DRAFT Stormwater Guidelines for Development

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Bega Valley Shire Council acknowledges and pays our respects to the traditional custodians of the lands, waterways and airspace of the shire.

Contents

Revision Register

Date	Revision	Author	Approver	Amendments
DRAFT	0 - Initial	WN		N/A

Abbreviations and Definitions

0074 Stormwater Drainage (Design)	Council's specification for stormwater drainage design
AR&R	Australian Rainfall and Runoff: A Guide to Flood Estimation 2019
AS3500.3	Australian Standard for stormwater drainage
BVSC	Bega Valley Shire Council
Chartered Professional Engineer	An engineer accredited by Engineers Australia as meeting a high level of experience and competence. Accreditation is in a particular discipline or disciplines
Council	Bega Valley Shire Council
DA	Development Application
DCP	Bega Valley Development Control Plan 2013
Detailed Design	Detailed stormwater design submitted with either the SWC or S68 application
Easement to Drain Water	As defined in the Conveyancing Act 1919
Greenfield subdivision	means subdivision of a large area of rural or vegetated land, whether for the purpose of residential, commercial, industrial or rural residential development, and includes the creation of new roads.
Hydraulic engineer	Typically, a subspecialty of civil engineering, environmental or mechanical engineering
Infill subdivision	means subdivision of previously subdivided residential, commercial, industrial or rural residential land, and does not involve the creation of a new road.
LEP	Bega Valley Local Environmental Plan 2013
OLFP	Overland Flow Path
OSD	On Site Detention
PSD	Permitted Site Discharge
Professional engineer	A person who is: - If legislation is applicable: A registered professional engineer in the relevant discipline who has appropriate experience and competence in the relevant field. - If legislation is not applicable: Registered in relevant discipline on the National Engineering Register (NER), a corporate member of Engineers Australia recognised as a Professional Engineer or eligible to become a corporate member as a Professional Engineer and has appropriate experience and competence in the relevant field.
RC	Reinforced Concrete
RCP	Reinforced Concrete Pipe
Roads Authority	Council, Transport for New South Wales or Crown Lands

Section 138 Application	Application under Section 138 of the *Roads Act 1993* to undertake works in the Road Reserve. Application is made to the relevant Roads Authority
Section 68 Application	Application under Section 68 of the *Local Government Act 1993* to connect to or alter Council's stormwater drainage system
SQID	Stormwater Quality Improvement Devices
SSR	Stormwater Storage Requirements
Suitably qualified and experienced professional	- Stormwater design: Civil, environmental or hydraulic *professional engineer* with relevant experience - Stormwater quality design: Civil or environmental *professional engineer* or environmental scientist with relevant experience - Structural design: Chartered professional engineer (structural) with relevant experience
SWC	Subdivision Works Certificate
TWL	Top water level

1 Introduction

1.1 Background

These guidelines supplement Council's Development Control Plan 2013. They prescribe Council's requirements for the management of stormwater within development sites and discharge of stormwater from development sites. They must be used in conjunction with Council's:

- Specification 0074 Stormwater Drainage (Design)
- Development Control Plan (DCP) 2013.

Stormwater objectives for development in the Bega Valley Shire are:

- Pre-development water quality is maintained or enhanced during construction and in post-development runoff.
- To address the impact of decreasingly pervious catchments on downstream property, infrastructure and the environment.
- To incorporate the principles of water sensitive urban design and integrated water cycle management.

The requirements of this guideline may be varied at the discretion of Council.

1.2 Required documentation and approvals

1.2.1 Development application stage

Dwelling house, ancillary development, alterations and additions, farm buildings and dual occupancy development

Development Applications (DAs) for these types of development require a stormwater concept plan to be submitted at DA stage, except alterations and additions that do not change existing stormwater arrangements. The stormwater concept plan must illustrate full drainage paths from roofs and hardstand areas to Council's stormwater system / or a drainage easement.

The stormwater concept plan can be completed by the builder/designer/architect/drafter for a dwelling house, dual occupancy, ancillary development and farm buildings.

A stormwater report prepared by a suitably qualified and experienced professional in accordance with these guidelines must accompany the DA if the site is stormwater constrained, on-site detention is required, or public/inter-allotment stormwater works are required or proposed. See section 6.1 for lodgement requirements.

All other development

Development Applications (DAs) for all other development types must be accompanied by a stormwater concept design and accompanying report prepared by a *suitably qualified and experienced professional*. Submission requirements are provided in Section 6.1.

Change of use and other development applications for internal works, where the impervious surfaces and stormwater arrangements are not changing, are exempt.

1.2.2 Construction stage

Construction stage – stormwater connections via Section 68 approval

An approval under Section 68 of the *Local Government Act 1993* must be obtained for construction of stormwater connections to Council's network. For basic connections where no engineers report was required at DA stage, the connection details can be provided on the architectural plans in conformity with these guidelines. Where an engineer's report was required at DA stage, engineering details of the proposed connection should be provided.

For basic connections this approval is typically a combined approval with the development's sewer connection. For specialised connections a separate Section 68 application may be required as indicated by the development consent.

Construction stage – Private works

Complex private drainage systems, on-site detention and Stormwater Quality Improvement Devices (SQID)s are required to be designed by a *suitably qualified and experienced professional* in accordance with these guidelines and Australian standards prior to the issue of a construction certificate for the development.

Detailed design, construction and certification requirements and timing are stipulated through conditions of development consent and/or as conditions of a Section 68 or Section 138 approval. Evidence of compliance with these requirements is typically required to be provided to the principal certifier.

Construction stage – Public Works

A Section 68 approval must be obtained for construction or upgrade of Council's network where it is within private property.

An approval under Section 138 of the Roads Act (1993) is required for all public stormwater works within public roads.

A Subdivision Works Certificate (SWC) is required for new stormwater infrastructure to be constructed as part of subdivision works.

Timing as indicated by the development consent. See section 6.1.1 for design submission requirements. Design to be in accordance with these guidelines and council specification *0074 Stormwater Drainage (Design).*

1.2.3 Complying Development Certificates

See Council's DCP 2013 Section 5.14 for complying development types that require Section 68 approval prior to the issue of a Complying Development Certificate (CDC). For these development types, submission requirements include:

- Architectural site plans showing internal stormwater systems
- Stormwater design documentation in accordance with Section 6.1.1.

For other complying development, the Section 68 submission requirements are as per *Construction stage – stormwater connections via Section 68 approval* in Section 1.2.2 of this document.

1.2.4 Prior to occupation or subdivision certificate

The following is an outline of the main stormwater documentation required to be submitted prior to occupation for building works or subdivision certificate for subdivision works. Additional documentation may be required, or timing varied on a case-by-case basis as indicated by the development consent.

Prior to the issue of an occupation certificate for building works the Principal Certifier must be provided with:

- Certification of private OSD and/or SQID systems as per section 6.5
- Evidence that the OSD system has been registered on the property title in accordance with section 6.6
- Any other certification of private engineering works associated with stormwater such as retaining walls, culverts etc.

Prior to the issue of an occupation certificate for building works or issue of a subdivision certificate for subdivision works, Council must be provided with:

- Certification of public OSD and/or SQID systems as per section 6.5
- Works as executed plans for public or inter-allotment drainage works in accordance with section 6.3
- CCTV report of any new Council stormwater and evidence of completion of any remediation work as per section 6.4
- Any other certification of approved public engineering works associated with stormwater such as retaining walls, culverts etc.

2 Stormwater Disposal Requirements

2.1 General

Site stormwater drainage systems should be designed to flow under gravity, through OSD and SQIDs (where required) and connect to Council's stormwater drainage system at the nearest suitable location or inter-allotment drain benefiting the site. Site drainage design should follow the natural fall of the catchment.

2.2 Stormwater system availability

It is the developer's responsibility to investigate the availability of a Council stormwater drainage system, inter-allotment drainage system or other legal and suitable point of discharge, prior to submitting a Stormwater Concept at DA stage. It is the developer's responsibility to undertake all acquisitions and construction required to extend the Council system or an inter-allotment system to the site where required.

Where Council stormwater infrastructure is not available within 50m of an urban development, the developer must extend the infrastructure to service the development. This does not apply to single residential dwellings.

Council does not provide new stormwater drainage infrastructure to facilitate private development.

2.3 Stormwater connection to Council pits, pipes and kerb and gutter

Single residential development, alterations and additions, and dual occupancy are deemed to comply for discharge into the kerb at a rate of 1 x 90mm kerb outlet per 250m2 of impervious area. A maximum of two outlets is permitted. Where this cannot be met a hydraulic design including connection to a pit and/or control of flows must be approved by Council development engineers.

For all other developments discharge must not exceed 30 l/s per 15m of kerb for a single pipe, with a total maximum discharge of 60 l/s. Stormwater design required as per section 1.

Notes:

1. Charged systems must first discharge into a boundary pit.
2. Direct connections to Council stormwater pipes must be to the obvert and are subject to approval.
3. Connection to the kerb must be via a suitably manufactured galvanised steel adaptor that matches the kerb profile.
4. Council will only permit connection to and upgrade of existing back of lot public stormwater. Council will not accept new back of lot public stormwater systems.

Stormwater design to be in accordance with these guidelines, AS3500.3 and Council specification *0074 Stormwater Drainage (Design).*

2.4 Connection to stormwater channel, bioretention or swales

Site stormwater runoff may be discharged into stormwater drainage channels, bioretention systems or swales subject to approval from Council.

Any proposed stormwater drainage connection to a stormwater channel, bioretention or swale must be made into an existing piped connection if one is available near the development site. If one is not available, then the connection must be made via a single connection point to the channel adjacent to the site.

The pipe connection is to be at 45° to the channel. The pipe invert is to be a minimum of 100mm above the expected Top Water Level (TWL) in the 1% AEP event.

For lined channels, developer must reinstate the lining of the channel, at the connection point, to Council's satisfaction.

For unlined channels, the channel is to be protected against erosion at the point of discharge into the channel. The protection must be in the form of a durable rock apron to Council's satisfaction.

Reinforced Concrete Pipe (RCP) between the property and the channel is typically required.

2.5 Piping stormwater drainage through Council owned and managed land

Council may approve an application for a developer to construct stormwater drainage and discharge infrastructure through Council owned and managed land.

Any approval will depend upon:

- The classification of the land under Section 26 of the *Local Government Act 1993*
- Whether the proposal can be accommodated within any plan of management or covenant that applies to the land
- Future intended use of the land.

The developer must consult Council to ascertain any requirements of Council prior to submitting the DA. The DA must include evidence of consultation and show how Council's requirements are met. Council may require the drainage structure to be sized to allow for future connections from adjoining properties. Council may seek compensation for granting easements and construction of stormwater drainage infrastructure through publicly owned land. The developer must bear all costs.

The minimum drainage structure crossing public land is 375 mm RCP. Erosion protection must be provided at any point of discharge.

2.6 Stormwater discharge to bushland

Council may approve an application for a developer to discharge stormwater into Council owned bushland.

Any approval will depend upon:

- The classification of the land under Section 26 of the *Local Government Act 1993*
- Whether the proposal can be accommodated within any plan of management or covenant that applies to the land

- Future intended use of the land.

Where stormwater is to drain to Council owned bushland, pipe outlet energy dissipaters are to be provided to reduce energy and to spread or direct the flow in a uniform manner, as the location requires.

Where stormwater is to drain to bushland not owned by Council the applicant must apply to and obtain written approval from the relevant authority that owns and controls the bushland prior to lodging any DA for development requiring stormwater drainage works. Easements may be required.

2.7 Connection to inter-allotment drainage

For sites where stormwater drainage is proposed to be conveyed across land owned by others, an easement to drain water must be created over the downstream properties, in favour of the lot(s) being developed.

Inter-allotment drainage systems must be designed and constructed to minimise the number of lots using each easement. As a guide, each inter-allotment drainage easement should serve no more than four lots.

Design of inter-allotment drainage to be in accordance with Council specification *0074 Stormwater Drainage (Design)* and AS3500.3.

2.8 Redirecting stormwater runoff to another catchment

Sub-catchment redirection of stormwater may increase flows beyond what the receiving system was designed for and increase chances of flooding of an Overland Flow Path (OLFP). Whenever this is proposed it must be supported by detailed calculations and analysis at DA stage. At minimum the following should be demonstrated:

- The additional flows must not increase the water surface levels in the OLFP to a point where neighbouring properties are adversely affected by the increased flows.
- Existing properties adjoining the OLFP should have habitable floor levels at least 500mm above the post development 1% AEP overland flow. No freeboard is required for non-habitable buildings such as sheds and garages.
- Velocity depth product [Vxd] should be in accordance with Council specifications.

2.9 Upstream flows through site

Generally, stormwater from the catchment upstream of the development must be collected separately and conveyed around the site without detention. Suitable easements must be created. However, care must be exercised to ensure that the provision of such diversions within the site does not result in the concentration of stormwater onto adjoining properties. If this cannot be achieved, then a suitable design including detention and or dissipation of stormwater inflows is required.

2.10 Drainage Easements

Where the creation of a downstream *Easement to Drain Water* is required to facilitate a development, timing of the provision of owner's consent and easement creation is as follows.

For infill development (i.e. not greenfield subdivisions), documents creating the easement to drain water are to be lodged and registered with Land Registry Services (LRS), in most cases, prior to issue of the Operational Development Consent. The Development Application may be approved with Deferred Commencement conditioned such that the registering of the easement is required for the consent to operate.

For greenfield subdivisions, any downstream lot to be burdened must be party to the development application and the appropriate owners consent provided. The easement may be created as part of the plan of subdivision and associated 88b instruments at subdivision certificate stage.

Where an easement has not been registered over an existing Council/public stormwater system, or if an existing easement is insufficient the developer may be required to create a new easement in accordance with the *Conveyancing Act 1919* favouring Council.

Private inter-allotment drainage easements should not benefit Council.

All costs for the creation of easements must be borne by the developer.

The following table sets out the required minimum easement widths:

Table 1 - Minimum Easement Widths

Pipe Diameter (mm)	**Minimum Width of Easement to Drain Water (m)**
100, 150, 225 & 300	1.0*
375 - 900	3.0
1050	3.5
1200, 1350	4.0
1500, 1650, 1800	5.0
Multiples	External width of the laid pipes plus 2 times diameter. Min 3m

* The easement width may be reduced to 0.9m between existing dwellings and boundary.

Notes:

1. The minimum easement width benefiting Council is 3m.
2. The minim width of an Overland Flow Path Easement is the lateral flow extent of the main channel in the 1% AEP event.
3. Where the depth of pipes necessitates benching to install/ maintain wider easements to suit will be required.

2.11 Large lot rural discharge requirements

For development on lots >2000m^2 stormwater is typically disposed of within the lot. Requirements are as follows:

1. Where the total developed area (roof + hardstand) <30% of the site area, and

2. the site drains to a 'blue line' watercourse as shown on the BVSC LEP 2013 Maps or a public road with drainage infrastructure, then;

- A stormwater outlet with suitable erosion protection (rip rap) is a deemed to comply solution.

Where either condition 1 OR 2 is not met, stormwater design to be provided by a *suitably qualified and experienced professional.*

Stormwater design for rural subdivisions to be in accordance with Council specification *0074 Stormwater Drainage (Design).*

3 Stormwater Constrained/Low Level Properties

This section applies to all types of developments and land uses that are stormwater constrained, where these properties fall naturally away from the street and there is no Council or inter-allotment drainage system available. The requirement for stormwater disposal is dependent on the type of development or land use proposed.

The property owner or developer is required to manage stormwater drainage according to the sequences of steps as outlined in Sections 3.1 to 3.3.

Council must be satisfied that all avenues of the first or preceding step have been exhaustively investigated and considers these avenues to be impractical or unviable, prior to consenting the property owner or developer to progress to the next step.

3.1 Subdivision, Industrial and large (>500m2 GFA) commercial developments

These types of developments are generally not suitable for stormwater constrained land unless downstream easements incorporating overland flow paths can be secured. These developments will be considered on a case-by-case basis subject to the provision of a detailed stormwater design and reporting at DA stage.

3.2 Site drainage for constrained single residential dwelling

A Development Application for a Residential Dwelling House (including with secondary dwelling or alts/adds) will require stormwater disposal from the site in accordance with the following steps:

Step 1 – Charged system

The use of a charged system will be permitted subject to the following:

1. Deemed to comply: Charged to street kerb if the available head (height difference) between roof gutter level or tank outlet, whichever is lower, is more than 1.5m.
2. Performance: Where the height above the kerb is between 0.5m and 1.5m the use of a charged system will be permitted subject to a hydraulic design demonstrating it can function appropriately.

Notes:

1. The system is to be completely sealed with an inspection / cleaning eye and bleeding point provided at the lowest point.
2. On-site absorption system or level spreader will be required to discharge stormwater from impervious areas of the development that cannot drain by gravity where these areas will exceed 20% of the total site area (refer Appendix B and C for design guidelines).

Step 2 – Acquire an inter-allotment drainage easement

Where the means of disposal in Steps 1 are not available, stormwater disposal from the site must be disposed via an inter-allotment gravity fed pipeline to the Council system. The pipeline must be covered by an easement to drain stormwater benefiting the subject property, through the downstream property(s).

Noting there may be difficulties obtaining an easement through multiple properties, the property owner is to approach the owner(s) to request an easement be granted for the purpose of draining stormwater to Council's drainage system (refer Appendix A – Sample Letter).

The requirements and timing for the creation of drainage easements is set out in Section 2.10.

Step 3 – Absorption system

Where the means of disposal in Steps 1 and 2 are not available, the use of an on-site absorption system for all stormwater may be permitted subject to the following:

1. The on-site absorption system will not have an adverse impact upon adjoining and/or downstream properties by the direction or concentration of stormwater on those properties, and
2. Soil absorption characteristics and other physical constraints indicate the on-site absorption system is appropriate for the property (refer Appendix B – On-site Absorption Design Guidelines), and
3. A Positive Covenant and Restriction on Use of Land over the on-site absorption system is created.

OSD and level spreaders may be required to help control flows to pre-development conditions.

Other

Council may, at its discretion, consider other methods of stormwater disposal only if all of the abovementioned methods have been exhaustively investigated and were considered not appropriate for this development.

Note:

> If an appropriate method of stormwater disposal cannot be provided, the Development Application will be refused.

3.3 Site drainage for other constrained residential and small (<500m2 GFA) commercial development

A Development Application over a stormwater constrained site, for any development other than a single dwelling, will require a mandatory on-site stormwater detention system and must have stormwater disposal from the site in accordance with the following steps.

Step 1 – Acquire an inter-allotment drainage easement

Stormwater disposal from the site must be disposed via an inter-allotment gravity fed pipeline to the Council system where an easement can be secured. The pipeline must be covered by an easement to drain stormwater benefiting the subject property, through the downstream property(s).

Noting there may be difficulties obtaining an easement through multiple properties, the property owner is to approach the owner(s) to request an easement be granted for the purpose of draining stormwater to Council's drainage system (refer Appendix A – Sample Letter).

The Development Application may be approved with Deferred Commencement conditioned such that the registering of the easement is a requirement for the consent to operate.

Step 2 – Charged system

Where the means of disposal in Step 1 is not available, the use of a charged line to drain roof runoff to the kerb and gutter system fronting the site will be acceptable provided:

i. Concept stormwater design and report is provided demonstrating it can function adequately,
ii. On-site absorption system will be required to collect stormwater from impervious areas of the development that cannot drain by gravity to the kerb and gutter system (refer Appendix B – Onsite Absorption Design Guidelines), and
iii. The on-site absorption system and on-site detention systems require the creation of a Positive Covenant and Restriction on Use of Land over the systems.

Note:

Where water quality treatment is required, connection from the water quality treatment to the on-site absorption system is considered acceptable.

Step 3 – Absorption system

Where the means of disposal in Steps 1, 2 and 3 are not available the use of an absorption system (or combination with level spreader) will be considered by Council for dual occupancies on a case-by-case basis subject to a detailed level of design at DA stage.

Design guidelines for absorption systems and level spreaders can be found in Appendices B and C.

A Positive Covenant and Restriction on Use of Land over the systems is required.

Other

Council may, at its discretion, consider other methods of stormwater disposal only if all of the methods outlined above have been exhaustively investigated and were considered not appropriate for this development.

Note:

If no method of stormwater disposal is feasible, the Development Consent will be refused.

3.4 Pump-out systems

Council will not accept stormwater disposal to the public road fronting the low-level property by employing pump-out systems because of the potential for failure of the pump-out system and consequent stormwater related damage to the property and adjacent properties.

Council will only permit pump-out systems for:

- draining sub-surface seepage flows from under-ground areas, such as basement garages
- the disposal of stormwater surface flows from basement vehicle entry driveways.

The pump-out discharge line is only to be connected to a Council stormwater gully pit and not to the kerb and gutter.

Design requirements for Basement Pump Out Drainage Systems are provided in Appendix D.

4 On Site Detention (OSD)

On-site Stormwater Detention (OSD) controls discharge flow rates from individual development sites to help mitigate the increasing rate of stormwater run-off in the broader catchment. Provision of OSD is intended to reduce the potential for local flooding and damage to property by limiting runoff from new developments to pre-developed levels.

An OSD system requires a flow control device to limit the discharge to an acceptable rate and a storage system to hold the excess discharge until capacity becomes available in the downstream drainage system.

OSD is required for all development unless exempt under Section 4.1.

4.1 Exemption for OSD

OSD is not required for:

- Single dwellings
- Low density dual occupancy where the post development site impervious fraction is <50%
- Alterations and additions where the increase in impervious area is < 100m^2
- Infill subdivisions – the developer must place a restriction/covenant on the title of proposed lots requiring OSD when individual lots are developed
- Industrial subdivisions – OSD is required at individual lot development stage by way of a restriction/covenant on title. OSD may be required for roadways and public hardstand at subdivision stage
- Development in rural/environmental zones (lot size > 2000m^2) where discharge is into natural watercourses or public road with sufficient drainage infrastructure
- Where the site discharges to a trunk drainage line within tidal reach of an estuary
- Where the discharge point from the development is located within a 1% AEP flood extent and the land downstream is not developed and cannot be developed (e.g. agricultural land, river flats etc). Suitable control of stormwater discharge will be required.

Notes:

1. Where there is a restriction or covenant on the land title which limits the rate of discharge or requires OSD, exemptions do not apply.
2. For greenfield subdivisions:
    a. Where it is proposed that public OSD facilities will be provided at the subdivision stage, proposed timing of asset transfer and ongoing maintenance requirements must be provided for the consideration of Council. Council will only accept dedications of land and assets where consistent with *Council's Policy 4.10 Lands under Council's Jurisdiction* and associated *Procedure 4.10.5 Acquisition and disposal of land or interests in land.*
    b. Where it is deemed suitable that OSD is deferred to lot development stage, the resulting lots require a suitable covenant on title detailing the requirement for private OSD at dwelling construction stage.
3. As part of any development application the stormwater concept must address on-site detention.

4.2 Detention and retention basins

This section typically applies to large subdivisions (and other development) where basin storage is proposed.

4.2.1 General

1. The use of natural and existing flood storage is preferred.
2. In general, the construction of detention (dry) basins is preferred. Retention/retarding basins will be accepted in areas of high groundwater or where necessary to achieve water quality improvement outcomes for large scale subdivisions and some private development.
3. Detention shall meet the Permissible Site Discharge (PSD) as follows:
    a. The peak flow from the proposed development for the 20%, 10%, 5% and 1% AEP events, for all durations from 5 mins to 3 hours, must not exceed the existing peak flow from the site
    b. Undeveloped catchments should be assumed 0% impervious
    c. Pre-developed catchment impervious fractions should be based on existing conditions
    d. Post development catchment assumptions to be as per Table 2.

Table 2 – Catchment assumptions for subdivisions

Development Type/ Zone	**LEP Minimum Landscape requirement***	**% impervious area to be assumed**
Residential RU5	40% (area < 1500m^2)	60%
Residential RU5	45% (area > 1500m^2)	50%
Residential R2 & R3	35%	70%
Large lot R5 & RU1-4	NA	5% if applicable
Industrial and commercial E1-5 & MU1	NA	90%
SP, RE, C zones	NA	Case by case basis

* Refer BVSC LEP 2013 Clause 6.18

4. Detention/retention basins should operate as sediment basins during construction and be combined with water quality facilities during operation. Construction sequencing should generally be as follows:
    a. Phase 1 – The facility shall be constructed to operate as a sediment basin initially. All final inlet and outlet structures shall be installed at this stage (unless alternate arrangements have been agreed by Council). The facility shall be maintained as a sediment basin until 80% of the lots draining to it have had housing constructed or a period of two years has passed since the release of the Subdivision Certificate.
    b. Phase 2 – A bond or bank guarantee shall be lodged with Council for the works to complete the SQID/ OSD facilities. The bond or guarantee shall be to the value determined in accordance with Subdivision Bonds and Guarantees Policy and shall have regard to the value of the capital of the landscaping works and 2 years maintenance.

c. Phase 3 – Once the catchment has been substantially developed (80% of the lots or two years whichever is the lesser), the sediment basin shall be decommissioned, and the final approved facility constructed and landscaped.

d. Phase 4 – Bond release.

4.2.2 Hydrology and hydraulics

1. Hydrological design to be in accordance with AR&R 2019 and BVSC Specification 0074 Stormwater drainage.
2. OSD basin hydraulic and public safety design shall be in accordance with requirements for Basins in BVSC Specification 0074 Stormwater drainage.
3. The spillway design shall generally be in accordance with the requirements for Open Channels in BVSC Specification 0074 Stormwater drainage.

4.3 On site stormwater detention

This section generally applies to infill development, e.g. dual occupancies, multi-unit developments, commercial and industrial developments. OSD for these facilities must be located within the site they serve.

The general requirement of this section is to ensure that the site's post development stormwater runoff does not exceed the site's pre-development runoff.

4.3.1 Hydrology

1. Hydrological design to be in accordance with AR&R 2019 and BVSC Specification 0074 Stormwater drainage.
2. The permissible site discharge (PSD) from the site shall limit the 5% AEP developed flows to no greater than the peak 20% AEP undeveloped flow. The 1% AEP developed flow shall be checked to ensure it does not exceed the 1% AEP undeveloped flow. The effects of all storms from 10, 20, 30 and 45 minutes are to be examined.
3. The OSD storage volume shall be provided such that the piped outflow of OSD system and bypass flow from the development site does not exceed the maximum permissible discharge allowed for the site. Generally, no more than 30% of the site area is permitted to bypass the OSD system.
4. All pipes shall be designed for a minimum of 5% AEP design storm event. Overland flow paths shall be designed for the 1% AEP event. Consideration must be given to how overland flows will be conveyed as not to adversely impact downstream lots.
5. Computer models such as DRAINS, ILSAX or other industry-accepted program can be used for computation.
6. Runoff times of concentration for pervious areas should be calculated using the Kinematic Wave Equation in accordance with AR&R or the 'Friend' equation. A minimum time of concentration of 5 minutes and maximum 20 minutes is acceptable for paved or impervious areas where suitable.
7. Local design parameters for each site should be sourced from the AR&R data hub: Home | ARR Data Hub.

Note:

Computations based on the approximate triangular method or the rational methods such as RARE are generally not accepted methods.

4.3.2 Stormwater discharge control methods

Acceptable methods for discharge control from OSD systems are the use of orifice plates installed over the outlet pipe and/or a broad crested weir.

The design of the detention storage must take into consideration of any backwater effects, drowned orifice and dead storage.

The formulae for the relevant discharge control methods are listed below.

4.3.3 Discharge control pits

Discharge Control Pits (DCPs) are to be designed and constructed to minimise or prevent future modification or removal by unauthorised persons and should have the following characteristics:

- Self-cleansing where possible
- Located in a suitable position from an aesthetics point of view
- Readily accessible for inspection and cleaning
- Minimum potential for overflow onto private property
- Reduced confined space hazard
- Tamper resistant
- Large enough to fit required trash screens
- Pit covers should be capable of being opened, by one person, in accordance with WHS requirements
- Step irons are required for pits greater than 1200mm depth. The step irons must be placed in a wall clear of the flow if possible
- Subsoil drainage may be required around control pits in aboveground storages, to prevent the ground becoming saturated during prolonged wet weather

4.3.4 Orifice plates

DCP's fitted with orifice plates and/or broad crested weirs must comply with the following requirements.

Orifice plates are to have the following characteristics:

- Manufactured from corrosion resistant stainless steel plate, marine grade near ocean and lave environments with a minimum thickness of 3mm (5mm where orifice diameter exceeds 150mm), with a central circular hole machined to 1mm accuracy.
- Machined hole must be a sharp edge.
- Plate is permanently fixed to the pit wall over the pipe outlet and epoxy sealed to prevent the leakage of water around the edges.
- Have an orifice diameter not less than 50mm.
- The plates are to be engraved with the orifice diameter.

Orifice Plate Discharge Control Formula

The maximum outflow rates can be determined from the following formula:

$Q_{max} = A\ C_d \sqrt{2gh}$

Where:

Q_{max} = Stormwater discharge rate (m^3/s)

A = Area of orifice opening

h = Depth to centreline of orifice opening

$C_d = 0.61$

g = Acceleration of gravity = $9.8 m/s^2$

Broad Crested Weirs are to have the following characteristics:

- Opening must be rectangular in shape and square edged
- The weir must not discharge directly onto the ground or footpath area. It must discharge into an outlet pit structure before draining to the Council drainage system.
- The weir must be constructed of masonry materials and constructed level.

Broad Crested Weir Discharge Control Formula

The maximum outflow rates can be determined from the following formula:

$Qmax = Cwh^{1.5}$

Where:

Q_{max} = Stormwater discharge rate(m^3/s) C = Weir co-efficient = 1.67

w = Width of weir

h = Height of water level over the weir

4.3.5 Trash screens

DCP's are to be fitted with an internal trash screen, which must have the following characteristics:

- Manufactured from galvanised Lysaght RH3030 Maxi-mesh (or approved equivalent) with galvanised angle steel frame where necessary.
- Screen all pit inflows to the orifice.
- Must be 50 times the orifice area.
- Screen all pit inflows to the orifice.
- Located a minimum distance of 150mm from the outlet orifice.
- Positioned as close to vertical as possible. Pits up to 600mm deep should have screens no flatter than 45 degrees. In pits over 600mm deep or in remote positions, this should be increased to 60 degrees from the horizontal surface.
- Include handle(s) for easy removal.

4.3.6 Debris sump

A sump is required in the base of the DCP to assist in avoiding turbulence near the pit floor from affecting the hydraulic performance of the orifice, and to prevent silt and debris from blocking the orifice. The sump also allows a simpler installation of the orifice plate.

To ensure drainage of the control pit sump, the following are to be provided:

- The invert of the sump must be 1.5 times the orifice diameter or 200mm, whichever is greater, below the centre of the outlet.
- The control pit must be constructed on an aggregate base wrapped in geotextile fabric and drained to the outlet pipe trench.
- Sufficient weepholes in the sump floor that are to be kept unblocked by construction debris.

4.3.7 Surface storage system

This specification has been framed to allow the designer maximum flexibility when integrating the storage in the site layout. The minimum design requirements for surface storage are below.

4.3.7.1 Landscape Storage

- Maximum ponding depth must not exceed 300mm. Any depths greater than this will require pool safe fencing surrounding proposed ponded, flood warning signs area and Council engineer approval.
- Storage volume in landscaping area must include an allowance for 20% additional storage for vegetation growth and construction inaccuracies.
- The desirable minimum surface slope is 1.5%, with the absolute minimum being 1.0%
- Maximum batter slope must be 1V:6H.
- Subsoil drainage around the outlet must be provided to prevent the ground becoming saturated during prolonged wet weather.
- Where the storage is in an area where frequent ponding could create maintenance problems or personal inconvenience to property owner, the first 10-20% of the storage should be provided in an area able to tolerate frequent inundation. For example, a paved outdoor entertainment area or a rock garden can be used.
- The structural adequacy of any retaining walls, including the hydrostatic loads caused by full storage should be checked and certified by a suitably qualified and experienced professional. Walls used in storage should be watertight and continuous.

4.3.7.2 Driveway and car park storage

- To avoid damage to vehicles, depth of ponding on driveways and car parks must not be greater than 200mm.
- Transverse paving slopes within storage areas should not be less than 0.5%.
- Where the storage is to be provided in a commonly used area where ponding will cause inconvenience (e.g. a car park), the area should only flood about once every year on average (1EY). This will require approximately the first 15% of the storage to be provided in a non-sensitive area.

4.3.8 Underground storage system

The designer must design the underground storages tanks to meet the following criteria:

- The storage is self-cleaning. The base of the tank must be graded toward the outlet of the tank at a minimum fall of 0.5% and is appropriately shaped.
- All stormwater must be drained from the storage tank by gravity.
- The storage tank and Discharge Control Pit must be fitted with grates to allow ready inspection, of the inlet and outlet, from the surface. Grates are to be provided so that no point in the tank is greater than 3 meters from an access point and at least one over each separate chamber.
- For storages over 1200mm deep, step irons are to be provided.
- The access grates and covers must be secured to prevent public access.
- A sealed storage tank should be ventilated to not cause the accumulation of noxious gases.

4.3.10 Rainwater Tank

Council will permit a combined system in the form of a rainwater tank whereby the 20% orifice sits above the rainwater tank requirements for the site.

This is achieved by providing dedicated airspace over the storage volume for reuse required. This can be achieved by installing orifices to achieve the discharge requirements. The outlet pipe(s) of the rainwater tank(s) are to be connected to the control pit prior to discharging to Council's stormwater system. A typical rainwater tank with on-site detention tank configuration is presented in Figure 2.

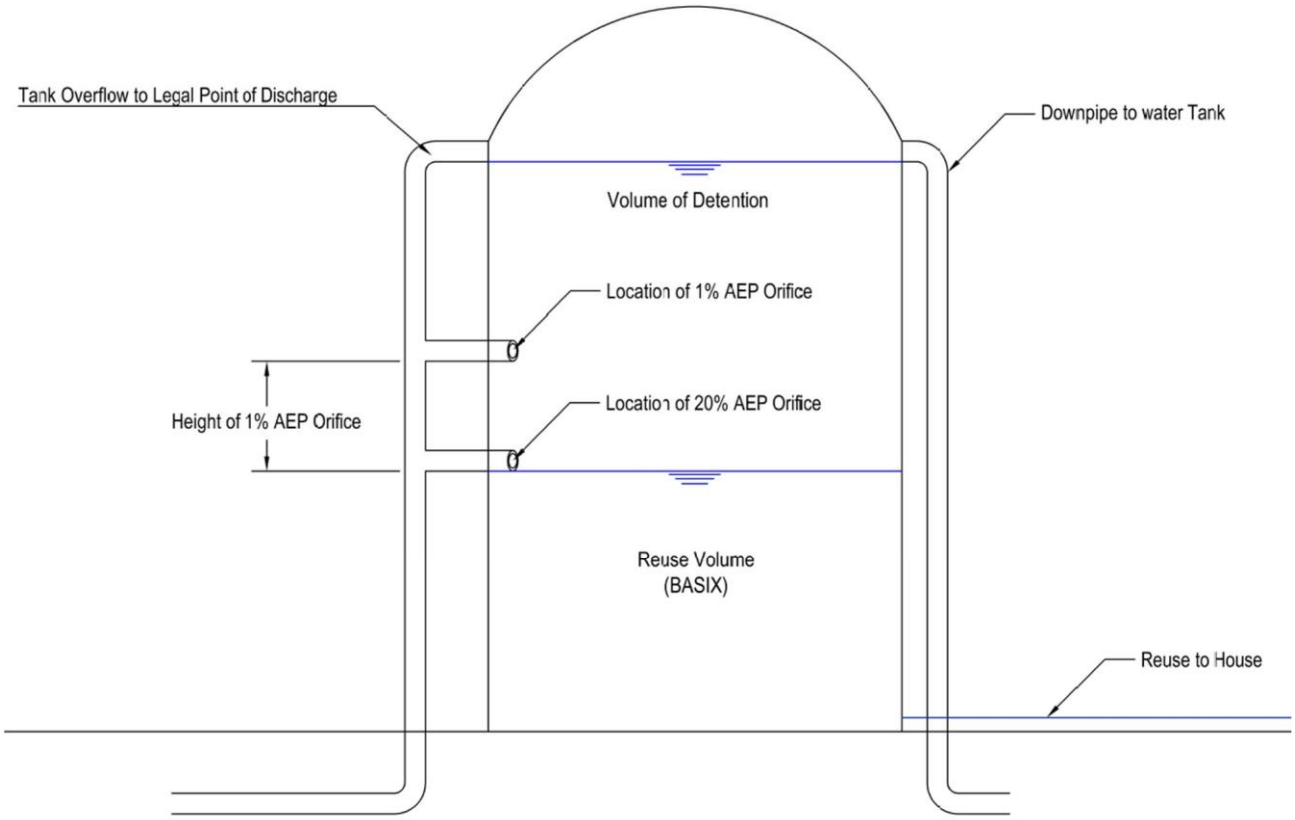

Figure 1 Rainwater Tank with On Site Detention Configuration

4.4 Miscellaneous requirements

4.4.1 Overland Flow Paths (OLFP)

Overland Flow Paths, including the provision of an emergency overflow to cater for blockage of the system or flows in excess of the 1% AEP storm flow must be provided. The flow route must be capable of carrying the flows generated by a 1% AEP storm with a freeboard of 500mm to the adjacent habitable floor levels of the development site and adjoining properties.

Development activities must not cause an adverse impact on adjoining or any other properties. This includes maintaining surface flow paths and not increasing water levels in these flow paths.

4.4.2 Visual impact

All drainage structures are to be designed to be visually unobtrusive and sympathetic with the proposed development and the surrounding environment. This requirement is necessary to integrate drainage structures into the development thereby minimising the likelihood of future occupants removing these facilities for aesthetic or other reasons.

4.4.3 Location of OSD system in multiple units/dwelling development

The OSD system must be wholly contained within common areas, i.e. common car park/driveway areas and common landscape areas. Storage in private courtyards will not be permitted.

Note:

For dual occupancy developments where common areas are minimal, individual OSD tanks will be permitted for each dwelling.

Standard On-Site Detention Marker plates

Standard marker plates are to be fixed to all OSD basins to indicate to owners, residents, maintenance personnel, contractors, etc the vicinity of the OSD system. The requirements of the Standard On-Site Detention Marker plate are as follows:

Minimum size:	150mm x 60mm
Material:	Non-corrosive metal or 4mm thick laminated plastic
Location:	Screwed to the nearest concrete or permanent surface and be above the expected water surface level in the basin
Wording:	Minimum letter height of 5mm. Wording to consist of:

THIS IS AN

ON-SITE STORMWATER DETENTION SYSTEM

AUTHORISED BY BEGA VALLY SHIRE COUNCIL

IT IS AN OFFENCE TO REDUCE THE VOLUME OF THE TANK OR BASIN OR TO INTERFERE WITH THE ORIFICE(S) THAT CONTROL OUTFLOW

THE BASE OF THE OUTLET CONTROL PIT AND THE DEBRIS SCREEN MUST BE CLEANED OF DEBRIS AND SEDIMENT ON A REGULAR BASIS BY THE OWNER

THIS PLATE MUST NOT BE REMOVED

5 Stormwater Quality Improvement

5.1 General

Developments must make provision for improving the water quality leaving the development site in accordance with these guidelines.

Generally, treatment systems shall be contained within the subject site. These works shall be maintained by the developer and/ or ultimate lot owner in perpetuity.

Developers shall undertake a risk assessment for all treatment sites. The assessment shall include fencing, grates across drains, wetlands, detention basins, pumping stations and other associated structures. Routine maintenance must be able to be carried out without need for access of confined spaces.

General lodgement requirements as per section 1.2.

5.2 Urban, commercial, industrial and village development

5.3 Exemptions and requirements

The following types of development are exempt from the installation of Stormwater Quality Improvement Devices (SQID)s and associated DA stage assessment*:

- Residential alterations and additions
- Change of use developments where the footprint and stormwater site catchment are not changing
- Single dwellings (including with secondary dwelling)
- Dual occupancies.

* Except where a restriction on title exists requiring SQIDs.

For all development that is not exempt as per the above list, stormwater quality must be addressed as part of the DA stormwater concept as per section 6.1.

Public Stormwater Quality Improvement Devices (SQIDs) will only be accepted where consistent with Council's *Policy 4.10 Lands under Council's Jurisdiction* and associated Procedure 4*.10.5 Acquisition and disposal of land or interests in land*. These facilities should be combined with detention/ retention basins where possible. Where it is deemed suitable that SQIDs are deferred to lot development stage, the developer may be required to place a restriction on the title of proposed lots requiring SQIDs when individual lots are developed.

For industrial subdivisions stormwater quality runoff from public areas must be addressed at subdivision DA stage. However, the design and installation of SQIDs for individual lots is required at individual lot development stage. The developer must place a restriction or positive covenant on the title of the proposed lots requiring this.

5.2.2 Reduction targets

Where SQIDs are required the discharge water quality shall meet the reduction targets below, at the point of discharge from the development.

- 80% retention of the typical urban annual load for Total Suspended Solids (TSS)

- 45% retention of the typical urban annual load for Total Phosphorus (TP)
- 45% retention of the typical urban annual load for Total Nitrogen (TN)
- 70% retention of the typical urban annual load for gross pollutants (>5mm)
- Litter > 50mm Retention up to the 4EY peak flow.

Generally, numerical modelling (e.g. MUSIC, S3QM etc) is required to demonstrate compliance. For minor development proposing only Gross Pollutant Traps, manufacturers data may be accepted to demonstrate compliance.

5.2.3 Design of Treatment systems

Treatment types shall be determined by the developer and be designed in accordance with *Council Specification 0074 Stormwater Drainage (Design).* The following treatment types are considered acceptable solutions:

- Gross pollutant traps and sediment traps
- Buffer strips and vegetated swales
- Bioretention systems
- Infiltration systems
- Constructed wetlands and ponds
- Sediment basins (construction only, see specification 0022 Control of erosion and sedimentation (design)).

Often, two or more of these systems in a treatment train is required to achieve compliance.

Performance solutions incorporating alternative systems will be considered on a case-by-case basis subject to detailed design and demonstrating compliance with the reduction targets.

5.3 Rural development

The extent of works required to improve water quality for rural development will depend on the scale of development and the location within the catchment.

Rural residential subdivisions, commercial development in rural areas and other larger scale development should be designed considering the principles from the *Water Sensitive Design Guide for Rural Residential Subdivisions* by WaterNSW. For these types of development, it must be demonstrated that water quality improvement strategies will have a neutral or beneficial effect on water quality leaving the site. Where sites are heavily constrained, close to sensitive receiving waters or significant hardstand is being created numerical modelling (e.g. MUSIC) will be required to demonstrate outcomes.

6 Detailed submission requirements

6.1 Concept stormwater design at development application (DA) stage

Where a stormwater report/design by an engineer is required in Section 1.2, the following detail must be included (as applicable):

1. Stormwater report outlining design process and parameters adopted, including:
    a) Calculation sheet in accordance with AR&R 2019 detailing applicable pre and post development flows and documenting all input parameters
    b) Calculations for required storage volume and discharge rates, flow paths and overflow capacities
    c) Where stormwater quality improvement devices are required or proposed, calculations and details of SQID components, including demonstrating integration with OSD
2. Any site investigation reports
3. Program files (e.g. from DRAINS, MUSIC etc)
4. Design plans which include
    d) Design certification
    e) Concept drainage design layout
    f) Catchment analysis and contours
    g) Location of proposed storages and SQIDs
    h) Stormwater discharge point and method of disposal (if the development intends to connect to the existing stormwater system, details of existing system are to be submitted)
    i) Overflow structures and/ or Overland Flow Paths,
    j) Cross sections and HGLs as appropriate
5. Completed and signed agreement for the creation of easement to drain water from property owners as required (Appendix A sample letter).

6.2 Details to be submitted as part of the Subdivision Works Certificate, Section 68 and/or Section 138 Application

The following details must be submitted with the above applications except for basic stormwater connections as defined in section 1.2.2:

1. Design certification (mandatory)
2. Any site investigation reports
3. The determined discharge values for the existing site and the storm duration(s) that gave these values

4. Dimensions and areas of the site including all existing and proposed roof and pavement areas. The areas draining to the OSD system must be clearly shown
5. Existing and proposed stormwater drainage layout, including pipe diameters, any existing or proposed pits, open drains, points of discharge, detention basin(s), surcharge facilities and surface flow path(s). Where connection is to be made via an easement through downstream properties, details are to be supplied
6. Dimensions and volume of the proposed detention storage. Stage/Storage calculation for the storage area
7. Diameter (mm) of the orifice/outlet. Orifice calculations are to be submitted
8. Floor levels of all permanent structures and proposed and existing surface levels and the drainage system to Australian Height Datum
9. A plan, elevation and sections to show basin invert level, centreline level of outlet orifice, top water level, finished surface levels and adjacent structures. These are to show the relationship to adjoining properties.
10. Longitudinal section of outfall drain (on site detention system to Council's stormwater system) showing calculated flow, velocity, size, type and class of pipe, grade, invert and surface levels, all service utilities and hydraulic grade line(s)
11. The frequency and period of ponding in the above ground storage
12. Details of access and maintenance facilities
13. Construction and structural details of all pits, and manufacturer's specifications for proprietary products
14. Hydrologic and hydraulic computations (including model files for DRAINS, MUSIC etc)
15. The emergency flow path and estimated flow levels in the event of blockage or damage to the OSD system.
16. Property(ies) burdened by the OSD system
17. Design details of any stormwater Quality Improvement devices and details of integration with other stormwater components
18. Safety in design report for major structures (as defined in Specification 0074) and high-risk works
19. Operation and maintenance manual.

6.3 Work-As-Executed (WAE) Plans

On completion of the OSD system and drainage works, the developer must supply Work-As-Executed (WAE) plans, to the Council, to verify that the works have been completed in accordance with the approved design. The WAE plans are to be prepared by a Registered Surveyor and include the following:

1. Sufficient levels and dimensions to verify the On-Site Detention storage volumes.
2. Location and surface levels of all drainage pits.
3. Invert levels of all drainage lines and pits.
4. Finished floor levels of structures such as units and garages.

5. Location and finished contour levels on any overland flow paths formed through the site.
6. Detail of any variations or omissions made from the approved plans.
7. Weir dimensions and levels.
8. The Work-As-Executed information should be shown on a copy of the approved civil works drawings. Any changes from the approved civil drawings are to be shown in red.
9. Shapefile or .dwg file required to be provided capturing all inter-allotment and Council drainage works. The file must be in projection MGA2020 Zone 55.
10. Copies of certificates of title showing the creation of easement to drain water.

6.4 CCTV of Council stormwater

Prior to Council accepting new stormwater infrastructure, a CCTV inspection of all new and modified stormwater assets must be undertaken in accordance with the Conduit Inspection Reporting Code of Australia WSA 05.

A copy of the CCTV inspection footage and inspection report prepared and certified by a suitably qualified person shall be provided to Council prior to the acceptance of works into the nominated 'into maintenance period'.

6.5 Certification of OSD and SQID system as constructed

The objective of the OSD/SQIDs is to mitigate the effects of increased runoff from redevelopment. Provided the discharge limits, PSD for the full site is maintained the volume of stored stormwater and other control standards are satisfied, changes in the drainage layout for construction purposes need only be approved by the Consulting Engineer.

The certificate must be provided on completion of the drainage works and prior to issue of the occupation certificate, occupation of the site or subdivision certificate, whichever comes first. This certification must document on-going maintenance requirements and include:

- Certification that the OSD/ SQID system will function in accordance with the approved design, or
- Identification of any deviations from the approved design and their impact on the performance of the OSD/SQID system. If there is detrimental impact on the performance of the OSD/SQID system then the steps to mitigate the impacts must be stated in a letter by the certifying consultant. The mitigating measures must be put in place and the system certified as above, or
- Certification that the deviations from the approved design will not impair the performance of the OSD/SQID system.

6.6 Registration of OSD on Title

Sites requiring an OSD system be installed must have the existence of such OSD system permanently registered on title with Land and Property Information to ensure the owners are aware of the system's design parameters, location and their obligation to maintain it.

Council requires that the design parameters, location and maintenance requirements are registered in the form of both a Restriction On The Use Of Land and a Positive Covenant on the

title of the land prior to occupation of the development, issue of an occupation certificate or issue of a subdivision certificate for the development, whichever comes first.

The developer must supply Council with evidence the Instrument setting out the terms of the Restriction On The Use Of Land and Positive Covenant have been created pursuant to Section 88B or Section 88E of the *Conveyancing Act 1919*. The location of the 'Onsite Stormwater Detention System' must be shown on the Deposited Plan or included as a site plan attached to the appropriate documents, which may be obtained from the Land Registry Services.

Standard Restriction on The Use of Land for OSD System

The standard terms of the **Restriction On The Use Of Land** Under (s) 88B must benefit Bega Valley Shire Council or under (s) 88E must nominate Bega Valley Shire Council the Prescribed Authority and must read as follows:

The Proprietor of the lot burdened must not:

a) Erect, construct or place any building or other structure and/or,

b) Make alterations to the ground surface levels, grates, pits, kerbs, tanks gutters or any other structure associated with the on-site stormwater detention system.

within the land so burdened, without the prior written consent of Bega Valley Shire Council.

Standard Positive Covenant for OSD System

The standard terms of the Positive Covenant Under (s) 88B must benefit Bega Valley Shire Council or under (s) 88E must nominate Bega Valley Shire Council the Prescribed Authority and must read as follows:

1. The registered proprietor, in respect to the On-Site Stormwater Detention System (which expressions include; all ancillary gutters pipes, drains, walls, safety fences, kerbs, pits, grates, tanks, chambers, basins, and surfaces designed to temporarily detain stormwater, hereinafter called "the system") erected on the land so burdened, will:

a) Permit stormwater runoff to be temporarily detained by the system.

b) Keep the system clean and free from silt, rubbish and debris.

c) Maintain and repair the system so that it functions in a safe and efficient manner.

d) Replace, maintain, repair, alter and renew the whole or parts of the system within the time and in the manner, if directed in a written notice issued by Council.

e) Carry out the matters referred to in paragraphs (b), (c) and (d) at the registered proprietor's expense.

f) Permit the Council or its authorised agents from time to time upon giving reasonable notice (but at any time and without notice in the case of an emergency) to enter and inspect the land for compliance with the requirements of this clause.

g) Comply with the terms of any written notice by the Council in respect to the requirements of this clause and within the time stated in the notice.

2. In the event the registered proprietor fails to comply with the terms of any written notice served in respect of the matters in clause 1, the Council or its authorised agents may enter with all necessary equipment and carry out any work required to ensure the safe and efficient operations of the system and recover from the registered proprietor the cost of carrying out the work, and if necessary, recover any costs of legal proceedings and entry of a covenant charge on the land under Section 88F of the Conveyancing Act 1919.

In carrying out any work under this clause, the Council must take reasonable precautions to ensure the land will be disturbed as little as possible.

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Appendix A – Sample Letter

Dear .....

I/we ..... are proposing to develop/redevelop our property at .....

Before we can proceed with this proposal Council has advised us that we must seek to obtain a drainage easement through the downstream properties to convey the stormwater runoff from our property to the downstream public stormwater system being .....

……. request that you consider granting a drainage easement through your property. All legal and survey costs for the creation of the easement, construction costs for stormwater drains and cost for remediation of your land will be borne by us. We are happy to discuss consideration for the use of your property as determined by an independent valuation or by mutual agreement. *(Attach independent valuation if you have one.)*

The other alternative is to install an underground absorption system or level spreader (if appropriate for this site) to spread and disperse the stormwater flow. As the runoff and seepage from this system may flow towards your property because of the slope of the land, the best solution would be to have a drainage system that will convey our stormwater via an inter-allotment drainage pipe to .....

Could you please indicate your position regarding this matter so that we can advise Council to enable our application to progress.

Property (Lot and DP) easement is proposed to burden:
……

Property (Lot and DP) easement is proposed to favour:
……

YES I/we, as owners of the property in question, are willing to grant you a drainage easement.

…….. ……

Name (Block letters) Signature

……..

Date

in the presence of: ……

Name (Block letters)

……..

Address of witness

…….

Signature

OR

NO I/we, as owners of the property in question, are not willing to grant you a drainage easement.

…….. ……

Name (Block letters) Signature

……..

Date

in the presence of: ……

Name (Block letters)

……..

Address of witness

…….

Signature

Appendix B – On Site Absorption Design Guideline

1. A consulting geotechnical engineer must submit a geotechnical report providing the following details (where applicable) for the proposed location of the absorption/dispersal trench:
    - Soil stratum and depth to rock where encountered
    - Depth to the water table where encountered
    - Measured infiltration rate (in litres/square metres/second)
    - Infiltration rate that can be maintained in the long term
    - Minimum distance any infiltration system should be located clear of property boundaries
    - Whether the use of infiltration is likely to cause seepage problems to the proposed structure or to any adjoining properties
    - The use of any waterproofing to protect underground areas
    - Any special requirements for the design of walls or footings on the site

    The above information must be submitted to Council to determine whether any absorption system is permitted for the site.
2. The absorption pit is to be designed for an 5% AEP storm using DRAINS or equivalent computer software based on the infiltration rate that can be maintained in the long term. An overflow mechanism in the form of a level spreader must be provided for all storms greater than the 5% AEP storm, up to and including the 1% AEP storm. The overflow mechanism is required to minimise overland flow disturbance to the lower property.
3. The roof guttering and downpipe system should be designed to collect the 5% AEP design rainfall and pipe it to the absorption system, or alternatively provide for surface collection of guttering overflows into the absorption system.
4. A site plan showing the location of absorption pit(s) relative to fences and to the buildings on-site and on neighbouring properties must be provided. The pipe layout with sizes and grades is also to be shown. Drainage calculations must be submitted with the plans.
5. Where a high water table is encountered and a gravel filled trench design is proposed, the base of the trench should be at least 500mm above the water table to accommodate fluctuations of the groundwater.
6. When considering available storage volumes for the storage design methods, a maximum of 20% voids in the base aggregate may be used.
7. The absorption pit should not be located within three metres of the rear boundary and two meters of the side boundary, and three metres from any on-site building or neighbouring buildings.
8. Coordination with any relevant OSM system should be detailed by consultant. This includes consideration of interaction between absorption rates and saturation impacts of each.

Appendix C – Level Spreader Design Guideline

1. Level spreader is to be designed by a suitably qualified and experienced professional.
2. Total discharge including bypass flows and controlled flows through the level spreader must not exceed the 5% AEP predevelopment (greenfield) total flow.
3. The level spreader should not be located within three metres of the rear boundary and two meters of the side boundary and three metres from any on-site building or neighbouring buildings.
4. The level spreader ideally is to be located as far as possible from the downstream boundary.
5. Level spreader must not directly or indirectly, result in the concentration and increase of surface flows downstream of the property.

Appendix D – Basement Pump Out Design Guideline

1. The contributing catchment area to the pump out system must be limited to the basement access ramps and subsoil drainage only. No more than 50m2 of access ramp, in the case of single dwelling or dual occupancies, or 100m2 in the case of other development, will be allowed to drain to the sump and pump out system. Surface stormwater runoff from the remainder of site must be diverted away from the basement area and the drainage systems are to be isolated from each other hydraulically.
2. The basement car parking area must be graded to fall to the sump and pump system.
3. Dual submersible type pump units, with capacity to pump subsoil drainage and any stormwater falling on or draining to the access ramp, must be installed. The engineer must size the pump system to have a pump out capacity for the 1% AEP design storm of duration five (5) minutes.
4. A pump system must be designed with a minimum of two pumps being installed, connected in parallel (with each pump capable of discharging at the permissible discharge rate) and connected to a control board so that each pump will operate alternatively. The pump wet well must be sized for the 1% AEP, 2 hour storm assuming both pumps are not working.
5. Engineering details and manufacturers specifications for the sump, pump and switching system must be submitted for approval prior to issue of the construction certificate.

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