

---

***Achieving Integrated Water Management of the Wallan Wallan Wetlands –  
Recognising gaps, understanding systemic obstacles to adoption, and identifying solutions***

---

**DISCUSSION PAPER 2 – July 2020**

**Introduction**

Nature Glenelg Trust (NGT) is an independent, charitable, not-for-profit non-government organisation operating in south-eastern Australia. While we work across a wide range of biodiversity issues, major priorities include wetland restoration and management, and threatened species research and recovery.

This discussion paper follows one produced and [circulated by NGT in March 2019](#) that introduced Herne Swamp, the largest of the original Wallan Wallan wetlands, as well as the challenges surrounding its future management and potential restoration.



***Herne Swamp: The largest of the Wallan Wallan wetlands***

This supplementary paper takes a closer look at the challenges to fully implementing the Victorian Government’s *Integrated Water Management (IWM) Framework* and *Healthy Waterways Strategy* for the Wallan Wallan wetlands in the upper Merri Creek Catchment, using another smaller wetland site upstream of Herne Swamp, Hanna Swamp, as an illustrated example. We’ll highlight how ‘business-as-usual’ presents major risks; in fact, Hanna Swamp could be incrementally lost to urbanisation without ever having been adequately assessed in an IWM context. The outcome of the Beveridge North West Precinct Structure Planning process, now underway, is set to determine its fate. But it is not too late. Despite the complexity of these issues, a more proactive approach to the implementation of existing policies can deliver outcomes for waterways and wetlands, while achieving improved liveability for the future residents of urban growth areas.

**Contents:**

**PART 1:** Policy context for wetlands in Melbourne’s urban growth areas ..... **Page 2**

**PART 2:** Case study – Hanna Swamp..... **Page 6**

**PART 3:** Technical analysis – Eleven gaps in the planning system that explain how natural wetlands are being overlooked..... **Page 16**

**PART 4:** Conclusion – Adopting solutions..... **Page 34**

## PART 1: Policy context for wetlands in Melbourne's urban growth areas

### The Victorian Government's IWM Framework (2017)<sup>1</sup>

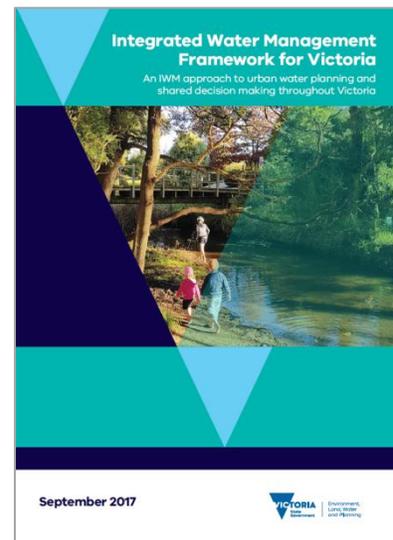
In 2017, the Victorian Government adopted the *Integrated Water Management Framework for Victoria*. The Minister's Foreword in this document sets the scene, and challenges all government agencies to play their part in delivering IWM outcomes:

*"The Victorian Government supports the best use of parks, wetlands, streams and areas of urban vegetation to make our communities better places to live. Our new Integrated Water Management Framework will help local governments and water sector partners to meet this objective."*

The document goes on to say that "the IWM approach involves robust economic analysis that compares options against a base case (often the 'business-as-usual' solution) to identify the best solution. This tests the effectiveness of both traditional and integrated solutions in a transparent way to increase the integrity of water infrastructure investment. It also enables externalities such as improved liveability to be considered. This contrasts with traditional water servicing approaches." In terms of engagement with First Nations people, "organisations involved in IWM have obligations to involve Traditional Owners and consider Aboriginal values in their organisational activities."

In summary, IWM is all about a shared and ongoing obligation to better communication and assessment of options, to deliver better results than 'business as usual', noting that:

*"collaboration can take more time than traditional planning, which focuses on the isolated planning and delivery of a single water service. However, collaborative IWM projects are demonstrating clear value in delivering better outcomes for communities."*



### The Healthy Waterways Strategy (2018)<sup>2</sup>

The *Healthy Waterways Strategy* (HWS) provides one of the key policy mechanisms for delivering IWM outcomes across Greater Melbourne. It provides a wide range of performance objectives for all organisations, groups and individuals with responsibilities or interests in water management to deliver. While there are so many key references throughout this Strategy that they are too numerous to list here, in terms of more specific guidance that is relevant for this discussion paper, the Yarra catchment itself (which includes Merri Creek) has a 10-year performance target to:

***"re-engage natural floodplain wetlands in key locations to meet ecological watering objectives, improve ecosystem services, cultural and social values"***

<sup>1</sup> <https://www.water.vic.gov.au/liveable/integrated-water-management-program/iwm-framework>

<sup>2</sup> <https://www.melbournewater.com.au/about/strategies-and-reports/healthy-waterways-strategy>

## What are the barriers to implementing these policies?

While this recent, very clear and enabling policy context might sound like a straightforward mandate for the organisations with statutory responsibilities to simply get on with the job of implementing IWM and the *Healthy Waterways Strategy*, the reality is not that simple.

Indeed within the IWM Framework<sup>1</sup>, the state government acknowledges that complexity, recognising that *business as usual* or ‘traditional water servicing approaches’, need robust testing against alternatives approaches via an IWM process to ensure key planning decisions are no longer made in isolation.

For example, an IWM process is required to ensure that “participants are not limited by institutional constraints in exploring servicing solutions and can focus on the community (and the environment) as the beneficiaries”. These missed opportunities can otherwise have very real, ongoing economic costs – that are usually not borne by the original proponents of development – but there are a number of complex barriers to getting this right.

### ***Meeting Minimum Legislated Standards***

The main barrier to implementing these policies is the industry wide focus on **minimum legislated standards** being the primary driver of decision making and planning in urban development. We use the term ‘industry wide’ because, up until now, this *business as usual* focus on meeting minimum legislated standards has been adopted by both the proponents of development and the relevant parts of the government bodies who have statutory responsibility for ensuring those standards are met.

It is worth stating up front that there are very good reasons for this being the current *business as usual* model and, in doing business this way, no one is ‘technically’ doing anything wrong.

Having a set of clear and unambiguous operating rules for urban development that everyone understands is helpful for both developers and statutory authorities. Developers need a level of certainty for planning major economic decisions about the configuration and design of development. Statutory authorities need to know what can and can’t be approved based on a set of reliable rules, and are very reluctant to ask anything of a proponent that is not explicitly backed by legislation. If everyone understands the rules that govern development then there are less likely to be disputes, and decisions can be made in a timely fashion.

But this is only half the story, because as we explored in the previous section, the Victorian Government has also clearly acknowledged that *business as usual* is not working and that we need to make changes to the way that development occurs and decisions are made. This is because a simple focus on meeting minimum legislated standards in some cases has been leading to perverse, unintended or substandard outcomes for catchment or water management.

For a recent example, Melbourne Water has stated in the most recent [Healthy Waterways Strategy Annual Report for 2019](#)<sup>3</sup> that three priority wetlands have already been lost through direct impacts of urbanisation despite the existence of the Strategy, and a further thirteen wetlands are under imminent risk.

---

<sup>3</sup> Melbourne Water (2019). Healthy Waterways Strategy, Annual report – 2019.



## Other barriers to adoption of IWM and the Healthy Waterways Strategy

First of all is simply **momentum and timing**.

Development plans for Melbourne's new suburbs take many years to progress. For example, in the case of the developments currently being progressed in the northern growth corridor near Wallan, the process for many areas has been underway for well over a decade. Adjusting *business as usual* plans that have been in the pipeline for that long and have momentum is extremely difficult. Understandably, there is also a lot of resistance to what are now seen as 'last-minute' major changes, to make plans compliant with the IWM philosophy and *Healthy Waterways Strategy*.

That resistance is also an example of the institutional **cultural barriers** to adopting IWM that exist.

*Business as usual* is more familiar and comfortable for staff accustomed to working on their part of the development cycle in ways that seem more time and cost efficient – at least in the short-term, during their role in the planning phase. The eventual economic, social or environmental cost of planning mistakes is generally not recognised, assessed, witnessed or counted by those who work in this initial part of the development cycle. This is because developments are often not physically constructed until years later and, in any case, those issues are eventually addressed by entirely different parts of those organisations that deal with on-ground issues, management of waterways or compliance. Some very real costs, like impacts on liveability, are not ever measured.

An IWM approach that requires increased scrutiny, information sharing, compromise and communication before any key decisions have been finalised, by genuinely seeking and integrating the input of others, is not only time-consuming and complex – it can be very uncomfortable when it produces alternative approaches and potential solutions that differ substantially from *business as usual*. Those approaches and solutions may not fit neatly into minimum legislated standards and, in some cases that we are aware of, can even be contrary to those standards.

Beyond these risks are the **economic pressures** that developers (and the relevant government authorities) face in trying to deliver cost-effective and affordable suburban developments.

Given the choice between *business as usual* or modifying existing plans to comply with IWM and Healthy Waterways Strategy objectives, there is currently a very real risk that existing development plans that are well advanced simply opt for expediency despite their obligations under these more recent policy initiatives.

Yet if the proper, full implementation of IWM is delayed, there are irreversible knock-on effects that will continue to have ramifications for future communities for decades and, in doing so, risk fundamentally contradicting the stated 'whole of government' objectives of IWM and the *Healthy Waterways Strategy* that are now in place today.

**Hanna Swamp** is a current, topical, highly relevant case study that illustrates this inherent complexity and the choices we face for how existing proposed development plans interact with the challenge of genuine IWM adoption. It shares many of the same issues that confront nearby Herne Swamp, the subject of the previous Discussion Paper<sup>4</sup>.

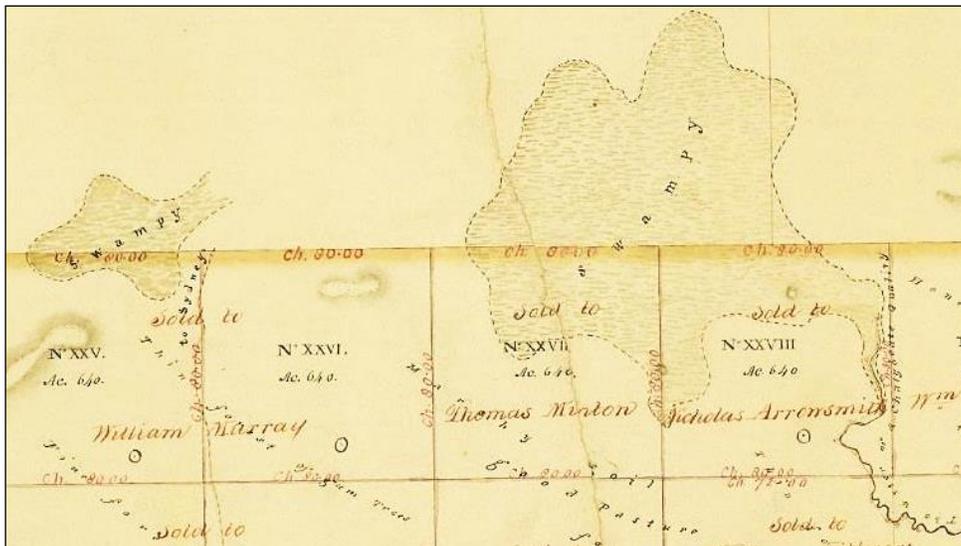
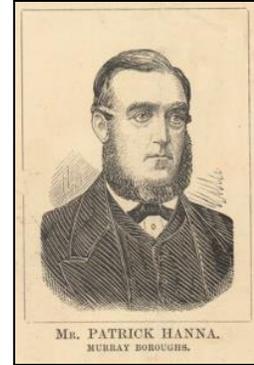
---

<sup>4</sup> <http://natureglenelg.org.au/lets-start-a-conversation-about-the-future-of-herne-swamp-and-the-wallan-wallan-wetlands/>

## PART 2: Case study – Hanna Swamp

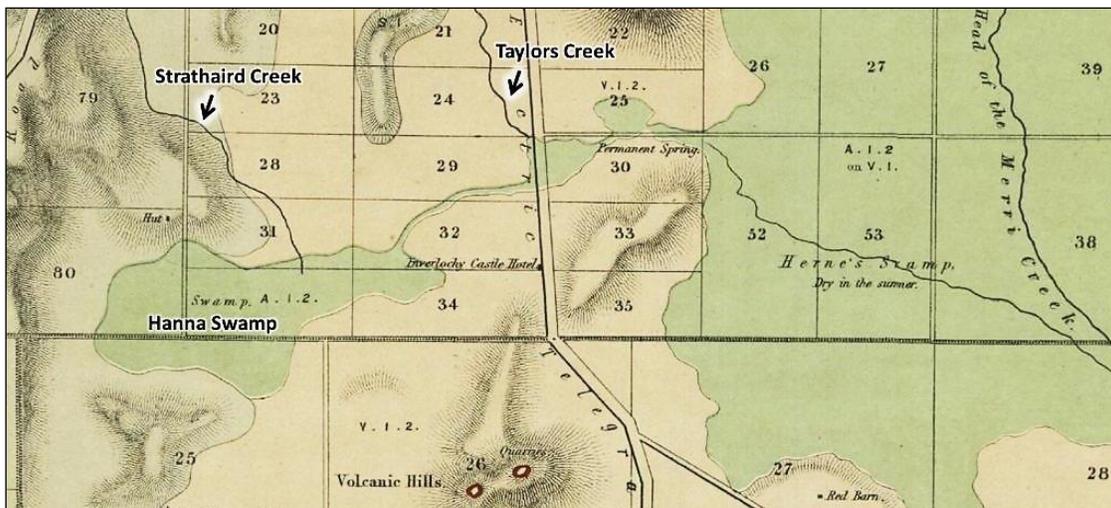
### An historical perspective

Hanna Swamp is named after its late 1800s owner and [parliamentarian Patrick Hanna](#) (1819-1890), right. Below is a map from 1840 showing the position of Hanna Swamp relative to Herne Swamp; the subject of the previous *Wallan Wallan Wetlands Discussion Paper*. On this map you can see the original overland route from Melbourne to Sydney skirting the eastern side of Hanna Swamp. This area is located approximately 50 km north of central Melbourne.



Hanna Swamp (left) and Herne Swamp (right). Parish of Merriang map, 1840.

Hanna Swamp is a moderately sized (approximately 60 hectare) in-stream wetland of Strathaird Creek, a tributary of upper Merri Creek. As shown below, together with Taylors Creek, these waterways flow into the western portion of Herne Swamp, south-east of Wallan. Prior to agricultural development, Hanna Swamp would have been a very reliable, seasonal wetland that inundated and held water for prolonged periods from rainfall generated flows in Strathaird Creek, likely supplemented by shallow groundwater.

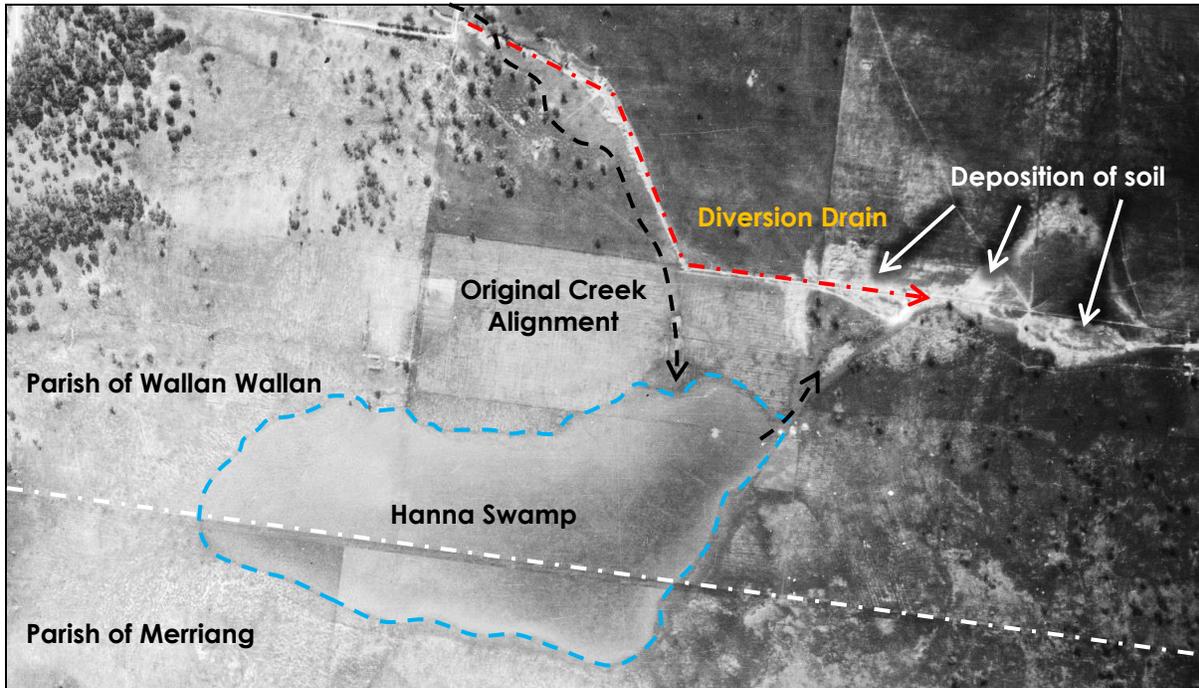


Hanna Swamp and Herne Swamp. Geological map published in 1862, based on an 1857 survey.

Hanna Swamp straddles the boundary of two Parishes:

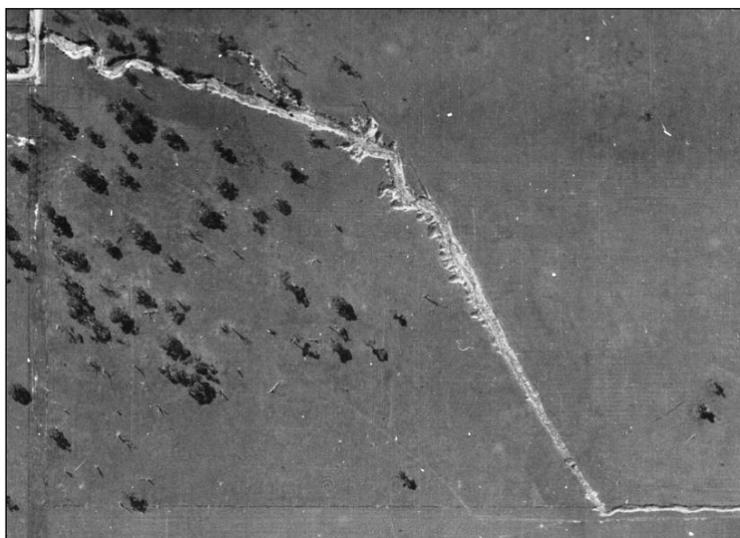
- the southern, smaller portion is within the Parish of Merriang
- the larger, northern portion lies within the Parish of Wallan Wallan

By the time the first aerial photography was captured of this area in the 1940s, a drain diverting Strathaird Creek to bypass Hanna Swamp was already in place.



**Hanna Swamp and Strathaird Creek in 1946, showing the original creek alignment (black) and location of the diversion drain (red) and wetland extent (blue). Dispersion and deposition of sub-soil is evident downstream of Hanna Swamp, as a result of erosion within the watercourse / diversion drain.**

A close-up of the 1940 image (below) shows the extent and activity of early erosion in the diversion drain, as a result of this constructed channel exposing sodic sub-soils, which are highly prone to dispersion (i.e. the clay becomes suspended, giving the water a milky appearance). While not explored in this paper in detail, this potential risk is just as relevant today in this catchment.



**A deeply eroding Strathaird Creek diversion drain in 1940.**

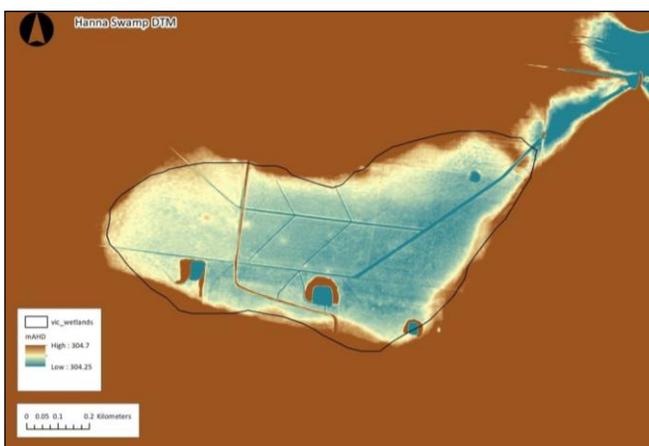
## Hanna Swamp today – an ephemeral wetland

By 1972 (below left), additional large dams had been dug into the bed of the southern part of the Hanna Swamp wetland. However, despite these changes and the prior diversion of Strathaird Creek, thanks to local runoff and shallow groundwater, Hanna Swamp appeared to be persisting across the bulk of its original footprint at this time. Eventually however, as has occurred with so many wetlands in Victoria, Hanna Swamp was more comprehensively drained for agricultural use, and only fragments of its original perennial native vegetation persisted until the present time.

The digital terrain model image (below right) shows the estimated original static water level for the main wetland feature when full but not flowing (based on the natural surface level at the natural outflow point); with everything above that level coloured brown. This image also clearly highlights the network of shallow drains that caused the major final alteration to the hydrology of the wetland in the recent past. This herringbone pattern of artificial drainage is commonly seen across the bed of extremely flat wetland sites that have been drained to facilitate agriculture, as a means to overcoming a lack of natural gradient to remove surface and/or groundwater.



**Hanna Swamp aerial photograph from 1972, showing broad consistency with how the feature is currently mapped in the state DELWP wetland database (polygon with black outline).**

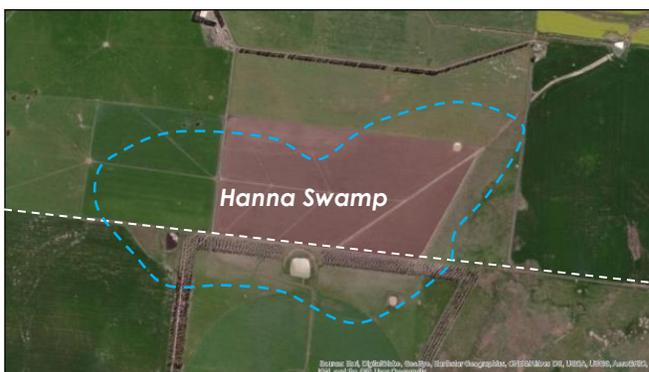


**Digital Elevation Model showing the currently drained condition of Hanna Swamp. The deepest parts of this seasonal wetland were typically inundated to around 45-50 cm (about knee deep).**

Despite its modified state, Hanna Swamp is a mapped waterway feature in the Department of Environment, Land, Water and Planning (DELWP) wetlands mapping layer – as shown (below left). Despite the original waterway configuration being overlooked in contemporary mapping, Hanna Swamp is still represented in reasonably accurate detail as a geomorphic feature.



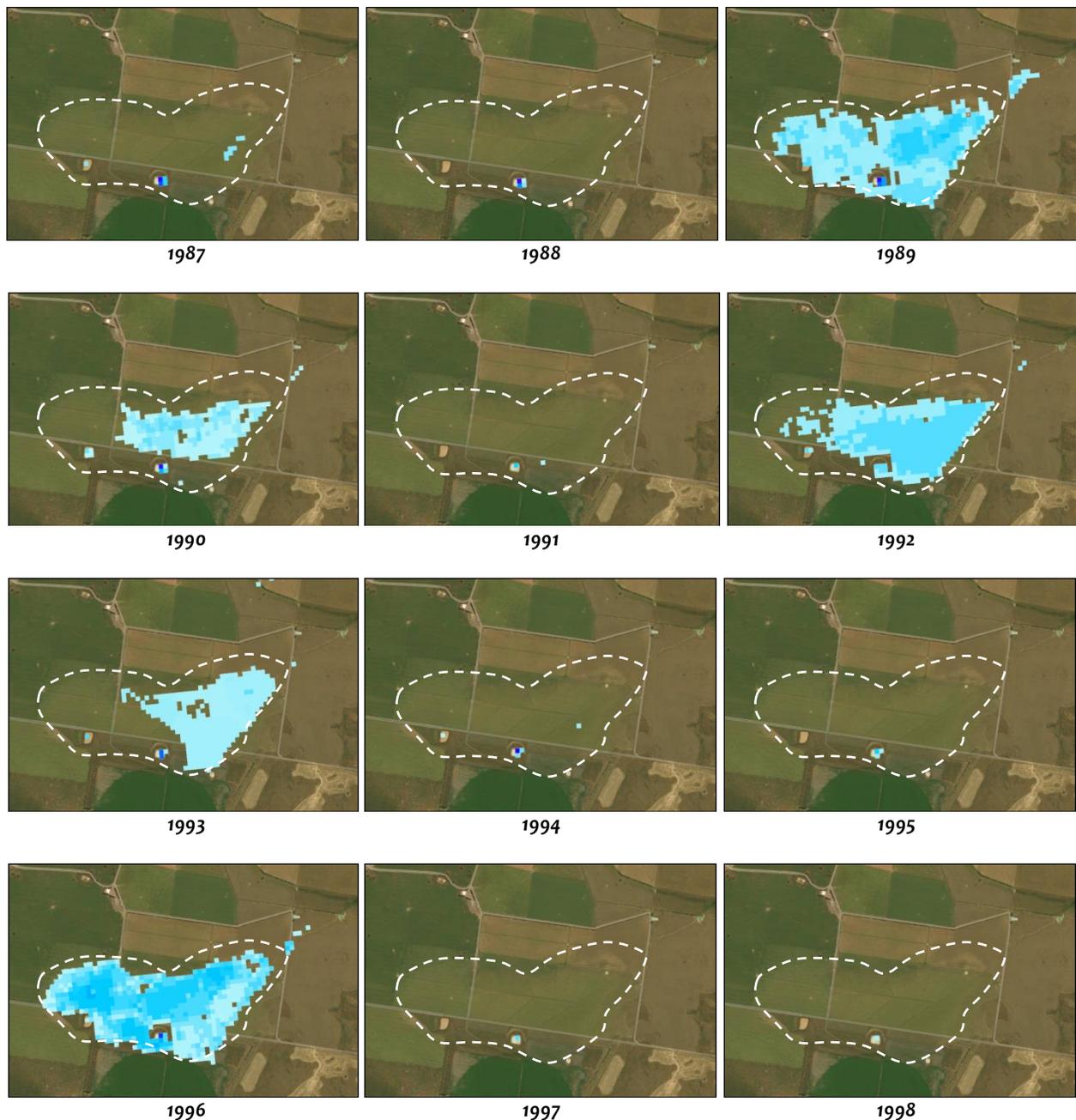
**Hanna Swamp is a mapped feature in the DELWP wetlands layer, but only artificial drains are shown as “waterways”.**



**Aerial image showing current site condition of Hanna Swamp – under agricultural use ahead of urbanisation.**

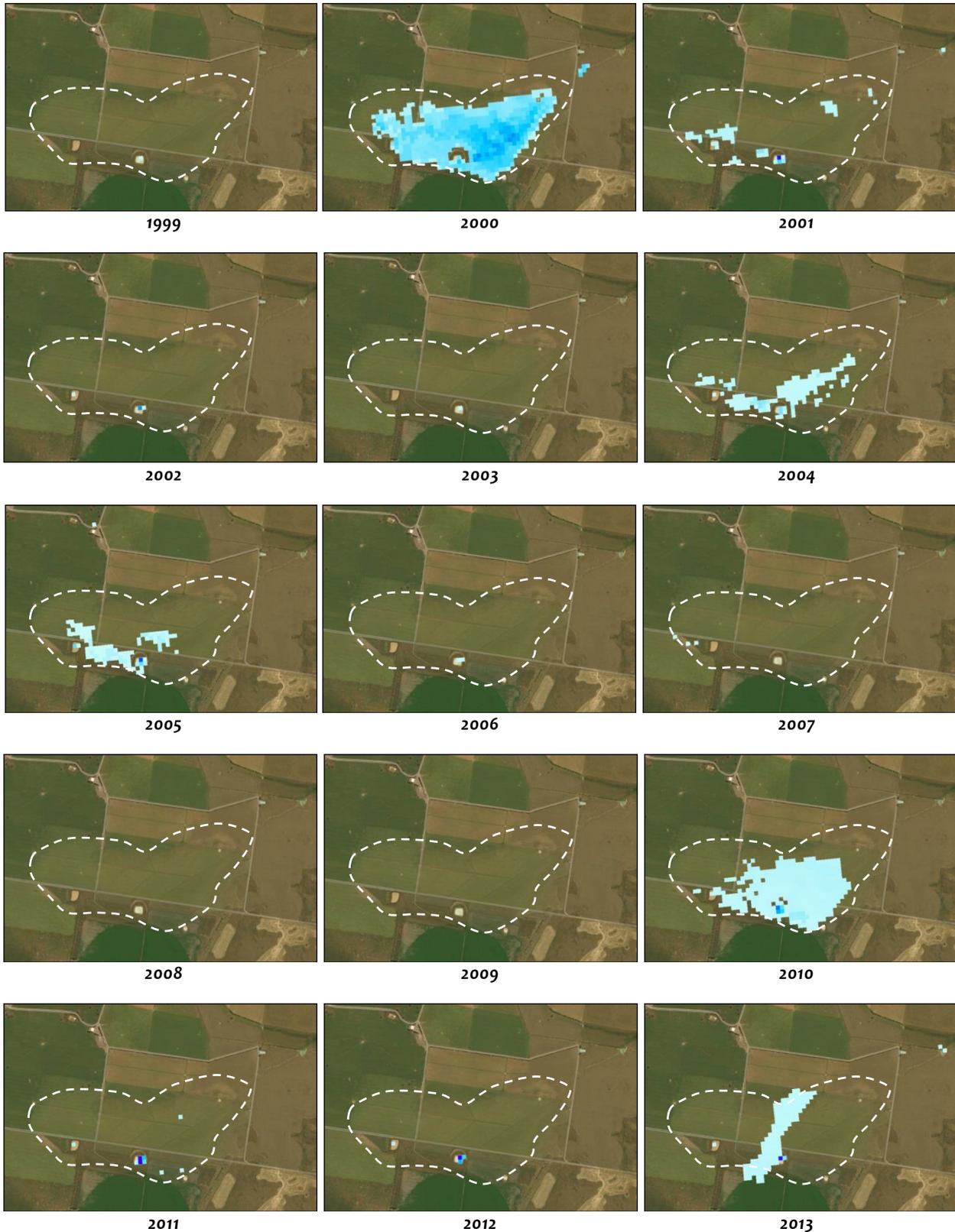
In addition to the historic aerial photography, the more recent presence of the wetland is also verified by annual *Water Observations from Space* (WoFS) data dating back to 1987 (available via the Digital Earth Australia web portal<sup>5</sup>, Geoscience Australia, Australian Government). WoFS information is based on the retrospective analysis of Landsat imagery to detect the presence of surface water.

Of note, despite the diversion of Strathaird Creek, artificial drainage and the Millennium Drought from 2001-2009, the wetland has partly or fully inundated approximately 1 in every 3 years since 1987 – as shown in the sequence below.



**The blue shading is the coarse maximum detected inundation extent per year, based on 25 years of *Water Observations from Space* at Hanna Swamp. Base map is present day aerial image. Data from Geoscience Australia, Australian Government.**

<sup>5</sup> <https://www.ga.gov.au/dea/products/wofs>



*The blue shading is the coarse maximum detected inundation extent per year, based on 25 years of Water Observations from Space at Hanna Swamp. Base map is present day aerial image. Data from Geoscience Australia, Australian Government.*

Despite its modified state, based on the Landsat data Hanna Swamp has still effectively functioned as an ephemeral (i.e. temporary or episodic) wetland for the past 30 years, rather than the more reliable seasonal (regularly filling) wetland it would have been prior to the diversion of Strathaird Creek and artificial drainage. In the context of this data, the mapping of Hanna Swamp

in the DELWP wetland layer, as an existing wetland feature, makes logical sense and is consistent with an assessment of this mapped wetland feature by Jacobs in 2020<sup>6</sup>.

These conditions also explain the ongoing persistence (until recently) of remnant patches of endangered wetland vegetation within Hanna Swamp, despite its history of modification. Biosis undertook a survey of the northern portion of Hanna Swamp in 2016<sup>7</sup>, which resulted in the detection and mapping of patches of the endangered Plains Grassy Wetland Ecological Vegetation Class (EVC) (synonymous with the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* listed Seasonal Herbaceous Wetlands endangered ecological community) in the drainage lines and along the eastern flank of the wetland.

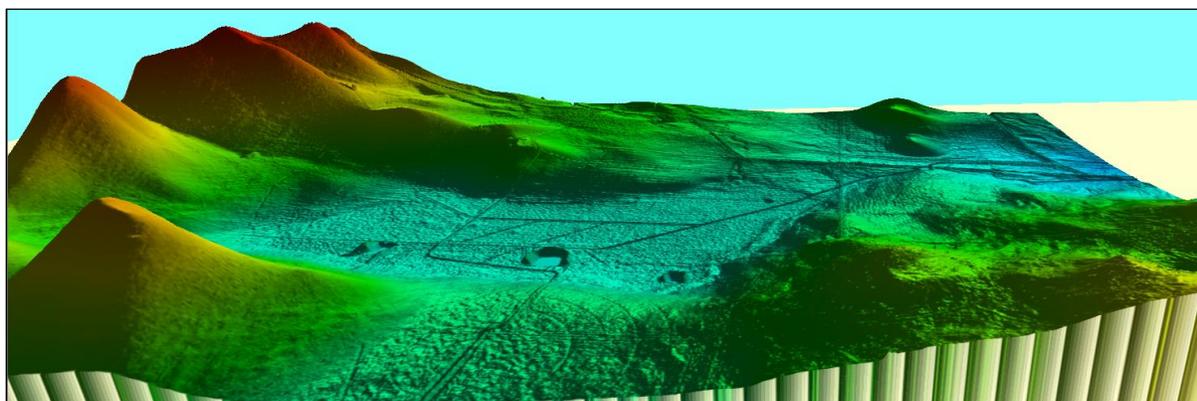
In summary, despite now being degraded as a result of past land management decisions and actions that have impacted upon its natural values, Hanna Swamp remains a natural in-stream wetland of the original Strathaird Creek alignment. The wetland feature exists, still occasionally inundates, is formally mapped as a wetland feature and has the potential to be brought back to health, to improve waterway condition and function in conjunction with the coming change in surrounding land use from agriculture to urbanisation.

## Do the policies of the relevant statutory authorities provide guidance?

The Victorian Planning Authority (VPA) is preparing the Precinct Structure Plans (PSPs) for urban development of the area that includes Hanna Swamp. PSPs are prepared within the strategic framework of the North Growth Corridor Plan<sup>8</sup>, which was prepared by VPA's precursor. Of note, the VPA's North Growth Corridor Plan states that:

*“Ensuring that the North Growth Corridor is an attractive location for a wide range of businesses, and a wide diversity of households are key challenges. The North Growth Corridor Plan seeks to meet these challenges by **preserving and enhancing the natural features of the Growth Corridor, including the significant landscape and biodiversity values**. New communities will benefit from an integrated open space network that provides a distinctive character and amenity, and **existing biodiversity values will be preserved and enhanced.**”<sup>8</sup>*

Those natural features include volcanic peaks, western hillslopes, wetlands and waterways.



**Landscape features: vertically exaggerated oblique terrain model looking north over Hanna Swamp (based on LiDAR data)**

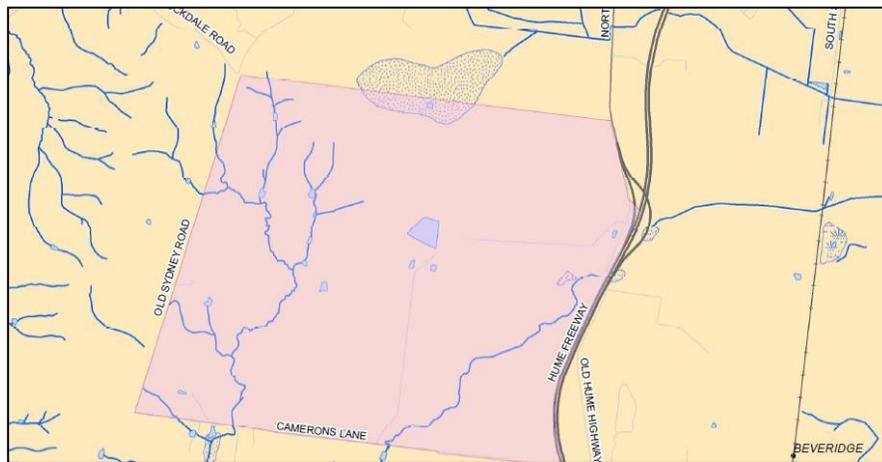
<sup>6</sup> Jacobs (2020) Wallan South and Wallan East Precinct Structure Plans Land Capability Assessment. Report to VPA. P. 54

<sup>7</sup> Biosis (2017). Wallan South Precinct Structure Plan: Biodiversity Assessment Report. Report for Crystal Creek Properties Pty Ltd.

<sup>8</sup> Growth Areas Authority (2012) Growth Corridor Plans: Managing Melbourne's Growth. GAA, Melbourne. P.60

In contrast however, the exhibited draft Beveridge North West PSP (2019)<sup>9</sup> proposes land uses for the southern portion of Hanna Swamp that would irreversibly alter the geomorphology (the natural topographic shape) of the natural wetland feature and eliminate the possibility of its future enhancement as part of a naturalised and reinstated Strathaird Creek. In doing so, this would set expectations and effectively pave the way for a similar approach to be taken in the adjoining Wallan South PSP, impacting the remaining, northern portion of the wetland feature.

Of note, this is despite a site assessment by Jacobs SKM (2014)<sup>10</sup>, commissioned by the VPA’s precursor (the Metropolitan Planning Authority), that identified Hanna Swamp during their assessment and “recommended it be retained during development, including any native vegetation”.



**Hanna Swamp, included in the wetlands and waterways mapping of the Site Suitability Assessment for the Beveridge North West PSP Area. From Jacobs (2014)**

Jacobs’ recommendations were based on the general intent provided by the Growth Corridor Plan. Indeed it was the Growth Corridor Plan that led to the placement of a Rural Conservation Zone over the entire northern portion of the Beveridge North West PSP, giving a form of planning protection to the southern part of Hanna Swamp (zoning which is currently in place). This was the only part of the wetland situated within the Urban Growth Boundary (UGB) at that time. This zoning issue is revisited later, in Part 3 of this Discussion Paper.

The following finer details were also provided in the Jacobs report:

| Eastings/Northing      | Wetland ID | Wetland category     | Area (Ha) | Subcategory | Proximity to site                            |
|------------------------|------------|----------------------|-----------|-------------|--|
| 319419mE,<br>5854708mN | 70701      | Freshwater<br>Meadow | 60.22     | Herb        | Within and along northern boundary<br>of PSP |

The Department of Environment, Land, Water and Planning (DELWP) are the key custodian of state biodiversity and waterway databases and data layers, and are responsible for ensuring those values are represented in the Planning Schemes that govern development in Victoria. Hence the local Mitchell Shire Planning Scheme contains many references that provide guidance for how a natural in-stream wetland like Hanna Swamp might be incorporated into development plans. A selection of the relevant clauses is provided over the following pages.

<sup>9</sup> <https://vpa.vic.gov.au/project/beveridge-north-west/>

<sup>10</sup> Jacobs SKM (2014). Beveridge North West Precinct Structure Plan Area - Site Suitability Assessment. Report to the Metropolitan Planning Authority.

## State-wide Planning Policy Framework

### Growth areas - Clause 11.03-2S

Identify the location of open space to be retained for recreation, and/or biodiversity protection and/or flood risk reduction purposes guided and directed by regional biodiversity conservation strategies.

Show significant waterways as opportunities for creating linear trails, along with areas required to be retained for biodiversity protection and/or flood risk reduction purposes.

### River corridors, waterways, lakes and wetlands – Clause 12.03-1S

**Objective:**

To protect and enhance river corridors, waterways, lakes and wetlands.

**Strategies:**

Protect the environmental, cultural and landscape values of all water bodies and wetlands.

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 waterbody or wetland's natural capacity to manage flood flow.

**Policy documents - Consider as relevant:**

*Healthy Waterways Strategy (Melbourne Water)*

### Floodplain management – Clause 13.03-1S

**Objective - To assist the protection of:**

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.

**Strategies:**

Identify land affected by flooding, including land inundated by the 1 in 100 year flood event or as determined by the floodplain management authority in planning schemes.

Avoid intensifying the impact of flooding through inappropriately located use and development.

### Catchment planning and management – Clause 14.02-1S

**Objective:**

To assist the protection and restoration of catchments, water bodies, groundwater, and the marine environment.

**Strategies:**

Require appropriate measures to filter sediment and wastes from stormwater prior to its discharge into waterways, including the preservation of floodplain or other land for wetlands and retention basins.

Ensure planning is coordinated with the activities of catchment management authorities.

## Water quality – Clause 14.02-2S

### Objective:

To protect water quality.

### Strategies:

Discourage incompatible land use activities in areas subject to flooding, severe soil degradation, groundwater salinity or geotechnical hazards where the land cannot be sustainably managed to ensure minimum impact on downstream water quality or flow volumes.

## Integrated water management – Clause 19.03-3S

### Objective:

To sustainably manage water supply, water resources, wastewater, drainage and stormwater through an integrated water management approach.

### Strategies:

Plan and coordinate integrated water management, bringing together stormwater, wastewater, drainage, water supply, water treatment and re-use, to:

- Take into account the catchment context.
- Protect downstream environments, waterways and bays.
- Minimise drainage, water or wastewater infrastructure and operational costs.
- Minimise flood risks.
- Provide urban environments that are more resilient to the effects of climate change.

Integrate water into the landscape to facilitate cooling, local habitat improvements and provision of attractive and enjoyable spaces for community use.

Ensure that development protects and improves the health of water bodies including creeks, rivers, wetlands.

Manage stormwater quality and quantity through a mix of on-site measures and developer contributions at a scale that will provide greatest net community benefit.

## Local Planning Policy Framework

## Floodplains – Clause 21.04-2

The catchments of the various rivers and streams within Mitchell include areas of flood prone land, where flooding has historically caused substantial damage to the natural and built environment.

Floods are naturally occurring events and the inherent functions of the floodplains to convey and store floodwater should be recognised and preserved.

Natural flooding of floodplains and their associated wetlands provides essential breeding habitats for bird and aquatic species, and promotes the health of rivers and floodplains.

It is evident that the impact of floods is increasing due to land use and vegetation changes, in particular:

Urban expansion in floodplains which has reduced flood storage, obstructed flood flows and increased the risk to life, health and safety to occupants of the floodplain.

### Key issues:

Maintaining natural environmental processes within floodplains.

**Objective 1:**

To sustainably manage floodplains.

**Strategies:**

Discourage raised earthworks that reduce natural flood storage, obstruct and/or redistribute flood flows, and increase flow velocities and levels.

Discourage urban expansion within floodplains that reduces flood storage, obstructs flood flows and increases the risk to life, health and safety.

**Water – Clause 21.05-2**

**Objective 1:**

To improve the quality of water in waterways and catchments.

**Strategies:**

Support integrated catchment management.

Protect and restore native vegetation corridors along waterways.

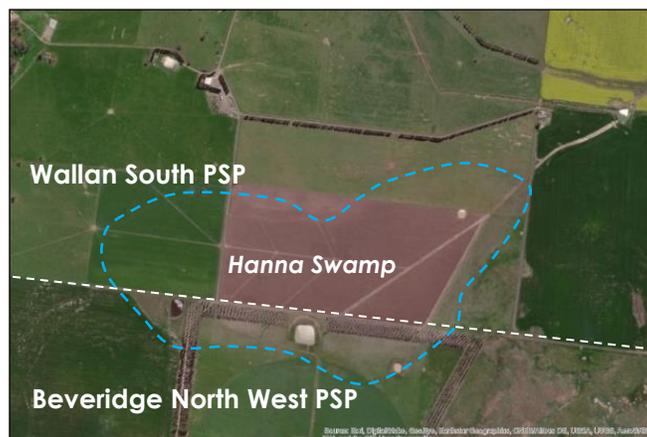
Minimise the quantity and retard the flow of stormwater run-off from urbanised areas.

Create wetlands, where possible, to encourage natural flow systems, improve stormwater quality and encourage and increase native biodiversity.

This comprehensive information contained within the Mitchell Shire Planning Scheme, covers a wide range of matters that would make the reinstatement of Strathaird Creek and the restoration of Hanna Swamp seem sensible to pursue as part of a strategic urban development planning philosophy for this catchment. It would help manage the risks associated with development in floodplains and wetlands, and provides the opportunity to improve the condition and function of waterways in the area ahead of urbanisation.

However, with the information presented here so far in mind, it may surprise the reader to learn that the Precinct Structure Plan (PSP) areas that cover Hanna Swamp, as shown below, are not currently proposing to do either of these things.

**Hanna Swamp is currently at risk of being completely lost: infilled and developed for other uses.** Its future is highly uncertain, with the outcome of the Beveridge North West PSP (currently in a Planning Panel hearing) and the upcoming Wallan South PSP set to determine its fate.



**Aerial image showing current site condition of Hanna Swamp – under agricultural use ahead of urbanisation.**

## PART 3: Technical analysis – Eleven gaps in the planning system that explain how natural wetlands are being overlooked

### Gap 1: Structural challenges that exist within key government agencies

Government agencies that are responsible for approving the planning and implementation of urban expansion around Melbourne are faced with a dilemma in the methods utilised for delivering their services to the community.

Parts of their bureaucracies are set up as statutory referral bodies, while other areas of the same organisations involved in strategic planning are consultative in nature and entrusted to set the strategic direction and intent of development for whole of government and the wider community.

As an example, Melbourne Water is the primary custodian leading the implementation of the *Healthy Waterways Strategy* in Greater Melbourne on behalf of the Victorian Government. To be successful, this area of work needs to be forward thinking, proactive and set the strategic direction for the sector as a whole – challenging *business as usual* across the industry and seeking broader adoption of the IWM Framework to improve development outcomes for wetlands, waterways and the community.

Yet at the same time, other parts of Melbourne Water are also the referral authority with statutory responsibility for Development Services Schemes (the layout and design of urban drainage infrastructure), and for assessing and providing responses to matters that impact waterways and wetlands. This is a much more conservative function.

For example, Development Services Schemes have an especially narrow, mandated focus on flood protection, conveyance of water and urban stormwater treatment. To date, they have not kept up with the integrated approaches of IWM or the broader objectives of the HWS, and are completely silent about restoration potential of waterways and wetlands. They take as their starting point existing conditions, which is often artificially drained agricultural land, completely eliminating the possibility of introducing a restoration philosophy or perspective.

Similarly, the statutory waterways and wetlands assessment function of Melbourne Water (like other water referral authorities) typically reacts to the independent proposals of third party proponents of development, and there appears to be a general reluctance to proactively influence those plans. Minimum legislated standards guide its advice.

Because implementation of the IWM Framework is essentially about workshopping negotiated solutions to wicked<sup>11</sup> water management problems, achieving better outcomes for waterways and wetlands using this philosophy is not yet adequately reflected in the *business as usual* activities of the statutory referral authorities. As illustrated in the *Healthy Waterways Strategy Annual report – 2019*, Melbourne Water is acutely aware of this issue and appears to be taking active steps to address it. It is also worth acknowledging that, being a wicked problem, this is no one's 'fault', it is simply a by-product of *business as usual* systems and processes that have been in place for decades. It is also not unique. This very same tension exists in all the large environment and water bureaucracies that play a role in this sphere.

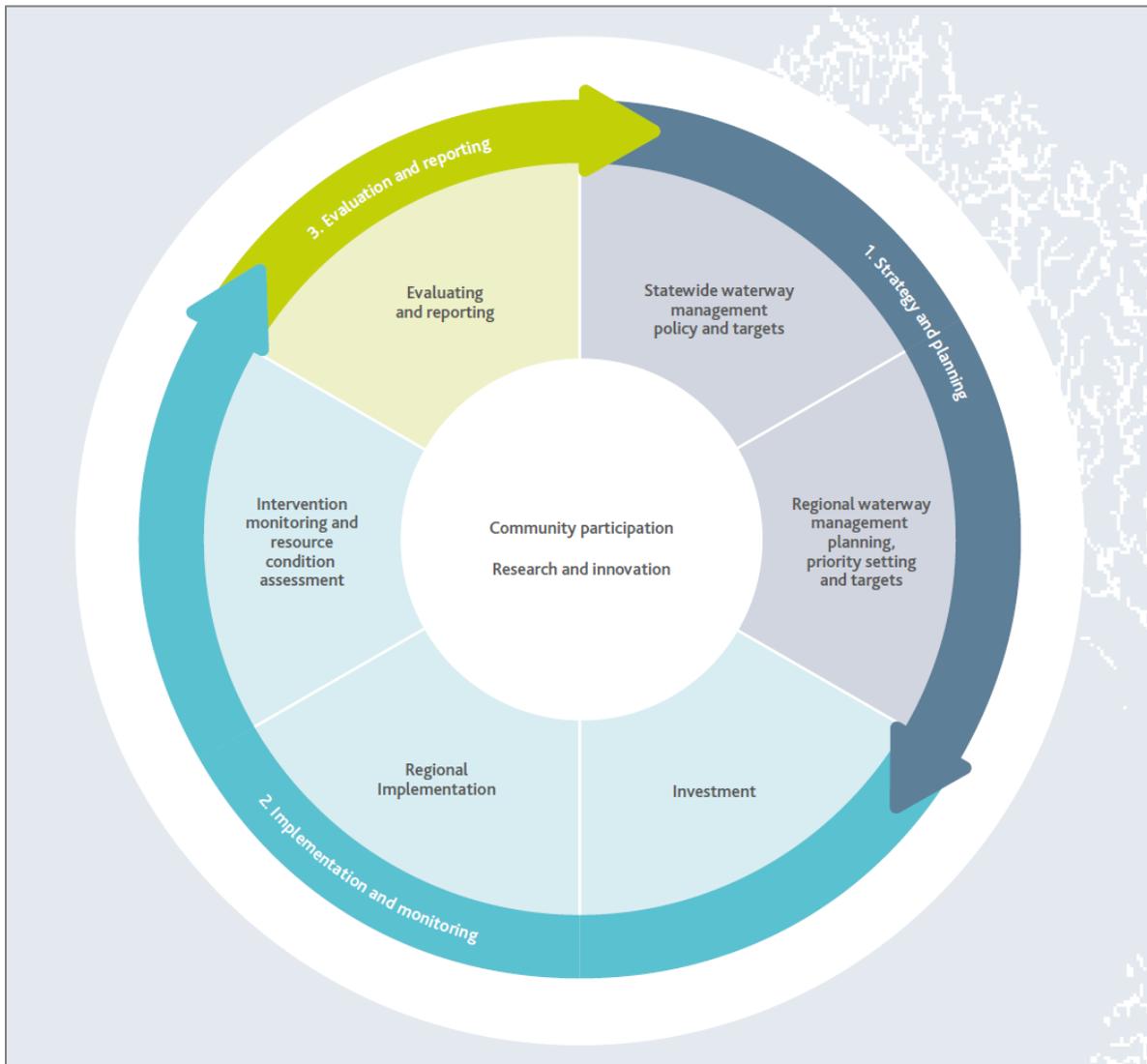
---

<sup>11</sup> In planning and policy, a 'wicked problem' is a problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognise. It refers to an idea or problem that cannot be fixed, where there is no single solution to the problem; and "wicked" denotes resistance to resolution.

## Gap 2: Lack of strategic IWM and HWS direction provided to developers

The nature of existing relationships referred to above mean that there is no IWM-informed strategic direction (in terms of natural waterway layout) provided to developers by the planning or referral authorities ahead of their early layout or precinct structure plans being drafted.

This is not to say that the authorities and developers are not talking all the time – quite the contrary. It is simply to make the point that up until now those conversations are not happening early enough, nor with the parts of those authorities (or indeed other potential partners) who have IWM or natural waterway enhancement expertise and can translate the strategic direction within the *Healthy Waterways Strategy* to assist planners or consultants. In turn this can help inform layout and designs of developments on the ground. This is an example of a gap in the adaptive management cycle, as outlined in the *Healthy Waterways Strategy* (below), where statewide policies and targets are yet to truly inform waterway planning or achieve full implementation.



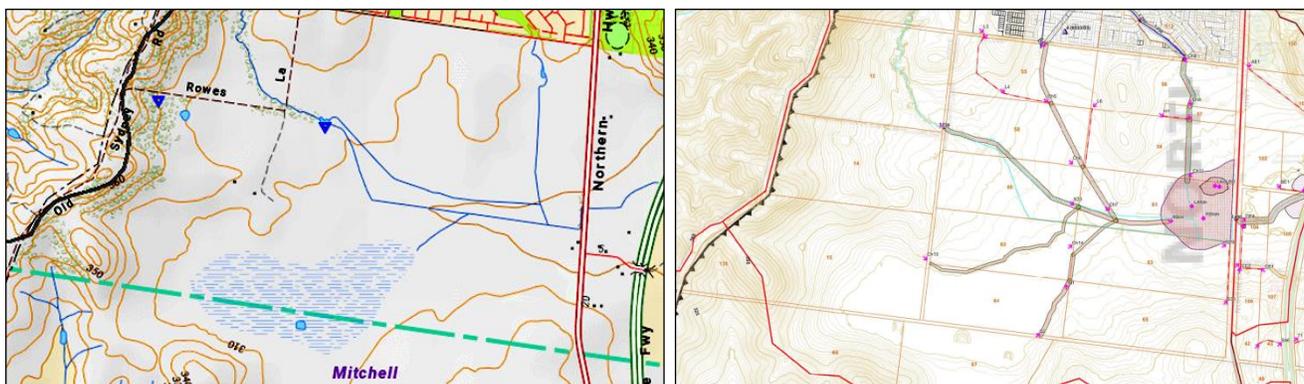
**The adaptive management cycle as presented in the *Healthy Waterways Strategy* (2018)**

As a result, we are currently missing a co-design opportunity to help resolve the anticipated IWM challenges posed by new urban development occurring in catchments previously modified for agriculture. In this respect, the Hanna Swamp case study is representative of a much wider issue.

## Gap 3: Limitations of mapping relied upon by planners and their consultants

To understand the significance of this issue requires a glance at the maps typically available to, and utilised by, planners and the statutory authorities when they start determining the layout and structure for urban development.

The area of the Wallan South and Beveridge North West PSPs that cover Hanna Swamp are shown below. This is the current standard information available from the government data layers relevant to waterways; in this case (a) the waterway and wetland mapping provided by DELWP (below left) and (b) the Development Services Scheme (DSS) map provided by Melbourne Water (below right). At first glance, a couple of issues stand out.



(a) DELWP waterway mapping – current as at July 2020

(b) The Taylors Creek DSS – current as at July 2020

Firstly, some of the existing mapped waterways are proposed to be retained under the DSS, plus the creation of some extra drainage infrastructure – presumably to capture increased runoff associated with development. Of note however, Hanna Swamp is entirely absent from the DSS despite being a mapped wetland feature in the DELWP wetland layer. This is not unusual, as the DSS process places a strong emphasis on built infrastructure and engineered designs for managing stormwater runoff from urban development. From a *business as usual* perspective, a DSS does not typically look for opportunities to integrate natural features. Hence planners in both the Wallan South and Beveridge North West PSPs have typically been utilising the Taylors Creek DSS, rather than the DELWP waterways mapping to inform their plans. This is the first of several reasons that explain the omission of Hanna Swamp from current PSP plans.

Secondly, reference to the earlier maps in this discussion paper around Hanna Swamp shows that neither the DELWP map nor the DSS plan bear any resemblance to the original condition and alignment of Strathaird Creek in the vicinity of Hanna Swamp. This highlights another major challenge for the implementation of the *Healthy Waterways Strategy*. These policies simply assume a level of accurate historic knowledge exists in relation to the waterways, floodplains or in-stream wetlands that could be re-engaged and/or enhanced to achieve IWM outcomes. However that knowledge is lacking in this instance (like so many other cases), simply because an historic investigation of these waterways, and mapping to better understand the original condition of the catchment, has never been done. This type of important foundational work is not a standard requirement of the current PSP planning process in Victoria.

For the purposes of this discussion paper, and illustrating the magnitude and importance of this issue, NGT has prepared a series of maps that show broad changes made to the Wallan Wallan Wetlands since European colonisation. These maps starkly illustrate the magnitude of the oversights or omissions that can be caused by working from current DELWP and Melbourne Water mapping layers alone, without further analysis or validation.



**Map 1: Estimated pre-European location and extent of the Wallan Wallan waterways and wetlands**

### Notes for Map 1

#### Wetlands:

- The extent of Hanna Swamp and Herne Swamp has been estimated by:
  - Using the mapped extent of these wetlands on original survey diagrams (1853 and 1862)
  - Combining this with the LiDAR derived Digital Terrain Model (DTM) and local flood overlay
  - Checking an estimated original pre-drainage full supply level for Hanna Swamp (e.g. see: <http://natureglenelg.org.au/hanna-swamp-a-forgotten-wallan-wallan-wetland-that-highlights-the-challenges-of-business-as-usual-urban-development/>)
- The extent of Meade Swamp has only been estimated using the original mapped extent in 1853
- For ease of interpretation and comparison with Map 2 (see Map 3), the original alignment of the meandering course of Merri Creek and Taylors Creek through Herne Swamp (Page 6) has not been shown on this map, nor have the Wallan and Upper Merri Creeks above Herne Swamp.
- These estimated wetland areas are relatively conservative and do not represent the catchment in flood or high flow conditions, when adjacent, upstream and downstream floodplain areas could inundate to a much greater extent. This is especially the case north of Herne Swamp and west of Meade Swamp.

#### Waterways:

- Along its course before flowing into Hanna Swamp, Strathaird Creek appears to have shifted over time, even before artificial drainage commenced:
  - #1 (on map): Based on the 1853 image, the original alignment of the creek is shown in **solid blue**.
  - #2 (on map): Based on the DTM, it appears that this catchment may have experienced an erosion event that resulted in realignment of this creek after 1853 but before the first aerial photograph in 1940 – shown in **black and blue**. Such events were common across Victoria in areas with dispersive sub-soils as a result of over-grazing by introduced livestock triggering erosion.



**Map 2: Waterways (blue), constructed artificial drains (red) and DELWP mapped 'wetlands' (orange)**

## Notes for Map 2

### Wetlands:

- Marked in orange are the DELWP mapping layer wetland polygons, associated with Hanna Swamp and Herne Swamp.
- The Hanna Swamp polygon is consistent with the original estimated extent and matches the geomorphology of this feature.
- The Herne Swamp polygons are not wetland polygons – they are simply remnant vegetation polygons for the Seasonal Herbaceous Wetland ecological community within the former Urban Growth Boundary. They in no way represent the original extent or geomorphology of the wetland feature, nor the full extent of Seasonal Herbaceous wetlands, as they were not surveyed north of the former UGB.
- Meade Swamp is not currently mapped, despite the fact that it still temporarily inundates (Page 25).

### Waterways:

- Blue lines are waterways on or near their original alignment.
- The red lines are all the artificial drains and diversion channels we have been able to map so far, noting that this task has been completed remotely, within a short space of time, and may be incomplete.
- Of note, two stages of artificial diversion/drainage of Strathaird Creek away from Hanna Swamp are apparent:
  - #3 (on map):** Based on the 1940 aerial image the first diversion drain, which shows a deeply eroded channel and dispersive clay sub-soil spread across Meade Swamp, was constructed prior to that era. The alignment of that diversion drain is shown in **red and yellow**.
  - #4 (on map):** Based on the DTM and current imagery, a more recent diversion drain is shown in **red**. This channel actually appears to have been designed as a bunded floodway, discharging flows over natural surface. It seems this has been put in place to (a) maintain the diversion away from Hanna Swamp, but (b) attempt to reduce erosion of sub-soils occurring in Channel #3.



**Map 3: Comparison between original waterway features vs. current artificial drainage and mapped features**

### Notes for Map 3:

#### Wetlands:

- Drainage to facilitate past agricultural production across these wetlands and waterways has been comprehensive, but is reversible.
- Despite this drainage work, all three wetlands are still capable of temporary inundation after heavy rainfall events; which is not incompatible with the agricultural use of the land (see: <http://natureglenelg.org.au/it-hasnt-been-restored-yet-so-how-do-we-explain-the-temporary-return-of-herne-swamp/>).
- This regular natural flooding however is entirely incompatible with urban development.
- This map clearly shows:
  - The accuracy of the Hanna Swamp wetland polygon in the DELWP wetland layer
  - The significant inaccuracy or absence of wetland mapping for Herne Swamp and Meade Swamp
  - The encroachment of urban development and infill into Herne Swamp, reducing its flood storage capacity

#### Waterways:

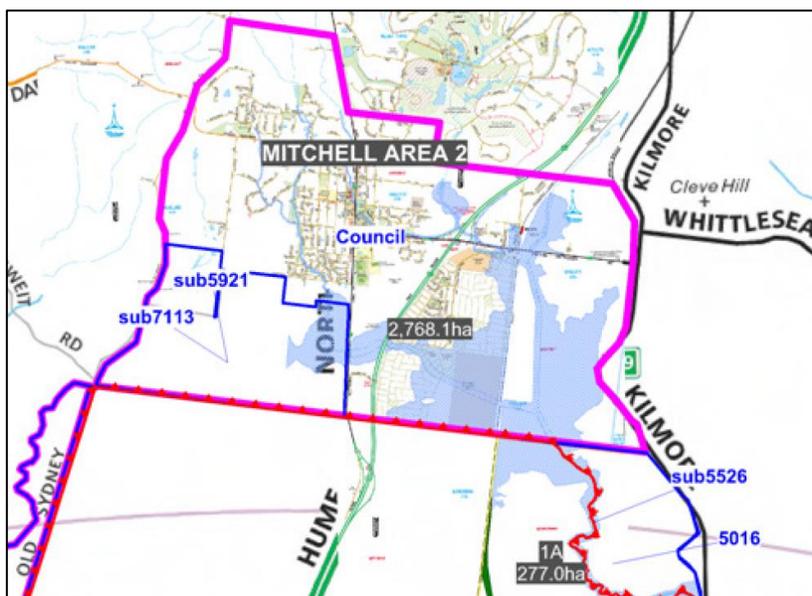
- This map illustrates:
  - The modification to wetland and waterways.
  - The identified serious erosion risk caused by the instability of soils in this catchment, as shown by the condition of Strathaird Creek over time.
- This map also reiterates how the current DELWP waterway layer and Melbourne Water's Taylors Creek DSS mapping (Page 18) do not recognise the natural waterway alignments, nor the geomorphology of these in-stream wetland features.
- Of note, in the case of DELWP mapping, this detail is also incorrect in the pre-1750 conditions map.

The maps provided demonstrate how difficult it is to achieve IWM outcomes and meet *Healthy Waterways Strategy* objectives, if the relevant parties are working with either erroneous or fundamentally different catchment template maps to begin with. As a result, you can be looking at the same location but find yourself seeing completely different landscape attributes – metaphorically ‘speaking a different language’. This is another major gap that helps to explain how Hanna Swamp (as well as Meade and Herne Swamp) have so far been overlooked as part of the development planning cycle.

## Gap 4: Urban Growth Boundary location and changes

As shown over the preceding pages, the former Urban Growth Boundary (UGB) creates some significant complications for achieving integrated and consistent outcomes for waterways in the Northern Growth Corridor – especially when two major wetland features, Hanna Swamp and Herne Swamp – actually straddle that administrative boundary.

The 2010 UGB was recommended for revision in 2011<sup>12</sup> and the current UGB adopted in 2012. This led to the formal expansion of Melbourne’s future growth corridor all the way to Wallan.



The 2010 UGB (red line) and the current expanded UGB (purple line) proposed in 2011, and adopted in 2012. Note the flood overlay (blue shading) on this map semi-accurately represents much of Herne and Meade Swamps, but does have gaps (e.g. it omits Hanna Swamp, plus the SW corner and centre of Herne Swamp).

As will be explored over subsequent pages, the 2012 change to the UGB is now causing a series of detrimental impacts – creating a degree of confusion for how wetland features and related waterway planning issues either side of the PSP boundary should be treated.

## Gap 5: Understanding the key limitations of the MSA program

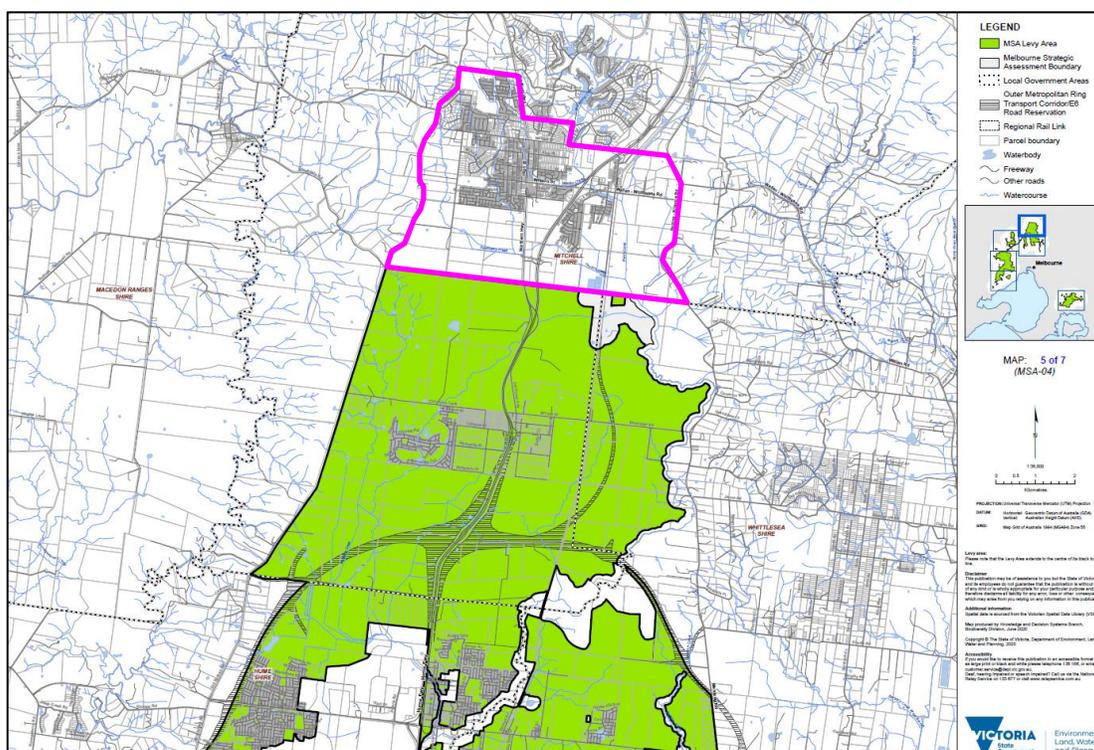
The Melbourne Strategic Assessment (MSA) program is the Victorian Government’s approach to manage the impact of urban development in Melbourne’s growth areas on significant vegetation communities, plants and animals; particularly those listed as threatened under the national *Environment Protection & Biodiversity Conservation Act 1999*.

<sup>12</sup> Growth Areas Authority (2011). Logical Inclusions Review Growth Areas Process. Preliminary Assessment Report. North Region: Whittlesea, Mitchell and Hume.

DELWP states<sup>13</sup> that:

“The MSA program applies to urban development that occurs within Melbourne’s urban growth areas, which were created following the significant expansion of the urban growth boundary in 2010. The strategic assessment also enables mitigation and offsetting efforts to be considered and effected in a more meaningful way. It allows Melbourne’s growth to follow a strategic, long-term plan. For example, the endorsed policy, plan or program can provide for consolidated habitat as opposed to more ‘scattered’ habitats that may result from ‘project-by-project’ mitigation measures.”

A key output of the MSA program is the Biodiversity Conservation Strategy<sup>14</sup> - the overarching strategy for the protection of biodiversity in the growth corridors. However, of note in the northern growth corridor, and of particular relevance for this discussion paper, the expanded UGB areas from 2012 (the so called “Logical Inclusions”) are not included in the MSA program area because of timing; i.e. this UGB expansion zone was apparently formalised by the State Government too late in the process to be included in the MSA program.



**The legislated MSA levy area (green) is based on the 2010 UGB. This map confirms that the MSA and Biodiversity Conservation Strategy do not include the expanded UGB area (purple) around Wallan.**

Hence, contrary to the often repeated assertion that the MSA program is the universal mechanism for ensuring the protection, enhancement and management of biodiversity in the growth corridors, the change to the UGB in 2012 has left some major geographic gaps that now undermine the stated intent of the MSA program.

Wetland or catchment features that straddle this boundary, such as Hanna Swamp and Herne Swamp, are left in a form of planning limbo, as the southern portions of these features have theoretically been assessed by the MSA, but not the larger portion of these same wetland features that fall on the northern side of the former UGB. Perhaps not unexpectedly, there is

<sup>13</sup> [https://www.msa.vic.gov.au/\\_data/assets/pdf\\_file/0030/473358/MSA-Act-Frequently-Asked-Questions.pdf](https://www.msa.vic.gov.au/_data/assets/pdf_file/0030/473358/MSA-Act-Frequently-Asked-Questions.pdf)

<sup>14</sup> DEPI (2013) Biodiversity Conservation Strategy for Melbourne’s Growth Corridors.

ongoing confusion among government agencies, developers and other interested parties working in this boundary zone, as they do not seem to fully recognise or appreciate the impact of this key gap in the current MSA program. Indeed many simply assume that the whole expanded UGB has been thoroughly assessed, when it has not. This means the MSA program in this area in particular cannot be relied upon as being a universal tool, and has fundamental limitations.

To illustrate the potential problems this creates, let's take a closer look at Hanna Swamp.

The MSA process did not identify any remnant biodiversity values in the southern portion of Hanna Swamp. As a result, the wetland area was not highlighted in the Beveridge North West PSP, despite being a mapped wetland feature by DELWP. Yet a later study commissioned by landholders for the Wallan South PSP area, which includes the northern portion of Hanna Swamp, did record remnant biodiversity values in the rest of the mapped wetland feature at Hanna Swamp. A number of patches of Plains Grassy Wetland, an endangered EVC of the Victorian Volcanic Plain in Victoria (that is also [nationally critically endangered](#)), were detected<sup>15</sup>, as shown.



**Plains Grassy Wetland (turquoise polygons) detected by Biosis within the northern portion of Hanna Swamp**

**Note: the white dashed line to show approximate extent of Hanna Swamp has been added by NGT.**

These values were found in a portion of Hanna Swamp that had previously been earmarked by Mitchell Shire Council as an area for future potential retention as a waterway<sup>16</sup>, as shown right.

**Right: Inset of the same portion of Hanna Swamp shown above, within the Wallan Structure Plan (Mitchell Shire Council 2015). Under this scenario from 2015, a large portion of Hanna Swamp, including the remnant areas of Plains Grassy Wetland, were potentially earmarked for protection, noting that at that time, the endangered native vegetation remnants had not yet been identified (as the Biosis study was in 2017).**



<sup>15</sup> Biosis (2017). Wallan South Precinct Structure Plan: Biodiversity Assessment Report. Report for Crystal Creek Properties Pty Ltd.

<sup>16</sup> Mitchell Shire Council (2015) Wallan Structure Plan. <https://engagingmitchellshire.com/wallan-structure-plan/widgets/170208/documents>

Despite the fact that the first report by Biosis in 2017 was completed to inform future urban development for the Precinct Structure Plan, a year later a separate report by Biosis<sup>17</sup> was prepared, seeking EPBC Act 1999 approval to remove the remaining native vegetation from the site – specifically from Hanna Swamp and surrounds – on the basis of continuing agricultural land use. In 2019, a planning permit was issued by Mitchell Shire<sup>18</sup> for this purpose.

This provides an example of how a lack of co-ordination outside of the MSA program area can lead to potentially perverse outcomes that might be contrary to the longer-term strategic intent of policies designed to govern development impacts on the environment within the expanded UGB. In contrast, these values would have been mapped and potentially earmarked for protection, if they were inside the MSA program area.

If Hanna Swamp is ultimately recommended for retention or enhancement in the future urban structure as an in-stream wetland for waterway management or flood protection purposes, then the landowner has potentially invested significant time and resources seeking to unnecessarily eliminate remnant biodiversity values from this part of Hanna Swamp for a short period of agricultural use ahead of urbanisation.



*A portion of Meade Swamp is temporarily inundated on the 4<sup>th</sup> of April 2020 after heavy rainfall*

## **Gap 6: Mismatch between planning zones and catchment features**

As an extension of item 5, we now have a situation where a Parish Boundary, MSA boundary, PSP boundary and related planning zone boundaries all follow the former UGB, which has a series of consequences for Hanna Swamp and Herne Swamp. Given that wetland or catchment features do not align at all with these artificial administrative boundaries, this is creating a significant gap that is preventing a coordinated planning solution for waterways and biodiversity values.

The Beveridge North West PSP is further advanced than the Wallan South PSP, yet layout decisions that this PSP will soon entrench for the southern portion of Hanna Swamp risk undermining strategic catchment and waterway planning directions in adjacent Wallan South – unless those matters are thoroughly and strategically considered together.

This gap has emerged because Hanna Swamp straddles the boundary of PSPs and is the only waterway feature in the Beveridge North West PSP area that is part of a different catchment (Strathaird / Taylors Creek), whereas the rest of the PSP area is part of the Kalkallo Creek catchment. Understandably and as a result, Hanna Swamp and catchment issues in Wallan South have not gained a lot of attention as part of the Beveridge North West PSP process.

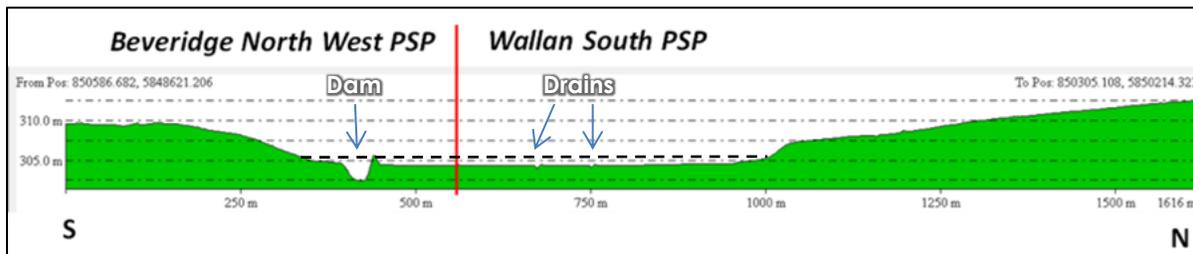
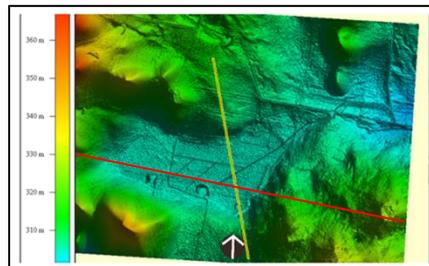
---

<sup>17</sup> Biosis (2018). Inverloch Farming Property, 175 Northern Highway, Wallan, Victoria: Preliminary Documentation. EPBC Referral number: 2018/8148.

<sup>18</sup> [Planning Permit Application PLP319/17 for Removal of Native Vegetation at 175 Northern Highway, Wallan](#)

The best way to understand this gap is to look at Hanna Swamp in cross-section, as shown below/right.

**Right: Hanna Swamp, showing the alignment of the cross-section below (yellow line) and the boundary between PSPs (red line)**



**An exaggerated cross section (as per yellow line in image top right) showing the bed of Hanna Swamp.**

The cross-section illustrates why decisions for wetland features that straddle planning boundaries (see red line on images) cannot be made in isolation – because land use or planning decisions that impact the hydrology of one side, automatically impact the other.

Prior to the diversion of Strathaird Creek and drainage, Hanna Swamp would have been a very reliable in-stream wetland that seasonally inundated to approximately half a metre deep. This depth is shown on the cross-section with a blacked dashed line.

If the Beveridge North West PSP allocates this land for an incompatible land use, prior to Wallan South catchment assessment and drainage plans being finalised, it would effectively prohibit any options that consider or assess the potential to reinstate this natural in-stream wetland.

## Gap 7: Mismatch in sequence of key studies and planning decisions

Further to Gap 6, there are several items of work currently underway and that are not yet complete, despite the progress of plans for the Beveridge North West and Wallan South PSPs. That investigative work being led by Melbourne Water, the Yarra IWM Forum<sup>19</sup> and DELWP, includes the following:

- Integrated Water Management Plan for Upper Merri Creek catchment (Yarra IWM Forum)
- Hydrological study and catchment assessment for the upper Merri Creek Catchment (Melbourne Water)
- Merri Creek Floodplain Investigation - Flood Modelling Study (Melbourne Water)
- Review of the Taylors Creek DSS (Melbourne Water)
- Wallan Regional Park Feasibility Study (DELWP).

Until these tasks are complete (at a minimum), it would be unwise to make any definitive decisions about the future of Hanna Swamp, specifically noting that these items of work do not have a biodiversity focus. This is significant because, irrespective of the issues with the MSA, as previously discussed, there are a whole suite of additional catchment related matters for which Hanna Swamp may be a necessary landscape feature to retain and reinstate. For example, it may be required to address drainage, water quality, recharge or flood management challenges.

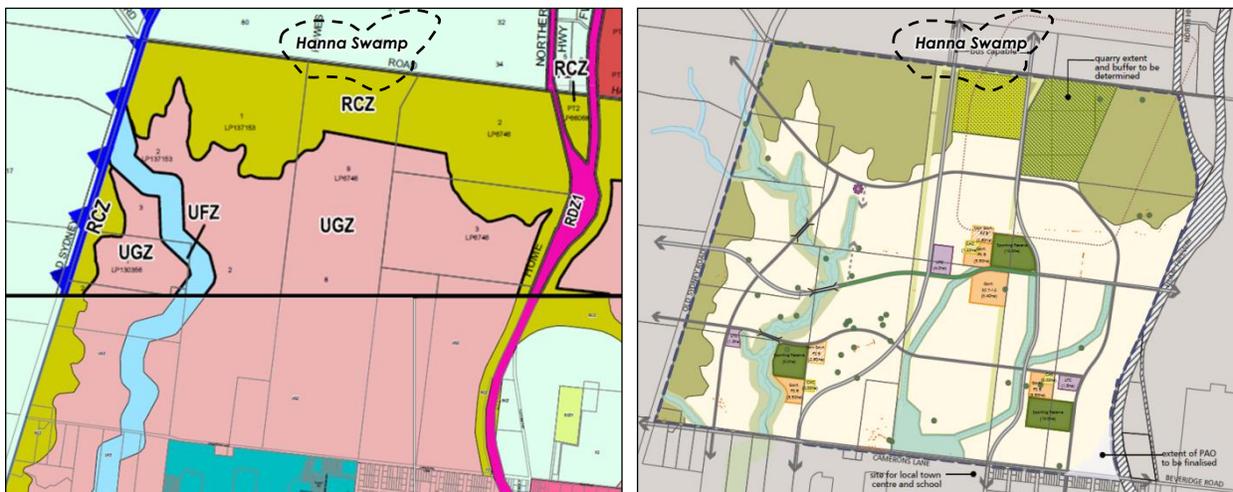
<sup>19</sup> The Yarra IWM Forum is one of a number of Integrated Water Management Forums that have been established across Victoria to identify, prioritise and oversee the implementation of collaborative water opportunities. The establishment of this Forum is an outcome of the Integrated Water Management Framework for Victoria (2017).

## Gap 8: Fragmentation of the Rural Conservation Zone around Hanna Swamp

The purpose of the Rural Conservation Zone (RCZ) in the Mitchell Shire Planning Scheme is:

- To protect and enhance the natural environment and natural processes for their historic, archaeological and scientific interest, landscape, faunal habitat and cultural values.
- To protect and enhance natural resources and the biodiversity of the area.
- To encourage development and use of land which is consistent with sustainable land management and land capability practices, and which takes into account the conservation values and environmental sensitivity of the locality.
- To provide for agricultural use consistent with the conservation of environmental and landscape values of the area.
- To conserve and enhance the cultural significance of open rural and scenic non-urban landscapes.

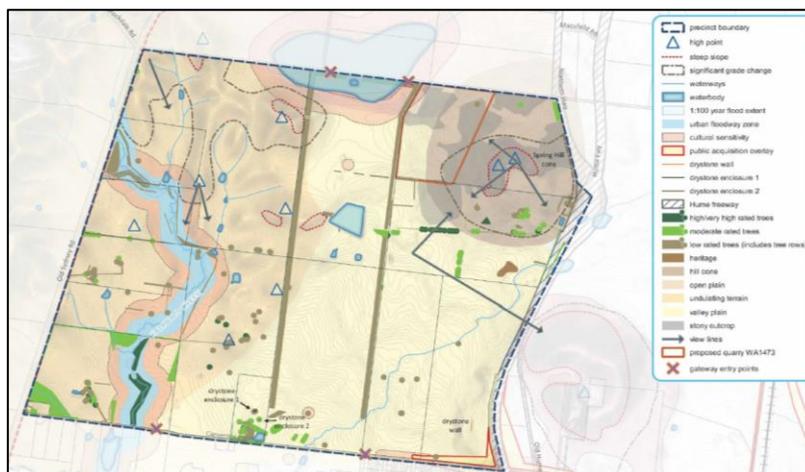
The 2014 draft Beveridge North West PSP was based on the pre-existing RCZ that was identified in the Growth Corridor Plan. Current zoning for the southern portion of Hanna Swamp is RCZ, as shown. Note that Hanna Swamp has been roughly outlined to show its location.



Current zoning which supports the 2014 urban structure

2014 MPA (VPA) Draft urban structure

This current configuration provides for a broad east-west open space corridor linking volcanic features to the east with hillslopes to the west, while the ground in between is the location of the southern portion of Hanna Swamp – as also shown on the Features Plan in the 2019 Exhibited PSP for Beveridge North West.



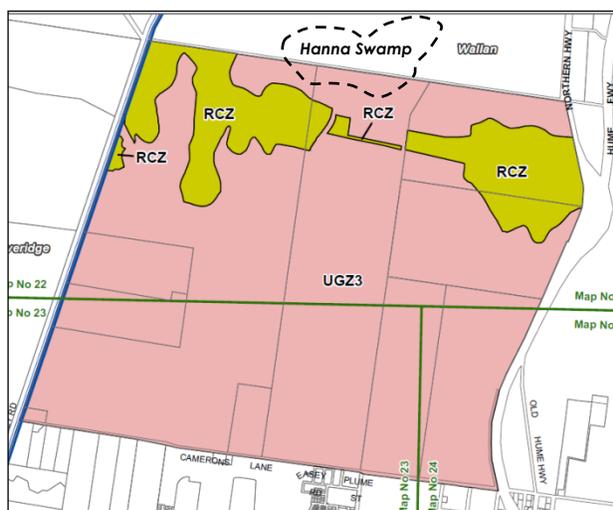
The Precinct Features Plan in the Exhibited Beveridge North West PSP – Hanna Swamp and the buffer zone around it are likely to retain cultural heritage values, noting that wetlands are known artefact hotspots.

The advantage of the existing zoning is that it provides a means for capturing the volcanic peaks, western hillslopes and Hanna Swamp in a single precinct of linked open space, which in turn provides an inter-urban break between the suburbs of Beveridge and the outer extent of the eventual greater Wallan township. Indeed, this was the original stated intent for the Rural Conservation Zone in this location. Of note, given the Logical Inclusion areas were recommended in 2011 and adopted by the Victorian Government in 2012 – these changes to the UGB were well entrenched prior to the draft urban structure that was proposed in 2014 (see previous page).

However, at some point over the subsequent five years, the emphasis changed significantly, and the layout and zoning now proposed by the VPA is only a fraction of the previous RCZ area. To illustrate the magnitude of this change, please compare the images below to the previous page.



VPA proposed urban structure in 2019



VPA proposed amendment to the RCZ in 2020

Not only has the RCZ open space zone in general been reduced across the entire PSP, but the area that incorporates the southern portion of Hanna Swamp is now proposed for residential and recreation facility development. Needless to say, these future land uses would necessitate the permanent loss of Hanna Swamp as a mapped wetland feature and preclude its future reinstatement as an in-stream wetland of Strathaird Creek.

## Gap 9: Methodological constraints in the biological survey of wetlands

Defining the true biodiversity value of any ecological system in a once-off snapshot survey is difficult. Even intact wetland systems are problematic because of their variable hydrology through time. As a result, ephemeral wetlands, as Hanna Swamp has become over the past few decades due to artificial drainage, are often the first sites to fall between the cracks. Survey the site when dry (which is most of the time) and you will find few perennial biodiversity values.

This significant gap is a problem in wetlands generally, but is exacerbated at modified wetland like Hanna Swamp, where existing values are much less visible between inundation events due to development, when residual values are dormant. Environmental assessment methods – to meet *business as usual* minimum legislated standards – generally adopt a once-off (i.e. single spring season) survey method to assess current conditions. There is limited ability to consider dormant values, longer term climatic trends, or restoration potential of the site based on a change in future management or conditions. As a result, and despite having tremendous restoration potential (see Gap 10), modified wetlands are often significantly disadvantaged by these methodological constraints – appearing to have ‘no value’, when this is clearly not the case.

## Gap 10: Potential values of a restored Hanna Swamp in future urban design

There are a number of values that Hanna Swamp could play in the future urban structure around Wallan, that are yet to be fully assessed but may be answered either partly or fully by the investigative work (subject to scope) referred to in Gap 7. Progressing PSP planning without full and proper consideration of these potential values has been another major gap until very recently. For example:

- **Flood management**

Natural in-stream wetlands perform a vital function in attenuating peak flows in episodic rainfall events, reducing downstream flood risk, and improving downstream water quality. The upper Merri Creek near Wallan is a flood-prone landscape where that risk will only increase with urbanisation, and will be exacerbated if floodplains and in-stream wetlands are reclaimed and developed for housing, as is currently proposed for Hanna Swamp.

- **Erosion management**

Minimising disturbance to natural waterways and re-instating natural instream wetlands at natural surface reduces erosion risk, which is especially important in this catchment given the prevalence of sodic dispersive sub-soils.

*The confluence of Merri Creek and the Yarra River in May 2018 (image courtesy of MCMC), after heavy rainfall mobilised plumes of dispersive clay from parts of the upper Merri Creek catchment*



- **Groundwater infiltration to reduce impacts of increased impervious surfaces**

The Upper Merri Creek is identified in the *Healthy Waterways Strategy* as being a stormwater priority area. Utilising the recharge capacity of natural wetlands in urban areas could meaningfully contribute to targets for increasing groundwater infiltration.

- **Social and aesthetic values**

Natural wetlands and waterways provide vital open space, connect communities to the local landscape and provide opportunities for the development of linear trails and passive recreational opportunities.

- **Urban climate considerations**

Town planners and water authorities are increasingly concerned about built up urban areas functioning as heat traps, with direct impacts on liveability, electricity consumption and human health. Restoring Hanna Swamp (and its capacity to retain moisture and create a significant green open space in the urban matrix) will provide an effective natural means of moderating the local climate as adjacent areas are urbanised. In short, a restored Hanna Swamp would improve liveability for future surrounding residents.



*An urban wetland in Perth.*

- **Cultural value**

Natural wetlands and waterways are key features in the traditional cultural landscape and their protection and/or restoration provides a tangible, genuine means of connecting with and supporting the aspirations of First Nations people. Chapter 6 in *Water for Victoria*<sup>20</sup> requires water planning to acknowledge Aboriginal water values by working in respectful partnership with Traditional Owners. Hanna Swamp and the Wallan Wallan wetlands could provide a meaningful opportunity for Traditional Owners to re-engage with cultural flows in the region. However it is unclear whether sufficient engagement with the Wurundjeri Woi Wurrung Traditional Owners has yet occurred in relation to PSP development plans and their impacts on the Wallan Wallan wetlands and upper Merri Creek waterways.

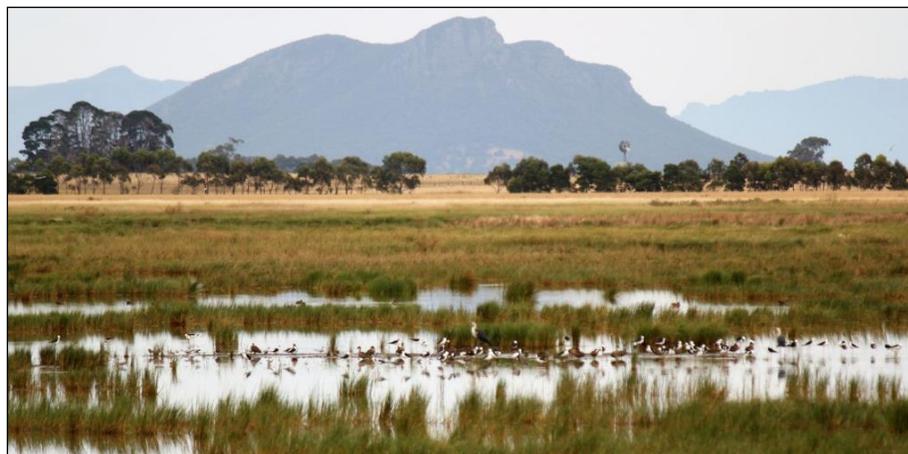
- **Biodiversity response**

For a site like Hanna Swamp in the agricultural landscape, a drained and cleared wetland is never really lost – just think of it as being in an artificially induced state of drought. This mimics a natural state and many wetland flora and fauna are adapted to this dry phase. Return the water (natural timing and extent of inundation) by restoring the bathymetry of the wetland and reversing drainage impacts, as Nature Glenelg Trust have now done at dozens of wetlands across Victoria, and the wetland would rapidly return to a natural healthy productive ecosystem. In short, both ecological values and hydrological function can be recovered in minimal time.



***Before (left) and after (right) NGT delivered hydrological restoration works at Scale Swamp.***

Artificial or not, once the drought breaks, natural wetlands are very forgiving ecosystems, capable of supporting wetland plants that are especially adept at bouncing back (e.g. from seed, rhizomes or other propagules), as well as a wide range of animals recolonising all by themselves, with the water attracting them and initiating their return.



***Spectacular habitat recovery at Scale Swamp. This photo was taken in 2017, three years after it was restored by NGT. Prior to restoration, this site was largely devoid of native vegetation and has a broadly similar agricultural drainage history to Hanna Swamp.***

<sup>20</sup> <https://www.water.vic.gov.au/water-for-victoria>

It is interesting to note that unlike many terrestrial (i.e. dry-land) ecosystems, which are more stable in their appearance and composition, many wetland types support a wide range – sometimes a majority – of values (plants and animals) that are seasonal or ephemeral. This is important to consider given that Hanna Swamp in its current state has (as previously described in this discussion paper) been functioning as an ephemeral wetland for the past few decades as a result of past changes to its hydrology.

In lay terms, this means that even at completely intact sites, dormancy phases, or for some animals migration, can mean those values quite literally disappear from view for months or even years at a time. This natural recovery, in turn, is the magic biological ingredient that underpins the return of these values once we restore degraded sites, by using the natural adaptations of wetland species to our strategic advantage.



**Right: Swans return to breed in a trial wetland restoration area within Herne Swamp. Photo courtesy of Gerard Barry – July 2020.**

## Gap 11: Understanding the benefits of natural vs. constructed wetlands

The typical approach for major developments in the urban setting is for drainage plans to be fully engineered with constructed waterways, stormwater retention basins and wetlands. Many planners assume that all wetlands are broadly of similar value and that constructed and natural wetlands are therefore essentially equivalent. However, this is actually not the case.

Despite in many cases being able to achieve similar hydrological and water quality outcomes, on ecological grounds, restoring natural wetlands is far superior.

This is because most of the biodiversity of natural wetlands (particularly the diversity of flora) and the production of resources for fauna, occurs within the zone that is inundated when water levels are high and exposed when water levels are low. In natural wetlands this zone can be very wide, and in fact with some wetland types, such as those with very flat bathymetry (topographic shape) like the Wallan Wallan wetlands, it can form most or all of the wetland. In contrast, constructed wetlands tend to have steep banks and so the area between the high and low water levels is often a narrow strip of limited diversity.



**An urban constructed wetland at Melton, Melbourne. Although functional and aesthetic to humans, these wetland cells are of fixed static depth and support simplistic habitat.**

Hence, many artificial wetlands built specifically to meet human needs tend to be simpler, less diverse ecosystems that are missing key ecological functions when compared to natural wetlands. The key drivers of this are area, shape, depth and hydrological regime of the wetland. In constructed wetlands water levels are often relatively fixed, or alternatively they rise and subsequently fall rapidly after rainfall events, which mean the vegetation zones are consequently highly simplified and/or relatively narrow around the edge of the wetland.



***An urban stormwater basin, so temporary that it provides no wetland habitat value between rainfall events.***

Even where larger constructed wetlands with a ‘semi-natural’ feel are created and planted, they tend to follow a relatively formulaic, pond-like construction method – typically for stormwater treatment purposes<sup>21</sup>: key features include a permanently inundated zone with stable water level, open water and emergent plants, a steep or narrow bank and narrow vegetated fringe.



***An urban constructed wetland at Royal Park, Melbourne. These larger constructed and planted wetlands typical of urban environments have a formulaic composition: deep inundated zone, vegetated fringe.***

In stark contrast, large seasonal natural wetlands like the Wallan Wallan Wetlands were once quite common all around Melbourne, and many would have presented with the general structural appearance of the wetland over the page. As you can see, this is totally different ecosystem to a constructed wetland.

<sup>21</sup> <https://www.melbournewater.com.au/building-and-works/developer-guides-and-resources/standards-and-specifications/constructed-wetlands>



***A seasonal, shallow wetland with variable depth – similar to the original character of the Wallan Wallan wetlands.***

In natural wetlands of this type, a diversity of habitats result where the increased shallow extent of inundation incorporates a large area of a gently grading or undulating wetland bed. In these conditions, a mosaic of vegetation zones are interspersed with inundated, shallow, exposed mud flats (as water seasonally recedes), increasing both the productivity and carrying capacity of the wetlands for a wide range of birds and other animals.

As a result, the diversity of animal and plant species associated with seasonal or ephemeral wetlands is often markedly higher than those associated with permanent waterbodies with fixed depth, like many constructed urban wetlands.

Across Greater Melbourne, large, shallow, seasonally inundated wetlands – like the Wallan Wallan Wetlands – are now mostly gone, having been infilled and built upon in the process of creating the urban environment. Importantly, because of their fundamentally different size, shape, water regime and floristic characteristics, once wetland areas like this are lost they simply cannot be recovered or recreated via future urban wetland creation or waterway naturalisation projects. We only get one chance to decide to retain, reinstate or recover natural wetlands of this type.

In the case of a drained or modified natural wetland, as described in Gap 10, the initial building blocks of restoration are generally already lying dormant in the soil – waiting to be activated. So while Hanna Swamp may currently appear degraded or lost, it can be restored, and if that were to occur, it would produce results far superior to a constructed wetland from an ecological perspective. Perhaps most importantly, because of the restoration potential of natural wetlands, the process of sustained recovery is potentially only a single season from getting underway. In the case of Hanna Swamp and the Wallan Wallan wetlands generally, restoration is likely to restore, protect and increase the extent of the Plains Grassy Wetland EVC, synonymous with Seasonal Herbaceous Wetlands (a [nationally critically endangered ecological community](#)). For the reasons outlined, constructed wetlands are not able to provide equivalent substitute value.

Restoration is, in this context, also much more cost and time effective than wetland construction, and causes a lot less disturbance because of working with a natural landscape feature that already exists. The Wallan Wallan wetlands could provide the local community with a fascinating window into the original nature of these wetlands, embedded in their local urban environment.



***The winter and summer appearance of the small wetland restoration trial area in Herne Swamp, being undertaken on Yarra Valley Water land adjacent to the Wallan Treatment Plant.***

## PART 4: Conclusion - Adopting solutions

In summary, despite now being degraded as a result of past land management decisions, Hanna Swamp remains a natural in-stream wetland. The original wetland feature exists, still occasionally inundates, is formally mapped as a wetland feature and has the potential to be brought back to health, to improve stormwater management and waterway condition in conjunction with the coming change in land use from agricultural to urban uses.

Yet there is a chance that suburban development will not recognise the location of the original waterways and wetlands of the Upper Merri Creek catchment and may instead simply entrench the changes that were made to facilitate past agricultural development, permanently locking in the detrimental impacts of those historic changes to waterway health. This is also despite the fact that this is a flood-prone landscape, where building on drained in-stream wetlands carries significant risks (both on-site and downstream) by reducing the capacity of the floodplain.

Even though the actual development works may be several years away, pivotal layout decisions are being made for this area through Precinct Structure Plans (PSPs). Yet there has not been any detailed comparative analysis between the legitimate choices for how these catchments are ultimately developed, such as whether flooding and other waterway risks could be better managed in alternative ways to *business as usual*; e.g. whether the original waterways, including in-stream features like Hanna Swamp, Meade Swamp and Herne Swamp, could be integrated into development designs and turned into community assets with multiple benefits.

As explored in this paper, finding a way to seamlessly deal with a complex issue of this nature is a major challenge when there are so many players, PSPs at different stages of development and a wide range of competing interests – but it is not too late. Fortunately, there is a growing awareness that there is a significant current gap between the policy framework and planning processes that typically apply within Melbourne’s Urban Growth Boundary. The relevant water policy is strong and already in place (refer to Part 1 and Part 2) but existing *business as usual* processes are yet to fully adopt and implement these policies (refer to Part 3). In a positive sign, goodwill exists among many of the players to address this gap.

**The first step that we recommend is a thorough comparative analysis to review the alternative future IWM options for the Wallan Wallan wetlands, including Hanna Swamp.** This is consistent with State policy and the IWM Framework, and will allow the implications of various options to be fully assessed and considered in a transparent way. In the meantime, the planning options for Hanna Swamp (and the other wetlands) should be left open by the PSPs while this work occurs.

While everyone attempts to ‘catch-up’ to fill the many gaps that exist with PSPs that are far advanced, this experience highlights how important it is for the timing and nature of IWM conversations to occur early in the development cycle. If this occurs, we may be able to shift from late, reactionary measures and instead focus on proactive, early, collegiate planning input. Such input can then genuinely incorporate and embed IWM and *Healthy Waterways Strategy* philosophies in early draft development plans, and resultant designs would provide a sound agreed spatial framework and layout for future urban development.

Nature Glenelg Trust is committed to making complex environmental science more accessible to decision makers and the general public, to deliver multiple benefits. In this spirit of constructive dialogue, feedback or questions in relation to this discussion paper are most welcome. You can contact Nature Glenelg Trust by emailing [info@natureglenelg.org.au](mailto:info@natureglenelg.org.au).