

*Draft*

**Stormwater  
Drainage Management  
Development Control Plan**

---

Adopted: ??  
Effective: ??

**Draft Version 1.1  
Dated 14/12/2006**





# Contents

---

1	Introduction	1
1.1	The Name of this DCP .....	1
1.2	Background.....	1
1.3	Related DCPs.....	1
1.4	Objectives of this DCP .....	2
1.5	Land and development to which this DCP applies.....	2
1.6	Relationship to other documents .....	3
1.7	Savings and transitional provisions .....	3
1.8	Approval and commencement of the DCP.....	4
2	Making an application	5
2.1	Pre-DA comments .....	5
2.2	DA information .....	5
2.3	Information available from Council .....	5
2.4	Which DCP do I need?.....	6
3	What are Council's stormwater drainage requirements?	7
3.1	Requirements .....	7
3.2	Activities beyond the perimeter of your land .....	7
4	Water sensitive urban design	8
4.1	Introduction .....	8
4.2	Objectives .....	8
4.3	Elements of WSUD .....	9
4.4	Rainwater tanks.....	9
5	On-site stormwater detention	12
5.1	Introduction .....	12
5.2	Where is on-site detention required?.....	12
5.3	Connection to an existing OSD system.....	13
5.4	OSD requirements.....	13
5.5	Detailed design requirements .....	16
6	Connection to drainage system	19
6.1	Requirements .....	19
6.2	Range of possible drainage systems.....	19
6.3	Connection to Council system .....	22
6.4	Exemption from discharging directly into Council's below ground drainage system .....	25
6.5	Extending council's stormwater drainage system .....	25
6.6	Subsoil drainage.....	27

---

7	Easements	28
7.1	Background .....	28
7.2	Type of easements .....	29
7.3	Acquisition of a private drainage easement .....	30
7.4	Registration of an easement(s) - General process .....	32

---

8	Structures over or near drainage lines and easements	33
8.1	General.....	33
8.2	New structure in zone of influence of Council drainage .....	34

---

9	References	37
---	------------	----

## List of Appendices

- Appendix A:** Glossary of terms  
**Appendix B:** List of categories of suitable practitioners  
**Appendix C:** Design rainfall intensities  
**Appendix D:** Details regarding positive covenants  
**Appendix E:** Checklists  
**Appendix F:** Urban coefficient of runoff  $C_{10}$   
**Appendix G:** Schedules of maintenance of rainwater tanks

*draft*

## 1 Introduction

### 1.1 The Name of this DCP

This development control plan (DCP) is known as the “**Stormwater Drainage Management Development Control Plan**”.

### 1.2 Background

The Stormwater Drainage Management DCP is one of a series of four development control plans that have been introduced to control all aspects of stormwater management within the Woollahra Local Government Area. The need for these plans has arisen due to the increasing demands on an aging system that was designed in an era where little was understood about stormwater management and there was less intensive urban development.

This DCP outlines the general stormwater issues that need to be addressed with regard to development applications (DAs).

A glossary of technical terms used in this DCP is provided in Appendix A.

### 1.3 Related DCPs

The four DCPs are:

1. **Stormwater Drainage Management DCP** – provides detailed control measures regarding stormwater drainage issues such as stormwater discharge from a site, on-site stormwater detention, easements and connection to a downstream stormwater drainage system.
2. **Flood Risk Management DCP**– provides detailed control measures regarding development of land subject to inundation from intense rainfall or from high water levels in Sydney Harbour.
3. **Stormwater Quality Management DCP** – provides detailed control measures regarding stormwater quality.
4. **Geotechnical and Hydrogeological Management DCP** – provides detailed control measures regarding proposed works below the level of the existing ground.

## 1.4 Objectives of this DCP

The objectives of this DCP are:

- to ensure that stormwater management is consistent with the principles of ecological sustainable development,
- to promote water conservation,
- to provide designers, developers, builders and the general public with a guide to Council requirements for the disposal of stormwater,
- to control the release of stormwater from private properties so as to avoid damage to private or Council property and prevent danger and nuisance to the general public,
- to ensure that stormwater management is appropriate to the site and its surroundings and that it is integrated into the overall design of the development,
- to reduce the impact of urban flooding on individual properties,
- to control stormwater pollution and improve water quality in streams, water bodies and groundwater,
- to manage and conserve the natural and built stormwater systems,
- to maintain and enhance the urban environment,
- to ensure a high standard of amenity and safety,
- to ensure that applications to Council are of a high standard, and
- to ensure that development meets all environmental and planning requirements of Council.

## 1.5 Land and development to which this DCP applies

This DCP applies to all land within Woollahra LGA. Development applications involving the following activities will require assessment of stormwater management:

- erect a new building, habitable room or structure, including such things as out-buildings, boat sheds, detention systems, tennis courts, swimming pools and retaining walls,
- add to or alter an existing building (including fences),
- change the use of an existing building or parcel of land required physical work to another use,
- subdivide land or strata subdivide a building,
- carry out earthworks, excavation or filling.

Some development in the above categories may be carried out under the Council's exempt and complying development provisions. Certain development must satisfy stormwater management criteria, in addition to other criteria, to qualify as either exempt or complying development. Exempt development may be carried out without development consent. An application for a complying development certificate may be lodged with the Council or an accredited certifier.

## **1.6 Relationship to other documents**

### **1.6.1 The Act and the Regulation**

This DCP has been prepared under section 72 of the Environmental Planning and Assessment Act 1979 and the Environmental Planning and Assessment Regulation 2000.

### **1.6.2 State policies and regional plans**

State environmental planning policies and regional environmental plans may apply to the land to which the DCP applies. Where this occurs, the statutory provisions of those policies and plans prevail over this DCP.

Note:

The provisions of this DCP that compete with *State Environmental Planning Policy (building Sustainability Index: BASIX) 2004* and consequently with BASIX commitments set out in a BASIX certificate have no effect. Refer to clause 5.4 for further information.

### **1.6.3 Woollahra LEP 1995**

Woollahra Local Environmental Plan 1995 applies to the land to which this DCP applies. Woollahra LEP 1995 is a statutory instrument that sets out the land use zones and broad development controls for development within the Woollahra Municipality. It also contains objectives for matters dealt with in this DCP such as stormwater management and environmental sensitive development.

This DCP supplements the provisions of Woollahra LEP 1995. The provisions of Woollahra LEP 1995 prevail over this DCP.

### **1.6.4 Other Woollahra DCPs, policies and codes.**

In the event of any inconsistency between this DCP and other development control plans, policies and codes, this DCP prevails unless otherwise specified in this plan or in other plans, policies and codes.

Except as provided in clause 1.7, this DCP repeals the Private Stormwater Code 1990.

## **1.7 Savings and transitional provisions**

The following savings and transitional provisions apply as if clause 1.6.4 did not operate.

The Private Stormwater Code 1990 continues to apply to a development application, an application under section 96 of the Environmental Planning and Assessment Act 1979 to modify development consent or an application under section 82A of the

Environmental Planning Assessment Act 1979 to review a determination of a development application that has been made prior to but not determined on the date of commencement of this DCP.

### **1.8 Approval and commencement of the DCP**

This DCP was approved by Woollahra Municipal Council on .....and commenced on .....

*draft*

## **2 Making an application**

### **2.1 Pre-DA comments**

You may use Council's pre-DA consultation service (for which a fee is charged) to discuss your development proposal with Council staff, including assessment officers, senior planners, landscape development officers, development engineers, heritage officers and health officers. The service provides useful comments on a proposal and identifies issues at an early stage. Minutes of the meeting are provided as part of the service. Refer to the pre-DA consultation service application for information that must be provided by applicants.

### **2.2 DA information**

Material that must be provided with a DA is set out in the Council's DA Guide. DA and advertising fees can be confirmed with Council prior to lodgement.

### **2.3 Information available from Council**

Council will make available information on its drainage system where it is available, on the express understanding that Council is not liable for the accuracy of the information or the consequences of it being used. The developer and/or design consultants must confirm by inspection and/or survey any information affecting designs. This includes confirmation of pit locations, pipe locations and size, and utility authority service locations.

Results from drainage studies carried out for Council, which have been reported to the Council may also be made available. Information provided to Council by other parties may be released at the discretion of Council, subject to copyright and privacy restrictions.

## 2.4 Which DCP do I need?

Stormwater Issues	Development Control Plan
<ul style="list-style-type: none"> <li>▪ Council requirements for the disposal of stormwater from a private property.</li> <li>▪ Connection to Council stormwater system.</li> <li>▪ Use of gravity and mechanical stormwater systems.</li> <li>▪ Use of infiltration systems (rubble pits or soak-away),</li> <li>▪ On-site stormwater detention (OSD).</li> <li>▪ Water Sensitive Urban Design.</li> <li>▪ Rainwater tanks.</li> <li>▪ Stormwater easements.</li> <li>▪ Compulsory acquisition of easements for stormwater under Section 88K of the Conveyancing Act 1919.</li> <li>▪ Existing and proposed structure over or near stormwater lines or easements.</li> </ul>	Stormwater Drainage Management
<ul style="list-style-type: none"> <li>▪ Council requirements to development on a flood prone land.</li> <li>▪ Council's Flood Planning Levels.</li> <li>▪ Preparation of flood or overland flow study.</li> </ul>	Flood Risk Management
<ul style="list-style-type: none"> <li>▪ Soil erosion and sediment control measures.</li> <li>▪ Council stormwater discharge quality requirements (during the construction period and long term).</li> </ul>	Stormwater Quality Management
<ul style="list-style-type: none"> <li>▪ Geotechnical or hydrogeological impacts on surrounding property and infrastructure as a consequence of carrying out a development.</li> <li>▪ Council's Geotechnical and hydrogeological requirements.</li> <li>▪ Preparation of geotechnical or hydrogeological studies.</li> </ul>	Geotechnical and Hydrogeological Management

### **3 What are Council's stormwater drainage requirements?**

#### **3.1 Requirements**

- The proposed development must not cause any adverse drainage impact on the proposed development, surrounding development, Council infrastructure or elsewhere in the catchment.
- Design rainfall data provided in Appendix C must be used for stormwater analysis.
- Proposed development must have a stormwater system that complies with this DCP.

#### **3.2 Activities beyond the perimeter of your land**

##### **3.2.1 Road opening permit application**

*This applies to minor stormwater works carried out in Council's roadway and typically includes stormwater connections to the kerb and gutter or in-ground drainage system.*

Where works, including stormwater works, are within a public roadway (this includes the footpath and nature strip areas), a road opening permit form Council must be obtained before commencing works.

##### **3.2.2 Roads Act 1993 – section 138 application**

*This applies to stormwater works carried out in public roads. Examples would include the extension of the public stormwater system to a site, upgrade, amplification or additions to the public stormwater system and the installation of stormwater quality devices into the public stormwater system.*

Where stormwater works are proposed within Council's roadway, approval from Council under section 138 of the Roads Act 1993 is required.

**The approval of works in the road can only be issued by Council.** The nominated principal certifying authority (PCA) for development consent other than the Council has no power to approve works under section 138 of the Roads Act 1993.

## 4 Water sensitive urban design

### 4.1 Introduction

One of the elements of WSUD is the use of captured rainwater for watering gardens, washing vehicles and flushing toilets. Rainwater tanks provide a practical method for storing water for these purposes.

#### *BASIX-related applications*

Use of rainwater tanks is consistent with the NSW State Government's objectives for reducing the amount of potable water (tap water). In July 2004 the Government introduced new planning legislation to establish water consumption and greenhouse gas emission reduction targets, and thermal performance requirements for certain types of housing in NSW. This legislation places mandatory requirements on nominated housing types. A web-based planning design tool, known as BASIX (the Building Sustainability Index), forms part of the Government's implementation package. Where a proposal involves one of the nominated housing types, applicants must obtain a BASIX certificate from the Department of Infrastructure Planning and Natural Resources by using the web-based tool. Provision of a rainwater tank can form part of a BASIX commitment listed within the BASIX certificate.

Because BASIX is being introduced in stages, you should examine the State Government's BASIX website to determine the current application of BASIX to particular development types. Requirements for a rainwater tank for certain types of development can then be determined. When BASIX applies to a development, the rainwater tank provisions of this DCP will be overridden unless the BASIX certificate makes specific reference to the tank meeting and being installed in the manner required by an applicable regulatory authority, such as the Council. If this occurs those requirements for tank location and construction, and for tank connection and water re-use applications set out in clause 5.4.1 of this DCP, which are not covered by the BASIX commitment list, will apply to rainwater tanks.

Note: The BASIX website may be access at [www.basix.nsw.gov.au](http://www.basix.nsw.gov.au). This note may be amended from time to time if the website details change.

### 4.2 Objectives

The objectives of the WSUD are:

- Maintain and restore natural water balance,
- Make more efficient use of water resources (conserve water),
- Reduce flood risk in urban areas,
- Reduce erosion of waterways, slopes and banks,
- Reduce the cost of providing and maintaining water infrastructure,
- Control stormwater pollution and improve water quality in stream and groundwater, and

- Integrate stormwater management with water supply and wastewater treatment.

### 4.3 Elements of WSUD

There are many elements to WSUD. Some of these elements such as re-use and recycling of wastewater, and protection of natural water systems and riparian corridors can only be addressed at a Council or State level. However, there are many elements that can be addressed by individual landowners. These are:

- Use of captured rainwater for watering gardens, washing vehicles or re-use within a building for flushing of toilets,
- Promote groundwater recharge through the reduction in the percentage of impervious external surfaces,
- Negate the effects of increased peak flows from a property as a result of an increase in urban density. This is addressed through the use of on-site stormwater Detention,
- Protect stormwater quality. This is achieved by using appropriate erosion and sediment control measures as well as minimise the usage of fertiliser for gardening
- Minimise water use. This is generally achieved for residential use by installing water saving shower heads, taps, toilets, dishwashers and clothes washing machines,
- Re-use of domestic grey water (eg: water discharged from cloth washing machines). Domestic grey water could be stored and used for gardening purposes.

### 4.4 Rainwater tanks

One of the elements of WSUD is use of rainwater tanks for watering gardens, washing vehicles and flushing of toilets. This also would assist for achieving the requirements under **Building Sustainability Index or BASIX** that is a mandatory component of the DA approval process introduced by the NSW Government. Under the BASIX, NSW Government established targets to reduce potable water (tap water) use by 40% and energy use by 25% for all new residential developments.

To save potable water developments may incorporate the installation of a rainwater tank for non-potable water re-uses. Where a rainwater tank is proposed to achieve BASIX targets the rainwater tank must meet the provisions set out in clause 4.4.1.

#### 4.4.1 Controls for rainwater tank

##### *General*

- Rainwater tanks must be installed in manner that will yield benefits to both the owner and/or occupant of the development and the wider community in both an environmental and an economic manner. Rainwater tanks should help promote natural water balance by helping maintain a balance between collection, infiltration and runoff of stormwater.
- Rainwater tank size should reflect its intended use(s), number of occupants, size of catchment area and expected precipitation rates and frequencies. The installations of the tank must be in the most practical manner possible with regards to plumbing requirements and connections, access for installation and maintenance and visual amenity.

### ***Tank location and construction***

- Tank stands must not be greater than 450mm above existing ground level.
- The maximum height of the tank must not be greater than 1.8 m above existing ground level.
- Tanks must be at least 1.5 m from any property boundary.
- Tanks must be sited beside or behind main buildings and should not be visible from the street.
- Tanks must not be sited on any wall footing or retaining wall.
- Tanks and tank stands must be installed in accordance with manufacturer specification.
- The colour of the tank and stand must match the existing/proposed building colour.
- Tanks must not be installed above or immediately adjacent to house services such as water, sewerage, gas, telephone or electricity.
- Tanks must be installed in a manner which maintain visual amenity from both the street and from neighbouring properties.
- Exceptions to any of these requirements may be sought from council where the site lends itself to rainwater collection, other drainage sub-components are not suited to the site or under other exceptional circumstances.

### ***Tank connection and water re-use applications***

- Tanks should only collect roof water (unless special consideration is sought from Council).
- Tanks must be fitted with a first flush device to divert the first 1mm of rainfall from the entire catchment area.
- All plumbing must be completed by a licensed plumber in compliance with Australian and New Zealand Standard AS/NZS3500.3 Plumbing and Drainage, any other relevant national standards and Sydney Water Requirements.
- Tanks must be fully sealed and fitted with a filter or screen to prevent debris from entering the tank and mosquitoes from breeding in the tank.
- Tanks must be designed such that they can be regularly desludged.
- Tanks may be connected to the internal use such as toilet flushing and washing machines and must be connected to all external use (excluding drinking water).
- Both the tank and any fittings connected to it must be labelled '**RAINWATER, NOT SUITABLE FOR DRINKING**'.
- Pumps must not be audible to neighbouring properties between 8:00pm and 7:00am Monday to Saturday and 8:00pm to 8:00am on Sundays (submersible pumps are recommended).
- Tanks may be connected to mains water to allow top-up during dry periods but top-up should not take place until the tank is 80% empty and should not be at a rate greater than 2L/minute (contact Sydney Water for details of valve requirements).

- A visible air gap must be maintained between the maximum height of water in the tank and the top-up outlet.
- Overflow from the tank should be directed to part of the drainage network, preferably to a landscaping measure or on-site stormwater detention facility.
- Tanks should not be directly connected to any part of the main water supply.

***Contribution of rainwater tanks to OSD requirements***

Rainwater tanks are not considered to contribute to on-site detention requirements. However, some reductions of OSD volume are allowed. Refer section 4 for details. Designs integrating rainwater tanks with on-site detention storage would be acceptable.

***Drinking tank water***

Since Woollahra is located in an area that includes heavy traffic, the use of tank water for drinking is not recommended. This is in accordance with the guidelines recommended by the NSW Health Department.

***Tank maintenance***

A schedule of maintenance should be created in accordance with *Appendix G: Schedules of maintenance of Rainwater Tanks*. The ongoing performance of the tank should be ensured through the application of the schedule of maintenance

## 5 On-site stormwater detention

### 5.1 Introduction

Recent developments within the Woollahra Municipality have resulted in a greater percentage of impervious cover of sites, with resultant increases in runoff and reductions in the time of concentration. This has increased demands on an aged drainage infrastructure, designed largely to old standards and intended for much less intense catchment development.

Council's on-site detention (OSD) requirements have been formulated to mitigate further increases in discharges from the development site or elsewhere in the catchment for all rainfall events up to and including the 1 in 100 ARI (average recurrent interval) event.

Council has carried out a preliminary catchment based OSD analysis. This analysis was undertaken to determine the capacity of the existing drainage network and thereby determine a range of interim permissible site discharges (PSDs) and site storage requirements (SSRs) throughout the Municipality. These parameters are only interim and are derived from the best information available to Council. Ultimately, when the large and complex process of full catchment modelling is complete, these parameters may be updated. Sydney-wide experience, to date, would indicate only minor variances to the PSDs and SSRs derived from a preliminary catchment analysis and a full catchment analysis.

The preliminary catchment based OSD analysis is not site-specific and therefore the pre-development and post-development extent of impervious cover on any individual site is not a factor in this analysis. Rather, the capacity of the existing drainage infrastructure and its ability to receive discharges from a site are of higher consideration. **Where OSD is required, this is to be provided to treat the whole site and not just the particular area of the site under consideration.**

The objective of OSD is to limit the increases in site discharges resulting from a development. This is done using suitably designed on-site storage structures. Water in these structures is slowly released during and after the rain at a rate that the existing drainage infrastructure can handle.

### 5.2 Where is on-site detention required?

On-site detention will be required except in the following circumstances:

- The additional gross impervious area is **less than or equal to 40 m<sup>2</sup>** (eg: alterations or additions).
- The total site area is less than 500 m<sup>2</sup>.
- The proposed site is located within the Council's OSD exemption area. The OSD exemption area map can be viewed at Council's Customer Service counter. This map can also be viewed from Council's web site.
- Where a mainstream flood study has been carried out and the results show that the site is subject to inundation in events up to and including the 1 in 5 year ARI storm event. If part of the development site is subject to inundation in events up to and

including the 1 in 5 year ARI event, OSD will not be required to that part of the property where inundation occurs.

### 5.3 Connection to an existing OSD system

Where it is proposed to connect the new works to an existing OSD system, an inspection report will be required to confirm the condition of the existing storage area, discharge control mechanisms, screens and appropriate re-configuring for continued usage on the site. Details and calculations supporting this must be provided with the DA.

### 5.4 OSD requirements

#### 5.4.1 General

- All OSD systems must drain by gravity to Council's drainage system. Exceptions to the gravity system will only be considered where the proposed development is an alteration or addition to an existing dwelling house and an exemption from gravity drainage has been granted by the Council.
- OSD systems require full hydraulic design in accordance with the details in this DCP.
- OSD storage must, generally, be located as close as possible to the lowest point of the site and be designed to collect all piped and surface stormwater runoff from all impervious areas of the site. The location and design of the OSD storage must not have a detrimental impact on upstream or adjacent properties.
- Where overland flow paths traverse the site, the flows generated from off-site must bypass the OSD system. (*This is to prevent flows, external to the site, entering the OSD storage, filling it more frequently with increased surcharging and nuisance to occupiers of the site*).
- OSD storage must be located outside the 1 in 100 ARI floodplain and not be located in drainage easements and/or overland flowpath that convey catchment flows through the site.
- Where all impervious areas of the site cannot be drained through the OSD storage, additional storage (attenuation) will be required.
- Where the development requires changes to the land titling to accommodate more than one residential dwelling or commercial premise the following apply:
  - Torrens title:** Separate on-site detention storage is to be provided for each dwelling.
  - Strata title or community title subdivision:** Storage must generally be located in common areas.
- The OSD structure must not be established across property boundaries.

- An overland flow path, to convey water to the street in the event of a blockage or failure of the OSD outlet must be clearly identified in the design.
- Discharge limiters from OSD systems must be by the use of an appropriately sized short length of reduced diameter pipe or a non-removable orifice plate.

#### 5.4.2 Above ground storage - additional design requirements

The following design items need to be considered where appropriate:

- The system is to be visually unobtrusive and sympathetic with the development. It must not cause hazard or inconvenience to pedestrian or vehicle access. Integration with the surrounding structures, hardstand and landscaped areas is required.
- The system is to provide for ease of inspection and regular minimum maintenance and be as tamper proof as possible.
- Building floor levels must be above the highest appropriate flood planning level (refer Flood Risk Management DCP). This requirement applies to both new and existing buildings.
- Minimum 20% of the OSD storage requirement must be incorporated as below ground storage or in areas not frequently used in order to minimise nuisance flooding.
- Pedestrian access paths must be maintained above the 1 in 100 ARI operating level for any non-enclosed storage. In the interests of safety and amenity, ponded water depths are not to exceed:

Storage type	Maximum depth of ponding
Parking/driveway areas	200 mm
Courtyards/grassed and landscaped areas	300 mm
Covered/fenced storage	No Limit

- Storage in landscaping areas will require an extra 20% volume to compensate for vegetation growth and construction variation (design of the hydraulic controls must be based on the normal volume).
- If the above ground storage occurs in a regularly trafficked area (ie. car park), a weather resistant sign must be placed in a visible and prominent location warning residents that periodic inundation of the area may occur during heavy rain.
- The desirable minimum slope for above ground storage must be 1.0% for hardstand areas and 1.5% for landscaped areas.
- Landscape design in the area of the surface storage must avoid the use of materials susceptible to creating blockages. This would include floatable landscaping materials (such as bark) and vegetation that drop significant amounts of debris. Adequate subsoil drainage must be provided in the aboveground storage to retain the amenity of the area after a rainfall event.
- **A depression within the OSD system is not to be used** to provide a silt/sediment trap. Where required a proprietary silt/oil arrester must be provided.

### 5.4.3 Below ground or enclosed storage - additional design requirements

The following design items need to be considered where appropriate:

- The system is to be visually unobtrusive and sympathetic with the development. Integration with the surrounding structures, hardstand and landscaped areas is required.
- The system is to provide for ease of inspection and regular minimum maintenance and be as tamper proof as possible. Access for cleaning (typically flushing) must be provided at the upstream and downstream ends of the storage. Generally, grated access points must be provided to allow for surcharging. Where the access points need to be sealed, alternative means must be provided.
- Building floor levels must be set above the top water level of the OSD storage plus freeboard where the OSD storage is located near buildings (refer Flood Risk Management DCP). This requirement applies to both new and existing buildings.
- The structural design of the OSD storage must be certified by a suitably qualified structural engineer including the following design issues:
  1. Internal supporting walls must be minimised to ease maintenance. Typically, internal supports must only be considered for spans greater than 3 m.
  2. Storage needs to be checked for normal earth, surcharge, traffic and hydrostatic loads. Where free draining soils do not exist around the tank, buoyancy must be considered.
  3. Excavation for the storage must be checked for impact on the zone of influence of adjacent footings and structures.
- The storage must have a minimum access opening size of 600 mm x 600 mm for tank depths less than 800 mm and a 900 mm x 900 mm opening size for deeper tanks. The access point must be fitted with a hinged, lockable galvanised grate over the outlet. Step irons must be placed at the access point to enable entry for maintenance and inspection. The designer must consider the provisions of AS 2865-1986 'Safe Working in a Confined Space' and other Work Cover requirements.
- A minimum slope of 1.0% must be provided to the floor of the storage.

### 5.4.4 Rainwater use

Council encourages the re-use of stormwater through the use of rainwater tanks. The rainwater tank can be constructed to form part of the OSD. Where a rainwater tank is proposed, the SSR for the site may be reduced as in the following table.

Use of rainwater tank	Reduction of SSR
Stormwater tank is for outdoor use such as gardening only.	Minimum of 40% of the rainwater tank volume OR 4 m <sup>3</sup>
Stormwater tank is connected to household internal use such as toilet flushing.	Minimum of 75% of the rainwater tank volume OR 7.5 m <sup>3</sup>

#### 5.4.5 Ongoing maintenance requirement

Council will maintain a register of on-site detention systems. A Positive and restrictive covenant for the OSD system will be required. Details regarding Positive Covenant are provided in Appendix D. The OSD system must not be altered from the approved design without Council consent. It must be maintained and fully operational at all times.

It is recommended that a suitably qualified engineer or other suitable practitioner carry out an annual inspection. Council officers are empowered to inspect the OSD system at any time and random inspections will be carried out. Non-compliance with the requirement of the positive and restrictive covenant can result in fines to the property owner.

### 5.5 Detailed design requirements

#### 5.5.1 Simplified design approach

A simplified design approach has been prepared utilising preliminary PSD and SSR values. This simplified design approach will provide benefits to developers by reducing the cost of detailed engineering calculations, remove ambiguity in design approaches and assumptions, provide a simple geometric approach and allow Council to easily review designs with the intent of reducing DA assessment times.

**All OSD designs within the Municipality must be prepared using this simplified design method.**

#### 5.5.2 PSD and SSR requirements

The OSD storage must be designed in accordance with the storage/discharge relationships appropriate to the development type as shown in the table below.

The values in the table are given per 1000 m<sup>2</sup> of the total site area. All runoff from impervious areas must drain through the OSD system.

<b>On-Site Detention Requirements For a 1000 m<sup>2</sup> of the total site area</b>			
<b>Development Type</b>	<b>PSD (l/s)</b>	<b>Min SSR (m<sup>3</sup>)</b>	<b>ARI (Year)</b>
Residential	24	4	1 in 2
	34	25	1 in 100
Non- residential	24	5	1 in 2
	34	29	1 in 100

Where possible, the drainage system should be designed to direct runoff from the entire site to the OSD system. Sometimes, because of ground levels, the receiving drainage system or other circumstances this will not be feasible. In these cases up to 20% of the

site area will be allowed not to drain to the OSD facilities, provided that as much of the runoff as possible from pervious areas is drained to the OSD system.

To compensate for the non-contributing area, the storage volume (SSR) is increased by half the percentage of the area not draining to storage. The PSD is adjusted downward proportionally by the twice the percentage of the area not draining to storage, eg: for a site where 10% of the area does not drain to the storage, the SSR will be increased by 5% and the PSD will be reduced by 20%.

#### Adjusted PSD and SSR for % of Area Bypassing the OSD

% of Area Bypassing OSD	% Reduction in PSD	% Increase in SSR
0	0	0
5	10	2.5
10	20	5
15	30	7.5
20	40	10

This simplified design approach assumes a high early discharge principle and this must be documented by the applicant.

#### 5.5.3 For larger development sites where the site area is more than 1200 m<sup>2</sup> (Example: development or redevelopment of part of a school land) Council may consider, if warranted, other methods of calculations for calculating PSD and SSR. Discharge control pit for high early discharge

*This pit provides the main control point for discharges from the site. The pit may or may not be incorporated directly with the OSD tank/storage area. The discharge control pit ensures the discharge to Council's drainage system is in accordance with the required PSD.*

Discharge control pits must be fitted with screens that can be easily removed for routine maintenance. The screen must:

- a) protect the outlet from blockage;
- b) dissipate the kinetic energy of inflows creating static conditions around the discharge restriction, which help to achieve predictable discharge coefficients; and
- c) retain litter and debris, which would degrade downstream waterways.

#### Screen type

A small aperture-expanded steel mesh is recommended for outlets of 150 mm or less in diameter. For outlets larger than 150 mm, the screen area necessary for a fine mesh screen can make it difficult to fit in a small aperture mesh. A grid mesh may be used for these larger outlets. Where the larger grid mesh is used, a fine mesh screen must be provided upstream to collect debris.

*Screen area*

The minimum area (including blocked area) for an internal screen is:

- 50 times the orifice area where a fine mesh is used,
- 20 times the orifice area where a grid mesh is used.

*Screen orientation*

The inlet pipe to the discharge control unit must direct inflows parallel to the screen. To assist in shedding debris, the screen must be positioned as close as possible to vertical and in any case is to be placed no less than 45 degrees to the horizontal.

Pits must be a minimum of 0.6 m by 0.6 m. Step irons are required for pits over 1.2 m deep.

*draft*

## 6 Connection to drainage system

### 6.1 Requirements

The following are Council's requirements:

- All stormwater drainage connection to Council's drainage system must be by gravity means except in the circumstances set out in clause 6.2.4. Non-mechanical pressurised (charged/siphon) systems will be considered in the circumstances set out in clause 6.2.4.
- Pumps for disposal of stormwater runoff will not be permitted except in the circumstances set out in clause 6.2.4.
- **Subsoil and basement drainage systems**, where separate from the stormwater drainage, may be exempted from the requirement for gravity drainage.
- Infiltration systems are not acceptable and will not be approved.
- The continued usage of stormwater infiltration (rubble pits) and surface discharge systems will not be approved.
- **Stormwater discharge to the sewer is not acceptable.** The applicant is to confirm that no stormwater drainage (even if this relates to a drainage system that is not part of the present application) on the property discharges to the sewer.
- The applicant is responsible for investigating and confirming the presence and suitability of Council's drainage system for connection.
- The possibility of failure of components (blockage, structural damage) of the stormwater drainage system must be considered and provision made for the safe conveyance of flows should failure occur.
- All stormwater from within the site and entering from upstream must be transferred through the site and discharged to a Council approved drainage system.
- Private drainage must be installed in accordance Australian and New Zealand Standard AS/NZS3500.3 Plumbing and Drainage, other relevant codes and the manufacturer's specification.

### 6.2 Range of possible drainage systems

#### 6.2.1 Connection to existing private drainage system

##### *Inspection and certification*

The applicant must supply an inspection report for the entire site drainage prepared by a suitably qualified practitioner (Appendix B). This inspection report must confirm the point and method of discharge (by way of sketch or plan) for the existing stormwater drainage system, the satisfactory structural condition of the existing system, the satisfactory capacity for continued usage and that no deleterious effect on adjacent or downstream properties will occur as a result of the continued use of this existing system.

Where it is proposed to connect the new works to an existing OSD system, an inspection report will be required. This report will confirm the condition of the storage

area, discharge control mechanisms and screens, and appropriate volume for continued usage on the site as required by this DCP.

#### *Private Drainage Easements*

Existing private stormwater drainage systems that discharge to an approved Council drainage point, after passing over other private properties, will be required to provide evidence of the existence of a private drainage easement. Alternatively evidence of the procurement of a private drainage easement over any intervening properties must be provided (refer Section 7).

### **6.2.2 Discharge to Sydney Harbour**

This generally only applies to developments adjacent to Sydney Harbour.

The applicant must obtain written approval from the Waterways Authority to discharge stormwater from the subject property directly into Sydney Harbour. The stormwater system must be designed in accordance with this DCP and any requirements of the Waterways Authority.

### **6.2.3 Gravity drainage systems**

This is the preferred means of disposal. Other than the exceptions listed in clause 6.2.4, where rainwater tanks are proposed, stormwater run-off must be collected and discharged from the site using an appropriately designed gravity system. The collection pit and conveyance (pipe) system for all development types must be designed to a minimum 1 in 20 ARI standard.

The collection and conveyance system in combination with the overland flow system must be designed for all storms up to and including the 1 in 100 ARI event. **The acquisition of an easement** over any intervening downstream properties (at the developer's cost) **will be required.**

### **6.2.4 Non-gravity drainage systems (for dwelling houses only)**

**Charged or siphonic system:** The use of a non-mechanical pressurised (charged/siphonic) system can be considered for dwelling houses where the roof drainage is located above the adjacent roadway and easements cannot be obtained for a standard gravity system. **Non-mechanical pressurised systems will not be approved.**

Pressurised pipe work must be designed and installed in accordance with the requirements of AS/NZS 3500.1, other relevant codes and the manufacturer's specifications.

Suitable backwater protection must be provided where the private drainage system discharges to Council's drainage system.

Where the hydraulic head available above the discharge point exceeds 6m, a stilling pit must be provided within the property, to reduce the potential erosion or other problems associated with a high-energy discharge.

**Pump and sump :** A Pump and sump arrangement for stormwater disposal will only be considered for approval where the proposed development is an alteration and

addition up to 40 m<sup>2</sup> plan area of roof to an existing dwelling- house and exemption from gravity drainage has been granted by the Council. The collection system for the pump and sump arrangement must be designed in accordance with the design criteria for gravity drainage and must incorporate adequate buffer storage as recommended by the pump manufacturer.

The pump out system must be designed by a suitable practitioner. As a minimum, the pump out system must consist of a duty and standby pump.

Discharge rate from the site should not exceed the required PSD. Full hydraulic design is required to determine the necessary storage requirements for a range of events up to and including the 1 in 100 ARI.

It may be acceptable for the duty and standby pumps to function dually for storms in excess of the 1 in 100 ARI event or in the event of a blockage.

The pump rising main must be installed in accordance with AS3500 National Plumbing and Drainage Code, other relevant codes for pressure pipe systems and the manufacturer's specification. Discharge from the system must pass through a stilling pit located within the site boundary prior to discharging to Council's below ground drainage system. In some instances, connection to Council's kerb and gutter may be allowed, and a stilling pit will need to be provided within the site boundary prior to discharging to Council's kerb and gutter. If it is proposed to discharge to Council's kerb and gutter the operation of pump must be designed such that the pump must not operate all time. This is to reduce running of water along the gutter all the time. This means that sufficient sump storage must be provided so that the pump would only operate when the water level in the sump reaches a pre-determined level.

Discharge from the site to Council's below ground drainage system must be protected by a non-return valve or flap located within the property.

The sump and associated storage must be located in an accessible and easily maintainable location. In the event of the failure of both the duty and standby pumps, an overland flow path and/or surcharge and pondage in a suitably visible area must be provided.

In circumstances where no overland path exists, pondage in a suitable area may be approved. The areas used for emergency storage must be sited with a view to minimising the cost of damage to occupiers of the property. A weather resistant sign must be placed in the emergency storage area warning residents that inundation of the area may occur in the event of a pump failure. An audible alarm may be installed to alarm the occupiers. The alarm should be set to activate when water level in the storage area reaches a pre-determined level.

Pump units selected should be suitable for stormwater containing silt and grit as a minimum with appropriate screening for large solids. Screening details must be provided. All electrical fittings and supply must be located to have at least 300 mm freeboard above the maximum water level and/or any overland flow paths.

Where a pump out system includes a significant portion of above ground storage, a means by which the pump rating can be locked to prevent adjustment of the site discharge will be required.

**Pump and sump for subsoil drainage and below ground car parks:** Pump and sump arrangements for the disposal of subsoil drainage or drainage collected from below ground car parks may be allowed for all development types. Pumped out discharge should be connected to Council's underground drainage system and connection to Council's kerb and gutter may be approved on a merit basis.

The designer must ensure that the continual pump out of sub-surface water to the kerb and gutter does not occur during normal operations (dry-weather periods). Either sufficient buffer storage or a pump timer must be designed into the system to ensure that dry weather period subsoil discharges occur at night and infrequently. A geotechnical or hydrogeological practitioner must provide an estimate of the expected sub-surface flow rate, for the development for use in the design.

**Ongoing maintenance of pump and sump:** Council will maintain a register of pump and sump systems. A Positive Covenant for these systems will be required. Council requires the pump and sump system and associated works to be unaltered from the approved design, maintained and fully operational at all times. Therefore property owners will be required to submit an annual inspection report prepared by a suitably qualified practitioner for this purpose.

Council officers are empowered to inspect the pump and sump system at any time and random inspections will be carried out. Non compliance with the requirement of the Positive and Restrictive Covenant can result in fines to the property owner.

### 6.3 Connection to Council system

Site drainage must connect to Council's above ground or below ground drainage system (pipes, pits, culverts, open channel, kerb and gutter) at the nearest suitable location. Discharge to a Council drainage system must only be by gravity means except in the circumstance set out in clause 6.2.4. A stilling pit must be provided within the development property prior to discharge to Council's system whenever the static head from a gravity system exceeds 6 m.

#### 6.3.1 General

The majority of drainage systems will fall into this category. For most developments, connection details will be provided as part of the Soil and Water Management Plan, however, where more major off-site works (ie. extension of Council's drainage network to site) are proposed, additional engineering stormwater plans and long-sections will be required. All works must comply with Council's "Specification for Road Works, Drainage and Miscellaneous Works".

Where an approved connection to Council's drainage system requires the provision of stormwater drainage across intervening properties, a private drainage easement must be acquired.

Immediately upon completion of the roof installation stormwater from any roof areas must be linked to a Council approved stormwater disposal system.

Where the property slopes towards the street, depending on the type of development stormwater discharge must be to Council's kerb and gutter or to underground drainage system. Discharge from single dwellings will be allowed to kerb and gutter.

Where the property slopes away from the street or site constraints prevent discharge to the kerb and gutter, alternative drainage measures must be considered in the following order.

**Alternative 1:**

Connection to Councils below ground drainage system may be possible where the system is in the vicinity of the site. This will require the construction of an access point such as a standard Council road pit at the point of connection, if one is not already available. Extension of Councils stormwater system to the site may be considered and full engineering plans and details need to be provided with the application.

**Alternative 2:**

For all new development the applicant will be required to obtain a private drainage easement from any intervening downstream property owners to enable a gravity solution to be provided. The applicant should seek legal advice to obtain a drainage easement (Refer Section 7).

**Alternative 3:**

If the proposed development is an alteration or addition to a dwelling house, Council may consider a charged or pump and sump system depending on the merit of the application. Council would consider the potential impacts on downstream properties, suitability of alternative solutions (charged or pumped system), site constraints and extent and nature of the proposed works. The applicant may only proceed to Alternative 3 if either:

- Council grants an exemption from the requirement to obtain an easement after completion of its merit-based assessment, and
- Written documentary evidence has been provided to Council of the negotiations carried out to obtain the easement and of the refusal to allow the easement.

**6.3.2 Connection to Council's Kerb and Gutter**

Connection to Council's kerb and gutter is only possible where a suitable site layout allows it (for example if their sufficient width to discharge a pipeline in between driveway laybacks). Connections into laneways or other areas without a formalised kerb may be possible and, generally, will require the construction of a new kerb and gutter or provision of a flow spreader.

The connection from the development site to Council's kerb and gutter must be in a direct route and be laid perpendicular to the line of the kerb and gutter. A maximum of two stormwater outlets per nominal 15m street frontage will be allowed.

Drainage conduits across footpath areas discharging to the kerb must be 125 mm x 75 mm galvanised box or sewer grade PVC pipes (maximum diameter 100mm, minimum diameter 65mm). A plastic kerb adaptor must be provided for 100/80mm PVC pipe to

increase concrete kerb cover. Where multiple PVC pipes/boxes are required across the footpath, the conduits must be separated by a minimum of 3m at the kerb.

Where the existing kerb is sandstone, the sandstone must be cored to provide the drainage discharge point thereby ensuring the integrity and visual amenity of the sandstone kerb. Where kerb has a special form (ie. bullnose, brick, sandstone) the kerb must be reinstated to match this form.

Construction will generally be required within Council's property (footpath, nature strip, and roadway). A Road Opening Permit must be obtained from Council for each new connection to the kerb and gutter.

### 6.3.3 Connection to Council's below ground drainage

For larger developments, other than dwelling houses and minor alterations and additions, the stormwater drainage discharge off the site is to be connected to Council's nearest below ground drainage system (Refer clause 6.4 for exemptions for variations to this requirement). Full design details are to be submitted to and approved by Council and the connection constructed by the developer at their full cost. The new drainage system is to be constructed to Council's specifications and requirements.

Where a direct stormwater connection into Council's below ground drainage system is required, construction of an appropriate access pit will be required where a larger diameter pipe (larger than 225-mm diameter) to be connected to Council's drainage.

This pit must consist of either a standard reinforced concrete Council gully pit or junction pit that Council considers appropriate for the site conditions. The substitution of precast products may be suitable with approval from Council.

Connection to existing Council pits must be carried out in a workmanlike manner with smooth transitions and rendering as appropriate. Where bolts or similar are required, stainless steel is to be used.

Direct connection to a Council's below ground drainage line using a tapping band, saddle or similar method may be accepted only for smaller diameter pipes (225-mm and smaller). The maximum allowable diameter depends on the size of the existing Council's pipe diameter and these are provided in the following table.

<b>Maximum allowable pipe diameter to be connected to Council drainage using a tapping band, saddle or similar method</b>	<b>Council's drainage Pipe diameter or smallest dimension of a box culvert</b>
100 mm	300 mm
150 mm	375 mm and up to 600 mm
225 mm	750 mm and larger

All connection must be in accordance with AS/ NZS 3500.3, Plumbing and drainage – Stormwater drainage. No portion of pipe to be connected will be allowed to intrude into Council's pipe. A closed circuit television (CCTV) inspection of the new connection must be carried and submitted to Council with works-as-executed plan to see the connection is carried out in accordance with AS/ NZS 3500.3.

Where the connection point to Council's below ground drainage line is not located adjacent the site, the applicant must extend Council's drainage system to the site.

#### **6.3.4 Connection to Council's parks, reserves and bushland**

**Initially it is recommended that the applicant discuss their proposal with Council's Public Open Space Section.**

Where a development is located adjacent to a park, reserve or bushland the following requirements apply:

- Stormwater discharge from the property may be directed into a natural watercourse or Council below ground drainage line subject to merits based assessment of the proposal. Factors to be considered will include, the proximity of a suitable drainage point, impact on the park, reserve or bushland during and after construction, environmental sensitivity, erosion potential and weed invasion potential.
- Where an extension of Council's below ground drainage system is proposed the pipeline must comply with the requirements of Section 6.5.
- All other requirements of this DCP are to be applied as appropriate.

#### **6.4 Exemption from discharging directly into Council's below ground drainage system**

An exemption from the requirement to discharge directly into Council's below ground drainage system may be considered where:

- The required extension of Council's below ground drainage system to the site exceeds 30 m and a merit-based assessment by Council deems an exemption is warranted. The merit-based assessment will consider factors such as the magnitude of the development, extent of required works beyond the minimum requirement and suitability of an alternative solution.
- Council has determined based on the merit of the development that the continued discharge of stormwater to the kerb and gutter is satisfactory. Factors to be considered include the nature of the works, proximity of Council's existing below ground drainage system, catchment flows and suitability of Council's existing below ground drainage system to cater for surface flows.

#### **6.5 Extending council's stormwater drainage system**

Stormwater systems may be required to be constructed by the developer, on behalf of Council, where the following occur:

- the connection point to Council's below ground drainage system is not located adjacent the development site and direct connection to Council's below ground drainage system is required,
- an existing Council stormwater line is located within or adjacent the development site,
- ancillary stormwater drainage works are proposed as part of flood and/ or overland flow protection for the site.

Where the connection point to Council's below ground drainage system is not located adjacent the site and direct connection to Council's below ground drainage system is required, the applicant will be required to extend Council's drainage system to the site.

Full engineering details of the proposed works must be submitted with the DA. The design must be carried out to ensure a minimum 1 in 20 ARI pipe capacity and allowed overland flowpath to contain flows in excess of the pipe capacity and up to 1 in 100 year ARI flows. Higher standard pipe capacity may be required if overland flow is excessive to reduce flood hazards.

A construction methodology detailing the proposed methods of construction, staging of works and proposed method of protecting and supporting the drainage line is required.

### **6.5.1 General construction requirements**

The developer is responsible to carry out any service investigations, liaison with utility authorities and utility deviations necessary to enable the works. All costs for the connection must be borne by the developer.

Construction will be undertaken within Council's property (footpath, nature strip, and roadway) and a Road Opening Permit or Infrastructure Works Bond will be required subject to the nature and extent of the works.

All pipe laying and construction works must be in accordance with Council's Stormwater Specification and comply with the requirements of any relevant Australian standards and codes as well as the manufacturer's specifications. Occupational Health & Safety and Work Cover legislation requirements must be adhered to at all times.

### **6.5.2 Specific construction requirements**

Where Council's below ground drainage system is to be extended by a developer on the Council's behalf, the following minimum requirements will apply depending upon the nature of the intervening land.

**Footway, grass verge, open space, park and landscaped areas:** *Council stormwater lines should generally be located under the kerb and gutter.*

Where Council allows a stormwater pipeline in its footway or grass verge a minimum pipe size of 375 mm must be provided. Pipelines must be laid at a minimum depth of 0.60 m to obvert and will, generally, be reinforced concrete, Class 2.

A standard Council junction pit must be constructed over the new line where it intersects with the private stormwater line. Where appropriate a capped pipe stub must be provided to enable future extension of the line upstream unless otherwise approved by Council.

**Roadway:** Generally, stormwater drainage lines in the roadway must be constructed under the kerb and gutter at a depth of 0.75 m to obvert. Any disturbed pavement, kerb or gutter must be reinstated to its original state or better.

The pipes within the road must be a minimum of either reinforced concrete or fibre-reinforced cement (FRC), Class 2, 375 mm diameter and have bedding to standard HS3, in accordance with *Australian Standard AS 3725 – (Loads on Buried Concrete Pipes)*. Rubber ring joints are required.

A standard Council double grated gully pit with 1.8 m kerb lintel must be constructed over the new line where it intersects with the private stormwater line. Where appropriate a capped pipe stub must be provided to enable future extension of the line upstream unless otherwise approved by Council.

### **6.5.3 New driveways impacting on existing Council drainage pits**

Where it is proposed to alter an existing driveway or construct a new driveway access that will intercept an existing Council drainage pit, the following applies:

1. At a minimum the existing inlet capacity of the drainage system must be maintained. Relevant calculations must be provided.
2. Typically an additional standard Council stormwater gully pit with a minimum 1.8 m kerb inlet or greater (to match existing) must be constructed upstream of the proposed driveway. This will be either constructed over the existing stormwater drainage line or by extension of Council's stormwater drainage system. In most instances the existing pit must be left after modification to remove the kerb inlet.

Where the proposed driveway is in a trapped lowpoint, the applicant should consider the potential for flooding or overland flows from the roadway.

## **6.6 Subsoil drainage**

Subsoil drainage must be discharged to Council's in-ground drainage network. The discharge of subsoil drainage from a development to Council's kerb and gutter system will not, generally, be accepted.

### **Pumpout:**

Where the pump out of a subsoil drainage system is necessary, the design and installation of the pumps must meet the intent of Section 6.2.4.

### **Property frontage elevated above Council footpath:**

Where the frontage of properties is elevated above the road and/or footway by more than 0.5 m and terraced garden walls/retaining walls and landscaping are utilised, Council will require the installation of a subsoil interception trench with slotted drains along the frontage of the property to prevent seepage across the footpath.

### **Cutting or cliff face:**

Where the proposed development is at the base of an existing or new cutting/cliff, the site's stormwater drainage system must cater for seepage water and surface runoff from this area. An overland flow path must be provided.

### **Maintenance:**

The site's subsoil drainage system must be designed to be easily maintained by flushing. Capped termination risers must be provided at the ends of all subsoil lines with regular capped riser flushing points provided at a maximum spacing of 40 m.

## **7 Easements**

### **7.1 Background**

#### **7.1.1 Why are easements required?**

Easements are commonly required to permit the development of land or improve the use of land where access is required over or under adjoining land for the:

- disposal of stormwater,
- placement of services such as electricity, gas, water supply, telecom,
- placement of foundation anchors,
- underpinning and shoring of adjoining buildings,
- temporary access for construction purposes (although this can also be by legal agreement).

#### **7.1.2 Are easements in the public Interest?**

**YES** – It is important that easements are created to ensure that land that is developed or improved has proper drainage and is provided with all required utility services.

Easements are also required where the support of adjoining buildings may require the provision of foundation anchorage systems, underpinning, shoring or similar such as civil and structural engineering works.

Easements are required to provide for the health and safety of all our community.

#### **7.1.3 When might Council require easements?**

Council often requires the creation of easements by Development Consent conditions issued under the Environmental Planning and Assessment Act 1979 where properties are “land locked” in terms of access to proper drainage systems or other utility services.

It is common for Council to require the creation of the easement as a deferred commencement condition to a Development Consent.

#### **7.1.4 How do I obtain an easement over adjoining land?**

The normal process is that a formal approach is made to the owner of the land, proposed to be burdened by the easement, by the owner of the property to be benefited by the proposed easement. A deed of agreement is compiled by legal representatives acting for both parties and then signed. The Deed of Agreement typically sets out:

- Land title details,
- Location of easement,
- Standards of design and construction (where work is required),
- Access to site during construction (where work is required),
- Standard of restitution of site following construction of easement,

- Registration of easement and maintenance of easement ,
- Agreed compensation and payment of compensation,
- Other legal matters as required by a legal adviser.

### 7.1.5 How is the amount of compensation generally calculated?

An objective assessment is made of the compensation that should be paid to the owner of the property, who would be burdened by the proposed easement. This objective assessment of compensation must take into account decisions that have been made by the NSW Supreme Court on the matter of how compensation is calculated, in accordance with the intent of section 88K of the *Conveyancing Act 1919*.

It is not Council's role or within Council's jurisdiction to adjudicate on amounts of compensation. **You must seek legal advice on this matter.**

Note: Section 88K of the *Conveyancing Act 1919* sets out the powers of the Supreme Court of NSW to create easements over land where an easement is "reasonably necessary for the effective use or development of other land." Before making an order imposing an easement the Court must be satisfied that:

- (a) use of the land having the benefit of the easement will not be inconsistent with the public interest, and
- (b) the owner of the land to be burdened by the easement and each other person having an estate or interest in that land can be adequately compensated for any loss or other disadvantage that will arise from imposition of the easement, and
- (c) all reasonable attempts have been made by the applicant for the order to obtain the easement or an easement having the same effect but have been unsuccessful.

### 7.1.6 What happens if an agreement to acquire an easement cannot be reached?

Options are available under section 88K of the *Conveyancing Act 1919* through application to the Supreme Court of NSW and section 40 of the *Land and Environment Court Act 1979* for acquiring an easement where agreement cannot be reached between property owners. You should seek legal advice if you intend to pursue one of these options.

## 7.2 Type of easements

### 7.2.1 Council easements

Council will require the creation of an easement to its benefit over existing Council stormwater pipes, boxes or channels on private land that:

- are not the subject of an easement, or
- have been constructed outside an existing easement. In this case the original easement will either be expanded to cover the works or will be extinguished in the process of creating the new easement.

The easement width must be the pipe, box or channel section width plus 1.5 m with an overall minimum width of 2.5 m.

Where necessary, the location of an existing structure within a property must be confirmed using electronic detection equipment or potholing (localised excavation) as appropriate. The easement created must be centred over the structure. Any costs associated with investigating or establishing the easement will be the responsibility of the developer.

### **7.2.2 Private drainage easement**

A private drainage easement over intervening private downstream properties is required where the drainage system traverses any other private property to connect to Council's drainage system. Minimum width of private drainage easements must be 1.0 m wide for pipe diameters up to 300 mm. Where pipe diameters exceed 300 mm, minimum private easement width must be pipe diameter (or box width) plus 1.2 m.

Stormwater pipework that traverses other property in the development to connect to a Council approved drainage point must be contained within a private drainage easement. The easement must be created on the certificate of title for all affected properties in favour of the properties to be drained.

## **7.3 Acquisition of a private drainage easement**

### **7.3.1 Step 1 - Acquisition of a private drainage easement**

The applicant must formally approach the owners of any intervening downstream property(s) where the potential to drain the applicant's site exists. The applicant must consider all potential drainage routes. **(Liaison with Council as to potential drainage easements is advised).**

The applicant must provide the owners of any intervening downstream property(s) with the following:

1. A formal letter to the owner(s) requesting the consent to an easement.
2. Details of the proposed easement, with engineering plans as required.
3. A copy of Council's Guidelines for Easements (Relevant parts of this DCP).
- 4.
5. A valuation of the compensation prepared by an Independent Valuer to be paid to the downstream property owner(s) for acquisition of the easement. An exemption from this step may be granted to dwelling house only, where no practical gravity solution exists. (for example a semi-detached or terrace dwellings downstream).  
**Steps 1 to 4 inclusive will still be required.**

*Details of suitable Independent Valuers can be sought from your legal counsel.*

### **7.3.2 Step 2 - Acquisition of a private drainage easement**

The following options are available to the applicant depending upon the response of the intervening downstream property(s).

### **OPTION 1 – Easement consent is given**

The applicant must complete the following:

1. Complete the Acquisition of Easement Checklist, attaching a copy of the formal consent from the owner(s) of the intervening downstream property(s) and submit this information with the DA.
2. A registered surveyor must prepare a plan of survey and the application for the easement must be lodged with the Land Titles Office with any necessary fees. **Woollahra Council must be annotated as the Prescribed Authority on the Section 88K Instrument.** A copy of the lodgment details must be provided to Council prior to operation of any development consent or activity application.

### **OPTION 2 – Easement consent is refused**

The information required of the applicant will depend upon the nature of the development.

*For alterations and additions up to 40m<sup>2</sup> plan area of roof to existing dwelling house:*

Where a **formal response is refused** by the intervening downstream property, the applicant may a Statutory Declaration declaring that the owner of the property was approached and the applicant's request was refused or otherwise. Contact details for the intervening downstream property owner must be supplied to Council. The applicant now write to Council requesting permission to use pump and sump system or any other non-gravity system to manage the stormwater. The applicant must obtain permission from Council to use non-gravity system before submitting the DA. If Council approved a non-gravity system then the letter of approval for non-gravity system should be submitted with the DA.

Major additions or alterations that change the lifespan or serviceability of dwellings do not fall under this category. These are considered as new dwellings for this purpose.

*For All Other Developments including new single dwellings:*

**The applicant must acquire an easement. The applicant should seek legal advice** and consider obtaining the easement by compulsory acquisition. Refer clause 7.1.6 for available options for compulsory acquisition of easements.

It should be noted that a pump and sump system or other non-gravity solution will not be approved as a substitute for non-acquirement of the easement. The DA will be refused or in some instances a consent may be granted with a deferred commencement condition. Such a condition will require registration of the easement and submission of proof of registration to Council or the accredited certifier before a construction certificate is issued. As minimum proof the applicant must provide Council or the accredited certifier with a copy of the easement plan, instruments, lodgment details and receipt for the registration of the easement from the Land Titles Office.

#### **7.4 Registration of an easement(s) - General process**

- Prior to lodgment of the DA, a Registered Surveyor must prepare a plan of survey. Council must be annotated as the Prescribed Authority on the Section 88K Instrument that accompanies the plan of survey.
- The plan of survey must be submitted to Council for approval together with the DA. Any required supporting documentation must also be submitted.
- The plan of survey and application must be lodged with the owner's approval at the Land Titles Office together with the fees.
- Council must be supplied with copies of lodgment details and receipts. (The DA process may proceed upon receipt of this information, subject to satisfying other Council requirements)
- The Land Titles Office advises applicant/owner and Council of registration of the easement(s).

*draft*

## 8 Structures over or near drainage lines and easements

### 8.1 General

New buildings, structures, overhanging structures or tennis courts are not permitted over drainage lines or drainage easements.

Paving over any drainage line or easement is acceptable but will require appropriate jointing at the easement boundary.

*All plans, details and supporting information relating to structures over or near a Council drainage line and easement must be provided with the DA.*

#### 8.1.1 Existing structure over Council drainage

If there is an existing structure over a drainage line or easement within the development property and this structure is to remain (ie. typically alteration and addition type works) then the following is required:

- A closed circuit television (CCTV) inspection of the drainage line must be carried out to assess the structural and serviceability condition. A copy of the video and reporting must be provided to Council with the Construction Certificate (CC) Application.
- Further details to the satisfaction of Council.

#### 8.1.2 Proposed structure over Council drainage

Council will not approve a new structure or overhanging structures over a drainage line or easement. Either the design must be modified so that this does not occur or the drainage line/easement must be realigned.

Diversion of the Council drainage must comply with the following:

- There is no adverse impact on upstream or downstream properties or Council's drainage system. An assessment of impacts must be provided by suitably qualified practitioner.
- Provision must be made for accessibility for future maintenance or alternatively provision of a maintenance-free system. Accessibility must include access for construction machinery and plant.
- The diverted system must be upgraded to a minimum of a 1 in 20 ARI capacity. Where the diverted system drains catchment areas without an overland flow path or that has overland flow paths through private property, then the diverted system must be upgraded to a 1 in 100 ARI capacity. An assessment of impacts must be provided by suitably qualified practitioner.
- Where diversion is proposed onto property, other than the development site, letters of permission from the relevant parties must be supplied to Council with the DA. The diverted system must be formalised by the creation of a new easement, which must be lodged with the Land Titles office.

- Further details as required by Council.

## **8.2 New structure in zone of influence of Council drainage**

### **8.2.1 General**

The following information applies to building adjacent to a stormwater drainage easement where Council is beneficiary of that easement, or an existing Council's drainage line.

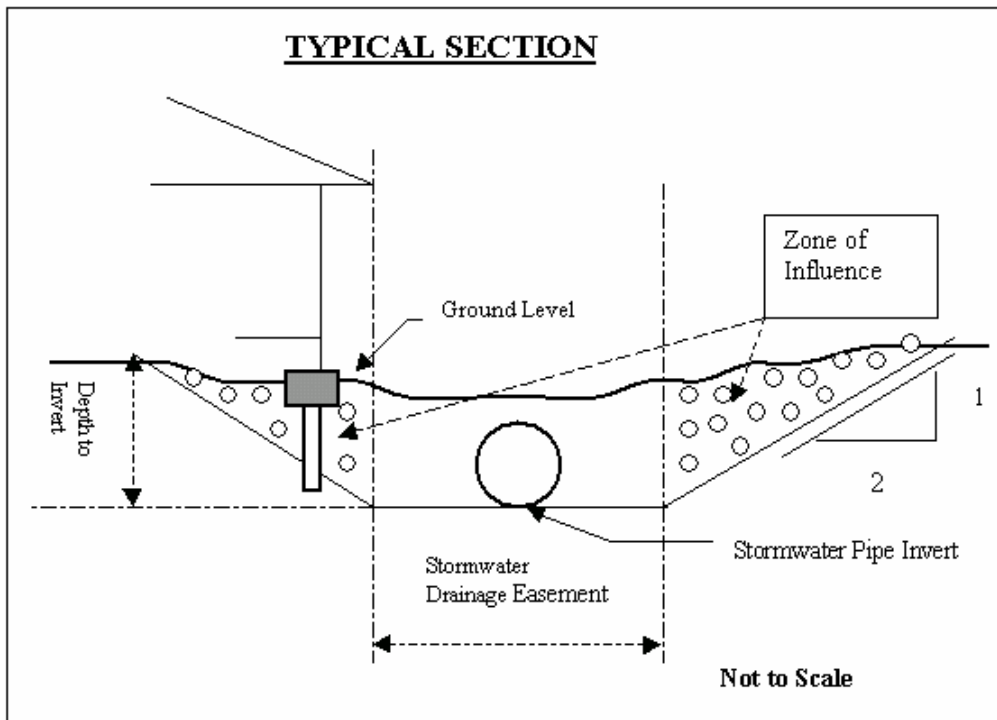
- Council requires the construction of piers when building near to a drainage easement or an existing drainage line.
- Full engineering details of the proposed piers and beams for all footings within the influence region of the drainage easement are to be submitted with the DA. A suitably qualified practitioner must prepare these details.
- A closed circuit television (CCTV) inspection of the drainage line must be carried out to assess the structural and serviceability condition. A copy of the video and reporting must be provided to Council with the CC application.
- The construction methodology must be provided by a suitably qualified practitioner detailing the proposed methods of construction, staging of works and proposed method of protecting and supporting the drainage line.
- Where Council determines that there is the potential for an impact on the existing drainage line due to the existing drainage line being in poor structural condition and/or satisfactory protection and support cannot be provided, then the applicant should amend the DA to remove the potential impact to the existing drainage line or divert the drainage (Refer Section 6.5).

### **8.2.2 Depth of piers**

- All piers along the drainage easement boundary shall have a minimum depth equal to the level of the invert of the nearest stormwater pipe or culvert. The pier depth may be decreased by 500 mm for each increment in distance of 1 metre from the boundary of the easement or at an angle equal to the natural response of the soil (saturated) as determined by a qualified practitioner.
- When an easement contains an existing watercourse or open drain to a depth greater than 1.5 metres the pier depth shall be a determined as 0.5 metres below the actual invert of the open drain or watercourse.
- Where a drainage easement is at present unpiPED or proposed to be piped but there is not a detailed design for the proposal to pipe an easement a minimum depth to the invert of a future pipeline of 1.5 metres shall be assumed unless otherwise specified by Council.

### 8.2.3 Typical section

A typical section showing the zone of influence is shown below.



**Notes:**

1. Building to be self supporting within Zone of Influence.
2. No building or overhanging structures are permitted within Drainage Easement.
3. If easement acts as a secondary flow path then no structures or landscaping is permitted within the drainage easement.



## 9 References

1. AS/ NZS 3500.3 : 2003, Plumbing and Drainage –Part 3: Stormwater drainage
2. Australian Rainfall and Runoff, 1987  
Institution of Engineers, Australia
3. Floodplain Management Manual, January 2001  
New South Wales Government
4. Private Stormwater Code, February 1990  
Woollahra Municipal Council
5. Stormwater Design Code, August 1999  
Rockdale City Council
6. Design Specification for Survey, Road and Drainage Works, May 2002  
Gosford City Council
7. Draft Rainwater Tank Policy, November 2003  
City of Canada Bay Council
8. Water Sensitive Resource Kit for the Sydney Region, November 2003  
Sydney Coastal Councils & Stormwater Trust



## APPENDIX A: Glossary of terms

<b>Annual Exceedance Probability (AEP)</b>	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood discharge of 500 m <sup>3</sup> /s has an AEP of 5%, it means that there is a 5% chance (that is a one-in-20 chance) of a peak flood discharge of 500 m <sup>3</sup> /s or larger occurring in any one year (see Average Recurrence Interval).
<b>Australian Height Datum (AHD)</b>	A common national surface level datum approximately corresponding to mean sea level.
<b>Biodiversity</b>	In broad terms, refers to “the variety of life forms, the different plants, animals and microorganisms, the genes they contain and the ecosystems they form” (NPWS 1997).
<b>Boat shed</b>	Means a building or any other structure used for the storage and routine maintenance of a boat or boats and which is associated with a private residence and includes any skid used in connection with the building or other structure.
<b>Catchment</b>	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
<b>Conservation</b>	Means the use, management and protection of resources so that they are not degraded, depleted or wasted and are available on a sustainable basis for present and future generations.
<b>Detention systems</b>	Detention systems are holding ponds that temporarily store stormwater to control and reduce downstream flow rates. They are designed to retard stormwater during intense rainfall and to empty once the peak of the storm has passed.
<b>Developer</b>	Means the person proposing the work or activity, for example the owner of the land or someone acting on behalf of the owner of the land.
<b>Development</b>	Is defined in Part 4 of the Environmental Planning and Assessment Act 1979.
<b>Development consent</b>	Means consent under Part 4 of the Environmental Planning and Assessment Act 1979 to carry out development.
<b>Development control plan (DCP)</b>	Means a plan made by either Council or under section 72 or section 51A of the Environmental Planning and Assessment Act 1979 respectively. DCPs are used to provide more detailed provisions than those included in a local environmental plan (in the case of a DCP made by a Council) or a regional environmental plan (in the case of a DCP made by the Department).

<b>Discharge</b>	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m <sup>3</sup> /s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).
<b>Drainage easements</b>	Are the legal rights attached to land whereby another parcel of land has the right to use part or all of the land for the purpose of draining water.
<b>Drainage reserves</b>	Are the lands vested in Council for drainage purposes.
<b>Easement</b>	Means a right applying to land enabling a person to have the use of other land in different ownership for a specific purpose. Without the easement the use would constitute a trespass or nuisance.
<b>Ecologically sustainable development (ESD)</b>	Using, conserving and enhancing natural resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be maintained or increased. A more detailed definition is included in the Local Government Act 1993.
<b>Existing ground level</b>	Means the surveyed level of the ground surface immediately prior to the proposed development and prior to any associated excavation, development or site works.
<b>Flood</b>	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
<b>Flood liable land</b>	Is synonymous with flood prone land (ie. land susceptible to flooding by the probable maximum flood (PMF) event). Note that the term flood liable land now covers the whole of the floodplain, not just that part below the flood planning level, as indicated in the 1986 Floodplain Development Manual (see flood planning area).
<b>Floodplain</b>	Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land.
<b>Flood prone land</b>	Land susceptible to flooding by the Probable Maximum Flood (PMF) event. Flood prone land is synonymous with flood liable land.
<b>Flood risk</b>	Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk is divided into 3 types, existing, future and continuing risks. They are described below.

**Existing flood risk:** the risk a community is exposed to as a result of its location on the floodplain.

**Future flood risk:** the risk a community may be exposed to as a result of new development on the floodplain.

**Continuing flood risk:** the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.

<b>Foreshore</b>	The section of land extending from the low water mark to the rear of the first line of properties as viewed from the waterway.
<b>Front fences and walls</b>	Refers to fences and walls located or proposed to be located forward of the building facade.
<b>Hazard</b>	A source of potential harm or a situation with a potential to cause loss. From a flood perspective, the hazard is flooding which has the potential to cause damage to the community. Definitions of high and low hazard categories are provided in the Floodplain Management Manual.
<b>Hydraulics</b>	Term given to the study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and velocity.
<b>Hydrology</b>	Term given to the study of the rainfall and runoff process; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods.
<b>Local environment plan (LEP)</b>	Means a plan made under section 70 of the Environmental Planning and Assessment Act 1979. An LEP is a legal document and generally provides the land use zones, Council objectives and development standards for different types of development.
<b>Local government area (LGA)</b>	The land area subject to control by the local authority (in this case Woollahra Municipal Council).
<b>Merit approach</b>	<p>The merit approach weighs social, economic, ecological and cultural impacts of land use options for different flood prone areas together with flood damage, hazard and behaviour implications, and environmental protection and well being of the States rivers and floodplains.</p> <p>The merit approach operates at two levels. At the strategic level it allows for the consideration of social, economic, ecological, cultural and flooding issues to determine strategies for the management of future flood risk which are formulated into Council plans, policy and planning instruments. At a site-specific level, it involves consideration of the best way of conditioning development allowable under the floodplain risk management plan, local floodplain risk management policy and planning instruments.</p>

<b>New development</b>	Means development of a vacant site or development following complete demolition of all buildings or development following substantial demolition of a building (50% of more of a building)
<b>Objective</b>	Describes an outcome that development is required to achieve in relation to DCP. Objectives describe the intent of the related performance criteria.
<b>Performance criteria</b>	Represents specific ways in which a proposed development can meet the related objectives in this DCP. The relevance and intent of a specific performance criterion in relation to a proposed development must be interpreted in the context of the related objective.
<b>Riparian zone</b>	Is the area of vegetation located on the bank of a natural watercourse, such as a river, where the flows from its site of origin by air, wind, water or gravity.
<b>Risk</b>	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. From a flood perspective it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
<b>Runoff</b>	The amount of rainfall which actually ends up as stream flow, also known as rainfall excess.
<b>Site</b>	Means the allotment or group of allotments of land on which a building stands or is proposed to be erected.
<b>Stormwater</b>	Means untreated rainwater that runs off the land onto which it falls.
<b>Survey plan</b>	A plan prepared by a registered surveyor.
<b>Trunk drainage</b>	Is the stormwater drainage system that links property, interallotment and street drainage with the receiving waters.

## APPENDIX B: List of categories of suitable practitioners

Task	Acceptable practitioner	Industry association
<b>Survey:</b>		
<ul style="list-style-type: none"> <li>▪ property boundaries,</li> <li>▪ title search,</li> <li>▪ easement plan,</li> <li>▪ cross-sections,</li> <li>▪ locating buildings,</li> <li>▪ certification.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Registered surveyor</li> </ul>	<p>Institution of Surveyors <a href="http://www.isaust.org.au">www.isaust.org.au</a></p> <p>Association of Consulting Surveyors NSW Inc <a href="http://www.acsnsw.com.au">www.acsnsw.com.au</a></p>
<b>Stormwater analysis:</b>		
<ul style="list-style-type: none"> <li>▪ investigation,</li> <li>▪ design,</li> <li>▪ local overland flooding study,</li> <li>▪ certification,</li> <li>▪ hydrologic/hydraulic modelling.</li> </ul>	<ul style="list-style-type: none"> <li>• National Professional Engineers Registration as administered by the Institution of Engineers, Australia (NPER) with a minimum of 10 years practice in the water engineering field in the last 15 years. Also, at least 5 years practical experience in the flooding and drainage field in small coastal catchments in Australia.</li> <li>• Persons currently registered on the stormwater register maintained by the Association of Hydraulic Services Consultants of Australia (AHSCA) with a minimum of 10 years practice in the water engineering field in the last 15 years. Also, at least 5 years practical experience in the flooding and drainage field in small coastal catchments in Australia.</li> </ul>	<p>Institution of Engineers Australia <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p> <p>Association of Hydraulic Services Consultants of Australia <a href="http://www.ahsca.com.au">www.ahsca.com.au</a></p> <p>Association of Consulting Surveyors NSW Inc <a href="http://www.acsnsw.com.au">www.acsnsw.com.au</a></p>
<b>Foreshore inundation:</b>		
<ul style="list-style-type: none"> <li>▪ investigation,</li> <li>▪ design,</li> <li>▪ flood study,</li> <li>▪ floodplain risk management study</li> <li>▪ certification,</li> <li>▪ hydrologic/hydraulic modelling,</li> <li>▪ flood proofing,</li> <li>▪ flood evacuation,</li> <li>▪ flood risk assessment.</li> </ul>	<ul style="list-style-type: none"> <li>• National Professional Engineers Registration as administered by the Institution of Engineers, Australia (NPER) with a minimum of 10 years practice in the water engineering field in the last 15 years. Also, at least 5 years practical experience in the flooding and drainage field in small coastal catchments in Australia.</li> </ul>	<p>Institution of Engineers Australia <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p>
<b>Structural analysis of water related structures:</b>		

<b>Task</b>	<b>Acceptable practitioner</b>	<b>Industry association</b>
<ul style="list-style-type: none"> <li>▪ inspection,</li> <li>▪ investigation,</li> <li>▪ design,</li> <li>▪ certification.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NPER with at least 5 years appropriate practical experience on similar structures.</li> </ul>	<p>Institution of Engineers <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p>
<b>On-site stormwater detention analysis:</b>		
<ul style="list-style-type: none"> <li>▪ investigation,</li> <li>▪ design,</li> <li>▪ hydrologic/hydraulic modelling.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NPER with a minimum of 5 years practical experience in this field.</li> <li>▪ Persons currently registered on the stormwater register maintained by the AHSCA with a minimum of 5 years practical experience in this field.</li> </ul>	<p>Institution of Engineers <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p> <p>Association of Hydraulic Services Consultants of Australia <a href="http://www.ahsca.com.au">www.ahsca.com.au</a></p> <p>Association of Consulting Surveyors NSW Inc <a href="http://www.acsnsw.com.au">www.acsnsw.com.au</a></p>
<b>Geotechnical:</b>		
<ul style="list-style-type: none"> <li>▪ inspection,</li> <li>▪ investigation,</li> <li>▪ design,</li> <li>▪ certification.</li> </ul>	<ul style="list-style-type: none"> <li>▪ NPER with a minimum of 10 years practice in the geotechnical field in the last 15 years.</li> </ul>	<p>Institution of Engineers <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p>
<b>Pump and sump:</b>		
<ul style="list-style-type: none"> <li>▪ inspection,</li> <li>▪ investigation,</li> <li>▪ implementation,</li> <li>▪ certification.</li> </ul>	<ul style="list-style-type: none"> <li>▪ An engineer with NPER and a minimum of 2 years practical experience.</li> <li>▪ Trades Person with a minimum of 5 years practical experience in this specific field</li> <li>▪ Persons currently registered on the stormwater register maintained by the AHSCA with a minimum of 2 years practical experience in this field</li> </ul>	<p>Institution of Engineers Australia <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p> <p>Association of Hydraulic Services Consultants of Australia <a href="http://www.ahsca.com.au">www.ahsca.com.au</a></p>
<b>Valuation:</b>		
<ul style="list-style-type: none"> <li>▪ property maintenance,</li> <li>▪ easement.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Registered property valuer.</li> </ul>	<p>Real Estate Institute of Australia <a href="http://www.reiaustralia.org.au">www.reiaustralia.org.au</a></p>
<b>Soil and water management plan:</b>		
	<ul style="list-style-type: none"> <li>▪ Registered surveyor</li> <li>▪ Engineer with a minimum of 5 years practical experience in this field.</li> <li>▪ Persons currently registered on the stormwater register maintained by the AHSCA with a minimum of 5 years practical experience in this field</li> </ul>	<p>Institution of Surveyors <a href="http://www.isaust.org.au">www.isaust.org.au</a></p> <p>Institution of Engineers Australia <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p> <p>Association of Hydraulic Services Consultants of Australia <a href="http://www.ahsca.com.au">www.ahsca.com.au</a></p> <p>Association of Consulting Surveyors NSW Inc <a href="http://www.acsnsw.com.au">www.acsnsw.com.au</a></p>
<b>Water quality analysis:</b>		

<b>Task</b>	<b>Acceptable practitioner</b>	<b>Industry association</b>
<ul style="list-style-type: none"> <li>▪ inspection,</li> <li>▪ investigation,</li> <li>▪ design,</li> <li>▪ certification.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Registered surveyor</li> <li>▪ Engineer with a minimum of 5 years practical experience in this field.</li> <li>▪ Persons currently registered on the stormwater register maintained by the AHSCA with a minimum of 5 years practical experience in this field</li> </ul>	<p>Institution of Surveyors <a href="http://www.isaust.org.au">www.isaust.org.au</a></p> <p>Institution of Engineers Australia <a href="http://www.ieaust.org.au">www.ieaust.org.au</a></p> <p>Association of Hydraulic Services Consultants of Australia <a href="http://www.ahsca.com.au">www.ahsca.com.au</a></p> <p>Association of Consulting Surveyors NSW Inc <a href="http://www.acsnew.com.au">www.acsnew.com.au</a></p>

*draft*

**Please note that Council Officers cannot recommend specific Practitioners to be engaged. After reviewing Appendix B it is recommended that you contact the relevant industry association for a list of members.**



## APPENDIX C: Design rainfall intensities

The following design rainfall intensities are to be used throughout the Woollahra Municipal Council LGA.

### Woollahra Municipal Council Design Rainfall Intensities

Duration		Average Recurrence Interval						
		1 in 1	1 in 2	1 in 5	1 in 10	1 in 20	1 in 50	1 in 100
Minutes	Hours	Rainfall Intensities in mm/hour						
5	0.083	104	133	167	187	213	246	271
6	0.100	98	125	157	175	199	231	254
7	0.117	92	118	148	166	189	219	241
8	0.133	88	112	141	158	180	209	231
9	0.150	84	107	135	151	173	201	222
10	0.167	80	102	130	146	166	193	214
11	0.183	77	99	125	140	161	187	207
12	0.200	74	95	121	136	156	181	201
13	0.217	72	92	117	132	151	176	195
14	0.233	69	89	114	128	147	171	190
15	0.250	67	86	111	124	143	167	185
16	0.267	65	84	108	121	139	162	180
17	0.283	64	82	105	118	136	159	176
18	0.300	62	80	102	115	133	155	172
19	0.317	60	78	100	113	130	152	168
20	0.333	59	76	98	110	127	148	165
21	0.350	57	74	95	108	124	145	162
22	0.367	56	72	93	106	122	143	159
23	0.383	55	71	91	104	119	140	156
24	0.400	54	69	90	101	117	137	153
25	0.417	53	68	88	100	115	135	150
26	0.433	52	67	86	98	113	132	147
27	0.450	51	65	85	96	111	130	145
28	0.467	50	64	83	94	109	128	143
29	0.483	49	63	82	93	107	126	140
30	0.500	48	62	80	91	105	124	138
31	0.517	47	61	79	90	104	122	136
32	0.533	46	60	78	88	102	120	134
33	0.550	46	59	77	87	101	118	132
34	0.567	45	58	75	86	99	117	130
35	0.583	44	57	74	84	98	115	128
36	0.600	43	56	73	83	96	113	126
37	0.617	43	55	72	82	95	112	125
38	0.633	42	55	71	81	94	110	123
39	0.650	42	54	70	80	92	109	121
40	0.667	41	53	69	79	91	107	120
41	0.683	40	52	68	78	90	106	118

### Woollahra Municipal Council Design Rainfall Intensities

Duration		Average Recurrence Interval						
		1 in 1	1 in 2	1 in 5	1 in 10	1 in 20	1 in 50	1 in 100
Minutes	Hours	Rainfall Intensities in mm/hour						
42	0.700	40	52	67	77	89	105	117
43	0.717	39	51	67	76	88	103	115
44	0.733	39	50	66	75	87	102	114
45	0.750	38	50	65	74	86	101	113
46	0.767	38	49	64	73	85	100	111
47	0.783	37	48	63	72	84	99	110
48	0.800	37	48	63	71	83	97	109
49	0.817	37	47	62	70	82	96	108
50	0.833	36	47	61	70	81	95	106
51	0.850	36	46	60	69	80	94	105
52	0.867	35	46	60	68	79	93	104
53	0.883	35	45	59	67	78	92	103
54	0.900	35	45	59	67	77	91	102
55	0.917	34	44	58	66	77	90	101
56	0.933	34	44	57	65	76	89	100
57	0.950	33	43	57	65	75	89	99
58	0.967	33	43	56	64	74	88	98
59	0.983	33	42	56	63	74	87	97
60	1	32	42	55	63	73	86	96
90	1.5	25	33	43	49	57	67	75
120	2	21	27	36	41	47	56	63
180	3	16	21	27	31	36	43	48
240	4	13	17	22	26	30	35	39
300	5	11	15	19	22	26	30	34
360	6	10	13	17	19	23	27	30
720	12	6	8	11	12	14	17	19
1440	24	4	5	7	8	9	11	12
2880	48	3	3	4	5	6	7	8
4320	72	2	3	3	4	4	5	6

Probable Maximum Precipitation Depth in mm				
Duration		Catchment Area		
Minutes	Hours	1km <sup>2</sup>	2km <sup>2</sup>	3km <sup>2</sup>
15	0.25	170	160	160
30	0.5	250	240	230
60	1	360	350	340
90	1.5	460	450	440
120	2	540	530	520
180	3	660	640	630
360	6	870	850	830

Linear interpolation should be undertaken for durations and catchment sizes not shown.

## APPENDIX D: Details regarding positive covenants

### Restriction as to user

The potential for modification or adjustment to an OSD system, dedicated overland flow paths through a property, pump-out systems and water quality devices is significant enough to warrant extra protection. Future owners of properties also need to be aware of their presence, purpose and requirement for regular maintenance. Consequently, a **Restriction As To User – Positive Covenant and Restrictive Covenant** will be required on the property title as part of the development approval conditions.

A Positive and Restrictive Covenant under Section 88B and Section 88E of the Conveyancing Act, 1919 will be required for any development incorporating OSD, dedicated overland flow paths, pit and pump system and water quality devices or as directed by the Director Technical Services.

The Instrument is to ensure the continued functioning and maintenance of the items detailed in the consent condition. The location of the item protected by the Positive and Restrictive Covenant must be included on the plan of survey for the property.

A registered surveyor must prepare the plan of survey. A solicitor or registered surveyor can prepare the Section 88B and Section 88E instruments. The wording, generally required by Council for standard developments and strata developments, is contained in Section ??.

### Registration of the positive/restrictive covenant

The following provides the general process for registration:

1. A Registered Surveyor must prepare the plan of survey and a solicitor or surveyor prepare the Section 88B/88E Instrument. **Council is to be annotated as the prescribed authority.**
2. A draft plan of survey and Section 88B/88E Instrument must be submitted to Council for review. Typically this would occur during the post construction phase (ie. prior to issue of Occupancy Certificate).
3. The survey plan and Section 88B/88E Instrument application must be lodged with the owner's approval at the Land Titles Office together with the fees.
4. Council must be supplied with copies of the lodgment details and receipts. **The occupancy certificate will not be released until this has occurred.**
5. The Land Titles Office advises the applicant/owner and Council of Registration of the Section 88B/88E Instrument.

**INSTRUMENT SETTING OUT TERMS OF POSITIVE COVENANT  
INTENDED TO BE CREATED PURSUANT TO SECTION 88B  
OF THE CONVEYANCING ACT, 1919**

Lengths are in metres

*Sheet 1 of 2 sheets*

**Plan:**

Plan of Subdivision of Lot **X** of  
Section **X** in DP **XXXX**  
covered by Council's Certificate  
No. of 2004

**Full name and address of  
proprietors of land:**

**PART 1**

Identity of Covenant  
firstly referred to in  
abovementioned plan:

Positive Covenant & Indemnity  
under Section 88E of the  
Conveyancing Act, 1919.

**SCHEDULE OF LOTS, ETC. AFFECTED**

Lots burdened  
Lot(s) **X**

Authority benefited  
Woollahra Municipal Council

**PART 2**

**Terms of Positive Covenant Firstly Referred To In Abovementioned Plan:**

The Owners of Lot(s) **X** in Deposited Plan **XXXX** ("the Owners") covenant and agree with Woollahra Municipal Council ("the Council") in respect of the structure erected on the land described as on-site stormwater detention system and pump sump system (which expression includes all ancillary gutters, pipes, drains, walls, kerbs, pits, pumps, grates, tanks, chambers, basins and surfaces designed to temporarily detain stormwater) shown on the plan or plans approved by the Council being Building Application **XXX/year** and the WORKS-AS-XECUTED PLAN, Revised Drawing No **XXX**, dated **XX/XX/XX** (hereinafter called "the system") as follows:-

The Owners will

- a. permit stormwater to be temporarily detained by the system;
- b. keep the system clean and free of silt rubbish and debris;
- c. maintain renew and repair as reasonably required from time to time the whole or part of the system so that it functions in a safe and efficient manner and in doing so complete the same within the time and in the manner reasonably specified in written notice issued by the Council;

- d. carry out the matters referred to in paragraphs (b) and (c) at the Owners expense;
- e. not make any alterations to the system or elements thereof without prior consent in writing of the Council and not interfere with the system or by its act or omission cause it to be interfered with so that it does not function or operate properly;
- f. permit the Council or its authorised agents from time to time upon giving reasonable notice (but at anytime and without notice in the case of an emergency) to enter and inspect the land with regard to compliance with the requirements of this covenant;
- g. comply with the terms of any written notice issued by Council in respect to the requirements of this clause within the time reasonably stated in the notice;
- h. where the Owner fails to comply with the Owner's obligations under this covenant, permit the Council or its agents at all times and on reasonable notice at the Owner's cost to enter the land with equipment, machinery or otherwise to carry out the works required by those obligations;
- i. indemnify the Council against all claims or actions and costs arising from those claims or actions which Council may suffer or incur in respect of the system and caused by an act or omission by the Owners in respect of the Owner's obligations under this covenant.

Name of authority having the right to release, vary or modify the said covenant:

Woollahra Municipal Council

.....  
Owner

.....  
Owner

.....  
Authorised Officer Woollahra Municipal Council

**INSTRUMENT SETTING OUT TERMS OF POSITIVE COVENANT  
INTENDED TO BE CREATED PURSUANT TO SECTION 88B  
OF THE CONVEYANCING ACT, 1919, AND SECTION 7(3)  
OF THE STRATA SCHEMES (FREEHOLD DEVELOPMENT) ACT, 1973.**

Lengths are in metres

*Sheet 1 of 2 sheets*

**Plan:** Plan of Subdivision of Lot X in DP  
XXXX  
covered by Council's Certificate  
No. of 2004

**Full name and address of proprietors of land:** *(name & address)*

**PART 1**

Identity of Covenant firstly referred to in abovementioned plan: Positive Covenant under Section 88E of the Conveyancing Act, 1919.

**SCHEDULE OF LOTS, ETC. AFFECTED**

<u>Lots burdened</u>	<u>Authority benefited</u>
Lots X, X, X and Common Property	Woollahra Municipal Council

**PART 2**

**Terms Of Positive Covenant Firstly Referred To In Abovementioned Plan:**

The Owners of Lots X, X, X and common property ("the Owners") covenant and agree with Woollahra Municipal Council ("the Council") in respect of the structure erected on the land described as on-site stormwater detention system and pump sump system (which expression includes all ancillary gutters, pipes, drains, walls, kerbs, pits, pumps, grates, tanks, chambers, basins and surfaces designed to temporarily detain stormwater) shown on the plan or plans approved by the Council being Building Application XXX/XX and the WORKS-ASEXECUTED PLAN, Revised Drawing No XXX, dated XX/XX/XX (hereinafter called "the system") as follows:-

The Owners will

- a. permit stormwater to be temporarily detained by the system;
- b. keep the system clean and free of silt rubbish and debris;
- c. maintain renew and repair as reasonably required from time to time the whole or part of the system so that it functions in a safe and efficient manner and in doing so complete the same within the time and in the manner reasonably specified in written notice issued by the Council;

- d. carry out the matters referred to in paragraphs (b) and (c) at the Owners expense;
- e. not make any alterations to the system or elements thereof without prior consent in writing of the Council and not interfere with the system or by its act or omission cause it to be interfered with so that it does not function or operate properly;
- f. permit the Council or its authorised agents from time to time upon giving reasonable notice (but at anytime and without notice in the case of an emergency) to enter and inspect the land with regard to compliance with the requirements of this covenant;
- g. comply with the terms of any written notice issued by Council in respect to the requirements of this clause within the time reasonably stated in the notice;
- h. where the Owner fails to comply with the Owner's obligations under this covenant, permit the Council or its agents at all times and on reasonable notice at the Owner's cost to enter the land with equipment, machinery or otherwise to carry out the works required by those obligations;
- i. indemnify the Council against all claims or actions and costs arising from those claims or actions which Council may suffer or incur in respect of the system and caused by an act or omission by the Owners in respect of the Owner's obligations under this covenant.

Name of authority having the right to release, vary or modify the said covenant:

Woollahra Municipal Council

Signed for & on behalf of

Signed for & on behalf of

.....  
Director

.....  
Director

.....  
Authorised Officer Woollahra Municipal Council

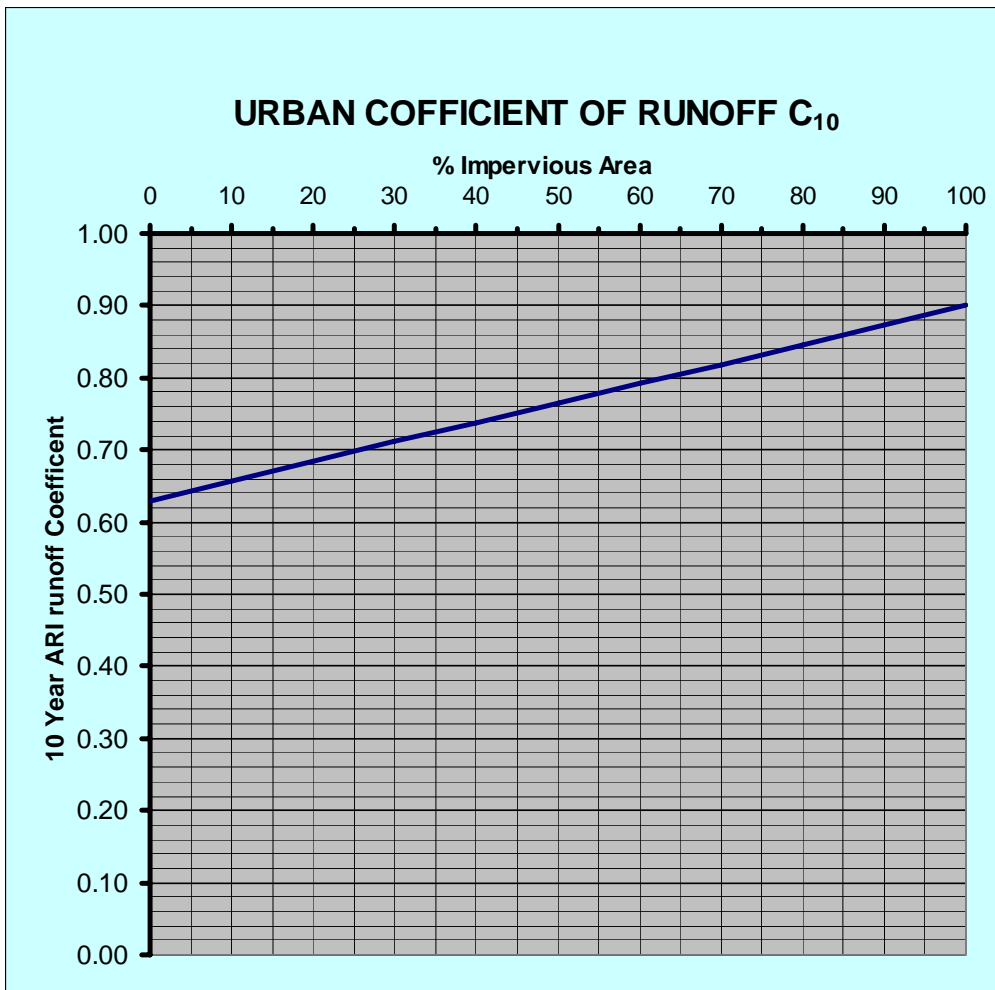


## APPENDIX E: Checklist

<b>GENERAL</b>		✓ or ✗
1	Reviewed and understood the Stormwater Drainage Management DCP with regard to the proposed development.	
2	A Soil & Water Management Plan detailing the proposed methods of controlling silts, sediments & runoff has been prepared.	
3	Pipe layout on the plan includes invert levels and pipe sizes/ types.	
4	Overland flow arriving at the site and flows originating within the site have been collected and conveyed through the site in a safe manner to Council drainage system.	
5	A trench grate has been provided at the front boundary where the site falls is to the street.	
6	Undertaken the overland flow study if there is a low level driveway or footpath, or the boundary levels of the site are below the level of Council's kerb. If the proposed site is affected by mainstream flooding or foreshore inundation a flood study and / or foreshore inundation study will be required. The study results and driveway profile (if necessary) have been included in the design. All recommendations arising from the flood study have been implemented within the architectural plans submitted with the DA. Refer Flood Risk Management DCP.	
7	Infiltration or Soak-away pits are NOT proposed to manage stormwater.	
8	Pump and Sump system is NOT proposed. (Minor extensions or additions to existing single dwellings may be exempted.) Refer Sections 6 & 7.	
9	Minimum 20 year ARI design standard for pipes & overland flowpath for flows above this and up to 100 year ARI are adopted in the design.	
10	Used design rainfall intensities from this DCP for the design.	
11	Used appropriate floor levels for the proposed development. Refer Flood Risk Management DCP.	
<b>CONNECTION, EASEMENT &amp; ZONE OF INFLUENCE</b>		
12	Proposed connection to Council's drainage system is by gravity.	
13	No stormwater connection is proposed to the sewer.	
14	Written approval is obtained from Waterways Authority to discharge stormwater directly into Sydney Harbour.	
15	Necessary private Drainage Easement is obtained if the site is "land locked" in terms of access to Council's drainage system. Refer Section 7.	
16	Easement(s) is registered with Land Title Office. Refer Section 7.	
17	No structures are proposed to affect Council's existing drainage easement, pipes or any other structures. Refer Section 8.	
<b>ON-SITE DETENTION</b>		
18	The PSD and storage volumes have been calculated using this DCP. Refer Section 4.	
19	Allowance has been made to amend the above PSD and storage volumes for areas not draining to the OSD. Refer Section 4.3 & Appendix F.	
20	Allowance has been made to amend the storage volume if landscape areas included as part of storage area. See Section 4.3	
21	Storage volume is adjusted if rainwater tank is proposed. Refer Section 4	
22	Positive & Restrictive Covenant is prepared for the proposed OSD & Rainwater Tank. Refer Section 7 & Appendix D.	
<b>WSUD &amp; RAINWATER TANK</b>		
23	Proposed development includes elements of WSUD.	
24	Proposed Rainwater Tank design satisfies the requirements of this DCP. Refer Section 5.	



## Appendix F: Urban coefficient of runoff $C_{10}$



For ARI other than 10 years the  $C_{10}$  value is multiplied by frequency factor from the following table.  $C_y = F_y \cdot C_{10}$

Where runoff coefficients calculated from the above equation exceed 1.0 they should be set equal to 1.0. (Source: *Australian Rainfall and Runoff 1987, Chapter 14*)

ARI (Years)	Frequency factor, $F_y$
1	0.8
2	0.85
5	0.95
10	1.0
20	1.05
50	1.15
100	1.2



## **APPENDIX G: Schedules of maintenance of rainwater tanks**

### **Schedules of maintenance**

All rainwater tank designs must be supported by an appropriate schedule of maintenance. The schedule of maintenance must address the site specific system and address each subcomponent of that system.

The schedule may be applicable across multiple allotments in circumstances where a drainage sub-component is installed in this way. In these circumstances, a single Schedule of Maintenance is required but each occupant is equally responsible for the maintenance.

Maintenance of stormwater systems will usually be included on a Positive Public Covenant made in favour of the Council under *Section 88B* of the *Conveyancing Act 1919*.

*Sample Schedule of Maintenance: Rainwater Tank System* of this Appendix shows an example of a Schedule of Maintenance for a typical rainwater tank system, which collects rainwater from a roof only.

### **Sample schedule of maintenance:**

This section outlines the procedures required to maintain a typical rainwater tank system. Each aspect of the system is addressed through both a description of the maintenance required and a more specific procedure of maintenance.

**All work required by this Schedule should be completed by Suitably Qualified Practitioner. All drainage works should be undertaken by a certified plumber in accordance with AS/NZS 3500.5. Other works, including electrical work, should be completed by other certified tradesmen in accordance with the relevant standards.**

**CAUTION:** Any maintenance works that require entry of a 'confined space' (eg: full body entry of a stormwater pit) must be carried out by suitably qualified personnel in accordance with the *Occupational Health and Safety Act 1993*, 'Workcover Authority of NSW' requirements and 'Confined Spaced' regulations.

### **Roof gutters**

#### *Description:*

All gutters will be fitted with leaf guards and should be inspected and cleaned to ensure leaf litter cannot enter the downpipes.

*Maintenance (6 monthly):*

Leaf guards should be inspected for defects and to ensure they are fully operational. Gutters should be cleaned of any debris.

**First flush device**

*Description:*

This first flush system which collects the initial runoff volume from the roof must be inspected and cleaned to ensure it remains fully functional. The collection reservoir and small bore outlet must be free of accumulated debris. The size of the small bore outlet should be maintained

*Maintenance (6 monthly):*

Open the cap of the base first flush reservoir, drain any water and remove any debris. Make sure the small bore outlet is not blocked.

**Rainwater storage tank**

*Description:*

The structural integrity of the rainwater storage tank is critical and should be inspected for faults. The inlet and outlet to the tank must be free of debris and fully operational. The tank should be desludged as is required.

*Maintenance (12 monthly):*

The tank should be inspected for cracks or defects along the external lining. The lid should be opened and the tank visually inspected along the internal lining as well. The inlet and outlet should be inspected for defects and to ensure they are fully operational. The mains top up device, including the float switch and valves should be tested and repaired where required. The tank should be drained and desludged as required (sludge build-up should not exceed 50mm) by emptying the tank with the drain outlet and washing away the sludge with the hose on high pressure.

**Water pressure pump**

*Description*

The Pressure pump supplies stored rainwater to the toilet cistern and outdoor uses. It is a mechanical item and must be maintained and serviced in accordance with the manufacturers specifications, to ensure a long life.

*Maintenance (12 to 24 monthly):*

Visually inspect the pump for any leaks. Check air pressure within pressure cell and adjust as required. Check solenoid and pressure switch for correct operation. Run pump and check for excessive bearing and impeller noise and replace if necessary. Check all electrical connections for any defects and repair as necessary.

*LAST PAGE - BLANK*

*draft*