ACT Government

MINISTERIAL BRIEF

Environment, Planning and Sustainable Development Directorate

To:	Minister for Water, Energy and Emissions Reduction	**Tracking No.:** 21/44934
Date:	04/06/2021	
CC:	Minister for Climate Action (for EPSDD E26 Solar for Low Income only)	
From:	Chief Financial Officer	
Subject:	2021-22 EPSDD business cases – Phase 2	
Critical Date:	**08/06/2021**	
Critical Reason:	To meet Treasury's deadline for Phase 2 Business Cases	

- DG drop copy 4/6/21
- DDG, Environment, Water and Emissions Reduction drop copy 4/6/21

Recommendations

That you:

1. **Note** the information contained in this brief; and

Noted / Please Discuss

2. **Endorse** the business cases at Attachment A and Wellbeing Impact Assessments at Attachment B for submission to the Treasurer.

Endorsed/Not endorsed/ Please Discuss

Shane Rattenbury MLA 6/6/21

Minister's Office Feedback

Background

1. During recent correspondences between the Chief Minister (CM) and each Portfolio Minister, Environment, Planning and Sustainable Development Directorate (EPSDD) brought forward the budget items with CM's authorities as full business cases for the 2021-22 Budget through Phase 1 and Phase 2.
2. EPSDD have separate submissions for Phase 2 to cope with the timing requirement of CM's direction which will inform a couple of Climate Change business case policy scopes.
3. The first round of Phase 2 business cases has been submitted to portfolio ministers in May, however revisions to some of the business cases have since occurred been hence ministerial information briefs no longer reflect the current status.
4. This brief includes the revised EPSDD C14 *Expand Healthy Waterways* and EPSDD E26 *Solar for Low Income* for ministerial endorsement.
5. There will be separate ministerial briefs for outstanding Climate Change business cases.

Issues

6. EPSDD C14 *Expand Healthy Waterways* was submitted to Minister for Water, Energy and Emissions Reduction on 20 May 2021 and updated following feedback received in late May from your Office (be more articulate and specific/ rearrange context).
7. *EPSDD E26 Solar for Low Income* is a new business case recently developed as per the outcome from a meeting on 27 May 2021 between CMO, your Office and EPSDD. This business case will be led by you as Minister for Water, Energy and Emissions Reduction and supported by the Minster for Climate Action.

Financial Implications

8. Over the next four years, $15.651 million in Controlled Recurrent Payments (CRP) and $16.855 million in Capital Injection (CI) are being requested. Total depreciation is $0.293 million.

	2021-22	2022-23	2023-24	2024-25	Total
	$'000	$'000	$'000	$'000	$'000
CRP	4,380	3,957	3,798	3,516	**15,651**
CI	1,844	5,434	7,025	2,552	**16,855**
Expenses - Depreciation		23	91	179	**293**
FTE Number	8.0	8.5	8.5	8.5	

Consultation

Internal

9. The business case has been prepared and cleared by relevant Executive Group Managers across the Directorate in close consultation with their respective Deputy-Directors General. The business cases have been through the relevant internal review process.

Cross Directorate

10. Cross-Directorate consultation is outlined in the business cases.

External

11. External consultation is outlined in the business cases.

Work Health and Safety

12. N/A

Benefits/Sensitivities

13. All benefits and sensitivities are outlined in the business cases.

Communications, media and engagement implications

14. This is considered Budget in Confidence at this stage so there are no media implications.

Signatory Name:	Geoffrey Rutledge	Phone:	X75001
Action Officer:	Thao Le	Phone:	X73042

Attachments

Attachment	Title
Attachment A	EPSDD 2021-22 business cases – Phase 2
Attachment B	EPSDD 2021-22 business case Wellbeing Impact Assessments
Attachment C	2021-22 EPSDD business case costing and supporting documents

ACT Government

Single Assessment Framework (SAF)

Business Case

Tier 1 (over $50 million or High Risk)
Tier 2 ($10 million to $50 million)

Project Name:	**Expand Healthy Waterways**
Total Project Value (estimated):	**$30,000,000**
Capital Appropriation Requested:	**$16,854,267**
Project Stage:	**Planning/Delivery**
Project Value:	**$28,504,000**
Risk Assessment (high/med/low):	**Medium**
Proposed Delivery Model:	**Capital works: PMCA/MC** **Services: Agency (EPSDD)**
Requesting Directorate:	**EPSDD**
Requesting Minister:	**Shane Rattenbury, Minister for Water, Energy and Emissions Reduction**
Business Case Advisors:	**Tbc**

NOTE: This template should be completed using the accompanying SAF Business Case Guidance Notes.

Contact Officers

Contact Officer, Requesting Directorate	**Ralph Ogden**
Reviewing Officer, Infrastructure Finance and Capital Works (IFCW):	**Tbc**
Reviewing Officer, Treasury:	**Tbc**

Sign Offs

Requesting Directorate:

Document in order to proceed

Infrastructure Finance and Capital Works (IFCW):

Document in order to proceed – IFCW Sign-offs complete

Treasury:

Document in order to proceed – CMTEDD Sign-offs complete

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Abbreviations

EPA – ACT Environmental Protection Authority

Healthy Waterways – ACT Healthy Waterways Project

Healthy Waterways 1 – the original Healthy Waterways contract (with variations) from 2014-2021

MC – Managing Contractor

MPC – Major Projects Canberra

PMCA – Project Managing Contract Administrator

TCCS – Transport Canberra and City Services

WSUD – Water Sensitive Urban Design

1. Executive Summary

This project will build on the extremely successful *ACT Healthy Waterways 1 Project (2014-2021)*, a $93.5M infrastructure project delivered by EPSDD and Government partners on time and on budget. It will take further steps to preserve or restore the amenity, recreational, ecological, and commercial values provided by Canberra's waterways by improving water quality and thus reducing the incidence of algal blooms in urban lakes and enhancing the condition of rivers and creeks and the community's wellbeing. This initiative will also focus on improving water quality in the non-urban waterways.

This project has been identified as a priority in the *Parliamentary and Governing Agreement. 10th Legislative Assembly. Australian Capital Territory*:

> 17.9 Expand the Healthy Waterways program ($30 M over 4 years)

1.1 Statement of Need

This project will take steps to preserve or restore the amenity, recreational, ecological, and commercial values provided by Canberra's waterways by improving water quality, reducing the incidence of nuisance algal blooms and enhancing the condition of rivers and creeks. These improvements are vital to maintain the ACT's environmental values and community wellbeing.

Lake Tuggeranong serves as an acute example of the problems this project aims to solve. The lake suffers from frequent, widespread, and intense blue-green algal blooms that close the lake to recreation for an average of three months every summer. The blooms and closures impact on the wellbeing of residents and local businesses alike. They give rise to health concerns among residents, close the lakes to recreational use during peak periods, and impact on the amenity of the lakes through unsightly scums and disagreeable smells. This diminishes the commercial, environmental and liveability values of the ACT and reduces water quality for downstream users of water from the Murrumbidgee River.

Poor water quality is not isolated to Lake Tuggeranong. Instead, Lake Tuggeranong provides a window to the potential future condition of other lakes and waterways in the ACT whose catchments were developed more recently. While none are as impacted as Lake Tuggeranong, the fact that algal blooms occur in these waterbodies means they are close to having a chronic problem. Increased runoff from suburbs—either as urban areas expand or with increased densification from urban infill—could tip the balance towards regular summer blooms in these lakes as is seen in Lake Tuggeranong.

The project will enable Government to make marked improvements in water quality in ACT Catchments that include the three major urban lakes—Lake Burley Griffin, Lake Tuggeranong, and Lake Ginninderra— and one to two priority urban ponds. A smaller part of the investment will be focussed on one to two rural catchments in the ACT, where streams and rivers are often choked with sediments eroded from pastoral or bushfire affected areas. The rural projects will be designed to serve as a template for future work throughout rural areas of the ACT.

The project will deliver the following.

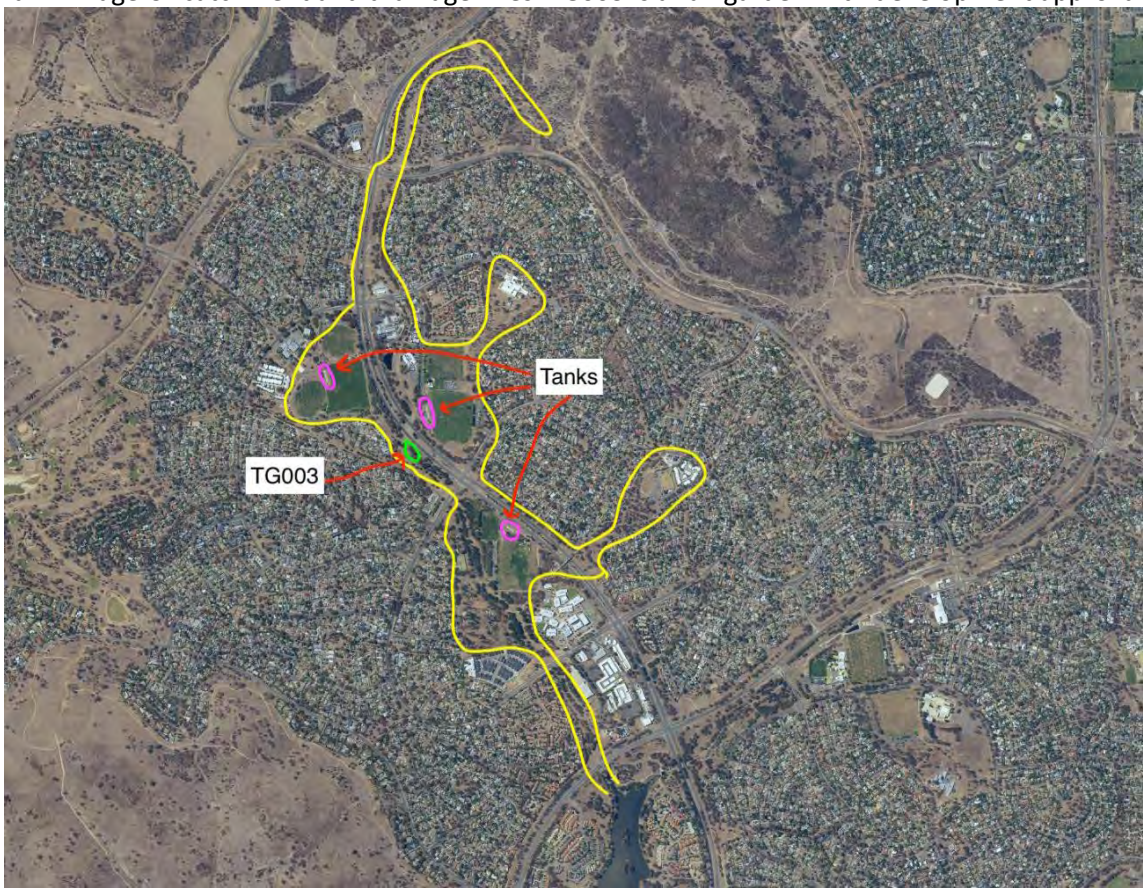
- Construction of infrastructure to improve water quality, focussed on three priority subcatchments within Tuggeranong (Kambah Playing fields, Richardson drain, upper Fadden catchment, Figure 1) and selected priority locations elsewhere (e.g. Emu Ck, Belconnen):
  - At least three large-scale assets to intercept stormwater pollution: two raingardens at Kambah District Playing Fields 1 and 3, and one wetland in Richardson, near the Tuggeranong Homestead (subject to approvals). These will be linked to water recycling schemes for the playing fields, augmented by stormwater from surrounding suburbs.
  - Small, street-scale water quality assets (raingardens, wetlands).
    - Trial of ten assets to understand costs and constraints.
    - Roll-out of ninety more street-scale water quality assets.
  - Swales and related features to promote infiltration of stormwater in green spaces.
    - Swale trials and the roll out of swales and related features, covering approximately 4% of the Tuggeranong catchment and in selected places elsewhere in Canberra.
- A behavioural change program targeting polluting activities by householders.
- Improved Government management of pollution coming from public green spaces in urban areas and the development of new suburbs.
- Riparian erosion control/mitigation works in Paddy's River and Lower Cotter reserve.
- Park-like landscaping around new water quality assets.
- Signage around ponds and lakes across Canberra to raise awareness about Ngunnawal history and culture related to water.
- Scoping/enabling activities:
  - Research into pollution sources and ways to prevent and treat blue-green algae in Canberra's urban lakes with a focus on the Tuggeranong catchment.
  - Stormwater water quality monitoring across the ACT.
  - Catchment plans—underpinned by water quality data and models—with the most cost-effective water quality management options for Lake Tuggeranong, Lake Burley Griffin, Lake Ginninderra, Yerrabi Pond and one other urban catchment.
  - Improved WSUD guidelines, codes and governance for new urban developments as well as greater monitoring and enforcement.
  - Community engagement about potential infrastructure sites and seeking inputs to catchment plans.

This work will result in—

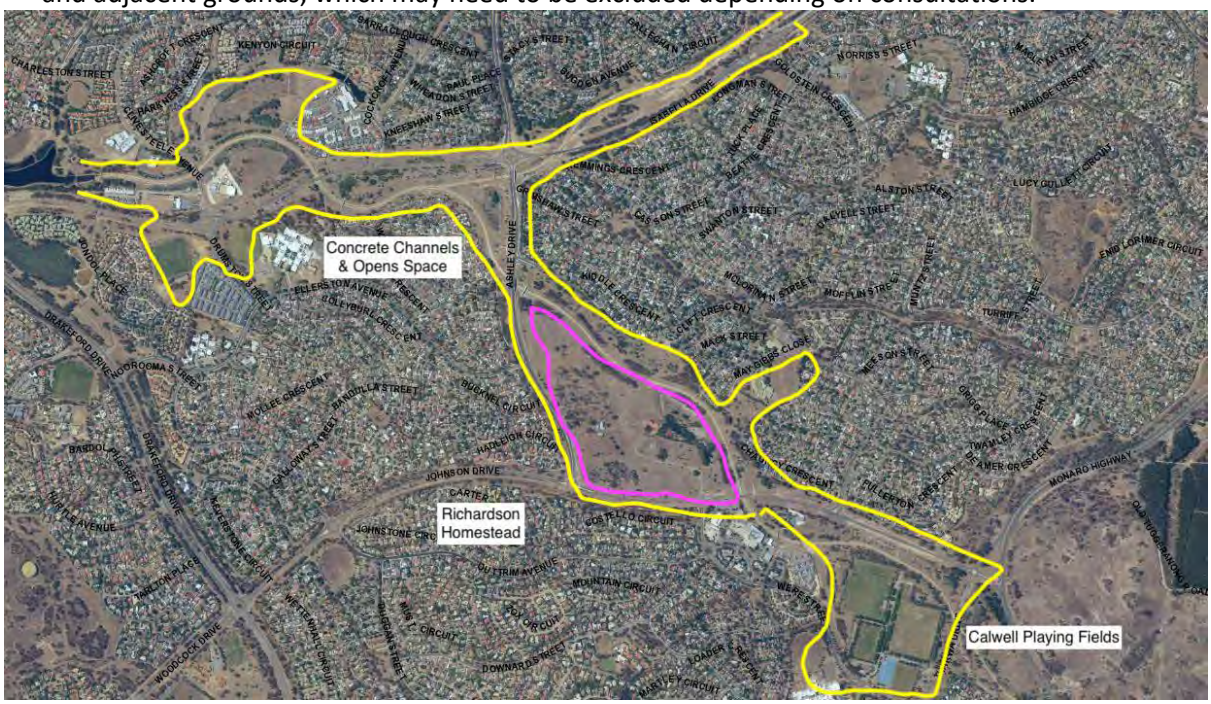
- Reduced pollution of urban lakes—intercepting at least 200 tons of total pollutants and 300 kg of phosphorus, including 10% of the pollution bound for Lake Tuggeranong.
- Significant water quality infrastructure in the catchment of Canberra's most degraded urban lake (Lake Tuggeranong) and selected places elsewhere in the ACT.
- Three hectares of improved parklands surrounding the large water quality assets.
- Greater awareness of Ngunnawal history and culture among residents.
- Reduced rural soil erosion in Paddy's River and Lower Cotter catchments and new, effective ways to overcome barriers to ongoing efforts in erosion control.
- A framework and tools for the ACT Government to protect lakes and watercourses from the impacts of current and future development.

Figure 1. Three priority sites for the construction of infrastructure assets to improve water quality

a. Village Ck catchment and drainage lines. TG003 is a raingarden with development approval.



b. Richardson catchment and drainage lines. The area enclosed in pink is Tuggeranong homestead and adjacent grounds, which may need to be excluded depending on consultations.



c. Fadden catchment and drainage lines.



There are four main benefits of Expand Healthy Waterways, and subsidiary benefits that arise from these.

1. **Improvements to water quality** and associated **decreases in the incidence of blue-green algal blooms**.
2. **Increased community wellbeing and business prosperity** as recreational and business opportunities arise associated with the use of lakes and ponds.
3. A **solution-based approach** that will further inform the Government of the nature of these problems and the cost and feasibility of improving the condition of waterways, e.g. reducing the incidence of blue-green algal blooms in Lake Tuggeranong from one every year to one very five years.
4. The project will provide **local jobs and economic stimulus** to the COVID-affected economy.

This is an ambitious project that aims to take material steps to solve recurring environmental problems that have affected our community for decades. It will take some time to mitigate the problems. However, there will be some immediate wellbeing benefits for local businesses and residents, including from enhancements associated with larger water quality assets. This infrastructure will enhance the green space in urban areas and increase awareness about Ngunnawal water narratives and cultural traditions to do with waterways.

1.2 Delivery Model

It is proposed to extend the existing Managing Contractor and Contract Administrator contracts that are still in place from the 'Healthy Waterways' project. This will enable the Expand Healthy Waterways project to efficiently and effectively deliver the construction program of capital works proposed for the project, and to maximise the impact of this project as an economic stimulus post-COVID. Major Projects Canberra will continue to manage these contracts.

Project services (waterway monitoring, research, development of models and catchment plans, public education, community engagement) will be delivered by, or under the direction of, the Lead Agency (EPSDD). The budget 'in-sources' several of the project activities. An alternative budget can be prepared that shifts elements of the in-sourced work to the private sector if that is deemed a priority. However, this would increase the project cost and shift core business out of EPSDD, which would increase risks and delivers less opportunity for the Directorate to benefit from building and retaining corporate knowledge. It would also be contrary to the agreed executive reforms in the *Parliamentary and Governing Agreement. 10th Legislative Assembly. Australian Capital Territory*, viz. 'government services will not be contracted out where they could be performed by public servants'.

Risk will be managed in accordance with risk standards for EPSDD, which in turn are consistent with ACT Government Risk Management Policy 2019, ACTIA's ACT Government Risk Management Policy Implementation Guide 2019, and Australian Standard Risk Management Guidelines (AS ISO 31000:2018).

The relative importance of commercial criteria, from most to least important, are:

1. Flexibility – There needs to be flexibility in planning of this program of activities to enable the project to deliver the greatest value for least cost. Flexibility is also vital to deal with situations arising during construction in-ground works within drainage lines compared with other kinds of infrastructure.
2. Innovation and Incentive – Expand Healthy Waterways is an innovative project and will need to be managed to promote innovation and incentive while enabling strong, transparent governance.
3. Risk Transfer – As a multifaceted project, comprising a variety of both works and services, it is vital to have a project solution that allocates risks in project design and delivery among those parties best positioned to manage that risk.
4. Time to Market – This project will be managed to a schedule of capital works and services (as was successfully done in the current Healthy Waterways 1 project). However, time pressures are less important than ensuring that the greatest benefit is achieved through the performance of works or services.
5. Price Certainty – This project aims to find solutions to pollution problems and create wellbeing benefits for the least cost. Spending is kept within budget for a given financial year, however, mechanisms will be put in place to provide flexibility in how the problem is solved so that uncertainties can be managed.

1.3 Funding Approval Sought

1.3.1. Type of funding sought

- ☐ Feasibility*
- ☐ Concept design
- ☐ Detailed design (note only where D+C has been justified)
- ☐ Full Business Case
- ☒ Delivery/Construction

*regardless of dollar value of the feasibility funding being sought, it is the estimated total value of the project which guides which Tier the project is considered under.

1.3.2. Cost Estimate

The project has an estimated total cost of $28.5 million comprised of $16.9 million in capital costs and $11.6 million in recurrent costs for 4 years from 2021-22 to 2024-25. The capital investment is 60% of the total cost of this proposal and the related 'Clean Catchments' project (funded January to June 2021).

1.3.3. Contingencies Included

A preliminary risk analysis was performed in January 2020 and will be updated in June 2021, taking into account a shift in scope, if the bid is successful. Risk Registers and plans will continue to be developed and updated as planning and scoping work progresses in the project.

The main strategic risks arising in the January 2020 risk analysis, which was carried out in relation to the Lake Tuggeranong catchment only, are:

Strategic risk	Possible mitigations
The cost of the preferred option in Lake Tuggeranong was underestimated.	• Increase the budget • Cut elements of budget for other ACT catchments.
The feasibility of the preferred option is over-estimated – it will take more catchment remediation than is practical or affordable to solve the nutrient pollution problem.	• Reconsider approach to solving the problem, or • Do nothing – tolerate increasing annual algal blooms

The project delivery contingencies identified to be managed are:

- Financial – the risk of cost over-runs associated with poor project management and flood damage to assets under construction
- People – especially the risk of injury to construction workers
- The environment – damage caused by disturbance of waterways under construction
- Mismanagement of records leads to nonconformity with audit finding, impacts on project performance, and/or hinders business continuity and adaptive management
- The reputation and image of the ACT Government and EPSDD if the project underperforms.

Successful risk management of various project contingencies will rely on:

- Experience of the project team
- Good planning
- Community consultation
- Finance staff and arrangements
- Contract arrangements.

The EPSDD-led project team has received high marks from stakeholders in MPC, TCCS, EPA and EPSDD for managing the $93.5M Healthy Waterways 1 project (Apis, 2019).

Contingency funds associated with the construction of water quality assets will be managed by the Managing Contractor.

1.4 Treasury Budget Summary

The budget for this project is summarised below. It is consistent with 1) priorities set by Government (e.g. in the Parliamentary and Governing Agreement), and 2) the most cost-effective approach. Note the comments to do with 'in-sourcing' of some project activities in Section 1.2.

EPSDD Business Case Costing Template - Summary					
Business Case No:	EPSDD C14				
Business Case Name:	Expand the Healthy Waterways program ($30M over 4 years)				
Output Class	02 Environment				
Funding: Ongoing or non-ongoing?	Non-ongoing				
Cross Directorate Impact (pick from the drop-down list)	Transport Canberra and City Services Directorate				
Has a component of DSGC? (Yes/No)	yes				
Financial Impact Summary	**2021-22 $'000**	**2022-23 $'000**	**2023-24 $'000**	**2024-25 $'000**	**Total $'000**
Capital Impact					
Capital (staff and supplier)	1,844	5,434	7,025	2,552	16,855
Expense Impacts (a)					
Expenses (staff and supplier)	3,386	2,959	2,796	2,509	11,650
Expenses - Depreciation	-	23	91	179	293
Revenue/Savings/Offsets Impacts					
Revenue	-	-	-	-	-
Savings	-	-	-	-	-
Offsets (b)	-	-	-	-	-
Staffing Impact	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**Total $'000**
FTE	6.5	7.0	7.0	7.0	
Capital staffing costs ($'000)	-	-	-	-	-
Recurrent staffing costs ($'000)	1,056	1,159	1,182	1,205	4,603

2. Project Outline

2.1 Description of the Project

2.1.1. Overview

This project will take steps to preserve or restore the amenity, recreational, ecological, and commercial values provided by Canberra's waterways by improving water quality, reducing the incidence of algal blooms in urban lakes and enhancing the condition of rivers and creeks. These improvements are vital to maintaining the ACT's environmental values and community wellbeing.

Many of Canberra's waterways suffer from poor water quality. Impervious surfaces in urban areas (roads, pavements, roofs etc.) efficiently deliver pollutants to the stormwater system, bypassing natural catchment areas that would capture and cleanse the water. Rural catchments are often impacted by soil erosion from agricultural activities and bushfires.

Consequently, urban lakes and ponds—which could serve as a social and commercial focal point—suffer from closures due to algal blooms or high bacterial counts, greatly diminishing their values.

Channels in rural areas are often choked with sediments that smother habitat and restrict the distribution of native fish and other biota, some of which are endangered.

This project aims to improve water quality in Canberra's waterways. It has five objectives (Tables 1 and 2), with a focus on the Lake Tuggeranong catchment while also addressing urban and rural areas of the ACT more broadly.

The experience gained in Healthy Waterways 1 will allow EPSDD and its partners to fast track this project.

Part 1 - A focus on Canberra's worst performing waterbody – Lake Tuggeranong

Deliverables (Table 1): building on the success of the ACT Healthy Waterways 1 Project (2014-2021), water quality in Lake Tuggeranong will be further improved through a three-pronged approach:

1. Minimise the amount of nutrients entering stormwater at the source in the catchment. This will be achieved with a combination of construction of 100 street-scale water quality assets, mainly in the three priority subcatchments in Tuggeranong (Figure 1), as well as several activities conducted right across the ACT (outlined next).
2. Intercept and filter the nutrients that have (unavoidably) entered stormwater. This will largely be achieved by building three water quality assets that filter pollutants from stormwater—two bioretention basins in the Kambah playing fields 1 and 3, and one wetland in Richardson—like those built by the Healthy Waterways 1 project.
3. Manage the in-lake environment so that the (less frequent) algal blooms that do occur are short-lived.

It will take some time for water quality to improve to the point that the incidence of algal blooms is reduced, however, enhancements associated with larger infrastructure will provide some immediate wellbeing benefits for local businesses and residents, including an increase in awareness about Ngunnawal water narratives and cultural traditions to do with waterways.

Outcomes (Table 2): The nutrient and sediment pollution of Lake Tuggeranong will be reduced by an estimated 10%. The wellbeing of Tuggeranong residents and businesses will increase as (over time) the incidence and impact of algal blooms is reduced. Lessons from this work will inform catchment plans being prepared for priority catchments across the ACT.

Table 1. *Project objectives and the works and services to achieve these in the Expand Healthy Waterways Project.*

Objective	Works (ACT-wide but focussed on Tuggeranong)	Services (ACT-wide)
1. Scope, plan and evaluate solutions to water quality problems in urban and rural areas	• Trialling of new kinds of infrastructure to feed into planning	• Research into nutrient pollution sources within suburbs and response of lakes to nutrient pollution • Stormwater monitoring to provide ambient water quality data and evaluate the effectiveness of infrastructure • Community engagement for feedback about potential infrastructure sites and seeking inputs to catchment plans • Databases, tools and dashboards to enable better water quality management • Evaluate—using water quality models—the efficacy of various management solutions for improving water quality • Expert advice about problems and potential solutions • Catchment plans for lakes, rivers and ponds
2. Minimise the amount of pollution entering urban stormwater and rural rivers (buffer waterways)	• Construct 100 small, street-scale water quality assets • Buffer 4% of the Tuggeranong catchment with contoured swales, sometimes with diversions and distribution systems for runoff into green spaces as 'evapo-transpiration fields' or to feed into local water recycling and treatment networks. • Undertake 1-2 major riparian restoration/ erosion control works in a rural catchment	• H2OK behavioural change campaign that aims to reduce pollution coming from households and businesses • Improved management of public green spaces • Improved urban development for more 'water sensitive' suburbs (WSUD governance, development practices)
3. Intercept and filter pollution that has entered stormwater	• Build two large-scale bioretention basins and one wetland to filter pollution from the stormwater system	
4. Treat lakes and ponds so that algal blooms are infrequent and short-lived	• Explore potential to install floating wetlands into water quality ponds	• Research and develop effective, safe algicides and agents to suppress phosphorus levels in lake water
5. Enhance the wellbeing of residents and businesses	• 3 ha of landscaping surrounding water quality treatment zones of assets improved to the standard of a local park • Install signs presenting Ngunnawal culture and history related to waterways	

Table 2. *Project objectives and the benefits and outcomes associated with these. The water quality benefits are based on MUSIC water quality models.*

Objective	Benefits and outcomes
1. Scope, plan and evaluate solutions to water quality problems in urban and rural areas	• Improved understanding of costs and benefits or disbenefits resulting in greater capacity for Government to select the most effective options for improving water quality • Enhanced capacity for Government to choose from options for improving water quality based on their costs and benefits or disbenefits
2. Minimise the amount of pollution entering urban stormwater and rural rivers (buffer waterways)	• A minimum of 103,000 kgs pollution, including 183 kgs of phosphorus, will be mitigated in the ACT region • 6% of pollution bound for Lake Tuggeranong will be intercepted before it enters stormwater • Improvements in water quality from works will mean residents and businesses can better utilise lakes and other waterways. • 5% of the Tuggeranong catchment will be buffered with swales and small-scale WSUD • Athletic fields no longer serve as point sources for pollution. • Pollution from greenfield urban developments is minimised. • Households and businesses adopt behaviours that reduce pollution. This benefit has not yet been quantified but is likely to be highly significant.
3. Intercept and filter pollution that has entered stormwater	• 84,000 kgs pollution, including 117 kgs of phosphorus, will be diverted from stormwater in ACT region • 4% of pollution bound for Lake Tuggeranong will be filtered from polluted stormwater
4. Manage the in-lake environment so that algal blooms are infrequent and short-lived	• Improvements in water quality will reduce the incidence of algal blooms in lakes and ponds. • Lake managers will be a step closer to having tools to combat algal blooms. • Catchment managers will have enhanced capabilities to mange waterway pollution as a result of Catchment Plans created in the project.
5. Enhance the wellbeing of residents and businesses	• Greater Ngunnawal cultural awareness among residents who utilise assets. • Greater opportunities for residents and businesses to utilise lakes and surrounding outdoor areas and other waterways. • Stronger mental and physical health of residents and enhanced business activity. • Enhanced aquatic ecological values. • Greater confidence in Government.

Part 2 - Improving water quality across the ACT

Deliverables (Table 1):

1. A comprehensive behavioural change campaign ('H2OK ') will be conducted across Canberra that aims to reduce pollution coming from households and businesses.
2. Detailed catchment plans will be developed for Canberra's three major urban lakes (Tuggeranong, Ginninderra and Burley Griffin) that outline how catchment water quality needs to be managed to restore and maintain the lakes in a condition that supports community and business aspirations. Plans will also be created for two to three other selected priority environmental assets (Paddy's River, Yerrabi Pond and possibly one other urban catchment).
3. New erosion control works and training of landholders will be implemented in Paddy's River and Lower Cotter reserve rural catchments to diminish the supply and impact of sediments on rural streams. Training will be designed to overcome barriers to the adoption of good soil conservation practices.

4. Catchment management practices on public land will be improved.
    - EPSDD and TCCS will collaborate to improve the management of green spaces.
    - EPSDD, SLA and EPA will collaborate to enhance pollution retention in the development of new suburbs and urban infill developments.
5. Catchment management practices on private urban land will be improved.
    - Householders will be engaged through a behavioural change program supported by the Government H2OK program but run by community organisations.
    - In a separate program, construction companies will be encouraged to adopt practices that reduce pollution from brownfield redevelopments and urban infill developments.

Outcomes (Table 2):

1. Pollution will be reduced through raised awareness about polluting activities among householders and the construction sector and a decrease in polluting behaviours.
2. The ACT Government will be poised to conduct catchment remediations that affect key lakes, ponds and rivers across the ACT. Government will have clear objectives for the condition of receiving waters and pathways to achieve these, and an understanding of costs of both remediation activities and ongoing maintenance.
3. New suburbs will function in a more 'water sensitive' manner, with designs that retain more sediments and nutrients than those used in older suburbs.
4. Waterway pollution caused by redevelopments and urban infill will be reduced.
5. Soil erosion will be locally curbed in selected rural catchments.

Part 3 – Building knowledge to enable better water management

Deliverables (Table 1):

1. Monitoring and research on the cause and effects of water pollution and publishing findings in easy to access reports, databases and dashboards.
2. Significantly improved Government water quality models.
3. Inputs from the community on approaches to catchment management and works under consideration by the project team.
4. Evaluations of the effectiveness of behavioural change programs and WSUD assets.

Outcomes (Table 2): The ACT Government's catchment plans can be formulated using the most cost-effective and acceptable approaches to catchment and waterway management, based on the evidence from research, monitoring, modelling and community engagement.

2.1.2. Scope of works

Small-scale infrastructure to buffer waterways will be built to reduce the amount of pollutants entering waterways. For example, swales placed aside runoff zones can reduce the amount of phosphorus leaking into receiving stormwater drains. This program will target 1) selected roadside drains and parking lots, 2) sports fields and other public green spaces, and 3) commercial centres.

In some areas green spaces will be utilised as '**evapotranspiration fields**', where the goal is to promote infiltration of urban runoff into soils (but not groundwaters), reducing both stormwater volumes and pollution loads.

Large-scale water quality assets—rain gardens, wetlands, ponds and related infrastructure that intercept and filter pollutants from stormwater—will be built in places where alternative measures to avoid the pollution of stormwater drains are not feasible. Initial developments in Kambah Playing Fields and Richardson will explore potential new approaches to WSUD.

Relatively inexpensive '**wellbeing enhancements**' to water quality (e.g. trees, paths, benches, signs and displays) will be built to improve the educational, amenity and recreational values. Educational material will focus on urban water quality and the relationship of Ngunnawal to waterways in the region.

Erosion control works will be trialled in priority rural catchments, in conjunction with feasibility studies, with the aims of 1) identifying barriers to the adoption of erosion control practices, and 2) evaluating the cost of remediating catchments and channels at a level required to create lasting improvements in stream and river-bed habitats.

2.1.3. Scope of services

Service improvements will be implemented to reduce the pollution of stormwater resulting from Government, business and community activities, with an emphasis on preventing dissolved nutrients from entering Canberra's waterways:

- ACT Government staff will improve the **management of public green spaces** to minimise the leakage of fertilisers into waterways. Staff will work across Directorates to **improve** how **new developments** are designed and carried out, and how brownfield construction is conducted, to reduce the pollution of waterways by these activities.
- The Healthy Waterways 1 **H2OK education campaign** (H2OK) will be extended to encourage the community to adopt behaviours and practices that help reduce the amount of nutrients entering waterways. Specially designed messages and methods will be trialled targeting, for example, the management of leaf litter, over-fertilisation of lawns, and reducing the amount of garden clippings and animal droppings entering drains. Successful messages and methods (and funding) for their delivery will be conveyed to Catchment Groups.

Research and development will be conducted into –

1) Nutrient pollution sources within suburbs and the response of lakes to nutrient pollution,
2) Safe, reliable 'knock-down' agents for clearing algal blooms when they arise, and
3) How to apply Phoslock to prevent phosphorus in lake sediments from polluting the overlying water column.

Element (1) will provide critical information to allow us to design the most cost-effective ways to curb water pollution. Elements (2) and (3) continue the fruitful research conducted under Healthy Waterways 1.

Stormwater monitoring will be conducted to identify the sources of sediment and nutrient pollution in catchments and to refine estimates of the amount of phosphorus entering waterways annually, extending Healthy Waterways 1 monitoring programs that were recently established.

Water quality and scenario modelling to allow for various scenarios of catchment remediations to be evaluated for their performance in reducing nutrient (especially phosphorus) pollution. The aim is to identify management/remediation scenarios that will reduce phosphorus loads below a threshold (e.g. in Lake Tuggeranong, ca. 50-100kg/year) that will allow for algal blooms to be managed in-lake. Models will be steadily improved as research results and water quality monitoring data are incorporated, allowing EPSDD to continually refine its options for phosphorus pollution abatement and algal bloom management work programs and reduce risks related to project delivery. A similar approach will be taken to tackle soil erosion and sediment pollution in rural catchments.

Databases and Dashboards will be developed to facilitate oversight and evidence-based management of waterways and the stormwater system.

Community engagement will be essential to help guide decision making in relation to choosing a comprehensive solution. Community inputs may be formalised in a Multi-Criteria Assessment of the solutions (and variants) akin to the assessment done in Healthy Waterways 1 (Aither 2015) to help prioritise sites for construction of water quality assets.

2.1.4. Project Assumptions and Dependencies

BEST SOLUTIONS – PRIORITISING WORKS AND SERVICES

The central tenet of this project is to find ways to improve water quality to an acceptable level for the least cost. The 'best solution' for mitigating pollution will depend on the characteristics of local catchments and must be investigated for every target catchment rather than being specified up front in this budget bid.

For example, recent research has shown that phosphorus pollution is driving algal blooms in Lake Tuggeranong (Ubrihien et al. 2019a, 2020). The phosphorus is mainly coming from the catchment instead of from lake sediments, as is often the case in urban lakes. Potential sources of pollution within the Tuggeranong catchment have been identified through recent research and monitoring as houses (roofs, drains), suburban driveways and yards, grass and trees on road verges, and playing fields. Car washes, commercial centres, and unplanned sewage inputs do not appear to be having material effects on nutrient pollution. A water quality monitoring program already underway—and to be augmented by funding from this project—will confirm these early findings and identify the relative importance of the potential sources of phosphorus pollution so that effective strategies can be developed to minimise the amount of phosphorus (and other pollutants) entering waterways in Tuggeranong.

At present, research and monitoring suggests that a program of catchment remediations, together with in-lake measures, is the best approach (i.e. the most cost-effective and acceptable to the Tuggeranong community) to solve the related phosphorus pollution and algal bloom problems. However, alternative options will be assessed against these criteria as research, monitoring and modelling progresses. There will be opportunities to modify the capital works program in response.

Suburbs and green spaces are also likely major contributors to poor water quality in Lake Burley Griffin and Lake Ginninderra. However, the Queanbeyan sewage treatment plant (STP) and flow rates of the Molonglo River will have unique influences on the pollution status of Lake Burley Griffin. Modelling is currently underway to evaluate the relative effects of rural catchments, the STP, urban areas and extensive 'water sensitive urban design' assets built into north Canberra on water quality in Lake Burley Griffin. Lake Ginninderra bears some similarities to Lake Tuggeranong, and is probably only a few years behind Lake Tuggeranong in developing nutrient pollution problems. As with the other lakes, potential sources of pollution within the Lake Ginninderra catchment will be evaluated so that effective strategies can be developed to minimise the amount of phosphorus (and other pollutants) entering waterways and the lake.

COST

For the purposes of this business case costs are estimated based on a mix of catchment remediation strategies that are currently thought to represent the least-cost solution to pollution problems. Catchment plans to be developed in the project will provide a more accurate estimate of the final cost of solving the pollution problems in both urban and rural catchments. Each pollution source requires a different strategy for remediation and the costs of implementing different strategies vary. Steady improvements to data and models should allow for this to be understood by before the end of the 2022, subject to funding of this bid.

DEPENDENCIES

There are several kinds of businesses and developments that have a significant potential to contribute pollution to waterways. Successful pollution abatement will rely on the ACT Government enacting appropriate regulations, monitoring the performance of businesses and developers, and enforcing compliance if necessary.

Review 1 (IFCW): Status of Functional Brief/Output Specification

Sign off that the functional brief/output specifications are sufficiently progressed in order to go to market under the delivery model selected and within the procurement timeline outlined in the business case. Attach the Functional Brief at **Appendix A**.

Review 1 (IFCW) Officer Name: _____

Signature: _____

Date: _____

- *This is the first review point for IFCW and is an assessment of the status of the functional brief/output specification.*
- *Sign off should only occur if the IFCW officer is confident that the functional brief/output specifications are sufficiently progressed in order to go to market under the delivery model selected, and within the procurement timeline outlined in the business case.*
- *Risk workshops and quantification of project risks is mandatory for Tier 1 and 2 projects.*

Disclaimer: *This review does not represent an endorsement or agreement by the signing officer as to the contents of the section or a certification that the work was correctly performed.*

3. Needs Analysis

This project has been identified as a priority in the *Parliamentary and Governing Agreement. 10th Legislative Assembly. Australian Capital Territory*:

> 17.9 Expand the Healthy Waterways program ($30 M over 4 years)

The business proposition is to restore the ACT's environmental values through a marked improvement in water quality in ACT Catchments that include the three major urban lakes—Lake Burley Griffin, Lake Tuggeranong, and Lake Ginninderra—and by doing so increase community wellbeing.

The three lakes suffer considerably from blue-green algal blooms in summer. The algal blooms:

- give rise to health concerns among residents,
- close the lakes to recreational use during peak periods,
- impact on the amenity of urban lakes through unsightly smells and odours

This diminishes the commercial, environmental and liveability values of the ACT and reduces water quality for downstream users of water from the Murrumbidgee River.

A smaller part of the investment will be focussed on one to two rural catchments in the ACT, where streams and rivers are often choked with sediments eroded from pastoral or bushfire affected areas. The rural projects will be designed to serve as a template for future work throughout rural areas of the ACT.

The project will deliver:

- Water quality infrastructure in the Lake Tuggeranong catchment and selected places elsewhere in the ACT.
- Reduced pollution coming from:
    - Households, because of community programs across Canberra that change polluting behaviours
    - Public green spaces, because of improved Government management of these
    - Urban developments, because of improved Water Sensitive Urban Design (WSUD) guidelines, codes, governance etc. and greater compliance through adoption across Directorates.
- New ways for rural catchments to implement erosion control.
- A framework and tools for the ACT Government to protect lakes and watercourses from the impacts of current and future development.

With continued investment, these activities and deliverables will reduce the incidence and extent of blue-green algal blooms in our urban lakes in summer and mitigate the pervasive impact of sediments on rural rivers.

Two Investment Logic workshops have been undertaken, and a third is scheduled to be conducted in mid-2021. The current Investment Logic Map is in **Appendix B**, focussed on the urban catchments.

3.1 Problem

Lake Tuggeranong and other urban waterways

Long-term monitoring in the ACT clearly highlights challenges facing waterways, including those that are within the urban catchments (ACT Water Report 2015, O'Reilly et al. 2019, State of Environment Report, 2019).

For example, blue-green algae outbreaks close Lake Tuggeranong to recreation for an average of three months every year, mainly in summer when demand for lake access is at its highest. Concerns are increasing in the community about impacts of algal blooms on recreational and commercial opportunities in Lake Tuggeranong and the health of residents.

Recent research by the University of Canberra (Ubrihien et al. 2019a, 2020) has shown that 1) excessive phosphorus pollution drives blue-green algal blooms in Lake Tuggeranong and 2) annually, the Tuggeranong catchment supplies around 5 times the amount of phosphorus to the lake than is required to support the growth of unpleasant and toxic algae.

Blue-green algal blooms also afflict Lake Burley Griffin, Lake Ginninderra and smaller ponds in the stormwater system around the ACT. This summer, beaches along Lake Burley Griffin have been periodically shut due to the presence of thick blue-green algal scums. Algal blooms are a problem that is not going to go away and climate change predictions of higher temperatures and more periods of prolonged heat are likely to extend the period of warm water when lakes are most prone to algal blooms (e.g. see pp. 83-84 of Ubrihien et al. 2019a).

Besides the issue of algal blooms, the levels of Total Phosphorus and Total Nitrogen in stormwater drains and other urban waterways regularly exceed targets set in the ACT Environment Protection Regulations 2005 for ambient (common or prevailing) conditions. For example, these limit Total Phosphorus to between 40-100 mg/L depending on the waterway. Median levels in stormwater in the Lake Tuggeranong catchment are around three times this amount according to University of Canberra research (Ubrihien et al. 2019a)

The rise in phosphorus pollution is a result of urbanisation in Canberra. The construction of impermeable pavements, and stormwater systems built to convey water away from areas of habitation, has led to increased runoff and peak flows in the urban catchments. For example, EPSDD recently estimated that Tuggeranong waterways have three times the discharge of neighbouring rural catchments. This means there is less opportunity for phosphorus within runoff to be filtered by soils or absorbed by catchment vegetation. And there are many additional artificial inputs of phosphorus in catchments, for example through detergents or fertiliser use. None of these outcomes is a necessary consequence of urbanisation. 'Water sensitive' drainage designs can be used to capture and filter water in more natural ways; the excessive use of fertilisers or phosphorus-containing detergents can be curbed; leaves and grass (which release nutrients as they break down) can be kept from drains. It is therefore possible to fix the problem.

Box: ACT Healthy Waterways 1 Project 2014-2021

The ACT Government has co-invested with the Australian Government in the ACT Healthy Waterways Project (Healthy Waterways 1), which sought to improve water quality in Canberra's waterways, and which directed significant investment towards the Lake Tuggeranong catchment. The focus of Healthy Waterways has been on building water quality infrastructure assets to filter pollutants from stormwater. Healthy Waterways finishes in June 2021. By then, assets in the Tuggeranong catchment will be capturing around 20% of the algae-promoting pollution that would previously have flowed into Lake Tuggeranong.

The Healthy Waterways 1 infrastructure represents useful and necessary progress. However, analyses have shown that the water quality assets alone will not alone solve the problem of nutrient pollution. This is because the assets do not treat all the water passing into the lake, especially in larger storms, when unexpectedly large amounts of dissolved phosphorus (a nutrient) passes through the stormwater system and into the lake. Healthy Waterways 1 has solved about 20% of the catchment pollution problem in the Lake Tuggeranong catchment, but more needs to be done to solve the water quality problems there. The same is true for other catchments across the ACT.

Lake Tuggeranong provides a window to the future condition of other lakes and waterways in the ACT whose catchments developed later. While none are as impacted as Lake Tuggeranong, the fact that blooms occur in these waterbodies means they are close to having a chronic problem. Increased runoff from suburbs—either as urban areas expand or with urban infill—could tip the balance towards regular summer blooms as is seen in Lake Tuggeranong.

The ACT's rural creeks and rivers

Long-term monitoring also highlights challenges facing rural waterways in the ACT (ACT Water Report 2015, O'Reilly et al. 2019, State of Environment Report, 2019) particularly regarding the pervasive impacts of sediments eroded from catchments on stream and river-bed habitats.

Given the scale of the rural catchments of the ACT (equivalent in size to the urban extent of the ACT), the degree of poor water quality generated in these catchments is considerable (O'Reilly et al. 2019). This in turn is a direct threat to the environmental, social and economic values held for those waterways, and those downstream. This is of particular concern in the ACT, where the rural catchments drain into the Murrumbidgee River, leading to faecal indicator bacteria blooms, which require the waterways be closed to public access (Vincent et al. in prep).

While land management is a key issue in the rural catchments, the conservation-managed estate of the ACT faces an emerging threat: more frequent, widespread and intense bushfires. The conservation estate contains pristine waterways that support much of the threatened freshwater fauna of the ACT, but also Canberra's water supply. Namadgi National Park (NNP) makes up almost 60% of the ACT in area, and contains the majority of Canberra's water supply catchment, the Cotter

River. Within the Cotter River system exist multiple threatened species, which are dependent on high water quality and good catchment health to persist in the ACT.

Wildfire is a growing risk in Australia, with major implications for wildlife, ecosystems and human life and infrastructure (Bushfire Royal Commission, 2020). Namadgi National Park has suffered two catastrophic wildfires in 18 years, and climate projections indicate that the risk of increased wildfires will increase both in terms of frequency and intensity. The smothering of instream habitat with sediments post-fire leads to complete loss of habitat for threatened fish, directly increasing the likelihood of localised extinctions, and reduced species resilience.

3.2 Benefits

3.2.1. Benefits to be delivered

There are four main benefits of Expand Healthy Waterways, and subsidiary benefits that arise from these.

1. **Improvements to water quality** and associated **decreases in the incidence of blue-green algal blooms**.
2. **Increased community wellbeing and business prosperity** as recreational and business opportunities arise associated with the use of lakes and ponds.
3. A **solution-based approach** that will further inform the Government of the nature of these problems and the cost and feasibility of improving the condition of waterways, e.g. reducing the incidence of blue-green algal blooms in Lake Tuggeranong from one every year to one very five years.
4. The project will provide **local jobs and economic stimulus** to the COVID-affected economy.

The infrastructure, services and management enablers created by this project should lead to a drop of at least 10% of the pollution entering Lake Tuggeranong and local improvements to water quality elsewhere around Canberra where infrastructure and services have a material effect. The 10% improvement is an underestimate because the effects of services like the behavioural change program—which could be quite significant—cannot be estimated at this time. The effects of such services will be monitored so their benefits can be quantified for future business cases. As a part of this work, around 5% of the Tuggeranong catchment will be buffered with swales and small-scale WSUD.

Also in Tuggeranong, three hectares of public green space surrounding water quality treatment zones of assets will be improved to the standard of a local park, providing amenity and mental and physical health benefits for nearby residents. There will also be greater Ngunnawal cultural awareness among residents who utilise assets, both in Tuggeranong and around lakes and ponds in the ACT where these will be placed.

The **environment** will benefit as **water quality improves** and **urban cooling** is enhanced by healthier (better watered) green spaces and new water sensitive urban assets (i.e. large water quality assets and smaller, street-scale buffers) are built. These assets replace pavement or dry lawns with more lush greenery as stormwater is re-directed to wetland plantings or onto dry landscaping where the water, phosphorus and other nutrients can be retained and/or filtered as in a natural catchment. Water quality will also be improved downstream of Lake Tuggeranong in the Murrumbidgee River corridor.

The creation of high-quality lake, wetland and 'swampy meadow' habitats enabled by catchment plans will restore some of the region's **biodiversity** lost through urbanisation and the impacts of agriculture and bushfires.

Local companies in the **construction industry** (and associated **consulting services**) will **immediately benefit** from the works to be built and analyses to be conducted.

Vibrant urban lakes will provide **financial and economic benefits** to lakeside businesses, and residents will also benefit as house prices rise. In rural areas, financial benefits will result from a better understanding of the relative benefits between investment in wildfire mitigation (such as fuel load management, prescribed burns) and post-fire recovery activities (e.g. sediment and erosion stabilisation works, reseeding and tree planting) to provide the best water supply security and ecosystem resilience. For example, the cost of undertaking post-fire recovery works is estimated to be in the millions of dollars. Having more detailed information on where and when actions need to be undertaken would lead to more cost-effective implementation.

The **physical and mental health** of the community will grow as urban lakes (especially underutilised ones like Lake Tuggeranong and Lake Ginninderra) become recreational hubs. Use of lakes by the local community should increase markedly once residents can rely on lakes being open in summer. This will result in a physically and mentally fitter community that has a reduced risk of serious illness. It will provide event organisers with the certainty they require to hold events centred on lakes or surrounding parklands, which will provide the community with greater opportunities for social interaction. Better water quality creates greater amenity for lakes and waterways in the catchment both up and downstream of the lake. Many in the community will visit for the purpose of birdwatching or other nature-based activities, or simply for relaxation and contemplation.

Improving water quality leaving the rural estate will benefit the broader ACT community through improved amenity and access to public waterways (due to reduced risk of illness from poor water quality), reduced costs to Icon Water from water treatment, and improved water supply security.

Greater **community connection** and **social cohesion** will emerge as opportunities to recreate, attend events and enjoy natural amenities rise. Community connection will rise as businesses like cafes and restaurants can take greater advantage of our urban lakes as a prime location, in the same manner as occurs in a limited fashion along the Lake Burley Griffin foreshore. Social cohesion will grow as opportunities for social interaction increase and become more regular, benefitting families (e.g. having a Sunday barbeque), clubs and other organisations holding events, and the public at large. Social cohesion will also be promoted as the public is educated about Ngunnawal stories as they are installed around WSUD assets and lakeshores.

Lastly but importantly, this is a big ambitious project that aims to take material steps to solve recurring environmental problems that have dogged the ACT Government and Canberra Community for decades. If the Government takes on the challenge, there will be **greater trust in institutions**—particularly the Government itself—arising out of this bold action.

Cost-benefit analyses of recent urban waterway restorations (NCEconomics 2019) have consistently returned ratios over 1. For example, a cost-benefit analysis undertaken for Healthy Waterways 1

estimated the benefit-cost ratio was most likely 1.66, with a 90% chance of being between 1.3 and 2.6 (see Section 5).

A cost-benefit analysis will be conducted for Expand Healthy Waterways early in the project.

KPIs are readily available to track the performance of the Expand Healthy Waterways Project in achieving outputs and outcomes.

KPIs related to outputs will be tracked through regular project reporting and evaluation by governance bodies, in a similar manner to the Healthy Waterways 1 Project.

Various KPIs can be applied to assess whether outcomes are being achieved over time, for example for activities in the Lake Tuggeranong catchment–

- Employment stimulus:
    - Numbers of jobs
    - Investment by FY
- Environment:
    - Phosphorus levels in waterways detected through monitoring
    - Number of days that Lake Tuggeranong and other urban lakes are closed to the public annually due to algal blooms
    - Urban heat mapping
    - Bird and frog surveys
- Physical and mental health
    - Lake foreshore use surveys
    - Community health surveys
    - Hospital admissions by post code, e.g. for heat stress, with changes to demographic profiles considered
- Community connection and social cohesion
    - Number of events held annually centred at our urban lakes
    - Survey of the level of use of lake by clubs and other community organisations
    - Changes in number and character of businesses taking advantage of our urban lakes
- Financial benefits
    - Business income attributable to urban lakes, from economic data and cost-benefit analyses
    - Tracking of house prices, commercial rent values in suburbs adjacent to lakes compared with more distant suburbs
- Greater trust in institutions
    - Number of complaints received by ACCESS Canberra and ACT Government Directorates about waterways, e.g. Tuggeranong waterways and Lake Tuggeranong.
    - Feedback from local MLAs.

3.2.2. Benefits for Government

Expand Healthy Waterways could serve as a ‘shovel ready’ investment, to be included in COVID investment packages being considered by governments. The combination of projects prepared during Healthy Waterways 1 and the six-month scoping activities (January-June 2021) means that

there will be 10-15 projects in the advanced stages of planning (most will either have development approvals or the DA process will be well underway).

Expand Healthy Waterways will help achieve many of the aims articulated in *Canberra: a statement of ambition*, but especially –

"DIRECTION OF TRAVEL 3. We must use our integrated government to deliver better metropolitan infrastructure that helps to renew our inner precincts, strengthen our suburbs and provide new opportunities. We believe that a city that works better for its own citizens will also work better as the nation's capital – and that the city which promotes itself effectively internationally, succeeds locally."

To change the trajectory of Lake Tuggeranong—one of Canberra's three urban lakes and a centrepiece for the Tuggeranong precinct—from increasing pollution and algal blooms to a state of good health is a major challenge. It is also a major challenge to maintain Lake Burley Griffin in its current condition (let alone improve its water quality) with the urban development planned for its catchment. The program of works and services outlined in Section 2 is a marked departure from 'business as usual' and will stand as a world-leading example of long-term planning and integrated urban water management.

It will cement Canberra's reputation internationally as a city committed to sustainability and as a place that enables government, businesses, experts and the community to work together to solve wicked problems.

The resulting improvements to liveability will promote resident's wellbeing and help Tuggeranong to become more compact and competitive.

Together these benefits will serve to attract the best businesses and talent to the region.

The ACT Government is committed to improve the liveability of Canberra and "is in the process of developing a set of wellbeing indicators to monitor our progress across a broad range of areas that reflect the values of Canberrans and influence our quality of life" (YourSay website).

The benefits of Expand Healthy Waterways have been explicitly framed in reference to wellbeing outcomes. This has profoundly changed the proposal and should ensure that it does not just serve the narrow requirements of environmental regulations.

Improving water quality and ensuring long-term water supply security align closely with the ACT Water Strategy 2014-2044, and the Aquatic and Riparian Strategy and the ACT Conservation Strategy. The objectives of Expand Healthy Waterways are also fully aligned with Canberra's Urban Lakes and Ponds Management Plan, the Tuggeranong Town Centre Master Plan, and the findings of an Auditor General's report and a consultant's report on how stormwater infrastructure is constructed and managed in the ACT. See Section 3.3.1 for details.

Expand Healthy Waterways will help the ACT to meet its water quality targets as per Environment Protection Regulations 2005 and, in the context of water quality of flows leaving the ACT, the Commonwealth Water Act 2007 (EPSDD 2019b). It will also help the Government achieve its ambitions as a liveable, sustainable and dynamic city.

3.3 Options Analysis

3.3.1. Strategic Solutions Analysis

Solutions to water quality problems at a catchment scale make use of one or more of the following four options that will be considered as a part of this proposal:

1. Prevent pollution of stormwater from occurring in the first place. This includes:
   - Passive via infrastructure:
     - creates opportunities for infiltration, e.g. castellated curbs, contour features
     - improves the filtering capacity of urban catchments, e.g. mini (street scale) raingardens
   - Active – non-infrastructure:
     - keep drainage surfaces clean (prevent pollution from occurring)
     - clean up pollution (removal of pollutants, e.g. grass and leaves, from drainage surfaces)
2. Filter pollution from stormwater in drains – e.g. using large scale water quality assets like wetlands, ponds and raingardens (in Kambah Playing Fields 1and3, Richardson)
3. Treat valued lakes and ponds – e.g. using algicides to clear algal blooms or Phoslock to prevent lake bottom sediments from polluting the water column
4. Re-imagine, redesign assets – e.g. convert a pond prone to algal blooms into a wetland by installing a floating wetland.

PREFERRED OPTIONS - URBAN

The strategic solutions will vary depending on which catchment, waterway or lake is the target for water quality improvements. The approach adopted by this project is to coalesce information gained through catchment research, stormwater monitoring, waterway and lake water quality modelling, construction investigations and trials, and community engagement into catchment plans that evaluate costed options for improving water quality and achieving benefits associated with this. The catchment plans will guide the delivery of solutions to water quality problems.

For example, according to recent research (Ubrihien et al. 2019a), managing algal blooms by cutting off the supply of pollutants from lake sediments (an element of option 3, treating valued lakes and ponds), as is done in many situations, is pointless in Lake Tuggeranong because of the excessive supply of phosphorus entering the lake from its catchment. Treating algal blooms as they arise with knock-down agents (i.e. chemical algicides, part of option 3), without also curbing phosphorus pollution (options 1 and 2), is expensive and risky. Unless phosphorus levels were also curbed the algal blooms would quickly re-appear, and managers would have to regularly re-apply chemical algicides to the lake. The excessive use of chemicals would be of concern to the public, and although the chemicals should be safe for limited use, repeated, regular application of them may negatively impact the lake environment.

Conversely, curbing pollution from Lake Tuggeranong tributaries (options 1 and 2) will also not solve the problem on its own. The research above also showed that for Lake Tuggeranong the amount of phosphorus already in the sediments is enough to support an algal bloom.

Within Option 1, both approaches to curbing phosphorus pollution entering the Lake Tuggeranong from the catchment (preventing the entry of pollution into waterways and filtering pollution from stormwater) will be required to reduce phosphorus to below target levels. Filtering pollution from stormwater was the focus of the $29 million Healthy Waterways 1 investment in water quality infrastructure in the Lake Tuggeranong catchment between 2014-2021. These assets are effective but are only partial filters of stormwater; significant levels of phosphorus and other pollutants bypass the infrastructure in medium to large storms. The focus of this project will therefore be on infrastructure such as swales and services such as a behavioural change program to prevent pollutants from entering waterways in the first place. Some water quality assets will be installed to filter stormwater near ovals (a detectable pollution point source; Ubrihien et al. 2020), but a significant focus of this project will be on pollution prevention.

Thus preferred solutions are likely to include elements of points 1, 2 and 3 above.

PREFERRED OPTIONS - RURAL

Approaches to remediating the erosion of rural catchments have been well understood for decades. Best practice involves recognising where erosion may become a problem and to intervening early to prevent it from expanding. Large gullies can develop very quickly from small scars where vegetation has been damaged or removed. Once gullies have developed it is very expensive to fix them. The key to success is therefore to understand the barriers to landholders recognising erosion problems and implementing various proven approaches.

Expand Healthy Waterways will collaborate with ACT NRM to

- Survey potential erosion sites in Paddy's River catchment.
- Train landholders to recognise erosion sites and how to stabilise sites with check-ponds, coir barriers, plantings and re-contouring for self-repair.
- Prepare training materials and demonstration sites for training landholders across the ACT.

CONSISTENCY WITH ACT GOVERNMENT POLICY and STRATEGY

The objectives and proposed actions are consistent with the following ACT water policies and regulations.

- Relevant Environment Protection Regulations 2005, which place limits of Total Phosphorus in various urban waterways as between 40-100 mg/L. Current median levels in stormwater in the Lake Tuggeranong catchment are around three times this amount according to University of Canberra research (Ubrihien et al. 2019a), and above targets for water quality leaving the ACT as per the Commonwealth Water Act 2007 (EPSDD 2019b).
- The *ACT Water Strategy: Striking the Balance*, *Implementation Plan Two (2019-23),* specifically Actions 2, 5, 7, 8, 9, 16 and 17.
- Canberra's Urban Lakes and Ponds Management Plan (2001).

This proposal is also consistent with guidance on implementing infrastructure projects provided to the ACT Government. The North Weston Ponds Project Report (ACT Auditor General's Office 2011) was a review of lessons learned from this major stormwater infrastructure project that experienced

delays and significant cost overruns. It concluded with eight recommendations, most relevant to this proposal that:

- there be a single, well-defined project owner with end-to-end responsibility for the project
- an inter-agency governance committee be convened to regularly review risks, progress and costs
- gateway reviews be incorporated into the project
- formal project wide risk assessments be undertaken
- roles of key stakeholders are identified and documented
- decision-making process for acceptance of infrastructure designs is documented, including treatment of risks identified.

These recommendations were accepted in the conduct of Healthy Waterways 1 and would similarly be applied in conducting the Expand Healthy Waterways Project.

This project will also need to be consistent with planning guidelines. For example, in Lake Tuggeranong catchment options will be assessed for how well they align with the Tuggeranong Town Centre Master Plan (Environment and Sustainable Development Directorate 2012). The Master Plan sets out a 30-year vision and strategy to manage development of the town centre, which relies in part on increased access to Lake Tuggeranong. The plan envisages 'active frontages' and 'active land uses' around the Lake Tuggeranong foreshore, which is identified as one of nine precincts for the town centre: "The foreshore area will be an active and vibrant public space embracing the lake" in a similar way that the Kingston Foreshore has been developed. It identifies improved access and facilities around the foreshore as vital features. However, the vision of a vibrant foreshore will be difficult to realise if the lake is afflicted by smelly, toxic algal blooms for the summer season when people are most likely to be using outside areas for entertainment, dining, recreation and relaxation.

In addition, a strategic review conducted by Alluvium Consulting (2016) into the ACT's urban water quality management infrastructure provided a basis for many operational elements of the Healthy Waterways 1 Project and is also relevant to this proposal. The review highlighted shortcomings in the design, construction, operation and maintenance of water quality infrastructure in the ACT. The findings have influenced this proposal (e.g. the strategic, catchment-based approach to solution design) and will provide Expand Healthy Waterways project managers with guidance on aspects of the project that will require special attention.

STAKEHOLDERS

EPSDD has a track record of working with other Directorates to create benefits for the greater public service. For example, the ACT Government's Digital Strategy is a vital component to its future Whole of Government service delivery strategy. EPSDD staff worked closely with CMTEDD's Office of the Chief Digital Officer in Healthy Waterways 1 to deliver a data lake for water data and associated business apps that can be used by all Directorates and has the capacity for public access. EPSDD then collaborated with the ACT Emergency Services Agency to create a new business app that will enable the ESA command centre and its field staff to be notified about the potential for the flooding of suburbs, and actual flooding, in real time as storms are occurring. This should allow ESA to greatly reduce risks to the public associated with floods like the ones that hit Woden in 1971 and Sullivan's Creek (Lyneham) in 2018. EPSDD also has close links in Healthy Waterways 1 (and other business)

with TCCS, as an agency for management responsibility for urban areas, and with CMTEDD/EPA in its statutory roles under the Environment Protection Act 1997, which will be extended through the Expand Healthy Waterways Project.

There will be substantial positive impacts on the construction industry and the organisations that successfully bid for service contracts.

As the owner of the environmental assets to be built in this project, TCCS is the ACT Directorate that will be most impacted by the project. As a result, one of the staff proposed for the project is an officer to facilitate the handover of assets from the construction contractors to TCCS, an approach that was used to great success in Healthy Waterways 1. EPSDD will also work closely with TCCS to ensure that maintenance costs of assets are factored into decision making about both the make-up of the construction program and the specific asset designs adopted, and EPSDD will also help TCCS to plan for future maintenance funding. The project will also place an officer in EPA to help monitor compliance in greenfield and brownfield developments. A fruitful collaboration with CMTEDD's Office of the Chief Digital Officer is anticipated, to build on the productive relationship established in Healthy Waterways 1, as described in the previous section. Major Projects Canberra may also be involved in the project, with a role in financial management, in a similar manner to Healthy Waterways 1.

Interaction with several other ACT Government projects is expected with:

- ACT NRM activities in catchment management and waterway stewardship and a behavioural change program about waterways
- Policy-makers in EPSDD and relevant staff in EPA and SLA developing new suburbs and setting and enforcing regulations around drainage and WSUD.

For the activities and works within this project there are no direct impacts on other jurisdictions.

3.3.2. Recommended Strategic Solution

The current preferred strategic option for the Lake Tuggeranong catchment is a combination of options 1, 2 and 3.

- Phosphorus pollution entering from the catchment could be reduced (option 1)
    - Install just under 100 street-scale WSUD assets (some will be installed elsewhere in Canberra)
    - Construct swales and evapotranspiration fields to buffer 4% of Tuggeranong catchment
    - Improve management of public green spaces
    - Conduct H2OK public education campaign aimed at reducing pollution coming from households
- Phosphorus pollution entering from the catchment filtered once it enters stormwater (option 2)
    - Build bioretention basins at Kambah 1 and 3 playing fields and a WSUD wetland in Richardson

- Once phosphorus pollution entering from the catchment drops, algal blooms can be managed in-lake (option 3).
    - Research and develop effective, safe algicides and agents to suppress phosphorus levels in lake waters

Options for catchment remediations—works and services—in both Lake Tuggeranong and five of Canberra's other urban and rural catchments (Section 2) will be determined as Catchment Plans are developed.

3.3.3. Project Solutions Analysis

CORE PRINCIPLES

These core principles underpin the 'project solutions' adopted for Expand Healthy Waterways:

- a commitment to solve the problem, embracing uncertainty
- strong planning with broad stakeholder input
- a stage gate to review/approve preferred solutions in particular catchments before they are implemented; and
- early steps to solve problems by capitalising on previous work and trialling new solutions.

Investment in the Expand Healthy Waterways Project will signal the Government's intent to solve water quality problems and to implement solutions that best balance costs and benefits. LEAD AGENCIES

This project comprises a range of environmental capital works and services. As an environmental project it is appropriate for the Environment, Heritage and Water Division in EPSDD to provide overall leadership and management for the project, as it has for the successful Healthy Waterways 1 (2014-2021).

Governance bodies will be established to guide project decision-making (also see Section 7). A Control Group will make strategic decisions and approvals. It will be chaired by Senior Executive of EPSDD and comprise senior officials from CMTEDD (Treasury and Major Projects Canberra) and Transport Canberra and City Services. The Expand Healthy Waterways program manager from EPSDD and contract administrator for managing the capital works contract for this project will attend Control Group meetings to represent the project team.

Contracts for the significant capital works component will be led and managed by Major Projects Canberra.

The services component will either be performed by staff from EPSDD and other Directorates or by contractors.

WORKS, SERVICES AND SUPPORTING ACTIVITIES

Early works, services and scoping activities will build the community capital and social licence to complete this project, in a similar manner as in Healthy Waterways 1.

Scoping analyses will be undertaken of strategic options using 'enabling' tools created by the project. The analyses will judge the options/approaches based on whole-of-lifecycle cost-effectiveness, feasibility, and risk, and provide decision-makers with a sound basis from which to deliver preferred solutions.

Scoping activities comprise a mix of services and works:

- **Research and monitoring** of:
    - catchment pollution sources
    - the responses of receiving waters (e.g. Lake Tuggeranong) to nutrient pollution; and
    - the effectiveness of water quality infrastructure at intercepting pollutants.
- **Trialling (construction and monitoring) of small or street-scale water quality infrastructure** (e.g. swales, tree pits, mini-rain gardens treatments systems and trains etc.) and enhanced use of green spaces to promote infiltration of stormwaters into the catchment (including local aquifer recharge). The trials will guide a broader rollout of these assets that aims to reduce nutrient leakage from athletic fields and households into waterways. This element will complement existing ACT Government investments announced in December 2019 and February 2021 (Objective references A24187043, fA10580350).
- **Continued development of water quality and decision support models and new cost modelling**, to support the development of continuous improvement of catchment plans in Tuggeranong and the other 3-4 priority catchments. Plans will outline a mix of infrastructure and services (e.g. a behavioural change program) that represents an estimate of the least cost management/remediation scenarios that will reduce nutrient pollution below target levels, e.g. to allow for algal blooms to be managed in lake in Lake Tuggeranong or to be excluded from Lake Burley Griffin.
- **Engagement of the community** to raise awareness of problems, help formulate solutions, and gauge reactions to various options that emerge. This is vital to obtaining a 'social licence' to undertake this work. Inputs will also be sought to shape the recreational and educational works, which contribute to wellbeing.

An initial activity is an extension of the **H2OK education campaign** targeting the pollution of waterways by households. Besides reducing pollution, this would have the added benefit of providing highly visible evidence of Government action on the issue of waterway pollution.

Work will begin from the start of the project on the **construction of infrastructure to improve water quality**, such as large wetlands or rain gardens, the siting and construction of which is well understood from the experience of constructing 20 such assets in Healthy Waterways 1.

Capital works will be delivered as a single package to reduce project management overheads for EPSDD, improve the management of financial risks/contingency funds, and align with market preferences (also see Section 6.3). The contractor will be responsible for design, construction and establishment of any water quality plantings or dry landscaping. Operations and maintenance will be the responsibility of TCCS once assets are formally handed over.

Options for procuring the design and construction of capital works for stormwater systems were explored early in the delivery phase of ACT Healthy Waterways 1 (Ernst and Young 2016) and included:

- Early contractor involvement
- Alliance contracting
- Alliance pricing
- Managing Contractor model
- Design and Construction model
- Public Private Partnership

The Managing Contractor (MC) approach was considered most appropriate for the circumstances in the Healthy Waterways 1 Project, and a Project Manager-Contract Administrator (PMCA) was also recommended to manage risks on behalf of the ACT, thus avoiding excessive cost of transferring risks to the Managing Contractor. The PMCA/MC approach was widely viewed as a success by participants and stakeholders in the Healthy Waterways 1 Project (Apis 2019).

The infrastructure program for this proposal is like that in Healthy Waterways 1 – both involve constructing a complex program of various stormwater quality infrastructure, with the cost and design for these strongly dependent on nature of the priority construction sites, but with strict limits on the total budget. However, there are differences in time pressures and requirements for flexibility in the work program. Therefore, external advice was sought about the procurement approach for the Expand Healthy Waterways Project. The preliminary assessment of Major Projects Canberra is that the Managing Contractor approach is also appropriate for Expand Healthy Waterways.

The project management team in EPSDD will perform some project **services** and direct others that are delivered by contract, in a similar arrangement as for services for the Healthy Waterways 1 Project (2014-2021), which is run out of the Directorate.

Project solutions will deliver results for the least cost through:

- The convening of governance bodies like those used in Healthy Waterways 1 that proved effective at dealing with project risks and ensured that decisions were made promptly, including those that required approval across different Directorates.
- The use of private sector expertise in delivering the complex program of capital works, and in supplying services that rely on specialist expertise (e.g. cost models) or strong connections with the community (e.g. the behavioural change program).
- The tight link between research and waterway monitoring on the one hand, and program design on the other, which will help ensure that all elements of the program contribute to observable improvements in water quality and will promote transparency in reporting of project performance.
- The use of decision support models that explicitly represent water quality and cost, which will allow least-cost solutions to be identified.
- Conducting water quality modelling in-house, which given the number of incremental improvements to water quality models and the number of management scenarios to be explored (Section 2.1.4), will save money (as well as time) compared with the normal practice of outsourcing this work.

- Strong public engagement, which will help ensure that funding for the recreation and wellbeing elements of this project is well invested.
- Building on or making use of complementary activities by the ACT Government, which will leverage benefits from programs funded externally to this project. For example, changes to the management of public green spaces to minimise the leakage of fertilisers into waterways will be done using existing EPSDD resources and will complement the works and services funded by the Expand Healthy Waterways project.

RISKS

The construction of capital works is the biggest expense in this project and has a range of risks associated with it. Stakeholders from ACT Government and collaborators involved in the Healthy Waterways 1 project agreed that one of the strengths of the PMCA/MC approach to managing the construction of capital works was that it was cost-effective, particularly in allowing for flexibility in the management of contingencies, which minimised budget allocations for these (Apis 2019). Officers in EPSDD and major Projects Canberra consider that the PMCA/MC approach is also best suited for the Expand Healthy Waterways Project.

Delivery of the proposed scope of works is feasible—can be done at a reasonable cost and within acceptable timeframes—and risks can be managed:

- Water quality infrastructure –
    - swales draining green spaces, roads and commercial centres to buffer waterways can be built using standard designs
    - there are commercial designs already available for other small-scale (street-scale) WSUD infrastructure (e.g. SPEL-Basin)
    - water quality assets – ponds and wetlands can be built using standard designs (there are already well over 100 of these in the ACT), and EPSDD has recent experience in constructing twenty of the more novel bioretention designs through Healthy Waterways 1 (EPSDD 2019a)—on time and within budget.
- Recreational/amenity/educational infrastructure – such as trees, paths, benches, signs and displays can be built or installed using standard designs. Elements of these were also delivered on time and within budget within the Healthy Waterways 1 program of work.
- Risks related to a construction program of water quality infrastructure will be managed through a cross-directorate governance body, in a similar manner to successful governance in Healthy Waterways 1 (Apis 2019).

Delivery of the proposed scope of services is also feasible and risks can be managed:

- The waterway monitoring program will use standard methods, extending an existing program of work from Healthy Waterways 1.
- The research program will extend a high-performing Healthy Waterways 1 research program that has been making steady progress towards 1) characterising the pollution problem at a level of detail that will allow for a program to be designed to curb pollution, and 2) approaches to manage the in-lake environment so that algal blooms are infrequent and short-lived.

- EPSDD has in-house capabilities for both water quality modelling and behavioural change, and regularly augments this with specialist support from external experts. These capabilities will be expanded by hiring staff on non-ongoing contracts using project funds.
- It is core business for ACT Government Directorates to work together to ensure that guidelines and codes for new developments are followed and are effective.

3.3.4. Base Case

The 'base case' is to achieve the desired water quality and wellbeing outcomes for the least cost. This objective cuts across both strategic and project solutions.

At the strategic level, the project will continually be reviewed and updated to achieve water quality/ wellbeing objectives for the least cost as new information (from research and monitoring) is incorporated into models and strategies.

At the project level, the approach to procuring and delivering capital works will be assessed based on cost-effectiveness and the costs of services will be minimised through various mechanisms outlined above.

For community and business wellbeing related to reducing pollution levels and the incidence of algal blooms, the only options to further save money over the long term are 1) to reduce the scope of works and services, which will mean that the incidence of algal blooms is curbed to an extent (e.g. from every summer to blooms in three of five summers) rather than to the best possible extent (blooms rare and short lived), or 2) to increase the project term (i.e. reduce the cost/year by extending the term over which the services and construction of work will be conducted).

3.3.5. Recommended Project Solution

The recommended solution is to deliver the project by implementing works/services that have already been planned while scoping out plans and comprehensive programs for ongoing work. This will involve:

- Project governance and management to manage risks and ensure the project is delivered with probity and strong stakeholder support.
- Construction of both small and large-scale water quality assets, mainly in the Lake Tuggeranong catchment.
- Provision of services (e.g. behavioural change) aimed at reducing pollution in urban catchments, particularly of dissolved phosphorus.
- Collaboration with other sections and Directorates to reduce pollution coming from the management of Government-owned green spaces and new developments.
- Trialling of works in rural catchments to prevent soil erosion and mitigate the impacts of sediments on stream and river channels.
- Activities to create community capital and social licence, which will be important for ongoing activities of this project. This will include engagement of the community to help formulate solutions, including to do with wellbeing enhancements.

- Research, monitoring and modelling to identify a least-cost solution to reduce pollutant loads below a threshold levels e.g. that will allow for algal blooms to be managed in-lake for Lake Tuggeranong or will keep Lake Burley Griffin free of algae most years.
- Preparation of Catchment Plans for Tuggeranong and other urban catchments containing comprehensive programs of capital works and services aimed at 1) reducing nutrient pollution and the incidence of algal blooms to acceptable levels, and 2) other wellbeing enhancements.

3.4 Review 2 (Treasury): Needs Analysis

Treasury directorate to sign off that a case for the project is present in the business case. Review 2 (Treasury) Officer Name: _____ Signature: _____ Date: _____

- *This is the first review point for Treasury and is assessment of the needs analysis.*
- *Sign off should only occur if the Treasury officer is confident that the needs analysis is robust, is based on evidence and an Investment Logic Workshop (ILW) has been undertaken (if applicable).*
- *Note that Tier 1 business cases anticipate review and signoff by the Under Treasurer.*

Disclaimer: *This review does not represent an endorsement or agreement by the signing officer as to the contents of the section or a certification that the work was correctly performed.*

4. Cost and Contingency

4.1 Preliminary Cost Estimate

The cost estimate is:

	C15 Clean Catchments, Clean Waterways (Jan-Jun 2021) ($M)	C14 Expand Healthy Waterways (Jul 2021-Jun 2025) ($M)	Total ($M)	%
Infrastructure (Capital)	1.217	16.855	18.072	60
Recurrent supplier	0.125	7.047	7.172	24
Recurrent staff (non-ongoing)	0.196	4.603	4.799	16
Total	1.538	28.504	30.043	

Costs of the sister project 'Clean Catchments, Clean Waterways', already funded for the period from January to June 2021 are included to give an understanding of the full commitment to Expand Healthy Waterways. Details of budgets for Expand Healthy Waterways are in Table 2 and Appendix C.

Capital cost estimates are based on:

- Water quality assets: costs for assets in Healthy Waterways 1
- Urban waterway buffers: quotes from the Healthy Waterways 1 Managing Contractor
- Wellbeing enhancements: costs of enhancements for Healthy Waterways 1 assets.
- Consultants, research, project managers: costs of similar contracts in Healthy Waterways and other projects.

Among the recurrent (non-ongoing) staff, five will deliver project outputs and only two will be partially involved in project management. The shared services management fee has been included in the project.

4.2 Contingency

4.2.1. Project Contingency

Risk Registers and plans will be developed and updated during the project. For example, a preliminary risk analysis has been performed for the Lake Tuggeranong catchment (Section 6, Appendix D). Based on this, the main strategic risks to be managed are:

Strategic risk	**Possible mitigations**
The cost of the preferred option in Lake Tuggeranong was underestimated.	• Increase the budget • Cut elements of budget unrelated to water quality.
The feasibility of the preferred option is over-estimated – it will take more catchment remediation than is practical or affordable to solve the nutrient pollution problem.	Either – • do nothing – tolerate annual algal blooms • install and operate a lake-water treatment plant • convert Lake Tuggeranong to a series of WSUD wetlands – all with increased costs and social impacts.

The purpose of the scoping/feasibility activities is to –

- support the improvement of water quality through capital works;
- develop options on a catchment-by-catchment basis and confirm they how viable they are (effective, feasible, affordable) in comparison with alternative options; and
- identify a high-level design for the catchment 'solution' based on the preferred option.

Thus the scoping activities will both improve outcomes for Expand Healthy Waterways and for future water quality improvement projects.

The project delivery contingencies identified to be managed are:

- Financial – the risk of cost over-runs associated with poor project management and flood damage to assets under construction
- People – especially the risk of injury to construction workers
- The environment – damage caused by disturbance of waterways under construction
- Mismanagement of records leads to nonconformity audit finding, impacts on project performance, and/or hinders business continuity and adaptive management
- The reputation and image of the ACT Government and EPSDD if the project underperforms.

Successful risk management of various project contingencies will rely on:

- **Experience of the project team** – The EPSDD project team has recent experience managing a program of work of similar size, scope and risk profile in the $93.5 million Healthy Waterways 1 Project, which includes around $85 million of waterways infrastructure, and $8.5 complementary services (with project management costs taken into account). Healthy Waterways 1 project managers at all levels of governance actively managed risks through normal mechanisms (education on finances and procurement, risk plans and registers, proactive risk mitigation, e.g. 'toolbox talks', etc.). To date the project team has delivered just under $93m of this project on time and within budget, with a significant scope of works produced (20 of 24 priority assets built, a further two designed), and with no significant injuries to construction workers. An additional asset—a floating wetland, which is a first for the ACT—was built on-time and within budget using an additional $1M investment. The team recognises elements that sit outside of their expertise (e.g. the construction of infrastructure) and either contract the delivery of major/specialist elements or gain advice on how to manage the delivery of minor elements that are delivered by the project team.
- **Good planning** – Scoping activities have been built into this project (as was the case for Healthy Waterways 1), and the detailed Catchment Plans produced, comprised of works and services, will be available for review and subject to approval before proceeding to implementation. Assets already earmarked for the construction in this project were either identified from earlier scoping activities in Healthy Waterways 1 or are trials that will contribute to the scoping activities. Therefore, the solutions and options adopted to achieve objectives will not be based on loose estimates, but on detailed system and cost modelling.
- **Community consultation** – Catchment works of the sort proposed for Expand Healthy Waterways happen within suburbs. The experience from Healthy Waterways 1 showed that community consultation is vital to inform residents about the nature and reasons for the works, to help prioritise sites for construction, to build and maintain support for sites chosen

for development, and eventually to co-opt locals in stewardship of public places within assets that are built.

- **Finance staff and arrangements** – Complex work programs run a risk of cost overruns due to inadequate tracking of finances. Strong links to the EPSDD Strategic Finance team were developed in Healthy Waterways 1 to ensure that the finances are managed appropriately and with probity. The ledger will be reviewed annually by an auditor, independently of the EPSDD audit, to help ensure that the books are in order.
- **Contract arrangements** – The delivery model can be used to share and manage risks, including the risk of cost overruns or under-delivery. For example, over-spends in the construction of infrastructure in Healthy Waterways 1 that were not managed as variations were to be financed by the Managing Contractor, which effectively capped the budget.

4.2.2. Delivery Model Contingency

The management of contingencies relating to construction delivery depends on the delivery model chosen (e.g. SAF Guidelines p.20). Contingency funding is managed quite differently for the Managing Contractor approach proposed for this project compared with approaches that contract out design and construction separately. For example, because the Managing Contractor for Healthy Waterways 1 controlled both design and construction of all sites, the initial contingency budget was only 10% (Construction Control 2017; compared with 30% in SAF guidelines), and any contingency funding that was ultimately released following the construction of an asset was used to build more assets. The efficient use of contingency is one of the strengths of the Managing Contractor delivery model. However, if the Managing Contractor approach is adopted, Treasury will not access and control contingency funding. Instead, contingency funds will be managed through governance processes established by the Managing Contractor.

Contingency funding will be worked out in detailed budgeting during the initial stages of the project.

4.3 Whole of Life

Whole-of-lifecycle costs of infrastructure are accounted for in each cycle of planning and evaluation in EPSDD waterways projects. Lifecycle costs were considered in both the options analysis during the planning phase for Healthy Waterways 1 (Aither 2015) and in the evaluation of project benefits following the construction of assets (NCEconomics 2019). The whole-of-lifecycle costs will again be considered in the options analysis to be conducted in the scoping activities for Expand Healthy Waterways (see Section 3.3.3).

4.4 Budget / Funding Strategy

The budget impacts of Expand Healthy Waterways are summarised in Table 2.

The budget prepared ‘in-sources’ several of the services in this project, consistent with 1) priorities set in the 10th Parliamentary and Governing Agreement, and 2) the most cost-effective approach.

However, an alternative budget can be prepared that shifts many elements of the in-sourced work to the private sector if that is deemed important. This would create considerably less value for greater cost and shifts core business out of EPSDD, which increases risks and delivers less

opportunity for the Directorate to benefit from growing corporate memory. It would also be contrary to the agreed executive reforms in the *Parliamentary and Governing Agreement. 10th Legislative Assembly. Australian Capital Territory*, viz. 'government services will not be contracted out where they could be performed by public servants'.

Table 2. Summary financial impact of Expand Healthy Waterways

EPSDD Business Case Costing Template - Summary					
Business Case No:	EPSDD C14				
Business Case Name:	Expand the Healthy Waterways program ($30M over 4 years)				
Output Class	02 Environment				
Funding: Ongoing or non-ongoing?	Non-ongoing				
Cross Directorate Impact (pick from the drop-down list)	Transport Canberra and City Services Directorate				
Has a component of DSGC? (Yes/No)	yes				
Financial Impact Summary	**2021-22 $'000**	**2022-23 $'000**	**2023-24 $'000**	**2024-25 $'000**	**Total $'000**
Capital Impact					
Capital (staff and supplier)	1,844	5,434	7,025	2,552	16,855
Expense Impacts (a)					
Expenses (staff and supplier)	3,386	2,959	2,796	2,509	11,650
Expenses - Depreciation	-	23	91	179	293
Revenue/Savings/Offsets Impacts					
Revenue	-	-	-	-	-
Savings	-	-	-	-	-
Offsets (b)	-	-	-	-	-
Staffing Impact	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**Total $'000**
FTE	6.5	7.0	7.0	7.0	
Capital staffing costs ($'000)	-	-	-	-	-
Recurrent staffing costs ($'000)	1,056	1,159	1,182	1,205	4,603

5. Economic Analysis

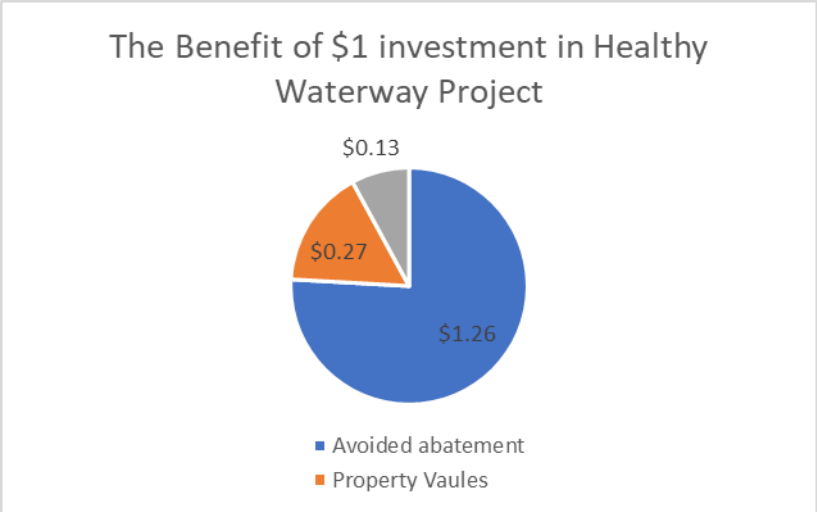
5.1 Cost Benefit Analysis

A cost-benefit analysis was undertaken in the planning phase for Healthy Waterways 1 and was recently updated following the construction of 20 water quality assets by that project (NCEconomics 2019). It estimated the benefit-cost ratio was between 1.3 and 2.6 (90% confidence interval), most likely 1.66. This analysis not only considered the benefits of pollution control but also enhanced amenity, physical activity and recreation for residents, urban cooling, and enhanced biodiversity associated with the water quality assets.

This project contributes to ACT's fiscal strength in two ways based on the most likely benefit-cost ratio from NCEconomics report (Figure 3). It is estimated that every $1 invested in this project will avoid potential abatement costs of $1.26, achieving a net fiscal saving of $0.26 per dollar of investment. As well, a $1 investment is estimated to increase ACT's property value by $0.27, which can translate into higher land tax, conveyance stamp duty and land sale revenue.

A new cost-benefit analysis will be conducted as a part of scoping activities for Expand Healthy Waterways because what is proposed differs in material ways to what was achieved in Healthy Waterways 1. Expand Healthy Waterways will commit roughly equal funding on 1) infrastructure to buffer waterways, aimed at preventing nutrients from entering and polluting stormwater in the first place, and 2) in a behavioural change program, research and monitoring, and wellbeing enhancements, and 3) water quality infrastructure aimed at filtering pollution from stormwater (i.e. approximately 1/3 funding to each). In contrast, Healthy Waterways 1 invested in the construction of water quality infrastructure to filter pollution from stormwater (ca. 91%), research and monitoring (7%) and a behavioural change program (ca. 1%). The cost-benefit analyses will strongly influence the final breakdown of the Expand Healthy Waterways 1 investment among various kinds of infrastructure, research etc.

Figure 3. Decomposing the benefits from $1 investment in a Healthy Waterways project



5.2 Wider economic benefits

The project also likely achieves a high fiscal multiplying effect. $1 spending is estimated to increase ACT's gross regional product (GRP) by $0.91 (NCEconomic, 2019). This is in the upper range of the fiscal multipliers (0.6 to 1; Ramey, 2018).

6. Delivery Model Analysis

6.1 Outline of Key Risks

Risk will be managed in accordance with risk standards for the Directorate, which in turn are consistent with ACT Government Risk Management Policy 2019, ACTIA's ACT Government Risk Management Policy Implementation Guide 2019, and Australian Standard Risk Management Guidelines (AS ISO 31000:2018).

A preliminary risk analysis has been performed (Appendix D) and a Risk Register will be used for the proposed Expand Healthy Waterways Project. Risk workshops will be conducted, and a Risk Plan developed, in the scoping activity of the project according the ACT Government Risk Management Policy Implementation Guide 2019.

6.2 Commercial Principles

The relative importance of commercial criteria, from most to least important, are:

1. Flexibility – In general there is less certainty in the construction of stormwater works than for many other kinds of infrastructure, and flexibility is vital to deal with situations arising during construction. Sources of uncertainty in waterway works relate, for example, to high risk levels from flooding, encountering illegally dumped asbestos or other contamination, existing utilities infrastructure, subtle features of construction sites resulting in large changes in asset hydraulics and thus performance, and unknown factors leading to unexpected plant losses (bioretention assets only). Allowing flexibility in asset designs and in how contingency funds are allocated within packages of works improve both the performance of assets and the cost-effectiveness of the project.
2. Innovation and Incentive – There are other examples of urban lake restoration from around the world but, nevertheless, Expand Healthy Waterways is not a 'standard' project in the way building a road or bridge might be considered. Innovations in the design and delivery of works and services will improve the performance of works constructed in the project, and incentives will maximise the benefits arising from the resources invested in the project. The project will need to be managed in a manner that enables innovation and provides incentives to achieve as much as possible for the investment provided. The managing Contractor approach is well suited to projects that require innovation (Ernst and Young 2016).
3. Risk Transfer – As a multifaceted project, comprising a variety of both works and services, it is vital to have a project solution that allocates risks in project design and delivery among those parties best positioned to manage that risk. This objective is a criterion used to help evaluate the various options for the procurement and delivery of both capital works and services.

4. Time to Market – This project will be managed to a schedule of capital works and services (as was successfully done in the current Healthy Waterways 1 project). However, time pressures are less important than ensuring that the greatest benefit is achieved through the performance of works or services.
5. Price Certainty – This project aims to solve a pollution problem and create water quality/wellbeing benefits for the least cost. Spending is kept within budget for a given financial year, however, mechanisms will be put in place to provide flexibility in how the problem is solved so that uncertainties can be managed. For example, it is not uncommon to encounter illegally dumped building products that contain asbestos during construction of water quality assets within waterways. Tactics for dealing with this—e.g. removal and disposal of materials or relocating the asset—will increase costs unless scope (and thus pollution filtering performance) is cut. And the approach of increasing the budget to cover such contingencies ends up costing more in situations where no problems are encountered. The approach to be adopted in this project will allow for some flexibility in the cost of building the asset, and facilitate the efficient use of contingency funding, rather than to building assets that underperform (filter less pollution). Experience in Healthy Waterways 1 suggests that this is a more effective and efficient approach to solving the problem.

6.3 Delivery Model Assessment

The Project Managing Contract Administrator/Managing Contractor approach will be adopted for this project, extending arrangements in Healthy Waterways 1 if approved. Under this model in Healthy Waterways 1, ca. 85% of the construction costs are procured via open market tenders.

6.4 Recommended Delivery Model

Extension to the existing Managing Contractor and Contract Administrator contracts for Healthy Waterways 1 will efficiently and effectively deliver the program of capital works proposed for the project. The services will be delivered under the direction of the Lead Agency, EPSDD.

6.5 Review 3 (IFCW): Delivery Model Selection

IFCW directorate to sign off that the delivery model selected is appropriate for the project risk profile and value.

Review 3 (IFCW) Officer Name: _____

Signature: _____

Date: _____

- *This is the second review point for IFCW and is an assessment of the delivery model analysis.*
- *Sign off should only occur if the IFCW office is confident that the delivery model selected is the most suitable to the project requirements and level of risk.*

Disclaimer: *This review does not represent an endorsement or agreement by the signing officer as to the contents of the section or a certification that the work was correctly performed.*

7. Project Governance

The successful governance arrangements in Healthy Waterways 1 will be used as a blueprint for project governance for Expand Healthy Waterways.

7.1 Expand Healthy Waterways Steering Committee

Purpose of Committee: The purpose of the Project Steering Committee is to provide a high-level consultative forum at the senior-executive-level to discuss strategic issues that affect the project, and ensure investments made meet the requirements of the agreed Project Schedule.

Project approval and decisions are the responsibility of EPSDD and not the project Steering Committee.

Committee Composition: The composition of the project Steering Committee is:

Members

- Director-General, Environment Planning and Sustainable Development Directorate or delegate (Chair) or delegate.
- Executive Group Manager, Infrastructure Delivery, Major Projects Canberra
- Executive Group Manager, City Services, Transport Canberra and City Services
- Executive Group Manager, Environment, Heritage and Water Division, Environment Planning and Sustainable Development Directorate

Observers/Supporting Officers

- Program manager, Expand Healthy Waterways Project
- Finance Manager, Expand Healthy Waterways Project
- Experts can be invited to the meeting on an as needs basis.

Chair and Secretariat: The Chair—the Director General, Environment Planning and Sustainable Development Directorate or delegate—shall convene the Project Steering Committee meetings. The Program Manager, Expand Healthy Waterways Project, shall arrange for minute taking, a decision register and venues for the meeting.

Quorum and Proxies: A minimum of one representative from EPSDD and two other members from outside EPSDD are required for the meeting to be recognised as an authorised meeting for the recommendations or resolutions to be valid. Members can send proxies to meeting, and they will be entitled to participate in discussion decision making.

Meeting Frequency: Meetings should aim to take place twice a year, with additional meetings where required.

Agenda Minutes and Decision Papers: A package will be sent to members three to five business days in advance of the Steering Committee meeting. The package will include the following:

- agenda for the upcoming meeting;
- minutes of the previous meeting;
- a progress report for the project;
- decision papers; and
- any other documents/information to be considered at the meeting.

7.2 Expand Healthy Waterways Working Group

Purpose of Committee: To inform the Project Steering Committee, and to provide a productive and efficient working relationship. At officer-level the Project Working Group will meet to:

- discuss progress of the Project;
- discuss the ACT's draft Annual Workplan;
- discuss draft progress reports;
- discuss any issues intended to be raised at the Project Steering Committee;
- resolve any potential issues at an officer level; and
- inform the Project Steering Committee on the Working Group meeting outcomes.

Committee Composition: The composition of the Working Group is

- Senior Director, Resilient Landscapes, Environment, Heritage and Water Division, Environment Planning and Sustainable Development Directorate (Chair)
- The Expand Healthy Waterways Program manager.
- An operational officer from each of MPC and TCCS.
- The Lead Contractor for capital works, e.g. for the PMCA/MC it is the PMCA.
- Experts can be invited to the meeting on a needs basis.

Chair and Secretariat: The Chair—the Senior Director, Resilient Landscapes, Environment, Heritage and Water Division, Environment Planning and Sustainable Development Directorate—shall convene the Project Steering Committee meetings. The Program Manager, Expand Healthy Waterways Project, shall arrange for minute taking, a decision register and venues for the meeting.

Quorum and Proxies: A minimum of one representative from both EPSDD and two other members from the ACT Government outside EPSDD are required for the meeting to be recognised as an authorised meeting for the recommendations or resolutions to be valid. Members can send proxies to meeting, and they will be entitled to participate in discussion decision making.

Meeting Frequency: Formal meetings should aim to take place at least six times a year. Informal meetings may be undertaken in between formal meetings as issues requiring discussion arise.

Agenda Minutes and Papers: For the formal meeting, a package will be sent to members three to five business days in advance of the Working Group meeting. The package will include the following:

- agenda for the upcoming meeting;
- minutes of the previous meeting; and
- any other documents/information to be considered at the meeting.

Arrangements for informal meetings are at the agreement of members.

A draft summary of the actions and relevant discussions should be provided to the committee members within five working days of the meeting.

Should an issue not be able to be resolved at the Working Group, then it should be referred up to the Project Steering Committee for resolution.

7.3 Expand Healthy Waterways User Group

Purpose of Committee: To provide a productive and efficient forum for communication and the management of risks and opportunities as they arise, and to inform the project Working Group. The User Group will meet to:

- discuss progress in delivery of the Project and any risks, impediments and opportunities that may affect the design and delivery of specific assets or the project schedule, scope or cost;
- report on workplace health and safety;
- make decisions on project matters as required;
- keep the project managers from EPSDD well-informed; and
- discuss any issues raised by or intended to be raised at the project Working Group.

Committee Composition: The composition of the User Group is

- The Lead Contractor for capital works, e.g. for the PMCA/MC it is the PMCA (Chair).
- The contractor in charge of procuring and directing capital works, e.g. for the PMCA/MC it is the MC.
- Experts invited to the meeting by the contractors on a needs basis.
- Representatives from EPSDD, MPC and TCCS as observers.

Chair and Secretariat: The Chair is the PMCA for capital works. The Chair shall arrange for minute taking and venues for the meeting.

Quorum and Proxies: No quorum is required. This is a management meeting.

Meeting Frequency: Formal meetings should aim to take place on a schedule as determined by PMCA for capital works, typically weekly.

Agenda Minutes and Papers: For the formal meeting, a package will be sent to members one day in advance of the project User Group meeting. The package will include the following:

- agenda for the upcoming meeting;
- minutes of the previous meeting; and
- any other documents/information to be considered at the meeting.

Draft minutes should be provided to the committee members within four working days of the meeting. The Lead Contractor for capital works has the discretion to refer issues or significant risks to the Working Group for their information of resolution.

7.4 Key Roles and Responsibilities

The roles and responsibilities of the respective key stakeholder agencies are:

Roles/Responsibilities	EPSDD DG/DDG	EPSDD Exec GM Enviro	EDSDD Senior Dir. Resilient Landscapes	EPSDD HLT Program manager	MPC, TCCS reps	Lead Contractor – infrastructure	Procure-ment/ Delivery Contractor
Participate in the Project Steering Committee meetings	chair		secretariat	observer	✓		
Participate in the Working Group meetings			chair	secretariat	✓	✓	observer
Participate in the User Group meetings				observer	observer	chair, secretariat	✓
Assess activity/asset proposals (Due diligence)		✓	✓	draft and submit			
Formal assessment and approval of the Annual Workplan, progress reports, Final Project Reports and Audited Financial Reports	✓	✓	✓	draft and submit			
Approve any Project Schedule variation if appropriate		✓	✓	propose			
Manage and deliver all aspects of the approved project schedule of outputs and evidence their delivery				✓	✓	✓	✓
Liaise with the ACT and other key stakeholders		✓	✓	✓	✓	✓	✓
Deliver the project outcomes			✓	✓			
Provide progress reports on meeting project milestones and progress towards initial outcomes, including income and expenditure statements. Provide an invoice for the associated payment.				✓			
Approve payments following assessment that the project team has met the payment pre-conditions		✓	✓				
Provide annual audited income and expenditure statements				✓			

Contact officers

Project contact officers are to have regular informal communications on the progress of the project, and to identify any emerging issues for the project. The appropriate officer level contacts for day-to-day interactions will be identified and shared among all appropriate members of governance bodies.

7.5 Public communication and media

EPSDD recognises that the Expand Healthy Waterways Project may impact the business, stakeholders and reputation of other Directorates in the ACT Government. Responsibility for communications will be led by EPSDD and shared among all Directorates represented on the governance committees as well as ACT Health, ACT EPA and Access Canberra. A common narrative for the project and issues like blue-green algal blooms will be collaboratively drafted by the partners in communication.

8. Timeline

8.1 Project Timetable

8.1.1. Outline

- Construction of strategic infrastructure, focussed on the Tuggeranong catchment and selected priority locations elsewhere:
    - Trials of ten street-scale water quality assets across Canberra but focussed on Tuggeranong.
    - Trials of swales and related features to promote infiltration of stormwater in green spaces in the Lake Tuggeranong (Richardson, near the Tuggeranong Homestead) and Lake Ginninderra (Emu Creek) catchments as a minimum.
    - Roll out of swales and related features to promote infiltration of stormwater in green spaces, covering approximately 4% of the Tuggeranong catchment.
    - At least three large-scale assets to filter out unavoidable stormwater pollution: two raingardens at Kambah District Playing Fields 1 and 3, and one in Richardson, near the Tuggeranong Homestead. These will be linked to water recycling schemes for the playing fields, augmented by stormwater from surrounding urban areas.
    - Roll-out of ninety more street-scale water quality assets across Canberra but focussed on Tuggeranong
- Initiate behavioural change program targeting polluting activities by householders, followed by full roll-out across Canberra as the effectiveness of various messaging and its delivery is confirmed.
- Riparian erosion control/mitigation works in Paddy's River and possibly one other rural catchment
- Scoping/enabling activities:
    - Research into pollution sources in the Tuggeranong catchment.
    - Stormwater water quality monitoring across the ACT.
    - Modelling of the cost-effectiveness of various water quality management options for 5-7 priority catchments (see next).

- Initial catchment plans for Lakes Tuggeranong, Burley Griffin, and Ginninderra, and for Yerrabi Pond and possibly one other urban pond or river.
- Initial catchment plans for Paddy's River and possibly one other rural catchment.
- Community engagement re potential infrastructure sites and seeking inputs to catchment plans.
- Design signage for landscaping around lakes, ponds and water quality assets across Canberra to raise awareness about Ngunnawal history and culture related to water.

8.1.2. Proposed float

There is flexibility in the staging of various elements of the project. The aim is to solve problems rather than manage a tight schedule as the highest priority (as might be the case in an externally funded project). However, given the recent water quality problems (e.g. over the last decade algal blooms in have averaged 3 months a year), there is a sense of urgency to resource a project and solve some problems, which is why most the infrastructure to be constructed by this project is being placed in the Lake Tuggeranong.

8.1.3. Project constraints and/or deadlines

At the year-to-year scale an ambitious program of work will need to be scheduled and managed to ensure that the investment achieves its objectives.

A rigorous process will be undertaken to ensure compliance with all ACT Government legislative requirements. To facilitate a smooth approval process, infrastructure options will be scoped based on:

- Territory Plan (key statutory planning document in the ACT) Land Use Constraints
- Slope
- Utility Easements
- Significant plants and animals (e.g. *Nature Conservation Act 2014*, *Environment Protection and Biodiversity Act 1999*)
- Registered Tree data (*Tree Protection Act 2005*)
- Heritage values (*Heritage Act 2004*)
- Contaminated Sites (*Environment Protection Act 1997*)

An intense phase of community engagement has been planned for early in the project (see Section 2.1.3). Internal engagement with TCCS, EPA, and MPC will occur through project governance (Section 7) and at an officer level. This will emulate aspects of the successful community engagement during planning for Healthy Waterways 1 (EPSDD 2017) and will build on relationships developed in that project.

8.1.4. Project decision points

The main decision points occur at the end of scoping activities as options analyses and catchment plans are finalised. At this point recommended options will have been evaluated in terms of their water quality benefits and wellbeing outcomes, based on cost-benefit analyses. Recommended

strategic solutions can then either be confirmed or replaced with alternative options according to Government priorities, as guided by the Project Steering Committee.

Other more minor decision points will occur through regular governance activities (Section 7) and will mainly focus on evaluating design options to achieve the greatest benefit for the least cost.

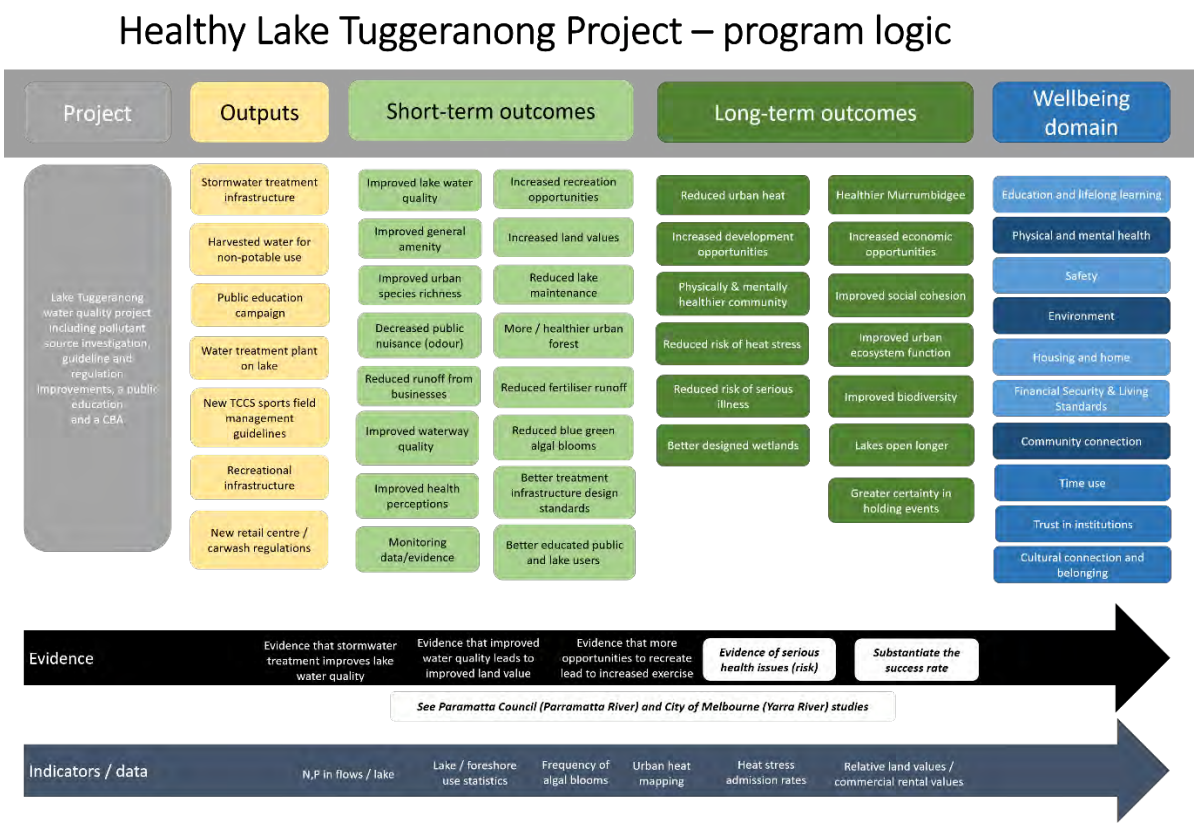
9. Appendices

Appendix A – Functional Brief/Output Specification

The full program of infrastructure is currently either being planned (newly considered assets) or reviewed (assets already with development approval). Detailed designs and specifications will be considered by the Project Steering Committees in the normal course of business.

Appendix B – Investment Logic Map.

This logic was developed for Lake Tuggeranong and a program logic will be developed for all priority catchments in this project by before June 30 2022.



Outcome	Alignment to wellbeing domains									
	Education and Life-long Learning	Physical & mental health	Safety	Environment	Housing and home	Financial Security and Living Standards	Community Connection	Time use	Trust in institutions	Cultural Connection and Belonging
	Tertiary alignment	Primary alignment	Tertiary alignment	Primary alignment	Tertiary alignment	Tertiary alignment	Primary alignment	Secondary alignment	Secondary alignment	Secondary alignment
Reduced urban heat / risk of heat stress		✓		✓			✓	✓		
Increased development opportunities					✓				✓	
Physically and mentally fitter community Reduced risk of serious illness		✓✓✓			✓		✓	✓	✓	✓
Improved land values						✓				
Healthier Murrumbidgee		✓		✓						✓
Increased economic opportunities			✓			✓	✓✓		✓	
Improved social cohesion / opportunities		✓✓	✓				✓✓			✓
Improved urban ecosystem function				✓✓✓						
More effective treatment systems				✓						
Lakes open longer / more events		✓✓✓					✓✓	✓	✓	✓
Improved lake biodiversity		✓		✓✓						
Improved awareness of water quality issues	✓			✓				✓		

Project outcome	Contributes to (Domain)	Strength of alignment	Rationale for strength of alignment
Reduced urban heat / risk of heat stress	Physical and mental health	Primary	Reduced urban heat and risk of heat stress results in improved physical health outcomes.
	Environment	Primary	Canberrans enjoy a natural and built environment that is climate resilient.
Increased development opportunities Improved land values	Housing and home	Secondary	A clean and vibrant lake environment will be more amenable to business activity
	Trust in institutions	Secondary	CBA data demonstrates improve land values for lakeside suburbs
Physically and mentally fitter community Reduced risk of serious illness	Physical and mental health	Primary	Good lake water quality results in improved health outcomes by reducing the risk of illness and stress related to the water quality issues.
Healthier Murrumbidgee Improved urban ecosystem function Improved lake biodiversity	Environment	Primary	Canberrans enjoy a natural environment that is climate resilient, clean and green.
Increased economic opportunities Lakes open longer / more events	Financial Security and Living Standards	Secondary	Events held at the lake contribute to a strong local economy.
Improved social cohesion / opportunities	Physical and mental health	Primary	Opportunities to come together for sport and recreation around the lake contribute to improved physical and mental health for Canberrans.
	Community connection	Primary	Canberrans can access places to come together around the lake for social activities including sport and recreation.
More effective treatment systems	Environment	Primary	Canberrans enjoy a natural and built environment that is climate resilient, clean and green.
Improved awareness of water quality issues	Education and life-long learning	Secondary	Canberrans have access to meaningful education opportunities through the communications of water quality issues and aboriginal land use story as a part of wellbeing enhancements

Appendix C – Cost Estimate

The budget prepared 'in-sources' many of the functions to do with this project, consistent with 1) priorities set in the 10th Parliamentary and Governing Agreement, and 2) the most cost-effective approach. However, an alternative budget can be prepared that shifts many elements of the work from the public to the private sector if that is deemed important.

Capital Supplier costs

Commercial in confidence

Recurrent Supplier costs

Commercial in confidence

Recurrent Staff costs

Impacts	2021-22	2022-23	2023-24	2024-25	Total
$	1,056,324	1,159,190	1,182,075	1,205,413	4,603,002
FTE	6.5	7.0	7.0	7.0	

Appendix D – Risk Register

A preliminary risk analysis has been undertaken. Below are two risk registers covering 1) the risks associated with the Lake Tuggeranong elements of the Expand Healthy Waterways proposal, and 2) the risk associated with not investing in Expand Healthy Waterways. Risk Registers and plans will continue to be developed early and updated regularly.

RISKS ASSOCIATED WITH THE HEALTHY LAKE TUGGERANONG PROJECT

Directorate: EPSDD Project:

Risk Reference Number	Risk Category	The Risk:	Link to Strategic Objective	Key Risk Indicators (KRIs)	Source	Impact / Outcome	Risk Owner	Risk Controls Currently in Place	Risk Rating: Consequence (1-5)	Likelihood of Consequence (1-5)	Inherent Risk Rating	Control Effectiveness	Further Treatments (Yes/No)	Comments
4	Financial	Cost over-runs	4 Build trust and confidence	1) Consistent underperformance of project in achieving objectives within budget 2) Options thought to solve problem do not (i.e. money has been spent but the problem is not solved)	1) Poor project management including poor cost estimation 2) Models used to estimate effects are inaccurate or underutilised	Loss of faith in Government to solve problems	EPSDD, ACT Government	1) Strong project management by dedicated staff including project manager and finance officer 2) Outsourcing elements if Govt does not have expertise to manage it 3) Dedicated staff, tasks and resources for cost and environmental modelling to provide greatest certainty that objectives can be achieved within budget 4) Strong governance combined with regular reporting and oversight	5	4	Extreme	Adequate	No	**Extreme consequence based on ACTIA criteria and cost blowouts in other ACT Govt projects. Confidence that risk mitigations are adequate comes from positive experience in Healthy Waterways Project. However, mitigation of risks relies on the budget for EPSDD staff being approved.**
1	Assets	Loss or destruction of assets	1 Deliver a compact and efficient city	Site inspections	Stormwater assets are by definition in drainage lines and thus are subject to damage during construction by excessive flows.	Increase cost of construction	EPSDD, Construction contractors	1) Flow diversions at construction sites 2) Higher contingency budget for vulnerable sites	3	4	High	Adequate	No	**Costs increases can be minimised if unspent contingency funds can be transferred to other assets under construction**
2	People	Serious injury causing hospitalisation	4 Build trust and confidence	WHS reports from construction project managers	Injuries can happen on worksites	1) Personal impact to injured person 2) Reputational/ accreditation impact to construction firm 3) Reputational impact to ACT Govt as a contractor 4) Increased insurance costs	EPSDD, Construction contractors, ACT Govt	1) WHS certification of consttruction firm 2) WHS practices by construction firm 3) Active oversight of WHS by governance bodies	3	4	High	Adequate	No	**ACTIA consequence criteria used but they seem too lenient. However, experience in Healthy Waterways suggests that the risk controls successfully mitigate the construction risks.**
3	Environment	Moderate, short-term disturbance of waterways	2 Enhance Canberrans' quality of life by conserving and experiencing nature and culture	1) Reporting of condition of construction sites 2) Bioassessment and pollutant levels from ecological and water quality monitoring	Construction temporarily disturbs sites and leaves them vulnerable to soil erosion	1) Disturbance of waterway biota 2) Can trigger events like algal blooms	EPSDD, construction contractors, EPA	1) Berms to isolate construction sites from adjacent waterways 2) Regular inspection of site condition and integrity	3	4	High	Adequate	No	
5	Information & records mgt	Complete, permanent loss of electronic records	4 Build trust and confidence	1) Negative assessments of project by governance bodies. 2) Nonconformity audit finding	1) Poor records management (e.g. no single source of truth, inadequate archiving or business continuity planning etc.) 2) Poor project management	1) Poor project evaluations, business continuity and capacity for adaptive management 2) Rectification of shortcomings in staff performance and project processes required 3) Loss of faith in EPSDD to solve problems	EPSDD	1) Strong project management by dedicated, well-trained staff including project manager, finance officer, project officer 2) Planning for records management, versioning and business continuity, and use of Govt tools (e.g. Objective) 3) Strong governance combined with regular reporting and oversight	4	4	High	Adequate	No	**Confidence that risk mitigations are adequate comes from positive experience in Healthy Waterways Project. However, mitigation of risks relies on the budget for EPSDD staff being approved.**
6	Reputation & Image	Intense public and political media scrutiny of an underperforming project means Minister must manage dissatisfaction across a large range of demographic groups	4 Build trust and confidence	1) Media coverage of community concerns 2) Complaints or other negative queries via Ministers or MLAs offices, Access Canberra & other channels	1) Pollution/algal blooms is a complex problem requiring expertise to solve... 2) ...and the project will be scrutinised. There is a history of community concerns over the condition of waterways generally and Lake Tuggeranong algal blooms specifically 3) There are many well informed community members (e.g. engineers, scientists) who will be looking for evidence of success and failure and either approach Government directly or pass on their concerns to media and community groups	Cynicism about the commitment and competence of Government to spend taxpayer money and solve problems	EPSDD, ACT Govt	1) Political commitment to solve the problem 2) Environmental and cost modelling managed as 'core business' to underpin options analyses and the design of the preferred option. 3) Outsourcing of most of the delivery to experts (construction, public education). 3) Project manager with appropriate stature and skills in communication and community liaison appointed to lead and engage with the public. 4) Dedicated communications staff and resources. 5) Communications and stakeholder engagement plans with proactive media and outreach strategy.	4	4	High	Adequate	No	
7	Cultural & Heritage	Permanent damage to structures and items of cultural significance	2 Enhance Canberrans' quality of life by conserving and experiencing nature and culture	1) Media coverage of community concerns 2) Complaints or other negative queries via Ministers or MLAs offices, Access Canberra & other channels	If analyses in the Planning Phase show that the urban catchment is simply too large for the size and flushing rate of the lake then the only possible outcomes are permenant algal blooms (i.e. do nothing scenario) or replace the lake with a park as a centrepiece. This would mean the loss of the iconic lake.	There is likely to be a strong reaction by the community to either of these outcomes.	ACT Govt, EPSDD	The preferred acenario for this project avoids these outcomes. The viability of the preferred scenario will be confirmed in analyses in the Planning Phase.	4	2	High	Inadequate	Yes	**The risk mitigations are rated 'inadequate' because the Government will need to do more to 'socialise' this reality should it eventuate.**

RISK OF NOT INVESTING IN HEALTHY LAKE TUGGERANONG PROJECT

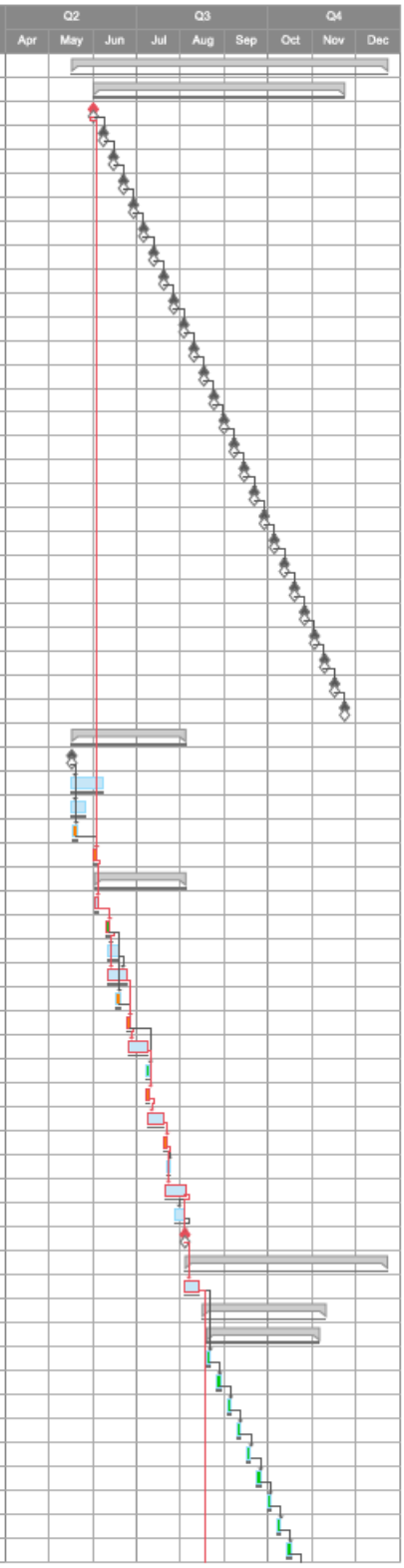
Directorate: EPSDD Project:

Risk Reference Number	Risk Category	The Risk:	Link to Strategic Objective	Key Risk Indicators (KRIs)	Source	Impact / Outcome	Risk Owner	Risk Controls Currently in Place	Risk Rating: Consequence (1-5)	Risk Rating: Likelihood of Consequence (1-5)	Risk Rating: Inherent Risk Rating	Control Effectiveness	Further Treatments (Yes/No)	Comments
1	Servrice delivery	Greatly diminished value of Lake Tuggeranong as an amenity and recreational centrepiece	2 Enhance Canberrans' quality of life by conserving and experiencing nature and culture	Amenity values - public perceptions (e.g. complaints to Access Canberra, social media; surveys), foreshore business activty, no. of events held Recreational values - lake closure days	Blue-green algal blooms occur in Lake Tuggeranong due to high loads of phosporus pollution	Diminished core service provided by Lake Tuggeranong for an average of 3 months/year	EPSDD, TCCS, EPA	None.	4	4	High	Inadequate	Yes	
2	People	Serious poisoning causing hospitalisation or medium-term disability (also applies to pet dogs) Psychological injury resulting in reduced ability to perform tasks and requiring ongoing support	2 Enhance Canberrans' quality of life by conserving and experiencing nature and culture	Incidence of hospital (or for dogs, vet) admissions for blue-green algal poisoning Incidence of referrals for psychosomatic symptoms arising from blue-green alagl blooms. Complaints to Access Canberra.	Direct contact with toxic blue-green algae (e.g. through swimming, boating) Blue-green algal scums are quite odourous	Can cause significant health problems in humans and is often fatal in dogs (due to their habit of licking their coats). Susceptible people may suffer psychosomatic symptoms. The health risks associated with algal aerosols have not been determined with certainty.	ACT Health, EPA, TCCS	1. Results of weekly monitoring of blue-green algal concentration in lake waters circulated widely in Govt. 2. Surveillance of media and cross-directorate communication about occurrence of blooms. 3. Public alerts and lake closures (communicated through the media and signs on-site. 4. Facts and narrative on health impacts drafted by ACT Health and shared with other directorates.	3	3	Medium	Room for improvement	Yes	**Weekly monitoring has missed blooms at times (either because they arise within the week or because algal concentartions are spatially variable), potentially exposing residents and their pets to health risks**
3	Environment	Poor water quality in Lake Tuggeranong, its tributaries and the Murrumbidgee River downstream	2 Enhance Canberrans' quality of life by conserving and experiencing nature and culture	Water quality monitoring Incidence of algal blooms	Drainage off urban surfaces increases waterway flows 3 times over rural catchments. Less absorption means less opportunity for soils and plants to bind 'natural' phosphorus. Use of fertilisers, detergents etc. increases phosphorus pollution.	Median phosphorus levels in Tuggeranong waterways are three times regulatory limits. Phosphorus drives blue-green algal blooms. It is the only driver of algal blooms that water managers can control.	EPSDD, EPA, TCCS, ACT Health	Some catchment works to filter phosphorus from stromwater system before water enters the lake Environmental regulation and compliance monitoring	4	5	Extreme	Inadequate	Yes	**The consequence rating is based on ACTIA guidelines, but seems excessive compared with the normal harm that is allowed to occur in the normal course of business.**
4	General business activities	Signifcant impact on businesses that rely on Lake Tuggeranong	1 Deliver a compact and efficient city	Business income in periods of algal bloom versus outside Benefit cost analyses to estimate lost income	Reduced amenity and recerational values through realisation of risk 1, and harm to people and the environment through realisation of risks 2 & 3	Less business activity, both for existing busiesses and for the establishment of new ones, compared to the scenario of a healthy Lake Tuggeraning	Treasury, Tuggeranong community	Various Government strategic plans (see Business Case)	4	5	Extreme	Inadequate	Yes	**Since algal blooms have afflicted the lake for at least the last decade, an estimate of costs of opportunities to do business in the absence of blooms may be the best estimate of impact.**
5	Financial	Less revenue or lower ROI for creation of Tuggeranong precinct	1 Deliver a compact and efficient city	Benefit cost analyses to estimate lost revenue to Treasury	Reduced business activity and lower property rates from nearshore commercial and residential assets	Lower tax base from which to drive services and investment	Treasury	None?	5	5	Extreme	Inadequate	Yes	**The consequence rating is based on ACTIA guidelines, but seems excessive.**
6	Compliance/ Regulation	Regular non-compliance with water quality targets sets a bad precendent for environmental regulation	4 Build trust and confidence	Response of water management stakeholders to evidence of non-compliance	Stakeholders are aware that poor water quality in Lake Tuggeranong, its tributaries and the Murrumbidgee River downstream (risk 3) regularly exceeds targets set by regulators to limit pollution, which reduces confidence in the effectiveness of regulatory processes	Lower confidence in environmental regulation limits its usefulness as a tool to achieve environmental outcomes Key stakeholders and the public lose faith in Government to solve problems	EPSDD & ACT Govt more broadly	Investments in ACT Healthy Waterways and recent $1.1m announcement of additional works by the Environment Minister	3	4	High	Inadequate	Yes	**The investments have been welcomed but there are informed stakeholders in the community - and an annual reminder in the form of algal blooms - to demonstrate that these investments are not enough to solve the problem**
7	Reputation & Image	Annual algal blooms and the prevalence of poor water quality harm the reputation of Government	4 Build trust and confidence	Feedback to MLAs and Government departments through Access Canberra and other channels	The persistence of problems in Lake Tuggeranong leads to perception that Government is either incompetent or unwilling to solve the problem	Dimished support for and confidence in Government	EPSDD & ACT Govt more broadly	Investments in ACT Healthy Waterways and recent $1.1m announcement of additional works by the Environment Minister	4	5	Extreme	Inadequate	Yes	**Without a significant program of works and services that can be shown to solve the problems in Lake Tuggeranong over the long term, the investments that have been made will increasingly be perceived as politically motivated window dressing.**

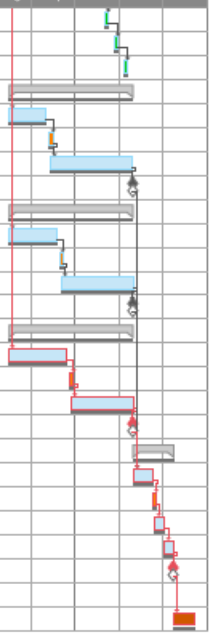
Appendix E – Project Programme

A detailed Project Program will be prepared near the completion of the first 6-month investment in Expand Healthy Waterways (i.e. January to June 2021) for use by the proposed bid. The attached program is a draft.

	Task Name	Duration	Start Date	End Date
1	**Healthy Waterways 2 - Planning Phase**	**155d**	**17/05/21**	**22/12/21**
2	**PMCA Meetings**	**123d**	**01/06/21**	**23/11/21**
3	PMCA Meeting 1	0	01/06/21	01/06/21
4	PMCA Meeting 2	0	08/06/21	08/06/21
5	PMCA Meeting 3	0	15/06/21	15/06/21
6	PMCA Meeting 4	0	22/06/21	22/06/21
7	PMCA Meeting 5	0	29/06/21	29/06/21
8	PMCA Meeting 6	0	06/07/21	06/07/21
9	PMCA Meeting 7	0	13/07/21	13/07/21
10	PMCA Meeting 8	0	20/07/21	20/07/21
11	PMCA Meeting 9	0	27/07/21	27/07/21
12	PMCA Meeting 10	0	03/08/21	03/08/21
13	PMCA Meeting 11	0	10/08/21	10/08/21
14	PMCA Meeting 12	0	17/08/21	17/08/21
15	PMCA Meeting 13	0	24/08/21	24/08/21
16	PMCA Meeting 14	0	31/08/21	31/08/21
17	PMCA Meeting 15	0	07/09/21	07/09/21
18	PMCA Meeting 16	0	14/09/21	14/09/21
19	PMCA Meeting 17	0	21/09/21	21/09/21
20	PMCA Meeting 18	0	28/09/21	28/09/21
21	PMCA Meeting 19	0	05/10/21	05/10/21
22	PMCA Meeting 20	0	12/10/21	12/10/21
23	PMCA Meeting 21	0	19/10/21	19/10/21
24	PMCA Meeting 22	0	26/10/21	26/10/21
25	PMCA Meeting 23	0	02/11/21	02/11/21
26	PMCA Meeting 24	0	09/11/21	09/11/21
27	PMCA Meeting 25	0	16/11/21	16/11/21
28	PMCA Meeting 26	0	23/11/21	23/11/21
29	**Feasibility**	**55d**	**17/05/21**	**03/08/21**
30	Variation Awarded	0	17/05/21	17/05/21
31	Mobilise Teams	15d	17/05/21	07/06/21
32	Prepare Scope Report and Programme	8d	17/05/21	26/05/21
33	Scope definition Meeting 1	1d	18/05/21	18/05/21
34	Scope definition meeting 2 at PMCA 1	1d	01/06/21	01/06/21
35	**Feasibility Study**	**44d**	**02/06/21**	**03/08/21**
36	Issue documentation	2d	02/06/21	03/06/21
37	Kick Off Meeting with Consultants	1d	10/06/21	10/06/21
38	Review Design Criteria Report	5d	11/06/21	18/06/21
39	Prepare Feasibility Study Criteria	8d	11/06/21	23/06/21
40	Site Visits to Catchments	2d	17/06/21	18/06/21
41	Feasibility Study - Workshop 1 with Stakeholders	1d	24/06/21	24/06/21
42	Consultant Review Identified Feasibility Options	9d	25/06/21	07/07/21
43	Feasibility Progress Meeting	1d	08/07/21	08/07/21
44	Feasibility Study - Workshop 2 with Stakeholders	1d	08/07/21	08/07/21
45	Update feasibility work and assess against criteria	7d	09/07/21	19/07/21
46	MCA Workshop to Finalise Feasibility Selections	1d	20/07/21	20/07/21
47	Feasibility Stage Progress Meeting	1d	22/07/21	22/07/21
48	Feasibility Report	10d	21/07/21	03/08/21
49	Prepare Scoping Documents for PSP Package	5d	28/07/21	03/08/21
50	Feasibility Stage Complete	0	03/08/21	03/08/21
51	**Preliminary Design**	**100d**	**04/08/21**	**22/12/21**
52	Prepare Fee Proposals & Award	8d	04/08/21	13/08/21
53	**Preliminary Design Development**	**81d**	**16/08/21**	**09/11/21**
54	**Preliminary Design Progress Meetings**	**55d**	**19/08/21**	**04/11/21**
55	Preliminary Design Progress Meeting 1	1d	19/08/21	19/08/21
56	Preliminary Design Progress Meeting 2	1d	26/08/21	26/08/21
57	Preliminary Design Progress Meeting 3	1d	02/09/21	02/09/21
58	Preliminary Design Progress Meeting 4	1d	09/09/21	09/09/21
59	Preliminary Design Progress Meeting 5	1d	16/09/21	16/09/21
60	Preliminary Design Progress Meeting 6	1d	23/09/21	23/09/21
61	Preliminary Design Progress Meeting 7	1d	30/09/21	30/09/21
62	Preliminary Design Progress Meeting 8	1d	07/10/21	07/10/21
63	Preliminary Design Progress Meeting 9	1d	14/10/21	14/10/21



	Task Name	Duration	Start Date	End Date
64	Preliminary Design Progress Meeting 10	1d	21/10/21	21/10/21
65	Preliminary Design Progress Meeting 11	1d	28/10/21	28/10/21
66	Preliminary Design Progress Meeting 12	1d	04/11/21	04/11/21
67	**Consultant package 1**	**61d**	**16/08/21**	**09/11/21**
68	Initial Design Works	20d	16/08/21	10/09/21
69	VM1 Workshop	1d	13/09/21	13/09/21
70	Complete Preliminary Design Works	40d	14/09/21	09/11/21
71	Issue PSP Report	0	09/11/21	09/11/21
72	**Consultant package 2**	**61d**	**16/08/21**	**09/11/21**
73	Initial Design Works	25d	16/08/21	17/09/21
74	VM1 Workshop	1d	20/09/21	20/09/21
75	Complete Preliminary Design Works	35d	21/09/21	09/11/21
76	Issue PSP Report	0	09/11/21	09/11/21
77	**Consultant package 3**	**61d**	**16/08/21**	**09/11/21**
78	Initial Design Works	30d	16/08/21	24/09/21
79	VM1 Workshop	1d	27/09/21	27/09/21
80	Complete Preliminary Design Works	30d	28/09/21	09/11/21
81	Issue PSP Report	0	09/11/21	09/11/21
82	**Planning Phase Report**	**20d**	**10/11/21**	**07/12/21**
83	Prepare Draft Planning Phase Report (PPR)	10d	10/11/21	23/11/21
84	Present Planning Phase Report	1d	24/11/21	24/11/21
85	Client Review of PPR	5d	25/11/21	01/12/21
86	Incorporate Client Comments	4d	02/12/21	07/12/21
87	Issue Planning Phase Report	0	07/12/21	07/12/21
88				
89	Contingency	11d	08/12/21	22/12/21



Appendix F – References

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Ubrihien RP et al. (2020) Lake Tuggeranong Research Project Report: Stage 3. October 2020. Link

Vincent, K., Starrs, D., and A. Lal (in prep). Patterns and processes driving faecal indicator bacteria in the Murrumbidgee River, ACT.

Proposal Name **EPSDD** **Wellbeing Impact 1**

EPSDD C14 Expand Healthy Waterways

Impact description

This proposal will have impact on:

- Improved urban ecosystem function
- Enhanced lake and waterway health and biodiversity
- Reduced urban heat

Who is affected?

- Residents who recreate in lakes and reserves within urban drainages
- Nature lovers
- Residents near waterways (i.e. lower urban heat)

Direction and type of impact

Positive - major

Timeframe

- Between one and five years
- 1-5 years for residents near constructed assets
- 5 to >10 years for lake users, depending on the lake

Evidence base and data

- EPSDD conducted 3 year's research into the source of quality problems (Ubrihien et al. 2020) and have done extensive water quality modelling in the Lake Burley Griffin catchment which augments years of reports there.
- AUSRIVAS and CHIP reports
- Neil (2012)
- NCEconomics (2019).
- The impact of cancellation of events (e.g. due to algal blooms preventing use of lakes) can be gauged from reports and the community's recent experience with COVID-related event cancellations. For published info, Neil (2012) estimated that continued deterioration in the quality and reliability of Lake Burley Griffin as a sporting venue creates an annual economic cost to the ACT and region of around $25 million per annum.

Accountability and evaluation

The project will be assessed for:

1) Delivery of outputs. Previous assessments have been made for elements of an existing program and the overall program (Apis 2019, Axiom 2016, 2018, NCEconomics 2019).
2) Outcomes will be assessed against numerous benchmarks such as:
   - Phosphorus levels in waterways detected through monitoring
   - Number of days that Lake Tuggeranong and other urban lakes are closed to the public annually due to algal blooms
   - Urban heat mapping
   - Bird and frog surveys

Key relationships

- Community groups and residents will be engaged near assets to be constructed and across Canberra in relation to a behavioural change program. A multifaceted engagement approach will be used, as in the successful initiative Healthy Waterways 1.
- Other Directorates (TCCS, CMTEDD-EPA, MPC, and sections in EPSDD, especially SLA), governments and companies in the water sector will be engaged formally through governance and operationally through working groups.
- The construction industry will be engaged through weekly and ad hoc management meetings.

Wellbeing domain

Environment and climate

Choose an item.

Proposal Name **EPSDD** **Wellbeing Impact 1**

EPSDD C14 Expand Healthy Waterways

Impact description

This proposal will have impact on:

- Mental and physical health of residents is improved
- Increased commercial opportunities for lakeside businesses
- Increased opportunities for the public and businesses to benefit from holding events
- Improved land values near lakes, ponds & waterways

Who is affected?

- Lakeside businesses & their clients
- Event organisers and participants
- Residents near waterways

Direction and type of impact

Positive - major

Timeframe

- Five years plus
- 5 to >10 years for lake users, depending on the lake

Evidence base and data

- NCEconomics (2019) ACT Healthy Waterways: Economic Analysis. Final report. 81pp, 29 October 2019. Objective ID A23612789.
- The impact of cancellation of events (e.g. due to algal blooms preventing use of lakes) can be gauged from reports and the community's recent experience with COVID-related event cancellations. For published info, Neil (2012) estimated that continued deterioration in the quality and reliability of Lake Burley Griffin as a sporting venue creates an annual economic cost to the ACT and region of around $25 million per annum.
- Neil, R (2012) Report on the state of the watercourses and catchments for lake Burley Griffin. Office of the Commissioner for Sustainability and the Environment, 604pp.

Accountability and evaluation

The project will be assessed for:

1) Delivery of outputs. Previous assessments have been made for elements of an existing program and the overall program (Apis 2019, Axiom 2016, 2018, NCEconomics 2019).
2) Outcomes will be assessed against numerous benchmarks such as:
    - Employment stimulus:
        - Numbers of jobs generated by project
        - Investment by FY
    - Physical and mental health
        - Lake foreshore use surveys
        - Community health surveys
        - Hospital admissions by post code, e.g. for heat stress, with changes to demographic profiles considered
    - Community connection and social cohesion
        - Number of events held annually centred at our urban lakes
        - Survey of the level of use of lake by clubs and other community organisations
        - Changes in number and character of businesses taking advantage of our urban lakes
    - Financial benefits
        - Business income attributable to urban lakes, from economic data and cost-benefit analyses
        - Tracking of house prices, commercial rent values in suburbs adjacent to lakes compared with more distant suburbs

Key relationships

- Community groups and residents will be engaged near assets to be constructed and across Canberra in relation to a behavioural change program. A multifaceted engagement approach will be used, as in the successful initiative Healthy Waterways 1.
- Other Directorates (TCCS, CMTEDD-EPA, MPC, and sections in EPSDD, especially SLA), governments and companies in the water sector will be engaged formally through governance and operationally through working groups.
- The construction industry will be engaged through weekly and ad hoc management meetings.

Wellbeing domain

Economy

Living standards

Proposal Name **EPSDD** **Wellbeing Impact 2 - Secondary**

EPSDD C14 Expand Healthy Waterways

Impact description

Tertiary impact:

- Social connectivity is improved.
- Increased trust and confidence in Government

Who is affected?

All residents and businesses that visit or use lakes for recreation, amenity etc.

Direction and type of impact

Positive - major

Timeframe

- Between one and five years 1-5 years for residents near constructed assets
- 5 to >10 years for lake users, depending on the lake

Evidence base and data

- Neil, R (2012) Report on the state of the watercourses and catchments for lake Burley Griffin. Office of the Commissioner for Sustainability and the Environment, 604pp.
- NCEconomics (2019) ACT Healthy Waterways: Economic Analysis. Final report. 81pp, 29 October 2019. Objective ID A23612789.

Accountability and evaluation

- Social connectivity will be assessed via surveys.
- Increased trust and confidence in Government Greater trust in institutions will be assessed against benchmarks such as:
    - Number of complaints received by ACCESS Canberra and ACT Government Directorates about waterways, e.g. Tuggeranong waterways and Lake Tuggeranong.
    - Feedback from local MLAs.

Key relationships

- Community groups and residents will be engaged near assets to be constructed and across Canberra in relation to a behavioural change program. A multifaceted engagement approach will be used, as in the successful initiative Healthy Waterways 1.
- Other Directorates (TCCS, CMTEDD-EPA, MPC, and sections in EPSDD, especially SLA), governments and companies in the water sector will be engaged formally through governance and operationally through working groups.
- The construction industry will be engaged through weekly and ad hoc management meetings.

Wellbeing domain

Social connection
Governance and institutions

Ref No.	User Guidance of 2021-22 Business Case Costing Template
1	This spreadsheet provides seven templates to be used for the 2021-22 Business Case costing. Input tabs are highlighted in green colour.
2	Line areas are required to use the templates for detailed business case costing based on what have been provided during the Business One Liners.
3	All input areas are highlighted in green colour for updating.
4	**DO NOT CHANGE** the cells where the cell includes the formular
5	Staff cost (Tab 3 & 4) - for additional FTEs needed to deliver the project to be included in the business case. Requires input of position levels and indicate **ongoing or non-ongoing** in Column M. For full time FTE, provide estimated engagement month and year (e.g. from March 2022)
6	Staff costs (Tab 5) - for **existing FTEs (including corporate)** that will be heavily involved in the project
7	Supplier cost (Tab 6 & 7) - examples of the cost breakdown names are provided for reference, please update the cost categories as per the business case resourcing requirements. **Please also specify the resource to be engaged within the corporate areas such as fleet costs or equipments in addition to the standard ICT equipment.**
8	Supplier cost (Tab 6 & 7) - provide the costing of the breakdowns into milestones by month for each forward year, and provide the justification in column P.
9	For capital cost in Tab 7, provide estimated useful time, commissioning date and asset category in the required fields. Refer to Tab 12 for Asset Classes and useful life. **Threshold amount for each asset is $5,000**. Contact Strategic Finance to assist with calculation of the depreciation if needed.
10	Revenue, Savings and Offsets (Tab 8) - update the relevant financial year and category as per the BC and provide the justification by category
11	Procurement forecast (Tab 9) - Mandatory requirement for your input.
12	Contact Budget Co-ordination team <**EPSDBudgetCo-ordination@act.gov.au**> if the template needs to be changed (e.g. Revenue for levy), or if you have questions.

EPSDD Business Case Costing Template - Summary

Business Case No:	EPSDD C14
Business Case Name:	Expand the Healthy Waterways program ($30M over 4 years)
Output Class	02 Environment
Funding: Ongoing or non-ongoing?	Non-ongoing
Cross Directorate Impact (pick from the drop-down list)	Transport Canberra and City Services Directorate
Has a component of DSGC? (Yes/No)	yes

Financial Impact Summary	**2021-22 $'000**	**2022-23 $'000**	**2023-24 $'000**	**2024-25 $'000**	**Total $'000**
Capital Impact					
Capital (staff and supplier)	1,844	5,434	7,025	2,552	16,855
Expense Impacts (a)					
Expenses (staff and supplier)	3,386	2,959	2,796	2,509	11,650
Expenses - Depreciation	-	23	91	179	293
Revenue/Savings/Offsets Impacts					
Revenue	-	-	-	-	-
Savings	-	-	-	-	-
Offsets (b)	-	-	-	-	-

Staffing Impact	**2021-22**	**2022-23**	**2023-24**	**2024-25**	**Total $'000**
FTE	6.5	7.0	7.0	7.0	
Capital staffing costs ($'000)	-	-	-	-	-
Recurrent staffing costs ($'000)	1,056	1,159	1,182	1,205	4,603

The information contained in this table should feed into the Business Case Financial Impacts Summary table.

2021-22 AVERAGE SALARY COSTING TEMPLATE (Whole of Government) - Recurrent cost for new FTE

Assumptions

Salary figures based on average of salary classification increments.

New staff superannuation rates have been applied as indicated.

On-costs include human resource support, organisational services, Desktop ICT service and property operating expenses.

***Workers Comp Rate (Please select either)**
1) 4.30% for Parks, Conservation and Lands Or
2) 0.98% for EPSDD Core

Per financial year and 'Position Level' required for BC, please select the required number of FTE/ month in the column P-AA
E.g. - BC requires 1*SOGA for Dec.21 - Jun22, fill in with '1' from column U-AA (i.e. Dec.21 - Jun22)

This will populate the total FTE per position level in column K and auto calculates the add-on costs for BC
*** For Cost center split please refer - column AE to AP**

The below administrative on-cost for new employees are included in th admin on-costs that are relevant to the recurrent staff cost please capt Recurrent Supplier Cost.

*Administrative On-Cost	2020-21	2021-22
Administrative Component (including items such as desktop IT items and support, accommodation, insurance, training etc)	$ 18,142	$ 18,469
Corporate Component (Human Resource and Finance Services)	$ 2,448	$ 2,492
Total Admin ON-Cost	$ 20,590	$ 20,961

2021-22 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	*Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	79,540	9,147	3,182	91,869	0.98%	779.5	92,649	20,961	113,609	0.0	0
INFRA 2	93,656	10,770	3,746	108,173		0.0	108,173	20,961	129,133	0.0	0
INFRA 3	116,901	13,444	4,676	135,021		0.0	135,021	20,961	155,982	0.0	0
INFRA 4	140,217	16,125	5,609	161,950		0.0	161,950	20,962	182,912	0.0	0
INFRA 5	156,718	18,023	6,269	181,009		0.0	181,009	20,961	201,970	0.0	0
SOG C	118.194	13.592	4.728	136.514		0.0	136.514	20.961	157.474	0.0	0
SOG B	141,011	16,216	5,640	162,867		0.0	162,867	20,961	183,828	0.0	0
SOG A	155,719	17,908	6,229	179,855		0.0	179,855	20,961	200,816	0.0	0
ASO 1	55,775	6,414	2,231	64,420		0.0	64,420	20,961	85,381	0.0	0
ASO 2	63,182	7,266	2,527	72,975		0.0	72,975	20,961	93,935	0.0	0
ASO 3	70,587	8,118	2,823	81,528		0.0	81,528	20,961	102,489	0.0	0
ASO 4	79,806	9,178	3,192	92,175		0.0	92,175	20,961	113,136	0.0	0
ASO 5	87,676	10,083	3,507	101,266	0.98%	859.2	102,125	20,961	123,086	1.0	123,086
ASO 6	95,112	10,938	3,804	109,854		0.0	109,854	20,961	130,815	0.0	0
Ranger 1	63,751	7,331	2,550	73,633		0.0	73,633	20,961	94,593	0.0	0
Ranger 2	71,245	8,193	2,850	82,288		0.0	82,288	20,961	103,248	0.0	0
Ranger 3	79,455	9,137	3,178	91,771		0.0	91,771	20,961	112,732	0.0	0
SOG C(T)	124,273	14,291	4,971	143,535		0.0	143,535	20,961	164,496	0.0	0
SOG B(T)	143,000	16,445	5,720	165,165		0.0	165,165	20,961	186,125	0.0	0
Technical Officer 1	64,941	7,468	2,598	75,007		0.0	75,007	20,961	95,968	0.0	0
Technical Officer 2	73,764	8,483	2,951	85,197		0.0	85,197	20,961	106,157	0.0	0
Technical Officer 3	85,673	9,852	3,427	98,952		0.0	98,952	20,961	119,913	0.0	0
Technical Officer 4	97,009	11,156	3,880	112,046		0.0	112,046	20,961	133,006	0.0	0
SPO C	124,273	14,291	4,971	143,535	0.98%	1,217.9	144,753	20,961	165,714	4.5	745,712
SPO B	143,000	16,445	5,720	165,165	0.98%	1,401.4	166,566	20,961	187,527	1.0	187,527
SPO A	157,916	18,160	6,317	182,393		0.0	182,393	20,961	203,353	0.0	0
Park Ranger 1	72,443	8,331	2,898	83,671		0.0	83,671	20,961	104,632	0.0	0
Park Ranger 2	80,932	9,307	3,237	93,477		0.0	93,477	20,961	114,438	0.0	0
Park Ranger 3	87.712	10.087	3.508	101.308		0.0	101.308	20.961	122.268	0.0	0
PO1	84.481	9.715	3.379	97.576		0.0	97.576	20.962	118.537	0.0	0
PO2	99,764	11,473	3,991	115,227		0.0	115,227	20,963	136,190	0.0	0
GSO 2	52,384	6,024	2,095	60,504		0.0	60,504	20,961	81,465	0.0	0
GSO 3	55,458	6,378	2,218	64,054		0.0	64,054	20,961	85,015	0.0	0
GSO 4	58,288	6,703	2,332	67,323		0.0	67,323	20,961	88,283	0.0	0
GSO 5	62,124	7,144	2,485	71,753		0.0	71,753	20,961	92,714	0.0	0
GSO 6	65,087	7,485	2,603	75,175		0.0	75,175	20,961	96,136	0.0	0
GSO 7	70,544	8,113	2,822	81,478		0.0	81,478	20,961	102,438	0.0	0
GSO 8	76.494	8.797	3.060	88.351		0.0	88.351	20.961	109.311	0.0	0
GSO 9	83,977	9,657	3,359	96,993		0.0	96,993	20,961	117,954	0.0	0
GSO 10	97,009	11,156	3,880	112,046		0.0	112,046	20,961	133,006	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

Total 6.5 1,056,324

2022-23 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	80,932	9,307	3,237	93,477		0.0	93,477	21,338	114,815	0.0	0
INFRA 2	95.295	10.959	3.812	110.066		0.0	110.066	21.338	131.404	0.0	0
INFRA 3	118.947	13.679	4.758	137.384		0.0	137.384	21.338	158.722	0.0	0
INFRA 4	142,671	16,407	5,707	164,784		0.0	164,784	21,338	186,122	0.0	0
INFRA 5	159,461	18,338	6,378	184,177		0.0	184,177	21,338	205,515	0.0	0
SOG C	120,262	13,830	4,810	138,903		0.0	138,903	21,338	160,241	0.0	0
SOG B	143,478	16,500	5,739	165,718		0.0	165,718	21,338	187,056	0.0	0
SOG A	158,444	18,221	6,338	183,002		0.0	183,002	21,338	204,340	0.0	0
ASO 1	56,751	6,526	2,270	65,547		0.0	65,547	21,338	86,885	0.0	0
ASO 2	64,287	7,393	2,571	74,252		0.0	74,252	21,338	95,590	0.0	0
ASO 3	71,822	8,260	2,873	82,955		0.0	82,955	21,338	104,293	0.0	0
ASO 4	81,202	9,338	3,248	93,788		0.0	93,788	21,338	115,126	0.0	0
ASO 5	89,211	10,259	3,568	103,038	0.98%	874.3	103,912	21,338	125,250	1.0	125,250
ASO 6	96,776	11,129	3,871	111,776		0.0	111,776	21,338	133,114	0.0	0
Ranger 1	64,867	7,460	2,595	74,921		0.0	74,921	21,338	96,259	0.0	0
Ranger 2	72,491	8,337	2,900	83,728		0.0	83,728	21,338	105,066	0.0	0
Ranger 3	80,846	9,297	3,234	93,377		0.0	93,377	21,338	114,715	0.0	0
SOG C(T)	126,448	14,541	5,058	146,047		0.0	146,047	21,338	167,385	0.0	0
SOG B(T)	145.502	16.733	5.820	168.055		0.0	168.055	21.338	189.393	0.0	0
Technical Officer 1	66,078	7,599	2,643	76,320		0.0	76,320	21,338	97,658	0.0	0
Technical Officer 2	75,054	8,631	3,002	86,688		0.0	86,688	21,338	108,026	0.0	0
Technical Officer 3	87,172	10,025	3,487	100,684		0.0	100,684	21,338	122,022	0.0	0
Technical Officer 4	98,707	11,351	3,948	114,006		0.0	114,006	21,338	135,344	0.0	0
SPO C	126,448	14,541	5,058	146,047	0.98%	1,229.2	147,286	21,338	168,624	5.0	843,121
SPO B	145,502	16,733	5,820	168,055	0.98%	1,425.9	169,481	21,338	190,819	1.0	190,819
SPO A	160.679	18.478	6.427	185.585		0.0	185.585	21.338	206.923	0.0	0
Park Ranger 1	73,710	8,477	2,948	85,136		0.0	85,136	21,338	106,473	0.0	0
Park Ranger 2	82,349	9,470	3,294	95,113		0.0	95,113	21,338	116,451	0.0	0
Park Ranger 3	89,247	10,263	3,570	103,080		0.0	103,080	21,338	124,418	0.0	0
PO1	85,959	9,885	3,438	99,283		0.0	99,283	21,339	120,622	0.0	0
PO2	101,510	11,674	4,060	117,244		0.0	117,244	21,340	138,584	0.0	0
GSO 2	53,301	6,130	2,132	61,563		0.0	61,563	21,338	82,901	0.0	0
GSO 3	56,429	6,489	2,257	65,175		0.0	65,175	21,338	86,513	0.0	0
GSO 4	59,308	6,820	2,372	68,501		0.0	68,501	21,338	89,839	0.0	0
GSO 5	63,211	7,269	2,528	73,009		0.0	73,009	21,338	94,347	0.0	0
GSO 6	66,226	7,616	2,649	76,491		0.0	76,491	21,338	97,829	0.0	0
GSO 7	71,778	8,254	2,871	82,904		0.0	82,904	21,338	104,242	0.0	0
GSO 8	77,833	8,951	3,113	89,897		0.0	89,897	21,338	111,235	0.0	0
GSO 9	85,446	9,826	3,418	98,690		0.0	98,690	21,338	120,028	0.0	0
GSO 10	98,707	11,351	3,948	114,006		0.0	114,006	21,338	135,344	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

Total 7.0 1,159,190

2023-2024 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	82,551	9,493	3,302	95,346		0.0	95,346	21,722	117,068	0.0	0
INFRA 2	97,201	11,178	3,888	112,267		0.0	112,267	21,722	133,989	0.0	0
INFRA 3	121,326	13,952	4,853	140,132		0.0	140,132	21,722	161,854	0.0	0
INFRA 4	145,524	16,735	5,821	168,080		0.0	168,080	21,722	189,802	0.0	0
INFRA 5	162,650	18,705	6,506	187,860		0.0	187,860	21,722	209,582	0.0	0
SOG C	122,667	14,107	4,907	141,681		0.0	141,681	21,722	163,403	0.0	0
SOG B	146,348	16,830	5,854	169,032		0.0	169,032	21,722	190,754	0.0	0
SOG A	161,613	18,585	6,465	186,662		0.0	186,662	21,722	208,384	0.0	0
ASO 1	57,886	6,657	2,315	66,858		0.0	66,858	21,722	88,580	0.0	0
ASO 2	65,573	7,541	2,623	75,737		0.0	75,737	21,722	97,459	0.0	0
ASO 3	73,259	8,425	2,930	84,614		0.0	84,614	21,722	106,336	0.0	0
ASO 4	82,826	9,525	3,313	95,664		0.0	95,664	21,722	117,386	0.0	0
ASO 5	90,995	10,464	3,640	105,099	0.98%	891.7	105,991	21,722	127,713	1.0	127,713
ASO 6	98,712	11,352	3,948	114,012		0.0	114,012	21,722	135,734	0.0	0
Ranger 1	66,164	7,609	2,647	76,419		0.0	76,419	21,722	98,141	0.0	0
Ranger 2	73,941	8,503	2,958	85,402		0.0	85,402	21,722	107,124	0.0	0
Ranger 3	82,463	9,483	3,299	95,245		0.0	95,245	21,722	116,967	0.0	0
SOG C(T)	128,977	14,832	5,159	148,968		0.0	148,968	21,722	170,690	0.0	0
SOG B(T)	148,412	17,067	5,936	171,416		0.0	171,416	21,722	193,138	0.0	0
Technical Officer 1	67,399	7,751	2,696	77,846		0.0	77,846	21,722	99,568	0.0	0
Technical Officer 2	76,555	8,804	3,062	88,422		0.0	88,422	21,722	110,144	0.0	0
Technical Officer 3	88,916	10,225	3,557	102,698		0.0	102,698	21,722	124,420	0.0	0
Technical Officer 4	100,681	11,578	4,027	116,287		0.0	116,287	21,722	138,009	0.0	0
SPO C	128,977	14,832	5,159	148,968	0.98%	1,264.0	150,232	21,722	171,954	5.0	859,770
SPO B	148,412	17,067	5,936	171,416	0.98%	1,454.4	172,871	21,722	194,593	1.0	194,593
SPO A	163,893	18,848	6,556	189,296		0.0	189,296	21,722	211,018	0.0	0
Park Ranger 1	75,185	8,646	3,007	86,838		0.0	86,838	21,722	108,560	0.0	0
Park Ranger 2	83,996	9,660	3,360	97,015		0.0	97,015	21,722	118,737	0.0	0
Park Ranger 3	91,032	10,469	3,641	105,142		0.0	105,142	21,722	126,864	0.0	0
PO1	87.679	10.083	3.507	101.269		0.0	101.269	21.723	122.992	0.0	0
PO2	103.540	11.907	4.142	119.589		0.0	119.589	21.724	141.313	0.0	0
GSO 2	54,367	6,252	2,175	62,794		0.0	62,794	21,722	84,516	0.0	0
GSO 3	57,557	6,619	2,302	66,479		0.0	66,479	21,722	88,200	0.0	0
GSO 4	60,494	6,957	2,420	69,871		0.0	69,871	21,722	91,593	0.0	0
GSO 5	64,475	7,415	2,579	74,469		0.0	74,469	21,722	96,191	0.0	0
GSO 6	67,550	7,768	2,702	78,020		0.0	78,020	21,722	99,742	0.0	0
GSO 7	73,214	8,420	2,929	84,562		0.0	84,562	21,722	106,284	0.0	0
GSO 8	79.389	9.130	3.176	91.695		0.0	91.695	21.722	113.417	0.0	0
GSO 9	87.155	10.023	3.486	100.664		0.0	100.664	21.722	122.386	0.0	0
GSO 10	100,681	11,578	4,027	116,287		0.0	116,287	21,722	138,009	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

Total 7.0 1,182,075

2024-25 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	84,202	9,683	3,368	97,253	0.98%	825.2	98,079	22,113	120,192	0.0	0
INFRA 2	99,145	11,402	3,966	114,512		0.0	114,512	22,113	136,625	0.0	0
INFRA 3	123,753	14,232	4,950	142,934		0.0	142,934	22,113	165,047	0.0	0
INFRA 4	148,434	17,070	5,937	171,442		0.0	171,442	22,113	193,555	0.0	0
INFRA 5	165,903	19,079	6,636	191,618		0.0	191,618	22,113	213,731	0.0	0
SOG C	125,121	14,389	5,005	144,515		0.0	144,515	22,113	166,628	0.0	0
SOG B	149,275	17,167	5,971	172,413		0.0	172,413	22,113	194,526	0.0	0
SOG A	164,845	18,957	6,594	190,396		0.0	190,396	22,113	212,509	0.0	0
ASO 1	59,044	6,790	2,362	68,196		0.0	68,196	22,113	90,309	0.0	0
ASO 2	66.884	7.692	2.675	77.251		0.0	77.251	22.113	99.364	0.0	0
ASO 3	74.724	8.593	2.989	86.306		0.0	86.306	22.113	108.419	0.0	0
ASO 4	84,483	9,716	3,379	97,578		0.0	97,578	22,113	119,691	0.0	0
ASO 5	92,815	10,674	3,713	107,201	0.98%	909.6	108,110	22,113	130,223	1.0	130,223
ASO 6	100,686	11,579	4,027	116,292		0.0	116,292	22,113	138,405	0.0	0
Ranger 1	67,487	7,761	2,699	77,948		0.0	77,948	22,113	100,061	0.0	0
Ranger 2	75,420	8,673	3,017	87,110		0.0	87,110	22,113	109,223	0.0	0
Ranger 3	84,112	9,673	3,364	97,149		0.0	97,149	22,113	119,262	0.0	0
SOG C(T)	131,556	15,129	5,262	151,947		0.0	151,947	22,113	174,060	0.0	0
SOG B(T)	151.381	17.409	6.055	174.845		0.0	174.845	22.113	196.958	0.0	0
Technical Officer 1	68.747	7.906	2.750	79.403		0.0	79.403	22.113	101.516	0.0	0
Technical Officer 2	78,087	8,980	3,123	90,190		0.0	90,190	22,113	112,303	0.0	0
Technical Officer 3	90,694	10,430	3,628	104,752		0.0	104,752	22,113	126,865	0.0	0
Technical Officer 4	102,695	11,810	4,108	118,612		0.0	118,612	22,113	140,725	0.0	0
SPO C	131,556	15,129	5,262	151,947	0.98%	1,289.3	153,237	22,113	175,350	5.0	876,748
SPO B	151,381	17,409	6,055	174,845	0.98%	1,483.5	176,328	22,113	198,441	1.0	198,441
SPO A	167,171	19,225	6,687	193,082		0.0	193,082	22,113	215,195	0.0	0
Park Ranger 1	76,688	8,819	3,068	88,575		0.0	88,575	22,113	110,688	0.0	0
Park Ranger 2	85,676	9,853	3,427	98,955		0.0	98,955	22,113	121,068	0.0	0
Park Ranger 3	92,853	10,678	3,714	107,245		0.0	107,245	22,113	129,358	0.0	0
PO1	89,432	10,285	3,577	103,294		0.0	103,294	22,114	125,408	0.0	0
PO2	105,611	12,145	4,224	121,980		0.0	121,980	22,115	144,095	0.0	0
GSO 2	55,455	6,377	2,218	64,050		0.0	64,050	22,113	86,163	0.0	0
GSO 3	58,708	6,751	2,348	67,808		0.0	67,808	22,113	89,921	0.0	0
GSO 4	61,704	7,096	2,468	71,268		0.0	71,268	22,113	93,381	0.0	0
GSO 5	65,765	7,563	2,631	75,958		0.0	75,958	22,113	98,071	0.0	0
GSO 6	68,901	7,924	2,756	79,581		0.0	79,581	22,113	101,694	0.0	0
GSO 7	74,678	8,588	2,987	86,253		0.0	86,253	22,113	108,366	0.0	0
GSO 8	80,977	9,312	3,239	93,529		0.0	93,529	22,113	115,642	0.0	0
GSO 9	88,898	10,223	3,556	102,678		0.0	102,678	22,113	124,790	0.0	0
GSO 10	102,695	11,810	4,108	118,612		0.0	118,612	22,113	140,725	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

Total 7.0 1,205,413

Overall Total 27.5 4,603,002

Formula based, no input required

Impacts	2021-22	2022-23	2023-24	2024-25	Total
$	1,056,324	1,159,190	1,182,075	1,205,413	4,603,002
FTE	6.5	7.0	7.0	7.0	27.5

2021-22 AVERAGE SALARY COSTING TEMPLATE (Whole of Government) - Capital cost for new FTE

Assumptions

Salary figures based on average of salary classification increments.
New staff superannuation rates have been applied as indicated.

On-costs include human resource support, organisational services, Desktop ICT service and property operating expenses.

***Workers Comp Rate (Please select either)**
1) 4.30% for Parks, Conservation and Lands Or
2) 0.98% for EPSDD Core

Per financial year and 'Position Level' required for BC, please select the required number of FTE/ month in the column P-AA
E.g. - BC requires 1*SOGA for Dec.21 - Jun22, fill in with '1' from column U-AA (i.e. Dec.21 - Jun22)

This will populate the total FTE per position level in column K and auto calculates the add-on costs for BC
*** For Cost center split please refer - column AE to AP**

The below administrative on-cost for new employees are included in the sta
admin on-costs that are relevant to the Capital staff cost please capture tho

***Administrative On-Cost**	**2020-21**	**2021-22**
Administrative Component (including items such as desktop IT items and support, accommodation, insurance, training etc)	$ 18,142	$ 18,469
Corporate Component (Human Resource and Finance Services)	$ 2,448	$ 2,492
Total Admin ON-Cost	$ 20,590	$ 20,961

2021-22 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	*Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	79,540	9,147	3,182	91,869		0.0	91,869	20,961	112,830	0.0	0
INFRA 2	93,656	10,770	3,746	108,173		0.0	108,173	20,961	129,133	0.0	0
INFRA 3	116,901	13,444	4,676	135,021		0.0	135,021	20,961	155,982	0.0	0
INFRA 4	140,217	16,125	5,609	161,950		0.0	161,950	20,962	182,912	0.0	0
INFRA 5	156,718	18,023	6,269	181,009		0.0	181,009	20,961	201,970	0.0	0
SOG C	118,194	13,592	4,728	136,514		0.0	136,514	20,961	157,474	0.0	0
SOG B	141,011	16,216	5,640	162,867		0.0	162,867	20,961	183,828	0.0	0
SOG A	155,719	17,908	6,229	179,855		0.0	179,855	20,961	200,816	0.0	0
ASO 1	55,775	6,414	2,231	64,420		0.0	64,420	20,961	85,381	0.0	0
ASO 2	63,182	7,266	2,527	72,975		0.0	72,975	20,961	93,935	0.0	0
ASO 3	70,587	8,118	2,823	81,528		0.0	81,528	20,961	102,489	0.0	0
ASO 4	79,806	9,178	3,192	92,175		0.0	92,175	20,961	113,136	0.0	0
ASO 5	87,676	10,083	3,507	101,266		0.0	101,266	20,961	122,227	0.0	0
ASO 6	95,112	10,938	3,804	109,854		0.0	109,854	20,961	130,815	0.0	0
Ranger 1	63,751	7,331	2,550	73,633		0.0	73,633	20,961	94,593	0.0	0
Ranger 2	71,245	8,193	2,850	82,288		0.0	82,288	20,961	103,248	0.0	0
Ranger 3	79,455	9,137	3,178	91,771		0.0	91,771	20,961	112,732	0.0	0
SOG C(T)	124,273	14,291	4,971	143,535		0.0	143,535	20,961	164,496	0.0	0
SOG B(T)	143,000	16,445	5,720	165,165		0.0	165,165	20,961	186,125	0.0	0
Technical Officer 1	64,941	7,468	2,598	75,007		0.0	75,007	20,961	95,968	0.0	0
Technical Officer 2	73,764	8,483	2,951	85,197		0.0	85,197	20,961	106,157	0.0	0
Technical Officer 3	85,673	9,852	3,427	98,952		0.0	98,952	20,961	119,913	0.0	0
Technical Officer 4	97,009	11,156	3,880	112,046		0.0	112,046	20,961	133,006	0.0	0
SPO C	124,273	14,291	4,971	143,535		0.0	143,535	20,961	164,496	0.0	0
SPO B	143,000	16,445	5,720	165,165		0.0	165,165	20,961	186,125	0.0	0
SPO A	157,916	18,160	6,317	182,393		0.0	182,393	20,961	203,353	0.0	0
Park Ranger 1	72,443	8,331	2,898	83,671		0.0	83,671	20,961	104,632	0.0	0
Park Ranger 2	80,932	9,307	3,237	93,477		0.0	93,477	20,961	114,438	0.0	0
Park Ranger 3	87,712	10,087	3,508	101,308		0.0	101,308	20,961	122,268	0.0	0
PO1	84,481	9,715	3,379	97,576		0.0	97,576	20,962	118,537	0.0	0
PO2	99,764	11,473	3,991	115,227		0.0	115,227	20,963	136,190	0.0	0
GSO 2	52,384	6,024	2,095	60,504		0.0	60,504	20,961	81,465	0.0	0
GSO 3	55,458	6,378	2,218	64,054		0.0	64,054	20,961	85,015	0.0	0
GSO 4	58,288	6,703	2,332	67,323		0.0	67,323	20,961	88,283	0.0	0
GSO 5	62,124	7,144	2,485	71,753		0.0	71,753	20,961	92,714	0.0	0
GSO 6	65,087	7,485	2,603	75,175		0.0	75,175	20,961	96,136	0.0	0
GSO 7	70,544	8,113	2,822	81,478		0.0	81,478	20,961	102,438	0.0	0
GSO 8	76,494	8,797	3,060	88,351		0.0	88,351	20,961	109,311	0.0	0
GSO 9	83,977	9,657	3,359	96,993		0.0	96,993	20,961	117,954	0.0	0
GSO 10	97,009	11,156	3,880	112,046		0.0	112,046	20,961	133,006	0.0	0
										Total	**0**

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

2022-23 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	80,932	9,307	3,237	93,477		0.0	93,477	21,338	114,815	0.0	0
INFRA 2	95,295	10,959	3,812	110,066		0.0	110,066	21,338	131,404	0.0	0
INFRA 3	118,947	13,679	4,758	137,384		0.0	137,384	21,338	158,722	0.0	0
INFRA 4	142,671	16,407	5,707	164,784		0.0	164,784	21,338	186,122	0.0	0
INFRA 5	159,461	18,338	6,378	184,177		0.0	184,177	21,338	205,515	0.0	0
SOG C	120,262	13,830	4,810	138,903		0.0	138,903	21,338	160,241	0.0	0
SOG B	143,478	16,500	5,739	165,718		0.0	165,718	21,338	187,056	0.0	0
SOG A	158,444	18,221	6,338	183,002		0.0	183,002	21,338	204,340	0.0	0
ASO 1	56,751	6,526	2,270	65,547		0.0	65,547	21,338	86,885	0.0	0
ASO 2	64,287	7,393	2,571	74,252		0.0	74,252	21,338	95,590	0.0	0
ASO 3	71,822	8,260	2,873	82,955		0.0	82,955	21,338	104,293	0.0	0
ASO 4	81,202	9,338	3,248	93,788		0.0	93,788	21,338	115,126	0.0	0
ASO 5	89,211	10,259	3,568	103,038		0.0	103,038	21,338	124,376	0.0	0
ASO 6	96,776	11,129	3,871	111,776		0.0	111,776	21,338	133,114	0.0	0
Ranger 1	64,867	7,460	2,595	74,921		0.0	74,921	21,338	96,259	0.0	0
Ranger 2	72,491	8,337	2,900	83,728		0.0	83,728	21,338	105,066	0.0	0
Ranger 3	80,846	9,297	3,234	93,377		0.0	93,377	21,338	114,715	0.0	0
SOG C(T)	126,448	14,541	5,058	146,047		0.0	146,047	21,338	167,385	0.0	0
SOG B(T)	145,502	16,733	5,820	168,055		0.0	168,055	21,338	189,393	0.0	0
Technical Officer 1	66,078	7,599	2,643	76,320		0.0	76,320	21,338	97,658	0.0	0
Technical Officer 2	75,054	8,631	3,002	86,688		0.0	86,688	21,338	108,026	0.0	0
Technical Officer 3	87,172	10,025	3,487	100,684		0.0	100,684	21,338	122,022	0.0	0
Technical Officer 4	98,707	11,351	3,948	114,006		0.0	114,006	21,338	135,344	0.0	0
SPO C	126,448	14,541	5,058	146,047		0.0	146,047	21,338	167,385	0.0	0
SPO B	145,502	16,733	5,820	168,055		0.0	168,055	21,338	189,393	0.0	0
SPO A	160,679	18,478	6,427	185,585		0.0	185,585	21,338	206,923	0.0	0
Park Ranger 1	73,710	8,477	2,948	85,136		0.0	85,136	21,338	106,473	0.0	0
Park Ranger 2	82,349	9,470	3,294	95,113		0.0	95,113	21,338	116,451	0.0	0
Park Ranger 3	89,247	10,263	3,570	103,080		0.0	103,080	21,338	124,418	0.0	0
PO1	85,959	9,885	3,438	99,283		0.0	99,283	21,339	120,622	0.0	0
PO2	101,510	11,674	4,060	117,244		0.0	117,244	21,340	138,584	0.0	0
GSO 2	53,301	6,130	2,132	61,563		0.0	61,563	21,338	82,901	0.0	0
GSO 3	56,429	6,489	2,257	65,175		0.0	65,175	21,338	86,513	0.0	0
GSO 4	59,308	6,820	2,372	68,501		0.0	68,501	21,338	89,839	0.0	0
GSO 5	63,211	7,269	2,528	73,009		0.0	73,009	21,338	94,347	0.0	0
GSO 6	66,226	7,616	2,649	76,491		0.0	76,491	21,338	97,829	0.0	0
GSO 7	71,778	8,254	2,871	82,904		0.0	82,904	21,338	104,242	0.0	0
GSO 8	77,833	8,951	3,113	89,897		0.0	89,897	21,338	111,235	0.0	0
GSO 9	85,446	9,826	3,418	98,690		0.0	98,690	21,338	120,028	0.0	0
GSO 10	98,707	11,351	3,948	114,006		0.0	114,006	21,338	135,344	0.0	0
										Total	**0.0**	**0**

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

2023-2024 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	82,551	9,493	3,302	95,346		0.0	95,346	21,722	117,068	0.0	0
INFRA 2	97,201	11,178	3,888	112,267		0.0	112,267	21,722	133,989	0.0	0
INFRA 3	121,326	13,952	4,853	140,132		0.0	140,132	21,722	161,854	0.0	0
INFRA 4	145,524	16,735	5,821	168,080		0.0	168,080	21,722	189,802	0.0	0
INFRA 5	162,650	18,705	6,506	187,860		0.0	187,860	21,722	209,582	0.0	0
SOG C	122,667	14,107	4,907	141,681		0.0	141,681	21,722	163,403	0.0	0
SOG B	146,348	16,830	5,854	169,032		0.0	169,032	21,722	190,754	0.0	0
SOG A	161,613	18,585	6,465	186,662		0.0	186,662	21,722	208,384	0.0	0
ASO 1	57,886	6,657	2,315	66,858		0.0	66,858	21,722	88,580	0.0	0
ASO 2	65,573	7,541	2,623	75,737		0.0	75,737	21,722	97,459	0.0	0
ASO 3	73,259	8,425	2,930	84,614		0.0	84,614	21,722	106,336	0.0	0
ASO 4	82,826	9,525	3,313	95,664		0.0	95,664	21,722	117,386	0.0	0
ASO 5	90,995	10,464	3,640	105,099		0.0	105,099	21,722	126,821	0.0	0
ASO 6	98,712	11,352	3,948	114,012		0.0	114,012	21,722	135,734	0.0	0
Ranger 1	66,164	7,609	2,647	76,419		0.0	76,419	21,722	98,141	0.0	0
Ranger 2	73,941	8,503	2,958	85,402		0.0	85,402	21,722	107,124	0.0	0
Ranger 3	82,463	9,483	3,299	95,245		0.0	95,245	21,722	116,967	0.0	0
SOG C(T)	128,977	14,832	5,159	148,968		0.0	148,968	21,722	170,690	0.0	0
SOG B(T)	148,412	17,067	5,936	171,416		0.0	171,416	21,722	193,138	0.0	0
Technical Officer 1	67,399	7,751	2,696	77,846		0.0	77,846	21,722	99,568	0.0	0
Technical Officer 2	76,555	8,804	3,062	88,422		0.0	88,422	21,722	110,144	0.0	0
Technical Officer 3	88,916	10,225	3,557	102,698		0.0	102,698	21,722	124,420	0.0	0
Technical Officer 4	100,681	11,578	4,027	116,287		0.0	116,287	21,722	138,009	0.0	0
SPO C	128,977	14,832	5,159	148,968		0.0	148,968	21,722	170,690	0.0	0
SPO B	148,412	17,067	5,936	171,416		0.0	171,416	21,722	193,138	0.0	0
SPO A	163,893	18,848	6,556	189,296		0.0	189,296	21,722	211,018	0.0	0
Park Ranger 1	75,185	8,646	3,007	86,838		0.0	86,838	21,722	108,560	0.0	0
Park Ranger 2	83,996	9,660	3,360	97,015		0.0	97,015	21,722	118,737	0.0	0
Park Ranger 3	91,032	10,469	3,641	105,142		0.0	105,142	21,722	126,864	0.0	0
PO1	87,679	10,083	3,507	101,269		0.0	101,269	21,723	122,992	0.0	0
PO2	103,540	11,907	4,142	119,589		0.0	119,589	21,724	141,313	0.0	0
GSO 2	54,367	6,252	2,175	62,794		0.0	62,794	21,722	84,516	0.0	0
GSO 3	57,557	6,619	2,302	66,479		0.0	66,479	21,722	88,200	0.0	0
GSO 4	60,494	6,957	2,420	69,871		0.0	69,871	21,722	91,593	0.0	0
GSO 5	64,475	7,415	2,579	74,469		0.0	74,469	21,722	96,191	0.0	0
GSO 6	67,550	7,768	2,702	78,020		0.0	78,020	21,722	99,742	0.0	0
GSO 7	73,214	8,420	2,929	84,562		0.0	84,562	21,722	106,284	0.0	0
GSO 8	79,389	9,130	3,176	91,695		0.0	91,695	21,722	113,417	0.0	0
GSO 9	87,155	10,023	3,486	100,664		0.0	100,664	21,722	122,386	0.0	0
GSO 10	100,681	11,578	4,027	116,287		0.0	116,287	21,722	138,009	0.0	0
										Total	**0.0**	**0**

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

2024-25 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	84,202	9,683	3,368	97,253		0.0	97,253	22,113	119,366	0.0	0
INFRA 2	99,145	11,402	3,966	114,512		0.0	114,512	22,113	136,625	0.0	0
INFRA 3	123,753	14,232	4,950	142,934		0.0	142,934	22,113	165,047	0.0	0
INFRA 4	148,434	17,070	5,937	171,442		0.0	171,442	22,113	193,555	0.0	0
INFRA 5	165,903	19,079	6,636	191,618		0.0	191,618	22,113	213,731	0.0	0
SOG C	125,121	14,389	5,005	144,515		0.0	144,515	22,113	166,628	0.0	0
SOG B	149,275	17,167	5,971	172,413		0.0	172,413	22,113	194,526	0.0	0
SOG A	164,845	18,957	6,594	190,396		0.0	190,396	22,113	212,509	0.0	0
ASO 1	59,044	6,790	2,362	68,196		0.0	68,196	22,113	90,309	0.0	0
ASO 2	66,884	7,692	2,675	77,251		0.0	77,251	22,113	99,364	0.0	0
ASO 3	74,724	8,593	2,989	86,306		0.0	86,306	22,113	108,419	0.0	0
ASO 4	84,483	9,716	3,379	97,578		0.0	97,578	22,113	119,691	0.0	0
ASO 5	92,815	10,674	3,713	107,201		0.0	107,201	22,113	129,314	0.0	0
ASO 6	100,686	11,579	4,027	116,292		0.0	116,292	22,113	138,405	0.0	0
Ranger 1	67,487	7,761	2,699	77,948		0.0	77,948	22,113	100,061	0.0	0
Ranger 2	75,420	8,673	3,017	87,110		0.0	87,110	22,113	109,223	0.0	0
Ranger 3	84,112	9,673	3,364	97,149		0.0	97,149	22,113	119,262	0.0	0
SOG C(T)	131,556	15,129	5,262	151,947		0.0	151,947	22,113	174,060	0.0	0
SOG B(T)	151,381	17,409	6,055	174,845		0.0	174,845	22,113	196,958	0.0	0
Technical Officer 1	68,747	7,906	2,750	79,403		0.0	79,403	22,113	101,516	0.0	0
Technical Officer 2	78,087	8,980	3,123	90,190		0.0	90,190	22,113	112,303	0.0	0
Technical Officer 3	90,694	10,430	3,628	104,752		0.0	104,752	22,113	126,865	0.0	0
Technical Officer 4	102,695	11,810	4,108	118,612		0.0	118,612	22,113	140,725	0.0	0
SPO C	131,556	15,129	5,262	151,947		0.0	151,947	22,113	174,060	0.0	0
SPO B	151,381	17,409	6,055	174,845		0.0	174,845	22,113	196,958	0.0	0
SPO A	167,171	19,225	6,687	193,082		0.0	193,082	22,113	215,195	0.0	0
Park Ranger 1	76,688	8,819	3,068	88,575		0.0	88,575	22,113	110,688	0.0	0
Park Ranger 2	85,676	9,853	3,427	98,955		0.0	98,955	22,113	121,068	0.0	0
Park Ranger 3	92,853	10,678	3,714	107,245		0.0	107,245	22,113	129,358	0.0	0
PO1	89,432	10,285	3,577	103,294		0.0	103,294	22,114	125,408	0.0	0
PO2	105,611	12,145	4,224	121,980		0.0	121,980	22,115	144,095	0.0	0
GSO 2	55,455	6,377	2,218	64,050		0.0	64,050	22,113	86,163	0.0	0
GSO 3	58,708	6,751	2,348	67,808		0.0	67,808	22,113	89,921	0.0	0
GSO 4	61,704	7,096	2,468	71,268		0.0	71,268	22,113	93,381	0.0	0
GSO 5	65,765	7,563	2,631	75,958		0.0	75,958	22,113	98,071	0.0	0
GSO 6	68,901	7,924	2,756	79,581		0.0	79,581	22,113	101,694	0.0	0
GSO 7	74,678	8,588	2,987	86,253		0.0	86,253	22,113	108,366	0.0	0
GSO 8	80,977	9,312	3,239	93,529		0.0	93,529	22,113	115,642	0.0	0
GSO 9	88,898	10,223	3,556	102,678		0.0	102,678	22,113	124,790	0.0	0
GSO 10	102,695	11,810	4,108	118,612		0.0	118,612	22,113	140,725	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

2021-22 AVERAGE SALARY COSTING TEMPLATE (Whole of Government) - Existing FTE cost working on Project

Assumptions

Salary fiigures based on averaze of salary classification increments.

New staff superannuation rates have been applied as indicated.
On-costs include human resource support, organisational services, Desktop ICT service and property operating expenses.

***Workers Comp Rate (Please select either)**

1) 4.30% for Parks, Conservation and Lands Or
2) 0.98% for EPSDD Core

Per financial year and 'Position Level' required for BC, please select the required number of FTE/ month in the column P-AA
E.g. - BC requires 1*SOGA for Dec.21 - Jun22, fill in with '1' from column U-AA (i.e. Dec.21 - Jun22)

This will populate the total FTE per position level in column K and auto calculates the add-on costs for BC
*** For Cost center split please refer - column AE to AP**

The below administrative on-cost for new employees are included in the s
additional admin on-costs that are relevant to the other staff cost please
employee costs - Recurrent Supplier Cost.

***Administrative On-Cost**	**2020-21**	**2021-22**
Administrative Component (including items such as desktop IT items and support, accommodation, insurance, training etc)	$ 18,142	$ 18,469
Corporate Component (Human Resource and Finance Services)	$ 2,448	$ 2,492
Total Admin ON-Cost	$ 20,590	$ 20,961

2021-22 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	*Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	79,540	9,147	3,182	91,869		0.0	91,869	20,961	112,830	0.0	0
INFRA 2	93,656	10,770	3,746	108,173		0.0	108,173	20,961	129,133	0.0	0
INFRA 3	116,901	13,444	4,676	135,021		0.0	135,021	20,961	155,982	0.0	0
INFRA 4	140,217	16,125	5,609	161,950		0.0	161,950	20,962	182,912	0.0	0
INFRA 5	156,718	18,023	6,269	181,009		0.0	181,009	20,961	201,970	0.0	0
SOG C	118,194	13,592	4,728	136,514	0.98%	1,158.3	137,672	20,961	158,633	0.6	95,180
SOG B	141,011	16,216	5,640	162,867		0.0	162,867	20,961	183,828	0.0	0
SOG A	155,719	17,908	6,229	179,855	0.98%	1,526.0	181,381	20,961	202,342	0.2	40,468
ASO 1	55,775	6,414	2,231	64,420		0.0	64,420	20,961	85,381	0.0	0
ASO 2	63,182	7,266	2,527	72,975		0.0	72,975	20,961	93,935	0.0	0
ASO 3	70,587	8,118	2,823	81,528		0.0	81,528	20,961	102,489	0.0	0
ASO 4	79,806	9,178	3,192	92,175		0.0	92,175	20,961	113,136	0.0	0
ASO 5	87,676	10,083	3,507	101,266		0.0	101,266	20,961	122,227	0.0	0
ASO 6	95,112	10,938	3,804	109,854	0.98%	932.1	110,786	20,961	131,747	1.0	131,747
Ranger 1	63,751	7,331	2,550	73,633		0.0	73,633	20,961	94,593	0.0	0
Ranger 2	71,245	8,193	2,850	82,288		0.0	82,288	20,961	103,248	0.0	0
Ranger 3	79,455	9,137	3,178	91,771		0.0	91,771	20,961	112,732	0.0	0
SOG C(T)	124,273	14,291	4,971	143,535		0.0	143,535	20,961	164,496	0.0	0
SOG B(T)	143,000	16,445	5,720	165,165		0.0	165,165	20,961	186,125	0.0	0
Technical Officer 1	64,941	7,468	2,598	75,007		0.0	75,007	20,961	95,968	0.0	0
Technical Officer 2	73,764	8,483	2,951	85,197		0.0	85,197	20,961	106,157	0.0	0
Technical Officer 3	85,673	9,852	3,427	98,952		0.0	98,952	20,961	119,913	0.0	0
Technical Officer 4	97,009	11,156	3,880	112,046		0.0	112,046	20,961	133,006	0.0	0
SPO C	124,273	14,291	4,971	143,535		0.0	143,535	20,961	164,496	0.0	0
SPO B	143,000	16,445	5,720	165,165		0.0	165,165	20,961	186,125	0.0	0
SPO A	157,916	18,160	6,317	182,393		0.0	182,393	20,961	203,353	0.0	0
Park Ranger 1	72,443	8,331	2,898	83,671		0.0	83,671	20,961	104,632	0.0	0
Park Ranger 2	80,932	9,307	3,237	93,477		0.0	93,477	20,961	114,438	0.0	0
Park Ranger 3	87,712	10,087	3,508	101,308		0.0	101,308	20,961	122,268	0.0	0
PO1	84,481	9,715	3,379	97,576		0.0	97,576	20,962	118,537	0.0	0
PO2	99,764	11,473	3,991	115,227		0.0	115,227	20,963	136,190	0.0	0
GSO 2	52,384	6,024	2,095	60,504		0.0	60,504	20,961	81,465	0.0	0
GSO 3	55,458	6,378	2,218	64,054		0.0	64,054	20,961	85,015	0.0	0
GSO 4	58,288	6,703	2,332	67,323		0.0	67,323	20,961	88,283	0.0	0
GSO 5	62,124	7,144	2,485	71,753		0.0	71,753	20,961	92,714	0.0	0
GSO 6	65,087	7,485	2,603	75,175		0.0	75,175	20,961	96,136	0.0	0
GSO 7	70,544	8,113	2,822	81,478		0.0	81,478	20,961	102,438	0.0	0
GSO 8	76,494	8,797	3,060	88,351		0.0	88,351	20,961	109,311	0.0	0
GSO 9	83,977	9,657	3,359	96,993		0.0	96,993	20,961	117,954	0.0	0
GSO 10	97,009	11,156	3,880	112,046		0.0	112,046	20,961	133,006	0.0	0

Total **1.8** **267,395**

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

2022-23 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	80,932	9,307	3,237	93,477		0.0	93,477	21,338	114,815	0.0	0
INFRA 2	95,295	10,959	3,812	110,066		0.0	110,066	21,338	131,404	0.0	0
INFRA 3	118,947	13,679	4,758	137,384		0.0	137,384	21,338	158,722	0.0	0
INFRA 4	142,671	16,407	5,707	164,784		0.0	164,784	21,338	186,122	0.0	0
INFRA 5	159,461	18,338	6,378	184,177		0.0	184,177	21,338	205,515	0.0	0
SOG C	120,262	13,830	4,810	138,903	0.98%	1,178.6	140,081	21,338	161,419	0.6	96,852
SOG B	143,478	16,500	5,739	165,718		0.0	165,718	21,338	187,056	0.0	0
SOG A	158,444	18,221	6,338	183,002	0.98%	1,552.7	184,555	21,338	205,893	0.2	41,179
ASO 1	56,751	6,526	2,270	65,547		0.0	65,547	21,338	86,885	0.0	0
ASO 2	64,287	7,393	2,571	74,252		0.0	74,252	21,338	95,590	0.0	0
ASO 3	71,822	8,260	2,873	82,955		0.0	82,955	21,338	104,293	0.0	0
ASO 4	81,202	9,338	3,248	93,788		0.0	93,788	21,338	115,126	0.0	0
ASO 5	89,211	10,259	3,568	103,038		0.0	103,038	21,338	124,376	0.0	0
ASO 6	96,776	11,129	3,871	111,776	0.98%	948.4	112,725	21,338	134,063	1.0	134,063
Ranger 1	64,867	7,460	2,595	74,921		0.0	74,921	21,338	96,259	0.0	0
Ranger 2	72,491	8,337	2,900	83,728		0.0	83,728	21,338	105,066	0.0	0
Ranger 3	80,846	9,297	3,234	93,377		0.0	93,377	21,338	114,715	0.0	0
SOG C(T)	126,448	14,541	5,058	146,047		0.0	146,047	21,338	167,385	0.0	0
SOG B(T)	145,502	16,733	5,820	168,055		0.0	168,055	21,338	189,393	0.0	0
Technical Officer 1	66,078	7,599	2,643	76,320		0.0	76,320	21,338	97,658	0.0	0
Technical Officer 2	75,054	8,631	3,002	86,688		0.0	86,688	21,338	108,026	0.0	0
Technical Officer 3	87,172	10,025	3,487	100,684		0.0	100,684	21,338	122,022	0.0	0
Technical Officer 4	98,707	11,351	3,948	114,006		0.0	114,006	21,338	135,344	0.0	0
SPO C	126,448	14,541	5,058	146,047		0.0	146,047	21,338	167,385	0.0	0
SPO B	145,502	16,733	5,820	168,055		0.0	168,055	21,338	189,393	0.0	0
SPO A	160,679	18,478	6,427	185,585		0.0	185,585	21,338	206,923	0.0	0
Park Ranger 1	73,710	8,477	2,948	85,136		0.0	85,136	21,338	106,473	0.0	0
Park Ranger 2	82,349	9,470	3,294	95,113		0.0	95,113	21,338	116,451	0.0	0
Park Ranger 3	89,247	10,263	3,570	103,080		0.0	103,080	21,338	124,418	0.0	0
PO1	85,959	9,885	3,438	99,283		0.0	99,283	21,339	120,622	0.0	0
PO2	101,510	11,674	4,060	117,244		0.0	117,244	21,340	138,584	0.0	0
GSO 2	53,301	6,130	2,132	61,563		0.0	61,563	21,338	82,901	0.0	0
GSO 3	56,429	6,489	2,257	65,175		0.0	65,175	21,338	86,513	0.0	0
GSO 4	59,308	6,820	2,372	68,501		0.0	68,501	21,338	89,839	0.0	0
GSO 5	63,211	7,269	2,528	73,009		0.0	73,009	21,338	94,347	0.0	0
GSO 6	66,226	7,616	2,649	76,491		0.0	76,491	21,338	97,829	0.0	0
GSO 7	71,778	8,254	2,871	82,904		0.0	82,904	21,338	104,242	0.0	0
GSO 8	77,833	8,951	3,113	89,897		0.0	89,897	21,338	111,235	0.0	0
GSO 9	85,446	9,826	3,418	98,690		0.0	98,690	21,338	120,028	0.0	0
GSO 10	98,707	11,351	3,948	114,006		0.0	114,006	21,338	135,344	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

Total **1.8** **272,093**

2023-2024 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	82,551	9,493	3,302	95,346		0.0	95,346	21,722	117,068	0.0	0
INFRA 2	97,201	11,178	3,888	112,267		0.0	112,267	21,722	133,989	0.0	0
INFRA 3	121,326	13,952	4,853	140,132		0.0	140,132	21,722	161,854	0.0	0
INFRA 4	145,524	16,735	5,821	168,080		0.0	168,080	21,722	189,802	0.0	0
INFRA 5	162,650	18,705	6,506	187,860		0.0	187,860	21,722	209,582	0.0	0
SOG C	122,667	14,107	4,907	141,681	0.98%	1,202.1	142,883	21,722	164,605	0.6	98,763
SOG B	146,348	16,830	5,854	169,032		0.0	169,032	21,722	190,754	0.0	0
SOG A	161,613	18,585	6,465	186,662	0.98%	1,583.8	188,246	21,722	209,968	0.2	41,994
ASO 1	57,886	6,657	2,315	66,858		0.0	66,858	21,722	88,580	0.0	0
ASO 2	65,573	7,541	2,623	75,737		0.0	75,737	21,722	97,459	0.0	0
ASO 3	73,259	8,425	2,930	84,614		0.0	84,614	21,722	106,336	0.0	0
ASO 4	82,826	9,525	3,313	95,664		0.0	95,664	21,722	117,386	0.0	0
ASO 5	90,995	10,464	3,640	105,099		0.0	105,099	21,722	126,821	0.0	0
ASO 6	98,712	11,352	3,948	114,012	0.98%	967.4	114,979	21,722	136,701	1.0	136,701
Ranger 1	66,164	7,609	2,647	76,419		0.0	76,419	21,722	98,141	0.0	0
Ranger 2	73,941	8,503	2,958	85,402		0.0	85,402	21,722	107,124	0.0	0
Ranger 3	82,463	9,483	3,299	95,245		0.0	95,245	21,722	116,967	0.0	0
SOG C(T)	128,977	14,832	5,159	148,968		0.0	148,968	21,722	170,690	0.0	0
SOG B(T)	148,412	17,067	5,936	171,416		0.0	171,416	21,722	193,138	0.0	0
Technical Officer 1	67,399	7,751	2,696	77,846		0.0	77,846	21,722	99,568	0.0	0
Technical Officer 2	76,555	8,804	3,062	88,422		0.0	88,422	21,722	110,144	0.0	0
Technical Officer 3	88,916	10,225	3,557	102,698		0.0	102,698	21,722	124,420	0.0	0
Technical Officer 4	100,681	11,578	4,027	116,287		0.0	116,287	21,722	138,009	0.0	0
SPO C	128,977	14,832	5,159	148,968		0.0	148,968	21,722	170,690	0.0	0
SPO B	148,412	17,067	5,936	171,416		0.0	171,416	21,722	193,138	0.0	0
SPO A	163,893	18,848	6,556	189,296		0.0	189,296	21,722	211,018	0.0	0
Park Ranger 1	75,185	8,646	3,007	86,838		0.0	86,838	21,722	108,560	0.0	0
Park Ranger 2	83,996	9,660	3,360	97,015		0.0	97,015	21,722	118,737	0.0	0
Park Ranger 3	91,032	10,469	3,641	105,142		0.0	105,142	21,722	126,864	0.0	0
PO1	87,679	10,083	3,507	101,269		0.0	101,269	21,723	122,992	0.0	0
PO2	103,540	11,907	4,142	119,589		0.0	119,589	21,724	141,313	0.0	0
GSO 2	54,367	6,252	2,175	62,794		0.0	62,794	21,722	84,516	0.0	0
GSO 3	57,557	6,619	2,302	66,479		0.0	66,479	21,722	88,200	0.0	0
GSO 4	60,494	6,957	2,420	69,871		0.0	69,871	21,722	91,593	0.0	0
GSO 5	64,475	7,415	2,579	74,469		0.0	74,469	21,722	96,191	0.0	0
GSO 6	67,550	7,768	2,702	78,020		0.0	78,020	21,722	99,742	0.0	0
GSO 7	73,214	8,420	2,929	84,562		0.0	84,562	21,722	106,284	0.0	0
GSO 8	79,389	9,130	3,176	91,695		0.0	91,695	21,722	113,417	0.0	0
GSO 9	87,155	10,023	3,486	100,664		0.0	100,664	21,722	122,386	0.0	0
GSO 10	100,681	11,578	4,027	116,287		0.0	116,287	21,722	138,009	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

Total **1.8** **277,458**

2024-25 — Formula based, no input required

Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)	Number of Staff (FTE) (j)	Total Costs (i) x (j) = (k)
INFRA 1	84,202	9,683	3,368	97,253		0.0	97,253	22,113	119,366	0.0	0
INFRA 2	99,145	11,402	3,966	114,512		0.0	114,512	22,113	136,625	0.0	0
INFRA 3	123,753	14,232	4,950	142,934		0.0	142,934	22,113	165,047	0.0	0
INFRA 4	148,434	17,070	5,937	171,442		0.0	171,442	22,113	193,555	0.0	0
INFRA 5	165,903	19,079	6,636	191,618		0.0	191,618	22,113	213,731	0.0	0
SOG C	125,121	14,389	5,005	144,515	0.98%	1,226.2	145,741	22,113	167,854	0.6	100,712
SOG B	149,275	17,167	5,971	172,413		0.0	172,413	22,113	194,526	0.0	0
SOG A	164,845	18,957	6,594	190,396	0.98%	1,615.5	192,011	22,113	214,124	0.2	42,825
ASO 1	59,044	6,790	2,362	68,196		0.0	68,196	22,113	90,309	0.0	0
ASO 2	66,884	7,692	2,675	77,251		0.0	77,251	22,113	99,364	0.0	0
ASO 3	74,724	8,593	2,989	86,306		0.0	86,306	22,113	108,419	0.0	0
ASO 4	84,483	9,716	3,379	97,578		0.0	97,578	22,113	119,691	0.0	0
ASO 5	92,815	10,674	3,713	107,201		0.0	107,201	22,113	129,314	0.0	0
ASO 6	100,686	11,579	4,027	116,292	0.98%	986.7	117,279	22,113	139,392	1.0	139,392
Ranger 1	67,487	7,761	2,699	77,948		0.0	77,948	22,113	100,061	0.0	0
Ranger 2	75,420	8,673	3,017	87,110		0.0	87,110	22,113	109,223	0.0	0
Ranger 3	84,112	9,673	3,364	97,149		0.0	97,149	22,113	119,262	0.0	0
SOG C(T)	131,556	15,129	5,262	151,947		0.0	151,947	22,113	174,060	0.0	0
SOG B(T)	151,381	17,409	6,055	174,845		0.0	174,845	22,113	196,958	0.0	0
Technical Officer 1	68,747	7,906	2,750	79,403		0.0	79,403	22,113	101,516	0.0	0
Technical Officer 2	78,087	8,980	3,123	90,190		0.0	90,190	22,113	112,303	0.0	0
Technical Officer 3	90,694	10,430	3,628	104,752		0.0	104,752	22,113	126,865	0.0	0
Technical Officer 4	102,695	11,810	4,108	118,612		0.0	118,612	22,113	140,725	0.0	0
SPO C	131,556	15,129	5,262	151,947		0.0	151,947	22,113	174,060	0.0	0
SPO B	151,381	17,409	6,055	174,845		0.0	174,845	22,113	196,958	0.0	0
SPO A	167,171	19,225	6,687	193,082		0.0	193,082	22,113	215,195	0.0	0
Park Ranger 1	76,688	8,819	3,068	88,575		0.0	88,575	22,113	110,688	0.0	0
Park Ranger 2	85,676	9,853	3,427	98,955		0.0	98,955	22,113	121,068	0.0	0
Park Ranger 3	92,853	10,678	3,714	107,245		0.0	107,245	22,113	129,358	0.0	0
PO1	89,432	10,285	3,577	103,294		0.0	103,294	22,114	125,408	0.0	0
PO2	105,611	12,145	4,224	121,980		0.0	121,980	22,115	144,095	0.0	0
GSO 2	55,455	6,377	2,218	64,050		0.0	64,050	22,113	86,163	0.0	0
GSO 3	58,708	6,751	2,348	67,808		0.0	67,808	22,113	89,921	0.0	0
GSO 4	61,704	7,096	2,468	71,268		0.0	71,268	22,113	93,381	0.0	0
GSO 5	65,765	7,563	2,631	75,958		0.0	75,958	22,113	98,071	0.0	0
GSO 6	68,901	7,924	2,756	79,581		0.0	79,581	22,113	101,694	0.0	0
GSO 7	74,678	8,588	2,987	86,253		0.0	86,253	22,113	108,366	0.0	0
GSO 8	80,977	9,312	3,239	93,529		0.0	93,529	22,113	115,642	0.0	0
GSO 9	88,898	10,223	3,556	102,678		0.0	102,678	22,113	124,790	0.0	0
GSO 10	102,695	11,810	4,108	118,612		0.0	118,612	22,113	140,725	0.0	0

*The applicable Workers' Compensation rate should be used. The figure is a percentage of the average salary (found on the Comcare Premiums tab)

Total **1.8** **282,929**

Recurrent costs - Supplier

Note:

*below listed supplier costs are examples only. Please update them as per your b

** if engaging contractor(s), please explain why this can't be done by internal sta

*** identify coporate FTEs as corporate support in below table if they are heavil

****Please choose the budgeting method as per drop-down list, if you choose Pr

*****Provide the 'Justification' on the different type of supplier cost. For e.g. - If

2021-22		
Supplier Costs (recurrent)*	**Full 2021-22**	**Jul-21**
Water quality models & management dashboards	200,000	
Erosion control/mitigation investigations and works	280,000	
Water quality monitoring	540,000	16,000
Catchment and lake research	600,000	
Beahvioural change program	370,000	
Audits, cost-benefit analyses and other evaluations	125,000	
Community engagement	140,000	
Other costs	75,000	6,250
Total Supplier Cost (recurrent)	2,330,000	**22,250**

2022-23		
Supplier Costs (recurrent)*	**Full 2022-23**	**Jul-22**
Water quality models & management dashboards	150,000	
Erosion control/mitigation investigations and works	220,000	
Water quality monitoring	244,000	16,000
Catchment and lake research	260,000	
Beahvioural change program	650,400	54,200
Audits, cost-benefit analyses and other evaluations	100,000	
Community engagement	100,000	
Other costs	75,000	6,250
Total Supplier Cost (recurrent)	1,799,400	**76,450**

2023-24		
Supplier Costs (recurrent)*	**Full 2023-24**	**Jul-23**
Water quality models & management dashboards	140,000	
Erosion control/mitigation investigations and works	-	
Water quality monitoring	244,000	16,000
Catchment and lake research	270,000	
Beahvioural change program	750,000	62,500
Audits, cost-benefit analyses and other evaluations	25,000	
Community engagement	100,000	
Other costs	85,000	6,250
Total Supplier Cost (recurrent)	1,614,000	**84,750**

Capital costs - Supplier

Note:

*below listed supplier costs are examples only. Please update them as per your business case resourcing requirements.

** if engaging contractor(s), please explain why this can't be done by internal staff, and what tasks/objectives will be performing and achieving.

***Contact Strategic Finance to assist with the depreciation calculation (should also include the tab 4 capital staff costs). Depreciation should be calculated on total cost of asset created.

****Please choose the budgeting method as per drop-down list, if you choose Pro-rata, the data enter field would be transparent and the data would be automatically populated into 12 months evenly. Otherwise, please mannually enter data into each month when the field is green.

Commercial in confidence

Fill in the Revenue, Savings and Offsets per financial year in the table below
Provide commentary around the Revenue, Savings and Offsets field in column 'G'
For e.g. If there's any Savings associated with the BC please highlight that in here/ If there is any Offsets to the associated BC that's coming to closure, it would be justified by referencing the BC name and number

	2021-22	2022-23	2023-24	2024-25	Total	Justification
Revenue	-	-	-	-	-	
Savings	-	-	-	-	-	
Offsets	-	-	-	-	-	
Overall Total Revenue	-	-	-	-	-	

*Relevant procurement field needs to be completed in the below table

Commercial in confidence

Year	Position Level	Average Salary (a)	Superannuation (11.5%) (b)	LSL/LL (4%) (c)	Sub-Total (a) + (b) + (c) = (d)	Workers' Comp Rate* (e)	Total Workers Comp (f)	Total Salary and Salary On-Costs (d) + (f) = (g)	Admin On-Costs (h)	Total Salary, Salary on-costs and admin on-costs (g) + (h) = (i)
2021-22	ASO 1	54815.66439	6303.801405	2192.626576	63312.09238	4.30%	2357.073569	65669.16594	20960.62	86629.78594
2022-23	ASO 1	55528.26803	6385.750824	2221.130721	64135.14958	4.30%	2387.715525	66522.8651	21337.91116	87860.77626
2023-24	ASO 1	56250.13552	6468.765584	2250.005421	64968.90652	4.30%	2418.755827	67387.66235	21721.99356	89109.65591
2024-25	ASO 1	56981.38728	6552.859537	2279.255491	65813.50231	4.30%	2450.199653	68263.70196	22112.98944	90376.6914
2021-22	ASO 2	62094.86922	7140.909961	2483.794769	71719.57395	4.30%	2670.079377	74389.65333	20960.62	95350.27333
2022-23	ASO 2	62902.10252	7233.74179	2516.084101	72651.92841	4.30%	2704.790408	75356.71882	21337.91116	96694.62998
2023-24	ASO 2	63719.82986	7327.780433	2548.793194	73596.40348	4.30%	2739.952684	76336.35617	21721.99356	98058.34973
2024-25	ASO 2	64548.18764	7423.041579	2581.927506	74553.15673	4.30%	2775.572069	77328.7288	22112.98944	99441.71824
2021-22	ASO 3	69372.96034	7977.890439	2774.918414	80125.7692	4.30%	2983.037295	83108.80649	20960.62	104069.4265
2022-23	ASO 3	70274.80883	8081.603015	2810.992353	81167.4042	4.30%	3021.81678	84189.22098	21337.91116	105527.1321
2023-24	ASO 3	71188.38134	8186.663854	2847.535254	82222.58045	4.30%	3061.100398	85283.68085	21721.99356	107005.6744
2024-25	ASO 3	72113.8303	8293.090484	2884.553212	83291.474	4.30%	3100.894703	86392.3687	22112.98944	108505.3581
2021-22	ASO 4	78432.98655	9019.793453	3137.319462	90590.09946	4.30%	3372.618422	93962.71789	20960.62	114923.3379
2022-23	ASO 4	79452.61537	9137.050768	3178.104615	91767.77076	4.30%	3416.462461	95184.23322	21337.91116	116522.1444
2023-24	ASO 4	80485.49937	9255.832428	3219.419975	92960.75178	4.30%	3460.876473	96421.62825	21721.99356	118143.6218
2024-25	ASO 4	81531.81087	9376.15825	3261.272435	94169.24155	4.30%	3505.867867	97675.10942	22112.98944	119788.0989
2021-22	ASO 5	86168.25539	9909.34937	3446.730216	99524.33497	4.30%	3705.234982	103229.57	20960.62	124190.19
2022-23	ASO 5	87288.44271	10038.17091	3491.537708	100818.1513	4.30%	3753.403037	104571.5544	21337.91116	125909.4655
2023-24	ASO 5	88423.19246	10168.66713	3536.927699	102128.7873	4.30%	3802.197276	105930.9846	21721.99356	127652.9781
2024-25	ASO 5	89572.69397	10300.85981	3582.907759	103456.4615	4.30%	3851.625841	107308.0874	22112.98944	129421.0768
2021-22	ASO 6	93475.85981	10749.72388	3739.034392	107964.6181	4.30%	4019.461972	111984.0801	20960.62	132944.7001
2022-23	ASO 6	94691.04599	10889.47029	3787.641839	109368.1581	4.30%	4071.714977	113439.8731	21337.91116	134777.7843
2023-24	ASO 6	95922.02958	11031.0334	3836.881183	110789.9442	4.30%	4124.647272	114914.5914	21721.99356	136636.585
2024-25	ASO 6	97169.01597	11174.43684	3886.760639	112230.2134	4.30%	4178.267687	116408.4811	22112.98944	138521.4706
2021-22	INFRA 1	78172.43529	8989.830059	3126.897412	90289.16276	4.30%	3361.414718	93650.57748	20960.62	114611.1975
2022-23	INFRA 1	79188.67695	9106.69785	3167.547078	91462.92188	4.30%	3405.113109	94868.03499	21337.91116	116205.9461
2023-24	INFRA 1	80218.12975	9225.084922	3208.72519	92651.93986	4.30%	3449.379579	96101.31944	21721.99356	117823.313
2024-25	INFRA 1	81260.96544	9345.011026	3250.438618	93856.41508	4.30%	3494.221514	97350.6366	22112.98944	119463.626
2021-22	INFRA 2	92045.21251	10585.19944	3681.8085	106312.2204	4.30%	3957.944138	110270.1646	20960.62	131230.7846
2022-23	INFRA 2	93241.80027	10722.80703	3729.672011	107694.2793	4.30%	4009.397412	111703.6767	21337.91116	133041.5879
2023-24	INFRA 2	94453.94368	10862.20352	3778.157747	109094.3049	4.30%	4061.519578	113155.8245	21721.99356	134877.8181
2024-25	INFRA 2	95681.84494	11003.41217	3827.273798	110512.5309	4.30%	4114.319333	114626.8502	22112.98944	136739.8397
2021-22	INFRA 3	114890.7271	13212.43362	4595.629085	132698.7898	4.30%	4940.301266	137639.0911	20960.62	158599.7111
2022-23	INFRA 3	116384.3066	13384.19526	4655.372263	134423.8741	4.30%	5004.525182	139428.3993	21337.91116	160766.3104
2023-24	INFRA 3	117897.3026	13558.18979	4715.892102	136171.3844	4.30%	5069.58401	141240.9685	21721.99356	162962.962
2024-25	INFRA 3	119429.9675	13734.44626	4777.198699	137941.6124	4.30%	5135.488602	143077.101	22112.98944	165190.0905
2021-22	INFRA 4	137805.1465	15847.59184	5512.205858	159164.9442	4.30%	5925.621297	165090.5654	20960.62	186051.1854
2022-23	INFRA 4	139596.6134	16053.61054	5583.864534	161234.0884	4.30%	6002.654374	167236.7428	21337.91116	188574.654
2023-24	INFRA 4	141411.3693	16262.30747	5656.454773	163330.1316	4.30%	6080.888881	169410.8205	21721.99356	191132.814
2024-25	INFRA 4	143249.7171	16473.71747	5729.988685	165453.4233	4.30%	6159.737837	171613.1611	22112.98944	193726.1506
2021-22	INFRA 5	154022.5726	17712.59585	6160.902903	177896.0713	4.30%	6622.97062	184519.0419	20960.62	205479.6619
2022-23	INFRA 5	156024.866	17942.85959	6240.99464	180208.7202	4.30%	6709.069239	186917.7895	21337.91116	208255.7006
2023-24	INFRA 5	158053.1893	18176.11677	6322.127571	182551.4336	4.30%	6796.287139	189347.7207	21721.99356	211069.7143
2024-25	INFRA 5	160107.8807	18412.40628	6404.315229	184924.6022	4.30%	6884.638871	191809.2411	22112.98944	213922.2306
2021-22	Ranger 1	62654.63241	7205.282728	2506.185297	72366.10044	4.30%	2694.149194	75060.24963	20960.62	96020.86963
2022-23	Ranger 1	63469.14264	7298.951403	2538.765705	73306.85974	4.30%	2729.173133	76036.03288	21337.91116	97373.94404
2023-24	Ranger 1	64294.24149	7393.837771	2571.76966	74259.84892	4.30%	2764.652384	77024.5013	21721.99356	98746.49487
2024-25	Ranger 1	65130.06663	7489.957662	2605.202665	75225.22696	4.30%	2800.592865	78025.81962	22112.98944	100138.8093
2021-22	Ranger 2	70019.34219	8052.224352	2800.773688	80872.34023	4.30%	3010.851714	83883.17195	20960.62	104843.7919
2022-23	Ranger 2	70929.59364	8156.903269	2837.183746	81923.68066	4.30%	3049.972527	84973.65318	21337.91116	106311.5643
2023-24	Ranger 2	71851.67836	8262.943011	2874.067134	82988.68851	4.30%	3089.622169	86078.31068	21721.99356	107800.3042
2024-25	Ranger 2	72785.75018	8370.361271	2911.430007	84067.54146	4.30%	3129.787258	87197.32871	22112.98944	109310.3182
2021-22	Ranger 3	78088.85138	8980.217908	3123.554055	90192.62334	4.30%	3357.820609	93550.44395	20960.62	114511.0639
2022-23	Ranger 3	79104.00644	9096.960741	3164.160258	91365.12744	4.30%	3401.472277	94766.59972	21337.91116	116104.5109
2023-24	Ranger 3	80132.35853	9215.221231	3205.294341	92552.8741	4.30%	3445.691417	95998.56552	21721.99356	117720.5591
2024-25	Ranger 3	81174.07919	9335.019107	3246.963168	93756.06146	4.30%	3490.485405	97246.54687	22112.98944	119359.5363
2021-22	SOG A	153040.3812	17599.64384	6121.615248	176761.6403	4.30%	6580.736392	183342.3767	20960.62	204302.9967
2022-23	SOG A	155029.9062	17828.43921	6201.196247	179059.5416	4.30%	6666.285965	185725.8276	21337.91116	207063.7387
2023-24	SOG A	157045.2949	18060.20892	6281.811798	181387.3157	4.30%	6752.947683	188140.2633	21721.99356	209862.2569
2024-25	SOG A	159086.8838	18294.99163	6363.475351	183745.3508	4.30%	6840.736003	190586.0868	22112.98944	212699.0762
2021-22	SOG B	138585.5465	15937.33785	5543.421861	160066.3062	4.30%	5959.178501	166025.4847	20960.62	186986.1047
2022-23	SOG B	140387.1586	16144.52324	5615.486345	162147.1682	4.30%	6036.647821	168183.816	21337.91116	189521.7272
2023-24	SOG B	142212.1917	16354.40204	5688.487668	164255.0814	4.30%	6115.124243	170370.2057	21721.99356	192092.1992
2024-25	SOG B	144060.9502	16567.00927	5762.438007	166390.3975	4.30%	6194.620858	172585.0183	22112.98944	194698.0078
2021-22	SOG C	116161.0072	13358.51582	4646.440287	134165.9633	4.30%	4994.923308	139160.8866	20960.62	160121.5066
2022-23	SOG C	117671.1003	13532.17653	4706.844011	135910.1208	4.30%	5059.857311	140969.9781	21337.91116	162307.8893
2023-24	SOG C	119200.8246	13708.09483	4768.032983	137676.9524	4.30%	5125.635456	142802.5878	21721.99356	164524.5814
2024-25	SOG C	120750.4353	13886.30006	4830.017412	139466.7528	4.30%	5192.268717	144659.0215	22112.98944	166772.0109
2021-22	SOG B(T)	140540.3442	16162.13958	5621.613768	162324.0976	4.30%	6043.234801	168367.3324	20960.62	189327.9524
2021-22	SOG C(T)	122135.5296	14045.5859	4885.421184	141066.5367	4.30%	5251.827773	146318.3645	20960.62	167278.9845
2021-22	Technical Officer 4	95340.7836	10964.19011	3813.631344	110118.6051	4.30%	4099.653695	114218.2588	20960.62	135178.8788
2021-22	Technical Officer 3	84199.4316	9682.934634	3367.977264	97250.3435	4.30%	3620.575559	100870.9191	20960.62	121831.5391
2021-22	Technical Officer 2	72494.8452	8336.907198	2899.793808	83731.54621	4.30%	3117.278344	86848.82455	20960.62	107809.4445
2021-22	Technical Officer 1	63824.3244	7339.797306	2552.972976	73717.09468	4.30%	2744.445949	76461.54063	20960.62	97422.16063
2021-22	SPO A	155199.8556	17847.98339	6207.994224	179255.8332	4.30%	6673.593791	185929.427	20960.62	206890.047
2021-22	SPO B	140540.3442	16162.13958	5621.613768	162324.0976	4.30%	6043.234801	168367.3324	20960.62	189327.9524
2021-22	SPO C	122135.5296	14045.5859	4885.421184	141066.5367	4.30%	5251.827773	146318.3645	20960.62	167278.9845
2021-22	Park Ranger 3	86203.6416	9913.418784	3448.145664	99565.20605	4.30%	3706.756589	103271.9626	20960.62	124232.5826
2021-22	Park Ranger 2	79540.4142	9147.147633	3181.616568	91869.1784	4.30%	3420.237811	95289.41621	20960.62	116250.0362
2021-22	Park Ranger 1	71196.7338	8187.624387	2847.869352	82232.22754	4.30%	3061.459553	85293.68709	20960.62	106254.3071
2021-22	GSO 10	95340.7836	10964.19011	3813.631344	110118.6051	4.30%	4099.653695	114218.2588	20960.62	135178.8788
2021-22	GSO 9	82532.34	9491.2191	3301.2936	95324.8527	4.30%	3548.89062	98873.74332	20960.62	119834.3633
2021-22	GSO 8	75178.431	8645.519565	3007.13724	86831.08781	4.30%	3232.672533	90063.76034	20960.62	111024.3803
2021-22	GSO 7	69330.249	7972.978635	2773.20996	80076.4376	4.30%	2981.200707	83057.6383	20960.62	104018.2583
2021-22	GSO 6	63967.1886	7356.226689	2558.687544	73882.10283	4.30%	2750.58911	76632.69194	20960.62	97593.31194
2021-22	GSO 5	61055.4312	7021.374588	2442.217248	70519.02304	4.30%	2625.385542	73144.40658	20960.62	94105.02658
2021-22	GSO 4	57285.4608	6587.827992	2291.418432	66164.70722	4.30%	2463.274814	68627.98204	20960.62	89588.60204
2021-22	GSO 3	54504.234	6267.98691	2180.16936	62952.39027	4.30%	2343.682062	65296.07233	20960.62	86256.69233
2021-22	GSO 2	51483.5298	5920.605927	2059.341192	59463.47692	4.30%	2213.791781	61677.2687	20960.62	82637.8887
2022-23	SOG B(T)	142367.3687	16372.2474	5694.694747	164434.3108	4.30%	6121.796853	170556.1077	21337.91116	191894.0188
2022-23	SOG C(T)	123723.2915	14228.17852	4948.931659	142900.4017	4.30%	5320.101534	148220.5032	21337.91116	169558.4144
2022-23	Technical Officer 4	96580.21379	11106.72459	3863.208551	111550.1469	4.30%	4152.949193	115703.0961	21337.91116	137041.0073
2022-23	Technical Officer 3	85294.02421	9808.812784	3411.760968	98514.59796	4.30%	3667.643041	102182.241	21337.91116	123520.1522
2022-23	Technical Officer 2	73437.27819	8445.286992	2937.491128	84820.05631	4.30%	3157.802962	87977.85927	21337.91116	109315.7704
2022-23	Technical Officer 1	64654.04062	7435.214671	2585.61625	74675.41191	4.30%	2780.135747	77455.54066	21337.91116	98793.45182
2022-23	SPO A	157217.4537	18080.00718	6288.698149	181586.159	4.30%	6760.35051	188346.5096	21337.91116	209684.4207
2022-23	SPO B	142367.3687	16372.2474	5694.694747	164434.3108	4.30%	6121.796853	170556.1077	21337.91116	191894.0188
2022-23	SPO C	123723.2915	14228.17852	4948.931659	142900.4017	4.30%	5320.101534	148220.5032	21337.91116	169558.4144
2022-23	Park Ranger 3	87324.28894	10042.29323	3492.971558	100859.5537	4.30%	3754.944424	104614.4982	21337.91116	125952.4093
2022-23	Park Ranger 2	80574.43958	9266.060552	3222.977583	93063.47772	4.30%	3464.700902	96528.17862	21337.91116	117866.0898
2022-23	Park Ranger 1	72122.29134	8294.063504	2884.891654	83301.2465	4.30%	3101.258528	86402.50502	21337.91116	107740.4162
2022-23	GSO 10	96580.21379	11106.72459	3863.208551	111550.1469	4.30%	4152.949193	115703.0961	21337.91116	137041.0073
2022-23	GSO 9	83605.26042	9614.604948	3344.210417	96564.07579	4.30%	3595.026198	100159.102	21337.91116	121497.0131
2022-23	GSO 8	76155.7506	8757.911319	3046.230024	87959.89195	4.30%	3274.697276	91234.58922	21337.91116	112572.5004
2022-23	GSO 7	70231.54224	8076.627357	2809.261689	81117.43128	4.30%	3019.956316	84137.3876	21337.91116	105475.2988
2022-23	GSO 6	64798.76205	7451.857636	2591.950482	74842.57017	4.30%	2786.346768	77628.91694	21337.91116	98966.8281
2022-23	GSO 5	61849.15181	7112.652458	2473.966072	71435.77034	4.30%	2659.513528	74095.28386	21337.91116	95433.19502
2022-23	GSO 4	58030.17179	6673.469756	2321.206872	67024.84842	4.30%	2495.297387	69520.1458	21337.91116	90858.05696
2022-23	GSO 3	55212.78904	6349.47074	2208.511562	63770.77134	4.30%	2374.149929	66144.92127	21337.91116	87482.83243
2022-23	GSO 2	52152.81569	5997.573804	2086.112627	60236.50212	4.30%	2242.571075	62479.07319	21337.91116	83816.98435
2023-24	SOG B(T)	144218.1445	16585.08661	5768.725779	166571.9569	4.30%	6201.380212	172773.3371	21721.99356	194495.3306
2023-24	SOG C(T)	125331.6943	14413.14484	5013.267771	144758.1069	4.30%	5389.262854	150147.3697	21721.99356	171869.3633
2023-24	Technical Officer 4	97835.75657	11251.11201	3913.430263	113000.2988	4.30%	4206.937532	117207.2364	21721.99356	138929.2299
2023-24	Technical Officer 3	86402.84653	9936.32735	3456.113861	99795.28774	4.30%	3715.322401	103510.6101	21721.99356	125232.6037
2023-24	Technical Officer 2	74391.9628	8555.075722	2975.678512	85922.71704	4.30%	3198.854401	89121.57144	21721.99356	110843.565
2023-24	Technical Officer 1	65494.54315	7531.872462	2619.781726	75646.19733	4.30%	2816.265355	78462.46269	21721.99356	100184.4562
2023-24	SPO A	159261.2806	18315.04727	6370.451225	183946.7791	4.30%	6848.235067	190795.0142	21721.99356	212517.0077
2023-24	SPO B	144218.1445	16585.08661	5768.725779	166571.9569	4.30%	6201.380212	172773.3371	21721.99356	194495.3306
2023-24	SPO C	125331.6943	14413.14484	5013.267771	144758.1069	4.30%	5389.262854	150147.3697	21721.99356	171869.3633
2023-24	Park Ranger 3	88459.5047	10172.84304	3538.380188	102170.7279	4.30%	3803.758702	105974.4866	21721.99356	127696.4802
2023-24	Park Ranger 2	81621.9073	9386.519339	3264.876292	94273.30293	4.30%	3509.742014	97783.04494	21721.99356	119505.0385
2023-24	Park Ranger 1	73059.88113	8401.886331	2922.395245	84384.1627	4.30%	3141.574888	87525.73759	21721.99356	109247.7312
2023-24	GSO 10	97835.75657	11251.11201	3913.430263	113000.2988	4.30%	4206.937532	117207.2364	21721.99356	138929.2299
2023-24	GSO 9	84692.12881	9739.594813	3387.685152	97819.40877	4.30%	3641.761539	101461.1703	21721.99356	123183.1639
2023-24	GSO 8	77145.77536	8871.764166	3085.831014	89103.37054	4.30%	3317.268341	92420.63888	21721.99356	114142.6324
2023-24	GSO 7	71144.55229	8181.623513	2845.782091	82171.95789	4.30%	3059.215748	85231.17364	21721.99356	106953.1672
2023-24	GSO 6	65641.14596	7548.731785	2625.645838	75815.52358	4.30%	2822.569276	78638.09286	21721.99356	100360.0864
2023-24	GSO 5	62653.19078	7205.11694	2506.127631	72364.43535	4.30%	2694.087204	75058.52255	21721.99356	96780.51611
2023-24	GSO 4	58784.56402	6760.224863	2351.382561	67896.17145	4.30%	2527.736253	70423.9077	21721.99356	92145.90126
2023-24	GSO 3	55930.5553	6432.013859	2237.222212	64599.79137	4.30%	2405.013878	67004.80525	21721.99356	88726.79881
2023-24	GSO 2	52830.80229	6075.542264	2113.232092	61019.57665	4.30%	2271.724499	63291.30115	21721.99356	85013.29471
2024-25	SOG B(T)	146092.9803	16800.69274	5843.71924	168737.3923	4.30%	6281.998155	175019.3905	22112.98944	197132.3799
2024-25	SOG C(T)	126961.0063	14600.51572	5078.440252	146639.9623	4.30%	5459.323271	152099.2855	22112.98944	174212.275
2024-25	Technical Officer 4	99107.6214	11397.37646	3964.304856	114469.3027	4.30%	4261.62772	118730.9304	22112.98944	140843.9199
2024-25	Technical Officer 3	87526.08353	10065.49961	3501.043341	101092.6265	4.30%	3763.621592	104856.2481	22112.98944	126969.2375
2024-25	Technical Officer 2	75359.05832	8666.291707	3014.362333	87039.71236	4.30%	3240.439508	90280.15187	22112.98944	112393.1413
2024-25	Technical Officer 1	66345.97221	7629.786804	2653.838888	76629.5979	4.30%	2852.876805	79482.4747	22112.98944	101595.4641
2024-25	SPO A	161331.6773	18553.14289	6453.267091	186338.0872	4.30%	6937.262123	193275.3494	22112.98944	215388.3388
2024-25	SPO B	146092.9803	16800.69274	5843.719214	168737.3923	4.30%	6281.998155	175019.3905	22112.98944	197132.3799
2024-25	SPO C	126961.0063	14600.51572	5078.440252	146639.9623	4.30%	5459.323271	152099.2855	22112.98944	174212.275
2024-25	Park Ranger 3	89609.47826	10305.09	3584.37913	103498.9474	4.30%	3853.207565	107352.155	22112.98944	129465.1444
2024-25	Park Ranger 2	82682.99209	9508.544091	3307.319684	95498.85587	4.30%	3555.36866	99054.22453	22112.98944	121167.214
2024-25	Park Ranger 1	74009.65958	8511.110852	2960.386383	85481.15682	4.30%	3182.415362	88663.57218	22112.98944	110776.5616
2024-25	GSO 10	99107.6214	11397.37646	3964.304856	114469.3027	4.30%	4261.62772	118730.9304	22112.98944	140843.9199
2024-25	GSO 9	85793.12648	9866.209545	3431.725059	99091.06108	4.30%	3689.104439	102780.1655	22112.98944	124893.155
2024-25	GSO 8	78148.67044	8987.097101	3125.946818	90261.71436	4.30%	3360.392829	93622.10719	22112.98944	115735.0966
2024-25	GSO 7	72069.43147	8287.984619	2882.777259	83240.19334	4.30%	3098.985553	86339.1789	22112.98944	108452.1683
2024-25	GSO 6	66494.48086	7646.865298	2659.779234	76801.12539	4.30%	2859.262677	79660.38807	22112.98944	101773.3775
2024-25	GSO 5	63467.68226	7298.78346	2538.70729	73305.17301	4.30%	2729.110337	76034.28335	22112.98944	98147.27279
2024-25	GSO 4	59548.76336	6848.107786	2381.950534	68778.82168	4.30%	2560.596824	71339.4185	22112.98944	93452.40735
2024-25	GSO 3	56657.65252	6515.63004	2266.306101	65439.58866	4.30%	2436.279058	67875.86772	22112.98944	89988.85716

2024-25	GSO 2	53517.60272	6154.524313	2140.704109	61812.83114	4.30%	2301.256917	64114.08806	22112.98944	86227.0775

	Agency	Premium rate
086	Justice and Community Safety	**5.67%**
086_015_000	JACS - Other	**2.24%**
086_028_000	ACT Corrective Services	**7.13%**
086_059	Emergency Services Authority (ESA)	**7.73%**
086_059_005	ACT Fire & Rescue	**5.29%**
086_059_006	Rural Fire Service	**6.47%**
086_059_007	ACT Ambulance Service	**12.17%**
086_059_008	SES	**5.28%**
086_059_009	Admin, Other	**2.02%**
108	Education Directorate	**2.43%**
108_001	Secondary Colleges	**1.72%**
108_002	High Schools	**3.99%**
108_003	Primary / Combined Schools	**1.76%**
108_004	Special Schools	**6.74%**
108_005	Preschools	**2.44%**
108_006	Learning, Teaching and Student Engagement	**2.84%**
108_008	Tertiary Education, Corporate and Support Services	**2.29%**
113	Chief Minister, Treasury & Economic Development	**2.02%**
113_001	Chief Minister Stream	**1.18%**
113_062	Access Canberra	**3.30%**
113_062_062	Access Canberra (Core)	**3.30%**
113_062_568	Gambling and Racing Commission Board	**0.70%**
113_430	Treasury	**1.75%**
113_430_003	Economic, Budget & IR	**0.77%**
113_430_015	Commercial Services & Infrastructure	**2.14%**
113_430_029	ACTIA	**1.69%**
113_430_402	Shared Services	**1.86%**
113_430_568	Property Group	**2.87%**
113_568	Economic Development	**2.05%**
113_568_001	Economic Development (Core)	**1.31%**
113_568_334	Cultural Facilities Corporation	**3.94%**
113_900	Building & Construction Industry Training Board	**0.70%**
115	University of Canberra	**0.93%**
143	Canberra Institute of Technology	**2.16%**
150	Housing ACT	**2.28%**
185	Calvary Health Care	**2.33%**
462	Community Services Directorate	**5.21%**
462_003	Corporate and Executive	**2.49%**
462_478	OCYFS	**7.36%**
462_478_002	OCYFS (Core)	**6.16%**
462_478_008	Bimberi	**12.11%**
466	Health Directorate	**2.71%**
466_002	Office of the Director-General	**0.71%**
466_011	DD-G TCH & Health Services	**2.59%**
466_011_011	Mental Health, Justice Health and Alcohol and Drug	**4.18%**
466_011_012	Surgery and Oral Health	**2.80%**
466_011_013	Women, Youth and Children's Health	**2.77%**
466_011_022	Office of the DD-G TCH & Health Services	**1.82%**
466_011_029	Medicine	**1.66%**
466_011_030	Pathology	**1.27%**
466_011_031	Chief of Clinical Operations	**2.41%**
466_011_085	Critical Care	**3.66%**
466_011_098	Clinical Support Services	**4.18%**
466_011_106	Rehabilitation, Aged and Community Care	**1.28%**
466_011_125	Cancer, Ambulatory & Community Health Support	**1.19%**
466_016	Quality, Governance and Risk	**1.94%**
466_019	Population Health	**0.79%**
466_032	Innovation	**0.70%**
466_040	DD-G Strategy & Corporate	**5.79%**
466_040_040	Business Support	**8.55%**
466_040_049	People and Culture	No longer part
466_040_056	Business Performance Information & Decision Support	**3.88%**
466_040_061	Strategic Finance	**0.70%**
466_040_138	Digital Solutions	**4.67%**
466_040_152	DDG Corporate	**0.62%**
466_040_153	Health Infrastructure Services	**1.03%**
466_099	Special Purpose Account	**0.70%**
500	Transport Canberra and City Services Directorate	**3.61%**
500_001	Chief Operating Officer	**1.35%**
500_015	City Services	**4.60%**
500_015_015	Yarralumla Nursery	**9.75%**
500_015_016	Canberra Cemeteries	**15.13%**
500_015_019	Capital Linen Service	**4.31%**
500_015_023	Roads ACT	**2.76%**
500_015_028	City Presentation	**6.19%**
500_015_029	Capital Works Design & Delivery	**1.22%**
500_015_030	ACT No Waste	**2.46%**
500_015_031	Libraries	**1.19%**
500_015_900	Birrigai	**2.23%**
500_022	Transport Canberra	**0.70%**
500_022_022	Light Rail Delivery	**0.70%**
500_022_078	Public Transport	**0.70%**
544	Environment, Planning and Sustainable Development	**1.88%**
544_002	EPSDD - Core	**0.98%**
544_038	Parks, Conservation and Lands	**4.30%**
606	ACT Audit Office	**1.22%**
955	Public Transport Operations	**9.85%**
985_025	Legal Aid ACT	**0.70%**
985_960	Public Trustee and Guardian	**1.32%**
985_981	Independent Competition and Regulatory Commission	**0.70%**
990_108	ACT Teacher Quality Institute	**0.70%**
990_113	ACT Government Executive	**0.70%**
990_467	ACT Legislative Assembly	**0.70%**
990_467_001	Office of the Legislative Assembly	**0.70%**
990_467_002	Legislative Assembly Members Staff	**0.70%**
990_605	ACT Long Service Leave Authority	**0.70%**
990_983	ACT Electoral Commission	**0.70%**
991	City Renewal Authority	**0.70%**
992	Suburban Land Agency	**0.70%**

Asset	Class	Recommned Standard Useful Life	Actual U/L range	Asset Sub Class	FV Classification
Barrier	Infrastructure	100	100-136	10006	3
Boat Ramp	Infrastructure	50	29-43	10019	3
Bridge	Infrastructure	100	100-125	10001	3
Bridges and Boardwalks	Infrastructure	100	50	10020	3
Bus Shelter	Infrastructure	40	40-107	10025	3
Bus Stops	Infrastructure	40	40-107	10025	3
Carpark - Bitumen, Concrete	Infrastructure	50	50-100	10007	3
Carpark - Gravel	Infrastructure	40	40-106	10007	3
Community Paths	Infrastructure	40	40-107	10011	3
Driveway	Infrastructure	50	50-109	10002	3
Fence	Infrastructure	30	30-123	10013	3
Gate	Infrastructure	30	30-122	10014	3
Irrigation	Infrastructure	20	15-59	10015	3
Jetty	Infrastructure	50	50	10021	3
Other Infrastructure	Infrastructure	Various		10022	3
Retaining Wall	Infrastructure	100	100-109	10024	3
Road - Arterial	Infrastructure	75	75-113	10005	3
Road - Gravel	Infrastructure	40	40-106	10005	3
Road - Municipal	Infrastructure	90	90-116	10005	3
Rockwall	Infrastructure	100	100-109	10016	3
Shopping Centre Pavement	Infrastructure	50	50-109	10003	3
Signs (PCL)	Infrastructure	10	10-100	10017	3
Signs (Roads)	Infrastructure	10	10-120	10017	3
Site Improvements	Infrastructure	25		10004	3
Skate Park	Infrastructure	40	40	10018	3
Stormwater - all	Infrastructure	100	100-138	10009	3
Stormwater - Culverts	Infrastructure	80	80-115	10009	3
Streetlight - Columns	Infrastructure	70	70-131.5	10008	3
Streetlight - inside Contactors	Infrastructure	50	50-77	10008	3
Streetlight - outside Contactors	Infrastructure	50	50-96	10008	3
Traffic Calming Measures - Concrete/Asphalt speed Humps	Infrastructure	20		10026	3
Traffic Calming Measures - Plastic/Rubber speed Humps	Infrastructure	10		10026	3
Traffic Signals set with Controller	Infrastructure	15	15	10010	3
Traffic Signals set withouth Controller	Infrastructure	35	35-54.6	10010	3
TV Transmitter	Infrastructure	5	2	10023	3
Waste Infrastructure	Infrastructure	Various		10012	3

ACT Government

SERVICES AGREEMENT

Date	26th June 2019
Parties	**AUSTRALIAN CAPITAL TERRITORY** **GINNINDERRA CATCHMENT GROUP INCORPORATED** **75 648 187 515**
	COMMUNITY ENGAGEMENT – WATERWAYS
Prepared by	Ralph Ogden Healthy Waterways Level 1 North 16 Challis Street Dickson, ACT, 2602 Environment, Planning and Sustainable Development Ph: (02) 6207 2207 Ref: A20264230
Version	26th June 2019

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PARTIES: **AUSTRALIAN CAPITAL TERRITORY**, the body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (Cth) **(Territory)** represented by the Environment, Planning and Sustainable Services Directorate.

Ginninderra Catchment Group (ABN 75 648 187 515) of 20 Kippax Place, Holt, ACT 2615 **(Consultant)**.

BACKGROUND

A. The Territory has undertaken a procurement process and has selected the Consultant to provide the Services.

B. The Territory has agreed to purchase and the Consultant has agreed to provide the Services in accordance with the provisions of this Agreement.

IT IS AGREED by the parties as follows.

1. Interpretation

1.1 Definitions

The following definitions apply in this Agreement, unless the context otherwise requires.

Confidential Text	any text of this Agreement that, for the purposes of the Procurement Act, either party proposes should not be published and which is specified in **Item 7 Schedule 1**.
Consultant Material	all material owned by the Consultant and used for the purpose of providing the Services, including documents, information and data stored by any means.
Contract Material	all material created, written or otherwise brought into existence as part of, or for the purpose of performing the Services including all reports (whether in draft or final form), documents, information and data stored by any means.
Contract Officers	in relation to each party, the representatives whose names and contact details are specified in **Item 1 Schedule 1**, or as notified from time to time by one party to the other.
Contract Price	the amounts specified in, or calculated in accordance with, **Item 3 Schedule 1**.
GST	has the same meaning as in the *A New Tax System (Goods and Services Tax) Act 1999* (Cth).
Information Privacy Act	the *Information Privacy Act 2014* (ACT).
Insolvency Event	(1) in respect of a natural person: (a) any orders, agreements or arrangements are made in respect of the affairs of the person in accordance with the *Bankruptcy Act 1966* (Cth); or (b) in the reasonable opinion of the Territory the person is likely to be declared bankrupt or lose control of the management of their financial affairs; or (2) in respect of all other entities:

(a) any of the events listed in sub-sections 459C(2)(a) to (f) of the *Corporations Act 2001* (Cth) occur in respect of the entity; or

(b) any other event occurs which, in the reasonable opinion of the Territory is likely to result, or has resulted, in the:

(i) insolvency;
(ii) winding up; or
(iii) appointment of a controller (as that term is defined in the *Corporations Act 2001* (Cth)) in respect of part or all of the property,

of the entity.

For the purpose of subparagraph (2)(b), subsections 459C(2)(a) to (f) *Corporations Act 2001*(Cth) are to be read as if applying to all incorporated entities.

Invoice an invoice that:

(1) if GST is payable in respect of the provision of the Services, is a valid tax invoice for the purposes of the *A New Tax System (Goods and Services Tax) Act 1999* (Cth);

(2) clearly sets out details of the Services provided and of the amount that is due for payment, is correctly calculated and is in respect of Services that have been performed in accordance with this Agreement;

(3) is accompanied by any other details or reports required under this Agreement; and

(4) is rendered at the times specified in **Item 3 Schedule 1** (if any) and addressed to the Territory's Contract Officer.

Personal Information is personal information as defined in section 8 of the Information Privacy Act, namely, information or an opinion about an identified individual or an individual who is reasonably identifiable:

(1) whether the information is true or not; and

(2) whether the information or opinion is recorded in a material form or not,

but does not include personal health information (as defined in the *Health Records (Privacy and Access) Act 1997* (ACT)) about the individual.

Prescribed Insurer an insurer that is authorised by the Australian Prudential Regulation Authority to conduct new or renewal insurance business in Australia and rated at AA or better by Standard & Poor's.

Procurement Act the *Government Procurement Act 2001* (ACT).

Services the services described in **Schedule 2**.

Special Condition any provision set out in **Schedule 3**.

Specified Personnel any person named in **Item 4 Schedule 1**, or any other employee or agent of the Consultant, who is approved by the Territory from time to time for the purpose of **clause 6**.

Term the term specified in **Item 2 Schedule 1**, and if extended, the initial term and the extended term.

Territory when used:

(1) in a geographical sense, the Australian Capital Territory; and

(2) in any other sense, the body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (Cth).

Territory Information the kind of information that:

(1) is or relates to documents, submissions, consultations, policies, strategies, practices and procedures of the Territory which are by their nature confidential;

(2) is notified (whether in writing or not) by the Territory to the Consultant as being confidential;

(3) is specified in **Item 6 Schedule 1**; or

(4) is Personal Information,

but does not include information that:

(5) is or becomes public knowledge other than by breach of this Agreement;

(6) has been independently developed or acquired by the Consultant; or

(7) has been notified by the Territory to the Consultant as not being confidential.

Territory Material any material provided by the Territory to the Consultant for the purposes of this Agreement including documents, equipment, information and data stored by any means.

TPPs the Territory Privacy Principles provided for in section 13 and set out in Schedule 1 of the Information Privacy Act.

TPP Code a code of practice about information privacy which, having regard to section 21(1) and (3) of the Information Privacy Act, binds an agency that engages the Consultant in the provision of the Services.

1.2 General

In this Agreement, unless a contrary intention is expressed:

(1) references to "Consultant" include any employees, agents or subcontractors of the Consultant;

(2) references to legislation or to provisions in legislation include references to amendments or re-enactments of them and to all regulations and instruments issued under the legislation;

(3) words in the singular include the plural and vice versa;

(4) headings are for convenience only and do not affect the construction or interpretation of this Agreement;

(5) an obligation imposed on more than one person binds them jointly and severally; and

(6) the word "include" and any derivation is not to be construed as a word of limitation.

2. Services

The Consultant must perform the Services in accordance with the provisions of this Agreement and to a standard of care, skill and diligence expected of a person

who regularly acts in the capacity in which the Consultant is engaged.

3. Term

This Agreement is for the Term unless terminated under the provisions of this Agreement.

4. Contract Price

4.1 Invoice

The Territory must pay the Consultant the Contract Price following its receipt of an Invoice and otherwise in accordance with **Item 3 Schedule 1**.

4.2 Incorrect payments

If, after payment, an invoice is found to have been incorrectly rendered, any underpayment or overpayment will be recoverable by or from the Consultant, as the case may be, and, without limiting recourse to other available remedies, may be offset against any amount subsequently due by the Territory to the Consultant under this Agreement.

5. Ownership and use of material

5.1 Ownership of material

Ownership of:

(1) all Contract Material, including any intellectual property rights, vests on its creation in the Territory;

(2) all Territory Material, including any intellectual property rights, remains with the Territory; and

(3) all Consultant Material, including any intellectual property rights, remains with the Consultant.

5.2 Licence of material

(1) The Territory grants to the Consultant a royalty-free, limited licence to use the Contract Material and Territory Material for the Term.

(2) The Consultant grants to the Territory a royalty-free, perpetual, limited licence to use the Consultant Material.

(3) For the purpose of this clause, "use" includes:

(a) such uses as are reasonably necessary for the Territory to obtain the full benefit of the Services, including use of the Contract Material; and

(b) such uses as are reasonably necessary for the Consultant to undertake the Services or as otherwise agreed by the Territory,

and may include supply, reproduce, publish, perform, communicate, broadcast, adapt and copy as the context requires.

5.3 Third party rights

The Consultant must ensure:

(1) the use of any Contract Material or Consultant Material will not infringe the intellectual property rights of any third party; and

(2) no fees, royalties or other payments are payable in respect of any third party rights as a result of the Territory's (or its agents') use of any Contract Material or Consultant Material.

5.4 Moral rights

The Consultant must, in relation to the authors of any work that comprises or forms part of the Contract Material:

(1) use its best endeavours to include in the Contract Material an attribution of those authors; and

(2) procure from those authors their genuine written consent for the Territory to:

(a) attribute the authorship of the work to the Territory or a third party where that attribution was inadvertent;

(b) not attribute the authorship of the author when using the work (including exhibiting or performing the work in or to the public); and/or

(c) materially alter the work in any way.

5.5 Safekeeping and preservation of material

The Consultant must ensure the safe-keeping and proper preservation of Contract Material and Territory Material in its possession or control and deliver to the Territory all Contract Material and Territory Material on the expiration or termination of this Agreement (other than copies of material that the Territory has authorised the Consultant to retain).

6. Consultant's personnel

The Consultant must:

(1) in performing the Services, engage only persons who have the skills, training and expertise appropriate for the Services;

(2) comply with all reasonable requirements notified by the Territory regarding the suitability and fitness of persons engaged by the Consultant for the performance of Services;

(3) ensure the Services are performed by Specified Personnel (if any) and provide replacement personnel acceptable to the Territory at no additional charge and at the earliest opportunity if the Specified Personnel are unable to perform any of the Services; and

(4) if the Territory requires, ensure that each person engaged in the performance of the Services executes a deed of confidentiality in a form acceptable to the Territory (including with respect to not accessing or otherwise safeguarding Personal Information as applicable), and provide those executed deeds to the Territory in accordance with any requirements that the Territory notifies.

7. Non-disclosure of Territory Information

7.1 Consultant's use of Territory Information

The Consultant must:

(1) use Territory Information held in connection with this Agreement only for the purposes of fulfilling its obligations under this Agreement;

(2) not transfer Territory Information held in connection with this Agreement outside the Territory, or allow any person (other than its authorised personnel) outside the Territory to have access to it, without the prior approval of the Territory;

(3) notify the Territory immediately if the Consultant becomes aware that a disclosure of Territory Information is required by law, or an unauthorised disclosure of Territory Information has occurred; and

(4) in respect of any Personal Information held in connection with this Agreement:

(a) comply with the TPPs and any applicable TPP Code and must not (and procure that any subcontractor engaged by the Consultant under this Agreement does not) act or engage in a practice that breaches a TPP or a TPP Code, and

(b) co-operate with any reasonable requests or directions of the Territory arising directly from, or in connection with, the exercise of the functions of the information privacy commissioner under the Information Privacy Act.

7.2 Consultant to protect Territory Information

(1) Except as provided in this Agreement, the Consultant must not disclose Territory Information to any person, nor deal with the Information in any way except for the purpose of this Agreement, without the prior written consent of the Territory except to the extent that the Territory Information is:

(a) required or authorised to be disclosed by law;

(b) disclosed to the Consultant's solicitors, auditors, insurers or advisers;

(c) generally available to the public; or

(d) in the possession of the Consultant without restriction in relation to disclosure before the date of receipt from the Territory.

(2) The Consultant must take all reasonable measures to ensure that Territory Information accessed or held by it in connection with this Agreement is protected against loss, unauthorised access, use, modification, disclosure or other misuse in accordance with reasonable procedures for that purpose and that only its authorised personnel have access to Territory Information.

(3) The Consultant must do all things necessary to ensure that Territory Information accessible to the Consultant and the Consultant's personnel by virtue of the performance of this Agreement is not accessed, published or communicated in any way, including imposing upon the Consultant's personnel obligations of confidentiality with respect to Territory Information.

7.3 Acknowledgement of effect of Crimes Act

The Consultant acknowledges that the publication or communication of any fact or document by a person which has come to its knowledge or into its possession or custody by virtue of the performance of this Agreement (other than to a person to whom the Consultant is authorised to publish or disclose the fact or document) may be an offence under section 153 of the *Crimes Act 1900* (ACT).

8. Confidential Text under Procurement Act

8.1 Territory may make Agreement publicly available

In giving effect to the principles of open and accountable government, the Territory may disclose documents and information unless it has otherwise agreed, or is otherwise required under law, to keep the information confidential. In accordance with those principles, this Agreement may be a notifiable contract under the Procurement Act and, if so, the Territory will be required to make the text of this Agreement available to the public, including by publication on a public contracts register.

8.2 Confidential Text

If **Item 7 Schedule 1** states that this Agreement is a notifiable contract under the Procurement Act and specifies Confidential Text, the grounds on which the text is confidential are set out in **Item 8 Schedule 1**, and **clause 8.3** applies.

8.3 Territory must not disclose Confidential Text

Except as provided in this Agreement, the Territory must not disclose Confidential Text to any person without the prior written consent of the Consultant (which consent will not be unreasonably withheld) except to the extent that Confidential Text:

(1) is required or authorised to be disclosed under law;

(2) is reasonably necessary for the enforcement of the criminal law;

(3) is disclosed to the Territory's solicitors, auditors, insurers or advisers;

(4) is generally available to the public;

(5) is in the possession of the Territory without restriction in relation to disclosure before the date of receipt from the Consultant;

(6) is disclosed by the responsible Minister in reporting to the Legislative Assembly or its committees; or

(7) is disclosed to the ombudsman or for a purpose in relation to the protection of public revenue.

9. Insurance and indemnity

9.1 Consultant's insurance

The Consultant must effect and maintain for the Term all insurance coverage required to be effected by it by law, public liability insurance and professional indemnity insurance in amounts not less than the amounts (if any) specified by **Item 5 Schedule 1**, and any other insurance specified in **Item 5 Schedule 1** with a Prescribed Insurer.

9.2 Indemnity

The Consultant indemnifies the Territory, its employees and agents against liability in respect of all claims, costs and expenses in relation to all loss, damage, injury or death to persons or property caused by the Consultant, in connection with the provision of the Services, except to the extent that the Territory caused the relevant loss, damage or injury.

9.3 Claims to be made good

The Consultant must, at its expense, make good the amount of all claims, loss, damage, costs and expenses the subject of the indemnity in **clause 9.2** and the Territory may deduct the amount, or any part of it, from any moneys due or becoming due to the Consultant under this Agreement.

10. Termination

10.1 Default

The Territory may terminate this Agreement, at any time by notice to the Consultant, if the Consultant:

(1) is the subject of an Insolvency Event;

(2) fails to commence timely provision of the Services or to meet any time frames specified in this Agreement; or

(3) is in breach of a provision of this Agreement, where that breach:

(a) if capable of being remedied, is not remedied within the period specified in a notice by the Territory; or

(b) is not capable of being remedied.

10.2 Termination for any reason or reduction of Services

The Territory may, at any time by notice to the Consultant, terminate this Agreement or reduce the Services for any reason, and in that event:

(1) the Territory will be liable only for:

(a) payments under this Agreement for Services rendered before the date of termination; and

(b) subject to **clauses 10.2(2)** and **10.2(3)**, any reasonable costs incurred by the Consultant and directly attributable to the termination or reduction of Services, but not in respect of loss of prospective profits;

(2) on receipt of a notice of termination or reduction, the Consultant must:

(a) stop work as specified in the notice;

(b) take all available steps to minimise loss resulting from that termination or reduction of Services; and

(c) continue to perform any part of the Services not affected by the notice; and

(3) in the event of a reduction of the Services, the Territory's liability to pay the Contract Price will, in the absence of agreement to the contrary, abate proportionately to the reduction in the Services.

10.3 No prejudice

Nothing in this **clause 10** prejudices any other rights or remedies of the Territory in respect of any breach of this Agreement.

11. Dispute resolution

(1) If a difference or dispute **(Dispute)** arises in relation to this Agreement either party may give notice to the other that a Dispute exists, which specifies details of the Dispute, and the parties agree that they will endeavour to resolve the Dispute by negotiations, or, if the Dispute has not been resolved within 28 days of the issue of the notice, undertake mediation with an independent mediator, the cost to be shared by the parties unless otherwise agreed.

(2) Nothing in this **clause 11** will prejudice the rights of either party to institute proceedings to enforce this Agreement or to seek injunctive or urgent declaratory relief in respect of any Dispute.

12. General

12.1 Cooperation and good faith

Each party will:

(1) fully cooperate with each other to ensure timely progress and fulfilment of this Agreement; and

(2) act reasonably and in good faith with respect to matters that relate to this Agreement.

12.2 Conflict of interest

The Consultant warrants that no conflict of interest exists or is likely to arise in the performance of the Services and its other obligations under this Agreement and must, if a conflict or risk of conflict arises, notify the Territory and comply with any requirement of the Territory to eliminate or deal with that conflict or risk.

12.3 No employment, partnership or agency relationship

Nothing in this Agreement constitutes the Consultant, or its employees, agents or subcontractors as employees, partners or agents of the Territory or creates any employment, partnership or agency for any purpose and the Consultant must not represent itself, and must ensure its employees, agents and subcontractors do not represent themselves, as being employees, partners or agents of the Territory.

12.4 No assignment or subcontracting

(1) The Consultant must not subcontract the performance of the Services or assign the whole or part of this Agreement without the prior written consent of the Territory. If the Territory gives its consent, the Territory may impose any conditions.

(2) A change in the control of the Consultant or a company that controls the Consultant (except a company listed on an Australian stock exchange) is taken to be an assignment, the term "control" including the direct or indirect holding of more than 50% of the share capital of a corporation.

(3) If the Consultant breaches **clause 12.4(1)**, the Territory reserves its rights, including requiring the Consultant to provide information regarding the proposed subcontractor's or assignee's capability to continue performing this Agreement or to provide security to ensure the proper performance of this Agreement.

12.5 Entire agreement

This Agreement comprises the entire agreement between the parties in relation to the Services and supersedes any prior representations, negotiations, writings, memoranda and agreements.

12.6 Severability

Any provision of this Agreement that is illegal, void or unenforceable will not form part of this Agreement to the extent of that illegality, voidness or unenforceability. The remaining provisions of this Agreement will not be invalidated by an illegal, void or unenforceable provision.

12.7 Variation

This Agreement may be varied or the Term extended only by the written agreement of the parties prior to the expiration of this Agreement.

12.8 No waiver

Failure or omission by the Territory at any time to enforce or require strict or timely compliance with any provision of this Agreement will not affect or impair that provision in any way or the rights and remedies that the Territory may have in respect of that provision.

12.9 Governing law and compliance with the law

This Agreement is governed by and construed in accordance with the law for the time being in force in the Territory and the parties submit to the non-exclusive jurisdiction of the courts of the Territory. The Consultant must comply with the laws from time to time in force in the Territory in performing the Services.

12.10 Notices

Any notice, including any other communication, required to be given or sent to either party under this Agreement must be in writing and given to the relevant Contract Officer. A notice will be deemed to have been given:

(1) if delivered by hand, on delivery;

(2) if sent by prepaid mail, on the expiration of two business days after the date on which it was sent;

(3) if sent by facsimile, on the sender's facsimile machine recording that the facsimile has been successfully and properly transmitted to the recipient's address; or

(4) if sent by electronic mail, on whichever of the following occurs first:

(a) the other party's acknowledgement of receipt by any means;

(b) the sender's electronic mail device recording that the electronic mail has been successfully transmitted to the recipient's address; or

(c) the expiration of two business days after the date on which it was sent without receipt of a notification that the delivery failed,

and if given in two or more ways, on the first of paragraphs (1) to (4) occurring.

12.11 Special Conditions

In the event of any inconsistency between any Special Condition and any other provision of this Agreement then, to the extent of any inconsistency, the Special Condition will prevail.

12.12 Survival of clauses

Clauses 7, 9.2 and 9.3 will survive the expiration or earlier termination of this Agreement.

SCHEDULE 1

CONTRACT DETAILS

Item 1. Contract Officers
See clauses 1.1 and 12.10

For the Territory:

Frank Garofalow
CEO ACT NRM
PH: 6207 0497

For the Consultant:

Sandy Lolicato
Convenor
PH: 6278 3309

Item 2. Term
See clauses 1.1 and 3

From 26 June 2019 until 30 June 2020.

Item 3. Contract Price
See clauses 1.1 and 4

(1) Contract Price: $297,000 (GST inclusive).

(2) The Contract Price is payable as a lump sum paid in advance of the Services.

(3) Except if otherwise stated in this Agreement, the Contract Price is:

(a) payable within 30 days of receipt by the Territory of an Invoice;

(b) inclusive of GST and all other taxes, duties and charges; and

(c) inclusive of all disbursements, including out-of-pocket expenses incurred by the Consultant.

Item 4. Specified Personnel
See clauses 1.1 and 6

Not applicable.

Item 5. Other amounts and insurance
See clause 9.1

(1) Public liability insurance: $20 million (in respect of each claim).

(2) Professional indemnity insurance: $10 million (in respect of each claim) and $10 million (in the annual aggregate).

The Consultant must maintain the professional indemnity insurance coverage required under this **Item 5** for an additional period of 6 years from the expiration

		of the Term. This Item survives the expiration or earlier termination of this Agreement."
Item 6.	**Territory Information** *See clauses 1.1 and 7*	Item 6 not used.
Item 7.	**Confidential Text** *See clauses 1.1 and 8*	Item 7 not used.
Item 8.	**Grounds for confidentiality of Confidential Text** *See clause 8*	Item 8 not used.

SCHEDULE 2

THE SERVICES

Objectives and background

The ACT Government is investing in Ginninderra Catchment Group to provide services in:

1) Community engagement to foster public stewardship of urban assets,
2) H2OK public education activities, and
3) Waterwatch water quality and ecological services.

Stewardship

Transport Canberra and City Services (TCCS) manages a wide range of natural assets, and twenty water quality infrastructure assets – mainly combinations of ponds and gardens of water plants – have recently been constructed in the ACT Healthy Waterways project. The long-term viability of these assets depends on public stewardship and education.

Stewardship of the assets involves the public taking a level of responsibility for them, providing both personal enrichment and benefits for the community. The public may appreciate the visual amenity of assets and enjoy encounters with individual plant and animals that live within them. In turn, actions by individuals, like the removal of trash or weeds, benefit the community by improving the functioning and habitat value of assets reducing maintenance costs normally borne by the asset owners (the ACT Government). Community advocates for assets also help ensure that the ACT Government manages sites according to community norms.

H2OK public education

The *H2OK Keeping our Waterways Healthy – Community Education and Behaviour Change Program* was developed to encourage actions and behaviours that reduce the inputs of diffuse and point sources of nutrients (principally organics, fertilisers, soil and septic sewage systems) to waterways. Lower pollutant inputs to waterways not only extend the life of water quality assets but have a number of other social and environmental benefits to the region's waterways and the local communities that use them. Catchment models have shown that algal blooms in urban lakes and other water quality problems in the ACT can only be solved if the level of pollutants entering waterways is reduced, so public education on this matter is vital to healthy waterways.

Waterway monitoring and Frogwatch

Waterwatch and Frogwatch are large citizen science programs in the ACT **Waterwatch** has been running since the 1990s. It facilitates community engagement through the monitoring and care of local waterways, provides data on water quality, macro-invertebrates and habitat features to the ACT government and the community. The annual CHIP report, summarizes and interprets the collected data and is used as an early warning system for water quality issues in the ACT. It also serves as a powerful way to raise community awareness about water quality and stream condition.

Frogwatch was established in 2002. Since then the program has run a FrogCensus in October each year, which involves citizen scientists of all ages in frog monitoring. The hands-on activity involves the collection of environmental parameters and the recording of frog calls at designated survey sites across the capital region. This enables community members to engage with the local environment, to develop and increase environmental stewardship and to contribute to one of the world's few long-term data sets on the distribution of frogs in a rapidly changing environment.

Desired outcomes

1. Stronger community connection with waterways, water quality assets and natural areas.
2. Active asset or waterway-care groups established.
3. Greater awareness among local communities about the effects of households on water quality and new behaviours adopted to help prevent pollution of waterways from households (noting that, given time and resourcing constraints, this outcome will need to be judged primarily on the basis of outputs).
4. Data on the condition of waterways collected by citizens are integrated into summary reports and government decision-making processes.

Services

Stewardship and public education activities will be conducted in consultation and (as appropriate) partnership with ACT EPSDD, TCCS and the ParkCare initiative. EPSDD has extensive H2OK materials and experience that may be drawn on in public education activities. TCCS (and in some instances, Parks and Conservation Service) needs to be involved as the owner of urban assets, and approvals may be required for some activities. The idea of involving ParkCare is to explore the possible benefits of extending the ParkCare model outside of local parks to green urban infrastructure more broadly.

The Consultant must provide the Services as follows within any specified timeframes.

Item Number	Details of Services	Timeframe for Completion
1	Conduct public engagement activities and hold events in relation to all or most recently constructed Healthy Waterways-TCCS sites in your jurisdiction to 1) generate interest from the community in forming 'asset-care' groups, and 2) educate local communities on preventing waterway pollution. Public education topics may include – • "The public's role in maintaining good water quality in ACT's waterways" • "What's the new infrastructure doing – the science behind urban wetlands ponds and	By June 30 2020

	raingardens" • "Relationship between community wellness and living near natural environments" • "Why runoff and streamflows matter to water quality" • "Algal blooms – causes and cures" and • "Macrophytes, native vegetation and weed identification in my wetland". Estimated expenditure $50,000.	
2	Conduct community engagement activities and hold events to generate interest in stewardship of (other) TCCS urban assets, in consultation with TCCS. Estimated expenditure $45,000.	By June 30 2020
3	Support nascent stewardship groups with social media (e.g. by creating a Facebook page) or other mechanisms, as appropriate. Estimated expenditure $5,000.	By June 30 2020
4	Employ a Waterwatch Coordinator to conduct deliverables on • Water quality monitoring • Community engagement and education; and • Monitoring to action. Details outlined in Appendix. See Appendix A for details. Estimated expenditure $95,000.	By June 30 2020
5	Employ a Frogwatch Coordinator to conduct deliverables on • Frog monitoring • Community engagement and education; and; • Monitoring to action. Details outlined in Appendix. See Appendix B for details. Estimated expenditure $75,000.	By June 30 2020
6	Financial and progress report	18 January 2020
7	Financial and final report on achievements and lessons learned.	30 June 2020
8	Meetings with TCCS, EPSD, PCS as agreed to facilitate project outputs.	As agreed/ required

Appendix A – Waterwatch Activities & Deliverables

The three core objectives of Upper Murrumbidgee Waterwatch are:

1. Engaging the community in monitoring and caring for our catchments

Volunteers measure water quality parameters in the ACT and region on a monthly basis, survey waterbugs, assess riparian condition and at times partake in other activities such as platypus and carp surveys.

2. Educating and raising awareness in schools and the community on catchment health

Waterwatch coordinators work with schools and attend public events to educate and raise awareness on issues of catchment health.

3. Using data collected by volunteers to inform policy and on ground catchment management.

The range of water quality data collected by volunteers gives a holistic understanding of catchment health. One example of where this is used is the Catchment Health Indicator Program (CHIP) report.

Estimated Expenses (excl GST)
Approximate salary: ASO6.2 x 30hrs + on costs (super and LSL 15%) – $79,550.00 $9,450 for: - Office space and IT $6,000 for: - Fuel Reimbursements - Waterwatch Program delivery. These may include: data analysis, event and educational materials, field equipment and professional development.

The following deliverables are based on these three core objectives. They are also highly complementary to the ACT Healthy Waterways Project from where this funding has been sourced.

Deliverable	**Performance indicator**	**Time schedule**
Water quality monitoring		
Water quality data	**Monitoring at Waterwatch sites** • All currently active sites monitored for water quality by volunteers to the minimum requirement for CHIP thresholds. • Coordinators are to encourage volunteers to upload data to ALA database by the end of the month. All water quality data uploaded by volunteers is cleared by coordinator at the end of each month.	Monthly Monthly
Waterbug sampling	• Assist with recruitment and implementation of Bug Blitz.	Spring and autumn

	• Key waterbug sites (those at the bottom of each CHIP reach) are monitored by Bug Blitz teams at least once a year in spring or autumn and preferably in both. • Waterbug data entered into ALA database within a month of completion	
RARC assessments	• RARC assessments completed for current Waterwatch sites • Sites where RARC assessment is >2 years old will be re-assessed (NB: it is suggested you stagger these assessments so that you are not conducting all of them in the one year). • RARC data entered in ALA database	Every two years Within a month of completion
Platypus Month	• Conduct at least four Platypus group surveys	During August
Water quality readings exceeding guidelines	• Abnormal water quality readings/events reported to relevant agencies	As soon as practicable
Data collection and quality assurance/ control	• All volunteers are trained and supported to ensure data meets Waterwatch standards. Training and documentation of volunteers must align with UMWW procedures. • All volunteers participate in the quality assurance (QA)/quality control (QC) process. QA/QC events are conducted biannually and volunteers have to attend one of these. If not, coordinator needs to follow up accreditation with volunteer. • Attend QAQC events	As required All volunteers accredited once/year. Twice a year
Deliverable	**Performance indicator**	**Time schedule**
Community engagement		
Communication Tools	• Waterwatch contributions provided to Catchment Group newsletter and other UMWW communications. • Volunteers receive email from the Waterwatch Coordinator notifying them of sampling weekend (third weekend of the month) and Waterwatch news	As required Monthly

	• ACT Healthy Waterways and H2OK messages are promoted to volunteers and wider community where appropriate. This could include, but is not limited to, media exposure, website, emails and flyers. • At least one update via @ACTlandwater (Twitter) or ACT Landcare and Waterwatch (Facebook)	Throughout project period Monthly
Community Events	• At least four events held/attended where community can participate or be exposed to Waterwatch messages. Examples of events include: Canberra Show, Clean Up events, World Wetlands Day and riparian planting days.	Annually
Network events/meetings	**Network events and meetings** • Network events/meetings attended promoting Waterwatch key messages eg Upper Murrumbidgee Catchment Network. **Partnerships** • Partner with catchment managers such as other catchment groups, ACT government, local councils and educational institutions to promote or implement Waterwatch initiatives.	At least six networking opportunities or partnership collaborations annually.

Deliverable	**Performance indicator**	**Time schedule**
Monitoring to action		
Catchment health reporting	**Catchment Health Indicator Program (CHIP) report** • Data that has been collected on water quality, water bugs, RARC in accordance with CHIP requirements. Coordinators will be encouraged to use other data in report cards such as algae, frogs, fish and platypus. • Meet timeframes for CHIP delivery outlined by the Regional Facilitator. • CHIP maps, report design and data coordination prepared by Regional Facilitator and Scientific Officer and analysis for report cards conducted by Waterwatch coordinators.	Data cut off is December 31 and CHIP report published by April 2020.
Waterwatch projects	• Where capacity permits, implement initiatives to improve waterway health based on information obtained through monitoring. This could range, for example, from riparian	Throughout project period.

	plantings through to advocating for improved water infrastructure.	

Deliverable	Performance indicator	Time schedule
Education activities	• For the equivalent of one day per week, promote the education program and deliver Waterwatch education activities to children such as scouts, girl guides and schools groups. • The coordinator is not restricted to their catchment group area for delivery of education activities and is encouraged to collaborate with the other Waterwatch staff to achieve this, where capacity permits. • Where possible, existing events should be targeted for educational activities, with supervised groups of children in pre-arranged venues or locations. Examples of these may include: junior ranger activities at Jerrabomberra Wetlands, SciScouts and National Science Week. Teacher training events should also prioritised. • Document the events attended by the coordinator and approximate number of children who have received the Waterwatch education program.	Throughout project period.

Deliverable	Performance indicator	Time schedule
General project implementation	• Attend meetings conducted by Regional Facilitator • Catch up with Catchment Group Manager and Regional Facilitator • Acknowledge funding source on website and other promotional material.	Monthly Twice during project period. Throughout project period.

All deliverables conducted by Waterwatch Coordinators and/or Waterwatch volunteers unless otherwise stated

Appendix B – Frogwatch Activities & Deliverables

The Contract Price $75,000.00 (excluding GST). It is payable in accordance with the following table. Clause 2 of Attachment B - *General Conditions of Contract* applies. Deliverables and KPIs to be determined in a project inception meeting

Estimated Expenses (excl GST)
Approximate salary: ASO6.2 x 22.5 hrs + on costs (super and LSL 15%) – $59,550.00 $9,450 for: - Office space and IT $6,000 for: - Fuel Reimbursements - Frogwatch Program delivery. These may include: data analysis, event and educational materials, field equipment and professional development.

DATE OF THIS AGREEMENT 27/6/19 Personal information

SIGNED for and on behalf of the)
AUSTRALIAN CAPITAL TERRITORY)
in the presence of:)

.....
Signature of Territory delegate

Personal information

IAN WALKER
.....
Print name

Signature of witness

Frank Garofalow
.....
Print name

SIGNED by or for and on behalf of)
Ginninderra Catchment Group Incorporated)
ABN: 75 648 187 515)
in the presence of:

Personal information

.....
Signature of authorised officer

Personal information

Personal information

.....
Signature of witness

.....
Signature of second authorised officer

Personal information

.....
Print name

Print name

Affix common seal if required under constitution

Note:

Date:	Must be dated on the date the last party signs the Agreement or, if signed counterparts of the Agreement are exchanged, the date of exchange. Also date the cover page.
Company:	Must be signed in accordance with section 127 of the *Corporations Act 2001* (Cth), for example, by 2 directors or a director and a secretary. Common seal may be affixed if required under the Consultant's constitution.
Individual:	Must be signed by the individual Consultant and witnessed.
Incorporated Association:	Must be signed in accordance with the Consultant's constitution, which may or may not require the common seal to be affixed. As a minimum, 2 authorised officers must sign.

ACT Government

SERVICES AGREEMENT

Date	25th June 2019
Parties	**AUSTRALIAN CAPITAL TERRITORY** **MOLONGLO CONSERVATION GROUP INCORPORATED** **ABN: 78 210 867 987**
	COMMUNITY ENGAGEMENT – WATERWAYS
Prepared by	Ralph Odgen Healthy Waterways Project Manager Level 1 North 16 Challis Street, Dickson, ACT, 2602 Environment, Planning and Sustainable Development Ph: 6207 2207 Ref: A20264848
Version	25 June 2019

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SCHEDULE 1 15

SCHEDULE 2 17

PARTIES: **AUSTRALIAN CAPITAL TERRITORY**, the body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (Cth) **(Territory)** represented by the Environment, Planning and Sustainable Development Directorate.

Molonglo Conservation Group Incorporated
ABN: 78 210 867 987 of Unit 2, 89 Tennant Street, Fyshwick, ACT, 2609 **(Consultant)**.

BACKGROUND

A. The Territory has undertaken a procurement process and has selected the Consultant to provide the Services.

B. The Territory has agreed to purchase and the Consultant has agreed to provide the Services in accordance with the provisions of this Agreement.

IT IS AGREED by the parties as follows.

1. Interpretation

1.1 Definitions

The following definitions apply in this Agreement, unless the context otherwise requires.

Confidential Text	any text of this Agreement that, for the purposes of the Procurement Act, either party proposes should not be published and which is specified in **Item 7 Schedule 1**.
Consultant Material	all material owned by the Consultant and used for the purpose of providing the Services, including documents, information and data stored by any means.
Contract Material	all material created, written or otherwise brought into existence as part of, or for the purpose of performing the Services including all reports (whether in draft or final form), documents, information and data stored by any means.
Contract Officers	in relation to each party, the representatives whose names and contact details are specified in **Item 1 Schedule 1**, or as notified from time to time by one party to the other.
Contract Price	the amounts specified in, or calculated in accordance with, **Item 3 Schedule 1**.

GST has the same meaning as in the *A New Tax System (Goods and Services Tax) Act 1999* (Cth).

Information Privacy Act the *Information Privacy Act 2014* (ACT).

Insolvency Event

(1) in respect of a natural person:

(a) any orders, agreements or arrangements are made in respect of the affairs of the person in accordance with the *Bankruptcy Act 1966* (Cth); or

(b) in the reasonable opinion of the Territory the person is likely to be declared bankrupt or lose control of the management of their financial affairs; or

(2) in respect of all other entities:

(a) any of the events listed in sub-sections 459C(2)(a) to (f) of the *Corporations Act 2001* (Cth) occur in respect of the entity; or

(b) any other event occurs which, in the reasonable opinion of the Territory is likely to result, or has resulted, in the:

(i) insolvency;
(ii) winding up; or
(iii) appointment of a controller (as that term is defined in the *Corporations Act 2001* (Cth)) in respect of part or all of the property,

of the entity.

For the purpose of subparagraph (2)(b), subsections 459C(2)(a) to (f) *Corporations Act 2001*(Cth) are to be read as if applying to all incorporated entities.

Invoice an invoice that:

(1) if GST is payable in respect of the provision of the Services, is a valid tax invoice for the purposes of the *A New Tax System (Goods and Services Tax) Act 1999* (Cth);

(2) clearly sets out details of the Services provided and of the amount that is due for payment, is correctly calculated and is in respect of Services that have been performed in accordance with this Agreement;

(3) is accompanied by any other details or reports required under this Agreement; and

(4) is rendered at the times specified in **Item 3 Schedule 1** (if any) and addressed to the Territory's Contract Officer.

Personal Information is personal information as defined in section 8 of the Information Privacy Act, namely, information or an opinion about an identified individual or an individual who is reasonably identifiable:

(1) whether the information is true or not; and

(2) whether the information or opinion is recorded in a material form or not,

but does not include personal health information (as defined in the *Health Records (Privacy and Access) Act 1997* (ACT)) about the individual.

Prescribed Insurer an insurer that is authorised by the Australian Prudential Regulation Authority to conduct new or renewal insurance business in Australia and rated at AA or better by Standard & Poor's.

Procurement Act the *Government Procurement Act 2001* (ACT).

Services the services described in **Schedule 2**.

Special Condition any provision set out in **Schedule 3**.

Specified Personnel any person named in **Item 4 Schedule 1**, or any other employee or agent of the Consultant, who is approved by the Territory from time to time for the purpose of **clause 6**.

Term the term specified in **Item 2 Schedule 1**, and if extended, the initial term and the extended term.

Territory when used:

(1) in a geographical sense, the Australian Capital

Territory; and

(2) in any other sense, the body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (Cth).

Territory Information the kind of information that:

(1) is or relates to documents, submissions, consultations, policies, strategies, practices and procedures of the Territory which are by their nature confidential;

(2) is notified (whether in writing or not) by the Territory to the Consultant as being confidential;

(3) is specified in **Item 6 Schedule 1**; or

(4) is Personal Information,

but does not include information that:

(5) is or becomes public knowledge other than by breach of this Agreement;

(6) has been independently developed or acquired by the Consultant; or

(7) has been notified by the Territory to the Consultant as not being confidential.

Territory Material any material provided by the Territory to the Consultant for the purposes of this Agreement including documents, equipment, information and data stored by any means.

TPPs the Territory Privacy Principles provided for in section 13 and set out in Schedule 1 of the Information Privacy Act.

TPP Code a code of practice about information privacy which, having regard to section 21(1) and (3) of the Information Privacy Act, binds an agency that engages the Consultant in the provision of the Services.

1.2 General

In this Agreement, unless a contrary intention is expressed:

(1) references to "Consultant" include any employees, agents or

subcontractors of the Consultant;

(2) references to legislation or to provisions in legislation include references to amendments or re-enactments of them and to all regulations and instruments issued under the legislation;

(3) words in the singular include the plural and vice versa;

(4) headings are for convenience only and do not affect the construction or interpretation of this Agreement;

(5) an obligation imposed on more than one person binds them jointly and severally; and

(6) the word "include" and any derivation is not to be construed as a word of limitation.

2. Services

The Consultant must perform the Services in accordance with the provisions of this Agreement and to a standard of care, skill and diligence expected of a person who regularly acts in the capacity in which the Consultant is engaged.

3. Term

This Agreement is for the Term unless terminated under the provisions of this Agreement.

4. Contract Price

4.1 Invoice

The Territory must pay the Consultant the Contract Price following its receipt of an Invoice and otherwise in accordance with **Item 3 Schedule 1**.

4.2 Incorrect payments

If, after payment, an invoice is found to have been incorrectly rendered, any underpayment or overpayment will be recoverable by or from the Consultant, as the case may be, and, without limiting recourse to other available remedies, may be offset against any amount subsequently due by the Territory to the Consultant under this Agreement.

5. Ownership and use of material

5.1 Ownership of material

Ownership of:

(1) all Contract Material, including any intellectual property rights, vests on

its creation in the Territory;

(2) all Territory Material, including any intellectual property rights, remains with the Territory; and

(3) all Consultant Material, including any intellectual property rights, remains with the Consultant.

5.2 Licence of material

(1) The Territory grants to the Consultant a royalty-free, limited licence to use the Contract Material and Territory Material for the Term.

(2) The Consultant grants to the Territory a royalty-free, perpetual, limited licence to use the Consultant Material.

(3) For the purpose of this clause, "use" includes:

(a) such uses as are reasonably necessary for the Territory to obtain the full benefit of the Services, including use of the Contract Material; and

(b) such uses as are reasonably necessary for the Consultant to undertake the Services or as otherwise agreed by the Territory,

and may include supply, reproduce, publish, perform, communicate, broadcast, adapt and copy as the context requires.

5.3 Third party rights

The Consultant must ensure:

(1) the use of any Contract Material or Consultant Material will not infringe the intellectual property rights of any third party; and

(2) no fees, royalties or other payments are payable in respect of any third party rights as a result of the Territory's (or its agents') use of any Contract Material or Consultant Material.

5.4 Moral rights

The Consultant must, in relation to the authors of any work that comprises or forms part of the Contract Material:

(1) use its best endeavours to include in the Contract Material an attribution of those authors; and

(2) procure from those authors their genuine written consent for the Territory to:

(a) attribute the authorship of the work to the Territory or a third party where that attribution was inadvertent;

(b) not attribute the authorship of the author when using the work (including exhibiting or performing the work in or to the public); and/or

(c) materially alter the work in any way.

5.5 Safekeeping and preservation of material

The Consultant must ensure the safe-keeping and proper preservation of Contract Material and Territory Material in its possession or control and deliver to the Territory all Contract Material and Territory Material on the expiration or termination of this Agreement (other than copies of material that the Territory has authorised the Consultant to retain).

6. Consultant's personnel

The Consultant must:

(1) in performing the Services, engage only persons who have the skills, training and expertise appropriate for the Services;

(2) comply with all reasonable requirements notified by the Territory regarding the suitability and fitness of persons engaged by the Consultant for the performance of Services;

(3) ensure the Services are performed by Specified Personnel (if any) and provide replacement personnel acceptable to the Territory at no additional charge and at the earliest opportunity if the Specified Personnel are unable to perform any of the Services; and

(4) if the Territory requires, ensure that each person engaged in the performance of the Services executes a deed of confidentiality in a form acceptable to the Territory (including with respect to not accessing or otherwise safeguarding Personal Information as applicable), and provide those executed deeds to the Territory in accordance with any requirements that the Territory notifies.

7. Non-disclosure of Territory Information

7.1 Consultant's use of Territory Information

The Consultant must:

(1) use Territory Information held in connection with this Agreement only for the purposes of fulfilling its obligations under this Agreement;

(2) not transfer Territory Information held in connection with this Agreement outside the Territory, or allow any person (other than its authorised personnel) outside the Territory to have access to it, without the prior approval of the Territory;

(3) notify the Territory immediately if the Consultant becomes aware that a disclosure of Territory Information is required by law, or an unauthorised disclosure of Territory Information has occurred; and

(4) in respect of any Personal Information held in connection with this Agreement:

(a) comply with the TPPs and any applicable TPP Code and must not (and procure that any subcontractor engaged by the Consultant under this Agreement does not) act or engage in a practice that breaches a TPP or a TPP Code, and

(b) co-operate with any reasonable requests or directions of the Territory arising directly from, or in connection with, the exercise of the functions of the information privacy commissioner under the Information Privacy Act.

7.2 Consultant to protect Territory Information

(1) Except as provided in this Agreement, the Consultant must not disclose Territory Information to any person, nor deal with the Information in any way except for the purpose of this Agreement, without the prior written consent of the Territory except to the extent that the Territory Information is:

(a) required or authorised to be disclosed by law;

(b) disclosed to the Consultant's solicitors, auditors, insurers or advisers;

(c) generally available to the public; or

(d) in the possession of the Consultant without restriction in relation to disclosure before the date of receipt from the Territory.

(2) The Consultant must take all reasonable measures to ensure that Territory Information accessed or held by it in connection with this Agreement is protected against loss, unauthorised access, use, modification, disclosure or other misuse in accordance with reasonable procedures for that purpose and that only its authorised personnel have access to Territory Information.

(3) The Consultant must do all things necessary to ensure that Territory Information accessible to the Consultant and the Consultant's personnel by virtue of the performance of this Agreement is not accessed,

published or communicated in any way, including imposing upon the Consultant's personnel obligations of confidentiality with respect to Territory Information.

7.3 Acknowledgement of effect of Crimes Act

The Consultant acknowledges that the publication or communication of any fact or document by a person which has come to its knowledge or into its possession or custody by virtue of the performance of this Agreement (other than to a person to whom the Consultant is authorised to publish or disclose the fact or document) may be an offence under section 153 of the *Crimes Act 1900* (ACT).

8. Confidential Text under Procurement Act

8.1 Territory may make Agreement publicly available

In giving effect to the principles of open and accountable government, the Territory may disclose documents and information unless it has otherwise agreed, or is otherwise required under law, to keep the information confidential. In accordance with those principles, this Agreement may be a notifiable contract under the Procurement Act and, if so, the Territory will be required to make the text of this Agreement available to the public, including by publication on a public contracts register.

8.2 Confidential Text

If **Item 7 Schedule 1** states that this Agreement is a notifiable contract under the Procurement Act and specifies Confidential Text, the grounds on which the text is confidential are set out in **Item 8 Schedule 1**, and **clause 8.3** applies.

8.3 Territory must not disclose Confidential Text

Except as provided in this Agreement, the Territory must not disclose Confidential Text to any person without the prior written consent of the Consultant (which consent will not be unreasonably withheld) except to the extent that Confidential Text:

(1) is required or authorised to be disclosed under law;

(2) is reasonably necessary for the enforcement of the criminal law;

(3) is disclosed to the Territory's solicitors, auditors, insurers or advisers;

(4) is generally available to the public;

(5) is in the possession of the Territory without restriction in relation to disclosure before the date of receipt from the Consultant;

(6) is disclosed by the responsible Minister in reporting to the Legislative Assembly or its committees; or

(7) is disclosed to the ombudsman or for a purpose in relation to the protection of public revenue.

9. Insurance and indemnity

9.1 Consultant's insurance

The Consultant must effect and maintain for the Term all insurance coverage required to be effected by it by law, public liability insurance and professional indemnity insurance in amounts not less than the amounts (if any) specified by **Item 5 Schedule 1**, and any other insurance specified in **Item 5 Schedule 1** with a Prescribed Insurer.

9.2 Indemnity

The Consultant indemnifies the Territory, its employees and agents against liability in respect of all claims, costs and expenses in relation to all loss, damage, injury or death to persons or property caused by the Consultant, in connection with the provision of the Services, except to the extent that the Territory caused the relevant loss, damage or injury.

9.3 Claims to be made good

The Consultant must, at its expense, make good the amount of all claims, loss, damage, costs and expenses the subject of the indemnity in **clause 9.2** and the Territory may deduct the amount, or any part of it, from any moneys due or becoming due to the Consultant under this Agreement.

10. Termination

10.1 Default

The Territory may terminate this Agreement, at any time by notice to the Consultant, if the Consultant:

(1) is the subject of an Insolvency Event;

(2) fails to commence timely provision of the Services or to meet any timeframes specified in this Agreement; or

(3) is in breach of a provision of this Agreement, where that breach:

(a) if capable of being remedied, is not remedied within the period specified in a notice by the Territory; or

(b) is not capable of being remedied.

10.2 Termination for any reason or reduction of Services

The Territory may, at any time by notice to the Consultant, terminate this Agreement or reduce the Services for any reason, and in that event:

(1) the Territory will be liable only for:

(a) payments under this Agreement for Services rendered before the date of termination; and

(b) subject to **clauses 10.2(2)** and **10.2(3)**, any reasonable costs incurred by the Consultant and directly attributable to the termination or reduction of Services, but not in respect of loss of prospective profits;

(2) on receipt of a notice of termination or reduction, the Consultant must:

(a) stop work as specified in the notice;

(b) take all available steps to minimise loss resulting from that termination or reduction of Services; and

(c) continue to perform any part of the Services not affected by the notice; and

(3) in the event of a reduction of the Services, the Territory's liability to pay the Contract Price will, in the absence of agreement to the contrary, abate proportionately to the reduction in the Services.

10.3 No prejudice

Nothing in this **clause 10** prejudices any other rights or remedies of the Territory in respect of any breach of this Agreement.

11. Dispute resolution

(1) If a difference or dispute **(Dispute)** arises in relation to this Agreement either party may give notice to the other that a Dispute exists, which specifies details of the Dispute, and the parties agree that they will endeavour to resolve the Dispute by negotiations, or, if the Dispute has not been resolved within 28 days of the issue of the notice, undertake mediation with an independent mediator, the cost to be shared by the parties unless otherwise agreed.

(2) Nothing in this **clause 11** will prejudice the rights of either party to institute proceedings to enforce this Agreement or to seek injunctive or urgent declaratory relief in respect of any Dispute.

12. General

12.1 Cooperation and good faith

Each party will:

(1) fully cooperate with each other to ensure timely progress and fulfilment of this Agreement; and

(2) act reasonably and in good faith with respect to matters that relate to this Agreement.

12.2 Conflict of interest

The Consultant warrants that no conflict of interest exists or is likely to arise in the performance of the Services and its other obligations under this Agreement and must, if a conflict or risk of conflict arises, notify the Territory and comply with any requirement of the Territory to eliminate or deal with that conflict or risk.

12.3 No employment, partnership or agency relationship

Nothing in this Agreement constitutes the Consultant, or its employees, agents or subcontractors as employees, partners or agents of the Territory or creates any employment, partnership or agency for any purpose and the Consultant must not represent itself, and must ensure its employees, agents and subcontractors do not represent themselves, as being employees, partners or agents of the Territory.

12.4 No assignment or subcontracting

(1) The Consultant must not subcontract the performance of the Services or assign the whole or part of this Agreement without the prior written consent of the Territory. If the Territory gives its consent, the Territory may impose any conditions.

(2) A change in the control of the Consultant or a company that controls the Consultant (except a company listed on an Australian stock exchange) is taken to be an assignment, the term "control" including the direct or indirect holding of more than 50% of the share capital of a corporation.

(3) If the Consultant breaches **clause 12.4(1)**, the Territory reserves its rights, including requiring the Consultant to provide information regarding the proposed subcontractor's or assignee's capability to continue performing this Agreement or to provide security to ensure the proper performance of this Agreement.

12.5 Entire agreement

This Agreement comprises the entire agreement between the parties in relation to the Services and supersedes any prior representations, negotiations, writings, memoranda and agreements.

12.6 Severability

Any provision of this Agreement that is illegal, void or unenforceable will not form part of this Agreement to the extent of that illegality, voidness or

unenforceability. The remaining provisions of this Agreement will not be invalidated by an illegal, void or unenforceable provision.

12.7 Variation

This Agreement may be varied or the Term extended only by the written agreement of the parties prior to the expiration of this Agreement.

12.8 No waiver

Failure or omission by the Territory at any time to enforce or require strict or timely compliance with any provision of this Agreement will not affect or impair that provision in any way or the rights and remedies that the Territory may have in respect of that provision.

12.9 Governing law and compliance with the law

This Agreement is governed by and construed in accordance with the law for the time being in force in the Territory and the parties submit to the non-exclusive jurisdiction of the courts of the Territory. The Consultant must comply with the laws from time to time in force in the Territory in performing the Services.

12.10 Notices

Any notice, including any other communication, required to be given or sent to either party under this Agreement must be in writing and given to the relevant Contract Officer. A notice will be deemed to have been given:

(1) if delivered by hand, on delivery;

(2) if sent by prepaid mail, on the expiration of two business days after the date on which it was sent;

(3) if sent by facsimile, on the sender's facsimile machine recording that the facsimile has been successfully and properly transmitted to the recipient's address; or

(4) if sent by electronic mail, on whichever of the following occurs first:

(a) the other party's acknowledgement of receipt by any means;

(b) the sender's electronic mail device recording that the electronic mail has been successfully transmitted to the recipient's address; or

(c) the expiration of two business days after the date on which it was sent without receipt of a notification that the delivery failed,

and if given in two or more ways, on the first of paragraphs (1) to (4) occurring.

12.11 Special Conditions

In the event of any inconsistency between any Special Condition and any other provision of this Agreement then, to the extent of any inconsistency, the Special Condition will prevail.

12.12 Survival of clauses

Clauses 7, 9.2 and 9.3 will survive the expiration or earlier termination of this Agreement.

SCHEDULE 1

CONTRACT DETAILS

Item 1. Contract Officers
See clauses 1.1 and 12.10

For the Territory:

Frank Garofalow
CEO ACT NRM
Environment, Planning and Sustainable Development Directorate

For the Consultant:

Karen Williams
President

Item 2. Term
See clauses 1.1 and 3

From 26 June 2019 until 30 June 2020.

Item 3. Contract Price
See clauses 1.1 and 4

(1) Contract Price: $192,500 (GST inclusive).

(2) The Contract Price is payable as a lump sum paid in advance of the Services.

(3) Except if otherwise stated in this Agreement, the Contract Price is:

(a) payable within 30 days of receipt by the Territory of an Invoice;

(b) inclusive of GST and all other taxes, duties and charges; and

(c) inclusive of all disbursements, including out-of-pocket expenses incurred by the Consultant.

Item 4. Specified Personnel
See clauses 1.1 and 6

Not applicable.

Item 5. Other amounts and insurance
See clause 9.1

(1) Public liability insurance: $20 million (in respect of each claim).

(2) Professional indemnity insurance: $10 million (in respect of each claim) and $10 million (in the annual aggregate).

The Consultant must maintain the professional indemnity insurance coverage required under this **Item**

		5 for an additional period of 6 years from the expiration of the Term. This Item survives the expiration or earlier termination of this Agreement."
Item 6.	**Territory Information** *See clauses 1.1 and 7*	Item 6 not used.
Item 7.	**Confidential Text** *See clauses 1.1 and 8*	Item 7 not used.
Item 8.	**Grounds for confidentiality of Confidential Text** *See clause 8*	Item 8 not used.

SCHEDULE 2

THE SERVICES

Objectives and background

The ACT Government is investing in Molonglo Conservation Group to provide services in:

1) Community engagement to foster public stewardship of urban assets,
2) H2OK public education activities, and
3) Waterwatch water quality services.

Stewardship

Transport Canberra and City Services (TCCS) manages a wide range of natural assets, and twenty water quality infrastructure assets – mainly combinations of ponds and gardens of waterplants – have recently been constructed in the ACT Healthy Waterways project. The long-term viability of these assets depends on public stewardship and education.

Stewardship of the assets involves the public taking a level of responsibility for them, providing both personal enrichment and benefits for the community. The public may appreciate the visual amenity of assets and enjoy encounters with individual plant and animals that live within them. In turn, actions by individuals, like the removal of trash or weeds, benefit the community by improving the functioning and habitat value of assets reducing maintenance costs normally borne by the asset owners (the ACT Government). Community advocates for assets also help ensure that the ACT Government manages sites according to community norms.

H2OK public education

The *H2OK Keeping our Waterways Healthy – Community Education and Behaviour Change Program* was developed to encourage actions and behaviours that reduce the inputs of diffuse and point sources of nutrient (principally organics, fertilisers, soil and septic sewage systems) to waterways. Lower pollutant inputs to waterways not only extend the life of water quality assets but have a number of other social and environmental benefits to the region's waterways and the local communities that use them. Catchment models have shown that algal blooms in urban lakes and other water quality problems in the ACT can only be solved if the level of pollutants entering waterways is reduced, so public education on this matter is vital to healthy waterways.

Waterway monitoring

Waterwatch is a large citizen science program that monitors water quality in streams. Waterwatch has been running since the 1990s. It facilitates community engagement through the monitoring and care of local waterways, provide data to the ACT government and community as an early warning system for water quality issues. It also serves as a powerful way to raise community awareness about water quality and stream condition.

Desired outcomes

1. Stronger community connection with waterways and water quality assets and natural areas.
2. Active asset or waterway-care groups established.
3. Greater awareness among local communities about the effects of households on water quality and new behaviours adopted to help prevent pollution of waterways from households (noting that, given time and resourcing constraints, this outcome will need to be judged primarily on the basis of outputs).
4. Data on the condition of waterways collected by citizens are integrated into summary reports and government decision-making processes.

Services

Stewardship and public education activities will be conducted in consultation and (as appropriate) partnership with ACT EPSDD, TCCS and the ParkCare initiative. EPSDD has extensive H2OK materials and experience that may be drawn on in public education activities. TCCS (and in some instances, Parks and Conservation Service) needs to be involved as the owner of urban assets, and approvals may be required for some activities. The idea of involving ParkCare is to explore the possible benefits of extending the ParkCare model outside of local parks to green urban infrastructure more broadly.

The Consultant must provide the Services as follows within any specified timeframes.

Item Number	Details of Services	Timeframe for Completion
1	Conduct public engagement activities and hold events in relation to all or most recently constructed Healthy Waterways-TCCS sites in your jurisdiction to 1) generate interest from the community in forming 'asset-care' groups, and 2) educate local communities on preventing waterway pollution. Public education topics may include – • "The public's role in maintaining good water quality in ACT's waterways" • "What's the new infrastructure doing – the science behind urban wetlands ponds and raingardens" • "Relationship between community wellness and living near natural environments" • "Why runoff and streamflows matter to water quality" • "Algal blooms – causes and cures" and • "Macrophytes, native vegetation and weed identification in my wetland". Estimated expenditure $50,000.	By June 30 2020

2	Conduct public engagement activities and hold events to generate interest in stewardship of (other) TCCS urban assets, in consultation with TCCS. Estimated expenditure $45,000.	By June 30 2020
3	Support nascent stewardship groups with social media (e.g. by creating a Facebook page) or other mechanisms, as appropriate. Estimated expenditure $5,000.	By June 30 2020
4	Funds to employ a Waterwatch Coordinator to conduct deliverables on • Water quality monitoring • Community engagement; and • Monitoring to action. Details outlines in Appendix See Appendix A for details. Estimated expenditure $75,000.	By June 30 2020
5	Financial and progress report	18 January 2020
6	Financial and final report on achievements and lessons learned.	30 June 2020
7	Meetings with TCCS, EPSD, PCS as agreed to facilitate project outputs.	As agreed/ required

Waterwatch Activities & Deliverables

The three core objectives of Upper Murrumbidgee Waterwatch are:

1. Engaging the community in monitoring and caring for our catchments

Volunteers measure water quality parameters in the ACT and region on a monthly basis, survey waterbugs, assess riparian condition and at times partake in other activities such as platypus surveys.

2. Educating and raising awareness in schools and the community on catchment health

Waterwatch coordinators work with schools and attend public events to educate and raise awareness on issues of catchment health.

3. Using data collected by volunteers to inform policy and on ground catchment management.

The range of water quality data collected by volunteers gives a holistic understanding of catchment health. One example of where this is used is the Catchment Health Indicator Program (CHIP) report.

Estimated Expenses (excl GST)
Approximate salary: ASO6.2 x 22.5 hrs + on costs (super and LSL 15%) – $59,550.00 $9,000 for: - Office space and IT $6,450 for: - Fuel Reimbursements Waterwatch Program delivery. These include: additional water quality kit contents (to be taken in turns to purchase between four Waterwatch Coordinators), event and educational materials (incl. QAQC workshop expenses), field equipment and professional development.

The following deliverables are based on these three core objectives. They are also highly complementary to the ACT Healthy Waterways Project from where this funding has been sourced.

Deliverable	**Performance indicator**	**Time schedule**
Water quality monitoring		
Water quality data	**Monitoring at Waterwatch sites** • All currently active sites monitored for water quality by volunteers to the minimum requirement for CHIP thresholds. • Coordinators are to encourage volunteers to upload data to ALA database by the end of the month. All water quality data uploaded by volunteers is cleared by coordinator at the end of each month.	Monthly Monthly

Waterbug sampling	• Assist with recruitment and implementation of Bug Blitz. • Key waterbug sites (those at the bottom of each CHIP reach) are monitored by Bug Blitz teams at least once a year in spring or autumn and preferably in both. • Waterbug data entered into ALA database within a month of completion	Spring and autumn
RARC assessments	• RARC assessments completed for current Waterwatch sites • Sites where RARC assessment is >2 years old will be re-assessed (NB: it is suggested you stagger these assessments so that you are not conducting all of them in the one year). • RARC data entered in ALA database	Every two years Within a month of completion
Platypus Month	• Conduct at least four Platypus group surveys	During August
Water quality readings exceeding guidelines	• Abnormal water quality readings/events reported to relevant agencies	As soon as practicable
Data collection and quality assurance/ control	• All volunteers are trained and supported to ensure data meets Waterwatch standards. Training and documentation of volunteers must align with UMWW procedures. • All volunteers participate in the quality assurance (QA)/quality control (QC) process. QA/QC events are conducted biannually and volunteers have to attend one of these. If not, coordinator needs to follow up accreditation with volunteer. • Attend QAQC events	As required All volunteers accredited once/year. Twice a year
Deliverable	**Performance indicator**	**Time schedule**
Community engagement		
Communication Tools	• Waterwatch contributions provided to Conservation Group newsletter and other UMWW communications. • Volunteers receive email from the Waterwatch Coordinator notifying them of sampling weekend (third weekend of the month) and Waterwatch news	As required Monthly Throughout project period

	• ACT Healthy Waterways and H2OK messages are promoted to volunteers and wider community where appropriate. This could include, but is not limited to, media exposure, website, emails and flyers. • At least one update via @ACTlandwater (Twitter) or ACT Landcare and Waterwatch (Facebook)	Monthly
Community Events	• At least four events held/attended where community can participate or be exposed to Waterwatch messages. Examples of events include: Canberra Show, Clean Up events, World Wetlands Day and riparian planting days.	Annually
Network events/meetings	**Network events and meetings** • Network events/meetings attended promoting Waterwatch key messages eg Upper Murrumbidgee Catchment Network. **Partnerships** • Partner with catchment managers such as other catchment groups, ACT government, local councils and educational institutions to promote or implement Waterwatch initiatives.	At least six networking opportunities or partnership collaborations annually.
Education activities	• Promote the education program and deliver Waterwatch education to children such as scouts, girl guides and school groups. • The coordinator is encouraged to collaborate with the other Waterwatch coordinators to deliver education activities. • Where possible, existing events should be targeted for educational activities, with supervised groups of children in pre-arranged venues or locations. Examples of these may include: junior ranger activities at Jerrabomberra Wetlands, SciScouts and other scout and guide activities and National Science Week. Schools with pre-existing relationships or close proximity to waterways should also be a priority. • Where necessary, comment and participate in workshops to refine education materials suitable for different age groups.	Throughout the project period.

	• Document the events attending and approximate number of children who have received the program.	

Deliverable	Performance indicator	Time schedule
Monitoring to action		
Catchment health reporting	**Catchment Health Indicator Program (CHIP) report** • Data that has been collected on water quality, water bugs, RARC in accordance with CHIP requirements. Coordinators will be encouraged to use other data in report cards such as algae, frogs, fish and platypus. • Meet timeframes for CHIP delivery outlined by the Regional Facilitator. • CHIP maps, report design and data coordination prepared by Regional Facilitator and Scientific Officer and analysis for report cards conducted by Waterwatch coordinators.	Data cut off is December 31 and CHIP report published by April 2020.
Waterwatch projects	• Where capacity permits, implement initiatives to improve waterway health based on information obtained through monitoring. This could range, for example, from riparian plantings through to advocating for improved water infrastructure.	Throughout project period.

Deliverable	Performance indicator	Time schedule
General project implementation	• Attend meetings conducted by Regional Facilitator • Catch up with Conservation Group Manger and Regional Facilitator • Acknowledge funding source on website and other promotional material	Monthly Twice during project period. Throughout project period.
Waterwatch staff	• Consult with EPSDD regarding any changes of personnel in relation to the Waterwatch program.	Throughout project period.

DATE OF THIS AGREEMENT 27/6/19

Personal information

SIGNED for and on behalf of the
AUSTRALIAN CAPITAL TERRITORY
in the presence of:

Personal information

Signature of witness

Frank Gratelow
Print name

Signature of Territory delegate

IAN WALKER
Print name

Personal information

SIGNED by or for and on behalf of
Molonglo Conservation Group Incorporated
ABN: 78 210 867 987

Affix common seal if required under constitution

Note:

Date:	Must be dated on the date the last party signs the Agreement or, if signed counterparts of the Agreement are exchanged, the date of exchange. Also date the cover page.
Company:	Must be signed in accordance with section 127 of the *Corporations Act 2001* (Cth), for example, by 2 directors or a director and a secretary. Common seal may be affixed if required under the Consultant's constitution.
Individual:	Must be signed by the individual Consultant and witnessed.
Incorporated Association:	Must be signed in accordance with the Consultant's constitution, which may or may not require the common seal to be affixed. As a minimum, 2 authorised officers must sign.

ACT Government

SERVICES AGREEMENT

Date	25 June 2019
Parties	**AUSTRALIAN CAPITAL TERRITORY** **SOUTHERN ACT CATCHMENT GROUP INC. ABN 45145814521**
	COMMUNITY ENGAGEMENT – WATERWAYS
Prepared by	Environment, Planning & Sustainable Development Directorate Level 1 North 16 Challis St Dickson, ACT 2602 Ph: 13 22 81/02 6207 1963 Ref: A20264842
Version	25 June 2019

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SCHEDULE 1 15

SCHEDULE 2 17

PARTIES: **AUSTRALIAN CAPITAL TERRITORY**, the body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (Cth) **(Territory)** represented by the Environment, Planning & Sustainable Development Directorate.

SOUTHERN ACT CATCHMENT GROUP INC. ABN 45145814521 (Consultant).

BACKGROUND

A. The Territory has undertaken a procurement process and has selected the Consultant to provide the Services.

B. The Territory has agreed to purchase and the Consultant has agreed to provide the Services in accordance with the provisions of this Agreement.

IT IS AGREED by the parties as follows.

1. Interpretation

1.1 Definitions

The following definitions apply in this Agreement, unless the context otherwise requires.

Confidential Text	any text of this Agreement that, for the purposes of the Procurement Act, either party proposes should not be published and which is specified in **Item 7 Schedule 1**.
Consultant Material	all material owned by the Consultant and used for the purpose of providing the Services, including documents, information and data stored by any means.
Contract Material	all material created, written or otherwise brought into existence as part of, or for the purpose of performing the Services including all reports (whether in draft or final form), documents, information and data stored by any means.
Contract Officers	in relation to each party, the representatives whose names and contact details are specified in **Item 1 Schedule 1**, or as notified from time to time by one party to the other.
Contract Price	the amounts specified in, or calculated in accordance with, **Item 3 Schedule 1**.

GST has the same meaning as in the *A New Tax System (Goods and Services Tax) Act 1999* (Cth).

Information Privacy Act the *Information Privacy Act 2014* (ACT).

Insolvency Event

(1) in respect of a natural person:

(a) any orders, agreements or arrangements are made in respect of the affairs of the person in accordance with the *Bankruptcy Act 1966* (Cth); or

(b) in the reasonable opinion of the Territory the person is likely to be declared bankrupt or lose control of the management of their financial affairs; or

(2) in respect of all other entities:

(a) any of the events listed in sub-sections 459C(2)(a) to (f) of the *Corporations Act 2001* (Cth) occur in respect of the entity; or

(b) any other event occurs which, in the reasonable opinion of the Territory is likely to result, or has resulted, in the:

(i) insolvency;
(ii) winding up; or
(iii) appointment of a controller (as that term is defined in the *Corporations Act 2001* (Cth)) in respect of part or all of the property,

of the entity.

For the purpose of subparagraph (2)(b), subsections 459C(2)(a) to (f) *Corporations Act 2001*(Cth) are to be read as if applying to all incorporated entities.

Invoice an invoice that:

(1) if GST is payable in respect of the provision of the Services, is a valid tax invoice for the purposes of the *A New Tax System (Goods and Services Tax) Act 1999* (Cth);

(2) clearly sets out details of the Services provided and of the amount that is due for payment, is correctly calculated and is in respect of Services that have been performed in accordance with this Agreement;

(3) is accompanied by any other details or reports required under this Agreement; and

(4) is rendered at the times specified in **Item 3 Schedule 1** (if any) and addressed to the Territory's Contract Officer.

Personal Information is personal information as defined in section 8 of the Information Privacy Act, namely, information or an opinion about an identified individual or an individual who is reasonably identifiable:

(1) whether the information is true or not; and

(2) whether the information or opinion is recorded in a material form or not,

but does not include personal health information (as defined in the *Health Records (Privacy and Access) Act 1997* (ACT)) about the individual.

Prescribed Insurer an insurer that is authorised by the Australian Prudential Regulation Authority to conduct new or renewal insurance business in Australia and rated at AA or better by Standard & Poor's.

Procurement Act the *Government Procurement Act 2001* (ACT).

Services the services described in **Schedule 2**.

Special Condition any provision set out in **Schedule 3**.

Specified Personnel any person named in **Item 4 Schedule 1**, or any other employee or agent of the Consultant, who is approved by the Territory from time to time for the purpose of **clause 6**.

Term the term specified in **Item 2 Schedule 1**, and if extended, the initial term and the extended term.

Territory when used:

(1) in a geographical sense, the Australian Capital Territory; and

(2) in any other sense, the body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (Cth).

Territory Information the kind of information that:

(1) is or relates to documents, submissions, consultations, policies, strategies, practices and procedures of the Territory which are by their nature confidential;

(2) is notified (whether in writing or not) by the Territory to the Consultant as being confidential;

(3) is specified in **Item 6 Schedule 1**; or

(4) is Personal Information,

but does not include information that:

(5) is or becomes public knowledge other than by breach of this Agreement;

(6) has been independently developed or acquired by the Consultant; or

(7) has been notified by the Territory to the Consultant as not being confidential.

Territory Material any material provided by the Territory to the Consultant for the purposes of this Agreement including documents, equipment, information and data stored by any means.

TPPs the Territory Privacy Principles provided for in section 13 and set out in Schedule 1 of the Information Privacy Act.

TPP Code a code of practice about information privacy which, having regard to section 21(1) and (3) of the Information Privacy Act, binds an agency that engages the Consultant in the provision of the Services.

1.2 General

In this Agreement, unless a contrary intention is expressed:

(1) references to "Consultant" include any employees, agents or subcontractors of the Consultant;

(2) references to legislation or to provisions in legislation include references to amendments or re-enactments of them and to all regulations and instruments issued under the legislation;

(3) words in the singular include the plural and vice versa;

(4) headings are for convenience only and do not affect the construction or interpretation of this Agreement;

(5) an obligation imposed on more than one person binds them jointly and severally; and

(6) the word "include" and any derivation is not to be construed as a word of limitation.

2. Services

The Consultant must perform the Services in accordance with the provisions of this Agreement and to a standard of care, skill and diligence expected of a person who regularly acts in the capacity in which the Consultant is engaged.

3. Term

This Agreement is for the Term unless terminated under the provisions of this Agreement.

4. Contract Price

4.1 Invoice

The Territory must pay the Consultant the Contract Price following its receipt of an Invoice and otherwise in accordance with **Item 3 Schedule 1**.

4.2 Incorrect payments

If, after payment, an invoice is found to have been incorrectly rendered, any underpayment or overpayment will be recoverable by or from the Consultant, as the case may be, and, without limiting recourse to other available remedies, may be offset against any amount subsequently due by the Territory to the Consultant under this Agreement.

5. Ownership and use of material

5.1 Ownership of material

Ownership of:

(1) all Contract Material, including any intellectual property rights, vests on its creation in the Territory;

(2) all Territory Material, including any intellectual property rights, remains with the Territory; and

(3) all Consultant Material, including any intellectual property rights, remains with the Consultant.

5.2 Licence of material

(1) The Territory grants to the Consultant a royalty-free, limited licence to use the Contract Material and Territory Material for the Term.

(2) The Consultant grants to the Territory a royalty-free, perpetual, limited licence to use the Consultant Material.

(3) For the purpose of this clause, "use" includes:

(a) such uses as are reasonably necessary for the Territory to obtain the full benefit of the Services, including use of the Contract Material; and

(b) such uses as are reasonably necessary for the Consultant to undertake the Services or as otherwise agreed by the Territory,

and may include supply, reproduce, publish, perform, communicate, broadcast, adapt and copy as the context requires.

5.3 Third party rights

The Consultant must ensure:

(1) the use of any Contract Material or Consultant Material will not infringe the intellectual property rights of any third party; and

(2) no fees, royalties or other payments are payable in respect of any third party rights as a result of the Territory's (or its agents') use of any Contract Material or Consultant Material.

5.4 Moral rights

The Consultant must, in relation to the authors of any work that comprises or forms part of the Contract Material:

(1) use its best endeavours to include in the Contract Material an attribution of those authors; and

(2) procure from those authors their genuine written consent for the Territory to:

(a) attribute the authorship of the work to the Territory or a third party where that attribution was inadvertent;

(b) not attribute the authorship of the author when using the work (including exhibiting or performing the work in or to the public); and/or

(c) materially alter the work in any way.

5.5 Safekeeping and preservation of material

The Consultant must ensure the safe-keeping and proper preservation of Contract Material and Territory Material in its possession or control and deliver to the Territory all Contract Material and Territory Material on the expiration or termination of this Agreement (other than copies of material that the Territory has authorised the Consultant to retain).

6. Consultant's personnel

The Consultant must:

(1) in performing the Services, engage only persons who have the skills, training and expertise appropriate for the Services;

(2) comply with all reasonable requirements notified by the Territory regarding the suitability and fitness of persons engaged by the Consultant for the performance of Services;

(3) ensure the Services are performed by Specified Personnel (if any) and provide replacement personnel acceptable to the Territory at no additional charge and at the earliest opportunity if the Specified Personnel are unable to perform any of the Services; and

(4) if the Territory requires, ensure that each person engaged in the performance of the Services executes a deed of confidentiality in a form acceptable to the Territory (including with respect to not accessing or otherwise safeguarding Personal Information as applicable), and provide those executed deeds to the Territory in accordance with any requirements that the Territory notifies.

7. Non-disclosure of Territory Information

7.1 Consultant's use of Territory Information

The Consultant must:

(1) use Territory Information held in connection with this Agreement only for the purposes of fulfilling its obligations under this Agreement;

(2) not transfer Territory Information held in connection with this Agreement outside the Territory, or allow any person (other than its

authorised personnel) outside the Territory to have access to it, without the prior approval of the Territory;

(3) notify the Territory immediately if the Consultant becomes aware that a disclosure of Territory Information is required by law, or an unauthorised disclosure of Territory Information has occurred; and

(4) in respect of any Personal Information held in connection with this Agreement:

(a) comply with the TPPs and any applicable TPP Code and must not (and procure that any subcontractor engaged by the Consultant under this Agreement does not) act or engage in a practice that breaches a TPP or a TPP Code, and

(b) co-operate with any reasonable requests or directions of the Territory arising directly from, or in connection with, the exercise of the functions of the information privacy commissioner under the Information Privacy Act.

7.2 Consultant to protect Territory Information

(1) Except as provided in this Agreement, the Consultant must not disclose Territory Information to any person, nor deal with the Information in any way except for the purpose of this Agreement, without the prior written consent of the Territory except to the extent that the Territory Information is:

(a) required or authorised to be disclosed by law;

(b) disclosed to the Consultant's solicitors, auditors, insurers or advisers;

(c) generally available to the public; or

(d) in the possession of the Consultant without restriction in relation to disclosure before the date of receipt from the Territory.

(2) The Consultant must take all reasonable measures to ensure that Territory Information accessed or held by it in connection with this Agreement is protected against loss, unauthorised access, use, modification, disclosure or other misuse in accordance with reasonable procedures for that purpose and that only its authorised personnel have access to Territory Information.

(3) The Consultant must do all things necessary to ensure that Territory Information accessible to the Consultant and the Consultant's personnel by virtue of the performance of this Agreement is not accessed, published or communicated in any way, including imposing upon the Consultant's personnel obligations of confidentiality with respect to

Territory Information.

7.3 Acknowledgement of effect of Crimes Act

The Consultant acknowledges that the publication or communication of any fact or document by a person which has come to its knowledge or into its possession or custody by virtue of the performance of this Agreement (other than to a person to whom the Consultant is authorised to publish or disclose the fact or document) may be an offence under section 153 of the *Crimes Act 1900* (ACT).

8. Confidential Text under Procurement Act

8.1 Territory may make Agreement publicly available

In giving effect to the principles of open and accountable government, the Territory may disclose documents and information unless it has otherwise agreed, or is otherwise required under law, to keep the information confidential. In accordance with those principles, this Agreement may be a notifiable contract under the Procurement Act and, if so, the Territory will be required to make the text of this Agreement available to the public, including by publication on a public contracts register.

8.2 Confidential Text

If **Item 7 Schedule 1** states that this Agreement is a notifiable contract under the Procurement Act and specifies Confidential Text, the grounds on which the text is confidential are set out in **Item 8 Schedule 1**, and **clause 8.3** applies.

8.3 Territory must not disclose Confidential Text

Except as provided in this Agreement, the Territory must not disclose Confidential Text to any person without the prior written consent of the Consultant (which consent will not be unreasonably withheld) except to the extent that Confidential Text:

(1) is required or authorised to be disclosed under law;

(2) is reasonably necessary for the enforcement of the criminal law;

(3) is disclosed to the Territory's solicitors, auditors, insurers or advisers;

(4) is generally available to the public;

(5) is in the possession of the Territory without restriction in relation to disclosure before the date of receipt from the Consultant;

(6) is disclosed by the responsible Minister in reporting to the Legislative Assembly or its committees; or

(7) is disclosed to the ombudsman or for a purpose in relation to the protection of public revenue.

9. Insurance and indemnity

9.1 Consultant's insurance

The Consultant must effect and maintain for the Term all insurance coverage required to be effected by it by law, public liability insurance and professional indemnity insurance in amounts not less than the amounts (if any) specified by **Item 5 Schedule 1**, and any other insurance specified in **Item 5 Schedule 1** with a Prescribed Insurer.

9.2 Indemnity

The Consultant indemnifies the Territory, its employees and agents against liability in respect of all claims, costs and expenses in relation to all loss, damage, injury or death to persons or property caused by the Consultant, in connection with the provision of the Services, except to the extent that the Territory caused the relevant loss, damage or injury.

9.3 Claims to be made good

The Consultant must, at its expense, make good the amount of all claims, loss, damage, costs and expenses the subject of the indemnity in **clause 9.2** and the Territory may deduct the amount, or any part of it, from any moneys due or becoming due to the Consultant under this Agreement.

10. Termination

10.1 Default

The Territory may terminate this Agreement, at any time by notice to the Consultant, if the Consultant:

(1) is the subject of an Insolvency Event;

(2) fails to commence timely provision of the Services or to meet any timeframes specified in this Agreement; or

(3) is in breach of a provision of this Agreement, where that breach:

(a) if capable of being remedied, is not remedied within the period specified in a notice by the Territory; or

(b) is not capable of being remedied.

10.2 Termination for any reason or reduction of Services

The Territory may, at any time by notice to the Consultant, terminate this Agreement or reduce the Services for any reason, and in that event:

(1) the Territory will be liable only for:

(a) payments under this Agreement for Services rendered before the date of termination; and

(b) subject to **clauses 10.2(2)** and **10.2(3)**, any reasonable costs incurred by the Consultant and directly attributable to the termination or reduction of Services, but not in respect of loss of prospective profits;

(2) on receipt of a notice of termination or reduction, the Consultant must:

(a) stop work as specified in the notice;

(b) take all available steps to minimise loss resulting from that termination or reduction of Services; and

(c) continue to perform any part of the Services not affected by the notice; and

(3) in the event of a reduction of the Services, the Territory's liability to pay the Contract Price will, in the absence of agreement to the contrary, abate proportionately to the reduction in the Services.

10.3 No prejudice

Nothing in this **clause 10** prejudices any other rights or remedies of the Territory in respect of any breach of this Agreement.

11. Dispute resolution

(1) If a difference or dispute **(Dispute)** arises in relation to this Agreement either party may give notice to the other that a Dispute exists, which specifies details of the Dispute, and the parties agree that they will endeavour to resolve the Dispute by negotiations, or, if the Dispute has not been resolved within 28 days of the issue of the notice, undertake mediation with an independent mediator, the cost to be shared by the parties unless otherwise agreed.

(2) Nothing in this **clause 11** will prejudice the rights of either party to institute proceedings to enforce this Agreement or to seek injunctive or urgent declaratory relief in respect of any Dispute.

12. General

12.1 Cooperation and good faith

Each party will:

(1) fully cooperate with each other to ensure timely progress and fulfilment of this Agreement; and

(2) act reasonably and in good faith with respect to matters that relate to this Agreement.

12.2 Conflict of interest

The Consultant warrants that no conflict of interest exists or is likely to arise in the performance of the Services and its other obligations under this Agreement and must, if a conflict or risk of conflict arises, notify the Territory and comply with any requirement of the Territory to eliminate or deal with that conflict or risk.

12.3 No employment, partnership or agency relationship

Nothing in this Agreement constitutes the Consultant, or its employees, agents or subcontractors as employees, partners or agents of the Territory or creates any employment, partnership or agency for any purpose and the Consultant must not represent itself, and must ensure its employees, agents and subcontractors do not represent themselves, as being employees, partners or agents of the Territory.

12.4 No assignment or subcontracting

(1) The Consultant must not subcontract the performance of the Services or assign the whole or part of this Agreement without the prior written consent of the Territory. If the Territory gives its consent, the Territory may impose any conditions.

(2) A change in the control of the Consultant or a company that controls the Consultant (except a company listed on an Australian stock exchange) is taken to be an assignment, the term "control" including the direct or indirect holding of more than 50% of the share capital of a corporation.

(3) If the Consultant breaches **clause 12.4(1)**, the Territory reserves its rights, including requiring the Consultant to provide information regarding the proposed subcontractor's or assignee's capability to continue performing this Agreement or to provide security to ensure the proper performance of this Agreement.

12.5 Entire agreement

This Agreement comprises the entire agreement between the parties in relation to the Services and supersedes any prior representations, negotiations, writings, memoranda and agreements.

12.6 Severability

Any provision of this Agreement that is illegal, void or unenforceable will not form part of this Agreement to the extent of that illegality, voidness or unenforceability. The remaining provisions of this Agreement will not be invalidated by an illegal, void or unenforceable provision.

12.7 Variation

This Agreement may be varied or the Term extended only by the written agreement of the parties prior to the expiration of this Agreement.

12.8 No waiver

Failure or omission by the Territory at any time to enforce or require strict or timely compliance with any provision of this Agreement will not affect or impair that provision in any way or the rights and remedies that the Territory may have in respect of that provision.

12.9 Governing law and compliance with the law

This Agreement is governed by and construed in accordance with the law for the time being in force in the Territory and the parties submit to the non-exclusive jurisdiction of the courts of the Territory. The Consultant must comply with the laws from time to time in force in the Territory in performing the Services.

12.10 Notices

Any notice, including any other communication, required to be given or sent to either party under this Agreement must be in writing and given to the relevant Contract Officer. A notice will be deemed to have been given:

(1) if delivered by hand, on delivery;

(2) if sent by prepaid mail, on the expiration of two business days after the date on which it was sent;

(3) if sent by facsimile, on the sender's facsimile machine recording that the facsimile has been successfully and properly transmitted to the recipient's address; or

(4) if sent by electronic mail, on whichever of the following occurs first:

(a) the other party's acknowledgement of receipt by any means;

(b) the sender's electronic mail device recording that the electronic mail has been successfully transmitted to the recipient's address; or

(c) the expiration of two business days after the date on which it was sent without receipt of a notification that the delivery failed,

and if given in two or more ways, on the first of paragraphs (1) to (4) occurring.

12.11 Special Conditions

In the event of any inconsistency between any Special Condition and any other provision of this Agreement then, to the extent of any inconsistency, the Special Condition will prevail.

12.12 Survival of clauses

Clauses 7, 9.2 and 9.3 will survive the expiration or earlier termination of this Agreement.

SCHEDULE 1

CONTRACT DETAILS

Item 1. Contract Officers
See clauses 1.1 and 12.10

For the Territory:

Frank Garofalow
CEO ACT NRM
Level 1 North
16 Challis St
Dickson, ACT 2602
Ph: 02 6207 2207

For the Consultant:

Miranda Gardiner
Erindale Business Park
2 Lansell Circuit
Wanniassa, ACT 2903
Ph: 02 6296 6400

Item 2. Term
See clauses 1.1 and 3

From 26 June 2019 until 30 June 2020.

Item 3. Contract Price
See clauses 1.1 and 4

(1) Contract Price: $264,000 (GST inclusive).

(2) The Contract Price is payable as a lump sum paid in advance of the Services.

(3) Except if otherwise stated in this Agreement, the Contract Price is:

(a) payable within 30 days of receipt by the Territory of an Invoice;

(b) inclusive of GST and all other taxes, duties and charges; and

(c) inclusive of all disbursements, including out-of-pocket expenses incurred by the Consultant.

Item 4. Specified Personnel
See clauses 1.1 and 6

Not applicable.

Item 5. Other amounts and insurance
See clause 9.1

(1) Public liability insurance: $20 million (in respect of each claim).

(2) Professional indemnity insurance: $10 million (in respect of each claim) and $10 million (in

		the annual aggregate). The Consultant must maintain the professional indemnity insurance coverage required under this **Item 5** for an additional period of 6 years from the expiration of the Term. This Item survives the expiration or earlier termination of this Agreement."
Item 6.	**Territory Information** *See clauses 1.1 and 7*	Item 6 not used.
Item 7.	**Confidential Text** *See clauses 1.1 and 8*	Item 7 not used.
Item 8.	**Grounds for confidentiality of Confidential Text** *See clause 8*	Item 8 not used.

SCHEDULE 2

THE SERVICES

Objectives and background

The ACT Government is investing in Southern ACT Catchment Group to provide services in:

1) Community engagement to foster public stewardship of urban assets,
2) H2OK public education activities, and
3) Waterwatch water quality services.

Stewardship

Transport Canberra and City Services (TCCS) manages a wide range of catchment assets, and twenty water quality infrastructure assets – mainly combinations of ponds and gardens of waterplants – have recently been constructed in the ACT Healthy Waterways project. The long-term viability of these assets depends on public stewardship and education.

Stewardship of the assets involves the public taking a level of responsibility for them, providing both personal enrichment and benefits for the community. The public may appreciate the visual amenity of assets and enjoy encounters with individual plant and animals that live within them. In turn, actions by individuals, like the removal of trash or weeds, benefit the community by improving the functioning and habitat value of assets reducing maintenance costs normally borne by the asset owners (the ACT Government). Community advocates for assets also help ensure that the ACT Government manages sites according to community norms.

H2OK public education

The *H2OK Keeping our Waterways Healthy – Community Education and Behaviour Change Program* was developed to encourage actions and behaviours that reduce the inputs of diffuse and point sources of nutrient (principally organics, fertilisers, soil and septic sewage systems) to waterways. Lower pollutant inputs to waterways not only extend the life of water quality assets but have a number of other social and environmental benefits to the region's waterways and the local communities that use them. Catchment models have shown that algal blooms in urban lakes and other water quality problems in the ACT can only be solved if the level of pollutants entering waterways is reduced, so public education on this matter is vital to healthy waterways.

Waterway monitoring

Waterwatch is a large citizen science program that monitors water quality in streams. Waterwatch has been running since the 1990s. It facilitates community engagement through the monitoring and care of local waterways, provide data to the ACT government and community as an early warning system for water quality issues. It also serves as a powerful way to raise community awareness about water quality and stream condition.

Desired outcomes

1. Stronger community connection with waterways and water quality assets and natural areas.
2. Active asset or waterway-care groups established.
3. Greater awareness among local communities about the effects of households on water quality and new behaviours adopted to help prevent pollution of waterways from households (noting that, given time and resourcing constraints, this outcome will need to be judged primarily on the basis of outputs).
4. Data on the condition of waterways collected by citizens are integrated into summary reports and government decision-making processes.

Services

Stewardship and public education activities will be conducted in consultation and (as appropriate) partnership with ACT EPSDD, TCCS and the ParkCare initiative. EPSDD has extensive H2OK materials and experience that may be drawn on in public education activities. TCCS (and in some instances, Parks and Conservation Service) needs to be involved as the owner of urban assets, and approvals may be required for some activities. The idea of involving ParkCare is to explore the possible benefits of extending the ParkCare model outside of local parks to green urban infrastructure more broadly.

The Consultant must provide the Services as follows within any specified timeframes.

Item Number	Details of Services	Timeframe for Completion
1	Develop and pilot a public stewardship/education event program aimed at local communities Explore engagement with businesses operating waterways and water quality infrastructure. Develop communication and education materials to support engagement and a communications activity template for all sites. Estimated expenditure $15,000.	By June 30 2020
2	Conduct public engagement activities and hold events in relation to all or most recently constructed Healthy Waterways-TCCS sites in your jurisdiction to 1) generate interest from the community in forming 'asset-care' groups, and 2) educate local communities on preventing waterway pollution. Public education topics may include – • "The public's role in maintaining good water quality in ACT's waterways" • "What's the new infrastructure doing – the science behind urban wetlands ponds and raingardens"	By June 30 2020

	• "Relationship between community wellness and living near natural environments" • "Why runoff and streamflows matter to water quality" • "Algal blooms – causes and cures" and • "Macrophytes, native vegetation and weed identification in my wetland". Estimated expenditure $70,000.	
3	Conduct public engagement activities and hold events to generate interest in stewardship of (other) TCCS urban assets, in consultation with TCCS. Estimated expenditure $45,000.	By June 30 2020
4	Support nascent stewardship groups with social media (e.g. by creating a Facebook page) or other mechanisms, as appropriate. Estimated expenditure $5,000.	By June 30 2020
5	Share lessons learned from your program of stewardship/public education events with Ginninderra and Molonglo Catchment Groups and support them to roll it out in their jurisdictions. Estimated expenditure $10,000	By June 30 2020
6	Funds to employ a Waterwatch Coordinator to conduct deliverables on • Water quality monitoring • Community engagement and education; and; • Monitoring to action. Details outlines in Appendix See Appendix A for details. Estimated expenditure $95,000.	By June 30 2020
7	Financial and progress report	18 January 2020
8	Financial and final report on achievements and lessons learned.	30 June 2020
9	Meetings with TCCS, EPSD, PCS as agreed to facilitate project outputs.	As agreed/ required

Appendix A – Waterwatch Activities & Deliverables

The three core objectives of Upper Murrumbidgee Waterwatch are:

1. Engaging the community in monitoring and caring for our catchments

Volunteers measure water quality parameters in the ACT and region on a monthly basis, survey waterbugs, assess riparian condition and at times partake in other activities such as platypus surveys.

2. Educating and raising awareness in schools and the community on catchment health

Waterwatch coordinators work with schools and attend public events to educate and raise awareness on issues of catchment health.

3. Using data collected by volunteers to inform policy and on ground catchment management.

The range of water quality data collected by volunteers gives a holistic understanding of catchment health. One example of where this is used is the Catchment Health Indicator Program (CHIP) report.

Estimated Expenses (excl GST)
Approximate salary: ASO6.2 x 30 hrs + on costs (super and LSL 15%) – $79,400.00 $9,000 for: - Office space and IT $6,600 for: - Fuel Reimbursements - Waterwatch Program delivery. These include: additional water quality kit contents (to be taken in turns to purchase between four Waterwatch Coordinators), event and educational materials (incl. QAQC workshop expenses), field equipment and professional development.

The following deliverables are based on these three core objectives. They are also highly complementary to the ACT Healthy Waterways Project from where this funding has been sourced.

Deliverable	**Performance indicator**	**Time schedule**
Water quality monitoring		
Water quality data	**Monitoring at Waterwatch sites** • All currently active sites monitored for water quality by volunteers to the minimum requirement for CHIP thresholds. • Coordinators are to encourage volunteers to upload data to ALA database by the end of the month. All water quality data uploaded	Monthly Monthly

	by volunteers is cleared by coordinator at the end of each month.	
Waterbug sampling	• Assist with recruitment and implementation of Bug Blitz. • Key waterbug sites (those at the bottom of each CHIP reach) are monitored by Bug Blitz teams at least once a year in spring or autumn and preferably in both. • Waterbug data entered into ALA database within a month of completion	Spring and autumn
RARC assessments	• RARC assessments completed for current Waterwatch sites • Sites where RARC assessment is >2 years old will be re-assessed (NB: it is suggested you stagger these assessments so that you are not conducting all of them in the one year). • RARC data entered in ALA database	Every two years Within a month of completion
Platypus Month	• Conduct at least four Platypus group surveys	During August
Water quality readings exceeding guidelines	• Abnormal water quality readings/events reported to relevant agencies	As soon as practicable
Data collection and quality assurance/ control	• All volunteers are trained and supported to ensure data meets Waterwatch standards. Training and documentation of volunteers must align with UMWW procedures. • All volunteers participate in the quality assurance (QA)/quality control (QC) process. QA/QC events are conducted biannually and volunteers have to attend one of these. If not, coordinator needs to follow up accreditation with volunteer. • Attend QAQC events	As required All volunteers accredited once/year. Twice a year

Deliverable	Performance indicator	Time schedule
Community engagement		
Communication Tools	• Waterwatch contributions provided to Catchment Group newsletter and other UMWW communications. • Volunteers receive email from the Waterwatch Coordinator notifying them of sampling weekend (third weekend of the month) and Waterwatch news • ACT Healthy Waterways and H2OK messages are promoted to volunteers and wider community where appropriate. This could include, but is not limited to, media exposure, website, emails and flyers. • At least one update via @ACTlandwater (Twitter) or ACT Landcare and Waterwatch (Facebook)	As required Monthly Throughout project period Monthly
Community Events	• At least four events held/attended where community can participate or be exposed to Waterwatch messages. Examples of events include: Canberra Show, Clean Up events, World Wetlands Day and riparian planting days.	Annually
Network events/meetings	**Network events and meetings** • Network events/meetings attended promoting Waterwatch key messages eg Upper Murrumbidgee Catchment Network. **Partnerships** • Partner with catchment managers such as other catchment groups, ACT government, local councils and educational institutions to promote or implement Waterwatch initiatives.	At least six networking opportunities or partnership collaborations annually.

Deliverable	Performance indicator	Time schedule
Monitoring to action		
Catchment health reporting	**Catchment Health Indicator Program (CHIP) report** • Data that has been collected on water quality, water bugs, RARC in accordance with CHIP requirements. Coordinators will be encouraged to use other data in report cards such as algae, frogs, fish and platypus.	Data cut off is December 31 and CHIP report published by April 2020.

	• Meet timeframes for CHIP delivery outlined by the Regional Facilitator. • CHIP maps, report design and data coordination prepared by Regional Facilitator and Scientific Officer and analysis for report cards conducted by Waterwatch coordinators.	
Waterwatch projects	• Where capacity permits, implement initiatives to improve waterway health based on information obtained through monitoring. This could range, for example, from riparian plantings through to advocating for improved water infrastructure.	Throughout project period.

Deliverable	**Performance indicator**	**Time schedule**
Education activities	• For the equivalent of one day per week, promote the education program and deliver Waterwatch education activities to children such as scouts, girl guides and schools groups. • The coordinator is not restricted to their catchment group area for delivery of education activities and is encouraged to collaborate with the other Waterwatch staff to achieve this, where capacity permits. • Where possible, existing events should be targeted for educational activities, with supervised groups of children in pre-arranged venues or locations. Examples of these may include: junior ranger activities at Jerrabomberra Wetlands, SciScouts and National Science Week. Teacher training events should also prioritised. • Document the events attended by the coordinator and approximate number of children who have received the Waterwatch education program.	Throughout project period.

Deliverable	Performance indicator	Time schedule
General project implementation	• Attend meetings conducted by Regional Facilitator • Catch up with Catchment Group Manger and Regional Facilitator • Acknowledge funding source on website and other promotional material.	Monthly Twice during project period. Throughout project period.

All deliverables conducted by Waterwatch Coordinators and/or Waterwatch volunteers unless otherwise stated

DATE OF THIS AGREEMENT 25/06/2019

Personal information

SIGNED for and on behalf of the)
AUSTRALIAN CAPITAL TERRITORY)
in the presence of:)

Personal information

Signature of Territory delegate

IAN WALKER
Print name

Signature of witness

Frank Gurofalow
Print name

SIGNED by or for and on behalf of)
SOUTHERN ACT CATCHMENT)
GROUP INC. ABN 45145814521)
in the presence of:

Personal information

Personal information

Print name

Signature of second authorised officer

Print name

Print name

Affix common seal if required under constitution

Note:

Date:	Must be dated on the date the last party signs the Agreement or, if signed counterparts of the Agreement are exchanged, the date of exchange. Also date the cover page.
Company:	Must be signed in accordance with section 127 of the *Corporations Act 2001* (Cth), for example, by 2 directors or a director and a secretary. Common seal may be affixed if required under the Consultant's constitution.
Individual:	Must be signed by the individual Consultant and witnessed.

Incorporated Association:	Must be signed in accordance with the Consultant's constitution, which may or may not require the common seal to be affixed. As a minimum, 2 authorised officers must sign.

1. REPORT SUMMARY AND CONCLUSIONS

INTRODUCTION

1.1 This report presents the results of a performance audit that reviewed the effectiveness of processes used by ACT Government agencies in planning, designing and constructing the North Weston Pond (the pond) in the Molonglo Valley.

1.2 The pond was planned as a component of the new Molonglo Valley residential development, situated to the north of the Weston Creek area. Construction was originally planned for completion in May 2011. Planning for the pond commenced in 2004 with a series of environmental site assessments and feasibility and design studies. Construction commenced in April 2010, but was halted in November 2010, when the discovery of much more contaminated and geotechnically unsuitable material than was originally expected led to substantial increases to project costs. The project recommenced in March 2011 following further assessment.

1.3 In January 2011, the Minister for Transport agreed to a revised design for the pond. The final details of the revised design is yet to be approved by the ACT Government, but is not expected to change significantly from that agreed to by the Minister. The revised pond is:

- estimated to cost $43.4 million ($22.6 million or 109 percent more than originally budgeted cost of $20.8 million); and
- expected to be much smaller than the originally designed pond (approximately 180 ML compared to the original pond design of 280 ML).

1.4 Completing the pond according to the original design specifications was estimated to cost at least $46.8 million.

1.5 The Auditor-General decided to undertake a performance audit to examine planning, design and construction of the North Weston Pond in response to a request from the Chief Minister and concerns raised in the ACT Legislative Assembly and community.

1.6 ACT Government agencies involved in the planning, design and construction of the pond include the ACT Planning and Land Authority (ACTPLA), the Department of Territory and Municipal Services (Roads ACT and ACT Procurement Solutions), Department of the Environment, Climate Change, Energy and Water (Environment Protection Authority) and ACTEW. Their roles and responsibilities are described in Table 2.1 in Chapter 2 of this report.

1.7 Audit appreciated the cooperation and assistance of all ACT Government agency staff, and that of the contractors and consultants who were also consulted during the audit.

BACKGROUND

1.8 The Molonglo Valley represents the next major area for residential land release in the ACT. It is an area of some 25 km^2, located in the west of Canberra, between Belconnen and Weston. Current and former uses of the land include rural leasehold areas and pine plantations that were destroyed in the 2003 bushfires. The Molonglo Valley is about ten kilometres from Civic, five kilometres from Woden and 12 kilometres from Belconnen. When fully developed, the Molonglo Valley will support an estimated 55 000 people.

North Weston Pond

1.9 The pond is an important component in the development of the Molonglo Valley precinct. It is intended to serve a variety of purposes, including:

- providing water quality protection to the Lower Molonglo River;
- providing a source of non-potable water for use on playing fields and other uses in the Weston Creek/Molonglo Valley area;
- improving stormwater quality management for Weston Creek, which currently does not have regional stormwater quality improvement measures; and
- providing benefits to the amenities in the area of North Weston, creating both a visual feature and a recreational area for the residents.

1.10 Public parkland, waterside promenades, picnic areas, playgrounds and cycle paths are also planned as part of the pond development. The pond was originally intended to cover an area of 15 hectares and have a stored volume of 280 ML.

Site features and former uses

1.11 The pond is to be located on or around several blocks which, at the time of planning for the pond, were unused and unleased Territory land. However, the site was problematic given its former uses, which were known to include:

- the Weston Creek Sewerage Treatment Plant (sewerage treatment plant), which was built in 1925 and operated until 1978;
- a quarry;
- a pine plantation, which was destroyed in the 2003 bushfires;
- an uncontrolled builders' landfill, on which builders were dumping waste and other materials from building sites without oversight or regulation by the Commonwealth or Territory government; and
- a nightspoil and waste oil deposit site. This site was located off the Cotter Road and provided public access to the sewerage system for the purpose of disposing of waste.

1.12 Informal notes from the Environmental Protection Authority dated 1999 indicate that the site may have been used as a training ground for drivers of earthmoving equipment during the 1990s. However, stakeholders, including industry representatives, provided conflicting accounts about this possible use of the site.

If the site was used for this purpose, then any contamination in the builders' landfills would have been spread over a larger area of the site.

1.13 Given the proximity of the site to the new Molonglo Valley residential development, any contamination risks deriving from the former uses of the site would have to be recognised and managed. This was required, irrespective of the proposed land use and was the reason for much of the environmental and contamination assessment work undertaken during planning for the pond.

1.14 The site is located at the intersection of large sewer mains connecting to the Molonglo Valley Interceptor Sewer (Interceptor Sewer), which is a key sewerage connection to the Lower Molonglo Water Quality Control Centre. The Interceptor Sewer handles approximately 70 percent of the region's sewerage.

Pond construction

1.15 Around $20 million was initially allocated in the ACT Capital Works Program for construction of the pond, to be spent in the 2009-10 and 2010-11 financial years. The estimate was updated to $20.8 million in August 2009, at the time of the development application. These estimates related to the construction of the pond only and did not take into account costs associated with planning and design consultancies, or nearby road works.

1.16 Construction of the pond commenced in April 2010. Within days of commencing the pond's construction, consultants and contractors involved in the project (including SMEC and Hewatt Earthworks) reported greater than expected contamination (asbestos containing material). Much of this material found on site during construction was removed, under the supervision of an environmental superintendent (SMEC) and transported to the Belconnen landfill site. Other contaminated material was removed to the Mugga landfill site.

1.17 Geotechnical issues associated with the site also became apparent as earthworks continued. The principle concern was the presence of the largely intact, but buried, sewerage treatment plant and the unsuitable nature of some of the underground material. This meant further excavation than expected was required to reach a suitable foundation for the pond's embankment wall and floor. Much of this geotechnically unsuitable material was removed off site.

1.18 About 100 metres of the Molonglo Valley Interceptor Sewer was to be under the pond and a further 600 metres close to the pond's embankment wall. There was some concern that the close proximity of the embankment wall to the Interceptor Sewer represented a significant risk to the integrity of the sewer, due mainly to the size of the embankment wall and weight of water over the sewer. ACTPLA's design for the pond took into account the risks associated with the location of the Interceptor Sewer. However, during construction, ACT Government agencies and contractors continued to discuss options for additional measures to protect the Interceptor Sewer during and following construction work for the pond.

Revised pond design

1.19 Construction was halted in November 2010 to provide ACT Government agencies an opportunity to identify alternative pond designs to manage the higher costs that were estimated to be incurred in the project.

1.20 On 17 January 2011, the Minister for Transport agreed to a revised pond design. The Minister was advised that although the revised design for the pond provided a 'high level of water quality improvement' and met 'most of the non-potable water supply for playing field irrigation', there was a 'reduction in water quality and stormwater harvesting capacity' compared to the original design.

1.21 The revised design involves two separate ponds, which are smaller and shallower than the original design. Storage capacity has been reduced from approximately 280 ML to 180 ML (a 36 percent reduction). The redesigned ponds are no longer over the Interceptor Sewer and do not require extensive works close to the Interceptor Sewer. The redesign reduces the previously mentioned risks to the integrity of the Interceptor Sewer. The revised design also minimises the amount of excavation required around the former sewerage treatment plant and provides a location for the reuse of geotechnically unsuitable material.

Timeline of key processes and events

1.22 An overview of key processes and events associated with the planning, design and construction of the North Weston Pond is included at Appendix B.

AUDIT OBJECTIVES

1.23 The objective of this audit was to provide an independent opinion to the ACT Legislative Assembly on whether the processes used by ACT Government agencies in planning, designing and constructing the North Weston Pond in the Molonglo Valley were effective.

1.24 The audit focused on the effectiveness of ACT Government agencies in managing contamination and geotechnical risks associated with the pond project.

AUDIT CONCLUSION

ACT Government agencies did not effectively manage the North Weston Pond project to ensure the project was completed for the budgeted cost within the planned timeframe. The project has required significant redesign to address escalating costs due to risks that were known at the earliest stages of the project. The smaller capacity ponds approved by the Minister for Transport in January 2011 are estimated to cost $43.4 million. This is $22.6 million (or 109 percent) more than the originally budgeted amount of $20.8 million. The original planned completion date of May 2011 has not been met.

The location of the North Weston Pond presented significant risks to the project. These risks stemmed from the former uses of the site and existence of the critical Molonglo Valley Interceptor Sewer at the site. ACT Government agencies were aware of these risks from the beginning of the project. However, the growing knowledge and understanding of these risks, including their impact on the project, was not adequately recognised by ACT Government agencies and reflected in project design and cost estimates.

Individual processes associated with the planning, design and construction of the pond were generally appropriate and in accordance with industry practice. However, ACT Government agencies did not effectively combine the information and knowledge generated from each process, to ensure the project was completed for the budgeted cost within the planned timeframe.

Specific shortcomings in the management of the project included a failure by ACT Government agencies to:

- apply a robust risk management framework;
- implement appropriate project governance or oversight arrangements to benefit from the combined knowledge and expertise of the different agencies and consultants involved in the project;
- critically assess the feasibility or otherwise of the pond at key points throughout the project, including cost implications of information that was available; and
- critically review the work and advice provided by consultants engaged in the project.

KEY FINDINGS

Chapter 2 - Governance and project management

- There was no single project owner with responsibility for the project from its inception through to its construction. Project ownership changed between the ACT Planning and Land Authority (ACTPLA) and Roads ACT, leading to decisions by new project participants (mainly representatives from Roads ACT and Procurement Solutions) who did not have a detailed history or understanding of the site. When contamination and geotechnical problems began emerging in the early stages of construction, no ACTPLA representatives with a detailed understanding of the environmental and contamination assessments were involved in the project.

- ACTPLA was the project owner for most of the planning and design phase of the project. ACTPLA did not establish effective project management or governance arrangements for the pond project, including:
  - an appropriate project governance or oversight committee, involving input and expertise from other ACT Government agencies and consultants involved in the project;
  - an overall strategic operational plan for the project;
  - an appropriate risk management framework for the project; and
  - regular and ongoing feasibility assessments for the pond throughout the project, which evaluated the project risks and cost implications of the pond, based on new and emerging knowledge and information.
- ACT Procurement Solutions was responsible for managing consultant and contractor performance on behalf of its client agencies (ACTPLA and Roads ACT). This included reviewing technical, environmental and geotechnical reports produced by consultants during preliminary investigation and assessment stages. There was little documentation to support the rigorous examination of consultants' advice, including the nature and extent of work performed and any limitations or caveats placed on the information and advice.
- There was, and remains, some confusion as to the role and responsibility of the Environment Protection Authority and Contaminated Site Auditor during the pond project and the level of assurance that can be obtained from their participation. Discussions with representatives from Roads ACT, Procurement Solutions and some project consultants indicated that involvement by the Environment Protection Authority and Site Auditor led them to assume a greater level of assurance that environmental and contamination issues were being addressed during planning, than was actually warranted. The Environment Protection Authority's *Contaminated Sites Environment Protection Policy* does not clearly state the role of the Authority or the Contaminated Site Auditor in the management of contaminated sites.
- There is an opportunity for the Environment Protection Authority to take a more proactive role in providing advice and guidance to ACT Government agencies managing future high-risk projects involving contaminated sites.

Chapter 3 - Environmental assessments

- At the earliest stages of the project, the Environment Protection Authority communicated the general environmental and contamination risks associated with the site to consultants engaged for the pond project.
- An important output from the environmental and contamination assessments was the Sampling and Analysis Quality Plan (Sampling Plan), which was developed over time by consultants involved in the project. The Sampling Plan determined the methodology and approach for testing for contamination on the site, the results of which were reported in the Phase 2 Environmental Site Assessment report. This plan has subsequently been assessed in a review commissioned by ACT Procurement Solutions, on behalf of Roads ACT, as inappropriate for testing for asbestos at a high risk site.

- The Remedial Action Plan, which was informed by the results of the testing undertaken as part of the Phase 2 Environmental Site Assessment, was a key document for the construction phase, as it articulated the processes for managing contaminated material encountered during construction. The Remedial Action Plan under-estimated the quantity of contaminated material and processes required to manage the asbestos containing material.

Chapter 4 - Feasibility and design of the pond

- ACTPLA undertook key stages of the planning and design process, including the finalisation of a feasibility study for the pond (incorporating design options) as well as the acceptance of the pond design, before completion of the Phase 2 Environmental Site Assessment, which provided more information about the ground conditions at the site.
- ACTPLA did not adequately recognise and cost issues identified during the environmental and geotechnical assessments during the planning process. These include risks associated with the integrity of the Molonglo Valley Interceptor Sewer (an ageing structure) and the existence of former Weston Creek Sewerage Treatment Plant structures at the location of the pond.
- ACTPLA did not adequately document acceptance of the pond design or the risks associated with the selected design option and measures to address these risks.

Chapter 5 - Construction of the pond

- Under the contractual arrangements agreed with the construction contractor (Hewatt Earthworks), Roads ACT paid for the removal of contaminated material on a volume basis. The tender brief for the construction phase included estimates of the likely quantities of asbestos containing material to be removed from the site, based on the quantities identified in the Remedial Action Plan. The estimated quantities proved to be substantially less than the quantities disposed of as 'asbestos containing material,' and recorded as such, during construction. The project budget was exceeded largely due to the need to pay higher than expected removal costs.
- Early in the construction phase, the initial Remedial Action Plan informed ACT Government agencies' (including Procurement Solutions and Roads ACT) activities for the management of asbestos containing material on the site. In the absence of any ACT, national or New South Wales guidelines, a 'zero tolerance' approach was adopted, whereby 'no known asbestos was to remain on site' nor were any asbestos fibres to remain in the soil. This established a conservative approach for the treatment of asbestos containing material at the site.
- During the construction phase, ACT Government agencies (Procurement Solutions and Roads ACT) treated fill containing builders' rubble as asbestos containing material, which required it to be removed from the site. This reflected the likelihood that builders' rubble included asbestos containing material, as well as the perceived impracticality of adopting on-site treatment options, such as sieving, to separate asbestos containing material from the fill. Decision-making processes at this time were not well documented, including assessing the impracticality of adopting on-site treatment options or their cost implications. In addition, there was a requirement in the revised Remedial Action Plan that

identified the site's topsoil as both geotechnically unsuitable material and asbestos containing material.

- The records maintained do not distinguish between the type of material (asbestos containing material or geotechnically unsuitable material) removed from the site.
- In May 2010, the higher than expected volumes of material treated as 'asbestos containing material' and resulting costs led to the adoption by ACT Government agencies (ACT Procurement Solutions and Roads ACT) of an alternative, more flexible and risk-based approach, which allowed low-risk asbestos containing material to remain on-site. This was facilitated by the Environment Protection Authority's adoption of revised guidelines for managing contaminated material. A revised Remedial Action Plan was developed and implemented in June 2010 to facilitate this. Although the new Environment Protection Authority guidelines and the revised Remedial Action Plan provided ACT Government agencies with more flexibility for managing asbestos at the site, large amounts of asbestos containing material continued to be removed off the site, because the concentration of asbestos exceeded the acceptable threshold.
- Work at the site recommenced on 8 March 2011. The completion of a revised, smaller capacity pond, as approved by the Minister for Transport in January 2011, is estimated to cost $43.4 million, $22.6 million (or 109 percent) more than the originally budgeted amount of $20.8 million.

RECOMMENDATIONS AND RESPONSE TO THE REPORT

1.25 This audit report has eight recommendations to address the audit findings. These recommendations apply to high risk or complex infrastructure projects, particularly those involving contaminated sites.

1.26 In accordance with Section 18 of the *Auditor-General Act 1996*, the proposed report was provided to the Chief Executives of the Department of Territory and Municipal Services and Department of the Environment, Climate Change, Energy and Water and the Chief Planning Executive of ACTPLA for consideration and comments. Their overall responses are shown below:

Response from the Chief Planning Executive of ACTPLA

As a general comment I don't believe the conclusions and key findings in the proposed report have been clarified sufficiently to lead the reader to the recommendations contained in the report.

I support the recommendations contained within the report and believe that implementing these will strengthen the process in relation to managing high-risk infrastructure projects that involve multiple agencies. I continue, however, to have a serious concern about commentary on the governance and project management processes that I believe were in place and which were followed for this project. I will reiterate that ACTPLA followed good practice and that the circumstances that have given rise to the current situation are not as a result of poor management or the other conclusions that could be reached from reading the report in its current form.

In relation to one of the other key aspects of the proposed report – that of the placement of ACTPLA's reliance on expert consultants reports – it is particularly frustrating to see the lack of audit commentary on what are obvious deficiencies in the reports and advice that ACTPLA, on behalf of the Government, 'purchased' for significant sums. It would appear from the commentary in the proposed report that consultants can simply adopt an 'all care and no responsibility' approach, and that the audit does not assess the 'performance' of these service providers in terms of value for money for government in its purchasing. This, in my view, should be a key aspect of any 'performance audit' undertaken by your Office.

Response from the Chief Executive of TAMS

Thank you for the opportunity to provide formal comments on the proposed report on the 'North Weston Pond Project.' My Department agrees with the general thrust of the report and supports the recommendations.

Response from the Chief Executive of DECCEW

The Department of the Environment, Climate Change, Energy and Water supports the Audit recommendations. The Department believes that there is always potential to improve governance and management of multi agency projects.

The Department remains cognisant of the need to continually review policy to ensure robustness and efficiency in procedures and decision making. It should be noted by the Audit that the Department is currently reviewing the Environment Protection Act 1997 (the Act) *and will ensure that issues raised are considered in the broader review.*

There still appears to be a misunderstanding as to the role of contaminated land auditors. As previously advised, the nationally accepted practice of assessment and remediation of contaminated sites is no different in the ACT to other jurisdictions. Accredited Contaminated Sites Auditors oversee the processes used by specialist environmental consultants to assess and remediate contaminated land to ensure it meets the standards for the intended land use.

1.27 In addition, the Chief Executives provided responses to each recommendation, as shown below.

Recommendation 1 (Chapter 2)

For future high-risk infrastructure projects, relevant ACT Government agencies should identify a single project owner agency early in the project with a clearly defined responsibility for planning, designing and constructing the asset. The nominated project owner agency should be involved throughout the project.

ACTPLA and DECCEW response:

Agreed.

TAMS response:

Agreed. The directorate with funding authorisation should be identified as the project owner. Further definition around 'high risk infrastructure' will be necessary to avoid confusion and delay, and assist in business case development.

Recommendation 2 (Chapter 2)

For projects involving multiple ACT Government agencies, the project owner should convene an inter-agency governance committee or similar arrangement to review project risks, progress and costs on a regular basis.

ACTPLA, TAMS and DECCEW response:

Agreed.

Recommendation 3 (Chapter 2)

For future high-risk infrastructure projects, the project owner should ensure that:

(a) a strategic operational plan for the entire project is prepared, as a key project governance document and ongoing reference source for the project oversight or governance committee; and

(b) a series of gateway reviews are incorporated within the plan. This should involve a series of critical reviews of the ongoing feasibility and appropriateness of the project at appropriate stages, which seek to test the project's underlying assumptions and cost considerations, based on new and accumulated information and knowledge.

ACTPLA and DECCEW response:

Agreed.

TAMS response:

a) Agreed. This is consistent with best practice project management in other jurisdictions.

b) Agreed. The gateway review process will deliver better project management outcomes, however, this approach will also have resource implications which will need to be identified in the initial business case.

Recommendation 4 (Chapter 2)

For future high-risk infrastructure projects, the project owner should seek to reduce risks through a formal project-wide risk assessment process that provides for input by all parties (ACT Government agencies, consultants and contractors) with relevant knowledge of risks.

ACTPLA, TAMS and DECCEW response:

Agreed.

Recommendation 5 (Chapter 2)

For future high-risk infrastructure projects, the project owner should ensure that the roles of key stakeholders are identified and documented, particularly regarding which agency will be responsible for critically reviewing technical advice provided by a third party before accepting and incorporating it into the project.

ACTPLA response:

Agreed in part. The critical review of technical advice provided by a third party may require an agency acquiring additional expertise in-house and should not obviate the professional competency and responsibility of the third party's expert advice to government.

TAMS response:

Agreed. Project governance will need to establish the reviewer and acceptor of technical advice early in the project planning phase. However, this approach will have time and cost implications in terms of program, skill level and staff resources to undertake technical reviews.

DECCEW response:

Agreed.

Recommendation 6 (Chapter 2)

The Environment Protection Authority should review the Contaminated Sites Environment Protection Policy and consider amendments to the Policy that:

(a) clarify roles and responsibilities for the management of contaminated sites, including its role, the role of the Contaminated Site Auditor and other stakeholders, including the project owner; and

(b) allow for greater and more sustained involvement from the Environment Protection Authority for future high-risk infrastructure projects involving contaminated sites.

TAMS and DECCEW response:

Agreed.

Recommendation 7 (Chapter 4)

For future high-risk infrastructure projects, the project owner should ensure that the decision-making process for acceptance of infrastructure design is properly documented, including documentation demonstrating that all known risks were recognised and either accepted or mitigated.

ACTPLA, TAMS and DECCEW response:

Agreed.

Recommendation 8 (Chapter 5)

For projects on contaminated sites, ACT Procurement Solutions should consider using alternative pricing methodologies that can provide better value for money for the excavation and removal of contaminants during the construction stage.

TAMS response:

Agreed. Project governance should identify preferred procurement options for the specifics of a major project. This advice should direct Procurement Solutions in identifying alternative contract pricing methodologies.

DECCEW response:

Agreed.

2. GOVERNANCE AND PROJECT MANAGEMENT

INTRODUCTION

2.1 This chapter discusses the roles and responsibilities of key ACT Government agencies involved in the project, including the ACT Planning and Land Authority (ACTPLA), ACT Procurement Solutions (Procurement Solutions) and the Environment Protection Authority.

KEY FINDINGS

- There was no single project owner with responsibility for the project from its inception through to its construction. Project ownership changed between the ACT Planning and Land Authority (ACTPLA) and Roads ACT, leading to decisions by new project participants (mainly representatives from Roads ACT and Procurement Solutions) who did not have a detailed history or understanding of the site. When contamination and geotechnical problems began emerging in the early stages of construction, no ACTPLA representatives with a detailed understanding of the environmental and contamination assessments were involved in the project.
- ACTPLA was the project owner for most of the planning and design phase of the project. ACTPLA did not establish effective project management or governance arrangements for the pond project, including:
  - an appropriate project governance or oversight committee, involving input and expertise from other ACT Government agencies and consultants involved in the project;
  - an overall strategic operational plan for the project;
  - an appropriate risk management framework for the project; and
  - regular and ongoing feasibility assessments for the pond throughout the project, which evaluated the project risks and cost implications of the pond, based on new and emerging knowledge and information.
- ACT Procurement Solutions was responsible for managing consultant and contractor performance on behalf of its client agencies (ACTPLA and Roads ACT). This included reviewing technical, environmental and geotechnical reports produced by consultants during preliminary investigation and assessment stages. There was little documentation to support the rigorous examination of consultants' advice, including the nature and extent of work performed and any limitations or caveats placed on the information and advice.
- There was, and remains, some confusion as to the role and responsibility of the Environment Protection Authority and Contaminated Site Auditor during the pond project and the level of assurance that can be obtained from their participation. Discussions with representatives from Roads ACT, Procurement Solutions and some project consultants indicated that involvement by the Environment Protection Authority and Site Auditor led them to assume a greater level of

assurance that environmental and contamination issues were being addressed during planning, than was actually warranted. The Environment Protection Authority's *Contaminated Sites Environment Protection Policy* does not clearly state the role of the Authority or the Contaminated Site Auditor in the management of contaminated sites.

- There is an opportunity for the Environment Protection Authority to take a more proactive role in providing advice and guidance to ACT Government agencies managing future high-risk projects involving contaminated sites.

BACKGROUND

2.2 The pond project was a high risk project. There were significant inherent risks associated with the pond site arising from the well-known former uses of the site and its resulting contamination and geotechnical risks.

2.3 The project was also administratively complex due to the involvement of several ACT Government agencies and consultants and the various administrative steps and processes undertaken, including different investigations, assessments and studies. In such circumstances, it is imperative that ACT Government agencies have clearly understood roles and responsibilities and implement effective governance arrangements.

2.4 Table 2.1 outlines the role of the various ACT Government agencies involved in the project.

Table 2.1: ACT Government agencies involved in the North Weston Pond project

Agency	Roles and responsibilities
ACTPLA	Responsible for planning and designing the pond, including undertaking environmental and geotechnical assessments. ACTPLA (Planning Services Branch) was the ACT Government project owner from project inception (before 2005) until approximately September 2009 when project ownership transferred to Roads ACT. ACTPLA (Development Services Branch) also reviewed and approved the Development Application.
Roads ACT (TAMS)	Responsible for managing the construction of the pond, including the procurement of the construction contractor. Roads ACT was the ACT Government project owner from the time of procurement of the construction contractor.
ACT Procurement Solutions (TAMS)	Responsible for administering procurement and contract management processes on behalf of project owners (ACTPLA and Roads ACT).
Environment Protection Authority	Provided advice and guidance throughout the project on ACT Government policy for the management of contaminated land. The Authority would also endorse / approve some project reports, when completed.
ACTEW	Provided advice and guidance on aspects of the design and construction of the pond, particularly with respect to the Molonglo Valley Interceptor Sewer.

Source: ACT Audit Office

2.5 Table 2.2 identifies the main consultants and contractors involved in the project, grouped under key areas and responsibilities:

Table 2.2: Consultants and contractors involved in the project

Consultants and contractors	Roles and responsibilities
Environmental/contamination assessments	
Coffey Geosciences	Responsible for the Preliminary Geotechnical and Contamination Constraints Study in 2005 and Phase 1 Environmental Site Assessment in 2005-06.
SMEC	Responsible for Phase 2 Environmental Site Assessment, Phase 3 Remedial Action Plan (2008-09).
CM Jewell and Associates	As Contaminated Site Auditor, responsible for overseeing aspects of the environmental and contamination assessments and endorsing key reports and deliverables, 2007 to the present.
Geotechnical assessments	
Coffey Geosciences	Responsible for Preliminary Geotechnical and Contamination Constraints Study in 2005.
Coffey Geotechnics	Undertook a Preliminary Geotechnical Investigation as part of the Pond Feasibility Study. Prepared a report for Bill Guy and Partners (see below).
Douglas Partners	Responsible for detailed Geotechnical Assessments, as part of Phase 2 Environmental Site Assessment (under sub-contract to SMEC).
Pond design	
Bill Guy and Partners	Responsible for Pond Feasibility Study, 2007-08.
Cardno Young	Responsible for Pond Design and Superintendence, 2008 to the present.
Pond construction	
Hewatt Earthworks	Responsible for the construction of the pond (and adjacent road).
Cardno Young	As project superintendent, responsible for overseeing the construction of the pond according to pond design specifications.
SMEC	As environmental consultant, responsible for overseeing the management of contamination risks during the construction of the pond.
CM Jewell and Associates	As Contaminated Site Auditor, responsible for overseeing aspects of the environmental and contamination assessments and endorsing key reports and deliverables, 2007 to the present.
Robson Environmental Pty Ltd	As the Occupational Hygienist, oversaw the removal of asbestos from the site.

Source: ACT Audit Office

2.6 Key issues to note from these tables are the:

- change in project ownership from ACTPLA to Roads ACT, which occurred between the planning and construction phases;
- significant number of consultants involved during the project; and

- involvement of multiple consultants for key processes. For example, at least two consultants were involved (at separate times) for each of the environmental/contamination assessment, geotechnical assessment and pond design processes.

2.7 The use of multiple consultants may be both a means to manage project risk and a source of project risk. One risk from having multiple service providers is the possibility of limited transfer of accumulated knowledge about the site. An additional project risk resulted from consultants' reference to, and use of, advice contained in reports from earlier consultants. Any shortcomings in the work of the earlier consultants could be incorporated into advice provided by subsequent consultants, resulting in an adverse cumulative effect on the project.

2.8 One means by which the risks associated with using multiple consultants can be mitigated is through implementation of strong, ongoing project management and governance arrangements.

Ongoing project ownership/responsibility

2.9 There was a lack of an ongoing project owner during the project.

2.10 Although Procurement Solutions was involved throughout the project, it did not have a project ownership role. Its governance documents identified that it was acting on behalf of client agencies (ACTPLA and Roads ACT). These client agencies remained responsible for the overall management of the project, its strategic direction, and implementation.

2.11 The change in project ownership between ACTPLA and Roads ACT led to decisions being made by new project participants who did not have a detailed history or understanding of the project. This occurred when issues and problems in the project began to emerge in the earliest stages of construction, (when Roads ACT was project owner). There is also a risk that the focus of the project and relative importance of particular priorities or issues changed with the project owner.

Recommendation 1

For future high-risk infrastructure projects, relevant ACT Government agencies should identify a single project owner agency early in the project with a clearly defined responsibility for planning, designing and constructing the asset. The nominated project owner agency should be involved throughout the project.

ACT PLANNING AND LAND AUTHORITY

2.12 ACTPLA was the project owner from the project's inception until approximately September 2009 when project ownership transferred to Roads ACT.

Project governance committee arrangements

2.13 The North Weston Pond project was a large and complex project involving multiple ACT Government agencies and consultants.

2.14 Specific components of the project were characterised by frequent communication and interaction between ACT Government agencies and consultants involved in that component. However, there was no regular inter-agency committee or working group tasked with the responsibility for centrally overseeing the project and facilitating effective participation from all ACT Government agencies (and key consultants).

2.15 An inter-agency management or governance committee, appropriately constituted with clearly defined roles and responsibilities, would have facilitated a more encompassing approach to the management of the project. Such a committee could have provided a mechanism by which the different components and interdependencies of the project could be recognised and discussed regularly. This may not be necessary for all ACT Government construction projects, but the high inherent risks and complexities of the pond project, as well as the involvement of multiple ACT Government agencies and consultants, indicates that the need for such a committee was reasonably foreseeable and warranted at the time.

Recommendation 2

For projects involving multiple ACT Government agencies, the project owner should convene an inter-agency governance committee or similar arrangement to review project risks, progress and costs on a regular basis.

Project planning

2.16 During the pond project, a range of different operational planning documents were produced. These included:

- procurement plans;
- remedial action plans;
- environmental management plans; and
- various plans prepared specifically by consultants for individual project components.

2.17 Specific *design* plans were also produced for the project, including Preliminary and Final Sketch Plans, and other detailed schematics identifying the geographic location of different features of the pond and its surrounding area.

2.18 Each of these documents fulfilled a defined and specific need in the project. However, there was no overall strategic operational plan (or similar document), that considered the project in its totality or, more specifically, the key interdependencies of the different project components and processes.

2.19 A strategic operational plan would clearly identify:

- project outcomes and objectives;
- project components, phases and interdependencies;
- project risks and risk treatments;
- key roles and responsibilities (including agency and consultant roles and responsibilities); and
- budgets and timeframes.

2.20 Developing an overall strategic operational plan would provide a key project governance document and an ongoing reference source for the project oversight or governance committee. Such a plan could be improved and modified throughout the project, and could reflect updated knowledge and information of the project as advice is provided by various expert consultants and studies.

Project feasibility assessments

2.21 Audit was advised that the pond, as originally designed, was capable of being constructed on the site. That is, there were no fundamental site issues that could not be overcome during the construction of the pond.

2.22 The location of the pond presented significant risks to the project. These risks stemmed from the former uses of the site and existence of the critical Interceptor Sewer at the site. ACT Government agencies were aware of these risks at the earliest stages of the project. However, the knowledge and understanding of these risks, including their impact on the project was not recognised by ACT Government agencies and reflected in the original project design and cost estimates. Agencies did not implement appropriate decision-making processes that recognised and more effectively accounted for the:

- significant and well-known inherent risks associated with the site;
- growing knowledge and understanding of the site (as well the limitations in this knowledge and understanding);
- limitations of the technical advice and expertise that was received, including many caveats and limitations placed on this advice; and
- interdependencies of the different components of the project.

2.23 Furthermore, there was no evidence of the project having been critically assessed, at key stages in its implementation, to determine the feasibility or appropriateness of proceeding in the originally designed form, recognising the accumulating body of knowledge associated with the project. Such assessments should have occurred and should have considered the design, construction and budget feasibility of continuing the project. Industry representatives consistently indicated that this is a useful practice for complex projects where knowledge and understanding of the site is improving as site assessments and studies are progressively undertaken. Such a process is sometimes referred to as a 'go/no go' or 'gateway' approach and the decision points referred to as 'hold points'.

2.24 Key considerations in adopting such an approach are:

- establishing a series of review points, sometimes known as 'gateways';
- conducting independent reviews of project status and risks at each gateway;
- ensuring all key stakeholders are involved, and can provide relevant expertise and input (similar to the governance or oversight committee identified earlier);
- understanding and assessing the adequacy of information that is known, including acknowledging its limitations;
- deciding when or if the ACT Government should be advised about cost implications;
- understanding the potential cost implications for the project from the information that is known and any potential limitations; and
- determining how to address identified risk, cost, and performance issues.

2.25 Such an approach should be documented and incorporated into the strategic operational plan prepared by the project owner.

Recommendation 3

For future high-risk infrastructure projects, agencies should:

(a) prepare a strategic operational plan for the entire project, as a key project governance document and ongoing reference source for the project management or governance committee; and

(b) incorporate a series of gateway reviews within the plan, involving critical reviews of the ongoing feasibility and appropriateness of the project at appropriate stages, and which seek to test the project's underlying assumptions and cost considerations, based on new and accumulated information and knowledge.

Project risk management

2.26 Different risk assessments were conducted for different components of the pond project. These included:

- a design consultancy risk assessment undertaken by ACTPLA. ACTPLA has a standard risk template (with seven generic risks) that is completed as part of all design consultancy projects;
- various procurement risk assessments undertaken by Procurement Solutions for major project contracts;
- a risk assessment undertaken by Cardno Young, incorporated into the Project Quality Plan, for the design and superintendency component of the project. The risk assessment identified risks to the achievement of project objectives, which could arise during the construction of the pond; and
- a risk assessment produced by Hewatt Earthworks for the construction phase of the project.

2.27 These risk assessments were:

- undertaken at different times of the project for specific purposes and components associated with the project; and
- conducted by the different project participants, with little or no input from other project participants.

2.28 However, ACT Government agencies did not combine the information in the risk assessments to facilitate an overall understanding and consideration of the project and its risks.

2.29 An overall project risk management approach, with regular review and input from knowledgeable ACT Government representatives (and consultants if appropriate), would be a means by which overall project risks could have been more effectively recognised, assessed and managed throughout the project.

Recommendation 4

For future high-risk infrastructure projects, agencies should seek to reduce risks through a formal project-wide risk assessment process that provides for input by all parties (ACT Government agencies, consultants and contractors) with relevant knowledge of risks.

ACT PROCUREMENT SOLUTIONS

2.30 ACT Procurement Solutions is the ACT Government's centre of expertise for procurement matters, providing procurement and contract management-related services to ACT Government agencies. Procurement Solutions was involved throughout the pond project, providing services to, and on behalf of, ACTPLA and Roads ACT as the project owners.

2.31 Procurement Solutions issued a project responsibilities document to advise its client agencies of its roles and responsibilities. This document outlines the allocation of responsibilities between itself and the client agency and addresses different stages of the project, from its initiation to completion.

2.32 Key points from this document are:

- the client agency (project owner) is responsible for early parts of the procurement, including the description of functional requirements;
- the procurement process is managed by Procurement Solutions, although the client agency (project owner) approves key documents including the Procurement Plan and Tender Evaluation Report;
- Procurement Solutions manages consultant performance on behalf of the project owner, including monitoring and reviewing performance, providing feedback and actioning performance issues;
- any variations are evaluated and prepared by Procurement Solutions, but approved by the client agency (project owner);

- any defects in project deliverables are identified and managed by Procurement Solutions, but final acceptance is the responsibility of the relevant agency (as advised by Procurement Solutions); and
- responsibility for dispute management is with Procurement Solutions but final dispute resolution and associated funding decisions are with the client agency (project owner) (as advised by Procurement Solutions).

2.33 This document is useful in identifying respective roles and responsibilities for the main design and construction aspects of a project. The roles and responsibilities were generally well understood and adhered to.

Managing technical and expert advice

2.34 As noted in the project responsibilities document, Procurement Solutions was responsible for managing consultants' performance, including monitoring and reviewing performance, and while any defects in project deliverables are identified and managed by Procurement Solutions, final acceptance is the responsibility of the relevant agency. A key issue that emerged during the audit related to the appropriateness of the review and acceptance of the environmental and geotechnical reports produced during initial investigation and assessment phases. The review was not performed or documented effectively.

2.35 A review of file documentation and discussions with staff from Procurement Solutions indicated that advice was sought from other stakeholders, including ACTPLA, the Environment Protection Authority and Site Auditor, to consider the technical appropriateness and acceptability of the advice contained in consultant reports. There was also evidence that technical advice and information produced by consultants was considered and questioned by ACTPLA during feasibility and design processes. However, there was little documentation to support the rigorous examination and acceptance of consultants' advice, including the nature and extent of work performed and any limitations or caveats placed on the information and advice.

2.36 ACTPLA has advised that it:

> should reasonably be expected to rely on expert consultants for highly specialised advice on projects such as this. It would not be feasible for ACTPLA or any other agency to have the specialist skills required for detailed review of such advice.

2.37 ACT Government agencies have a right to expect a high quality of services from consultants. Standard contractual terms require consultants to perform services 'to the standard of care and skill expected of a person who regularly acts in the capacity in which the consultant is engaged and who possesses the knowledge, skill and experience of a person qualified to act in that capacity.' However, this does not mean that ACT Government agencies can abrogate their ultimate responsibility for the government activity by transferring this responsibility to another party, such as an expert. Agencies should therefore take steps to reasonably satisfy themselves that the other party has properly applied its expertise. The Australian National Audit Office's Better Practice Guide on Developing and Managing Contracts notes:

> ... final accountability for accepting contract deliverables remains with the acquiring entity. Information provided by a third party or the contractor for monitoring purposes should be reviewed and audited, as necessary, to ensure its accuracy and reliability.

2.38 Accordingly, it remains necessary for ACT Government agencies to assess the quality and appropriateness of any external technical advice received, including any limitations placed on the advice, and document the assessment. In assessing the quality and appropriateness of the advice, agencies should consider the reasonableness of the assumptions, methods and source data used by the expert, and the reasonableness of the expert's findings in relation to other information known and available to the agency.

2.39 Where, as in the case of this project, the advice is specialised or complex and has potentially significant consequences for the project, agencies should implement effective processes for reviewing the advice regardless of whether the agency has the in-house specialist skills to review the advice.

2.40 Where there is a highly technical component to a project and external advice is received there should be explicit decisions as to who will be the ACT Government's 'technical expert'. The 'technical expert' would be the party responsible for critically reviewing expert advice provided by a third party before accepting it.

Recommendation 5

For future high-risk infrastructure projects, agencies should have processes for recognising and documenting the roles of key stakeholders, particularly regarding which agency will be the responsible for critically reviewing technical advice provided by a third party before deciding whether to accept it.

ENVIRONMENT PROTECTION AUTHORITY

2.41 The Environment Protection Authority is a statutory position established by the *Environment Protection Act 1997*, with responsibility for regulating the assessment and remediation of contaminated sites. In practice, this work is undertaken by the Environment Protection Unit (a part of the Environment Protection Authority, within DECCEW).

2.42 The Environment Protection Authority, through the Environment Protection Unit, has been involved in planning for the pond from early 2005. The Authority's involvement included:

- providing advice and input to other ACT Government agencies, from initial planning through to activities to manage contaminated material during construction;
- providing responses to contaminated land search requests of the Authority's records from various consultants during the process; and

- endorsing reports produced by consultants during the pond project (including the Phase 1 Environmental Site Assessment reports and final Site Audit Statement produced by the Site Auditor).

2.43 The Environment Protection Authority did not have a role or responsibility regarding geotechnical risks associated with the site of the pond project, or for developing cost-effective remediation strategies for the site.

Contaminated Sites Environment Protection Policy

2.44 Part 4 of the *Environment Protection Act 1997* allows the Environment Protection Authority to develop environment protection policies.

2.45 The Contaminated Sites Environment Protection Policy (the policy) was developed in 2000 and subsequently updated in November 2009. The substance of the policy did not change significantly in the 2009 revision. The policy provided the primary framework and context for the management of contamination risks associated with the site. The policy:

> ... is designed to help people understand the [Environment Protection Act and Regulation] as they apply to contaminated land.
>
> ... contains information and policies relating to the assessment and remediation (including management) of contaminated land and aims to minimise the risk of adverse impacts of contaminated land on the environment and human health. This [policy] explains the procedures used by the Environment Protection Authority to manage contaminated land within the [the ACT] and provides guidance for owners and occupiers of contaminated land to meet their legislative obligations ...

2.46 Various participants may be involved in managing a contaminated site. These include the:

- project's proponent;
- environmental consultant undertaking the site assessment;
- Contaminated Site Auditor (Site Auditor); and
- Environment Protection Authority.

2.47 These participants, particularly the environmental consultant and Site Auditor, produce a series of reports, some of which are subject to endorsement by the Environment Protection Authority.

2.48 The Environment Protection Policy does not adequately specify these participants' roles and responsibilities or the purpose and outcomes sought from the different processes. The shortcomings in the policy particularly related to the role and purpose of the Site Auditor and Environment Protection Authority and the nature and types of audits to be conducted.

Role of the Contaminated Site Auditor

2.49 The Environment Protection Policy stated that 'a site audit of contaminated land is an independent review of an assessment or remediation by an accredited contaminated land auditor'. Under the policy:

An audit can be conducted for the purpose of determining any one or more of the following matters:

- the nature and extent of any contamination of the land;
- the nature and extent of the assessment or remediation;
- what assessment or remediation remains necessary before the land is suitable for any specific use or range of uses; and
- the comprehensiveness of a remedial action plan for contaminated land.

2.50 The policy states that 'on completion of an audit, the auditor is required to issue a site audit statement (or certificate of environment audit)' and 'the main purpose of an audit is to determine whether a site is suitable for a particular use or range of uses'.

2.51 Under the policy a 'Section A' audit statement may be completed 'where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land use(s)'. Alternatively, a 'Section B' audit statement may be completed as an interim statement:

> 'to determine the nature and extent of contamination and/or the appropriateness of an investigation or remedial action or management plan and/or whether the site can be made suitable for a specific land use or uses subject to the successful implementation of a remedial action or management plan'.

2.52 The policy was not clear about who was responsible for setting the scope of the audit (i.e. choosing from among the matters listed in paragraph 2.49, or determining whether an interim 'Section B' audit statement was warranted). The policy implied a discretionary role for the Site Auditor and did not provide sufficient guidance on the nature and extent of the Site Auditor's role.

2.53 No interim 'Section B' audit statements were issued for this project certifying that the nature or extent of the contamination had been appropriately determined or that environmental investigations or the Remedial Action Plan were appropriate. However, representatives from ACT Government agencies (ACTPLA, Procurement Solutions and Roads ACT) continued to expect that, because of the Site Auditor's involvement during the project, ongoing assurance was obtained about the management of the contamination risks for the site.

2.54 While some comfort could be gained from the Site Auditor's involvement in the project, the Site Auditor's deliverables for the North Weston Pond Project were the provision of a 'Section A' Site Audit Report and Site Audit Statement at the conclusion of the remediation process.

2.55 The project brief for the Site Auditor did not specify whether a 'Section A' or 'Section B' report was required, or differentiate between the two types of report. The assurance that can be obtained from each type of audit, was not well understood by agency representatives, suggesting it should be explained more clearly in the policy.

Role of the Environment Protection Authority

2.56 The role of the Environment Protection Authority was not adequately described in the Environment Protection Policy. In the case of the pond project, the Authority was involved throughout the process and provided advice and input to other agencies and other parties on particular issues and matters. The Authority had endorsed some (but not all) of the reports produced during the contaminated site management process. Reports formally endorsed by the Authority (in relation to the North Weston Pond site) included:

- the Phase 1 Environmental Site Assessment by Coffey in March 2006 (although this endorsement was subject to a review of the assessment by the Site Auditor and a review of the proposed methodology for sampling and analysis); and
- a Site Audit Report and Site Audit Statement for the adjacent former pine plantation block (Block 1204).

2.57 The Environment Protection Authority was expecting to endorse Site Audit Reports produced by the Site Auditor for other blocks, when they were finalised, including a report for Block 1196 (on which the former Weston Creek Sewerage Treatment Plant and parts of the builders' landfill was located).

2.58 The Environment Protection Authority did not have a role in endorsing other reports, including preliminary investigation reports, Phase 2 site assessment reports, environmental management plans or remedial action plans.

2.59 Similar to earlier comments on the role of the Site Auditor, there was some confusion among other ACT Government agencies (ACTPLA and Procurement Solutions) about the role of the Environment Protection Authority and its role in the project. In some instances, these agencies sought endorsement or approval from the Authority on a particular process, which was not forthcoming. In other instances, agencies incorrectly assumed that the Authority had 'approved' or 'signed-off' on various aspects of the process, or would do so.

Application of the Contaminated Sites Environment Protection Policy to the North Weston Pond

2.60 The Contaminated Sites Environment Protection Policy identified processes for the management of contaminated sites that generally focused on:

- assessment of the contamination risks;
- remediation of the contamination risks; and
- site audit (including the Site Audit Report, which is subsequently endorsed by the Environment Protection Authority).

2.61 Although the Environment Protection Authority prefers these activities to occur prior to development and/or construction activities on the site, the Environment Protection Policy does not specifically require this.

2.62 Remediation for the North Weston Pond was to occur at the same time as construction. This is logical for the construction of a pond, as remediation of

contaminated material occurs as the potentially contaminated material is dug from the ground to construct the pond void.

2.63 In practice, however, this meant that a 'Section A' Site Audit Report and Site Audit Statement (to be endorsed by the Environment Protection Authority) could not be produced until the pond was largely completed. At the time of audit fieldwork in February 2011, there had not been a Site Audit Report and Site Audit Statement for the key North Weston Pond site (Block 1196), despite the extensive and expensive work undertaken on the pond project by various agencies, consultants and contractors.

2.64 A 'Section A' Site Audit Report and Site Audit Statement produced at this stage (that is, when the pond was largely completed) is not timely assurance 'to the actual or prospective lessees/occupiers of the site, including the ACT Government and community that the site is suitable for a particular land use or range of uses'. This is an expected outcome of a site audit, as described in the Contaminated Sites Environment Protection Policy.

2.65 The processes outlined in the Environment Protection Policy, which were generally completed sequentially, may be suitable for a 'simple' contaminated site. However, the pond was on a complex site, which involved significantly higher risks such as the:

- contamination risks identified for the site; and
- simultaneous completion of remediation and construction processes.

2.66 Consequently, amendments to the policy should be considered that address these risks and provide for a greater and more sustained involvement of the Environment Protection Authority as well as clearer guidance on the nature and types of audits to be conducted (i.e. Section A or Section B audits) and when they are warranted.

Recommendation 6

The Environment Protection Authority should review the Contaminated Sites Environment Protection Policy and consider amendments to the Policy that:

(a) clarify roles and responsibilities for the management of contaminated sites, including its role, the role of the Contaminated Site Auditor and other stakeholders, including the project owner; and

(b) allow for greater and more sustained involvement from the Environment Protection Authority for future high-risk infrastructure projects involving contaminated sites.

CONCLUSION

2.67 The pond project has not met its original objectives. It is late, well over budget and has required significant redesign.

2.68 The main geotechnical and environmental constraints and risks of the pond were known, at least in outline, from the start. Although various processes were undertaken by ACT Government agencies to understand and manage these constraints and risks, these agencies did not combine the knowledge and information into a coherent whole to effectively address these constraints and risks.

2.69 Major causes of this project's problems are the shortcomings in the project's governance and management arrangements. There was inadequate coordination between the various ACT Government agencies and consultants and agencies did not implement effective overall strategic planning and project risk management arrangements.

3. ENVIRONMENTAL ASSESSMENTS

INTRODUCTION

3.1 This chapter describes the environmental assessment processes conducted during planning for the pond. Key outcomes sought from these assessments were the identification of contamination and geotechnical constraints for consideration during the pond's construction phase.

3.2 ACTPLA was the ACT Government agency with primary responsibility at this stage of the project. Procurement Solutions acted on behalf of ACTPLA in the procurement and contract management of several contractors engaged to carry out the assessments.

KEY FINDINGS

- At the earliest stages of the project, the Environment Protection Authority communicated the general environmental and contamination risks associated with the site to consultants engaged for the pond project.
- An important output from the environmental and contamination assessments was the Sampling and Analysis Quality Plan (Sampling Plan), which was developed over time by consultants involved in the project. The Sampling Plan determined the methodology and approach for testing for contamination on the site, the results of which were reported in the Phase 2 Environmental Site Assessment report. This plan has subsequently been assessed in a review commissioned by ACT Procurement Solutions, on behalf of Roads ACT, as inappropriate for testing for asbestos at a high risk site.
- The Remedial Action Plan, which was informed by the results of the testing undertaken as part of the Phase 2 Environmental Site Assessment, was a key document for the construction phase, as it articulated the processes for managing contaminated material encountered during construction. The Remedial Action Plan under-estimated the quantity of contaminated material and processes required to manage the asbestos containing material.

BACKGROUND

3.3 In 2004, the Molonglo Valley was identified in the Canberra Spatial Plan as the next area for major residential development within the ACT. The Plan stated that 'due to its proximity to existing services and employment centres, the Molonglo Valley is considered highly suitable for urban development.'

3.4 Following the identification of the Molonglo Valley as an area for residential development, a series of environmental and geotechnical assessments were undertaken. These included a:

- Preliminary Geotechnical and Environmental Constraints Study;
- Phase 1 Environmental Site Assessment; and
- Phase 2 and 3 Environmental Site Assessment.

3.5 As part of usual environmental site assessment practice, a Contaminated Site Auditor (Site Auditor) was engaged by Procurement Solutions on behalf of ACTPLA to review the outcomes of the environmental site assessments. The Site Auditor would issue Site Audit Statements to certify the land as suitable for its intended use.

3.6 Each of these components of the environmental and geotechnical site assessments is considered in further detail in this chapter, as well as Environment Protection Authority records associated with the site.

ENVIRONMENT PROTECTION AUTHORITY RECORDS

3.7 The Environment Protection Authority maintains information on contaminated sites and potentially contaminated sites through its Contaminated Site Management Database.

3.8 The Environment Protection Authority also maintains the Register of Contaminated Sites, required by Section 21A of the *Environment Protection Act 1997*. The Register contains particulars of land for which:

- an order has been made to assess whether the land is contaminated,
- an order has been made to remediate contaminated land; or
- an environment protection order has been made to manage the contaminated land.

3.9 No such orders have ever been made for the North Weston Pond site, nor were they made during this process. Consequently, the North Weston Pond site has never been placed on the Register.

3.10 The Environment Protection Authority provided the results of contaminated land searches from its Contaminated Site Management Database to the consultants undertaking the Preliminary Geotechnical and Environmental Constraints Study and the Phase 2 Environmental Site Assessment (Coffey and SMEC respectively).

Results of contaminated land searches

3.11 The Environment Protection Authority advised the consultants (Coffey and SMEC) of the following risks associated with the site of the pond.

- Sewerage treatment works – 'part of the site was formerly the old Weston Creek Sewerage Treatment Works which was demolished on site and covered with soil. There are no records of an assessment being undertaken for the decommissioning of the former sewerage works';
- Forestry plantation – 'the other major use of the block was for Forestry Plantation (Radiata Pine) which was destroyed in the January 2003 bushfires. Records held by Environment ACT indicate that the application of chemicals may have been undertaken in the area for the purpose of pest control'; and
- Landfill – 'there is also an historic quarry located on the site which was subsequently used as an uncontrolled landfill'.

3.12 Anecdotal evidence that the site may have been used as a training ground for drivers of earthmoving equipment was not communicated to consultants engaged in the project.

3.13 The Environment Protection Authority's advice to the consultants noted that 'the information ... only relates to records held by the Environment Protection Unit and may not represent the actual condition of the site' and the information provided by the Authority 'does not absolutely rule out the possibility of contamination and should not be interpreted as a warranty that there is no contamination'. The Authority consistently stated 'due to the lack of specific plans recorded for the activities on the site, you or your client should also investigate the historic aerial photographs for the block'.

3.14 The records maintained by the Environment Protection Authority recognised key sources of risk for the site, including the Weston Creek Sewerage Treatment Plant, uncontrolled builders' landfill and forestry plantation. These risks were communicated to the consultants (identified above) undertaking the environmental site assessments.

3.15 The Environment Protection Authority's records also indicated that the structures relating to the former sewerage treatment plant could still be located on the site.

3.16 The Environment Protection Authority's records were not sufficient to provide precise information about the nature and location of the builders' material on the site. The Authority's advice to consultants recognised that the builders' landfill was uncontrolled and that it was close to the disused quarry at the southern end of the site. It was subsequently discovered during site investigations that the builders' material was located more extensively throughout the site.

PRELIMINARY GEOTECHNICAL AND CONTAMINATION CONSTRAINTS STUDY

3.17 The purpose of the Preliminary Geotechnical and Contamination Constraints Study was 'to assess broad geotechnical and environmental constraints to urban development within the Molonglo area.' The study addressed the area of the proposed new residential development.

3.18 The project brief required consideration of available reports, a desktop study of information and inspection of any constraints visible from the surface. The focus was on geotechnical issues, but the consultant was also required to identify areas of environmental concern, such as sites used for filling, spoil dumping, sheep dips or waste disposal. According to the brief:

> The study will be used to determine if there are any areas that should be excluded from urban development or where special engineering works may be required to address geotechnical constraints.

3.19 Procurement Solutions engaged Coffey to undertake the Constraints Study in July 2004, through a selective tender process (with three firms invited to tender). The report was completed in May 2005.

Findings of the Preliminary Geotechnical and Contamination Constraints Study

3.20 The preliminary study identified geotechnical constraints and noted that:

- excavation of a pond would be required due to the existing narrow creek channel;
- existing drainage and sewerage infrastructure constrained where the pond could be created; and
- excavation of hard, slightly weathered to fresh bedrock, if required, would be difficult and slow.

3.21 The report also noted that remnant structures of the Weston Creek Sewerage Treatment Plant and uncontrolled fill in the former quarry may create problems.

3.22 The study found 'at least thirteen potential areas of environmental concern within the Molonglo Valley urban development area, comprising eight sheep dips, various landfill areas, Weston Creek Sewerage Treatment Works, Coppins Crossing sludge ponds, forestry plantation areas and a waste oil disposal point.' All of these areas were assessed as 'able to be remediated if required ... although there may be moderate costs incurred for the remediation.' The term 'moderate costs' was not clarified further.

3.23 The report also stated that further investigation of the areas of environmental concern should be carried out (a Phase 1 Environmental Site Assessment) to assess the nature and extent of potential contaminants.

3.24 The Coffey report on geotechnical and environmental constraints met its objectives and provided appropriate advice on areas of environmental concern and the contaminants that may be found.

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

3.25 A Phase 1 Environmental Site Assessment was conducted on the recommendation in the Coffey Preliminary Study to investigate areas of environmental concern.

3.26 The objectives of this study were to:

- identify areas of environmental concern, possible constraints on the use of the land (including its use as an urban pond); and
- scope the requirements for a more detailed Phase 2 investigation.

3.27 The study was also expected to assess and report on the type and extent of any contamination on the site.

3.28 Coffey was engaged to undertake the Phase 1 Environmental Site Assessment. This work was awarded on 25 May 2005 and the report was completed on 7 February 2006.

3.29 The initial project brief was limited to the former Weston Creek Sewerage Treatment Plant. However, this was recognised and the contract was varied in

June 2005 to include the builders' landfill (part of Blocks 1196 and 1179) and Block 1203 (labelled as the Night Spoil Depot).

Findings from the Phase 1 Environmental Site Assessment

3.30 The report, completed by Coffey in February 2006, noted the potential for hotspots of contamination within each of the areas of environmental concern. The report noted the presence of asbestos and other contaminants through observation and limited sampling and confirmed that the site assessment should proceed to Phases 2 and 3.

3.31 The report included a draft Sampling Analysis and Quality Plan (Sampling Plan) and provided an estimate of the cost of the Phase 2 site assessment. The report did not include an estimate for the cost of Phase 3, as this would primarily depend on the results of the Phase 2 environmental site assessment. The draft Sampling Plan developed at this stage formed the basis for the testing methodology subsequently adopted in the Phase 2 environmental site assessment.

Subsequent criticism of the Phase 1 Environmental Site Assessment

3.32 In August 2010, following concerns about the removal of large amounts of contaminated material at the construction stage, Roads ACT commissioned a review of the environmental and geotechnical site assessments. This review identified deficiencies in the Phase 1 Environmental Site Assessment. These included:

- borehole test results (which represented approximately one-third of the testing conducted at the location of the former Weston Creek Sewerage Treatment Plant) that inadequately described the nature of the building debris revealed by the tests; and
- some borehole tests that did not penetrate deep enough to obtain useful results (for example, drill 'refusal' was encountered as shallow as 0.3 metres below ground level).

3.33 The review concluded that the proposed Sampling Plan was underscoped and inappropriate given the known history of the site. This is discussed further at paragraphs 3.44 to 3.49.

3.34 In response to this criticism, Coffey has advised that the Sampling Plan was in draft form and would have been the starting point for subsequent investigations. Should any of the test pits identify potential contaminants it was expected that the environmental site assessor [SMEC] would expand the scope of the investigation. (SMEC subsequently expanded the scope of testing as part of the Phase 2 Environmental Site Assessment).

Tender process for the Phase 2 and 3 Environmental Site Assessment

3.35 Coffey's preliminary assessment of the cost for the Phase 2 study was $75 000 to $82 500 (GST exclusive) and that the cost of engaging the Site Auditor would range between $10 000 and $20 000 (GST exclusive). Coffey said 'the potential extent of remedial works will not be known until the completion of the Phase 2

[Environmental Site Assessment] and therefore it has not been possible to prepare budget estimates for Phase 3.'

3.36 A tender for the Phase 2 and 3 assessments was commenced, based on these estimates. The tender process was abandoned when insufficient tenders were received.

3.37 The work was subsequently re-tendered with a Procurement Solutions budget of up to $550 000. The final cost of the consultancy, which was awarded to SMEC, was $569 395. Douglas Partners was subcontracted by SMEC to undertake the detailed geotechnical testing. The Site Auditor's contract was initially identified as $22 500, although the final cost of the contract was estimated to be $50 000.

3.38 The initial cost estimates provided by Coffey for Phase 2 of the project have subsequently proven to be significantly less than the actual costs for these components of the project. This indicates that, at the conclusion of Phase 1, the expectations for the nature and extent of the work to be performed as part of Phase 2 were significantly underscoped.

PHASE 2 ENVIRONMENTAL SITE ASSESSMENT

3.39 SMEC completed the Phase 2 Environmental Site Assessment (for the part of the site containing the former sewerage treatment plant, builders' landfill and nightspoil depot) on 9 May 2009, over a year after the pond design option had been selected. The Phase 2 Environmental Site Assessment scope of works also included a geotechnical assessment. This was conducted by Douglas Partners (under subcontract to SMEC), but this was reported separately to Procurement Solutions. The results of the geotechnical assessment are discussed in Chapter 4.

3.40 The project brief identified that the purpose of the study was to 'define the comprehensive ground conditions in the locations proposed for the infrastructure works' and that the study 'required extensive geotechnical, environmental investigation and reporting for detailed design of the North Weston Pond'.

3.41 A detailed scope of works was identified, although the key requirements for the environmental and contamination component of the project were that SMEC was to develop a Sampling Plan and execute testing in accordance with the Sampling Plan 'to provide detailed analysis on extent and degree of contamination and migration sufficient to develop a Phase 3 Environmental Site Assessment Remedial Action Plan (RAP) if required'.

Findings of the Phase 2 Environmental Site Assessment

3.42 SMEC reported that 'in general, contaminant concentrations in soil, groundwater, surface water and sediments were less than the adopted assessment criteria' although several exceptions were identified. SMEC identified various locations where there was excess lead, heavy metals, petroleum hydrocarbons, phosphorus and asbestos. Fill material was also identified on the site comprising 'a range of wastes including domestic, building, operational and maintenance waste'.

3.43 SMEC identified hotspots (where there were excessive amounts of contaminants) and identified that these would need to be remediated, together with removal of surface fill material.

Sampling Analysis and Quality Plan

3.44 The Sampling Plan developed as part of the Phase 2 Environmental Site Assessment was an overarching sampling methodology for the project. Several different consultants were involved in producing the Sampling Plan.

Development of the Sampling Plan

3.45 The Sampling Plan was developed in the following stages.

- A draft was prepared by Coffey as part of the Phase 1 Environmental Site Assessment.
- The draft was reviewed and commented on by the Site Auditor and Environment Protection Authority. The Authority was 'in general agreement' with the draft and provided brief comments. The Site Auditor provided comments and a detailed amended draft plan.
- The draft Sampling Plan was used in the project brief as part of the tender process for the Phase 2 and 3 Environmental Site Assessment.
- SMEC was required, as part of the brief for Phase 2 and 3 Environmental Site Assessment, to prepare its own 'preliminary Sampling Analysis and Quality Plan [to be] finalised in conjunction with the Site Auditor, based on the review of associated Phase 1 Environmental Site Assessment report and before the commencement of Phase 2 works'.
- SMEC prepared a revised Sampling Plan in May 2008.
- SMEC's plan was reviewed and commented on by the Site Auditor who considered that it was 'acceptable for the purpose of [the] audit' subject to 'a few minor issues that should be addressed in the final [Sampling Plan]'.

3.46 SMEC prepared a final version of the Sampling Plan, which was then used to guide testing on the site. The results of this testing were a major influence on the estimated quantities of contaminants and processes identified in the Phase 3 Remedial Action Plan.

Reported deficiencies in the Sampling Plan

3.47 As previously noted, in August 2010, Procurement Solutions commissioned a peer review of the environmental and geotechnical site assessments. The peer reviewer noted that 'the absence of ACT guidelines on assessing [asbestos containing material] or asbestos impacted sites/soils at the time of investigation provided little direction on the preferred investigation for potentially asbestos impacted soil.' However, the peer reviewer also concluded that the Sampling Plan (and its subsequent execution) was inappropriate for the site, as there was insufficient focus on testing for asbestos, which should have been considered as one of the most commonly occurring contaminants on a site that had previously been used as an uncontrolled builders' landfill.

3.48 Specifically, the testing was assessed as deficient because:

- many borehole sampling locations did not extend deep enough to provide a reliable indication of the nature and extent of the fill material;
- some testpits (excavated with a backhoe) did not meet the objective of this aspect of the investigation, which was to extend into natural ground; and
- less than 15 percent of all samples collected were analysed for asbestos, and these were mostly from or near surface locations.

3.49 In its response to this report, SMEC has advised that the Sampling Plan met the minimum requirements of the NSW guidelines for sampling (as adopted by the ACT) and that the testing was reasonable in the circumstances.

PHASE 3 ENVIRONMENTAL SITE ASSESSMENT - REMEDIAL ACTION PLAN

3.50 There was one contract for the conduct of Phases 2 and 3 of the Environmental Site Assessment. The project brief for this work stated that, among other things, a Phase 3 Remedial Action Plan was to be produced to assess remedial options for all areas of environmental concern. The Remedial Action Plan was an outcome of the testing conducted under the Sampling Plan.

3.51 At a minimum, the Remedial Action Plan was expected to:

- identify areas within the study area that require remediation or have particular management requirements;
- select the remediation goals;
- specify site cleanup criteria;
- outline remediation, validation, site control and health and safety procedures; and
- provide a basis for which the construction specifications for site remediation activities can be established.

Amount of contaminants estimated in the Phase 3 Remedial Action Plan

3.52 The Phase 3 Remedial Action Plan was completed by SMEC on 10 September 2009. The Remedial Action Plan was subsequently relied upon by ACT Government agencies for identifying the remediation work (and associated costs) to be performed during the construction phase of the project.

3.53 The Remedial Action Plan identified the need to remediate soil at various specific points, but provided little guidance as to the practicalities of undertaking the remediation or how the remediation would be managed. The Remedial Action Plan identified Total Petroleum Hydrocarbons contamination at 15 locations, asbestos at seven locations and heavy metal contamination at one location.

3.54 Based on these locations, the Remedial Action Plan provided estimates of volumes of material that would have to be remediated: up to approximately 6 400 m^3 (about 9 600 tonnes) of Total Petroleum Hydrocarbons and / or asbestos

containing material. SMEC based its calculation of this quantum on remediating the specific locations across the site and detailed and precise depths of soil.

3.55 The Remedial Action Plan underestimated the amount of material that was subsequently treated and disposed of as 'asbestos containing material', primarily because of the shortcomings identified in the Sampling Plan. The consultant who undertook the review for Procurement Solutions (on behalf of Roads ACT) has criticised the Remedial Action Plan on the basis that there is no clear rationale for how these volumes were estimated. In particular:

- volume estimates appeared to be calculated on the area immediately surrounding asbestos finds. An accepted practice for volume estimation is to take the mid-point between a clean and dirty sample and assume that all soil requires excavation up to the midpoint (although even more conservative approaches to estimating volumes may be adopted); and
- fill containing scattered presence of asbestos containing material or fibres should be deemed entirely as impacted with asbestos unless appropriate management conditions existed at the site.

Remediation criteria

3.56 The Remedial Action Plan confirmed the remediation criteria for asbestos was to be 'no free fibres in soils' and 'no known asbestos containing materials are to remain on site'. This is, in effect, a zero tolerance policy for asbestos on site, which accorded with Environmental Protection Authority guidance at the time.

3.57 Having such a high criteria for asbestos remediation, however, requires:

- highly accurate estimates of the amount of asbestos to be remediated; or
- large contingencies in the project budget, to allow for greater-than-expected amounts.

3.58 The under-estimated volumes of material treated as 'asbestos containing material' in the Remedial Action Plan, combined with Procurement Solutions' reliance on these estimated volumes to inform purchasing decisions for the construction contractor has contributed to much of the higher than expected costs associated with the project.

CONTAMINATED SITE AUDITOR

3.59 Procurement Solutions also engaged a Contaminated Site Auditor (CM Jewell and Associates), to review the work of SMEC and to subsequently issue Site Assessment Statements to certify the land as suitable for its intended use.

3.60 The project brief required the Site Auditor to:

- review the Phase 1 Environmental Site Assessment report;
- review the Sampling and Analysis Sampling Plan prepared in Phase 2;
- endorse the Phase 2 report and Phase 3 Remedial Action Plan; and
- conduct extensive consultations with the consultant (SMEC).

Demands and expectations of the Site Auditor

3.61 ACT Government agencies (Procurement Solutions, ACTPLA and Roads ACT) placed a high degree of reliance on the Site Auditor. The Site Auditor reviewed the Sampling Plan, provided ongoing advice and feedback to environmental assessors and reviewed and commented on Remedial Action Plans and Environment Management Plans. Although the Site Auditor provided ongoing advice throughout the project, the Site Auditor had only issued a formal Site Assessment Statement for Block 1204 (the former pine plantation block) and no other statements have been issued for the site.

3.62 A 'Section A' Site Assessment Statement (certifying that the land is suitable for its proposed land use(s)) cannot be issued by a contaminated site auditor until final remedial action is complete. At the time of this report, remedial action had not been completed for affected blocks other than Block 1204. Therefore, the Site Auditor has not yet issued an audit statement for Block 1196 (the former sewerage treatment plant, builders' landfill and nightspoil depot site) or other blocks that were also included within the scope of the investigations.

3.63 This is a key point that has not been well understood by some parties (ACT Procurement Solutions and Roads ACT) during the pond project. In the absence of a 'Section B' Site Audit Statement the role of the Site Auditor was to certify the appropriateness of the land for its intended use following remediation. In the case of the pond project, remediation was to occur simultaneously with construction, and in the case of the main Block 1196, is yet to be completed. However, as noted in Chapter 2, it was not clear why 'Section B' statements were not sought from the Site Auditor.

3.64 The Site Auditor drew attention to the high level of expectations being placed on their role. In commenting on the project brief for Phases 2 and 3, the auditor noted that 'the scope of work for the audit appears to be moving beyond the original tender brief.' As early as 4 December 2008, Procurement Solutions also noted that 'large amounts of contaminated sites auditor assessment time were allowed for but now this time has been exhausted'.

CONCLUSION

3.65 The environmental site assessments did not provide a reasonable estimate of the amount of contaminated material. The reasons for this included:

- an insufficient consideration of the risks associated with the source and dispersion of the asbestos containing material based on the history of the site, even though most of this history was generally known and documented;
- a Sampling Plan and testing that did not fully reflect the likely dispersion of asbestos on the site; and
- a Remedial Action Plan that significantly underestimated quantities of material subsequently treated as asbestos contaminated material, based on a misunderstanding of the asbestos dispersion throughout uncontrolled landfill and within the old sewerage treatment plant structures.

Source: ACT Audit Office – photograph taken 27 January 2011

Source: ACT Audit Office – photograph taken 27 January 2011

4. FEASIBILITY AND DESIGN OF THE POND

INTRODUCTION

4.1 This chapter assesses the management of the design phase of the pond project by ACT Government agencies. This involved designing the pond to meet ACT Government objectives, while recognising the limitations and constraints of the site.

KEY FINDINGS

- ACTPLA undertook key stages of the planning and design process, including the finalisation of a feasibility study for the pond (incorporating design options) as well as the acceptance of the pond design, before completion of the Phase 2 Environmental Site Assessment, which provided more information about the ground conditions at the site.
- ACTPLA did not adequately recognise and cost issues identified during the environmental and geotechnical assessments during the planning process. These include risks associated with the integrity of the Molonglo Valley Interceptor Sewer (an ageing structure) and the existence of former Weston Creek Sewerage Treatment Plant structures at the location of the pond.
- ACTPLA did not adequately document acceptance of the pond design or the risks associated with the selected design option and measures to address these risks.

BACKGROUND

4.2 In 2006, Cardno Young reviewed stormwater needs in the Molonglo Valley on behalf of ACTPLA, to 'inform Government on a preferred strategy for ponds and lakes as one component of an integrated stormwater management plan.' The resulting Molonglo Valley Ponds and Lakes Options Study identified three prospective options for the area:

- a 16 GL lake on Molonglo River and a 280 ML pond on Weston Creek;
- a short 6.3 GL lake at Coppins Crossing, a 150 ML pond on Yarralumla Creek and a 280 ML Weston Creek pond; or
- consolidated regional ponds throughout the Molonglo Valley with a 480 ML pond on Yarralumla Creek in combination with upstream ponds/wetlands as well as a 280 ML Weston Creek pond.

4.3 A key outcome of the study was that all three options supported the placement of a 280 ML pond at the Weston Creek site.

POND FEASIBILITY STUDY

4.4 In 2007, following the completion of the Cardno Young Options Study, ACTPLA engaged Bill Guy and Partners to:

> [Undertake] the feasibility study for a major pond on Weston Creek for water quality control purposes, non-potable water supply and to form a major landscape

feature for the proposed North Weston (formerly Western Broadacre) urban development and to create an interface and gateway to the proposed Molonglo Valley development.

4.5 The primary objectives for the study were to:

- identify pond layout options;
- provide plans and details for the pond including embankment and spillway options; and
- provide a detailed assessment of related major sewer protection and/or relocation options.

Feasibility study findings

4.6 Bill Guy and Partners provided the feasibility study report on 26 February 2008. The report noted:

> Major constraints for the implementation of a large pond at this location are the trunk sewer system running along Weston Creek, the available site area for the pond and the contamination at the site of the former Weston Creek Sewerage Treatment Works near the confluence of Weston Creek and Molonglo River.

4.7 The report concluded that two options should be considered:

> Option 1: Utilises a long embankment, which is lengthened to contain the pond, specifically to minimise the extent of protection or relocation required for the Molonglo Valley Interceptor Sewer.
>
> Main components of Option 1 are a northern embankment of about 100 metres to impound the water, a western embankment of about 600 metres in length along the west side of the pond to contain the pond, protect the Molonglo Valley Interceptor Sewer and to act as a secondary spillway.
>
> The former Weston Creek Sewerage Treatment Plant would be largely inundated by the pond development, requiring minimum excavation and remediation over this area.
>
> Option 2: Created by a short embankment across Weston Creek, it requires the relocation of a 910 metre section of the Molonglo Valley Inceptor Sewer on the eastern side of the pond.
>
> Similar to Option 1, the former Weston Creek Sewerage Treatment Plant would be largely unaffected.

4.8 The report identified Option 1 as the preferred option, noting that 'the key advantage of this option is the minimal impact on the Molonglo Valley Interceptor Sewer, which crosses the site.' Additional benefits identified from Option 1 included:

- a significantly lower initial capital cost;
- a cost effective spillway arrangement, using the long embankment spillway to minimise pond runoff during storms; and
- more effective land use and planning outcomes, providing more available land for the proposed residential development west of the pond.

4.9 Table 4.1 summarises the estimated costs for these two options.

Table 4.1: 2008 Estimated costs for pond options

Option	Construction cost ($ million)		Life cycle cost ($ million)
	Pond	Other Works	
Option 1	8.4	5.6	11.1
Option 2	6.5	12.5	8.3

Source: Bill Guy and Partners' feasibility report dated 26 February 2008

Choice of pond design

4.10 At the time of the feasibility study, detailed geotechnical or environmental assessments had not been completed. Although findings from the Preliminary Investigation and Phase 1 Environmental Site Assessment were made available to Bill Guy and Partners, this assessment only provided the preliminary information needed for subsequent, more detailed environmental site assessments.

4.11 ACTPLA has advised that the results of the Preliminary Investigation and Phase 1 Environmental Site Assessment were 'considered appropriate for a feasibility design. Detailed investigations are usually conducted to inform the final design'.

4.12 ACTPLA accepted Option 1 and it became the basis for all subsequent planning and design activities. There is little documentation within ACTPLA to support this decision, including evidence of rigorous analysis of the costs, benefits and risks associated with selecting Option 1 over Option 2. ACTPLA subsequently advised that 'the feasibility study concept design did not require an official design sign-off but it was presented, reviewed and commented by a number relevant ACT Government agencies and ActewAGL.'

4.13 Such a significant decision should have been properly documented. Documentation of the decision-making process should include recognition and analysis of the risks associated with the different options, and consideration of their potential implications for design and cost objectives of the project.

Recommendation 7

For future high-risk infrastructure projects, the project owner should ensure that the decision-making process for acceptance of infrastructure design is properly documented, including documentation demonstrating that all known risks were recognised and either accepted or mitigated.

GEOTECHNICAL CONSIDERATIONS

4.14 Douglas Partners, under subcontract to SMEC, completed a detailed geotechnical site study in December 2008 as part of the Phase 2 Environmental Site Assessment.

4.15 Douglas Partners conducted geotechnical testing based on Option 1. In its report, Douglas Partners said the purpose of its testing was 'to provide information on the subsurface conditions to assess excavation conditions and reuse of borrow material and to provide comments on pond/embankment design and construction and protection measures for the Molonglo Valley Interceptor Sewer.'

4.16 The report noted that:

> the existing uncontrolled filling within the site is considered suitable for re-use following screening of unsuitable factors such as building rubble, vegetation, cobbles and boulders greater than a maximum particle size of 150 millimetre. The screened material could then be used as general filling or incorporated into the downstream zone of the embankment.

4.17 Douglas Partners did not specifically test for the existence of structures from the former sewerage treatment plant, but reported that:

> It is understood that there are concerns regarding the possible existence of existing structures buried in the old sewerage treatment plant site and their possible collapse during bulk earthworks. Should such structures exist or be located, the sites should be over-excavated to the full depth of the structure and subsequently backfilled under controlled conditions ... The depth of over-excavation can only be determined onsite following determination of the extent of such structures.

4.18 Regarding the Molonglo Valley Interceptor Sewer, the report noted:

> The condition of the existing Molonglo Valley Interceptor Sewer appears to be a major concern with a significant likelihood that following construction of the proposed pond, even with protection measures in place, replacement of pipeline will be required in the future.
>
> Hence it is strongly recommended that consideration should be given to installing a redundancy line either adjacent to the alignment of the existing pipeline (prior to commencement of pond construction) or outside the pond perimeter. Construction of a new pipeline following completion of the pond would most likely prove to be significantly more expensive particularly if failures in the existing Molonglo Valley Interceptor Sewer pipeline occur. The cost of protection measures for the existing pipeline could offset the cost of the new pipeline which will be required in the future regardless.

4.19 The report highlighted the risks associated with the location of the Molonglo Valley Interceptor Sewer and the possible existence of the sewage treatment plant structures. These risks were realised during the construction phase and have subsequently lead to higher than expected costs for the project for:

- the removal of the sewerage treatment plant structures; and
- additional protection measures for the Molonglo Valley Interceptor Sewer.

4.20 These risks also led to a revised pond design (agreed in January 2011), which involves two smaller ponds that avoid the Molonglo Valley Interceptor Sewer.

FINAL POND DESIGN

4.21 In April 2008, Cardno Young was appointed to administer the preparation of the final design of the pond. ACTPLA directed Cardno Young to finalise the design

of the pond based on Option 1 identified in the feasibility study and to prepare tender documents for its construction.

4.22 Throughout the latter half of 2008 and early 2009, Cardno Young worked on the design, in conjunction with the Planning Services Branch of ACTPLA. The Planning Services Branch was involved in the major activities, including finalising the preliminary and final sketch plans, preparing the Development Application and construction tender documents.

4.23 ACTPLA's Planning Services Branch agreed to the final design in August 2009 as part of preparing the final sketch plans and development application. The design closely resembled Option 1 from the feasibility study. However, the design agreed to by ACTPLA and ActewAGL did not incorporate the redundancy protection for the Interceptor Sewer that had been 'strongly recommended' by Douglas Partners because ACTPLA considered it too expensive.

Exemption from an Environmental Impact Statement

4.24 ACTPLA sought and received an Environmental Impact Statement exemption from the Minister for Planning in July 2009 for Molonglo Stage 1 (Coombs, Wright and North Weston), in accordance with Section 211 of the *Planning and Development Act 2007*. The exemption was granted on the basis that 'the expected environmental impact of the proposal has already been sufficiently addressed by another study or studies.'

Development application

4.25 The development application was submitted in August 2009, with endorsements by executives of the various TAMS branches (Environment and Recreation, Parks Conservation and Lands, and Roads ACT) that were the owners of the leases. The development application was assessed and approved by ACTPLA's Development Services Branch, in a process similar to any other development.

CONCLUSION

4.26 The basic pond design and location was largely decided by ACTPLA before receiving results of the detailed geotechnical testing. The detailed geotechnical testing identified significant risks associated with the proposed design in relation to the site and recommended a series of measures be implemented for managing these risks (primarily associated with protecting the Interceptor Sewer and the former sewerage treatment plant).

4.27 The geotechnical testing noted the serious risks associated with constructing the pond adjacent to the Interceptor Sewer and recommended the construction of an additional redundancy line. This was not adopted. The revised pond design, decided in January 2011, avoids the Interceptor Sewer.

4.28 ACTPLA's acceptance process for the design of the pond was not adequate, and there was a lack of an overall, rigorous analysis of the feasibility of the pond, as designed, including an analysis of the risks associated with the design of the pond and the potential impact on the project's design and cost objectives.

5. CONSTRUCTION OF THE POND

INTRODUCTION

5.1 This chapter assesses ACT Government agencies' activities during the construction phase of the pond project, including remediation activities.

KEY FINDINGS

- Under the contractual arrangements agreed with the construction contractor (Hewatt Earthworks), Roads ACT paid for the removal of contaminated material on a volume basis. The tender brief for the construction phase included estimates of the likely quantities of asbestos containing material to be removed from the site, based on the quantities identified in the Remedial Action Plan. The estimated quantities proved to be substantially less than the quantities disposed of as 'asbestos containing material,' and recorded as such, during construction. The project budget was exceeded largely due to the need to pay higher than expected removal costs.
- Early in the construction phase, the initial Remedial Action Plan informed ACT Government agencies' (including Procurement Solutions and Roads ACT) activities for the management of asbestos containing material on the site. In the absence of any ACT, national or New South Wales guidelines, a 'zero tolerance' approach was adopted, whereby 'no known asbestos was to remain on site' nor were any asbestos fibres to remain in the soil. This established a conservative approach for the treatment of asbestos containing material at the site.
- During the construction phase, ACT Government agencies (Procurement Solutions and Roads ACT) treated fill containing builders' rubble as asbestos containing material, which required it to be removed from the site. This reflected the likelihood that builders' rubble included asbestos containing material, as well as the perceived impracticality of adopting on-site treatment options, such as sieving, to separate asbestos containing material from the fill. Decision-making processes at this time were not well documented, including assessing the impracticality of adopting on-site treatment options or their cost implications. In addition, there was a requirement in the revised Remedial Action Plan that identified the site's topsoil as both geotechnically unsuitable material and asbestos containing material.
- The records maintained do not distinguish between the type of material (asbestos containing material or geotechnically unsuitable material) removed from the site.
- In May 2010, the higher than expected volumes of material treated as 'asbestos containing material' and resulting costs led to the adoption by ACT Government agencies (ACT Procurement Solutions and Roads ACT) of an alternative, more flexible and risk-based approach, which allowed low-risk asbestos containing material to remain on-site. This was facilitated by the Environment Protection Authority's adoption of revised guidelines for managing contaminated material. A revised Remedial Action Plan was developed and implemented in June 2010 to facilitate this. Although the new Environment Protection Authority guidelines and the revised Remedial Action Plan provided ACT Government agencies with

more flexibility for managing asbestos at the site, large amounts of asbestos containing material continued to be removed off the site, because the concentration of asbestos exceeded the acceptable threshold.

- Work at the site recommenced on 8 March 2011. The completion of a revised, smaller capacity pond, as approved by the Minister for Transport in January 2011, is estimated to cost $43.4 million, $22.6 million (or 109 percent) more than the originally budgeted amount of $20.8 million.

BACKGROUND

5.2 Contracts for the construction of the pond and adjacent road works were combined as the two projects were considered to complement each other, particularly given the opportunity to use cut and fill material.

5.3 Hewatt Earthworks Pty Ltd (Hewatt Earthworks) was engaged through a tender process for the construction of the pond and road. Hewatt Earthworks was managed by Procurement Solutions on behalf of Roads ACT. Following on from its role in the final design of the pond, Cardno Young was appointed as superintendent and was assigned to monitor and sign-off stages of the project.

5.4 The intention was to remediate the site simultaneously with construction work. As both pond construction and remediation work involved significant earthworks it was cost effective to do them at the same time.

TENDER BRIEF REQUIREMENTS

5.5 In September 2009, Procurement Solutions advertised the tender for the construction phase of the project, from which three tenders were received and reviewed by Procurement Solutions and Cardno Young. Hewatt Earthworks was selected as the preferred tenderer and the contract for the construction of North Weston Pond and Molonglo Infrastructure Stage 1A was executed on 21 January 2010. Construction commenced on 6 April 2010. The contract was valued at $38.25 million and represented more than 70 percent of the total approved budget of the whole North Weston Pond and Molonglo Infrastructure projects ($54.5 million).

5.6 Audit reviewed the tender process and identified that:

- the final design of the pond had not been settled when the tender was released (it was finalised in January 2010);
- the development application had not been approved when the tender was released (it was approved and finalised in early December 2009); and
- key tender documents were finalised by Cardno Young only days before the tender was released.

5.7 Furthermore, TAMS' Certificate of Design Acceptance for the pond (which signifies that the design of the works is acceptable, to the extent that it complies with the plans, specifications and requirements) was not issued until 15 March 2010. This indicates that the tender was released before key aspects of the project had been settled.

5.8 Representatives from Hewatt Earthworks and Cardno Young advised that the tender process was compressed, for a project of this size and magnitude. The tender was advertised on 16 September 2009 with responses due on 29 October 2009. The due date was extended twice, however, with final tenders due on 19 November 2009.

5.9 The tender documents advised prospective tenderers of the potential for contaminated material to be present on site:

> Environmental investigations undertaken at the site have identified several areas where contamination poses a potential risk to human health and the environment, including a landfill, uncontrolled fill, grease trenches and underground tanks impacted with total petroleum hydrocarbon and demolition waste which contains asbestos containing material.

5.10 Under the heading 'Asbestos occurrences – soil' the tender brief advised:

> The potential exists for additional buried asbestos containing material to be present ... Such materials may not be encountered until earthworks commence. Therefore remediation efforts may not be solely limited to the areas in this report. All additional occurrences of asbestos containing material, if any, will require remediation.

5.11 The tender brief identified that remediation works were to:

> reduce the ... contamination at the site to a level that does not pose an unacceptable risk to human health and the environment under a sensitive land use setting, in order to provide for appropriate future land use.

Estimation of quantities

5.12 The tender brief identified approximate amounts of waste material (including contaminated material) that would need to be disposed of off-site. Prospective tenderers were expected to use this information to offer a schedule of rates for the disposal of spoil material.

5.13 Cardno Young was responsible for preparing the tender documents. As noted previously, estimated quantities for contaminated material were derived from the Remedial Action Plan.

5.14 Table 5.1 shows the predicted quantity of waste material to be removed off-site and the actual waste material recorded as removed off-site (as of November 2010).

5.15 As discussed at paragraph 5.49, during construction fill containing significant amounts of builders' rubble was removed off-site and recorded as asbestos containing material. Records of materials removed from the site do not distinguish between the type of material removed (that is, whether it was asbestos containing material or geotechnically unsuitable material).

Table 5.1: Predicted quantities and recorded quantities of waste material as at November 2010

Description	Predicted quantity (tonnes)	Recorded quantity removed (tonnes)
Inert waste	1 425	13 200
Solid waste	7 800	
Industrial waste	30	
Hazardous waste	30	
Asbestos waste	405	90 500
Other unsuitable material	30 000	(a further 25 000 tonnes remain stockpiled on site for assessment and potential removal)

Note: The predicted quantity of spoil material in the tender brief was expressed in cubic metres, while the actual quantity of material removed was expressed in tonnage. Audit has converted the predicted quantities into tonnage at a conversion rate of 1 m^3 = 1.5 tonnes

Source: North Weston Pond Tender Brief and Hewatt Earthworks Contaminated Material Record

5.16 The per unit cost for the removal of asbestos containing material was approximately 20 times the per unit cost for the removal of unsuitable material.

5.17 Fill containing builders' rubble was treated as asbestos containing material. In addition, there was a requirement in the revised Remedial Action Plan that identified the site's topsoil as both geotechnically unsuitable material and asbestos containing material. The above table shows that 90 500 tonnes of material was treated as contaminated and removed off-site.

5.18 Handling a substantially higher volume of material as 'asbestos containing material' was a key factor in the significant increase in project costs. In October 2010, it was estimated that the cost of transporting contaminated material off-site would be $9.5 million. The originally budgeted cost was $1.8 million.

Pricing methodologies

5.19 The tender brief and associated construction contract were conventional in practice. The contract included a pricing schedule of rates against the identified provisional quantities of material to be removed. This practice is common for excavation work and is appropriate where there is a reasonable degree of certainty about the quantities. In this situation, it is appropriate to identify a per unit price for removal of materials to appropriately evaluate tenders and lock in expected costs for the project.

5.20 There are risks with such an approach, however, where there is a possibility that the predicted quantities will vary considerably from initial estimates. In these circumstances, alternative pricing methodologies may be more appropriate, such as the provision of renegotiation points for schedules of rates if higher volumes are reached. A variety of such approaches are currently in use within the construction industry, particularly for dealing with the uncertainty of contaminated land.

5.21 At the time of the tender process, Procurement Solutions' staff believed the quantities of asbestos containing material estimated by Cardno Young (on the basis of information in the Remedial Action Plan) to be sufficiently accurate to use a conventional pricing methodology. A better understanding of the risks of the site, the appropriateness of the testing and its inherent limitations, could have identified that such an approach had higher-than-anticipated risks.

5.22 Accordingly, there may be an opportunity for Procurement Solutions to recognise these alternative approaches in pricing methodologies for future projects.

Recommendation 8

For projects on contaminated sites, ACT Procurement Solutions should consider using alternative pricing methodologies that can provide better value for money for the excavation and removal of contaminants during the construction stage.

MANAGING THE REMOVAL OF CONTAMINATED MATERIAL

5.23 Initial key documents that provided the framework for the management of contamination on the site during construction were:

- the Remedial Action Plan, produced by SMEC in September 2009 (the Plan was revised in June 2010); and
- the Remedial Works Plan, produced by Hewatt Earthworks in March 2010.

Remedial Action Plan

5.24 The purpose of the Remedial Action Plan was to articulate a strategy to 'reduce residual contaminant concentrations within the site to acceptable levels, in accordance with environmental protection policies.' Following the remediation strategies identified in the Remedial Action Plan, it was intended that the site would be suitable for its intended use.

5.25 With respect to asbestos, the original Remedial Action Plan states:

> To date, there are no national, NSW DECC or ACT EPA endorsed guidelines relating to human health or the environmental investigation of material containing asbestos on sites. Hence the EPA provisional criteria of no free fibres in soils has been adopted. In addition, no known [asbestos containing materials] are to remain on site. Further information regarding Asbestos Criteria and Remediation will be provided by the engaged occupational hygienist.

5.26 This is essentially a 'zero tolerance' approach for managing asbestos found during construction; that is, no asbestos or asbestos containing material was to remain on site.

5.27 In June 2010 the Remedial Action Plan was revised to recognise the Environmental Protection Authority's adoption in May 2010 of the Western Australian guidelines for the assessment, remediation and management of contaminated sites. The revised Remedial Action Plan allowed for soil considered

to be 'low-risk' (generally where asbestos content is below 0.02 percent) to be reused on-site, below one metre of fill.

Remedial Works Plan

5.28 The purpose of the Remedial Works Plan was to outline Hewatt Earthworks' approach to managing the classification and removal of contaminated material found during construction.

5.29 When developing the Remedial Works Plan in March 2010, Hewatt Earthworks questioned the accuracy of the September 2009 Remedial Action Plan and communicated its concerns to Cardno Young and Procurement Solutions.

Confirmation of expected quantities of asbestos containing material

5.30 Partially in response to Hewatt Earthworks' concerns, a meeting was held on 6 April 2010 between Cardno Young, SMEC, ACTPLA and Procurement Solutions to discuss the accuracy of the testing and the expected quantities of asbestos containing material. There was no representative present from the project owner, Roads ACT.

5.31 At the meeting, Procurement Solutions sought confirmation from SMEC on whether the amount of asbestos containing material identified (270 m^3, or 405 tonnes) was correct. According to Procurement Solutions notes of the meeting, SMEC 'expressed a good level of certainty of the quantity of various types of contaminated material and asbestos containing material'. However, some variation could be expected at the northern site (close to the former sewerage treatment plant) of between five percent to seven percent and that:

> 'this means that some additional asbestos containing material can be reasonably expected ... [this] can present an additional 2 450m^3 of asbestos containing material'.

5.32 This revised estimate (approximately a ten-fold increase) had an implication for the project and project budget, particularly as contractual arrangements, including the agreed schedule of rates, had already been agreed with Hewatt Earthworks.

5.33 There is no evidence that Procurement Solutions recognised the implications of the revised estimate on the project budget. This information should have prompted a concerted inter-agency effort to manage the potential additional costs. This may have involved temporarily halting the project to obtain a better understanding of the likely quantity of contaminated material on the site.

5.34 However, any delays to the project caused by Procurement Solutions or other ACT Government agencies could result in significant prolongation costs that could be claimed by the contractor.

REMOVAL OF CONTAMINATED MATERIAL

5.35 Construction of the pond commenced on 6 April 2010. Asbestos containing material was first recorded as removed from the site on 14 April 2010.

5.36 On the first day of remediation, 1 500 tonnes of the waste material was recorded as removed from the site.[1] By 21 April 2010, ACT Procurement Solutions reported that 9 000 tonnes had been recorded as removed from the site[2] and by 2 July 2010 Hewatt Earthworks reported that 27 694 tonnes had been recorded as removed. By November 2010, Hewatt Earthworks reported that 90 500 tonnes had been recorded as removed from the site, with a further 25 000 tonnes stockpiled for further testing. As noted previously, these figures do not necessarily represent the amount of asbestos containing material removed from the site.

Consideration of alternative approaches to managing contaminated material

5.37 On 13 April 2010 (the day before the removal off-site of excavated waste material commenced), a regular on-site meeting was held at which Hewatt Earthworks, Procurement Solutions, SMEC and Cardno Young were present. During this meeting alternative approaches to managing the risks of asbestos contamination were discussed. Two options were discussed:

- no asbestos containing material was to remain on-site [as per the Remedial Action Plan] and any builders' rubble that was found would be assumed to contain contaminated material and subject to a visual inspection by SMEC and the environmental consultant. If any asbestos was observed or detected during this process, it was to be removed off-site; or
- low-risk asbestos containing material could remain on-site, being buried and capped, thereby avoiding the need for removal, provided the eventual land owner was willing to implement a long-term Asbestos Management Plan. Any builders' rubble would be assumed to contain asbestos, unless proven otherwise through a visual inspection process.

5.38 No resolution was reached at the meeting, other than to refer a decision on the preferred option to Procurement Solutions in consultation with the Environment Protection Authority. Nevertheless, both options provided that builders' rubble be assumed to contain asbestos contaminated material (and disposed of as such).

5.39 Subsequent activities and records indicate that Procurement Solutions and Roads ACT continued with the first option (in accordance with the Remedial Action Plan) and continued to remove all such material off-site (records show that any asbestos containing material identified in excavated material was removed off-site). This decision was not documented. Consequently, there was no evidence to indicate that Procurement Solutions recognised the implications of the decision, or its potential impact on project costs. Nor is there evidence that Roads ACT (the project owner) was involved or informed of this development.

5.40 Further discussion about alternative approaches to the management of asbestos contamination risks represented an opportunity for ACT Government agencies to

[1] In a letter to ACT Procurement Solutions on 30 April 2010, Cardno Young reported that 1 000 cubic metres was removed off site on the first day of construction. Audit has equated this amount to 1 500 tonnes (1 cubic metre = 1.5 tonnes).

[2] In an e-mail to Cardno Young on 21 April 2010, ACT Procurement Solutions identified that more than 6 000 cubic metres had been removed off site by 21 April 2010. Audit has equated this amount to 9 000 tonnes (1 cubic metre = 1.5 tonnes).

manage the potential cost increases for the project. However, financial penalties may have been incurred by the ACT Government, in accordance with the contract, if decisions were made that delayed construction activities on the site.

Treatment of builders' rubble as contaminated material

5.41 On the first day of removal of the asbestos containing material (14 April 2010), Hewatt Earthworks was prepared to remove asbestos containing material from the site. SMEC, which was responsible for assessing each load excavated to identify whether it was contaminated, had a representative on site for this purpose. The SMEC representative communicated their concerns that material that may not have contained asbestos was being moved off-site.

5.42 SMEC's representative was concerned that:

- the level of contamination varied but was generally low;
- the contaminants were widespread across the site; and
- insufficient time was being allowed by the contractor to adequately assess each load of excavated material.

5.43 A report from Cardno Young to Procurement Solutions confirmed SMEC's concerns and advised:

> there was some concern also with the approach taken that defines all material containing building rubble as [asbestos containing material] and the reluctance from Hewatt Earthworks to comply [with] the instruction [from SMEC] to stockpile building material not containing visible asbestos because of previous discussions deeming all building rubble to be contaminated'.

5.44 These concerns were discussed on 15 April 2010 in a meeting between Hewatt Earthworks, SMEC and Cardno Young. In response, a Hewatt Earthworks' foreman was assigned to assist the SMEC representative in communicating whether to stockpile material or whether to take it off-site.

Source: SMEC – photograph taken April 2010

Reports on fill containing asbestos containing material

5.45 On 19 April 2010, in response to the large amounts of material treated as asbestos containing material being removed off-site, SMEC sent a letter to Procurement Solutions advising:

> The initial gross excavation works on the site ... indicated that asbestos containing material is contained within significant areas of the fill. To date asbestos containing material, contaminated rubble and soil has been identified at 1-2 metres depth within the builders' landfill (area of environmental concern 2) section of the site ... The concentration of bonded asbestos containing material fill is very low.
>
> However, these concentrations of asbestos containing material appear to be present in much of the fill associated with building rubble. Consequently, high volumes of fill contain low level asbestos waste, as the fill contains significant levels of rubble.
>
> Given the volume of fill material being excavated, and the physical nature of the material, it is considered impractical to provide onsite treatment such as sieving. It is also difficult to segregate fill containing rubble and asbestos containing material from fill containing rubble with no asbestos containing material. In the original Remedial Action Plan, all the asbestos containing material is to be directly disposed offsite. Given the volume of fill that contains rubble across the site, and which may contain asbestos containing material, a different approach is required to reduce the volumes being disposed of as asbestos waste.

5.46 On 22 April 2010, Hewatt Earthworks was instructed to stop removing excavated material off-site while alternative solutions were considered to manage the risks associated with this material. Hewatt Earthworks was redirected to excavate other non-contaminated parts of the site during this period. This action was taken to mitigate project delay costs until alternative solutions were found.

5.47 A series of inter-agency and consultant and contractor meetings occurred around this time. One outcome of these meetings was that, in May 2010, the Environment Protection Authority adopted technical aspects of the Western Australia Department of Health *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in WA*. The WA Guidelines provided more flexibility for managing risks associated with asbestos containing material on contaminated sites, including recognising tolerance levels at which it was deemed safe for asbestos containing material to be present.

5.48 In June 2010 a revised Remedial Action Plan was implemented. This plan allowed for stockpiling of material into categories for assessment and treatment depending on the on-site assessment by SMEC and the environmental consultant. The revised Remedial Action Plan:

- required that 100 millimetres of topsoil at the site should be treated as 'industrial waste containing asbestos.' The material was identified as 'geotechnically unsuitable material and not considered suitable for any reuse options'; and
- allowed for the assessment of other site material, and where considered to be 'low-risk' (generally where asbestos content is below 0.02 percent), this could be re-used on-site, below one metre of fill. Material was stockpiled on site while samples were being assessed.

5.49 In practice, any fill that contained more than 20 to 30 percent of builders' rubble was treated as high-risk material, recorded as 'asbestos containing material' and removed off-site.

5.50 In June 2010, Hewatt Earthworks recommenced the removal of asbestos containing material off-site. Considerable amounts of material continued to be removed off-site, reflecting a combination of factors, including the:

- greater than expected amount of asbestos containing material on site;
- assumption that builders' rubble contained asbestos containing material;
- impracticality of adopting on-site treatment services such as sieving; and
- difficulty in segregating fill containing rubble and asbestos containing material from fill containing rubble that had no asbestos containing material; and
- inability to reuse geotechnically unsuitable material.

5.51 Procurement Solutions advised that adopting on-site treatment services was considered expensive and time-consuming, for the original estimated quantities, and would have involved variations to the construction contract to allow for alternative approaches to be adopted.

5.52 The continuing removal of waste material off-site was to have a significant impact on the project costs. ACT Government agencies, including Procurement Solutions and Roads ACT, recognised the cost implications and sought to address these through a number of initiatives, including:

- receiving a waiver of tip fees from the landfill sites; and
- seeking to renegotiate contractual rates with Hewatt Earthworks.

5.53 During this period, estimates of the material to be treated as asbestos containing material on site varied considerably. For example:

- on 22 June 2010, it was estimated by Hewatt Earthworks that 18 000 tonnes remained to be removed off-site (in addition to 16 000 tonnes already removed); and
- on 24 August 2010, it was estimated by Hewatt Earthworks that a total of 63 000 tonnes was to be removed off-site.

5.54 These estimates have since proved to be too low (with up to 90 500 tonnes having been recorded as removed off-site as at November 2010). These estimates are included in the report to demonstrate the imperfect information that was available to ACT Government agencies, consultants and contractors during this period.

CONCLUSION

5.55 The discovery of more asbestos containing material than expected, followed by undocumented decision-making to treat all builders' rubble as if it were asbestos containing material, led to large amounts of material being removed over a short period at the start of the contract. Although communication of these issues was reasonably quick (a small number of weeks), a large and costly volume was moved before the project was suspended. Key operational decisions, which had a significant impact on project costs, were being made prior to and during this period, but were not well documented.

APPENDIX A: AUDIT OBJECTIVE, APPROACH AND METHODOLOGY

AUDIT OBJECTIVE

The audit objective was to provide an independent opinion to the Legislative Assembly on whether the processes adopted by ACT Government agencies in planning and delivering the North Weston Pond in the Molonglo Valley were effective. In particular, the audit focuses on the effectiveness of ACT Government agencies in managing contamination and geotechnical risks associated with the pond project.

SCOPE AND FOCUS

The audit examined the management of risks associated with the site of the North Weston Pond.

The audit focused on three key processes or activities:

Process/Activity	Key agency
Environmental assessments and surveys to detect contaminated material and design of the ponds to account for geotechnical issues, including the Molonglo Valley Interceptor Sewer.	ACTPLA/Procurement Solutions
Approval and sign-off of environmental assessments and surveys and identification of remediation and mitigation strategies.	ACTPLA/ Environment Protection Authority /Procurement Solutions
Recognition of contaminated material risks in pond construction and management of the design and construction phases.	TAMS/Procurement Solutions

Audit considered the following issues:

- the adequacy of Territory records and information to identify the existence and extent of contaminated material on the site;
- the adequacy of environmental surveys and assessments undertaken during the planning process to identify the existence and extent of contaminated and geotechnical material;
- the adequacy of the environmental approval and sign-off process for the construction of the North Weston Pond, including identification and consideration of any remediation and mitigation strategies that are to be implemented;
- the adequacy of any activities or strategies to recognise and incorporate remediation and mitigation requirements in the pond construction process; and
- how geotechnical issues were investigated and volumes of contaminated materials were estimated.

AUDIT METHODOLOGY

The performance audit was conducted under the authority of the *Auditor-General Act 1996*, and in accordance with the principles, procedures, and guidance contained in Australian Auditing Standards relevant to performance auditing. These standards prescribe the minimum standards of professional audit work expected of performance auditors. Of particular relevance is the professional standard on assurance engagements - *ASAE 3500 Performance Engagements*.

The audit approach and methodology consisted of:

- compiling a timeline of relevant information relating to the history of the site;
- reviewing ACT Government records and information to identify the information recorded for the site;
- discussing administrative processes with relevant ACT Government agency representatives;
- reviewing the completeness and reliability of environmental assessments and surveys undertaken for the project; and
- reviewing procurement processes and contracts relating to environmental assessments and surveys conducted for the project as well as the construction of North Weston Pond.

The above activities involved a review of files and other documentation maintained by ACT Government agencies, including ACTPLA, DECCEW and TAMS (including Roads ACT and Procurement Solutions), and discussions with management and staff of relevant agencies.

Audit also met with representatives of most of the consultants and contractors involved in the planning for the pond, including representatives from:

- Coffey Geosciences;
- SMEC;
- Douglas Partners;
- Cardno Young;
- CM Jewell and Associates; and
- Hewatt Earthworks.

Audit also engaged Sinclair Knight Merz (SKM) to provide additional environmental and geotechnical advice.

APPENDIX B: KEY PROCESSES AND EVENTS

Timeframes	Key processes and events	Description
2004	Canberra Spatial Plan	In 2004, the Canberra Spatial Plan identified the Molonglo Valley as the next major area for residential development within the ACT.
July 2004 to May 2005	Preliminary Geotechnical and Contamination Constraints Study	The purpose of the Preliminary Study was to assess broad geotechnical and environmental constraints to urban development within the Molonglo Valley area. Coffey was engaged in July 2004 and the report was delivered in May 2005.
May 2005 to February 2006	Environmental Site Assessment Phase 1	The purpose of the Phase 1 Assessment was to: • identify potential areas of environmental concern and potential contaminants of concern; • assess potential planning constraints to development; conduct preliminary soil and groundwater sampling to assess the sites contamination status; and • assess the scope of work and budget estimates required for further Phase 2 investigations and a Phase 3 Remedial Action Plan. Coffey was engaged in May 2005 and the report was completed in February 2006.
February 2007 to February 2008	Review of North Weston Pond design options.	The purpose of the review was to undertake pond layout options, provide plans and details for the pond and provide a detailed assessment of related major sewer protection and/or relocation options. This was completed by Bill Guy and Partners in February 2008.
November 2007 - ongoing	Engagement of the Contaminated Site Auditor	The role of the Contaminated Site Auditor was to: • review the work of the Environmental Site Assessor (SMEC) and • issue Site Audit Statements to certify that the land is suitable for its intended use. The auditor also reviewed the draft Sampling Analysis and Sampling Plan (Sampling Plan) prepared in Phase 1. CM Jewell and Associates was engaged in November 2007.

Timeframes	Key processes and events	Description
November 2007 to December 2007	Project brief prepared for Phases 2 and 3	ACTPLA, with Procurement Solutions, prepared the project brief for Detailed Geotechnical Investigation and Environmental Site Assessment Phases 2 and 3. This used input from the Environmental Site Assessment Phase 1 report and advice from the Contaminated Site Auditor and Environment Protection Authority.
November 2007 to March 2008	Tender process for Phases 2 and 3	Initial tender process, which was conducted from November 2007 to January 2008, did not have an outcome. A revised tender process was conducted from January to March 2008. SMEC was selected as the preferred tenderer, with Douglas Partners as a subcontractor for geotechnical investigations.
April 2008 to September 2009	Detailed Geotechnical Investigation and Environmental Site Assessment Phases 2 and 3 North Weston and Molonglo Valley Suburbs 1 and 2	The purposes of Phase 2 and 3 assessments included developing an Sampling Plan and excavation and analysis according to the Sampling Plan. The Phase 3 Remedial Action Plan was to assess remedial options for all areas of environmental concern. The consultant was also required to provide a short-term Environmental Management Plan for the management of the site during construction of the pond. SMEC was prime contractor for environmental assessment, with Douglas Partners responsible for geotechnical assessment. SMEC and Douglas Partners were engaged in April 2008, with work ongoing to September 2009.
July 2009	EIS exemption granted	ACTPLA sought and received an Environmental Impact Statement exemption from the Minister for Planning.
August 2009 to November 2009	Development Application	Development application lodged for the construction of the pond on 31 August 2009. ACTPLA approved the development application on 26 November 2009, with amendment on 7 December 2009.
September 2009 to November 2009	Tender process for Pond construction	Tender advertisements on 16 September and 26 September 2009. Hewatt Earthworks was identified as the preferred tenderer.
April 2010	Construction work commenced	Construction work commenced 6 April 2010.
April 2010	Construction work temporarily stopped	Construction work temporarily stopped on 22 April 2010 to identify alternative solutions to the greater than expected amounts of asbestos containing material.

Timeframes	Key processes and events	Description
May 2010	EPA adopts technical aspects of WA Dept of Health 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in WA'	Adoption of the WA Guidelines allows more flexibility for managing asbestos containing material that is found on site. In response, a revised Remedial Action Plan was prepared and endorsed by the Contaminated Site Auditor.
November 2010	Construction work stopped	Construction work stopped while alternative design options were considered
March 2011	Construction work re-commenced	Construction work re-commenced on revised design option on 8 March 2011.

AUDIT REPORTS

	Reports Published in 2010-11
Report No. 3 / 2011	The North Weston Pond Project
Report No. 2 / 2011	Residential Land Supply and Development
Report No. 1 / 2011	Waiting Lists for Elective Surgery and Medical Treatment
Report No. 10 / 2010	2009-10 Financial Reports
Report No. 9 / 2010	Follow-up audit – Courts Administration
Report No. 8 / 2010	Delivery of Mental Health Services to Older Persons
Report No. 7 / 2010	Management of Feedback and Complaints
Report No. 6 / 2010	Annual Report 2009-10
Report No. 5 / 2010	Delivery of ACTION Bus Services
	Reports Published in 2009-10
Report No. 4 / 2010	Water Demand Management: Administration of Selected Initiatives
Report No. 3 / 2010	Delivery of Budget Initiatives
Report No. 2 / 2010	Student Support Services for Public High Schools
Report No. 1 / 2010	Performance Reporting
Report No. 8 / 2009	2008-09 Financial Audits
Report No. 7 / 2009	Annual Report 2008-09
Report No. 6 / 2009	Government Office Accommodation
Report No. 5 / 2009	Administration of employment issues for staff of Members of the ACT Legislative Assembly
	Reports Published in 2008-09
Report No. 4 / 2009	Delivery of Ambulance Services to the ACT Community
Report No. 3 / 2009	Management of Respite Care Services
Report No. 2 / 2009	Follow-up Audit: Implementation of Audit Recommendations on Road Safety
Report No. 1 / 2009	Road Projects: Fairbairn Avenue Upgrade and Horse Park Drive
Report No. 8 / 2008	2007-08 Financial Audits
Report No. 7 / 2008	Proposal for a Gas-Fired Power Station and Data Centre – Site Selection Process
Report No. 6 / 2008	Annual Report 2007-08
Report No. 5 / 2008	Administration of the *Freedom of Information Act 1989*
Report No. 4 / 2008	Maintenance of Public Housing
	Reports Published in 2007-08
Report No. 3 / 2008	Records Management in ACT Government Agencies
Report No. 2 / 2008	Management of Calvary Hospital Agreements
Report No. 1 / 2008	Chris21 Human Resource Management System: Procurement and Implementation
Report No. 8 / 2007	2006-07 Financial Audits
Report No. 7 / 2007	The Aged Care Assessment Program and the Home and Community Care Program
Report No. 6 / 2007	Annual Report 2006-07
Report No. 5 / 2007	The FireLink Project

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ACT Basin Priority Project

Multi criteria and economic analysis for water quality improving catchment options: report on multi criteria assessment

A confidential Final Report prepared for the ACT Government

December 2015

AITHER

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Executive Summary

Aither was engaged by the Australian Capital Territory (ACT) Environment and Planning Directorate (EPD) to assess water quality improvement options for six priority catchments in the ACT. The methods used were Multi-Criteria Analysis (MCA) and Cost Benefit Analysis (CBA). This report documents the process, method and outcomes associated with the MCA.

Background

As part of broader national water reform processes, in 2014 the Commonwealth Government made an in-principle commitment to provide the ACT Government with funding of up to $85 million to undertake a Basin Priority Project (BPP). It was intended that funding would be used to improve water quality in the ACT and the Murray Darling Basin (MDB).

The ACT's BPP aims to resolve water quality issues that have impacted the ACT region and its waterways over a number or years. It is expected that by reducing pollutant loads, the BPP will be able to improve water quality outcomes, including within the ACT, in the Murrumbidgee River, and the broader Murray-Darling Basin.

The MCA framework

The goal of the MCA was to efficiently and transparently assess a large number (188) of possible water quality improvement options (projects), in order to filter and prioritise them for further investigation and assessment (via CBA). The MCA framework is comprised of a number of elements, including: problem structuring (which includes identifying criteria and indicators); criteria and indicator weighting; scoring (including classification); option ranking, and; sensitivity analysis.

- **Criteria and indicators** were established collaboratively by key stakeholders, including the BPP expert panel, engineering consultants, and EPD, with input from Aither.
    - There are five criteria associated with: water quality, the environment, social and liveability matters, project feasibility, and cost. Within these criteria, there are a total of 20 indicators against which the performance of each project was assessed (scored).
    - These were selected based on their reflection of key issues to be considered in options evaluation, as well as the availability of data and information, and other factors.
- **Weightings** for the criteria and indicators were initially proposed by Aither at the request of EPD, and subsequently refined by the same group of stakeholders.
    - Water quality was weighted 50%; environment, social and feasibility matters were each weighted 10%; and costs were weighted 20%.
    - These weightings were viewed to broadly reflect program objectives, and were the product of discussion, debate and agreement amongst stakeholders.
- **Scoring** against indicators was based on qualitative and quantitative data and information sourced from the independent consultants who developed the water quality options.
    - All options were assessed on a –4 (very much worse) to +4 (very much better) scale, with zero representing the base case (i.e. no change).

- Quantitative indicators were scored based on scoring bounds (classifications) established consistent with best-practice guidance and stakeholder expectations.
- Qualitative indicators were scored by independent consultants that designed the options, based on scoring guidance from Aither (e.g. 1=slight increase, 4=major increase, etc.)

- **Ranking** of the options is based on a total MCA score calculated by an algorithm that includes option scores, and weightings for each indicator and each of the criteria.
  - Rankings are based on the numerical MCA score for each option
  - This provided an overall MCA ranking, and an MCA ranking within each catchment
- **Sensitivity testing** was completed to determine how option scoring and ranking responded to changes in assumptions about the importance of each criterion.
  - Tests were completed at the criteria level, including independently varying percentage weights for each criterion, for each of the catchments.

Results and findings

The number of options and average scores across catchments were as follows.

- Fyshwick – 31 options, average score: 0.76
- Lower Molonglo – 28 options, average score: 0.65
- Tuggeranong – 52 options, average score: 0.74
- Upper Molonglo – 15 options, average score: 0.63
- West Belconnen – 13 options, average score: 0.70
- Yarralumla – 39 options, average score: 0.60

Overall results suggest at least some high performing options exist in all catchments, but higher ranking options exist in Fyshwick, Tuggeranong, Yarralumla and Lower Molonglo (Table 1).

Table 1 Top ranked MCA options overall – all catchment options

Overall MCA rank	Site ID	Score	Overall MCA Rank	Site ID	Score
1	TG012	1.90	11	WB004	1.62
2	YA005	1.88	12	WB008	1.61
3	FW012	1.78	13	TG032	1.51
4	FW022	1.77	14	YA020	1.50
5	FW021	1.73	15	TG011C	1.50
6	UM004	1.66	16	FW019	1.49
7	FW025	1.65	17	YA020P	1.49
8	LM002B	1.63	18	TG029	1.49
9	LM007	1.63	19	FW013	1.48
10	TG019	1.62	20	FW014A	1.47

Note: Ranking of options with same scores is due to rounding.

In general, options in Upper Molonglo and West Belconnen did not score as highly as in other catchments. This aligned with views of the expert panel and independent consultants that opportunities to implement tangible improvements in these catchments are more limited.

Table 2 Top ranked MCA options within individual catchments

Catchment rank	Overall rank	Site ID	Score	Catchment rank	Overall rank	Site ID	Score
Fyshwick				Upper Molonglo			
1	3	FW012	1.78	1	6	UM004	1.66
2	4	FW022	1.77	2	31	UM015	1.34
3	5	FW021	1.73	3	57	UM002	0.87
4	7	FW025	1.65	4	82	UM014	0.63
5	16	FW019	1.49	5	89	UM012	0.56
Lower Molonglo				West Belconnen			
1	8	LM002B	1.63	1	11	WB004	1.62
2	9	LM007	1.63	2	12	WB008	1.61
3	33	LM002BP	1.33	3	21	WB009	1.47
4	34	LM013	1.33	4	36	WB006	1.32
5	48	LM006	1.01	5	38	WB010	1.28
Tuggeranong				Yarralumla			
1	1	TG012	1.90	1	2	YA005	1.88
2	10	TG019	1.62	2	14	YA020	1.50
3	13	TG032	1.51	3	17	YA020P	1.49
4	15	TG011C	1.50	4	22	YA006	1.46
5	18	TG029	1.49	5	29	YA016	1.37

Sensitivity testing suggested that the weightings applied to the water quality and financial criteria have the greatest influence on ranking. This was not unexpected given these criteria had the greatest proportion of the initial weightings, and because they had indicators with the highest scores on average. Further findings of the sensitivity testing included that:

- changes in option rank were more significant for catchments with more options (because scores are clustered more closely)
- the direction of change in settings had different implications (e.g. decreasing the water quality weighting is more influential than increasing it)
- changing criteria other than water quality and financial had limited impact on ranking.

On balance, the MCA ranking was reasonably resilient to change in weightings, especially where these were subtle. However, the sensitivity tests highlighted the importance of the relative weight given to water quality and cost criteria.

Conclusions

The goal of the MCA was to efficiently and transparently assess a large number of possible water quality improvement options, in order to filter and prioritise them for further investigation. It was also intended to engage stakeholders, and demonstrate that a wide range of options has been considered.

The extensive process of completing the MCA, and documenting the results, suggests this objective was met. One hundred and eighty-eight options (178 catchment options and 10 in-lake options) were assessed and ranked based on a robust framework that reflects expert knowledge, community preferences, the objectives of the Commonwealth government, and other important considerations for the ACT Government and community.

The MCA framework was validated by the review role provided by MCA workshops undertaken as part of the MCA process. The results of these discussions suggested that highly ranked options were those that stakeholders felt comfortable with and expected to be preferable overall. The process highlighted options that may be considered priorities, but also identified issues related to certain options which may provide an opportunity to further refine them.

1. Introduction

Aither has been engaged by the Australian Capital Territory (ACT) Environment and Planning Directorate (EPD) to undertake a multi-criteria and economic analysis of water quality improvement options for six priority catchments in the ACT.

This report forms Task 4c form Aither's project proposal.[1] It is in accordance with Aither's proposed assessment approach for the ACT Basin Priority Project (BPP), as articulated in Aither's assessment framework report.[2]

1.1. Purpose

This purpose of this report is to describe the process, method, and outcomes associated with the multi-criteria assessment (MCA). It describes the approach adopted for the MCA and the outcomes from this phase of the project.

The MCA process is designed to assist decision makers and key stakeholders, including the ACT Government Environment and Planning Directorate, and Territory and Municipal Services, to prioritise options in a way that is consistent with community expectations addresses the requirements of the Commonwealth Government for funding the BPP.

1.2. Background

As part of broader national water reform processes, in 2014 the Commonwealth Government made an in-principle commitment to provide the ACT Government with funding of up to $85 million to undertake a Basin Priority Project (BPP). It was intended that funding would be used to improve water quality in the ACT and the Murray Darling Basin (MDB). The final business case for the project was presented in July 2013. In January 2014, the Australian Government announced that the ACT Government had been successful in its bid for funding. Funding has already been made available for monitoring, with an in-principle commitment to spending on infrastructure.

The ACT's BPP aims to resolve significant water quality issues that have plagued the ACT region and its waterways over a number or years – and lead to negative impacts such as blue-green algae outbreaks. It is expected that by reducing pollutant loads, the ACT Government will be able to improve water quality and better manage impacts. Pollutant reduction will help to achieve better water quality outcomes in the ACT region, as well as positively contribute to the health of the Murrumbidgee River and broader MDB system.

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1 ACT BASIN PRIORITY PROJECT, Multi Criteria Framework and Economic Analysis for Water Quality Improving Catchment Options – Request for Tender No. 25932.100, A confidential proposal prepared for the ACT Government Environment and Planning Directorate and Procurement and Capital Works, March 2015.

2 *ACT Basin Priority Project, Multi criteria and economic analysis for water quality improving catchment options: interim report on assessment framework*, A confidential report prepared for the ACT Government Environment and Planning Directorate and Procurement and Capital Works, October 2015.

1.3. Scope of this report

This interim report summarises the approach to, and results from the multi criteria assessment (MCA) that has been used to help prioritise water quality improvement options for subsequent inclusion in cost benefit analysis (CBA). It addresses the:

- MCA process and framework adopted
- criteria and indicators identified
- data used to inform the assessment
- process undertaken to score and rank options, including scoring classification
- outcomes of MCA workshops to discuss, refine and agree the results.

This report is not intended to extensively detail the broader project context or the approach to the CBA that will follow. It is an explanation of the process and results of the first component of the assessment – reflecting on the initial stage of options evaluation and highlighting options to progress to CBA.

1.4. Report context and structure

This report builds on Aither's draft assessment framework report[3], which provided detail on the framework proposed for the MCA. Content from that report has been reproduced and refined to reflect the application of the assessment framework.

The remainder of this report is structured around the approach undertaken for the MCA, with subsequent sections as follows:

- Section 2: overview of MCA framework and elements
- Section 3: preparing the MCA elements (criteria, indicators and weightings)
- Section 4: applying the MCA framework (scoring options against indicators)
- Section 5: MCA results (ranking of options, MCA workshop and summary outcomes)
- Section 6: Conclusions and suggested next steps.

[3] Ibid.

2. Overview of MCA framework

2.1. Objectives

The goal of the MCA is to efficiently and transparently assess a large number of possible water quality improvement options (projects), in order to filter and prioritise them for further investigation. The MCA also provides the opportunity to engage key stakeholders in the decision-making process and demonstrate that a broad range of options has been considered.

2.2. Framework elements

The MCA process comprised the stages summarised in Figure 1. These key stages are discussed further below.

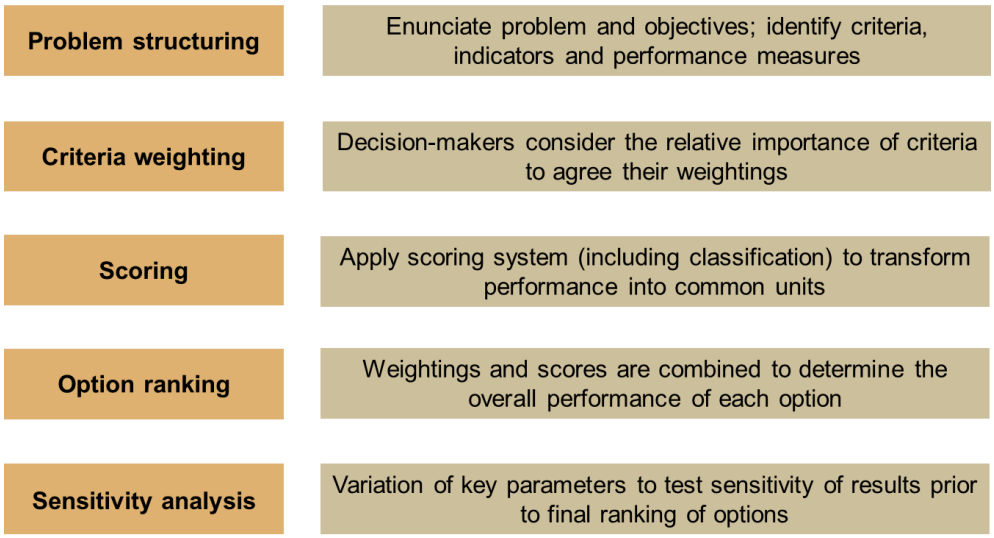


Figure 1 Summary of the MCA process

2.2.1. Overview of MCA process

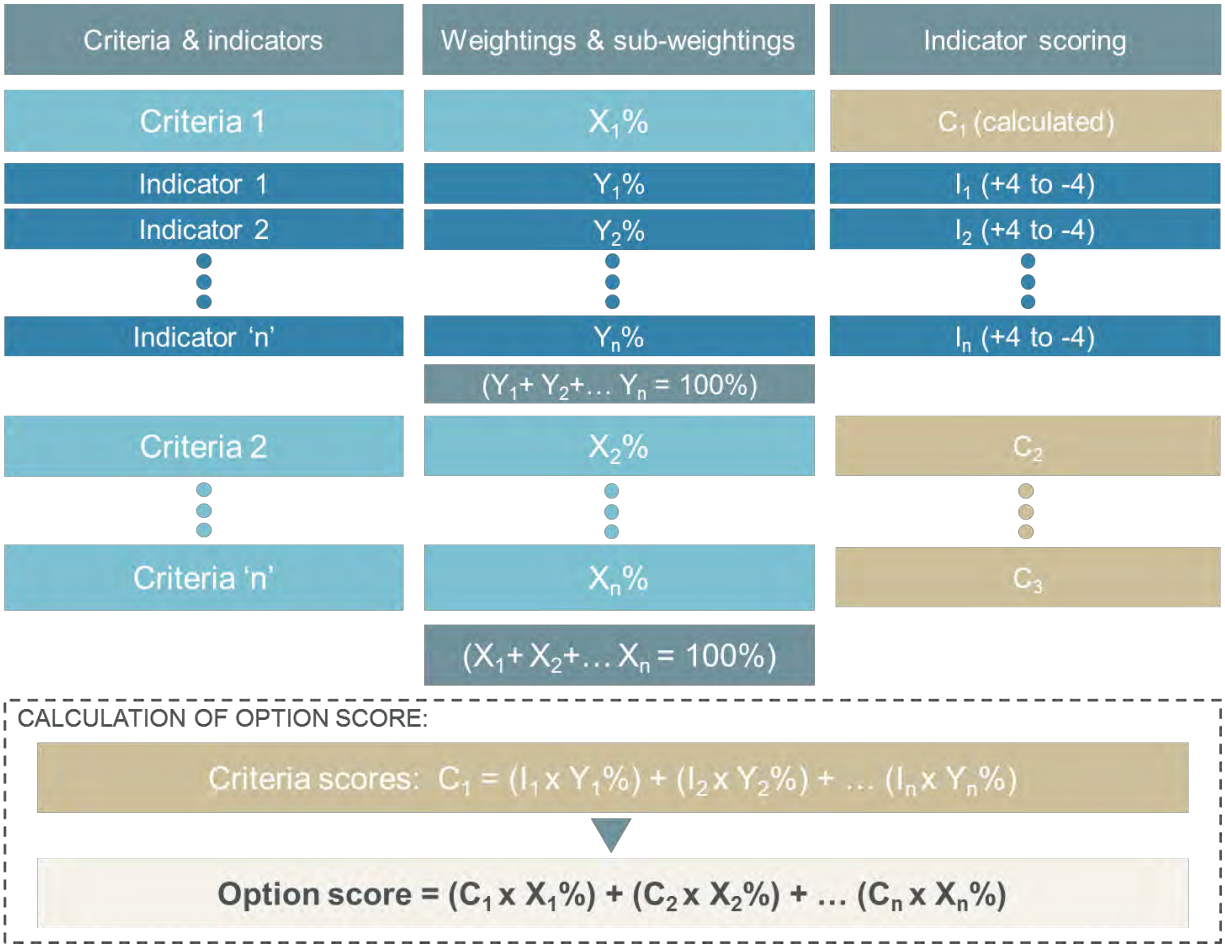
The MCA facilitates comparison of options by determining an overall numerical score for each. This unifying score (which provides an overall ranking of options), is based on:

- a set of criteria
- individual indicators within each criterion.

Indicators are scored individually, which reflects the performance of each option against that indicator (e.g. amount of pollutant reduction for nitrogen achieved by the option). Both the criteria, and individual indicators, are assigned 'weightings' which reflect their relative importance to achieving the intended outcome(s).

Overall scores (and ranking) for individual options are therefore calculated based on performance against a range of indicators, which are given relative emphasis based on their perceived significance. In mathematical terms this is a straightforward algorithm that is calculated according to

the process summarised in Figure 2. The algorithm is a function of (1) individual scores against each indicator, (2) the % weightings of each indicator, and (3) the % weightings of the criteria.



Note: C = Criterion, I = Indicator, Y = percentage weighting of Indicator, X = percentage weighting of Criterion.

Source: Aither.

Figure 2 Calculating option scores

2.2.2. Establishing criteria and indicators

The first stage of the MCA process involves the identification of criteria that are the basis for evaluating and comparing option performance. The criteria represent the broad themes against which each project is to be assessed. They should be directly linked to the principal objective – in this case improvements to water quality – but will also reflect other stakeholder priorities and issues.

Each criterion is further described by one or more indicators, which collectively provide the basis for measuring performance against the criteria. The final criteria and indicators (discussed in Section 3.1) were developed through consultation with a range of stakeholders.

2.2.3. Criteria weightings and indicator sub-weightings

The relative importance of both criteria and indicators is reflected by allocating weightings to each.

Identifying weightings is a key opportunity for the MCA process to appropriately reflect what stakeholders consider the relative importance of each criterion to be. They should therefore be discussed and agreed by a stakeholder group that reflects a broad representation of interests and disciplines, ensuring a wide and varied perspective. The weightings that were determined through this process are discussed further in Section 3.

2.2.4. Options scoring

A performance measure is required for each indicator, described by a metric that enables consistent, repeatable and accurate measurement. This is straightforward for indicators that can be analysed quantitatively (for example, the total reduction in nitrogen discharge), but may be more challenging for indicators that are assessed qualitatively (for example, change in amenity).

Indicator performance is informed by the options development and analysis (in this instance the engineering investigation of different water quality improvement options). For qualitative indicators, this includes guidance, expert judgement and then discussion to ensure consistent application across different options. The scoring scale used for the MCA was +4 to -4, reflecting that some items are negative (e.g. costs are scored negatively, with greater costs giving more negative scores).

The +4 to -4 approach was in part proposed because it can contribute to a simpler process for assessment, analysis and scoring. This is especially the case for qualitatively scored indicators, where it may be more challenging to observe meaningful distinctions between classes when a large number of scores are possible. The approach has been successfully applied by Aither in previous assessments of stormwater management options. This includes a recent assessment in Victoria using a similar number and type of MCA indicators[4] and data[5] as used for the BPP, and which assessed the same types of interventions.[6]

Other scoring approaches are available and may also be valid to use, including a 0 to 100 scale,[7] or +10 to -10 approaches, the latter of which was also tested by Aither as part of testing scoring classification approaches, but was not ultimately used (the reasons for which are further discussed in Section 4.1.3).

For quantitative indicators, scoring classifications need to be defined and applied consistently to indicators. Scoring classifications (or bounds) are required to assign scores (e.g. +4) against different indicators for particular options, given their performance values for that indicator (e.g. 250kg per annum reduction in Total Phosphorous). The scoring process (including classifications) and outcomes are described in Section 4.1.

2.2.5. Sensitivity analysis

The MCA process is inherently subjective, incorporating judgement throughout – from the identification of criteria and indicators, to determining weightings and scores. However, being cognisant of this subjectivity as a feature of MCA enables it to be mitigated through a number of measures, including:

- identifying a decision-making team that is suitably qualified and informed

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4 19 Indicators across 9 criteria.

5 E.g: kilogram per year pollutant reductions, potable water substitution volumes, quantitative impacts on the area of open space and area of habitat, deliverability issues, lifecycle costs for projects.

6 E.g: wetlands, ponds, biofilters, on public land in residential areas.

7 Department for Communities and Local Government, *Multi-criteria analysis: a manual* January 2009, London.

- choosing criteria and weightings that accurately reflect the range and importance of issues that should influence a decision
- undertaking sensitivity analysis to understand the implications and materiality of decisions or assumptions.

Sensitivity analysis can be undertaken to test the sensitivity of the results to different indicators or criterion, including their scores or weightings. Sensitivity can be undertaken to test uncertainty and assumptions associated with input data (for example, confidence in construction cost estimates), the weightings previously agreed in framework development, or the particular scores given. Such testing can highlight the criticality of different factors in determining the results (scores and ranking of options), which may further aid decision makers.

The sensitivity analysis applied and the results are summarised in Section 4.2.

2.2.6. MCA workshops and finalisation of results

Once the options have been scored and a sensitivity analysis undertaken, the preliminary results should be discussed with key stakeholders. This provides a further test of the MCA process by interrogating the findings in the context of the collective assumptions made in weighting and scoring the options.

This was facilitated by a number of workshops with EPD and the engineers responsible for the option development and analysis, enabling the results to be discussed in the context of the broader design and analysis of options, particularly the engineers' understanding of the catchments, their characteristics and system-wide implications. The culmination of the workshops was general agreement on the MCA results – a ranking of projects that should be investigated further and potentially included as part of the CBA. This is discussed in Section 5.

3. Establishing the MCA elements

3.1. Criteria and indicators

The process of developing the criteria and indicators was reflective of the stakeholder engagement that the MCA stimulates, involving extensive discussion and refinement to arrive at the final preferred list. Criteria initially proposed by EPD (which evolved from guidance from the Expert Panel) were reviewed by Aither, with suggested amendments then the basis for discussion in a workshop including EPD, Aither and the engineering consultants undertaking the option development and analysis.

Following this workshop, the criteria (and indicators) were further refined and agreed. It was important that this preceded the development of water quality improvement options, in order to partly inform the nature of the data requirements from the engineering analysis.

Broadly, the agreed criteria and indicators were selected on the basis that they:

- Provide a reasonable reflection of the breadth of key issues that should be considered in evaluating options
- Have regard for the scientific input from the Expert Panel
- Can be informed (either quantitatively or qualitatively) by data generated in the development and analysis of the options
- Avoid double-counting (i.e. multiple indicators do not measure a common outcome)
- Are material but also concise (i.e. limited to those factors that are considered significant to the evaluation).

3.1.1. Distinguishing between catchment and in-lake options

Acknowledging that some of the key issues that influence decision-making are different for in-lake options (specific to Lake Tuggeranong) to those of in-catchment options, the EPD preferred different sets of criteria and indicators for each. These are largely common or similar at the criteria level, but are distinguished by the inclusion or exclusion of certain indicators as relevant.

Table 3 summarises the criteria and indicators for the catchment options, as well as a definition or description of the indicators and the rationale for their inclusion. Table 4 provides similar information for the in-lake options, however, due to methodological differences (including in modelling the performance of in-lake options) there are some differences between the two sets.

Note that the numbering of the codes used for the indicators, which on occasion are not sequential, reflects the fact that the process of identifying, discussing and agreeing indicators resulted in some original indicators being excluded from the final list.

Table 3 Summary of MCA criteria and indicators (for in-catchment options)

Criteria	Indicators		Description	Rationale
Water quality & hydraulic function	WQ1	Absolute reduction in annual TN load discharged	The reduction in pollutant loads (total nitrogen; total phosphorous; total suspended solids; gross pollutants and heavy metals), relative to the base case	These indicators reflect key measures of improvement in water quality that is the core objective of the Basin Priority Project. The indicators selected are not exhaustive (i.e. there are other aspects of water quality that could be considered) but generally these pollutants are recognised as identifiable and measurable indicators of water quality impacts. *Note that WQ5 only applies to the Fyshwick catchment, where there is an established challenge with heavy metal discharges attributed to the industrial characteristic of this catchment.*
	WQ2	Absolute reduction in annual TP load discharged		
	WQ3	Absolute reduction in annual TSS load discharged		
	WQ4	Absolute reduction in annual gross pollutants load discharged		
	WQ5	Absolute reduction in annual heavy metals load discharged **(Fyshwick catchment only)**		
Ecology & environment	ECO1	Effect on ecosystem	The impact on ecological communities or vegetation classes	Recognises the potential for interventions within the catchment to impact on existing ecological communities or ecological vegetation classes (EVCs), as identified within relevant databases.
	ECO2	Effect on habitat of threatened species	The impact on habitat of threatened or endangered species	Recognises the potential for interventions within the catchment to impact on habitat of threatened or endangered species, as identified within relevant databases.
	ECO3	Groundwater recharge	The impact on local groundwater resources	Recognises the potential for interventions that contribute to recharge of shallow and deeper aquifers as a result of increased infiltration over time, contributing to improved baseflow, protection of groundwater dependent ecosystems (GDEs) and long-term sustainability of groundwater resources.
	ECO4	Climate change	Resilience to climate change impacts	Has regard to the long-term impacts of climate change and the resilience of the intervention to continue to function as intended under those impacts.

Criteria	Indicators		Description	Rationale
Social and liveability	SOC1	Effect on recreational opportunity (quality of open space)	Change in the nature and quality of open space	Recognises the importance of open space for local communities and reflects the potential change in the type and *quality* of open space (positive or negative) that may result from intervention.
	SOC2	Impact on quantity of open space	Change in the availability of useable open space	Distinguished from SOC1 by reflecting the area impacted that results in a change in the *quantity* of open space available for public access. In this context public open space is defined as unencumbered land that is accessible to the public for passive or active recreational purposes.
	SOC3	Effect on amenity value	Change in the quality of existing amenity and aesthetic value of the site	Included to reflect the potential for interventions to enhance (or potentially reduce) the perceived amenity, where amenity is broadly interpreted as the appeal or pleasantness of the location.
	SOC4	Impact on flood risk	The capacity of the intervention to mitigate existing and future flood risk; or the risk of exacerbating flood risk	Recognising that most interventions involve some change to local hydrology, considers the relative impact on existing flood risk (and future flood risk that may be influenced by development or climate change).
	SOC5	Potential water availability	The volume of alternative water resource for fit-for-purpose use potentially available	Reuse of harvested stormwater may be an additional benefit of interventions to primarily address water quality.
	SOC6	Perceived community attitudes	Assessment of local community support or animosity for proposed intervention	Included as a measure of the likelihood and extent of community support or disapproval for the intervention, reflecting the importance of community opinion vested in public areas.
Feasibility	FY3	Cultural heritage values	Risk of impact on areas with recognised cultural heritage values	Reflects the risk to project delivery of known (or potential) cultural heritage sites that prevent development.

Criteria	Indicators		Description	Rationale
	FY5	Effect on trees	Risk of impact on trees of significant value	Reflects the risk to project delivery of registered trees that must not be impacted by works.
Financial	FIN1	Construction costs	Total capital cost	Costs are a key consideration in assessing the effectiveness of each option to achieve the intended outcomes.
	FIN2	Operation and maintenance costs	Annual and recurring operating and maintenance costs	
	FIN3	Decommissioning / renewal costs	Costs to renew or decommission the asset(s) at the end of their practical life	

Table 4 Summary of MCA criteria and indicators (for in-lake options)

Criteria	Indicators		Description	Rationale
Water quality & hydraulic function	LIGHT	Available light for phytoplankton growth	Kd (limitation of light for phytoplankton growth) relative to base case	Water quality parameters that have an influence on in-lake water quality and potential for poor water quality events (e.g. blooms)
	TEMP	90th percentile of different between top and bottom temperature at 12 noon (over the year)	Degree Celsius	
	HRT	Reduce hydraulic retention time	Number of days	
	WQ1	Absolute reduction in annual TN load discharged	The reduction in pollutant loads (total nitrogen; total phosphorous; total suspended solids; gross pollutants and heavy metals), relative to the base case. These indicators reflect key measures of improvement in water quality that is the core objective of the Basin Priority Project. The indicators selected are not exhaustive (i.e. there are other aspects of water quality that could be considered) but generally these pollutants are recognised as identifiable and measurable indicators of water quality impacts.	
	WQ2	Absolute reduction in annual TP load discharged		
	WQ3	Absolute reduction in annual		

Criteria	Indicators		Description	Rationale
		TSS load discharged		
	WQ8	Organic loading	Reduction in DOC relative to base case	Additional water quality parameters that have an influence on in-lake water quality and potential for poor water quality events (e.g. algal blooms)
	WQ9	Dissolved oxygen	Reduction relative to the base case	
	WQ10	Dissolved inorganic nitrogen	Reduction relative to the base case	
	WQ11	Dissolved inorganic phosphorous	Reduction relative to the base case	
Ecology & environment	ECO2	Effect on habitat of threatened species	The impact on habitat of threatened or endangered species	Recognises the potential for interventions within the catchment to impact on habitat of threatened or endangered species, as identified within relevant databases.
	ECO4	Climate change	Resilience to climate change impacts	Has regard to the long-term impacts of climate change and the resilience of the intervention to continue to function as intended under those impacts.
Social and liveability	SOC1	Effect on recreational opportunity (quality of open space)	Change in the nature and quality of open space	Recognises the importance of open space for local communities and reflects the potential change in the type and *quality* of open space (positive or negative) that may result from intervention.
	SOC6	Perceived community attitudes	Assessment of local community support or animosity for proposed intervention	Included as a measure of the likelihood and extent of community support or disapproval for the intervention, reflecting the importance of community opinion vested in public areas.
Financial	FIN1	Construction costs	Total capital cost	Costs are a key consideration in assessing the effectiveness of each option to achieve the intended outcomes.

Criteria	Indicators		Description	Rationale
	FIN2	Operation and maintenance costs	Annual and recurring operating and maintenance costs	Costs are a key consideration in assessing the effectiveness of each option to achieve the intended outcomes.
	FIN3	Decommissioning / renewal costs	Costs to renew or decommission the asset(s) at the end of their practical life	Costs are a key consideration in assessing the effectiveness of each option to achieve the intended outcomes.

3.2. Criteria weightings and indicator sub-weightings

At the request of EPD, Aither developed a draft set of weightings and sub-weightings for the criteria and indicators. The EPD team and Expert Panel reviewed these and then collectively provided the broad project perspective required to confirm and revise weightings as and where required. This was determined through discussion, debate and agreement, recognising also that it was important that the implications of the initial weightings would also be tested by sensitivity analysis and discussed as part of the subsequent MCA workshops.

The criteria weightings that resulted from this process are identified in Table 5 and the indicator sub-weightings in Table 6 and Table 7 (for in-catchment and in-lake options respectively). The indicator sub-weightings are also distinguished by a slight variation for the Fyshwick catchment, which includes consideration of the implications for heavy metals. This indicator was deemed not material for the other catchments considered, and results were not modelled by the options consultants for those catchments.

Table 5 Summary of criteria weightings

Criteria	Weighting	
	(in-catchment)	(in-lake)
Water quality and hydraulic function	50%	60%
Ecology and environment	10%	10%
Social and liveability	10%	10%
Feasibility	10%	0%
Financial	20%	20%
(Total)	100%	100%

Table 6 Summary of indicator sub-weightings (in-catchment)

Criteria	Indicators	Sub-weighting	
		Fyshwick only[1]	Other catchments
Water quality and hydraulic function	WQ1 (N)	15%	15%
	WQ2 (P)	25%	25%
	WQ3 (SS)	30%	35%
	WQ4 (GP)	20%	25%
	WQ5 (Pb)	2.5%	0%
	WQ5 (Cd)	2.5%	0%
	WQ5 (Zn)	2.5%	0%
	WQ5 (Cu)	2.5%	0%
	Total	100%	100%
Ecology and environment	ECO1	35%	
	ECO2	35%	

	ECO3	15%
	ECO4	15%
	Total	100%
Social and liveability	SOC1	15%
	SOC2	10%
	SOC3	15%
	SOC4	20%
	SOC5	20%
	SOC6	20%
	Total	100%
Feasibility	FY3	70%
	FY5	30%
	Total	100%
Financial	FIN1	55%
	FIN2	40%
	FIN3	5%
	Total	100%

[1] Fyshwick is the only industrial catchment, hence the only catchment where heavy metals are part of the assessment framework

Table 7 Summary of indicator sub-weightings (in-lake)

Criteria	Indicators	Sub-weighting (in-lake)
Water quality and hydraulic function	LIGHT1	3%
	TEMP1	3%
	HRT	9%
	WQ1	5%
	WQ2	10%
	WQ3	15%
	WQ8	15%
	WQ9	10%
	WQ10	10%
	WQ11	20%
	Total	100%
Ecology and environment	ECO1	60%
	ECO2	40%
	Total	100%

Social and liveability	SOC1	50%
	SOC6	50%
	Total	100%
Financial	FIN1	55%
	FIN2	40%
	FIN3	5%
	Total	100%

4. Applying the MCA framework

4.1. Option scoring

As discussed in Section 2.2.4 above, Aither has applied a scoring system that ranges from –4 (very much worse) to +4 (very much better), with zero representing the base case (i.e. no change).

4.1.1. Facilitating consistent input data

One hundred and eighty eight (188) individual options were identified during the option development and analysis phase. To ensure that the relevant information for each option could be readily and consistently applied within the MCA framework, a template was provided to the engineering firms as a common link between the outputs of the engineering analysis and the required inputs to the MCA. The template facilitated consistent application of the outputs across different catchments (and from different engineering firms).

The template was structured around the indicators, effectively providing a single reference point for the results of every option as they applied to each indicator. The engineering firms completed the template for each option, helping to ensure consistent application of the findings from the engineering analysis and providing a line of sight between the analysis and the MCA.

The majority of the inputs to the template consisted of direct (quantitative) outputs from the analysis (such as modelling outputs or cost estimates). However, in some instances the input was the indicator score itself, where this was determined qualitatively. This is discussed further below.

4.1.2. Indicators scored qualitatively

Due to various factors, including data, scope, time or cost limitations, a number of indicators needed to be scored qualitatively, using the expert judgement of those designing the options – in this case, the engineering firms. For these indicators, the engineering firms were asked to score options based on scoring guidance provided by Aither and confirmed by EPD, as indicated in Table 9 below.

The guidance was provided to facilitate consistent scoring across catchments (and by different engineering firms).

4.1.3. Indicators scored quantitatively

Where facilitated by the indicator metric and available data, most indicators were scored by Aither based on the input data from the analysis of the engineering firms. The results for many of these indicators consisted of the results of water quality modelling, or cost estimation undertaken by the engineering firms.

To ensure consistent scoring across all options, Aither defined scoring bounds (or classifications) once the distribution of values was known for each indicator across all options. This effectively ‘standardises’ the scoring, and enables effective comparison of all options. The final classifications for quantitative indicators are highlighted below (Table 10 for catchment options and Table 11 for in lake options).

Scoring classification method

To ensure consistent scoring across all options, Aither defined scoring bounds (classifications) once the range of values was known for each indicator across all options. This effectively 'standardises' the scoring, and enables effective comparison of all options. The main approaches to scaling include:

- linear scaling – most commonly used approach to local or global scaling (non-linear scaling can also be used where appropriate)[8]
- direct rating judgements – commonly used where it is not possible to quantify values (can pose problems due to consistency)[9]
- scoring based on pairwise assessments.[10]

Aither's chosen approach was to use linear scaling for quantified indicators. The rationale for this includes: the options being assessed meet the conditions for its use; it is the most commonly used and accepted methodology;[11] values can and were quantified (so direct rating is not necessary), and; there were too many options to allow for practical implementation of pairwise assessments.

The process for setting the classification boundaries was as follows:

1. Determine the minimum, and maximum values, for the indicator, based on the input data provided (e.g., for TP this ranged from 0 to 1750kg reduced per year)
2. Set the maximum value to the 85th percentile value (for TP this is 102kg per year)
3. Set the scoring bounds to be linear to the assumed maximum value (i.e. the 85th percentile value)

The reason for Aither setting the maximum value to the 85th percentile value included the presence of a number of extremely high values for many of the quantitative indicators (including those with the highest criteria weightings). As is explained further below, setting the maximum value to the actual maximum in the data had the effect of giving nearly all options a score of +1 or -1. This outcome was not viewed as logical or helpful by stakeholders (including ACT Government EPD and TAMS) in distinguishing between options. Such an outcome also highlights the risks associated with input data.[12]

The resulting scoring bounds for all quantitative indicators were therefore:

- Values > 0% and <= 25% of the 85th percentile value are given score of +1
  - 0 to 25.5 in absolute terms for TP
- Values > 25% and <= 50% of the 85th percentile value are given score of +2
  - 25.5 to 51 in absolute terms for TP
- Values > 50% and <= 75% of the 85th percentile value are given score of +3

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8 Setting levels of performance to correspond with two reference points on a scale, such as 0 being the worst level of performance and 100 the best level of performance.

9 Direct rating involves an expert simply associating a particular level of performance, with a value in the scale.

10 This involves eliciting verbal pairwise assessments from decision makers that express a judgement about the performance of each option relative to each of the others.

11 See: Department for Communities and Local Government, *Multi-criteria analysis: a manual* January 2009, London.

12 For example, water quality modelling error or poor estimation of costs could provide extreme values which may contribute to the majority of options being assigned the same score.

- 51 to 76 in absolute terms for TP

- Values >75% of the 85th percentile value are given score of +4.
  - greater than 76 in absolute terms for TP

Rationale for classification method

The linear approach to scaling is justified on the basis that the data for the indicators included in the MCA are linear in their performance. For example, a key water quality indicator is Total Phosphorous removed (in kilograms per year). Each additional kilogram removed is only considered to be one unit better than the previous, and is therefore linear. Similarly, for costs, each additional dollar of cost is only one unit worse than the previous unit.[13]

In establishing scoring bounds, a range of methods were compared to identify the method that:

- is consistent with best practice guidance of using a linear distribution of values[14]
- produces plausible results that are consistent with stakeholder views (including ACT Government EPD and TAMS)
- ensures the MCA distinguishes between options and allows for effective decision making

The three methods that were compared included:

1. Using a linear scaling between the lowest and highest value. The scoring was changed to +10 to -10 to enable greater distinction between scores.

2. Using a linear distribution of values within each quartile for each indicator (e.g. 1st quartile was scored +1; second quartile was scored +2; etc.)

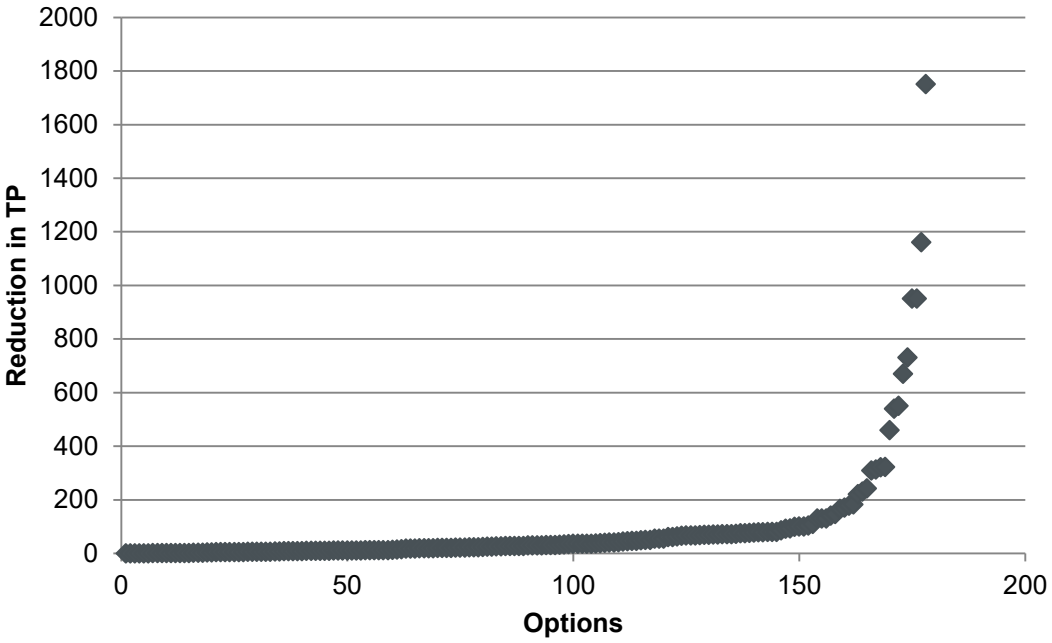
3. Using a linear scaling between the lowest value and an assumed maximum score (established consistently at the 85th percentile value for each indicator).

Method 1

The results for method 1 found that the extremely high variation in values did not allow scoring to differentiate between options. Consider the graph and associated histogram in Figure 3 below.

[13] Best practice guidance recommends a linear approach. See for example: Multi-criteria analysis: a manual January 2009, Department for Communities and Local Government: London.

[14] Ibid. See section 4.7.



		Frequency	*Cumulative %*
+1	175	159	90%
+2	350	9	95%
+3	525	1	95%
+4	700	3	97%
+5	875	1	98%
+6	1050	2	99%
+7	1225	1	99%
+8	1400	0	99%
+9	1575	0	99%
+10	1750	1	100%

Figure 3 Distribution of values for TP (method 1)

Figure 3 shows that with linear scaling with a +10 score range, 90 per cent of the options scored +1, and only 5 options (of 188 options) scored +5 or higher. This method prioritised options in a way that was not intuitive, including tending to prioritise more expensive options, at the expense of better performing options.

For this method, the use of a +10 to a -10 range for scores did provide greater separation of the values; however it was the use of the absolute maximum value that produced skewed results that were intuitively incorrect.

Method 2

The priorities produced using method 2 were more consistent with ACT Government views on the likely higher priority and better performing options, however this methodology was not consistent with best practice guidance of using a linear distribution of values.

Method 3

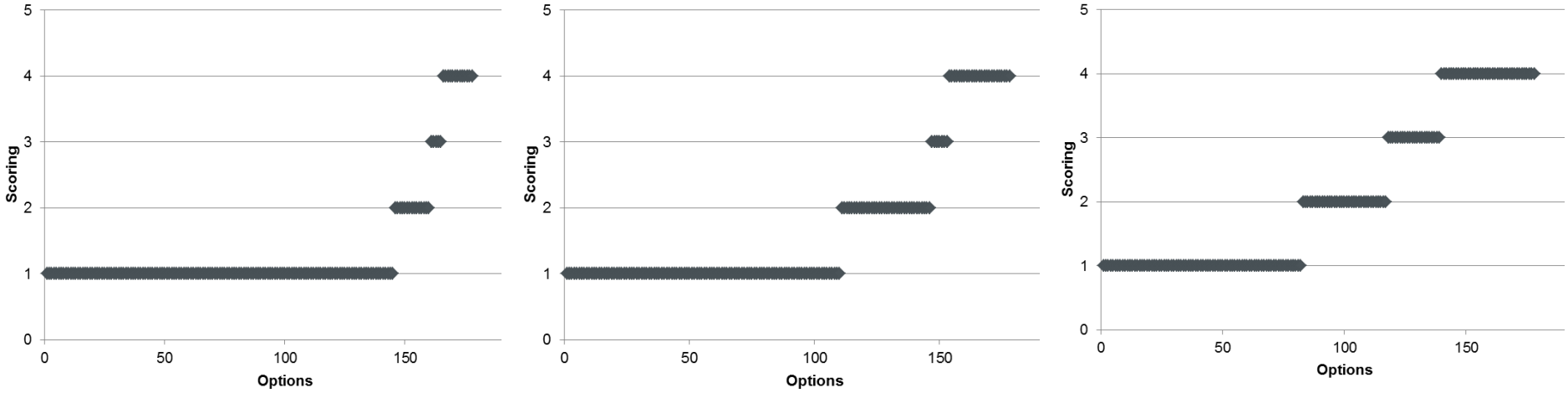
The rationale for method 3 was to develop an approach where a sensible distribution of options for each score was achieved. Various sensitivity analyses were undertaken to determine the most appropriate maximum value.

The objective was to select the largest maximum value that provided a distribution of scores that allowed options to be distinguished from one another in the key criteria (such as water quality and cost).

The distribution of scores between +4 and -4 was tested using the:

- 95th percentile
- 90th percentile
- 85th percentile

The findings from this sensitivity analysis are shown in Figure 4 using TP as an example indicator. The results show that when using the 90th and 95th percentile, the scores for TP are predominantly +1. Establishing the maximum value at the 85th percentile for all options provided the most balanced distribution of scores.



95th percentile | 90th percentile | 85th percentile

Figure 4 Distribution of scores for TP (method 3)

Overall
The summarised results from the comparison of options are shown in Table 8.

Table 8 Comparison of methods for scoring options

	Method 1	Method 2	Method 3
Uses a linear distribution of values	Yes	No	Yes
Produces plausible priorities consistent with stakeholder views	No	Yes	Yes
Produces a rational distribution of option scores between 1 and 4	No	Yes	Yes
Preferred			✓

Our findings support method 3 (85th percentile) as the preferred approach, as it is consistent with best practice guidance on the use of linear scaling of options,[15] it produces plausible results that are consistent with stakeholder views, and it enables decision makers to effectively distinguish between different options.

4.1.4. Example of scoring results

The figure below shows the average score for each indicator across all options. The figure provides some indication of the relative influence of different indicators in the final MCA scores. For example, it is evident that SOC4 (flood risk) was given a score of zero for practically all options. This suggests that the indicator is redundant as a meaningful consideration in decision-making (and as a result has no bearing on the outcome). This is true to a lesser extent for ECO3 and ECO4, which average low scores across all options. It should be noted that the average scores for the WQ5 indicators are artificially low because these indicators were applied to a limited number of options in the Fyshwick catchment only.[16]

By contrast, the average scores for water quality and financial indicators tend to be higher (in absolute terms), which indicates their relative importance and influence in the overall MCA scores and rank.

[15] Ibid.
[16] For options FW001 through to FW005.

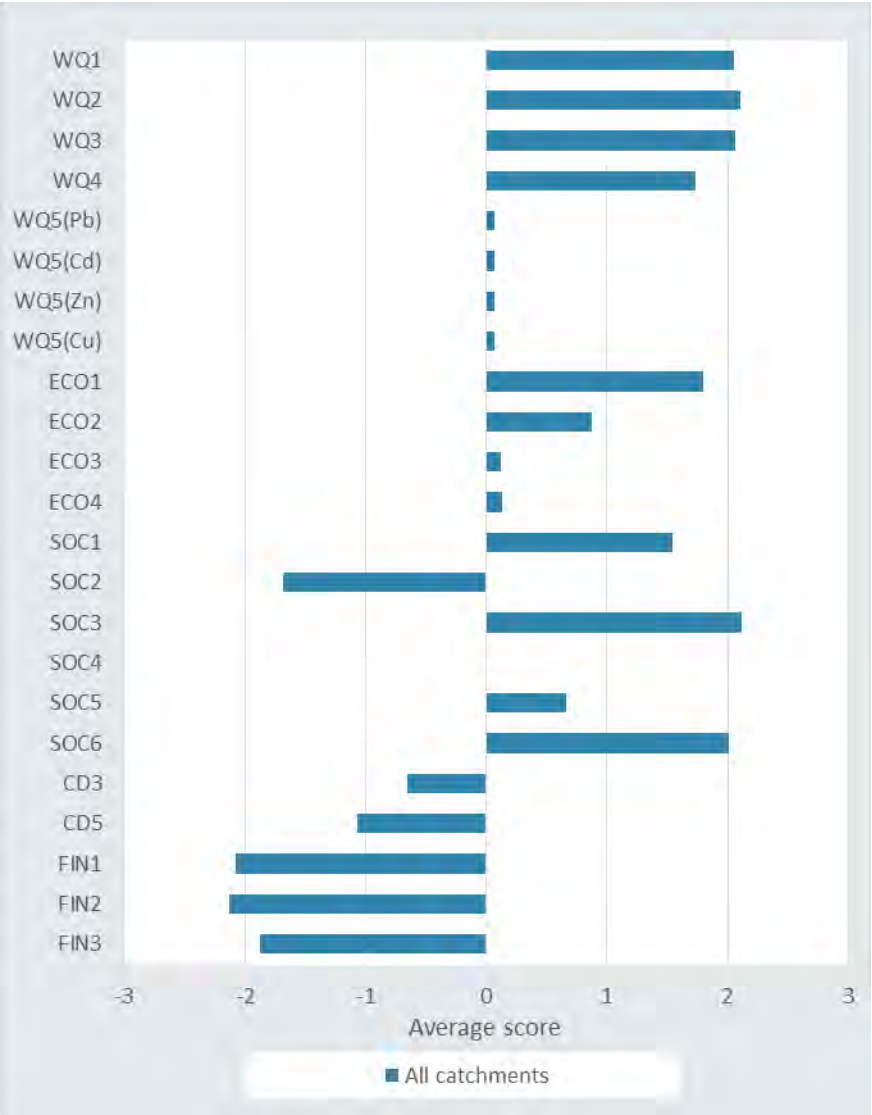


Figure 5 Average scores across all options

Table 9 Qualitative indicator scoring guidance

	4	3	2	1	0	-1	-2	-3	-4
ECO3	Major contribution to groundwater recharge (large area with good hydraulic conductivity above aquifers demonstrated as depleted)	Large contribution to groundwater recharge (large area with good hydraulic conductivity)	Moderate contribution to groundwater recharge (either small area with good hydraulic conductivity, or larger area with poor hydraulic conductivity)	Some contribution to groundwater recharge (small area and unknown or poor hydraulic conductivity)					
ECO4	Extremely resilient to future climate change impacts (such as higher flows from more intense/frequent storms; extended periods of reduced rainfall; higher temperatures]				Future climate change impacts have no implications for performance				Option performance (water quality improvements, amenity benefits, operating costs as proposed) are at high risk from the impacts of climate change

	4	3	2	1	0	-1	-2	-3	-4
SOC1	Major increase in diversity and/or functionality of space for recreational use (eg existing space is poorly maintained, under-utilised or otherwise lacks functionality, and will be substantially improved to reverse this)	Large increase in diversity and/or functionality of space for recreational use	Moderate increase in diversity and/or functionality of space for recreational use	Slight increase in diversity and/or functionality of space for recreational use	Negligible or no change	Slight reduction in diversity and/or functionality of space for recreational use	Moderate reduction in diversity and/or functionality of space for recreational use	Large reduction in diversity and/or functionality of space for recreational use	Major reduction in diversity and/or functionality of space for recreational use (eg large area of uninterrupted space for sport or recreation is lost, dissected or otherwise impaired)
SOC3	Very much better (site with poor existing aesthetic characteristics is significantly enhanced)	Much better	Moderately better	Slightly better	Negligible or no change	Locally significant heritage compromised	Regionally significant heritage compromised		
SOC4	Contributes to significant decrease in local flood levels	Contributes to large decrease in local flood levels	Contributes to moderate decrease in local flood levels	Contributes to some decrease in local flood levels	Negligible or no change	Contributes to some increase in flood levels	Contributes to a moderate increase in flood levels	Contributes to a large increase in flood levels	Contributes to a significant increase in flood levels

	4	3	2	1	0	-1	-2	-3	-4
SOC6	Full community support anticipated		Some community support		Neither positive or negative		Some community opposition		Total community outrage

Table 10 Indicator scoring bounds – catchment options

	Unit	4	3	2	1	0	-1	-2	-3	-4
WQ1 (TN)	kg/year	>435	290 to 435	145 to 290	0 to 145	0				
WQ2 (TP)	kg/year	>76	76 to 51	25.5 to 51	0 to 25.5	0				
WQ3 (TSS)	kg/year	>56,000	37,000 to 56,000	19,000 to 37,000	0 to 20,000	0				
WQ4 (GP)	kg/year	>11,900	7940 to 11,900	3970 to 7940	0 to 3,970	0				
WQ5 (Pb)	kg/year	>12	8 to 12	4 to 8	0 to 4	0				
WQ5 (Cd)	kg/year	>0.14	0.09 to 0.14	0.05 to 0.09	0 to 0.05	0				
WQ5 (Zn)	kg/year	>82	54 to 82	27 to 54	0 to 27	0				
WQ5 (Cu)	kg/year	>7.0	4.7 to 7.0	2.3 to 4.7	0 to 2.3	0				
ECO1	m^2	>11,800	7890 to 11,800	3900 to 7890	0 to 3900	0				
ECO2	m^2	>2,700	1800 to 2700	901 to 1800	0 to 901	0				
SOC2	m^2					0	0 to 8320	8,320 to 16,600	16,600 to 24,900	>24,900
SOC5	ML/year	>3.2	2.1 to 3.2	1.1 to 2.1	0 to 1.1	0				
CD3	No. sites					0	0 to 0.25	0.25 to 0.5	0.5 to 0.75	>0.75
CD5	No. trees					0	0 to 3.1	3.1 to 6.2	6.2 to 9.3	>9.3
FIN1	$					0	0 to 1,750,000	1,750,000 to 3,500,000	3,500,000 to 5,240,000	>5,240,000
FIN2	$					0	0 to 24,000	24,000 to 49,000	49,000 to 73,000	>73,000
FIN3	$					0	0 to 168,000	168,000 to 335,000	335,000 to 503,000	>503,000

Table 11 Indicator scoring bounds – in-lake options

	Unit	4	3	2	1	0	-1	-2	-3	-4
LIGHT 1	% change	<-1.4	-0.9 to-1.4	-0.5 to -0.9	0 to -0.5	0.0	0 to 0.5	0.5 to 0.9	0.9 to 1.4	>1.4
TEMP 1	% change	>1.1	0.8 to 1.1	0.4 to 0.8	0 to 0.4	0.0	0 to -0.4	-0.4 to -0.8	0.8 to -1.1	<-1.1
HRT	% change	>0.03	0.02 to 0.03	0.01 to 0.02	0 to 0.01	0.00	0 to -0.01	-0.01 to -0.02	0.02 to -0.03	<-0.03
WQ1	kg/year	>193	129 to 193	64 to 129	0 to 64	0	0 to -64	-64 to -129	-129 to -193	<-193
WQ2	kg/year	>54	36 to 54	18 to 36	0 to 18	0	0 to -18	-18 to -36	-36 to -54	<-54
WQ3	kg/year	>7,500	5000 to 7500	2500 to 5000	0 to 2500	0	0 to -2500	-2500 to -5000	-5000 to -7500	<-7500
WQ4	kg/year	>0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0
WQ8	% change	>1.2	0.8 to 1.2	0.4 to 0.8	0 to 0.4	0.0	0 to -0.4	-0.4 to -0.8	-0.8 to -1.2	<-1.2
WQ9	% change	<-3.5	-2.3 to -3.5	-1.2 to -2.3	0 to -1.2	0.0	0 to 1.2	1.2 to 2.3	2.3 to 3.5	>3.5
WQ10	% change	>1.4	0.9 to 1.4	0.5 to 0.9	0 to 0.5	0.0	0 to -0.5	-0.5 to -0.9	-0.9 to -1.4	<-1.4
WQ11	% change	>1.1	0.7 to 1.1	0.4 to 0.7	0 to 0.4	0.0	0 to -0.4	-0.4 to -0.7	-0.7 to -1.1	<-1.1
FIN1	$					0	0 to 3,600,000	3,600,000 to 7,200,000	7,200,000 to 11,000,000	>11,000,000
FIN2	$					0	0 to 24,000	24,000 to 48,000	48,000 to 73,000	>73,000
FIN3	$					0	0 to 2,000,000	2,000,000 to 3,900,000	3,900,000 to 5,900,000	>5,900,000

Note: Results were not provided for ECO2 and ECO4, or SOC1 and SOC6 so scoring bounds were not established.
Most results were provided as a percentage change from the base case, rather than absolute values

4.2. Sensitivity analysis

Given that there is a range of inputs into the MCA process, including a number that are determined by expert judgement, it is important to test the sensitivity of the results to these inputs. The most significant variables are the weightings attributed to the criteria.

4.2.1. Sensitivity tests

The sensitivity analysis was therefore undertaken by independently varying key criteria weightings to test the implications for the MCA ranking. For example, tests included:

- reducing the water quality criteria to 20%, and increasing it to 80%
- reducing environment and ecology to 0%
- reducing financial to 10%, and separately increasing it to 50%.

An example of the outputs from this process is provided in Figure 6 for Yarralumla catchment, which can be interpreted as follows:

- the 'heat mapping' reflects the rank of the catchment options for each test, where green is a high rank and red is a low rank
- comparing across the columns gives a relative sense of the change in ranking from the initial conditions, to the conditions under each test (i.e. as a result of changing the weightings)
- for each test, the change in ranking from initial conditions for each option is also provided (the number of places each option shifts up or down)
- the average number of places shifted (in absolute terms) by each option under each test is also indicated.

The implications of the test are discussed further below.

The sensitivity test was limited to criteria weightings only (i.e. did not include testing the 23 indicators). The reasons for this include the following:

- As subsets of the criteria, the influence of the indicator weightings is less significant than that of the overarching criteria weightings. For example, the influence of a water quality indicator that is one of seven contributing to the total water quality component of the score is limited in comparison to the influence of the higher level criteria weighting.
- A number of indicators were shown to have very low average scores (see Figure 5), so varying their weighting will have negligible impact (i.e. changing the weighting of a score that is consistently low (or zero) across all options will not register any change in the total score).
- The purpose of the sensitivity analysis is to understand the extent to which major assumptions or input values materially influence the results. Since they apply across all the indicator values, the criteria weightings influence the MCA scores most substantially.

Yarralumla		Criteria weightings									
Initial Rank		Reduce WQ to 20%		Increase WQ to 80%		Reduce E&E to 0%		Reduce FIN to 10%		WQ & FIN equal (50% each)	
Rank	Site	Rank	Shift	Rank	Shift	Rank	Shift	Rank	Shift	Rank	Shift
1	YA005	1	-	1	-	1	-	1	-	1	-
2	YA020	3	-1	2	-	2	-	2	-	13	-11
3	YA020P	2	+1	4	-1	3	-	4	-1	2	+1
4	YA006	4	-	3	+1	6	-2	3	+1	21	-17
5	YA016	6	-1	5	-	4	+1	6	-1	3	+2
6	YA025	8	-2	6	-	5	+1	5	+1	7	-1
7	YA012	9	-2	7	-	7	-	7	-	4	+3
8	YA017	17	-9	8	-	9	-1	8	-	27	-19
9	YA009B	30	-21	9	-	10	-1	9	-	30	-21
10	YA025P	5	+5	12	-2	8	+2	12	-2	6	+4
11	YA028	15	-4	13	-2	11	-	11	-	9	+2
12	YA008	11	+1	14	-2	13	-1	14	-2	22	-10
13	YA001	28	-15	11	+2	17	-4	13	-	8	+5
14	YA026A	20	-6	15	-1	12	+2	16	-2	5	+9
15	YA002	12	+3	16	-1	15	-	15	-	23	-8
16	YA009A	35	-19	10	+6	16	-	10	+6	33	-17
17	YA021	18	-1	17	-	14	+3	17	-	24	-7
18	YA007	7	+11	19	-1	18	-	20	-2	20	-2
19	YA019	10	+9	20	-1	21	-2	19	-	26	-7
20	YA014D	13	+7	21	-1	19	+1	23	-3	14	+6
21	YA014B	14	+7	22	-1	20	+1	24	-3	16	+5
22	YA029	16	+6	23	-1	23	-1	25	-3	10	+12
23	YA018	31	-8	18	+5	24	-1	18	+5	35	-12
24	YA014C	19	+5	24	-	22	+2	26	-2	15	+9
25	YA027	24	+1	25	-	30	-5	21	+4	28	-3
26	YA022A	25	+1	27	-1	31	-5	22	+4	29	-3
27	YA026B	21	+6	26	+1	25	+2	27	-	11	+16
28	YA013	22	+6	28	-	26	+2	28	-	17	+11
29	YA010A	23	+6	29	-	27	+2	29	-	19	+10
30	YA024	26	+4	30	-	28	+2	30	-	12	+18
31	YA010B	27	+4	31	-	29	+2	31	-	18	+13
32	YA023	29	+3	32	-	32	-	33	-1	25	+7
33	YA011	32	+1	33	-	33	-	32	+1	34	-1
34	YA022B	33	+1	34	-	34	-	34	-	31	+3
35	YA016W	34	+1	35	-	35	-	35	-	32	+3
36	YA014A	36	-	36	-	36	-	37	-1	36	-
37	YA015	37	-	37	-	37	-	36	+1	37	-
38	YA004	38	-	38	-	38	-	38	-	38	-
39	YA003	39	-	39	-	39	-	39	-	39	-
Average shift (no. places)			5		0.8		1.2		1.2		7.1

Figure 6 Example of sensitivity analysis outputs (Yarralumla)

4.2.2. Results and findings

A summary of the sensitivity test across all catchments (exemplified in Figure 6) is provided in Table 12 below. The table summarises the average number of places that each option shifts in rank (either up or down) when key criteria weightings are varied. It is evident that the weightings applied to the water quality and financial criteria have the greatest influence on rankings, which could be expected because:

- they comprise the greatest proportion of total weighting (70%) initially
- they tend to have indicators with higher scores on average (see Figure 5) and therefore a change in the weighting that is applied to these scores results in a more pronounced change.

Table 12 Average shift in option rank for sensitivity test of criteria weightings

Catchment	Change in criteria weighting				
	Reduce WQ to 20%	Increase WQ to 80%	Reduce E&E to 0%	Reduce FIN to 10%	WQ & FIN equal (50% each)
	Shift in option rank (average number of places)				
Yarralumla	4.6	0.8	1.2	1.2	7.1
Tuggeranong	7.7	1.4	1.0	1.7	8.3
Fyshwick	2.4	0.3	0.3	0.8	4.1
Upper Molonglo	1.7	0.1	0.9	0.9	3.2
Lower Molonglo	3.3	0.9	2.9	2.0	4.6
West Belconnen	1.2	0.0	0.0	0.0	1.4
Average	3.5	0.6	1.0	1.1	4.8

Observations from the sensitivity tests that are summarised in Table 12 include the following:

- The average change in option rank is more significant for catchments with more options, which is driven by the fact that there is a greater number of options within the scoring range and therefore a smaller change is required to influence their relative scores (and cause them to change more substantially in rank in absolute terms). For example, there are 52 options in the Tuggeranong catchment that have total scores within approximately the same range as West Belconnen, with 13 options; therefore a subtle change in scores is far more influential in Tuggeranong.
- As stated above, the financial and water quality weightings are most influential, but the direction of change from the current settings has different implications. For example:
  - A decrease in the water quality weighting is more influential than an increase. This indicates that this criteria tends to dominate the scoring at the current setting of 50%, to the extent that increasing it further has limited impact on rankings. By contrast, reducing the weight of this criteria gives greater emphasis to other factors and has a more material impact on rankings
  - Similarly, a reduction in the weighting of the financial criteria further dilutes the influence of this criteria relative to others and has limited impact on ranking, while increasing it (so that water quality and financial criteria are equally weighted) results in more material change.
- The impact of changes to the other criteria (i.e. not financial or water quality) is also relatively limited, particularly given their initial weighting of 10%; removing the ecology and environment criteria (setting its weighting to zero), for example, does not substantially alter option rankings.
- To some extent, the sensitivity test reflects on the trade-off between water quality objectives (the key driver for the project) and the costs to achieve them. For example, if these factors are given equal importance in the MCA, the final ranking is somewhat different.

However, in general, it is considered that the MCA ranking is, on balance, reasonably resilient to change in weightings (particularly where these are subtle). Some change in rankings should be expected when weightings are varied; this is, after all, the intent of the MCA and the use of weightings to represent decision-makers' judgement about their relative importance.

The overall stability of the rankings can be seen in Figure 6 by considering the 'heat mapping' that illustrates the relative ranking of the options across the different sensitivity tests. Notwithstanding shifts in rank for some individual options, the overall prioritisation tends to be reasonably consistent (i.e. high-ranking and low-ranking options tend to remain either at the top or bottom of the list). In particular, the list does not 'switch' when weightings are altered.

The visible exception to this is for the more substantial changes to the water quality and financial weightings, which do impact the relative position of a greater number of options in general. However, as discussed, this is reflective of the relative influence of these criteria and the judgement that has been applied in setting these weightings.

While the sensitivity test confirms that the overall ranking is resilient to variations in the weightings, this does not preclude some options shifting places based on their particular characteristics (relative to others). For example, the ranking of a project with no impact on open space (when all others impact significantly on open space) would be more heavily influenced by the weighting of that indicator. This is a reflection of the fact that the MCA enables these individual characteristics to be a feature of the ranking process.

5. MCA results

5.1. Summary

As noted above, the MCA provides a score for each option, which provides the ability to rank all projects overall. In addition, the scores enable the ranking of options within a particular catchment. In total, 188 options were scored and ranked for catchment options across the six sub catchments (note that this excludes the in-lake options, which proved problematic to definitively score and were instead addressed in the relevant workshop). The number of options and average scores across catchments are summarised below:

- Fyshwick – 31 options, average score: 0.76
- Lower Molonglo – 28 options, average score: 0.65
- Tuggeranong – 52 options, average score: 0.74
- Upper Molonglo – 15 options, average score: 0.63
- West Belconnen – 13 options, average score: 0.70
- Yarralumla – 39 options, average score: 0.60

These results suggest higher performing options in Fyshwick and Tuggeranong.

5.2. MCA ranking of projects

A full listing of the rankings for individual projects, including a ranking across all catchments, and within individual catchments, is provided at Appendix A. The highest overall results and top results for each catchment are summarised below.

Table 13 Top ranked MCA options overall – catchment options

Overall MCA rank	Site ID	Score	Overall MCA Rank	Site ID	Score
1	TG012	1.90	11	WB004	1.62
2	YA005	1.88	12	WB008	1.61
3	FW012	1.78	13	TG032	1.51
4	FW022	1.77	14	YA020	1.50
5	FW021	1.73	15	TG011C	1.50
6	UM004	1.66	16	FW019	1.49
7	FW025	1.65	17	YA020P	1.49
8	LM002B	1.63	18	TG029	1.49
9	LM007	1.63	19	FW013	1.48
10	TG019	1.62	20	FW014A	1.47

Note: Ranking of options with same scores is due to rounding.

The overall results suggest that there are some high performing options in all catchments, but there tend to be higher ranking options in the Fyshwick, Tuggeranong, Yarralumla and Lower Molonglo catchments.

Table 14 Top ranked MCA options within individual catchments

Catchment rank	Overall rank	Site ID	Score	Catchment rank	Overall rank	Site ID	Score
Fyshwick				Upper Molonglo			
1	3	FW012	1.78	1	6	UM004	1.66
2	4	FW022	1.77	2	31	UM015	1.34
3	5	FW021	1.73	3	57	UM002	0.87
4	7	FW025	1.65	4	82	UM014	0.63
5	16	FW019	1.49	5	89	UM012	0.56
Lower Molonglo				West Belconnen			
1	8	LM002B	1.63	1	11	WB004	1.62
2	9	LM007	1.63	2	12	WB008	1.61
3	33	LM002BP	1.33	3	21	WB009	1.47
4	34	LM013	1.33	4	36	WB006	1.32
5	48	LM006	1.01	5	38	WB010	1.28
Tuggeranong				Yarralumla			
1	1	TG012	1.90	1	2	YA005	1.88
2	10	TG019	1.62	2	14	YA020	1.50
3	13	TG032	1.51	3	17	YA020P	1.49
4	15	TG011C	1.50	4	22	YA006	1.46
5	18	TG029	1.49	5	29	YA016	1.37

5.2.1. Discussion of results

As is shown in the tables above, there are a large number of high ranking options in Fyshwick and Tuggeranong. In general, options in Upper Molonglo and West Belconnen have not scored as highly as in other catchments. This was mirrored by the engineers' reflections on the extent of the opportunity to implement tangible water quality improvements in these catchments.

However, it is also important to reflect on the individual scores and the level of accuracy that is inherent in the analysis. Specifically, many scores are close in absolute terms, and making a distinction between them solely on the basis of the MCA scores is not advisable. The MCA workshops facilitated a broader discussion about the relative merits and characteristics of the top-ranking options, and the outcomes of this process provide a range of considerations that help to inform the final ranking of options.

5.3. MCA workshops

Given the MCA process is subjective to an extent, and requires expert judgement with regard to a number of different aspects, the overall process design included workshops involving a number of key stakeholders. The purpose of these workshops was to check and validate the results of the MCA, including that the results were aligned with expert judgement and expectations around preferable options.

The workshops also provided the opportunity to interrogate specific options in detail, including the higher ranking options, and also investigate if and why any particular options were not highly ranked. This may have been due to data quality or entry issues, scoring issues, or other factors (such as characteristics of different options, which were not able to be reflected in the MCA indicators).[17] Participants at the workshops included the BPP team (representatives of EPD), the options consultants who had prepared the options, community representatives, members of the BPP expert panel (which includes EPD, TAMS, CMTEDD, University of Canberra and E2Designlab), and Aither.

The MCA workshops validated the MCA scores and ranking of options within each catchment, with some qualifications or caveats in relation to specific options, or overall results for the catchments. In general, participants were comfortable with the options that were ranking highly, and as the workshops progressed, there was increasing evidence that the MCA rankings were working well overall. However, key issues arising from the workshops in relation to each catchment are summarised below.

5.3.1. Yarralumla

One of the key issues in Yarralumla related to projects associated with stream naturalisation. There were some concerns around the modelling approach for erosion-related outcomes and sediment transport and geomorphology issues for some options (which scored more favourably due to high TSS reductions).

There was also discussion around the flooding implications of certain options, including safety and other issues. This led to a discussion about the hydraulic function and performance of certain options. That indicator was previously moved to a ‘non-core’ indicator, and is not directly reflected in the MCA criteria and results.

It was evident that the MCA results aligned well with the prior understanding of the opportunities within the catchment, with a number of high ranked options having previously had design investigations and some degree of community consultation and support. However, there was some concern regarding the high prevalence of bioretention systems amongst the higher ranking options, particularly relating to performance risk. In general, higher performing options were characterised by large catchments with smaller treatment systems; it was suggested that these are at greater risk of regular inundation that could jeopardise vegetation health and therefore system performance. The consultants maintained that appropriate design, contractor supervision and contract arrangements such as extended handover periods to ensure establishment of vegetation, could mitigate these risks.

[17] For example, potential changes in future land use only reflected in high level strategy documentation; historical issues with particular sites; particular deliverability issues not reflected in standard GIS overlays for services.

5.3.2. Tuggeranong

A large number of options were identified in the Tuggeranong catchment, but overall participants had a high degree of comfort with those options that ranked highly. Discussion focused on a number of key sites that were also the subject of parallel investigations or potential investments, and are known to present strong opportunities for water quality improvements. There was, however, some debate regarding the true performance of certain types of options (extended detention for example), and there was a suggestion to include certain options that were not ranked highly due to other reasons not factored into the MCA (including the significance of the homestead site).

The results in Tuggeranong also suggested a need to adjust the scoring bounds (due to the high proportion of Tuggeranong options achieving a very high pollutant reduction load), which were subsequently modified, which contributed to revised rankings.[18] Consistent with the Yarralumla catchment, similar concerns were raised about the prevalence and design of bioretention systems.

5.3.3. Tuggeranong in-lake

The Tuggeranong in-lake options are substantially different to the catchment options, and the MCA process was challenged to some extent by the distinction between the catchment and in-lake analysis. This included an inability to compare indicator results with other catchments, which was exacerbated by the fact that, because of the nature of the options, some had the ability to increase pollutant loads as well as decrease them. In some instances, the same option demonstrated a relative improvement in some water quality parameters, while a decline in others. In this context the ability of the MCA to report accurately on the relative outcome of each option was limited.

The workshop provided an opportunity to understand the analysis and implications of water quality modelling, which were able to focus on the relative likelihood of chlorophyll-a levels (indicative of algal growth) as a direct outcome of each option. This revealed that, within the accuracy of the analysis, none of the options had a material impact on reducing the likelihood of algal blooms. Moreover, there was also limited basis to distinguish between the performances of the individual options.

It was also noted that there was a wider degree of community opinion in relation to the options, including negative sentiment in some instances. The conclusion of the workshop discussion was that there was limited benefit from investing in the in-lake options, and that interventions within the catchment would be more beneficial for lake water quality outcomes. Further, investment in in-lake options would be substantially undermined without primarily improving the water quality of inflows through interventions within the catchment.

5.3.4. Lower Molonglo

Consistent with other catchments, there was a general perception amongst workshop participants that the options that ranked highly in the MCA were options that might be expected to be most desirable overall.

More generally, there was further discussion in this workshop on bioretention filter design parameters and the suitability of this system in the Canberra context. This largely remains a design issue that requires further resolution from the engineers.

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[18] Initial draft results required updates to scoring bounds in order to accurately reflect the full range of input data values. The scoring bounds were subsequently updated consistent with Section 4.1.3 above.

There was also discussion around capital cost estimates, including the fact the unit rates adopted may not reflect opportunities for economies of scale, which may be artificially preferencing smaller options (by under-representing the costs of small-scale options and over-estimating costs for larger-scale options).

5.3.5. Upper Molonglo

In general, the Upper Molonglo options did not perform as well as those in other catchments. Discussion at the workshops suggested this was potentially always expected, as there are substantially fewer opportunities within the catchment to implement interventions, including limited availability of suitable sites due to the built and urban form in the catchment. There was some surprise about how certain options were scored, which was suggested to be due to modelling issues and outputs for some parameters. It was also suggested that the design of some options was somewhat different to the general brief for options development under the BPP and this may have led to them being scored differently (this included some waterway projects).

5.3.6. West Belconnen

Options in West Belconnen also did not score particularly well relative to other catchments. Some high ranking options in this area were for stream naturalisation projects, which had been identified in other catchments as potentially problematic as they may not fit well within the BPP scope, and had other concerns or issues. Notwithstanding this, some of these projects were suggested to be beneficial, but may need to be funded through other means. These projects were also suggested to potentially have misleading or inaccurate cost estimations.

Some projects were proposed that included stormwater harvesting and there was substantial debate as to whether this element should be included in the scope, and costing, of BPP options. In some cases these projects were identified as potentially highly beneficial for other reasons, which did create some concerns as to prioritising them within BPP investments. The idea of separating out the components of these options was discussed.

Issues related to diversion structures were also raised in this catchment. Overall there seemed to be consensus there was less opportunity for robust and cost-effective interventions in this catchment.

5.3.7. Fyshwick

Fyshwick was noted for having much higher potential for investment to deliver greater water quality improvement gains. However, there were some issues with the definition and isolation of options in this catchment, including a number of options along Jerrabomberra Creek that are effectively in series, with modelling and mutual exclusivity implications as a result.

One particular option (at the bottom of Jerrabomberra creek) was the subject of much discussion given its perceived very high potential to remove pollutants at a relatively low cost. While the existing cost estimates may not reflect the full extent of an optimal option at the site, it was still suggested to be a very important option to explore or include.

There were some modelling challenges for certain options in this catchment which were reinforced by the initial MCA rankings, and some indicators with low weightings had been scored slightly inconsistently in this catchment relative to others. There was further discussion about the potential for certain options to be left to property developers adjacent to Lake Burley Griffin, and the suitability of different options upstream in Jerrabomberra creek. While there was some concern about modelling

results, costs, and option definition, there was general agreement that there was strong potential to make cost-effective investments in this catchment to achieve water quality outcomes.

5.3.8. Summary

Following the completion of the workshops, it was generally recognised that the MCA results are one of a number of inputs that decision makers will need to consider in choosing how to prioritise investments and determine the options with the most merit. Some of the broad overall considerations noted that may add further to any assessment of suitability included:

- The suitability, performance and design considerations for bioretention filters in the Canberra context
- Operational considerations beyond cost, particularly the capability and capacity of operators to maintain some asset types (particularly, for example, systems that rely on constant pumping, which are likely to be neglected and therefore under-perform over time)
- The modelling approach for stream naturalisation projects, but more broadly their suitability within the BPP remit
- How options involving stormwater harvesting are considered
- Amenity values and community preferences for wetlands versus bioretention filters.

6. Conclusions

The goal of the MCA was to efficiently and transparently assess a large number of possible water quality improvement options, in order to filter and prioritise them for further investigation. It was also intended to engage stakeholders, and demonstrate that a wide range of options have been considered.

The extensive process of completing the MCA, and documenting the results, suggests this objective has been met. One hundred and eighty-eight options (178 catchment options and 10 in-lake options) have been assessed and ranked based on a robust framework that reflects expert knowledge, community preferences, the objectives of the Commonwealth government, and other important considerations for the ACT Government and community.

The MCA framework, including the weightings assigned to different indicators and criteria, and the resulting scores and ranking of options, was validated by the review role effectively provided by the MCA workshops. With some notable exceptions[19], the discussion and views provided in the MCA workshops suggested that highly ranked options within each catchment were those that stakeholders felt comfortable with and expect to be preferable overall.

The process has added value by not only highlighting options worthy of further consideration, but also identifying issues related to the design, specification, operation or likely performance of options. This provides the opportunity to further refine options that may have high potential, but also interrogate options that performed poorly in the MCA but stakeholders viewed as having merit for other reasons.

[19] These related to water quality modelling issues and cost estimates for some options. Input data for some options provided was viewed as erroneous. Updated data was subsequently provided to Aither by the engineering consultants developing the options.

7. References

Department for Communities and Local Government 2009, *Multi-criteria analysis: a manual*, London.

Appendix A – MCA ranking of options

Table 15 Overall and within catchment MCA rankings

MCA Rank	Overall rank	Site ID	MCA Score
1	2	YA005	1.88
2	14	YA020	1.50
3	17	YA020P	1.49
4	22	YA006	1.46
5	29	YA016	1.37
6	37	YA025	1.32
7	44	YA012	1.13
8	49	YA017	1.01
9	58	YA009B	0.86
10	62	YA025P	0.81
11	66	YA028	0.77
12	68	YA008	0.75
13	71	YA001	0.72
14	74	YA026A	0.70
15	76	YA002	0.67
16	77	YA009A	0.66
17	81	YA021	0.64
18	100	YA007	0.49
19	110	YA019	0.47
20	117	YA014D	0.43
21	118	YA014B	0.43
22	119	YA029	0.42
23	122	YA018	0.42
24	125	YA014C	0.40
25	132	YA027	0.37
26	133	YA022A	0.37
27	134	YA026B	0.37
28	135	YA013	0.37
29	136	YA010A	0.37
30	142	YA024	0.34

MCA Rank	Overall rank	Site ID	MCA Score
31	143	YA010B	0.34
32	155	YA023	0.23
33	157	YA011	0.19
34	158	YA022B	0.15
35	159	YA016W	0.15
36	168	YA014A	-0.04
37	170	YA015	-0.06
38	176	YA004	-0.16
39	177	YA003	-0.16
1	1	TG012	1.90
2	10	TG019	1.62
3	13	TG032	1.51
4	15	TG011C	1.50
5	18	TG029	1.49
6	23	TG003	1.46
7	25	TG010C	1.44
8	26	TG030	1.43
9	30	TG017	1.35
10	35	TG023	1.32
11	39	TG030W	1.26
12	40	TG008	1.22
13	41	TG028	1.19
14	42	TG025A	1.18
15	46	TG006	1.08
16	50	TG014	0.98
17	52	TG007B	0.94
18	53	TG010CW	0.93
19	54	TG018	0.93
20	65	TG011B	0.78
21	67	TG015	0.76
22	69	TG016	0.74
23	73	TG009	0.71
24	75	TG028W	0.69

MCA Rank	Overall rank	Site ID	MCA Score
25	78	TG005	0.64
26	79	TG031	0.64
27	80	TG027	0.64
28	83	TG021A	0.60
29	84	TG004	0.60
30	86	TG007A	0.59
31	88	TG011A	0.57
32	93	TG025C	0.52
33	94	TG021B	0.52
34	102	TG013	0.48
35	115	TG024	0.43
36	120	TG022	0.42
37	124	TG002	0.40
38	127	TG006W	0.38
39	130	TG014W	0.37
40	140	TG007BW	0.34
41	141	TG003W	0.34
42	144	TG023W	0.31
43	147	TG017W	0.26
44	148	TG025B	0.26
45	149	TG018W	0.26
46	153	TG029W	0.24
47	154	TG010A	0.23
48	156	TG001	0.21
49	160	TG010B	0.14
50	166	TG026	-0.03
51	167	TG020	-0.03
52	169	TG031W	-0.05
1	11	WB004	1.62
2	12	WB008	1.61
3	21	WB009	1.47
4	36	WB006	1.32
5	38	WB010	1.28

MCA Rank	Overall rank	Site ID	MCA Score
6	55	WB013	0.91
7	87	WB007	0.57
8	92	WB011	0.53
9	146	WB005	0.28
10	152	WB012	0.25
11	173	WB001	-0.11
12	180	WB002	-0.25
13	184	WB003	-0.42
1	3	FW012	1.78
2	4	FW022	1.77
3	5	FW021	1.73
4	7	FW025	1.65
5	16	FW019	1.49
6	19	FW013	1.48
7	20	FW014A	1.47
8	24	FW020	1.45
9	27	FW014	1.41
10	28	FW018	1.38
11	32	FW027	1.33
12	43	FW029	1.16
13	47	FW011	1.06
14	56	FW028	0.88
15	59	FW003	0.84
16	70	FW008	0.74
17	72	FW001	0.72
18	96	FW024	0.51
19	98	FW026	0.50
20	123	FW005	0.40
21	131	FW004	0.37
22	138	FW030	0.34
23	161	FW002	0.13
24	162	FW023	0.07
25	164	FW007	0.03

MCA Rank	Overall rank	Site ID	MCA Score
26	171	FW010	-0.06
27	172	FW017	-0.10
28	174	FW015	-0.11
29	175	FW016	-0.12
30	178	FW009	-0.18
31	183	FW006	-0.42
1	8	LM002B	1.63
2	9	LM007	1.63
3	33	LM002BP	1.33
4	34	LM013	1.33
5	48	LM006	1.01
6	51	LM004A	0.95
7	60	LM001	0.82
8	63	LM010	0.79
9	64	LM008C	0.79
10	85	LM019	0.60
11	95	LM008B	0.52
12	97	LM002A	0.50
13	99	LM015	0.49
14	101	LM020	0.49
15	103	LM005	0.48
16	106	LM011	0.48
17	108	LM017	0.47
18	109	LM016	0.47
19	111	LM012	0.46
20	112	LM003	0.46
21	116	LM009	0.43
22	121	LM004B	0.42
23	126	LM022	0.38
24	128	LM008A	0.38
25	129	LM018	0.38
26	139	LM021	0.34
27	151	LM008D	0.25

MCA Rank	Overall rank	Site ID	MCA Score
28	163	LM014	0.07
1	6	UM004	1.66
2	31	UM015	1.34
3	57	UM002	0.87
4	82	UM014	0.63
5	89	UM012	0.56
6	90	UM013	0.56
7	91	UM007	0.56
8	104	UM009	0.48
9	105	UM005	0.48
10	107	UM011	0.47
11	113	UM008	0.46
12	114	UM006	0.45
13	137	UM010	0.35
14	145	UM001	0.31
15	150	UM003	0.26

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AITHER

GHD

Review of the ACT Healthy Waterways project

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1 Introduction

1.1 Scope

Apis has been engaged by GHD to conduct a "lessons learned" review (the Review) of the ACT Healthy Waterways Project. The purpose of the Review was to document key observations and lessons learned from stakeholders involved in the project.

The Review was conducted from September 2019 to November 2019. The approach used included:

- Brief review of selected project documentation;
- A facilitated workshop held on 17 September 2019; and
- Some follow up bi-lateral consultations.

This document presents the findings of the Review. It reflects a consolidation of stakeholder feedback provided through a facilitated consultation process. The Report does not include any scientific, engineering, legal, or technical opinion from the Review Team.

Terms of Reference are presented in **Appendix 1**.

A list of participants involved in consultations is in **Appendix 2**.

1.2 Background

The ACT Healthy Waterways project is a joint initiative of the Australian and Capital Territory Governments. The purpose of the project is to improve long-term water quality in the ACT and the Murrumbidgee River system.

Canberra's lakes and waterways play a vital role in protecting the health of the Murrumbidgee and Molonglo rivers by reducing the impact of storm water and trapping sediment and other pollutants.

Across the ACT region, individual water quality treatment assets have been identified as wetlands, ponds, creek restoration, swales, bioretention systems and stormwater supply infrastructure. The project is intended to reduce pollutant loads in six catchments:

1. Fyshwick
2. Lake Tuggeranong
3. Lower Molonglo
4. Upper Molonglo
5. West Belconnen
6. Yarralumla Creek

Further details of the ACT Healthy Waterways project can be found online at: https://www.environment.act.gov.au/water/act-healthy-waterways

The project included the construction of wetlands, ponds and rain gardens infrastructure as well as two research trials. It has been funded through the Australian Government, under a program of investment of some $93.5M.

Funding was provided in two stages, with 10% in stage 1 to develop the business case, and 90% for implementation /construction. There were 500 potential sites initially identified, down-selected to 30 for more detailed analysis based on the assets potential water quality improvement, of which 20 “assets” were delivered. The sites had varying levels of risk and constructability, with much of the risk coming from the potential for asbestos and other site contamination, existing utilities infrastructure, watercourse locations, in-stream operations, weather and community support.

As part of the $93.5M program, a discrete project was let for the construction of 19 assets delivered between October 2019 and June 2019 and with a Managing Contractor Target Cost of $64M.

1.3 Delivery Context

The $64M project involved collaboration across a number of stakeholders, utilising a delivery system referred to as the Managing Contractor (MC) model. The MC function is one of a number of functioning relationships in the delivery of the project.

By way of summary, the delivery system incorporates the role of a Project Management Contract Administrator (PMCA), awarded to GHD acting on behalf of the ACT Government, and a Managing Contractor (MC), awarded to Construction Control for the design and delivery of the project. The Managing Contractor’s role was to manage the design and construction process through sub-contracting, as opposed to designing and constructing the project itself. The pricing model for the MC contract was based on:

- A fixed price management fee for:
    - Planning phase design services;
    - Delivery phase construction management services; and
- Reimbursable costs for competitively tendered design and construction packages

The strategic intent of the MC delivery system over, say a traditional Design & Construct system, is:

- to afford greater control to the project owner and policy agency in upfront planning and determination of target cost and scope;
- to improve transparency in pricing and delivery decisions;
- to improve flexibility in the approach while minimising contract variations;
- allow major scope variations without overhead penalties

- to optimise the balance for industry participation in the project between a lead contractor and local sub-contractors; and
- to optimise the allocation of risk in project design and delivery among those parties best positioned to manage that risk.

Further information about how a Managing Contract delivery system works can be found online[1] .

Figure 1 provides a short overview of participants in the Control Group, a key governance mechanism used in the day to day delivery of the project.

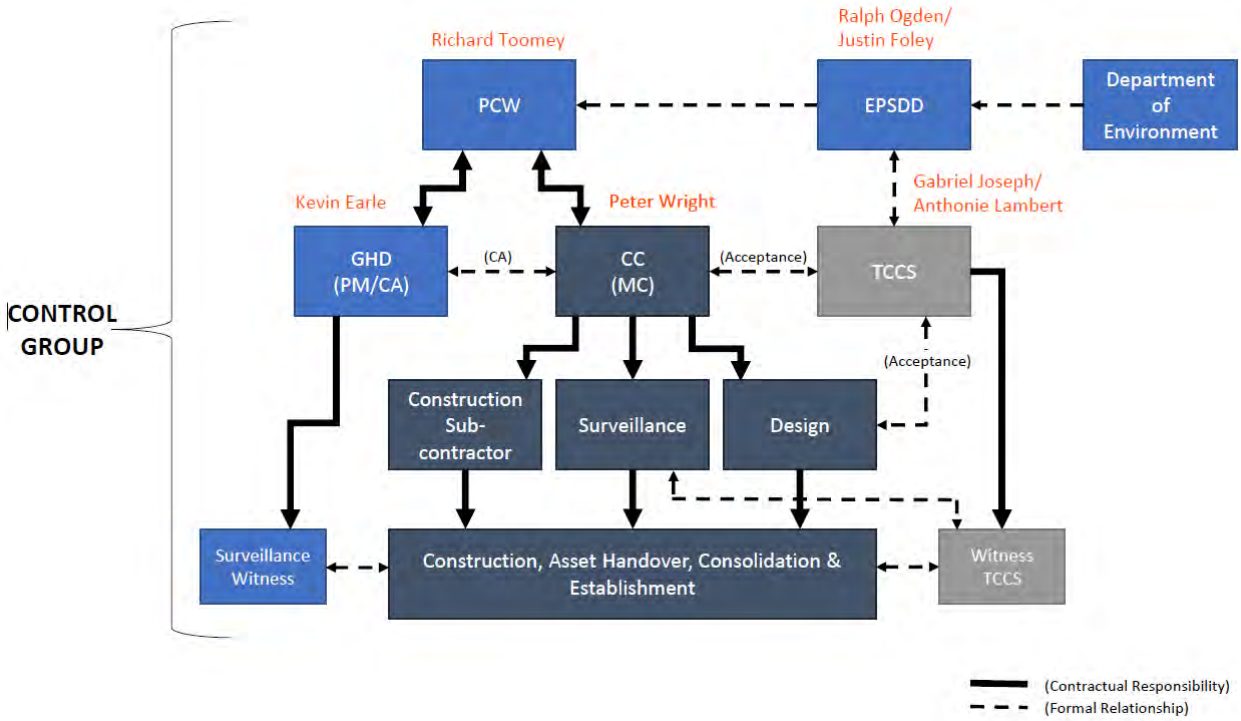


Figure 1 – Delivery Phase Organisation Structure[2]

For simplicity, Figure 1 excludes some other key relationships, including the Australian Government as the primary sponsor of the project. Some individuals are named in Figure 1 for convenience.

2 Observations

2.1 Themes identified

This section summarises observations arising from the consultations. The observations have been categorised into six primary themes, as follows:

[1] http://www.mondaq.com/australia/x/86596/Building+Construction/Relationship+Contracting+The+Managing+Contractor+Model

[2] Source: supplied by GHD

- **Theme 1: Business Case**, reflecting the processes and suitability of the business case to meet Australian Government (AG) expectations.
- **Theme 2: Delivery System**, reflecting the commercial arrangements put in place, central to which was a Managing Contractor model, and the roles and responsibilities of participants under the delivery system.
- **Theme 3: Governance**, reflecting the structures and forums for decision making, central to which was the project's Control Group.
- **Theme 4: Collaboration**, reflecting the informal relationships, business culture of the project, and the approaches to problem solving throughout the project.
- **Theme 5: Community Engagement**, reflecting the approach to communication and engagement with the community throughout the project.
- **Theme 6: Design and Delivery,** reflecting the appropriateness and progress of activities over the course of the project.

2.2 Observations

The following observations reflect primary messaging arising from the consultations, grouped into themes defined in section 2.1.

ITEM	COMMENTARY	THEME
1	**Central role of the Policy department** – The ACT Government's Environment, Planning and Sustainable Development department (EPSDD) played a pivotal "coordinating" role and worked closely in partnership with ACT Government Procurement Services. This led to the adoption of the Managing Contractor delivery system and allowed private sector capability to be incorporated into the overall governance model. This was a key to the success of the project.	2 -Delivery system 3 - Governance
2	**Industry participation** - There was high consensus among stakeholders that the Managing Contractor contracting model was effective in getting a commercial industry response and engaging smaller, local contractors while not making them take on excessive levels of risk on a project by project basis. Industry participation through the sub-contracted packages was noted to be positive by the MC project team and ACT Government.	2 - Delivery system
3	**Staged approach to funding** - The funding of the project was broken into two stages (planning and delivery), however, the planning stage experienced delays. Territory stakeholders commented that the allocation of 10% funding in Stage 1 meant that parallel delivery activity was delayed (i.e. procurement of the PMCA and MC for delivery of the project). Some stakeholders noted that these delays could have been avoided had some financial reserves been made available to keep the project team	1 - Business Case 2 - Delivery system

ITEM	COMMENTARY	THEME
	working during that period. The AG will not provide funds ahead of any assessment or approval of proposed works. Therefore, until such time as Stage 2 was assessed and the funding agreed, no funds would be pre-provided.	
4	**Understanding of the delivery system** - While the contracting approach is reported to be well known in some major Australian Government departments (especially Defence, Finance, APH, Home Affairs, NCA, AIS, CSIRO) , it was not well understood in Department of Agriculture, Water and Environment when the concept was first raised as a preferred model. Taking more time with awareness raising and explaining the model and its benefits could have eased the process in the early days of the project.	2 - Delivery system
5	**Uncertainty in scope and cost** - Stakeholders consistently noted that the Managing Contractor delivery system was effective in delivering the greatest value under conditions of uncertainty over the individual sites and strict budgetary and schedule constraints.	2 - Delivery system
6	**Role and responsibilities** – Because the Managing Contractor delivery system is a more sophisticated model, there was evidence of misaligned expectations around roles and responsibilities between parties, e.g. surveillance, design approval. This arose from some misunderstandings of how the model worked. Stakeholders agreed that once the model had been operating for a while, coupled with strong governance, these issues were mitigated, and improved considerably. The key learning was around upfront communication and clarification of all roles involved in the model.	2 -Delivery system 3 - Governance
7	**Role of the Contract Administrator** - Having an effective administrator (GHD) managing the interface between the Territory client and the MC contractor and delivery contractors was important in terms of managing the multiple contacts and scope. GHD played a key role in managing upwards to government to insulate the delivery contractors from potential distractions and allow them to do their job. This kept the respective risks and risk management with the parties allocated to manage each risk.	2 -Delivery system 3 - Governance
8	**Strategic approach to governance -** All stakeholders commented on the strength of the project governance mechanisms as a key contributor to project success. Key features of governance that contributed to success included: • Senior executive involvement and commitment through the Deputy Generals (DG) Group between ACT and Australian governments; • A charter to describe the relationship between ACT and AG;	3 - Governance

ITEM	COMMENTARY	THEME
	• An effective Project Control Group with participation by key players; • Regular reporting and meetings of key forums; • Risk management central to project governance allowing issues to be addressed as they arose; and • Multi-lateral commitment to the project evident through regular leadership attendance. Many stakeholders reiterated that the approach to governance was a positive lesson to be identified from this project.	
9	**Project Control Group** – There was high consensus among all stakeholders that the Project Control Group operated effectively as a governance mechanism throughout the project. The meeting mechanics were strong, with meetings ran regularly and were governed very well. The Control Group was chaired by the Deputy Director General, EPSDD, and this was handed extremely well. In particular, the involvement of multiple parties in the Control Group (refer Figure 1) afforded early and active resolution of issues.	3 - Governance
10	**Effective risk management** – Stakeholders consistently noted the proactive approach to risk management. The MC delivery system allowed risks to be managed by appropriate "risk owners", and the governance structures promoted early and clear reporting and actioning as risks emerged into issues. A project risk register proved a central tool in tracking risk management.	3 - Governance 6 – Design & Delivery
11	**Business Case** – Development of the business case did cause some concerns between Australian Government (AG) and the Territory. AG representatives emphasised the importance of maintaining a traceable "value for money" proposition throughout the process of site selection, and the importance of clear and concise project objectives and outcomes that supported the water quality improvement aim for the project. This was difficult to maintain when the numbers of assets reduced from early expectations through the design process.	1 – Business Case
12	**Project outcomes** - The primary objective of the project was the delivery of water quality outcomes. Notwithstanding this, community expectation of expenditure on areas of community amenity was evident early in the project. Expectations had to be managed carefully. Stakeholders noted that there was evidence of improved amenity, signage and other features that in part contributed to improved community perceptions.	1 – Business Case
13	**Management overhead** - AG stakeholders noted that, notwithstanding the involvement of multiple managing parties, the estimates of the overall project management overhead for the ACT Government and GHD in the costings for the project remained	1 – Business Case

ITEM	COMMENTARY	THEME
	within reasonable limits, and this allayed earlier concerns around the MC model.	
14	**Collaboration** - All stakeholders concurred that there was highly effective collaboration across groups involved in the project, with everybody bringing the right attitude. There was a good balance of seniority and experience across the project, with a good blend of specialist skill sets, age ranges and personalities building collective trust and respect. In particular, the Review team noted there was longevity of key personnel over the course of the project in key roles within the ACT government, Contract Administrator, the Managing Contractor and the Australian Government.	4 - Collaboration
15	**Individual commitment** – Many stakeholders commented on the professional commitment and involvement of senior representatives from the Territory, the Contract Administrator, the Management Contractor and the Australian Government, and their high level of engagement in the project. This was a key contributing factor to overall success of the project.	4 - Collaboration
16	**Constructability** - Stakeholders noted the importance of assessing the "constructability" of a project, including both physical factors and its social license, rather than its pure desirability in terms of outcomes or availability. The MC model contributed to this, because it incorporated the construction expertise of the MC during the design phase, and this was regarded as a particular strength.	6 – Design & Delivery
17	**Design Standards** – There was some evidence of early project design utilising out of date or incorrect design standards right up front, and these created a delay that continued on to the next stage. This meant that design modifications flowed through into asset delivery from time to time, and this could have been improved. Examples included filter materials and flood controls. Anything resembling redesign created delays and confusion. However, stakeholders noted that these issues were minor, and did not detract from the success of the construction.	6 – Design & Delivery
18	**Value Management Workshops** - For every one of the 19 assets, the project went through a two-stage "value management process". This involved detailed planning and design workshops with high levels of involvement from stakeholders, including relevant expertise, designers and construction representatives. This multi-disciplinary approach was extremely well regarded, and a key contributor to success of the project.	3 - Governance 6 – Design & Delivery
19	**Stakeholder Engagement Strategy** – The project developed an effective stakeholder engagement strategy early on. This proved a	4 - Collaboration

ITEM	COMMENTARY	THEME
	good contributor to success. Central to the strategy was the approach to "bring the community into the process" rather than as an afterthought.	5 – Community Engagement
20	**Community engagement** - Community engagement was done very well, and the project experienced very few complaints. The key to this was leveraging scientific expertise and using this expertise to advocate in the media. There was good opportunity for community representatives to be briefed on the project. This led to community understanding and involvement, while focussing on delivering the primary objective of improved water quality.	5 – Community Engagement
21	**Research involvement** - The project developed a good relationship with the lead researchers. The scientific advisory group incorporated early involvement of 10 scientists for Stage 1. Representation was broad and inclusive. Stage 2 had a separate scientific reference group (Uni of CBR), and this was also considered by stakeholders to be a strong mechanism.	4 - Collaboration 5 – Community Engagement
22	**In-line assets** - During the construction phase, it was noted that 3 of the 19 assets were "in-line" assets (watercourse running through it, returning concrete channels into a lined creek). Two were a particularly complex and one kept getting washed away, taking six months to complete instead of six weeks. The lesson to the government is that channel naturalisation is realistically a difficult construction activity, noting that these designs needed to be revisited an improved during construction to combat damaging flows in the creeks.	6 – Design & Delivery
23	**Surveillance** – Project surveillance was variable. TCCS maintained their own representative in a surveillance role, notwithstanding that this was a sub-contracted responsibility of the MC with secondary supervision by the PMCA. Some design and construction non-conformance matters were identified by TCCS that maybe should have been picked up by the MC. However, when these issues were raised, the MC was noted by stakeholders as being highly responsive to their resolution, and this mitigated much of the concern.	2 - Delivery system 6 – Design & Delivery
24	**Public announcements** – There was some evidence of a disjointed approach to media announcement on delivery of assets. The key learning is around the importance of clearance / involvement of key sponsors in public announcements.	6 – Design & Delivery
25	**Infrastructure Sustainability Council of Australia (ISCA) Rating –** The inclusion of obtaining an ISCA rating for both the design and construction phases of the project was seen as a positive step, particularly given the environmental sustainability aspects of water quality improvement. ISCA should be discussed and agreed to be incorporated on a project such as this earlier in the planning phase	6 – Design and Delivery

ITEM	COMMENTARY	THEME
	in future to achieve better sustainability outcomes, and to also reduce the pressure of collecting and maintaining adequate record keeping in order to provide the comprehensive submission required.	

3 Lessons Learned

This section provides a suite of concluding "lessons learned", drawn from the above observations.

3.1 Theme 1 – Business Case

The Business Case is the primary deliverable that supports the program sponsor in determining overall value for money as a condition of sponsorship. The key lesson here is to ensure:

- Clear description of strategic outcomes, in this case, water quality outcomes
- Traceability of works to those project outcomes through some form of program logic; and
- Alignment with the AG / Territory funding agreement that arises from approval of the business case;

3.2 Theme 2 – Delivery System

The Managing Contractor delivery system was a successful, well executed approach to this project. The model displayed many of the advantages of an MC model described in Section 1.3. If it is to be used in a future project, close consideration should be payed to:

- promoting and communicating an **understanding of the roles and responsibilities** of all parties involved, especially in milestone approvals;
- greater clarity in **requirements for upfront design and standards**, and
- maintaining **flexibility in the planning phase** to allow funding into the delivery phase where timing permits

3.3 Theme 3 - Governance

Success of this project was underpinned by good governance at all levels (strategic, operational and day to day). The governance structures on this project, particularly the Control Group, reflect **better practice**, supported by **high levels of senior involvement** from all parties, particularly the Managing Contractor.

The key lesson here is that with the strong governance that this project experienced, most other issues and challenges were speedily resolved.

Further, a strong **risk management framework** underpinned the workings of the Control Group, with clear allocation of risk to parties best positioned to manage those risks.

3.4 Theme 4 - Collaboration

All stakeholders on the project commented on the **high levels of commitment**, buy-in and professionalism of project team. Informal collaboration was evident over the duration of the project. While the project was not without challenges, the collaborative approach to problem solving allowed good resolution of issues.

Underpinning a high level of collaborating was good **longevity of key personnel** over the course of the project in key roles within the ACT government, Contract Administrator, the Managing Contractor and Australian Government.

3.5 Theme 5 – Community Engagement

A thorough stakeholder engagement strategy was developed earl in the project, and it included substantial community engagement. The key lesson here was the **bringing together of the scientific expertise with community involvement** from an early stage of the project. This got the community on side with the project, and minimised complaints and confrontation during delivery stages.

3.6 Theme 6 – Design and Delivery

Design and delivery were well executed, arising from a strong delivery system and good governance (as commented previously). Complexities in delivery arose from in-line assets, and site-specific challenges. There were no systemic problems identified for the project.

The biggest challenge and lesson learned here arose from perceived **shortcomings in the surveillance model** (noted by TCCS) for identification of construction on-conformance. Where non-conformances were identified, the strength of the contracting relationships allowed speedy resolution.

4 Conclusion

This was a successful project. 19 assets were delivered on time, within budget. By way of conclusion, the primary contributors to success were:

- the Managing Contractor delivery system;
- a proactive, multi-disciplinary governance model;
- high levels of collaboration and buy-in from government and private sector parties; and

- strong community engagement.

The project should be considered as a “better practice” example for future projects of similar size and scale.

Appendix 1 – Terms of Reference

The Terms of Reference for the assignment is as follows:

Item	Details

Scope:	• Register as a supplier with GHD (Allow 2 hours)
	• Review of ACT Healthy Waterways Project and related background documents (Allow 1 day)
	• Planning meeting with GHD and EPSDD for Learning Workshop and Interviews of key Project staff and stakeholders (Allow 1/2 day)
	• Conduct Learning Workshop and follow-up interviews (Allow 1 day)
	• Draft a report for review on lessons from the conduct of the Project, addressing benefits (aspects that went well that future projects should emulate) and challenges (aspects that could be improved on by future projects) related to: (Allow 1 day)
	  ○ the suitability of the delivery system for design and construction
	  ○ effectiveness of the collaboration framework
	  ○ effectiveness of the 4 design types in a built up urban setting
	  ▪ Pond
	  ▪ Wetland
	  ▪ Bioretention
	  ▪ Creek restoration
	  ○ Ideas for next time
	  ○ lessons emerging from other matters raised in discussions that contributors consider important.
	• Finalise and submit report. (Allow 1 day)

Appendix 2 – Consultation List

Apis appreciates the involvement and contribution from a range of stakeholders who were involved in the consultation process for this report.

Name	Organisation	Meeting
Personal information	GHD	17 September 2019
	GHD	17 September 2019
	GHD	17 September 2019
	GHD	17 September 2019
	Construction Control	17 September 2019
	Construction Control	17 September 2019
	Construction Control	17 September 2019
	Construction Control	17 September 2019
Ralph Ogden	ACT Govt – EPSDD	17 September 2019
Justin Foley	ACT Govt – EPSDD	6 November 2019
Felicity Grant	ACT Govt – EPSDD	17 September 2019
Danswell Starrs	ACT Govt – EPSDD	17 September 2019
Maria Mangeruca	ACT Govt – EPSDD	17 September 2019
Matt Kendall	ACT Govt – EPSDD	17 September 2019
Joel Kelly	ACT Govt – TCCS	17 September 2019
Gabriel Joseph	ACT Govt – TCCS	5 November 2019
Noreen Vu	ACT Govt – TCCS	17 September 2019
Richard Toomey	ACT Govt – IDPG (Major Projects Canberra)	17 September 2019
Simon Webber	ACT Govt – IDPG (Major Projects Canberra)	17 September 2019
Personal information	Australian Government - Department of Agriculture, Water and Environment	1 November 2019
	Australian Government - Department of Agriculture, Water and Environment	1 November 2019



ACT HEALTHY WATERWAYS BASIN PROJECT

CONSULTATION REPORT

January 2017



Australian Government

ACT Government

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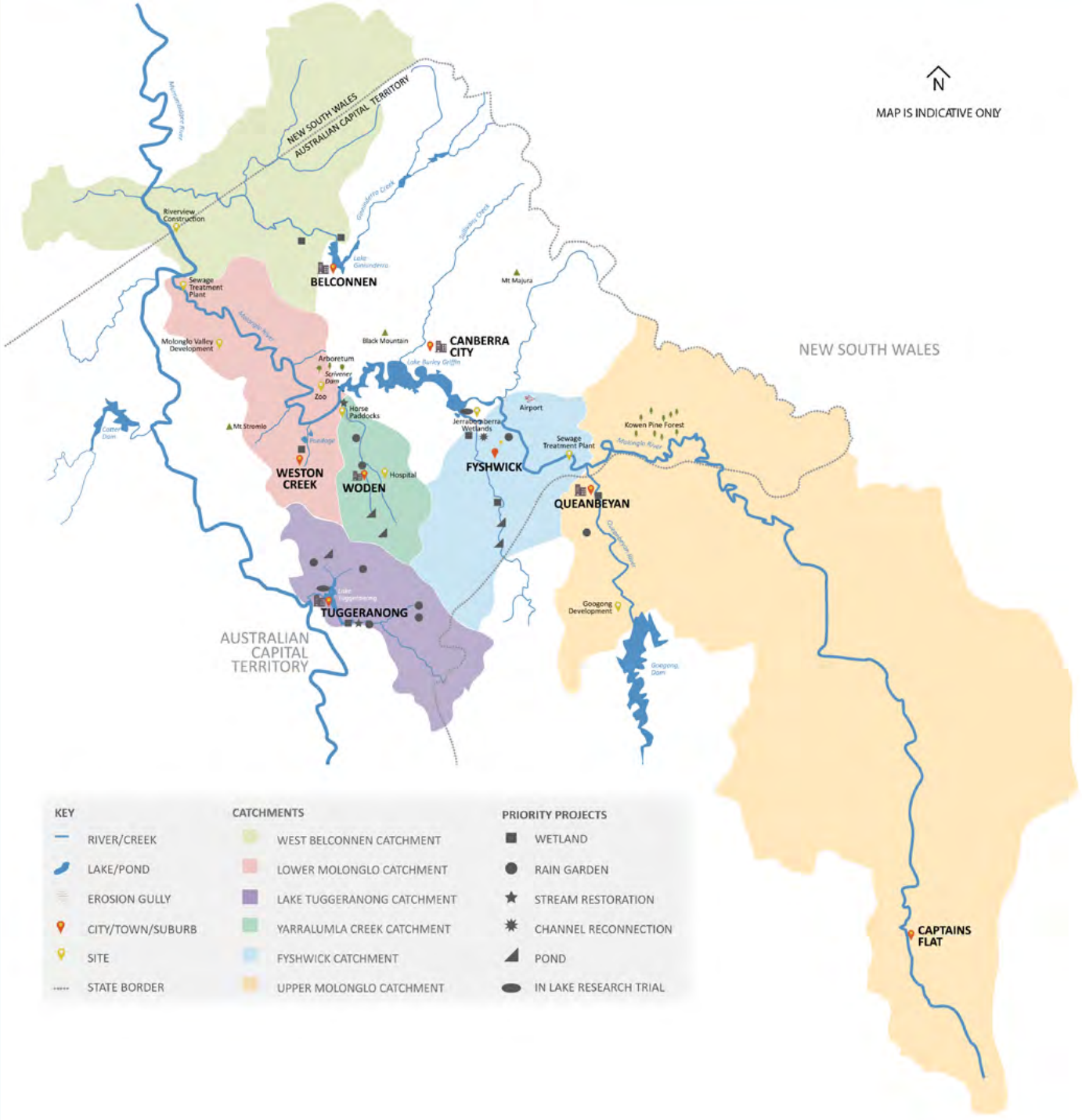
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ACT HEALTHY WATERWAYS (BASIN PROJECT)

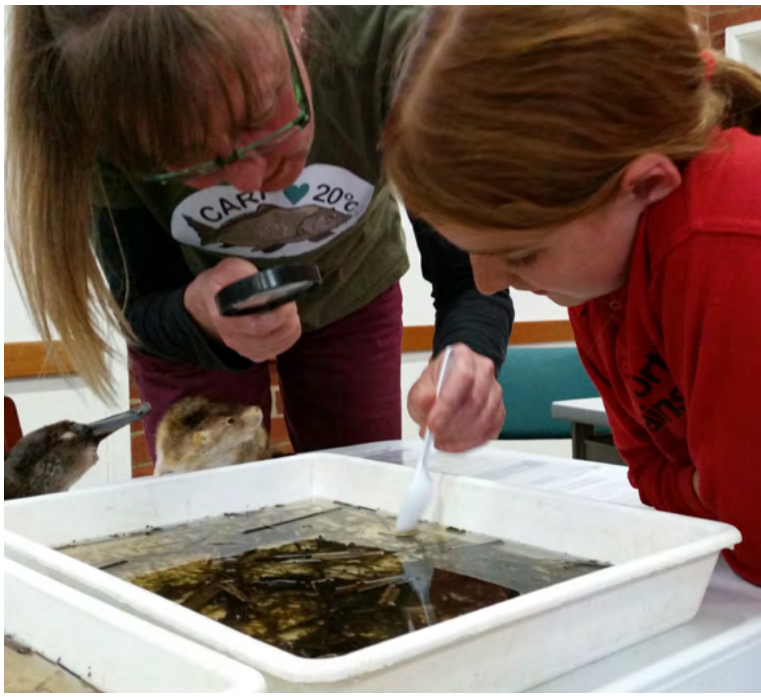
SIX PRIORITY CATCHMENTS



WHY WE NEED TO UPGRADE OUR WATERWAYS

Canberra's lakes and waterways are under increasing pressure, largely due to urban development, past land and water management regimes, climate change, and a lack of awareness about the kinds of activities that affect water quality.

Stormwater pollution risks public health and aquatic life and threatens the many social, economic and environmental benefits our lakes and waterways provide. Polluted stormwater also causes problems beyond our borders, affecting water quality downstream in the Murrumbidgee River system and, more broadly, in the Murray–Darling Basin.



ACT HEALTHY WATERWAYS

ACT Healthy Waterways is a joint initiative of the Australian and ACT governments to protect and improve long-term water quality in the ACT and the Murrumbidgee River system, which are part of Australia's iconic Murray–Darling Basin.

More than $93 million will be spent on up to 25 new water quality infrastructure as well as improved water monitoring, in-lake research and a campaign to let residents, businesses and visitors know how they can help look after our waterways.

It plays an important role in achieving targets in the ACT's Water Strategy, announced in 2014, which sets out how the ACT Government will manage the Territory's water resources over the next 30 years.

BASIN PROJECT

The Basin Project involves the construction of a range of infrastructure – ponds, wetlands, rain gardens and swales as well as creek restoration and channel reconnection – designed to "turn off" or reduce the amount of nutrients, sediment and pollutants entering our waterways. The focus is on improving water quality higher up in the catchment where rainwater becomes stormwater.

PRIORITY PROJECTS

Up to 25 projects (including in-lake research) have been prioritised across six catchments:

1. The established catchment of Lake Tuggeranong
2. The established catchment of Yarralumla Creek
3. The developing catchment of Upper Molonglo
4. The developing catchment of Lower Molonglo
5. The developing catchment of West Belconnen
6. The industrialised Fyshwick catchment.

A carefully balanced combination of factors was considered when selecting the projects, underpinned by thorough scientific research and consultation with technical experts, government and the broader community. The factors considered included:

- The predicted water quality outcomes each option would generate
- The cost of building and maintaining infrastructure over its lifetime
- Potential environmental impacts and site-specific practical constraints
- Broader economic costs and benefits, social values and community preferences.

All efforts will be made to deliver these projects within the allocated budget and timeframe.

COMMUNITY INPUT IS VITAL

Input from the community has played a vital role in the Basin Project since it commenced two years ago.

The project team initially identified over 500 potential sites across six priority catchments. A panel (including technical experts and community representatives) evaluated the list and the sites were prioritised according to cost and feasibility as well as the potential for improved water quality and increased amenity.

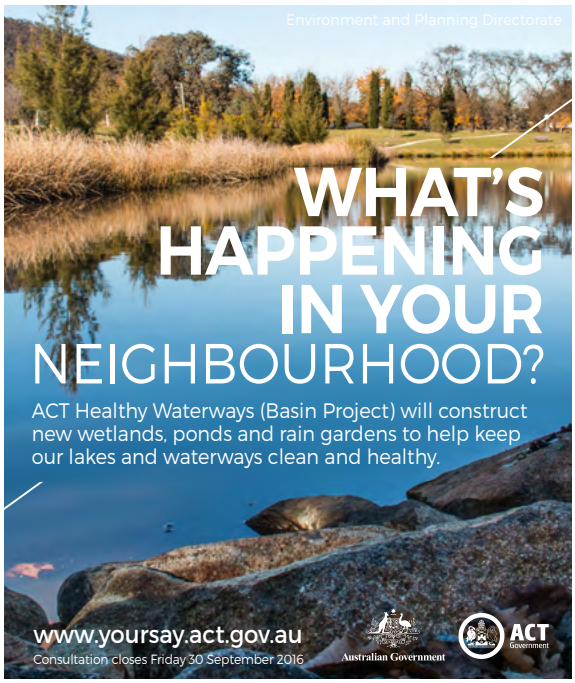
As a result, the list was reduced to 188 (178 infrastructure and 10 in-lake projects) and the design team developed concept plans for each site ahead of the first round of community consultations in July 2015. Comments were received from a range of different sources, including experts in the field, community groups and people who attended the six catchment-based drop-in sessions. The feedback received helped shape the next step in the process: the development of preliminary plans for 24 priority projects, 12 reserve projects and in-lake research.

At drop-in sessions during September 2016, visitors could view the preliminary sketch plans, talk with the design team and provide feedback. The plans were also available online on the Your Say website (from 22 August) and the community invited to comment.

The project team used a range of communication tools and mediums to promote the September drop-in sessions and encourage comment on the Your Say website:

- Residents who live near each of the sites were notified via a letterbox drop
- Advertisements were placed in The Chronicle and the Canberra Weekly
- Stakeholders received regular email updates





- Updates and event listings were shared on the then Environment and Planning Directorate social media pages
- Posters and brochures were displayed in all ACT public libraries
- Information about the Basin Project was included in the ACT Government e-newsletters
- Internal emails advised ACT Government staff
- Access Canberra public screens featured information about the project and dates for drop-in sessions
- Articles were published in a range of publications and on associated websites, e.g. ACT Landcare, Youth Coalition of the ACT, various catchment groups.

Although the consultation period closed on 30 September, online comments remained open until 5 October to allow for last-minute submissions over the long weekend.

With the design phase consultation now complete, work is under way on developing plans to be submitted to the planning and land authority for development approval, a legislative requirement for all construction work in the ACT. This process includes a consultation period which offers another chance for members of the community to comment on the proposed infrastructure.



[1] Unique visits to the Your Say website.
[2] Does not include conversations with people who attended the drop-in session or community meetings. Nor does it include telephone conversations or email exchanges between stakeholders or members of the community and the project team.

FEEDBACK

Over 3000 people either visited the Your Say website or attended one of the six drop-in sessions. Following the funding announcement in May 2016, the project team presented to more than 14 community groups, talking directly to an estimated 300 people.

Feedback received prior to and during the consultation period was positive. People were supportive of infrastructure to improve water quality and felt the planned projects would be valuable community assets. Some identified opportunities for environmental education, particularly for children, and others for increased recreation.

A number of sites received no comments with a few generating a lot of interest. The Your Say website offered everyone the chance to express an opinion, ask questions of the project team and engage in a conversation with supporters and opponents alike.

TAKING ACTION

During the August/September 2016 consultation period, comments about the overall project and specific sites were received via a range of mediums – the Your Say website, emails and correspondence sent to the project team, feedback forms completed at drop-in sessions and letters to the then Minister for the Environment and Climate Change.

Comments and suggestions relating to design were passed on to the design team for their consideration when drafting plans in support of the development applications. Comments not related to design have either been addressed by the project management team (for example, requests to add additional sites for new infrastructure) or passed on to the relevant ACT government agency (for example, increases in water rates, the maintenance of existing water infrastructure, the management of litter, etc.).



LOWER MOLONGLO CATCHMENT

126 people viewed the plan online[1]





13 people attended drop-in session

17 comments received





17 positive comments or questions received[2]

[1] Unique visits to the Your Say website.

[2] Does not include conversations with people who attended the drop-in session or community meetings. Nor does it include telephone conversations or email exchanges between stakeholders or members of the community and the project team.

Key facts

- Includes the Molonglo River downstream of Lake Burley Griffin below Scrivener Dam to the Murrumbidgee River.
- Only a small portion of the stormwater that runs off urban areas is treated before being discharged into the Molonglo River.
- Land use in the catchment is mixed and includes grazing, forestry and urban areas.
- Proposed urban development in the catchment is expected to place further pressure on water quality.

Expected benefits

- The priority project will remove 113,000 kg/year of suspended solids, 182 kg/year of phosphorus and 610 kg/year of nitrogen from Lower Molonglo waterways.
- The new wetlands will improve the amenity of the space and offer more opportunities for recreation.

Projects

Wetlands between Cotter Road and Dixon Drive, Holder (LM013): Two new wetlands will be established in the open space. Reeds, grasses and trees will use the nutrients in the stormwater to grow and help remove sediment by reducing the speed of water flows. Sympathetic design will minimise the impact on existing vegetation and paths, currently used for walking, horse riding and cycling. Extensive landscaping will help to maintain amenity and the site is expected to be a favorite destination for families, walkers and cyclists.

Reserve projects

Rain garden between Tristania Street and Streeton Drive, Rivett (LM006)

Wetland adjacent to Centre for Teaching and Learning, Freemantle Drive, Stirling (LM004)

Rain garden near Araluen Street, Fisher (LM001)

Wetland between Streeton Drive and Weston Creek stormwater channel, Holder (LM008C)

Rain garden near De Graaff Street, Holder (LM010)

For more information visit the Your Say website.

Feedback summary

Priority project

In regards to LM013, the community was supportive and many happily anticipated using the new recreational space. Some requested sufficient off-street parking and seating to accommodate classes of children who might visit from local schools.

Reserve projects

Comments were supportive of the projects and hopeful that cost savings may mean that the rain garden near De Graff Street, Holder (LM010) in particular would go ahead.

For a more detailed summary of comments and responses, see Appendix A.

UPPER MOLONGLO CATCHMENT



[1] Unique visits to the Your Say website.
[2] Does not include conversations with people who attended the drop-in session or community meetings. Nor does it include telephone conversations or email exchanges between stakeholders or members of the community and the project team.

Key facts

- Includes a mix of both rural and urban areas.
- Land practices along the Molonglo and Queanbeyan Rivers, as well as the urban areas of Queanbeyan, put a significant strain on water quality.
- Land clearing in the upper reaches of the catchment is linked to higher run-off, erosion and increased nutrient levels in the Molonglo River.
- New development is placing further pressure on water quality.
- Water quality monitoring indicates the highest level of pollution in the catchment occurs in Queanbeyan's urban areas.
- Only a small portion of stormwater that runs off urban and industrial areas is treated.
- The older layout of Queanbeyan means there is limited space for water-sensitive urban design infrastructure.

Expected benefits

- The priority projects will remove 73,600 kg/year of suspended solids, 105 kg/year of phosphorus and 600 kg/year of nitrogen from the Molonglo and Queanbeyan rivers.
- Other benefits for the catchment include improved open space and recreational areas as well as an increase in the diversity of the area's natural habitat.

Projects

Wetland on the reserve adjacent to Morrisett Street, Queanbeyan (UM015): A new wetland, on the city-side bank of the Queanbeyan River near the low level crossing, will improve water quality by trapping sediment and nutrients. It will also increase the area's appeal as a recreational space. The design allows the retention of some open space for existing activities such as dog walking.

Rain gardens at Alanbar Street and Kenneth Place, Karabar (UM004): Twin rain gardens - one within a roundabout and the other in open space - will slow run-off, with plants helping to remove sediment and nutrients. Both areas will be landscaped. The rain garden near Alanbar Street in open space has been designed to retain the existing mature tree on the north side of the site and the path will be realigned to go around the garden.

Please note there are no reserve projects identified for the Upper Molonglo catchment.

For more information visit the Your Say website.

Feedback summary

Priority projects

There was some very valuable feedback from Queanbeyan Palerang Regional Council (QPRC) about the wetland in Queanbeyan (UM015). They suggested moving the wetland further uphill, using open channels to allow for the movement of fish and the incorporation of a gross pollutant trap (GPT). They also offered ideas about how to protect the asset during flood events and asked that more space be allocated to general use.

QPRC anecdotally reported that the local Aboriginal community welcomed the extended habitat along the river and had requested some educational and cultural signage and interpretation, along with additional seating.

Other comments about the rain gardens in Karabar (UM004) included a request for a new path on the existing desire line, cautionary information about past flood events, the need to ensure rain gardens are resilient, and recommendations to extend capture and involve local Aboriginal people.

For a more detailed summary of comments and responses, see Appendix A.

FYSHWICK CATCHMENT



[1] Unique visits to the Your Say website.
[2] Does not include conversations with people who attended the drop-in session or community meetings. Nor does it include telephone conversations or email exchanges between stakeholders or members of the community and the project team.

Key facts

- Drains into Lake Burley Griffin.
- Pollution from industrial areas, including heavy metals and hydrocarbons, and ageing stormwater infrastructure are the two key contributors to poor water quality, e.g. untreated stormwater drains from buildings and streets into pipes that run directly into Jerrabomberra Creek and the Molonglo River.
- Includes crop production, rural grazing land and intensely urbanised industrial and commercial areas.
- Water quality monitoring has shown that stormwater run-off in Fyshwick contains zinc levels double that of other urban catchments.
- A research project will also be undertaken.

Expected benefits

- The priority projects will remove 1,755,100 kg/year of suspended solids, 2630 kg/year of phosphorus and 9797 kg/year of nitrogen from waterways in the catchment.
- Other benefits include improved open spaces and recreational areas as well as an increase in the diversity of the area's natural habitat.

Projects

Wetland, Eyre Street, Kingston, adjacent to Jerrabomberra Creek (FW012): Water from Jerrabomberra Creek will be diverted to a new wetland before returning to the creek. The existing networks of walking tracks that run through the Jerrabomberra Wetlands have been incorporated into the design.

Pond, Jerrabomberra Creek, corner of Hindmarsh Drive and Monaro Highway, Symonston (FW020): The storage capacity of the existing pond will be increased to enable more stormwater to be treated before being returned to the creek.

Channel reconnection, Jerrabomberra Wetlands, Dairy Road (FW025): A channel on Jerrabomberra Creek will be rehabilitated to create a new wetland. This will help improve water quality in the creek and add to the amenity and ecology of what is a highly modified part of the Jerrabomberra Wetlands.

Pond adjacent to Jerrabomberra Creek, between Bonshaw Road and Payenda Circuit, Symonston (FW021): The existing pond adjacent to Jerrabomberra Creek (in the open space between Lanyon Drive and Hindmarsh Drive) will be enlarged and connected to the creek. This will increase the storage capacity of the pond and enable more stormwater to be treated before it returns to the creek.

Wetland and potential stormwater use, Matina Street, south of Mill Creek Oval, Narrabundah (FW019): A new wetland will take advantage of open space between Matina Street and the Monaro Highway. Low flows from Jerrabomberra Creek will be diverted to the wetland before returning to the waterway, while high flows will bypass the wetland and continue along the existing creekline. The wetland will be a valuable recreational space for the local community.

Rain garden, Gladstone Street, Fyshwick (FW001): Two treatment options (a gross pollutant trap and a rain garden) will remove pollutants and sediment from the water before it flows into the Molonglo River, which, in turn, feeds into Lake Burley Griffin.

In-lake research project, Jerrabomberra Creek and lakes: Jerrabomberra Creek will be part of a catchment research project that will examine the effectiveness of earth banks in controlling wetland wetting and drying. The results have implications for issues like carp management and nutrient removal. Work is progressing on identifying the scope of this project.

Please note there are no reserve projects identified for the Fyshwick catchment.

For more information visit the Your Say website.

Feedback summary

Priority projects

FW019 (Matina Street, Narrabundah) was the only project in this catchment to attract comments from the community. There was a great deal of support for the wetland, with many existing users keen to see the site better utilised and restored to a more natural state. Requests for more stable paths and trails and improved amenity (eg. on-site rubbish bins) were common as was a suggestion that new trails could connect with the wider cycling network and provide access to other wetlands close by.

Representatives from Canberra Airport raised concerns that the projects close to flight paths may present a bird-strike risk. This relates to five of the six projects planned for the catchment, including FW019.

Action taken

The ACT Healthy Waterways team continues to liaise with representatives from the Canberra Airport regarding bird-strike and a risk assessment will be conducted.

For a more detailed summary of comments and responses, see Appendix A.



LAKE TUGGERANONG CATCHMENT



[1] Unique visits to Your Say website.
[2] Does not include conversations with people who attended the drop-in session or community meetings. Nor does it include telephone conversations or email exchanges between stakeholders or members of the community and the project team.

Key facts

- The highest levels of pollution entering the lake come from the Kambah and Wanniassa stormwater drains.
- This network of older stormwater pipes and concrete-lined channels were designed to move run-off into Lake Tuggeranong as quickly as possible, along with pollutants like leaves, chemicals, animal faeces and grass clippings.
- Tuggeranong Creek feeds into Lake Tuggeranong which, in turn, flows into the Murrumbidgee River.
- Large volumes of untreated water frequently overwhelm the capacity of the lake to process pollutants, creating conditions that lead to blue-green algal blooms.

Expected benefits

- The priority projects will remove 689,100 kg/year of suspended solids, 954 kg/year of phosphorus and 4533 kg/year of nitrogen from stormwater inflows to the lake.
- Other benefits include enhanced open space, an increase in the diversity of the area's natural habitat and the potential for irrigation of local sporting fields.

Projects

Rain garden and potential stormwater use, Chirnside Circuit, Kambah (TG003): A new rain garden in open space south of the Kambah West District Playing Fields near Drakeford Drive will improve the overall ecology and amenity of the site. The existing cycleway will not be affected but some trees may need to be removed to allow for construction.

Rain gardens and potential stormwater use, Athllon Drive between Langdon Avenue and Fincham Crescent, Wanniassa (TG008): A series of rain gardens will be established adjacent to St Anthony's Primary School near Athllon Drive. Some of the captured and treated stormwater may be used to irrigate Wanniassa Playing Fields.

Rain garden, Upper Stranger Pond, Isabella Plains (TG010): A rain garden upstream from Upper Stranger Pond will help remove sediment and nutrients from stormwater. Depending on conditions, water from the pond could be used to irrigate Isabella Plains Neighbourhood Oval and nearby playing fields. The area will also be landscaped to incorporate vegetation and planting beneath existing trees.

Swale, Corlette Crescent, Monash to Isabella Pond (TG012): Part of the concrete channel between Corlette Street, Monash and Isabella Pond will be converted to a swale. Vegetation in the swale will help treat stormwater before it enters the pond and increase the diversity of the area's natural habitat. The swale will occupy a wider area compared to the current concrete channel.

Rain garden and potential stormwater use, north of Isabella Drive near Kirkcaldie Circuit, Chisholm (TG023): The new rain garden may be combined with an irrigation system so captured and treated stormwater can be used to irrigate Chisholm District playing fields. While some existing trees will need to be removed, the project includes extensive landscaping and new planting

Pond and potential stormwater use between Kett Street and Drakeford Drive, Kambah (TG030): A new pond in open space near the Burns Club will capture stormwater that could be used to irrigate the adjacent Kambah East District Playing Fields. The site will be landscaped to enhance the existing open space.

Rain gardens, Fadden Pines Reserve, Fadden (TG029): Two rain gardens will improve the open space between Isabella Drive and Coyne Street. The area will also be landscaped to incorporate vegetation and filtering media to remove nutrients and sediment. The design minimises the removal of existing trees and leaves a large landscaped area as a recreational space for the local community).

Wetland, Isabella Pond, Drakeford Drive, Monash (TG011C): A wetland will be constructed on the edge of Isabella Pond in conjunction with the proposed upgrade of the Isabella Weir spillway for flood mitigation purposes. These improvements will help remove nutrients from the stormwater that enters Lake Tuggeranong via the pond. NB: This project is funded directly by the ACT Government and has been progressed as part of the broader Isabella Weir spillway upgrade works (for flood mitigation) being undertaken by Chief Minister's, Treasury and Economic Development Directorate. A development application covering the weir and the wetland has been approved.

In-lake research Lake Tuggeranong: Lake Tuggeranong will be part of a catchment research project to improve understanding of how changes in sediment movement and oxygen profiles affect algal blooms, including:

- managing change in the movement of sediment, potentially using sediment curtains
- managing dissolved oxygen profiles, potentially using bubblers.

Work is progressing on identifying the scope of the research project.

Reserve projects

Rain garden and potential stormwater use, Bugden Avenue, opposite Kellett Street, Gowrie (TG017)

Rain garden and potential stormwater use opposite Viking Park, McBryde Cresent, Erindale (TG014)

Rain garden north of De Little Circuit, Greenway (TG007B)

Rain garden north of Holy Family Primary School, Weathers Street, Gowrie (TG018)

For more information visit the Your Say website.

Feedback summary

Priority projects

The rain gardens in Fadden Pines Reserve (TG029) generated the most interest. This is already a popular recreational space with users welcoming the increase in amenity.

Some suggested other sites for projects in addition to those identified. Many highlighted existing issues around pollution, particularly general rubbish that finds its way into waterways. They also identified a need for community education to encourage people to take personal responsibility for the quality of water.

Operation and maintenance of the infrastructure post-construction (including graffiti) were raised as a concern. Some asked questions about access and parking.

Reserve projects

There was very little feedback on the reserve projects. Feedback was supportive and related to the increased amenity.

Action taken

The project team advised that, although we would like to be in a position to look more closely at additional sites, they fall outside the project scope agreed by the Commonwealth Government.

During the detailed design phase vandal resistant material (no timber) will be selected. Works will be reconfigured to improve visibility, reduce opportunities for vandalism, and discourage inappropriate vehicular access and parking.

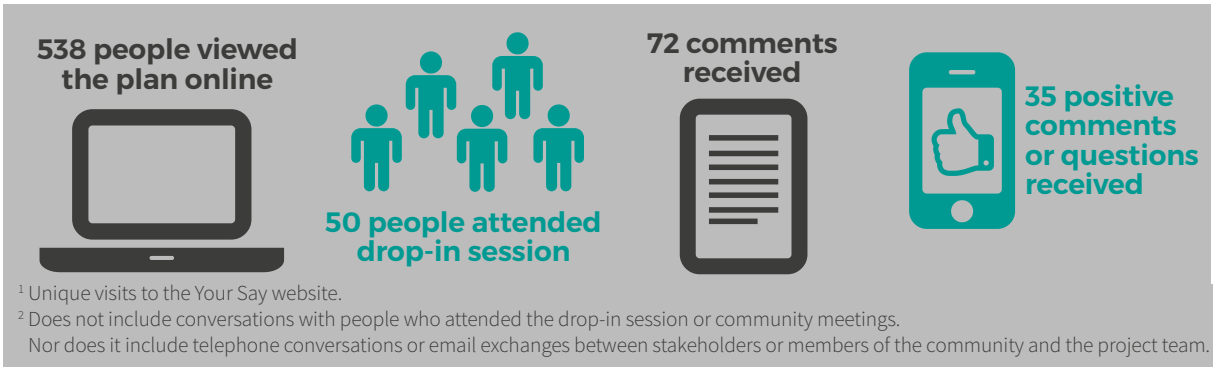
ACT Healthy Waterways includes a program to raise awareness about water quality issues and how residents, businesses and visitors can help look after our waterways.

Regarding maintenance, the ACT Government has undertaken to fund operation and maintenance of the infrastructure.

For a more detailed summary of comments and responses, see Appendix A.



YARRALUMLA CREEK CATCHMENT



[1] Unique visits to the Your Say website.
[2] Does not include conversations with people who attended the drop-in session or community meetings. Nor does it include telephone conversations or email exchanges between stakeholders or members of the community and the project team.

Key facts

- Highly urbanised with only small remnant areas of nature reserve.
- Older network of stormwater pipes and concrete-lined channels, designed to transfer water out of the area as quickly as possible, result in fast-flowing run-off capable of causing rapid soil erosion.
- Water flowing from the stormwater drains is of poor quality, containing soil and sediment, organic matter (leaves and garden waste) and animal faeces.
- Hard surfaces like roofs, roads and paving transport pollutants and nutrients into the stormwater system, even during light rain.
- The main waterway, Yarralumla Creek, discharges high sediment and nutrient loads into the Molonglo River.

Expected benefits

- The priority projects will remove 2,388,980 kg/year of suspended solids, 333 kg/year of phosphorus and 2018 kg/year of nitrogen from Yarralumla Creek waterways.
- The frequency and severity of erosion in Yarralumla Creek will be reduced and erosion in the lower reaches will be stabilised.
- Other benefits include improved open space, more recreational areas and the potential for irrigation of local sporting fields.

Projects

Pond and potential stormwater use, Athllon Drive, Mawson (YA020): A new pond will be constructed opposite Marist College to capture stormwater which may be used for irrigation. The project will include landscaping, like understorey planting, which will improve the existing open space.

Rain garden, Reynolds Street, Curtin (YA012): A rain garden in the open space between walking paths in Reynolds Street will enhance the area and increase its appeal as a recreational space for the local community. The site will be landscaped to incorporate vegetation and filtering media to remove nutrients and sediment.

Creek stabilisation, Yarralumla Creek, Lady Denman Drive, Yarralumla (YA001): The project will involve stabilising and revegetating the banks of Yarralumla Creek where it enters the Molonglo River just downstream of Scrivener Dam. The lower banks will be landscaped with rockwork to prevent ongoing erosion which is a significant problem. The upper banks will be revegetated to improve stability and filter run-off.

Pond and stormwater use, corner of Wilkins and Beasley Street, Mawson (YA025): A new pond at the Mawson District Playing Fields will enhance the outdoor sports and recreation area and offer the potential to use the water to irrigate the playing surfaces. The area will be landscaped to improve amenity and habitat diversity. The site has been chosen to minimise the removal of existing vegetation.

Rain garden, Flood Memorial site near Service Street, Curtin (YA016): The highly visible open area in the Yarra Glen arterial corridor near Service Street in Curtin will be the site for a new rain garden. An existing cycle path will be realigned to go around the garden. The area will be landscaped to incorporate vegetation and filtering media to remove nutrients and sediment from stormwater.

Reserve project

Rain garden, corner of Plunkett Street and Childe Place, Chifley (YA028)

For more information visit the Your Say website.

Feedback summary

Priority projects

Early feedback indicated concern among those living around the planned rain garden at Reynolds Street, Curtin (YA012). Vocal opponents mobilised the immediate community and, as a result, there was significant opposition at the beginning of the consultation period.

Some of their concerns stemmed from a misunderstanding about the nature of a rain garden and were amplified by the neighbourhood's experiences with periodic nuisance flooding on the proposed site. Many assumed there would be permanent pooling water, thereby attracting mosquitoes and snakes, exacerbating flooding and presenting a drowning risk for children. Those fears were confounded when peers referred to existing wetlands as an example of the type of treatment proposed.

As local residents and concerned citizens made their own investigations, with many attending a drop-in session, support for the project grew.

There was general support for the other projects in this catchment and many people asked questions to gain a better understanding of the detail. Queries about operation and maintenance post-construction were raised, others were keen to retain and add to the amenity proximate to each site and some raised concerns about pooling water.

Reserve project

There was very little feedback on the reserve project aside from suggestions to use it as a replacement site for the Reynolds Street rain garden.

Action taken

The project team focussed on providing accurate information and encouraged people to attend a drop-in session where they could talk directly to the project and design teams.

Queries about increased flood risk, pooling water and drowning, an increase in mosquito and snake populations, and a decrease in play areas particularly for children at YA012, were all addressed in an effort to allay concerns.

All suggestions relating to design (about YA012 and other projects) were passed on to the design team for their consideration when preparing plans for development application.

For a more detailed summary of comments and responses, see Appendix A.



WEST BELCONNEN CATCHMENT



[1] Unique visits to Your Say website.
[2] Does not include conversations with people who attended the drop-in session or community meetings. Nor does it include telephone conversations or email exchanges between stakeholders or members of the community and the project team.

Key facts

- Includes grazing land, rural areas and some urban development.
- Water quality problems are generated upstream in the Gungahlin area and include high levels of nutrients and suspended solids, largely a result of rainwater running through areas cleared for housing construction.
- Proposed housing developments in West Belconnen will put additional pressure on water quality in the area.
- When it rains the flow of water through the catchment can be relatively large. This can have a significant effect on water quality in Lake Ginninderra and the Murrumbidgee River.
- Most of the water drains, with minimal treatment, into Ginninderra Creek then into the Murrumbidgee River.

Expected benefits

- The priority projects will remove 112,300 kg/year of suspended solids, 158 kg/year of phosphorus and 804 kg/year of nitrogen from West Belconnen waterways.
- Other benefits include enhanced open spaces, an increase in the diversity of the area's natural habitat and opportunities for recreation.

Projects

Wetlands, Croke Place, McKellar (WB009): A series of wetlands will be constructed in the open space next to the northern bank of Ginninderra Creek, downstream of Lake Ginninderra. Flows from residential areas will move through the wetlands for treatment. In addition to helping maintain water quality in the creek downstream of the lake, the wetlands will add to the amenity and ecology of the area.

Wetlands and potential stormwater use, Corner of Krefft Street and Barnard Circuit, Florey (WB008): Located in open space between St Francis Xavier College and Krefft Street, the new wetland will help improve water quality by slowing stormwater and trapping sediment and nutrients.

Some of the captured and treated stormwater may be used to irrigate the St Francis Xavier College oval. Landscaping, including understorey planting, will improve the existing open space and provide opportunities for recreation and the enjoyment of nature.

Reserve projects

Wetland, corner of Ginninderra Drive and Copland Drive, Melba (WB004)

Drain naturalisation / swale, Tattersalls Crescent, Florey (WB010)

Wetland between Shakespeare Crescent, Fraser and Halls Creek (WB013)

For more information, please visit the Healthy Waterways (Basin Project) Your Say website.

Feedback summary

Priority projects

Many people queried why there are no projects upstream of Lake Ginninderra or further downstream closer to the Murrumbidgee River.

There was general support for both projects and some strong opinions about plant selection - what should be retained, removed and planted. Questions also arose about the seasonal wetting and drying of the wetlands and the affect on mosquito populations.

Maintenance post-construction was a concern.

Action taken

The project team advised that a comprehensive assessment process identified that infrastructure in Ginninderra Creek immediately downstream of Lake Ginninderra would deliver the most effective outcomes for improving water quality.

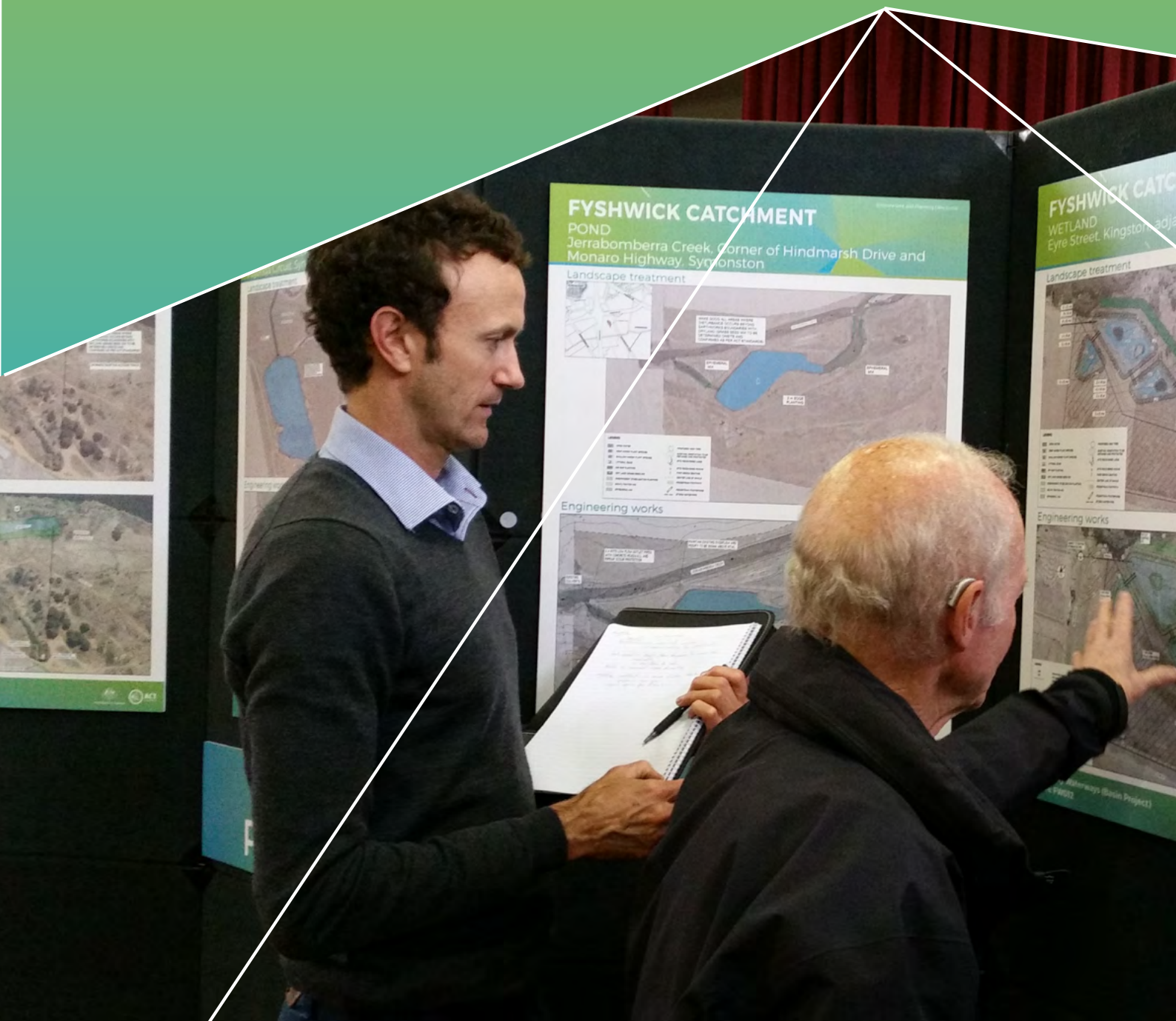
Regarding maintenance, the ACT Government has undertaken to fund operation and maintenance of the infrastructure.

Reserve projects

There were no comments received about the reserve projects in the West Belconnen catchment.

APPENDIX A

SUMMARY OF KEY ISSUES ARISING FROM CONSULTATION



General comments

Project description	Summarised comments	Responses and actions
Comments about water quality treatments or Basin Project in general.	• Vegetated floating islands in wetlands should be used as a visible and effective way to improve water quality. • Independent Competition and Regulatory Commission (ICRC) - new water rates – not supported. • Clarification sought on whether the project could fund infrastructure outside of the priority catchments. • Shelter for birds should be provided away from the shoreline, eg. floating islands in wetlands and ponds. • Concern that ponds and wetlands emit odours during dry spells. • How will projects be sequenced? • Clarification sought on who has responsibility for project funding and delivery of works.	• A range of water treatment options – including floating islands – were considered during the assessment of sites. Subsequent selections reflect the most efficient and cost-effective methods for reducing harmful nutrients in stormwater. • We encouraged anyone concerned about rates policy to make a submission to the ICRC. • Although we would like to be in a position to fund infrastructure elsewhere, we can only work within the scope of the project as agreed by the Commonwealth Government. • Construction of the first projects is expected to begin in 2017. The order in which they unfold will depend on opportunities to generate greater value and efficiencies by combining work on various projects and site and seasonal constraints. • ACT Healthy Waterways (Basin Project) is a joint initiative between the Australian and ACT Governments. The project is budget funded through a signed agreement between the two Governments. • The work will be contracted out. The ACT Government is currently working through this process.

Lower Molonglo catchment

Project description	Summarised comments	Responses and actions
Wetlands between Cotter Road and Dixon Drive, Holder (LM013)	• Comments supportive – increases amenity and recreational opportunity, habitat, educational opportunities. • Seating to accommodate visiting students from local schools. • Include off-street parking and parking bays. • Bicentennial National Trail was marked in the wrong place on the map • How much water would remain in the wetlands during drought / dry summers. • Interaction between the proposed works and the local BMX riders who use the track. • Plant additional trees in adjacent area. • Increased pedestrian traffic – need to include paths to accommodate commuting cyclists (high speed vs. pedestrians). • Plans for ongoing maintenance post-construction.	• Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • The wetlands will include several deep ponds that will store water to tide the wetlands over dry summers. The optimum size of these ponds will be calculated during the detailed design phase. • The proposed wetland will leave the BMX track undisturbed. • Although we would like to be in a position to fund tree planning in adjacent areas, this work is outside the project scope. We can only work within the scope of the project as agreed by the Commonwealth Government. • There are no plans to change or improve existing paths. • The wetlands will have a routine maintenance program. We anticipate that the gross pollutant traps will be serviced on a three month interval, with sediment ponds typically cleaned out on a five year interval. • The ACT Government has committed to fund operation and maintenance of assets constructed as part of the Basin Project.
Rain garden near De Graaff Street, Holder (LM010) (R)	• Upgrade existing playground. • Provide better access for people with disability and people with prams. • Retain open space for active recreation.	• Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • Note this is a reserve project and will go ahead only if any of the priority options are no longer considered viable or unexpected savings are made in completing the priority projects.

Upper Molonglo catchment

Project description	Summarised comments	Responses and actions
Rain gardens at Alanbar Street and Kenneth Place, Karabar (UM004)	• Maintain pedestrian desire line. • Ensure native plant selection.	• Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • The project team will be guided by local knowledge, local government regulations and practicality in the selection of plants. In general, our approach is to identify species known to have grown in the vicinity, obtain advice about planting and establishing these under present conditions and use only seeds, roots and rizomes germinated or struck locally.
Wetland on the reserve adjacent to Morrisett Street, Queanbeyan (UM015)	• Construct open channels with rocks to encourage fish movement. • Include Aboriginal interpretation and seating area. • Relocate the wetland further uphill to give more solid land between the wetland and the river. • Ensure native plant selection. • Include gross pollutant trap (GPT) to trap and reduce rubbish and slow flows. • Banks need to be stabilised. • Structural mitigation works required to protect the wetland from flooding. • Retain some open space for active recreation.	• Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • The project team will be guided by local knowledge, local government regulations and practicality in the selection of plants. In general, our approach is to identify species known to have grown in the vicinity, obtain advice about planting and establishing these under present conditions and use only seeds, roots and rizomes germinated or struck locally. • The project will include a gross pollutant trap (GPT) near the proposed diversion pit. A substantial proportion of litter and other gross pollutants are carried in the initial phase of storms or 'first flush'. This first flush will be diverted toward the new GPT and captured for removal and disposal. This will substantially reduce the quantity of gross pollutants entering the river. • We are aware of the dynamic nature of the river at this location and the constraints. Although this is a natural deposition site, we acknowledge that river turbulence and temporary eddies may cause local scouring and dumping of sediment. • During the detailed design phase, we anticipate that input from a river geomorphologist will guide the selection of plant types and locations as well as any structural mitigation works to protect the new wetland. • The infrastructure will not take up the entire area available - retaining open space for active recreation.

Fyshwick catchment

Project description	Summarised comments	Responses and actions
Wetland and potential stormwater use, Matina Street, south of Mill Creek Oval, Narrabundah (FW019)	• Supportive comments - improved amenity, water quality, habitat, recreational opportunity, promotion of a sense of community. • Make paths stroller and bike/scooter friendly. • Cycle track to connect to Kingston bike paths and wider bike network (including connecting to the lake). • On-site rubbish bins and water bubbler. • Walking path to connect wetland to the lake. • Extent of seating to be provided. • Include provision for dogs to swim in the wetland. • Duration of construction.	• Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • There are no bubblers in the plans as there is no potable water on the site. • Bench seating is planned for two locations around the site. • The wetland will not be in a dog off-leash area. • Scheduling of construction for individual projects has not yet been undertaken. However, we anticipate construction on this site will take 12-18 months due to the size of the wetland and its proximity to the creek.
All projects	• Canberra Airport concerned about the potential for bird strike.	• Risk assessments in relation to bird strike will be conducted for all planned projects in the Fyshwick catchment.

Lake Tuggeranong catchment

Project description	Summarised comments	Responses and actions
General comments	• Plan for ongoing maintenance post-construction. • Include an upgrade to the existing ponds in Fadden Hills. • Need for a public education program to change people's 'bad' habits. • More street sweeping. • Consult outside the ACT and with youth. • Use a water filtration recycling system.	• The ACT Government has committed to fund operation and maintenance of assets constructed as part of the Basin Project. • The ponds in Fadden Hills are outside the scope of this project, as is a water recycling filtration system. • ACT Healthy Waterways includes funding for a program to raise awareness about water quality issues and how residents, businesses and visitors can help look after our waterways. • The Basin Project includes two projects across the border in NSW (Queanbeyan and Karabar) to reduce pollutant load upstream. The project is also part of a Commonwealth Government initiative to improve water quality in the Murray-Darling Basin and involves all the Basin states. • The project team engaged with a number of community organisations, including the Youth Coalition of the ACT.
Rain gardens and potential stormwater use, Athllon Drive between Langdon Avenue and Fincham Crescent, Wanniassa (TG008)	• Include a mesh barrier across drains in Wanniassa streets to collect rubbish and organics. • Conduct a program to educate residents about gutters and drains and where water goes. • Better rubbish collection at Wanniassa High School to assist water quality at this site.	• Gross pollutant traps are commonly used throughout the ACT. They are effective in removing a range of pollutants from waterways, including rubbish, coarse sediment and litter. • ACT Healthy Waterways includes funding for a program to raise awareness about water quality issues and how residents, businesses and visitors can help look after our waterways. • Concerns about the management of rubbish at Wanniassa High School passed on to the ACTSmart Sustainable Schools Project Officer.
Rain garden, Upper Stranger Pond, Isabella Plains (TG010)	• Risk of graffiti. • Better fencing to prevent vehicle access to the water's edge. • Prevent people from littering. • Ensure proposed paths are maintained.	• During the detailed design phase we will select materials that are vandal resistant (no timber) and reconfigure the works to improve visibility and reduce opportunities for vandalism. • The proposed works do not include fencing. Our approach is to encourage greater use of the area by the community. A well used space is less prone to vandalism and littering. • Although the rain garden will enable public access, the surface will not support a moving vehicle. Any attempt to cross it will likely lead to a bogging. This should dissuade individuals from accessing the existing pond by means other than walking. • The ACT Government has committed to fund operation and maintenance of assets constructed as part of the Basin Project.

Lake Tuggeranong catchment

Project description	Summarised comments	Responses and actions
Wetland, Isabella Pond, Drakeford Drive, Monash (TG011C)	• Impact of the weir upgrade on flood mitigation. • Flood design levels used in planning. • Storm flows versus low flows. • The wetlands should be downstream of the weir. • Plan for ongoing maintenance post-construction.	• The Basin Project team will take responsibility for the construction of the south wetland as part of the much larger upgrade to the Isabella Weir spillway. Drawings were included in the consultation for information only and because of its relationship to this project. • Comments about this project have been referred to Chief Minister, Treasury and Economic Development Directorate.
This project is funded directly by the ACT Government and has been progressed as part of the broader Isabella Weir spill-way upgrade works (for flood mitigation) being undertaken by Chief Minister's ,Treasury and Economic Development Directorate. A development application has been approved. This covers both the weir and the wetland.		
Rain garden and potential stormwater use, open space north of Isabella Drive near Kirkcaldie Circuit, Chisholm (TG023)	• Error in project description relating to the location of the asset. • Open space between Isabella Dr and Kirkcaldie Circuit is the preferred location. • Vehicle access to the site.	• Error in asset descriptor corrected. • The asset was originally proposed for the open space between Isabella Dr and Kirkcaldie Cct. It was moved for several reasons, including: the need to remove a stand of pines, the slope and width of the site and concerns about encountering hydrocarbon contamination. • The intent is to have a single vehicle access point on Isabella Drive, coinciding with the location of the maintenance bay for the gross pollutant trap. Access will be restricted to left in, left out.
Rain gardens, Fadden Pines Reserve, Fadden (TG029)	• Informal vehicle access should be restricted, cause of erosion. • Address access and parking issues. • Upgrade existing toilets. • Project may increase mosquito numbers. • Gravel on nature strips harmful to stormwater. • Need an education program about water quality. • Effective ongoing maintenance critical.	• Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • The areas immediately surrounding the projects proposed will be landscaped to enhance amenity which will help with erosion on informal tracks. • The toilets are outside the scope of this project. • Mostly dry, rain gardens look very much like gardens on the surface but have a filtration system underground that reduces the levels of nutrients in stormwater before it re-enters the drainage system. As such, they do not feature regular or extended periods of surface pooling or ponding of water which generally means that, given larvae's 7-12 day lifecycle, mosquitoes are not an issue. • ACT Healthy Waterways includes funding for a program to raise awareness about water quality issues and how residents, businesses and visitors can help look after our waterways. • The ACT Government has committed to fund operation and maintenance of assets constructed as part of the Basin Project.

Yarralumla Creek catchment

Project description	Summarised comments	Responses and actions
Creek stabilisation, Yarralumla Creek, Lady Denman Drive, Yarralumla (YA001)	• Include a path to allow access to lower section of creek plus seating, creating an opportunity for passive recreation and increased community ownership. • Extend works to the stone basket work below the gross pollution trap. • Retain access along the creek for walkers.	• Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • Works will be within the channel or 5-10m of the banks where stabilisation is required. There may be some access issues during construction but longer term the works are unlikely to impact access.
Rain garden, Reynolds Street, Curtin (YA012)	• Explain what a rain garden is and how it works. • Comparisons to wetlands in Dickson, Lyneham and O'Connor. • Plans for ongoing maintenance post-construction. • Upgrade the existing playground but retain rocks. • Future of the existing stormwater drains. • New planned playground should be 'nature play', planted with deciduous trees and with path extending through. • Put power lines on the western side underground. • Lack of consultation and detail provided on the website. • Methodology used to select sites. • Increased flooding as a result of the proposed works.	• A rain garden (or bio retention system) is not a pond or a wetland. It is a depression densely planted with natives, sedges and grasses, perennials and flowers. There is no extended ponding of still water (infiltration is 200mm per hour) and the maximum depth of water during storms is 30cm. Rain gardens are dry most of the time and typically hold water for no more than 3-4 hours after a rainfall event. • The ACT Government has committed to fund operation and maintenance of assets constructed as part of the Basin Project. • Design specific comments have been passed on to our design team for their consideration when developing plans for development approval. • The website only carries the overview images of the rain garden. A more comprehensive set of drawings was available at the drop-in session and are still available for examination and explanation at the Environment, Planning and Sustainable Development Directorate offices in Dickson. • Consultation with the community has been vital at all stages of this project since it commenced in early 2014. From the original list of over 500 sites, 188 projects were tested with the community in July 2015. All comments received during the current consultation period which ended on 30 September will be considered. There will be an additional opportunity to provide comment as part of the development approval process. Site signs have been installed. • Sites were selected using a course filter elimination process followed by a fine filter analysis. In prioritising the options, facts such as water quality performance, cost, amenity value, feasibility, environmental and heritage values were taken into account. The Reynolds Street site emerged as one of the top 25 sites across the entire Project.

Yarralumla Creek catchment

Project description	Summarised comments	Responses and actions
Rain garden, Reynolds Street, Curtin (YA012) (Continued)	• Relocate the rain garden to a broad acre site / away from local residences / closer to existing stormwater drains. • Loss of green and open play space. • Plant deciduous trees for summer shade, plant lots of natives. • Potential for the rain garden to increase mosquito populations, number of snakes visiting the area. • Drowning risk, especially for children. • Odours during dry periods, and the risk of bacteria, fungi and moulds.	• The sites chosen for the stormwater quality improvement works are generally located in open spaces that were established to be multi-functional. The 'park' at Reynolds street is a stormwater drainage corridor, a cycle-walking corridor, a utility services corridor, green space separating residential precincts and open space for informal activities. The proposed rain garden is consistent with the stormwater drainage function and has been located to take advantage of existing stormwater pipes and to address constraints associated with other services e.g. sewer, water, telecommunications. • The source of the water quality problem is local; from near the Reynolds Street park and up-hill and this asset will help to attack a large problem emerging in the Murrumbidgee. • The existing stormwater drains will be retained. The proposed rain garden will augment capacity, not replace it. Currently there are no stormwater treatment works in the catchment above Reynolds Street. Contaminated stormwater is discharged directly into Yarralumla Creek and subsequently into Molonglo River. • The existing drainage system is designed to carry the normal run-off underground and the 'unusual' runoff (e.g. during heavy storms) above ground. Only a small proportion • Within the treatment systems across the Basin Project sites (including the site in Reynolds St) all plantings will be native. Within the broader associated landscaping, planting will be a mix of native and non-native species to suit the context of the site and anticipated use. • Rain gardens are designed to absorb water, not to create ponds. Rain garden will not hold water long enough for mosquito larvae to complete their 7-to-12-day life cycle. A well-designed rain garden with mature plants will not have standing water in it after 3-4 hours; all the water will have soaked into the garden. • Snakes avoid active non-fringe urban areas, like the green space near Reynolds Street. They are far more attracted to a ready supply of rodents so compost heaps and chicken coups are far stronger lures than a rain garden full of lizards and frogs. Appropriate vegetation mixes, landscaping and maintenance regimes will help manage this risk.

Yarralumla Creek catchment

Project description	Summarised comments	Responses and actions
Rain garden, Reynolds Street, Curtin (YA012) (Continued)		• We are unaware of any drowning incidents in rain gardens in Australia. Rain gardens are normally dry and have a maximum depth during storms of 30cm. They are fitted with an overflow device to ensure that this limit is not exceeded and the water will begin to recede once runoff has stopped. • Following a rain event, the rain garden will dry out quickly thanks to infiltration and under-drains that will return the treated water to the existing drainage system. The free-draining course soils within the rain garden are more efficient at draining water than the sandy-clay soils in the existing parkland. The rain garden will smell no worse than your neighbours' front gardens.
Rain garden, Flood Memorial site near Service Street, Curtin (YA016)	• Source of water for the rain garden. • Plant and tree selection. • Wildlife, particularly snakes, will be attracted to the area. • Former tip site the preferred location for the project. • Maintain walking and cycling links. • Fix concrete drain to reduce flood potential.	• Water for the rain garden will be diverted from the existing drainage pipes near Launceston Street. • The rain garden will not hold any permanent water. It will include free-draining soils with under drains. The plants will selected based on their ability to survive the extended dry spells we frequently experience in Canberra and, as such, we do not expect them to be particularly attractive to frogs and you shouldn't see any more snakes. Also, the general plant type is not normally preferred by kangaroos. • The adjoining open space off Holman Street was considered. Geotechnical investigations confirmed the local 'former tip' anecdote. As the rain garden requires an excavation of about 1.2m, we consider it best to avoid disturbing the buried waste. • Across the program we aim to maintain the existing cycle and walking connections although some will need slight alteration. We have gone to lengths to minimise disturbance. In this instance we have moved the rain garden about 50m north of the optimum position to avoid any interference with the flood memorial. • Regarding the existing concrete channel, flow velocities and local flooding: our project funding is for improvement of water quality only; the issue of flood reduction is outside of our scope.