Delivering Water Sensitive Urban Design in the Peel-Harvey catchment

Responding to local catchment contexts, conditions and priorities

Internationally important landscape

Bindjareb Djilba, the Peel-Harvey estuary, is a vital ecological, cultural, and economic asset in south-western Australia.

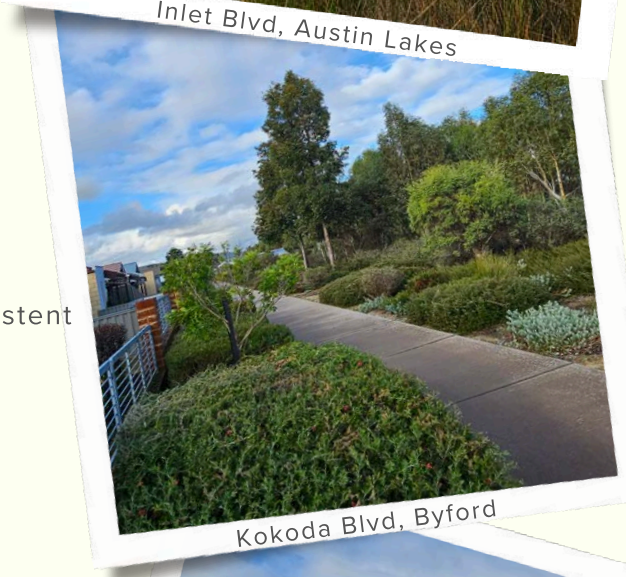
Planning for water

Water sensitive urban design (WSUD) is a critical consideration for all types of planning and development in the Peel Harvey catchment, consistent with State Planning Policy 2.9 Water.

Achieving a common goal

By applying the principles of WSUD, any urban development within the catchment can contribute to the overall goal of improving water quality to safeguard the future health of the estuary, as highlighted in the Bindjareb Djilba (Peel-Harvey estuary) Protection Plan.

Inlet Blvd, Austin Lakes



Kokoda Blvd, Byford

Torwood Edge, Seascapes

Contact us

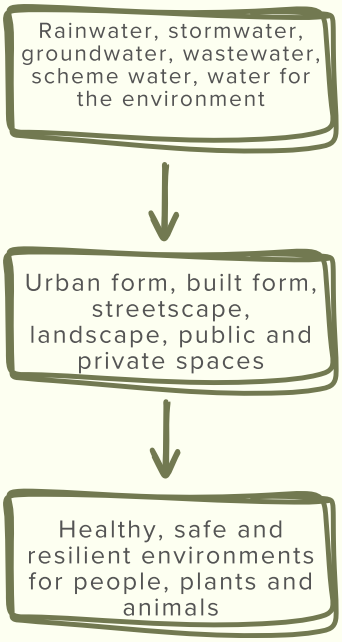
5 Rivers NRM
Working Together

Delivering on the
Bindjareb Djilba Peel-Harvey estuary Protection Plan

This project is part of the Bindjareb Djilba (Peel-Harvey estuary) Protection Plan, a State Government plan to improve the water quality of the estuary.

WSUD is

A planning and design approach that incorporates the sustainable management and integration of stormwater, groundwater, wastewater and water supply into the built form to achieve water and environmental outcomes as well as aesthetic/urban amenity, liveability, and urban cooling outcomes.



Apply the following design principles when planning for urban development in the Peel-Harvey catchment.

Development should be designed to:

1. enhance community and system resilience, amenity and liveability.
2. mimic natural hydrological processes and ensure that the design of urban and built form is based on local site conditions and minimises changes to hydrology.
3. manage, protect and restore wetlands, waterways and other natural systems.
4. provide protection from flooding in 1% annual exceedance probability (AEP) flood event and surface or groundwater inundation/waterlogging.
5. maximise water use efficiency and facilitate fit-for-purpose water sources including water reuse and recycling.
6. minimise pollution inputs and outputs in surface water and groundwater flows and in receiving environments.
7. create fit-for purpose, safe and sustainable water management systems that are integrated into the urban form.
8. enhance economic, social and cultural values of water resources.

Principle 1: Enhance community and system resilience, amenity and liveability.

Retaining trees provides significantly more biodiversity, cooling and heat mitigation benefits than planting new trees.

Overland pathways provide greater climate resilience that piping your drainage.

Public open space functionality is paramount but WSUD also improves open space quality and maximises the use of land resources.

Providing “more” water to wetlands and streams experiencing declining water levels and/or flows is an opportunity (provided upstream and downstream impacts are considered).

Focus on the big picture outcomes and use water as an enabler of these.

Osprey Waters, Shoveler Crescent

Principle 2: Mimic natural hydrological processes and ensure that the design of urban and built form is based on local site conditions and minimises changes to hydrology.

Kardan Blvde, Byford

The post development water management strategy should aim to mimic the site's pre-development hydrology as far as practicable.

The surrounding environment (vegetation, wetland, waterway or groundwater) should receive a similar amount of water (total runoff volume) and at a similar speed (peak flow rate) for the critical 1 exceedance per year (1 EY) event after development.

For sites discharging to the estuary, the 1 EY criterion is not applicable. However, the 15mm criterion is still applicable for water quality management.

Provide adequate space in road reserves for at-source stormwater management systems for small rainfall events at the structure plan stage, as it is too late at subdivision or development.

On sandy sites, promote infiltration and retention. Consider use of tree pits, permeable paving, raingardens, soakwells, infiltration cells/basins.

If the site has clay soils or rock, limit stormwater infiltration systems unless a sand layer is created. Retention systems such as rainwater tanks, above-ground raingardens, tree pits and raingardens located in imported soil (rather than in-situ soil) can be used. Manage runoff through appropriateluy designed living streams and detention systems (e.g. storage tanks, vegetated basins and swales) which should slow down flows to pre-development conditions.

Where the water went before development is where it should go afterwards.

Principle 3: Manage, protect and restore wetlands, waterways and other natural systems.

Ensure all high-value ecological areas are retained or protected and revegetate or restore those with lesser value.

Create private and public spaces that provide access to nature for the community and refuges for biodiversity.

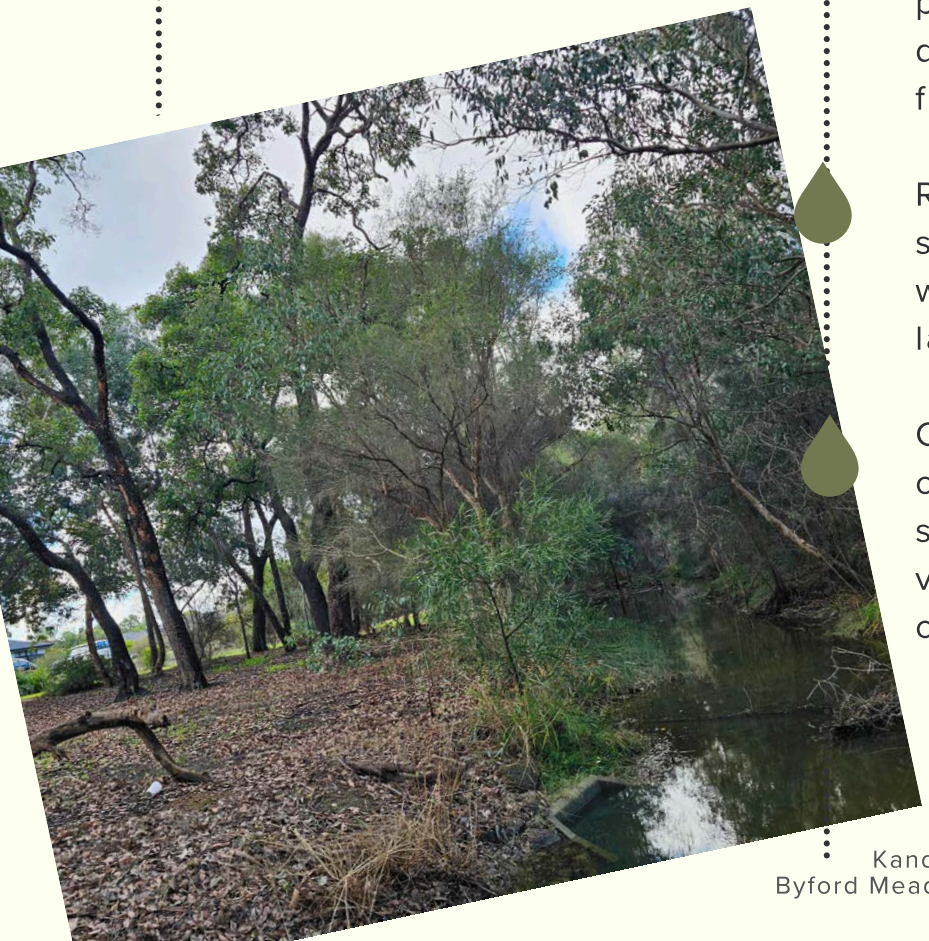
Retain any rural drain and incorporate it into linear public open space as a living stream or swale. Work with the local government to provide for its future management.

Foreshore reserves should have a minimum width of 30m and provide at least a 50m vegetated buffer to wetlands. Revegetate foreshore reserves and wetland buffers with endemic species and limited turf.

Use local, native waterwise plant species in landscape designs, particularly in the foreshore and buffers.

Remove all weeds of significance and ensure no weed species are included in landscaping design.

Create linkages between areas of vegetation within and off-site, through planting vegetation in the ground and on structures.



Kandimak Blvd,
Byford Meadows Estate

Principle 4: Provide protection from flooding in 1% annual exceedance probability (AEP) flood event and surface or groundwater inundation/waterlogging.

Design stormwater flood mitigation in accordance with Australian Rainfall and Runoff: A Guide to Flood Estimation - https://arr.ga.gov.au/arr-guideline.

Also apply the Code of Practice: Urban and peri-urban drainage modelling in Western Australia, the Decision Process for Stormwater Management in WA and the Stormwater Management Manual for Western Australia.

Quandong Park, Seascapes

The proposal must demonstrate no increase in flood risk to neighbouring properties; adequate freeboard levels in flood-prone areas (finished floor levels to be 0.3 m above street drainage systems and 0.5 m above natural/floodplain systems for the 1% AEP event level); and maintenance of natural drainage corridors.

The minor rainfall event is likely to move across a catchment, so erosion control may be required at pipe discharge points, but otherwise can be grassed. Check peak flow rates are not causing erosion – 1.5m/s in clay or rock areas.

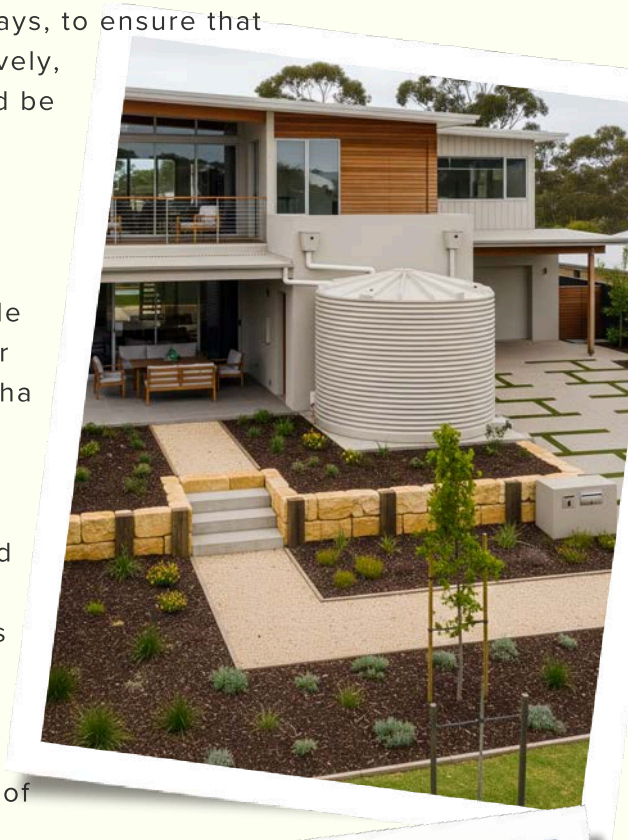
If shallow groundwater is present, show how the subsoil system will interact with the stormwater system (they are more efficient if integrated). If the groundwater is poor quality, it is more important that effective treatment and a free flowing outfall is provided for groundwater rather than stormwater.

Stormwater solutions appropriate to shallow groundwater areas include shallow infiltration systems such as 0.6m soakwells, tree pits, raingardens, biofilters, and swales distributed throughout the streets and on the lots, instead of piping to a large system in public open space.

Additional guidance is found in Water resource considerations when controlling groundwater levels in urban development (Department of Water, 2013) and Specification for separation distances for groundwater-controlled urban development (Institute of Public Works Engineering Australasia 2016).

Principle 5: Maximise water use efficiency and facilitate fit-for-purpose water sources including water reuse and recycling.

Alternative sources of water for irrigation include stormwater or subsoil drainage harvesting and wastewater reuse, however both are likely to require treatment and possibly storage to enable optimal use. This should be supported by a water balance assessment, including an understanding of ecological and cultural water requirements for bushland, wetlands and waterways, to ensure that the water requirements are maintained. Alternatively, groundwater trading is an opportunity that should be explored.

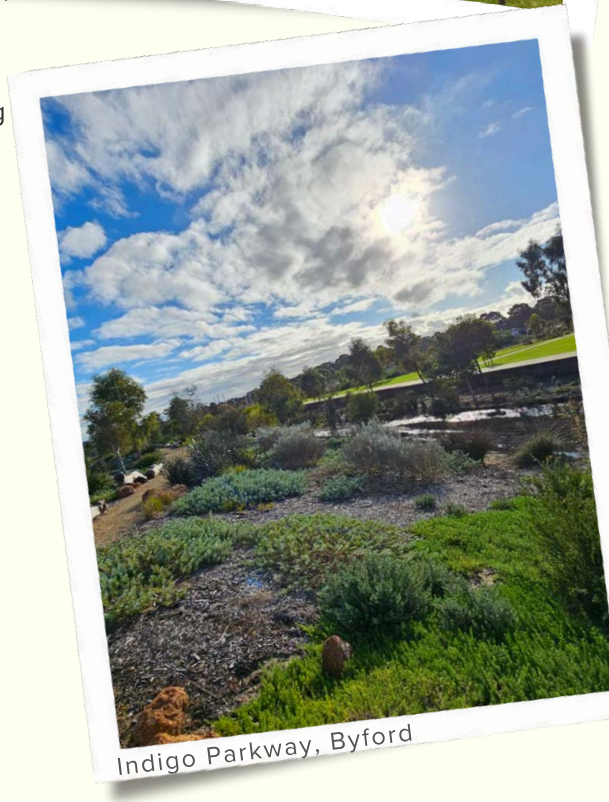


The use of waterwise planting, smart technology and best practice irrigation systems can reduce water needs. Consider the opportunity for variable rates of irrigation for different levels of service or POS typologies, as this may not require 6,750kL/ha (however a greater volume may be required for active open space).

Passively watered street trees should be included – simple kerb breaks let stormwater flow from roads into the verge to the tree. Locate footpaths at back of kerb to lower design, construction and maintenance requirements.

Strategically plan developments to prioritise use of limited water resources for active areas with higher irrigation requirements (such as ovals, school and active turf). Complement by maximising user of natives, waterwise landscaping and nature play in other areas.

Rainwater tanks should be included for non-potable water use (preferentially plumbed into toilets).



Indigo Parkway, Byford

Let the water in

Principle 6: Minimise pollution inputs and outputs in surface water and groundwater flows and in receiving environments.

The requirement for treatment depends on the types of contaminants stormwater is able to pick up or are contained within the groundwater. If the risk of contamination is low, treatment may not be required but always aim to pass stormwater over vegetation and soils.

Effort should be made during design so that the runoff generated by the first 15mm of rainfall is managed at-source (i.e. on the lots, in the car park and in the road reserve). The degree of importance is dependent on the potential for pollution to reach a sensitive environment – the greater the risk, the greater the effort required.

Minimise runoff by disconnecting hard surfaces with pervious surfaces and vegetation. This will reduce the area for calculation of 15mm. Note if the surface is disconnected, this should not be used in the calculation.

If 15mm runoff is unable to be managed at-source, a reduction in this criterion is acceptable where the risk of poor water quality impacting significant environmental values is low.

Principle 6: Minimise pollution inputs and outputs in surface water and groundwater flows and in receiving environments continued...

Provide overland flow paths (preferably through vegetated swales prior to foreshore areas and wetland buffers) for stormwater management, whereverp ossible and particularly if 15mm runoff is not able to be managed on-site.


Redgum Brook, Byford

Minimise the footprint of biofilters impacting upon functional POS. If water quality treatment is managed close to source and/or in the road reserve (through median swales, tree pits or raingardens), or if risk of polluted stormwater is low, dedicated biofilters are not required.

If the catchment is small-lot residential (<400m2), nutrients are unlikely to be an issue due to small garden sizes (as demonstrated in the Urban Nutrient Survey by DWER) and a biofilter is not required. Treatment can be delivered through simpler systems (e.g. soakwells, pervious paving, tree pits and raingardens).

If the catchment is just roads, the key pollutant is hydrocarbons, which are able to be treated via sand/soils, especially if vegetation (e.g. trees) are included, and biofilters are usually not required.

Gross pollutant traps (GPTs) should only be used in areas with high gross pollutant load i.e. commercial or poorly managed light industrial areas, or where space may be constrained and the cost of ongoing maintenance is understood and accepted.


Osprey Waters

Avoid mobilising contamination if contaminated soil or groundwater is present. Do not locate stormwater infiltration systems on top of contaminated soil or groundwater. If subsoils are proposed in an area of poor groundwater quality (e.g. high nutrient levels), the subsoils should discharge into vegetation and soil to provide treatment (biofilters will usually be required).

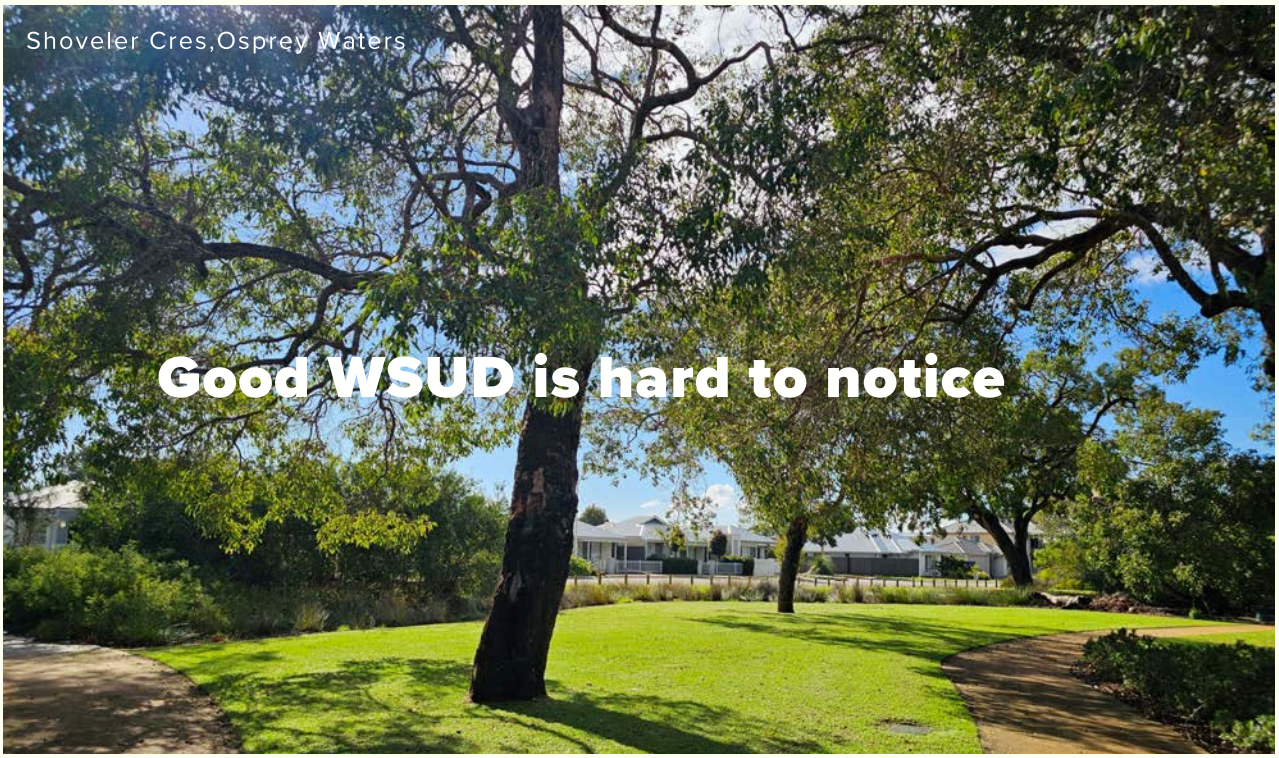
Include effective sediment and erosion control measures, both during and post construction.

Design to minimise mosquito and midge breeding sites.

Principle 7: Create fit-for purpose, safe and sustainable water management systems that are integrated into the urban form

Make the solution appropriate to the urban and built form context. This should facilitate integration of water into multiple use corridors and parks, streetscape, private open space, and buildings. Systems should be designed in accordance with an agreed level of service and maintenance requirements, demonstrated at handover.

Unless flood modelling has shown that there would be upstream or downstream impacts, runoff from minor and major rainfall events should not be discharged into large basins located in foreshore reserves or wetland buffers. The stormwater should discharge into the waterway or wetland (via overland flow) once the water quality requirements have been met.



Integrate flood storage areas within landscape designs. Linear systems that flow towards a discharge point are preferred over creation of a trapped low. Any infrastructure within flood storage areas should be designed to cope with wetting and drying and located according to an agreed level of service. Maintenance requirements should also be discussed and agreed with the local government.

Any proposal for on-site wastewater disposal must meet the requirements of the Government Sewerage Policy contained within the SPP 2.9 Planning for Water Guidelines, particularly in Sewerage Sensitive Areas.

Principle 8: Enhance economic, social and cultural values of water resources.

- Project team collaboration is critical – work with planners, landscape architects and engineers in partnership with local governments.
- WSUD benefits the community through increased mental and physical wellbeing.

Understand local cultural heritage values – work with the landscape – not against it. Try to retain it and support it moving forwards. Don't be afraid to ask what the community thinks.

Mandurah Tce, Mandurah

How it all comes together....

Use kerb breaks to facilitate passive watering of street trees and rain gardens.

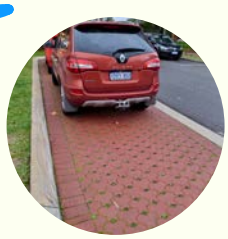
Use soak wells and raingardems in road reserves to disconnect the catchment and reduce management requirements.

Retain trees in road reserves, roundabouts and POS

Median swales provide overland flowpaths to convey minor events. Plant trees for shade and biodiversity.

Use GPTs in commercial areas or where space is restricted.

POS should be multi-functional and provide flood (major event) storage.



Install permeable paving in car parks to disconnect hard surfaces and increase soil moisture.

Prioritise water use for active POS areas and optimise waterwise planting and other POS functions in other areas.

Retain wetlands, revegetate buffers and stream foreshore areas with local, native species.

Ensure POS is functional. Reduce treatment areas (<15mm) where contaminantion risks and environmental receptors are low.

Local centre

School

Public open space

Retained wetland

Retained tree

Passively watered stree tree

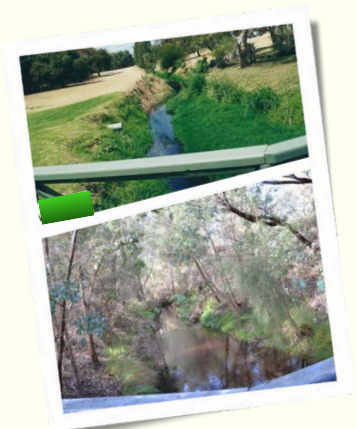
Living stream

Median swale

Pervious paving

Multiple use corridors provide overland flow paths and storage for minor and major events.

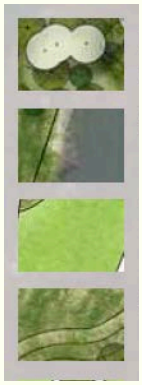
Provide erosion control for minor events and at discharge points.



Rural drains converted to living streams improve water quality, and provide urban cooling and places for people to connect to nature.

Manage sediment loss as part of site and housing construction.

And it all fits beautifully into our communities!

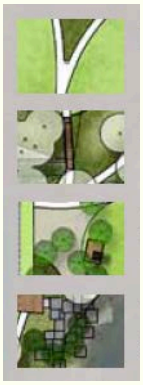


Existing trees to be retained

Retained vegetation and rehabilitated edge

Turf

Planting



Insitu concrete path

Boardwalk

Exposed aggregate banding

Tiered concrete platform to estuary

Shade structure

Feature seating

Exercise node

Playspace

Feature artwork location

Source: Emerge Associates

Together, we can create great water-sensitive places for our communities that contibute to maintaining the health of the beautiful Peel-Harvey estuary.

Useful contacts

City of Kwinana	(08) 9439 0200	admin@kwinana.wa.gov.au
City of Mandurah	(08) 9550 3777	council@mandurah.wa.gov.au
Shire of Harvey	(08) 9729 0300	shire@harvey.wa.gov.au
City of Rockingham	(08) 9528 0333	customer@rockingham.wa.gov.au
Shire of Serpentine-Jarrahdale	(08) 9526 1111	info@sjshire.wa.gov.au
Shire of Murray	(08) 9531 7777	mailbag@murray.wa.gov.au
Shire of Waroona	(08) 9733 7800	warshire@waroona.wa.gov.au

For general advice on the integration of water into land use planning and development

Department of Planning, Lands and Heritage, Water Policies Team
(08) 6551 8002 waterpolicies@dplh.wa.gov.au
Map layers associated with SPP 2.9 are on PlanWA
https://www.planning.wa.gov.au/mapping-and-data/planwa

For general advice on urban water management

Department of Water and Environmental Regulation

Kwinana-Peel Region	(08) 9550 4222	peel@dwer.wa.gov.au
South-West Region (Bunbury)	(08) 9726 4111	bunburyadmin@water.wa.gov.au

5 Rivers NRM
Working Together

Delivering on the
Bindjareb Djilba Protection Plan
Peel-Harvey estuary

This project is part of the Bindjareb Djilba (Peel-Harvey estuary) Protection Plan, a State Government plan to improve the water quality of the estuary.