

Superseded

**Technical Specification**

**Transport and Main Roads Specifications  
MRTS52 Erosion and Sediment Control**

**January 2015**

Superseded

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## 1 Introduction

This technical specification:

- applies to the control of erosion and sediment during investigation for and construction of transport infrastructure projects,
- shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements*, MRTS51 *Environmental Management*, MRTS16 *Landscape and Revegetation Works* and other technical specifications as appropriate, and
- forms part of the Principal's Specifications.

Transport and Main Roads encourages the early installation of permanent drainage and water quality controls for use as construction erosion and sediment controls where appropriate. Where permanent controls are to be used the relevant project drawings and technical specification shall take precedence over the design requirements within this specification, however the performance requirements and intent of this specification must be adhered to.

This technical specification has not been designed to be used for marine or boating infrastructure projects.

### 1.1 Relationship to other documentation

Where other contractual or statutory requirements applicable to the project demand higher standards of environmental management, the higher standards shall be adopted, where applicable.

This includes but is not limited to:

- conditions of any environmental approvals or licences obtained by Principal or Contractor for this Contract, and
- Department of Environment and Heritage Protection (DEHP) *Procedural Guide - Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland*.

Clause 1 of MRTS51 Annexure provides information on environmental approvals and/or licences obtained by the Principal that may have erosion and sediment control conditions. The Contractor shall be responsible for identifying and obtaining any other licences and permits that are required.

### 1.2 Departure from standards

The requirements and recommendations set out in this technical specification should not be inferred to preclude innovative or alternative solutions that provide improved value for money outcomes that meet the intent and principles of this specification.

Where departures are proposed (due to an approved innovation proposal or due to other restrictions) the Contractor must clearly state the departures from standards within the tender submission. This departure must have prior agreement from the Principal.

For significant departures the Contractor is encouraged to use the Guided Tender Alternative method and obtain in principal agreement prior to submission of tender. All Transport and Main Roads Transport Infrastructure Contracts (TIC) require that deviations agreed prior to contract award are recorded within the Schedule of Deviations.

It must be noted that insufficient space within the road reserve or challenging topographic conditions is not in itself a reason for departures from the standard. With appropriate staging, areas within the works footprint can be used for temporary controls, sediment basin sizes can be reduced through the use of high efficiency sediment basins, or adjacent land can be obtained through rent or other prior agreement. The Contractor is responsible for obtaining any necessary areas. In some instances the Principal may have pre-negotiated areas for use for sediment and erosion control. Details of these areas and requirements are given in Annexure MRTS52 Clause 1. The Contractor must be aware of and abide by the Notification of Entry requirements contained within General Conditions of Contract.

The Contractor is responsible for temporary erosion and sediment control and for ensuring that controls are adequately designed, installed, adapted, maintained and decommissioned.

### 1.3 Project risk

For the purposes of the management requirements required to be employed under this specification, the project is deemed to have the Erosion Risk identified in Table 1 unless otherwise nominated in Clause 2 of Annexure MRTS52.

**Table 1 - Erosion Risk Level**

Erosion Risk	Characteristics of risk level
Low	<ul style="list-style-type: none"> <li>&lt; 2500 m<sup>2</sup> disturbed surface area open at any one time OR</li> <li>&lt; 10 t/ha/year soil loss predicted (using RUSLE), and</li> <li>controls installed and maintained in accordance with prescriptive standard (e.g. standard drawings).</li> </ul>
General	<ul style="list-style-type: none"> <li>all projects not meeting the characteristics above or below.</li> </ul>
High	<p>Projects with two or more of the following characteristics:</p> <ul style="list-style-type: none"> <li>project duration &gt; 6 months</li> <li>project working within or discharging to sensitive environment such as marine parks, wetlands or waterway</li> <li>soils with high to very high erodibility rating (i.e. dispersive soils)</li> <li>projects which have &gt; 1 hectare of land exposed during months with monthly rainfall erosivity (R factor) is greater than 285</li> <li>topography factor (LS) is greater than 2 or modal slopes on project are steeper than 15% (6.6 degrees).</li> </ul>

While Table 1 above has been prepared as indicative of likely erosion risk level there are many factors that impact on the actual environmental risk. With the breadth of infrastructure projects delivered by the department – including location, duration, season, type and receiving environments – it is difficult to develop a simple table that will account for every scenario.

The department's project managers in consultation with design consultants and environmental officers are encouraged to state the risk level that is appropriate for their project in Clause 2 of Annexure MRTS52.

Factors that should be taken into account when determining the project risk level include soil type, location and timing (rainfall volume, intensity and likelihood), landform (including the ability to install sediment basins or other erosion and sediment controls).

#### 1.4 Erosion and sediment control principles

The primary purpose in installing sediment and erosion controls is to not cause environmental harm nor deposit prescribed water contaminants in waterways as per the *Environmental Protection Act*.

In addition appropriate erosion control can have the benefit of decreasing soil degradation hence improving asset protection and decreasing maintenance costs during and post construction.

Erosion and sediment control for all projects shall be designed, installed, maintained and decommissioned in accordance with the following principles:

- a) erosion and sediment controls are integrated with construction planning
- b) effective and flexible erosion and sediment control plans are developed based on soil, weather, construction conditions and the receiving environment
- c) the extent and duration of soil exposure is minimised
- d) water movement through the site is controlled - in particular clean water is diverted around the site
- e) soil erosion is minimised
- f) disturbed areas are promptly stabilised
- g) sediment retention on site is maximised
- h) controls are maintained in proper working order at all times, and
- i) the site is monitored and erosion and sediment control practices adjusted to maintain the required performance standard.

## 2 Definition of terms

The terms in this technical specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*.

Additional terms used in this specification shall be as defined in Table 2.

**Table 2 – Definition of terms**

Term	Definition
AEP	Annual Exceedance Probability The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.

Term	Definition
Appropriately qualified person (AQP)	<p>Appropriately qualified person(s) is as defined by the administering authority of the <i>Environmental Protection Act</i>.</p> <p>The definition at time of publication of this specification relevant to temporary sediment and erosion control is:</p> <p>.. a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.</p> <p>The appropriately qualified person(s) should have, or collectively have, all the following capabilities:</p> <ol style="list-style-type: none"> <li>a) A detailed understanding of relevant sections of the following guidelines and legislation: <ol style="list-style-type: none"> <li>i. <i>Environmental Protection Act</i> and <i>Environmental Protection Regulation</i></li> <li>ii. <i>Environmental Protection (Water) Policy</i></li> <li>iii. <i>Environment and Heritage Protection Urban Stormwater Planning Guidelines</i></li> <li>iv. <i>Queensland Urban Drainage Manual</i></li> <li>v. <i>IECA Best Practice Erosion and Sediment Control Manual</i>.</li> </ol> </li> <li>b) An understanding of hydrology and hydraulics, including the ability to size and determine stabilisation requirements of drainage structures and treatment devices.</li> <li>c) An understanding of soil as it relates to revegetation and erosion. Specifically the ability to conduct an effective soil sampling program, interpret results and design management strategies to address problem soils (pH, sodic, dispersive, and saline).</li> <li>d) An understanding of appropriate use of the revised universal soil loss equation (RUSLE) to estimate soil loss.</li> <li>e) An understanding of the erosion, drainage and sediment controls considered best practice in Australia, and knowledge on the correct installation, operation and maintenance of these controls.</li> <li>f) Ability to prepare erosion and sediment control plans of a standard that is suitable for construction.</li> <li>g) Has experience in erosion and sediment control and a suitable environmental or engineering degree from a recognised institution.</li> </ol>
CPESC	Certified Professional in Erosion and Sediment Control. A CPESC is an example of a person likely to be appropriately qualified.
DEHP	Department of Environment and Heritage Protection (Queensland)
EMP(C)	Environmental Management Plan (Construction)
Environmental harm	As defined by the <i>EP Act</i> , including nuisance, serious and material environmental harm.
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
EY	Exceedances per year
IFD	Intensity Frequency Duration

Term	Definition
Rainfall erosivity	<p>The ability of rainfall to cause erosion.</p> <p>Rainfall erosivity can be determined using the formula Annual Average erosivity <math>R = 164.74 (1.1177)^S \times S^{0.64444}</math> where <math>S = 2</math> year ARI, 6 hour rainfall event (mm/h). The average monthly erosivity is the annual average erosivity x % rainfall that falls in that month.</p> <p>Alternatively rainfall erosivity risk ratings for various towns are provided in Table 4.4.4 of <i>IECA Manual</i>.</p>
RUSLE	<p>Revised Universal Soil Loss Equation (RUSLE)</p> <p>Predictor of erosion risk based on the estimated annual soil loss.</p> $A = R \times K \times LS \times C \times P$ <p>A = annual soil loss due to erosion (t/ha/year)</p> <p>R = rainfall erosivity factor</p> <p>K = soil erodibility factor</p> <p>LS = topographic factor based on slope length and gradient</p> <p>C = cover and management factor</p> <p>P = erosion control practice factor</p> <p>Refer to <i>IECA Manual</i>, Appendix E for further information.</p>
RPEQ	Registered Professional Engineer, Queensland
Type 1, Type 2 and Type 3 controls	As defined by <i>IECA Manual</i> 'Sediment Control Classification System' design guide.

### 3 Referenced documents

Table 3 lists documents referenced in this technical specification.

Unless otherwise specified a reference to a statute includes its delegated legislation and a reference to a statute or delegated legislation or a provision of either includes consolidations, amendments, re-enactments and replacements.

**Table 3 - Referenced documents**

Reference	Title
ARR	Australian Rainfall and Runoff, Engineers Australia
DEHP Standard Work Method	Procedural Guide - Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland (Department of Environment and Heritage).
EP Act	Environmental Protection Act including subordinate legislation and regulations
Monitoring and Sampling Manual	Monitoring and Sampling Manual 2009, Version 2, July 2013 (Department of Environment and Heritage Protection)
IECA Manual	International Erosion Control Association Australasia "Best Practice Sediment and Erosion Control"



Reference	Title
South East Queensland (SEQ)	As defined by Sustainable Planning Regulation or subsequent legislation. Includes areas of: Brisbane City Council Gold Coast City Council Ipswich City Council Lockyer Valley Regional Council Logan City Council Moreton Bay Regional Council Toowoomba Regional Council (part of) Redland City Council Scenic Rim Regional Council Somerset Regional Council Sunshine Coast Regional Council Noosa Shire Council
Geotechnical Design Standard	Transport and Main Roads Geotechnical Design Standard
MRTS03	Transport and Main Roads Specification MRTS03 Drainage, Retaining Structures and Protective Treatments
MRTS04	Transport and Main Roads Specification MRTS04 General Earthworks
MRTS16	Transport and Main Roads Specification MRTS16 Landscape and Revegetation Works
MRTS27	Transport and Main Roads Specification MRTS27 Geotextiles (Separation and Filtration)
MRTS50	Transport and Main Roads Specification MRTS50 Specific Quality System Requirements
MRTS51	Transport and Main Roads Specification MRTS51 Environmental Management
Water and Wastewater Sampling Guidelines	EPA Guidelines, Regulatory Monitoring and Testing, Water and Wastewater Sampling (South Australian Environment Protection Agency, 2007).

## 4 Standard test methods

Unless stated elsewhere herein, testing shall be carried out in accordance with the relevant Australian Standard. All laboratory analyses required under this technical specification must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses.

## 5 Quality system requirements

### 5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points and Milestones applicable to this specification are summarised in Table 4.

**Table 4 - Hold Points and Milestones**

Clause	Hold Point
6.1	1. Assessment of suitability of Erosion and Sediment Control Plan for each stage and/or section of the works where required.
7.1	2. Installation of appropriate erosion and sediment controls in each section of the works.

The number of hold points relating to Erosion and Sediment Control will be dependent on the risk associated with the project.

- For low risk projects there are likely to be two hold points on the project – the first being no works to occur prior to the assessment of suitability of the ESCP, the second being no earthworks (other than works necessary to install devices) until erosion and sediment control devices have been installed.
- For high risk projects there is likely to be many hold points throughout the project as the assessment of suitability of the plan and assessment of installation of controls shall be required for each section or stage of the works.

## 6 Erosion and Sediment Control Plan

### 6.1 General

Before the natural surface is disturbed on a section of the Works, the Contractor shall submit an Erosion and Sediment Control Plan (ESCP) for that section.

An ESCP is required to be prepared for all areas prior to use or disturbance including auxiliary areas under the control of the contractor such as stockpile and storage areas, access and haulage tracks, temporary waterway crossing, borrow areas, compound areas and material processing areas.

Clearing and grubbing (or the use of the area for stockpiles) for that section shall not start until the ESCP for that section is assessed as suitable by the Administrator. **Hold Point 1**

For high risk projects multiple erosion and sediment control plans will be required for sections that have significant cut and fill (e.g., a plan for clearing, a plan for commencement of bulk earthworks and a plan for completion of earthworks). Prior to significant changes to drainage flow or sediment treatment locations, an updated erosion and sediment control plan shall be developed and submitted by the Contractor and assessed as suitable by the Administrator. Each ESCP shall clearly detail the area and work that it is valid for. It is acceptable to have a primary 'over-arching' ESCP supplemented by numerous progressive ESCP on a project.

Timelines for assessment of suitability of ESCP shall be as per Conditions of Contract for the assessment of EMP(C).

### 6.2 Plan requirements

The Erosion and Sediment Control Plan (ESCP) shall be developed in accordance with the principles in Clause 1.4 of this specification and taking into account:

- a) seasonal conditions

- b) soil types, particularly dispersive, sodic, saline soils and acid sulfate soils
- c) topography, particularly areas with natural, during construction or final slope > 10%
- d) local hydrology and drainage affecting the worksite including temporary and overland flow paths
- e) specific project issues including no go zones, protected flora and fauna, private property boundaries, contaminated land, and
- f) specific project issues and requirements listed in MRTS52 Annexure Clause 3.

The ESCP shall consist of the following:

- a) the works and area that the plan is valid for
- b) the location of major features of the site, such as waterways, limitations of disturbance areas, property boundaries and other special features (including sensitive environments, contaminated land, dispersive soils)
- c) contour lines or flow direction arrows sufficient to show direction of waterflow
- d) the type and location of all erosion and sediment control measures, including but not limited to:
  - i. proposed erosion control measures including soil treatment and batter stabilisation methods such as soil binders, geofabric, hydromulching and/or early revegetation
  - ii. drainage paths for runoff from exposed area and diversion drains for clean water
  - iii. sediment controls such as sediment basins for all areas greater than one hectare on general and high risk sites, and Type 2 and Type 3 controls for other areas
  - iv. location of nominated discharge points, and
  - v. site exit points and controls.
- e) the installation sequence and timing of controls including timing of installation of any permanent works being relied upon as drainage control during construction
- f) list of any deviations from *IECA Manual* with regard to the installation, construction and maintenance of all erosion and sediment control measures (in particular any deviation from Book 4 – Design Fact Sheets and Book 6- Standard Drawings) and justification for such deviations
- g) the response strategy for managing significant rain events, and
- h) the person/s responsible for development of the ESCP including their experience and qualifications for determination by the Administrator as to whether appropriately qualified.

For general risk sites the ESC Plan shall include the above (a to h) and:

- i) design calculations for all drainage and sediment control measures, including sediment basins, earth banks high flow/spillways, outlet structures and drainage lines.

The administrator may also request to view the calculations for low risk sites.

For high risk sites the ESC Plan shall include the above (a to i) and:

- j) the qualifications and experience of the independent verifier (refer to Clause 6.3 below) and a statement from the independent verifier that the ESCP if implemented correctly will meet the requirements of this specification, and
- k) the proposed frequency and timing of independent audits (refer to Clause 9.1.2)
- l) the monitoring and maintenance requirements for the project site, erosion and sediment controls and receiving environment.

The ESCP for all projects undertaken in South-East Queensland shall comply with *Procedural Guide - Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland (Department of Environment and Heritage)*.

The number and complexity of the Erosion and Sediment Control Plans will vary depending on the size and complexity of the project.

For low risk projects, the above specification could be met by one drawing or diagram that includes notes on timing of installation of controls.

For high risk and large scale general projects the ESCP is likely to consist of multiple sets of drawings for various areas, and various stages of each area. One option for major projects is for an overarching ESCP to be developed containing key methods, procedures and features which is then supplemented by numerous progressive ESCP. A report detailing assumptions and calculations for drainage, erosion and sediment controls will also be required.

Note that the response strategy for managing significant rain events may be contained within the Severe Weather Management Plan or other document.

### 6.3 Personnel – plan development

The Erosion and Sediment Control Plan shall be prepared and updated by personnel who have the requisite level of training and experience outlined in Table 5, or as modified by Annexure MRTS52 Clause 5.

**Table 5 - Erosion and Sediment Control Plan – personnel minimum requirements**

Erosion Risk Level (as per Clause 1.3)	Minimum requirements for plan development and verification
Low	<ul style="list-style-type: none"> <li>ESCP to be prepared by a person who has undertaken environmental representative training and has at least five years' experience in relevant construction type (for example, roadwork construction).</li> </ul>
General	<ul style="list-style-type: none"> <li>ESCP to be prepared by Appropriately Qualified Person/s (see definitions) with experience in relevant construction type (for example general road projects).               <ul style="list-style-type: none"> <li>Drawings and design for any items that are Prescribed Engineering Service (PES) as per the <i>Professional Engineers Act, 2002</i> shall be certified by an RPEQ.</li> </ul> </li> </ul>

Erosion Risk Level (as per Clause 1.3)	Minimum requirements for plan development and verification
High	<ul style="list-style-type: none"> <li>• ESCP to be prepared by Appropriately Qualified Person/s (see definitions) with experience in relevant construction type (for example major road projects).</li> <li>• Drawings and design for any items that are Prescribed Engineering Service (PES) shall be certified by an RPEQ.</li> <li>• ESCP to be reviewed and deemed suitable by an independent verifier who is an Appropriately Qualified Person.</li> </ul>

The Contractor must submit details of the person preparing the ESCP and the verifier to the Administrator with the ESCP for determination of suitability by Administrator. The Contract may submit details prior to engagement of said person/s.

#### **6.4 Implementation and revision of plan**

The Contractor shall:

- a) implement the Erosion and Sediment Control Plan
- b) monitor the continued effectiveness of the ESC during the contract
- c) update the ESCP where necessary.

The plans shall be updated in accordance with Clause 5.1 of this specification, and updated such that all major drainage paths and Type 1 sediment treatment devices are shown correctly. The updates shall be undertaken by personnel approved as suitable by the Administrator (that is, who has the requisite level of training and experience outlined in Table 5, or as modified by Clause 4 of Annexure MRTS52).

### **7 Erosion and sediment control management – general requirements**

#### **7.1 Installation**

As soon as practicable and prior to initial earthworks operations (clearing and grubbing) for any stage or section of the works, the Contractor must install erosion and sediment controls (including sediment traps, catch banks and diversion drains) associated with drainage paths flowing through the works area. The completion of these activities will be a Hold Point for any further earthworks. **Hold Point 2**

Where clearing is required in order to construct or install the erosion and sediment controls this shall be discussed and approved by the Administrator.

#### **7.2 Operation and maintenance**

The Contractor shall maintain all erosion and sediment controls in effective working order including reconfiguring drainage lines as required during the construction process to ensure runoff from exposed areas is directed into sediment controls at all times.

Reuse of the water collected in sediment ponds or basins for dust suppression and roadworks is preferred over release into the environment. Where water is being stored for dust suppression the required design capacity of the basins shall be available.

Sediment basins and other sediment controls shall be operated and maintained in a manner that minimises the risk of environmental harm. The design capacity of the upper settling volume shall be made available within 120 hours of the most recent rainfall event which causes runoff.

The sediment storage zone shall be maintained at all times with the accumulated sediment removed in a manner that does not allow the sediment to be conveyed into a watercourse or offsite.

Where coagulants or flocculants are used to treat stormwater:

- a) A jar test or streaming current detector (SCV) must be undertaken to determine the volumes of the coagulant or flocculant required and to reduce the risk of overdosing. The type and volume of coagulant or flocculant used must be in accordance with the test results and recorded on discharge water quality spreadsheet (refer to Section 8.2.2 below).
- b) The coagulant or flocculant must not causing harm to the receiving waters or environment, and
- c) The sediment captured within the basin containing flocculant or coagulant must be disposed of in accordance with the safety data sheet of the product used.

Coagulants or flocculants containing aluminium (including alum and PAC) shall not be used when water is being discharged to an acidic environment where natural pH is less than 6.0 (such as wallum stream or wetland).

The greatest environmental risk from coagulants/flocculants exists when overdosing has occurred. This risk can be mitigated by discharging water from sediment basin that has been flocced into a drainage channel rather than directly into a waterway. For projects using coagulants other than gypsum this practice is recommended.

### **7.3 Decommissioning and removal**

The Contractor shall remove temporary controls when permanent measures are in place and/or site stabilisation has occurred. This should occur prior to the end of the Defects Liability Period or the end of the Landscape and Revegetation Works Monitoring Period whichever is the later. The Contractor will not receive a Final Certificate until these temporary controls have been removed from the site.

Any areas used for erosion and sediment control shall be rehabilitated to the satisfaction of the Administrator.

## **8 Erosion and sediment control management – performance requirements**

### **8.1 Performance requirements**

There shall be no erosion resulting from construction practices unless there are provisions within the worksite to manage resultant sediment.

#### **8.1.1 Reuse**

The reuse of the stormwater including water captured in sediment basins such as for dust suppression, roadworks or landscaping is preferred over release into the environment. Where water is to be reused for landscaping refer to MRTS16 for quality requirements.

Approval from the Administrator is required where captured water is to be reused on roadworks.

### 8.1.2 Discharge

Runoff from site including releases from sediment basins shall comply with the following unless varied by MRTS52 Annexure Clause 3.1:

**Table 6 - Discharge criteria**

Parameter	Discharge Criteria
Suspended Solids	For high risk projects: <ul style="list-style-type: none"> <li>Not to exceed 50 mg/L for rainfall events up to and including the 85th percentile 5 day rain event.</li> </ul>
Turbidity	For low and general risk projects: <ul style="list-style-type: none"> <li>Not to exceed 75NTU (for rainfall events up to and including the 80th percentile 5 day rain event), or</li> <li>As determined by correlation of turbidity with 50 mg/L suspended solids.</li> </ul> For high risk projects: <ul style="list-style-type: none"> <li>the turbidity limit shall be determined by the Contractor by correlating turbidity with the suspended solids limit.</li> </ul>
pH (general)	General: 6.5 – 8.5 Wallum/Acidic Ecosystems: 5.0 – 7.0
Hydrocarbons	No visible trace
Waste	No waste or litter

Water shall not be released until pH is stable.

Releases from site must not cause scour at the area of discharge. Water must only be released at the discharge point nominated within the ESCP and as deemed acceptable by the Administrator. Any modification to discharge point must be agreed by the Administrator.

The Project Manager and/or Environmental Officer is encouraged to develop site specific discharge criteria relevant to the receiving environment/catchment site based on the risks to the receiving environment and site specific information available. In particular it is recommended that site specific criteria be developed for:

- naturally occurring acid environments and ecosystems such as wallum streams, and
- projects located in western catchments such as Murray-Darling and desert channel area.

Consideration may need to be given to the analysis of water for electrical conductivity (EC) particularly if using a coagulant or flocculant which increases EC and water being discharged into a low salinity low flow stream.

### 8.1.3 Offsite impacts - waterways

Construction works shall not result in erosion and sedimentation that causes environmental nuisance or harm outside the worksite, or to permanent water bodies within the worksite.

Unless varied by MRTS52 Annexure Clause 3.2 water quality of a waterway outside the parameters below shall be investigated by the Contractor and reported to the Administrator.



**Table 7 - Water quality investigation criteria (waterways)**

Issue	Investigation Criteria	
	Levels	Change (Upstream – Downstream)
Dissolved Oxygen (mg/L or % saturation)	> 85% saturation for flowing waters DO > 5 mg/L	10% decrease
pH	General: 6.5 – 8.5 Wallum/Acid ecosystems: 5.0 - 7.0	1.0 pH unit change
suspended solids (mg/L) or turbidity (NTU)		10% increase
Electrical conductivity		20% change
Hydrocarbons	No visible trace	
Waste	No waste or litter	

#### 8.1.4 Offsite impacts – roadways

Sediment shall not be tracked onto a road, cycleway or footpath external to the project site where that sediment has the potential to enter the stormwater system during a rain event, or where sediment has the potential to cause a safety hazard to motorists or pedestrians. The Contractor shall install sediment control measures as per *IECA manual* for all construction exit points.

### 8.2 Monitoring and reporting

#### 8.2.1 Monitoring of rainfall

The Contractor shall install a proprietary rain gauge and keep a record of the rainfall depth (mm) of each rainfall event, and where possible duration of the rainfall event. For large projects where rainfall is likely to differ significantly across the site the Contractor shall install a rain gauge at locations representative of each climatic zone.

Where a release of water causes non-compliance with the limits detailed in Section 8.1.2 and 8.1.3 the Contractor shall determine the size of the rainfall event and provide this information to the Administrator. The Contractor shall use the most recently available IFD (Intensity – Frequency-Duration) data available through the Bureau of Meteorology ([www.bom.gov.au](http://www.bom.gov.au)). Alternatively the Contractor may utilise data from a calibrated site based rainfall intensity gauge.

The rainfall event shall be expressed as exceedance probability (for example, 10% Annual Exceedance Probability (AEP) except those events that are more frequent than 50% AEP which shall be expressed as number of exceedances per year (EY). While the use of ARI is discouraged, the Contractor may be requested to also express the rainfall event in this manner until such time as the administering authority requirements are updated in line with Australian Rainfall and Runoff (ARR) recommendations.

#### 8.2.2 Monitoring of discharges

Waters released from sediment basins or trap must be sampled prior to release. The samples taken must be representative of the water being discharged.



The water shall be analysed for:

- a) pH
- b) turbidity and/or suspended solids (as per Table 6 or Annexure MRTS52 Clause 4.1)
- c) any other parameter nominated in Annexure MRTS52 Clause 4.1, and
- d) visually for hydrocarbons and litter.

The results of monitoring shall be recorded in a dedicated spreadsheet and compared against discharge criteria. Water above discharge criteria shall not be released other than in the case of safety reasons or where there is a demonstrable environmental benefit of releasing. The type and volume of flocculant/coagulant used (if used) shall be also recorded on this spreadsheet.

Any release (purposeful or otherwise) outside of discharge criteria shall be immediately reported to the Administrator and treated as a non-conformance. Where the discharge causes or has the potential to cause environmental harm as defined by *Environmental Protection Act* the event shall also be reported to the regulatory authority.

Otherwise, reporting of results shall be as per Clause 9.3.

Where it is not possible to sample water prior to discharge or runoff from site (for example, sheet flow) visual water quality monitoring shall be undertaken. Records of the results of the visual observations shall be kept within daily inspection records.

### **8.2.3 Monitoring of environment (waters)**

The Contractor shall conduct water quality monitoring as per any licence, permit or approval conditions.

Unless otherwise required by licence, permit, and approval condition or varied by Annexure MRTS52 Clause 4.2:

- a) All waterbodies and waterways within the project site, and all waterbodies and waterways where stormwater is discharged shall be monitored.
- b) Monitoring shall be undertaken:
  - i. at least one week prior to construction activities
  - ii. weekly during construction activities that have the potential to impact the waterbody or waterway, and
  - iii. immediately following a discharge from sediment basin and/or a rain event causing runoff into the waterway or waterbody.
- c) Monitoring shall be undertaken at a representative location upstream and downstream of the works. Where possible the downstream monitoring location should be no more than 100 metres downstream of the works.
- d) Water shall be analysed for:
  - i. pH
  - ii. turbidity and/or suspended solids
  - iii. dissolved oxygen

- iv. electrical conductivity, and
- v. visually for hydrocarbons and litter.

Monitoring shall be undertaken in accordance with the *Monitoring and Sampling Manual*, DEHP, 1999. Use of field water quality meters shall be undertaken in accordance with manufacturer's requirements (including calibration) and Section 5.2 of *Water and Wastewater Sampling Guidelines* (SA, EPA, 2007).

The results of monitoring shall be recorded in a dedicated spreadsheet and compared against investigation criteria and previous monitoring results. The monitoring results, including results of investigations, shall be provided to the Administrator monthly.

For each result that exceeds the investigation criteria the Contractor shall:

- a) report the exceedance to the Administrator within 24 hours (unless significant issue or release occurred in which case reporting requirements shall follow incident procedures)
- b) investigate the cause of the exceedance
- c) develop and implement improved work procedures or mitigation measures to improve water quality
- d) report the results of the investigation and the actions taken on (or attached to) the water quality monitoring spreadsheet, and
- e) provide the above information to the Administrator within the next monthly report.

Any exceedances deemed to be caused by the project works shall be treated as a non-conformance.

Where the exceedance is considered to have caused or have the potential to cause environmental harm as defined by *Environmental Protection Act* the event shall be reported as per incident reporting requirements to the relevant regulatory authority.

## **9 Administrative requirements**

### **9.1 Inspections and audits**

#### **9.1.1 Contractor inspections and audits**

The Contractor shall undertake inspections and audits at the frequency identified by MRTS51. The site inspections shall include visual assessment of erosion and sediment control structures to verify their condition and effectiveness, and of all site discharge points.

#### **9.1.2 Independent audits**

For sites determined to have a high erosion risk (by Table 1 of this Annexure or as nominated in MRTS52 Annexure Clause 2) the Contractor shall engage an independent Appropriately Qualified Person (AQP). The AQP shall assess the compliance of ESC measures against this specification and the accepted ESCP and the compliance of the ESC measures with the ESCP objectives and discharge limits.

The Contractor shall submit the independent review report to the Administrator with proposed and completed actions undertaken to address the identified issues not more than seven days following the audit.

Unless modified by Clause 5.1 of Annexure MRTS52 the Contractor shall allow for a minimum of three independent audits for each stage of the project – for example: one audit immediately following clearing and grubbing and one audit during cut and fill and one audit at end of major earthworks.

The Administrator may request the Contractor to have an independent audit at any time throughout the project.

Transport and Main Roads may elect to nominate a greater frequency such as monthly if desired or nominate high frequency for areas around sensitive environments.

### **9.1.3 Administrator and principal audits**

The Administrator or the Principal may undertake compliance audits of the Contractor's sediment and erosion control measures and provide feedback.

Feedback will be provided in the form of audit report and in line with Principal's Contractor Performance Report in the *Transport Infrastructure Project Delivery System* (available at [www.tmr.qld.gov.au](http://www.tmr.qld.gov.au)).

Any non-conformances identified as a result of these audits shall be managed as per the non-conformance and corrective action requirements outlined in Clause 10.2 of MRTS50.

### **9.2 Non-conformances and incidents**

Management and reporting of non-conformances and incidents relating to erosion and sediment control shall be as per requirements for environmental non-conformances and incidents (Clause 7.4 of MRTS51). Notification to the Administrator or the Principal does not in any way negate the requirements on the Contractor to notify DEHP, other regulatory authorities and landowners under the *Environmental Protection Act* or other Acts.

The Administrator reserves the right to seek costs against the Contractor for incidents that cause environmental harm. The costs shall correspond to the cost for additional administration of the contract (which may include investigation of the incident, internal and external reporting of incident, meetings and correspondence). The costs shall be recovered based on the hourly rate listed in Clause 6 of Annexure MRTS52.

### **9.3 Records and reporting**

The Contractor shall establish records to show the Contractors conformance to the requirements of this Specification and other relevant reference documents. All records and registers maintained by the Contractor shall be available for inspection by the Administrator upon request.

For general and high risk sites, compliance with and issues relating to Erosion and Sediment Control shall be reported with the Contractor monthly environmental report (Clause 7.3 of MRTS51).

The monthly report shall contain:

- a) results of discharge monitoring (as per 8.2.1 above)
- b) results or waterway monitoring (as per 8.2.2 above), and
- c) key activities to be undertaken within the next month, the controls in place and the actions that will be taken to mitigate the potential environmental risks associated with those activities.

## 10 Design and technical standards

### 10.1 Technical standards

The Contractor shall ensure sediment and erosion controls are designed, installed and maintained in accordance with the *IECA Manual* (particularly Book 4 – Design Fact Sheets and Book 6 – Standard Drawings) and manufacturers specifications except as modified by design requirements in Clause 10.2 below.

Where controls will become permanent, the relevant specification shall have precedence, for example:

- a) MRTS03 shall apply for drainage controls that become permanent including sheet or strip filter drains
- b) MRTS16 shall apply for permanent revegetation (including specifications for cover crop to be included within permanent seed mixes), and
- c) MRTS27 shall apply for geotextiles that are part of the permanent works.

### 10.2 Design requirements

Controls shall be designed to have the capacity and structural strength specified in Table 8.

**Table 8 - Design requirements**

Item	Disturbed area open for:		
	0 - 12months	12 – 24 months	> 24 months
Drainage controls: <ul style="list-style-type: none"> <li>diversion drains</li> <li>channels</li> <li>batter chutes.</li> </ul>	40% AEP or (~ 2 year ARI)	20% AEP (~ 5 year ARI)	~ 10% AEP (10 year ARI)
Sediment basins	80th percentile 5 day rain event Projects adjacent to sensitive receiving waters: 85th percentile, 5 day rain event.		
Sediment basin inlet	20% AEP (~ 5 year ARI)	~ 10% AEP (10 year ARI)	~ 10% AEP (~ 10 year ARI)
Sediment basin – emergency outlet, embankments.	5% AEP (~ 20 year ARI)	5% AEP (~ 20 year ARI)	2% AEP (~ 50 year ARI)

#### 10.2.1 Sediment basin embankments

Fill materials used for the construction of sediment basin embankment shall be in accordance with “Water Retaining Embankments” in Clause 14.2.6 of MRTS04 *General Earthworks*. The material shall be compacted to not less than 97% in accordance with “Levee Embankment” requirement stipulated in Table 15.3-B of MRTS04. The stability requirements shall be as per Clause 2 of the department’s *Geotechnical Design Standard*.

#### 10.2.2 Catch drains

Triangular V drains (Type B catch drains as shown in IECA Standard Drawing CD-01: Catch Drains) shall not be installed in areas with dispersive soil.

## 11 Supplementary requirements

The requirements of MRTS52 *Erosion and Sediment Control* are varied by the additional requirements specified in Annexure MRTS52 Clause 7.

Superseded

Superseded