Mosman COUNCIL

ASSET MANAGEMENT Stormwater

Adopted by Council 6 August 2013

1 Introduction

The Mosman local government area is located in Sydney's northern suburbs, around 6 kilometres from central Sydney. The Council area is predominately residential with commercial areas along Military Road. Assets with large institutional uses (including HMAS Penguin, National Park, Sydney Harbour Federation Trust and Taronga Zoo) are not included in this Plan. The Council area includes significant areas of Sydney Harbour foreshore. Early settlement in Mosman dates from the 1800s, but development of the area was slow until the 1880s and 1890s, when road access was improved. Significant growth in Mosman occurred in the interwar period as well as the 1950s and 1960s when many residential flat buildings were constructed. Since this period, growth has slowed as development opportunities have become fewer.

1.1 Nature of Services

Mosman Council provides, operates, and/or maintains the following stormwater assets:

- Pipelines and culverts
- Pits and manholes
- Converters
- Open drains
- Covers, inlets and outlets
- Pollution control devices
- Drainage control devices
- Stormwater reuse tanks
- Natural watercourses

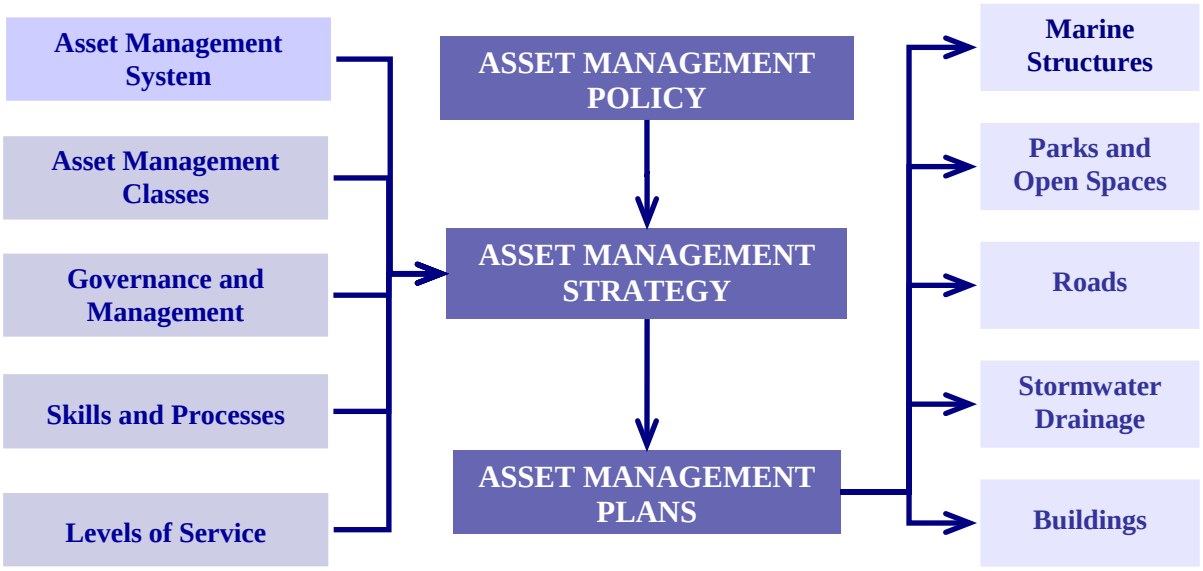
Through the provision, operation and maintenance of these assets, Mosman Council provides the services of:

- Limiting the risk of flooding of public and private property;
- Limiting the risk to public health from flooding, including to pedestrian and vehicular traffic;
- Protecting downstream environments through managing the quality and quantity of stormwater discharged, and the location of discharge;
- Helping to manage regional water resources;
- Potable water savings through stormwater reuse; and
- Helping to maintain the provision of public recreational areas, including aquatic environments.

1.2 Corporate and Community Direction

In accordance with the NSW government's Integrated Planning and Reporting framework, Mosman Council's *Community Strategic Plan (2011-2021)* presents a broad outline of Mosman Council's aspirations for serving its residents, based on community engagement. It includes a Resourcing Strategy, which outlines financial, human resource and asset needs to deliver Council's services, and gives Council's Asset Management Framework, which is reproduced in Figure 1.1.

Figure 1.1: Mosman Council Asset Management Framework



Key components of the Resourcing Strategy and the Asset Management Framework are the *Asset Management Policy* and *Asset Management Strategy*. These documents are currently being updated.

The key points from the *Asset Management Policy* are:

- Assets are to be managed (from creation, through operation to disposal) in accordance with Council's priorities for service delivery;
- Each infrastructure asset class (buildings, roads, stormwater drainage, parks and open space, marine structures) has an asset management plan;
- The asset management strategy is to be implemented in order to apply asset management best practice;
- Relevant legislation will be taken into account in asset management; and
- Council will promote continuous improvement in asset management.

The *Asset Management Strategy* sets out what should be covered in the asset management plans, describes the current status of risk management and asset information systems within Council, and outlines human resource needs and staff roles and responsibilities. This Asset Management Plan is in accordance with the *Asset Management Strategy*.

2 Levels of Service

2.1 Customer Research

Council have conducted public meetings, focus groups, online forums, community conversations and held 'Street Speak' sessions to hear what the community is saying about various aspects of its business. In the lead-up to the development of MOSPLAN, Council undertook the 2012 Community Survey (a survey of this kind was previously undertaken in 2010), and it was intended that the survey be carried out every two years.

In the 2012 survey questions relating to stormwater management were combined with environment, and responses were rated on the combined issues of *"Management & Protection of the environment (eg water quality, stormwater management, restoring natural bushland areas)",* which is likely to have affected community feedback.

2.2 Stormwater Roles & Responsibilities within NSW State Government

A variety of organisations and State agencies in New South Wales share responsibility for stormwater management with Mosman Council, these include:

- Sydney Water holds responsibility for predominantly large (or trunk) drains within a proportion of their operational areas. They are required to maintain both the condition and hydraulic capacity of these assets. Sydney Water's stormwater assets extend across 27 local government areas in the greater Sydney metropolitan area.
- Roads & Maritime Services (RMS), with stormwater management responsibilities normally limited to drains needed to pass stormwater across State roads. RMS contributes to the cost of drains along these roads under certain circumstances, and also has responsibility for stormwater management on its freeways.

A number of other State agencies carry responsibility for establishing the policy framework for environmental and natural resource management, including stormwater management. These are:

- Office of Environment and Heritage (OEH), which has supported the Stormwater Trust since its inception, and coordinates the policy direction for stormwater management in New South Wales. Additionally, the OEH is developing a suite of documents under the Managing Urban Stormwater theme, published to provide guidance to councils and developers on issues ranging from treatment techniques to stormwater planning.
- Department of Natural Resources (DNR), which holds ultimate responsibility for management of natural resources within the State.

Of particular relevance to stormwater management is the integral role the Office of Environment and Heritage has in coordinating Floodplain Management Plans (FMPs):

- The Sydney Metropolitan Catchment Management Authority (SMCMA), which is responsible for overseeing natural resource management within the area;
- Department of Primary Industries Office of Water, which promotes integrated water cycle management by water utilities to manage water systems in a sustainable way that benefits the community and local environment. The Department also provides guidance and support to local water utilities that operate under the *Local Government Act*.

2.3 Target Levels of Service

Table 2.1: Levels of Service (targets per year unless stated otherwise)

Service description	Performance Measure	Performance Target	Current Performance
Adequate capital works planning	Capital works program in place	Yes	Yes
Community involved in planning	Community consultation process implemented	Yes	Yes
New development protected from flooding to reasonable extent	Number of building approvals granted without protection from a 1 in 20 year rainfall event per year	0	0
Public health and safety	Number of injuries attributable to poorly maintained stormwater drains per year	0	Data to be recorded beginning 2013
Lack of public nuisance	Number of verified incidents of public nuisance attributable to stormwater infrastructure per year	5	Data to be recorded beginning 2013
	Number of complaints per year concerning pit blockages	5	Data to be recorded beginning 2013
	Number of incidents of vehicular and pedestrian traffic interruptions	10	Data to be recorded beginning 2013
Protection of private property from flooding damage	Number of properties damaged as a result of flooding per year (3 year average)	1	1

Stormwater

Service description	Performance Measure	Performance Target	Current Performance
Customer service	Percentage of written and telephone enquiries acknowledged within 5 business days	90%	Data to be recorded beginning 2013
Stormwater resource management	Volume of collected stormwater in Council stormwater tanks reused per year	2 ML/year	Data currently being recorded
Adequate asset assessment	Percentage of pipes CCTV assessed in last 5 years	25%	10%
	Percentage of open conduits assessed in last 5 years	100%	100%
	Percentage of pits and manholes assessed in last 5 years	10%	10%
	Percentage of SQIDs condition assessed in last 5 years	100%	Data currently being recorded
	Percentage of large culverts condition assessed in last 5 years	100%	100%
Continuation of service	Percentage of responses to blockages of pipes/pits within 3 days in last year	95%	Data to be recorded beginning 2013

3 Demand

There is limited opportunity for further residential development within many areas of the Council area, particularly those furthest from the Military Road spine. It is expected that Mosman's population will increase from 28,450 in 2011 to 29,395 by 2031 (data from Council's preferred demographics provider, forecast.id®).

3.1 Factors Affecting Demand

The following factors affect the demand for the services provided by stormwater assets:

- Climate change and long and short term weather patterns (making storms more intense and the burden on stormwater assets greater, and making levels of service more difficult to achieve)
- Population growth (indirectly, by promoting greenfield development or increasing population density)
- Development – particularly greenfield development (by increasing hard-surface areas and therefore increasing run-off rates and the size and concentration of flows to stormwater assets)
- Increased legislative demands
- More sophisticated flood predictions (which may uncover the previously unknown need for new or higher-capacity stormwater assets)
- Customer expectations (which may vary according to price-to-service scenarios, if presented).

3.2 Predicted Demand

Demand will be predicted through the use of a hydraulic model which is due to be completed in mid 2014. The model will take into account topographical contours and overland flow paths, modelling various rainfall event scenarios. Expected outcomes from the model are the:

- Identification of areas (and property) currently vulnerable to various intensity rainfall events
- Hydraulic criticality of pipes, culverts and open channels
- Identification of the need for new/upgraded assets to meet flooding-related service standards
- Information leading to flood risk management.

3.3 Demand Management

Mosman Council is a well developed area of Sydney and the number of available greenfield sites is extremely limited. Additional stormwater loads are, in general, related to re-development. It is not practical for Council to upgrade its stormwater system in the short term to cater for additional loading, and the increased runoff is managed through water sensitive urban design (WSUD) solutions. Strategies employed to achieve WSUD include the following:

- Limiting discharges per unit area to a rate corresponding to the existing drainage systems existing capacity, taking into account future upgrading works which Council will be implementing;
- Developing catchment based policy;
- Utilising on-site stormwater detention (O.S.D), to limit both the peak load on the stormwater system, and flooding to private property; and
- Flood risk management.

4 Current Status of Assets

4.1 Dimensional, Condition, Age and Material Information

The following information is based on data collected by Cardno between 2011 and 2013, supplemented by previous Council data on its GIS. Cardno collected the following data:

- Condition and dimensional inspection of pits, headwalls, endwalls and converters (as a group, 'nodes'). This included drawings of pipe sizes connecting pits and their connectivity with other nodes;
- Condition and dimensional inspection of all open channels;
- CCTV survey of 10,503 metres of pipelines and 'small' culverts; and
- Topographical survey of natural watercourses, nodes and open channels.

Condition grades of between 1 and 5 were assigned to assets according to the general descriptions given in Table 4.1.

Table 4.2: Condition grades and descriptions

Condition grade	Qualitative grade	Description
1	Excellent	Insignificant deterioration has occurred. Appears to be in good condition.
2	Good	Minor deterioration has occurred. Minor defects are present.
3	Fair	Moderate deterioration has occurred. Developed defects are present but do not affect short/medium term structural integrity.
4	Poor	Serious deterioration has occurred. Significant defects are present that affect structural integrity.
5	Expired	Failure has occurred or is imminent.

4.1.1 Pipes

Cardno's analysis of pit and pipe connections resulted in pipe data as shown in Table 4.2.

Table 4.2: Pipe length by size

Pipe diameter (mm)^	Number	Length (m)	Average Length (m)	% by Length (excepting 'unknown')
Unknown	655	13323.4	20.3	--
<125*	35	285.1	8.1	0.59%
150	78	711.8	9.1	1.47%
225	156	1827.8	11.7	3.78%
300	639	10147.5	15.9	20.99%
375	847	16141.5	19.1	33.39%
450	333	7047.2	21.2	14.58%
525	100	2882.8	28.8	5.96%
600	193	4645.6	24.1	9.61%
675	17	414.3	24.4	0.86%
750	32	783.3	24.5	1.62%
825	9	229.0	25.4	0.47%
900	39	1413.4	36.2	2.92%
1050	33	943.9	28.6	1.95%
1200	15	456.0	30.4	0.94%
1350	7	254.3	36.3	0.53%
1500	2	14.4	7.2	0.03%
1750	1	15.6	15.6	0.03%
1900	2	125.3	62.6	0.26%
Total	**3193**	**61662.1**	**19.3**	**100%**

^ Some pipe diameters recorded as non-standard sizes have been assigned the closest standard size

* Generally, pipes with a diameter less than 150 mm are not considered part of the stormwater network

The material breakdown of pipes, taken from Council data, is shown in Table 4.3. The vast majority of pipes are concrete, with small amounts of vitrified clay and unplasticised polyvinyl chloride (uPVC) (the latter presumably coming from pipe relining).

Table 4.3: Pipe length by material

Pipe material	Number	Length (m)	% by Length (excepting 'unknown')
Unknown	632	12862.3	--
Concrete	2343	46307.4	94.89%
uPVC	152	1646.9	3.37%
Vitrified Clay	33	312.6	0.64%
Other	33	532.9	1.09%
Total	**3193**	**61662.1**	**100%**

Table 4.4 shows the breakdown of pipes by apparent age (taken from Council data, which was assumed based on circumstantial historical information, such as the construction date of houses). The accuracy of the data is assumed to be relatively poor. It indicates that the majority of pipes are between 30 and 70 years old, with a substantial portion being between 70-110 years old, and a small number being less than 30 years old, which fits with the development of the area.

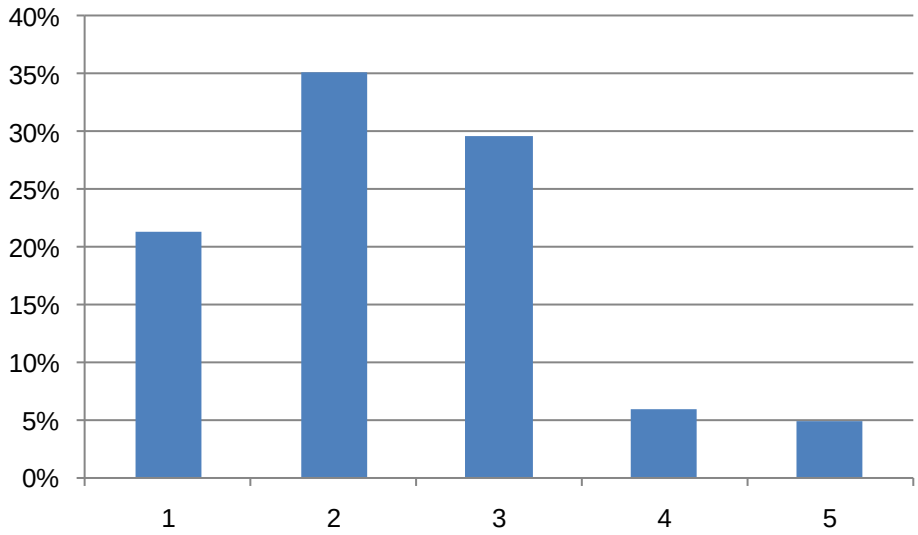
Table 4.4: Pipe length by apparent pipe age

Apparent pipe age	Number	Length (m)	% by Length (excepting 'unknown')
Unknown	267	3134.0	--
'New' (<30 years old)	224	4541.9	7.76%
'Recent' (30-70 years old)	1730	33384.0	57.04%
'Ageing' (70-110 years old)	972	20602.2	35.20%
'Old' (>110 years old)	0	0	--
Total	**3193**	**61192.8**	**100%**

Cardno surveyed 9,787 metres of the stormwater pipe network via CCTV, which is considered statistically significant and representative of the network as a whole. [Please note that this is the total length of footage obtained, with some pipes only being partially

surveyed because of abandonments. The total length of pipes surveyed, if summing the entire length of each pipe (i.e. if there had been no abandonments) is 11,217 m.] The condition profile of this portion of the network is shown in Figure 4.1. Only 4.8% of pipes are in a condition 5, while 6.0% are in a condition 4. This indicates that on the whole, despite being a relatively old area, the pipes in Mosman are in a fair condition to good condition.

Figure 4.2: Condition profile of pipes surveyed by CCTV



Photos of typical defects and/or pipe cross sections from the CCTV surveys, according to condition grade, are shown in Figure 4.2.

Figure 4.3: Pipe defects/cross sections from CCTV surveys by condition grade

Condition 1

Condition 2

Condition 3

Condition 4

Condition 5

Condition 5

Pipe conditions broken down by pipe diameter are presented in Table 4.5. While for pipe sizes above 900 mm diameter and 225 mm and below, there are insufficient numbers of pipes to infer a trend, it is clear that the majority of condition 5 pipes are of a 450 mm diameter, with 300 mm and 375 mm pipes also having some condition 5 grades. Condition 4 grades were found in 300, 375, 450, 525 and 750 mm pipes.

Table 4.5: Condition grade by pipe diameter

Pipe diameter (mm)	Number	Length (m)	Condition Grade (percentage by length)				
			1	2	3	4	5
150	1	9.10	0.00%	0.00%	100.00%	0.00%	0.00%
225	3	101.56	22.84%	53.64%	23.52%	0.00%	0.00%
300	86	1845.83	21.68%	34.89%	30.11%	5.54%	7.78%
375	173	4210.50	21.82%	27.14%	39.27%	6.69%	5.08%
450	58	1413.13	10.07%	49.63%	19.64%	11.41%	9.24%
525	10	408.16	0.00%	61.16%	36.25%	2.59%	0.00%
600	23	655.70	36.24%	41.09%	22.67%	0.00%	0.00%
675	2	134.58	15.08%	68.05%	16.87%	0.00%	0.00%
750	8	349.45	56.39%	23.10%	6.90%	13.62%	0.00%
900	20	537.49	35.38%	47.67%	16.95%	0.00%	0.00%
1050	3	83.46	22.21%	77.79%	0.00%	0.00%	0.00%
1200	2	16.63	0.00%	0.00%	100.00%	0.00%	0.00%
1350	1	21.78	0.00%	0.00%	100.00%	0.00%	0.00%
Total	**390.00**	**9787.38**					

Around 97% of pipes surveyed by CCTV were concrete. Because of this, it is not possible to infer a trend of condition by pipe material.

Table 4.6 shows condition grades by apparent pipe age. While the number of ‘unknown’ pipes means the trend for such pipes cannot be relied upon, there are more significant numbers of new, recent and ageing pipes, which show unintuitive trends. There is a decreasing proportion of condition 4 pipes with increasing apparent age, as well as a larger proportion of condition 1 pipes with increasing age, both of which are contrary to expectation. The highest proportion of Condition 5 pipes occurs with ‘New’ pipes, and the total of condition 4 and 5 pipes decreases with increasing apparent age. The only trend

which runs with expectation is that for condition 3 pipes, where the proportion increases with age. There may be some kind of "they don't make [/install] them like they used to" effect present, coupled with an effect from older pipes already having been repaired/replaced. Cardno's experience is that pipe manufacturers have progressively been reducing manufacturing allowances, which would support this finding. The imprecision of the age data may also be affecting the proportions, meaning no clear implication can be drawn.

Table 4.6: Condition grade by apparent pipe age

Apparent pipe age	Number	Length (m)	Condition Grade (percentage by length)				
			1	2	3	4	5
Unknown	11	159.17	18.75%	66.55%	5.81%	0.00%	8.89%
New	33	1037.67	15.16%	41.82%	24.94%	8.65%	9.43%
Recent	245	5528.70	21.21%	38.68%	28.99%	7.29%	3.83%
Ageing	101	3061.84	25.75%	28.63%	36.64%	3.62%	5.36%
Old	0	0	--	--	--	--	--
Total	390	9787.38					

4.1.2 Pits, endwalls, headwalls, and converters ('nodes')

All pits, endwalls, headwalls and converters were condition inspected by Cardno. The number of each type of these assets are shown in Table 4.7.

Table 4.7: Numbers of nodes by type

Asset type	Number	Description
Buried Junction*	657	A pit connecting two or more pipes which has had its cover/lid buried by, typically, a road surfacing such as asphalt. Also known as a blind pit.
Converter	132	A structure that acts to transfer gutter flow to piped flow or vice versa.
Headwall/Endwall	272	A structure supporting the inlet (headwall) or outlet (endwall) of a pipe and is open to the environment. Headwalls typically take flows from a natural watercourse or open conduit into a pipe network; endwalls typically release flows from a piped network into a natural watercourse or open conduit.

Stormwater

Asset type	Number	Description
Junction Pit	401	A pit connecting two or more pipes that does not intake additional stormwater through a surface inlet, and that has a square/rectangular lid and pit.
Kerb Inlet Pit	1529	A pit which forms part of the kerb system and which has a surface inlet for receiving stormwater from gutters. It is usually connected to upstream and downstream pits.
Manhole	65	Similar to a junction pit, but with a circular lid and a circular pit.
Node	118	The junction of two line assets where there is no separate structure – not considered assets themselves, but used for hydraulic modelling purposes.
Surface Inlet Pit	462	A pit with a surface inlet that is not part of a kerb-and-gutter system.
Unknown	8	The asset could not be accessed and is therefore of an unknown type.
Total	3644	

* Buried junctions were not condition inspected and either inferred or their existence taken from Council data.

Typical images of nodes assets are shown in Figure 4.3.

Figure 4.4: Example photos of node assets

Converter

Kerb Inlet Pit

Surface Inlet Pit

Endwall

Junction Pit

Manhole

Condition inspections gave scores to each of the following:

- Walls
- Base
- Connections (of incoming pipes)
- Step-irons
- Lintel
- Cover
- Apron

Accordingly, nodes could generally be rated according to their structure (the average score of the walls and base scores), according to the cover, and according to the lintel. Condition gradings are presented in Table 4.8.

Generally, node assets are in a fair-good condition. Converters are in the poorest condition, while no manhole structures exhibit any defects resulting in a condition 4 or 5 grading. Covers and lintels for all nodes are in a worse state than the structure itself.

Table 4.8: Condition of node assets by type and structure/lintel/cover

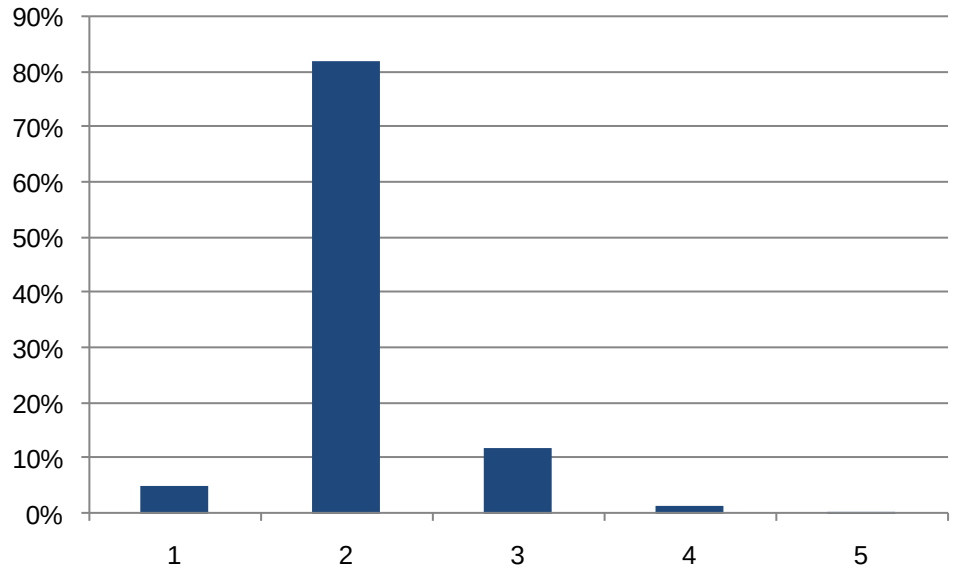
Node type	Condition Grade (percentage by length)				
	1	2	3	4	5
Converters					
Lintel^ (structure)	15.5%	49.6%	24.0%	7.8%	3.1%
Headwalls/Endwalls					
Structure	4.2%	55.8%	35.2%	4.8%	0.0%
Junction Pits					
Structure	4.1%	74.1%	20.1%	1.8%	0.0%
Cover	4.4%	76.2%	12.9%	3.9%	2.6%
Kerb Inlet Pits					
Structure	0.8%	74.8%	22.5%	2.0%	0.0%
Lintel	23.8%	52.2%	18.1%	4.3%	1.6%
Cover	29.5%	61.3%	7.1%	1.2%	0.9%
Manholes					
Structure	0.0%	92.2%	7.8%	0.0%	0.0%

Node type	Condition Grade (percentage by length)				
	1	2	3	4	5
Cover	1.6%	83.6%	9.8%	1.6%	3.3%
Surface Inlet Pits					
Structure	6.3%	67.2%	24.2%	1.9%	0.4%
Cover	30.8%	58.1%	7.0%	1.3%	2.8%

^ Converter lintel conditions were taken as a proxy for their structures. Structures could not be assessed because the lintel covers them and is fixed.

A general condition profile for node structures as a group is given in Figure 4.4.

Figure 4.5: General condition profile for node structures



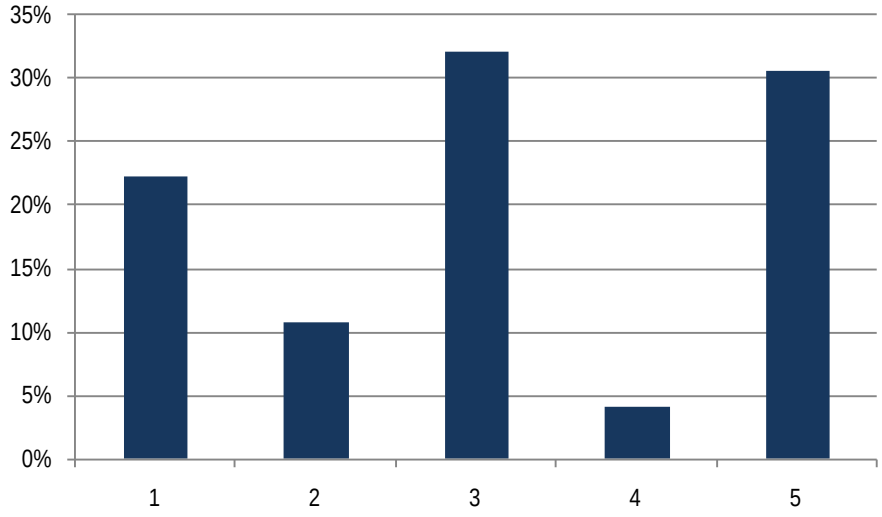
4.1.3 Open conduits

Open conduits are defined as man-made channels, either lined (typically by concrete) or unlined (typically being earth), which are open to the environment, and which are designed to convey stormwater. Council has 134 open conduits with a total length of 3,826 metres, varying in characteristic size from as small as 30 mm to as large as 1,500 mm. They are of varying shapes and designs, although the vast majority are lined. Example photos are given in Figure 4.5.

Figure 4.6: Example open conduits

The condition profile for Council's open channels, based on inspection undertaken by Cardno, is shown in Figure 4.6. In comparison to Council's other stormwater drainage assets, there is a high proportion of open channels that are in a condition 5. These open channels tend to be of a larger size and a longer length.

Figure 4.7: Condition profile of open channels



4.1.3 Culverts

Large Culverts

Large culverts, those with a span of greater than 1.8 metres and a total open area of greater than 3.0 m2, are considered to be bridges.

Council has three large culverts (one of which has an intermediate pit, meaning it is broken into two asset numbers). A Cardno bridge engineer was deployed to each of these three culverts to conduct physical inspections. A summary of the information on these culverts is contained in Table 4.9. Two of the three large culverts are in a fair to good condition; the other is in a fair-poor condition with a significant section in a condition 5 state, requiring rectification as soon as possible. Photographs of the three large culverts are given in Figure 4.7.

Table 4.9: Summary of dimensions and condition of large culverts

Location			
Parameter	Cowles Rd, Mosman (near Holt Ave intersection)	Bay St, Mosman (between Carrington Ave and Bickell Rd)	Balmoral Beach (near intersection of Raglan St and The Esplanade)
Width (mm)	2200	6500	5665
Height (mm)	1700	1350	950
Length (m)	11.1	31.3	52.4
Walls grading	3	3	3
Top slab grading	2	2	Majority 3; significant section of 5
Base grading	3	2	4

Figure 4.8: Large culvert photographs

Bay St

Cowles Rd

Balmoral Beach

Balmoral Beach

Small Culverts

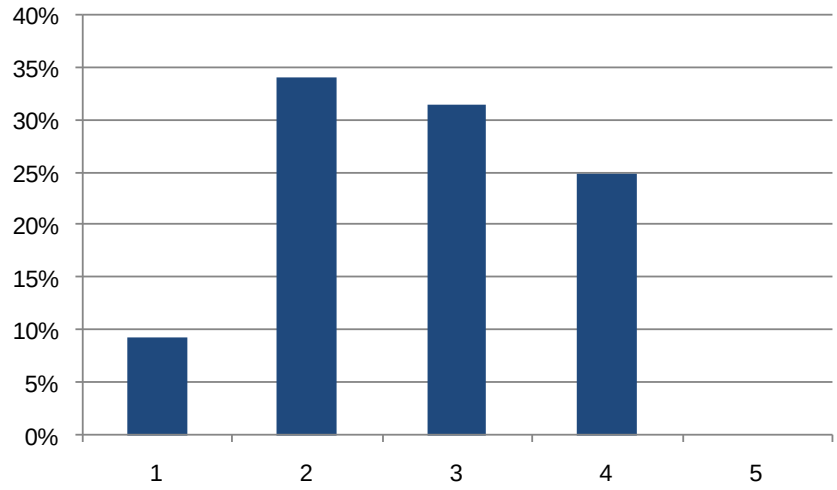
Council has 182 small culverts (with an open cross-sectional area of less than 3.0 m^2), with a total length of 3,420 metres. Cardno surveyed 18 of these small culverts using CCTV, a total length of 716 m (21% of the total length of culverts). The condition grades collected, shown in Table 4.10, are in general worse than those of pipes, although none of the culverts surveyed were in a condition 5.

Table 4.10: Condition grading of small culverts inspected by CCTV

Condition grade	Number of small culverts	Length of small culverts (m)	% by length
1	6	71.2	9.4%
2	4	259.5	34.1%
3	5	239.8	31.5%
4	3	190.5	25.0%
5	0	0.0	0.0%

The condition profile for small culverts is shown in Figure 4.8.

Figure 4.9: Condition profile for small culverts



Photographs showing cross sections/defects for each of the grades, taken from the CCTV survey, are shown in Figure 4.9.

Figure 4.10: Culvert defects/cross sections from CCTV surveys by condition grade

	
Condition 1	Condition 2

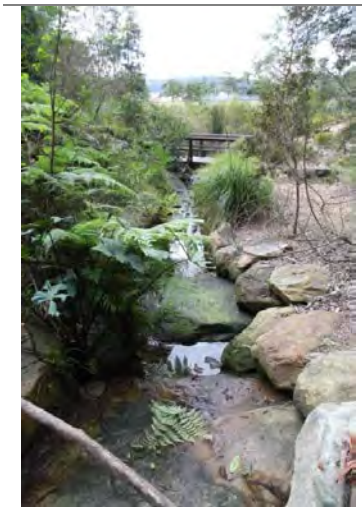
Condition 3

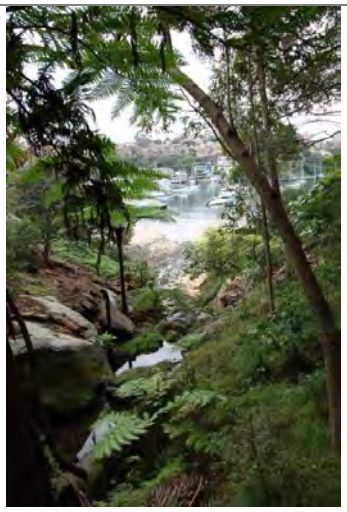
Condition 4 (manhole visible)

4.1.5 Natural watercourses

Council has 3214 metres of natural watercourses – drainage routes which have formed naturally. These are connected to the built drainage system via headwalls, pits and endwalls. Council cleans natural watercourses on an as-needed basis. Example natural watercourses are shown in Figure 4.10.

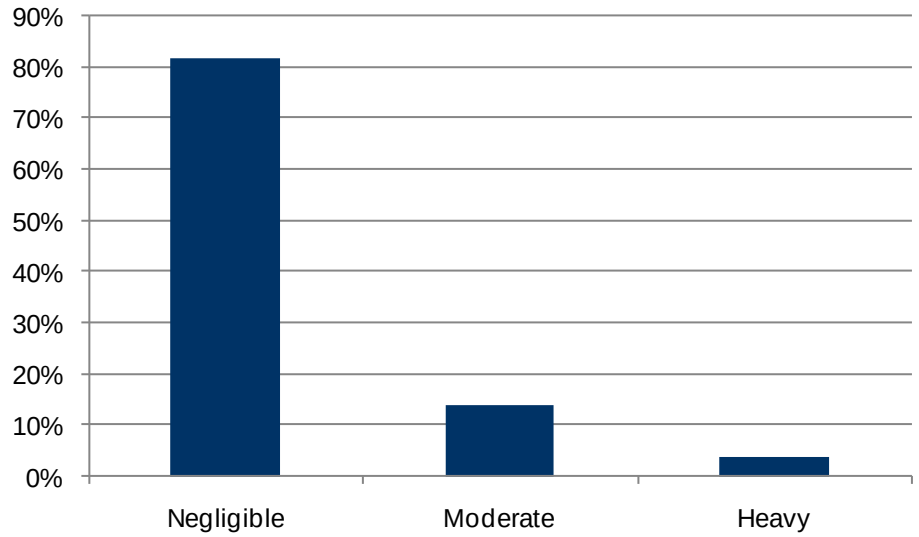
Figure 4.11: Example natural watercourses





Inspection of natural watercourses for unnatural debris found most watercourses in a 'good' condition – i.e. that there was a negligible amount of debris present, as shown in Figure 4.11.

Figure 4.12: Amount of debris in natural watercourses



4.1.6 Stormwater quality improvement devices (SQIDs)

Council owns 38 stormwater quality improvement devices (SQIDs), the earliest installed in 1996 and most being installed between 2000 and 2005. Table 4.11 shows the breakdown of SQIDs by unit type.

Table 4.11: SQID units owned by Council

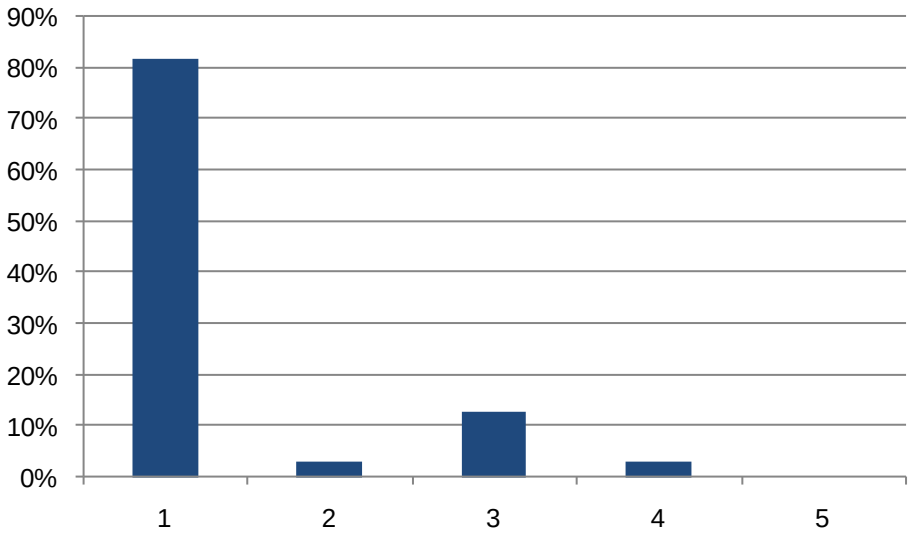
SQID Unit Type	Number	% by Number
Continuous Deflective Separation Technology (CDS)	21	55%
CleansAll	2	5%
Ecosol	2	5%
NetTech	7	18%
Pit Basket	1	3%
Pit with Screen	2	5%
Sand Filter	3	8%
Total	**38**	**100%**

The condition grades as assessed by Council staff are shown in Table 4.12. The condition profile is shown in Figure 4.12.

Table 4.12: SQID condition grades

Condition grade	Number	% by Number
1	31	82%
2	1	3%
3	5	13%
4	1	3%
5	0	0%

Figure 4.13: Condition profile for SQIDs



Example SQIDs are shown in Figure 4.13.

Figure 4.14: Example SQID devices

NetTech device

Pit with screen being installed

4.1.7 Rainwater reuse tanks

Council owns two rainwater reuse tanks as detailed in Table 4.13. Both systems rely on groundwater being collected in porous underground tanks through suitable fill material and geo-textile fabric. The Botanic Road rainwater reuse tank is shown in Figure 4.14.

Table 4.13: Details of rainwater reuse tanks

Location	Dimensions	Condition
Rawson Park	500 kL	1
Botanic Road	500 kL	1

Figure 4.15: Rainwater tank installation and finished state – Botanic Road

Installation

Finished state

4.2 Expected Useful Lives and Unit Rates

Extracts of expected useful lives and unit rates of the different asset types are given in Table 4.14 and Table 4.15. They have been taken from industry practice and Cardno's experience and research. The full list of asset useful life and unit rates are held within Council's Information System.

Table 4.14: Expected useful lives

Asset type	Expected useful life
Closed stormwater drain (pipe/culvert) – concrete or vitrified clay	100
Closed stormwater drain (pipe/culvert) – uPVC	70
Lined open stormwater drain – any material	100
Unlined open stormwater drain (earthworks)	150
Culvert – any material	100
Headwall/Endwall	100
Manhole	100
Kerb inlet pit	100
Surface inlet pit	100
Stormwater quality improvement device (SQID)	100
NetTech	20
Rainwater reuse tank	50

Asset type	Expected useful life
Natural watercourse	N/A

Table 4.15: Unit rates for replacement/renewal of assets

Asset type	Unit rate (including overheads)
Headwalls	Varies from $1,556 to $36,390 per unit
Converters	Varies from $734 to $965 per unit
Manholes	Varies from $754 to $13,603 per unit
Pits	Varies from $1,430 to $14,933 per unit
Lintels	Varies from $400 to $4,454 per unit
Pipes (replacement)	Varies from $218 to $7,985 per metre
Pipes (relining)	Varies from $114 to $2,504 per metre
Box culverts	Varies from $332 to $11,208 per metre
SQID	Varies from $2,264 to $246,708 per unit
Rainwater reuse tank	Varies from $507,000 to $742,000 per unit

5 Lifecycle Management

5.1 Lifecycle Strategy

Council aims to provide its stormwater drainage services to its target standards at the lowest lifecycle cost. The lifecycle of an asset encompasses:

- Identification of its need (including confirming that there is no non-asset solution)
- Selection of the asset solution (according to a set process)
- Installation/construction
- Operation, maintenance and inspection
- Renewal/upgrade
- Disposal.

5.2 Valuation Information

Council's stormwater assets are valued as shown in Table 5.1. Closed conduits form the bulk of the total asset value, with nodes being in second place and SQIDs slightly outweighing open conduits. The total annual depreciation amount gives a rough indication of the average renewals expenditure required to sustain the present asset base. Values of pipes have been based on relining costs, rather than the cost of replacing the whole section of pipe. This is further discussed in Section 6.1.1.

Table 5.16: Summary of valuation information

Asset type	Current replacement cost ($ 2013/14)	Written down value ($ 2013/14)	Annual depreciation ($ 2013/14)
Closed conduits (pipes and culverts)	$47,968,335	$38,271,870	$279,988
Nodes	$7,273,054	$4,940,429	$72,731
Open conduits	$2,333,090	$1,019,514	$23,325
SQIDs	$3,318,075	$2,890,788	$36,178
Rainwater tanks	$1,249,478	$1,129,221	$24,990
Total	**$62,142,032**	**$48,251,822**	**$437,212**

5.3 Capital Works

Capital works are works that increase the capital value of assets. This includes the installation of new assets, the renewal of assets (such as relining a pipe) and the replacement of an asset.

Overview

Council does not currently have a set process for capital works planning based on lifecycle costs. However, for stormwater drainage, the following principles usually apply:

- Adopt non-Council asset solutions:
    - Set exclusion zones for development (where modelling shows there is likely to be significant flooding)
    - Retain conditions on development such that flows from private sites must be attenuated on-site, so that peak loads on Council infrastructure are not increased
    - Adopt a climate change policy that limits Council's liability for flooding to private property that would not have occurred without climate change
- For existing assets:
    - All condition 5 assets should be renewed/replaced within 3 years (preferably 2)
    - Condition 4 assets should be renewed/replaced within 3-5 years in general
    - For cost efficiency, replacement of assets in condition 3 or worse if it coincides with major road works
    - Before replacement/renewal, the asset should be inspected to confirm its condition and the need for replacement
    - For pipes, reline where possible, replacing the pipeline entirely only where relining is not possible or where an upgrade of the size is necessary (relining is usually cheaper in the short term and also usually results in a lower lifecycle cost, as relining lasts at least 40 years on anecdotal evidence)
    - For culverts, replace with a standard size pipe if replacement is necessary, and if a pipe is possible, as pipes are generally easier to maintain and repair/renew
    - For pits, when making structural replacements, replace with a pre-fabricated pit type, which will be cheaper to repair/replace in future
    - For headwalls, when making replacements, replace with a prefabricated/standard structure, which will be cheaper to repair/replace in future
    - For open channels, when making replacements, replace with a prefabricated/standard structure where visually appropriate.

- For new assets:
    - Council generally engages a consultant for design services and will liaise with the consultant in determining the optimal solution for the asset need.

If a lifecycle cost process was implemented, it would prescribe analysis of the lifetime cost of various solutions against expected asset lifetime and factors such as availability of components, aesthetics, reliability, ease of operation, health and safety and environmental considerations.

Renewals/replacement triggers

Renewals and replacements are triggered as follows:

- Failure of the asset
- Upgrade of the asset being required
- The asset being in a condition 5 (renew/replace within 3 years, and preferably within 2 years)
- The asset being in a condition 4 (renew/replace within 3-5 years)
- The asset being in a condition 3 and road works taking place.

Before capital works are carried out, an inspection should be conducted to confirm the condition of the asset and the need for its renewal/replacement.

Documentation

There is no documentation in relation to planning new assets. The usual procedure is for Council to utilise specialised consultants to prepare detailed designs for specific locations. Council would benefit from a policy that outlined design requirements, for instance lifecycle cost, environmental considerations and aesthetic consideration, to supply to consultants, as well as a process for capital works planning which considered approaches to non-asset, existing asset and new asset scenarios.

Current issues

Intruding services, illegal sewer connections and tree roots present a problem for capital works, as described in Section 5.4.1.

Costs

Recent spending on capital works is shown in Table 5.2. Spending has generally been reactive (in response to collapses) and has been at a level well under the annual depreciation level of $416,755, which provides a rough approximation of required capital works spending to maintain an asset base at a serviceable condition.

Table 5.17: Recent spending on capital works

Year	Capital works spend
2011/12	$142,489.40
2010/11	$148,168.74
2009/10	$65,584.38
2008/09	$58,995.00
Average	**$103,809.38**

Given the introduction of the Stormwater Levy and the establishment of the 12 year work program, it is anticipated that future spending on capital works will increase to an average yearly spend of $448,961.

5.4 Operations, Maintenance and Inspections

5.4.1 Operations

Overview

There is no staff requirement for operations of stormwater assets. The stormwater network is designed to operate without human intervention, and there is no mechanical/electrical equipment that requires control.

Documentation

There are no documented procedures for operations, and no need of any.

Current issues

Council have noted a moderate number of intruding connections of other underground service providers (for instance, gas and telecommunications). This is an operation and maintenance problem as well as a management problem. Intruding services:

- Reduce the hydraulic capacity of Council's network, therefore reducing service levels and increasing flooding risks
- Can make cleaning of conduits problematic or impossible, which result in reduced service levels
- Limit the potential to renew pipes by relining, forcing trenched replacement of pipes
- Are often difficult to determine ownership of
- Can require a significant amount of time and effort to resolve with the service provider
- Can hasten the failure of pipes, and in doing so cause damage to road infrastructure.

Council are currently dealing with these issues on a case-by-case basis. There is the potential to develop a standard process for dealing with these issues, and to establish

channels and protocols with other services providers such that problems can be most efficiently resolved. Example photos are shown in Costs.

Costs for operations are bundled with maintenance costs, and described in Section 5.4.2.

Figure 5.1

The intrusion of tree roots causes many of the same physical problems as intruding services, and are also an ongoing issue.

Costs

Costs for operations are bundled with maintenance costs, and described in Section 5.4.2.

Figure 5.16: Example service intrusion photos from CCTV survey


EVERVIEW AVE
10070 <- 10413
300
23.03.2012
ITS Trenchless
2.65m


PRINCE ALBERT ST
12330 -> 12329
450
17.02.2012
ITS Trenchless
26.58m

5.4.2 Maintenance

Overview

Maintenance is currently entirely reactive, and mainly involves clearing pipe and pit blockages and emptying SQIDs when they are close to full, or at regular intervals. Council would like to shift to having planned maintenance programs to at least some extent; though due to the unpredictable nature of stormwater drainage, reactive maintenance will continue to form a major part of Council's maintenance work.

Documentation

There are no documented procedures for maintenance except for SQIDs, though there are plans for a pit maintenance schedule. Council aims to establish simple procedures for maintenance work.

Current issues

The intruding services problem described in Section 5.4.1 affects maintenance of stormwater assets. Council also wishes to move to a planned maintenance program as far as possible.

Costs

Recent spending on operations and maintenance is shown in Table 5.3. It is split into spending on SQIDs (mainly for emptying) and on other stormwater assets as a group. Generally, spending on SQIDs is higher than on other assets, as SQIDs are the devices which are designed to capture large solids from stormwater flows, and hence must be emptied regularly. Council expects future spending on operations and maintenance to increase to $177,500 annually, to account for better cleaning of pits and hence fewer flooding problems during rainfall events.

Table 5.18: Recent spending on O&M for stormwater assets

Year	O&M spend (excluding SQIDs)	O&M spend (SQIDs)	Total spend
2011/12	$39,615.77	$80,077.90	$119,693.67
2010/11	$43,029.27	$47,680.44	$90,709.71
2009/10	$36,693.45	$43,467.32	$80,160.77
2008/09	$95,011.92	$68,666.00	$163,677.92
Average	**$53,587.60**	**$59,972.92**	**$113,560.52**

5.4.3 Inspections

Overview

To date, inspections have been carried out irregularly, to varying levels of comprehensiveness. Council would like to institute a regular asset inspection program so that it can identify assets in need of remedial work. Such a proactive approach should guarantee better services. Making this shift, inspectors should carry out inspections according to set procedures and standards, so that results are relatively uniform. To this end, a condition inspection manual should be developed. Cardno developed a condition inspection manual for inspections in 2012, and this can be used as the basis for a Council condition inspection manual.

As the vast majority of nodes have been inspected in the 2012/13 financial year, the start of yearly inspections of nodes should commence in 2017/18. Similarly, all open conduits were inspected in 2012/13, and so a new round of inspections is not scheduled until 2018/19. The inspection of other assets should commence earlier.

The envisaged inspection programs for each category of asset are outlined in Table 5.4. The precise timing of works will depend on prevailing circumstances – for instance, after the large scale of inspections over 2012/13, Council has identified the need for remedial works and thus has a full program for capital works for the next three years.

Table 5.19: Desired inspection program and estimated costs

Asset type	Program length	Number/length to inspect	Estimated average cost ($2013/14) per year
Pipes and 'small' culverts	Continuous	Entire network over 10 years	$25,000
Large culverts	All large culverts once every 5 years	3 large culverts (94.8 m) (every 10 years)	$4,000 (once every 10 years)
Nodes	Continuous	572 (20% of 'inspectable' nodes every 2 years)	$27,000
Open conduits	All open conduits once every 10 years	3988 m (every 10 years)	$30,000 (once every 10 years)
SQIDs	All SQIDs once every 5 years	38 (every 5 years)	$10,000 (once every 5 years)
Average yearly expenditure			**$57,400**

Council's inspection program over the next 12 years is as shown in Table 5.5.

Table 5.20: Inspection program 2013/14 to 2024/15

Year	Assets Inspected	Total Cost
2013/14	Closed conduit inspections	$25,000
2014/15	Closed conduit inspections	$21,000
2015/16	Closed conduit inspections	$38,000
2016/17	Closed conduit inspections	$42,000
2017/18	SQID inspections Node inspections	$64,000
2018/19	Closed conduit inspections	$21,000
2019/20	Node inspections	$54,000
2020/21	Closed conduit inspections Open conduit inspections	$51,000
2021/22	Node inspections	$54,000
2022/23	SQID inspections	$10,000
2023/24	Large culvert inspections Node inspections	$58,000
2024/25	Closed conduit inspections	$42,000
Average (over 12 years)		$40,000

The averages in Table 5.4 and Table 5.5 differ because the latter takes account of inspections already conducted, whereas the former describes a model ten-year program.

5.4.4 Key performance indicators

Council has set operations and maintenance key performance indicators as detailed in Table 5.6.

Table 5.21: Operations and maintenance key performance indicators

Performance Measure	Performance Target	Current Performance
Spending on operations and maintenance as a percentage of asset replacement cost in past year	Between 0.5% and 2%	To be established
Ratio of planned to unplanned maintenance spend in past year	1:1	To be established
Tonnage of material removed from SQIDs per year	No target set; depends on mass collected	300 tonnes (2010/11)
Percentage of pits cleaned as per the yearly pit cleaning program	90%	To be established

5.5 Asset Disposal

Overview

Asset disposal is usually carried out if upgrading a stormwater pipeline, replacing a failed asset, or upgrading a road, and therefore generally comes under capital works planning. However, there may be instances where Council may choose to discontinue the service being provided by an asset, hence eliminating its need.

Documentation

There is currently no documentation regarding making the choice to dispose of an asset. It should be integrated into a capital works planning document.

Current issues

There are no major issues surrounding asset disposal at present. Council does not appear to have any asbestos material pipes.

Costs

Disposal costs are included in capital works costs as part of the replacement/upgrade of an asset.

6 Capital Works Program

6.1 Approach to Capital Works Program

The 12-year capital works program is shown in Appendix A. For the purposes of this report the works program has been provided as an asset category only. A more detailed works lists by location has been established in consultation with staff utilising the priority measures established in this report. This program will be a live program that is subject to change annually depending on emerging works. It is considered that every year, prior to the preparation of the annual works program, the four year program be reviewed and new works identified.

The works program has been developed so as to continue service provision and avoid failure of assets that may lead to collapse of an asset or flooding, which is a risk management approach.

Each inspected asset has been given a condition score between 1 and 5 and a criticality score based on its condition, size and location. A renewal year has been assigned to all condition 4 and 5 assets based on their criticality.

Also included in the capital works program is the inspections program outlined in Section 5.4.3. An ongoing inspections program allows renewal/replacement capital works planning which is based on field data rather than a model of when assets will fail, and is likely to be more accurate.

The specific approach to criticality and renewals for each type of asset is described as follows.

6.1.1 Stormwater Pipes and Culverts

Renewals are triggered on the basis shown in Table 6.1, and prioritised following the same table.

Table 6.22: Renewal triggers for stormwater pipes and culverts for capital works program

Structural grading thresholds – stormwater pipes			
Overall grade	Description	Renewal approach	Condition criticality score
1	Insignificant deterioration of the pipe has occurred. Appears to be in good condition.	Don't renew	0
2	Minor deterioration of the pipe has occurred. Minor defects are present.	Don't renew	20
3	Moderate deterioration has occurred. Developed defects are present but do not affect short/medium term structural integrity.	Don't renew	40
4	Serious deterioration of the pipe has occurred. Significant defects are present that affect structural integrity.	Renew within 3-5 years	60
5	Failure of the sewer has occurred or is imminent.	Renew within 2 years	80

All condition 4 and 5 pipes identified by CCTV have been programmed for renewal based on the following criticality scoring:

Criticality score (100) = Condition criticality (80) + road type criticality (10) + size criticality (10)

Road criticality is defined as follows:

- Arterial road = 10
- Regional road = 7.5
- Collector road = 5
- Minor local road/no road = 2.5.

Larger sized pipes were given a proportionally higher size criticality, as this reflects how much water they have been designed to transport.

Following a ten-year cycle of renewing pipes currently in a condition 4 or 5, pipe renewals have been calculated as costing 0.50% of the total current value of pipes and culverts. This reflects the current condition of pipes and includes a small safety factor. Expenditure in future years (after 2025) is expected to slowly rise as pipes age.

It has been assumed that relining would be the principle method of renewing pipes, as no collapsed or significantly deformed pipes were found during CCTV inspections to date. The

replacement costs of the pipes may be 'optimised' downwards to allow for this method of pipe renewal. Anecdotal evidence is that relined pipes exhibit lifetimes of at least 40 years – within the Sydney region, contractors state that they have not yet observed a failed relined pipe during the 40 years of their use. Cardno considers that a useful life of 70 years may be assumed (though manufacturers generally only give warranties for 40 years); with the lower capital costs of relining, this favours a lower lifecycle cost for relined pipes.

6.1.2 Nodes

All condition 4 and 5 nodes have been programmed for renewal, either structurally (i.e. the entire asset), just the cover, or just the lintel. A criticality score has been calculated to prioritise the structural renewals as follows:

Criticality (100) = condition criticality (80) + road type criticality (5) + number of connecting pipes criticality (5) + total area of connecting pipes criticality (10)

Cover and lintel renewals were prioritised on the following basis:

Criticality (100) = condition criticality (80) + road type criticality (20)

It has been assumed that after these known defects have been rectified, a program of inspections and replacements/renewals will commence, with approximately 10% of pits inspected per year and renewals spending at the average of spending in prior years.

6.1.3 Open Conduits

All open conduits have been inspected by Cardno (with condition rating meanings equivalent to those for pipes). A large portion of them are in a condition 4 or 5 as shown below, meaning that a disproportionally high amount of expenditure is required on them in the renewals program. A criticality approach was adopted to prioritise the renewals, following the formula:

Criticality (100) = condition criticality (80) + road type criticality (10) + size criticality (10)

After the specific renewals based on condition inspections are complete, the renewals program assumes a rate of expenditure equivalent to 1% of the current replacement value, with another round of inspections conducted in 2017/18.

6.1.4 Stormwater Quality Improvement Devices (SQIDs)

Cardno did not conduct condition assessments of SQIDs. It is understood that no SQID renewals are required in the short term; therefore, a rate of expenditure equivalent to depreciation has been assumed for the period commencing 2018/19.

6.2 Summary of Projected Capital Works Costs

A summary of the 12-year works program detailed in Appendix A is given in Table 6.2. It is exclusive of inspection programs. The average spend is fractionally lower than the annual depreciation figure shown in Table 5.1, which reflects that the current general condition of assets is slightly better than an 'average' condition.

Table 6.23: Summary of projected capital works costs for next 12 years

Year	Capital works spend
2013/14	$464,887
2014/15	$468,530
2015/16	$451,213
2016/17	$436,650
2017/18	$425,790
2018/19	$443,803
2019/20	$422,372
2020/21	$468,690
2021/22	$446,618
2022/23	$465,739
2023/24	$446,618
2024/25	$446,618
Average	**$448,961**

7 Financial Summary And Comments

A summary of the expected costs of operating, maintaining, renewing and replacing capital works between 2013/14 and 2024/25 is given in Table 7.1, which also includes the current budget for expenditure for those years. This assumes that no additional new capital works will be built.

The projections also suggest that Council will need to show minor flexibility in budget carry-overs and under-runs. They also show that the increase that Council has made to the total budget given to stormwater capital works, inspections, and operations and maintenance is justified by the necessary expenditure to maintain assets, and therefore services. The projections of necessary expenditure are based on Council's experience and Cardno's inspections and analysis.

Table 7.24: Financial summary to 2024/25

Year	Operations and Maintenance	Inspections	Capital Works (Renewals, Replacements and Upgrades)	Total Required Expenditure	Budgeted Expenditure
2013/14	$177,500	$25,000	$464,887	$667,387	$667,500
2014/15	$177,500	$21,000	$468,530	$667,030	$667,500
2015/16	$177,500	$38,000	$451,213	$666,713	$667,500
2016/17	$177,500	$42,000	$436,650	$656,150	$667,500
2017/18	$177,500	$64,000	$425,790	$667,290	$667,500
2018/19	$177,500	$51,000	$443,803	$672,303	$667,500
2019/20	$177,500	$54,000	$422,372	$653,872	$667,500
2020/21	$177,500	$21,000	$468,690	$667,190	$667,500
2021/22	$177,500	$54,000	$446,618	$678,118	$667,500
2022/23	$177,500	$10,000	$465,739	$653,239	$667,500
2023/24	$177,500	$58,000	$446,618	$682,118	$667,500
2024/25	$177,500	$42,000	$446,618	$666,118	$667,500
Total	**$2,130,000**	**$480,000**	**$5,387,531**	**$7,997,531**	**$8,010,000**
Average	**$177,500**	**$40,000**	**$448,961**	**$666,461**	**$667,500**

8 Other Management Items

8.1 Information Management

A summary of Council's information management status for stormwater drainage is given in Table 8.1. In general, Council's asset information is of a good quality, covering most of Council's assets and being accurate. However, the CIVICA system is yet to be fully implemented and operational. Implementation of the system is ongoing with other asset data being established. It is intended that recently collected stormwater data be uploaded to CIVICA from established spreadsheet inventories.

Outstanding data issues are:

- Inspection of much of the closed conduit network is required; this is incorporated in the inspection program
- Some pipe connectivity is not properly understood. This is usually the case where pipes connect to buried junctions. CCTV survey or other underground investigations may be required to properly trace some pipes
- There are a small number of assets requiring survey
- Performance data against service levels in some cases is yet to be recorded because of the measures have only recently been instituted.

As Council carries out inspections of assets, and condition information changes, it should store the historical information so that it can carry out analysis of asset degradation in order to inform future asset planning.

Table 8.25: Information management status

Information	System	Asset type	Data quality	Accessibility to required staff
Asset attribute information	MapInfo and Excel	Pipes and culverts	More CCTV inspections required Of data available, data is accurate	Adequate
		Large culverts	Data meets needs and is accurate	Adequate
		Nodes	Data meets needs and is accurate	Adequate
		Open conduits	Data meets needs and is accurate	Adequate

Stormwater

Information	System	Asset type	Data quality	Accessibility to required staff
		SQIDs	Data meets needs and is accurate	Adequate
		Natural Watercourses	Data meets needs and is accurate	Adequate
Spatial information	MapInfo	Pipes and culverts	Some connectivity information to be investigated	Adequate
		Large culverts	Data meets needs and is accurate	Adequate
		Nodes	Data generally meets needs and is accurate There are a small number of nodes requiring survey	Adequate
		Open conduits	Data generally meets needs and is accurate There are a small number of open culverts requiring survey	Adequate
		SQIDs	Data meets needs and is accurate	Adequate
		Natural Watercourses	Data generally meets needs and is accurate There are a small number of natural watercourses requiring survey	Adequate
Valuation information	Civica	All assets	Data meets needs and is accurate	Further work required
	Excel	All assets	Data meets needs and is accurate	Adequate
Service level performance	Excel	All assets	Data is yet to be recorded against some service measures	Adequate

8.2 Reporting

Reporting is identified and is carried out on a quarterly basis through MOSPLAN. Council will further develop its reporting in the next 12-36 months.

8.3 Human Resources Management

Table 8.2 describes who carries out various asset management functions and if current budgets and staff levels are adequate. Council generally has adequate staff levels and consultancy budgets to carry out functions.

Table 8.26: Asset management human resource adequacy

Function	Carried out by	Adequacy of staff levels/consultancy budget
Asset management planning – levels of service setting, data presentation and analysis, life cycle asset planning, action plan development	Council staff/Consultants	Adequate
Demand forecasting/hydraulic modelling	Consultants	Adequate (through grants)
Service level performance recording	Council staff	Adequate
Asset management reporting and reviewing	Council staff	Adequate
Operations	Council staff	Adequate
Maintenance	Council staff/Contractors	Adequate
Condition assessment	Consultants/Contractors	Adequate
Data management	Council staff	Adequate
Capital works design and scheduling (new, upgrades, replacements, renewals)	Council staff/Consultants	Adequate
Capital works delivery	Council staff/Consultants/Contractors	Adequate
Subcontractor management	Council staff	Adequate
Asset financial planning	Council staff/Consultants	Adequate
Community engagement	Council staff/Consultants	Adequate

Function	Carried out by	Adequacy of staff levels/consultancy budget
Inspections	Council staff/Contractors	Not adequate/further works required

Table 8.3 outlines the training and awareness ideal for Council staff, and the current level of adequacy for each. Staff are considered to be adequately trained and aware, though general staff could be made more aware of the asset management policy.

Table 8.27: Staff training desired and current levels

Role/Position	Target level of training/awareness	Current level of training/awareness
Councillors	Awareness of *Asset Management Policy*	Adequate
General management	Awareness of *Asset Management Policy*	Adequate
General staff	Awareness of *Asset Management Policy*	More awareness required.
Asset Management Engineers	Training in PAS 55 or similar standard IPWEA 'Stormwater Drainage Condition Assessment Workshop' or similar IPWEA 'Infrastructure Financial Management' or similar	Adequate
Financial/budgeting manager	IPWEA 'Infrastructure Financial Management' or similar	Adequate
Field staff	Awareness of *Asset Management Policy* Necessary health and safety training for field work	Adequate

8.4 Risk Management

Council has a *Risk Management Policy* (last updated 2012) and is in the process of establishing a risk register for stormwater drainage.

9 Asset Management Improvement Actions

Stormwater asset management within Council is presently at a moderately sophisticated level. However, improvements could be made as detailed in Table 9.1.

Table 9.28: Asset management improvement plan

Priority	Improvement area	Action	Timing
1	Documentation	Develop maintenance schedules	2013/14
1	Management of intruding services	Establish communication channels and protocols for solving intruding service problems with other underground service providers	2013/14
2	Levels of service	Record current performance against levels of service	Annually
2	Documentation	Develop policy to give to consultants for capital works planning outlining Council's design requirements	2013/14
3	Documentation	Develop process for capital works planning	2014/15
3	Levels of service	Analyse costs against levels of service and engage customers in setting target levels	2015/16
3	Documentation	Develop simple procedures for maintenance work	2014/15
4	Asset degradation awareness	As new asset inspections are carried out, retain historical condition data so that deterioration trends can be observed and analysed	Ongoing
5	Asset degradation awareness	Analyse pipe conditions in respect to surrounding soil types and adjust asset management practices if necessary	2015/16
5	Risk management	Establish a risk register for stormwater drainage	2015/16

Appendix A

Capital Works Program

Asset Group	Work Type	Indicative Cost ($2013/14)	Expected Renewal Year
SQIDs and nodes	Maintenance	$115,000	2013/14
Closed and open conduits	Maintenance	$62,500	2013/14
Closed conduits	Renewals/replacements from inspections	$231,887	2013/14
Nodes	Renewals/replacements from inspections	$93,000	2013/14
Open conduits	Renewals/replacements from inspections	$90,000	2013/14
Stormwater assets in general	Roadwork related upgrades	$50,000	2013/14
Closed conduits	Inspections	$25,000	2013/14
SQIDs and nodes	Maintenance	$115,000	2014/15
Closed and open conduits	Maintenance	$62,500	2014/15
Closed conduits	Renewals/replacements from inspections	$154,725	2014/15
Nodes	Renewals/replacements from inspections	$138,145	2014/15
Open conduits	Renewals/replacements from inspections	$105,661	2014/15
SQIDs	Renewals/replacements from inspections	$20,000	2014/15
Stormwater assets in general	Roadwork related upgrades	$50,000	2014/15
Closed conduits	Inspections	$21,000	2014/15

Asset Group	Work Type	Indicative Cost ($2013/14)	Expected Renewal Year
SQIDs and nodes	Maintenance	$115,000	2015/16
Closed and open conduits	Maintenance	$62,500	2015/16
Closed conduits	Renewals/replacements from inspections	$204,181	2015/16
Nodes	Renewals/replacements from inspections	$75,662	2015/16
Open conduits	Renewals/replacements from inspections	$121,371	2015/16
Stormwater assets in general	Roadwork related upgrades	$50,000	2015/16
Closed conduits	Inspections	$38,000	2015/16
SQIDs and nodes	Maintenance	$115,000	2016/17
Closed and open conduits	Maintenance	$62,500	2016/17
Nodes	Renewals/replacements from inspections	$131,215	2016/17
Open conduits	Renewals/replacements from inspections	$205,435	2016/17
Stormwater assets in general	Flood study improvement works	$50,000	2016/17
	Roadwork related upgrades	$50,000	2016/17
Closed conduits	Inspections	$42,000	2016/17
SQIDs and nodes	Maintenance	$115,000	2017/18
Closed and open conduits	Maintenance	$62,500	2017/18
Closed conduits	Renewals/replacements from inspections	$211,537	2017/18
Nodes	Renewals/replacements from inspections	$44,176	2017/18

Stormwater

Asset Group	Work Type	Indicative Cost ($2013/14)	Expected Renewal Year
Open conduits	Renewals/replacements from inspections	$70,076	2017/18
Stormwater assets in general	Flood study improvement works	$50,000	2017/18
	Roadwork related upgrades	$50,000	2017/18
Nodes	Inspections	$54,000	2017/18
SQIDs	Inspections	$10,000	2017/18
SQIDs and nodes	Maintenance	$115,000	2018/19
Closed and open conduits	Maintenance	$62,500	2018/19
Closed conduits	Renewals/replacements from inspections	$211,537	2018/19
Open conduits	Renewals/replacements from inspections	$113,271	2018/19
SQIDs	Renewals/replacements from inspections	$48,995	2018/19
Stormwater assets in general	Flood study improvement works	$50,000	2018/19
	Roadwork related upgrades	$50,000	2018/19
Closed conduits	Inspections	$21,000	2018/19
SQIDs and nodes	Maintenance	$115,000	2019/20
Closed and open conduits	Maintenance	$62,500	2019/20
Closed conduits	Renewals/replacements from inspections	$211,537	2019/20
Nodes	Renewals/replacements from inspections	$61,840	2019/20
SQIDs	Renewals/replacements from inspections	$48,995	2019/20
Stormwater assets in general	Flood study improvement works	$50,000	2019/20

Asset Group	Work Type	Indicative Cost ($2013/14)	Expected Renewal Year
	Roadwork related upgrades	$50,000	2019/20
Nodes	Inspections	$54,000	2019/20
SQIDs and nodes	Maintenance	$115,000	2020/21
Closed and open conduits	Maintenance	$62,500	2020/21
Closed conduits	Renewals/replacements from inspections	$211,537	2020/21
Nodes	Renewals/replacements from inspections	$61,840	2020/21
Open conduits	Renewals/replacements from inspections	$16,318	2020/21
SQIDs	Renewals/replacements from inspections	$48,995	2020/21
Stormwater assets in general	Flood study improvement works	$50,000	2020/21
	Roadwork related upgrades	$50,000	2020/21
Closed conduits	Inspections	$21,000	2020/21
Open conduits	Inspections	$30,000	2020/21
SQIDs and nodes	Maintenance	$115,000	2021/22
Closed and open conduits	Maintenance	$62,500	2021/22
Closed conduits	Renewals/replacements from inspections	$211,537	2021/22
Nodes	Renewals/replacements from inspections	$61,840	2021/22
Open conduits	Renewals/replacements from inspections	$24,246	2021/22
SQIDs	Renewals/replacements from inspections	$48,995	2021/22
Stormwater assets in general	Flood study improvement works	$50,000	2021/22

Stormwater

Asset Group	Work Type	Indicative Cost ($2013/14)	Expected Renewal Year
	Roadwork related upgrades	$50,000	2021/22
Nodes	Inspections	$54,000	2021/22
SQIDs and nodes	Maintenance	$115,000	2022/23
Closed and open conduits	Maintenance	$62,500	2022/23
Closed conduits	Renewals/replacements from inspections	$211,537	2022/23
Nodes	Renewals/replacements from inspections	$61,840	2022/23
Open conduits	Renewals/replacements from inspections	$43,367	2022/23
SQIDs	Renewals/replacements from inspections	$48,995	2022/23
Stormwater assets in general	Flood study improvement works	$50,000	2022/23
	Roadwork related upgrades	$50,000	2022/23
SQIDs	Inspections	$10,000	2022/23
SQIDs and nodes	Maintenance	$115,000	2023/24
Closed and open conduits	Maintenance	$62,500	2023/24
Closed conduits	Renewals/replacements from inspections	$211,537	2023/24
Nodes	Renewals/replacements from inspections	$61,840	2023/24
Open conduits	Renewals/replacements from inspections	$24,246	2023/24
SQIDs	Renewals/replacements from inspections	$48,995	2023/24
Stormwater assets in general	Flood study improvement works	$50,000	2023/24
	Roadwork related upgrades	$50,000	2023/24

Asset Group	Work Type	Indicative Cost ($2013/14)	Expected Renewal Year
Closed conduits	Inspections	$4,000	2023/24
Nodes	Inspections	$54,000	2023/24
SQIDs and nodes	Maintenance	$115,000	2024/25
Closed and open conduits	Maintenance	$62,500	2024/25
Closed conduits	Renewals/replacements from inspections	$211,537	2024/25
Nodes	Renewals/replacements from inspections	$61,840	2024/25
Open conduits	Renewals/replacements from inspections	$24,246	2024/25
SQIDs	Renewals/replacements from inspections	$48,995	2024/25
Stormwater assets in general	Flood study improvement works	$50,000	2024/25
	Roadwork related upgrades	$50,000	2024/25
Closed conduits	Inspections	$42,000	2024/25

Mosman COUNCIL

Civic Centre, Mosman Square
Mosman NSW 2088
PO Box 211
Spit Junction NSW 2088
9978 4000 fax 9978 4132
council@mosman.nsw.gov.au

mosman.nsw.gov.au

Parks&OpenSpace 20132017