

Parkfield Lake and Public Open Space retrofit

Land use / development type	Scale
Public Open Space	Lot
Retrofitting	Lot

Stormwater controls	Scale
Bioretention area	Lot
Bubble-up pits	Lot

Efficient use of water	Scale
Waterwise landscaping	Lot

Water reuse	Scale
Constructed stream and lake water recycling	Lot

Water quality treatment	Scale
Native vegetation	Lot
High PRI filter media	Lot
Lateritic gravel mulch	Lot
Aeration of lake and stream water	Lot

Site conditions	
Groundwater	Shallow, directly connected to POS
Slope	Steep slopes within park

Local government	Location
City of Kwinana	Bertram

Parkfield public open space was originally developed as part of an old residential development. The park which is in the suburb of Bertram included a central water body and surrounding landscaping. The original design was for the water body to function as a compensating basin.

The lake was maintained through its direct connection to groundwater and the surrounding public open space was constructed with steep turfed slopes. While no water quality issues were initially present, algal blooms occurred after a number of years. These algal blooms are thought to be

caused by legacy nutrients occurring in groundwater likely to be associated with previous market garden usage within the locality and nutrient loads from surrounding urban development, stormwater and park runoff.

The park and surrounding road system was also subject to repeated flooding resulting in safety hazards. The safety hazards as well as the algal blooms and water quality were of concern to the community.

To address the community concerns and the range of complex surface water, groundwater and health and safety issues, the City of Kwinana, in partnership with the Peel-Harvey Catchment Council, engaged TME consultants to investigate these issues and design and retrofit a public open space solution to improve the environmental, flood storage, aesthetic and recreational values of Parkfield public open space.

The water body was of high value to the local residents and there was a strong preference for a water body in the final design.

The retrofit landscape design utilises native vegetation planting around the installed biofilter and general parkland. A natural rocky channel has been designed to connect the stream to the lake. The lake and channel are disconnected from the groundwater and stormwater systems.

The biofilter basin and surrounding area also provide the required storage to alleviate flooding.

Key Project Features

- Biofilter planted with locally native species for storage of 1 in 10 year average recurrence interval (ARI) stormwater event to address downstream flood constraints
- High Phosphorus Retention Index (PRI) soil and nutrient absorbing filter media added to the soils of the biofilter and topped with lateritic gravel mulch to aid treatment of stormwater during infiltration
- Subsoil drainage system beneath biofilter to separate nutrient rich groundwater from surface water
- Provision for separate treatment of nutrient rich groundwater system downstream
- Construction of rock-lined flow path and lake to replace existing water features, maintained with low-nutrient groundwater abstracted from a deeper confined aquifer and recycled using pump system
- Use of native plants and rocky drops within lake and channel to provide additional fauna habitat, and improve aesthetic value through aeration
- Inclusion of active open space, with entry pits around the edge of the lake to capture runoff from

Parkfield Lake was previously subject to flooding and dangerous algal blooms



the lawn areas

Issues

Algal blooms were caused by the discharge of nutrient rich, untreated groundwater and urban stormwater runoff into the Parkfield Lake. Due to the need to maintain the aesthetic quality and value of the location for the community, adequate treatment of groundwater could not be undertaken at the site due to the lack of space. A subsoil system was constructed to allow treatment of groundwater further downstream where more space was available and to separate rising groundwater from the surface water system to alleviate flooding and the development of wet areas.

The new design incorporated a smaller constructed lake and stream to meet community expectations, including a pumping system to circulate water and minor rocky waterfalls assisting with aeration and prevent algal blooms while providing 'white noise' for a relaxing environment.

Development Costs¹

Subsurface drainage	\$100,000
Filter media (supply)	\$ 30,000
Bioretention area planting	\$ 15,000
Landscape & irrigation works	\$430,000
Bulk earthworks, dewatering	\$250,000

¹All Costs are site specific and are an approximation given for guidance purposes only



Outcomes

TME and the City of Kwinana successfully retrofitted a water sensitive public open space that maintained the water features of the previous design valued strongly by the community, while managing flood issues through the provision of effective stormwater detention and water quality treatment through the development of a bioretention area.

Management of groundwater was achieved through a subsoil drainage system to separate groundwater from surface systems and through the use of a high PRI media in the soils of the bioretention area to allow some treatment of highly eutrophic groundwater.

The construction of a water sensitive public open space has provided an opportunity to create a more useable active open space

by regrading existing steep sloped areas to a more flattened form that is appropriate for recreation and that maximises visual amenity, access to and interaction with the water.

The design provides fauna habitat, reduces invasive weeds, and enhancing water quality treatment of stormwater by providing a buffer to fertiliser run-off, lawn clippings and other additional nutrient sources.



Contact details for further information:

Calibre Consulting (formerly TME) (08) 9791 4411
City of Kwinana (08) 9439 0200
Peel-Harvey Catchment Council (08) 6369 8800



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