

LIVERPOOL CITY COUNCIL

Water Quality Management Strategy June 2016

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INTRODUCTION

The Liverpool Local Government Area (LGA) is traversed by two major river systems, the Georges River and the Nepean River, and many of their tributary creeks and waterways systems. The waterways are under pressure from past and existing developments, catchment disturbance and hydrological modification, land use transformation and large-scale vegetation changes. The population of Liverpool is projected to undergo another period of significant growth as a result of major infill developments and new urban release areas within western areas of Liverpool. The projected growth and associated development will produce significant pollution loads into the waterways. Without appropriate strategy to manage issues associated water quality and ecological health of waterways and wetlands, there would be substantial adverse impact on the environment and the community.

The Liverpool Council is responsible for the management of the waterways stormwater quantity and quality to ensure developments within the LGA are sustainable, water quality is improved and ecological health of our waterways and wetlands are preserved. Council is also committed to reducing potable water consumption within the facilities managed and operated by Council.

Stormwater Management is a principle activity under Direction 5 “Natural Sustainable City” of Council’s ten year Community Strategic Plan *Growing Liverpool 2023*. The plan has strategic target to improve ecological health of all waterways within the LGA to B+ or better. Number of key policies also exists to support the strategic targets of Direction 5, any policy and strategies to address water quality issue is currently lacking.

This Water Quality Management Strategy is a key element of Council’s water management planning process and provides a framework for undertaking water quality improvement projects in a coordinated manner.

As shown in Figure 1, the Water Quality Management Strategy includes both activities and actions in Council managed lands as well as private developments. The key water related actions include Water Sensitive Urban Design (WSUD) provisions in new development, water quality treatment systems installed by Council as part of road, footpath and park upgrades, Environment Restoration Program (ERP) strategy and riparian zone management. Council’s flood plain management strategy and water efficiency plan also influence the water quality performance. Key considerations for all water projects are operation and maintenance, and management of water quality improvement assets as identified in Figure 1.

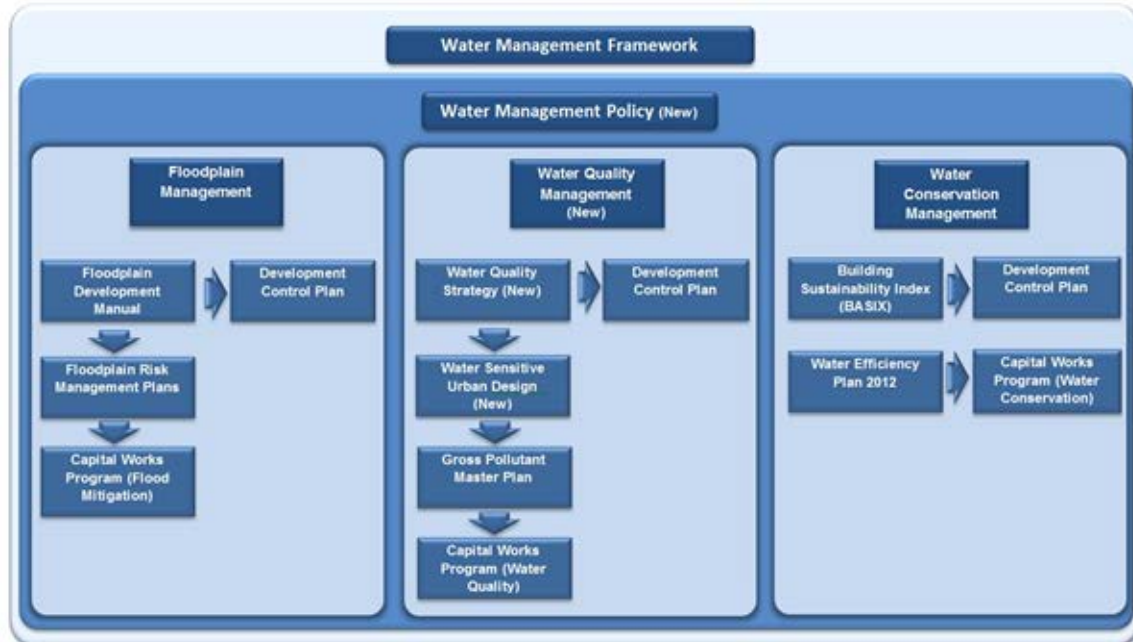


Figure 1: Liverpool City Council Water Quality Management Framework

While Council's current Development Control Plan (DCP) has specific water quality targets to improve the water quality and ecological health of waterways and wetlands, this Water Quality Management Strategy together with revised Development Control Plan and technical guideline will enable a more coordinated and consistent application of current best management practices across the LGA.

Through a strategic and coordinated approach to water management, Council will be able to achieve its stated objectives in its Water Management Policy as well as obtain better value for money in the delivery of services to the community. Such coordinated approach will also assist Council to better manage the considerable environmental risk it is exposed to due to the increased urbanisation and human activities.

Implementation of the Water Management Policy, Water Quality Management Strategy and revised Water Quality Development Control Plan will have following benefits:

- better allocation of limited council resources;
- improved direction of actions with community expectations;
- improved public awareness and increased source control opportunity;
- increased opportunity to participate into the State Government initiatives;
- improved coordination of water related activities across Council;
- more effective maintenance of Council assets; and
- improved governance and accountability through improved decision making based on better understanding of the benefits and costs of alternatives therefore actions and decisions are optimal and focused on real needs.

Council's Water Quality Management Strategy identifies high level actions that are aimed at improving Council's water related skills and knowledge, process, policies and its implementation.

BACKGROUND TO THE WATER QUALITY MANAGEMENT STRATEGY

Located in the heart of Sydney's southwest region, Liverpool City is one of the largest council areas of Sydney covering over 305 square kilometres and 42 suburbs. Liverpool has been characterised by substantial population growth and rapid development. The population of Liverpool is projected to undergo another period of significant growth as a result of major urban release areas within western areas of Liverpool. The latest projection suggests a population of 325,000 by 2036, an increase of over 60 percent of current population.

The LGA is traversed by two major river systems, the Georges River and the Nepean River, and many of their tributary creeks and waterways. The waterway systems are under pressure from past and existing developments. The projected growth and associated development has potential to produce significant pollutant loads. Without proper water quality management strategy in place, these pollutants will enter into the natural waterways and adversely impact their water quality and ecological health.

Ecological health of major creeks in the Georges River catchment are currently rated to be either poor or very poor requiring significant improvement initiatives to achieve strategic target rating of B+ as outlined in the Community Strategic Plan "Growing Liverpool 2023". Ratings of ecological health of the waterways in the Nepean River catchment are currently unavailable. A consistent approach and strategic water quality improvement target from the new developments as well as water quality improvement initiatives in the existing developments will be essential to achieve this strategic target.

This Water Quality Management Strategy is a key element of Council's water management planning process and provides a framework for undertaking water quality improvement projects in a coordinated manner.

PURPOSE OF THE WATER QUALITY MANAGEMENT STRATEGY

The purpose of the Water Quality Management Strategy is to set Council's direction on all water related elements and address gaps in current practice through the development of comprehensive action plan. Building on the gaps identified, the Water Quality Management Strategy has deliverable actions and targets to improve current practices and outcomes.

The Water Quality Management Strategy (WQMS) provides high level actions that will build the water management capability, minimising gaps in Council's current water quality management practices. The Strategy will facilitate the achievements of key objectives of the strategy. The key objectives of the Strategy include:

- Improved water quality in stormwater runoff from developments through requirement for WSUD development controls (DCP);
- Improved vegetated creek corridors through bush regeneration;

- Gross pollutants being captured prior to entering to waterways through the installation of gross pollutant traps (GPT);
- Enhancement of waterways and wetlands through weed controls, removal of sediment and management of erosion from creek banks;
- Effective maintenance of water quality control structures;
- Community education and awareness, and source control;
- Compliance, monitoring and enforcement;
- Conservation of water and reducing water consumption; and
- Improved governance and accountability.

The purpose of the Water Quality Management Strategy is to set Council's direction on all water related elements and address gaps in current practice through the development of comprehensive action plan. Building on the gaps identified, the Water Quality Management Strategy has deliverable actions and targets to improve current practices and outcomes.

Council's Water Quality Management Strategy has been developed to address the following questions:

- What is the current water management situation / practice?
- Where do we want to be – the desired future state and strategic outcomes?
- How will we get there – strategies, actions and performance measures to bridge the gap between current and desired positions?

OUR WATER MANAGEMENT ASSETS

Liverpool City Council's drainage assets include more than 578 kilometres of piped drainage systems and associated pits, gross pollutant traps, flood detention basins, formed channels and waterways with a combined value of over \$390 million. The drainage network is projected to grow by 100 kilometres or 18 per cent over the next 10 years.

Liverpool Council has already installed 120GPTs, with a further 3-4 being added every year. The GPTs are maintained under an external contract which is generally broken into half of these systems being maintained on a frequency basis (eg every six months) and the other half on an as need basis (ie after a large storm event). Developers are also installing GPTs and other water treatment systems as part of major development projects.

Council's Stormwater Management Service Charge, which generates approximately \$1.2 million each year, has provided Council a sustainable funding source for its stormwater management program and this funding has enabled more enhanced maintenance and renewal programs to be undertaken.

Condition and utilisation of our assets

Inspections and assessments of the water assets (GPTs, basins, and wetlands) has shown that between 75% and 82% of the assets are in an excellent or good condition.

The proportion of the water quality assets falling to an average or below average condition is likely to grow due to ageing, deterioration and lack of maintenance.

Water Assets	Proportion of asset in each of the following condition state				
	Excellent	Good	Average	Poor	Very Poor
Gross pollutant traps	24%	58%	18%	0%	0%
Retarding Basins	3%	72%	25%	0%	0%
Wetlands	3%	72%	25%	0%	0%

CURRENT WATER MANAGEMENT PRACTICES

As a proactive response to address issues associated with water quality and ecological health of waterways, Council has developed and has in place a range of strategies and programs that seek to protect aquatic ecosystems and water resources, and minimise the impacts of urban development on the urban water cycle. A range of programs are currently in place to manage water quality in new urban release areas and existing areas.

Managing stormwater quality in new urban release areas

For new developments, it is essential that the right controls are put in place to manage stormwater, prevent flooding and improve water quality. Water quality management in new areas is regulated through controls in the Development Control Plan (LDPC 2008), which requires developers to implement an integrated system of water quality improvement devices in accordance with best management practices and water sensitive urban design principles. This involves the implementation of a hierarchy of controls utilising the following treatment-train approach to progressively remove pollutants from stormwater runoff to achieve the targeted quality parameters;

- **Primary controls** - use of gross pollutant traps (GPTs) and purpose-built trash racks to capture gross pollutants comprising leaf litter, cans, bottles and coarse sediments before these pollutants enter the creeks and waterways. Grassed swales and sediment ponds are also being used to specifically treat coarse sediments.
- **Secondary controls** - a range of secondary controls are now being introduced within the newer areas of Liverpool comprising rain gardens and vegetated filters to remove the finer sediments and nutrients. Examples of this can be seen in new residential release areas such as Voyager Point and Elizabeth Hills as well as in Council's own projects such as Carnes Hill Community and Recreation Centre and Kurrajong Road.
- **Tertiary controls** - comprise bio-retention systems and wetlands that are specifically designed to remove nutrients and dissolved heavy metals. Again, examples of this can be seen in Elizabeth Hills, Georges Fair, Cecil Hills, Wattle Grove and Carnes Hill.

Managing stormwater quality in existing areas

Large parts of the existing urban areas already have an extensive network of piped drainage systems discharging stormwater directly into creeks and waterways. Over the years, Council has implemented a comprehensive program of stormwater quality improvement works to address the adverse effects of stormwater runoff. These include:

i). Provision of gross pollutant traps (GPT) and trash racks

Liverpool Council's existing stormwater system consists of approximately 570 km of pipe network. The network consists of more than 120 gross pollutant traps that have been installed to capture pollutants before it reaches the waterways. Council continues to install new GPTs annually funded through its stormwater levy. However, a more recent assessment shows that the existing GPTs are well below the total number of these devices required to effectively manage the capture of gross pollutants. A GPT Master Plan has been developed identifying locations of new GPTs in existing urban areas and they will be constructed progressively under Council's annual capital works delivery program.

It is worth noting, however, that GPTs are designed to capture pollutants mobilised during the more frequent rain events. During the less frequent but larger storms, the capacity of the pipe system and the associated GPTs are very quickly exceeded and the runoff including the mobilised pollutants and debris bypass the entire stormwater system and end up in downstream waterways.

ii). Riparian zone vegetation works

Riparian vegetation is vitally important to the health of rivers and streams. Among others, it provides a buffer between adjoining land and the river, filtering nutrients, sediment and pesticides from catchment runoff. It provides stability to creek banks, minimises erosion and provides shade that can influence water temperature and light penetration, thereby regulating instream primary production.

Council's assessment shows that one of the underlying reasons for the poor ecological health of the creeks and river systems is degraded riparian vegetation and increased colonisation of invasive aquatic weeds. While council implements a regular program of bush regeneration and weed removal treatment along the river corridors through its Environment Restoration Plan (ERP) program, a more comprehensive ERP strategy is being developed to improve and re-establish the riparian vegetation along the creek corridors with greater focus on improving water quality and overall environmental outcomes.

iii). Erosion protection and bank stabilisation works

Council spends an average of \$250,000 annually to restore and stabilise eroded creek banks and stormwater outlets. These works are not only critical for asset protection but prevents ongoing erosion and contamination of the water course through sedimentation and siltation.

iv). Education and awareness

Council’s website currently provides important information on the river and creek catchments, water quality and water sensitive urban design to the community. A number of fact sheets are available to educate the community on how to reduce litter and pollutants generated from day to day activities, such as car washing, gardening and household cleaning, from entering into our waterways. These fact sheets are also distributed to the community at community events such as National Tree Day. The proposed Water Management Policy and Strategy will review the current awareness program and provide more focus on the active education and awareness program for pollution control.

EMERGING TRENDS AND ISSUES

As the Liverpool City Council area grows to a possible population of 325,000 by 2036, there will be rising community expectations for improved open space and recreational facilities, including how waterways and stormwater assets are managed. The following outlines some of the key emerging issues for Council and its implications on Council’s water management practices.

Community expectations and aspirations

Council’s ten year Community Strategic Plan “Growing Liverpool 2023”, identifies long term priorities and goals that Liverpool’s community want to have delivered in their City. Council’s water management practices and programs are driven by the following stated key directions in Growing Liverpool 2023, the ten year Community Strategic Plan for the City of Liverpool.

- Vibrant Prosperous City
- Liveable Safe City
- Natural Sustainable City
- Leading Proactive Council

The Community Strategic Plan has identified a series of water related targets, the status of which are outlined in the table below.

10 Year Targets	Status
<ul style="list-style-type: none"> • Improved condition of rivers and waterways to B+ or better*. • A yearly household water consumption rate comparable to greater Sydney. • Increased natural bush land corridors that are restored. 	<ul style="list-style-type: none"> • <i>Only 2 out of 6 rivers/waterways in Liverpool have this rating. (Source: 2014-2015 river health card- GRCCC</i> • <i>Average water consumptions in Liverpool are 236 Kilo-litres and 190KL per house and unit respectively. (Source: Sydney Water 2013/14)</i> • <i>Natural bushland corridors are restored progressively under Environmental Restoration Plan program.</i>

* Note – As defined by the annual Georges River Water Quality Report Card prepared by the Georges River Combined Councils Committee, where A+ (Excellent); A – B+ (Good); B – C- (Fair); and D+ - F- (Poor). Waterways in Liverpool City Council are currently given a “Poor” grading of E.

A consistent approach and strategic water quality improvement from the new developments, as well as water quality improvement initiatives in the existing developments, will be essential in improving the waterway condition, to meet community expectations.

Water Sensitive Urban Design

The national guide to evaluating options for Water Sensitive Urban Design (2009) defines WSUD as the integrated design of the urban water cycle, incorporating water supply, wastewater, stormwater and groundwater management, urban design and environmental protection. Water Sensitive Urban Design (WSUD) is a holistic approach that aims to minimize negative impacts of developments on the natural water cycle and protect the health of aquatic systems. The following diagram illustrates how the challenge of achieving natural water balance imposed by the rapid urbanisation is optimised by introducing the elements of Water Sensitive Urban Design.

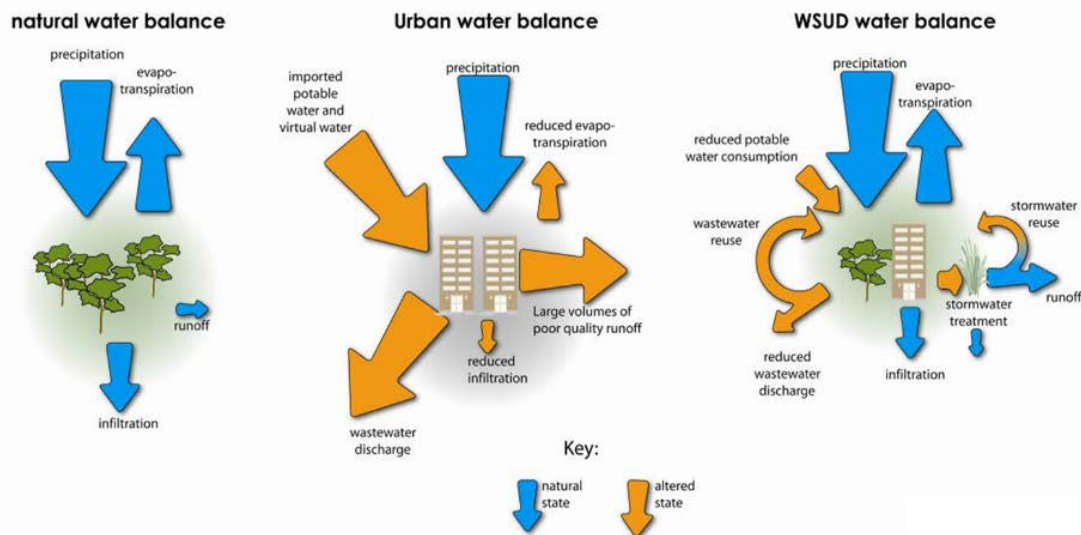


Figure 2. Urban water cycle showing changes to the natural water cycle from urban development and with WSUD (Hoban and Wong 2006).

WSUD includes a suite of technologies such as water efficient fittings and appliances, and rainwater tanks to reduce potable water consumption and costs, as well as bio-retention systems (raingardens), swales, wetlands, and vegetated roofs, to reduce the pollution from stormwater ending up in local waterways. The stormwater assets are designed to retain, filter and sometimes harvest surface water, and must be maintained like other drainage systems. Some of the features of WSUD treatment train include:

- Gross pollutant traps (GPT) to remove gross pollutants such as bottles, cans and coarse sediments
- grass swales to replace concrete gutters
- bio-retention basins to remove pollutants and allow for enhanced rainwater infiltration to groundwater
- artificial wetlands provide stormwater buffering to natural waterways
- rainwater tanks to reduce household demand on reticulated water

The design of WSUD is assessed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC), which is the industry standard water quality modelling software.

ANALYSING THE GAPS

A water management framework to drive best practice has been developed to analyse the current gaps and benchmark water management practice in Council. The framework seeks to analyse the capacity of council, as well as plans and policies and on the ground implementation of projects.

The framework is based on WSUD best practice to address this gap and identified 26 WSUD capacity needs of councils across the attributes of skills and knowledge, professional development, organisational strengthening, directive reforms, and facilitative reforms.

An improvement action plan was developed to address the identified gaps. The improvement action plan consists of over 30 different actions to be completed over the next 2-3 years to set foundation for achieving medium to long term strategic vision of council to become water sensitive city.

Assessment framework for Council's WSUD Policies, Plans and Programs

Staff Skills & Knowledge	Internal Processes	WSUD Policies, Plans and Guidelines	Project design and implementation
<ul style="list-style-type: none"> • Knowledge of WSUD design by council staff • Knowledge of WSUD by Senior Management • Knowledge of WSUD modelling • Knowledge of performance and cost of water management measures • In house technical skills for WSUD design 	<ul style="list-style-type: none"> • Stormwater coordination committee • Roles and responsibilities for WSUD • WSUD integrated into departments of Council 	<ul style="list-style-type: none"> • WSUD in Council Community Plan • Overarching Catchment plan • Riparian Zone Strategy • GPT Strategy • DCP Objectives • WSUD Design Technical Guidelines and Standard Drawings • Standard clauses for WSUD • Incentives / Education • Council's water management policy, strategy and technical guidelines and plans • WSUD into major projects of council 	<ul style="list-style-type: none"> • Concept and detailed design • Asset registration of council WSUD assets • Asset registration of developer funded WSUD assets • Construction • Operation and Maintenance • Asset Handover of developer funded WSUD assets • Operation and maintenance of developer funded assets

The assessment of Council's current and desired business practice for each theme and element is outlined in the following tables.

Theme 1: Staff skills and knowledge

Process	Current business practice	Desired business practice
Knowledge of WSUD by Council Staff	While there is some knowledge of water quality initiatives and WSUD by some staff within Council, there is a need to ensure a broad and consistent understanding of best practice water quality management.	Good knowledge of water quality initiatives and WSUD by all relevant staff within Council.
Knowledge of WSUD by Senior Management	There is need to ensure water quality and WSUD initiatives of Council are communicated to senior management within Council.	Good knowledge of water quality initiatives and WSUD by senior management within Council.
Knowledge of WSUD modelling	Some staff have knowledge of WSUD modelling software but are not able to critique water quality modelling proposals submitted as part of DA process.	Council has skills and knowledge to undertake and review water quality models.
Knowledge of performance and cost of water management measures	Council has good information on gross pollutant traps but limited information on the performance and costs for vegetated treatment systems.	Council has appropriate knowledge of the performance and costs of WSUD treatment systems.
In house technical skills for WSUD design	Council is only beginning to gain experience in the design and operation of WSUD treatment systems.	Council has skills to design and operate WSUD treatment systems.

Theme 2: Internal Process

Internal Processes	Current business System	Desired business system
Stormwater coordination committee	Council's Environment Advisory Committee (EAC), among other environmental matters discusses water management issues and initiatives. This committee has been established primarily to consider and provide input to Council's environment programs by making recommendations to Council.	Formation of a formal technical working group that includes EAC, Technical Support, City Presentation and Planning and Growth.
		Ensure consideration of WSUD into relevant projects being delivered by different sections of Council.
Roles and responsibilities for WSUD	Roles and responsibilities for water management in Council are not well defined which has the potential to impact on the coordination and implementation of water quality initiatives.	Clear understanding of roles and responsibilities for water management within council.
WSUD integrated into departments of Council	WSUD is not a key consideration in some project decision making of Council (eg Development Assessment, Major Projects).	Create process whereby WSUD is considered in decision making for relevant projects / departments in Council.

Theme 3: WSUD Policies, Plans and Guidelines

WSUD Policies, Plans and Guidelines	Current business requirements	Desired business requirements
WSUD in Council Community Plan	The Liverpool Council Community Strategic Plan "Growing Liverpool 2023" has identified a target score of B+ for the health of its waterways as recorded in the Georges River Combined Council Report Card.	Review target scores within the Community Strategic Plan, and revise targets as appropriate and achievable for Council.
Overarching Catchment Plan	Council's catchment issues are managed through ad hoc and disintegrated plans and is very much reactive in nature.	Develop a Liverpool Council Catchment Management Plan to prioritise and coordinate water management activities of Council.
Riparian Zone Strategy	Council has a biodiversity strategy but has not undertaken a vegetation condition assessment of all riparian zones across the LGA.	Detailed Riparian Zone Plan to prioritise and coordinate riparian zone works.
GPT Strategy	Council installs GPTs with reactive approach on an ad hoc basis.	Development of GPT masterplan and a framework to assess the costs and benefits of GPTs to prioritise GPT installation.
DCP Objectives	Not all water quality provisions in Council's DCP are currently consistent with best practice.	Update Council's WSUD planning provisions.
WSUD Technical Guidelines and Standard Drawings	Council does not have a technical guideline or standard drawings to support the implementation of WSUD by Council or developers.	Suite of technical guidelines and standard drawings to support the implementation of WSUD by Council and developers.
Standard clauses for WSUD	Council does not currently have any standard WSUD clauses to facilitate the consideration or implementation of WSUD into a variety of Council projects.	Standard WSUD clauses to facilitate the consideration and implementation of WSUD into all relevant Council projects.
Incentives / Education	Council does not have a program of incentives (eg rainwater tank rebates, or education) to reward residents for their implementation of water quality initiatives in existing private land.	Consideration of appropriate WSUD incentives to foster WSUD uptake in existing private lands and undertake education to support WSUD initiatives.
Council's water management policies, plans and technical advice	At the moment there is no common repository for information on water management practices used by councils including case studies and commonly sourced information.	All water management information is housed in a common location for Council staff to access.
WSUD into major projects of council	WSUD is not uniformly implemented in major large scale projects undertaken. These projects may include park or streetscape upgrades.	Ensure WSUD is integrated into all council projects

Theme 4: Project Design and Implementation

Design and Implementation	Current business requirements	Desired business requirements
Concept and detailed design	Council outsources some of its WSUD design and there is limited knowledge of water quality design by staff within Council.	Council has in-house design skills to both design and review a range of common WSUD elements.
Asset registration of Council WSUD assets	There are inadequate descriptions of WSUD elements in Council's asset management systems.	Detail common elements of WSUD systems for Council's Asset Management system. The asset handover process to confirm detailed descriptions of WSUD elements are recorded.
Asset registration of developer funded WSUD assets	WSUD elements installed by developers to meet the DCP requirements are not specifically registered in Council's asset registration systems as water quality assets.	All developer funded WSUD elements installed for Councils DCP are registered on Council's asset management system.
Construction	Council is only beginning to undertake WSUD projects and knowledge of construction and supervision is needs to increase to address any problems in implementation.	Council has experience on WSUD construction and supervision.
Operation and Maintenance	Council is only starting to experience WSUD operation and maintenance.	All water quality treatment systems are maintained as required to ensure ongoing performance.
Asset Handover of developer funded WSUD assets	At present WSUD assets are handed over to Council as normal assets without specifying WSUD type. Documentation specific to asset type such as operation / maintenance manual, drawings are not handed over with the asset.	Formal asset handover of developer funded WSUD elements to Council.
Operation and maintenance of developer funded assets	The maintenance of developer funded WSUD elements is not being checked by Council.	Compliance checking by Council to ensure the ongoing operation and maintenance of developer funded WSUD elements installed by to meet Councils WSUD requirements.

HOW DO WE GET THERE

Water management improvement plan

Achievement of the desired business state will be a continual and ongoing process. The following presents an improvement plan that will over time, achieve the principles stated in Council's Water Management Policy and in doing so achieve Council's water management objectives:

Water Quality management practice area	Required improvement task	Target	Resources & Costs	Responsibility	Performance Measure
Knowledge of WSUD by Council Staff	Raise WSUD awareness through: <ul style="list-style-type: none"> WSUD workshops for development planners, engineers and City Presentation staff Technical tours at various WSUD project sites in Sydney region. 	December 2016 & annually	Internal	Manager Technical Support	<ul style="list-style-type: none"> Annual workshops on WSUD completed Annual Technical tour at WSUD project sites completed.
Knowledge of WSUD by Senior Management	Raise WSUD awareness through presentation at Manager's meetings.	July 2016 & annually	Internal	Manager Technical Support	WSUD presentation at Manager's meetings undertaken
Knowledge of WSUD modelling	Develop technical skills of Council engineers on MUSIC modelling	November 2014	Training on MUSIC model and software cost (\$13,000)	Coordinator Floodplain & Water Management	Council engineers have demonstrated knowledge skills on MUSIC modelling
	Training on assessment of WSUD for Development Applications (DA)	On-going	Internal	Coordinator Floodplain & Water Management	Council engineers have demonstrated skills on assessment of water quality measures
	Pilot project – water quality modelling of Wattle Grove Lake catchment	December 2016	External technical assistance to Pilot project (\$5,000)	Coordinator Floodplain & Water Management	Water Quality modelling of Wattle Grove Lake completed.

Water Quality management practice area	Required improvement task	Target	Resources & Costs	Responsibility	Performance Measure
Knowledge of performance and cost of water management measures	Provide Council staff training on performance assessment of WSUD devices	August 2017	External technical assistance to provide training (\$10,000)	Coordinator Floodplain & Water Management	Council staff have demonstrated knowledge on performance assessment of WSUD devices
	Develop standard unit rates for construction, operation & maintenance of water quality management devices	August 2017	Internal	Coordinator Floodplain & Water Management	Standard unit rates for WSUD devices developed
In house technical skills for WSUD design	Provide Council engineers training on design of WSUD treatment systems	April 2017	Internal	Manager Technical Support	Council engineers capable of undertaking design of WSUD devices
Stormwater Coordination Committee	Formation of a Stormwater Coordination Committee that includes staff from Technical Support, City Presentation and Planning and Growth.	October 2016	Internal	Manager Technical Support	SCC formed and monthly meetings conducted
Roles and responsibilities for Water Management	Undertake review of current roles and responsibilities of Council staff in the following areas: <ul style="list-style-type: none"> MUSIC Modelling, Design of WSUD, DA assessment, Operation and maintenance of WSUD devices 	November 2016	Internal	Coordinators: <ul style="list-style-type: none"> Floodplain & Water Management Land Development Investigation and Design Maintenance Planning 	Agreed roles and responsibilities established.
	Identify skill gaps and provide necessary training	December 2016	Internal	Respective coordinators	Skill gaps identified and necessary training provided.
WSUD integrated into Departments of Council	Incorporate provisions of WSUD in Council projects and make necessary budget allocation.	Annually - during project planning and budgeting	Internal	<ul style="list-style-type: none"> Manager Technical Support Manager Project Delivery 	WSUD integrated into Council capital work programs.
WSUD in Council Community Plan	Review WSUD related targets in Liverpool Council Community Strategic Plan to ensure that the target scores within the Community Strategic Plan is appropriate and achievable for Council	Feb 2017 & annually	Internal	Technical Working Group	Revision of WSUD Community Strategic Plan Targets undertaken

Water Quality management practice area	Required improvement task	Target	Resources & Costs	Responsibility	Performance Measure
Overarching Catchment Plan	Development of an overarching Water Quality Management Plan to prioritise water management initiatives through the LGA including riparian zones, streetscapes and parks, and GPTs.	December 2016	\$50,000	Technical Working Group	Water Quality Management Plan
Riparian Zone Strategy	Undertaken a vegetation condition assessment of riparian zones, and develop riparian zone management plan.	December 2017	\$100,000	Manager Technical Support	Riparian zone management plan
GPT Strategy	Undertake investigation for existing urban catchment and develop a GPT Masterplan and prioritise GPT installation program	August 2016	\$5,000	Coordinator Floodplain & Water Management	GPT Masterplan developed and being implemented
DCP objectives	Review and update WSUD planning provisions of the DCP in accordance with best management practice.	July 2016	\$5,000	Coordinator Floodplain & Water Management	WSUD planning provisions of the DCP updated and adopted by Council.
WSUD Technical Guidelines	Develop Technical Guidelines to support the implementation of WSUD by Council or developers.	December 2016	\$10,000	Coordinator Floodplain & Water Management	WSUD Technical Guidelines developed.
WSUD Standard Drawings	Develop standard drawings to support the implementation of WSUD by Council or developers.	December 2016	\$10,000	Coordinator Floodplain & Water Management	WSUD Standard Drawings developed.
Standard clauses for WSUD	Develop standard WSUD clauses to facilitate the consideration or implementation of WSUD into a variety of Council projects	December 2016	Internal	<ul style="list-style-type: none"> • Manager Technical Support • Manager Project Delivery 	Standard WSUD clauses developed and incorporated in Council projects.
Incentives/ Education	Investigate and develop a program of appropriate WSUD incentives to promote WSUD in private land developments	December 2016	\$5,000	Coordinator Floodplain & Water Management	WSUD incentives program developed
	Develop education strategy/program to foster WSUD initiative in private developments	March 2017	Internal	Coordinator Floodplain & Water Management	WSUD education program developed

Water Quality management practice area	Required improvement task	Target	Resources & Costs	Responsibility	Performance Measure
Council's water management policy, strategy, technical guidelines and plans.	Design and develop webpage and publish Council's water management policy, strategy, technical guidelines and plans into Council webpage	December 2016	\$10,000 (IT support)	Manager Technical Support	Webpage developed
WSUD into major projects of Council.	Ensure provision of WSUD incorporated into major Council projects at planning and sub-division stage.	Ongoing	Internal	Manager Strategic Planning Manager Development Engineering	WSUD is incorporated into major Council projects.
Concept and detailed design	Provide Council engineers training on design of WSUD treatment systems.	October 2016	\$10,000	Coordinator Floodplain & Water Management Coordinator Investigation and Design	Council engineers capable of designing WSUD devices.
Asset registration of Council WSUD assets	Develop a comprehensive database of all WSUD assets (public and developer funded), with information pertaining to device details, catchment details, installation date, operation and maintenance records.	December 2016	Internal	Coordinator Floodplain & Water Management, Coordinator Asset Planning and Management	WSUD asset registration database developed
Asset registration of developer funded WSUD assets	Develop a comprehensive database of all developer funded (S94) WSUD assets, with information pertaining to device details, catchment details, installation date, operation and maintenance records.	December 2016	Internal	Coordinator Floodplain & Water Management, Coordinator Asset Planning and Management	WSUD asset registration database (S94) developed.
Construction	Training of Council staff on construction and supervision of WSUD projects	August 2017	External technical assistance to provide training (\$10,000)	Coordinator Floodplain & Water Management, Coordinator Maintenance Planning, Coordinator Civil Construction.	Council staff are capable of construction and supervision of WSUD projects.

Water Quality management practice area	Required improvement task	Target	Resources & Costs	Responsibility	Performance Measure
Operation and Maintenance	Develop Operation & Maintenance Manual for WSUD devices including case studies and project reports.	Progressively by December 2017	\$50,000	Manager Technical Support Director City Presentation	Operation and Maintenance Manual for WSUD devices developed.
	Estimate and document operation and maintenance costs for new WSUD devices as a part of the O&M Manual.	Progressively by December 2017		Manager Technical Support Director City Presentation	Operation and Maintenance costs for WSUD devices developed.
Asset handover of developer funded WSUD assets	Develop process to allow for more advance notice of handover. Ensure asset handover process include site project inspection to ensure the system is operating and intended prior to handover.	September 2016	Internal	Coordinator Floodplain & Water Management, Coordinator Land Development Coordinator Asset Planning	WSUD asset handover process developed
Operation and maintenance of developer funded assets	Develop a compliance checking mechanism to ensure the operation and maintenance of WSUD elements meets Council's WSUD requirements.	June 2017	\$100,000/year	Coordinator Floodplain & Water Management, Coordinator Land Development	Compliance checking model developed

Water Quality Management Strategy Implementation

Implementation of the identified improvement actions will have a corporate significance and will result in significant benefits and performance improvements over the long term. The process and systems integration that is a key feature of the strategy will require high levels of interdepartmental coordination and regular monitoring to ensure intended outcomes are being achieved.

Resources and funding

At this stage, most of the identified improvement actions can be implemented with existing resources. Where additional funding has been identified, the required funding has been allocated either within the existing program or will be requested in upcoming budget review process.

Responsibility and accountability

The primary responsibility for the coordination of identified improvement actions will be the Manager Technical Support. A more detailed project implementation schedule will be developed following adoption of the strategy and the water management plans.

It is expected that a technical working group will be developed to oversee the implementation of the Water Quality Management Strategy.

Reporting and review

Council will prepare reports on the performance of the strategy to Senior Executives as well as the compliance related issues on annual basis.