Local Water Management Strategy

Bassendean Precinct Structure Plan

19 September 2025

→ **The Power of Commitment**

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1. Introduction

1.1 Purpose of this report

This Local Water Management Strategy (LWMS) details the water management approach to be taken in the redevelopment and revitalisation of the Bassendean Town Centre and the Success Hill frame (the Precinct). It is expected that detailed surface and groundwater modelling will be undertaken as part of future development applications. This LWMS provides the background, key principles, design criteria and development requirements for the Precinct, ensuring that water management outcomes align with future development.

1.2 Assumptions

This LWMS is based on a desktop study only, using available information from a range of existing published and unpublished data sources and reports. Development within the Precinct should be completed with regard to site specific investigations and analysis at the time of assessment of a development application.

1.3 Planning background

This LWMS has been prepared in accordance with Draft State Planning Policy 2.9: Water Resources (SPP2.9) (WAPC, 2021), Waterwise Perth Action Plan (DWER, 2024), and Better Urban Water Management (WAPC, 2008) planning guidelines. The planning framework for land and water planning is illustrated in Figure 1.

Further key state and local guidance documents are summarised in section 1.3.1 and section 1.3.2, respectively. Department of Water and Environmental Regulation (DWER) Water Sensitive Urban Design (WSUD) guidance (DWER, 2017b) is of relevance to water management in the Precinct.

WSUD is a forward-thinking approach to urban planning and design that places a high priority on water sustainability, resilience, and environmental stewardship. This method holistically incorporates the entire urban water cycle, which encompasses potable water, wastewater, and stormwater.

By seamlessly integrating these elements into both constructed and natural landscapes, WSUD not only addresses water management issues but also contributes to the well-being of society and the preservation of the environment. This multi-faceted approach ensures that urban development is in harmony with nature, promoting a sustainable and resilient future.

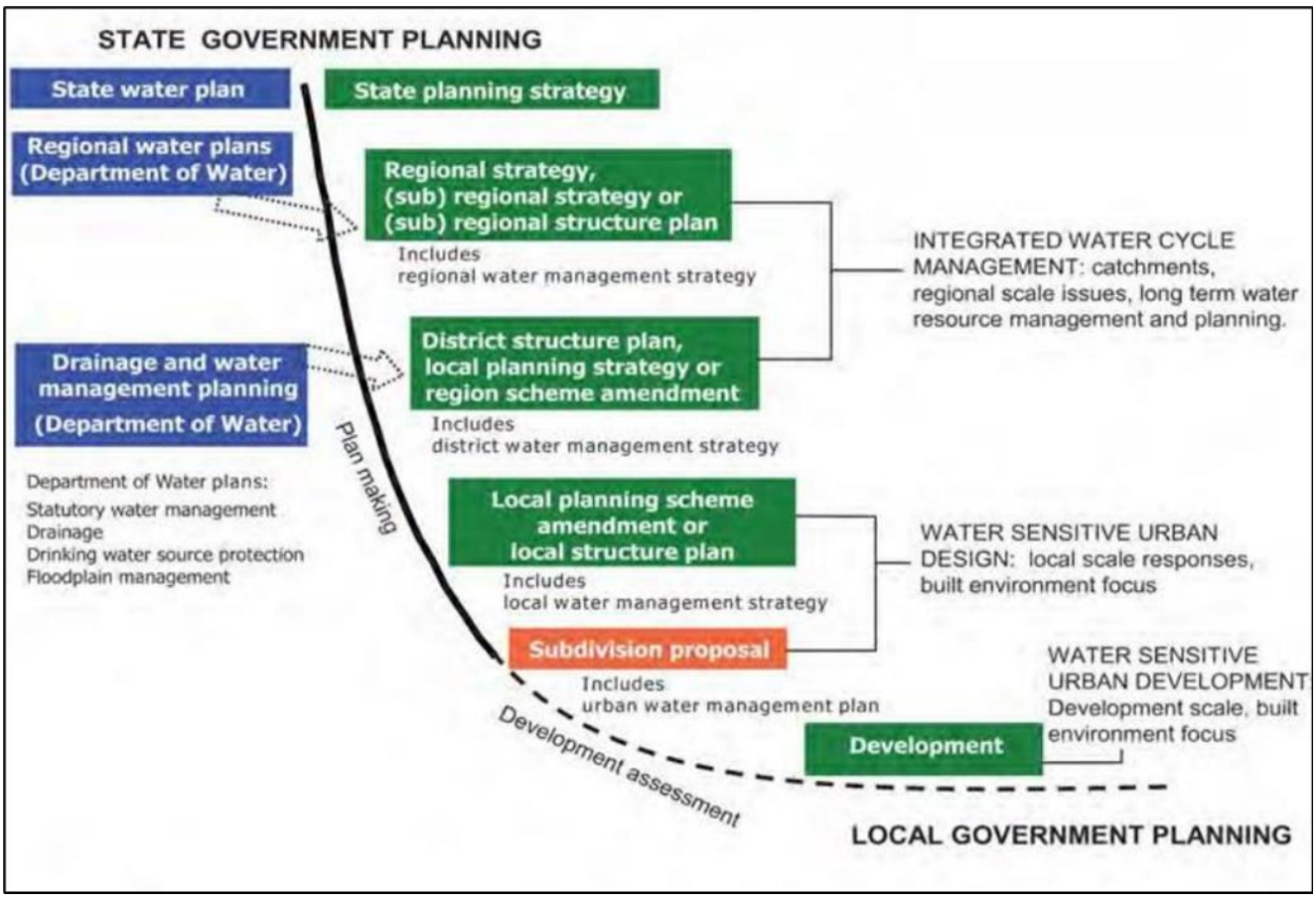

Figure 1 Integrated water planning framework

1.3.1 State planning policies and guidance

1.3.1.1 State Planning Policy 4.2 Activity Centres

SPP4.2 identifies the requirements for planning, redevelopment, and renewal of existing centres. Under SPP4.2, planning for the precinct must ensure that planning contributes to the conservation of resources, in particular reduced consumption of water, with identification of design guidelines for the application of sustainable development principles to maximise water conservation. Table 1 identifies the specific elements of SPP4.2 relevant to water management at Precinct Structure Plan stage.

Table 1 SPP4.2 planning considerations for water management

Element	Planning considerations
Waterwise plants	– While landscaping helps soften the public environment and provide respite consideration must be given to the type of plants used. Landscaped areas should be designed for high water efficiency through use of 'waterwise' planting.
Stormwater management	– Investigate opportunities to apply Water Sensitive Urban Design principles to manage stormwater from roads and open space, and to incorporate other integrated water systems.
Efficiency measures	– Water conservation may extend to buildings through water-saving installation and management measures. Structure plans may set design controls for water-efficient development including targets to collect and re-use rainwater.
SPP4.2 also notes under clause 6.4 the following with respect to water	– Mandate the use of waterwise plants and trees in all centre landscape plans. – Establish targets for stormwater and greywater use.

1.3.1.2 State Planning Policy 2.9 – Planning for Water Guidelines

The SPP2.9 – Planning for Water Guidelines aim to ensure that planning and development considers water resource management and includes appropriate water management measures to achieve optimal water resource outcomes. The guidelines set out the requirement for a Local Water Management Plan, to demonstrate feasibility of water management systems and strategies with conceptual plans and designs that are proposed for implementation through detailed design and development. To do so, the following questions should be addressed:

– How will water be managed within the Precinct?
– How much land is needed for water management and protection and where will it be located?
– Who will deliver services, where will they be located, are they secured and when will they be provided?

This LWMS has been prepared in compliance with the guidelines, with measures that should be further implanted at development application phase, or through works to the public realm.

1.3.1.3 Kep Katitjin – Gabi Kaadadjan – Waterwise Action Plan 3

The Waterwise Perth Action Plan (DWER, 2024) continues to set out the direction for transitioning Perth to a leading waterwise city by 2030. The action plan defines a waterwise city:

Waterwise cities are where communities care about and value water, while making best use of its various sources (groundwater, dams, stormwater, sea water and wastewater). The city serves as a catchment and provides healthy natural environments, supporting a range of cultural, social, ecological and economic benefits

The action plan explores mechanisms in which water usage can be improved at the precinct scale, including:

– Improving water efficiencies in new developments and retrofitting existing developments
– Implementing Drainage for Liveability and Waterwise Greening
– Optimising groundwater usage
– Adopting waterwise management practises for open spaces
– Increasing wastewater recycling
– Planning for future water
– Increasing wastewater recycling
– Reducing household water usage

The action plan explores the many benefits of a waterwise environment, some of which are illustrated in the figure below.

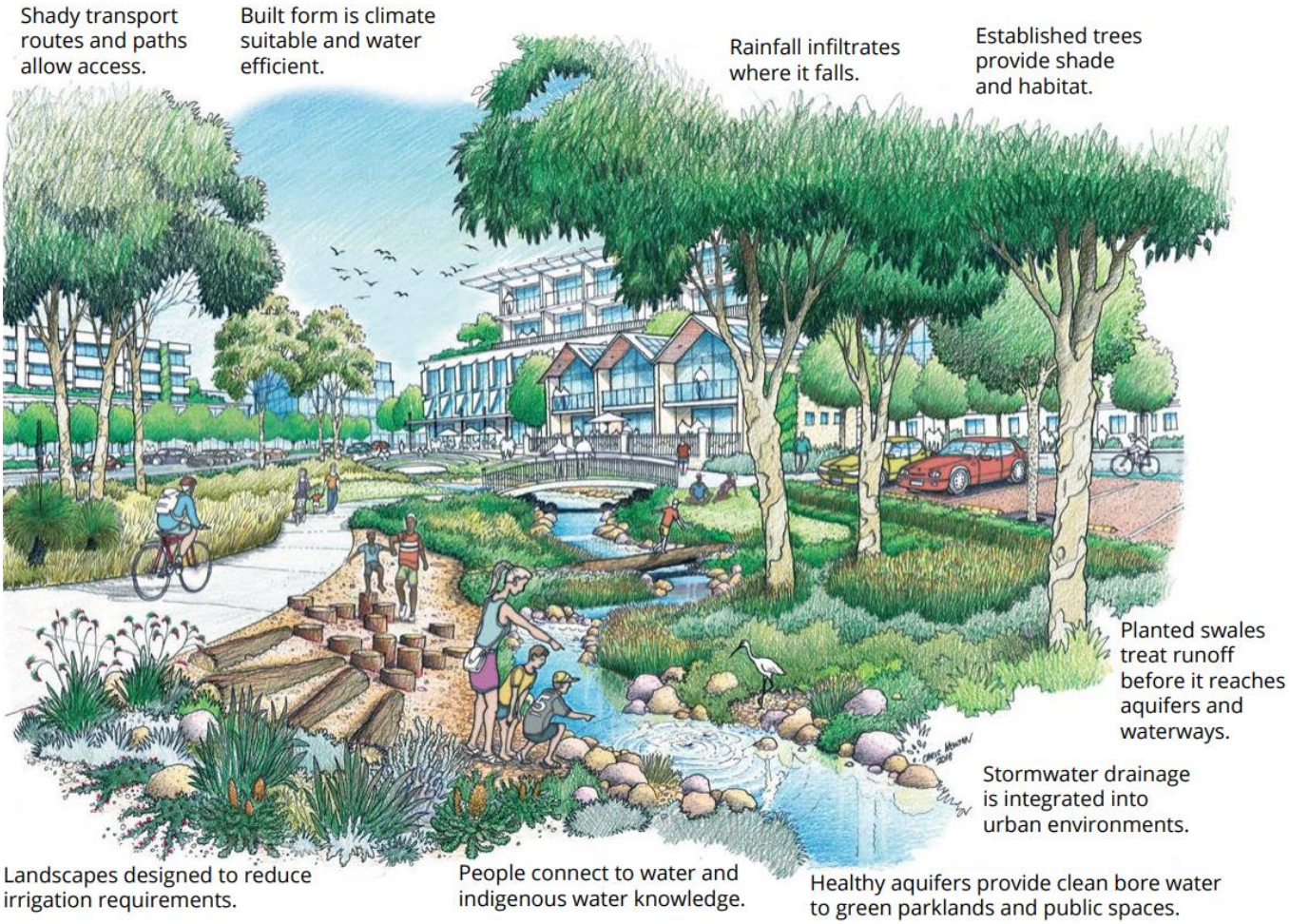

Figure 2 Waterwise features in landscape design

1.3.1.4 Better Urban Water Management Guidelines

The Better Urban Water Management Guidelines are designed to facilitate better management and use of urban water resources by ensuring an appropriate level of consideration is given to the total water cycle in each stage of the planning process.

1.3.2 Town of Bassendean plan, policies and guidelines

1.3.2.1 Our Plan for the Future – Council Plan 2023 - 2033

The Council Plan sets out a future vision for the Town of Bassendean, outlining objectives, strategies and measurement of success (ToB, 2023a). The document outlines performance areas, one of which is 'planet', covering all aspects of the environment and sustainability, including management of the river foreshore, water conservation and tree planting. The Council Plan identifies direction to:

- Implement waterwise initiatives and policies for residents, businesses and other organisations
- Retain Gold Waterwise Council status and improve quality of water flows into the Swan River
- Stream restoration measures and improved implementing waterwise and urban forest projects

1.3.2.2 Local Planning Strategy

The Town's Local Planning Strategy (ToB, 2023b) sets out the way land is to be used and developed, classifies areas for land use and includes provisions to coordinate infrastructure, including specific development controls which apply to each property. The Local Planning Strategy identifies planning issues and opportunities related to water, as described in Table 2.

Table 2 Planning issues / opportunities

Planning issue / opportunity	Actions
No. 10 – Natural areas	– Water monitoring in significant natural areas – Enhancing existing drainage lines by converting open drains into living streams
No. 11 – Climate change	– Implementing waterwise and urban forest projects
No. 14 – Servicing	– Servicing updates may be required to sewer and scheme water systems – Evaluate capacity of stormwater infrastructure

1.3.2.3 Local planning policies and plans

The Town's planning frameworks provide further context on local water management (refer Table 3).

Table 3 Town of Bassendean planning frameworks

Document	Overview
LPP2 – Sustainable Development	Outlines criteria and design standards for sustainable residential development, encouraging and facilitating the adoption of sustainable built form throughout the Town.
LPP13 – Tree Retention and Provision	Outlines the circumstances in which development approval is required for tree damaging activities, aiming to ensure the retention and enhancement of trees at all stages of the planning process.
LPP14 – Stormwater	Outlines the requirements for stormwater retention and management within the Town.
Waterwise Council Action Plan	Outlines the Town's Waterwise Vision, Corporate and Community Goals, and actions to achieve them with the aim for continued recognition as a Gold Waterwise Council.
Public Open Space Strategy	Provides the strategic direction and framework for the provision, development and management of local open space within the Town of Bassendean.
Natural Environment and Sustainability Statement	Outlines the Town's commitment to managing environmental impacts, ensuring environmental compliance and improving environmental performance.
Tree Canopy Action Plan	Outlines the Town's strategic approach to maintaining and increasing tree canopy cover, to achieve a target of 30% canopy cover by 2040.
Street and Reserve Trees Council Policy	Provides a consistent approach to the care, control and management of trees on land vested with or managed by the Town of Bassendean, with a target to increase tree canopy cover to 30% by 2040.

2. Existing site characteristics

2.1 Precinct area description

2.2 Climate

The climate within the Precinct is typically classified by hot, dry summers and mild, wet winters. The nearest Bureau of Meteorology (BoM) weather station with long term data is located at the Perth Airport (Station 009021), approximately 3.9 kilometres away. Weather has been recorded at this station since 1944.

Maximum temperatures in summer average 31.1°C while minimum temperatures average 16.6°C. Maximum temperatures in winter average 18.5°C while minimum temperatures average 8.4°C. Temperatures have gradually increased by upwards of 1°C over the last century which has substantially increased potential evapotranspiration and decreased the effectiveness of rainfall.

Winds are strongest during summer, with an average summer windspeed of 21.6 km/h, and average winter windspeed of 16.1km/h. The typical summer pattern is strong easterly winds in the morning swinging to a strong south-westerly wind or sea breeze in the afternoon.

The average annual rainfall recorded at the station since 1944 is 752.7 mm, with an average of 32 days of rain. Most of the rainfall falls between May to September, with the monthly distribution of rainfall shown in Table 4.

Table 4 Mean rainfall for Perth Airport (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall	10.3	14.4	16.5	39.0	96.4	153.7	153.8	118.0	72.1	42.8	25.7	10.6

Rainfall in the Perth metropolitan area has reduced 15 per cent since 1975, with climatic models predicting a further six per cent reduction by 2030 (DWER, 2019).

The average number of days with temperatures above 35°C are also predicted to increase, with this increase linked to the 'urban heat island effect' which results in built-up areas to be warmer both during the day and at night (UMW, 2014), with the effect intensified in suburbs with minimal tree canopy.

2.3 Topography and geology

2.3.1 Topography

Topography within the Precinct generally ranges from 10 to 25 Australian Height Datum (ADH), generally sloping east towards the Swan River (refer Figure 3).

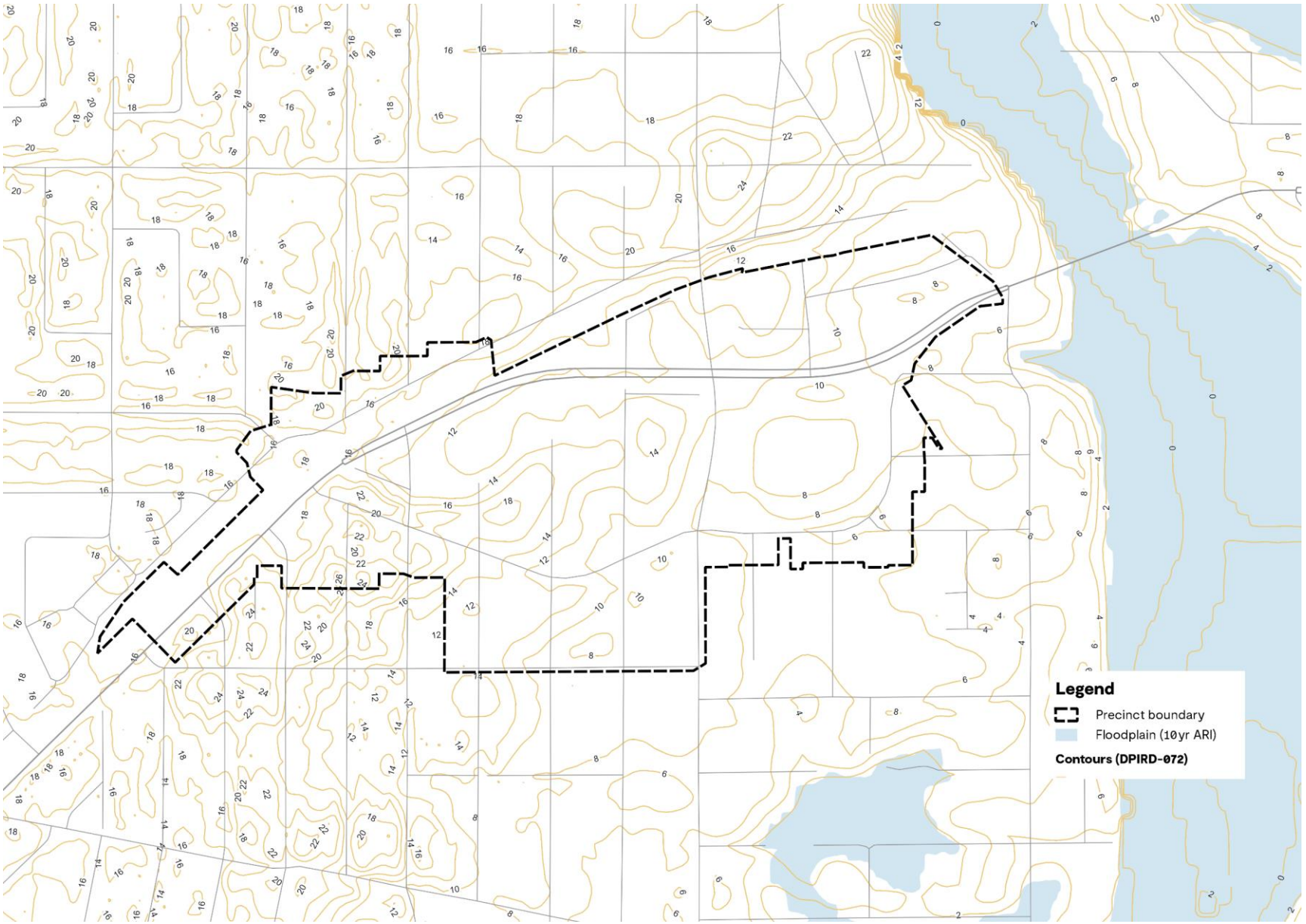

Figure 3 Precinct topography

2.3.2 Soils

The Department of Primary Industries and Regional Development (DPIRD) DPIRD-076 dataset (DPIRD, 2013) attributes WA Soil Groups to each Soil Landscape Mapping Unit. DPIRD uses the following criteria to differentiate soil groups: presence of carbonates, colour, depth to soil horizons, pH, and soil structure.

The dataset identifies two key soil types within the Precinct (refer Table 5).

Table 5 Soil classifications

Soil type	Description	Land use considerations
Pale deep sand (Soil Group 444)	Sand >80 cm deep with white, grey or pale yellow topsoil.	– Poor fertility and water holding – Prone to wind erosion – Groundwater recharge and nutrient leaching issues – Neutral to acid pH
Semi-wet soil (Soil Group 103)	Dark grey to black organically stained sands, waterlogged to 30-80 cm for a major part of the year.	– Waterlogging and seasonal inundation – Artificial draining may be an option – Often good summer moisture – Acid to neutral pH

These soil types extend over large areas of the Swan Coastal Plain, particularly in proximity to the Swan River, including nearby areas of Bayswater and Belmont. The identified soil type suggests that increased development at this location can be supported, subject to consideration of how development interacts with groundwater levels.

2.3.3 Acid sulfate soils

A review of the DWER acid sulfate soil (ASS) risk mapping for the Swan Coastal Plain (DWER-055) indicates a '*moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3m of natural soil surface'* within the Precinct.

2.4 Contaminated sites

A search of the DWER Contaminated Sites Database identifies multiple sites within the Precinct (refer Figure 4). It is understood that the database does not include reported sites, including those awaiting classification or classified as *Potentially contaminated – Investigation required*. Where contaminated sites are known to exist, or are identified during construction activities, these should be managed in accordance with the *Contaminated Sites Act 2003* (WA).

Table 6 Contaminated sites

Location	Contamination	Land use
1 Park Lane	Contaminated – restricted use	Car Park
78 Old Perth Road	Remediated for restricted use	Mixed-use development
309 Guildford Road	Remediated for restricted use	Petrol Station

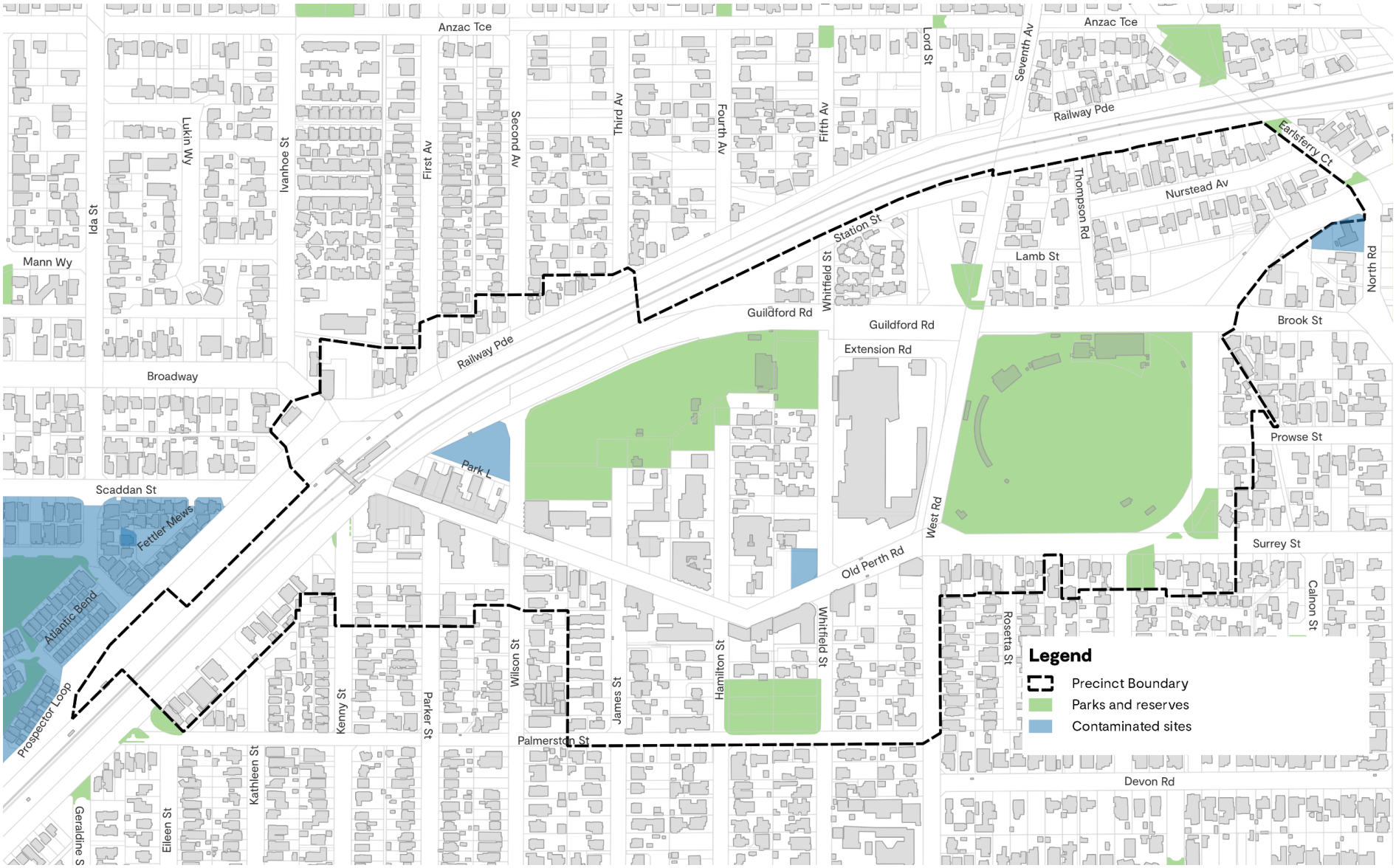

Figure 4 Contaminated sites

2.5 Flora and fauna

2.5.1 Native vegetation extent

The pre-European native vegetation within the Precinct area is mapped as *Swan Complex* (fringing woodland with localised occurrence of low open forest) and *Bassendean Complex-Central and South* (woodland to low woodland and sedgelands). Due to the long history of development in Bassendean, a majority of native vegetation has been cleared. A search of the DBCA's Threatened and Priority Flora database (DBCA-036), identified that there are no threatened or priority flora recorded within the Precinct.

2.5.2 Bush Forever

There are no Bush Forever sites within or directly adjacent to the Precinct. However, Bush Forever Sites No. 305 and No. 491 are less than 1km from the Precinct boundary.

2.5.3 Threatened Ecological Communities

The Town is located within the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) region (Department of the Environment and Energy, 2016; DCCEEW, 2024). The DBCA Threatened and Priority Ecological Community (TEC and PEC) database (DBCA-038) indicates that no TECs occur within the Precinct. Within a 1km radius of the Precinct, there are a total of three (3) TEC extent mapped areas. These appear to originate from Bindaring Park and Ashfield Flats.

2.5.4 Environmentally Sensitive Areas

The DWER maintains a dataset of Environmentally Sensitive Areas (ESAs). ESAs are areas of land deemed to support conservation, heritage or ecological value, or an area protected through existing State policy. A search of the DWER ESA database (DWER-046) found no ESAs within the Precinct boundary. Multiple ESAs exist to the East and South of the Precinct, in association with the Swan River, Bindaring Park and Ashfield Flats.

2.5.5 Urban tree canopy

The Town of Bassendean has a relatively low tree canopy cover of 26.75 ha or 15% of total land area and a 22.6% green cover (ToB, 2023c). In 2014, the University of Technology Sydney completed the first ever benchmarking of urban tree canopy cover in Australia using the i-Tree methodology (Jacobs et al, 2014). In this report, Town of Bassendean was identified as having a relatively low canopy cover of 15.7%. To 2020, an increase was observed over all land types with street blocks increasing from 11 to 13%, roads from 11 to 15% and parks from 19 to 25%.

In 2024 the Town collated new tree canopy data, observing the extent of canopy exceeding 3.0 m. Table 7 describes the extent of tree canopy exceeding 3.0 m by each zone. Mature canopy is present primarily on reserved land (open space, parks and recreation and education reserves) and is lower over regionally managed transport reserves (roads, railways) and within the District Centre zone, generally along Old Perth Road between Guildford Road and West Road.

Table 7 +3m canopy by zone/reserve type

Scheme	Zone/reserve	% Tree Canopy 3m+
Local planning scheme	District Centre	14.05
	Education	26.20
	Mixed use	20.19
	Public open space	42.76
	Public purposes	62.89
	Residential	19.68
Region scheme	Railways	2.51

	Parks and recreation	32.85
	Roads	14.72

The Town has set a target of achieving 30% tree canopy coverage by 2040.

2.5.6 Fauna

A search of the DBCA's Threatened and Priority Fauna database (DBCA-037) identified two recordings of threatened fauna (bird) within the precinct and one recording of specially protected fauna (migratory bird). The database recordings are not always locationally accurate, and to confirm the presence or absence of fauna, on-ground surveys are required.

The Precinct is not identified as intersecting with any confirmed or unconfirmed Carnaby's Black Cockatoo roosting sites. However, the Precinct forms part of the wider Swan Coastal Plain and Jarrah Forest IBRA region where roosting and migration of Carnaby's Black Cockatoo is prevalent.

Native fauna within the Town, particularly birds, frogs and reptiles, are concentrated in the wetlands and damplands outside of the Precinct. Apart from possible localised populations of Quendas (Isoodon obesulus), and brushtail possums (Trichosurus vulpecular), there are few native mammal species remaining.

2.5.7 Groundwater dependent ecosystems

A search of the online Groundwater Dependent Ecosystems (GDE) Atlas (BoM, 2021) identified no GDEs within the Precinct boundary. Several high to moderate potential GDEs exist in proximity to the Precinct in association with the surrounding wetlands.

2.5.8 Public open space and reserves

In July 2025, the Town of Bassendean adopted a Public Open Space (POS) Strategy, establishing a clear strategic framework to guide the planning, development, and management of local open spaces. The Strategy outlines key initiatives aimed at creating a cohesive and accessible POS network that improves community wellbeing while addressing existing challenges.

The Precinct contains a range of POS areas, including the regionally significant Bassendean Oval. In total, approximately 10.88 ha of public open space is available within the precinct. This represents approximately 19.2% of the precincts total area. This considerably exceeds the 10% of gross subdivision area criteria set out in the WAPC's Development Control Policy 2.3 – Public Open Space.

However, as per the Town's POS Strategy, the suburb of Bassendean provides only 6.42% of land area as public open space. The concentration of public open space within the precinct leads to design responses contained in this plan that seek to improve the functionality and accessibility of POS areas for the benefit of the wider Bassendean neighbourhood.

Table 8 Public open space areas

Name	Hierarchy classification	Area (approx.)	Function
Bassendean Oval	Regional	5.95 ha	Sport
BIC Reserve	District	3.64 ha	Recreation
BIC Reserve North	Local	0.45 ha	Nature
Palmerston Square	Local	0.61 ha	Recreation
Christie Park	Small	0.11 ha	Recreation
Surrey Street Reserve	Small	0.06 ha	Recreation

2.6 Heritage

2.6.1 Aboriginal heritage

A search of the DPLH Aboriginal Heritage Inquiry System (ACHIS) identified four (4) registered Aboriginal Cultural Heritage (ACH) Places intersecting the Precinct (Table 9). The location of the registered sites in relation to the Precinct is illustrated in Figure 5. This depicts the dithered boundaries associated with each place. Confirmation of whether the Precinct or a particular development falls within the actual boundaries of a protected place requires enquiry to DPLH.

Table 9 Registered ACH Places

Site ID	Site name	Status	Type
3840	Bennet Brook: Camp Area	Registered	Burial; Artefacts / Scatter; Camp; Ritual / Ceremonial; Creation / Dreaming Narrative; Fish Trap; Historical; Hunting Place; Traditional Structure; Plant Resource; Water Source
3487	Bennet Brook: Edin Hill R.	Registered	Camp; Meeting Place; Water Source
3758	Helena River	Registered	Ritual / Ceremonial; Creation / Dreaming Narrative; Repository / Storage Place
3757	Success Hill	Registered	Artefacts / Scatter; Birthplace; Camp; Ritual / Ceremonial; Creation / Dreaming Narrative; Fish Trap; Traditional Structure; Meeting Place; Other; Quarry; Repository / Storage Place; Water Source

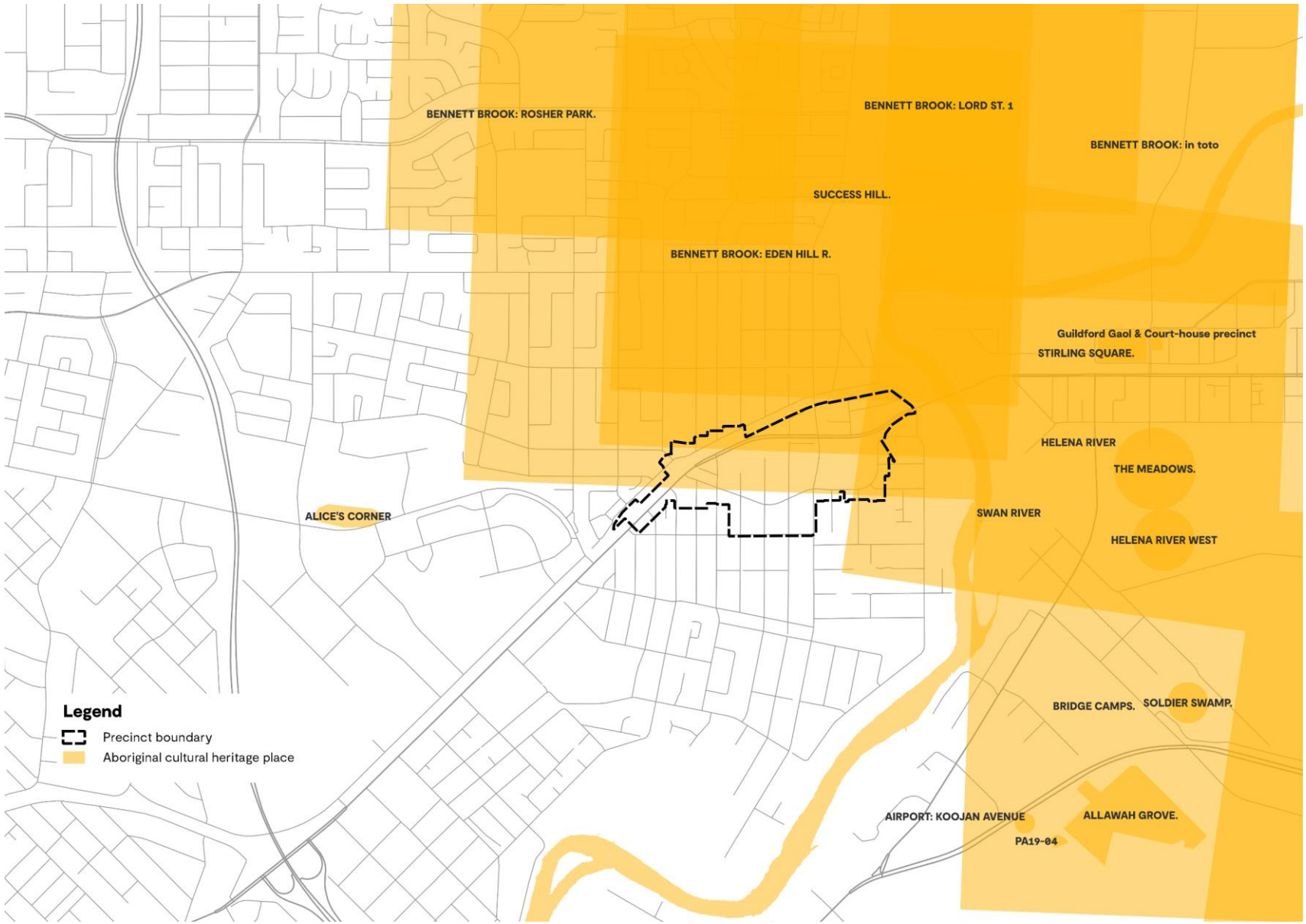

Figure 5 *Aboriginal cultural heritage places*

2.6.2 European heritage

There are several European Heritage sites listed on the State Register of Heritage Places (refer Table 10). The Town's Local Heritage Survey and Heritage List contains buildings, local landmarks, and individual residencies, including:

- Bassendean War Memorial (P7407)
- Bassendean Hotel (P133)
- Bassendean Railway Station (P7399)
- Bassendean Post Office (P7401)
- Bassendean Uniting Church and Hall (P134)
- St Josph's Church and School (P13069)

Table 10 State Registered Heritage Places

ID	Place name
P7403	Bassendean Oval
P18088	Bassendean Oval Entrance Gate
P18089	Bassendean Oval Grandstand
P18090	MacDonald Grandstand
P132	Padbury's Buildings, Bassendean
P129	Bassendean Fire Station

The location of the registered Heritage Places in relation to the Precinct is illustrated in Figure 6.

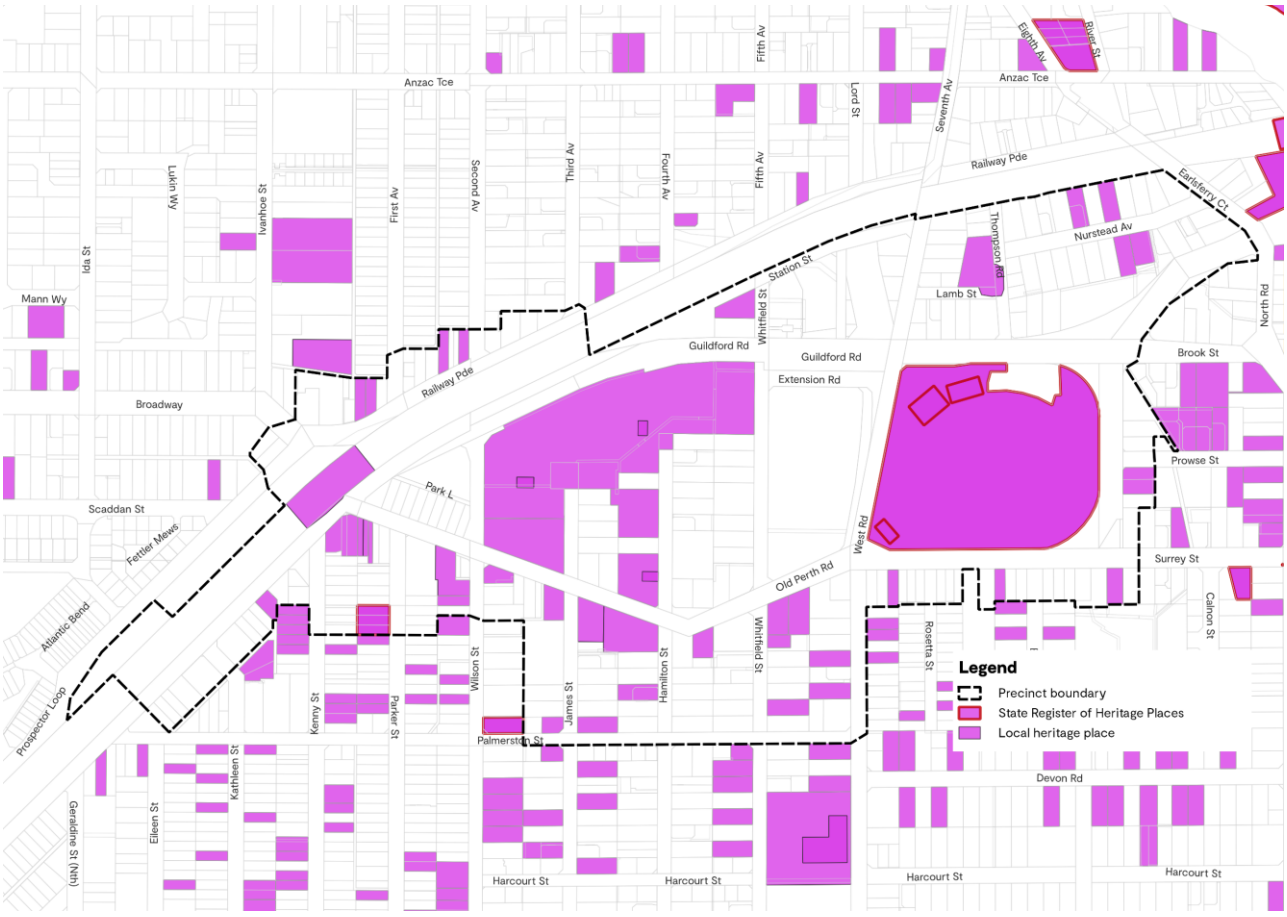

Figure 6 Registered Heritage Places

3. Existing site water background

3.1 Surface water

3.1.1 Catchments

3.1.1.1 Regional

The Precinct is located within the Swan-Avon River Catchment - Lower Swan River. This catchment extends to most areas adjacent to the Swan/Avon River tributaries.

3.1.1.2 Local

The Precinct is located within the Swan-Canning Estuary Catchment (refer Figure 7).

3.1.2 Stormwater and drainage

Effective management of stormwater is essential to prevent flooding and the pollution of nearby waterbodies. Within the Town, a majority of stormwater directly infiltrates into the soil (ToB, 2023). Stormwater resulting from more developed, impervious areas is directed to a network of piped and/or open drains to outlets that discharge into the Swan River (ToB, 2014).

Three main drainage lines exist within the Town; the Kitchener Street, Chapman Street and Guildford Road drains (ToB, 2014). These drains are owned and managed by the Water Corporation, while the Town supports ongoing monitoring to ensure they remain functional and free from contamination. Numerous drains under local authority also drain stormwater runoff from surrounding areas and discharge into the main drains.

3.1.3 Flood mapping and management area

The Precinct is not located within the DWER Flood Extent and Floodplain Area (DWER-017). However, areas of to the east of the Precinct are affected by the 1 in 10 year (10% AEP) flood extent and other designated flooding events. The Local Planning Strategy seeks to apply appropriate planning mechanisms to limit land use intensification on properties subject to riverine flooding, to manage risk and protect community safety and infrastructure.

3.1.4 Waterbodies and wetlands

No waterbodies or wetlands are present within the Precinct boundary. The Swan River is the main water body existing in proximity to the Precinct. However, several small wetlands also remain adjacent to the river and its floodplain (refer Figure 8).

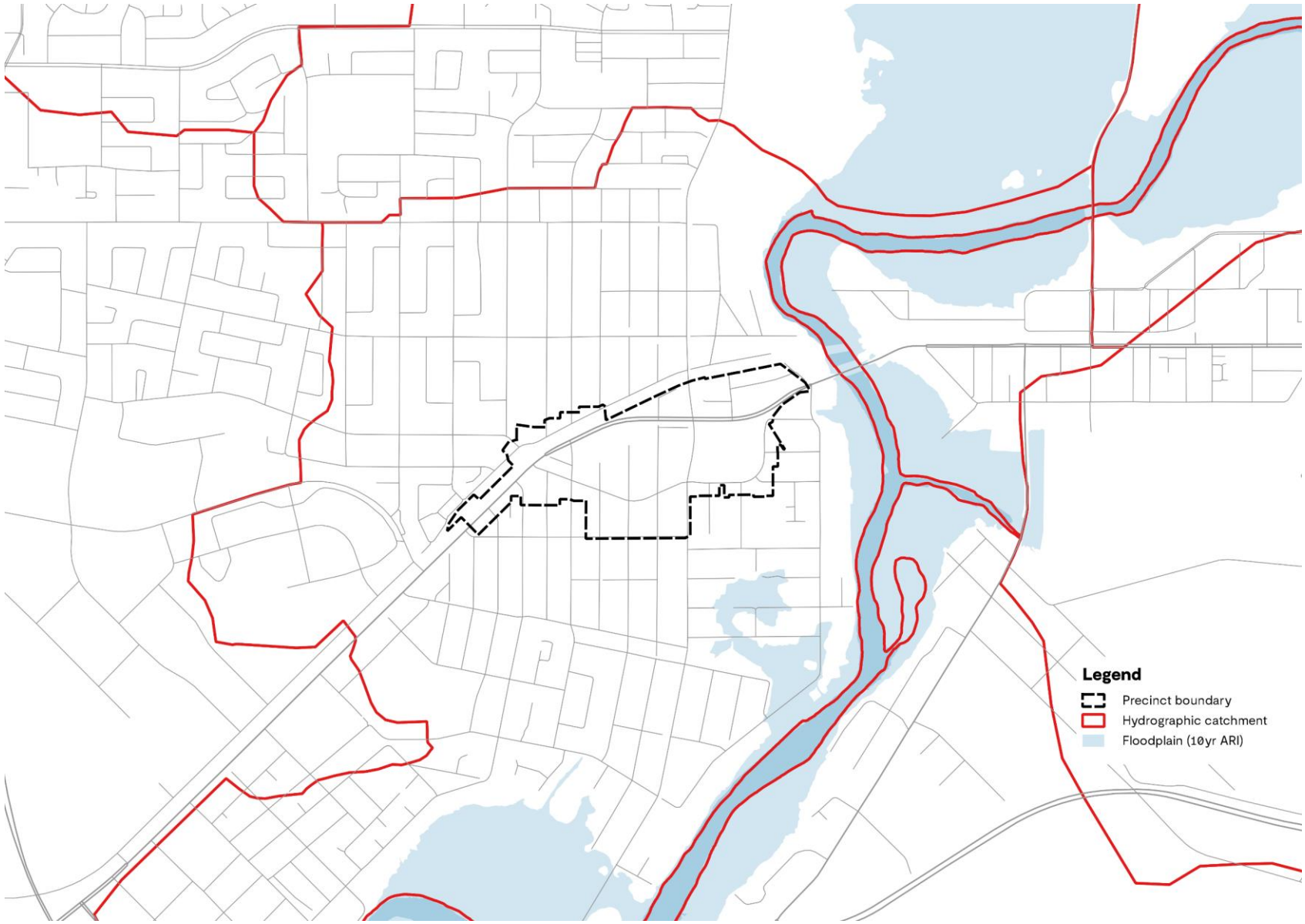

Figure 7 Local catchment boundary

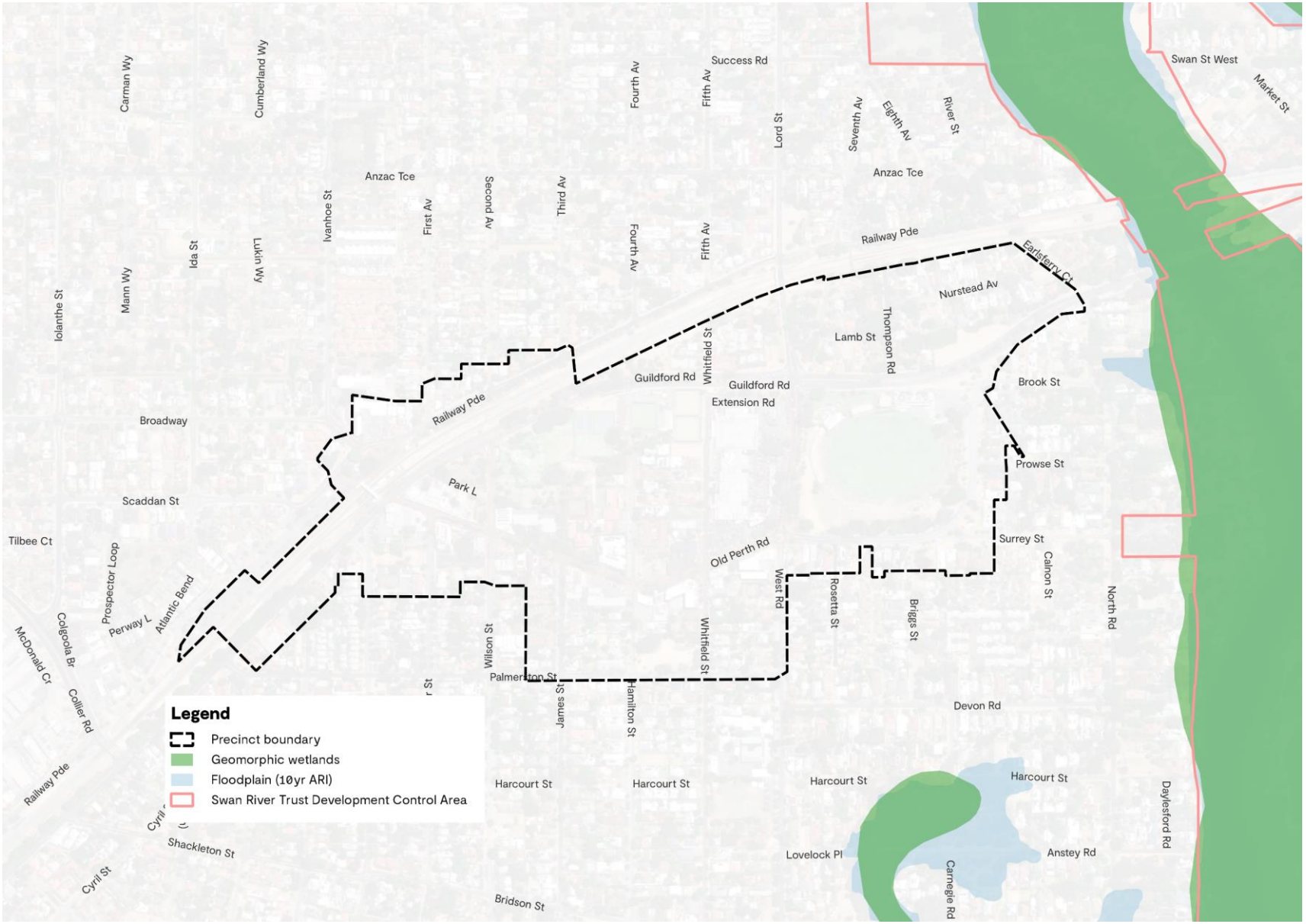

Figure 8 Waterbodies and wetlands

3.1.5 Surface water quality

The Town's Health Services team collect water samples from Sandy Beach Reserve, Point Reserve and Success Hill between November and April each year. The water samples are assessed to see if the bacteria levels are within safe limits and that dangerous amoeba are not detected in the water. This ensures that the water is safe for swimming and for other recreational activities.

The Town's Sustainability & Environment team undertakes stormwater monitoring within Kitchener St Drainage Network, Chapman St Drainage Network and Bindaring Creek in July, August and September annually. The monitoring includes review of physical parameters, Total Suspended Solids, Nutrients and Metals against Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG).

3.2 Groundwater

3.2.1 Licensed groundwater allocation

The DWER online Water Register identifies that groundwater resources within the Precinct area are fully allocated. Licensed groundwater abstractions in the Precinct area are summarised in Table 11 below.

Table 11 Groundwater abstraction licences

Licence number	Licence expiry date	License allocation	Registered party or Licence holder	Aquifer
166452	12/3/2029	179150KL	Town of Bassendean	Perth - Leederville
166454	12/3/2029	158240KL	Town of Bassendean	Perth - Superficial Swan
208658	1/4/2025	6400KL	Bassendean Bowling Club	Perth - Superficial Swan
210023	17/4/2025	35000KL	Water Corporation	Perth - Superficial Swan

3.2.2 Groundwater level

Review of groundwater levels across the Precinct has considered the following data sources:

– The DWER Perth Groundwater Map with groundwater levels based on groundwater modelling of regional groundwater levels
– DWER Water Information Reporting database groundwater level data with groundwater levels based on measurements from monitoring bores within and in proximity to the area. The measured groundwater levels have been compared to a Digital Elevation Map (DEM) in 5m resolution.

The DWER Perth Groundwater Map indicates that the depth to groundwater is typically between 5 m to 15 m below ground level (bgl), depending on the location within the Precinct and the local surface elevation. Depth to groundwater is likely < 6.0 m below the surface in the eastern portions of the Precinct. This presents challenges in delivering built-form outcomes with subterranean parking levels. These levels apply to the Bassendean Hawaiians shopping centre and Bassendean Oval, as well as a range of other properties nearby to Old Perth Road and within the Success Hill Frame.

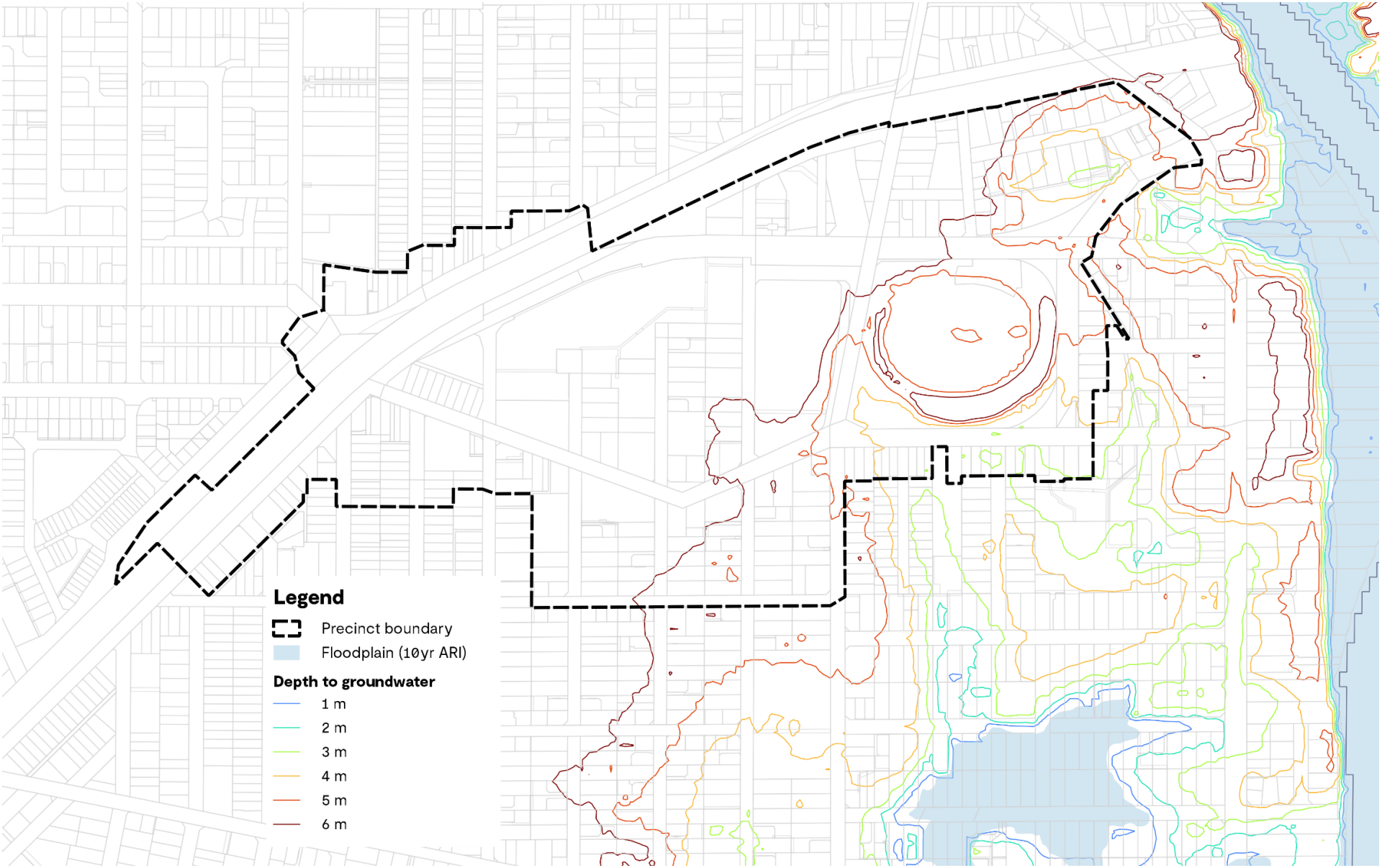

Figure 9 *Depth to groundwater (max)*

3.3 Water infrastructure

3.3.1 Potable water supply

3.3.1.1 Existing infrastructure

Due to the Town's location within the Perth Metropolitan Region, the vast majority of land has ready access to reticulated potable water supply (ToB, 2023). The local water supply network is shown in Figure 10.

3.3.1.2 Proposed infrastructure

Current infrastructure is not considered a hindrance to future development and subdivision (ToB, 2023). The Water Corporation will monitor the existing water supply system and make adjustments as necessary to accommodate growing demand.

Water Corporation (WCORP011-WCORP015) does not indicate any planned waste water or water lines within or nearby to the Precinct.

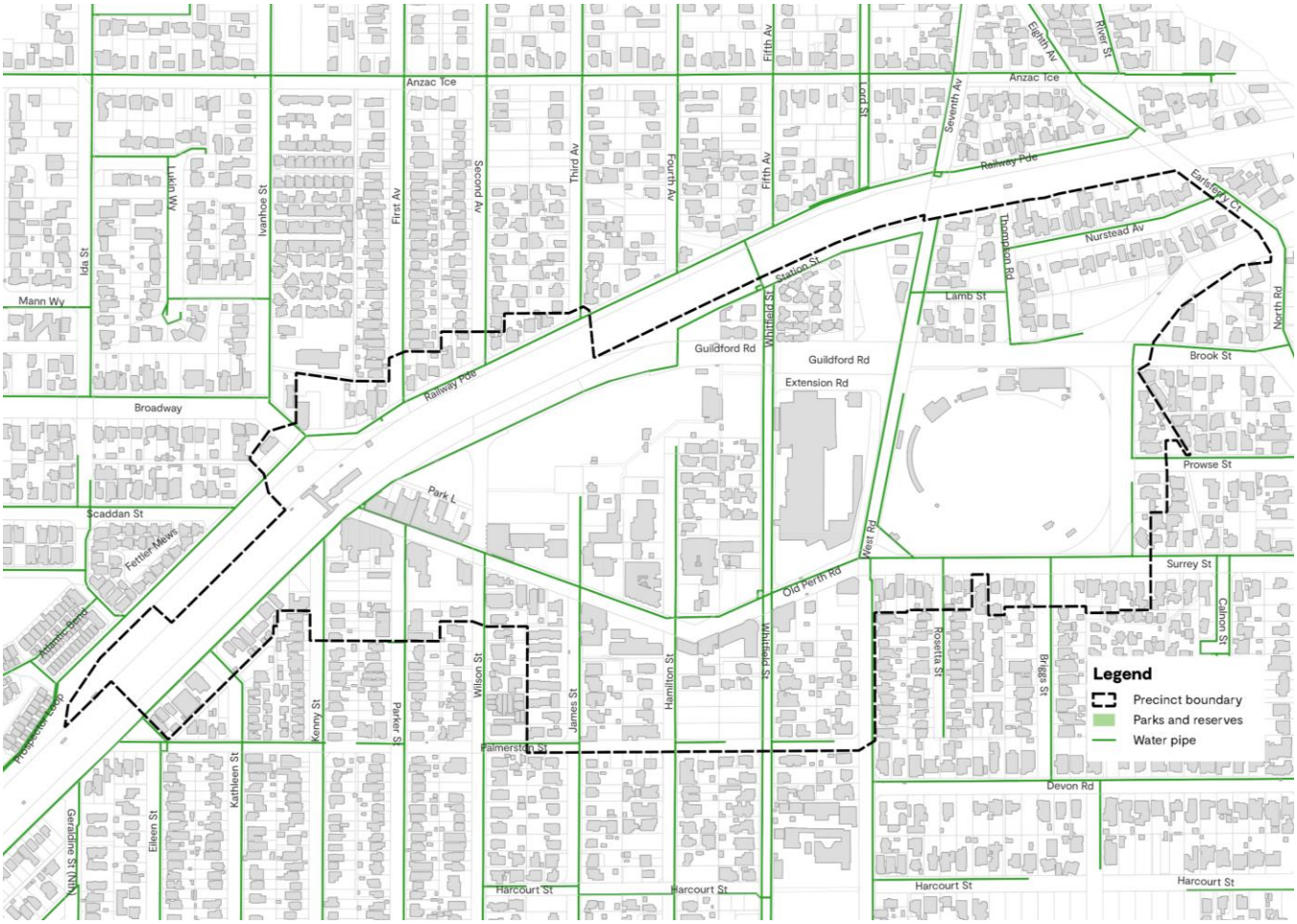

Figure 10 Water supply network

3.3.2 Waste water services

3.3.2.1 Existing infrastructure

The Precinct is wholly within the Bassendean sewer district. Much of the Town is serviced with reticulated sewerage, but a large portion of the Ashfield industrial area and several localised residential street blocks remain unsewered. The absence of sewer in some areas place localised constraints on development.

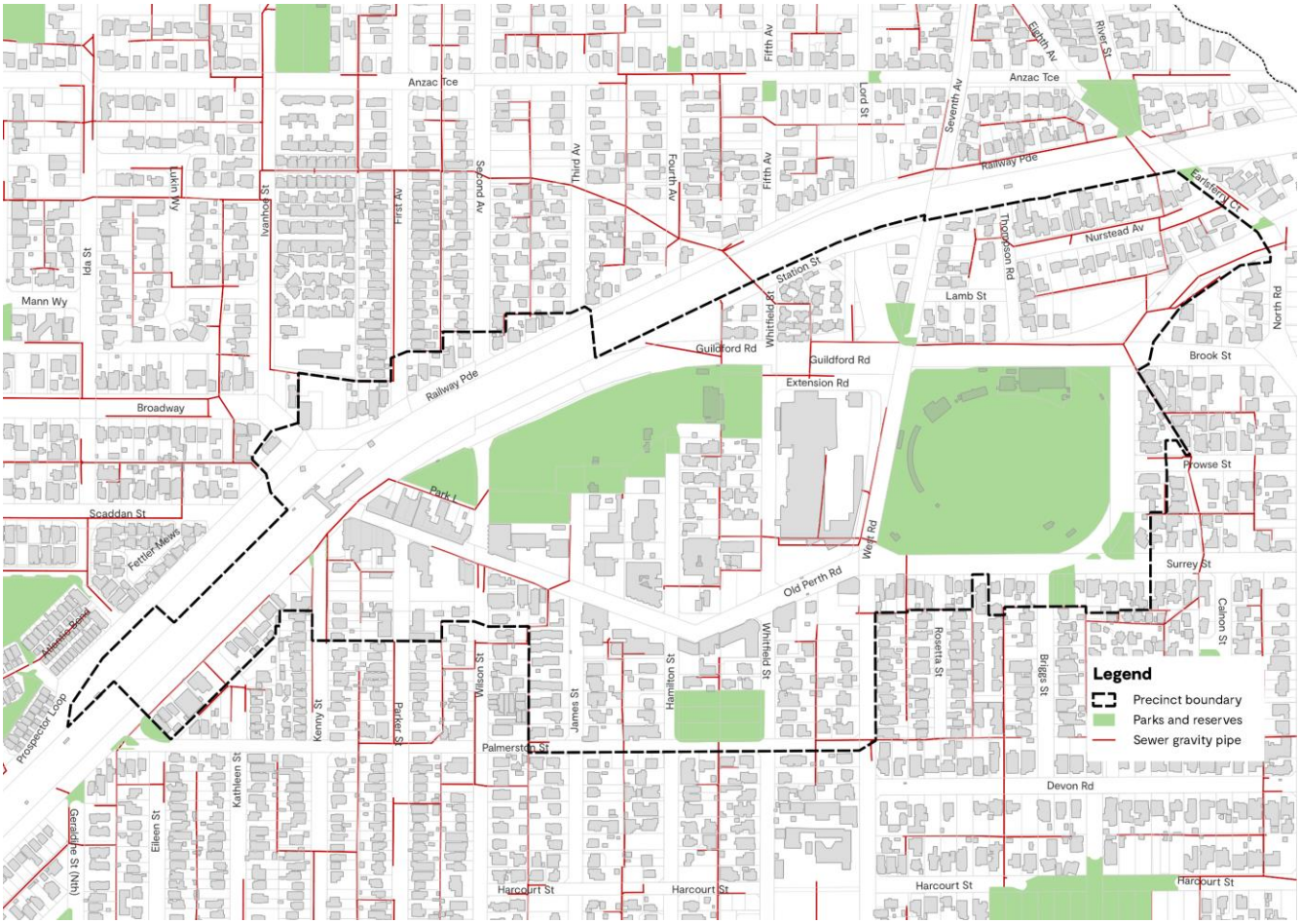

Figure 11 Sewer gravity pipe network

3.3.2.2 Proposed infrastructure

The Water Corporation's sewerage system may require some upgrading for the Bassendean Sewer District in the long term if dwelling growth exceeds approximately 6,500 dwellings in the suburb of Bassendean (i.e. about 2,500 more dwellings than existing). This will be assessed on a case-by-case basis and as part of a future Precinct Structure Plan (ToB, 2023).

Old wastewater pipes at Whitfield Street and West Road are set to be relined by the Water Corporation in 2025, protecting the local wastewater system, homes and environment.

3.3.3 Stormwater and drainage

3.3.3.1 Existing infrastructure

Stormwater and drainage infrastructure within the Town of Bassendean is described in section 3.1.2, with Water Corp assets depicted on .

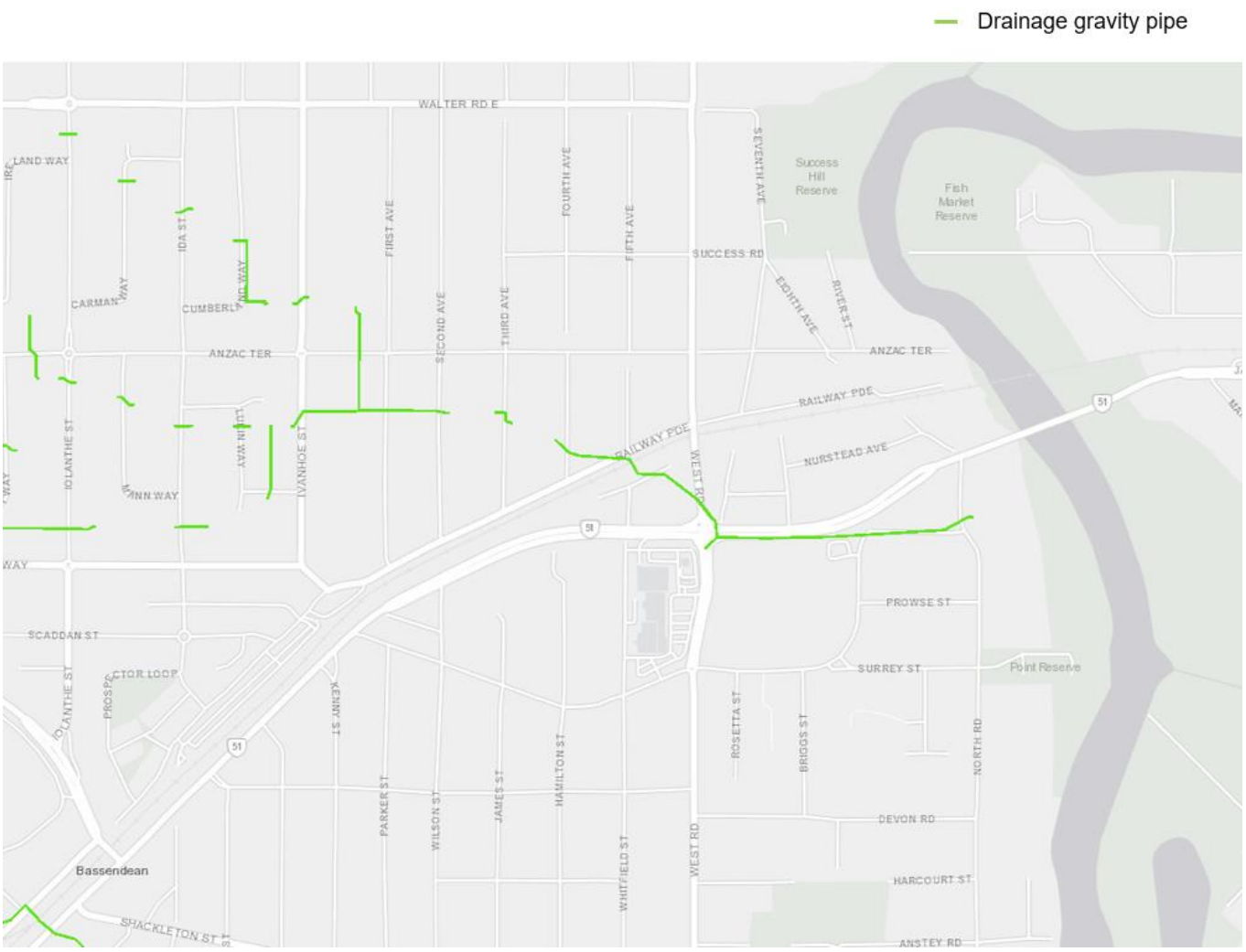

Figure 12 Water Corporation drainage network (WCOPR-080)

3.3.3.2 Proposed infrastructure

In 2014, the Town commissioned a Town-wide 'Drainage Network Desktop Assessment'. Three necessary drainage network upgrades within the precinct were identified, which are yet to be implemented:

– Ø300 line at Lamb Street and Thompson Road, connecting to existing infrastructure on Guildford Road
– Upgrade to existing Ø300 pipe connecting Nurstead Avenue to the network at North Road.
– New lines to address a trapped low point in the vicinity of the intersection at Guildford Road and North Road.

In 2022, Urbaqua prepared a technical hydrological assessment of the Success Hill catchment with the objective of providing a stormwater management solution that would mitigate the need for direct discharge to the Swan River. Results of the study proposed introduction or addition of storage capacity within Success Hill Reserve and at the existing Third Avenue sump.

A further 'Drainage Review and Assessment' was undertaken for the Town in 2016, followed by an updated 'Drainage Network Review and Flood Modelling' assessment in 2023. The 2023 assessment was prompted by flooding experienced in the Town in response to a storm event that occurred in June 2023. The assessment identifies primary areas of concern for flooding and provides recommendations for future works to ensure the maintenance of drainage standards and prevent or mitigate future flooding. Both the 2016 and 2023 identified substantial portions of the Town (and some portions of the precinct) that were susceptible to flooding and insufficiently serviced by the drainage network.

The 2023 assessment identified localised flooding occurrence (5% AEP) because of insufficient drainage network within the precinct, as shown in Figure 13 below. The key characteristics of inundation for each of the flood comparison points in the 5% AEP rainfall event are summarised in Table 12 below.

Table 12 Key characteristics of flooding for flood comparison points in 5% AEP rainfall event

Comparison Point	Flood characteristics and expected causes
1. Briggs Street	– Flood depth up to 143 mm in a 5% AEP event – Inundation in the road surface does not flow into the adjacent lot via surface flows. – Flows from the roadside drainage network surcharges from the two grates located next to the footpath in the road verge. Surcharged water then flows into the lot to the west (which is lower), then secondarily into the road surface. – Runoff from surrounding lots is conveyed into the lot at 125 Old Perth Road via intra-lot flow – pathways and the Briggs Street footpath.
2. Old Perth Road	– Significant inundation occurs within the eastbound lane (up to 500 mm), minor inundation in the westbound lane (up to 200 mm) and the surrounding road reserve. – The inundation is temporary, has no velocity and so is of limited safety concern although may somewhat impact trafficability.
3. Surrey Street	– Flood depth up to 192 mm in a 5% AEP event – The lot at 6 Surrey Street is lower than the surrounding lots and road. – The bank of the living stream/swale adjacent to the lot is marginally defined and readily overtops into the lot. – Excessive flows within the swale or any downstream constriction of flows could cause the noted overtopping potential to occur and hence cause inundation as the stormwater rises within the low-lying lot. – Inundation is present within the lot in the 5% AEP event to such an extent (~200 mm at the comparison point) that some impact to the dwelling is likely, though less severely than in the June Event modelling.
4. Garnsworthy Place 5. North Street	– These locations are trapped lows and are shown in the modelling of the 5% AEP event to inundate significantly, particularly Garnsworthy Place, which reaches depths of 750 mm. – Given that there are sufficient inlets at these locations it is concluded that the conveyance capacity of the run of 525 mm main drainage line of pipes at this location is insufficient to fully alleviate inundation in these locations.
6. Seventh Avenue	– The intersection of Seventh Avenue and Success Hill experiences some minor flooding in the 5% AEP event, however is contained almost wholly within the road reserve and no stormwater from the road reserve flows into nearby lots or footpaths.

The 2023 assessment made the following recommendations:

– Implement the following pipe upgrades, as these appear to effectively mitigate the inundation of key areas of concern:
  - A 750 mm pipeline is modelled from the wetland discharge upstream to the point that the greatest capacity is needed.
  - The anomalous 375 mm pipes were replaced with 450 mm to match the upstream pipes.
  - Similarly, the pipes connecting the living stream/swale were increased to 450 mm.
  - The small pipes to the east of 125 Old Perth Road on Briggs Street were increased to 375 mm to the tie into Surrey Street drainage with the specific aim of alleviating the local inundation in this area.
– Undertake further investigation of lot-scale contingency measures at 125 Old Perth Road and 6 Surrey Street, as the residual impacts at these locations are due to the relatively low elevation of these lots and this is unlikely to be remedied by the capacity of the Town's drainage network.
– Assuming that the Success Hill subsurface storage is implemented, provide an overflow pathway to the Swan River for runoff in excess of the proposed storage capacity. The design of this overland flow pathway should incorporate erosional control measures given the steep slope from the reserve to the river, and should consider larger infrequent storm events i.e. up to the 1% AEP event.
– Further assessment of the 1% AEP event is recommended to ensure that the Town is fully aware of risks proposed to infrastructure and residents.

Further investigation into the capacity of the Town's stormwater infrastructure is required to ensure the system has adequate capacity to cater for the development as well as meet the objectives of the State's Better Urban Water Management framework. Stormwater modelling should be undertaken for the development site, including utilising

drainage data (pits, pipes, storages) to build a catchment model of the existing condition and post development condition. Assessment of stormwater capacity at a precinct level is made in the Local Infrastructure Servicing Strategy accompanying the Precinct Structure Plan.

Notwithstanding the above, the purpose of a Precinct Structure Plan is to provide long term guidance to resolution of stormwater management; whether through better urban water systems, increased infiltration or artificial drainage improvements. Upgrades to infrastructure should occur incrementally and align with the pace and scale of development.

Contributions for improved drainage systems

While State Planning Policy 3.6 (SPP3.6) provides a framework for Development Contribution Plans (DCPs), these are typically applicable where infrastructure is either new or being upgraded due to additional demand generated by development. Within the Precinct, proposed development is likely to reduce overall demand on the drainage network due to improved on-site stormwater management and water re-use. As these measures are likely to decrease demand, preparation of a Development Contribution Plan for the precinct, as relevant to drainage infrastructure, is unlikely to address the provisions of SPP3.6.

Given the above, the Precinct Structure Plan adopts other approaches that seek to minimise discharge into the drainage network:

– Incentives, or in some cases require, the capture of water on-site for re-use, instead of disposal into the drainage network. This is achieved through requirements that development meet rating criteria of the Green Building Council of Australia's Green Star rating tool, or an equivalent system.
– Increased levels of landscaping and infiltration on private land, as well as in public realm areas. The Precinct Structure Plan includes provisions for development to contribute to improved public realm, including contributions that relate to necessary civil and service infrastructure upgrades.

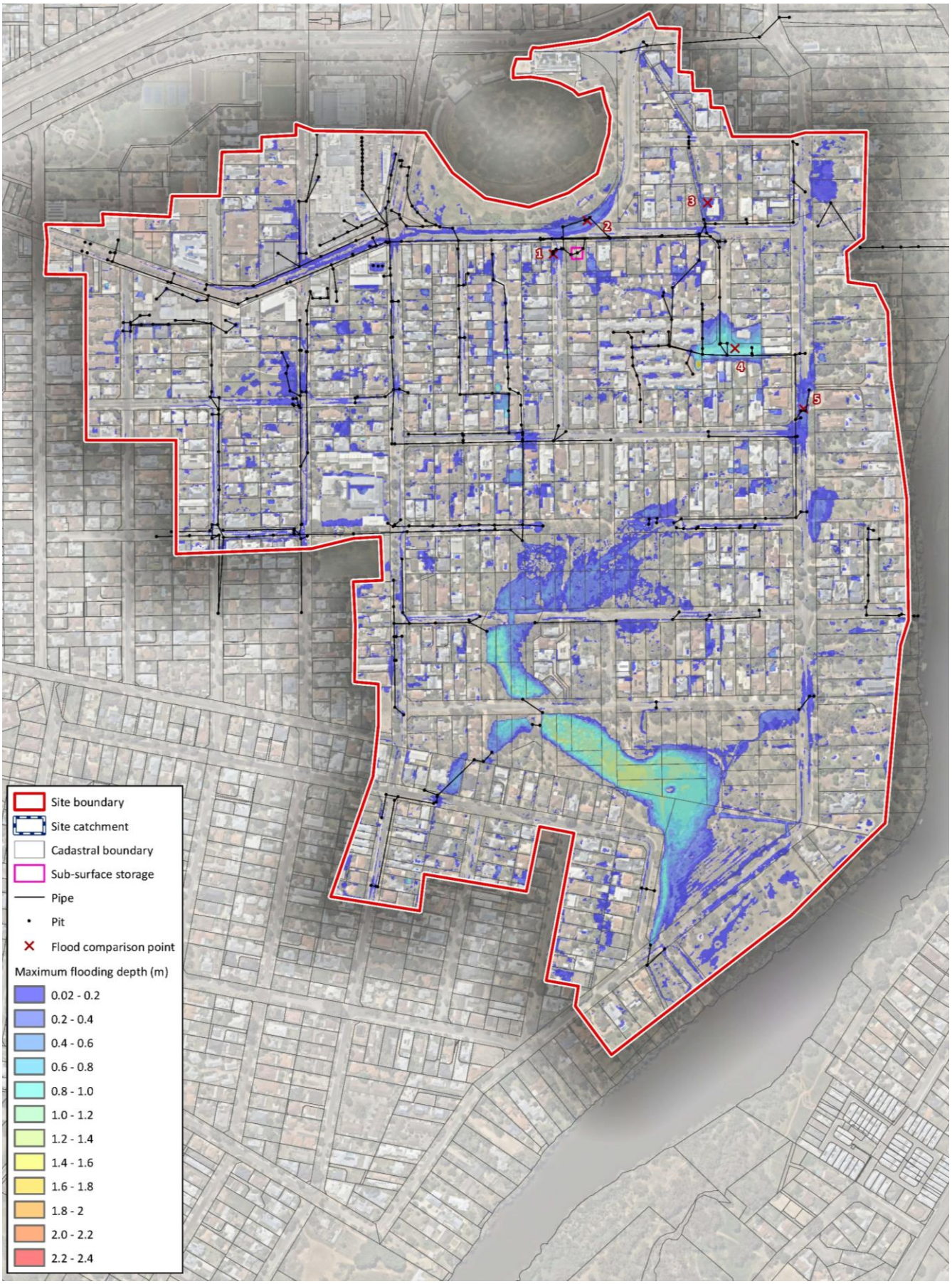

Figure 13 *Flood Mapping - Existing Environment (5% AEP 3 hour) (Bindaring) (Source: Emerge Associates)*

4. Water management strategy

The following section identifies the water management principles, development requirements and strategies to achieve total water cycle management for redevelopment of the Precinct area.

The Town recognises that the climate is changing as seen in a decline in annual rainfall, increase in extreme weather events such as prolonged heatwaves and severity of storms. It is important that community and Council assets and infrastructure are resilient to changes in climate.

Climate resilience should be considered where possible in the precinct provisions, and surface water and groundwater resources protected. Actions may include sustainable building design, water/biodiversity sensitive urban design and increased urban canopy cover.

4.1 Water conservation

Redevelopment within the precinct must aim to optimise water conservation, maximise water reuse and incorporate water management initiatives throughout the life of the development, with opportunities at the lot, precinct, and development scale to achieve sustainable water management for both in-house and ex-house applications.

4.1.1 Potable water targets

The Town has consistently received a Gold Waterwise endorsement from the Water Corporation, and strives to:

– Maintain Corporate scheme water usage at or below per capital levels of 1000L per capita (residents)
– Maintain community scheme water consumption at or below 125kL per capita (residents)

4.1.2 Sustainable water use

Sustainable water use throughout the precinct will be achieved through implementation of a range of measures to further optimise water use efficiency and maximise water reuse wherever possible.

4.1.2.1 Buildings

For buildings throughout the precinct, sustainable water use can primarily be achieved through several sustainability measures:

– The design of buildings that optimise cooling and heating via passive solar design, promoting air movement and providing shade.
– The opportunity to retrofit existing buildings to make them more water efficient.
– The opportunity for storm water management and/or reuse on-site or within the local area via storage, slow water percolation, permeable paving, filter drains or retention ponds; and
– The integration usable green roofs as part of new development.

To achieve water use efficiency, development design should incorporate water efficient fittings and appliances. Fittings and appliances should be within one level of the highest level available under the Water Efficiency Labelling and Standards (WELS) system. Waterwise developments may be encouraged through accreditation under Green Star, EnviroDevelopment, One Planet Living or Living Community Building Challenge.

Non-potable water sources should be utilised where possible within buildings to further reduce potable water consumption. Opportunities for non-potable water use include:

– Installation of infrastructure to harvest and store stormwater runoff from roof and impervious surfaces.
– Installation of greywater recycling systems, or provision of required connections and infrastructure for future conversion. Where wastewater recycling systems (greywater and/or blackwater) are proposed, systems are to be designed in accordance with the requirements of the Department of Health. Details, including required

connections to centralised infrastructure, should be provided to the Town at Development Application (DA) stage.

– Use of alternative fit for purpose water sources for both internal non-potable uses (toilet flushing, laundry, irrigation, and potentially cooling towers) and external irrigation.
– Below ground infrastructure should be designed to be waterproof to minimise ongoing pumping of groundwater ingress and dewater disposal over the life of the building.

4.1.2.2 Landscape and private open spaces

Landscaping plans should demonstrate full compliance with the Water Corporations Waterwise Development criteria, including the use of plants with low water requirements and use of waterwise irrigation types and practices. This includes subsurface irrigation systems, selection of 'waterwise' species, and soils improved with conditioners and mulch to reduce water demand.

Groundwater usage efficiency for irrigation of any additional open spaces should be maximised through appropriate landscape design so that additional allocations are not required. Irrigation efficiencies can be improved through automation, timing of water, placement of irrigation zones and hydro-zoning.

4.2 Stormwater management

Stormwater management includes the potential to redirect stormwater inflow into wetlands and the aquifer which could be considered as part of future district, local and urban water management regimes associated with urban development.

The decision process for stormwater management in Western Australia (DWER, 2017) emphasises mimicking natural hydrological processes, preventing and reducing water pollution, integrating stormwater management systems into urban design, and considering local site parameters. Stormwater modelling has not been undertaken for the precinct to date but may need to be undertaken to size and configure any changes at the lot scale.

Key stormwater management design criteria for the precinct should include:

– All runoff from constructed impervious area within the precinct to receive treatment prior to infiltration or discharge, typically through appropriately sized biofilters or other proprietary devices within public and private land.
– Retain or detain stormwater runoff from constructed impervious surfaces generated by the first 15 mm of rainfall at-source.
– All development within the precinct is to manage stormwater up to the 1% AEP within lot boundaries, to maintain peak stormwater discharge rates to pre-development conditions.
– Design and implement water sensitive urban design elements at the lot scale and street scale, including retrofit of local drainage infrastructure and streetscapes where feasible. Elements should be designed in accordance with the Stormwater Management Manual for Western Australia (DoW, 2004).

4.2.1 Local drainage infrastructure

The Precinct is developed and predominantly serviced by piped local drainage infrastructure. During redevelopment and revitalisation of precinct, opportunities to retrofit existing drainage infrastructure and incorporate water sensitive urban design elements at both the lot and streetscape scale.

Recognising the existing constraints on the local drainage network and the developed nature of the Precinct, stormwater management should identify opportunities to maintain or reduce existing stormwater discharge rates to the downstream drainage network. Redevelopment of street facing blocks provides the opportunity to retrofit existing local pit and pipe street drainage to incorporate water sensitive urban design (WSUD) elements in line with the Waterwise Perth Action Plan (DWER, 2019).

4.2.2 Lot drainage

Stormwater generated within lots is to be retained on site for all events including the small (1EY), minor (10% AEP) and major (1% AEP) events. Options for stormwater retention within lots include stormwater storage,

direction to bio-retention areas and infiltration to groundwater through deep soil zones within the lot boundary (DoW, 2004).

Runoff from constructed impervious areas (podiums, paved areas at ground level, basement parking), or from non-native garden on podiums, should receive treatment prior to infiltration. Treatment will typically be achieved through appropriately sized bio-retention areas or proprietary devices.

Management for stormwater runoff at the lot scale include:

– Underground tanks may be utilised to provide stormwater storage as well as providing options for reuse where there is sufficient clearance from groundwater.
– Rainwater tanks may be utilised to harvest stormwater from buildings with the water used for a range of non-potable demands including indoor non-potable uses (e.g. toilet flushing, cold water laundry) and landscape irrigation.
– Infiltration options that may be implemented at the lot scale subject to site conditions include:
    - Biofilters.
    - Tree pits.
    - Swales within car parking areas to direct stormwater runoff to landscape areas and promote recharge of groundwater.
    - Maximise permeable surfaces to reduce stormwater runoff and increase local infiltration (e.g. gravel, permeable paving).
    - Soak wells, drainage cells or infiltration galleries may be required where car parking or other impervious areas are large.

4.2.3 Flood management

Portions of the Town are part of the Swan River floodway and floodplain. There is a general presumption against intensification of land use within these areas. Further investigation may be considered for long-term planning and control of flood-affected areas, ensuring the ongoing protection of subject infrastructure and property.

4.3 Water sensitive urban design

WSUD offers multiple benefits sought by the objectives of the precinct, including improvements to green space, urban heat, water quality, liveability, canopy cover, and runoff control.

Opportunities to incorporate and retrofit WSUD elements and water quality treatment structures should be investigated at the lot, road and development scale. WSUD opportunities at different scales of development are summarised in Table 13 below.

Table 13 Best practise WSUD measures

Development scale	WSUD element
Lot scale	– Landscaped treatment structures e.g. biofilters, tree pits, vegetated swales, rain gardens – Water wise and nutrient wise landscaping – Permeable pavements – Hydrocarbon management and sediment traps – Roof gardens – Green (vegetated) walls – Rainwater & stormwater tanks
Car parks	– Landscaped treatment structures – Hydrocarbon management and sediment traps – Underground storage – Permeable pavements
Street scale	– Landscaped treatment structures

Development scale	WSUD element
	– Hydrocarbon management, sediment traps, gross pollutant traps – Permeable pavements – Conveyance biofilter systems – Sufficient setback to allow for WSUD opportunity – Kerb openings to maximise at source infiltration
Landscaping	– Waterwise gardens – Roof gardens – Green walls – Landscaped treatment structures – Conveyance biofilter systems

Examples of some best practice WSUD measures are presented in Figure 9.

a) Biofiltration pocket adjacent side entry pit

b) Example permeable paving

c) Residential rain garden

d) Median swale with flush kerbing

e) Examples of biofiltration pocket and car park raingarden

Opportunities to retrofit WSUD principles into the public realm and as part of major redevelopment are prevalent within the Precinct. The Precinct Structure Plan identifies several 'Opportunity Sites' whereby redevelopment is expected. Some of these locations present considerable opportunities for better water management:

- Park Lane, given its relatively low topography and proximity to BIC Reserve
- Council site, given interaction with urban environments (Old Perth Road) and open space (BIC Reserve)
- Bassendean Hawaiian's shopping centre and Bassendean Oval, given the low depth to groundwater
- Whitfield Street, given the topography, depth to groundwater and proposed open space adjacent to Lord Street.

Figure 14 WSUD opportunity sites

4.4 Groundwater management

4.4.1 Pre-construction

Groundwater levels may need to be considered across the Precinct during pre-development, construction, and post-construction phases of redevelopment where underground basements or car parks are proposed.

Building design and construction management should align with:

– The Local Planning Strategy
– Local Planning Policies
– Relevant Australian Standards for buildings design of concrete structures, with consideration of risk potential water quality impacts

Site specific monitoring, technical investigations and management plans may be beneficial to support development design, construction management and planning approval. The level of investigation and management required should be appropriate to the site location, site specific characteristics, proposed development approach and extent of dewatering required. Further detail of supporting information that may be required at the various stages is summarised in the following sections.

4.4.1.1 Site investigations

If basements or any works likely to require dewatering are proposed, detailed assessment of groundwater depth should be undertaken. This is likely to be the case in eastern portions of the Precinct.

A summary of key site-specific investigations and management plans to support development design and construction management is provided in Table 14. These should be submitted with development applications or to satisfy a condition of approval.

Table 14 Groundwater management requirements

Site investigation / management plan	Development requirements
Pre-development groundwater monitoring	Characterise site-specific conditions: – Groundwater level and recharge characteristics of the water table – Groundwater quality, including pH, salinity, and presence of contamination – Monitoring should be for a minimum of 18 months covering two winter maximums, with monthly or continuous records
Geotechnical and soil investigation	Characterise site-specific conditions: – Geotechnical conditions – Soil type – Presence of ASS – Presence of contaminate soils
Groundwater assessment report	Investigation of the impact of development design, construction, and groundwater management on local groundwater conditions. Groundwater modelling may be required to support some dewatering proposals. The potential for cumulative impacts to groundwater from concurrent dewatering of multiple buildings may also require groundwater modelling. Should be completed by suitably qualified hydrogeologist
Construction Environmental Management Plan	Required to be submitted and approved by the Town prior to commencement of site works.

4.4.1.2 Design

Building design can impact groundwater management requirements during and after construction. The development application and supporting documents should provide justification and rationale outlining why a particular development type and construction approach has been selected. Development approvals are often

granted based on the preparation of a Construction Environmental Management Plan (CEMP) to ensure implementation of water management building design outcomes. Design and development of buildings in the Precinct, including below ground infrastructure, should:

– Minimise groundwater drawdown during construction
– Reduce requirements for ongoing dewatering post-construction
– Consider concrete requirements for below ground infrastructure, to ensure durability and performance over the design life of the structure in line with Australian Standards.

4.4.2 Construction

Construction phase requirements for groundwater management include implementation and reporting of site-specific management plans and monitoring. The format and detail of these plans will be determined in the planning application phase.

Management plans must articulate risks associated with effluent disposal; actions taken to minimise the risks as well as contingency dewatering disposal options.

In almost all cases, development proposals that minimise the volume and rate of dewatering required will carry lower dewatering related risks, costs and have more viable options available for dewater disposal.

Construction dewatering system designs should be incorporated into, and presented with development plans and building design to ensure constructability and risks are manageable. Off-site increases or decreases in groundwater levels from dewatering, injection, or the impediment of groundwater flow paths has the potential to introduce geotechnical risk and structural damage to nearby buildings and infrastructure. The developer will be responsible for managing and mitigating these risks. Where redevelopment within the Precinct requires dewatering, conditions will be applied to the development approval requiring supporting site investigations and management plans (if required) to detail the dewatering method and disposal option selected, including justification and rationale. For redevelopment, the options for dewater disposal in the precinct, in order of preference, are summarised in Table 15.

Table 15 Dewater disposal options

Disposal option	Description
Discharge to Water Corporation sewer	Where disposal to sewer is proposed this will be subject to Water Corporation approval, subject to volume and water quality criteria. Water Corporation have preliminary advice of capacity constraints in some sections of existing wastewater infrastructure that should be considered. Developers should contact Water Corporation for advice on disposal to sewer and any capacity constraints.
On-site recharge of abstracted groundwater	On-site recharge of abstracted groundwater (e.g. reinjection wells and infiltration ponds) is subject to site constraints. Groundwater modelling and monitoring may be required to demonstrate any impact of recharge on local groundwater levels and quality is manageable and acceptable.
Tankering of dewater off-site for disposal	This approach may be subject to other site constraints, including traffic management.
Dewater disposal to local stormwater infrastructure	This approach is subject to volume and water quality criteria and will require identification of discharge points and monitoring for duration of dewatering. Active water treatment may also be required.

4.4.3 Post-construction

Post-construction stage requirements for groundwater management are typically limited to development that requires ongoing dewatering or for developments which have an off-site drawdown. The requirement for a post construction monitoring program and will be identified during the planning phase of the project. Post-construction water level and water quality targets may be a condition of development approval.

4.4.4 Groundwater quality

Review of development applications should consider the risk to groundwater quality from the proposed development with reference to proposed groundwater management during construction and post-construction stages. Key groundwater quality risks that should be considered include:

– Potential for saline groundwater intrusion from over-abstraction of local groundwater. Cumulative impacts from concurrent developments should also be considered and may require alternate groundwater disposal options.
– Potential for mobilisation of existing groundwater contamination associated with current or historic land use.

5. Implementation

As the precinct is an existing urban area implementation of the requirements of this LWMS will occur over extended timeframes. This section identifies requirements for future planning and development and review timeframes.

This LWMS provides guidance on water management within the precinct. Urban water management plans are not anticipated to be required to support small scale residential redevelopment of individual lots.

5.1 Requirements for future planning and development

5.1.1 Development application

Development applications submitted to the Town should be supported by clear and auditable documentation that details the water management requirements and fit for purpose water source systems, including any proposed staging, and demonstrating compliance with the objectives and criteria in this LWMS. At the DA stage additional supporting documentation may be required that reports on the outcomes of specialist studies and site investigations.

The DA and supporting documents should provide justification and rationale outlining why a particular development type and construction approach has been selected. For tower development in areas with high groundwater conditions key documentation required to support the development application will include:

– Geotechnical and soil investigation.
– Groundwater assessment report, including detail of pre-development monitoring and groundwater modelling if required.

Other site investigations and summary reporting may be required based on existing site conditions. Developers should seek advice from the Town, DWER and DBCA where required.

5.1.2 Pre-construction

A CEMP may be required for all development to ensure careful management of the construction process. Key aspects of a CEMP include:

– Dust management
– Stormwater and sediment control
– Soil excavation method (if applicable)
– Groundwater management and dewatering management (if applicable)
– Waste management
– Monitoring and reporting requirements.

The Town may require submission and approval of additional site management plans prior to commencement of site works. The requirement for additional supporting site investigations and management plans (if required) will be applied to the development approval.

5.1.3 Construction management

Construction shall occur in accordance with management plans prepared in support of the DA or prepared as a condition of approval. Where contaminated sites are identified during construction activities these should be managed in accordance with the *Contaminated Sites Act 2003* (WA).

5.2 Review

In recognition of the infill and redevelopment nature of the proposed development, this LWMS has been developed as a live document that is subject to scheduled reviews or may be updated more frequently as key documents or concepts are prepared to support redevelopment.

Scheduled reviews of the LWMS should occur every five years, or as required, ensuring the information presented and the recommendations remain current in achieving best management practice in total water cycle management through the life of the redevelopment. As key documents or concepts are prepared the information may be referred to in an addendum to the LWMS or incorporated during the document revision.

References

Department of Biodiversity Conservation and Attractions (DBCA) (2024) Dandjoo Tool, https://dandjoo.bio.wa.gov.au/

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024) Banksia Woodlands of the Swan Coastal Plain ecological community - indicative map, https://www.dcceew.gov.au/environment/biodiversity/threatened/publications/banksia-woodlands-swancoastal-plain-guide28/6/24

Department of the Environment and Energy (2016) Banksia Woodlands of the Swan Coastal Plain ecological community, https://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-indicativedistribution-map.pdf

Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Inquiry System (ACHIS), https://espatial.dplh.wa.gov.au/ACHIS/index.html?viewer=ACHIS

Department of Primary Industries and Regional Development (DPIRD) (2019) Pre-European Vegetation (DPIRD-006), https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006

Department of Water (DoW) (2004) Stormwater Management Manual for Western Australia, Government of Western Australia, https://www.wa.gov.au/system/files/2022-05/Stormwater-management-manual-

Chapter-5-Stormwater-management-plans.pdf

Department of Water Environmental Regulation (DWER) (n.d) Acid Sulfate Soil Risk Map, Swan Coastal Plain (DWER-055), https://catalogue.data.wa.gov.au/dataset/acid-sulphate-soil-risk-map-swan-coastal-plain-dwer-055

Department of Water and Environmental Regulation (DWER) (n.d) Water Register https://maps.water.wa.gov.au/#/webmap/register

Department of Water and Environmental Regulation (DWER) (2017a) Decision process for stormwater management in Western Australia, https://www.wa.gov.au/system/files/2022-05/Decision-process-forstormwater-management-in-Western-Australia.pdf

Department of Water and Environmental Regulation (DWER) (2017b) Water Sensitive Urban Design (WSUD)

Department of Water Environmental Regulation (DWER) (2019) Waterwise Perth Action 1

Department of Water and Environmental Regulation (DWER) (2021) Western Australian Climate Projections, https://www.wa.gov.au/system/files/2022-01/Western_Australian_Climate_Projections_Summary.pdf

Department of Water Environmental Regulation (DWER) (2022) Waterwise Perth Action 2

Department of Water and Environmental Regulation (DWER) (2024) Perth Groundwater Map, https://www.wa.gov.au/service/building-utilities-and-essential-services/water-supply/perth-groundwater-map

Department of Water and Environmental Regulation (DWER) (2024) Kep Katitjin – Gabi Kaadadjan Waterwise action plan 3

Government of Western Australia (2024) Find a known contaminated site, https://www.wa.gov.au/service/environment/environment-information-services/find-known-contaminated-site

Schoknecht, N.R. and Pathan, S. (2013) Soil groups of Western Australia: a simple guide to the main soils of Western Australia (4th edn), https://library.dpird.wa.gov.au/rmtr/348/

Town of Bassendean (ToB) (2021) Town of Bassendean Masterplan: Guiding principles and approach, https://www.bassendean.wa.gov.au/Profiles/bassendean/Assets/ClientData/Document-Centre/Planning/Bassendean_Town_Centre_Masterplan.pdf

Town of Bassendean (ToB) (2023a) Council Plan 2023-33, https://www.bassendean.wa.gov.au/documents/1236/council-plan-2023-33

Town of Bassendean (ToB) (2023b) Local Planning Strategy, https://www.bassendean.wa.gov.au/Profiles/bassendean/Assets/ClientData/TOB_Local_Planning_Strategy_Feb2023.pdf

Town of Bassendean (ToB) (2023c) Tree Canopy Action Plan 2023-2027, https://www.bassendean.wa.gov.au/Profiles/bassendean/Assets/ClientData/Human_Resources/Tree-Canopy-Action-Plan-2023-2027.pdf

Town of Bassendean (ToB) (2024) Natural Environment and Sustainability Action Statement, https://www.bassendean.wa.gov.au/Profiles/bassendean/Assets/ClientData/Natural_Environment_and_Sustainability_Statement_2024_25.pdf

Town of Bassendean (ToB) (2025) Public Open Space Strategy, https://www.bassendean.wa.gov.au/Profiles/bassendean/Assets/ClientData/Draft_Public_Open_Space_Strategy-Feb2025.pdf

Western Australian Planning Commission (WAPC) (2008) Better Urban Water Management planning guideline

Western Australian Planning Commission (WAPC) (2021) Draft State Planning Policy 2.9: Water Resources

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