

# Victorian Desalination Project



## D&C Utilities Environmental Management Plan Attachment I10 – Waterways and Wetlands Sub Plan

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## Definitions and Acronyms

The following Definitions and Acronyms are used in this document:

ANZECC	Australia and New Zealand Environment and Conservation Council
Class One Environmental Incident	Class One Environmental Incidents create permanent or long term damage to the environment. This damage will result in the environment taking 12 months or more to return to pre-existing conditions or costs in excess of \$50,000 to remediate. (See AEMP Attachment K).
Class Two Environmental Incident	Class Two Environmental Incidents create short to medium term damage to the environment. This damage will result in the environment taking up to 12 months to return to pre-existing conditions or costs in excess of \$10 000 but not exceeding \$50,000 to remediate. (See AEMP Attachment K)
Class Three Environmental Incident	Class Three Environmental Incidents typically cause short term or nuisance damage. The damage is easily rectified usually within one day. Class 3 incidents do not cause medium or long term damage or costs less than \$10 000 to remediate. (See AEMP Attachment K).
CMA	Catchment Management Authority
CWMS	Construction Work Method Statements
D&C	Design and Construct Phase of the VDP
DEWHA	Department of the Environment, Water, Heritage and the Arts
DPI	Department of Primary Industries
DSE	Department of Sustainability and Environment
EES	Environment Effects Statement
EIRP	Environmental Incident Response Plan
EPA	Victorian Environment Protection Authority
EP Act	<i>Environment Protection Act 1970</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EMP	Environmental Management Plan
Environmental Incident	Any event that causes, has caused or has the potential to cause an Environmental Hazard or Pollution (from section 4, Appendix S3, PS&PR). [Please see the definition of <i>Environmental Hazard</i> . Please see the definitions of <i>Pollution of Atmosphere</i> , <i>Pollution of Land</i> and <i>Pollution of Waters</i> for the legislative definitions of 'Pollution' in Victoria.]
FFG Act	<i>Flora and Fauna Guarantee Act 1988 (Vic.)</i>
GOV	Groundwaters of Victoria
JHA	Job Hazard Analysis
JSEA	Job Safety and Environmental Analysis
NEPM	National Environment Protection Measure



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NVMF	Native Vegetation Management Framework
O&M	Operation and Maintenance Phase of the VDP
OHS	Occupational Health and Safety
Performance Criteria	The Performance Criteria outline the overarching requirements based on the environmental objective for each Subject Area of Schedule A of Appendix S3 of the Project Scope and Project Requirements
Plant site	Victorian Desalination Project Wonthaggi Plant site
PR	Performance Requirements
Project Area	Refers to all areas designated for the project as defined in the Project Deed including both the plant area and the utilities corridor
PS&PR	Project Scope and Project Requirements
Ramsar	Wetland listed under the international treaty for the conservation of wetlands
SEI	Site Environmental Inspection
SEP	Site Environmental Plans
SEPP	State Environment Protection Policy
SEPP (WoV)	State Environment Protection Policy (Waters of Victoria)
sp.	Species (one species)
spp.	Species (more than one species)
The State	The Honourable Timothy James Holding, MP, in his capacity as the Minister for Water of the State of Victoria for and on behalf of the Crown in the Right of the State of Victoria
TDJV	Thiess Degremont Joint Venture
Utilities corridor	Construction footprint of the Victoria Desalination Project transfer pipeline, power supply and associated utilities
VDP	Victorian Desalination Project
VDP Utilities	Collective term used to refer to the power supply, transfer pipeline and communications components of the VDP including compensations reaction stations, surge vessels and the booster pump station. Refer to Section 1.4 of the Utilities Area EMP for further description of these utilities.
WAP	Work Area Packages
WP	Work Packs

## 1 Purpose and scope

This Waterways and Wetlands Sub Plan describes the existing waterways and wetland conditions and the management measures required to mitigate the potential negative impacts to the flora, fauna and water quality in these waterways and wetlands, associated with the design and construction (D&C) of the of the Victorian Desalination Project (VDP) transfer pipeline and power supply (collectively referred to as the Utilities Corridor).

This sub plan must be read in conjunction with the Environmental Management System (EMS) Manual, D&C Environmental Management Plan (D&C EMP) and the D&C Utilities Area EMP. This sub plan forms an attachment to the D&C Utilities Area EMP and addresses requirements listed in the Environmental Compliance Tracker (TDV-0-EV-RP-0001-01), including licence conditions, Performance Requirements, Performance Criteria (PC) and other obligations which may influence waterways and wetlands.

Specific management measures from this and other environmental sub plans have been incorporated into Work Area Packages (WAP) and Work Packs (WP) which include Construction Work Method Statements (CWMS), Site Environmental Plans (SEP) and Job Safety and Environmental Analysis (JSEA's) where applicable.

This sub plan should be read in conjunction with the Water Quality & Erosion Management and Soil Management and Hazardous Materials sub plans for additional control measures.

## 2 Objectives and Targets

The objective of this Sub Plan is to minimise and manage the impacts to waterways and wetlands during design and construction including native species and ecological communities, particularly those listed as threatened under the Commonwealth EPBC Act and State *Flora and Fauna Guarantee Act 1988* (FFG Act), and to ensure project objectives, targets and obligations, including PRs and associated criteria, are met.

Table 1 outlines the relevant waterways and wetlands objectives and targets nominated to be achieved during the D&C phase of the VDP. Numbered entries are applicable performance requirements taken from Schedule A of Appendix S3 of the Project Deed.

**Table 1: Environmental objectives, targets and performance requirements**

Issue	Objective/Performance Criteria	Target/Performance Requirement
Waterways and Wetlands	<p><b>Protect waterways and wetlands</b></p> <p>Comply with the State Environment Protection Policy (Waters of Victoria) or ANZECC Guidelines (2000) <b>(PR#07060)D, C.</b></p> <p>No significant impact on Western Port Ramsar Site <b>(PR#07060)D, C.</b></p> <p>Maintain the environmental</p>	<p>Develop and implement construction methods and site rehabilitation plans that seek to protect the habitat values of waterways and wetlands including <b>(PR#07062)C:</b></p> <ul style="list-style-type: none"> <li>• Developing appropriate construction methods to minimise environmental impacts for crossing sensitive waterways including: <ul style="list-style-type: none"> <li>Powlett River</li> <li>Bridge Creek</li> <li>Woolshed Creek</li> </ul> </li> </ul>

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	<p>values of waterways and wetlands <b>(PR#07060)D, C.</b></p> <p>Compliance with all relevant Government Agency and/or Water Authority requirements for waterway crossings <b>(PR#07060)D, C.</b></p> <p>Avoid where practicable or minimise impacts in the designated areas presented under the EES <b>(PR#07060)D, C.</b></p>	<p>Bass River</p> <p>Lower Lang Lang River</p> <p>Yallock Cut</p> <p>Yallock Creek</p> <p>Bunyip River</p> <p>McDonalds catch Drain</p> <p>Deep Creek</p> <p>Toomuc Creek</p> <p>Cardinia Creek</p> <p>Tennant Creek</p> <ul style="list-style-type: none"> <li>• Wherever practicable, where trenching of waterways is to occur, trench during dry conditions</li> <li>• Site specific construction methods to minimise environmental impacts on ecologically significant species and vegetation, as well as the risk of sedimentation, heightened flood risk, acid sulphate soils and impacts on downstream water users.</li> <li>• Reinstating and revegetating disturbed areas</li> <li>• Limiting impact on ecological processes such as fish movements and breeding</li> <li>• Undertake an environmental risk assessment of individual waterway crossings to guide decision-making on the most appropriate crossing method and related mitigation <b>(PR#07062) D,C</b></li> </ul> <p>Develop and implement monitoring and reporting on the effects of construction on waterways and wetlands. <b>(PR#07063)C.</b></p> <p>Develop and implement methods and management systems to limit impacts on waterways and wetlands during operation. <b>(PR#07063-1)</b></p> <p>Re-establishment of wetland (unnamed tributary of the Powlett River) on the Leased Area. <b>(PR#07064-1)D, C.</b></p> <p>Develop maintenance and emergency management plans for the Transfer Pipeline which meet the performance criteria <b>(PR#07064-2)</b></p> <p>Design and locate scour and other relief valves to meet the performance criteria <b>(PR#07065)</b></p>
<p>Flooding control</p>	<p><b>Protect public and private assets from flooding:</b></p> <p>Limit impacts of flooding from Project Activities <b>(PR#:13092) D,C</b></p>	<p>Design and construct the Works and the Temporary Works to avoid impacts on flood potential and obtain approval of the relevant Government Agency or Water Authority to any change in waterway flood levels. <b>(PR#:13094) D,C</b></p> <p>Develop and implement methods and management</p>

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systems that:

- Identify and investigate potential interactions with flood protection systems during Project Activities
- Maintain existing flood protection systems during Project Activities
- Maintain flood dependent ecosystems to the extent practicable

**(PR#:13096) C**

Any Project activities on waterways are to be in accordance with the requirements of the relevant Government Agency or Water Authority.

**(PR#:13097) D,C**

D = Design phase requirement; C= Construct phase requirement

All PRs from Project Deed Schedule A of Appendix S3 are contained within the D&C Utilities Area EMP Attachment G – Environmental Obligations Register. The Environmental Compliance Tracker tracks conformance with these PRs and is updated regularly by the TDJV Environmental Coordinator and Area Environmental Managers.

### 3 Legal, regulatory, licence, permits and approval requirements

This sub plan has been developed in accordance with the following legislation:

- ~ *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and subsequent Waterways Environmental Management Strategy, prepared as required by the EPBC Act Approval for the project.
- ~ *Flora and Fauna Guarantee Act 1988*
- ~ *Catchment and Land Protection Act 1994*
- ~ *Environment Protection Act 1970* (Section 30a consent)
- ~ *Environment Protection Act 1970*
  - State Environment Protection Policy – Groundwaters of Victoria
  - State Environment Protection Policy – Waters of Victoria (2003) and Insertion of Schedule F8: Waters of Westernport and Catchment 2001
  - State Environment Protection Policy (Prevention and Management of Contamination of Land)
- ~ National Environment Protection (Assessment Of Site Contamination) Measure, 1999, [NEPM] – Schedule A and Schedule B
- ~ *Water Act 1989*

There are several guidelines and strategies that are used in Victoria to establish water quality objectives to assist in determining the level of management necessary to meet SEPP requirements. These include:

- ~ Regional Catchment Strategies (Port Phillip and Western Port CMA and West Gippsland CMA)

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- ~ River Health Strategies:
  - Port Phillip and Westernport Regional River Health Strategy
  - West Gippsland River Health Strategy
- ~ Bass Coast, Cardinia and Casey Planning Schemes – Land Subject to Inundation Overlays
- ~ ANZECC and ARMCANZ, 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality
- ~ EPA (Vic) Publication 668: Hydrogeological Assessment (Groundwater Quality) Guidelines
- ~ EPA (Vic) Publication 840: The Clean-up and Management of Polluted Groundwater
- ~ EPA (Vic) Publication 669: Groundwater Sampling Guidelines
- ~ EPA (Vic) Publication 441: A guide to the sampling and analysis of waters, wastewaters, soils.
- ~ Environmental Guidelines for Major Construction Sites (EPA 1996)
- ~ 1991 Guidelines for Stabilising Waterways
- ~ Technical Guidelines for Waterway Management (DSE 2007).

Permits applicable to the UtilitiesCorridor are contained within the Environmental Licence, Permit and Approvals Register (Attachment F to the D&C Utilities Area EMP). Permits applicable to the waterways and wetlands impacted by the UtilitiesCorridor include:

- ~ Melbourne Water or West Gippsland CMA – Works on waterways
- ~ DSE – Groundwater pumping for any dewatering in conjunction with pipeline development
- ~ DSE – Translocation of any Nationally and State-listed fish species
- ~ Department of Primary Industries – Fish Surveys for Research Permit
- ~ *EP Act 1970* – Permits to access groundwater and manage groundwater resources sustainably
- ~ *EP Act 1970* – License to discharge water into waterways (via section 30A consent).

The legislative and contractual requirements for the D & C Utilities area are summarised in:

- ~ D&C Utilities Area EMP – Attachment E – Environmental Legislation Register
- ~ D&C Utilities Area EMP – Attachment F – Environmental Licence, Permit and Approval Register
- ~ D&C Utilities Area EMP – Attachment G – Environmental Obligations Register.

The applicable PRs from Project Deed Schedule A of Appendix S3 are provided in Table 1.

Under the Project Deed the D&C EMP, all sub plans and any changes to these must be endorsed by the State, who may refer aspects to relevant agencies. Any changes to this sub plan need to be reviewed against the EPBC Waterways Environmental Management Strategy. If such changes are not consistent with the strategy, amendments to the EPBC Act approval must be sought through DEWHA.

EPA and any other relevant agencies and stakeholders will be consulted with regard to any specific approval requirements in relation to this sub plan. The requirements of any permits, licences and approvals obtained will be placed in the Environmental Licence, Permit and Approval Register on receipt and updated in the Environmental Compliance Tracker.

## 4 Existing Conditions and Issues

### 4.1 Waterways and Wetland

The Utilities Corridor of the VDP will extend some 85km, with a construction easement 40m wide. Near Cranbourne, where the transfer pipeline and power supply are separated, the construction easement is 30m wide for eight kilometres. The route for the Utilities Corridor passes through some sensitive habitat and requires 96 waterway crossings. The corridor routing seeks to minimise potential impacts of this construction by avoiding areas of significant vegetation and key habitat zones. Many of the threatened species identified as potentially occurring along the alignment are closely associated with waterway habitats. As a result, some major waterway crossings will be pipe-jacked and constructed without requiring surface earthworks (channelling).

Potential impacts are those identified in the EES under Surface Water and Groundwater, Flora and Fauna (Wetlands), and Interactions with the Environment.

#### 4.1.1 Waterways

Surface water is water that flows in streams and rivers and sits in natural lakes, wetlands and reservoirs. There are approximately 100 waterways along the Utilities Corridor ranging from rivers and streams to drains. Many of these systems rarely contain water or are ephemeral and dry for several months of the year and are of limited habitat value to most aquatic fauna.

However, all of the waterways play an important part of the catchment of Western Port and Port Phillip region in terms of water quality, aquatic fauna and aquatic ecology. Therefore all waterways which the pipeline will cross will require appropriate measures to minimise any environmental impacts.

Approximately a quarter of these waterways may provide suitable habitat for fish and 12 are named as sensitive waterways within the Scoping Requirements for the Desalination Project EES. These are:

- Powlett River
- Bridge Creek
- Woolshed Creek
- Bass River
- Lower Lang Lang River
- Yallock Cut
- Yallock Creek
- Bunyip River
- Deep Creek
- Toomuc Creek
- Cardinia Creek
- Tennant Creek.

#### 4.1.2 Wetlands, dams, floodplains, saltmarsh and swamps

Wetlands, dams, floodplains and swamps are important for ecological functions, and provide habitat (including breeding habitat) for birds, fish and macroinvertebrates. These also assist in dispersion of macroinvertebrates and fish (during flood conditions).

### 4.1.3 Westernport Bay

The Western Port Ramsar site is a large bay connected to Bass Strait by a wide channel between Flinders and Phillip Island and a narrow channel between San Remo and Phillip Island, draining an area of 3,200 square kilometres. French Island lies in the middle of Western Port Bay. The tidal range in Western Port Bay is the greatest for any location on the Victorian coast (up to three metres) and is characterised by a wide variety of marine habitats ranging from deep channels to extensive sea grass flats, mangroves, saltmarsh and wide tidal mudflats.

### 4.1.4 Threatened Species

Threefish species that have been recorded or have potential to occur in several of the creeks along the Utilities Corridor alignment and have been listed in the technical appendices (Appendix 15: Biosis Research, August 2008) to the EES.

Where the Utilities Corridor intersects waterways, the construction of culverts for access roads and construction near waterways could potentially impact aquatic species, including EPBC Act-listed Australian Grayling and Dwarf Galaxias and the FFG Act listed Australian Mudfish, through impacts to habitat and water quality.

Surveys for listed fish species along the proposed Utilities Corridor were conducted in 2008 as part of the EES. Although some of these threatened species were not recorded, due to the nature of these cryptic species, the possibility of occurrence of these species cannot be completely dismissed. The lack of records does not preclude all waterways from supporting Dwarf Galaxias, Australian Mudfish and Australian Grayling, and mitigation measures are still required for these species.

There are several threatened terrestrial species not covered by this document that may be affected by the construction of the Utilities Corridor. These are the subject of the Utilities Flora and Fauna Sub Plan.

## 5 Environmental Risk

An environmental risk assessment has been carried out for the D & C Utilities Corridor. This assessment is contained in the Environmental Risk Register, Attachment C of the D&C Utilities Area EMP. Table 2 summarises the potential hazards from project activities, potential impacts of these hazards and the risk of occurrence as rated by the environmental risk assessment.

**Table 2: Summary of utilities risk assessment for Waterways and Wetlands**

Activity posing hazard	Risk/ Potential Impact	Inherent Risk (before controls)	Control measure reference (Att I10.1)
Excavation, transfer of material and movement of stockpiles, equipment and materials	Negative impact to sensitive waterways such as loss of habitat, reduction in habitat quality, damage to bank vegetation, loss of sediment to waterway.	High	#2, 4,14,15

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Activity posing hazard	Risk/ Potential Impact	Inherent Risk (before controls)	Control measure reference (Att I10.1)
Pipe-jacking of waterway	Sensitive waterway compromised as a result of destabilisation from pipe jack failure. There may be impacts on significant species and potentially the Western Port Ramsar site.	High	#2, 4  See Contingency measures in Section 9
Accidental contamination of a waterway and/or area of vegetation or significant habitat, through the incorrect disposal of ASS/PASS soils or rock.*	Negative impact to sensitive waterways such as loss of habitat, reduction in habitat quality from contamination.	Extreme	See Att I12 ASS Sub Plan
Establishment or removal of access roads, clearing of ROW and removal of vegetation	Flood protection systems not maintained resulting in a flooding event  Impact on waterway riparian zone.	Extreme	#3, 23-25
Failure of temporary water barriers during construction.	Negative impact to sensitive waterways such as loss of habitat, reduction in habitat quality from contamination.	High	See Contingency measures in Section 9

\* Dealt with in the Acid Sulfate Soils Sub Plan.

Attachment C of the D&C Utilities Area EMP should be consulted for a comprehensive assessment of these risks.

The following risks from project activities have been identified elsewhere in the risk assessment as potentially impacting on waterways and wetlands. They are addressed directly in other sub plans as follows:

- ~ Accidental spills of chemicals and fuels from machinery or during transportation (Water Quality and Erosion Management and Hazardous Materials sub plans)
- ~ Sediment laden run off from erosion of soil, roads and earthworks spoil (Water Quality and Erosion Management Sub Plan)
- ~ Run off from incorrect disposal of contaminated wastes (Soil Management Sub Plan)
- ~ Exposure and/or desiccation (i.e. dewatering or diversion of stream to allow construction to occur)(Water Quality and Erosion Management Sub Plan)
- ~ Waterway reinstatement impacting fish passage in waterways and wetlands (Site Reinstatement Sub Plan)

The Risk Assessment did not determine general flooding risk from working on a flood plain as significant, but controls applicable are outlined in Attachment I10.1 (Control Measures #21 – 23).



## **6 Control, management and mitigation measures**

Attachment I10.1 describes a range of mitigation and control measures to be used to minimise and manage potential impacts to waterways and wetlands.

The measures in Attachment I10.1 are designed to address potential impacts from the risks outlined in Section 5 as well as deliver on the objectives, targets and in particular the PRs listed in Section 2. They include requirements and responsibilities for design, construction, evaluating performance and reporting.

Attachment I10.1 also references Design Packages (DPs) in design-related control measures. PRs that relate to design are addressed in accordance with the Design Management Plan (PL-TDV-PM-0-X-000-0011-0-00).

Additional control measures relevant to waterways and wetlands are detailed under the Water Quality & Erosion Management, Soil Management, Hazardous Materials, Acid Sulfate Soils and Air Quality sub plans.

During the development of construction methods for sensitive waterway crossings, a risk assessment approach is used to develop site specific environmental mitigation measures. The measures are incorporated into waterway crossing specific CWMS and SEPs for each waterway. The location specific CWMS and SEPs are reviewed in consultation with the appropriate asset managers (e.g. Melbourne Water and WGCMA) prior to works and form part of the permit application process to ensure that location appropriate construction methods and environmental mitigation measures are implemented.

## **7 Site environmental plans**

Site Environmental Plans (SEPs) have been developed for the Utilities Corridor that detail environmental sensitive areas and general management measures implemented to minimise potential impacts of construction activity on the environment and community.

The information contained in the SEPs is presented in pictorial and tabular drawing format. This is to make them easy to use by all site personnel, consultants and subcontractors. SEPs are updated to reflect operating practices on a regular basis.

The waterways and wetlands management controls set out in the SEPs are drawn from this Sub Plan and include exclusion zones through pipe jack waterways, identification of sensitive waterways, and identification of acid sulphate soils.

SEPs are held onsite by Area Environment Managers. Additional practical management measures are picked up and covered by the Weekly Environmental Inspection Checklist.

## **8 Evaluating performance and reporting**

### **8.1 Water Quality**

During construction water quality is to be maintained within the background condition (pre-construction) of the waterway and in accordance with SEPP WoV as varied within the Schedule F8 Waters of Western Port and Catchment (EPA 2001) and the ANZECC Guidelines (ANZECC 2000). River health will be monitored through three phases of the construction of the utilities (pre-construction, during and post construction).

Water quality monitoring will also provide trigger values of when conditions have significantly worsened during construction from the background condition.

### 8.1.1 Trigger values

1. Determine trigger values from background (pre-construction) monitoring for a minimum four data points including real time logging for turbidity to take place at a minimum of one month prior to construction
2. Any values exceeding the trigger values during construction monitoring will cause a contingency measure procedure (Section 9) to be followed.

The data from the pre-construction monitoring program will be collated and the maximum and minimum of the background condition will be ascertained. This will enable trigger values to be developed which indicate when conditions have deteriorated in the waterway requiring a site audit to be undertaken.

The following trigger values should be used:

- Turbidity >20% background condition
- Electrical Conductivity >1% background condition
- Dissolved Oxygen Concentration <1% background condition
- Nutrients must not substantially exceed background condition. *Substantially* is defined as a statistically significant difference ( $\alpha > 0.05$ )

However, these triggers may be revised after detailed water quality monitoring is completed prior to the start of construction.

### 8.1.2 Monitoring and reporting

Environmental audits and site environmental inspections are scheduled to detect where PRs and other environmental requirements are not being met with appropriate corrective actions developed to address these issues as they arise. Schedules, responsibilities and reporting procedures for water quality monitoring, are set out in the Monitoring, inspection, audit and reporting schedule - Attachment L of the D&C Utilities Area EMP.

Monitoring will be undertaken by appropriately qualified personnel, in accordance with the appropriate standards and guidelines as specified in Attachment L of the D&C Utilities Area EMP and Utilities Water Quality and Erosion Sub Plan. Monitoring equipment will be calibrated in accordance with relevant Australian Standards.

## 9 Contingency measures

Contingency measures have been developed and are summarised below. The control measures table (Attachment I10.1) focuses on preventative measures.

All environmental incidents will be responded to in accordance with the Utilities Environmental Incident Response Procedure (EIRP) (PR-PLV-PM-3-X-000-0001-00-00). The EIRP provides project specific details for the identification of and response to potential environmental related incidents along the Utilities Corridor during the D&C phase of the VDP. It provides assistance in managing potential and actual incidents, as well as follow-up and reporting requirements.

The environmental risk assessment has identified the following circumstances which could occur outside normal operating conditions that may impact on waterways and wetlands:

- ~ Hazardous Chemical Spill(s) (Refer to the Hazardous Material Sub Plan)

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- ~ ASS/PASS Contamination (Refer to the Acid Sulfate Soils Sub Plan)
- ~ Tunnelling waterway crossing failure(see below)
- ~ Open trench waterway crossing failure (see below)
- ~ Frac-Outs (see below)

Other risks identified in other sub plans that could also impact on waterways and wetlands include:

- ~ Erosion or Sedimentation (Refer to Water Quality and Erosion Management Sub Plan)

### 9.1 Tunnelling crossing waterway failure

Tunnelling (pipe jacking) is a trenchless pipe lay technique which is foreseen as a preferred option for environmentally sensitive areas as it allows impacts to environmentally sensitive areas to be avoided over short distances. Although tunnelling is perceived to have the least impact on waterways, it is a higher risk construction method than trenching for the following reasons:

- ~ tunnelling requires specialised equipment that is less mobile and not readily available including tunnel boring machine (TBM), hydraulic pipe jacking frame and operational cribs on the surface
- ~ changing ground conditions encountered during the tunnelling program can cause tunnels to be abandoned and the subsequent excavation to lay pipe and retrieve equipment is significantly larger than that required for a modified standard trenching pipe lay
- ~ tunnelling requires establishment of drive shafts, large excavations to 8m depth, which require the use of sheet piling, a high vibration activity in close proximity to the creek banks .

If these circumstances occur, the initial contingency response procedure to managing the waterway illustrated in Figure 1 will be followed.

### 9.2 Open trench waterway crossing failure

The failure of an open trench crossing is most likely to occur as a result of the failure of the flow control structures or bypass pumps failure resulting in uncontrolled water flow into site. If these circumstances occur, the initial contingency response procedure to managing the waterway illustrated in Figure 2 will be followed.

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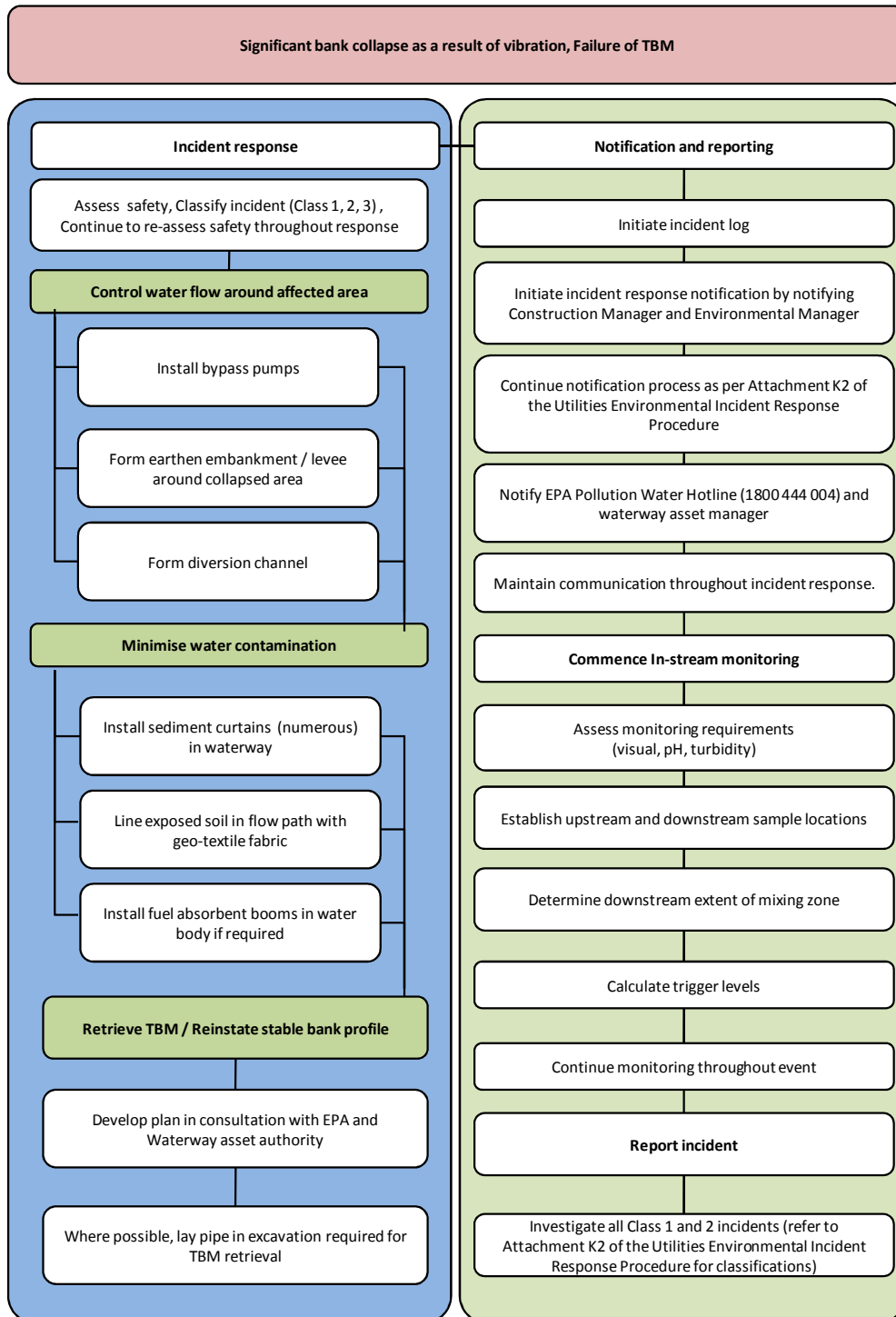


Figure 1: Trenchless Waterway Crossing Failure Contingency Response Plan

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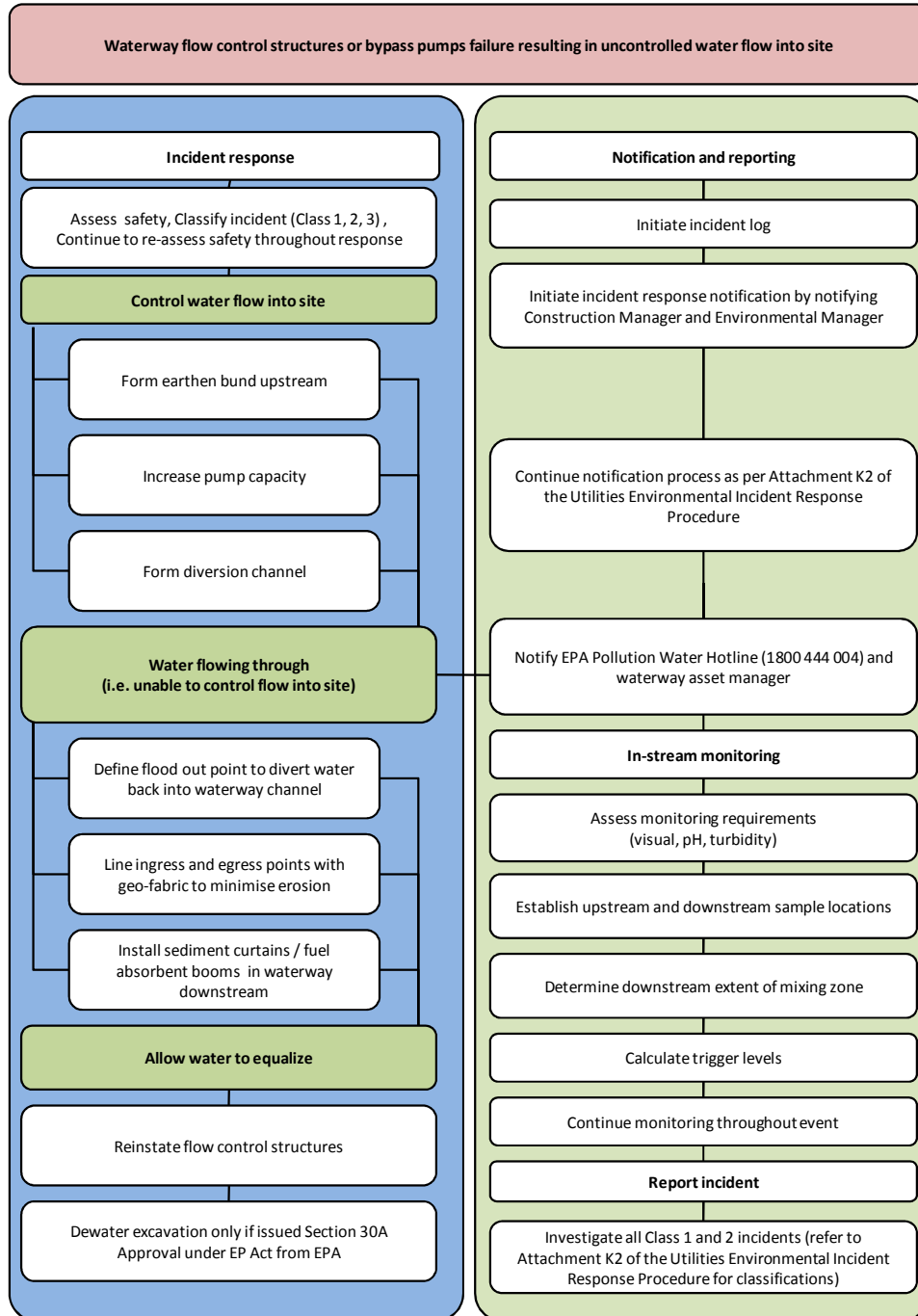


Figure 2: Open Trench Waterway Crossing Failure Contingency Response Plan



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### 9.3 Horizontal Directional Drilling or Pipe-jack Frac-out

Frac-out, or the inadvertent return of Bentonite based drilling fluid to the surface, may occur when the pressurized drilling fluids used in Horizontal Direction Drilling or grouting of pipe jacks crossings escapes through fractures in the surrounding rock or soil to the surface. This may result in the drilling fluid escaping to the terrestrial environment or into waterways. Frac-out may be identified through visual monitoring of the surface, or by through a loss in pressure of the drilling fluid.

In the event of a terrestrial frac-out, all work stops, including the recycling of drilling mud/lubricant, and determine the location and extent of the frac-out. The pressure of water above the pipe keeps excess mud from escaping through the fracture.

If the frac-out is terrestrial:

- ~ Isolate the area with hay bales, sand bags, or silt fencing to surround and contain the drilling mud.
- ~ A mobile vacuum truck will be used to pump the drilling mud from the contained area and recycled to the return pit.

If the frac-out occur into a waterway:

- ~ Isolate the area with hay bales, sand bags, or silt fencing through the waterway to surround and contain the drilling mud (Bentonite generally sinks in slow moving water) and slow water flowing around the affected area if possible.
- ~ Monitor frac-out for 4 hours to determine if the drilling mud congeals. (Bentonite will usually harden, effectively sealing the frac-out location).
- ~ If drilling mud congeals, take no other action that would potentially suspend sediments in the water column.
- ~ If drilling mud does not congeal, erect isolation/containment environment (underwater boom and curtain).

If the fracture becomes excessively large, follow the waterway contamination from fuel or chemical spill, or sediment laden run off – contingency procedure in the Utilities EMP Attachment I9 – Water Quality and Erosion Management Sub Plan.

## 10 References

### 10.1 VDP documents

- Environmental Effects Statement, Volume 4, Transfer Pipeline
- Minister of Planning VDP Assessment under the Environment Effects Act 1978, (Jan 2009)
- Environmental Effects Statement, Technical Appendix 15; Biosis Research Pty Ltd (August 2008)
- Environmental Effects Statement; Appendix 63; GHD (August 2008)

### 10.2 Technical / legislative documents

- ANZECC and ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.



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- DSE (2007). Advisory List of Threatened Vertebrate Fauna in Victoria – 2003. Department of Sustainability and Environment, Victoria.
- DSE (2008). Flora and Fauna Guarantee Threatened List (November 2008) Department of Sustainability and Environment, Victoria.
- DSE (2008). Flora and Fauna Guarantee Processes List November 2008 Department of Sustainability and Environment, Victoria.
- Environment Protection Authority, 1970: Environmental Protection Act. Act No. 8056/1970.
- EPA (1996). Environmental Guidelines for Major Construction Sites. Publication 480, Environment Protection Authority Victoria, Melbourne.
- Environment Protection Authority (1997). State Environment Protection Policy (Groundwaters of Victoria). Victorian Government Gazette No.S 160, Environment Protection Authority Victoria, Melbourne.



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## **ATTACHMENT I10.1 Waterways and wetlands – Control measures table**

## ATTACHMENT I10.1 WATERWAYS AND WETLANDS – CONTROL MEASURES TABLE

#	Issue	PR # addressed	Measure	Responsibility *	Project Phase	Evidence	Audit Check
1	Induction	-	All staff and contractors to be trained and inducted in environmental management actions	Area Environment Manager	Construct	Training records	
2	Environmental impact	07060 07062	Appropriate design and construction methods to minimise environmental impacts on the sensitive waterways including the use of trenchless excavation methods at the following waterways: <ul style="list-style-type: none"> <li>- Powlett River</li> <li>- Bass River</li> <li>- Yallock Cut and Levee</li> <li>- Boundary Drain</li> <li>- Main Drain (Bunyip River)</li> </ul> (refer to PR Sensitivity Areas – Transfer Pipeline – Sheet 1,2,4,5 and 6 and PR Sensitivity Areas – Northerly Grid Connection)	Design Manager	Design, Construct	Site Environmental Plans	
3	Permits and approvals	07060	Obtain permit from relevant waterway asset manager for all works in waterways. Comply with permit requirements.	Area Environment Manager	Design, Construct	Permit	

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#	Issue	PR # addressed	Measure	Responsibility *	Project Phase	Evidence	Audit Check
4	Construction procedure	07062	<p>Develop a generic waterway crossing procedure for low flow and ephemeral waterways.</p> <p>Develop site specific construction methods and environmental mitigation measures at medium and high flow waterways. These measures are to be incorporated into waterway crossing work method statements and site environment plans for each waterway.</p> <p>Complete risk assessment to determine suitable control measures for each waterway at medium and high flow waterways.</p> <p>Assess weather conditions prior to the commencement of critical construction steps (phases of works that between which the site cannot be secured, stabilised and evacuated in event of flooding)</p>	Area Environment Manager, Crossing Engineers	Construct	WMS and SEPs	
5	Monitoring - Macroinvertebrate monitoring	07063	Macroinvertebrate Rapid Bioassessment at medium and high flow waterways, one month prior, one month after, 6 months after and 12 months after construction.	Environment Officer	Construct	Monitoring results	
6	Monitoring – trigger values	07063	<p>Water quality monitoring to be undertaken pre-construction to determine trigger values.</p> <p>Continuous turbidity monitoring will be undertaken at medium and high flow waterways.</p>	Environment Officer	Construction	Monitoring results	

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#	Issue	PR # addressed	Measure	Responsibility *	Project Phase	Evidence	Audit Check
7	Monitoring – trigger values	07063	Notification of EPA and asset manager (Melbourne Water, WGCMA) when trigger values are breached. Also notify IREA and DSE if trigger values breached.  Introduction of action plan (e.g. additional sediment controls, temporarily cease works, reassessment of trigger values).	Area Environment Manager	Construct	Correspondence record	
8	Material storage	07062, 07063.1	No stockpiles within 10 metres of waterways	Site Manager	Construct	Site Environmental Plans and Inspection records	
9	Habitat conservation	07060	Minimise all disturbance to soil, vegetation and fauna habitat near waterways and wetlands as far as possible, by minimising the construction footprint and protecting retained vegetation and habitat	Area Environment Manager/ Site Manager	Design, Construct	Site Environmental Plans, SEIs and Inspection records	
10	Habitat Conservation	07060, E	Develop and implement a Waterways Environmental Management Strategy approved by Commonwealth Minister for Environment	Area Environment Manager	Construct	Waterway Environmental Management Strategy	
11	Habitat Conservation	07060, E	This sub plan and control measures table will be consistent with the Waterways Environmental Management Strategy	Area Environment Manager	Construct	Waterway Environmental Management Strategy	
12	Rehabilitation	07062	Rehabilitation to begin as soon as practicable in a suitable rehabilitation season following the completion of construction (rehabilitation and revegetation plan)	Site Manager	Construct	Site Environmental Plans and Site Inspection records	
13	Site management	07062, 07063.1	Vehicles and personnel to minimise direct access to waterways and remain on access roads/tracks where possible	Site Manager	Construct	Site Environmental Plans and Inspection records	

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#	Issue	PR # addressed	Measure	Responsibility *	Project Phase	Evidence	Audit Check
14	Waterway crossings	07062	<p>Minimising the impacts to water bodies potentially associated with waterway crossings by:</p> <ul style="list-style-type: none"> <li>- Crossing on a straight portion of the waterway to avoid the risk of erosion and perpendicular to the direction of flows</li> </ul>	Design Manager	Design	Design plans	
15	Waterway crossings	07062	<p>Minimise impacts to waterways by introducing appropriate sediment controls (e.g. silt curtains, sediment fences, bunding, diversion drains) which aim to prevent sediment entering the waterway.</p>	Area Environment Manager/ Site Manager	Construction	SEPs, WMS, Inspection records	
16	Waterway crossings	07062	<p>Minimise impact to waterways by reducing construction footprint in waterways, where possible. This can be achieved by avoiding the placement of bell holes in the invert of waterways, and reducing width of RoW where possible.</p>	Site Manager	Construction	Inspection records	
17	Waterway crossings	07062	<p>Use temporary and low impact structures as coffer dams during stream diversion works (e.g. aquabarriers). Ensure that temporary diversion structures are clean prior to placing them in water.</p>	Site Manager	Construction	WMS	
18	Contamination	0762	<p>Ensure that all fuel consuming plant involved in waterway crossing works (including waterway diversion pumps) are self bunded or housed in a well constructed bund area away from the waterway banks.</p>	Site Manager	Construction	Inspection records	

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#	Issue	PR # addressed	Measure	Responsibility *	Project Phase	Evidence	Audit Check
19	Reporting	07063	An annual summary (within 3 months of every 12 month anniversary) of the results of fish surveys and water quality monitoring will be conducted for a minimum of five years and sent to DSE. Ensure ongoing reporting obligation is handed over to the O&M phase of the project.	Area Environment Manager	Construct	Correspondence records	
20	Reporting	07063	Relevant authorities will be informed of any significant findings resulting from the targeted surveys, salvage and translocation measures (if instigated), and post-construction monitoring and maintenance actions.	Area Environment Manager	Construct	Reports	
21	Flooding control - stockpiles	13092	Plan and manage stockpiles to minimise the potential for 'wash-out' and the generation of sediment-laden runoff during periods of rainfall.	Construction Manager	Construct	Site inspection records	
22	Flooding control	13094	Equipment and materials liable to float away and potentially polluting substances, products and materials (including loose spoil, sand and aggregates) will not be stored within areas at risk from foreseeable flooding nor within 10 metres horizontal distance from any surface watercourse or drain.	Construction Manager	Construct	Inspection records	
23	Flooding control	13092 13094 13096	Maintain existing flood protection systems including levy banks, ensure any removed levy banks are reinstated	Construction Manager	Construct	Inspection records	

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#	Issue	PR # addressed	Measure	Responsibility *	Project Phase	Evidence	Audit Check
24	Scour and other relief valves	07065	“Design for scour and other relief valves are outlined in the following Design Packages: <ul style="list-style-type: none"> <li>• DP 3-0510 Flowmeter Details Transfer Pipeline</li> <li>• DP 3-0511 - Typical Air, Scour and Isolation Valves”</li> </ul>	Design manager	Design	Design package	

\* The *Responsibilities* column refers in many cases to senior positions within the project organisation, due to the changing nature of project teams. In practice some responsibilities may be delegated by the person nominated.

E As required by EPBC Act Approval