

4 Future Directions



Objectives

Protect and enhance Koolunga Native Reserve now and into the future to provide healthy outcomes for the local community and the environment by managing the reserve to achieve the following outcomes:



Protect the ecological biodiversity and habitat values of the land



Better manage stormwater to improve water quality



Continue to welcome the local community to enjoy the natural environment and improve their health and wellbeing





Stormwater Management Options

Better manage stormwater to improve water quality

What is stormwater management?

Stormwater which enters a waterway directly from the drainage system contains excess nutrients, chemicals, soils and other materials collected from the streets and properties within the catchment. These pollutants and inconsistent flows can impact the health of the waterway.

Effective stormwater management will ideally have the following outcomes -

- less contamination in the water (both from litter, sediment and excess nutrients) which will support overall ecosystem health
- divert excess stormwater flows into a dedicated location for filtration
- slowed and more consistent water flows across ground and in creek lines, especially after storm events which supports vegetation and habitat health and reduces erosion
- reduced likelihood of significant water pollution events

These outcomes can partially be achieved by slowing down the flow of water so that it has time to filter through the ground. This process is called biofiltration, which occurs naturally as water soaks into the ground, especially where there is vegetation to absorb water.

This process can be enhanced by installing an engineered biofiltration system such a raingarden or swale to collect the water in one area and filter it underground through layers of filtration material.

These systems can help mitigate the impacts of increased pollutant loads associated with urbanisation on the natural environment (particularly waterways). Water is filtered through soil and vegetation which physically filters, chemically binds, and biologically processes pollutants (e.g. suspended solids, chemicals, pathogens).

What is a Gross Pollutant Trap (GPT)?

Concrete filter structures which are installed underground at stormwater outlets to collect sediment and pollutant materials. When maintained and cleaned out regularly, GPTs reduce the accumulation of soil, rubbish, sediment and gravels in waterways, swales or raingardens.

What is a swale?

A swale is area for biofiltration which receives and directs stormwater from an outlet or drain, so that it can infiltrate into the ground.

What is a raingarden?

A more engineered version of a swale, a raingarden is designed to slow water flows and capture more nutrients than a swale. Raingardens have above ground and below ground elements. These areas feature native vegetation, rocks and logs to mimic a natural creek line with perforated collection pipe/s below layers of soils and gravels to filter the water. An impervious liner forms the base and helps to direct water flows.

What is a constructed wetland?

A series of densely-planted, man-made ponds that help improve water quality by storing, filtering and slowly releasing stormwater. Constructed wetlands mimic natural systems most closely and are typically larger and deeper than rain gardens.



Stormwater Management Options

What has already been considered?

In response to community feedback against a constructed wetland in the reserve, Council commissioned a Stormwater Quality Study to determine the best alternative outcome for the Reserve taking into account the relative environmental and recreation values. The recommendations in this report take into account the following summary.

Options Considered				
Treatment	Treatment outcome	Pros	Cons	Recommendation
Gross Pollutant Traps (GPTs) at the southeast and/or southwest outlets (which flow into Forest Road Drain directly)	A GPT at either of these outlets could each capture: • sediment (~ 30 tonnes/ year) • gross pollutants (~10 tonnes/year), nitrogen (~30kg/year) • phosphorous (~110kg/year).	Very effective at collection of large, non-biodegradable pollutants and litter. Small footprint, underground infrastructure which will not reduce the amount of highly valued open space for recreation. A GPT at either of these outlets is expected to produce the best water quality outcomes compared to treatments the North outlet (proposed below).	Not considered very effective at removing nutrients from water, so will rely on the existing Forest Road drain for this treatment. Requires specialist contractors/machinery to extract captured sediments and litter. The South West catchment is the largest and most developed, but the location of the outlet is not feasible as it is not accessible for ongoing maintenance.	One GPT is recommended at the southeast drain outlet (nearest to Forest Road) as it is expected to provide good water quality outcomes when compared with the cost of installation and maintenance.
Vegetated Swale and GPT at North outlet (new above ground treatment in open space)	A GPT and swale is expected to capture: • sediment (~10 tonnes/year) • gross pollutants (~2 tonnes/year) • nitrogen (~16kg/year) • phosphorous (~66kg/year)	Both the growing medium beneath, and the vegetation above, treat the stormwater as it passes through the system. The combination vegetated swale and GPT will remove some nitrogen, phosphorus, sediments and pollutants from the stormwater before it reaches the creek line.	Treatment without engineered filter media and under drains (which exist with raingardens) means the stormwater flows through the system faster allowing for more nutrients and other pollutants to pass through without being captured. The catchment of the North outlet is smaller than that of the south east and south west outlets, and is least developed. Therefore, a GPT and swale is expected to capture less sediment and pollutants, compared to a GPT at the other outlets.	Not considered good value for money (outcomes compared to cost of installation and management). However, vegetation (without a swale beneath, or GPT) is likely to have a positive impact on water management without the costs of installation and maintenance.
Linear Raingardens and GPT at north outlet (new above ground treatment in open space)	A GPT and raingarden system is expected to capture: • sediment (~10 tonnes/ year) • gross pollutants (~2 tonnes/year) • nitrogen (~16kg/year) • phosphorous (~70kg/year)	The engineered filter medium and under drains beneath and vegetation above make raingardens highly effective at removing pollutants from stormwater when compared to their overall footprint.	Raingardens are not as effective at holding and slowly releasing stormwater when compared to wetlands. Raingardens are also complex systems which are costly to construct and require a lot of maintenance to keep them operating as intended.	Not considered good value for money (outcomes compared to cost of installation and management)



Protect the ecological, biodiversity and habitat values of the land

Outcome		Activities	Implementation
Protect and enhance areas of significance and sensitivity from degeneration	1.1	Continue to (and enhance where possible) weed control within the reserve	Ongoing bushland management activities (guided by the bushland management plan)
	1.2	Strategic vegetation planting to: • protect vulnerable or threatened species, • fill gaps in the canopy • reestablish endemic species • increase vegetation on creek line banks to reduce erosion	Ongoing bushland management activities (guided by the bushland management plan)
	1.3	Provide learning and collaboration opportunities to the community, to support volunteers and the community in caring for and about the reserve.	Ongoing bushland management activities (guided by the bushland management plan)
	1.4	Acknowledging current faunal species usage of the mature pines that are nearing end of life, plan for a staged removal of <i>Pinus radiata</i> throughout the reserve, including revegetation with appropriate indigenous species in consultation with Council's Biodiversity Team.	Ongoing bushland management activities (guided by the bushland management plan)
Control access to sensitive areas to protect the sensitive bushland	1.5	Close and revegetate the 20m-long connecting path parallel to the Forest Road Drain, 12 m northeast of the bridge near the dead end of St Elmo Av to protect the large number of rare native orchids	Park Upgrade Program (Capital Works)
	1.6	Design pathway edges to create a visual barrier between public access areas and bushland. Use logs, rocks and other natural features to direct access away from bushland areas	Ongoing bushland management activities (guided by the bushland management plan) Routine park operations activities
	1.7	Review fencing, remove any no longer required to leave only necessary fencing. Provide signage explaining fencing location and requesting that the area not be accessed	Ongoing bushland management activities (guided by the bushland management plan)
Educate the community about the environmental values of the Reserve	1.8	Refresh all environmental education and information boards to: provide clear and engaging information about the flora and fauna of Koolunga Native Reserve, recognise the role and work of the Friends of Koolunga Native Reserve within the Reserve and recognition of the Traditional Owner custodians of the environment.	Ongoing bushland management activities (guided by the bushland management plan)
	1.9	Engage with Melbourne Water and strongly encourage Melbourne Water to undertake community engagement on the renaming of the watercourse currently known as Forest Road Drain.	Park planning



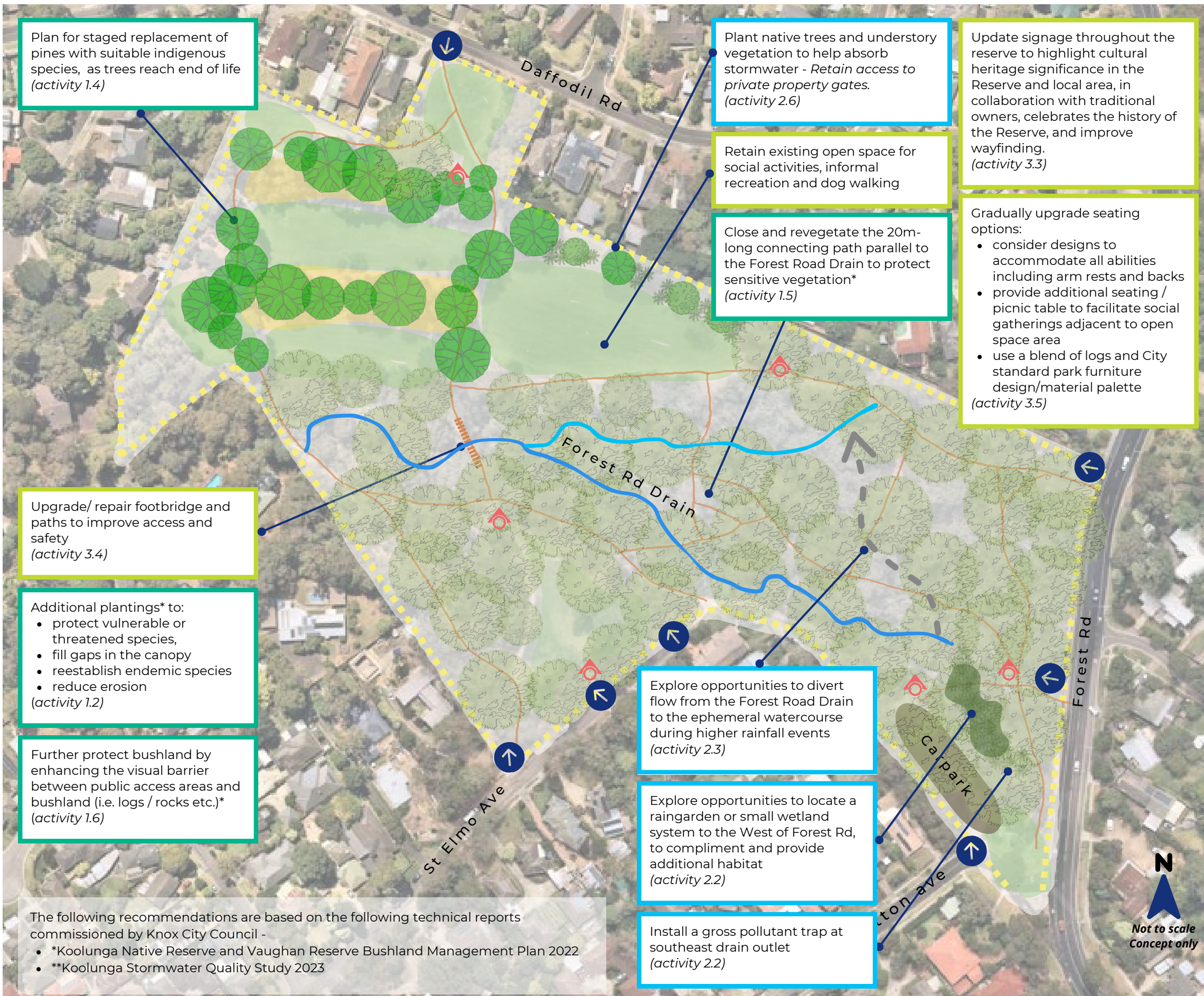
Better manage stormwater to improve water quality

Outcome		Activities	Implementation
Adopt improved stormwater management measures	2.1	In collaboration with Melbourne Water, seek to retain the \$120k Living Rivers Stormwater Program funding to improve functionality of Forest Road Drain within the Reserve – with a view to slowing down the water flow, removing sediment, guiding weed removal, and revegetating with indigenous species.	Stormwater management capital works and ongoing bushland management activities (guided by the bushland management plan)
	2.2	Design and install a Gross Pollutant Trap (GPT) at the southeast outlet in the eastern section of the reserve with consideration for a bio filtration raingarden or small wetland system to the west of Forest Rd to compliment and provide additional habitat.	Stormwater management capital works
	2.3	Explore the possibility with Melbourne Water of diverting some of the flow from the Forest Road Drain to the ephemeral watercourse to help mitigate pulse flow issues in Forest Road Drain.	Stormwater management capital works
	2.4	Prepare a water management plan for the eastern Blind Creek catchment to improve outcomes catchment wide. Develop an educational campaign highlighting the impacts of pollution, illegal dumping and spills on the watercourses and work with the EPA to monitor and undertake enforcement activities.	Strategic planning (implementation and review of city-wide water management strategy)
	2.5	Consider adopting additional measures upstream to remove pollutants at source. This might include silt traps at bases of pits, trash racks, tree pits or smaller bioretention swales in road reserves.	Routine asset management works, asset management plan implementation and review
	2.6	Plant indigenous mature trees and understory vegetation along the northern fence line of the reserve. This vegetation will help to absorb stormwater entering the reserve from the north stormwater catchment.	Stormwater management capital works and ongoing bushland management activities (guided by the bushland management plan)



Continue to welcome the local community to enjoy the natural environment and improve their health and wellbeing

Outcome		Activities	Implementation
Improve resident and visitor safety	3.1	Maintain firebreaks and remove vegetation to reduce bushfire hazard	Ongoing bushland management activities (guided by the bushland management plan) Annual bushfire preparedness works
	3.2	Proactively inspect and manage trees to mitigate safety issues, and factors contributing to defoliation.	Ongoing bushland management activities (guided by the bushland management plan)
Improve visitor experience	3.3	Update signage throughout the reserve to highlight cultural heritage significance in the Reserve and local area, in collaboration with traditional owners, celebrates the history of the Reserve, and improve wayfinding.	Ongoing bushland management activities (guided by the bushland management plan) Routine park operations activities
	3.4	Repair / upgrade bridge and paths to improve access and safety. Investigate providing additional paths within the reserve (outside of the remnant vegetation area) where there are existing informal walking paths.	Ongoing park operations activities
	3.5	Gradually upgrade seating options: - Consider designs to accommodate all abilities including arm rests and backs - Provide additional seating / picnic table to facilitate social gatherings adjacent to open space area - Use a blend of logs and City standard park furniture design/material palette	Ongoing park operations activities
	3.6	Support responsible dog ownership by providing additional bins, education, and enforcement where necessary.	Ongoing park operations activities



The following recommendations are based on the following technical reports commissioned by Knox City Council -

- *Koolunga Native Reserve and Vaughan Reserve Bushland Management Plan 2022
- **Koolunga Stormwater Quality Study 2023

Outcomes



Protect the ecological biodiversity and habitat values of the land

- Protect and enhance areas of significance and sensitivity from degeneration
- Control access to sensitive areas to protect the sensitive bushland
- Educate the community about the environmental values of the Reserve



Better manage stormwater to improve water quality

- Maintain the existing pipe network system for the broader catchment and plan for future upgrades
- Adopt improved stormwater management measures on site including a pollutant trap and strategic planting



Welcome the local community to improve their health and wellbeing

- Improve resident and visitor safety
- Improve visitor experience
- Retain and celebrate local history and cultural heritage

Legend



Reserve entry/exit point



Existing Pine trees



Indigenous understory regrowth



New trees and understory vegetation



Forest Road Drain



Existing trails



Existing open space to be retained



Existing trees



Indicative locations for updated signage



Koolunga Native Reserve

Future Directions Plan - July 2023

knox
your city



