FRASER COAST REGIONAL WATER QUALITY STRATEGY IMPLEMENTATION GUIDELINE

Purpose

This guideline is intended to assist with the implementation of the Water Quality Strategy by providing guidance for preferred water sensitive urban design solutions for the Fraser Coast Region. The guideline also informs where opportunities exist for potential offsets where development constraints restrict full compliance with the State Planning Policy.

Council's Implementation Guidelines are intended to apply a standard approach to the interpretation and implementation of relevant aspects of the Planning Scheme. They offer a degree of certainty to Applicants, Council and the community. Where an Applicant is proposing a solution that is different from the guidelines the onus is on the Applicant to demonstrate the facts and circumstances to support the solution. This guideline does not preclude alternative innovative solutions proposed by the Developer or Applicant.

Preferred solutions

For the Fraser Coast Region, locally appropriate stormwater quality management means:

- Being resilient to very long dry periods and intense storms;
- Focussing on the high sediment loads in stormwater runoff;
- Minimising risks of weed infestations;
- Supporting a green and shady city while preserving local water resources; and
- Minimising maintenance costs.

Preferred solutions include the following:

- Watersmart street trees that receive passive irrigation from street runoff;
- Bioretention street trees;
- Targeted proprietary gross pollutant traps (e.g. gully baskets, trash racks/socks, and integrated GPT units) in suitable locations;
- Small raingardens and bioretention systems (up to 500 m² maximum) where they can be integrated into urban designs;
- Swales (vegetated & grass); and
- Harvesting and reuse of roof water and stormwater.

Refer to Appendix A: Design Matrix for Stormwater Quality Solutions for full listing and design criteria.

Stormwater Quality Offsets

Stormwater quality offsets provide flexibility to Developers by allowing the purchase of stormwater quality offsets where full compliance with stormwater quality targets within an eligible development, is demonstrated to not be technically feasibile. The scheme is a partial offsets scheme, providing the opportunity for Developers to pay an offset in lieu of implementing full onsite management once minimum on-site treatment standards are met.

The minimum on-site treatment standard is 50% of the Total Suspended Solids (TSS) load reduction target.

The TSS reduction target is 85%, and 50% of this is 42.5%. So, the minimum on-site treatment standard is a 42.5% reduction in TSS loads. To clarify, the use of the TSS reduction as a target metric, does not remove the requirement to treat Total Phosphorus (TP) and Total Nitrogen (TN).

The purpose of the minimum on-site treatment standard is to:

- Ensure that cost effective measures are implemented onsite;
- Provide a basic level of mitigation of stormwater impacts associated with new developments; and
- Regulate the demand on stormwater quality offsets from Council.

The tables on the following pages may be used to guide treatment strategies for common development scenarios. For scenarios that do not match the scenarios outlined, the applicant is required to provide water quality modelling (using MUSIC or similar software) to assess the performance of stormwater treatment strategies.

The use of stormwater quality offsets does not obviate the need to attend to any other aspect of stormwater management including drainage and flood mitigation.

To determine eligibility for an offset, refer to Eligibility Criteria for Potential Offset in Appendix B.

Offset pricing

The offset pricing has been developed through benchmarking of comparable stormwater quality offset schemes in other local governments. Consideration has also been given to both physical and fiscal constraints in the practical delivery of off-site solutions by Council, which may require land costs.

The offset price is $68,500 per hectare of full development area, provided a minimum of 50% TSS target reduction is met at source.

Offset payable = [100% of TSS Treatment Filter Area Required/ha - (% of TSS Treatment Filter Area Delivered/ha)] x offset price x full development area (ha)

The offset price is subject to annual review in Council's Fees & Charges.

Treatment performance and offset payment examples

The following table is provided to simplify the estimation of treatment performance and offset payment calculations for a range of development land use scenarios. The scenarios rely on the modelled filter material required to service the development as a base for establishing the offset reduction payment criteria.

Table 1 Treatment system sizing and offsets payable where deemed eligible

Greenfield Residential				
% TSS Reduction	**% of TSS Target**	**Treatment Size**	**Portion of Treatment Area Delivered on site**	**Offset Payable^**
%	*%*	*trees/ha***	*%*	*$/ha*
42.5	50*	15 (19m2 filter area)	17%	$ 56,855
51	60	15 trees + 10 m² bio (29m2 filter area)	27%	$ 50,005
59.5	70	15 trees + 20 m² bio (39m2 filter area)	36%	$ 43,840
68	80	15 trees + 29 m² bio (48m2 filter area)	44%	$ 38,360
85	100	15 trees + 90 m² bio (109m2 filter area)	100%	$ 0
Industrial				
% TSS Reduction	**% of TSS Target**	**Treatment Size**	**Portion of Treatment Area Delivered on site**	**Offset Payable^**
%	*%*	*m²/ha*	*%*	*$/ha*
42.5	50*	22	15%	$ 58,225
51	60	36	24%	$ 52,060
59.5	70	49	33%	$ 45,895
68	80	64	43%	$ 39,045
85	100	149	100%	$ 0
Commercial				
% TSS Reduction	**% of TSS Target**	**Treatment Size**	**Portion of Treatment Area Delivered on site**	**Offset Payable^**
%	*%*	*m²/ha*	*%*	*$/ha*
42.5	50*	27	15%	$ 58,225
51	60	38	21%	$ 54,115
59.5	70	55	31%	$ 47,265
68	80	78	43%	$ 39,045
85	100	180	100%	$ 0
Multi-unit Residential (MCU example)				
% TSS Reduction	**% of TSS Target**	**Treatment Size**	**Portion of Treatment Area Delivered on site**	**Offset Payable^**
%	*%*	*m²/ha*	*%*	
42.5	50*	18	16%	$ 57,540
51.0	60	23	21%	$ 54,115
59.5	70	37	33%	$ 45,895
68.0	80	51	46%	$ 36,990
85.0	100	112	100%	$ 0

**minimum filter area on site treatment required.*

***street trees have a filter media area of 1.25m² each*

^ Offset payable = 100% of TSS Treatment Filter Area Required/ha - (% of TSS Treatment Filter Area Delivered/ha) x offset price x full development area (ha)

Application and Payment Procedure

The collection and expenditure of offset funds is to operate as follows:

1. ***Prelodgement:*** DA teams, through the pre-lodgement process, ensure Applicants are aware of the offset scheme and gauge interest in whether each application is likely to take it up. This will assist Council in managing its forward works planning and help implement offset projects in parallel with, or immediately following, the impacts of new development.

   It is preferable that the stormwater quality management planning be undertaken for the whole of development site rather than on a stage by stage basis (e.g. master planned communities) to ensure integrated and holistic water quality networks.

   Notification of an Applicant's intention to purchase water quality offsets at prelodgement stage is highly encouraged and will enable the matter to be fully considered at the initial planning and design stage.

2. ***Lodgement:*** When a DA is lodged, Developers will demonstrate compliance with the eligibility criteria and provide formal notification of their intention to purchase water quality offset to supplement or replace on-site stormwater quality management.

   a. This can be in the form of a deed of agreement (Infrastructure Agreement), which specifies the timing and amount of payment. The Infrastructure Agreement must be executed prior to issuance of development approval; or

   b. Council will require an amended plan(s) of development demonstrating full on site compliance with the relevant stormwater quality targets, prior to issuance of a development decision.

   c. Council discourages deferral of water quality assessment until Operational Works or later stages of development.

3. ***Program Management:*** The Infrastructure Services Department will develop and maintain a schedule of future projects to align with the offset payments received.

4. ***Developer Payment:*** Developers pay offset funds to Council in accordance with the provisions of the executed infrastructure agreement. This may occur at the time of plan of survey for reconfiguration of a lot applications (RAL) or commencement of use for material change of use applications (MCU) or other such agreement.

Design Standards

Relevant guidelines

Water by Design (2014) *Bioretention Technical Design Guidelines* (Version 1.1) Healthy Waterways Ltd, Brisbane

Water by Design (2017) *Wetland Technical Design Guidelines* (Version 1). Healthy Land and Water Ltd, Brisbane.

Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands (WaterbyDesign, 2010)

Local modifications to design guidelines

- For bioretention systems: Organic content of filter media to be 10%. This may be achieved by cultivating 50 mm of mature compost into the top 100 mm of filter media.
- Bioretention systems may not be larger than 500 m² of filter media area. For large catchments this means treatment may need to be provided using multiple treatment systems e.g. a combination of bioretention trees, bioswales, etc, with a bioretention basin and/or pods.

Standard drawings

Where Council does not have relevant standard drawings, the following Standard Drawings will apply (refer Appendix C):

- The IPWEAQ Standard Drawings for Water Sensitive Urban Design (WSUD-001 to WSUD-012).
- For bioretention street trees:
  - Brisbane City Council Standard Drawings for WSUD Typical tree pit with grate (BSD-9031) and WSUD Tree in Turf (BSD-9034 and BSD-9035); and
  - Gold Coast City Council Standard Drawing for Street Tree Planting Setout Guidelines for Roadsworks (05-103).
- For bioretention pods (aka rain gardens), Brisbane City Council Standard Drawing for Watersmart Bioretention Pod (Kerb Buildout Type) – Layout (BSD-8333).

Where the above plans make reference to individual Councils, the reader shall interpret this to mean Fraser Coast Regional Council, until such time as standard drawings are included in the Fraser Coast Regional Council Planning Scheme.

Proprietary Stormwater Quality Treatment Devices

Proprietary treatment devices are non-preferred in public ownership due to the high upfront costs, high ongoing maintenance costs, and limited range of benefits compared with vegetated treatment systems (such as hydrologic management and urban greening).

Proprietary treatment devices will only be accepted in private ownership, in the following circumstances:

- Where is not practicable to use vegetated systems and the offsets scheme to comply with the policy.
- The performance claims for the device are supported by independent certification by Stormwater Australia under the Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP).
- A site-specific stormwater quality improvement devices (SQID) maintenance management plan (MMP) is prepared by a suitably qualified professional consistent with the maintenance

requirements of the devices in the proposed treatment train. The MMP is submitted to Council for approval prior to the commencement of the use. The approved MMP must be included in the Body Corporate by-laws or Community Management Plan. The MMP must address the following:

- The MMP must include all associated costs related to the device (e.g., installation, inspection and replacement/maintenance, certifications, reporting, health and safety plans, training, area of land required to install the device etc.).
- The MMP must include the lifecycle cost of the proposed treatment devices.

Council may consider gross pollutant traps and gully baskets at its discretion, such as where a strategic catchment approach has been identified to target appropriate litter capture, and will therefore only be considered on a case by case basis taking into account the site circumstances.

Innovative treatment measures

Applicants wishing to implement innovative treatment measures that maximise ecological outcomes and minimise maintenance costs are encouraged to arrange a pre-lodgement meeting with Council.

MUSIC Model Parameters

The MUSIC modelling that underpins the development scenarios in Table 1 – *Treatment performance and offset payment examples* is based on the MUSIC parameters summarised in Table 2 below. Applicants may use these parameters where customised modelling is undertaken.

Table 2 Treatment Parameters

CATCHMENT ID	Bioretention Street Trees (1.25 m²)	Biorientation raingardens	Carpark Bioretention raingardens
Extended detention depth (m)	0.1	0.3	0.1
Filter area (m²)			
Unlined filter media perimeter (m)	0.01	0.01	0.01
Saturated hydraulic conductivity (mm/hour)	200[1]	200	200
Filter depth (m)	0.8	0.5	0.5
TN content of filter media (%)	400	400	400
Orthophosphate content of filter media (mg/kg)	30	30	30
Is the base lined? (Y/N)	N	N	N
Effectiveness of plant TN removal (effective/ineffective/ unvegetated)	Effective	Effective	Effective
Overflow weir width (m)	2.00	2.00	2.00
Exfiltration rate (mm/hr)	3.60	3.60	3.60
If an exfiltration rate greater than zero has been used, has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1) (Y / N / N/A)			
If exfiltration rate has been used, is the exfiltration rate justified? (Y / N / N/A)			
Underdrain present? (Y/N)	Y	Y	Y
Submerged zone with carbon present?			
Depth of submerged zone (m)	0.45	0.45	0.45
Confirmation that K and C* remain default? (Y/N)	N	N	N

[1] The Health Land and Water MUSIC modelling guidelines recommend a 100 mm/hr for self-watering street trees based on a design prone to blockage whereby water is delivered to the rootzone via an ag pipe. 200 mm/hr has been adopted given the proposed street trees are effectively configured as small bioretention systems resistant to blockage and that tree roots sustain and enhance infiltration capacity.

Appendix A: Design Matrix for Stormwater Quality Solutions

Stormwater Quality Solution	Stormwater Quality Solution Description	Stormwater Quality Solution Location Criteria	Guideline/ Reference	Design Considerations
Water Tanks	Rainwater tanks	Retained and managed as private asset on private land	Manufacturer Specification	As per product specifications
Roofwater Gutter diversions	Downpipe diverters	Retained and managed as private asset on private land	Manufacturer Specification	As per product specifications
Gully baskets	In-pit SQID	Retained and managed as private asset on private land and/or Council discretion on public land	Manufacturer Specification	Council may consider in identified/targeted high litter areas
Gross Pollutant Traps (chamber)	Underground treatment chamber (incl bypass, baskets or sumps)	Retained and managed as private asset on private land and/or Council discretion on public land	Manufacturer Specification	Not preferred for residential land uses Council may consider where a strategic catchment approach has been identified to target appropriate litter capture No wet-sump style GPT's Sufficient space/clearances for services and provision for maintenance access
Gross Pollutant Traps (net)	Above ground trash net on headwall/outlets (i.e. Ecosol trash net)	Council discretion	Manufacturer Specification	Council may consider where a strategic catchment approach has been identified to target appropriate litter capture Need for frontage to enable access for maintenance; Needs to be free-draining; Ramp for access required
Proprietary Filtration Devices	Multiple	Retained and managed as private asset	Manufacturer Specification	As per product specifications

Stormwater Quality Solution	Stormwater Quality Solution Description	Stormwater Quality Solution Location Criteria	Guideline/ Reference	Design Considerations
Bioretention basin	Dedicated drainage reserve	Council discretion on public land, when combined with other preferred solutions (e.g. Bioretention Street Trees).	Bioretention Technical Design Guidelines (WaterbyDesign, 2014); Construction & Establishment Guidelines (2010	Treatment filter area: Minimum 300m2 and maximum 500m2 Integrity to be protected during construction phase Sufficient space/clearances for services and provision for maintenance access Must have free-draining underdrainage, which is also free from tidal inundation Bioretention basins are not preferred for development sites less than 5 hectares
Bioretention pod	Small on-road raingarden	Council discretion on public land, when combined with other preferred solutions (e.g. Bioretention Street Trees).	Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands (WaterbyDesign, 2010) BCC Standard Drawing BSD-8333 (Watersmart Bioretention Pod (Kerb Buildout Type) - Layout	Treatment filter area: Minimum 5m^2 and maximum 25m^2 Integrity to be protected during construction phase Road reserve width must be sufficient to maintain minimum 2m clearance for safe pedestrian movement; sufficient space for underground services; provision for driveway construction (and sight-lines), and on-street car parking Suitable area being serviced Not located fronting lots or is appropriately sited to not compromise site access Preferred placement such as one way cross fall to open space Bioretention pods are not preferred for development sites less than 1 hectare
Bioretention Street Tree	Bioretention tree pit with filter media & underdrainage	Preferred solution on private or public land at desirable minimum of 10 trees per hectare	BCC Standard Drawings 9031 (WSUD Typical tree pit with grate), 9034 (WSUD Tree within turf – plan) & 9035 (WSUD Tree within turn – section); and GCC Standard Drawing 05-103 (Street Tree Planting Setout Guidelines for Roadsworks)	Integrity to be protected during construction phase Road reserve width must be sufficient to maintain minimum 2m clearance for safe pedestrian movement; sufficient space for underground services; provision for driveway construction (and sight-lines), and on-street car parking Suitable area being serviced
Watersmart Street Tree	Passively irrigated street tree i.e. retrofit	Retained and managed as private asset on private land and/or Council discretion on public land		Road reserve width must be sufficient to maintain minimum 2m clearance for safe pedestrian movement; sufficient space for underground services; provision for driveway construction (and sight-lines), and on-street car parking Is appropriately sited to not compromise site access

Stormwater Quality Solution	Stormwater Quality Solution Description	Stormwater Quality Solution Location Criteria	Guideline/ Reference	Design Considerations
Constructed Wetland	4-8% of catchment area	Retained and managed as private asset on private land and/or Council discretion on public land	Wetland Technical Design Guidelines (WaterbyDesign, 2017); Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands (WaterbyDesign, 2010)	Pre-lodgement discussion with Council required
Bioswales – Vegetated **Swales – Grass**		Retained and managed as private asset on private land and/or Council discretion on public land	Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands (WaterbyDesign, 2010)	DA Application requires: Design check and summary form, Site details plan, stormwater treatment conceptual plans and sections
Permeable pavement		Retained and managed as private asset on private land	Manufacturer specification	Suitable applications include carparks, driveways and pedestrian areas
Riparian Revegetation		To be delivered by Council through offset program		
Gully Erosion Management		To be delivered by Council through offset program		
Waterbody Management		To be delivered by Council through offset program		
Alternative Solutions		By exception or negotiation only	Industry best practice, at Council discretion	

Notes:
For vegetated stormwater assets:

- Applicants must provide applicable design checklists and summary, site detail plans, stormwater treatment conceptual plans and sections for any development that will trigger water quality requirements at the earliest stage of application
- DA conditions must reference Construction and Establishment Guidelines, Mandate use of Sign-off Forms, Compliance certified by Superintendent/Designer/RPEQ, and Inspections to occur in accordance with sign-off forms
- Standard Drawings may be amended

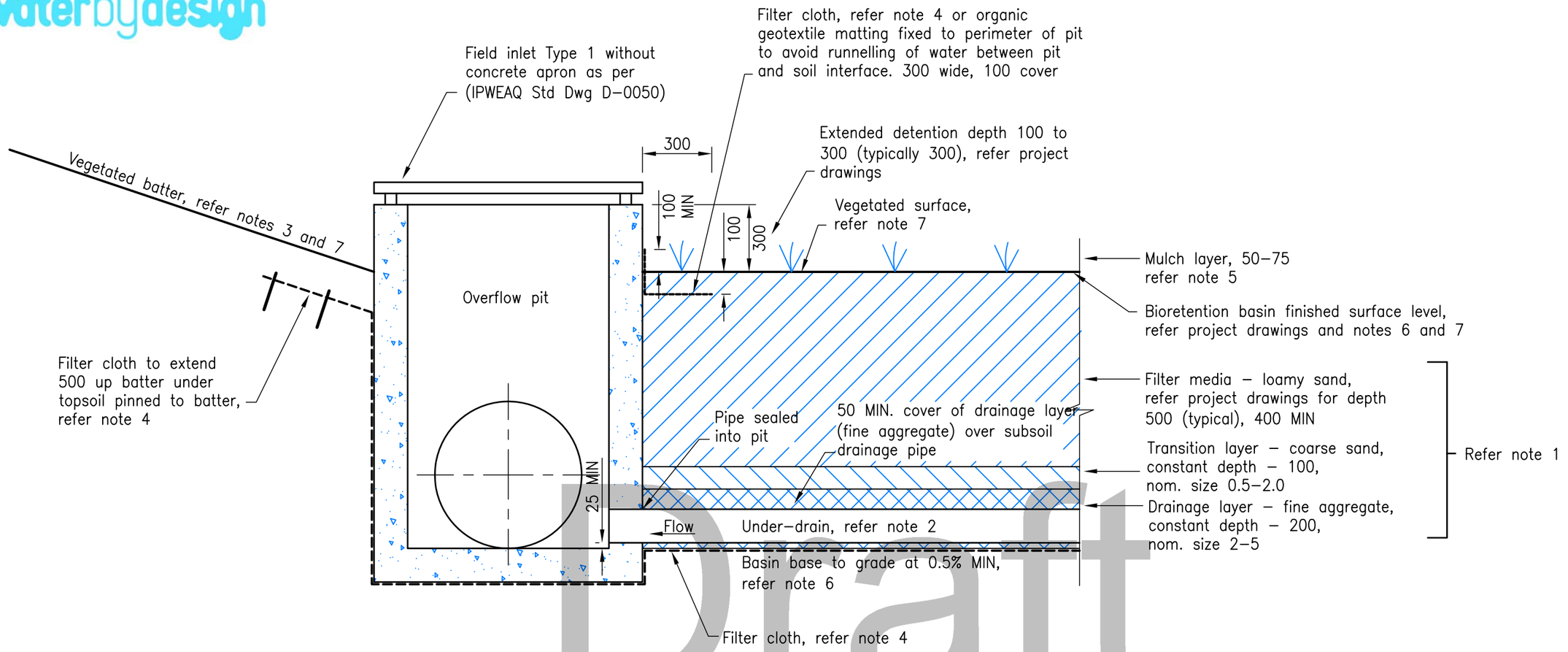
Appendix B: Eligibility Criteria for Potential Offset

Development Type		Treatment Requirements	Offset Eligibility	Requirements
Residential - Urban	• RAL	• Refer SPP for treatment trigger	• Yes – up to 1 ha • No – over 1 ha unless the outcomes represent a risk to Council to take ownership.	• Minimum 50% reduction target on-site (refer implementation guide) for eligible development • Preference for 100% on site (refer design matrix for guidance) • Offset options would be subject to perceived risk to Council to accept alternative. Minimum 50% reduction target on-site (refer implementation guide) for eligible development
	• MCU • Operational Works • Retirement Village • Community Title (Lifestyle village/ caravan park)	• Refer SPP for treatment trigger • Refer SPP for treatment trigger • Refer SPP for treatment trigger • Refer SPP for treatment trigger	• No^ • No^ • No^ • No^	• 100% on site, privately owned and managed • 100% on site treatment • 100% on site, privately owned and managed • 100% on site, privately owned and managed
Residential - Rural	• RAL • Farmstay	• Subject to DA Assessment Manager • All treatment to be provided on site (no offsets)	• No	• 100% on site, privately owned and managed
Industrial	• RAL • MCU/Building works	• Refer SPP for treatment trigger • All treatment to be provided on site (no offsets) with the exception of inconsistency with urban design outcomes (e.g. commercial built to boundary requirements)	• No^ • No, unless contrary to Commercial Urban Design Outcomes	• 100% on site treatment • 100% on site, privately owned and managed, unless otherwise approved to achieve Commercial Urban Design Outcomes
Commercial/	• RAL • MCU/Building works	• Refer SPP for treatment trigger • All treatment to be provided on site (no offsets) with the exception of inconsistency with urban design outcomes (e.g. commercial built to boundary requirements)	• No^ • No, unless contrary to Commercial Urban Design Outcomes	• 100% on site treatment • 100% on site, privately owned and managed, unless otherwise approved to achieve Commercial Urban Design Outcomes

Development Type		Treatment Requirements	Offset Eligibility	Requirements
Water supply buffer areas	• Any Development Works	• Refer SPP for treatment trigger • All treatment to be provided on site (no offsets)	• No	• 100% on site treatment

^ Unless the Developer demonstrates significant physical constraints exist to prevent full compliance over the development site. If accepted by the DA Assessment Manager, a minimum 50% reduction target must be achieved on-site.

Appendix C: Standard Drawings



BIORETENTION BASIN OVERFLOW PIT DETAIL

NOTES:

1. Bioretention media specification shall be in accordance with the Facility for Advancing Biofiltration "Guidelines for Soil Filter Media in Bioretention Systems". Bioretention hydraulic conductivity shall be in accordance with the Facility for Advancing Biofiltration 'Practice Note 1: In Situ Measurement of Hydraulic Conductivity". The number of samples to be tested shall be in accordance with the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands (Water by Design).
2. Under–drain: slotted rigid pipe (uPVC or similar to AS 2439.1) or approved equivalent, 0.5% MIN. grade. Refer project drawings for diameter and invert level (Typically ø100–150). Pipe should not be installed with a filter sock surrounding pipe. Under–drainage pipes shall be sealed into pits using grout or other approved watertight seal.
3. Refer to project drawings for vegetated batter slopes (1 in 3 MAX, 1 in 4 typical) and batter topsoil requirements.
4. Filter cloth – non–woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
5. Basin finished surface level is top of filter media. Surface to be mulched and planted as per landscape drawings.
6. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits, pipes and base levels must be noted on project drawings.
7. Refer landscape drawings for plant specification. Plant specification and density shall be in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
8. All dimensions are in millimetres unless otherwise noted.

Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
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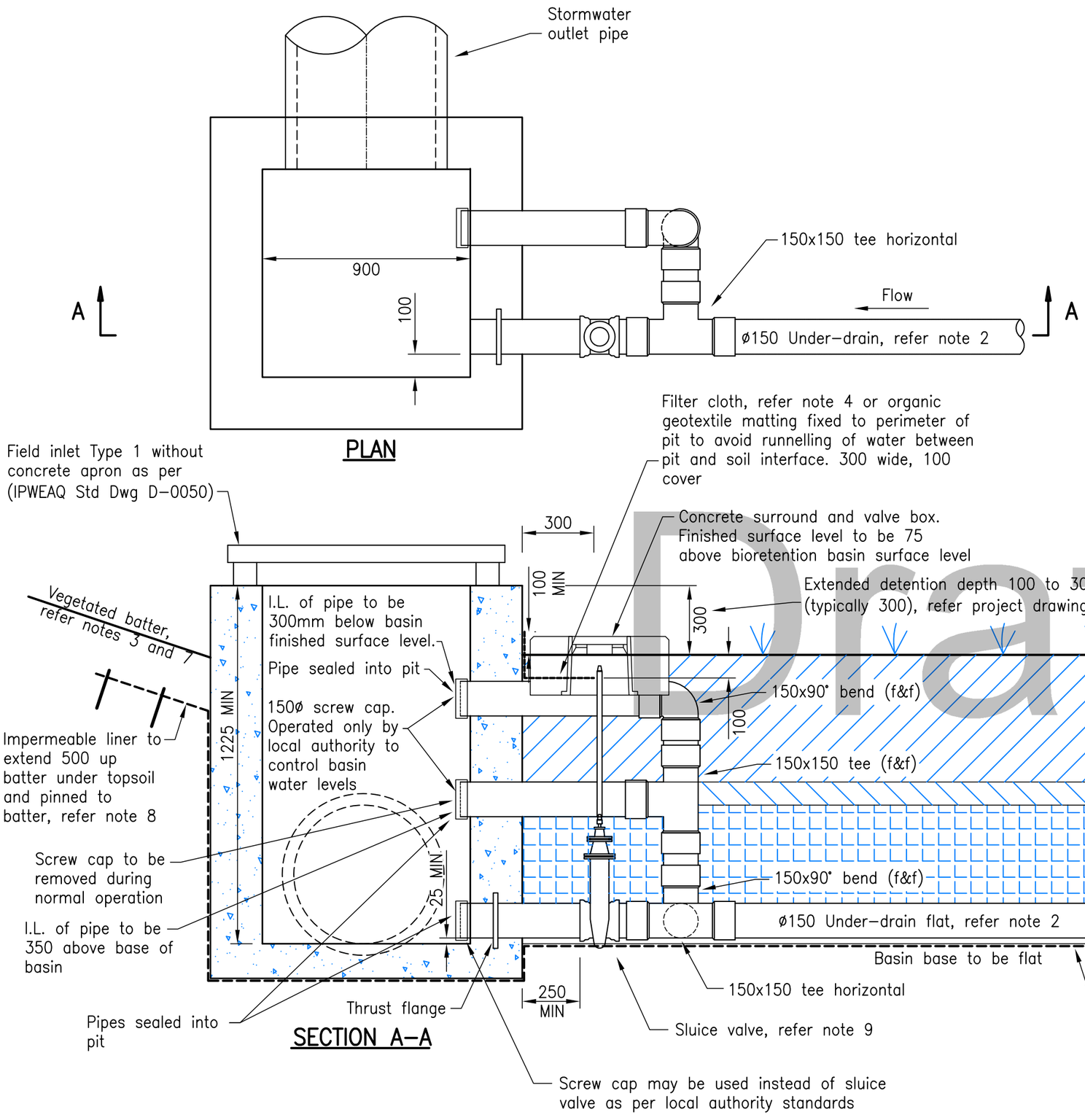
STANDARD DRAWINGS

BIORETENTION STANDARD PROFILE
OVERFLOW PIT

DRAWING No.
WSUD–001
Rv. A



NOTES:

1. Bioretention media specification, refer note 1 IPWEAQ WSUD–001
2. Under–drain, refer note 2 IPWEAQ WSUD–001.
3. Vegetated batter slopes, refer note 3 IPWEAQ WSUD–001.
4. Filter cloth, refer note 4 IPWEAQ WSUD–001,
5. Basin finished surface level, refer note 5 IPWEAQ WSUD–001.
6. Construction tolerances, refer note 6 IPWEAQ WSUD–001.
7. Landscape, refer note 7 IPWEAQ WSUD–001.
8. Impermeable liner – HDPE, bentonite, compacted clay or approved equivalent to base and sides, installed as per manufacturer's and/or geotechnical engineer's specification. Where compacted clay liner is adopted, filter cloth is to be used as per note 4 on IPWEAQ drawing WSUD–001. Refer to the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) for details.
9. Sluice valve, to local authority standards (to remain closed). Operated by local authority only to manually drain base of bioretention basin (provide extension spindle as directed by superintendent).
8. All dimensions are in millimetres unless otherwise noted.

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BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate council

Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

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STANDARD DRAWINGS

BIORETENTION STAURATED ZONE
OVERFLOW PIT

DRAWING No.
WSUD–002
Rv. A

NOTES:

1. Bioretention media specification shall be in accordance with the Facility for Advancing Biofiltration "Guidelines for Soil Filter Media in Bioretention Systems". Bioretention hydraulic conductivity shall be in accordance with the Facility for Advancing Biofiltration "Practice Note 1: In Situ Measurement of Hydraulic Conductivity". The number of samples to be tested shall be in accordance with the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design).

2. Under–drain: slotted rigid pipe (uPVC or similar to AS 2439.1) or approved equivalent, 0.5% MIN. grade. Refer project drawings for diameter and invert level (typically Ø100–150). Pipe joins should be glued using plumbing cement. Pipe should not be installed with a filter sock surrounding pipe. Under–drainage pipes shall be sealed into pits using grout or other approved watertight seal.

3. Refer to project drawings for vegetated batter slopes (1 in 3 MAX, 1 in 4 typical) and batter topsoil requirements.

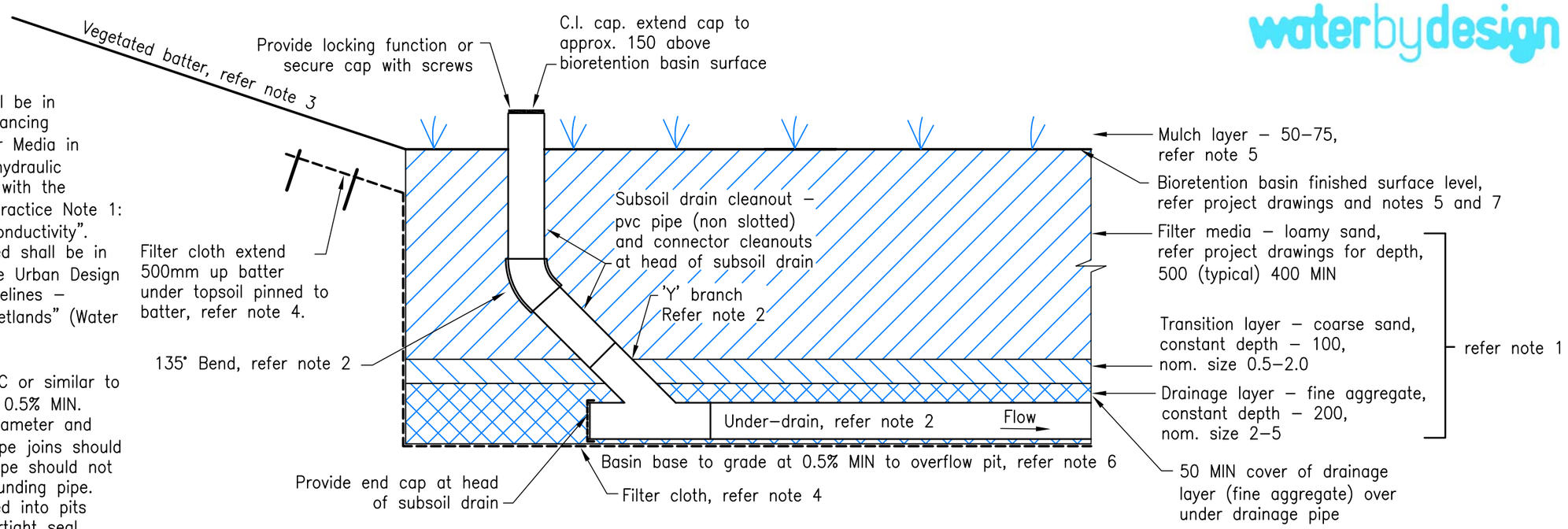
4. Filter cloth – non–woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the 'Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).

5. Basin finished surface level is top of filter media. Surface to be mulched and planted as per landscape drawings.

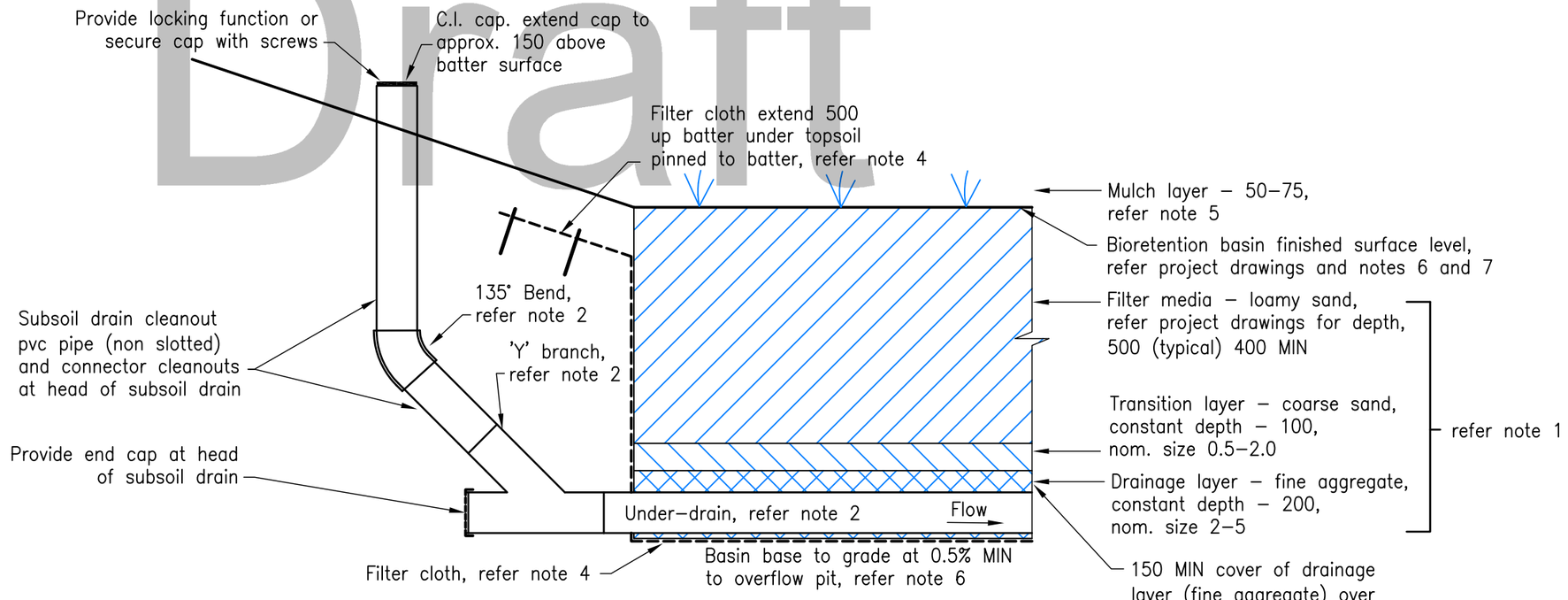
6. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits and pipes and base levels must be shown on project drawings.

7. Refer landscape drawings for plant specification. Plant specification and density shall be in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).

8. All dimensions are in millimetres unless otherwise noted.



BIORETENTION UNDER–DRAIN CLEANOUT – IN BASIN



BIORETENTION UNDER–DRAIN CLEANOUT – IN BATTER

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A	13/01/2010	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
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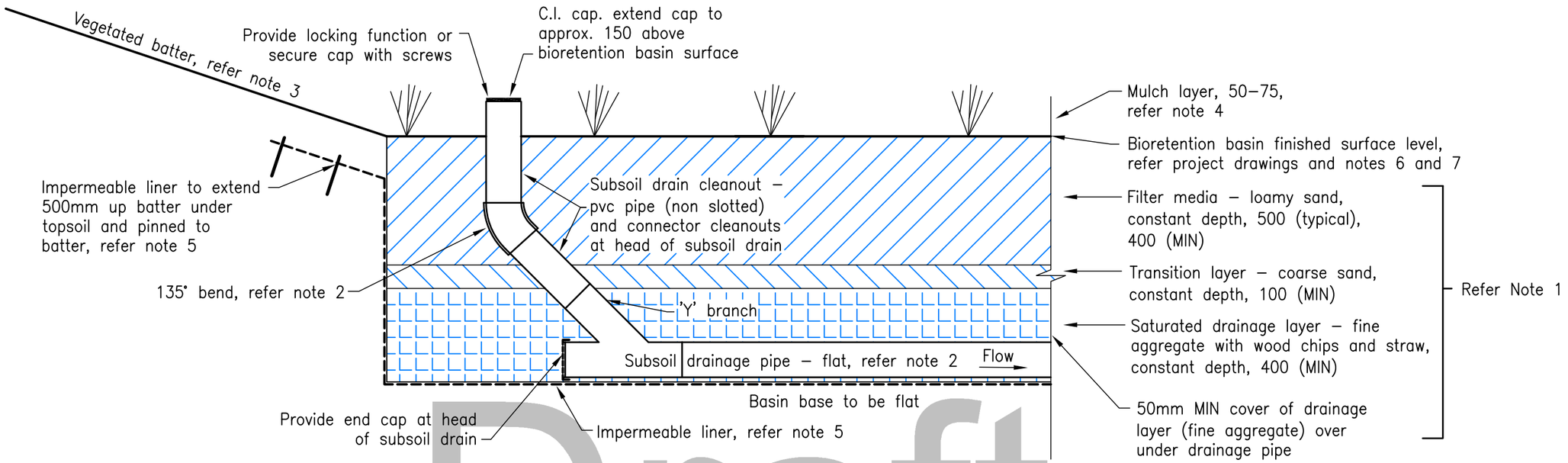
STANDARD DRAWINGS

BIORETENTION STANDARD PROFILE
UNDERDRAIN CLEANOUT

DRAWING No.
WSUD–003
A



SUBSOIL DRAIN CLEANOUT – IN BASIN

NOTES:

1. Bioretention media specification shall be in accordance with the Facility for Advancing Biofiltration "Guidelines for Soil Filter Media in Bioretention Systems". Bioretention hydraulic conductivity shall be in accordance with the Facility for Advancing Biofiltration "Practice Note 1: In Situ Measurement of Hydraulic Conductivity". The number of samples to be tested shall be in accordance with the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands (Water by Design).

2. Under–drain: slotted rigid pipe to AS 2439.1 or approved equivalent, 0.5% MIN. grade. Refer project drawings for diameter and invert level (Typically Ø100–150). Pipe joins should be glued using plumbing cement. Pipe should not be installed with a filter sock surrounding pipe). Under–drainage pipes shall be sealed into pits using grout or other approved watertight seal.

3. Refer to project drawings for vegetated batter slopes (1 in 3 MAX, 1 in 4 typical) and batter topsoil requirements.

4. Basin finished surface level is top of filter media. Surface to be mulched and planted as per landscape drawings.

5. Impermeable liner – HDPE, bentonite, compacted clay or approved equivalent to base and sides, installed as per manufacturer's and/or geotechnical engineer's specification. Where compacted clay liner is adopted, filter cloth is to be used as per note 4 on IPWEAQ drawing WSUD–001. Refer to the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) for details.

6. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans.

7. Refer landscape drawings for plant specification. Plant specification and density shall be in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).

8. All dimensions are in millimetres unless otherwise noted.

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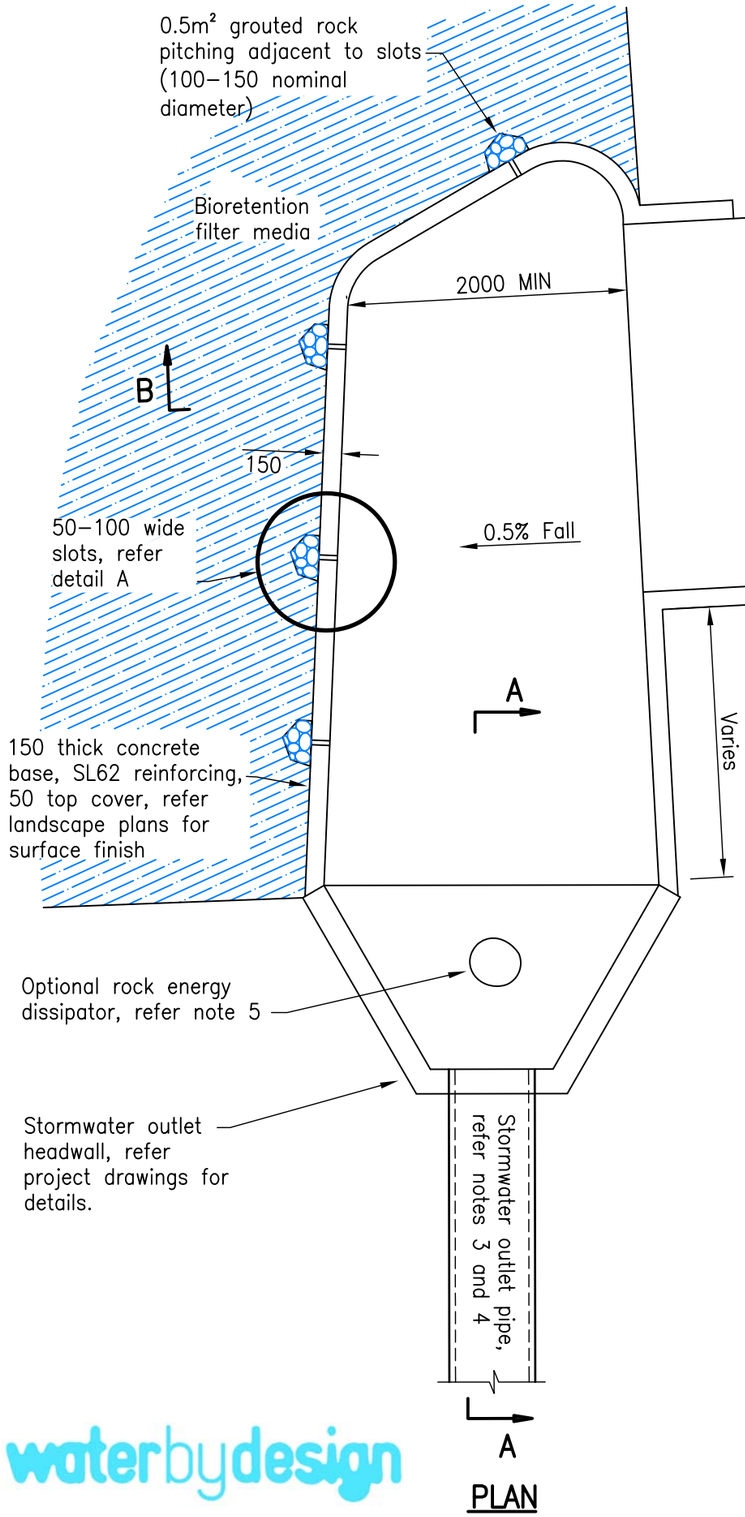
Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

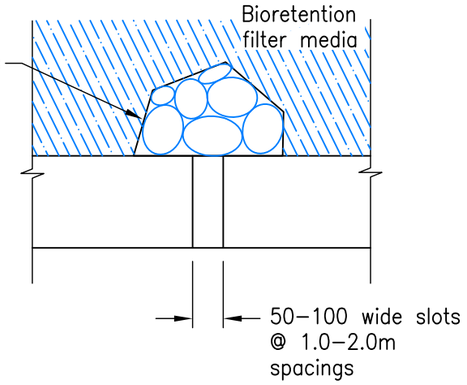
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

BIORETENTION SATURATED ZONE
UNDERDRAIN CLEANOUT

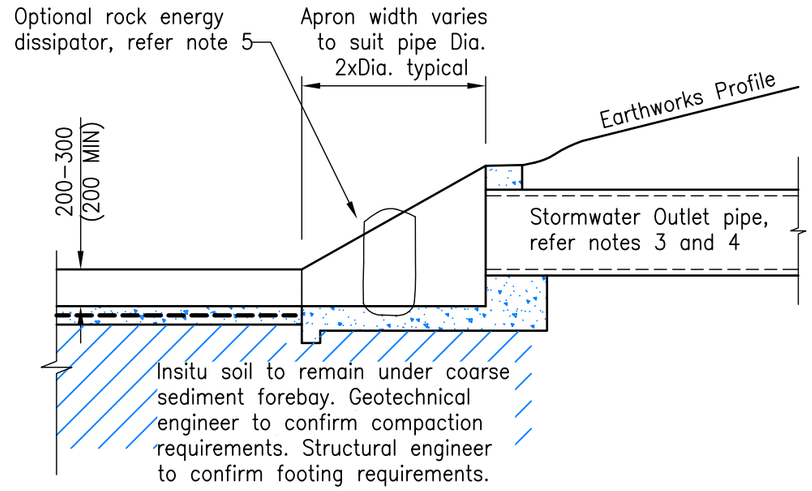
DRAWING No.
WSUD–004
Rv. A



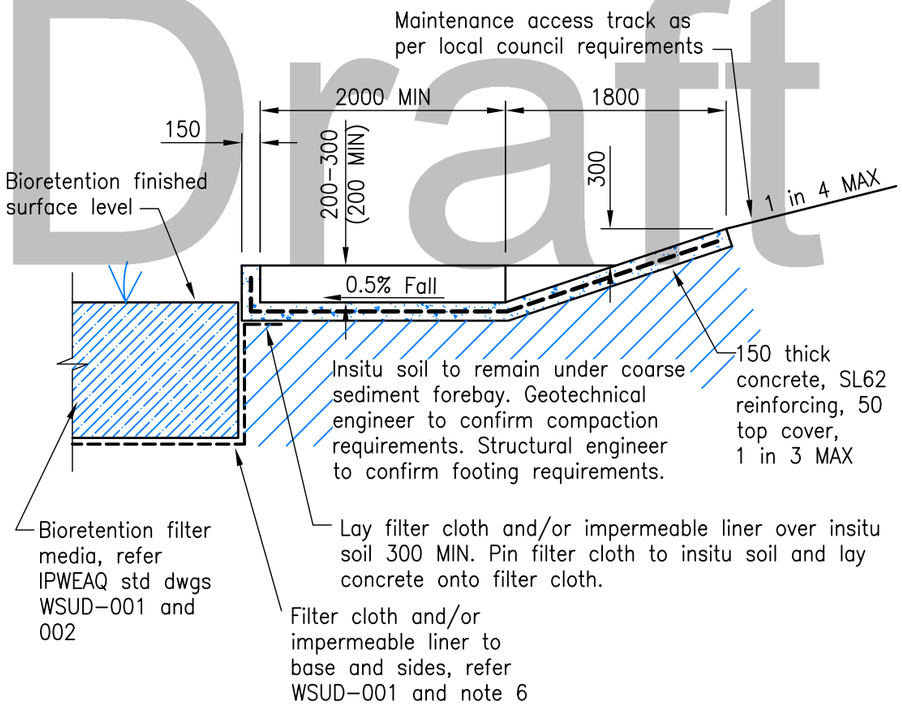
PLAN



DETAIL A



SECTION A–A



SECTION B–B

NOTES:

1. Refer to relevant section of the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design) and project drawings for sizing of coarse sediment forebay.
2. Prefer L:W of forebay is MIN 2:1
3. Refer to project drawings for stormwater pipe diameter and invert level.
4. Stormwater pipe to be aligned to within a MAX of 45° to the long axis of the coarse sediment forebay to provide energy dissipation.
5. Refer to project drawings for size and location of energy dissipators.
6. Filter cloth – proprietary product, Bidum A24 or equivalent non–woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
7. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels and base levels must be noted on project drawings.
8. All dimensions are in millimetres unless otherwise noted.

waterbydesign

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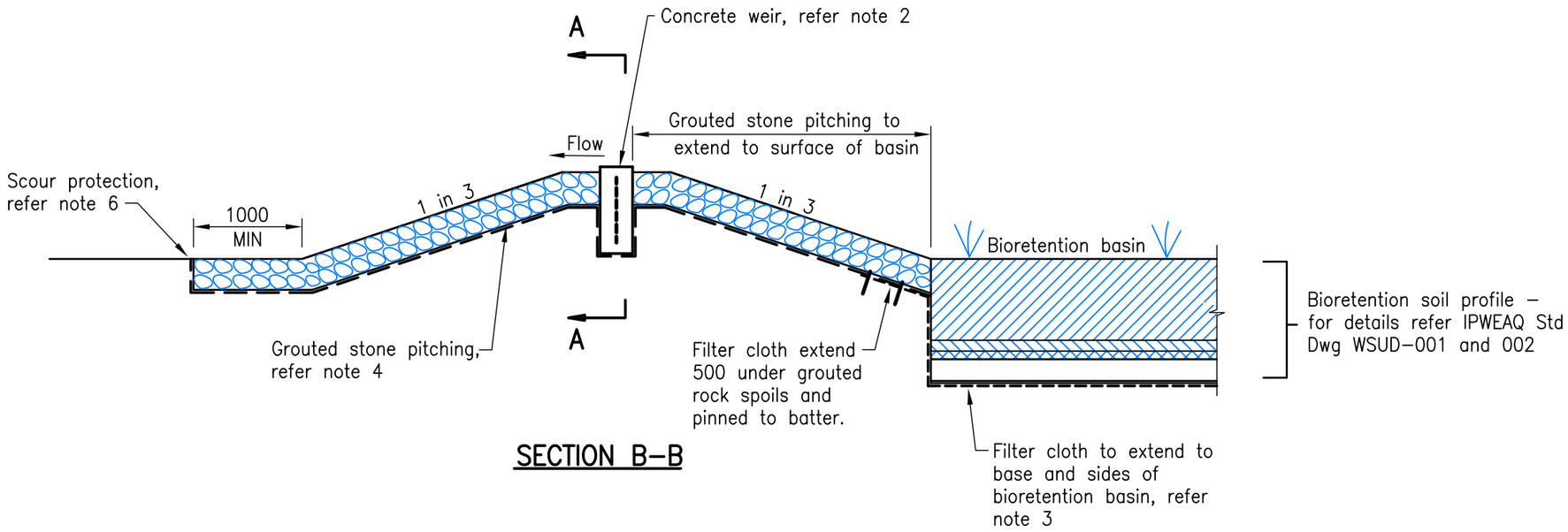
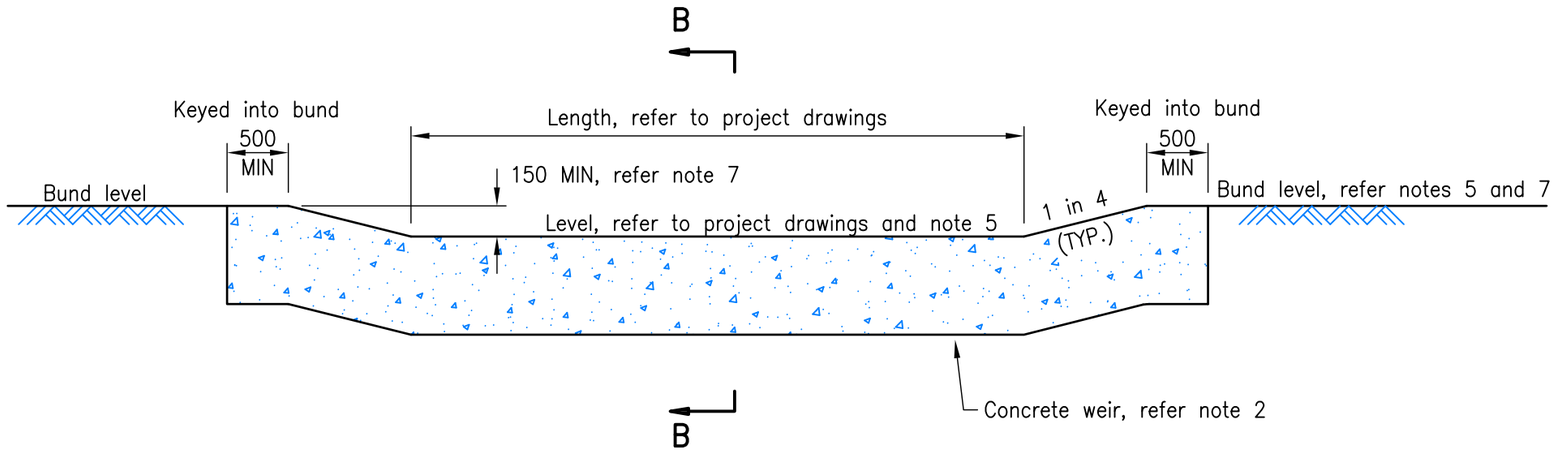
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

BIORETENTION
LARGE COARSE SEDIMENT FOREBAY

DRAWING No.
WSUD–005
A



SECTION B–B



SECTION A–A

NOTES:

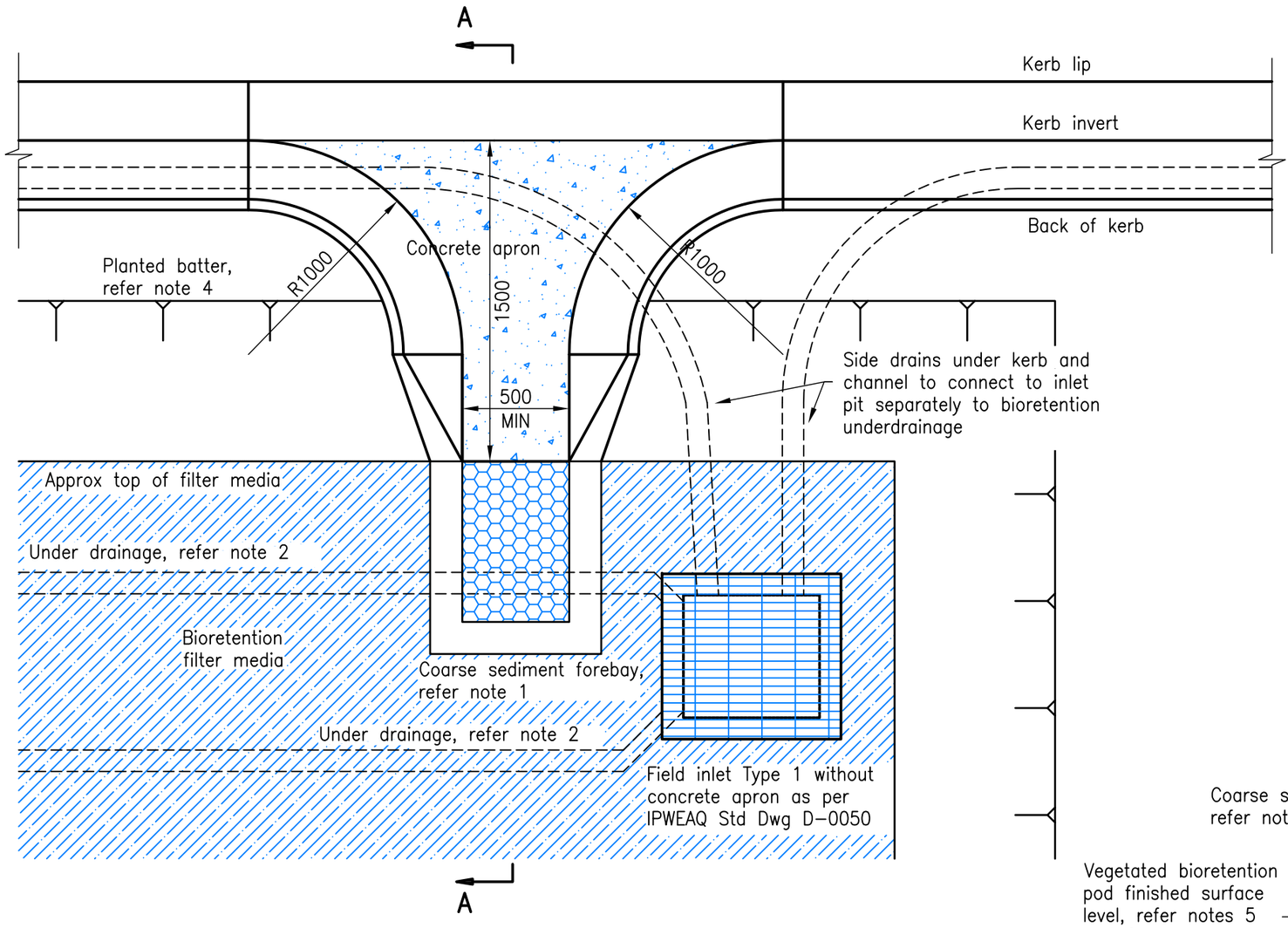
1. Insitu material to be tested and approved by geotechnical engineer prior to weir construction.
2. Concrete weir – 300 wide x 800 high concrete (N32) with SL81 mesh placed centrally.
3. Filter cloth – non–woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
4. Grouted stone pitching – stones 75–100, 300 thick on filter cloth, refer note 3. Refer landscape drawings and project drawings for plant specification and details. Geotechnical engineer to confirm compaction requirements for bund subsoil. Option to drill 100 cores through to subsoil to provide voids for planting (subject to flow velocities and local government requirements). Refer landscape drawings for planting details.
5. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances and bund levels must be noted on project plans.
6. For extent and details of scour protection refer to project drawings.
7. Bund level, refer to project drawings for minimum freeboard requirements. Bund levels must be noted on project drawings.
8. All dimensions are in millimetres unless otherwise noted.

Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

BIORETENTION BASIN
WEIR DETAILS

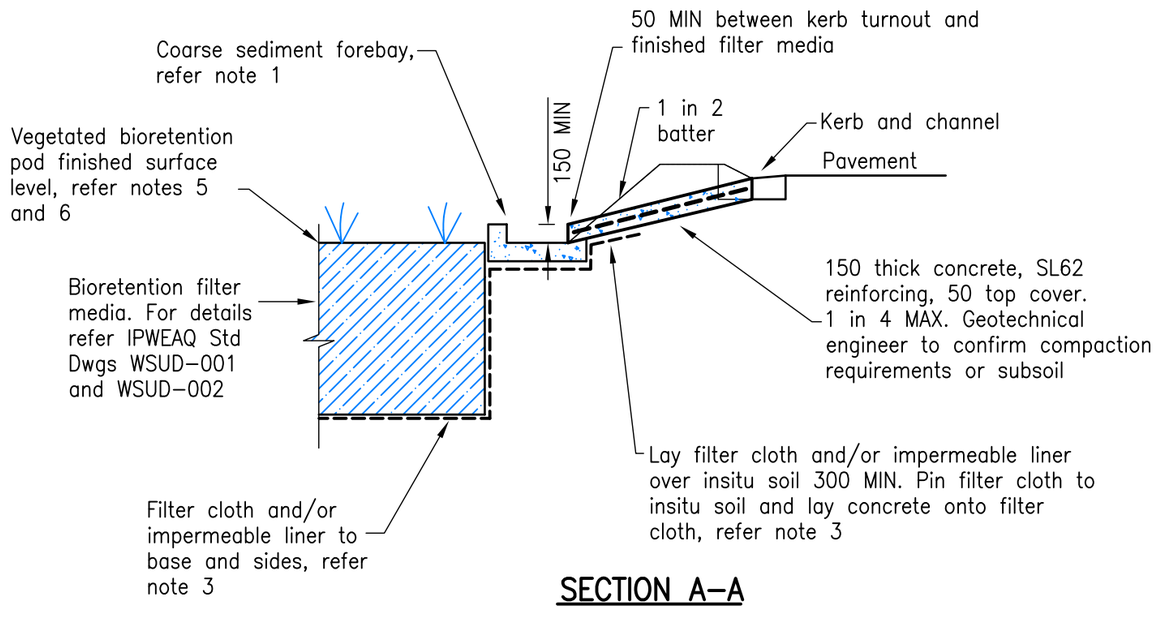
DRAWING No.
WSUD–006
A



PLAN

NOTES:

1. Refer to relevant section of the "Water sensitive Urban Design Technical Design Guidelines" (Water by Design) and project drawings for sizing of coarse sediment forebay.
2. Under-drain: slotted rigid pipe to AS 2439.1 or approved equivalent, 0.5% MIN. grade. Refer project drawings for diameter and invert level (Typically ø100-150). Pipe should not be installed with a filter sock surrounding pipe. Under-drainage pipes shall be sealed into pits using grout or other approved watertight seal.
3. Filter cloth - non-woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
4. Refer to project drawings for vegetated batter slope (1 in 3 MAX, 1 in 4 typical) and batter topsoil requirements.
5. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines - Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits, pipes and base levels must be noted on project drawings.
6. Refer landscape drawings for plant specification. Plant specification and density shall be in accordance with the "Water Sensitive Urban Design Technical Design Guidelines for South-East Queensland" (Water by Design).
8. All dimensions are in millimetres unless otherwise noted.



SECTION A-A

waterbydesign

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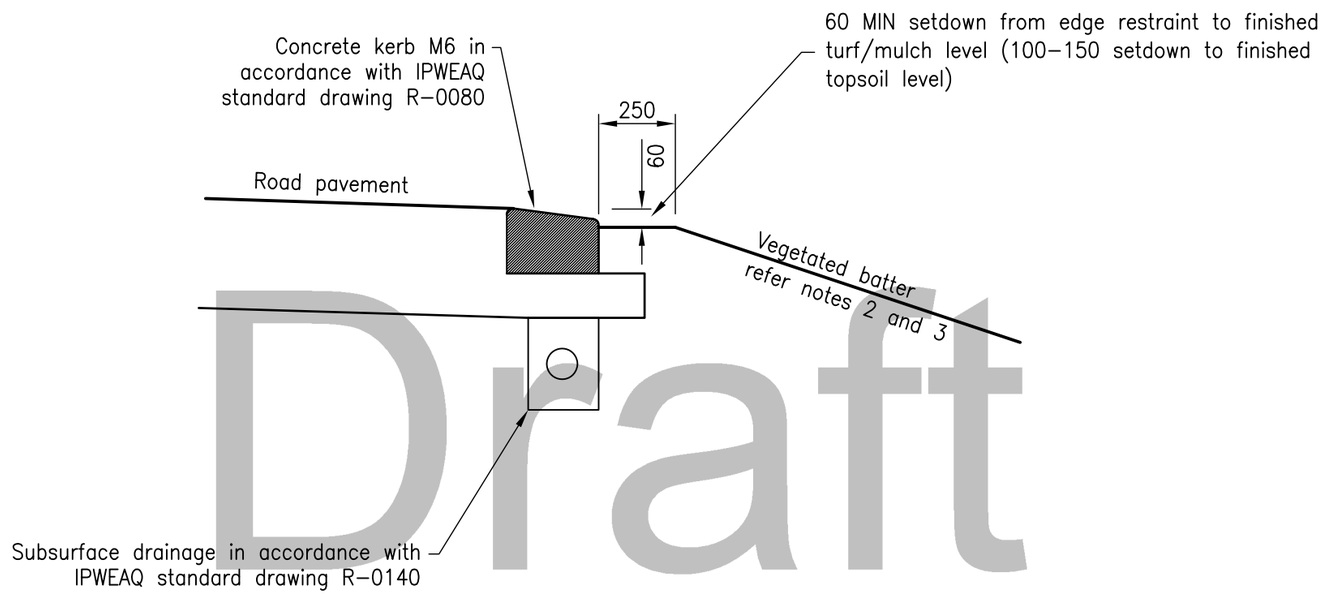
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

BIORETENTION POD
KERB CUTOUT

DRAWING No.
WSUD-007
Rv. A



NOTES:

1. For topsoil requirements refer project drawings.
2. Refer to project drawings for vegetated batter slope, 1 in 3 MAX 1 in 4 typical.
3. Refer landscape drawings for plant specification. Plant specification and density shall be in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
8. All dimensions are in millimetres unless otherwise noted.

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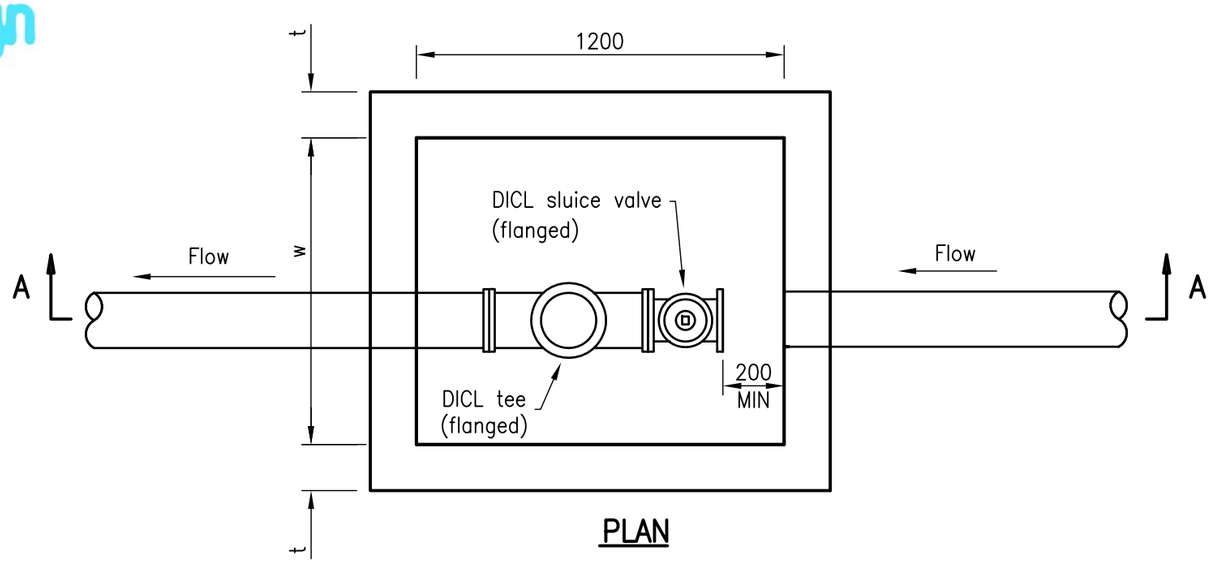
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

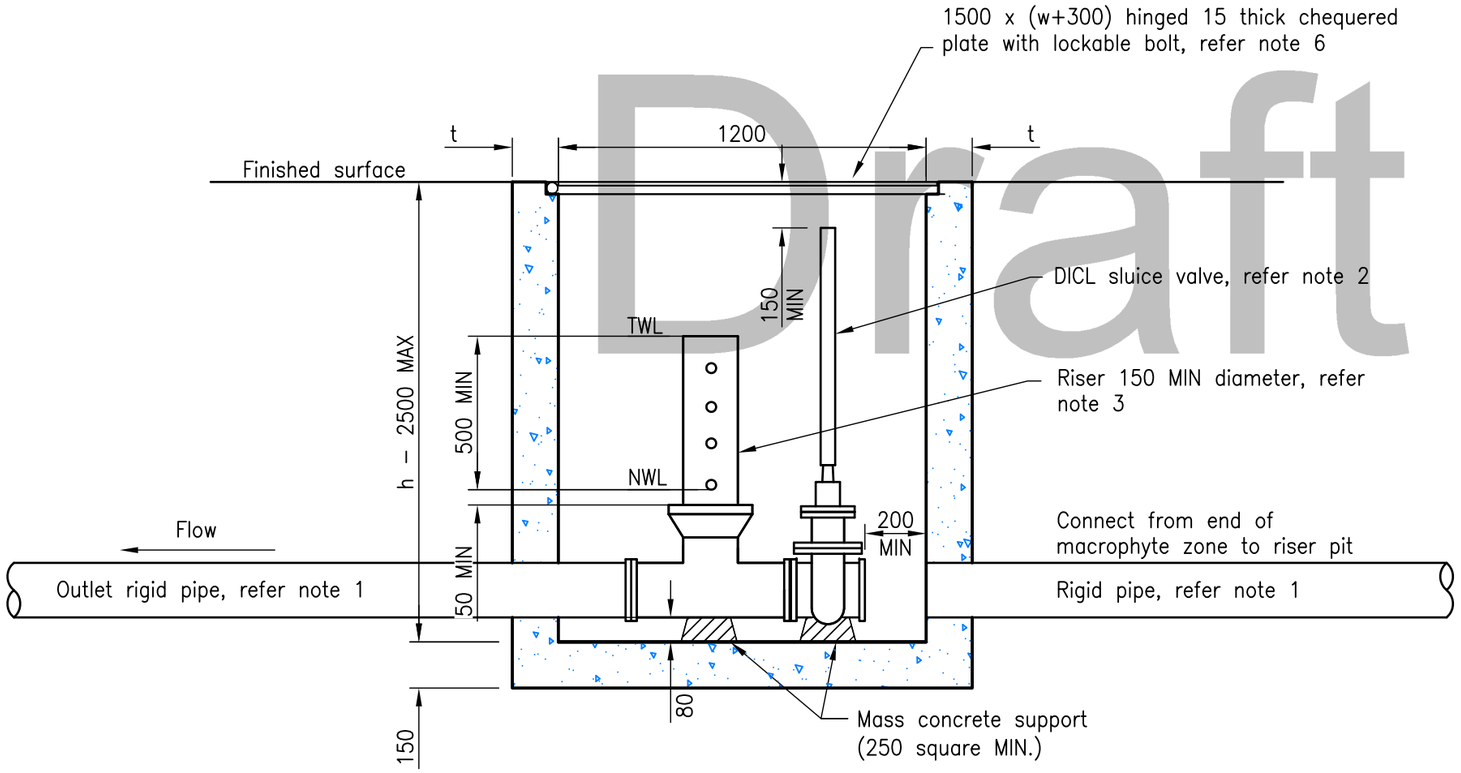
BIORETENTION SWALES
FLUSH KERB SETDOWN

DRAWING No.
WSUD–008
Rv. A



PLAN

Pit Dimensions		
Height (h)	Width (w)	Wall Thickness (t)
0-1500	600	150
1500-2500	900	225



SECTION A-A

NOTES:

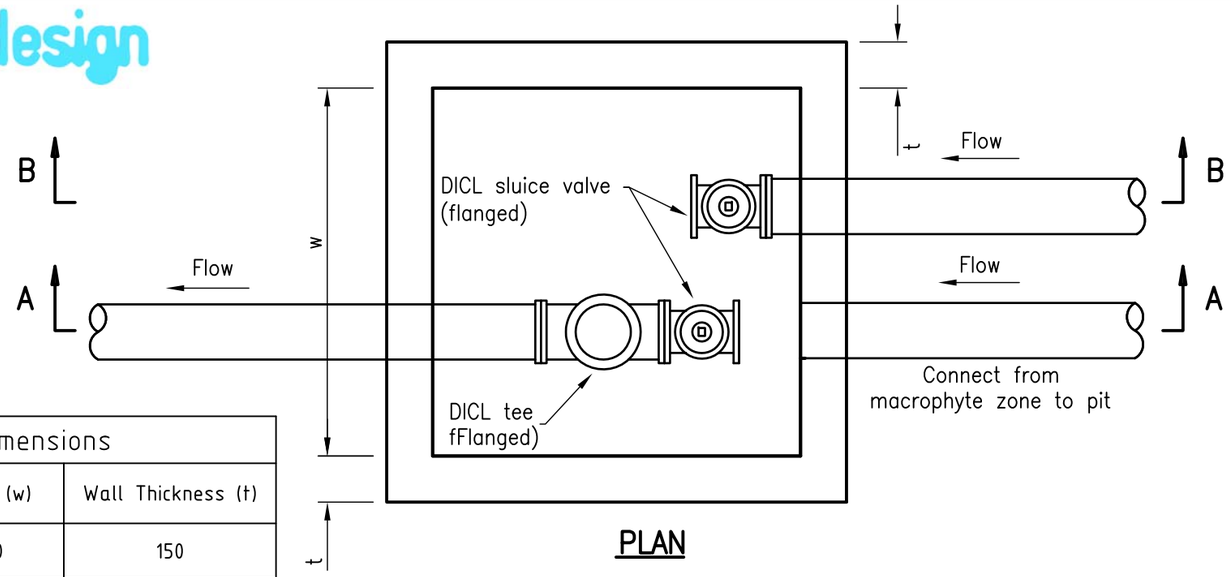
1. Refer to project drawings for rigid pipe diameter and invert level.
2. DICL sluice valve, refer project drawings for valve size. Valve to remain in closed position for normal operation. Valve to be opened to lower the water level for maintenance of the wetland.
3. Riser rigid pipe CL16, refer to project drawings for holes sizes and locations. Hole size and number as per relevant section of "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
4. For pits over 2500 in depth refer project drawings for pit dimensions and reinforcing details.
5. Concrete N25 in accordance with AS 1379 and AS 3600.
6. Lid and frame to be hot dip galvanised after fabrication to AS 1650.
7. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits, pipes and base levels must be noted on project drawings.
8. All dimensions are in millimetres unless otherwise noted.

Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

CONSTRUCTED WETLAND
OUTLET RISER PIT
OPTION A

DRAWING No.
WSUD-009
A
Rv.

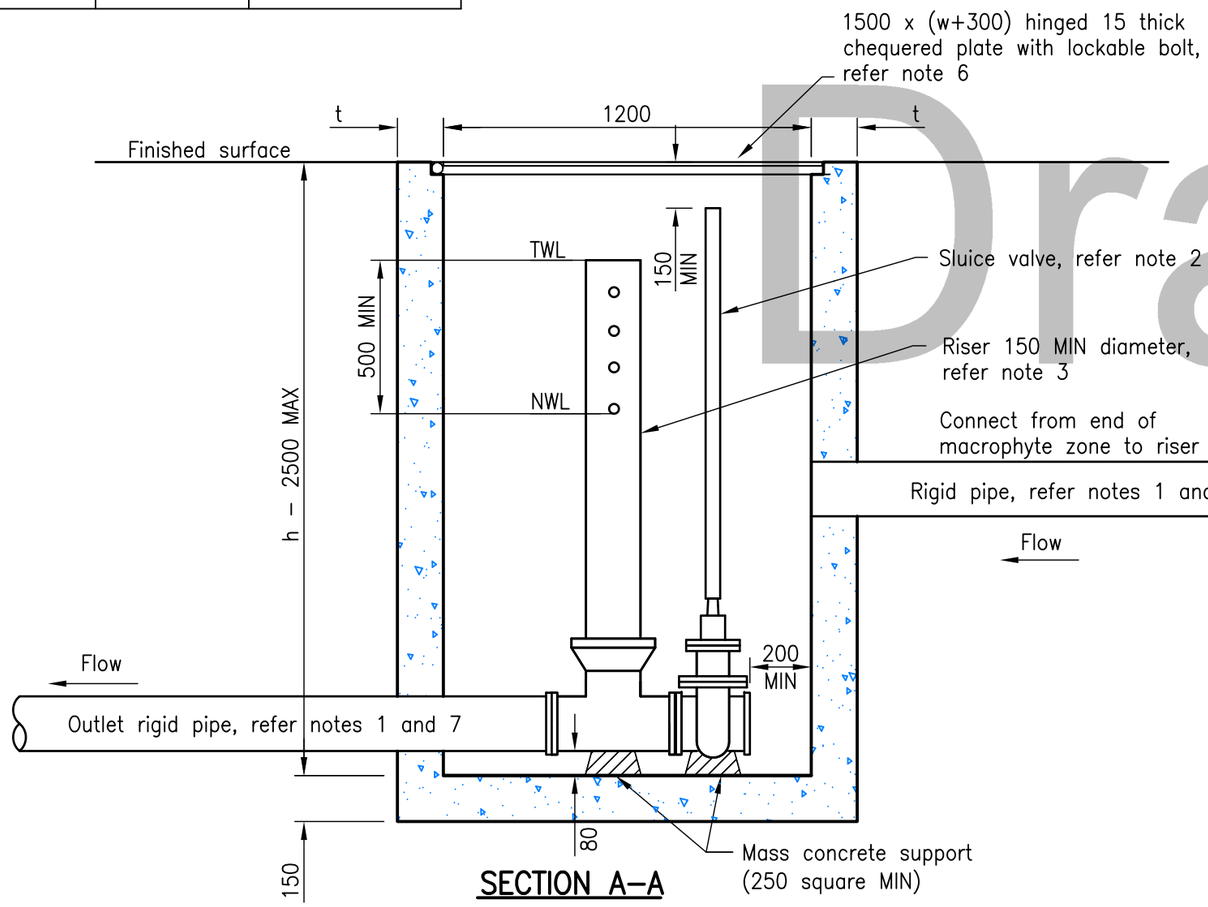


PLAN

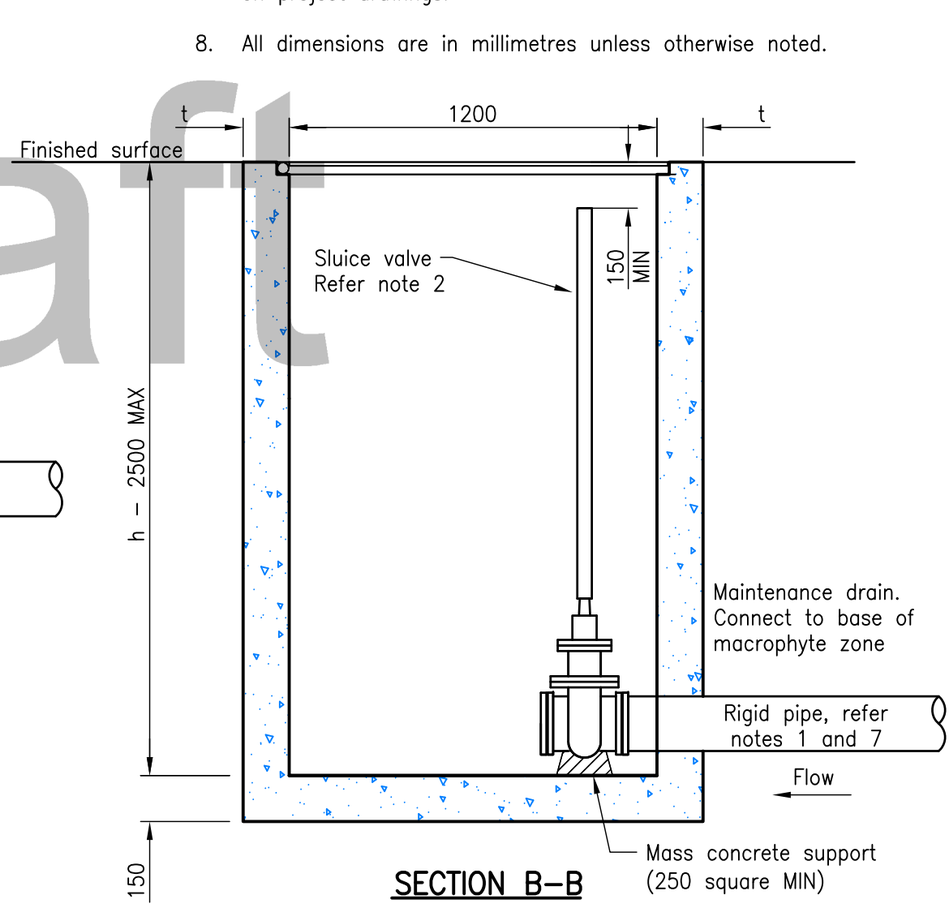
Pit Dimensions		
Height (h)	Width (w)	Wall Thickness (t)
0-1500	900	150
1500-2500	900	225

NOTES:

1. Refer to project drawings for rigid pipe diameter and invert level.
2. DICL sluice valve, refer project drawings for valve size. Valve to remain in closed position for normal operation. Valve to be opened to lower the water level for maintenance of the wetland.
3. Riser rigid pipe CL16, refer to project drawings for holes sizes and locations. Hole size and number as per relevant section of "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
4. For pits over 2500 in depth refer project drawings for pit dimensions and reinforcing details.
5. Concrete N25 in accordance with AS 1379 and AS 3600.
6. Lid and frame to be hot dip galvanised after fabrication to AS 1650.
7. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits, pipes and base levels must be noted on project drawings.
8. All dimensions are in millimetres unless otherwise noted.



SECTION A–A



SECTION B–B

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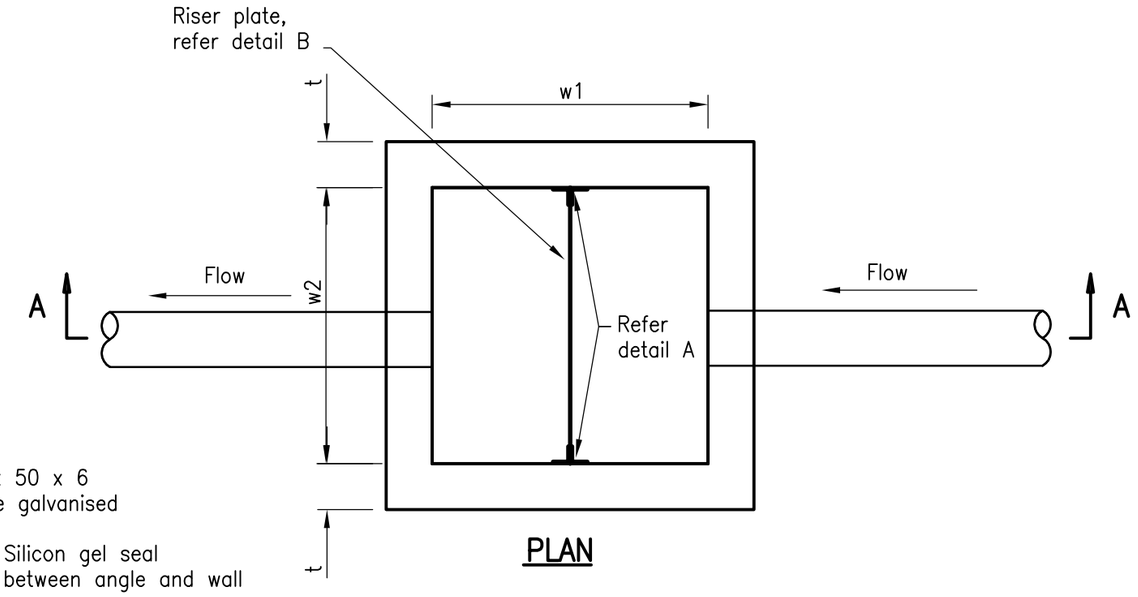
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

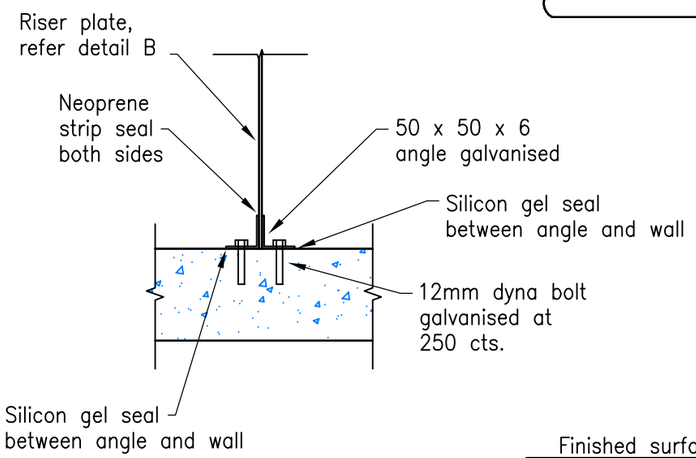
CONSTRUCTED WETLAND
OUTLET RISER PIT
OPTION B

DRAWING No.
WSUD–010
A
Rv.

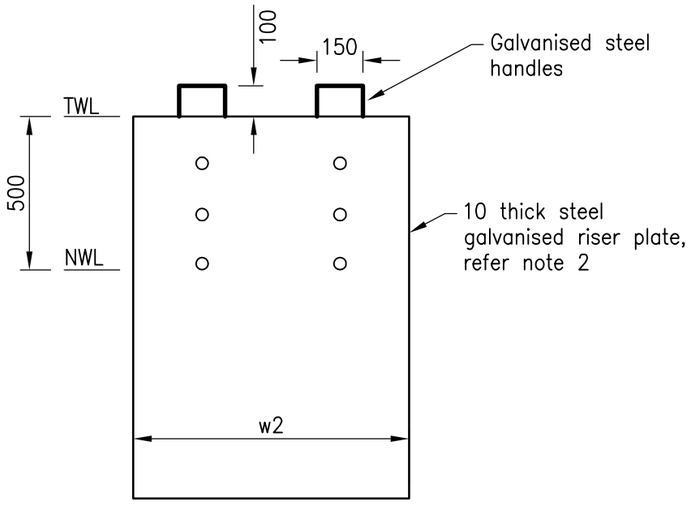
waterbydesign



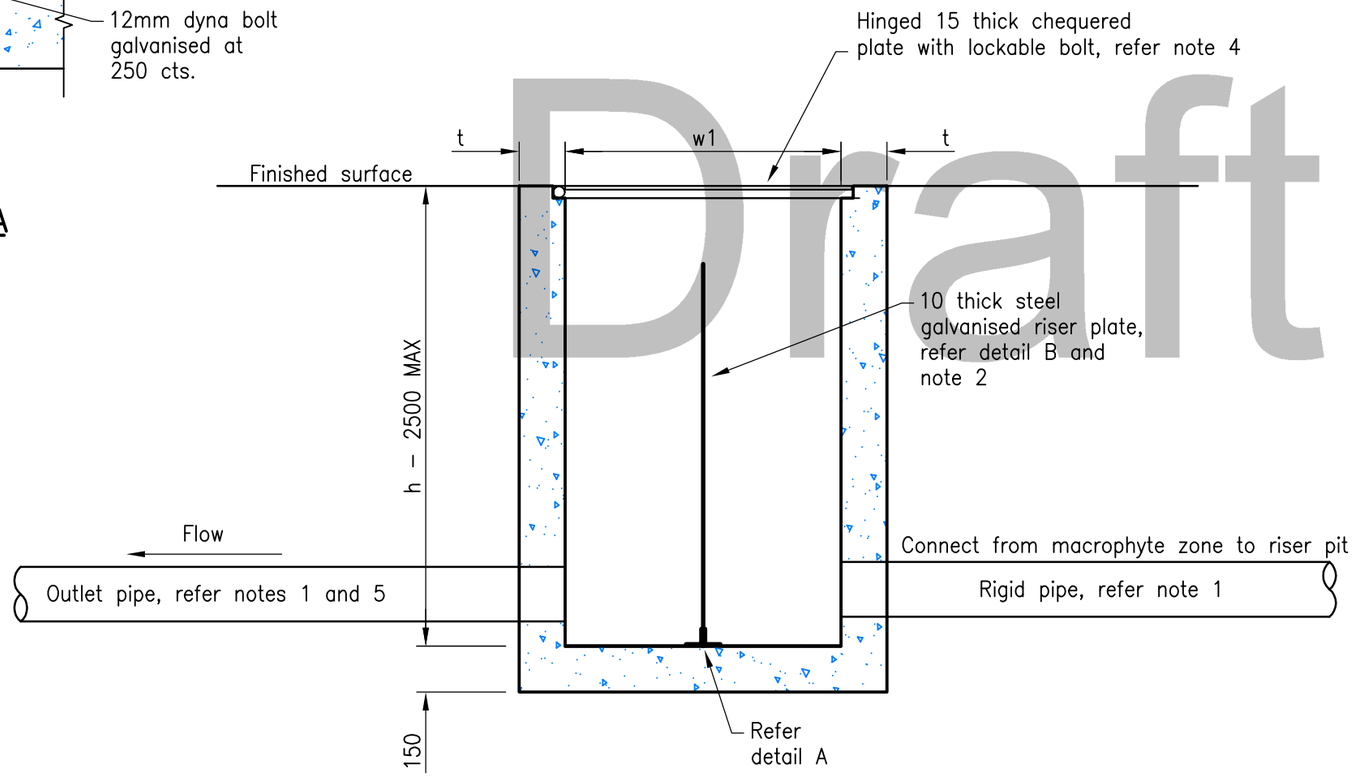
PLAN



DETAIL A



DETAIL B
RISER PLATE



SECTION A–A

Pit Dimensions			
Height (h)	Width (w1)	Width (w2)	Wall Thickness (t)
0-1000	600	600	150
1000-1500	900	600	150
1500-2500	900	900	225

NOTE:

1. Refer to project drawings for rigid pipe diameter and invert level.
2. Riser plate, refer to project drawings for holes sizes and locations. Hole size and number as per relevant section of "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
3. Concrete N25 in accordance with AS 1379 and AS 3600.
4. Lid, riser plate frame and handles to be hot dip galvanised after fabrication to AS 1650.
5. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits, pipes and base levels must be noted on project drawings.
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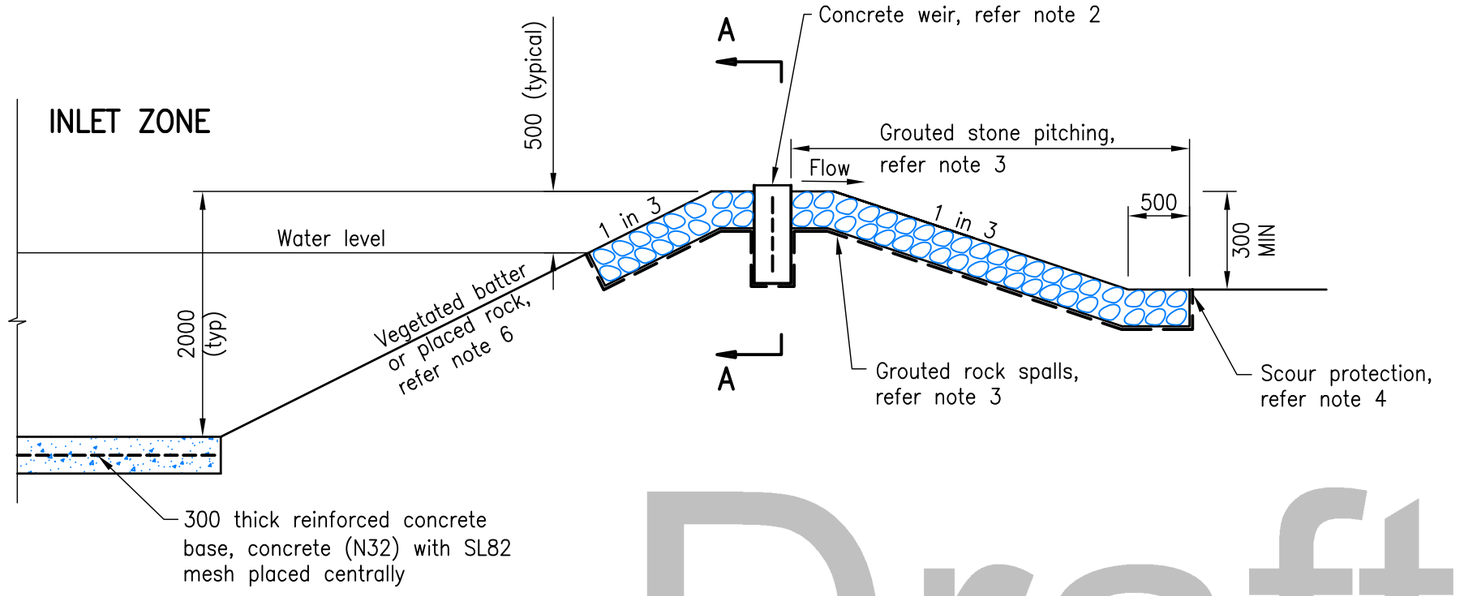
A	13/01/2010	ORIGINAL ISSUE

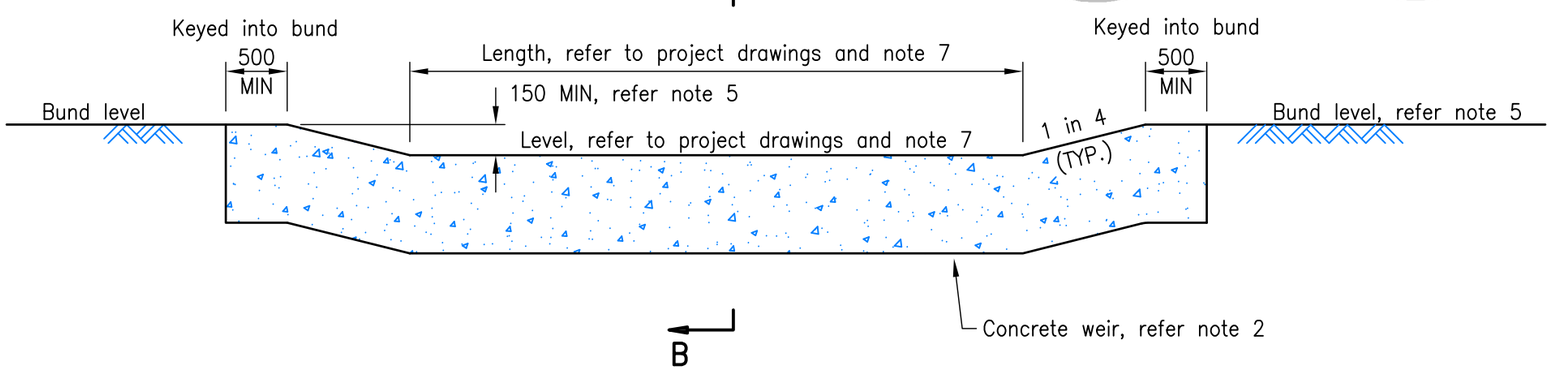
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

CONSTRUCTED WETLAND
OUTLET PIT
OPTION C

DRAWING No.
WSUD–011
A
Rv.



SECTION B–B



SECTION A–A

NOTES:

1. Insitu material to be tested and approved by geotechnical engineer prior to weir construction.
2. Concrete weir – 300 wide x 800 high concrete (N32) with SL81 mesh placed centrally.
3. Grouted stone pitching – stones 75–100, 300 thick on filter cloth, non–woven geotextile. Refer Landscape drawings and project drawings for plant specification and details. Geotechnical engineer to confirm compaction requirements for bund subsoil. Option to drill 100 cores through to subsoil to provide voids for planting (subject to flow velocities and local government requirements). Option to use placed rock with void plantings subject to approval by hydraulic engineer and local authority.
4. For extent and details of scour protection refer to project drawings. Bund levels must be noted on project drawings.
5. Bund level, refer to project drawings for minimum freeboard requirements.
6. Refer to project drawings for vegetated batter slope, 1 in 3 typical. Batters must be in accordance with local authority safety requirements.
7. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits, pipes and base levels must be noted on project drawings.
8. All dimensions are in millimetres unless otherwise noted.

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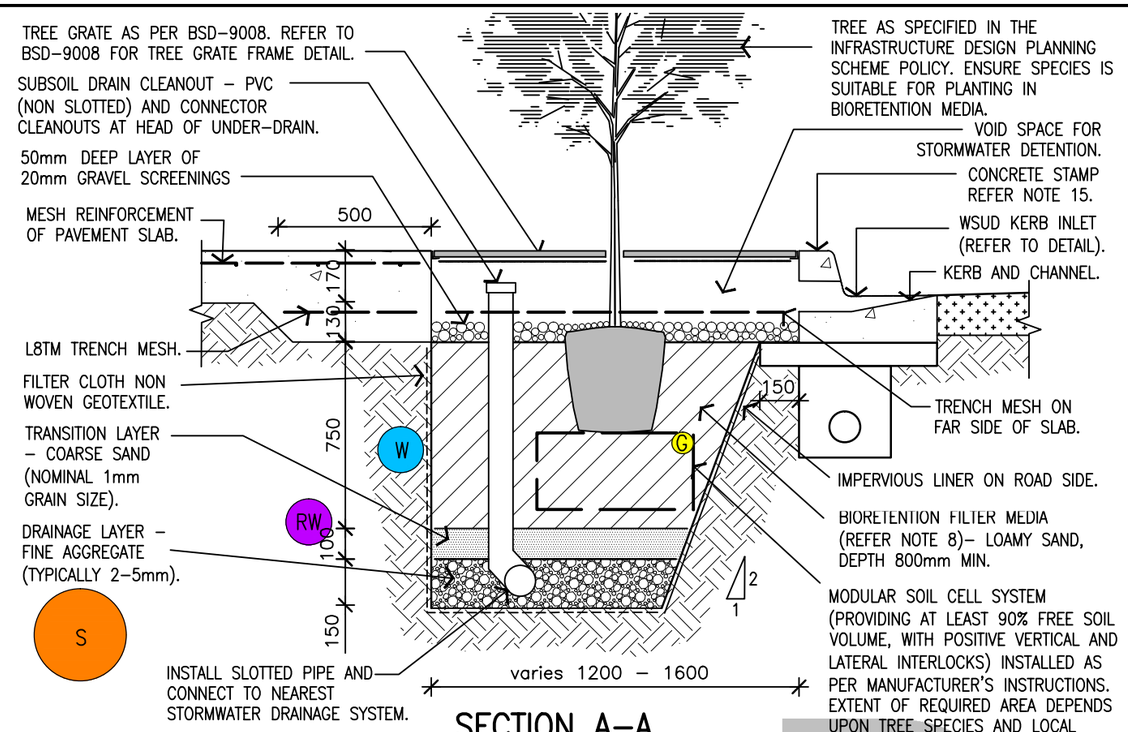
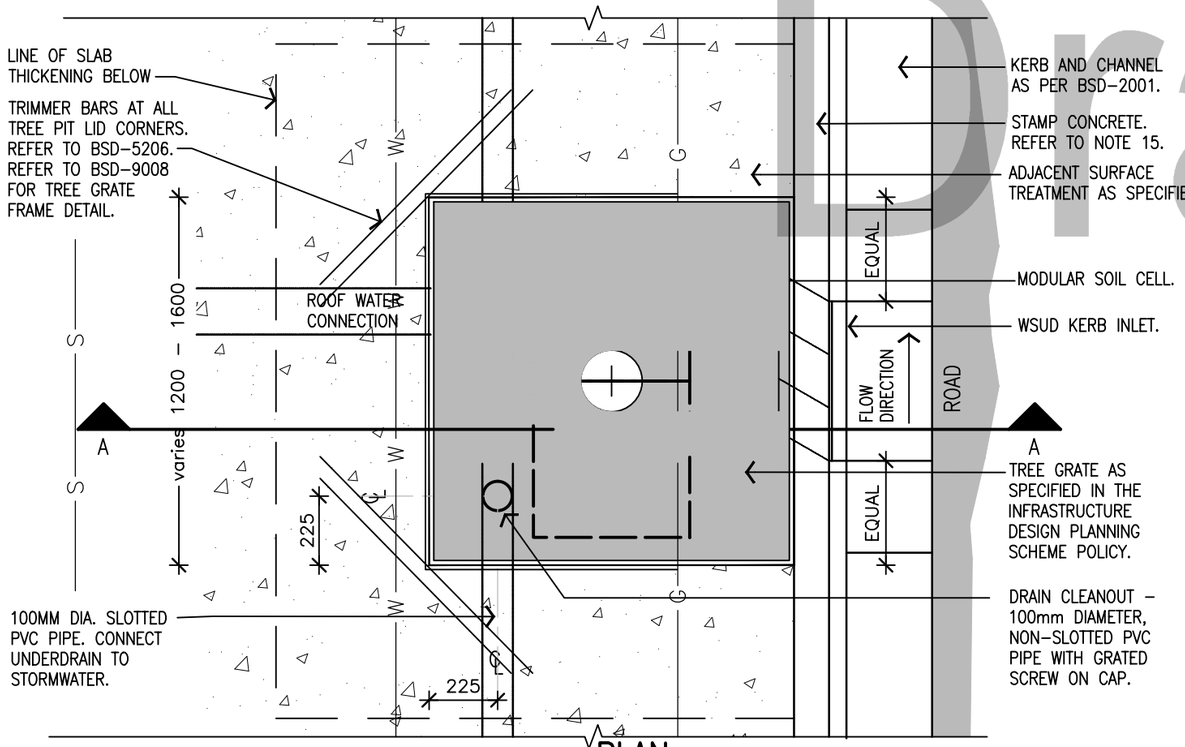
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

CONSTRUCTED WETLAND INLET ZONE
WEIR DETAILS

DRAWING No.
WSUD–012
Rv. A



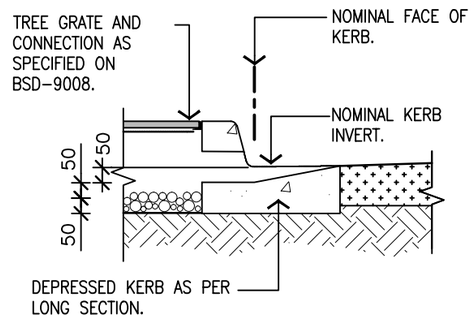
SECTION A–A



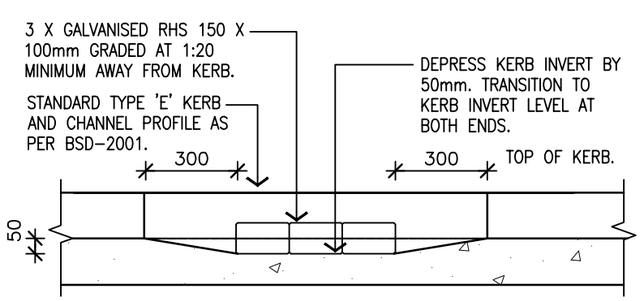
PLAN

NOTES

1. DETAIL TO BE INCORPORATED IN DEVELOPMENTS WHERE SERVICES/PERMITS/GRADES ENABLE THE CONSTRUCTION OF THE TREE PIT AND WHERE THE UNDER-DRAIN CAN BE CONNECTED TO GULLY.
2. THE WSUD KERB SHOWN IS ONLY SUITABLE FOR STREET TREE PITS AND SMALL RAINGARDENS. LARGER SYSTEMS (E.G TREE TRENCHES) MAY NEED SPECIFIC INLET DESIGN OR MUTIPLE INLETS.
3. WHERE THE TREE PIT LIES IN A LOW POINT (SAG) INLETS MAY BE ALIGNED AT RIGHT ANGLES TO KERB. ENSURE DRAINAGE IS INSTALLED APPROPRIATELY TO MANAGE STORMWATER VOLUMES.
4. ENSURE TREE PIT DRAINAGE IS CONNECTED TO STORMWATER SYSTEM TO AVOID FLOODING THE TREE.
5. TREE PITS ARE TO BE LOCATED UPSTREAM OF GULLY PITS.
6. ALL PUBLIC WALKWAYS ARE TO COMPLY WITH AUSTRALIAN STANDARD 1428: DESIGN FOR ACCESS AND MOBILITY.
7. IF A SERVICE (IE GAS) WILL CROSS THE WSUD TREE PIT, PROVIDE A CONDUIT FOR FUTURE USE. SERVICE SIZE TO BE CONFIRMED WITH SERVICE PROVIDER.
8. BIORETENTION FILTER MEDIA, TRANSITION LAYER AND DRAINAGE LAYER IN ACCORDANCE WITH "THE GUIDELINES FOR SOIL MEDIA IN BIORETENTION SYSTEMS". FACILITY FOR ADVANCING WATER BIORETENTION (FAWB) AND AS4419–2003.
9. VEGETATION: PLANT SPECIES, STREET FURNITURE AND LAYOUT TO BE DETERMINED ON A PROJECT BY PROJECT BASIS. PLANT SPECIFICATION AND DENSITY SHALL BE IN ACCORDANCE WITH WATER BY DESIGN'S "WATER SENSITIVE URBAN DESIGN TECHNICAL GUIDELINE FOR SOUTH EAST QUEENSLAND" AND BRISBANE CITY COUNCIL'S "INFRASTRUCTURE PLANNING SCHEME POLICY". TREE SPECIES TO BE SELECTED AS PER THE CENTRES DESIGN MANUAL AND ALSO CONSIDERING THEIR SUITABILITY FOR WET AND DRY CONDITIONS.
10. MAINTAIN 50–100mm RADIUS SEPARATION BETWEEN GRAVEL SCREENINGS AND STEM OF TREE.
11. FILTER CLOTH – NON–WOVEN GEOTEXTILE. FILTER CLOTH NOT TO BE PLACED BETWEEN ANY FILTER LAYERS. IMPERVIOUS LINER MAY BE REQUIRED ADJACENT TO ROADS AND MAY ALSO BE REQUIRED SUBJECT TO SOIL TESTING REQUIREMENTS IN ACCORDANCE WITH THE WATER SENSITIVE URBAN DESIGN TECHNICAL GUIDELINES (WATER BY DESIGN).
12. GENERAL CONSTRUCTION: BIORETENTION SYSTEM TO BE CONSTRUCTED IN ACCORDANCE WITH WATER BY DESIGN'S "CONSTRUCTION AND ESTABLISHMENT GUIDELINES: SWALES, BIORETENTION SYSTEMS AND WETLANDS".
13. SLOTTED RIGID PIPE (UPVC OR SIMILAR TO AS 2439.1) OR APPROVED EQUIVALENT, 0.5% MINIMUM GRADE. DIAMETER TYPICALLY 100 TO 150mm. PIPE JOINS SHALL BE SEALED INTO PITS USING GROUTS OR OTHER APPROVED WATERTIGHT SEAL. 50mm DRAINAGE LAYER (FINE AGGREGATE) COVER OVER 2–3mm SLOTTED PIPE.
14. STORMWATER KERB OPENING TO BE TEMPORARILY BLOCKED DURING CONSTRUCTION.
15. STAMP CONCRETE WITH THE FOLLOWING TEXT " THIS GARDEN FILTERS STORMWATER AND PROTECTS OUR WATERWAYS". TEXT TO BE 2 INCH HIGH AND STYLE AVENIR (SANS SERIF) OR ARIAL (SANS SERIF) IN LINE WITH BCC'S CORPORATE STYLE GUIDE.



WSUD KERB INLET CROSS SECTION



WSUD KERB INLET LONG SECTION

STRUCTURAL DESIGN REVIEWED & CERTIFIED FOR ISSUE
NAME: BALA BALAKUMAR RPEQ: 3963
SIGNATURE: SIGNATURE ON ORIGINAL DATE: 10/04/14

DESIGN REVIEWED & CERTIFIED FOR ISSUE
NAME: MARK R GIBSON RPEQ: 6722
SIGNATURE: SIGNATURE ON ORIGINAL DATE: 03/04/14

VERIFY LOCATION OF SERVICES PRIOR TO EXCAVATION.

ISSUE	AMENDMENT	DRAWN DATE	CHK'D DATE	APPR'D DATE
D	Updated Superseded reference in Draing Details	MAY '17	MAY '17	MAY '17
C	Drawing filename amended	FEB '16	JUL '16	JUL '16
B	AMENDED NOTES	Feb '15	Feb '15	Feb '15
A	ORIGINAL ISSUE	Apr '14	Apr '14	Apr '14

DESIGN AUTHORISED FOR PUBLICATION
INGA CONDRIC SIGNATURE ON ORIGINAL DATED 14/04/14
ASSET ENGINEERING MANAGER STRATEGIC ASSET MANAGEMENT
DESIGN APPROVED
PETER KURAS SIGNATURE ON ORIGINAL DATED APRIL 14
PRINCIPAL PROGRAM OFFICER NATURAL ENVIRONMENT WATER & SUSTAINABILITY

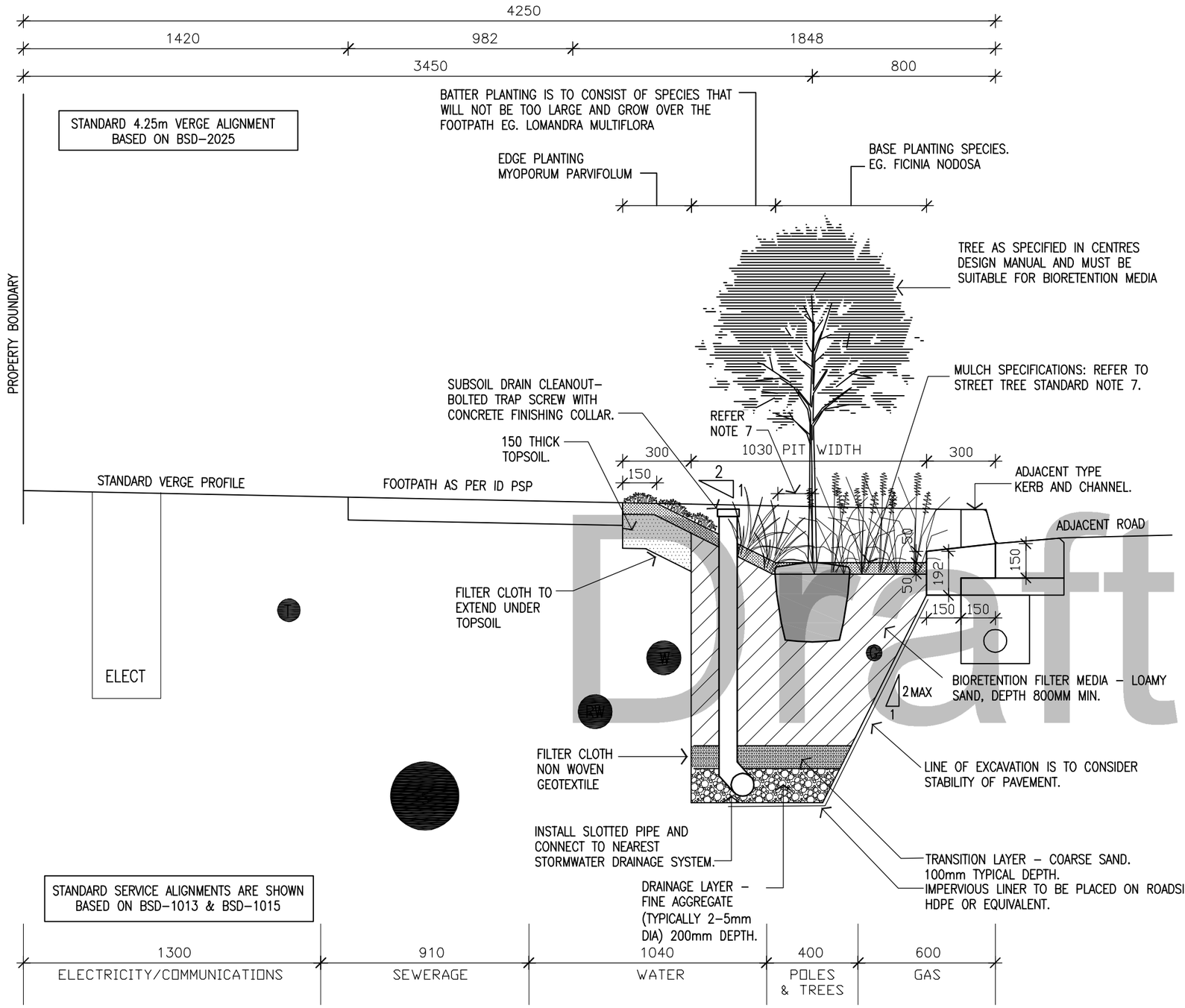
DESIGN	CPO - P&D	DATE	Apr '14
DRAWN	CPO - P&D	DATE	Apr '14
CHECKED	M. GIBSON	DATE	Apr '14
DRAWING FILENAME	BSD-9031 (C) WSUD typical tree pit with grate.dwg		
ASSOCIATED PLANS			

BRISBANE CITY

BRISBANE CITY COUNCIL STANDARD DRAWING

WSUD TYPICAL TREE PIT WITH GRATE

SCALE: NOT TO SCALE
DWG No.: BSD-9031
ORIGINAL SIZE: A3
REVISION: D



A 9034 WATER SMART TREE WITHIN TURF – TYPICAL SECTION

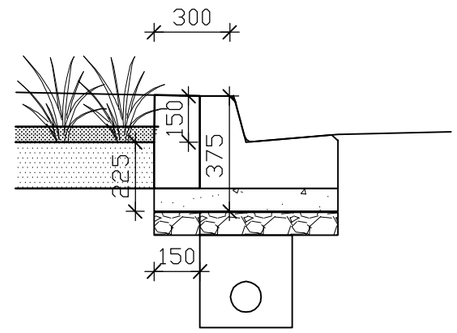
NOTES

STREET TREE STANDARD NOTES:

1. SYSTEM IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE WATER BY DESIGN 'CONSTRUCTION AND ESTABLISHMENT GUIDELINES.'
2. STORMWATER KERB OPENING IS TO BE TEMPORARILY BLOCKED DURING CONSTRUCTION.
3. FILTER MEDIA, TRANSITION LAYER AND DRAINAGE LAYER IN ACCORDANCE WITH THE "GUIDLEINES FOR SOIL MEDIA IN BIO–RETENTION SYSTEMS", FACILITY FOR ADVANCING WATER BIO–FILTRATION (FAWB).
4. UNDER–DRAIN, SLOTTED RIGID PIPE UPVC/HDPE OR SIMILAR TO AS 2439.1) OR APPROVED EQUIVALENT, 0.5% MINIMUM GRADE. DIAMETER TYPICALLY 100. PIPE JOINS SHALL BE GLUED WITH PLUMBING CEMENT. PIPE SHALL NOT BE INSTALLED WITH A FILTER SOCK SURROUNDING PIPE. UNDER–DRAINAGE PIPES SHALL BE SEALED INTO PITS USING GROUTS OR OTHER APPROVED WATERTIGHT SEAL. MINIMUM 50MM DRAINAGE LAYER OVER UNDERDRAINAGE PIPE.
5. FILTER CLOTH – NON–WOVEN GEOTEXTILE. FILTER CLOTH NOT TO BE PLACED BETWEEN ANY FILTER LAYERS. IMPERVIOUS LINER MAY BE REQUIRED ADJACENT TO ROADS AND MAY ALSO BE REQUIRED ELSEWHERE SUBJECT TO SOIL TESTING REQUIREMENTS IN ACCORDANCE WITH THE 'BIORETENTION TECHNICAL DESIGN GUIDELINES' (WATER BY DESIGN).
6. VEGETATION: PLANT SPECIES AND LAYOUT TO BE DETERMINED ON A PROJECT BY PROJECT BASIS. PLANT SPECIFICATION AND DENSITY SHALL BE IN ACCORDANCE WITH "BIORETENTION TECHNICAL DESIGN GUIDELINES" (WATER BY DESIGN) AND BRISBANE CITY COUNCIL'S INFRASTRUCTURE DESIGN PLANNING SCHEME POLICY. TREE SPECIES TO BE SELECTED AS PER THE CENTRES DETAIL DESIGN MANUAL AND ALSO CONSIDERING THEIR SUITABILITY FOR WET AND DRY CONDITIONS. REFER TO NEW PLANTING STANDARD DRAWING.
7. MULCH: 75MM MULCH LAYER TO BE ORGANIC AND FRIABLE, SUCH AS SUGARCANE MULCH. MULCH TO BE SECURED WITH JUTE MESH TO MANUFACTURERS SPECIFICATIONS.

SECTION NOTES:

1. THIS PLAN IS TO BE READ IN CONJUNCTION WITH BSD 9034. REFER TO BSD–9034 FOR PLAN VIEW DETAILS AND NOTES.
2. PROVISION FOR SAFETY OF PEDESTRIANS AND OTHER USERS SHALL BE IN ACCORDANCE WITH AUSTROADS REQUIREMENTS SUCH AS LIMITING DEPTH OF VERTICAL DROPS.
3. MAINTAIN 50–100MM RADIUS SEPARATION BETWEEN MULCH AND STEM OF TREE.
4. DROP FROM KERB BACKING STRIP TO FILTER SURFACE NOT TO EXCEED 250MM.
5. KERB ADAPTORS ARE NOT TO BE DIRECTLY PLUMBED INTO SYSTEM.
6. TREE PITS MAY BE LINKED VIA SUITABLY SIZED DRAINAGE PIPE WHERE DISTANCE TO NEAREST GUILLY EXCEEDS 30M.



B 9034 KERB BACKING STRIP DETAILS

DESIGN REVIEWED & CERTIFIED FOR ISSUE
NAME: MARK R GIBSON RPEQ: 6722
SIGNATURE: SIGNATURE ON ORIGINAL DATE: 03/04/14

VERIFY LOCATION OF SERVICES PRIOR TO EXCAVATION.

ISSUE	AMENDMENT	DRAWN DATE	CHK'D DATE	APPR'D DATE
B	CLARIFICATION & IMPROVEMENT TO NOTES & DESIGN	Nov '16	Nov '16	Dec '16
A	ORIGINAL ISSUE	Apr '14	Apr '14	Apr '14

DESIGN AUTHORISED FOR PUBLICATION
Inga Condric Authorised
Original 14/04/2014
for ASSET ENGINEERING MANAGER
STRATEGIC ASSET MANAGEMENT

DESIGN APPROVED

PRINCIPAL PROGRAM OFFICER
NATURAL ENVIRONMENT WATER & SUSTAINABILITY

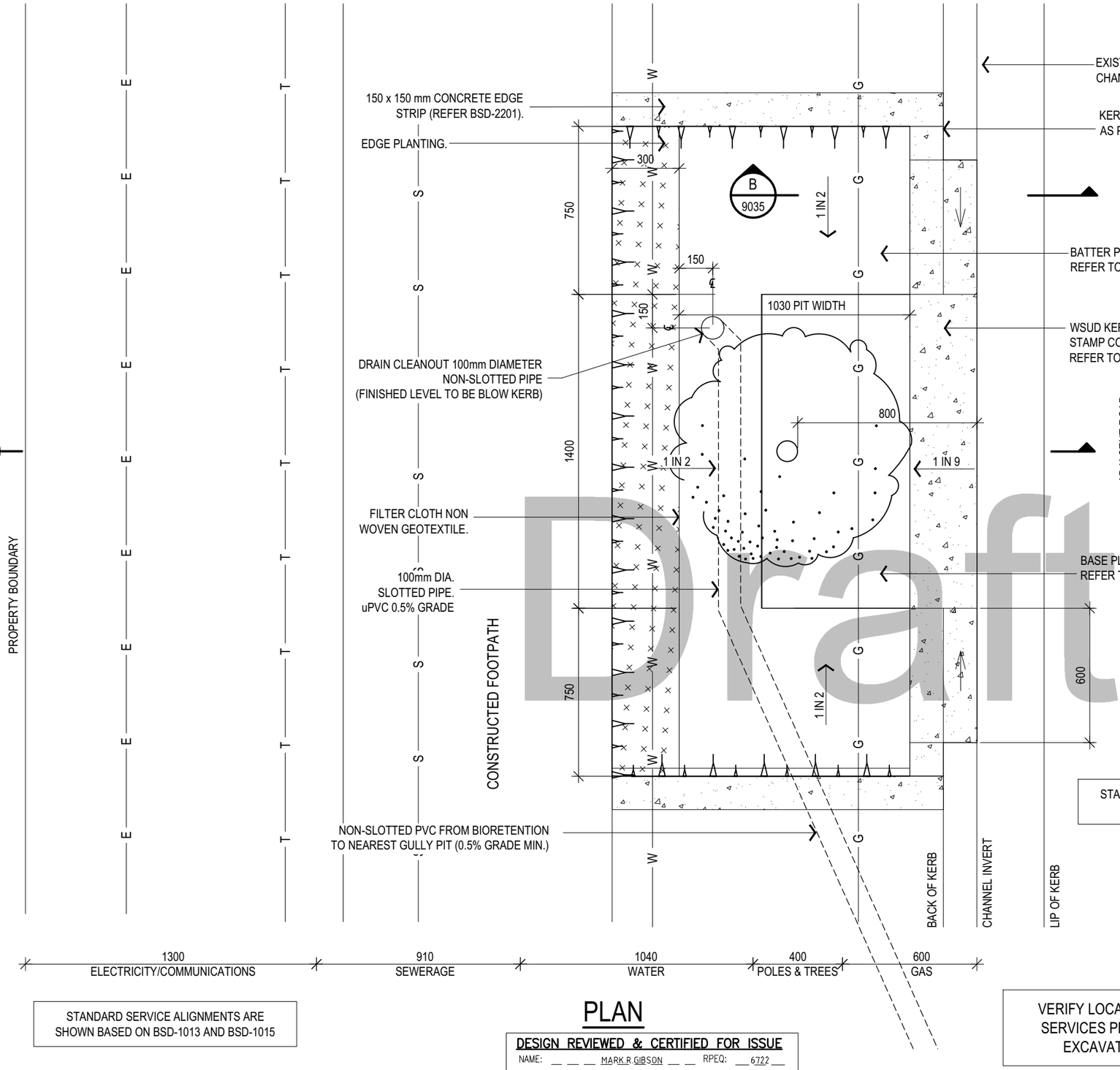
DESIGN	CPO - P&D	DATE	Apr '14
DRAWN	CPO - P&D	DATE	Apr '14
CHECKED	M. GIBSON	DATE	Apr '14
DRAWING FILENAME	BSD-9035.dwg		
ASSOCIATED PLANS			

BRISBANE CITY

BRISBANE CITY COUNCIL STANDARD DRAWING

WSUD TREE WITHIN TURF – SECTION

SCALE NOT TO SCALE
DWG No. BSD–9035
ORIGINAL SIZE A3
REVISION B



STANDARD SERVICE ALIGNMENTS ARE SHOWN BASED ON BSD-1013 AND BSD-1015

PLAN

DESIGN REVIEWED & CERTIFIED FOR ISSUE
NAME: MARK R GIBSON RPEQ: 6722
SIGNATURE: DATE: 03/04/14

SERVICES LEGEND

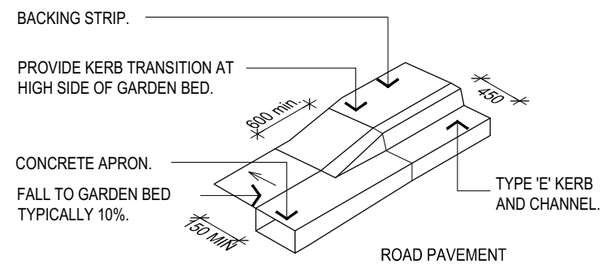
S	SEWERAGE
T	TELECOMMUNICATIONS
G	GAS
W	WATER MAIN
E	ELECTRICITY
→	DENOTES SLOPE DOWN

NOTES:

1. THIS PLAN IS TO BE READ IN CONJUNCTION WITH BSD-9035
2. DETAIL TO BE INCORPORATED IN DEVELOPMENTS WHERE SERVICES/PERMITS/GRADES ENABLE THE CONSTRUCTION OF THE TREE PIT AND WHERE THE UNDER-DRAIN CAN BE CONNECTED TO GULLY.
3. REFER TO BSD-9035 FOR NOTES ON FILTER MEDIA, VEGETATION, UNDER-DRAINS, FILTER CLOTH, SLOTTED PIPE, GENERAL CONSTRUCTION AND SERVICES.
4. THE WSUD KERB SHOWN IS ONLY SUITABLE FOR STREET TREE PITS AND SMALL RAINGARDENS. LARGER SYSTEMS (e.g. TREE TRENCHES) MAY NEED SPECIFIC INLET DESIGN OR MUTIPLE INLETS.
5. TREE PITS ARE TO BE LOCATED UPSTREAM OF GULLY PITS.
6. STAMP CONCRETE WITH THE FOLLOWING TEXT "THIS GARDEN FILTERS STORMWATER AND PROTECTS OUR WATERWAYS". TEXT TO BE 2 INCH HIGH AND STYLE AVENIR (SANS SERIF) OR ARIAL (SANS SERIF) IN LINE WITH BCC'S CORPORATE STYLE GUIDE.
7. IF A SERVICE (IE GAS) WILL CROSS THE WSUD TREE PIT, PROVIDE A CONDUIT FOR FUTURE USE. SERVICE SIZE TO BE CONFIRMED WITH SERVICE PROVIDER.
8. STEEP VERGE OR ROAD GRADES MAY LIMIT THE FEASIBILITY OF STREETSCAPE BIORETENTION.
9. FOR KERB BACKING STRIP DETAILS REFER TO BSD-9035.
10. CONCRETE EDGE-STRIP (150 x 150) REQUIRED AT BACK EDGE OF DEVICE WHERE NO FOOTPATH IS PROPOSED.
11. MAXIMUM LENGTH OF DEVICE IS TO BE SIZED TO ALLOW ADEQUATE SPACE FOR DRIVEWAY CROSSOVERS AND WASTE PICKUP. TYPICAL MAXIMUM LENGTH IS 3 METRES.

STANDARD 4.25m VERGE ALIGNMENT BASED ON BSD-2025

VERIFY LOCATION OF SERVICES PRIOR TO EXCAVATION.



KERB TRANSITION DETAIL

ISSUE	AMENDMENT	DRAWN DATE	CHK'D DATE	APPR'D DATE
C	Note For Service Alignments Updated to Reference Current BSD	NOV '18	APR '19	APR '19
B	CLARIFICATION & IMPROVEMENT TO NOTES & DESIGN	Nov '16	Nov '16	Dec '16
A	ORIGINAL ISSUE	Apr '14	Apr '14	Apr '14

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Original 14/04/2014
for ASSET ENGINEERING MANAGER
STRATEGIC ASSET MANAGEMENT

DESIGN APPROVED
PRINCIPAL PROGRAM OFFICER
NATURAL ENVIRONMENT WATER & SUSTAINABILITY

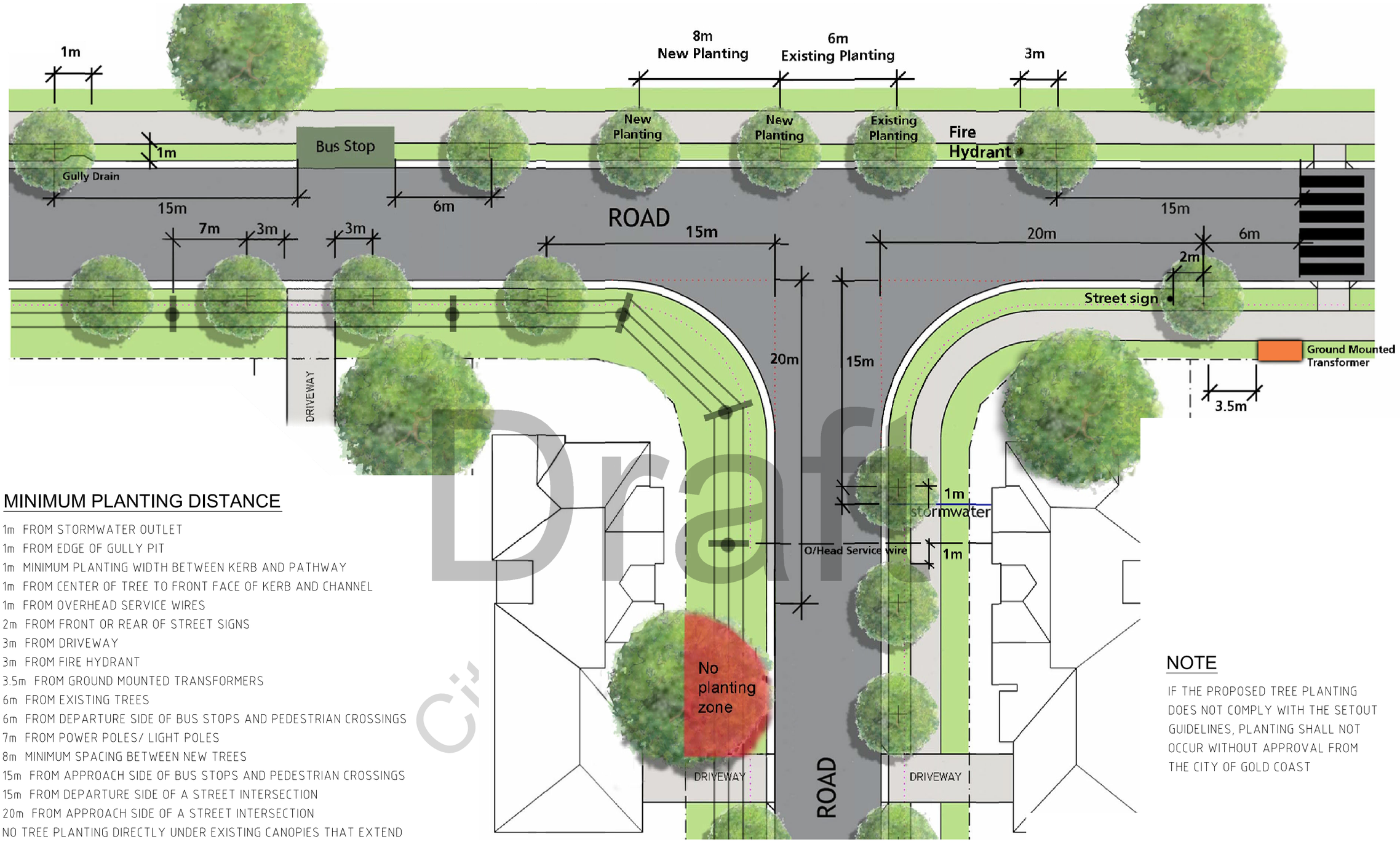
DESIGN	CPO - P&D	DATE	Apr '14
DRAWN	CPO - P&D	DATE	Apr '14
CHECKED	M. GIBSON	DATE	Apr '14
DRAWING FILENAME	BSD-9034 (C) WSUD tree within turf - plan.dwg		
ASSOCIATED PLANS			

BRISBANE CITY

BRISBANE CITY COUNCIL STANDARD DRAWING

WSUD TREE WITHIN TURF - PLAN

SCALE: NOT TO SCALE
DWG No.: BSD-9034
ORIGINAL SIZE: A3
REVISION: C



MINIMUM PLANTING DISTANCE

1m FROM STORMWATER OUTLET
1m FROM EDGE OF GULLY PIT
1m MINIMUM PLANTING WIDTH BETWEEN KERB AND PATHWAY
1m FROM CENTER OF TREE TO FRONT FACE OF KERB AND CHANNEL
1m FROM OVERHEAD SERVICE WIRES
2m FROM FRONT OR REAR OF STREET SIGNS
3m FROM DRIVEWAY
3m FROM FIRE HYDRANT
3.5m FROM GROUND MOUNTED TRANSFORMERS
6m FROM EXISTING TREES
6m FROM DEPARTURE SIDE OF BUS STOPS AND PEDESTRIAN CROSSINGS
7m FROM POWER POLES/ LIGHT POLES
8m MINIMUM SPACING BETWEEN NEW TREES
15m FROM APPROACH SIDE OF BUS STOPS AND PEDESTRIAN CROSSINGS
15m FROM DEPARTURE SIDE OF A STREET INTERSECTION
20m FROM APPROACH SIDE OF A STREET INTERSECTION
NO TREE PLANTING DIRECTLY UNDER EXISTING CANOPIES THAT EXTEND TO AND BEYOND THE KERB AND CHANNEL

NOTE

IF THE PROPOSED TREE PLANTING DOES NOT COMPLY WITH THE SETOUT GUIDELINES, PLANTING SHALL NOT OCCUR WITHOUT APPROVAL FROM THE CITY OF GOLD COAST

CITY OF GOLDCOAST.
City of Gold Coast
PO Box 5042
Gold Coast MC 9729
P: 1300 GOLDCOAST

THIS DRAWING IS NOT TO BE AMENDED WITHOUT REFERENCE TO STANDARDS COMMITTEE

CONTROLLED DOCUMENT

DO NOT SCALE
TAKE FIGURED DIMENSIONS ONLY

No.	AMENDMENT	APPROVED	DATE	ISSUED

DRAWN BY
CITY OF GOLD COAST

PASSED - COORDINATOR OPEN SPACE ASSETS
NAME: CAMERON TAYLOR 17/10/13

APPROVED - MANAGER PARKS & RECREATIONAL SERVICES
NAME: RON JACOBS 17/10/13

STANDARD DRAWING

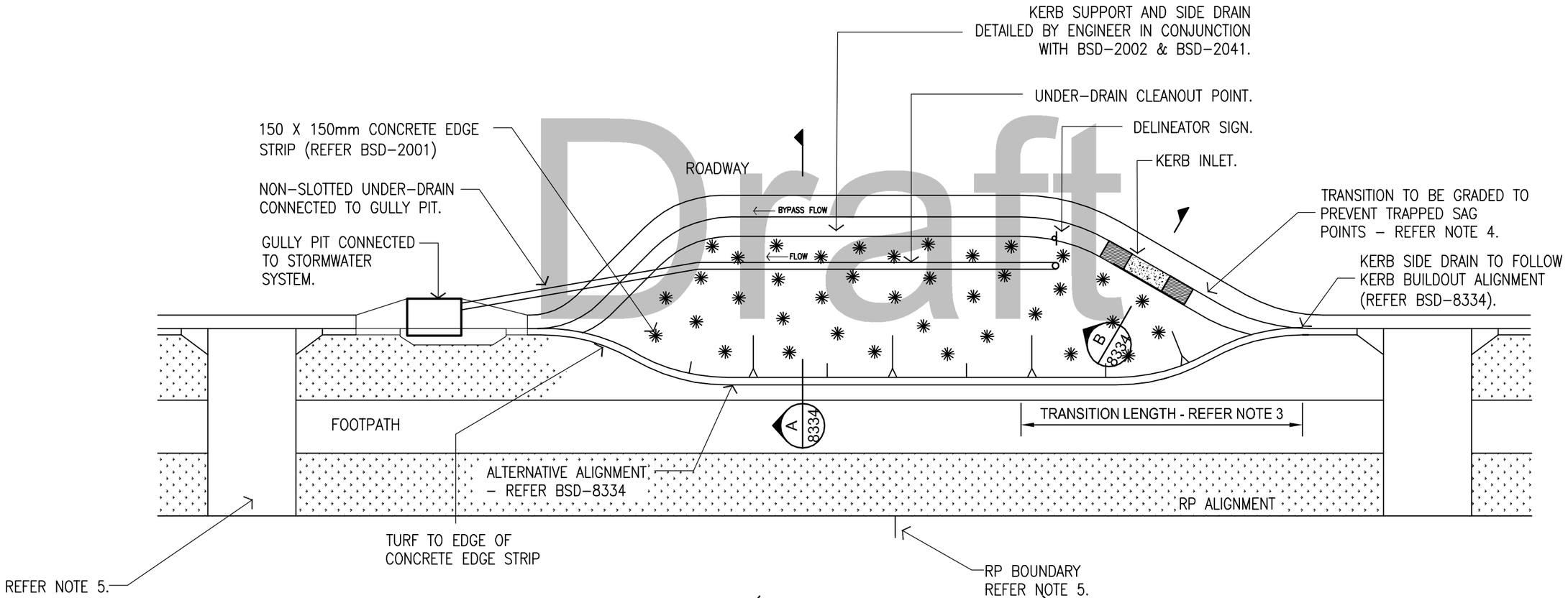
STREET TREE PLANTING SETOUT GUIDELINES FOR ROADWORKS

STANDARD DRAWING No.
05-103

ISSUE
2015 EDITION

NOTES:

1. THIS PLAN IS TO BE READ IN CONJUNCTION WITH BSD 8334. FOR BIORETENTION SYSTEM NOTES, REFER TO BSD–8331.
2. FOR BIORETENTION SYSTEM NOTES REFER TO BSD–8334.
3. SELECTION OF APPROPRIATE PLAN LAYOUT IS BASED ON SITE SPECIFIC DETAILS INCLUDING SPACE, SERVICES, DRAINAGE, TOPOGRAPHY, TRAFFIC CONDITIONS ETC.
4. FLOWS MUST BE DEMONSTRATED TO BYPASS THE KERB BUILDOUT AND NOT POOL ON THE UPSTREAM SIDE ONCE BIORETENTION HAS REACHED CAPACITY.
5. KERB BUILDOUT TO COMPLY WITH GENERAL DESIGN CRITERIA AS PER BSD–3201 AND LINEMARKING AND SIGNAGE REQUIREMENTS FOR INTEGRATED KERB BUILDOUTS AS PER BSD–5257.
6. CONSIDER PLACEMENT OF KERB TO PREVENT IMPINGING ON AVAILABLE PROPERTY ACCESS.
7. USE OF KERB BUILD–OUT WILL REQUIRE CONSULTATION WITH ROADS/TRAFFIC ENGINEER.
8. CONCRETE EDGE STRIP (150 X 150mm) REQUIRED AT BACK EDGE OF DEVICE WHERE NO FOOTPATH IS PROPOSED.
9. MAXIMUM LENGTH OF DEVICE IS TO BE SIZED TO ALLOW ADEQUATE SPACE FOR DRIVEWAY CROSSOVERS AND WASTE PICKUP. TYPICAL MAXIMUM LENGTH IS 8 METERS.
10. IN SAG LOCATIONS OF TYPE 1 FIELD INLET WITHIN THE BASIN MAY BE SUBSTITUTED FOR A GULLY PIT.



STREETSCAPE BIORETENTION POD (KERB BUILDOUT TYPE) – TYPICAL LAYOUT

DESIGN REVIEWED & CERTIFIED FOR ISSUE
NAME: MARK.R.GIBSON RPEQ: 6722
SIGNATURE: SIGNATURE ON ORIGINAL DATE: 03/04/14

VERIFY LOCATION OF SERVICES PRIOR TO EXCAVATION.

ISSUE	AMENDMENT	DRAWN DATE	CHK'D DATE	APPR'D DATE
C	CLARIFICATION & IMPROVEMENT TO NOTES & DESIGN	Nov `16	Nov `16	Dec `16
B	Drawing Title Amended	JUL `16	JUL `16	FEB `16
A	ORIGINAL ISSUE	Apr '14	Apr '14	Apr '14

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14/04/2014
for ASSET ENGINEERING MANAGER
STRATEGIC ASSET MANAGEMENT

DESIGN APPROVED

PRINCIPAL PROGRAM OFFICER
NATURAL ENVIRONMENT WATER & SUSTAINABILITY

DESIGN	CPO – P&D	DATE	Apr '14
DRAWN	CPO – P&D	DATE	Apr '14
CHECKED	M. GIBSON	DATE	Apr '14
DRAWING FILENAME	BSD-8333.dwg		
ASSOCIATED PLANS			

BRISBANE CITY

BRISBANE CITY COUNCIL STANDARD DRAWING

WATERSMART BIORETENTION POD (KERB BUILDOUT TYPE) – LAYOUT

SCALE: NOT TO SCALE
DWG No.: BSD–8333
ORIGINAL SIZE: A3
REVISION: C