

Pettavel Basin Augmentation Project

Prepared for: Barwon Water
12 June 2026





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EPBC Act Declaration

EPBC number	2024/09840
Project name	Pettavel Basin Augmentation Project
Proponent / ABN	Barwon Water / 86 348 316 514
Proposed action	To construct and operate a new water storage basin, overflow area and first party offset site wetland at the Pettavel Basin
Location of the action	210-240 Reservoir Road, Waurin Ponds, Victoria

Declaration of accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed:



Full name: Giles Flower

Organisation: Barwon Water

Date: 12 / 06 / 2026

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1. Introduction

SMEC Australia Pty Ltd (SMEC) was engaged by Barwon Water to complete a Construction Environmental Management Plan (CEMP) for the Pettavel Basin Augmentation Project (the Project). This document provides environmental management actions that will be implemented during the construction phase of the Project as detailed below.

1.1 Purpose of the CEMP

The purpose of the CEMP is to provide an integrated framework for the identification and management of environmental risks associated with construction activities for the Project. This CEMP details the environmental management approach to be implemented by Barwon Water and their contractors during construction to ensure that potential risks to the environment are avoided or mitigated throughout the construction phase of the Project. The CEMP also describes specific management measures to protect sensitive ecological matters relevant to the Project works, including Growling Grass Frog (*Ranoidea raniformis*), a nationally threatened species which is present within the Project Area. All personnel involved in the construction of the Project, including sub-contractors must comply with the requirements of this CEMP in relation to their specific areas of responsibility.

Specifically, the objectives of the CEMP are to:

- Provide a structured framework for identifying, assessing, and managing environmental risks associated with construction activities;
- Ensure compliance with all relevant legislation, approvals, permit conditions and environmental standards;
- Avoid, minimise, and mitigate potential risks to environmental values during construction;
- Protect sensitive ecological features, including native vegetation and Growling Grass Frog habitat;
- Clearly define environmental management measures, controls, and performance requirements for contractors;
- Establish roles, responsibilities, and accountability for environmental management across all personnel and contractors;
- Promote best-practice environmental management and continuous improvement throughout the construction phase;
- Facilitate monitoring, reporting, and auditing to demonstrate environmental performance and compliance;
- Ensure effective communication of environmental requirements to all site personnel and stakeholders; and
- Provide protocols for incident management, corrective actions, and adaptive management where incidents occur.

Sections 5 and 6 of this CEMP are designed to print and display in visible locations within the construction site compound.

1.2 Project Overview

1.2.1 Background

Pettavel Basin is situated on a 25 ha parcel of land on the corner of Draytons Road and Reservoir Road, Waurn Ponds, that has been used as a Barwon Water storage site for over 105 years. The Project aims to increase the water storage capacity of the existing Pettavel Basin water storage facility through the construction of a new 100 ML covered drinking water storage basin (Basin No.3) to augment the existing supply, directly adjacent to the existing water supply Basins No.1 and No.2 that total 100ML. This new 100ML water storage basin (Basin No.3) is required to meet future demand of the growing populations of Armstrong Creek, Leopold the Bellarine Peninsula and the Surf Coast.

The site for the new Basin No.3 is currently occupied by an artificial wetland that formed in an excavation hole known as a 'borrow pit'. Targeted surveys were undertaken in the borrow pit wetland as part of the environmental assessment completed for the Project and a breeding population of Growling Grass Frog was detected (SMEC 2024a). The species is listed as Vulnerable under the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Project requires the removal of the borrow pit wetland to replace it with the new Basin No.3. To compensate for this impact, a new designated Growling Grass Frog wetland and terrestrial vegetation zone will be created on the property and protected as a First Party Offset Site. The new Growling Grass Frog wetland and Stage 1 of the terrestrial habitat zone will be constructed and fully established prior to excavation of the borrow pit wetland, providing replacement habitat for the frogs when the borrow pit wetland is removed. Growling Grass Frogs will be captured prior to its removal and relocated to the new Growling Grass Frog wetland.

A laydown site on the eastern side of Drayton's Road will be used in Stage 1 and will be available as a laydown area for storage of materials and/or spoil ('**east laydown**'). A portion of the land parcel to the north of the basin site on the west side of Draytons Road will be used during construction for a site office and amenities, laydown areas and storage of spoil and construction materials ('**west laydown**').

1.2.2 EPBC Act referral

The Project was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 30 May 2024 (EPBC 2024/09840) due to impacts on Growling Grass Frog and the Project was deemed a controlled action on 28 June 2024. The Project is to be assessed by Preliminary Documentation – Further Information (PDFI) (requested initially by DCCEEW on 7 August 2024). Therefore, the Project is subject to specific conditions which require approval by the Minister for the Environment. The following documents form part of State and Commonwealth conditions and must be strictly adhered to throughout construction:

- This CEMP;
- SMEC 2026. Pettavel Basin Upgrade Project – Growling Grass Frog Offset and Management Plan. Prepared for CMP Consulting Group Pty Ltd, September 2025.
- SMEC 2024b. Pettavel Basin Augmentation Project – Detailed Flora and Fauna Assessment Report prepared for CMP Consulting Group Pty Ltd.
- SMEC 2024c. Pettavel Basin Augmentation Project – Raptor Management Plan. Prepared for CMP Consulting Group Pty Ltd, May 2024.

1.2.3 Project Area and Construction Zone

This CEMP refers to two areas:

- **Project Area:** refers to the Pettavel Basin site, west laydown area (including site facilities) and east laydown area, as identified on Figures 1 and 2.
- **Construction Zone:** refers to the construction of the Impact Site and Offset Site within the Project Area where new infrastructure is located and where earthworks are required. The Construction Zone will differ between the Stage 1 (Figure 1) and the Stages 2 and 3 (Figure 2). The Construction Zone will trigger the requirement for Growling Grass Frog management, vehicle, plant and personnel hygiene requirements, as discussed in Section 4.

1.2.4 Primary strategies to manage impacts

The primary strategies to manage impacts to environmental values include:

- Timing of works to coincide outside of breeding periods and when replacement ponds are built;
- Growling Grass Frog exclusion fencing;
- Vehicle, plant and personnel hygiene protocols to avoid pathogen (Chytrid fungus) and weed transfer; and
- Capture and relocation events of Growling Grass Frog and other fauna, as required.

Detailed strategies to manage and mitigate impacts are further detailed below in Sections 3, 4 and 6.

1.2.5 Project timing

The appropriate timing and order of construction activities is essential to the success of the Project. The Offset Site must be constructed well before the excavation of the Impact Site to ensure that there is alternative Growling Grass Frog habitat available on site when the Impact Site is removed. The process is summarised in Table 1.

Table 1: Timing of works. Vertical green indicates Growling Grass Frog activity season for relocation.

Year	Action	Duration	Start	End	Apr-26	May-26	Jun-26	Jul-26	Aug-26	Sep-26	Oct-26	Nov-26	Dec-26	Jan-27	Feb-27	Mar-27	Apr-27	May-27	Jun-27	Jul-27	Aug-27	Sep-27	Oct-27	Nov-27	Dec-27	Jan-28	Feb-28	Mar-28	Apr-28	May-28	Jun-28	Jul-28	Aug-28	Sep-28	Oct-28	Nov-28	Dec-28	Jan-29	Feb-29	Mar-29	Apr-29	May-29	Jun-29	Jul-29	Aug-29	Sep-29	Oct-29	Nov-29	Dec-29						
2026	Pre-construction Phase:																																																						
	A suitably qualified ecological restoration sub-contractor will be used for plant procurement in preparation of wetland planting.	0	Apr-26	Apr-26																																																			
	EPBC Act approval	1	Apr-26	Jun-26																																																			
	Civil contractor mobilisation on-site	0	Jul-26	Jul-26																																																			
Stage 1:																																																							
2026	Install temporary frog exclusion fencing (1) around Impact Site to prevent frogs from accessing construction site	1	Jul-26	Jul-26																																																			
	Civil construction of the Growling Grass Frog wetland, the Overflow Detention Storage Basin and the southern extent of the Vegetated Swale (approx. 3 months duration)	3	Jul-26	Sep-26																																																			
	Vegetation planting and habitat installation of the southern components of the Offset Site: the Growling Grass Frog wetland and the southern extent of the vegetated swale (approx. 1 month duration)	3	Sep-26	Dec-26																																																			
	Practical Completion of Stage 1A of Offset Site (see Section 3.2.4.1)	0	Dec-26	Dec-26																																																			
	Remove temporary frog exclusion fencing (1) from Impact Site to allow unrestricted movement between the Impact Site and the Offset Site	0	Dec-26	Dec-26																																																			
	Stage 2:																																																						
2027	Assessment of Offset site to confirm whether it meets targets for Final Completion (min. 12 months after Practical Completion)	0	Dec-27	Dec-27																																																			
	Final Completion of Stage 1A Offset Site (see Section 3.2.4.2)	0	Dec-27	Dec-27																																																			
	Install temporary frog exclusion fencing (2) around Offset Site and overflow basin to prevent frogs from accessing construction site after relocation	0	Dec-27	Dec-27																																																			
	Growling Grass Frog relocation prior to Impact Site removal	0	Dec-27	Dec-27																																																			
	Growling Grass Frog relocation during Impact Site dewatering	1	Dec-27	Jan-28																																																			
2028	Impact Site removal and GGF relocation	1	Jan-28	Feb-28																																																			
	Basin No.3 and associated construction works commence (approx. 14 months duration)	18	Feb-28	Aug-29																																																			
2029	Install permanent exclusion fencing around Offset Site. Ensure fencing still allows free movement of frogs.	0	Aug-29	Aug-29																																																			
	Basin No.3 now complete and operational	0	Aug-29	Aug-29																																																			
Stage 3:																																																							
2029	Civil construction of the northern component of the Offset Site (the northern extent of the vegetated swale)	0	Feb-29	Feb-29																																																			
	Vegetation planting and habitat Installation of the northern component of the Offset Site (the northern extent of the vegetated swale)	1	Aug-29	Sep-29																																																			
	Offset Site complete	0	Sep-29	Sep-29																																																			

1.2.6 Construction and design

The purpose of the Project is to increase the water storage capacity at the Pettavel Basin site with the addition of a new 100 ML (Basin No.3) to cater for significant population growth within the region. Barwon Water proposes to construct Basin No. 3 in the location of the existing borrow pit. An important breeding population of Growling Grass Frog was detected in the wetland that has formed within the borrow pit, which will be removed as part of the Project.

Therefore, as part of the project works, a dedicated **Growling Grass Frog wetland** will be constructed prior to excavation of the borrow pit. An overflow detention storage is also required to detain overflow discharge from Basin No.3. The proposed location of this overflow detention storage is directly adjacent to the Growling Grass Frog wetland so the associated earthworks will be constructed at the same time.

Construction of the Basin No.3 is proposed to be split into three main work portions: Stage 1, Stage 2 and Stage 3 as described below.

1.2.6.1 Stage 1

Stage 1 includes:

- Construction and establishment of the southern components of the **Offset Site**:
 - **Growling Grass Frog wetland.**
 - **Southern extent of the vegetated swale and an inline pond.**
- Construction of the **Overflow Detention Storage Basin** and embankment which separates the storage from the Growling Grass Frog wetland.

A **minimum establishment period of 12 months** is allowed to give the Growling Grass Frog wetland vegetation and habitat time to become ecologically established before relocating Growling Grass Frog from the Impact Site.

1.2.6.2 Stage 2

Stage 2 includes:

- Dewatering and removal of the borrow pit wetland (**the Impact Site**).
- Capture and relocation of the Growling Grass Frog from the **Impact Site** to the **Offset Site**.
- Construction of **Basin No.3**. This includes:
 - All bulk earthworks to regrade and remove fill material from inside the borrow pit in preparation for building the new earthen embankments of the new 100ML basin occupying the same footprint with site won or new engineered material fill prior to compaction. One of the embankments will sit hard up against the existing 56ML (Basin No.2) and share an embankment wall.
 - Construction of the new earthen embankments, base and wingwalls of the new 100ML storage basin. Post performance testing of the earthen embankments, the internal surface of the 100ML storage will be lined with a HDPE liner to prevent seepage, contamination and ensure sufficient operational volume can be achieved, before the cover (over high water mark) is placed.
 - Associated DN1800 mild steel cement lined (MSCL) pipework and associated valves, fittings, pits and control systems to provide operational control of treated water in and out from the basin.
- Minor regrading of swales and installing new subsurface pipes and pits to reroute site drainage lines to suit the removal of the borrow pit wetland and ensure overland flows reach the **Overflow Detention Storage Basin**.

1.2.6.3 Stage 3

Stage 3 includes:

- Construction and establishment of the northern component of the **Offset Site**:
- **the northern extent of the vegetated swale and an inline pond.**

1.3 Regulatory context and project approvals

Information about regulatory context and the approvals that apply to the Project is provided in Table 2. Additional environmental protection policies that apply are referred to throughout the document.

In the instance that an Australian Standard, Guideline or legislation referenced in this CEMP becomes invalid, superseded or replaced, the updated standards will apply.

Table 2: Summary of key environmental legislation and associated approvals for the Project.

Legislation	Potential impact	Approval / Recommendation
<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	EPBC Act-listed matters with potential to be impacted by the Project or were recorded during site assessments: - Flora: N/A - Fauna: Growling Grass Frog - Communities: N/A	The Project is subject to conditions of approval under the EPBC Act (EPBC 2024/09840) and has been deemed a controlled action by the federal Minister for the Environment. Adherence to this CEMP and the GGFOMP is a condition of the EPBC Act approval and must be followed for the duration of construction.
<i>Environment Effects Act 1978 (EE Act)</i>	Native vegetation and suitable habitat for threatened species and communities were identified within the study site, both potential referral triggers under the EE Act. An EE Act self-assessment was completed, and it is considered unlikely that the Project will have a significant effect on ecological matters.	An EE Act referral or assessment is not applicable to the Project.
<i>Flora and Fauna Guarantee Act 1988 (FFG Act)</i>	FFG Act-listed matters with potential to be impacted by the Project or were recorded during site assessments: <i>Flora</i>: Giant Honey-myrtle (<i>Melaleuca nesophila</i>) <i>Fauna</i>: Growling Grass Frog, Little Eagle (<i>Hieraaetus morphnoides</i>) <i>Communities</i>: Western Basalt Plains (River Red Gum) Grassy Woodland	A permit under the FFG Act applies to the Project (1-1-2024-397) for the removal of Giant Honey-myrtle and the listed community. Adhere to conditions of the permit during vegetation removal works. Follow mitigation outlined in Sections 3.1.3 and Section 4 of this CEMP and the Growling Grass Frog Offset and Management Plan to avoid impacts to Growling Grass Frog. Follow mitigation outlined in Section 3.1.2 of this CEMP and the Raptor Management Plan (SMEC 2024c) to avoid impacts to Little Eagle.
<i>Planning and Environment Act 1987 (Clause 52.17 and the Guidelines)</i>	Native vegetation is proposed to be impacted by the Project. A total of 2.81 ha will be impacted.	A planning permit applies to the Project (PP-35-2024). Ensure construction works comply with relevant conditions of the permit.
<i>Aboriginal Heritage Act 2006</i>	No potential impacts identified, however possibility of encountering unexpected heritage finds.	Refer to unexpected finds procedure in Section 3.2 for incidental discovery of Aboriginal heritage.

Legislation	Potential impact	Approval / Recommendation
<i>Heritage Act 2017</i>	No potential impacts identified, however possibility of encountering unexpected heritage finds.	No permit requirements. Refer to unexpected finds procedure in Section 3.2 for incidental discovery of non-Aboriginal heritage.
<i>Wildlife Act 1975</i>	A range of common and threatened fauna species were identified within the study site.	Capture and relocation of wildlife is required during works involving removal of vegetation and excavation during the Stage 2 (i.e. removal of existing Growling Grass Frog habitat within the borrow pit). Adhere to protocols and management measures outlined within the Growling Grass Frog Offset and Management Plan and Raptor Management Plan (SMEC 2026, 2024c). All personnel involved in the capture and relocation of fauna (including threatened species) during construction must hold a current permit under the <i>Wildlife Act 1975</i> .

2. Roles and Responsibilities

2.1 Responsibilities

To ensure effective implementation of this management plan, the following responsibilities have been assigned to key project personnel. It is essential that all personnel associated with all Project stages to comply with the requirements of this management plan and all applicable environmental legislation, regulations, codes of practice and standards.

The responsibilities of the contractor **Project Manager** include (but are not limited to):

- Confirm with Barwon Water that all relevant environmental permits are obtained for the Project;
- Ensure all relevant environmental permits are obtained for the Project;
- The Barwon Water accepted Site Environmental Plan (SEP) is adhered to and followed in accordance with Barwon Water contract requirements and policies;
- Investigate and report incidents and non-conformance and ensure corrective and preventive action is taken and is effective;
- Has the authority to stop a particular task or activity in circumstances of potential environmental harm as a result of Project works; and
- Reporting environmental incidents in a timely manner.

The responsibilities of the **Site Supervisor** include (but are not limited to):

- Provide site inductions (Principal Contractor and Barwon Water) and environmental awareness training to ensure all staff and contractors engaged to work on the Project are appropriately inducted and trained in the requirements of this management plan;
- Maintaining a register of all staff and contractors that have undertaken the inductions and environmental awareness training;
- Ensure all relevant environmental procedures are prepared, reviewed and approved, and fully accessible to staff, contractors and sub-contractors;
- Overseeing all environmental management aspects of the Project works;
- Being the primary contact for internal and external communication in relation to environmental matters; and
- Reporting environmental incidents and near misses to the Project Manager and Barwon Water in a timely manner.

The responsibilities of the **contractors** and **sub-contractors** include (but are not limited to):

- Meeting the objectives of the detailed Growling Grass Frog wetland design specifications outlined within Section 3, Appendix 2 and Appendix 5 of the Growling Grass Frog Offset and Management Plan (SMEC 2026);
- Compliance with the requirements of this management plan;
- Coordination of site resources and personnel to implement the requirements of this management plan;
- Participation in induction and environmental training, regular toolbox meetings and refresher training (as required); and
- Reporting environmental incidents and near misses to the Site Supervisor and Barwon Water in a timely manner.

2.2 Training and awareness

2.2.1 Environmental induction

All staff and contractors engaged to work on the Project are required to attend a compulsory site induction that includes an environmental component prior to commencing work on-site. This is so that all personnel involved in the Project are aware of the requirements of the CEMP and to correctly implement environmental management measures. The induction process includes:

1. A record is kept of all persons who have been inducted to site;
2. Daily record of who is currently present on site is held by the Site Supervisor;
3. All persons undertaking works on a Barwon Water site must be inducted and achieve 'compliant' status via the Rapid Global system (platform used widely by the construction industry). Rapid Global independently reviews and validates all qualifications, competencies and high risk works inductions for all persons before being allowed to start on site;
4. Barwon Water's environmental team conducts a 'site induction' and site-specific training with all site personnel on site, before any site works commence; and
5. The site supervisor will confirm that all personnel hold appropriate competencies/qualifications for their intended role.

Short-term visitors to site for purposes such as deliveries will be required to undertake a short-form induction and be accompanied by inducted personnel at all times.

Barwon Water may authorise amendments to the induction at any time, as well as refresher training. Possible reasons for changes to the induction may include project scope adjustment and legislative changes, or as part of corrective actions following an incident.

The environmental component of the site induction will include, but is not limited to, an overview of:

- Key environmental issues (particularly exclusion zones, environmentally sensitive areas and protocols associated with Growling Grass Frog);
- Key management and mitigation measures for the control of environmental issues; and
- Environmental incident response and reporting requirements.

Inducted personnel will sign a site induction training register acknowledging receipt and understanding of the requirements of this CEMP. Records of inductions will be retained by the Site Supervisor.

2.2.2 Toolbox talks

All staff and contractors engaged to work on the Project are required to attend toolbox talks prior to commencing work. The toolbox talks are used to convey environmental awareness matters as they arise, and will continue during the construction program. Content will be tailored to specific environmental issues relevant to upcoming works. Targeted environmental awareness training will be provided to individuals or groups of workers with a specific authority or responsibility for environmental management or those undertaking an activity with a high risk of environmental impact (e.g. creation of the Growling Grass Frog wetland, excavation of the borrow pit and vegetation removal).

Toolbox talks will be conducted at regular intervals, and records of all site personnel in attendance at toolbox talks will be retained by the Site Supervisor.

2.3 Monitoring and auditing

2.3.1 Environmental monitoring

Monitoring of the Project against environmental outcomes will be undertaken to validate the impacts predicted for the work, to measure the effectiveness of management plans, measure environmental controls and implementation of this CEMP, and to address approval requirements.

The Site Supervisor will undertake **daily** inspections of priority items, such as fuel stores, erosion and sediment pollution control equipment, and **weekly** inspections of other environmental controls within the work site (Table 3). The Project Manager will be advised of any non-conformances from monitoring. A non-conformance Environmental Incident Report and/or Environmental Improvement Notice (with appropriate corrective actions) will be issued by the Project Manager in response to the non-conformance issue.

All incidents will be logged in the Principal Contractor's Hammertech system, which produces a report (PDF) once complete. All persons on site are trained to use the software package (and phone app) to be able to log any incident on site, including uploading site photos. Requirements that must be followed in an event of any near miss, non-conformance or incident as stipulated in the construction contract and Barwon Water' SQECR document. Depending on severity of the incident will determine the immediate response (to fix/correct) before a level of incident investigation is undertaken and corrective actions and learnings are set in place to ensure compliance. As per Barwon Water's SQECR, the levels of investigation are: Level 1 - Root Cause analysis; Level 2 - 5 Whys; Level 3 - ICAM investigation.

One (1) physical log book will be kept on site at the disinfection bay. The Site Supervisor will be responsible for inspecting all vehicles/ plant, removing mud and dirt and ensuring it has undergone disinfection (for Chytrid Fungus) on entry to the site. The log book will record vehicle registration (or unique identifier), date/time, driver details and other details as per the Growling Grass Frog Offset and Management Plan (SMEC 2026).

Records of environmental monitoring and outcomes will be retained by the Site Supervisor. Construction risk assessments are further detailed in the Principal Contractor's Integrated Project Management Plan and Project Risk Assessment documents.

2.3.2 Growling Grass Frog monitoring

As part of the Project, an ecologist (appointed by Barwon Water) is required to conduct monitoring of the Growling Grass Frog population during and following construction activities, with works generally occurring after hours (i.e. following nightfall when Growling Grass Frog are active) (refer to the Growling Grass Frog Offset and Management Plan) (Table 3). Any ecologist entering the site must adhere to the requirements of this CEMP and the Growling Grass Frog Offset and Management Plan, including inductions and hygiene protocols. Ecologists entering the site after hours are to notify the Site Supervisor and Barwon Water at least 24 hours prior.

Monitoring and reporting requirements are outlined within Section 5 of the Growling Grass Frog Offset and Management Plan (SMEC 2026).

2.3.3 Auditing and reporting

As part of the construction works, an inspection will be conducted **monthly** by the Site Supervisor to ensure that all environmental management obligations are being met and environmental safeguards have been adequately implemented. Environmental audits will detail compliance and performance against the expected environmental outcomes of the Project. Records of auditing and outcomes will be retained by the Site Supervisor with the following auditing time frames:

1. Fortnightly SQE audits. Any observations are issued to the Principal Contractor to rectify. Where any non-conformances are detected on site, a non-conformance report is issued;
2. Daily pre-start and toolboxes;
3. Weekly site walks; and
4. Weekly self-performing audits.

Principal Contractor templates for monthly environmental audits, incident reporting, weekly site walks and site establishment checklists have been developed and will be provided to the Principal Contractor prior to works commencing. The environmental management controls, monitoring frequency and management action are further detailed in Table 3 below.

Monitoring, reporting and additional independent auditing requirements are outlined within Section 5 of the Growling Grass Frog Offset and Management Plan (SMEC 2026). Construction risk assessments are further detailed in the Principal Contractor's Integrated Project Management Plan and Project Risk Assessment documents.

Table 3: Environmental management controls

Risks and potential impact	Management Action	Monitoring frequency	Relevant section
Non-compliance with requirements under local, State and commonwealth policies	All contractors to complete environmental site inductions to ensure all personnel are aware of the site's environmental sensitivities. Record of site inductions kept in a log book.	Pre and during construction.	Section 2.2.1
Spread of pathogens (Chytrid Fungus) and weeds through soil/mud.	Vehicle/plant moved through disinfection bays. Site supervisor to undertake inspections everyday of vehicles/plant to confirm they are free of soil/mud and visible seeds. Record of inspections in log book that will be kept on site at the disinfection bay.	Daily inspections, during construction.	Section 2.3.1, Section 6 and the Growling Grass Frog Offset and Management Plan (SMEC 2026)
Environmental controls are damaged or not functioning as intended and impact the local environment. This includes erosion, dust, noise, chemical, fuel, hygiene etc.	Confirm fuel stores, dust, noise, hygiene, erosion, sediment and pollution control equipment are not damaged and functional. Undertake immediate repairs of any damaged/ non-functioning environmental controls. Record in a log book any controls needing repairs.	Daily inspections, pre and during construction.	Section 2.3.1 and Section 6
Unintentional impacts to environmental values via non-functional fences and signage.	The Principal Contractor and Barwon Water will conduct regular inspections on site, to ensure the frog exclusion fence is not damaged and functional, showing no visible signs of damage and remains in place in accordance with section 4.3 of the Growling Grass Frog Offset and Management Plan (SMEC 2026). Repairs will be undertaken immediately for any damaged temporary or exclusion fencing, with repairs recorded in a log book.	Weekly inspections during construction.	Section 3, Section 4 and the Growling Grass Frog Offset and Management Plan (SMEC 2026)
Incidents are not reported, resulting in unintentional and ongoing impacts to environmental values.	All incidents will be logged in the Principal Contractor's Hammertech system, which produces a report (PDF) once complete. All persons on site are trained to use the software package (and phone app) to be able to log any incident on site, including uploading site photos.	Pre and during construction.	Section 2.3 and Section 5.

Risks and potential impact	Management Action	Monitoring frequency	Relevant section
	Requirements that must be followed in an event of any near miss, non-conformance or incident as stipulated in the construction contract and Barwon Water's SQECR document. Depending on severity of the incident will determine the immediate response (to fix/correct) before a level of incident investigation is undertaken and corrective actions and learnings are set in place to ensure compliance. As per Barwon Water's SQECR, the levels of investigation are: Level 1 - Root Cause analysis; Level 2 - 5 Whys; Level 3 - ICAM investigation.		
Unintended direct and indirect impacts to Growling Grass Frog populations and offset site.	Adhere to management triggers, objectives and methods outlined in the Growling Grass Frog Offset and Management Plan (SMEC 2026).	Pre and during construction.	Section 4 and the Growling Grass Frog Offset and Management Plan (SMEC 2026)

2.3.4 Reporting

Various environmental reporting requirements will be undertaken for the project, prepared by the Principal Contractor and provided to Barwon Water. These include, but are not limited to:

- Site establishment checklist
- Log books for vehicle/plant disinfection;
- Log books for environmental controls, fencing or signage requiring report;
- Log books of site inductions; and
- Incident reporting logged in the Principal Contractor's Hammertech system

In addition to the above, and as outlined in the Growling Grass Frog Offset and Management Plan (SMEC 2026), the outcomes of vegetation, habitat and water quality monitoring for Growing Grass Frog must be supplied as follows:

- **Practical Completion:** A letter report summarising the wetland establishment process and the outcome of the vegetation, habitat and water quality monitoring. This will include photographs of the process and the completed wetland and habitat;
- **Final Completion:** A letter report summarising the outcome of vegetation, habitat and water quality monitoring, and demonstrating that the Offset Site has met Final Completion targets, must be submitted to DCCEEW for approval before frog relocation can proceed;
- **Baseline (Year 0):** The letter report from the Final Completion assessment (above) will provide the findings for the baseline (Year 0) assessment;
- **Years 1-3:** A letter report must be supplied after each habitat monitoring event in Years 1-3. Findings must also be summarised in the Annual Report; and
- **Years 4-5:** An annual summary of habitat and water quality monitoring must be supplied in the Annual Report.

2.4 Adaptive management

This CEMP adopts an adaptive management approach to ensure environmental risks and uncertainties are progressively reduced during construction, and that environmental objectives, targets and performance criteria are achieved. Environmental management measures will be regularly reviewed in response to monitoring outcomes, site observations and audit findings, and refined where necessary to maintain their effectiveness and ensure compliance with approval conditions.

Monitoring, auditing and reporting processes are integrated to support a structured adaptive implementation program. Where monitoring or inspections identify that performance criteria are not being met, or where new risks or impacts emerge, corrective actions will be implemented and management measures updated as required. This approach supports continuous improvement and ensures environmental management remains responsive, evidence-based and auditable. The Principal Contractor will regularly discuss any required adaptive management approaches with Barwon Water, and seek approval from Barwon Water prior to any adaptive implementation.

Adaptive management and contingency pertaining to Growling Grass Frog are outlined within Section 5 of the Growling Grass Frog Offset and Management Plan (SMEC 2026).

3. Sensitive areas

3.1 Flora and fauna

A Detailed Flora and Fauna Assessment was completed for the Project (SMEC 2024b), with native vegetation and habitat for several threatened flora and fauna species identified on site (Figure 1; Figure 2). Project impacts to native vegetation and fauna habitat are shown on Figure 3. Specific mitigation measures for each value or species is provided in the following sections.

3.1.1 Native vegetation and fauna habitat

Description

A total of 2.81 ha of native vegetation was identified within the study site, all of which is proposed to be impacted by the Project. No native vegetation is present within the laydown areas.

The majority of vegetation in the Project Area has been cleared of native vegetation and is dominated by introduced grasses that are regularly slashed to maintain the safe and efficient operation of the site. Rows of mature pine and cypress trees to 15 m high fringe the northern extent of the Construction Zone and provide potential habitat for Little Eagle (*Hieraaetus morphnoides*) (refer 3.1.2 below). These trees will be removed to provide access between the west laydown area and the Construction Zone.

Small, disjunct patches of Plains Grassland (EVC 132_61) occur along the perimeter of the pine and cypress tree rows (refer SMEC 2024b). This vegetation may harbour small reptiles, especially where exposed rock occurs.

The majority of native vegetation within the Construction Zone surrounds the borrow pit wetland and includes Non-Eucalypt Grassy Woodland (175_61) (refer SMEC 2024b). This vegetation includes a dense shrub layer comprising wattle (*Acacia* spp.) and sheoak (*Allocasuarina* sp.) and lacks large canopy trees. This vegetation is likely to provide habitat for small reptiles, mammals and birds (including nests of non-threatened bird species).

Further native vegetation is present within the borrow pit wetland and includes patches of Tall Marsh (EVC 821) and Plains Sedgy Wetland (EVC 647) (refer SMEC 2024b). Habitat provided by this wetland includes areas of open water in addition to emergent, floating and submerged vegetation. Species likely to utilise this habitat include a range of wetland bird species including waterbirds, ducks, egrets and herons. The aquatic environment is known to support Short-finned Eel (*Anguilla australis*) and several species of frogs, including the threatened Growling Grass Frog.

Key actions

The following key actions apply to the treatment of native vegetation and fauna habitat:

- All patches of native vegetation are assumed lost due to construction constraints and are covered by the planning permit obtained for the Project. Ensure all vegetation removal is in accordance with conditions of the planning permit (PP-35-2024), including:
 - An ecologist must conduct a pre-clearance survey to assess the presence of fauna (refer Section 3.1.4.1)
 - Where fauna is likely to be present in trees or vegetation proposed for removal, a suitably qualified wildlife handler must be present to ensure that native fauna are managed in accordance with DEECA guidance (refer Section 3.1.4.2 and 4.2.4)
 - Dams filled as part of the approved development must be drained at least 48 hours prior to works commencing to enable the relocation or translocation of fauna (refer Section 4.2.4 and 4.2.5.1);
- Prior to any vegetation removal, confirm the requirements and procedures with Barwon Water.

3.1.2 Raptors (birds of prey)

Description

Ecological assessments undertaken for the Project identified nesting habitat for several raptor species within the established pine windrows along the northern boundary of the Project Area (SMEC 2024c). Seven raptor species were observed utilising this habitat or flying over Project Area, including:

- Little Eagle (*Hieraaetus morphnoides*) – listed as vulnerable under the FFG Act;
- Wedge-tailed Eagle (*Aquila audax*);
- Black Kite (*Milvus migrans*);
- Whistling Kite (*Haliastur sphenurus*);
- Collared Sparrowhawk (*Accipiter cirrocephalus*);
- Brown Goshawk (*Accipiter fasciatus*); and
- Brown Falcon (*Falco berigora*).

The entire pine windrow will be removed to facilitate the construction and operational requirements of the Project which is likely to impact any roosting and/or nesting raptors (Figure 3).

Key actions

- An RMP has been developed for the project (SMEC 2024c) with key management actions outlined below:
 - Tree removal (i.e. the pine trees) will be staggered and occur in two stages associated with the Stage 1 and the Stage 2 of the Project (refer Figures 1 and 2). **Note:** part of tree removals associated with Stage 1 has been completed already by SMEC.
 - **Tree removal must occur between February to May**, which is outside of the breeding period of resident raptor species
 - **A pre-clearance survey is required two weeks prior to tree removal works** by a qualified ecologist. The pre-clearance survey will confirm if there are any active nests prior to tree removal.
 - If an active nest is identified outside the raptor breeding period (i.e. June to December), an ecologist will provide recommendations to Barwon Water and the contractor on the best form of approach to minimise disturbance to the raptor species on site.
- Ensure the RMP is read and understood by the Project Manager and Site Supervisor and key actions are adhered to for the duration of construction activities.

3.1.3 Growling Grass Frog

Description

Growling Grass Frog is a nationally listed threatened species and is confirmed present within the Project Area. Refer to Appendix 4 for a full species profile and description of habitat within the Project Area.

Key actions

Specific mitigation measures for Growling Grass Frog are provided in Section 4.

3.1.4 General fauna procedures

3.1.4.1 General fauna management procedures

All native fauna is protected under the *Wildlife Act 1975*, and it is an offence to harm native wildlife or move them from where they are found without an authorisation permit. The following general management procedures must be followed:

- Approval to capture, collect and relocate fauna is required from the Department of Energy, Environment and Climate Action (DEECA) under the Victorian *Wildlife Act 1975*. Therefore, DEECA must be informed at least three business days prior when the relocation activities are to commence;
- Any animal located within the Project Area will be left to move out of the construction zone of its own accord, unless it is injured or unable to do so;
- Any wildlife requiring capture and relocation must be undertaken by appropriately qualified and licenced personnel (i.e. an ecologist, wildlife handler or fauna spotter/catcher);
- Any fauna injuries or deaths must be reported to Barwon Water and then notify the relevant authority if it involves a threatened species. The cause of injury or death will be investigated, and any required changes to clearing methodology will be implemented;
- Woody debris, hollow logs and rock piles will be retained for use in rehabilitation wherever possible; and
- New infrastructure and access will utilise existing tracks wherever practicable to minimise vegetation removal, ground-stripping and overall disturbance.

3.1.4.2 Fauna spotter/catcher (FSC)

All fauna handling, pre-clearance surveys and capture and relocation must be undertaken by a suitably qualified zoologist, ecologist or fauna spotter/catcher (FSC), with experience in the capture and relocation of native fauna on construction sites. The FSC will be responsible for the following:

- Pre-clearance surveys (refer to Section 4.2.4 below, Growling Grass Frog Offset and Management Plan and RMP);
- Checking areas immediately prior to any clearing for the presence of native fauna and habitat features (i.e. tree hollows, reptiles under fall logs), and breeding places (i.e. nests and burrows);
- Overseeing tree clearing activities;
- Overseeing Growling Grass Frog habitat removal (refer to Section 4.2.4 and Growling Grass Frog Offset and Management Plan);
- Relocating any captured fauna to a suitable release site;
- Keeping a record of any fauna relocated during clearing activities;
- Advising construction contractors as to best practice approach to avoiding impacts on breeding places and fauna species; and
- Reporting any fauna injuries or deaths firstly to the Barwon Water Project Manager (see Key Contacts in Section 5.1), and/or the relevant authority if it involves a threatened species. The cause of injury or death will be investigated, and any required changes to clearing methodology will be implemented.

3.2 Aboriginal and non-Aboriginal heritage

The following sections outline the unexpected find procedure should heritage objects or places (defined under the *Aboriginal Heritage Act 2006* or the *Victorian Heritage Act 1995*) be identified during construction works. Further detail is provided within Barwon Water's Safety, Quality and Environment (SQE) contract requirements.

3.2.1 Unexpected finds

3.2.1.1 Aboriginal Heritage

The unexpected find procedure for Aboriginal heritage requires:

- Works to stop immediately if any item or place of Aboriginal heritage significance is found during construction works;
- The Project Manager to be contacted immediately, who will then inform a representative from Barwon Water and WTOAC;

- A representative of WTOAC will be contacted to provide advice and next steps. As much information as possible will be provided to the representative including photographs, GPS location, detailed description etc.; and
- Works are not to recommence until advice to do so has been provided by WTOAC and Barwon Water.

3.2.1.2 Non-Aboriginal Heritage

The unexpected find procedure for non-Aboriginal heritage requires:

- Works to stop immediately if any item or place of non-Aboriginal heritage significance is found during construction works;
- The Project Manager to be contacted immediately, who will then inform a representative from Barwon Water;
- A representative of Heritage Victoria will be contacted to provide advice and next steps. As much information as possible will be provided to the representative including photographs, GPS location, detailed description etc.; and
- Works are not to recommence until advice to do so has been provided by Heritage Victoria and Barwon Water.

4. Growling Grass Frog Management

Specific mitigation measures will be required for the management of Growling Grass Frog during all phases of the project including pre-construction, construction and post-construction. The following sections provide a summary of requirements only, with further detail provided in the Growling Grass Frog Offset and Management Plan.

Table 4 below summarises the key risks to Growling Grass Frog as a result of Project activities, related mitigation measures and relevant section of the Growling Grass Frog Offset and Management Plan (GGFOMP) (SMEC 2026).

Table 4: Summary of impacts and mitigation measures for Growling Grass Frog

Project activity	Risk	Mitigation	GGFOMP Section
Pre-construction	Unmitigated impacts to Growling Grass Frog throughout construction phase.	Site induction for all site personnel.	Section 4.2
Construction - Stage 1	Loss of habitat.	Construction and establishment of new Growling Grass Frog wetland prior to removal of existing borrow pit wetland.	Section 4.5
	Frogs entering construction zone.	Temporary frog exclusion fencing.	Section 4.3.2
	Introduction of chytrid fungus through plant/vehicle/ personnel movement and construction materials.	Plant/vehicle/personnel hygiene protocols.	Section 4.4
Construction - Stage 2	Disturbance of newly established habitat.	Permanent exclusion fencing.	Section 4.3.3
	Mechanical injury to frogs during excavation of borrow pit.	Capture and relocation events.	Section 4.5
	Frogs entering construction zone.	Temporary frog exclusion fencing.	Section 4.3.2
	Introduction of chytrid fungus through plant/vehicle/ personnel movement and construction materials.	Plant/vehicle/personnel hygiene protocols.	Section 4.4

4.1 Pre-construction phase

The following measures are to be implemented prior to construction commencing:

4.1.1 Site induction

Site inductions must be completed to the satisfaction of Barwon Water prior to any construction works commencing on site. Daily pre-start toolboxes will be run before works commence each day to confirm all staff and site personnel are inducted to the site.

All site personnel (including sub-contractors) are required to attend a compulsory site induction that includes an environmental component prior to commencing work on-site.

This is so that all personnel involved in the Project are aware of sensitive environmental values present on site, specifically Growling Grass Frog and its habitat. Records of all environment inductions will be maintained and kept on-site. The Site Supervisor may authorise amendments to the induction at any time, as well as refresher training with Barwon Water to be notified. Permissible reasons to legitimise a change to the site induction includes a material change to the project scope, or legislative change, or as part of corrective actions following an incident.

4.2 Construction phase

4.2.1 Timing of works

The construction of the new Growling Grass Frog wetland is proposed to compensate for the loss of Growling Grass Frog habitat associated with the Project. The wetland must be designed in accordance with the Growling Grass Frog Offset and Management Plan (SMEC 2026). The new wetland is to be constructed in advance of the excavation of the borrow pit wetland such that there is alternative Growling Grass Frog habitat available on site when the borrow pit wetland is removed.

The appropriate timing and order of construction activities is essential to the success of the Project. The Stage 1 of the Offset Site must be constructed well before the excavation of the Impact Site to ensure that there is alternative Growling Grass Frog habitat available on site when the Impact Site is removed. The process is summarised in Table 1.

4.2.2 Frog exclusion fencing

Temporary frog exclusion fencing must be installed prior to each stage of works as detailed below. Refer to Figures 2 and 3 for locations of frog exclusion fencing. Refer to the Growling Grass Frog Offset and Management Plan for further detail on fencing specifications.

Stage 1

Temporary frog exclusion fencing 1 - must be installed around the Impact Site prior to construction of new Growling Grass Frog Offset Site and Overflow Detention Storage Basin to prevent fauna from accessing Stage 1 works (Figure 1).

- A designated '*rest period*' - a designated '*rest period*' where no temporary exclusion fencing between the Impact Site and Offset Site will be implemented during establishment of the wetland. This is designed to allow unrestricted movement between the Impact Site and Offset Site, and prior to dewatering and the capture and relocation of frogs by an Ecologist.
- Temporary fencing will be removed once Stage 1 works are completed.

Stage 2

- *Temporary frog exclusion fencing 2* - must be installed around the Offset Site and perimeter of the overflow basin after they have been constructed and prior to capture and relocation of frogs and borrow pit removal (Figure 2). Temporary fencing will be removed once Stage 2 works are completed.

- *Permanent exclusion fencing* - must be installed at the completion of Stage 1 civil construction works (currently aiming for October 2026) around the newly constructed Growling Grass Frog wetland as per Figure 2. However the aperture in the bottom 1/3 of the exclusion fence, must be modified to allow large female Growling Grass Frog passage once habitat establishment is complete, while continuing to support rabbit control measures (aperture 100 mm wide x 75 mm high). The permanent fence will remove direct internal access between the water supply basins and the new Growling Grass Frog wetland. Access for maintenance vehicles and site personnel will be through the separate dedicated site gates, one for the wetland and one for the water basins and around the outside perimeter of the offset site (Figure 2).

All frog temporary exclusion fence will be removed once the new offset wetland has been established, prior to relocation of existing frog populations.

4.2.3 Management of Chytrid fungus

Given the proposed construction works will be undertaken in an area with a known population of Growling Grass Frog, the potential for humans and associated equipment to aid in the transmission and spread of diseases, specifically Chytrid fungus (*Batrachochytrium dendrobatidis*), must be treated with appropriate caution.

Detailed hygiene requirements are outlined within the Growling Grass Frog Offset and Management Plan (hygiene measures based on Phillott et al. 2010; Murray et al. 2011), with key points summarised below:

- All workers and sub-contractors will undergo inductions and awareness training to ensure compliance with hygiene protocols;
- Construction works must utilise town water;
- No topsoil from natural or offsite sources is to be brought into the Construction Zone;
- All site personnel must clean and disinfect their footwear before entering and exiting the Construction Zone at the boot-wash station (Figures 1 and 2; Plate 1);
- All vehicles, plant and equipment must be cleaned of all soil, vegetation and debris, and disinfected prior to entering and/or exiting the Construction Zone at the designated washdown bay (Figures 1 and 2). Refer to Appendix B for key areas of vehicles and heavy plant to focus in during washdown procedures); and
- Once washed, vehicles will then be considered 'clean' for the duration of the works. If they leave the Construction Zone then they will be required to re-wash on the next time of entry.

Note: The Construction Zone boundary differs between the Stage 1 and the Stage 2, as identified on Figure 2 and 3.



Plate 1: Example of materials required at a disinfection station for boots, vehicles and equipment (Source: NRM South 2010).

4.2.4 Growling Grass Frog capture and relocation

The procedures for Growling Grass Frog capture and relocation are described in detail within the Growling Grass Frog Offset and Management Plan (SMEC 2026). Frogs will be captured in the **Impact Site** (the borrow pit wetland) and relocated to the **Offset Site** (the Growling Grass Frog wetland).

It must be understood that no construction works within a designated 30 m No-Go Zone surrounding the aquatic habitat zone at the Impact Site can commence until the Offset Site has been formally established in accordance with the Growling Grass Frog Offset and Management Plan (SMEC 2026, Figure 2).

There are three specific capture and relocation events for Growling Grass Frog associated with the Stage 2 as described below:

- *Capture and relocation prior to habitat removal* – To ensure the safe relocation of as many frogs as possible, the preliminary capture and relocation of Growling Grass Frog will be undertaken during the active period, and approximately two weeks prior to the scheduled removal of the Impact Site.
- *Capture and relocation during wetland dewatering* - Wetland dewatering of the Impact Site will be undertaken immediately after the preliminary capture and relocation event described above. An ecologist will be on call during de-watering activities to undertake capture and relocation of Growling Grass Frog during the dewatering process. Further requirements for dewatering are described in Section 4.2.5 below.
- *Capture and relocation during habitat removal* – The removal of Impact Site will commence two weeks following dewatering and will be monitored by an ecologist. The vegetation and topsoil are to be carefully removed by an excavator operator who will be briefed by the ecologists on salvage methods. Ecologist will actively search for frogs and other fauna during staged excavation of Impact Site (staged methods detailed in Section 4.2.5.2 below).

The capture, hold and release procedures described in Section 4.2.4.1 must be followed at all times during all capture and relocation events.

4.2.4.1 Capture, hold and release procedures

The following capture, hold and release procedures must be followed at all times during the capture and relocation of Growling Grass Frog. Ideally, capture and relocation must be undertaken by a suitably qualified and experienced ecologist when present on site (i.e. during the three events described above). However, the following procedure may also be applied to construction personnel where Growling Grass Frog are detected incidentally within the Construction Zone during works:

- The Site Supervisor and project ecologist must be notified to confirm the species identification and recommended steps outline below;
- All site sheds will contain a species fact sheet (refer Appendix A) and suitable equipment to handle and relocate frogs in accordance with best practice hygiene protocols (refer to Growling Grass Frog Offset and Management Plan);
- Single-use gloves will be used for all frogs to prevent the transfer of pathogens during capture and handling;
- Captured frogs must be held in secure containers or plastic sample bags with adequate air supply for as short a period as possible;
- Captured frogs must be re-located as soon as possible to the Growling Grass Frog wetland. As only on-site relocation will be undertaken, frogs will be transported on foot in their container or sample bags to the Growling Grass Frog wetland;
- Frogs must be released into suitable habitat in the Growling Grass Frog wetland margins, within or adjacent to sheltering habitat such as dense vegetation, rocks or logs; and
- All frogs will be visually monitored after release to ensure that they do not show signs of stress or injury. If individuals show such signs, they will continue to be monitored until adequate recovery is evident. If recovery does not become apparent the individual may be re-captured and transported to a veterinarian or wildlife carer for further assessment.

4.2.5 Stage 2 construction procedures

4.2.5.1 Dewatering procedure

The following describes the procedure and actions required for dewatering of the borrow pit wetland:

- Prior to commencement of dewatering, appropriate water filters will be fitted to the hoses to prevent aquatic fauna, including frogs, tadpoles and fish, from being sucked up. This could be a mesh placed over or around the water pump inlet and/or hose to effectively exclude fauna.
- Where possible, water will be extracted from close to the water's surface and at least 5 m away from submerged aquatic vegetation to reduce the likelihood of fauna being sucked into the pump.
- The depth of the wetland will be lowered in stages (approx. 15 cm increments). At each stage, the ecologist will actively search soil, vegetation and other ground debris to capture frogs and other fauna. The ecologist will complete a final rigorous search once the wetland is empty.
- Dewatering is to cease when frogs and/or tadpoles are detected and only commence after capture by a qualified ecologist.
- Once empty, the wetland must be left for two weeks before habitat can be removed. This will give remaining fauna an opportunity to self-relocate.
- If rains partially refill the wetland, the water will be immediately pumped out. If the substrate beneath the wetland is permeable soils, an excavator can be used to dig or scrape a hole at the wetland's deepest point to breach the clay liner, enabling rainwater to drain into the ground.

4.2.5.2 Excavation procedure

The following describes the actions that must be undertaken during the removal of the Impact Site, which includes the borrow pit wetland and any vegetation within 40 m of the wetland:

- The removal of the Impact Site can be undertaken two weeks after wetland dewatering.
 - The vegetation and topsoil are to be carefully removed by an excavator operator who will be briefed by the ecologists on salvage methods. The excavation of the wetland will involve removing terrestrial habitat in the following stages:
 - Prior to commencement of excavation, the ecologist will actively search soil, vegetation and other ground debris (e.g. rocks and logs) for frogs and other fauna.
 - The excavator will scrape the vegetation such that plants are uprooted, enabling the ecologist to search for frogs at the base of plants. The excavator will lift any large rocks and/or logs surrounding the wetland, allowing the ecologist to conduct a thorough search beneath these refugia.
 - The excavator will then scrape the topsoil to a depth of approximately 30 cm, with the ecologist observing closely for excavated or disturbed frogs. The excavator will spread or sprinkle the excavated material in an adjacent area to allow the ecologist to search for frogs in the material.
 - If removal of habitat is expected to take more than one day, a search of habitat and stockpiles will be undertaken each morning before excavation of vegetation and topsoil removal begins.
- Excavation is to cease when frogs and/or tadpoles are detected and only commence after capture by a qualified ecologist.

Sections 5 and 6 of this CEMP and Figure 1 (Stage 1) and Figure 2 (Stages 2 and 3) are designed to print in A3 and display in visible locations within the construction site.

Construction Environmental Management Plan, Pettavel Basin Augmentation Project (SMEC 2026 [V6]; 13 March 2026)

The following describes the environmental management procedures that must be implemented for the Project. Text from Sections 5 and 6 of the CEMP, designed to print and display in visible locations within the construction site. Specific measures for sensitive areas are described in Sections 3 and 4 of the CEMP, and summarised below in Section 6.1.

5. Project management

The following section outlines the Project management responsibilities to be employed for the Project.

5.1 Key contacts

Key and emergency contacts for the Project are provided in the table below.

Organisation / Role	Contact Name	Phone Number
Contractor Project Manager		
Contractor Site Supervisor		
Barwon Water Project Manager		
Barwon Water Environmental Advisor		
Project Ecologist		

5.2 Working hours

Where possible, work will follow the recommended standard hours for construction work (major infrastructure projects) consistent with *Construction guide to preventing harm to people and the environment* (EPA Publication 1820.1, 2021) and the *Civil construction, building and demolition guide* (EPA Publication 1834.1, 2023) which are:

- 7.00am – 6.00pm Monday to Friday;
- 7.00am – 1.00 pm Saturdays, and
- No work on Sundays or public holidays.

5.3 Inspections and maintenance

The following inspections and maintenance will be undertaken by the Site Supervisor:

- Two inspections per week of all environmental management measures described in Section 6.
- Daily inspections of sensitive areas, No-Go Zones and associated protection measures.
- Inspections prior to and after storm event and/or heavy rain.
- Immediate repair of sediment control measures and No-Go Zone protection measures if damaged.
- All environmental management measures found to be defective or ineffective are to be repaired or replaced immediately OR within a timeframe that ensures an impact cannot and does not occur.
- If a defective or ineffective environmental management measure could potentially result in an environmental impact, all works must cease immediately and may not resume until the mitigation measure is repaired or replaced.
- Records of inspections to be kept in a site diary and made available for inspection at the request of the Local Planning Authority or Barwon Water.

5.4 Training and awareness

The following training and awareness programs will be implemented by the Site Supervisor:

- Induction of all staff and contractors to ensure they are aware of sensitive areas associated with the Project (i.e. Growling Grass Frog and raptors) and the environmental management requirements set out in this CEMP.
- Relevant aspects of CEMP to be addressed in daily toolbox meetings (i.e. Sections 3 and 4, especially prior to ground-breaking works commencing).
- CEMP to be displayed in visible location within construction site.
- Records of inductions & toolbox meetings to be kept on site and made available for inspection at the request of Geelong City Council, Barwon Water or DEECA/DCCEEW.

5.5 Informing residents

Local residents will be informed of Project works as follows:

- Affected residents to be notified by the contractor 7 days prior to construction commencing. Notification is via letter drops and will include Project key contacts and complaints process.
- Signage on site entry will display 24-hour contact information.

5.6 Emergency and incident reporting

The emergency procedures are provided in ***Appendix D: Emergency response and*** incident procedure. In all instances, works cannot resume until the factors causing the incident to have been adequately controlled and preferably following modification of procedures to prevent recurrence of the environmental incident.

The Project Manager, Site Supervisor and Barwon Water representative will be notified immediately in the event of an environmental incident.

6. Environmental management procedures

The following section outlines the key management and mitigation measures to be employed during the construction phase of the Project.

6.1 Sensitive areas

6.1.1 Flora and fauna

Sensitive areas for flora and fauna are described in Section 3.1 of the CEMP, and summarised below:

- Sensitive areas that are to be retained (including habitat for Growling Grass Frog) will be protected as No-Go Zones, with fencing and signage installed during all stages of the Project to avoid any unintended impacts. No-Go Zones are shown in Figure 2 and 3.
- Ensure general fauna management procedures are followed prior to and during vegetation removal and other relevant construction activities, particularly for the removal of trees (Section 3.1.4).
- Ensure specific measures are applied for Growling Grass Frog as detailed in Section 4 including:
 - Adherence to all requirements in the Project’s Growling Grass Frog Offset and Management Plan (SMEC 2026);
 - Timing of works, ensuring that the Growling Grass Frog wetland is established prior to Stage 2 commencing (refer Section 4.2.1).
 - Frog exclusion fencing is in place at appropriate stages, refer Figures 2 and 3 (Section 4.2.2).
 - Capture and relocation during habitat removal (i.e. during Stage 2) (refer Section 4.2.4). Specific procedures required during dewatering and excavation of the borrow pit (refer Section 4.2.5).
 - Hygiene protocols outlined in Section 4.2.3 and 6.3.
- Ensure specific measures are applied for raptors as per the Project’s Raptor Management Plan. Key actions include:
 - Tree removal (i.e. the pine trees) to occur in two stages: Stage 1 and the Stage 2
 - Tree removal must occur between February to May.
 - A pre-clearance survey is required two weeks prior to tree removal works by a qualified ecologist.
 - If an active nest is identified outside the raptor breeding period (i.e. June to December), an ecologist will provide recommendations on how to proceed.

6.1.2 Aboriginal and non-Aboriginal heritage

Adhere to Barwon Water’s Safety, Quality and Environment (SQE) contract requirements. Follow the unexpected find procedure for Aboriginal and non-Aboriginal heritage described in Section 3.2 if triggered during site works.

6.2 No-Go Zones and exclusion fencing

No-Go Zones are shown in Figures 2 and 3. The following is required for No-Go Zones:

- Stage 1 – the borrow pit wetland is a No-Go Zone. Exclusion fencing must be installed prior to works commencing and must remain in place for the duration of the Stage 1.
- Stage 2 – the newly constructed Growling Grass Frog wetland is a No-Go Zone (other than species monitoring or capture/relocation activities). Exclusion fencing must be installed prior to works commencing and must remain in place for the duration of the Stage 2.
- Exclusion fencing consists of double-stranded, high visibility bunting, with signage at reasonable intervals;
- No access within No-Go Zones will be permitted unless approved by the Project Manager and Barwon Water.

6.3 Hygiene and wash-down

6.3.1 Vehicles and machinery

The following measures will be implemented to ensure vehicles and machinery do not inadvertently transport weeds or pathogens to or from the site:

- Any vehicle accessing the site will be inspected by construction personnel (e.g. Site Supervisor or delegate) prior to being permitted to enter. No unauthorised materials may enter the site, e.g. mud, contaminated fill, weeds, rubbish or waste materials. Approved materials (e.g. clean fill) must be certified, with an accompanying certificate from the supplier.
- Vehicles and machinery to use designated site entry and exit points for the Project Area.

- All large loads entering and/or exiting the site will be covered (i.e. tarp) or bound (i.e. webbing straps) appropriately and will not be filled above the height of the container.
- Vehicles and machinery entering or exiting the Construction Zone to be cleaned of excessive mud/dirt at the designated washdown bay on site. Note different Construction Zones for Stage 1 and Stage 2 (Figures 2 and 3).
- A logbook must be kept at the washdown bay for all vehicles or machinery that enters and exits the site and record the following information: date, time, vehicle/machinery type, identification (rego/serial number), origin, destination, inspection sign-off.

6.3.2 Management of Chytrid fungus

Additional hygiene precautions are required to minimise the possibility of transfer of disease, specifically Chytrid fungus (*Batrachochytrium dendrobatidis*), from personnel, footwear, equipment and/or vehicles (refer Section 4.2.1).

- Induction of all staff and contractors to ensure they are aware of sensitive areas associated with the Project and the importance of managing Chytrid fungus.
- Any movement of personnel or equipment offsite must implement these hygiene measures prior to re-entering the construction zone to ensure no transmission.
- Topsoil or water must not be transported to site or between sites unless it is from a certified clean supplier.
- All personnel, vehicles and equipment must be cleaned (physical removal of soil/mud) and disinfected (solution of 1% bleach or 0.075% phytoclean) at the washdown bay before entering the Construction Zone (refer Section 4.2.3, Figure 2 and 3 and the Growling Grass Frog Offset and Management Plan).

6.4 Erosion and sediment

The following erosion and sediment control measures will be implemented in accordance with EPA Publications 275, 1820, and 1834.1 (as relevant):

- No construction during severe rain events.
- Soil stabilisation:
 - Grade and seal soils as required, re-instate topsoil and re-vegetation/grassing disturbed soil areas to be carried out as soon as practical. Jute matting as required.
- Stockpile protection:
 - Stockpiles are to be a maximum of 2:1 ratio and placed at least 10 m from drainage inlets, open drains, watercourses, conservation areas and paved areas.
 - Stockpile inspections following heavy rainfall (>10 mm/h).
 - Divert run-off away from stockpile areas and erect silt fencing around the downstream side of stockpiles where applicable.

6.5 Dust

The following mitigation measures are recommended to control dust generation as a result of construction activities:

- Minimise stripped areas.
- Minimise activities on high wind days (gusts >30km/hr). Visual monitoring of area and weather monitoring to occur to ensure compliance with EPA publications 1820.1 & 1834.1.
- Water cart available at all times, with water spraying as required (not within 30 m of any waterway or waterbody).
- Stabilise exposed areas at completion of earthworks. Apply mulch/wood chips where possible (areas to be re-vegetated).

6.6 Noise and vibration

The mitigation of construction noise will include:

- Where possible, work will follow the recommended standard hours for construction work (see Section 5.2).
- Construction vehicles and equipment shall have appropriate noise attenuation devices fitted and be effectively maintained to minimise engine noise.
- Noisy equipment shall be enclosed where possible.

6.7 Weed control

The following procedures for weed control will be implemented:

- Weed control must be undertaken by a qualified weed control contractor or suitably trained personnel within Barwon Water. The contractor must be fully briefed on the location and extent of sensitive areas.
- Weeds will be stockpiled separately to vegetation for disposal.
- Only “wetland-friendly” herbicides (e.g. low-toxicity glyphosate) to be utilised within 50 m of aquatic habitats on site. Strictly no adjuvants (wetting agents / surfactants);
- No boom spray application of herbicides or other pesticides;

- Use of sensitive spot spray methods is acceptable, either knapsack or rail mounted spray unit with handguns. Spraying only undertaken during low or no wind conditions and during daylight hours when visibility is at its highest.
- Marker dye is to be used.

6.8 Waste management

The following actions will be implemented to address waste management (e.g. fuels, lubricants, chemicals and construction waste):

- All waste material and contaminated soil will be contained (within suitable skips onsite) and collected by an EPA permitted contractor on a regular basis to ensure skips do not overflow;
- Offsite transport and disposal of classified waste or contaminated soils must be to a lawful place and undertaken in accordance with the following EPA publications:
 - Guideline to Classifying Industrial Waste (Pub. No. 1968, 2021b)
 - Waste classification assessment protocol (Pub. No. 1827.2, 2021c)
 - Waste disposal categories – characteristics and thresholds (Pub. No. 1828.2, 2021d);
- Green waste comprising native vegetation may be kept on-site however weeds to be disposed of at a lawful green waste facility. A permit is required to transport CaLP Act-listed weeds offsite (Agriculture Victoria 2024).

6.9 Chemicals, fuels and other hazardous materials

To avoid the risk of spills contaminating the environment including off-site receptors, the following measures will be implemented consistent with the guidance given in EPA publication 1698 as well as Worksafe Victoria dangerous goods storage and handling regulations:

- A designated set down area for vehicle and equipment storage, vehicle refuelling and temporary safe storage of chemicals and fuels will be sited and established in accordance with relevant EPA guidelines (Publications 275, 1698, 1820, 1834.1):
 - Located a minimum of 100 m from drainage lines, stormwater inlets, areas of native vegetation/fauna habitat and other sensitive areas identified on site;
 - Appropriately banded to contain all contaminated water; and
 - Fenced off and clearly labelled/signposted in accordance with Worksafe Victoria dangerous goods storage and handling regulations for safe and easy materials identification.
- All chemicals and fuels Safety Data Sheets (SDS) available at all times within the relevant storage compartment;
- Machinery will be checked daily to ensure there is no oil, fuel or other liquids leaking;
- A fuel spill response plan will be incorporated into the toolbox meeting. An adequately sized spill kit will be kept approximately 10 m away from the fuel storage area so that it is accessible in the event of a spill; and
- Potential pollutants present on site and the protocols for storage, handling, disposal and spills will be covered during the environmental site inductions.

6.10 Site remediation

The following actions must be undertaken post construction:

- Re-establishment of open, grassy areas that are impacted during construction. This includes re-seeding areas stripped of grass and topsoil.
- any remaining temporary frog fencing.
- Reinstate tracks and perimeter fencing as required.
- Remove all rubbish and excess material from the Project Area



Temporary frog exclusion fencing 1:
To be installed prior to and
maintained during construction of GGF wetland and detention storage.

Overflow
Detention
Storage
Basin

DRAYTON ROAD

RESERVOIR ROAD

Site access for
Stage 1 works

Eastern laydown overflow area,
if required (during construction)

Site access for operations
for Basin No.1 and No.2

LEGEND

- Site boundary
- Construction zone - early works
- Site compound stage 1 (and stockpile area)
- Won stockpiles stage 1 (if required)
- Temporary frog exclusion fencing 1
- No-go zone
- Constructed Swale Drain
- Semi-permanent connectivity waterbodies
- Maintenance tracks
- Overflow detention storage basin
- Growing Grass Frog wetland (Stage 1)
 - Submergent vegetation zone
 - Emergent vegetation zone
 - Terrestrial zone
- Vegetated swale
 - Terrestrial zone (stage 1)
- Not in scope for referral
- (Operational drinking water basins, to remain operational)

KEY MAP
1:1,800,000

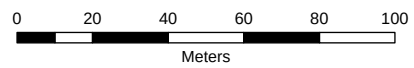


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PROJECT: Pettavel Basin
Augmentation Project
PROJECT NO: 30049187
FIGURE NO: 1
FIGURE TITLE: Stage 1 Construction Plan
CREATED BY: RS17486
DATE: 29/05/2026
VERSION: 7



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149



Scale: 1:2,000 @ A3
GDA2020 MGA Zone 55

LEGEND

- Study Site
- Growing Grass Frog Habitat Impacted**
- Aquatic/Emergent Vegetation Zone
- Terrestrial Zone
- Not in scope for referral
(Operational drinking water basins, to remain operational)
- Stage 1 Pine Removals
- Stage 2 Pine Removals

KEY MAP



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PROJECT:	Pettavel Augmentation Project
PROJECT NO:	30049187
FIGURE NO:	3
FIGURE TITLE:	Vegetation and Habitat Impact Map
CREATED BY:	RS17486
DATE:	27/05/2026
VERSION:	5

References

- Agriculture Victoria 2025.** Information on CaLP Act-listed weeds can be accessed at: <http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/weeds>
- Clemann, N. and Gillespie, G.R. 2012.** National Recovery Plan for the Southern Bell Frog *Litoria raniformis*. Department of Sustainability and Environment, Melbourne.
- DCCEEW 2025.** Species Profile and Threats Database. Commonwealth Department of Climate Change, Energy, the Environment and Water, Canberra, Australia. Available at: <http://www.environment.gov.au/sprat>
- EPA 1991.** Construction techniques for sediment pollution control, Environmental Protection Authority, Melbourne. (EPA Pub No. 275)
- EPA 2009a.** Sampling and analysis of waters, wastewaters, soils and wastes, Environmental Protection Authority, Melbourne. (Publication IWRG701 – June 2009).
- EPA 2009b.** Soil hazard categorization and management, Environmental Protection Authority, Melbourne. Publication IWRG621 – July 2009.
- EPA 2009c.** Soil sampling. Environmental Protection Authority, Melbourne. (Publication IWRG702 (June 2009))
- EPA 2018.** Liquid storage and handling guidelines, Environmental Protection Authority, Melbourne. (EPA Pub. No. 1968)
- EPA 2020.** Civil construction, building and demolition guide, Environmental Protection Authority, Melbourne. (EPA Pub. No. 1834)
- EPA 2021a.** Environmental Reference Standard, Environmental Protection Authority, Melbourne.
- EPA 2021b.** Guidelines to classifying industrial waste, Environmental Protection Authority, Melbourne.
- EPA 2021c.** Waste classification assessment protocol, Environmental Protection Authority, Melbourne.
- EPA 2021d.** Waste disposal categories – characteristics and thresholds, Environmental Protection Authority, Melbourne.
- EPA 2021e.** *Construction guide to preventing harm to people and the environment*, Environmental Protection Authority, Melbourne. (EPA Pub. No. 1820.1).
- Murray, K., Skerratt, L., Marantelli, G., Berger, L., Hunter, D., Mahony, M. & Hines, H. 2011.** *Hygiene protocols for the control of diseases in Australian frogs*, Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available at: www.environment.gov.au/biodiversity/invasive-species/publications/hygiene-protocols-control-diseases-australian-frogs.pdf
- NRM South 2010.** Keeping it Clean: A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens, NRM South, South Hobart. Available at: https://nre.tas.gov.au/Documents/15130802_52keepingitcleanspreadswe.pdf
- Phillott, A. D., Speare, R., Hines, H. B., Meyer, E., Skerratt, L. F., McDonald, K. R., Cashins, S. D., Mendez, D., & Berger, L. 2010.** Minimising exposure of amphibians to pathogens during field studies. *Diseases of Aquatic Organisms*.
- SMEC 2026.** Pettavel Basin Upgrade Project – Growling Grass Frog Offset and Management Plan. Prepared for Barwon Water and CMP Consulting Group Pty Ltd, March 2026.
- SMEC 2024a.** Pettavel Basin Augmentation Project – Targeted surveys for Growling Grass Frog and Latham’s Snipe. Technical memo prepared for CMP Consulting Group Pty Ltd.
- SMEC 2024b.** Pettavel Basin Augmentation Project – Detailed Flora and Fauna Assessment Report prepared for CMP Consulting Group Pty Ltd.
- SMEC 2024c.** Pettavel Basin Augmentation Project – Raptor Management Plan. Prepared for CMP Consulting Group Pty Ltd, May 2024.
- SWIFFT 2025.** State-Wide Integrated Flora and Fauna Teams: Growling Grass Frog. Accessed at: https://www.swiff.net.au/cb_pages/sp_growling_grass_frog.php.

Appendix A: Growling Grass Frog species profile

Growling Grass Frog

Conservation status

Vulnerable under the EPBC Act; Vulnerable under the FFG Act.

Description

A large frog up to 10 cm long with colour varying from dull olive to bright emerald green with golden-bronze blotches (Clemann and Gillespie 2012) (refer images below). Grass Frog may be active during both the day and night, and is highly mobile - known to move up to one kilometre in 24 hours (Clemann and Gillespie 2012).

Ecology

Growling Grass Frogs generally breed between November to March, following local flooding and a rise in water levels. This rise in water levels triggers breeding males to begin calling for females (DCCEEW 2025). Eggs are laid within days of breeding and tadpoles hatch between 2–4 days later (DCCEEW 2025). The metamorphosis stage of the tadpoles generally takes approximately three months, however, may take up to 12 months in exceptional circumstances (DCCEEW 2025). In Victoria, most tadpoles have emerged as frogs by the end of May (SWIFFT 2025).

Growling Grass Frog can be a highly mobile species, capable of moving up to 1 km over a 24-hour period (DCCEEW 2025). When restricted to small, permanent waterbodies, dispersal is low where they tend to move shorter distances indicating high site fidelity. Conversely, when occupying ephemeral waterbodies, Growling Grass Frog are likely to disperse more and travel further distances to reach other suitable wetland habitat (SWIFFT 2025).

Growling Grass Frog are carnivorous where their diet ranges from invertebrates, small fish, small reptiles and other amphibians, even Growling Grass Frog young in rare circumstances (DCCEEW 2025).

Habitat within the Project Area

A population of Growling Grass Frog is present within the borrow pit wetland and is confirmed to be utilising this area for foraging, refuge and breeding. Following completion of Stage 1, it is anticipated that that Growling Grass Frog population will be translocated into the constructed Growling Grass Frog wetland. The borrow pit wetland will then be removed as part of Stage 2.

Colour variations of Growling Grass Frog

The following images show some of the possible colour variations of Growling Grass Frog, ranging from brown, olive green and bright green (all images: SMEC 2026). Note prominent tympanum (ear) behind eye (i.e. large brown disk).



Common frog species also identified within the Project Area



Eastern Banjo Frog / Pobblebonk
(*Limnodynastes dumerilli*)

A large frog reaching up to 7.5 cm (similar size to Growling Grass Frog) with brown or grey-brown back, with orange or yellow mottling on the sides (Australian Museum 2025). Distinguishable from Growling Grass Frog by prominent pale stripe under eye to the shoulder and lack of prominent ear. Burrows into soil and emerges after rains.



Eastern Common Froglet (*Crinia signifera*)

A small frog up to 3 cm with mottled colouration ranging from brown, grey, cream, beige, reddish or mustard yellow (Australian Museum 2025). Difficult to see due to effective camouflage with its surroundings, small size and is generally found in areas with dense ground covers.



Brown Tree Frog (*Litoria ewingii*)

A medium-sized frog reaching up to 4.5 cm. Prominent dark stripe from tip of snout, through the eye to the shoulder. Generally brown and cream in colour but occasionally lime green. As the name suggests, Brown Tree Frog is an agile climber.

Appendix B: Hygiene protocols for vehicles and heavy machinery (extract from NRM South, 2010)

Appendix C: Example erosion and sediment controls

The following erosion and sediment control principles should be adopted for this work.

During work planning assess the site and proposed works for erosion and sedimentation risks:

- Identify how surface water will flow across the site (e.g. up slope sources, soil type, slopes and contours);
- Identify where the surface water will drain (e.g. drainage lines, inlets and waterways);
- Determine factors that can increase the risk of sediment entering a drain or waterway; and
- Identify disturbed or steep areas that may erode and contribute sediment.



Implement measures to prevent erosion:

- Minimise the removal of vegetation and reuse removed vegetation where possible;
- Minimise the amount of site disturbance and the time that areas including stockpiles are left exposed;
- Minimise the number of vehicle access points (preferably to one);
- Avoid causing site disturbance during wet weather;
- Divert surface water around exposed areas; and
- Avoid or keep stockpiling to a minimum.



Install sediment controls before work starts:

- Ensure all run-off from disturbed areas is directed towards sediment controls
- Place controls so that sediment is trapped as close to the source as possible
- Install controls downstream of disturbed areas, stockpiles, along slopes, and to protect drainage lines (e.g. drains, pits, creeks)
- Typical controls employed to capture sediment are geo-fabric, sediment fences, and straw bales.



Install Silt Curtains:

- Runoff from works will be controlled using erosion control measures including suitable silt retention structures (e.g. silt fences, hay bales, settling basins) hessian and geofabric lined drains;
- Silt fencing to be installed along banks adjacent to any works that are undertaken;
- Silt curtain to be installed within the wetland during construction works; and
- All sediment controls must be maintained and intact for the duration of the works and inspected regularly.



Image taken from Trade Enviro 2022:

<https://www.tradeenviro.com.au/silt-curtain/>

Employ good site management during works:

- Avoid making a mess (e.g. transport soil and materials to prevent sediment dropping on surrounding roads and stabilise site accesses);
- Clean up as you go;
- Ensure surrounding areas are clean and free of sediment; and
- Strip and segregate topsoil for use in rehabilitation.



Note: Image displays incorrect practice with steep sloping stockpile adjacent to overfilled silt fence.

Inspect and maintain controls.

- Inspect and maintain controls to ensure they are working effectively (at a minimum, weekly during dry periods and daily during rain periods);
- The work site and surrounding areas should be clean and adequately protected, and only clean water should be leaving the site; and
- Remove built up sediment and repair sediment control devices as necessary.



Note: Image displays incorrect practice with material placed against overfilled silt fence.

Appendix D: Emergency response and incident procedure

Incident:	Response:
Minor spillage (i.e. less than 20 litres) of fuels, lubricants and/or hydraulic fluids from excavation/drilling equipment. Refer to EPA 2018. <i>Liquid storage and handling guidelines</i> , Environmental Protection Authority, Melbourne. (EPA Pub. No. 1968)	• Stop work, assess the risk, ensure proper safety equipment is being worn • Control or stop release • Employ spill kits • Contain and remove all materials affected by the spillage • All contaminated materials are to be placed into suitable containers and transported from the investigation site for disposal at a suitably licensed facility • Contact Site Supervisor to organise for the appropriate disposal of the contaminated materials • Report the incident in writing
Significant spillage (i.e. greater than 20 litres) of fuels, lubricants and/or hydraulic fluids from excavation/drilling equipment. Refer to EPA 2018. <i>Liquid storage and handling guidelines</i> , Environmental Protection Authority, Melbourne. (EPA Pub. No. 1968)	• Stop work, assess the risk, ensure proper safety equipment is being worn • Control and stop release if possible • Employ spill kits • Contain and/or bund contamination source • Contact Site Supervisor for advice on contacting the relevant authorities (EPA, Fire Brigade). • Project Manager to contact the relevant authorities • Report the incident in writing
Disturbance of areas of potential archaeological or heritage significance.	• Stop work and contact the Barwon Water Project Manager or Environmental Officer who will contact the relevant authorities.
Damage/removal/injury to EPBC Act-listed threatened species or habitat	• Stop work arrangements in the immediate area of the incident. The Barwon Water Project Manager will be notified. Consultation will occur with Barwon Water to assess the significance of the impact. Any relevant approvals, licences or permits that are required will be obtained before the works can recommence.
Injured fauna	• If native fauna is captured during habitat clearing, it will be released <100 m into a suitable nearby location that has been identified as such by an ecologist or wildlife handler. Injured fauna will be taken to a nearby vet clinic for assessment. Records of fauna captured and relocated will be kept on site with the Site Supervisor. Any injury or death of threatened species will be reported to the Barwon Water Project Manager or Environmental Officer immediately.
Fire	• Minor fires will be extinguished where possible and safe to do so. If fires cannot be safely extinguished, evacuate to safe area and contact the fire brigade immediately (Call 000), as well as the Site Supervisor.

Incident:	Response:
Potential contamination of waterways, groundwater or land, including: • Sediment wash off entering waterways • Interception of groundwater during construction works • Any damage to existing groundwater bores • Any evidence of groundwater impacts	• If contamination of waterways occurs from the inadequate installation and subsequent failure of temporary erosion and sediment controls, the following steps must be undertaken: • Identify the source of the contamination • Use emergency erosion and sediment controls such as straw bales or sediment fence fabric to temporarily isolate the source of contamination • Fix the cause of the erosion and sedimentation contamination (i.e. repair damaged sediment and erosion controls) • Check storage of stockpiles are in good condition and maintain the sites erosion and sediment control measures • Ensure water is returned to pre-construction quality within 24 hours • The incident must be reported to the Site Supervisor immediately and Barwon Water will be notified. Contact Site Supervisor for advice on contacting the relevant authorities (EPA). Review how often erosion and sediment controls are being maintained and upgraded and increase if necessary.



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