Emu Point

District Water Management Strategy

Prepared by Urbaqua for

Department of Planning, Lands and Heritage

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SUMMARY

This water management strategy has been prepared to demonstrate how water resource protection and management outcomes are intended to be delivered in Emu Point. This strategy identifies areas of the study area that will be subject to development in future and provides site-specific water management guidance for proponents. The following tables provide a summary of key issues and considerations.

Table 1: Emu Point District Water Management Strategy – Summary

Emu Point District Water Management Strategy – Summary	
Planning considerations *(in brief, see section 2.6 and section 5.1 for details)*	Development will be guided by *Emu Point Precinct Structure Plan*, *City of Albany Local Planning Strategy and City of Albany Local Planning Scheme No. 2*. *Emu Point Precinct Structure Plan* has been developed based on identified land use opportunity areas within the study area that have been determined with consideration of environmental and water management constraints, including: • Existing parks and recreation reserves. • Existing special control areas. • Waterways and their mapped floodplain areas. • The proposed Emu Point waterway foreshore reserve (see Section 3.8 and Figure 19). • Mapped conservation and resource enhancement wetlands and indicative buffers. • Albany Regional Vegetation Survey (ARVS) extent of native vegetation. Figure 4 to Figure 7 presents land use opportunity areas that have been identified within the study area that are considered further by the water management strategies presented in Section 5 of this report. Proposed foreshore management areas and indicative wetland buffers are identified in Section 3.8 and Figure 19 Areas designated as foreshore management areas are to be rehabilitated and revegetated. Where a development proposal includes subdivision for urban development, these areas will be created into 'Foreshore Reserves' and ceded to the Crown at the time of subdivision free of cost and without payment of compensation by the Crown. Access to created 'Foreshore Reserves' is to be provided by easement or road reserve. Development is not permitted within any foreshore management area. Where foreshore management areas are retained in private ownership, they are to be maintained by the landowner as vegetated conservation areas. Any development or structures proposed within a floodplain require assessment by Department of Water and Environmental Regulation. Documentation for assessment should include a flood risk assessment and estimation of afflux to demonstrate no impact on surrounding areas, including cumulative considerations of current, future, and residual flood risk. Wetland buffers should be identified on a case-by-case and consider the physical characteristics relevant to the wetland, including the wetland values, attributes and the surrounding land use. Various amendments to LPS2 Special Control Area provisions are recommended in Section 6.1 for consideration.

Emu Point District Water Management Strategy – Summary	
Drainage *(in brief, see section 5.2 for details)*	The Emu Point Precinct area is dunal and undulating, with some low-lying and flat sections, sandy and silty soils, and a shallow groundwater table influenced by coastal and tidal conditions. Stormwater management for new developments and subdivisions within the City of Albany is generally required to be in accordance with Module 4 of the latest edition of Local Government Guidelines for Subdivision Development by the Institute of Public Works Engineering Australia (WA Division Inc). Specific modifications to the requirements that apply to greenfield, infill and redevelopment sites in the City of Albany are provided in *City of Albany Subdivision and Development Guidelines 2018* and include requirements for lot-scale drainage. No direct untreated stormwater discharges to the Yakamia Creek, Lake Seppings or other sensitive waterways or wetlands will be permitted. All developments are required to demonstrate: • on-site management (retention or detention) of 15 mm of rainfall. • compliance with storage and discharge requirements of the *City of Albany Subdivision and Development Guidelines 2018*. • provision of 0.3m vertical separation between habitable floor levels and the expected 1% AEP flood event in adjacent drainage systems and streets. Developments adjacent to the Yakamia Creek and the Lake Seppings drainage corridor floodplains, or other significant arterial flood storage areas or conveyance paths are required to provide 0.5m vertical separation between habitable floor levels and the expected 1% AEP flood event, and a suitable evacuation route during major floods. Development in areas adjacent to and/or potentially affected by flooding in overland flow paths or stormwater drainage infrastructure identified on the arterial drainage plans are ensure that the flood path is not obstructed as a result of the development.
Drinking water *(in brief, see section 5.3.1 for details)*	All development is required to connect to scheme water for drinking water purposes. Consultation with Water Corporation will be necessary to identify the infrastructure requirements, costs and timeframes associated with connection to the Integrated Water Supply System (IWSS). All development is to incorporate water efficient fixtures and fittings and aim to achieve water consumption of less than 100 kL/person/year.
Non-drinking water *(in brief, see section 5.3.2 for details)*	Development proponents in this area should secure a suitable water source for the non-potable water demands of their projects, through consideration of opportunities for: • rainwater tanks and lot scale greywater recycling systems. • flood detention areas designed to provide surface water storage. • local groundwater resources (where available and not required to meet local public open space irrigation demands as advised by City of Albany).

Emu Point District Water Management Strategy – Summary	
Wastewater *(in brief, see section 5.3.3 for details)*	Development in Emu Point is required to comply with the requirements of the *Government Sewerage Policy* (2019) and the draft *Planning for Water SPP* (2021) and residential development with lots smaller than one hectare is required to connect to sewerage. Wherever possible, development in Emu Point is required to connect to reticulated sewerage, including constructing the necessary local system elements required to achieve connection. Proposals for unsewered residential development must demonstrate that each lot meets relevant site requirements and can accommodate on-site sewerage disposal in accordance with AS/NZS 1547 *On-Site Domestic Wastewater Management* (Standards Australia/New Zealand Standard, 2012) (AS/NZS 1547). This should generally be provided in the form of a Site and Soil Evaluation (SSE). Consultation with Water Corporation will be necessary to identify the infrastructure requirements, costs and timeframes associated with connection to sewerage.
Implementation and staging *(in brief, see section 6.2 for details)*	Any proposed land intensification within the Emu Point Precinct Structure Plan area is required to demonstrate that the proposal: • will not detrimentally impact water resources and associated environmental values. • can manage surface water and groundwater. • can be serviced with water and wastewater. All development in Emu Point is required to be supported by submission of a Water Management Report (WMR) or detailed stormwater management plan (including engineering and landscaping) that will be assessed and approved by the City of Albany in consultation with DWER consistent with the requirements of *State Planning Policy 2.9 – Planning for Water SPP* (SPP 2.9) and *SPP2.9 Guidelines*. In general, small-scale infill and redevelopment in the Emu Point Precinct Structure Plan area will be required to provide a detailed stormwater management plan demonstrating compliance with City of Albany drainage reuqirements while larger scale development, including at key sites identified in Table 2 below, will be required to deliver a more comprehensive water mangement report.
City role *(in brief, see section 6.3 for details)*	Review and approval of water management documentation with reference to the requirements of this DWMS, the *Government Sewerage Policy* (2019), *State Planning Policy 2.9 – Planning for Water SPP* (SPP 2.9) and *SPP2.9 Guidelines*.

Table 2: Specific water management requirements for land use opportunity areas

	Specific water management requirements for land use opportunity areas
Collingwood Heights Precinct	Development of Lot 22 and 23 Brewster Street, located within the Collingwood Heights precinct area shown in Figure 4 requires a local development plan to be prepared which should be supported by a local water management report. Specific considerations for this sub-precinct, as indicated in Figure 5 include: • Potential soil and/or groundwater contamination • Areas of remnant native vegetation • Areas of alluvial soils with high to moderate risk of acid sulfate soils • Floodplain areas • Possible areas of shallow or perched groundwater • Impacts of future climate change including sea level rise It is likely that development in this area will require provision of a drainage detention basin and it is preferrable for a single basin to be designed to accommodate drainage from both lots. The LWMR will need to include drainage modelling to demonstrate compliance with City of Albany requirements and provide guidance for implementation including consideration of staging and equitable funding for delivery of a consolidated and coordinated drainage system.
Rural Smallholding Zone	Development in the rural smallholding zone identified in Figure 4 requires a local development plan to be prepared which should be supported by a local water management report. Specific considerations for this zone, as indicated in Figure 6 include: • Areas of remnant native vegetation • Areas of alluvial soils with high to moderate risk of acid sulfate soils • The Yakamia Creek and its foreshore management area • Floodplain areas • Wetlands and their indicative buffers • Coastal inundation areas (shown in Figure 8) • Possible areas of shallow or perched groundwater • Impacts of future climate change including sea level rise
Future Investigation Zone	The future investigation zone identified in Figure 4 requires further consideration of the potential extent and type of development that could be supported and to determine the appropriate planning pathway. However, regardless of the planning approach applied, any proposal to develop this zone will need to be supported by an appropriate water management report. Specific considerations for this zone, as indicated in Figure 7 include: • Areas of remnant native vegetation • Areas of alluvial soils with high to moderate risk of acid sulfate soils • The Yakamia Creek and its foreshore management area • Floodplain areas • Wetlands and their indicative buffers • Possible areas of shallow or perched groundwater • Impacts of future climate change including sea level rise Depending on the nature of development proposed in this area, it is possible that a drainage detention basin will be required. The LWMR will need to include drainage modelling to demonstrate compliance with City of Albany reuqirements and provide guidance for implementation including consideration of staging and equitable funding for delivery of a consolidated and coordinated drainage system.

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1 INTRODUCTION AND BACKGROUND

This district water management strategy is delivered in response to State Planning Policy 2.9 – Planning for Water, supports the development of the *Emu Point Precinct Structure Plan.* Whilst it is acknowledged that this level of planning would normally be supported by a local water management report, the nature and extent of development proposed in the *Emu Point Precinct Structure Plan* is necessarily limited by site constraints and therefore this report has been prepared to address the requirements of a district water management report (see Figure 1) that are relevant for development in the described planning areas. This level of water management report is required to establish a framework for delivery of future local, or subdivision and development water management reports and to support the design and delivery of new and upgraded stormwater management systems.

This water management strategy has been prepared to demonstrate water resource protection and management outcomes intended to be delivered in Emu Point (the Study Area presented in Figure 2). This strategy identifies areas that will be subject to development in the future and provides site-specific water management guidance for proponents.

It is noted that a large proportion of the Study Area is highly constrained by existing environmental conditions and limited access to service infrastructure. Therefore, the extent of development proposed in the *Emu Point Precinct Structure Plan* is limited to defined areas where site constraints have been assessed and are considered to be manageable through future planning and development.

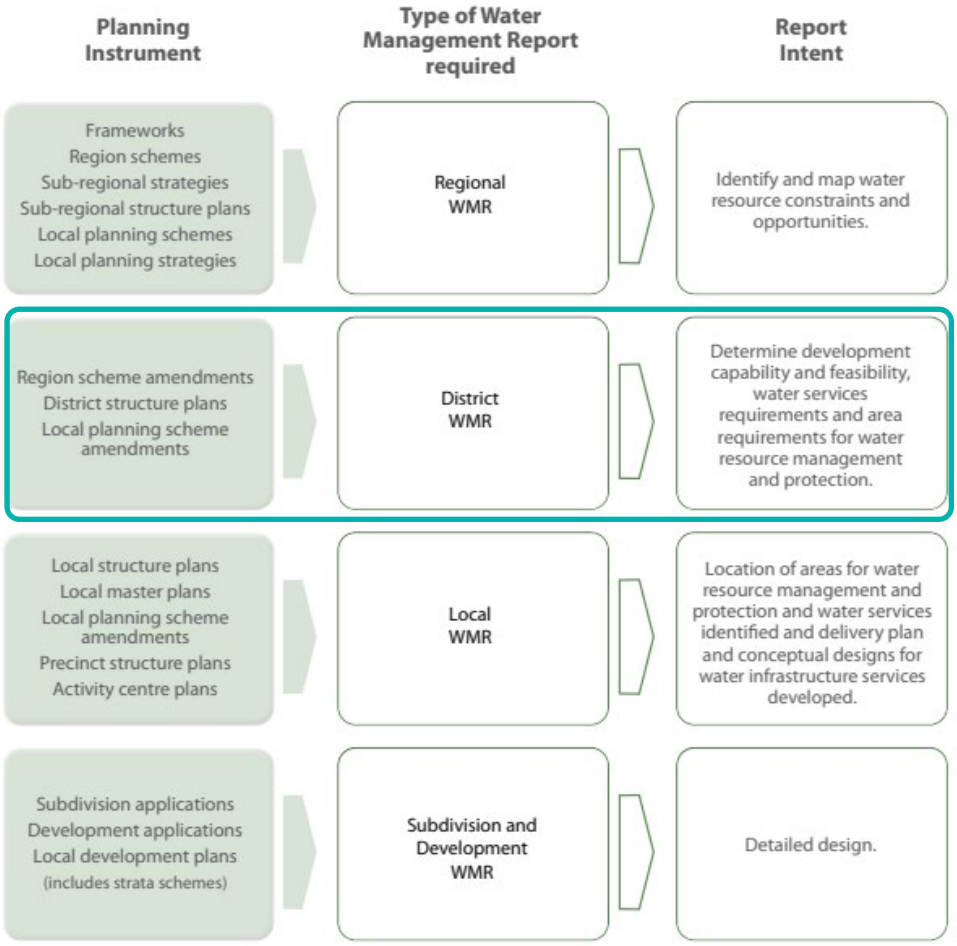


Figure 1: The water management report and planning instrument hierarchy (WAPC, 2021)

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 2 - Location plan



LEGEND:

- Study Area
- Cadastre
- Waterways



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1.1 Previous studies

Water management requirements within the Study Area have been reviewed and partially addressed previously by the following reports:

Water supply

- Great Southern Regional Water Supply Strategy (DoW, 2014)

Stormwater and floodplain management

- City of Albany Stormwater Management Strategy (2017)
- Albany Arterial Drainage Plan (EE 2017)
- Willyung Creek Floodplain Management Plan (GHD, 2007)
- Yakamia Creek Albany Floodplain Management Strategy (Aquaterra, 2002)
- Yakamia Creek Flood Study (WRC, 2001)
- Yakamia Creek Management Study (WAWA, 1989)
- Yakamia Creek Flood Investigation Report (PWD, 1981)

Water management

- City of Albany Water Management Strategy (Urbaqua, 2025)

Coastal hazard risk management and adaptation planning

- Emu Point to Middleton Beach Coastal Hazard Risk Management Adaptation Plan (CHRMAP) (City of Albany, 2019)
- Emu Point to Middleton Beach CHRMAP Implementation Plan (City of Albany, 2019).
- Statewide Coastal Inundation Assessment Phase 2 Report (Seashore Engineering, 2024)

Foreshore management planning

- Emu Beach Foreshore Management Plan (City of Albany, 2020)
- Oyster Harbour Foreshore Management Plan (City of Albany, 2023)

1.1.1 Water supply

Great Southern Regional Water Supply Strategy (DoW, 2014) was developed to plan for establishment of sustainable water supplies and support long-term regional development.

The Lower Great Southern towns water supply scheme (LGSTWSS) services the towns of Albany, Narrikup, Mount Barker and Kendenup, as well as farms adjacent to the scheme main. Water for the scheme is obtained from the South Coast borefield south-west of Albany and the Angove Creek pipehead dam at Two People's Bay east of Albany.

The strategy acknowledged that existing water sources will not be sufficient to meet drinking water demands in future and identified that demand can be expected to exceed availability by 2030 under a medium growth scenario.

The strategy identified seawater desalination as the most likely next source option with new groundwater sources in the Albany hinterland identified for further investigation.

1.1.2 Stormwater and floodplain management

Several studies prior to 2017, examined the response of existing drains and waterways to major flood events and recommended planning and development controls to maintain floodplain performance and minimise the impact of future development which have been implemented.

Each report gave recommendations for future action. Some of these recommendations have been implemented including establishment of planning controls to protect and maintain floodplain extent.

In 2017, the City of Albany endorsed the *Albany Arterial Drainage Plan* (EE 2017) which was the result of detailed stormwater management system modelling and a review of earlier studies to create a guiding document to identify key drainage issues throughout the City and prioritisation of those issues for further investigation and resolution. The *Albany Arterial Drainage Plan* (AADP) also provided recommended maintenance actions and design criteria for subdivision development but did not specifically address planning for development in Emu Point.

1.1.3 Water management

The *City of Albany Water Management Strategy* (Urbaqua, 2025) was developed to establish a water management vision for the City of Albany and proposes actions intended to deliver a series of desired outcomes.

The City's water management vision is:

Working together to protect and manage our water resources and landscapes to create a sustainable future for all.

Desired outcomes that are identified in the strategy are:

1. **Enhanced waterways and biodiversity** – Waterways and biodiversity are protected and restored through revegetation, sustainable access, and improved catchment management.
2. **Resilient and water sensitive urban design** – Drainage and flood management practices create climate-resilient, attractive, and functional spaces for people, plants and animals.
3. **Sustainable irrigation and green spaces** – Public spaces are sustainably irrigated, enhancing urban greening, canopy cover, and community wellbeing.
4. **Optimised wastewater management** – Wastewater is managed effectively to protect receiving environments and maximise reuse opportunities.
5. **Empowered waterwise communities** – Communities are engaged and supported to adopt water sensitive behaviours and care for water resources.
6. **Leadership in sustainable water management** – Water management practices enhance resource efficiency, service delivery, and support equitable access for all.

1.1.4 Coastal hazard risk management and adaptation planning

Part of the study area is included in the *Emu Point to Middleton Beach Coastal Hazard Risk Management Adaptation Plan* (CHRMAP) and *Emu Point to Middleton Beach CHRMAP Implementation Plan* (City of Albany, 2019).

Seven highly valued assets were identified as requiring adaptation in the short term (0-10 years), whilst other assets within the 100 year hazard lines were identified as likely to be at risk of

erosion in long term (up to 100 years) with broader adaptation pathways identified to reduce coastal impacts of erosion.

The recommended adaptation options for assets requiring short term management that are within the study area of this DWMS are as follows:

- MU3 Griffiths Street Properties: Managed retreat, relocate assets.
- MU3 Emu Beach Holiday Park and Dual Use Path: Managed retreat of assets in the southern portion.
- MU3 Emu Beach Holiday Park and Dual Use Path: Renovation/expansion of groynes (geotextile sand container).
- MU3 Emu Beach Holiday Park and Dual Use Path: Upgrade Existing Protection Structures.
- MU4 Emu Point Foreshore Reserve: Maintain and enhance nearshore system – seagrass regeneration.
- MU4 Emu Point: Revetment and parkland development.
- MU5 Oyster Harbour Southeast Beach: Sand nourishment.

The *CHRMAP Implementation Plan* also recommends key strategic planning, statutory planning, and policy or governance interventions that are relevant to all assets, including those at risk over the longer-term and notes that the City of Albany will need to implement these options regardless of the final adaptation option chosen per at-risk asset.

One of the key recommendations of the *CHRMAP Implementation Plan* was the introduction of Special Control Areas for specific coastal hazard areas into the Local Planning Scheme as noted in Section 2.3 above. Three coastal hazard special control areas are present within the study area (SCA11, SCA12, SCA16).

Low lying land within the study area, adjacent to Oyster Harbour has been identified as being at risk of coastal inundation in the *Statewide Coastal Inundation Assessment Phase 2 Report* (Seashore Engineering, 2024). The report identifies three critical inundation levels above the highest astronomical tide that are relevant within the study area:

- High – 1.1m AHD
- Extreme – 1.2m AHD
- Extreme + 0.9m allowance for sea level rise – 2.1m AHD

1.1.5 Foreshore Management Planning

There are two foreshore management plans in place within the study area. These plans have been prepared to provide detailed plans for management of specific areas, as recommended by the *Emu Point to Middleton Beach CHRMAP* (City of Albany, 2019). These are:

- Emu Beach Foreshore Management Plan (City of Albany, 2020)
- Oyster Harbour Foreshore Management Plan (City of Albany, 2023)

1.2 Guiding documents

In addition to the previous studies identified above, preparation of this DWMS has considered the following guiding and technical documents:

- Great Southern Regional Planning and Infrastructure Framework (WAPC, 2015)
- Lower Great Southern Strategy (WAPC, 2016)

- Albany Local Planning Strategy (CoA, 2019)
- City of Albany Local Planning Scheme No. 1 (CoA, 2009, last updated: 2022)
- City of Albany Urban Tree Strategy (CoA, 2017)
- City of Albany Strategic Community Plan 2032 (CoA, 2017)
- City of Albany Natural Reserves Strategy and Action Plan (CoA, 2017)
- Cycle City Albany 2014-2019 (CoA 2014)
- City of Albany Strategic Bush Fire Plan 2014-2019 (CoA, 2014)
- City of Albany Subdivision and Development Guidelines 2018
- Liveable Neighbourhoods (WAPC, 2015)
- State Planning Policy 2.9: Water Resources (WAPC, 2008)
- Better Urban Water Management (WAPC, 2008)
- Draft State Planning Policy 2.9: Planning for Water (WAPC, 2021)
- Draft Planning for Water Guidelines (WAPC 2021)
- Government Sewerage Policy (Government of Western Australia, 2019)
- Western Australian State Water Plan (Government of Western Australia, 2007)
- Stormwater Management Manual for Western Australia (DoW, 2004–2007)
- Decision Process for Stormwater Management in WA (DWER, 2017)
- Guidelines for district water management strategies (DoW 2013)
- Specification Separation Distances for Groundwater Controlled Urban Development (IPWEA, 2016)
- Water Resource Considerations when Controlling Groundwater Levels in Urban Development (DoW, 2013)
- Water monitoring guidelines for better urban water management strategies and plans (DoW, 2012)
- Public Parkland Planning and Design Guide WA (Government of WA, 2014)
- Guidance Statement No.33 Environmental Guidance for Planning and Development (EPA, 2008)
- Environmental Factor Guideline - Inland Waters | EPA Western Australia (EPA, 2018)
- Operational policy 4.3 - Identifying and establishing waterways foreshore areas (DoW, 2012)
- Australian Rainfall and Runoff: a guide to flood estimation (Geoscience Australia 2019).

1.3 Scope of the DWMS

This district water management strategy is delivered in response to State Planning Policy 2.9 – Planning for Water, supports the development of the *Emu Point Precinct Structure Plan.* Whilst it is acknowledged that this level of planning would normally be supported by a local water management report, the nature and extent of development proposed in the *Emu Point Precinct Structure Plan* is necessarily limited by site constraints and therefore this report has been prepared to address the requirements of a district water management report.

The selection of an appropriate level of water management reporting was informed through consultation with the Department of Water and Environmental Regulation (DWER) that commenced in August 2024.

Through this consultation process, the following advice was provided by DWER:

"DWMS should demonstrate that the land is capable of supporting the proposed land uses and is able to achieve appropriate urban water management outcomes. The DWMS will inform decision making process associated with the proposed land uses, and will demonstrating that proposed development

- *will not detrimentally impact water resources and associated environmental values, and*
- *can manage surface water and groundwater, and*
- *can be serviced with water and wastewater."*

These criteria have been considered in the development of this DWMS and through assessment of the considerable site constraints present in the Study Area to determine areas where limited land use intensification may be feasibly achieved. The existing environmental constraints and potential for connection to services for areas of land identified in the *Emu Point Precinct Structure Plan* for potential development have been assessed and are considered to be manageable through future planning and development.

This DWMS does not address the full range of requirements for water management reporting to support local structure planning, subdivision or development and therefore further water management reporting will be necessary to support future planning and development as indicated in Section 6.

2 PLANNING BACKGROUND

This section provides a summary of the planning instruments that will guide the future development of Emu Point.

2.1 Great Southern Regional Planning and Infrastructure Framework

The *Great Southern Regional Planning and Infrastructure Framework* (GSRPIF) (WAPC, 2015) was prepared to provide strategic regional context in order to guide future land use planning and infrastructure investment in the Great Southern region including the City of Albany.

Key objectives of the GSRPIF that are relevant to this water management strategy include:

- Secure sufficient power, water, wastewater and telecommunication capacity and distribution systems to support the cost-efficient delivery of services to residents, new mining and industrial operations and the agricultural and forestry sectors.
- Provide for the protection and management of key natural assets, to secure the foundation of the social, economic, and environmental fabric of the region.
- Recognise the region's cultural, heritage and visual landscape assets and safeguard and manage these assets to retain their intrinsic value and acknowledge their contribution to community well-being and their role in supporting the regional economy.

2.2 Lower Great Southern Strategy

The *Lower Great Southern Strategy* (LGSS) (WAPC, 2016) provides guidance and strategic direction for the Lower Great Southern Subregion which includes the City of Albany as the subregion's main regional centre.

Key objectives of the LGSS that are relevant to this water management strategy include:

- Support the Lower Great Southern community in being adaptive and resilient to climate change.
- Provide and protect water and wastewater infrastructure and treatment and recycling facilities.
- Provide suitable alternative servicing options in settlements where normal servicing methods are restricted and/or unavailable.
- Provide existing and future populations with adequate and sustainable water supplies.
- Protect threatened flora, fauna, and ecological communities.
- Maintain and improve coverage of native vegetation from existing levels.
- Identify and map the extent of important riparian, estuarine and wetland areas.
- Maintain the environmental and water quality of rivers and wetlands through effective catchment management practices.
- Conserve and maintain the conservation and biodiversity values of riparian, estuarine and wetland environments.
- Identify and protect valued landscape features and viewsheds.

2.2.1 Water supply

The LGSS identifies that water is supplied to Albany from Water Corporation's Lower Great Southern Towns Water Supply Scheme, (LGSTWS) and notes that recent improvements in water efficiency, combined with an increase in Water Corporation's licensed allocation from the

Albany Groundwater Area is expected to satisfy growth in these towns until approximately 2025. The LGSS suggests that identification of the next source must occur prior to 2025; however, this may be delayed if the additional groundwater identified during recent investigations in the Albany Groundwater Area is confirmed.

There is opportunity for water conservation and efficiency though the structure planning process with the development of integrated water management strategies. Strategies can minimise irrigation demands for domestic irrigation and for public open space including the use of drought tolerant species. Whilst the planning system does not have operational control over water consumption post-construction, it can seek to influence end-use (i.e. household, commercial use) water efficiency and source substitution.

2.2.2 *Wastewater*

The LGSS recognises some areas of Albany as high priorities for reticulated sewerage connection, if and when funding becomes available under the Sewerage Infill Program or through other means, although Emu Point is not discussed.

2.3 Albany Local Planning Strategy

Albany Local Planning Strategy (ALPS) guides settlement growth and land use planning over 10-15 years and provides a rationale for zoning, land use and development controls in the City's Local Planning Scheme. Additionally, the ALPS Rivers, Estuaries and Wetlands section identifies significant waterways including Yakamia Creek, Lake Seppings, and Oyster Harbour.

Key objectives of the ALPS that are relevant to this water management strategy include:

- Protect the City's pristine natural and coastal environments and other landscape qualities.
- Meet the service infrastructure requirements for settlement growth.

Key actions from the Rivers, Estuaries and Wetlands section of the ALPS include:

1. Assess development and subdivision applications to ensure that no direct discharge occurs to rivers, estuaries and wetlands from stormwater and industrial wastewater outfalls.
2. Ensure structure planning, subdivision and development that proposes onsite effluent disposal takes cumulative impacts into consideration and complies with separation distances from water resources as set out under the Government Sewerage Policy.
3. Require best practice, stormwater management in subdivisions, including the incorporation of site-responsive water sensitive urban design to manage stormwater quality and quantity and runoff into all waterways.
4. Identify and accurately map priority flood-prone areas with assistance from the Department of Water and Environmental Regulation.
5. Land use planning controls within flood-prone areas are contained within the Local Planning Scheme and local planning policy. The need for additional controls will be investigated under the review of the Local Planning Scheme.
6. Protect regionally important river (shown on Figures 1 and 2), wetland and estuarine foreshores, and other priority sites with high conservation value through mechanisms including ceding for public ownership. Foreshore areas shall be determined as part of structure plans and ceded at subdivision and development (whichever occurs first).
7. Advocate for the vesting of Unallocated Crown land with high conservation values with an appropriate agency to ensure secure protection and management.

8. Condition fencing and revegetation and ongoing management of rivers, floodplains, wetlands and estuaries to reduce sediment and nutrient transportation at structure plan and subdivision stages.
9. Investigation Area 11 – Protection of Yakamia Creek and Lake Seppings with the following specific actions identified:
    - Identify planning mechanisms to protect the environmental qualities of Yakamia Creek and Lake Seppings
    - Extending the Yakamia Structure Plan area to include lower Yakamia Creek catchment
    - Updating the Lake Seppings flood mapping
    - Incorporate recommendations from the Yakamia Creek Living Stream Management Plan (Janicke, S & G 2015)
    - Include the floodplain/catchment area of Yakamia Creek and Lake Seppings as a Special Control Area under the Local Planning Scheme.

Key actions from the Coastal Planning and Management section of the ALPS include:

1. Require that coastal planning strategies or foreshore management plans are carried out as early as possible in the planning process. Foreshore management plans are to determine suitable setbacks and land required to be ceded for public foreshores reserves by an assessment of coastal processes in accordance with *State Planning Policy* 2.6 – *State Coastal Planning*.
2. Pursue funding and progressively undertake Coastal Hazard Risk Management Adaptation Plans for priority areas, including Princess Royal Harbour, Oyster Harbour, Goode Beach and the Whaling Station area.
3. Investigation Area 12 – Implementation of the Emu Point to Middleton Beach Coastal Hazard Risk Management Adaptation Plan with the following specific actions identified:
    - Implement the recommendations of the CHRMAP for Emu Point to Middleton Beach through an Investigation Area (IA12).

2.3.1 Stormwater and floodplain management

The ALPS identifies that there is a need to identify flood risk land, protect drainage infrastructure and channels, identify land requirements for drainage network upgrades e.g. attenuation basins, and treat stormwater before it enters watercourses/water bodies.

2.3.2 Water supply

The ALPS identifies that in the short term (up to five years), water for public water supply is available from the proclaimed Albany groundwater area. Expansion of available resources in this area was expected to allow for supply until 2030.

Medium to long term (five to 15 years) water supply options discussed in the ALPS included a hinterland source, seawater desalination or from the Marbellup Brook aquifer storage and recovery.

2.3.3 Wastewater

The ALPS identifies that Water Corporation is responsible for the treatment of Albany's wastewater. This incorporates various pump stations, the Timewell Road Wastewater Treatment Plant (WWTP) and woodlot irrigation near the airport. The WWTP has been upgraded to meet demand in the long-term and ALPS provides for actions such as the staged settlement to guide

development towards priority sewerage areas and supporting Water Corporation with an ongoing backlog sewerage program within Albany. The City seeks associated funding from the State Government to extend the sewerage infill program when funding becomes available.

The ALPS recognises the designation of sewerage sensitive areas associated with protection of Oyster Harbour and indicates that developers are responsible for providing sewerage to new residential estates to the satisfaction WAPC and of Water Corporation. Water Corporation will upgrade the system to cater for future growth.

2.4 City of Albany Local Planning Scheme No. 2

Figure 3 presents an extract of the *City of Albany Local Planning Scheme No. 2* showing the current zones and reserves in the Study Area.

- Existing special control areas to be acknowledged and revisions proposed if necessary
- Existing reserves to be presented as part of the land use opportunity mapping
- Aboriginal land transfer areas to be acknowledged and revisions proposed if necessary
- Servicing constraints to be discussed further with Brett Combes and considered in more detail, particularly in relation to the hollow along Lower King Rd & need for new pump station(s)
- Opportunities for alternative approaches to built form to be considered

There are several Special Control Areas present in the study area that are particularly relevant to this DWMS. These are:

- Special Control Area 11 – Coastal Erosion Risk — Griffiths Street
- Special Control Area 12 – Coastal Erosion Risk — Emu Point
- Special Control Area 13 – Yakamia Creek Inundation Area
- Special Control Area 14 – Lake Seppings Inundation Area
- Special Control Area 16 – Oyster Harbour Inundation Area

These special control areas include specific provisions for horizontal setbacks, vertical separations and requirements for notification on title associated with fluvial flooding and coastal erosion and inundation.

2.5 South West Native Title Settlement

The Study Area includes land within and adjacent to the Wagyl Kaip & Southern Noongar Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement.

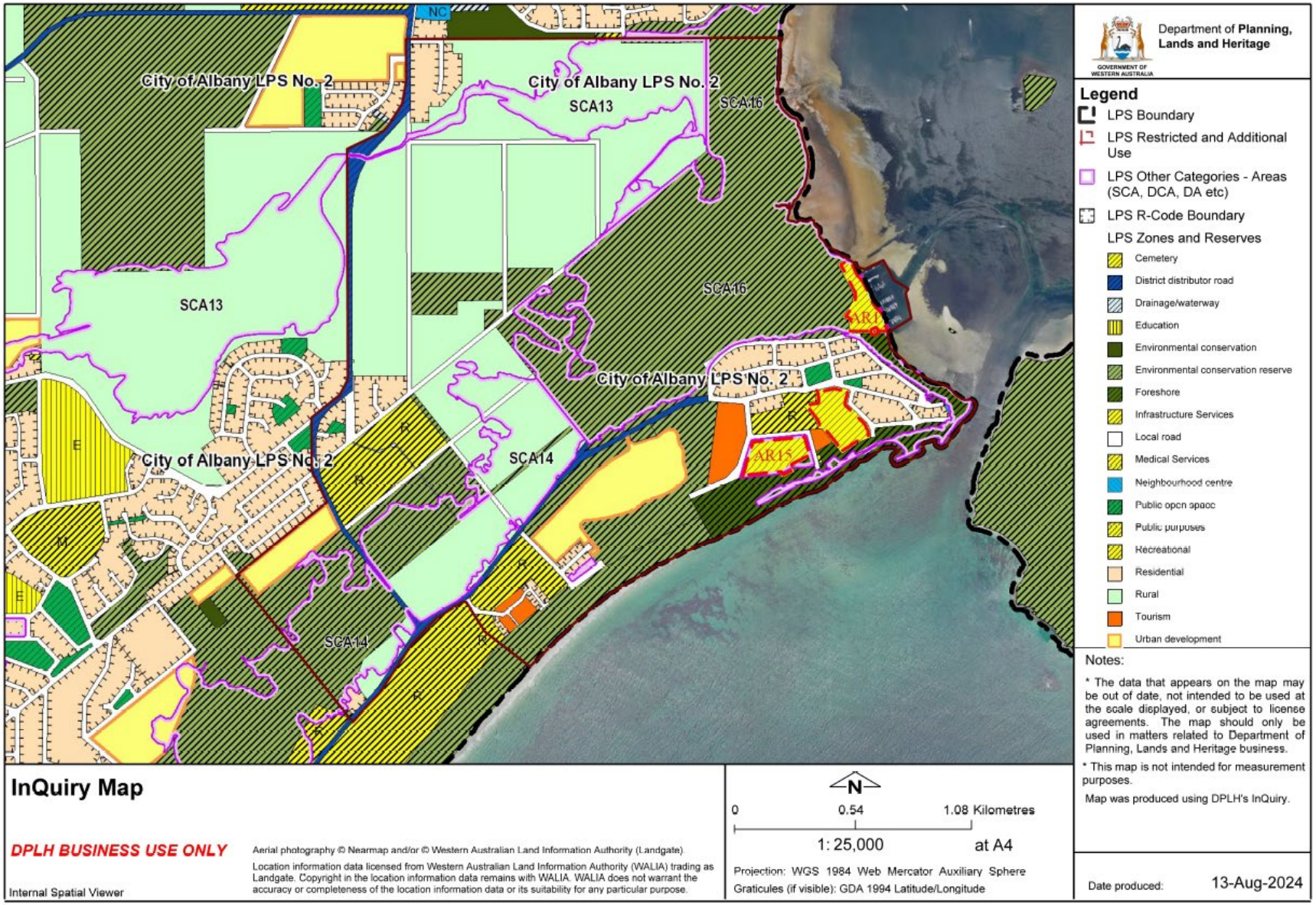


Figure 3: City of Albany Local Planning Scheme No. 2 Extract

It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

2.6 Emu Point Precinct Structure Plan

Emu Point Precinct Structure Plan has been developed based on identified land use opportunity areas within the study area that have been determined with consideration of environmental and water management constraints, including:

- Existing parks and recreation reserves.
- Existing special control areas.
- Waterways and their mapped floodplain areas.
- The proposed Emu Point waterway foreshore reserve (see Section 3.8 and Figure 19).
- Mapped conservation and resource enhancement wetlands and indicative buffers.
- Albany Regional Vegetation Survey (ARVS) extent of native vegetation.

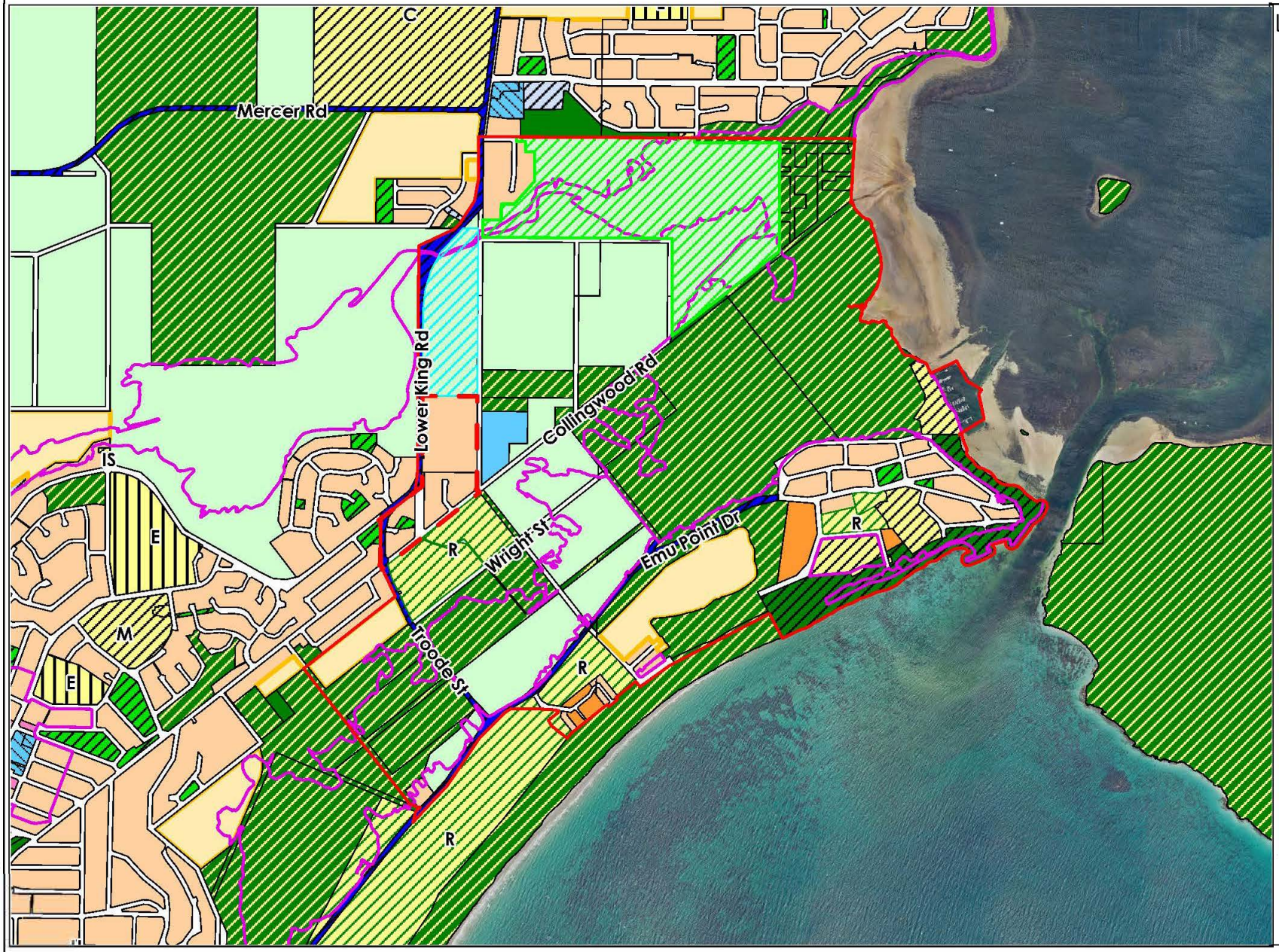
Figure 4 to Figure 7 presents land use opportunity areas that have been identified within the study area that are considered further by the water management strategies presented in Section 5 of this report.

Land within the study area but outside of specified land use opportunity areas may still be suitable for other opportunities not including development for more intensive land uses. For example, the presence of native vegetation or wetlands may limit the ability for a particular lot to be developed but could provide significant opportunities for the lot to contribute to strategic offsets and carbon capture for nature positive outcomes.

Carbon offsetting and capture can be achieved through carbon sequestration projects such as tree planting and land restoration. Some examples include:

- Planting of native trees and vegetation to restore habitats and improve soil carbon storage.
- Implementation of practices to increase soil carbon storage in agricultural areas such as using biochar to stabilise organic matter in soil.
- Wetland restoration to restore habitats and improve their capacity to store carbon.

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 4 - Land use opportunites



LEGEND:

- Study Area
- Cadastre

Land use opportunity areas

- Collingwood Heights Precinct
- Residential
- Rural Smallholding zone
- Future Investigation area - subject to further planning
- Private Community Purpose zone

LPS2 Zones and Reserves

- Cemetery
- District Distributor Road
- Drainage/waterway
- Education
- Environmental Conservation
- Environmental conservation reserve
- Foreshore Reserve
- Infrastructure Services
- Local road
- Medical Services
- Neighbourhood centre
- PUBLIC OPEN SPACE
- Public Purposes
- Recreational
- Residential
- Rural
- Tourism
- Urban development
- LPS Other Categories - Areas (SCA, DCA DA etc)

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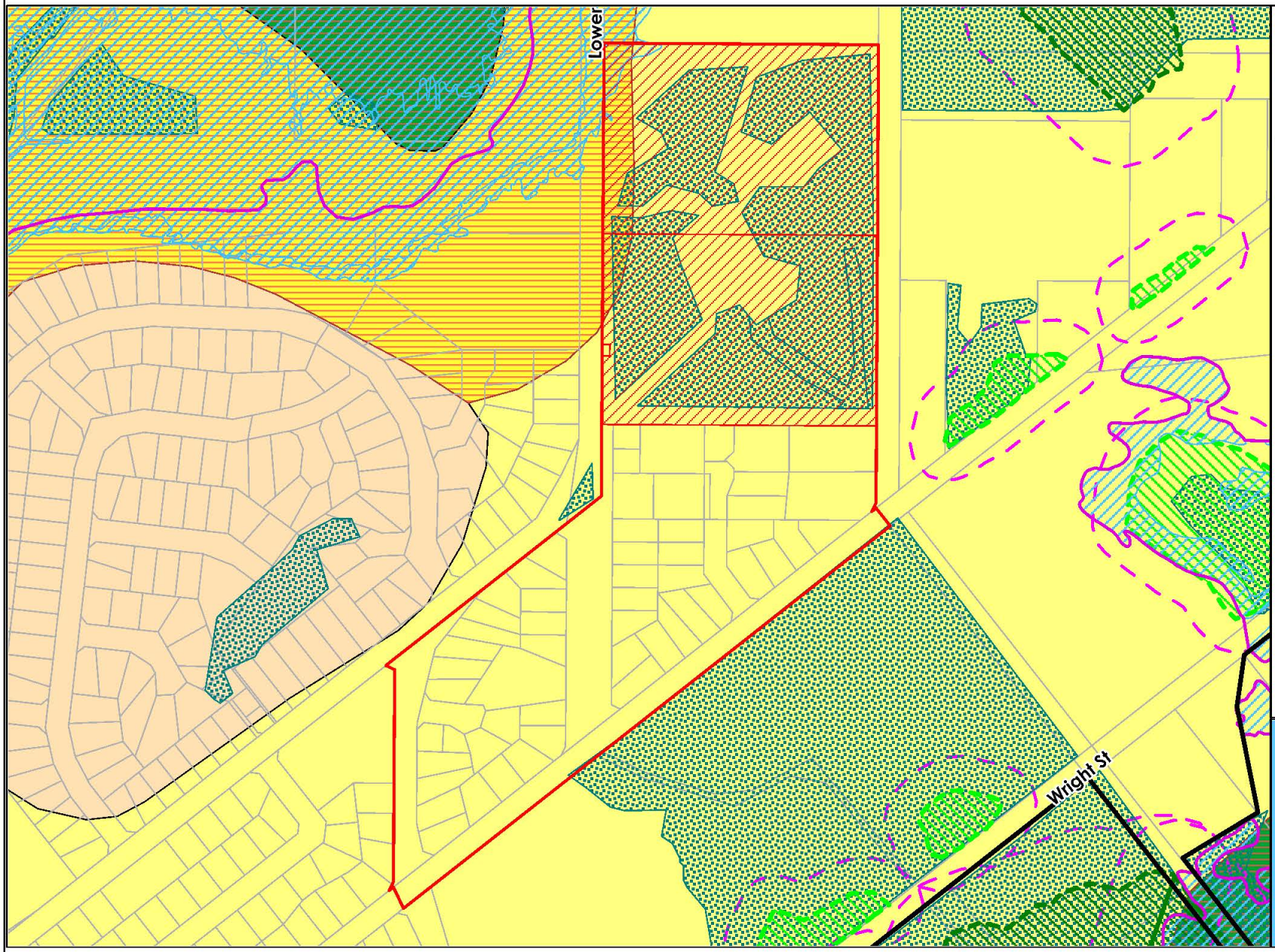
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Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 5 - Land use opportunites - Collingwood Heights Precinct



LEGEND:

- Collingwood Heights Precinct
- Cadastre
- Waterways
- LPS2 Special Control Areas
- Proposed foreshore management area
- Floodplain areas
- Native vegetation extent (ARVS)

Evaluated wetlands

- Conservation
- Resource enhancement
- Indicative wetland buffers

Soils

- LA7 - Laterite
- S14 - Sand (Alluvium)
- S6 - Sand
- High to moderate risk of acid sulfate soils
- Potentially contaminated - investigation required

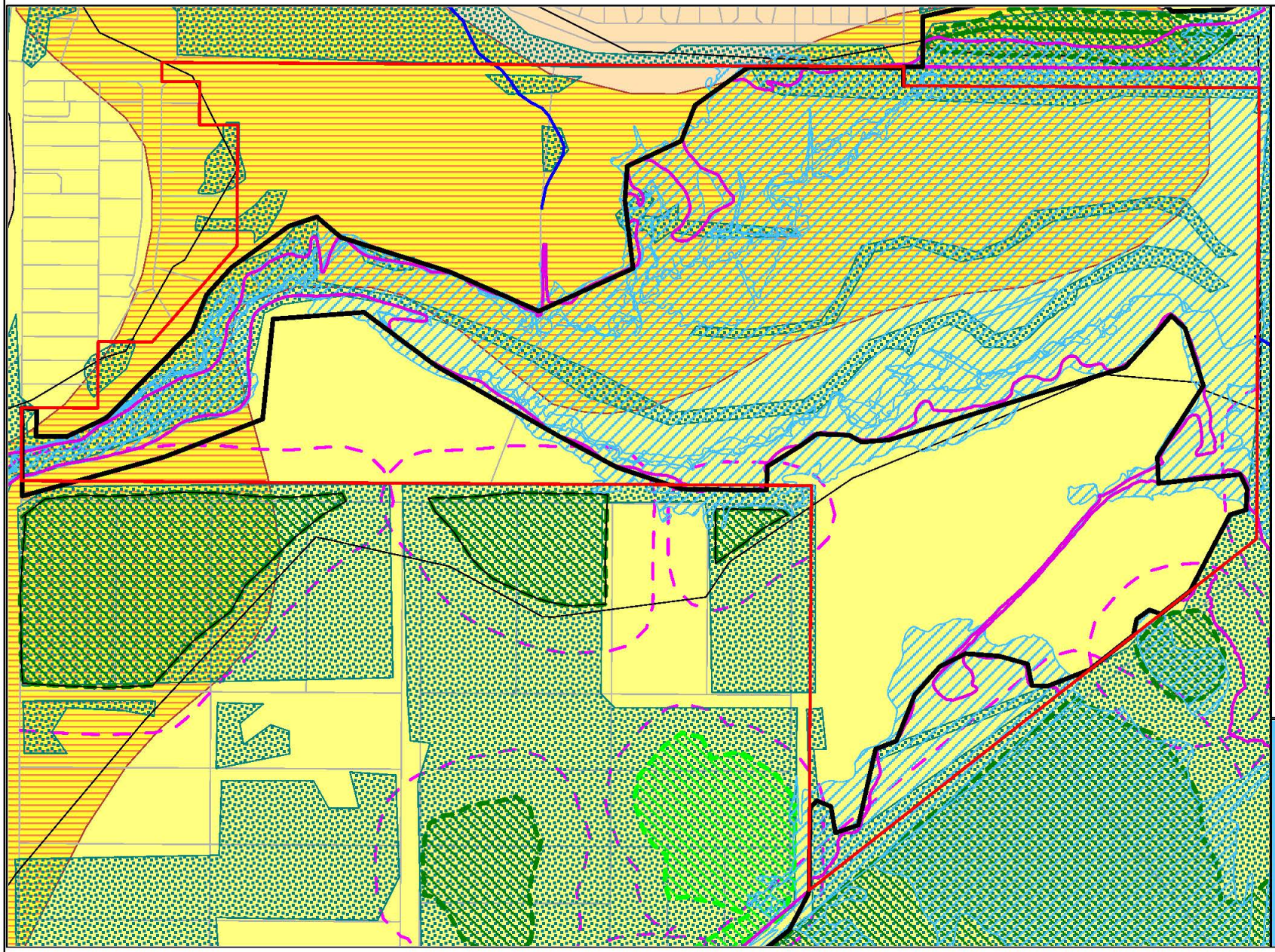


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Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 6 - Land use opportunites - Rural Smallholding zone



LEGEND:

- Rural Smallholding zone
- Cadastre
- Waterways
- LPS2 Special Control Areas
- Proposed foreshore management area
- Floodplain areas
- Native vegetation extent (ARVS)

Evaluated wetlands

- Conservation
- Resource enhancement
- Indicative wetland buffers

Soils

- LA7 - Laterite
- S14 - Sand (Alluvium)
- S6 - Sand
- High to moderate risk of acid sulfate soils



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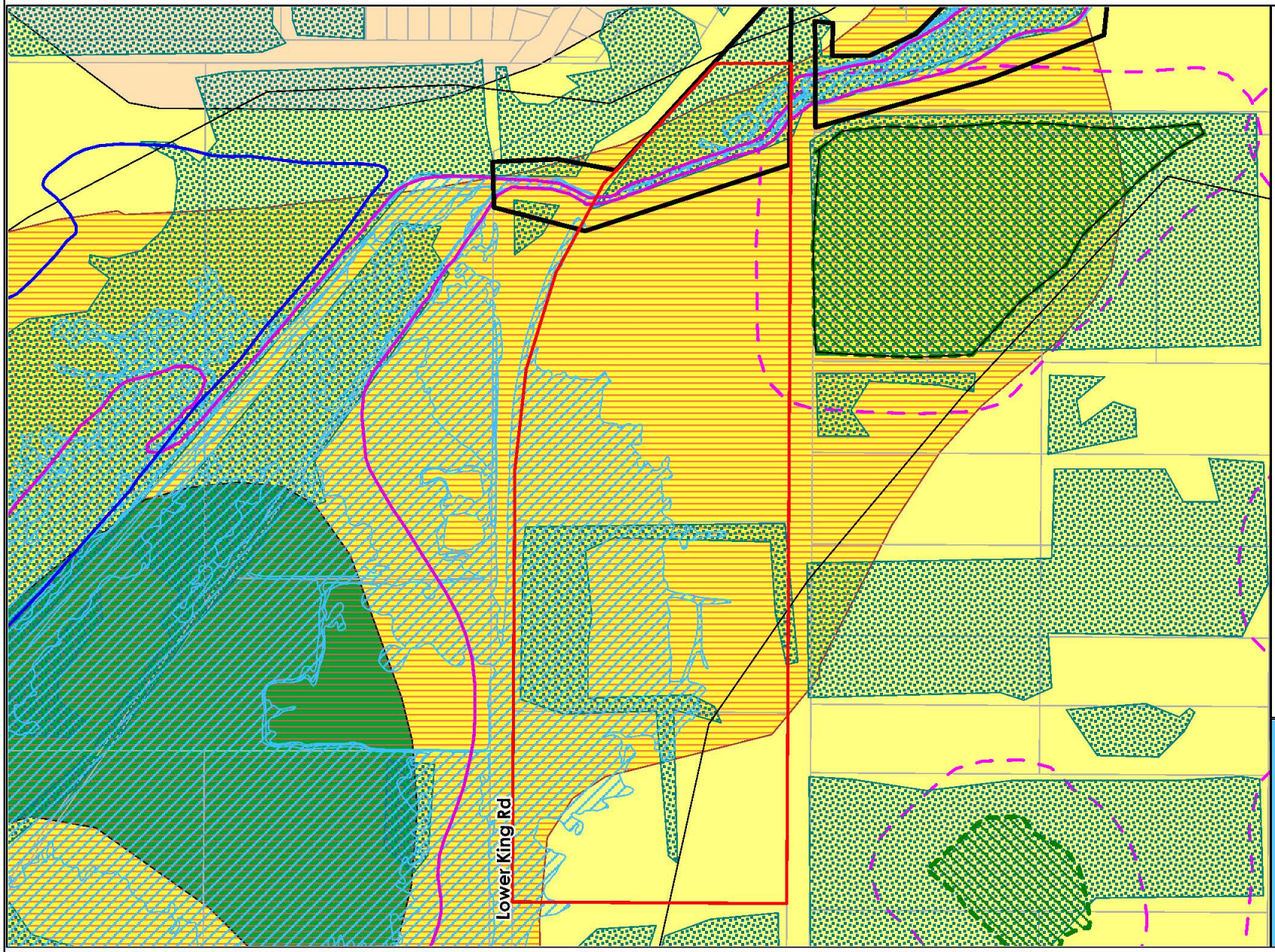
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Figure 7 - Land use opportunites - Future Investigation area



LEGEND:

- Future Investigation area
- Cadastre
- Waterways
- LPS2 Special Control Areas
- Proposed foreshore management area
- Floodplain areas
- Native vegetation extent (ARVS)

Evaluated wetlands

- Conservation
- Resource enhancement
- Indicative wetland buffers

Soils

- LA7 - Laterite
- S14 - Sand (Alluvium)
- S6 - Sand
- High to moderate risk of acid sulfate soils



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3 SITE CHARACTERISTICS

The existing environmental conditions at Emu Point define the opportunities and constraints for water management. A summary of the conditions is provided in this section.

3.1 Climate

Albany is characterised by Mediterranean climate with warm summer conditions and mild-wet winter conditions. Albany (BoM site No. 9500) is the closest station to the Study Area and has recorded data since 1877. The annual rainfall average registered at the Albany station and presented in Chart 1 is 924.7 mm. The most reliable rainfall occurs between May and September with monthly averages up to 143 mm in July and 127mm in August.

For consideration of a longer-term record, the continuous record since 1900, has been used and this data is presented in Chart 2. Average annual rainfall registered at Albany has decreased from its long term average of 924.7 mm to 854.5 mm since the year 2000, with the most significant decreases occurring in May, June, July, and October.

Summer is typically hot and dry whilst winter features most of the rainfall volume and is therefore more humid. Average monthly maximum and minimum temperatures are represented in Chart 1 and range from a max of 22.9 °C in February to a minimum of 8.2 °C in July.

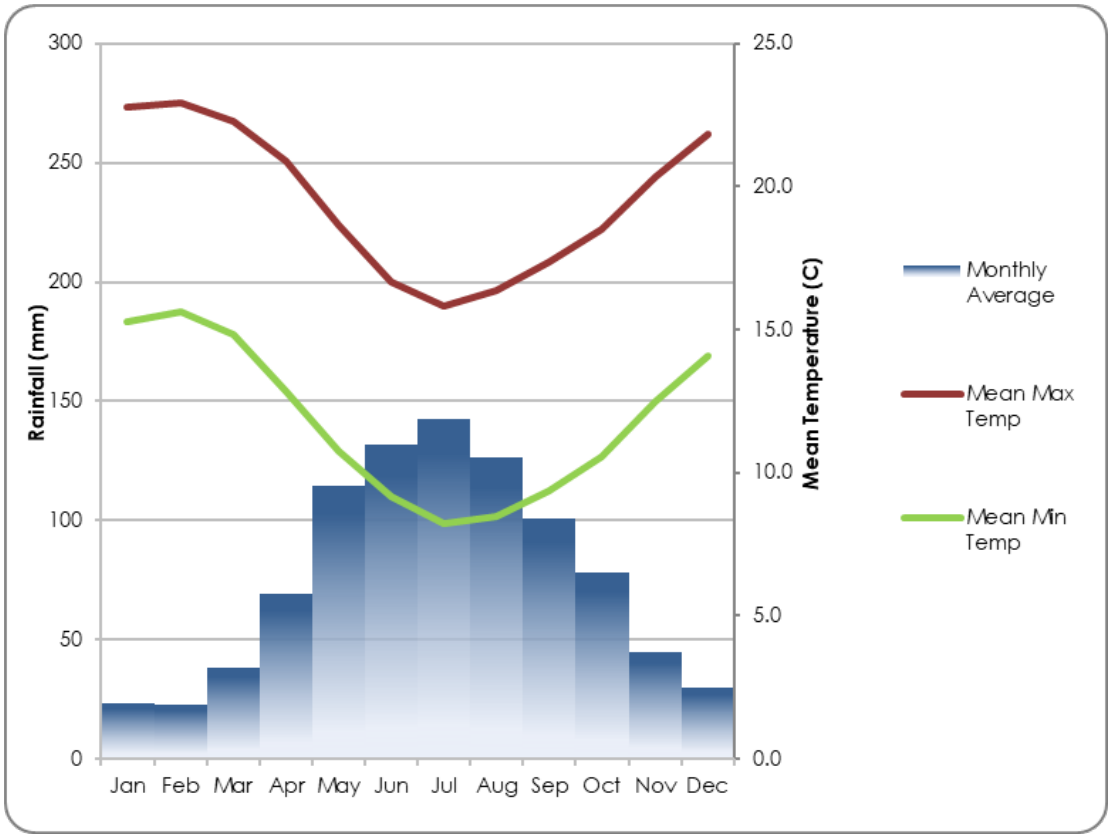


Chart 1: Temperature and rainfall data for Albany (BoM reference 9500) (BoM, 2022)

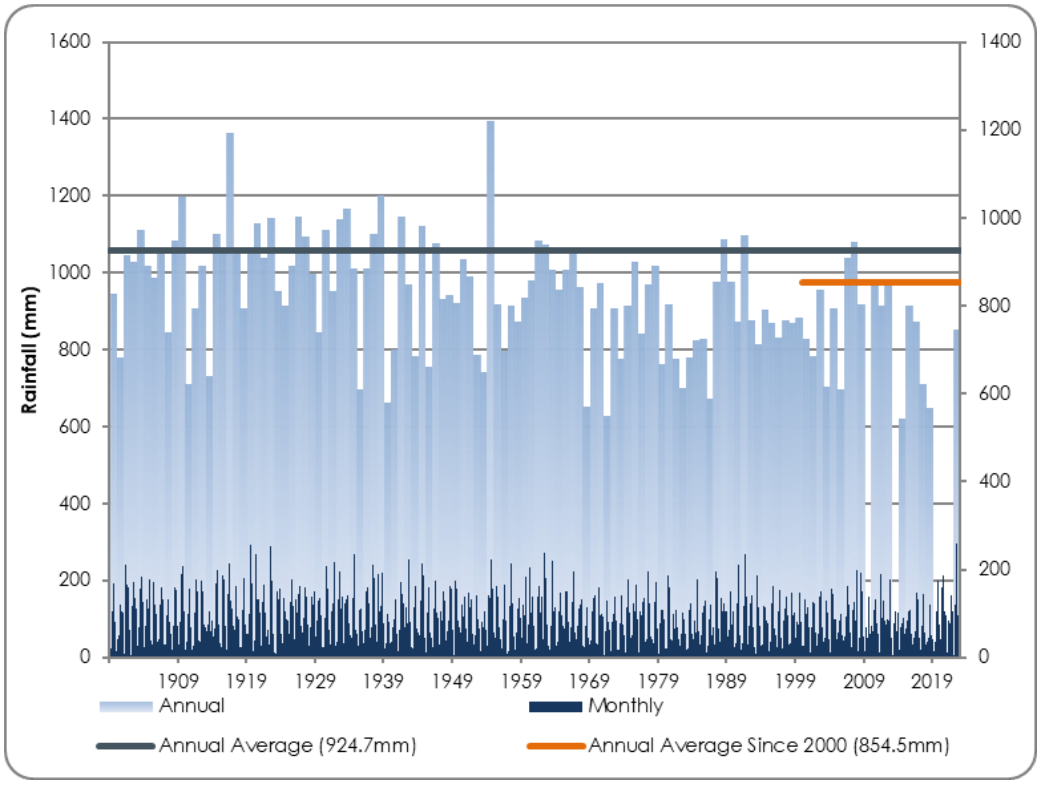


Chart 2: Historic rainfall trend at Albany (BoM reference: 9500) (BoM, 2022)

Decreasing rainfall is also noted in the *Selection of future climate projects for Western Australia* (DoW, 2015). Mean annual rainfall decreases projected by DWER, based on the 1961-1990 baseline, varies between -4% (wet scenario) and -25% (dry scenario) by 2050. This extends to -7% (wet) and -47% (dry) by 2090.

Implications for future development

It will be important to consider historic, current and future climate as an integral part of water management investigations and modelling to inform development and validation of strategies. This should include an understanding of the representativeness of local monitoring results and demonstrated understanding of how future changes are likely to impact on the total water cycle.

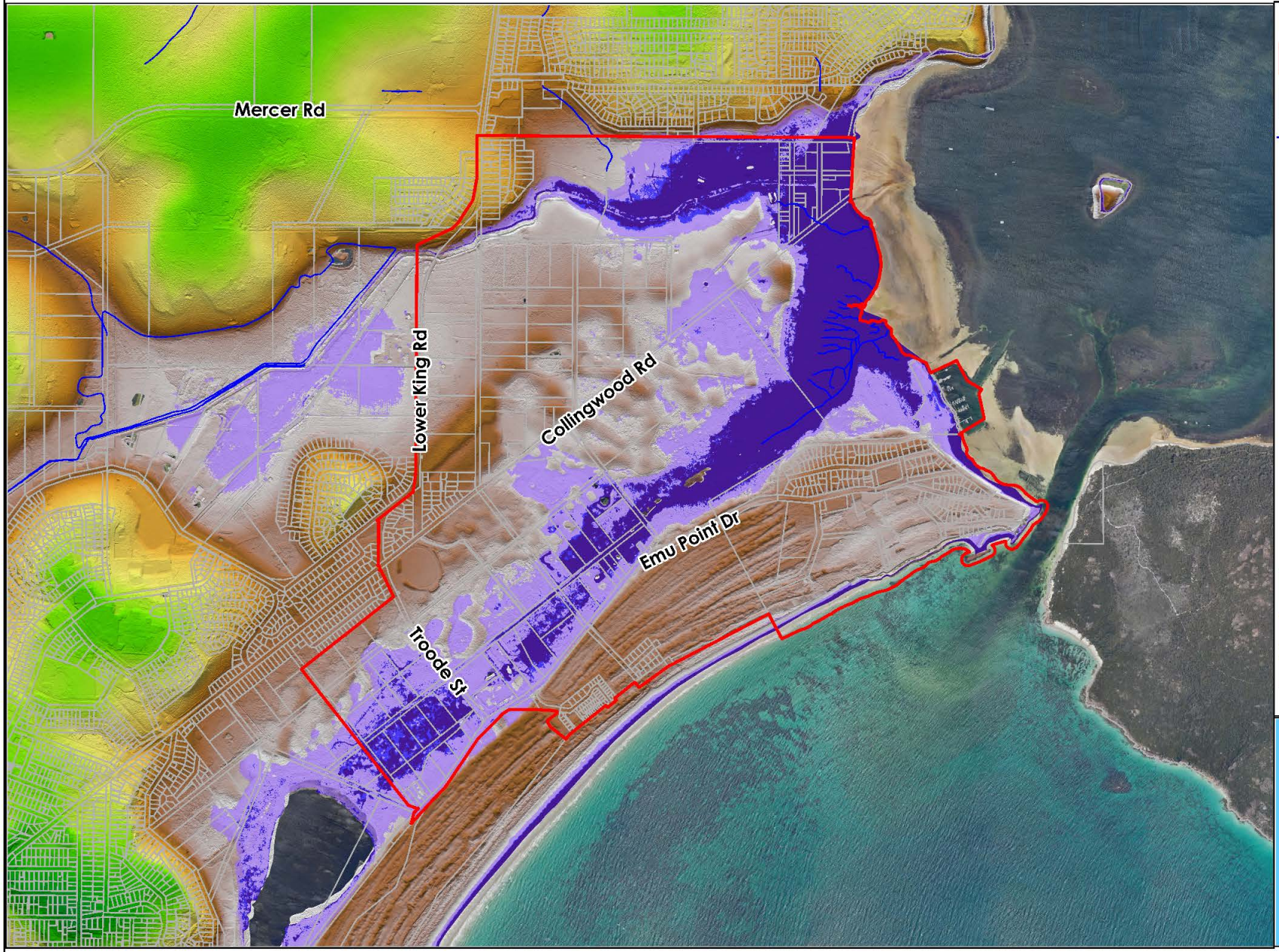
3.2 Topography

The topography of Emu Point is shown in Figure 8. A Digital Elevation Model (DEM) was generated from LiDAR information provided by the City and is sourced from DWER. Elevations in the Study Area start at sea level up to a maximum elevation of around 25 m AHD at the northern boundary, with the majority of the Study Area being below 10m AHD.

Low lying land within the study area, adjacent to Oyster Harbour has been identified as being at risk of coastal inundation in the *Statewide Coastal Inundation Assessment Phase 2 Report* (Seashore Engineering, 2024). The report identifies three critical inundation levels above the highest astronomical tide that are relevant within the study area and shown in Figure 8:

- High – 1.1m AHD
- Extreme – 1.2m AHD
- Extreme + 0.9m allowance for sea level rise – 2.1m AHD

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 8 - Topography



LEGEND:

- Study Area
- Cadastre
- Waterways

Elevation (m)

65m AHD

0m AHD

Statewide coastal inundation assessment

Coastal inundation levels

- High inundation - 1.1m AHD
- Extreme inundation - 1.2m AHD
- Extreme inundation + SLR - 2.1m AHD



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Implications for future development

Retention of topography and slope assists the movement of water across a site and reduces the need for earthworks. It also helps to retain mature trees which mitigate urban heat island effects. It will be important to consider retention of landform as part of future planning and development.

Parts of the study area are prone to coastal inundation effects that will increase in future with sea level rise. Developments will need to provide adequate vertical separation from coastal inundation levels for habitable buildings and critical infrastructure.

3.3 Geology and soils

The surface geology of Emu Point and the surrounding area is mainly comprised of clays and sandy clays. As shown in Figure 9, the following soil types are present in the Study Area:

- Sand (S6 – Czs) – pale grey, fine to coarse, angular to sub-rounded quartz, loose, moderately sorted, occasional pebbles of laterite.
- Sand (Alluvium) (S14 – Qa) – white to pale grey, fine to medium, occasionally coarse, angular to sub-angular quartz, little fines, moderately sorted.
- Silty Sand (Sm2 – Qe) – greyish brown, medium to coarse-grained, quartz, variable silt content.

Implications for future development

The nature of soils, particularly permeability, is a critical element in determining an appropriate drainage strategy. Low permeability soils require consideration of drainage strategies comprising on-site and in-system detention to avoid significant increases in peak flows to existing drainage systems and sensitive receiving water bodies.

The underlying geology of the Albany region is impermeable granitic or gneissic rocks surrounding seasonally waterlogged lower catchments.

The low-lying silty and sandy soils prevalent in the Study Area have variable permeability and phosphorus retention capacity and local investigations are required to determine if soils are suitable for infiltration and/or require amendment to provide for water quality treatment.

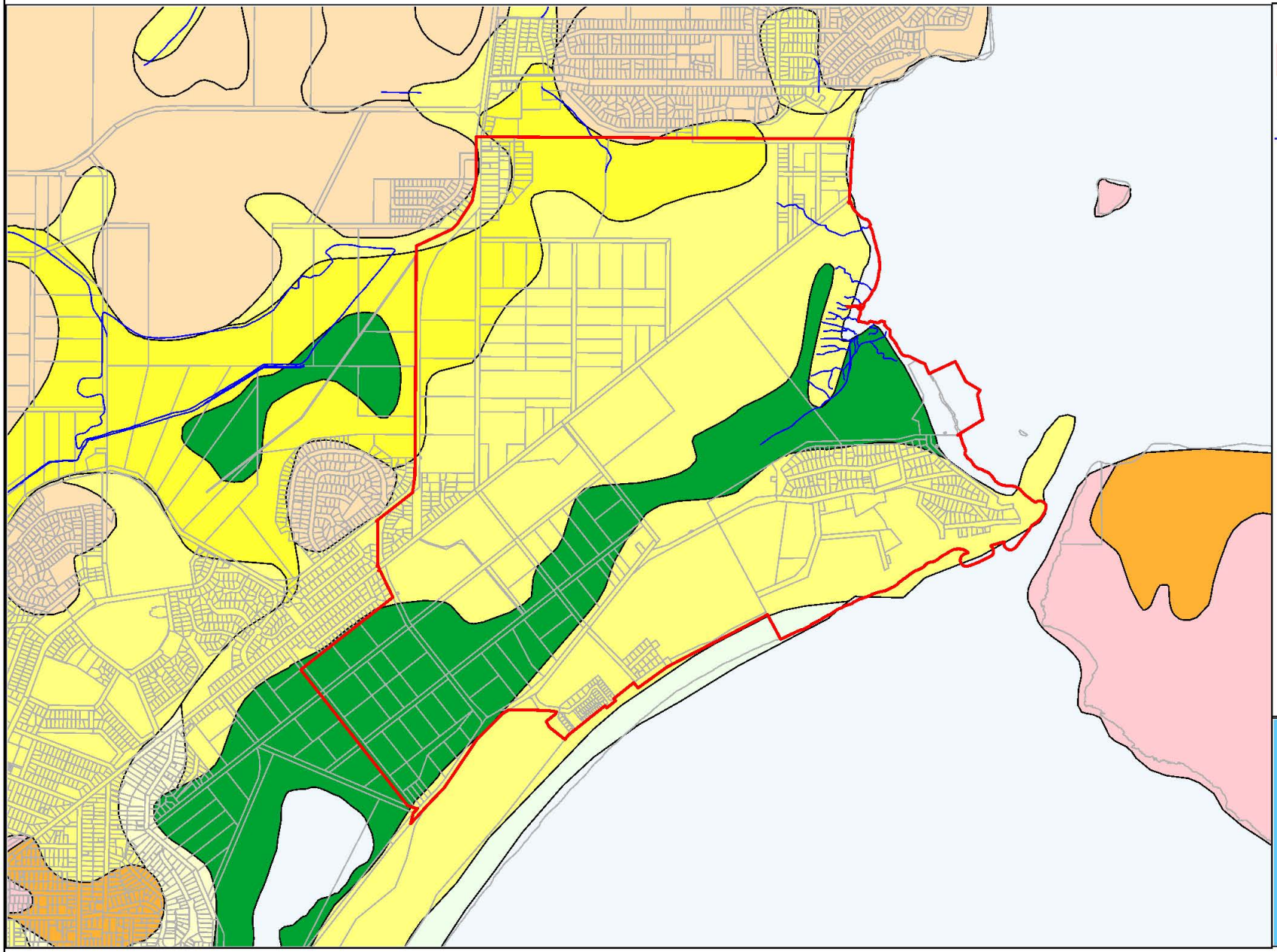
3.3.1 Acid sulfate soils

Mapping of Acid Sulfate Soil Risk is maintained by DWER (2022a) and is presented in Figure 10. Mapping indicates high to moderate risk of acid sulfate soils occurring within 3 m of the natural surface around Oyster Harbour, and within the Yakamia Creek and Lake Seppings drainage corridors with no known risk elsewhere.

Implications for future development

Areas of acid sulfate soils cannot be confirmed or removed at this stage of the development process and will need to be determined by an acid sulfate soils investigation, potentially with sampling within the site. Acid sulfate soils can be managed through appropriate management plans, sampling and treatment, which is handled through a DWER approval process at local structure plan stage, prior to any subdivision.

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 9 - Surface geology



LEGEND:

- Study Area
- Cadastre
- Waterways

Soil types

- GR - Granite
- LA1 - Laterite (on Granite)
- LA7 - Laterite
- S14 - Sand (Alluvium)
- S6 - Sand
- Sm2 - Silty Sand
- ST3 - Siltstone



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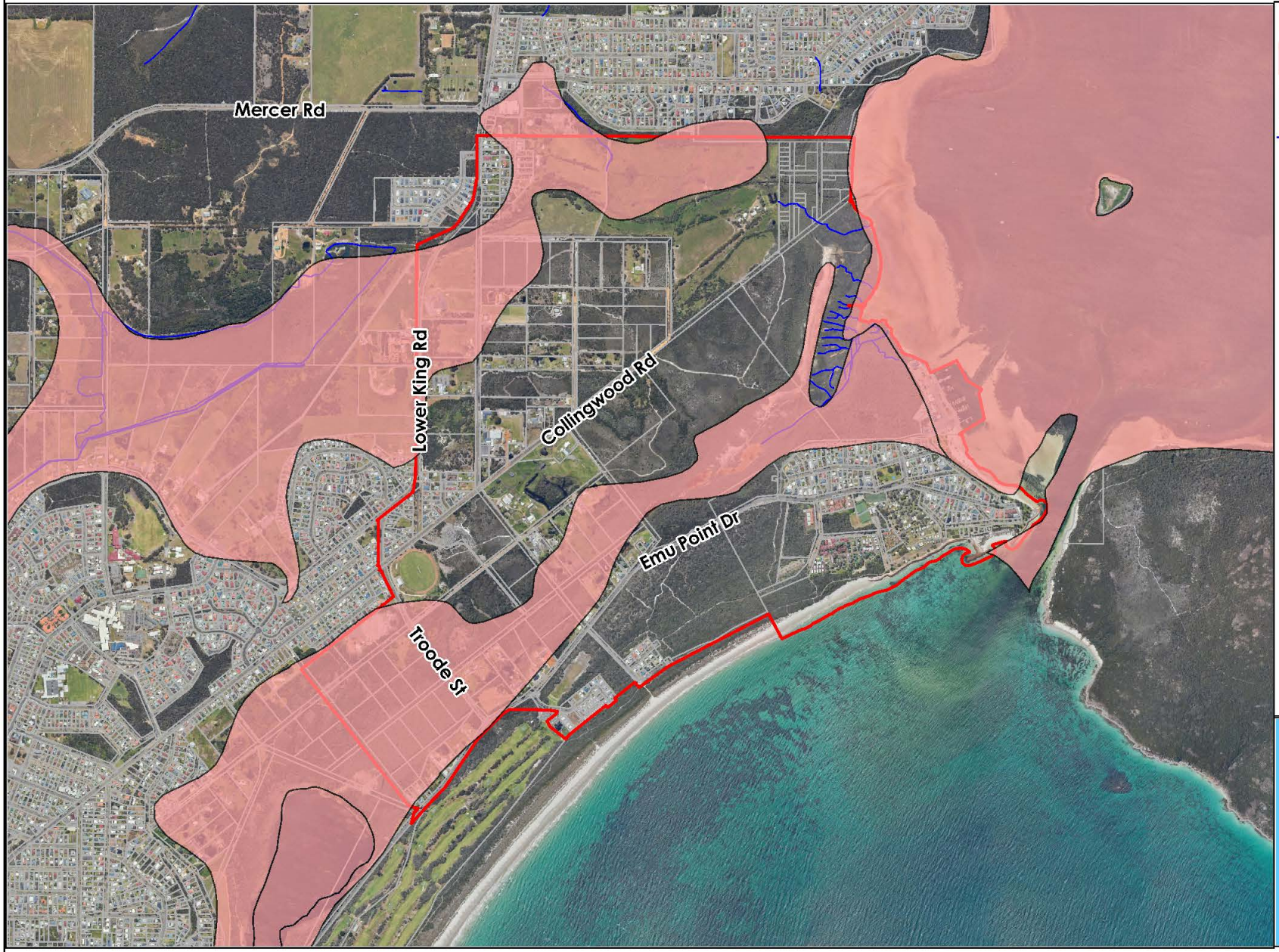
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Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 10 - Acid sulfate soil risk



LEGEND:

- Study Area
- Cadastre
- Waterways

Acid Sulfate Soil Risk

- High to moderate risk
- Moderate to low risk



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3.3.2 Contamination

There are no registered contaminated sites within or surrounding the study area. However, Lots 22 and 23 Brewster Street have been identified as 'Potentially Contaminated – Investigation Required' and is awaiting further classification. DWER advice indicates that it is potentially contaminated, largely in an existing cleared area of the site and a geotechnical investigation is expected to be completed late in 2025 including soil testing to confirm if the site is contaminated.

In addition, there are sites within the study are that are currently, or have previously been, utilised for industry, agriculture and horticulture, all of which could be considered potentially contaminating activities. Existing land uses are presented in Figure 11.

Implications for future development

Further investigations are required to determine the potential for contaminated soil and/or groundwater associated with current or past land uses. A Preliminary Site Investigation (PSI) is recommended at Local Structure Plan stage. This should include consideration of high levels of nutrients (which generally fall outside the Contaminated Sites Act).

Where preliminary site investigations identify the presence or historical presence of industrial, agricultural, and horticultural activities which are considered potentially contaminating, any proposed stormwater and groundwater management approaches should account for the risk of pollutant mobilisation due to runoff infiltration or groundwater movement. Avoidance strategies should be incorporated to prevent contamination spread.

3.4 Wetlands

The important wetlands and waterways of the study area are presented in Figure 12.

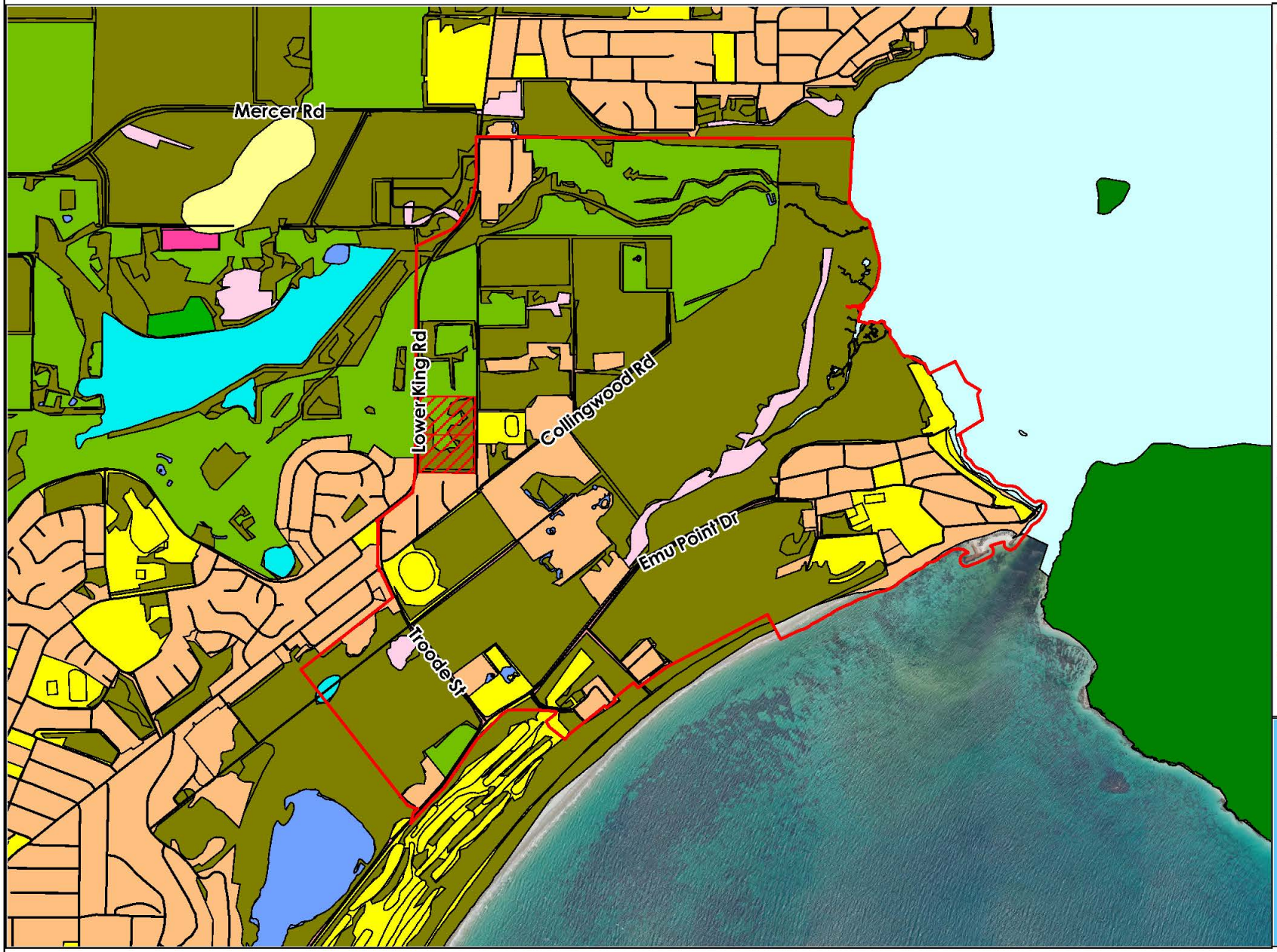
The study area is bounded to the east by Oyster Harbour (Miaritch) which is the receiving water body for all surface water and groundwater flows from the catchments and watercourses of the study area. Oyster Harbour is listed in the Directory of Important Wetlands in Australia (DIWA) administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and is recognised as an environmentally sensitive area under the Environmental Protection Act 1986.

As well as its significant biodiversity values, Oyster Harbour holds great significance for the Menang Noongar People and is known as Miaritch which refers to the meeting place of the Warrecoolyup (King) and Kalganup (Kalgan) rivers, and also a meeting place of the Menang people.

Lake Seppings (Tjuirtgellong) also has significant biodiversity values and has been listed as a South Coast Significant Wetland, Conservation Class by the Department of Biodiversity, Conservation and Attractions (DBCA). Lake Seppings lies just outside the study area to the west but is part of a significant drainage corridor that extends through the study area to Oyster Harbour and includes several wetlands such as the Lake Seppings flats and Collingwood complex as shown in Figure 12.

An evaluation of wetlands in the Albany urban area that was undertaken by DWER in 2007 classified areas of the Lake Seppings and Yakamia Creek drainage corridors within the Study Area as a mix of conservation category, resource enhancement, and multiple use wetland areas. Mapping of the evaluated wetlands is presented in Figure 12.

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 11 - Existing land uses and contamination



LEGEND:

- Study Area
- Cadastre

Catchment scale land use (DPIRD, 2018)

- 1.1 Nature conservation
- 1.3 Other minimal use
- 3.1 Plantation forests
- 3.2 Grazing modified pastures
- 3.6 Land in transition
- 4.4/4.5 Irrigated horticulture
- 5.4 Residential and farm infrastructure
- 5.5 Services
- 5.8 Mining
- 6.1/6.2 Lake/Reservoir/Dam
- 6.5 Marsh/wetland
- 6.6 Estuary/coastal waters

Contaminated sites (DWER, 2025)

- Contaminated - remediation required
- Contaminated - restricted use
- Remediated for restricted use
- Potentially contaminated - investigation required



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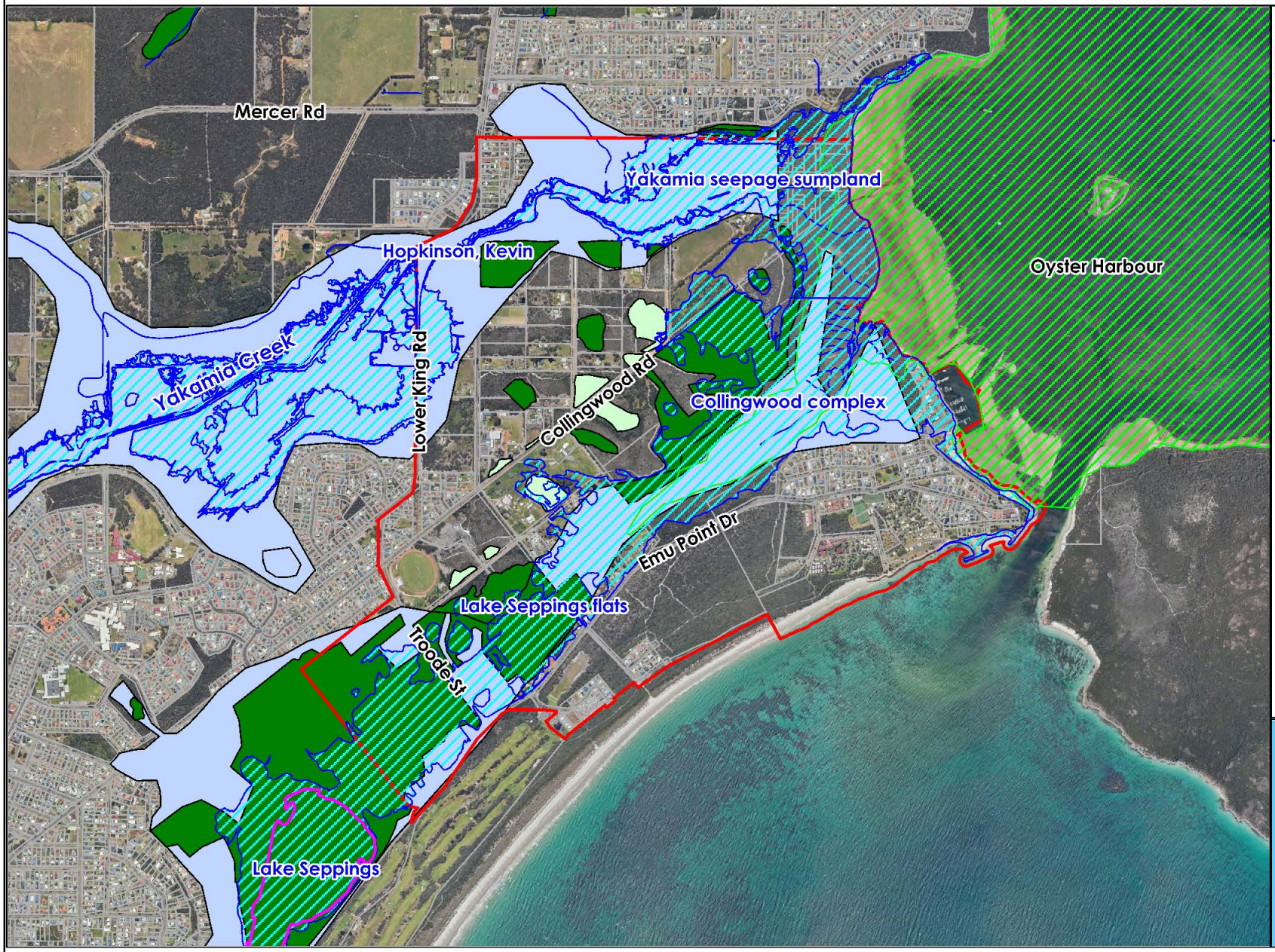
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Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 12 - Wetlands and waterways



LEGEND:

- Study Area
- Cadastre
- Waterways
- Wetlands of national and international importance (DIWA)
- South coast significant wetlands

Evaluated wetlands (DWER, 2007)

- Conservation
- Resource enhancement
- Multiple use
- Floodplain areas



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It is noted that more recent environmental investigations have indicated that Yakamia Creek and its tributaries have the values and attributes of a conservation category wetland. Additionally, despite its status as a multiple use wetland, the Yakamia Creek is a waterway and is therefore discussed further in Section 3.5 below.

Implications for future development

Mapped wetlands in the Study Area that are associated with the Lake Seppings and Yakamia Creek drainage corridors have significant biodiversity and heritage values and are critical for floodplain management and therefore require protection. Retained areas of wetland should be revegetated to enhance habitat values.

Setbacks including wetland buffers, waterway and coastal foreshore areas are needed to protect biodiversity values and habitats, water quality and hydrology.

Also, as noted above, since the original classification of wetlands in the Study Area in 2007, environmental conditions have changed and many of the areas classified as multiple use have demonstrated a capacity to recover from previous degradation and may incorporate the values and attributes of a conservation category wetland and will therefore require investigation and re-evaluation prior to development of the land.

Classification of land as multiple use wetland does not generally present any constraint to development but is an indicator that site conditions are seasonally wet.

While broadscale filling of the land and installation of subsoil drainage is not contemplated in the Study Area it is noted that some areas of fill and/or subsoil drainage may be necessary to manage local areas of shallow or perched groundwater.

Local site investigations will be necessary to determine local depths to groundwater and identify the extent of any areas of shallow and perched groundwater, particularly in lower-lying areas where the effects of climate change may include rising groundwater levels.

3.5 Surface water

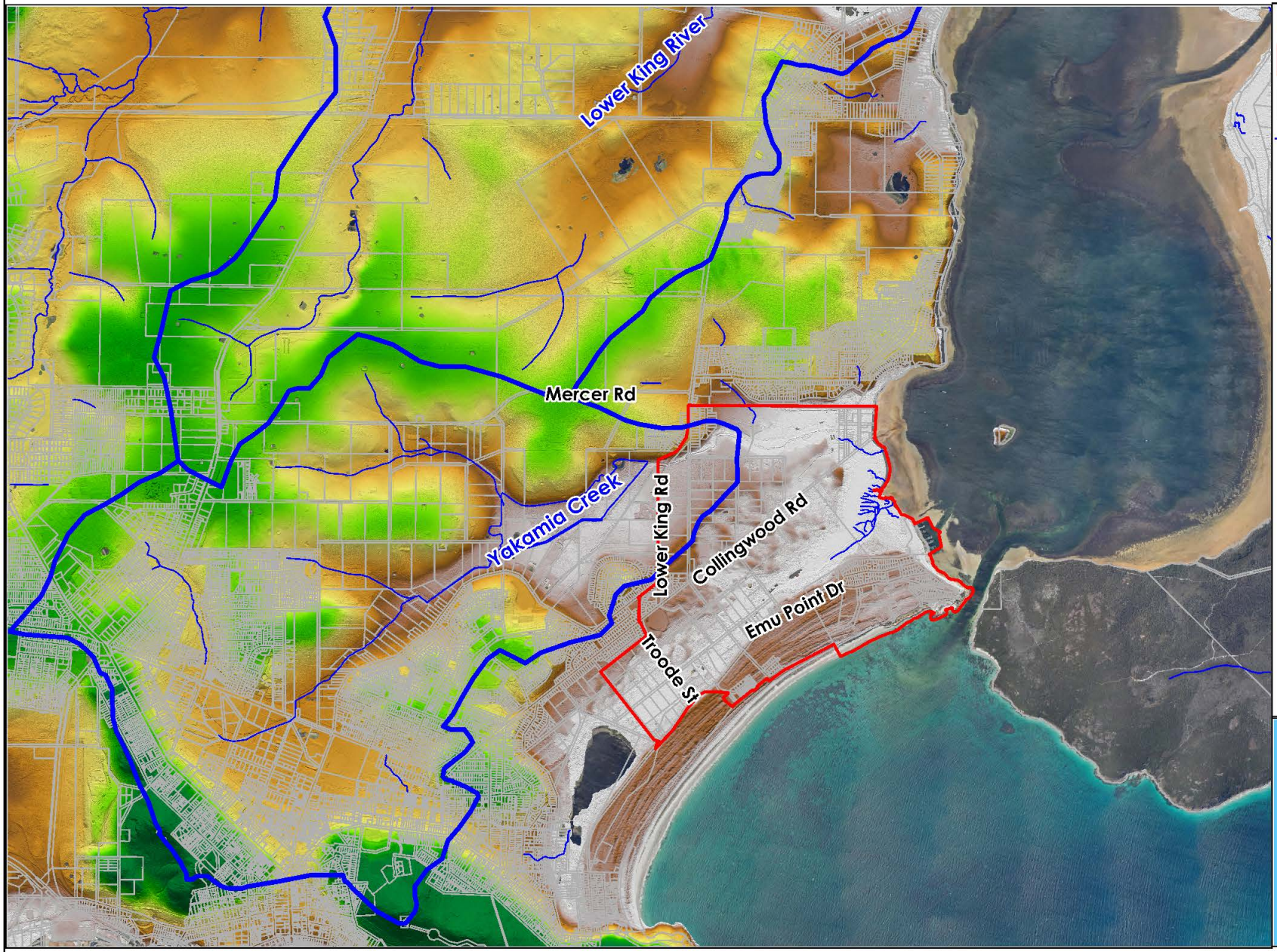
The Study area contains both natural waterways and constructed local drainage systems which are described below.

3.5.1 Waterways

The principal waterway in the Study Area is Yakamia Creek, which flows from west to east along the northern boundary of the Study Area and discharges into Oyster Harbor, as shown in Figure 12. The Lake Seppings drainage corridor, which also discharges into Oyster Harbor is not characterised as a defined waterway but forms a contiguous low-lying band of wetlands and overland flood paths through the centre of the Study Area. The catchments of both the Yakamia Creek and Lake Seppings are presented in Figure 13.

Department of Water and Environmental Regulation (DWER) flood mapping is available for the Yakamia Creek providing flood levels and floodplain extent (available online via: https://www.wa.gov.au/service/natural-resources/water-resources/floodplain-mapping-tool). Areas of mapped floodplain extent within the Study Area are recognised as a special control area in the City's local planning scheme No 2.and included in Figure 12.

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 13 - River catchments



LEGEND:

- Study Area
- Cadastre
- Waterways

Elevation (m)

65m AHD

0m AHD



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Data source: Landgate. Created by: HB Projection: MGA: zone 50.

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Flood mapping for the Lake Seppings drainage corridor is also shown in Figure 12, developed by the City of Albany and recognised as a special control area in the City's local planning scheme No 2.

It is noted that current DWER flood mapping for Yakamia Creek includes consideration of 0.9m sea level rise consistent with *SPP2.6 State Coastal Planning Policy* (WAPC, 2013) while no consideration of sea level rise was included in the development of flood mapping for Lake Seppings. Updated modelling of both Yakamia Creek and Lake Seppings may be necessary in future to provide further guidance on the combination of fluvial flooding and coastal inundation impacts within the Study Area.

Stormwater modelling of the Yakamia Creek that was undertaken to support the North Albany District Structure Plan included preliminary consideration of the joint probability of fluvial flooding combined with coastal inundation events.

As recommended by ARR2019, pre-screening analysis was undertaken to determine the areas where various levels of interdependence apply including two pre-screening scenarios selected for the 1% AEP rainfall AEP event, as shown in Table 3. Water levels were then also compared to extreme inundation levels generated by coastal inundation with no rainfall from the *Statewide Coastal Inundation Assessment Phase 2 Report* (Seashore Engineering, 2024).

Table 3: Joint probability pre-screening assessment scenarios

	No rainfall	1% AEP
Highest astronomical tide (0.8m AHD)		✓
Extreme Inundation (2.1m AHD)	✓	✓

The results of this analysis are presented in Figure 14 demonstrating that the study area contains areas dominated by fluvial processes or coastal processes where ARR2019 recommends that complete interdependence should be assumed. The study area also contains a substantial zone of joint dependence. In this area, additional consideration of the interdependence of coastal and fluvial processes will be required to determine the appropriate combination of boundary conditions is applied in flood modelling.

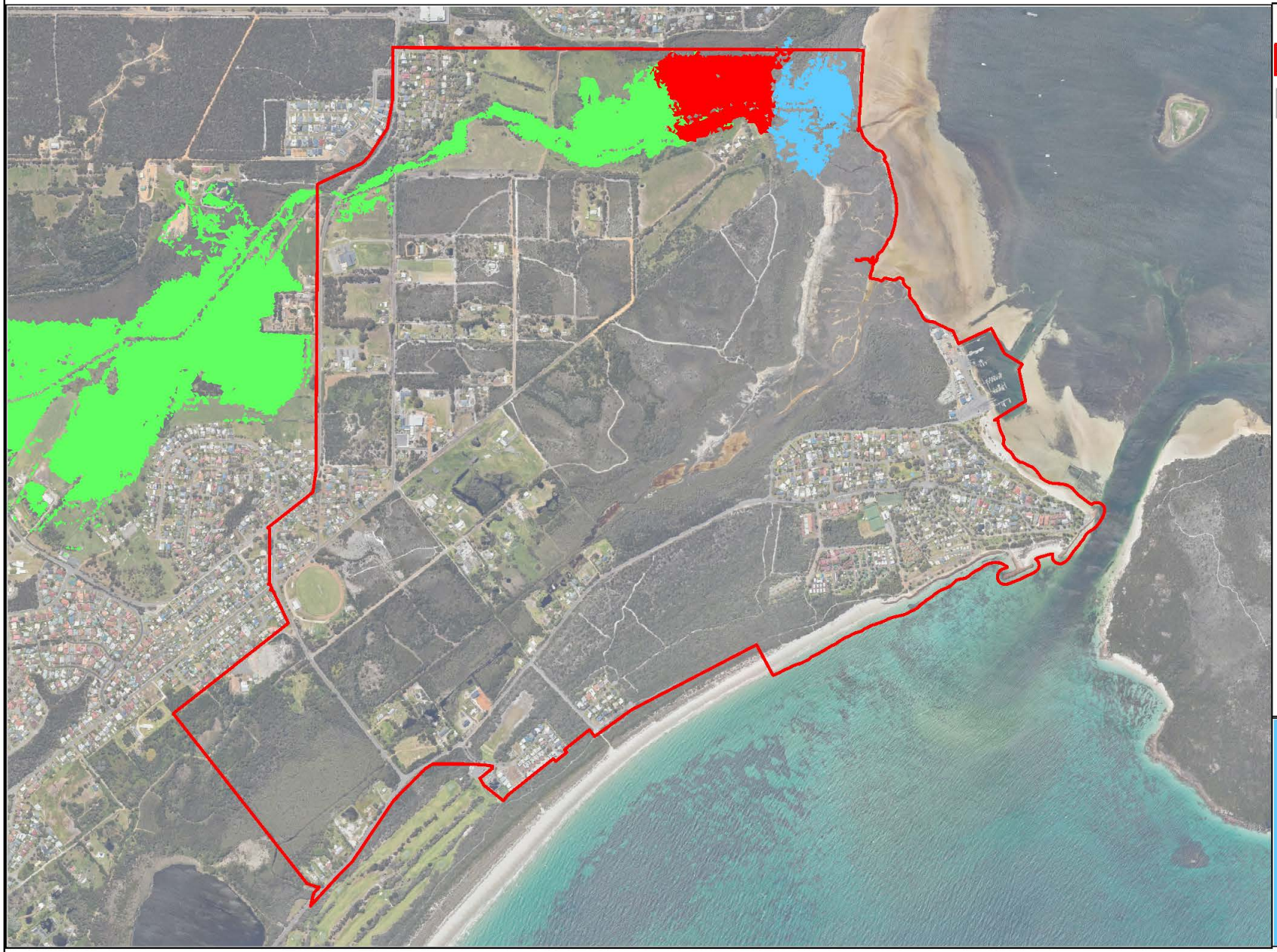
Implications for future development

Development should maintain the 1% AEP pre-development flood regime (flood level, peak flow rates and storage volumes). Any proposed alterations to the flood regime will require assessment and/or modelling of the capacity of the entire system and the cumulative impacts from the change, to the satisfaction of the City of Albany, DWER and other relevant agencies.

Developments adjacent to Yakamia Creek and the Lake Seppings drainage corridor are required to provide 0.5m vertical separation between habitable floor levels and the expected 1% AEP flood event, and consider appropriate emergency management, such as providing a suitable evacuation route during major floods. Developments will also need to consider the effects of future sea level rise when proposing site levels.

Development is generally not permitted within mapped floodplains. Any development or structures proposed within the floodplain will be assessed by the City of Albany, with support from DWER, based on their individual merits. Some of the factors considered include the depth of flooding, velocity of flow, its obstructive effects on flow, possible structural and potential flood damage, difficulty in evacuation during major floods and its regional benefit.

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 14 - Joint probability pre-screening analysis



LEGEND:

- Study Area
- Cadastre
- Waterways and open water features
- Drainage pipes

Joint probability pre-screening zones

- Joint dependence zone
- Complete independence zone (Coastal dominance)
- Complete independence zone (Fluvial dominance)



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Data source: Landgate. Created by: HB Projection: MGA: zone 50.

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The proponent may be required to undertake the investigations and documentation to demonstrate the proposal has adequate flood protection and does not impact the flood risk to existing developments or the environment. The investigation may need to consider the impact of cumulative developments to assess current, future, and residual flood risk

Waterways require a foreshore area consistent with the Operational policy: Identifying and establishing waterway foreshore areas and Draft State planning policy 2.9 Planning for water and its guidelines.

3.5.2 Surface water use

There are no proclaimed surface waters in the Study Area. Water from unproclaimed waterways may be taken in accordance with legislation provided flows are not sensibly diminished.

3.5.3 Surface water quality

Emu Point lies adjacent to and within the catchment of the Oyster Harbor estuary. Water quality in the estuary and its catchment is measured by DWER. Water quality is measured at several locations in the estuary, two sites on the Yakamia Creek (upstream and downstream of the Study Area), one site on Willyung Creek (just upstream of its discharge point into the King River), and one site on the lower King River (upstream of the Willyung Creek discharge point. A summary of total nitrogen and total phosphorus concentrations reported by DWER at the waterway sites is provided in Figure 15 and key results are summarised below:

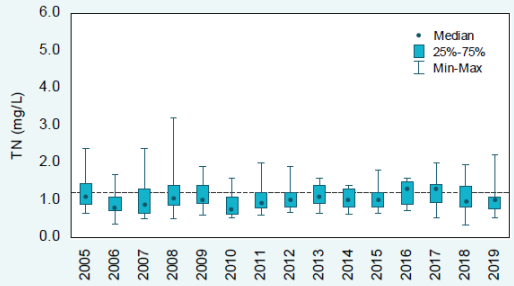
- Median annual nitrogen concentrations in the upper Yakamia Creek were below ANZG default guideline values in all years except for 2016 and 2017.
- Median annual nitrogen concentrations in the lower Yakamia Creek were below ANZG default guideline values in all years.
- Median annual nitrogen concentrations in the lower Willyung Creek were below ANZG default guideline values in all years except for 2008.
- Median annual nitrogen concentrations in the lower King River were below ANZG default guideline values in all years except for 2005, 2008, and 2016.
- Median annual phosphorus concentrations in the upper Yakamia Creek were above ANZG default guideline values from 2005 to 2009 and in 2019.
- Median annual phosphorus concentrations in the lower Yakamia Creek were below ANZG default guideline values in all years except for 2005.
- Median annual phosphorus concentrations in the lower Willyung Creek were above ANZG default guideline values in all years except for 2014, 2015 and 2018.
- Median annual phosphorus concentrations in the lower King River were above ANZG default guideline values in all years except for 2014, 2015, 2018 and 2019.

Annual nutrient loads into Oyster Harbor estuary from the major river catchments (King River/Mill Brook and Kalgan River) were estimated by DWER in 2019. The King River was estimated to contribute 5.1 tonnes of nitrogen and 0.56 tonnes of phosphorus which represents the largest loads per square kilometre (32 kg/km^2 nitrogen and 3.6 kg/km^2 phosphorus).

It is noted that water quality in the upper Yakamia Creek is generally poorer than in the lower Yakamia Creek. This is likely due to differences in land use and the hydrological characteristics of the Creek. The upper Yakamia Creek catchment is largely urban with a fairly extensive connected urban drainage system. Further downstream, the catchment is more rural, and the creek itself has a natural form with vegetated banks and broad floodplain and fringing wetland areas. It is considered likely that the lower Yakamia Creek and fringing wetlands

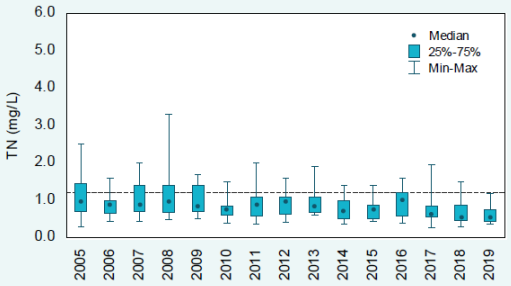
perform a catchment scale water quality treatment function, slowing flows and stripping nutrients prior to discharge downstream.

Yakamia Creek – Upper



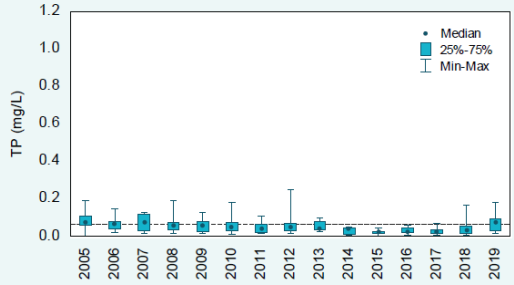
Total nitrogen concentrations, 2005–19 at site 602011. The dashed line is the ANZECC trigger value.

Yakamia Creek – Lower



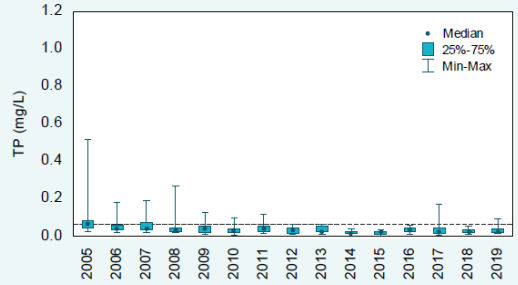
Total nitrogen concentrations, 2005–19 at site 602012. The dashed line is the ANZECC trigger value.

Yakamia Creek – Upper



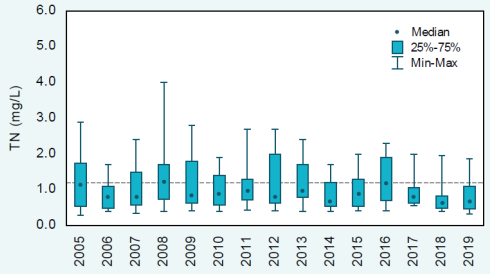
Total phosphorus concentrations, 2005–19 at site 602011. The dashed line is the ANZECC trigger value.

Yakamia Creek – Lower



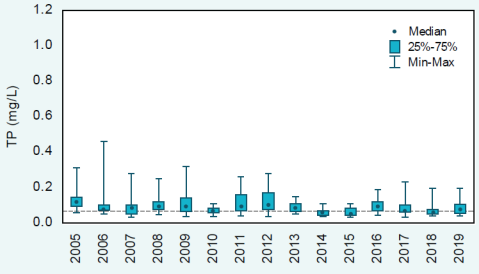
Total phosphorus concentrations, 2005–19 at site 602012. The dashed line is the ANZECC trigger value.

Willyung Creek



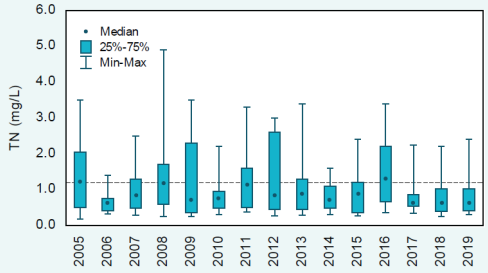
Total nitrogen concentrations, 2005–19 at site 602013. The dashed line is the ANZECC trigger value.

Willyung Creek



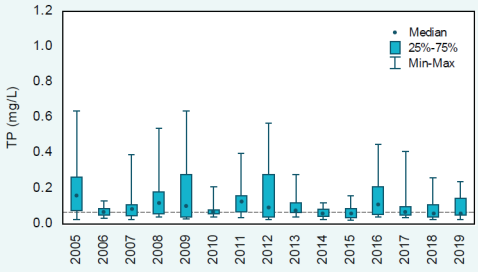
Total phosphorus concentrations, 2005–19 at site 602013. The dashed line is the ANZECC trigger value.

King River



Total nitrogen concentrations, 2005–19 at site 602014. The dashed line is the ANZECC trigger value.

King River



Total phosphorus concentrations, 2005–19 at site 602014. The dashed line is the ANZECC trigger value.

Figure 15: Summary water quality data (DWER, 2019)

Implications for future development

It is important that future surface water (drainage) systems are designed to incorporate water quality management through water sensitive design approaches to ensure that future development does not negatively impact the water quality of downstream sensitive environments. No direct untreated stormwater discharges to the Yakamia Creek, Lake Seppings or other sensitive waterways or wetlands will be permitted.

In order to protect and improve water quality within the waterway and in receiving environment of Oyster Harbour, waterways require a foreshore area consistent with the Operational policy: Identifying and establishing waterway foreshore areas and Draft State planning policy 2.9 Planning for water and its guidelines.

3.5.4 Local drainage

There is very little formal drainage infrastructure within the Study Area mainly comprising open drains alongside existing roads with culverts at intersections and driveway crossovers, as shown in Figure 16.

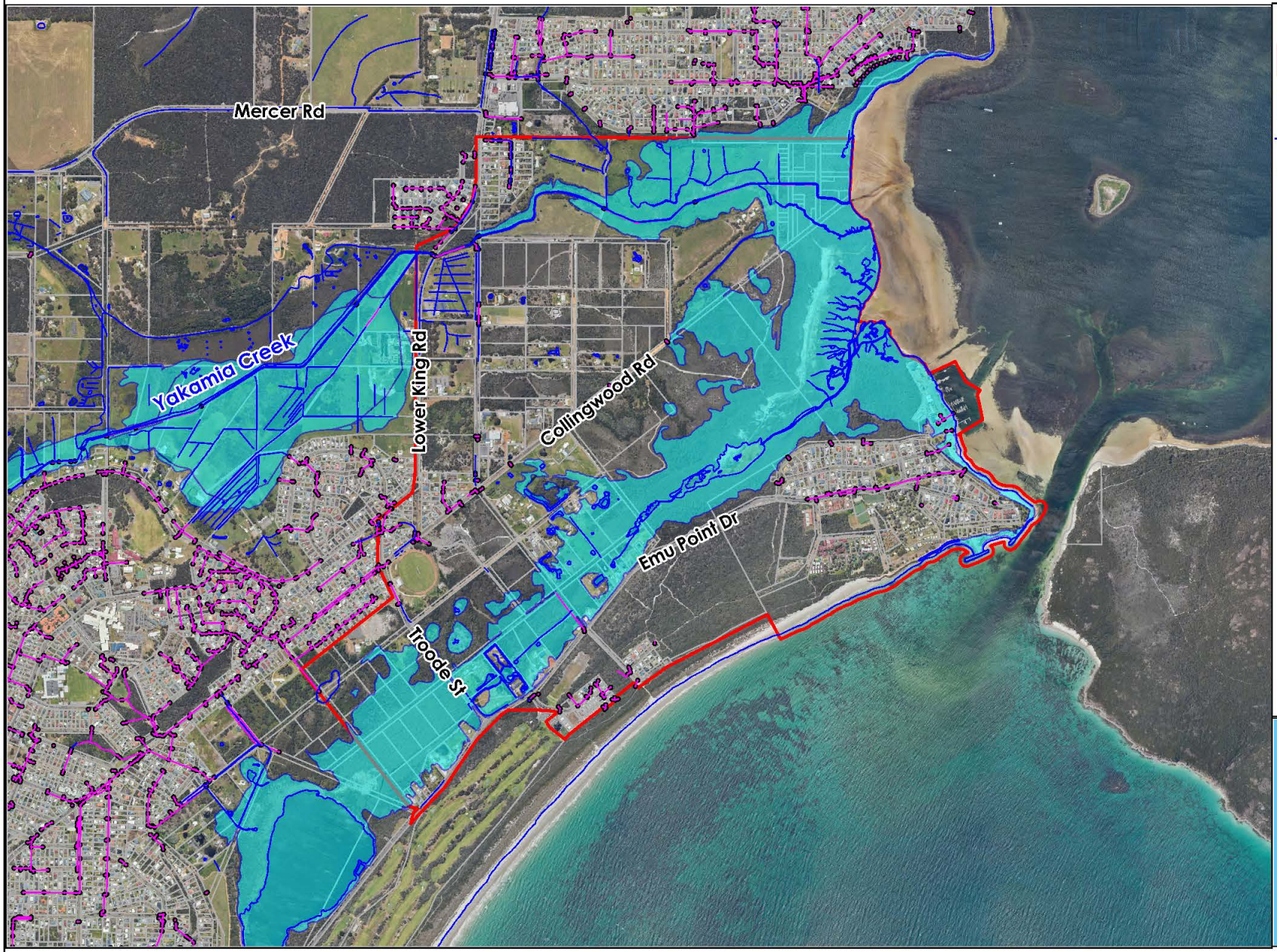
Within Emu Point itself, the area is identified as generally permeable in the City's addendum to the Local Government Guidelines for Subdivision Development (IPWEA) and is therefore designated for infiltration. The existing stormwater network consists of piped infrastructure along Mermaid Avenue, which conveys stormwater toward Oyster Harbour, with occasional pits and pipes directing flows to the adjoining marshlands. Limited kerbing along roads allows runoff to infiltrate via the verges. However, during major storm events, infiltration infrastructure cannot be fully relied upon, constraining infiltration and gravity drainage and creating potential for flooding and surface ponding during and after storm events.

In the surrounding areas, the soils are typically less permeable — clayey in the higher areas and marshy in the low-lying areas with high groundwater levels. These conditions necessitate more intensive stormwater infrastructure, with drainage challenges particularly evident in the lower areas. The soil conditions and topography across the EPPSP area present ongoing challenges for effective stormwater management. Future development will need to incorporate site-responsive drainage solutions and water-sensitive urban design measures. Areas flagged for potential higher-density development will also require corresponding upgrades to the road network and associated stormwater drainage infrastructure to urban standards, including along roads such as Brewster and Parkes Streets.

An arterial drainage planning study, including modelling with the DRAINS hydrological and hydraulic model, was undertaken for the City of Albany by Essential Environmental in 2014 for the Yakamia catchment and subsequently extended to include surrounding areas, including areas around Lake Seppings, but not the Lake itself or downstream natural water features, in 2017 and reported in the *Albany Arterial Drainage Plan* (EE, 2017). The purpose of the study was to provide a review of stormwater infrastructure performance within the city and immediate surrounds. A number of existing drainage issues were identified and prioritised for resolution by the City as funding becomes available.

More recent drainage system modelling was undertaken for the *North Albany District Water Management Strategy* (Urbaqua, 2025) utilising InfoWorks Integrated Catchment Model. Modelling of the Yakamia Catchment was based on the 2017 DRAINS model, expanded to include areas of the city that had not previously been modelled and with updated land uses and system details provided by the City of Albany. This modelling did not include Lake Seppings catchments.

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 16 - Stormwater management system



LEGEND:

- Study Area
- Cadastre
- Waterways
- Drainage_Pipes
- Drainage pits
- Floodplain areas



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Implications for future development

Modelling and arterial drainage planning to date has provided some assessment of flows within the lower Yakamia Creek that is applicable to this study, including the level and extent of 1% AEP flooding.

Similarly, the level and extent of 1% AEP flooding in the Lake Seppings drainage corridor has been determined in previous modelling.

However, no post-development stormwater modelling has been undertaken within the study area. Future planning and development of the land in the Study Area will need to undertake modelling and drainage design work for presentation in future subdivision scale water management plans to demonstrate that peak discharges do not exceed predevelopment conditions.

3.6 Groundwater

The Study Area lies entirely within the western section of the Bremer Basin within the unproclaimed Albany hinterland management area shown in Figure 17. Areas of groundwater are present in parts of the management area as paleochannels, minor sedimentary aquifers and in fractured rock aquifers.

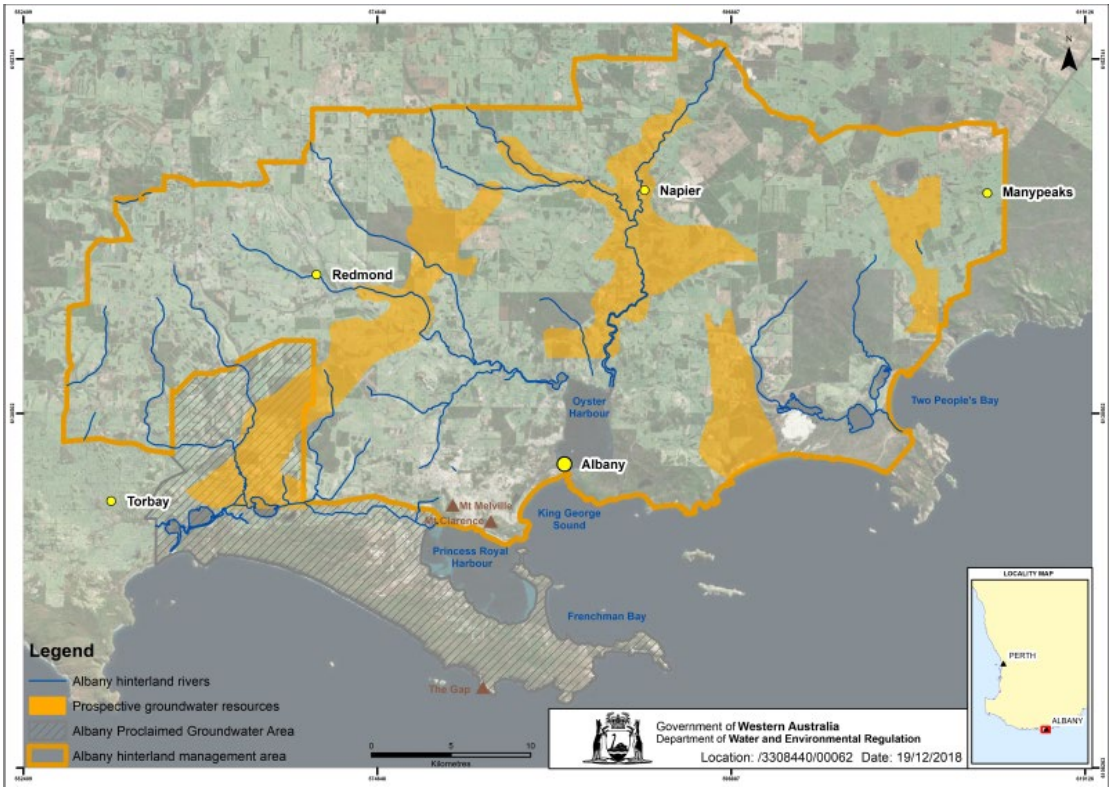


Figure 17: Location of prospective groundwater resources in the hinterland study area (DWER)

The nature of groundwater systems present in the Study Area, and a lack of groundwater monitoring data mean that it is not possible to provide a district scale assessment of depth to groundwater. However, it is known that areas of shallow and perched groundwater are present in the Study Area, particularly in lower-lying areas.

It is also noted that groundwater levels in low-lying parts of the Study Area may be affected by sea level rise in future and consideration of the effects of sea level rise on groundwater levels should be considered in future water management reports.

The Albany hinterland management area extends 25 kilometres inland, covering 1,200 square kilometres from the north west to the north east of the Albany urban area. The hinterland takes in the localities of Redmond, Napier and Manypeaks. The hinterland has strong potential for to support expansion in agricultural, fit for purpose industrial or potable (drinking water) supplies.

The unproclaimed Albany hinterland contains several large areas of groundwater. In unproclaimed areas, access to confined (or artesian) groundwater, is regulated under the *Rights in Water and Irrigation Act 1914*. Non-artesian groundwater in unproclaimed areas is unregulated at this stage.

Hinterland areas with prospective groundwater resources were identified through the government funded South Coast groundwater investigation project. The study revealed a better picture of the groundwater resources in the Albany hinterland management area.

Implications for future development

No groundwater investigations have been undertaken within the Study Area, and it is considered unlikely that aquifers able to yield useable quantities of water are present within the Study Area.

Local site investigations will be necessary to determine local depths to groundwater and identify the extent of any areas of shallow and perched groundwater, particularly in lower-lying areas where future sea level rise may lead to rising groundwater levels.

Where it is necessary to manage shallow, or potentially increasing groundwater levels, it may be necessary to install a subsurface drainage system to control or limit groundwater levels.

3.6.1 Shallow groundwater flow

The upper slopes of Albany catchments are steep and have relatively thin layers of sand or sedimentary rocks overtopping granite and gneiss. Whilst the sand and sedimentary rocks are relatively permeable, the steepness of the catchment can result in quite rapid down-slope flow of groundwater through this layer. This geology, coupled with high rainfall distributed throughout the year means that there is limited water retention capacity within the catchment and results in almost continual base flow within drains and watercourses that intercept this 'groundwater flow layer'.

In the lower-lying land towards the downstream extent of Albany's catchments, shallow groundwater may be present in sedimentary aquifers, fed by direct rainfall and by waterways from steep upstream catchments. The contributions to groundwater in these areas from upstream waterways are partially via baseflows becoming sluggish as they enter flatter sections of waterways thus allowing for re-infiltration. Additionally, episodic flooding from silted waterways into fringing wetland and floodplain areas contributes further to this accumulated shallow groundwater.

Implications for future development

Shallow groundwater flow and long-term base flow in watercourses and drains is a characteristic of upper catchments in Albany that provides significant challenges for water management both in terms of quantity and quality. The channel capacity of drains and

watercourses in the catchment does not typically exceed base flow substantially and there is often insufficient capacity to manage even relatively minor event peak flows. Short upper catchment retention times and steep fast flowing drains and watercourses also results in limited retention of nutrients and other pollutants in the catchment and may be a contributing factor to poor water quality in downstream receiving environments.

These issues mean that the flatter and wetter, lower catchments of the Study Area characterised by broader floodplains and fringing wetlands perform key functions in slowing flows and providing for longer retention periods that allow for water quality improvements prior to discharge into Oyster Harbour.

3.6.2 Groundwater quality

Very little groundwater quality information is available within the Study Area. Groundwater quality data extracted from DWER's Water Information Reporting (WIR) database for surrounding areas by Aurora Environmental (2013) indicated that groundwater often exceeds ANZG water quality default guideline values for lowland rivers in south-west WA of 1.2 mg/L for Total Nitrogen and 0.065 mg/L for Total Phosphorus.

Implications for future development

Areas of poor groundwater quality have the potential to impact on surface water quality where groundwater is proposed to be exported off site. An understanding of groundwater quality is required to inform development of water management strategies at a local scale. This will require on-site sampling in development precincts where subsoil drainage is proposed.

3.7 Water and wastewater services

Consultation with Water Corporation has been undertaken to develop an understanding of the current and future capacity for expansion of existing water and wastewater services.

3.7.1 Drinking water

Albany's drinking water is supplied by the Lower Great Southern Towns Water Supply Scheme (LGSTWSS) which supplies Albany, Mount Barker, Narrikup, and Kendenup. South Coast borefield, south west of Albany, and Angove Creek pipehead dam are the two major water sources for the scheme.

In response to climate change impacts and forecast increases in demand on drinking water supplies, Water Corporation are currently investigating what water sources may be needed to maintain a reliable drinking water supply via the Lower Great Southern Towns Water Supply Scheme (LGSTWSS). These include:

- new groundwater sources in the Manypeaks and Angove areas close to Albany.
- a possible seawater desalination plant at the existing South Coast Water Treatment Plant in Torndirrup.

So far environmental and Aboriginal Heritage surveys have been completed for the groundwater source and desalination site areas under consideration, including the Manypeaks, Angove, Torndirrup, Little Grove, Big Grove, and Goode Beach areas.

Long term water distribution planning is undertaken by Water Corporation based on approved local structure plans. There are no current plans for expansion or upgrades to the water

distribution network within the Study Area. However, it is noted that the existing system is relatively old and operates under very high pressure due to the high elevation of storage tanks serving Albany. This means that the system in this area is likely to become increasingly prone to leaks and bursts in the next ten to twenty years, requiring increased frequency of repairs and renewal.

It is expected that the Water Corporation will commence water distribution planning for the Study Area in response to the Emu Point Precinct Structure Plan and this will include consideration of the age and potential need for renewal of existing assets.

Implications for future development

Development in the study area has not been considered in the Water Corporation's long-term scheme planning for water and wastewater as the land remains zoned either Rural or Environmental Conservation, and some areas are outside of the Water Corporation's existing Sewer District and Water Zone. The Water Corporation will need to investigate further what the implications are to add these areas to the existing scheme and identify what upgrades will be needed (if required).

Long-term water planning prepared in response to structure planning is inherently conceptual and is not programmed immediately on completion. Typically, delivery of necessary upgrades and new infrastructure will be staged where feasible by proponents in consultation with Water Corporation.

All development is required to connect to scheme water for drinking water purposes. Consultation with Water Corporation will be necessary to identify the infrastructure requirements, costs and timeframes associated with connection to the GSTWSS. Conventional headworks charges (now called Standard Infrastructure Charges) will be payable at time of connection.

The progression of a logical development front is critical for efficient and logical staging of delivery of planning for water servicing. In general, Water Corporation funds permanent headworks infrastructure including water source and treatment infrastructure, and major distribution mains. Local reticulation is to be funded and installed by the developers as part of their subdivision works.

3.7.2 Non-drinking water

100% of wastewater from the City of Albany is currently recycled and used for irrigation of the Albany tree plantation. The *Great Southern Regional Water Supply Strategy* (DoW, 2014) identified that potentially some of this water could be used to reduce demand on the drinking water supply scheme. However, considerations included the cost of replacing infrastructure and the ongoing needs of agriculture operations and the option was not included in the short-list for further investigation.

Implications for future development

Development proponents in this area should secure a suitable water source for the non-potable water demands of their projects through consideration of opportunities for:

- rainwater tanks and lot scale greywater recycling systems.
- flood detention areas designed to provide surface water storage.

3.7.3 Wastewater

Long term wastewater planning is undertaken by Water Corporation based on approved local structure plans. There are no current plans for expansion or upgrades to the wastewater network within the Study Area.

It is expected that the Water Corporation will commence wastewater planning for the Study Area in response to the Emu Point Precinct Structure Plan.

Land use information together with the natural landform is used for sewer modelling to generate estimated sewer design flows and develop conceptual planning of indicative routes, sizes (capacities) and grades for future gravity sewers, as well as the locations and sizes of future wastewater pump stations.

Long-term wastewater planning prepared in response to structure planning is inherently conceptual and is not programmed immediately on completion. The planning, when it has been completed, will be conceptual and can be changed and staged where feasible by proponents in consultation with Water Corporation.

The *Government Sewerage Policy* (2019) and the draft *Planning for Water SPP* (2021) include mapping of sewage sensitive areas where unsewered lots smaller than one hectare are not permitted. As shown in Figure 18, the entire study area is classified as a sewage sensitive area.

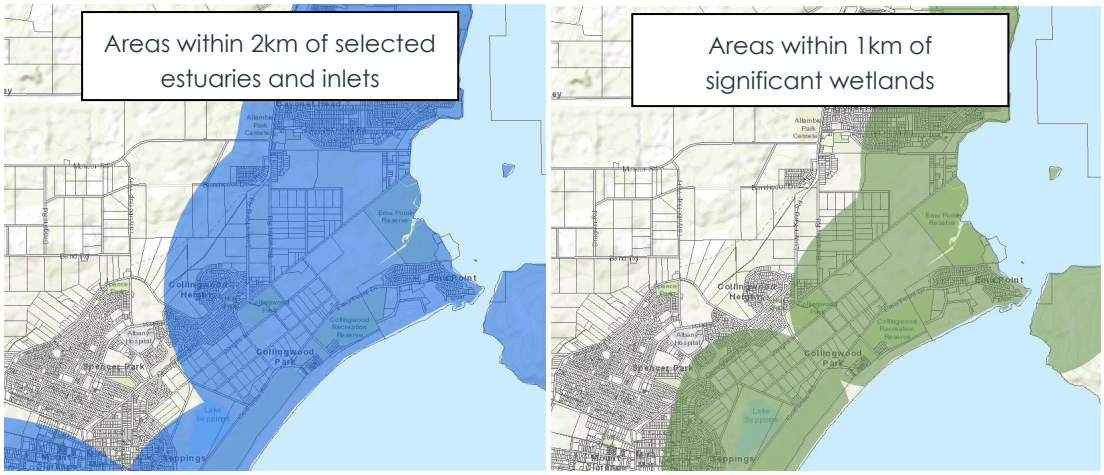


Figure 18: Government Sewerage Policy – Sewerage Sensitive Areas (DPLH, 2025)

Implications for future development

Development in Emu Point is required to comply with the requirements of the *Government Sewerage Policy* (2019) and the draft *Planning for Water SPP* (2021) and residential development with lots smaller than one hectare is required to connect to sewerage.

Consultation with Water Corporation will be necessary to identify the infrastructure requirements, costs and timeframes associated with connection to sewerage.

Proposals for unsewered residential development must demonstrate that each lot meets relevant site requirements and can accommodate on-site sewerage disposal in accordance with AS/NZS 1547 *On-Site Domestic Wastewater Management* (Standards Australia/New Zealand Standard, 2012) (AS/NZS 1547). This should generally be provided in the form of a Site and Soil Evaluation (SSE).

The progression of a logical development front is critical for efficient and logical staging of delivery of planning for wastewater servicing. In general, Water Corporation funds permanent headworks infrastructure including the WWTP, planned WWPSs, their pressure mains and large gravity sewers (<300mm diameter). Local gravity reticulation sewers are to be funded and installed by the developers as part of their subdivision works.

3.8 Riparian ecological and historical context

A preliminary biophysical assessment of riparian areas has been undertaken to assist with the delineation of foreshore management areas, considering results from previous studies, available GIS layers, and aerial imagery. Proposed foreshore management areas and indicative wetland buffers are delineated in Figure 19. The following key factors have contributed to the assessment:

- Significant changes in topography and soils as shown in Figure 8 and Figure 9.
- Extent of contiguous riparian vegetation, as shown in Figure 19.
- Extent of Aboriginal heritage places, as shown in Figure 19.
- Extent of floodplain areas as shown in Figure 12, Figure 16 and Figure 19.

3.8.1 Biodiversity

The Emu Point district structure plan area is located in the Jarrah Forest IBRA biogeographic region and lies within the Southwest Australian Biodiversity Hotspot, one of 34 internationally recognised biodiversity hotspots which correspond to the Southwest Botanical Province (Myers et al. 2000; Conservation International 2004).

Vegetation in the study area has been previously mapped by the Albany Regional Vegetation Survey (ARVS, Sandiford & Barrett, 2010) and *Environmental Assessment Study (EAS) – Emu Point Precinct Structure Plan* (Ecosystem Solutions, 2025) provides a review of that mapping and an up-to-date assessment of environmental conditions in the study area.

The EAS report included the findings of a vegetation assessment was undertaken for the district structure plan area by Ecosystem Solutions in 2025. Figure 19 includes identification of contiguous riparian vegetation based on this assessment, as well as broadscale mapping of remnant native vegetation provided by the Department of Primary Industries and Regional Development.

Vegetation quality in the study area was assessed by Ecosystem Solutions, and large areas associated with the many wetlands in the study area and the Lake Seppings drainage corridor were found to be very good to excellent condition predominantly located within unallocated crown lands and existing reserves. However, the relatively small areas of remaining riparian vegetation along the Yakamia Creek were largely found to be degraded.

Three threatened and priority ecological communities were also identified and mapped in the study area (Ecosystem Solutions, 2025):

- Banksia coccinea Shrubland/Eucalyptus staeri/Sheoak Open Woodland ('Community type 14a') (Endangered TEC (part) / Priority 1)
- Coastal Saltmarsh (Vulnerable / Priority 3)
- Astartea scoparia Swamp Thicket (Priority 1)

A desktop assessment and basic terrestrial fauna survey was also undertaken to identify conservation listed fauna species or assemblages within the study area (Ecosystem Solutions,

2025). The desktop assessment identified14 conservation significant species that have been previously observed within the study area while five were observed during the field survey.

Consideration of wetland and waterway fauna species was included in the EAS report based on third party information. The report highlights the importance of wetlands and waterways in the study area as habitat for many migratory bird species, turtles, fish and other aquatic species, noting that provision of wetland buffers and waterway foreshore reserves is critical for protection of these habitat areas.

Implications for future development

Foreshore management areas and wetland buffers identified in in Figure 19 are a priority for rehabilitation and revegetation and proactive management of these areas is recommended. Where a development proposal includes subdivision for urban development there is an opportunity for creation of foreshore reserves for long term protection and management, preferably by the City of Albany. This requires consideration of maintenance access arrangements through creation of a road reserve or easement.

Where larger lots are proposed, it may be impractical for foreshore reserves to be created and in these circumstances, it may be necessary for landowners to manage the foreshore area. Lot purchasers should be provided with adequate guidance for waterway and foreshore restoration and management that is consistent with bushfire risk reduction requirements.

3.8.2 Aboriginal heritage

Emu Point is located in the country of the Menang Noongar people, who are the traditional custodians of the Albany and Great Southern region of Western Australia, and Yakamia Creek, Oyster Harbour and Lake Seppings are all significant.

Figure 19 includes current mapping of Aboriginal Heritage Places from the Department of Planning, Lands and Heritage Aboriginal Heritage Information System (AHIS).

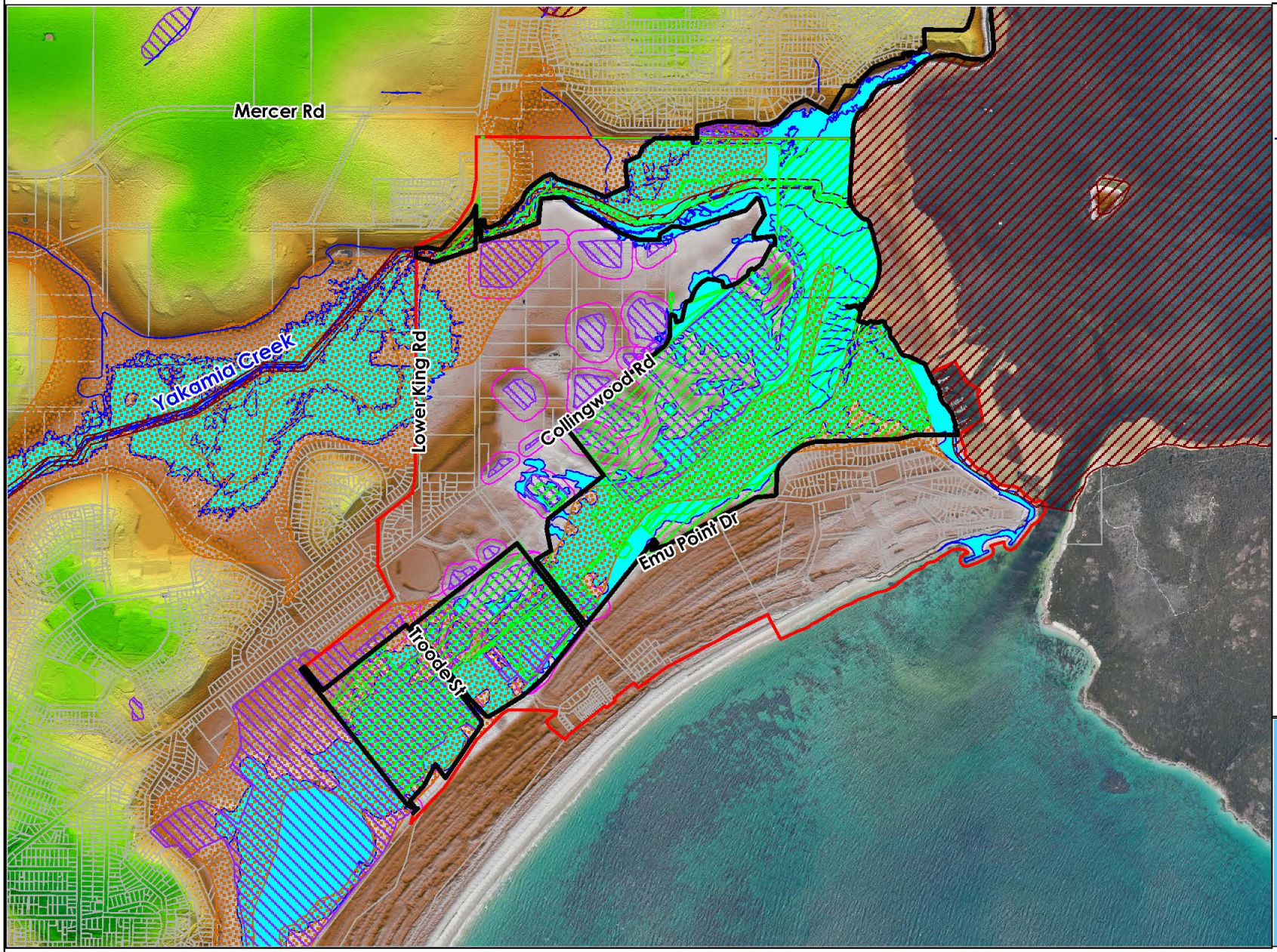
Oyster Harbor, known as Miaritch features significant sites like the ancient fish traps, believed to be over 6,500 years old, which are protected and managed by the Menang people, is recorded in the AHIS as a; Creation/Dreaming Narrative Place with (ID: 636).

It is also noted that Yakamia Creek has been historically recorded in the AHIS as a; Historical, Mythological, Natural Feature, Water Source (ID: 24418). The name "Yakamia" is tied to the Aboriginal heritage of the Albany region in Western Australia, likely derived from the Noongar language and connected to the Menang people. While interpretations vary, it is thought to relate to the "place of the long-necked tortoise" (yakinup) or a "campsite" (mia) near Yakamia Creek. Another possible meaning is "sister to a small creek".

An Aboriginal heritage survey was undertaken for the Yakamia Structure Plan area by Brad Goode and Associates in 2007. Consultation undertaken with the Aboriginal Heritage Reference Group Aboriginal Corporation identified Yakamia Creek as a place of importance for the gathering of resources, travel and association with spiritual beliefs in the *Marchant* (water snake).

Lake Seppings also has cultural heritage significance, being named Tjuirtgellong which means "The place of the long-necked tortoise" which still remain very prolific in the lake, and also the Dreamtime connection of the lake as the footprint of Tjuirt (Djrat) – or the place where he walked - who created the South Western Coast of Australia.

Department of Planning, Lands and Heritage - Emu Point District Water Management Strategy
Figure 19 - Riparian ecological and historical context



LEGEND:

- Study area
- Cadastre
- Waterways
- Contiguouss riparian vegetation
- Mapped extent of alluvial soils
- Floodplain areas
- Evaluated conservation and resource enhancement wetland extent (DWER, 2007)
- Aboriginal heritage places
- Proposed foreshore management area
- Indicative wetland buffers

Ground elevation (m)

65 0



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Data source: Landgate. Created by: HB Projection: MGA: zone 50.

N

0 500
meters

Scale 1:25,000 @ A4

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4 WATER MANAGEMENT OBJECTIVES

The objectives in Table 4 have been developed for Emu Point with consideration of the DWER *Guidelines for district water management strategies* (DoW, 2013) and the site and planning context. The objectives will be achieved through implementation of the strategies in Section 5, either in response to existing issues that have been identified (short to medium term), or as part of the future planning, design, and development (medium to long term) (see Section 6).

Table 4: Water management objectives

Item	Objective
Natural areas that are celebrated and supported by blue and green links	• Protect and enhance wetlands, waterways and catchments through appropriate management of water quality and maintenance of hydrology as part of land use change and development. • Protect and enhance significant natural areas and their buffers and provide for ecological linkages along waterways and roads. • Recognise and protect the environmental and cultural values associated with landform. • Identify opportunities for strategic offsets and carbon capture to deliver nature positive outcomes.
Resilient places and communities	• Support traditional owners to create opportunities for beneficial custodianship of the Noongar Land Estate, potentially through the Noongar Ranger program. • Design urban spaces to manage stormwater, flood and coastal risks. • Make water infrastructure multi-functional. • Create opportunities for the community to engage with water resources and the environments they sustain. • Create walkable, liveable and adaptive urban landscapes, including blue-green linkages.
Efficient and sustainable use of water services	• Provide for equitable access to water and wastewater services • Optimise the use of water, encourage reuse/recycling, and reduce the use of non-renewable energy. • Sustainably manage the use of basic raw materials.

5 WATER MANAGEMENT STRATEGY

To achieve the water management objectives of this DWMS in a manner consistent with the water management principles in draft *State Planning Policy* 2.9 – *Planning for Water* (WAPC, 2021), the following water management strategies need to be delivered as part of future planning and development of Emu Point.

The strategies are to be incorporated into local structure planning and subdivision applications supported by water management reports in accordance with the implementation framework in Section 6.

The water management strategies for Emu Point, explained further below, address:

- Foreshore area definition
- Management of surface water and groundwater
- Fit-for-purpose water supply and wastewater servicing

5.1 Waterway foreshore reserve and wetland buffer definition

Areas designated as foreshore management areas are to be rehabilitated and revegetated. Where a development proposal includes subdivision for urban development, these areas will be created into 'Foreshore Reserves' and ceded to the Crown at the time of subdivision free of cost and without payment of compensation by the Crown.

Access to created 'Foreshore Reserves' is to be provided by easement or road reserve.

Development is not permitted within any foreshore management area. Where foreshore management areas are retained in private ownership, they are to be maintained by the landowner as vegetated conservation areas.

Any development or structures proposed within a floodplain require assessment by Department of Water and Environmental Regulation. Documentation for assessment should include a flood risk assessment and estimation of afflux to demonstrate no impact on surrounding areas, including cumulative considerations of current, future, and residual flood risk.

Foreshore management areas are identified in Section 3.8 and Figure 19.

Wetland buffers should be identified on a case-by-case and consider the physical characteristics relevant to the wetland, including the wetland values, attributes and the surrounding land use. Further guidance on the determination of appropriate and functional buffers between wetlands and proposed land uses is contained in *Guidance Statement 33: Environmental Guidance for Planning and Development* (EPA, 2008) and in the *Draft Guideline for the Determination of Wetland Buffer Requirements* (WAPC, 2005).

Indicative wetland buffers are shown in Figure 19.

5.2 Management of surface water and groundwater

The Emu Point Precinct area is dunal and undulating, with some low-lying and flat sections, sandy and silty soils, and a shallow groundwater table influenced by coastal and tidal conditions.

The Emu Point Precinct's low-lying topography, shallow groundwater, and reliance on infiltration-based drainage, limit opportunities for more intensive development. While the area is generally permeable, the

existing stormwater network has limited capacity and is vulnerable to ponding and localised flooding during major rainfall events. These conditions highlight the need to manage future development carefully to avoid further burdening the drainage system and to ensure stormwater can continue to be effectively managed within the constraints of the coastal environment.

The less permeable soils and high groundwater levels in Collingwood Heights and adjoining low-lying rural land create ongoing stormwater management challenges. Areas flagged for future development or increased densities than existing will require site-responsive drainage, water-sensitive urban design, and likely upgrades to the road network and associated stormwater drainage infrastructure to urban standards, including along key roads such as Brewster and Parkes Streets.

Furthermore, until further coastal hazard and inundation assessments are undertaken for the northern and north-western areas of Emu Point and the adjoining catchments, a cautious approach to any increase in residential yield is recommended.

5.2.1 Small event and groundwater management requirements

Stormwater management for new developments and subdivisions within the City of Albany is generally required to be in accordance with Module 4 of the latest edition of Local Government Guidelines for Subdivision Development by the Institute of Public Works Engineering Australia (WA Division Inc).

Specific modifications to the requirements that apply to greenfield, infill and redevelopment sites in the City of Albany are provided in *City of Albany Subdivision and Development Guidelines 2018* and include requirements for lot-scale drainage.

It is noted that no direct untreated stormwater discharges to the Yakamia Creek, Lake Seppings or other sensitive waterways or wetlands will be permitted. It is therefore necessary to consider how small rainfall events managed, including treatment, consistent with the *Decision Process for Stormwater Management in WA* (DWER, 2017).

Small rainfall event management at-source

Small rainfall events are to be managed (retained and/or detained and treated (if required)) at source (in lots and streets) wherever possible.

In accordance with *City of Albany Subdivision and Development Guidelines 2018* infill development in areas of pervious soils is required to provide of on-site infiltration of the 63% AEP (1EY - 1 Exceedance per Year) event.

Where the depth to groundwater is limited and subsurface drainage systems are required, the design of at-source stormwater infiltration systems should be informed by consideration of the interaction between infiltrated stormwater and the controlled groundwater level. The (surface water and groundwater management) systems should be designed to ensure that both systems will function appropriately to prevent damage to property and infrastructure and maintain reasonable levels of amenity.

Where it is not feasible to retain or infiltrate small rainfall events at source without impacting amenity, the use of systems such as rainwater tanks, raingardens and detention tanks should be considered as alternatives to more traditional systems. Examples of these types of alternative approaches are shown Figure 20.

Developers will need to demonstrate on-site management of 15 mm of rainfall and maintenance of pre-development annual discharge volumes for the subcatchment. This may be achieved through:

- Capture and use of roof runoff for non-potable uses including toilets, washing machines and irrigation.
- Passive irrigation by directing hardstand areas (car parks, driveways and paths) towards garden beds and lawns or dedicated tree pits and raingardens.
- Above or below ground storage to retain and infiltrate water or detain rainfall prior to connection to the local drainage system.



Figure 20: Examples of at-source management of small rainfall events

Controlled groundwater levels

This DWMS does not contemplate significant areas for development requiring groundwater management and does not establish a district-scale controlled groundwater level. However, it is acknowledged that local site conditions in some development areas may include areas of shallow or perched groundwater.

Where it is necessary to manage shallow, or potentially increasing groundwater levels, it may be necessary to install a subsurface drainage system to control or limit groundwater levels.

The invert level of an installed subsurface drainage system is typically referred to as the controlled groundwater level and the minimum controlled groundwater level should be determined through consideration of the ecological water requirements of wetland and waterway systems and vegetation and the quality of groundwater to be intercepted.

In order to avoid mobilising poor quality groundwater into the environment, the City in most instances will not permit the controlled groundwater level to be lower than the average annual maximum groundwater level (AAMGL). Where sub-soils drains are likely to mobilise polluted groundwater, the mobilised polluted groundwater should be treated before allowing to flow into the receiving environments

5.2.2 Minor event and flood management

In accordance with *City of Albany Subdivision and Development Guidelines 2018* developments are required to demonstrate that post-development flow rates are to be attenuated to pre-development flow rates (up to and including the 20% AEP event (1 in 5 year ARI)) through the provision of adequate retention or detention storage as indicated by the in-situ soil conditions.

Developments adjacent to the Yakamia Creek and the Lake Seppings drainage corridor floodplains, or other significant arterial flood storage areas or conveyance paths are required to provide 0.5m vertical separation between habitable floor levels and the expected 1% AEP flood event, and a suitable evacuation route during major floods.

Developments away from the Yakamia Creek and the Lake Seppings drainage corridor floodplains, or other significant arterial flood storage areas or conveyance paths are required to provide 0.3m vertical separation between habitable floor levels and the expected 1% AEP flood event in adjacent drainage systems and streets.

Development in areas adjacent to and/or potentially affected by flooding in overland flow paths or stormwater drainage infrastructure identified on the arterial drainage plans are ensure that the flood path is not obstructed as a result of the development.

Future planning and development of the land in the Study Area will need to undertake modelling and drainage design work for presentation in future water management reports and stormwater management plans to demonstrate that they maintain pre-development peak flow rates, storage volumes and flood levels.

5.2.3 Design criteria for local drainage systems

It is noted that the City of Albany currently has a set of guidelines which establish a standard of service to be provided in development of lots or through subdivision. It is the proponent's responsibility to undertake the necessary reviews, assessments and modelling to demonstrate, to the satisfaction of the City, that the proposed development is consistent with *City of Albany Subdivision and Development Guidelines 2018* and the following design criteria:

- To prevent damage or increased rates of erosion to natural flow paths and to maintain similar flood frequency in downstream drainage systems, development is required to detain surface water flows to prevent any increase in peak flow rates to downstream drainage systems or natural flow paths.
- Developments are required provide for conveyance of stormwater from upstream catchments without increases to upstream or downstream flood frequency.
- The quantity and distribution of environmental flows should be maintained.
- Constructed piped drainage systems within residential streets should be designed to accommodate 20% annual exceedance probability (AEP) flows without surcharge.

- Gutter spread on roads during the minor (20% AEP) flood should provide an appropriate level of service and the major (1% AEP) flood is to be contained below kerb height.
- Maximum flow velocities in open channels should not exceed 1.5 m/s.
- Drainage systems shall be designed to control sediment transport through management of flow velocities, provision of sediment control points prior to discharge and energy dissipation structures at discharge points.
- Flood detention or infiltration areas shall be designed with low flow outlets to avoid extended durations of inundation and facilitate passage of baseflow.
- Drainage systems are to be designed to avoid excessive maintenance requirements.
- Direct drainage from any future subdivision areas into the creek system is not to occur.

5.3 Fit for purpose water supply and wastewater servicing

Development in Emu Point should proceed through the extension and sequential roll-out of existing water and wastewater services from the townsite. This is likely to provide the most efficient and cost-effective way of infrastructure provision.

Local structure plans and development proposals must provide details for the provision of drinking water, wastewater, and irrigation of public open space.

5.3.1 Drinking water

All development is required to connect to scheme water for drinking water purposes. Consultation with Water Corporation will be necessary to identify the infrastructure requirements, costs and timeframes associated with connection to the Integrated Water Supply System (IWSS). Conventional headworks charges will be payable at time of connection.

All development is to incorporate water efficient fixtures and fittings and aim to achieve water consumption of less than 100 kL/person/year.

Where development is proposed to proceed in advance of the sequential roll-out of extended water services, developers may choose to prefund construction of the required major arterial system components to facilitate connection to the existing system.

Planned water distribution mains may be eligible for prefunding arrangements if the capital for the project is secured in the Corporation's 5 year Capital Investment Program. In most locations, proponents will be required to extend suitable sized water retic mains (generally 200mm or 250mm diameter) to service standalone subdivisions that proceeds in remote locations ahead of the logical development front.

Consultation with Water Corporation will be necessary to identify the infrastructure requirements, costs and timeframes associated with connection to scheme water.

5.3.2 Non-drinking water

Development proponents in this area should secure a suitable water source for the non-potable water demands of their projects, through consideration of opportunities for:

- rainwater tanks and lot scale greywater recycling systems.
- flood detention areas designed to provide surface water storage.
- local groundwater resources (where available and not required to meet local public open space irrigation demands as advised by City of Albany).

5.3.3 Wastewater servicing

Development in Emu Point is required to comply with the requirements of the *Government Sewerage Policy* (2019) and the draft *Planning for Water SPP* (2021) and residential development with lots smaller than one hectare is required to connect to sewerage.

Wherever possible, development in Emu Point is required to connect to reticulated sewerage, including constructing the necessary local system elements required to achieve connection.

Proposals for unsewered residential development must demonstrate that each lot meets relevant site requirements and can accommodate on-site sewerage disposal in accordance with AS/NZS 1547 *On-Site Domestic Wastewater Management* (Standards Australia/New Zealand Standard, 2012) (AS/NZS 1547). This should generally be provided in the form of a Site and Soil Evaluation (SSE).

Consultation with Water Corporation will be necessary to identify the infrastructure requirements, costs and timeframes associated with connection to sewerage.

6 IMPLEMENTATION FRAMEWORK

The success of the water management strategies relies on effective implementation during subsequent planning, management, construction, and maintenance. The framework for implementation is outlined in this Section.

6.1 Precinct scale recommendations

City of Albany Local Planning Scheme 2 (LPS2) includes several Special Control Areas (SCAs) within the study area:

- Special Control Area 11 – Coastal Erosion Risk — Griffiths Street
- Special Control Area 12 – Coastal Erosion Risk — Emu Point
- Special Control Area 13 – Yakamia Creek Inundation Area
- Special Control Area 14 – Lake Seppings Inundation Area
- Special Control Area 16 – Oyster Harbour Inundation Area

These SCAs include specific provisions for horizontal setbacks, vertical separations and requirements for notification on title associated with fluvial flooding and coastal erosion and inundation.

The provisions of SCAs have been reviewed and the following revisions are recommended to improve alignment with contemporary flood information and remove overlaps with the National Construction Code and other legislation.

SCA 13 – recommend modification of provision 1 to read (bold indicates added text):

> All habitable buildings are to be constructed with a minimum finished floor level height of 0.5m above the designated flood level shown adjacent to the site in the Water and Rivers Commission/Aquaterra floodplain management, Yakamia Creek flood study (plans 15264-3-1 to 15264-3-3) or any replacement study **including allowance for sea level rise over a 100yr planning timeframe**.

SCA 14 – recommend review of the specified development level to include consideration of coastal inundation and sea level rise consistent with *SPP2.6 State Coastal Planning Policy* (WAPC, 2013).

SCA13 and SCA14 – recommend removal of provisions 2, 3, and 4 as there are existing requirements for building drainage and waterproofing contained within the National Construction Code.

6.2 Development controls

Any proposed land intensification within the Emu Point Precinct Structure Plan area is required to demonstrate that the proposal:

- will not detrimentally impact water resources and associated environmental values.
- can manage surface water and groundwater.
- can be serviced with water and wastewater.

All development in Emu Point is required to be supported by submission of a Water Management Report (WMR) or detailed stormwater management plan (including engineering and landscaping) that will be assessed and approved by the City of Albany in consultation with DWER consistent with the requirements of *State Planning Policy 2.9 – Planning for Water SPP* (SPP 2.9) and *SPP2.9 Guidelines*. The type of

document is dependent on the scale and complexity of the proposed development and will need to demonstrate compliance with the strategies set out in this document including:

- connection to water and wastewater services
- on-site wastewater minimum lot size and management requirements (where relevant)
- on-site stormwater and groundwater management requirements
- water efficiency measures

In general, small-scale infill and redevelopment in the Emu Point Precinct Structure Plan area will be required to provide a detailed stormwater management plan demonstrating compliance with City of Albany drainage reuqirements while larger scale development, including at key sites identified below, will be required to deliver a more comprehensive water mangement report.

6.2.1 Key sites where water management reports are required

Water Management reports are required to demonstrate that designs achieve the objectives, strategies and design criteria outlined in this DWMS and any relevant local water management strategy. Any water management report should be prepared in consultation with the City of Albany and DWER and submitted to these agencies for approval.

Water Management reports are based on local site investigations appropriate to the proposal and level of risk to water resources. The Water Management report should be consistent with the requirements of the Department of Water and Environmental Regulation's *Urban water management plans: Guidelines for preparing plans and for complying with subdivision conditions* (DoW, 2008b).

Specifically, the Water Management report should include detailed engineering designs (drainage and wastewater) and any landscaping designs relating to water quality improvement or water efficiency improvement. The Water Management report will also include a framework for implementing the water management strategies and plans through the construction and post-development phases of the project.

Collingwood Heights Precinct

Development of Lot 22 and 23 Brewster Street, located within the Collingwood Heights precinct area shown in Figure 4 requires a local development plan to be prepared which should be supported by a local water management report. Specific considerations for this sub-precinct, as indicated in Figure 5 include:

- Potential soil and/or groundwater contamination
- Areas of remnant native vegetation
- Areas of alluvial soils with high to moderate risk of acid sulfate soils
- Floodplain areas
- Possible areas of shallow or perched groundwater
- Impacts of future climate change including sea level rise

It is likely that development in this area will require provision of a drainage detention basin and it is preferrable for a single basin to be designed to accommodate drainage from both lots. The LWMR will need to include drainage modelling to demonstrate compliance with City of Albany requirements and provide guidance for implementation including consideration of staging and equitable funding for delivery of a consolidated and coordinated drainage system.

Rural Smallholding Zone

Development in the rural smallholding zone identified in Figure 4 requires a local development plan to be prepared which should be supported by a local water management report. Specific considerations for this zone, as indicated in Figure 6 include:

- Areas of remnant native vegetation
- Areas of alluvial soils with high to moderate risk of acid sulfate soils
- The Yakamia Creek and its foreshore management area
- Floodplain areas
- Wetlands and their indicative buffers
- Coastal inundation areas (shown in Figure 8)
- Possible areas of shallow or perched groundwater
- Impacts of future climate change including sea level rise

Future Investigation Zone

The future investigation zone identified in Figure 4 requires further consideration of the potential extent and type of development that could be supported and to determine the appropriate planning pathway. However, regardless of the planning approach applied, any proposal to develop this zone will need to be supported by an appropriate water management report. Specific considerations for this zone, as indicated in Figure 7 include:

- Areas of remnant native vegetation
- Areas of alluvial soils with high to moderate risk of acid sulfate soils
- The Yakamia Creek and its foreshore management area
- Floodplain areas
- Wetlands and their indicative buffers
- Possible areas of shallow or perched groundwater
- Impacts of future climate change including sea level rise

Depending on the nature of development proposed in this area, it is possible that a drainage detention basin will be required. The LWMR will need to include drainage modelling to demonstrate compliance with City of Albany reuqirements and provide guidance for implementation including consideration of staging and equitable funding for delivery of a consolidated and coordinated drainage system.

6.3 Role of the City

The City of Albany plays a central role in the successful implementation of the water management strategies. It is noted that the City's role is limited to its local government functions. However, these functions include regulatory and operational activities and provision of various community services that will lead to improved water management outcomes.

The following activities are considered to provide the best opportunities for the City to improve water resource protection and management across the Project Area:

- Planning decision-making on future planning and development proposals.
- Management and maintenance of local drainage infrastructure.
- Maintenance of public open space including irrigation.
- Advocacy and leadership for increased water conservation and efficiency and reuse.

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