POLICY FOR

STORMWATER MANAGEMENT IN

MOSMAN

Amendments

Date	Amendment	Reference
6 November 2007	Adopted	EP/247
3 December 2024	Adopted	EP/38

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1. STANDARD RAINWATER GUIDELINES

1.1. INTRODUCTION

These Guidelines outline Council's requirements for the design and maintenance of stormwater drainage systems on private property within Mosman.

It is the responsibility of individual property owners and developers to pipe stormwater from private property to Council's drainage system. In some cases this could be to kerb and gutter, a pit, pipe or open channel. It is important that private drainage is considered carefully, as inappropriate internal drainage can cause flooding and seepage to downstream properties and erosion and damage to bushland. In many cases properties will be able to drain directly to the street gutter by gravity. However in cases where the property is lower than the street frontage the solution will not be so clear.

Where on-site detention is required for a particular site, these Guidelines shall be used in conjunction with Section 2 and Section 3 of this Policy.

These Guidelines do not preclude the use of alternative design methods not specifically referred to herein.

1.2. PRELIMINARY STORMWATER DRAINAGE PLAN

A Stormwater drainage plan is required for all Developments that may have an impact on drainage and they should be included with the Development Application. The drainage plan must demonstrate the feasibility of the proposed drainage system within the site and the proposed connection to Council's system. This plan must be in accordance with the guidelines set out below, as well as meeting Council's "On Site Detention/Retention" requirements (if applicable). This plan is to show:

(I) The proposed method of stormwater disposal including any easements required and sufficient design level information to demonstrate that the proposed system will drain.

(ii) Approximate location of on-site detention/retention storage (if applicable) and the site drainage system.

(iii) Any site constraints such as trees, services or structures that may affect the viability of the drainage or on site detention/retention system.

1.3. GENERAL DESIGN PARAMETERS

Development and/or Building Approvals will not be granted until details of the proposed drainage have been approved by the Council's Environment & Planning Department.

Drainage systems should be designed in accordance with the requirements of the Institution of Engineers, Australia publication "Australian Rainfall and Runoff, a Guide to Flood Estimation Volume 1 Reprinted Edition 2001", and drainage should be in accordance with the BRANZ plumbing and Drainage Guide, Part 3 Stormwater Drainage Australian Standard 3500.3 - 2003.

All roof gutters and downpipes shall be designed to cater for the 1 in 100 year storm.

Property drainage shall be designed with a pipe system to drain all roof areas and all impervious areas such as pathways, driveways, and paved areas. The design criteria used for gravity flow pipe systems shall be:-

Recurrence Interval:	20 years
Time of concentration:	5 minutes
Rainfall Intensity:	206 mm/hr
Coefficient of Runoff:	Pervious: 0.75
	Impervious: 1.00

An emergency overflow mechanism is to be incorporated which shall be designed to accommodate a storm of 5 minutes duration and a recurrence interval of 1 in 100 years. If the only overflow available is through private property, or if an overflow path is not available then the design criteria for the piped system shall be:-

- Recurrence Interval:	100 years
- Time of concentration:	5 minutes
- Rainfall Intensity:	267 mm/hr
- Coefficient of Runoff:	Pervious: 0.75,
	Impervious: 1.00

- Have a minimum of 1% fall from boundary to kerb.

Details to be submitted include:-

(I) A plan of the works proposed which includes the locations, size, grade, and class of all pipes proposed, as well as positions of all pits, together with existing and proposed structures, trees including drip lines, overland flow paths, proposed paved areas including driveways paths etc,

(ii) Calculations showing the capacity of the system (if required) as well as any other calculations required by the conditions given below.

(iii) Where the design will necessitate works being undertaken within the drip line area of trees, including those of neighbouring properties. A report from a qualified arborist is to be submitted with the design stating the likely impact on the health and stability of the tree, together with details of the preferred methods of construction and any remedial work.

(iv) Copies of certificates of title showing the creation of easements to drain water (if required).

1.4. PROPERTIES THAT FALL TO THE STREET

1.4.1. Connection to the Kerb and Gutter

This is the most common way to connect to Councils drainage system. The minimum standards for pipe connection are:-

- Sewer grade UPVC
- 1% fall
- 100 mm diameter.

For 150 mm and 225 mm diameter pipes connection to the kerb can be made with a standard convertor or 90 mm x 140 mm hot dipped galvanised box sections. Pipe sizes larger than 225 mm diameter shall be piped directly to the nearest Council pit or pipe. Only one convertor shall be allowed to connect to the same gutter system per property. Pipes laid down vertical rock faces shall be cut into the face and rendered over.

It is necessary when carrying out this work to obtain a road opening permit from Council. A Road Opening Application is available at Councils Civic Centre.

1.4.2. Connection to Councils Pit or Pipeline

When connecting to a Council pipe, pit, open channel or creek it is necessary to make an application to connect to Council=s system. An Application to Connect to Council=s Stormwater System is available from Council=s Civic Centre.

Connection to a Council pipe is to be made at the obvert. The hole is to be neatly made by cutting or drilling. Any reinforcement encountered is to be cut away. The connection shall not protrude beyond the inner surface of the Council pipe. Following inspection by a Council officer from the Environment & Planning Department the junction shall be smoothly finished with 2:1 cement mortar.

When the diameter of the connection is more than 1/3 the diameter of the Council pipe, connection is to be made by construction of a standard junction pit.

1.4.3. Connection to an Inter-allotment Drainage System.

Connection to an inter-allotment drainage system is the same as for connection to a Council pipeline, however Development Approval or Building Approval will not be granted until documented evidence has been furnished to Council proving that the subject property has a legal right to drain water over downstream properties. Council may also require an analysis of existing inter-allotment pipes, as well as details of proposed pipes.

1.5. PROPERTIES THAT FALL AWAY FROM THE STREET

1.5.1. Absorption Trenches

Systems using on-site absorption and dispersion are considered inadequate as a primary means of draining developments in most areas of Mosman. Council will however consider the use of this type of system when the majority of a site can drain to Councils system by other means. It is anticipated this method will only be approved for driveways, single garages/carports etc. If it is proposed to utilise an absorption trench as a stormwater disposal method, then the following conditions need to be satisfied prior to the release of any Development Approval:

(I) A plan showing the proposed system with dimensions of pits and trenches, and details of how the system is to operate, including types of materials to be used. An example of this is seen in figure 1.0

(ii) Calculations and a report by a geotechnical engineer including an assessment of the infiltration capacity of the soil profile, which takes into account moisture conditions, water table and soil types. The trench is to be sized to withstand a 1 in 20 year storm event. The report must show overland and subsoil flows from the site into downstream properties will not exceed what would be received from a “Greenfield” site. That is a site in which there is no development but only natural material such as grass and rocky outcrops. Due to the geological nature of Mosman, the ratio of grass to rocky outcrops is to be determined on site by a suitably qualified Engineer.

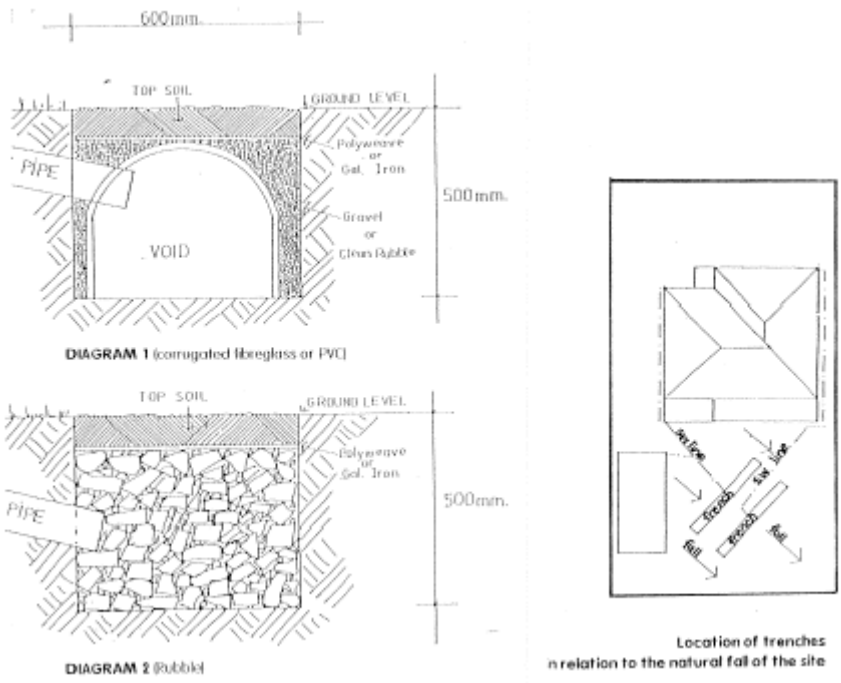

Figure 1.0 Absorption Trench Details

1.5.2. Charged Pipe System

In some cases where the roof level of a house is above the street gutter level, it is possible to drain roof water to the street even though the ground level is below road level. This uses a siphon effect to make water flow up the pipe. Granting of Development Approval and Building Approval for developments wishing to use this method of disposal is conditional on the following.-

- A minimum of 1.5 m of head is required.
- The pipe has to be completely sealed.
- A cleaning eye is required at the Aelbow≅ or lowest point in the pipe.
- Plans submitted should also show levels of Councils kerb and gutter and levels of the roof gutter being drained.
- Calculations from a qualified civil or hydraulic engineer showing that the proposal meets the design criteria given in section 1.3.
- Proposed method of draining areas lower than the road level.

Charged systems will not work in conjunction with on site detention and they do not work for drainage of ground surfaces.

1.5.3. Councils Reserve

Each case will be considered individually and Council will in most cases require a bond to carry out work within a reserve.

For properties draining to reserves, Council will require that the stormwater be piped to the high water mark, a creek or Council pipe. All pipes must be constructed with sufficient cover. Pipes being laid down vertical rock faces must be cut into the rock and rendered over. Outlets at high water mark should be constructed to be visually unobtrusive.

Council will require a plan of the proposed route of the pipe through the reserve, showing all trees rock ledges and cliffs as well as any other significant detail.

If it can be shown that it is not feasible to pipe the water through a reserve, then Council may consider other methods of disposal. These should be accompanied by written submissions from experts. For Example, a proposal utilising absorption/dispersion will need to have a report from a geotechnical engineer and a proposal within the root zone of a tree will require a report from a qualified arborist.

1.5.4. Draining directly to the Ocean

For properties draining to the ocean reserve, Council will require that the stormwater be piped to the high water mark. All pipes must be constructed with sufficient cover. Pipes being laid down vertical rock faces must be cut into the rock and rendered over. Outlets at high water mark should be constructed to be visually unobtrusive. A silt trap or discharge control pit should be installed to minimise erosion and scour. The location of discharge is to be determined by a suitably qualified engineer.

1.5.5. Pump Systems

Council will not under any circumstances approve the use of pump systems for disposal of surface stormwater.

1.5.6. Easements Through Downstream Properties

In the event that the above options are unsuitable, it will be necessary for applicants to obtain easements through adjoining downstream properties for stormwater drainage. Development and Building Approval will not be granted until easements have been created on the property titles of downstream properties, and full details of the proposed stormwater disposal system are approved by Council=s Director Environment and Planning.

1.6. MAINTENANCE OF DRAINAGE SYSTEM

Once an approved drainage system has been constructed, it is the owner's responsibility to maintain the system in good working order, including roof gutters, downpipes, pits, and drainage pipes, to the point of connection to Council's drainage system. Failure to do this may result in flooding of downstream properties or in the case of broken pipes on the footpath, a danger to pedestrians. Under the Local Government Act (1993) and the Roads Act (1993), Council can require property owners to maintain their drainage systems to prevent these problems from occurring. In some cases Council may require the provision of a positive covenant for maintenance purposes.

1.7. DRAINAGE OF SUBSOIL FLOWS

1.7.1. Subsoil Drainage by Gravity

Subsoil drainage by gravity means may be connected to the property drainage system and should conform to the guidelines given above.

1.7.2. Subsoil Drainage by Pumps

Subsoil drainage by pump out shall be directly connected to a Council pipe or pit, as outlined in section 3.0. In the event that there is not a Council pit or pipe in close proximity, it will be necessary to design and construct a pipeline to Council=s system. The pump out system shall be designed to conform with the following criteria:-

(i) The capacity of the pump and holding well shall be designed to accommodate a sub-soil inflow rate during wet weather as determined by either:-

(a) a test procedure as approved by the Director Environment & Planning or

(b) an estimated value as approved by the Director Environment & Planning

(ii) The capacity of the holding well shall be calculated as above the level at which the pumps are automatically brought into operation.

(iii) The minimum capacity of the holding wall shall be equal to the total sub-soil inflow for a twelve (12) hour period.

(iv) A silt trap of suitable design shall be provided on the inlet side of any holding well.

(v) At least two pumps of equal capacity each capable of pumping out the volume calculated in (iii) above, in a period of five (5) minutes.

(vi) The discharge pipeline from the pumping plant (rising main) shall be in accordance with the recommendations of the pump manufacturer.

(vii) The rising main from a pumping plant shall be connected to either an existing Council stormwater drainage gully pit, an underground pipeline, or to a small drainage pit within the property and thence by gravity to Council's gutter by at least a 90 mm diameter pipe. An Application to Connect to Council's Stormwater Drainage System and a Road Opening Permit must be obtained and all associated fees paid prior to work commencing on the laying of the rising main.

(viii) Pumps shall be provided with automatic level switches so that both pumps operate simultaneously should the volume calculated in (iii) above be exceeded.

(ix) The electric connection of the individual pumps shall be arranged so that separate circuits are provided from the main or sub-switchboard, through separate level switches for each individual pump.

(x) The switching of the pumps shall be arranged so that they operate alternatively.

(xi) An automatic alarm system shall be provided to warn of the failure of the pumping system. The alarm system shall have visual indicators and an audible alarm siren.

An Electrical Engineer's Certificate shall be supplied to Council on completion of the works certifying that the electrical details of the pump out system have been checked and fully tested and are operating in accordance with these Guidelines.

1.7.3. Maintenance of Sub Soil System

A 24 hour x 12 monthly Emergency and Maintenance Contract shall be obtained from a company capable of executing the work and shall be kept in force by the property owner(s) for the life of the building. This requirement is applicable to any pump-out system approved by Council for installation.

The Maintenance Contract shall be carried out every three (3) months and shall include the following activities:-

(I) Clean out all pits of silt and debris.

(ii) Check and clean out, if necessary, all pipelines.

(iii) Check:-
Pumps for wear
Pump oil seals
Pump strainer and clean

(iv) Carry out routine maintenance to pumps as recommended by the manufacturer.
(v) Check operational sequence of level switches, pumps and control panel.

(vi) The Emergency Contract shall provide for a 24 hour x 7 day per week service.

The Contractor shall provide a name plate stating name, working hours, telephone number and out of hours number and such name plate shall be fixed to the front of the control panel and at other locations determined by Council.

1.8. OTHER CONSIDERATIONS

Properties with watercourses or natural flow paths and properties in low points shall provide overland flow paths designed to cope with the 1 in 100 ARI storm event, regardless if there is a pipe of adequate capacity draining the low point or creek or not.

To prevent flooding there must be a minimum of 300 mm freeboard to the adjacent habitable floor levels including those of nearby properties, to overland flow paths, creeks and OSD storage .

2. ON SITE DETENTION

2.1. INTRODUCTION

With the intensive redevelopments which are now taking place in Mosman, increases will occur in stormwater runoff which in most cases cannot be accommodated by Council's existing drainage system. This may result in flooding of private property.

Financial constraints imposed on Council have made the upgrading of trunk drainage systems impractical. Any Drainage Improvement Works to be undertaken by Council are prioritised, the majority involving the upgrading of local inadequacies to match overall existing system capacities.

To overcome these problems, Mosman Council has adopted a policy of on-site stormwater detention (O.S.D.) for developments where there is to be an increase in run off to that of the site in it's natural state i.e., undeveloped. Ultimately Council's goal is to work towards a catchment based policy. This is a time consuming process involving analysis of individual catchments to estimate capacities of existing systems. The resulting policy would aim to limit discharges per unit area to a rate corresponding to the existing drainage system's capacity, taking into account future upgrading works which Council will be implementing. A catchment based policy will in the longer term simplify the design procedure for all parties concerned. Until this can be completed, Mosman Council will continue to utilise O.S.D.

On-site detention systems provide temporary storage of stormwater runoff from developments and restrict discharge from the site to a rate which Council's existing drainage system is capable of accommodating.

This document has been prepared to assist developers and qualified Civil Engineers in preparing designs for detention storage basins.

Applicants shall include the proposed location of the detention system as part of the Development Application. The detailed design of the detention system shall be submitted as part of the Building Application. Building approval will only be issued upon submission of a satisfactory design.

2.2. APPLICATION OF THIS POLICY

This O.S.D. policy is to apply to the entire site area of:-

(i) All commercial and medium density developments

(ii) All new dwellings (including where an existing building is demolished)

(iii) Major subdivisions

(iv) Retirement villages

(v) Tennis courts

(vi) Alterations and additions which in the opinion of Council's Director Environment and Planning will have an impact on the capacity of Council's stormwater pipeline system

Where O.S.D. facilities are provided for subdivisions under torrens title, a separate O.S.D. facility should be provided for each lot. Use of a single O.S.D. facility serving all lots will necessitate the use of legal agreements, easements etc. regarding use and maintenance of the O.S.D. facility.

Strata subdivisions which have an area of common property may utilize a single O.S.D. facility provided that it is located on that common property. Maintenance etc. then becomes the responsibility of the Body Corporate. However any OSD on common property must take into account the whole site regardless if any of the dwellings are pre-existing. OSD facilities for torrens title lots must be contained wholly within that lot.

2.3. EXEMPTIONS

Properties may be given an exemption where it can be shown that

(i) The increase in impervious area on the site is less than 5% of the total site area. However structures proposed on existing impervious surfaces such as paving, concrete slabs or asphalt will not be exempt unless such surfaces were approved in a previous development or building approval.

(ii) Construction of any garage/carport larger than single size will attract a requirement for O.S.D. irrespective if the garage/carport is constructed over an existing impervious area or not. Construction of a single size garage/carport will require the applicant to install a rainwater tank of at least 1500 liters in capacity. Rainwater from this tank is to be used for irrigation and car washing purposes.

(iii) The discharge from a property does not pass through a structure such as a pipe, culvert, bridge or other control structure or through a natural drainage system before reaching receiving waters of Sydney or Middle Harbour.

(iv) The proposed development is within a catchment that has an adequate drainage system. Council will only consider this if the request for exemption is accompanied by a study prepared or endorsed by a qualified civil engineer which:-

- Analyses the whole catchment and shows that the capacity of the existing system is adequate for Council's design standards after development of the site and allowing for increased development of other sites within the catchment.

- Uses a method of analysis acceptable to Council.

- Considers storm frequencies up to Council's current design standards.

- Shows that there is no increase in the incidence of flooding at any downstream location without O.S.D.

(v) In the case of subdivisions, on-site detention will only be required for the newly created lot(s) where the existing dwelling is to be retained without any increase in impervious areas.

2.4. TECHNICAL SPECIFICATIONS

Designs shall be prepared by a qualified Consulting Civil Engineer, in accordance with this Policy and to the satisfaction of Council's Director Environment and Planning. A Chartered Civil Engineer's Certificate shall be submitted with the design certifying that the design has been prepared in accordance with this Policy.

The detention storage shall be designed to accommodate stormwater run-off resulting from a storm with an average recurrence interval of:-

(i) 20 years where overflow paths are not through private property; and,

(ii) 100 years where overflow paths are through private properties and/or known flooding problems occur.

The Permissible Site Discharge (PSD) for the site is found using the intensities given in table 1, below. These figures have been adopted as most of Council's trunk stormwater lines were installed during the 1930's and 1940's. Run-off from residential areas was calculated using the Rational Method with a Coefficient of Runoff "C" equal to 0.65 and Rainfall Intensity values supplied by the "D.M.R. Waterway Calculations Manual" as detailed.

Time of Concentration 't' (Minutes)	Rainfall Intensity 'I' (mm/hr)
7	139.7
8	131.4
9	123.8
10	117.5
11	111.8
12	106.7
15	92.5
20	79.0
25	67.8
30	61.5

Table 1 Rainfall Intensities.

The permissible site discharge from a proposed development shall be calculated using the rational method with the values of intensity given above. The time of concentration is to be that of the upstream catchment in most cases this will be the time of concentration of the site which is to be not less than 7 minutes. The current rainfall intensities for Mosman are attached and shall be used in determining run-off from the developed site and the storage volume required. When calculating runoff the whole site including access roads garden areas etc, will be considered in the calculations. Where it is not feasible to direct runoff from the entire development site to O.S.D. storage due to site topography or other circumstances, Council may allow part of the site to drain directly to the street or Council's stormwater system. In these cases flow/through the O.S.D. device will have to be restricted so that total flow from the site (i.e., unrestricted and from the O.S.D. facility added together) does not exceed the permissible site discharge. The method used for calculating storage volumes shall be undertaken using a full hydrographic producing computer model that uses Australian Rainfall and Runoff (1987) temporal patterns. Calculations must include a range of storms that clearly show the critical storm has been identified. As there are commonly two peaks in storage volumes, calculations would need to extend until the second peak has been identified or to the 2 hour storm.

Landscaping that is constructed over the top of an impervious surface and is well drained such as landscaping over basement car parking or on top of a roof shall be assumed to be impervious for calculating flow through the system.

Aesthetic Considerations

All drainage structures and measures are to be designed to be visually unobtrusive and sympathetic with the environment, to the satisfaction of the Director Environment and Planning. This requirement is

necessary to help ensure that future occupants/owners do not adjust or remove facilities for aesthetic reasons without understanding the functional impact of such actions.

2.5. SURFACE FLOW PATH

Surface flow paths, including the provision of an emergency overflow to cater for blockage of the system or flows in excess of the 20 year ARI storm flow must be provided. The flow route must be capable of carrying the flows generated by a 5 minute 100 year ARI storm with a freeboard of 300 mm 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. Diverting flows from one catchment to another will not be permitted.

2.6. RUNOFF FROM ADJACENT PROPERTIES

Surface runoff from outside the development site shall not be allowed to enter OSD systems. This may require provision of a floodway, in the event that it is impossible to design the system to exclude runoff from outside the site, then the design must provide sufficient storage to detain the runoff from the upstream catchment.

2.7. FLOOR AND GROUND LEVELS

All habitable floor levels and power points are to be a minimum of 300 mm and garage floor levels and pedestrian entry egress facilities a minimum of 150 mm above the maximum design storage water surface level and flow path levels.

2.8. SITE DISCHARGE AND CONNECTION TO THE COUNCILS STORMWATER SYSTEM

The Permissible Site Discharge is to be piped to the Council's drainage system, as described in Council’s Guidelines for Stormwater Drainage Systems.

If the outlet from the basin cannot be classed as a 'free outlet', eg: if the outlet drains into a Council pit instead of to the street gutter, full hydraulic calculations will be required for the receiving drainage system in order to demonstrate the effect on the proposed detention system. Hydraulic calculations are to be undertaken with water surface profiles determined using hydraulic grade line or backwater calculations for this purpose.

Calculations are to be prepared by a suitably qualified and experienced practitioner and in accordance with current practices and principles outlined in *Australian Rainfall and Runoff* (Reprinted 2001) and the Technical Specification.

If the property is on the lower side of a street and cannot drain to the street frontage, it will be necessary to obtain easements over downstream properties. Pump out systems are not acceptable and under no circumstances will development approval be granted until easements have been acquired and registered on property titles.

2.9. INTERNAL DRAINAGE SYSTEM

The drainage system for the site should be able to convey all runoff for the required average recurrence interval storm event to the O.S.D. storage for the time of concentration of the site.

2.10. DISCHARGE CONTROL DEVICES AND STORAGE PITS

A high-level outlet is to be provided at the discharge control pit to cater for surcharge during major storm events. Access to the discharge control pit is to be provided for inspections and maintenance of the silt trap and mesh screen. Such opening is to have a minimum size of 600 mm x 600 mm to be fitted with a removable galvanised steel grate and to be placed above the outlet and silt trap. Additional access may be required for larger underground storage. Essentially, the system is to be designed to maximise ease of maintenance and ensure safety for the proprietor. To avoid unpleasant odours and health risks, maintenance of the OSD structure must be carried out on a regular basis by the owner.

A stainless steel screen (Maxi-mesh RH3030 or equivalent) with a minimum area of 50 times the orifice area, and fitted with a lifting handle, shall be provided between the orifice and the inlet. The screen is to be a minimum distance from the orifice equal to 1.5 times the diameter of the orifice or 200 mm, whichever is the greater. If possible the screen should be positioned so that inflows are directed parallel and across the screen.
Each discharge control pit shall also have a silt trap minimum size 600 mm x 600 mm, and 100 mm deep. Small weep holes should be placed at the bottom of the trap to allow free draining of these weep holes the base of the trap should be poured or placed on 100 mm base of free draining material such as river gravel or open graded road base. Silt traps should be positioned close to the orifice and below access points for ease of cleaning.

The orifice plate is to be a minimum 200 mm x 200 mm flat stainless steel plate, 3 mm thick. The orifice is to be tooled to the exact dimension as calculated, uniform circular shape with sharp (not rounded) edges. The plate is to be cast into the wall or epoxied and securely fixed over the outlet pipe by at least four Dyna bolts or similar, one at each corner.

The orifice is to be sized using the equation given below:

$Q=CA(2gH)^{0.5}*10^3$

Where Q=flow through the orifice in litres/second
C=0.61
H=depth of ponding from the centre line of the orifice
A=cross sectional area of orifice in square metres
g=9.81

Generally orifice diameters smaller than 40 mm will not be approved

Outflow pipes shall be as recommended in table 2, below. Use of outflow pipes of a smaller diameter will only be approved if a full hydraulic grade line analysis is provided which shows that the outflow pipe diameter proposed will not impede flow through the orifice.

Maximum size of orifice (millimetres)	Minimum Pipe size (millimetres)
40*	100
60	100
90	150
130	225
180	300

Table 2 Minimum outflow pipe size.

*note 40 mm is the minimum allowable orifice size.

For safety, all maintenance access to storages must conform to the current Confined Spaces Regulations.

Venting shall be provided where there is potential for gas buildup. A hydrostatic valve is to be provided where necessary.

Step irons are to be installed where the depth of the underground tank is 1200 mm or greater.

2.11. SURFACE STORAGE SYSTEMS

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 as follows.

LANDSCAPED STORAGE:

(i) Maximum ponding depth is not to exceed 300 mm under design conditions. This includes overflow conditions.

(ii) Storage volumes in landscaping areas shall include an allowance for 20 per cent additional storage for vegetation growth and construction inaccuracies.

(iii) The desirable minimum surface slope is 1.5 per cent, with the absolute minimum being 1.0 per cent.

(iv) Maximum batter slopes to be 1:4

(v) Subsoil drainage around the outlet is to be provided to prevent the ground becoming saturated during prolonged wet weather.

(vi) Unless above ground storage is in an area not used for purposes other than for on site detention then the first 15% of storage should be provided in an area able to tolerate frequent inundation. For example, a small underground tank or a rock garden may be used.

(vii) The structural adequacy of any retaining wall, including the hydrostatic loads caused by a full storage should be checked (draft UPRCT 1994).

2.12. DRIVEWAY AND CAR PARK STORAGE:

(i) To avoid damage to vehicles, depths of ponding on driveways and car parks is not to exceed 200 mm under design conditions. This includes overflow conditions.

(ii) Transverse paving slopes within storage areas should not be less than 0.7 per cent.

(iii) 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 per cent of the storage to be provided in a non-sensitive area (draft UPRCT 1994).

2.13. INFORMATION TO BE SUBMITTED WITH THE DESIGN

A preliminary storm water drainage plan is to be submitted with the Development Application demonstrating the feasibility of the proposed drainage system within the site and connection to Council's system. This plan must be in accordance with the Guidelines for Stormwater Drainage Systems seen in section 1 of this document.. This plan is to show:

(i) Proposed method of stormwater disposal including any easements required, and sufficient levels to demonstrate that the proposed system will drain.

(ii) Approximate location of on-site detention storages and site drainage system.

(iii) Any site constraints such as trees, services, or structures that may affect the viability of the drainage or on site detention system.

The following details are to be submitted with the Building Application and must be in accordance with the technical specification given in Clause 4 above:

(i) Certification of design from a qualified Hydraulic or Civil Engineer.

(ii) Copies of certificates of title showing the creation of easements to drain water (if required), and creation of positive covenants. A positive covenant is necessary as the detention system once constructed, must be maintained in an operable condition and must not be removed without the prior consent of Council. In this regard, a positive covenant is to be placed on the title of the property to this effect. Arrangements satisfactory to Council's Solicitor are to be made prior to the issue of approval to build. All costs (including those of Council) arising from preparation and registration of the covenant are to be met by the applicant. At the time of submitting the Building Application, the applicant is requested to advise Council's Administration Manager so that appropriate action may be commenced.

(iii) Where the design will necessitate works being undertaken within the dripline area of trees, including those of neighbouring properties. A report from a qualified arborist is to be submitted with the design stating the likely impact on the health and stability of the tree and detail preferred methods of construction and any remedial work.

(iv) Plans and specifications which clearly show:

Dimensions and areas of the site including all existing and proposed roof and pavement areas. Floor levels of all permanent structures, proposed and existing surface levels to Australian Height Datum, and locations of all trees, including drip lines, to be retained on site.

(v) A longitudinal section of outflow pipelines showing calculated flow, velocity, size and class of pipe, grade, invert levels, any service utilities as well as any existing or proposed pits, Where connection is to be made via an easement through downstream properties, details are to be supplied. If the outflow pipe is smaller than the one recommended for the size of orifice proposed then a hydraulic grade line analysis of the outflow pipe will also be required. Details of internal drainage including grades, size and locations of pipes and pits. open drains, points of discharge, detention basin(s), control pit(s), surcharge facilities and surface flow path(s).

(vi) Dimensions (mm) and volume (m^3) of the proposed detention storage, including a plan, elevations 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.

(vii) Details of the orifice/outlet,

(viii) Details of access and maintenance facilities, including to screen and silt trap.

(ix) Construction and structural details of all tanks and pits, and manufacturers' specifications for proprietary products

(x) The emergency overflow path and estimated flood levels.

Calculations which clearly show

(I) The method used, for calculation of storage volumes, this analysis shall be undertaken using a full hydrographic producing computer model.

(ii) Calculation of orifice size, including a height storage outflow table which must be used in calculation of storage volume.

(iii) The frequency and period of ponding in the above ground storage areas.

(iv) Any other calculations that may be required such as:

-Analysis showing the capacity of the overflow path
-Analysis of the downstream catchment in the case where the system does not have a “free outlet”
-Analysis of outflow pipe if pipe size proposed is smaller than recommended for the size of orifice proposed.

2.14. COMPLETION OF WORKS

Works as executed drawings of the detention storage shall be furnished to Council upon completion of the works. A Chartered Civil Engineer's Certificate shall be supplied to Council in respect of:-

(i) The soundness of the storage structure;

(ii) The capacity of the detention storage;

(iii) The adequacy of the outlet mechanism to achieve the discharge specified;

(iv) The works being constructed in accordance with the approved design.

2.15. OTHER CONSIDERATION

Where above ground storages are installed, Council will notate on Section 149 and 603 Certificates the fact that certain areas of the property act as a detention basin and are liable to flood during intense storms.

An application form should be filled out for the connection of all new drainage work to Council's pipelines or gully pits. Application forms are available at Council's Civic Centre.

A Road Opening Permit will be required for any other work outside the property boundary associated with the installation of the system. These permits are available at Council's Civic Centre

3. RAINWATER TANKS

3.1. INTRODUCTION

Due to the constant redevelopment occurring within the Mosman district, Councils existing stormwater drainage system may no be able to accommodate large increases in stormwater run off. To overcome this problem, the Council has adopted a policy for new developments where there is an increase in run off to that of its natural undeveloped state. This policy involves the concept of On-Site Detention. On-Site Detention systems provide temporary storage of stormwater runoff from developments and restrict discharge from the site to a rate which Council's existing drainage system is capable of accommodating.

In addition to the need to reduce stormwater run off entering Council's drainage system, Council has become aware of the increasing strain put on the reserves of potable water within the Sydney Catchment. To alleviate this problem Council is looking at ways to reuse rain and stormwater while minimising the impact it has on the Council's drainage system. Possible solutions to this dilemma include the installation of a rainwater tank.

In many circumstances, rainwater tanks can assist in the balance between water storage, water usage, water absorption and stormwater run off. It has been estimated that approximately 54% of domestic purposes in an average Sydney household could be supplemented by non-potable water such as water stored in rainwater tanks. (Sydney Water 2003). Thus in order to maximise the re-use of rainwater, rainwater can be connected to household items such as washing machines and toilets and can be used outside to wash vehicles and water gardens. In addition to this rainwater tanks can be designed to act as on-site detention units and thus reduce the impact on Council's drainage systems.

Currently in many developments, Council is permitting the installation of rainwater tanks for domestic purposed. In addition to this, in some locations, Council is in the position of permitting rainwater re-use tanks to be used in conjunction with and/or in lieu of onsite detention tanks.

This document has been prepared to assist developers and Civil engineers in preparing designs utilizing rainwater tanks.

Below is an example of the potential usage from a rainwater tank.

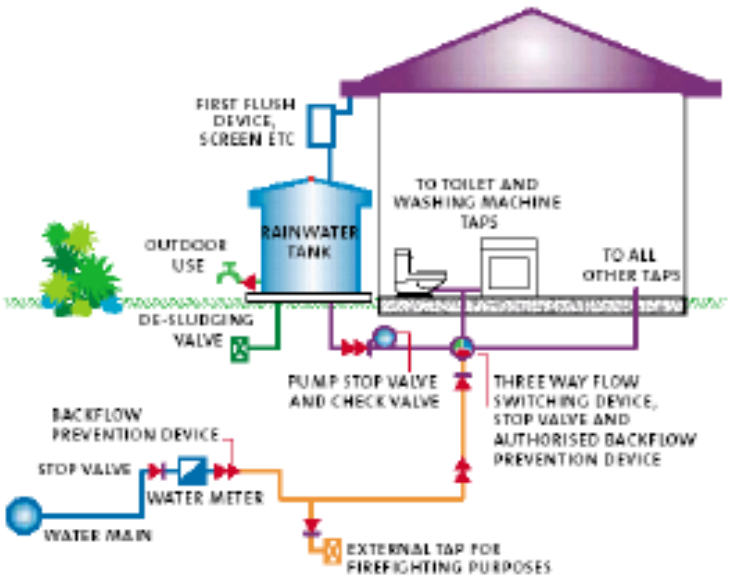

Figure 3 Potential uses for rainwater

If the installation of a rainwater tank is the only work proposed, Mosman Councils Exempt and Complying Development document should be consulted to determine if any approval from Council is necessary. Where rainwater tanks are installed as part of a Development Application, the requirements outlined in sections 3.2 to section 3.5 should be adhered to.

3.2. RAINWATER RE-USE TANKS IN LIEU OF ON-SITE DETENTION

The following section should also be read in conjunction with On site Detention requirements and Guidelines for Stormwater Drainage.

3.2.1. Requirements

If On-Site Detention is required for a site the applicant may seek permission to use rainwater re-use tanks in conjunction with or in lieu of onsite detention tanks. If this is the case then the following restrictions will apply:

(i) The rainwater re-use system is to be connected to the house for some domestic use. The minimum domestic use shall be for flushing of all toilets in the building and connection to the laundry for washing purposes.

(ii) A concept plan is to be submitted to Council showing all relevant connections to the house and to Councils Drainage System.

(iii) No surface run off is permitted to enter the tank.

(iv) The tank and associated reticulation system to the house shall be installed to the requirements of Sydney Water.

(v) A first-flush-by-pass device must be installed allowing the first 1mm of initial runoff to bypass the tank.

(vi) The General Design Parameters listed in Section 3.4 below should be noted.

3.2.2. OSD Discount

Mosman Council will permit the following discounts to OSD volume requirements when a rainwater tank is installed.

USAGE	PERMITTED DISCOUNT OF OSD VOLUME
Rainwater tank connected to all toilets and laundry for washing machine.	30% of the rainwater tank can be counted as OSD.
Rainwater tank connected to all toilets, laundry for the washing machine and all showers in the building.	70% of the rainwater tank can be counted as OSD.

Table 3.0 Permitted discount for Rainwater re-use.

Applicants are permitted to discount the entire volume of OSD provided the above conditions are met.

3.2.3. Permissible Site Discharge (PSD) and Surface Run off

If an OSD tank is constructed that provides additional storage for rainwater the application PSD still applies. If the tank is solely for the use of rainwater collection then PSD will not apply.

Due to health regulation, surface water is not permitted to enter the rainwater re-use tank. For this reason surface run off must be managed. In addition to the rainwater tanks, additional surface water drainage is necessary. Surface run off must be managed and discharged in accordance with section 1 of this document.

3.3. RAINWATER TANKS OTHER THAN THAT REPLACING OSD

If on site detention is not required during a Development Application but an applicant wishes to install a rainwater tank, the conditions outlined below are to apply. If the installation of a rainwater tank is the only work proposed, Mosman Councils Exempt and Complying Development document should be consulted to determine if any approval from Council is necessary. If no approval is required, the following details should be used as a guideline.

(i) A concept plan is to be submitted to Council showing all relevant connections to the house and to Councils Drainage System.

(ii) If the tank is to be used for domestic purpose such as flushing of toilets and washing machines, no surface water is allowed to enter the tank and a first-flush-by-pass device must be installed allowing the first 1mm of initial runoff to bypass the tank.

(iii) If the tank is only to be used for irrigation and washing vehicles then surface water is permitted to enter the tank.

(iv) The General Design Parameters listed in Section 3.4 below should be noted.

3.4. GENERAL DESIGN PARAMETERS

3.4.1. Overflow

In the occurrence of prolonged periods or rain, any overflow from the rainwater tank should be discharged via an existing stormwater drainage system or to a Council approved device such as an on-site stormwater detention system.

Council will under no circumstances approve the use of pump systems for disposal of stormwater/rainwater to Councils drainage system. Only gravity or charged system discharge (provided 1.5 meters head is achieved) will be permitted.

In the event that discharge to Councils system can not be achieved through a charged system or via gravity flow, it will be necessary for the applicant to obtain an easement through a downstream property. Development Approval will not be granted until such an easement is obtained.

In the event that an easement can not be obtained Council may permit the overflow from the rainwater tank to enter an in site absorption system. If this option is chosen the following strict conditions must be met:

(i) A report and calculations from a Geotechnical engineer as detailed in Section 1.5.1 of this policy. However the trench is to be sized to withstand with a 1 in 100 year storm event.

(ii) Overflow must not be permitted to enter the sewer.

(iii) If the rainwater tank is underground, the invert level of the discharge pipe must be above the 1 in 100 year ARI flood level.

(iv) The overflow pipeline must be covered with an insect proof mesh to prevent the breeding of mosquitoes.

3.4.2. Materials and Design

The colour of the rainwater tank and associated fittings should be the same or compatible with the surrounding structures. Details of the colour of the tank and its fittings in addition to the colour of surrounding structures should be submitted with the Development Application.

Tanks must be non-corrosive and non-reflective.

The materials used for the plumbing must comply with Australian and New Zealand Standards AS/NZ AS 3500 "Part 1 Water Supply Section 2 Materials and products".

Rainwater tanks can be constructed from materials such as fiberglass, concrete, polyethylene and metal. An appropriate material should be selected to compliment surrounding structures. Details of the material used to construct the rainwater tank should be submitted with the Development Application.

To ensure reasonable acoustic amenity for surrounding properties is maintained any mechanical equipment associated with the rainwater re-use tank and associated reticulation system shall be located in a sound proof container and positioned so that there is no increase in noise level at any point on the boundary with another property, including a public place. Pumps must be installed by a licensed electrician and details of their location are to be submitted with the Construction Certificate application.

The maximum height of the rainwater tank should not be greater than 2.5 meters above the natural level of the ground. The rainwater tank should not be greater than 500mm above an adjoining fence.

Tank stands should be limited to 500mm above the natural ground level.

For safety all maintenance access to storages must conform to the current Confined Spaces Regulations.

3.4.3. Positioning and location

Tanks must not be installed over or in close proximity to any easements, water or sewer mains or any maintenance structures or fittings without meeting the requirements and approval of the appropriate authority.

The tank should be designed in a manner that none of its load is transferred to an adjoining structure or wall unless it has been specifically designed to do so by a qualified structural engineer.

The tank location should be at least 500mm from any property boundary. However this minimum distance may vary in individual cases where site restrictions apply and shall be assessed on a case by case basis. Additionally if site conditions permit it is encouraged that tanks be installed underground.

If located in a Heritage or Conservation area, tanks must be positioned so to minimise any impact to the surrounding area.

Tanks should not be visible from the street and should be installed at the rear or side of properties.

3.4.4. Foundations

The tank must be situated on a suitable foundation material in accordance with the engineers or manufactures details.

3.4.5. Plumbing Details

All plumbing work conducted is to be undertaken in compliance of Sydney Water's "Guidelines for Rainwater Tanks in Residential Properties" and "Rainwater tanks, Information For Plumbers" and the NSW Code of Practice: Plumbing and Drainage.

All plumbing work conducted should be done under the supervision of a licensed plumber. Work must be conducted in accordance to Australian Standard/New Zealand Standard AS/NZ 3500.5 and Sydney Water requirements.

3.4.6. Pumps

Council will require pumps to be located in an acoustic enclosure to reduce any acoustic emissions. Any pumps used must comply with EPA guidelines.
To ensure reasonable acoustic amenity for surrounding properties pumps should be positioned so that there is no increase in noise level at any point on the boundary with another property, including a public place. Pumps must be installed by a licensed electrician and details of their location are to be submitted with the Construction Certificate application.

3.4.7. Bunding

The area beneath any above-ground tank outlet tap or drainage outlet is to be contained and discharged via an existing stormwater drainage system or to a Council approved device such as an on-site stormwater detention system.

3.4.8. Mains Top-Up Zone

To ensure adequate storage is available in the case of excessive rainfall and alternatively to ensure adequate storage is available for continuous non potable-use, a maximum storage volume (mains top-up-zone) is to be set when installing the system. This level is to be calculated using the expected non-potable usage for one day. Additional information on the daily usage patterns of average households can be obtained from Sydney Water or at www.sydneywater.com.au.

3.4.9. Health and Safety

Adequate mosquito proofing is required on all rainwater tanks.

Any inlet and outlet to the rainwater tank must be covered with a mesh or screened to prevent animals and foreign matter entering the system.

For an above ground tank, Both the tank and the fittings must be labeled "RAINWATER, NOT SUITABLE FOR DRINKNG".

Additional information on health and safety with regards to rainwater tanks can be found on NSW Health Department's "Guidance on the Use of Rainwater Tanks". Please contact the NSW Health Department or visit www.health.nsw.gov.au for further information.

3.4.10. Maintenance

Maintenance of the rainwater tank and the associated stormwater system will be included on a Positive Covenant made in favour of the Council. Additional information on maintenance can be obtained from Sydney Water and NSW Health Department.

INFORMATION TO BE SUBMITTED WITH THE DESIGN

A preliminary storm water drainage plan is to be submitted with the Development Application demonstrating the feasibility of the proposed drainage system within the site and connection to Councils drainage system. This plan must be in accordance with Council's Policy for On-Site Stormwater Detention, Council's Guidelines for Stormwater Drainage Systems and this document. This plan is to show:

(i) Proposed method of stormwater/rainwater disposal including any easements required, and sufficient levels to demonstrate that the proposed system will drain.

(ii) Approximate location of the rainwater tanks

(iii) Any site constraints such as trees, services of structures that may affect the viability of the drainage or the rainwater reuse system.

(iv) A surface water drainage plan showing the proposed method of managing surface run off.

3.5. BASIX REQUIREMENTS

Due to the introduction of BASIX, many properties are required to install rainwater tanks as part of their development. As mentioned in section 3.2 of this document, the volume of these tanks can be used to offset the requirements of On-Site Detention as long as at a minimum these tanks are connected to the washing machine and toilets within the premises.

The installation of rainwater tanks as part of BASIX requirements **DOES NOT** negate the requirement for On-Site Detention.

4. PERMANENT POST-CONSTRUCTION STORMWATER QUALITY CONTROLS

The following development types (as required by the Development Control Plan) must meet the permanent post-construction stormwater quality controls:

- Any development involving three or more dwellings
- Any non-residential development (excluding development contained within the existing building envelope).

Controls:

a) All stormwater flows from regular rainfall events up to and including the 0.393 AEP (1:2 year ARI) shall be captured for treatment prior to discharge to the stormwater drainage system.

b) The captured stormwater shall be treated to the following standards*
i. Gross Pollutants 90%
ii. Total Suspended Solids 85%
iii. Total Phosphorus 60%
iv. Total Nitrogen 45%

Determination of water quality targets are to be achieved in line with Sydney Water guidelines or using a MUSIC (Model for Urban Stormwater Improvement Conceptualisation) model. If the MUSIC model is used, parameters are to be in line with the parameters in Sydney Catchment Authority's document 'Using MUSIC in Sydney's Drinking Water Catchment'.

c) Treatment shall occur as close as practicable to the source so as to maximise the effectiveness of the device(s).

d) In storm events greater than that of the design discharge or if the storage capacity of captured material is exceeded, the storage system must not allow any release of the previously captured material.

e) Where it is proposed to treat stormwater using one or more proprietary devices, technical specifications from the manufacturer shall be provided with the development application as evidence of the performance capabilities of the device.

f) The system must be designed to be able to bypass flows greater than the design discharge without blocking or overtopping.

g) The design should ensure that there is minimal risk of mosquito breeding within the system.

h) A suitably qualified and experienced engineer shall certify that the proposed management measure(s) to be used at the site (whether proprietary or otherwise) will achieve the standards for water quality required in this Policy. The certification shall be submitted with the development application.

i) The submission of the development application shall be accompanied by a maintenance schedule for the proposed water quality management measure(s) that specifies requirements including:
i. inspection frequency
ii. frequency of maintenance during normal rainfall (to be specified)
iii. frequency of maintenance when rainfall is above average

iv. dewatering and waste disposal procedures
v. access, training and equipment requirements, including occupational health and safety procedures
vi. performance monitoring methods, and
vii. emergency control procedures (in the event of component failure).

j) A restriction on the use of land and positive covenant must be executed and registered against the title of the lots containing water quality control systems to require maintenance of the system. The restriction on the use of land and positive covenant must be prepared prior to issue of the occupation certificate.

*Standards to be achieved are a percentage of the 'baseline annual pollutant load', which is defined as the expected post-development pollutant load that would be discharged from the site over the course of an average year if no stormwater reuse or treatment measures were applied.

5. LEGAL REQUIREMENTS

As with OSD, applicants will be required to place a Positive Covenant on the title of the land. The purpose of this covenant is to ensure that future owners are made aware of the existence of the rainwater re-use tank and associated reticulation system and water quality control system and maintain it in an operable condition, The covenant shall be prepared to the satisfaction Of Council's solicitors and all costs associated with preparation and registration of the covenant shall be met by the applicant. Wording of this covenant is seen below. A fee will be payable at the Council Cashiers for the checking, approval and execution of the Positive Covenant by Council and must accompany the Positive Covenant when lodged with Council.

5.1. COVENANT WORDING

On-Site Detention/Rainwater Re-use/*Water Quality Control System*

(i) In this Positive Covenant "detention/Rainwater Re-use system *or water quality control system*" shall mean the detention/rainwater re-use system or water quality control system approved by Mosman Municipal Council pursuant to Development Consent No. INSERT DA CONSENT NUMBER or any modification thereof approved by Mosman Municipal Council in writing.

(ii) The Registered Proprietors will at their own expense well and sufficiently maintain and keep in good and substantial repair and working order any detention/rainwater re-use system/water quality control system which exists from time to time on the land.

(iii) The Registered Proprietors shall not remove the detention/rainwater re-use system without the prior consent of Mosman Municipal Council.

(iv) The Registered Proprietors hereby agree to indemnify Mosman Municipal Council from and against all claims, demands, actions, suits, causes of action, sum or sums of money, compensation damages, costs and expenses which Mosman Municipal Council or any other person may suffer or incur as a result of any malfunction or non-operation of any such detention/rainwater re-use system/water quality control system arising from any failure of the Registered Proprietors to comply with the terms of this Covenant.

(v) The term “Registered Proprietors” shall include the Registered Proprietors of the land from time to time and all their heirs, executors, assigns and successors in title to the land and where there are two or more registered proprietors of the land the terms of this covenant shall bind all those registered proprietors jointly and severally.