

# Protecting Waterways Guideline

EHTM Attachment 6A

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## Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Supporting Documentation	1
1.2	Performance Outcome	1
1.3	Legislative Context	1
1.4	Green Infrastructure Commitment	2
<b>2</b>	<b>Processes for Assessing and Managing Impacts</b>	<b>3</b>
2.1	Key Considerations during Project Planning and EHIA	4
2.2	Water Quality Risk Assessment	5
2.3	Permits, Licences and Authorisations	9
2.4	Soil Erosion Drainage Management Plan	10
2.5	Water Quality Monitoring Plan for Construction	13
<b>3</b>	<b>Reporting</b>	<b>16</b>
3.1	Proving	16
3.2	Pre-Delivery/Delivery	16
3.3	Realisation	17
	<b>Appendix A – SEDMP Checklist</b>	<b>18</b>

## Abbreviations

Term /Acronym	Meaning
ADS Act	Adelaide Dolphin Sanctuary Act 2005
CEMP	Contractor's Environmental Management Plan
DEW	Department for Environment and Water (SA)
DIT or the Department	Department for Infrastructure and Transport
EHIA	Environment and Heritage Impact Assessment
EPA	South Australian Environment Protection Authority
EP Act	Environment Protection Act 1993
EP Regulations	Environment Protection Regulations 2009
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EHTM	Environment and Heritage Technical Manual
FM Act	Fisheries Management Act 2007
LG Act	Local Government Act 1999
LSA Act	Landscape South Australia Act 2019
NV Act	Native Vegetation Act 1991
NV Regulations	Native Vegetation Regulations 2017
PDI Act	Planning, Development and Infrastructure Act 2016
PPMF	The Department's Program and Project Management Framework
SEDMP	Soil Erosion Drainage Management Plan
WAA	Water Affecting Activities
WQMP	Water Quality Monitoring Plan
WQRA	Water Quality Risk Assessment
WQ EPP 2015	EPA Environment Protection (Water Quality) Policy 2015
WSUD	Water Sensitive Urban Design
WSRD	Water Sensitive Road Design

## Glossary

Term	Meaning
Contract Documentation	Contract Scope and Technical Requirements; Functional and Operational Requirements; Contract or Project Scope
Contractors	Contractor engaged by the Department to undertake the planning, design or construction of a project (including maintenance projects)
Project Area	Area in which a project can have an effect on environmental and heritage aspects. Includes the construction, operational and maintenance footprints

# 1 [Introduction](#)

The Protecting Waterways Guideline forms Attachment 6A of the Department's Environment and Heritage Technical Manual (EHTM). This document applies to a range of Department programs and projects including road, rail, marine and other infrastructure, as required. The document applies to employees of the Department (direct or contracted) and others operating under the direction of the Department.

Transport infrastructure can affect our waterways through changes to landform, drainage, flow patterns, sedimentation and pollution. The purpose of this document is to detail the processes to be followed and criteria to be applied when assessing and mitigating potential impacts to the quality of receiving waters and the aquatic environment.

It is expected that, unless otherwise approved by the Department, Contractors undertaking the works described in this Guideline are suitably qualified professionals, listed on, or that can demonstrate their eligibility to be listed on, the Department's Professional and Technical Services Prequalification for Environmental Services.

## 1.1 Supporting Documentation

The following supporting DIT documentation applies to assessments undertaken under these guidelines and is available for download via the EHTM Toolkit:

- DIT Sustainability Manual
- DIT Acid Sulphate Soils Assessment and Management Plan
- DIT Water Affecting Activities Permit – Best Practice Operating Procedure
- DIT Fauna Impact Guideline

## 1.2 Performance Outcome

In order to meet the performance requirements under this document, unless specified otherwise in the Contract Documentation, the following shall be achieved:

- Undertake the appropriate level of risk assessment to determine the level of management and monitoring required to ensure that, to the extent reasonably practicable, the construction and operation of a project results in no change or results in an improvement of the quality of receiving waters and/or aquatic environments.
- Identify the required level of management and monitoring for project works and ensure that relevant plans are prepared in accordance with this guideline.

## 1.3 Legislative Context

Users of this document are responsible for complying with relevant legislation and obtaining relevant approvals, permits or authorisations (where required by the Contract Documentation).

The following legislation may apply to departmental construction, demolition, operation and maintenance activities associated with transport and building (including property) related infrastructure:

- *Environment Protection Act 1993* and Environment Protection Regulations 2009 (EP Act and EP Regulations) and subordinate guidelines and policies. A key policy is the Environment Protection (Water Quality) Policy 2015 (WQ EPP 2015)
- *Landscape South Australia Act 2019* (LSA Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Fisheries Management Act 2007* (FM Act)
- *Local Government Act 1999* (LG Act) and the *Local Government (Stormwater Management) Amendment Act 2007*
- *Fisheries Management Act 2007* (FM Act)

- *Planning, Development and Infrastructure Act 2016* (PDI Act) and Planning, Development and Infrastructure (General) Regulations 2017
- *Native Vegetation Act 1991* (NV Act) and Native Vegetation Regulations 2017
- *Adelaide Dolphin Sanctuary Act 2005* (ADS Act)
- South Australia's Water Sensitive Urban Design (WSUD) Policy 2013

Note that this list is non-exhaustive and other legislation may be relevant for consideration.

## 1.4 Green Infrastructure Commitment

In response to the Government's objective to accelerate urban greening (as detailed in the South Australian Government Climate Change Action Plan 2021-2025), the Department has committed to expanding Green Infrastructure (including water sensitive urban design) on public land, focusing on priority areas identified by Green Adelaide, corridors which provide for active travel, and new infrastructure projects. In order to deliver this commitment, Green Infrastructure needs to form part of planning and design thinking from the outset of a project. For projects in the Adelaide metropolitan area and townships, a Green Infrastructure assessment is undertaken during the proving phase to assess the opportunity to incorporate Green Infrastructure into the asset and identify the priority objectives and desired characteristics for Green Infrastructure across the project area.

Outputs are captured in a Green Infrastructure concept plan, showing the types and approximate extent of Green Infrastructure envisaged across the project (taking into account anticipated land acquisition/boundary realignment and having regard to the likely location of services and approximate space required to achieve Water Sensitive Urban Design policy targets). The outcomes of the water quality risk assessment, including any project specific objectives and/or mitigation treatments, should be fed into the Green Infrastructure assessment.

## 2 Processes for Assessing and Managing Impacts

The process outlined in this section is intended as a guide. Actual requirements will differ depending on the Project Area, water bodies/ landscape present, interface with construction activities and; nature of potential impacts and the project phase.

As detailed in Part 1 of the EHTM, assessment of environmental impacts (including impacts to water) is integrated in the Department’s Program and Project Management Framework (PPMF). The PPMF describes how the Department should manage the development of programs and projects. It provides guidance on the key activities, minimum deliverables, decisions, and approvals within each phase of the Project lifecycle. These stages are outlined in The process followed in the Proving phase, where the scope of a project is undefined or there may be a range of alignment/location options to be assessed, will differ to the Pre-delivery or Delivery phase where the scope is defined and/or a preferred design and construction methodology is known.

Table 2-1 along with the expected level of impact assessment and/ or obtainment of approvals for each phase.

The process followed in the Proving phase, where the scope of a project is undefined or there may be a range of alignment/location options to be assessed, will differ to the Pre-delivery or Delivery phase where the scope is defined and/or a preferred design and construction methodology is known.

**Table 2-1 Summary of PPMF Stages and Associated Level of Assessment Regarding the Protection of Waterways**

PPMF Stage	Description	Level of Assessment
Initialisation	Building the foundation for the program or project through establishing the need, engaging the team, and identifying and assessing options.	N/A
Proving	Proving the option identified in the initialisation phase is suitable and ensuring the way forward is achievable.	Preliminary Impact Assessment - refer to Section 2.1.1
Pre-Delivery	Firming up the scope and approach for delivery, identifying and addressing any remaining information gaps and ambiguities, and ensuring commitment to delivery of a project or program prior to going to market.	Detailed Impact Assessment – refer to Section 2.1.2
		Water Quality Risk Assessment - refer to Section 2.2
		Permits, Licences and Authorisations – refer to Section 2.3
Procurement	Delivery strategy is implemented and the delivery is put to the market for tender. Final preparation to ensure readiness for delivery	N/A
Delivery	Asset is constructed by the delivery contractor, handed over and put into operation	Detailed Impact Assessment – refer to Section 2.1.2
		Water Quality Risk Assessment - refer to Section 2.2
		Permits, Licences and Authorisations – refer to Section 2.3
		Sediment Erosion Drainage Management Plan – refer to Section 2.4
		Water Quality Monitoring Plan – refer to Section 2.5

## 2.1 Key Considerations during Project Planning and EHIA

A preliminary water quality impact assessment should be undertaken during the project Proving phase. A more detailed impact assessment shall be undertaken during the Pre-Delivery/ Procurement/ Delivery phase when the project has a preferred design and is at a level that is generally representative of the final design. Once a preferred design has been selected, the detailed impact assessment should be undertaken to determine if further investigation is required and to determine the mitigation measures to be adopted.

### 2.1.1 Proving Phase

The preliminary impact assessment should identify potential impact minimisation options influencing planning and design decisions (e.g. via informing the Multi-Criteria Analysis process). The preliminary impact assessment shall identify physical features and project specifics including:

- The location of any water bodies (including surface, ground and marine) and receiving stormwater systems within and adjacent to the Project Area;
- Ecologically sensitive areas;
- Environmental areas of special significance (e.g. seasonal habitats, wetlands) including areas that are protected under Commonwealth or State legislation;
- Physical disturbances including the alteration of landforms, realigning or altering creek lines, lining of channels etc;
- Hydrologic disturbances including changes to surface and sub-surface flows, alteration of the volume or timing of water flows either on a temporary or long term basis;
- Interaction with groundwater (with reference to the proposed extent of ground disturbing activities) including the need for dewatering;
- Interaction with waterways, potentially requiring a water affecting activity permit;
- Potential contribution to dryland salinization;
- Any built structures within/across water bodies that may pose potential barriers to fauna (e.g. fish) passage that should be remediated (existing structures) or optimised (new structures) - refer to the Department's Fauna Impact Assessment Guideline;
- The need to take water or other interaction with a groundwater well, potentially requiring a water affecting activity permit/licence.
- The location of prescribed water resources and any interactions with such waters that could be minimised;
- Pollutants generated during the construction or operation of transport infrastructure;
- Landscaping;
- Disturbance of Acid Sulphate Soils;
- Mobilisation of contaminants from contaminated land.

The preliminary impact assessment will also:

- Identify if and what other information may be required in this or subsequent phases;
- Identify management and mitigation measures required to be adopted during delivery (including design);
- Determine if any permits or authorisations may be required and the recommended approval pathway with reference to timing implications;
- Present impacts/opportunities that are to be considered when evaluating alternatives and selecting the preferred project options (if relevant);
- Identify any water quality requirements specific for the project site.

The outcome of the preliminary impact assessment may be summarised in the Environment and Heritage Impact Assessment (EHIA) report, planning report and/or the design report. If outcomes are likely to

influence the objectives and desired characteristics for Green Infrastructure (including WSUD) on the project, they should be fed into the Green Infrastructure assessment and used to inform the Green Infrastructure concept plan (if applicable).

### 2.1.2 Pre-Delivery/ Delivery Phase

Once the detailed project scope and/or the preferred design is known, if there is a need for further investigation, the preliminary impact assessment should be reviewed and updated to become the detailed impact assessment. In addition to the outcomes in Section 2.1.1, the detailed impact assessment shall address the following:

- Identify mitigation measures and legislative requirements for each of the identified potential impacts during the delivery and operation of a project.
- Identify the need for a Water Quality Risk Assessment and subsequent completion of such assessment. Note that this would usually be required where project works include works over water or potential discharges to water.
- Obtainment of permits or authorisations (if required in Contract Documentation) including the need for a Water Affecting Activity Permit (as required by the LSA Act).

The outcome of the detailed impact assessment shall be summarised in the EHIA report, planning report and/or the design report etc.

## 2.2 Water Quality Risk Assessment

Where required in accordance with Contract Documentation (including Master Specification adopted for the project) or where a project poses a significant risk to the water quality of a waterbody/watercourse (i.e. works over water, potential discharges to water, changes in flow regime), a Water Quality Risk Assessment (WQRA) must be undertaken.

The WQRA shall be undertaken to determine the potential nature, scale and likelihood of any impacts during the design, construction and the operational use of the infrastructure and to ensure that the mitigation proposed through the design and construction methodology works to reduce the risk. Consideration must also be given to WSUD performance objectives for the project (refer Master Specification Part RD-DK-D1 "Road Drainage Design").

The process to be adopted for the WQRA should follow the generic framework in AS/NZS ISO 31000-2009 as well as that developed by AustRoads (2001) in Environmental Risk Management Guidelines and Tools for Road Projects.

The phase and scale of the project should be considered when determining the stakeholders involved throughout the WQRA process and any associated workshops. Generally, stakeholders should include the project manager, a stormwater engineer/designer for the project, the construction manager for the project, an environmental consultant/advisor and (where the scale or likely level of impact warrants) external stakeholders such as representatives from Local Council, Landscape Boards, the South Australian Environment Protection Authority (EPA). Where Water Quality criteria/targets are unable to be achieved, it will need to be demonstrated that all reasonable and practicable measures have been investigated and assessed and that the activity will not result in environmental harm (as defined under the *Environment Protection Act 1993*).

Throughout the risk assessment, the following should be considered:

- The purpose and nature of the project;
- Legislative compliance requirements;
- The water quality objectives or strategic directions for the catchment;
- Particular environmental concerns raised by the local community;
- The cost of the treatment/opportunity should be proportional to the risk and scale of the project works;
- The risk acceptance criteria for the project. Note that the overarching criteria should include no change or an improvement in water quality and/or the quality of aquatic environments.

The main steps in the risk management process are:

1. Establishing the context;
2. Identifying the risks;
3. Analysing and evaluating the risks; and
4. Identifying treatments for the risks.

The following sub-sections provide further details for each of the main steps.

## 2.2.1 Establishing the Context

Noting that the nature of the Department's projects can vary, the following should be considered when defining the scope of the WQRA:

- The purpose and nature of the project;
- Legislative compliance requirements noting that some activities are prescribed in legislation and are subject to approvals and licence conditions;
- The water quality objectives or strategic directions for the catchment/project area including:
  - where available, documented in the Regional Landscape Plans (including Water Allocation Plans), Council Water Management Plans and Stormwater Management Plans (where available);
  - consideration of Water Sensitive Road Design (WSRD) measures (for road projects) and WSUD performance targets;
  - consideration of any project specific objectives that have been developed.
- The Green Infrastructure assessment and concept plan (if this has been prepared at the time of undertaking the WQRA);
- Particular environmental concerns raised by the local community.

## 2.2.2 Identifying the Risks

Every conceivable environmental risk arising from the project should be recorded, as prompted by answers given to the key questions:

- What can happen?
- How and why can it happen?

To carry out this step, a thorough understanding of the local environment in and surrounding the Project Area is required. Knowledge of the methods to be used during construction and the ongoing operational characteristics will also be needed. Information gathered shall be documented to a level of detail appropriate to the likely scale of potential environmental impact of the project.

Risk identification may require input from many areas and other agencies or stakeholders. Various tools are available to obtain input to the process, ranging from individual consultation to a WQRA workshop. An appropriate tool for risk identification and management during the remainder of the process shall be selected to suit the scale and potential environmental impact associated with the project. The WQRA must document who 'owns' the risk and who is accountable for its effective management.

The aspects listed below shall be considered in identifying risks (this list is non-exhaustive and project specific considerations should also be made):

### Site Characteristics

- The topography of the site.
- The nature and erodibility of the soils (including potential acid sulfate soils).
- Climate and rainfall patterns.
- The drainage pattern and size of catchments. Where indicated in RD-DK-D1 hydrological modelling shall be undertaken.
- The quality and nature of receiving waters e.g. a water supply reservoir, recreational water body, or protected marine area;
- The quality and depth to groundwater and any pollution transport mechanisms;

- The vegetation and ecology of the site and surrounding area, including the downstream aquatic environment for example important wetlands, aquatic habitat, rare or endangered flora or fauna, or other significant area;
- The land use of the adjacent and downstream areas. Any sensitive land and water uses that may be affected by soil erosion or water quality impacts from the project including downstream water users must be identified, as well as any existing stormwater management treatment measures or reuse of the water resource in place, or planned, downstream of the project;
- The nature and capabilities of any water quality treatment measures already in place downstream of the project area;
- Presence of contaminated soil/groundwater/surface water within and surrounding the Project Area;
- Presence of potential acid sulphate soil material.

#### Project Characteristics

- The timing and scale of the project;
- Any proposed staging of the project (extent of area under construction at any one time), particularly the area exposed to erosion during high rainfall or potential storm event periods;
- The extent of cut and fill;
- The volume and nature of traffic, extent of commercial vehicles or hazardous loads;
- Potential traffic accident characteristics;
- Concentration or dispersion of stormwater, changing the nature, timing and location and quality of flows or altering flood patterns;
- The extent to which risks can be avoided by management measures;
- The effect of the project on any water quality treatment measures already in place downstream of the project area;
- Impediments to achieving any water quality objectives for the catchment and WSUD objectives for the project;
- Impacts on water quality from scouring and erosion of the project site, with consequent siltation of downstream watercourses, will need to be addressed. Other risks, such as harm to biota and downstream users through changes in flow regime, volumes and peak flows, spilling or leakage of toxic substances used on site, or operational pollutants (for example, sediments and nutrients) shall also be considered.

### 2.2.3 Analysing and Evaluating the Risks

Risk analysis is accomplished through the examination of all identified risks in relation to two questions:

- How likely is it to occur?
- What is the potential consequence, if it does occur?

The information about the site and the project is examined again to answer these questions.

Once the likelihood and potential consequences have been assigned levels, a qualitative risk analysis matrix provides a simple way to evaluate the level of risk.

Appendix E of AS/NZS 4360:1999 gives examples of qualitative descriptive scales that can be used to assign levels of consequence or impact. Qualitative levels of likelihood are similarly assigned. Refer to Table 2-2 for an example WQRA matrix.

Where the project area crosses multiple waterbodies/water courses/aquatic ecosystems and catchment areas, the specific hazards for each should be identified followed by the analysis and evaluation of risks.

Table 2-2 Example Water Quality Risk Assessment Matrix

Likelihood	Consequence		
	Low Minor adverse social or environmental impact.	Medium Measurable adverse environmental or social impact. Will result in annoyance or nuisance to community	High Significant damage or impact on environmental systems and local community.
<b>Low</b> The event could occur only rarely, or is unlikely to occur.	Low Risk	Low Risk	Medium Risk (or High if in a sensitive area)
<b>Medium</b> The event will occur occasionally or could occur	Low Risk	Medium Risk	High Risk
<b>High</b> The event will occur often or is most likely to occur	Medium Risk	High Risk	High Risk (or Critical if in a sensitive area)

### 2.2.4 Treating the Identified Risks

The risk assessment process indicates which risks to water quality require priority attention, during both the operational and construction phases. Table 2-3 provides a general indication of the efforts in treatment and mitigation that would typically be warranted for the risk levels indicated by the process.

Table 2-3 Levels of Risk and Associated Levels of Treatment

Level of Risk	Proposed Level of Treatment
Critical	<ul style="list-style-type: none"> <li>Ensure appropriate treatment methods adopted and/or consider alternative project options or alignments to reduce the level of risk</li> <li>Cost of treatment shall not be the primary consideration</li> <li>Development and implementation of a detailed Soil, Erosion and Drainage Management Plan (and other water quality plans as required) for construction</li> </ul>
High	<ul style="list-style-type: none"> <li>Ensure an integrated stakeholder approach and risk management plan in place</li> <li>Cost of treatment shall not be the primary consideration</li> <li>A range of treatments shall be applied to the site (i.e. adopt the treatment train approach)</li> <li>Design of treatments shall be based on a judicious, conservative application of design procedures</li> <li>Development and implementation of a detailed Soil, Erosion and Drainage Management Plan (and other water quality plans as required) for construction</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Cost of treatments may be considered. Select in conjunction with the most suitable measures for the site constraints</li> <li>A range of treatments shall be applied to the site (i.e. adopt the treatment train approach)</li> <li>Design sizing of treatments, may be at a lower standard than those under the “high” risk descriptor if substantial cost reduction will result for a small increase in potential risk. For example, if reducing the capacity of a detention basin results in significant cost savings for a small increased sediment or pollution risk</li> <li>Use standard construction site management practices and comply with Master Specification Part PC-ENV2</li> </ul>

Level of Risk	Proposed Level of Treatment
Low	<ul style="list-style-type: none"> <li>• Only low cost operational treatments to be applied</li> <li>• Use standard construction site management practices and comply with Master Specification Part PC-ENV2</li> </ul>

Detailed consideration of specific treatment measures to address risks requires answers to the following questions:

- How effective are any existing mitigation measures?
- If not effective, what additional treatments are available and how effective would they be in reducing the risk to an acceptable level?
- Are the additional measures reasonable and practicable?

Where identified targets cannot be met, demonstration of having undertaken all reasonable and practicable measures to meet the general environmental duty, including that the activity will not result in environmental harm is required. For example, where all WSUD targets for a project cannot be met, evidence of communication with stakeholders as well as offset measures must be demonstrated.

Noting that the outcomes of the WQRA will directly influence the design and operation of the project, the following must be considered when making recommendations/prescribing specific treatment measures:

- Incorporation of measures to improve water quality where reasonable and practicable and when they are identified as a requirement from the planning phase. These may include measures such as swale drains, detention basins, gross pollutant traps;
- In developing water quality protection measures liaison should be undertaken with the stormwater authority (e.g. local council) and Landscape Boards;
- Investigation of opportunities for optimising, with appropriate temporary amendments, the joint use of any treatment measures during both construction and operation. Consider the potential for incorporating concepts such as:
  - sediment basins that can be employed in post construction as a gross pollutant trap and sediment basin upstream of a constructed wetland;
  - runoff diversion drains on shallow grades may be converted to grass swales with or without infiltration trenches or check dams, after construction.
- Drainage features shall be designed to maintain or enhance, where possible, the aesthetics and aquatic ecology of the aquatic environment;
- Water quality treatment measures incorporated as an aesthetic or urban design feature in an urban area;
- The on-going maintenance requirements shall be considered as part of the recommendation, selection and design of any water quality management measures;
- Where water quality targets have been set for the project, modelling is required to demonstrate that such targets will/will not be met;
- Where ongoing monitoring has been recommended to determine the effectiveness of the treatment measures, specific details regarding the level and intensity of monitoring must be identified. Where monitoring needs to be undertaken by persons with specific qualifications, this must also be detailed. Further details regarding considerations for a Water Quality Monitoring Plan are presented in Section 2.5.

The South Australian Government Water Sensitive Urban Design Technical Manual should be referred to for further information on design of treatment measures.

## 2.3 Permits, Licences and Authorisations

As an outcome of the EHIA and WQRA, it shall be determined if any approvals, permits or licenses will be required for the project, for example, under the LSA Act or the EP Act. These may include:

- A Water Affecting Activities (WAA) Permit or a water licence under the LSA Act for water affecting activities and/ or the taking of water.

Refer to the relevant Landscape Board website for further information as well as the Department's Water Affecting Activities Best Practice Operating Procedure.

- An EPA Environmental Authorisation for prescribed activities under the EP Act.

With respect to the taking of water, the following is noted:

- Applications for the taking of water are assessed by the Department for Environment and Water (DEW) Water Licencing Branch in accordance with the provisions of a Water Allocation Plan specific to the water resource affected.
- Provision of a flood diversion channel or the construction of a wetland as part of a construction project may be considered to constitute the "taking of water" and advice should be obtained from the relevant Landscape Board. Construction of a wetland is likely considered the construction of a water body (dam) and a WAA permit will be required.
- Taking of water for certain uses (such as use of water for road making) from a prescribed watercourse, lake or well or from a prescribed area may be authorised by the responsible Minister. Notwithstanding such authorisation, all reasonable measures must be undertaken by the Department and its contractors to investigate and utilise alternative sources of water such as reclaimed water, treated stormwater etc. to avoid the use of prescribed water, particularly in drought years.
- If there is uncertainty as to whether a project will constitute the 'taking of water' that requires a permit, clarification must be sought from the Water Resource Officer at the relevant Landscape Board.

## 2.4 Soil Erosion Drainage Management Plan

Construction activities disturb soil and once disturbed it may be easily eroded and move outside of the Project Area into stormwater drains/waterways, becoming a significant source of sediment pollution in waterways. Water quality management on a construction site must be incorporated at all stages of infrastructure development including planning, design and construction. A 'best management practice' approach shall be adopted, utilising the best available methods, technologies and designs to achieve the goal of pollution minimisation in a practical and cost-effective manner.

Site management needs to be in compliance with the EPA Stormwater Pollution Prevention Code of Practice for Local, State and Federal Government and the EPA Code of Practice for the Building and Construction Industry. These codes inform organisations of their 'general environmental duty' with respect to stormwater under the EP Act, and the best management practice approach to stormwater pollution prevention.

A Soil Erosion and Drainage Management Plan (SEDMP) is the document used to manage erosion, sedimentation and water quality on the construction site. The SEDMP must identify the drainage flows within the Project Area and the treatment measures required to manage them. It needs to be a living document and able to be modified as construction progresses and flexible to predict and respond to changes on the construction site.

The EPA Stormwater Pollution Prevention Code of Practice for Local, State and Federal Government provides a guide to the preparation of a SEDMP. The WQ EPP 2015 specifies that a number of pollutants cannot be discharged to the stormwater system or onto land where they may enter waters. The SEDMP must be designed to ensure that such pollutants do not reach the stormwater system and/ or waterways.

The key intent of a SEDMP is to ensure that appropriate consideration is given to erosion and sediment control requirements **before** works commence. Appendix A of this document provides a checklist of issues that a Contractor shall take into consideration when preparing a SEDMP. The SEDMP should be informed by the WQRA undertaken during the Proving/Pre-Delivery/Delivery phase of a project.

The level of detail required in the SEDMP should be determined by the scale and risk of the project works. A simple SEDMP may be prepared for projects with a low risk of soil erosion drainage impacts whilst a more comprehensive SEDMP will be required for projects with medium and high risks of soil erosion drainage impacts. Major projects would require a comprehensive or detailed SEDMP to be prepared and implemented.

The following guide may be utilised to determine the level of SEDMP to be adopted for the project. It should be undertaken in the Pre-delivery or early in the Delivery phase and documented in the EHIA Report and subsequent SEDMP:

- Refer to Table 2-4 to conduct an initial site erosion risk assessment for a project.
- Refer to Table 2-5 to determine the nature of documentation and management of the site required during the construction phase based on the score obtained by adding the individual factors from Table 2-4.

**Table 2-4 Initial Site Erosion Risk Assessment**

Parameter	Ranges	Score
Location (for determining erosivity)	Areas over 500mm rainfall	2
	Other areas	1
Average slope before construction works (from topographical maps of the site)	Not greater than 2 percent	1
	Greater than 2 to 5 percent	2
	Greater than 5 to 10 percent	4
	Greater than 10 percent	8
Soil type by Universal Soil Classification (where there is more than one type, select the highest score)	Sandy soil or gravel	0
	Sandy loam	1
	Clay loam	2
	Clay soil	3
Expected duration of risk undertaken at any one time	3 months or less	1
	3 to less than 6 months	2
	6 to less than 12 months	4
	Longer than 12 months	8
Expected area disturbed at any one time	Less than 500 m <sup>2</sup>	1
	More than 500 m <sup>2</sup> but not exceeding 1000 m <sup>2</sup>	2
	More than 1000 m <sup>2</sup> but not exceeding 2500 m <sup>2</sup>	4
	More than 2500 m <sup>2</sup>	8
Sensitivity of receiving environment	Highly disturbed system	0
	Slightly to moderately disturbed system	2
	High conservation or ecological value system	4
<b>Total</b>		<b>To be calculated</b>

**Table 2-5 Detail Required for SEDMP**

Score	Level of Risk	Site Assessment Requirements
Over 20	Extreme	Detailed SEDMP High level of site management Third party auditing with regular (e.g. fortnightly or monthly) reporting to demonstrate compliance
16 to 20	High	Detailed SEDMP High level of site management Self-auditing with regular (e.g. fortnightly or monthly) inspections/reporting to demonstrate compliance
10 to 15	Moderate	Medium level SEDMP Self-auditing with regular (e.g. fortnightly or monthly) inspections/reporting to demonstrate compliance
0 to 9	Low	Simple SEDMP Self-auditing with regular (e.g. fortnightly or monthly) inspections/reporting to demonstrate compliance

The SEDMP shall form part of the Contractor's Environmental Management Plan (CEMP). The SEDMP shall describe the range of measures proposed for managing the site and responses to the issues raised

during the Proving/Pre-Delivery/Delivery project planning phases, the EHIA process and/or the WQRA process (as well as any Contract Documentation). For example, the SEDMP shall include a plan of the high risk areas within the Project Area and identify the proposed management measures such as use of silt fences, temporary stabilisation, straw bales, sand bags, cut off drains, sedimentation basins.

### 2.4.1 SEDMP for Sites of Low Erosion Risk – Simple SEDMP

A simple SEDMP should include a figure/series of figures detailing the following:

- North point and plan scale;
- Site and easement boundaries and adjoining roadways;
- Construction access points;
- Site office, car park and location of stockpiles;
- Proposed construction activities and limits of disturbance;
- Retained vegetation including protected trees;
- General soil information and location of problem soils;
- Location of critical environmental values (where appropriate);
- Existing site contours (unless the provision of these contours adversely impacts the clarity of the SEDMP);
- Final site contours including locations of cut and fill;
- General layout and staging of proposed works;
- Higher risk areas of the site;
- Location of all drainage, erosion and sediment control management and water quality protection measures that will be utilised, if required, for example silt fences, hay bales, water diversion systems (i.e. to divert clean water away from disturbed areas), stockpile protection measures and sediment traps;
- Site revegetation requirements (if not contained within separate plans);
- Any other relevant information that may be required by a regulating body or to satisfy any conditions of environmental authorisations; and
- Contractors shall indicate responsibilities for and frequency of site monitoring to ensure environmental protection.

A simple SEDMP and Water Quality Monitoring Plan (if required) shall be included within the project's CEMP.

### 2.4.2 SEDMP for Sites of Moderate Erosion Risk – Medium SEDMP

In addition to the requirements listed for the Simple SEDMP, a medium SEDMP should include the following:

- Construction drainage plans for each stage of earthworks, including land contours for that stage of construction, sub-catchment boundaries and location of watercourses;
- Details of the construction treatment measures to be deployed (and associated durations), including the location, size and type of all construction-phase water quality treatment measures;
- For the construction treatment measures that will not be deployed throughout the full period of construction, the stages at which various measures will be deployed;
- Calculation sheets for the sizing of any water quality treatment measures;
- Responsibilities for site environmental management;
- Emergency response measures;
- The nature and frequency of site inspection and monitoring (including any water quality monitoring); and
- The nature and frequency of site reporting.

A medium SEDMP and Water Quality Monitoring Plan (if required) may be included within the project's CEMP or be standalone documents.

### 2.4.3 SEDMP for Sites of High Erosion Risk – Detailed SEDMP

In addition to the requirements listed for the Simple and Medium SEDMP, a detailed SEDMP should include the following:

- How the issues identified within the EHIA, WQRA and contract documents will be managed on site. This may include situations where off-site conditions may either affect the management of the site during construction, or be adversely affected by soil loss from the site. Appropriate operations-phase treatment measures will need to be incorporated into the site design;
- Full design and construction details (e.g. cross-sections, minimum channel grades, channel linings) for all drainage and sediment control devices and measures, including diversion channels and sediment basins;
- The location of proposed stormwater discharge point(s) from the site, both during and following completion of construction;
- Limits of site disturbance including areas of cut and fill volumes at each disturbance location and proposed stockpile areas;
- Site plans (e.g. Site Environmental Plans /Project Control Plans) that identify types of sediment and erosion control measures and their locations for all stages of construction works; and
- Water Quality Monitoring Plan (refer Section 2.5)

The Detailed SEDMP shall form a sub-plan to the project's CEMP.

## 2.5 Water Quality Monitoring Plan for Construction

Where identified to be required (during Proving/Pre-Delivery/Delivery phase project panning, EHIA, WQRA and/or Contract Documentation), water quality monitoring of the Project Area shall be undertaken to detect pollution discharges and to assess the potential impact of such discharge on the aquatic environment.

During the delivery of a project (construction phase), monitoring must be undertaken to determine if site management practices and mitigation measures are successful in preventing sediment, waste waters or pollution from entering drainage lines/waterways or impacting water quality to an unacceptable level. The level and duration of monitoring required is determined by a number of factors, including an evaluation of the nature of a threat from a discharge and the level of protection required for the environment. Generally the greater the potential environmental risk posed by a project, the more rigorous and complex the monitoring requirements become.

The type and frequency of water quality monitoring should be based on previous risk assessment and recommendations made by suitably qualified persons. The level of monitoring required should be determined with consideration of the following criteria:

- The nature of the threat from a discharge;
- The level of protection for the environment as determined with reference to the Australian and New Zealand (2018) Guidelines for Fresh and Marine Water Quality categories of ecosystem conditions (i.e. high conservation/ecological value systems, slightly to moderately disturbed systems, highly disturbed systems); and
- The environmental value of the waters, as prescribed in the WQ EPP 2015.

A Water Quality Monitoring Plan (WQMP) must be prepared to ensure that monitoring will be undertaken in accordance with legislative requirements and relevant guidelines, achieve the required objectives and that collected data will be of good quality. The plan must include details of the following:

- The monitoring objective;
- A description of the receiving environment;
- Details of the legislative framework relevant to the monitoring plan;
- The approach and methodology of the monitoring works including sampling frequency;

- Parameters to be measured and analysed, including analytical method (where relevant). Standard parameters include salinity, turbidity, pH and dissolved oxygen;
- The criteria against which monitoring results will be assessed;
- A map showing the sampling locations, major infrastructure and sensitive environmental receptors. Generally, sampling locations include within the Project Area, downstream of construction activities/ discharge points and a background/control location;
- Data quality control and assessment processes;
- The method and frequency of reporting;
- A monitoring plan review process to allow for corrective actions; and
- Work health and safety requirements.

Where there is a risk that project works will mobilise known contamination (for example, heavy metals or other leachable contaminants and/or potential acid sulphate soils or present a biological risk), a site contamination professional as well as other technical experts shall be consulted when designing the water quality monitoring plan.

For lower risk construction activities (within the Project Area) where discharges can only enter highly disturbed systems or moderately disturbed systems, the monitoring activities and criteria as detailed in Table 2-6 may be sufficient.

**Table 2-6 Water Quality Monitoring Requirements - Low Risk Activities in Disturbed Systems**

<b>Scenario</b>	<ul style="list-style-type: none"> <li>• Low risk construction activities (within the Project Area) or activities where discharges may only enter highly disturbed systems or moderately disturbed systems</li> </ul>
<b>Monitoring Method</b>	<ul style="list-style-type: none"> <li>• Visual inspection of site erosion and drainage management measures</li> <li>• Visual inspection of drainage discharge points</li> <li>• Photo Points</li> <li>• Temperature and rainfall from nearest Bureau of Meteorology station</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Weekly and during rainfall events</li> </ul>
<b>Criteria</b>	<ul style="list-style-type: none"> <li>• Sediment traps clear and available for trapping sediment</li> <li>• No visible sediment discharge in receiving waters</li> </ul>
<b>Equipment</b>	<ul style="list-style-type: none"> <li>• Camera</li> </ul>
<b>Expertise</b>	<ul style="list-style-type: none"> <li>• Monitoring may be undertaken by Contractor’s Environmental Management Representative or staff with supervisory responsibilities, good observational skills and ability to reliably assess, record site condition.</li> </ul>

Where potential soil erosion and drainage discharge points may enter high conservation/ ecological value systems or slightly to moderately disturbed systems, and for all other scenarios (other than that represented in Table 2-6), the water quality monitoring plan must be prepared by a suitably qualified person to ensure that the monitoring plan meets legislative requirements, conditions of any approvals sought as well as meeting the Contractor’s general environmental duty. During the preparation of the WQMP, the following should also be considered:

- Monitoring frequency and criteria must be sufficient to address the WQ EPP 2015 or any other policies/guidelines relevant to the receiving water body/water course/aquatic ecosystem;
- Continuous or automated monitoring of adjacent watercourses, up and down stream, during flow events with manual sampling at minor discharge points may be required to demonstrate the effectiveness of implemented control measures;
- Field testing results may require validation via supplemental laboratory analysis;
- Where undertaken, all laboratory analysis is to be undertaken by National Association of Testing Authorities, Australia Accredited laboratories only;
- Sample collection should be undertaken by appropriately trained persons only. Biological samples must be collected and analysed by a skilled ecologist;

- For extreme risk work activities or works undertaking in high conservation/ecological value areas, baseline and follow-up monitoring may be required; and
- The plan must include contingency measures detailing actions to be adopted where there are exceedances of adopted guidelines/screening criteria.

For all water quality monitoring, the associated reporting should demonstrate performance of the water quality protection measures, compliance against the adopted screening/ guideline criteria and provide details of corrective measures implemented.

### 3 Reporting

Unless specified otherwise in Contract Documentation the following reporting applies to each phase of a project. Completed reporting shall be provided to the Principal for review and acceptance by Department's Technical Services Environment Unit and Independent Design Certifier (where specified in Contract Documentation).

#### 3.1 Proving

During the Proving phase of a project, water quality impact assessment information may be required for input into an options assessment, the EHIA Report and to inform the cost estimation of the project.

##### *Preliminary Impact Assessment information*

The outcomes of a preliminary impact assessment (refer to the assessment outcomes detailed in Section 2.1.1) and supporting documentation are to be incorporated into the preliminary EHIA. The impact assessment should also be summarised in the planning and/or design reports. Where multiple project options are being assessed and compared, the preliminary impact assessment outcomes are to be reported in a suitable location to inform such option comparisons.

#### 3.2 Pre-Delivery/Delivery

During the Pre-Delivery/Delivery phase of the project, water quality impact assessment may be required for input into the EHIA Report, to inform project design and the approvals pathway for the project.

##### *Detailed Impact Assessment information*

The outcomes of a detailed impact assessment (refer to the assessment outcomes detailed in Section 2.1.2) and supporting documentation are to be incorporated into the EHIA report and/or Detailed Design Report(s). The impact assessment should also be summarised in the planning and/or design reports.

AND

##### *Water Quality Risk Assessment*

The WQRA report shall contain the following information as a minimum:

- General site and project information;
- A summary of relevant legislation;
- Details of the participants involved in the WQRA;
- Summary of the approach and methodology of the WQRA in accordance with the process detailed in this guideline;
- Clear and concise WQRA in accordance with the process detailed in this document; and
- Details of the required level of SEDMP and Water Quality Monitoring for specific project activities.

The WQRA is to be incorporated into the EHIA report and/or Detailed Design Report(s)

The following information is to be provided during the Delivery phase of a project once the construction methodology has been established:

##### *Soil Erosion Drainage Management Plan*

SEDMPs are required to address the requirements for the different level SEDMPs as detailed in Section 2.4.

AND

##### *Water Quality Monitoring Plan*

The WQMP is required to address the requirements as detailed in Section 2.5.

Water quality monitoring results (in comparison to guideline criteria) must be readily available to be provided to the Department upon request and as per the specified frequency in contract documents.

AND

Stormwater treatment devices are installed throughout the Department's infrastructure network. The Department maintains a Stormwater Treatment Infrastructure Manual (STIM) to ensure that such infrastructure is maintained in a manner that meets the initial design objectives.

*Handover Documentation*

The following information is to be recorded and submitted for the installed stormwater treatment infrastructure:

- Location and identification details;
- Physical details;
- Water treatment design objectives; and
- Maintenance requirements to achieve initial design objectives.

This information is to be provided in the project handover documentation and, where relevant, in accordance with the specifications detailed in MS DK-DK-D1.

### 3.3 Realisation

During the Realisation phase, ongoing maintenance of water quality treatment measures will be required in accordance with handover documentation.

## Appendix A – SEDMP Checklist

The following sub-sections detail some key factors to be considered when developing a SEDMP:

### **Earthworks**

- Undertake earthworks in a manner that conserves topsoil and minimises disturbance. Separate topsoil and store for use in rehabilitation.
- Avoid any soil disturbance beyond the limit of approved development.
- Where possible, avoid disturbance to areas of high or extreme erosion risk.
- Use appropriate treatment measures to treat runoff.
- When necessary, install erosion and sediment control structures before the commencement of site disturbance and construction works.
- Schedule earthworks to retain as much protective ground cover as possible at all times.
- Program site stabilisation and revegetation as soon as possible after completion of earthworks.

### **Drainage**

- Divert off site and “clean” drainage around disturbed areas.
- Intercept and redirect runoff on the site to protect exposed areas.
- Where appropriate, install sediment detention basins early so that site drainage can be directed to them as soon as possible.
- Consider the impact of all works including minor works such as service trenches, pavement cutting.

### **Treatment Train Approach**

- Use a treatment train approach to minimise erosion and velocity of runoff to reduce the need, size and cost of sediment collection basins. For example:
- Locate catch (diversion) drains above proposed cuttings where upslope drainage is into the cutting area;
- Construct diversion drains to protect slopes by directing intercepted drainage to a stable outlet;
- Construct batter toe or catch drains to collect runoff from batter slopes. Direct to drainage system or watercourse;
- Protect minor drainage lines to slow water velocities and filter sediment with measures such as sand bags, hay bales, silt fences, gabions or local materials. Typically, these are suitable for drainage areas of less than 0.5 hectares. Construct level spreaders to convert concentrated flows to sheet flow at non-erosive velocities. Direct sheet flow across stabilised, vegetated areas; and
- Where conditions permit, use grass filter strips as a simple sediment trapping measure. These are more effective on low gradient slopes.
- Where possible retain or convert site treatment measures for operations phase water quality treatment. Sediment detention basins may be either temporary, or can be integrated into the operations-phase treatment system. For example, a sediment basin used in construction may be converted at a later stage into a sediment trap upstream of a wetland system.

### **Site Facilities**

- Ensure site facilities such as depots, access tracks and stockpile sites are identified and established in appropriate locations.
- Ensure sediment controls around these areas where there is an erosion risk exists.
- Ensure sediment controls at site exits such as shaker ramps, washdown bays or street sweeping to minimise off site sediment from vehicles.

### **Landscaping and Rehabilitation**

- Begin rehabilitation of disturbed areas as soon as possible after final land formation for each area. Options available include installation of the permanent landscape or a temporary cover of

a sterile or non-seeding grass species (e.g. sterile rye grass), chipped or mulched vegetation, biodegradable mats or soil binders.

### **Inspection and Monitoring**

- Regularly inspect and maintain all treatment devices on site. Check that suitable site measures are in place prior to rain events. After each significant runoff event, inspect treatment devices for damage or clogging by silt or debris and replace or clean out as necessary.
- Ensure temporary drainage measures such as diversion channels are in place on site at the end of each day, particularly if rain is forecast.
- Ensure all environmental authorisation conditions are complied with.
- On sensitive sites, where appropriate, or where required by contract or licence conditions, undertake water quality monitoring to effectively manage the site. Such monitoring should be undertaken simultaneously up stream and down stream of the site and include stream flow.
- Inspection and management measures should be documented as part of the records of implementation of the SEDMP and Weekly Site Reports and be made available to the contract manager. Records should include details of rainfall; water quality testing (if required); the effectiveness of site management measures and any modifications proposed; and other matters which contribute to the level of performance of work practices.
- If inspection and monitoring indicates a notable failure in the SEDMP, the source of the failure should be investigated and remediation measures undertaken and procedures modified, as appropriate.

### **Site Waste Management**

- Minimise the risk of pollution from other construction activities by adopting the following:
  - Appropriate collection and disposal of wastes;
  - Undercover storage and suitable bunding of materials such as paints, chemicals, fuel etc;
  - Suitable disposal of washdown waters from cleaning vehicles;
  - Discharge of wastewater and wash water in an approved manner to a sewer (if applicable), or approved disposal site.

Further waste management and chemical storage requirements are detailed in the Department's Master Specification.