



8150 Bioretention Systems

REVISION: 25/08/2025

8150.1 Introduction

This supplementary specification refers to the supply of materials, construction and installation of bioretention systems as detailed on the project Drawings for new or rectified bioretention systems complying with MRC PSP – Healthy Waters.

The design requirements of any bioretention system have been deemed to be satisfied prior to the issue of design drawings and project documentation for construction.

Council preference is to Type 1 Saturated Zone bioretention systems as documented in Clause 2.5.2 of MRC PSP – Healthy Waters. The design process shall take into account this preferred option of bioretention type.

Unless otherwise stated, this specification is modelled on current available best practices through the utilisation of referenced guidelines from Water By Design and Healthy Land and Water.

8150.1.1 Definition of Terms

The following terms apply specifically to this specification;

Term	Definition
MRC PSP – Healthy Waters	Mackay Regional Council Planning Scheme Policy – Healthy Waters, reference document acronym.
Bioretention Basin Type	Refer to Clause 2.4 of WBD Bioretention Technical Design Guidelines for further details and compliance requirements; Type 1 Saturated Zone, Type 2 Sealed, Type 3 Conventional, Type 4 Pipeless.
Biopod	Small streetscape bioretention systems less than 50 m ² in area.
Bioswale	Vegetated swale that conveys stormwater with the intended design of removing coarse to medium sediments, generally work in conjunction with underground stormwater or bioretention basins.
Rectifying of bioretention systems	The undertaking of remedial works to restore a poorly performing or dysfunction bioretention system to a functional state, this may include any component of the system.
Bioretention Maintenance	The undertaking of necessary works/actions to ensure an established and relatively well function bioretention system continues to function relatively well.
Construction Sign Off Forms	Water By Design Forms from their Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands, in Appendix “A”.
Asset Designer	Within this specification asset designer is to be assigned to the various system functions and taken as; RPEQ Consultant – responsible for the hydraulics and stormwater function of the system, any hard built structures and their functions.



		Registered Landscape Architect – responsible for the soft landscaping, planting media, mulch, and any irrigation requirements.
HES Basin		High efficiency sediment basin, structure designed to capture sediment entrained in runoff (known as tailwater) or stormwater runoff by adding clarifying agents (coagulants and flocculants) to increase the settlement of suspended sediments.
Sacrificial Layer		Layer of turf installed over the filter media layer for a period in new bioretention basins which acts as a protective layer until it is removed, and the plantings are carried out.
Liner		A layer surrounding either or both the base and sides of bioretention systems. Liners can be either permeable or impermeable. The need for a liner or type is dependent on the type of bioretention system design.
Hydraulic Structures		Hard constructed structures such as inflow pipe, overflow pit, outlet pipe, and weir, their purpose to convey stormwater into the bioretention system and discharge after treatment.
Filter Media		A prescribed soil media used to filter stormwater and support plant growth.
Transition Layer		Course sand layer located under the filter media which acts a bridging layer to prevent filter media particles migrating into the underdrainage aggregate and pipe system.
Underdrainage		Fine aggregate and slotted pipes that allow treated stormwater to be removed from the bioretention system.
Bioretention Forebay	Sediment	Constructed structure which captures and stores coarse sediment for bioretention systems, it also acts as an energy dissipater for the incoming stormwater flows. Smaller systems may utilise an inlet pond.
High Flow Drainage	By-pass	System of designed drainage which has the capacity to convey flows which exceed the designed system bio-treatment capacity while not impacting the low flow treatment device/s.
FAWB Guidelines		Facilities for Advancing Water Biofiltration (FAWB), guidelines providing clear, practical guidance for constructing and establishing biofiltration systems.
Registered Landscape Architect (RLA) with membership to AILA		Required qualification for landscaping as applies to the Australian Institute of Landscape Architects.
Water Sensitive Urban Design (WSUD)		An approach to the planning and design of urban areas that aims to minimise the impacts of urban development on receiving waters, bioretention systems and wetlands are examples of this approach.
Stormwater Improvement Device (SQID)	Quality Device	Designed to remove a wide range of pollutants including sediments, litter, and some metals, oils, nutrients, and gross pollutants from stormwater before it has a chance to join any natural bodies of water, Gross Pollutant Trap is an example of this.



8150.1.2 Table of Contents

Contents

8150.1	Introduction.....	1
8150.1.1	Definition of Terms	1
8150.1.2	Table of Contents.....	3
8150.2	Referenced Documents	4
8150.3	Description of Work Items	5
8150.4	Quality Systems Requirements	5
8150.4.1	Std Test Methods (Testing Regime)	5
8150.4.2	Hold Points, Witness Points and Milestones.....	7
8150.4.3	Construction Tolerances	10
8150.5	Preliminary	11
8105.5.1	Materials	12
8150.5.2	Personnel	13
8150.5.4	Environmental.....	13
8150.5.5	Erosion and Sediment Control	13
8150.5.5	Safety During and at Completion of Works	14
8150.6	Construction	14
8150.6.1	Work Operations	14
8150.6.2.1	Plant Sourcing, Timing, and Delivery	15
8150.6.3	Prestart Meetings	15
8150.6.3.1	Prestart Meeting Civil Works.....	16
8150.6.5	Earthworks and Hydraulic Structures to Bioretention System	17
8150.6.5.1	Earthworks to Bioretention System	17
8150.6.5.2	Utilising or disposing of surplus material.	17
8150.6.5.3	System Inspection Prior to Installation Works Commencing	17
8150.6.5.4	Construction of Hydraulic Structures	17
8150.6.6	Carrying out All Works for the Installation of the Liner (where required).....	19
8150.6.7	Carry Out All Works for the Installation of Underdrainage Pipes and Drainage Aggregate layer.	19
8150.6.8	Carry Out All Works for the Installation of Transition Layer.....	19
8150.6.9	Carry Out All Works for the Installation of Filter Media Layer.....	20
8150.6.10	Bioretention System Sediment Forebay (where required)	20
8150.6.11	Bioretention System Access	21
8150.6.12	Mulch Installation.....	21
8150.6.13	Install protective measures.....	22
8150.6.13.1	Use as a HES Basin	22
8150.6.13.2	Use as a Bioretention Basin	22
8150.6.14	Plantings	22
8150.6.15	Make Safe and Clean Work Site	23
8150.6.16	Defects Liability Period/s New and Reconstructed Bioretention Systems.....	23
8150.7	Post construction	24
8150.7.1	Works Inspection and Future Maintenance – Defects Liability Period	24
8150.7.2	Collection and submission of all As Constructed data including QA data requirements.....	24



8150.8	Measurement and Payment	24
	Appendix "A" Forms.....	25

8150.2 Referenced Documents

This supplementary specification shall be read in conjunction with the following:

- MRS01 *"Introduction to Specifications"*;
- MRTS01 *"Introduction to Technical Specifications"*;
- MRS03 and MRTS03 *"Drainage, Retaining Structures and Embankment Slope Protections"*;
- MRS04 and MRTS04 *"Earthworks General"*;
- MRS16 and MRTS16 *"Landscape and Revegetation Works"*;
- MRS50 and MRTS50 [*"Specific Quality System Requirements"*](#);
- MRS51 and MRTS51 *"Environmental Management"*;
- MRS52 and MRTS52 *"Erosion and Sediment Control"*;
- MRS70 and MRTS70 *"Concrete"*;
- MRS71 and MRTS71 *"Reinforcing Steel"*;
- AS 3600 *"Concrete Structures"*;
- AS3610 *"Formwork for Concrete"*;
- MRC Supplementary Specification 8300 *"Landscaping and Horticultural Treatment"*;
- MRC Supplementary Specification 8317 *"Landscaping and Horticultural Treatment Maintenance Period"*;
- MRC Supplementary Specification 8170 *"Gross Pollutant Traps"*;
- MRC Supplementary Specification 8180 *"Permanent Sediment Control Structures"*;
- MRC Supplementary Specification 8207 *"Dissipater Structures"*;
- Guidelines for Soil Filter Media in Bioretention Systems (FAWB); Water by Design *"Bioretention Technical Design Guidelines"*, current version;
- Water by Design *"Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands"*, current version; Water by Design *"Construction & Establishment Guidelines – Swales, Bioretention systems and Wetlands"*, current version;
- Water by Design *"Specifications for Bioretention Filter Media"*, current version;
- Water by Design *"Transferring Ownership of Vegetated Stormwater Assets"*, current version;
- Water by Design *"MUSIC Modelling guidelines"*, current version;
- MRC PSP – Healthy Waters Planning Scheme Policy;
- MRC Approved Plant Species List;
- AS2758 *"Aggregates & Rocks for Engineering Purposes"*;
- AS 1289 *"Methods of Testing of Soils for Engineering Purposes"*;
- ASTM F1815-11 *"Standard Test Methods for Saturated Hydraulic Conductivity, Water Retention; Porosity, and Bulk Density of Athletic Field Rootzones"*;
- AS 4419 *"Soils for landscaping and garden use"*;
- AS 2303 *"Tree Stock for Landscape Use"*;
- AS 4454 *"Composts, soil conditioners and mulches"*;
- FAWB *Practice note 1: In-situ measurement of hydraulic conductivity* (Hatt & Le Coustumer 2008) (Hatt & Le Coustumer 2008)
- IPWEAQ Standard drawings DS-050, DS-070 to DS-078, and;
- the project Drawings.



8150.3 Description of Work Items

Work items incorporated by this supplementary specification are identified in Section 8150.6 and 8150.7 with individual activities/tasks for measurement and payment sourced from the Bill of Quantities and listed in MRC Supplementary Specification Annexure 8150_1 Bioretention Systems Section 1

8150.4 Quality Systems Requirements

The Contractor shall prepare a quality plan compliant with MRTS50 and submit this to the Superintendent a minimum 4 weeks prior to site works commencing and prior to the prestart meeting being requested.

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8150.4.1 Std Test Methods (Testing Regime)

The following minimum testing regime applies to this specification:

Unless otherwise stated the manufacturer certification of the drainage pipe/s, and duckbill floodgate shall form the basis of the requirements.

Civil works activities associated with the bioretention system structures, drainage, and earthworks shall be tested as per the relevant MRTS specification MRTS03, MRTS04, MRTS70, and MRTS71 unless otherwise approved by the Superintendent.

Liner, underdrainage aggregate, transition layer, and filter media shall be tested in accordance with and comply with MRC Planning Scheme Policy – Healthy Waters.

Topsoil and Mulch tested in accordance with MRC Planning Scheme Policy – Healthy Waters, with all materials delivered to site certified by the supplier through the test results and the delivery docket.

All test results shall be submitted by the Contractor for review and approval 4 weeks prior to commencement of site works. Ongoing insitu testing shall be carried out as required and compliance verification taking place prior to proceeding with installation of the next layer of material.

Insitu audit testing for conductivity shall be undertaken by a NATA registered laboratory, the number of tests and test method shall be undertaken in accordance with FAWB *Practice note 1: In-situ measurement of hydraulic conductivity ((Hatt & Le Coustumer 2008)* at the following timing;

- One set prior to planting establishment period commencing (“On maintenance”)
- One set of insitu tests completed within 3 months of final completion inspection (prior to “Off Maintenance”) as part of the transferring ownership of the basin.

All earthworks, layers within the bioretention system, and structures shall be surveyed for compliance to construction tolerances as required by the design drawings. Where works are outside of the required tolerances the Contractor shall carry out immediate works to rectify the non-compliance to the design drawings and/or specification.



Table 1. Material and Survey Testing

	TASK	WHEN & TEST	FREQUENCY
1	Drainage Aggregate, sampling and testing confirming compliance with Water by Design and FAWB guidelines. Geometrics (surface levels and layer thickness)	For all aggregate proposed to be used as a drainage layer As per Facilities for Advancing Water Biofiltration (FAWB Guidelines) Survey as per Clause 8150.4.3	Per lot or mix Test prior to use, and audit test once in place Survey as per Clause 8150.4.3
2	Transition Layer (coarse sand), sampling and testing confirming compliance with Water by Design and FAWB guidelines. Geometrics (surface levels and layer thickness)	For all coarse sand transition layer material proposed to be used as a drainage layer As per Facilities for Advancing Water Biofiltration (FAWB Guidelines) Survey as per Clause 8150.4.3	Per lot or mix Test prior to use, and 4 audit tests once in place Survey as per Clause 8150.4.3
3	Filter Media, sampling and testing confirming compliance with Water by Design and FAWB guidelines. Geometrics (surface levels and layer thickness)	For all filter material proposed to be used as a drainage layer As per Facilities for Advancing Water Biofiltration (FAWB Guidelines) Hydraulic Conductivity measurement testing Survey as per Clause 8150.4.3	Per lot or mix Test prior to use, and 4 audit tests once in place Insitu testing prior to establishment (“on Maintenance”) and 3 months prior to Off maintenance Survey as per Clause 8150.4.3
	Liner hydraulic conductivity < 1X10 ⁻⁹ m/s Comply with AS3706.12 (soil acids and alkalis) and AS3706.13 (microorganisms) Geometrics (size, shape, limits)	4.2.3.2 Water by Design – Bioretention Technical design Guidelines Survey as per Clause 8150.4.3	Per lot Water by Design As per Australian Standards Survey as per Clause 8150.4.3
4	Plants – selection as per MRC requirements in both species and nursery selection and acclimatisation	For all plants to be incorporated into the bioretention system As per MRC landscaping requirements	Per Lot or species
5	Topsoil sampling and testing confirming compliance to AS4419.	For all topsoil insitu on site or manufactured on site or delivered to site. As per AS4419 Appendix “A”	Per Lot or material type As per AS4419 Appendix “A”
6	Mulch sampling and testing confirming compliance to AS4454	For all mulch manufactured on site or delivered to site. As per AS4454 Appendix “A”	Per Lot or material type As per AS4454 Appendix “A”
7	Earthworks testing, confirming compaction of excavated base material, embankment, weir, and bunds are compacted	MRTS04 for compaction standards, layer control, and unsuitable material.	1/component/layer for small systems less than 100m ² 1/component/layer/100m ² or part thereof for systems >100m ²



	Geometrics (levels, size, shape, grades, extents)	Survey as per Clause 8150.4.3	Survey as per Clause 8150.4.3
8	Concrete testing – strength and slump Geometrics (levels, tolerances)	All concrete pours As per MRTS70 All formwork set ups	1/ 15m3 Concrete or part thereof for strength Slump test every load or mix. Every pour and structure

8150.4.2 Hold Points, Witness Points and Milestones

The following table represents the minimum inspection requirements for this specification, some activities may not be relevant to renewal works, this should be reflected in the Contractors Quality Plan submitted to the Superintendent for approval.

Table 2 Inspection Regime

Activity	Inspection Type	When	Clause Reference
Construction Procedure and other submissions as required by Clause 8150.5	Milestone	4 Weeks prior to works commencing	8150.5
Plant and nursery inspection	Hold Point	12 weeks prior to plantings occurring or being delivered to site	8150.5.1
Plant and nursery inspection	Hold point	Prior to Prestart meeting	8150.6.2.1
Site prestart meeting (Civil and Landscaping)	Hold Point	Prior to site works commencing, approval to commence works	8150.6.3.1 & 8150.6.3.2
Site inspection and identification of works to be demolished	Hold Point	Prior to demolition works commencing	8150.6.4
Site inspection of demolition works	Hold Point	At completion of demolition to verify extent of works as approved	8150.6.4
Exposed reinforcing treated and sealed	Witness Point	Prior to works continuing	8150.6.4
Prepour set up of concrete works as part of rectification works	Hold Point	Prior to each concrete pour for levels, set up of formwork and reinforcing	8150.6.4
Stripping of formwork and curing of concrete as part of rectification works	Hold Point	After concrete pour has occurred, minimum 3 days before stripping and 7 days of curing.	MRTS 70
Layout location of system	Hold Point	Prior to earthworks commencing	8150.6.5.1
Finished earthworks and associated excavated floor	Witness Point	Prior to the installation of the liner or continuing with installation of under drainage	8150.6.5.1
System inspection, verification of levels and layout and approval to proceed	Hold Point	At completion of earthworks, approval to proceed with transition layer	8150.6.5.3
Excavated bed for outlet culverts	Hold Point	Completion of excavation of bed	8150.6.5.4
Bed and embedment compliance including layer control of	Witness Point	During culvert installation	8150.6.5.4



backfilling			
Laying of outlet culverts	Hold Point	Prior to backfilling	8150.6.5.4
Prepour set up of overflow pit structure including floor	Hold Point	Prior to each concrete pour for levels, set up of formwork and reinforcing	8150.6.5.4
Stripping of formwork and curing of concrete in overflow pit	Hold Point	After concrete pour has occurred, minimum 3 days before stripping and 7 days of curing.	8150.6.5.4
Submission of survey and test results	Hold Point	At completion of installation of outlet pipe and overflow pit.	8150.6.5.4
Outlet structured installed and compliant with design drawings	Witness Point	After outlet culverts have been laid	8150.6.5.4
Liner extension under weir	Witness Point	At time of formwork set up for weir	8150.6.5.4
Prepour set up of weir structure	Hold Point	Prior to each concrete pour for levels, grade, set up of formwork and reinforcing	8150.6.5.4
Stripping of formwork and curing of concrete in weir	Hold Point	After concrete pour has occurred, minimum 3 days before stripping and 7 days of curing.	8150.6.5.4
Installation of rock protection to weir and correct size	Witness Point	After rock protection has been installed	8150.6.5.4
High flow by-pass drainage constructed as per project documents and approved environmental plan	Witness Point	After works are complete on the high flow by-pass drainage	8150.6.5.4
Compliance of hydraulic structures to specification and tolerance requirements	Hold Point	At completion of works, submission of all survey and test results for review and approval	8150.6.5.4
Installation of liner	Witness Point	At completion of installation for extents and joints	8150.6.6
Testing of impermeable liner for water tightness	Hold Point	Prior to underdrainage approval to proceed from geotechnical engineer	8150.6.6
Under drainage pipes, joints, and risers installed to design drawings requirements	Hold Point	Before backfilling over under drainage pipes	8150.6.7
Under drainage works process complied with.	Witness Point	During installation of drainage pipes, joints, and risers prior to backfilling over with drainage aggregate	8150.6.7
Survey of underdrainage pipes and underdrainage Inspection and approval to proceed	Hold Point	At completion of underdrainage layer, approval to proceed with transition layer	8150.6.7
Temporary cease of works (if required)	Hold Point	Prior to commencing the transition layer (mulch and plantings must be on site)	8150.6.7
Landscape prestart meeting	Hold Point	Prior to mulching and planting occurring and Superintendents approval to proceed	8150.6.3.2
Verification of the procurement of mulch and plantings available once filter media has been installed	Milestone	Landscaping prestart meeting	8150.6.3.2
Site delivery and verification of the transition layer material quality	Witness Point	Delivery to site prior to installation	8150.6.8



Rectification works to drainage layer and pipes (as required)	Hold Point	During and at the completion of installing the transition layer material	8150.6.8
Survey of levels and depth of transition layer	Hold Point	After installation of underdrainage material	8150.6.8
Completion of Appendix A form "C's"	Hold Point	Approval to proceed with the filter media layer verifying all underlying layers are compliant	8150.6.8
Site delivery and verification of filter media quality	Witness Point	Delivery to site prior to installation	8150.6.9
Installation in layers (as required) and light compaction of filter media	Witness Point	During installation of filter media	8150.6.9
Survey of levels and depth of filter media layer	Hold Point	After installation of filter media	8150.6.9
Completion of Appendix A form "C's"	Hold Point	Approval to proceed at the completion of the filter media layer verifying all layers are compliant	8150.6.9
Inspection of all concrete access works (excavated floor, prepour, curing, and formwork stripping)	Hold Point	Concrete pours and compliance to MRTS 03/04, MRTS70 and MRTS71	8150.6.10
Bioretention basin liner installed correctly under sediment forebay	Witness Point	During installation of liner and set up of sediment forebay before pouring	8150.6.10
Sediment forebay scour protection installation	Witness Point	During and at completion of installation of scour protection	8150.6.10
Installation of energy dissipators	Witness Point	During and at completion of works for compliance to design drawings	8150.6.10
Inspection of all concrete access works (excavated floor, prepour, curing, and formwork stripping)	Hold Point	Concrete pours and compliance to MRTS 03/04, MRTS70 and MRTS71	8150.6.11
Site delivery and verification of mulch quality	Witness Point	Delivery to site prior to installation	8150.6.12
Survey of levels and thickness of mulch layer	Hold Point	After installation of mulch	8150.6.12
Installation of HES Basin and flow controls (as required)	Witness Point	After filter media layer installed and sacrificial layer installed	8150.6.13.1
Protective sacrificial layer installed (as required)	Witness Point	At completion of system works	8150.6.13.2
Site inspection of plants delivered, poor health or damaged plants to be returned to nursery and replaced.	Hold Point	At delivery to site prior to planting out	8150.6.14
Correct plantings, quantity, layout, and planting process (species zonation)	Hold Point	During planting out of bioretention system	8150.6.14
Install Plantings as per works procedure and MRC requirements	Witness Point	During planting works for verification to MRC specifications	8150.6.14
Establishment and watering program	Witness Point	At completion of works and in line with approved maintenance plan	8150.6.14
Make safe site and install fencing	Witness	At completion of works	8150.6.15



if required	Point		
Site ESC Measures in place	Hold Point	Ongoing and at end of project	8150.6.15
“On Maintenance” site inspection	Hold Point	At completion of works	8150.7.1
As-Constructed documentation	Hold Point	4 weeks prior to practical completion being requested.	8150.7.2
Maintenance of bioretention system and lodgement of weekly maintenance log and details	Witness Point	As required by the approved maintenance management plan for the respective Defects Liability Period and Establishment period	8150.7.1

8150.4.3 Construction Tolerances

Unless otherwise approved by the Superintendent the following construction tolerances shall apply as to this Specification;

The construction activity outcome shall not depart from the widths, lengths, heights, and shapes specified by the relevant specifications as applies to this specification;

- Concrete tolerances in accordance with MRTS70 Concrete,
- Earthworks tolerances in accordance with MRTS04 General Earthworks,
- Bedding, laying, and backfill to culvert tolerances in accordance with MRTS03,
- Pavement tolerances in accordance with MRTS05 Unbound Pavement,
- Bioretention basin infrastructure tolerances in accordance with PSP – Healthy Waters.

Where there is conflict between specification references the order of documentation shall be the PSP – Healthy Waters, Water by Design Guidelines, then MRC Supplementary Specifications, followed by TMR Specifications as referenced.

Tolerances specific to the project are detailed on the design drawings and are included in Clause 2 of MRC Supplementary Specification Annexure 8150_1 Bioretention Systems

All surveys are to be carried out by a qualified Surveyor, with data collected to comply with MRC Design Guideline D20 - Drawings and documentation for as-constructed purposes.

The following tables 3 and 4 set out those requirements for the construction of bioretention systems as relates to this specification;

Table 3 Tolerances (Design requirements – Table 24 WBD Bioretention Technical Design Guidelines)

Component	Considerations	Tolerance
Hydraulic structures	The construction of hydraulic structures must ensure design levels are achieved. The tolerances given apply to: <ul style="list-style-type: none"> • Inlet pipes. • Overflow pit crest level. • Under-drainage connections to overflow pit. • Outlet pipe invert levels (upstream and downstream). • High flow bypass weirs. 	±25 mm or ±15 mm when installed in streetscape
Under-drainage pipes	To freely drain the base of bioretention systems, the under-drainage pipes must be sloped towards the overflow pit at a grade of >0.5% in most cases. Installation of the under-drainage pipes should meet the recommended tolerance to ensure this grade is achieved.	±0.2%



Earthworks (base of bioretention system)	To enable the perforated under- drainage pipes to drain freely, the base should be sloped towards the outlet pit at a minimum of 0.5% longitudinal grade. It is also important to ensure the base is free from localised depressions. This means earthworks bulking and trimming needs to be carefully undertaken.	+25mm – Base of bioretention system ± 0.2% - Departure from grade
Saturated zone (where required)	The depth of the saturated zone should ensure at least 400 – 500 mm of ponding in the base. The material used is coarse gravel (10 – 20 mm) with a mix of carbon sources.	±25 mm
Drainage and transition layers	The depth of the drainage layer should ensure at least 50 mm of aggregate cover over the under- drainage pipes. The depth of the transition layer should ensure that 100 mm of coarse sand covers the aggregate.	±25 mm
Surface level (filter media)	The surface of the filter media must be free from localised depressions to ensure even distribution of stormwater flows and to prevent localised ponding. Compaction should be light and even across the surface.	±25 mm, though achieving a flat surface on large bioretention systems can be challenging so a separate tolerance is provided. ±40 mm for filter media for systems greater than 300 m ² , provided the average extended detention depth is within 25 mm of the design.
Embankments and bunds	Embankments or bunds around bioretention systems hold stormwater within the extended detention during rainfall. If required, they force runoff from larger rainfall into the hydraulic structures. Therefore, the crest level on embankments or bunds is important.	-25 mm +50 mm It is preferable for the bund to be higher than lower.

Survey frequency shall reflect and comply with the following requirements;

- Table 2.6 Survey Spacing Requirements for Bioretention Systems of WBD Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands, and
- Additional sufficient survey to accurately represent size, shape, grades, and changes of level to verify compliance of system to design requirements."

8150.5 Preliminary

As part of the works the Contractor shall be aware of other gross pollutant and sediment measures required to be installed as part of the project, these shall be installed in accordance with the relevant MRC and/or TMR specification for that type of treatment infrastructure as referenced either in this supplementary specification or within the design drawings and documents.

The Contractor is to submit for approval the following documentation 4 weeks prior to commencing work or a prestart is conducted:

- Landscape Architect endorsed construction procedure covering all facets of the bioretention system civil and landscaping works, including sub-contractor qualifications and experience to carry out the required works. The works procedure shall generally follow the civil construction process documented in WBD Guideline – Guidelines for the Construction and Establishment of



Bioretention Systems and Wetlands but modified to reflect and suit site specific constraints and requirements including where works are;

- 1) New systems,
 - 2) Rectification of existing systems.
- Works procedures for the installation of complimentary gross pollutant and sediment control structures as required by the design drawings.
 - Maintenance management plan of bioretention system based on MRC Supplementary Specification 8317 during;
 - 1) Construction,
 - 2) Defects liability period during system/plantings establishment,
 - 3) Full defects liability period, and
 - 4) Ongoing maintenance plan as an asset after handover in order to achieve maximum benefit and useful life from the system.
 - Workplace Health & Safety Plan, including public safety where the use of a HES Basin is proposed,
 - Environmental Plan outlining bioretention type and site specific Erosion and Sediment Plan/s,
 - Quality Management Plan outlining the requirements of Section 8150.4 as a minimum,
 - Traffic Management Plan and TGS's (as required),
 - Experience and qualifications of all personnel carrying out works, including subcontractors,
 - Registered Landscape Architect endorsement of details of all materials to be used and all required test results verifying the material compliance,
 - Material tests peripheral to the bioretention system (topsoil, mulch, amelioration process),
 - Temporary fencing and permanent public exclusion measures from bioretention basin,
 - Details of plant selection and sourcing including the process for acclimatisation endorsed by Registered landscape Architect.

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Other preliminary requirements unique to the project will be listed in the MRC Supplementary Specification Annexure 8150_1 Bioretention Systems.

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8105.5.1 Materials

Prior to procurement and delivery to site the Contractor shall submit test results and manufacturers certifications of all materials for approval by the Superintendent at least 4 weeks prior to works commencing or the Prestart meeting occurring.

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Supply of all materials to site is the responsibility of the Contractor at their cost, where items are Principal supplied the nominated storage site shall be obtained from MRC Supplementary Specification Annexure 8150_1 Bioretention Systems Section 3 and shall be the point of supply.

Filter media, transition layer, and drainage layer materials for use in the construction of the bioretention system shall conform to Mackay regional Council planning Scheme Policy – Healthy Waters ~~Water By Design~~ “Specifications for Bioretention filter Media”, this also includes where design drawings indicate the inclusion of compost. All test results shall be endorsed by the project AILA.

General use mulch and topsoil shall comply with MRC Supplementary Specification 8300. Mulch for use within the bioretention system shall comply with MRC Planning Scheme Policy – Healthy Waters.

The liner/s shall comply with their purpose of use, impermeable liners shall not allow water to be infiltrated into the surrounding soil with a hydraulic conductivity of less than $1 \times 10^{-9} \text{m/s}$.



Underdrainage shall comply with Table 2.2 of Water By Design Guidelines for Construction and Establishment of Bioretention Systems.

Plants and trees shall be from MRC Approved Plant Species List, from a certified nursery, and be of the species and size as required by the design drawings and shall be acclimatised for a minimum 12 weeks prior to planting. The transporting and delivery of plantings shall take place by closed in and covered vehicles.

The superintendent is to carry out a nursery inspection with the Contractor to approve of the plantings and inspect the plants at time of delivery. Any plant/s that are not in good health or transported by closed in vehicle shall be rejected and returned to the nursery at no cost to the principal.

HOLD POINT

Where plantings are tube or hiko stock these shall be local species and be sourced from the Mackay Natural Environment Centre (MNEC) and verification at delivery time of their origin.

Embedment, excavation floor, and bund material shall conform to the requirements of MRTS03 and MRTS04 for the activity being carried out.

Concrete and reinforcing shall conform to the requirements of MRTS70, MRTS71, and MRTS03. Where glues and sealants are required, these shall comply with their recommended use and the manufacturers requirements and be used as set out in the approved construction procedure submitted to Council.

Where the outlet pipe may be inundated from flood events or subject to tidal effects the outlet to the overflow pipe/s shall have a Tideflex Duckbill Check Valve installed. Consideration to alternatives will only be considered where it can be proven the outlet is not susceptible to inundation from tidal influence, rises in water course levels, or flash flooding of the outlet and the alternative has the same if not better properties of sealing the outlet.

8150.5.2 Personnel

Personnel, sub-contractors and suppliers utilised in the installation of bioretention systems shall have previous experience in the installation, reconstruction, and renewal of bioretention systems.

The Contractor shall provide documented evidence for the Superintendent's approval to demonstrate the experience, qualification, skills and training of proposed personnel, sub-contractors and suppliers at least 10 working days prior to the relevant personnel, sub-contractors and suppliers undertaking works on the project.

MILESTONE

8150.5.4 Environmental

The Contractor shall submit an Environmental Works Plan to the Superintendent for review and approval a minimum 4 weeks prior to site works commencing or the request for a prestart meeting is submitted. The Environmental Plan and site works shall reflect the requirements of and be carried out in accordance with MRTS51.

MILESTONE

8150.5.5 Erosion and Sediment Control

The Contractor shall submit an Erosion and Sediment Control Plan to the Superintendent for review and approval a minimum 4 weeks prior to site works commencing or the request for a prestart meeting is submitted. The ESC Plan and site works shall comply with the requirements of and be carried out in accordance with MRTS52 and detail site requirements and ESCP changes to reflect the various stages and activities and timing of works on site.

MILESTONE



8150.5.5 Safety During and at Completion of Works

Safety fencing, including temporary safety fencing, shall be provided generally in accordance with the requirements QUDM s12.4 Safety fencing. Where water is 250mm or deeper non-climbable safety fencing and/ or perimeter planting to control public access to the open body of water must be installed. The contractor shall include this requirement in their works procedure plan submitted to the Superintendent for approval.

MILESTONE

8150.6 Construction

This section lays out the works operations with more detail based on specific requirements of this supplementary specification. Some activities may appear to include items which are stated within other specifications, the purpose is to reinforce that requirement specific to this supplementary specification.

All works shall be carried out in the locations and in accordance with the details shown on the design drawings and respective specifications for that activity and as per the approved works procedure.

Work operations fall into 2 Categories;

1. New and Reconstructed Bioretention Systems – Works entail the construction or full reconstruction of the bioretention system.
2. Rectification of existing Bioretention System – Works entail cost effective rectification works to restore the drainage, amenity, and some water quality treatment functions of the bioretention system to restore a poorly performing or dysfunction bioretention system to a functional state.

Where the works are rectification of the existing bioretention system the Contractor shall not commence works on the transition layer until all plants and mulch are available on site, this is to minimise contamination of the filter media and the transition layer materials.

Where site works (including constructability) are in conflict with the design drawings and/or project documentation the Contractor is to immediately raise this conflict with their RPEQ Engineering Consultant or Registered Landscape Architect and the Superintendent. Depending on the nature of the conflict the RPEQ Engineering Consultant or Registered Landscape Architect shall submit an endorsed resolution for the conflict to the Superintendent for approval. This includes foreseen conflicts being reported during the works planning by the Contractor prior to commencing works.

8150.6.1 Work Operations

Work operations incorporated in this item are those included in Clause 2.1.5 of MRS01 ‘Introduction to Standard Specifications’ and the following work scope activities and associated sub activities;

8987.6.1.1 Work Scope

The scope of works (including all associated sub activities) covered under this specification shall include but not limited to the following:

- Demolition of existing components or structure/s where rectification works are carried out,
- Storage of identified materials for reuse, including plants, and disposal of waste materials,
- Supply and installation of temporary fencing and permanent safety measures to bioretention basin as approved.
- Earthworks required to form the bioretention system,
- Install hydraulic structures including scour protection,
- Supply and installation of liner including joining of edges as required by the manufacturer,



- Supply and installation of under drainage pipe system,
- Supply and install drainage layer,
- Supply and install transition layer,
- Manufacture, supply and install filter materials,
- Install sediment forebay and scour protection,
- Install access track to forebay and any other access requirements to service the basin,
- Install dissipater structures and flow distribution structures (as required)
- Selecting, sourcing, and delivery of plants,
- Installing and establishing plants,
- Maintenance of plantings including watering,
- Procurement, supply and installation of mulch and netting (as required),
- Compliance requirements, Survey and Testing of media/material layers preconstruction and insitu during and after construction
- Preparation and submission of QA documentation.

8150.6.2 Supply of All Materials.

All materials, plant, and labour required to carry out the works under this Specification is to be supplied by the Contractor, where the materials are Principal supplied the designated storage site will be the point of supply for the purposes of this Specification.

8150.6.2.1 Plant Sourcing, Timing, and Delivery

The sourcing of plantings including turf shall be as required by MRC Supplementary Specification 8300 - Soft Landscaping and Horticultural Treatment. Tube and hiko stock shall be sourced from Mackay Natural Environment Centre (MNEC).

The Contractor shall ensure the sourced plantings are mature, sun-hardened, and contain a fully established root ball that does not crumble when removed from its container. Ideally, the plants will be on average 300 – 500 mm high and not less than 200 mm high.

Tube and hiko stock sourced for use in the bioretention basin shall not leave the MNEC until they are deemed suitable for planting out, this includes maturity and seasoned.

The Contractor shall ensure sufficient lead time and planning to enable the specified plants can be sourced and will be ready for delivery when required, this also means where seed harvesting and propagation can occur.

Where plantings are sourced from a registered nursery the contractors Registered Landscape Architect (or Representative) shall make arrangements with the Superintendent to carry out a nursery inspection to ensure the plants are identified, tagged, and climatized prior to delivery to site. In the case where an onsite nursery was approved the plants shall be inspected prior to being planted.

HOLD POINT

Any materials which are damaged or not within the specification requirements are not to be used and are to be returned to the supplier.

8150.6.3 Prestart Meetings



The Contractor shall organise the holding of prestart meetings for civil works and landscaping works, these shall be held separately as differing personnel and consultants will need to be present at the respective meetings.

8150.6.3.1 Prestart Meeting Civil Works

Appendix “A” Form “ Sign off Form and Prestart Meeting”

The Contractor shall hold a prestart for the works whereby the works program and procedure, testing, inspections, material compliance, and construction risks shall be discussed and documented. A separate prestart will be held for landscaping works.

All documentation which was required to be submitted 4 weeks prior form the basis of the minutes of the prestart meeting, no works shall commence until the Superintendents approval to proceed is granted.

HOLD POINT

8150.6.3.2 Landscaping Prestart Meeting

Appendix “A” Forms “ Sign off Form and Prestart Meeting”

The Contractor shall hold a prestart for the landscaping works whereby the works program and procedure, testing, inspections, material compliance, and construction risks shall be discussed and documented.

HOLD POINT

All documentation which was required to be submitted 4 weeks prior to works commencing and form the basis of the minutes of the prestart meeting.

Approval for works commencing on the drainage layer is dependent on the procurement and procurement and availability of approved filter media, mulch and plantings being delivered to site, the Contractor shall ensure their planning takes this into account as works will not be given approval to proceed by the Superintendent until this requirement can be verified.

HOLD POINT

8150.6.4 Demolition and/or Rectification Works, as required.

Prior to demolition works occurring the Contractor shall inspect the site/s with the Superintendent to verify the extent of demolition, and take up and store identified components, materials, and plantings deemed able to be recovered and reused during rectification works.

HOLD POINT

Remove, demolish, or modify existing landscaping and infrastructure (including outlet weir and pipe, and overflow pit) as required by the design drawings and/or project documents for the specific site/s. Upon completion of demolition or modification works the Superintendent is to verify the extent of the works carried out. Any unapproved demolition works shall be reinstated at no cost to the Principal.

HOLD POINT

Where rectification of existing concrete structures occurs which exposes reinforcing the Contractor shall ensure the reinforcing is sealed, the method shall be as per the Contractors Works procedure for these activities. The Superintendent shall conjointly inspect all exposed reinforcing with the Contractor.

WITNESS POINT

Where concrete works are required as part of the renewal works these shall be carried out in accordance with MRTS70 and MRTS71, including all inspections and testing requirements. Formwork



shall be compliant to the requirements of AS3610 where MRTS70 does not address specific formwork requirements.

The Contractor shall present all formed up concrete works for inspection by the Superintendent prior to the concrete pour occurring.

HOLD POINT

8150.6.5 Earthworks and Hydraulic Structures to Bioretention System

8150.6.5.1 Earthworks to Bioretention System

Appendix “A” Form “B”

Prior to works commencing the Contractor shall carry out a layout survey for the bioretention system in accordance with the design drawings and/or project documentation with the Superintendent and install temporary measures to restrict access to the public.

HOLD POINT

Carry out earthworks as required to the base and batters/bunds to the design drawings and/or project documentation profile including grade. All earthworks are to be carried out in accordance with MRTS04.

Where bunds, batters, and high flow swales are to landscape the topsoil and mulch are to comply with and be installed as required by MRC Supplementary Specification 8300 - Soft Landscaping and Horticultural Treatment in accordance with the design drawings and/or project documentation.

The finish of the excavated floor shall comply with the design drawings and/or project documentation and be compliant to the levels, grades, and tolerances as required for the nominated Type of bioretention basin in accordance with WBM Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands.

HOLD POINT

8150.6.5.2 Utilising or disposing of surplus material.

The contractor is to ensure all materials (including landscaping) identified for reuse are removed to an agreed storage site. All materials not identified for reuse shall be disposed of by the Contractor as identified in their Works procedure and Environmental Plan at no cost to the Principal. . If disposal offsite is to occur and dependent on volumes materials are to be disposed at regulated waste facilities or at site with current Bulk Earthworks approvals in place. Spoil disposal criteria and methodology as per MRTS 51 and EP175 are to be followed.

8150.6.5.3 System Inspection Prior to Installation Works Commencing

Appendix “A” Form “A”

The contractor shall carry out a geometric survey for As-Constructed documentation of the bioretention system and be presented to the Superintendent for review, as part of the works verification the works shall also be inspected by the Contractor and Superintendent for compliance to the design drawings and/or project documentation.

HOLD POINT

8150.6.5.4 Construction of Hydraulic Structures

Appendix “A” Form “A”

1) Overflow Pit and Outlet Pipe

Layout and construction of works shall comply with the design drawings and/or project documentation. All works associated with the construction of the overflow pit and outlet pipe/s



shall be carried out in accordance with MRTS03, MRTS04, MRTS70, MRTS71, and AS3610 where MRTS70 does not address specific formwork requirements.

WITNESS POINT

All inspection and testing shall be carried out as required by the relevant specifications. Survey carried out, alignment and levels comply with the design drawings. All survey and test results submitted to Superintendent for review and approval.

HOLD POINT

During prepour forming of the overflow pit stubs shall be put in place for the inlet and outlet pipes, alternative drilling of holes after pouring shall only occur with the Superintendents approval.

The outlet to the overflow pipe/s shall have a Tideflex Duckbill Check Valve installed. Alternatives will only be considered where it can be proven the outlet is not susceptible to inundation from tidal influence, rises in water course levels, or flash flooding of the outlet.

WITNESS POINT

2) Bioretention Weir

The overflow weir is located and constructed as per the design drawings and/or project documentation. Levels and grades comply with the design requirements and tolerances, the structure is to be keyed into the bund walls with the liner extending under the weir.

WITNESS POINT

The concrete constructed weir is to comply with MRTS70, MRTS71, with all inspections and testing applying as per the relevant specification.

HOLD POINT

Rock protection is to be installed as per the design plans and/or project documentation, if there is a lack of detail IPWEAQ Standard drawing DS-076 shall apply.

WITNESS POINT

3) High flow by-pass drainage

The high flow by-pass drainage is located and constructed as per the design drawings and/or project documentation. Levels and grades comply with the design requirements and tolerances, constructed such to prevent afflux of water from downstream discharge receptacles, including 1% AEP (Annual Exceedance Probability) of riverine flooding and 300mm above Highest astronomical Tide (HAT).

The high flow by-pass drainage is to be vegetated as per Plans and be operational while the bioretention system is being constructed to direct stormwater flows away from the system. Erosion and sediment control measures shall be installed as per the approved Environmental plan and maintained.

WITNESS POINT

The finish of the hydraulic structures shall comply with the design drawings and/or project documentation and be compliant to the levels, grades, and tolerances as required for the nominated Type of bioretention basin (1, 2, 3, or 4) in accordance with Table 2.5 of WBM Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands. All survey and test results shall be submitted to the Superintendent for review and approval.

HOLD POINT



8150.6.6 Carrying out All Works for the Installation of the Liner (where required)

Appendix "A" Form "B"

Install approved liner for the bioretention basin Type ensuring it extends to the height as required by the design drawings and/or the project documentation, if not indicated extend to a minimum of 500mm beyond the side walls or to the top of the batter. The liner is to also extend under the inlet/course sediment bay and outlet weir.

WITNESS POINT

Where impermeable liners are installed protrusions through the liners such as outlet pipes shall be treated to ensure a watertight seal. Testing and sign-off of liners by a geotechnical engineer must be obtained stating that the liner has been installed in accordance with the product specifications and is watertight (impermeable).

HOLD POINT

Once in place the batters are to be topsoiled with approved topsoil material.

8150.6.7 Carry Out All Works for the Installation of Underdrainage Pipes and Drainage Aggregate layer.

Appendix "A" Form "B" and "C"

The contractor shall install the under-drainage pipes and drainage aggregate layer as required by the Design Plans and/or project documentation. Prior to backfilling the drainage pipes the contractor shall carry out a survey to ensure the pipe/s grade is compliant and no humps or hollows are present.

HOLD POINT

Only the pipes along the base of the drainage floor are to be perforated, the 45 degree joiner and the clean out pipes are not to be perforated.

Included as part of these works is the installation of clean out points which shall be finished 150mm above the finished bioretention planting/mulch layer.

No heavy plant shall be driven on the drainage layer either before, during, or after the installation process begins, the Contractor shall follow their approved process of laying and backfilling.

WITNESS POINT

Prior to installation of the transition layer the Contractor shall present the finished works for inspection by the Superintendent along with the surveyed under drainage pipe system and finished levels of the drainage layer and layer depth/thickness.

HOLD POINT

If approved to proceed mulch and plantings are not on site, works shall temporarily cease until the Superintendent is satisfied the transition layer and filter media will not be contaminated. If contamination occurs the materials shall be removed and reinstated at no cost to the Principal.

HOLD POINT

8150.6.8 Carry Out All Works for the Installation of Transition Layer.

Appendix "A" Forms "C"

The contractor shall inspect the transition layer material for compliance to the approved material. Initially delivery dockets shall be used with audit testing to follow up.

WITNESS POINT



The contractor shall install the transition layer as required by the Design Plans and/or project documentation and be compliant to the levels, grades, and tolerances as required for the nominated Type of bioretention basin in accordance with WBM Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands.

Works shall be carried out as per the Contractors work procedure and ensure the under drainage layer including pipes are not damaged. If any section of the under drainage is damaged the Contractor shall cease works on the transition layer, notify the Superintendent, and rectify the damaged section. The superintendent is to approve of the rectification method and works.

HOLD POINT

Prior to installation of the filter media layer the Contractor shall carry out a survey and present the finished works for inspection by the Superintendent along with the surveyed transition layer finished levels and layer depth/thickness.

HOLD POINT

When works comply all parties are to complete the sign off of the relevant Water BY Design “Form C – Install Filter materials” as part of the Quality Documentation verification process.

HOLD POINT

8150.6.9 Carry Out All Works for the Installation of Filter Media Layer.

Appendix “A” Forms “C”

The contractor shall inspect the filter media layer material for compliance to the approved material. Initially delivery dockets shall be used with audit testing to follow up.

WITNESS POINT

The contractor shall install the filter media material layer as required by the Design Plans and/or project documentation and shall be carried out as per the Contractors work procedure which shall document laying to avoid compaction of the filter material. Table 2.5 of WBD Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands lists the construction tolerance requirements for installation of filter media.

Where the depth of filter media is greater than 500mm’s it shall be installed in 2 even lifts with light even compaction to remove air voids. Compaction shall be such that a post hole shovel can dig down through the filter media and transition layers without resistance. The Contractor shall dig audit holes to verify the light even compaction.

WITNESS POINT

At the completion of works after a spreader bar has flattened the surface the Contractor shall carry out a survey and present the finished works for inspection by the Superintendent along with the surveyed filter media layer finished levels and layer depth/thickness.

HOLD POINT

When works comply all parties are to complete the sign off of the relevant two form Water By Design “Form C – Install Filter materials” as part of the Quality Documentation verification process.

HOLD POINT

8150.6.10 Bioretention System Sediment Forebay (where required)

Appendix “A” Form “E”

The layout and construction of works shall comply with the design drawings and/or project documentation, and MRC PSP – Healthy Waters. On systems >400m² in order to ensure evenly



distributed flows across the filter media multiple flow distribution points shall be installed emanating from the sediment forebay/s shall be installed either from;

- Multiple inflow points,
- Distribution channels along the edge of the bioretention system.

All works associated with the construction of the sediment forebay including scour protection shall be carried out in accordance with MRTS03, MRTS04, MRTS70, MRTS71, and AS3610 where MRTS70 does not address specific formwork requirements.

All inspection and testing shall be carried out as required by the relevant specifications, these include but not limited to the excavated floor, all concrete prepour, curing and stripping of formwork.

HOLD POINT

Where a liner is installed as part of the bioretention base it shall be extended under the forebay by a minimum of 300mm.

WITNESS POINT

The forebays nib wall and scour protection shall be installed as per the design drawings and/or project documentation, where these do not address specific requirements refer to IPWEAQ STD DRW DS-075. The rock protection apron shall line the full length of the nib wall.

WITNESS POINT

Where design flow velocities entering the forebay will exceed 2.0m/sec energy dissipators shall be installed as required by the design drawings and documentation and comply with MRC Supplementary Specification 8207 Dissipator Structures and Queensland Urban Drainage Manual (IPWEA).

WITNESS POINT

8150.6.11 Bioretention System Access

The bioretention system shall have provision of access to:

- The sediment forebay of a minimum 2.5m wide concrete access to the course sediment forebay by vehicular traffic for maintenance, the grade of access track shall be between 1 in 3 and 1 in 4,
- Outlet infrastructure by small earthmoving equipment, this includes such structures as Tideflex Check Valve outlets,
- Perimeter maintenance access to the bioretention basin or each cell shall be in line with the requirements of Table 10 of WBD Bioretention Technical Design Guidelines.

All accesses shall be constructed in concrete, after setup of formwork and prior to concrete pour the Contractor shall present for inspection by the Superintendent the formed formation along with the survey for the width and grade of the access track/s. Concrete pour, curing, and formwork stripping to be in accordance with MRTS70 and MRTS71, including all inspections and testing.

HOLD POINT

8150.6.12 Mulch Installation

Appendix "A" Form "G"

The approved mulch shall be installed to the system in the thickness as designated on the design drawings and/or the project documentation, this also includes the consideration of organic matting to protect the surfaces.

The Contractor is to ensure the mulch delivered complies with MRC PSP – Healthy Waters for the bioretention basin surface plantings and MRC Supplementary Specification 8300 - Soft Landscaping and Horticultural Treatment for the bunds and general landscaping outside of the bioretention basin surface



area, and have site audit test carried out to verify the delivered mulch complies with the relevant specification for the mulches use. No mechanical plant or heavy equipment shall be utilised in the distribution and installation of the mulch.

WITNESS POINT

The contractor shall carry out a survey and present the finished works for inspection by the Superintendent along with the surveyed mulch layer finished levels and layer depth/thickness. If the submitted documentation including audit test results comply with the requirements of this supplementary specification the Superintendent shall grant approval to proceed with plantings.

HOLD POINT**8150.6.13 Install protective measures.****Appendix "A" Form "F"****8150.6.13.1 Use as a HES Basin**

The contractor shall indicate within their construction procedure whether a HES basin will be in operation, if so, the following shall apply;

- The various flow controls for the HES basin should be installed in accordance with the civil design drawings. Refer to a recognised guideline, for example the *Best practice erosion and sediment control* (IECA 2008).
- The base of the HES basin should be stabilised to avoid scouring and resuspension of sediment. This may involve the installation of turf and/or filter cloth in the base of the basin.
- During the building phase, operate the bioretention system as a HES basin and maintain the structure as such. When 80% of the building in the catchment is complete, the next steps can proceed.
- Remove and dispose of sediment, turf, topsoil, and lining as per the approved environmental plan, and remove unnecessary sediment basin flow controls.

WITNESS POINT**8150.6.13.2 Use as a Bioretention Basin**

If a HES Basin is not part of the operations, then a protective sacrificial layer is to be installed as required by the design drawings and/or project documents, the following shall apply;

- Cover the surface of filter media with filter cloth (geofabric) and place 50 mm of topsoil and turf over the filter cloth.
- Following installation of protective layers, the site superintendent and asset designer will inspect the bioretention system with the civil contractor. If approved, sign-off *Form F* will be completed and, along with photos, stored with relevant civil construction documentation.
- During the building phase, the bioretention system will operate as a shallow sediment basin and protect the filter media from sediment and clogging.
- When 80% of the building in the catchment is complete, the next steps can proceed.
- Remove and dispose of sediment, turf, topsoil, and lining as per the approved environmental plan.

WITNESS POINT**8150.6.14 Plantings****Appendix "A" Form "G"**



Plantings shall comply with the requirements of MRC PSP – Healthy Waters and Clauses 8150.5.1 and 8150.6.2.1, including mulch installation.

The transporting of all plantings shall be in closed in and covered vehicles, plants that are not transported in this manner shall be rejected, returned to the nursery and replaced with the same approved species.

Upon delivery the Contractors AILA and the Superintendent shall inspect the plantings for compliance to the nursery inspection for species, numbers, maturity, and health, any plantings which are poor in health or damaged shall be returned to the nursery and replaced with the same approved species.

HOLD POINT

The Contractor shall lay out the plants prior to planting to verify the zonation of the species to the design drawings and/or project documentation, the Landscape Architect and the Superintendent shall confirm compliance with the design drawings.

HOLD POINT

All works installing and planting shall be carried out in accordance with MRC Supplementary Specification 8300 - Soft Landscaping and Horticultural Treatment using hand tools or light machinery like augers. Where there is a lack of detail plantings shall be installed in accordance with WBD Guidelines for the Construction and Establishment of Bioretention Systems and Wetlands.

WITNESS POINT

Establishment and watering shall be carried out in accordance with the submitted Maintenance Management Plan.

WITNESS POINT

8150.6.15 Make Safe and Clean Work Site

Prior to works acceptance the Contractor shall remove any temporary barriers/fencing and ensure that non-climbable fencing and/or perimeter planting to control public access is installed, fencing shall be compliant with QUDM s12.4 Safety fencing.

WITNESS POINT

The site is to be cleaned of all debris, excavated material, and construction materials and returned to its natural state prior to the “On Maintenance” inspection occurring.

Disturbed areas are to be rehabilitated as required by the design drawings and erosion and sediment control measures installed as per the Contractors approved Erosion and sediment control Plan and as directed by the Superintendent.

HOLD POINT

8150.6.16 Defects Liability Period/s New and Reconstructed Bioretention Systems

Appendix “A” Form “H”

The following defects liability periods shall apply after conjoint inspection between the Contractor and the Superintendent for new and reconstructed works;

- (1) 12 months for all civil works as well as underdrainage layer pipes and materials, transition layer, filter media, mulch.
- (2) Until 80% build out of catchment area a defect liability period on the sacrificial layer, and
- (3) After landscape planting is complete, a defect period in line with Section 2.4.4.4 of MRC PSP – Healthy Waters shall apply. If establishment has not occurred within the appropriate period, it



shall be extended by the Superintendent until such time as the plantings have established themselves.

The following defects liability periods shall apply after conjoint inspection between the Contractor and the Superintendent for rectification works;

- (1) 12 months for all civil works as well as underdrainage layer pipes and materials, transition layer, filter media, mulch, irrigation, and plantings on berms/levees.
- (2) After landscape planting is complete a 12 week establishment period applies to the plantings only, any plants which show signs of poor health within or at the end of this period shall be replaced. If establishment has not occurred or there is not 90% cover within the 12 week period, it shall be extended by the Superintendent until such time as the plantings have established themselves to the requirements of MRC PSP – Healthy Waters.

8150.7 Post construction

8150.7.1 Works Inspection and Future Maintenance – Defects Liability Period

Appendix “A” Form “D”

The Contractor shall arrange for the Superintendent to carry out an “On Maintenance” site inspection, this inspection and submitted As Constructed Documentation shall determine the timing of the defects liability period.

HOLD POINT

Maintenance of the bioretention system shall be carried out by the Contractor for the term of the Defects Liability Period as laid out in the approved Maintenance Management Plan approved by Council. All maintenance activities shall reflect as a minimum the requirements set out in MRC Supplementary Specification 8317 - Landscaping and Horticultural Treatment Maintenance Period.

WITNESSPOINT

8150.7.2 Collection and submission of all As Constructed data including QA data requirements.

The Contractor is to supply and submit As-Constructed documentation as required by *MRC D20 - Drawings and Documentation* for approval by the Superintendent 4 weeks prior to requesting a practical completion inspection.

Format of submitted “As Constructed” documentation shall be compliant with MRC Supplementary Specification 8919.

HOLD POINT

8150.8 Measurement and Payment

Provision for these works shall be included in the scheduled unit rate for the items show in Clause 8150.3 of this Supplementary Specification and Annexure. No separate payment will be made for the works specified within this Supplementary specification or it’s annexure.

Version Control:

Version	Description	Reviewed / Endorsed	Date
1.0			23.11.2012
2.0	Review	C. Sultana	25.08.2025



Appendix “A” Forms

Construction and Establishment Sign-Off Forms for Bioretention Systems

CONSTRUCTION & ESTABLISHMENT SIGN-OFF FORMS FOR BIORETENTION SYSTEMS			
Asset location:			
Asset ID:		Development approval #:	
Catchment area (ha):		Bioretention area (ha):	
Civil design drawing #:		Landscape design drawing #:	
SIGN-OFF FORMS			
FORM	DATE COMPLETED	NAME & ROLE (E.G. SUPERINTENDENT)	SIGNATURE
Pre-start meeting			
Form A: Undertake earthworks and install hydraulic structures			
Form B: Install liner and under-drainage			
Form C: Install filter materials			
Form D: Undertake as-constructed survey			
Form E: Install coarse sediment forebay			
Form F: Install protective measures			
Form G: Landscape bioretention system			
Form H: Establish bioretention system			



PRE-START MEETING			
Purpose: To ensure everyone involved in construction works understands the processes and requirements.			
Meeting location:			Date:
ROLE/STAKEHOLDER	COMPANY	CONTACT NAME	SIGNATURE
Asset designer			
Landscape architect			
Civil engineer			
Site superintendent (construction)			
Civil contractor			
Local authority compliance officer			
Other			
Other			
Other			
Other			
BEFORE YOU START	CHECKED	ACTION	
Has the local authority approved works?			
Is there a reliable source of compliant filter materials nearby?			
Is there no significant rain forecast during works?			
Comments (attach and refer to additional pages if necessary)			
Actions (attach and refer to additional pages if necessary)			
<i>Add pages if necessary</i>			


FORM B: INSTALL LINER AND UNDER-DRAINAGE BIORETENTION SYSTEMS

Purpose: To ensure under-drainage is installed correctly and in accordance with the civil design.

ITEMS	CHECKED	SATISFACTORY	ACTION (IF UNSATISFACTORY)	INITIAL
Base of system free from debris.				
Liner correctly installed.				
No socks in or around under-drainage pipes.				
Correct under-drainage has been supplied.				
Under-drainage pipes laid at correct spacing (small system 1.5 m; large system 2 m).				
Under-drainage pipes at correct level (± 25 mm).				
Under-drainage pipes at correct grade (0.5% grade).				
All junctions and connections are appropriately sealed.				
Top of clean out points at design level (50 – 150 mm above filter media surface).				

HOLD POINT: Superintendent and asset designer inspection and sign-off before proceeding.

COMMENTS:

Attach as-constructed survey and photos
Add pages if necessary

Signed by superintendent:

Print name:

Date:

Signed by asset designer:

Print name:

Date:


FORM C: INSTALL FILTER MATERIALS BIORETENTION SYSTEMS

ITEMS	CHECKED	SATISFACTORY	ACTION (IF UNSATISFACTORY)	INITIAL
Base of system free from debris.				
Drainage layer installed to correct depth (\pm 25 mm).				
Transition layer installed to correct depth (\pm 25 mm).				
Filter media installed to correct depth (\pm 25 mm).				
Filter media installed in two lifts.				
Filter media installed to avoid compaction.				
Ultralight, even compaction applied to remove air gaps.				
Spreader bar used to flatten surface of filter media.				
Sediment control fencing erected.				

HOLD POINT: Superintendent and asset designer inspection and sign-off to occur during installation of filter materials. Photos must be taken by the superintendent, the asset designer, or the civil contractor.

COMMENTS:

Attach as-constructed survey and photos

Add pages if necessary

Signed by superintendent: Print name: Date:	Signed by asset designer: Print name: Date:
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FORM F: INSTALL PROTECTIVE MEASURES BIORETENTION SYSTEMS

Purpose: To ensure protective measures are installed correctly to protect the bioretention system while building is occurring in the catchment.

OPTION 1 – HIGH EFFICIENCY SEDIMENT BASIN

ITEMS	CHECKED	SATISFACTORY	ACTION (IF UNSATISFACTORY)	INITIAL
Continuous sediment control fencing is installed around perimeter of filter media and top of batter.				
High efficiency sediment (HES) basin installed in accordance with <i>Best Practice Erosion and Sediment Control</i> (IECA 2008).				
Suitable access is provided to HES basin for inspection and maintenance.				

OPTION 2 – TEMPORARY SURFACE PROTECTION

ITEMS	CHECKED	SATISFACTORY	ACTION (IF UNSATISFACTORY)	INITIAL
Continuous sediment control fencing is installed around perimeter of filter media and top of batter.				
Where landscaping works are not to commence immediately, cover batters with filter cloth.				
Protective covering (e.g. filter cloth + 25 mm topsoil + turf) installed across entire filter media area.				

HOLD POINT: Superintendent or asset designer inspection and sign-off before proceeding.

COMMENTS:

Attach as-constructed survey and photos

Add pages if necessary

Signed by superintendent: Print name: Date:	Signed by asset designer: Print name: Date:
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FORM G: LANDSCAPE BIORETENTION SYSTEM

Purpose: To ensure the plants are supplied, installed, and established correctly and in accordance with the landscape design.

ITEMS	CHECKED	SATISFACTORY	ACTION (IF UNSATISFACTORY)	INITIAL
Mulch complies with specifications.				
Mulch applied to correct depth.				
Mulch secured.				
Supplied plants are correct species.				
Supplied plants are in correct pot sizes.				
Supplied plants at correct maturity and hardened.				
Supplied plants are healthy.				
Plants have been installed at correct planting density (minimum 6 plants/m ²).				
As-constructed drawings marked up with final plant species and densities.				
Mulch is clear of plant stems by approximately 50 mm.				

HOLD POINT: Superintendent and asset designer inspection and sign-off before proceeding.

COMMENTS:

Attach as-constructed survey and photos

Add pages if necessary

Signed by superintendent: Print name: Date:	Signed by asset designer: Print name: Date:
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