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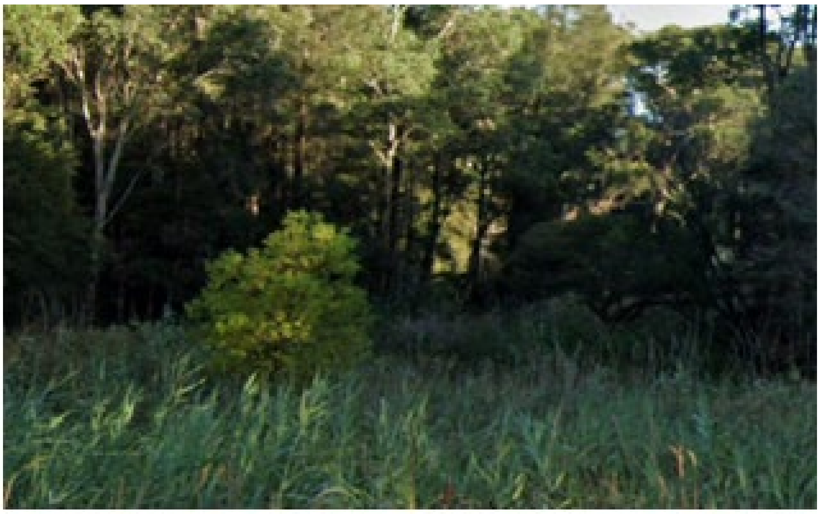

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Contents

Executive Summary

The Mamre Road Precinct is a mixed green and brownfield industrial development located approximately 8 km northeast of the new Western Sydney International Airport (the Nancy-Bird Walton Airport) (Figure 1-1). The Precinct sits within the Wianamatta-South Creek corridor, immediately adjacent to the confluence of Kemps Creek and South Creek, bounded by Kemps Creek to the west and Ropes Creek to the east.

The NSW Governments' statutory and planning documents for the Aerotropolis and Mamre Road Precincts have adopted a new land-use planning and urban design approach to achieve the Parkland City vision for Western Sydney.

As part of this significant shift, new waterway health objectives and targets for the Wianamatta-South Creek Catchment have been set, based on the Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions. This framework has been applied in the development of targets, with the final targets outlined in the Wianamatta-South Creek stormwater management targets.

In early 2022, Sydney Water was appointed authority responsible for the management and delivery of stormwater management in the leading precincts. Sydney Water is responsible for designing, delivering, managing and maintaining the regional stormwater network in the precinct along with its drinking water, wastewater and recycled water systems.

In March 2024, the NSW Government asked IPART to provide advice on:

i.) Determining the efficient costs of providing stormwater drainage services within the Mamre Road Precinct

ii.) Allocating these costs efficiently between developers, taxpayers, and other stakeholders.

The stormwater management modelling for the Mamre Road precinct was undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). Hydrology and Risk Consulting (HARC) has been engaged by IPART to provide independent expert advice on the stormwater management system design and underlying MUSIC modelling to support its advice to the Government.

The objectives of this review were to advise IPART on:

i. Whether the Mamre Rd precinct stormwater management system design:
   - (a) Complies with the relevant guidelines and standards and meets the mandated flow and water quality target for the region.
   - (b) Efficiently delivers the stormwater management services covered by the DSP charge.

ii. In the context of system delivery:
   - (a) Which aspects of the design are the major drivers of cost, and what, if any, opportunities are there to reduce these costs?
   - (b) Which, if any, elements of the system should IPART's independent cost consultant focus on in their review of the delivery cost.

iii. Differences in the infrastructure requirements in meeting the new risk-based targets and those targets typically in place for Local Councils in the Greater Sydney region.

The scope of this project review includes the review of Sydney Water's MUSIC models and underlying conceptual design, particularly focusing on two of the five sub-catchment clusters, the Northwest and the East. The demand for recycled water used in the MUSIC modelling has been covered in other review work undertaken by IPART and is not in the scope of this review.

In September 2023, a technical working group (TWG) was created by DCCEEW to examine opportunities for optimising the Mamre Road stormwater scheme conceptual design. The TWG also included an independent stormwater management consultant who has provided specific advice and alternative concept design suggestions.

The TWG's stormwater consultant developed alternative designs for the two sub-catchment clusters, and these designs were used to compare with and contrast to Sydney Water's conceptual designs. In addition, the TWG provided other advice and recommendations from their review as consulted by IPART, and Sydney Water's response to this review is examined.

The new risk-based targets for Wianamatta-South Creek required greater levels of stormwater pollutant reduction than those typical targets set by local Councils in the Sydney Metropolitan area. These targets also include requirements for the management of flows.

The review of MUSIC modelling undertaken for the Northwest and East sub-catchment clusters for the Mamre Road development precinct has confirmed that the Sydney Water conceptual design produces predicted pollutant reduction and flow management outcomes that largely comply with the risk-based targets for the Wianamatta-South Creek.

The input pollutant load parameters used by Sydney Water for the different land uses comply with current industry standards.

The alternative conceptual layouts generated by the TWG stormwater consultant for the Northwest and East sub-catchment clusters also generate pollutant and flow outcomes that are largely compliant with the targets. The review information provided by the consultant includes valid suggestions for Sydney Water to consider in the ongoing improvement of their models.

The most significant potential impact on improving the efficiency of the Sydney Water concept design has been made by changing the configuration of treatment systems and increasing the depth of recycled water storage ponds. This results in a significant reduction in the footprint of treatment and stormwater recycling infrastructure. These will be major drivers of stormwater management system costs.

This result suggests that the efficiency of the Sydney Water conceptual design could be improved. It also suggests that Sydney Water's concept design approaches could be improved by examining a greater number of potential treatment and storage configurations and undertaking sensitivity testing of the concept design outcomes to changes in key assumptions and inputs.

In examining the information provided by Sydney Water and the MUSIC modelling files, it is apparent that the modelling and documentation could be improved with a more systematic approach to organising the modelling effort. This would include the adoption of procedures to ensure consistent identification of model catchments, nodes and treatment and storage systems, plus the use of catchment imagery as a background for the positioning of treatment systems within the catchment.

The development of alternative conceptual layouts required to meet the typical Sydney Metropolitan pollution reduction standards demonstrates that the risk-based pollution reduction targets for Wianamatta-South Creek and the addition of flow management targets adds significantly to the size of treatment and storage systems and the associated area of land required.

This report makes the following recommendations:

1. Sydney Water should consider the modification of their current conceptual design to incorporate the types of changes suggested in the alternative conceptual layouts developed by the TWG stormwater consultant across all five sub-catchment clusters.
2. Given the importance of the demand for water in the sizing of recycled water storage ponds, Sydney Water should continue its efforts to better understand the likely demands for water in the types of large format industrial (LFI) development being developed in the Mamre Road precinct.
3. Sydney Water should develop formal internal procedures to support future MUSIC modelling efforts. These procedures should cover:
    a. Model setup and organisation.
    b. Treatment train optioneering.
    c. Sensitivity testing.
4. Future stormwater modelling work in the Wianamatta-South Creek catchment should utilise an extended simulation time series.

1. Introduction

1.1 Background

The Mamre Road Precinct is a mixed green and brownfield industrial development located approximately 8 km northeast of the new Western Sydney International Airport (the Nancy-Bird Walton Airport) (Figure 1-1). The precinct sits within the Wianamatta-South Creek corridor, immediately adjacent to the confluence of Kemps Creek and South Creek, bounded by Kemps Creek to the west and Ropes Creek to the east.

The precinct falls in the land areas covered by the State Environmental Planning Policy (Western Sydney Employment Area) 2009 and is one of the Western Sydney Aerotropolis leading precincts.

The NSW Governments' statutory and planning documents for the Aerotropolis and Mamre Road Precincts have adopted a new land-use planning and urban design approach to achieve the Parkland City vision for Western Sydney.

As part of this significant shift, new waterway health objectives and targets for the Wianamatta-South Creek Catchment have been set, based on the Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions (Dela-Cruz, Pik, & Wearne, 2017). This framework has been applied in the development of flow and water quality targets, with the final targets outlined in the Wianamatta-South Creek stormwater management targets (Department of Planning and Environment, 2022b). These targets are now part of the Mamre Road Development Control Plan (DCP).

In late 2021, after the preparation of a Strategic Business Case (Frontier Economics, 2021) it was determined that a regional approach to the management of stormwater was the preferred approach to meeting the risk-based targets. Sydney Water was subsequently appointed the authority responsible for the management and delivery of stormwater management in the leading precincts. Sydney Water is responsible for designing, delivering, managing and maintaining the regional stormwater network in the precinct along with its drinking water, wastewater and recycled water systems.

In addition to the targets, the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) released a number of important documents:

- *Review of water sensitive urban design strategies for Wianamatta–South Creek* (Department of Planning and Environment, 2022)
- *Technical guidance for achieving Wianamatta–South Creek stormwater management targets* (Department of Planning and Environment, 2022).

Sydney Water has been working towards its current conceptual design since later 2022. A series of iterations of the scheme have been released in draft form over that time.

In September 2023, a technical working group (TWG) was created by DCCEEW to examine opportunities for optimising the Mamre Road stormwater scheme conceptual design. The TWG also included an independent stormwater management consultant who provided specific advice and alternative concept design suggestions.

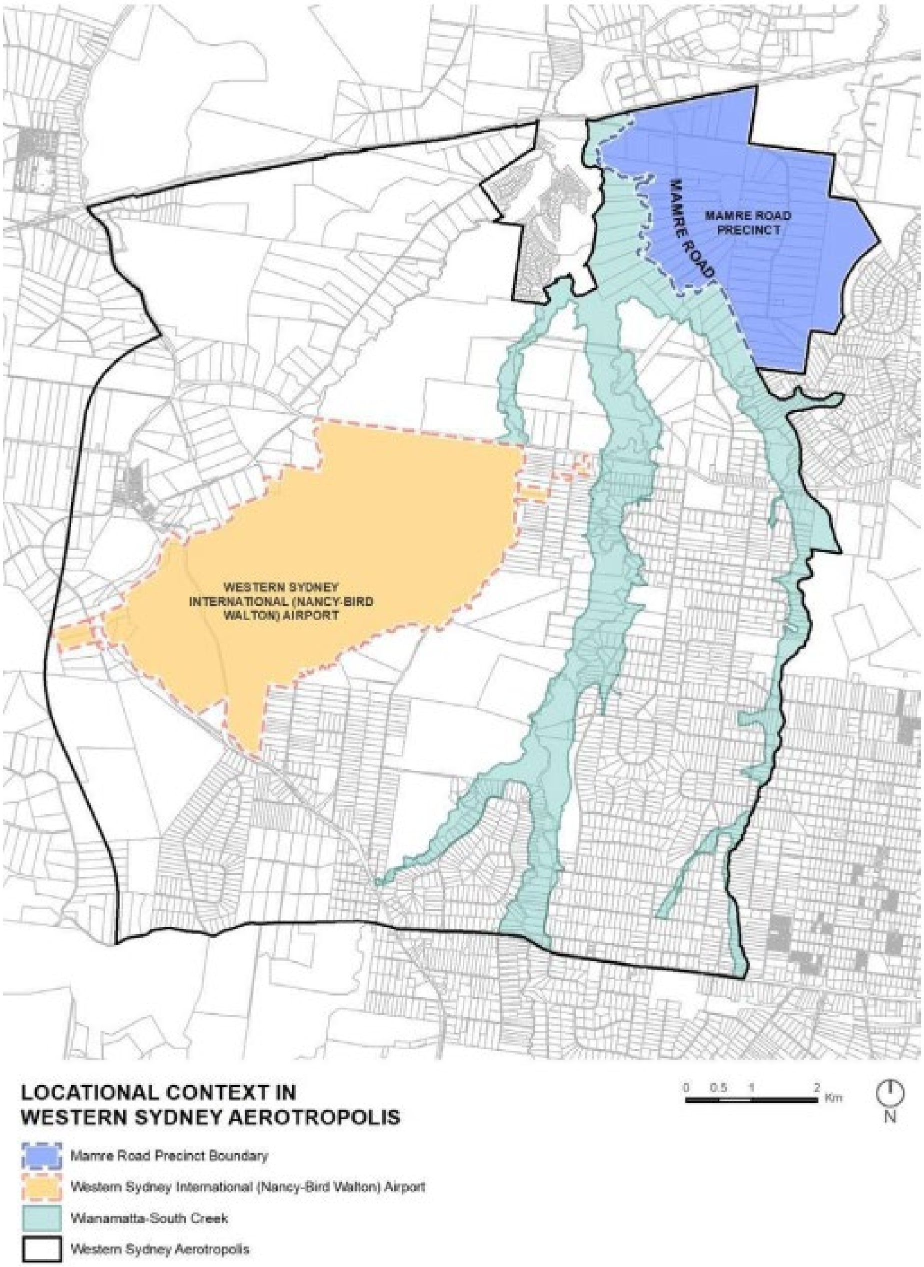

Figure 1-1 Mamre Road Precinct location in relation to the Western Sydney Aerotropolis (Sydney Water, 2021)

1.2 About this review

In March 2024, the NSW Government asked IPART to provide advice on:

i.) Determining the efficient costs of providing stormwater drainage services within the Mamre Road Precinct.

ii.) Allocating these costs efficiently between developers, taxpayers and other stakeholders.

Hydrology and Risk Consulting (HARC) has been engaged by IPART to provide independent expert advice on the stormwater management system design and underlying MUSIC modelling to support its advice to the Government.

1.2.1 Objectives

The objectives of this review were to advise IPART on:

i. Whether the Mamre Rd precinct stormwater management system design:

   (a) Complies with the relevant guidelines and standards and meets the mandated flow and water quality target for the region.

   (b) Efficiently delivers the stormwater management services covered by the DSP charge.

ii. In the context of system delivery:

   (a) Which aspects of the design are the major drivers of cost, and what, if any, opportunities are there to reduce these costs?

   (b) Which, if any, elements of the system should IPART's independent cost consultant focus on in their review of the delivery cost?

iii. Differences in the infrastructure requirements in meeting the new risk-based targets and those targets typically in place for Local Councils in the Greater Sydney region.

1.2.2 Scope

This review has considered Sydney Water's MUSIC models (version 18) and the underlying treatment system design. It has focused on two of the five sub-catchment clusters modelled by SW, the Northwestern (NW) and the Eastern (E) clusters.

A review of the recycled stormwater demands used in the MUSIC model was outside the scope of this work but has been completed as part of separate review work undertaken by IPART.

The TWG's stormwater consultant developed alternative designs for these two sub-catchment clusters, and these were compared and contrasted to Sydney Water's conceptual designs to develop recommendations for SW model improvements. Sydney Water's response to these recommendations is examined in this review..

2. Mamre Road system modelling and design

2.1 Background and context

Stormwater management within the Mamre Road precinct is governed by the Wianamatta-South Creek guidelines from the Department of Planning and Environment (DPE). These guidelines provide stormwater quantity and quality targets, design principles, and acceptable MUSIC model parameter ranges, as well as outline cost assumptions.

The stormwater quality reduction targets, shown in Table 2-1 are in mean annual load from unmitigated development. The Wianamatta-South Creek reduction targets are higher than the Penrith City and Blacktown City council targets, which are typical of those adopted by Local Councils throughout the Greater Sydney Metropolitan area. Further information on the guidelines is provided in Appendix A.

Table 2-1 Stormwater quality reduction targets

Parameter	Wianamatta-South Creek Target (State of NSW and Department of Planning and Environment, 2022c)	Penrith City Council Targets (Penrith City Council, 2013)	Blacktown Council Targets (Blacktown City Council, 2020)
Gross pollutants	**90%**	**90%**	**90%**
Total suspended solids (TSS)	**90%**	**85%**	**85%**
Total phosphorous (TP)	**80%**	**60%**	**65%**
Total Nitrogen	**65%**	**45%**	**45%**

While the typical local Council has targets requiring the temporary detention of stormwater flow on-site to minimise the sizing of stormwater conveyance infrastructure and stream erosion, there are typically no targets for flow reductions across the fuller spectrum of flows. In contrast, the risk-based target for Wianamatta-South Creek includes the flow targets at different flow percentiles. Two options are provided for complying with the targets as shown in Table 2-2 and Table 2-3. With large areas of impervious surfaces in urban development, meeting these targets will necessitate the capture and re-use of some portion of stormwater flows.

Table 2-2 - Wianamatta-South Creek Flow Targets - Option 1

Index	Target
Minimum Annual Runoff Volume (MARV)	**< 2 ML/ha/yr**
90%ile	**1,000 to 5,000 L/ha/day**
50%ile	**5 to 100 L/ha/day**
10%ile	**0 L/ha/day**

Table 2-3 - Wianamatta-South Creek Flow Targets - Option 2

Index	Target
95%ile	**3,000 to 15,000 L/ha/day**
90%ile	**1,000 to 5,000 L/ha/day**
75%ile	**100 to 1,000 L/ha/day**
50%ile	**5 to 100 L/ha/day**
Cease to Flow	**10-30%**

2.2 Modelling considerations

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) simulates:

- Rainfall-runoff processes;
- Stormwater pollutant generation – Total Suspended Solids (TSS), Total Phosphorus (TP), and Total Nitrogen (TN); and
- Pollutant removal by structural assets designed to manage and mitigate the hydrological and water quality impacts of urbanisation.

Consistent with modelling best practice, it is important to understand and interpret music modelling results in the context of the uncertainties inherent in the data, modelling assumptions and capabilities and limitations of the model itself.

Imteaz et al. (2013), Watson (2014) and Sydney Water's (2024a) all highlight the uncertainties associated with MUSIC modelling, in particular, those associated with the use of default model parameterisations (as is the case with the MUSIC models reviewed in this project).

Consequently, a modelling investigation needs to explore and understand the sensitivity of model results to key assumptions and input parameters and data.

To this end, HARC notes that the MUSIC models reviewed have been run using the comparatively short ten-year rainfall time series (1999-2008) specified for use in the Winematta Creek Guidelines (Department of Planning and Environment, 2022a). In the context of the full climate record (Figure 2-1), the rainfall period adopted is one of the drier periods on record.

While this rainfall period is suitable for evaluating the guideline specified flow and water quality objectives, caution should be exercised when evaluating other climate-related performance objectives such as stormwater reuse.

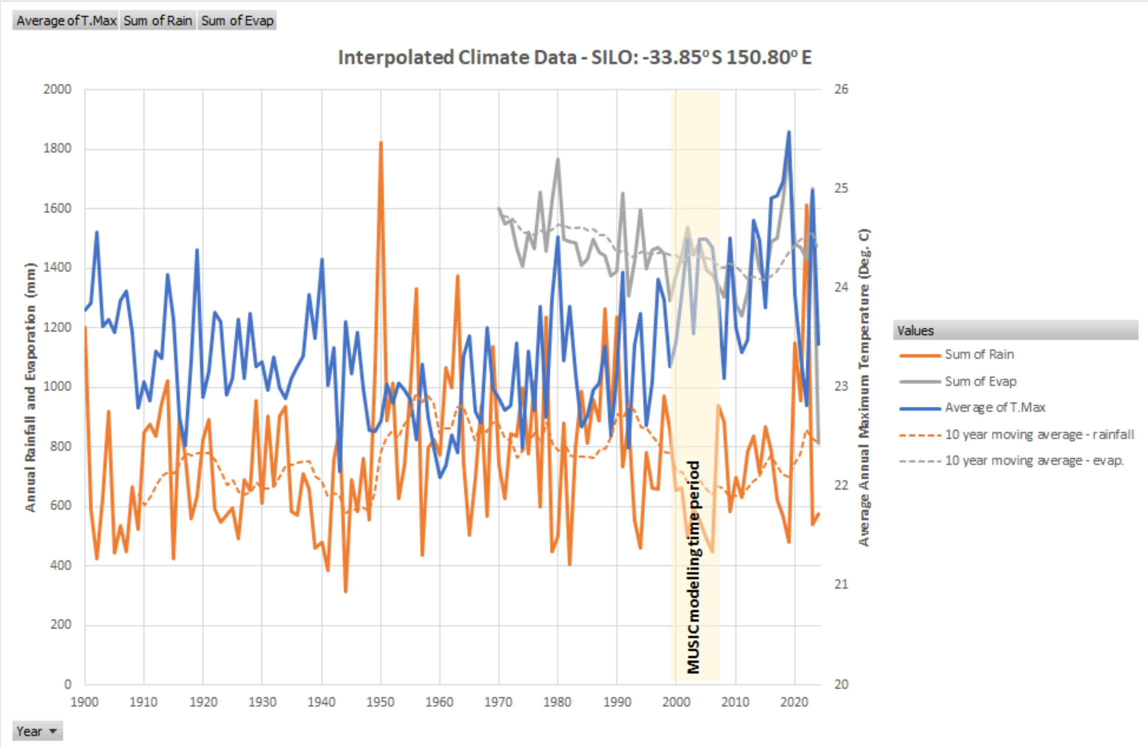

Figure 2-1 - Historical climate context - Mamre Road development precinct

2.3 Overview of the Sydney Water Modelling

Sydney Water's Mamre Road precinct MUSIC modelling consists of five separate MUSIC models built for each of the precinct's sub-catchments and referred to as the North, Northwest, East, West, and Southwest cluster models.

Sydney Water's MUSIC models incorporated the simulation of stormwater management devices such as gross pollutant traps, passively watered street trees, precinct bioretention basins and wetlands, as well as regional re-use storage in the form of ponds. These are all stormwater measures adopted in the WSUD strategies from the Wianamatta-South Creek guidelines (State of NSW and Department of Planning and Environment, 2022a).

Both the Northwest and East cluster models largely achieved the Wianamatta-South Creek water quality and quantity targets. In testing whether the models passed the water quality and quantity targets, two different nodes were checked. For water quality, the node at the end of the development (either South Creek or Ropes Creek nodes) was used. For water quantity, the flows were measured from the next node (labelled junction in both models), which also included flows from the area of public open space (POS) immediately adjacent to the receiving water bodies. This approach is justifiable as the flow targets are set for the entire catchment and this external POS will contribute.

2.4 TWG reviews, findings and recommendations

2.4.1 Background

In February 2024, the TWG stormwater consultant reviewed both the technical aspects of the scheme design and the costing from Sydney Water's (SW) updated December 2023 scheme. This included a review of the SW's assumptions used in their MUSIC and the development of alternative conceptual layouts for two of the five sub-catchment clusters (Northwest and East). Their costing review only assessed CAPEX and not OPEX.

2.4.2 TWG's stormwater consultant findings and recommendations

The TWG stormwater consultant found SW information to be below the required level for stormwater strategies submitted as part of State Significant Development (SSD) applications in NSW, with much of the information missing or difficult to interpret. Additionally, they found errors and efficiencies in the layout of SW's scheme in two of the five sub-catchment clusters examined.

The main issues raised by the TWG stormwater consultant as well as commentary on their context of good/best practice modelling are:

- Pond depths were shallow - The Wianamatta Creek guidelines recommend a maximum pond depth of 3m. All of the TWG stormwater consultant's pond depths are within this range.
- Unrealistic drainage paths.
- Deep transfer pipes.
- Modelling not reflecting proposed configuration.
- Splitting flows upstream of wetlands.
- Ponds in powerline easement.
- Wetland only treatments – the opportunity to reduce area of measures if coupled with bioretention
- Powerline easement not modelled separately.
- Reuse demand outlined in the Technical Guidelines were not adopted.
- Kemps Creek dam site is not considered.

3. System design comparison

Within the TWG stormwater consultant's review, four MUSIC models were created for both the NW and E clusters. Each model represented a design alternative. In this comparison, the Alternative 1 model from the NW cluster and the Alternative 3 model from the E cluster were focused on as they were assessed as the most comparable to SW's models. In the TWG stormwater consultant's alternatives, they proposed deeper, consolidated, reshaped ponds, coupled bioretention and wetland treatments, different reuse demands, and other changes within the MUSIC models and WSUD system. They also raised the possibility of using Kemps Creek dam in the NW cluster, and a turkey nest dam in the E cluster. These last two options were not considered in our assessment due to time constraints.

Both the alternative models that were compared largely achieved the Wianamatta-South Creek water quality and quantity targets. Similarly to the SW models, the water quality was tested at the penultimate node, and water quality at the final node.

In the TWG stormwater consultant's model, small adjustments in water demand were made to reflect changes in the land available for POS irrigation due to reductions in treatment system footprints.

3.1 Northwest cluster

3.1.1 Key elements of Sydney Water's design

- Three catchments: NW01, NW02 and NW03.
- Each catchment has three lot source nodes: Roof, Pavement, and Landscape. All flow into a Gross Pollutant Trap (GPT).
- Each catchment has two street nodes: Pervious and Pavement. Both flow into the bioretention street trees.
- In NW01 and NW02, the GPT and bioretention street trees both flow into a bioretention. In NW03 there is also a Wetland with an inlet pond, with weir overflow which then flows into a bioretention.
- In all the catchments, this then runs into a Pond (1 for NW01, and 2 + 3 for NW02 and NW03). IN NW02 there is a generic treatment node that diverts flows less than 0.0125m^3/s around the pond directly to Wianamatta-South Creek.
- NW01 also has some POS which flows directly into Pond 1.
- From the ponds, the flow goes to Wianamatta-South Creek.
- All the ponds have re-use.
- There is also some flow from external POS which goes to a node beyond Wianamatta-South Creek.

3.1.2 Differences in the TWG stormwater consultant's design

- Sedimentation Basins are added before the bioretentions in NW01 and NW03, and before the wetland in NW02. These replace either the inlet pond volume in the wetland, or filter area in the bioretentions. The TWG stormwater consultant sedimentation pond in

NW02 is reduced in size from the size of the inlet pond volume in SW's model (2970m^3 -> 1500m^3).

- Pond 1 is removed. The depth of Pond 2 + 3 is increased to 2.999m from 1.755m. The surface area is consequently decreased. However, the TWG stormwater consultant's volume in Pond 2 + 3 is still greater than the combined pond volumes in SW's model (165,000m^3 compared to 134,882m^3)
- The total monthly pattern re-use was increased slightly.
- The internal POS in NW01 is routed through the bioretention in NW01.
- Several areas in the model were decreased or increased in both source and treatment nodes.
- The differences in the stormwater water balance outcomes between the two models is discussed in Section 3.4.

3.1.3 Sydney Water's response to the TWG stormwater consultant changes

In a TWG paper, Sydney Water (2024b) provided the following responses to the design improvement suggestions:

- The sedimentation basins were initially modelled as part of other nodes as it was easier during the scheme planning to reduce number of changes. Moving forward SW may separate sedimentation basins into separate nodes as scheme progresses.
- In response to the pond changes, SW is open to further deepening ponds and are currently undertaking investigations into feasibility. They will also review the pond shapes during the detail design to ensure efficiency.
- SW will continue to use their recycled water demands because if the predicted demands are not achieved, they will breach stormwater quantity targets.

3.1.4 Feasibility of designs

The MUSIC model parameters were compared to the acceptable parameter ranges and design principles from the Technical guidance for achieving Wianamatta-South Creek stormwater management targets (State of NSW and Department of Planning and Environment, 2022b). The following discrepancies were found in SW's models:

- The total nitrogen (TN) content of filter media was 400 mg/kg in all bioretention basins and street trees, compared to the acceptable value of 800mg/kg.
- There was no pre-treatment sedimentation basin or wetland for the bioretention basins in catchment NW01 or NW02.
- The permanent pool volume in the wetland in the NW03 catchment was outside the acceptable range of 0.3 – 0.4 m times wetland surface area (instead 0.28)
- The notional detention time for the wetland in NW03 was 47.9hrs, which is below the acceptable minimum of 48hrs. Due to the uncertainty in MUSIC model parameters, although this falls outside the acceptable range provided, it is close enough to not cause concern.

In the TWG stormwater consultant's model sedimentation basins were added before the bioretention basins in the NW01 and NW02 catchments, and the permanent pool volume was within the acceptable range. However, the TN content and notional detention time values remained the same.

3.2 East cluster

3.2.1 Key elements of Sydney Water's design

- Three catchments: E01, E02, and E03.
- Each catchment has three lot source nodes: Roof, Pavement, and Landscape. All flow into a Gross Pollutant Trap (GPT).
- Each catchment has two street nodes: Pervious and Pavement. Both flow into the bioretention street trees.
- In all the catchments, the GPT and bioretention street trees flow into a wetland. The weir overflow then flows into a pond in each catchment. In E03 there is also a bioretention, that the weir overflow flows into from the wetland, then to the pond.
- The outflows from the wetland as well as the outflows from the ponds, flow into Ropes creek.
- All the ponds have re-use.
- There is also some flow from external POS which goes to a node beyond Ropes creek.

3.2.2 Differences in the TWG stormwater consultant's design

- The depth of all the ponds was increased to 2m. The surface area is consequently decreased, with a slight decrease in total volume (112,410m^3 to 100,356m^3). The impervious fraction (IF) of Pond 29 + 30 + 31 in E03 was decreased from 100% to 90% to match the IF of the other ponds.
- The daily re-use demands were decreased at all ponds.
- The wetland source and treatment areas were changed in all catchments. The IF in wetland 25 + 26 (E01) and 28 (E02) source nodes was decreased from 90% to 40% to match the IF in wetland 29 + 30 + 31 (E03). Other input changes were also made to all three wetlands.
- Bioretention nodes were added in E01 and E02 after the wetlands to create coupled systems. All outflow except for the pipe flow from these new bioretention nodes is directed straight to Ropes creek. The pipe flow flows to the ponds. There were also changes in source and treatments areas.
- The TWG stormwater consultant modelled the easements separately. Creating a separate source node for each catchment with an IF of 20%. Consequently, the lot areas in all three catchments were decreased by this same amount. In each catchment they were proportionally split across the three contributing nodes, roof, pavement and landscape.
- A gained area source node was added, with an area similar to the reduction in area required for treatments in the cluster. This has an IF of 20%.

- The differences in the stormwater water balance outcomes between the two models is discussed in Section 3.4.

3.2.3 Sydney Water's response to the TWG stormwater consultant changes

In a TWG paper, Sydney Water (2024b) provided the following responses to the design improvement suggestions:

- In response to the pond changes, SW is open to further deepening ponds and are currently undertaking investigations into feasibility. They will also review the pond shapes during the details design to ensure efficiency.
- SW will continue to use their recycled water demands because if the predicted demands are not achieved, they will breach stormwater quantity targets.
- In reference to the coupled bioretention-wetland systems, the developers pipe grades are insufficient to accommodate biofiltration. Further refinement of the scheme is ongoing.
- SW will model the easements separately in the next revision of MUSIC models if beneficial to do so. In the initial model it was easier to model the easements together to reduce the number of changes.

3.2.4 Feasibility of designs

The MUSIC model parameters were compared to the acceptable parameters ranges and design principles from the Technical guidance for achieving Wianamatta-South Creek stormwater management targets (State of NSW and Department of Planning and Environment, 2022b). The following discrepancies were found in SW's models:

- The total nitrogen (TN) content of filter media was 400 mg/kg in all bioretention basins and street trees, compared to the acceptable value of 800mg/kg.
- The permanent pool volume in the wetland in all the catchments was outside the acceptable range of 0.3 – 0.4 m times wetland surface area (instead 0.13, 0.14, and 0.28).
- The notional detention time for the wetlands in E01 and E02 were 47.9 and 47.6hrs respectively, which is below the acceptable minimum of 48hrs. Due to the uncertainty in MUSIC model parameters, although this falls outside the acceptable range provided, it is close enough to not cause concern.
- The unlined filter media perimeter in the bioretention basin in E03 was 14m compared to the acceptable range of 0.01m.

In the TWG stormwater consultant's model the wetlands' permanent pool volumes were within the acceptable range, and the unlined filter media perimeter in the bioretention were set to the acceptable value of 0.01m. However, the TN content and notional detention time values remained outside the acceptable ranges.

3.3 Designs for meeting typical Sydney Metro local government targets

Additional MUSIC models were created for the Northwest and East clusters that satisfied typical flow quality targets in place in local government areas across the Sydney Metropolitan area. The purpose was to understand the impacts of the higher flow quality targets set in the Wianamatta-South Creek guidelines on infrastructure requirements.

The water quality standards adopted as typical for local government are set out Table 3-1.

Table 3-1 - Assumed typical Sydney Metropolitan local Council stormwater quality reduction targets

Parameter	Reduction target
Gros pollutants	**90%**
Total suspended solids (TSS)	**85%**
Total phosphorous (TP)	**60%**
Total Nitrogen	**45%**

The designs provided by the TWG stormwater consultant were further modified to meet the less stringent standards typically applied by local councils in the Sydney Metropolitan area. The storage ponds and water recycling elements were removed from the conceptual layouts as the on-site detention of water is required under all targets. The changes in the sizing of treatment and storage nodes associated with all designs, including those required to meet typical Sydney Metropolitan Council targets is shown in Table 3-2 to Table 3-8.

3.3.1 Northwest cluster

Table 3-2 - Design parameters - Northwest cluster - Bioretention

Basin No.:	1			2			3		
Treatment node:	Altis_Bioretention Nth			NW02_Bioretention			Altis_Bioretention Sth		
Parameter:	Surface Area (m^2)	EDD (m)	Filter depth (m)	Surface Area (m^2)	EDD (m)	Filter depth (m)	Surface Area (m^2)	EDD (m)	Filter depth (m)
Sydney Water Design	**1,406.0**	**0.30**	**0.50**	**4,186.0**	**0.30**	**0.50**	**4,709.0**	**0.30**	**0.50**
TWG Consultant Design	**1,006.0**	**0.30**	**0.50**	**3,500.0**	**0.30**	**0.50**	**2,500.0**	**0.30**	**0.50**
Typical Council Targets Design	**1,156.9**	**0.30**	**0.50**	**4,025.0**	**0.30**	**0.50**	**2,875.0**	**0.30**	**0.50**

Table 3-3 - Design parameters - Northwest cluster - Wetlands

Basin No.:	1		
Treatment node:	Wetland 4		
Parameter:	Surface Area (m^2)	Depth (m)	Inlet pond volume (m^3)
Sydney Water Design	9,575.0	0.28	2,970.0
TWG Consultant Design	9,575.0	0.30	0.0
Typical Council Targets Design	9,575.0	0.30	0.0

Table 3-4 - Design parameters - Northwest cluster - Sedimentation basins

Basin No.:	1		2		4	
Treatment node:	Sedimentation Basin		Sedimentation Basin		Sedimentation Basin	
Parameter:	Surface Area (m^2)	Depth (m)	Surface Area (m^2)	Depth (m)	Surface Area (m^2)	Depth (m)
Sydney Water Design	N/A	N/A	N/A	N/A	N/A	N/A
TWG Consultant Design	400.0	1.50	500.0	1.50	1,000.0	1.50
Typical Council Targets Design	400.0	1.50	500.0	1.50	1,000.0	1.50

Table 3-5 - Design parameters - Northwest cluster - Ponds

Basin No.:	1		2	
Treatment node:	Pond 1		Pond 2 + Pond 3	
Parameter:	Surface Area (m^2)	Depth (m)	Surface Area (m^2)	Depth (m)
Sydney Water Design	10,323.0	1.79	66,324.0	1.76
TWG Consultant Design	N/A	N/A	55,000.0	3.00
Typical Council Targets Design	N/A	N/A	N/A	N/A

3.3.2 East cluster

Table 3-6 - Design parameters - East cluster - Bioretention

Basin No.:	25 + 26			28			29 + 30 + 31		
Treatment node:	25-26 Bio			28 Bio			E03_Bioretention		
Parameter:	Surface Area (m^2)	EDD (m)	Filter depth (m)	Surface Area (m^2)	EDD (m)	Filter depth (m)	Surface Area (m^2)	EDD (m)	Filter depth (m)
Sydney Water Design	N/A	N/A	N/A	N/A	N/A	N/A	8,176.0	0.30	0.50
TWG Consultant Design	1,731.0	0.30	0.50	822.0	0.30	0.50	6,707.0	0.30	0.50
Typical Council Targets Design	1,731.0	0.30	0.50	822.0	0.30	0.50	6,707.0	0.30	0.50

Table 3-7 - Design parameters - East cluster - Wetlands

Basin No.:	25 + 26			28			29 + 30 + 31		
Treatment node:	Wetland 25 + 26			Wetland 28			Wetland 29 + 30 + 31		
Parameter:	Surface Area (m^2)	Depth (m)	Inlet pond volume (m^3)	Surface Area (m^2)	Depth (m)	Inlet pond volume (m^3)	Surface Area (m^2)	Depth (m)	Inlet pond volume (m^3)
Sydney Water Design	6,005.7	0.13	2,751.8	3,357.5	0.14	1,542.2	22,962	0.28	5,727.0
TWG Consultant Design	5,193.0	0.33	1,154.0	2,466.0	0.33	548.0	20,122	0.33	4,472.0
Typical Council Targets Design	5,193.0	0.33	1,154.0	2,466.0	0.33	548.0	20,122	0.33	4,472.0

Table 3-8 - Design parameters - East cluster - Ponds

Basin No.:	25 + 26		28		29 + 30 + 31	
Treatment node:	Pond 25 + 26		Pond 28		Pond 29 + 30 + 31	
Parameter:	Surface Area (m^2)	Depth (m)	Surface Area (m^2)	Depth (m)	Surface Area (m^2)	Depth (m)
Sydney Water Design	14,904.0	1.82	5,440.7	1.25	49,983.0	1.57
TWG Consultant Design	12,216.0	2.00	2,961.0	2.00	35,000.0	2.00
Typical Council Targets Design	N/A	N/A	N/A	N/A	N/A	N/A

3.4 Water balance outcomes

Figure 3-1 and Figure 3-2 summarise the system water balance for the Northwest and Eastern clusters. A more detailed breakdown of these water balances can be found in Appendix B.

The figures show

- The SW and TWG stormwater consultant conceptual layouts achieve similar outcomes.
- The importance of stormwater harvesting in managing the runoff volume and achieving the flow reduction targets.

The observed difference in the evaporative losses between the SW and TWG layouts was investigated and found to be a function of land use classification; being driven by differences in the proportion of imperviousness and treatment pond surface area and the relative differences in the evaporation rates of these landuses.

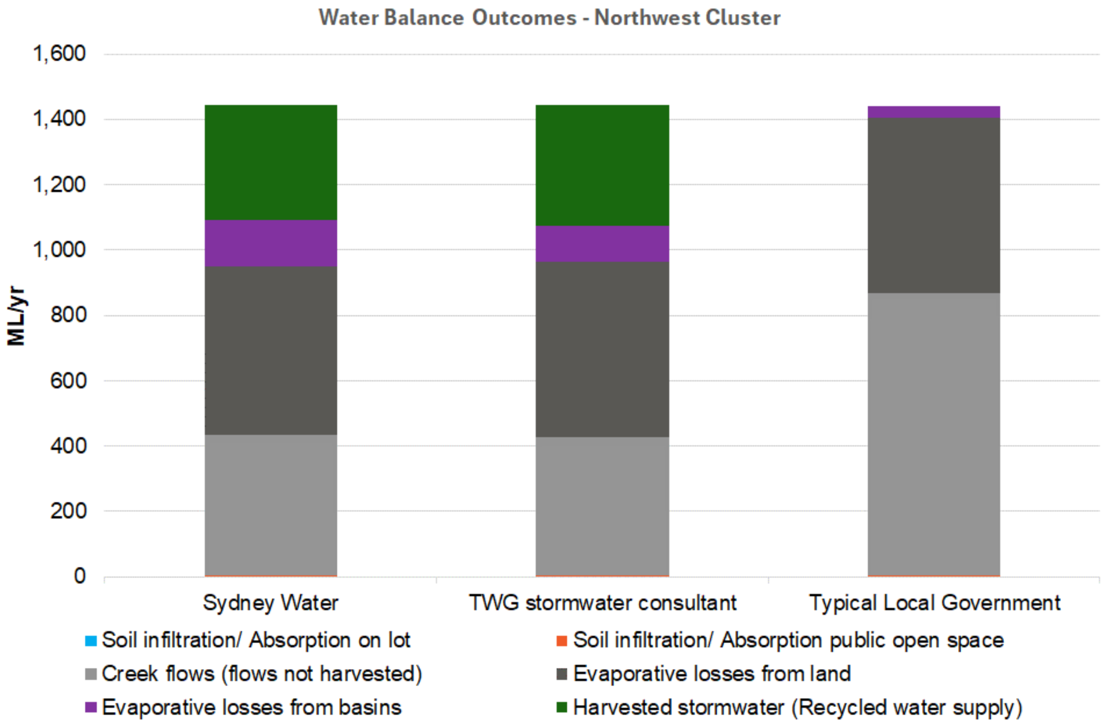

Figure 3-1 - Water balance outcomes - Northwest cluster

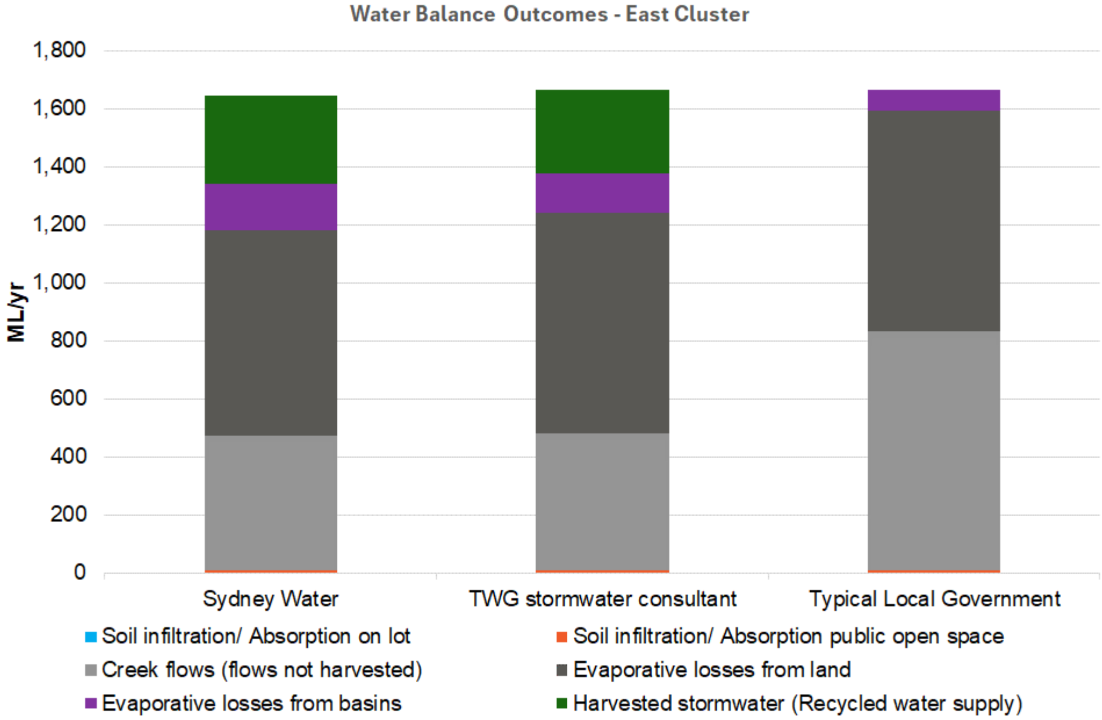

Figure 3-2 - Water balance outcomes - East cluster

4. Discussion, findings and recommendations

4.1 Discussion and findings

The review of MUSIC modelling undertaken for the Northwest and East sub-catchment clusters for the Mamre Road development precinct has confirmed that the Sydney Water conceptual design produces predicted pollutant reduction and flow management outcomes that largely comply with the risk-based targets for the Wianamatta-South Creek.

The input pollutant load parameters used by Sydney Water for the different land uses comply with current industry standards.

The alternative conceptual layouts generated by the TWG stormwater consultant for the Northwest and East sub-catchment clusters also generate pollutant and flow outcomes that are largely compliant with the targets. The review information provided by the consultant includes valid suggestions for Sydney Water to consider in the ongoing improvement of their models.

The most significant potential impact on improving the efficiency of the Sydney Water concept design has been made by changing the configuration of treatment systems and increasing the depth of recycled water storage ponds. This results in a significant reduction in the footprint of treatment and stormwater recycling infrastructure. These will be major drivers of stormwater management system costs.

This result suggests that the efficiency of the Sydney Water conceptual design could be improved. This result also suggests that Sydney Water's concept design approaches could be improved by examining a greater number of potential treatment and storage configurations and also undertaking sensitivity testing of the concept design outcomes to changes in key assumptions and inputs.

In examining the information provided by Sydney Water and the MUSIC modelling files, it is apparent that the modelling and documentation could be improved with a more systematic approach to organising the modelling effort. This would include the adoption of procedures to ensure consistent identification of model catchments, nodes, treatment and storage systems, plus the use of catchment imagery as a background for the positioning of treatment systems within the catchment.

The development of alternative conceptual layouts required to meet the typical Sydney Metropolitan pollution reduction standards, demonstrates that the risk-based pollution reduction targets for Wianamatta-South Creek and the addition of flow management targets adds significantly to the size of treatment and storage systems and the associated area of land required.

4.2 Recommendations

This report makes the following recommendations:

1. Sydney Water should consider the modification of its current conceptual design to incorporate the types of changes suggested in the alternative conceptual layouts developed by the TWG stormwater consultant across all five sub-catchment clusters.
2. Given the importance of the demand for water in the sizing of recycled water storage ponds, Sydney Water should continue its efforts to better understand the likely demands for water in the types of large-format industrial development being developed in the Mamre Road precinct.
3. Sydney Water should develop formal internal procedures to support future MUSIC modelling efforts. These procedures should cover:
    a. Model setup and organisation.
    b. Treatment train optioneering.
    c. Sensitivity testing.
4. Future stormwater modelling work in the Wianamatta-South Creek catchment should utilise an extended simulation time series.

5. References

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Watson T. D. (2014), *MUSIC Stormwater Modelling: A Calibration Study*, University of Melbourne.

Appendix A Technical requirements

A.1 Stormwater quantity targets

Table A-1: Wianamatta-South Creek Operational phase stormwater quantity (flow) targets Option 1 – MARV (State of NSW and Department of Planning and Environment, 2022c)

Parameter	Target
Mean annual runoff volume (MARV)	≤2 ML/ha/y at the point of discharge to the local waterway
90%ile flow	1,000–5,000 L/ha/day at the point of discharge to the local waterway
50%ile flow	5–100 L/ha/day at the point of discharge to the local waterway
10%ile flow	0 L/ha/day at the point of discharge to the local waterway

A.2 Wianamatta-South Creek Guidelines acceptable MUSIC treatment node parameters

Table A-2: Parameter ranges for sedimentation basins (State of NSW and Department of Planning and Environment, 2022b)

Sedimentation basin	Acceptable parameter ranges
Surface area	User defined
Extended detention depth	Maximum extended detention depth of 350 mm when part of a wetland system and up to 1.0 m when acting in isolation
Permanent pool volume	Calculate with depth up to a maximum of 2.0 m
Initial volume	Same as permanent pool volume
Exfiltration rate	Maximum of 0.01 mm/hour
Evaporative loss	Maximum of 100% of PET

Table A-3: Parameter ranges for wetlands (State of NSW and Department of Planning and Environment, 2022b)

Wetlands	Acceptable parameter ranges
Inlet pond volume	Set to zero if upstream sediment basin is modelled separately or sized to target 95% removal of 125 µm particles for 4EY[1] flow events
Extended detention depth	Maximum of 350 mm
Permanent pool volume	0.3–0.4 m x wetland surface area
Exfiltration	Maximum of 0.01 mm/hour
Evaporative loss	Maximum of 125% of PET
Outlet pipe	Adjust to ensure notional detention time is within ranges
Notional detention time	48–72 hours for detention depths of 100–350 mm No less than 48 hours for detention depths <100 mm
k & C* values (MUSIC)	Use default values

[1] 4EY = 4 exceedances per year

Table A-4: Parameter ranges for bioretention (raingardens) (State of NSW and Department of Planning and Environment, 2022b)

Bioretention	Acceptable parameter ranges
Extended detention depth	Maximum of 300 mm Maximum of 150 mm in streetscape bioretention
Unlined filter media perimeter	0.01 m (i.e. the systems are lined)
Saturate hydraulic conductivity	Maximum of 100 mm/hour
Filter media depth	0.4–0.7 m
TN content	800 mg/kg
Orthophosphate content	40 mg/kg
Exfiltration rate	zero
Lining	Yes – base is lined
Underdrain present	Yes
k & C* values (MUSIC)	Use default values

Table A-5: Parameter ranges for storage ponds (dams) (State of NSW and Department of Planning and Environment, 2022b)

Storage ponds	Acceptable parameter ranges
Water source	Only roof water or treated water into reuse storage ponds
Surface area	User defined
Permanent pool volume	Calculate with depth up to a maximum of 3.0 m
Initial volume	Same as permanent pool volume
Exfiltration rate	Maximum of 0.01 mm/hour
Evaporative loss	Maximum of 100% of PET
Reuse demands	Irrigation to be modelled as an annual demand Distribution* to be defined with a monthly pattern which is (Jan–Dec): 13%, 6%, 6%, 4%, 2%, 0%, 4%, 7%, 12%, 14%, 13%, 19% Indoor reuse to be modelled as a daily demand

* Irrigation distribution takes into account PET, rainfall and crop types

Appendix B MUSIC model details

B.1 MUSIC model schematics

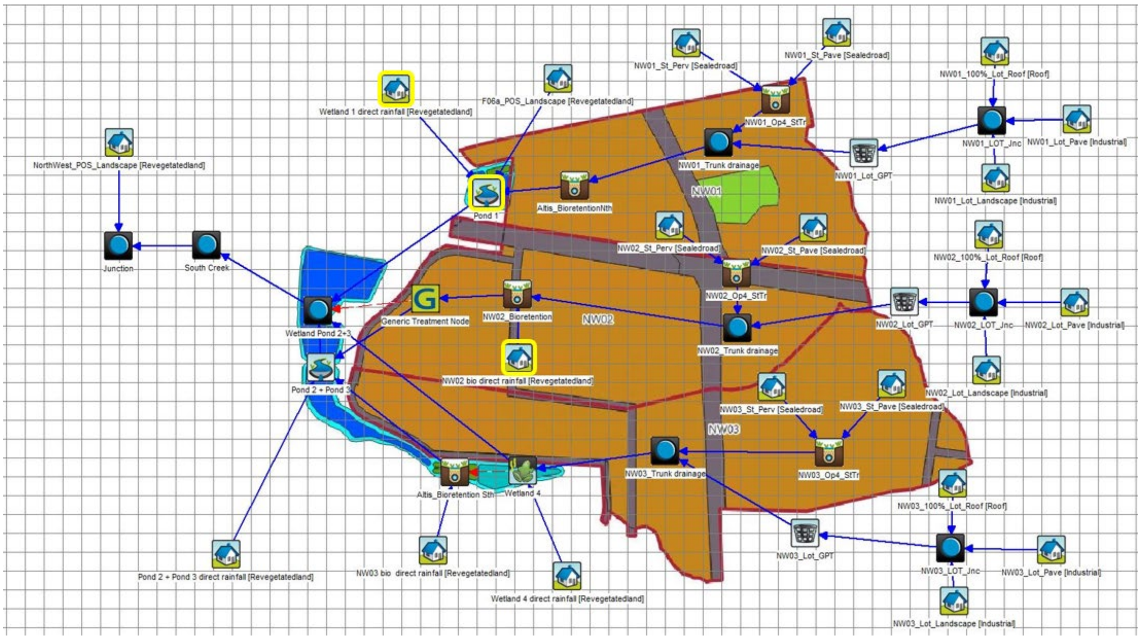

Figure B-1: MUSIC model schematic - Sydney Water - Northwest cluster

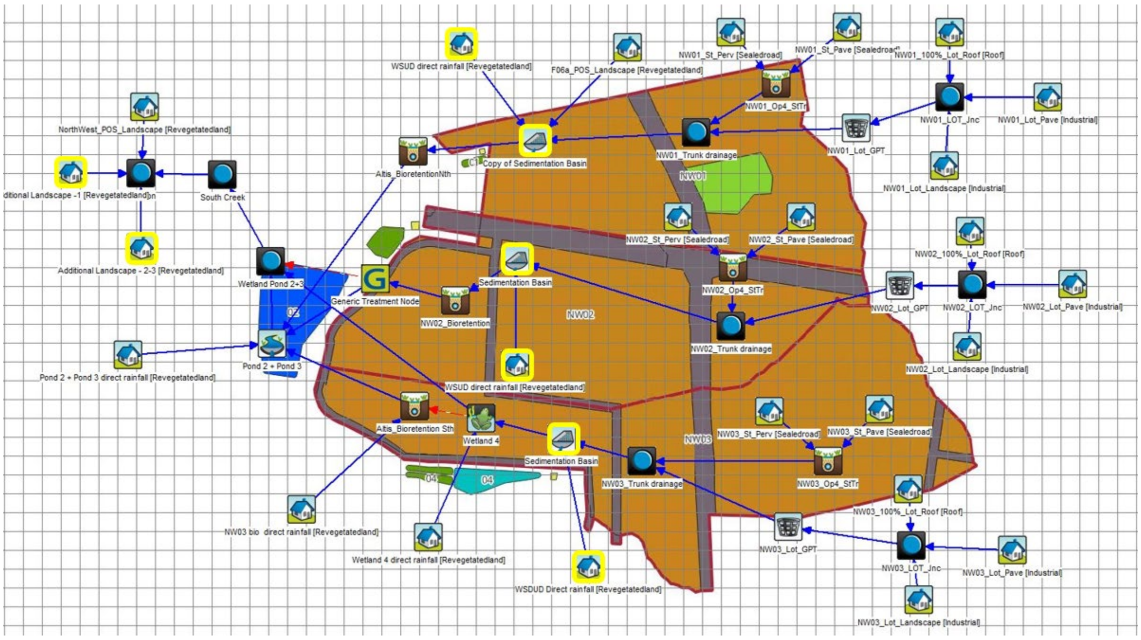

Figure B-2: MUSIC model schematic – TWG Stormwater Consultant - Northwest cluster

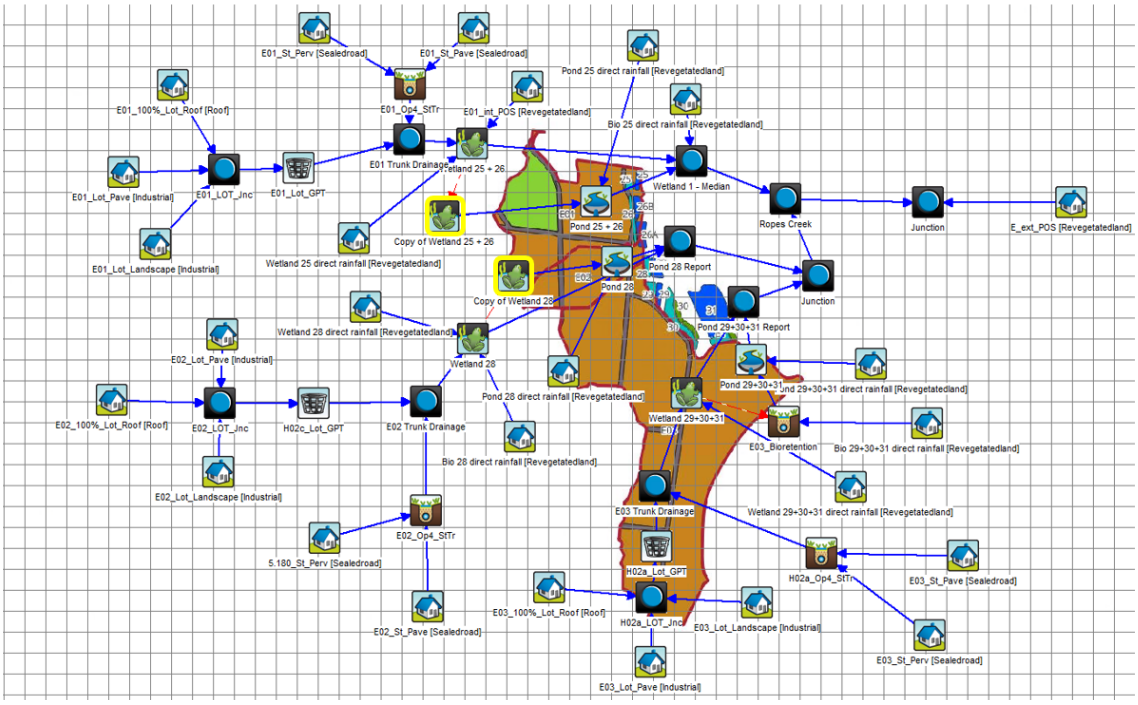

Figure B-3: MUSIC model schematic - Sydney Water - East cluster

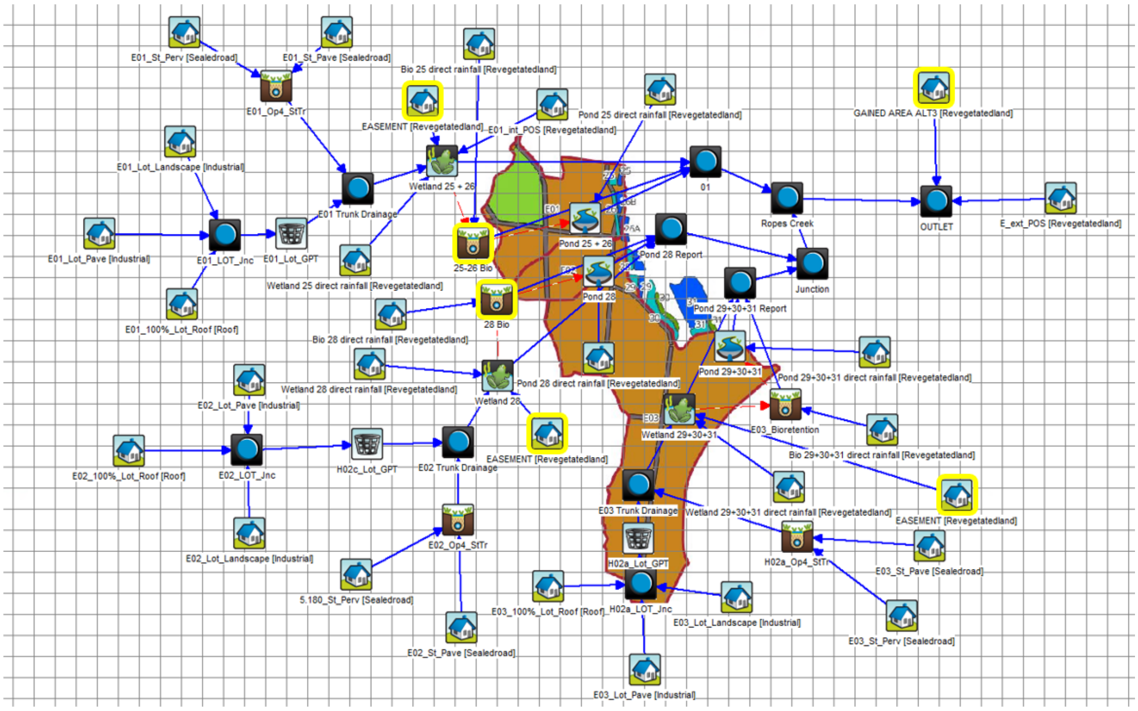

Figure B-4: MUSIC model schematic – TWG Stormwater Consultant - East cluster

B.2 MUSIC model inputs

B.2.1 Sydney Water Northwest Cluster

Table B-1: Source node information – Sydney Water - Northwest cluster

Location	NW01_100%_Lot_Roof	NW01_Lot_Pave	NW01_Lot_Landscape	NW01_St_Pave	NW01_St_Perv	Wetland 2A + 2B direct rainfall	Pond 2 + Pond 3 direct rainfall	Wetland 4 direct rainfall	NW02_100%_Lot_Roof	NW02_Lot_Pave	NW02_Lot_Landscape	NW02_St_Pave	NW02_St_Perv	NW03_100%_Lot_Roof	NW03_Lot_Pave	NW03_Lot_Landscape	NW03_St_Pave	NW03_St_Perv	F06a_POS_Landscape	NorthWest_POS_Landscape	Wetland 1 direct rainfall	NW01 bio 1 direct rainfall	NW02 bio direct rainfall	NW03 bio direct rainfall
ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	50	51	52
Node Type	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou
Zoning Surface Type	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Revegetat	Revegetat	Revegetat	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat
Total Area (ha)	21.47	11.71	5.86	2.13	0.66	0.837	7.12	0.942	24.72	13.48	6.74	9.78	3	31.14	16.98	8.49	5.49	1.69	2.91	30.72	0.69	0.231	0.419	0.471
Area Impervious (ha)	21.47	11.71	0	2.13	0	0.7533	6.408	0.8478	24.72	13.48	0	9.78	0	31.14	16.98	0	5.49	0	0	0	0.621	0	0	0
Area Pervious (ha)	0	0	5.86	0	0.66	0.0837	0.712	0.0942	0	0	6.74	0	3	0	0	8.49	0	1.69	2.91	30.72	0.069	0.231	0.419	0.471
Field Capacity (mm)	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Pervious Area Infiltration Capacity coefficient - a	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
Pervious Area Infiltration Capacity exponent - b	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Impervious Area Rainfall Threshold (mm/day)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pervious Area Soil Storage Capacity (mm)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Pervious Area Soil Initial Storage (% of Capacity)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Groundwater Initial Depth (mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Groundwater Daily Recharge Rate (%)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Groundwater Daily Baseflow Rate (%)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Groundwater Daily Deep Seepage Rate (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Suspended Solids Mean (log mg/L)	1.3	2.43	2.15	2.43	2.43	1.95	1.95	1.95	1.3	2.43	2.15	2.43	2.43	1.3	2.43	2.15	2.43	2.43	1.95	1.95	1.95	1.95	1.95	1.95
Stormflow Total Suspended Solids Standard Deviation (log mg/L)	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Stormflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Phosphorus Mean (log mg/L)	-0.89	-0.3	-0.6	-0.3	-0.3	-0.66	-0.66	-0.66	-0.89	-0.3	-0.6	-0.3	-0.3	-0.89	-0.3	-0.6	-0.3	-0.3	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
Stormflow Total Phosphorus Standard Deviation (log mg/L)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Stormflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.34	0.3	0.34	0.34	0.3	0.3	0.3	0.3	0.34	0.3	0.34	0.34	0.3	0.34	0.3	0.34	0.34	0.3	0.3	0.3	0.3	0.3	0.3
Stormflow Total Nitrogen Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Stormflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	1.2	1.2	1.2	1.15	1.15	1.15	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.15	1.15	1.15	1.15	1.15	1.15
Baseflow Total Suspended Solids Standard Deviation (log mg/L)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Baseflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	-0.85	-0.85	-0.85	-1.22	-1.22	-1.22	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22
Baseflow Total Phosphorus Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Baseflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0.11	0.11	0.11	-0.05	-0.05	-0.05	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Baseflow Total Nitrogen Standard Deviation (log mg/L)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Baseflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flow based constituent generation - enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Flow based constituent generation - flow file																								
Flow based constituent generation - base flow column																								
Flow based constituent generation - pervious flow column																								
Flow based constituent generation - impervious flow column																								
Flow based constituent generation - unit																								

Table B-2: UTSM treatment nodes – Sydney Water - Northwest cluster

Location	Wetland 2A + 2B	Wetland 4	Wetland 1 - up to 10322	Pond 2 + Pond 3	NW01_Op4_StTr	NW02_Op4_StTr	NW03_Op4_StTr	NW01_Bioretention	NW02_Bioretention	Altis_Bioretention Sth	Altis_Bioretention Nth	Pond 1
ID	22	23	24	25	26	27	28	44	45	46	54	55
Node Type	WetlandN	WetlandN	WetlandN	PondNod	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	PondNode
Lo-flow bypass rate (cum/sec)	0	0	0	0	99	99	0	0	0	0	0	0
Hi-flow bypass rate (cum/sec)	13.5	15	12	100	100.098	100.136	0.15	100	100	100	1	100
Inlet pond volume	4933.6	2970	2209.1	0								0
Area (sqm)	8373	9575	6920	66324	653	901	996	6921	4186	14286	1406	10323
Initial Volume (m^3)	2512	2708	2076	116408								18474
Extended detention depth (m)	0.05	0.05	0.3	0.05	0.02	0.02	0.02	0.3	0.3	0.3	0.3	0.05
Number of Rainwater tanks												
Permanent Pool Volume (cubic metres)	2512	2708	2076	116408								18474
Proportion vegetated	0.5	0.5	0.5	0.1								0.1
Equivalent Pipe Diameter (mm)	68	73	97	171								68
Overflow weir width (m)	5	5	5	20	2	2	2	20	8	20	8	20
Notional Detention Time (hrs)	48.3	47.9	48	60.5								59.5
Orifice Discharge Coefficient	0.6	0.6	0.6	0.6								0.6
Weir Coefficient	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Number of CSTR Cells	2	2	2	2	3	3	3	3	3	3	3	2
Total Suspended Solids - k (m/yr)	1500	1500	1500	400	8000	8000	8000	8000	8000	8000	8000	400
Total Suspended Solids - C* (mg/L)	6	6	6	12	20	20	20	20	20	20	20	12
Total Suspended Solids - C** (mg/L)	6	6	6	12								12
Total Phosphorus - k (m/yr)	1000	1000	1000	300	6000	6000	6000	6000	6000	6000	6000	300
Total Phosphorus - C* (mg/L)	0.06	0.06	0.06	0.09	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.09
Total Phosphorus - C** (mg/L)	0.06	0.06	0.06	0.09								0.09
Total Nitrogen - k (m/yr)	150	150	150	40	500	500	500	500	500	500	500	40
Total Nitrogen - C* (mg/L)	1	1	1	1	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1
Total Nitrogen - C** (mg/L)	1	1	1	1								1
Threshold Hydraulic Loading for C** (m/yr)	3500	3500	3500	3500								3500
Horizontal Flow Coefficient					3	3	3	3	3	3	3	
Reuse Enabled	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	On
Max drawdown height (m)				1.755								1.788983
Annual Demand Enabled	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	On
Annual Demand Value (ML/year)				95.37								35.11
Annual Demand Distribution				Monthly								Monthly
Annual Demand Monthly Distribution: Jan				13								13
Annual Demand Monthly Distribution: Feb				6								6
Annual Demand Monthly Distribution: Mar				6								6
Annual Demand Monthly Distribution: Apr				4								4
Annual Demand Monthly Distribution: May				2								2
Annual Demand Monthly Distribution: Jun				0								0
Annual Demand Monthly Distribution: Jul				4								4
Annual Demand Monthly Distribution: Aug				7								7
Annual Demand Monthly Distribution: Sep				12								12
Annual Demand Monthly Distribution: Oct				14								14
Annual Demand Monthly Distribution: Nov				13								13
Annual Demand Monthly Distribution: Dec				19								19
Daily Demand Enabled	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	On
Daily Demand Value (ML/day)				0.474								0.174
Custom Demand Enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Custom Demand Time Series File												
Custom Demand Time Series Units												
Filter area (sqm)					653	901	996	2307	4186	4709	1406	
Filter perimeter (m)					0.01	0.01	0.01	14	14	14	14	
Filter depth (m)					0.52	0.52	0.52	0.5	0.5	0.5	0.5	
Filter Median Particle Diameter (mm)												
Saturated Hydraulic Conductivity (mm/hr)					25	25	25	100	100	100	100	
Infiltration Media Porosity					0.35	0.35	0.35	0.35	0.35	0.35	0.35	
Length (m)												
Bed slope												
Base Width (m)												
Top width (m)												
Vegetation height (m)												
Vegetation Type					Vegetatec	Vegetatec	Vegetatec	Vegetatec	Vegetatec	Vegetatec	Vegetatec	
Total Nitrogen Content in Filter (mg/kg)					400	400	400	400	400	400	400	
Orthophosphate Content in Filter (mg/kg)					40	40	40	40	40	40	40	
Is Base Lined?					Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Is Underdrain Present?					Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Is Submerged Zone Present?					No	No	No	No	No	No	No	
Submerged Zone Depth (m)												
B for Media Soil Texture	-9999	-9999	-9999	-9999	13	13	13	13	13	13	13	-9999
Proportion of upstream impervious area treated												
Exfiltration Rate (mm/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Evaporative Loss as % of PET	125	125	125	100	100	100	100	100	100	100	100	100
Depth in metres below the drain pipe												
TSS A Coefficient												
TSS B Coefficient												
TP A Coefficient												
TP B Coefficient												
TN A Coefficient												
TN B Coefficient												
Sfc					0.61	0.61	0.61	0.61	0.61	0.61	0.61	
S*					0.37	0.37	0.37	0.37	0.37	0.37	0.37	
Sw					0.11	0.11	0.11	0.11	0.11	0.11	0.11	
Sh					0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Emax (m/day)					0.008	0.008	0.008	0.008	0.008	0.008	0.008	
Ew (m/day)					0.001	0.001	0.001	0.001	0.001	0.001	0.001	

Table B-3: Generic treatment nodes - Sydney Water - Northwest cluster

Location	NW01_Lot_GPT	NW01_EOP_GPT	NW02_Lot_GPT	NW02_EOP_GPT	NW03_Lot_GPT	NW03_EOP_GPT	Generic Treatment Node 2.70000	Generic Treatment Node 3.33000	Generic Treatment Node 3.60000	Generic Treatment Node
ID	38	39	40	41	42	43	47	48	49	53
Node Type	GPTNode	GPTNode	GPTNode	GPTNode	GPTNode	GPTNode	GenericN	GenericN	GenericN	GenericN
Lo-flow bypass rate (cum/sec)	0	99	0	99	0	99	0	0	0	0.0125
Hi-flow bypass rate (cum/sec)	0.66	100	0.76	100	0.96	100	2.7	3.33	15	100
Flow Transfer Function										
Input (cum/sec)	0	0	0	0	0	0	0	0	0	0
Output (cum/sec)	0	0	0	0	0	0	0	0	0	0
Input (cum/sec)	10	10	10	10	10	10	10	10	10	20
Output (cum/sec)	10	10	10	10	10	10	10	10	10	20
Gross Pollutant Transfer Function										
Enabled	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Input (kg/ML)	0	0	0	0	0	0	0	0	0	0
Output (kg/ML)	0	0	0	0	0	0	0	0	0	0
Input (kg/ML)	100	100	100	100	100	100	15	15	15	15
Output (kg/ML)	2	2	2	2	2	2	15	15	15	15
Total Nitrogen Transfer Function										
Enabled	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0	0	0	0	0	0	0	0
Output (mg/L)	0	0	0	0	0	0	0	0	0	0
Input (mg/L)	50	50	50	50	50	50	50	50	50	50
Output (mg/L)	50	50	50	50	50	50	50	50	50	50
Total Phosphorus Transfer Function										
Enabled	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0	0	0	0	0	0	0	0
Output (mg/L)	0	0	0	0	0	0	0	0	0	0
Input (mg/L)	0.5	0.5	0.5	0.5	0.5	0.5	5	5	5	5
Output (mg/L)	0.5	0.5	0.5	0.5	0.5	0.5	5	5	5	5
Input (mg/L)	10	10	10	10	10	10				
Output (mg/L)	7	7	7	7	7	7				
Total Suspended Solids Transfer Function										
Enabled	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0	0	0	0	0	0	0	0
Output (mg/L)	0	0	0	0	0	0	0	0	0	0
Input (mg/L)	75	75	75	75	75	75	1000	1000	1000	1000
Output (mg/L)	75	75	75	75	75	75	1000	1000	1000	1000
Input (mg/L)	1000	1000	1000	1000	1000	1000				
Output (mg/L)	300	300	300	300	300	300				
TSS Flow based Efficiency Enabled	Off	Off	Off	Off	Off	Off	On	On	On	On
TSS Flow based Efficiency							[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]
TP Flow based Efficiency Enabled	Off	Off	Off	Off	Off	Off	On	On	On	On
TP Flow based Efficiency							[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]
TN Flow based Efficiency Enabled	Off	Off	Off	Off	Off	Off	On	On	On	On
TN Flow based Efficiency							[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]
GP Flow based Efficiency Enabled	Off	Off	Off	Off	Off	Off	On	On	On	On
GP Flow based Efficiency							[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]	[0:1];[1:1]

Table B-4: Other nodes - Sydney Water - Northwest cluster

Location	NW01_LOT_Jnc	NW01_Trunk drainage	South Creek	NW02_LOT_Jnc	NW02_Trunk drainage	NW03_LOT_Jnc	NW03_Trunk drainage	Wetland Pond 2+3	Junction
ID	29	30	31	32	33	34	35	36	37
Node Type	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN

B.2.2 TWG stormwater consultant Northwest Cluster Alternative 1

Table B-5: Source node information – TWG stormwater consultant - Northwest cluster

Location	NW01_100%_Lot_Roof	NW01_Lot_Pave	NW01_Lot_Landscape	NW01_St_Pave	NW01_St_Perv	Pond 2 + Pond 3 direct rainfall	Wetland 4 direct rainfall	NW02_100%_Lot_Roof	NW02_Lot_Pave	NW02_Lot_Landscape	NW02_St_Pave	NW02_St_Perv	NW03_100%_Lot_Roof	NW03_Lot_Pave	NW03_Lot_Landscape	NW03_St_Pave	NW03_St_Perv	F06a_POS_Landscape	NorthWest_POS_Landscape	WSUD direct rainfall	NW03 bio direct rainfall	Additional Landscape - 2-3	WSUD direct rainfall	Additional Landscape -1	WSDUD Direct rainfall
ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	39	40	43	46	47	49
Node Type	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou
Zoning Surface Type	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Revegetat	Revegetat	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat
Total Area (ha)	21.47	11.71	5.86	2.13	0.66	5.5	0.942	24.72	13.48	6.74	9.78	3	31.14	16.98	8.49	5.49	1.69	2.91	30.72	0.419	0.25	2.85	0.14	0.55	0.1
Area Impervious (ha)	21.47	11.71	0	2.13	0	4.95	0.8478	24.72	13.48	0	9.78	0	31.14	16.98	0	5.49	0	0	0	0	0	0	0	0	0.09
Area Pervious (ha)	0	0	5.86	0	0.66	0.55	0.0942	0	0	6.74	0	3	0	0	8.49	0	1.69	2.91	30.72	0.419	0.25	2.85	0.14	0.55	0.01
Field Capacity (mm)	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Pervious Area Infiltration Capacity coefficient - a	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
Pervious Area Infiltration Capacity exponent - b	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Impervious Area Rainfall Threshold (mm/day)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2.5	1	2.5	1
Pervious Area Soil Storage Capacity (mm)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Pervious Area Soil Initial Storage (% of Capacity)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Groundwater Initial Depth (mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Groundwater Daily Recharge Rate (%)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Groundwater Daily Baseflow Rate (%)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Groundwater Daily Deep Seepage Rate (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Suspended Solids Mean (log mg/L)	1.3	2.43	2.15	2.43	2.43	1.95	1.95	1.3	2.43	2.15	2.43	2.43	1.3	2.43	2.15	2.43	2.43	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
Stormflow Total Suspended Solids Standard Deviation (log mg/L)	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Stormflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Phosphorus Mean (log mg/L)	-0.89	-0.3	-0.6	-0.3	-0.3	-0.66	-0.66	-0.89	-0.3	-0.6	-0.3	-0.3	-0.89	-0.3	-0.6	-0.3	-0.3	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
Stormflow Total Phosphorus Standard Deviation (log mg/L)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Stormflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.34	0.3	0.34	0.34	0.3	0.3	0.3	0.34	0.3	0.34	0.34	0.3	0.34	0.3	0.34	0.34	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Stormflow Total Nitrogen Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Stormflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	1.2	1.2	1.2	1.15	1.15	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Baseflow Total Suspended Solids Standard Deviation (log mg/L)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Baseflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	-0.85	-0.85	-0.85	-1.22	-1.22	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22
Baseflow Total Phosphorus Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Baseflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0.11	0.11	0.11	-0.05	-0.05	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Baseflow Total Nitrogen Standard Deviation (log mg/L)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Baseflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flow based constituent generation - enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Flow based constituent generation - flow file																									
Flow based constituent generation - base flow column																									
Flow based constituent generation - pervious flow column																									
Flow based constituent generation - impervious flow column																									
Flow based constituent generation - unit																									

Table B-6: UTSM treatment nodes – TWG stormwater consultant - Northwest cluster

Location	Wetland 4	Pond 2 + Pond 3	NW01_Op4_StTr	NW02_Op4_StTr	NW03_Op4_StTr	NW02_Bioretention	Altis_Bioretention Sth	Altis_Bioretention Nth	Sedimentation Basin	Copy of Sedimentation Basin	Sedimentation Basin
ID	20	21	22	23	24	37	38	42	44	45	48
Node Type	WetlandN	PondNode	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	Sediment	Sediment	Sedimenta
Lo-flow bypass rate (cum/sec)	0	0	99	99	0	0	0	0	0	0	0
Hi-flow bypass rate (cum/sec)	15	100	100.098	100.136	0.15	100	100	1	100	100	100
Inlet pond volume	0	0							0	0	0
Area (sqm)	9575	55000	653	901	996	4000	13075	1406	500	400	1000
Initial Volume (m^3)	2872.5	165000							500	400	1500
Extended detention depth (m)	0.05	0.08	0.02	0.02	0.02	0.3	0.3	0.3	0.01	0.01	0.01
Number of Rainwater tanks											
Permanent Pool Volume (cubic metres)	2872.5	165000							500	400	1500
Proportion vegetated	0.5	0.1							0	0	0
Equivalent Pipe Diameter (mm)	73	171							1000	1000	1000
Overflow weir width (m)	5	20	2	2	2	8	20	8	10	10	10
Notional Detention Time (hrs)	47.9	63.4							5.96E-03	4.77E-03	1.19E-02
Orifice Discharge Coefficient	0.6	0.6							0.6	0.6	0.6
Weir Coefficient	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Number of CSTR Cells	2	2	3	3	3	3	3	3	1	1	1
Total Suspended Solids - k (m/yr)	1500	400	8000	8000	8000	8000	8000	8000	8000	8000	8000
Total Suspended Solids - C* (mg/L)	6	12	20	20	20	20	20	20	20	20	20
Total Suspended Solids - C** (mg/L)	6	12							20	20	20
Total Phosphorus - k (m/yr)	1000	300	6000	6000	6000	6000	6000	6000	6000	6000	6000
Total Phosphorus - C* (mg/L)	0.06	0.09	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Total Phosphorus - C** (mg/L)	0.06	0.09							0.13	0.13	0.13
Total Nitrogen - k (m/yr)	150	40	500	500	500	500	500	500	500	500	500
Total Nitrogen - C* (mg/L)	1	1	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Total Nitrogen - C** (mg/L)	1	1							1.4	1.4	1.4
Threshold Hydraulic Loading for C** (m/yr)	3500	3500							3500	3500	3500
Horizontal Flow Coefficient			3	3	3	3	3	3			
Reuse Enabled	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
Max drawdown height (m)		2.999									
Annual Demand Enabled	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
Annual Demand Value (ML/year)		140.68									
Annual Demand Distribution		Monthly									
Annual Demand Monthly Distribution: Jan		13									
Annual Demand Monthly Distribution: Feb		6									
Annual Demand Monthly Distribution: Mar		6									
Annual Demand Monthly Distribution: Apr		4									
Annual Demand Monthly Distribution: May		2									
Annual Demand Monthly Distribution: Jun		0									
Annual Demand Monthly Distribution: Jul		4									
Annual Demand Monthly Distribution: Aug		7									
Annual Demand Monthly Distribution: Sep		12									
Annual Demand Monthly Distribution: Oct		14									
Annual Demand Monthly Distribution: Nov		13									
Annual Demand Monthly Distribution: Dec		19									
Daily Demand Enabled	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
Daily Demand Value (ML/day)		0.648									
Custom Demand Enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Custom Demand Time Series File											
Custom Demand Time Series Units											
Filter area (sqm)			653	901	996	3500	2500	1006			
Filter perimeter (m)			0.01	0.01	0.01	0.01	14	14			
Filter depth (m)			0.52	0.52	0.52	0.5	0.5	0.5			
Filter Median Particle Diameter (mm)											
Saturated Hydraulic Conductivity (mm/hr)			25	25	25	100	100	100			
Infiltration Media Porosity			0.35	0.35	0.35	0.35	0.35	0.35			
Length (m)											
Bed slope											
Base Width (m)											
Top width (m)											
Vegetation height (m)											
Vegetation Type			Vegetatec	Vegetatec	Vegetatec	Vegetatec	Vegetatec	Vegetatec			
Total Nitrogen Content in Filter (mg/kg)			400	400	400	400	400	400			
Orthophosphate Content in Filter (mg/kg)			40	40	40	40	40	40			
Is Base Lined?			Yes	Yes	Yes	Yes	Yes	Yes			
Is Underdrain Present?			Yes	Yes	Yes	Yes	Yes	Yes			
Is Submerged Zone Present?			No	No	No	No	No	No			
Submerged Zone Depth (m)											
B for Media Soil Texture	-9999	-9999	13	13	13	13	13	13	-9999	-9999	-9999
Proportion of upstream impervious area treated											
Exfiltration Rate (mm/hr)	0	0	0	0	0	0	0	0	0	0	0
Evaporative Loss as % of PET	125	100	100	100	100	100	100	100	75	75	75
Depth in metres below the drain pipe											
TSS A Coefficient											
TSS B Coefficient											
TP A Coefficient											
TP B Coefficient											
TN A Coefficient											
TN B Coefficient											
Sfc			0.61	0.61	0.61	0.61	0.61	0.61			
S*			0.37	0.37	0.37	0.37	0.37	0.37			
Sw			0.11	0.11	0.11	0.11	0.11	0.11			
Sh			0.05	0.05	0.05	0.05	0.05	0.05			
Emax (m/day)			0.008	0.008	0.008	0.008	0.008	0.008			
Ew (m/day)			0.001	0.001	0.001	0.001	0.001	0.001			

Table B-7: Generic treatment nodes – TWG stormwater consultant - Northwest cluster

Location	NW01_Lot_GPT	NW02_Lot_GPT	NW03_Lot_GPT	Generic Treatment Node
ID	34	35	36	41
Node Type	GPTNode	GPTNode	GPTNode	GenericNc
Lo-flow bypass rate (cum/sec)	0	0	0	0.0125
Hi-flow bypass rate (cum/sec)	0.66	0.76	0.96	100
Flow Transfer Function				
Input (cum/sec)	0	0	0	0
Output (cum/sec)	0	0	0	0
Input (cum/sec)	10	10	10	20
Output (cum/sec)	10	10	10	20
Gross Pollutant Transfer Function				
Enabled	TRUE	TRUE	TRUE	TRUE
Input (kg/ML)	0	0	0	0
Output (kg/ML)	0	0	0	0
Input (kg/ML)	100	100	100	15
Output (kg/ML)	2	2	2	15
Total Nitrogen Transfer Function				
Enabled	TRUE	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0	0
Output (mg/L)	0	0	0	0
Input (mg/L)	50	50	50	50
Output (mg/L)	50	50	50	50
Total Phosphorus Transfer Function				
Enabled	TRUE	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0	0
Output (mg/L)	0	0	0	0
Input (mg/L)	0.5	0.5	0.5	5
Output (mg/L)	0.5	0.5	0.5	5
Input (mg/L)	10	10	10	
Output (mg/L)	7	7	7	
Total Suspended Solids Transfer Function				
Enabled	TRUE	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0	0
Output (mg/L)	0	0	0	0
Input (mg/L)	75	75	75	1000
Output (mg/L)	75	75	75	1000
Input (mg/L)	1000	1000	1000	
Output (mg/L)	300	300	300	
TSS Flow based Efficiency Enabled	Off	Off	Off	On
TSS Flow based Efficiency				[0:1];[1:1]
TP Flow based Efficiency Enabled	Off	Off	Off	On
TP Flow based Efficiency				[0:1];[1:1]
TN Flow based Efficiency Enabled	Off	Off	Off	On
TN Flow based Efficiency				[0:1];[1:1]
GP Flow based Efficiency Enabled	Off	Off	Off	On
GP Flow based Efficiency				[0:1];[1:1]

Table B-8: Other nodes – TWG stormwater consultant - Northwest cluster

Location	NW01_LOT_Jnc	NW01_Trunk drainage	South Creek	NW02_LOT_Jnc	NW02_Trunk drainage	NW03_LOT_Jnc	NW03_Trunk drainage	Wetland Pond 2+3	Junction	Junction
ID	25	26	27	28	29	30	31	32	33	50
Node Type	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN

B.2.3 Sydney Water East Cluster

Table B-9: Source node information – Sydney Water - East cluster

Source nodes																										
Location	E01_int_POS	Wetland 25 direct rainfall	Pond 25 direct rainfall	Wetland 28 direct rainfall	Pond 28 direct rainfall	Wetland 29+30+31 direct rainfall	E03_100%_Lot_Roof	E03_Lot_Pave	E03_Lot_Landscape	E03_St_Pave	E03_St_Perv	E01_100%_Lot_Roof	E01_Lot_Pave	E01_Lot_Landscape	E01_St_Pave	E01_St_Perv	E02_100%_Lot_Roof	E02_Lot_Pave	E02_Lot_Landscape	E02_St_Pave	5.180_St_Perv	E_ext_POS	Pond 29+30+31 direct rainfall	Bio 25 direct rainfall	Bio 28 direct rainfall	Bio 29+30+31 direct rainfall
ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	49	51	53
Node Type	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSour
Zoning Surface Type	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat
Total Area (ha)	10.23	0.69	1.606	0.246	0.542	2.289	59.46	32.44	16.22	5.33	1.64	14.75	8.05	4.02	3.85	1.18	8.16	4.45	2.23	0.81	0.25	51.62	4.997	0.246	0.088	0.817
Area Impervious (ha)	0	0.621	1.4454	0.2214	0.4878	0.921408	59.46	32.44	0	5.33	0	14.75	8.05	0	3.85	0	8.16	4.45	0	0.81	0	0	4.997	0	0	0
Area Pervious (ha)	10.23	0.069	0.1606	0.0246	0.0542	1.367592	0	0	16.22	0	1.64	0	0	4.02	0	1.18	0	0	2.23	0	0.25	51.62	0	0.246	0.088	0.817
Field Capacity (mm)	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Pervious Area Infiltration Capacity coefficient - a	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
Pervious Area Infiltration Capacity exponent - b	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Impervious Area Rainfall Threshold (mm/day)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pervious Area Soil Storage Capacity (mm)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Pervious Area Soil Initial Storage (% of Capacity)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Groundwater Initial Depth (mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Groundwater Daily Recharge Rate (%)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Groundwater Daily Baseflow Rate (%)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Groundwater Daily Deep Seepage Rate (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Suspended Solids Mean (log mg/L)	1.95	1.95	1.95	1.95	1.95	1.95	1.3	2.43	2.15	2.43	2.43	1.3	2.43	2.15	2.43	2.43	1.3	2.43	2.15	2.43	2.43	1.95	1.95	1.95	1.95	1.95
Stormflow Total Suspended Solids Standard Deviation (log mg/L)	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Stormflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Phosphorus Mean (log mg/L)	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.89	-0.3	-0.6	-0.3	-0.3	-0.89	-0.3	-0.6	-0.3	-0.3	-0.89	-0.3	-0.6	-0.3	-0.3	-0.66	-0.66	-0.66	-0.66	-0.66
Stormflow Total Phosphorus Standard Deviation (log mg/L)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Stormflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.34	0.3	0.34	0.34	0.3	0.34	0.3	0.34	0.34	0.3	0.34	0.3	0.34	0.34	0.3	0.3	0.3	0.3	0.3
Stormflow Total Nitrogen Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Stormflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Suspended Solids Mean (log mg/L)	1.15	1.15	1.15	1.15	1.15	1.15	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.15	1.15	1.15	1.15	1.15
Baseflow Total Suspended Solids Standard Deviation (log mg/L)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Baseflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Phosphorus Mean (log mg/L)	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-1.22	-1.22	-1.22	-1.22	-1.22
Baseflow Total Phosphorus Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Baseflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Nitrogen Mean (log mg/L)	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-0.05	-0.05	-0.05	-0.05	-0.05
Baseflow Total Nitrogen Standard Deviation (log mg/L)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Baseflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flow based constituent generation - enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Flow based constituent generation - flow file																										
Flow based constituent generation - base flow column																										
Flow based constituent generation - pervious flow column																										
Flow based constituent generation - impervious flow column																										
Flow based constituent generation - unit																										

Table B-10: UTSM treatment nodes – Sydney Water - East cluster

Location	Wetland 25 + 26	Wetland 28	Wetland 29+30+31	Pond 25 + 26	Pond 28	Pond 29+30+31	H02a_Op 4_StTr	E01_Op4 _StTr	E02_Op4 _StTr	E02_Bior etention	E01_Bior etention	E03_Bior etention	Wetland 28	Copy of Wetland 25 + 26	Copy of Wetland 28
ID	24	25	26	27	28	29	30	31	32	45	46	47	54	55	56
Node Type	WetlandN	WetlandN	WetlandN	PondNode	PondNode	PondNode	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	WetlandN	WetlandN	WetlandN
Lo-flow bypass rate (cum/sec)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hi-flow bypass rate (cum/sec)	4	5	5	100	100	100	0.271	0.075	0.037	100	100	100	66	4	5
Inlet pond volume	2751.8	1542.2	5727	0	0	0							1226	0	0
Area (sqm)	6005.7	3357.5	22962	14904	5440.7	49983	1797.59	497.53	248.32	3344	9359.3	31138	2464	6005.7	3357.5
Initial Volume (m^3)	785	461	6480	27148	6808	78454							739	785	461
Extended detention depth (m)	0.02	0.01	0.05	0.05	0.05	0.1	0.02	0.02	0.02	0.3	0.3	0.3	0.01	0.3	0.3
Number of Rainwater tanks															
Permanent Pool Volume (cubic metres)	785	461	6480	27148	6808	78454							739	785	461
Proportion vegetated	0.5	0.5	0.5	0.1	0.1	0.1							0.5	0.5	0.5
Equivalent Pipe Diameter (mm)	46	29	112	199	120	434							25	90	68
Overflow weir width (m)	10	10	80	10	10	20	2	2	2	8	8	20	10	10	10
Notional Detention Time (hrs)	47.9	47.6	48.8	10	10.1	10							47	48.4	47.4
Orifice Discharge Coefficient	0.6	0.6	0.6	0.6	0.6	0.6							0.6	0.6	0.6
Weir Coefficient	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Number of CSTR Cells	2	2	2	2	2	2	3	3	3	3	3	3	2	2	2
Total Suspended Solids - k (m/yr)	1500	1500	1500	400	400	400	8000	8000	8000	8000	8000	8000	1500	1500	1500
Total Suspended Solids - C* (mg/L)	6	6	6	12	12	12	20	20	20	20	20	20	6	6	6
Total Suspended Solids - C** (mg/L)	6	6	6	12	12	12							6	6	6
Total Phosphorus - k (m/yr)	1000	1000	1000	300	300	300	6000	6000	6000	6000	6000	6000	1000	1000	1000
Total Phosphorus - C* (mg/L)	0.06	0.06	0.06	0.09	0.09	0.09	0.13	0.13	0.13	0.13	0.13	0.13	0.06	0.06	0.06
Total Phosphorus - C** (mg/L)	0.06	0.06	0.06	0.09	0.09	0.09							0.06	0.06	0.06
Total Nitrogen - k (m/yr)	150	150	150	40	40	40	500	500	500	500	500	500	150	150	150
Total Nitrogen - C* (mg/L)	1	1	1	1	1	1	1.4	1.4	1.4	1.4	1.4	1.4	1	1	1
Total Nitrogen - C** (mg/L)	1	1	1	1	1	1							1	1	1
Threshold Hydraulic Loading for C** (m/yr)	3500	3500	3500	3500	3500	3500							3500	3500	3500
Horizontal Flow Coefficient							3	3	3	3	3	3			
Reuse Enabled	Off	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
Max drawdown height (m)				1.820619	1.25131	1.569614									
Annual Demand Enabled	Off	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
Annual Demand Value (ML/year)				19.223	8.753	66.002									
Annual Demand Distribution				Monthly	Monthly	Monthly									
Annual Demand Monthly Distribution: Jan				13	13	13									
Annual Demand Monthly Distribution: Feb				6	6	6									
Annual Demand Monthly Distribution: Mar				6	6	6									
Annual Demand Monthly Distribution: Apr				4	4	4									
Annual Demand Monthly Distribution: May				2	2	2									
Annual Demand Monthly Distribution: Jun				0	0	0									
Annual Demand Monthly Distribution: Jul				4	4	4									
Annual Demand Monthly Distribution: Aug				7	7	7									
Annual Demand Monthly Distribution: Sep				12	12	12									
Annual Demand Monthly Distribution: Oct				14	14	14									
Annual Demand Monthly Distribution: Nov				13	13	13									
Annual Demand Monthly Distribution: Dec				19	19	19									
Daily Demand Enabled	Off	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off	Off	Off	Off
Daily Demand Value (ML/day)				0.121	0.06	0.437									
Custom Demand Enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Custom Demand Time Series File															
Custom Demand Time Series Units															
Filter area (sqm)							1797.59	497.53	248.32	880	2463	8176			
Filter perimeter (m)							0.01	0.01	0.01	14	14	14			
Filter depth (m)							0.52	0.52	0.52	0.5	0.5	0.5			
Filter Median Particle Diameter (mm)															
Saturated Hydraulic Conductivity (mm/hr)							25	25	25	100	100	100			
Infiltration Media Porosity							0.35	0.35	0.35	0.35	0.35	0.35			
Length (m)															
Bed slope															
Base Width (m)															
Top width (m)															
Vegetation height (m)															
Vegetation Type							Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated			
Total Nitrogen Content in Filter (mg/kg)							400	400	400	400	400	900			
Orthophosphate Content in Filter (mg/kg)							40	40	40	40	40	40			
Is Base Lined?							Yes	Yes	Yes	Yes	Yes	Yes			
Is Underdrain Present?							Yes	Yes	Yes	Yes	Yes	Yes			
Is Submerged Zone Present?							No	No	No	No	No	No			
Submerged Zone Depth (m)															
B for Media Soil Texture	-9999	-9999	-9999	-9999	-9999	-9999	13	13	13	13	13	13	-9999	-9999	-9999
Proportion of upstream impervious area treate															
Exfiltration Rate (mm/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Evaporative Loss as % of PET	50	50	125	100	100	100	100	100	100	100	100	100	125	50	50
Depth in metres below the drain pipe															
TSS A Coefficient															
TSS B Coefficient															
TP A Coefficient															
TP B Coefficient															
TN A Coefficient															
TN B Coefficient															
Sfc							0.61	0.61	0.61	0.61	0.61	0.61			
S*							0.37	0.37	0.37	0.37	0.37	0.37			
Sw							0.11	0.11	0.11	0.11	0.11	0.11			
Sh							0.05	0.05	0.05	0.05	0.05	0.05			
Emax (m/day)							0.008	0.008	0.008	0.008	0.008	0.008			
Ew (m/day)							0.001	0.001	0.001	0.001	0.001	0.001			

Table B-11: Generic treatment nodes - Sydney Water - East cluster

Location	H02a_Lot_GPT	E01_Lot_GPT	H02c_Lot_GPT
ID	42	43	44
Node Type	GPTNode	GPTNode	GPTNode
Lo-flow bypass rate (cum/sec)	0	0	0
Hi-flow bypass rate (cum/sec)	1.84	0.46	0.25
Flow Transfer Function			
Input (cum/sec)	0	0	0
Output (cum/sec)	0	0	0
Input (cum/sec)	10	10	10
Output (cum/sec)	10	10	10
Gross Pollutant Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (kg/ML)	0	0	0
Output (kg/ML)	0	0	0
Input (kg/ML)	100	100	100
Output (kg/ML)	2	2	2
Total Nitrogen Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0
Output (mg/L)	0	0	0
Input (mg/L)	50	50	50
Output (mg/L)	50	50	50
Total Phosphorus Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0
Output (mg/L)	0	0	0
Input (mg/L)	0.5	0.5	0.5
Output (mg/L)	0.5	0.5	0.5
Input (mg/L)	10	10	10
Output (mg/L)	7	7	7
Total Suspended Solids Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0
Output (mg/L)	0	0	0
Input (mg/L)	75	75	75
Output (mg/L)	75	75	75
Input (mg/L)	1000	1000	1000
Output (mg/L)	300	300	300
TSS Flow based Efficiency Enabled	Off	Off	Off
TSS Flow based Efficiency			
TP Flow based Efficiency Enabled	Off	Off	Off
TP Flow based Efficiency			
TN Flow based Efficiency Enabled	Off	Off	Off
TN Flow based Efficiency			
GP Flow based Efficiency Enabled	Off	Off	Off
GP Flow based Efficiency			

Table B-12: Other nodes - Sydney Water - East cluster

Location	Wetland 1 - Median	H02a_LOT_Jnc	E01_LOT_Jnc	Pond 29+30+31 Report	E02_LOT_Jnc	Pond 28 Report	Junction	Ropes Creek	Junction	E01 Trunk Drainage	E02 Trunk Drainage	E03 Trunk Drainage	Note on sed basins
ID	33	34	35	36	37	38	39	40	41	48	50	52	57
Node Type	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN

B.2.4 TWG stormwater consultant East Cluster Alternative 3

Table B-13: Source node information – TWG stormwater consultant - East cluster

Location	E01_int_POS	Wetland 25 direct rainfall	Pond 25 direct rainfall	Wetland 28 direct rainfall	Pond 28 direct rainfall	Wetland 29+30+31 direct rainfall	E03_100%_Lot_Roof	E03_Lot_Pave	E03_Lot_Landscape	E03_St_Pave	E03_St_Perv	E01_100%_Lot_Roof	E01_Lot_Pave	E01_Lot_Landscape	E01_St_Pave	E01_St_Perv	E02_100%_Lot_Roof	E02_Lot_Pave	E02_Lot_Landscape	E02_St_Pave	5.180_St_Perv	E_ext_POS	Pond 29+30+31 direct rainfall	Bio 25 direct rainfall	Bio 28 direct rainfall	Bio 29+30+31 direct rainfall	GAINED AREA ALT3	EASEMENT	EASEMENT	EASEMENT
ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	47	49	51	54	57	58	59
Node Type	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSou	UrbanSour
Zoning Surface Type	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Roof	Industrial	Industrial	Sealedroa	Sealedroa	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat	Revegetat
Total Area (ha)	10.23	0.577	1.606	0.274	0.542	2.236	57.651	31.446	15.723	5.33	1.64	13.101	7.146	3.573	3.85	1.18	6.952	3.792	1.896	0.81	0.25	51.62	4.997	0.173	0.082	0.575	3.55	3	2.2	3.3
Area Impervious (ha)	0	0.23009	1.4454	0.109263	0.4878	0.900073	57.651	31.446	0	5.33	0	13.101	7.146	0	3.85	0	6.952	3.792	0	0.81	0	0	4.507369	0	0	0	0.695694	0.58791	0.431134	0.646701
Area Pervious (ha)	10.23	0.34691	0.1606	0.164737	0.0542	1.335927	0	0	15.723	0	1.64	0	0	3.573	0	1.18	0	0	1.896	0	0.25	51.62	0.489631	0.173	0.082	0.575	2.854306	2.41209	1.768866	2.653299
Field Capacity (mm)	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Pervious Area Infiltration Capacity coefficient - a	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
Pervious Area Infiltration Capacity exponent - b	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Impervious Area Rainfall Threshold (mm/day)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pervious Area Soil Storage Capacity (mm)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Pervious Area Soil Initial Storage (% of Capacity)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Groundwater Initial Depth (mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Groundwater Daily Recharge Rate (%)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Groundwater Daily Baseflow Rate (%)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Groundwater Daily Deep Seepage Rate (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Suspended Solids Mean (log mg/L)	1.95	1.95	1.95	1.95	1.95	1.95	1.3	2.43	2.15	2.43	2.43	1.3	2.43	2.15	2.43	2.43	1.3	2.43	2.15	2.43	2.43	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
Stormflow Total Suspended Solids Standard Deviation (log mg/L)	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Stormflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Phosphorus Mean (log mg/L)	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.89	-0.3	-0.6	-0.3	-0.3	-0.89	-0.3	-0.6	-0.3	-0.3	-0.89	-0.3	-0.6	-0.3	-0.3	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
Stormflow Total Phosphorus Standard Deviation (log mg/L)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Stormflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.34	0.3	0.34	0.34	0.3	0.34	0.3	0.34	0.34	0.3	0.34	0.3	0.34	0.34	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Stormflow Total Nitrogen Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Stormflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Suspended Solids Mean (log mg/L)	1.15	1.15	1.15	1.15	1.15	1.15	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Baseflow Total Suspended Solids Standard Deviation (log mg/L)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Baseflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Phosphorus Mean (log mg/L)	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22	-1.22
Baseflow Total Phosphorus Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Baseflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Phosphorus Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baseflow Total Nitrogen Mean (log mg/L)	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Baseflow Total Nitrogen Standard Deviation (log mg/L)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Baseflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Nitrogen Serial Correlation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flow based constituent generation - enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Flow based constituent generation - flow file																														
Flow based constituent generation - base flow column																														
Flow based constituent generation - pervious flow column																														
Flow based constituent generation - impervious flow column																														
Flow based constituent generation - unit																														

Table B-14: UTSM treatment nodes – TWG stormwater consultant - East cluster

Location	Wetland 28	Wetland 29+30+31	Pond 25 + 26	Pond 28	Pond 29+30+31	H02a_Op 4_StTr	E01_Op4 _StTr	E02_Op4 _StTr	25-26 Bio	E03_Bior etention	Wetland 25 + 26	28 Bio
ID	24	25	26	27	28	29	30	31	44	45	53	55
Node Type	WetlandN	WetlandN	PondNode	PondNode	PondNode	BioRetent	BioRetent	BioRetent	BioRetent	BioRetent	WetlandN	BioRetent
Lo-flow bypass rate (cum/sec)	0	0	0	0	0	0	0	0	0	0	0	0
Hi-flow bypass rate (cum/sec)	5	5	100	100	100	0.271	0.075	0.037	100	100	4	100
Inlet pond volume	548	4472	0	0	0						1154	
Area (sqm)	2466	20122	12216	2961	35000	1797.59	497.53	248.32	7501	29065	5193	3562
Initial Volume (m^3)	822	6707	24433	5923	70000						1731	
Extended detention depth (m)	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.3	0.3	0.05	0.3
Number of Rainwater tanks												
Permanent Pool Volume (cubic metres)	822	6707	24433	5923	70000						1731	
Proportion vegetated	0.5	0.5	0.1	0.1	0.1						0.5	
Equivalent Pipe Diameter (mm)	37	106	199	120	434						54	
Overflow weir width (m)	10	80	10	10	20	2	2	2	25	20	10	25
Notional Detention Time (hrs)	48	47.7	8.22	5.48	4.95						47.5	
Orifice Discharge Coefficient	0.6	0.6	0.6	0.6	0.6						0.6	
Weir Coefficient	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Number of CSTR Cells	2	2	2	2	2	3	3	3	3	3	2	3
Total Suspended Solids - k (m/yr)	1500	1500	400	400	400	8000	8000	8000	8000	8000	1500	8000
Total Suspended Solids - C* (mg/L)	6	6	12	12	12	20	20	20	20	20	6	20
Total Suspended Solids - C** (mg/L)	6	6	12	12	12						6	
Total Phosphorus - k (m/yr)	1000	1000	300	300	300	6000	6000	6000	6000	6000	1000	6000
Total Phosphorus - C* (mg/L)	0.06	0.06	0.09	0.09	0.09	0.13	0.13	0.13	0.13	0.13	0.06	0.13
Total Phosphorus - C** (mg/L)	0.06	0.06	0.09	0.09	0.09						0.06	
Total Nitrogen - k (m/yr)	150	150	40	40	40	500	500	500	500	500	150	500
Total Nitrogen - C* (mg/L)	1	1	1	1	1	1.4	1.4	1.4	1.4	1.4	1	1.4
Total Nitrogen - C** (mg/L)	1	1	1	1	1						1	
Threshold Hydraulic Loading for C** (m/yr)	3500	3500	3500	3500	3500						3500	
Horizontal Flow Coefficient						3	3	3	3	3		3
Reuse Enabled	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off	Off
Max drawdown height (m)			1.999	2	2							
Annual Demand Enabled	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off	Off
Annual Demand Value (ML/year)			19.223	8.753	66.002							
Annual Demand Distribution			Monthly	Monthly	Monthly							
Annual Demand Monthly Distribution: Jan			13	13	13							
Annual Demand Monthly Distribution: Feb			6	6	6							
Annual Demand Monthly Distribution: Mar			6	6	6							
Annual Demand Monthly Distribution: Apr			4	4	4							
Annual Demand Monthly Distribution: May			2	2	2							
Annual Demand Monthly Distribution: Jun			0	0	0							
Annual Demand Monthly Distribution: Jul			4	4	4							
Annual Demand Monthly Distribution: Aug			7	7	7							
Annual Demand Monthly Distribution: Sep			12	12	12							
Annual Demand Monthly Distribution: Oct			14	14	14							
Annual Demand Monthly Distribution: Nov			13	13	13							
Annual Demand Monthly Distribution: Dec			19	19	19							
Daily Demand Enabled	Off	Off	On	On	On	Off	Off	Off	Off	Off	Off	Off
Daily Demand Value (ML/day)			0.1089	0.0522	0.424							
Custom Demand Enabled	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Custom Demand Time Series File												
Custom Demand Time Series Units												
Filter area (sqm)						1797.59	497.53	248.32	1731	6707		822
Filter perimeter (m)						0.01	0.01	0.01	0.01	0.01		0.01
Filter depth (m)						0.52	0.52	0.52	0.5	0.5		0.5
Filter Median Particle Diameter (mm)												
Saturated Hydraulic Conductivity (mm/hr)						25	25	25	100	100		100
Infiltration Media Porosity						0.35	0.35	0.35	0.35	0.35		0.35
Length (m)												
Bed slope												
Base Width (m)												
Top width (m)												
Vegetation height (m)												
Vegetation Type						Vegetatec	Vegetatec	Vegetatec	Vegetatec	Vegetatec		Vegetatec
Total Nitrogen Content in Filter (mg/kg)						400	400	400	400	900		400
Orthophosphate Content in Filter (mg/kg)						40	40	40	40	40		40
Is Base Lined?						Yes	Yes	Yes	Yes	Yes		Yes
Is Underdrain Present?						Yes	Yes	Yes	Yes	Yes		Yes
Is Submerged Zone Present?						No	No	No	Yes	Yes		Yes
Submerged Zone Depth (m)									0.3	0.3		0.3
B for Media Soil Texture	-9999	-9999	-9999	-9999	-9999	13	13	13	13	13	-9999	13
Proportion of upstream impervious area treated												
Exfiltration Rate (mm/hr)	0.01	0.01	0	0	0	0	0	0	0	0	0.01	0
Evaporative Loss as % of PET	125	125	100	100	100	100	100	100	100	100	125	100
Depth in metres below the drain pipe												
TSS A Coefficient												
TSS B Coefficient												
TP A Coefficient												
TP B Coefficient												
TN A Coefficient												
TN B Coefficient												
Sfc						0.61	0.61	0.61	0.61	0.61		0.61
S*						0.37	0.37	0.37	0.37	0.37		0.37
Sw						0.11	0.11	0.11	0.11	0.11		0.11
Sh						0.05	0.05	0.05	0.05	0.05		0.05
Emax (m/day)						0.008	0.008	0.008	0.008	0.008		0.008
Ew (m/day)						0.001	0.001	0.001	0.001	0.001		0.001

Table B-15: Generic treatment nodes – TWG stormwater consultant - East cluster

Location	H02a_Lot_GPT	E01_Lot_GPT	H02c_Lot_GPT
ID	41	42	43
Node Type	GPTNode	GPTNode	GPTNode
Lo-flow bypass rate (cum/sec)	0	0	0
Hi-flow bypass rate (cum/sec)	1.84	0.46	0.25
Flow Transfer Function			
Input (cum/sec)	0	0	0
Output (cum/sec)	0	0	0
Input (cum/sec)	10	10	10
Output (cum/sec)	10	10	10
Gross Pollutant Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (kg/ML)	0	0	0
Output (kg/ML)	0	0	0
Input (kg/ML)	100	100	100
Output (kg/ML)	2	2	2
Total Nitrogen Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0
Output (mg/L)	0	0	0
Input (mg/L)	50	50	50
Output (mg/L)	50	50	50
Total Phosphorus Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0
Output (mg/L)	0	0	0
Input (mg/L)	0.5	0.5	0.5
Output (mg/L)	0.5	0.5	0.5
Input (mg/L)	10	10	10
Output (mg/L)	7	7	7
Total Suspended Solids Transfer Function			
Enabled	TRUE	TRUE	TRUE
Input (mg/L)	0	0	0
Output (mg/L)	0	0	0
Input (mg/L)	75	75	75
Output (mg/L)	75	75	75
Input (mg/L)	1000	1000	1000
Output (mg/L)	300	300	300
TSS Flow based Efficiency Enabled	Off	Off	Off
TSS Flow based Efficiency			
TP Flow based Efficiency Enabled	Off	Off	Off
TP Flow based Efficiency			
TN Flow based Efficiency Enabled	Off	Off	Off
TN Flow based Efficiency			
GP Flow based Efficiency Enabled	Off	Off	Off
GP Flow based Efficiency			

Table B-16: Other nodes – TWG stormwater consultant - East cluster

Location	1	H02a_LOT_Jnc	E01_LOT_Jnc	Pond 29+30+31 Report	E02_LOT_Jnc	Pond 28 Report	Junction	Ropes Creek	OUTLET	E01 Trunk Drainage	E02 Trunk Drainage	E03 Trunk Drainage		
ID	32	33	34	35	36	37	38	39	40	46	48	50	52	56
Node Type	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN	JunctionN

B.3 MUSIC model water balances

B.3.1 Northwest cluster

Table B-17 - MUSIC Water Balance Summary - Sydney Water - Northwest cluster

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
In	Rainfall (precipitation)	206.6	0.69	m/yr.	1,424.3	Total Precinct - Modelled from 1999 to 2008 in MUSIC
In	Harvested stormwater (Recycled water supply)	NA	353.4	ML/yr.	353.4	Based on MUSIC modelling
In	Remaining recycled water supply (waste or potable water)	NA	13.2	ML/yr.	13.2	Meeting recycled water demand shortfall from stormwater
Total In					1,790.9	
Recycled water use	*Internal recycled water demand*	170.5	3.8	*kL/Nha/d*	236.5	Sydney Water figures for internal use demand (3.8kL/day per hectare of net developable land). Daily re-use demand from MUSIC model
Irrigation Demand	*Irrigation recycled water demand (on-lot, street verge, public open space, Sydney Water assets, and floodplain)*	NA	0.3 to 0.6	m/Ha/yr.	130.5	Based on ability of soil to absorb water without impact salinity or vegetation health. Annual demand value from MUSIC model
Total recycled water use					370.0	
Out	Soil infiltration/ Absorption on lot	140.6	0.0013	m/yr.	1.8	Rainfall only. Irrigation not known. This was taken as all

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
						deep seepage loss and baseflow out of all lot source nodes in the MUSIC model
	Soil infiltration/ Absorption public open space	77.6	0.0045	m/yr.	3.5	Rainfall only. Irrigation not known. This was taken as all infiltration loss, seepage loss, and baseflow out from all non-lot source nodes and all treatment nodes
Out	Creek flows (flows not harvested)	206.6	0.21	m/yr.	428	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from land	206.2	0.25	m/yr.	518.3	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from basins	11.6	1.2	m/yr.	139.3	Based on MUSIC modelling. Area taken as area of all attached treatment nodes
Total Out					1,090.9	

Table B-18 - MUSIC Water Balance Summary – TWG stormwater consultant - Northwest cluster

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
In	Rainfall (precipitation)	207.7	0.69	m/yr.	1,435.2	Total Precinct - Modelled from 1999 to 2008 in MUSIC
In	Harvested stormwater (Recycled water supply)	NA	371.3	ML/yr.	371.3	Based on MUSIC modelling
In	Remaining recycled water supply (waste or potable water)	NA	5.7	ML/yr.	5.7	Meeting recycled water demand shortfall from stormwater
Total In					1,812.2	
Recycled water use	*Internal recycled water demand*	170.5	3.8	*kL/Nha/d*	236.5	Sydney Water figures for internal use demand (3.8kL/day per hectare of net developable land). Daily re-use demand from MUSIC model
Irrigation Demand	*Irrigation recycled water demand (on-lot, street verge, public open space, Sydney Water assets, and floodplain)*	NA	0.3 to 0.6	m/Ha/yr.	140.7	Based on ability of soil to absorb water without impact salinity or vegetation health. Annual demand value from MUSIC model
Total recycled water use					377.2	
Out	Soil infiltration/ Absorption on lot	140.6	0.0013	m/yr.	1.8	Rainfall only. Irrigation not known. This was taken as all deep seepage loss and baseflow out of

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
						all lot source nodes in the MUSIC model
	Soil infiltration/ Absorption public open space	75.9	0.0049	m/yr.	3.7	Rainfall only. Irrigation not known. This was taken as all infiltration loss, seepage loss, and baseflow out from all non-lot source nodes and all treatment nodes
Out	Creek flows (flows not harvested)	207.7	0.21	m/yr.	423	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from land	207.7	0.26	m/yr.	537.3	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from basins	8.8	1.2	m/yr.	107.4	Based on MUSIC modelling. Area taken as area of all attached treatment nodes
Total Out					1,073.2	

B.3.2 East cluster

Table B-19 - MUSIC Water Balance Summary - Sydney Water - East cluster

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
In	Rainfall (precipitation)	236.2	0.69	m/yr.	1,632	Total Precinct - Modelled from 1999 to 2008 in MUSIC
In	Harvested stormwater (Recycled water supply)	NA	304.7	ML/yr.	304.7	Based on MUSIC modelling
In	Remaining recycled water supply (waste or potable water)	NA	15.3	ML/yr.	15.3	Meeting recycled water demand shortfall from stormwater
Total In					1,952	
Recycled water use	*Internal recycled water demand*	162.6	3.8	*kL/Nha/d*	225.6	Sydney Water figures for internal use demand (3.8kL/day per hectare of net developable land). Daily re-use demand from MUSIC model
Irrigation Demand	*Irrigation recycled water demand (on-lot, street verge, public open space, Sydney Water assets, and floodplain)*	NA	0.3 to 0.6	m/Ha/yr.	94.0	Based on ability of soil to absorb water without impact salinity or vegetation health. Annual demand value from MUSIC model
Total recycled water use					319.6	
Out	Soil infiltration/ Absorption on lot	149.8	0.0013	m/yr.	1.9	Rainfall only. Irrigation not known. This was taken as all deep seepage loss and baseflow out of

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
						all lot source nodes in the MUSIC model
	Soil infiltration/ Absorption public open space	101.0	0.0057	m/yr.	5.8	Rainfall only. Irrigation not known. This was taken as all infiltration loss, seepage loss, and baseflow out from all non-lot source nodes and all treatment nodes
Out	Creek flows (flows not harvested)	236.2	0.20	m/yr.	464	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from land	236.2	0.30	m/yr.	707.2	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from basins	14.6	1.1	m/yr.	160.9	Based on MUSIC modelling. Area taken as area of all attached treatment nodes
Total Out					1,339.8	

Table B-20 - MUSIC Water Balance Summary – TWG stormwater consultant - East cluster

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
In	Rainfall (precipitation)	239.3	0.69	m/yr.	1,653.4	Total Precinct - Modelled from 1999 to 2008 in MUSIC
In	Harvested stormwater (Recycled water supply)	NA	291.2	ML/yr.	291.2	Based on MUSIC modelling
In	Remaining recycled water supply (waste or potable water)	NA	16.0	ML/yr.	16.0	Meeting recycled water demand shortfall from stormwater
Total In					1,960.6	
Recycled water use	*Internal recycled water demand*	154.0	3.8	*kL/Nha/d*	213.6	Sydney Water figures for internal use demand (3.8kL/day per hectare of net developable land). Daily re-use demand from MUSIC model
Irrigation Demand	*Irrigation recycled water demand (on-lot, street verge, public open space, Sydney Water assets, and floodplain)*	NA	0.3 to 0.6	m/Ha/yr.	94.0	Based on ability of soil to absorb water without impact salinity or vegetation health. Annual demand value from MUSIC model
Total recycled water use					307.6	
Out	Soil infiltration/ Absorption on lot	141.3	0.0013	m/yr.	1.8	Rainfall only. Irrigation not known. This was taken as all deep seepage loss and baseflow out of

Flux	Water sources	Area (Ha)	Rate	Unit	Volume (ML/yr)	Assumptions or comments
						all lot source nodes in the MUSIC model
	Soil infiltration/ Absorption public open space	110.1	0.0083	m/yr.	9.1	Rainfall only. Irrigation not known. This was taken as all infiltration loss, seepage loss, and baseflow out from all non-lot source nodes and all treatment nodes
Out	Creek flows (flows not harvested)	239.3	0.20	m/yr.	468	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from land	239.3	0.32	m/yr.	761.9	Based on MUSIC modelling. Area taken as area of all attached source nodes
Out	Evaporative losses from basins	12.1	1.1	m/yr.	133.9	Based on MUSIC modelling. Area taken as area of all attached treatment nodes
Total Out					1,374.7	