21 October 2024

Andrew Nicholls
Chief Executive Officer
IPART - Independent Pricing and Regulatory Tribunal
via email: ipart@ipart.nsw.gov.au

## Sydney Water response to the Mamre Road stormwater review - draft report

Dear Mr Nicholls

Thank you for the opportunity to respond to IPART's efficiency review of Sydney Water's proposed Mamre Road stormwater servicing.

Our customers want us to keep bills affordable and also protect waterways. We look forward to continuing to work with Government and developers to deliver timely and cost-effective regional stormwater services to protect the sensitive waterways of Wianamatta. It is in this context, that our feedback is provided.

Sydney Water agrees with the majority of IPART's draft findings, specifically:

- the risk-based process to set stormwater management targets was appropriate
- the higher cost to provide services in this area is driven by the need to protect waterways and the specific nature of development in the area
- additional community benefits do not drive scheme costs
- developers should pay the incremental costs of the scheme (this aligns to nationally accepted pricing principles and maximises economic efficiency)
- Sydney Water's recommended scheme costing was efficient for the proposed design,

***Identified Risks***

IPART has based its efficient cost estimate on an alternative scheme design but noted this is subject to technical feasibility. We agree with IPART, that all feasible options, particularly, lower cost options, must continue to be tested until such time as evidence can be found to exclude them. However, we disagree that we have excluded the smaller basin footprint design adopted in IPART's efficient cost estimate, rather, we have not counted on this potentially lower cost design for the calculation of the initial infrastructure contribution paid by developers because we do not consider it represents the best balance of cost and risk at this stage of the project.

Including assumed efficiencies in a future developer infrastructure contribution without appropriate evidence, places the funding risk with customers, rather than developers. That is, if actual costs exceed IPART's assumed efficient cost, because the assumed efficiencies are not possible to achieve in practice, customers rather than developers, will bear the increased costs. The following assumptions in IPART's assessment increase this risk:

*Smaller basin footprints are possible at all sites*
Actual cost savings from smaller basins are dependent on the geotechnical (ground) and groundwater conditions at each site. That is, once ground and groundwater conditions are known, it allows us to compare cost savings from reduced land purchases with any increased costs from ground and groundwater conditions. Sydney Water based our draft infrastructure contribution on the preliminary available ground and groundwater information to balance the funding risk between customers and developers.

*Smaller footprints will always result in less land acquisition*
Reducing the basin footprint does not necessarily result in a proportional reduction of land acquisition and associated costs at each site. Land severance and the application of the *Land Acquisition (Just Terms Compensation) Act 1991* need to be considered.

*Minimal land contamination at all sites*
Sydney Water has several projects in progress in Western Sydney including the Upper South Creek Advanced Water Recycling Centre and water and wastewater networks in areas such as Austral and Leppington. Asbestos and general land contamination are the norm rather than the exception, so management and disposal costs are likely to be high rather than low.

We have attached a Technical Appendix drawn from extensive internal subject matter expertise and specialist external advice which provides more detailed analysis for IPART's further consideration.

***Mitigating Risks***

Sydney Water is committed to minimising the cost of the scheme and will adopt measures to minimise risks identified above. These include:

1. Review our forecast of recycled water demand for large format industrial properties.
2. Work with the development industry to find opportunities to optimise the scheme design
3. Look a developer delivered approach for infrastructure that matches development timeframes and avoid the need for interim and/or abortive works.
4. Explore innovative strategies to mitigate cost allocation risk.

Thank you again for your consideration of the efficient cost and cost allocation for these important services, which underpin a significant improvement in the sustainability and resilience of our growing city.

Yours sincerely

[redacted]

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**Managing Director**

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# IPART Mamre Road stormwater scheme review

## Technical appendix responding to IPART's draft report

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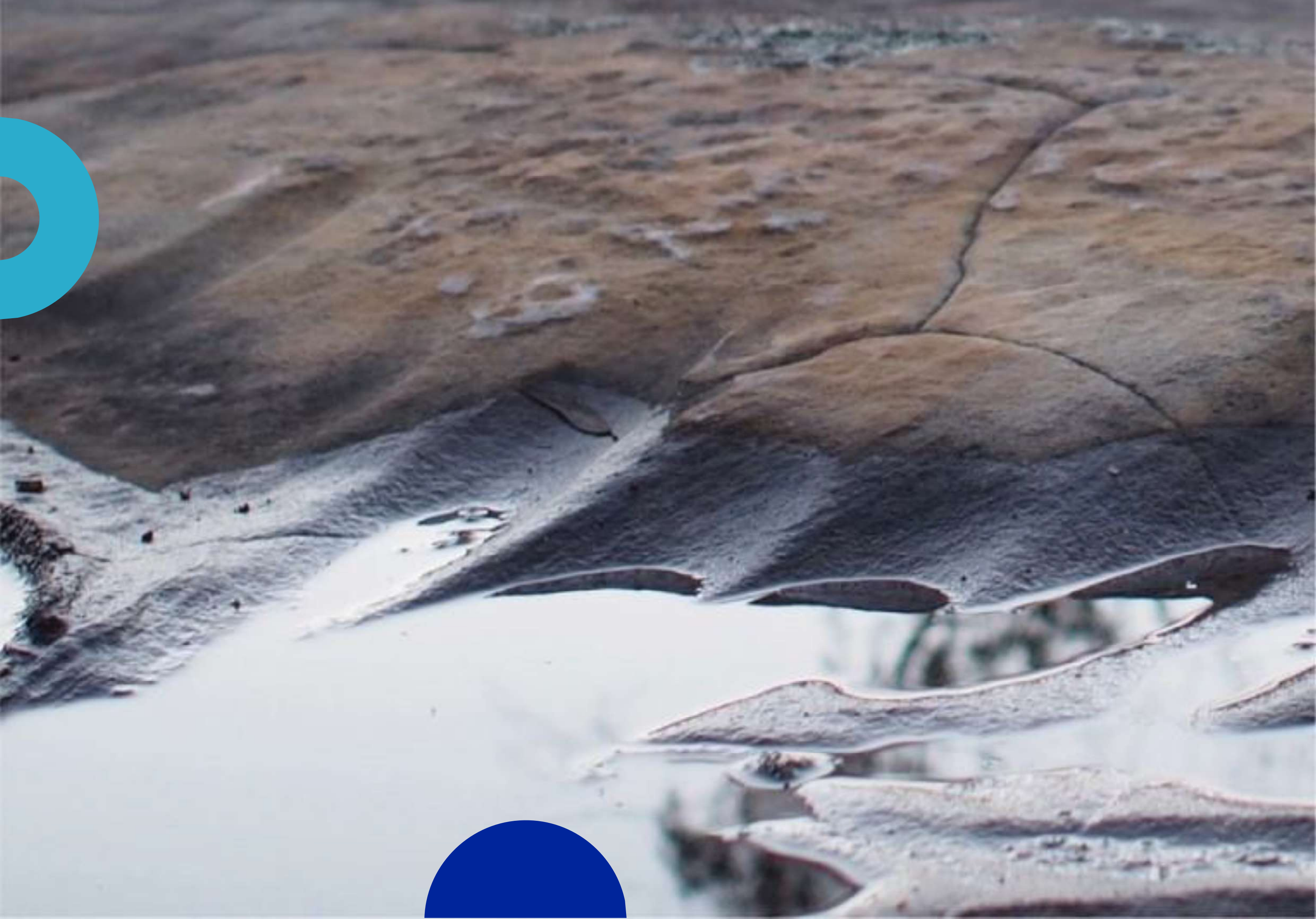
# Acknowledgement of Country

Sydney Water respectfully acknowledges the Traditional Custodians of the land and waters on which we work, live and learn. We pay respect to Elders past and present.



# Contents

# 1. Executive Summary

Sydney Water appreciates the opportunity to respond to IPART's Mamre Road Stormwater – Draft Report. We support IPART's review approach and agree with many of the draft findings. With Greater Sydney's population forecast to reach 8 million people over the next 40 years, it is imperative growth occurs sustainably and without detriment to our resources and ecosystems. The population within Western Sydney is expected to almost double by 2041 and comprise about 20% of total forecast growth across Greater Sydney.

At the centre of the Western Parkland City (WPC) will be the Western Sydney International (Nancy-Bird Walton) Airport which is surrounded by the Mamre Road industrial precinct, and the four Aerotropolis Initial Precincts (Bradfield, Northern Gateway, Agribusiness, and Badgerys Creek). The NSW Government has appointed Sydney Water as the Regional Stormwater Authority for these precincts where we will deliver least-cost integrated stormwater servicing which has been estimated to result in over $2 billion additional benefit when compared to traditional servicing.

We are keen to work with Government and developers to deliver cost-effective regional stormwater services and support development in a timely fashion. We must balance this within the context that two of our customers' top three priorities are for Sydney Water to protect waterway health and keep bills affordable. We appreciate IPART's recognition that our plans to deliver integrated regional stormwater servicing is key to protecting the sensitive waterways of Wianamatta.

We will work with the development industry to find opportunities to optimise the scheme design as we progress into detailed design and delivery phases. We will continue to review our processes and look for opportunities to improve. We are also supporting a transition to a developer delivered approach for stormwater infrastructure to better match development timeframes and avoid the need for interim and/or abortive works, saving the development industry both time and money.

Sydney Water agrees with the majority of IPART's draft review findings and recommendations including:

- The NSW Government's risk-based process to develop Wianamatta–South Creek stormwater management targets was appropriate
- the higher cost to provide services in this area is driven by the need to protect waterways from development
- additional community benefits are incidental, and do not drive scheme costs
- developers should pay the incremental costs of the scheme (this aligns to nationally accepted pricing principles and maximises economic efficiency)
- Sydney Water's recommended scheme costing was efficient for the proposed design
- there may be a more efficient alternative scheme design but this is subject to technical feasibility.

Sydney Water remains concerned that for greenfield stormwater servicing, locking in assumed efficiencies during the initial Development Servicing Plan (DSP) period places disproportionate forecast risk with customers rather than developers. As such, we plan to address this risk by adopting a suite of mitigating measures. For example, we agree with IPART it is important for us to review our forecast of recycled water demand for large format industrial properties and with the importance of considering a range of options, including smaller basin footprints during optioneering. We have not ruled out the option of smaller basin footprints. This option is still included in our optioneering process and has not been discarded. However, our preliminary draft DSP costing was not based on smaller basin footprints due to the numerous delivery risks involved. We remain committed to reviewing and optimising the scheme design as soon as reliable information is available to make informed decisions.

This Technical Appendix describes our response to IPART's recommendations and stakeholder concerns and highlights key risks and opportunities for IPART's consideration, drawn from extensive subject matter expertise. In summary, we plan to

- Improve recycled water demand forecasting
- Improve our optioneering strategy - Sydney Water has already begun to improve optioneering for the remaining Aerotropolis precincts by adopting lessons learnt in our process for the Mamre precincts. Deeper basins have not been ruled out. Our optioneering and forecast risk mitigation strategies mean that after we exhibit the first DSP, we will not stop optioneering and optimisation activities, rather, as we do for all servicing, optioneering and optimisation will continue to evolve as we progress through detailed design and delivery phases of our schemes. The earlier DSP cost estimates for greenfield stormwater will always have a higher level of uncertainty and funding risk than later DSPs due to the extended rather than up-front delivery of assets relative to the timing of development. Our estimation process balances the risk between customers and developers, based on years of delivery experience and robust planning processes.
- Explore innovative strategies to improve cost allocation risk.

We also provide further analysis of the feasibility and risks associated with the draft IPART/TWG efficient cost which demonstrates:

- The potential for customer bill impact – given IPART's building block model for retail prices and infrastructure contribution funding models work in tandem to fund efficient costs
- Risk in extrapolating efficiency savings due to currently known constraints:
  - increased geotechnical risks with deeper basins
  - land severance considerations
  - soil contamination
  - trade-off between capex and opex efficiencies.

In total, once the above factors are considered, Sydney Water estimates the higher risk TWG smaller basin design alternative would result in a 6-10% reduction, rather than the full 17% reduction estimated in IPART's draft report. This results in, $893,000 to 933,000 per hectare ($2024)[1] or $921,000 to 963,000 per hectare ($2025)[2] for a higher risk alternative infrastructure contribution. The outcomes of detailed design, informed by geotechnical data and land severance consideration for each basin, will also allow continuous improvement to the certainty of Sydney Water's efficient cost estimate which is currently $1,022,000 per hectare ($1,055,000 in $2025) for the initial DSP.

## 1.1 Sydney Water recommendations

We support IPART's recommendation that we review our forecast methodology for recycled water demand by large format industrial lots in the Aerotropolis. We agree the effective forecasting and management of this demand is a key risk area however the small sample of comparable sites in our area of operations presents a challenge for developing an evidence-based method. We would welcome IPART providing specific suggestions or examples we could explore as part of this recommendation in their final report.

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[1] ($2024) used here for ease of comparison to IPART's alternative design DSP template result is $850,448 per hectare

[2] ($2025) used here for ease of comparison to the price the first DSP will likely use as we plan to register during 2024/25..

We recommend IPART consider the limitations we have identified in extrapolating efficiencies identified in two basin clusters to the remaining basins in their final efficient scheme costing, given the different constraints, complexities and characteristics of each sub-catchment.

We do not agree that Sydney Water made early, lower stormwater infrastructure cost estimates public. We request IPART revise their draft finding 14, which implies our early estimates sent inaccurate signals of the true cost of developing the Mamre Road Precinct to developers.

We are exploring the potential for innovative cost allocation mechanisms to better balance the risk between customers and developers. We request IPART consider the proposed POMBO ‘opt out’ option and provide feedback in their final report.

# 2. Response to recommendations

In this section we respond to IPART's four draft recommendations:

1. *Sydney Water should review its method of forecasting recycled water demand for future large format industrial development areas in the broader Aerotropolis.*
2. *Sydney Water should review its stormwater optioneering for the broader Aerotropolis to identify the most cost-effective stormwater solution at an earlier design stage.*
3. *Developers should fund the efficient costs of delivering stormwater services in the Mamre Road Precinct. This includes land tax and any interim works on their own land that allow them to begin development ahead of Sydney Water's stormwater scheme.*
4. *When submitting the Mamre Road Precinct development servicing plan to IPART for registration, Sydney Water should ensure the plan is based on efficient costs only. We estimate this to be around $850,000 per hectare in the Mamre Road Precinct.*

In summary:

- we support a review of our current forecasts, but request IPART provide more detail of their expectations about the timing and nature of their recommended review.
- we support continuous review of our optioneering but clarify that adopting a marginally higher cost option for the initial DSP does not mean we had ruled out *the most cost-effective solution*, rather, as we are still in *early design stage*, it would not be prudent to lock-in assumed efficiencies in the absence of concrete evidence these can be achieved.
- we agree incremental costs associated with growth should be borne by developers as this aligns with nationally accepted pricing principles.
- our initial DSP will be based on efficient costs only. We provide further analysis of risk and feasibility associated with IPART's draft estimate of $850,000 for IPART's consideration.

## 2.1 Recycled water forecast risk mitigation strategy

A robust recycled water forecast is important as basin sizes are based on both the catchment run-off volumes (determined using the MUSIC Modelling software) and the recycled water demands of the precinct.

IPART's draft recommendation is:

5. *Sydney Water should review its method of forecasting recycled water demand for future large format industrial development areas in the broader Aerotropolis.*

We support IPART's recommendation to review our methodology to forecast large format industrial recycled water use. As such a review will take time, and, ideally would be supported by monitoring and data collection, we have begun to implement a suite of risk mitigation strategies to manage demand forecast risk for our Mamre Road and Aerotropolis schemes:

1. Engagement with high water use industries, such as data centres, to encourage their connection to the scheme
2. Digital metering roll-out for new large format industrial properties in Mamre Road and Aerotropolis
3. Tariff structure trials to explore the use of alternative tariff structures to incentivise demand.

As stated in IPART's review, there is a lack of a similar industrial estate typology in Greater Sydney that has a recycled water supply[3]. A further complication is the uncertain demand associated with achieving the Parkland city vision which requires a higher degree of irrigation for greening and cooling of public and private open space to mitigate inherent higher heat for this region of Sydney. The effective management of this demand is a key risk area so we would appreciate if IPART could provide further details or more specific actions they expect as part of this recommendation in their final report.

## 2.2 Improved optioneering

This section clarifies that adopting a marginally higher cost option for the initial DSP does not mean we had ruled out *the most cost-effective solution*, as IPART's draft recommendation implies. Rather, we are still in *early design stage*, so do not consider it prudent to lock-in assumed efficiencies in the absence of concrete evidence these can be achieved. We describe the optioneering approach we have taken to date and improvements we plan to make including steps to improve stakeholder engagement and awareness which we hope may address the misconception we lock in inefficient designs during the preliminary design stage.

Our Mamre Road integrated stormwater system will service a precinct of over 1,000 hectares with a net developable footprint of more than 750 hectares. There are few examples in Australia of stormwater infrastructure of this combined scale and complexity. Although there are other systems of equal or greater size, this is one of the first precinct scale developments to require detailed stormwater quality and quantity modelling to demonstrate compliance with dual stormwater quality and quantity targets. In addition, we must model and design storage, harvesting, and distribution infrastructure, which adds a further layer of complexity as we progressively hone our options.

During our optioneering process, we assess the costs and risks of a range of potentially effective and efficient stormwater solutions. We do not rule out potential solutions in the absence of a thorough assessment of the uncertainty and risks. Locking in a low cost/high risk solution early in the planning phase, without appropriately accounting for an associated increase in risk-based cost estimates would lead to an unrealistic view of the actual scheme costs. The uncertainty of both deeper basins and land severance was recognised in IPARTs findings and we agree the efficiency of these elements should be subject to further feasibility and uncertainty analysis.

### 2.2.1 Current planning phases

Sydney Water has engaged in significant design optioneering and optimisation activities with multiple stakeholders over the last three years. This has contributed to the estimated infrastructure contribution for the scheme being reduced from $1.3 million per developable hectare ($FY22) to $1.055 million per developable hectare ($FY25).

A summary of the optimisation process since March 2023 is shown in Figure 1. Sydney Water has engaged extensively with both the public and with specific groups of stakeholders including incorporating feasible suggestions where possible. Specific feedback was sought through public exhibition of the scheme design and targeted technical forums with government and developer stakeholders.

Sydney Water's current consultation on the draft Stormwater Developer Works Policy will be finalised in October. This policy and the supporting process will be a key mechanism for continuing to optimise the scheme through detailed design and deliver stages based on the requirements of specific development and developers who may be best placed to deliver the infrastructure.

[3] Page 25 of the Draft Report: *The assumption of 50% of on-lot use being non-potable is based on Sydney Water's records of non-residential customer water consumption in recycled water service areas. While these areas are not exclusively large format industrial, we consider that this is a reasonable assumption in the absence of better information.*

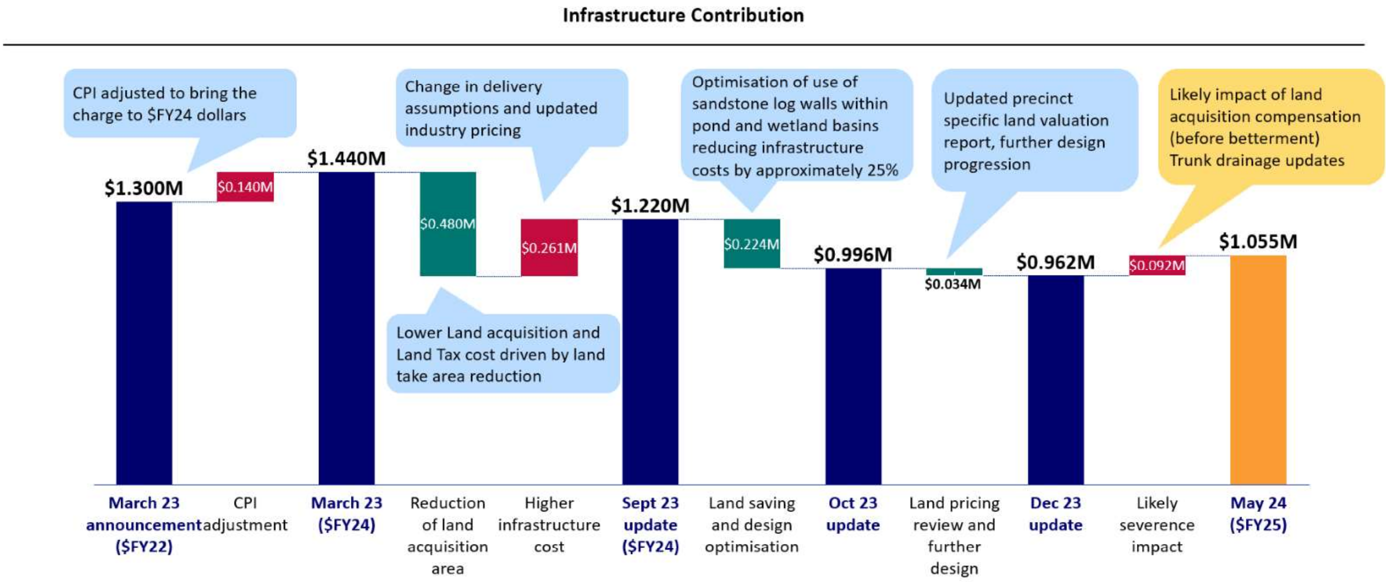


**Figure 1 Sydney Water's optimisation process for DSP costing since 2023**

Sydney Water undertook many activities which resulted in changes to the stormwater scheme or associated costs. Table 1 provides a summary of these activities.

**Table 1 Optimisation activities undertaken as part of Sydney Water's optioneering process.**

| Input | Who | Optioneering and optimisation activity |
|---|---|---|
| Property expertise for land acquisition assumptions | CBRE consultants | Preparation of land valuation and escalation rates based on recent relevant sales data. |
| Design (capex and opex) | DPE (Planning and EHG), Design Flow, Infrastructure and Development Consultants (IDC) Australia, Urban Development Institute of Australia (UDIA), Mamre Road Land owners Group (MLOG) | DPE facilitated review of design scheme by independent consultant, review of design by DPE consultant and review of scheme design and assumptions by development industry. The majority of these items were incorporated in scheme design published in Dec 2023 resulting in an approximate 40% reduction in land purchase and infrastructure costs. Additional changes to the scheme plan were made in May 2024 (found here) to reduce severance risk, when possible, and further optimisation suggested by DPE. |
| Complete scheme design, basis of costs and schedule of rates for costs preparation | MLOG and UDIA | Regular meetings over a three-month period in late 2023 including detailed sharing of costs assumptions. Review of totals and rates, minor adjustments including developer delivery assumptions. This specific project working group was subject to confidentiality agreements due to the level of commercial information shared. |
| Ongoing consultation on interim measures and developer delivery | Sydney Water, MLOG and UDIA | Ongoing regular meetings asking for comment on updates to the Infrastructure Contribution calculation. Ongoing collaboration on potential efficiency gains by moving to ultimate solution to avoid investment in interim solutions. |
| RBCE total costs | Prepared externally by Bowery Associates | Comparison to rates and contingencies used by Council and construction industry. |
| Developer delivered assets | MLOG, UDIA and public. | Review and commentary on proposed 100% reimbursement framework for developer delivered works. |
| In depth review of business case and expenditure | Infrastructure NSW | Review of business case, costs and servicing need against government's strategic objectives. |

## 2.2.2 Improved engagement during optioneering phases

A detailed stakeholder engagement plan was put in place for the Mamre Road scheme and is being updated as we transition into the Mamre Road Delivery Approval Business Case. Sydney Water published draft scheme plans in June 2022, December 2022 (link), December 2023 (link), and finalised the Integrated stormwater scheme plan in May 2024 (link).

As the scheme planning for the Initial Aerotropolis Precincts progresses, stakeholder engagement and early optioneering will continue to align with design development to ensure feedback can be incorporated at regular opportunities. The initial opportunity for similar stakeholder feedback for the Aerotropolis scheme will be as draft Aerotropolis scheme plans are completed. All replicable and appropriate learnings identified from the Mamre Road scheme will be applied before draft plans are finalised. While detailed stakeholder mapping is a continually evolving activity, it is expected this engagement would include specific engagement with government, development, landowners and other key stakeholders but also regularly published on a range of channels including Sydney Water's website for full transparency. Documents describing Sydney Water's approach to regional stormwater management can be found here. We also provide access to the most up to date scheme plan and design guideline materials here.

Sydney Water has seen a progressive increase in stakeholder support and acceptance for our integrated stormwater servicing of Mamre Road and Aerotropolis precincts. We anticipate this will allow stakeholder engagement for the Aerotropolis precincts to be more structured and less reactive, with specific scopes reviewed at specific times.

# 3. Response to draft findings and stakeholder concerns

In this section we provide a summary of our response to all IPART's draft findings and to some of the concerns raised in the public hearing held on Tuesday 15 October.

Sydney Water agrees with the majority of IPART's draft review findings and recommendations including:

- The NSW Government's risk-based process to develop Wianamatta–South Creek stormwater management targets was appropriate
- the higher cost to provide services in this area is driven by the need to protect waterways from development
- additional community benefits are incidental, and do not drive scheme costs
- developers should pay the incremental costs of the scheme (this aligns to nationally accepted pricing principles and maximises economic efficiency)
- Sydney Water's recommended scheme costing was efficient for the proposed design
- there may be a more efficient alternative scheme design but this is subject to technical feasibility.

We however have concerns about IPART's draft finding 13, which implies we ruled out adopting the most efficient scheme design in our preliminary optioneering. We consider that proposing a marginally higher cost option than a theoretically lower option for the initial DSP does not mean we had ruled out *the most cost-effective solution*, rather, as we are still in *early design stage*, it would not be prudent to lock-in assumed efficiencies in the absence of concrete evidence these can be achieved. We remain committed to optimise our design as we gain additional evidence and move through to detailed design.

We do not agree that Sydney Water made early, lower stormwater infrastructure cost estimates public. We request IPART revise draft finding 14, which implies our early estimates sent inaccurate signals of the true cost of developing the Mamre Road Precinct to developers.

We consider most concerns raised in the public hearing are matters for IPART and NSW Government consideration. Some concerns related to misconceptions that Sydney Water's proposed efficient cost included a cross-subsidy and that we would not provide fair compensation to land-owners when purchasing land for the scheme. We wish to clarify we have not included cross-subsidy in calculating the efficient cost, rather, have included avoided costs to account for the interaction between products, which decrease, rather than increase the proposed cost. We also support the compensation process set out under the *Land Acquisition (Just Terms Compensation) Act 1991* which will ensure fair compensation to landowners when we purchase their land.

## 3.1 Summary of response to each finding

1. The stormwater management targets for the Mamre Road Precinct are stricter than the typical local government stormwater targets that apply in neighbouring areas and cost significantly more to meet.

**Agree**

2. The main purpose of the targets is to manage stormwater runoff from land-use changes that stem from large format industrial development in the precinct. Waterway improvements and other benefits that result from the targets being met are incidental.

**Agree**

3. The process used to develop the risk-based Wianamatta–South Creek stormwater management targets was appropriate.

**Agree**

4. The stormwater treatment, storage and recycling systems proposed by Sydney Water would meet the risk-based water quality and flow targets.

**Agree**

5. The parameters governing runoff and pollutant loads used by Sydney Water in their Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Large Format Industrial model are consistent with industry standards for water sensitive urban design.

**Agree**

6. A significant proportion of scheme costs is dependent on the size of the recycled water storage ponds, which are dependent on the demand for recycled water.

**Agree**

7. Sydney Water's initial recycled water demands were subject to significant uncertainty. However, the final recycled water demands Sydney Water used in its stormwater scheme design are reasonable.

**Agree**.

8. Stricter water quality targets require a greater than proportional increase in the size of treatment systems, which adds to the costs of the scheme.

**Agree**

9. The requirement to remove water from the system through storage and recycled water systems adds significant costs to the scheme.

**Agree**

10. Given the urgent project time frames, the potential use of the Kemps Creek Dam as a storage for recycled stormwater is not a pragmatic option at this stage.

**Agree**

11. Sydney Water's cost estimates for their current concept design are reasonable compared to comparable projects at a similar stage and risk profile.

**Agree**

12. Sydney Water has employed an appropriate and robust methodology in setting costs for land acquisition and a contingency for this cost.

**Agree**

13. It could be possible to achieve substantial cost savings through better optioneering, including more efficient design of stormwater treatment trains and use of deeper storage basins.

**Somewhat agree**. We agree that a smaller basin design has the potential to achieve cost savings, however we have already incorporated many savings identified by the TWG **where feasible** in our scheme design. Given the project stage and risk profile (IPART notes above in finding 11), we do not deem it prudent and efficient to count on additional cost savings before they can be verified through the detailed design process informed by geotechnical data and land severance considerations at each basin site.

14. In hindsight, the former Department of Planning and Sydney Water's early stormwater infrastructure cost estimates have proven to be too low, sending inaccurate signals of the true cost of developing the Mamre Road Precinct to developers.

**Agree in part**. We understand some early estimates published by others may have been interpreted by developers as indicative of final costs. However, the first Sydney Water estimate we are aware that was made public was our preliminary DSP estimate of $1.3 million per hectare ($FY2022), which we have reduced over time as would be expected as more details allow cost estimates to become more certain.

**We do not agree** that Sydney Water made early, lower stormwater infrastructure cost estimates public and request IPART revise the above finding accordingly.

15. The stormwater scheme may incidentally deliver non-market benefits, such as improved waterway quality, carbon sequestration, air pollution removal and avoided local cooling costs. It is developers who are driving those incidental non-market benefits and they, rather than the community, should be required to pay for them.

**Agree**

16. Developers are the appropriate party to fund the cost of interim solutions because they benefit the most from their implementation.

**Agree**

17. While land tax is a material cost impost, it is a statutory cost that Sydney Water incurs to deliver the scheme and should be funded in the same way as other costs.

**Neutral**. The NSW taxation system is a matter of Government policy.

18. Development in the Mamre Road Precinct would remain viable with a stormwater infrastructure contribution of around $850,000 per hectare.

**Agree**. We also note IPART considers that development would also be viable with charges of up to $1.3 million per hectare based on their analysis of land values and development costs.

## 3.2 Concerns raised in public hearing

During the public hearing, a number of concerns were raised. The following is a brief response to those which were either directly related to Sydney Water or we found of particular concern.

1. **Request for waterway health target review –** We heard that some stakeholders remain concerned about the risk-based process used by Government to set waterway health targets, including the validity of the supporting waterway models. Under our enabling legislation, Sydney Water must consider the principles of ecologically sustainable development in exercising our key functions, which include:

   - The precautionary principle – if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation; and
   - conservation of biological diversity and ecological integrity should be a fundamental consideration.

   IPART has found that an appropriate risk-based process was used to set waterway health targets, and that our proposed design can achieve the resulting targets. Sydney Water also notes there are many case study examples of urban development resulting in severe and irreversible degradation of existing waterways and ecological communities.

   Further, we consider the risks of a full review of this Government policy now will only add to further delay to development which is likely to outweigh any potential benefits.

2. **Private Landowners – raised concerns about unfair land acquisition, severance, compensation and safety concerns**. We support the compensation process set out under the *Land Acquisition (Just Terms Compensation) Act 1991* which includes consideration of severance, and other relevant matters such as business

impact[4].

Sydney Water places the highest value on public safety. As such, we always ensure our infrastructure is built in compliance with relevant safety standards and in a manner which minimises the risk to the public.

3. **Recycled Water – suggestions Sydney Water has cross-subsidised costs and that on-lot options are more efficient** - Stormwater harvesting and re-use is a critical outcome of the scheme design. As such, the Advanced Water Recycling Centre (AWRC) is required only as a top up source to ensure non-potable water is available when demand exceeds supply. We have not cross-subsidised AWRC costs in the stormwater contribution, rather, have included avoided AWRC costs, which make the contributions lower.

On-lot solutions have been shown in numerous studies and cost benefit analyses to result in unacceptable risk of failure and higher economic cost, including sterilisation of developable land due to the required footprint of on-lot stormwater infrastructure.

4. **Concerns about interim/abortive works:** Sydney Water is promoting a developer delivered model to maximise efficiencies in scheme delivery and minimise the amount of interim/abortive works. More details are provided in Strategy to balance funding risk section.

[4] These matters are also refered to as 'heads of compensation' https://www.nsw.gov.au/housing-and-construction/land-values-nsw/resource-library/compensation-following-compulsory-acquisition

# 4. Feasibility and risk assessment of the IPART/TWG draft efficient cost

All funding frameworks include forecast risk. We are concerned that due to the nature of greenfield stormwater infrastructure delivery relative to the timing of the initial DSP, the risk of customers funding growth can be higher than for other DSPs. In this section we outline why this can occur and why it is a more significant risk for the initial DSP for Mamre Road compared to other DSPs.

We also outline our preliminary analysis of the feasibility of fully realising IPART's draft estimate of 17% savings which identifies significant deliverability risks due to considerations such as land severance, contaminated spoil disposal and efficient land acquisition timing.

## 4.1 Forecast risk for the initial Mamre Road DSP

On 30 September, Sydney Water submitted our price proposal to fund all our services for the next five years (1 July 2025 to 30 June 2030). IPART is assessing our proposal and will conduct their review over the coming months. Unusual to this price review, is the Premier's request to IPART to conduct a separate efficiency review of the Mamre Road stormwater scheme. This scheme, along with the services in adjacent Aerotropolis catchments, forms a large part of our forecast expenditure and developer infrastructure contribution revenue over the next five years ($1.5 billion and $2.5 billion respectively).

IPART's two funding frameworks, (1) customer prices set using the building block model, and (2) developer contributions set using the infrastructure contribution methodology, work together to fund the efficient costs to deliver essential water, wastewater and stormwater services. The models and associated frameworks are based on nationally accepted pricing principles[5].

No funding model is perfect, and all include some risk that forecast costs and development timing do not match actuals. As IPART's models work in tandem to fund efficient costs, if developer contributions are set too low, then customer bills are the default source to make up the funding shortfall. In the following sections, we explain our concerns that IPART's draft efficient scheme estimate places disproportionate forecast risk on customers rather than developers.

### 4.1.1 Optioneering and DSP timing

The timing of the optioneering phase for greenfield stormwater is significantly different to that for water and wastewater relative to the first DSP costing. This does not mean that we must lock in an inefficient design at an earlier stage, rather, that the optioneering phase is likely to be carried out over a longer period relative to the first DSP exhibition. This section describes this difference and the consequences in more detail and demonstrates that Sydney Water's proposal to base the initial DSP on a certain design, was not an indication we had rejected other, potentially lower cost, designs. Rather, the alternative designs considered were higher risk so should not be counted on until further detailed investigations are complete. On balance, and given our many years of delivery experience, we did not consider a lower cost but higher risk design provided the best balance of funding risk between customers and developers.

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[5] National Water Intitiative (NWI) pricing principles.

### 4.1.2 Delivery timing results in higher forecast risk in early years

We are keen to strike the right balance between the risk that customers pay for growth because infrastructure contributions are too low and the risk that the developers, who connect to our stormwater services during the first DSP period, pay an infrastructure contribution which is too high. As such, our optioneering process, developed over many years of infrastructure delivery, estimates efficient costs from an early stage which we consider have an equal chance of proving to be too high or too low once more detailed cost estimates and subsequent efficient delivery costs are known.

While our optioneering processes are largely the same for stormwater as they are for water and wastewater, the timing of stormwater delivery relative to development rollout can be quite different. This may have given rise to the misconception we had locked in an inefficient design *during early design stage*. Stormwater infrastructure is more able to be delivered in stages as we take advantage of the permeable nature of the remaining undeveloped lots. Staged delivery reduces the cost to develop significantly[6] but increases the proportion of costs which must be estimated for the initial DSP for a greenfield stormwater area.

The effect of staged delivery on the estimation of efficient costs used in the early greenfield stormwater DSPs relative to other DSPs is depicted in Figures 2 and 3. To further demonstrate this effect, Figure 4 shows a comparison of the commissioned infrastructure costs for three water and wastewater DSPs compared to our current draft Mamre Road Stormwater DSP. This comparison shows that while all DSPs contain estimated forecast costs, the initial Mamre Road DSP will contain a far higher proportion of estimated costs than our other DSPs.

The staged roll-out of greenfield stormwater does not alter the fact that all development connecting to the Mamre Road system will rely on the final scheme design, regardless of when they connect. All developers benefit from the delayed timing of infrastructure which is possible due to the mitigating effect of runoff from undeveloped land within each catchment. Ideally, all development should pay an equal share of the cost to deliver growth services, however, for connection to greenfield stormwater infrastructure, development which connects earlier, faces both increased likelihood of benefiting or dis-benefiting from inherently higher cost uncertainty relative to that for water and wastewater. Our preliminary analysis shows this likelihood should greatly reduce over the next five to seven years if development proceeds as currently forecast

[6] The cost to develop referred to here is the cost of the stormwater infrastructure contribution, which uses IPART's present value methodology so staged delivery results in a far lower contribution than up-front delivery.

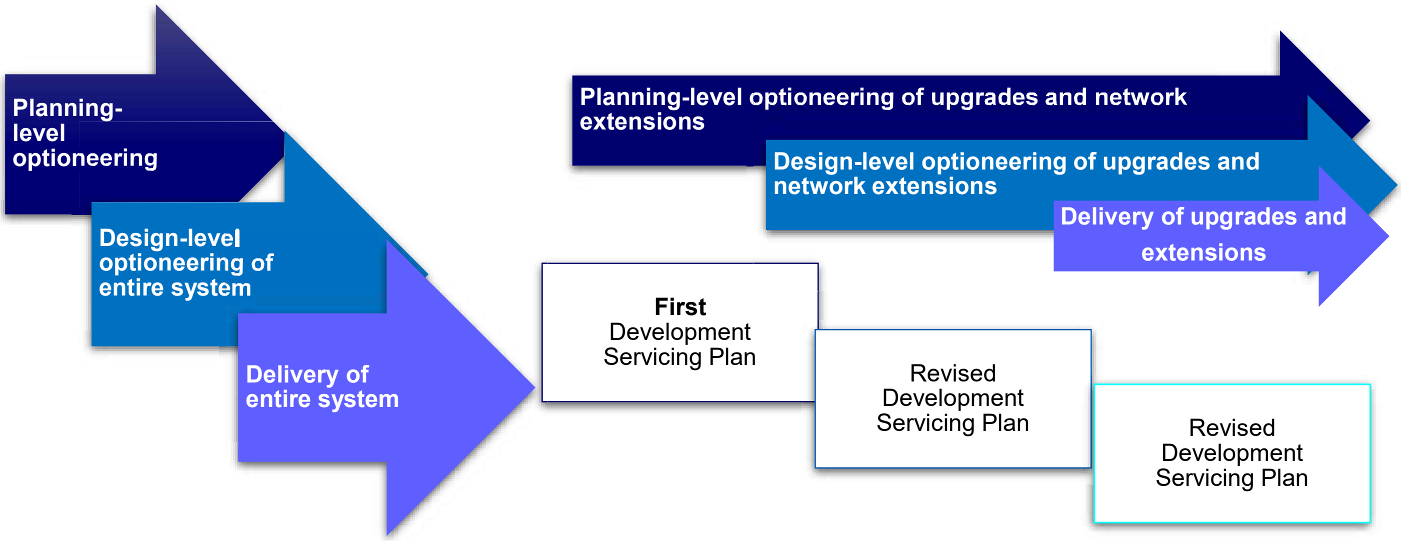


**Figure 2 Optioneering and Development Servicing Plan timing for other DSPs where more costs are known before the first connections occur**

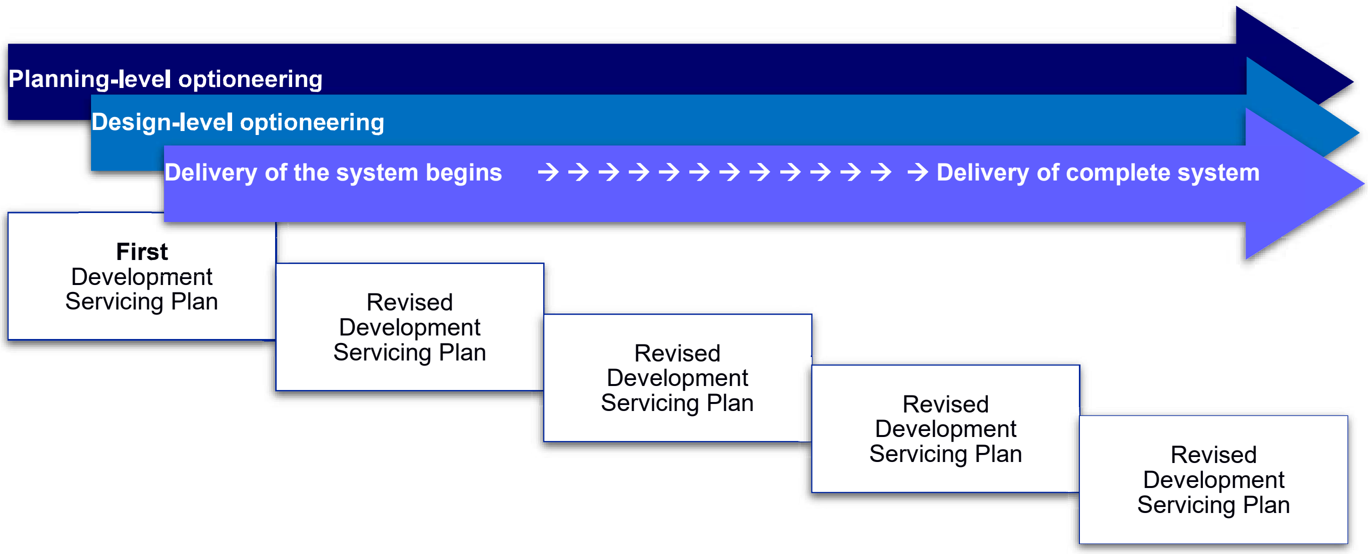


**Figure 3 Optioneering and Development Servicing Plan timing for greenfield stormwater where many costs are unknown for an extended period**

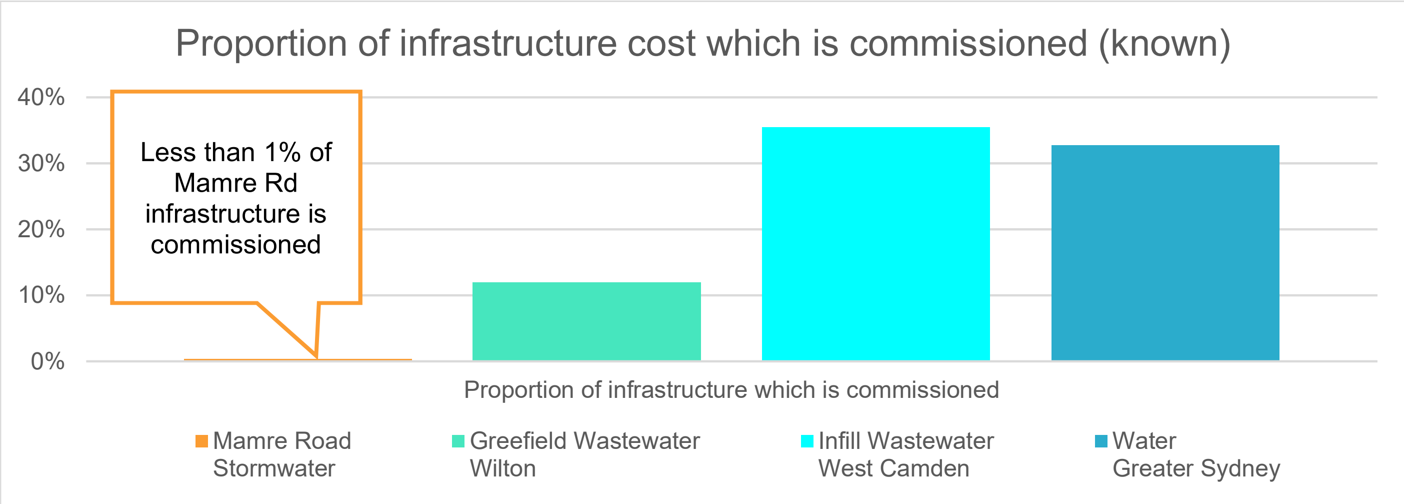


**Figure 4 Proportion of infrastructure cost which is known (commissioned) for the draft Mamre Road DSP compared to other DSPs**

IPART's final efficient cost estimate for our first DSP will require us to begin to pass estimated savings on to developers before we can be certain of the vast majority of actual efficient costs. This means for the initial Mamre Road DSP, there is a higher probability that developers who connect during the initial DSP period may pay a significantly different charge to connect than those who connect during subsequent DSP periods. While this trend can be expected for all DSPs, the above analysis shows this issue is particularly apparent for the first Mamre Road DSP.

Regardless of the additional uncertainty, we accept we must begin to collect stormwater contributions before we have completed large portions of the detailed design and before any infrastructure has been delivered and will therefore not yet know the actual costs of the assets the contributions are for. Should actual efficient costs turn out to be higher than those currently recommended by IPART, we consider it likely the shortfall will be made up by a combination of increased customer bills and reduced shareholder dividend[7]. To mitigate these risks, we are committed to optimise our current design during the design phase of each sub-catchment and include any savings identified in each subsequent DSP review. In addition, we are exploring new and innovative delivery and funding strategies. We provide more details of these in the **Strategy to balance funding risk** section.

## 4.2 Feasibility assessment of alternative design

Sydney Water has assessed the efficiency savings identified in IPART's draft report to determine which elements we consider can feasibly be applied to each sub-catchment in the Mamre Road scheme. Some savings are possible, but risky, whereas we consider other savings are not feasible. In this section we present the results of our preliminary investigation for IPART's further consideration.

### 4.2.1 Efficiency savings assessment

As outlined in the **Current planning phases** section, Sydney Water has progressively honed our scheme design and associated costing since our preliminary scheme estimates were published in March 2023. We are concerned that IPART's efficiency estimates were based on comparison of Sydney Water's MUSIC model from December 2023 not the most recently release scheme design of May 2024. As shown in Figure 1, the scheme costing associated with that

[7] Sydney Water's shareholder is the NSW Government.

model does not include two critical updates which have since been included in our current MUSIC model and costing estimates (from May 2024) and represent our current best estimate of the p50 scheme costs:

- **Land severance**: Cost increase to purchase and/or compensate for additional severed land as required under the *Land Acquisition (Just Terms Compensation) Act* 1991. This assessment was made after December 2023 and does not appear to have been factored into IPART's efficiency estimate. A contingency was added based on the difference between the best case and the most likely case in the desktop analysis of every lot in the precinct impacted by the Scheme. This amount is currently based on potential compensation payable for severance only and does not include other forms of compensation under the *Land Acquisition (Just Terms Compensation) Act 1991*. Potential matters to be considered[8] in the acquisition process include severance and business impact compensation so this estimate may increase once individual negotiations take place. Our current efficient DSP estimate includes the land tax payable on severed land we are likely to purchase.
- **Imperviousness error**: There was an error in the December 2023 MUSIC model which resulted in an under-estimate of the total storage volumes required. This error was corrected in our most recent scheme design and costing, at the same time as we included a number of TWG efficiencies. As both the error and the efficiencies were completed in the same update, it is difficult to determine the exact contribution of each change in isolation to the other.

In total, we estimated the above two factors added around $94,300 per hectare ($FY25) to the efficient infrastructure contribution. We are concerned these key changes were not considered by IPART when calculating their efficient cost estimate given they occurred in conjunction with a suite of other changes. We can also see it was preferable, for other reasons, for IPART to compare estimates from the TWG model against the model which our Final Business Case costing was based on rather than our current model. However, we are unsure how the above factors were addressed in IPART's draft estimate. IPART noted in their draft report:

> *We have also included in our cost estimates the reduced quantity of land Sydney Water would need to purchase, in line with the smaller basin surface areas in the TWG Option.* ***This may be an impractical outcome, given the nuanced complexities involved in purchasing land, and in appropriately compensating existing land holders.***

As such, we have provided additional evidence of the work we have recently completed to understand and quantify these nuanced complexities for further consideration of efficient costs in IPART's final report.

In the following sections we outline how we have further tested the feasibility and risks associated with extrapolating savings identified at only two sub-catchments to the entire scheme and suggest revised efficiency savings for IPART's consideration in the **Suggested revision to IPART's estimate of efficient scheme costs** section. We also provide more detailed responses to specific details within IPART's and IPART's consultants' draft reports in Attachment A.

### 4.2.2 Feasibility of increased pond depths

Sydney Water and our planning partner, Aurecon, reviewed the current scheme pond depths and known geotechnical information to test the opportunity for increasing pond depths to reduce footprints. The analysis was still somewhat limited because the geotechnical and ground water depth investigations are ongoing with results not anticipated until late 2024. However, as the preliminary geotechnical findings indicate that groundwater in the Kemps Creek sub-catchment (south-west cluster) is likely to be close to the surface (that is, between 1.5 to 3m), in this analysis we have examined two scenarios:

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[8] These matters are also known as 'heads of compensation' : https://www.nsw.gov.au/housing-and-construction/land-values-nsw/resource-library/compensation-following-compulsory-acquisition

### Maximum Potential Savings Scenario

This scenario involves increasing pond depths to the maximum possible depth without introducing additional safety or operational issues. These maximum depths are generally:

- Three metres for small ponds or in areas with high geotechnical risk.
- Four metres for large ponds or those located within IN1 land, to minimise land take.

This scenario does not include any associated increase in risk-based costs related to geotechnical or groundwater constraints, which are likely to arise within the precinct due to the increased delivery risk at these pond depths.

### Potentially Feasible Savings - 50% of Maximum Potential Scenario

This scenario assumes deepening the pond depths to 50% of the gap between the current and maximum potential depth.

We consider this approach to be more realistic, as it is accounts for the increased likelihood of geotechnical and ground water constraints that may be identified during the detailed design process. Sydney Water will further investigate these constraints during detailed design to determine the actual depth achievable once the evidence becomes available to do so.

### Results

Our analysis resulted in the following land take reductions:

- **Maximum potential** savings (Scenario 1): reduced land take by 6.6 hectares, or **21%**.
- **Potentially feasible** savings (Scenario 2): reduced land take by 4.6 hectares, or **15%**.

A direct comparison between these results and IPART's draft report findings, based on the TWG review, is challenging due to the design changes made between December 2023 and May 2024. A significant change was the inclusion of an additional 100ML of volume across ponds 2, 3, 7 and 9 to offset the deletion of basin 11 and to address the imperviousness error in basin 9 identified in the MUSIC modelling. However, it would appear the full 36% reduction in land take from deeper ponds, identified by TWG for the Northwest and East clusters and then extrapolated by IPART to the entire scheme, cannot be realised in full as more storage volume needs to be added to the system. In addition, the savings do not appear to have been adjusted in any way to factor in the increased risk from geotechnical constraints. For example, increase in costs to anchor basin liners which lie below the groundwater table and additional excavation costs should rock be found close to the surface.

### Cost outcomes from the analysis

The main cost which can be saved from reducing pond footprints comes from reduced land acquisition. Table 2 outlines the land acquisition saving for both the maximum potential and potentially feasible (50% reduction) scenarios, using a basin-by-basin assessment that includes the cost impact of the associated land zoning. The current depths used in this analysis were from the May 2024 scheme plan so eight out of twenty ponds were at or close to the maximum depth, therefore minimum cost savings occurred for these systems.

**Table 2 Land take and cost savings from maximum potential and potentially feasible pond depth scenarios**

| | Current ($m^2$) | Cost | Potentially feasible: 50% reduced ($m^2$) | Cost | Maximum potential: 100% reduced ($m^2$) | Cost |
|---|---|---|---|---|---|---|
| ENV/RE1 land take | 289,460 | $24,604,100 | 249,920 | $21,243,176 | 232,340 | $19,748,909 |
| IN1 land take | 26,142 | $16,992,461 | 19,513 | $12,683,648 | 16,803 | $10,921,907 |
| Combined land take | 315,602 | $41,596,560 | 269,433 | $33,926,824 | 249,143 | $30,670,816 |
| Total reduction | | | 46,169 | $7,669,736 **(18%)** | 66,459 | $10,925,744 **(26%)** |

Some additional cost savings could arise from reduction in batters, vegetation, and maintenance tracks. However, these savings would be minor in comparison to land acquisition, including associated land tax and land severance costs.

The analysis highlights the significant benefit of reducing land take in the IN1 zoned land. While only 8% of pond footprint is within IN1, it accounts for 41% of the total land acquisition cost in the current scheme. As a result, prioritising maximum depth within IN1 zoned land is essential for reducing overall scheme costs. In other areas, it is likely the focus should be on minimising land severance, particularly where this impact is significant. Detailed results of the pond depth analysis are contained in **Attachment B: Feasibility analysis report**. This assessment has been made in the absence of detailed geotechnical and land severance studies which are currently underway.

### 4.2.3 Feasibility of reduced treatment measures

To test the feasibility of reducing treatment measure footprints recommended in IPART's draft report, Sydney Water analysed three scenarios:

1) **Current scheme design stormwater treatment measures.**
   This scenario includes sediment basin, wetland, and bioretention system, at their full size. It is designed to ensure the water quality flowing into the pond was of high standard with treatment being sized appropriately to reduce the risk of algal blooms and other water quality issues. The wetland size is particularly crucial as it facilitates ongoing treatment of pond water through a recirculation system, which pumps the full water volume from the pond into the wetland every seven days.
2) **Current scheme with treatment measures at 75% of full size.**
   This scenario assesses the impact of a moderate footprint reduction. While it somewhat resembles the TWG proposed reductions, the east and north-west catchments don't have many systems with a coupled wetland and bioretention system due to topography constraints and impacts from existing development. Therefore, comparing this Sydney Water scenario with the TWG option is not a like-for-like comparison.
3) **Current scheme with treatment measures at 50% of full size.**
   This scenario is included to demonstrate the effects of a significant reduction in footprint. However, we consider it unlikely to be achievable in practice.

#### MUSIC modelling results

The three scenarios were tested in MUSIC within the Kemps/South Creek sub-catchment (West cluster). The detailed results are provided in **Attachment B: Feasibility analysis report** and in summary:

- **Reducing wetland footprint reduces evaporation**. Waterway health target (MARV) is breached for both scenarios 2 and 3. This would require additional storage volume and footprint in ponds to offset this reduction so any cost savings would likely be reduced once this is considered.

- **Reducing wetland footprint results in higher risk of poor water quality in the storage ponds**. Neither Scenario 2 nor 3 meet phosphorus and suspended solids targets. Significantly increased untreated flows into the pond will impact pond water quality, which increases the risk of being unable to harvest due to algae or other poor water quality issues. Reduced harvesting significantly increases the risk of breaching the MARV waterway health target and increases the reliance on recycled water from the advanced recycled water centre to meet the non-potable demand of the development.

### 4.2.4 Contaminated vs virgin spoil assumption risk

IPART's draft efficiency estimate relies on the assumption that spoil can be assumed to be 'virgin' or VENM, that is, with no contamination. Evidence at sites nearby with similar previous land-use shows around 5 to 10% of the site footprint was contaminated. Given our wetlands and pond infrastructure is located adjacent to public open space, contaminated soils will not be able to be contained on site and will need to be disposed of at significant cost.

### 4.2.5 Waterway health risk from alternative design

#### Modelled compliance should be verified by monitoring before locking in smaller basin footprints

IPART's consultant noted the limitations of modelled compliance compared to results from monitoring once a scheme is operational:

> *MUSIC itself is not a perfect system. In Sydney Water's (2024a) calibration report, they stated that greater awareness is required upon the range of uncertainty in the input parameters from MUSIC models and the implications on their results. Watson (2014) in their MUSIC calibration study, found that MUSIC over-estimates WSUD system performance, particularly in total suspended solids (TSS) and total phosphorous (TP) when using default parameters such as those used by Sydney Water. Similarly, Imteaz et al. (2013) found that although MUSIC can simulate flow conditions well, its predictions on removal efficiencies for TSS, TP and total nitrogen (TN) are varying. This highlights the importance of sensitivity testing in the input parameters used, and their potential impacts on the WSUD system results.*[9]

We support HARC's assessment and note this highlights the additional risk of banking on lower cost option estimates before detailed design is complete. Should actual flow conditions deviate from those modelled, locking in smaller basins early limits the option for basin footprints to be increased at a later stage to mitigate other forecast risks.

#### Efficient land acquisition strategy favours larger rather than smaller basin footprints

Early land acquisition by Sydney Water minimises overall costs to developers because land is highly likely to increase in value well above general inflation[10]. If we buy a smaller footprint initially, and find that it subsequently needs to be expanded, this creates a major risk to delivery and cost. It is highly unlikely we will be able to buy additional land in a timely fashion, and if it has already been developed, the possibility of purchasing such land may reduce to zero. In many cases we will need to buy land early in the delivery process to ensure it is available for timely delivery of infrastructure to meet the needs of development within the precinct. Land in the precinct that remains in private ownership is a key area of risk we are managing in the precinct, and in particular the southwest sub-catchment and we consider a smaller basin footprint design exacerbates this risk.

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[9] Section 2.2 Limits of MUSIC modelling in IPART technical report

[10] Land escalation estimates for Developable land, zoned IN1 are CPI+4%, whilst constrained land such as ENZ are CPI+1.5%.

# 5. Way forward - Balancing forecast risk between customers and developers

In this section we outline the strategies we will implement and those we will further explore to better balance the forecast risk between customers and developers.

## 5.1 Suggested revision to IPART's estimate of efficient scheme costs

We consider our current efficient cost estimate of $1,022,000 per hectare ($1,055,000 in $2025) is appropriate for the early stage of the project, lack of geotechnical and groundwater evidence and likely site constraints at each basin. This estimate balances the risk between customers and developers based on years of delivery experience and which has been further evidenced by the recent analysis provided in the **Feasibility and risk assessment of the IPART/TWG draft efficient cost** section.

Given the evidence we have presented of the potential for over-estimation of cost savings in IPART's draft efficient cost estimate and other risks associated with locking in the costs of a higher risk design, we suggest IPART consider revising their efficient cost estimate in their final report. Ideally, revised estimates would be based on a full scheme MUSIC model comparison (apples for apples comparison) so that where potential efficiency savings are offset by associated increases in cost, these are fully accounted for. However, given the time constraint and the need to progress delivery of the scheme to avoid any further delay to development, we have estimated three high-level efficient cost scenarios for IPART's consideration.

In each scenario we have removed a portion of the draft savings which we consider are likely to be offset by the combination of land severance and the model error adjustment noted in the **Efficiency savings assessment** section. We have then applied IPART's 17% draft efficiency savings (representing the difference between our proposed $1,022,000 per hectare ($FY24) and IPART's draft $850,000 per hectare ($FY24) to the remaining Infrastructure Contribution under three scenarios

- **Option 1: High risk**: This scenario assumes the full 17% saving can be achieved pro-rata without the likely associated risk-based cost increases identified above in our additional analysis.
- **Option 2: Medium risk**: This scenario assumes 85% of IPART's efficiency saving can be achieved, pro rata.
- **Option 3: Potentially acceptable risk**: This scenario assumes only 75% of IPART's 17% efficiency saving can be applied pro rata to costs not affected by the land severance and model error adjustment offsets.

The high-level estimates are set out in Table 3 below.

**Table 3 Sydney Water's suggested efficient Mamre Road infrastructure contribution options**

| | Adjustments | | Estimated infrastructure contribution | |
|---|---|---|---|---|
| | ($ million per hectare) | | | |
| | ($2024) | ($2025) | ($2024)* | ($2025)** |
| **Sydney Water - December estimate** | | | **0.962** | **0.993** |
| **Plus:** land severance + model error adjustments | + 0.092 | + 0.095 | 1.054 | 1.088 |
| **less:** | | | | |
| **Option 1 – High risk**: 100% Draft IPART savings with pro-rata adjustment | - 0.161 | - 0.166 | **0.893** | **0.921** |
| **Option 2 – Medium risk:** 85% Draft IPART savings with pro-rata adjustment | - 0.137 | - 0.141 | **0.917** | **0.946** |
| **Option 3 – Potentially acceptable risk:** 75% Draft IPART savings with pro-rata adjustment | - 0.121 | - 0.125 | **0.933** | **0.963** |

* $2024 is provided for comparison to IPART's draft report finding

** $2025 is provided to show what the equivalent registered charges would likely be as we plan to register in the 2024/25 financial year.

In summary, Sydney Water considers higher risk efficient cost estimates for the initial infrastructure contribution for the Mamre Road stormwater scheme could be $921,000 per hectare ($2025) if IPART accepts a high-risk estimate or $963,000 per hectare ($2025) if IPART adopts a lower risk estimate. Sydney Water considers $1,055,000 per hectare ($1,022,000 in $2024) strikes the appropriate balance between the risk to customers, the shareholder (NSW Government) and developers for the initial DSP.

## 5.2 Strategy to balance funding risk

Sydney Water proposes a number of elements to better balance funding risk for the Mamre Road integrated stormwater services:

- Fast-tracked geotechnical investigations, land acquisition negotiation and detailed design optioneering
- Early DSP review and reset (if required)
- Infrastructure delivery via a developer delivered model
- Early market sounding via expression of interest and requests for feedback during the DSP exhibition process

We are also investigating the potential for innovative funding agreements, however these are subject to further analysis and would require IPART, stakeholder and Sydney Water endorsement.

### Fast-tracked geotechnical investigations, land acquisition negotiation and detailed design optioneering

Sydney Water is currently undertaking geotechnical investigations in the Mamre Road precinct with full results expected by the end of 2024. This will provide better insight into actual groundwater levels and ground conditions at seven sites[11]. Our detailed design will require geotechnical investigations at all sites. As the current round of

[11] We could not gain approval from all land-owners at all sites for this initial investigation, however we will continue to gain the appropriate permissions to continue this work.

investigations do not cover every basin there remains geotechnical and ground water constraint risks which need to be accounted for in the efficient scheme cost adopted in the initial DSP. We are also fast-tracking evaluation of site contamination and material quality to optimise material reuse over disposal.

We have progressed early discussions about land acquisition however, negotiation cannot occur with landowners until the scheme receives the necessary approvals to ensure that potential commercial arrangements are discussed in good faith. Land acquisition in the Mamre Road precinct is complex due to multiple government agencies seeking to acquire land and the complexities of land severance and compensation as required under the Land Acquisition (Just Terms Compensation) Act 1991.

There are several private landowners in the precinct in addition to developer landowners, in many cases these landholdings include private residences or small businesses. As part of the developer delivered approach for infrastructure, Sydney Water is working closely with the developers to optimise the design of stormwater infrastructure that services each development. In the next phase of work Sydney Water intends to enter commercial agreements with developers to undertake detailed design and delivery of scheme infrastructure including stormwater basins and trunk drainage channels.

Sydney Water has been working with the Biodiversity, Science, and Conservation group with DCCEEW to develop an approach that allows developers to deliver the regional basins and by doing so they can receive an acknowledgement of proposed Scheme Service Area (SSA)[12]. This approach allows developers to develop that equivalent area without the need for locking up land for interim stormwater quality/quantity works until the regional basins have been delivered. This SSA approach has the following objectives:

- continued optimisation and innovation of the scheme design
- provide a robust solution that can be deployed in line with development and achieve the waterway health targets at all times
- Optimisation of the overall integrated stormwater scheme cost
- Incentivise construction of the regional stormwater basins by developers
- Facilitate and fast track development and approvals of employment lands while minimise or avoid the need for interim or abortive works that would otherwise be required by the development. Through high level discussions with developers this SSA approach has been supported, although the detail and processes still need to be provided with further consultation with the approval agencies and developers.

### Early DSP review

Our plan to move to detailed design and procurement as quickly as possible should allow the first DSP to be reviewed earlier than the standard five-year period if we observe actual costs consistently diverging from IPART's draft estimate of efficient costs. That is, IPART's Infrastructure Contribution Determination allows for earlier reviews if there has been a material change in inputs compared to those estimated. We anticipate that we should have sufficient evidence to request IPART for an early DSP review after around two years with two outcomes possible:

- Actual efficient costs **significantly exceed** IPART's finding in this review: We estimate this would cap the risk of Mamre Road stormwater scheme costs being paid by customers to around $20 million or less than $0.50 increase to an average customer bill[13]. However, should IPART consider a similar cost saving could be applied to the

[12] The draft proposed SSA framework is provided in **Attachment C: DRAFT proposed Scheme Serviced Area framework**

[13] Based on current differential between Sydney Water and IPART draft efficient cost estimates over a period of two years. Should the time taken to review the DSP be longer or the differntial be greater, the potential impact to customer bills would be higher.

remaining Aerotropolis precincts, this cap increases to around $100 million (just over $2.00 increase to an average customer bill).

- Actual efficient costs are **significantly lower** than IPART's finding in this review: IPART could consider how the funding differential might be incorporated in the review to ensure developers do not fund more than the efficient costs of the scheme.

#### Developer delivered model and deeper engagement during DSP exhibition process

We consider the combination of IPART's DSP exhibition process and Sydney Water's proposed developer delivered model has the potential to provide a natural tension between developers advocating for infrastructure contributions which are too low and those which are too high. The DSP exhibition process is a pragmatic and appropriate requirement to ensure developers are comfortable with the costs proposed for each asset which services their development. The process involves Sydney Water specifying each asset, with its associated forecast commissioning date and cost. When this process is combined with a developer delivered model, there is a natural tension between developers advocating for higher and lower cost estimates than those proposed. That is, for developers who are best placed to deliver some of the assets, it provides an opportunity to raise concerns should the forecast cost and timing to deliver those assets be too low or misaligned with development. Similarly, all developers can raise concerns if any forecast cost to deliver an asset is considered too high.

Sydney Water will place particular focus on this aspect during our upcoming Mamre Road stormwater DSP exhibition process with targeted questions about the infrastructure most likely to be delivered by developers. We will further look at ways to gain early indication of the market's willingness to deliver infrastructure at the costs identified in our upcoming Mamre Road DSP. We note that our Developer Works Policy will require developers to tender all works greater than $500,000 to ensure competitive market prices. We are also keen to further explore additional strategies which could further balance the risk of customers funding infrastructure which does not provide them a service and developers paying an unequal share of the cost to deliver the infrastructure which services their development as outlined below.

### 5.2.1 Emerging opportunities – Negotiated Service Agreements for delayed payments and the Plus or Minus Bonding option

Sydney Water has been actively engaging with the development industry to explore new and innovative ways to deliver growth services. As part of this engagement, developers have asked us to consider ways to mitigate the financial implications of paying infrastructure contributions upfront and in full. Three options appear to have broad support by developers including increased use of bonding and/or alternative financial security arrangements, deeds of deferment and 'non-cash infrastructure contributions' (off-sets to cash contributions for DSP assets, also known as 'works in kind'):

- **Delayed payment on property settlement**: This concept would see infrastructure contributions paid as part of the property settlement process as set out in a Deed of Deferment or similar. Other debt associated with properties (unpaid customer service and usage bills) is already automatically paid to Sydney Water in a similar manner, however, these debts are generally small in comparison to an infrastructure contribution. We are in the early stages of looking at the benefits and risks of this proposal.
- **Works in kind:** This is where developers deliver and transfer assets to Sydney Water which count as a remittance of their infrastructure contribution charges. These arrangements are often used by Councils for a range of works including stormwater assets.
- **Negotiated Service Agreements for a Plus or Minus Bonding Opportunity (POMBO).** This concept would see developers being able to opt out of the regular DSP process by entering into a Negotiated Service Agreement (NSA) with alternative payment arrangements such as bonding. These bonding agreements would

require payment of some portion of the current infrastructure contribution at the time of connection, while entering into a bonding arrangement (financial security) for a value that covers an estimate of the remaining infrastructure contribution plus an additional component equal to the differential between the two. An indicative example is shown figuratively in Figure 5. Release of the bond subject to agreed payments being made would be scheduled to occur after registration of the revised DSP (DSP 2 shown in the figure). That is, upon registration of the revised DSP three outcomes would be possible; if the revised DSP contribution is:

- **less than or equal to** the portion already paid, then the full bond would be released without further payment by the developer
- **greater than or equal to** the portion already paid plus the bond, then the full bond would be released upon payment of the full bonding amount
- **between the portion already paid, and the portion already paid plus the full bonding amount**, then then only that portion of the bond would be payable to make total payment equal to the revised DSP, with any remaining bonding amount being released.

This would allow the full payment that developers connecting during the first DSP period to better match the future, more certain cost estimates contained in the second (or next) DSP up to an agreed plus or minus limit. Our preliminary consideration of this proposal is that it has the potential to improve the chance that all development pays an equal share for more certain estimates of the efficient cost of infrastructure which services their development and also mitigates the risk of customers paying development related costs. This option is discussed further below.

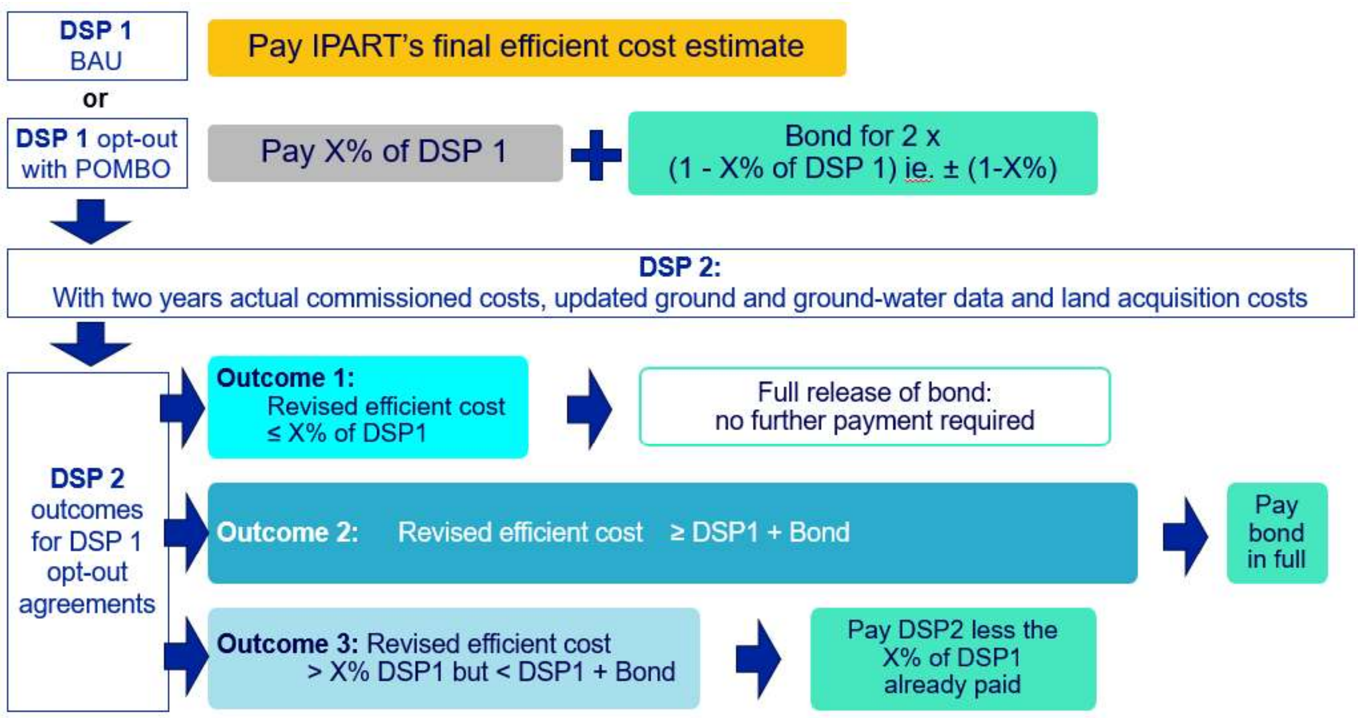


**Figure 5 Graphical representation of POMBO showing incentive in the 'minus' is equal to the risk in the 'plus'**

We have advocated for IPART to allow voluntary agreements for entities who are well placed to negotiate these for many years. For example, in our response to IPART's 2018 review of infrastructure contributions, we noted we were particularly interested in working with developers to ensure that current and future stormwater infrastructure delivers as much benefit as possible to the wider community. Our preliminary analysis of POMBO agreements are they would be allowable under IPART's 2018 infrastructure contribution determination under the conditions set out in finding 16 of the final report: *Allow utilities and developers to opt-out of the determination through bilateral agreements, subject to ring-*

*fencing of unregulated costs*. The 2018 final report sets out a number of requirements on Sydney Water that must be met in relation to such agreements. As such, we consider there will be additional administrative costs which would need to be paid by the proponent, for both the increase in Sydney Water's contract administration and additional compliance obligations. These payments would likely need to be treated as un-regulated income.

Our consideration of POMBO is at an early stage however, we expect that developers may wish to inform us of what value of X% might interest them to enter a POMBO agreement during the initial DSP exhibition. That is, once IPART's final efficient cost estimate is known, developers should be able to estimate the value of X that would provide them an appropriate balance of incentive and risk in entering a POMBO agreement. As IPART noted in their 2018 final report for the determination of infrastructure contributions:

> *…developers have the ability to scrutinise water utilities' forecasts, DSPs are regularly reviewed, and a dispute resolution process is in place if a developer and water utility disagree on the level of charges.*
>
> and
>
> *…We consider that the current requirements still meet the objectives of achieving transparency by enabling scrutiny by developers without imposing undue administrative burden*

As such, we would welcome IPART's further consideration of the appropriate level of ring-fencing evidence for POMBO agreements in comparison to other Negotiated Service Agreements which relate to delivery of bespoke higher cost infrastructure. Sydney Water considers the ring-fencing requirement for POMBO agreements should be less onerous, considering the agreements would still be linked to IPART's regular DSP maximum prices for connection to regulated infrastructure. The proposal also has the potential to improve efficient cost allocation between developers, customers, taxpayers and others compared to the standard arrangements where the initial DSP includes a high proportion of unknown costs. For example, the ring-fencing requirements could be limited to reporting in Annual Information Returns and retail price reviews:

1. The total POMBO agreement infrastructure contribution income in each year
2. The total regulated infrastructure contribution income foregone because of POMBO agreements
3. The differential between 1 and 2 above (which may be positive or negative).
4. Allowing POMBO income to be added to the total regulated infrastructure contribution revenue reported each year, and to be deducted from the RAB in the same way as other regulated infrastructure contributions
5. Review of POMBO agreement treatment and reporting at the next retail price review.

### 5.2.2 Future alternatives

Other options to better balance the forecast risk between customers and developers could also be considered when IPART next reviews their Infrastructure Contributions determination.

# 6. Attachment A

## 6.1 Addressing HARC MUSIC model design concerns

| Ref. | Technical issue | Sydney Water response |
|---|---|---|
| Report section 1.2 | *The modelling and costs covered all the leading precincts in the Aerotropolis and gave no specific breakdown of costs for the Mamre Road Precinct. Concurrently, Sydney Water undertook their own integrated servicing options review, specifically for the Mamre Road Precinct. This review found that the total cost of stormwater services required to meet the risk-based targets was $231m ($2026), which included the cost of land acquisition. This is around a quarter of Sydney Water's current cost estimates.* | The options report IPART appears to be referring to was provided as commercial in confidence only. It was for Sydney Water options comparison purposes only as it was prepared well in advance of any detailed design or associated detailed risk-based cost estimates. The cost estimate which IPART has quoted in their draft report is also far lower than that used in that report. It would appear IPART have misinterpreted information provided as part of this review.<br>**Requested action**: IPART review the statement and provide correct details in their final report including to note this report was completed before the detailed scheme plan was adopted, the costs estimated were high level and only for option comparison purposes, included a list of items that required further cost analysis, and was intentionally kept for Sydney Water use only to ensure it did not convey an unrealistic expectation of the cost to develop. |
| Throughout the report | Use of the term 'conceptual design' for both Sydney Water's current design and the TWG design. For example:<br>*We have also included in our cost estimates the reduced quantity of land Sydney Water would need to purchase, in line with the smaller basin surface areas in the TWG Option. This may be an impractical outcome, given the nuanced complexities involved in purchasing land, and in appropriately compensating existing land holders. However, overall the TWG Option represents a credible conceptual alternative that could have been explored in the optioneering phase.* | The review that occurred during the TWG process did not include the same level of analysis undertaken by Sydney Water in developing the scheme plan. Our proposed depths reviewed existing information and determined assumed depths based on risks considering detailed geotechnical information was not yet available. The TWG design did not include any risk analysis and was based only on creek invert levels. This introduces a significant risk that assumed deeper basins are not feasible.<br>**Suggested action**: IPART to update the report to note that Sydney Water have selected basin depths based on risk analysis and the TWG proposed design was not informed by similar analysis. |
| Throughout the report | Description of Sydney Water's optioneering phase as being in the past. For example, in the Executive Summary (emphasis added):<br><br>*However, overall, the TWG Option represents a credible conceptual alternative that **could have been explored in the optioneering phase**.* | **Requested Action**: IPART to update the report to note that Sydney Water's optioneering is ongoing. |

| Ref. | Technical issue | Sydney Water response |
|---|---|---|
| Report section 3.3 | *The water demand estimates were subsequently refined over the design process, with the final on-lot estimates being based on 50% of the average demands from similarly sized large format industrial lots supplied with potable water. Additional demand has been added for additional irrigation (on-lot and off-lot) plus non-revenue water. The estimation of NRW has not used a correct formula, although the impact of this error is minor.* | The report indicates we have not used the correct formula. There is no further reference to this in the report or in the MUSIC modelling review.<br>**Requested Action:** It would be helpful if HARC could please indicate the correct formula in the report for clarity. |
| Report section 4.1 and in 4.4 | *Our review of recent work undertaken by stormwater consultants for the Technical Working Group in 2 of the 5 sub-catchment clusters suggests that it could be possible to achieve material cost savings through more efficient design of stormwater treatment trains and the use of deeper storage ponds, both of which lead to reduced cost and land take. If these cost savings are extrapolated to the remaining catchments within the precinct, we estimate that the stormwater infrastructure charge could be reduced to approximately $850,000 per hectare* | Reviewing only 2 out of 5 sub-catchments in Sydney Water's perspective is inadequate to assume that all cost saving can be extrapolated to the other 3 sub-catchments. Each sub-catchment has different topography and constraints that impact the placement, size and depth of stormwater assets.<br>Also, the east and north-west sub-catchments were the only sub-catchment analysed and they don't have the TWG proposed treatment train due to site constraints and existing development. The other 3 sub-catchment have the TWG proposed treatment train and therefore assuming the same savings could be generated is at high risk of over estimating savings.<br>. |
| Report section 5.5.1 | *Based on our efficient costs from using the TWG Option, we estimate that land tax would reduce to around $111 million. This is still around the same proportion of total costs.* | These calculations are not included in any information exhibited for stakeholder review. It would be beneficial for stakeholder to understand how this was calculated. |
| MUSIC report section 2.2 | *The MUSIC modelling toolkit has been set up with a relatively short ten-year rainfall time series from 1999 to 2008. In the context of the full climate record (Figure 2-1), this is one of the drier periods on record, suggesting that the flow targets may be easier to meet during this time period.* | The modelling toolkit has been adopted based on the advice from Department of Planning and Environment that the agreed method of demonstrating the stormwater targets.<br>The 10-year time set was established by DPIE at the time of setting the targets and Sydney Water has continued its use to ensure our proposed design achieves the targets using the same model. Using a different model to how the targets were set can create issues in being able to meet the targets.<br>**Requested Action**: IPART/HARC note the 10-year rainfall time-set by DPIE was the same used to create the targets and assure compliance with the scheme objectives and is therefore acceptable. |

| Ref. | Technical issue | Sydney Water response |
|---|---|---|
| MUSIC report section 2.4 | The main issues raised by the TWG stormwater consultant as well as commentary on their context of good/best practice modelling are<br>1. 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.<br>2. Unrealistic drainage paths.<br>3. Deep transfer pipes.<br>4. Modelling not reflecting proposed configuration.<br>5. Splitting flows upstream of wetlands.<br>6. Ponds in powerline easement.<br>7. Wetland only treatments – the opportunity to reduce area of measures if coupled with bioretention<br>8. Powerline easement not modelled separately.<br>9. Reuse demand outlined in the Technical Guidelines were not adopted.<br>10. Kemps Creek dam site is not considered. | Sydney Water responded to many of the issues raised in the TWG document. Most of our responses at the time were to take the feedback on notice for further investigation.<br>Since that time many of the issues raised in the TWG document were rectified in our revised May 2024 scheme plan:<br>1. Made deeper when low risk (8 of 20 ponds are at 3m depth in May 2024 scheme plan)<br>2. Rectified in May 2024 scheme plan<br>3. Will be reviewed in detailed design<br>• Rectified in May 2024 scheme plan and will provide more detail in next MUSIC model version.<br>• Further clarification required from the TWG.<br>4. Sydney Water has noted examples when this is possible and already approved.<br>5. Use of wetland only is due to site/grade constraints, otherwise coupled systems would be used.<br>6. It was included within the development node.<br>7. Sydney Water used own demand, endorsed by HARC<br>8. Investigation ongoing, significant risk requiring detailed review.<br><br>**Requested Action**: IPART/HARC to note that the above changes were made in response to TWG proposal in Sydney Water's revised model adopted for the FBC so it is clear to readers how we responded. |
| MUSIC report section 3.1.4 | *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.* | This modelling is consistent with filter media guidance (Blacktown Council requires TN to be <1000mg/kg) but is acknowledged to be on the low side. We note that the TN content in Tech guide is 800mg/kg. This parameter is not significant in meeting the flow, TN load or load reduction targets for the scheme, which is highly dependent on stormwater harvesting, rather than only on the filtration of water. This will not influence the size of infrastructure or scheme costs.<br>**Sydney Water action**: A value of 800mg/kg will be used in the current and future modelling to be consistent with the technical guideline. |

| Ref. | Technical issue | Sydney Water response |
|---|---|---|
| | *There was no pre-treatment sedimentation basin or wetland for the bioretention basins in catchment NW01 or NW02.* | This is due to upstream development already having bioretention systems proposed and built within their development to. It would provide little to no benefit to place a sediment basin downstream of already existing stormwater treatment device. This would add costs for no real benefit. This change has been reflected in v19 of the MUSIC model.<br>**Requested Action**: HARC to note that Sydney Water has added the private stormwater measures in the regional scheme treatment train for the NW sub-catchment. Therefore, no additional sediment basins are required. |
| | *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)* | Noted, this value is within the acceptable range of modelling. Sydney Water will review the wetland depths/volumes to ensure they meet the tech guideline requirement. Adjusting this number will not have any material difference in the modelling outcomes or scheme costs.<br>**Sydney Water action**: An average depth of 0.3m will be used in the current and future modelling and design |
| MUSIC report section 3.2.2 | *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.* | It was previously agreed with the TWG that permanent water bodies would have an impervious value of 90%.<br>**Sydney Water action**: An impervious value of 90% for wetlands and ponds will be adopted for basin design. |
| MUSIC report section 3.2.2<br><br>MUSIC report section 3.2.3 | *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.*<br>*In reference to the coupled bioretention-wetland systems, the developers pipe grades are insufficient to accommodate biofiltration. Further refinement of the scheme is ongoing* | The design of the basins 25, 26, and 28 has progressed over the time the IPART review was undertaken. The use of bioretention is still not proposed due to the lack of grade required to appropriately drain the system and maintain pond depths/storage. Sydney Water will continue to review the design and try to incorporate bioretention when possible but for costing will assume it does not work. It does not appear that HARC or DesignFlow have analysed grade constraints into consideration in their review.<br>**Requested Action**: HARC to note if assessment of grades was undertaken and the inclusion of bioretention systems adds a risk of overestimating the cost savings being generated if they can't fit due to existing constraints. |

| Ref. | Technical issue | Sydney Water response |
|---|---|---|
| MUSIC report section 3.2.2<br><br>MUSIC report section 3.2.3 | *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.*<br><br>*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* | It was previously agreed with the TWG that easements would be incorporated into the existing nodes rather than create a separate node.<br>Modelling as separate node will not have any material difference in the modelling outcomes or scheme costs.<br>**Sydney Water action**: No action required. Sydney Water has included the proposed easement into consideration into the development node imperviousness.<br>**Requested action**: HARC note that the easements have already been considered in the development note imperviousness. |
| MUSIC report section 3.2.4 | *The unlined filter media perimeter in the bioretention basin in E03 was 14m compared to the acceptable range of 0.01m.* | Sydney Water will review the unlined media perimeter to ensure they meet the technical guideline requirement. Noting this is unlikely to have any difference in the modelling outcomes.<br>**Sydney Water action**: This parameter will be used in the current and future modelling. |
| MUSIC report section 3.3.1 | *Table 3-2 - Design parameters - Northwest cluster – Bioretention, TWG consultant design row.* | Sydney Water has accepted AR&R view to use larger water quality devises upstream of ponds to reduce risk of poor water quality in ponds due to potential algal blooms. Sydney Water note there is a risk of letting poor water quality into the pond and harvesting this water for recycled water, placing a greater strain to the final treatment measures, mechanical and disinfection.<br>**Sydney Water action**: To determine the difference in treatment level and water quality between Sydney Water and TWG models.<br>This analysis will determine if it is more cost effective to reduce treatment footprints on IN1 land, but the cost vs risk is unlikely to provide any benefit in ENZ land.<br>**Requested Action**: HARC to note Sydney Water will undertake further analysis to determine a suitable medium between required treatment level vs the TWG approach of minimising treatment upstream. |
| MUSIC report section 3.3.2 | *Table 3-6 - Design parameters - East cluster - Bioretention* | This table is the same as the NW cluster. Assume this is an editing issue.<br>**Requested Action**: HARC to update table in next revision |

| Ref. | Technical issue | Sydney Water response |
|---|---|---|
| MUSIC report section 3.4 | *One issue that is apparent in looking at the results in the East cluster is that there is a noticeable increase in the volume of evaporative losses from land between the SW and TWG stormwater consultant's conceptual layouts. This change can be attributed to an important change in the assumptions around the proportion of impervious area in the powerline easements in the sub-catchments. It clearly demonstrates the sensitivity of water balance outcomes to key assumptions.* | Sydney Water note that the difference in evaporation is more likely due to the larger footprint of open water storages (pond, sediment basin and wetland) rather than just changes to imperviousness.<br>**Requested Action**: HARC to update this assessment to determine the cause of this difference. |
| Cost analysis report – section 5.3.2 | *OFF SITE MATERIAL DISPOSAL*<br>*It is observed that $40 million of the total $212 million in direct costs is allocated for off-site material disposal, which represents 19% of the total budget. The current rate for off-site disposal is $48 per cubic meter, covering 800,000 cubic meters. However, WT note that the actual off-site disposal volume is 976,281 cubic meters, with a rate of $47 per cubic meter, resulting in a total cost of $45.8 million. Based on a quote received for VENM (Virgin Excavated Natural Material) at a rate of $6 per tonne.* | Sydney Water note this is a significant saving and opportunity to reduce costs but it does have a significant risk if the savings are not materialised. Especially if there is a large amount of rock or non-VENM material that needs disposal.<br>There was allowance made for reduction in spoil costs based on policy driven reuse. Given that the saving identified by WT is driven by unknown latent conditions it would be inappropriate to revise the cost at this time. Disposal cost should be revised prior to DSP exhibit once appropriate planned geotechnical investigations are carried out. It is also noted that WT also received a quote higher than Bowery's estimate for VENM disposal as well as the lower rate identified |
| Cost analysis report – section 5.3.3 | *STORMWATER COLLECTION PIPELINE – DN375*<br>*WT has not accounted for the excavation and laying of pipes in trenches deeper than 3 meters. After assessing various scenarios, all 5-meter and 6-meter trenching works have been adjusted and treated as 3-meter works. This decision is based on further investigation, which indicated that the elevation where the stormwater collection pipeline runs is unlikely to exceed 3 meters deep. This assessment was verified using the Google Earth documents provided by Russell Beatty on August 20, 2024, specifically the file: 'Indicative Stormwater Gravity_MainDec2023.shp'.* | This analysis indicates that WT and HARC may have misunderstood aspects of the proposed stormwater collection pipeline, otherwise known as the daisy chain system. Our design calls for a pipe that connects ponds within 4 clusters (North, East, North-west and South-west) to the cluster pump that supplies the harvested stormwater to the reservoir. The pipes connect to the cluster via gravity and due to the topography (and some having to drain against gravity) the pipeline needs to be deep in sections. Sydney Water via Aurecon completed a fatal flaw assessment (found as an appendix to the TWG document) and this proposed design was the lowest risk option and provided the best outcome. Note that Sydney Water are quite used to installing deep gravity mains for sewers.<br>Sydney Water are going to start a more detailed design of the system, but assuming there will be no pipes deeper than 3m is a risk and will likely require more pumping which is an ongoing cost and adds risk of failure.<br>**Requested Action**: WT to indicate that the proposed pipeline will need deeper pipes, but this will be reviewed during detailed design. |

| Ref. | Technical issue | Sydney Water response |
| --- | --- | --- |
| Cost analysis report – section 6 | Assume 1 tubestock/m2 . | We do not consider this an acceptable assumption. Sydney Water are assuming a minimum of 5 plants/m2. Anything less will not achieve the desired vegetation cover, leading to more maintenance (weeds) and reducing irrigation requirements.<br>**Requested Action**: WT to remove this recommendation. |
| Cost analysis report – section 10 | *WT has identified that Sydney Water has included allowances for reticulation and discharge pump (submersible in diversion chamber including pipework) including power for pump, SCADA control of pumps and cabling. Based on Russell Beatty's from HARC advice, the allowance may potentially not be required given the scope is based on a gravity system rather than a rising system. Each basin has included an amount of $277,500 potentially resulting in savings.* | The proposed design is that stormwater is harvested (lifted) by submersible pumps into the gravity pipe (daisy chain) system. Sydney Water has the following concerns with not managing the harvesting component via pumps:<br>- Without these pumps lifting water from the base of the pond (currently averaging 2m in depth but proposed by HARC to be 3m) the gravity pipes will need to be substantially deeper for the full length of the pipeline (from first pond to last).<br>• use of automated valves to control stormwater harvesting will be difficult to control flow rates and a higher risk of failure. Also noting that flow rates will vary substantially between a full pond (3m head) vs a near empty pond (0.2m head).<br>• Each pond will require a reticulation system to reduce the risk of algal blooms and stratification, leading to poor water quality. The $277K proposed includes the reticulation system and any other aeration systems required to ensure the correct oxygen levels and mixing is occurring. Therefore, it is already required it shouldn't be considered a major cost.<br><br>**Requested Action**: WT to remove this recommendation or provide more information as how the proposed alternative will work. |

# 7. Attachment B: Feasibility analysis report

## Analysis of draft stormwater quality/quantity footprint reduction

### Overview

IPART's efficiency review (September 2024) has acknowledged that Sydney Water's current Mamre Road scheme design and associated costs for the proposed design are efficient. However, IPART has also indicated that an alternative scheme design featuring deeper basins, reduced land take may offer increased efficiency. This alternative design could present higher upfront risks but may result in a reduced cost per developable hectare.

As a result, Sydney Water has undertaken further analysis of alternative designs to assess the costs, benefits, and associated risks before determining whether the future scheme can feasibly be re-designed to reduce costs while still meeting the waterway health targets.

This document outlines the findings from the analysis of reducing the footprint of water quality / quantity asset in alignment with the recommendations from Technical Working Group (TWG) and IPART review. It also provides a high-level overview of the risks, opportunities and potential savings associated with implementing these recommendations.

#### Details of the analysis undertaken

Sydney Water and its planning partner, Aurecon, have taken the findings from the Draft IPART Efficiency Report and undertaken three (3) separate analyses:

1) <u>Pond Depth Opportunities</u>

This analysis reviewed the current scheme pond depths and known geotechnical information to explore opportunities for reducing pond depths and reduce footprints. The analysis is generally limited as the geotechnical and ground water depth investigations are still ongoing with results anticipated by late 2024. Preliminary geotechnical findings indicate that groundwater in the Kemps Creek sub-catchment (south-west cluster) could be close to the surface (between 1.5 to 3m).

The analysis considered two scenarios:

I. Increasing storage depth to the ultimate depth (between 3 and 4m) which is considered a maximum potential savings scenario.
II. Increasing storage depth by 50% of the gap between current depth and ultimate depth, which we consider is more realistic given the associated geotechnical and groundwater ingress risks and that long/narrow basins might not to achieve maximum depths or significant land reduction savings.

- No reduction in treatment (Sediment basin, Wetland and bioretention) footprint size was proposed in this scenario.

2) <u>Reduced Footprint of Treatment Measures</u>

This analysis evaluated the impacts of reducing the stormwater treatment train measures within a single sub-catchment (west cluster), noting that the TWG / IPART had previously undertaken analysis of two other sub-catchments (north-west and east). Two scenarios were analysed:

I. Treatment area reduced to 75% of current size.
II. Treatment area reduced to 50% of current size.

- The analysis considered the differences in performance and the cost implications for both capital expenditure (CAPEX) and land acquisition. The results provide a detailed comparison to the TWG/IPART review, which primarily determined if the design met the waterway health targets without providing data for further comparative analysis. No reduction in pond volume was proposed in this scenario.

3) Combined Pond Depth and Reduced Footprint of Treatment Measures

This analysis combined the strategies from option 1 and 2 above in the Southwest Cluster to meet the waterway targets and balance the overall outcomes. The analysis adopted an increased storage depth by 50% of the gap between current depth and ultimate depth combined with the following reductions in treatment areas:

I. Ponds deepened to 50% of maximum and treatment area reduced to 85% of current size.

II. Ponds deepened to 50% of maximum and treatment area reduced to 90% of current size.

III. Ponds deepened to 50% of maximum and treatment area reduced to 95% of current size.

# Pond Depth Opportunities

### Land reduction outcomes

In late 2023, the TWG requested that Sydney Water maximise pond depths to reduce land take and associated cost impacts. At the time, Sydney Water completed a review of the pond depths, which were previously set at a maximum depth of 1.5 metres (as per the December 2022 scheme plan), to determine acceptable depth increases given the unknown geotechnical and ground water level constraints. This review included assessment of the creek invert levels and ensuring that pond depths remained 300 mm above these inverts.

This resulted in an update to the pond depths in the December 2023 and a further update in the May 2024 Stormwater Scheme Plan. The May 2024 plan indicates that ponds take approximately 31.6 hectares and include the following depth information:

- 8 out of 20 (40%) have a maximum depth of 2.6 to 3 metres.
- 7 out of 20 (35%) have a maximum depth of 2 to 2.5 metres.
- 5 out of 20 (25%) have a maximum depth of 1.5 to 2 metres.

The TWG and IPART undertook further review of the pond depths in the South and Ropes Creek sub-catchments (northwest and east clusters). The TWG's review, however, was based on the December 2023 scheme plan, which contained an imperviousness error. While the review suggested Sydney Water achieve deeper pond depths, some potential savings from this finding were offset by the need to address the imperviousness error.

By comparison, the May 2024 version already incorporated savings from low-risk opportunities identified earlier. The majority of the TWG recommendations had already been incorporated in the May 2024 version, although additional land costs were incurred to address the imperviousness error, which underestimated the total storage volumes and land required.

Sydney Water has now conducted an additional review to further explore opportunities for reducing land take from ponds, by considering two scenarios:

I. Maximum Potential Savings Scenario:

This scenario involves increasing pond depths to the maximum possible depth without introducing additional safety or operational issues. These maximum depths are generally:

- 3 metres for small ponds or in areas with high geotechnical risk.
- 4 metres for large ponds or those located within IN1 land, to minimise land take.

This analysis does not include any associated increase in risk-based costs related to geotechnical or groundwater constraints, which are likely to arise within the precinct due to the increased delivery risk at these pond depths. The outcome of this scenario is shown in Table 1.

II. Potentially Feasible Savings - 50% of Maximum Potential Scenario

This scenario assumes deepening the pond depths to 50% of the gap between the current and maximum potential depth scenario.

- This approach is considered more realistic, as it is accounts for the increased likelihood of geotechnical and ground water constraints that may be identified during the detailed design process. The outcome of this analysis is shown in Table 2.

**Table 1 – Maximum potential savings scenario.**

| Basin | Pond Surface Area (m2) | Pond Volume (m3) | Current Max Depth (m) | Aver. Depth (m) | Adjust this Field to Change outcome - Potential Max Depth (m) | Additional Depth (m) | Area reduced | Total Scheme Surface Area With Revised Depths (m2) |
|---|---|---|---|---|---|---|---|---|
| **1** | 0 | 0 | 0.00 | | | | | |
| **2** | 57,528 | 152,318 | 3.00 | 2.65 | 4.00 | 1.00 | 11,571.56 | 45,956.88 |
| **3** | 15,391 | 34,753 | 2.95 | 2.26 | 4.00 | 1.05 | 3,642.09 | 11,748.62 |
| **4** | - | - | 0.00 | | 3.00 | 0.00 | - | - |
| **6** | 1,817 | 2,442 | 3.20 | 1.34 | 3.00 | 0.00 | - | 1,817.28 |
| **7** | 39,956 | 110,863 | 3.20 | 2.77 | 3.00 | 0.00 | - | 39,955.79 |
| **9** | 30,825 | 58,570 | 2.20 | 1.90 | 3.00 | 0.80 | 6,755.72 | 24,068.82 |
| **11** | | | | | | | - | - |
| **12** | 14,960 | 20,398 | 1.50 | 1.36 | 3.00 | 1.50 | 6,329.81 | 8,630.50 |
| **13** | 14,081 | 30,257 | 2.60 | 2.15 | 3.00 | 0.40 | 1,554.47 | 12,526.20 |
| | 27,351 | 59,251 | 2.60 | 2.17 | 3.00 | 0.40 | 2,997.76 | 24,353.02 |
| **16 wetland** | | | | | | | - | - |
| **16 pond** | 3,695 | 5,849 | 2.20 | 1.58 | 3.00 | 0.80 | 931.36 | 2,764.07 |
| **17** | 9,227 | 14,756 | 2.00 | 1.60 | 3.00 | 1.00 | 2,714.70 | 6,512.17 |
| **18** | 4,301 | 8,924 | 3.00 | 2.07 | 3.00 | 0.00 | - | 4,301.26 |
| **19** | 4,688 | 6,264 | 2.00 | 1.34 | 3.00 | 1.00 | 1,560.34 | 3,127.59 |
| **22** | 7,235 | 9,319 | 1.50 | 1.29 | 4.00 | 2.50 | 4,080.83 | 3,153.93 |
| **23** | 9,517 | 20,386 | 3.00 | 2.14 | 4.00 | 1.00 | 2,259.08 | 7,258.37 |
| **24** | 4,702 | 9,710 | 3.00 | 2.07 | 4.00 | 1.00 | 1,147.55 | 3,554.56 |
| **25** | 2,836 | 4,537 | 3.00 | 1.60 | 3.00 | 0.00 | - | 2,836.07 |
| **26** | 12,068 | 22,611 | 2.83 | 1.87 | 3.00 | 0.17 | 688.40 | 11,380.02 |
| **28** | 5,441 | 6,808 | 1.50 | 1.25 | 3.00 | 1.50 | 2,416.65 | 3,024.03 |
| **29** | 3,760 | 4,698 | 1.70 | 1.25 | 3.00 | 1.30 | 1,540.23 | 2,220.25 |
| **30** | | | | | | | - | - |
| **31** | 46,222 | 73,757 | 1.70 | | 3.00 | 1.30 | 16,268.66 | 29,953.59 |
| **Total** | 315,602 | 656,472 | 2.32 | 1.82 | 3.24 | 0.80 | 66,459.20 | 249,143.04 |
| **ha** | 31.6 | | | | | | 6.65 | 24.91 |

**Table 2 – Potentially feasible savings - 50% of Maximum Potential scenario**

| Basin | Pond Surface Area (m2) | Pond Volume (m3) | Current Max Depth (m) | Aver. Depth (m) | Adjust this Field to Change outcome - Potential Max Depth (m) | Additional Depth (m) | Area reduced | Total Scheme Surface Area With Revised Depths (m2) |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0.00 | | | | | |
| 2 | 57,528 | 152,318 | 3.00 | 2.65 | 3.50 | 0.50 | 6,432.74 | 51,095.71 |
| 3 | 15,391 | 34,753 | 2.95 | 2.26 | 3.50 | 0.55 | 2,150.04 | 13,240.67 |
| 4 | - | - | 0.00 | | 3.00 | 0.00 | - | - |
| 6 | 1,817 | 2,442 | 3.20 | 1.34 | 3.00 | 0.00 | - | 1,817.28 |
| 7 | 39,956 | 110,863 | 3.20 | 2.77 | 3.00 | 0.00 | - | 39,955.79 |
| 9 | 30,825 | 58,570 | 2.20 | 1.90 | 2.60 | 0.40 | 3,793.57 | 27,030.97 |
| 11 | | | | | | | - | - |
| 12 | 14,960 | 20,398 | 1.50 | 1.36 | 2.25 | 0.75 | 4,014.10 | 10,946.21 |
| 13 | 14,081 | 30,257 | 2.60 | 2.15 | 2.80 | 0.20 | 822.64 | 13,258.03 |
| | 27,351 | 59,251 | 2.60 | 2.17 | 2.80 | 0.20 | 1,585.79 | 25,764.99 |
| 16 wetland | | | | | | | - | - |
| 16 pond | 3,695 | 5,849 | 2.20 | 1.58 | 2.60 | 0.40 | 532.82 | 3,162.61 |
| 17 | 9,227 | 14,756 | 2.00 | 1.60 | 2.50 | 0.50 | 1,591.47 | 7,635.41 |
| 18 | 4,301 | 8,924 | 3.00 | 2.07 | 3.00 | 0.00 | - | 4,301.26 |
| 19 | 4,688 | 6,264 | 2.00 | 1.34 | 2.50 | 0.50 | 935.93 | 3,752.00 |
| 22 | 7,235 | 9,319 | 1.50 | 1.29 | 2.75 | 1.25 | 2,841.92 | 4,392.84 |
| 23 | 9,517 | 20,386 | 3.00 | 2.14 | 3.50 | 0.50 | 1,281.65 | 8,235.81 |
| 24 | 4,702 | 9,710 | 3.00 | 2.07 | 3.50 | 0.50 | 653.52 | 4,048.59 |
| 25 | 2,836 | 4,537 | 3.00 | 1.60 | 3.00 | 0.00 | - | 2,836.07 |
| 26 | 12,068 | 22,611 | 2.83 | 1.87 | 3.00 | 0.17 | 688.40 | 11,380.02 |
| 28 | 5,441 | 6,808 | 1.50 | 1.25 | 2.25 | 0.75 | 1,553.30 | 3,887.38 |
| 29 | 3,760 | 4,698 | 1.70 | 1.25 | 2.40 | 0.70 | 1,022.68 | 2,737.80 |
| 30 | | | | | | | - | - |
| 31 | 46,222 | 73,757 | 1.70 | | 3.00 | 1.30 | 16,268.66 | 29,953.59 |
| Total | 315,602 | 656,472 | 2.32 | 1.82 | 2.88 | 0.44 | 46,169.22 | 269,433.02 |
| ha | 31.6 | | | | | | 4.62 | 26.94 |

## Outcomes From Analysis

The analysis showed the following land take reductions:

- Maximum potential savings (Scenario 1): reduced land take by 6.6 hectares, or 21%.
- Potentially feasible savings (Scenario 2): reduced land take by 4.6 hectares, or 15%.

A direct comparison between these results and the IPART analysis, based on the TWG review, is challenging due to the design changes made between December 2023 and May 2024. A significant change was the inclusion of an additional 100ML of volume across ponds 2, 3, 7 and 9 to offset the deletion of basin 11 and address the imperviousness error in Basin 9 identified in the MUSIC model. As a result, the full reduction in land take from deeper ponds was not realised in full as more volume was added to the system.

However, based on this analysis, it could be inferred that if the two analyses were comparable, the maximum potential savings scenario would be similar to the TWG outcome. This assumes all ponds could be deepened, leading to significant reductions in both land take and land acquisition costs, but it would appear, the savings have not been adjusted in any way to factor in the increased risk from geotechnical constraints.

### Cost outcomes from analysis

The main cost savings from reducing the pond footprints come from land acquisition. Table 3 outlines the land acquisition saving for scenario1 and scenario 2. It should be noted that IPART's report indicated that the TWG alternative design led to a 29% reduction to the Sydney Water price.

**Table 3 – land take and cost savings from current to Scenario 1 and Scenario 2.**

| | Current ($m^2$) | Cost | Scenario 2 ($m^2$) | Cost | Scenario 1 ($m^2$) | Cost |
|---|---|---|---|---|---|---|
| ENV/RE1 land | 289,460 | $24,604,100 | 249,920 | $21,243,176 | 232,340 | $19,748,909 |
| IN1 land | 26,142 | $16,992,461 | 19,513 | $12,683,648 | 16,803 | $10,921,907 |
| Combined land | 315,602 | $41,596,560 | 269,433 | $33,926,824 | 249,143 | $30,670,816 |
| Total reduction | | | 46,169 | $7,669,736 (or 18%) | 66,459 | $10,925,744 (or 26%) |

Additional cost savings could arise from reduction in batters, vegetation, and maintenance tracks. However, these savings would be minor in comparison to land acquisition, including land tax and land severance costs.

The analysis highlights the significant benefit of reducing land take in the IN1 zoned land. Although, 8% of pond footprint is within IN1, it accounts for 41% of the total land acquisition cost in the current scheme. As a result, prioritising maximum depth within IN1 zoned land is essential for reducing overall scheme costs. In other areas, we consider the focus should be on minimising land severance, particularly where this impact is applicable.

## Reduced Footprint of Treatment Measures

Sydney Water analysed two scenarios against the current scheme design which includes sediment basin, wetland, and bioretention system, in the May 2024 (v19) scheme plan. The current scheme has been designed to ensure the water quality flowing into the pond was of high standard with treatment being sized appropriately to reduce the risk of algal blooms and other water quality issues. The wetland size is particularly crucial as it facilitates ongoing treatment of pond water through a recirculation system, which pumps the full water volume from the pond into the wetland every seven days.

The two scenarios include:

4) Current scheme design with stormwater treatment measures at 75% of full size.
   This scenario assesses the impact of a moderate footprint reduction. While it somewhat resembles the TWG proposed reductions, it is important to note that the east and north-west catchments don't have many coupled wetland and bioretention systems due to topography constraints and impacts from existing development. Therefore, comparing this Sydney Water scenario with the TWG option does not provide a direct comparison.
5) Current scheme design stormwater treatment measures at 50% of full size.
   This scenario is included to evaluate the effects of a significant reduction in footprint. However, we consider it unlikely to be achievable in practice.

**MUSIC modelling outcomes from the analysis:**

The three scenarios were tested in MUSIC within the Kemps/South Creek sub-catchment (west cluster). For all options, there were no change to the catchment size, impervious fractions, pond volume or demand. The main results are indicated in Table 4 below and detailed analysis results in Appendix 1.

**Table 4 – Results from MUSIC modelling analysis of 25% and 50% treatment reductions in Kemps/South Creek (West cluster).**

| Result | Outcome/impact |
|---|---|
| **MARV targets (<2ML/Ha/year)** | |
| ○ Current design = 1.96<br>1. Scenario 1 = 2.03<br>2. Scenario 2 = 2.10 | ○ Loss in evaporation by reducing wetland footprint increases MARV.<br>○ It is important to highlight, that the reduction of treatment area's results in non-conformance of the MARV targets. It is essential that the MARV remain +/- 0.01 of the MARV as these basins provide compensatory storage for the Southwest Cluster. |
| **Meeting the water quality targets** | |
| ○ Current design meets both the Total Phosphorus (TP) and Total Nitrogen (TN) targets however Total Suspended Solid (TSS) is 1.9% above the target.<br>○ Scenario 1 meets TN, 1% above TP and 2.2% above TSS target.<br>○ Scenario 2 meets TN, 2% above TP and 2.7% above TSS target. | ○ All scenarios will meet the waterway quality targets with the ponds included.<br>○ There are only minor differences when comparing each scenario based on load concentration reductions. |
| **Average and 90%ile nutrient loads into pond** | |
| ○ TSS and TN increases almost double in scenario 1 but flattens out for scenario 2 with minimal impact between them.<br>○ TP no real impact. | ○ These loads when calculated based on catchment area do increase loads substantially.<br>○ TN loads doubling in scenario 2 and 3 is concerning for algal growth. |

| Result | Outcome/impact |
|---|---|
| **Mean inflow loads into pond** | |
| ○ TSS increases by 76% in scenario 1 and 150% in scenario 2.<br>○ TP increases by 64% in scenario 1 and 100% in scenario 2.<br>○ TN increases by 80% in scenario 1 and 120% in scenario 2. | ○ Increasing TSS will likely require additional final treatment to meet recycled water quality requirements.<br>○ Increasing TP and TN will significantly increase risk of not being able to harvest due to algae and poor water quality. |
| **Untreated and treated flow into pond** | |
| ○ Untreated flow volumes into pond almost doubles in scenario 1 and triple in scenario 2.<br>○ Treated flow volumes into pond decrease by 7% in scenario 1 and 21% in scenario 2. | ○ Significantly increased untreated flows and decreasing treated flows will impact pond water quality, increasing risk of not being able to harvest due to algae or poor water quality. |
| **Wetland reticulation rates and pond residence time** | |
| ○ Reticulation rate ($m^3$/day and Litres/second) reduce, and pond residence time increases at the proportionate rates. | ○ To size a wetland to meet inflow water quality and reticulation water quality is a balancing act that MUSIC doesn't calculate accurately.<br>○ Reduction in wetland area/volume will require more intensive monitoring and approaches to minimise algal blooms. |

This analysis differs from the assessment conducted by the TWG and IPART. The Sydney Water analysis used the existing (May 2024 v19) MUSIC model for the west cluster and focused on reducing the treatment train components (sediment basin, wetland, bioretention) without modifying the pond node, in comparison to the TWG review modified all components. The Sydney Water models can and should be further refined to ensure that both water quality and quantity objectives are met. It is important to note that a reduction in treatment area of 25% and 50% would result in MARV non-compliance that will require additional storage, which will likely reduce any gain by reducing treatment train footprint.

### High level cost analysis

Sydney Water has analysed the potential cost savings generated resulting from the reduction of the treatment measure footprints. These savings encompass land acquisition costs, CAPEX and OPEX reductions. It is important to note that these costs are high-level and indicative, generally only refer to direct costs and do not account for total costs. Additionally, these figures have not been subjected to any models that take into consideration NPV or other complex calculations.

### Land acquisition costs

Table 5 includes the asset footprints for all three scenarios and does so using high level zoning information and rates. This information does not account for land tax, which generally has a higher impact on IN1 land due to significant growth over the DSP term.

**Table 5 – Treatment train area and land acquisition analysis**

| Component | Current (m2) | Current ($) | Scenario 1 (m2) | Scenario 1 ($) | Scenario 2 (m2) | Scenario 2 ($) |
|---|---|---|---|---|---|---|
| **Sed basin** | 10,631 | $1,896,340 | 7,973 | $1,422,255 | 5,316 | $948,170 |
| **Wetland** | 126,687 | $22,134,778 | 95,015 | $16,601,083 | 63,343 | $11,067,389 |
| **Bioretention** | 58,833 | $7,982,260 | 44,125 | $5,986,695 | 29,416 | $3,991,130 |
| **Total** | 196,151 | $32,013,377 | 147,113 | $24,010,033 | 98,075 | $16,006,689 |
| **$ saving from Scenario 1** | | $0 | -25% | -$8,003,344 | -50% | -$16,006,689 |

Table 6 analyses the asset footprints for all three scenarios, focusing on the reductions within IN1 zoned land. The results indicated that targeting the IN1 land could yield over a 50% impact on savings when compared to total achieved if all asset footprints were reduced. This is substantial, considering only 14% of the total footprints are located within IN1 land. This analysis does not include land tax which is substantial and will have ongoing cost implications.

**Table 6 - Treatment train area and land acquisition analysis for IN1 land only**

| Component | Current (m2) | Current ($) | Scenario 1 (m2) | Scenario 1 ($) | Scenario 2 (m2) | Scenario 2 ($) |
|---|---|---|---|---|---|---|
| **Sed basin** | 10,631 | $1,896,340 | 10,192 | $1,610,828 | 9,753 | $1,325,315 |
| **Wetland** | 126,687 | $22,134,778 | 121,657 | $18,865,682 | 116,628 | $15,596,586 |
| **Bioretention** | 58,833 | $7,982,260 | 57,513 | $7,124,754 | 56,194 | $6,267,249 |
| **Total** | 196,151 | $32,013,377 | 189,363 | $27,601,263 | 182,575 | $23,189,149 |
| **$ Saving from Scenario 1** | | $0 | -14% | -$4,412,114 | -28% | -$8,824,228 |

### Reduction in maintenance tracks and external batters

This analysis provides a high-level overview that would need to be confirmed by more detailed mapping of assets in 12D once a decision is made on regarding the outcome. The current design has a combined footprint of the sediment basin, wetland, and bioretention totals 19.6 hectares and the pond's total footprint is 31.5 hectares, representing only 38% of the overall footprint. The maintenance access tracks, and external batters are currently 14.8 hectares. Assuming a direct correlation to treatment train footprint and the maintenance access track, this would approximate to 5.65 hectares.

**Table 7 – Maintenance track and batter area and land acquisition analysis**

| Component | Current (m2) | Current ($) | Scenario 1 (m2) | Scenario 1 ($) | Scenario 2 (m2) | Scenario 2 ($) |
|---|---|---|---|---|---|---|
| **Total maint. track/batter** | 148,423 | $27,644,390 | | | | |
| **Proportioned maint. Track/batter** | 56,561 | $10,518,526 | 42,421 | $7,888,895 | 28,281 | $5,259,263 |
| **$ Saving from Scenario 1** | | $0 | -25% | -$2,629,632 | -50% | -$5,259,263 |
| **Only reducing impact on IN1 land** | | | | | | |
| **Proportioned maint. Track/batter in IN1** | | | 54,512 | $8,876,038 | 52,463 | $7,233,550 |
| **$ Saving from Scenario 1** | | $0 | -16% | -$1,642,488 | -31% | -$3,284,977 |

### Impact on CAPEX

Sydney Water have estimated the potential construction savings associated with reducing the treatment train footprints in the proposed scenarios. The rates in Table 8 (excluding spoil management and disposal cost) were applied in the analysis.

**Table 8 – Indicative capital costs of treatment train components**

| Component | $/m2 |
|---|---|
| **Sed basin** | $109.00 |
| **Wetland** | $85.00 |
| **Bioretention** | $219.06 |
| **Maintenance Track** | $62.50 |

Table 9 presents the reduced footprints from the scenarios above and calculates the estimated savings by multiplying each asset by the respective rates. The reduction in bioretention yields the most savings accounting for 45% of the total CAPEX compared to the other assets. However, it is important to consider that reducing the asset footprints will lead to a shorter renewal timeframe (15 to 20 years, instead of 25 to 30 years etc.) resulting in increased ongoing CAPEX and OPEX costs. These potential impacts have not been considered or costed in this estimate.

**Table 9 - Treatment train area and capital cost analysis**

| Component | Current (m2) | Current ($) | Scenario 1 (m2) | Scenario 1 ($) | Scenario 2 (m2) | Scenario 2 ($) |
|---|---|---|---|---|---|---|
| **Sed basin** | 10,631 | $1,158,779 | 7,973 | $869,084 | 5315.5 | $579,390 |
| **Wetland** | 126,687 | $10,768,383 | 95,015 | $8,076,287 | 63343 | $5,384,191 |
| **Bioretention** | 58,833 | $12,887,994 | 44,125 | $9,665,995 | 29,416 | $6,443,997 |
| **Maint. Track** | 56,561 | $3,535,089 | 42,421 | $2,651,317 | 28,281 | $1,767,544 |
| **Total** | 252,712 | $28,350,244 | 189,534 | $21,262,683 | 126,356 | $14,175,122 |
| **Saving from full** | | | -25% | -$7,087,561 | -50% | -$14,175,122 |

### Impact on OPEX costs

A high-level analysis was conducted to assess the annual cost impacts of reducing asset footprints on OPEX. The analysis indicated that:

- Scenario 1, costs would reduce by approximately $90,000 to $100,000,
- Scenario 2 may result in a reduction of by $180,000 to $200,000.

However, these savings are relatively minor compared to the cost savings from land acquisition and therefore not considered a major benefit of reducing asset infrastructure.

Bioretention systems will likely need to be renewed (replacing filter media and plants) more frequently. This increased frequency may lead to some long-term cost implications and are considered insignificant relative to the overall cost of the scheme. The analysis suggests that renewal costs are largely offset by the savings achieved through reducing footprint and associated land acquisition savings.

The analysis does not include any algal bloom mitigation beyond standard maintenance requirements. It is likely this might have a financial impact but would require a more detailed analysis.

### Other costs

Several additional cost were not considered in this analysis, including:

- Land tax, which can be substantial for IN1 land.
- Indirect costs, which would be added to direct costs to get total CAPEX cost.
- Cost of spoil removal/disposal, it could be assumed reducing treatment train and pond depths would reduce these costs, but the extent of saving will need further investigation.
- Cost of lost revenue, if the stormwater can't be harvested due to poor water quality/algae, the scheme would require the use of recycled water and/or potable water, if recycled water is not available.
- Cost of additional algal treatment/management, there would likely need to be times when dosing or intensive algal management will be required to ensure the stormwater meets the correct standards.
- Impact on land severance, by reducing footprints it is likely the cost of land severance would also be reduced. This currently equates to $40m in the DSP and if reduced can substantially reduce the DSP cost.

### Combined Cost Savings

The table below outlines the combined cost reductions that could be achieved by reducing the pond depths and treatment measures footprint area.

**Table 10 – Total combined area and capital/land acquisition cost analysis**

| Component | Current (m2) | Current ($) | Scenario 1 (m2) | Scenario 1 ($) | Scenario 2 (m2) | Scenario 2 ($) |
|---|---|---|---|---|---|---|
| **Sed basin** | 10,631 | $3,055,119 | 7,973 | $2,291,339 | 5,316 | $1,527,560 |
| **Wetland** | 126,687 | $32,903,160 | 95,015 | $24,677,370 | 63,343 | $16,451,580 |
| **Bioretention** | 58,833 | $20,870,253 | 44,125 | $15,652,690 | 29,416 | $10,435,127 |
| **Maint. Track** | 56,561 | $14,053,615 | 42,421 | $10,540,211 | 28,281 | $7,026,807 |
| **Pond** | 315,602 | $41,596,560 | 269,433 | $33,926,824 | 249,143 | $30,670,816 |
| **Total** | 568,314 | $112,478,707 | 458,967 | $87,088,434 | 375,499 | $66,111,890 |
| **Saving from current design** | 0 | $0 | -23% | **-$25,390,273** | -41% | **-$46,366,817** |
| **Reduction in DSP ($/ha)** | | | | **-$33,629** | | **-$61,413** |

The best-case scenario results in savings of $46m, equating to a reduction of $61k/ha in the DSP. In the moderate scenario, the savings amount to $33k/ha, based on direct costs and land acquisition costs only. It is important to note that these figures do not include total costs or land tax.

## Combined Pond Depth and Reduced Footprint of Treatment Measures

Sydney Water conducted a post-IPART Draft review scenario analysis to assess potential maximum savings within the South-west Cluster, while adhering to waterway health targets and considering existing constraints. This analysis involved deepening ponds to 50% of their maximum capacity and reducing treatment surface areas. The results, shown in Table 11, were compared against the original Base Case May 2024 scheme (version 19 MUSIC models). The three scenarios include:

I. Ponds deepened to 50% of maximum and treatment area reduced to 85% of current size.
II. Ponds deepened to 50% of maximum and treatment area reduced to 90% of current size.
III. Ponds deepened to 50% of maximum and treatment area reduced to 95% of current size.

The south-west sub-catchment is heavily constrained by the irregular zoning of the IN1 and RE1 land, and the proximity of the floodway to the precinct boundary. These factors influence the placement of regional basins, with the design philosophy focused on minimising impact on IN1 land and using existing topography to reduce excavation.

Due to these constraints, the southwest sub-catchment does not meet the MARV target independently but relies on the west and north-west sub-catchments to achieve additional MARV reductions, ensuring compliance with the Wianamatta waterway health targets. Any further increases in MARV within the south-west sub-catchment will require additional storage in the other sub-catchments. However, this would be challenging, as those basins are already compensating for the shortfall, additional adjustments would likely be inefficient.

**Table 11 - Results from MUSIC modelling analysis (Southwest Cluster)**

| Result | Outcome/impact |
|---|---|
| **MARV targets (<2ML/Ha/year)** | |
| ○ Base Case = 2.22<br>○ **85% Scenario = 2.24**<br>3. **90% Scenario** = 2.23<br>4. 95% Scenario **= 2.22** | ○ Loss in evaporation by reducing wetland and pond footprint increases MARV marginally in.<br>○ Additional MARV needs to be provided in other basins in Northwest and west clusters. |

| Result | Outcome/impact |
|---|---|
| **Achieving water quality targets** | |
| ○ Water quality treatment train reductions are generally consistent with the base case across the three scenarios with a maximum change being 2% for Total Nitrogen. | ○ All scenarios will meet the waterway quality targets with the ponds included.<br>○ There are only minor differences when comparing each scenario based on load concentration reductions. |

The results indicate a correlation between treatment train size and MARV, with a 5% reduction in treatment area associated with a 0.01 increase in MARV non-compliance. Each 0.01ML/ha/year translates to approximately 3ML of additional volume required. The inherent risk is that if this volume is not stored elsewhere within the precinct, the scheme will fail to meet NSW Government targets. The analysis suggests that the optimal outcome would potentially involve a 10% reduction in treatment surface area combined with pond deepening.

## Risk and Opportunities from Analysis

Table 12 below provides some high-level risks and opportunities that impact the current scheme plan and should be explored by Sydney Water during further optimisation of the scheme plan.

**Table 12 – Risk and opportunities to explore in future scheme plan updates**

| Risks | Opportunities |
|---|---|
| - Detail investigations are still ongoing to acquire the data needed to confirm pond depths. If the data indicates a reduced pond depth (generally >3m) would impact the pond footprint and therefore not achieving the desired cost savings.<br>- Reducing infrastructure footprints will lead to the scheme not being compliant with the waterway health targets, including the MARV. This will mainly occur from:<br>• reducing treatment train footprint will impact water quality and increase the amount of untreated stormwater entering pond increasing algae management and final treatment infrastructure and management.<br>• Reducing the ponds and wetland area will reduce evaporation losses. This will mean the pond volume will need to increase.<br>- Reducing the footprint of the wetland and bioretention system will likely reduce their lifespan as there will be substantially more pressure on these systems. This is known in the industry as a likely impact, but its cost impacts are not well documented. However, the cost savings from reducing footprint will likely be greater than any short-term increase | - Reducing treatment train footprint will reduce land acquisition costs, especially for the land that is zoned as industrial (IN1) in Ropes and South Creek Tributary (east and north) sub-catchments. This will also include maintenance access tracks and batters.<br>- The CAPEX costs will reduce significantly, especially for bioretention systems and maintenance access tracks.<br>- There are likely opportunities to reduce land severance in the Kemps Creek (south-west) sub-catchment that will again reduce DSP rate.<br>- By reducing asset footprint there is likely to be a reduction in the regular vegetation maintenance for OPEX of the wetland, bioretention, and batters, although this would only be minor benefit. |

in OPEX/renewal costs. The cost impact will likely come apparent in 50+ years.

- Reducing treatment train footprints will likely result in additional infrastructure, such as aeration systems and final treatment (mechanical screen/media filtration) impacting both CAPEX and OPEX. However, these are only minor costs compared to cost savings from land acquisition and reduced CAPEX costs by reducing footprints.
- If the footprint is reduced in the next revision of the scheme plan and due to site constraints the footprints will need to increase it would have a potential major cost impact (purchasing more land or having to remobilise construction) and impact the staging of development, which is relying on the basins being delivered to meet waterway health targets.

## Key messages

- There are opportunities to further reduce scheme costs by decreasing the footprints of regional basin infrastructure. However, several considerable risks may not be fully understood until detailed design or in-depth investigations are undertaken. These risks include:
    - Geotechnical including:
        - Presence of rock or spoil that is sodic or not-reusable
        - Contamination spoil that is not VENM or contains high levels of heavy metals or asbestos.
    - High ground water table that is likely to lead to ingress into pond system, impacting water quality and liner integrity.
    - Poor water quality in pond system leading to:
        - not being able to harvest and breaching compliance requirements (both water quality and MARV)
        - additional end of pipe treatment to meet water quality requirements (CAPEX/OPEX)
        - sustained pressure on treatment systems, leading to more frequent renewal timeframes
    - Infrastructure delivery timeframes not being achieved, causing delays in development.
- Moving forward Sydney Water will continue to focus on:
    - Reducing land acquisition/land tax as this would provide the best return.
    - Reducing regional system infrastructure in IN1 land and reducing land severance as a priority.
    - Reducing bioretention footprints, when possible, due to the significant CAPEX savings.

**Appendix 1 – MUSIC model outcomes from scenario testing**

| | | | |
|---|---|---|---|
| Western cluster (Ha) | 226.7 | | |
| Lumped imperviousness | 83% | | |
| Pond volume fixed (m3) | 171,875 | 758.16 | ML/ha |
| | | | |
| Scenarios | **Full size** | **Three Quart** | **Half Size** |
| Sed Basin (%) - Mamre ave is 0.2% | 0.2% | 0.2% | 0.1% |
| Macrophyte Zones (%) - Mamre ave is 1.4% | 1.7% | 1.3% | 0.8% |
| Bioretention (%) Mamre ave is 0.7% | 0.8% | 0.6% | 0.4% |
| | | | |
| **MARV downstream of Pond (ML/Ha/yr) - target <2** | 1.96 | 2.03 | 2.10 |
| **Mean Concentration reduction before pond** | | | |
| Total Suspended Solids (% reduction) - target 90% | 88.1 | 87.8 | 87.3 |
| Total Phosphorus (% reduction) - target 80% | 79.9 | 79.1 | 78 |
| Total Nitrogen (% reduction) - Target 65% | 73.2 | 71.2 | 68.4 |
| | | | |
| **Avge inflow to pond** | | | |
| TSS Load (kg/Day/Ha) | 0.080 | 0.140 | 0.196 |
| TP Load (kg/Day) | 0.001 | 0.001 | 0.001 |
| TN Load (kg/Day) | 0.006 | 0.011 | 0.014 |
| | | | |
| **90%ile inflow to pond** | | | |
| TSS Load (kg/Day/Ha) | 0.136 | 0.180 | 0.184 |
| TP Load (kg/Day) | 0.001 | 0.002 | 0.002 |
| TN Load (kg/Day) | 0.010 | 0.019 | 0.020 |
| | | | |
| **Wetland volume (m3)** | 11,512 | 8,634 | 5,756 |
| Recirculation rate to provide 5 days in wetland (m3/d) | 2,302 | 1,727 | 1,151 |
| Recirculation rate to provide 5 days in wetland (L/s) | 27 | 20 | 13 |
| Residence time in pond (days) | 75 | 100 | 149 |
| | | | |
| **Overflow rates (ML/yr)** | | | |
| 6+7 overflow to pond | 81 | 136 | 227 |
| 9 overflow to pond | 21 | 43 | 84 |
| Total Untreated inflow | 102 | 179 | 311 |
| | | | |
| **Treated flow rates (ML/yr)** | | | |
| 6+7 treated to pond | 515 | 478 | 407 |
| 9 treated to pond | 265 | 255 | 226 |
| Total reated inflow | 780 | 733 | 633 |
| | | | |
| **Bypassed inflow (flow to pond that overflows wetland/bio)** | **12%** | **20%** | **33%** |
| | | | |
| **Mean Inflow Loads** | **Full size** | **Three Quart** | **Half Size** |
| **TSS Load (kg/Day)** | 18.04 | 31.70 | 44.40 |
| **TP Load (kg/Day)** | 0.14 | 0.23 | 0.28 |
| **TN Load (kg/Day)** | 1.40 | 2.52 | 3.10 |

# 8. Attachment C: DRAFT proposed Scheme Serviced Area framework

## Stormwater Scheme Serviced Area

This document provides an explanation of the Stormwater Scheme Serviced Area (SSA), including guiding principles and how it is applied within the Mamre Road and Aerotropolis Initial Precincts.

- Sydney Water are the regional stormwater authority for the Mamre Road and Aerotropolis Initial Precincts
- Sydney Water are to achieve the Wianamatta stormwater quality/quantity targets of the relevant DCP's by implementing regional stormwater treatment and harvesting infrastructure
- Sydney Water has developed the SSA to ultimately fast track the delivery of regional infrastructure to minimise the need for on-lot abortive works and developable land sterilisation.

### Current on-lot approach to meet stormwater targets

Development that precedes the delivery of regional stormwater infrastructure must meet the DCP requirements on-lot using interim and temporary infrastructure. This process generates several issues:

- a large cost to the developer through:
  - Designing, modelling, constructing, operating, and managing the interim solution
  - Sterilising developable land until the Sydney Water regional approach is operational (approximately 40% of each development would be allocated to meet the controls)
  - Decommissioning of interim infrastructure once the regional scheme is operational
- negative environmental/sustainability outcomes due to use of short-term temporary infrastructure
- a burden on both State Government and Councils for assessing, conditioning, approving and ensuring compliance of interim on-lot systems.

### Proposed solution to reduce on-lot controls

To rapidly progress to the regional scheme assets, Sydney Water has developed an accounting approach with the following objectives:

1. Provide a robust solution that can be deployed in line with development and achieve the waterway health targets at all times
2. Optimisation of the overall integrated stormwater scheme cost (the "Development Service Plan" – DSP)
3. Incentivise construction of the regional stormwater basins by developers
4. Facilitate and fast track development and approvals of employment lands.

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## Principles of SSA accounting scheme

The following principles have been developed to achieve the above objectives and to ensure consistency and transparency.

**Definition**: The Stormwater Scheme Serviced Area is an area of land that can be developed without the need for interim/temporary on-lot stormwater quality/quantity infrastructure, excluding those that are required specifically in the DCP, such as gross pollution traps, on-site detention, passively watered street trees, erosion and sediment control and sediment basins (refer 13).

### • Key principles of SSA

1. Stormwater management targets (including both the adopted water quality and water quantity targets) will be met at all times.
2. The targets will be assessed on a sub-catchment basis (as shown in Figure 1 for the Mamre Road Precinct). Sub-catchments have been determined to be consistent with discharge into the receiving waterway and align with more recent published Stormwater Scheme MUSIC models.

### • Generation of SSA

3. SSA will be generated at the practical completion of construction of stormwater basins (when 'practical completion' is awarded by Sydney Water).
4. The 'currency' will be net developable area (NDA) as per Sydney Water's net developable area factsheet
5. The amount of area available for development without requiring interim temporary on-lot infrastructure (generally a temporary bioretention or pond with a dedicated irrigation area) to meet the waterway health targets will be based on the following formula:

$$SSA = \left(\frac{(Constructed\ basin\ footprint)}{(Total\ subcatchment\ basin\ footprint)}\right) X\ NDA\ of\ Subcatchment$$

6. The basin footprints will be based on the values in the most recent published MUSIC models.

### • Allocation of Scheme Serviced Area

7. SSA will be allocated by Sydney Water via a Feasibility Advice letter that can be included in the DA/SSDA documentation. The letter will outline:

a) the amount of SSA being awarded to the developer
b) the developments/land where the developer can use the SSA which will be based on the land that the developer currently owns within the sub-catchment
c) processes/requirements for the developer to implement ensuring SSA will be appropriately used
d) Resolution pathways if the matters in point c above are not appropriately addressed.

8. SSA can only be used in the sub-catchment in which they are generated and cannot be transferred between sub-catchments (see point 2)
9. SSA cannot be traded as a commodity in any form.
10. SSA will be allocated by Sydney Water to the developer/s who enter into an agreement to construct the basin or by negotiation with involved parties. If multiple developers build one basin the allocation of SSA between the parties will need to be agreed prior to approval.
11. Any 'excess' SSA will be allocated by Sydney Water to other developments at their discretion. As all works will be reimbursed in accordance with Sydney Water's Stormwater Developer Works Policy, Sydney Water owns the allocation of excess SSA.
12. Sydney Water expects to allocate 'excess' SSA based on the following:

a) to development that has been approved and allocation of SSA will be based on the NDAs for section 73 approvals (in order of approval date); THEN,
b) to developments within the sub-catchment that are in the process of lodging a development application (in order of lodgement date).

### • SSA recipient requirements:

13. Recipients of SSA will be required to meet the construction phase IWCM controls in the relevant DCP for their site. Unless otherwise advised by Sydney Water, sediment basins are to be provided on lot with a minimum storage volume of 250 m³/hectare. Consistent with the technical guidelines, these sediment basins are to remain active until the regional basin becomes operational or until notified by Sydney Water that they can be removed.

a) This can generally be achieved by a combined sediment basin and on-site detention system at the lowest area of the development. The staging of development must ensure the sediment basin can stay active until notified by Sydney Water.

14. Recipients of SSA must meet any on-site stormwater detention requirements of Council as outlined in the DCP or as required for floodplain management.

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- ## Accounting scheme manager

15. Sydney Water will manage the SSA accounting process and be responsible for and certify that the waterway health targets are being achieved by Scheme Infrastructure at all times.

16. Sydney Water will provide quarterly reporting on the status of the accounting approach including for each sub-catchment:

a) details of basin stage including functional design, detailed design, under construction, practical completion, establishment, and full operation
b) total SSA generated
c) total SSA allocated
d) total net developed area to determine what SSA's have been used and remain
e) total impervious and pervious areas
f) certification/compliance with the waterway health targets based on MUSIC models.

17. As part of the quarterly reporting Sydney Water will provide details of active on-lot sediment basins.

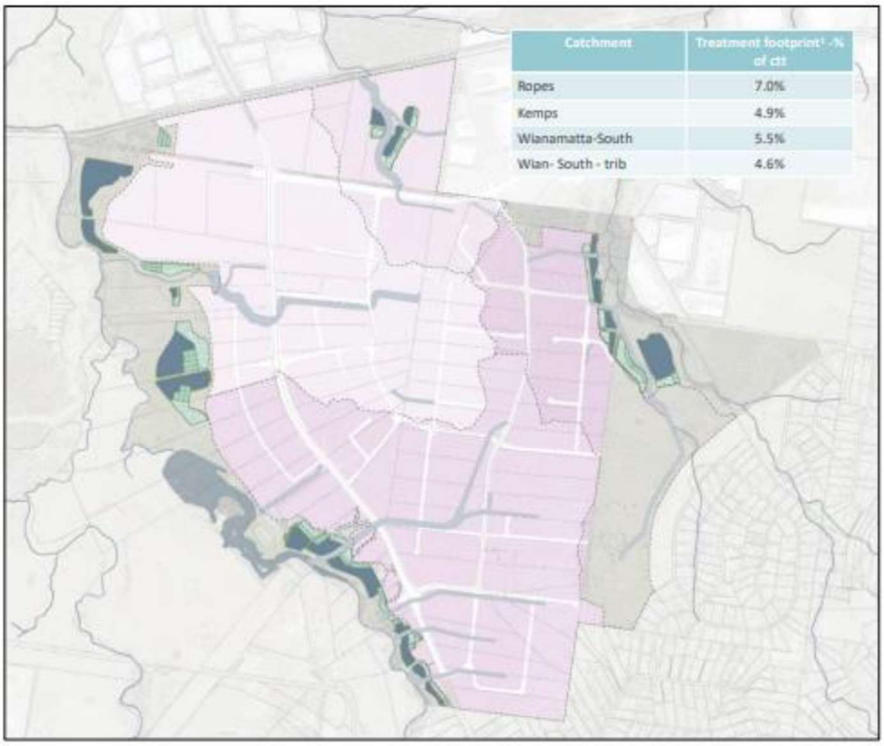
18. Once a regional basin is built to practical completion, it is at Sydney Water's discretion as to when the components of the basin (i.e. sediment basin, wetland, bioretention, or pond) will become operational. As indicated in note 15 Sydney Water will ensure the waterway health targets are achieved at all times and this might require some infrastructure be operational at different times. Generally, the bioretention and wetland component can take up to 24 months to be fully operational, however the sediment basin and pond will likely be operational at practical completion.

- ## Site works not covered by this SSA approach

19. Development sites must still meet the stormwater requirements identified by the relevant DCP not directly associated with the regional waterway health targets, including:

- On lot Gross Pollutant Traps
- On site detention
- Passively Irrigated Street Trees
- Naturalised Trunk Drainage Channels and existing waterways
- Other stormwater drainage outcomes.

(Below) Figure 1 - The four stormwater sub-catchments in the Mamre Road Precinct



| Catchment | Treatment footprint[1] -% of ctt |
|---|---|
| Ropes | 7.0% |
| Kemps | 4.9% |
| Wianamatta-South | 5.5% |
| Wian- South - trib | 4.6% |

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## Illustrative example 1 (hypothetical example only)

Basins 28 and 29 are within the Ropes Creek catchment. Developer A owns land draining to Basins 28 and 29 as well as the land on which the proposed Basins 28 and 29 are to be constructed. Developer A owns a total of 25 ha of NDA draining to Ropes Creek.

Developer A also owns a small portion of land in the south west draining to South Creek.

Developer A agrees with Sydney Water to construct Basins 28 and 29 and a feasibility advice letter is provided including the amount of SSA (20 ha) that will be allocated and the requirements for construction of the basins. As the SSA is less than the total NDA, no excess SSA is generated.

Developer A constructs Basins 28 and 29 generating approximately 20 ha of SSA that can be used for the land within the Ropes creek sub-catchment. Developer A's 25 ha of NDA is greater than the SSA (20 ha), hence Dev A needs to either construct additional basins OR request any available excess SSA from Sydney Water OR provide interim on-lot measures for 5 ha of NDA.

The SSA cannot be used by Developer A for NDA draining to another sub-catchment (areas draining to the west).


*Basins 28 and 29 are constructed by Dev A generating 20 ha of SSA*

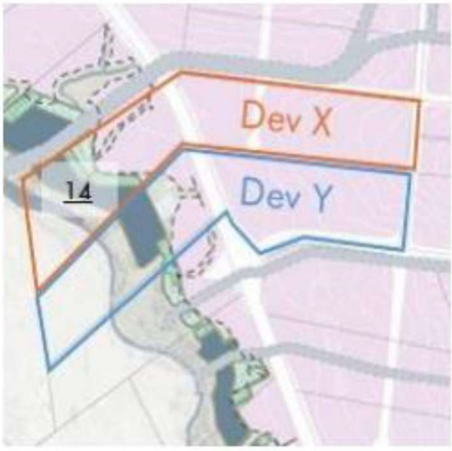
## Illustrative example 2 (hypothetical example only)

Basin 14 is within the Kemps Creek catchment. Developer X and Developer Y both own land draining to Basin 14 as well as part of the land on which the proposed Basin 14 is to be constructed. Dev X and Developer Y each own a total of 30 ha of NDA draining to Kemps Creek. Basin 14 generates 80 ha of SSA.

Developer X and Y reach a commercial agreement to construct all of Basin 14. Developers X and Y agree with Sydney Water to construct all of Basin 14 and a feasibility advice letter is provided to Developers X and Y including the amount of SSA (Developer X and Y both receive 30 ha) that will be generated and the requirements for construction of the basins.

As the SSA generated by construction of Basin 14 is greater than the total NDA of Developer X and Y, 20 ha of excess SSA is generated. Sydney Water owns the excess SSA and may allocate this to other developments within the Kemps Creek sub-catchment.

Developers X and Y construct Basin 14 based on their commercial agreement and generate 80 ha of SSA and Developer X and Y can develop all 30 ha of their NDA (as the SSA is greater than the combined NDA).




*Basin 14 is constructed by Developer X and Y generating 80 ha of SSA*

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