Six Mile Creek Dam Safety Upgrade Project

Stormwater Management Plan

Document number: LMDIP-05829-GNL-ENV-MPL-00002

Revision 0 | April 2025

Definitions and Abbreviations

Term	Definition
Appropriately qualified person / AQP	A person having the qualifications, experience or standing appropriate to undertake the work required.
CGER	Coordinator General's Evaluation Report (2019)
CGCR	Coordinator-General's change report – Construction (2025)
CM	Contractor Construction Management
CEMP	Construction Environmental Management Plan
DETSI	Department of Environment, Tourism, Science and Innovation
ESCP	Erosion and Sediment Control plan
ESM	Environmental & Sustainability Manager
EMP	Environmental Management Plan
EP Act	Environmental Protection Act 1994
FF-Dewatering-MP	Flora & Fauna (Dewatering) Management Plan
Harm	As per EP Act 1994 Section 493A
IECA	International Erosion Control Association
km	kilometres
LMDIP	Lake Macdonald Dam Improvement Project
ML	Megalitres
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NTU	Nephelometric Turbidity Unit
PM	Project Manager
RL	Relative level
RPA	Remotely piloted aircraft
SEMP	Site Environmental Management Plan
SM	Site Manager / Super Intendant

Term	Definition
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
WQO	Water Quality Objectives

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1. Scope

The Stormwater Management Plan (this Management Plan) is applicable to all construction phase works associated with the Lake Macdonald Dam Improvement Project (LMDIP) (the project). This Management Plan is to be read in conjunction with the:

- Site Environmental Management Plan (SEMP) (Ref: LMDIP-05829-GNL-ENV-MPL-00001)
- Species Management Program/s (Ref: LMDIP-05327 -GNL-ENV-REP-00002 and LMDIP-05327-GNL-ENV-REP-00003)
- SMEC Impact Assessment Report incl. the Draft Environmental Management Plan (Ref: Appendix B of the SMEC Impact Assessment Report)
- SMEC LMDIP site specific water quality objectives 2024 (Ref: LMDIP-05762-RES-ENV-REP-00001)

This Management Plan has been prepared to address the relevant imposed conditions outlined in the Coordinator-General's change report 2025 (CGCR) – Construction and recommendations (the addressable items).

This Management Plan specifically relates to the management of "**Construction Affected Water**", and "**Groundwater**". these are defined as:

- Construction-affected water relates to water that is potentially affected by construction activities in that it has fallen on a disturbed area or has ponded within the active work area
- Groundwater relates to underground water that is intercepted or actively dewatered in the course of construction activities within the active work area

This Management Plan does not include the management of water quality associated with lake lowering activities. Management of water quality during lake lowering will be addressed in the approved revision of the Lake Macdonald Flora & Fauna (Dewatering) Management Plan (FF-Dewatering-MP) (Ref: LMDIP-05327-GNL-ENV-MPL-00003). Water that is pumped/syphoned from Lake Macdonald to downstream and water that spills over the cofferdam and through the construction area is not considered to be a discharge but is regarded as a natural system flow. Therefore, these are not considered in this Management Plan.

1.1. Objectives

The objectives of this Management Plan are to:

- Preserve water quality within the Six Mile Creek Catchment area and maintain the Environmental Values (EVs), including compliance with relevant local water quality objectives (WQOs)
- Meet the requirements of the CGCR addressable items

1.2. Stakeholder Consultation

In preparing this Management Plan the following stakeholders were consulted and feedback considered in the development of management measures:

- The Office of Coordinator General (OCG) through the review of the draft Management Plans provided in May 2024
- Department of Environment, Tourism, Science and Innovation (DETSI)
- John Holland Group

2. Performance Measures

2.1. Specific Performance Measures

The specific performance measures relevant to the implementation of this Management Plan have been detailed in Table 1.

Table 1 Performance Measures

Specific Performance Measure	Measurable Target(s)
Prevent or minimise adverse effects on the environment due to unplanned releases or discharges of contaminants to water	Water discharge to Six Mile Creek downstream of the dam via pumps and siphons for the purpose of lake lowering or lake level maintenance will not exceed 10 m^3/s at any time
	All ponded/collected water in the Borrow Pit will discharge to the reservoir via the sediment basin. The Borrow Pit will be designed to manage water generated by (up to and including) a 24-hour storm event with an average recurrence interval of 1 in 5 years
Minimise adverse impacts to the Noosa Water Treatment Plant (WTP) Supernatant Lagoon and licensed discharge point	No discharge of construction affected water to the Noosa WTP Supernatant Lagoon and licensed discharge point. All construction affected waters will be diverted away from the WTP Supernatant Lagoon and appropriately discharged
Water quality within and downstream of the construction footprint is maintained	Monitoring demonstrates existing ecosystem attributes and water quality within Six Mile Creek is maintained throughout construction period (Appendix A Impoundment and Downstream Water Quality Monitoring)
	Water quality aspects of the approved FF-DEWATERING-MP are adhered
	Intersected groundwater will not be discharged into the Six Mile Creek unless it meets specific discharge criteria (Section 2.3)

2.2. Water Quality Objectives (WQOs)

Water quality objectives (WQOs) will be used to establish the standard of any retained waters on site before they can be discharged.

The relevant WQOs for discharges to the Project are Lowland freshwater (aquatic ecosystem – moderately disturbed) in the Upper Mary River, as outlined in the *Environmental Protection (Water) Policy 2009 for the Mary River Environmental Values and Water Quality Objectives Basin No. 138*. These WQOs values are:

- Turbidity: <50 NTU
- Suspended solids: <6 mg/L
- Chlorophyll a: <5 µg/L
- Total nitrogen: <500 µg/L
- Oxidised nitrogen: <60 µg/L
- Ammonia: <20 µg/L

- Organic nitrogen: <420 µg/L
- Total phosphorus: <50 µg/L
- Filterable reactive phosphorus (FRP): <20 µg/L
- Dissolved oxygen: 85% – 110% saturation
- pH: 6.5 – 8.0
- Electrical conductivity: 626 µS/cm[1]

2.3. Discharge criteria

For collected waters to be discharged from the Project, they will need to meet the discharge criteria detailed in Table 2. The discharge criteria for retained waters are based on:

1. *Environmental Protection (Water) Policy 2009, Mary River environmental values and water quality objectives Basin No. 138*, including all tributaries of the Mary River, July 2010, Table 2 (page 15) "Freshwater lakes/reservoirs"
2. Transport and Main Roads Specification MRTS51: Environmental Management

Site specific discharge criteria will not change throughout the duration of construction, unless sufficiently justified.

Table 2 Discharge criteria

Water Parameter	Units	Catchment WQO	Project Discharge Criteria
pH	pH	6.5 – 8.0	6.5 – 8.0
Turbidity	NTU	<20	<50 or less than the ambient water (determined from sampling point I1, Figure 2) +10% whichever is the greater
Dissolved Oxygen	%	90 – 110% saturation	85 – 110% saturation or 90% of ambient water concentration (determined from sampling point I1, Figure 2)
Hydrocarbons	N/A	No hydrocarbon sheens observed	No hydrocarbon sheens observed

Table Notes:

- The criteria in Table 2 do not apply to waters discharged from Lake Macdonald during Lake Lowering or lake level maintenance. Refer to the Water Quality requirements detailed in the FF-Dewatering-MP
- Discharge criteria only applies to waters being discharged from the area between the cofferdam and spillway (refer Figure 1)
- The primary compliance point is location DS01 (Figure 2). DS01 will be compared to the discharge criteria listed in Table 2. Where the discharge criteria can be determined from ambient water concentrations, data from monitoring location I1 will be used (Figure 2).

A water quality monitoring program (Appendix A Impoundment and Downstream Water Quality Monitoring) will be implemented to:

- Record water quality for the duration of construction works, to establish water quality trends and determine if there is any impact on downstream water quality, that could be attributable to the Project

[1] Derived from: Queensland Water Quality Guidelines 2009 (Appendix G), 75th percentile of Sandy Coastal soil zone

- Prior to any discharge of collected waters

This water quality monitoring program will be undertaken in conjunction with, and does not replace, the detailed water quality monitoring program requirements that will be required under the approved version of the FF-Dewatering-MP. Where monitoring requirements of the FF-Dewatering-MP and this plan are the same or substantially similar, the monitoring will not be duplicated.

2.4. Trigger Values

Revised assessment of site-specific WQOs has been undertaken to understand baseline water quality in the vicinity of the Project area and update the currency of the low-risk and high-risk trigger values to appropriately manage areas directly affected by operational works. Site specific values have been calculated in accordance with the methodology and results stipulated in the LMDIP site specific water quality objectives 2024 report produced by SMEC (Ref: LMDIP-05762-RES-ENV-REP-00001) and summarised in Table 3.

Table 3 Site Specific Water Quality Objectives

Water Quality Parameter	Unit	Low-risk trigger values (20th/80th percentile)		High-risk trigger values (min/max)	
		Min trigger value	Max trigger value	Normalised min recorded values	Normalised max recorded values
Lake Macdonald					
pH	$-Log_{10}\{H+\}$	6.41	6.64	5.73	7.3
Turbidity	NTU	-	9.75	-	42.6
Dissolved oxygen	%	>74.1 (6.1 mg/L)	-	31.80 (2.62 mg/L)	-
Total suspended solids	mg/L	-	5	-	9
Total nitrogen	mg/L	-	0.59	-	0.78
Nitrate	mg/L	-	0.0142	-	0.02
Nox	mg/L	-	0.0116	-	0.04
Ammonia	mg/L	-	0.0528	-	0.11
Total phosphorus	**mg/L**	**-**	**0.034**	**-**	**0.048**
Six Mile Creek					
pH	$-Log_{10}\{H+\}$	6.25	6.65	5.7	7.13
Turbidity	NTU	-	4.13	-	6.69
Dissolved oxygen	%	>98.02 (8.07 mg/L)	-	56.96 (4.69 mg/L)	-

The site-specific WQOs provide a measurable assessment of management measures, established upon the mitigation of significant impact to ecological receptors within the Project area and informing ongoing management actions. The trigger values indicate the adequacy of management measures associated with the LMDIP adaptive management plan, with the following measures to be undertaken relative to the management plan and trigger met:

- Low-risk trigger – Implementation of an active watch scenario where increased water sampling is undertaken alongside identification of current mitigation measure controls.
- High-risk trigger – Implementation of intervention control (i.e. fish salvage exercises, increased aeration, management of erosion and sediment control devices.

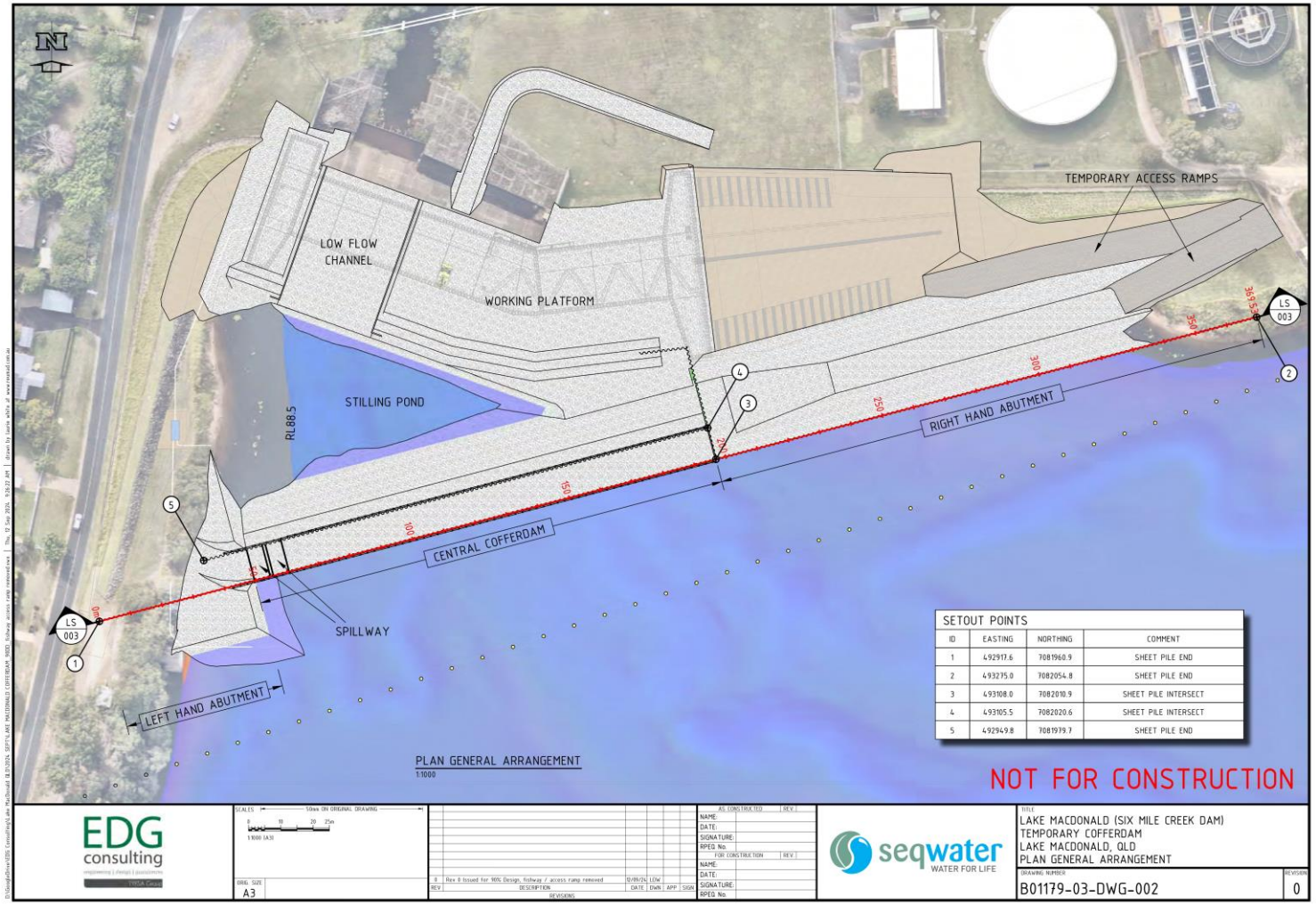

Figure 1 Temporary cofferdam and dam construction area schematic arrangement

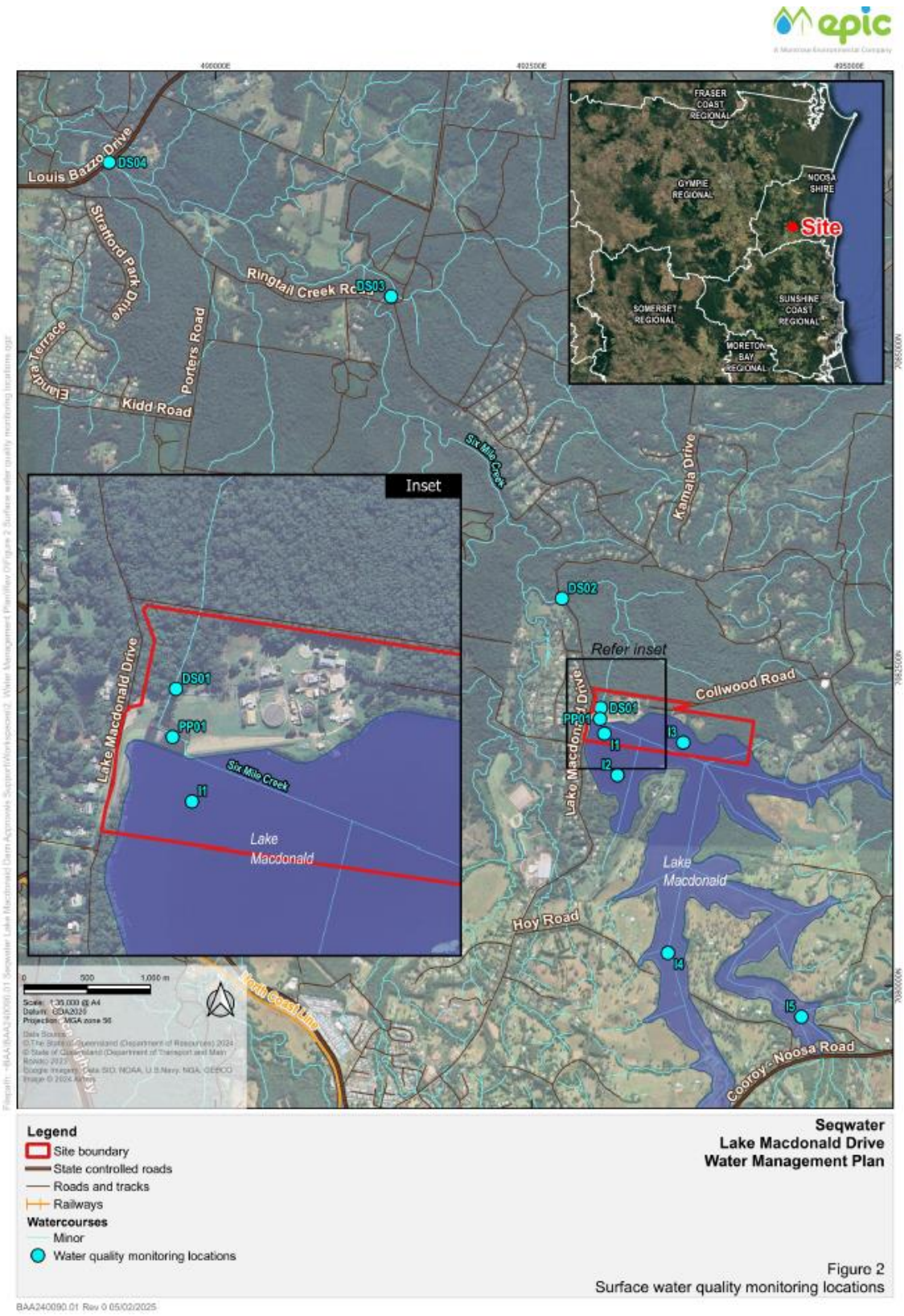

Figure 2 Surface water quality monitoring locations

3. Roles and Responsibilities

Roles and responsibilities applicable to the implementation of this Management Plan are detailed in Table 4. These roles and responsibilities are in addition to those described in Table 9 of the SEMP.

Table 4 Roles and Responsibilities

Role	Responsibility
Seqwater	• Manage the construction process as the Project proponent • Allocate sufficient resources to prepare, review and update this Management Plan • Ensure that the requirements of any statutory approvals, legislation and this Management Plan are included in the contract documentation are implemented • Undertake audits of the contractor to verify compliance with any legislative requirements and this Management Plan
Principal Contractor	• Implement this Management Plan in accordance with their own Environmental Management System (EMS) and processes • Ensure all construction works are conducted in accordance with approvals, the contract, relevant legislation, and local laws • Maintain for the duration of the construction phase, open and effective communication with the communities in the vicinity of the Project about the construction program, scale, duration and nature of the proposed work, and details of proposed impact mitigation measures
Contractor Project Manager (PM)	• Maintain a master copy of this Management Plan, a record of the completion of management measures, monitoring records and reports • Provide sufficient resources to ensure the effective implementation of this Management Plan • Participate in any audits initiated by Seqwater • Provide relevant and timely information about construction activities that may impact on the amenity of stakeholders
Contractor Construction Manager (CM)	• Understand the content and requirements of this Management Plan • Ensure all water management undertaken in accordance with this Management Plan • Report any incidents, non-compliances and complaints Contractor Project Manager • Participate in any investigations of complaints or non-conformances • Ensure all staff are trained/inducted to the Project
Contractor Commercial Manager (CCM)	• Ensure environmental requirements are considered in procurement processes

Role	Responsibility
	• Facilitate procurement for items and subcontract packages required for conformance with this plan • Ensure environmental requirements are included in subcontracts, this is to include but not be limited to the requirements of the SEMP and relevant permits and approvals applicable to the works • Ensure environmental performance is considered in sub-contract progress reviews
Contractor Environment and Sustainability Manager (ESM)	• Primary responsibility is to implement all necessary stormwater management measures ensuring both effective resource use and the safety of workers • Undertake regular inspections of work activities and reporting on inspections and maintaining all documentation by the Management Plan • Coordinate required monitoring • Participate in toolbox talks as required to ensure staff are aware of key concerns associated with water management • Report any incidents, non-compliances and complaints to Seqwater • Lead any investigations of complaints or non-conformances and report any findings and corrective actions to Seqwater
Engineers (Eng)	• Ensure environmental controls are established prior to commencement of construction activities • Participate in the preparation of Risk Management documentation • Immediately report any non-conformances, near misses or environmental incidents to the ESM • Ensure and verify that corrective actions are undertaken when required for non-conforming work
Healthy and Safety Manager (HSM)	• Liaise with the ESM to implement all necessary water management measures to ensure both effective resource use and the safety of workers
Community & Stakeholder Manager (CSM)	• Ensure community members are appropriately notified of relevant project work • Manage the Project enquiries and responses • Register and report community complaints and ensure adherence to the complaints procedure
Supervisors (Sup)	• Ensure that this Management Plan requirements are communicated to all personnel and are being fully implemented on site • Reporting any near misses, environmental incidents or non-conformances to the ESM • Undertake any rectifications as required by the ESM
Subcontractors	• Implement requirements of All Project Personnel below

Role	Responsibility
	• Comply with reasonable directions given by Principal Contractor regarding environmental matters • Implement any measures as required by legislation, permits and approvals as apply to the subcontracted scope of work • Comply with the requirements of the SEMP and sub-plans as relevant to the subcontracted works
All Project personnel (including Subcontractors)	• Comply with reasonable directions given by the PM, CM and/or ESM regarding environmental matters • Comply with the requirements of this Management Plan as relevant to the subcontracted works • Environmental incidents, non-conformances and near misses are to be reported to the Supervisor

4. Receiving Environment

The Project, located on Six Mile Creek, is approximately 10 kilometres (km) from Cooroy in the Noosa hinterland. It was constructed in the early 1960s and raised in 1979. At full capacity, the dam holds 8,018 megalitres (ML) of water, a surface area of 260 ha, and has a catchment area of 49 km².

4.1. Aquatic Ecology

Several protected aquatic species are known or likely to inhabit the area around the Project. These include five species listed as Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES): the Mary River cod (*Maccullochella mariensis*), Australian lungfish (*Neoceratodus forsteri*), Mary River turtle (*Elusor macrurus*), white-throated snapping turtle (*Elseya albagula*), and giant barred frog (*Mixophyes iterates*).

The tusked frog (*Adelotus brevis*) and platypus (*Ornithorhynchus anatinus*), both MSES species, have been recorded within Lake Macdonald and its upper reaches, with the platypus also observed in Six Mile Creek.

4.2. Groundwater Dependent Ecosystems

Within 2 km of Lake Macdonald, three classes of aquatic ecosystems have been identified by WelandInfo that rely on the surface present of groundwater, these being:

- Creeks with a high potential for groundwater interaction, including Six Mile Creek downstream of the spillway and Lake Macdonald
- Creeks with a moderate potential for groundwater interaction, including Six Mile Creek upstream of Lake Macdonald
- Wetlands with a moderate potential for groundwater interaction. State mapping of wetlands shows that both riverine and palustrine wetlands associated with Six Mile Creek occur downstream of the spillway

Whilst these GDEs are noted, it is considered unlikely the project will impact on these ecosystems, as the project will not:

- Drawdown on groundwater and consequently limit the availability of groundwater for GDEs[2]
- Release contaminated water to surface or groundwater, and ultimately impacting the quality of available water for GDEs

4.3. Water Quality

Four water quality reports were generated for Lake Macdonald between 2023 – 2024. The initial survey was conducted in September 2023 with the following three completed between March-May 2024.

Water quality was measured on-site for parameters such as temperature, pH, electrical conductivity, dissolved oxygen, and turbidity using a calibrated meter. Measurements were taken within Lake Macdonald, upstream of Lake Macdonald, and downstream of Lake Macdonald. Measurements were taken approximately 0.3 metres below the water surface at mid-channel locations for river sites, and at 1 metre intervals to create a depth profile for samples within Lake Macdonald. Water quality results were compared to the relevant WQO, detailed in Section 2.2.

The September 2023 monitoring results indicated that:

- Sites within Lake Macdonald were generally not stratified at the time of the 2023 survey
- The Upstream of Lake Macdonald site displayed a slight water quality change with depth
- Electrical conductivity and pH were higher than previous maximums at all sites within Lake Macdonald
- Turbidity was higher than previous maximums at the Lake Macdonald site
- Dissolved oxygen exceeded the WQO at all sites, being less than the WQO upstream and downstream of Lake Macdonald and higher than the WQO within Lake Macdonald
- pH was higher than both the WQO and the previous range at the upstream Lake Macdonald site within Lake Macdonald

While electrical conductivity and turbidity generally met WQOs across all sites, there were deviations in other parameters. Temperature, electrical conductivity, and pH were frequently outside ranges based on previous surveys, with electrical conductivity and pH levels reaching new maximums within Lake MacDonald. Additionally, turbidity exceeded previous maximums at the Lake MacDonald site, and dissolved oxygen levels failed to meet WQOs at any location.

4.3.1. Water Quality Monitoring at Lake Macdonald (March-May 2024)

Monitoring of Lake Macdonald and downstream areas was carried out over the months of March, April, and May 2024. The monitoring was conducted at eight key locations around Six Mile Creek Dam, both within Lake Macdonald and downstream. The sampling was done using a combination of remotely piloted aircraft (RPA) for difficult-to-access areas and traditional methods. The following water quality parameters were measured; temperature, pH, turbidity, dissolved oxygen, suspended solids, total & dissolved mercury, nitrogen (total,

[2] There will be minor and intermittent groundwater dewatering required around excavations and piling activities. However, this level of dewatering will be localised to the immediate location dewatering and will not cause drawdown of downstream groundwater levels.

ammonia, oxidised, kjeldahl), and total phosphorus. Water quality results were compared to the relevant WQO, detailed in Section 2.2.

Over the three-month period, there was a noticeable trend in the water quality results. March saw minor exceedances of the WQOs not linked to rainfall, April experienced more significant pH exceedances. By May, the number of exceedances had decreased.

The data collected from March to May 2024 reveals that the Lake Macdonald's water quality is highly sensitive to natural variations. . The minor and temporary nature of most exceedances suggests that while the lake is responsive to changes, these fluctuations may not necessarily indicate long-term or significant environmental risks. However, the consistent exceedances in pH during April and May highlight the need for adaptive management strategies. In conclusion, while the water quality in Lake Macdonald generally remained within acceptable ranges, the observed exceedances, particularly in pH levels.

4.3.2. Lake Macdonald March-May 2024 vs. 2023 Water Quality Surveys

The 2023 survey indicated a lack of significant stratification in Lake MacDonald, with sharp decreases in dissolved oxygen and increases in turbidity and electrical conductivity at specific depths. While variances in pH were noted in the2024 data, the results highlight natural variability within the impoundment rather than chemical or thermal stratification. The 2023 survey showed widespread non-compliance with dissolved oxygen WQOs, a trend that continued in 2024, suggesting an ongoing issue with oxygen levels in the lake and its surroundings. Turbidity levels, while generally compliant, showed occasional exceedances, particularly at the Mid-Lake site, across sampling.

The persistent exceedances in pH and electrical conductivity, along with low dissolved oxygen levels, are likely an artefact of inflow and water quality and are expected to be principally related to leading to increased hydraulic residence within Lake MacDonald. The data from both 2023 and 2024 indicates that these parameters frequently exceed management guidelines. In conclusion, the 2024 water quality surveys largely corroborate the findings from 2023, highlighting persistent background water quality. Water Quality Monitoring of Tailwater Releases at Lake Macdonald

The water quality of the tailwater release were analysed and compared against the WQOs. Monitoring was conducted within the tailwater environmental release stream. Key water quality parameters, including temperature, pH, turbidity, dissolved oxygen, nitrogen (total, ammonia, oxidised, kjeldahl), and phosphorus, were measured. Monthly samples were taken from January to July 2024.

It was identified that:

- pH values were consistently low across all months, with exceedances against the WQOs
- Turbidity would often stay within the WQO, to then exceed the WQO during high rainfall events. Turbidity results from 4th April 2024 was considered an outlier, with high turbidity readings with no evidence of rainfall within the past 7 days
- Dissolved oxygen would fluctuate in and out of range but consistently staying above 70% saturation

4.4. Sensitive Users

Seqwater is the only authorised user to take water from Lake Macdonald and there are no other water licenses in place for Lake Macdonald. The major licensee is the South-East Queensland Water Grid Manager (Seqwater) to take an annual volumetric limit of 3,495 ML for the purpose of town water supply. A lesser license to take water is

granted to Queensland Bulk Water Supply Authority for an annual volumetric limit of 5 ML/yr. This additional water licence adds 1,500 ML to the annual volumetric limit for town water supply.

Note that no person has a licence to take water from the impoundment of Six Mile Creek Dam, other than the licence for town water supplies held by Seqwater, as described above. At the present time, there is no scope under the Water Act to grant any other person a new water licence to take water from the impoundment.

4.5. Impacts to Water Quality

Construction earthworks and runoff from soil stockpiles can degrade water quality. Additionally, the submersion of decomposing organic matter during the dam refill phases can lead to water quality deterioration and eutrophication.

Increased turbidity and total suspended solids can occur from the disturbance of earth and runoff from soil stockpiles during construction. Increased turbidity can negatively impact fish and macroinvertebrates by reducing respiratory and feeding efficiency, and it can adversely affect submerged aquatic plants by reducing light penetration required for photosynthesis. While small and brief increases in turbidity (consistent with natural flow events) are unlikely to have significant impacts, substantial increases, especially from fine silt and clay particles, could adversely affect the health, feeding, and breeding ecology of aquatic fauna.

A reduced dissolved oxygen concentration can occur in the lake and downstream in Six Mile Creek if the waterbody becomes stratified or eutrophic, such as through the submersion of decomposing organic matter (e.g., decomposing *Cabomba caroliniana* (Cabomba)) during the refill phase. Dissolved oxygen is essential for respiration and metabolism by aquatic biota, and reduced levels can cause stress and potentially mass mortality. While some regional waterways naturally experience low dissolved oxygen, sustained periods of low dissolved oxygen will cause mortality in aquatic fauna.

There exists a probability of increased nutrient concentrations if drawdown exposes deep sediments below approximately 92.5 m AHD, which have higher nutrient content, and during refill if the lake becomes eutrophic from decomposing organic matter. High nutrient concentrations can lead to increased growth of phytoplankton, depleting dissolved oxygen, and promoting excessive algae and aquatic plant growth, which reduces in-stream habitat quality for some biota.

Increasing dissolved metal concentrations can occur construction and refilling phases due to the mobilisation and oxidation of lake sediments, lateral transport of sediment pore water, and ebullition fluxes. Drawdown exposing deep sediments below approximately 92.5 m AHD, which have higher metal content, increases the risk of adverse water quality impacts.

Spills of fuels, oils, or other chemicals from pumping equipment or other machinery/vehicles during drawdown and construction can be toxic to aquatic flora and fauna. Significant fuel spills can have a locally significant impact on both flora and fauna, with the size of the spill and the volume of water in the creeks influencing the length of the stream impacted.

5. Legislation and Other Compliance Requirements

5.1. CGCR Addressable Items

Details of the applicable CGCR addressable items and how these have been addressed in the WMP are detailed in Table 5.

Table 5 CGCR addressable items relevant to the WMP

CGCR Reference	Type	Addressable Items	How addressed in the WMP
Coordinator-General Conditions			
Appendix A. Imposed Conditions, Schedule 1, Condition 1 (c) Site Environmental Management Plan (SEMP)	Imposed Condition	The SEMP must include the following construction EMPs: (A) stormwater management plan	This Stormwater Management Plan is a construction environmental plan and sub-plan of the Site Environmental Management Plan

5.2. Legislation

Details of relevant legislation applicable to this Management Plan are detailed below.

Table 6 Other legislation applicable to the WMP

Legislation	How it applies to the Management Plan
Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)	The Project was deemed a controlled action for impacts on MNES. Therefore, the Project has an EPBC Approval (ref EPBC 2017/8078) for impacts to Listed Threatened Species and Communities. There are multiple Commonwealth listed fauna species that might be impacted by water quality
Environment Protection Act 1994 (EP Act)	Under the EP Act the Project must not cause an unreasonable impact on water quality Seqwater has an obligation to uphold their general environmental duty, duty to notify, and duty to restore the environment under the EP Act to prevent environmental harm, nuisance and contamination occurring from project activities.
Environmental Protection (Water) Policy 2009 (EPP Water)	The EPP Water provides the framework to achieve the objective of the EP Act in regards to impacts to water. Within the EPP Water this is achieved by: • Identifying environmental values and management goals for Queensland waters • Stating water quality guidelines and water quality objectives to enhance or protect the environmental values • Providing a framework for making consistent, equitable and informed decisions about Queensland waters • Monitoring and reporting on the condition of Queensland waters

6. Potential Impacts

The construction activities, aspects and potential impacts relevant to this Management Plan are detailed in Table 7.

Table 7 Potential Impacts – Water Quality

Construction Activity	Potential Impact No.	Potential Impact – Water Quality
Construction earthworks and soil stockpiles	PI1	Unprotected or exposed soils from construction earthworks and runoff from soil stockpiles can produce sediment laden water which increases turbidity and total suspended solids (TSS) and/or decreased pH where acidic soils are exposed or disturbed, adversely impacting on water quality/environmental values within and downstream of the construction footprint
	PI2	Adverse effects on the environment due to unplanned releases or discharges of contaminants to water
Concrete batching plant	PI3	Discharge of highly alkaline wastewater that may have an adverse impact to environmental values/water quality
Cofferdam construction and operation	PI4	Exposed soils during cofferdam construction and operation produces sediment laden water which enters the environment which increases turbidity and TSS and/or decreased pH where acidic soils are exposed or disturbed, adversely impacting on water quality/environmental values within and downstream of the construction footprint
Groundwater dewatering	PI5	Release of groundwater that contaminates the downstream receiving water bodies and adversely effects environmental values (including Groundwater Dependent Ecosystems) and water quality, where the groundwater has an increased sediment load, salinity, nutrient levels or a low/high pH
Fuel and chemical storage and refuelling	PI6	Water contamination from chemical or fuel spills from pumping equipment or other machinery and/or vehicles
Demolition of existing dam	PI7	Water contamination from the release of sediment laden water, increasing the water turbidity downstream
Construction of new dam	PI8	Water contamination from the release of sediment laden water, increasing the water turbidity downstream. Water contamination from the release of high pH water from concrete works, impacting downstream pH levels

7. Management Measures

The management measures that will be implemented to minimise the potential for impacts associated with water quality are detailed in Table 8.

Table 8 Management Measures

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
Management of construction affected water: This is water that is potentially affected by construction activities in that it has fallen on a disturbed area or has ponded within an active work area					
MM1	Y	All captured water, runoff and ponded water (construction affected water) shall be pumped through the water treatment system once established, in order to meet the discharge criteria in Table 2. The treatment system will adjust the pH, treat and flocculate the water. Large volumes of ponded waters unable to be discharged through site drainage will be stored in the tank farm prior to treatment and offsite disposal. The treatment plant is designed for an inflow rate at 12 L/s, and inflow and outflow will be continuously monitored. Prior to installation of the treatment plant, water will be tested and treated insitu prior to discharge, in accordance with the best practice. Ponded water will be used as dust suppression water, if the pH is suitable.	PI1 & PI2	ESM/CM	Project Delivery
MM2		No discharge of construction contaminated water to the Noosa Water Treatment Plant Supernatant Lagoon and licensed discharge point	PI1 & PI2	All Personnel	Project Delivery
MM3		Washout facilities will be installed and used for cleaning plant and equipment, concrete, paint or other environmentally hazardous substances. All water from	PI1, PI2 & PI6	CM	Project Delivery

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
		these activities will be collected, stored and disposed of using a licensed waste contractor			
MM4	Y	Clean water diversion drains will be installed to minimise overland flow entering the work area. The location of all clean water diversion drains, their direction of flow and discharge points will be clearly identified on the ESCP (Appendix B). The effectiveness of clean water diversion drains will be assessed during rainfall events, through site observations to confirm that no clean waters are entering the construction footprint.	PI4	ESM/CM	Project Delivery
MM5		Mobile plant and vehicles, including deliveries must use designated travel routes, site access routes, site access tracks and lay down areas	PI6	All personnel	Project Delivery
MM6		Mobile plant and vehicles must be clean of any mud or organic material prior to arriving or departing from site to prevent the spread of contaminants into stormwater drains and waterways. Haul roads are to be fully sealed to reduce mud/dust being tracked out onto local roads. Rumble/shaker grids will be installed onsite and all vehicles will traverse over these prior to exiting site. A watercart will be used onsite to undertake dust suppression. Street sweeper trucks will be deployed if mud/dust on public roads becomes a risk to water quality	PI2	All personnel	Project Delivery
MM7		Vehicle and plant to park in designated hard stand zones when not in use	PI6	All personnel	Project Delivery
MM8		All primary stormwater quality treatment devices will be routinely checked, serviced and cleaned in accordance with the maintenance program and manufacturer's recommendations	PI1 & PI2	ESM/CM	Project Delivery

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
Management of groundwater: This is underground water that is intercepted or actively dewatered in the course of construction activities within the active work area					
MM9	Y	Groundwater is anticipated to be intercepted and will require management, testing and potential treatment prior to discharge All intercepted groundwater shall be tested to determine if discharge criteria in Table 2 is achieved. Where groundwater does not achieve the discharge criteria, it will be pumped through the water treatment system, in order to meet the discharge criteria in Table 2.	PI5	ESM/ Engineers/ Supervisors	Workplace Planning & Project Delivery
General Construction Requirement					
MM10	Y	During dam demolition, spillway cell excavation, foundation preparation and concrete cells dewatering, contained surface and groundwater will be tested to confirm compliance with the discharge criteria in Table 2. Where it does not meet the discharge criteria, it will be diverted to the water treatment system for treatment prior to discharge. Water quality requirements for discharge are identified Table 2.	PI2, PI5, PI7 & PI8	ESM / CM	Project Delivery
MM11	Y	Works within or over designated watercourses must be assessed against the relevant jurisdictional regulations, codes, standards and/or guidelines to assess whether permits or licensing applies. The relevant planning, fisheries or waterways authorities must be identified and consulted during the planning and design phases. There will be no works within any watercourses or waterways that are outside of the approved construction footprint as outlined in the approved plans on the approvals, including the CGER, the Approval issued under the EPBC 2017/8078, and any subsequent regulatory approvals. Prior to commencement of works, the ESM in conjunction with the project engineer and surveyor will identify no-go zones within proximity of waterways and riparian areas to delineate these areas to ensure that erosion and	PI2, PI7 & PI8	ESM	Workplace Planning

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
		sediment controls are not constructed within or encroach upon the no-go zones.			
MM12	Y	A site-specific ESCP (including stormwater) will be developed and implemented in accordance with the wider project stormwater plan for the following areas: - Concrete batch plant - Borrow pit - East & west embankments & the working platform - Stockpile area - Demolition area The site-specific ESCP (Appendix B) will be provided to Noosa Shire Council.	PI3, PI7 & PI8	ESM / Batching Plant Subcontractor	Workplace Planning
MM13		Facilities, plant laydown areas, refueling areas, stockpiles or chemical storage, will be designed to avoid areas that drain towards surface water or stormwater systems. Design will also comply with the Noosa Plan Water Quality and Drainage code.	PI1 & PI2	PER/ Engineers/ Supervisors	Workplace Planning
MM14		Spill kits and fire response equipment must be located where chemicals and fuelled plant or equipment is being stored, operated or maintained	PI6	All personnel	Project Delivery
MM15		Refuelling will be conducted in accordance with Australian Standard 1940: *The storage and handling of flammable and combustible liquids* (2004). Where refuelling of mobile plant in the field is required, it will take place on level ground, in a bunded area or over portable drip trays, an appropriate distance from watercourses and will be accompanied by a spotter and suitable spill kit. Measures will be taken to contain fuel drip during transfer. Refuelling over waterways will be conducted using mobile bunds and will be accompanied by a spotter and suitable spill kit.	PI6	All personnel	Project Delivery

No.	Hold Point	Actions	Related Potential Impact	Staff Responsible	When
Existing Dam Demolition					
MM16	Y	No demolition works are to commence until: - The cofferdam has been constructed - The ESCP has been implement on the embankments - JHG demolition Activity Method Statement reviewed and approved - A dewatering system is commissioned to dewater the stilling basin - The stilling basin (zone between cofferdam and the existing dam wall) has been dewatered to RL88.5m - Current spec TS2100 requires 8 clear days on the weather forecast for us to commence the demolition - Catchment saturation levels need to be accepted and approved by Seqwater Dam Safety - The Seqwater panel (Seqwater senior management and members experienced in flood hydrology, flood forecasting, dam safety and the operation of Lake Macdonald) have made a decision on approving the demolition works can commence	PI7	PM	Prior to demolition works commencing
MM17		During demolition works, daily monitoring of the receiving waters will be undertaken to confirm no increase in turbidity of water downstream water (refer to Section 9)	PI7	ESM	During demolition
MM18		All dewatering of the stilling basin is diverted back to the reservoir.	PI7	ESM	During demolition

8. Hold Points

The hold points that will be adopted for water management are detailed in Table 9.

Table 9 Project hold points

Hold Point Number	Related management measure	What	When does it occur	Staff responsible	Construction activities restricted until Hold Point completed
1	MM1	Construction affected water is tested and treated (if required) prior to discharge	Project delivery	ESM / CM	Discharge of construction affected water
2	MM4	Installation of clean water diversions	Project delivery	ESM / CM	Cofferdam construction
3	MM9	No dewatering is to proceed without testing and treatment (if required)	Project delivery	ESM/ Engineers/ Supervisors	Dewatering activities
4	MM10	Water from spillway cell excavation, foundation preparation and concrete cells is treated prior to discharge	Project delivery	ESM / CM	Discharge of water from spillway cell excavation, foundation preparation and concrete cells
6	MM11	Authorisation for works outside the area of approved construction footprint	Project delivery	ESM	Works outside the approved construction footprint
7	MM12	Development of a site-specific ESCP (including stormwater) for: - Concrete batch plant - Borrow pit - East & west embankments & the working platform	Project delivery	ESM	Establishment of: - Concrete batch plant - Borrow pit - East & west embankments & the working platform

Hold Point Number	Related management measure	What	When does it occur	Staff responsible	Construction activities restricted until Hold Point completed
8	MM16	Spillway panel make an assessment of the appropriate installation of controls	Prior to demolition works occurring	Seqwater	Existing dam demolition works

9. Monitoring

To verify that this Management Plan is achieving its performance measures, the following monitoring program is proposed (Table 10).

Water sampling will be undertaken in accordance with the following standards/codes:

- Australia and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council, 2000)
- AS/NZS 5667.1:1998 – Water quality – Sampling – Guidelines on the design of sampling programs, sampling techniques and the preservation and handling of samples
- AS/NZS 5667.12:1998 – Water quality – Sampling – Guidance on sampling bottom sediments
- AS/NZS 5667.11:1998 – Water quality – Sampling – Guidance of sampling of groundwaters
- Queensland Monitoring and Sampling Manual – Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (DES, 2018)

Table 10 Monitoring program

No.	What	Who	When / Frequency
1	General observations for the daily management of stormwater diversion controls will be documented in site dairies	ESM	Daily during Project Delivery
2	Prior to discharge of any water to Six Mile Creek, testing of the water to be discharged, DS01, and I1 is required. Water to be discharged to meet discharge criteria detailed in Table 2	ESM	Prior to any discharge
3	Water quality within the impoundment and downstream of the construction site will be undertaken and analysed for the parameters defined under the in accordance with Appendix A Impoundment and Downstream Water Quality Monitoring	ESM	Defined in Appendix A Impoundment and Downstream Water Quality Monitoring
4	Weekly inspection of erosion and stormwater diversion controls will be undertaken and documented Visual inspections of the construction site during and after rainfall to ensure that mitigation measures are in place and stormwater diversion control measures are in working order	ESM/CM	Weekly and during and after storm events >10mm

No.	What	Who	When / Frequency
5	The volume of discharges from the site via pumps, syphons or gravity will be recorded	CM	Daily
	Levels in the borrow pit and treatment tanks are to be monitored	ESM	Daily
6	Quarterly (internal) and annual (external) audits of this Management Plan will be undertaken as part of the SEMP auditing process	ESM	Quarterly/Annual during Project Delivery
7	Monitoring of turbidity at monitoring locations DS01 and PP01	ESM	Daily during existing dam demolition

10. Corrective Actions

Corrective actions that will be implemented in the event that a performance measure has not been achieved, have been detailed in Table 11.

Table 11 Corrective Action Plan

Issue / Event	Event Response
Unplanned releases or discharge to the environment	• All relevant construction activities to cease immediately upon becoming aware of an environmental incident onsite • Report incident to the CM and ESM for review in context of relevant approvals • Investigate if mitigation measures have been implemented as described in Table 8. Where management measures have not been implemented, the CM must implement appropriate measures identified in Table 8 and provide additional training to personnel • Revision of construction activities and further mitigation measures to be considered and implemented as appropriate • Implement appropriate treatment measure/s • ESM to monitor success of treatment measure/s • Enter details of event into site register/records
Water quality downstream (from any downstream monitoring point) of the construction footprint is below WQOs (Section 2.2) or not within the historical baseline limits, where the	• Report incident to the ESM and CM • ESM to investigate and identify potential sources causing the exceedance • Increased monitoring on relevant water quality parameters • Clean up or rehabilitate identified impacts (identify if project impact or non-project related) • Review the dewatering activities from the demolition works and determine whether diversion to the water treatment plant is required • Review and update the ESCP if current controls are compromised or ineffective, this includes revise and implementing updated appropriate controls onsite. • Review construction methods, control effectiveness and device design • Report any exceedances to Seqwater and the relevant authority • Revision of construction activities and further mitigation measures to be considered and implemented as appropriate to prevent further environmental harm from occurring

Issue / Event	Event Response
baseline limit exceeds the respective WQO[3]	

Water to be discharged is above the discharge criteria (Table 2)	• Report to the ESM and review in context of relevant approvals
	• Retain water in tank farm
	• Try to re-use water for site operations (dust suppression)
	• Review treatment methods currently in place
	• Identify source of non-compliant levels
	• Increased monitoring of I1 to determine if there are varying background conditions
	• If pH outside of criteria limits
	  ○ All handling and PPE requirements for pH altering substances specified in the relevant safety data sheet (SDS)
	  ○ pH under criteria: to increase the pH by adding an alkaline such as agricultural lime or caustic soda
	  ○ pH over criteria: lower the pH by adding acid (typically hydrochloric or sulfuric acid)
	  ○ pH adjustment will be undertaken in consultation with and where necessary under the direction of technical specialists
	• If turbidity above discharge criteria
	  ○ Waters above discharge criteria will be treated with the appropriate flocculant and retested until water meets the discharge criteria
	  ○ Use coagulant and/or flocculants under the guidance of technical specialist to increase settling velocities and timeframes to achieve discharge criteria
	  ○ No flocculant to be added directly to Six Mile Creek
	• ESM to monitor success of mitigation measure/s

Spills or leaks of chemicals or hydrocarbons	• Stop works and identify source of harm • Spills/Leaks to be contained, cleaned up • Spill kits to be stored onsite including aquatic spill kits and booms for working around/adjacent to water • Supervisors' vehicles to contain mobile spill kits • Report incident to the ESM and CM and review in context of relevant approvals. ESM to report to Seqwater and the relevant authority (where required) • ESM to investigate if mitigation measures have been implemented as described in Table 8. Where management measures have not been implemented, the CM must implement appropriate measures identified in Table 8 and provide additional training to personnel • Review refuelling/plant maintenance practices and modify if appropriate • ESM to monitor success of mitigation measure/s • Enter details of event into site register/records

[3] Defined as greater than two times the 95th percentile of the baseline data. For pH, a drop/rise of pH by more than 1 unit from the baseline median pH value. For Dissolved Oxygen, and increase/decreased of 20% from the baseline median dissolved oxygen value.

Issue / Event	Event Response
	• Regular tool boxing on the risks of potential hydrocarbon leaks and spills from machinery and refuelling procedures to minimise and manage these risks
Groundwater drawdown greater than anticipated	• Stop works, identify source of harm and rectify as appropriate • Report incident to the ESM and CM and review in context of relevant approvals • Issue to be investigated and actions taken as guided by an appropriately qualified person
Sediment observed entering Lake and Six Mile Creek	• Stop works, identify source of harm and rectify as appropriate • Report incident as per the wider to the ESM and review in context of relevant approvals • Investigate if mitigation measures have been implemented as described in Table 8. Where management measures have not been implemented, the CM must implement appropriate measures identified in Table 8 and provide additional training to personnel • Redesign stormwater diversion controls, if required • ESM to monitor success of treatment measure/s • Enter details of event into site register/records

11. Reporting

Reporting that will be undertaken in accordance with this Management Plan is detailed in Table 12.

Table 12 Reporting plan

No.	Reporting Required	By Whom	By When	To Whom
1.	Details of field observations will be reported via the Weekly Environmental Inspection Checklist, and communicated to staff during pre-starts, toolbox and team meetings as appropriate.	ESM	Weekly	All Staff
2.	All complaints / incidents regarding water quality will be reported immediately to the ESM (The ESM will escalate reporting to Seqwater and regulatory agencies as required).	All personnel / ESM	Within 1 hours of a complaint/incident	PM / Seqwater
3.	Monthly report to Seqwater that includes details of monitoring, audits, non-compliances, complaints, and incidents.	ESM	Monthly	Seqwater
4.	Quarterly report to the CG as per the requirements of schedule 2, condition 2. Report will include: • An evaluation of compliance with the SEMP • Monitoring data required by the Imposed Conditions included in Schedule 2 of the CGCR (2025) for the period and an interpretation of the results • Details of any environmental incident during the reporting period, including a description of the	Seqwater	Quarterly	Coordinator-General

No.	Reporting Required	By Whom	By When	To Whom
	incident, resulting effects, corrective actions (including site remediation activities), revised activity practices to prevent a recurrence, responsibility and timing The reports must be provided to the Coordinator-General and also be made available on the Project website within 20 business days of the end of the three-month period to which the report relates and continue to be available on the project website for the duration of the Project.			

12. Training and Awareness

Site inductions will include the following specific components for water management:

- Awareness of potential impacts to surface water including the aquatic ecology of Lake Macdonald, Six Mile Creek and the Mary River
- Protocols relating to stormwater and construction water management, including the requirement for water quality validation prior to recycling or re-use and prior to discharge from the Project to the environment
- Surface water toolbox talks will be implemented as relevant and required to reinforce information provided during site inductions. This will include a delineation of no-go areas and relevant legislative/conditioned requirements, with practical discussions on how they will be complied with
- Prohibition of discharge of construction contaminated water directly to the Noosa Water Treatment Plant Supernatant Lagoon and licensed discharge point

In addition to the induction the following will be undertaken:

- All personnel involved in discharge of water from site will be appropriately trained including in monitoring, treatment and discharge requirements by the ESM
- Surface water toolbox talks will be implemented as relevant and required to reinforce information provided during site inductions

13. Review

This Management Plan will be reviewed within the first three months of site mobilisation to ensure the plan is fit for purpose and any identified incidents, issues or hazards are addressed in the Management Plan accordingly. Follow up reviews are to be undertaken annually during construction. This Management Plan shall reviewed, out of the normal cycle, in the event of a legislative breach, incident, community complaint or when a new hazard or impact is discovered.

Appendix A Impoundment and Downstream Water Quality Monitoring

Location	Co-ordinates (Approximate)	Level	Field Suite (pH, EC, DO, Turb, Temp)	Nitrogen (total, oxidised, ammonia, organic)	Total Phosphrous and filterable reactive phosphorus	Total Recoverable Hydrocarbons	Metals	TSS (Laboratory)	Hydrocarbons
DS01	152° 55.80841776' E 26° 22.84125899' S	Weekly	Prior to discharge & weekly	Monthly	Monthly	Monthly	Monthly	Monthly	Weekly - Visual Only
DS02	152° 55.62707662' E 26° 22.35625612' S	Weekly	Weekly	Monthly	Monthly	Monthly	Monthly	Monthly	Weekly - Visual Only
DS03	152° 54.82171491' E 26° 21.06288983' S	Weekly	Weekly	Monthly	Monthly	N/A	Monthly	Monthly	N/A
DS04	152° 53.48107317' E 26° 20.48873137' S	Weekly	Weekly	Monthly	Monthly	N/A	Monthly	Monthly	N/A

Location	Co-ordinates (Approximate)	Level	Field Suite (pH, EC, DO, Turb, Temp)	Nitrogen (total, oxidised, ammonia, organic)	Total Phosphrous and filterable reactive phosphorus	Total Recoverable Hydrocarbons	Metals	TSS (Laboratory)	Hydrocarbons
PP01	26° 22' 52.33" S 152° 55' 48.43" E	Daily	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly – visual only
I1	152° 55.82835411' E 26° 22.93524681' S	Weekly	Weekly	Monthly	Monthly	Monthly	Monthly	Monthly	Weekly - Visual Only
I2	152° 55.89056563' E 26° 23.11340333' S	Weekly	Weekly	Weekly during lowering and for 3 months after then monthly	Weekly during lowering and for 3 months after then monthly	For cause	Monthly	Monthly	Weekly - Visual Only
I3	152° 56. 20318577' E 26° 22.97337884' S	Weekly	Weekly	Weekly during lowering and for 3 months after then monthly	Weekly during lowering and for 3 months after then monthly	For cause	Monthly	Monthly	Weekly - Visual Only
I4	152° 56.13004670' E 26° 23.86835828' S	Weekly	Weekly	Weekly during lowering and for 3 months after then monthly	Weekly during lowering and for 3 months after then monthly	For cause	Monthly	N/A	Weekly - Visual Only

Location	Co-ordinates (Approximate)	Level	Field Suite (pH, EC, DO, Turb, Temp)	Nitrogen (total, oxidised, ammonia, organic)	Total Phosphrous and filterable reactive phosphorus	Total Recoverable Hydrocarbons	Metals	TSS (Laboratory)	Hydrocarbons
I5	152° 56.76492496' E 26° 24.14181909' S	Weekly	Weekly	Weekly during lowering and for 3 months after then monthly	Weekly during lowering and for 3 months after then monthly	For cause	Monthly	N/A	Weekly - Visual Only

Appendix B – Erosion & Sediment Control Plan