MIDCOAST council

SITE STORMWATER DRAINAGE GUIDELINES

February 2024

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1 Introduction

These guidelines apply to all new site stormwater drainage systems within subdivisions, development sites for buildings, structures requiring drainage improvements, building additions and site works. A suitably qualified Civil Engineer or Registered Surveyor must be engaged to design and certify the stormwater drainage plans for all developments. Where special circumstances arise, the requirements of this section may be varied at the discretion of Council.

These requirements are intended to ensure that:

- A high standard of stormwater drainage infrastructure is established within the development site.
- The proposed and constructed stormwater drainage system has no adverse impact on Council's stormwater drainage system, the development itself and adjoining properties.
- Buildings are not affected by inundation from stormwater runoff resulting from the 1% AEP storm event.
- Any proposed stormwater drainage works are designed to minimise any nuisance caused by stormwater drainage flows from local catchment flooding or mainstream flooding.
- Water quality and quantity considerations are made to ensure an integrated outcome.

Please Note: Failure to provide adequate stormwater drainage as part of the essential services of development will lead to refusal, in accordance with the Local Environmental Plan – Essential Services.

The following requirements are to be implemented to manage stormwater runoff, prevent damage to buildings and property and reduce hazardous flows:

1.1 Quick Reference for All Development Types

The table below outlines types of development, on-site detention requirements and methods permissible for the calculation of on-site detention.

Table 1 - Development Types OSD Requirements

Type of Development	OSD Required	OSD Methods
Single Dwelling	No*	NA
Dual Occupancy	Yes	Simplified or Time Area Hydrograph
Townhouses	Yes	Time Area Hydrograph
Multi-Unit Dwellings	Yes	Time Area Hydrograph
Commercial	Yes	Time Area Hydrograph
Industrial	Yes	Time Area Hydrograph

*Subject to any restrictions for discharge as required by an 88B Instrument.

1.2 Subdivisions

This section shall apply to all developments other than individual dwellings, multi-unit development, commercial and industrial development. Typical included are multiple allotments, subdivision, and areas greater than 2500m^2.

Calculations for onsite detention requirements (OSD) are to be completed using Drains Software and the design file submitted to Council for approval. Technical specifications for Drains parameters can be found in Section 5.4.

For all subdivisions of any number of lots, the following requirements must be addressed:

- Location of stormwater disposal for every lot including the method of disposal.
- How the subdivision will deal with any stormwater generated by council's existing infrastructure and any runoff generated by the development itself

Detention shall meet the Permissible Site Discharge (PSD) and Site Storage Requirements (SSR) detention volume, and flow rates as follows:

1.2.1 Residential

- Previously undeveloped catchment
  - Detention volume is to be equivalent to the difference in volume between pre-development and post-development flows up to and including the 1% AEP.
    - Undeveloped catchment should be assumed 0% impervious.
    - Each lot is to be assumed 60% impervious as part of post development flow and detention calculations.
  - Discharge is to be equivalent to pre-development runoff rate for all storm events up to and including the 1% AEP.
- Previously developed catchment
  - Detention volume is to be equivalent to difference in volume between pre-development and post-development flows up to and including the 1% AEP.
    - Pre-development catchment to be current percentage impervious of the existing site.
    - Each lot is to be assumed 60% impervious as part of post development flow and detention calculations.
  - Discharge is to be equivalent to pre-development runoff rate for all storm events up to and including the 1% AEP.

1.2.2 Commercial & Industrial

- Previously undeveloped catchment
  - Detention volume is to be equivalent to the difference in volume between pre-development and post-development flows up to and including the 1% AEP.
    - Undeveloped catchment should be assumed 0% impervious.
    - Discharge is to be equivalent to pre-development runoff rate for all storm events up to and including the 1% AEP.
- Previously developed catchment
  - Detention volume is to be equivalent to difference in volume between pre-development and post-development flows up to and including the 1% AEP.
    - Pre-development catchment to be current percentage impervious of the existing site.
  - Discharge is to be equivalent to pre-development runoff rate for all storm events up to and including the 1% AEP.

1.3 Disposal of Stormwater Runoff from a development Site

In general, site stormwater drainage systems should be designed to flow under gravity, through water treatment areas (if required) and be connected 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 to a pipeline connection point that has been designed for the runoff. Catchment redirections may be permitted subject to compliance with the requirements outlined below. A separate approval to connect to Council’s stormwater drainage system must be obtained from Council.

Pipelines to drain the developed land constructed in the road reserve must generally be confined to within the development site frontage. In certain circumstances Council may consider allowing the pipeline to extend along the road reserve in front of an adjoining property. The Applicant must demonstrate that the development potential of the adjoining property, including construction of driveway / footpath crossings, will not be adversely affected.

1.4 Council stormwater system availability

It is the developer's responsibility to investigate the availability of Council's stormwater drainage system, in accordance with the provisions of this guideline, prior to submitting a Stormwater Connection Application. Where the stormwater drainage system is unavailable or the Council stormwater drainage system must be extended to the development site, it is the developer's responsibility to undertake all acquisitions and construction required to extend the Council system to the site. The minimum pipe size Council will maintain is 375mm diameter (or equivalent) Reinforced Concrete. Council does not undertake to provide or assist in providing stormwater drainage infrastructure to facilitate proposed developments.

1.5 Redirecting stormwater runoff to another catchment

Sub-catchment redirection of stormwater results in stormwater being directed to a drainage system that may not have been designed to receive it. This redirection of stormwater may increase flows to part of that system and increase chances of flooding of an Overland Flow Path (OLFP). Where additional properties are affected by the redirected flows, Council may require a drainage study to assess the impact of the redirected catchment to the part of the drainage system that will receive increased flows. This may generally be along the receiving street gutter, existing stormwater drainage system and the adjoining properties to the low point in the subject street then to the OLFP through to the next street drainage system downstream. If Council requires a drainage study, then the following criteria should be assessed before the redirected stormwater will be permitted:

- 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 300mm above the computed 1% AEP flood level. No freeboard is required for non-habitable buildings such as sheds and garages.
- Velocity depth product [Vxd] should remain unchanged or be in accordance with MCC AUSPEC 0074 Section 3.5.

2 Stormwater Disposal Requirements

2.1 Stormwater Connection to the Kerb and Gutter

The minimum pipeline connection to the street kerb and gutter must be made via a suitably sized galvanised steel rectangular or rigid kerb adaptor (or similar). A 100mm diameter heavy-duty sewer grade pipe may be substituted as the minimum drainage outlet in areas where it is unlikely to be damaged by heavy vehicular movements.

The 100mm diameter sewer grade pipe may be installed for drainage of a Single Dwelling or for drainage of a Dual Occupancy where two separate outlets, one for each dwelling, are proposed for discharge to the kerb and gutter. The 100mm diameter sewer grade pipe must be connected to the kerb by using a heavy duty non flexible kerb adaptor set flush with top of the kerb. If multiple pipes are installed to meet the capacity requirements of the site discharge, pairs are acceptable to be co-located. If more than two pipes are required, the pipes (or pipe pairs) are to be separated by a minimum distance of 1m at the kerb face and the kerb is to be reinstated to Council's satisfaction in accordance with Council's Standard Drawing (SD0112).

The angle of the kerb outlet from the drainage pipes should be installed between 45° and 90° in the direction of the gutter flow.

2.1.1 Maximum Stormwater Discharge to the Kerb and Gutter

The maximum direct discharge from the site to the kerb and gutter must be limited to 20 litres per second, at any one discharge point, for the 20% AEP storm. It may be required that multiple, separated pairs of pipes be installed to meet the capacity requirements of the discharge from the site. If this is the case, they must be installed in accordance with Council's applicable Standard Drawing. If the site discharge is greater than 20 L/s in 20% AEP storm event, a connection to Council's underground pipe/pit system may be required. Alternatively, OSD may be provided, or increased to limit the discharge to permissible flows. All underground direct connections to Council pipelines are to be constructed in accordance with Council Standard and inspected by Council prior to backfilling under a Section 68 Application and Approval.

2.2 Connection to Council’s Pipe Drainage System

Where a development proposes connection to council’s drainage system, approval under Section 68 of the Local Government Act (1993) will be required from Council. Only after the design is approved by Council, connection to the system will be permitted by means of directly connecting to an existing pit or construction of a new pit over the existing pipeline.

Pits constructed over existing pipelines and in line with the kerb and gutter must be constructed as gully pits with minimum 450mm x 900mm grated inlet in the gutter. A lintel may be required to be installed where the gutter flows are considered to be high enough to warrant the installation of an additional lintel. Junction pits may be constructed in other locations along the pipeline. Proprietary lids or grates are permitted in the footway area. All pits must be designed and constructed in accordance with Council's Standard Drawings, whichever applies to the proposed situation, and as required by Council.

Council will permit a direct connection to its pipeline for discharge pipes up to 150mm diameter and where a direct connection to a Council pit is not feasible. A 225mm diameter pipelines can be directly connected to a 600mm diameter or greater Council pipeline. Connections are to be made in accordance with Council’s Standard and satisfaction to Council’s surveillance officer. A cleaning eye or pit must be constructed within the development lot at the nearest convenient location adjacent to the connection of the Council pipeline.

An existing Council drainage pipeline may be extended, along the kerb alignment, to the development site to enable a connection to be made. The minimum pipe size of the extended Council pipeline is to be 375mm diameter Reinforced Concrete Pipe (RCP).

Any connection to Council's piped drainage system will require a Public Engineering Works Permit (PEWP) with inspections undertaken by Council's Development Engineering Inspection Officer.

2.3 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 under Section 68 of The Local Government Act.

Any proposed site stormwater drainage connection to a stormwater channel, bioretention or swale must be made into an existing piped connection if one is available in close proximity to the development site. If it is not available, adjacent to the development site, 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 150mm above the channel invert at the connection.

For reinforced channels, the connection to the channel must be made using a reinforced concrete pipe (RCP) or pipe from the channel to the boundary of the development site. The developer must reinstate the lining of the channel, at the connection point, to Council's satisfaction.

For unreinforced 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.

2.4 Piping stormwater drainage through Council parks and reserves

Council may approve an application for a developer to construct stormwater drainage infrastructure through public land. Any approval will depend upon:

- The classification of the land;
- Whether the proposal can be accommodated within any plan of management or covenant that applies to the land;
- Future intended use of the land.

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 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.

The minimum size for any drainage structure crossing public land is 375 mm nominal diameter reinforced concrete pipe (RCP).

2.5 Stormwater discharge to bushland

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. For velocities up to 1m/s, the dissipater must be constructed of rock riprap of nominal size 200-400mm placed on geotextile filter fabric to achieve a compact rock blanket, with a downstream length of 6 metres. Where flow velocities are higher than 1m/s, or where a significant drop occurs at the structure the outlet is to be designed by a qualified Civil Engineer.

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.

2.6 Connection to Inter Allotment Drain

For sites where the drainage of stormwater involves the construction of a stormwater drainage system 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.

The minimum pipe size contained within a Drainage Easement for any form of development must be 150mm and connected to the Council system via an approved connection method.

Reinforced Concrete Pipes (RCP) may be required in trafficable areas or as deemed necessary by the designer.

A connection to an interallotment drainage system will require an approval under Section 68 of the Local Government Act.

2.6.1 Drainage Line Easement Widths

The creation of an easement to drain water must be agreed to, in writing, by the burdened property owners, prior to an operational DA Consent being issued by Council.

Documents relative to the creation of an easement to drain water are to be lodged and registered with Land Registry Services (LRS) prior to issue of the Construction Certificate. All costs must be borne by the developer.

The following table shows the required minimum easement widths:

Table 2 - Drainage Easement Widths

Pipe Diameter (mm)	Width of Easement to Drain Water (m)
100, 150	1.2*
225	1.2*
300	1.5
375,450	2.0
525, 600, 675	2.5
750, 825, 900	3.0
1050, 1200	3.5
1350, 1500	4.0
1650, 1800	4.5

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

Where an easement has not been registered over a Council stormwater system, an easement to drain water located centrally about the pipe and drainage system, must be created in favour of Council. The minimum easement widths required are shown in the table above. When a lot is to be developed, the developer may be required to extend or widen and existing easement to suit Council's or other authority's requirements as a condition of the Development Application.

The above table is only an indication of easement widths for shallow pipe systems. Council may consider reducing the required easement widths where it is demonstrated that the full easement width cannot be obtained and the proposed pipe and an overland flow path can be installed, maintained and replaced as required in perpetuity.

Where multiple pipes are proposed, a larger easement width may be required. The proposed easement width should be at least the external width of the laid pipes plus 2 times diameter.

Where the depth of pipes becomes excessive then Council may require a wider easement, benching is required when the depth of the pipe exceeds 1.5m.

3 Stormwater Drainage from Low Level Properties

This section applies to all types of developments and land uses where these properties fall naturally away from the street and cannot connect to a Council drainage system. The requirement for stormwater disposal is dependent on the type of proposed development or proposed land use for the property.

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

Council is to 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 Site drainage without On Site Detention

A Development Application for a Residential Dwelling House where an on-site stormwater detention system is not required for the low-level property, will require stormwater disposal from the site in accordance with the following steps:

Step 1

i. Connection of stormwater to an existing Council stormwater drainage line located within the development site.

OR

ii. Charged to the kerb on the street if the available head (height difference between roof gutter level or invert of rainwater tank overflow pipe in case of the provision of rainwater tank to the invert of kerb and channel at connection point of the kerb) is more than 1.0m.

Note:

- The charged portion of the drainage system, rising out of the ground, must be sealed to a minimum height above the ground, which allows the calculated flow of roof stormwater drainage to be hydraulically pushed to the outlet at the kerb and gutter plus 0.5 metres. It is generally considered 1.0m above the invert of kerb and gutter.
- No surface inlet pits, or water treatment can be connected to the charged lines.
- Sealed cleaning eyes must be placed at 30-meter intervals, critical bends in the pipeline and at the lowest point in the drainage system.

OR

iii. Connection of stormwater to an existing Inter Allotment Drain.

Step 2

Where the means of disposal in Step 1 are not available, the use of an on-site absorption system will be permitted subject to the following:

- The on-site absorption system is designed by a suitably experienced and qualified civil engineer or surveyor and,
- 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,
- 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,
- The on-site absorption system must require the creation of a Positive Covenant and Restriction on Use of Land over the system.

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

Step 3

Where the means of disposal in Steps 1 and 2 are not available, stormwater disposal from the site must be via a gravity fed pipeline. This will require an easement to drain stormwater to Council's drainage infrastructure through the downstream property(s).

Noting there may be difficulties obtaining an easement through multiple properties, the property owner is to ascertain which adjoining downstream property(s) it may be feasible and practical to drain stormwater through, and then 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). If the property owner is unable to attain any written approval from the adjacent downstream property owner(s), the property owner is to then enclose a Statutory Declaration stating the above.

Step 4

Where the means of disposal in Steps 1, 2 and 3 are not available, the use of level spreader will be permitted subject to the following circumstances:

- The level spreader stormwater flows from the site are to be restricted to the 20% AEP predevelopment storm event, for all storm events up to and including the 1% AEP storm event. This system will require the provision of an on-site stormwater detention system (refer Appendix C – Level Spreader Design Guideline).
- The level spreader will have minimal impact on the adjoining property, including public reserves and parks, by the direction and flow of stormwater and,
- Soil absorption characteristics and other physical constraints indicate the on-site absorption system is not appropriate for the property (refer Appendix B – On-site Absorption Design Guidelines) and,

– Compliance with any requirements of the affected downstream property owners, and

– The level spreader must require the creation of a Positive Covenant and Restriction on Use of Land over the system.

Step 5

Council may, at its discretion, consider other methods of stormwater disposal *(pump out system – excluding roof water)* 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 may be refused.

3.2 Site drainage with On Site Detention

A Development Application for the following developments:

- Dual occupancies
- Multi units
- Commercial developments
- Industrial development and
- Mixed commercial/industrial/residential
- Subdivisions
- Lots with restrictions limiting the discharge rate

Will require an on-site stormwater detention system and must have stormwater disposal from the site in accordance with the following steps:

Step 1

i. Connection of stormwater to an existing Council stormwater drainage line located within the development site.

OR

ii. Connection of stormwater to an existing Inter Allotment Drain.

Step 2

Where the means of disposal in Steps 1 is not available, stormwater disposal from the site must be via a new gravity fed pipeline. This will require an easement to drain stormwater to Council's drainage infrastructure through the downstream property(s).

Noting there may be difficulties obtaining an easement through multiple properties, the property owner is to ascertain which adjoining downstream property(s) it may be feasible and practical to drain stormwater through, and then approach the owner(s) to request an easement be granted for the purpose of draining stormwater to Council's drainage system (refer Attachment 1 - Sample Letter). If the property owner is unable to attain any written approval from the adjacent downstream property owner(s), the property owner is to then enclose a Statutory Declaration stating the above.

Step 3

Where the means of disposal in Steps 1 and 2 are 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:

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 – On-site Absorption Design Guidelines), and

The on-site absorption system must require the creation of a Positive Covenant and Restriction on Use of Land over the system.

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

OR

The use of a level spreader to discharge stormwater will be acceptable to Council subject to the following:

Stormwater flows from the whole site are to be restricted to the 20% AEP predevelopment storm event, for all storm events up to and including the 1% AEP storm event. This system will require the provision of an on-site stormwater detention system (refer Appendix C – Level Spreader Design Guideline).

- The level spreader must require the creation of a Positive Covenant and Restriction on Use of Land over the system.

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 other method of stormwater disposal is feasible, the Development Consent may be refused.

3.3 Pump-out system

Council will only permit pump-out systems for draining sub-surface seepage flows from under-ground areas, such as basement garages where the seepage flows are minor and intermittent. The pump-out discharge line is only to be connected to a Council stormwater gully pit and not to the kerb and gutter.

The use of sump and pump-out systems for the disposal of stormwater flows are only to be used for the drainage of surface flows from basement vehicle entry driveways.

Council will not accept stormwater disposal to the public road fronting the low-level property by employing pump-out systems because of the following reason:

- Potential failure of the pump-out system and consequent stormwater related damage to property and adjacent properties.

3.3.1 Requirements for Basement Pump Out Drainage Systems

Basement pump out stormwater drainage system will be acceptable to Council subject to the following criteria:

- The contributing catchment area to the pump out system must be limited to the basement access ramps and subsoil drainage only. No more than 50m^2 of access ramp, in the case of single dwelling or dual occupancies, or 100m^2 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. The areas may be varied at the discretion of Council.
- The basement car parking area must be graded to fall to the sump and pump system.
- 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.
- 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.
- Engineering details and manufacturers specifications for the sump, pump and switching system must be submitted for approval prior to issue of the construction certificate.
- The pump out system must require the creation of a Positive Covenant and Restriction on Use of Land over the system.

4 On Site Detention (OSD)

On-site Stormwater Detention (OSD) is a stormwater management method that enables the runoff discharge flow rates of individual development sites to be controlled. 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.

4.1 Applicability

OSD is required where any of the following situations occur:

- Where there is an existing stormwater system that is unable to cater for the increase in discharge due to the development.
- Where there is a restriction identified on the lot which limits the rate of discharge; or
- Where it is intended to connect stormwater directly to the street kerb and gutter and the discharge for the 20% AEP storm exceeds 20 L/s.
- Where the disposal from the site is a level spreader and a restriction on the predevelop discharge is applied.

Types of developments where OSD may be applicable include (but are not restricted to) multi-unit/dwelling residential development, dual occupancies, industrial and commercial developments and redevelopment of lands where Council feels the development is likely to produce increase in stormwater runoff and adverse impacts to the neighbouring properties.

Provision of OSD is intended to reduce the potential for local flooding and damage to existing properties by limiting runoff from new developments to pre-developed levels. A suitably qualified Civil Engineer or registered surveyor must be engaged to prepare calculations and designs in accordance with these requirements. Notwithstanding the following criteria, Council may consider the need for OSD on a case-by-case basis, where justified by sound engineering principles.

4.2 Exemption for OSD

OSD will not be required where:

- It is proven to Council's satisfaction that the lack of OSD will not have an adverse effect on downstream drainage systems for up to the 1% AEP storm event. A full local catchment analysis may be required with a stormwater management plan.
- A building addition or internal alteration within the footprint (plan area) of the existing building or impervious area.
- An extension/renovation’s additional impervious surfaces (e.g. roof, driveway, paving) total is less than 30 square meters in plan area and combined impervious area is less than 75 % of the site area. (NOTE: the designer is advised to confirm with Council engineering first to ensure that the cumulative total of previous and future additions still remains less than 30 square meters, otherwise OSD will apply),
- Development / redevelopment is proposed which does not increase the post development stormwater runoff from the site,

- A subdivision of land is proposed that does not involve the creation of a road reserve. Council may require OSD as part of the future development on the new lots at the building construction stage and may do so by placing a restriction on the use of land on the title of the new lots when created,

- the site of the development is located within a 1% AEP flood extent from the local flooding / overland flooding and that it can be demonstrated that lesser storm events will also flood the site.

4.3 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.

5 Technical Requirements for OSD Systems

An experienced and competent designer would need to be engaged to ensure compliance with all of the requirements of this Specification. The general requirement of this section is to ensure that the site's stormwater runoff after any development does not exceed the runoff prior to the development.

5.1 Site Requirements

Where possible, the OSD system must be designed to capture stormwater runoff from the entire existing and proposed roof and paved areas of the site and any other areas which can be physically directed to the system.

A minimum of 70% of the site piped stormwater system and 70% of the site's overland flow must drain through the OSD system. This excludes commercial, industrial and subdivision developments where 100% of the site (piped or overland) must drain through the OSD system.

If only part of the site is drained through the OSD system, the maximum allowable discharge must be reduced so that the discharge from the OSD system plus the discharge from the remainder of the site does not exceed that from the site prior to development.

Stormwater from the catchment upstream of the development must be collected separately and conveyed around the site without detention. Council may vary this requirement where site constraints do not warrant it and objection is supported by sound engineering principles.

Where partial or staged development of a large site is likely, consideration should be given in locating the OSD system in an area where the entire development can drain to it. The system could be modified as additional development occurs and may be more practical than having numerous smaller systems scattered throughout the site.

5.2 OSD Storage & Discharge Requirements

The OSD storage is to be designed to the storage/discharge relationship appropriate to the development location. OSD storage/discharge must be undertaken in accordance with one of the following methods where applicable:

- "Simplified Method" for all developments in Taree T4 catchment
- "Time Area Hydrograph Method" for all areas except Taree T4 catchment and dual occupancy
- An "On site detention Calculator" for all other dual occupancy development on greenfield site – *Currently under development*

5.2.1 Simplified Method

The Simplified Method involves the use of the Site Storage Requirement (SSR) and the Permissible Site Discharge (PSD), as predetermined by Council requirements below. The whole of the site area must be considered in the calculation of SSR and PSD. This method is to be used for Taree T4 Sub-catchment which is presented in Figure 1 of this specification and Figure 8.13 of Greater Taree Urban Stormwater Management Plan, December 2000.

The Simplified Method can only be used when the whole of the site can be collected by the OSD system. That is, all runoff from the site is routed through the OSD system prior to discharging to the receiving external drainage system. A maximum of 30 m^2 of the site area, which cannot be physically drained to the OSD system, is permitted to bypass. However, where more than 30 m^2 of

the site cannot be collected by the OSD system, then the Time Area Hydrograph Method must be used.

Where there is more than one OSD system on the site, it is possible to calculate the required volume and discharge rate from each OSD system by determining the percentage of the site area draining to each OSD unit and then distributing the total calculated SSR and PSD (calculated from the total site area) to each OSD system.

Council will permit the use of the simplified method for all areas outside of the T4 catchment for dual occupancy development only. The applicant may choose to design their OSD using the simplified method or the time area hydrograph method. Any development other than dual occupancy must design to the time area hydrograph method unless located within the T4 catchment.

The followings are the parameters to be used for Simplified Method in the T4 Catchment:

- Site Storage Requirement (SSR) = 363 m^3/ha
- Permissible Site Discharge (PSD) = 75 L/s/ha

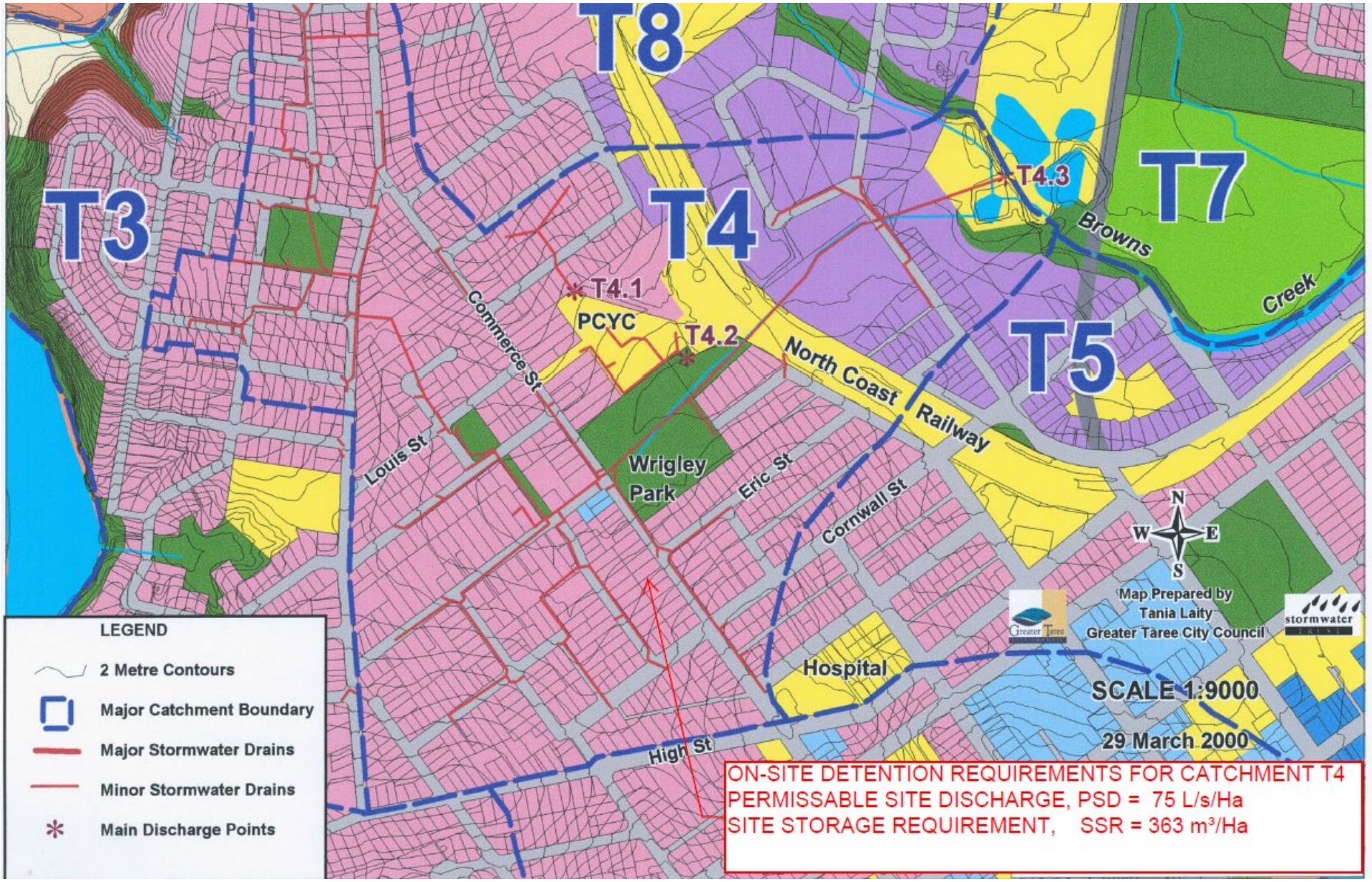

Figure 1: Taree Catchment T4

5.3 Time Area Hydrograph Method

Where the site conditions vary from those given in the Simplified Method and/or more than 30% of the site cannot physically drain to the OSD system then the Time Area Hydrograph Method must be used.

An experienced and competent designer would need to be engaged to ensure compliance with all of the requirements of this Specification. In many cases, this method of analysis may produce the most economical design. The Time Area Hydrograph Method involves the use of computer models to simulate rainfall and runoff from the site to determine volume or Site Storage Requirements (SSR) and the Permissible Site Discharge (PSD). The computer program Drains must be used for computation.

Computations must be performed for the existing site conditions for a low recurrence interval (20% AEP), a medium recurrence interval (10% AEP or 5% AEP or 2% AEP), and the upper value, which will be the 1% AEP storm. The effects of all storms up to 2 hours are to be examined, in some cases analysis of storms beyond 2 hours may be required at the discretion of Council.

The rate of stormwater runoff (both piped and overland) from the post-developed site is not to exceed the rate of runoff from the pre-developed site for the above storm events.

The determination of the volume of the site storage requirement (SSR) is to be undertaken by trial and error, using the above runoff constraints.

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 is acceptable for paved or impervious areas where suitable.

5.4 Design Parameters to be Used in the Model

Where the Full Computation Method is to be applied, Drains is to be setup using the following design parameters:

- Initial and Continuing Loss (IL-CL) method is to be used for computation.
- Rainfall - Bureau of Meteorology Design Rainfall System
  - Temporal Patterns
  - IFD depths
- Losses
  - Impervious Initial Loss = 1mm
  - Impervious Continuing Loss = 0mm/h
  - Pervious Losses (Initial and Continuing) - Australian Rainfall and Runoff (ARR) Data Hub
- Pre-burst Depths
  - ARR Data Hub

- Pits
  - Kerb Inlet lengths
    - Preferred Maximum 3.0m
    - Maximum 5.0m where grade is 10% or steeper.
    - Maximum 4.0m where grade is less than 10%
  - Blockage Factors

Condition	Inlet Type	Percentage of Theoretical Capacity Allowed
Sag	Side Entry	80%
Sag	Grated	50%
Sag	Combination	100% Side inlet capacity only – Grate assumed completely blocked
Continuous Grade	Side Entry	80%
Continuous Grade	Grated	50%
Continuous Grade	Combination	90%
Source: *ARR Book 9 Table 9.5.1 or Austroads AGRD05A Table 5.4.*		

- Hydraulic Losses
  - Refer to MidCoast Council Auspec 0074 Stormwater Drainage and ARR 2019.
- Drains Model
  - Model must incorporate entire drainage network as a single model (pits, pipes, overflow routes, detention basins etc.) should all be included on a single model. **Submission of multiple files will not be accepted.**
  - Model to incorporate background information (roads, structures, property boundaries etc.)
  - Catchments sizing and impervious area is to be provided as part of the Stormwater management plan and accompanying report. Ensure that the catchment names correlate between the model and the report.
  - Overflow routes must use appropriate cross sections.
  - Model to run full unsteady analysis for minor and major storm events.

- Results must show the following:
    - All storms and All durations are able to reach the OSD system without bypass, meeting discharge control requirements.
    - All overflow routes meet safe depth requirements.

If any of the above parameters are to be changed, justification of any changes must be provided within the Stormwater Management Plan and report.

5.5 OSD Calculator

An on-site detention calculator is currently under development that provides storage requirements, permitted discharge and orifice sizing.

This will only be permitted to be used for dual occupancy development on greenfield sites not within the Taree T4 catchment.

5.6 Surface flow paths

Surface 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.

5.7 Runoff from adjacent properties

Surface runoff from upstream properties must not be allowed to enter OSD system(s). OSD system(s) must not be located in overland flow path which convey catchment flows through the site. The design of suitable channels, open Drains, pits and pipes, mounding, landscaping or walls may be necessary to divert stormwater from adjacent properties away from the system(s). 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 the OSD system(s) must be designed to cater for the additional stormwater inflow.

5.8 Freeboard to finished floor level

Finished floor levels of existing and new buildings are to be set so they are a minimum of 500mm above the OSD storage’s maximum design water surface level and the spillway water level.

Garage floor levels are to be set so they are a minimum of 150mm above the OSD storage's maximum design water surface level.

6 OSD controls and structures

6.1 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.

As it is normally impractical to use a single outlet of fixed diameter to restrict flows for the range of events from 20% AEP to 1% AEP, the discharge control pit should be designed to have a two-stage outlet. The first stage outlet should limit discharge to predevelopment 20% AEP flow and the second stage outlet should be designed to restrict flows for larger events up to and including the 1% AEP event.

This can be achieved using a dual chamber pit with the required diameter orifice plate between the two and the top of the dividing wall forming a weir. This design may also act as an emergency overflow in the event the first stage outlet becomes blocked by debris.

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.

6.2 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.

6.2.1 Orifice Plates & Broad Crested Weirs

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. The orifice diameters are to be certified by the manufacturers.

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 (m^2)

h = Depth to centreline of orifice opening (m)

C_d = 0.61 – (Refer ARR Book 9 Figure 9.5.24 for other Orifice Coefficients)

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:

$Q_{max} = Cwh^{1.5}$

Where:

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

C = Weir co-efficient = 1.67

w = Width of weir (m)

h = Height of water level over the weir (m)

6.2.2 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.

6.2.3 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.

6.3 Storage system

This specification has been framed to allow the designer maximum flexibility when integrating the storage in the site layout. The following provides details on storage options.

6.3.1 Surface Storage

The minimum design requirements for surface storage are as follows:

Landscape Storage

- Maximum ponding depth must not exceed 300mm. Any depths greater than this will require pool safe fencing surrounding proposed ponded 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 located 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 Engineer. Walls used in storage should be watertight and continuous.

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. This will require approximately the first 15% of the storage to be provided in a non-sensitive area.

6.3.2 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 so as to not cause the accumulation of noxious gases.

6.3.3 Rainwater Tank

Council will permit a combined system in the form of a rainwater tank whereby the 20% orifice sites 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.

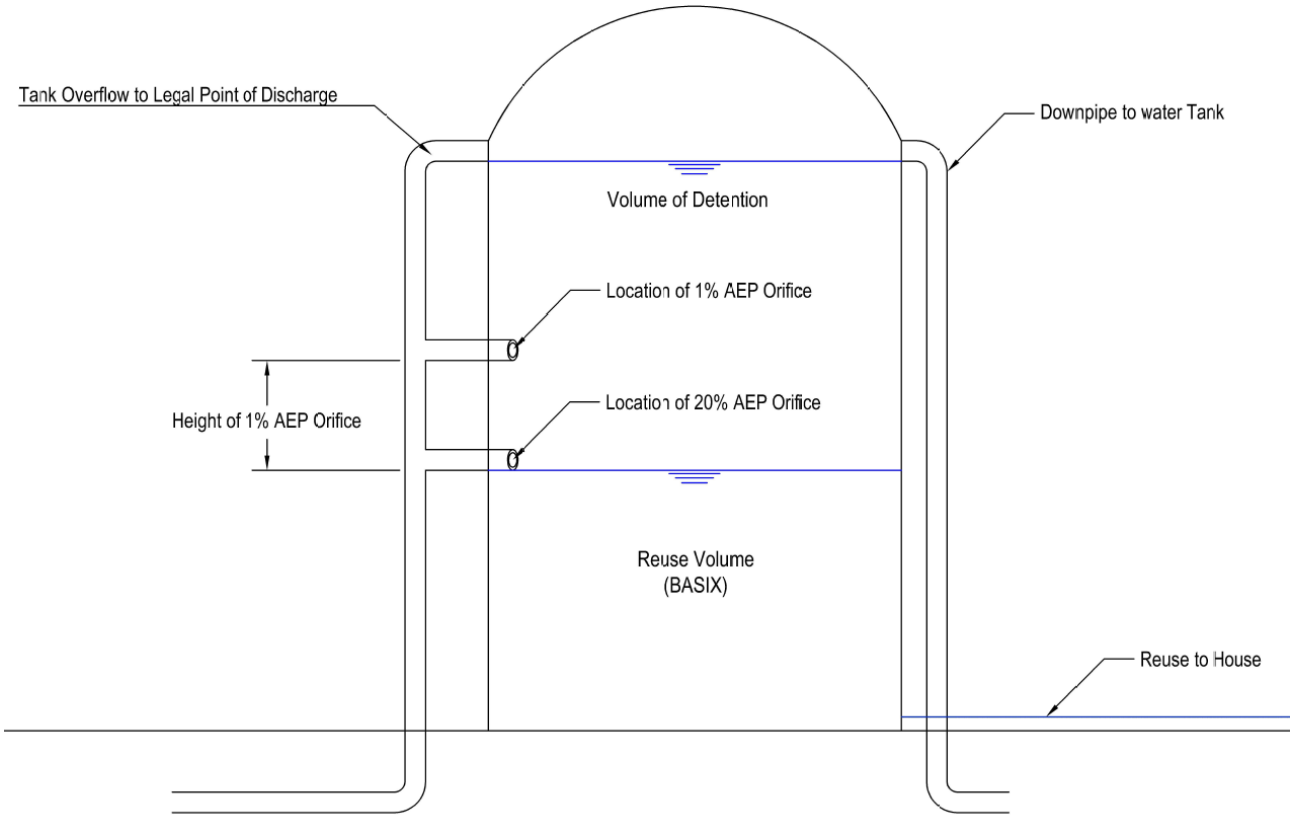

Figure 2 - Rainwater Tank with On Site Detention Configuration

6.4 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 this requirement can be discussed with Council and alternative arrangements will be considered.*

6.5 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:

DO NOT TAMPER WITH THIS ON-SITE DETENTION STRUCTURE.

CONTACT MIDCOAST COUNCIL PRIOR

TO ANY PROPOSED WORKS IN THIS AREA.

7 Information Required for Submission

7.1 Details to be submitted as part of the development application (DA)

Council requires the mandatory submission of stormwater plans as part of the development application. Failure to submit adequate stormwater plans may lead to the rejection of the DA. The following details must be submitted as part of the development application:

- Approximate size and location of onsite detention tanks, retention tanks and water quality requirements (Raingarden etc.) if required.
- Location and layout of any pits and pipes.
- 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)
- For all subdivisions involving the creation of new roads, multi-dwelling housing (including residential flat buildings), commercial or industrial developments (unless exempt from OSD as per section 4.2)
  - A Drains model and report incorporating at a minimum:
    - Pre-development catchment and discharge.
    - Post-development catchment (with appropriate impervious areas) and discharge.
    - OSD and Orifice Sizing restricting the post development flow to predevelopment flow rates.
    - Background information.
  - Location of stormwater disposal for every lot (must include the method of disposal).
  - How the development will deal with any stormwater generated by council's existing infrastructure and any runoff generated by the subdivision itself.

Note: Council reserves the right to ask for detailed modelling of the site and any other additional information required to undertake assessment.

7.2 Details to be submitted as part of the Section 68 Application or Subdivision Works Certificate

The following details must be submitted with the Stormwater Connection Application (Section 68) or Subdivision Works Certificate as appropriate;

- Certificate of design.
- A Drains model and report incorporating all requirements as set out in Section 4,5 & 6 of this guideline.
- Stormwater Management Plan & Civil Design Plans with the following details:
  - Time of concentration (tc) (minutes) of existing site.
  - The determined discharge values for the existing site and the storm duration(s) that gave these values.
  - 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.
  - 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.
  - Dimensions (mm) and volume (m^3) of the proposed detention storage. Stage/Storage calculation for the storage area.
  - Diameter (mm) of the orifice/outlet. Orifice calculations are to be submitted.
  - Number of downpipes required to successfully drain into the OSD system with supporting calculations.
  - Floor levels of all permanent structures and proposed and existing surface levels and the drainage system to Australian Height Datum.
  - 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.
  - 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).
  - The frequency and period of ponding in the above ground storage.
  - Details of access and maintenance facilities.
  - Construction and structural details of all pits, and manufacturer's specifications for proprietary products.
  - Hydrologic and hydraulic computations.
  - The emergency flow path and estimated flow levels in the event of blockage or damage to the OSD system.

  - Property(ies) burdened by the OSD system.
  - Demonstration of integration of any WSUD requirements for stormwater disposal.
  - Completed and signed agreement for the creation of easement to drain water from property owners (Appendix A sample letter).
- A complete checklist from Appendix D – Application Submission Checklist

8 Information Required After Construction

After approval has been provided by Council and works completed, the following is required:

8.1 Work-As-Executed 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:

- Sufficient levels and dimensions to verify the On-Site Detention storage volumes.
- Location and surface levels of all drainage pits.
- Invert levels of the internal drainage line, orifice plates, outlet control pit.
- Finished floor levels of structures such as units and garages.
- Verification that the orifice plates have been fitted and the diameter of the fitted plates.
- Verification that trash screens are installed.
- Location and finished contour levels on any overland flow paths formed through the site.
- Detail of any variations or omissions made from the approved plans.
- Weir dimensions and levels.
- The Work-As-Executed information should be shown on a copy of the approved civil works drawings. Duplicating all information shown on the approved drawings would ensure a suitably detailed submission. Any changes from the approved civil drawings are to be shown in red.
- Copies of certificates of title showing the creation of easement to drain water.

8.2 Certification of OSD System as Constructed

The original drainage design consultant is required to provide this certification in conjunction with the work-as-executed plans.

The objective of the OSD policy 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 or Surveyor.

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 of the development, whichever comes first. This certification must include:

- Certification that the OSD 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 system. If there is detrimental impact on the performance of the OSD 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 system.

8.3 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 LRS.

8.4 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 Mid Coast Council or under (s) 88E must nominate Mid Coast 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 Mid Coast Council.

8.5 Standard Positive Covenant for OSD System

The standard terms of the Positive Covenant Under (s) 88B must benefit Mid Coast Council or under (s) 88E must nominate Mid Coast 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.

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 have two options for the drainage of stormwater, the first, which is Council's preferred method, is to obtain a drainage easement to convey the stormwater runoff from our property to the nearest public stormwater drainage infrastructure or Council approved discharge point, being .....

This will require you to grant me/us a drainage easement through your property with all legal and survey costs for the creation of the easement being borne by us, together with any consideration for the use of your property as determined by an independent valuation or agreement. (Attach independent valuation or agreement to this form)

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 . . . . . .

You are advised that if Council determines that the only way for the drainage of stormwater is via an easement through your property, I/we may pursue this through Section 88K of the Conveyancing Act 1919 to request the Supreme Court to grant me/us the drainage easement. This may result in legal expenses and time spent for both you and I/us.

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

YES I/we are willing to grant you a drainage easement.

.....	.....
Name	Address

NO I/we are not willing to grant you a drainage easement.

.....	.....
Name	Address

Appendix B – On Site Absorption Design Guideline

- A consulting geotechnical engineer must submit a geotechnical report providing the following details (where applicable) for the proposed location of the absorption/dispersal trench:
  - Depth to rock
  - Depth to the water table
  - 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.
- 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.
- 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.
- 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.
- 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.
- When considering available storage volumes for the storage design methods, a maximum of 20% voids in the base aggregate may be used.
- 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.

Appendix C – Level Spreader Design Guideline

- Level spreader is to be designed by a suitably qualified and experienced Civil Engineer, who has Membership to the Institution of Engineers Australia or a Registered Surveyor
- Stormwater flows from the developed site are to be restricted for all storm events up to and including the 1% AEP storm event. This system will require the provision of an on-site stormwater detention system.
- Total discharge including bypass flows and controlled flows through the level spreader must not exceed the 20% AEP predevelopment developed site flow.
- 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.
- The level spreader ideally is to be located as far as possible from the downstream boundary.
- Level spreader must not directly or indirectly, result in the concentration and increase of surface flows downstream of the property

Appendix D – Application Submission Checklist

Use this checklist to ensure that the submission addresses all of the requirements as set out in the guideline. Failure to submit the checklist will result in delay or rejection of the application.

- ☐ Plans showing drainage layout, pits, pipes, detention basins (with sizing)
- ☐ Stormwater Management Plan - Report must include:
    - Catchment Area for each pit/structure
    - Discharge type and location for all lots
    - Justification for diversion from the guidelines (losses, rainfall etc.)
    - Results verifying that the OSD system is able to store and restrict outflow for all storms and time steps
    - Management of any upstream flows
    - Any other information relevant to the submission in accordance with this guideline
- ☐ Use of Initial and Continuing Loss Method
- ☐ Use of BOM IFD tables/temporal patterns
- ☐ Use of ARR Data Hub for Losses and Preburst Depths
- ☐ Complete and Functional Drains Model with the following:
    - Background Layout
    - Pits and pipes over the layout
    - Overflow Routes specified with appropriate cross sections and direction
    - Detention Basins attached to drainage network
    - Results verifying that the OSD system is able to store and restrict outflow for all storms and time steps