New WAter Ways

www.newwaterways.org.au
info@newwaterways.org.au

Water sensitive urban design Self-drive tour

South-eastern Perth metro Site descriptions

This project is supported by the Swan River Trust, through funding from the Australian Government

New WAter Ways partners are:

Department of Planning
Department of Water
Swan River Trust
Urban Development Institute of Australia (WA)
West Australian Local Government Association

October 2014

New WAter Ways

Sites in City of Gosnells:

1 Glenview Way, Southern River

Latitude: 32°6'8.12"S Longitude: 115°56'54.99"E

2 Stillwater Street, Southern River

Latitude: 32°6'18.92"S Longitude: 115°57'23.08"E

3 Flowerfield Loop, Southern River

Latitude: 32°6'30.31"S Longitude: 115°57'2.29"E

4 Siroi Court Southern River

Latitude: 32°6'23.24"S Longitude: 115°56'54.40"E

5 Panther Elbow, Southern River

Latitude: 32°6'31.26"S Longitude: 115°56'52.44"E

Source: Landgate (WA)

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Sites in City of Armadale:

6 Benalla Drive, Harrisdale

Latitude: 32°6'55.14"S Longitude: 115°55'47.75"E

7 Sotheby Drive & Wright Rd, Harrisdale

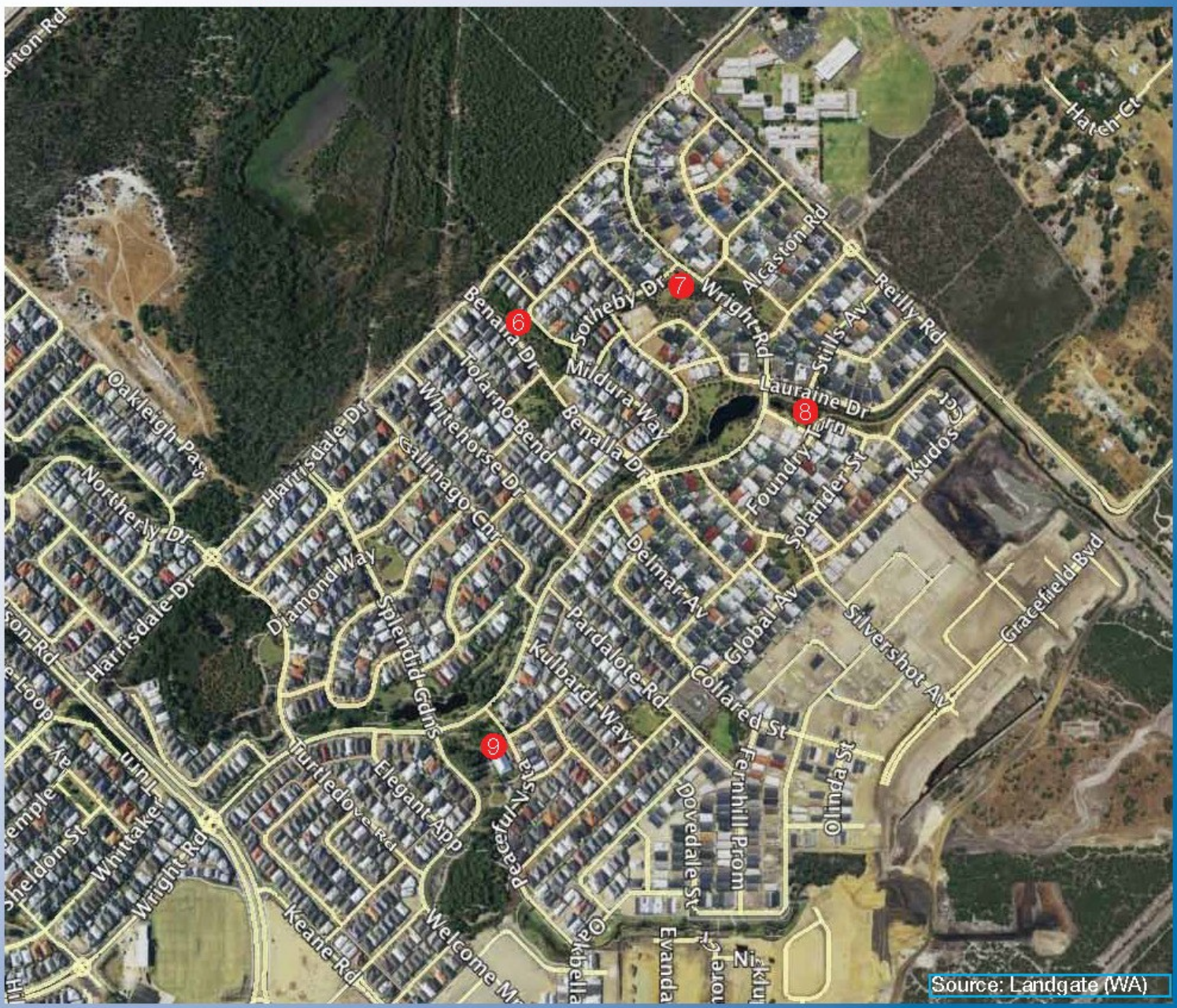
Latitude: 32°6'53.10"S Longitude: 115°55'57.49"E

8 Lauraine Drive, Harrisdale

Latitude: 32°6'58.93"S Longitude: 115°56'5.90"E

9 Peaceful Vista, Harrisdale

Latitude: 32°7'21.47"S Longitude: 115°55'46.68"E



Source: Landgate (WA)

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Contents & Acknowledgements

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New WAter Ways

Best management practices at each site:

Glenview Way, Southern River
- Grassed swales
- Bubble up pits
- Flush kerbing

Stillwater Street, Southern River
- Walled bioretention basins in side verges
- Grassed swales
- Bubble up pit

Flowerfield Loop, Southern River
- Bioretention basin
- Flush kerbing

Siroi Court, Southern River
- Constructed watercourse
- Biofiltration basin
- A revegetated buffer to the wetland
- Public open space irrigated by treated groundwater
- Flush kerbing
- Tree Pit

Panther Elbow, Southern River
- Tree Pits
- Flush kerbing
- Underground storage cells
- Bubble-up pits

Benalla Drive, Harrisdale
- Flush kerbing
- Vegetated detention area
- Bubble-up pits

Sotheby Drive & Wright Rd, Harrisdale
- Grassed swale
- Vegetated bioretention basin
- Bubble up pit
- Flush kerbing
- Head wall and piped connection

Lauraine Drive, Harrisdale
- Grassed swale
- Bubble-up pits
- Flush kerbing

Peaceful Vista, Harrisdale
- Grassed drainage basins
- Rehabilitated conservation category wetland
- Buffer to conservation category wetland
- Detention basin
- Flush kerbing

New WAter Ways' Partners:

Government of Western Australia
Department of Planning
Department of Water
WALGA
UDIA Urban Development Institute of Australia Western Australia
Swan River Trust

The Government of Western Australia
Australian Government

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Thank you for assistance and input from
- City of Armadale
- City of Gosnells

Also to:
- Wallis Property Company
- Stockland
- Satterley
- Epcad
- Plan E
- Blackwell and Associates

for providing designs and feedback where necessary.

Self-drive WSUD Tour

Site 1: Glenview Way swales
Developer: Bletchley Park, Wallis Property Company
Address: Glenview Way & Bletchley Parkway, Southern River
Latitude: 32° 6'8.12"S Longitude: 115°56'54.99"E
Approximate design date: 2006

The road reserves located at the corner of and along **Glenview Way** and **Bletchley Parkway** have been constructed to provide a stormwater conveyance function using best practice WSUD principles. Flush kerbing bordering the road allows stormwater generated during small rainfall events to flow into grassed swales contained within adjacent verges. This design maximises local infiltration of runoff, thereby contributing to the maintenance of pre-development hydrological conditions, as well as providing a conveyance function. Swales also provide physical and biochemical water quality treatment via deposition and filtration of sediments and nutrient uptake. Bubble-up pits are also contained within the grassed swales as part of conveyance of minor stormwater flows piped from surrounding access streets.

Runoff generated during major rainfall events from these streets is conveyed by pipe to the most northern POS site in the precinct and then directed to the adjacent conservation category wetland buffer zone, which has been revegetated to provide additional water quality treatment.

Key site objectives:

- Detention and treatment of small rainfall events to achieve water quality objectives
- Multiple use of school parkland and optimal pedestrian access

Best management practices include:

- Grassed swales (A)
- Bubble up pits (B)
- Flush kerbing to direct stormwater to the public open space and bioretention basin (C)

Other objectives include:

- Infiltration of small events at source
- Increased amenity of streetscapes
- Low maintenance WSUD treatments

Self-drive WSUD Tour

Site 2: Stillwater Street bioretention basins & swales
Developer: Bletchley Park, Wallis Property Company
Address: Stillwater Street, Southern River
Latitude: 32° 6'18.92"S Longitude: 115°57'23.08"E
Approximate design date: 2007



The **Stillwater Street** site in Bletchley Park is characterised by three walled bioretention basins in the verge along the street. The basins are connected to the road by side entry pits and pipes. The bioretention basins are planted with native vegetation for water quality improvement and are designed to treat and infiltrate stormwater runoff generated from the 1 year ARI event on-site.

Stormwater runoff generated in major rainfall events is directed overland into the nearby conservation category wetland.

Key site objectives:

- Infiltration of stormwater at source to maintain local hydrology
- Improved water quality through treatment by native vegetation

Best management practices include:

- Walled bioretention basins in side verges which manage small rainfall events (A)
- Grassed swales (B)
- Bubble up pit (C)
- Major flows are directed to adjacent conservation category wetlands (D)

Self-drive WSUD Tour

Site 3: Flowerfield Loop bioretention basin & public open space
Developer: Bletchley Park, Wallis Property Company
Address: Flowerfield Loop, Southern River
Latitude: 32° 6'30.31"S Longitude: 115°57'2.29"E
Approximate design date: 2010



Flowerfield Loop borders a public open space (POS) area of Bletchley Park Estate which is characterised by a bioretention basin and retained native vegetation. The bioretention basin has been designed to treat local runoff generated during small rainfall events via native vegetation. The basin provides flood protection during rainfall events through detention of minor flows.

Native vegetation was retained within the bioretention basin to enhance the sense of place and provide some native fauna habitat. The vegetation also improves water quality of stormwater runoff before infiltrating into the Superficial aquifer.

Flowerfield Loop POS provides recreational amenity for local residents, incorporating WSUD treatments into a local park, enhancing the local connection to landscape and providing space for passive, non-structured recreation.

Key site objectives:

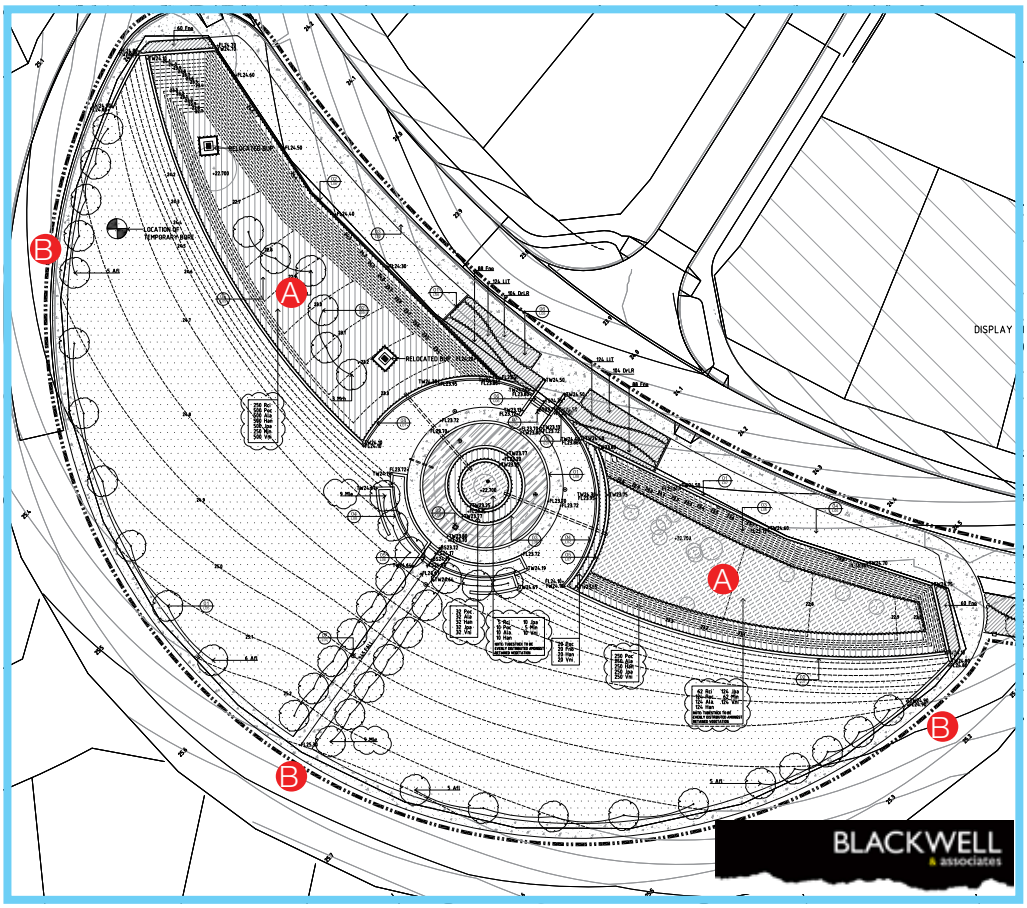
- Detention and treatment of small rainfall events to achieve water quality objectives
- Detention of small rainfall events to provide for serviceability
- Retention of native vegetation to enhance sense of place

Best management practices include:

- Bioretention basin for treatment of small events (A)
- Flush kerbing to direct stormwater to the public open space and bioretention basin (B)

Other objectives include:

- Retention of mature native vegetation for provision of faunal habitat
- Amenity in public open space for local residents via seating, shading and grassed areas



Self-drive WSUD Tour

Site 4: Siroi Court constructed treatment lake & wetland buffer zone
Developer: Bletchley Park, Wallis Property Company
Address: Corner of Siroi Court & Tiger Circle, Southern River
Latitude: 32° 6'23.24"S Longitude: 115°56'54.40"E
Approximate design date: 2010

The Siroi Court site comprises multiple WSUD best practices. This includes the innovative use of a constructed treatment lake for the storage and treatment of shallow groundwater for public open space (POS) irrigation, a biofiltration basin to treat stormwater runoff generated from adjacent roads during small events, and a revegetated buffer zone to rehabilitate adjacent conservation category wetland, Balannup Lake.

The constructed treatment lake, located at the end of Siroi Court, receives and stores groundwater pumped from the superficial aquifer, which undergoes initial treatment via aeration. A constructed watercourse connects this lake to a larger irrigation lake located within a POS area on Castlewood Parkway, and provides additional treatment to groundwater through further aeration and the settling of suspended solids. Treated groundwater is subsequently stored in the larger lake and utilised for irrigation of vegetated POS areas throughout the precinct. The constructed lakes and watercourse serve multiple purposes by providing treatment and storage of groundwater for irrigation; providing amenity to local residents; and providing habitat for local fauna.

A biofiltration basin located next to the constructed treatment lake functions as a water quality treatment system for stormwater runoff generated in small events from adjacent road reserves. Nearby tree pits and flush kerbing along Castlewood Parkway are also best practice stormwater management, which act to maximise local infiltration and water quality treatment of stormwater runoff from the local road network.

Another key feature of this site is the revegetated zone adjacent to the constructed treatment lake, biofiltration basin and Tiger Circle road reserve which separates and buffers the development from the Balannup Lake conservation category wetland. The buffer zone has been planted with locally native species to facilitate the rehabilitation of the wetland and habitat of native flora and fauna, as well as protecting it from impacts resulting from the development.

Key site objectives:

- Vegetated buffers to adjacent important wetlands
- Treatment, storage and use of groundwater for POS irrigation
- On-site stormwater infiltration and treatment

Best management practices include:

- Constructed treatment lake (A) and constructed watercourse lake (B) for treatment of groundwater before entering irrigation lake (C)
- Biofiltration basin (D)
- A revegetated buffer to the wetland beyond (E)
- Public open space irrigated by treated groundwater (F)
- Flush kerbing (G)
- Tree Pit (H)

Other objectives include:

- Provision of amenity for local residents through maintained public open space including grass, paths and playgrounds
- Creation of fauna habitat

Self-drive WSUD Tour

Site 5: Panther Elbow public open space & tree pits
Developer: Bletchley Park, Wallis Property Company
Address: Panther Elbow, Southern River
Latitude: 32° 6'31.26"S Longitude: 115°56'52.44"E
Approximate design date: 2011



Panther Elbow is a local street within the Bletchley Park Estate which borders a Bush Forever site and conservation category wetland, Balannup Lake. It also borders a passive public open space (POS) area which incorporates existing mature native vegetation and provides flood detention for runoff generated during major rainfall events. Underground storage cells have also been installed on the border of the POS area to infiltrate road runoff generated from the 1 year ARI event at source, and maintain local hydrological conditions. Underground cells are connected to the major POS detention area via a bubble up pit. Tree pits are also located within Panther Elbow and connecting streets and are designed to treat the first 5 mm of stormwater runoff generated from rain events.

Overall, the POS has been developed to maximise amenity for local residents, provide a drainage function, and create a connection with surrounding natural bushland and wetlands.

Key site objectives:

- Detention of stormwater to achieve flood protection objectives
- Infiltration and treatment of small rainfall events

Best management practices include:

- Tree pits (A)
- Flush kerbing to direct stormwater flows to vegetated areas (B)
- Underground storage cells (C)
- 2 bubble-up pits connecting the adjacent POS detention area to the Balannup drain. The southern grate is an inlet bubble-up pit, connected to the northern grate, an outlet bubble up pit, by a small v-drain. By planting the v-drain, some water quality treatment is being provided to stormwater that is conveyed between the POS and the Balannup drain outlet pipe and thus the drain also acts as a swale (D)

Other objectives include:

- Retained mature native trees
- Useable public open space providing an appropriate connection to the Bush Forever site

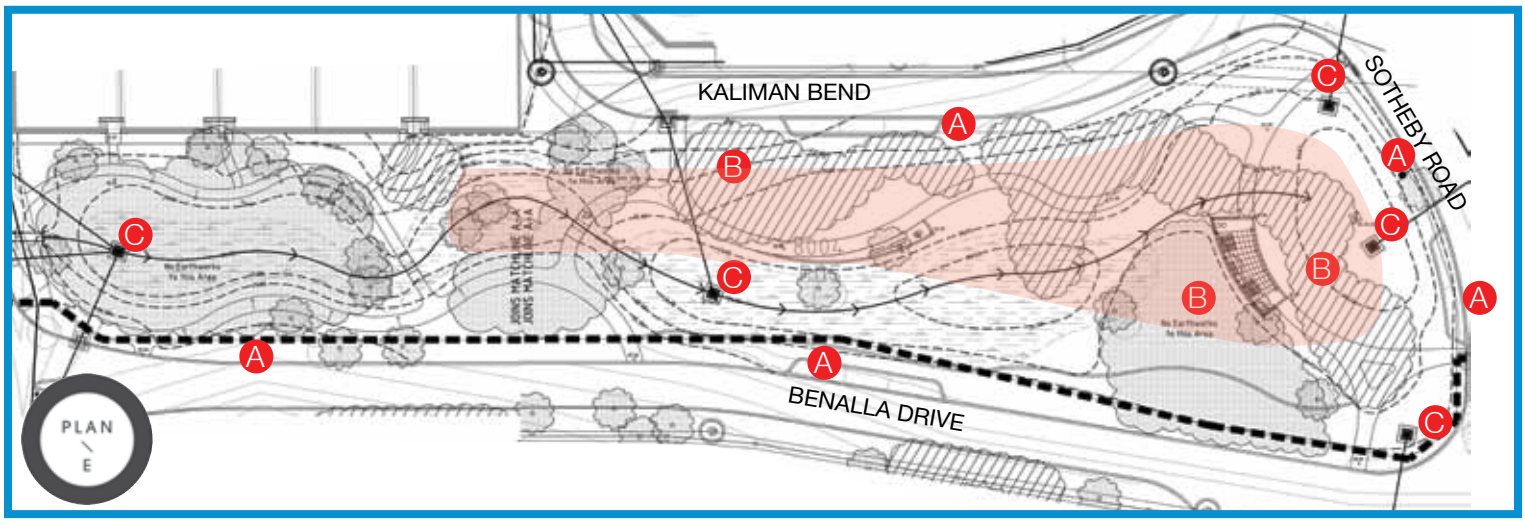
Source: Landgate (WA)

Self-drive WSUD Tour

Site 6: Benalla Drive public open space
Developer: Vertu, Stockland
Address: Benalla Drive & Sotheby Road, Harrisdale
Latitude: 32° 6'55.14"S Longitude: 115°55'47.75"E
Approximate design date: 2005



The public open space (POS) bordered by **Benalla Drive** in Vertu Estate is characterised by the expanse of native vegetation retained on site. The retention of native vegetation has significantly reduced the irrigation needs of the site, as well as providing attractive public amenity and habitat for local fauna. The POS achieves multiple objectives through its capacity to treat, detain and infiltrate stormwater runoff as well as provide recreational amenity. Runoff is conveyed to the POS through the use of WSUD systems such as flush kerbing and grassed swales surrounding the detention areas containing native vegetation. The naturally vegetated detention area in the centre of the POS site improves the water quality of stormwater runoff before infiltration to groundwater The meandering design of swales and connecting flow paths through the POS has been used to maximise local infiltration.



Key site objectives:

- Maximise local infiltration through a meandering flow path through grass and shrubs (shaded area of map).
- Water quality treatment of small events in vegetated areas.

Best management practices include:

- Flush kerbing adjacent to public open spaces to direct stormwater to infiltration areas (A)
- Vegetated detention area (B)
- Bubble-up pits (C)

Other objectives include:

- Retained native vegetation to reduce irrigation needs
- Public amenities:
  - Seating
  - Playgrounds
  - BBQs
  - Pathways and bridges through the natural vegetation

Self-drive WSUD Tour

Site 7: Sotheby Drive & Wright Road public open space
Developer: Vertu, Stockland
Address: Sotheby Drive & Wright Road, Harrisdale
Latitude: 32° 6'53.10"S Longitude: 115°55'57.49"E
Approximate design date: 2005

The public open space (POS) on the corner of **Sotheby Drive** and **Wright Road** in Vertu Estate features a round grassed space which provides a dual function to provide attractive public amenity as well as detention of stormwater runoff for flood protection. Best practice stormwater treatment is achieved at this site through the use of grassed swales and flush kerbing along the boundaries of the POS. These provide conveyance and allow maximum local infiltration. Bioretention basins planted with native vegetation improve the quality of stormwater before infiltration. Bubble-up pits are included within both grassed areas and areas containing native vegetation as part of conveyance of minor stormwater flows to the POS for detention and treatment. Subsoil drains have also been installed to control local groundwater levels.

Key site objectives:

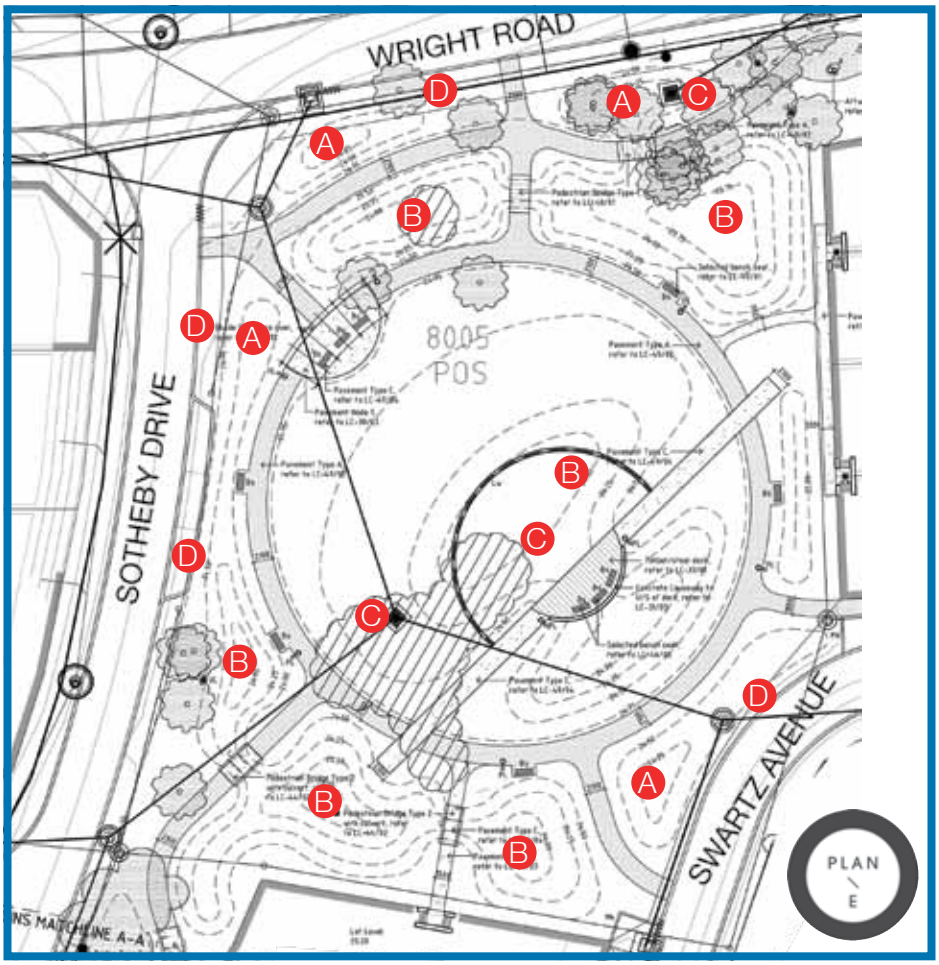
- To create an aesthetically pleasing public open space with the added benefits of managing small and large rainfall events

Best management practices include:

- Grassed swale (A)
- Vegetated bioretention basin (B)
- Bubble up pit (C)
- Flush kerbing (D)

Other objectives include:

- Retention of native mature vegetation (paperbarks)
- Large events flow to active area of public open space
- Public amenities
  - Seating and BBQ
  - Shade
  - Pathways around the grassed areas

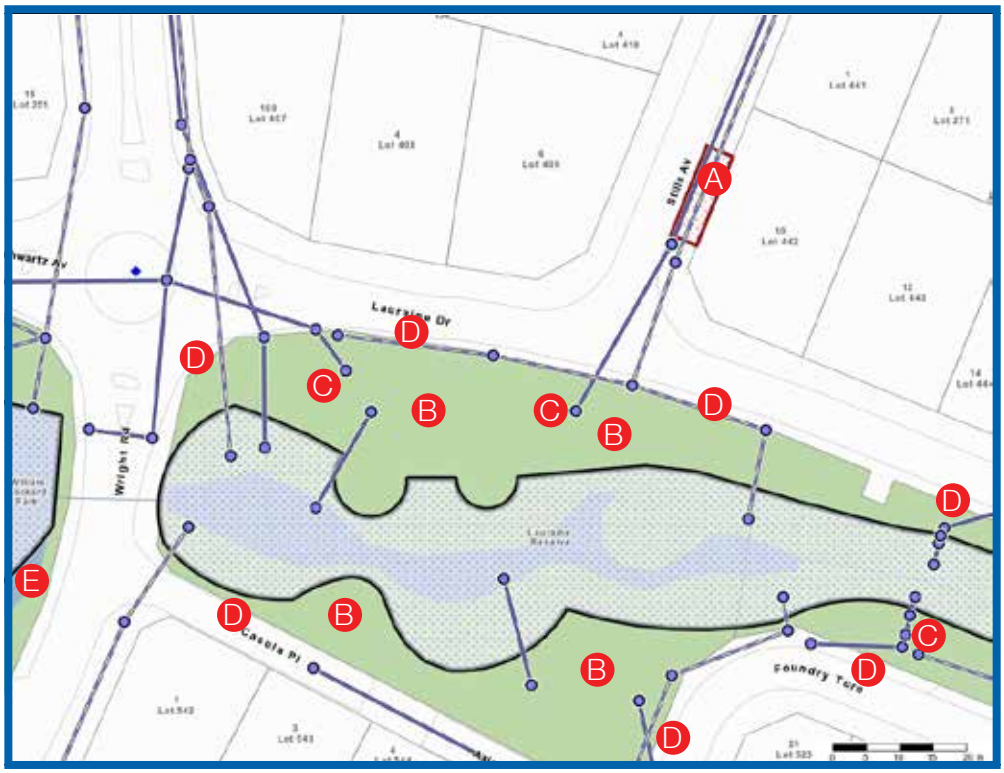


Self-drive WSUD Tour

Site 8: Lauraine Drive public open space
Developer: Vertu, Stockland
Address: Lauraine Drive, Harrisdale
Latitude: 32°6'58.93"S Longitude: 115°56'5.90"E
Approximate design date: 2005



Lauraine Drive public open space (POS) in Vertu Estate is characterised by the Balannup Drain which runs through its centre. Stormwater from the street network is treated in a bioretention basin in Stills Avenue, before flowing into the POS. Flush kerbing along Lauraine Drive allows local runoff from rainfall events to be infiltrated within the grassed swales and vegetated areas of the POS, and thus close to source. Major events will overflow to the drain, after being detained by a series of constricting culverts. The retention of native vegetation and the planting of additional native vegetation provides a nutrient stripping function to the drain. Soft edge treatment of the drain west of Wright Road is preferred to the walled treatment east of Wright Road; however, the lack of grade across this area is noted as providing challenging conditions. Shallow groundwater is also controlled in the area through subsoil drainage.



Drainage line - subsoil
Drainage line

Key site objectives:

- Management of rainfall from small and large events before entering Balannup Drain (shaded area)
- Creating an interactive public open space incorporating existing natural bushland

Best management practices include:

- Bioretention basin in non-active frontage (A)
- Grassed swale (B)
- Bubble-up pits to grassed swales (C)
- Flush kerbing (D)
- Soft edge treatment of drain (E)

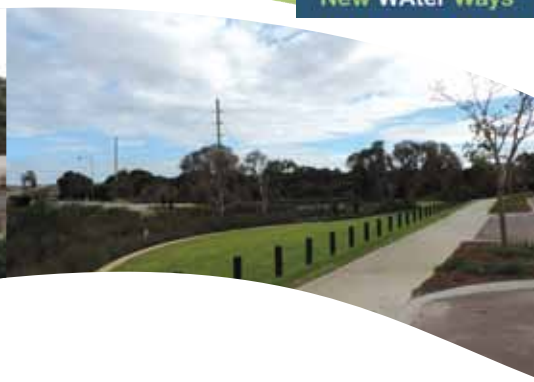
Other objectives include:

- Retained native vegetation
- Some nutrient stripping vegetation within the walled drainage channel
- Amenities:
  - Seating
  - Picnic tables
  - BBQs
  - Playground

Self-drive WSUD Tour

Site 9: Peaceful Vista public open space
Developer: Heron Park, Satterley Property Group
Address: Peaceful Vista, Harrisdale
Latitude: 32°7'21.47"S Longitude: 115°55'46.68"E
Approximate design date: 2009





The public open space (POS) area located along **Peaceful Vista** in Heron Park Estate incorporates an existing conservation category wetland into its design, with a focus on retention and revegetation of native plants and trees, in conjunction with localised stormwater management. Grassed basins throughout the POS allow for local infiltration of road runoff generated from small rainfall events, while larger detention areas including native vegetation have been incorporated into the site to allow water quality treatment and provide flood protection. In addition to providing a drainage function, this POS also provides significant amenity to local residents, as well as habitat for native fauna within and adjacent to the wetland.

Key site objectives:

- Creating a space which incorporates public amenities within the natural vegetation while managing stormwater as close to source as possible

Best management practices include:

- Grassed drainage basins for small rainfall events (A)
- Conservation category wetland rehabilitated with native tubestock planting (B)
- Buffer to conservation category wetland (C)
- Detention basin with retained trees and vegetated swales to manage large rainfall events (D)
- Flush kerbing (E)

Other objectives include:

- Retention of mature trees
- Public amenities:
  - Seating and play areas dotted around the public open space
  - BBQs and picnic facilities
  - Small amphitheatre with shade and backdrop for small community events
- Water quality treatment
- Protection of conservation and natural values

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Your notes

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