CHAPTER 8 – SURFACE WATER AND WATER MANAGEMENT

STANMORE ID EXTENSION PTY LTD

ISAAC DOWNS EXTENSION PROJECT

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8. SURFACE WATER AND WATER MANAGEMENT

8.1 Introduction

This chapter describes the surface water environmental values for the Isaac Downs Extension (IDE) Project (the Project), establishes water quality objectives, describes the proposed water management strategy, system and infrastructure for management of all types of water in the Project area, provides a site water balance, assesses the performance of the water management system, and assesses the management measures and mitigation strategies designed to protect surface water environmental values.

The information in this chapter is based on the surface water and water management assessment provided in **Appendix I**. Hydrology, hydraulics (i.e. flooding) and geomorphology are described in **Chapter 9**. An assessment of the final void lake, including modelling of the lake volumes and water quality is provided in **Chapter 5**.

The Project's water management systems will be integrated into Isaac Plains Complex (IPC), comprising Isaac Downs Mine (IDM) and Isaac Plains Mine (IPM).

8.2 Regulatory Framework

8.2.1 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) provides for environmental protection policies that establish the environmental values (EVs) which are to be protected, that include quality standards that are relevant to the water environment. The EVs of waterways in Queensland are protected under the EP Act and the subordinate *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water).

8.2.2 Environmental Authority and Progressive Rehabilitation and Closure Plan Schedule under the EP Act

The Project requires an environmental authority (EA) and progressive rehabilitation and closure plan (PRCP) schedule under the EP Act for the Project's mining leases. All Project-related activities will be conditioned by the EA and PRCP schedule, including water releases, management of water systems and rehabilitation of water management infrastructure. EAs and PRCP schedules are administered by the Department of the Environment, Tourism, Science and Innovation (DETSI).

Appendix AA provides a draft EA, with proposed conditions related to surface water management. DETSI is responsible for granting the EA conditions for the Project. In relation to surface water, the proposed draft EA conditions cover:

- the release of mine affected water to the receiving environment, including by specifying authorised release points
- required water quality of mine affected water
- the frequency, locations, and quality characteristics of water monitoring
- that releases must only take place during periods of natural flow events in accordance with the receiving water flow criteria
- that releases must comply with the water management plan.

The water management plan must be developed and implemented by an appropriately qualified person, in accordance with relevant government guidelines, and must be reviewed and reported on annually by an appropriately qualified person. **Appendix I** provides the content requirements and basis for a water management plan.

Release criteria have been established in accordance with Model Mining Conditions which use variable flow rates in the receiving environment to determine the release volumes and water quality of mine affected water releases, so that downstream EVs and water quality objectives (WQOs) are protected.

Water quality monitoring at specified locations and frequencies is proposed for water storages associated with the release points, and for the receiving environment at upstream background sites and downstream of release points. The draft EA outlines actions that must be taken if quality characteristics of the mine affected water release or downstream monitoring sites exceed any of the trigger levels. For all water monitoring, information including the date, time, flow rate, and details of any exceedances of the conditions must be submitted annually to the administering authority, being DETSI.

A receiving environment monitoring program (REMP) and erosion and sediment control plan (ESCP) are required to be developed and implemented by an appropriately qualified person. As described in **Chapter 12**, the proponent proposes to join the Fitzroy Regional Receiving Environment Monitoring Program (FRREMP) (Fitzroy Basin Association, 2025). The FRREMP is supported by DETSI, which has prepared the Fitzroy Basin regional receiving environment monitoring program guideline (ESR/2023/6463) (DETSI, 2025). An ESCP for the Project is provided as **Appendix AD**.

Appendix AC provides a draft PRCP schedule, including the rehabilitation milestones and completion criteria for water management infrastructure.

8.2.3 Environmental Protection Regulation 2019

The *Environmental Protection Regulation 2019* (EP Regulation) elaborates how the principles and objectives of the EP Act are to be implemented and enforced. The EP Regulation also defines the environmental objective and performance outcomes for Queensland's water environment, which are applicable to the Project's assessment and management of potential surface water impacts.

8.2.4 Environmental Protection (Water and Wetland Biodiversity) Policy 2019

The EPP Water is the primary instrument for surface water management under the EP Act. The EPP Water governs discharge to land, surface water and groundwater, aims to protect EVs and sets water quality guidelines and objectives.

The processes to identify EVs and to determine WQOs in Queensland waters is based on the Australian and New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality (ANZG, 2018), hereafter referred to as the 'Australian Water Quality Guidelines'. The EPP Water is supported by the Queensland Water Quality Guidelines 2009 (QWQG) (DEHP, 2013).

EVs and WQOs have been established for many waterways in Queensland under Schedule 1 of the EPP Water.

8.2.5 Isaac River Sub-basin Environmental Values and Water Quality Objectives

The relevant document, pursuant to the EPP Water, for the Project is the *Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part)*, *including all waters of the Isaac River Sub-basin (including Connors River), September 2011* (DEHP, 2011), hereafter referred to as the 'Isaac River Sub-basin EVs and WQOs'. The document is made pursuant to the provisions of the EPP Water. It contains EVs and WQOs for waters in the Isaac River Sub-basin, and they are listed under Schedule 1 of EPP Water.

8.2.6 Manual for Assessing Consequence Categories and Hydraulic Performance of Structures

The Manual for Assessing Consequence Categories and Hydraulic Performance of Structures[1] (the Manual) defines the methodology and assessment criteria to determine if a structure associated with an environmentally relevant activity should be regulated under the EP Act. The Manual details the hydraulic design requirements for regulated structures (e.g. dams and levees) and this document has been used as a reference in the preliminary design of the water management system and preliminary sizing of dams associated with the Project. It has also been used to inform the design of Project levees.

In relation to water systems, the draft EA conditions the design, construction and operation of regulated structures, including that they are designed, constructed and operated in accordance with the Manual.

8.2.7 Model Mining Conditions

The Model Mining Conditions[2] are a set of model conditions to form general environmental protection commitments given for mining activities, and EA conditions for resource activities imposed by the administering authority under the EP Act. These model conditions have been used as a guide for developing environmental protection commitments relating to water management and for appropriate conditions for the draft EA (**Appendix AA**) for the Project.

The Model water conditions for coal mines in the Fitzroy basin[3] provide a set of model conditions to form the basis of water related environmental protection commitments in an EA for coal mines located within the Fitzroy Basin.

8.2.8 Water Act 2000

In Queensland, the *Water Act 2000* (Water Act) is the primary statutory document that establishes a framework for the planning, allocation and use of non-tidal water. The Water Act is primarily administered by the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD) and the Department of Local Government, Water and Volunteers.

The main purposes of the Water Act, as relevant to the Project, include for the following:

- The sustainable management of Queensland's water resources by establishing a system for the planning, allocation and use of water; and riverine protection.
- The sustainable and secure water supply for designated regions.
- The management of impacts on underground water caused by the exercise of underground water rights by the resource sector.

The Project does not require a licence or permit under the Water Act to take surface waters for water supply to the Project, as all water required for the Project is from the Project's water managements systems or existing external water supplies.

A watercourse is defined by the Water Act as a river, creek or stream in which water flows permanently or intermittently and includes the bed and banks and any other element of a river, creek or stream confining or containing water. DNRMMRRD have published a watercourse identification map of the State that shows: watercourses (other than their lateral limits), the downstream limit of watercourses, drainage features, lakes and springs.

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[1] https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=1933&name=era-mn-assessing-consequence-hydraulic-performance.pdf

[2] https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=1936&name=rs-gl-model-mining-conditions.pdf

[3] https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=1561&name=rs-gl-water-conditions-mines-fitzroy.pdf

A diversion of Conrock Gully is proposed for the Project. The diversion of Conrock Gully is proposed to be authorised under the EP Act, and therefore, a licence for the diversion under the Water Act is not required.

Placing fill or excavating in a watercourse will require a riverine protection permit (RPP) if the activity does not comply with guidelines for Riverine protection permit exemption requirements[4]. The proponent will obtain a RPP if the exemption requirements cannot be met.

A Quarry Material Allocation Notice will not be required for the Project as riverine materials will not be taken with the intent to be sold or used for productive purposes.

8.2.9 Water Plan (Fitzroy Basin) 2011

The *Water Plan (Fitzroy Basin) 2011* was developed under the Water Act to define the availability of water in the Fitzroy Basin and:

- provide a framework for sustainably managing water and the taking of water
- identify priorities and mechanisms for dealing with future water requirements
- provide a framework for establishing water allocations
- provide a framework for reversing, where practicable, degradation in natural ecosystems
- regulate the taking of overland flow water
- regulate the taking of groundwater.

8.2.10 Water Regulation 2016

The *Water Regulation 2016* is subordinate legislation to the Water Act and provides details, protocol and instruction for the following:

- water rights and planning
- statutory authorisations to take or interfere with water
- matters relating to water licenses
- water allocations
- water supply and demand management
- declarations about watercourses.

8.2.11 Water Supply (Safety & Reliability) Act 2008

The *Water Supply (Safety and Reliability) Act 2008* provides for the safety and reliability of water supply in Queensland. The purpose is achieved primarily by:

- providing a regulatory framework for providing water and sewerage services in the State
- providing a regulatory framework for defining recycled water and drinking water quality, primarily for protecting public health.
- the regulation of referable dams.
- stating flood mitigation responsibilities.

8.2.12 Fisheries Act 1994

Approval under the *Fisheries Act 1994* for waterway barrier works within waterways is not required as mining activities on a mining lease are exempt from the Act. There are no declared fish habitat areas in the area of the Project's activities. Refer to **Chapter 4** and **Chapter 12** for additional information on waterway barriers.

4 https://www.rdmw.qld.gov.au/_shared-content/policy-register/policy-register-pdf?getdoc=726&name=riverine-protection-permit-exemption-requirements.pdf

8.2.13 Environment Protection and Biodiversity Conservation Act 1999

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) determined the Project to be a controlled action (EPBC 2025/10183). The controlling provisions include 'a water resource, in relation to coal seam gas development and large coal mining development (sections 24D & 24E)'. This controlling provision is relevant to the surface water assessment.

The Independent Expert Scientific Committee (IESC) on Coal Seam Gas and Large Coal Mining Developments provides scientific advice to decision makers on the impact that coal seam gas and large coal mining development may have on Australia's water resources. The IESC assess the proposals against the Information Guidelines for Independent Expert Scientific Committee advice (IESC, 2024)[5] on coal seam gas and large coal mining development proposals where there is a significant impact on water resources. The core purpose of the guideline is to determine whether a coal seam gas (CSG) or large coal mining development has or is likely to have a significant impact on a water resource. **Chapter 24** provides an assessment of the significance of impacts to surface water resources. **Chapter 24** provides a cross reference table identifying where the requirements of the IESC Guidelines have been addressed.

8.2.14 Environmental Objectives and Performance Outcomes

The environmental objectives and performance outcomes, based on the EP Regulation and terms of reference (ToR) for the Project's EIS, that are relevant to the surface water assessment and regulated structures, are provided in Table 8-1 and Table 8-2, respectively. A corresponding EIS section reference is provided in these tables demonstrating how the Project meets these environmental objectives and performance outcomes.

Table 8-1 Environmental Objectives and Performance Outcomes – Surface Water

<table>
<tr><th>Requirement</th><th>Environmental Objectives and Performance Outcomes</th><th>EIS Reference</th></tr>
<tr><td>EP Regulations</td><td rowspan="2">The activity will be operated in a way that protects environmental values of waters.</td><td rowspan="2">8.3, 8.4, 8.6, 8.7
Chapter 9</td></tr>
<tr><td>Terms of Reference</td></tr>
<tr><td colspan="3">Performance Outcomes</td></tr>
<tr><td colspan="2">1 There is no actual or potential discharge to waters of contaminants that may cause an adverse effect on an environmental value from the operation of the activity.</td><td>8.6, 8.7, 8.7.2, 8.7.3, 8.7.6</td></tr>
<tr><td colspan="2">2 All of the following—
(a) the storage and handling of contaminants will include effective means of secondary containment to prevent or minimise releases to the environment from spillage or leaks;</td><td>8.4.3.6, 8.7.6</td></tr>
<tr><td colspan="2">(b) contingency measures will prevent or minimise adverse effects on the environment due to unplanned releases or discharges of contaminants to water;</td><td>8.6, 8.6.6, 8.6.7, 8.6.8, 8.7.2, 8.7.6</td></tr>
<tr><td colspan="2">(c) the activity will be managed so that stormwater contaminated by the activity that may cause an adverse effect on an environmental value will not leave the site without prior treatment;</td><td>8.4.3.3, 8.6.8, 8.7.2.3, 8.7.10</td></tr>
<tr><td colspan="2">(d) the disturbance of any acid sulfate soil, or potential acid sulfate soil, will be managed to prevent or minimise adverse effects on environmental values;</td><td>Section 7.3.21 of Chapter 7</td></tr>
</table>

[5] https://www.iesc.gov.au/sites/default/files/2024-02/info-guidelines-proponents-preparing-coal-seam-gas-large-coal-mining-development-proposals.pdf

<table>
<tr><td colspan="2">(e) acid producing rock will be managed to ensure that the production and release of acidic waste is prevented or minimised, including impacts during operation and after the environmental authority has been surrendered;</td><td>Sections 7.3.12, 7.4.3 and 7.5.3 of Chapter 7</td></tr>
<tr><td colspan="2">(f) any discharge to water or a watercourse or wetland will be managed so that there will be no adverse effects due to the altering of existing flow regimes for water or a watercourse or wetland;</td><td>8.4.3, 8.6.6, 8.6.8, 8.7.4
Chapter 9
Section 12.4 Chapter 12</td></tr>
<tr><td colspan="2">(g) for a petroleum activity, the activity will be managed in a way that is consistent with the coal seam gas water management policy, including the prioritisation hierarchy for managing and using coal seam gas water and the prioritisation hierarchy for managing saline waste;</td><td>Not applicable</td></tr>
<tr><td colspan="2">(h) the activity will be managed so that adverse effects on environmental values are prevented or minimised.</td><td>8.3, 8.4, 8.6, 8.7
Chapter 9</td></tr>
<tr><td colspan="3">Additional Environmental Objective</td></tr>
<tr><td rowspan="5">Terms of Reference</td><td>Equitable, sustainable and efficient use of water resources.</td><td>8.6.12, 8.7.5</td></tr>
<tr><td>Maintenance of the stability of beds and banks of watercourses.</td><td>Chapter 9</td></tr>
<tr><td>Maintenance of environmental flows and water quality to support the long term condition and viability of terrestrial, riverine, wetland and lacustrine ecosystems.</td><td>8.4, 8.6, 8.7
Chapter 9
Section 11.5.3 of Chapter 11
Section 12.4 of Chapter 12
Section 10.6.3 of Chapter 10</td></tr>
<tr><td>Maintenance of supply to existing users of surface and groundwater resources.</td><td>8.3.7, 8.7.8
Chapter 10</td></tr>
<tr><td>The construction and operation of the project aims to ensure that the risk and potential adverse impacts from flooding are avoided, minimised or mitigated to protect people, property and the environment.</td><td>Chapter 9</td></tr>
</table>

Table 8-2 Environmental Objectives and Performance Outcomes – Regulated Structures

<table>
<tr><th>Requirement</th><th>Environmental Objectives and Performance Outcomes</th><th>EIS Reference</th></tr>
<tr><td>EP Regulations</td><td rowspan="2">The design of the facility permits the operation of the site, at which the activity is to be carried out, in accordance with best practice environmental management.</td><td rowspan="2">8.4, 8.4.4, 8.6
Chapter 9</td></tr>
<tr><td>Terms of Reference</td></tr>
<tr><td colspan="3">Performance Outcome</td></tr>
</table>

Requirement	Environmental Objectives and Performance Outcomes	EIS Reference
(b) regulated structures comply with the document called 'Manual for assessing consequence categories and hydraulic performance of structures', published by the department;		8.4.4 **Chapter 9**
Additional Environmental Objective		
Terms of Reference	The potential consequences of the failure of a regulated structure on human life and the environment require that the highest standards are used for their design, construction, operation, modification and decommissioning.	8.4.4 **Chapter 9**

8.2.15 EIS Information Guidelines

The EIS assessment has been undertaken in accordance with the EIS information guideline – Water[6] and EIS information guideline – Regulated structures[7]. The relevant EIS sections where the requirements of these guidelines have been addressed are provided in Table 8-3 and Table 8-4, respectively.

Table 8-3 EIS Information Guidelines – Surface Water

Guideline Requirement	Section of EIS
Water sampling, characterisation and monitoring	8.3, 8.3.6
Surface water resources	8.3
Water quality and environmental values	8.3
Alterations to flow of water	8.4, 8.5, 8.6, 8.7, 8.7.4
Water supply	8.4, 8.4.1, 8.4.2, 8.4.3.5, 8.5, 8.5.3, 8.5.4, 8.5.6
Project infrastructure	8.4, 8.5
Discharges and onsite reuse of wastewater	8.4, 8.5, 8.6.6, 8.6.7, 8.6.8, 8.7.2
Discharges to wetlands	**Chapter 12**
Release of particular contaminants to the Great Barrier Reef (GBR) catchment waters and other waters	8.7.3
Bank stability and riparian vegetation	**Chapter 9**
Voids	**Chapter 5**
Acid producing material	**Chapter 7** (geochemistry and soils)
Avoidance and mitigation measures	8.4, 8.7
Monitoring and corrective actions	8.7.9, 8.7.11
Commitments and conditions	**Appendix A, Appendix AA, Appendix AC**

6 https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=5312&name=eis-tm-water-information-guide.pdf

7 https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=5307&name=eis-tm-regulated-structures-information-guide.pdf

Table 8-4 EIS Information Guidelines – Regulated Structures

Guideline Requirement	Section of EIS
Dams	8.4.4
Levees	**Chapter 4** and **Chapter 9**
Voids	**Chapter 5**

8.2.16 Guideline - Applications for Activities with Impacts to Water

The EIS assessment has been undertaken in accordance with the Guideline - Applications for Activities with Impacts to Water (ESR/2015/1837). The relevant EIS sections where the requirements of this guideline have been addressed are provided in Table 8-5.

Table 8-5 Guideline - Applications for Activities with Impacts to Water

Guideline Requirement	Section of EIS
Project description information relevant to waters.	**Chapter 4** 8.4, 8.5
Identifying environmental values of receiving waters, including topography, surface waters, wetlands, catchments (including Great Barrier Reef), water quality objectives flooding, hydrology, bores, hydrogeological features, aquifers, groundwater dependent ecosystems, water quality, groundwater levels.	8.3 **Chapter 9** **Chapter 10**
Possible impacts to identified environmental values, including discharges and releases, uncontrolled releases, water infrastructure, surface water and groundwater interactions, groundwater changes, and impacts to wetlands, catchments and hydrology.	8.6, 8.7 **Chapter 9** **Chapter 10**
Proposed management practices, including management hierarchy and practices, release controls and limits, stormwater management, and managing activities near watercourses.	8.7
Management plans, including for stormwater, groundwater monitoring and site water management	8.7 **Chapter 10**
Rehabilitation of the site	**Chapter 5**

8.2.17 Guideline - Wastewater Release to Queensland Waters

The EIS assessment has been undertaken in accordance with the Guideline - Wastewater Release to Queensland Waters (ESR/2025/1654). The relevant EIS sections where the requirements of this guideline have been addressed are provided in Table 8-6.

Table 8-6 Guideline - Wastewater Release to Queensland Waters

Guideline Requirement	Section of EIS
Project description information relevant to waters.	**Chapter 4** 8.4, 8.5

Guideline Requirement	Section of EIS
Description of the receiving environment (water bodies), relevant environmental values and water quality objectives, legislative requirements	8.2, 8.3
Predict outcomes or impact of the proposed wastewater release, including assimilative capacity	8.6, 8.7, 8.6.6, 8.6.7, 8.6.8, 8.7.2
Set circumstances, limits and monitoring conditions	8.5.7, 8.7.11

8.2.18 Great Barrier Reef Guideline

Section 41AA of the EP Regulation aims to achieve no net decline in water quality in the surface water basins that discharge to the Great Barrier Reef (GBR). Since June 2021, all new or expanding projects that potentially impact the waters for the GBR are required to provide information about their dissolved inorganic nitrogen (DIN) and total suspended solids (TSS) load.

In accordance with the criteria outlined in Table 1.2 of the Guideline – Environmental Protection Act 1994: Reef discharge standards for industrial activities (DESI, 2024)[8] ('the GBR Guideline'), Section 41AA of the EP Regulation is applicable to the Project.

8.3 Environmental Values

8.3.1 Environmental Values under EPP Water

The watercourses and drainage features within and surrounding the Project area are the Isaac River, Cherwell Creek, Conrock Gully and JB Gully. Only the downstream portion of Conrock Gully is a defined watercourse under the Water Act.

The Isaac River and Conrock Gully are located within the Isaac and lower Connors River main channel region of the Isaac River Sub-Basin (WQ1301). Cherwell Creek and JB Gully are located within the Isaac western upland tributaries region of the Isaac River Sub-Basin.

The EVs under the EPP Water that are potentially relevant for watercourses and drainage features within and surrounding the Project area are:

- aquatic ecosystem protection (slightly to moderately disturbed ecosystems, QWQG 2009)
- visual recreation
- cultural and spiritual values.

It is unlikely that the following EVs under the EPP Water are relevant for watercourses and drainage features within and surrounding the Project area, due to the identified downstream uses of water, water quality or ephemeral nature of flows:

- irrigation, farm use and stock watering
- human consumption
- primary and secondary recreation
- drinking water
- industrial use.

The Project will not impact the marine environment, including seagrass beds and corals.

[8] https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=5627&name=era-gl-reef-discharge-standards-industrial-activities.pdf

8.3.2 Water Quality Objectives

The indicators and water quality guidelines relevant to the EPP Water environmental values are listed in the QWQG and Australian Water Quality Guidelines. The conditions of waterways located in the vicinity of the Project are classified as slightly to moderately disturbed ecosystems under the QWQG.

The WQOs relevant to the identified EVs are provided in Table 8-7 and are generally based on the trigger values or default guideline values (DGVs) nominated in the QWQG and Australian Water Quality Guidelines. Where different EVs have different WQOs/DGVs, the lowest value has been adopted. WQOs/DGVs are displayed for physio-chemical parameters only.

A comparison of the WQOs against local streamflow water quality monitoring in the Isaac River has been undertaken to assess whether local site-specific trigger values (SSTVs) can be assigned to any water quality parameters. The outcomes of this assessment are presented in Section 3.7.2.4 of **Appendix I**.

Table 8-7 Water Quality Objectives, Isaac River Sub-basin

Parameter	WQO/DGV	Relevant EV
Ammonia N	< 720 µg/L	Aquatic ecosystem[a]
Oxidised N	< 60 µg/L	Aquatic ecosystem[b]
Organic N	< 420 µg/L	Aquatic ecosystem[b]
Total nitrogen	< 500 µg/L	Aquatic ecosystem[b]
Filterable Reactive Phosphorus (FRP)	< 20 µg/L	Aquatic ecosystem[b]
Total phosphorus	< 50 µg/L	Aquatic ecosystem[b]
Chlorophyll a	< 5 µg/L	Aquatic ecosystem[b]
Dissolved oxygen	85-110% saturation > 4 mg/L at surface	Aquatic ecosystem[b] Drinking water[c]
Turbidity	< 50 NTU	Aquatic ecosystem[b]
Suspended solids	< 55 mg/L	Aquatic ecosystem[b]
pH	pH 6.5-8.5	Aquatic ecosystem[b]
Conductivity (EC) baseflow	720 µS/cm	Aquatic ecosystem[b]
Conductivity (EC) high flow	250 µS/cm	Aquatic ecosystem[b]
Sulphate	250 mg/L 25 mg/L	Drinking water[c] Aquatic ecosystem[b]
Total Dissolved Solids	< 2000 mg/L	Stock watering[d]
Colour	50 Hazen Units	Drinking water[c]
Total Hardness	150 mg/L as CaCO3	Drinking water[c]
Sodium	< 188 mg/L	Based on 80th percentile for Isaac River at Goonyella gauge
Aluminium	< 5 mg/L < 55 µg/L	Stock watering[d] Aquatic ecosystem[a]
Antimony	< 9 µg/L	Aquatic ecosystem[h]
Arsenic	2.0 mg/L 0.5 mg/L up to 5 mg/L < 13 µg/L	Irrigation[g,e] Stock watering[f] Aquatic ecosystem[a]

Parameter	WQO/DGV	Relevant EV
Beryllium	< 0.5 mg/L	Irrigation[g]
Boron	< 5 mg/L < 940 µg/L	Stock watering[f,e] Aquatic ecosystem[a]
Cadmium	< 0.01 mg/L < 0.2 µg/L	Stock watering[f,e] Aquatic ecosystem[a]
Chromium	< 1 mg/L < 1 µg/L	Stock watering[f,e] Aquatic ecosystem[a]
Cobalt	< 0.1 mg/L < 1.4 µg/L	Irrigation[g] Aquatic ecosystem[h]
Copper	< 1 mg/L < 1.4 µg/L	Stock watering (cattle)[f,e] Aquatic ecosystem[i]
Fluoride	< 2 mg/L < 320 µg/L	Irrigation[g] Based on 80th percentile for Isaac River at Goonyella gauge
Iron	< 10 mg/L < 280 µg/L	Irrigation[g] Aquatic ecosystem[a]
Lead	< 0.1 mg/L < 3.4µg/L	Stock watering[f,e] Aquatic ecosystem[i]
Lithium	< 2.5 mg/L	Irrigation[g]
Manganese	< 10 mg/L < 1,900 µg/L	Irrigation[g] Aquatic ecosystem[a]
Mercury	< 0.002 mg/L < 0.2 µg/L	Irrigation[g] Aquatic ecosystem[i]
Molybdenum	< 0.05 mg/L < 34 µg/L	Irrigation[g] Aquatic ecosystem[h]
Nickel	< 1 mg/L < 11 µg/L	Stock watering[f,e] Aquatic ecosystem[a]
Selenium	< 0.02 mg/L < 5 µg/L	Stock watering[f,e] Aquatic ecosystem[i]
Silver	< 1 µg/L	Aquatic ecosystem[i]
Uranium	< 0.1 mg/L < 1 µg/L	Irrigation[g] Aquatic ecosystem[i]
Vanadium	< 0.5 mg/L < 10 µg/L	Irrigation[g] Aquatic ecosystem[i]
Zinc	< 5 mg/L < 8 µg/L	Irrigation[g] Aquatic ecosystem[a]
Nitrate	< 1.1 mg/L	Aquatic ecosystem[a], for soft water

Parameter	WQO/DGV	Relevant EV
a - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018): trigger values for slightly-moderately disturbed systems (95% level of protection) b - Table 2 of Isaac River Sub-Basin Environmental Values and Water Quality Objectives: Aquatic ecosystem – moderately disturbed c - Table 4 of Isaac River Sub-Basin Environmental Values and Water Quality Objectives: Drinking water EV d - Table 10 of Isaac River Sub-Basin Environmental Values and Water Quality Objectives: Stock watering EV: salinity e - short-term trigger value f - Table 11 of Isaac River Sub-Basin Environmental Values and Water Quality Objectives: Stock watering EV: heavy metals and metalloids g - Table 9 of Isaac River Sub-Basin Environmental Values and Water Quality Objectives: Irrigation EV: heavy metals and metalloids h - Section 8.3.7 of Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000): low reliability guideline i - Based on Limit of Reporting (LOR) for ICPMS/CV FIMS analytical methods		

8.3.3 Regional Drainage Network

The Project is located within the headwaters of the Isaac sub-catchment of the greater Fitzroy Basin. The Isaac River is the main watercourse in the vicinity of the Project area (the Project's mining lease application (MLA) areas), and flows in a north-west to south-east direction to the east of the Project.

The catchment commences at the Denham Range located about 98 km to the north of the Project. The Isaac River flows in a southwesterly direction through the Carborough and Kerlong Ranges before turning in a southeasterly direction near the Goonyella Riverside Mine. The Connors River, which has a catchment area similar to the upstream Isaac River, flows into the Isaac River approximately 120 km downstream of the Project. The Isaac River finally converges with the Mackenzie River a further 53 km downstream.

Ultimately, the Mackenzie River joins the Fitzroy River, which flows initially north and then east towards the east coast of Queensland and discharges into the Coral Sea southeast of Rockhampton near Port Alma. Port Alma is located approximately 450 km downstream of the Project. Figure 8-1 presents the regional location of the Project in the Fitzroy Basin and Isaac-Connors sub-catchment. Figure 8-2 shows the upper Isaac River drainage including the Cherwell Creek and Conrock Gully catchments.

The catchment area of the Isaac River to downstream of the Cherwell Creek confluence and including the Project area is around 3,528 km^2. This represents around 2.5% of the overall Fitzroy River catchment and 15.8% of the Isaac-Connors sub-catchment.

The Project area is approximately 27 km^2, which represents 0.02% and 0.12% of the overall Fitzroy River and Isaac-Connors catchment areas, respectively.

The Isaac River is a seasonally flowing watercourse, typically with surface flows in the wetter months from November to April, reducing to shallow subsurface flows from about May to October. All other waterways in the vicinity of the Project are ephemeral and experience flow only after sustained or intense rainfall in the catchment. Stream flows are highly variable, with most channels drying out during winter to early spring when rainfall and runoff is historically low.

8.3.4 Local Drainage Network

The following ephemeral drainage systems (Figure 8-3) are located in the vicinity of the Project and are designated as watercourses under the Water Act:

- Isaac River – 2,759 km^2 catchment to the Project (upstream of the confluence with Conrock Gully).
- Cherwell Creek – 698 km^2 catchment to its confluence with the Isaac River.
- JB Gully – 26 km^2 catchment to its confluence with Cherwell Creek.

- Conrock Gully – 71 km^2 catchment to its confluence with the Isaac River.

The majority of Conrock Gully upstream and including the beginning of the proposed diversion is defined as a drainage feature under the Water Act. The 3.2 km downstream reach of Conrock Gully to its confluence with Isaac River is defined as a watercourse. There are several minor drainage lines in the vicinity of the Project that are designated as either drainage features or unmapped (Figure 8-3).

8.3.4.1 Isaac River

The Isaac River channel in the vicinity of the Project has an average bed width of 45 metres (m) varying between 33 m and 60 m (90% confidence limits) and is approximately 10 m deep. The bed slope and hydraulic gradient from Moranbah township to the Cherwell Creek confluence is very uniform at 0.08%. Under the Strahler ordering system, the Isaac River is a fifth order stream upstream of the Grosvenor Creek confluence, which is located 7.3 km upstream of the Project, and a sixth order stream downstream of the Grosvenor Creek confluence, including the reach that drains past the Project.

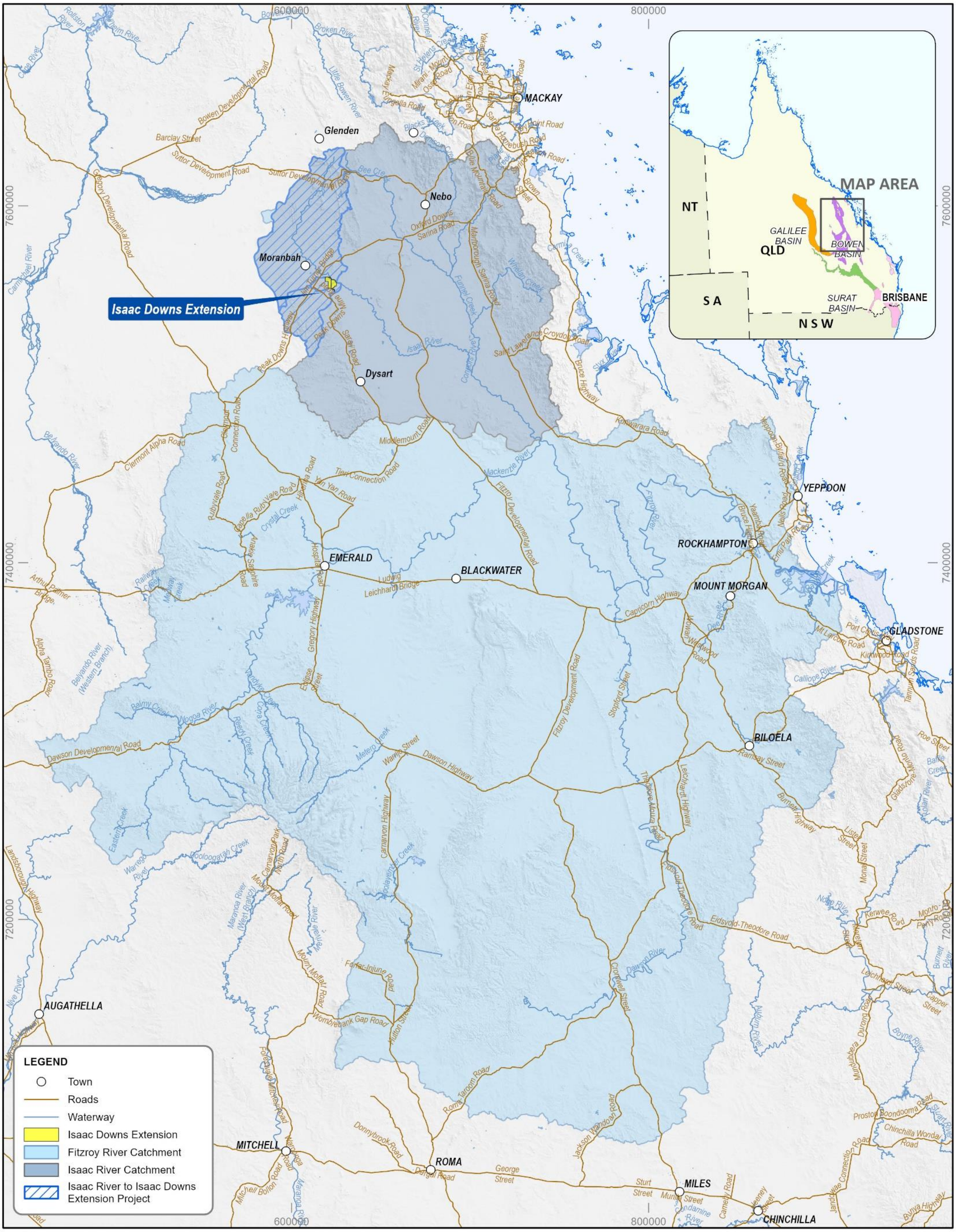
The bed of the river channel is characterised by extensive sand sheet deposits indicating it is sediment choked. Sand point bars are evident on the inside of bends and vegetated benches are located on one or both sides of the river along the straight sections. A number of well vegetated sand islands are located in the river channel indicating that some of the old benches have eroded forming channels either side of the old riverbank. SedNet modelling of the catchment undertaken by Dougall et al. (2006) indicated hillslope erosion to be a dominant input over gully and riverbank erosion. Total predicted sediment inputs range from 0.31 to 1.25 t/ha/annum.

The banks of the river consist of a sandy loam and have eroded to near vertical for a depth of 1 m to 2 m along much of its length and 1V:4H[9] to 1V:5H batters above this depth. The bank batters are well vegetated with established and mature trees, mostly eucalypts and casuarinas, and buffel grass understorey. The active benches consist of scattered trees and buffel grass with the overbank areas cleared for grazing.

As part of the Project works, a bridge will be constructed across the Isaac River, connecting the Project with the neighbouring IDM, as part of the integration of the Project into IPC. A temporary dragline crossing will also be constructed across the Isaac River. No diversion of the Isaac River is proposed.

Section 3.2.1.1 and Figure 3.2 of **Appendix I** provide a review of other geomorphic investigations of the Isaac River, and include photographs of the Isaac River channel, upstream, downstream and adjacent to the Project area, respectively.

[9] V = vertical, H = horizontal



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Kilometers

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File:	20260223 Regional Catchments.aprx

DISCLAIMER: Third party data sources are used in this map compilation. Minserve makes no warranty regarding this data's accuracy or currency.

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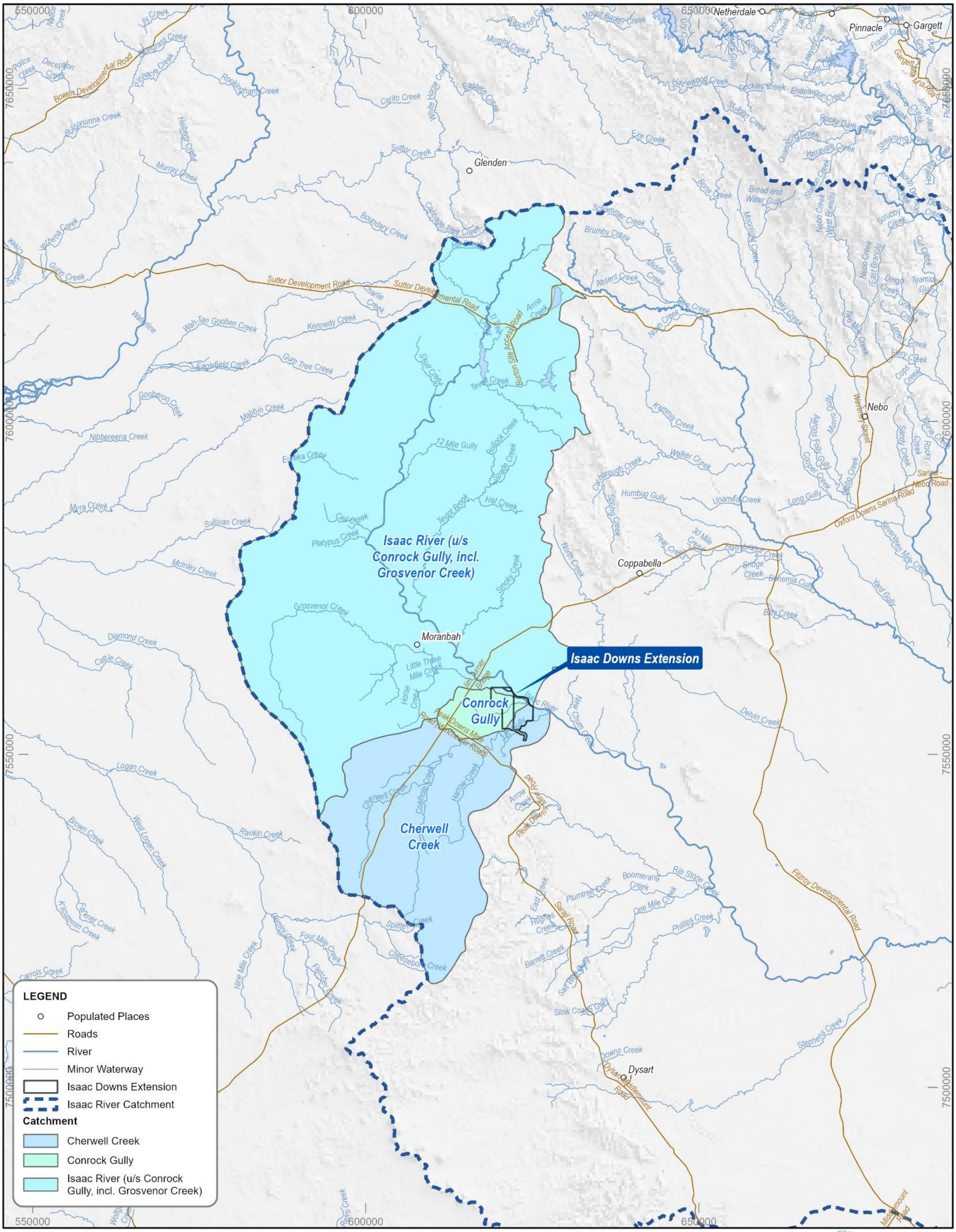
ISAAC DOWNS EXTENSION

Regional Catchments and Watercourse

Figure | 8-1



0 5 10 15 20 25
Kilometers

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File:	20260223 Upper Isaac River Drainage.aprx

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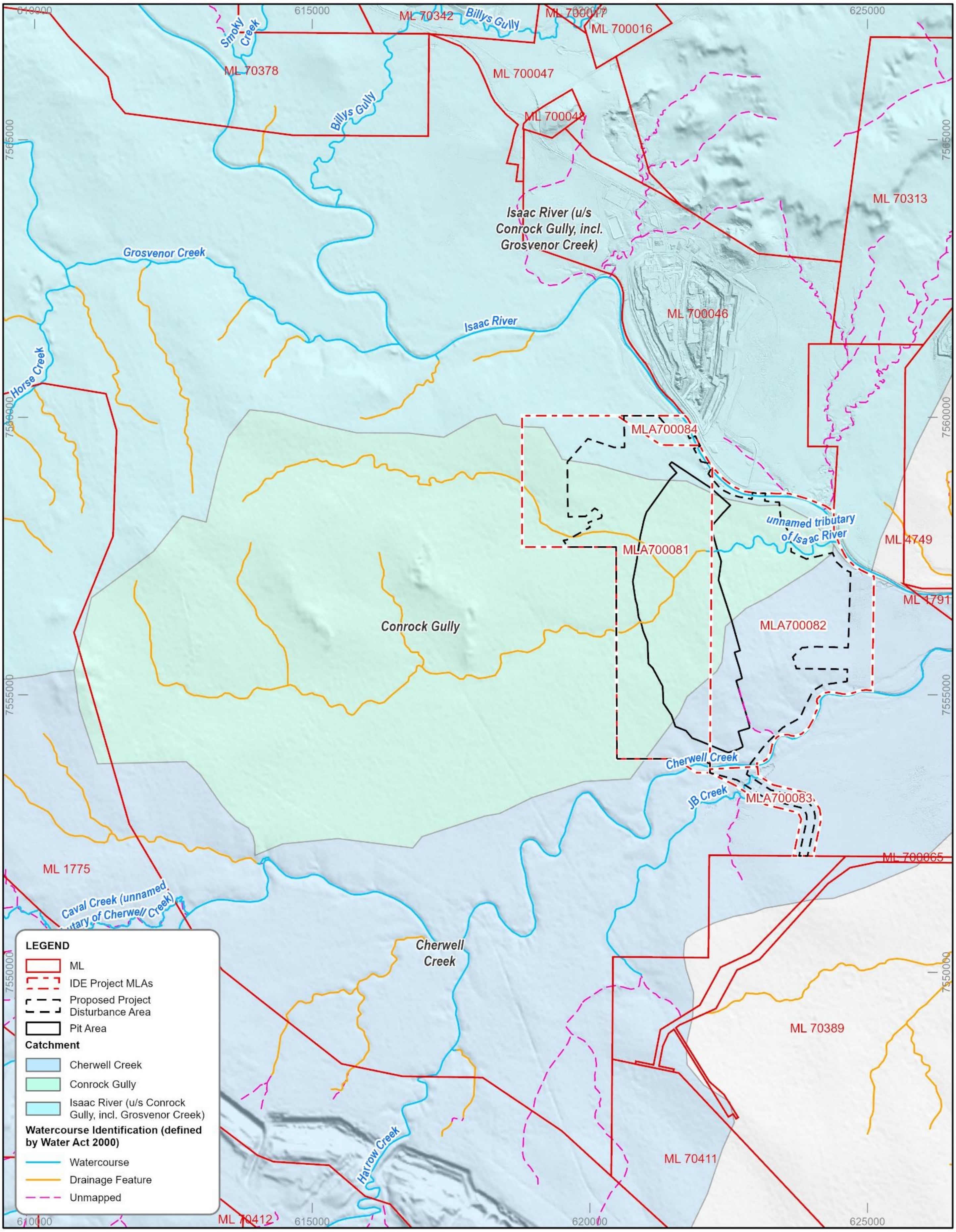
ISAAC DOWNS EXTENSION

Upper Isaac River Drainage

Figure | 8-2



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ISAAC DOWNS EXTENSION

Local Catchments and Watercourses

Figure | 8-3

8.3.4.2 Cherwell Creek and JB Gully

Cherwell Creek, a tributary of the Isaac River, runs west to east to the south of the Project area. The Cherwell Creek catchment begins in the Cherwell Range and Denham Ranges at an elevation of 380 m, west of the Project area, and flows downstream to join the Isaac River at an elevation of 200 m, east of the Project area. Cherwell Creek is approximately 65 km long to the Isaac River junction with a catchment area of approximately 698 km^2. Cherwell Creek and its tributaries have clearly defined channels.

The dominant land use within the Cherwell Creek catchment is beef cattle grazing, with substantial clearing of vegetation having occurred over time to improve pastures and increase grazing area. The Peak Downs Mine is located in the middle reaches of Cherwell Creek, about 13 km upstream of the Project, and has approval for controlled releases to Cherwell Creek. The catchment is not in pristine condition and is susceptible to the impacts of these land use activities, such as increase runoff, scouring, erosion and unstable creek banks.

Cherwell Creek was diverted in 1991 and 1995 as part of the progression of Peak Downs Mine. Both diversions replaced meandering sections of creek floodplain, terraces, benches, low flow channel, active channel, and high flow channel features with a relatively straight alignment and trapezoidal channel. The designs were developed in accordance with best practice at the time, which preceded DNRME (2019) as the current best practice design guideline. Erosion of the Cherwell Creek diversions in the form of channel widening and deepening, and reduced functioning of stream stabilisation structures, have been observed in previous years.

Within and adjacent the Project area, the natural low flow channel width varies between 15 m to 25 m wide and the high flow channel top width varies between approximately 100 m to 200 m. The channels are generally deeply incised to a depth of 6 m to 10 m. The channel banks slopes are typically 1(V) in 2(H) and vegetated with native long grass and scattered trees. A number of minor anabranches form along the length of Cherwell Creek, particularly within the Isaac River floodplain. The riverbed comprises mainly silty sands.

Cherwell Creek also includes a second order tributary, JB Gully, that runs west to east to the south of the Project area. JB Gully is significantly smaller than Cherwell Creek, with a typical main channel bed width of 1 m to 2 m and a depth of 2 m. The high flow channel near the confluence with Cherwell Creek is relatively wide, around 200 m to 300 m, likely due to natural head cut from Cherwell Creek backwater flows.

The Project’s planned secondary access route will cross Cherwell Creek, via a bridge, and JB Gully, via a bed-level crossing.

8.3.4.3 Conrock Gully

Conrock Gully has a catchment area of approximately 38 km^2 upstream of the proposed stream diversion, and approximately 71 km^2 to its confluence with the Isaac River.

The catchment extends west approximately 10 km from the western Project MLA boundary and east to the Isaac River confluence, at the east of the Project MLA boundary.

The Conrock Gully channel banks appear well vegetated and relatively stable. Digital elevation models acquired from 2012 to 2018 show no evidence of significant channel movement when compared to photographs taken in 2011.

A long section of the Conrock Gully channel bed in the vicinity of the Project area, approximately 6 km upstream from the confluence with the Isaac River, including the section that intersects the Project area, is shown in Figure 3.3 of **Appendix I**. The channel bed slope in this area is a uniform 0.14% (1 in 690), aside from a steeper downstream section at 0.48% (1 in 210) as Conrock Gully joins the Isaac River.

The Conrock Gully channel cross-section geometry can be typified by the generalised cross-section provided in Figure 3.4 of **Appendix I**, which was created from a statistical analysis of cross-section data collected from the topography within and surrounding the Project area. The median channel can be described as having a:

- base width of approximately 4 m
- side slope of 1V in 6H for the channel
- side slope of 1V in 30H on the channel overbank.

The channel is typically approximately 1.5 m to 3.5 m deep. At a depth of 2 m, the channel top width is typically approximately 50 m.

8.3.5 Streamflow

8.3.5.1 Isaac River at Deverill Stream Flow Gauge

The Isaac River at Deverill stream flow gauge (Deverill) is located 25 km downstream of Conrock Gully, and is operated by DNRMMRRD.

Figure 8-4 provides a ranked plot of the daily stream flows in the Isaac River recorded at Deverill. The following salient points are noted with respect to the recorded stream flows:

- The Isaac River is ephemeral with flows recorded only on 27% of days at Deverill. Flows above 100 megalitres per day (ML/d) occur for less than 10% of days at Deverill. A flow of 100 ML/d would not fully inundate the bed of the Isaac River at Deverill.
- The mean daily flow for all days is 430 ML/d at Deverill.
- The highest recorded flow, 2,638 cubic metres per second (m^3/s), at Deverill occurred in March 1988 where the river reached a gauge height of 11.4 m.

The downstream reach of Conrock Gully, including the proposed diversion, will be impacted by Isaac River flood flows. Hydraulic modelling presented in Section 9.5 of **Chapter 9** indicates Isaac River flood flows will back up into Conrock Gully during a 50% annual exceedance probability (AEP) (1 in 2 year) regional flood event, which is equivalent to a 375 m^3/s (32 ML/d) peak discharge in the Isaac River at Deverill. Isaac River floodwaters are expected to back up into Conrock Gully for approximately 15% of total days or around 55% of Isaac River flow days.

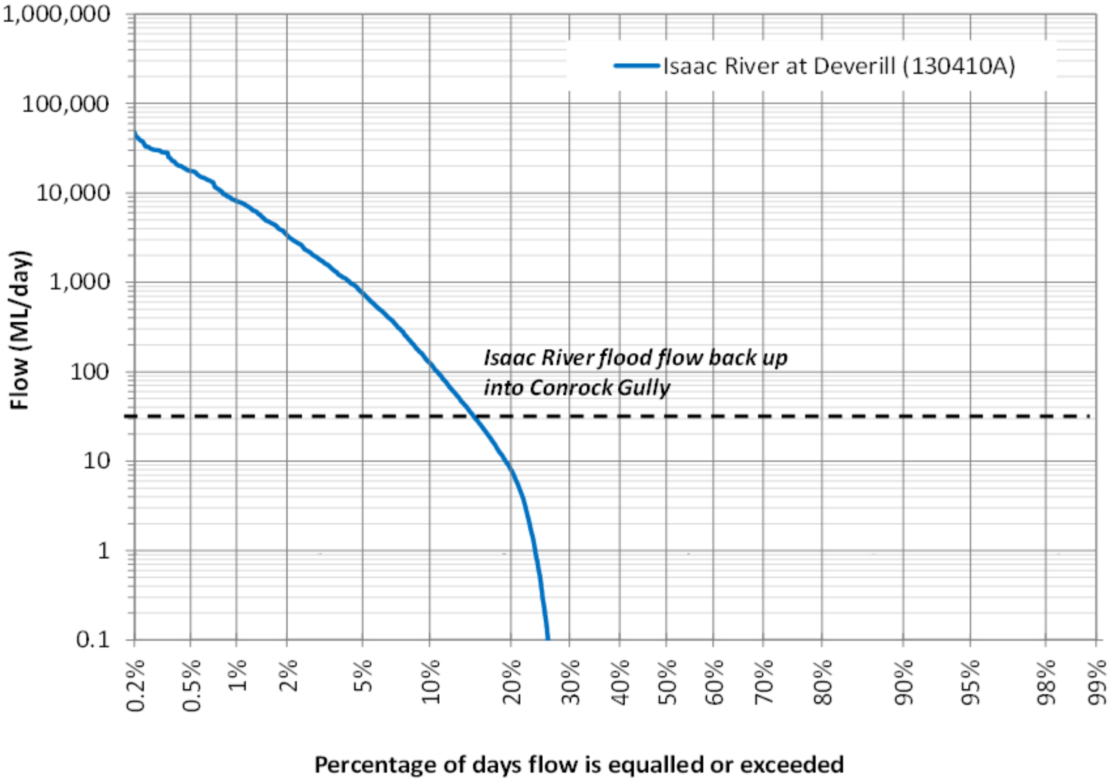


Figure 8-4 Stream Flow Duration Curves – Isaac River's Deverill Gauge

8.3.5.2 Isaac River at Stanmore Stream Flow Gauge

Stanmore has operated a stream flow gauge on the Isaac River in the vicinity of IDM since August 2021. The IDM stream flow gauge (gauge no. 333925) is located approximately 4.5 km upstream of the Conrock Gully confluence.

The recorded stream flows in the Isaac River at the IDM stream flow gauge are shown as water levels in Figure 3.8 of **Appendix I**. At the IDM stream flow gauge, Isaac River flows were recorded on approximately 6.6% of days over the four-year period of operation. Flows of greater than 100 ML/d occurred for less than 1.2% of days at this location over the four-year period of operation.

During April 2025, a maximum water level of around 6.292 m was recorded for the Isaac River at the IDM stream flow gauge, which corresponded to a flow of 1,028 m^3/s (approximately 88,819 ML/d).

8.3.5.3 Conrock Gully Stream Flows

There are no streamflow gauges on Conrock Gully, and as a result, there is no current or historical streamflow data for Conrock Gully.

Stanmore has operated a stream gauge on Billy's Gully at the nearby IDM since 2013 (gauge no. 332402). Billy's Gully has a similar catchment area (68 km^2) and general characteristics to Conrock Gully. Therefore, an analysis of the Billy's Gully streamflows was undertaken to represent the potential flows in Conrock Gully.

The recorded streamflows in Billy's Gully, along with recorded rainfall, is displayed in Figure 3.9 of **Appendix I**. At Billy's Gully streamflow gauge, flows were recorded on approximately 0.1% of days. During February 2016, a maximum water level was recorded at Billy's Gully of around 2.6 m at the gauge.

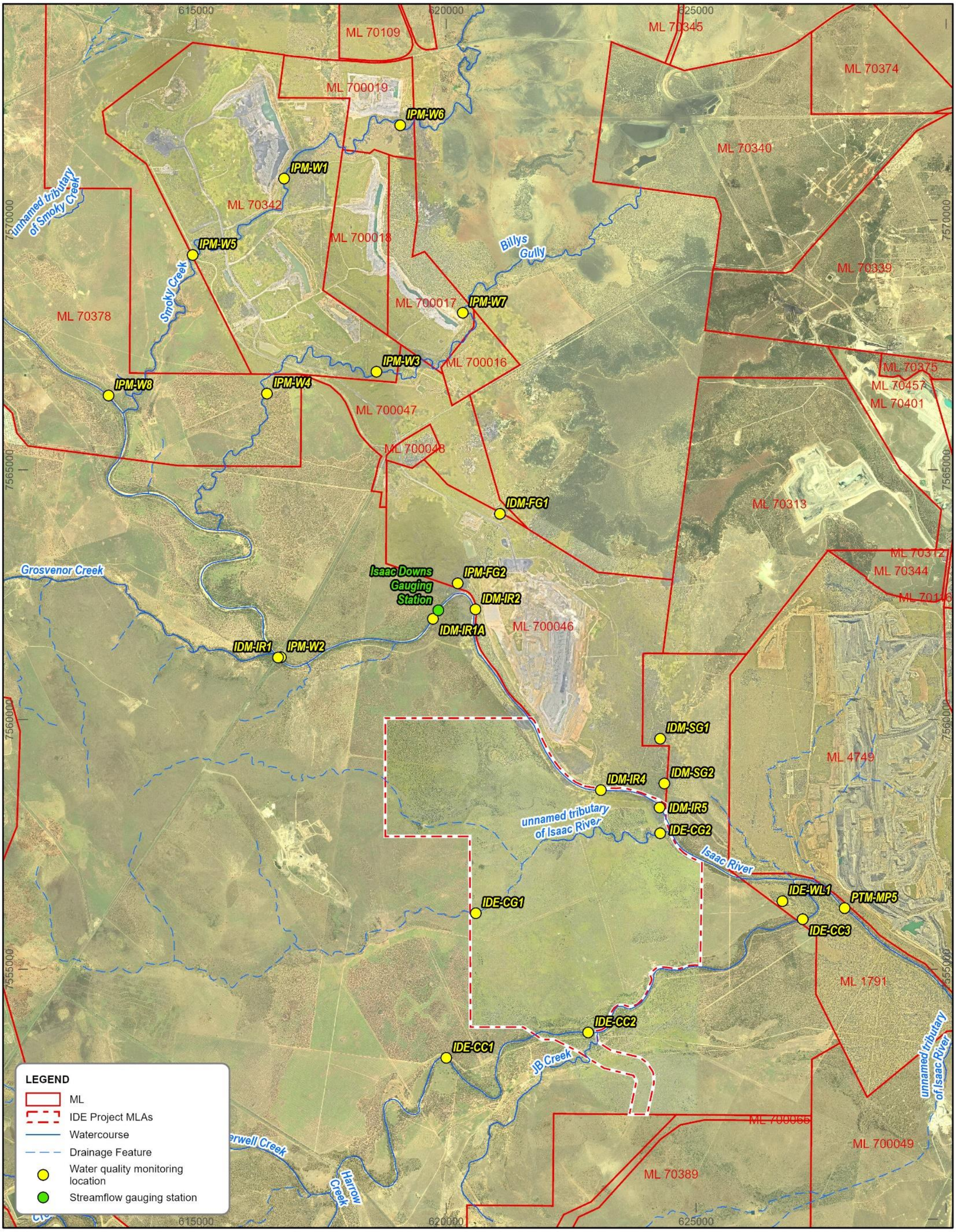
8.3.6 Water Quality

8.3.6.1 Monitoring Locations

Water quality monitoring results for the area surrounding the Project area are available from a number of gauging stations, in addition to the baseline monitoring that has been undertaken by Stanmore at the Project area and nearby IPC operations. Details on the water quality monitoring locations are summarised in Table 3.1 of **Appendix I** (including number of sampling events), and their locations are shown in Figure 8-5. These locations are associated with IPC (comprising IDM and IPM) and Poitrel Mine.

As IDM adjoins the Project, with the Isaac River located between IDM and the Project, monitoring sites along the Isaac River, associated with IDM, have also been used as the Project monitoring sites upstream, adjacent and downstream of the Project, to avoid unnecessary duplication of monitoring sites. Monitoring sites along Cherwell Creek (3 sites), Conrock Gully (2 sites) and a wetland (1 site) were established for the Project as there were no historical monitoring sites within and adjacent the Project area.

In combination these monitoring locations are representative of the surface water environment within and surrounding the Project area.



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Metres

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ISAAC DOWNS EXTENSION

Local Water Quality Monitoring Locations

Figure | 8-5

8.3.6.2 Regional Water Quality

Publicly available regional water quality data for the Isaac River at the Burton Gorge, Goonyella and Deverill gauging stations have been analysed and a comparison of 20th percentile, median and 80th percentile water quality at these sites to the WQOs/DGVs are displayed in Table 3.2 of **Appendix I**. These sites were selected because complete datasets (i.e. individual sample analysis results) are publicly available as opposed to only summary data being publicly available.

The Isaac River (Burton Gorge) and Isaac River (Goonyella) stations are no longer operating, having ceased operation in 1988 and 2021, respectively.

The Isaac River (Goonyella) and Isaac River (Deverill) stations are located downstream of several operating mines, and therefore, may potentially include releases from these mines. The Isaac River (Burton Gorge) and Isaac River (Goonyella) stations are about 78 km and 42 km upstream of the Project, respectively. The Isaac River (Deverill) station is located about 24 km downstream of the Project. These stations provide an indication of water quality and in particular metal toxicants in the Isaac River upstream and downstream of the Project.

The water quality data show that some readings at these monitoring locations are at or above the relevant WQO/DGV, including the following:

- dissolved aluminium at Goonyella and Deverill (80th percentile);
- dissolved copper at Goonyella and Deverill (median and 20th/80th percentile);
- EC at Goonyella (80th percentile) exceeds the high flow DGV;
- dissolved iron at Burton Gorge (median and 80th percentile) and Deverill (80th percentile);
- nitrate at Burton Gorge (median and 80th percentile) and Goonyella (median and 80th percentile) and Deverill (80th percentile);
- total sodium at Burton Gorge/Goonyella (median and 80th percentile) and Deverill (90th percentile);
- total suspended solids at all three sites (median and 80th percentile values);
- turbidity at Burton Gorge (median and 20th/80th percentile) and Goonyella (median and 80th percentile) and Deverill (80th percentile); and
- dissolved zinc at Goonyella/Deverill (median and 20th/80th percentile).

These results indicate that the current WQOs/DGVs may not necessarily reflect the typical background water quality within the upper Isaac River. It is acknowledged that some exceedances at the Goonyella and Deverill stations may potentially be associated with coincident water releases from upstream mining operations.

8.3.6.3 Local Water Quality

Taken as a whole, the water quality data from IPM, IDM and Project specific monitoring provides a comprehensive dataset of local water quality. Water quality sampling has been done in accordance with the Monitoring and Sampling Manual (DES, 2018).

Water quality data from IPM is shown in Table 3.3 to Table 3.5 of **Appendix I**. This includes 26 and 44 samples at each of the two Isaac River monitoring sites associated with IPM, which are upstream of the Project.

Water quality data from IDM is shown in Table 3.6 to Table 3.8 of **Appendix I** This dataset includes sites which form part of the Project's baseline water quality monitoring as they are shared with IDM. There are between 12 and 20 samples per monitoring site (5 sites) along the Isaac River. For the upstream and downstream sites for IDM (sites IR1 and IR4 with data from 2020 to 2025), the data shows:

- median EC values of 209 µS/cm and 307 µS/cm
- pH is slightly alkaline;

- median TSS values of 315 mg/L and 111 mg/L
- aluminium, copper, iron and sodium exceed the ANZG (2018) WQOs for multiple samples.

Project water quality data (where it is not already included in an IDM dataset) is shown in Table 3.9 and Table 3.10 of **Appendix I**. As flows in these local watercourses are ephemeral and access can be constrained for health and safety reasons, the number of samples over the study period for the Project is limited with around 3 – 5 samples per location. Certain baseline water quality values surrounding the Project do not meet the WQOs for the region, these include:

- electrical conductivity and sulphate
- turbidity and TSS
- sodium
- aluminium, copper, zinc and iron (dissolved)

In addition, water quality data from a monitoring site utilised for monitoring water quality upstream of Poitrel Mine, and which is downstream of the Project, had 10 sampling events.

A review of the Isaac River WQOs have been undertaken with reference to the Information Guidelines Explanatory Note - Deriving site-specific guideline values for physico-chemical parameters and toxicants (Huynh & Hobbs, 2019).

To establish local WQOs, the QWQG require that with 3 or more reference sites, 12 samples are collected over at least 12, but preferably 24 months. Stanmore has established 8 reference sites along the Isaac River between the IPM, IDM and Poitrel operations. These reference sites have been used to collect a large database of water quality sampling information along the local reach of the Isaac River, with up to 150 samples across the 8 sites, over the period 2016 to 2026. The majority of the samples (around 85%) have been collected in the last 5 years (since 2021).

Statistical analysis of this water quality data from these 8 sites is presented in Table 8-8 with a comparison to WQOs/DGVs, which shows the following:

- The 80th percentile value for dissolved aluminium (0.212 mg/L) is almost four time the WQO trigger value (0.055 mg/L).
- The 80th percentile value for dissolved copper (0.003 mg/L) is more than double the WQO trigger value (0.0014 mg/L).
- The 80th percentile value for turbidity (1,930 NTU) is significantly higher than the WQO trigger value (50 NTU).
- The 80th percentile value for total suspended solids (1,050 mg/L NTU) is significantly higher than the WQO trigger value (55 mg/L).

Based on this water quality data, the following site-specific trigger values are proposed based on the 80th percentile for Isaac River water quality where site specific values exceed the WQOs/DGVs:

- Dissolved aluminium – 0.212 mg/L
- Dissolved copper – 0.003 mg/L
- Total suspended solids (TSS) – 1,050 mg/L

There are no proposed changes for turbidity, as it is not typically included as a WQO in contemporary EAs, with TSS usually used in its place.

Site specific trigger values cannot be derived for Cherwell Creek and Conrock Gully as there is insufficient data to establish local WQOs in accordance with the QWQG. This is typical for the ephemeral watercourses and creeks in the region where many years of data may be required to capture sufficient information.

Table 8-8 Combined Isaac River Water Quality Data

Parameter	Units	Limit of Reporting	Combined Isaac River Sites				*WQO*
			No. Samples	20%ile value	Median	80%ile value	
pH (Lab)	-	0.01	158	7.36	7.57	7.80	*6.5-8.5*
Electrical Conductivity (Lab)	µS/cm	1	158	148	227	377	*250-720*
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	152	3	7	14	*25*
TSS	mg/L	5	148	85	225	1,050	*55*
Turbidity	NTU	0.1	158	242	479	1,930	*50*
Aluminium (filtered)	mg/L	0.01	152	0.010	0.030	0.212	*0.055*
Arsenic (filtered)	mg/L	0.001	152	0.001	0.001	0.001	*0.013*
Boron (filtered)	mg/L	0.05	143	0.05	0.06	0.08	*0.94*
Cadmium (filtered)	mg/L	0.0001	152	0.0001	0.0001	0.0001	*0.0002*
Chromium (III+VI) (filtered)	mg/L	0.001	152	0.001	0.001	0.001	*0.001*
Cobalt (filtered)	mg/L	0.001	152	0.001	0.001	0.001	*0.0014*
Copper (filtered)	mg/L	0.001	151	0.001	0.002	0.003	*0.0014*
Iron (filtered)	mg/L	0.05	143	0.005	0.08	0.206	*0.28*
Lead (filtered)	mg/L	0.001	152	0.001	0.001	0.001	*0.0034*
Manganese (filtered)	mg/L	0.001	143	0.001	0.001	0.0026	*1.9*
Mercury (filtered)	mg/L	0.0001	143	0.0001	0.0001	0.0001	*0.0002*
Molybdenum (filtered)	mg/L	0.001	142	0.001	0.001	0.001	*0.034*
Nickel (filtered)	mg/L	0.001	151	0.002	0.002	0.003	*0.011*
Selenium (filtered)*	mg/L	0.01	142	0.01	0.01	0.01	*0.005*
Silver (filtered)	mg/L	0.001	143	0.001	0.001	0.001	*0.001*
Sodium (filtered)	mg/L	1	138	15	26	45	*188*
Uranium (filtered)	µg/L	1	143	1	1	1	*1*
Vanadium (filtered)	mg/L	0.01	142	0.01	0.01	0.01	*0.01*
Zinc (filtered)	mg/L	0.005	152	0.005	0.005	0.005	*0.008*
Fluoride	mg/L	0.1	152	0.1	0.1	0.2	*0.32*
TRH C6-C9	mg/L	79	40	20	20	20	*20*
TRH C10-C36	mg/L	78	40	100	100	100	*100*
*The exceedance for filtered Selenium is due to the limit of reporting being above the WQO trigger value							

8.3.7 Existing Water Use Entitlements

There are 10 licences to take water from the Isaac River downstream of the Project which have been issued for irrigation, stock watering, domestic supply and water harvesting, as shown in Figure 3-14 of **Appendix I**. The nearest of these licences is 25 km downstream. Detailed information regarding individual licences for Isaac River surface water users was obtained through analysis of water licences data provided by DNRMMRRD. Some limitations in the dataset include the absence of names of water users, and in some cases, allocated volumes for water licenses due to privacy restrictions. Details regarding the volume, source and purpose of the licences is included in Table 3.11 of **Appendix I**.

There are also several historical riparian water access notifications along the Isaac River which authorise stock and domestic supplies only. Section 20 of the Water Act provides that an owner of land adjoining a watercourse may take water for domestic and stock purposes without the need for a permit or licence.

The above information indicates that there is currently minimal use of surface water from the Isaac River downstream of the Project, and water use is limited to irrigation and stock watering.

8.3.8 Wetlands

Wetlands in the vicinity of the Project are described in **Chapter 12**, which also provides an assessment of the potential impacts to wetlands, and the proposed management measures to mitigate impacts to wetlands.

8.4 Water Management System

8.4.1 Overview and Objectives

The water management system (WMS) is the primary management measure to mitigate Project impacts to surface water quality and flows. Hence the design of the system, as demonstrated in this and subsequent sections, is crucial to achieving its objectives.

This WMS forms the basis for a water management plan for the Project. It outlines specific, measurable and time-bound management measures for storage, transfers, releases and monitoring associated with the Project's water management system, and is designed to protect downstream EVs. These measures provide the necessary information to underpin operational controls that may be linked to the identified water management measures.

There are different water types for the purposes of developing the WMS:

- Mine-affected water – as defined in the Model Mining Conditions, is summarised as water that has come into contact with coal seams (e.g. groundwater or runoff in the pit, or runoff from run-of-mine (ROM) coal pads).
- Sediment water - runoff from areas that are disturbed by mining operations (including waste rock / overburden dumps)[10], which may contain high sediment loads but does not contain elevated levels of other water quality parameters (e.g. EC, pH, metals, metalloids, non-metals). This runoff must be managed to ensure adequate sediment removal prior to release to receiving waters.
- Clean or diverted water - surface runoff from areas unaffected by mining operations. Clean catchment water includes runoff from undisturbed areas and fully rehabilitated areas.
- Raw or external water - untreated water, generally from an external water supply, that has not interacted with mining activities. For the Project, raw water is supplied to IPC under an existing contract with Sunwater, with water coming from the Eungella / Burdekin dam pipeline (i.e. with a water quality that is typical of dams and watercourses).

[10] The terms 'overburden', 'spoil' and 'mine waste rock' are used synonymously in this EIS, and include interburden.

- Contaminated water - runoff from areas potentially containing hazardous chemicals as well as flammable and combustible liquids (including petroleum products), generally associated with infrastructure areas. For the Project this is limited to local areas within the go-line area.
- Potable water - treated water suitable for human consumption. For the Project, potable water will be trucked to site for the limited office and crib room requirements during construction and operation. These requirements will not exceed existing potable water requirements for IPC, which is a supply managed under agreement with the Isaac Regional Council (IRC).

The are three key WMS objectives are as follows:

- Minimise mine-affected water accumulation within the Project's WMS and the risk of uncontrolled discharges.
- Maintain sufficient water for the operations during dry periods.
- Successfully engage with external stakeholders to be a good custodian of society's water resources.

Specific objectives for each water type are as follows:

- Mine-affected water: minimise generation, maximise reuse and prevent uncontrolled releases.
- Sediment water: minimise generation, maximise reuse and remove sediment prior to discharge.
- Clean/diverted water: separate the mine-affected and sediment water systems as much as reasonable and feasible and allow it to pass uninterrupted through the catchment.
- Raw/external water: Ensure that external water allocation and associated infrastructure is sufficient to meet site demands particularly under low rainfall conditions.
- Contaminated water: Ensure full separation from other water sources and manage to prevent contaminant release, including under the requirements of AS1940 – Storage and Handling of Flammable and Combustible Liquids.

These objectives are supported by the following management principles:

- Minimise land disturbance.
- Reduce the size of mine-affected, sediment, and contaminated catchments.
- Divert clean water around disturbed areas.
- Capture mine-affected and sediment-laden runoff in dams (with sediment dams designed to allow for sediment removal prior to discharge in accordance with erosion and sediment control best practice).
- Reuse mine-affected and sediment water on site for dust suppression activities.
- Conduct controlled releases of mine-affected water in accordance with the proposed EA conditions to protect downstream EVs.

8.4.2 Integration of the Water Management System into IPC

Crucially the Project's WMS has been integrated with the WMS for the rest of IPC. This integration allows for balancing of mine-affected water across the system as a whole, with excess water transferred from the Project to IPC during wet climatic conditions, and water transferred to the Project from the rest of IPC in dry climatic conditions. As mine-affected water would be transferred to and from IDM as the closest part of IPC to the Project, transfers are described as occurring with IDM.

As the Project will replace mining activities at IDM, controlled releases from the Project will not occur coincidently with any potential releases from IDM.

The integrated WMS also allows for the import of raw water, if required for the Project, from the existing Sunwater allocation.

8.4.3 Proposed Water Management Infrastructure

8.4.3.1 Overview

Figure 4.1 to Figure 4.6 of **Appendix I** (as taken from **Chapter 4**) shows the locations of the key water management features of the proposed Project area over the life of mine for a series of selected Project years or stages. These plans show the progression of the active mining pit from west to east.

Key water management infrastructure proposed as part of the Project and their indicative timing are described below. The majority of the proposed surface water infrastructure is constructed by Year 1, and remains generally constant throughout the life of the Project with the exception of the additional sediment dams constructed by Year 6 and Year 16:

- Constructed by Year 1
  - Three mine-affected water (MAW) dams - MAW1, MAW2 and MAW3.
  - Eight sediment dams (SD) that collect runoff from the out-of-pit dumps, low wall spoil emplacements and non-coal contact disturbed areas - SD1, SD3, SD4, SD5, SD6, SD7, SD10 and SD11.
  - A clean water dam (CWD) that collects runoff from undisturbed and cleared areas ahead of the mining pit - CWD.
  - A proposed diversion of Conrock Gully, with associated flood protection bunds and waterway channel plugs.
- Constructed by Year 6
  - Two additional sediment dams that captures runoff from out-of-pit dumps – SD2 and SD8.
- Constructed by Year 16
  - One additional sediment dam that captures runoff from disturbed land – SD9.

8.4.3.2 Mine-affected Water Management

MAW2 (235 ML) is the primary MAW storage, with an operating configuration that:

- receives pit dewatering from the active pits
- receives pumped inflows from MAW1 and MAW3
- supplies dust suppression water demands
- can pump excess MAW to IDM (i.e. transfers of MAW in the integrated WMS)
- can import water from IDM if there is a shortfall of water at the Project
- has a proposed controlled release point to the receiving environment (release to Conrock Gully diversion about 900 m from confluence with the Isaac River).

MAW1 (40 ML) and MAW3 (20 ML) capture water from ROM pads and go-line areas, and pump water to MAW2.

Controlled releases will only occur in accordance with the controlled release strategy described in Section 8.5.7.

Importantly, as the Project will replace mining activities at IDM, controlled releases from the Project will not occur coincidently with any potential releases from IDM. Project operations will occur following the cessation of operations at IDM, when mine water will accumulate in the approved IDM void and not be released to the environment. That is, there will be no simultaneous release of water from both IDM and the Project. The intent of the Project's controlled release strategy is to adopt the same release conditions as currently approved at IDM.

MAW will be supplied via a dedicated pipeline from IDM should mine-affected water reserves at the Project be depleted. This dedicated pipeline will also be used to transfer excess mine-affected water from the Project to IDM as required. The mine water transfer pipeline will be installed in a linear infrastructure corridor adjacent to the haul road, and will be fitted with leak detection shut-off valves. Where the water pipeline crosses the Isaac River, the pipe will either be located with the bridge or will be trenched and buried below predicted scour depth with the pipe encased through a larger diameter pipe (enveloper) to protect it from damage. The mine water pipeline will be approximately 300 – 400 mm diameter polyethylene pipe. Pumps will be used to transfer water along the pipelines. Mine water transfer pipelines will include engineered controls such as isolation valves, pressure release valves and flow meters, to prevent or minimise any accidental releases of water during transfer between IDM and the Project.

8.4.3.3 Sediment Water Management

Sediment water will be managed in accordance with the ESCP, as provided in **Appendix AD**, and summarised in Section 8.7.10. The proposed sediment dams are a key design feature of the ESCP.

Eleven sediment dams are proposed to be constructed over the life of mine to capture runoff from dumps, haul roads and cleared areas in advance of the highwall progression.

The proposed sediment dams have been sized in accordance with the International Erosion Control Association (IECA) method (IECA, 2018), based on the following design standards and methodology:

- ‘Type D’ sediment dams.
- Total sediment dam volume = settling zone + sediment storage volume. The sediment storage volume is the portion of the basin storage volume that progressively fills with sediment until the basin is de-silted. The settling zone is the minimum required free storage capacity that must be restored within 5 days after a runoff event.
- Sediment dam settling volume based on 85th percentile 5-day duration rainfall (32.9 mm, calculated per eq. B8 in IECA guidelines) with an adopted volumetric event runoff coefficient for disturbed catchments of 0.54 (Group C soils – loamy clay with a 20% factor for steep catchments).
- Solids storage volume = 50% of settling zone volume.

The adopted design standard does not provide 100% containment for runoff from disturbed areas. Hence, it is possible that overflows will occur from sediment dams if rainfall exceeds the design standard. To minimise passive releases from sediment dams and maximise water reuse, the water collected by the sediment dams will be reused on-site where possible (e.g. dust suppression).

A summary of the conceptual sediment dam capacities is provided in Table 4.2 of **Appendix I**, ranging in size from 3 ML to 63 ML.

8.4.3.4 Clean Water Management

The infrastructure for clean water management at the Project comprises:

- diversion of Conrock Gully
- levee along the Isaac River and levee plug along Cherwell Creek
- clean water catchment reporting to the CWD, comprising undisturbed catchment between the mining operations and the Isaac River levee.

Chapter 9 provides a detailed assessment of the diversion of Conrock Gully and the proposed levees. In the context of the Project’s WMS, this infrastructure separates clean water, including flood flows, in Conrock Gully, the Isaac River and Cherwell Creek from Project operations (i.e. mine pit, dumps, MAW dams, infrastructure areas). The diversion and levees are sized to prevent a 0.1% AEP (1 in 1,000 year) flood event from interacting with mining operations.

The CWD is approximately 200 ML. Following rainfall events clean water will be pumped over the levee into the remnant Conrock Gully downstream of the levee.

8.4.3.5 Raw Water

Raw water will be supplied via a separate pipeline from the raw water dam at IPM, which is supplied under a contract with Sunwater for offtake from the existing Eungella Burdekin water supply pipeline. Raw water is only required to supply vehicle washdown and firefighting requirements. However, it could potentially provide an emergency supply of water should mine-affected water reserves at the Project be depleted. Controls will be installed on raw water pipelines to manage any accidental releases, noting that this water is 'fresh'.

8.4.3.6 Potentially Contaminated Water

Facilities at the go line for the storage of fuels and minor maintenance requirements will be constructed and bunded in accordance with the relevant Australian Standard specifications, including but not limited to the provisions of AS 3780:2008 – The storage and handling of corrosive substances, AS 1940:2004 – The storage and handling of flammable and combustible liquids (AS 1940), AS 3833:2007 – Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers.

Hazardous substances Safe Operating Procedures (SOP) will be in place at these operations. A register will be maintained on site for all chemicals. Where appropriate, material safety data sheets will be kept in storage areas or available for on-line access, as required.

Fuel storage areas are a potential source of hydrocarbons, and fuel storage areas will be constructed and bunded in accordance with the relevant specifications of AS1940. Fuel storage areas will be inspected regularly, with repair and maintenance work completed as required. Bunds filled with stormwater will be drained or pumped out by a licensed contractor as soon as practicable to maintain the bund volume.

A waste oil system will collect all waste oils for transfer offsite or recycling onsite, so that waste oils are not released to the environment. Lubricants will be stored in a bunded concrete area with a sump to collect any spills.

All runoff from areas with potential contaminants will pass through water management controls such as an oily water separator or sediment trap before entering the mine affected water management system.

Incident reporting and the management of spills will be undertaken in accordance with the site operational incident reporting forms and procedures. A spill response protocol will be developed and implemented. Spills management procedures will be designed to contain and remediate any spills of fuels or chemicals to prevent impacts to surface waters. Spill kits will be available close to areas where chemicals are being regularly used or stored.

Specific waste bins and bunding will be used to isolate waste liquids, chemicals and hazardous wastes.

Hazardous liquid wastes awaiting disposal, such as hydrocarbons and oils, will be stored appropriately in accordance with AS1940:2004 'The storage and handling of flammable and combustible liquids'.

All areas containing potential contaminants or hazardous wastes will be protected from flooding by levees with flood protection for a 0.1% AEP (1:1,000 year) flood event. Hence, they will have a negligible risk of releasing contaminants during flood events.

8.4.4 Preliminary Consequence Category Assessment

A preliminary consequence category assessment (CCA) to inform the design of the Project's water storages has been undertaken in accordance with the Manual. Section 5 of **Appendix I** provides the details of the CCA.

The CCA considers the following scenarios to determine if the dams have a 'significant' or 'high' consequence, and hence should be considered regulated structures:

- failure to contain – overtopping
- failure to contain – seepage
- dam break.

Each of these potential failure modes is assessed in terms of potential for harm to humans, general environmental harm, and general economic loss or property damage. The Project context (i.e. regional location with limited potential for human or third party infrastructure interactions) and potential impacts on water quality if a failure were to occur, were assessed.

This preliminary CCA determined that none of the Project's water storages are regulated structures. As such, there are no required hydraulic performance criteria for water storages at the Project.

This preliminary CCA for the Project was based on conceptual design information for the proposed water storages. The CCA will be reviewed and revised during detailed design as more information becomes available for the design of dams, at which time certified copies of the consequence category determination from a Registered Professional Engineer of Queensland will be provided to the administering authority.

8.5 Water Balance Model

8.5.1 Methodology

A computer-based operational simulation model, GoldSim, was used to assess the dynamics of the water balance under varying rainfall and catchment conditions throughout the operation of the Project. Water balance modelling pertains to the operational period of mining activities.

The Project is interconnected with the historical and ongoing mining operations at IPC. Therefore, to accurately assess the behaviour of the Project, as well as the adequacy of the connected IPC infrastructure, IPM and IDM have been considered in the Project water balance model. The Project is integrated with IPC through the ability to transfer mine-affected water between the sites and through supply of raw water (external supply) from IPC.

Section 6 of **Appendix I** describes the water balance model in detail. In the description of modelling, the 'IPC water management system' refers to the existing water management systems at IPM and IDM, prior to the integration of the Project into IPC; and the term 'IDE' is used interchangeably with 'the Project'.

The GoldSim model dynamically simulates the operation of the water management system and keeps account of all site water volumes and salt loads on a daily time step. The simulated inflows and outflows included in the model are:

- inflows:
  - direct rainfall on water surface of storages
  - catchment runoff
  - groundwater inflows to the open cut pit
  - external water supply from IPC
- outflows:
  - evaporation from water surface of storages
  - dust suppression demand
  - miscellaneous water demand
  - water transfer to IPC
  - offsite releases from sediment dams in accordance with design criteria
  - controlled releases in accordance with the proposed release strategy.

The Project's water management system will change over the approximate 16-year mine life, including changes in catchment areas, mining progression and site water demands. To represent the evolution of the mine layout over time, the Project was modelled in six discrete phases. One-year to five-year representative periods have been selected to reflect the average conditions over the mine phase, being:

- Year 1 / Phase 1(construction year)

- Year 2 / Phase 2
- Year 4 / Phase 3
- Year 6 / Phase 4
- Year 11 / Phase 5
- Year 16 / Phase 6 (final year of operations).

8.5.2 Climate and Climate Change

Rainfall and evaporation information was obtained from the Scientific Information for Land Owners (SILO) climate database facility operated by DETSI, based on data derived from the Bureau of Meteorology.

The potential changes to climate within the operational life of the Project were assessed using the Australian Government Consistent Climate Scenarios (CCS) project (see Section 7.4 of **Appendix I**). This was used to generate climate change adjusted rainfall and evaporation data, which transformed historical climate data from the period 1960 and 2024 (64 years).

The Shared Socioeconomic Pathway SSP2-8.5 was selected as the emission pathway for the Intergovernmental Panel on Climate Change assessment report AR5, with a base case global warming sensitivity for the Year 2050. The Year 2050 was selected as it represents the general period of time by when Project mining operations cease, conservatively overestimating the degree of climate change during the proposed operational period ending 2043.

The 64 years of CCS data was compared with the baseline SILO rainfall and evaporation dataset, with the following observations:

- The CCS data predicts an overall 15% decrease in rainfall over the 65-year period.
- The CCS data predicts an overall 8.5% increase in Morton's Lake evaporation over the 65-year period.

These factors have been applied to the baseline 136 years of SILO data that has been used for the forecast operational water balance assessment with climate change. This is considered a highly conservative approach, as it applies the 2050 climate change factors to the climate data from the commencement of operations in 2029.

8.5.3 Catchment Yield Parameters and Catchment Areas

The Australian Water Balance Model (AWBM) model was used to represent the runoff characteristics of mine site catchments. To adequately simulate the site water balance, the runoff characteristics of the various catchment surface types were defined. Catchments were characterised into the following land use types:

- 'natural', representing areas undisturbed by mining
- 'hardstand', representing hauls roads and hardstand/cleared areas
- 'spoil', representing uncompacted dumped overburden material
- 'rehab'; representing rehabilitated emplacement areas
- 'pit', representing the pit floor
- 'cleared', representing areas disturbed ahead of mining (e.g. pre-strip).

Catchment areas for each modelled phase of operations were based on the staged mine plans provided in Figure 4-21 to Figure 4-26 of **Chapter 4**. The adopted catchment areas and land use types for each modelled phase of the Project are provided in Figure 8-6 to Figure 8-10 for each Project phase. A summary of adopted catchment areas and land use types for each modelled phase is provided in Table 6.4 of **Appendix I**.

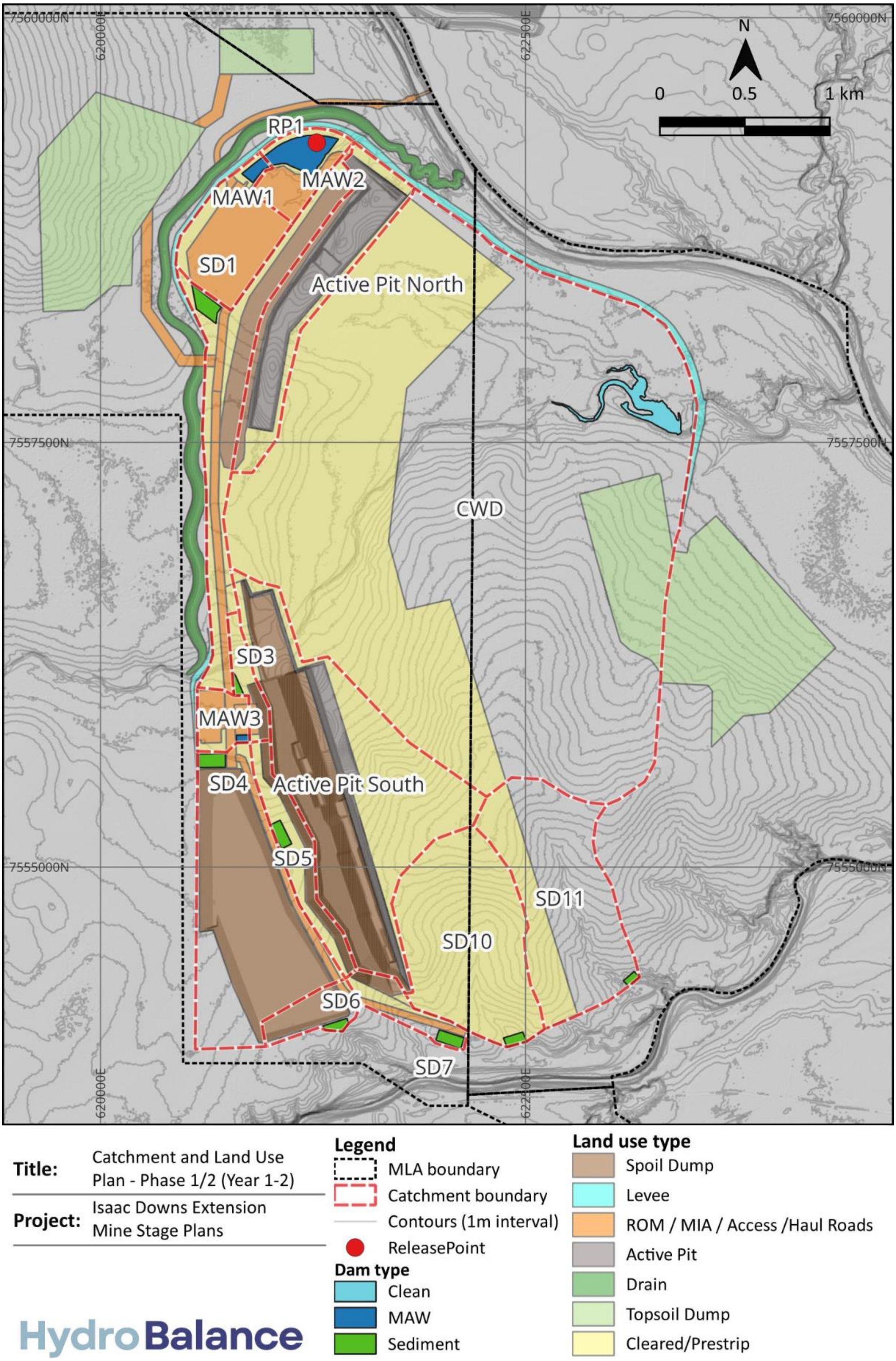


Figure 8-6 Catchment and Land Use Plan - Phase 1 and 2

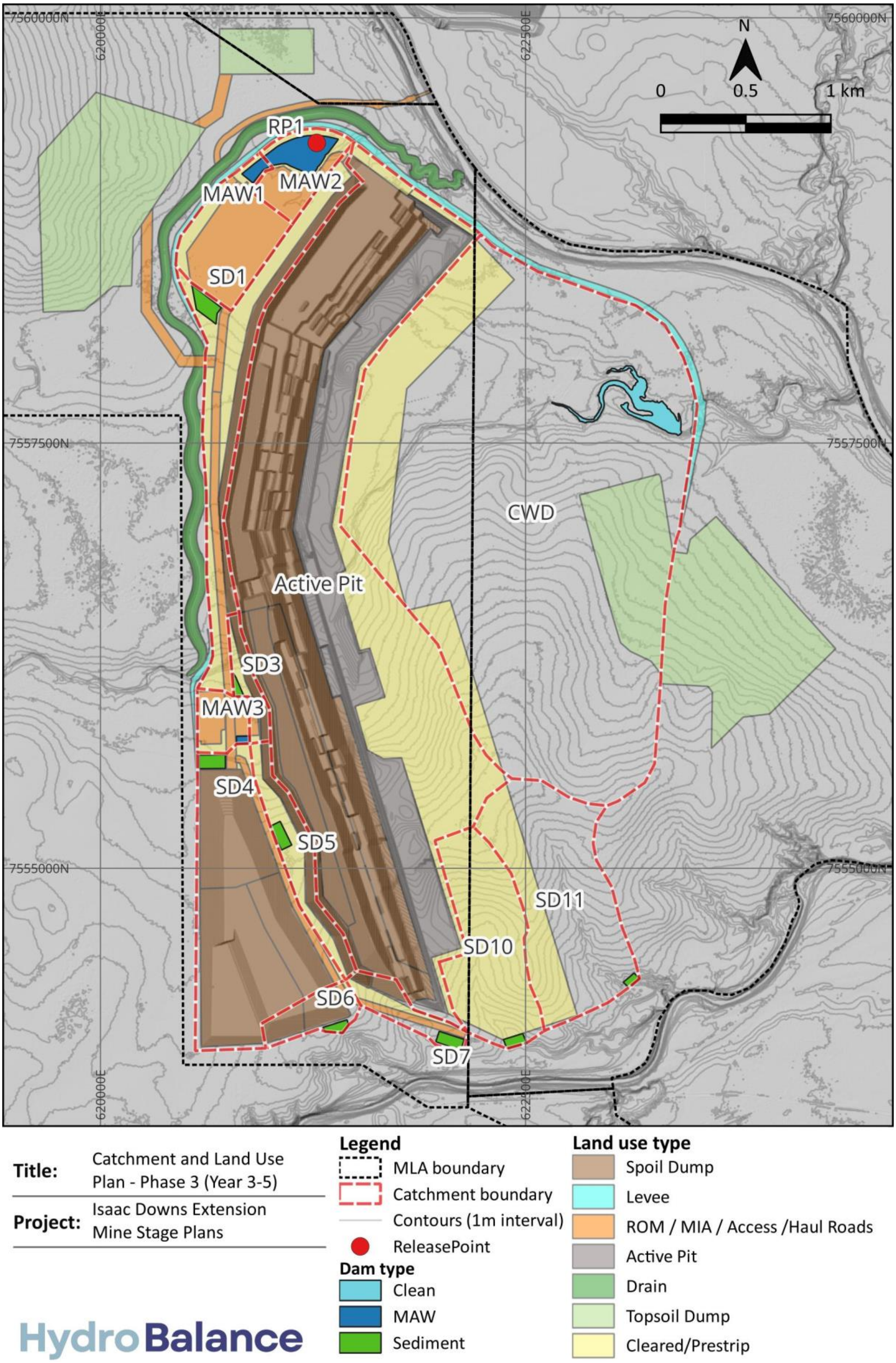


Figure 8-7 Catchment and Land Use Plan - Phase 3

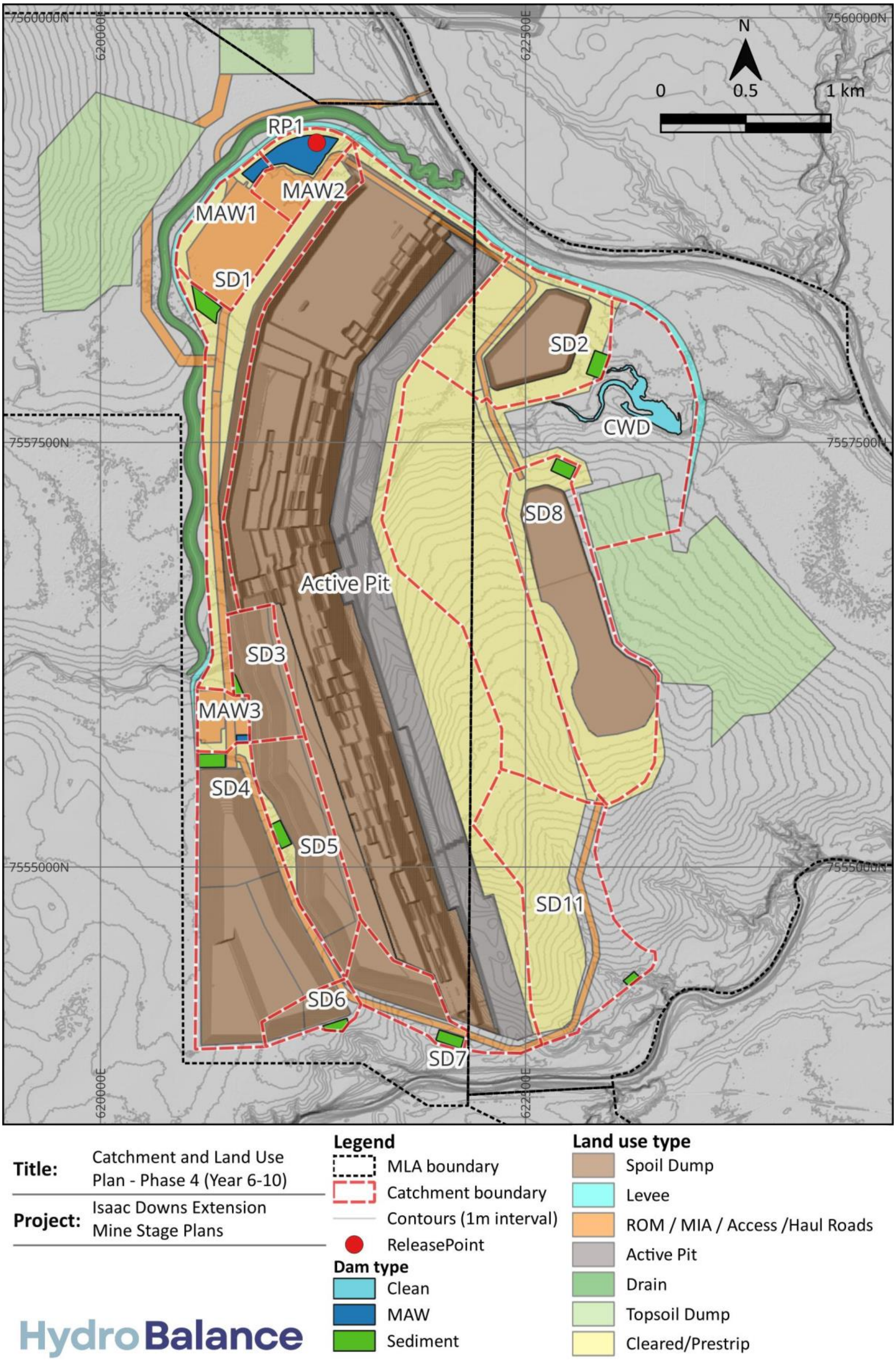


Figure 8-8 Catchment and Land Use Plan - Phase 4

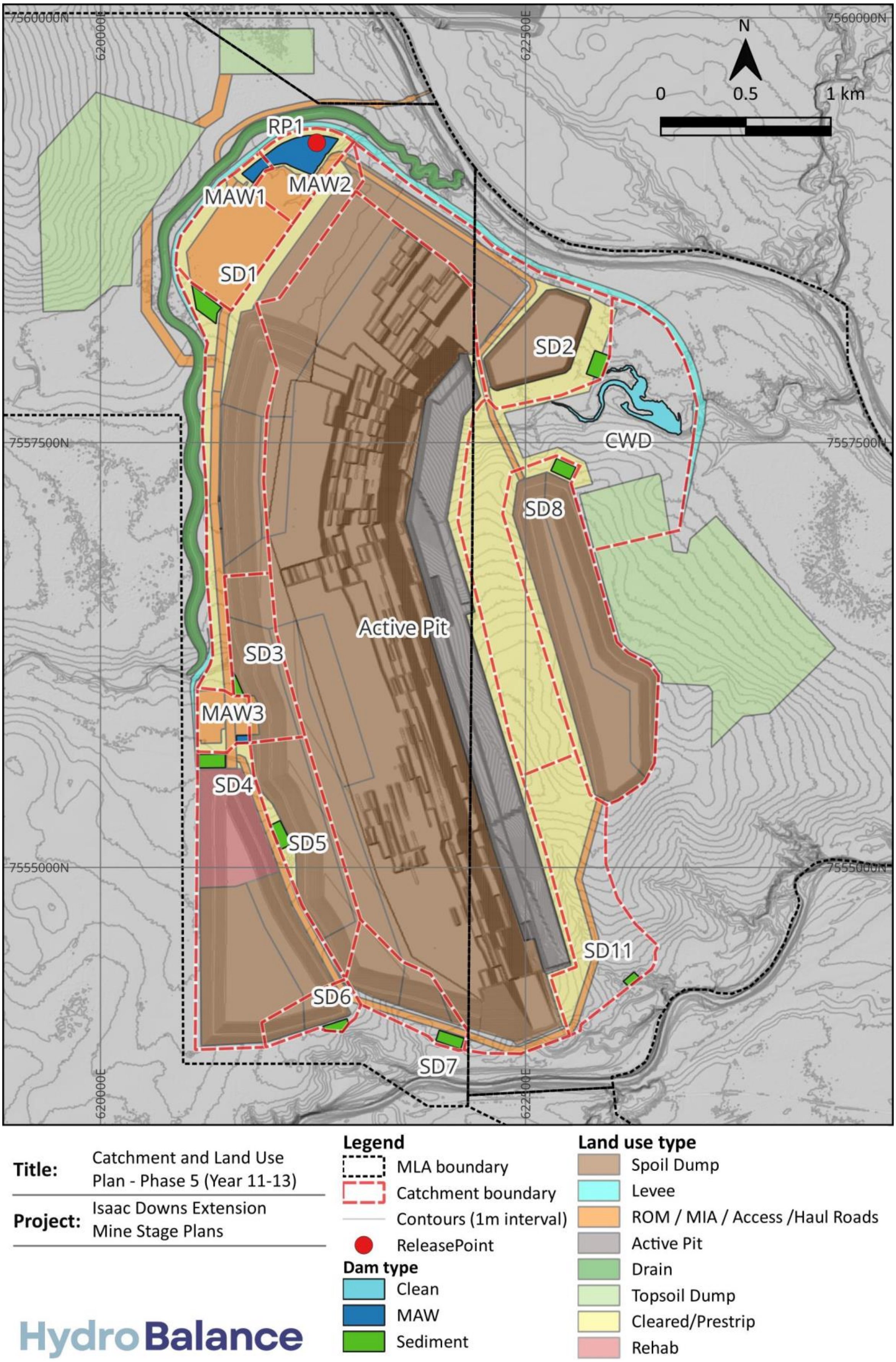


Figure 8-9 Catchment and Land Use Plan - Phase 5

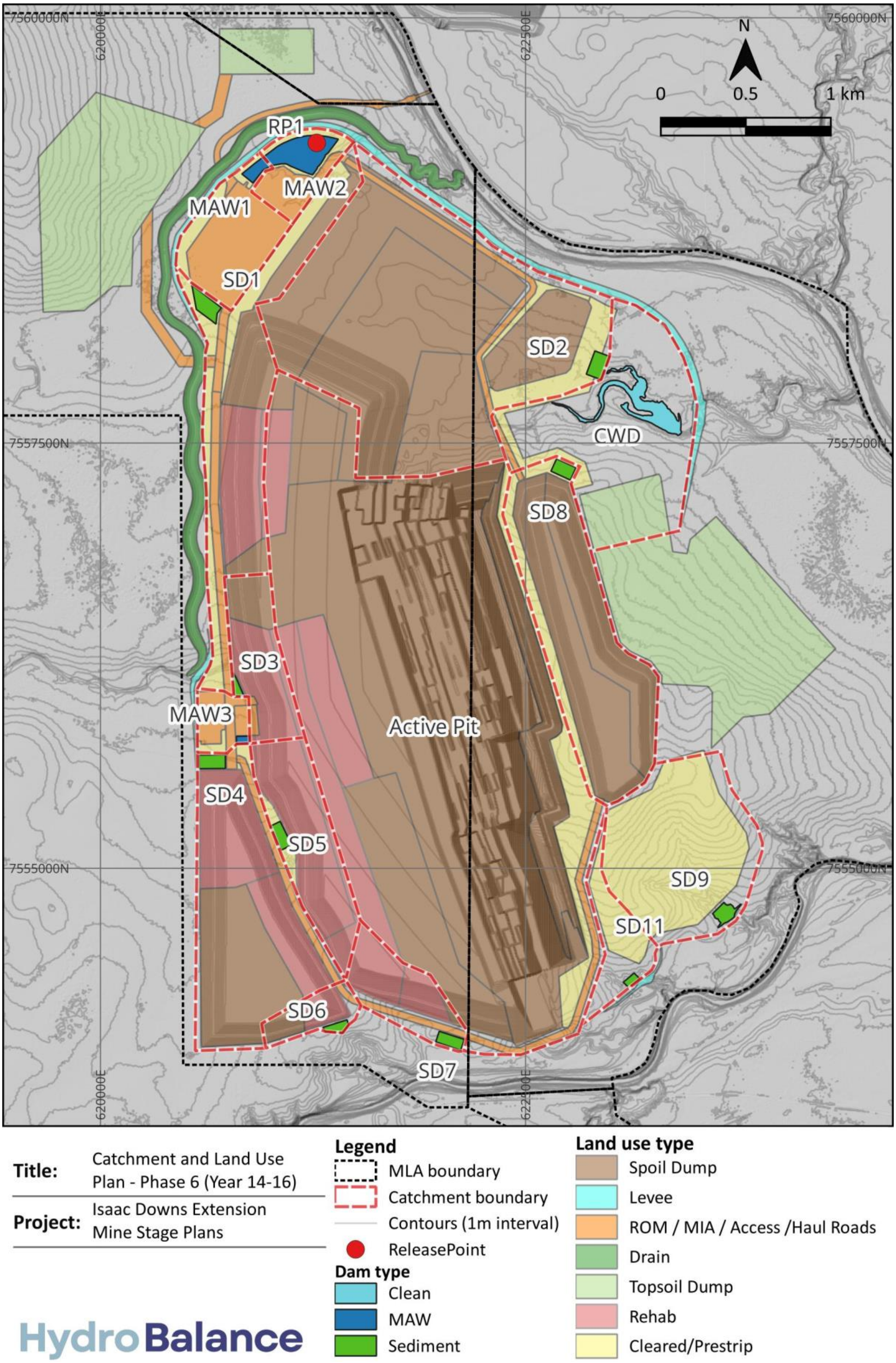


Figure 8-10 Catchment and Land Use Plan - Phase 6

8.5.4 Water Management System Configuration

A schematised plan of the proposed water management system configuration is shown in Figure 8-11. A summary of the modelled water management system operating rules for each component of the system is provided in Table 6.5 of **Appendix I**.

To prevent uncontrolled discharges from the mine water storages, maximum operating volumes (MOVs) have been set for the out-of-pit MAW storages. The MOV is the volume at which pumping from the pit and sediment dams to the mine-affected water storages ceases (specifically MAW2). This was included as an operating rule in the water balance model.

8.5.5 Water Demands

ROM coal extracted at the Project will be processed at the existing IPC coal handling and preparation plant (CHPP). As the water balance model is integrated into IPC, the water demands of the CHPP are included in the water balance model. In order to assess the performance of the integrated IPC water management system, including the Project, the total ROM coal throughput from all sources at IPC has been included in the water balance model. The key parameters for the CHPP water balance are provided in Section 6.7 of **Appendix I**. The net CHPP water demand is between 150 to 340 megalitres per annum (ML/a).

Water for haul road dust suppression at the Project will be sourced from MAW2. Daily haul road dust suppression watering rates were estimated based on haul road surface area and daily rainfall and evaporation rates. Average daily dust suppression demand is between 3.1 and 9.3 ML/d.

Predicted industrial/miscellaneous usage (includes usages such as washdown, fire circuit, pump gland seals and sprays) has been based on advice from site personnel. The adopted industrial/miscellaneous usage for the simulation period is 50 ML/a, with a net 50% loss.

8.5.6 Groundwater Inflows

The adopted groundwater inflows into the Project's mine pit are based on predictions from the groundwater modelling (see Section 10.7.6 of **Chapter 10** and **Appendix K**) and have been provided annually between 2029 and 2043. A summary of the predicted annual groundwater inflows is provided in Figure 6.10 of **Appendix I**, with a round 100 – 150 ML/a during operations.

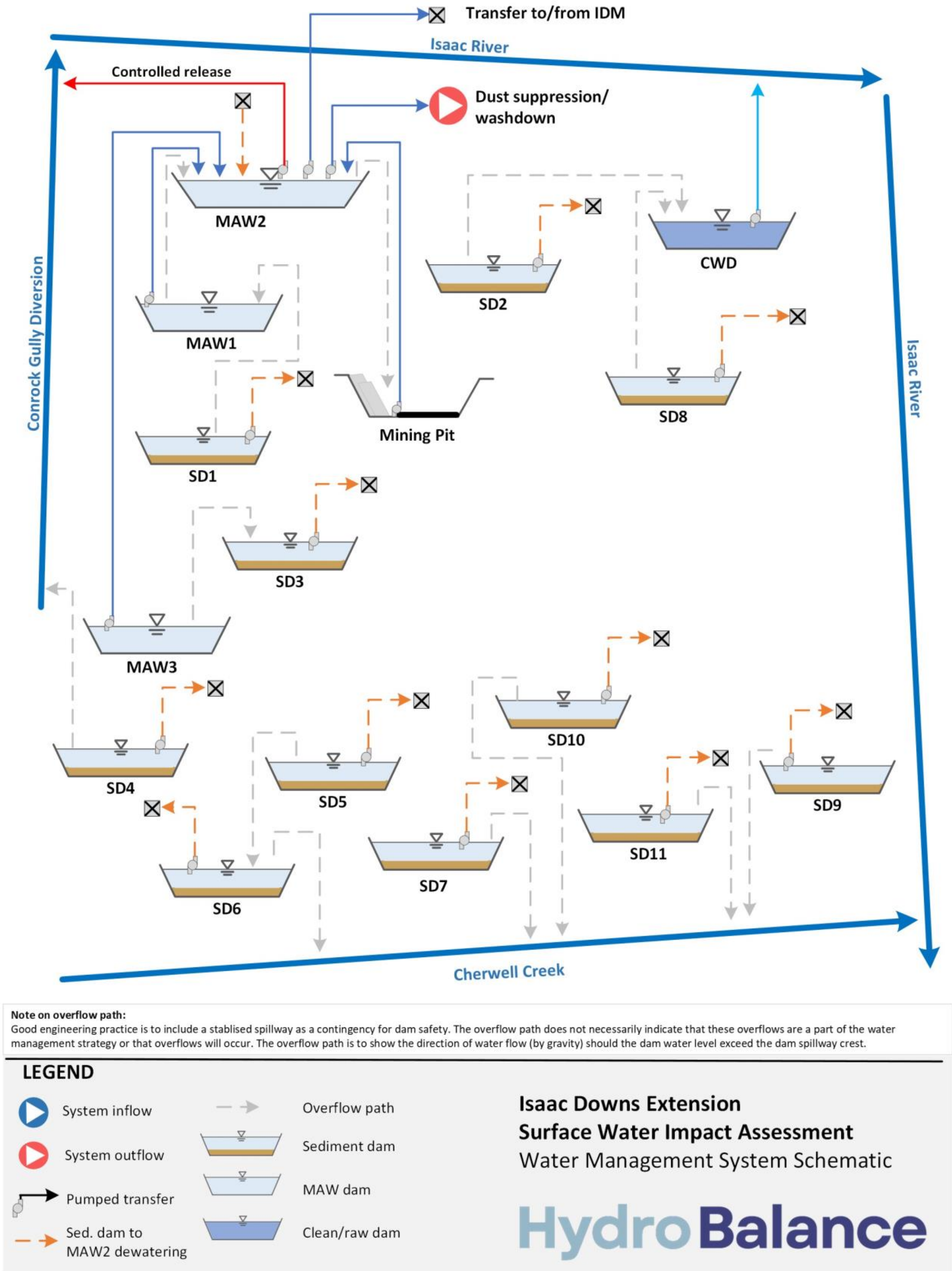


Figure 8-11 Water Management System Schematic

8.5.7 Controlled Releases

IDM's EA authorises releases of mine water, based on the established methodology from DETSI's Model Mining Conditions. The proposed release conditions for the Project have been based on the approved IDM release conditions, as any releases from the Project would be offset by the reduction in releases from IDM. The water balance model has been configured to simulate these proposed release conditions, using EC as the target contaminant. The controlled release point will be located on MAW2.

Table 8-9, Table 8-10 and Table 8-11 show the proposed variable contaminant release conditions and receiving water contaminant release trigger levels. Under these conditions, the release of mine-affected water from authorised release points to receiving waters must not exceed those values (dependant on receiving water flow for some contaminants). The proposed receiving water contaminant trigger levels are based on approved EA conditions at IPM, IDM and other nearby operating coal mines (as developed from the Model Mining Conditions), and allow for an accurate evaluation of the impact of any releases from the Project.

Table 8-9 Mine-affected Water Release Limits

Quality characteristic	Units	Minimum	Maximum
EC	µS/cm	n/a	Variable[1]
pH	pH units	6.5	9.0
TSS	mg/L	n/a	Variable[1]
Sulphate (SO_4^{2-})	mg/L	n/a	Variable[1]
1: Release limits for EC, TSS and SO_4 are dependent on receiving water flow. Refer to Table 8-10.			

Table 8-10 Mine-affected Water Release Conditions

Receiving Waters	Release Point (RP)	Gauging Station	Gauging Station Longitude (GDA2020)	Gauging Station Latitude (GDA2020)	Receiving Water Flow Recording Frequency	Receiving Water Flow Criteria for Discharge (m^3/s)	Maximum Release Rate (for all Combined RP Flows)	Release Limits
Isaac River (via Conrock Gully Diversion)	RP1	Isaac Downs	148.175979	-22.066880	Continuous (minimum daily)	**Very Low Flow** <4m^3/s for a period of 28 days after natural flow events that exceed 4m^3/s	< 2 m^3/s	EC: 720 µS/cm SO_4^{2-}: 250 mg/L TSS: 55 mg/L
						Low Flow 4 m^3/s	0.142 m^3/s	EC: 3,000 µS/cm SO_4^{2-}: 300 mg/L TSS: 55 mg/L
						Medium Flow 10 m^3/s	0.257 m^3/s	EC: 4,000 µS/cm SO_4^{2-}: 300 mg/L TSS: 200 mg/L
						High Flow 50 m^3/s	1.09 m^3/s	EC: 5,000 µS/cm SO_4^{2-}: 400 mg/L TSS: 200 mg/L
						Very High Flow 100 m^3/s	2.02 m^3/s	EC: 5,000 µS/cm SO_4^{2-}: 400 mg/L TSS: 300 mg/L
						Flood Flow 250 m^3/s	3.07 m^3/s	EC: 8,000 µS/cm SO_4^{2-}: 400 mg/L TSS: 400 mg/L

Table 8-11 Proposed Receiving Water Contaminant Trigger Levels

Quality Characteristic	Units	Trigger Level	Monitoring Frequency
EC	µS/cm	1,000 (maximum)[1]	Daily during the release
pH	pH units	6.5 - 8.5 (range)[2]	
TSS	mg/L	1,050 (maximum)[3]	
SO_4^{2-}	mg/L	250 (maximum)[1]	

1: Model Water Conditions for Coal Mines in the Fitzroy Basin[11]

2: Isaac River Sub-basin Water Quality Objectives

3: 80th percentile of local water quality samples – see Table 8-8

8.5.8 Isaac River Streamflows

To simulate flows in the Isaac River, AWBM parameters have also been developed for Isaac River catchments. The adopted AWBM parameters have previously been developed to reflect the recorded river flow conditions at each of the Isaac River locations. The Isaac River AWBM parameters have been used to estimate the future flow conditions based on the modelled climate and hence determine the controlled release opportunities.

8.5.9 Salinity Parameters

The water balance model has been configured to use EC as an indicator for water quality. Each runoff type has been assigned an EC concentration that has been based on the available historical water quality monitoring data at IPC, as well as additional information provided as part of the geochemical assessment for overburden / spoil (see Section 4.3 of **Appendix F**, also described in **Chapter 7**) and the groundwater assessment for inflows from the Rangal Coal Measures (see Section 10.7 of **Chapter 10** and **Appendix K**). The adopted EC concentrations for each land use or inflow contributing to the water balance model, and the source of the EC data, is provided in Table 6.13 of **Appendix I**.

EC has been continuously monitored and recorded at the Deverill gauging station since August 2011. This monitoring data has been analysed and a relationship between EC and discharge has been developed. This flow-EC relationship for the Isaac River has been incorporated into the water balance model as the EC source for the flows in the Isaac River upstream of the Project. Flow and salinity are used by the water balance model to assess whether controlled releases can occur, as well as assessing the potential impact of discharges on the receiving water salinity.

8.6 Water Management System Assessment

8.6.1 Overview

Assessment of the proposed WMS, as integrated into IPC, has been undertaken using the water balance model with the adopted rainfall runoff parameters, against the following key performance indicators:

- overall water balance
- mine-affected water inventory
- pit inundation characteristics
- controlled water releases

[11] https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=1561&name=rs-gl-water-conditions-mines-fitzroy.pdf

- uncontrolled spillway discharges
- mine-affected water transfers to IPC
- imported mine-affected water from IPC
- IPC mine-affected water inventory
- IPC raw water take
- overall salt balance.

The 'IPC water management system' refers to the existing water management systems at IPM and IDM, prior to the integration of the Project (also referred to as 'IDE') into IPC. An assessment of the overall mine affected water inventory at IPC was also undertaken. The purpose of this assessment is to confirm that the existing IPC infrastructure (including dam and pit storages) is able to accommodate the additional water demands, transfers and processing requirements resulting from the Project.

8.6.2 Interpretation of Results

In interpreting the results of the water balance assessment, it should be noted that the results provide a statistical analysis of the water management system's performance over the 16 years of operations at the Project, based on 121 realisations with different climatic sequences.

The model results are presented as a probability of exceedance. For example, the 10th percentile represents 10% probability of exceedance and the 90th percentile results represent 90% probability of exceedance. There is an 80% chance that the result will lie between the 10th and 90th percentile traces.

Whether a percentile trace corresponds to wet or dry conditions depends upon the parameter being considered. For site water storage, where the risk is the storage capacity will be exceeded, the lower percentiles correspond to wet conditions. For example, there is only a small chance that the 1 percentile storage volume will be exceeded, which would generally correspond to wet conditions.

For external site water supply volumes (for example), where the risk is that insufficient water will be available, there is only a small chance that more than the 1 percentile water supply volume would be required. This would generally correspond to dry climatic conditions.

It is important to note that a percentile trace shows the likelihood of a particular value on each day and does not represent continuous results from a single model realisation. For example, the 50th percentile trace does not represent the model time series for median climatic conditions.

The assessment outcomes are dependent on the accuracy of input assumptions. There is inherent uncertainty with respect to some key site characteristics (e.g. catchment yield/rainfall runoff, mining area groundwater inflows). The use of a large number of climate sequences reflecting the full range of historical climatic conditions provides an indication of the system performance variance under very wet, very dry and average climatic conditions.

8.6.3 Overall Water Balance

Water balance results for the Project are presented in Table 7.1 of **Appendix I**, averaged over each model phase. The results presented are the average of all realisations and will include wet and dry periods distributed throughout the mine life. A more detailed analysis of the performance of the various components of the water management system is provided in the following sections.

8.6.4 Mine-affected Water Inventory

Figure 8-12 shows the combined forecast inventory for MAW1, MAW2 and MAW3 over the 16-year forecast. To prevent uncontrolled discharges from the mine water storages, MOVs have been set for the out-of-pit MAW storages. Also shown is the combined full supply volume (FSV), which is the combined capacity of these dams.

MAW1, MAW2 and MAW3 will be decommissioned and rehabilitated following the cessation of mining operations at the Project, in accordance with the PRCP schedule.

The model results show the following:

- For the 1%ile results (very wet climatic conditions), the peak inventory in the out-of-pit MAW storages reaches a volume of around 280 ML.
- For the 10%ile results (wet climatic conditions), the peak inventory in the out-of-pit MAW storages reaches a volume of around 185 ML.
- For the 50%ile results (median climatic conditions), the peak inventory in the out-of-pit MAW storages reaches a volume of around 65 ML.
- The combined out-of-pit mine MAW inventory is maintained below the combined capacity of all the MAW dams.

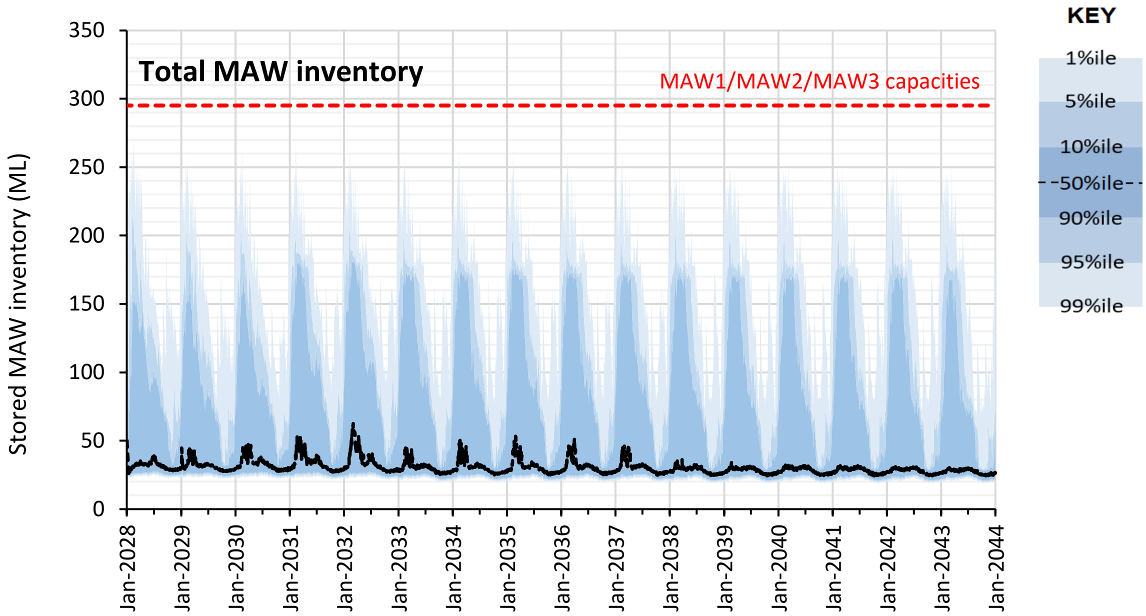


Figure 8-12 Forecast Mine-Affected Water Inventory

8.6.5 Pit Inundation Characteristics

Figure 7.2 of **Appendix I** shows the forecast inventory for the Project's mining pit over the 16-year simulation. The pit recovers (i.e. becomes dry) after each wet season when the Project is operational. The pit will become a final void after operations cease and hence will accumulate water from 2043 onwards. An assessment of the final void water balance is provided in **Chapter 5**.

These modelling results demonstrate that the pit is able to continuously operate under all but the most extreme rainfall conditions.

8.6.6 Controlled Mine-affected Water Releases

The water balance model is configured to release mine-affected water in accordance with the proposed controlled release conditions outlined in Section 8.5.7. The predicted annual controlled release volumes from MAW2 are provided in Figure 8-13. The results show that:

- For very wet climatic conditions (99%ile), the maximum annual controlled release will be 130 ML.
- For wet climatic conditions (90%ile), the maximum annual controlled release will be 40 ML.
- No controlled releases are predicted to occur in median and drier climatic conditions.

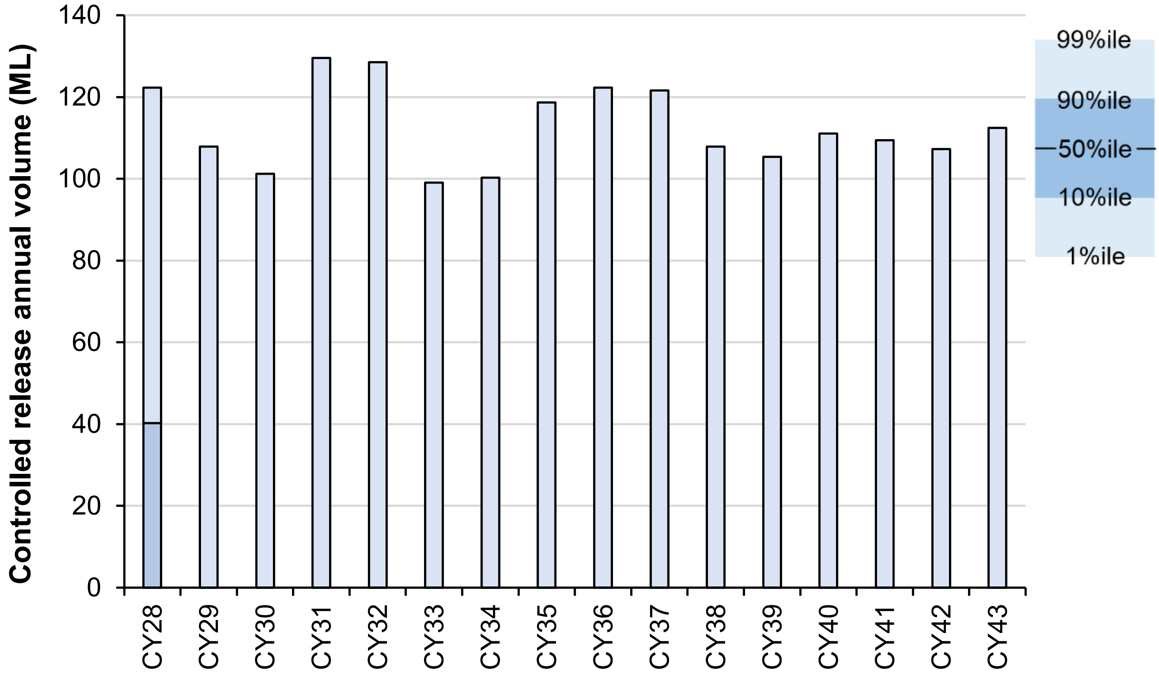


Figure 8-13 Forecast Annual Mine Water Controlled Release Volumes

8.6.7 Uncontrolled Releases - Mine-affected Water Dams

There are no predicted uncontrolled releases. There are no MAW dams that overflow directly to the receiving environment. Therefore, there is nil risk of uncontrolled spillway discharges of mine-affected water to the receiving environment.

8.6.8 Sediment Dam Overflows

Consistent with the IECA design standard (see Section 8.4.3.3), the Project's sediment dams do not provide 100% containment for captured runoff. Hence overflows will occur from sediment dams when rainfall exceeds the design standard. The potential for overflows from the proposed sediment dams has been assessed using a forecast assessment simulation. There are six sediment dams that overflow to the environment: SD4, SD6, SD7, SD9, SD10 and SD11.

The predicted annual combined sediment dam overflows under this scenario are provided in Figure 8-14. The results show that:

- During very wet climatic conditions (99%ile) where rainfall events can exceed the dam design standard, modelled sediment dam overflows are between 565 ML/year and 770 ML/year.
- During wet climatic conditions (90%ile) where rainfall events sometimes exceed the dam design standard, modelled sediment dam overflows are between 190 ML/year and 405 ML/year.
- During median climatic conditions (50%ile) where rainfall events sometimes exceed the dam design standard, modelled sediment dam overflows are between 0 ML/year and 10 ML/year.
- There are no predicted overflows from the sediment dams during dry and very dry climatic conditions.

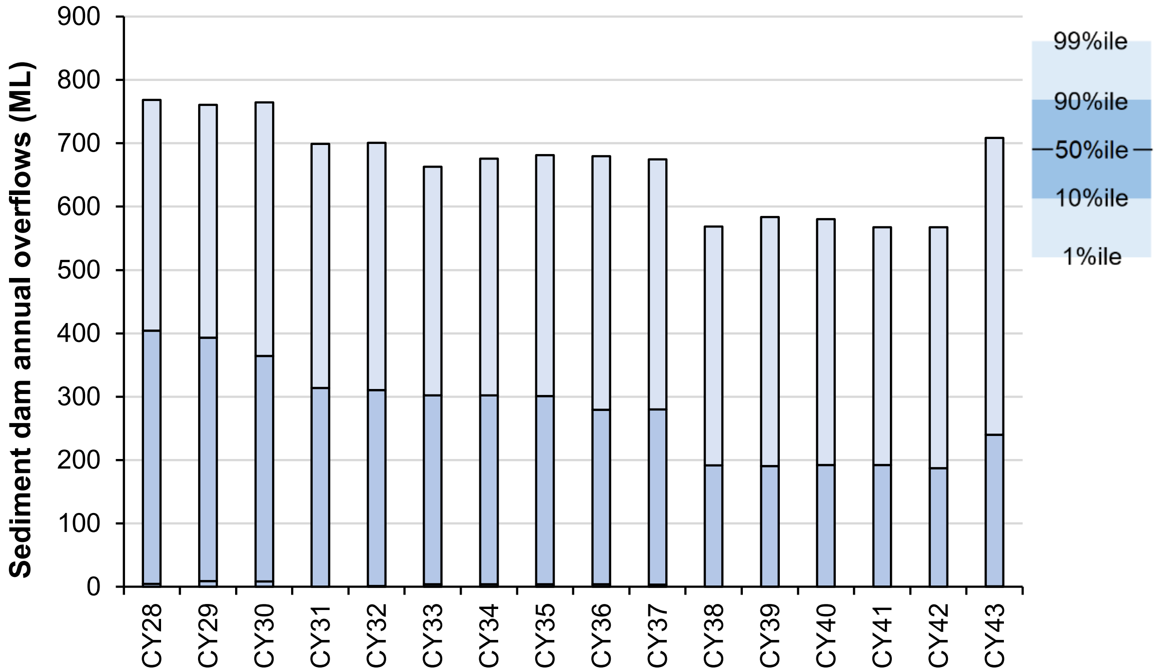


Figure 8-14 Forecast Annual Sediment Dam Overflow Volumes

8.6.9 Mine-affected Water Transfers to IPC

The ability of the Project's pit to recover after each wet season is largely attributed to the capacity of the WMS system to transfer water to IPC (i.e. IPM and IDM) when required. Modelling results show the following:

- For the 1%ile results (very wet climatic conditions), a maximum of 1,660 ML/a will be transferred from the Project to IPC.
- For the 10%ile results (wet climatic conditions), a maximum of 710 ML/a will be transferred from the Project to IPC.
- For the 50%ile results (median climatic conditions), there are no modelled transfers of MAW from the Project to IPC.

8.6.10 Imported Mine-affected Water from IPC

Net water demands at the Project will be sourced from IPC (i.e. IPM and IDM). A key objective of the WMS is to maximise the reuse of captured surface water runoff and groundwater inflows. Recycling mine water will minimise the volume of water from IPC that is required to satisfy Project site demands. However, the volume of water captured on site is highly variable dependent upon climatic conditions and groundwater inflows. Hence, the required makeup water volume from IPC will vary from year to year.

Figure 8-15 shows the total annual modelled demand for mine-affected water from IPC over the 16-year simulation. The modelling results show that the Project is dependent on the pipeline to IPC to supplement shortfalls in water, even during very wet climatic conditions. This is a function of designing an integrated WMS, with reduced dam storage footprint at the Project, and hence with limited storage capacity available at the Project to hold a significant volume of mine-affected water during the dry season.

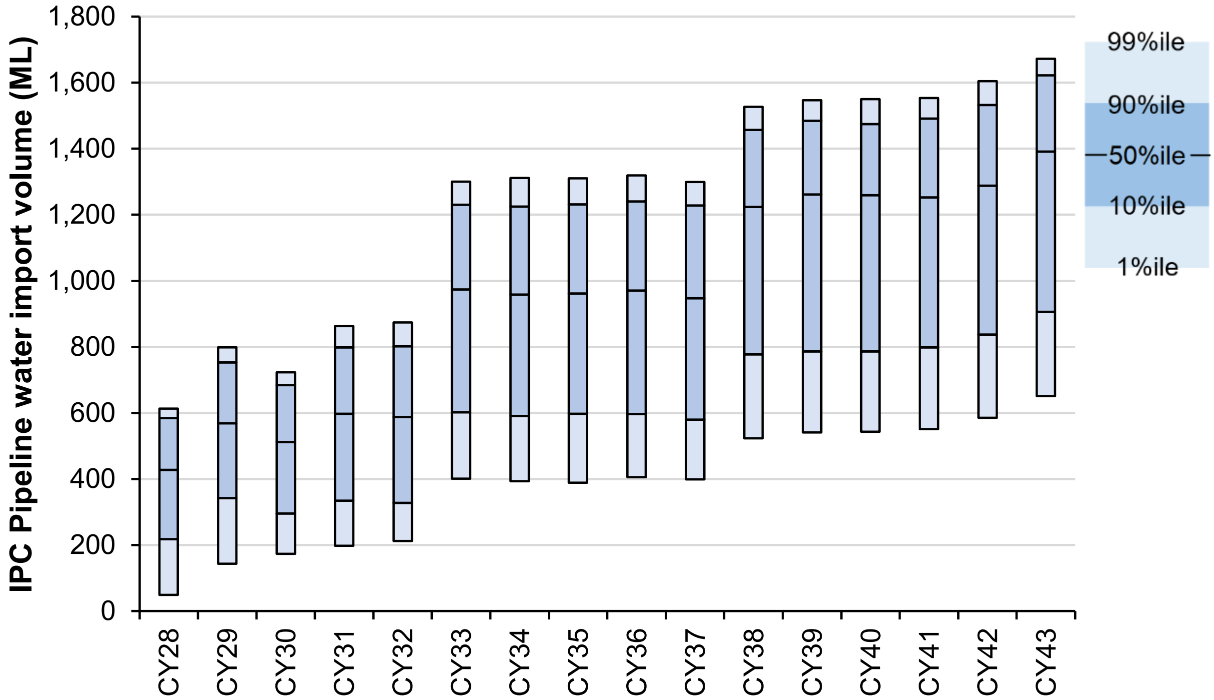


Figure 8-15 Annual Mine-affected Water Demand from IPC

8.6.11 IPC Mine-affected Water Inventory

The total IPC mine water inventory, inclusive of transfers to and from the Project, is shown in Figure 8-16. This figure also shows combined maximum operating volumes for the IPC storages (existing voids) at various stages of Project life, ranging between 38,900 ML and 87,000 ML. These results demonstrate that the IPC WMS can manage the addition of Project water transfers and demands, with the peak inventory in the IPC mine water system during very wet climatic reaching a volume of around 11,100 ML, which is well below the combined capacity for the system, under the most extreme climatic conditions.

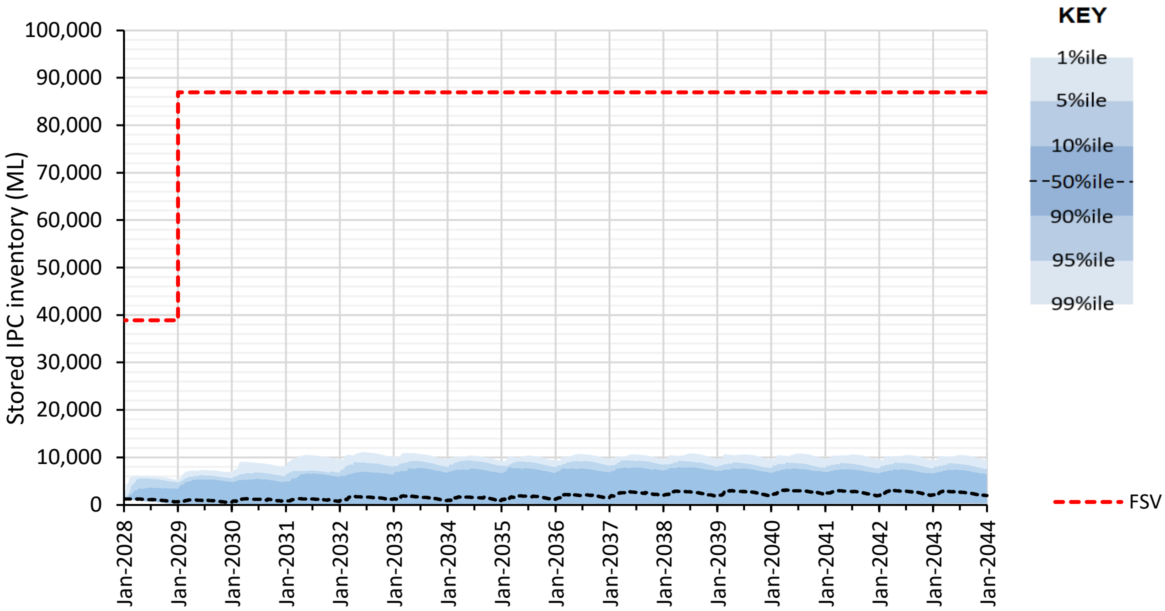


Figure 8-16 Forecast Total IPC Mine-affected Water Inventory

8.6.12 IPC Raw Water Take

The additional raw water demands due to the Project are as follows:

- The 40 ML/a raw water demand associated with the IDE washdown/fire water circuit.
- If the mine-affected water supplies at IPM, IDM and the Project are exhausted, then additional raw water will be required to supply site demands at IPM, IDM and the Project.

The current annual raw water allocation (see Section 8.4.3.5) available to IPC is 1,287 ML/a (938 ML/a for the existing IPC allocation, and 349 ML/a for Stanmore's non-operational Millenium mine adjoining IPC). The modelled external water requirements at IPC are shown in Figure 8-17, which shows that neither the existing allocation at IPC of 938 ML/a, or the combined allocation of 1,287 ML/a, will be exceeded for any climatic realisations.

The Project's mine water demands will be adequately supplied from the mine-affected water stored within the integrated WMS under most climatic conditions. However, there is a small probability (around 10% AEP) that the mine-affected water reserves in the integrated WMS be depleted, and additional external raw water will be required to satisfy site demands. Even when this occurs, as shown in Figure 8-17, the existing raw water allocation would not be exceeded.

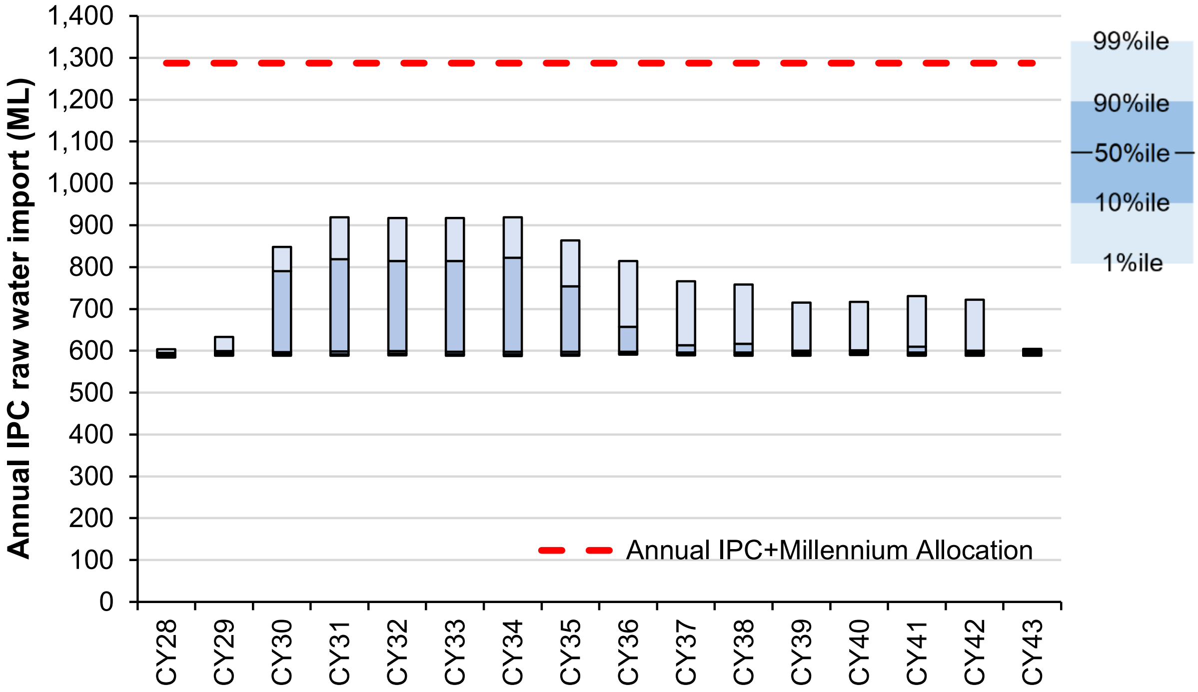


Figure 8-17 External Raw Water Demand for IPC (Including Project Demands)

8.6.13 Overall Salt Balance

Table 7.3 of **Appendix I** provides an indication of the long-term average annual salt inputs and outputs from the Project WMS, during each phase of the Project.

8.6.14 Climate Change Assessment

The methodology for assessing the influence of climate change on the modelled WMS is described in Section 8.5.2. The water balance model developed for the Project was used to simulate the performance of the WMS using the climate change factors, as described in Section 7.4 of **Appendix I** and summarised below.

The climate change model results show no material change to the operations of the mine-affected water storages in comparison to base case modelling provided in Section 8.6.4.

These climate modelling results demonstrate that the Project pit is able to continuously operate under all but the most extreme rainfall condition, which is the same as for the base case modelling.

For controlled releases of mine-affected water, the model results show that in comparison to the base case modelling provided in Section 8.6.6:

- For very wet climatic conditions (99%ile), the maximum annual controlled release volume (85 ML) is around 45 ML lower than under base case conditions (130 ML).
- For wet climatic conditions (90%ile), the maximum annual controlled release is less than 2ML, compared with 40 ML under base case conditions.
- No controlled releases are predicted to occur in median and drier climatic conditions.

There are no MAW dams that overflow directly to the receiving environment using the factored climate dataset. Therefore, there is nil risk of uncontrolled spillway discharges of mine-affected water to the receiving environment under the conservative climate change scenario.

For sediment dam overflows, the model results show that in comparison to the base case modelling provided in Section 8.6.8:

- During very wet climatic conditions (99%ile) where rainfall events can exceed the dam design standard, modelled sediment dam overflows are between 350 ML/year and 550 ML/year (up to 220ML/yr less than under base case conditions).
- During wet climatic conditions (90%ile) where rainfall events sometimes exceed the dam design standard, modelled sediment dam overflows are between 100 ML/year and 200 ML/year (up to 200ML/yr less than under base case conditions).
- There are no predicted overflows from the sediment dams during median, dry and very dry climatic conditions.

The impacts of the climate change projections on the performance of the operational water management system are summarised as follows:

- Overall, there is less mine-affected water and sediment water in the WMS due to the higher evaporation and lower rainfall.
- There is a corresponding lower risk of pit inundation, controlled release volumes and sediment dam overflow volumes.

8.6.15 Adaptative Management of the WMS

The site water balance model results represent the application of the proposed WMS rules over the life of the Project, regardless of climatic conditions. In reality, there are numerous options for adaptive management of the WMS to respond to climatic conditions and the site water inventory in a way that would further reduce the risks of impacts to surface water resources and quality.

The integrated IPC water balance model will be updated once operations commence at the Project to reflect any changes in the WMS over the life of the operation.

8.7 Assessment of Impacts and Management Measures

8.7.1 Overview of Potential Impacts

The section describes the potential impacts on surface waters from the Project, based on the assessments of the WMS. The WMS has been designed as the primary management measures to protect the EVs and WQOs for surface waters. **Appendix I** provides the content requirements and basis for a water management plan for the Project. The proposed management measures align with industry best practice for water management and are predicted to be effective in managing impacts to surface waters.

Chapter 9 provides an assessment of the potential impacts on surface waters Project related changes to hydrology, flood regimes and geomorphology (e.g. from levees and bridges).

This chapter assesses the potential Project impacts on surface waters from:

- controlled and uncontrolled releases from the mine-affected water management system
- stormwater runoff and sediment water releases during both construction and operation
- changes in stream flows due to loss of catchment area draining to local drainage paths due to capture of runoff within onsite storages and the open cut pit, as well as for the final landform
- changes in TSS or DIN, in accordance with the GBR Guideline, from relevant Project releases
- changes to regional water demand due to the potential need to obtain water from external sources to meet operational water requirements of mining operations
- releases of contaminants other than mine-affected water
- cumulative impacts of projects in the region on the EVs of the receiving waters.

Any impacts on surface waters could have an impact on the relevant EVs for the Isaac River sub basin (see Section 8.3.1), namely aquatic ecosystems (see **Chapter 12** for an assessment of potential impacts to aquatic ecology), visual recreation or cultural and spiritual values (see **Chapter 20** for an assessment of potential impacts to these values).

8.7.2 Changes to Water Quality

8.7.2.1 Mine-affected Water Management – Uncontrolled Releases

The water balance modelling results presented in Section 8.6.7 demonstrate that there is no risk of uncontrolled discharges of mine-affected water.

In addition, as described in Section 8.4.3.2, controls such as isolation valves, pressure release valves and flow meters, will be included in the design and construction of mine water transfer pipeline to prevent or minimise any accidental releases of water during transfer between IDM and the Project.

8.7.2.2 Mine-affected Water Management – Controlled Releases

The design of mine-affected water management system to allow for controlled releases in a manner that protects downstream EVs and WQOs, is described in Sections 8.4.3.2, 8.5.7 and 8.6.6.

The controlled release strategy is based on the EA releases conditions approved for IDM and the Model Mining Conditions. Due to the sequence of operations at IDM and the Project (i.e. IDM ramps down before the Project commences operations), concurrent releases of mine-affected water from IDM and the Project will not occur. The Project's proposed release strategy is effectively an extension of the approved release strategy at IDM. The latest REMP for IDM from January 2025 concludes that "The REMP is considered suitably designed to effectively address all potential concerns associated with current activities and historical releases at Isaac Downs, with the environmental management techniques adopted by Isaac Downs appropriately mitigating any significant impacts to the receiving environment. Furthermore, there are no indications that the current discharge limits are unsuitable to protect downstream environmental values." This demonstrates that the IDM release strategy protects downstream environmental values, and therefore, is suitable as a basis for the Project's proposed controlled release conditions.

Controlled releases will only be required during wet or very wet climatic conditions (10% AEP and higher), and the predicted releases volumes are relatively low (a maximum annual volume of 131 ML/a) (see Section 8.6.6). During controlled release events, the release volumes are less than 0.25% of the Isaac River flows (typically less than 0.1%).

Figure 8-18 shows a ranked plot of modelled EC in the Isaac River downstream of the controlled release point on days when there is a controlled release opportunity of mine-affected water (i.e. when the Isaac River flow exceeds the minimum flow criteria and there is water available for release). The plot shows the modelled EC in Isaac River both with and without controlled releases.

The results demonstrate that the impact of the proposed controlled release strategy on the Isaac River salinity is insignificant (i.e. barely discernible difference between the 'including releases' and 'excluding releases' lines on Figure 8-18), with a potential increase in EC in the vicinity of the Project of less than 8 µS/cm. This insignificant increase is considered within the error margin of detectable change. The predicted Isaac River EC during controlled releases is below the high flow regional WQO of 250 µS/cm, and well below the proposed receiving water contaminant trigger level of 1,000 µS/cm (see Table 8-11).

The model predicts that controlled releases would only occur on less than 0.1% of all Isaac River flow days over the simulation period.

On this basis, the modelling demonstrates that the implementation and design of the mine-affected WMS and proposed release conditions would mitigate impacts of the Project from mine water releases on the salinity of downstream water quality.

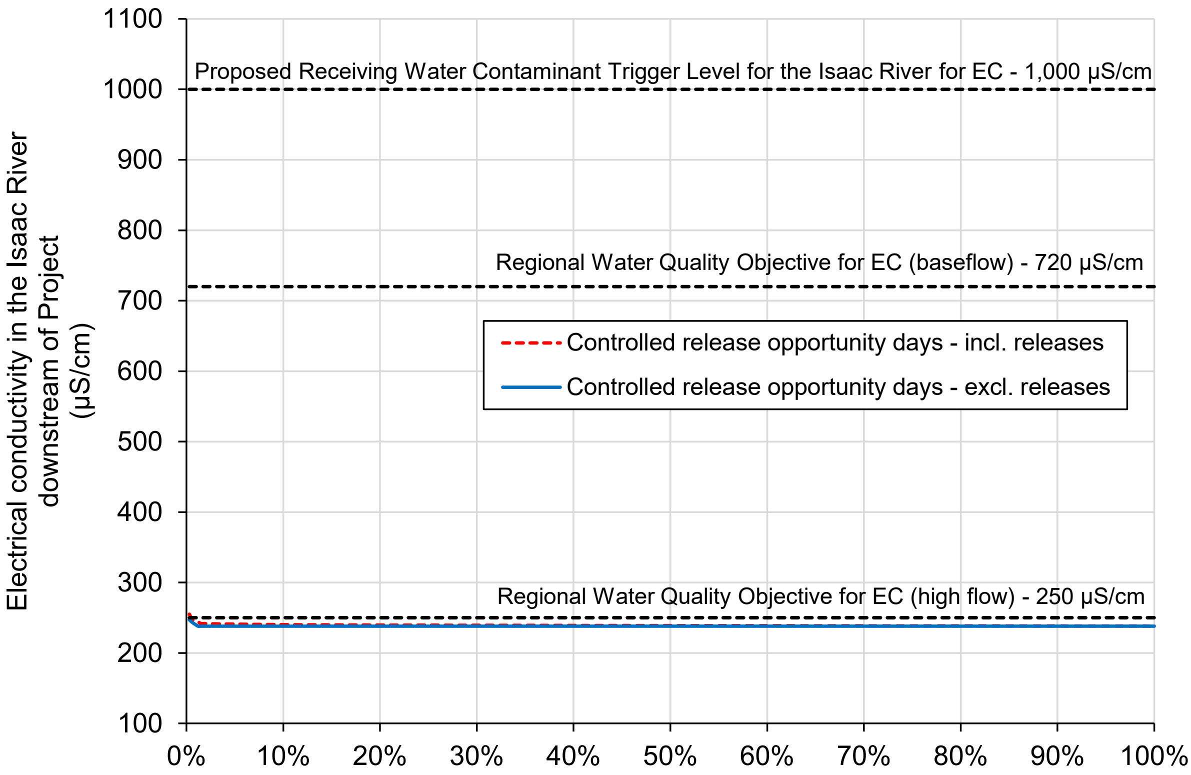


Figure 8-18 Electrical Conductivity in the Isaac River - Controlled Release of Mine-affected Water

8.7.2.3 Sediment Water Management

An assessment of the sediment affected water management system is provided in Section 8.6.8. The model results show that some overflow of water from sediment dams may occur during wet periods that exceed the design standard of the sediment control system (Section 8.4.3.3).

The geochemical characterisation of overburden / spoil material (see Section 7.3.12 of **Chapter 7**) indicates that the runoff draining to the sediment dams would have low salinity. Overflows would only occur during significant rainfall events which would also generate runoff from surrounding undisturbed catchments at background salinity. The water balance modelling indicates that the salinity of receiving water will be between 240 to 480 µs/cm, subsequent to any overflows from the sediment dams (typically during wet or very wet climatic conditions), which is well below the proposed EA receiving waters contaminant trigger level for EC of 1,000 µs/cm (the current EA receiving waters contaminant trigger level for IPM and IDM).

Figure 8-19 shows a ranked plot of modelled EC in the Isaac River downstream of the Project on days when there is a sediment dam overflows to the receiving environment. The plot shows the modelled EC in Isaac River both with and without sediment dam releases. The predicted increase in Isaac River EC is less than 24 µs/cm (i.e. barely discernible difference between the 'including releases' and 'excluding releases' lines on Figure 8-19). For the majority of release days (greater than 98%), the impact of sediment dam releases on Isaac River EC is less than 10 µs/cm. This insignificant increase is considered within the error margin of detectable change.

On this basis, the modelling demonstrates that the implementation and design of the sediment water management system would mitigate potential impacts of the Project from sediment dam overflows on the salinity of downstream water quality.

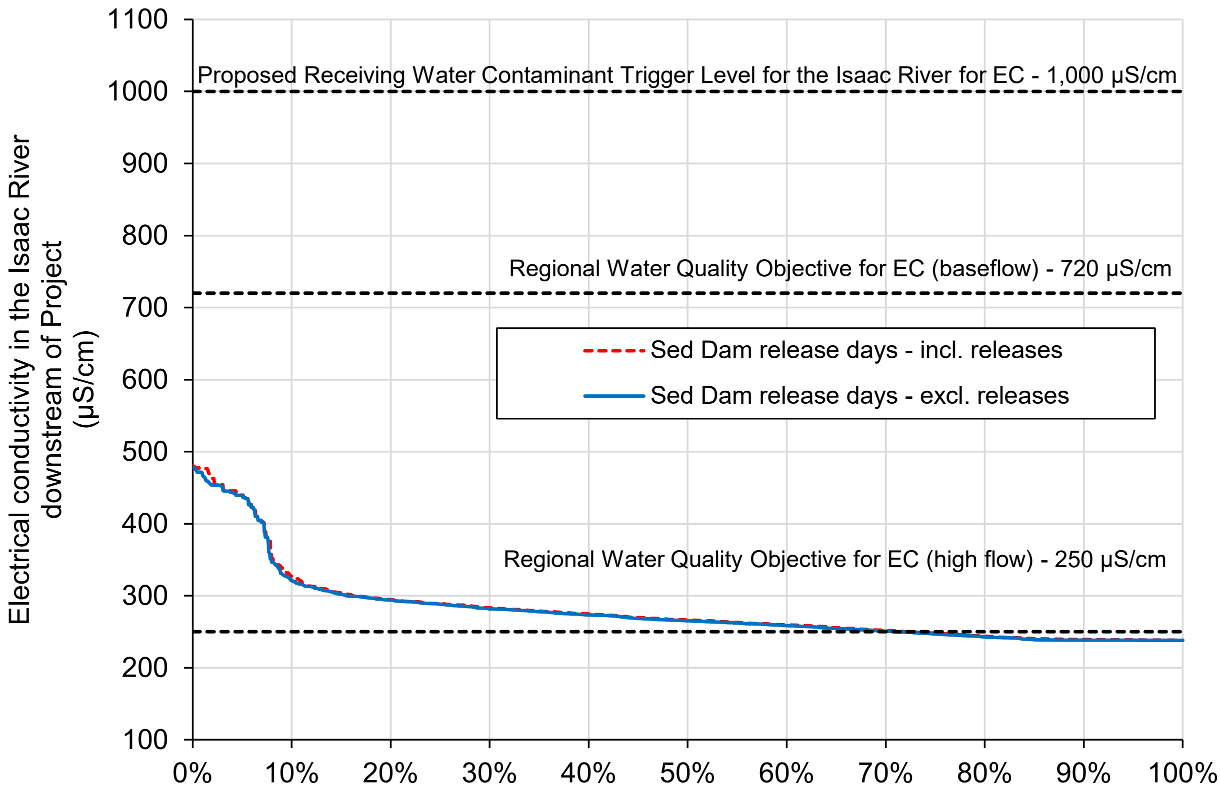


Figure 8-19 Electrical Conductivity in the Isaac River - Sediment Dam Releases

8.7.2.4 Management Measures

Section 8.4.1 describes the objectives and principles of the water management system, which have been developed to protect water quality and the EVs of the waterways potentially affected by the Project.

The general principles of the water management system, are as follows:

- A catchment runoff water management system that separates clean water from mine affected water and sediment water wherever possible.
- A mine affected water management system that contains potentially saline runoff from the pit and coal catchments in mine affected water dams. Mine affected water will be used as a priority in meeting site demands. Water from the mine affected water management system may only be released to the downstream environment in compliance with the proposed release rules, which are designed to protect WQOs and EVs.
- An on-site stormwater management system that contains runoff that potentially has elevated sediment concentrations in sediment dams. Water collected in the sediment dams will be managed in accordance with the ESCP (see 8.7.10) and used for dust suppression or will overflow to receiving watercourses after a period of settling.

The mine and sediment water management systems have been effectively designed to mitigate potential downstream impacts on surface water quality and protect the EVs and WQOs.

8.7.3 GBR Guideline Assessment

The objective of Section 41AA of the EP Regulation and the GBR Guideline is no net decline in water quality in the surface water basins that feed into the GBR (see Section 8.2.18). The GBR Guideline sets out the relevant information to determine if a Project will result in a net decline in water quality, based on specific water quality parameters (DIN and TSS) and activities.

The key Project activity for assessment against the GBR Guideline is the controlled release of mine-affected water. In accordance with the GBR Guideline "Triggers for assessment under section 41AA do not include contaminated stormwater that contains sediment only. This will allow for an exclusion for stormwater proposed to be managed through erosion and sediment control measures." As sediment water will be managed under the ESCP (see **Appendix AD**), including sediment dams, it is excluded from the assessment against the GBR Guideline.

As the Project will replace controlled releases of mine-affected water from IDM with those from the Project, a comparison of the potential volumes of releases was undertaken to determine whether this would result in a decrease or increase in releases. Other than volumes released, the mine affected water release criteria (see Section 8.5.7) for both sites are the same. Based on IDM's approved EA conditions (derived from the predicted mine-affected water release volumes provided in the IDM EIS), IDM could release up 682 ML/a. By comparison, as per Section 8.6.6, the maximum mine-affected water releases from the Project under very wet climatic conditions (99%ile) would be 130 ML/a. Hence the volume of mine-affected water released from the Project is less than volume that could be released from IDM, and therefore, would not result in a net decline in water quality.

The controlled release of mine-affected water is proportional to the receiving waterway flows, in a manner designed to minimise impacts to the water quality. As a result, a controlled release is a very small addition to the overall volume of water at the point of discharge and a negligible change for the catchment area at the GBR. This further demonstrates that no net decline in water quality in the receiving environment is expected as a result of the Project.

Section 9.7 of **Appendix I** provides an assessment against all requirements of the GBR Guideline, concluding that the Project would not result in a net decline in water quality in the surface water basins that feed into the GBR, based on:

- volumes and controls on mine-affected water releases, as described above
- no uncontrolled releases of mine-affected water
- proposed erosion and sediment control measures
- no sewage treatment or treated sewage effluent management occurring at the Project, with all sewage waste (e.g. from crib room and administration area) removed by a licensed contractor to a suitable waste disposal facility.

8.7.4 Streamflow Changes

8.7.4.1 Operations

During active mining operations (approximately 15 years), the WMS will capture runoff from areas that would have previously flowed to the downstream sections of Conrock Gully, Cherwell Creek and the Isaac River. The captured catchment area will change as the mine develops. A breakdown of the maximum catchment areas captured by the WMS is provided in Table 8-12.

Table 8-12 Catchment Area Captured During Operations by the Project

Catchment	Total Catchment Area (km^2)	Maximum Captured Catchment Area (km^2)
Conrock Gully	71	9.5
Cherwell Creek	698	3.6
Isaac River to downstream Cherwell Creek (includes Conrock Gully and Cherwell Creek)	3,528	13.6

The maximum captured catchment areas represent:

- Up to 13.4% (9.5 km^2) of the Conrock Gully catchment to the downstream boundary of the mine, by the end of mining.
- Up to 0.5% (3.6 km^2) of the Cherwell Creek catchment to the downstream boundary of the mine, by the end of mining.
- Up to 0.4% (13.6 km^2) of the Isaac River catchment to downstream of the Cherwell Creek confluence, by the end of mining.

The potential impact on water quantity in Cherwell Creek and the Isaac River due to the Project is likely to be undetectable and is considered negligible.

For Conrock Gully, the majority of the catchment lies upstream of the Project and is unaffected by catchment excision. The only area within the Conrock Gully catchment that is affected by catchment excision is the small zone immediately downstream (to the east) of the Project between the Isaac River levee and the Isaac River.

Due to the diversion of Conrock Gully around the Project and discharging into the Isaac River upstream of the Conrock Gully confluence, this small zone (approximately 103 ha in area) has the majority of its catchment excised. However, this area lies within the Isaac River floodplain and would regularly be inundated by Isaac River backwater during flood flows.

Information provided in Section 9.4 of **Chapter 9** shows that this downstream 1,450 m of Conrock Gully would be inundated by Isaac River backwater flows for flood events greater than the 50% AEP (1 in 2 year). This means that the loss of catchment from catchment excision from the Conrock Gully diversion is largely mitigated by Isaac River backwater flows for flows greater than 50% AEP.

8.7.4.2 Final Landform

At the completion of mining, the majority of the final landform impacted by mining will be rehabilitated with catchment runoff returned to the surrounding catchment. Rehabilitation and closure for the final landform is described in **Chapter 5**. Approximately 70% of the peak catchment area captured during mining operations will be returned to the receiving environment as part of the final landform design. Nevertheless, a final void remains in the final landform, which will continue to capture some runoff. A breakdown of the catchment areas captured by the final landform is provided in Table 8-13.

Table 8-13 Catchment Area Captured Within the Project's Final Landform

Catchment	Total Catchment Area (km^2)	Final Landform Captured Catchment Area (km^2)
Conrock Gully	71	2.9
Cherwell Creek	698	1.5
Isaac River to downstream Cherwell Creek (includes Conrock Gully and Cherwell Creek)	3,528	2.9

The final landform captured catchment areas represent:

- Around 4.1% (2.9 km^2) of the Conrock Gully catchment to the downstream boundary of the mine.
- Around 0.2% (1.5 km^2) of the Cherwell Creek catchment to the downstream boundary of the mine.
- Around 0.1% (2.9 km^2) of the Isaac River catchment to the downstream boundary of the mine.

The potential impact on streamflows in Cherwell Creek and the Isaac River for the final landform is negligible and would likely be undetectable.

Similar to the operational period, the majority of the Conrock Gully catchment lies upstream of the Project and is unaffected by catchment excision. The only area within the Conrock Gully catchment that is affected by catchment excision is the small zone immediately downstream (to the east) of the Project's final landform and the Isaac River.

Due to the diversion of Conrock Gully around the Project and discharging into the Isaac River upstream of the Conrock Gully confluence, this small zone (approximately 525 ha in area) has the majority of its catchment excised. However, this area lies within the Isaac River floodplain and would regularly be inundated by Isaac River backwater during flood flows.

Information provided in Section 9.4 of **Chapter 9** shows that this downstream 3,000 m of Conrock Gully would be inundated by Isaac River backwater flows for flood events greater than the 50% Annual AEP (1 in 2 year). This means that the loss of catchment from catchment excision from the Conrock Gully diversion is largely mitigated by Isaac River backwater flows for flows greater than 50% AEP.

8.7.5 Regional Water Availability

The assessment of demand for raw water in Section 8.6.12 demonstrates that the Project's raw water demands, as integrated into the IPC WMS, will not exceed that existing raw water allocations with Sunwater. As such, the Project will have no impact on regional water availability.

The Project's workforce histogram and accommodation strategy is described in **Chapter 4** and **Chapter 21**. The Project will allow for the transition of workers from IDM to the Project with a similar accommodation blend of workers living locally in Moranbah and in existing workforce accommodation villages (WAVs) in Moranbah and Coppabella. There will be small, temporary increase in the number of workers for a 12 month period during construction. There will be no increase in the number of workers requiring accommodation locally or in WAVs during operations. Hence there will be no increase in the demand for town water supply from the IRC in Moranbah or Coppabella. Stanmore contributes to the availability of town water supply by making excess raw water at its operations available to IRC under contract.

8.7.6 Release of Contaminants

The system for managing potentially contaminated water is described in Section 8.4.3.6. The location of potential contaminants such as fuel, oil or chemical storage, is limited to the go-line / crib area. These areas will be protected from flooding by the Project levees with a 0.1% AEP (1:1,000 year) design. In summary, these systems will be designed in accordance with Australian Standards for the handling, storage (including bunded storages) and management of potential contaminants to prevent their release to the environment. Procedures will be implemented to manage any accidental releases.

8.7.7 Cumulative Impacts

8.7.7.1 Overview and Projects Assessed

An assessment was undertaken is to identify the potential for impacts from the Project to contribute similar impacts from other projects, including activities proposed, under development or already in operation within a suitable region of influence of the Project (see Section 9.9 of **Appendix I**). Information on over 25 existing and proposed resource operations and renewables projects in the vicinity of the Project is provided in tables and figures in Section 9.9 of **Appendix I**, including IDM and the Bowen Gas project. Cumulative impacts were assessed for the following areas:

- Localised cumulative impacts that may result from multiple existing or proposed mining operations in the immediate vicinity of the Project. Localised cumulative impacts include the effect from concurrent operations that are close enough to potentially cause additive effect on the receiving environment. All existing and proposed projects located within the Isaac River catchment were included in the assessment.

- Regional cumulative impacts from mining operations throughout the Bowen Basin region or at a catchment level. Each mining operations may not represent a substantial impact at a regional level. However, the cumulative effect on the receiving environment may warrant consideration.

8.7.7.2 Water Quality

The Project is located in the Isaac River catchment, which is a major tributary within the Fitzroy basin. The Fitzroy basin is the largest catchment in Queensland draining into the Pacific Ocean and also the largest catchment that drains to the GBR, although it does not contribute significant freshwater flows to the coastal environment when compared to river systems further north.

In 2008, the Queensland Government undertook an investigation into the cumulative effects of coal mining in the Fitzroy River basin on water quality. The investigation found that:

- There were inconsistencies in discharge quality limits and operating requirements for coal mine water discharges as imposed through environmental authorities.
- In some cases, discharge limits and operating conditions of coal mines were not adequately protecting downstream EVs.

These conclusions led to a number of inter-related actions by Queensland Government and other stakeholders:

- WQOs were developed for the Fitzroy Basin and added to Schedule 1 the EPP Water in October 2011.
- Model Mining Conditions were developed for coal mines in the Fitzroy basin. These are designed to manage water discharges to meet the WQOs set out in the EPP Water and to provide consistency between mining operations in the Fitzroy basin.
- EAs for a number of mining operations were amended to introduce conditions consistent with the Model Mining Conditions.
- A number of mining operations entered into transitional environmental programs under the EP Act, which focussed on actions that would allow mines to achieve compliance with new EA conditions and upgrade operating conditions.

With these measures in place, a strong strategic and policy framework has been in place for over a decade for management of cumulative water quality impacts from mining activities in the Fitzroy Basin. This framework allows for management of individual mining activities in such a way that overarching WQOs can be achieved.

Mine-affected water from the Project will be managed through a mine water management system which is designed to operate in accordance with proposed EA conditions that are based on the Model Mining Conditions, and incorporated into the release criteria used in modelling the mine water management system. This mine-affected and sediment water management systems are demonstrated to have negligible impacts on water quality, specifically in relation to controlled releases of mine-affected water and sediment dams overflows. The potential impacts are considered within the error margin of detectable change. Therefore, the Project is expected to make a negligible contribution to cumulative impacts on surface water quality and associated EVs, especially as these are managed within the existing overarching strategic framework for cumulative impacts in the Fitzroy Basin.

8.7.7.3 Loss of Catchment and Stream Flows in the Isaac River

Section 8.7.4 describes the reduction in catchment of the Isaac River as a result of the Project final landform, which is around 0.1% of the catchment area of Isaac River to the confluence of Cherwell Creek

The cumulative impact assessment includes mining operations within the Isaac River catchment that are upstream, adjacent or downstream of the Project. The catchment of the Isaac River to the Stephens Creek confluence is around 7,782 km^2. This location has been selected as it is located downstream of existing projects included in the cumulative impact assessment.

There are approximately 20 existing coal mines that also capture runoff from the Isaac River catchment. The total estimated captured area of all these projects (including the Project) represents around 9.5% of the Isaac River catchment to the Isaac River and Stephens Creek confluence (encompassing all projects in the cumulative impact assessment including those downstream of the Project), of which the Project represents less than 0.2% of this value.

Areas captured within ESCP systems typically accounts for around 70% of the total captured area for a mine site. If this is applied to all sites, then the estimated captured catchment area within mine-affected water systems reduces to around 2.7% of the Isaac River catchment to the Stephens Creek confluence.

In addition, these mines have discharge licences which return captured surface water, as well as groundwater collected in underground workings, to the Isaac River catchment. Site discharges would reduce the impact on surface water volumes. There is limited information available on actual discharge volumes from the mines to the Isaac River.

The Project's contribution to the overall loss of catchment is minor. When taking into account potential discharges from the operating mines in accordance with their current approved release rules, the overall loss of catchment area and associated stream flow is relatively small. In practical terms, impacts on the volume of water flow in the Isaac River would be undetectable.

8.7.8 Downstream Water Users

Section 8.3.7 identifies existing water use entitlements downstream of the Project, which indicates that there is currently minimal use of surface water from the Isaac River downstream of the Project, and water use is limited to irrigation and stock watering. In combination with the negligible changes expected from the Project on surface water quality and flows, downstream users are unlikely to be impacted by the Project.

8.7.9 Water Management System Monitoring and Maintenance

The Project site's WMS will be monitored to ensure that they are operating as designed, including the following:

- Continual monitoring of water quality and storage volumes in the mine affected storages and sediment dams will be undertaken.
- The pit and dam pumps will be inspected and operated regularly to ensure they will operate when required.
- Sediment dams will be cleaned out on a regular basis to maintain the available sediment storage volume.
- Clean water drains will be monitored regularly to ensure they are operating as designed and do not allow mixing of clean and dirty water.
- Contaminated water sumps and interceptors will be inspected and cleaned out regularly.

8.7.10 Erosion and Sediment Control Plan

8.7.10.1 Overview

The Project's ESCP was developed to ensure the principles and objectives for the management of erosion and disturbed area runoff were properly addressed to meet the statutory requirements of the Model Mining Conditions. Section 8.4.3.3 details how sediment water will be managed by the Project. Sections 1.2 and 1.3 of **Appendix AD** provide further details on the purpose of the ESCP.

As demonstrated in **Chapter 7** through landform evolution modelling, the design of the rehabilitated landform will achieve the erosional stability in accordance with the rehabilitation milestone criteria proposed in the PRCP schedule (**Appendix AC**).

This erosion and sediment control will be implemented for the following phases of Project work:

- planning and design (non-operational)
- construction and operation.

Project workers and contractors involved in earthworks and civil construction will be provided access to the ESCP. All works involving disturbance will be required to adhere to all aspects of the ESCP unless abnormal circumstances prohibit their use.

The management and implementation of the ESCP will be administered through the following key personnel:

- The Site General Manager is accountable for the application of the ESCP.
- The Site Environmental Superintendent is responsible for documentation and revisions of the ESCP.
- Contractors engaged to undertake work at the Project are responsible for implementation of the ESCP.

8.7.10.2 Erosion and Sediment Control

The ESCP is designed to assist in the management, reduction and mitigation of erosion and its associated sediment transport within and from the Project. The three cornerstones of the ESCP are as follows:

- Erosion control – prevention or minimisation of soil erosion (from dispersive, non-dispersive or competent material) caused by rain drop impact and exacerbated overland flow on disturbed surfaces.
- Drainage control – prevention or reduction of soil erosion caused by concentrated flows and appropriate management and separation of the movement of clean and dirty water through the area of concern.
- Sediment control – trapping or retention of sediment either moving along the land surface, contained within runoff (i.e. from up-slope erosion) or from windborne particles.

Catchments that drain internally to the mine water management system into MAW dams or pits do not require erosion and sediment control management measures.

To be function efficiently, the ESCP will operate under the following principles:

- Ensure erosion and sediment control measures are designed and constructed effectively.
- Minimise the duration and extent of soil exposure.
- Promptly stabilise disturbed areas.
- Maximise sediment retention on the site.
- Control water movement through the site.
- Utilise existing topography and adopt construction practices that minimise soil erosion and sediment discharge from operational areas.
- Integrate erosion and sediment control issues / measures into the planning phases of construction and operations.
- Choose the erosion and sediment control techniques to account for site conditions such as soil, weather and construction conditions.
- Maintain all erosion and sediment control measures in proper working order at all times.
- Monitor the site and adjust erosion and sediment control practices to maintain the required performance standard.

Five main categories were taken into consideration to determine the appropriate erosion and sediment control technique to apply, all of which influence the erosion potential and the type of control measure(s) applicable:

- soil/spoil classification (e.g. dispersiveness)
- average slope of disturbance area
- extent and duration of soil disturbance
- location within the catchment and whether run-off from upslope can be controlled
- proximity to waterways.

Further details in relation to erosion and sediment control are provided in Section 4 of **Appendix AD**.

8.7.10.3 Erosion Control Measures

Water erosion was identified as the most likely cause of erosion within the Project's operational areas and commonly occurs as one or more of the following forms:

- Splash erosion is the spattering of soil particles cause by the impact of raindrops on soil.
- Sheet erosion is the uniform removal of soil in thin layers from sloping land.
- Rill erosion is the removal of soil by water concentrated in small but well-defined channels.
- Gully erosion produces channels deeper and larger than rills, generally greater than 300 mm deep).

Section 5.2 of **Appendix AD** summarises general erosion control techniques that are commonly used, such as gravelling, mulching and revegetation, with their applicability to flat, mild and steep slopes. Management methods proposed for dispersive soils include avoidance (e.g. stripping of non-dispersive topsoil rather dispersive subsoil for use in rehabilitation), reducing period of exposure, treatment with gypsum and covering with non-dispersive topsoil).

8.7.10.4 Drainage Control Measures

Operational drainage is considered temporary and will only be used during the Project's operational period. Once no longer required, all operational drainage will be decommissioned and rehabilitated.

The key drainage controls to be applied at the Project are as follows:

- Upslope catchment diversion drains, which divert the natural catchment around the site.
- Plateau drains, which convey runoff from the top of dumps towards the chutes and runoff collection drains.
- Overburden dump rock chutes, which collect runoff from the top and sides of dumps and convey the flow to the collection drains.
- Collection drains, which convey flow from dumps and infrastructure areas to the sediment dams.

The conceptual arrangement and location of proposed sediment drains for the mid stage of the Project are shown in Figure 6.1 of **Appendix AD**, based on reporting to the sediment dams shown in Figure 8-8. Final design and sizing of the proposed sediment drains over the life of the Project will be a dynamic process and will be undertaken by the proponent's mining contractor. Erosion and sediment controls will also be developed for the construction phase of the Project.

Section 6.2 of **Appendix AD** describes designs for drainage controls including:

- design life, where operational drainage controls that are anticipated to last longer than 24 months will be designed to cater for a 20-year Average Recurrence Interval (5% AEP) design storm to provide effective separation of diverted and sediment water
- check dam velocity control structures and velocity limits depending on material types for drains
- appropriate channel and chute linings (e.g. grass, rock, etc) to provide effective scour protection
- design of outlet structures to provide effective scour protection, including to sediment dams

- controls for unsealed roads such as shedding at regular intervals to sediment traps
- controls for waterway crossings (culverts and bed level crossings)
- drain configurations based on drains with low flows or high flows.

8.7.10.5 Sediment Control Measures

Due to the design of the Project's mining area and natural topography, only a limited proportion of the total mine disturbance area drains towards the receiving environment. The majority of the catchments drain internally and will be managed by the Project's WMS (Section 8.4). Notwithstanding this, internally draining spoil dumps and other erosion and sediment control catchments will be managed by the ESCP.

Section 8.4.3.1 overviews the Project's planned water management structure, which includes 11 sediment dams that will be used over the life of mining. The location of the proposed sediment dams is shown in Figure 8-6 to Figure 8-10. Additional minor sediment control structures will be constructed as part of the out of pit dump development. The final design and sizing of the planned sediment dams will include details of erosion and sediment controls required for the construction phase of the Project.

The design of the proposed sediment dams (see Section 7.2 of **Appendix AD**) has been based on maximum catchment area, settling volume, solid storage volume and total capacity.

Other primary and secondary supplementary sediment control techniques likely to be applied for the Project for localised sediment controls include rock filter dams, sediment traps, vegetated buffer strips and sediment fences.

The correct implementation of the Project's sediment controls will be guided by technical information derived from the IECA (2008).

8.7.10.6 Erosion and Sediment Control - Construction

The Project's disturbance activities will be conducted in accordance with site systems for the implementation of erosion and sediment control, including:

- a Permit to Disturb procedure
- internal projects standards
- Project-specific approval requirements
- an inspection regime.

Erosion and sediment control measures will be constructed prior to disturbance to reduce sediment laden stormwater discharging to the receiving environment. The scheduling and timing of works is an important element of any construction activity, with higher erosion risk in the wets season than the dry season. Erosion and sediment control measures will be designed and constructed by suitably qualified and experienced persons. Construction records and the management of change will be implemented for the Project's erosion and sediment control measures.

8.7.10.7 Erosion and Sediment Control Planning

The main areas of erosion and sediment control planning for the Project is associated with the overburden dumps, haul roads and topsoil stockpiles. As the Project progresses, it is possible that any changes to the proposed layout during the detailed design and construction phase may require a review of the planned erosion and sediment control measures.

Section 9 of **Appendix AD** details the steps required to determine the applicable erosion and sediment control techniques for a catchment and outlines the sequence for the installation of erosion and sediment control measures.

Decommissioning of erosion and sediment control measures will be part of returning the Project site to a natural landform which is safe, stable, non-polluting and able to support the proposed post mining land uses sustainably. The objective of decommissioning erosion and sediment control measures is to remove the operational structures and establish revegetation..

The decision as to which combination of erosion and sediment control measures will be adopted will be based on the following factors:

- site topography
- material / soil / surface / strata type – to determine where the control measure will be implemented and downstream of the control measure
- current disturbance category
- site specific constraints (e.g. proximity of local watercourse)
- length of time that area will remain at this disturbance category
- overall purpose of implementing erosion and sediment control measures at a particular location
- applicability of erosion and sediment control measures as per the erosion and sediment control measures matrix.

The erosion and sediment control matrix in Section 9.5 of **Appendix AD** shows a matrix of land uses and erosion and sediment control measures developed to assist in determining which erosion and sediment control measure(s) may be applicable. Not all erosion and sediment control measures will be applicable to the relevant land use type. This tool for selecting appropriate erosion and sediment control measures is based on:

- the phase of the site (operational, non-operational or construction)
- land use type, adjacent land usage / classification and proximity to watercourses
- level of priority in providing erosion and sediment control measures.

An asset register database will be prepared for all erosion and sediment control structures at the Project site.

8.7.10.8 Monitoring and Maintenance

An effective monitoring and maintenance program will be established to assess the effectiveness of the Project's erosion and sediment control measures, and where required, conduct the appropriate repairs for identified issues. Section 10.1 of **Appendix AD** details how the monitoring and maintenance program for the Project's erosion and sediment control measures will function.

Any failure of effectiveness of an erosion and sediment control structure will be reported to the Site Environmental Superintendent. Incident reporting procedures will be established to report the ineffectiveness of an erosion and sediment control structure. The incident reporting will be managed in accordance with the Project's environmental management system. Corrective actions will be developed as soon as practicable for ineffective erosion and sediment control measures and may require advice from an appropriately qualified person. All corrective actions will be captured in the Project's environmental management system.

To ensure continuous improvement, the ESCP will be reviewed by an appropriately qualified person annually and regularly updated to ensure it remains current in relation to applicable reference documents, and erosion and sediment control techniques and application.

8.7.11 Surface Water Monitoring

8.7.11.1 Overview

Monitoring of surface water quality within and surrounding to the Project area in waterways and Project water storages will form a key component of the surface water management system. Monitoring of upstream, onsite and downstream water quality will assist in demonstrating that the Project's water management system is effective in meeting its objective of minimal impacts on receiving water quality and will allow for early detection of any impacts and appropriate corrective action.

The surface water monitoring protocols will:

- ensure compliance with the Project's EA and PRCP schedule
- provide valuable information on the performance of the water management system
- facilitate adaptive management of water resources on the site.

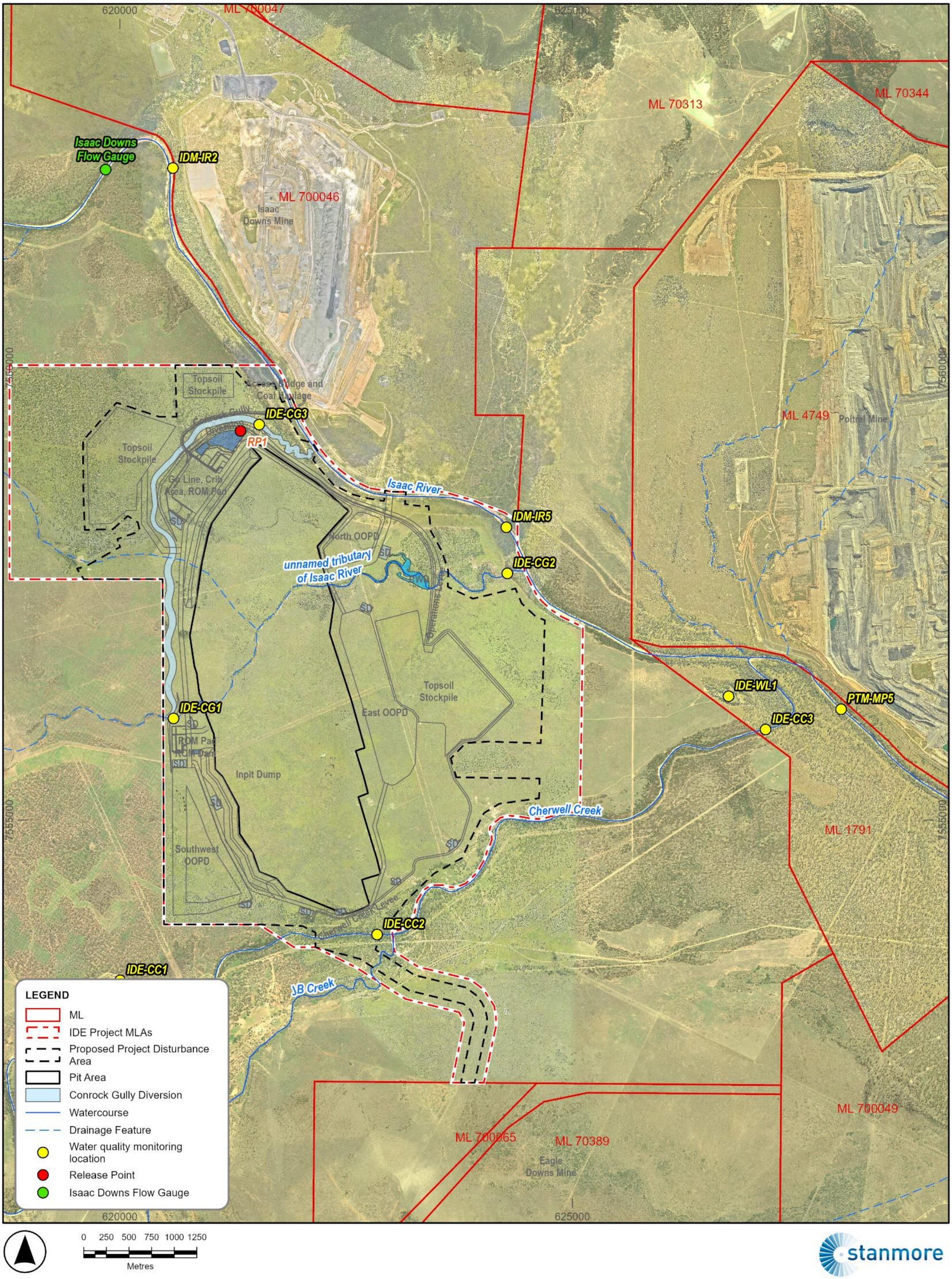
The surface water monitoring program will be implemented in accordance with the Monitoring and Sampling Manual (DES, 2018).

8.7.11.2 Water Quality Monitoring Locations

Surface water has been monitored a number of surface water locations in the Project vicinity (see Section 8.3.6). The surface water monitoring program will include continued monitoring at a number of these sites to monitor water quality upstream and downstream of the Project. The proposed surface water monitoring locations are shown in Figure 8-20 and summarised in Table 8-14. Figure 8-20 also shows the proposed release point (RP1) from the MAW2 into Conrock Gully diversion near the confluence with the Isaac River.

Table 8-14 Proposed Surface Water Monitoring Program

Site name	Waterway	Location	
		Longitude (GDA2020)	**Latitude (GDA2020)**
<u>Upstream monitoring points</u>			
ID-IR2	Isaac River – upstream of IDM and IDE Project	148.168197	-22.040876
IDE-CG1	Conrock Gully – upstream of IDE Project	148.169025	-22.095638
IDE-CC1	Cherwell Creek – upstream of IDE Project	148.163531	-22.121846
<u>Downstream monitoring points</u>			
ID-IR5	Isaac River – downstream of Conrock Gully diversion	148.205483	-22.077632
IDE-CG2	Conrock Gully – downstream of IDE Project	148.204658	-22.080908
IDE-CG3	Conrock Gully diversion – downstream before confluence with Isaac River	148.177970	-22.066234
IDE-CC2	Cherwell Creek – upstream of JB Gully	148.191014	-22.117059
IDE-CC3	Cherwell Creek – downstream of IDE Project	148.232452	-22.096283
IDE-WL1	Unnamed wetland	148.228449	-22.092989
PTM-MP5	Isaac River – downstream of IDE Project	148.240546	-22.094180



Datum:	GDA2020 Zone 55
Scale:	See Scale Bar
Date:	6/05/2026 3:08 PM
Drawn:	Minserve
Source:	Minserve/Stanmore
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DISCLAIMER: Third party data sources are used in this map compilation. Minserve makes no warranty regarding this data's accuracy or currency.

stanmore

ISAAC DOWNS EXTENSION

Surface Water Monitoring Locations

Figure | 8-20

8.7.11.3 Mine-affected Water Quality Monitoring

The proposed mine-affected water release limits and monitoring frequency to be sampled at the proposed release point are provided in Table 8-9 and Table 8-10, based on variable flow criteria. These are the criteria that are proposed in the draft EA for the Project (see **Appendix AA**).

The proposed release contaminant trigger investigations levels for mine-affected water are provided in Table 8-15. Monitoring will commence within two hours of a release and thereafter weekly during release. In accordance with the draft EA (see **Appendix AA**) these are the trigger levels, where if they are exceeded, would require:

- a comparison of upstream and downstream monitoring results
- a comparison of downstream results with the trigger values
- where downstream results exceed upstream results and the trigger values, then undertake an investigation into potential for environmental harm and report to DETSI within a specified timeframe on the investigations and actions taken to prevent environmental harm.

Release contaminant trigger investigations levels were derived from the following sources as indicated in Table 8-15:

- WQOs/DGVs (typically for aquatic ecosystem EVs) presented in Section 8.3.2
- Site specific trigger values where this was supported by regional or local water quality data (see Section 8.3.6), and where these are greater than WQOs/DGVs
- Model Mining Conditions, where these are not available as WQOs/DGVs or site specific trigger values
- Limit of reporting, where this represents the lowest detectable limit in a sample.

Event-based sampling of mine-affected water releases will enable quantification of release water quality and their potential impact on the water quality of receiving waters.

Table 8-15 Release Contaminant Trigger Investigations Levels

Quality Characteristics	Trigger Level µg/L	Source of Trigger Level
Aluminium	212	Site-specific trigger value – see Table 8-8
Antimony	9	Aquatic ecosystem EV
Arsenic	13	Aquatic ecosystem EV
Cadmium	0.2	Aquatic ecosystem EV
Chromium	1.0	Aquatic ecosystem EV
Copper	3.0	Site-specific trigger value – see Table 8-8
Iron	280	Aquatic ecosystem EV
Lead	3.4	Aquatic ecosystem EV
Mercury	0.2	Aquatic ecosystem EV
Nickel	11	Aquatic ecosystem EV
Zinc	8.0	Aquatic ecosystem EV
Boron	940	Aquatic ecosystem EV
Cobalt	1.4	Aquatic ecosystem EV
Manganese	1,900	Aquatic ecosystem EV
Molybdenum	34	Aquatic ecosystem EV

Quality Characteristics	Trigger Level µg/L	Source of Trigger Level
Selenium	10	Limit of Reporting
Silver	1.0	Aquatic ecosystem EV
Uranium	1.0	Aquatic ecosystem EV
Vanadium	10	Aquatic ecosystem EV
Ammonia	720	Aquatic ecosystem EV
Nitrate	1,100	Aquatic ecosystem EV
Petroleum hydrocarbons (C6-C9)	20	Model Mining Conditions
Petroleum hydrocarbons (C10-C36)	100	Model Mining Conditions
Fluoride	320	80th %ile for Isaac River at Goonyella gauge (see Table 3.2 of **Appendix I**)
Sodium	188,000	80th %ile for Isaac River at Goonyella gauge (see Table 3.2 of **Appendix I**)

8.7.11.4 Receiving Water Contaminant Trigger Levels

Table 8-11 provides the proposed receiving water contaminant trigger levels, which are the criteria proposed in the draft EA (**Appendix AA**). In accordance with the draft EA, if receiving waters at a downstream monitoring point exceed the trigger levels during a mine-affected water release event then:

- downstream results are compared to upstream results
- where the downstream results exceed the upstream results, then undertake an investigation into potential for environmental harm and report to DETSI within a specified timeframe on the investigations and actions taken to prevent environmental harm.

8.7.11.5 Water Storage Monitoring

The water quality monitoring program will also include dam monitoring of all mine-affected water dams and sediment dams, as described in Section 8.4.3.2 and 8.4.3.3, respectively.

These water storages will be monitored on a quarterly basis for the parameters listed in Table 8-9, Table 8-10 and Table 8-15. Sampling from the water storages allows for an understanding of trends in water quality parameters prior to release and hence enables appropriate remedial actions to be undertaken if required prior to release (e.g. transfer to another storage or void at IPC).

8.7.12 Fitzroy Regional Receiving Environment Monitoring Program

The proposed adoption of the FRREMP for the Project is described in **Chapter 12**.

8.8 Conclusion

A comprehensive surface water assessment was undertaken for the Project, including identification of environmental values and the development of a water management system.

The environmental values of surface waters within and surrounding the Project area, including catchments, watercourses, drainage features, regional and local water quality and streamflows, were identified through field based monitoring and studies and desktop information. The Project is located in the Isaac River catchment of the Fitzroy Basin and is bounded by the Isaac River and Cherwell Creek. Water quality objectives for these surface waters were developed through published guidelines, and regional and local water quality sampling.

The water management system was developed for all water types for the Project, and is the primary management measure to mitigate potential impacts to surface waters. The water management system involves separation of mine-affected water, sediment water and clean water. Raw water will be imported to site under existing allocations from Sunwater for IPC. The Project's water management system has been integrated into IPC's water management system which allows for balancing of mine-affected water flows, transfers of raw water, and hence a reduction in storage requirements at the Project.

Mine-affected water dams and sediment dams have been designed to achieve the objective of the water management system to protect downstream environmental values. A preliminary consequence category assessment has been completed for all water storages, which based on the low consequence of failure, were not assessed as regulated structures.

A comprehensive numerical water balance model was developed to test the performance of the water management system. The model simulated water inflows and outflows through the various stages of mine development with different climatic sequences. The model maximises the recycling of water from water storages to meet Project water demands. The system assessment found the following:

- There would be no uncontrolled releases of mine-affected water.
- Controlled releases of mine-affected water would be undertaken in accordance with flow and water quality criteria designed to protect downstream environmental values and water quality objectives, including negligible change in the salinity of receiving waters.
- Sediment dam overflows would occur in accordance with their engineered design standard during wet or very wet climatic conditions, but these overflows would result in a negligible change in salinity of receiving waters.
- The Project's mine pit would continue to operate in all but very wet climatic conditions.
- The Project would be a net importer of water from the rest of IPC.
- Void water storages at IPC would remain well below their capacity, including storage of any excess water from the Project.
- The whole of IPC, inclusive of the Project would not require an external raw water supply in excess of the existing allocations with Sunwater.
- During the period of operations, changes in climate would lower the risk of pit inundation, controlled release volumes and sediment dam overflow volumes.

During operations the water management system will capture runoff that would otherwise report to the watercourses. The final landform, which includes a residual void, will capture runoff that would otherwise report to the watercourses, but to a lesser extent than during operations. This loss of streamflow is expected to be negligible for the Isaac River and Cherwell Creek. There will be a loss of flows to the downstream reach of Conrock Gully. However, this area will continue to be flooded by backwater flood flows from the Isaac River for flood events greater than 1 in 2 years.

In accordance with GBR Guideline requirements, the Project will not result in a net decline in water quality to surface water basins that feed into the GBR.

In areas with potential contaminants such as hydrocarbons or chemicals (e.g. go-line area), additional controls will be implemented to prevent the release of contaminants, capture any contaminants in management systems and remediate spills if they occur.

An erosion and sediment control plan has been developed to manage sediment releases during construction and operations, through the design and installation of erosion and sediment control structures including strategically located sediment dams.

A surface water monitoring program has been developed to monitor releases from the Project, including the development of release limits based on variable flows and water quality, release contaminant trigger investigation levels, and receiving water contaminant trigger levels for mine-affected water. The proponent proposes to join the FRREMP (as supported by DETSI), as a regional industry participant, to monitor any changes to the receiving environment. The surface water monitoring program and FRREMP will be implemented to monitor potential environmental impacts and ensure that the site water management system is meeting its objectives.

The water management system, water quality objectives, Model Mining Conditions and water quality monitoring data forms the basis for the proposed EA and PRCP schedule conditions for the Project.

Based on the assessment of surface water impacts the environmental objectives and performance outcomes for the Project, as they relate to surface waters, will be achieved.

8.9 References

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