Plan

Iron Bridge Inland Waters Plan

Environment

17 April 2025

IB-0000-PL-EN-0004

Rev A

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EXECUTIVE SUMMARY

State legislation		
Proponent name	FMG Iron Bridge (Aust) Pty Ltd	
Proposal name	North Star Magnetite Project North Star Magnetite Project Extension	
Ministerial number	MS 993	
Purpose of EMP	Provide monitoring and management measures for the environmental values of inland waters within, and adjacent to, the North Star Magnetite Project.	
Key environmental factor/s	Inland Waters "*To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*"	
Outcomes	**IW- 1 (1):** Avoid direct disturbance and have no impacts to pools Mundagoora Pool and Site 12 pools within the development envelope. **IW- 1 (2):** No impacts to pools Pool_SW, NJA19-002, and NJA19-004, outside of the development envelope. **IW-1 (3):** No impacts to surface water quality within Strelley River, Shaw River and Turner River catchments. **IW-3 (1):** No impacts to surface water hydrological regime 11 km downstream of the Proposed Amendment area in Shaw River catchment. **IW-3 (2):** No impacts to surface water hydrological regime 9 km downstream of the Proposed Amendment area in Turner River catchment.	
Operation / construction date	The North Star Magnetite Project (MS 993) became operational in 2023. Construction of the North Star Magnetite Project Extension is expected 2026.	
Commonwealth legislation		
Proponent name	FMG Iron Bridge (Aust) Pty Ltd	
ACN	78 150 848 025	
Project name	North Star Magnetite Project	North Star Magnetite Project Extension
Instrument number	EPBC 2012/6689	EPBC 2023/9466 (under assessment)
Proposed action	To develop a magnetite iron ore mine approximately 110 km south of Port Hedland in the Pilbara region, and associated borefield in the Canning Basin, Western Australia.	The proposed action is an extension of the approved proposal North Star Magnetite Project (EPBC 2012/6689). The proposed action consists of an extension of the Mine Development Envelope to develop new mine pits, an extension of the waste rock dump and development of additional ancillary infrastructure. The total disturbance for the proposed action is 606.9 ha.
Location of the action	Iron Bridge Mine, Pilbara, Western Australia	
EMP preparation date	April 2025	
Declaration of accuracy	In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I	

	have no knowledge of that authorisation being revoked at the time of making this declaration. Signature/date: Name: Jarrod Pittson Role: Group Manager Environment and Closure Organisation: Fortescue Ltd

1 INTRODUCTION

1.1 Purpose

The purpose of this *Inland Waters Plan* (the Plan) is to provide monitoring and management measures for the environmental values of inland waters within, and adjacent to, the North Star Magnetite Project.

1.2 Proposal

Fortescue Ltd (Fortescue) is an integrated green technology, energy, and metals company. The mining assets in the Pilbara region of Western Australia comprises of mine, rail, and port operations. An unincorporated joint venture between subsidiary group FMG Iron Bridge (Aust) Pty Ltd and Formosa Steel IB Pty Ltd (Formosa) operates the North Star Magnetite Project (the Project).

The Project is located approximately 110 kilometres southeast of Port Hedland in the Pilbara region of Western Australia. The Project comprises of:

- Approved proposal under Ministerial Statement 993 (MS 993) of an open cut magnetite iron ore mine and associated infrastructure, including roads, administrative buildings, accommodation camp, aerodrome, borefield, slurry and raw water pipelines and an auxiliary power station. The approved works include clearing of 5,371 hectares of vegetation. Construction for the Project was initiated in August 2019 and operations commenced in May 2023.The mine life is expected to be 50 years.

- Proposed amendment of MS 993: Referral of the significant amendment for the Project in 2022 included extension of the Mine Development Envelope for additional pits, extension of the waste rock dump, ancillary infrastructure, increased abstraction by the near mine borefield to a rate of up to 3.5GL/a, and an additional 606.9 hectares of clearing.

1.3 Legislative context and definitions

Fortescue employees and contractors are obliged to comply with all relevant environmental Commonwealth and State legislation. Environment legislation directly relevant to this Plan is provided in Appendix A.

Definitions of terms and acronyms used throughout this Plan are provided in Appendix B.

1.4 Key environmental factors

This Plan addresses the key environmental factors relevant to the Project, including:

- Environmental Protection Authority's (EPA's) objective for the key environmental factors of Inland Waters "*to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*"

- Matters of National Environmental Significant under the *Environmental Protection and Biodiversity Conservation Act* 1999, specifically national threatened species and ecological communities (i.e. Pilbara Olive Python and habitat at Site 12 Pool and Mundagoora Pool).

1.5 Condition requirements

The proposed amendment is currently being assessed through an Environmental Review Document (ERD) under Part IV of the *Environmental Protection Act* 1986 (EP Act). This Plan outlines the Fortescue's approach to inland waters and has been prepared to provide supporting information to this application. Condition requirements have not yet been issued.

1.6 Rationale

This Plan adopts outcome-based provisions. Outcome-based provisions relate to environmental monitoring and hydrological assessment and are applied when sufficient information exists to establish and evaluate specific measurable outcomes.

Outcomes-based provisions have been selected as the data (i.e. disturbed areas, ecosystem health, water quality, water levels) is easily measurable and reportable. The trigger criteria has been set for each of the outcomes at a conservative level to warn the approach towards the threshold criteria. This allows for actions to be implemented in advance to reduce the risk of exceeding the threshold criteria and compromising the environmental outcome.

1.7 Approach

Several hydrological and hydrogeological assessments have been completed for the Project as part of the *North Star Magnetite Project Public Environmental Review (*Assessment number 1946; Report 1514) and for the referral of the *North Star Magnetite Project Extension*, including:

- *Site 12 Pool Water Quality and Quantity Monitoring Plan* (Fortescue, 2021)
- *North Star Extension – Site 12 Pool Hydrogeological Assessment Report* (Fortescue, 2023)
- *Iron Bridge: Surface Water Monitoring and Aquatic Ecology Survey Baseline Report Late Wet 2019/2020 to Late WET 2023* (Hydrobiology, 2023)
- *North Star and Glacier Valley Magnetite Project – Subsurface Materials Characterisation* (SRK Consulting, 2021)

- *Section 38: Significant Amendment to Approved Proposal - the North Star Project - Environmental Review Document. Iron Bridge Hydrogeological Investigation Summary- 662NS-0000-MU-HY-0001* (Fortescue, 2022)
- *Iron Bridge Mine Area Hydrogeological Assessment* (Fortescue, 2023)
- *North Star Extension: Potential impacts to groundwater recharge from changes in surface water flow* (Fortescue, 2023)
- *Site 12 Pool – Water Quantity Assessment and Management* (Fortescue, 2023)
- *North Star Extension – Proposed Groundwater Management Memo* (Fortescue, 2023)
- *North Star Magnetite Project Extension – Baseline Hydrology Report* (Worley, 2024)
- *North Star Magnetite Project Extension – Hydrological Impact Assessment Report: Waterways* (Worley, 2024)
- *North Star Extension – Proposed Groundwater Management Memo* (Fortescue, 2023).
- *NSE PER Inland Waters – Pools Characterisation* (Hydrobiology, 2025).

For the purposes of this Plan, inland water features include freshwater pools (Table 1) and the Shaw River and Turner River catchments.

Due to the complexity of the hydrological and environmental conditions at the site, the use of single parameters to indicate potential detrimental harm may not be representative, therefore multiple lines of evidence has been used for the monitoring approach. This approach is supported by ANZG (2018a). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality and ANZG* (2018b) *Guidance Document for Assessing and Managing Water Quality in Temporary Waters*. The primary monitoring parameters for analyses are surface water elevation and surface water quality. Supplementary monitoring parameters will be collected and analysed in the event of the primary monitoring parameters have been identified as potential development impact.

Table 1: Summary of environmental values and baseline data for Pools located within and adjacent to Project

Name	Hydrology and environmental setting	Water quality	Ecology	Baseline data	Primary water source	Rationale
Mundagoora	Located approximately 1 km downstream of the Proposed Amendment northern open cut pit, Mundagoora Pool (previously referred as South Star Pool, or Pool SS) has a catchment area of 3.3 km^2 and is located within Heritage Place NJA16-019. Discharge from Mundagoora Pool flows to Cockatoo Creek and eventually to the Turner River. Mundagoora Pool is a relatively deep, permanent pool located at the base of an intermittent waterfall which appears to only flow during high rainfall events. The pool water level is controlled by a sill at the downstream edge. Hydrobiology (2023) consider the pool is largely sustained by groundwater as water levels remain relatively consistent within the pool with the exception of short duration peaks following significant rainfall events. The pool contains a hard bottom (rock) at the inflow point, likely to be scoured out during high-flow events. Groundwater inflows sustain a constant discharge from the pool downstream, which in turn sustains a wetland dominated by dense reeds and sedges. The wetland extends downstream along a shallow braided channel for several hundred metres. Logged data indicates the pool is largely sustained by groundwater with periodic flushing by fresh surface water flows after rainfall events. Following a flushing event, it takes approximately 3 weeks for the groundwater to displace captured surface water.	Mean physico-chemical parameters (n=6) show the pool is slightly brackish (876.28 µS/cm) and near neutral (pH 7.3) however during a surface water flow event the pool is likely to become fresh. The pool is a clear water pool with low average turbidity (1.94 NTU) and moderate oxygenation (6.37 mg/L DO). Average TN, TP, Nitrate and Nitrite were above ANZG (2018) DGVs for 95% species protection. However, all average metals were below ANZG (2018) DGVs and predominantly below detection limits. Chromium exceeded ANZG (2018) DGVs in all sediment samples analysed (n=5), reflecting naturally elevated chromium in soils within the area. Nickel also exceeded DGVs in all samples and copper exceeded DGVs in two samples.	Mundagoora Pool is considered to have high ecological value and supports an abundance of fish, macroinvertebrates, extensive beds of macrophytes and riparian vegetation. Fauna associated with wetland environments (e.g. fishing birds) and other fauna such as kangaroo and dingoes have been recorded using the wetland sustained by Mundagoora Pool. Mundagoora Pool is of conservation significance given it provides a permanent water source throughout the dry season, supports a large number of terrestrial and aquatic taxa within the pool and associated wetland and provides preferred habitat for the Pilbara Olive Python (permanent water surrounded by rocky terrain and spinifex) (Tutt et al., 2004 as cited in Hydrobiology, 2023).	Water level loggers installed late dry, December 2019; Aquatic ecology commenced late wet 2020, May 2020.	Bedrock aquiclude - groundwater discharge	It is unlikely that the Proposed amendment and approved proposal will have significant hydrological impact to Mungagoora Pool. Mitigation measures have been put in place to manage the potential impacts to the Pool. The outcome of “Avoid direct disturbance and have no impacts to pools Mundagoora Pool and Site 12 pools within the development envelope” is proposed to monitor impacts to quality and ecological parameters.
Site 12	Site 12 Pool is one of a series of shallow pools, spanning an approximate 650 m reach and an area of 1,266 m^2, that lies to the north-east of the Proposed Amendment on a small tributary to the upper Six Mile Creek. The catchment area above the pool is 7.4 km^2 and a very small portion of the Proposed Amendment WRD extension extends into the top of the catchment. The pool is a shallow bedrock supported habitat which represents surface expression of groundwater. It is therefore frequently perennial, though it has been known to dry out following lower than average wet seasons (pools were dry during the 2015, 2016, 2020 and 2022 dry seasons). It is unknown whether the larger pools downstream of the Site 12 Pool monitored as part of the surface water quality program, dry out at the same frequency as the Site 12 Pool as they are not accessed regularly due to heritage restrictions. The hydrology is connected to both surface and groundwater sources with the pool sustained by groundwater until the underlying aquifer drops below the base of the pool in the late dry season. The pools are periodically flushed with fresh surface water during rain events, with groundwater replacing surface water within 2−3 weeks. Most pools are shallow with the deepest being approximately 2.5 m. The total volume of the pools is estimated to be 2,532 m^3.	Water is generally clear (mean turbidity, 1.2 NTU), well oxygenated (mean DO, 8.14 mg/L) and is classified as a magnesium-bicarbonate dominated water with low sulphates. Mean physico-chemical parameters (n=6) indicate water is alkaline (pH 8.4) and slightly brackish (1,399.29 µS/cm). However, similar to other pools in the local area and indeed the region, pool water quality is known to vary seasonally in response to climatic conditions, with the greatest variability occurring after a rainfall event. During a flushing event pool water quality temporarily transitions from slightly brackish to extremely fresh (<100 µS/cm) and turbidity increases. Water quality changes somewhat as a result of evapo-concentration as pools recede over the dry season. Mean nutrients (TN and TP) are above ANZG (2018) DGVs for 95% species protection. Mean metals concentrations for all analysed metals were below respective DGVs, however maximum measured copper and zinc concentrations exceed DGVs. All measured chromium and nickel concentrations in sediment (n=4) exceeded ANZG DGVs, reflecting natural mineralisation within the area.	The Site 12 Pool is fresh to brackish and occurs within a predominantly bedrock habitat, providing habitat for a diverse range of fauna and flora, including the EPBC Act listed Pilbara Olive Python, Northern Quoll and Pilbara Leaf-nosed Bat. The Dinner-plate Turtle (Chelodina steindachneri), a species endemic to Western Australia and one of the least known Australian turtles has also been sighted at the pool. The series of pools at Site 12 are therefore considered to have significant environmental value and are subject to an existing Water Quality and Quantity Monitoring Plan (WQQMP) conditioned under MS 933 for the Approved Proposal. Riparian vegetation upstream of the pools acts as both a filter for sediments and a moderator of flows. The pool also supports a diverse range of macroinvertebrates, algal communities, macrophytes. Three species of native fish, (*Melanotaenia australis* (Western Rainbowfish), *Leiopotherapon unicolor* (Spangled Perch) and *Neosilurus hyrtlii* (Hyrtl’s Catfish) fish have been observed in abundance and at various life stage indicating the site is an important habitat exploited by these species. Given the naturally elevated copper concentrations in the pools, freshwater fish here have likely adapted to surviving in naturally higher copper content waters. Burrowing toadlets (*Uperoleia* sp.) a genus that typically inhabits rocky creeks have also been observed.	Water level loggers installed and first aquatic ecology commenced late wet 2020, May 2020.	Bedrock aquiclude - groundwater discharge	The Approved Proposal remains the main contributing risk to Site 12 Pool. The existing outcome that has been applied in the approved *Site 12 Pool Water Quality and Quantity Monitoring Plan* (662MI-5700-PL-WM-0001) of “Implementation of the Project will not cause a detrimental impact on the water quality or hydrological regime within the catchment of Site 12 Pool located in the MDE” has been revised to “Avoid direct disturbance and have no impacts to pools Mundagoora Pool and Site 12 pools within the development envelope”. The intent of no impact to the Site 12 Pool remains with the updated outcome.

Name	Hydrology and environmental setting	Water quality	Ecology	Baseline data	Primary water source	Rationale
Pool_SW	Pool_GR occurs on a creek line that descends through a small gorge from the top of the Glacier Valley escarpment and has a relatively small catchment of 0.72 km^2. It is a semi-permanent plunge pool with a bedrock foundation and is likely to display similar water quality and ecological characteristics as the ephemeral GV_SW_Pool_SW and GV_SW_Pool_NJS21-006_US Pools, with seasonal wet season flows filling the pool with water presence potentially persisting into the early dry season. The creek line and Pool_GR discharge into Mundagoora Pool. The pool was first captured in the surface water and aquatic ecology monitoring program in June 2023. It had a depth of 0.65 m, though it appears to fill to 2−3 m following surface runoff events as indicated by surrounding rock colouration. Pool_GR falls within the mine footprint and it is therefore proposed to be removed during mining.	Field measurements recorded at the pool in June 2023 show a slightly acidic pH (5.90), very low salinity (EC 91.6 uS/cm) and moderate dissolved oxygen (4.46 mg/L). Laboratory results indicate all metals except zinc were velow the 95% species protection level ANZ (2018) DGVs. TN and TP levels were also above the ANZ (2018) DGVs. High presence of algae and slight green colour of the pool during site visit corroborate these results.	Low ecological value. The semi-permanent nature of Pool_GR provides habitat for various macroinvertebrates (particularly those species with airborne life stages) and small animals such as reptiles and birds. Due to the pool's elevation and presence of rock barriers, upstream migration of fish is unlikely, thereby limiting a food source for other animals in the area. While both Northern Quoll and Pilbara Olive Python have been recorded at Pool_GR during surveys conducted in 2012, they have also been recorded at nearby Site 12 and Cow Spring Pools indicating Pool_GR is not a sole refuge for these conservation significant species. Mundagoora Pool is also located nearby and provides suitable habitat for the Pilbara Olive Python due to more extensive and permanent aquatic features.	Added to the surface water and aquatic ecology monitoring program in June 2023.	Bedrock - perched water	The approved and proposed amendment is not expected to result in significant hydrological impacts to the Pool. The outcome of "No impacts to pools Pool_SW, NJA19-002, and NJA19-004 outside of the development envelope" is proposed with the triggers and threshold criteria related to no pit flood response discharge to the pool.
NJA19-002	NJA19_002 is a small ephemeral pool located above bedrock approximately 2.8 km south-west of NJA_006_US and within an identified Heritage Place (NJA19_002).. NJA19_002 is positioned against a cliff face within the upper catchment of NJA21_006_US on the eastern face of the Glacier Valley ridgeline. No disturbance is proposed within the small catchment (0.74 km^2) that feeds NJA19-002. Similar to NJA_006_US, the pool is filled by surface water runoff following significant storm events during the wet season, with water retained into the late dry season. During the wet season 2022, the pool recorded a maximum height of 1.59 m with water levels slowly declining during the dry season so that a shallow pool remained (<0.2 m) during the late dry season survey. Although the pool lies proximal to the Proposed Amendment, it is unlikely to be impacted as the disturbance footprint does not intersect the pool catchment and no indirect impacts have been identified.	Due to the small size and ephemeral nature of the pool there has been insufficient water present to collect a representative sample to date when visited. Water quality characteristics are likely similar to NJA_006_US given the similar environmental setting (situated above bedrock, high in the catchment) and will vary over time depending on the hydrocycle.	Low ecological value. No fish have been observed within the pool and macrophytes have also not been present. The ecology of NJA19_002 is again likely to be similar to those observed at NJA21_006_US due to the similar hydrology and environmental setting. '*Like NJA21-006-US, the longer residency of water in the pool will allow for the completion of aquatic fauna life stages for macroinvertebrates and various frog species that have been observed in the pool; however, the pool is not considered a significant ecosystem and is unlikely to be a refuge for any conservation-listed fauna'* (Hydrobiology, 2023).	Pools added to the surface water monitoring program in the late dry 2021; Water level loggers installed Q3 2021; these are small ephemeral pools, which do not support substantive aquatic ecosystems and therefore have not supported detailed aquatic ecology survey.	Bedrock - Surface water and fracture flow groundwater sources	The hydrological regime of these pools will not be impacted by the Proposed Amendment or Approved Proposal as the waste dump development is located out of the catchment of the pools. The outcome of "No impacts to pools Pool_SW, NJA19-002, and NJA19-004 outside of the development envelope" is proposed with the trigger and threshold related to disturbance within these pool catchments.
NJA19-004	NJA19_004 is a small ephemeral pool located on the eastern face of the Glacier Valley ridgeline and within Heritage Place NJA19-004. No development associated with the Proposed Amendment is located within the pool catchment (0.2 km^2). Similar to NJA19_002 the pools overlies bedrock and fills rapidly following significant runoff events, though in this case water residency time is shorter with the pool rapidly drying out. Similar to NJA19_002, although the pool lies proximal to the Proposed Amendment, it is unlikely to be impacted by the Proposed Amendment as the disturbance footprint does not intersect the catchment and there are no identified indirect impacts.	One water quality sample collected in the late 2022 wet season from a pool approximately 20 m upstream of the NJA19_004 Pool. Water from this pool was found to be fresh (228 µS/cm), slightly alkaline (pH of 8.62), oxygenated (DO 7.08 mg/L) and slightly turbid (6.75 Nephelometric Turbidity unit (NTU) turbidity).	Low ecological value. The pool has surrounding riparian vegetation, though no macrophytes have been observed as the pool has been dry when visited. Ecological assessments have been limited due to the absence of water when visited. No fish or macrophytes were observed in the proxy pool located 20 m upstream of NJA19_004 when visited in the late 2022 wet season. The highly ephemeral nature of the pool and short water residency times indicate that though local terrestrial fauna, including birds would utilise the pool when water is available, there have been no recordings of conservation significant fauna and it is unlikely to provide a refuge for listed fauna. Pool NJA19_004 is therefore not considered a significant ecosystem.		Bedrock - Surface water and fracture flow groundwater sources	

Key assumptions and uncertainties for inland waters include:

- Baseline surveys have provided a representative degree of variability (e.g. seasons and years) in the natural system.
- Trigger criteria adequately detect declining water quality that encompass the range of potential impact mechanisms.
- Ecological parameters adequately detect declining aquatic ecosystem functionality and thereby detect loss of key environmental values. Substantial decreases in water levels and the natural drying process of the pool (i.e., not a Project related impact) are expected to impact significantly on the ecological health of pools due to evapo-concentration increasing environmental stressors (e.g., salinity) or lower water levels reducing available habitat.
- Trigger and threshold criteria are derived from site-specific values in accordance with ANZG (2018), and as such may reflect the upper ranges (predominantly, 80th percentile for trigger criteria, and 95th percentile for threshold criteria) of baseline variation within reference sites rather than levels at which increased toxicity and/or increased risk to the ecosystem may occur per se.

2 PLAN COMPONENTS

A series of outcomes (refer to Table 2) have been developed to mitigate environmental impacts on inland waters that could potentially be caused by Fortescue's activities.

Table 2: Environmental outcomes provision table

EPA Factor and objective: Inland Waters "*To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*"
Proposal: North Star Magnetite Project (Assessment number APP-0012119), North Star Magnetite Project (EPBC 2012/6689) and North Star Magnetite Project Extension (EPBC 2023/9466) (under assessment)
Outcomes:

- **IW- 1 (1):** Avoid direct disturbance and have no impacts to pools Mundagoora Pool and Site 12 Pool within the development envelope.
- **IW- 1 (2):** No impacts to pools Pool_SW, NJA19-002, and NJA19-004 outside of the development envelope.
- **IW-1 (3):** No impacts to surface water quality within Strelley River, Shaw River and Turner River catchments.
- **IW-3 (1):** No impacts to surface water hydrological regime 11 km downstream of the Proposed Amendment area in Shaw River catchment.
- **IW-3 (2):** No impacts to surface water hydrological regime 9 km downstream of the Proposed Amendment area in Turner River catchment.

Key Environmental Values: Conservation significant fauna and their critical habitats; Water dependent systems; Conservation Significant Vegetation and Flora; Social Surrounds
Key Impacts and Risks: surface water flows alteration and changes to quality, changes to hydrological regime, groundwater drawdown, groundwater quantity and quality

Environmental criteria	Response actions	Monitoring	Reporting
Outcome IW- 1 (1): Avoid direct disturbance and have no impacts to pools Mundagoora Pool and Site 12 Pool within the development envelope.			
Trigger criteria: Direct disturbance[1] within 15 m of Mundagoora or Site 12 Pool. **Threshold criteria:** Direct disturbance[1] within Mundagoora or Site 12 Pool.	**Trigger actions** • Review future proposed clearing areas to ensure threshold criteria is not exceeded. • Review existing LUCs in system and do not approve any future LUCs to ensure threshold criteria is not exceeded. **Threshold actions** • Ground truth the direct clearing to validate extent of clearing and cause. **Once the direct clearing has been validated:** • Where the direct clearing was caused by construction, operation, or decommissioning activities: o Review the LUC process and implement any further measures including changes to the process to reduce the potential for clearing outside approved areas. o Implement actions to remediate/rehabilitate the clearing where possible. • Where the direct clearing was not caused by construction, operation, or decommissioning activities: o No further action required.	Reconciliation of disturbance data with the respective year's aerial imagery **Timing:** March **Frequency:** Annually	**Annual reporting** Annual Compliance Assessment Reports (CAR) are required to be submitted in accordance with Condition 4-6 of MS 993 and EPA's *Post Assessment Guideline for Preparing a Compliance Assessment Report* (CAR), Post Assessment Guideline No. 2. In the event that a trigger/threshold criteria was exceeded during the reporting period, the CAR will include a description of the effectiveness of the contingency actions implemented to manage the impact and any adaptive management measures applied as a result of the exceedance. **Potential non-compliance reporting** When an exceedance of a Threshold criteria has occurred, Fortescue will, in accordance with Condition 4-5 of MS 993: • Report the potential non-compliance to the DWER within 7 days of the exceedance being identified.
Early response criteria: An exceedance of Early Response Trigger Levels (Table 4) attributable to the Amended Proposal. **Trigger criteria:** Ecological parameters (Table 5) met for Moderate or High Risk categories and attributable to the Amended Proposal. **Threshold criteria:** Ecological parameters (Table 5) met for either: • ≥2 High Risk	**Early response criteria** • Re-examine water quality results by checking the QA/QC sample result is consistent and ensuring correct calibration of sampling equipment. • Resample and reassess to confirm the exceedance. This will also help to establish if the parameter in exceedance is increasing or decreasing in the timeframe since previous sampling. • Check Project related operations that have the potential to impact the water quantity and / or quality. • Investigate trends at location with exceedance and across regional unimpacted reference sites. This may include: o Assess water level data from loggers located at upstream and downstream locations of the Pool. o Check Pool water quality relative to water quality from recent and baseline concentrations at upstream and downstream locations of the Pool. This may include water quality from first flush sampling collected using rising stage samplers. o Review water quality and levels across Iron Bridge pools for evidence of a spatial trend across the region. • If two consecutive monitoring events exceed trigger criteria, identify potential causes and propose additional sampling investigations (I.e., ecotoxicity tests, tissue metals study) for the next annual monitoring event. • Continue the above until levels return to below trigger criteria. **Trigger actions:** • Review sampling procedure, laboratory QA/QC, and results from other monitoring locations to assess the potential cause. • If the exceedance is a one-off event with no visible spatial / temporal trend, continue monitoring as normal. If a trend is apparent, consider resampling during current wet season (if practical).	**Monitoring** Pool water quality (Physicals, Nutrients, Ions, Metal suite) Ecosystem health, when water is present Refer to Table 3 Item 1 and 2	

[1] No direct disturbance permitted unless for low level impact activities associated with monitoring and management only (e.g. installation of monitoring bores or surface water management controls).

Environmental criteria	Response actions	Monitoring	Reporting
• ≥2 Moderate Risk and ≥1 High Risk • ≥3 Moderate Risk	• If two consecutive monitoring events exceed trigger criteria, identify potential causes and propose additional sampling investigations (I.e., ecotoxicity tests, tissue metals study) for the next annual monitoring event. • Investigate potential causes of the exceedance and practical mitigation measures. • If three consecutive monitoring events exceed trigger criteria and additional sampling investigations suggests the Project as cause, implement mitigation measures and consider remedial actions if at risk of threshold exceedance. • Continue the above until levels return to below trigger criteria. **Threshold actions:** • Review sampling procedure, laboratory QA/QC, and results from other monitoring locations to assess the potential cause. • Investigate the cause of the threshold criteria exceedance and engage environmental specialist (I.e., aquatic ecologist) to investigate potential environmental harm and / or alteration of the environment. • Undertake repeat sampling during current wet season, where practicable (i.e., if conditions are correct and sampling is possible). • For a confirmed threshold exceedance caused by Project operations, implement controls onsite to reduce levels as soon as practicable and repeat sampling as soon as possible with additional investigation sampling including biomarkers (I.e., fish tissue metal study, ecotoxicity tests). Consider remedial actions. • For a repeat threshold exceedance implement controls onsite (I.e., case-specific Pool Recovery Plan) to reduce levels as soon as practicable and continue sampling investigation (I.e., ecotoxicity tests, tissue metals study). • Continue the above until levels return to below threshold criteria for two consecutive sampling events, or as determined by the case specific Pool Recovery Plan, and DWER has confirmed in writing that the threshold criteria are being met. • Identify measures to prevent the threshold criteria being exceeded in the future.		
Outcome IW- 1 (2): No impacts to pools Pool_SW, NJA19-002, and NJA19-004 outside of the development envelope.			
Trigger/Threshold criteria: No pit flood response discharge to Pool_SW	**Trigger/Threshold actions** • Ground truth the presence of pipeline if identified through aerial imagery. **Once the presence has been validated:** • As soon as practicable remove the pipeline so that pit flood water is not discharged into Pool_SW. • Investigate the cause of the threshold criteria being triggered and undertake corrective actions to ensure that the event can not occur again. • Review the LUC process and implement any further measures including changes to the process. • If a pit flood discharge event has occurred, undertake monitoring of surface water as soon as practicable after the event to determine environmental harm or alteration of the environment that may have occurred. If impacts have occurred undertake remedial actions.	Reconciliation of disturbance data with the respective year's aerial imagery **Timing:** March **Frequency:** Annually Visual inspection **Frequency**: Biannually	**Annual reporting** Annual Compliance Assessment Reports (CAR) are required to be submitted in accordance with Condition 4-6 of MS 993 and EPA's *Post Assessment Guideline for Preparing a Compliance Assessment Report* (CAR), Post Assessment Guideline No. 2. In the event that a trigger/threshold criteria was exceeded during the reporting period, the CAR will include a description of the effectiveness of the contingency actions implemented to manage the impact and any adaptive management measures applied as a result of the exceedance. **Potential non-compliance reporting** When an exceedance of a Threshold criteria has occurred, Fortescue will, in accordance with Condition 4-5 of MS 993: Report the potential non-compliance to the DWER within 7 days of the exceedance being identified.
Trigger criteria: Direct disturbance[1] within 15 m of the NJA19-002 and/or NJA19-004 pool catchment. **Threshold criteria:** Direct disturbance[1] within NJA19-002 and/or NJA19-004 pool catchment	**Trigger actions** • Review future proposed clearing areas to ensure threshold criteria is not exceeded. • Review existing LUCs in system and do not approve any future LUCs to ensure threshold criteria is not exceeded. **Threshold actions** • Ground truth the direct clearing to validate extent of clearing and cause. **Once the direct clearing has been validated:** • Where the direct clearing was caused by construction, operation, or decommissioning activities: o Review the LUC process and implement any further measures including changes to the process to reduce the potential for clearing outside approved areas. o Implement actions to remediate/rehabilitate the clearing where possible. • Where the direct clearing was not caused by construction, operation, or decommissioning activities: o No further action required.	Reconciliation of disturbance data with the respective year's aerial imagery **Timing:** March **Frequency:** Annually	

Environmental criteria	Response actions	Monitoring	Reporting
Outcome IW-1 (3): No impacts to surface water quality within Strelley River, Shaw River and Turner River catchments.			
Trigger criteria: Discharge to Strelley River, Shaw River and/or Turner River catchments exceeds trigger criteria[2]. **Threshold criteria:** Discharge to Strelley River, Shaw River and/or Turner River catchments exceeds threshold criteria[Error! Bookmark not defined.].	**Trigger actions** • Re-examine water quality results by checking the QA/QC sample result is consistent and ensuring correct calibration of sampling equipment. • Resample and reassess to confirm the exceedance. This will also help to establish if the parameter in exceedance is increasing or decreasing in the timeframe since previous sampling. • Check Project related operations that have the potential to impact the water quantity and / or quality. • Investigate spatial trends upstream of River catchment, and across regional unimpacted reference sites. This may include: o Assess water level data from loggers located at upstream and downstream locations. o Check water quality relative to water quality from recent and baseline concentrations at upstream and downstream locations. o Review water quality and levels across Iron Bridge for evidence of a spatial trend across the region. • If two consecutive monitoring events exceed trigger criteria, identify potential causes and propose additional sampling investigations (I.e., ecotoxicity tests, tissue metals study) for the next annual monitoring event. • Continue the above until levels return to below trigger criteria. **Threshold actions** • Re-examine water quality results by checking the QA/QC sample result is consistent and ensuring correct calibration of sampling equipment. • Investigate the cause of the threshold criteria exceedance and determine any environmental harm or alteration of the environment that may have occurred. • Check Project related operations that have the potential to impact the water quantity and / or quality. • Investigate spatial trends upstream of River catchment, and across regional unimpacted reference sites. This may include: o Assess water level data from loggers located at upstream and downstream locations. o Check water quality relative to water quality from recent and baseline concentrations at upstream and downstream locations. o Review water quality and levels across Iron Bridge for evidence of a spatial trend across the region. • Resample location and conduct sampling investigation. • Identify measures to prevent the threshold criteria being exceeded in the future.	**Monitoring** Surface water level and quality (Physicals, Nutrients, Ions, Metal suite, AMD suite), when water is present Refer to Table 3 Item 3 **Timing/ Frequency:** Event based, following flood pit response	**Annual reporting** Annual Compliance Assessment Reports (CAR) are required to be submitted in accordance with Condition 4-6 of MS 993 and EPA's *Post Assessment Guideline for Preparing a Compliance Assessment Report* (CAR), Post Assessment Guideline No. 2. In the event that a trigger/threshold criteria was exceeded during the reporting period, the CAR will include a description of the effectiveness of the contingency actions implemented to manage the impact and any adaptive management measures applied as a result of the exceedance. **Potential non-compliance reporting** When an exceedance of a Threshold criteria has occurred, Fortescue will, in accordance with Condition 4-5 of MS 993: • Report the potential non-compliance to the DWER within 7 days of the exceedance being identified.
Outcome IW-3 (1): No impacts to surface water hydrological regime 11 km downstream of the Proposed Amendment area in Shaw River catchment.			
Trigger criteria: Removal of 2.5 km² of surface water catchment contributing to Shaw River attributed amended Proposal. **Threshold criteria:** Removal of 3.2 km² of surface water catchment contributing to Shaw River attributed amended Proposal.	**Trigger actions** Review future proposed clearing areas to ensure threshold criteria is not exceeded. Review existing LUCs in system and do not approve any future LUCs to ensure threshold criteria is not exceeded. **Threshold actions** Ground truth the direct clearing to validate extent of clearing and cause. **Once the direct clearing has been validated:** • Where the direct clearing was caused by construction, operation, or decommissioning activities: o Review the LUC process and implement any further measures including changes to the process to reduce the potential for clearing outside approved areas. o Implement actions to remediate/rehabilitate the clearing where possible. • Where the direct clearing was not caused by construction, operation, or decommissioning activities: o No further action required.	Reconciliation of disturbance data with the respective year's aerial imagery **Timing:** March **Frequency:** Annually	**Annual reporting** Annual Compliance Assessment Reports (CAR) are required to be submitted in accordance with Condition 4-6 of MS 993 and EPA's *Post Assessment Guideline for Preparing a Compliance Assessment Report* (CAR), Post Assessment Guideline No. 2. In the event that a trigger/threshold criteria was exceeded during the reporting period, the CAR will include a description of the effectiveness of the contingency actions implemented to manage the impact and any adaptive management measures applied as a result of the exceedance. **Potential non-compliance reporting** When an exceedance of a Threshold criteria has occurred, Fortescue will, in accordance with Condition 4-5 of MS 993:

[2] Site specific water quality parameters are derived from baseline data with seasonal 80th percentile calculated for each analyte as a conservative value for trigger criteria and 95th percentile calculated for each analyte for threshold criteria. Baseline data is still being collected for due to the ephemeral nature of pools.

Environmental criteria	Response actions	Monitoring	Reporting
			• Report the potential non-compliance to the DWER within 7 days of the exceedance being identified.
Outcome IW-3 (2): No impacts to surface water hydrological regime 9 km downstream of the Proposed Amendment area in Turner River catchment.			
Trigger criteria: Removal of 5 km² of surface water catchment contributing to Turner River Southern Tributary attributed amended Proposal. **Threshold criteria:** Removal of 6 km² of surface water catchment contributing to Turner River Southern Tributary attributed amended Proposal.	**Trigger actions** Review future proposed clearing areas to ensure threshold criteria is not exceeded. Review existing LUCs in system and do not approve any future LUCs to ensure threshold criteria is not exceeded. **Threshold actions** Ground truth the direct clearing to validate extent of clearing and cause. **Once the direct clearing has been validated:** • Where the direct clearing was caused by construction, operation, or decommissioning activities: o Review the LUC process and implement any further measures including changes to the process to reduce the potential for clearing outside approved areas. o Implement actions to remediate/rehabilitate the clearing where possible. • Where the direct clearing was not caused by construction, operation, or decommissioning activities: o No further action required.	Reconciliation of disturbance data with the respective year's aerial imagery **Timing:** March **Frequency:** Annually	**Annual reporting** Annual Compliance Assessment Reports (CAR) are required to be submitted in accordance with Condition 4-6 of MS 993 and EPA's *Post Assessment Guideline for Preparing a Compliance Assessment Report* (CAR), Post Assessment Guideline No. 2. In the event that a trigger/threshold criteria was exceeded during the reporting period, the CAR will include a description of the effectiveness of the contingency actions implemented to manage the impact and any adaptive management measures applied as a result of the exceedance. **Potential non-compliance reporting** When an exceedance of a Threshold criteria has occurred, Fortescue will, in accordance with Condition 4-5 of MS 993: • Report the potential non-compliance to the DWER within 7 days of the exceedance being identified.

2.1 Environmental impact

Potential direct and indirect impact to inland waters include:

- Loss of pools and/or alteration of surface water flows and quality through construction of open pits and infrastructure.
- Changes to surface water quality from increases in sediment load in surface water run-off and hydrocarbon and chemical spills.
- Alteration of surface water flows and quality through excess in-pit water discharge following major rainfall events.
- Reduction in groundwater quantity; reduced aquifer levels due to creation of open voids during mining and increased abstraction from the existing near-mine water supply borefield or dewatering bores.
- Changes to the hydrological regime of pools and water quality as a result of disturbance within pool catchments and/or increased abstraction from the existing near-mine water supply borefield.
- Poor quality seepage generated due to the exposure of potentially acid forming (PAF), metalliferous or non-acid forming (NAF) but saline leaching materials, enters the receiving surface and groundwater environment leading to a reduction of water quality.
- Changes to groundwater recharge from changes in surface water flows.
- Spills, leaks, or overflow of untreated effluent, hydrocarbons or chemicals resulting in contamination of surface water or groundwater and a reduction in water quality.

2.2 Environmental risk

2.2.1 Risk reviews

Fortescue actively manages risk by undertaking a risk assessment prior to relevant approval submissions to identify high risk areas where potential impacts are likely. Annual Environmental Risk Reviews are undertaken during construction and operations phase where all environmental risks are considered with a focus on high-risk impacts. The review considers the effectiveness of management actions that are currently in place for these impacts. The review also considers any relevant incidents that have occurred, if the actions from incident investigations have translated into new management actions and generally considers the need for any new management actions to ensure lower risk targets can be achieved.

2.2.2 Compliance

Fortescue ensures compliance with its legal obligations through first party quality assurance by site and corporate environment teams with a focus on effective environmental management through the implementation of the Fortescue wide Environmental Management System.

Fortescue has adopted a risk-based approach to monitor compliance with its legal obligations. Site environment teams will monitor their compliance with this Plan.

Where non-conformances occur, the incident will be reported in accordance with the *Incident Event Management Procedure* (45-PR-SA-0080) and implement reporting requirements and contingency actions defined in Table 2.

Non-conformance issues and/or opportunities for improvement identified will be documented and tracked via Fortescue's business management system.

3 MONITORING GUIDELINES

Table 3 provides a summary of the monitoring aspect, methods, monitoring parameters and frequency for inland waters monitored under this Plan.

To allow for comparisons of change over time moving monitoring sites should be avoided; however, on occasion, changes to operational plans (i.e., mine plan changes), land access (i.e., relinquishment of tenure / heritage constraints) or safety requirements (i.e., accessing areas at night), may require a change to monitoring locations. Any changes, and impacts of these, will be detailed in the annual monitoring report, and captured in the next revision of the management plan.

Monitoring parameters for includes water level and quality and are based on the requirements identified in:

- *Water Quality Protection Guidelines No. 11 Mining and Mineral Processing – Mine Dewatering* (DWER, 2000).
- *Australian and New Zealand guidelines for fresh and marine water quality* (ANZECC & ARMCANZ 2000).
- *Operational Policy no 5.12 – Hydrological reporting associated with a groundwater well licence* (DoW 2009).

Groundwater sampling should be conducted in accordance with the requirements of AS/NZS 5667.11:1998 *Water Quality – Sampling - Guidance on Sampling of Groundwaters*. Surface Water Sampling should be conducted in accordance with the AS/NZS 5667.1:1998 *Water Quality-Sampling-Guidance on the design of sampling programs, sampling techniques and preservation and handling of samples* and the Department of Water Field Sampling Guidelines: *A guideline for field sampling for surface water quality monitoring programs.*

Water samples will be analysed for the parameters by NATA accredited laboratories.

Innovations in monitoring techniques and methods should be incorporated into the program design over time. This would, however, be dependent on, and driven by, the quality and quantity of data collected from each site. Further, program design should be based on replicable sampling at potential impact and reference sites.

Table 3: Monitoring site locations

Ref	Area / aspect to be monitored	Monitoring sites	Parameter	Collection method	Frequency[3, 4]
1	Site 12 Pool[5]	IB_SW_Pool12_01 IB_SW_Pool12_Baro IB_SW_Pool12_USN IB_SW_Pool12_USW_RSS[6] IB_SW_Pool12_USS	Pool water level & upstream channel water level	Water loggers	Automatic logging 3 hour for pool and 15 minute for watercourse[7]
		NS-0664	Groundwater level	Water loggers	Automatic logging 3 hour
		IB_SW_Pool12_01 IB_SW_Pool12_USN IB_SW_Pool12_USW_RSS[6] IB_SW_Pool12_USS NS-0664	Dissolved oxygen (DO), pH, Electrical Conductivity (EC), Turbidity, Temperature	Field measurement	Monthly from November to April, Quarterly from May to October and/or event based[8].
		IB_SW_Pool12_01 IB_SW_Pool12_USN IB_SW_Pool12_USW_RSS[6] IB_SW_Pool12_USS	• TSS, TDS, TOC, DOC • **Nutrients**[9] - Total Nitrogen, Total Phosphorus, Nitrate+Nitrite (NOx as N), Total Kjeldahl Nitrogen: TKN, Ammonia/Ammonium • **Ions** - Total Alkalinity, Cl, F, Sulphate, Bicarbonate/ Carbonate, Ca, Mg, Na, K, Total Acidity SO4, Hardness • **Total and dissolved metals**[10] - Al, As, Cd, Cr, Cu, Fe, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V	Water samples for laboratory analysis	Monthly from November to April, Quarterly from May to October and/or event based[8].
		NS-0664	• **AMD suite**[11] - Ag, Bi, Ce, Cs, La, Mo, Rb, Sb, Sc, Sn, Sr, Th, Ti, Tl, U, W	Water samples for laboratory analysis	Quarterly
		IB_SW_Pool12_01	• **Ecological Monitoring Indicator** - Parameters • **Diatom community** - DSIAR scores and diversity • **Aquatic macroinvertebrate community** - EPT abundance index • **Fish community** - Presence/absence, Size structure • **Sediment quality** - Total Alkalinity, Total Acidity SO4, TSS, Nutrients (Total Nitrogen, Total Phosphorus, Nitrate+Nitrite (NOx as N), Total Kjeldahl Nitrogen: TKN), Ions (Cl, F, Ca, Mg, Na, K), total metals (As, Cd, Cr, Cu, Fe, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V), TOC • **Habitat assessment** - Wider habitat health • **Macrophyte diversity** - Presence/absence	Visual inspection and laboratory analysis for ecological monitoring • Diatom periphytometers: within 2 m of data logger • Fyke net: downstream 3 m from data logger • Sediment: northern edge of data logger cross section • Macrophytes: 50 m reach • Habitat Assessment: upper pools to downstream pools prior to downstream junction • Macroinvertebrates: southern and northern edge of channel at gorge entrance	Biannual, when water is present[12]

[3] Frequency will depend on accessibility to monitoring site. When it is determined to be unsafe to access the location due to high rainfall events etc. and the frequency timeframe is unable to be met, the sampling will be undertaken as soon as possible following the event. This will not be reported as a non-compliance with the Plan.
[4] The precise timing and frequency of field measurements and sample collection will depend on the presence of water at the monitoring locations. It may not be possible to collect measurements or samples in every event, as the sampling locations may be dry for several months of the year or in some instances, inaccessible. Monitoring locations will be checked at the frequencies outlined in above table and recorded as “dry” or “nil” if there is no water.
[5] Primary monitoring site for Site 12 Pool is IB_SW_Pool12_01, other monitoring sites are to provide supplementary information to support multiple lines of evidence
[6] Water quality impacts are expected to be limited upstream of Site 12 Pool once the WRD access road is extended to block the stream flow from WRD.
[7] Biannual data downloaded from data logger or when required.
[8] Event based is defined as rainfall that has resulted in visual streamflow across a floodway or down a designated river/pool/creek/stream. Monitoring following rainfall events will only be undertaken once it is considered safe to access monitoring site.
[9] TP, TN and NOx have a 28 day holding time, phosphate, nitrate and nitrite individually have a 2 day holding time. The remoteness of the site location prevents reliable laboratory delivery and analysis within less than 5 days (the laboratory recommendation is for samples to arrive at the lab with half the holding time remaining to allow for lab scheduling and processing).
[10] For sites in the waterways (IB_SW_Pool12_USN, IB_SW_Pool12_USW_RSS, IB_SW_Pool12_USS) while all dissolved metal parameters are required, total metal parameters only Cu, Hg, Zn are to be measured.
[11] AMD suits water quality analysis are applicable to the impacted waterways only (IB_SW_Pool12_USW_RSS, IB_SW_Pool12_USS)
[12] Biannual ecological surveys including water quality and sediment quality for laboratory analysis are conducted during the late-wet period (indicative February to April) and the dry periods (indicative September to November), only when water is present

Ref	Area / aspect to be monitored	Monitoring sites	Parameter	Collection method	Frequency[3, 4]
2	Mundagoora Pool	GV_SW_Pool_Mundagoora_SS	Surface water level and quality Physicals - pH, Temperature, Dissolved Oxygen (DO), Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Turbidity, Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC) Nutrients - Total Nitrogen, Total Phosphorus, Ammonia/Ammonium, Total Kjeldahl Nitrogen (TKN), Nitrate+Nitrite (NOx as N) Ions (major anions) - Total Alkalinity, Chloride, Fluoride, Sulphate, Bicarbonate/Carbonate Ions (major cations) - Calcium (Ca), Potassium (K), Magnesium (Mg), Sodium (Na), Total Acidity as CaCO3 Hardness Metal suite (dissolved) – Al, As, Cd, Cr, Cu, Fe, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V Metals suite (total) - Cu, Hg, Zn	Field Measurement using calibrated instruments Pressure transducers (water level)[13] Grab water samples	3hr automatic water level logging Biannually and/or event based
			Ecosystem health **Diatom community:** DSIAR scores and diversity **Aquatic macroinvertebrate community:** EPT abundance index **Fish community:** Presence/ absence, Size structure **Sediment quality:** Total Alkalinity, Total Acidity, SO4, Nutrients (nitrite, nitrate, phosphate), Ions (Cl, F, Ca, Mg, Na, K), total metals (As, Cd, Cr, Cu, Fe, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V), TOC **Habitat assessment:** Wider habitat health • **Macrophyte diversity:** Presence/absence	Diatom plates (periphytometers) Sweep nets Fyke nets Sediment sampling Visual inspection of habitat Quality / health record on habitat sheet Visual inspection of habitat Habitat sheet	Biannually
3	Strelley River, Shaw River and Turner River –downstream of development areas (Potential impact waterways)	IB_SW_Pool_Central Ck GV_SW_Pool_NJA21-006_DS	Surface water level and quality (Physicals, Nutrients, Ions, Metal suite, AMD suite)	Field Measurement using calibrated instruments	Event based, following flood pit response
4	Centroid, upper reaches of rainfall catchment. On high ground away from buildings, vegetation etc.	Nate Tower	Rainfall	Local weather stations including Nate Communication Tower and Met Station at the aerodome Tipping bucket rain gauge	Continuous

[13] Pressure Transducers have been and will continue to be installed at all surface water level monitoring locations. The sensors will allow for collection of a time series of water levels.

Table 4: Early response trigger level

Parameter	Unit	Wet season – Site 12 Pool	Dry season – Site 12 Pool	Mundagoora Pool
pH	-	<6.5 >9.0	<6.5 >9.0	<6.5 >8.5
Electrical conductivity (SPC)	µs/cm	>1854	>1517	>1000
Turbidity	NTU	>37	>1.6	>11
Total alkalinity (as $CaCO_3$)	mg/L	<82.2 >825.8	<364.1 >741.9	<345 >390
Total acidity (as $CaCO_3$)	mg/L	>6.8	>5.5	-
Sulphate (SO_4)	mg/L	>112.4	>65.0	-
Dissolved Iron (Fe)	mg/L	>0.05	>0.05	-
Nitrate and Nitrate (NO_x as N)[1]	mg/L	>0.6	>0.6	>0.05

[1] TP, TN and NOx have a 28-day holding time, Phosphate, nitrate and nitrite individually have a 2-day holding time. The remoteness of the site location prevents reliable laboratory delivery and analysis within less than 5 days (the laboratory recommendation is for samples to arrive at the lab with half the holding time remaining to allow for lab scheduling and processing).

Table 5: Ecological Threshold criteria

Fauna biota	Low risk[1]	Moderate risk[1]	High risk[1]
Macroinvertebrate communities[2]	Presence of EPT taxa > 0.5B	EPT index < 0.5B OR SIGNAL2 score < the lower of 2 or B-1	No EPT taxa present
Fish communities	Melanotaenia australis present including small size classes and breeding (recruitment <30 mm)	Melanotaenia australis present and no small size classes (evidence recruitment) present	No fish species present
Macrophyte communities	Emergent (reed like and tussock/rush like species) present in ≥ isolated abundance	Emergent macrophytes present, with evidence of deteriorating health > B maximum	Emergent and submerged macrophytes absent

[1] B=Baseline seasonally relevant mean (i.e., wet or dry season ecological baseline values).

[2] The EPT Richness Index estimates water quality by the relative abundance of three major orders of stream insects that have low tolerance to water pollution: Ephemeroptera (mayflies), Plecoptera (stoneflies), and Tricoptera (caddisflies). SIGNAL (Stream Invertebrate Grade Number – Average Level) is a scoring system for macro-invertebrate samples from Australian rivers that indicates water quality based on tolerance or sensitivity of macroinvertebrate families present to water quality.

[3] DSIAR score (Diatom Species Index for Australian Rivers score) estimates water quality by the relative abundance of diatom species sensitive to water quality stressors.

3.1 Data-handling and statistical analysis

Data handling protocols will be established annually by the responsible consultant. The protocol will include the requirements as to data storage and protection, data extraction, quality control, analysis, interpretation, reporting and presentation.

The protocol will also directly reference and align with the requirements detailed in *Document Control (Information Management) Standard* (100-ST-DC-001) and *Geographic Information Systems and Raw Data Guidelines* (100-GU-EN-0009).

Statistical analysis of data will be undertaken where data permits. Where data capture allows, analysis will include using appropriate statistical analysis techniques. If parameter relationships appear to be present or exceedances or trends occur, causative assessment will be undertaken and corrective actions implemented.

The results of chemical and physical data should be analysed after every sample event, values of each parameter should be compared to the existing dataset.

Monitoring (water elevation) data will be used to identify any variation in the baseline modelling using actual flood event data recorded from rainfall and surface water monitoring sites within the project catchments. A minimum of two annual seasonal events will be required to revisit a review of the surface water model for the site, and only events that have whole of catchment runoff will be considered as significant for modelling review to take place. Where an exceedance has occurred, a complete verification of the flood model developed during baseline modelling will be required.

4 ADAPTIVE MANAGEMENT AND REVIEW

Fortescue will implement adaptive management practices to learn from the implementation of mitigation measures and monitoring. Adaptive management practices that will be assessed for the monitoring program as part of this approach will include:

- Evaluation of the monitoring program, data and comparison to baseline data and reference sites on an annual basis to verify whether responses to project activities are the same or similar to predictions.
- Evaluation of assumptions and uncertainties of the monitoring program.
- Re-evaluation of the risk assessment and revision of risk-based priorities as a result of monitoring outcomes.
- Review of data and information gathered over the review period that has increased understanding of site environment in the context of the regional ecosystem.
- Any significant changes to proposed mine plans.
- Evaluation and introduction of new or different monitoring methods due to changes in technology.
- Assessment of changes which are outside the control of the project (i.e. new project within the area or region).

The monitoring program will be technically assessed and reviewed every five years. The main objective of the assessment and review will be to ensure that the methods, parameters and frequency used are considerate and appropriate to the findings of the monitoring program. The frequency of monitoring will be reduced to a frequency supported by the review.

This Plan will be reviewed in response to

- Monitoring program review, inclusive of baseline data capture or adaptive management response.
- Revision to the conceptual water model(s) in response to testing and verification.
- Amendments to the environmental risk assessment in response to a new Mining Proposal submitted under the *Mining Act* 1978.

Revisions of this Plan will be submitted to the relevant State regulator for approval, in accordance with relevant approval conditions.

5 STAKEHOLDER CONSTULATION

Fortescue has undertaken stakeholder consultation program whereby landowners, regulators and other relevant parties have been consulted with regard to investigation and design through the environmental approvals process.

Table 6 will be updated following receipt of stakeholder comment as a result of the review and approval process.

Table 6: Stakeholder consultation

Stakeholder	Correspondence	Changes
DWER	**Fortescue:** Submission of *Surface Water Management Plan* (100-PL-EN-1015) to meet the requirements of Condition 12-1 of MS 993 (UID-49718; 29/06/2015).	*Surface Water Management Plan* (100-PL-EN-1015)
DoW	**Fortescue:** Submission of *Surface Water Management Plan* (100-PL-EN-1015) to meet the requirements of Condition 12-1 of MS 993 (UID-49717; 29/06/2015).	*Surface Water Management Plan* (100-PL-EN-1015)
DoW	**Fortescue**: Submission of draft *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev C) for comment (UID-56014; 04/01/2016).	*Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev C)
DoW	Meeting with Department of Water (18/01/2016), comments include • Commitment to obtain at least 12 months of baseline water quality data as soon as possible • Inclusion of hydrogeology information upstream of Site 12 Pool Clarification regarding contingency actions and monitoring frequency where trigger levels are exceeded.	
DoW	**DoW**: Comments on draft *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev C) (UID-56015; 19/01/2016).	
DWER	**Fortescue:** Response to DoW comments and submission of amended *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev D) (UID-56526; 19/02/2016).	*Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev D)
DoW	**Fortescue:** Response to comments and submission of amended *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev D) (UID-56523; 19/02/2016).	*Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev D)
DoW	**DoW:** Comments on *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev D). Recommendation monitoring programme is extended to include groundwater levels and water quality at bore NS-0064, as water in this bore is likely to represent the alluvial sources of Site 12 Pool water. It is not necessary to develop triggers for this bore. (UID-58354; 04/04/2016).	
DWER	**DWER:** Comments on *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev D). Comments included: • Plan to include locations of surface water/storm water monitoring sites within the proposal boundary, in particular in culverts, drainage	

	basins and around the base of the waste rock dump to monitor any leachate discharged to the environment. • Site-specific Trigger Values should be developed using the 80th percentile value of collected data. • Frequency of monitoring activities detailed in the plan will not provide sufficient early warning for potential breaches. The DWER requires the frequency in the plan to be amended to include the following: o Monthly leachate monitoring from the waste rock dump o Significant rainfall event monitoring following each event • Specified trigger levels should include a measure for total alkalinity given the current chemical composition of the Site 12 Pool water and the likely that buffering of some metals may occur. Parameters should also reflect the analytes that would likely to occur in the leachate from the proposed Waste Rock Dump • The information provided in the Site 12 Pool Water Quality and Quantity Monitoring Plan indicates that water quality is close to pristine. This indicates that any perceived impact on pool water quality from feral animal grazing is negligible. The Environmental Protection Authority Report 1514 determined that the Site 12 Pool was regionally significant and recommended that condition 12 be applied to maintain existing water quality and quantity in Site 12 Pool The EPA requires the protection level to be amended to 99% species protection level to adequately ensure condition 12-2 is met and the existing quality and quantity of the Site 12 Pool is maintained. Any change to this protection level should only occur where comprehensive biological effects and monitoring data show that biodiversity would not be altered. • Plan is required to be amended to clearly detail that the monitoring frequency will be adjusted to monthly when an investigation determines that trigger exceedances are Project attributable. • Include threshold criteria and include threshold contingency actions. (UID-62128; 12/08/2016).	
DWER	**Fortescue:** Submission of *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 0) (UID-62353; 30/09/2016).	*Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 0)
DWER	**DWER:** Approval of *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 0) (UID-64117; 26/10/2016).	
	North Star Stage 1 Project placed in care and maintenance (January 2018).	
	Project restarted in preparation for Stage 2 (June 2019).	
DWER	**DWER**: Meeting to discuss updated *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001) (29/01/2020).	
DWER	**Fortescue:** Submission of *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 0) (UID-115172; 22/12/2020).	*Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 0)
DWER	**DWER:** Comments on *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 0) (UID-124168; 20/08/2021).	
DWER	**DWER:** Meeting with DWER to discuss DWER RFI on the groundwater items 1, 2, 3 and 5 of the Site 12 Pool Water Quality and Quantity Monitoring Plan received on 18 August 2021. Recommendation included:	

	• Update the conceptual hydrogeology in the Site 12 Pool Water Quality and Quantity Monitoring Plan – include photos from the catchment and figure with proposed WRD development area within the catchment and proposed monitoring sites (SW and GW sites) • Update the conceptual hydrogeology in the Hydrobiology report (2020a) • Resubmit the plan to the EPA with the amendments. (31/08/2021).	
DWER	**Fortescue:** Response to comments and submission of *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 1) (UID-126996; 29/10/2021).	*Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 1)
DWER	**DWER:** Approval of *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 1) with required actions during implementation (UID-130807; 31/01/2022)	
DWER	**Fortescue**: Request for clarification from DWER on approval of Plan and requirement to install additional bore due to environmental impact concerns (UID-154191; 17/04/2023).	
DWER	**DWER:** Confirmation that additional bore is not required to be installed (UID-160653; 22/08/2023).	
DWER	**Fortescue**: Submission of *Inland Waters Plan* (IB-0000-PL-EN-0004 Rev A), in support of the submission for the North Star Extension. Plan supersedes *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001 Rev 1) and *Surface Water Management Plan* (NS-00000-PL-EN-0001).	*Inland Waters Plan* (IB-0000-PL-EN-0004 Rev A)

6 REFERENCES

This report and all internal supporting documents will be managed as per Fortescue Document Governance Standards. These may be read in conjunction with this report.

[1] AS/NZS 5667.1:1998 Water Quality-Sampling-Guidance.

[2] Australian and New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality (2018). Australian and New Zealand Governments and Australian state and territory governments, Canberra.

[3] ANZG (2018). Guidance Document for Assessing and Managing Water Quality in Temporary Waters, Unpublished.

[4] ANZG 2020. Ecosystem receptor indicators. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. CC BY 4.0. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, Australia.

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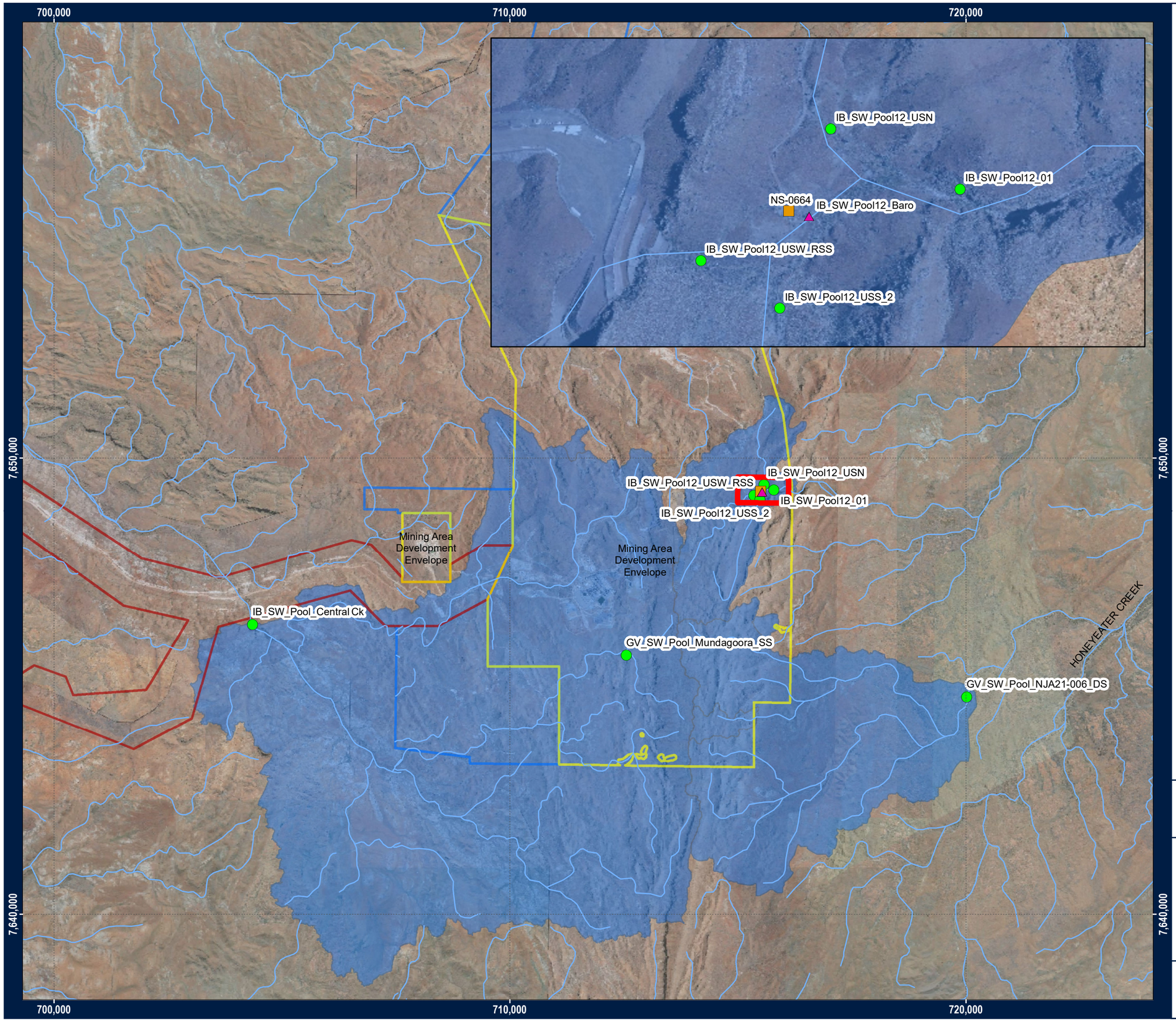
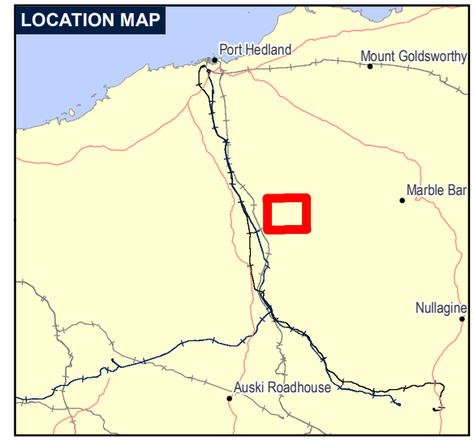
DOCUMENT CONTROL

Iron Bridge Inland Waters Plan		
Status	DRAFT	17-Apr-25
Summary of Changes	Supersedes: • *Site 12 Pool Monitoring Plan* (662MI-5700-PL-WM-0001) • *Surface Water Management Plan* (NS-00000-PL-EN-0001)	
Author	J Humphrey	Signature
Checked or Squad Review# (if applicable)	Ying Yu, Hui Min Lee, Michael Carroll, Damien Cancilla	Signature
Approved	Scott Poole	Signature
Next Review Date (if applicable)	17-Apr-30	

FIGURE 1 MONITORING LOCATIONS





LEGEND

- Surface Water Monitoring Sites
- Ground Water Bore
- Weather Station
- GOV 100K Drainage
- Surface Water Catchments
- Infrastructure Development Envelope
- Slurry Corridor Development Envelope
- Water Corridor Development Envelope
- Mine Development Envelope

N

0 1 2 3 4 5

Kilometres

Monitoring Sites
Iron Bridge

Requested By: J. Humphrey
Drawn By: D. Cancilla
Revised By: dcancilla
Approved By: J. Nelson
Scale: 1:80,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: IWMP_MonitoringSites

Date: 17/04/2025
Size: A3L
Revision: 0
Confidentiality: 1

GDA94

Fortescue

APPENDIX A LEGISLATIVE CONTEXT

Legislation	Application
Biodiversity Conservation Act 2016 (WA)	Conservation and protection of biodiversity and biodiversity components.
Environment Protection Act 1986 (WA)	State environmental impact assessment and Ministerial approval process.
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	Assesses the conservation significance of fauna species and forms the framework for significant species protection at the Federal level.
Environmental Protection (Unauthorised Discharge) Regulations 2004 (WA)	The Regulations administer the prevention of direct discharge of sediment or pollutants to surrounding surface waters.
Rights in Water and Irrigation Act 1914 (WA)	The RIWI Act relates to rights in water resources, to make provision for regulation, management, use and protection of water resources, to provide for irrigation schemes, and for related purposes.
Soil and Land Conservation Act 1945 (WA)	Addresses the conservation of soil and land resources and the mitigation of the effects of erosion.

APPENDIX B ACRONYMS AND DEFINITIONS

Acronym / Term	Definition
BMS	Business Management System. System used for managing business records, including recording incidents and feral animals and conservation significant animals.
Cth	Commonwealth of Australia
DWER	Department of Water and Environmental Regulation
EP Act	*Environment Protection Act* 1986
Environmental exclusion zone	Geospatial locations of features that have legislative or other assigned protection (e.g., areas that are not permitted by Ministerial Statement to be disturbed).
EPA	Environmental Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act* 1999
GIS	Geographic information system
LUC	Land Use Certificate. A certificate issued through a web-based system to confirm that proposed land use activities adhere to the correct approvals granted by Government departments. A LUC is required whenever any work (e.g., access, ground disturbance, maintenance, rehabilitation) is undertaken. The LUC has sensitivity checks against GIS spatial data to determine if the area proposed for works intersects with any mapped constraints, and environmental exclusion zones datasets. Depending on the type of constraint, proposed works will be referred for assessment or blocked. The LUC is then assessed by key Fortescue stakeholders (e.g., Tenure, Environment, Heritage, Water Infrastructure) to determine if the activities can be approved. Approval may be unconditional, or subject to conditions.
MS	Ministerial Statement
QA/QC	Quality assurance and quality control