



Seaford Wetlands Residential Environs Study

Final Report

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FRANKSTON CITY COUNCIL

SEAFORD WETLANDS RESIDENTIAL ENVIRONS STUDY

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1 Introduction

Frankston City Council has sought the preparation of a planning investigation into the Seaford Wetlands Residential Environs to *'identify an appropriate planning control, such as a DDO, to regulate lot size, setbacks and building height to protect the amenity and environmental qualities of the Seaford Wetlands. The proposed control would complement and potentially replace an interim requirement for a 40% permeability standard that will likely be included in a schedule to the existing zoning of the area (as authorised by Council).'*

The brief acknowledges that a number of zones and planning overlays have been applied within proximity of the Study area but that *'more should be done to protect the values of the wetland environs.'* Critical to the project is the establishment of a reliable evidence base to support any changes to the existing planning framework.



Source: Frankston City Council

1.1 Project Scope

The updated Frankston Housing Strategy 2018, adopted by Council in 2018, states that a key action is to *'undertake an investigation in consultation with Melbourne Water through a specific study into the significance and management of the Seaford Wetlands and its residential environs, with a view to implement a specific Design and Development Overlay for this location'*.

The project also includes a review of stormwater impacts on the Seaford Wetlands reserve from the surrounding residential area. We will identify issues in discussion with Council and provide recommendations to reduce the impact of urban development on this Ramsar site. In this regard, it will be important to acknowledge changes made by Amendment VC154 which modifies the Planning Policy Framework to reflect integrated water management objectives and introduces a new particular provision for stormwater management in urban development.

2 Methodology

This report has been developed utilising the following methodology.

- a) Identification and description of the Study Area (Note: the project study area was refined following an inception meeting with Council Officers).
- b) Existing Conditions review (utilising mapping and observations from the field).
- c) Review of Council GIS data and permit history.
- d) Literature Review identifying implications for the project.
- e) Review of relevant VCAT decisions.
- f) Review of Planning Panel reports.
- g) Review and analysis of the impact and effectiveness of existing planning controls.
- h) Review of other similar DDOs (Frankston and other LGAs).
- i) Identification of key issues & impacts of development on the study area.
- j) Recommendations (Statutory / Non-statutory)
- k) High level water quality (MUSIC) modelling of stormwater leaving the residential environs of the wetland system - both current and future (developed) conditions;
 - i. Based on the modelling, an assessment of the increase in pollutant loads due to future infill development;
 - ii. An assessment of the quantitative impact of the increased pollutant loads relative to the pollutants entering the wetland system from upstream;
 - iii. The formation of a high-level stormwater strategy which recommends viable treatment options.

3 The Study Area

The Seaford Wetlands form part of the Edithvale-Seaford Wetlands, collectively a Ramsar site of international significance and the only Victorian Ramsar site located in an urban area. The Wetlands were formerly part of the Carrum Carrum Swamp which occupied over 5,000 hectares, most of which has now been drained and turned into residential land. The Seaford Wetlands were disconnected from their natural catchment, Boggy Creek, in the 1880s, and receive most surface inflow via stormwater drains. Although located on Crown Land and freehold land owned by Melbourne Water, Frankston City Council assumes responsibility for the management of some parts of the wetland.



The Seaford Wetlands are located within Frankston City Council and are the largest remaining natural wetlands of their type in the Port Phillip and Westernport basins. The Kananook Creek Reserve and Seaford Foreshore are approximately 1 kilometre and 1.5 kilometres, respectively, west of the Wetlands. Relatively low-density housing development adjoins much of the length and is clearly visible from the existing shared path that runs adjacent to these residential properties.

Source: Frankston City Council

An aerial photo showing the study area is seen at Figure 1 (overleaf). The study area is defined by:

- Eel Race Drain to the north;
- Old Wells Road and Frankston Freeway to the east;
- Johnstone Street and Seaford Road to the south; and
- Mitchell Street, Park Street, Hallifax Street, Newton Street and Wunalla Road to the west.

The study area contains both the Seaford Wetlands (public land) and surrounding land consisting of private residential land, the Downs Estate (Council land), the Seaford North Primary School, part of the Seaford Primary School, Patterson River Secondary College and Riviera Reserve. Areas within the study area are used differently. In broad terms, this may be described as:

- The largely fenced area of the Seaford Wetlands is not publicly accessible and is reserved for environmental and drainage purposes.
- The perimeter of the Wetlands is largely accessible to the public and contains recreation trails, vegetation, drainage and other infrastructure.
- The broader surrounding environs are developed for housing or education separated from the Wetlands by fences and roads.

The study area was originally defined based on two key factors:

- The potential for drainage and flooding impacts – land which may contribute to stormwater impacts on the Wetlands or flooding from the Wetlands.
- The potential for visual impact (land adjacent to and within immediate proximity of the Wetlands which, if further developed, could lead to visual impacts).

The identification of the study area took a conservative approach at the project outset to ensure that land was not excluded from the study. Through the course of the study, it was determined that the potential for impact on the Wetlands was contained to a smaller area. This is discussed later in the project findings which are shaped accordingly. Refer to **Figure 1** overleaf for the identification of the study area.

The Study Area



Figure 1: Aerial photo showing study area

4 Review of existing conditions

An existing conditions review was carried out based upon observations from a field inspection undertaken with Council officers in November 2018, and through a review of aerial photography and Government mapping.

4.1 Built form and surrounding environs

Northern interface

To the north of the study area is Eel Race Drain, which forms the northern boundary of the study area. Dwellings abutting the Seaford Wetlands are separated from the Wetlands by timber paling fences, informal walking tracks and grassed embankments. Further to the north, the urban landscape is predominantly used for residential uses and consists primarily of one and two storey detached dwellings.



Southern interface

The southern interface of the study area is characterised by predominately single storey detached dwellings separated from the Wetlands by Austin Road. This area provides a viewing platform and signage of the Wetlands.



Review of existing conditions



Eastern interface

Old Wells Road is adjacent to the eastern side of the Wetlands. Some pockets of 1-2 storey residential buildings exist, and mature roadside vegetation provides a visual barrier between the road and Wetlands. There is an access point to the Peninsula Link Trail at the north-eastern corner of the Wetlands. The trail follows the eastern boundary of the Wetlands until Rossiter Court. As only a small part of the eastern interface is bordered by housing, the walking trail is typically less populated compared to the western side.



Western interface

To the west, streets run perpendicular to the walking trail which separates the Wetlands from private housing. Residential buildings are comprised of predominantly single-storey dwellings orientated to the street (rather than the Wetlands). A buffer zone of approximately 20 metres exists between the trail and Wetlands. The buffer contains a walkway for pedestrians and cyclists, vegetation and some drainage infrastructure as seen in the images below.



Review of existing conditions



Buildings along the western interface are predominately single storey, however there are some newer double-storey developments emerging. The example currently under construction (see below) utilises the Wetlands views through windows and balconies on the second floor. Living spaces are oriented to face the Wetlands rather than turning their back in the manner that much of the older housing stock has traditionally done. Further development in this manner has the potential to improve the outlook from the Wetlands. It also has the benefit of improving passive surveillance of the Wetlands from private property, thereby providing improved security within the public realm.



It was observed that there are opportunities to strengthen landscaping and soften the impacts of new development, both in the private and public realm. This could be achieved through the planting of appropriate species and Water Sensitive Urban Design initiatives such as raingardens at all interfaces (but particularly to the west and south where gaps in vegetation exist).



4.2 Key Legislation and Agreements

There are numerous legislations and agreements protecting the Wetlands on an international, national and state level. Those of key relevance are listed below.

Ramsar Convention

The Ramsar Convention came into force in 1975 with Australia being one of the first countries to sign it. The mission of the Convention is the '*conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.*' The three key documents used to record and maintain ecological character of Ramsar sites are the Ramsar Information Sheet (RIS), Ecological Character Description (ECD) and Management Plan.

Migratory Bird Conventions

Due to the presence of migratory birds in the Seaford Wetlands, a number of bilateral treaties apply. These are the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and The Bonn Convention on Migratory Species (CMS). These agreements aim to protect migratory birds and their environment.

Additionally, the Wetlands are covered by the East Asian-Australasian Flyway Partnership (EAAFP), which seeks to protect migratory waterbirds through voluntary initiatives. The partnership supports the recognition and maintenance of Ramsar wetlands due to their important function as a habitat for migratory birds.

Environment Protection and Biodiversity Conservation (EPBC) Act

The EPBC Act seeks to protect matters of national environmental significance, including Ramsar wetlands. Any action which impacts the ecological character of a Ramsar site requires an environmental assessment and approval under the Act. The Act also established the Australian Ramsar Management Principles, which protect the migratory bird species listed under JAMBA, CAMBA and CMS amongst other nationally significant species.

Environment Protection Act 1970

This Act establishes the Environment Protection Authority (EPA) and seeks to improve the condition of air, land and water environments, partially through State Environment Protection Policies (SEPPs). The Seaford Wetlands are covered by the Waters of Victoria SEPP, which outlines objectives and targets for water quality.

Additionally, several state policies aimed at preventing and regulating pollution from acid sulfate soils apply to the Wetlands. These include the State Environment Protection Policy, Industrial Waste Management Policy and Best Practice Management Guidelines for Dredging.

Environment Effects Act 1978

This Act establishes the Environmental Effects Statement (EES) and gives the Minister for Planning the authority to decide on whether one is required. The effects of potential long-term change to the ecological character of a Ramsar site is considered grounds for an EES to be required.

Flora and Fauna Guarantee Act 1988

Flora and fauna in Victoria are protected under the Act, which aims to conserve all of Victoria's native plants and animals. The act also aims to protect the species of Victoria from potentially threatening processes which may impact their distribution, habitat and ecology. The Act also established the mechanism of listing threatened species and threats to native species.

4.3 Biodiversity

Biodiversity is a measure of variation at a genetic, species and ecosystem level. It is important to preserve biodiversity in order to maintain stable ecosystems of flora and fauna.

The Seaford Wetlands are a site of national and international ecological significance due to the migratory birds and other significant species which inhabit the site. This is proven through the numerous bilateral agreements outlined in Section 4.2. The Wetlands also form part of the Carrum Wetlands Important Bird and Biodiversity Area (IBA). IBAs are sites of international importance for bird conservation. Globally important bird populations in the Carrum Wetlands IBA include the Australian Bittern and Sharp-tailed Sandpiper, both of which are present in the Edithvale-Seaford Wetlands; the former is also a nationally endangered species.



Australasian Bittern
(Source: Richard Hall Photography)

Aside from birdlife, the Edithvale-Seaford Wetlands support a mob of Eastern Grey Kangaroos and countless other mammals, bats, frogs, reptiles and fish. They also contain several plant populations, four of which are of state significance: Plains Sedgy Wetland, Tall Marsh, Brackish Aquatic Herbland and Large River Buttercup. Key Ramsar values of the site include its function as an important foraging habitat for migratory waders, as a breeding habitat for resident and nomadic species, and drought refuge.

A total of 6 Ecological Vegetation Classes (EVCs) have been identified in the Seaford Wetlands, including the Tall Marsh, Plains Grassy Woodland and Brackish Wetland. Figure 2 below maps the EVCs. It is important to note that the distribution and occurrence of these EVCs is variable due to fluctuating water levels and salinity.

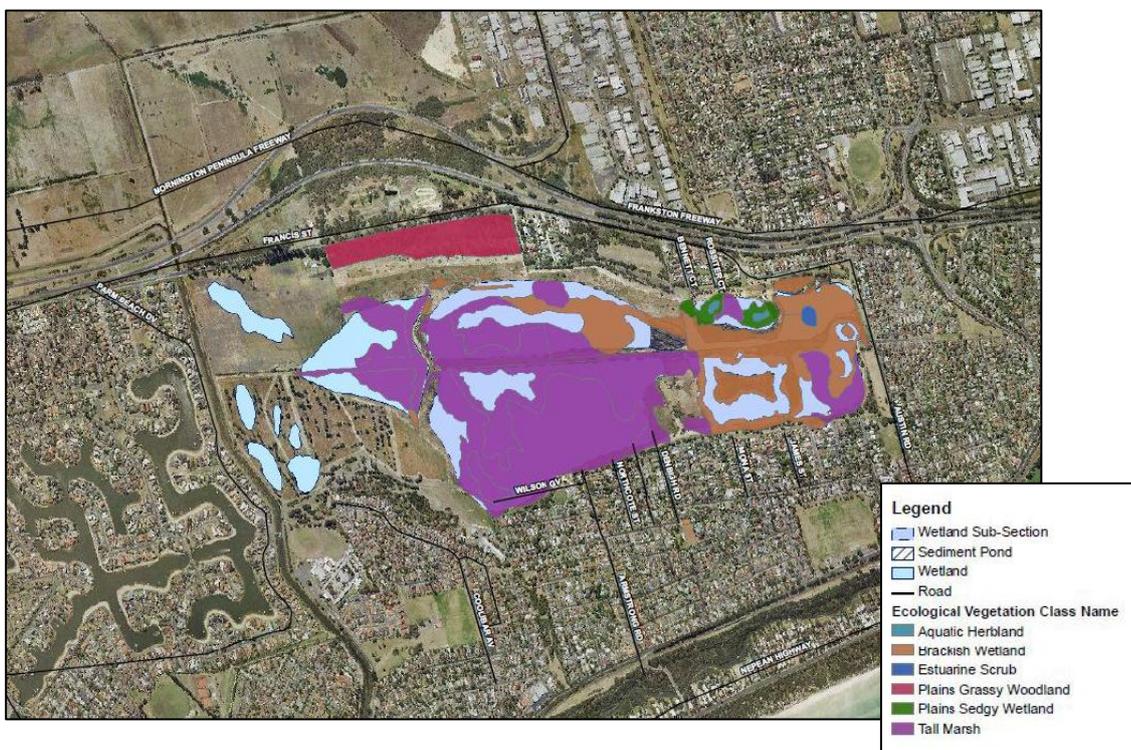


Figure 2 - Distribution of wetland vegetation classes (SKM, 2011)

Review of existing conditions

Figure 3 below identifies that the majority of the Wetlands has a Strategic Biodiversity Value Ranking of 90 out of a possible 100 (indicated by the darkest green shading). This reinforces the fact that biodiversity within the study area is of significant value.

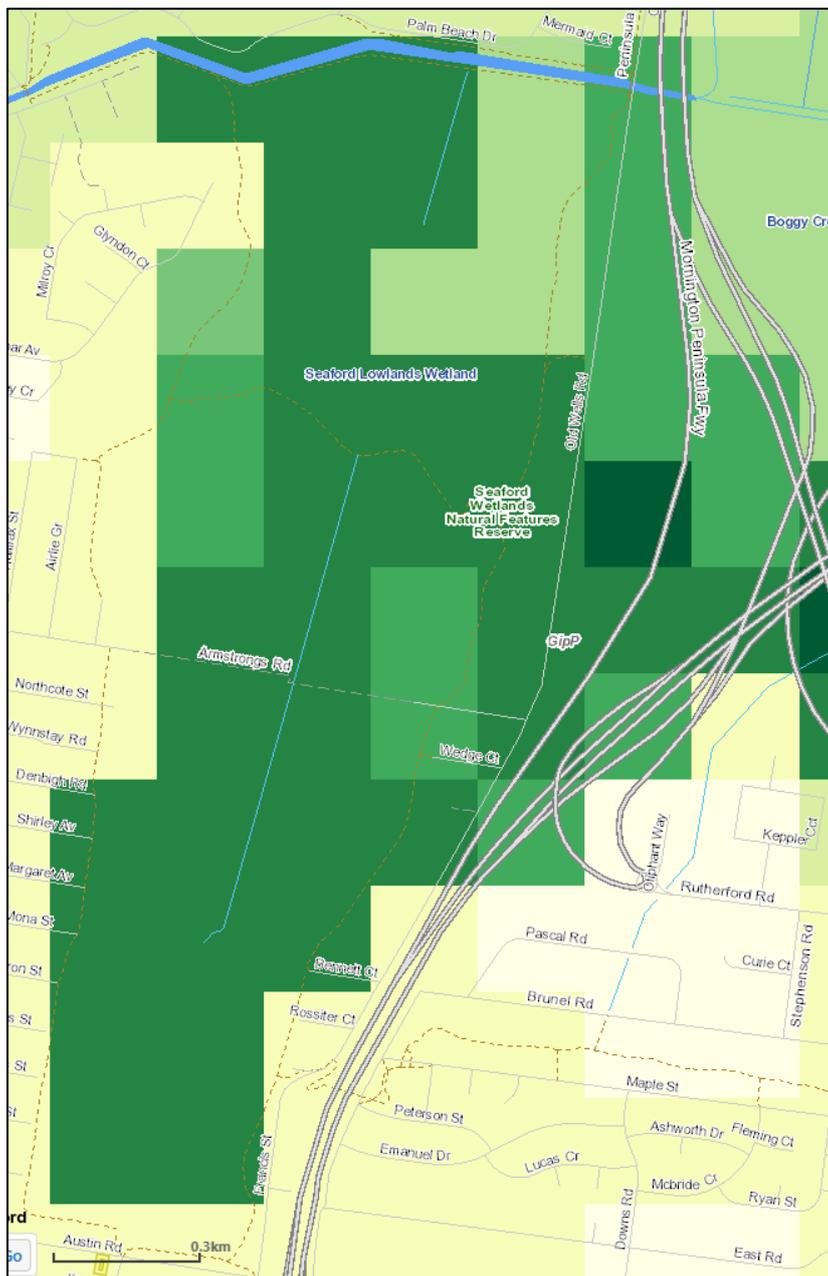


Figure 3 - Biodiversity Map (Source: DELWP NatureKit, <http://maps.biodiversity.vic.gov.au>)

The Seaford Wetlands provide other important services such as assisting in the natural flow of flooding, retaining and diverting stormwater runoff, as well as protecting the water quality of Port Phillip Bay through treating stormwater. They also provide education opportunities for schools and community groups through the Edithvale-Seaford Wetland Education Centre, which is operated by Melbourne Water.

5 Review of Council permit data

A review of Council planning permit data for the Study Area was undertaken to interpret trends from 2006-2018. Key findings are summarised below.

Number of planning permit applications determined

- While there have been minor fluctuations, the number of planning permit applications decided by Council within the study area steadily increased from 2006-2017.
- There is a noticeable drop-off in planning permit applications decided in 2018. It is unclear as to whether this trend is likely to continue. Possible explanations include:
 - The data was sourced in November 2018, providing approximately one further month for Council to receive and decide on planning permit applications.
 - Changes made by Amendment GC13 in October 2017 removed the Bushfire Management Overlay from most private land within the study area, therefore removing a permit trigger.
 - Changes to residential zones (introduction of mandatory garden area requirements, height limits) through Amendment VC110 in March 2017 have placed new restrictions on development which may reduce the viability of some development types.

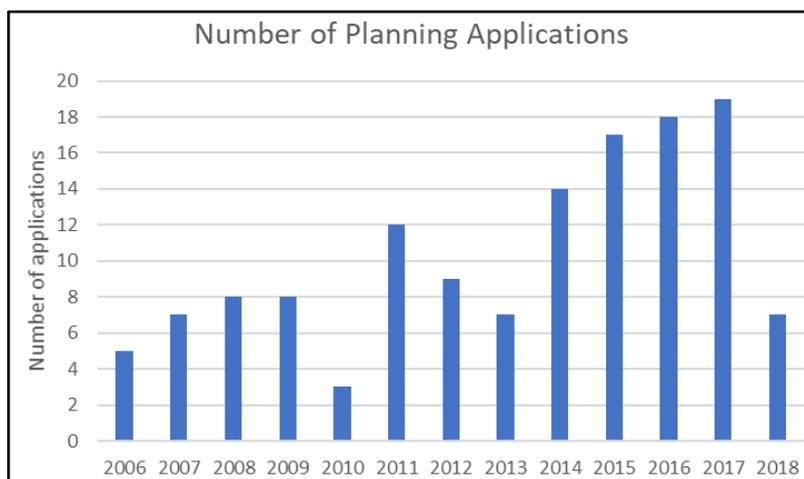


Figure 4 - Number of planning applications determined, 2006-2018

Planning application type

- Over half of all applications determined related to the construction of more than one dwelling on a lot. Similar to the trends identified above, there is a sharp decline in 2018 with only three applications.
- Approximately 10% of applications are to construct one dwelling on a lot. There are no examples in 2018.

Application type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	%
Alterations to a building structure or dwelling									1		1	3		5	3.7%
Change or extension of use							1							1	0.7%
Creation/Removal of Easement/Covenant/R.O.W.			1											1	0.7%
Ext to an exist dwell or structure ass with dwell			1	1	1	2	1	1	1		1	1	1	11	8.2%
Extend building (other than dwelling)	1	2												3	2.2%

Review of Council permit data

More than one new dwelling, but less than ten	1	4		3		9	5	1	7	12	14	9	3	68	50.7%
Native Vegetation Removal			1	1					1		1			4	3.0%
One new dwelling	2	1		1	2	1	1		3			2		13	9.7%
One or more new buildings				1				1						2	1.5%
Other							1	4	1					6	4.5%
Other buildings & works (dam, earthworks, etc)			1							2				3	2.2%
Subdivision of land (1 to 9 lots)			4	1						1		3	2	11	8.2%
Subdivision of land (10 or more lots)	1													1	0.7%
Vic Smart Application										2	1	1	1	5	3.7%
Total	5	7	8	8	3	12	9	7	14	17	18	19	7	134	

Figure 5 – Planning applications by type, 2006-2018

Determination pathway

- An overwhelming amount of applications in the study area were approved under delegation.
- Only 9 applications have been refused since 2006.
- Only four applications resulted in VCAT appeal.
- Since 2006, only one application has been decided at a Council meeting.

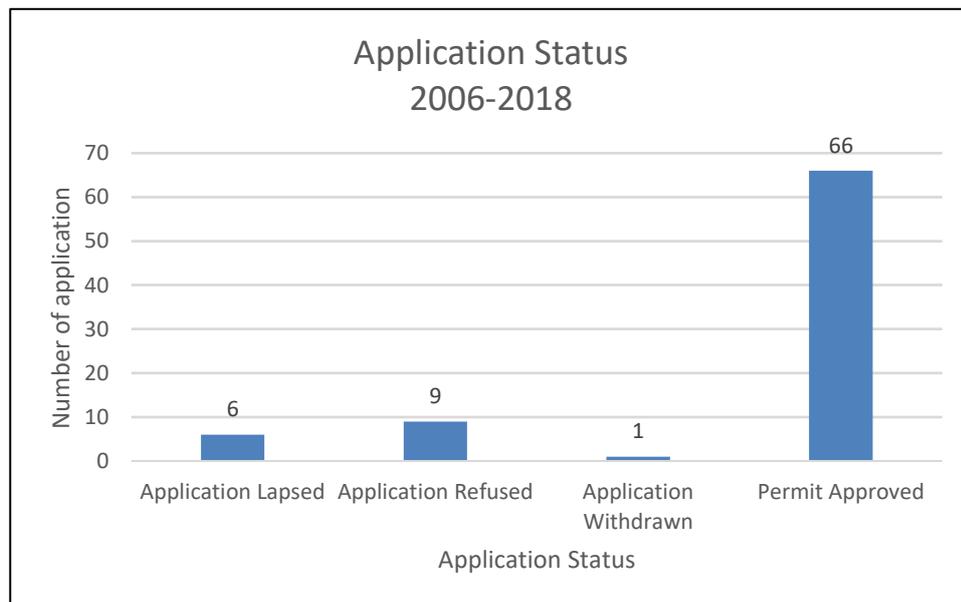


Figure 6 – Determination pathway 2006-2018

Comparison of current planning overlays and planning permit applications

- The location of planning applications is largely scattered.
- There is not a direct correlation between the extent of overlays and planning permit applications.
- As established earlier, over 50% of all applications relate to the construction of more than one dwelling on a lot with a permit trigger outside of the overlay controls.
- Council has control over issues relating to inundation and flooding courtesy of overlays on private land.
- The Bushfire Management Overlay affecting the site area has been significantly reduced via Amendment GC13 for planning permit applications outside of its current mapped area to the east of the Study Area. It is evident that there is a concentration of planning permit applications within the current extent of the Overlay.

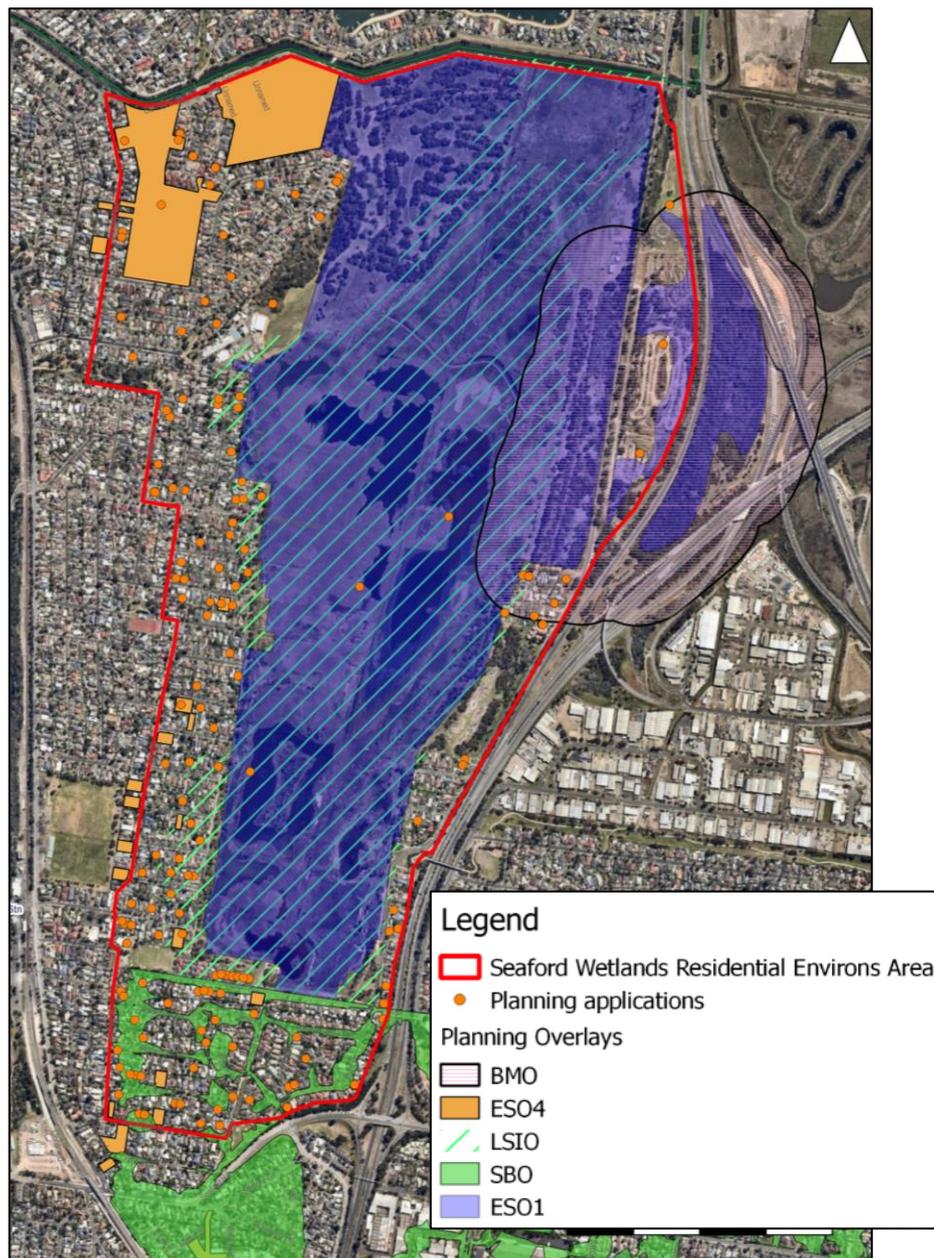


Figure 7 – Current Planning Overlays & Planning applications 2006-2018

5.1 Project Implications

While planning permit applications have steadily risen over the past decade, the number dropped dramatically in 2018, including a decrease in applications to construct more than one dwelling.

The causes for the decrease may be due to Amendments GC13 and VC110 which reduce the development potential of land. More specifically, new minimum garden area requirements and mandatory height provisions introduced in 2017 are likely to have reduced the potential for multi-unit developments. This is consistent with our experience elsewhere.

Based on a review of Council's planning permit data, there is not a definitive pattern of development posing threat to the study area. The need for more restrictive planning provisions is not clear at this point. It is also questionable as to what impact recent changes to planning provisions have made.

To better understand this situation, it is recommended that Council monitor and review planning and building permit activity for at least a 12-month period. Refer to Section 11 for further detail.

6 Literature Review

6.1 Strategies & Management Plans

Frankston Housing Strategy 2018

The Frankston Housing Strategy (FHS) was adopted by Council in June 2018 to provide policy direction for the provision of new housing development in Frankston City. Key objectives of the strategy are ‘to maintain a steady supply of new housing that is affordable and fit for purpose, while protecting and enhancing the quality of residential amenity and neighbourhood character across Frankston City’s different suburbs’.

As shown below, the study area is identified as being an Incremental Change Area. This is the second-most restrictive change area after the Minimal Change Area and covers the majority of the Frankston LGA. According to the Housing Strategy, Incremental Change Areas: ‘are established residential areas which provide some opportunities for housing growth and change over time, including some dispersed medium density dwellings, provided developments are well designed and have regard to neighbourhood character. The typical infill development is the dual occupancy, where a new dwelling is located in the backyard of an existing dwelling and the existing driveway is shared. Another common development type is where a single house on a large lot is replaced by two three or four townhouses, which again may share a single crossover for vehicle access. Depending upon lot size and the design of the street network, scattered infill developments of this sort, in traditional suburban residential areas can be accommodated with little change to the prevailing residential amenity.’

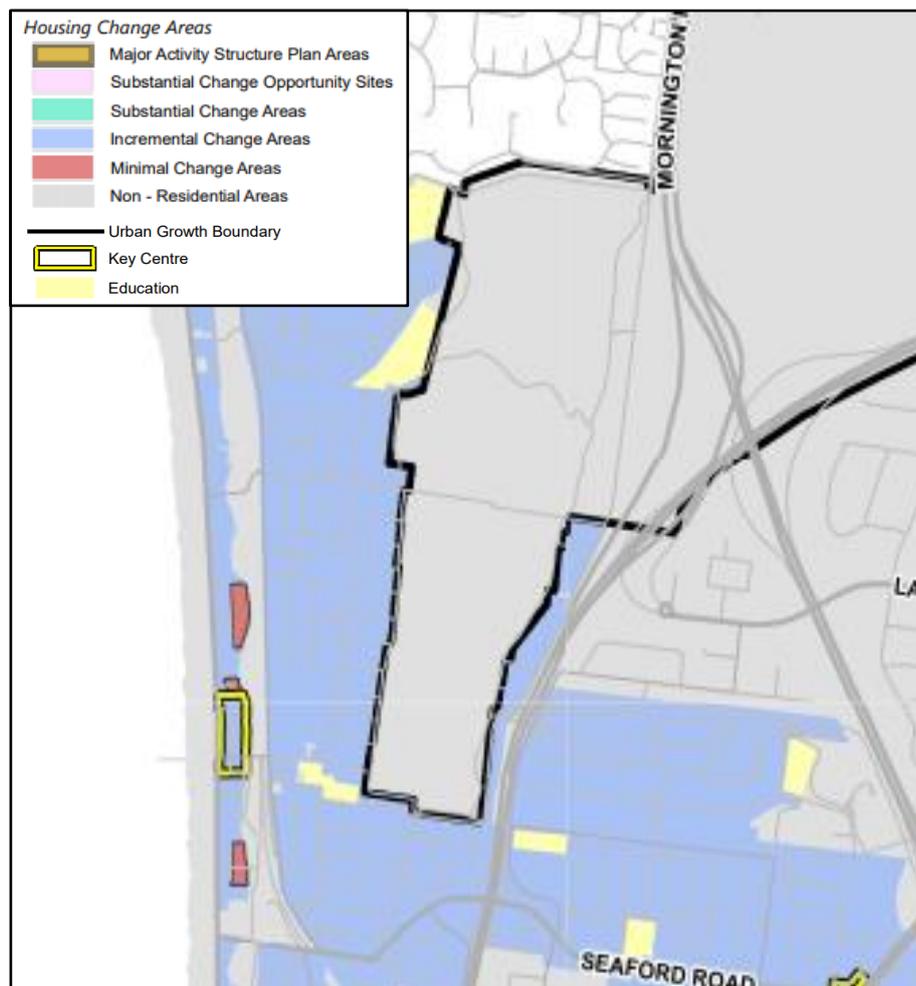


Figure 8 - Frankston City Council Housing Framework Plan

Draft Healthy Waterways Strategy, June 2018

The strategy identifies key threats to waterway values as *'stormwater, climate change, poor water quality, and pest plants and animals'*. The strategy also notes that *'urban encroachment and densification around urban waterways detract from waterway amenity'*. The strategy promotes a place-based approach to integrating land-use planning and waterway management. Key objectives for the Edithvale-Seaford Wetlands include increasing the buffer of native vegetation and reducing the threat of invasive plant species.

Water for Victoria – Water Plan Strategy, 2018

Water for Victoria is a newly published strategic plan for management of Victoria's water resources. Notably, the strategy identifies that better stormwater management can mitigate the pollution of waterways and wetlands. The strategy states that *'Now we know that keeping stormwater in the landscape and managing discharges to our stormwater systems can help to reduce the impact of erosion and pollution of our urban waterways. By better managing stormwater we can build our resilience to floods and make more water available for urban vegetation'*.

Groundwater Preliminary Impacts – Ecological Assessment – Rail Under Road, 2017

As part of the LXRA groundwater assessment for Edithvale and Bonbeach, the report investigated potential impacts of the level crossing removals on the Edithvale-Seaford Wetlands (with primary focus on the Edithvale Wetlands). The report identifies that *'based on DELWP EVC (Ecological Vegetation Classes) modelling, there is potential for up to six EVCs to be present within a one-kilometre buffer of the Edithvale-Seaford Wetlands'*.

Edithvale-Seaford Wetlands Ramsar Site Management Plan, 2016

A Management Plan for the Wetlands is produced by Melbourne Water approximately every 7 years. The purpose of the plan is *'to maintain, and where possible improve, the ecological character of the Edithvale-Seaford Wetlands Ramsar site and promote wise use'*. The Plan notes that subject to the Aboriginal Heritage Act, land within 200 metres of a declared Ramsar wetland area is an area of cultural heritage sensitivity.

The Management Plan states that *'water quality in the Edithvale-Seaford Wetlands is likely to be significantly influenced by saline water intrusion from groundwater, exposure of coastal acid sulphate soils, backflows of saline water in drains during high tides and the quality of stormwater run-off from adjoining urban areas'*.

A risk assessment undertaken for the site also identifies the Wetlands' vulnerability to pressures such as urban stormwater, litter, disturbance of Acid Sulfate Soils (ASS), invasive species and climate change. In particular, the impacts of sea level rise and predatory species (foxes, rats and cats) are categorised as extreme level risks.

Victorian Auditor-General Report on Ramsar Sites, 2016

The report highlights the need for all Ramsar sites, including Seaford, to adopt a comprehensive management framework. The report states that *'No one plan met all the requirements to be considered a comprehensive management framework for a Ramsar site.... and identified risks from recreational activity, changes in water quality and climate change were rarely addressed.'*

Description of the Ecological Character of the Edithvale-Seaford Wetlands Ramsar Site, 2012

The document outlines key data gaps, notably that *'information is less detailed for hydrological inflow and outflow volumes, flood storage capacity, vegetation condition and soil type. While water levels within hydrological management cells are well understood and documented, bathymetry of the wetlands has not been mapped.'*

Integrated Water Action Plan, 2016-2026

Frankston City Council's Integrated Water Action Plan (IWAP) is a ten-year plan to facilitate a strategic and practical approach to integrated and sustainable water management. A key focus of the IWAP is reducing stormwater pollution to the City's waterways and to Port Phillip Bay. Key actions relating to the Wetlands include:

Literature Review

- *Develop an agreement with Melbourne Water regarding stormwater management in the Frankston municipality, to clarify the roles and responsibilities of each organisation, including Maintenance Agreements*
- *Implement Council's Municipal Strategic Statement (MSS) and update over time to support integrated water management within the municipality*
- *Develop enhanced planning controls to require IWM for all development within the municipality - including infill, industrial and commercial development*
- *Investigate a stormwater quality offset scheme (i.e. developer contributions to the City's stormwater quality infrastructure in lieu of development scale infrastructure)*
- *Review Council's Flood Management Plan and Drainage Strategies and commence development and a budget bid for new plans/strategies*
- *Review Council's WSUD Guidelines to better communicate Council's standards and requirements for external WSUD development projects and to improve developer compliance*
- *Educate community on the environmental and recreation value of natural assets such as Seaford Wetlands, Kananook Creek and Sweetwater Creek*
- *Advocate for the feasibility assessment of, and if viable, the Seaford Wetland Reserve stormwater treatment scheme*
- *Investigate the feasibility of installing additional Gross Pollutant Traps in Council's stormwater drainage system, to capture litter and coarse sediment and prevent from entering the stormwater system and local waterways*

Many of the strategies of the IWAP would benefit the water quality of the Seaford Wetlands by improving stormwater treatment and retention in new developments. The IWAP also ties into Frankston's Flood Management Plan and WSUD guidelines.

Frankston WSUD Guidelines, 2012

Water Sensitive Urban Design (WSUD) is a component of sustainable water management that recognises the value of stormwater. It enables water conservation, water quality improvement, and stormwater detention to be incorporated into urban planning and design. WSUD asset types include rain gardens, gross pollutant traps, rainwater tanks and stormwater harvesting systems. When applied to residential developments, these assets would assist in treating and re-using stormwater, which would result in less and cleaner runoff. WSUD developments are required to submit a concept design followed by a detailed design.

Currently, WSUD is encouraged as a strategy throughout Frankston's MSS and local policy. Under Clause 53.18 Stormwater Management in Urban Development, WSUD is referenced in stormwater management for subdivisions only.

Frankston Flood Management Plan, 2011

The Flood Management Plan for Frankton City Council and Melbourne Water was created for the purpose of managing existing, residual and future flood risks. The Plan includes an analysis of existing flood risks, pressures to the drainage system and the roles and responsibilities for both Council and Melbourne Water. The report concludes with an Improvement Plan listing issues and actions for reducing flood risk.

Notably, the plan flags that flood mapping has not been undertaken in Council-managed drains and recommends that the *'planning and engineering departments of Council to liaise with each other to ensure flood risks are taken into account'* with high priority.

The management plan states that a full review will be undertaken every 5 years; however, it has not been updated since its release in 2011.

Other:

- Dandenong Valley & Western Port Authority, City of Frankston: Report on Carrum Carrum Wetlands, Seaford Swamp Master Plan, 1991

Literature Review

- City of Frankston, Dandenong Valley Authority: Seaford Swamp Development Master Plan, 1989
- Department of Sustainability and Environment, Endorsement of Documentation for the Edithvale-Seaford Wetlands Ramsar Site, 2008.

6.2 Relevant VCAT decisions

Gangi v Frankston CC [2011] VCAT 288 (28 February 2011)

20 Airlie Grove, Seaford adjoins the western boundary of the Seaford Wetlands. The Tribunal noted the proximity to the Wetlands as a planning consideration and placed several conditions on the permit including expanding the rear open space and requiring one tall canopy tree in the backyard in addition to perimeter landscaping.

Jackson & Ors v Frankston CC & Anor [2010] VCAT 1069 (25 June 2010)

14 Wynnstay Road, Seaford is located approximately 60m from the western boundary of the Wetlands. The proposal involved the demolition of an existing single-storey dwelling, construction of two dwellings (a double-storey at the front) and removal of a mature Elm tree. In this case, the Tribunal overturned Council's decision to grant a permit subject to conditions, on the basis that the building height and removal of the Elm were unacceptable outcomes. However, the Tribunal deemed that dual occupancy developments as a whole were suitable for the area.

White Ash v Frankston CC [2004] VCAT 2170 (28 October 2004)

17 to 43 Austin Road, Seaford is located adjacent to the Wetlands' southern boundary. The proposal involved the construction of 24 dwellings in total across the 13 lots and comprised seven applications. A key objector to the proposal was the Friends of Edithvale-Seaford Wetlands Inc., while Melbourne Water and DELWP joined the proceedings as relevant authorities.

For properties at 29 to 39 Austin Road Seaford, a permit was granted subject to conditions. Most notably, dwellings were restricted to single storey, the acoustic paling fence was moved back 10m south of the northern boundary, and the applicant entered into an agreement with Melbourne Water to ensure all external lighting be baffled and downcast and no cats or dogs to be kept on the land.

For properties at 17 to 27 Austin Road Seaford, a similar agreement with Melbourne Water was arranged. The basis for these lighting and pet requirements were based on a management plan by Ecology Australia – an earlier version of the current 2016 Management Plan. Excerpts from the VCAT case quotes the Management Plan: *'Control disturbing influences such as noise, inappropriate levels of use on nearby reserves and limit lighting to low lux strength within 500m of the wetlands.'*



Source: Frankston City Council

The Tribunal rejected all of the applications for multi-dwelling proposals on the basis that they represented an over-development of the site with regards to the sensitive nature of the adjoining wetlands. Neither DEWLP nor Melbourne Water objected to the applications. However, both expressed the need to be cautious in relation to development of the land given its abuttal to the Wetlands and possible impact on protected bird species and their habitat.

6.3 Review of Planning Panel Reports

Frankston Lapsed Amendment C95, 2013

Frankston Amendment C95, which lapsed in March 2015, was designed to implement the new residential zones (Neighbourhood Residential, General Residential, Residential Growth) generally in accordance with the Frankston Housing Strategy 2013. The amendment was not supported by an Independent Panel. The Panel identifies that *'restrictive provisions have been applied in areas not addressed in the Frankston Housing Strategy'*.

Amendment C95 would have applied a 100m Neighbourhood Residential buffer zone around the Wetlands. In particular *Schedule 6 – Seaford Wetlands Environs* specified maximum 40% site coverage, 40% permeability, all proposed plantings on landscape plans to be indigenous species, private open space and setback requirements..

The rejection of C95 by the Panel reinforces the need to support proposed amendments with strong strategic analysis and to ensure planning controls coincide with Council’s Housing Strategy. The Panel stated that *‘any need to better address the environment of the Seaford Wetlands should be addressed through separate specific investigation into the significance and management of this area’*.

Frankston Amendment C78, 2014

Amendment C78 sought to implement the recommendations of the *Sweetwater Creek Planning Controls Investigation, 2011* by applying design and built form controls to provide neighbourhood character and landscape protection to reduce the impacts of development on the Sweetwater Creek corridor and the wider environs. More specifically, it introduced DDO8 and DDO9 built form planning controls which apply to the Sweetwater Creek immediate and wider environs. The Panel supported the amendment on the basis of the findings of the 2011 investigation which found that *‘there is a need to protect and improve the environmental and character qualities of the creek and its environs. This includes applying stronger planning policies and controls’*. However, the DDOs were implemented with changes – notably, the two mandatory controls for height and rear setback were removed as the Panel could not find any justification for mandatory controls.

6.4 Implications

The key implications arising from the literature review may be summarised as follows:

- a) Threats to waterway values were identified as stormwater, climate change, poor water quality, and pest plants and animals, urban encroachment and densification around urban waterways.
- b) Increasing the buffer of native vegetation and reducing the threat of invasive plant species are seen as key objectives for the Edithvale-Seaford Wetlands.
- c) Based on DELWP EVC (Ecological Vegetation Classes) modelling, there is potential for up to six EVCs to be present within a one-kilometre buffer of the Edithvale-Seaford Wetlands.
- d) Land within 200 metres of a declared Ramsar wetland is an area of Cultural Heritage Sensitivity.
- e) Water quality in the Edithvale-Seaford Wetlands is likely to be significantly influenced by saline water intrusion from groundwater, exposure of coastal acid sulphate soils, backflows of saline water in drains during high tides and the quality of stormwater run-off from adjoining urban areas.
- f) There appear to be data gaps, notably that information is less detailed for hydrological inflow and outflow volumes, flood storage capacity, vegetation condition and soil type. While water levels within hydrological management cells are well understood and documented, bathymetry (depth of the wetlands) has not been mapped.
- g) All Ramsar sites including Seaford are required to adopt a comprehensive management framework. Risks from recreational activity, changes in water quality and climate change have not been properly addressed previously.
- h) Any need to better understand the environment of the Seaford Wetlands should be addressed through separate specific investigation into the significance and management of this area.
- i) DDOs have been supported previously around Sweetwater Creek in Frankston South; however, two mandatory controls relating to height and rear setback were removed as the Panel could not find any justification for mandatory controls.

7 Planning Policy Review

A summary of existing planning policy applicable to the study area is provided below:

Clause 12.01 Biodiversity

Key strategies include to:

- *Strategically plan for the protection and conservation of Victoria's important areas of biodiversity.*
- *Ensure that decision making takes into account the impacts of land use and development on Victoria's biodiversity, including consideration of:*
 - *Cumulative impacts.*
 - *Fragmentation of habitat.*
 - *The spread of pest plants, animals and pathogens into natural ecosystems.*
- *Consider impacts of any change in land use or development that may affect the biodiversity value of national parks and conservation reserves or nationally and internationally significant sites; including wetlands and wetland wildlife habitat designated under the Convention on Wetlands of International Importance (the Ramsar Convention).*

Clause 12.01-2S Native Vegetation Management

The strategy for Clause 12.01-2S is to:

Ensure decisions that involve, or will lead to, the removal, destruction or lopping of native vegetation, apply the three-step approach in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (Department of Environment, Land, Water and Planning, 2017):

- *Avoid the removal, destruction or lopping of native vegetation.*
- *Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.*
- *Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.*

Clause 12.03 Water Bodies and Wetlands

Key strategies include to:

- *Ensure development responds to and respects the significant environmental, conservation, cultural, aesthetic, open space, recreation and tourism assets of water bodies and wetlands.*
- *Ensure development is sensitively designed and sited to maintain and enhance environmental assets, significant views and landscapes along river corridors and waterways and adjacent to lakes and wetlands.*
- *Ensure development does not compromise bank stability, increase erosion or impact on a water body or wetland's natural capacity to manage flood flow.*



Source: Frankston City Council

Clause 13.03-1S Floodplain Management

Key objectives include to assist in protecting:

- *The natural flood carrying capacity of rivers, streams and floodways.*
- *The flood storage function of floodplains and waterways.*
- *Floodplain areas of environmental significance or of importance to river health.*

A key strategy for this clause is to ‘*avoid intensifying the impact of flooding through inappropriately located use and development.*’

Clause 21.05 Environmental Risk

The Seaford Wetlands are flagged as an area of environmental risk in terms of sea level rise and natural hazard events, bushfire risk, flooding and inundation, coastal acid sulfate soil, indigenous flora and fauna and waterway health. As such, Council states that the Precautionary Principle should be applied to all new developments adjacent to the Wetlands. Frankston’s Flood Management Plan 2011 is included as a document of relevance.

Clause 21.06 Environmental and Landscape Values

Clause 21.06 of the MSS identifies the importance of protecting significant biodiversity and wetlands from inappropriate development. Furthermore, a key strategy is to ‘*identify, protect and enhance the habitat and flood retarding values of waterways and wetlands.*’ The Seaford Wetlands is classified as an ‘Environmentally Sensitive Area’, while parts of the study area to the east and west are identified as habitat corridors.

Clause 22.08 Neighbourhood Character Policy

Council’s Neighbourhood Character Policy outlines specific built form objectives to achieve the desired character for each precinct. As seen in Figure 7, the study area is covered by Seaford Precincts 5, 6 and 8. The overall design response for buildings adjacent to the Wetlands is that they ‘*should be designed to minimise visual impact when viewed from the wetlands reserve through the use of massing, forms, muted colours and materials.*’

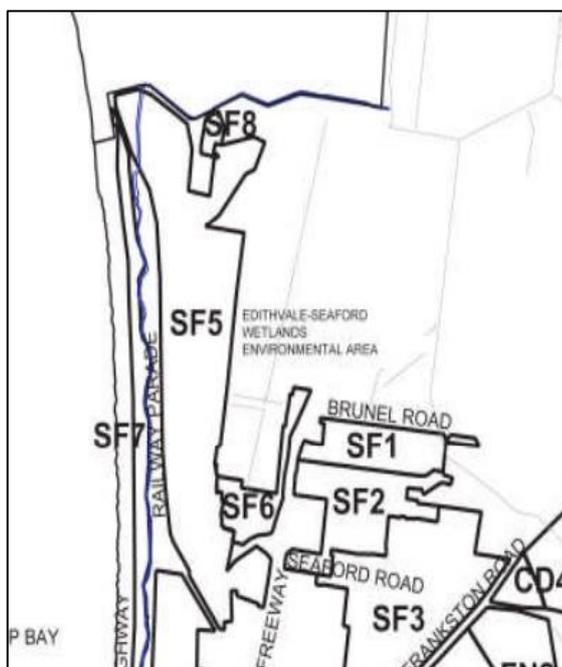


Figure 9 - Neighbourhood Character Precincts Map

Planning Policy Review

Precincts 5 and 6 have similar guidelines; the preferred character statements focus on maintaining open, spacious streetscapes and respecting the wetland environment by not dominating the landscape. A key design response for both precincts is *'Where a site adjoins Kananook Creek or the Seaford Wetlands; Building mass should be located on that part of the lot away from the creek or wetlands. The second storey component of any building should be set back from the ground floor creek or wetland elevation a distance of at least the ground floor building height'*. Precinct 5 requests low pitched roof forms as a design response, while Precinct 6 requires applications to include a landscape plan utilising low maintenance plants and indigenous species where possible. Precinct 6 also requests the retaining of large and established native trees.

Precinct 8, which occupies a small portion of the study area to the north-west, focuses solely on maintaining open streetscapes.

7.1 Zones

Public Use Zone 1 & Public Conservation & Resource Zone

The Public Use Zone 1 (PUZ1) has been applied to the bulk of the public land (the Wetlands). The Public Conservation & Resource Zone has been applied to the northern section of the Wetlands.

Urban Flood Zone, & Green Wedge Zone

The Urban Flood Zone (UFZ) and Green Wedge Zone (GWZ) have been applied to the north-eastern corner of the Wetlands.

Public Use Zone 2

The Public Use Zone 2 (PUZ2) has been applied to schools within the study area.

General Residential Zone Schedule 1

Private land surrounding the Seaford Wetlands is mostly contained within the General Residential Zone Schedule 1 (GRZ1). The General Residential Zone applies to the majority of residential areas in Melbourne and encourages growth in housing which respects existing neighbourhood character. The Zone specifies a minimum garden area of 25-35% dependent on lot size – for most properties in the study area this would be either 30% or 35%. The garden area calculations include areas on spaces such as open entertaining areas, lawns, garden beds, swimming pools, and tennis courts.

There is also a mandatory height control of 11 metres and 3 storeys.

Schedule 1 to the GRZ places no additional conditions on development. This means that aside from the maximum height specified in the Zone, development must conform to ResCode standards for site coverage, permeability, setbacks etc.

As discussed in Section 5, recent changes to Residential Zones (notably the introduction of mandatory garden area requirements, height limits) through Amendment VC110 in March 2017 have placed new restrictions on development which may assist in reducing developable area and increasing site permeability and filtration.



Figure 10 - Zoning Map

7.2 Overlays

Environmental Significance Overlay

The Environmental Significance Overlay (ESO) has been applied throughout the Wetlands to some individual properties and schools in the north west of the Study Area. These properties are included as they have significant tree species and therefore undergo more stringent assessment for vegetation removal. Refer overleaf.

Land Subject to Inundation Overlay

The Land Subject to Inundation Overlay (LSIO) applies to a majority of the Wetlands and also to private property adjacent to the wetlands to the west. Under the LSIO, applications must be consistent with any local floodplain development plan and will be referred to Melbourne Water for referral. Refer overleaf.

Special Building Overlay

A number of properties directly to the south of the Wetlands are covered by the Special Building Overlay (SBO) which applies to urban land liable to flooding from drainage systems. Under the SBO, applications must be accompanied by a site plan, must be consistent with any local floodplain development plan and will be referred to Melbourne Water for referral. See below.

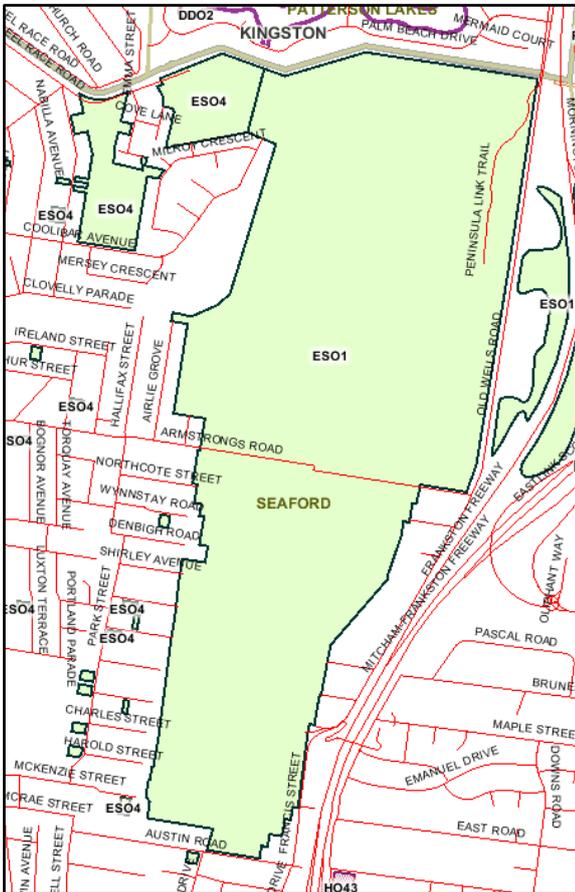


Figure 11 - ESO Map

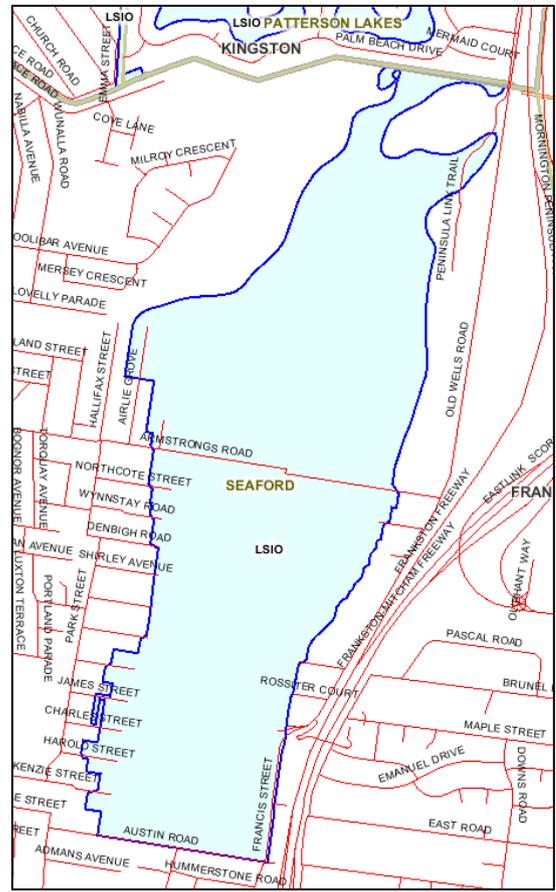


Figure 12 - LSIO Map

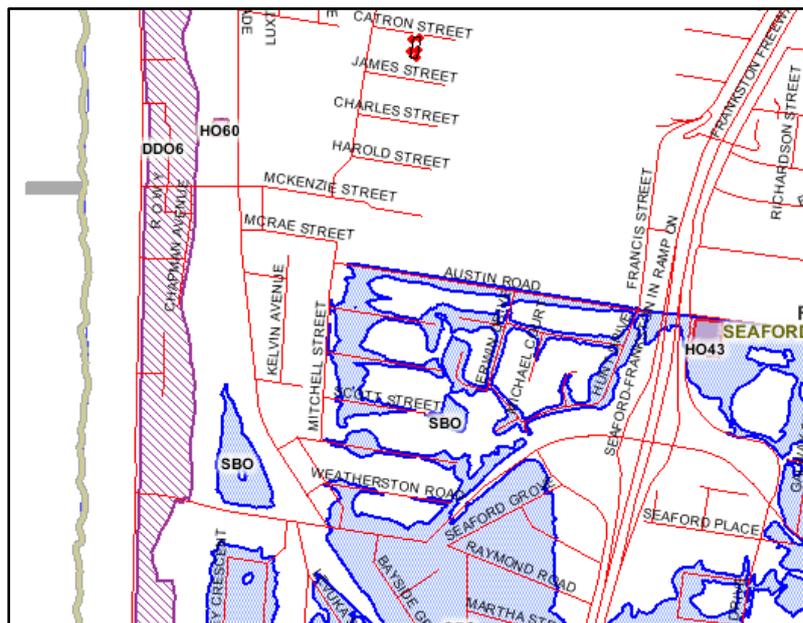


Figure 13 - SBO Map

7.3 Particular Provisions

Clause 53.18 Stormwater Management in Urban Development

Clause 53.18 outlines standards for buildings, works and subdivisions in urban areas and was introduced in October 2018 through Amendment VC154. The policy aims to improve the management of stormwater generated from all forms of urban development, not just subdivision and apartment developments. Clause 53.18-5 (Stormwater management objectives for buildings and works) applies to all applications for two or more dwellings on a lot within the study area. Key objectives which must be satisfied are to:

- *Encourage development that reduces the impact of stormwater on the drainage system and filters sediment and waste from stormwater prior to discharge from the site;*
- *Encourage stormwater management that contributes to cooling, local habitat improvements and provision of attractive and enjoyable spaces; and*
- *Ensure that industrial and commercial chemical pollutants and other toxicants do not enter the stormwater system.*

The clause states that developments should meet the best practice objectives for stormwater quality as contained in the *Urban Stormwater - Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee, 1999). General decision guidelines for applications include the incorporation of WSUD, water quality of stormwater discharge and on-site stormwater retention.

The recent introduction of Clause 53.18 may assist in meeting the objectives of this study, but again needs time to play out.

Clauses 54 & 55 Residential Development Standards (ResCode)

ResCode standards at Clauses 54 and 55 outline the development standards for the construction of dwellings on a lot. ResCode includes a suite of objectives and standards – the most relevant to this report are street setback, building height and site coverage/permeability.

The General Residential Zone currently specifies 11 metres as the maximum building height which overrides the ResCode standard of 9 metres.

Street setback is dependent on the setbacks of abutting properties, while side and rear setbacks are dependent on building height. Minimum permeability is specified at 20% while maximum site coverage is 60%.

ResCode also includes standards for neighbourhood character. Applications must be accompanied by a neighbourhood and site description and design response which demonstrate how the development will integrate into the existing streetscape.

7.4 Review of comparable planning controls

We have reviewed planning provisions developed in Frankston and the surrounding municipalities of Kingston and Bayside given common themes pertaining to the protection of wetlands and sensitive environs.

Frankston Schedule 8 to the Design and Development Overlay - Sweetwater Creek Frankston South – Immediate Environs (DDO8)

DDO8 applies to a small portion of Frankston South in the immediate vicinity of the Sweetwater Creek. Design objectives seek to ensure that development is sensitive to the creek and its environs and minimises visual impact. Furthermore, maintaining adequate space on sites to allow for the planting of vegetation and reduced stormwater runoff is encouraged. The overlay extends approximately 50 - 100 metres from the creek.

Frankston Schedule 9 to the Design and Development Overlay - Sweetwater Creek Frankston South – Wider Environs (DDO9)

DDO9 applies to the wider environs of Sweetwater Creek. The design objectives are similar, focusing on enhancing the character of the broader Sweetwater Creek valley and maintaining adequate space on a site for vegetation and reduced stormwater runoff. DDO9 extends as far as 620 metres from the creek.

Kingston South East Non-Urban Area Policy

Kingston's South East Non-Urban Area Policy (Clause 22.04 of its Local Planning Policy) includes a Keysborough/Wetlands framework plan. Key points of the framework plan include:

- *Protection of flood plain storage capacity*
- *Recreation of wetlands*
- *Improvements to water quality along Mordialloc Creek*
- *Ensure that landscaping and urban design along the freeway reserve and main roads contribute to the rural character*
- *Some further opportunities for the establishment of low density 'urban related' uses; siting and design of new buildings to maximise east-west views, be of a low profile and provide sufficient setbacks to reduce visual impact*

Kingston Schedule 3 to the General Residential Zone (GRZ3)

Through Amendment C54 in 2006, the General Residential 1 Zone in the City's Incremental Change areas was replaced with the General Residential 3 Zone. The key changes were a 9m maximum height restriction and a maximum site coverage of 50%.

Kingston Schedule 2 to the Design and Development Overlay – Patterson Lakes Residential Waterways Area (DDO2)

Schedule 2 seeks to protect and enhance the waterway environment of Patterson Lakes. It prohibits buildings and works within 6 metres of the waterfront boundary other than decks and landings, paving, fences and swimming pools.

Bayside Clause 22.08 Water Sensitive Urban Design (Stormwater Management)

Clause 22.08 seeks to reduce the impact of urban development on waterways and water bodies through improving stormwater quality. All dwelling applications must be accompanied by a site layout plan showing stormwater treatment measures, demonstrated compliance with the *Urban Stormwater Best Practice Environmental Management Guidelines* (CSIRO, 1999) and a site management plan. Policy requires the treatment of stormwater runoff in line with the *Best Practice* guidelines as well as measures to prevent litter.

8 Stormwater Management

Water Technology (WT) was engaged to review and model stormwater conditions affecting the study area. This included:

- Review of the previous report by SKM, 2011
- Description of the ecological character of the Edithvale-Seaford Wetlands Ramsar Site, 2012
- A high-level water quality (MUSIC) model to estimate pre- and post-development stormwater pollution.
- A meeting with Frankston Council Officers, PLC Consulting and Water Technology (8 January 2019).

A summary of key findings arising from the WT review is provided here.

A full copy of the WT advice is **attached** to this report.

8.1 General

The Edithvale-Seaford Wetlands originally formed part of the much larger Carrum Carrum Swamp. Past development in the area has resulted in the fragmentation of this once wetland habitat, with Edithvale and Seaford Wetlands located in Kingston and Frankston respectively. The Edithvale-Seaford Wetlands is a Ramsar site and is therefore protected under international agreement. This study only considers the Seaford Wetland, a 158 ha wetland, for which Melbourne Water has formal management responsibility. Although located on Crown Land and freehold land owned by Melbourne Water, Frankston City Council also assumes responsibility for the management of some of the drier northern parts of the Seaford Wetland.

As a Ramsar site, the Seaford Wetland supports a range of habitat and waterbirds. The inundation regimes across the Seaford Wetland depend on a number of different sources and vary greatly. Surface inflows to the wetlands are primarily from drains, many of which are actively managed due to the low-lying nature of adjacent residential areas. Saline groundwater inflows also contribute, either via seepage or backflow from Kananook Creek, a drain at the southern end of the wetland. The Seaford Wetland is now actively managed and has been divided into hydrological cells to facilitate its management.

The Seaford population is forecast to increase (incrementally) over the next 20 years, with housing requirements likely to be met via infill development. Infill development has the potential to increase stormwater runoff in areas upstream of the Seaford Wetland, due to increase imperviousness and thus, freshwater inputs to the wetland. These changes may be ultimately positive however, they are also likely to influence how the Ramsar site is managed in the future.

Council officers have advised that all new development lots will need to have on-site detention and rainwater tanks. Additionally, the recently adopted Amendment VC154 introduces new stormwater management provisions for urban development, including all residential multi-dwelling developments.

8.2 Drainage catchments

The catchments contributing directly to Seaford Wetland (ignoring major flood overflows) are shown overleaf. They were delineated based on DELWP LiDAR dataset, existing drainage infrastructure (Melbourne Water and Council), parcels and aerials. Three sub-catchments that drain the site under existing conditions were identified:

- Western residential area (74.3 ha), with fraction imperviousness (FI) estimated to be about 0.6; This catchment has multiple inlets to Seaford Wetland;
- Eastern residential area (16.5 ha), predominantly located east of Brunel Road, with FI estimated to be about 0.6; and
- Seaford Wetland and its reserve (198.6 ha), with negligible FI.

The estimated fraction imperviousness values were derived from Melbourne Water's MUSIC Guidelines and were based on a mixed urban type of land form and the predominant type of residential lot sizes now and into the future. Based on the provided information, it has been assumed that most of the development zones are changing from large residential density to standard density. A maximum of 0.65 fraction imperviousness is expected based on current mandatory Garden Area requirements specified within the Planning Scheme.

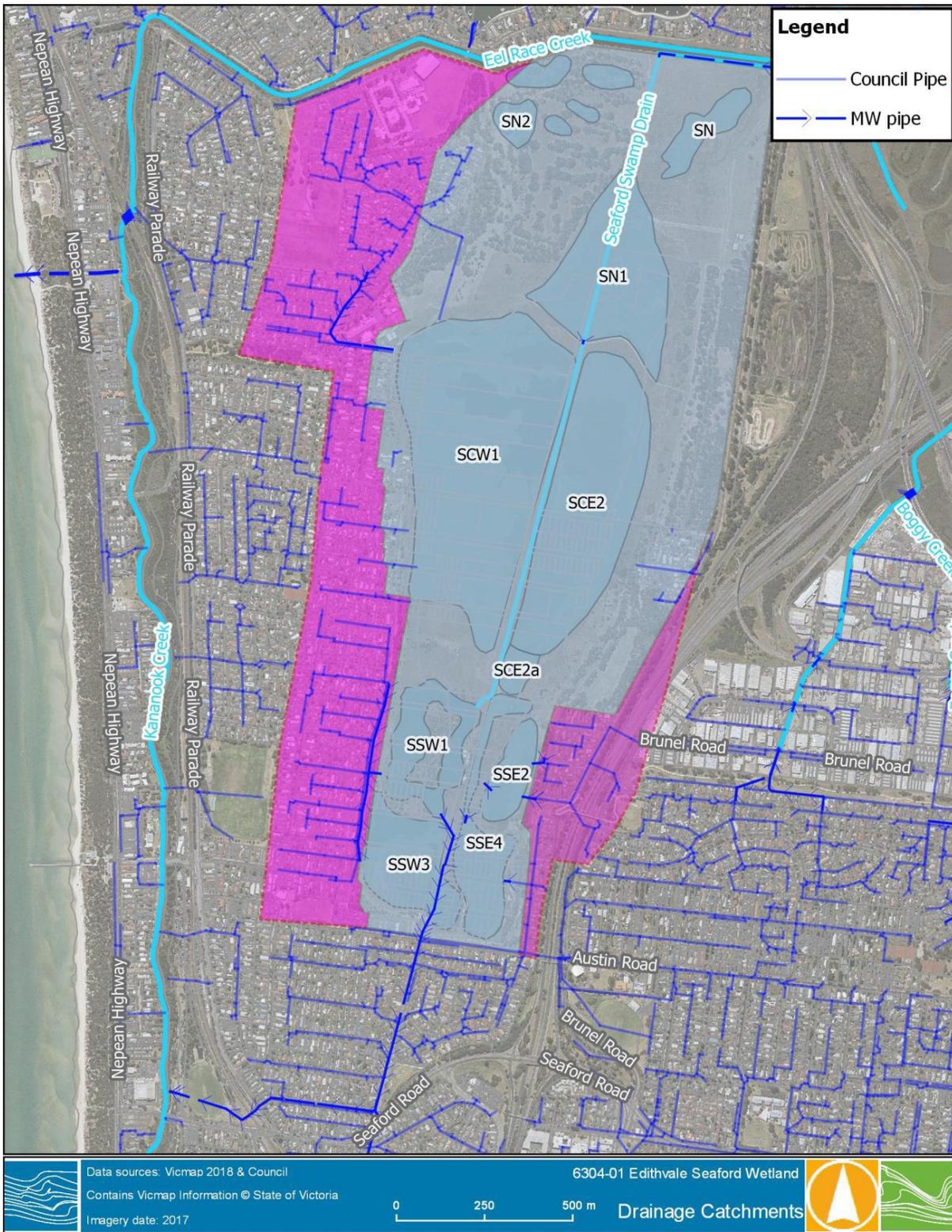


Figure 14 – Drainage Catchments

8.3 Key findings

- The modelling results indicate an increase of approximately 10% in surface runoff reaching the Wetlands. In order to preserve the wetland regime and ecological health, runoff treatment, infiltration and/or roof rainwater use will be required in ideal development scenarios.
- New development in the residential environs of the Ramsar listed Edithvale-Seaford Wetlands will need to comply with best practice, i.e. meet the Urban Stormwater – Best Practice Environmental Management (BPEM) Guidelines (Victorian Stormwater Committee, 1999).
- The BPEM requires flow discharges for the 1.5 year Average Recurrence Interval (ARI) at pre-development levels. This should generally ensure that impact from future developments on the hydrology regime of the Wetlands are mitigated.
- The State Environmental Protection Policy (SEPP) also provides a framework to protect and improve the quality of Victoria’s waters having regard to the principles of environmental protection set out in the Environment Protection Act 1970 (the Act). It sets pollutant load targets for a number of Victorian waterbodies, including Port Phillip Bay.
- Areas of High Conservation Values, such as Ramsar sites, may warrant an additional level of protection. It may therefore be possible to set further pollutant load targets for the Seaford Wetlands to protect and improve the water and ecological quality. However, this would likely require:
 - Evidences to support the higher level of planning control;
 - Identification of suitable pollutant reduction targets. Pollutant load targets will need to be informed by site particularities including beneficial uses, RAMSAR environmental values and other influences, such as tidal and soil characteristics; and
 - Establishment of baseline conditions and implement a water quality monitoring program to report on targets.

This may help support a range of WSUD strategies to further protect/improve Seaford Wetlands, including:

- The development of Stormwater Quality Contribution Payments to help meet specific stormwater quality requirements for Seaford Wetlands. The levied contributions could subsequently be used to fund a range of stormwater strategies such as:
 - Streetscape raingardens and tree pits – this could be coordinated with planned infrastructure upgrades (e.g. roads);
 - End-of-line WSUD assets at outlets, which could form part of landscaped areas along new walkways.
- Upgrad of stormwater infrastructure, with or without external funding such as Living Rivers and/or Port Phillip Bay Fund.

9 Key issues

Key issues identified in this report may be summarised as follows:

a) Protection of Ramsar wetlands

All Ramsar sites including the Seaford Wetlands are required to adopt a comprehensive management framework. The Victorian Auditor General found that risks from recreational activity, changes in water quality and climate change have not been properly addressed previously (this applies to all Ramsar sites). The protection of the Ramsar-listed Wetlands needs to be carefully considered in this context.

The Seaford Wetlands provide other important services such as assisting in the natural flow of flooding, retaining and diverting stormwater runoff and protecting the water quality of Port Phillip Bay through treating stormwater. They also provide education opportunities for schools and community groups.

Based on DELWP EVC (Ecological Vegetation Classes) modelling, there is potential for up to six EVCs to be present within a one-kilometre buffer of the Edithvale-Seaford Wetlands. Exotic predators such as foxes, cats and rabbits are identified as an extreme risk to the wetlands by Melbourne Water (2016). They prey on birds, small mammals and frogs. Other species such as the Mosquitofish, European Rabbit and weeds are prevalent and may cause a threat to flora and fauna. In order to prevent species – particularly foxes – from entering the wetlands, improvements to perimeter fencing and stormwater drains are recommended.

b) Previous attempts to strengthen planning provisions

We note comments made by previous Planning Panels where changes to planning schemes were proposed to combat similar issues, including lapsed Amendment C95. This amendment would have applied a 100m Neighbourhood Residential buffer zone around the Seaford Wetlands. In particular *Schedule 10 Seaford - Kananook Creek Environs west* specified maximum 40% site coverage, 40% permeability, all proposed plantings on landscape plans to be 100% indigenous species, private open space and setback requirements and 12m maximum height. The amendment sought to achieve many of the aspirations sought by this project but was ultimately unsuccessful.

While protection of the Ramsar Wetlands is critical, the amendment of planning schemes requires strong strategic rigour. This is likely to include the identification of:

- Demonstrated threats to the Wetlands (detailed research and reporting);
- Comprehensive stormwater modelling;
- The identification of deficiencies within the existing planning framework which are failing to address threats;
- The identification of planning provisions which would deliver benefit in addressing these threats.

Changes would not be retrospective and would only apply to future development.

c) Stormwater Management

It has been identified that the Seaford Wetlands would be placed at risk due to pollutants entering the system. The nature and severity of this risk needs to be further understood. The literature suggests that water quality in the Edithvale-Seaford Wetlands is likely to be significantly influenced by saline water intrusion from groundwater, exposure of coastal acid sulphate soils, backflows of saline water in drains during high tides and the quality of stormwater runoff from adjoining urban areas.

The Edithvale Seaford Wetlands Ramsar Management Plan 2016 previously identified that a lack of data and monitoring was problematic in understanding these risks and developing appropriate risk management measures. Modelling estimates undertaken through this study identify the potential for 10% increase in surface runoff reaching the Wetlands. We understand through discussion with Melbourne Water that monitoring of the water quality of the Wetlands is currently underway with results likely to be known by mid-2019.

Increasing the buffer of native vegetation and reducing the threat of invasive plant species were seen as key objectives for the Edithvale-Seaford Wetlands. Runoff treatment, infiltration and/or roof rainwater use were identified

Key issues

in this study as further measures for consideration. These recommendations remain high level. There is a need to better understand these risks and develop appropriate risk management measures for the study area.

Stormwater management is an existing issue and threat but is not confined to the study area; these issues manifest more broadly. The City of Frankston is home to a number of Wetlands and sensitive coastal environments. Council could consider the application of policy across the whole municipality to address these issues.

d) Development activity

Council's 2018 Housing Strategy identifies that the study area will experience incremental growth. Development activity has steadily increased over the past decade prior to a significant drop in 2018. There are a number of possible causes for this trend, including recent changes to planning requirements which restrict the potential for single dwelling house lots to be subdivided for multi-unit development. The two policies which show significant potential in reducing both infill development and its stormwater impacts are the new General Residential Zone provisions and Clause 53.18 (Stormwater Management in Urban Development). The mandatory garden area requirement of 25-35% is a significant change and is likely to improve stormwater retention and treatment at the source, thus reducing the impact on the Wetlands.

Water Technology's report outlines that Clause 53.18 will generally mitigate the impact from future developments on the hydrology regime of the Wetlands. These changes need further time to play out, in order to determine whether development activity is pre-or post-2017 conditions. There is a need to monitor development activity within the study area to develop a more definitive understanding of development pressures.

e) Visual impact

The topography of the study area is relatively flat. Visual impact is only likely to be relevant for properties either directly abutting or in close proximity to the Wetlands. A visual analysis of the study area did not identify significant volumes of new development which would negatively impact the study area.

There is no correlation between new development and adverse visual impact. As development does occur, there are a number of opportunities for the private realm to contribute positively to the public realm through good design. This includes:



- Passive surveillance – through the avoidance of blank rear and side walls and the orientation of living spaces and windows to face the public realm (refer example to the right);
- Appropriate setbacks to side and rear boundaries;
- Space for mature trees to grow and develop;
- Appropriate fencing;
- Use of appropriate colours and materials.

f) Public realm

The study area contains both the Seaford Wetlands (public land) and surrounding land consisting of private residential land, the Downs Estate (Council land), the Seaford North Primary School, part of the Seaford Primary School, Patterson River Secondary College and Riviera Reserve. Areas within the study area are used differently. In broad terms, this may be described as:

- The largely fenced area of the Seaford Wetlands is not publicly accessible and is reserved for environmental and drainage purposes.

Key issues

- The perimeter of the Wetlands is largely accessible to the public and contains recreation trails, vegetation, drainage and other infrastructure.
- The broader surrounding environs are developed for housing or education separated from the Wetlands by fences and roads.

The perimeter of the Wetlands which is publicly accessible provides an opportunity to improve the public realm. According to officers, this area is managed and maintained largely by Council but could play a stronger role in providing a suitable interface between private land and the sensitive (fenced) area of the Wetlands. Measures for consideration include:

- Beautification of the Wetlands boundaries – tree planting, landscaping;
- Rain gardens to assist with stormwater management;
- Further completion of the walking trail / circuit around the Wetlands;
- Directional signage to assist with wayfinding;
- Facilities to support walking and cycling;
- Upgrades to existing facilities, including seating;
- Improvements to the Austin Road Rotunda.

10 Conclusion - Effectiveness of planning framework

a) Policy:

The Planning Policy Framework was recently revamped to include State, Regional, and Local policy. The Policy Framework includes broad directions relating to issues including Stormwater Management, Environmental Management, and Built Form (amongst other directions). State Planning Policy provides explicit directions relating to Biodiversity at Clause 12.01 – Biodiversity:

- *Strategically plan for the protection and conservation of Victoria's important areas of biodiversity.*
- *Ensure that decision making takes into account the impacts of land use and development on Victoria's biodiversity, including consideration of:*
 - *Cumulative impacts.*
 - *Fragmentation of habitat.*
 - *The spread of pest plants, animals and pathogens into natural ecosystems.*
- *Consider impacts of any change in land use or development that may affect the biodiversity value of national parks and conservation reserves or nationally and internationally significant sites; including wetlands and wetland wildlife habitat designated under the Convention on Wetlands of International Importance (the Ramsar Convention).*

The Seaford Wetlands are identified in policy as an area of environmental risk in terms of sea level rise and natural hazard events, bushfire risk, flooding and inundation, coastal acid sulfate soil, indigenous flora and fauna and waterway health. Policy seeks to apply a Precautionary Principle to all new developments adjacent to the Wetlands.

Stormwater management is an existing issue and threat but is not confined to the study area. Frankston City Council is home to a number of wetlands and sensitive coastal environments. Council could consider the application of policy across the whole municipality to address these issues.

b) Application of Zones:

Within the public realm, the application of four different zones within the Seaford Wetlands is not reflective of ground conditions. We are aware the Council are looking to rezone the Wetlands to provide more cohesion, and that this may benefit the management of the Ramsar site.

The application of zones within the private realm is largely confined to the General Residential Zone. In recent years, the Zone has been adjusted (across Victoria) to introduce mandatory height limits and garden area requirements. The combination of ResCode and General Residential Zone requirements has impacted the way in which residential land can be subdivided and developed, and is more restrictive than previous iterations. The results of this are still playing out and need time to be understood.

A question this report explores is whether the current zone is appropriate to meet future needs. Through the use of a schedule to the zone there is an ability to customise specific outcomes for the study area. This could be entertained; however, the timing of changes needs to be responsive to a full understanding of issues and their cause in order to design a planning tool which is appropriate.

c) Application of Overlays:

The extent of Land Subject to Inundation Overlay (LSIO) and Special Building Overlay (SBO) provisions relates to flood mapping and modelling. Unless new flood mapping reveals changes in overland flows or flooding, there is no need to change either Overlay.

The Environmental Significance Overlay, Schedule 4 (ESO4) – Significant Trees and Areas of Vegetation has only been applied to schools within the north west of the study area. We note that Armstrongs Reserve may provide habitat connectivity between the study area and coast. As such, the potential for stronger protection through the ESO4 or similar should be further explored.

Conclusion - Effectiveness of planning framework

The Bushfire Management Overlay (BMO) applies to the east of the study area. We understand that changes were made in 2017 to reduce the extent of the BMO within the study area. Discussions with Council officers through the course of the project indicate that a reduction in the extent of the BMO has reduced the number of planning permit applications. This appears to be supported by Council's planning permit data which shows a noticeable drop in planning permit applications within the study area in 2018. Given the recency of this work, and further changes made to the Planning Policy Framework with respect to bushfires, further changes to the BMO are unlikely to be required at this time.

10.1 Implications

We believe there is sufficient planning framework direction (in some cases overlapping) within the current planning scheme to guide decision making. The two policies which show significant potential in reducing infill development and its stormwater impacts are the new General Residential Zone provisions and Clause 53.18 (Stormwater Management in Urban Development). The mandatory garden area requirement of 25-35% is a significant change and is likely to improve stormwater retention and treatment at the source, thus reducing impact on the Wetlands. Meanwhile, Clause 53.18 will generally mitigate the impact from future developments on the hydrology regime of the Wetlands as outlined by Water Technology.

Other policies which support the protection of the Seaford Wetlands from urban development include Frankston's Neighbourhood Character Policy, PPF Clauses 12.01 (Biodiversity) and 12.03 (Water Bodies and Wetlands) and Frankston City Council's WSUD Guidelines.

Based on the policies discussed above and the need to let Amendments VC110 and GC13 and Clause 53.18 play out, we cannot conclude that changing the Schedule to the GRZ or introducing a DDO to address drainage / flooding or built form / visual impact is appropriate at this stage. Stormwater management is certainly an existing issue and threat, but it is not exclusive to the study area. Council could consider the application of relevant policy across the whole municipality to tackle stormwater issues.

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11 Recommendations

PLC Consulting was requested to review the existing planning framework within the study area to determine whether it is sufficient to meet current and future needs. This included the consideration of whether improvements were necessary to encourage better outcomes for Council and the community. Council also sought a high-level stormwater strategy as part of the project.

In summary, it would appear that impacts on the study area posed by increased stormwater are likely to be the priority focus for future action (this may include measures to address site coverage). Impacts posed by built form and visual impact would appear to be of secondary importance.

We are mindful of previous comments made by Planning Panels where similar planning controls have attempted to be introduced. We are also mindful of a number of recent and emerging sources of information which are likely to be important in providing the necessary strategic justification for change.

For these reasons, we believe it would be premature to seek introduction of more restrictive planning provisions within the study area at this point. This is due to:

- a) Recent changes to Residential Zones (introduction of mandatory garden area requirements, height limits) through Amendment VC110 in March 2017 that placed new restrictions on development which may assist in reducing developable area and increasing site permeability / filtration. The impacts of these changes need time to play out.
- b) The recent introduction of policy across the State – ‘Stormwater Management in Urban Development’, VC154 in October 2018 may also deliver protections to the study area. While the Amendment does not make changes to the General Residential Zone, it does introduce changes to Clause 55.03-4 which would apply to the assessment of planning applications for two or more dwellings on a lot. This change may assist in meeting the objectives of this study, but again needs time to play out.
- c) While planning permit applications have steadily risen over the past decade, they have dramatically decreased in 2018. We question whether the relatively low number of applications seen in 2018 will continue.
- d) Through visual inspection, we did not identify developments which had adversely impacted the public realm in terms of scale, massing, or siting of new buildings. We acknowledge one notable exception to the west of the study area; however, we do not believe this provides the basis for change.
- e) Council does not appear to be pressured by a significant number of applications going to the Tribunal within the study area. There is no evidence at this point that the existing planning framework is problematic or threatened by challenge at the Tribunal.



Source: Frankston City Council

In light of the above findings, we conclude that implementing a DDO or Schedule to the GRZ is not required at this stage. With the above in mind, we would recommend consideration of the following actions overleaf.

Item	Action	Detail	Likely Timing
1	Monitoring and Review	Council monitor and review planning and building permit activity – End 2019. Monitoring should include a qualitative and quantitative assessment of planning outcomes within the study area. This should include an interrogation of Council building permit data to understand the relationship between the size of lots and % site coverage. The review should also include an assessment of changes within the study area over the past 3 years (2017-2019).	End 2019
2	Policy development	Development of a dedicated “Stormwater Management” policy for application across the City of Frankston.	Late 2019
3	Management	Council to further liaise with Melbourne Water to understand its priorities for the Seaford Wetlands, including: <ul style="list-style-type: none"> • Grant monies which may be utilised for Capital Works to improvements to the public realm, including: Tree planting with appropriate tree species; Streetscape raingardens and tree pits; and End-of-line WSUD assets. • The development of standard planning permit conditions applicable to the Study Area focused on improving stormwater quality. • The production of education materials for residents around the significance of the Wetlands and measures that can be implemented to assist in their protection. • In order to prevent species – particularly foxes – from entering the Wetlands, improvements to perimeter fencing and stormwater drains are recommended. 	Ongoing
4	Capital works	The perimeter of the Wetlands which is publicly accessible provides an opportunity to improve the public realm. Measures for consideration include: <ul style="list-style-type: none"> • Beautification of the Wetlands boundaries – tree planting, landscaping; • Rain gardens to assist with stormwater management; • Further completion of the walking trail / circuit around the Wetlands; • Directional signage to assist with wayfinding; • Facilities to support walking and cycling; • Upgrades to existing facilities, including seating; • Improvements to the Austin Road Rotunda. 	Subject to Council budget cycle

12 Limitations

This report was prepared for the sole use of Frankston City Council and should not be relied upon by any other person. None of PLC Consulting Pty Ltd or any of its related entities, employees or directors (each a PLC Person) owes a duty of care (whether in contract, tort, statute or otherwise) to any third party with respect to or in connection with this report and no PLC Person accepts any liability for any loss or damage suffered or costs incurred arising out of or in connection with the use of this report by any third party.

The conclusions and recommendations provided in this report are based on available information and it is possible that different conclusions and recommendations could be made should new information become available, or with changing site conditions over time.

The report will not be updated if anything occurs after the date of this report and PLC Consulting Pty Ltd will not be obliged to inform any person of any matter arising or coming to its attention after that date.



Attachment 1 – Water Technology Report

MEMORANDUM

To Tom Harrington | PLC Consulting
From Cintia Dotto & Bertrand Salmi | Water Technology
Date 18 January 2019
Subject Seaford Wetlands Residential Environs Study

Water Technology was engaged by PLC Consulting to undertake a study on the impacts of the residential environs of the Ramsar listed Edithvale-Seaford Wetlands to investigate the need for changes to the Frankston Planning Scheme.

This memorandum documents the findings of a desktop study, to assess stormwater runoff influence pre- and post-development on Edithvale-Seaford Wetlands. It has been informed by:

- A review of the previous report by SKM, 2011¹.
- Description of the ecological character of the Edithvale-Seaford Wetlands Ramsar Site, 2012².
- A high-level water quality (MUSIC) model to estimate pre- and post-development stormwater pollution.
- A meeting with Frankston Council Officers, PLC Consulting and Water Technology (8 January 2019).

This memorandum forms the first stage in providing Frankston City Council with a quantitative impact assessment on future stormwater pollution and provides preliminary recommendations for a future stormwater strategy to mitigate potential impacts.

1 SEAFORD WETLAND

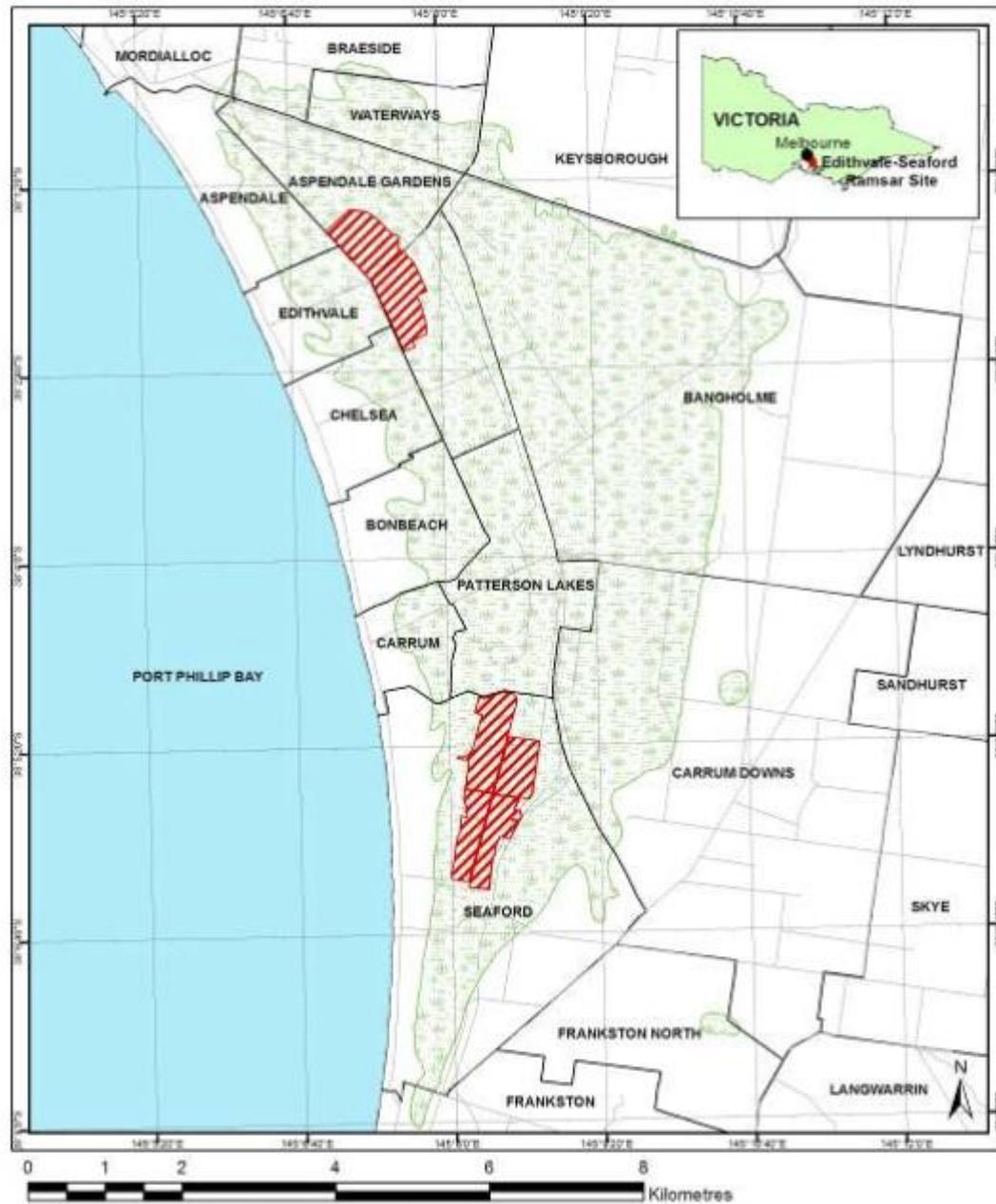
Edithvale-Seaford Wetlands originally formed part of the much larger Carrum Carrum Swamp, as shown in Figure 1-1. Past development in the area has resulted in the fragmentation of this once wetland habitat, with Edithvale and Seaford Wetlands located in Kingston and Frankston respectively. The Edithvale-Seaford Wetlands are Ramsar site and is therefore protected under international agreement.

This study only considers Seaford Wetland, a 158 ha wetland, for which Melbourne Water has formal management responsibility. Although located on Crown Land and freehold land owned by Melbourne Water, Frankston City Council also assumes responsibility for the management of some of the drier northern parts of the Seaford Wetland.

Located within the Bunyip River Basin, Seaford Wetland has been modified and impacted over the years due to land use and urbanisation of its upstream catchment. Seaford Wetlands the water levels are generally quite shallow and stable, supporting a range of habitats – ranging from fresh to saline – and Ecological Vegetation Classes (EVCs), shown in Figure 1-2, all with a Bioregional Conservation Significances of “Endangered”.

¹ SKM (for Melbourne Water) (2018). Environmental water requirements and associated capital works for the Edithvale-Seaford Wetlands.

² Victorian Government Department of Sustainability and Environment Melbourne (2012). Description of the ecological character of the Edithvale-Seaford Wetlands Ramsar Site.



Location: Edithvale - Seaford Ramsar Site

Legend

- Edithvale-Seaford Ramsar Site
- Carrum Carrum Swamp
- Suburb
- Roads

COORDINATE SYSTEM
MGA84

PROJECTION: Universal Transverse Mercator (UTM) Projection

DATUM: Horizontal: Geocentric Datum of Australia (GDA)
Vertical: Australian Height Datum (AHD)

GRID: Map Grid of Australia 1984 (MGA84) Zone 54S

Disclaimer: This map is a snapshot generated from Victorian Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the

Figure 1-1 Edithvale-Seaford Ramsar Site (source GDA)



■ **Figure 3-2 Distribution of wetland vegetation classes at the Seaford wetland (data sourced from MW)**

Figure 1-2 Ecological Vegetation Classes in Seaford Wetland (source: SKM)



1.1 Hydrological Regime

As a Ramsar site, Seaford Wetland supports a range of habitat and waterbirds, each with their respective water regime requirements (see Appendix A). The inundation regimes across the Seaford Wetland depend on a number of different sources and vary greatly, as is evident from Figure 1-3. Surface inflows to the wetlands are primarily from drains, many of which are actively managed due to the low-lying nature of adjacent residential areas. Saline groundwater inflows also contribute, either via seepage or backflow from Kananook Creek, a drain at the southern end of the wetland.

Seaford Wetland is now actively managed and has been divided into hydrological cells, shown in Figure 1-4, to facilitate its management. Objectives include to maintain a predominantly fresh brackish environment to sustain key invertebrate and wader habitats and/or to provide critical seasonal habitats for a range of bird species in fresh brackish regime (eg in Cell SCE2).

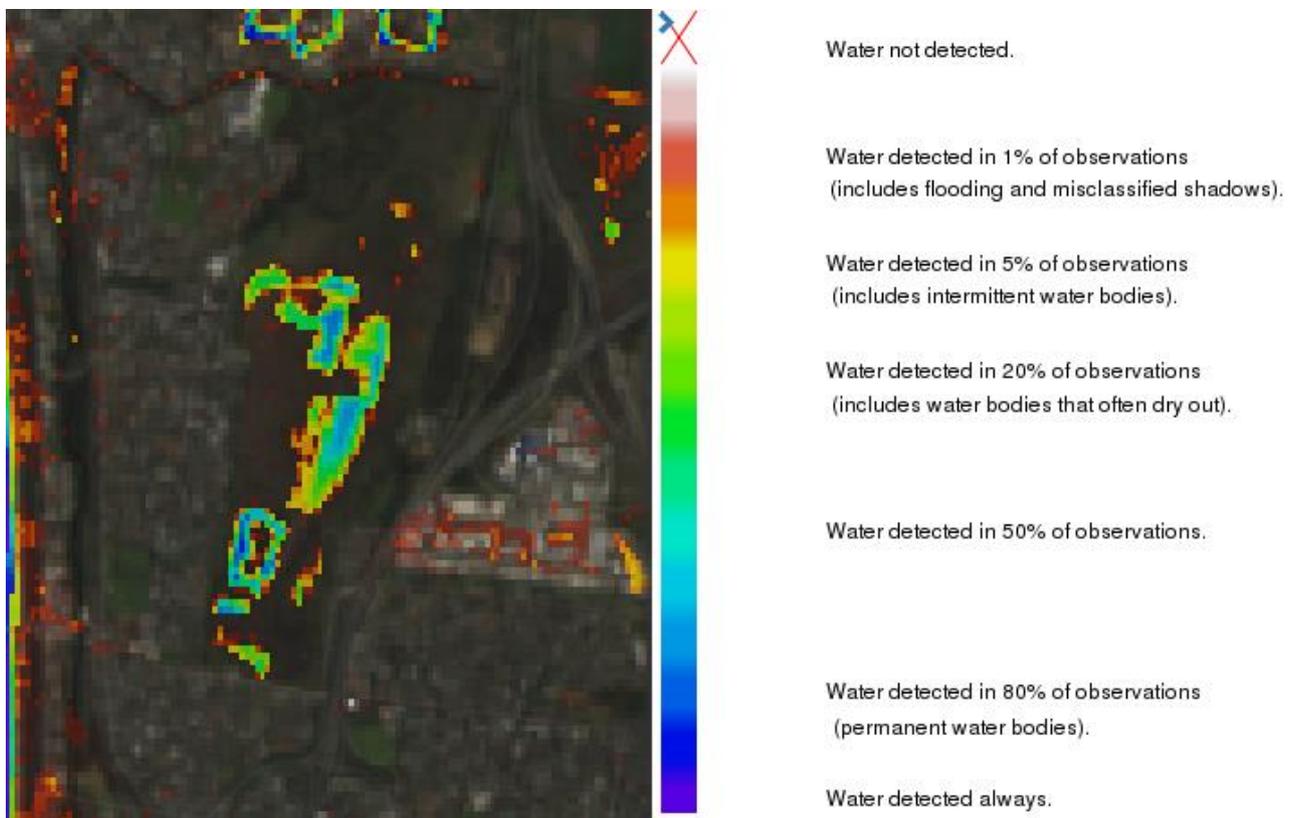


Figure 1-3 Seaford Wetland Typical Water Level (source: WOfS, 2018³)

³ <http://www.ga.gov.au/interactive-maps/#/theme/water/map/wofs>



Figure 1-4 Hydrological Cells in Seaford Wetland (Cell locations obtained from SKM Report)



SKM derived a “ideal watering regime”, shown in Figure 1-5. Whilst its bathymetry is generally quite shallow and stable, salinity levels are increasing, due to the marinization of Kananook Creek and past excavation in parts of the wetland through the natural peat layer (SKM, 2012). Key to achieving this “ideal watering regime” is managing freshwater inputs to the system as well as saline intrusion/levels.

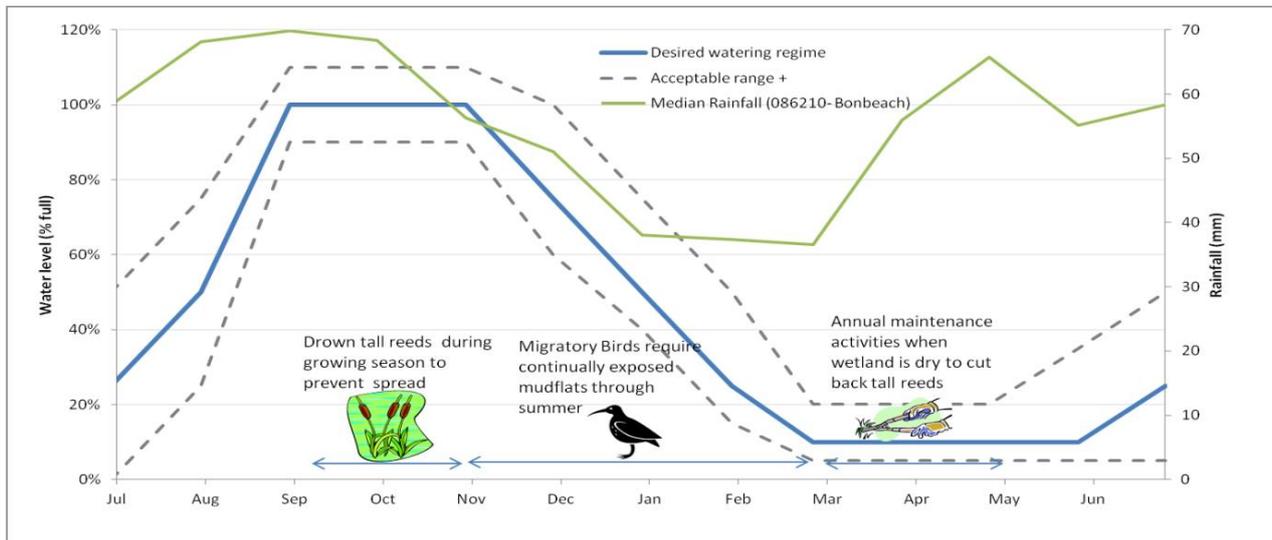


Figure 1-5 Proposed Ideal Watering Regime by SKM (source SKM)

The Seaford population is forecast to increase over the next 20 years, with housing requirements likely to be met via infill development. Infill development has the potential to increase stormwater runoff in areas upstream of Seaford Wetland, due to increase imperviousness and thus, freshwater inputs to the wetland. These changes may be ultimately positive however, they are also likely to influence how the Ramsar site is managed in the future.

The following Section assess quantitatively possible changes in stormwater runoff, both in terms of quality and volumes, due to local infill development and discuss how impacts could be mitigated.

2 STORMWATER QUANTITY AND QUALITY ANALYSIS

A high-level water balance of Seaford Wetland upstream catchments was developed to:

- Identify and delineate existing catchment(s) upstream of the proposed ornamental wetland;
- Assess impacts of future development on stormwater runoff, both in terms of quantity and quality.

2.1 Drainage Catchments

The catchments contributing directly to Seaford Wetland (ignoring major flood overflows) are shown in Figure 2-1. They were delineated based on DELWP LiDAR dataset, existing drainage infrastructure (Melbourne Water and Council), parcels and aerials. Three sub-catchments that drain the site under existing conditions were identified:

- Western residential area (74.3 ha), with fraction imperviousness (FI) estimated to be about 0.6;
 - This catchment has multiple inlets to Seaford Wetland;



- Eastern residential area (16.5 ha), predominantly located east of Brunel Road, with FI estimated to be about 0.6; and
- Seaford Wetland and its reserve (198.6 ha), with negligible FI.

The estimated fraction imperviousness values were derived from Melbourne Water's MUSIC Guidelines⁴, and were based on a mixed urban type of land form and the predominant type of residential lot sizes now and into the future. Based on the provided information, it has been assumed that most of the development zones will be changing from large residential density to standard density. Water Technology has been advised by PCL that a future FI of maximum 0.65 is expected.

2.2 MUSIC Modelling

To understand catchment hydrological regime and pollutant inflows, a MUSIC model was set up and run for 10 years of pluviographic rainfall data from the Melbourne City rainfall gauge. Melbourne City is the recommended rainfall data for the area in Melbourne Water's MUSIC Guidelines⁴.

Table 2-1 summarises MUSIC results under existing conditions, for each sub-area.

Table 2-2 summarises MUSIC results under future conditions.

⁴ Melbourne Water (2018). MUSIC Guidelines: recommended input parameters and modelling approaches for MUSIC users.

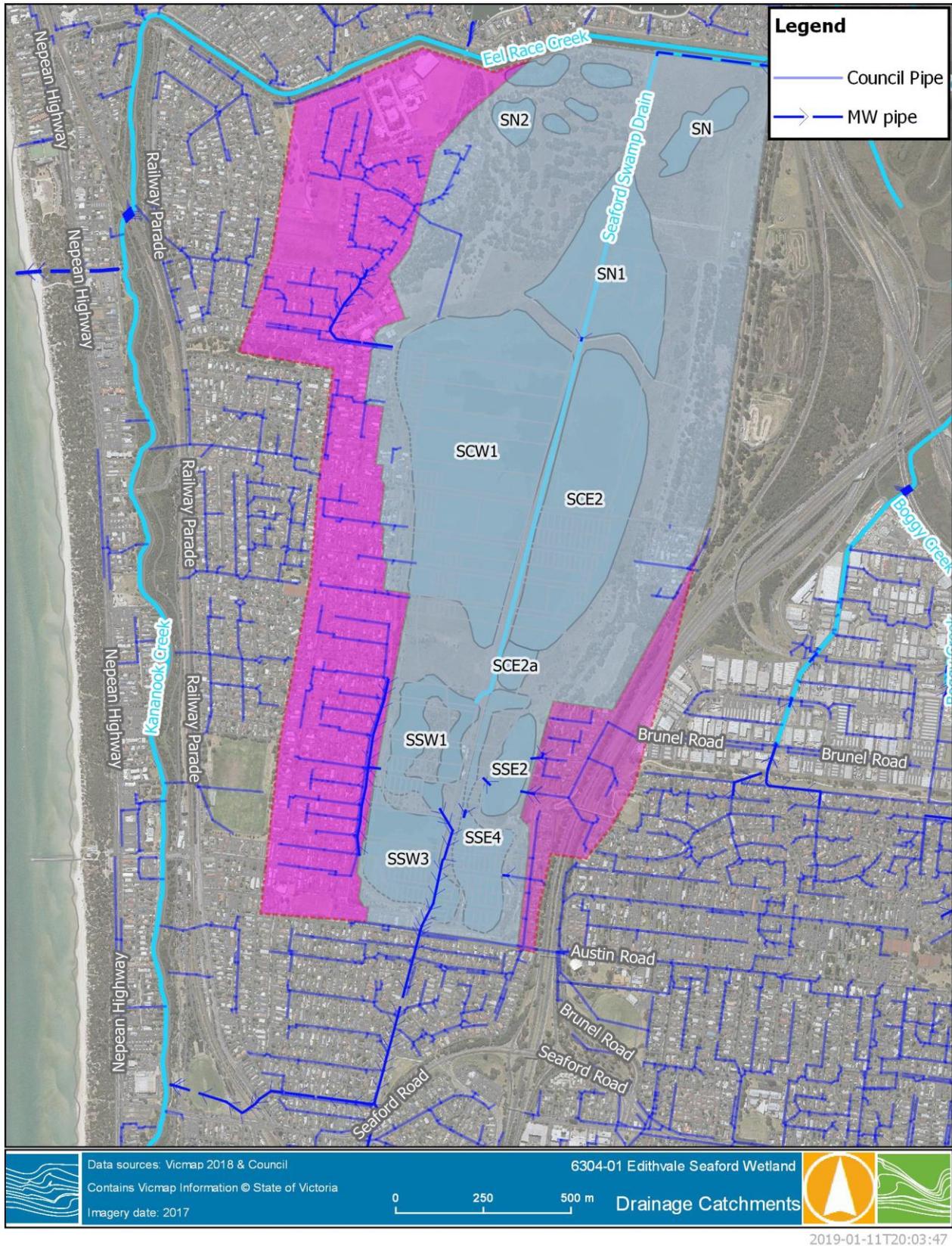


Figure 2-1 Seaford Wetland Direct Catchments



Table 2-1 MUSIC Model Results – Existing Scenario

Catchment	Area (ha)	FI	Stormwater Runoff (ML/year)	TSS (Kg/year)	TP (Kg/year)	TN (Kg/year)
Seaford Wetland	198.6	0.0	260	5,600	46.6	571
Western Res Area	74.3	0.6	299	54,900	116	838
Between Seaford Wetland and Brunel Road	16.5	0.6	66.6	12,100	25.4	184
TOTAL	289.4	0.19 (av)	625.6	72,600	188	1,593

Table 2-2 MUSIC Model Results – Future Scenario

Catchment	Area (ha)	FI	Stormwater Runoff (ML/year)	TSS (Kg/year)	TP (Kg/year)	TN (Kg/year)
Seaford Wetland	198.6	0.05	305	17,500	68	712
Western Res Area	74.3	0.65	312	57,700	121	873
Between Seaford Wetland and Brunel Road	16.5	0.65	70.1	13,200	27.6	196
TOTAL	289.4	0.24 (av)	687.1	88,400	216.6	1,781

Upon the assumption of the development zones changing from large residential density to standard (smaller allotment sizes) under a business as usual scenario (larger portion of the catchments are directly connected to the drainage system), the modelling results indicate an increase of approximately **10% in surface runoff reaching the wetland**. The increase in pollutant loads were estimated to be in the magnitude of approximately:

- 20% for Total Suspended Solids;
- 15% for Total Phosphorous; and
- 12% for Total Nitrogen.

In order to preserve the wetland regime (which has been reported to be appropriated) and protect the wetland ecological health, runoff treatment, infiltration and/or roof rainwater use will be required in the future development scenario.



3 STORMWATER MANAGEMENT STRATEGY - RECOMMENDATIONS

Council officers have advised that all new development lots will need to have on-site detention and rainwater tanks. Additionally, the recently adopted Amendment VC154 introduces new stormwater management provisions for urban development, including all residential multi-dwelling developments. As a result, most new development in the residential environs of the Ramsar listed Edithvale-Seaford Wetlands will need to comply with Best Practice, ie meet the *Urban Stormwater – Best Practice Environmental Management (BPEM) Guidelines* (Victorian Stormwater Committee, 1999).

One of the stormwater management clause in the BPEM document is the requirements to maintain flow discharges for the 1.5 year Average Recurrence Interval (ARI) at pre-development levels. This should generally ensure that impact from future developments on the hydrology regime of the wetlands are generally mitigated.

The State Environmental Protection Policy (SEPP) also provides a framework to protect and improve the quality of Victoria's waters having regard to the principles of environment protection set out in the **Environment Protection Act 1970** (the Act). It sets pollutant load targets for a number of Victorian waterbodies, including Port Phillip Bay.

Areas of High Conservation Values, such as Ramsar site, may therefore also warrant additional level of protections. It may therefore be possible to set further pollutant load targets for Seaford Wetlands to protect and improve the quality of Seaford Wetlands however, this would likely require:

- Evidences to support the higher level of planning control;
- To identify suitable pollutant reduction targets;
 - Pollutant load targets will need to be informed by site particularities, including beneficial uses, RAMSAR environmental values, other influences, such as tidal and soil characteristics;
- To establish baseline conditions and implement a water quality monitoring program to report on targets:

This may help support a range of WSUD strategies, to further protect/improve Seaford Wetlands, including:

- The development of Stormwater Quality Contribution Payments, to help meet specific stormwater quality requirements for Seaford Wetlands. The levied contributions could subsequently be used to fund a range of stormwater strategies:
 - Streetscape raingardens and treepits – this could be coordinated with planned infrastructure upgrades (eg roads);
 - End-of-line WSUD assets at outlets (see Figure 3-1) – this could form part of landscaped area along new walkway.
- Upgrades of stormwater infrastructure, with or without external funding such as Living Rivers and/or Port Phillip Bay Fund.

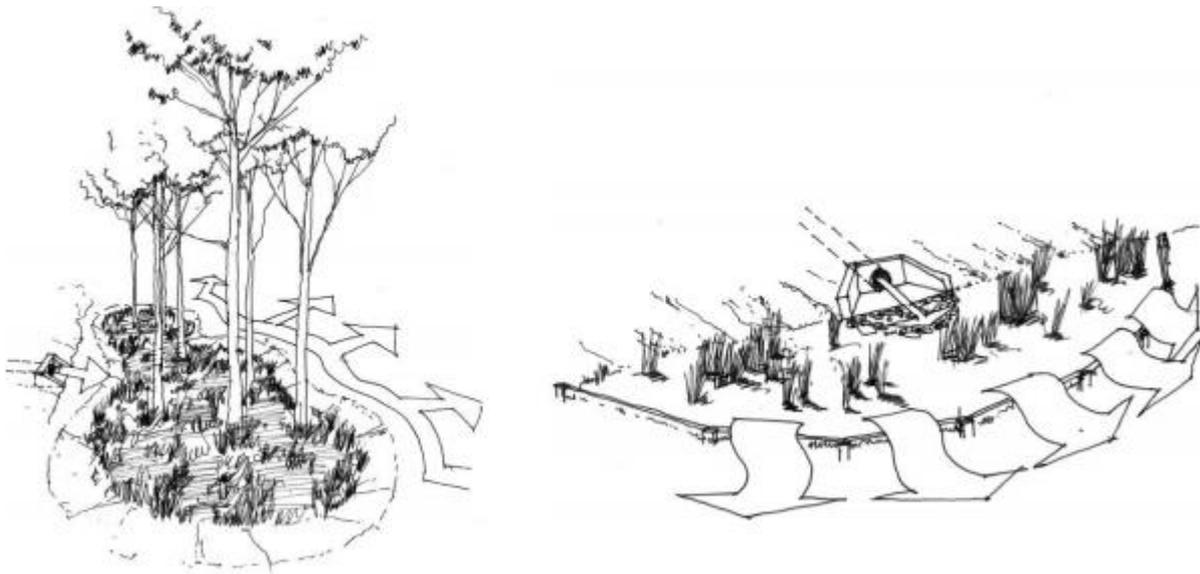


Figure 3-1 Stormwater Outlets to WSUD assets (left) or riparian area (right) (source: Water by Design 2014)

4 SUMMARY

In relation to future residential development of the Seaford suburb, Water Technology has been asked to complete preliminary investigations – including a high-level hydrological assessment - to assess stormwater runoff influence pre- and post-development on Edithvale-Seaford Wetlands. This memorandum summarises findings from the desktop assessment and the preliminary MUSIC modelling undertaken and provides preliminary recommendations as to a possible holistic approach to Stormwater management for the wider catchment.

I trust that we have included sufficient information for consideration.

Yours sincerely

Water Technology Pty Ltd

Bertrand Salmi

Senior Engineer

WATER TECHNOLOGY PTY LTD

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APPENDIX A - SEAFORD WETLAND – WATER REGIME REQUIREMENTS (SKM, 2011)

■ Table 3-4 Water regime requirements to meet objectives for ESW (Higgins and Davies 1996; Marchant and Higgins 1990, 1993; Andrew Silcocks and Sean Dooley, Birds Australia, pers. comm.).

Value/Threat	Ecological objective	Water regime requirements				
		Component	Frequency	Timing	Duration	Depth
RAMSAR VALUES						
Australasian bittern Criterion 2	Maintain and/or enhance suitable habitat to continue to support this species	Common reed and cumbungi and high water levels	Annually	Winter-spring	8-12 months (favours permanent wetlands)	Forage and nest above shallow permanent water (≤ 0.3 m)
Sharp-tailed sandpiper Criterion 6	Maintain and/or enhance suitable habitat to support ecologically significant numbers	Shallow water and exposed mudflats i.e. drying wetlands High secondary productivity of invertebrates required	Annually, or at least in every one of three years	Spring-summer migratory period (drawdown December to February)	6-8 months	Shallow (150 mm) water and bare mudflat should continually be exposed throughout the summer drying phase
High diversity of waterbirds Criterion 3	Maintain and/or enhance the diversity of habitats for supporting populations of species for maintaining biodiversity	Diversity of habitats, including areas of: common reed and cumbungi; deep open freshwater; open shallow water/ exposed mudflat	Annually, or at least in one of every two years	Variable, including Winter-spring (Australasian bittern), Spring-summer (migratory waders) and Winter-summer (diving ducks and black swan)	8-12 months for Australasian bittern and diving ducks and 6-8 months migratory waders	Variable: ≤ 0.3 m for Australasian bittern; shallow (150 mm) water and exposed mudflat for migratory waders; and deep (≥ 0.5 m) for diving ducks
Important foraging habitat for migratory waders, breeding habitat for resident and nomadic species, and/or drought refuge Criterion 4	Maintain and/or enhance habitats for supporting species during the critical phases of their life cycles or providing refuge during adverse conditions	Diversity of habitats, including areas of: common reed and cumbungi; deep open freshwater; open shallow water/ exposed mudflat.	Annually, or at least in one of every two years	Variable, including Winter-spring (Australasian bittern), Spring-summer (migratory waders) and Winter-summer (diving ducks and black swan)	8-12 months for Australasian bittern and diving ducks and 6-8 months for migratory waders	Variable: ≤ 0.3 m for Australasian bittern; shallow (150 mm) water and exposed mudflat for migratory waders; and deep (≥ 0.5 m) for diving ducks

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Value/Threat	Ecological objective	Water regime requirements				
		Component	Frequency	Timing	Duration	Depth
OTHER VALUES						
CAMBA/JAMBA migratory species	Maintain and/or enhance habitats for supporting migratory waders	Open, shallow water and/or exposed mudflats	Annually	Spring-summer migratory period	6-8 months	Shallow (150 mm) water and bare mudflat should continually be exposed throughout the summer drying phase
Threatened diving duck species	Enhance habitat so that breeding is regular for key species (e.g. blue-billed duck, hardhead and musk duck)	Deep open water for foraging and inundated vegetation (e.g. reedbeds) for nesting (e.g. nest site is between 10-100 cm above water and in vegetation reaching 50-150 cm above nest)	Annually	Mostly during Winter-summer (July-February), and occasionally in autumn	8-12 months (favours permanent wetlands)	Deep (≥ 0.5 m)
Australasian shoveller (threatened in Victoria)	Enhance habitat for foraging	Usually forages to about 0.3 m depth, but also dives to greater depths	Annually	Year-round	8-12 months (favours deep permanent wetlands)	≤ 0.3 m to ≥ 2 m
Little bittern (**Edithvale only)	Maintain and/or enhance breeding and foraging habitat	Dense reedbeds (cumbungi and common reed) where forages in shallow water or from emergent or aquatic vegetation over deeper water; and nest in dense vegetation at 5-210 cm above water of 10-70 cm depth	Annually	Late-spring to early-autumn migratory period (November to March)	6 months	≤ 0.3 m to ≥ 2 m mostly sighted where there is Fresh water
Crakes and Rails, including FFG-listed Lewin's rail and Baillon's crake	Maintain and/or enhance breeding and foraging habitat for these species	Shelter and nest in dense vegetation (e.g. reedbeds of cumbungi and common reed) above water or mud and forage in adjoining shallow water (< 5 cm for Lewin's rail and < 3 cm for Baillon's crake) or on exposed mud Baillon's crake nest height above water varies between 4-60 cm	Annually	Year-round for Lewin's rail (possibly resident) and Spring-summer (September to February) for Baillon's crake (summer migrant)	12 months for Lewin's rail and 6 months for Baillon's crake	Variable: shallow water (< 3 cm deep) and exposed mudflat for foraging and inundated reedbeds for nesting to about 0.6 m
FFG-listed great	Maintain and/or	In freshwater wetlands, Great	Annually	Year-round	12 months	Variable water levels to

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Value/Threat	Ecological objective	Water regime requirements				
		Component	Frequency	Timing	Duration	Depth
egret, intermediate egret and little egret	enhance foraging habitat by providing a range of water levels to accommodate the species	Egrets and little egrets forage in open water to 0.3 m and 0.15 m deep, respectively. Intermediate Egrets prefer to forage in freshwater < 80 mm deep and amongst dense aquatic vegetation, but can dive for fish and invertebrates				0.3 m deep
Latham's snipe	Enhance foraging habitat to support higher numbers	Shelter in dense vegetation (e.g. grass tussocks and reedbeds) and forage in shallow (150 mm) water or on exposed mudflat	Annually	September to March	September to March (7 months)	Shallow (150 mm) water and bare mudflat should continually be exposed, especially throughout the summer drying phase
Royal spoonbill	Maintain and/or enhance foraging habitat	Structure of bill limits foraging to waters of less than 0.4 m deep; nest in trees, shrubs (e.g. swamp paperbark) or reedbeds over water 0.5 to 1.5 m deep	Annually	October to February	October to February when water levels are low	≤ 0.4 m deep for foraging
Marshland passerines	Maintain and/or enhance breeding and foraging habitat	Common reed and cumbungi used for nesting and shelter and edges used for foraging; inundation important for maintaining invertebrate supplies over summer	Annually	October to January	October to January	Shallow and drawdown over summer
Raptors	Maintain and/or enhance breeding and/or foraging habitat	Swamp harrier nests and forages within dense vegetation of wetlands (e.g. in reedbeds); other species may forage over wetlands or take prey from areas adjoining wetlands	Annually	October to January	October to January	Shallow and drawdown over summer

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