APPENDIX I - SURFACE WATER AND WATER MANAGEMENT ASSESSMENT

Isaac Downs Extension

Surface Water Impact Assessment

Stanmore ID Extension Pty Ltd

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For and on behalf of **Hydro**Balance
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1 Introduction

1.1 Background

Stanmore ID Extension Pty Ltd (ID Extension), a wholly owned subsidiary of Stanmore Resources Ltd (Stanmore) proposes to develop the Isaac Downs Extension (IDE) Project (the Project). The Project will extend the life of mining operations at Isaac Plains Complex (IPC). IPC comprises Isaac Downs Mine (IDM) and Isaac Plains Mine (IPM). Stanmore, through various subsidiary entities, operates IPC and other nearby mines, namely Poitrel Mine and Eagle Downs (Figure 1.1). Mining activities, including the workforce, will transition from IDM to the Project as operations ramp down at IDM.

The Project requires approvals from the:

- State under the *Environmental Protection Act 1994* (EP Act), for a new environmental authority (EA) and progressive rehabilitation and closure plan (PRCP) schedule.
- Commonwealth through referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPC Act).

The proponent has applied for four mining leases (MLs) for the Project (ML application [MLA] 700081, MLA 700082, MLA 700083 and MLA 700084), together forming the Project area. The proponent is preparing a voluntary environmental impact statement (EIS) under the EP Act which will support the EA, PRCP schedule and Referral for the Project.

HydroBalance was commissioned by Stanmore to undertake a Surface Water Impact Assessment (SWIA) and Flooding Impact Assessment (FIA) for the Project. The SWIA addresses the proposed site water management system during operations and post-closure, to assess potential impacts to the to the quality and quantity of water for receiving users. The SWIA is presented in this report, and the FIA is presented in HydroBalance (2026). These reports should be considered together when interpreting the potential impacts to surface water due to the Project.

The SWIA report forms part of the EIS submission for the Project.

1.2 Project overview

The Project activities that will extend the life of mining operations at IPC comprise an open cut coal mine pit and associated infrastructure, primarily mining metallurgical (steel making) coal. Approximately 46 Mt of run of mine (ROM) coal will be mined over 15 years, with approximately 2 – 4.5 Mtpa. The proponent intends to commence construction activities in late 2027 / early 2028, subject to obtaining all required approvals, with mining operations commencing in 2028 and ROM coal extraction in 2029.

The open cut mining methods for the Project will be similar to those at IDM, including:

- clearing of vegetation, stripping and stockpiling of topsoil
- drilling and blasting of pre-strip overburden
- removing the pre-strip overburden using mining equipment at IDM being a dragline and / or truck and shovel fleets and / or dozers
- drilling and blasting of overburden
- drilling and blasting of pit floor for geotechnical stability to allow for in-pit dumping
- overburden removal using the existing dragline at IDM and / or truck and shovel fleets
- coal mining using excavators
- formation of out of pit and in-pit overburden dumps as mining progresses
- progressive rehabilitation of overburden dump areas.

ROM coal will be transported from the Project's ROM coal pad to the coal handling and preparation plant (CHPP) at IPM for washing, utilising existing haul roads at IPC and new haul roads, including a bridge across the Isaac River, constructed in the Project area. The dragline will be walked from IDM to the Project via a temporary crossing of the Isaac River.

A satellite go line and crib area will be constructed at the Project, with the existing mine infrastructure area (MIA) at IDM continuing to service Project activities.

The primary access to the Project for workers and deliveries will be via IDM's existing access road and new internal roads connecting with the Project, utilising the bridge to be constructed across the Isaac River. There is potential for a secondary access route to the Project between the Project and Stanmore's Eagle Downs project, utilising new and existing roads to connect with the Peak Downs Mine Road.

During operations, levees will be constructed to protect the open cut pit area from flooding of the Isaac River, Cherwell Creek and Conrock Gully up to a 0.1% annual exceedance probability (AEP) (1:1,000 year) flood event. Conrock Gully will be diverted around the active mining areas into the Isaac River, with the diversion remaining post mining. Any residual void remaining post mine life will not be located within the 0.1% AEP flood event.

A mine affected water dam will store water from the pit, ROM pad, go line and crib area, with the ability to transfer mine affected water to and from IDM and IPM within IPC's integrated water management system, thereby enabling the balancing of water supply and demand. Sediment water drains and dams will be constructed to capture runoff from overburden dumps. Clean water drains and dams will be constructed to separate clean water from mine affected water and sediment water.

IPC has access to external raw water supplied from SunWater and has excess storage capacity for water within existing mined voids and dams. As the Project's water management systems will be integrated with IPC, it is anticipated that water supply will be available during dry periods, and storage capacity will be able to receive any excess water during wet periods. Therefore, no new sources of water supply will be required.

Topsoil stockpile areas will be used for storage of topsoil that has been stripped from mining and infrastructure areas, for future use in rehabilitation.

Power for the dragline will be supplied to the Project via powerline connections with existing power supply at IDM. The Project may require additional linear infrastructure at IDM to facilitate the extension of IDM mining activities to the Project; however, this will be within areas authorised for disturbance.

The proposed Project layout, MLA areas and proposed disturbance area is shown in Figure 1.2. The proposed disturbance allows for working and construction areas within and around proposed Project activities and infrastructure. The area of the 4 MLAs is 2,707 ha and the proposed disturbance area is 2,080 ha. The disturbance area has been refined to minimise and / or avoid sensitive ecological features (e.g. habitat for listed threatened species and riparian areas). The disturbance area may be subject to further refinement for environmental or operational reasons. The disturbance area excludes approximately 2.5 ha of disturbance on IDM MLs for which an IDM EA and PRCP schedule amendment will be required.

The Project operational workforce will be similar to, but lower than that for current operations at IPC, with around 300 - 400 workers, compared to around 400 - 450 workers. Approximately 100 – 150 workers will be engaged at the Project for infrastructure construction. The Project, being an extension of mining activities at IPC, is therefore important to ensure a near steady state workforce across IPC beyond 2027 and 2028.

Workforce accommodation arrangements will continue in a similar manner to those for the current IPC workforce, being a mix of residences in Moranbah and other local or regional towns, and mine accommodation villages in the region. Through the Project, Stanmore will continue to support local and regional suppliers and contractors, providing additional economic benefits and employment in the region.

The Project is not proposing any novel or unproven resource extraction process, technology or activity.

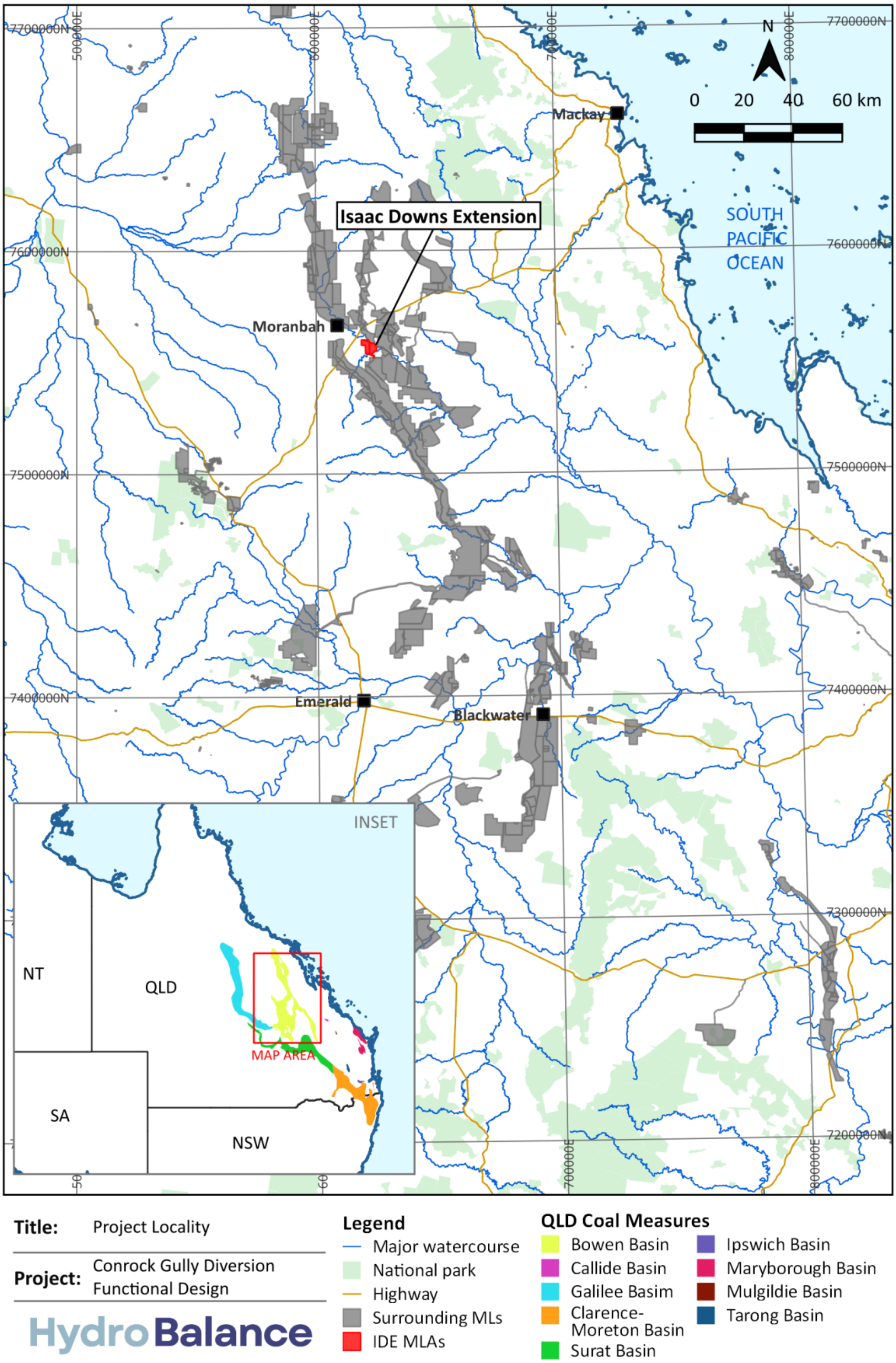


Figure 1.1 - Project locality

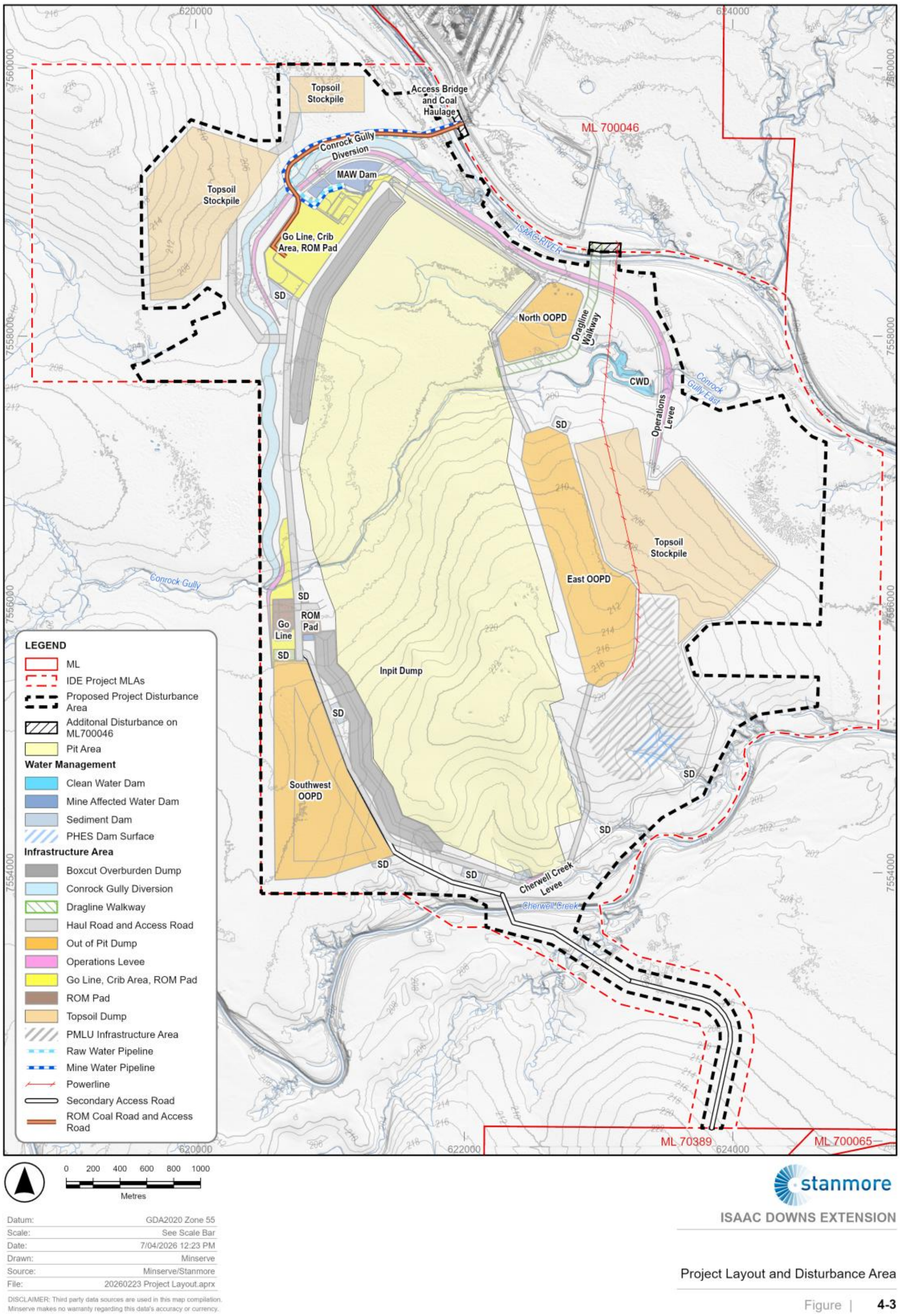


Figure 1.2 – Proposed Project layout

1.3 Terms of Reference

This SWIA forms part of an EIS which has been prepared in accordance with Section 40 the EP Act. This assessment has been prepared to satisfy the requirements of *the Terms of reference for an environmental impact statement – Isaac Downs Extension Project* issued by the Department of Environment, Tourism, Science and Innovation (DETSI) on 11 December 2025.

This SWIA addresses the Terms of Reference (ToR) relevant to surface water. Table 1.1 lists the elements of the ToR relevant to this assessment and the sections of this report where those TORs are addressed.

Table 1.1 – Terms of Reference for EIS relevant to surface water

Project specific matters	Requirement	Report Section
<u>Climate</u>		
9.1	Conduct the assessment in accordance with the latest version of the department's *Climate—EIS information guideline* (ESR/2020/5298) (DETSI 2024).	Section 6.3
9.2	Describe the project area's climate patterns that are relevant to the environmental impact assessment, particularly the project's discharges to water and air, and propagation of noise. Provide climate data in a statistical form including long-term averages and extreme values.	Section 6.3
9.3	Assess the project's vulnerabilities to projected climate change (e.g. changing patterns of temperature, rainfall, hydrology, and extreme weather events). In the assessment of climate hazards and risks, reference relevant climate projection data and employ appropriate risk assessment methodologies.	Section 7.4, Section 8.4.2
<u>Water</u>		
Water quality		
9.28	Conduct the impact assessment in accordance with the following guidelines: *Water—EIS information guideline* (ESR/2020/5312) (DETSI 2024), *Applications for activities with impacts to water* (ESR/2015/1837) (DETSI 2025), *Water quality guidelines* (DETSI n.d.), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ 2000); (ANZG 2018); 2023), *Queensland Water Quality Guidelines* (DEHP 2009), *Wastewater release to Queensland waters* (ESR/2015/1654) (DETSI 2025), *Monitoring and sampling manual* (DES 2018), *Information guidelines on deriving site-specific guideline values for physico-chemical parameters and toxicants* (IESC 2019) and *Using monitoring data to assess groundwater quality and potential environmental impacts* (DES 2021). Projects in Great Barrier Reef catchments must also undertake an assessment in accordance with the guideline *Reef discharge standards for industrial activities* (ESR/2021/5627) (DESI 2024) and address the relevant information requirements."	Section 2.1, Section 9.10.1, Section 3.7.2.4, Section 9.7
9.29	Demonstrate that the project can meet the environmental objectives and performance outcomes in Schedule 8 of the EP Regulation.	Section 9.8
9.30	With reference to the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and section 9 the EP Act, identify the environmental values of surface- and ground- waters within the project area and immediately downstream or downgradient that may be affected by the project, including wetlands, semi-permanent and permanent pools, seagrass beds, corals, any human uses and cultural values of water.	Section 2 Section 3
9.31	Define the relevant water and sediment quality guidelines applicable to the environmental values and demonstrate how these will be met by the project during construction, operation, decommissioning and following project completion. Locally derived trigger values must be derived in accordance with best practice environmental management including the guidelines listed in *Water—EIS information guideline* (ESR/2020/5312) (DETSI 2024).	Section 2.1 Section 3.7 Section 9.10

Project specific matters	Requirement	Report Section
9.32	Detail the hydrological, hydrogeological, chemical, physical and biological characteristics of surface waters and groundwater within the area that may be affected by the project and at suitable reference locations using sufficient data to define natural variation, including for various water types, and seasonal and spatial variation.	Section 3
9.33	Describe the quantity, quality, location, duration and timing of all potential and/or proposed releases of contaminants. Releases may include controlled water discharges to surface water streams, uncontrolled discharges when the design capacity of storages is exceeded, spills of products during loading or transportation, contaminated run-off from operational areas of the site (including seepage from waste rock dumps), or run-off from disturbed acid sulfate soils.	Section 7.3.4, Section 7.3.5 Section 9.6 Section 9.7
9.34	Assess the potential impact of any releases from point or diffuse sources on all relevant environmental values and water quality objectives of the receiving environment. The impact assessment must consider the resultant quality and hydrology of receiving waters, cumulative impacts, and the assimilative capacity of the receiving environment.	Section 9.6 Section 9.7 Section 9.9
9.35	Describe how water quality guidelines and objectives would be achieved and environmental impacts would be avoided or minimised through the implementation of management strategies that comply with the management hierarchy and management intent of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019. Appropriate management strategies may include the use of erosion and sediment control practices, and the separation of clean storm water run-off from the run-off from disturbed and operational areas of the site.	Section 4, Section 7 Section 9.10
9.36	Describe how monitoring would be used to demonstrate that objectives were being assessed, audited and met. For example, provide measurable criteria, standards and/or indicators that will be used to assess the condition of the ecological values, environmental values and health of surface- and ground- water environments. Propose detailed corrective actions to be used if objectives are not likely to be met.	Section 9.10
<u>Water resources</u>		
9.37	Conduct the impact assessment in accordance with the department's *Water—EIS information guideline*, ESR/2020/5312 (ESR/2020/5312) (DETSI 2024) and DAF *Environmental impact assessment companion guide* (DAF 2024).	Section 9
9.38	Describe present and potential users and uses of water in areas potentially affected by the project, including municipal, agricultural, industrial, recreational and environmental uses of water.	Section 3.8
9.40	Model and describe the inputs, movements, exchanges and outputs of surface water that would or may be affected by the project including potential post-mining land use outcomes. The models used to estimate associated water take must take into account the climatic conditions at the site, assess the potential impacts on water resources and include a site water balance.	Section 6, Section 7, Section 8
9.41	Provide a description of the project's impacts including cumulative impacts at the local scale and in a regional context including: (a) changes in flow regimes from diversions, water take and discharges (c) management of mine affected water (d) alterations to riparian vegetation and bank and channel morphology and stability (e) direct and indirect impacts arising from the development.	FIA Section 3, Section 7 (HydroBalance, 2026) Section 4, Section 4.8. Section 9
9.43	Provide a water management plan, for the life of the project, which details management strategies of mine-affected water, sediment-affected water and drainage from areas not disturbed by mining activities. Any water taken off site for further use must also be accounted for and must be consistent with the General Use Approval for associated water (including CSG water).	Section 4

Project specific matters	Requirement	Report Section
9.44	Identify any approvals or entitlements that would be needed under the Water Act 2000. Specifically address whether or not the project would take water from, or affect recharge to, aquifers of the Great Artesian Basin. Address the requirement/s for a Riverine Protection Permit (RPP) and/or Quarry Material Allocation Notice (QMAN). Describe the practices and procedures that would be used to avoid or minimise impacts on water resources	Section 1.5.1
9.46	Include maps of suitable scale showing the location of diversions and other water-related infrastructure in relation to resource infrastructure. Detail any significant diversion or interception of overland flow, including the effects of subsidence.	Figure 1.2 FIA Section 4.2 (HydroBalance, 2026)
9.47	Provide the following plans (a) natural (representative) profile (cross-section) of any waterway sections (e.g. Conrock Gully) that are proposed to be impacted and diverted including low flow channel, main channel and top of banks (b) existing and proposed profiles (cross-section) of the waterways where infrastructure is proposed including the bridge and temporary access over the Isaac River and access over Cherwell Creek."	FIA Section 4, Appendix D (HydroBalance, 2026)
9.48	Describe watercourse diversion design, operation, monitoring and rehabilitation based on current engineering practice and relevant guidelines including 'Guideline Works that interfere with water in a watercourse for a resource activity—watercourse diversions (OSW/2019/4599) (DNRME 2019); Maintenance of geomorphic processes in Bowen Basin River Diversions' (Australian Coal Association Research Program ((ID&A Pty Ltd. 2000); 'Monitoring and Evaluation Program for Bowen Basin River Diversions' (Fisher Stewart, ID&A Pty Ltd., & Earth Technology 2001); and 'Criteria for functioning river landscape units in mining and post mining landscapes' (White, K., Moar, D., Hardie, R., Blackham, D., & Lucas, R. 2014). The diversion design must address function beyond mine life including hydrology, hydraulics, geomorphic stability, sediment transport regime, gradient continuity at diversion-waterway tie-ins at the upstream and downstream extents, floodplain corridor width, and riparian vegetation establishment in accordance with the relevant established Guidelines.	FIA Section 4, Appendix D (HydroBalance, 2026)
9.49	Describe the various options for supplying water to the project and assess any potential consequential impacts in relation to the objectives and strategies of any water plan and associated planning documents that may apply. The construction of in-stream water storages to collect water supply for the project should not be the only option presented. Alternative water supply options must be fully detailed.	Section 4 Section 4.9
9.50	Describe the proposed supply of potable water for the project, including temporary demands during the construction period. Also describe on-site storage and treatment requirements for wastewater from accommodation and/or offices and workshops.	Section 4.11
9.51	Determine any additional town water supply demands to service worker camps or household water needs in Moranbah and surrounding towns that may experience growth (even if only temporary) from the project and how this will be met. Determine if the additional water needs for the project will have a water security impact on Isaac Regional Council towns, particularly Moranbah.	Refer to EIS report
<u>Flooding</u>		
9.55	Describe the history of flooding onsite and in proximity to the project site. Describe current flood risk considering the location of domains (operational and post-closure phase) for a range of annual exceedance probabilities up to the 0.1% annual exceedance probability (AEP) and probable maximum flood levels for the project site. Use flood modelling to assess how the project may potentially change flooding and run-off characteristics on-site and both upstream and downstream of the site. The assessment must consider all infrastructure associated with	FIA Section 5, Appendix A (HydroBalance, 2026)

Project specific matters	Requirement	Report Section
	the project including levees, roads, and linear infrastructure, and all proposed measures to avoid or minimise impacts.	
9.56	Evidence must be provided to demonstrate that the securing of storage containers of hazardous contaminants during flood events meets the requirements of schedule 8 of the EP Regulation.	Section 4.12
9.57	Describe, illustrate and assess where any proposed infrastructure, including tailing storage facilities, dams, voids and waste rock dumps, disturbed and rehabilitated areas, would lie in relation to modelled flood levels, including the 0.1% AEP and probable maximum flood levels. Describe management actions to minimise impacts of flooding to mine infrastructure and manage in mine pit water post-flooding.	FIA Section 5, (HydroBalance, 2026)
9.58	Identify and label the proposed dragline crossing point across the Isaac River on a map and provide indicative earthworks footprints required to facilitate the crossing. A specific model scenario should be undertaken as part of the flood study to assess the potential flood impacts and inform the crossing location.	FIA Section 4.2, Section 4.4.4, Section 5 (HydroBalance, 2026)
9.59	Assess the project's vulnerabilities to climate change as they relate to flooding (e.g. changing patterns of rainfall, hydrology, temperature and extreme weather events). Describe possible adaptation strategies (preferred and alternative) based on climate change projections for the project site.	FIA Section 5.6, (HydroBalance, 2026)
The Independent Expert Scientific Committee (IESC)		
9.60	The EIS must provide the information requirements contained in the IESC's Information guidelines (IESC 2024) including relevant information guidelines explanatory notes (e.g. uncertainty analysis, assessing groundwater-dependent ecosystems).	Section 1.4
9.115	Identify the quantity, quality and location of all potential discharges of water and contaminants by the project, including treated wastewater and sewage. Describe whether the discharges would be from point sources (whether uncontrolled and controlled discharges) or diffuse sources (such as irrigation to land of treated wastewater/sewage effluent) and describe the receiving environment (such as land or surface waters). Refer to the Water section of the TOR and Water—EIS information guideline (ESR/2020/5312) (DETSI 2024) for further guidance. For potential discharges to surface waters, provide detail to demonstrate consistency with the assessment approaches outlined in the guideline Wastewater release to Queensland waters (ESR/2015/1654) (DETSI 2025). For potential discharges to groundwaters, provide an assessment using the appropriate approaches and guidelines listed in the Water—EIS information guideline (ESR/2020/5312) (DETSI 2024). Note that the EP Act and EP regulation hold strict provisions in terms of waste discharges to groundwaters or sensitive areas.	Section 4.10, Section 6.9, Section 7.3.4, Section 7.3.5, Section 7.4.4, Section 7.4.5
9.116	Provide a risk assessment of the potential impacts on waters, in the near-field and far-field, resulting from controlled or uncontrolled discharges from the site. Address the following matters with regard to every potential discharge of contaminated water, contaminants or wastes: (a) Describe the circumstances in which controlled and uncontrolled discharges might occur (b) Provide stream flow data and information on discharge water quality, including any potential variation in discharge water quality that will be used in combination with proposed discharge rates to estimate in-stream dilution and water quality. Chemical and physical properties of any wastewater, including concentrations of constituents, at the point of entering natural surface waters must be discussed along with toxicity of effluent constituents to human health, flora and fauna. (c) Provide an assessment of the available assimilative capacity of the receiving waters given existing water quality and other potential point source discharges in the catchment.	Section 6.9, Section 9.6, Section 9.9.4, Section 7.3.4, Section 7.3.5, Section 7.4.4, Section 7.4.5,

Project specific matters	Requirement	Report Section
	Options for controlled discharge at times of natural stream flow must be investigated to ensure that adequate flushing of wastewater is achieved. (d) Provide water quality limits that are appropriate to maintain background water quality and protect other water uses (e) Describe the necessary streamflow conditions in receiving waters under which controlled discharges will be allowed.	
Regulated structures		
9.61	Conduct the impact assessments on in accordance with the latest version of the department's guidelines on *Regulated structures—EIS information guideline* (ESR/2020/5307) (DETSI 2024), *Structures which are dams or levees constructed as part of environmentally relevant activities* (ESR/2016/1934) (DETSI 2025) and *Manual for assessing hazard consequence categories and hydraulic performance of structures* (ESR/2016/1933) (DETSI 2025).	Section 5
9.62	Describe the purpose of all dams or levees proposed on the project site. Show their locations on appropriately scaled maps, and provide plans and cross-sections, illustrating embankment lengths, heights and widths, spillways, discharge points, design storage allowances, and maximum volumes.	Section 4 FIA Section 4 (HydroBalance, 2026)
9.63	Describe and illustrate how dams and levees would be: (a) sited to avoid or minimise risks from flooding using flood mapping showing the 0.1% AEP and probable maximum flood (b) located, constructed and operated to avoid, minimise and mitigate impacts on environmental values (c) located and designed to maximise progressive rehabilitation and closure.	Section 4 FIA Section 5 (HydroBalance, 2026)
9.64	Undertake a consequence category assessment for each dam or levee, according to the criteria outlined in department's *Manual for assessing hazard consequence categories and hydraulic performance of structures* (ESR/2016/1933) (DETSI 2025). The assessment must be undertaken for the three different failure event scenarios described in the department's manual, i.e. for seepage, overtopping and dam break. Regulated structures must comply with the *Manual for assessing hazard consequence categories and hydraulic performance of structures* (ESR/2016/1933) (DETSI 2025) in accordance with schedule 8, division 2 of the EP Regulation.	Section 5 FIA Section 6 (HydroBalance, 2026)
9.65	Following the consequence category assessment, determine the consequence category ('low, significant, or high') according to table 1 of department's *Manual for assessing hazard consequence categories and hydraulic performance of structures* (ESR/2016/1933) (DETSI 2025) and provide certified copies of the consequence category determination for each of the proposed dams or levees assessed.	Section 5 FIA Section 6 (HydroBalance, 2026)
9.66	Describe how risks associated with dam or levee failure, seepage through the floor, or embankments, and/or with overtopping of the structures will be avoided, minimised or mitigated to protect people, property and the environment.	Section 5 FIA Section 6 (HydroBalance, 2026)
Appendix 3: Description of the environment		
A3.24	Describe the environment of the project site and surrounding areas (i.e. adjacent, upstream and downstream from project site) that may be affected by the project. At a minimum, this section needs to include details of:	
	g) Hydrology of water resources (surface water and groundwater), including flood extents, relevant hydrogeology, groundwater depth across the project area, and local water quality,	FIA Section 2 (HydroBalance, 2026)

Project specific matters	Requirement	Report Section
	including, but not limited to, the Isaac River and Cherwell Creek and relevant wetlands and aquifers in the region	Section 2, Section 3
	h) characteristics of potentially impacted water resources (surface water and groundwater) including, but not limited to, the Isaac River and Cherwell Creek and relevant wetlands in the region	FIA Section 2 (HydroBalance, 2026) Section 2, Section 3
	i) values of water resources, including but not limited to social and economic values (including third party uses of groundwater and surface water), and cultural values.	Section 2 Section 3
Environmental information required within project area and surrounds		
A3.27	Provide information on topography and elevation across the project area and adjacent area to enable assessment of MNES and relevant impacts on MNES such as sediment run-off and erosion. Include a map with contour intervals.	FIA Section 2 (HydroBalance, 2026)
Matters of National Environmental Significance (MNES)		
A3.41	Provide information on the current baseline condition and characterisation of surface water hydrology and quality in the project area and surrounding area. Consider the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018), or updated revisions. Provide details of the potential impacts from creek diversions in relation to:	Section 3
	a) surface water baseflows, flow and no-flow duration, seasonality, and other factors that could alter surface water regimes (such as high rainfall events)	Section 3.4 FIA Section 2, Appendix D (HydroBalance, 2026)
A3.43	Provide a conceptualisation of water resources. Conceptualisation and understanding of surface water should:	
	a) be informed by systematic water level and water quality monitoring with appropriate temporal coverage to best capture seasonality, inter-annual variability and trends, including:	Section 3.4 Section 3.7 FIA Section 2, (HydroBalance, 2026)
	iii) regular water quality sampling of surface waters, and event-based sampling as needed	Section 3.7
	b) follow relevant Commonwealth, State and/or best practice guidelines to conduct a baseline study and derive site-specific water quality guidelines where appropriate and/or adopt default guidelines as provided by the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018) (and other relevant sources)	Section 2 Section 3.7
	c) include measurement of physico-chemical parameters, nutrients, metals and metalloids, and any other relevant parameters, such as hydrocarbons, needed to understand potential impacts	Section 3.7
	d) describe, if relevant, how baseline hydrological conditions may be influenced by activities associated with nearby mining operations	Section 3.2 Section 3.7 FIA Section 3, Section 7.5

Project specific matters	Requirement	Report Section
		(HydroBalance, 2026)
	e) provide a statement to evaluate the representativeness of water sampling and monitoring sites.	Section 3.7
A3.44	Identify water quality and environmental flow guidelines and objectives within and at the outflow point of the Fitzroy Catchment.	Section 2.1
Relevant impacts		
	The MNES chapter must include a description of all the relevant impacts of the project. Relevant impacts are impacts that the project will have or is likely to have on a matter protected by a controlling provision. The MNES chapter must include a description of all the relevant impacts of the project. 'Likely' is taken to mean a "real or not remote chance or possibility". Relevant impacts are impacts that the project will have or is likely to have on a matter protected by a controlling provision.	Section 7 Section 8 Section 9 FIA Section 5, Section 7 (HydroBalance, 2026)
A3.50	With consideration of all project phases, identify and describe which component/s and stage/s of the project and/or consequential actions are of relevance to each listed threatened species and/or ecological community. All relevant impacts of the project are to be assessed in accordance with the latest relevant Commonwealth policies and guidelines, and information provided in the SPRAT database, including but not limited to:	
	j) changes to hydrological regimes (including flow changes, groundwater levels and flooding)	Section 9.5 FIA Section 5, Section 7, Section 7.2 (HydroBalance, 2026)
	k) impacts on or changes to water quality (including direct and indirect), including but not limited to total suspended sediment and turbidity changes, waste and chemical pollution and land contamination	Section 9.6
	n) sedimentation and erosion.	FIA Section 5.5, Section 7.4 (HydroBalance, 2026)
A3.51	Describe all relevant impacts of the project (direct, indirect, cumulative and facilitated), including the magnitude, duration and frequency of the impacts (including any temporary impacts). All stages and components of the project must be addressed, and the following information provided:	
	a) a detailed assessment of the nature and extent of the likely short-term and long-term relevant impacts, taking into consideration any indirect impacts (e.g. light and dust pollution, noise from operations, construction and explosives, increased risk of predation, edge effects, barrier effects, habitat fragmentation, drawdown, contamination)	Section 7 Section 8 Section 9 FIA Section 5, Section 7 (HydroBalance, 2026)

Project specific matters	Requirement	Report Section
	b) a statement, with supporting evidence, whether any relevant impacts are likely to be unknown, unpredictable or irreversible	Section 9 FIA Section 5, Section 7 (HydroBalance, 2026)
	c) any technical data and other information used or needed to make a detailed assessment of the relevant impacts, including but not limited to baseline studies, site characterisation, relevant modelling, and surveys undertaken. This should include a discussion of what is included in studies and characterisation assessments and any relevant thresholds used	Section 4 Section 6 Section 7 Section 8 Section 9 FIA Section 5, Section 7 (HydroBalance, 2026)
	d) the geographic extent of impacts and the length of the impact period(s).	Section 4 Section 6 Section 7 Section 8 Section 9 FIA Section 5, Section 7 (HydroBalance, 2026)
	f) an analysis of the significance of the relevant impacts.	Section 7 Section 8 Section 9 FIA Section 5, Section 7 (HydroBalance, 2026)
A3.52	Provide a detailed assessment of any likely impact that the project may have on the MNES above at the local, regional, state, and national scale. The assessment of impacts should include a discussion of the overall implication of all relevant impacts on population and sub-population size (including genetic diversity), species recovery, health and species range for each relevant MNES.	
	a) establish and describe clear spatial and temporal boundaries for the assessment of cumulative impacts	Section 9.9 Section 9.9.4 FIA Section 3, Section 7.5 (HydroBalance, 2026)

Project specific matters	Requirement	Report Section
	c) a discussion of the potential for existing pressures and threats to be exacerbated by the proposed project	Section 9.9 Section 9.9.4 FIA Section 3, Section 7.5 (HydroBalance, 2026)
	d) a review and analysis of residual impacts of the proposed project, and of other known proposals, where there may be a spatial or temporal overlap.	Section 9.9 Section 9.9.4 FIA Section 3, Section 7.5 (HydroBalance, 2026)
A3.56	Where relevant, the MNES chapter should consider the anticipated/predicted future climatic conditions at the site in the assessment of impacts on MNES, and how changes in climate and the frequency and severity of weather events may interact with, exacerbate or reduce the impacts of the proposed project on MNES over time. This should include, but not be limited to, the:	
	c) overtopping of the sediment basin/Mine Affected Water (MAW) dam/s during extreme rain events and the downstream impacts on MNES	Section 7.3.5 Section 9.6 Section 9.7
	d) inclusion of different climate scenarios in water modelling.	Section 6.3 Section 7.4 FIA Section 5.6, (HydroBalance, 2026)
<u>Impacts to water resources</u>		
	The National Partnership Agreement on Coal Seam Gas and Large Coal Mining, to which Queensland is a signatory, specifies that all coal seam gas and large coal mining proposals that are likely to have a significant impact on water resources are to be referred to the Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development (IESC) for advice. The IESC provides scientific advice to decision makers on potential impacts from unconventional gas and large coal mining developments on Australia's water resources. The IESC's Information guidelines for proponents preparing coal seam gas and large coal mining development proposals (2024) outlines the information considered necessary to enable the IESC to provide robust scientific advice to relevant decision-makers on water-related impacts of unconventional gas and large coal mining projects. The proponent should ensure that all the information outlined in the IESC Information Guidelines is provided in the MNES chapter. Historic and contemporary data should be included.	Section 1.4
	The MNES chapter must describe and assess the impacts to water resources giving consideration to the EPBC Act Significant impact guidelines 1.3: Coal seam gas and large coal mining developments— impacts on water resources (2022).	Section 7 Section 8 Section 9
A3.67	With consideration of all project phases, identify and describe which component/s and stage/s of the project and/or consequential actions are of relevance to water resources. All relevant	

Project specific matters	Requirement	Report Section
	impacts of the project must be assessed in accordance with the latest relevant Commonwealth policies and guidelines, including but not limited to:	
	a) changes to hydrological regimes (including flow changes, groundwater levels, river-floodplain connectivity, inter-aquifer connectivity, groundwater recharge rates and flood regimes)	Section 9 FIA Section 5, Section 7, (HydroBalance, 2026)
	b) impacts on or changes to water quality (including direct and indirect), including but not limited to total suspended sediment and turbidity changes, waste and chemical pollution and land contamination	Section 7 Section 9
	e) changes to sedimentation and erosion.	FIA Section 5.5, Section 7.4, (HydroBalance, 2026)
A3.68	Identify and assess the cumulative impacts on water resources created by the project and the activities of other existing and proposed adjacent, upstream and downstream relevant developments, water users and land users. This must include at a minimum, cumulative impacts of other projects impacting on groundwater levels and other relevant parameters including, but not limited to, the Isaac Downs coal mine project (EPBC 2019/8413), the Bowen Gas Project (EPBC 2012/6377), the Moranbah South Project Coal Mine (EPBC 2012/6337) and any other mines which may might interact with the impacts for the proposed action. Details of these projects can be found on DCCEEW's EPBC Public Notices website.	Section 9.9 FIA Section 3, Section 7.5, (HydroBalance, 2026)
A3.69	Provide a conceptual model/s to describe impact pathways and linkages for pre- and post-mining activities, showing at least, but not limited to:	
	c) altered geomorphology of water courses through proposed infrastructure (e.g. diversion, bridge, levees).	FIA Section 5.5 Section 7.4, (HydroBalance, 2026)
Surface water		
A3.73	Provide a detailed impact assessment for surface water resources (and dependent flora and fauna) in the project area and downstream of the project area and in the surrounding area.	Section 7 Section 9 FIA Section 5 Section 7, (HydroBalance, 2026)
A3.74	Provide information to identify and assess risks to all surface water resources (and dependent flora and fauna) in the project area.	Section 7 Section 9 FIA Section 5 Section 7, (HydroBalance, 2026)
Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development (IESC) Explanatory notes		
	Deriving site-specific guideline values for physico-chemical parameters and toxicants (Huynh and Hobbs, 2019)	Section 3.7.2.4 Section 9.10

Project specific matters	Requirement	Report Section
Avoidance, mitigation and management measures		
A3.84	Describe in detail measures proposed to avoid, mitigate and manage relevant impacts during all stages of the project on MNES. The proposed measures are to be based on best available practices, appropriate standards and supported by scientific evidence (e.g. outcomes of successful field trials, research papers, other projects, etc.). The MNES chapter is to include:	Section 4 Section 5 Section 8
	a) proposed measures to be undertaken to avoid and mitigate the relevant impacts of the project on MNES, including those required by other Commonwealth, State and local government approvals. Measures must be specific to the ecology of each affected MNES	Section 4 Section 5 Section 8 Section 9 FIA Section 7, (HydroBalance, 2026)
	b) an assessment and evaluation of the predicted effectiveness of the proposed measures supported by scientific evidence including details on how proposed measures meet best practice standards	Section 7 Section 8 Section 9 FIA Section 7, (HydroBalance, 2026)
	e) details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure	Section 9
	f) information on the timing, frequency and duration of the measures to be implemented	Section 4 Section 5 Section 8 Section 9 FIA Section 7, (HydroBalance, 2026)
	g) the outcomes to be achieved for each relevant MNES through the implementation of individual or combined mitigation measures, including details of how these outcomes can be measured	Section 9 FIA Section 7, (HydroBalance, 2026)
	h) name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	Section 9
A3.86	Describe how impacts to water resources will be avoided. Provide details on the expected water quality of the overflow water from sediment dams and whether the water will be treated prior to reuse. Clarify whether treatment of MAW will be undertaken and, if so, describe how.	Section 4 Section 7.3.4 Section 7.3.5 Section 9, Section 9.6.2, Section 9.6.3

1.4 Commonwealth legislation

A referral under the EPBC Act was submitted to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for the Project. DCCEEW determined that the Project was a controlled action under the EPBC Act subject to the following controlling provisions for matters of national environmental significant (MNES):

- Listed threatened species and ecological communities
- Water resources that relate to large coal mining development.

DCCEEW will assess the Project's relevant technical assessments, including a review of assessments for water resources by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC).

Guidelines have been developed in order to assist the IESC in reviewing CSG or large coal mining development proposals that are likely to have significant impacts on water resources. Details on where aspects of IESC information requirements checklist relating to surface water impacts have been addressed and are documented within this report are outlined in Table 1.2.

Table 1.2 – Surface Water Resources related IESC Information Requirements Checklist Items

Item	Section in Report
Description of the proposed project	
Describe the watercourses, standing waters and springs across the site, including: • drainage patterns and key surface water and floodplain features • hydrological regimes (especially ecologically relevant components such as durations, timing and frequency of periods when no surface water is present) • current stressors, including impacts from any currently approved projects.	Section 3 FIA Section 2, (HydroBalance, 2026)
Describe the existing water quality of surface waters potentially impacted by the proposed development. – Include comparison to relevant default guideline values (ANZG 2018) and regional and local (or site-specific) water quality objectives.	Section 2 Section 3.7 Section 9.10
Environmental impact assessment - Modelling of water storage and movement	
Provide a detailed description of all analytical, numerical and conceptual models used, and any methods and evidence (e.g., expert opinion, analogue sites) employed in addition to modelling.	Section 6 Section 8 FIA Section 5, Appendix A, Appendix B, (HydroBalance, 2026)
Explain the conceptualisation of the system(s), including multiple conceptual models if appropriate. Describe the data and information, including field data, on which the models are based; all key assumptions; and model limitations and their consequences.	Section 4 Section 6 Section 8 FIA Appendix A, Appendix B, (HydroBalance, 2026)
Calibrated models require adequate monitoring data from either the project area or sites representative of local conditions, ideally with calibration targets related to model predictions. Summarise the extent to which parameterisation is consistent with expectations based on literature	Section 6

Item	Section in Report
values, outcomes of field or laboratory investigations, or with values obtained by calibration in similar nearby applications.	FIA Appendix A, Appendix B, (HydroBalance, 2026)
Where possible, verify models by using past and/or existing site monitoring data that were not used for calibration.	FIA Appendix A, (HydroBalance, 2026)
Assess the quality of, and risks and uncertainty inherent in, the data used to establish baseline conditions and in modelling, particularly with respect to predicted potential impact scenarios. Identify key gaps in data and knowledge and describe how they can be addressed.	Section 6 Section 7.5 FIA Appendix A, Appendix B, (HydroBalance, 2026)
Describe the various stages of the proposed project (construction, operation and rehabilitation) and their incorporation into the model. Provide predictions of changes and recovery in each water resource for the life of the project and beyond, including an assessment of the impacts of climate change where applicable, and cumulative impacts.	Section 4.4, Section 6 Section 7.4 Section 8.4 FIA Section 4, Section 5.6, Section 7.5 (HydroBalance, 2026)
Provide a program for reviewing and updating models as more data and information become available, including reporting requirements.	Section 7.5
For flood estimation, use methods in accordance with the most recent publication of *Australian rainfall and runoff* (Ball et al. 2019); for rainfall-runoff modelling, use methods as outlined by Vaze et al. (2012); and for the modelling of water and salt balances related to mine water management, refer to the water accounting framework (Minerals Council of Australia 2022). Consider the relevance of regional information (see Nathan and McMahon 2017). It is expected that flood risks are assessed for annual exceedance probabilities of at least 1% (i.e., 1 in 100); however, in many instances it may be necessary to estimate floods with rarer annual exceedance probabilities, such as 0.1% (i.e., 1 in 1,000), or events which have a negligible chance of being exceeded (the probable maximum flood).	FIA Section 5, Appendix A (HydroBalance, 2026)
Describe all potential impacts of the proposed project on surface waters. Include a clear description of the impact on the resource and the likelihood and consequences of the impact. Consider: – impacts on streamflow under the full range of flow conditions, focusing on metrics that are most relevant to ecologically important flow components (e.g., the timing, frequency and variability of zero- and low-flow days, low flows exceeded 90% of the time, flow pulses related to ecological processes such as spawning and migration) as well as those relevant to water supply reliability • impacts associated with surface water diversions • impacts on water quality, including consideration of mixing zones (i.e., areas downstream of discharges where water quality objectives do not apply) if applicable • the quality, quantity and ecotoxicological effects of operational and emergency discharges of water (including saline water) at different flows, and the likely impacts on water resources and water-dependent assets • landscape modifications such as subsidence, voids, post-rehabilitation landform collapses and on-site earthworks (including disturbance of acid-forming or sodic soils, roadway and pipeline networks), and	Section 7 Section 8 Section 9 FIA Section 5, Section 7 (HydroBalance, 2026)

Item	Section in Report
describe how these could affect surface water flow, surface water quality, erosion and sedimentation within and downstream of the project area.	
Identify processes to determine surface water quality guidelines and quantity thresholds which incorporate seasonal variation but provide early indication of potential impacts on assets.	Section 2 Section 9.10
Assess the risks of flooding (including channel form and stability, water level, depth, extent, velocity, shear stress and stream power) and the impacts of flooding on water-dependent assets, project infrastructure and the final project landform.	FIA Section 5, Section 7 (HydroBalance, 2026)
Identify and evaluate the quality (including uncertainty) and other aspects of streamflow and other hydrological data, such as proximity to rainfall stations and stream gauges, duration of data records, and whether missing data have been patched.	Section 3.4 Section 3.7 FIA Section 2, Section 5 (HydroBalance, 2026)
Develop and describe a plan for ongoing ecotoxicological monitoring, including direct toxicity assessment of discharges to surface waters where appropriate.	Aquatic Ecology Assessment
Environmental impact assessment - Water and salt balances	
Describe the proposed development’s water requirements and on-site water management infrastructure, including modelling to demonstrate the infrastructure’s adequacy under a range of potential climatic conditions, including extremes associated with predicted climate change.	Section 4 Section 6 Section 7 Section 7.4 FIA Section 4, Section 5 (HydroBalance, 2026)
Provide salt balance modelling that includes stores and the movement of salt between stores, and takes into account seasonal and long-term variation.	Section 7.3.10 Section 8 Section 9.6
Indicate the vulnerability to contamination (e.g., from salt production and salinity) of, and the likely impacts of contamination on, the identified water-dependent ecological assets.	Section 9.6
Identify how produced water, brine and waste from water treatment plants that are stored on site during operations will be managed and disposed of after operations cease, where applicable.	Section 4.11
Provide a quantitative site-level water balance model describing the total water supply and demand under a range of rainfall conditions and allocations of water for mining activities (e.g., dust suppression, coal washing), including all sources and uses.	Section 6, Section 7
Provide estimates of the quality and quantities of operational discharges under dry, median and wet conditions, potential emergency discharges due to unusual events, and the likely impacts on water-dependent ecological assets.	Section 7.3.4, Section 7.3.5, Section 9.6
Baseline data	
For groundwaters, surface waters and ecological water-dependent assets that have been identified in the risk-based assessment, present data that are sufficient to establish pre-development (baseline) conditions and that have been collected at an appropriate sampling frequency and spatial	Section 3.4, Section 3.7 FIA Section 2 (HydroBalance, 2026)

Item	Section in Report
coverage of monitoring sites, ideally over a period sufficiently long to characterise the impacts of climatic variability.	
Provide data for the hydrological regime of all watercourses, standing waters and springs across the site, including: • spatial, temporal and seasonal trends in streamflow and/or standing water levels • spatial, temporal and seasonal trends in water quality data (such as turbidity, acidity, salinity, relevant organic chemicals, metals, metalloids and radionuclides).	Section 3.4, Section 3.7 FIA Section 2 (HydroBalance, 2026)
Monitoring and management	
Describe the rationale for selected monitoring parameters and their sampling duration, frequency and methods, including the use of satellite or aerial imagery to identify and monitor large-scale impacts. Target monitoring programs to address key areas of uncertainty, especially for valued assets and water resources that are at greater risk of impacts from the proposed development.	Section 9.10
Ensure water quality monitoring complies with relevant National Water Quality Management Strategy guidelines (ANZG 2018) and relevant legislated state protocols (e.g., Queensland Government 2018). Identify and justify monitoring sites representative of the diversity of potentially affected water-dependent assets and the nature and scale of potential impacts. Match suitably replicated control and reference sites (BACI design, Downes et al. 2002) to enable detection and monitoring of potential impacts.	Section 9.10
Describe the processes employed to determine impact thresholds for water-dependent assets (e.g., threshold at which a significant impact on an asset may occur).	Section 9.10
Describe proposed mitigation and management actions, and their adequacy, for each significant impact identified, including any proposed mitigation or offset measures for long-term impacts post mining.	Section 4 Section 5 Section 9
Identify modifications or alternatives to avoid, minimise or mitigate potential cumulative impacts, and provide evidence of the likely success of these measures (e.g., case studies).	Section 9 Section 9.9
Propose adaptive management measures and management responses, giving details of trigger action response plans (TARPs) for valued assets and water resources that are at greater risk of impacts from the proposed development.	Section 4.1
Identify and justify dedicated sites to monitor hydrology, water quality, and channel and floodplain geomorphology before, during and for a suitable period after the proposed development.	Section 9.10
Describe a surface water monitoring program that will collect sufficient data to detect and identify the cause of any changes from established baseline conditions, and assess the effectiveness of mitigation and management measures. The program should: – include baseline monitoring data for physico-chemical parameters, as well as contaminants (e.g., metals)	Section 9.10

Item	Section in Report
• compare physico-chemical data to national/regional guidelines or to site-specific guidelines derived from reference condition monitoring if available • identify baseline contaminant concentrations and compare these to national guidelines, allowing for local background correction (e.g., bioavailability) if required.	
Cumulative impacts	
Assess the condition and likely responses of all water-dependent assets and water resources likely to be cumulatively impacted by the proposed development combined with all developments (past, present and/or reasonably foreseeable) and other water-intensive activities.	Section 9.9 FIA Section 7.5 (HydroBalance, 2026)
Assess the cumulative impacts on potentially affected water-dependent assets and water resources, considering: – the full extent of potential impacts from the proposed project (including whether there are alternative options for infrastructure and mine configurations which could reduce impacts) • all stages of the development, including exploration, operations and post-closure/rehabilitation • the likely spatial magnitude and timeframe over which cumulative impacts will occur (ensuring that the analysis has sufficiently broad geographic and temporal boundaries to include all potentially significant impacts) • opportunities to work with other water users to avoid or mitigate potential cumulative impacts to meet specified environmental objectives.	Section 9.9 FIA Section 7.5 (HydroBalance, 2026)

1.5 State legislation

1.5.1 Water Act 2000

Under the *Water Act 2000* (QLD) (Water Act), a water licence is required for taking or interfering with surface water, overland flow water or underground water. Changes to several provisions in the Water Act came into effect on 6 December 2016 through the *Water Reform and Other Legislation Amendment Act 2014* (WROLA Act). These changes included a simplification of the water licensing process and several exemptions. Under Section 97 and 98 of the Water Act, diversions associated with an EA (Section 97), or resource activity (Section 98) are approved through the EA process. As such, the diversion of Conrock Gully associated with the Project will be authorised as part of the EA application process, and a separate water licence will not be required.

The defined watercourses in the vicinity of the Project are:

- Isaac River;
- Cherwell Creek;
- JB Gully; and
- The downstream reach of Conrock Gully (the upstream reach is a defined drainage feature).

The *Water Plan (Fitzroy Basin) 2011* and *Fitzroy Basin Resource Operations Plan* outline the use of water within the Fitzroy Basin under the Water Act. The plan defines the availability of water and provides a framework for sustainable management such as targets for environmental flow objectives and regulating the taking of overland flow. The Project falls within the Isaac River sub-basin area of the Fitzroy Basin Water Resources Plan, and the specific objectives set for this sub basin area are presented in Section 2 and considered throughout this SWIA.

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. 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.

1.5.2 Fisheries Act 1994

The *Fisheries Act 1994* (Fisheries Act) regulates waterway barrier works within declared watercourses, which may include certain watercourses and drainage features. Mapping for waterway barrier works classifies declared waterways based on their risk of impact to fish passage.

Conrock Gully (and its tributaries), Cherwell Creek and the Isaac River are mapped within the *Queensland waterways for waterway barrier works* layer, with classifications ranging between *Green* (low) and *Purple* (major). Conrock Gully within the Project disturbance boundary is classified as an *Amber* (moderate) waterway, and its tributaries classified as *Green* (low) waterways. Both the Isaac River and Cherwell Creek are classified as Purple (Major) waterways.

Approval under the Fisheries Act for waterway barrier works within waterways is not required for the Project as mining activities on a ML are exempt from the Fisheries Act.

1.5.3 Environmental Protection Act 1994

The *Application requirements for activities with impacts to water* guideline under the EP Act outlines the information proponents must provide when seeking environmental approval for activities that may affect Queensland's water resources. Proponents must demonstrate how the project will manage, avoid, or mitigate impacts to surface water and groundwater, including changes to water quality, flow, and aquatic ecosystems. The application must include hydrological and hydrogeological assessments, details of water management systems (such as sediment dams, diversions, and mine dewatering), and an assessment of potential cumulative impacts.

In 2019, the EP Act was amended to provide for the inclusion of Section 41AA of the *Environmental Protection Regulation 2019* (EP Regulation). The aim of Section 41AA is to achieve no net decline in water quality in the surface water basins that feed into 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.

To determine whether Section 41AA of the EP Regulation is applicable to the Project, the criteria outlined in Table 1.2 of the "*Guideline – Environmental Protection Act 1994: Reef discharge standards for industrial activities*" (DESI, 2024) were reviewed (refer to Table 1.3). Since all of the criteria are met, Section 41AA is applicable to the Project. The additional EA amendment assessment requirements to address Section 41AA are detailed in Section 9.7.

Table 1.3 – Determination of applicability of GBR discharge standards

Criteria	Triggered by	Applicable to this Application	Comments
Application type	A site-specific EA application under Chapter 5 of the Environmental Protection Act 1994 (inter alia).	Yes	This study is to inform the assessment of a site-specific EA application
Activity type	Resource and prescribed Environmentally Relevant Activities (ERAs).	Yes	The amendment application is in relation to the proposed mining activity, which is an ERA.
Release location	The release is to the GBR catchment waters.	Yes	Site location and regional catchment described in Section 3.1 The Project is located in the Fitzroy Basin which is a GBR catchment.

Criteria	Triggered by	Applicable to this Application	Comments
Release type	• An application proposing a point source release to GBR catchment waters; and • Release is from a point source as the end of pipe; • Release source is wastewater from the relevant activity (excluding stormwater containing sediment only); and • Release event is planned/controlled.	Yes	The application proposes the ability to undertake controlled releases of mine-affected water from a point source to the receiving environment. See Section 4.10.
Contaminant type	An application proposing to discharge wastewater from a point source release that contains DIN/TSS.	Yes	Controlled releases of mine affected water are expected to contain DIN and/or TSS. This is discussed further in Section 9.7.

1.6 Report structure

This report is structured as follows:

- Section 2 describes the environmental values of the regional receiving waters.
- Section 3 describes the existing surface water environment including the regional and local drainage characteristics.
- Section 4 describes the existing and proposed surface water management system including the management objectives and principles.
- Section 5 presents the preliminary Consequence Category Assessment.
- Section 6 describes the site water balance model configuration and outcomes.
- Section 7 presents the outcomes from the water balance modelling assessment.
- Section 8 presents the outcomes from the final void assessment.
- Section 9 describes the outcomes from the impact assessment for surface water, with proposed mitigation and management measure.
- Section 10 presents a summary of findings for the SWIA.
- Section 11 provides a list of references.

2 Environmental values

The *Environmental Protection Policy (Water and Wetland Biodiversity) 2019* (EPP [Water]), which is subordinate legislation to the EP Act, provides a framework for identifying environmental values (EV) for a waterway and deciding water quality objectives (WQO) to protect or enhance those EV's. EV's for water are the qualities of water that make it suitable for supporting aquatic ecosystems and human water uses. These EVs need to be protected from the effects of habitat alteration, contaminated runoff and releases and changed flow to ensure healthy aquatic ecosystems and waterways that are safe for community use.

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

According to the Isaac River Sub-basin Environmental Values and Water Quality Objectives scheduling document (DEHP, 2011), the EVs prescribed for the relevant regions of the Isaac River Sub-Basin are listed in Table 2.1, along with the potential downstream impacts due to the Project.

Table 2.1 – Environmental values for the Isaac River sub-basin

Environmental value	Description and potential impacts of the Project
Aquatic ecosystems	The mining footprint could potentially impact the aquatic ecosystems of the local waterways when comparing to pre-mining conditions, as a portion of surface water flows will be drained and captured locally in the pit reducing the total discharge volumes.
Irrigation	The partial capturing of runoff is not expected to impact on irrigation supply to downstream users.
Farm supply	The partial capturing of runoff will not impact on supply to downstream farms. Peak flow rates and flow frequencies are being closely matched.
Stock watering	The partial capturing of runoff is not expected to impact on stock water supply to downstream users.
Aquaculture*	The partial capturing of runoff is not expected to impact on aquaculture activities within the downstream waterways.
Human consumer	The partial capturing of runoff will not impact downstream users, subject to erosion and sediment controls being implemented to treat any runoff discharged.
Primary recreation	Due to the ephemeral nature of the watercourses and their location it is considered unlikely that waterways will be used for primary recreation.
Secondary recreation	As above, it is considered unlikely that the waterways will be used for secondary recreation.
Visual recreation	The waterways have values for visual recreation. However, due to their location and ephemeral nature they are unlikely to be used for recreational activities.
Drinking water	Due to the ephemeral nature of the watercourses, it is considered unlikely that the environmental value for drinking water will apply.
Industrial use	There are no industrial water users in the vicinity of the Project site, and there is no change to peak flow rate or frequency downstream of the Project MLs.
Cultural and spiritual values	The waterways hold cultural and spiritual values.

*Note: * applies to the Isaac western upland tributaries region only*

In summary, the key EV's for water that are to be protected are:

- physical, chemical and biological integrity of the watercourses within the catchment and their amenity as potential water sources for human use and to support aquatic ecosystems;

- the qualitive and quantitative integrity of local groundwater as a potential water source for agriculture or other suitable uses; and
- the integrity of raw water supplies and associated infrastructure in the region.

2.1 Water quality objectives

The indicators and water quality guidelines relevant to the above environmental values are listed in the *Queensland Water Quality (QWQ) Guidelines* and *ANZG* (2018). The conditions of waterways located in the vicinity of the Project are classified as slightly to moderately disturbed ecosystems under the QWQ Guidelines (DEHP, 2013).

The WQOs relevant to the identified EV's are provided in Table 2.2 and are generally based on the trigger values or Default Guideline Values (DGVs) nominated in the QWQ and ANZG guidelines. Where different EV's 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.

Table 2.2 – 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

Parameter	WQO/DGV	Relevant EV
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]
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

[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

3 Existing surface water environment

3.1 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 and flows in the 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 3.1 presents the location of the Project and Isaac River catchment downstream of the Connors River confluence.

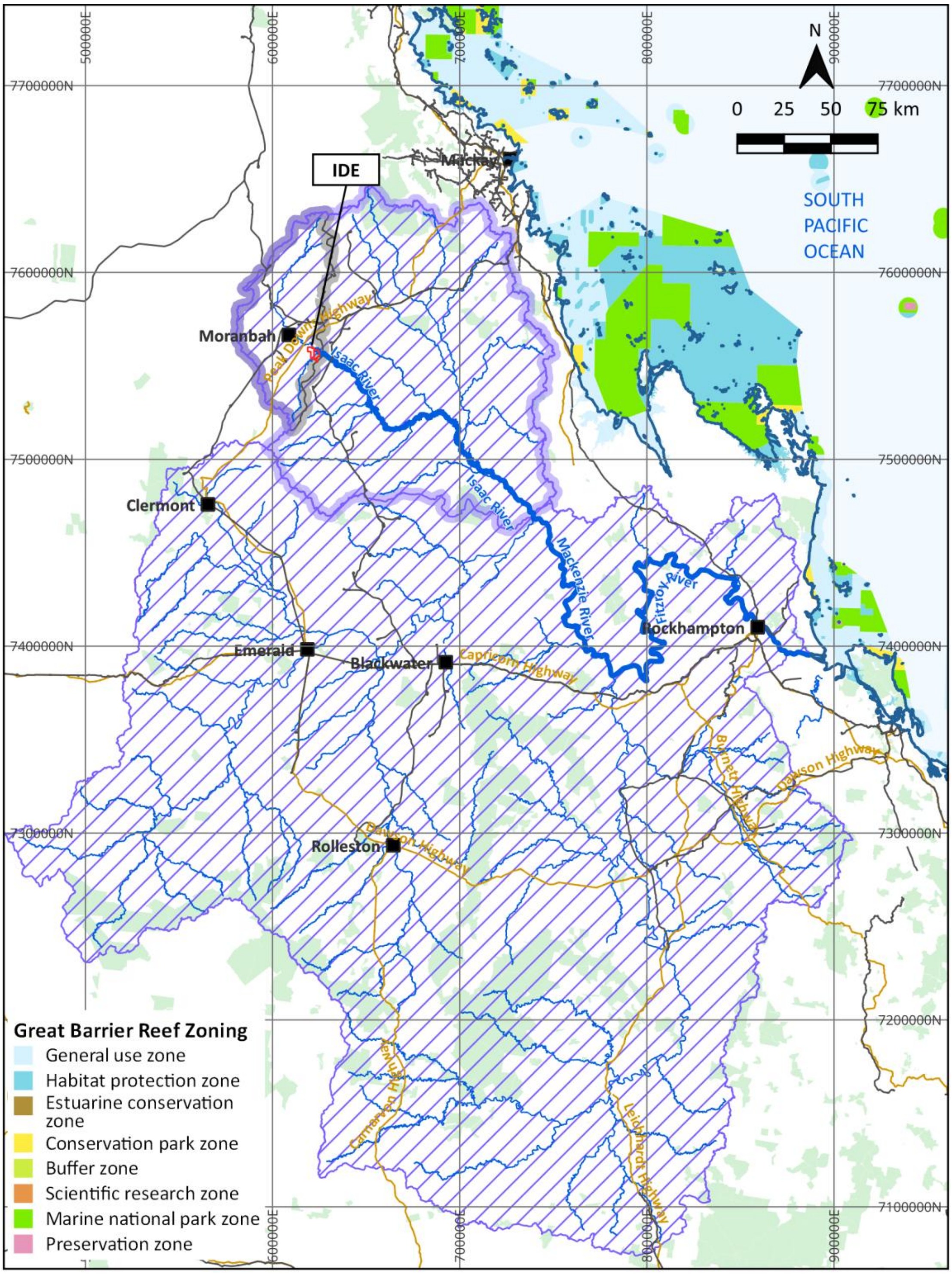
The greater Isaac-Connors sub-catchment area is approximately 22,364 km^2 (to the Mackenzie River confluence), out of a total Fitzroy River catchment of 142,665 km^2. That is, it represents around 15% of the overall Fitzroy River catchment.

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 MLA areas (of which approximately 25% will not be disturbed by mining) is approximately 27 km^2 and 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 of the Project area 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. Therefore, physical attributes, water quality, and the composition of aquatic flora and fauna communities are also expected to be highly variable over time.

The Isaac River catchment upstream of the Project comprises mainly scattered to medium dense bushland, grazing land and the township of Moranbah. There are several existing coal mines in the Isaac River catchment including Burton, North Goonyella, Grosvenor, Goonyella-Riverside, Broadmeadow, Broadlea, IPM, IDM, Carborough Downs, Caval Ridge, Poitrel, Daunia, Millennium and Moranbah North.



Title: Regional Drainage

Project: Isaac Downs Extension Surface Water Assessment

HydroBalance

Legend

- Town
- Major watercourse
- Isaac River to Coral Sea flowpath
- National park
- Highway
- Railway
- Fitzroy River basin
- Isaac River sub-catchment
- Upper Isaac River to Project sub-catchment
- IDE MLAs

Figure 3.1 – Regional drainage characteristics

3.2 Local drainage network

The following ephemeral drainage systems (shown in Figure 3.5) are located in the vicinity of the Project:

- Isaac River – 3,528 km^2 catchment to the Project (downstream of the confluence with Cherwell Creek).
- Cherwell Creek – 698 km^2 catchment to it confluence with the Isaac River.
- Conrock Gully– 71 km^2 catchment to its confluence with Cherwell Creek.
- JB Gully – 26 km^2 catchment to its confluence with the Isaac River.

3.2.1 Isaac River

The Isaac River channel in the vicinity of the Project has an average bed width of 45 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 river bank. SedNet modelling of the catchment undertaken by Dougall et al (2006) indicated hillslope erosion to be a dominant input over gully and river bank 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 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 with Project with the neighbouring IDM. A temporary dragline crossing will also be constructed across the Isaac River. No diversion of the Isaac River is proposed.

3.2.1.1 Review of other geomorphic investigations of the Isaac River

As part of the Pembroke Olive Downs Coking Coal Project (ODCCP) EIS study, Fluvial Systems (FS, 2018) undertook a geomorphological study of a reach of the Isaac River and its tributaries approximately 15 – 50 km downstream of the Project area. Given the close proximity of the FS study to the Project, the findings from the FS study are considered relevant for the Project.

Key outcomes from this study are as follows:

- The surface geology of the ODCCP Study Area comprised extensive undifferentiated sandy sediments and soils and Quaternary alluvium within river corridors. This suggests that sand bed rivers and streams would be naturally occurring in this region, and not necessarily the result of accelerated sediment delivery caused by land use change, although this process could have increased the rate of sand delivery to channels above background levels.
- The majority of the wider ODCCP Study Area has moderately stable surface soils. Erodible non-cohesive soils and dispersive soils occur in fragmented patches, with more concentrated areas of erodible soils occurring in Ripstone Creek catchment just upstream of the core ODCCP Study Area, and in the corridor of the Isaac River just upstream of the core ODCCP Study Area.
- Most of the stream reaches were in a stable, close to natural geomorphic condition. Some streams were potentially impacted by factors that reduced their condition, in particular high loads of sand in the bed, but without historical data concerning condition prior to the land cover and drainage being modified for agricultural and mining use, this remains uncertain.

- No knickpoints or zones of major geomorphic instability were observed.
- The risk of erosion of the Isaac River channel and floodplain was assessed using the method of maximum permissible bed shear stress and velocity assessment, with the hydraulic variables modelled as part of the flood study. This assessment of the most critical areas found that while there could be isolated areas subject to somewhat higher risk of scour compared to the existing situation, the overall risk of rapid and significant geomorphic change in the Isaac River due to the proposed mining activity was low.

Photographs of the Isaac River channel upstream and downstream of, and adjacent to the Project MLA (taken in 2024 as part of the aquatic ecology study) are shown Figure 3.2.

3.2.2 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) and flows downstream to join the Isaac River at an elevation of 200 m (east of the Project). 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. 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 has previously been diverted (in 1991 and 1995) as part of the Peak Downs Mine progression. Both diversions replaced meandering sections of creek floodplain, terraces, benches, low flow channel, active channel, and high flow channel features with relatively straight alignment and trapezoidal channel. The designs were developed in accordance with best practice at the time, which preceded current best practice design guidelines (DNRM, 2019). Erosion of the Cherwell Creek diversions (channel widening and deepening) and reduced functioning of stream stabilisation structures has been observed in previous years.

Within and adjacent to 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 river bed consists mainly of 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 headcut from Cherwell Creek backwater flows.

The proposed secondary access route to the Project will cross Cherwell Creek (via a bridge) and JB Gully (low level crossing).

AQ1 (downstream Cherwell Creek confluence) **Isaac River** **10/11/2024**	**Co-ordinates (UTM 55K)** **E 627664** **S 7556522**
 **Upstream**	 **Downstream**
AQ10 (upstream of IDM) **Isaac River** **9/11/2024**	**Co-ordinates (UTM 55K)** **E 619807** **S 7562136**
 **Upstream**	 **Downstream**
AQ9 (adjacent to Project MLA, upstream Conrock Gully) **Isaac River** **9/11/2024**	**Co-ordinates (UTM 55K)** **E 622711** **S 7558630**
 **Upstream**	 **Downstream**

Figure 3.2 – Photos of the Isaac River – taken in 2024, adjacent to the Project MLA

3.2.3 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 the confluence with the Isaac River.

The catchment extends west approximately 10 km from the western MLA boundary and east to the Isaac River confluence approximately 1.5 km upstream of the eastern MLA boundary.

The Conrock Gully channel banks appear well vegetated and relatively stable. Digital elevation models acquired in 2012 to 2018 shows 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. The channel bed slope in this area is a uniform 0.14% (1 in 690), aside from a steeper downstream section 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 in Figure 3.4, 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;
- A side slope of 1V in 6H for the channel;
- A 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.

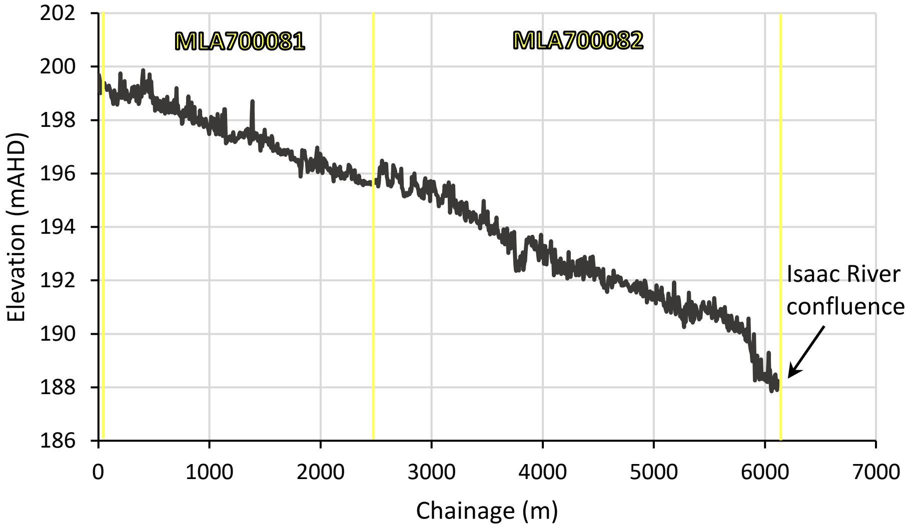


Figure 3.3 – Long-section of the Conrock Gully reach to be diverted

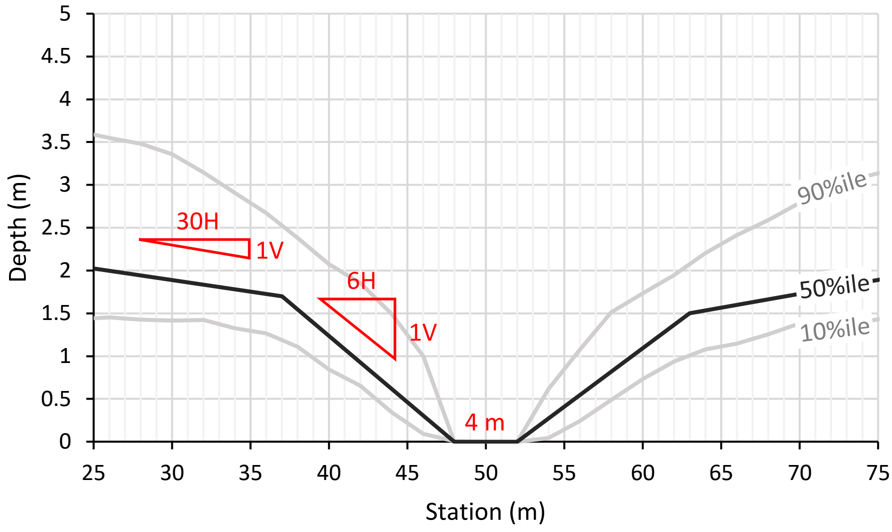


Figure 3.4 - Generalised Conrock Gully cross-section in the vicinity of the reach to be diverted

3.3 Project area watercourse identification

Figure 3.6 shows the watercourse identification mapping within the Project area under the Water Act per the DoR (2017) mapping. The Isaac River, Cherwell Creek and JB Gully are designated watercourses in the vicinity of the Project. The majority of Conrock Gully upstream and including the beginning of the proposed diversion is defined as a “drainage feature”. The 3.2 km downstream reach of Conrock Gully to its confluence with the Isaac River is defined as a watercourse. The several minor drainage lines in the vicinity of the Project (highlighted in Figure 3.6) are designated as either “drainage features” or “unmapped”.

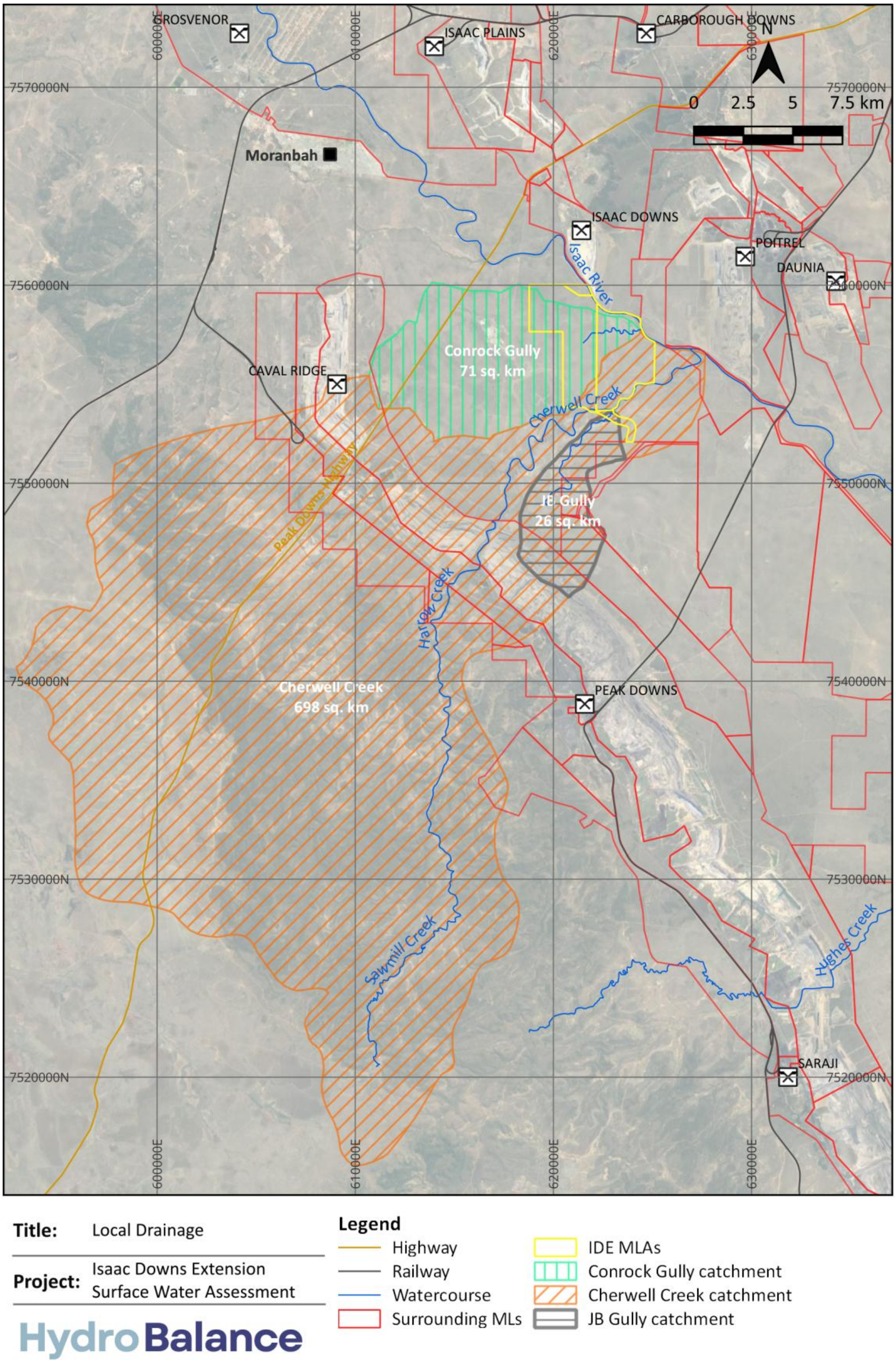


Figure 3.5 – Local drainage characteristics

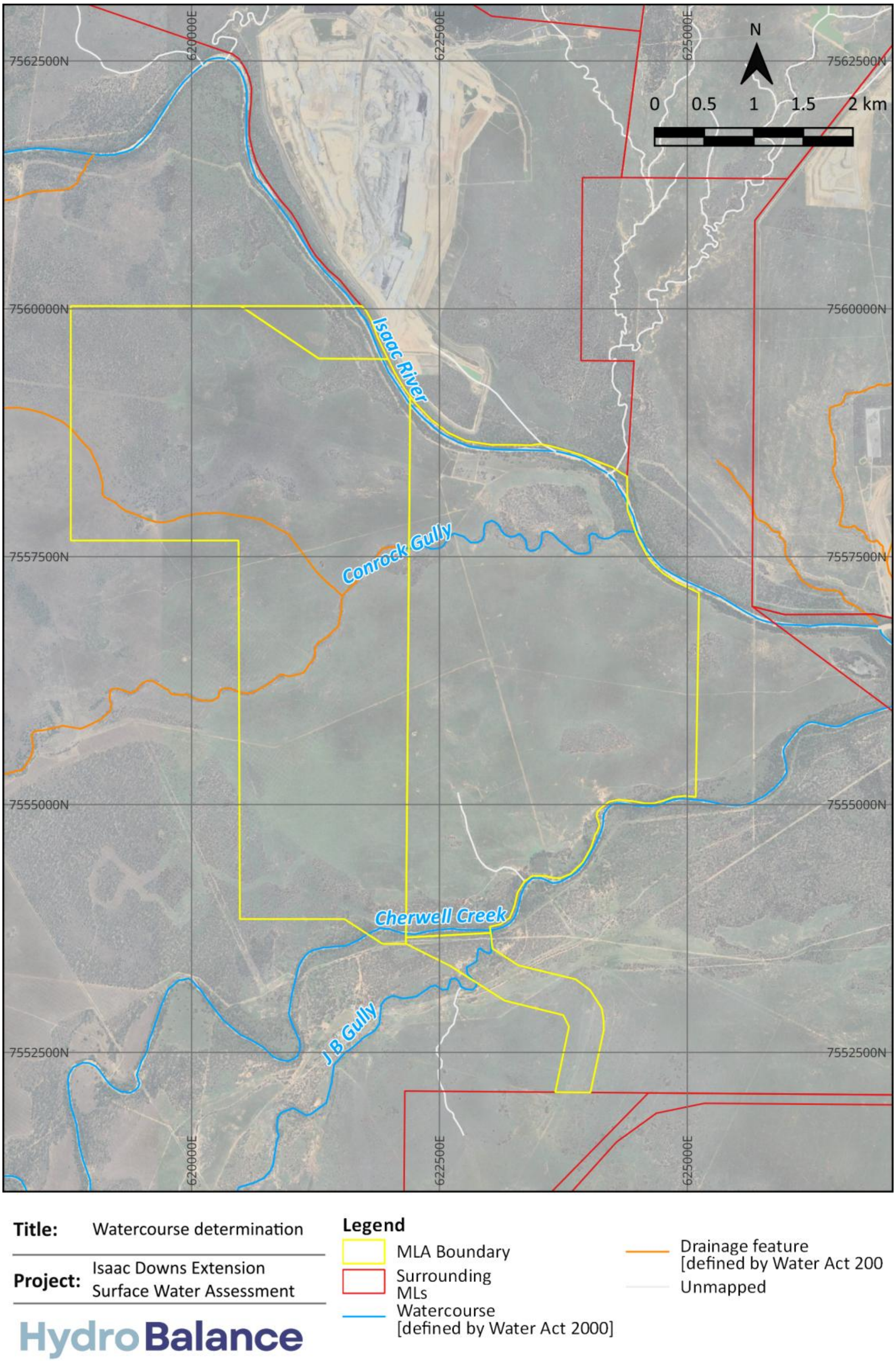


Figure 3.6 – Project area watercourse determination

3.4 Streamflow

3.4.1 Isaac River at Deverill (DNRMMRRD gauge)

The Isaac River at Deverill stream flow gauge is located 25 km downstream of the Conrock Gully confluence, which is operated by the Department of Natural Resources and Mine, Manufacturing and Regional and Rural Development (DNRMMRRD).

Figure 3.7 shows a ranked plot of the daily stream flows in the Isaac River recorded at the Deverill stream gauge. The following is of note 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 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 (all days) is 430 ML/d at Deverill.
- The highest recorded flow (2,638 m^3/s) at the Deverill gauge 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 the Flooding Impact Assessment report) indicates Isaac River flood flows will back up into Conrock Gully during a 50% AEP (1 in 2 year) regional flood event, which is equivalent to a 375 m^3/s (32 ML/d) peak discharge at 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.

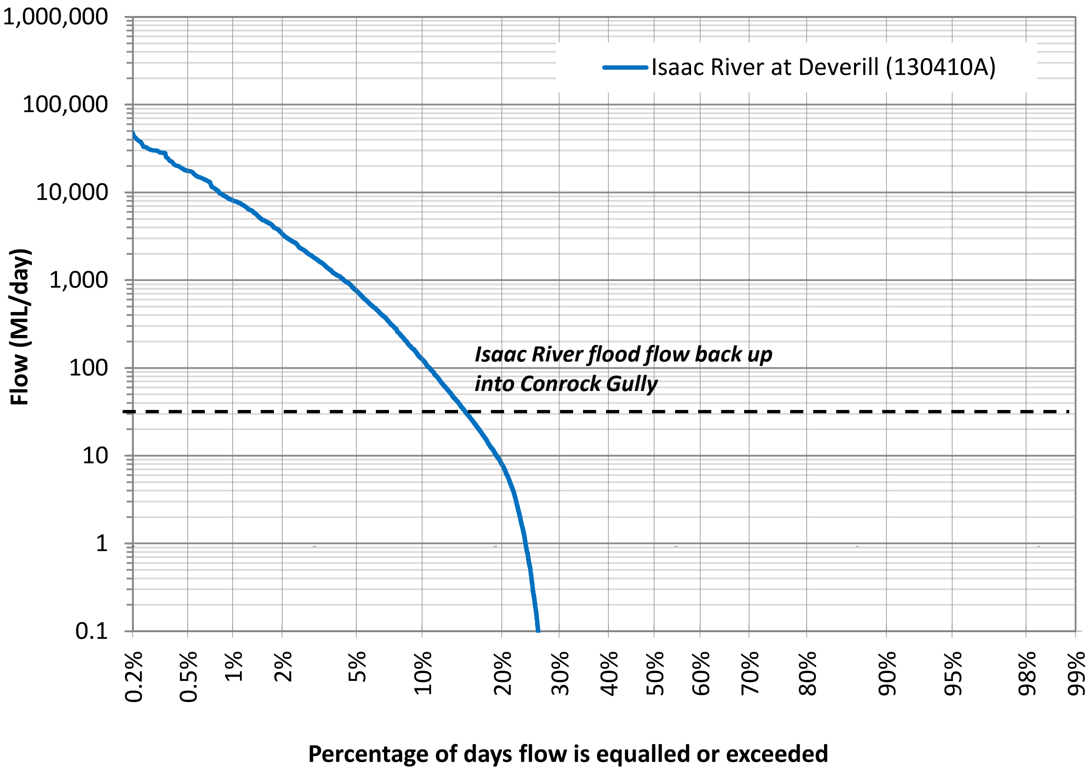


Figure 3.7 - Stream flow duration curves, Isaac River at Deverill gauge

3.4.2 Isaac River at Isaac Downs (Stanmore gauge)

Stanmore has operated a stream gauge on the Isaac River (Isaac River at Isaac Downs) since August 2021, with the gauge located approximately 4.5 km upstream of the Conrock Gully confluence.

The recorded stream flows in the Isaac River are shown in Figure 3.8. At Isaac River at Isaac Downs streamflow gauge, flows were recorded on approximately 6.6% of days over the four-year period. Flows of greater than 100 ML/d occurred for less than 1.2% of days at this location over the four-year period.

The maximum water level recorded at Isaac River at Isaac Downs was 16.292 mGH in April 2025 (flow depth of around 6.292 m at the gauge), which corresponded to a flow of 1,028 m^3/s.

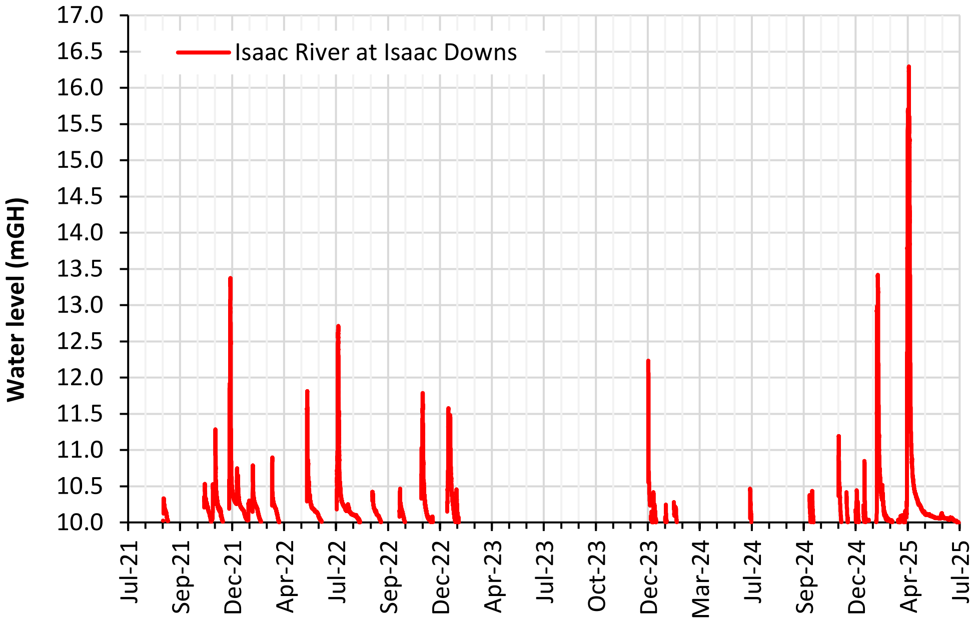


Figure 3.8 - Recorded water level at Isaac River at Isaac Downs (Gauge No. 333925)

3.4.3 Conrock Gully

There are no streamflow gauges on Conrock Gully, therefore there is no current or historical streamflow data for Conrock Gully.

Stanmore has operated a stream gauge on Billy's Gully at the nearby IPM since 2013. Billy's Gully has a similar catchment area (68 km^2) and general characteristics to Conrock Gully. An analysis of the Billy's Gully stream flows has been undertaken to represent the potential flows in Conrock Gully.

The recorded stream flows in Billy's Gully, along with recorded rainfall, is shown in Figure 3.9. At Billy's Gully streamflow gauge, flows were recorded on approximately 0.1% of days. The maximum water level recorded at Billy's Gully was 12.6 mGH in February 2016 (flow depth of around 2.6 m at the gauge).

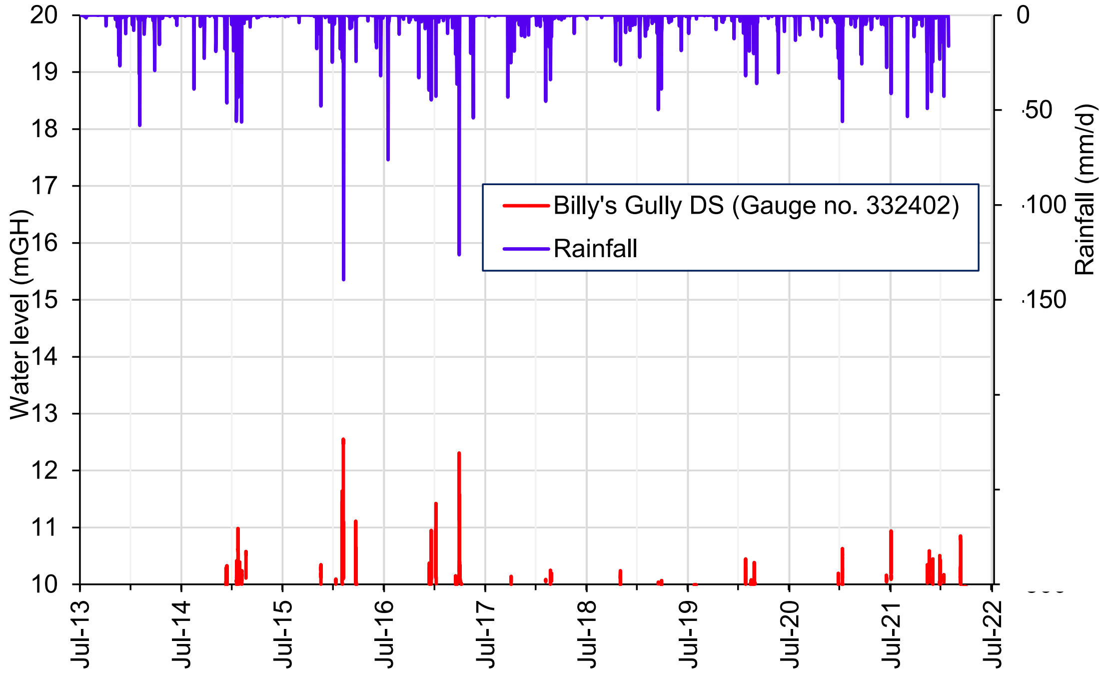


Figure 3.9 - Recorded water level at Billy's Gully DS (gauge no. 332402)

3.5 Geological setting

The Project is located in the northern part of the Permo-Triassic Bowen Basin. Structurally, the deposit lies on the western boundary of the deformed Nebo Synclinorium immediately west of the regional Isaac Thrust fault system. To the east and north of the thrust, seams are repeated.

The economic seams are contained in the Late Permian Rangal Coal Measures which are approximately 100 m thick. The Rangal Coal Measures are underlain by the Fort Cooper Coal Measures and overlain by the Late Permian to Early Triassic Rewan Group.

The Rangal Coal Measures comprise light grey, cross-bedded, fine to medium grained labile sandstones, grey siltstones, mudstones and coal seams. Cemented sections are common in the sandstones. The transition from the Rangal Coal Measures to the Rewan Formation is generally difficult to define and is often based on the change from the green-grey colour of the Rewan sandstones to the blue-grey colour of the Rangal sandstones. The transition between the formations is 15 to 60 m above the first major seam in the Rangal Coal Measures, being the Leichhardt Seam.

The Fort Cooper Coal Measures comprise typically tuffaceous sandstones, siltstones, mudstones and coal seams. The transition between the Rangal Coal Measures and the Fort Cooper Coal Measures is generally clearly marked by the Yarrabee Tuff - a basin-wide marker bed comprised of weak, brown tuffaceous claystone.

The deposit area contains Quaternary sediments range in thickness from 2 to 20 m (average 7.8m). Some thicker Quaternary sediments are present along the banks of the Isaac River in the north and a minor amount along Cherwell Creek to the south. In the north of the Project area the Leichhardt and the Vermont seams coalesce to form a thickened pod of coal. The Vermont coalesces with the Girrah seam in the south of the Project area. The Rangal Coal Measures dip to the east at 2 to 6 degrees.

Depth of weathering over the whole deposit ranges from 11 to 36 m averaging 20 m. Non-coal Permian sediments consist of moderately weak to strong sandstones, siltstones and minor mudstones. Sandstone and siltstone appear to be co-dominant. There are no significant Tertiary basalt flows in the Project area.

3.6 Groundwater

The hydrogeological regime located in the Project area and surrounds comprises the following key hydrogeological units:

- Cenozoic sediments:
  - Quaternary alluvium – unconfined aquifer (sporadically water-bearing strata of permeable unconsolidated sand or gravel with interlayered clays and silts) localised to major ephemeral drainage line channels (Isaac River and Cherwell Creek).
  - Quaternary to Tertiary non-alluvial sediments and weathered units (collectively termed 'regolith') – unconfined unit with variable but limited saturation and generally present at the surface within the Project area.
- Triassic Rewan Group – Considered a regional scale aquitard, however, some saturated more hydraulically conductive horizons exist within, particularly within the upper weathered zone. The Rewan Group subcrops on the eastern side of the Project area.
- Permian coal measures with:
  - Low permeability interburden and overburden units with aquitard properties.
  - Coal seams that exhibit water bearing properties associated with secondary porosity through cracks and fissures.

The coal seams within the Permian Rangal coal measures (RCM) are the main aquifer units in the Project area. The coal seams can be characterised as confined aquifers, with the Leichhardt and Vermont coal seams forming the main aquifer units locally. The RCM overburden and interburden act as aquitards and are typically dry, or very low yielding.

3.7 Water quality

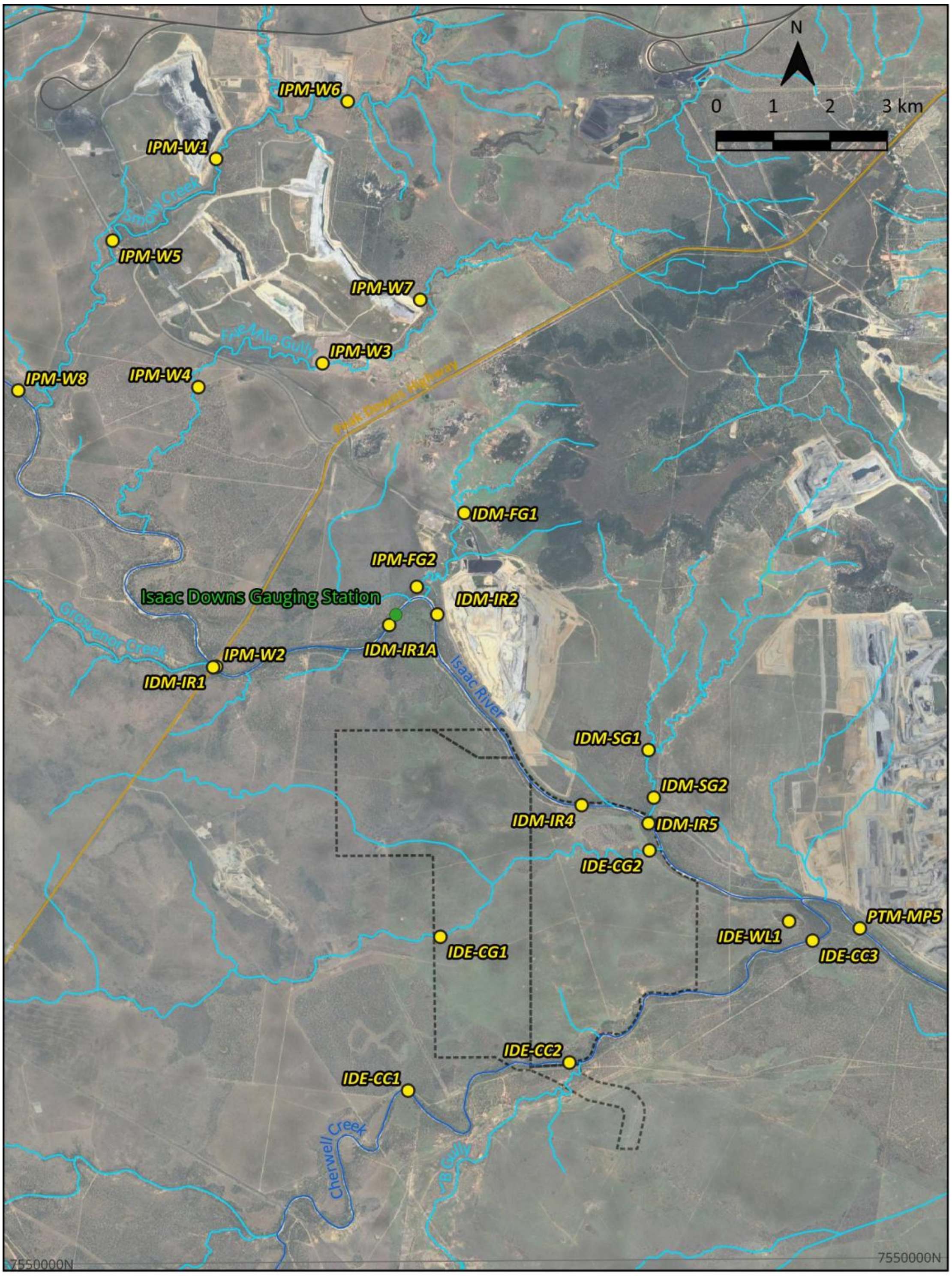
The Isaac River catchment has seen significant changes in land use over the past 50 years. Widespread land clearing and coal mine development have occurred throughout the catchment. The extent to which these activities have affected water quality is difficult to ascertain. Coal mines have historically discharged mine-affected water immediately following significant rainfall events, but few records are available of the timing and quality of these releases. Typically, under normal conditions, water is conserved on site to provide water for site use. It is likely that streamflow and water quality records are not significantly affected by mine releases except for potentially during the recession of flood events when mine affected water is more than likely released.

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 and their locations are shown in Figure 3.10 and Figure 3.11. Monitoring sites along the Isaac River, associated with IDM, have also been used as the Isaac River monitoring sites upstream, adjacent and downstream of the Project, to avoid unnecessary duplication of monitoring sites.

Table 3.1 – Water quality data monitoring locations

Site name	Watercourse	Location		Data source Duration of record	No. of samples
		Lat. (decimal degrees)	Long. (decimal degrees)		
IPM					
W1	Smoky Creek	-21.9631	148.1308	2016-2025	33
W2	Isaac River	-22.0496	148.1308	2016-2025	44
W3	Billy's Gully	-22.9979	148.1489	2022	1
W4	Billy's Gully	-22.0020	148.1278	2020-2025	24

Site name	Watercourse	Location		Data source Duration of record	No. of samples
		Lat. (decimal degrees)	Long. (decimal degrees)		
W5	Smoky Creek	-21.9770	148.1132	2016-2025	55
W6	Smoky Creek	-21.9536	148.1532	2018-2025	22
W7	Billy's Gully	-21.9871	148.1656	2021-2025	15
W8	Isaac River	-22.0025	148.0971	2015-2025	26
IDM					
FG1	Five Milly Gully	-22.0234	148.1731	2021-2025	9
FG2	File Mile Gully	-22.0360	148.1650	2022-2025	6
IR1	Isaac River	-22.0497	148.1303	2020-2025	19
IR1A	Isaac River	-22.0425	148.1603	2021-2025	12
IR2	Isaac River	-22.0407	148.1685	2020-2025	18
IR4	Isaac River	-22.0732	148.1931	2020-2025	20
IR5	Isaac River	-22.0763	148.2045	2020-2025	18
IDE					
CC1	Cherwell Creek	-22.1219	148.1635	2025-2026	5
CC2	Cherwell Creek	-22.1171	148.1910	2025-2026	4
CC3	Cherwell Creek	-22.0963	148.2324	2025-2026	4
CG1	Conrock Gully	-22.0956	148.1690	2025-2026	3
CG2	Conrock Gully	-22.0809	148.2047	2025-2026	4
WL1	Wetland	-22.0930	148.2284	2025-2026	4
PTM					
MP5	Isaac River	-22.0942	148.2405	2017-2025	10



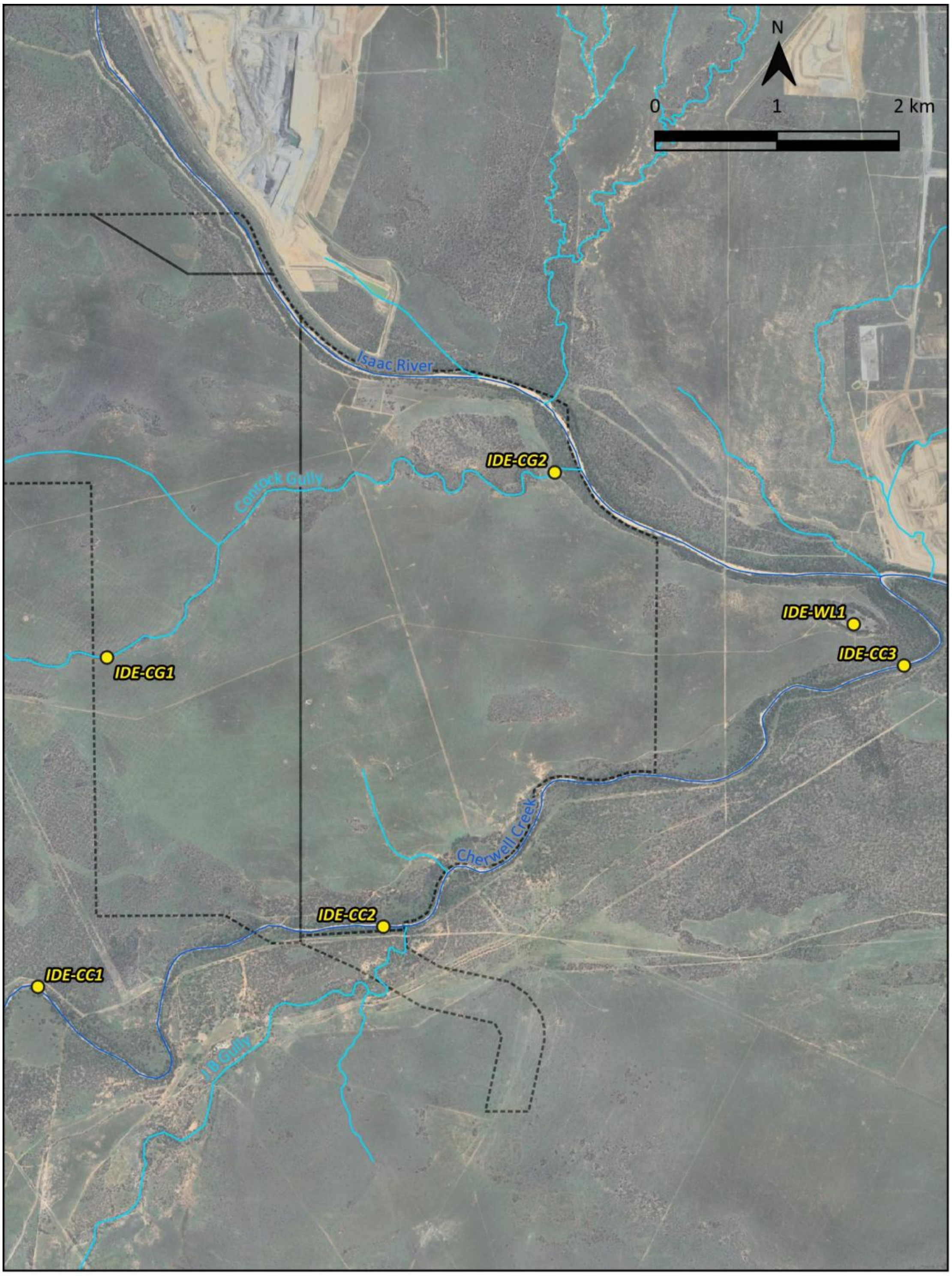
Title:	Surface water quality monitoring locations
Project:	Isaac Downs Extension Surface Water Assessment

HydroBalance

Legend

- Project MLA Boundary
- Minor watercourse/ drainage line
- Major watercourse
- Highway
- Rail line
- Water quality monitoring location
- Streamflow gauging station

Figure 3.10 – Water quality monitoring locations – all Stanmore sites



Title:	Surface water quality monitoring locations
Project:	Isaac Downs Extension Surface Water Assessment

Legend

- Project MLA Boundary
- Minor watercourse/ drainage line
- Major watercourse
- Highway
- Rail line
- Water quality monitoring location

HydroBalance

Figure 3.11 – Water quality monitoring locations – Project only

3.7.1 Regional Isaac River 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/DGV's are displayed in Table 3.2. 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 potentially include mine releases. 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.

Table 3.2 shows that some readings at the Isaac River DNRMMRRD monitoring locations are at or above the regional DGVs, 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).

This indicates that the current DGV's 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 which may potentially be associated with coincident water releases from upstream operations.

Further discussion relating to the setting of site-specific trigger values (SSTVs) for the Project is provided in Section 3.7.2.4.

Table 3.2 – Regional Isaac River water quality summary – DNRMMRRD gauges

Parameter	Unit	Isaac River @ Burton Gorge				Isaac River @ Goonyella				Isaac River @ Deverill				WQO/DGV (refer Table 2.2)
		No. of samples	20th %ile value	Median value	80th %ile value	No. of samples	20th %ile value	Median value	80th %ile value	No. of samples	20th %ile value	Median value	80th %ile value	
Aluminium (dissolved)	mg/L	-	-	-	-	13	0.004	0.05	0.056	14	0.03	0.05	0.15	0.055 (aquatic)
Boron (total)	mg/L	4	0.03	0.03	0.034	30	0.04	0.08	0.12	21	0.04	0.06	0.096	5 (stock)
Calcium (dissolved)	mg/L	19	13	36	50	33	8.2	14	24	49	6.7	16	22	-
Chloride (total)	mg/L	19	23	45	92	33	18	79	250	45	10.2	32	61	-
Copper (dissolved)	mg/L	-	-	-	-	13	0.012	0.03	0.05	16	0.006	0.03	0.036	0.002 (aquatic)
Electrical Conductivity	µS/cm	19	169	458	644	33	195	512	1,140	49	120	261	398	720 (baseflow 250 (high flow)
Fluoride (total)	mg/L	19	0.1	0.19	0.22	33	0.1	0.2	0.32	46	0.1	0.14	0.2	2 (irrigation)
Iron (dissolved)	mg/L	5	0.4	1	7	30	0.01	0.04	0.234	17	0.02	0.06	0.34	0.3 (aquatic)
Magnesium (dissolved)	mg/L	19	5.1	15	18	33	4.1	9.6	21.6	49	3.3	7.7	10	-
Manganese (dissolved)	mg/L	-	-	-	-	15	0.008	0.01	0.02	13	0.001	0.01	0.01	1.9 (aquatic)
Nitrate (total)	mg/L	9	0.4	1.5	3.6	30	0.98	1.96	3.48	12	0.004	0.02	0.25	0.1 (aquatic)
pH	-	19	7.4	7.8	8	33	7.2	7.7	8	49	7.19	7.6	8	6.5-8.5 (aquatic)
Phosphorus (total)	mg/L	-	-	-	-	10	0.041	0.203	0.344	12	0.04	0.09	0.67	50 (aquatic)
Potassium (total)	mg/L	16	3.5	5.4	6.6	33	2.8	3.8	4.6	46	3.16	4.55	5.26	-
Sodium (total)	mg/L	19	18	33	58	33	21	67	188	49	12	22	40	30 (drinking water)
Sulphate (total)	mg/L	13	2.7	4.3	9.8	33	4.7	10	75.4	42	6.92	10	18.8	25 (aquatic)
Total Alkalinity	mg/L	19	58	148	204	33	48	78	117	49	42	78	100	-
Total Dissolved Solids	mg/L	19	122	255	353	33	114	280	622	47	81	155	224	2,000 (stock)
Total Suspended Solids	mg/L	15	10	230	2,002	33	14	74	2,752	41	10	135	1,340	55 (aquatic)
Turbidity	NTU	4	66	100	100	32	16	100	147	19	11	50	910	50 (aquatic)
Zinc (dissolved)	mg/L	-	-	-	-	12	0.01	0.015	0.02	14	0.01	0.01	0.06	0.008 (aquatic)

The DNRMMRRD has collected daily electrical conductivity data at the Isaac River at the Deverill gauges. Electrical conductivity, which is a measure of the salt concentration, has been used to define the potential water quality impacts of the Project. The Deverill gauge is located near the downstream boundary of the Project and would be representative of water quality that drains past the site.

Figure 3.12 presents a time history of recorded instantaneous EC and stream flow for the Isaac River at Deverill gauging station. Figure 3.13 details the relationship between instantaneous flow and EC at the Isaac River at Deverill gauging station. The data collected by DNRMMRRD at the Deverill gauging station spans the period from 2011 to 2025 and indicates:

- The EC for high flows greater than 200 m^3/s are generally below the high flow WQO EC of 250 µS/cm.
- The EC of instantaneous flows below 100 m^3/s vary significantly from 50 µS/cm to 1,870 µS/cm with many recorded values exceeding the low flow WQO EC of 720 µS/cm.
- The mean daily EC has exceeded the low flow WQO on a total of 22 days over this period and all of these days experienced some flow (not stagnant flow).
- The stream flows are highly ephemeral with baseflows ceasing within a few days or weeks of a runoff event or at least flowing below the top of the sandy bed.

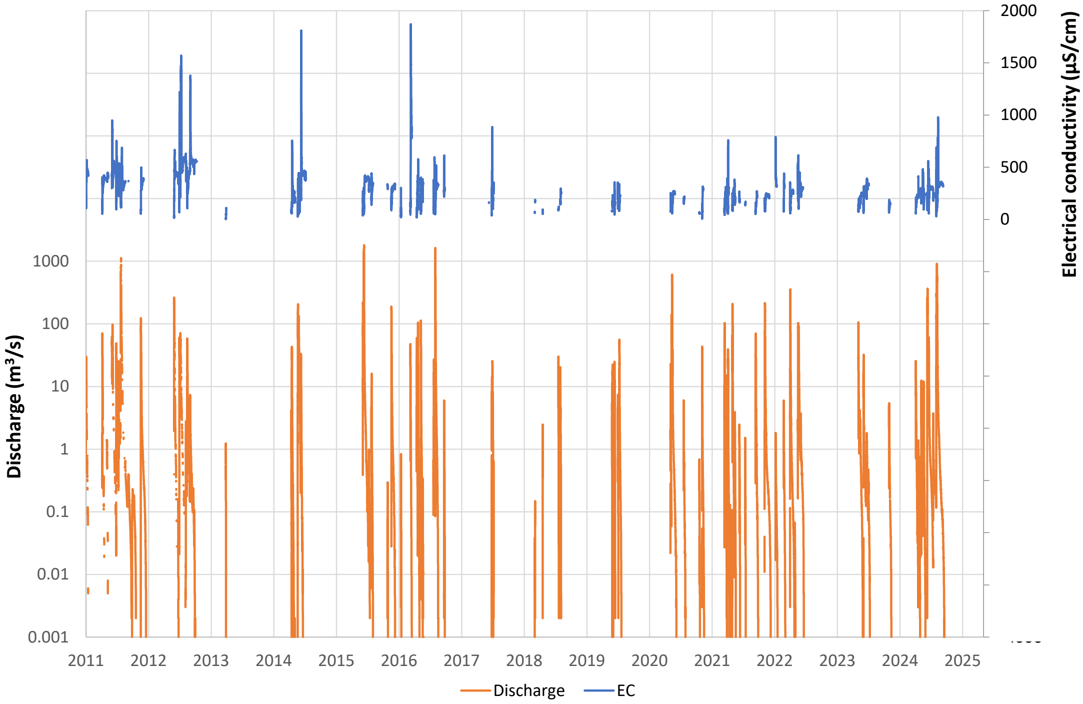


Figure 3.12 – Electrical Conductivity and flow (Isaac River @ Deverill gauge)

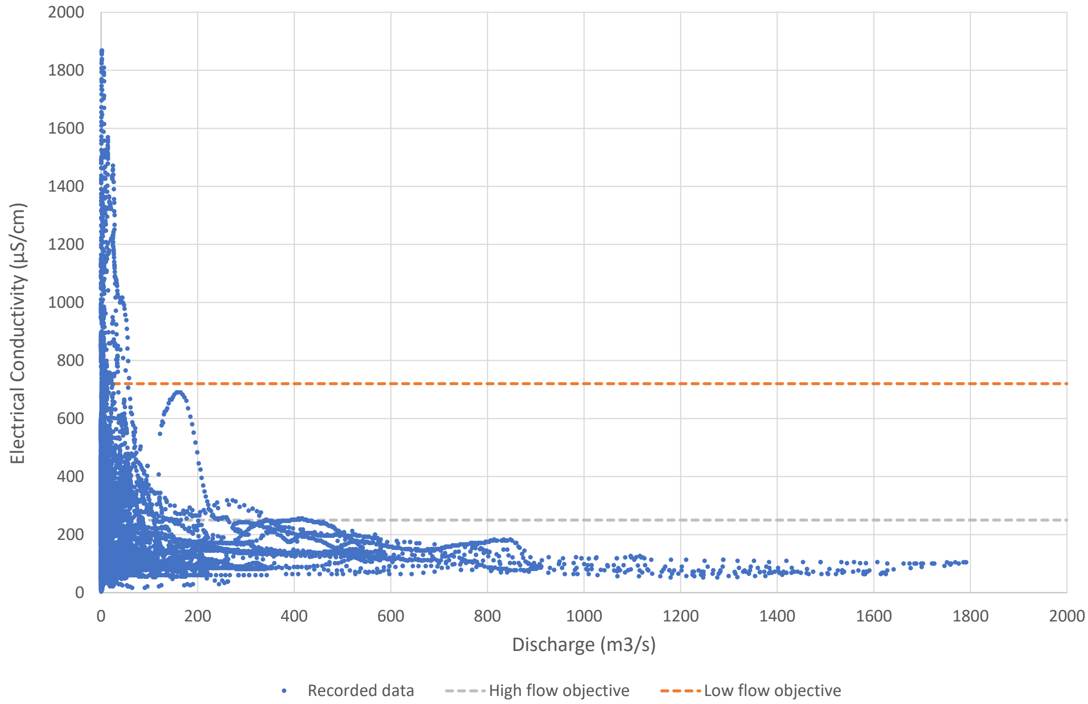


Figure 3.13 – Flow vs Electrical Conductivity (Isaac River @ Deverill gauge)

3.7.2 Local water quality

3.7.2.1 IPM sampling

Water quality at the existing IPM operations is monitored in Isaac River, Smoky Creek and Billy's Gully upstream and downstream of the mine. A summary of IPM water quality sampling results is provided in Table 3.3 to Table 3.5.

Routine water quality samples for the upstream and downstream Isaac River Creek monitoring points show the following:

Upstream (W8):

- Typical EC values vary from 180 µS/cm (20th percentile) to 297 µS/cm (80th percentile), with a median value of 219 µS/cm from 2015 to 2025;
- pH is slightly alkaline;
- Typical TSS values in vary from 34 mg/L (20th percentile) to 549 mg/L (80th percentile), with a median value of 299 mg/L from 2015 to 2025; and
- Aluminium, copper, sodium, zinc and phosphorus exceed the ANZG (2018) WQO's for multiple samples over 2015 to 2025.

Downstream (W2):

- Typical EC values vary from 125 µS/cm (20th percentile) to 361 µS/cm (80th percentile), with a median value of 206 µS/cm from 2015 to 2025;
- pH is slightly alkaline;
- Typical TSS values in vary from 144 mg/L (20th percentile) to 767 mg/L (80th percentile), with a median value of 331 mg/L from 2015 to 2025; and
- Aluminium, sodium and phosphorus exceed the ANZG (2018) WQO's for multiple samples over 2015 to 2025.

3.7.2.2 IDM sampling

Water quality at the existing IDM operations is monitored in Isaac River, Five Milly Gully and Southern Gully upstream and downstream of the mine. A summary of IDM water quality sampling results is provided in Table 3.6 to Table 3.8.

Routine water quality samples for the upstream and downstream Isaac River monitoring points show the following:

<u>*Upstream (IR1):*</u>

- Typical EC values vary from 133 µS/cm (20th percentile) to 259 µS/cm (80th percentile), with a median value of 209 µS/cm from 2020 to 2025;
- pH is slightly alkaline;
- Typical TSS values in vary from 116 mg/L (20th percentile) to 847 mg/L (80th percentile), with a median value of 315 mg/L from 2020 to 2025; and
- Aluminium, copper, iron and sodium exceed the ANZG (2018) WQO's for multiple samples over 2020 to 2025.

<u>*Downstream (IR4):*</u>

- Typical EC values vary from 191 µS/cm (20th percentile) to 411 µS/cm (80th percentile), with a median value of 307 µS/cm from 2020 to 2025;
- pH is slightly alkaline;
- Typical TSS values in vary from 49 mg/L (20th percentile) to 218 mg/L (80th percentile), with a median value of 111 mg/L from 2020 to 2025; and
- Aluminium and sodium exceed the ANZG (2018) WQO's for multiple samples over 2020 to 2025.

3.7.2.3 Isaac Downs Extension water quality data

Water quality sampling was undertaken as a component of the baseline surface water quality sampling between February and April 2025 for the IDE Project. Analyses for a range of physio-chemical parameters were completed at sites on local waterways; CC1, CC2, CC3, CG1, CG2 and WL1 (Table 3.9). Furthermore additional sampling along the Isaac River (upstream, adjacent and downstream of the Project) in December 2025 is included in the water quality results presented in Section 3.7.2.4.

Review of Table 3.9 shows that certain baseline water quality values surrounding the Project do not meet the WQOs for the region, these include:

- Electrical conductivity and sulphate
- Turbidity and total suspended solids (TSS);
- Sodium;
- Aluminium, copper, zinc and iron (dissolved);

Similar to the regional water quality data presented in Table 3.2, the local water quality data suggests that a number of parameters may exceed the DGVs. However, it is acknowledged that this is based on a relatively small number of samples (2 to 4 depending on site).

3.7.2.4 Review of Isaac River WQOs

A review of the Isaac River WQOs have been undertaken with reference to the guideline *Information guidelines on deriving site-specific guideline values for physico-chemical parameters and toxicants* (IESC 2019).

To establish local water quality objectives, the QWQG (2009) 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 their IPM, IDM and Poitrel operations. They have collected 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 is presented in Table 3.11, which shows the following:

- The 80^{th} percentile value for dissolved aluminium (0.212 mg/L) is almost four time the WQO trigger value (0.055 mg/L).
- The 80^{th} percentile value for dissolved copper (0.003 mg/L) is more than double the WQO trigger value (0.0014 mg/L).
- The 80^{th} percentile value for turbidity (1,930 NTU) is significantly higher than the WQO trigger value (50 NTU).
- The 80^{th} 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 SSTVs are proposed:

- 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.

Table 3.3 – Local water quality summary – IPM sites (Part 1)

Parameter	Units	Limit of reporting	W1				W2				W3				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
pH (Lab)	-	0.01	33	7.49	7.75	8.00	44	7.37	7.57	7.79	1	7.42	7.42	7.42	*6.5-8.5*
Electrical Conductivity (Lab)	µS/cm	1	33	132	175	253	44	125	203	360	1	224	224	224	*250-720*
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	27	2.2	5	7	41	3	8	17.2	1	10	10	10	*25*
TSS	mg/L	5	27	137	395	1,236	41	200	782	2,090	1	146	146	146	*55*
Turbidity	NTU	0.1	33	222	535	1,330	44	371	1,120	3,414	1	740	740	740	*50*
Aluminium (filtered)	mg/L	0.01	27	0.062	0.16	0.588	41	0.01	0.06	0.18	1	0.005	0.005	0.005	*0.055*
Arsenic (filtered)	mg/L	0.001	27	0.0005	0.0005	0.0005	41	0.0005	0.0005	0.0005	1	0.0005	0.0005	0.0005	*0.013*
Boron (filtered)	mg/L	0.05	26	0.025	0.025	0.025	40	0.025	0.025	0.06	1	0.025	0.025	0.025	*0.94*
Cadmium (filtered)	mg/L	0.0001	27	0.00005	0.00005	0.00005	41	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	*0.0002*
Chromium (III+VI) (filtered)	mg/L	0.001	27	0.0005	0.0005	0.0005	41	0.0005	0.0005	0.0005	1	0.0005	0.0005	0.0005	*0.001*
Cobalt (filtered)	mg/L	0.001	27	0.0005	0.0005	0.0005	41	0.0005	0.0005	0.0005	1	0.0005	0.0005	0.0005	*0.0014*
Copper (filtered)	mg/L	0.001	27	0.002	0.002	0.003	40	0.002	0.002	0.003	1	0.002	0.002	0.002	*0.0014*
Iron (filtered)	mg/L	0.05	26	0.1	0.175	0.27	40	0.025	0.120	0.240	1	0.025	0.025	0.025	*0.28*
Lead (filtered)	mg/L	0.001	27	0.0005	0.0005	0.0005	41	0.0005	0.0005	0.0005	1	0.0005	0.0005	0.0005	*0.0034*
Manganese (filtered)	mg/L	0.001	26	0.0005	0.001	0.011	40	0.0005	0.0005	0.002	1	0.0005	0.0005	0.0005	*1.9*
Mercury (filtered)	mg/L	0.0001	26	0.00005	0.00005	0.00005	40	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	*0.0002*
Molybdenum (filtered)	mg/L	0.001	26	0.0005	0.0005	0.0005	40	0.0005	0.0005	0.001	1	0.003	0.003	0.003	*0.034*
Nickel (filtered)	mg/L	0.001	27	0.002	0.002	0.003	41	0.002	0.002	0.003	1	0.002	0.002	0.002	*0.011*
Selenium (filtered)	mg/L	0.01	26	0.005	0.005	0.005	40	0.005	0.005	0.005	1	0.005	0.005	0.005	*0.005*
Silver (filtered)	mg/L	0.001	26	0.0005	0.0005	0.0005	40	0.0005	0.0005	0.0005	1	0.0005	0.0005	0.0005	*0.001*

Parameter	Units	Limit of reporting	W1				W2				W3				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
Sodium (filtered)	mg/L	1	23	10	14	16	38	11	23	41	1	32	32	32	*188*
Uranium (filtered)	µg/L	1	26	0.5	0.5	0.5	40	0.5	0.5	0.5	1	0.5	0.5	0.5	*1*
Vanadium (filtered)	mg/L	0.01	26	0.005	0.005	0.005	40	0.005	0.005	0.005	1	0.005	0.005	0.005	*0.01*
Zinc (filtered)	mg/L	0.005	27	0.0025	0.0025	0.0025	41	0.0025	0.0025	0.0025	1	0.0025	0.0025	0.0025	*0.008*
Fluoride	mg/L	0.1	28	0.1	0.2	0.2	41	0.1	0.1	0.2	1	0.1	0.1	0.1	*0.32*
Total Phosphorus as P	mg/L	0.01	15	0.148	0.32	0.56	20	0.118	0.34	0.764	1	0.53	0.53	0.53	*0.05*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

Table 3.4 – Local water quality summary – IPM sites (Part 2)

Parameter	Units	Limit of reporting	W4				W5				W6				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
pH (Lab)	-	0.01	24	7.41	7.55	7.91	55	7.53	7.70	7.92	22	7.20	7.56	7.73	*6.5-8.5*
Electrical Conductivity (Lab)	µS/cm	1	24	195	304	912	55	133	277	677	22	117	143	172	*250-720*
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	24	14	26	105	50	5	12	42	21	1	3	6	*25*
TSS	mg/L	5	24	153	942	1,628	50	75	387	1,392	21	98	318	1,020	*55*
Turbidity	NTU	0.1	9	672	2,055	3,452	55	133	550	2450	22	278	815	1,564	*50*
Aluminium (filtered)	mg/L	0.01	24	0.005	0.0075	0.116	51	0.005	0.04	0.36	21	0.005	0.01	0.04	*0.055*
Arsenic (filtered)	mg/L	0.001	24	0.0005	0.0005	0.0005	51	0.0005	0.0005	0.001	21	0.0005	0.0005	0.0005	*0.013*
Boron (filtered)	mg/L	0.05	23	0.025	0.05	0.08	51	0.025	0.025	0.06	21	0.025	0.025	0.05	*0.94*
Cadmium (filtered)	mg/L	0.0001	24	0.00005	0.00005	0.00005	50	0.00005	0.00005	0.00005	21	0.00005	0.00005	0.00005	*0.0002*
Chromium (III+VI) (filtered)	mg/L	0.001	24	0.0005	0.0005	0.0005	51	0.0005	0.0005	0.0005	21	0.0005	0.0005	0.0005	*0.001*

Parameter	Units	Limit of reporting	W4				W5				W6				*WQO*
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
Cobalt (filtered)	mg/L	0.001	24	0.0005	0.0005	0.0005	51	0.0005	0.0005	0.0005	21	0.0005	0.0005	0.0005	*0.0014*
Copper (filtered)	mg/L	0.001	24	0.0016	0.002	0.003	51	0.002	0.002	0.003	21	0.002	0.003	0.004	*0.0014*
Iron (filtered)	mg/L	0.05	23	0.025	0.06	0.112	51	0.025	0.08	0.24	21	0.025	0.025	0.11	*0.28*
Lead (filtered)	mg/L	0.001	24	0.0005	0.0005	0.0005	51	0.0005	0.0005	0.0005	21	0.0005	0.0005	0.0005	*0.0034*
Manganese (filtered)	mg/L	0.001	23	0.0005	0.0005	0.004	51	0.0005	0.0005	0.005	21	0.0005	0.0005	0.001	*1.9*
Mercury (filtered)	mg/L	0.0001	23	0.00005	0.00005	0.00005	51	0.00005	0.00005	0.00005	21	0.00005	0.00005	0.00005	*0.0002*
Molybdenum (filtered)	mg/L	0.001	23	0.001	0.001	0.004	51	0.0005	0.001	0.003	21	0.0005	0.0005	0.0005	*0.034*
Nickel (filtered)	mg/L	0.001	24	0.0008	0.002	0.0024	51	0.001	0.002	0.002	21	0.002	0.002	0.003	*0.011*
Selenium (filtered)	mg/L	0.01	23	0.005	0.005	0.005	51	0.005	0.005	0.005	21	0.005	0.005	0.005	*0.005*
Silver (filtered)	mg/L	0.001	23	0.0005	0.0005	0.0005	51	0.0005	0.0005	0.0005	21	0.0005	0.0005	0.0005	*0.001*
Sodium (filtered)	mg/L	1	24	28	49	143	47	12	23	83	21	5	12	15	*188*
Uranium (filtered)	µg/L	1	23	0.5	0.5	0.5	51	0.5	0.5	0.5	21	0.5	0.5	0.5	*1*
Vanadium (filtered)	mg/L	0.01	23	0.005	0.005	0.005	51	0.005	0.005	0.005	21	0.005	0.005	0.005	*0.01*
Zinc (filtered)	mg/L	0.005	24	0.0025	0.0025	0.0039	51	0.0025	0.0025	0.0025	21	0.0025	0.0025	0.0025	*0.008*
Fluoride	mg/L	0.1	22	0.1	0.2	0.3	48	0.1	0.2	0.2	21	0.1	0.1	0.2	*0.32*
Total Phosphorus as P	mg/L	0.01	16	0.23	0.37	0.79	27	0.15	0.31	0.96	17	0.26	0.46	0.67	*0.05*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

Table 3.5 – Local water quality summary – IPM sites (Part 3)

Parameter	Units	Limit of reporting	W7				W8				*WQO*
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
pH (Lab)	-	0.01	15	7.31	7.46	7.68	26	7.36	7.66	7.85	*6.5-8.5*
Electrical Conductivity (Lab)	µS/cm	1	15	135	142	182	26	168	218	296	*250-720*
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	15	4	6	10	23	5	9	14	*25*
TSS	mg/L	5	15	158	557	1,466	23	47	435	837	*55*
Turbidity	NTU	0.1	15	453	3,070	6,718	26	297	950	1,930	*50*
Aluminium (filtered)	mg/L	0.01	14	0.008	0.040	1.746	23	0.005	0.010	0.142	*0.055*
Arsenic (filtered)	mg/L	0.001	15	0.0005	0.0005	0.0006	23	0.0005	0.0005	0.0005	*0.013*
Boron (filtered)	mg/L	0.05	15	0.025	0.06	0.158	20	0.025	0.05	0.06	*0.94*
Cadmium (filtered)	mg/L	0.0001	14	0.00005	0.00005	0.00005	23	0.00005	0.00005	0.00005	*0.0002*
Chromium (III+VI) (filtered)	mg/L	0.001	15	0.0005	0.0005	0.0026	23	0.0005	0.0005	0.0005	*0.001*
Cobalt (filtered)	mg/L	0.001	15	0.0005	0.0005	0.0009	23	0.0005	0.0005	0.0005	*0.0014*
Copper (filtered)	mg/L	0.001	15	0.0018	0.002	0.004	23	0.002	0.002	0.003	*0.0014*
Iron (filtered)	mg/L	0.05	14	0.025	0.13	1.264	20	0.025	0.025	0.1	*0.28*
Lead (filtered)	mg/L	0.001	15	0.0005	0.0005	0.0005	23	0.0005	0.0005	0.0005	*0.0034*
Manganese (filtered)	mg/L	0.001	15	0.0005	0.001	0.0092	20	0.0005	0.0005	0.001	*1.9*
Mercury (filtered)	mg/L	0.0001	14	0.00005	0.00005	0.00005	20	0.00005	0.00005	0.00005	*0.0002*
Molybdenum (filtered)	mg/L	0.001	15	0.0005	0.0005	0.0021	20	0.0005	0.0005	0.0012	*0.034*
Nickel (filtered)	mg/L	0.001	15	0.0018	0.002	0.0052	23	0.002	0.002	0.003	*0.011*
Selenium (filtered)	mg/L	0.01	15	0.005	0.005	0.005	20	0.005	0.005	0.005	*0.005*
Silver (filtered)	mg/L	0.001	15	0.0005	0.0005	0.0005	20	0.0005	0.0005	0.0005	*0.001*
Sodium (filtered)	mg/L	1	15	17	23	31	23	19	22	32	*188*

Parameter	Units	Limit of reporting	W7				W8				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
Uranium (filtered)	µg/L	1	14	0.5	0.5	0.5	20	0.5	0.5	0.5	*1*
Vanadium (filtered)	mg/L	0.01	15	0.005	0.005	0.005	20	0.005	0.005	0.005	*0.01*
Zinc (filtered)	mg/L	0.005	14	0.0025	0.0025	0.0025	23	0.0025	0.0025	0.008	*0.008*
Fluoride	mg/L	0.1	12	0.1	0.2	0.3	20	0.1	0.2	0.2	*0.32*
Total Phosphorus as P	mg/L	0.01	8	0.17	0.33	0.88	15	0.05	0.32	0.53	*0.05*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

Table 3.6 – Local water quality summary – IDM sites (Part 1)

Parameter	Units	Limit of reporting	FG1				FG2				IR1				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
pH (Lab)	-	0.01	8	7.126	7.47	7.576	6	7.15	7.76	8.37	19	7.338	7.51	7.654	*6.5-8.5*
Electrical Conductivity (Lab)	µS/cm	1	8	447.2	806.5	1662	6	92	1597.5	5150	19	133.4	209	259.2	*250-720*
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	8	10.4	17.5	30.4	6	7	26.5	274	19	3	6	10.8	*25*
TSS	mg/L	5	9	30	258	836	6	109	409.5	717	18	116.2	315.5	846.6	*55*
Turbidity	NTU	0.1	9	132.4	805	3092	6	56.7	380	2510	19	278.4	836	2134	*50*
Aluminium (filtered)	mg/L	0.01	8	0.01	0.015	0.036	6	0.01	0.035	0.11	19	0.01	0.03	0.356	*0.055*
Arsenic (filtered)	mg/L	0.001	8	0.001	0.001	0.001	6	0.001	0.001	0.001	19	0.001	0.001	0.001	*0.013*
Boron (filtered)	mg/L	0.05	6	0.09	0.135	0.18	6	0.06	0.155	0.3	15	0.05	0.05	0.07	*0.94*
Cadmium (filtered)	mg/L	0.0001	8	0.0001	0.0001	0.0001	6	0.0001	0.0001	0.0001	19	0.0001	0.0001	0.0001	*0.0002*
Chromium (III+VI) (filtered)	mg/L	0.001	8	0.001	0.001	0.001	6	0.001	0.001	0.001	19	0.001	0.001	0.001	*0.001*
Cobalt (filtered)	mg/L	0.001	8	0.001	0.001	0.001	6	0.001	0.001	0.001	19	0.001	0.001	0.001	*0.0014*

Parameter	Units	Limit of reporting	FG1				FG2				IR1				*WQO*
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
Copper (filtered)	mg/L	0.001	8	0.002	0.002	0.003	6	0.001	0.0015	0.002	19	0.001	0.002	0.0034	*0.0014*
Iron (filtered)	mg/L	0.05	6	0.05	0.05	0.06	6	0.05	0.08	0.15	15	0.05	0.12	0.306	*0.28*
Lead (filtered)	mg/L	0.001	8	0.001	0.001	0.001	6	0.001	0.001	0.001	19	0.001	0.001	0.001	*0.0034*
Manganese (filtered)	mg/L	0.001	6	0.001	0.0015	0.007	6	0.001	0.002	0.005	15	0.001	0.001	0.0042	*1.9*
Mercury (filtered)	mg/L	0.0001	6	0.0001	0.0001	0.0001	6	0.0001	0.0001	0.0001	15	0.0001	0.0001	0.0001	*0.0002*
Molybdenum (filtered)	mg/L	0.001	6	0.001	0.001	0.001	6	0.001	0.001	0.008	15	0.001	0.001	0.001	*0.034*
Nickel (filtered)	mg/L	0.001	8	0.003	0.0035	0.004	6	0.001	0.0015	0.003	19	0.002	0.003	0.003	*0.011*
Selenium (filtered)	mg/L	0.01	6	0.01	0.01	0.01	6	0.01	0.01	0.01	15	0.01	0.01	0.01	*0.005*
Silver (filtered)	mg/L	0.001	6	0.001	0.001	0.001	6	0.001	0.001	0.001	15	0.001	0.001	0.001	*0.001*
Sodium (filtered)	mg/L	1	7	73.4	127	256.2	6	8	178.5	988	15	13.2	22	38.8	*188*
Uranium (filtered)	µg/L	1	6	1	1	1	6	1	1.5	2	15	1	1	1	*1*
Vanadium (filtered)	mg/L	0.01	6	0.01	0.01	0.01	6	0.01	0.01	0.01	15	0.01	0.01	0.01	*0.01*
Zinc (filtered)	mg/L	0.005	8	0.005	0.005	0.0098	6	0.005	0.005	0.005	19	0.005	0.005	0.0066	*0.008*
Fluoride	mg/L	0.1	8	0.1	0.15	0.26	6	0.1	0.15	0.6	19	0.1	0.1	0.1	*0.32*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

Table 3.7 – Local water quality summary – IDM sites (Part 2)

Parameter	Units	Limit of reporting	IR1A				IR2				IR4				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
pH (Lab)	-	0.01	12	7.364	7.505	7.646	18	7.294	7.54	7.836	20	7.34	7.595	7.822	*6.5-8.5*
Electrical Conductivity (Lab)	µS/cm	1	12	152.4	227.5	371.8	18	153.4	278	464.8	20	191.2	306.5	410.6	*250-720*
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	12	3	5.5	11.2	18	2	7	19.6	20	4.6	8	22.2	*25*
TSS	mg/L	5	12	61.2	110	185.6	17	76.2	146	1006.4	19	48.8	111	218.2	*55*
Turbidity	NTU	0.1	12	235.4	344	951	18	181	336.5	1538	20	146.4	248.5	470	*50*
Aluminium (filtered)	mg/L	0.01	12	0.01	0.01	0.142	18	0.01	0.02	0.064	20	0.01	0.02	0.066	*0.055*
Arsenic (filtered)	mg/L	0.001	12	0.001	0.001	0.001	18	0.001	0.001	0.001	20	0.001	0.001	0.001	*0.013*
Boron (filtered)	mg/L	0.05	11	0.05	0.06	0.07	18	0.05	0.06	0.07	20	0.05	0.06	0.072	*0.94*
Cadmium (filtered)	mg/L	0.0001	12	0.0001	0.0001	0.0001	18	0.0001	0.0001	0.0001	20	0.0001	0.0001	0.0001	*0.0002*
Chromium (III+VI) (filtered)	mg/L	0.001	12	0.001	0.001	0.001	18	0.001	0.001	0.001	20	0.001	0.001	0.001	*0.001*
Cobalt (filtered)	mg/L	0.001	12	0.001	0.001	0.001	18	0.001	0.001	0.001	20	0.001	0.001	0.001	*0.0014*
Copper (filtered)	mg/L	0.001	12	0.001	0.0015	0.003	18	0.001	0.0015	0.002	20	0.001	0.002	0.002	*0.0014*
Iron (filtered)	mg/L	0.05	11	0.05	0.06	0.15	18	0.05	0.065	0.13	20	0.05	0.08	0.144	*0.28*
Lead (filtered)	mg/L	0.001	12	0.001	0.001	0.001	18	0.001	0.001	0.001	20	0.001	0.001	0.001	*0.0034*
Manganese (filtered)	mg/L	0.001	11	0.001	0.001	0.008	18	0.001	0.001	0.0034	20	0.001	0.001	0.0062	*1.9*
Mercury (filtered)	mg/L	0.0001	11	0.0001	0.0001	0.0001	18	0.0001	0.0001	0.0001	20	0.0001	0.0001	0.0001	*0.0002*
Molybdenum (filtered)	mg/L	0.001	11	0.001	0.001	0.001	18	0.001	0.001	0.002	20	0.001	0.001	0.0012	*0.034*
Nickel (filtered)	mg/L	0.001	12	0.0012	0.0025	0.0046	18	0.002	0.002	0.0036	20	0.002	0.002	0.004	*0.011*
Selenium (filtered)	mg/L	0.01	11	0.01	0.01	0.01	18	0.01	0.01	0.01	20	0.01	0.01	0.01	*0.005*
Sodium (filtered)	mg/L	1	12	14.4	28	44.6	14	17	41	71	17	23.6	36	56.6	*188*
Silver (filtered)	mg/L	0.001	11	0.001	0.001	0.001	18	0.001	0.001	0.001	20	0.001	0.001	0.001	*0.001*

Parameter	Units	Limit of reporting	IR1A				IR2				IR4				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
Uranium (filtered)	µg/L	1	11	1	1	1	18	1	1	1	20	1	1	1	*1*
Vanadium (filtered)	mg/L	0.01	11	0.01	0.01	0.01	18	0.01	0.01	0.01	20	0.01	0.01	0.01	*0.01*
Zinc (filtered)	mg/L	0.005	12	0.005	0.005	0.005	18	0.005	0.005	0.005	20	0.005	0.005	0.005	*0.008*
Fluoride	mg/L	0.1	12	0.1	0.1	0.2	18	0.1	0.1	0.2	20	0.1	0.1	0.1	*0.32*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

Table 3.8 – Local water quality summary – IDM sites (Part 3)

Parameter	Units	Limit of reporting	IR5				SG1				SG2				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
pH (Lab)	-	0.01	18	7.432	7.625	7.832	2	7.628	7.79	7.952	3	7.44	7.74	7.866	*6.5-8.5*
Electrical Conductivity (Lab)	µS/cm	1	18	195.2	283.5	404.2	2	219.8	317	414.2	3	179.6	197	273.2	*250-720*
Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	18	3.2	8	15.8	2	7.8	9	10.2	3	3.8	5	5.6	*25*
TSS	mg/L	5	17	43.6	129	231	2	1718	3530	5342	3	368	743	1941.2	*55*
Turbidity	NTU	0.1	18	162	262.5	410.4	2	2918	6549	10179	3	1481	3570	4788	*50*
Aluminium (filtered)	mg/L	0.01	18	0.01	0.02	0.144	2	0.016	0.025	0.034	3	0.018	0.03	0.03	*0.055*
Arsenic (filtered)	mg/L	0.001	18	0.001	0.001	0.001	2	0.001	0.001	0.001	3	0.001	0.001	0.001	*0.013*
Boron (filtered)	mg/L	0.05	18	0.06	0.06	0.07	2	0.072	0.09	0.108	3	0.068	0.08	0.092	*0.94*
Cadmium (filtered)	mg/L	0.0001	18	0.0001	0.0001	0.0001	2	0.0001	0.0001	0.0001	3	0.0001	0.0001	0.0001	*0.0002*
Chromium (III+VI) (filtered)	mg/L	0.001	18	0.001	0.001	0.001	2	0.001	0.001	0.001	3	0.001	0.001	0.001	*0.001*
Cobalt (filtered)	mg/L	0.001	18	0.001	0.001	0.001	2	0.001	0.001	0.001	3	0.001	0.001	0.001	*0.0014*
Copper (filtered)	mg/L	0.001	18	0.001	0.002	0.002	2	0.0012	0.0015	0.0018	3	0.002	0.002	0.002	*0.0014*
Iron (filtered)	mg/L	0.05	18	0.05	0.075	0.14	2	0.054	0.06	0.066	3	0.058	0.07	0.112	*0.28*

Parameter	Units	Limit of reporting	IR5				SG1				SG2				WQO
			No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	No. Samples	20%ile value	Median	80%ile value	
Lead (filtered)	mg/L	0.001	18	0.001	0.001	0.001	2	0.001	0.001	0.001	3	0.001	0.001	0.001	*0.0034*
Manganese (filtered)	mg/L	0.001	18	0.001	0.001	0.0068	2	0.001	0.001	0.001	3	0.001	0.001	0.0154	*1.9*
Mercury (filtered)	mg/L	0.0001	18	0.0001	0.0001	0.0001	2	0.0001	0.0001	0.0001	3	0.0001	0.0001	0.0001	*0.0002*
Molybdenum (filtered)	mg/L	0.001	18	0.001	0.001	0.001	2	0.001	0.001	0.001	3	0.001	0.001	0.001	*0.034*
Nickel (filtered)	mg/L	0.001	18	0.002	0.002	0.0036	2	0.001	0.001	0.001	3	0.001	0.001	0.0016	*0.011*
Selenium (filtered)	mg/L	0.01	18	0.01	0.01	0.01	2	0.01	0.01	0.01	3	0.01	0.01	0.01	*0.005*
Silver (filtered)	mg/L	0.001	18	0.001	0.001	0.001	2	0.001	0.001	0.001	3	0.001	0.001	0.001	*0.001*
Sodium (filtered)	mg/L	1	15	22.6	34	53.6	2	26.6	32	37.4	3	25.2	27	28.2	*188*
Uranium (filtered)	µg/L	1	18	1	1	1	2	1	1	1	3	1	1	1	*1*
Vanadium (filtered)	mg/L	0.01	18	0.01	0.01	0.01	2	0.01	0.01	0.01	3	0.01	0.01	0.01	*0.01*
Zinc (filtered)	mg/L	0.005	18	0.005	0.005	0.005	2	0.005	0.005	0.005	3	0.005	0.005	0.0254	*0.008*
Fluoride	mg/L	0.1	18	0.1	0.1	0.1	2	0.3	0.3	0.3	3	0.24	0.3	0.36	*0.32*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

Table 3.9 – IDE Project – baseline water quality monitoring – local waterways (Part 1)

Parameter	LOR	Unit	IDE-CC1					IDE-CC2				IDE-CC3				WQO
			18/2/25	27/2/25	23/4/25	30/1/26	3/3/26	26/2/25	23/4/25	30/1/26	4/3/26	27/2/25	23/4/25	30/1/26	4/3/26	
pH Value	0.01	pH unit	7.77	7.54	8.24	8.44	8.50	7.92	8.24	8.40	8.45	7.63	8.26	8.45	8.45	*6.5-8.5*
Electrical Conductivity	1	µS/cm	409	675	825	3,250	2,150	556	938	2,960	2,080	482	1200	2,890	2,060	*250-720*
Sulfate as SO4	1	mg/L	46	82	100	547	311	52	119	483	292	44	144	1	2	*25*
TSS	5	mg/L	60	<5	<5	9	19	<5	<5	8	14	13.00	<5	9	16	*55*
Turbidity	0.1	NTU	330	1.8	3.1	12	39	3.20	5.0	11	26	15.8	20.4	10	27	*50*

Parameter	LOR	Unit	IDE-CC1					IDE-CC2				IDE-CC3				*WQO*
			18/2/25	27/2/25	23/4/25	30/1/26	3/3/26	26/2/25	23/4/25	30/1/26	4/3/26	27/2/25	23/4/25	30/1/26	4/3/26	
Aluminium (dissolved)	0.01	mg/L	0.12	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.02	0.46	0.01	*0.055*
Arsenic (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.013*
Boron (dissolved)	0.05	mg/L	0.05	0.05	0.06	0.15	0.13	0.05	0.08	0.14	0.12	<0.05	0.09	0.14	0.12	*0.94*
Cadmium (dissolved)	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*0.0002*
Chromium (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.001*
Cobalt (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	*0.0014*
Copper (dissolved)	0.001	mg/L	0.002	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	*0.0014*
Iron (dissolved)	0.05	mg/L	0.17	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	*0.28*
Lead (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0034*
Manganese (dissolved)	0.001	mg/L	0.003	0.166	0.092	0.003	0.004	0.005	0.009	0.006	0.003	0.206	0.006	0.018	0.004	*1.9*
Mercury (dissolved)	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*0.0002*
Molybdenum (dissolved)	0.001	mg/L	<0.001	0.002	0.002	0.012	0.008	0.001	0.002	0.012	0.007	<0.001	0.00	0.013	0.007	*0.034*
Nickel (dissolved)	0.001	mg/L	0.002	0.001	0.001	0.002	0.002	0.001	0.002	0.001	0.001	0.002	0.002	0.002	0.001	*0.011*
Selenium (dissolved)	0.01	mg/L	<0.01	<0.01	<0.01	0.021	0.009	<0.01	<0.01	0.022	0.008	<0.01	<0.01	0.022	0.008	*0.005*
Sodium (dissolved)	1	mg/L	50	67	99	604	389	56	138	538	380	52	186	524	355	*188*
Uranium (dissolved)	1	µg/L	<1	<1	<1	1	2	<1	<1	2	2	<1	<1	2	1	*1*
Vanadium (dissolved)	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	*0.01*
Zinc (dissolved)	0.005	mg/L	0.07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	*0.008*
Fluoride	0.1	mg/L	0.10	0.20	0.10	0.20	0.30	0.10	<0.1	0.20	0.20	<0.1	<0.1	0.20	0.20	*0.32*
Ammonia as N	0.01	mg/L	0.05	0.14	0.06	<0.01	<0.01	<0.01	0.04	<0.01	0.02	0.05	0.07	<0.01	<0.01	*0.72*
Nitrate as N	0.01	mg/L	0.61	0.05	0.19	4.90	4.26	<0.01	0.54	5.05	3.14	<0.01	0.02	5.32	2.77	*1.1*
C6 - C9 Fraction	20	µg/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	*20*

Parameter	LOR	Unit	IDE-CC1					IDE-CC2				IDE-CC3				WQO
			18/2/25	27/2/25	23/4/25	30/1/26	3/3/26	26/2/25	23/4/25	30/1/26	4/3/26	27/2/25	23/4/25	30/1/26	4/3/26	
C10 - C36 Fraction (sum)	50	µg/L	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	400	<50	<50	*100*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

* The exceedance for filtered Selenium occur due to the limit of reporting being above the WQO trigger value.

Table 3.10 – IDE Project – baseline water quality monitoring – local waterways (Part 2)

Parameter	LOR	Unit	IDE-CG1			IDE-CG2				IDE-WL1				WQO
			27/2/25	30/1/26	4/3/26	27/2/25	22/4/25	30/1/26	3/3/26	28/2/25	22/4/25	30/1/26	3/3/26	
pH Value	0.01	pH unit	7.44	7.84	7.89	7.52	8.48	8.02	8.00	7.30	7.48	7.17	7.70	*6.5-8.5*
Electrical Conductivity	1	µS/cm	249	219	169	281	418	366	201	164	89	143	182	*250-720*
Sulfate as SO4	1	mg/L	<1	1	2	<1	2	1	2	<1	<1	1	<1	*25*
TSS	5	mg/L	25	15	39	<5	20	6	24	29	27	22	16	*55*
Turbidity	0.1	NTU	108	16	61	21	33	7	44	20	5	29	20	*50*
Aluminium (dissolved)	0.01	mg/L	0.050	0.020	0.300	0.10	<0.01	<0.01	0.110	0.060	0.020	0.450	0.030	*0.055*
Arsenic (dissolved)	0.001	mg/L	0.002	0.002	0.001	0.001	0.002	0.002	<0.001	0.003	0.003	0.003	0.002	*0.013*
Boron (dissolved)	0.05	mg/L	0.07	<0.05	0.05	0.06	0.06	0.06	0.05	<0.05	<0.05	<0.05	<0.05	*0.94*
Cadmium (dissolved)	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*0.0002*
Chromium (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.001*
Cobalt (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.004	<0.001	*0.0014*
Copper (dissolved)	0.001	mg/L	0.004	0.001	0.002	0.004	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	*0.0014*
Iron (dissolved)	0.05	mg/L	0.12	0.06	0.23	0.17	<0.05	<0.05	0.12	2.61	1.60	1.48	0.87	*0.28*
Lead (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0034*
Manganese (dissolved)	0.001	mg/L	0.005	0.010	0.007	0.007	0.038	0.042	0.004	0.155	0.017	0.582	0.042	*1.9*
Mercury (dissolved)	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*0.0002*

Parameter	LOR	Unit	IDE-CG1			IDE-CG2				IDE-WL1				*WQO*
			27/2/25	30/1/26	4/3/26	27/2/25	22/4/25	30/1/26	3/3/26	28/2/25	22/4/25	30/1/26	3/3/26	
Molybdenum (dissolved)	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.034*
Nickel (dissolved)	0.001	mg/L	0.004	0.004	0.003	0.004	0.004	0.004	0.003	0.002	0.002	0.004	0.002	*0.011*
Selenium (dissolved)	0.01	mg/L	<0.01	<0.004	<0.004	<0.01	<0.01	<0.004	<0.004	<0.01	<0.01	<0.004	<0.004	*0.005*
Sodium (dissolved)	1	mg/L	10	9	8	13	17	13	9	2	1	7	8	*188*
Uranium (dissolved)	0.001	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	*1*
Vanadium (dissolved)	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	*0.01*
Zinc (dissolved)	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	<0.005	<0.005	<0.005	*0.008*
Fluoride	0.1	mg/L	0.20	0.10	0.20	0.10	0.1	0.10	0.20	<0.1	<0.1	<0.1	<0.1	*0.32*
Ammonia as N	0.01	mg/L	0.08	<0.01	<0.01	0.04	0.08	0.01	<0.01	0.05	0.05	0.01	<0.01	*0.72*
Nitrate as N	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	*1.1*
C6 - C9 Fraction	20	µg/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	*20*
C10 - C36 Fraction (sum)	50	µg/L	<50	<50	<50	<50	<50	<50	<50	130	240	<50	<50	*100*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

* The exceedance for filtered Selenium occur due to the limit of reporting being above the WQO trigger value.

Table 3.11 –Collated Isaac River water quality summary – IR1/IR1A/IR2/IR4/IR5/W2/W8/MP5

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*

Parameter	Units	Limit of reporting	Combined Isaac River sites				WQO
			No. Samples	20%ile value	Median	80%ile value	
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*

Parameter	Units	Limit of reporting	Combined Isaac River sites				*WQO*
			No. Samples	20%ile value	Median	80%ile value	
TRH C10-C36	mg/L	78	40	100	100	100	*100*

Notes: Shaded cells indicates an exceedance above the WQO trigger value

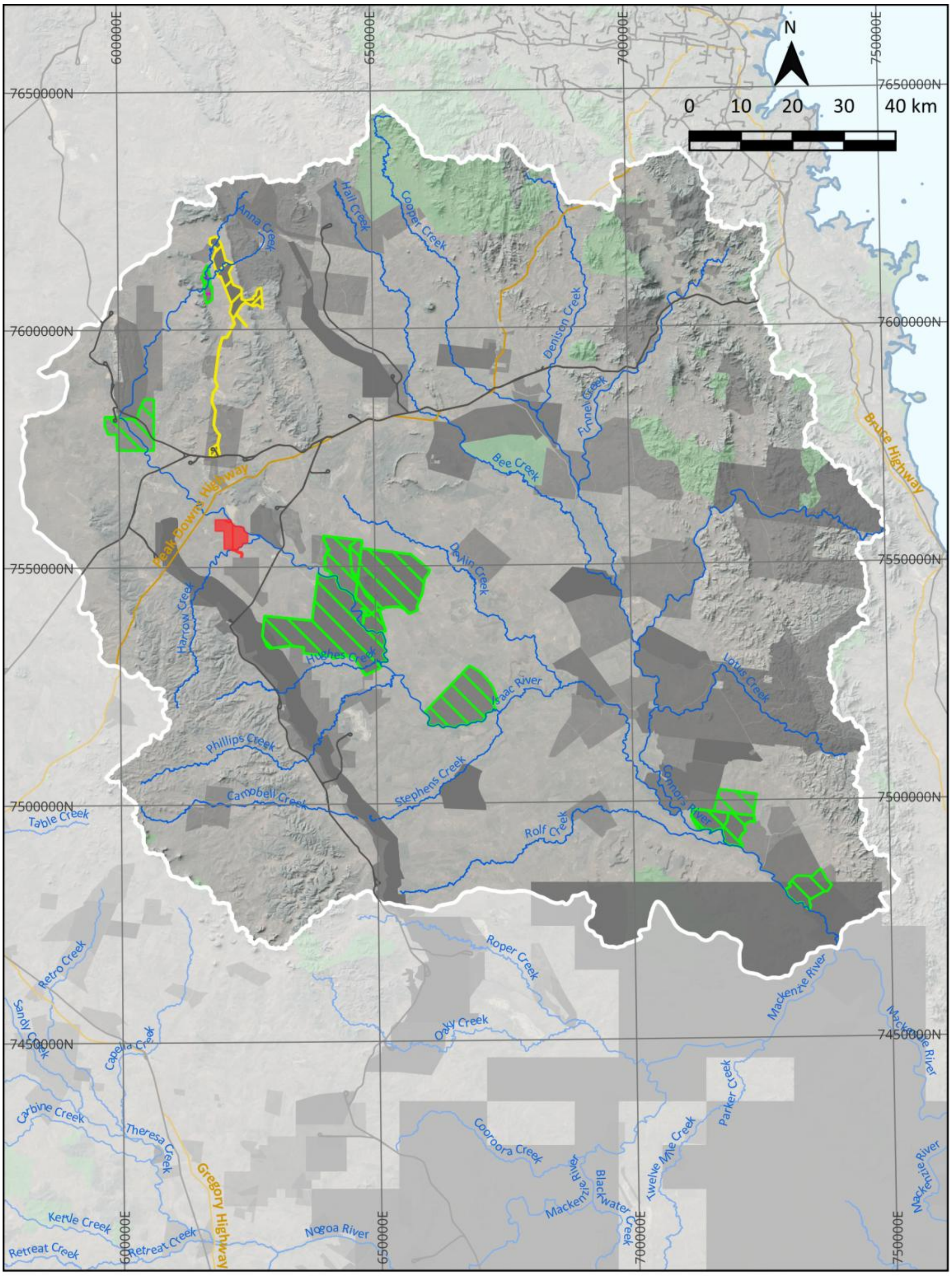
* The exceedance for filtered Selenium occur due to the limit of reporting being above the WQO trigger value.

3.8 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 (current as of March 2025). 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 3.12.

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 2000 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.



Title:	Water licences within the Isaac River basin
Project:	Isaac Downs Extension Surface Water Assessment

HydroBalance

Legend

- ML boundary
- Major watercourse
- Highway
- Rail line
- Water licences

Isaac River licences

- Take water
- Interfere - diversion
- Interfere - impound

Figure 3.14 – Water licences in Isaac River basin

Table 3.12 – List of Isaac River surface water licences

Study sub-catchment	Watercourse	Authorisation reference	Authorisation type	Authorisation status	Authorisation expiry date	Purpose	Allocation	Location land list	Location
Fitzroy	Isaac River	45231U	Licence to take water	Issued	20/06/2111	Irrigation	40 ha/ water year	14/ROP89	Immediately downstream of Isaac & Connors River confluence (approx. 140 km d/s of Project)
Fitzroy	Isaac River	405577	Licence to take water	Issued	20/06/2111	Irrigation; Stock intensive	60 ML/ water year	14/ROP89	
Fitzroy	Isaac River	405578	Licence to take water	Issued	20/06/2111	Irrigation	150 ha/ water year	14/ROP89	
Fitzroy	Isaac River	45202U	Licence to take water	Issued	20/06/2111	Stock	-	7/KL112	
Fitzroy	Isaac River	43173WL	Licence to take water	Issued	20/06/2111	Water harvesting	-	18/SP113322	Adjacent to Isaac River & North Creek confluence (approx. 25 km d/s of Project)
Fitzroy	Isaac River	43174L	Licence to take water	Issued	20/06/2111	Water harvesting	-	18/SP113322	
Fitzroy	Isaac River	57481U	Licence to take water	Issued	20/06/2111	Irrigation	40 ha/ water year	6/RP860051	Immediately upstream of Isaac & Mackenzie River confluence (approx. 155 km d/s of Project)
Fitzroy	Isaac River	619183	Licence to take water	Issued	20/06/2111	Any	100 ML/ water year	11/KL135; 9/CNS98	Adjacent to Isaac River & North Creek confluence (approx. 30 km d/s of Project)
Fitzroy	Isaac River	619184	Licence to take water	Issued	20/06/2111	Any	15 ML/ water year	11/KL135; 9/CNS98	
Fitzroy	Isaac River	619255	Licence to take water	Issued	20/06/2111	Agriculture	1,250 ML/ water year	9/KL97	Upstream Isaac River & Stephens Creek confluence (approx. 67 km d/s of Project)

4 Surface water management strategy and infrastructure

4.1 Overview

This section describes the objectives and principles of the proposed Project water management system (WMS), including a description of the infrastructure and systems that have been designed to achieve the objectives and principles.

This SWIA has been prepared in support of the Project's EA application under the EP Act, and forms part of the Project's voluntary EIS. This assessment considers the potential surface water impacts associated with the Project's proposed activities.

The IDE WMS will operate as one component of a broader integrated water management network with IPC, that includes connections IDM and IPM. Where relevant, components of the IDM and IPM water management systems that may interact with the Project WMS have also been considered in the assessment of the WMS.

This section provides the basis for the Project Water Management Plan. It outlines specific, measurable and time-bound management measures for releases from the Project's water management system, designed to protect downstream environmental values. These measures provide the necessary information to underpin Trigger Action Response Plans (TARPs) and other operational controls that may be linked to the identified water management measures.

4.2 Types of water generated on-site

Land disturbance associated with mining activities, if not suitably managed, has the potential to adversely affect the quality of surface runoff in downstream receiving waters through increased sediment loads. In addition, runoff from active mining areas, if not suitably managed, may have increased concentrations of salts and other pollutants when compared to natural runoff. The strategy for the management of surface water at IDE is based on the separation of water from different sources based on anticipated water quality.

Definitions of the types of water generated by the Project are shown in Table 4.1.

Table 4.1 – Surface water types

Water type	Definition
Mine-affected water	In accordance with *Guideline – Model Mining Conditions* (DETSI, 2024a) (and as per the existing IDM EA), mine-affected water means the following types of water: **i.** pit water, tailings dam water, processing plant water **ii.** water contaminated by a mining activity which would have been an environmentally relevant activity under Schedule 2 of the *Environmental Protection Regulation 2008* if it had not formed part of the mining activity, **iii.** rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage runoff containing sediment only, provided that this water has

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Water type	Definition
	not been mixed with pit water, tailings dam water, processing plant water or workshop water, **iv.** groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, **v.** groundwater from the mine dewatering activities, **vi.** a mix of mine-affected water (under any of paragraphs i to v) and other water.
Sediment water	Surface water runoff from areas that are disturbed by mining operations (including out-of-pit waste rock emplacements). This runoff does not come into contact with coal or other carbonaceous material and 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/diverted water	Surface runoff from areas unaffected by mining operations. Clean catchment water includes runoff from undisturbed areas and fully rehabilitated areas.
Raw/external water	Untreated water, generally from an external water supply, that has not interacted with mining activities.
Contaminated water	Contaminated water includes runoff from areas containing hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods, as well as flammable and combustible liquids (including petroleum products), generally associated with infrastructure areas.
Potable water	Treated water suitable for human consumption.

4.3 Surface water management objectives

The objective of the site WMS is to manage all types of water onsite to meet operational, social and environmental objectives identified in the Model Mining Conditions guideline (DETSI, 2024).

The are three key WMS objectives are as follows:

- Minimise mine-affected water accumulation within the Project 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. The priority issues are the mine's impact on surface water and groundwater.

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 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.

4.4 Proposed water management infrastructure

Figure 4.1 to Figure 4.6 shows the locations of the key features of the proposed Project area over the Life-of-Mine (LOM) for a series of selected Project years. 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 for 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 that collect runoff from the out-of-pit dumps, lowwall spoil emplacements and non-coal contact disturbed areas - SD1, SD3, SD4, SD5, SD6, SD7, SD10 and SD11.
  - A clean water dam 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 spoil emplacements – SD2 and SD8.
- **Constructed by Year 16**
  - One additional sediment dam that captures runoff from disturbed land – SD9.

4.5 Clean water management system

The clean water management system for the Project is comprised of Conrock Gully diversion (refer Section 4.6.1 for details) and the proposed CWD behind the Isaac River levee. There are no other areas within the Project footprint that require the re-direction or diversion of clean water flows.

4.6 Creek diversions and levees and waterway crossings

4.6.1 Conrock Gully diversion

A diversion of Conrock Gully is proposed to facilitate access to mine the coal resource extending under Conrock Gully. The Conrock Gully diversion will divert Conrock Gully north and east around the operations, discharging into the Isaac River around 2.9 km upstream of the existing confluence. The proposed diversion and the diverted reach are approximately 5.2 km long and 5.8 km long, respectively.

The diversion has been designed to contain at 0.1% (1 in 1,000) Annual Exceedance Probability (AEP) flood event and meets the accepted standards for diversion design to be geomorphically stable.

Details of the Conrock Gully diversion and its hydraulic performance are provided in the Project Flooding Impact Assessment report (HydroBalance, 2026).

4.6.2 Levees

The following levees are proposed, to protect mine working from local and regional flooding:

- **Isaac River levee:** The proposed 5.9 km long levee would provide immunity from the regional Isaac River flood and has been located at the edge of the proposed mine disturbance area.
- **Cherwell Creek levee plug**: A 0.5 km levee plug will be required along Cherwell Creek, to prevent ingress of floodwaters into the Mine Pit.
- **Conrock Gully levee plug**: A 0.9 km levee will be required at the upstream end of the diversion to prevent flows continuing to traverse the old Conrock Gully channel.

All levees have been designed with sufficient height to provide immunity from the 0.1% (1 in 1,000) AEP local and regional design flood events.

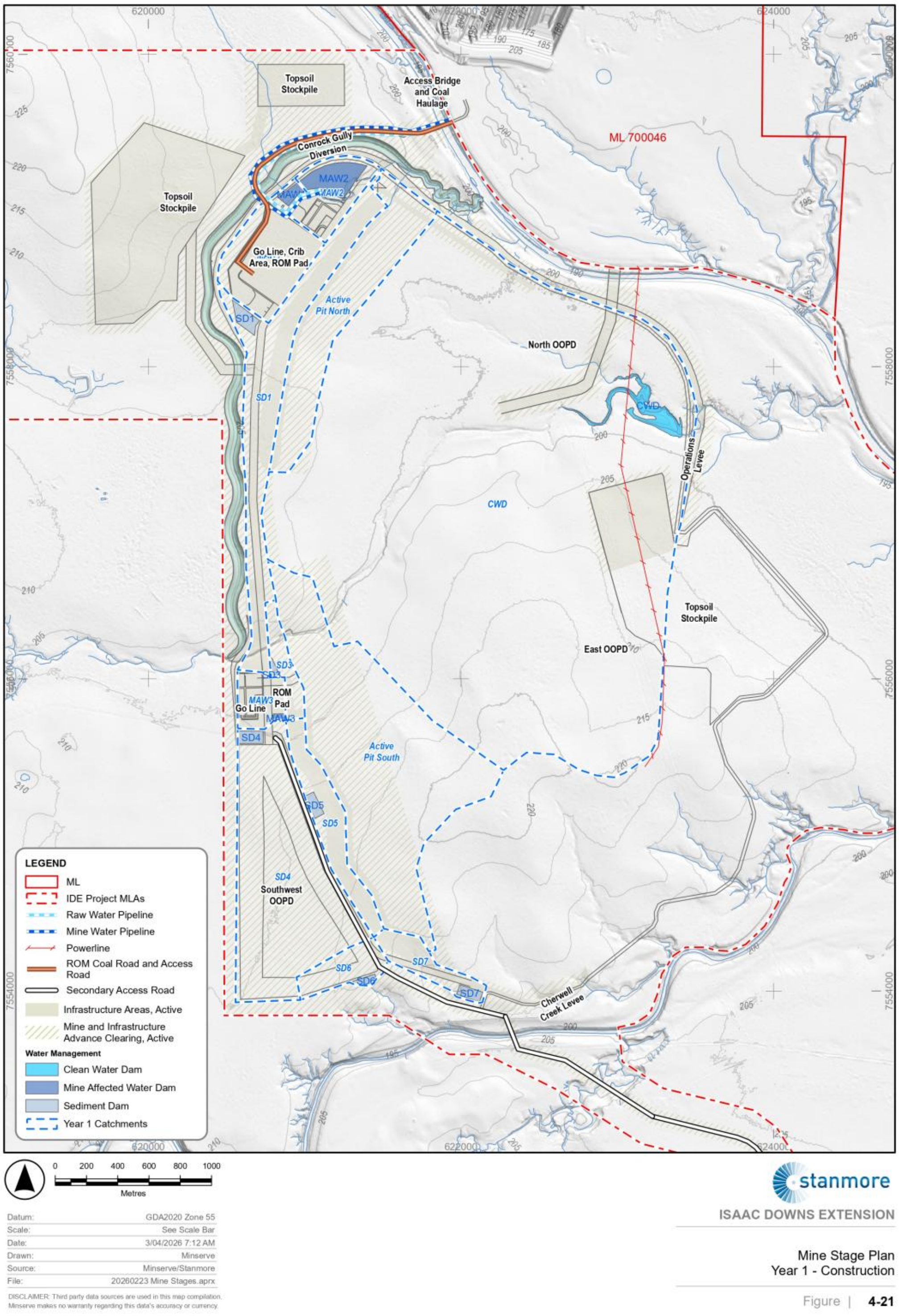


Figure 4.1 –Project site water management infrastructure – Year 1 (construction phase)

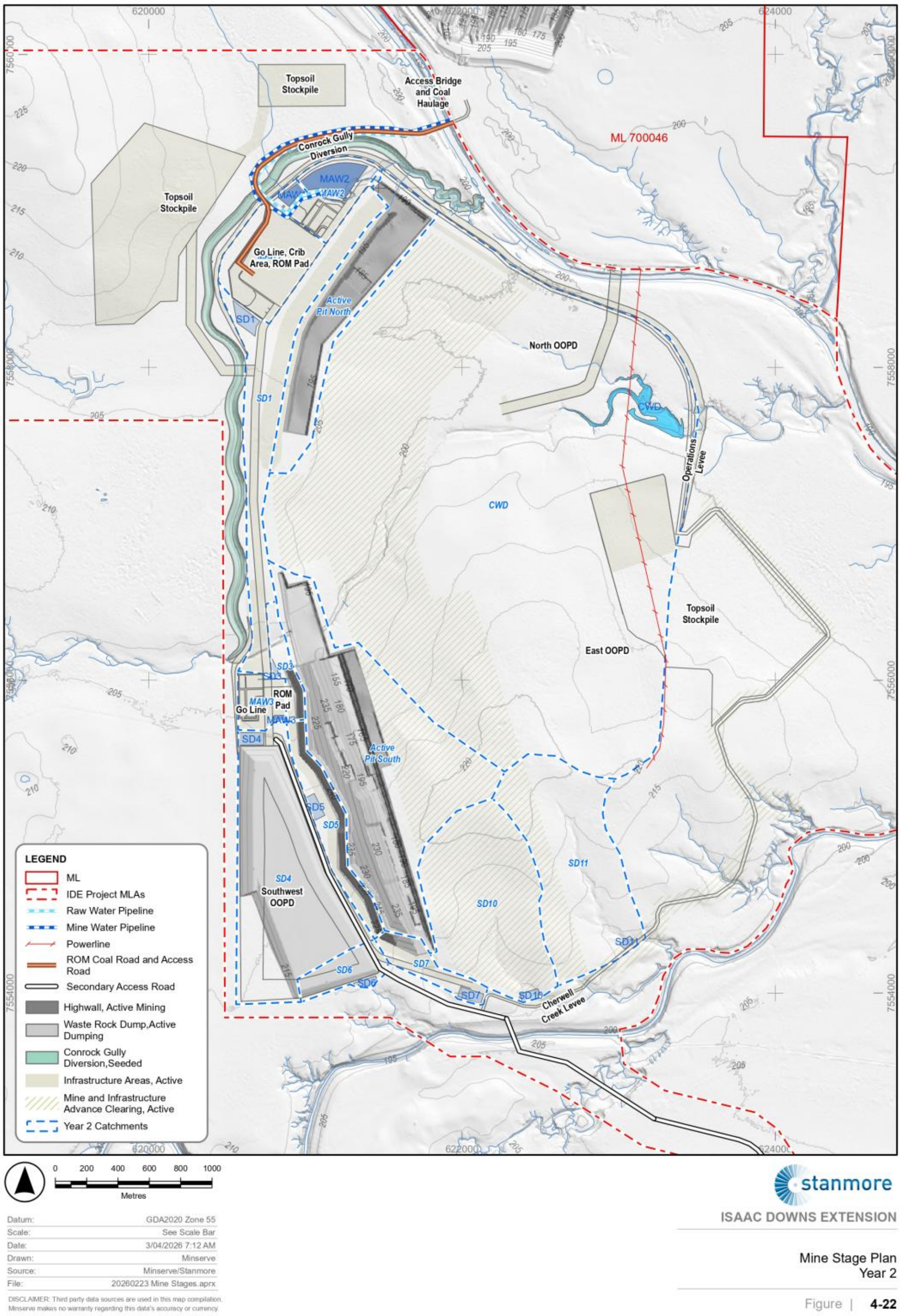


Figure 4.2 – Project site water management infrastructure – Year 2

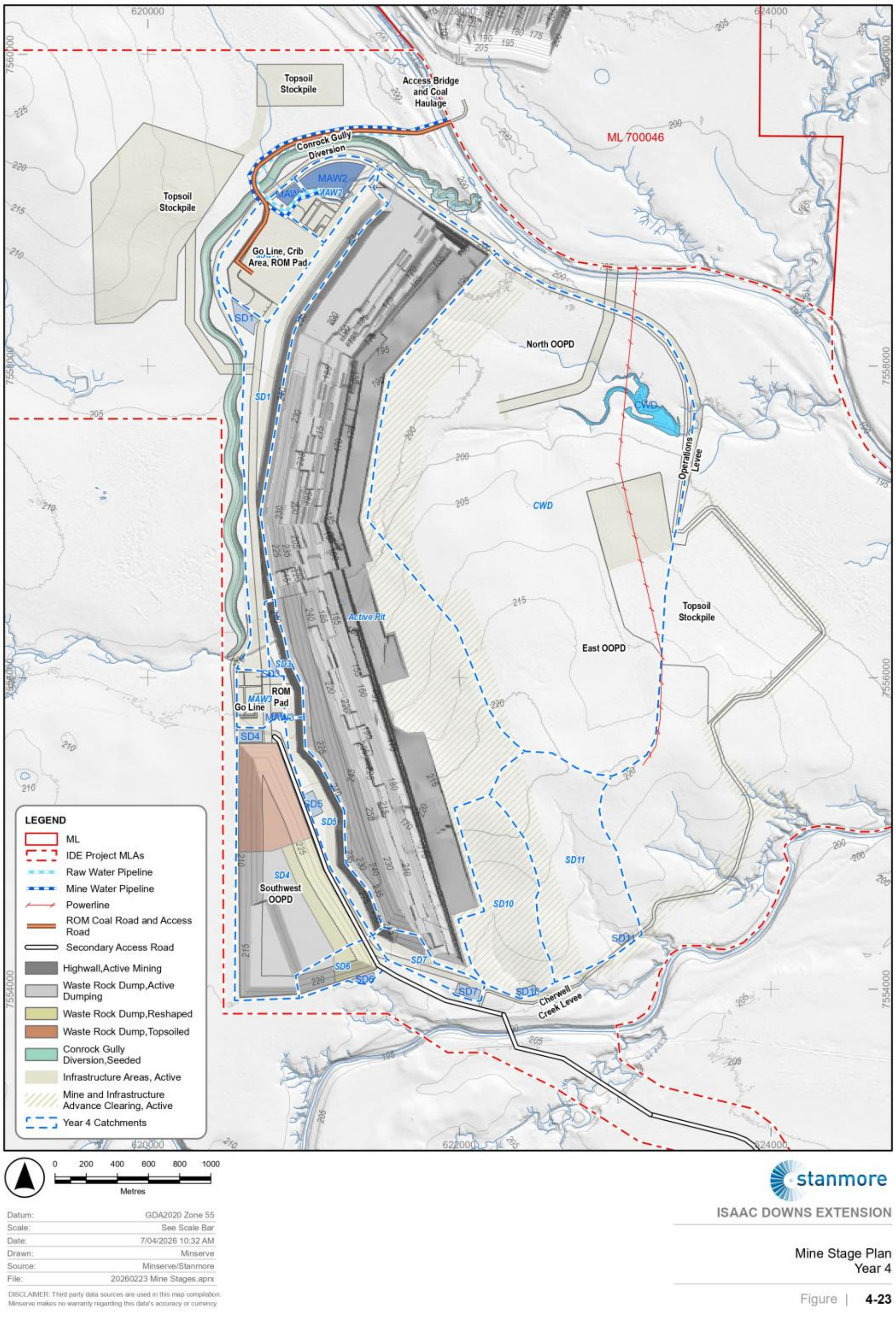


Figure 4.3 – Project site water management infrastructure – Year 4

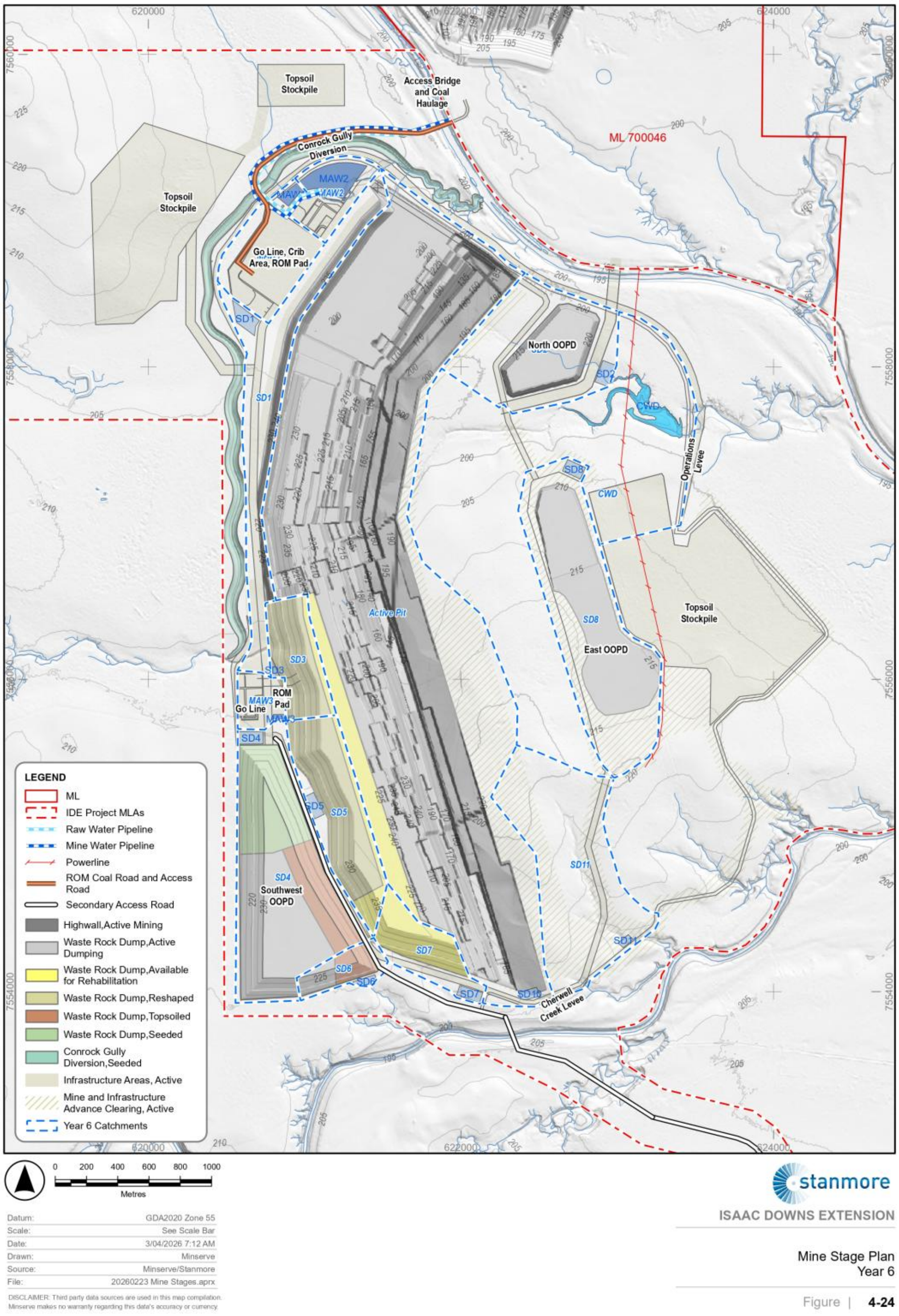


Figure 4.4 – Project site water management infrastructure – Year 6

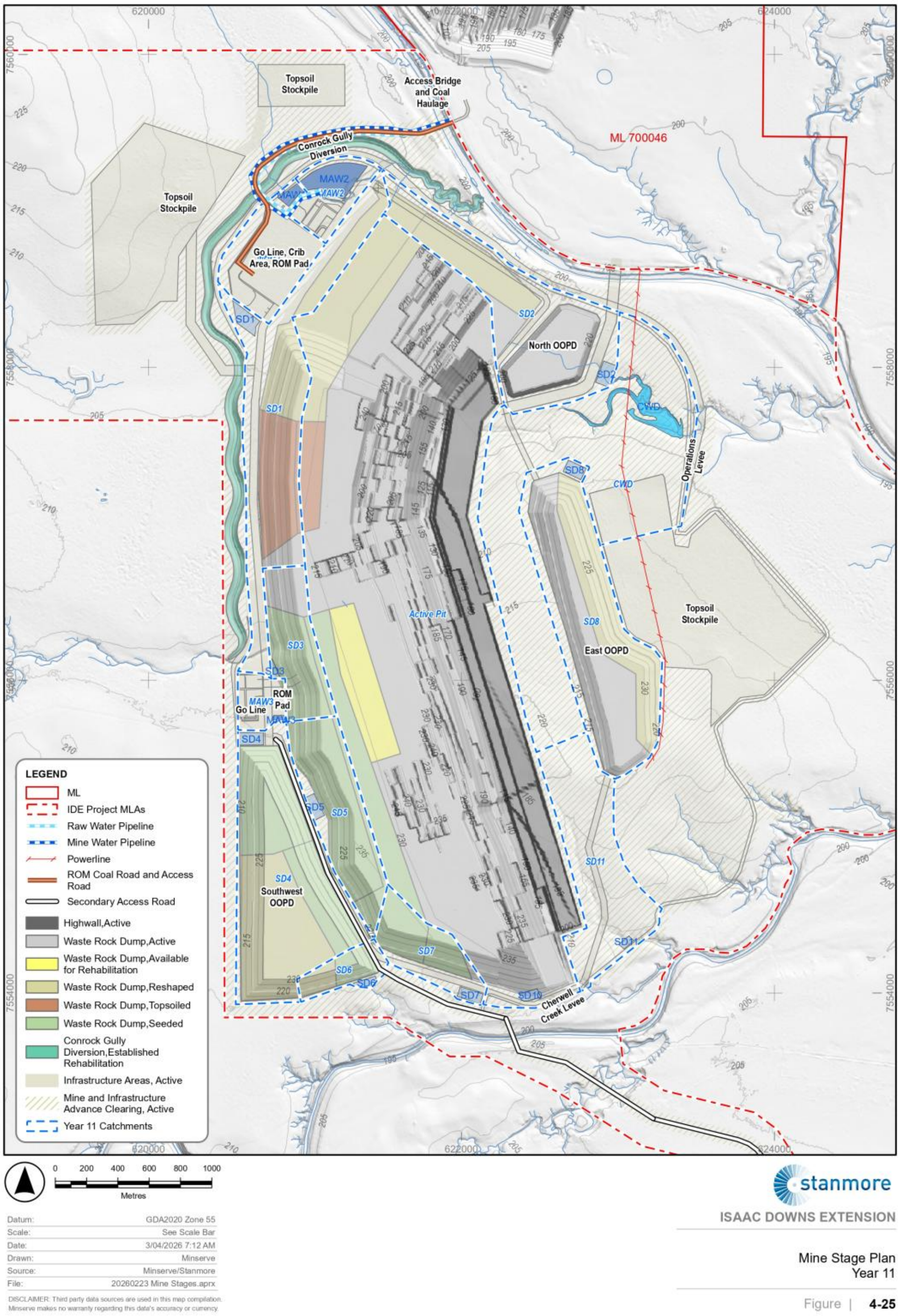


Figure 4.5 – Project site water management infrastructure – Year 11

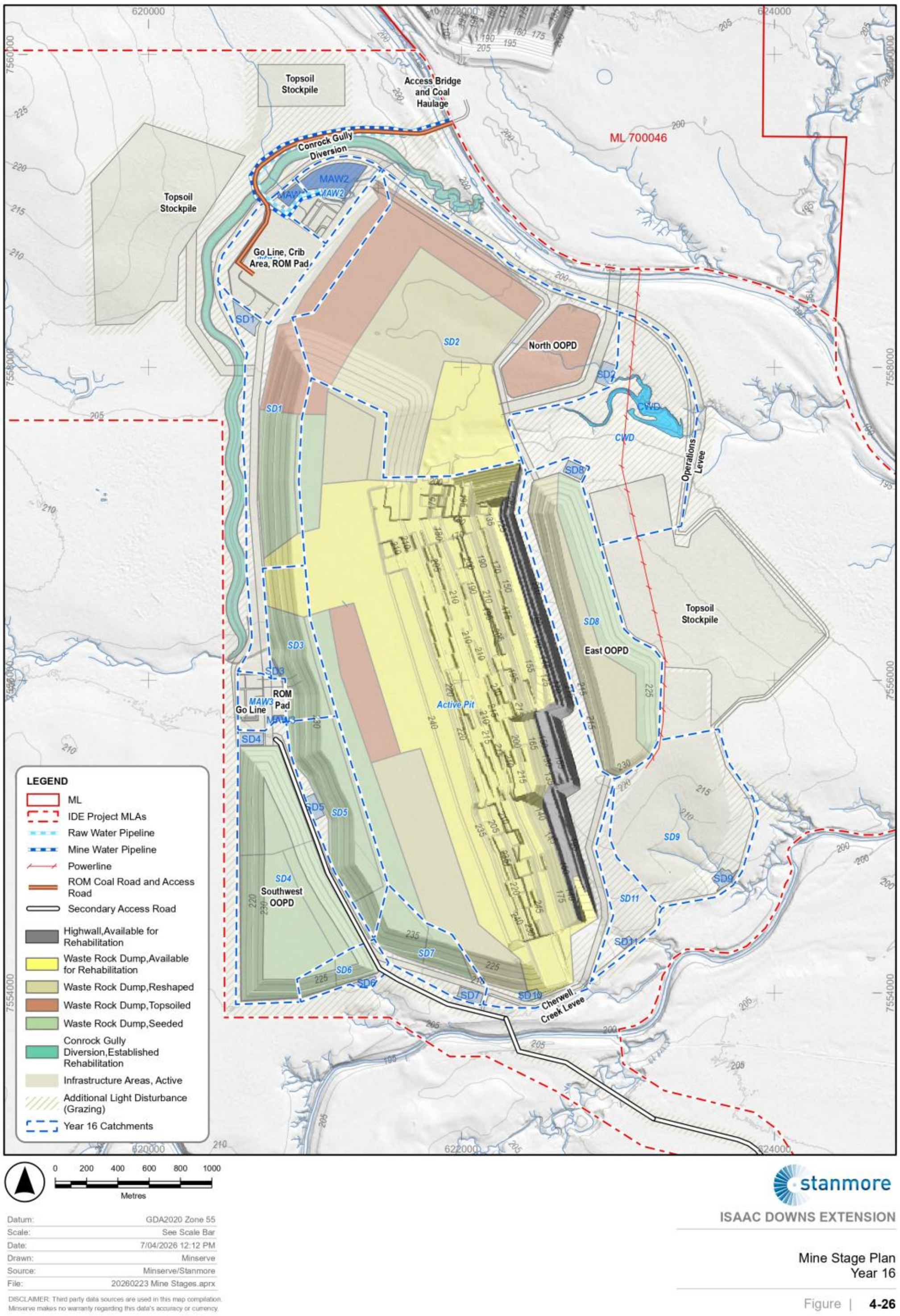


Figure 4.6 – Project site water management infrastructure – Year 16

4.7 Sediment water management system

4.7.1 Overview

Sediment water containment (runoff from spoil [i.e. waste rock] and areas yet to be rehabilitated) will be managed in accordance with an Erosion and Sediment Control Plan (ESCP). The ESCP will adopt the three cornerstones of erosion and sediment control.

- Drainage control – prevention or reduction of soil erosion caused by concentrated flows and appropriate management and separation of the movement of diverted and surface water through the area of concern.
- Erosion control – prevention or minimisation of soil erosion (from dispersive, nondispersive or competent material) caused by rain drop impact and exacerbated overland flow on disturbed surfaces.
- 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.

The mine will require a combination of the three control measures to effectively manage sediment and erosion at the site.

Over the life of mine (LOM), the majority of disturbed areas drains back to the pit, and from undisturbed areas into CWD located behind the Isaac River levee. Eleven sediment dams are proposed to be constructed over the LOM to capture runoff from OOPDs, haul roads and cleared areas in advance of the highwall progression.

Detailed information relating to the proposed ESC measures will be incorporated into the Project ESCP documentation.

4.7.2 Sediment dam locations and sizing

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); and
- 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.

Table 4.2 – Conceptual sediment dam capacities

Dam name	Max. catchment area (ha)	Min. settling volume (ML)	Min. solids storage volume (ML)	Min. total volume required (ML)
SD1	94.9	16.8	8.4	25.2
SD2	238.8	42.2	21.1	63.3
SD3	30.0	5.3	2.7	8.0
SD4	95.7	16.9	8.5	25.4
SD5	42.7	7.6	3.8	11.3
SD6	11.9	2.1	1.1	3.2
SD7	25.1	4.4	2.2	6.7
SD8	100.9	17.8	8.9	26.8
SD9	96.8	17.1	8.6	25.7
SD10	78.7	13.9	7.0	20.9
SD11	84.7	15.0	7.5	22.5

4.8 Mine-affected water management

Containment of mine-affected water within the Project WMS is provided by the following storages:

- MAW1;
- MAW2; and
- MAW3.

The operating configuration for each of the MAW dams is as follows:

- MAW1 (40 ML):
    - Captures runoff from the northern ROM Pad, Go Line and Crib area.
    - Pumps water to MAW2 (if storage capacity available).
- MAW2 (235 ML):
    - Primary MAW storage for the IDE WMS.
    - 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.
    - Can import water from IDM if there is a shortfall of water at IDE.
    - Proposed controlled release point on MAW2 to the receiving environment (Isaac River)
- MAW3 (20 ML):
    - Captures runoff from the southern ROM Pad and Go Line.
    - Pumps water to MAW2 (if storage capacity available).

The operating volumes for the MAW storages are summarised in Table 4.3.

Table 4.3 – MAW storage operating volumes

Dam name	Dam capacity to spillway (ML)	Max. operating volume (MAW inflows) (ML)	Max. operating volume (sediment water inflows) (ML)	Pump-out trigger volumes (ML)
MAW1	40	-[a]	-[a]	Pump to MAW 2 - 4 ML (10%)
MAW2	235	188 ML (80%)	59 ML (25%)	Pump to IDM - 165 ML (70%) Controlled release – 212 ML (90%)
MAW3	20	-[a]	-[a]	Pump to MAW 2 - 2 ML (10%)

[a] does not received pumped inflows, operating volume not applicable.

4.9 External water supply and transfer

There are two proposed external water supplies to the Project:

- Raw water supply (via an existing Sunwater allocation at IPM); and
- Mine affected water supply (from IDM operations).

Raw water will be supplied via pipeline from the raw water dam (RWD) 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.

MAW will be supplied via a dedicated pipeline from IDM operations 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.

4.10 Release of water to the receiving environment

There are three key mechanisms through which water from the Project can enter the receiving environment:

- Controlled release through authorised release points;
- Passive or pumped overflows from sediment dams; and
- Pumped overflows from CWD.

Both controlled releases and passive/pumped overflows from sediment dams and CWD are point sources. Model predictions of volumes and salt loads from these sources are provided in Section 7.3.4 and 7.3.5.

Controlled release of water from the water management system will occur directly from MWD2 into Conrock Gully Diversion, and then into the Isaac River. The distance between the proposed controlled release point and the Isaac River is around 900 m, where it will mix directly with flow in the Isaac River.

Controlled releases will only occur in accordance with the proposed controlled release strategy discussed in Section 6.9.

Importantly, due to the timing of the Project with respect to 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 IDE controlled release strategy is to adopt the same release conditions as currently approved at IDM.

4.11 Treated sewage effluent

No sewage treatment will occur at the Project. Waste from sewage facilities at the crib area will be removed by a licensed contractor to a suitable waste disposal facility.

4.12 Hazardous materials storage

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 (MSDS) 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 on surface waters.

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

Spill kits will be available close to areas where chemicals are being used or kept.

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.

5 Preliminary consequence category assessment

5.1 Overview

A preliminary consequence category assessment (CCA) for the Project's water storages has been undertaken in accordance with the following documents:

- *Manual for assessing consequence categories and hydraulic performance of structures ESR/2016/1933* (DETSI, 2025a) (Dams Manual)
- *Regulated structures—EIS information guideline* (ESR/2020/5307) (DETSI 2024b)
- *Structures which are dams or levees constructed as part of environmentally relevant activities* (ESR/2016/1934) (DETSI 2025b)

The outcomes from this assessment are provided in the sections below.

Note that this assessment is based on preliminary design information only and therefore relies on a number of assumptions. This assessment will be updated during detailed design, once more information becomes available on the design of the proposed water storages.

As a Registered Professional Engineer of Queensland (RPEQ), certification can only be provided for detailed engineering designs that are sufficiently developed and supported by the necessary technical information. At this stage of the Project, the design remains conceptual in nature and therefore it is not appropriate to provide certified documentation. Certified drawings and supporting documentation will be prepared and provided at the appropriate stage of the Project, prior to detailed design finalisation and construction.

5.2 Assessable infrastructure

5.2.1 Levee and levee plugs

A preliminary consequence category assessment for the Project levees and levee plugs is provided in the FIA report (HydroBalance, 2026).

5.2.2 Water storages

The water storages considered relevant in the context of this CCA have been summarised for reference in Table 5.1

Table 5.1 – Assessable water storages – summary details

Storage	Storage volume (ML)	Water type	Drains to	
			Destination	Off-site
MAW1	40	MAW	MAW2	No
MAW2	235	MAW	Pit (can be pumped to Conrock Gully diversion for controlled releases)	No
MAW3	20	MAW	SD3 (can be pumped to MAW2)	No
SD1	25.2	Sediment	MAW1	No
SD2	63.3	Sediment	CWD	No
SD3	8.0	Sediment	Pit	No
SD4	25.4	Sediment	Conrock Gully diversion	**Yes**
SD5	11.3	Sediment	SD6	No
SD6	3.2	Sediment	Cherwell Creek	**Yes**

Storage	Storage volume (ML)	Water type	Drains to	
			Destination	Off-site
SD7	6.7	Sediment	Cherwell Creek	**Yes**
SD8	26.8	Sediment	CWD	No
SD9	25.7	Sediment	Cherwell Creek	**Yes**
SD10	20.9	Sediment	Cherwell Creek	**Yes**
SD11	22.5	Sediment	Cherwell Creek	**Yes**
CWD	200	Clean	Conrock Gully	**Yes**
Pumped Hydro Dam	135.4	MAW	Cherwell Creek	**Yes**

5.2.3 Water quality monitoring data

Water quality monitoring data from IDM has been used as a best estimate for expected water quality which may be stored within the assessable water storages.

For mine affected water, samples taken in the MAW storages at IPM and IDM in 2025 indicate the following:

- The pH typically ranges between 7.1 and 8.7.
- The electrical conductivity ranges between 1,250 and 9,420 µS/cm, with a median value of 4,790 µS/cm

For sediment water, samples taken in RD2 and IPM in 2025 indicate the following:

- The pH typically ranges between 8.5 and 9.6.
- The electrical conductivity ranges between 1,040 and 4,050 µS/cm, with a median of 1,800 µS/cm.

For clean catchment water, there is no data available for runoff that drains solely from the clean catchment at IPM and IDM. As such, the median EC and pH values for Smoky Creek upstream (W1) at IPM over 2016 to 2025 have been adopted. These are 175 µS/cm and 7.8, respectively.

This consequence category assessment has been undertaken on the assumption that the “typical” water quality values are indicative of expected water quality at the commencement of any failure to contain or dam break scenario. Note that this is conservative for failure to contain scenarios, as it does not allow for any stormwater dilution that might occur as the storage is in the process of filling, leading up to an uncontrolled release of water.

5.3 Environment

5.3.1 Environmental values

The waterways in the vicinity of the Project fall within the Isaac and lower Connors River main channel region of the Isaac River Sub-Basin (WQ1301).

As discussed in Section 2, the key EV’s for water that are to be protected are:

- physical, chemical and biological integrity of the watercourses within the catchment and their amenity as potential water sources for human use and to support aquatic ecosystems;
- the qualitive and quantitative integrity of local groundwater as a potential water source for agriculture or other suitable uses; and
- the integrity of raw water supplies and associated infrastructure in the region.

Aquatic ecosystems and low intensity dryland cattle grazing are the predominant values within the immediate vicinity of the Project.

5.3.2 Waterways

There are three waterways that can potentially receive overflows or discharges from the Project; the Isaac River, Cherwell Creek and Conrock Gully.

- If it overtopped, SD4 would overflow to the Conrock Gully diversion, which drains to the Isaac River approximately 5 km downstream of the dam overflow location.
- If they overtopped, SD6, SD7, SD9, SD10, SD11 and Pumped Hydro Dam would overflow to Cherwell Creek, which drains to the Isaac River approximately 5 to 8 km downstream of the dam overflow locations.

5.3.3 Water quality monitoring data

Characterisation of the Isaac River water quality is provided in Section 3.7.1. The regional and local Isaac River water quality data indicates that there are some water quality indicators that are consistently above the DGVs, in particular aluminium (dissolved), copper (total and dissolved), filterable reactive phosphorus, zinc (dissolved), iron (total and dissolved), suspended solids and turbidity.

The EC data collected by DNRMMRRD at the Deverill gauging station between 2011 and 2025 suggests a median EC of around 267 µS/cm during flow events. The DNRMMRRD water quality summary states a median field pH of 7.7.

5.4 Assessment protocols

Per the requirements of the Dams Manual, consequences categories have been assessed for all dams associated with the Project, based on potential harm that would result from the following failure event scenarios:

- Failure to Contain – Seepage (FTC – Seepage): spills or releases to ground and/or groundwater via seepage from the floor and/or sides of the structure;
- Failure to Contain – Overtopping (FTC – Overtopping): spills or releases from the structure that result from loss of containment due to overtopping of the structure; and
- Dam Break: collapse of the structure due to any possible cause

Consequence categories will be determined by applying Table 1 of the Dams Manual to the assessment of each failure event scenario. The consequence category of a structure is the highest consequence category determined under any of the assessment criteria set out in Table 1 for each failure event scenario.

5.5 Assessment criteria

5.5.1 Harm to Humans

The ‘Harm to Humans’ criteria comprises two distinct modes of assessment: 1) direct mechanical harm caused by floodwaters (e.g. drowning), and 2) indirect harm via contamination of drinking water supply.

Direct harm applies specifically to the dam break failure mode. Assessment of consequence involves review of downstream environments to determine whether people may be routinely present in the failure path of the storage. For the purposes of consequence category assessment, this refers to people other than site personnel engaged by the resource operation and located on the associated tenements and tenure. Third-party personnel operating the Goonyella railway line are not considered to be ‘at risk’ in a failure event of the assessed storages due to relative distances to the downstream waterway crossing and the volume and geometry of the mine’s storages. The downstream Poitrel Mine levee is not considered ‘at risk’ due it’s relative distance downstream, and it is our understanding that it is designed to function for a 0.1% AEP Isaac River flood, which is much higher than the expected dam failure flows. There are no additional instances where persons are considered to be ‘at risk’.

Indirect harm (contamination of water supply) is not considered to be a potential risk of any FTC-overtopping or dam break scenario considered as part of this assessment. There are no known drinking water bores downstream of the Project, and there are no drinking water sources from the Isaac River itself.

5.5.2 General Environmental Harm

The 'General Environmental Harm' criteria require the assessor to consider potential impacts arising from a release of contaminants to any downstream areas of ecological significance including any existing aquatic ecosystems. For the purposes of this preliminary consequence category assessment, a potential aquatic ecosystem has been defined as any reach of waterway intersecting one of the following areas:

- Protected areas under the *Nature Conservation Act 1992*
- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animals under the *Nature Conservation (Wildlife) Regulation 2006* (critical habitat)
- Regulated vegetation under the *Vegetation Management Act 1999* ('endangered' and 'of concern' regional ecosystems)
- Wetlands of high ecological significance (HES) or general ecological significance (GES) shown on the Map of Referable Wetlands under the *Environmental Protection Regulation 2019*

Significant or high consequence is expected in any scenario where contaminant bearing release waters intersect a downstream area of significance, and one of the following conditions is satisfied:

- Loss or damage or remedial costs exceed a specified threshold (varies depending on intersected environmental value – minimum threshold of all categories is $10M)
- Remediation of damage is likely to take longer than a specified duration (varies depending on intersected environmental value – minimum threshold of all categories is 6 months)
- Significant alteration of an existing ecosystems is expected
- The damage footprint exceeds a specified area threshold (varies depending on intersected environmental value – minimum threshold is 1 km^2)

Loss or damage or remedial costs have been assessed on a case-by-case basis. Remediation durations and damage footprints may exceed minimum thresholds in certain scenarios; however, it is considered that doing so would first involve significant alteration of an existing ecosystem – and as such, condition three has been selected as the primary assessment criteria.

Assessment of the potential to significantly alter a downstream ecosystem has been undertaken by comparing expected release water concentrations for pH and salinity against acceptable limits specified in applicable water quality guidelines. Adopted water quality limits have been listed in Section 5.5.2.2.

5.5.2.1 Water quality criteria (aquatic ecosystems)

Adopted water quality limits have been selected based on review of the following documents/guidelines:

- Environmental Protection (Water & Wetland Biodiversity) Policy 2019 (EPP Water) 2019 – Isaac River Sub-basin Environmental Values and Water Quality Objectives.
- Australian and New Zealand Environment and Conservation Council (ANZECC), Oct 2000. Australia and New Zealand Guidelines for Fresh and Marine Water Quality.
  - Volume 1 – The Guidelines (Ch 1-7)
  - Volume 2 – Aquatic Ecosystems – Rationale and Background Information (Ch 8).
- Australian and New Zealand Governments (ANZG), 2018. Australia and New Zealand Guidelines for Fresh and Marine Water Quality.
- Vink, S. and R. Prasad, August 2012. Assessing the Ecotoxicology of Salinity on Organisms in Seasonally Flowing Streams in the Fitzroy Catchment. The University of Queensland, and Department of Environment and Resource Management, ACARP Project C18033.

pH

ANZECC (2000) recommends that “pH changes in aquatic ecosystems be measured for two reasons: (1) low pH can cause direct adverse effects on fish and aquatic insects (CCREM 1991) (USEPA 1986b), and (2) pH changes (particularly reduced pH) can cause the toxicity of several pollutants (e.g. ammonia, cyanide, aluminium) to significantly increase (Collier & Winterbourn 1987, Alabaster & Lloyd 1982, CCREM 1991)”.

The same guidelines also state that “changes to pH may affect the physiological functioning (e.g. enzymes, membrane processes) of biota. Reviews of the effects of pH changes on freshwater biota indicate no acutely lethal effects to fish in the pH range 5 to 9 (Alabaster & Lloyd 1982, CCREM 1991). Chronic effects have been reported below pH 5, with harmful effects on eggs and fry (ANZECC 1992). Loss of fish populations have been attributed to spawning failure and diminished hatching success at moderate (less than 6.0) pH levels (CCREM 1991). Changes in pH can also lead to indirect toxic effects on aquatic biota through changes to the toxicity of several contaminants. For example, low pH can increase the toxicity of cyanide and aluminium, while increased pH increases the toxicity of ammonia (ANZECC 1992).”

Also, “Almost all water quality guidelines around the world (e.g. (ANZECC 1992, CCREM 1991, Alabaster & Lloyd 1982, USEPA 1986b) recommend that pH should be maintained in the range 6.5 to 9.0 to protect freshwater aquatic organisms.”

The pH water quality objective (WQO) listed for the sub-basin is 6.5-8.5.

Given that WQOs are long-term goals for water quality management, this CCA has assumed that values outside the 6.5-8.5 WQO range will not cause significant impacts during short-duration events (e.g. FTC overtopping scenarios), provided that they fall within the 6.5-9.0 ‘general’ range listed in ANZECC.

Consequence category assessment has not considered dilution of release water pH during FTC-overtopping or dam break failure scenarios.

Salinity (Electrical Conductivity)

The WQO for EC is 250 µS/cm (high flow conditions) to 720 µS/cm (low flow conditions), as listed for the Isaac River Sub-basin.

ANZECC (2000) includes a reference to a study undertaken by Hart et al. (1990 and 1991) which “reviewed the biological effects of saline discharges into freshwater systems and concluded that adverse biological effects would be expected in Australian aquatic ecosystems if salinity was allowed to increase to around 1,000 mg/L (or approximately 1,500 µS/cm). These reviews covered the lethal and sub-lethal effects of salinity on microbes (mainly bacteria) macrophytes and micro-algae, riparian vegetation, invertebrates, fish, amphibians, reptiles, mammals and birds.”

A study undertaken by Vink and Prasad (2012) investigated the effects of salinity specific to the ecology found within the Fitzroy catchment. They found ecological values for EC corresponding to a 95% level of protection for slightly to moderately disturbed ecosystems, such as those found in the Fitzroy catchment, between 2,000 and 2,500 µS/cm.

This CCA has considered dilution of release water EC with any concurrent environmental flow in the downstream reach. Mixed EC has been assessed against the minimum threshold value recommended by Vink and Prasad (2,000 µS/cm) to determine potential for adverse effects on downstream aquatic ecosystems. Given that WQOs are long-term goals for water quality management, mixed EC values above the WQO are not expected to cause significant impacts during short-duration events (e.g. FTC-overtopping scenarios), provided that they do not exceed the threshold proposed by Vink and Prasad.

5.5.2.2 Summary

Water quality thresholds adopted for the purposes of this CCA have been summarised for reference in Table 5.2. Threshold values used for comparison (i.e. water quality tables in Appendix A assessment sheets) are highlighted in blue.

Table 5.2 – Summary of adopted water quality thresholds

Parameter	Units	Value	Source	Comment
pH	-	6.5 – 8.5	EPP Water (2019)	No impact range
		6.5 – 9.0	ANZECC 2000	Acceptable range (short-duration events)
Electrical conductivity (EC)	µS/cm	250	EPP Water (2019)	No impact threshold
		2,000	Vink and Prasad (2012)	For the purposes of this assessment - aquatic ecosystems assumed to be significantly affected if threshold exceeded

5.5.3 General economic loss or property damage

The general economic loss or property damage failure criteria requires the assessor to consider potential impacts on any third-party assets located within the failure path of a water storage. For the purposes of this CCA, the only identifiable third-party assets are the Goonyella railway (located around 10 km downstream of the Project) and Poitrel Mine levee (located around 4 km downstream of the Project).

The manual specifies that any failure scenario that results in greater than $1M in rehabilitation, compensation or rectification costs to any downstream third-party asset be assessed as having at least a significant consequence category.

Damage to the aforementioned rail asset is assumed to be via mechanical effects under a dam break flooding scenario. Infrastructure repair costs and/or potential costs associated with interruption of rail service may be expected to exceed the $1M threshold but would be unlikely to exceed $10M (note however that no failure scenarios were identified that would be expected to result in these consequences).

It is our understanding that the Poitrel Mine levee is designed to function under 0.1% AEP Isaac River flow conditions, which are significantly larger than the expected dam failure flows. As such, infrastructure repair costs would not be expected to exceed the $1M threshold. In addition, no failure scenarios were identified that would be expected to result in these consequences.

Any waterway or standing water body that is not fenced off is considered to be accessible to livestock. Investigations have considered potential impacts on livestock based on water quality, and flooding (dam break scenario only). ANZECC (Volume 1) lists the following with respect to effects of salinity in beef cattle drinking water:

- No adverse effects on animals expected in the range of 0 to 4,000 mg/L TDS (upper EC 6,150 µS/cm)
- Animals may have initial reluctance to drink or there may be some scouring, but stock should adapt without loss of production in the range of 4,000 to 5,000 mg/L TDS (upper EC 7,690 µS/cm)
- Above 5,000 mg/L TDS (EC 7,690 µS/cm), loss of production and a decline in animal condition and health would be expected. Stock may tolerate these levels for short periods if introduced gradually.

Water quality-based impact on livestock has been assessed as occurring when the mixed waterway EC within a livestock accessible area exceeds 7,400 µS/cm – the (rounded) threshold, which if exceeded may result in loss of production and a decline in animal condition and health.

5.6 Failure to contain - seepage

Appendix B of the Dams Manual – 'notes on consequence category assessment based on failure event scenarios' of the Manual specifies the following:

- Evaluation of the consequence of spills or releases to ground and/or groundwater via seepage from the floor and/or sides of the structure.
- Assessment of the 'failure to contain' via seepage scenario is only required for new structures and does not apply to structures approved prior to development of the Manual.

There are only three dams that will contain mine affected water at the Project; MAW1, MAW2 and MAW3 Dam. The walls and floor of these dams will be suitably constructed to minimise the risk of seepage occurring.

If seepage to groundwater were to occur, the impact on local groundwater quality is expected to be negligible. The water quality contained within these storages is expected to be similar to the expected water quality within the local groundwater aquifers (based on expected EC of groundwater within the alluvial aquifers).

Seepage from MAW1, MAW2 and MAW3 may potentially result in water seeping out of the ground into Conrock Gully. Seepage that presents in Conrock Gully is unlikely to extend as far downstream as the Isaac River, and the potential volumes of seepage are expected to be low.

As such, the preliminary consequence category for MAW1, MAW2 and MAW3 for FTC – seepage has been assessed as 'low'.

For the remaining sediment and clean water dams, the water quality in these storages is expected to be relatively fresh, and any seepage would have a negligible effect on groundwater or surface water quality. As such, the preliminary consequence category for SD1 to SD11, and CWD for FTC – seepage has been assessed as 'low'.

This assessment will be reviewed when actual monitoring data in the proposed storages becomes available following commencement of operations.

5.7 Failure impact zone

The extent of flooding can be described by its reach length, being the furthermost distance the water may flow downstream of the proposed dam. A failure impact zone is the extent downstream where there may be potential population at risk (PAR). The downstream reach length can be related to the volume of water released during a containment failure. The reach distance for the dam has been estimated from Table 5 in the Guidelines for Failure Impact Assessment of Water Dams (DNRME, 2018), which provides a rough guide for an initial assessment of failure impact zone using a mathematical relationship between storage and indicative downstream distance (refer Table 5.3). It should be noted that the numbers in this table are based on dam failure studies and distances may be substantially greater or lesser, depending on the containment type and downstream channel.

It is expected that the Failure to Contain volumes would be significantly lower than the Dam Break volume.

Table 5.3 – Indicative failure impact zone distances (DNRME, 2018)

Storage (ML)	Indicative total distance downstream from containment (km)
20,000	Up to 60 km
2,000	Up to 20 km
200	Up to 5 km

5.8 Failure to contain – overtopping

Appendix B of the Dams Manual – 'notes on consequence category assessment based on failure event scenarios' specifies the following:

- Evaluation of the consequence potential on releases requires information on the probable chemical nature of the stored material, including rates, volume and concentrations at the time of a possible release.
- A consequence category based on 'dam break' or 'failure to contain' scenarios, must be assessed based on the most adverse environmental harm that can arise from the range of all possible scenarios. The consequence category is based on the consequence of failure, not on the perceived probability of the failure occurring. The following aspects of possible adverse scenarios should be carefully considered:
    - a suitable range of rainfall scenarios will need to be considered
    - where potential harm is by release of a contaminant, account should be taken of the potential dilution by clean runoff entering the dam prior to release, and potential dilution in receiving waters.

5.8.1 Rainfall-runoff driven overflows

For the FTC – overtopping scenario, a failure volume of 71 ML has been adopted for this assessment for the Pumped Hydro Dam. This is based on the following calculations:

- Pumped Hydro Dam water level at spillway.
- The total rainfall from a 1% AEP 24-hour rainfall event is 231 mm.
- For a total catchment area of 61.2 ha, an estimated event runoff volume of 71 ML (with a 50% runoff coefficient, which is very conservative).

Based on the relationship in Table 4.1 which is extrapolated in Figure 4.1, the estimated failure impact zone in the event of overtopping failure has been calculated to be 3.0 km downstream of the dam. This includes an additional allowance for uncertainty, given the relationship is derived from dam failure studies only. The 3.0 km extent has been considered for this assessment to give a conservative estimation of the potential sensitive receptors.

It should be noted that the following storages cannot overflow to the receiving environment, and therefore are not considered for the FTC – overtopping assessment:

- MAW1;
- MAW2;
- MAW3;
- SD1;
- SD2;
- SD3;
- SD5;
- SD8;
- CWD.

5.9 Dam break

The maximum volume that may be released during a dam break event is equal the storage capacity above the natural ground surface. The volume stored in excavated capacity of the dam will not be lost during a dam break failure of the embankment. The volume stored between the lowest adjacent ground level and the embankment level is approximately 135 ML.

For the dam break failure scenario, a failure volume of 135 ML has been adopted for this assessment for the Pumped Hydro Dam.

Based on the relationship in Table 4.1 which is extrapolated in Figure 4.1, the estimated failure impact zone in the event of dam break has been calculated to be 4.2 km downstream of the dam. This includes an additional allowance for uncertainty, given the relationship is derived from dam failure studies only and no breach modelling has been undertaken at this stage. Sensitive receptors within the 4.2 km failure impact zone have been identified and considered as PAR as part of the assessment.

It should be noted that the following storages cannot overflow to the receiving environment, and therefore are not considered for the FTC – dam break assessment:

- MAW1;
- MAW2;
- MAW3;
- SD1;
- SD2;
- SD3;
- SD5;
- SD8;
- CWD.

5.10 Assessment outcomes

5.10.1 Water Storage Structures

A summary of consequence categories is provided in Table 5.4. Detailed information pertaining to each assessment is provided in Appendix A, and for each assessed storage includes:

descriptions of function, catchment and outlet works; summary specifications; layout figures; and description of potential consequence associated with each failure mode, and each category of harm, supported by 'downstream reach analysis' outcomes where appropriate.

Table 5.4 – Summary consequence categories - storages

Storage	Consequence category			Overall category	Storage is regulated?	Requires DSA/MRL?
	FTC - overtopping	FTC - seepage	Dam break			
MAW1	low	low	low	low	no	no
MAW2	low	low	low	low	no	no
MAW3	low	low	low	low	no	no
SD1	low	low	n/a	low	no	no
SD2	low	low	n/a	low	no	no
SD3	low	low	n/a	low	no	no
SD4	low	low	n/a	low	no	no

Storage	Consequence category			Overall category	Storage is regulated?	Requires DSA/MRL?
	FTC - overtopping	FTC - seepage	Dam break			
SD5	low	low	n/a	low	no	no
SD6	low	low	n/a	low	no	no
SD7	low	low	n/a	low	no	no
SD8	low	low	n/a	low	no	no
SD9	low	low	low	low	no	no
SD10	low	low	n/a	low	no	no
SD11	low	low	low	low	no	no
CWD	low	low	low	low	no	no
Pumped Hydro Dam	low	low	low	low	no	no

5.11 Hydraulic performance criteria

According to the Dams Manual, regulated dams are storages which have been assigned a consequence category of 'Significant' or 'High'. This preliminary assessment determined that there were no regulated structures. As such, there are no required hydraulic performance criteria for water storages at the Project.

5.12 Futures revisions of the CCA

This preliminary CCA for the IDE Project was based on preliminary information for the purpose of this SWIA. This CCA should be reviewed and revised during detailed design as more information becomes available for the design of dams.

This CCA should also be regularly reviewed and updated during the operational phase of the Project, particularly as more information becomes available regarding the actual range of water quality in dams, operational performance of the integrated water management system, and corresponding consequences of failure.

6 Water balance modelling

6.1 Overview

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. Section 8 describes the water balance of the rehabilitated final landform.

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. In this report the 'IPC water management system' refers to the existing water management systems at IPM and IDM, prior to the integration of the IDE Project into IPC. The IPC model setup and configuration are not discussed in detail in this report; however, the most recent version of the IPC water balance model has been integrated into the assessment for the IDE Project. IDE 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.

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 given in Table 6.1.

Table 6.1 – Simulated inflows and outflows to the water management system

Inflow	Outflows
Direct rainfall on water surface of storages	Evaporation from water surface of storages
Catchment runoff	Dust suppression demand
Groundwater inflows to the open cut pit	Miscellaneous water demand
External water supply (from IPC)	Transfer to IPC
	Offsite releases from sediment dams in accordance with design criteria
	Controlled releases in accordance with the proposed release strategy

6.2 Simulation methodology

The IDE 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.

The modelled mining phases are summarised in Table 6.2.

Table 6.2 – Representative model phases

Phase	Representative model year	Representative model period	Duration (years)
1	Year 1	Year 1	1
2	Year 2	Year 2	1
3	Year 4	Years 3-5	3
4	Year 6	Years 6-10	5
5	Year 11	Year 11-13	3

Phase	Representative model year	Representative model period	Duration (years)
6	Year 16	Year 14-16	3

6.3 Climate

The region has a sub-tropical climate, exhibiting distinct wet seasons (November to April) and dry seasons (April to October). Long-term climate data for the Project area (including rainfall and evaporation) was obtained from the SILO climate database facility operated by the Queensland Department of Environment, Tourism, Science and Innovation (DETSI), based on data derived from the Bureau of Meteorology (BoM). Climate data was obtained for a location within the Project boundary (22.10°S, 148.20°E).

6.3.1 Rainfall

A statistical analysis of the long-term rainfall data is presented in Figure 6.1. This figure shows that rainfall can vary significantly at the Project area, with the highest rainfall generally occurring in January and February before reaching a typical low in August and September.

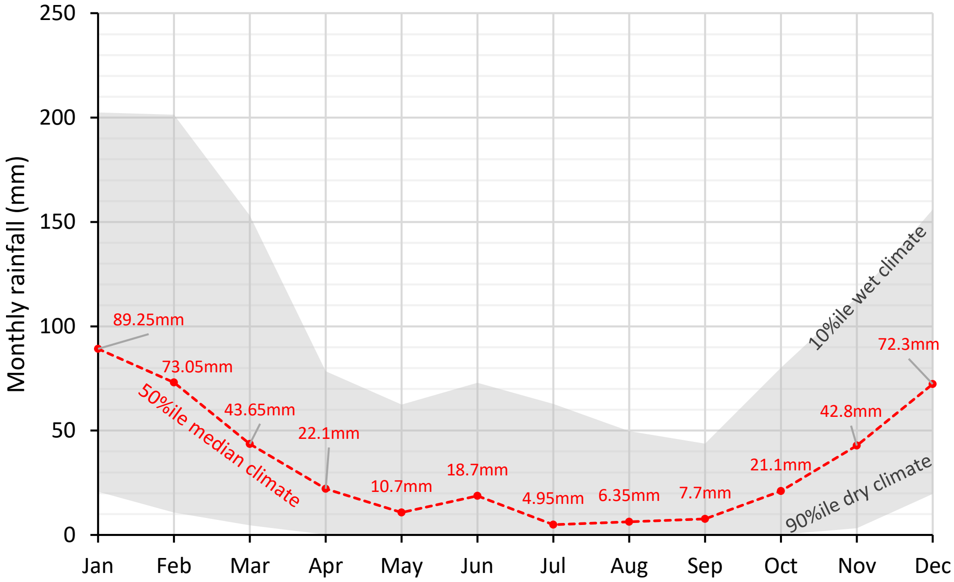


Figure 6.1 – Long-term rainfall distribution at IDE

6.3.2 Evaporation

The long-term evaporation and evapotranspiration data at the Project is presented in Figure 6.2 as a daily averaged rate. The following loss rates have been adopted for the WB assessment:

- **Mortons Lake evaporation**: used to represent evaporation from a free water surface. This data is be used to estimate evaporative losses from the water storage surfaces.
- **Mortons Wet evaporation**: used to represent evapotranspiration from a saturated soil surface. This data is used in the AWBM surface runoff calculations.

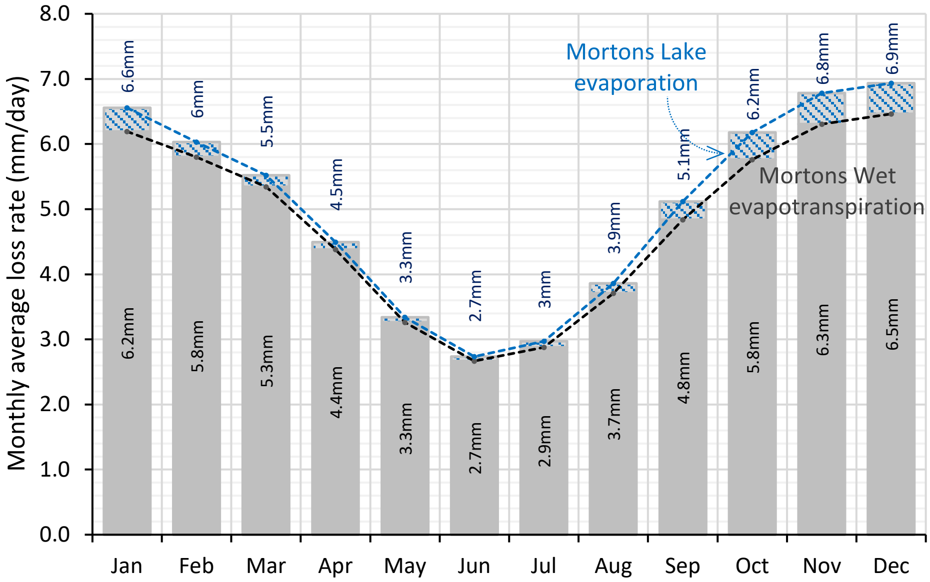


Figure 6.2 – Long-term Mortons Lake evaporation and Mortons Wet evapotranspiration at IDE

6.4 Catchment yield parameters

The AWBM model was used to represent the runoff characteristics of mine site catchments. AWBM uses a group of connected conceptual storages (3 surface storages and 1 groundwater storage) to represent catchment runoff. Water in the conceptual storages is replenished by rainfall and reduced by evapotranspiration. Simulated surface runoff occurs when any of these storages fill and overflow. The model parameters define the depth and relative area of each of the storages, as well as the rate of water flux from/between storages.

To adequately simulate the site water balance, it is necessary to define the runoff characteristics of the various catchment surface types. Catchments were characterised into the following land use types:

- Natural, representing areas undisturbed by mining;
- Hardstand, representing hauls roads and hardstand/cleared areas; and
- Spoil, representing uncompacted dumped overburden material;
- Rehab; representing rehabilitated emplacement areas;
- Pit, representing the pit floor; and
- Cleared, representing areas disturbed ahead of mining (e.g. pre-strip).

The AWBM parameters adopted for this assessment have been based on previous water balance modelling and calibration undertaken at IPC. A summary of the parameters is provided in Table 6.3.

Table 6.3 – Adopted AWBM parameters

Parameter	Natural	Hardstand	Spoil	Rehab	Pit	Cleared
A1	0.013	0.134	0.1	0.1	0.134	0.1
A2	0.444	0.433	0.4	0.4	0.433	0.9
A3	0.543	0.433	0.5	0.5	0.433	-
C1	15	1.9	15	15	1.9	12
C2	100	19.1	100	100	19.1	54

Parameter	Natural	Hardstand	Spoil	Rehab	Pit	Cleared
C3	651	80	100	200	80	-
C_{av}	398.1	43.2	91.5	141.5	43.2	49.8
BFI	0.21	-	0.8	0.8	-	-
k_{base}	0.914	-	0.9	0.9	-	-
k_{surf}	0.502	-	-	-	-	-

6.5 Catchment areas and land use classification

Catchment areas for the mine pit and site water management infrastructure have been based on the topographic survey and mine plans provided by Stanmore. The adopted catchment areas and land use types for each modelled phase of the Project are provided in Figure 6.3 to Figure 6.7.

A summary of adopted catchment areas and land use types at IDE for each modelled phase is provided in Table 6.4.

Table 6.4 – Land use and catchment breakdown for IDE, Phase 1 to Phase 5

Catchment	Natural	Hardstand	Spoil	Rehab	Pit	Cleared	TOTAL
Phase 1/2							
MAW1	0.0	26.3	0.0	0.0	0.0	6.6	32.9
MAW2	0.0	8.8	0.0	0.0	0.0	9.4	18.2
MAW3	0.1	8.5	0.0	0.0	0.0	1.7	10.3
Active Pit North	0.1	0.0	7.4	0.0	33.7	12.3	53.6
Active Pit South	0.0	0.0	62.8	0.0	15.8	58.1	136.7
SD1	0.3	12.5	20.6	0.0	0.0	26.3	59.6
SD3	0.1	1.2	2.3	0.0	0.0	5.1	8.6
SD4	18.6	6.6	66.1	0.0	0.0	3.5	94.8
SD5	0.0	0.0	9.1	0.0	0.0	12.0	21.1
SD6	2.4	0.7	8.5	0.0	0.0	0.3	11.9
SD7	3.1	2.6	2.5	0.0	0.0	3.7	11.9
SD10	0.0	0.0	0.0	0.0	0.0	78.7	78.7
SD11	54.2	0.0	0.0	0.0	0.0	24.9	79.1
CWD	369.8	0.5	0.0	0.0	0.0	304.6	674.9
Phase 1/2 TOTAL	***448.7***	***67.6***	***179.4***	***0.0***	***49.5***	***547.2***	***1,292.4***
Phase 3							
MAW1	0.0	26.3	0.0	0.0	0.0	6.6	32.9
MAW2	0.0	8.8	0.0	0.0	0.0	9.4	18.2
MAW3	0.1	8.5	0.0	0.0	0.0	1.7	10.3
Active Pit	0.0	0.0	0.0	0.0	104.4	88.5	413.4
SD1	1.9	0.0	218.8	0.0	0.0	31.6	60.0
SD3	0.3	1.1	4.4	0.0	0.0	2.7	8.5

Catchment	Natural	Hardstand	Spoil	Rehab	Pit	Cleared	TOTAL
SD4	4.9	6.6	79.9	0.0	0.0	3.5	94.9
SD5	0.4	0.0	8.8	0.0	0.0	12.0	21.2
SD6	2.4	0.7	8.6	0.0	0.0	0.3	11.9
SD7	3.5	2.6	2.7	0.0	0.0	3.2	12.0
SD10	2.5	0.0	0.0	0.0	0.0	48.9	51.4
SD11	54.5	0.0	0.0	0.0	0.0	24.6	79.1
CWD	365.4	0.5	0.0	0.0	0.0	112.9	478.8
Phase 3 TOTAL	***436.0***	***67.5***	***338.7***	***0.0***	***104.4***	***346.0***	***1,292.6***
Phase 4							
MAW1	0.0	26.3	0.0	0.0	0.0	6.6	32.9
MAW2	0.0	8.8	0.0	0.0	0.0	9.4	18.2
MAW3	0.1	8.2	0.3	0.0	0.0	1.7	10.3
Active Pit	3.2	5.4	289.3	0.0	119.9	73.5	491.2
SD1	0.3	12.9	16.4	0.0	0.0	31.8	61.3
SD2	1.1	3.6	22.6	0.0	0.0	38.0	65.3
SD3	0.1	0.1	22.9	0.0	0.0	0.0	23.2
SD4	5.4	6.6	80.2	0.0	0.0	2.9	95.0
SD5	0.2	0.0	38.5	0.0	0.0	3.9	42.7
SD6	2.5	0.7	8.6	0.0	0.0	0.0	11.9
SD7	4.5	2.7	15.4	0.0	0.0	0.0	22.6
SD8	4.2	0.2	48.4	0.0	0.0	38.2	91.1
SD11	22.9	6.3	0.0	0.0	0.0	55.5	84.7
CWD	70.5	2.2	0.0	0.0	0.0	156.7	229.4
Phase 4 TOTAL	***115.0***	***83.9***	***542.5***	***0.0***	***119.9***	***418.4***	***1,279.7***
Phase 5							
MAW1	0.0	26.3	0.0	0.0	0.0	6.6	32.9
MAW2	0.0	8.8	0.0	0.0	0.0	9.4	18.2
MAW3	0.1	8.2	0.3	0.0	0.0	1.7	10.3
Active Pit	2.6	2.9	430.8	0.0	86.7	18.1	541.1
SD1	1.0	12.9	49.6	0.0	0.0	31.5	94.9
SD2	9.9	6.7	49.3	0.0	0.0	15.8	81.7
SD3	0.1	1.2	28.6	0.0	0.0	0.0	29.9
SD4	5.5	6.6	55.7	24.8	0.0	3.1	95.7
SD5	0.1	0.0	38.3	0.0	0.0	3.7	42.1
SD6	2.5	0.7	8.6	0.0	0.0	0.0	11.9
SD7	4.6	2.7	17.4	0.0	0.0	0.0	24.6

Catchment	Natural	Hardstand	Spoil	Rehab	Pit	Cleared	TOTAL
SD8	0.3	0.3	77.1	0.0	0.0	13.8	91.5
SD11	22.9	5.7	0.0	0.0	0.0	30.4	59.0
CWD	70.6	2.1	0.0	0.0	0.0	83.4	156.1
Phase 5 TOTAL	***120.3***	***85.2***	***755.6***	***24.8***	***86.7***	***217.5***	***1,290.2***
Phase 6							
MAW1	0.0	26.3	0.0	0.0	0.0	6.6	32.9
MAW2	0.0	8.8	0.0	0.0	0.0	9.4	18.2
MAW3	0.1	8.2	0.3	0.0	0.0	1.7	10.3
Active Pit	5.7	8.2	405.5	55.0	0.0	22.5	496.9
SD1	1.2	12.9	27.0	22.3	0.0	31.5	94.8
SD2	10.1	7.5	192.1	0.0	0.0	29.0	238.8
SD3	1.0	1.2	7.7	20.1	0.0	0.0	30.0
SD4	5.5	6.6	40.1	40.3	0.0	3.1	95.7
SD5	0.1	0.0	0.0	38.4	0.0	3.7	42.2
SD6	2.5	0.7	3.7	4.9	0.0	0.0	11.9
SD7	5.1	2.7	0.8	16.6	0.0	0.0	25.1
SD8	0.3	0.3	77.1	0.0	0.0	23.2	100.9
SD9	24.3	0.0	0.0	0.0	0.0	72.5	96.8
SD11	9.4	0.0	0.0	0.0	0.0	9.9	19.3
CWD	70.6	1.7	0.0	0.0	0.0	29.5	101.7
Phase 6 TOTAL	***136.0***	***85.2***	***754.1***	***197.9***	***0.0***	***242.6***	***1,415.8***

Disturbed areas outside the site storage catchments (such as topsoil dumps) will be managed through localised sediment and erosion control practices. They do not form an active part of the site water management system, and have not been included in the water balance modelling.

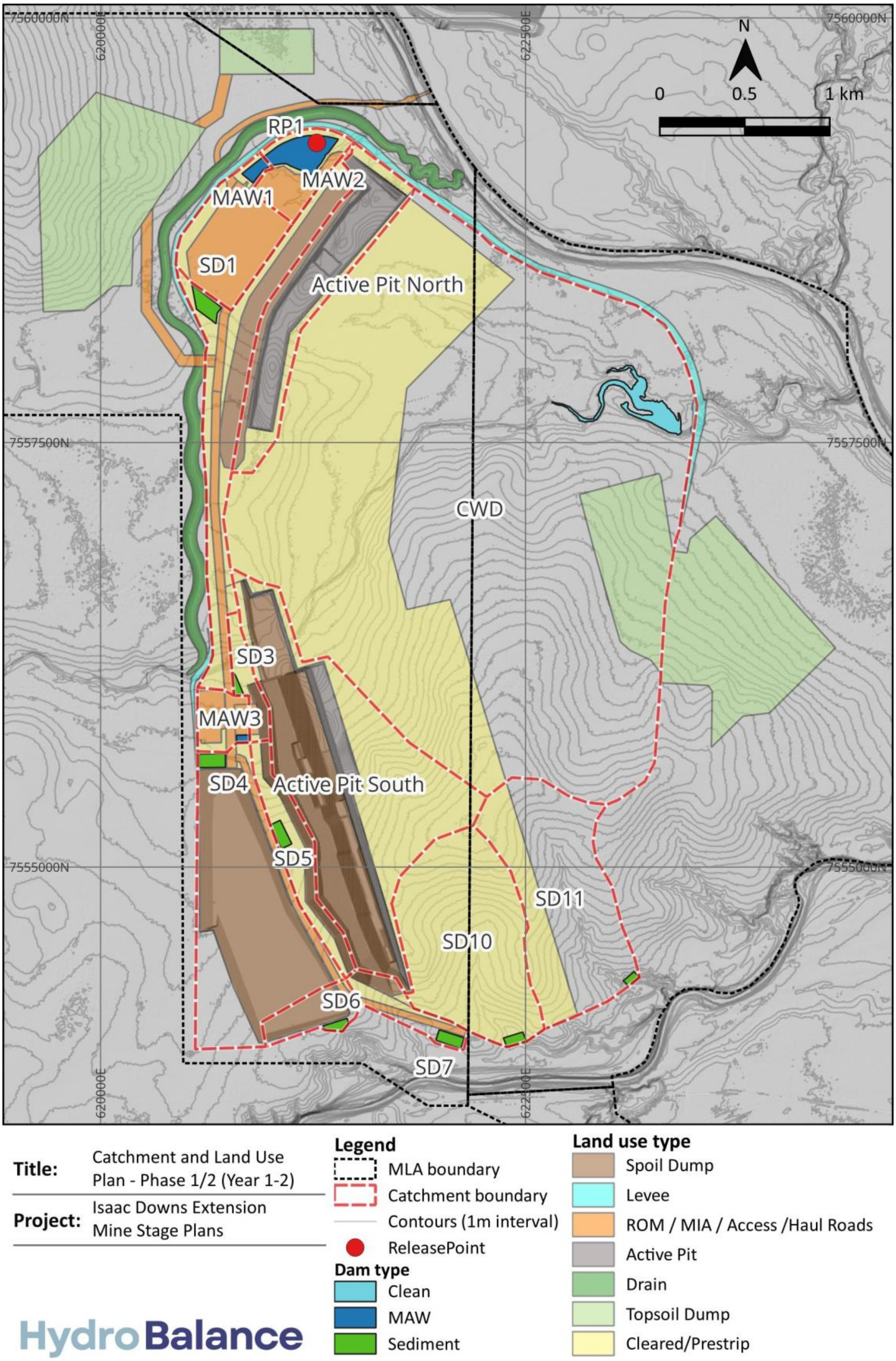


Figure 6.3 – IDE catchment and land use plan – Phase 1/2

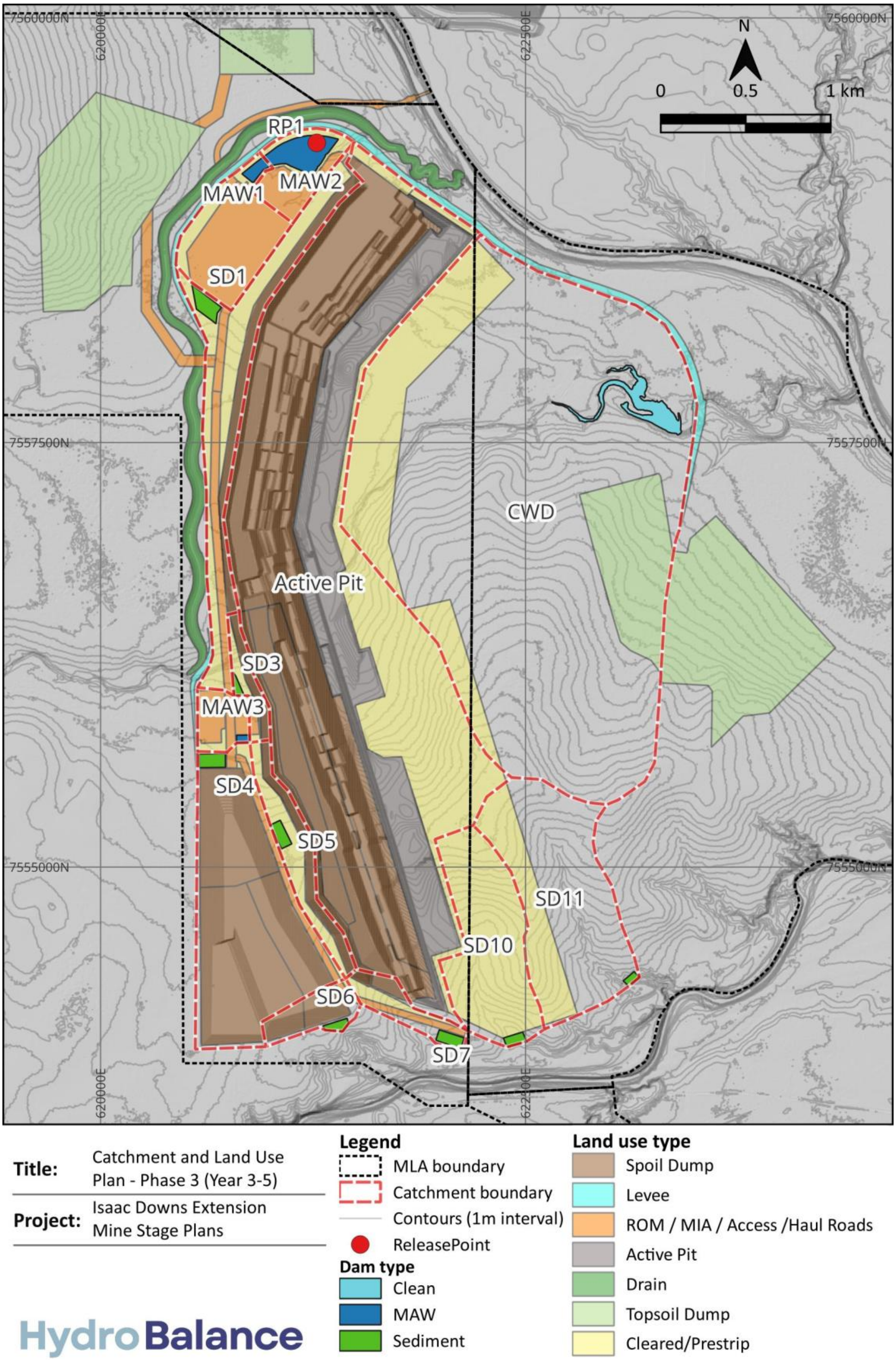


Figure 6.4 – IDE catchment and land use plan – Phase 3

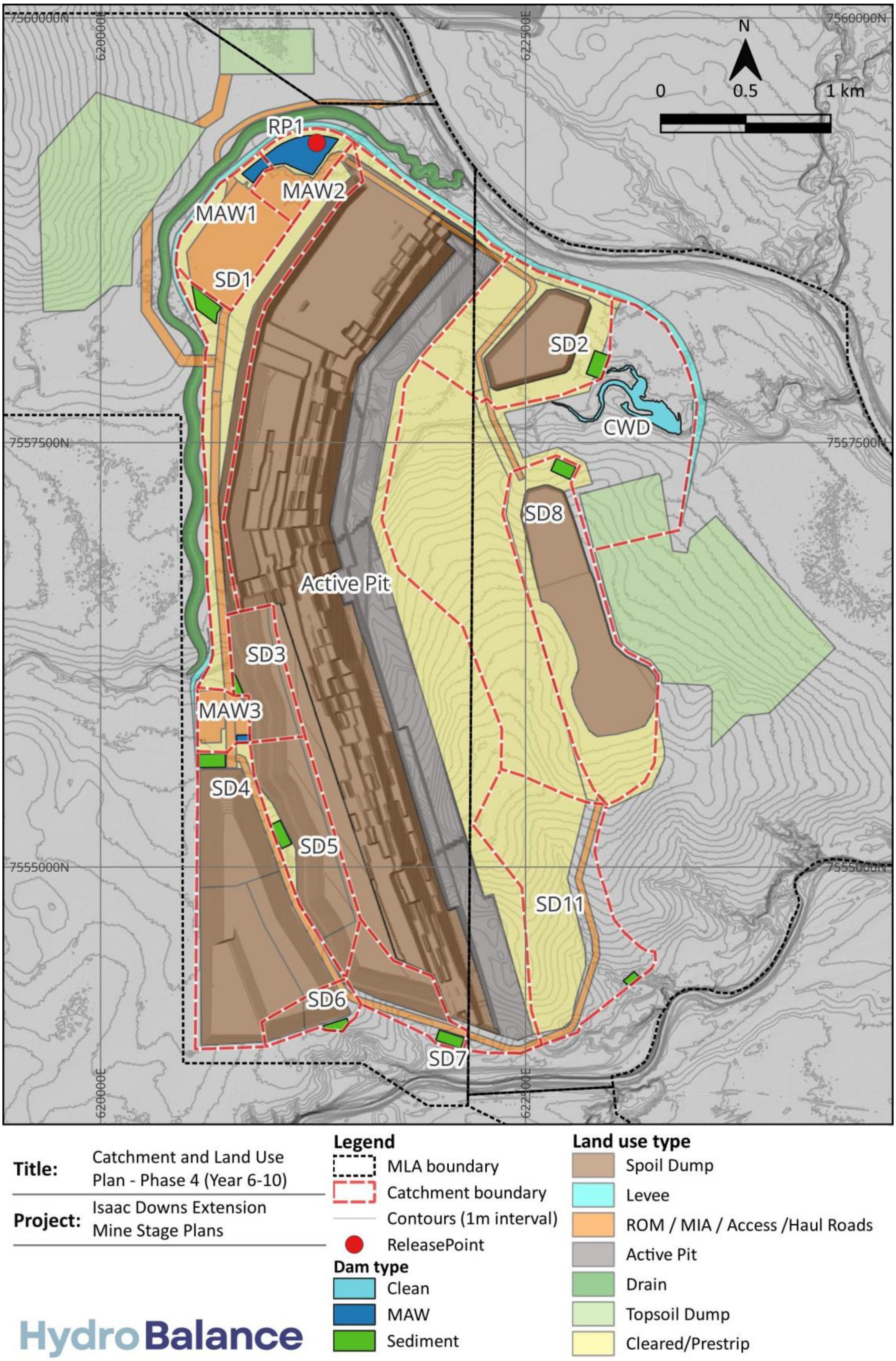
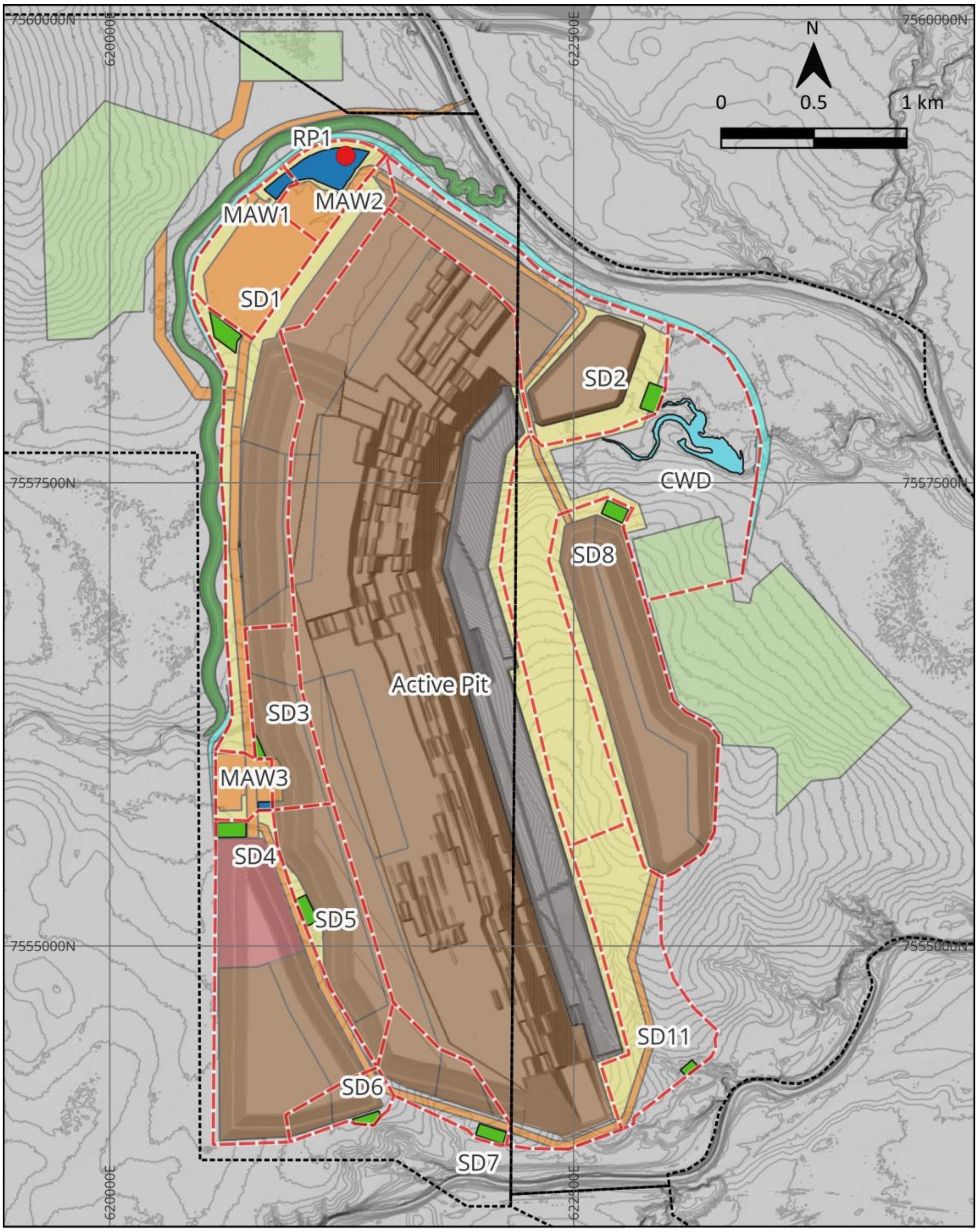


Figure 6.5 – IDE catchment and land use plan – Phase 4



Title:	Catchment and Land Use Plan - Phase 5 (Year 11-13)
Project:	Isaac Downs Extension Mine Stage Plans

Legend
- MLA boundary
- Catchment boundary
- Contours (1m interval)
- ReleasePoint

Dam type
- Clean
- MAW
- Sediment

Land use type
- Spoil Dump
- Levee
- ROM / MIA / Access /Haul Roads
- Active Pit
- Drain
- Topsoil Dump
- Cleared/Prestrip
- Rehab

HydroBalance

Figure 6.6 – IDE catchment and land use plan – Phase 5

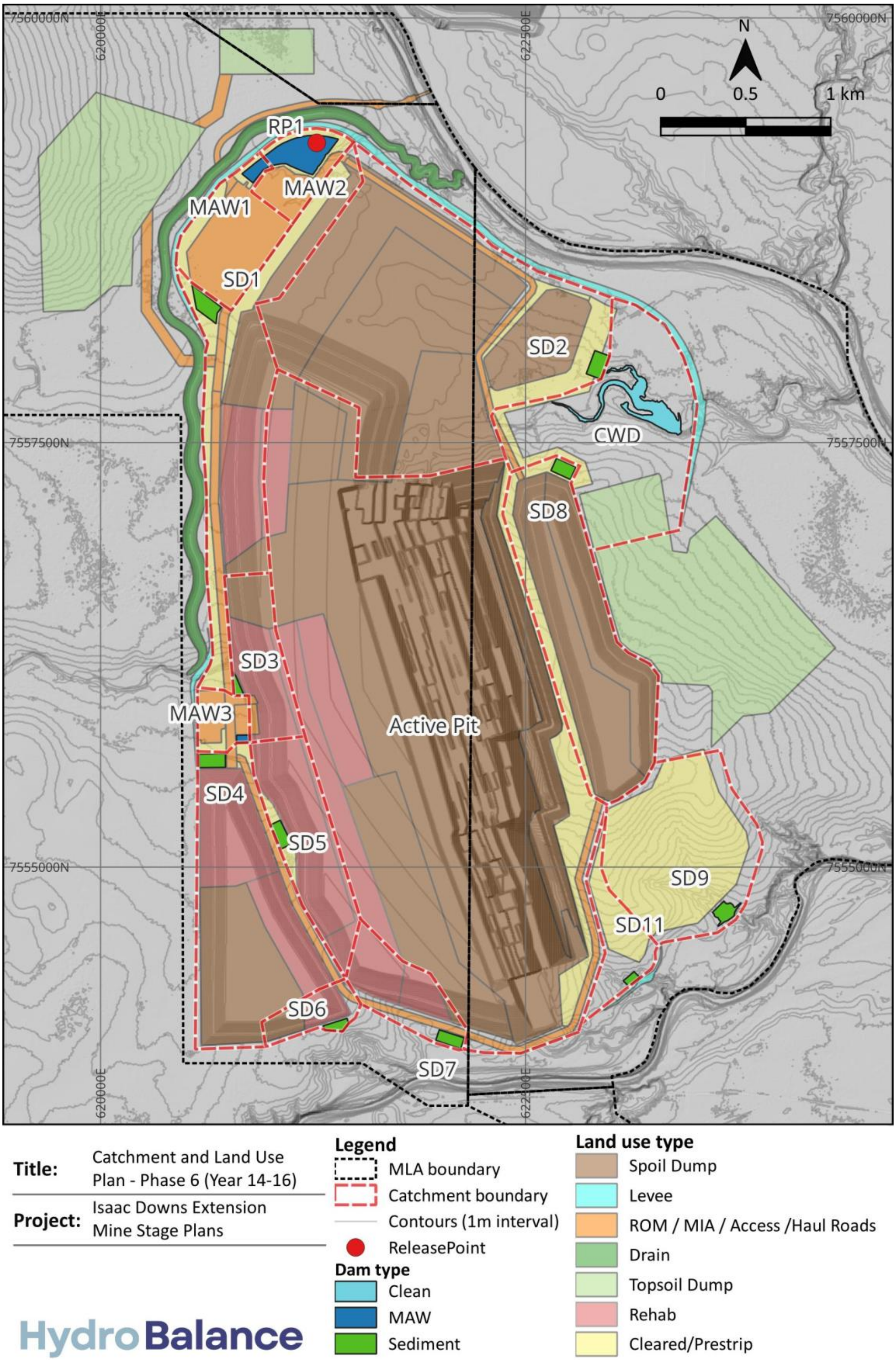


Figure 6.7 – IDE catchment and land use plan – Phase 6

6.6 Conceptual water management system configuration and schematic

A schematised plan of the proposed water management system configuration is shown in Figure 6.8. A summary of the modelled water management system operating rules is outline in Table 6.5.

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 (MAW MOV) and sediment dams (SED MOV) to the mine affected water storages ceases (specifically MAW2). This was included as an operating rule in the water balance model.

Table 6.5 – Isaac Downs Extension model operating rules

Item	Description	Operating rules
1.0	***External water supply***	
1.1	Isaac Downs (IDM)	• MAW can be imported from IDM to supplement mine water reserves • Supplies haul road and ROM dust suppression demands via MAW2
1.2	Eungella Burdekin pipeline	• Supplies raw water for vehicle washdown and fire water demand via a raw water tank
2.0	***Supply to demands***	
2.1	Haul road dust suppression	• Demands sourced from MAW2. • Refer to Section 6.7.2 for haul road dust suppression demand estimates. • 100% loss assumed
2.2	Industrial / miscellaneous usage	• Demands sourced from MAW2 • Refer to Section 6.7.3 for industrial and miscellaneous water usage. • 100% loss assumed
3.0	**Transfer of MAW**	
3.1	Isaac Downs (IDM)	• Excess MAW can be pumped to IDM.
4.0	**Operations of pits**	
4.1	Active pits	• Proposed mining pits, active during all stages • Two separate pits in Phase 1/2, merging to form a single pit from Phase 3 onwards • Continuous pumping from pit dewatering pumps to MAW2 at a combined maximum rate of 200 L/s, if sufficient capacity available in MAW2. • Dewaters to MAW2 if in-pit volume exceeds 20 ML (nominal in-pit sump volume) • Receives groundwater inflows
5.0	**Operations of key storages**	
5.1	MAW1	• MAW storage with a capacity of 40 ML, and a pump-out trigger volume of 4 ML (10%) • Receives runoff from northern ROM Pad, Go Line and Crib area, and overflows from SD1 • Pumps to MAW2 at a maximum rate of 120 L/s, if:

Item	Description	Operating rules
		○ MAW1 volume exceeds its MOV ○ MAW2 is below its MOV • Overflows to MAW2
5.2	MAW2	• Primary MAW storage with a capacity of 235 ML, and a pump-out trigger volume of 165 ML (70%) to IDM • Receives runoff from northern ROM Pad and overflows from MAW1 • Receives pumped transfers up to its MAW MOV of 188 ML (80%) from the following sources: ○ MAW1 ○ MAW3 ○ Active Pit/s • Receives pumped transfers up to its SED MOV of 59 ML (25%) from the following sources: ○ SD1 ○ SD2 ○ SD3 ○ SD4 ○ SD5 ○ SD6 ○ SD7 ○ SD8 ○ SD9 ○ SD10 ○ SD11 • If MAW2 inventory falls below 23.5 ML (10%), it demands water from IDM at a maximum rate of 100 L/s • If MAW2 inventory exceeds 165 ML (70%), it pumps water to IDM at a maximum rate of 170 L/s • Supplies water to the following demands as required: ○ Haul road dust suppression ○ ROM pad dust suppression • Proposed release point (RP1), which discharges to Conrock Gully diversion. Releases can occur when the MAW2 inventory exceeds 212 ML (90%). • Overflows to pit
5.3	MAW3	• MAW storage with a capacity of 20 ML, and a pump-out trigger volume 2 ML (10%) • Receives runoff from southern ROM Pad and Go Line • Pumps to MAW2 at a maximum rate of 50 L/s, if: ○ MAW3 volume exceeds its MOV ○ MAW2 is below its MOV • Overflows to SD3
5.4	SD1	• Sediment dam with a capacity of 25.2 ML

Item	Description	Operating rules
		• Following rainfall events, if SD1 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to MAW1
5.5	SD2	• Active from Phase 4 • Sediment dam with a capacity of 63.3 ML • Following rainfall events, if SD2 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to CWD
5.6	SD3	• Sediment dam with a capacity of 63.3 ML • Following rainfall events, if SD3 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to remnant Conrock Gully channel. If this occurs, mobile pumps will be used to dewater channel back to MAW2.
5.7	SD4	• Sediment dam with a capacity of 25.4 ML • Following rainfall events, if SD4 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to remnant Conrock Gully. If this occurs, mobile pumps will be used to dewater channel back to MAW2.
5.8	SD5	• Sediment dam with a capacity of 11.3 ML • Following rainfall events, if SD5 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to SD6.
5.9	SD6	• Sediment dam with a capacity of 3.2 ML • Following rainfall events, if SD6 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to Cherwell Creek.
5.10	SD7	• Sediment dam with a capacity of 6.7 ML • Following rainfall events, if SD7 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to Cherwell Creek.
5.11	SD8	• Active from Phase 4 • Sediment dam with a capacity of 26.8 ML • Following rainfall events, if SD8 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s

Item	Description	Operating rules
		• Overflows to CWD.
5.12	SD9	• Active from Phase 6 • Sediment dam with a capacity of 25.7 ML • Following rainfall events, if SD9 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to Cherwell Creek.
5.12	SD10	• Sediment dam with a capacity of 20.9 ML • Following rainfall events, if SD10 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to Cherwell Creek.
5.13	SD11	• Sediment dam with a capacity of 22.5 ML • Following rainfall events, if SD11 exceeds its MOV (33%) and MAW2 is below its SED MOV, then it will pump water to MAW2 at a maximum rate of 40 L/s • Overflows to Cherwell Creek.
5.14	CWD	• Clean water dam located behind the Isaac River levee, with a capacity of 200 ML • Following rainfall events, clean water will be pumped over the levee into Conrock Gully which flows into the Isaac River, at a maximum rate of 40 L/s • Overflows to remnant Conrock Gully channel behind the levee. If this occurs, mobile pumps will be used to dewater the channel to Conrock Gully downstream of the levee.
6.0	**General**	• All storages and pits receive local catchment runoff and lose water through evaporation

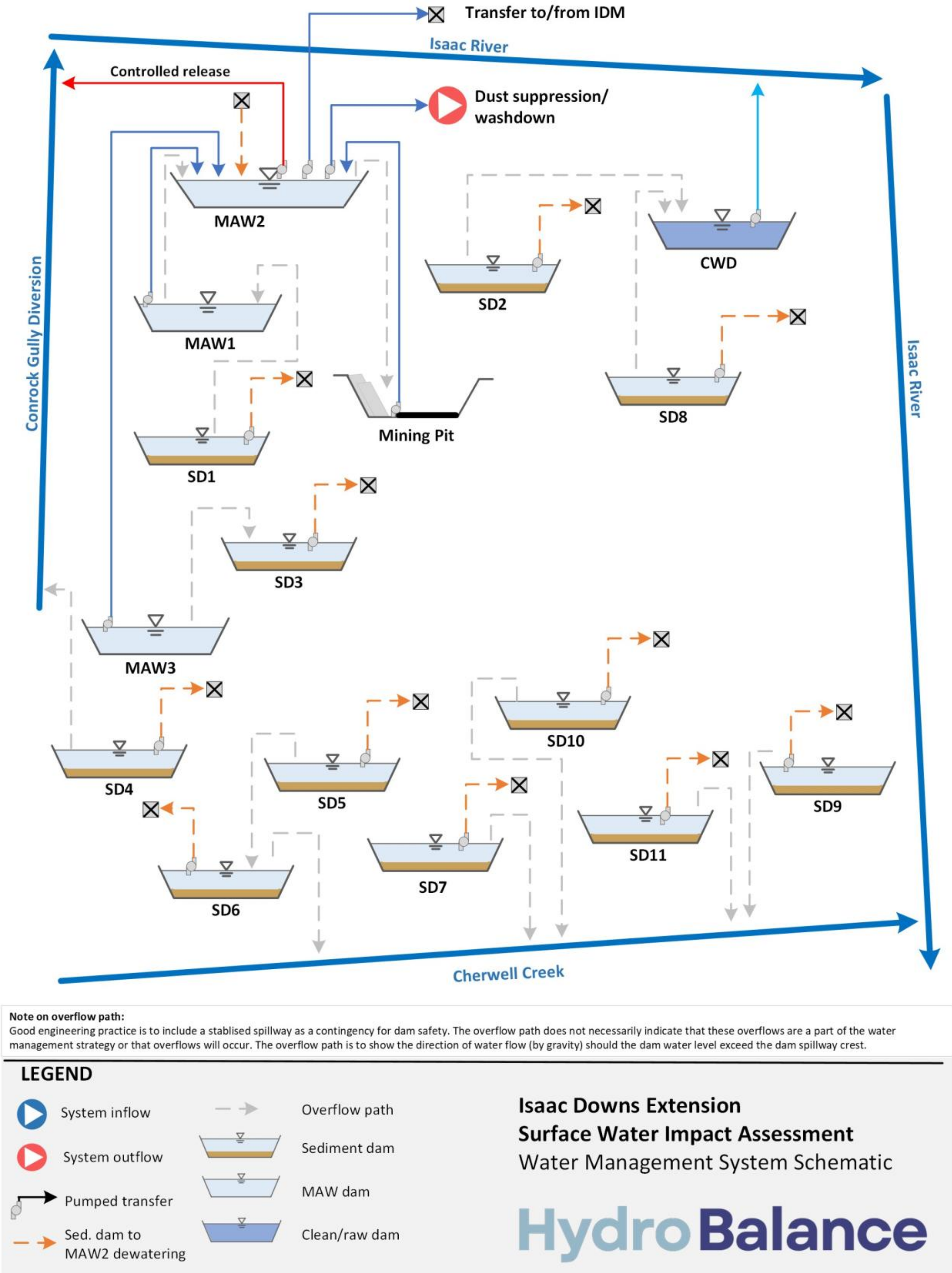


Figure 6.8 – IDE water management system schematic

6.7 Site water demands

6.7.1 Coal handling and preparation plant (CHPP)

Coal which is extracted at IDE will be processed at the existing IPC CHPP. In order to assess the performance of the integrated IPC (IPM/IDM/IDE) water management system, the total ROM throughput from all sources (IDM and IDE) has been included in the water balance model.

The key parameters for the CHPP water balance are shown in Table 6.6 and Figure 6.9.

There are two waste products generated by the IPM CHPP; coarse rejects and fine rejects. Coarse rejects from the coarse coal circuit will be transferred by conveyor to the CHPP rejects stockpile for reclaim by excavator/truck and placement to coarse reject cells located within the approved in-pit waste rock emplacement areas, wholly within the IPM final pit footprint.

Fine rejects from the fines coal circuit are pumped to the approved N1 Pit in-pit tailings cells, where the tailings is decanted to an average material moisture content of 20%. The excess decant water reports to the N1 Pit water storage where it is recycled back into the IPC WMS.

Both coarse rejects cells and N1 Pit tailings cells will be managed in accordance with the approved IPM Rejects Management Plans, and following operations they will be capped by spoils, recontoured and topsoiled for final rehabilitation.

Based on the adopted IPM CHPP operating parameters, the net water requirement for material processing at the IPM CHPP is approximately 75 L/ROM tonne. For the overall IPC life of mine, the projected annual ROM coal feed and the estimated gross and net annual CHPP water makeup requirement for each year is provided in Table 6.7.

The net CHPP water requirements for the IPC operations will be sourced from the IPM infrastructure. This will include any water transferred from IDE operations back to IDM and IPM.

Table 6.6 – Key CHPP water balance parameters

Item	Value
Moisture contents	
ROM coal feed	7.0% w/w
Primary product coal	11.0% w/w
Secondary product coal	9.5% w/w
Coarse rejects	20.0% w/w
Fine tailings (initial)	80.0% w/w
Fine tailings (consolidated)	20.0% w/w
Primary product yield (dry)	60.9% of ROM coal feed
Secondary product yield (dry)	15.5% of ROM coal feed
Course rejects (dry)	70% of total rejects
Fine tailing (dry)	30% of total rejects

Table 6.7 – Forecast annual coal production and estimated CHPP makeup requirements

IDE Phase	Year	IDM ROM (ktpa) (wet)	IDE ROM (ktpa) (wet)	Total ROM (ktpa) (wet)	Net CHPP makeup requirement (ML/a)
1	1	2,000	0	2,000	150
2	2	0	2,176	2,176	163
3	3	0	4,500	4,500	338
	4	0	4,500	4,500	338
4	5	0	4,500	4,500	338
	6	0	4,500	4,500	338
	7	0	4,500	4,500	338
	8	0	3,469	3,469	260
5	9	0	2,866	2,866	215
	10	0	2,586	2,586	194
	11	0	2,538	2,538	190
	12	0	2,255	2,255	169
	13	0	2,383	2,383	179
6	14	0	2,464	2,464	185
	15	0	2,372	2,372	178
	16	0	467	467	35

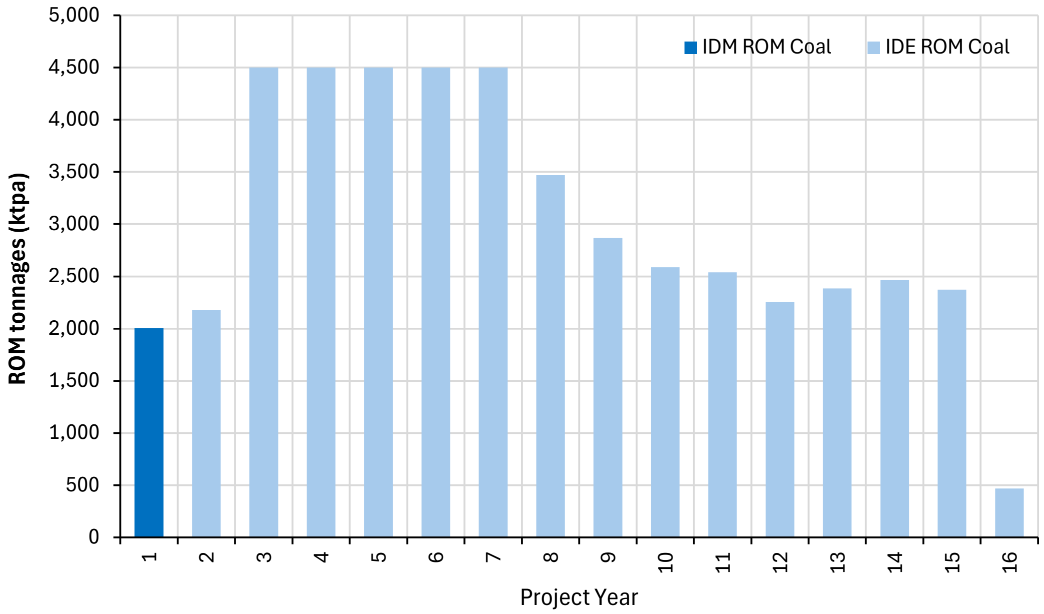


Figure 6.9 – Forecast ROM tonnages, IPC & IDE Project

6.7.2 Haul road dust suppression

Water for haul road dust suppression at IDE 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. The following rules were used to determine the applied dust suppression rate on any given day of the historical rainfall record:

- The assessment used daily evaporation rates sourced from the SILO evaporation dataset;
- For a dry day (zero rainfall), the haul road watering rate is equal to the daily evaporation rate;
- For a rain day when rainfall is less than the daily evaporation rate, the watering rate is reduced and is only required to make up the remaining depth to the daily evaporation rate;
- For a rain day when rainfall exceeds the daily evaporation rate, no haul road watering is required;
- It was assumed that a haul road width of 40 m would be watered; and
- The estimated haul road dust suppression will vary based on the haul road length for a given mine stage.

The calculations include an allowance for minor roads, based on 6 km of roads with a watered width of 10 m, across all stages.

Haul road parameters and dust suppression statistics are shown in Table 6.8.

Table 6.8 – Estimated haul road dust suppression demands

IDE Phase	Haul road length (km)	Haul road area (ha)	Average daily dust suppression demand (ML/d)	Average annual dust suppression demand (ML/yr)
1	8	32	3.1	517
2	11	44	4.3	710
3	13	52	5.0	840
4	20	80	7.8	1,292
5	24	96	9.3	1,551
6	24	960	9.3	1,551

6.7.3 Industrial/miscellaneous usage

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.

6.8 Groundwater inflows

The adopted groundwater inflows into the IDE mine pit are based on predictions provided by SLR Consulting (SLR) (2026) and have been provided annually between 2029 and 2043. A summary of the predicted annual groundwater inflows is provided in Figure 6.10.

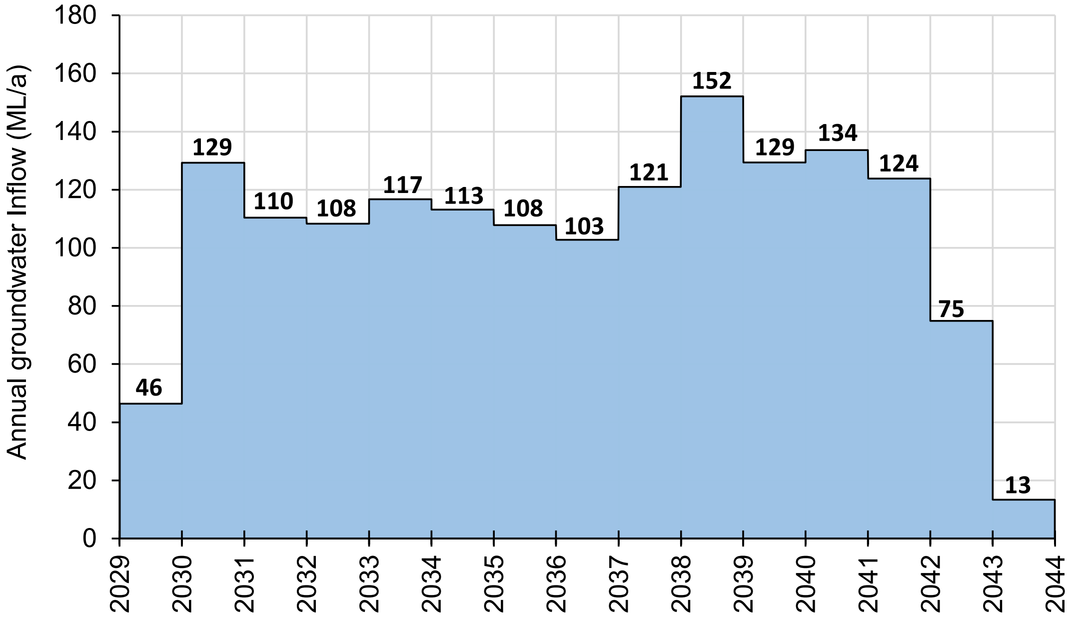


Figure 6.10 – Estimated annual groundwater inflows (data source: SLR, 2026)

6.9 Controlled releases

IDM currently has an Environmental Authority (EA0002817; DETSI 2025d) which includes water release 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 electrical conductivity (EC) as the target contaminant. The controlled release point will be located on MAW2.

A description of the proposed water release conditions is provided below.

6.9.1 Release conditions

Table 6.9, Table 6.10 and Table 6.11 show the proposed 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, and allow for an accurate evaluation of the impact of any releases from the Project. See Section 9.10.4 for further discussion.

Table 6.9 – Proposed mine affected water release limits

Quality characteristic	Units	Minimum	Maximum
Electrical Conductivity (EC)	µS/cm	n/a	Variable[1]
pH	pH units	6.5	9.0
Total Suspended Solids (TSS)	mg/L	n/a	Variable[1]
Sulphate ($SO4_2^-$)	mg/L	n/a	Variable[1]

Note: 1/ Release limits for EC and SO4 are dependent on receiving water flow.

Table 6.10 – Modelled release conditions

Receiving waters	Release point (RP)	Gauging station	Gauging station Easting (GDA94-Z55)	Gauging station Northing (GDA94-Z55)	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	619,857	7,562,207	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 $SO4^{2}$: 250 mg/L TSS: 55 mg/L
						Low Flow 4 m^3/s	0.142 m^3/s	EC: 3,000 µS/cm $SO4^{2}$: 300 mg/L TSS: 55 mg/L
						Medium Flow 10 m^3/s	0.257 m^3/s	EC: 4,000 µS/cm $SO4^{2}$: 300 mg/L TSS: 200 mg/L
						High Flow 50 m^3/s	1.09 m^3/s	EC: 5,000 µS/cm $SO4^{2}$: 400 mg/L TSS: 200 mg/L
						Very High Flow 100 m^3/s	2.02 m^3/s	EC: 5,000 µS/cm $SO4^{2}$: 400 mg/L TSS: 300 mg/L
						Flood Flow 250 m^3/s	3.07 m^3/s	EC: 8,000 µS/cm $SO4^{2}$: 400 mg/L TSS: 400 mg/L

Table 6.11 – Proposed receiving water contaminant trigger levels

Quality characteristic	Units	Trigger level	Monitoring frequency
Electrical conductivity (EC)	µS/cm	1,000 (maximum)[1]	Daily during the release
pH	pH units	6.5 - 8.5 (range)[2]	
Total suspended solids (TSS)	mg/L	1,050 (maximum)[3]	
Sulphate (SO_4^{2-})	mg/L	250 (maximum)[1]	

Notes: 1/ Final Model Water Conditions for Coal Mines in the Fitzroy Basin (DERM, 2009)
2/ Isaac River Sub-basin Water Quality Objectives
3/ 80th percentile of local water quality samples

6.10 Isaac River streamflows

To simulate flows in the Isaac River, AWBM parameters have also been developed for the following Isaac River catchments:

- Issac River to Burton Gorge Dam: 363.7 km^2.
- Upper Isaac River to the Isaac River gauging station (Figure 3.10): 2,675 km^2.

The adopted AWBM parameters are presented in Table 6.12 and 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.

Table 6.12 – Adopted AWBM rainfall runoff parameters for the Isaac River catchments

Parameter	Burton Gorge	Upper Isaac
C1 (mm)	10.5	12
C2 (mm)	60	120
C3 (mm)	200	250
A1	0.074	0.134
A2	0.493	0.433
A3	0.433	0.433
Cav	117.0	161.8
BFI	0.19	0.35
Kbase	0.77	0.7
Ksurf	0.06	0.2
Cv	11.6%	6.5%

6.11 Salinity parameters

The water balance model has been configured to use electrical conductivity (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 (Terrenus, 2026).

The adopted EC concentrations are given in Table 6.13.

Table 6.13 – Modelled salinity parameters

Land use/inflow	EC (µS/cm)	Source
Isaac River flows	240-480 (dependent on flow)	Flow vs EC relationship developed based on recorded EC at Deverill Gauging Station between 2011 and 2025, representative of the EC for Isaac River flows. Refer to Section 6.11.1 for further details.
Natural	225	Based on median recorded EC at Isaac River monitoring locations (IR1, IR1A, IR4, IR5, W2, and W8); representative of the EC for natural runoff
Spoil dump/available for rehabilitation	395	Based on median EC value for spoil kinetic leach testing (RGS, 2026), representative of the EC for runoff from active spoil areas.
Pit floor	4,800	Based on median value of IPM and IDM MAW storage water quality sampling for 2025, representative of the EC for runoff from the pit floor.
Compacted/roads/hardstand	2,700	Based on median value of IDM MIA Dam storage water quality sampling for 2025, representative of the EC for runoff from hardstand areas.
Cleared/pre-strip/benching	600	Based on adopted value in latest integrated IPC water balance model, representative of the EC for runoff from cleared and pre-strip areas.
Rehabilitated spoil	225	Assumed to be similar to natural catchment salinity once rehabilitation is established, representative of the EC for runoff from rehabilitated overburden dumps.
Groundwater	11,550	Based on the median EC value for bores within the Rangal Coal Measures across 84 samples.
MAW water (pipeline)	4,800	Based on median value of IPM and IDM MAW storage water quality sampling for 2025, representative of the EC of water that would be pumped from IDM to IDE.
Raw water (pipeline)	210	Based on median value of IPM and IDM Raw Water Dam storage water quality sampling for 2025, representative of the EC of water that is suppled from the raw water pipeline.

6.11.1 Isaac River salinity

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, as shown in Figure 6.11. This relationship flow-EC relationship for the Isaac River has been incorporated into the water balance model as the EC source term the flows in the Isaac River upstream of the Project. This flow and salinity are used by the water balance model to assess whether controlled releases can occur, as well as assess the potential impact of discharges on the receiving water salinity.

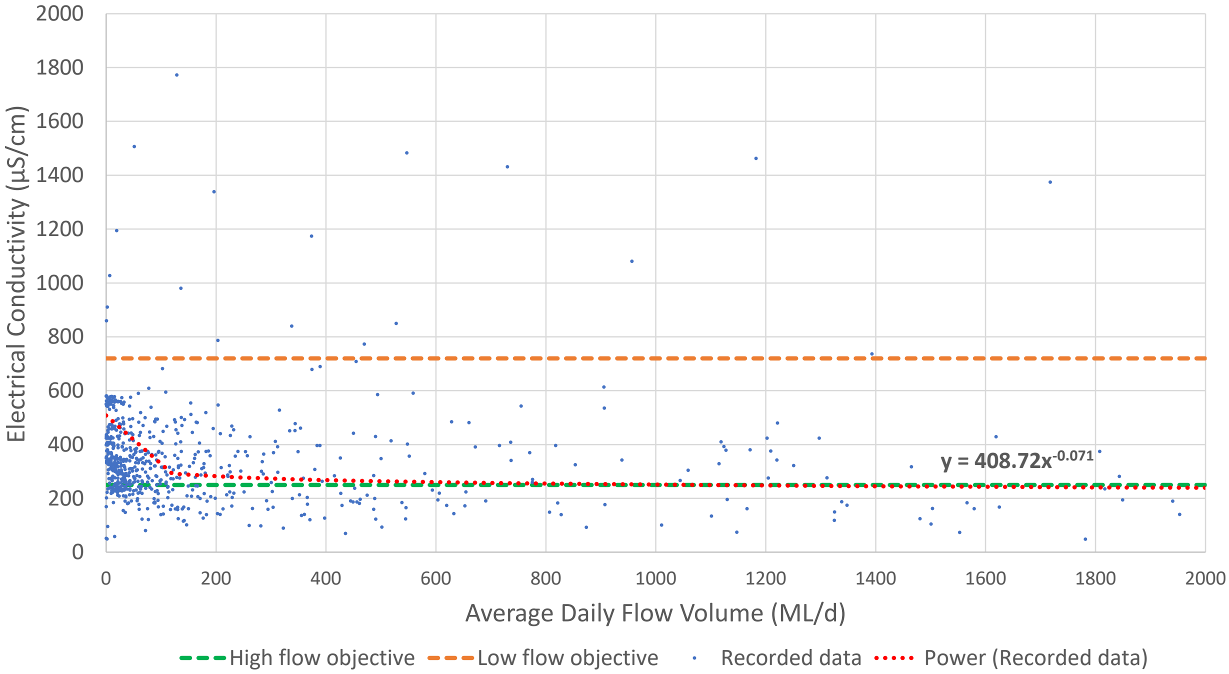


Figure 6.11 – Relationship between EC and mean daily flow volume at Deverill Gauge

7 Water management system assessment

7.1 Overview

Assessment of the proposed IDE water management system, 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 (see Section 7.3.1);
- Mine affected water inventory (see Section 7.3.2);
- Pit inundation characteristics (see Section 7.3.3);
- Controlled water releases (see Section 7.3.4);
- Uncontrolled spillway discharges (see Section 7.3.5);
- Mine affected water transfers to IPC (see Section 7.3.6);
- Imported mine affected water from IPC (see Section 7.3.7;
- IPC mine affected water inventory (see Section 7.3.8);
- IPC raw water take (see Section 7.3.9); and
- Overall salt balance (see Section 7.3.10).

In this report the 'IPC water management system' refers to the existing water management systems at IPM and IDM, prior to the integration of the IDE Project into IPC. An assessment of the overall mine affected water inventory at IPC has also been 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 IDE Project.

It is important to note that investigation 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.

7.2 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 IDE, based on 121 realisations with different climatic sequences.

The model results are presented as a probability of exceedance. For example, the 10^{th} percentile represents 10% probability of exceedance and the 90^{th} percentile results represent 90% probability of exceedance. There is an 80% chance that the result will lie between the 10^{th} and 90^{th} 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 50^{th} percentile trace does not represent the model time series for median climatic conditions.

7.3 Water balance model results

7.3.1 Overall water balance

Water balance results for the IDE Project for all of the 121 model realisations are presented in Table 7.1, 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. Rainfall yield for each stage is affected by the variation in climatic conditions within the adopted climate sequence.

Table 7.1 provides an indication of the long-term average annual inflows and outflows. Key outcomes from the overall water balance are as follows:

- Average annual inflows from rainfall runoff are generally consistent between Phase 1 and Phase 6.
- The spillway overflows from the sediment dams are highest in Phase 1 and generally reduce between Phase 2 and Phase 6.
- Transfer of water from IPC (i.e. IDM and IPM) increases over time from Phase 1 to Phase 6.
- Transfer of water to IPC (i.e. IDM and IPM) is relatively consistent over time
- The total change in inventory is low for all stages, which indicates that the system is generally in balance under "average" climate conditions. It also indicates that the inventory at IDE can be successfully managed through the proposed transfers to/from IPC.

It should be recognised that the following items are subject to climatic variability:

- Rainfall runoff;
- Evaporation;
- Dust suppression demand;
- Transfers to/from IDM;
- Dam overflows and clean water discharges; and
- Controlled releases.

Whilst it provides an indication of the long-term average annual inflows and outflows, application of the nominated values for other purposes should only be undertaken with due consideration of the suitability of the nominated value and any potential implications.

In particular, the "average" sediment dam overflows do not necessarily mean that discharges occur under median climatic conditions. It means that there was a discharge in at least one of the 121 model realisations. A more detailed analysis of the performance of the various components of the water management system is provided in the following sections.

Table 7.1 – Average annual water balance – IDE Project

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
INFLOW (ML/yr)						
Rainfall runoff	910	920	888	1,054	906	913
Groundwater inflows	46	46	116	112	138	71
Transfer from IPC	413	562	555	943	1,188	1,258
Net raw water inflow	25	25	25	25	25	25
TOTAL INFLOWS	**1,394**	**1,554**	**1,584**	**2,134**	**2,257**	**2,266**
OUTFLOWS (ML/yr)						
Evaporation from storages	182	191	189	220	212	216

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
			INFLOW (ML/yr)			
Haul road dust suppression	612	807	894	1,388	1,647	1,647
Transfer to IPC	94	103	170	221	202	190
Clean water discharges	177	185	134	127	90	89
Dam overflows (offsite)						
MAW dams	0	0	0	0	0	0
Sediment dams	260	274	188	169	102	118
Controlled releases	9	6	7	7	7	6
TOTAL OUTFLOWS	**1,334**	**1,566**	**1,582**	**2,131**	**2,260**	**2,266**
			Change in volume (ML/yr)			
Changed in stored volume	59	-13	2	3	-3	1

7.3.2 Mine affected water inventory

Figure 7.1 shows the combined forecast inventory for MAW1, MAW2 and MAW3 over the 16-year forecast. To prevent uncontrolled discharges from the mine water storages, maximum operating volumes (MOVs) have been set for the out-of-pit MAW storages (see Table 4.3). The MOV is the volume at which pumping from the pit (MAW MOV) and sediment dams (SED MOV) to the mine affected water storages ceases (specifically MAW2). This was included as an operating rule in the water balance model. 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 IDE, 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.

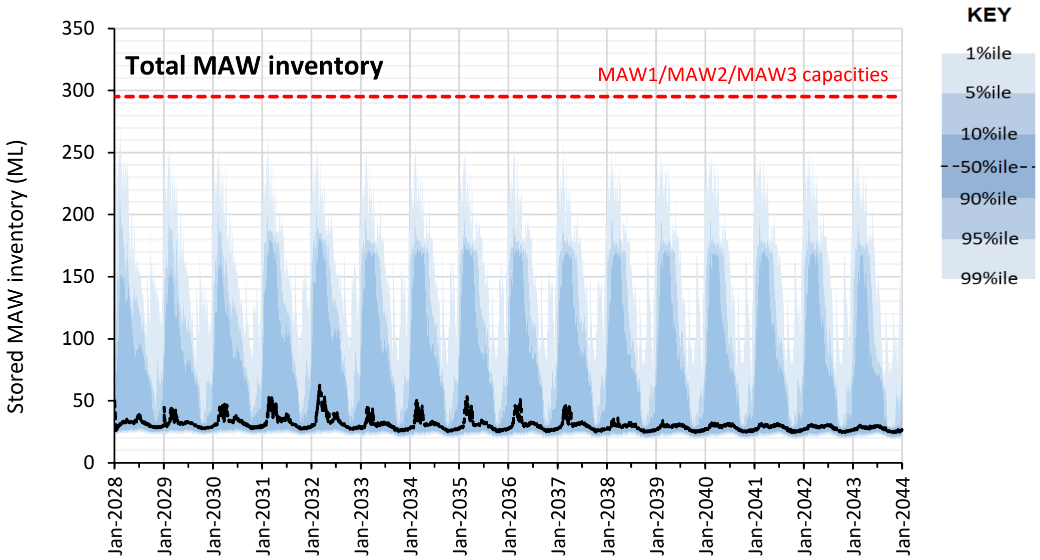


Figure 7.1 – Forecast mine-affected water inventory

7.3.3 Pit inundation characteristics

Figure 7.2 shows the forecast inventory for the IDE Project mining pit over the 16-year simulation. The pit recovers (i.e. becomes dry) after each wet season when IDE is operational. The pit will become a final void after operations cease at IDE and hence will accumulate water from 2043 onwards.

The forecast modelling results for the pit inventory are summarised as follows for the 16 years of IDE operations:

- For the 1%ile results (very wet climatic conditions), the peak inventory in the pit reaches a volume of around 1,440 ML.
- For the 10%ile results (wet climatic conditions), the peak inventory in the pit reaches a volume of around 280 ML. This equates to less than 2% of total pit capacity and should be able to be managed through in-pit sumps.
- The pit remains effectively dry (less than 30 ML of stored water) for median and drier climatic conditions.

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

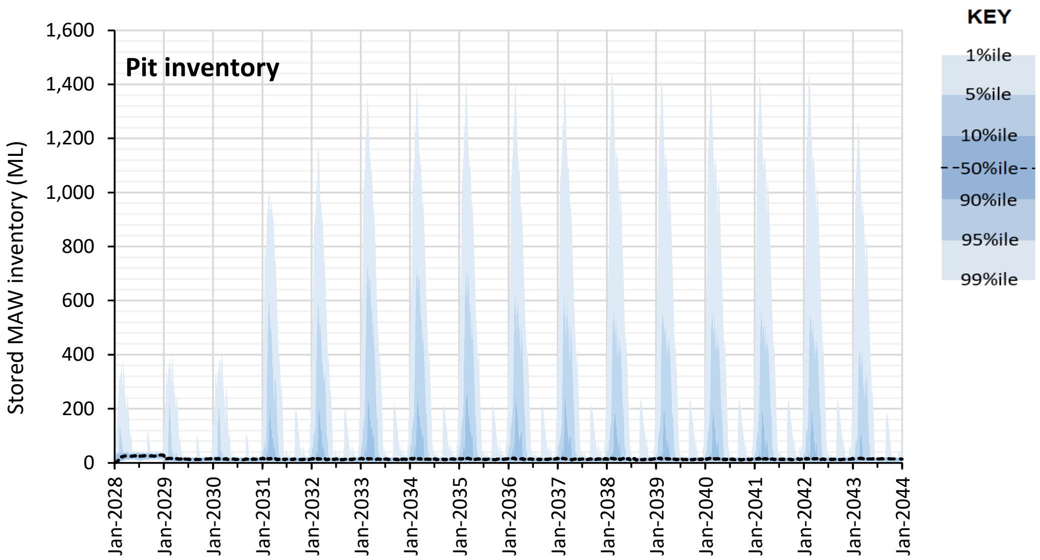


Figure 7.2 – Forecast pit inventory

7.3.4 Controlled water releases

The water balance model is configured to release water in accordance with the proposed controlled release conditions outlined in Section 6.9. The predicted annual controlled release volumes from MAW2 are provided in Figure 7.3. 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 projected to occur in median and drier climatic conditions.

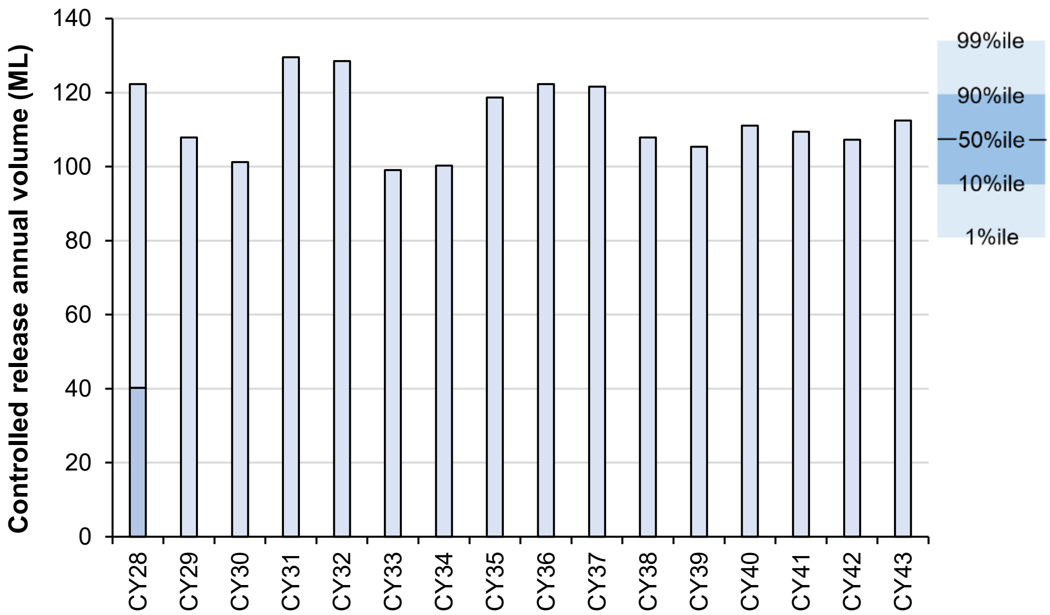


Figure 7.3 – Forecast annual controlled release volumes

7.3.5 Uncontrolled spillway discharges

7.3.5.1 Mine affected water dams

There are no MAW dams that overflow directly to the receiving environment. Therefore, there is nil risk of uncontrolled spillway discharges of MAW to the receiving environment.

7.3.5.2 Sediment dams

Consistent with the IECA design standard, the IDE 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 directly to the environment: SD4, SD6, SD7, SD9, SD10 and SD11.

The predicted annual combined sediment dam overflows under this scenario are provided in Figure 7.4. 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.

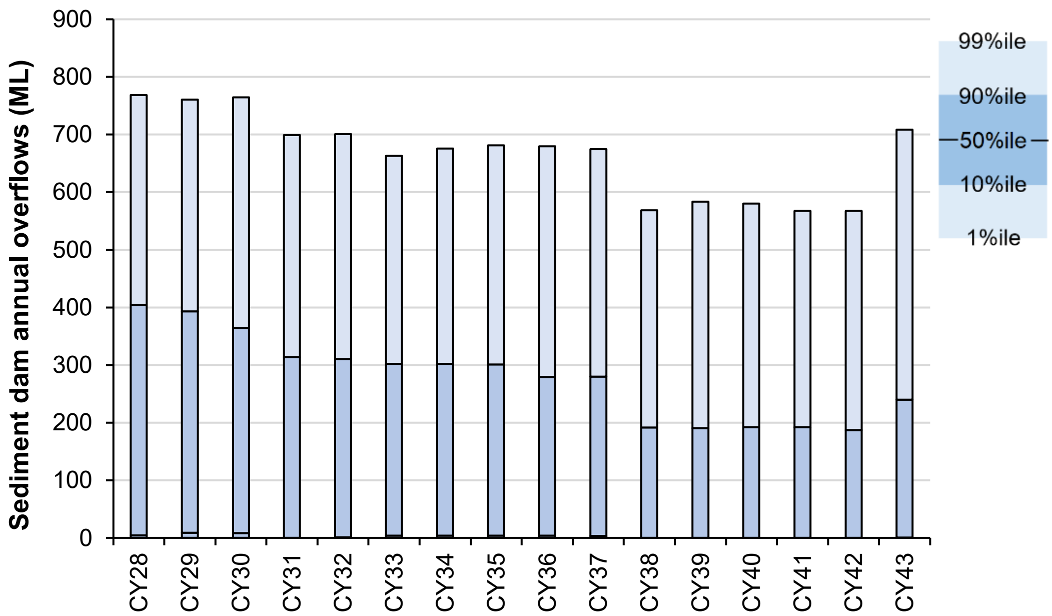


Figure 7.4 – Forecast annual sediment dam overflow volumes

An assessment of the predicted salinity of overflows from the sediment dams to the receiving environment has been undertaken. The modelling indicates that salinity of receiving waters 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.

7.3.6 Mine affected water transfers to IPC

The ability of the IDE pit to recover after each wet season is largely attributed to the capacity of the IDE WMS system to transfer water to IPC when required. The forecasted annual volume of water transferred to IPC is shown in Figure 7.5. The following is of note regarding these results:

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

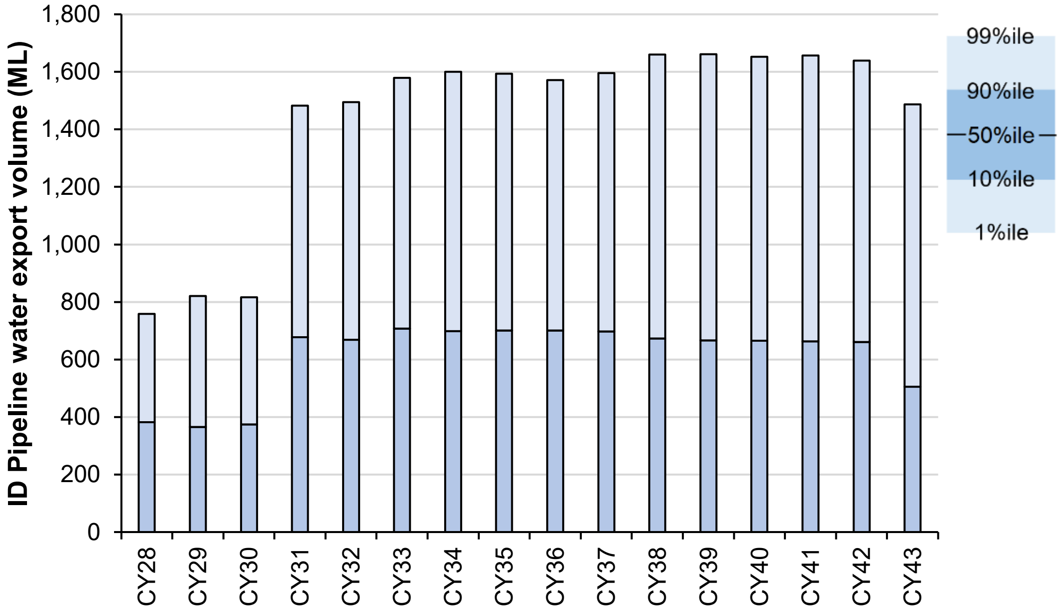


Figure 7.5 – Forecast pit inventory

7.3.7 Imported mine affected water from IPC

Water from external sources is required to meet operational water demands, primarily during extended dry climatic periods and periods of low groundwater inflows. To supplement the water demands at IDE, water will need to be sourced from IPC.

A key objective of the mine site water management system 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 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 significantly from year to year.

Figure 7.6 shows the total annual modelled demand for mine affected water from IPC over the 16-year simulation. The modelling results show the following:

- IDE WMS water will require mine affected water from IPC for most climatic realisations over the 16 years of IDE operation.
- For the 99%ile results (very dry climatic conditions), a maximum of 1,670 ML/a will be demanded from IPC to supplement water supplies at IDE.
- For the 90%ile results (dry climatic conditions), a maximum of 1,620 ML/a will be demanded from IPC to supplement water supplies at IDE.

- For the 50%ile results (median climatic conditions), a maximum of 1,390 ML/a will be demanded from IPC to supplement water supplies at IDE.
- For the 10%ile results (wet climatic conditions), a maximum of 905 ML/a will be demanded from IPC to supplement water supplies at IDE.
- For the 1%ile results (very wet conditions), a maximum of 650 ML/a will be demanded from IPC to supplement water supplies at IDE.

The modelling results show that the IDE WMS is dependent on the pipeline to IPC to supplement shortfalls in water at IDE, even during very wet climatic conditions. This is a function of designing an integrated IPC water management system, with reduced footprint and hence with limited storage capacity available at IDE to hold significant volume of MAW during the dry season.

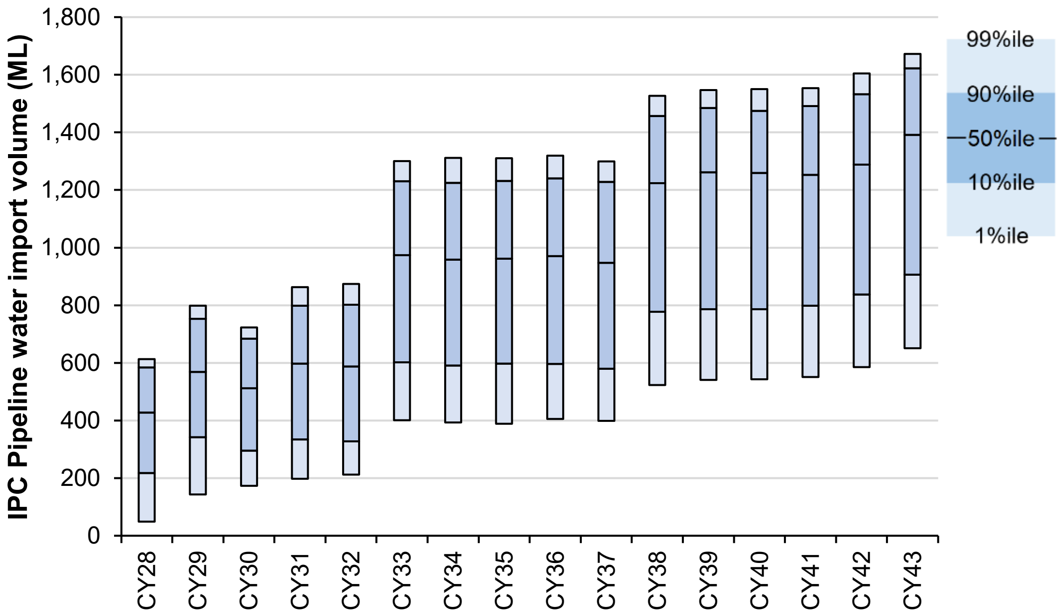


Figure 7.6 – Annual MAW demand from IPC

7.3.8 IPC mine water inventory

The total IPC mine water inventory is shown in Figure 7.7. This figure also shows combined maximum operating volumes (MOV) for the IPC storages at various stages as shown in Table 7.2. The MOV will change over time as mining is completed at IPM and IDM, allowing for the storage of excess water if required.

The available capacity denoted by the MOV has been estimated based on the timing and capacities shown in Figure 7.7. These results demonstrate that the IPC system can manage the addition of IDE water transfers and demands. The model results show the following:

- For the 1%ile results (very wet climatic conditions), the peak inventory in the IPC mine water system reaches a volume of around 11.1 GL.
- For the 10%ile results (wet climatic conditions), the peak inventory in the IPC mine water system reaches a volume of around 8.0 GL.
- For the 50%ile results (median climatic conditions), the IPC mine water system reaches a volume of around 3.1 GL.

The model results demonstrate that the IPC WMS is able to easily accommodate the water transfers and demands from the Project. The total forecast mine water inventory at IPC is well below the combined capacity for the system, under the most extreme climatic conditions.

Table 7.2 – Estimates of available storage capacity at IPC

Year/s (inclusive)	Combined capacity to void source/sink trigger elevation (GL)	Pits/voids contributing to IPC capacity
2028	38.9	S2 Pit, E2/3 Pit & E5 Pit (IPM)
2029-2043	87.0	S2 Pit, E2/3 Pit & E5 Pit (IPM) Pit 1 (ID)

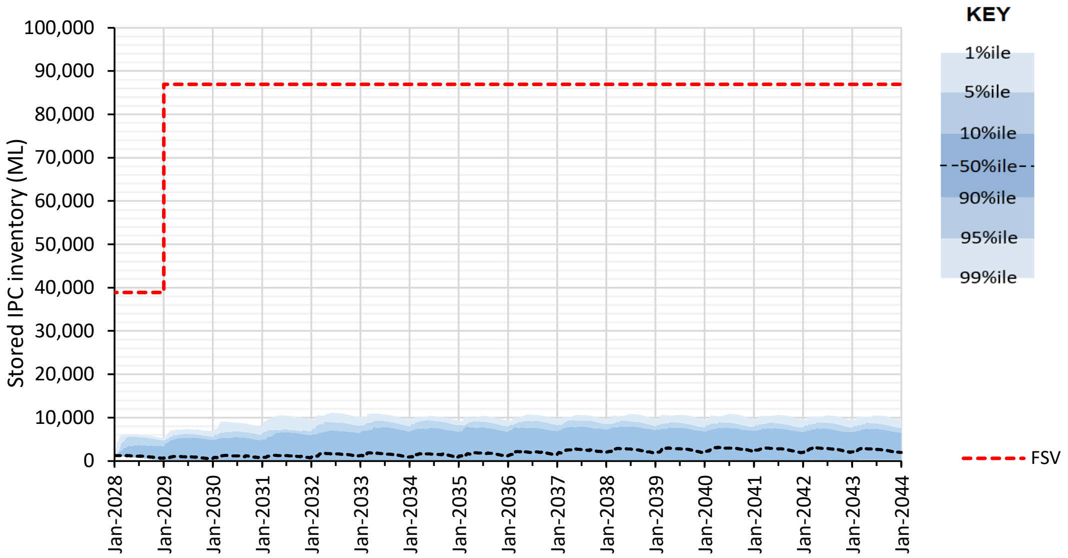


Figure 7.7 – Forecast total IPC MAW inventory

7.3.9 IPC raw water take

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

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

The current annual raw water allocation available to IPC is 1,287 ML/a (938 ML/a for existing IPC allocation, and 349 ML/a for Stanmore's non-operational Millenium mine adjoining IPC). The modelled external water requirements at IPM are shown in Figure 7.8. This figure 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 IDE 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 water reserves at the integrated WMS be depleted, and additional external raw water will be required to satisfy site demands. Even when this occurs, the existing allocation would not be exceeded.

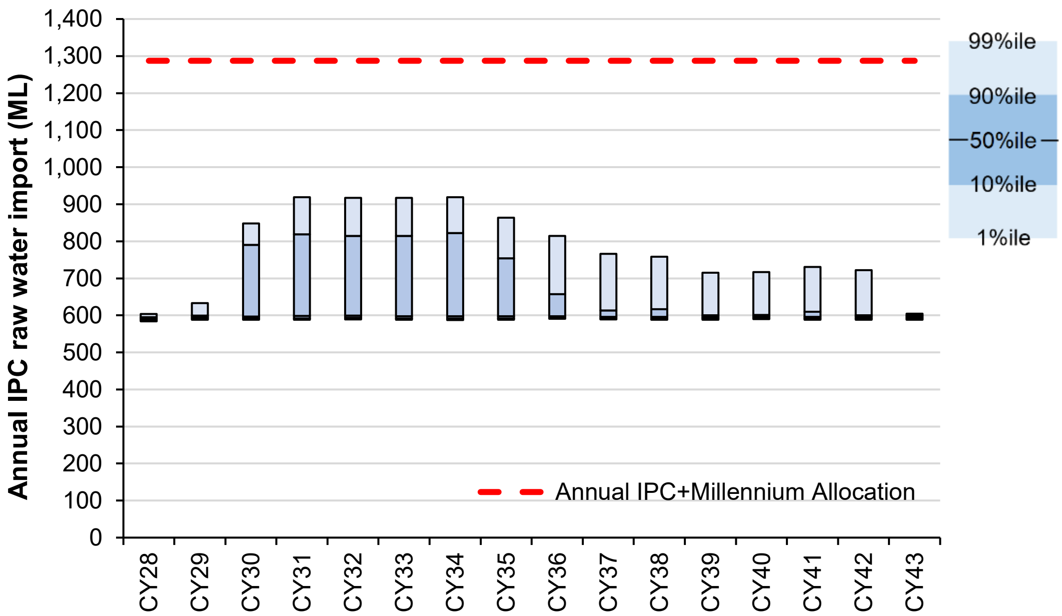


Figure 7.8 – External raw water demand for IPC (including IDE demands)

7.3.10 Overall salt balance

Table 7.3 provides an indication of the long-term average annual salt inputs and outputs from the Project WMS, with net contributions from IPC when supplying water to the Project.

Table 7.3 – Average annual salt balance – IDE Project

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
INPUT (t/yr)						
Catchment runoff	919	922	1,102	1,454	1,153	984
Groundwater inflows	535	535	1,339	1,296	1,600	817
Transfer from IPC	1,981	2,698	2,662	4,527	5,702	6,037
TOTAL INPUTS	**3,435**	**4,154**	**5,104**	**7,277**	**8,455**	**7,839**
OUTPUTS (t/yr)						
Haul road dust suppression	2,555	3,750	4,543	6,605	7,955	7,438
Transfer to IPC	179	203	354	446	349	276
Clean water discharges	99	108	74	88	65	65
Dam overflows (offsite)						
MAW dams	0	0	0	0	0	0
Sediment dams	144	157	109	119	75	81
Controlled releases	17	12	15	13	12	10
TOTAL OUTPUTS	**2,994**	**4,228**	**5,095**	**7,270**	**8,455**	**7,871**
Change in salt load (t/yr)						
Changed in stored salt load	442	-74	9	7	-1	-32

7.4 Climate change assessment – operational period

7.4.1 Climate change factors

The potential changes to climate within the operational life of the Project were assessed using the Australian Government Consistent Climate Scenarios (CCS) project (Ricketts, J., et al, 2013). 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). Further details on the CCS climate data are provided in Section 8.4.2 as part of the final void water balance modelling.

The Shared Socioeconomic Pathway SSP2-8.5 was selected as the emission pathway for the Intergovernmental Panel on Climate Change (IPCC) 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. This is considered a highly conservative approach, as it applies the 2050 climate change factors to the climate data from the commencement of operations.

7.4.2 Potential climate change impacts

7.4.2.1 Overview

Potential climate change impacts to the water balance were assessed for the operational period of the Project (2028-2043). The water balance model developed for the Project was used to simulate the performance of the WMS using the climate change factors described in Section Climate change factors.

7.4.2.2 Mine affected water inventory – climate change

Figure 7.9 shows the combined forecast inventory for MAW1, MAW2 and MAW3 over the 16-year forecast using the factored climate dataset. The model results show no material change to the operations of the MAW storages (in comparison to base case modelling shown in Figure 7.1).

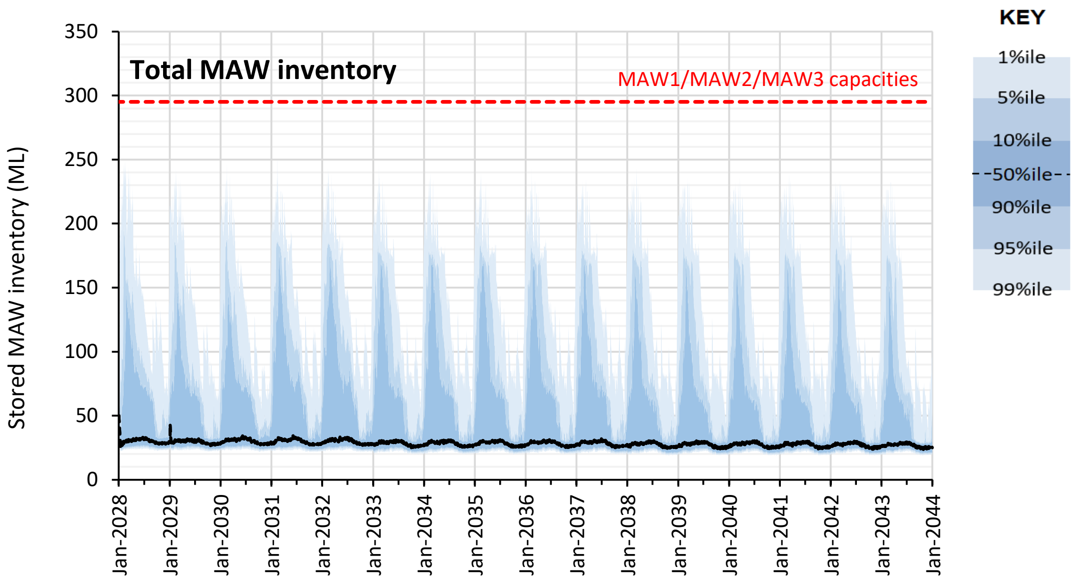


Figure 7.9 – Forecast mine-affected water inventory – climate change assessment

7.4.3 Pit inundation characteristics – climate change

Figure 7.10 shows the forecast inventory for the IDE Project mining pit over the 16-year simulation using the factored climate dataset. The forecast modelling results for the pit inventory are summarised as follows for the 16 years of IDE operations (in comparison to base case modelling shown in Figure 7.2):

- For the 1%ile results (very wet climatic conditions), the peak inventory in the pit (840 ML) is around 600 ML lower than base case conditions.
- For the 10%ile results (wet climatic conditions), the peak inventory in the pit (125 ML) is around 160 ML lower than base case conditions.
- The pit remains effectively dry (less than 30 ML of stored water) for median and drier climatic conditions.

These modelling results demonstrate that the IDE pit is able to continuously operate under all but the most extreme rainfall conditions under a conservative climate change scenario.

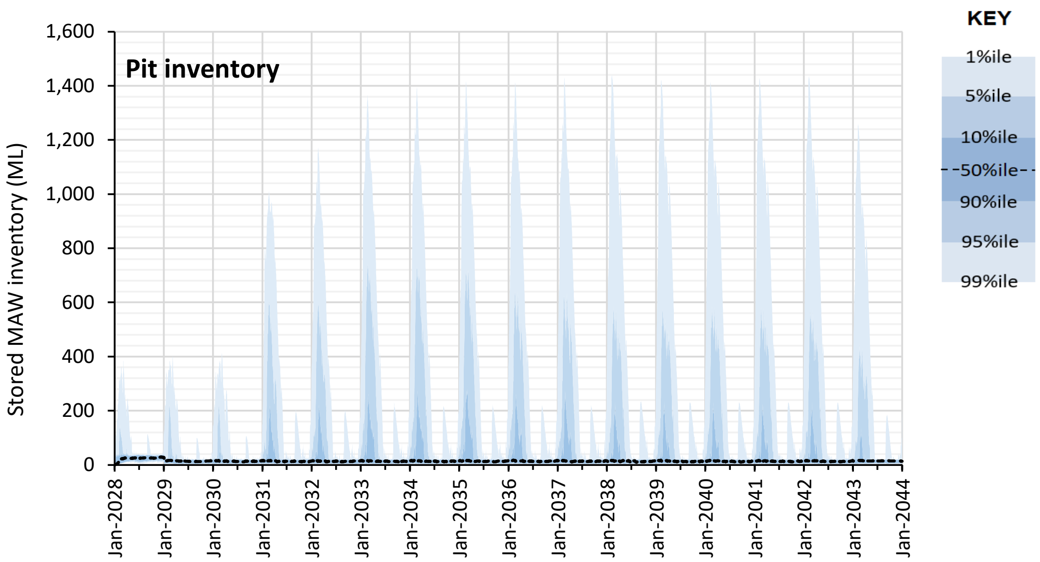


Figure 7.10 – Forecast pit inventory – climate change assessment

7.4.4 Controlled water releases – climate change

The predicted annual controlled release volumes from MAW2 using the factored climate dataset are provided in Figure 7.11. The results show that (in comparison to base case modelling shown in Figure 7.3):

- 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.

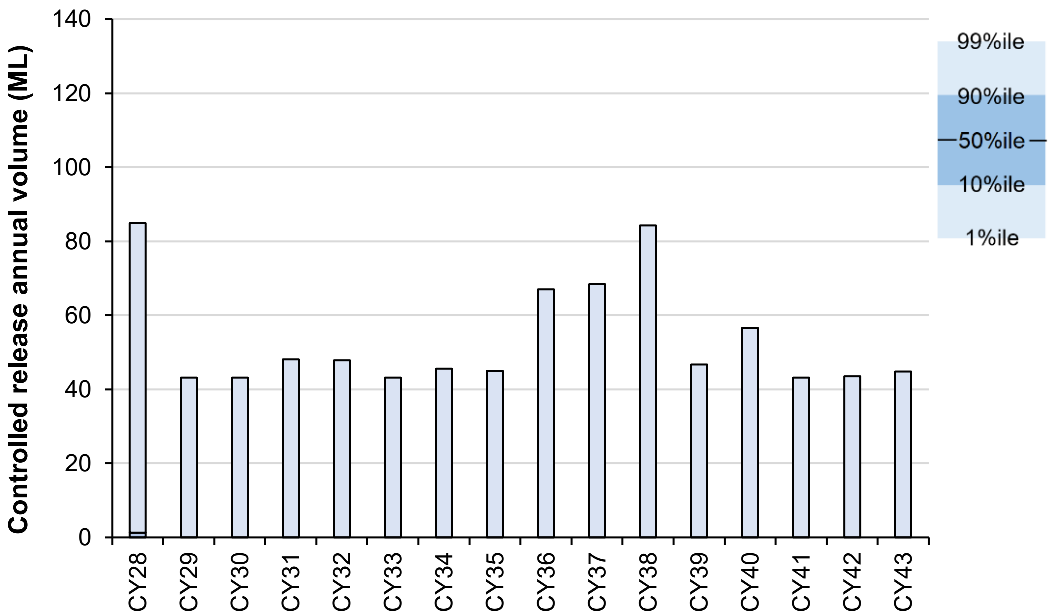


Figure 7.11 – Forecast annual controlled release volumes – climate change assessment

7.4.5 Uncontrolled spillway discharges – climate change

7.4.5.1 Mine affected water dams – climate change

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 MAW to the receiving environment under the conservative climate change scenario.

7.4.5.2 Sediment dams

The predicted annual combined sediment dam overflows using the factored climate dataset are provided in Figure 7.12. The results show that (in comparison to base case modelling shown in Figure 7.4):

- 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.

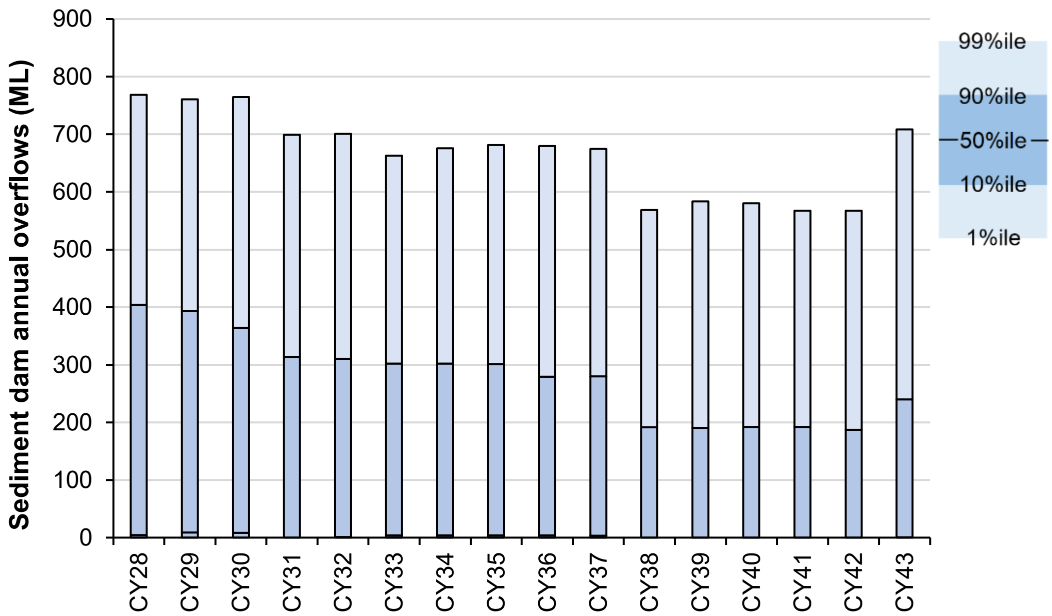


Figure 7.12 – Forecast annual sediment dam overflow volumes

7.4.6 Summary of climate change impacts on the operational water balance

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

- Overall, there is less MAW 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.

7.5 Adaptive management of the water management system

The site water balance model results presented above represent the application of the proposed water management system rules over the life of the Project, regardless of climatic conditions. In reality, there are numerous options for adaptive management of the mine water system 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 IDE to reflect any changes in the surface water management system over the life of the operation.

8 Final void behaviour

8.1 Overview

Water levels in the final void will vary over time, depending on the prevailing climatic conditions, and the balance between evaporation losses and inflows from rainfall, surface runoff, and groundwater. A final void GoldSim model (separate to the GoldSim model used for the operational modelling) was used to assess the likely long-term water level behaviour of the final void.

The volume of water in the void is calculated at each time step as the sum of direct rainfall to the water surface, catchment runoff and groundwater inflows, less evaporation losses.

Key features of the final landform include:

- Pit void located outside of the Isaac River floodplain.
- Conrock Gully diversion remains as part of the final landform.
- Northern void area backfilled to approximate pre-mining levels.
- Isaac River levee is decommissioned and its footprint rehabilitated.
- Rehabilitated out-of-put spoil dump.

8.2 Final void geometry

The proposed IDE final landform incorporates a single residual void. This final landform would form during mining, incorporating in-pit backfilled spoil sitting atop a mined pit shell. A digital elevation model (DEM) of the final landform (i.e. the final surface expected at the end of the mine life) was provided by Stanmore.

A summary of the final void geometry is provided in Table 8.1, including the year that the void commences.

Table 8.1 – Residual void geometry

	Floor level (mAHD)	Crest level (mAHD)	Depth (m)	Volume to crest (ML)	Surface area at crest (ha)
Final void	122	203	80	34,641	133.3

8.3 Final void configuration

The final void configuration and contributing catchment area is shown in Figure 8.1 and Table 8.2. A depth varying storage evaporation factor has been applied to each void to simulate the expected change in evaporation as residual void water levels vary. The storage evaporation factors are as follows:

- Bottom of void – 0.8.
- 10 m from top of void – 0.9.
- Top of void – 1.0.

Table 8.2 – Contributing catchment to final void

	Contributing surface catchment area (ha)			
	Natural	Spoil	Rehab	Total
Final void	20.5	39.4	379.3	**439.2**

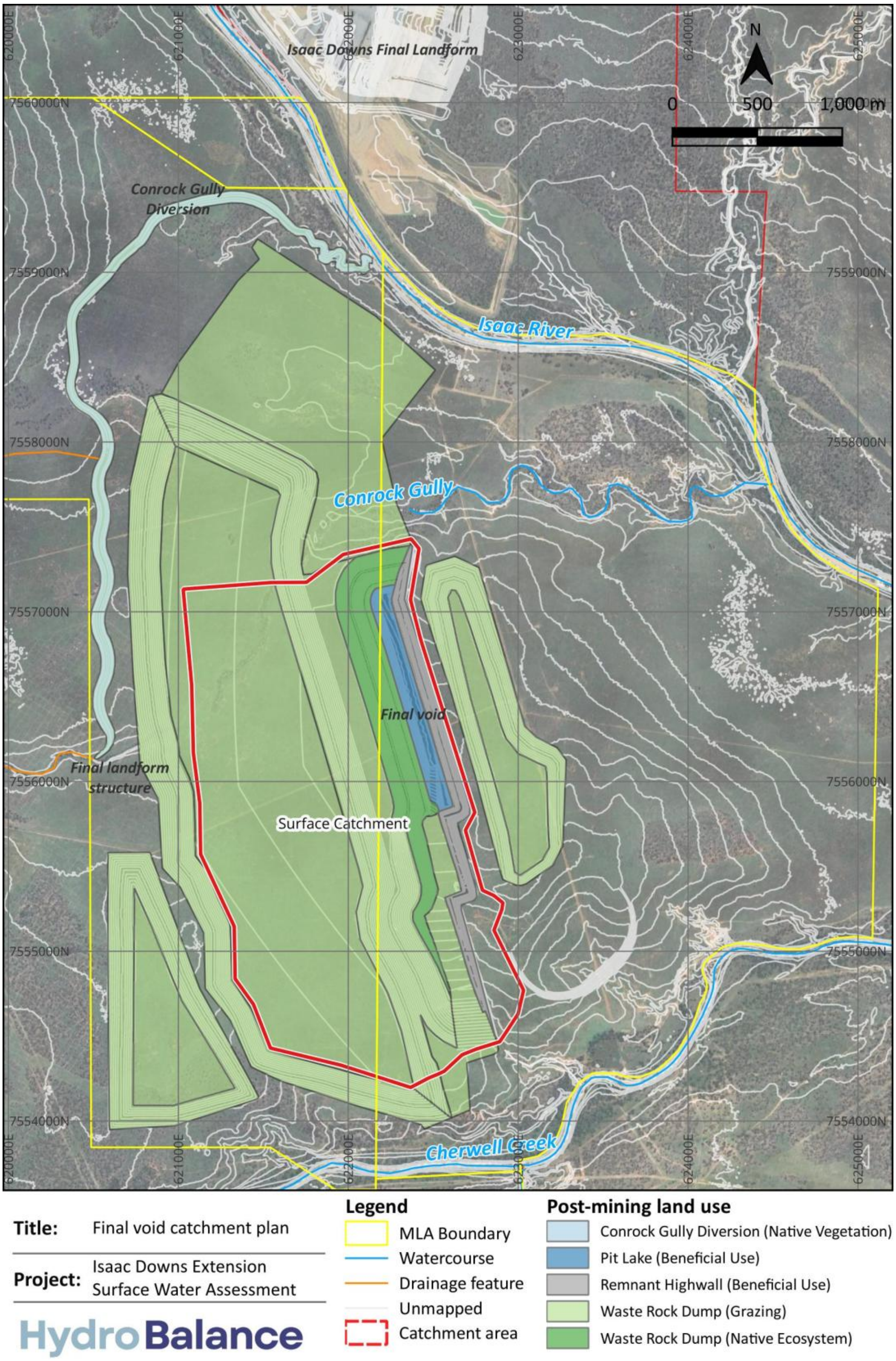


Figure 8.1 – Final void catchment plan

8.4 Model configuration

8.4.1 Modelling approach

The GoldSim software platform was used to simulate the long-term water level behaviour for the void. Water levels in the residual void would vary over time, depending on the prevailing climatic conditions, and the balance between evaporation losses and inflows from rainfall, surface runoff, and groundwater.

The GoldSim model was used to simulate the generation, movement, and loss of water on a daily time-step within the final void, over a 500-year period. The volume of water in the voids was calculated at each time step as the sum of direct rainfall to the void surface, catchment runoff, and groundwater flux, less evaporation losses. The model also tracks the quantity of salt captured and stored within the system.

Key components of the model are summarised in the following sub-sections, including descriptions of key model inputs, assumptions, and sensitivity parameters.

8.4.2 Climate data

The Australian Government Consistent Climate Scenarios (CCS) project (Ricketts, J., et al, 2013) 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 CCS project provides climate projections as a daily time series across Australia on a 0.05-degree grid. The grid point closest to the centroid of the Project was used for this assessment.

The Shared Socioeconomic Pathway SSP2-8.5 was selected as the emission pathway for the Intergovernmental Panel on Climate Change (IPCC) assessment report AR5, with a base case global warming sensitivity for the Year 2050. The Year 2050 was selected as it represents a general starting point for the void commencement date.

SSP2-8.5 represents “middle-of-the-road” socio-economic development but with very high greenhouse gas emissions, equivalent to a high-emissions / high radiative forcing pathway (8.5 W/m^2 by 2100). It is considered a high-end climate risk scenario (rather than a central or most likely pathway), but it used to help test system sensitivity to extreme warming and is valuable for understanding upper-bound risks.

The climate data was selected according to the following climate sensitivity and climate change model composites:

- Climate warming sensitivity assumed to fall in the medium category; and
- The representative future climate cluster was selected as HP, which represents a high level of global warming.

Using the 64 years of climate-adjusted rainfall and evaporation data, a 500-year stochastic rainfall and evaporation dataset was generated using the Stochastic Climate Library (SCL) software, which forms part of the eWater Cooperative Research Centre (CRC) catchment modelling toolkit. The SCL User Guide (SCL, 2004) explains stochastic climate data as follows:

> *“In short, stochastic climatic data are random numbers that are modified so that they have the same characteristics (in terms of mean, variance, skew, long-term persistency, etc…) as the historical data from which they are based. Each stochastic replicate (sequence) is different and has different characteristics compared to the historical data, but the average of each characteristic from all stochastic replicates is the same as the historical data.*
>
> *Using historical climate data as inputs into hydrological models provides results that are based on only one realization of the past climate. Stochastic climate data provide alternative realizations that are equally likely to occur and can therefore be used as inputs into hydrological and ecological models to quantify uncertainty in environmental system associated with climate variability.”*

Using the SCL, 500 replicates of a 500-year rainfall and evaporation sequence have been generated for use in the water balance model. The model generates 500 sets of results (or realisations) that reflect the variation in the historical climate data (1960 to 2024).

Pan evaporation has been converted to Morton's Lake (mLake) and Morton's Wet (mWet) evapotranspiration to account for evapotranspiration losses from the pit lake and catchment as follows:

- Pan evaporation to mLake factor: 0.894 – applied to the evaporation acting on the surface of the pit lake.
- Pan evaporation to mWet factor: 0.850 – applied to the evaporation.

8.4.3 AWBM parameters

The final void GoldSim model uses the same AWBM parameters as for the operational model. Refer to Section 6.4 for further details.

8.4.4 Groundwater inflows

Groundwater inflows into the residual void were provided by SLR (2026) as a time series over 500-year simulation period. The inflows have been provided as two inflow sources:

- Flow to void from spoil – representing the groundwater inflow that enters the void from the backfilled spoil.
- Flow to void from rock - representing the groundwater inflow that enters the void from the highwall (coal seam).

Figure 8.2 shows the modelled groundwater inflows over time for the residual void..

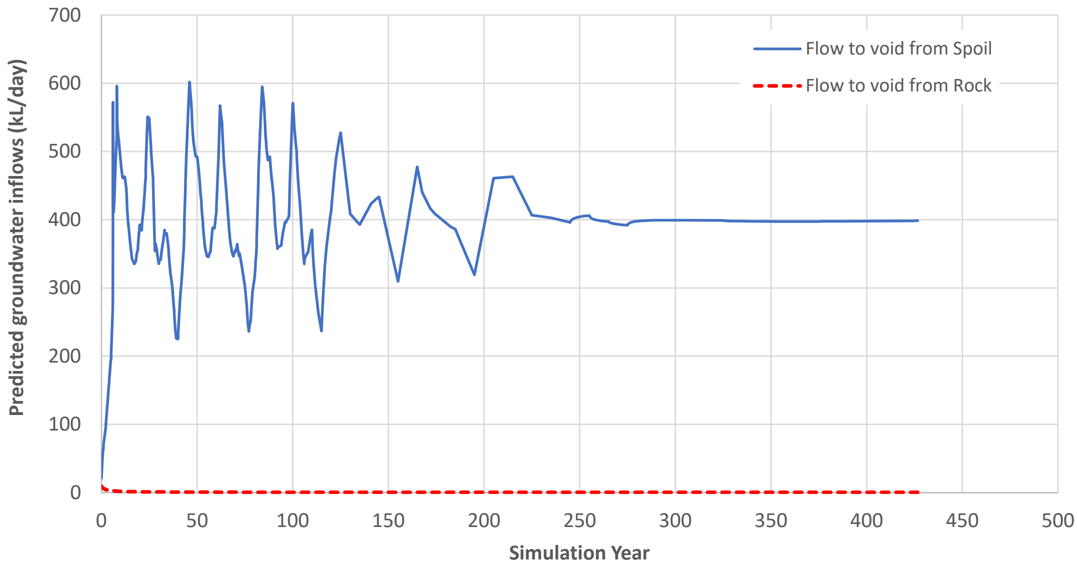


Figure 8.2 – IDE residual void – annual groundwater inflows

8.4.5 Runoff salinity

The salinity concentrations in the final void model have been set to maintain consistency with the salinity source terms set within the RGS (2026) geochemical model. This includes salt loads and concentrations associated with the following model inputs:

- Surface water inputs: runoff from natural, rehab and spoil catchments; and
- Groundwater inputs: inflows from surrounding non-coal rock, inflows from the backfilled spoil mass, and inflows from the coal seam to the void.

The adopted surface runoff salinity for the final void assessment is applied at a fixed concentration and does not include any allowance for decay in runoff salinity over time and is therefore likely to overstate salinity.

The geochemical source terms for salinity are provided in Section 4.5.3 of RGS (2026). Salinity provides a key metric to assess the performance of void as a PMLU for stock watering with the additional scenarios.

8.5 Post-mining land uses

Several post-mining land uses (PMLUs) for water in the final void have been assessed, including:

- Stock watering – use of void water as a cattle drinking water supply
- Algae production facility ('algae farm') – use of void water to produce commercial algae products
- Pumped hydro energy storage (PHES) scheme – use of void water, in combination with a surface storage dam to generate power.

Information on these proposed PMLUs is provided in the EIS. This report models and assesses how these proposed PMLUs alter the void lake levels and salinity.

The stock watering PMLU is considered part of the "base case" scenario final void configuration and therefore is included as part of all assessed final void options.

Two additional scenarios have been modelled:

- Stock watering and algae farm (i.e. without PHES)
- Stock watering, algae farm and PHES.

For the base case scenario, the results of the volumetric modelling (i.e. volumes of water in the void) were provided to RGS for use in hydrogeochemical modelling of void lake water quality. Section 8.6 presents the results of the volumetric and salinity modelling using the GoldSim final void model. The results from this model have been compared against the salinity results from RGS hydrogeochemical model (2026) in Section 8.6.2.2. Modelling results for other hydrogeochemical parameters are provided in RGS (2026).

For the additional model scenarios, both void water volumes / levels and salinity from the GoldSim final void model are presented in this report only.

8.5.1 Stock watering beneficial use (base case)

Final void modelling results indicate that the water quality in the pit void for the final landform is suitable for a stock watering beneficial use (e.g. cattle production) – see Section 8.6.

An annual extraction rate of 29 ML/year (0.08 ML/d) has been applied to the final void. This is based on an average cattle water consumption rate of 29,200 L per head per year (80 L per head per day), for an adopted cattle carrying capacity of 2.4 hectare per Animal Equivalent (AE) and a resulting 970 AE cattle (for 2,234 ha of cattle carrying land). The area of cattle carrying land was derived from the northern portions of Winchester Downs, the property on which the Project is located, and which are currently used for grazing activities, but constrained by lack of consistent water supply.

A water quality salinity threshold of 7,800 µS/cm has been adopted as being "suitable quality" water for the purposes of the final void water quality assessment. This is based on the NSW Department of Primary Industries (DPI) fact sheet "*Water for livestock: interpreting water quality tests*" (DPI, 2014). This fact sheet provides guidance on the general effects of saline drinking water for various livestock types.

For beef cattle, it states that salinity of up to 7,800 µS/cm "*can be used with reasonable safety for dairy and beef cattle, sheep, pigs and horses*". Specifically, for salinities of between 6,300 and 7,800 µS/cm (for beef cattle), "*animals may have initial reluctance to drink or there may be some diarrhoea, but stock should adapt without loss of production*."

There should be no expected adverse effects on beef cattle for salinities of up to 6,300 µS/cm.

These values are generally consistent with the ANZG '*Livestock drinking water guidelines*' (ANZG, 2018), which states that:

- Livestock may be reluctant to drink but should adapt without loss of production for TDS of between 4,000 and 5,000 mg/L (6,250-7,800 µS/cm based on 0.64 EC:TDS conversion factor).
- No adverse effects expected for beef cattle for TDS of up to 4,000 mg/L (6,250 µS/cm based on 0.64 EC:TDS conversion factor).

8.5.2 Algae production

An algae production facility (referred to in this report as an algae farm) has been considered as a potential supplementary PMLU for the final void. Full details of the algae farm configuration are provided in UQ (2026).

The key inputs and outputs to the final void model from the algae farm are as follows:

- Average daily water demand from the void to the algae farm of 203 kL/d:
  - 162 kL/d to offset the net losses from the algae production cycle (primarily evaporative losses).
  - 41 kL/d to offset the estimated average blowdown return to the void. The blowdown is an operational and its volume and frequency is dependent on numerous factors.
  - Salt load is drawn from the void with the makeup demand at the ambient void water concentration (calculated each day).
- Average daily water return to void:
  - 41 kL/d for the estimated blowdown function.
  - It is assumed that the salinity of the blowdown water is 10,000 mg/L TDS (15,400 µS/cm).

8.5.3 Pumped hydro scheme

A small-scale PHES scheme has been considered as a potential supplementary PMLU for the final void. Full details of the PHES configuration are provided in the EIS document, and summarised as follows:

- The final void forms the lower reservoir.
- The upper reservoir is a proposed 135 ML embankment dam, with an operating volume of 60 ML.
- The upper reservoir has a catchment area of 67 ha, and a surface area of 3.92 ha at its operating volume.

As the void water balance model is a daily model, it does not explicitly model the cycle of water between the upper and lower reservoirs. The impact of the upper reservoir on the final void water balance is modelled as follow:

- The model maintains a stored volume in the upper reservoir at 60 ML by pumping water to/from the lower reservoir at a nominal rate of 30 L/s.
- Evaporation losses are applied to a surface area of 3.92 ha each day, simulating the expected dam lake area during the day.
- If the volume in the upper reservoir drops below 60 ML, water is transferred from the lower reservoir to maintain the target operating volume at 60 ML.
- If the volume in the upper reservoir exceeds 70 ML, water is transferred to the lower reservoir to maintain the target operating volume at 60 ML.

8.6 Final void model results – stock watering PMLU only (base case)

8.6.1 Overview

The final void was modelled using the assumptions outlined in the sections above and the results are provided in Section 8.6.2. In addition, analysis of the final void behaviour for extreme rainfall events was undertaken as presented in Section 8.6.3.

8.6.2 Final void model results

8.6.2.1 Water level

The final void modelled water levels for the 500-year simulation period are presented in Figure 8.3, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake reaches equilibrium within the first 100 years, with a water level of between 144 and 148 mAHD. The maximum void water level (147.7 mAHD) is around 54 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- For the 95th percentile results, the void lake reaches equilibrium within the first 100 years, with a water level of between 149 and 152 mAHD. The maximum void water level (152.1 mAHD) is around 50 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- Based on the groundwater modelling (SLR, 2026) the residual void functions as a long-term groundwater sink.

8.6.2.2 Salinity

The final void modelled salinity levels for are presented in Figure 8.4, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 2,800 and 3,100 µS/cm.
- For the 95th percentile results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 3,400 and 4,000 µS/cm.
- The void water quality is suitable to support the proposed stock watering PMLU over the 500 years simulation.

The long-term predicted void water salinity from the RGS hydrogeochemical model is presented in Figure 8.5, showing consistent results with the median GoldSim model results (EC reaching equilibrium around 3,000 µS/cm). This demonstrates that both models are representing the long-term void behaviour consistently.

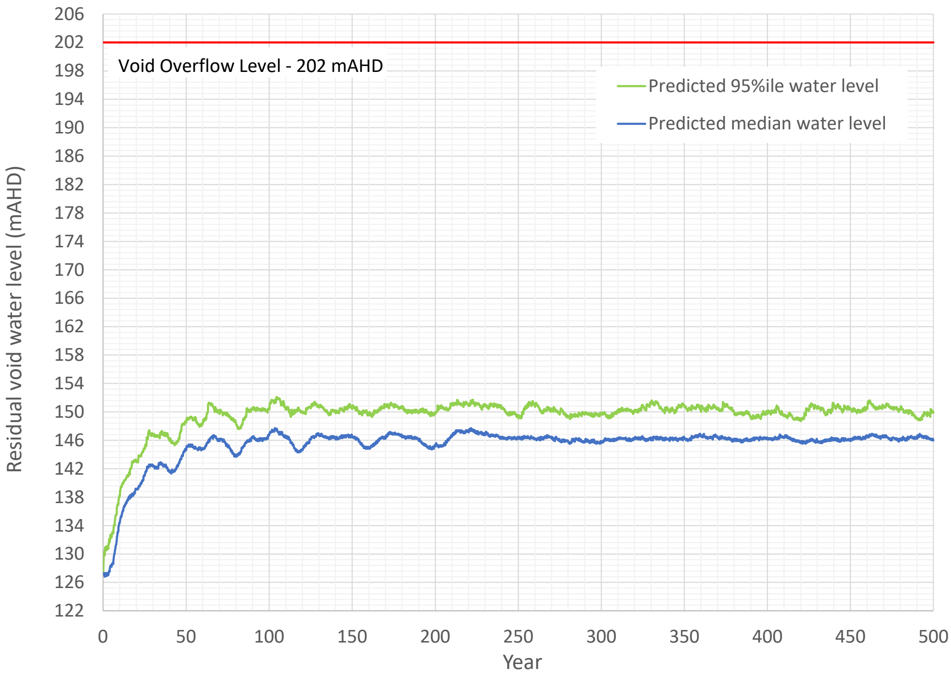


Figure 8.3 – Long-term predicted void water levels (base case)

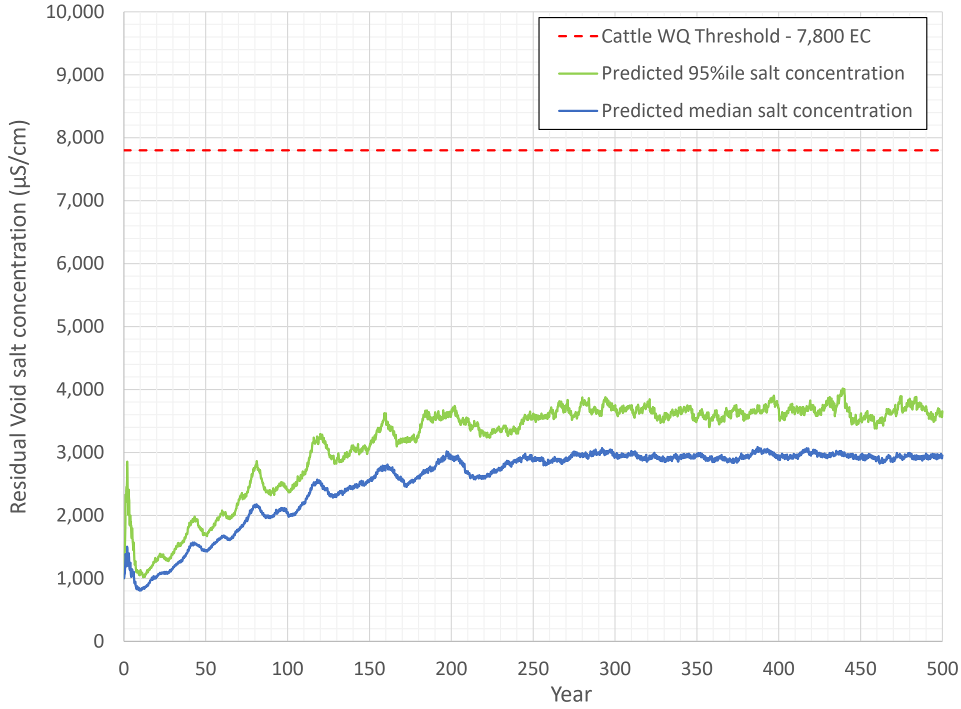


Figure 8.4 – Long-term predicted void water salinity (base case)

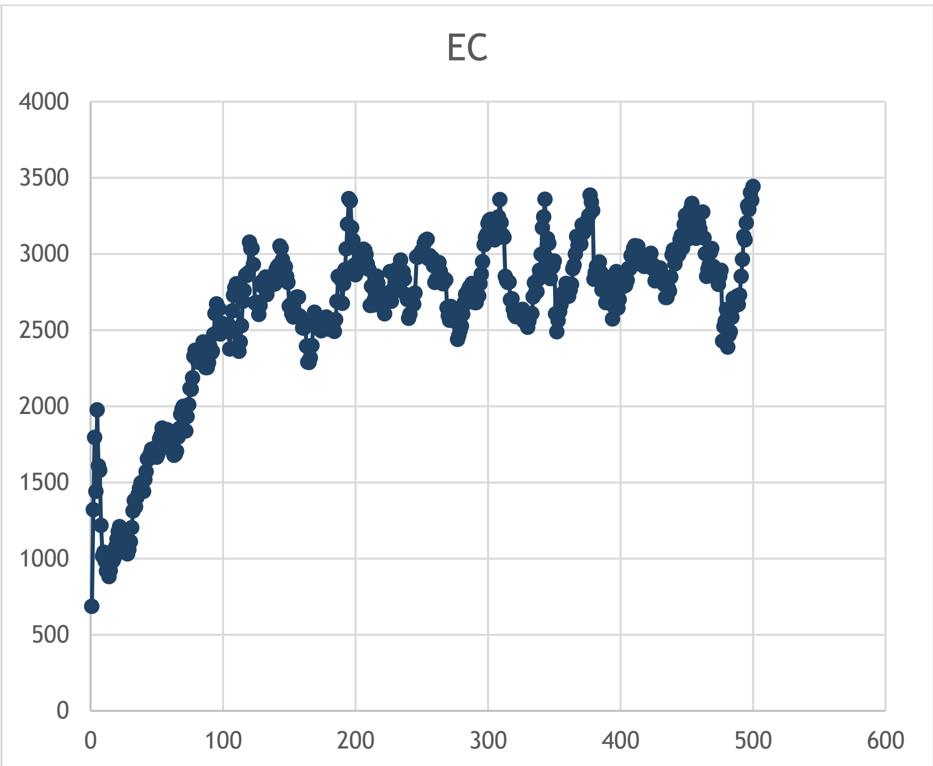


Figure 8.5 – Long-term predicted void water salinity from hydrogeochemical model (RGS, 2026)

8.6.3 Extreme storm event behaviour – stock water PMLU only (base case)

8.6.3.1 Methodology

An assessment of the impact of extreme storm events on the water level in the final void has been undertaken for the final void with the stock watering PMLU. The potential for discharge of void water during a large storm was assessed for the 1 in 1,000 AEP (or 0.1% AEP) 72-hour (3 day) design storm. For conservatism, it has been assumed that the extreme storm would occur coincident with the peak modelled long-term water levels for the 95th percentile simulation result.

Design rainfall depths for the above events were estimated using standard procedures in Australian Rainfall and Runoff (ARR) (Ball et al., 2019). The runoff generated from the storm events has been conservatively calculated assuming 100% of runoff reports to the voids (i.e. no losses) from the surface catchment reporting to the voids.

8.6.3.2 Results

The results of the storm event analysis are presented in Table 8.3. The freeboard value is the difference between the pit crest level and the final water level. This is an indicator of how much free space is available above the maximum pit water level.

These results show that, even during extreme short duration storm events, the final void pit crest would not be overtopped.

Table 8.3 – Storm event modelling results – stock water PMLU only

Void	Runoff volume (ML)	Water level increase (m)	Final volume (ML)	Final water level (mAHD)	Pit crest level (mAHD)	Freeboard (m)
Pit void	2,328	9.4	5,330	161.5	202	40.5

8.7 Final void model results – stock watering and algae farm PMLUs

8.7.1 Overview

The final void with the stock watering and algae farm PMLUs was modelled using the assumptions outlined in the sections above and the results are provided in Section 8.7.2.

8.7.2 Final void model results

8.7.2.1 Water level

The final void modelled water levels for the 500-year simulation period are presented in Figure 8.6, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake reaches equilibrium within the first 100 years, with a water level of between 136 and 138 mAHD. The maximum void water level (138.6 mAHD) is around 63 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- For the 95th percentile results, the void lake reaches equilibrium within the first 100 years, with a water level of between 140 and 144 mAHD. The maximum void water level (144.2 mAHD) is around 58 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- In comparison to the base case scenario, the addition of the algae PMLU reduces the void water levels by around 8 m. The void is able to provide a reliable source of water to both the stock watering and algae farm PMLUs.

8.7.2.2 Salinity

The final void modelled salinity levels for are presented in Figure 8.7, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 3,000 and 3,400 µS/cm. During the first 200 years, the void salinity has intermittent peaks of between 3,700-5,400 µS/cm.
- For the 95th percentile results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 3,700 and 4,300 µS/cm. During the first 200 years, the void salinity has intermittent peaks of between 4,800-7,100 µS/cm.
- In comparison to the base case scenario, the addition of the algae PMLU results in similar salinity equilibrium levels, with some higher peak salinities during the first 250 years of the simulation.
- The void water quality is suitable to support the proposed stock watering PMLU over the 500 years simulation, as well as the requirements of the algae farm.

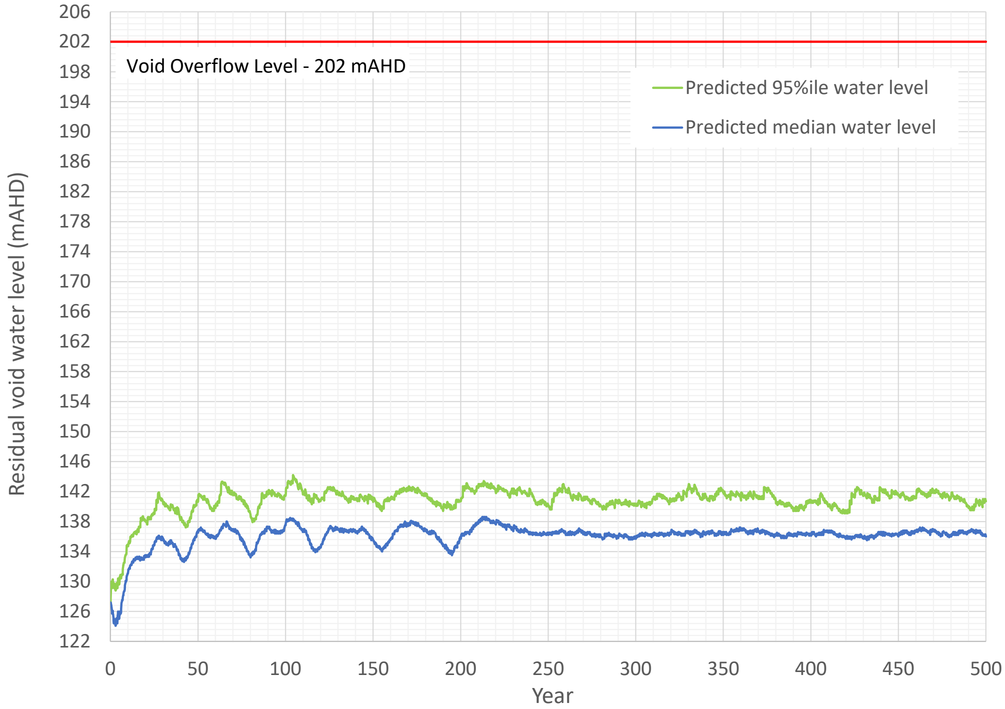


Figure 8.6 – Long-term predicted void water levels (stock watering + algae farm PMLUs)

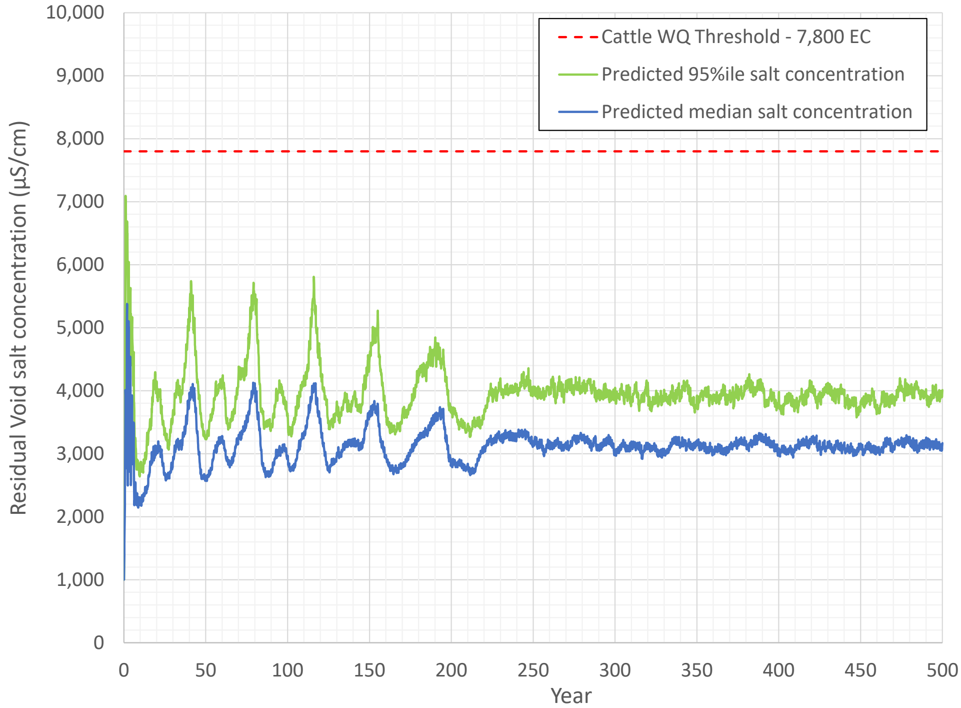


Figure 8.7 – Long-term predicted void water salinity (stock watering + algae farm PMLUs)

8.8 Final void model results – stock watering, algae farm and PHES PMLUs

8.8.1 Overview

The final void with the stock watering, algae farm and PHES PMLUs was modelled using the assumptions outlined in the sections above and the results are provided in Section 8.8.2.

For this scenario, additional water is required at an annual rate of 100 ML/year to sustain the net water demands and losses from the overall system. For this assessment, it has been assumed that this additional water would be sourced from the Sunwater pipeline allocation, with 100 ML/year representing less than 10% of the existing Sunwater allocation for IPC (see Section 7.3.9).

8.8.2 Final void model results

8.8.2.1 Water level

The final void modelled water levels for the 500-year simulation period are presented in Figure 8.8, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake reaches equilibrium within the first 100 years, with a water level of between 144 and 147 mAHD. The maximum void water level (147.0 mAHD) is around 55 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- For the 95th percentile results, the void lake reaches equilibrium within the first 100 years, with a water level of between 148 and 152 mAHD. The maximum void water level (148.2 mAHD) is around 50 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- The modelled water levels are similar to the base case, as the imported 100 ML/year offsets the water demands and additional evaporative losses associated with the algae farm and PHES PMLUs.

8.8.2.2 Salinity

For salinity, the results have been presented as the total system salinity (final void and upper reservoir). The modelled salinity levels for the combined system are presented in Figure 8.9, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 4,000 and 4,400 µS/cm. During the first 200 years, the void salinity has intermittent peaks of up to 4,700 µS/cm.
- For the 95th percentile results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 6,000 and 7,000 µS/cm. During the first 200 years, the void salinity has intermittent peaks of up to 7,600 µS/cm.
- In comparison to the base case scenario, the addition of the algae farm and PHES PMLUs (plus the 100 ML/year imported water source) results in slightly elevated salinity equilibrium levels, which some higher peak salinities during the first 250 years of the simulation.
- The overall system quality is suitable to support the proposed stock watering PMLU over the 500 years simulation, even under dry climatic conditions.

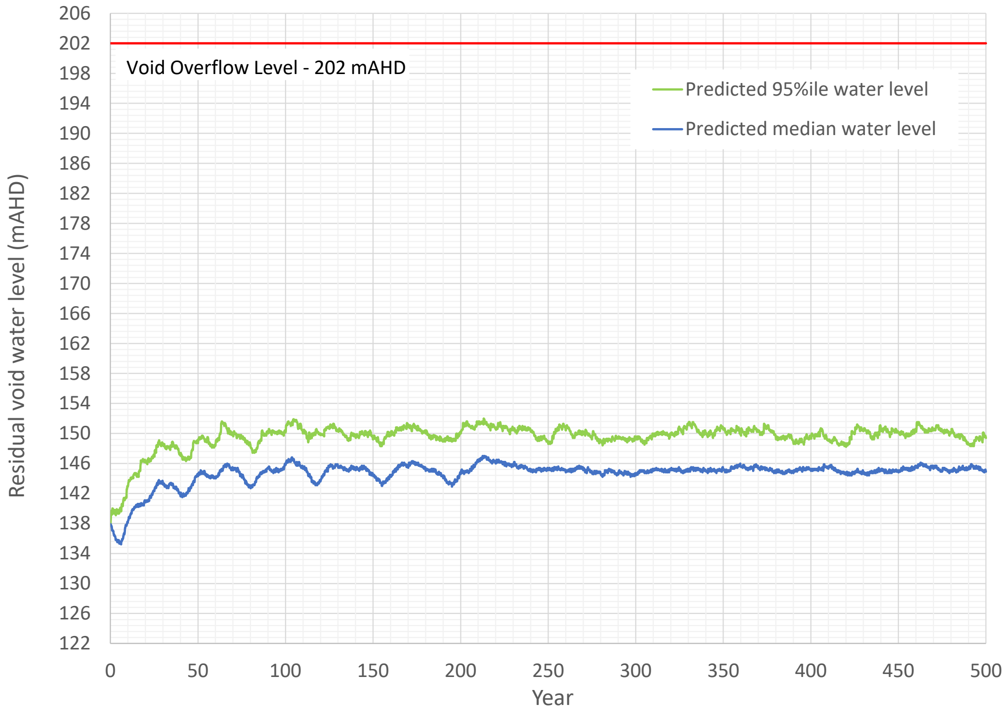


Figure 8.8 – Long-term predicted void water levels (stock watering + algae farm + PHES PMLUs)

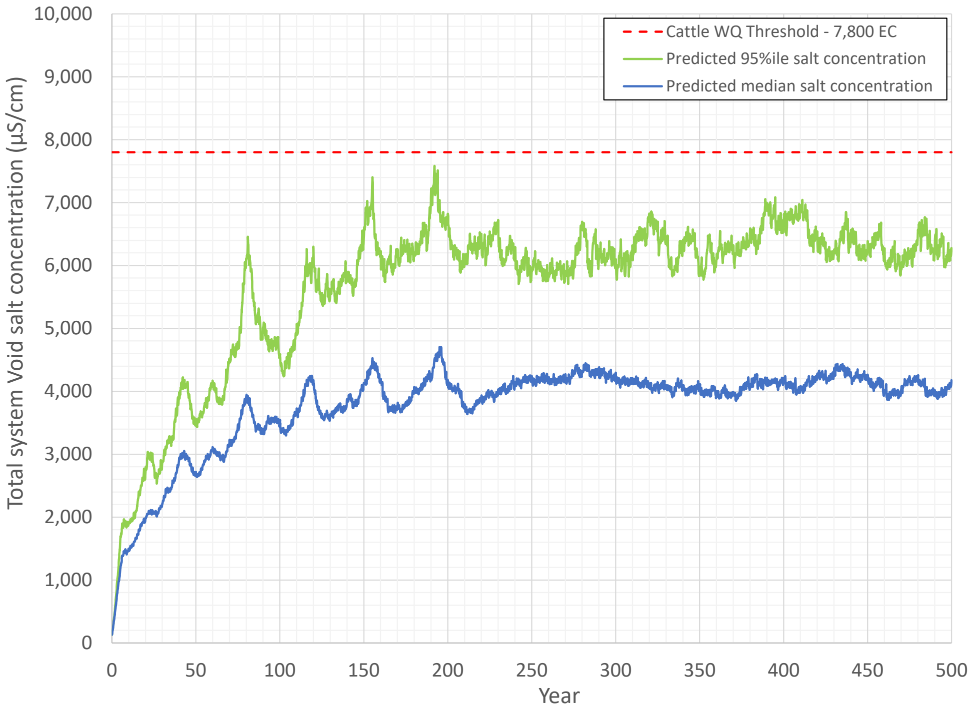


Figure 8.9 – Long-term predicted total system salinity (stock watering + algae farm + PHES PMLUs)

8.9 Alternative final void configurations

8.9.1 Overview

The final landform for the Project was developed through an iterative process that considered mining geometry, spoil balance, geotechnical constraints, drainage behaviour, post-mining land use objectives and economic viability. This approach is consistent with Queensland rehabilitation guidance, which requires rehabilitation strategies to demonstrate that the final landform will be safe, stable, non-polluting and capable of sustaining an agreed post-mining land use.

8.9.2 Final void options development

In developing the final landform, alternative configurations were assessed to test the extent to which residual voids could be reduced, reshaped or removed, while still maintaining an environmentally acceptable and operationally feasible PMLU outcome. Two options were considered prior to the selection of the proposed final landform, with each model adopting the same modelling approach and model inputs as the preferred option (e.g. climatic inputs, groundwater inflows, rainfall runoff model):

- Option 1 (Figure 8.10): Maximum void size, where only in-pit dumping during the operational period occurs leaving the maximise void size.
- Option 2 (Figure 8.11): Partial backfill, involving backfill of the final void to around 175 mAHD, with void lake forming across the backfilled pit area.

For all options the selected void configuration was not located within the 0.1% AEP flood event for the final landform.

These options were tested against key closure criteria, including the ability to support the proposed stock water PMLU. The final void water balance modelling results, and the reasons why these options were discarded, are provided in the following sections.

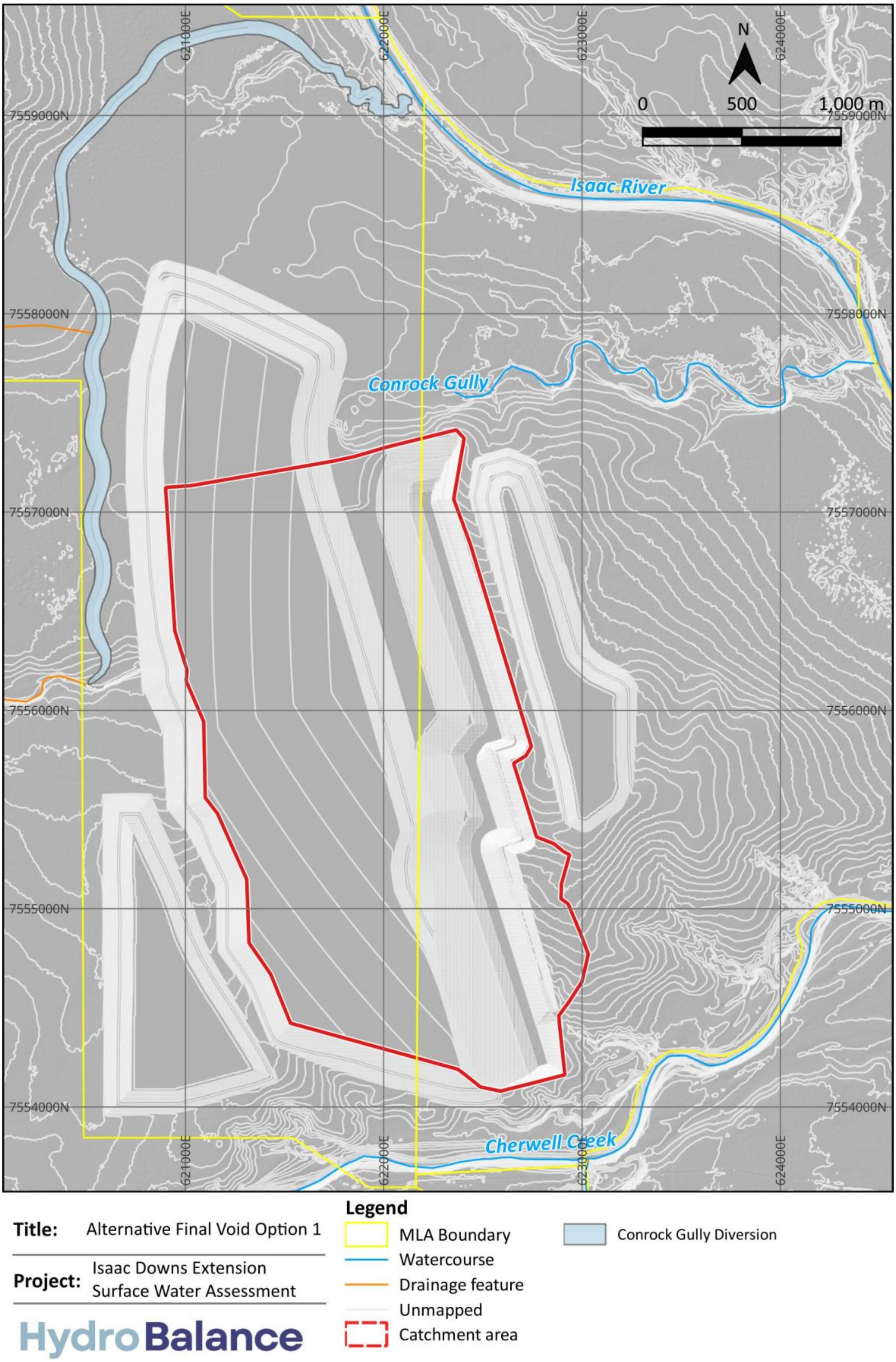
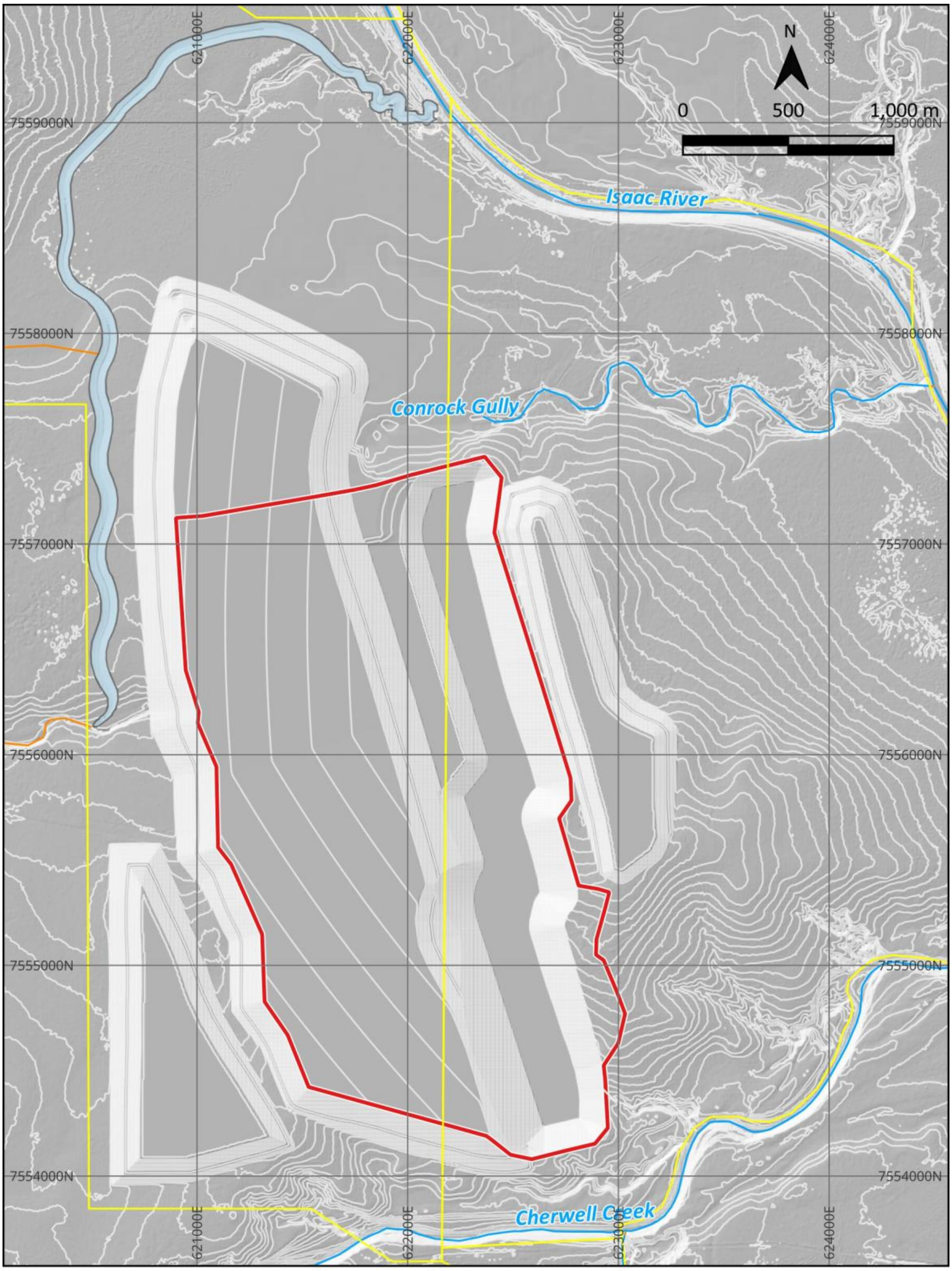


Figure 8.10 – Alternative final void Option 1 – Maximum void size (in-pit dumping only during operational period)



Legend

Title:	Alternative Final Void Option 2
Project:	Isaac Downs Extension Surface Water Assessment

HydroBalance

- MLA Boundary
- Watercourse
- Drainage feature
- Unmapped
- Catchment area
- Conrock Gully Diversion

Figure 8.11 – Alternative final void Option 2 – Partial backfill

8.9.3 Option 1 – Maximum void size option

The final void modelled water levels and salinity for the 500-year simulation period for the maximum void size option are presented in Figure 8.12 and Figure 8.13, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- The void lake reaches equilibrium within the first 25 years of the simulation, with water levels of between 125 mAHD (50th percentile) and 129 mAHD (95th percentile). The pit crest does not overtop at any point in the 500-year simulation, for any climatic conditions.
- The salinity of the void lake reaches the stock watering water quality threshold within 75 years under median climatic conditions, and within 15 years under very dry (95th percentile) climatic conditions.
- Once the water quality threshold is reached, the salinity concentration in the void steadily increases over time, never reaching an equilibrium. Equilibrium is unable to be reached as, once the cattle cease drinking the water, the salt load within the pit lake continues to increase over time without the extraction of salt within the stock water usage.
- This configuration is unable to reliability support a stock watering PMLU for a significant period of time from a water quality perspective. The void water would may become unsuitable for cattle within 25-75 years following mine closure. It also results in the maximum void area within the final landform.

As such, the Option 1 void configuration was discarded as it would not support a stock watering PMLU on the basis of unsuitable water quality.

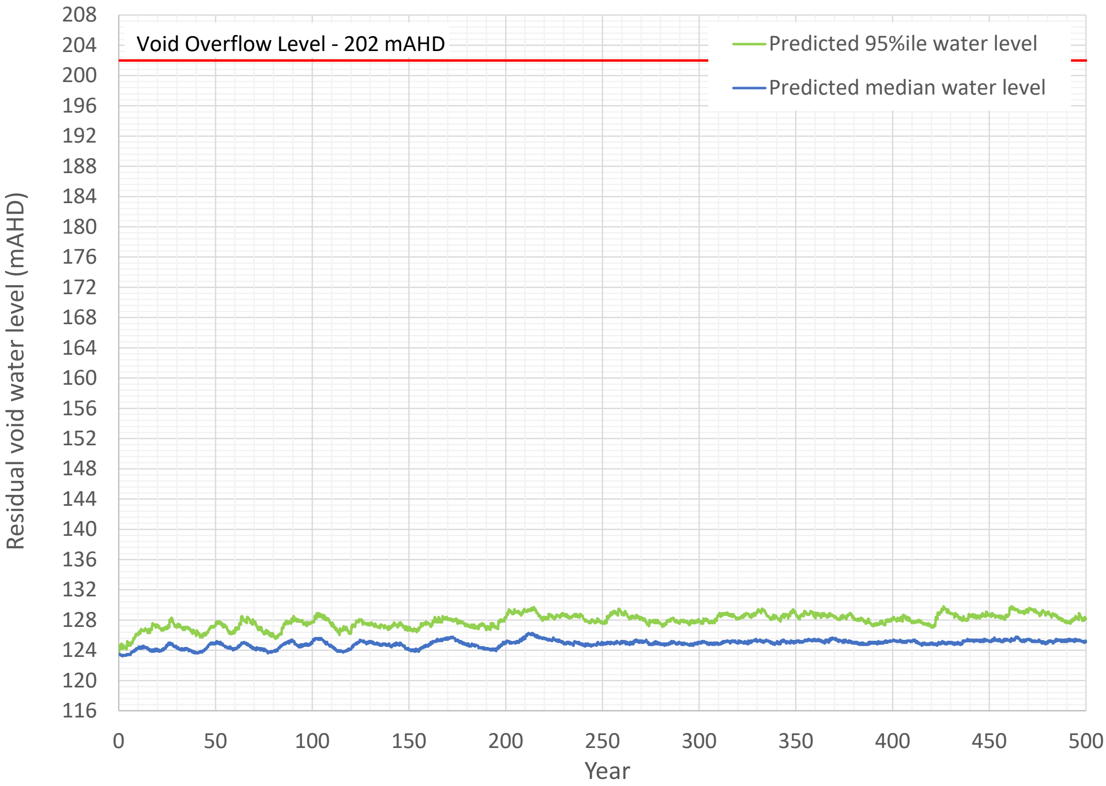


Figure 8.12 – Long-term predicted void water levels – Alternative Option 1

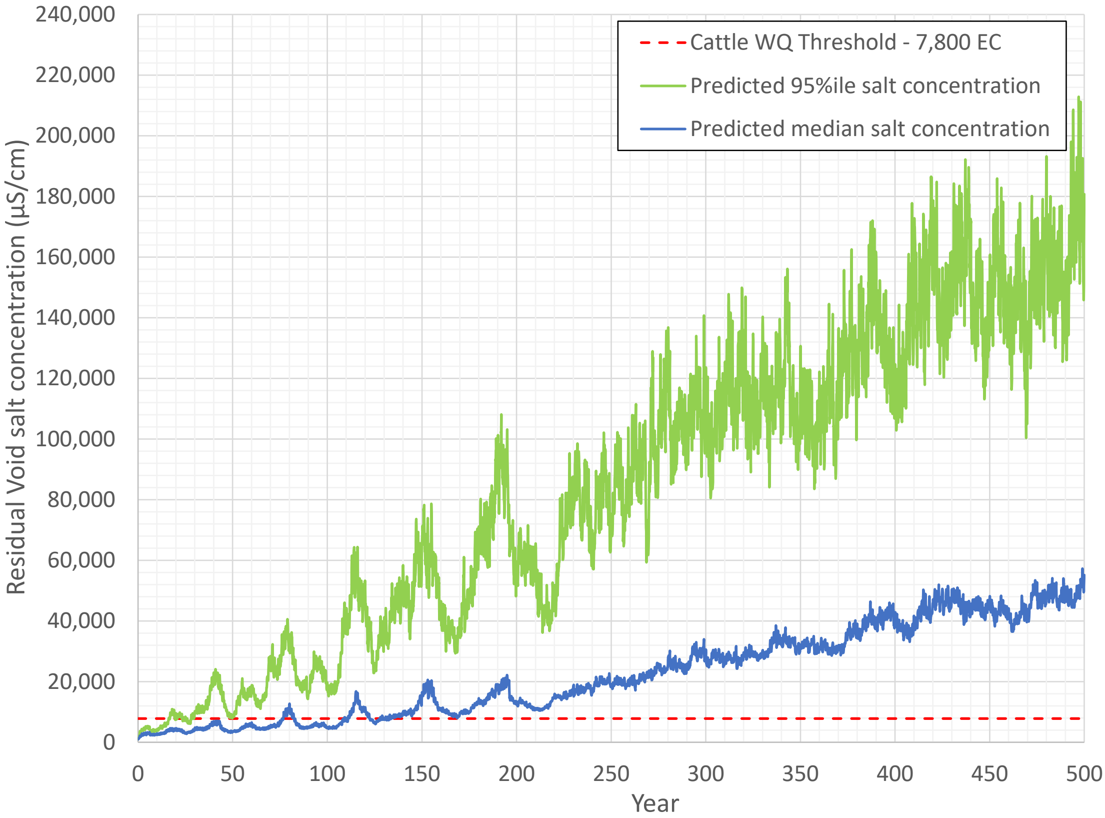


Figure 8.13 – Long-term predicted void water salinity- Alternative Option 1

8.9.4 Option 2 – Partial backfill option

The final void modelled water levels and salinity for the 500-year simulation period for the partial backfill option are presented in Figure 8.14 and Figure 8.15, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- The void lake is very shallow at most time (less 0.2 m in depth) and empties regularly. This presents a water supply security issue for any intended PMLU of void lake water.
- The salinity of the void lake varies significantly over time due to the small volume of water within the bottom of the void. The salinity of the void water becomes hyper saline at times (e.g. > 100,000 µS/cm and regularly exceeds the upper EC threshold for drinking water for cattle.
- This configuration is unable to reliably support a stock watering PMLU from a volumetric and water quality perspective. The void can only supply can only supply around 7-12% of the modelled demand, and the water is regularly undrinkable for the cattle. Additionally, to achieve this void configuration, extremely large volumes of spoil re-handling would be required.

As such, the Option 2 void configuration was discarded on a volumetric, water quality and an economic viability basis.

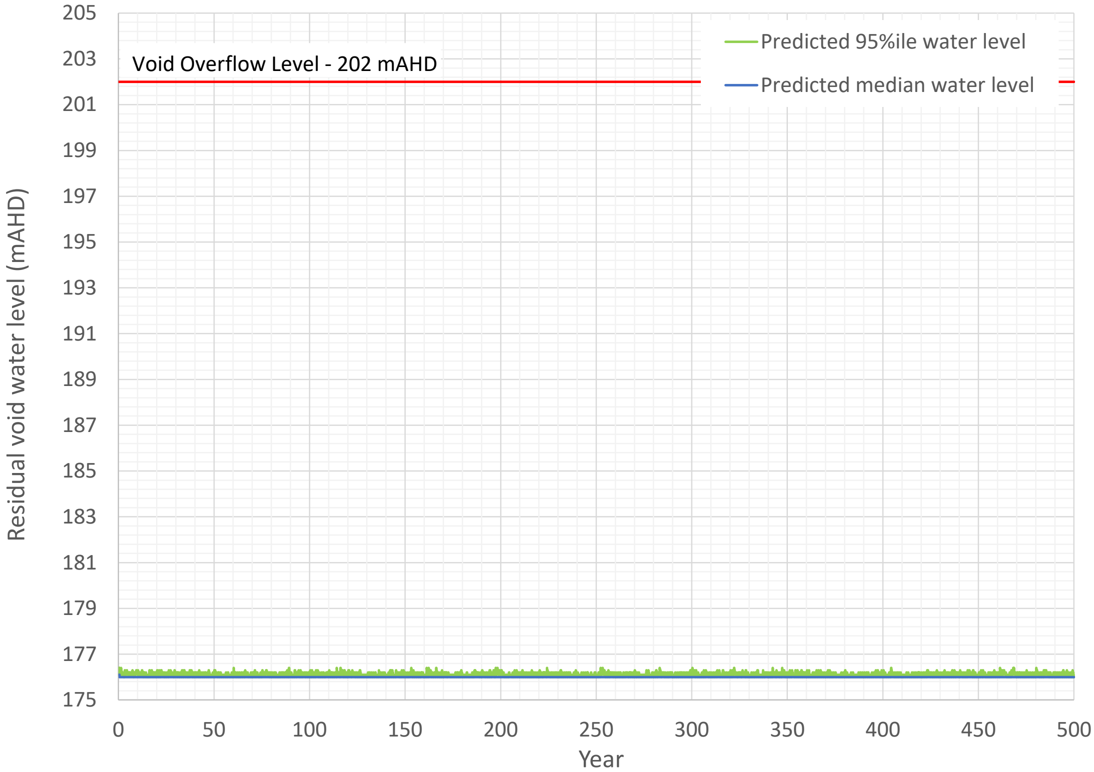


Figure 8.14 – Long-term predicted void water levels – Alternative Option 2

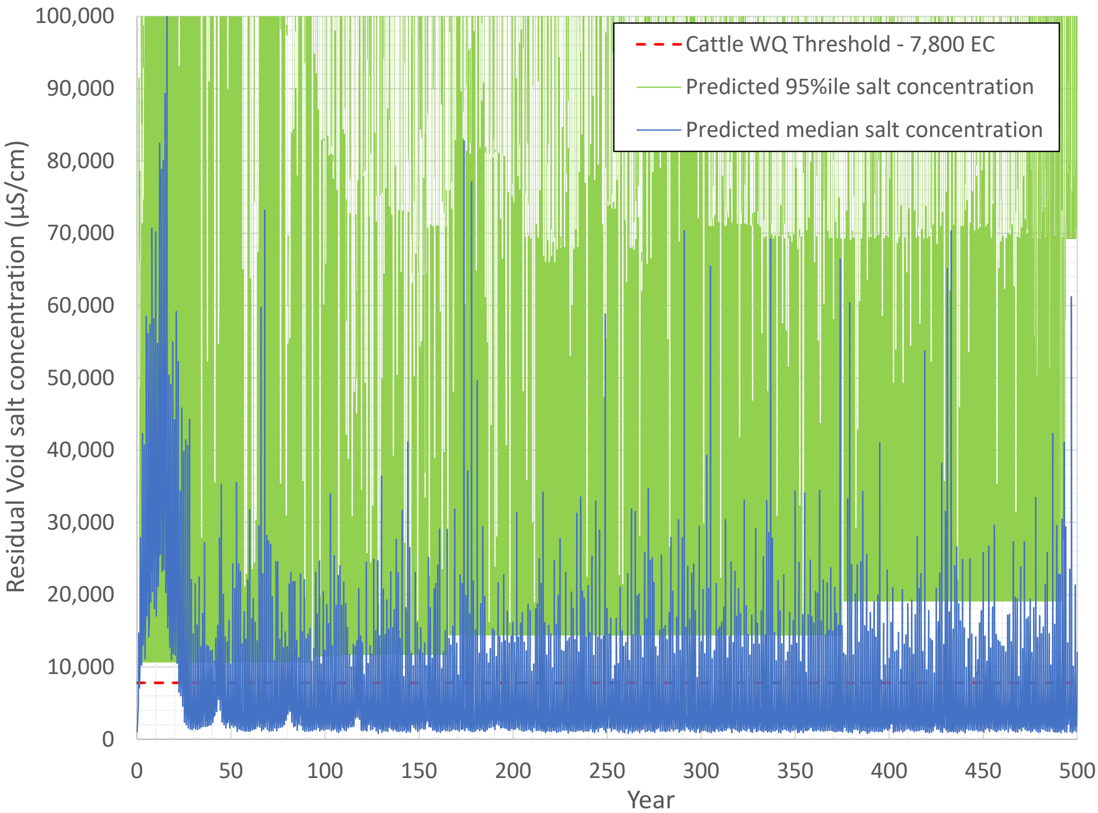


Figure 8.15 – Long-term predicted void water salinity- Alternative Option 2

9 Assessment of potential impacts, and mitigation and management measures

9.1 Potential impacts

The potential impacts of the Project on surface water resources include:

- Alterations to the flooding regime of the Isaac River and local creeks (Cherwell Creek, JB Gully and Conrock Gully);
- Changes to creek and floodplain geomorphology, due to the construction of Conrock Gully diversion;
- Impacts on regional water availability due to the potential need to obtain water from external sources to meet operational water requirements of mining operations;
- Impacts on 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;
- Adverse impacts from the quality of on-site stormwater runoff draining from the disturbance areas to the various receiving waters surrounding the Project, during both construction and operation of the Project;
- Adverse impacts on environmental values in local creeks associated with controlled and uncontrolled releases from the mine water management system; and
- Cumulative impacts of all projects in the region on the environmental values of the receiving waters.

A comparison of the potential impacts to the Environmental Values for the Isaac River is provided in Table 9.1.

Table 9.1 – Environmental values for the Isaac River sub-basin

Environmental value	Description and potential impacts of the Project
Aquatic ecosystems	The extended mining footprint could potentially impact the aquatic ecosystems of the local waterways when compared to pre-mining conditions, as a portion of surface water flows will be drained and captured locally in the pits reducing the total discharge volumes.
Stock watering	The partial capturing of runoff is not expected to impact on stock water supply to downstream users.
Primary recreation	Due to the ephemeral nature of the watercourses and their location it is considered unlikely that waterways will be used for primary recreation.
Secondary recreation	As above, it is considered unlikely that the waterways will be used for secondary recreation.
Visual recreation	The waterways have values for visual recreation. However, due to their location and ephemeral nature they are unlikely to be used for recreational activities.
Drinking water	Due to the ephemeral nature of the watercourses, it is considered unlikely that the environmental value for drinking water will apply.
Industrial use	There are no industrial water users in the vicinity of the Project site, and there is no material change to peak flow rate or frequency downstream of the Project.
Cultural and spiritual values	The waterways hold cultural and spiritual values.
Irrigation	The partial capturing of runoff is not expected to impact on irrigation supply to downstream users.

Environmental value	Description and potential impacts of the Project
Human consumer	The partial capturing of runoff will not impact downstream users, subject to erosion and sediment controls being implemented to treat any runoff discharged.
Farm supply	The partial capturing of runoff will not impact on supply to downstream farms. Peak flow rates and flow frequencies are being closely matched.

An assessment of each of these potential impacts of the Project is provided in the following sections.

The assessment of surface water impacts has been undertaken based on commonly applied methodologies for the simulation of the water management system, and its water balance, using currently available data. The adopted approach is considered suitable for quantifying impacts to a level of accuracy consistent with current industry practice. Certain aspects of the Project, such as changes to landforms due to construction of overburden emplacements, will create impacts that are irreversible, although this does not mean that any such impacts are necessarily detrimental to the environmental values of receiving waters.

9.2 Flooding impacts

Potential impacts of the Project on flood levels, velocities and the geomorphic characteristics of the Isaac River, Conrock Gully, Cherwell Creek and JB Gully are addressed in the Flooding Impact Assessment report (HydroBalance, 2026).

9.3 Diversion geomorphology

Potential impacts of proposed Conrock Gully diversion are addressed in the Flooding Impact Assessment report (HydroBalance, 2026).

9.4 Regional water availability

A significant proportion of mine site water requirements will be sourced from water collected and stored across the Project site, including rainfall runoff and groundwater inflows to the open cut pit which will be stored in the mine affected water dams for recycling and reuse.

Any potential water shortfalls at the Project will be supplied via a pipeline connection to IPM / IDM (integrating the Project into IPC's WMS), mitigating the need for additional external water sources.

The results of the water balance modelling (see Section 7.3.6) show that the current raw water allocation at IPC is more than adequate under all historical climate sequences. As such, the Project will have no impact on regional water availability.

9.5 Streamflow impacts

9.5.1 Operations

During active mining operations, the mine water management system will capture runoff from areas that would have previously flowed to the downstream defined watercourses of Conrock Gully, Cherwell Creek and the Isaac River. The captured catchment area will change as the mine develops. A breakdown of the catchment areas captured by the water management system is provided in Table 9.2.

Table 9.2 – Catchment area captured within the whole Project WMS

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 d/s Cherwell Creek (includes Conrock Gully and Cherwell Creek)	3,528	13.6

The total catchment areas of Conrock Gully, Cherwell Creek and the Isaac to the downstream boundary of the Project tenements are approximately 71 km^2, 698 km^2 and 3,528 km^2, respectively.

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 d/s 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.

The Flooding Impact Assessment report (HydroBalance, 2026) 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% Annual Exceedance Probability (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.

9.5.2 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 in general accordance with the configuration shown in Figure 8.1. Approximately 70% of the peak area captured during mining operations returns to the receiving environment as part of the final landform design.

A breakdown of the catchment areas captured by the closure landform is provided in Table 9.3.

Table 9.3 – Catchment area captured within the 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 d/s 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 post-closure landform is negligible and would likely be undetectable.

Similar to the operational period described in Section 9.5.1, 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 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.

The Flooding Impact Assessment report (HydroBalance, 2026) 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 Exceedance Probability (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.

9.6 Regional water quality and environmental values

9.6.1 Overview

Section 4 describes the objectives and principles of the water management system, which have been developed to protect water quality and the environmental values 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.
- Waterway diversion and levee infrastructure that protects mining operations from the 0.1% AEP flood event. Details of the proposed infrastructure is provided in Section 4.6.
- 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 and used for dust suppression or will overflow to receiving watercourses after a period of settling. Details of the sediment water management system are provided in Section 4.7.
- 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 water quality objectives and environmental values. Details of the proposed mine affected water management system and its expected performance are provided in Section 4.8.
- A contaminated water management system that collects and contains all potentially contaminated water on site. This water would be recycled for use on-site or disposal without releasing it to the receiving environment.

9.6.2 Performance of the mine affected water management system

An assessment of the mine affected water management system is given in Section 7.3.5.1. The results of the water balance modelling indicate that, under the model assumptions and configuration, there is nil risk of MAW entering the receiving environment through uncontrolled discharges.

9.6.3 Performance of the sediment water management system

An assessment of the sediment affected water management system is given in Section 7.3.5.2. 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 4.7).

The geochemical characterisation of overburden material (Terrenus, 2026) 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 9.1 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 (from 121 model realisations). The predicted increase in Isaac River EC is less than 24 µs/cm. 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 management system would mitigate potential impacts of the Project on downstream water quality from sediment dam overflows.

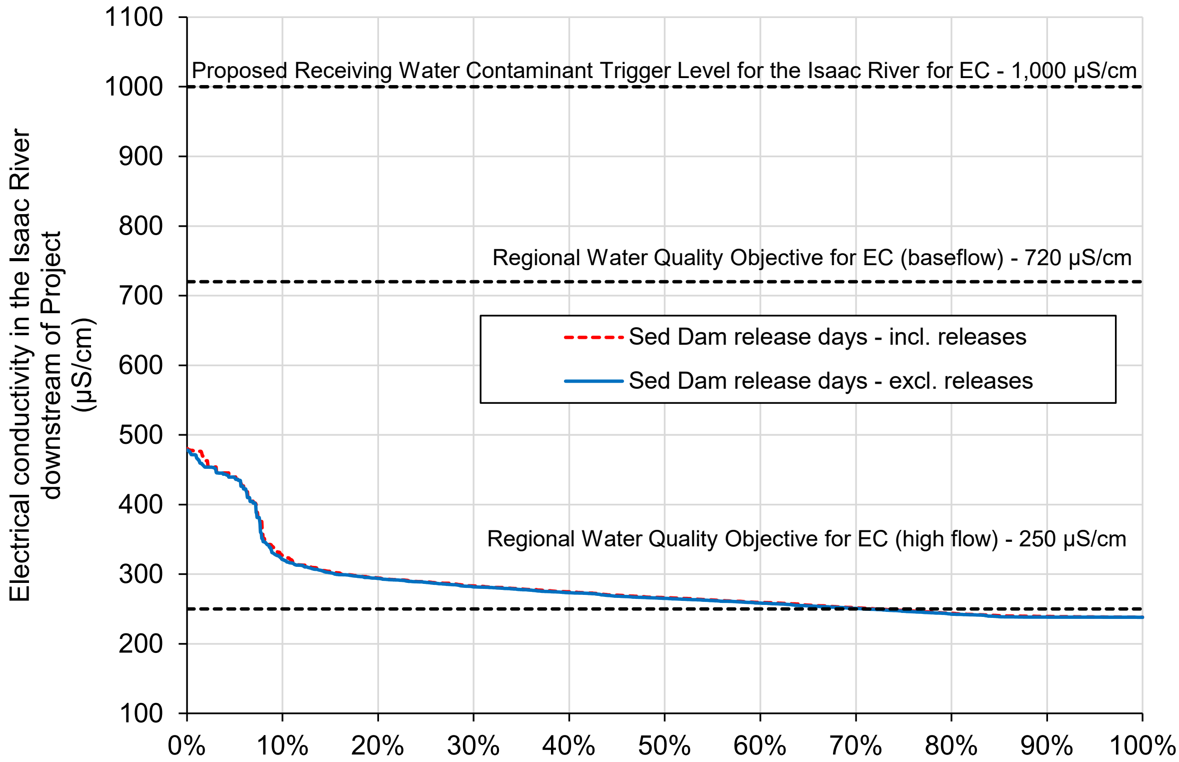


Figure 9.1 – Electrical conductivity in Isaac River during release of sediment water, downstream of the controlled release point

9.6.4 Controlled releases

The proposed controlled release strategy is based on the approved releases strategy at IDM. Due to the sequence of operations at IDM and IDE (i.e. IDM ramps down before IDE commences operations), concurrent releases of mine affected water from IDM and IDE will not occur. The IDE proposed release strategy is effectively an extension of the approved release strategy at IDM.

An assessment of the expected annual controlled release volumes from the Project over the life of mine is presented in Section 7.3.4. The assessment shows that 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). During controlled release events, the release volumes are less than 0.25% of the Isaac River flows (typically less than 0.1%).

Figure 9.2 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 (from 121 model realisations).

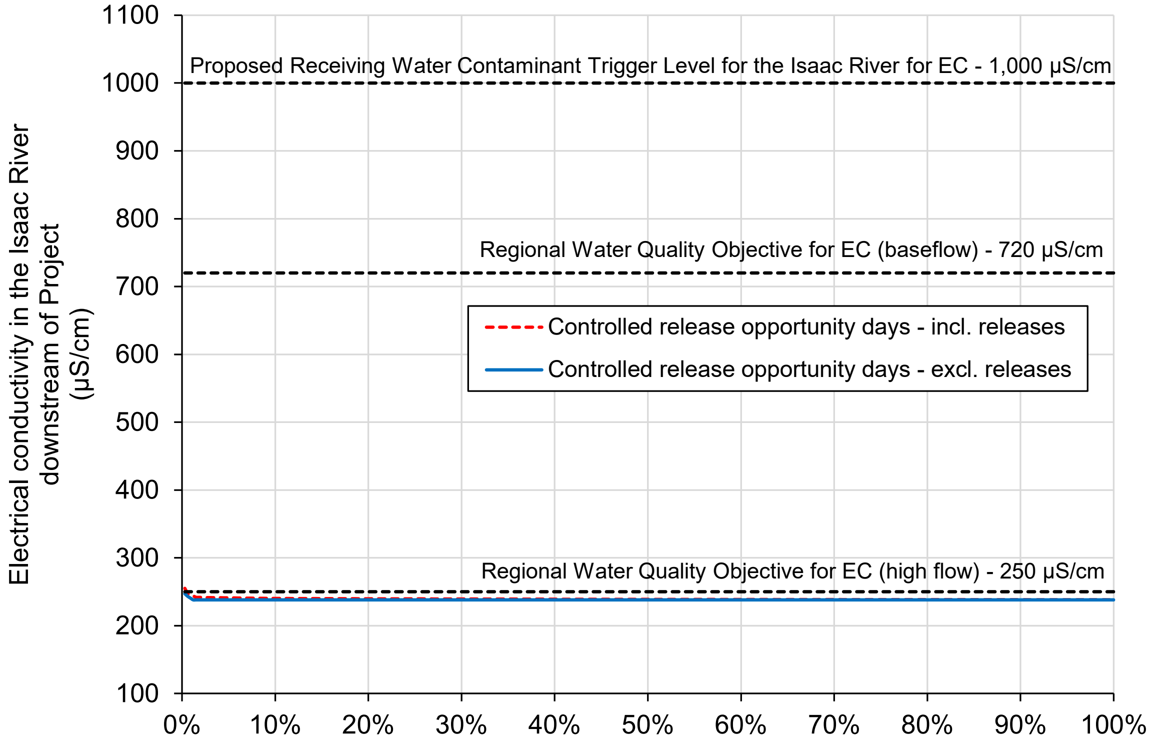


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Figure 9.2 – Electrical conductivity in Isaac River during controlled release of mine affected water, downstream of the controlled release point

The results show that the impact of the proposed controlled release strategy on the Isaac River salinity is insignificant, with a potential increase in EC (in the vicinity of the Project) by 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 water quality objective of 250 µS/cm, and well below the proposed receiving water contaminant trigger level of 1,000 µS/cm.

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 of the water management system and proposed release conditions would mitigate any impacts of the Project on downstream water quality from mine water releases.

9.6.5 Monitoring and maintenance

It will be necessary to monitor the site water management systems to ensure that they are operating as designed:

- 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 are to be inspected and cleaned out regularly.

9.7 Great Barrier Reef considerations

The relevant information required for an EA application to address Section 41AA of the EP Regulation, as per Section 3.2 of the "*Reef discharge standards for industrial activities*" guideline (DESI, 2024) is provided in Table 9.4.

The aim of Section 41AA is to achieve no net decline in water quality in the surface water basins that feed into the Great Barrier Reef (GBR).

Stanmore are approved to release up 682 ML/a, based on predicted release volumes presented in the IDM EIS (WRM, 2020) and approved IDM EA, which was based on the EIS. As IDM operations will ramp down and cease prior to mining operations at IDE, this volume of releases from IDM will no longer occur. Hence any volume released from IDE less than this volume would result in no net decline in water quality.

The assessment presented in Section 7.3.4 shows that there will be a reduction in potential controlled releases at IDE in comparison to the approved release strategy at IDM.

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

Table 9.4 – Requirements for Section 41AA for EA Amendment applications

Item No.	Item per the Reef Guideline	Relevant Information
1	A description of the location of a release and indicate whether it is within the GBR catchment waters, and the applicable river basin. A site map which can be provided in hardcopy or digital format.	Location of the Project in relation to the GBR catchment waters is discussed in Section 3.1 and shown in Figure 3.1.
2	If the release is from a point source, provide the location of the end of pipe.	A release point is proposed on MAW2, as shown in Figure 4.1.
3	A description of the potential source of the DIN/TSS to be released and whether the wastewater is a result of the relevant activity. Per The Guideline: *"In the absence of data or information on DIN that would be sufficient to support an application, the administering authority may consider the use total nitrogen (TN) as the contaminant of interest for the purposes of section 41AA of the Environmental Protection Regulation 2019."*	Stormwater: • Stormwater runoff from disturbed areas will be managed using erosion and sediment control infrastructure, described in Section 4.7. Sewage effluent • No sewage treatment will occur at the Project. Waste from sewage facilities at the crib area will be removed by a licensed contractor to a suitable waste disposal facility.. Controlled Releases • Current release limits for the approved IPM and IDM operations do not require consideration nitrogen for planned water releases. Therefore, total nitrogen is not currently measured as part of regular water quality monitoring data for water releases; and • Water balance modelling results for the Project (Section 7.3.4) suggest that planned releases would generally be minimal, less than 130 ML/year under very wet climatic conditions. This is less than the currently approved release volumes from IDM. Concurrent releases from existing IDM operations and the Project will not occur (i.e. releases from IDM will cease prior to the commencement of operations at IDE). • The predicted volumes of release water is a negligible volume when considered in the context of the volume off the catchment flows to the GBR.

Item No.	Item per the Reef Guideline	Relevant Information
4	A description of any wastewater releases that may not be included in the Section 41AA such as any predicted unplanned/uncontrolled releases, watercourse diversions, clean stormwater diverted around disturbed areas or stormwater that contains only sediment. Per the 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 outlined in Section 4.5, there will be stormwater diversions around disturbed areas which do not require assessment under Section 41AA requirements. Stormwater is managed through erosion and sediment control measures: • The erosion and sediment control infrastructure will be designed to manage the disturbance area associated with the Project. Details of the proposed infrastructure is presented in Section 4.7. Uncontrolled Releases: • As outlined in Section 7.3.5.1, the assessment demonstrates that there is nil risk of uncontrolled releases from any MAW storages to the receiving environment.
5	For an amendment application, the characteristics of the wastewater to be released from the relevant activity subject of the amendment application (e.g., load, concentration, volume, release rate, timing and duration of release). It should be provided to allow for an assessment on an annual basis for the life of the project.	N/A
6	The characteristics of the receiving environment (e.g., water type (freshwater, marine, tidal), environmental values, sensitive receptors).	Section 2 discusses the environmental values and Section 3.7 provides a description of the receiving environment water quality.
7	The spatial and temporal extent of potential changes in stream hydrology or estuarine hydraulics and water quality (regarding an increase in DIN/TSS).	There will be no net increase in releases of TSS and DIN and therefore no net decline in water quality compared with the approved release strategy at IDM. The potential for increased DIN and fine sediment annual loads, resulting in impacts to the GBR as a result of the Project, are therefore considered to be negligible.
8	The mitigation measures proposed.	The following mitigation measures are inherently part of the design of the mine water management system: • Design and implementation of the water management system as per Section 4.4.

<table>
<tr><th>Item No.</th><th>Item per the Reef Guideline</th><th>Relevant Information</th></tr>
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Stanmore will prepare a Water Management Plan (WMP) routinely to ensure functioning of the WMS for the day-to-day operations of the site.
Stanmore undertakes controlled releases in accordance with approved EA conditions, based on the designed water management system.
An Erosion and Sediment Control Plan (ESCP) will be implemented for the Project. The ESCP provides guidance to Stanmore staff and contractors on how to prevent and minimise potential erosion and sediment impacts as well as implementation of a monitoring program to provide early detection of potential issues and to ensure controls are working efficiently and effectively.
General measures to manage potential erosion and sediment transport include the following:

Implementation of a permit to disturb process for any ground disturbance proposed;
Redirection of runoff from clean water catchments around disturbed areas via clean water drains and banks to discharge into natural watercourses, where practicable;
Installing appropriate ESC measures/structures, such as silt fences, catch drains and sediment basins, prior to disturbance of any land;
Minimising disturbed areas and stabilisation by progressive rehabilitation/stabilisation as soon as practicable;
Clearly identifying and delineating areas required to be disturbed and ensuring that disturbance is limited to those areas;
Reducing the flow rate of water across the ground on disturbed surfaces;
Interception of runoff from disturbed catchment areas in sediment dams to settle out suspended sediment prior to discharge back to the natural system;
Restricting access to rehabilitation and undisturbed areas;

</td></tr>
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Item No.	Item per the Reef Guideline	Relevant Information
		○ Drainage design aims to enable the transfer of water at non-erosive velocities; and ○ Regular inspections and maintenance of all erosion and sediment control works to ensure that they are operating in accordance with their design principles.

9.8 Environmental Protection Regulation 2019 - Schedule 8 considerations

The relevant information required for this EIS to address the environmental objectives for Water and Wetlands under the *Environmental Protection Regulation 2019* - Schedule 8 is provided in Table 9.5. This table shows that this assessment adequately addresses all environmental objectives and performance outcomes set out in the *Environmental Protection Regulation 2019*.

Table 9.5 – Requirements for Environmental Protection Regulation 2019 - Schedule 8

Performance outcome	Relevant Information
Water *Environmental objective: The activity will be operated in a way that protects environmental values of waters.*	
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;	Handling of contaminants will be managed under the Water Management Plan and in accordance with the requirements of *AS1940 – Storage and Handling of Flammable and Combustible Liquids*
(b) contingency measures will prevent or minimise adverse effects on the environment due to unplanned releases or discharges of contaminants to water;	Section 7.3.5.1 shows the there is no risk of mine water dam uncontrolled releases occurring.
(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;	Stormwater will be managed in sediment basins (and ancillary ESC infrastructure) per Section 4.7. The assessment in Section 9.6.4 demonstrates that releases of sediment water will have a negligible impact on the downstream environmental values.
(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;	No acid sulfate soils detected onsite.
(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;	Any potential acid rock drainage will be managed in accordance with a Water Management Plan. Refer to Terrenus (2026) for details on potential acid mine drainage risk (assessed as low risk).
(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;	Section 7.3.4 shows no increase in the cumulative discharge volumes of mine-affected water over the life of mining at the Project, in comparison to the approved discharge volumes for IDM. Furthermore the assessments in Section 9.6.3 and Section 9.6.4 demonstrate that any controlled releases of mine affected water or releases of sediment water will have a negligible impact on the downstream environmental values.
(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;	No petroleum activities proposed as part of the Project.

Performance outcome	Relevant Information
(h) the activity will be managed so that adverse effects on environmental values are prevented or minimised.	Adverse impacts to the EVs listed in Table 2.1 will be minimised by: • Designing flood protection infrastructure to minimise changes in flood behaviour (Section 9.2) • Negating the requirement to draw in any additional external water to supply the Project, on top of the existing allocation (Section 9.4) • Limiting the degree of catchment excising and impacts to downstream streamflow volumes (Section 9.5) • Preventing uncontrolled releases, and managing controlled releases, to the receiving environment (Section 9.6) • Implementing appropriately design and operated erosion and sediment control measures (Section 9.6).
Wetlands *Environmental objective: The activity will be operated in a way that protects the environmental values of wetlands.*	
2) The activity will be managed in a way that prevents or minimises adverse effects on wetlands.	Refer to Aquatic Ecology report (Freshwater, 2026).

9.9 Cumulative impacts

9.9.1 Overview

The objective of this assessment is to identify the potential for impacts from the IDE Project to have compounding interactions with similar impacts from other projects, including activities proposed, under development or already in operation within a suitable region of influence of the IDE Project. A figure showing existing and proposed operations in the vicinity of the proposed IDE Project is presented in Figure 9.3.

There are two levels at which cumulative impacts have been assessed:

- <u>Localised cumulative impacts</u> – These are the impacts that may result from multiple existing or proposed resource operations in the immediate vicinity of the IDE Project. Localised cumulative impacts include the effect from concurrent operations that are close enough to potentially cause additive effect on the receiving environment. For the purposes of this assessment, all existing and proposed projects located within the Isaac River catchment have been included.
- <u>Regional cumulative impacts</u> – These include the IDE Project's contribution to impacts that are caused by resource operations and renewable energy projects throughout the Bowen Basin region or at a catchment level. Each operation in itself may not represent a substantial impact at a regional level; however, the cumulative effect on the receiving environment may warrant consideration.

9.9.2 Existing projects

Projects which are currently operating within the Isaac River catchment upstream of the Deverill gauging station and have been included in the cumulative impacts assessment for the IDE Project are listed in Table 9.6.

9.9.3 New or developing projects

Relevant projects that have been considered include:

- Projects within the predicted sphere of influence of the IDE Project, as listed on the Department of State Development, Infrastructure and Planning (DSDIP) website that are undergoing assessment under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for which an Initial Advice Statement (IAS) or an EIS are available; and
- Projects within the predicted sphere of influence of the IDE Project, which are listed on the website of the Department of Environment, Tourism. Science and Innovation (DETSI) that are undergoing assessment under the *Environmental Protection Act 1994* (EP Act) for which an IAS or an EIS are available.

Projects currently undergoing assessment or having recently completed assessment under these processes and included in the cumulative impact assessment for the IDE Project are listed in Table 9.6 and their locations relative to the Project shown in Figure 9.3.

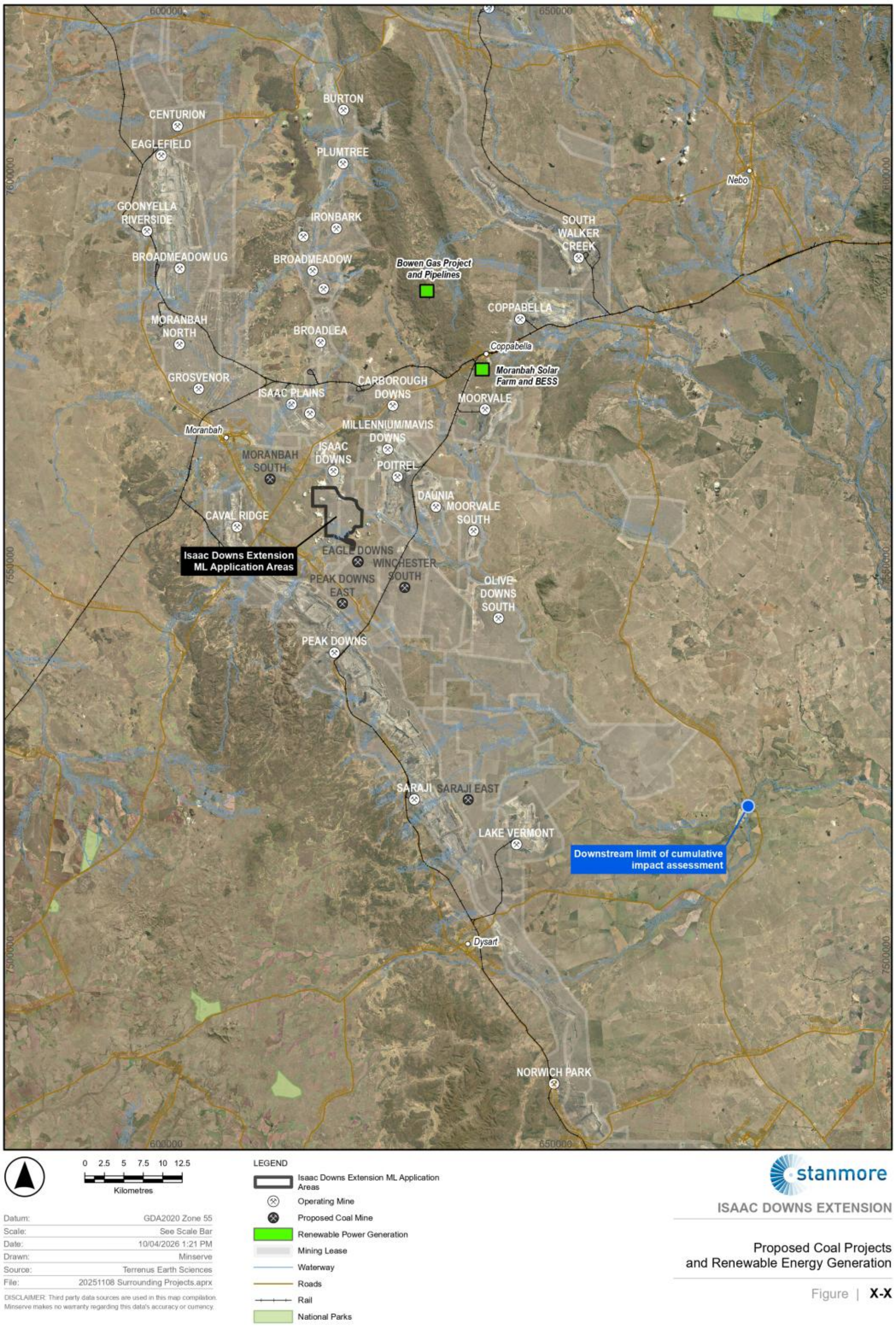


Figure 9.3 – Operating and proposed projects in the vicinity of IDE

Table 9.6 – Existing projects considered in the cumulative impact assessment

Project - Proponent	Description	Operational status	Relationship to the Project MLA	
			Timing	Location
Burton– Bowen Coking Coal	Open cut coal mine	Operations suspended - under administration	May have overlapping operational phases with the construction and operations of the project, although unlikely given the current operational status.	Located 55 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Centurion - Peabody Energy Australia	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 53 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Goonyella Riverside - BMA	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 45 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Moranbah North– Anglo American	Underground coal mine	Operations currently suspended	May have overlapping operational phases with the construction and operations of the project.	Located 35 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Grosvenor– Anglo American	Underground coal mine	Operations currently suspended	May have overlapping operational phases with the construction and operations of the project.	Located 25 km to the east of the Project area. Located within the Isaac River catchment (upstream).
Broadlea– Fitzroy Australia Resources	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 23 km to the north of the Project area. Located within the headwaters of Smoky Creek, within the Isaac River catchment.
Carborough Downs– Fitzroy Australia Resources	Underground coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 16 km to the east of the Project area. Located within the headwaters of Billy's Gully, within the Isaac River catchment.
Ironbark– Fitzroy Australia Resources	Underground coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 39 km to the north of the Project area. Located within the headwaters of Bullock Creek, within the Isaac River catchment.
Isaac Plains Mine - Stanmore	Open cut coal mine	Operating, but ramping down prior to Project commencement	IPM is included in the integrated IPC water management system, and hence cumulatively assessed.	Located 18 km to the northwest of the Project area. Located within the Smoky Creek and Billy's Gully catchment, within the Isaac River catchment.

Project - Proponent	Description	Operational status	Relationship to the Project MLA	
			Timing	Location
Isaac Downs Mine - Stanmore	Open cut coal mine	Operating, but ramping down prior to Project commencement	IDM is included in the integrated IPC water management system, and hence cumulatively assessed.	Located 5 km to the north of the Project area, within the Isaac River catchment.
Millennium– M Resources	Open cut coal mine	Care and maintenance	May have overlapping operational phases with the construction and operations of the project, although unlikely given the current operational status.	Located 9 km to the northeast of the Project area. Located within the headwaters of Southern Gully, within the Isaac River catchment.
Daunia - BMA	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 11 km to the east of the Project area. Located on North Creek within the Isaac River catchment (downstream).
Poitrel - Stanmore	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 8 km to the northeast of the Project area. Located on New Chum Creek within the Isaac River catchment (downstream).
Olive Downs– Pembroke Resources	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 19 km to the southeast of the Project area. Located within the Isaac River catchment (downstream).
Caval Ridge - BMA	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 15 km to the west of the Project area. Located within the headwaters of Grosvenor Creek within the Isaac River catchment (upstream).
Peak Downs - BMA	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 13 km to the southwest of the Project area. Located on Cherwell Creek within the Isaac River catchment (downstream).
Moorvale– Peabody Energy Australia	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 22 km to the northeast of the Project area. Located within the headwaters of the North Creek catchment within the Isaac River catchment (downstream).

Project - Proponent	Description	Operational status	Relationship to the Project MLA	
			Timing	Location
Saraji– BMA	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 34 km to the southeast of the Project area. Located within the Isaac River catchment (downstream).
Saraji South– BMA	Open cut coal mine	Ceased production indefinitely	May have overlapping operational phases with the construction and operations of the project, although unlikely given the current operational status.	Located 65 km to the southeast of the Project area. Located within the Isaac River catchment (downstream).
Lake Vermont– Jellinbah Group	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 47 km to the southeast of the Project area. Located within the Isaac River catchment (downstream).

Table 9.7 – Proposed projects considered in the cumulative impact assessment

Project - Proponent	Description	Operational status	Relationship to the Project MLA	
			Timing	Location
Moranbah South - Anglo American	Underground coal mine	Proposed (not approved)	Timing highly uncertain but may only commence (if it commences) once Project operations have ceased.	Located adjacent and to the west of the Project area. Located within the Isaac River catchment (upstream).
Winchester South – Whitehaven	Open cut coal mine	Proposed (not approved)	May have overlapping operational phases with the construction and operations of the project.	Located 10 km to the southwest of the Project area. Located within the Isaac River catchment (downstream).
Eagle Downs - Stanmore	Underground coal mine	Approved, on hold	May have overlapping operational phases with the construction and operations of the project.	Located 8 km to the south of the Project area. Located within the Isaac River catchment (downstream).
Saraji East - BMA	Underground coal mine	Project cancelled	Unlikely to have overlapping operational phases with the construction and operations of the project, as the project has been cancelled	N/A
Bowen Gas Project	CSG production	Approved	May have overlapping operational phases with the construction and operations of the project.	Located within the broader Bowen Basin region with scattered CSG activities. Partially located within the Isaac River catchment.

Project - Proponent	Description	Operational status	Relationship to the Project MLA	
			Timing	Location
Peak Downs Continuation - BMA	Open cut coal mine	Proposed	May have overlapping operational phases with the construction and operations of the project.	Located 13 km to the southwest of the Project area. Located on Cherwell Creek within the Isaac River catchment (downstream).
Moranbah Solar and BESS – Grupa Cobra	Renewables	Proposed	May have overlapping operational phases with the construction and operations of the project.	Located 26 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).

9.9.4 Cumulative impacts – surface water resources

9.9.4.1 Water quality

The IDE 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 Great Barrier Reef, 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 (EPA, 2009). 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 environmental values.

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

- Water quality objectives were developed for the Fitzroy Basin and added to Schedule 1 the EPP Water in October 2011.
- Model Mining Conditions (MMC) were developed for coal mines in the Fitzroy basin (DERM, 2012). These MCC are designed to manage water discharges to meet the water quality objectives set out in the EPP (Water) and to provide consistency between mining operations in the Fitzroy basin.
- Environmental authorities for a number of mining operations were amended to introduce conditions consistent with the MMC.
- A number of mining operations entered into Transitional Environmental Programs (TEP) under the EP Act. These TEPs were focussed on actions that would allow mines to achieve compliance with new environmental authority 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. This framework allows for management of individual mining activities in such a way that overarching water quality objectives can be achieved.

Mine affected water from the IDE 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 MMC, and incorporated into the release criteria used in modelling the mine water management system in this report. The mine affected and sediment water management system is demonstrated in Section 9.6 to have negligible impacts on water quality, specifically in relation to controlled releases of MAW and sediment dams overflows. The potential impacts are considered within the error margin of detectable change.

Given that the proposed Project mine affected and sediment water releases are expected to have negligible impacts and will be managed within an existing overarching strategic framework for management of cumulative impacts of mining activities, the proposed management approach for mine and sediment water from the Project is expected to make a negligible contribution to cumulative impacts on surface water quality and associated environmental values.

9.9.4.2 Loss of Catchment and stream flows in the Isaac River

As detailed in Section 9.5, the IDE Project will result in a loss of catchment to the Isaac River during operations and post-closure. The surface runoff volume lost from the catchment will generally be in proportion to the loss of catchment area. The IDE Project area is around 0.1% of the catchment area of Isaac River to the confluence of Cherwell Creek, with runoff from a portion of rehabilitated final landform areas reporting to downstream environments.

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 (see Table 9.6).

There are approximately 20 existing coal mines that also capture runoff from the Isaac River catchment, as shown in Figure 9.3. The total estimated captured area of all these projects (including the IDE Project) represents around 9% of the Isaac River catchment to the Isaac River/Stephens Creek confluence (encompassing all projects in the cumulative impact assessment including those downstream of the IDE Project), of which the Project represents less than 0.2% of this value. Due to the uncertainty in estimating captured catchment areas for proposed greenfield projects, only existing mines have been included in this assessment.

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 MAW 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.

A comparison of the captured catchment areas of the existing mining projects considered in the cumulative impact assessment with the Isaac River catchment to the Stephens Creek confluence is provided in Table 9.8, which indicates the following:

- The combined total catchment area of the existing mines (including the IDE Project) represents around 9% of the total catchment area of the Isaac River to the Stephens Creek confluence.
- The combined MAW catchment area (estimated) represents less than 2.7% of the total Isaac River catchment area to the Stephens Creek confluence.

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.

Table 9.8 – Catchment area of existing projects considered in the cumulative impact assessment

Catchment	Total catchment area (km^2)	Estimated MAW/captured catchment area (km^2)
Isaac Downs Extension (the Project)	13.6	6.0
Other mines	686	206
Combined	700	212
Isaac River (to the Stephens Creek confluence)	**7,782**	

9.10 Surface water monitoring program

9.10.1 Overview

Monitoring of surface water quality both within and external to the Project area 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 impact on receiving water quality and will allow for early detection of any impacts and appropriate corrective action.

The proposed monitoring program will be implemented in accordance with the Monitoring and sampling manual (DES, 2018). 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; and
- facilitate adaptive management of water resources on the site.

9.10.2 Water quality monitoring locations

The proponent has previously monitored a number of surface water locations in the Project vicinity (as detailed in Section 3.7.2). 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 water quality monitoring program will also include dam monitoring, including all MAW and sediment dams.

Locations of the proposed surface water monitoring locations are shown in Figure 9.4 and summarised in Table 9.9.

Table 9.9 – Proposed Project surface water monitoring program

Site name	Waterway	Location	
		Easting (GDA94 Z55)	Northing (GDA94 Z55)
Upstream monitoring points			
ID-IR2	Isaac River – upstream of IDM and IDE	620,553	7,562,186
IDE-CG1	Conrock Gully – upstream of IDE	620,592	7,556,123
IDE-CC1	Cherwell Creek – upstream of IDE	620,003	7,553,226
Downstream monitoring points			
ID-IR5	Isaac River – downstream of Conrock Gully diversion	624,369	7,558,087
IDE-CG2	Conrock Gully – downstream of IDE	624,281	7,557,725
IDE-CG3	Conrock Gully diversion – downstream before confluence with Isaac River	621,540	7,559,371
IDE-CC2	Cherwell Creek – upstream of JB Gully	622,842	7,553,734
IDE-CC3	Cherwell Creek – downstream of IDE	627,135	7,556,000
IDE-WL1	*Unnamed wetland*	626,725	7,556,368
PTM-MP5	Isaac River – downstream of IDE	627,972	7,556,226

9.10.3 Water quality monitoring schedule

Table 9.10, Table 9.11 and Table 9.12 defines the proposed frequency and parameters to be sampled at the proposed release point during the discharge of MAW.

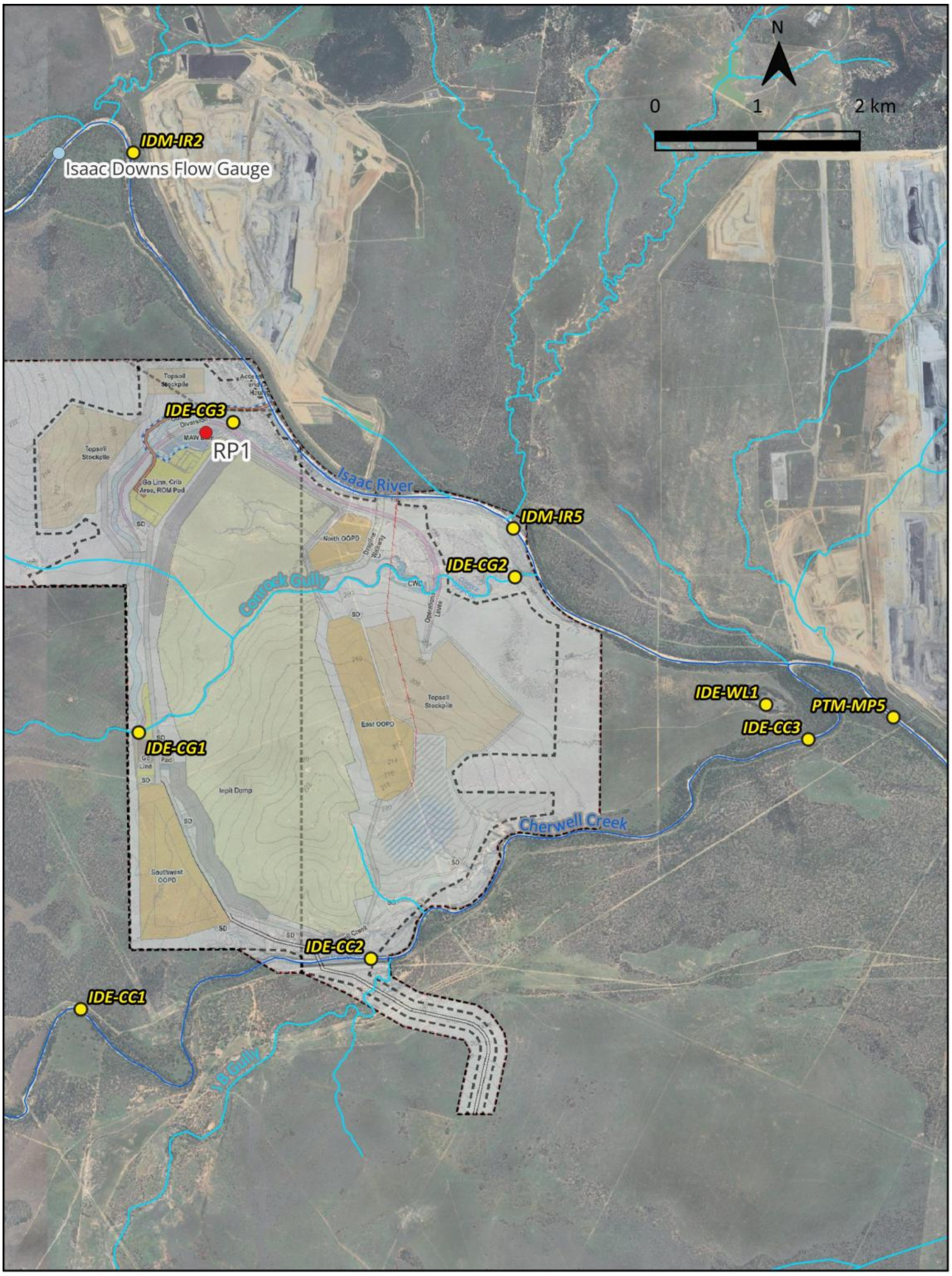
The event-based sampling will enable quantification of parameters within MAW releases from the site and their potential impact on the water quality of receiving waters. On-site quarterly sampling from the water storages allows for an understanding in trends of water quality parameters prior to release and hence enable appropriate remedial action can be taken if required prior to release.

Table 9.10 – Mine affected water release limits

Quality characteristic	Units	Minimum	Maximum
Electrical conductivity (EC)	µS/cm	n/a	Variable[1]
pH	pH units	6.5	9.0
Total suspended solids (TSS)	mg/L	n/a	Variable[1]

Quality characteristic	Units	Minimum	Maximum
Sulphate (SO_4^{2-})	mg/L	n/a	Variable[1]

Note: 1/ Release limits for EC, SO4 and TSS are dependent on receiving water flow



Title:	Proposed Project surface water monitoring program
Project:	Isaac Downs Extension Surface Water Assessment

HydroBalance

Legend

- Project MLA Boundary
- Minor watercourse/ drainage line
- Major watercourse
- Highway
- Rail line
- Water quality monitoring location
- Release Point
- Flow gauging station

Figure 9.4 – Proposed surface water monitoring locations

Table 9.11 – Proposed release conditions

Receiving waters	Release point (RP)	Gauging station	Gauging station Easting (GDA94-Z55)	Gauging station Northing (GDA94-Z55)	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	RP1	Isaac Downs[1]	619,857	7,562,207	Continuous (minimum daily)	**Very Low Flow** <4m^3/s for a period of 28 days after natural flow events that exceed 4 m^3/s	< 2 m^3/s	EC: 720 µS/cm Sulphate: 250 mg/L TSS: 55 mg/L
						Low Flow 4 m^3/s	0.142 m^3/s	EC: 3,000 µS/cm Sulphate: 300 mg/L TSS: 55 mg/L
						Medium Flow 10 m^3/s	0.257 m^3/s	EC: 4,000 µS/cm Sulphate: 300 mg/L TSS: 200 mg/L
						High Flow 50 m^3/s	1.09 m^3/s	EC: 5,000 µS/cm Sulphate: 400 mg/L TSS: 200 mg/L
						Very High Flow 100 m^3/s	2.02 m^3/s	EC: 5,000 µS/cm Sulphate: 400 mg/L TSS: 300 mg/L
						Flood Flow 250 m^3/s	3.07 m^3/s	EC: 8,000 µS/cm Sulphate: 400 mg/L TSS: 400 mg/L

Note: 1/ Goonyella flow gauging station can be utilised as a backup if Isaac Downs station is inoperable.

Table 9.12 – Release contaminant trigger investigations levels

Quality characteristics	Trigger level µg/L	Source of trigger level	Monitoring frequency
Aluminium	212	Site-specific trigger value (SSTV)	Commencement of release within (2) hours and thereafter weekly during release
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	SSTV	
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	
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	80^{th} %ile for Isaac River at Goonyella gauge	
Sodium	188,000	80^{th} %ile for Isaac River at Goonyella gauge	

9.10.4 Receiving water contaminant trigger levels

A set of proposed receiving water contaminant triggers levels have been developed based on the Final Model Water Conditions for Coal Mines in the Fitzroy Basin (DERM, 2009). These are consistent with the currently approved EA conditions at IPM, IDM and generally consistent with other nearby operating coal mines.

These trigger levels are presented in Table 9.13 and are proposed to be measured at the upstream and downstream Isaac River monitoring stations (ID-IR2 and PTM-MP5, respectively). Monitoring at these locations will assist with controlled release operations, allow for an accurate evaluation of the impact of any releases from the Project, and allow for identification of any upstream influences that are not associated with the Project.

Table 9.13 – Proposed receiving water contaminant trigger levels

Quality characteristic	Units	Trigger level	Monitoring frequency
Electrical conductivity (EC)	µS/cm	1,000 (maximum)[1]	Daily during the release
pH	pH units	6.5 - 8.5 (range)[2]	
Total suspended solids (TSS)	mg/L	1,050 (maximum)[3]	
Sulphate (SO_4^{2-})	mg/L	250 (maximum)[1]	

Notes: 1/ Final Model Water Conditions for Coal Mines in the Fitzroy Basin (DERM, 2009)
2/ Isaac River Sub-basin Water Quality Objectives
3/ 80th percentile of local water quality

10 Summary of findings

10.1 Overview

The potential impacts of the Project on surface water resources will be mitigated through the implementation of a mine site water management system to control the flow and storage of water of different qualities across the site. A surface water monitoring program will be implemented to monitor potential environmental impacts and ensure that the site water management system is meeting its objectives.

10.2 Water management system performance

The performance of the mine water management system has been investigated using a detailed site water balance model. The model simulated water inflows and outflows through the various stages of mine development, based on 121 realisations with different climatic sequences.

Water collected on the site will be used as first priority to satisfy site demands, such as haul road dust suppression, ROM pad dust suppression and to supplement the CHPP water requirements at IPM. The water management system will also have the capability to transfer mine affected water to and from existing IPC operations via MWD2 to meet operational needs.

Raw water will be supplied (for vehicle washdown and fire water circuit only) via pipeline from the IPM raw water dam, which is supplied under a contract with Sunwater for offtake from the existing Eungella Burdekin water supply pipeline.

The water balance results show that the Project water demands will be adequately supplied from the mine affected water stored at either the Project or existing IPC operations under most climatic conditions. There is a small probability (around 10% AEP) that additional external water may be required to satisfy site water demands. However, even when this occurs, the current annual raw water allocation of 1,287 ML/a would not be exceeded.

10.3 Flooding and geomorphology

Refer to the Section 8 of Flooding Impact Assessment report (HydroBalance, 2026).

10.4 Impacts on downstream water quality

Controlled releases from the water management system will only occur when water quality and river flows meet the proposed release trigger levels, which are designed to protect downstream environmental values. The water balance modelling results indicate that the proposed controlled release strategy will achieve the WQOs for the Isaac River sub-basin.

There are no modelled uncontrolled releases from the MAW dams, never-the-less the MAW dams do not overflow directly to the receiving environment.

The water balance model was used to assess the risk of releases from sediment dams in accordance with their design criteria to the receiving environment. The modelling indicates that increase in Isaac River salinity is typically less than 10 µs/cm during sediment dam overflows.

As such, it is unlikely that controlled releases of mine water or sediment dam overflows will have a measurable impact on receiving water quality or environmental values.

10.5 Reduction in downstream flow during operations

The Project will reduce the catchment area draining to receiving watercourses due to capture of runoff from disturbed catchment areas within the water management system. The maximum mine affected catchment areas represent:

- Less than 0.4% of the Isaac River catchment to downstream of the Cherwell Creek confluence.

- Less than 0.5% of the Cherwell Creek catchment to the downstream boundary of the mine.
- Up to 13.4% of the Conrock Gully catchment to the downstream boundary of the mine.

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 (for events greater than the 50% AEP) (refer to the FIA report [HydroBalance, 2026] for further details). 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.

10.6 Long-term reduction in catchment runoff

At the completion of mining, surface runoff from rehabilitated out-of-pit waste rock emplacement areas will be released from the site. An area of approximately 2.9 km2 will continue to drain to the final void.

The final landform topography will reduce the catchment draining to the Isaac River (to the Cherwell Creek confluence) by around 2.9 km2 (compared to pre mining conditions), a decrease of less than 0.1%. The impact on long term catchment runoff due to this change in catchment would 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 between the 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. 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.

10.7 Final void

Water balance simulation of the final void (with the stock watering beneficial use PMLU) shows that the water surface is expected to reach an equilibrium water level well below pit crest and will remain a groundwater sink in perpetuity (refer to the Groundwater Impact Assessment [SLR, 2026] report for further details). The pit void lake will take around 100 years to reach an equilibrium level.

The water quality in the void is predicted to reach equilibrium within 250 years, with an EC concentration of around 3,100 µS/cm (median) to 4,000 µS/cm (95th percentile). The water salinity remains well below the cattle drinking water quality threshold of 7,800 µS/cm and is therefore suitable over the entire simulation as a PMLU.

10.8 Cumulative impacts

The development of the proposed release strategy to the Isaac River has been based on the existing release conditions for nearby operating coal mines (including the existing IPM and IDM operations). Controlled releases from the Project would be less than, and replace, those approved for IDM, resulting in a net decrease in mine water releases across IPC. Furthermore, the release conditions have been developed by regulators within an overarching strategic framework for the management of the cumulative impacts of water releases from mining activities. The site water management system has been designed such that the risk of offsite release of mine affected water is very low (with no modelled mine affected dam uncontrolled releases under any climatic conditions).Therefore the Project is expected to have a negligible contribution to cumulative impacts on surface water quality and associated environmental values.

11 References

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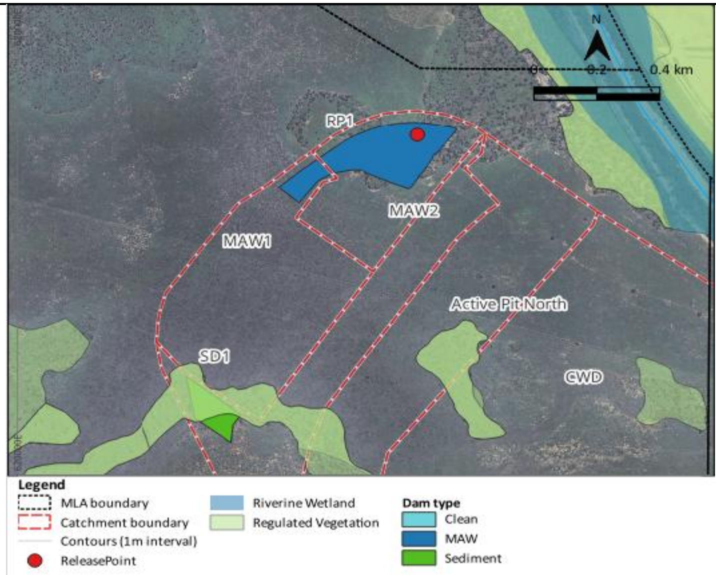
Appendix A. Preliminary consequence category assessment sheets

Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments
Water Storage Name	**MAW1**

Overview

Functional Description	Structure acts as a storage for mine-affected water.
Catchment Description	Local catchment comprises disturbed area.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW1; spills are directed downstream to MAW1.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	620,915	
Northing (GDA94 z55)	m	7,559,107	
Catchment Area	ha	3.3	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	40	S2
Wetted Area at Spillway	ha	1.0	S2
Spills Flows To:		MAW2	
Spill Diluting Catchment	ha	n/a	
Embankment Height	m	*tbc*	S2
Dam Break Volume	ML	40	S3
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	8		Q1
Electrical Conductivity	µS/cm	2,000	4000		Q1

[1] Refer to main report for basis of trigger levels

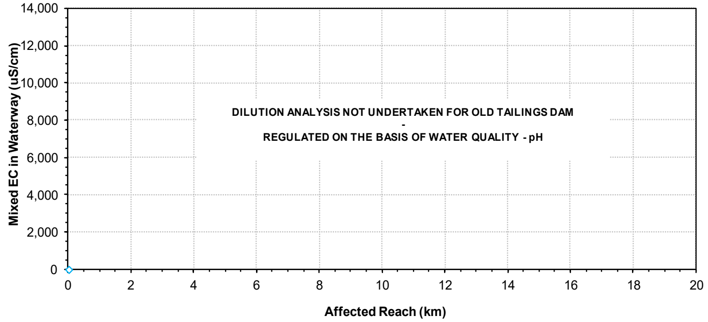
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Not applicable. Storage cannot overflow to receiving environment. ▶ If a spill occurs, would be discharged to the MAW1 and contained within the mining complex.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ No identifiable surface/groundwaters within the reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Not applicable. Storage cannot overflow to receiving environment.	low	
	General Economic Loss or Property Damage	▶ No third party infrastructure considered to be at risk due to a dam break. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

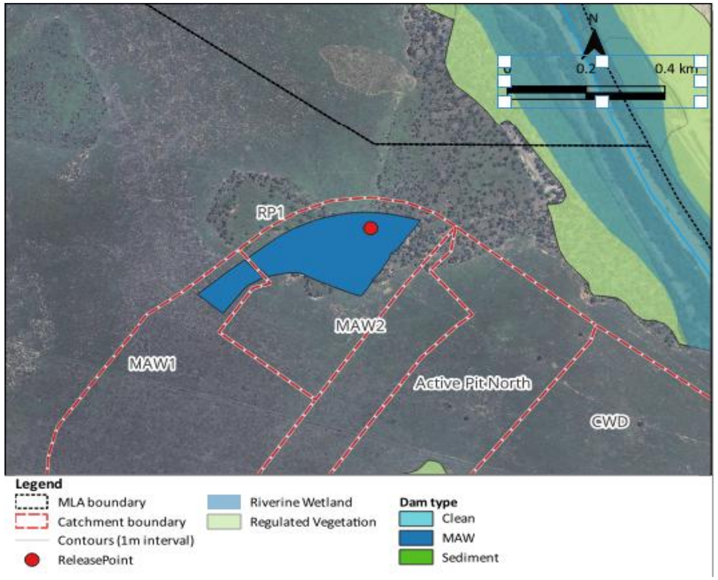
Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Water Storage Name	MAW2

Overview

Functional Description	Structure acts as a storage for mine-affected water.
Catchment Description	Local catchment comprises disturbed area.
Outlet Description	Storage consists of a constructed embankment and spillway or piped outlet. Releases are pumped directly to theintegrated IPC/ID WMS or the Isaac River; spills are directed downstream to the mining pit.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	621,193	
Northing (GDA94 z55)	m	7,559,214	
Catchment Area	ha	1.8	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	235	S2
Wetted Area at Spillway	ha	5.8	S2
Spills Flows To:		Pit	
Spill Diluting Catchment	ha	n/a	
Embankment Height	m	*tbc*	S2
Dam Break Volume	ML	235	S3
Dam Break Flows To:		Pit	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	8		Q1
Electrical Conductivity	µS/cm	2,000	4000		Q1

[1] Refer to main report for basis of trigger levels

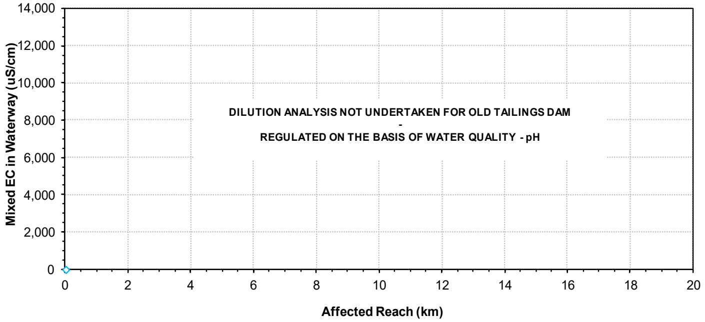
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Not applicable. Storage cannot overflow to receiving environment. ▶ If a spill occurs, would be discharged to the mining pit and contained within the mining complex.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ No identifiable surface/groundwaters within the reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Not applicable. Storage cannot overflow to receiving environment.	low	
	General Economic Loss or Property Damage	▶ No third party infrastructure considered to be at risk due to a dam break. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

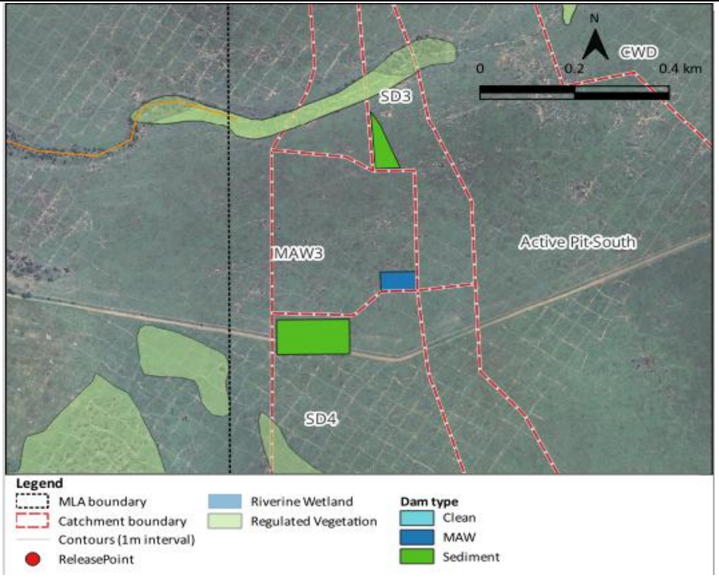
Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	**Isaac Downs Extension Project - Preliminary Consequence Category Assessments**

Water Storage Name	**MAW3**

Overview

Functional Description	Structure acts as a storage for mine-affected water.
Catchment Description	Local catchment comprises disturbed area.
Outlet Description	Storage consists of a constructed embankment and spillway or piped outlet. Releases are pumped directly to MAW1; spills are directed downstream to SD3.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	620,837	
Northing (GDA94 z55)	m	7,555,756	
Catchment Area	ha	10.3	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	20	S2
Wetted Area at Spillway	ha	5.8	S2
Spills Flows To:		SD3	
Spill Diluting Catchment	ha	n/a	
Embankment Height	m	*tbc*	S2
Dam Break Volume	ML	20	S3
Dam Break Flows To:		SD3	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	8		Q1
Electrical Conductivity	µS/cm	2,000	4000		Q1

[1] Refer to main report for basis of trigger levels

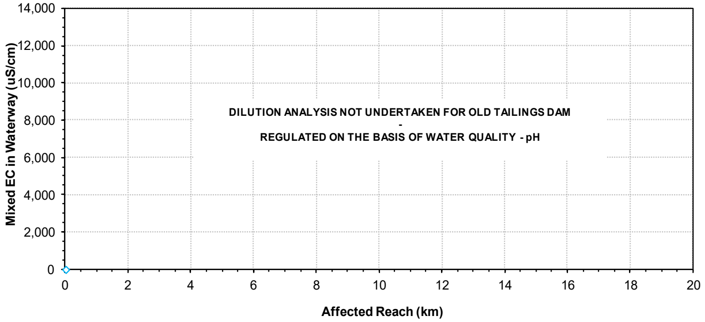
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Not applicable. Storage cannot overflow to receiving environment. ▶ If a spill occurs, would be discharged to the mining pit and contained within the mining complex.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ No identifiable surface/groundwaters within the reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Not applicable. Storage cannot overflow to receiving environment.	low	
	General Economic Loss or Property Damage	▶ No third party infrastructure considered to be at risk due to a dam break. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



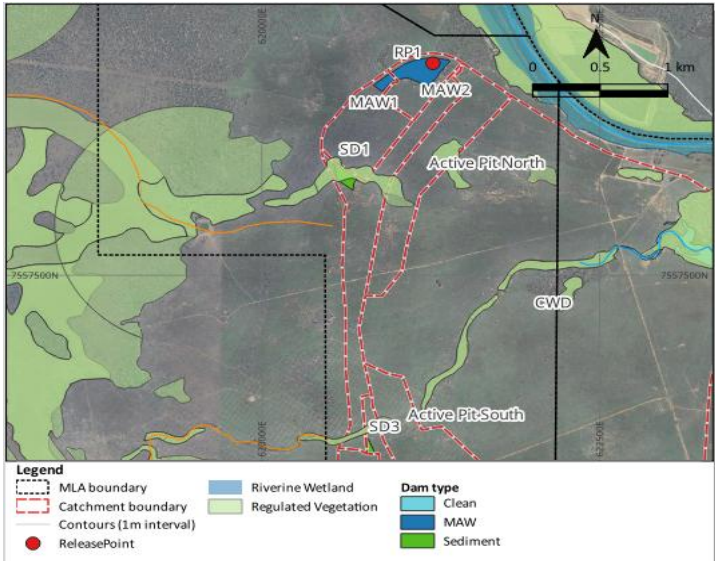
DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments
Water Storage Name	**SD1**

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material and haul road.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to MAW1.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	620,626	
Northing (GDA94 z55)	m	7,558,294	
Catchment Area	ha	94.9	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	25.2	S2
Wetted Area at Spillway	ha	1.7	S2
Spills Flows To:		MAW1	
Spill Diluting Catchment	ha	-	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

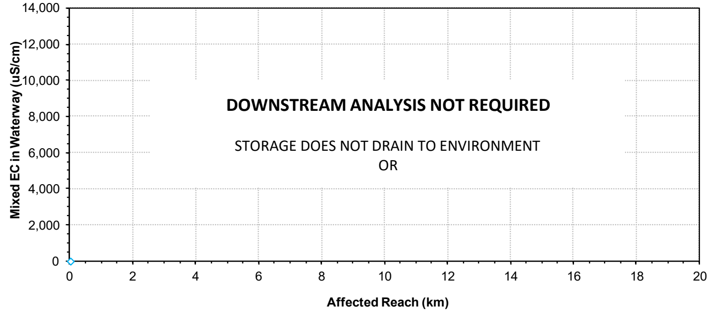
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ If a spill occurs, would be discharged to MAW1 and likely contained within the mining complex. ▶ Release not expected to reach natural environment.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	**Isaac Downs Extension Project - Preliminary Consequence Category Assessments**
Water Storage Name	**SD2**

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to CWD.

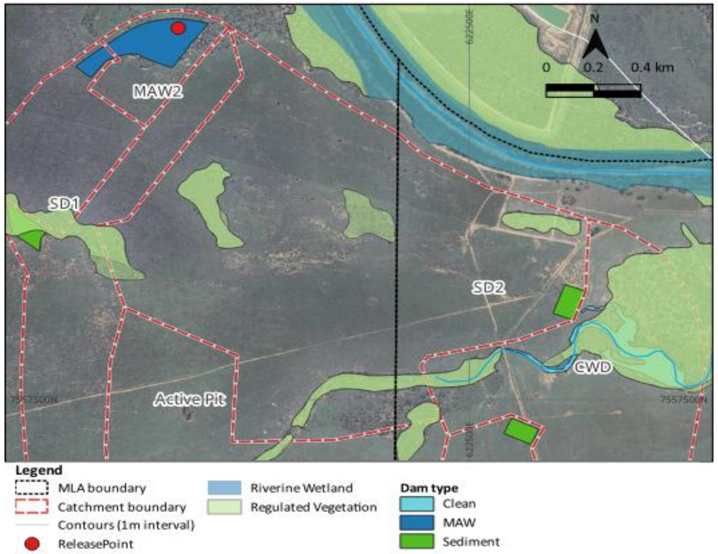
Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	622,293	
Northing (GDA94 z55)	m	7,557,961	
Catchment Area	ha	238.8	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	63.3	S2
Wetted Area at Spillway	ha	2.8	S2
Spills Flows To:		MAW1	
Spill Diluting Catchment	ha	-	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels



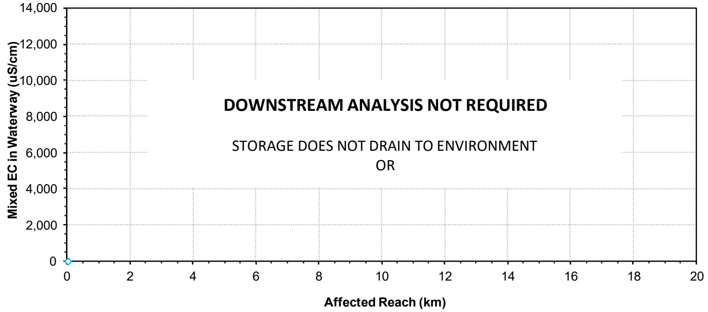
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ If a spill occurs, would be discharged to CWD and likely contained within the mining complex. ▶ Release not expected to reach natural environment.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

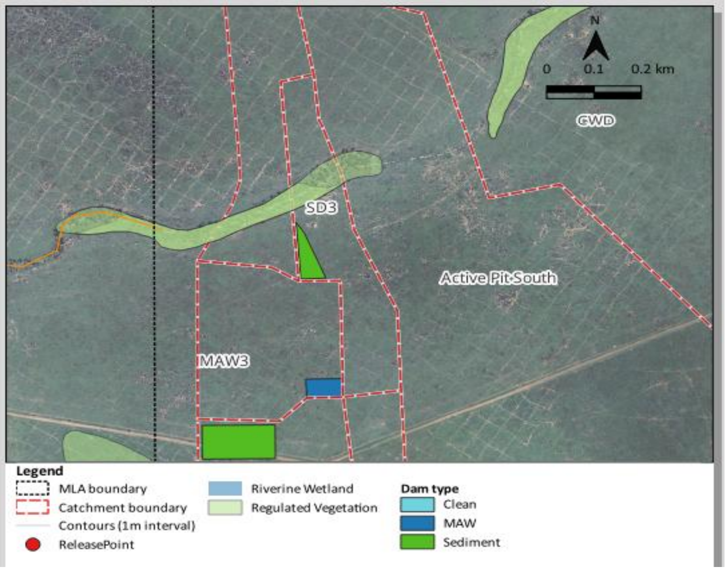
Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	**Isaac Downs Extension Project - Preliminary Consequence Category Assessments**

Water Storage Name	**SD3**

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to pit.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	620,805	
Northing (GDA94 z55)	m	7,556,051	
Catchment Area	ha	30.0	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	8	S2
Wetted Area at Spillway	ha	0.4	S2
Spills Flows To:		Pit	
Spill Diluting Catchment	ha	-	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

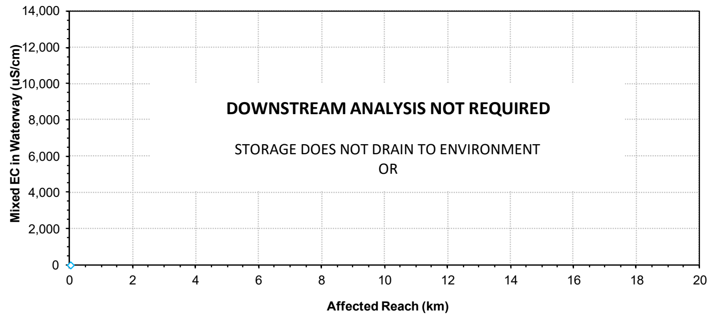
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ If a spill occurs, would be discharged to the pit and likely contained within the mining complex. ▶ Release not expected to reach natural environment.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



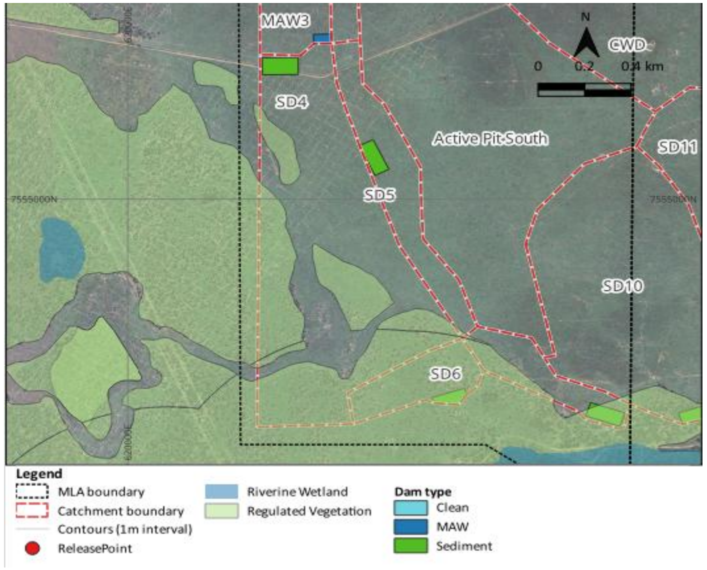
DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**

Worksheet Title	**Isaac Downs Extension Project - Preliminary Consequence Category Assessments**
Water Storage Name	**SD4**

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to Conrock Gully diversion.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	620,650	
Northing (GDA94 z55)	m	7,555,622	
Catchment Area	ha	95.7	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	25.4	S2
Wetted Area at Spillway	ha	1.2	S2
Spills Flows To:		Conrock Gully	
Spill Diluting Catchment	ha	7100	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

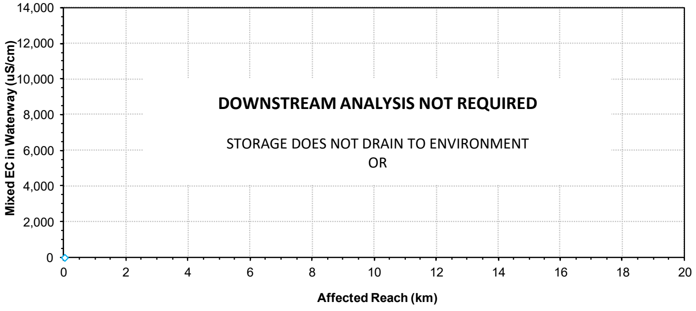
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

Item		Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Conrock Gully from SD4 would be small, and concentrations of EC would be diluted to background levels after mixing with the Conrock Gully and Isaac River flows. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of a spillway overflow.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

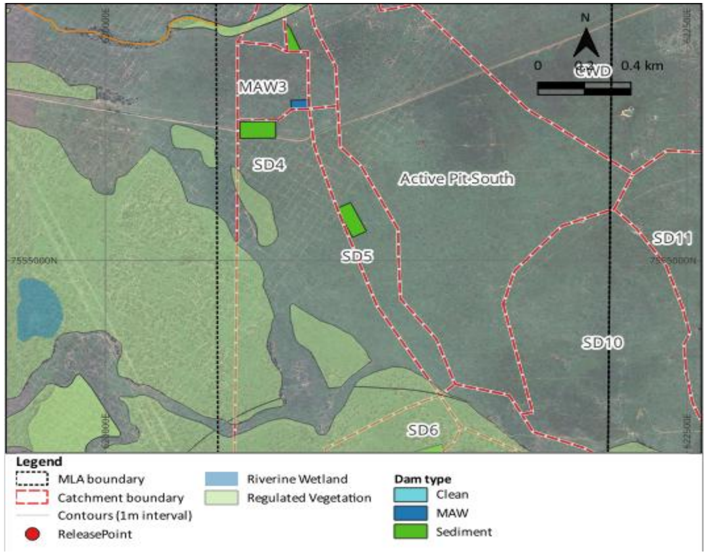
Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Water Storage Name	SD5

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material and disturbed area.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to SD6.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	621,060	
Northing (GDA94 z55)	m	7,555,195	
Catchment Area	ha	42.7	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	11.3	S2
Wetted Area at Spillway	ha	1.0	S2
Spills Flows To:		SD6	
Spill Diluting Catchment	ha	-	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

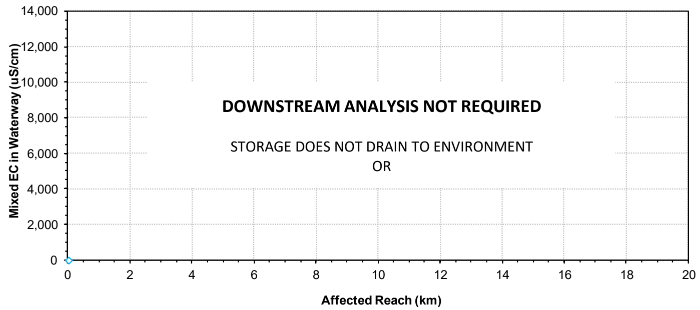
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

Item		Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ If a spill occurs, would be discharged to SD6 and likely contained within the mining complex. ▶ Release not expected to reach natural environment.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)

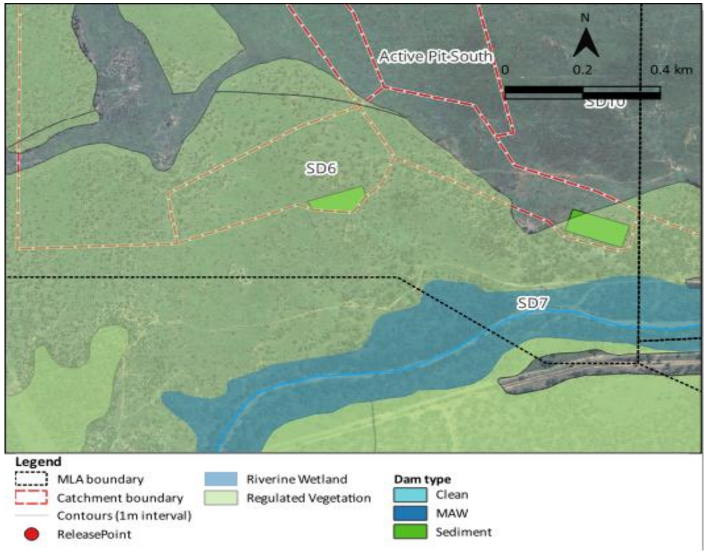


DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	**Isaac Downs Extension Project - Preliminary Consequence Category Assessments**

Water Storage Name	**SD6**



Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material and disturbed area.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to Cherwell Creek.

Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	621,395	
Northing (GDA94 z55)	m	7,554,065	
Catchment Area	ha	11.9	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	3.2	S2
Wetted Area at Spillway	ha	0.14	S2
Spills Flows To:		Cherwell Creek	
Spill Diluting Catchment	ha	698,000	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

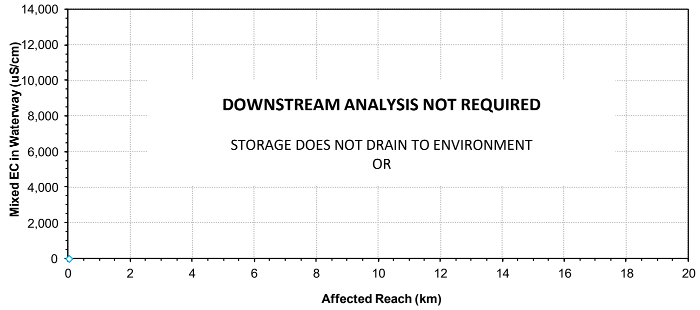
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

Item		Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Cherwell Creek from SD6 would be small, and concentrations of EC would be diluted to background levels after mixing with the Cherwell Creek and Isaac River flows. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of a spillway overflow.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**

Worksheet Title	**Isaac Downs Extension Project - Preliminary Consequence Category Assessments**
Water Storage Name	**SD7**

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material and disturbed area.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to Cherwell Creek.

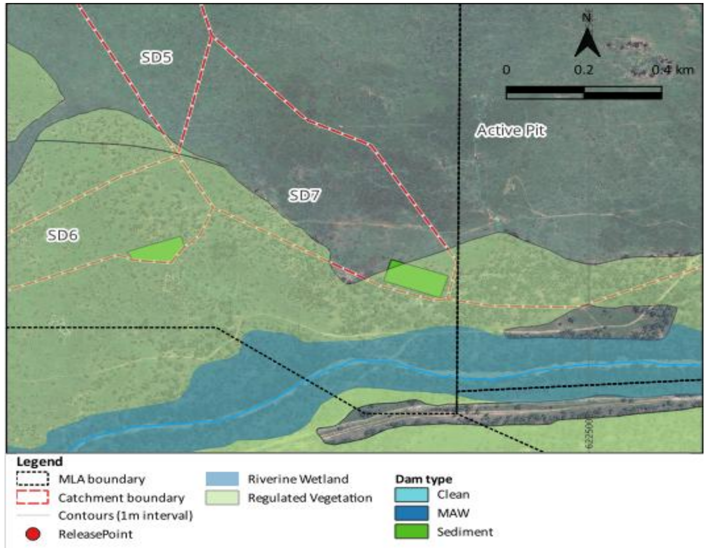
Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	622,050	
Northing (GDA94 z55)	m	7,553,990	
Catchment Area	ha	25.1	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	6.7	S2
Wetted Area at Spillway	ha	0.30	S2
Spills Flows To:		Cherwell Creek	
Spill Diluting Catchment	ha	698,000	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels



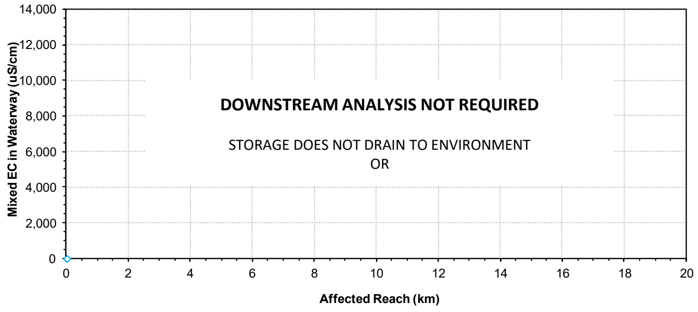
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

Item		Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Cherwell Creek from SD7 would be small, and concentrations of EC would be diluted to background levels after mixing with the Cherwell Creek and Isaac River flows. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of a spillway overflow.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

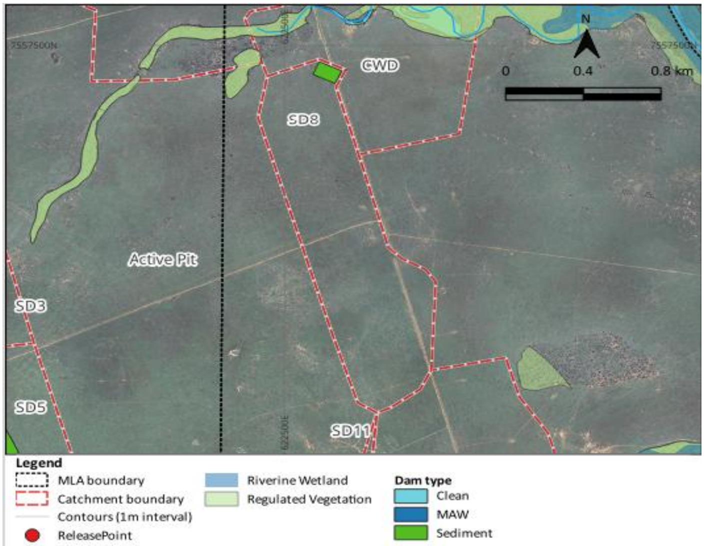
Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Water Storage Name	SD8

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises unrehabilitated spoil material and disturbed area.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to CWD.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	622,725	
Northing (GDA94 z55)	m	7,557,360	
Catchment Area	ha	100.9	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	26.8	S2
Wetted Area at Spillway	ha	1.19	S2
Spills Flows To:		CWD	
Spill Diluting Catchment	ha	-	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

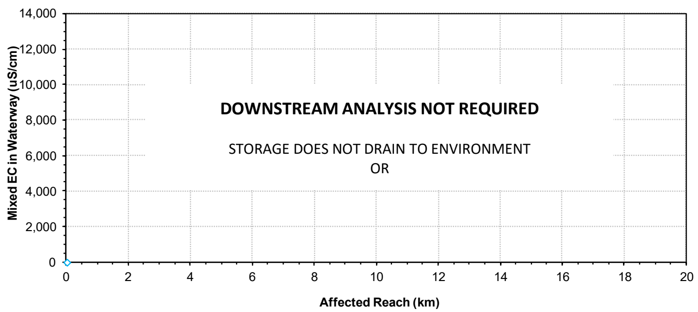
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

Item		Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ If a spill occurs, would be discharged to CWD and likely contained within the mining complex. ▶ Release not expected to reach natural environment.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

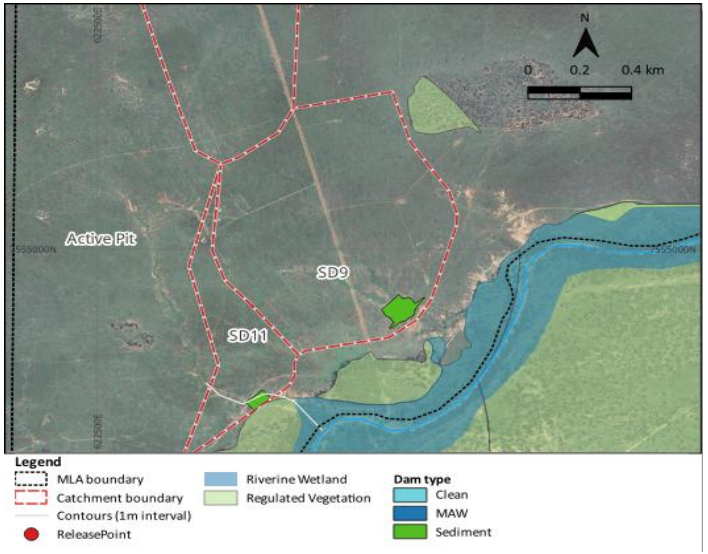
Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Water Storage Name	**SD9**

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises disturbed area.
Outlet Description	Storage is expected to be an embankment dam with a spillway. Releases are pumped directly to MAW2; spills are directed downstream to Cherwell Creek.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	623,670	
Northing (GDA94 z55)	m	7,554,730	
Catchment Area	ha	96.8	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	25.7	S2
Wetted Area at Spillway	ha	1.14	S2
Spills Flows To:		Cherwell Creek	
Spill Diluting Catchment	ha	698,000	
Embankment Height	m	5	S2
Dam Break Volume	ML	25.7	S3
Dam Break Flows To:		Cherwell Creek	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

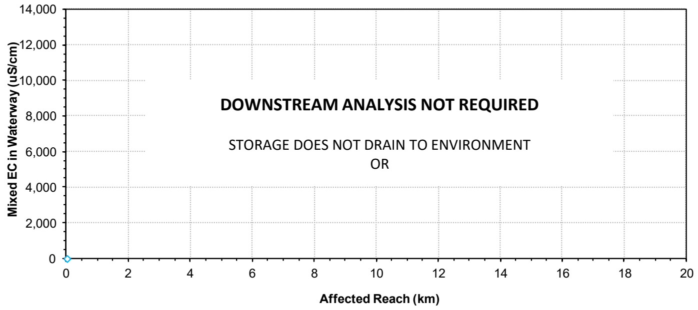
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Cherwell Creek from SD7 would be small, and concentrations of EC would be diluted to background levels after mixing with the Cherwell Creek and Isaac River flows. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of a spillway overflow.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ No identifiable surface/groundwaters within the reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Cherwell Creek from SD7 would be small, and concentrations of EC would be diluted to background levels after mixing with the Cherwell Creek and Isaac River flows. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of dam-break	low	
	General Economic Loss or Property Damage	▶ No third party infrastructure considered to be at risk due to a dam break. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

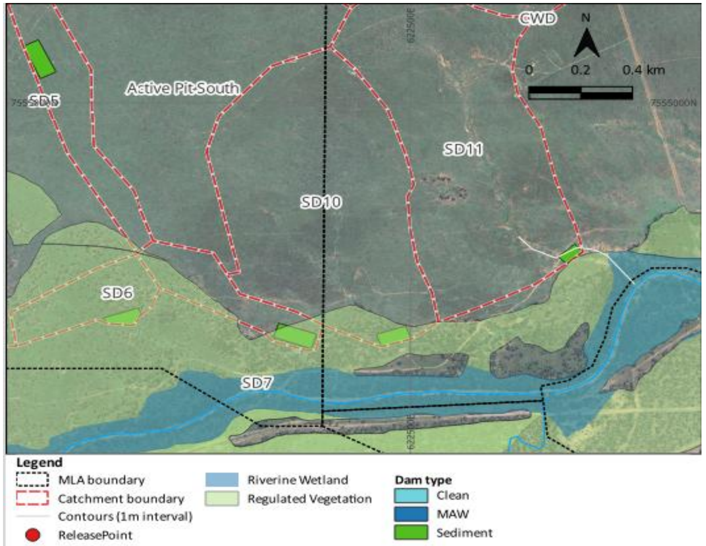
Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Water Storage Name	SD10

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises disturbed area.
Outlet Description	Storage is expected to be an exacavated dam and does not consist of any constructed embankments or spillways. Releases are pumped directly to MAW2; spills are directed downstream to Cherwell Creek.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	622,435	
Northing (GDA94 z55)	m	7,553,980	
Catchment Area	ha	78.7	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	20.9	S2
Wetted Area at Spillway	ha	0.93	S2
Spills Flows To:		Cherwell Creek	
Spill Diluting Catchment	ha	698,000	
Embankment Height	m	n/a	
Dam Break Volume	ML	n/a	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

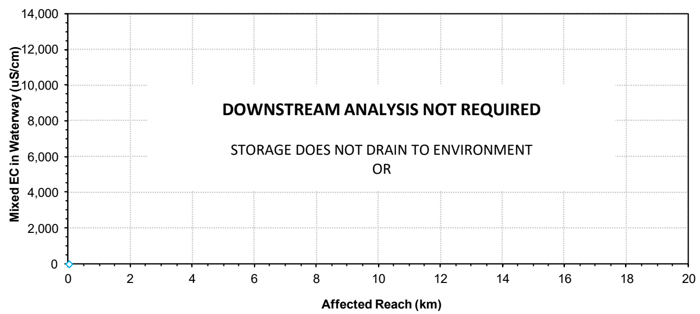
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

Item		Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Cherwell Creek from SD7 would be small, and concentrations of EC would be diluted to background levels after mixing with the Cherwell Creek and Isaac River flows. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of a spillway overflow.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ not applicable.	n/a	n/a
	General Environmental Harm	▶ not applicable.	n/a	
	General Economic Loss or Property Damage	▶ not applicable.	n/a	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

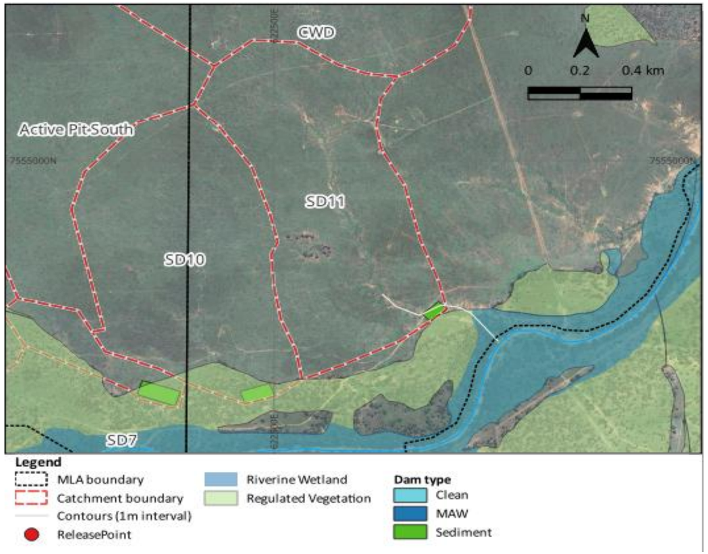
Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Water Storage Name	SD11

Overview

Functional Description	Structure stores sediment water.
Catchment Description	Local catchment primarily comprises disturbed area.
Outlet Description	Storage is expected to be an embankment dam with a spillway. Releases are pumped directly to MAW2; spills are directed downstream to Cherwell Creek.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	623,120	
Northing (GDA94 z55)	m	7,554,345	
Catchment Area	ha	84.7	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	22.5	S2
Wetted Area at Spillway	ha	1.00	S2
Spills Flows To:		Cherwell Creek	
Spill Diluting Catchment	ha	698,000	
Embankment Height	m	3	S2
Dam Break Volume	ML	22.5	S3
Dam Break Flows To:		Cherwell Creek	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	840		Q1

[1] Refer to main report for basis of trigger levels

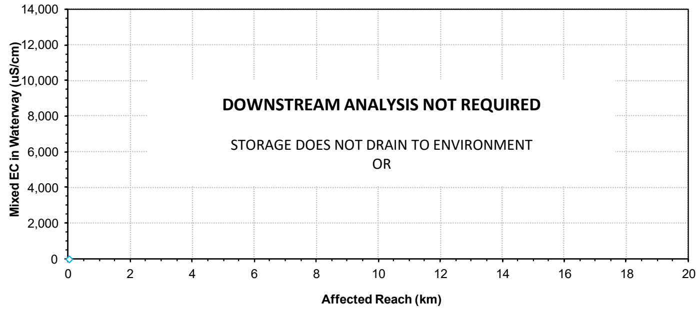
Notes

S1	
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Cherwell Creek from SD11 would be small, and concentrations of EC would be diluted to background levels after mixing with the Cherwell Creek and Isaac River flows. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of a spillway overflow.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ No identifiable surface/groundwaters within the reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels. pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ The volume of water discharging to Cherwell Creek from SD11 would be small, and concentrations of EC would be diluted to ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of dam-break	low	
	General Economic Loss or Property Damage	▶ No third party infrastructure considered to be at risk due to a dam break. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	

Downstream Reach Analysis (pH and Electrical Conductivity)
(refer to main report for methodology)



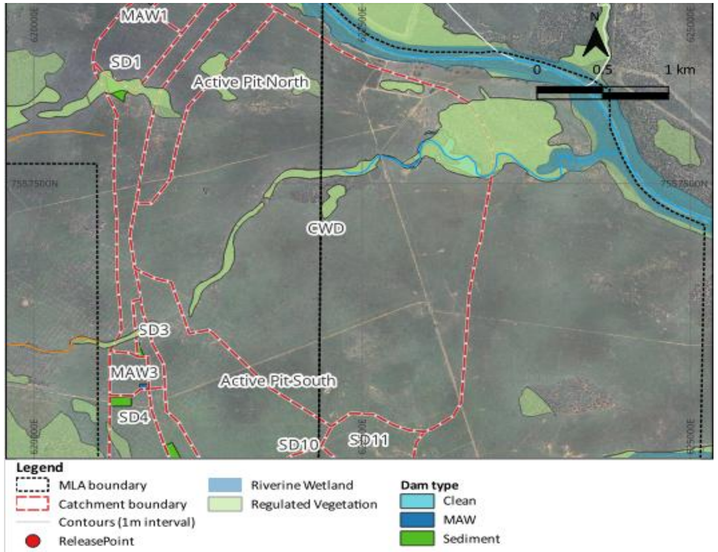
DSA Design Standard	N/A
ESS/MRL Design Standard	N/A
Spillway Design Standard	N/A

Preliminary Regulated Status	Non-Regulated
Preliminary Consequence Category	Low

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments
Water Storage Name	**CWD**

Overview

Functional Description	Structure stores clean catchment water.
Catchment Description	Local catchment comprises undisturbed areas and/or topsoil stockpiles
Outlet Description	Storage is expected to be an embankment dam with a spillway. Releases are pumped directly to Conrock Gully; spills are directed to behind the Isaac River levee.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	623,403	
Northing (GDA94 z55)	m	7,558,887	
Catchment Area	ha	675	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	200	S2
Wetted Area at Spillway	ha	*6*	S2
Spills Flows To:		IR Levee	
Spill Diluting Catchment	ha	-	
Embankment Height	m	4	
Dam Break Volume	ML	200	
Dam Break Flows To:		n/a	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	7.8		Q1
Electrical Conductivity	µS/cm	2,000	222		Q1

[1] Refer to main report for basis of trigger levels

Notes

S1	Catchment of 5 Mile Gully measured directly upstream of likely point of failure.
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

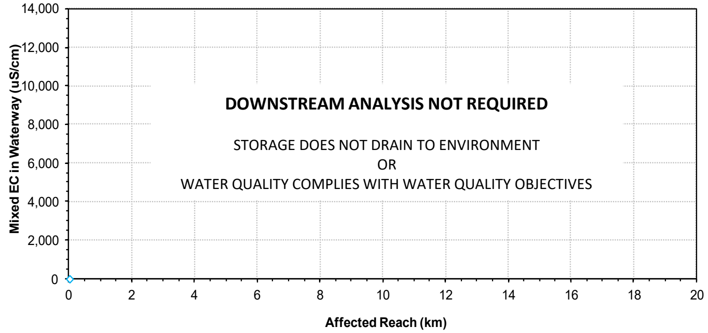
Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH is within the adopted water quality trigger levels . pH is not of significant concern for short-duration overtopping events. ▶ Expected EC is below the 2000 µS/cm limit proposed by Vink and Prasad (2012) to minimise risk of adverse effects on aquatic ecosystems within the Fitzroy catchment. Minimal impact expected. ▶ If a spill occurs, would be discharged to the remnant Conrock Gully channel behind the Isaac River Levee and contained onsite. ▶ Releases not expected to reach natural environment.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ No identifiable surface/groundwaters within the reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Any release of water from CWD is not expected to reach the natural environment. ▶ On this basis, no significant alteration to downstream ecosystems would be expected in the event of dam-break	low	
	General Economic Loss or Property Damage	▶ No third party infrastructure considered to be at risk due to a dam break. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	

DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**

Downstream Reach Analysis (Electrical Conductivity)
(refer to main report for methodology)



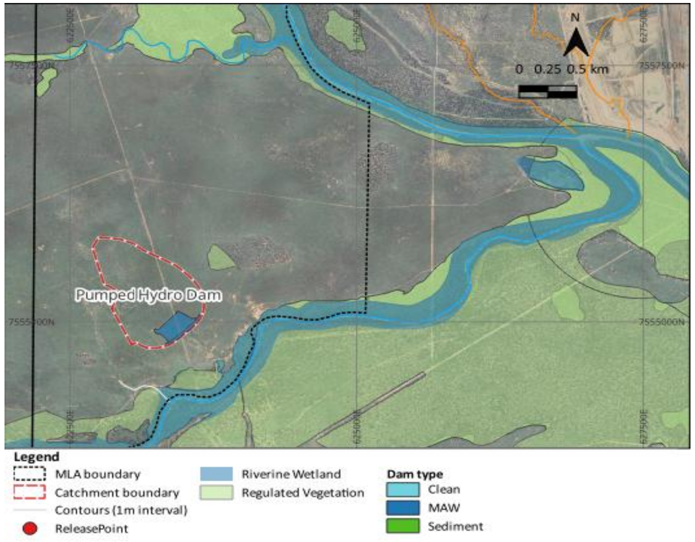
Regulated vegetation
Wildlife habitat
Wetland (High Ecological Significance)

Worksheet Title	Isaac Downs Extension Project - Preliminary Consequence Category Assessments

Water Storage Name	**Pumped Hydro Dam**

Overview

Functional Description	Structure functions as the upper reservoir for the PHES.
Catchment Description	Local catchment comprises rehabilitated areas.
Outlet Description	Storage is expected to be an embankment dam with a spillway. Spillway releases discharge to Cherwell Creek.



Specifications

Item	Units	Value	Note
Easting (GDA94 z55)	m	623,247	
Northing (GDA94 z55)	m	7,554,613	
Catchment Area	ha	67	
Spillway (or Breakout) Level	mRL	*tbc*	S2
Volume at Spillway	ML	135	S2
Wetted Area at Spillway	ha	*4.6*	S2
Spills Flows To:		Cherwell Creek	
Spill Diluting Catchment	ha	698,000	
Embankment Height	m	4.5	
Dam Break Volume	ML	135	
Dam Break Flows To:		Cherwell Creek	
DSA Compliance Level	mRL	n/a	
MRL Compliance Level	mRL	n/a	

Expected water quality in storage

Sample	Units	Trigger[1]	Expected	Sampled	Note
pH	-	6.8-8.5	8		Q1
Electrical Conductivity	µS/cm	2,000	4000		Q1

[1] Refer to main report for basis of trigger levels

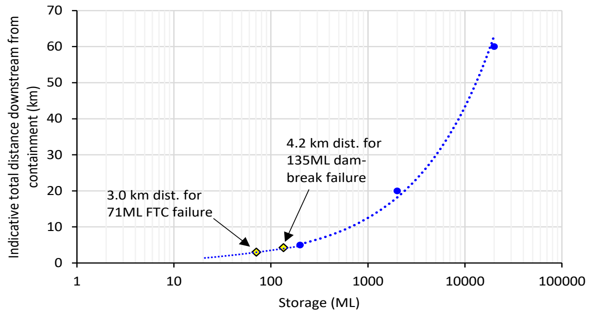
Notes

S1	Catchment of 5 Mile Gully measured directly upstream of likely point of failure.
S2	Dam configuration and geometry to be confirmed as part of the detailed design process
S3	For conservatism, dam break volume assumed to be equal to full supply volume
Q1	Water quality data not available. Based on expected water quality.

Consequence Category Assessment

	Item	Potential Impact	Item Rating	Criteria Rating
Failure to Contain - Overtopping	Harm to Humans	▶ No identifiable surface/groundwaters within the immediate reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Expected pH exceeds adopted trigger but is within the 6.5-9 range commonly adopted in water quality guidelines around the world (ANZECC 2000 vol 2 pg 8.2-25). pH is not of significant concern for short-duration overtopping events. ▶ Regulated vegetation ecosystem intersected within the affected reach. ▶ Threshold 2000 µS/cm EC to limit adverse effects on aquatic ecosystems within the Fitzroy catchment (per Vink and Prasad, 2012) exceeded within waterway reach 3.0 km downstream from the point of discharge. The failure impact zone not expected to reach the Isaac River. ▶ Regulated vegetation ecosystem intersected within the affected reach. ▶ The EC concentrations would be diluted to background levels after mixing with the Cherwell Creek and downstream Isaac River flows. ▶ On this basis, no significant alternation to downstream ecosystems would be expected in the event of a spillway overflow.	low	
	General Economic Loss or Property Damage	▶ No identifiable third party assets likely to be affected by an overtopping event. ▶ Threshold 7400 uS/cm EC to limit adverse effects on livestock (beef cattle) (per ANZECC 2000 vol 1 Table 4.3.1) is not expected to be exceeded within discharge reach. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	
Dam Break	Harm to Humans	▶ No identifiable surface/groundwaters within the reach of interest that would be used for human consumption	low	low
	General Environmental Harm	▶ Threshold 2000 uS/cm EC to limit adverse effects on aquatic ecosystems within the Fitzroy catchment (per Vink and Prasad, 2012) exceeded within waterway reach 4.2 km downstream from the point of discharge. The failure impact zone not expected to reach the Isaac River. ▶ Regulated vegetation ecosystem intersected within the affected reach. ▶ The EC concentrations would be diluted to background levels after mixing with the Cherwell Creek and downstream Isaac River flows. ▶ On this basis, no significant alternation to downstream ecosystems would be expected in the event of a dam break.	low	
	General Economic Loss or Property Damage	▶ No third party infrastructure considered to be at risk due to a dam break. ▶ Low risk of stock loss (e.g. cattle) - compensation not expected to exceed $1 million.	low	

Downstream Failure Impact Zone Distance Estimation



DSA Design Standard	**N/A**
ESS/MRL Design Standard	**N/A**
Spillway Design Standard	**N/A**

Preliminary Regulated Status	**Non-Regulated**
Preliminary Consequence Category	**Low**