alluvium

REPORT:

Wallan East and South

Integrated Water Management issues and opportunities

November 2020

Document history

Revision:

Revision no.	01
Author/s	Lucie Bright
Checked	Dan O'Halloran
Approved	Dan O'Halloran

Distribution:

Revision no.	01
Issue date	October 2020
Issued to	Zachary Powell Victorian Planning Authority
Description:	Draft for comment
Revision no.	02
Issue date	November 2020
Issued to	Zachary Powell Victorian Planning Authority
Description:	Final

Citation:

Alluvium (2020) Wallan East and South PSP: IWM Issues and opportunities 0120182 by Alluvium Consulting Australia for the Victorian Planning Authority

Acknowledgements:

Alluvium acknowledges the Traditional Owners and custodians of the lands on which we work.

This project was undertaken on Wurundjeri land

We pay our respects to their elders, and the elders of all Aboriginal and Torres Strait Islander Peoples, past, present, and into the future.

Contents

Figures

Abbreviations

Alluvium	Alluvium Consulting Australia Pty Ltd
BPEM	Best Practice Environmental Management
CMA	Catchment Management Authority
DELWP	Department of Environment, Land, Water and Planning
DS	Drainage Scheme
DSS	Development services scheme
GL	Gigalitre
Ha	Hectare
IWM	Integrated Water Management
LGA	Local Government Area
MCMC	Merri Creek Management Committee
ML	Megalitre
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
MW	Melbourne Water
PET	Potential Evapotranspiration
PSP	Precinct Structure Plan
SDS	Strategic Directions Statement
STP	Sewage treatment plant
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total suspended solids
VPA	Victorian Planning Authority
WSUD	Water sensitive urban design
YVW	Yarra Valley Water

1 Introduction

The Victorian Planning Authority (VPA) engaged Alluvium Consulting Australia Pty Ltd (Alluvium) to prepare a summary of Integrated Water Management Issues and Opportunities across the Wallan South and East PSPs. Wallan East and South PSPs are located approximately 45 km north of Melbourne within the Northern Growth Corridor and the Merri Creek Catchment. Both PSPs lie within the Mitchell Shire.

While this report will focus on those PSPs, the Issues and Opportunities will also be influenced by strategies and programs that apply to the northern growth corridor and Upper Merri Creek catchment more broadly.

Figure 1 shows both PSPs in the context of other PSPs in the corridor.

1.1 Aim

The aim of this report is to:

- Identify IWM issues and opportunities for these PSPs.
- Summaries previous studies that are relevant to Integrated Water Management (IWM) and provide strategic context for IWM within each PSP and the Northern Growth Corridor.
- Summarise IWM related work that is being planned for and undertaken in neighbouring PSPs and the corridor more generally to understand the potential for opportunities to extend beyond the PSP boundary.

1.2 Developing this paper

This paper was prepared based on the following:

- A literature review of relevant strategies and plans prepared or provided by VPA, landowners, Yarra Valley Water, Melbourne Water and community groups including the Merri Creek Management Committee (MCMC).
- Interviews with representatives from Melbourne Water, Yarra Valley Water, Mitchell Shire, landowners and landowner representatives (e.g. consulting engineers). The interviews included individuals generally involved in land development and strategic planning.
- Attendance at VPA led co-design workshops (with ~90 attendees) to discuss land use, location of community assets, treatment or management of natural assets, recreational areas and transport links.

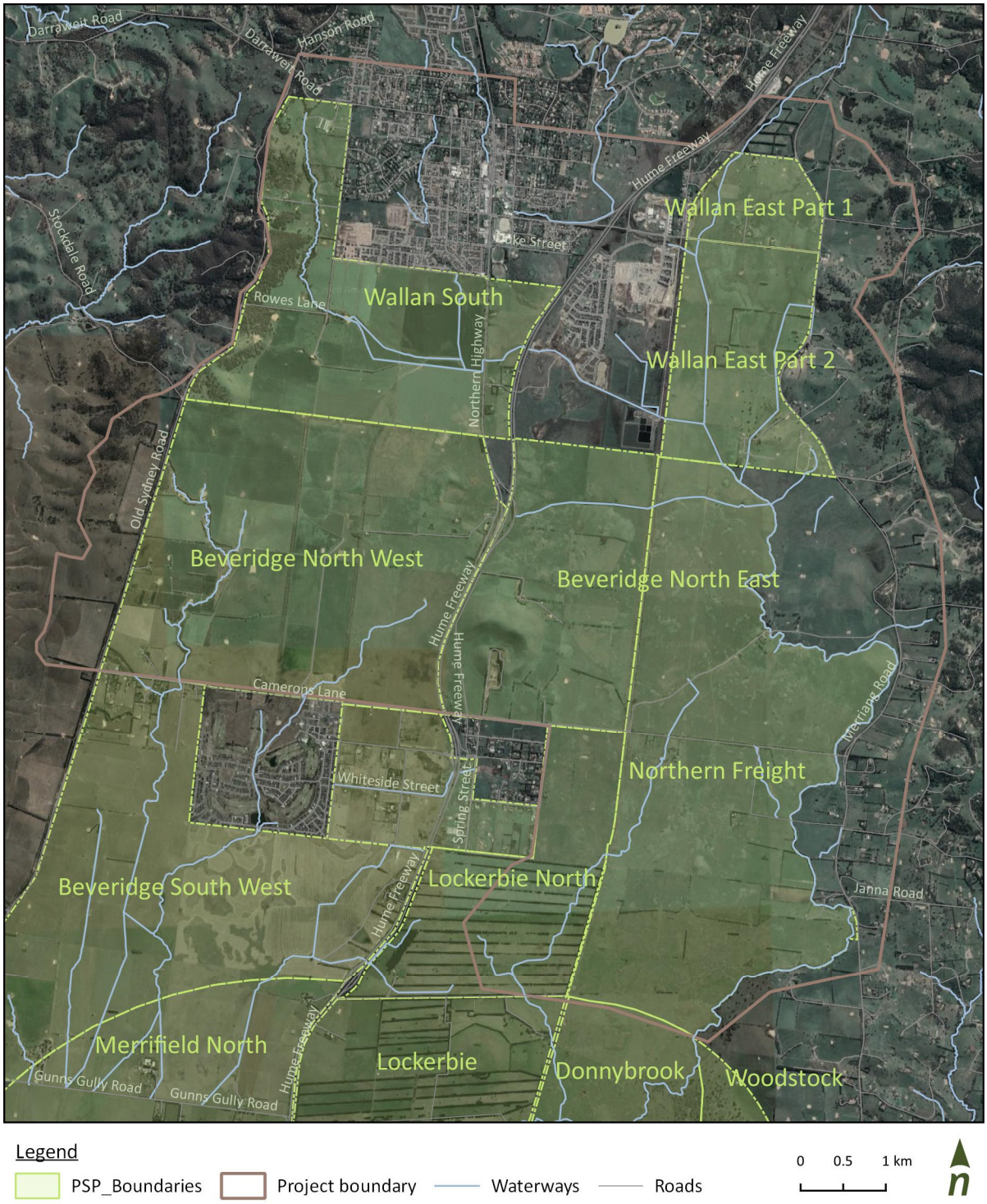


Figure 1. *Study area – Wallan South and East in the context of the northern growth area*

2 Strategic documents – Growth Corridor Scale

The following will provide a brief summary of key strategic documents that are driving IWM approaches in these PSPs and the corridor beyond.

2.1 Yarra Strategic Directions Statement (IWM Forum, September 2018)

Strategic Directions Statements (SDS) have been prepared for Metropolitan Melbourne's five sub-catchments, including the Yarra River, of which the Merri Creek is a tributary. The vision of this document is: *Working together, Yarra is a world-leading water sensitive catchment and our communities are healthy and thriving. We honour the land and the water of the Birrarung and its tributaries as the lifeblood of the catchment.* The desired outcomes for the SDS are summarised in Figure 2 below, highlighting the range of considerations in planning for water management within the corridor.

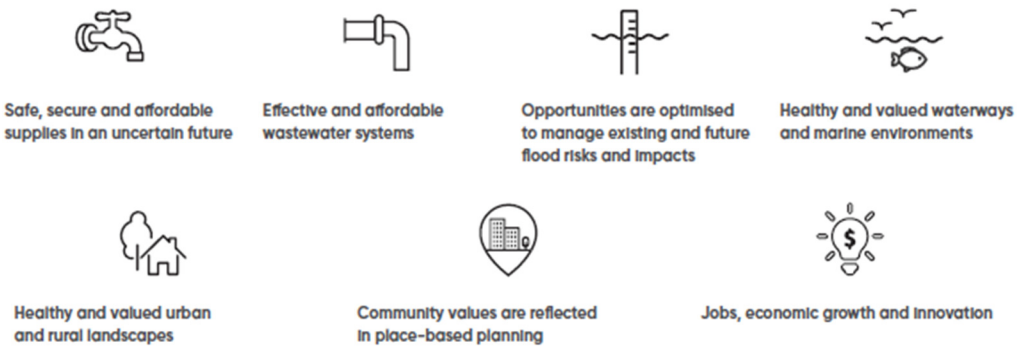


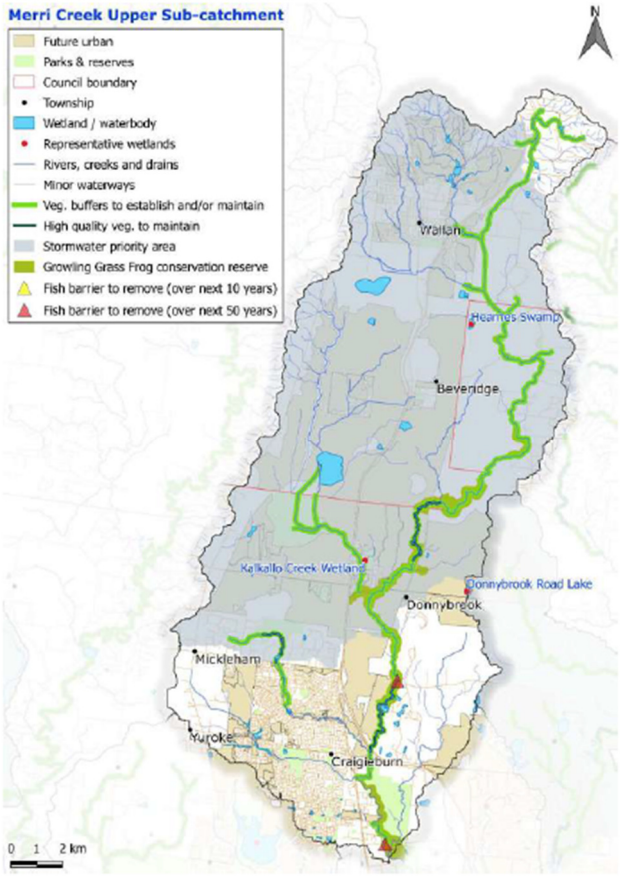
Figure 2. *Yarra catchment SDS outcomes*

Three of the actions identified within the SDS are highly relevant to the corridor and by extension these PSPs. The text below is lifted directly from the SDS:

- **IWM Sub-catchment plan**: This project will develop place based IWM Sub-Catchment Plans to clearly convey planning requirements and infrastructure investment sequencing information. It will provide a coordinated, consistent and proactive approach from water authorities, catchment managers and local governments in relation to water resources planning and management for specified areas across Metropolitan Melbourne.
- **Merri Creek Upper IWM Sub-Catchment Plan Pilot**: The Merri Creek Upper sub-catchment will be a pilot site for the implementation of IWM Sub-catchment Plans in a predominantly greenfield development setting.
- **Wallan Restorative Project**: The Wallan Sewage Treatment Plant (STP) will be connected to the metropolitan sewer network by 2021. At this time, the STP will become a sewer mining plant. There is an opportunity to repurpose the existing irrigation land and 165 ML winter storage lagoons for other benefits Including for the storage and reuse of harvested stormwater. While the volume of stormwater that this facility can harvest and store in an average year is unknown, it is a significant storage asset that should be incorporated into any precinct scale IWM planning analysis.

2.2 Healthy Waterways Strategy – Co-designed Catchment Program for the Yarra Catchment

The Healthy Waterways Strategy seeks addresses conditions within the "Merri Creek Upper" sub-catchment that includes catchment upstream of Craigieburn Road that includes the Kalkallo, Malcolm and Aitken Creeks, that are tributaries to the Merri Creek.



As well as objectives across vegetation (extent and quality), water quality, physical form, access and community participation, the Stormwater Condition target states "*directly connected imperviousness (DCI) remains below 2% on the Merri Creek at Summerhill Road (Wollert). For every hectare of new impervious area, this requires harvesting around 4.5 ML/y and infiltrating 1.1 ML/y, which is about 21.4 GL/y and 5.2 GL/y for full development to the urban growth boundary*".

The strategy also highlights Hearnes Swamp, that is downstream of both Wallan South and East PSPs, as "*a freshwater meadow and is also a nationally listed Seasonally Herbaceous Wetland*" with objectives to

- Improve the wetland water regime
- Improve wetland habitat and
- Improve wetland buffer to 50% of wetland perimeter.

A location plan for Hearnes Swamp (in relation to Wallan township) is provided Figure 3 below, also showing the location of Hanna and Meade Swamp, Taylor and Strathaird Creek.

Figure 3. *Herne Swamp (Source: Place making in the Upper Merri)*

2.3 Place making in the Upper Merri Creek: Integrated Water Management Plan (2020) - *draft*

The development of a sub-catchment IWM plan was a key action stated within the Yarra SDS (2018) (see Section 2.1). The "Place-Making in the Upper Merri Creek: IWM Plan, is at draft stage and is expected to be finalised in early 2021 (TBC). The plan has nine key outcomes:

1. An engaged, inspired and knowledgeable community that drives decision making
2. Leadership and capacity
3. Institutional, policy and regulatory arrangements that drive integrated and collaborative approaches to water cycle planning
4. Water infrastructure and systems that are fit for purpose, resilient and adaptable to change
5. Improved ecological health and biodiversity of natural environments
6. Healthy, cool, green cities and regions supported by blue and green infrastructure
7. Resource efficiency and recovery towards regenerative outcomes
8. Innovative system-wide transformations towards a circular economy
9. Water-related business opportunities.

Each outcome has accompanying targets and actions that are drawn from the cultural flows assessment (draft), Healthy Waterways Strategy, Living Melbourne: Our Melbourne Urban Forest Strategy, Melbourne Water's Urban Cooling Program and the Yarra SDS.

The Plan also highlights the importance of engagement with the Traditional Custodians of the Upper Merri Creek region, the Wurundjeri Woi Wurrung Cultural Heritage Aboriginal Corporation, while emphasising the importance of understanding cultural flow and management objectives.

Findings from the cultural flows assessment are to be finalised, however a number of culturally important landforms have been identified (Figure 4). Two locations noted in the assessment include Pretty Sally (already noted as a possible site of cultural significance in the Wallan South PSP regional context plan – marked as 'Green Hill') and the confluence of the Mittagong-Merri Creek – located immediately south of the Wallan East PSP boundary (note – Mittagong Creek is also mapped as Wallan Creek). A third location is the confluence of Strathaird-Merri Creek which is downstream of both PSP areas.

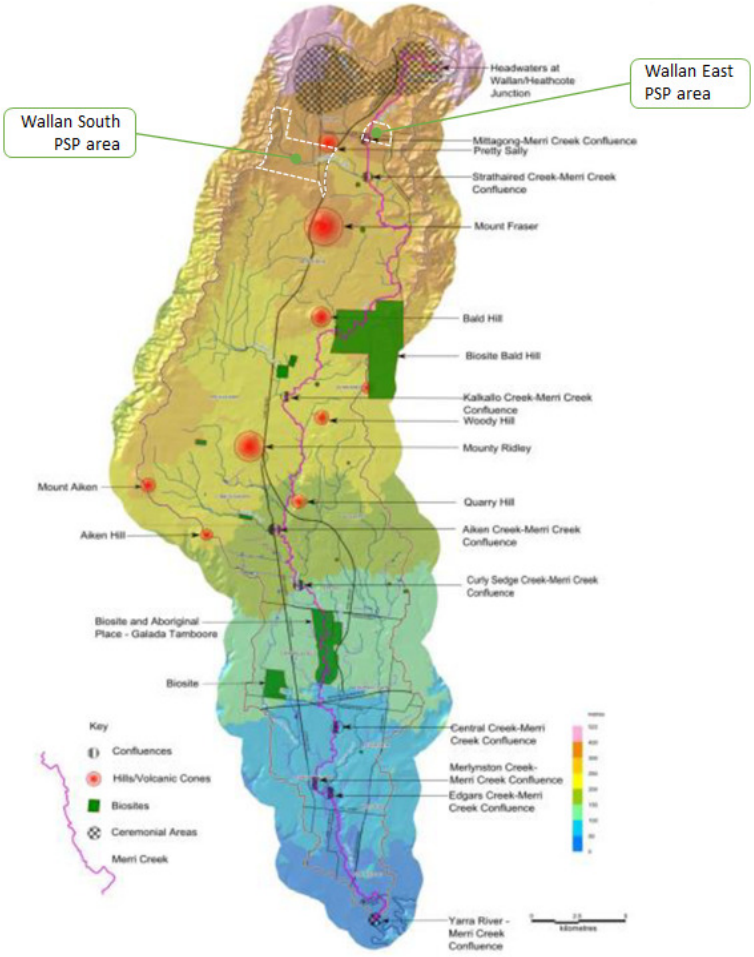


Figure 4. *Upper Merri Creek Cultural Flows Assessment – locations of culturally important landforms (draft)*

The plan also highlights the impact of development on the water cycle at a macro scale, highlighting the changes in demand for potable water, sewage created, and stormwater generated across the sub-catchment.

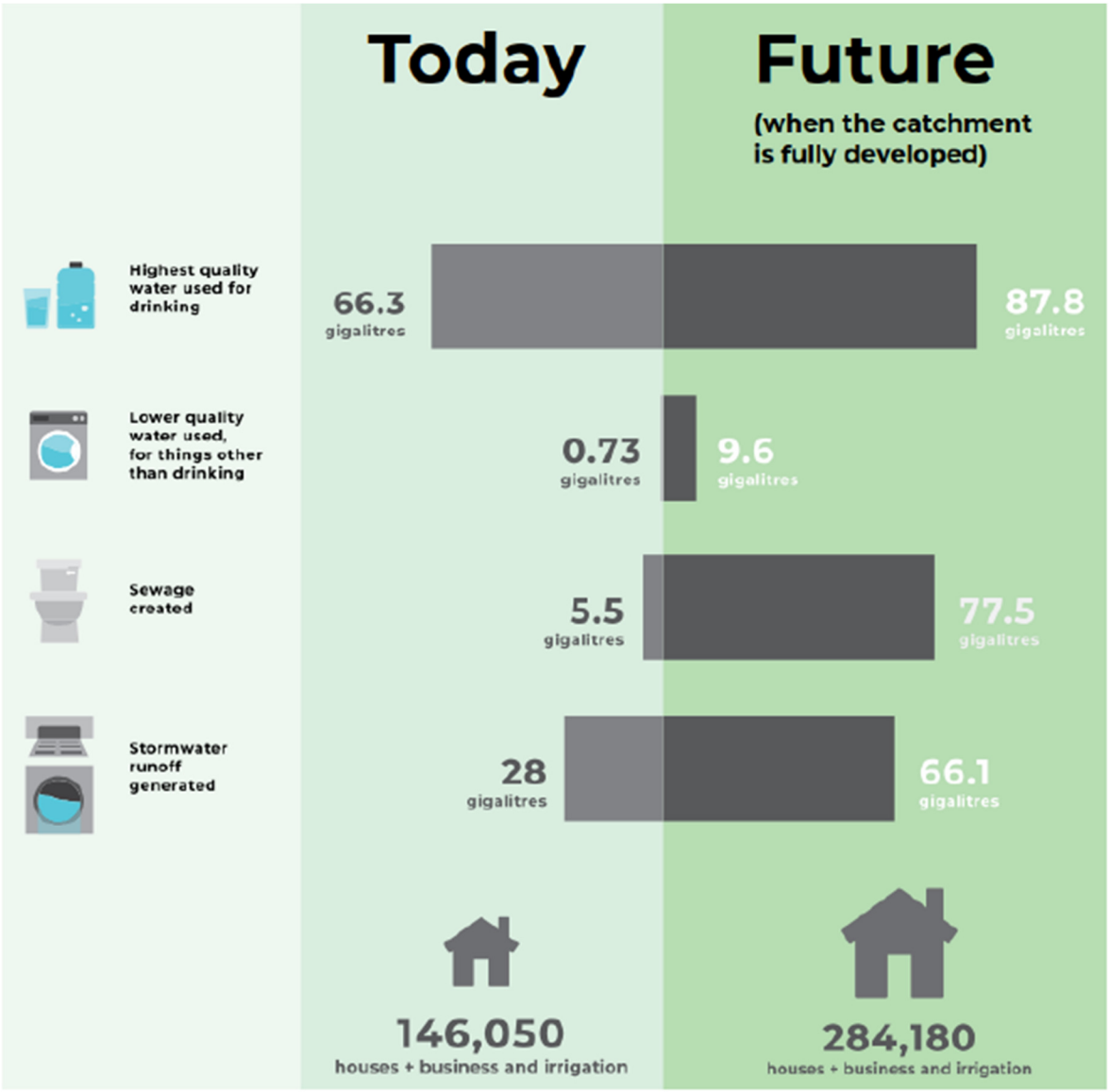


Figure 5. *Changes in key water cycle parameters (Source: Place making in the Upper Merri)*

2.4 Beveridge North West PSP: Hazelwynde

The Beveridge North West PSP abuts the Wallan South PSP to the south. About 740Ha of the land within the Beveridge North West PSP is land owned by Yarra Valley Water (YVW) known as Hazelwynde. This area equates to approximately 60% of the Beveridge North West PSP. It is included here as YVW are relatively advanced in terms of defining the vision for that location and related targets. The approach and outcomes are therefore instructive for neighbouring PSPs and other landowners seeking to implement IWM innovation.

YVW's vision is to deliver:

- Water centric (IWM) development
- Net water and energy producing environment
- Fundamental shift in waste management
- Jobs, affordable housing and social infrastructure

Specific targets include:

- Becoming a net water producer
- Stormwater runoff is reduced by 50% above conventional subdivisions
- The land is developed with green spaces, blue corridors and trees to increase the community's connection with nature and minimise the urban heat island effect delivering a subdivision that will be at least 2 degrees cooler (than a conventional development).

2.5 Greater Wallan / Merri State Park

This proposal is for a continuous parkland along the length of the Merri Creek. While this is in proposal stage the park would reach the south east corner of the Wallan South PSP. Therefore, the quality of water exiting the PSP and the continuation of green links within the PSP, potentially along Strathaird and Taylors Creeks, may present an opportunity to extend the 'themes' of this regional park.

3 Wallan South PSP

The Wallan South PSP cover 806 Ha and is located 43 km north of Melbourne in the Mitchell Shire. It is planned to accommodate 25,000 people and 8,000 dwellings. The PSP is bounded to the east by the Hume Highway and to the west by Old Sydney Road. The site is bounded to the south by the Beveridge North West PSP that includes YVW's Hazelwynde land holding.

From a water perspective, the two most significant corridors are associate with Taylors and Strathaird Creeks. Hanna Swamp, a DELWP mapped waterbody, intersects with the southern boundary of the PSP, extending into the Beveridge North West PSP. In general terms, the site drains from north to south, with the main drainage outlet heading east under the Northern Highway and Hume Freeway via Taylors Creek.

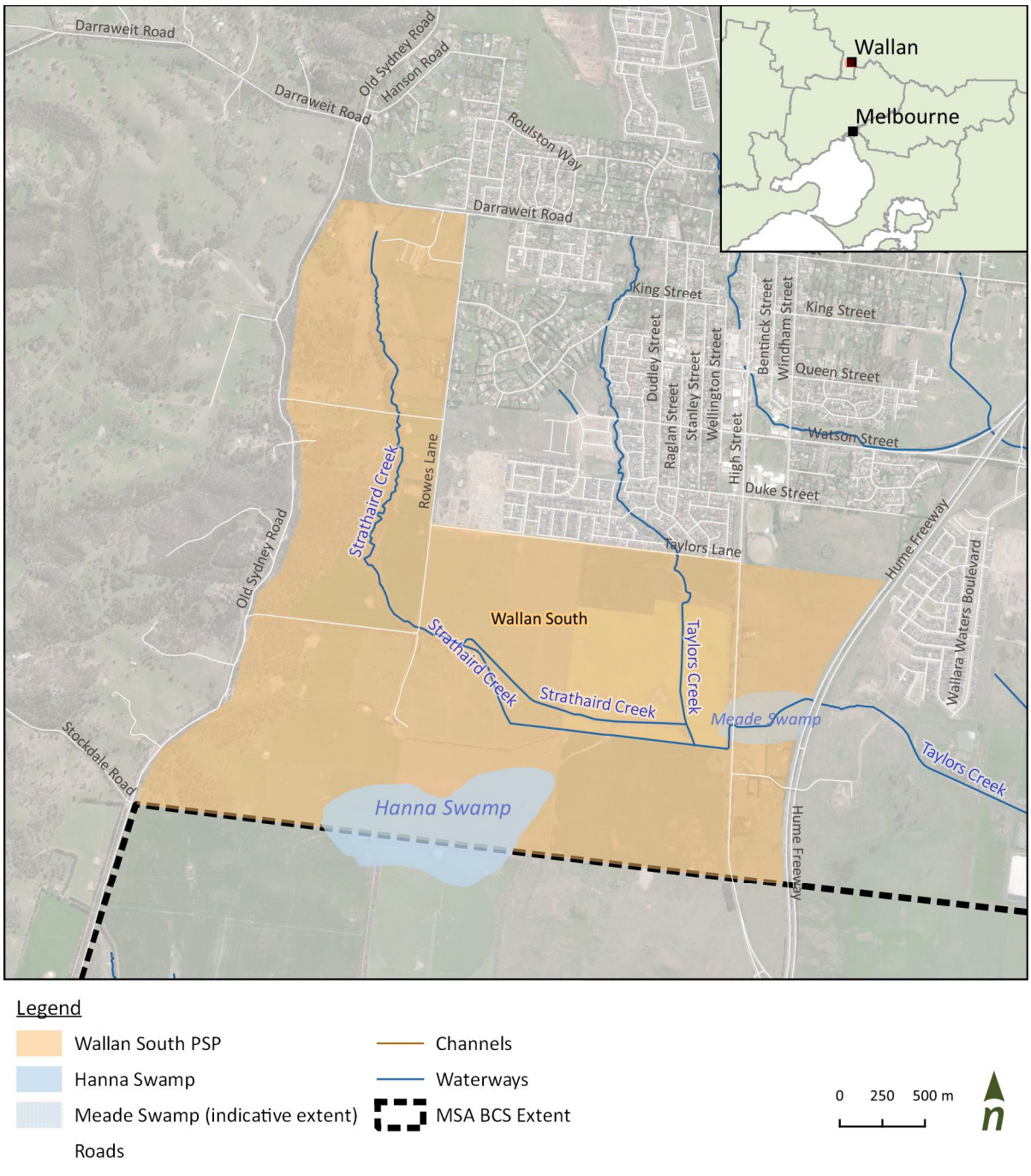


Figure 6. *Wallan South PSP – Location Plan*

3.1 Context

Development Services Scheme (DSS)
Melbourne Water are currently reviewing the Taylors Creek Development Services Scheme (DSS) for Wallan South. The DSS defines surface water management requirements, including stormwater treatment, flood detention and waterway corridor allowances. The DSS locates those assets and defines their associated land take. While the DSS does not specify IWM requirements, it forms an important building block as initiatives like stormwater harvesting are typically associated and located with wetlands or other stormwater treatment assets. Melbourne Water are also undertaking modelling around Wallan to determine flood extents; however, the outcomes were not available at the time of writing.

Discussions with Melbourne Water have highlighted possible requirements of the DSS, and while these are not confirmed they are provided here as an indication:

- **Retarding basin**: no retarding basins are indicated in the MESH PSP plan shown in Figure 7 above, however possible locations (based on consultation with Melbourne Water) may be at the 'intersection' of
    - Darraweit Road and Strathaird Creek (near the northwestern boundary of the PSP)
    - Northern Highway and Meades Swamp.
- **Waterways**: retention of the Strathaird Creek and Taylors Creek waterway corridors with potentially wider corridors to accommodate and manage the influence of sodic soils.
- **Stormwater quality treatment assets** are yet to be incorporated, however there may be potential to co-locate these with retarding basin assets, as is relatively standard practice, if and as appropriate.

Wallan South Place Based Co-design workshop (28 August 2020)
Alluvium attended this workshop to get an appreciation of the broader planning context and the IWM initiatives being proposed. The following points that are relevant to IWM are drawn from that discussion:

- A developer preference for a central lake with the potential for stormwater harvesting and the location of open space proximate to that lake to minimise distribution costs associated with stormwater.
- A preference for the lake to be incorporated with any proposed retarding basin at the boundary of the Northern Highway.
- Early provision of open space and other community infrastructure, to service this PSP and the broader community. This may influence the timing of DSS assets and any future harvesting scheme.
- Support for green corridors linking residential areas to commercial areas, community assets and parklands along the PSPs perimeter.
- The developers preference for the 'removal' or development of Hanna Swamp and an understanding that ecological investigations in relation to that and other ecological features are ongoing.
- Separation of significant transport corridors (roadways) from waterway corridors to improve amenity (particularly at the northern extent of Strathaird Creek).

Wallan Beveridge Waterways Assessment (Melbourne Water, 2020)
The following summarises some of the key ecological takeaways from this waterway assessment for Wallan South:

Strathaird Creek has continuous vegetation for the majority of the north western portion. Generally low to medium quality throughout with regenerating indigenous species and some native plantings. There is an opportunity to retain this vegetation as per the HWS.

Hanna Swamp: Hanna Swamp is identified as a "notable wetland feature" within the southern section of the PSP. It has been observed to be substantially altered from its original form with "reduced surface area, reduced species diversity of flora and fauna and altered hydrology due to changed drainage conditions". The area within the Wallan South PSP is described as highly variable, being "managed for intensive agriculture….exotic pasture species dominate. Indigenous flora is currently restricted to drainage lines comprising robust common species indicating of a degraded conditions".

In summary it is noted that it would require "high inputs to rehabilitate and maintain". The section within the Beveridge North West PSP qualifies as a Seasonal Herbaceous Wetland and reaches the high-quality benchmark.

Sodic Soil: Sodic soils are named based on their principal identifying feature of high levels of sodium. The weakness of sodium – in contrast to divalent cations such as calcium – means that the strength of a sodic soil in the presence of water is low. This creates a substantial vulnerability to compaction on productive soils, or weak foundations for infrastructure development if soils are not properly stabilised or compacted (Alluvium, 2020). The main drivers of erosion in these landscapes are disturbance of sodic layers, and high-water volumes and velocities. The risk of dispersion typically increasing with depth. As such the constructing waterways and wetlands in this region are likely to have an inherent risk of erosion.

The response depends on the slope of the waterway and two examples are provided below. For steeper sections, including reaches of Strathaird Creek at the north east of Wallan South PSP, some of the practical recommendations include:

- Ensuring pipelines are set back from the waterway channel
- Diverting the majority of frequent flows out of the channel (e.g. via sub-surface low flow drainage pipelines)
- Including rock armouring and grade control structures.

Flatter reaches may be able to be managed by:

- Applying gypsum
- Clay capping of waterway bed and banks
- Ensuring appropriate vegetation and batter slopes.

Site visits to Wallan highlight the issue of dispersive soils with lateral gullying on site shown in Figure 7 below.

Figure 7. *Wallan South PSP –Rowes Lane (north side of bend)*

Wallan Restorative Priority Project (Yarra Valley Water)
The Wallan Sewage Treatment Plant (STP) is planned to be connected to Melbourne's metropolitan sewerage network by 2021. It is intended that at that time the STP will become a sewer mining plant. The site will maintain an odour buffer, however there is an opportunity to repurpose the 165 ML onsite storage for other purposes, including the harvesting and reuse of stormwater to contribute to Healthy Waterways Strategy targets.

Noting the Healthy Waterways Strategy's targets around stormwater reuse and infiltration, storage within the corridor will be potentially valuable and enable a number of potential benefits highlighted by Yarra Valley Water including:

- Rehabilitation and ecological watering of Hearnes Swamp
- Stormwater treatment wetlands and creek diversions for treatment and water quality improvement
- Stormwater detention and flood mitigation for the Upper Merri sub-catchment
- Biodiversity and habitat development
- Community access and eco-tourism and
- Traditional Owner economic opportunities.

Wallan South, Utilities Servicing Assessment (VPA, 2020)
This assessment addresses the utility requirements for the PSP. The report notes that as the responsible water authority, Yarra Valley Water (YVW) "have indicated future non-drinking water (NDW) supply mains within the precinct and currently programmed to be delivered during and post 2023 servicing the south eastern area of the PSP area only". The conclusion from this is that recycled water may not be provided to the entire PSP meaning that irrigation using stormwater is likely to be desirable and the two water sources will not be in 'competition'. This should be confirmed with YVW.

The potential for stormwater harvesting should be considered in the context of the DSS prepared by Melbourne Water when they are complete.

Beveridge North West Precinct Structure Plan: Panel Report (2020)
For the purposes of this review, the panel report examines the DSS process and also the potential treatment of Hanna Swamp. The Panel recommended further investigation into how Hanna Swamp might be protected, and its natural values restored and utilised in planning for both PSPs noting that "to do otherwise would be a significant lost opportunity".

Both this report and the Wallan Beveridge Waterways Assessment note the significant difference in condition between 'northern' and 'southern' section of the swamp, each under separate land holdings.

The panel note that "stormwater quality treatment and use of stormwater harvesting is subject to detailed design to the satisfaction of Melbourne Water and Mitchell Shire Council". As such this is likely to be the subject of ongoing discussion.

3.2 Wallan South Issues and opportunities summary

Category	Issue	Opportunity
Melbourne Water Planning / DSS	The Developer Services Scheme is yet to be confirmed and therefore the location and land take of key assets (retarding basins, waterways and stormwater treatment wetlands) has not been confirmed	To locate and design these to contribute to amenity and stormwater harvesting objectives while considering sodic soil design requirements (see Issue below) Ensure sufficient waterway corridor widths to retain remnant vegetation (including allowing Strathaird Creek)
Waterways / Waterway amenity	Defining a suitable corridor width in the context of sodic soils, noting existing erosion in the upper reaches of Strathaird Creek Potential conflict between road alignments and maintaining waterway amenity	Retain existing waterway corridors (Strathaird / Taylors Creeks) • Design waterway corridors to accommodate passive and recreational transport (e.g. walking / cycling) • Separate major transport corridors / roadways and waterways to maximise amenity • Implement 're-wilding' principles along waterways, building on existing vegetation, to provide biodiversity links with neighbouring PSPs to the south and east • Design any constructed waterways to mitigate impact of sodic soils and erosion
Stormwater treatment	Stormwater treatment assets including constructed wetland/s are yet to be located via the DSS process. The footprint/s for these assets has not been incorporated into existing planning documents There may be issues with stormwater treatment and harvesting (see below) if sodic soils convey sediment to the wetland or other assets	See 'co-location' of these assets with retarding basin comment above as per standard practice Locate wetland proximate to central waterbody and open spaces to reduce potential stormwater harvesting scheme costs
Stormwater harvesting	The Healthy Waterways Strategy specifies rates for every additional hectare of development as 4.5 ML/y for harvesting and 1.1 ML/y infiltration There is a risk to stormwater harvesting given the for sodic soils to transport, sediment loads. This is yet to be investigated or quantified. Should a lake asset be pursued as part of a harvesting scheme, Melbourne Water are unlikely to volunteer to manage that asset and this responsibility would (most likely) reside with Council (See opportunity to the right)	HWS targets are driving stormwater harvesting and infiltration within PSPs. Council and Melbourne Water will need to negotiate the use of stormwater harvesting for irrigation of open spaces There may be financial support from Melbourne Water for a harvesting scheme, particularly if it can be illustrated to 'link in' to a regional harvesting scheme (including Yarra Valley Water plans in the Beveridge North West PSP). The land developer is seen to be supportive (in principle) of stormwater harvesting and has proposed a lake asset as the storage / source of that water (to be confirmed). To locate the waterbody / wetland / lake asset centrally to minimise distance to key open spaces (including school grounds) and to maximise township amenity.

Category	Issue	Opportunity
Swamps	Hanna Swamp: There is an observed difference in the north and south sections of the swamp. The northern section, within the Wallan South PSP is likely to require "high inputs to rehabilitate and maintain". The question as to whether Hanna Swamp can be rehabilitated to reflect its prior values is not certain based on the review and assessment work completed to date.	There is an opportunity to restore Hanna Swamp, however the extent of inputs will be high and the likely ecological outcome is contested. If it decided that the input v outcome isn't feasible, there may be an opportunity to focus on the restoration of other swamp assets like Hearnes Swamp, that have better existing vegetation and ecological values. Hearnes Swamp is discussed further below as part of the Wallan East discussion.
Sodic soils	As noted above, sodic soils exist across the PSP and will impact the design and ongoing management of waterway assets, stormwater treatment and stormwater harvesting schemes. These conditions can impact waterway health and form. Design considerations have been listed above and will need to be considered if constructed waterways are proposed with potential for a greater lateral footprint.	The potential for wider waterway corridors (to be determined) may be used to enhance the quality of green / blue corridors through the PSP To prepare specific sodic soil sensitive waterway corridor designs that also support vegetation and liveability outcomes.
Cultural values	The Cultural Flows Study is yet to be completed. The outcomes of that study will need to be assessed when available.	Based on the Place Making in the Upper Merri Creek document, there are a number of practical initiatives that could be considered for inclusion in the PSP such as, but not limited to: • Public infrastructure and open spaces to have Woi Wurrung language names • Indigenous plantings and vegetation associated with stormwater treatment assets and waterway vegetation (e.g. drawing from Wurundjeri Woi Wurrung species list) • Rehabilitating waterway systems including waterways and swamps • Incorporating Wurundjeri Woi Wurrung flora and fauna assessments as planning tools for future planning and development within the sub-catchment.
Flood detention	Allowance for flood detention / retarding basin required. Possible locations based on MW consultation: • Darraweit Road / Strathaird Creek intersection • Northern Highway / Meades Swamp intersection	Co-location of stormwater treatment (and potentially harvesting) assets with retarding basins (as per standard practice) To locate and design these RBs in a way that maximises community benefit and incorporates surrounding ecological values
Street scale WSUD	Defining streetscape to accommodate desired density and streetscale WSUD or passive irrigation assets	To employ street scale WSUD and passive irrigation of street trees along corridors that are proposed for 're-wilding' and for key boulevard and other major streets that connect residential areas to commercial, education and recreation precincts.
Biodiversity / connection	Limited resident ecological values (including within the section of Hanna Swamp) within the PSP. Some remnant vegetation along Strathaird Creek	To build on existing vegetation and extend that to have a seamless connection of landscape and biodiversity treatment s between this and the Beveridge North West PSP. Also, to continue the themes of the Wallan Regional Park through the PSP via the waterways.

4 Wallan East PSP

The Wallan East PSP Part 1 covers 140 Ha with Part 2 a potential future PSP to the south of Part 1. This section of the report focusses on Wallan East Part 1, the northernmost PSP in the northern growth corridor. Both are within the Mitchell Shire. The overall Wallan East PSP bounded by Epping-Kilmore Road to the east, Wallan-Whittlesea Road to the south, the Melbourne to Sydney rail line to the west and Kelby Lane to the north. The Merri Creek runs parallel to the western boundary of the PSP. Wallan East Part 1 extends as far south as Wallan – Whittlesea Road.

The relevant developer services scheme for Wallan East is the Woodlands Place DSS which is yet to be completed.

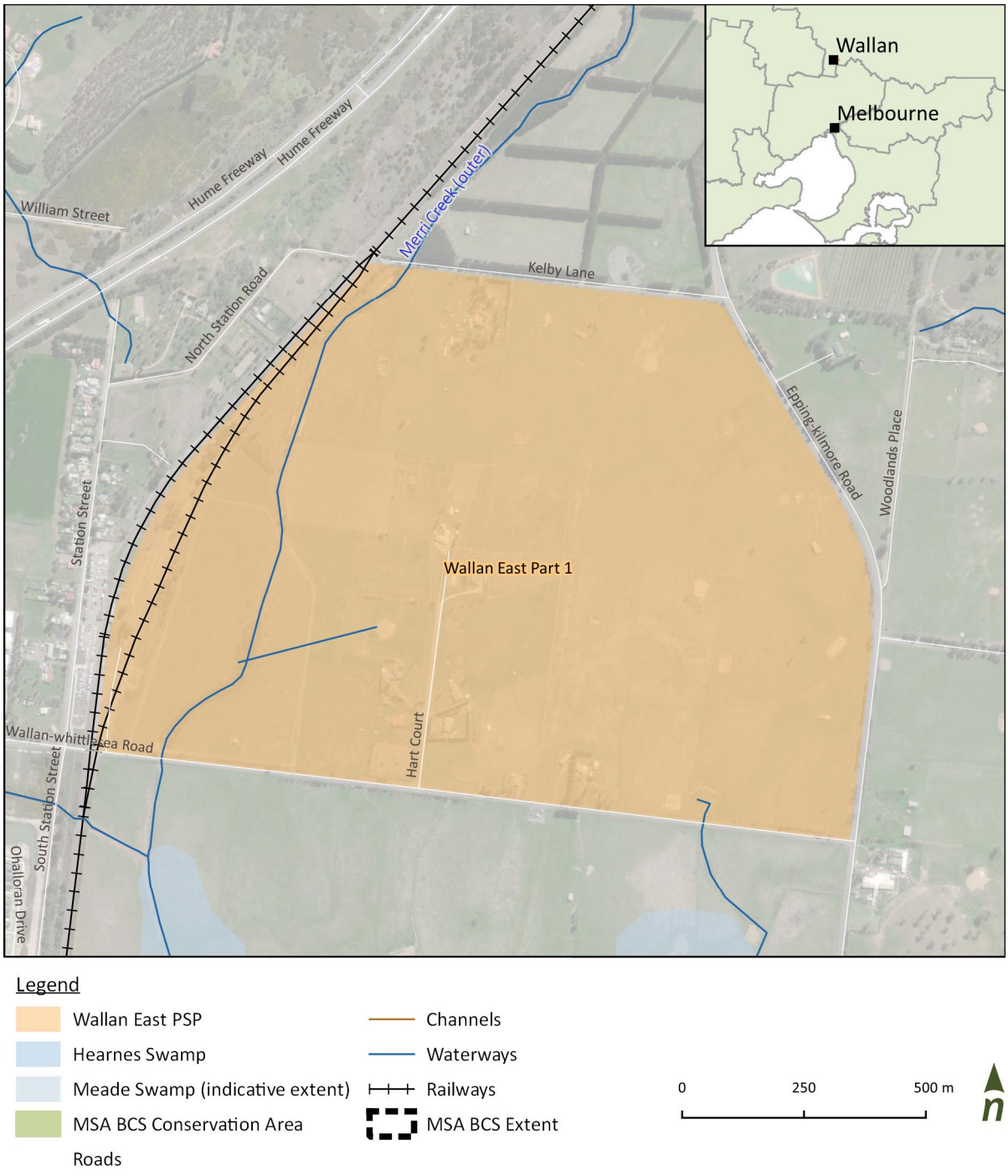


Figure 8. *Wallan East PSP – Part 1*

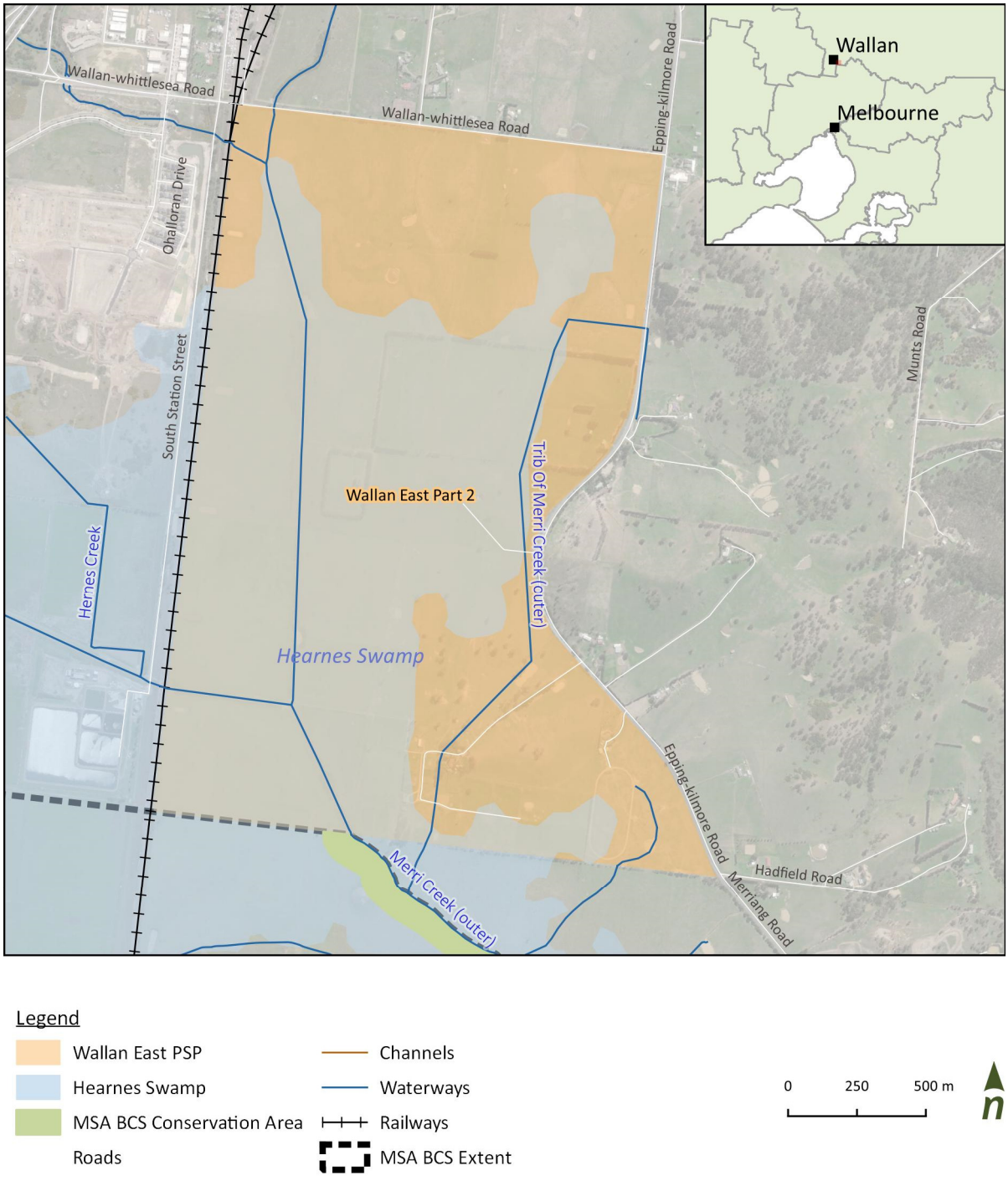


Figure 9. *Wallan East PSP – Part 2*

4.1 Context

Preplanning work has been undertaken for the Wallan East Part 1 through land and capability, flora and fauna, servicing reports and a co-design workshop process run by the VPA with a supporting report: "Wallan East: Vision and Purpose". That report highlights a number of themes including "Managing water in an integrated and sustainable way". Under this theme a number of opportunities have been highlighted including 'meaningful IWM outcomes', taking advantage of any stormwater or recycled water availability in the corridor and addressing the Healthy Waterways Strategy targets.

Wallan East Part 1 is within a priority stormwater management area and this implies the same stormwater reduction targets that are applicable to Wallan South PSP to be achieved through harvesting and infiltration.

The ***Wallan East Part 1 PSP – Pitching Summary Report*** summarise identified issues and opportunities including:

- Access, including connection to surrounding neighbourhoods, the Wallan township and Wallan train station
- Flooding, which is recognised to extend beyond the LSIO in Wallan East Part 1 and across 33 Ha of Wallan East PSP overall. This is driven by the confluence of the Merri and Mittagong Creeks (Jacobs, 2020). Anecdotal evidence suggests significant volumes of fill are likely to be required to enable development (*pers comm*).
- Adjacent land uses, as the report notes that the Department of Transport is preparing a detailed business case for the Beveridge Intermodal Freight Precinct (BIFP), due late 2020, and the connection between these land uses will require further investigation.
- Preserving the ecological and aesthetic values of both the Merri Creek and Herne Swamp are important place making opportunities, including recognising Aboriginal Heritage values
- The report also notes soil type, biodiversity and drainage investigations are underway.

The Wallan East: Vision and Purpose (VPA, 2020) document also noted:

- Sodic soils are an issue here as they are in Wallan South with the Jacobs report noting that "development in areas that have these geologies and soil types…is an issue both through the construction phase and ongoing management of waterways".
- The Flora and Fauna Assessment (WSP, 2020) highlighted an area for retention to "protect a large proportion of the native vegetation along Merri Creek", specifically a "3.268 ha of treeless Plains Swampy Woodland and Aquatic Herbland".
- Remnant River Red Gums (Wallan East Part 2 PSP) offer an opportunity to retain key trees and to use stormwater to 'irrigate' these trees and mimic their natural hydrology.
- Wallan East (Part 2) overlaps with Hearnes Swamp that presents an opportunity to retain and improve some / all of this area, and potentially use it as a stormwater removal asset, either by infiltration or evaporation.
- An AP Gas Pipeline bisects the PSP north-south requiring an easement.
- Another factor is the potential Beveridge Intermodal Freight Terminal (BIFT). The BIFT is south of Wallan East Part 1, intersects Wallan East Part 2, the Northern Freight PSPs, Merri Creek floodplain and Hearnes Swamp. The integration of these land uses will need to be addressed.

The ***Wallan-Beveridge Pre-planning Waterways Assessment (2020)*** also identified issues and opportunities; however these were mostly located within the Wallan East Part 2 boundary, however the following points are worth noting:

- Merri Creek: The channelised reach of the Merri Creek and constructed waterways of the eastern side of the study area vary in condition (just south of Wallan East Part 1), some showing greater erosion processes than others. Vegetation along these waterways is limited and where present is generally exotic.
- The Red Gum swamp and Hearnes Swamp (see Figure 10) are not within the Wallan East Part 1 boundary, however they do represent significant values and rehabilitation opportunities.

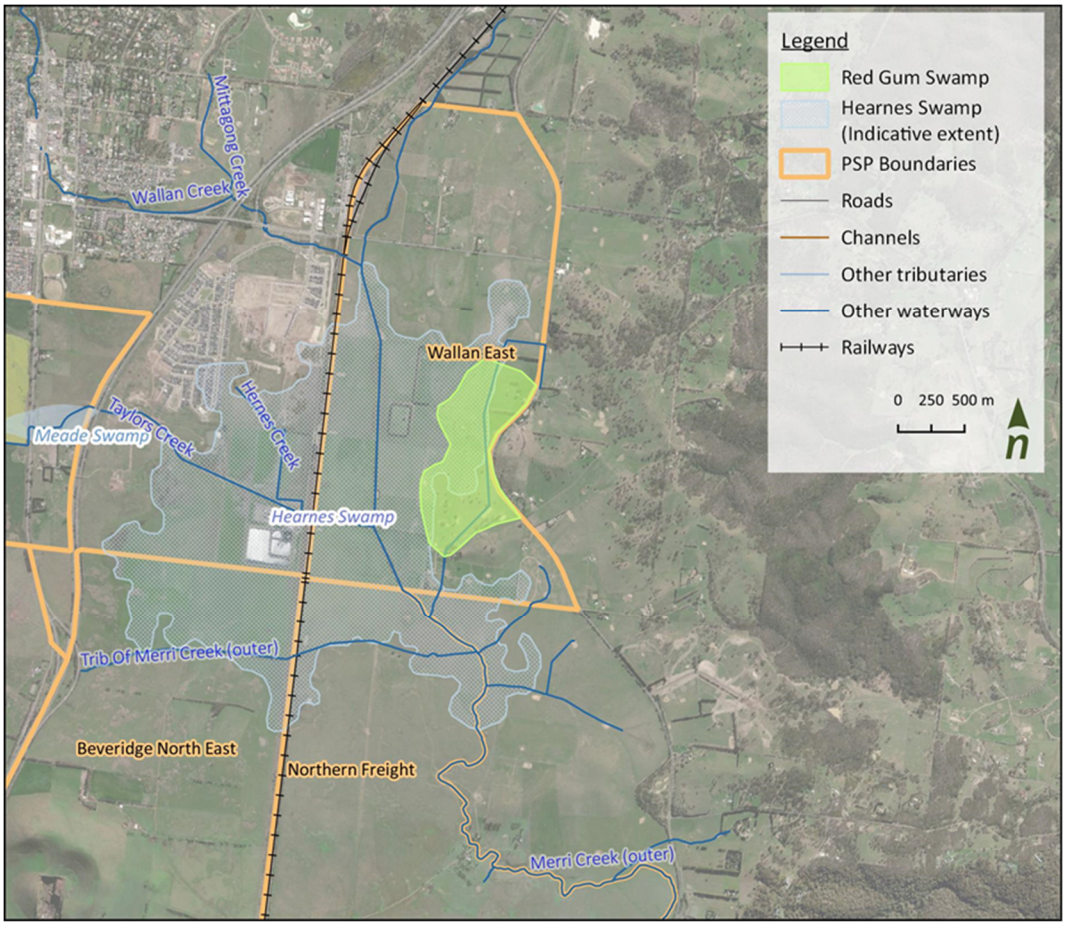


Figure 10. *Red Gum and Hearnes Swamp locations*

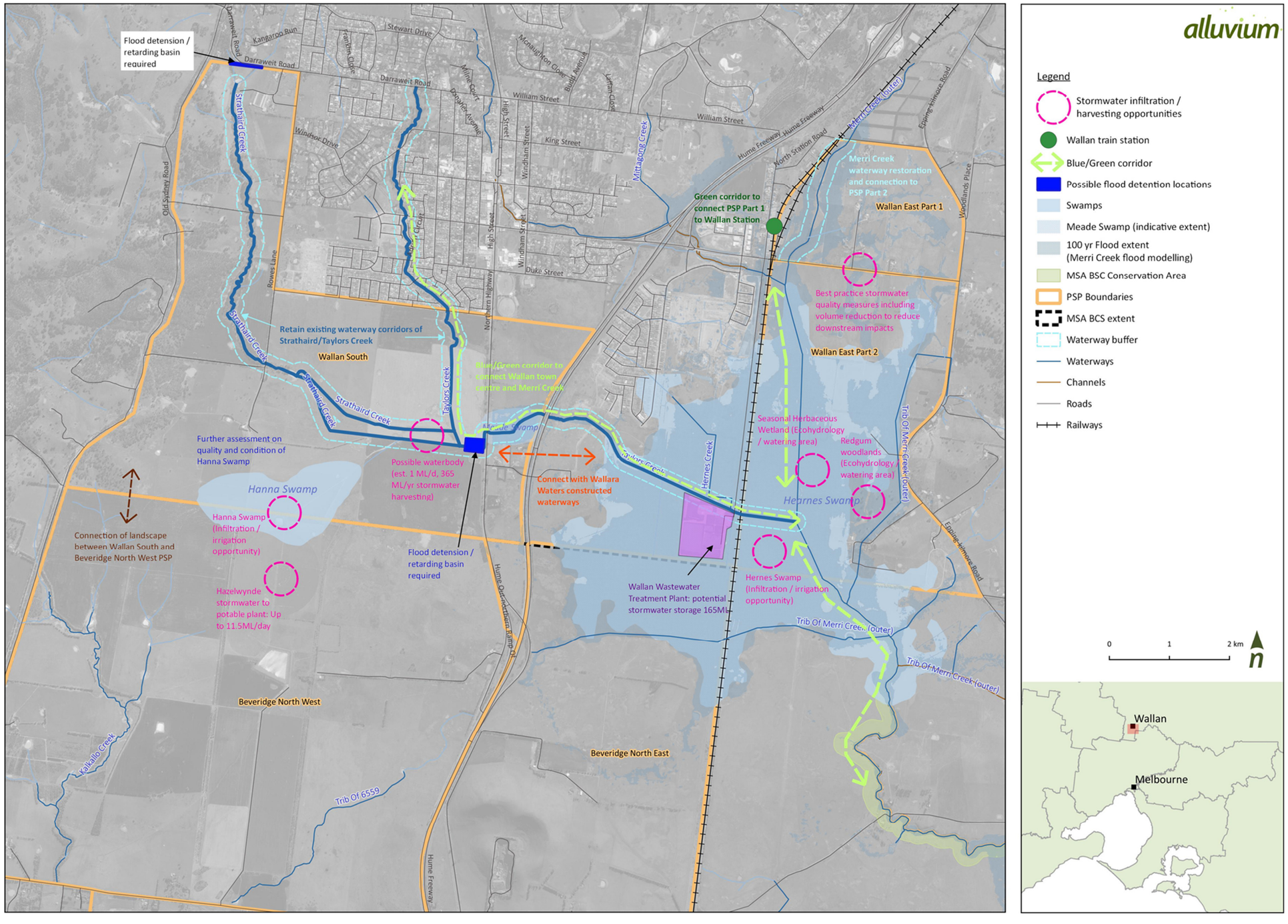
Figure 11. *Wallan East PSP- River Red Gum*

4.2 Wallan East Part 1 – Issues and opportunities summary

Category	Issue	Opportunity
Melbourne Water Planning / DSS	Woodlands Place DSS to be completed. Location of flood detention and stormwater treatment assets unknown.	
Waterways / Waterway amenity	Defining a suitable waterway corridor width in the context of sodic soils (as per Wallan South PSP). Access to surrounding neighbourhoods etc has been noted as an issue	Merri Creek runs along the western boundary of Wallan East PSP. Opportunity to revegetate the riparian corridor and create a green corridor / linear biodiversity parkland Establish a continuous riparian vegetated buffer, maintain and extend existing vegetation Use the Merri Creek and other waterways as key connection corridor north – south.
Stormwater treatment	Potentially large car parking space associated with the nearby Wallan train station creating runoff	Best practice WSUD, taking into account sodic soils and potential incorporating culturally relevant vegetation and signage
Stormwater	The Healthy Waterways Strategy specifies rates for every additional hectare of development as 4.5 ML/y for harvesting and 1.1 ML/y infiltration Based on information available, it seems there is no landowner driven desire for stormwater harvesting	To begin planning how Wallan East Stage 1 and 2 could integrate with a regional stormwater harvesting and reuse scheme that could incorporate the 165 ML Wallan STP storage and the Beveridge North East PSP reuse scheme. There is potential to extend this to a reticulated stormwater / recycled water network through the Wallan East Part 1 landscape to irrigate trees and boulevards.
Swamps	To recognise and meet the objectives for the Healthy Waterways Strategy with regard to Hearnes Swamp Wallan East Part 1 does not overlap with Hearnes Swamp so the practical impact in the swamp in early stages may be minimal (Wallan East Part 2 does overlap with Hearnes Swamp)	• This PSP will contribute stormwater flows to the Merri that then drains south toward Hearnes Swamp. • Investigate opportunities to further re-engage the natural wetland / swamp in this area and to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value. • Additional flows could contribute to HWS targets and support ecological / cultural values • Review the eco-hydrology outcomes from the Wallan-Beveridge Pre-planning Waterways Assessment (2020) and apply to support resident values. These outcomes apply to Wallan East Part 2, moreso than Part 1.
Sodic soils	• Sodic soils exist in the Wallan East Part 1 and 2 PSPs with similar implications to those identified for Wallan South PSP	To design the Merri Creek corridor to accommodate the ecological and cultural objectives of the PSP and corridor, ensuring long term stability through and appropriate corridor width. This will apply particularly to the reach of the Merri Creek within Wallan East Part 1

Category	Issue	Opportunity
Cultural values	The Cultural Flows Study is yet to be completed. The outcomes of that study will need to be assessed when available.	The confluence of the Mittagong-Merri Creek south of the Wallan East PSP Part 2 is considered a location of cultural significance. Based on the Place Making in the Upper Merri Creek document, the following could be considered prior to the release of the cultural flows study outcomes: • Public infrastructure and open spaces to have Woi Wurrung language names • Indigenous plantings and vegetation associated with stormwater treatment assets and waterway vegetation (e.g. drawing from Wurundjeri Woi Wurrung species list) • Rehabilitating waterway systems including waterways and swamps • Incorporating Wurundjeri Woi Wurrung flora and fauna assessments as planning tools for future planning and development within the sub-catchment.
Flood detention	Flooding issues associated with the Merri Creek floodplain, which extends beyond the LSIO 33 Ha of Wallan East Part 2 is within floodplain Significant fill requirement	To reengage the floodplain in accordance with Healthy Waters Strategy goals including: • Deliver environmental water to key billabongs on the Yarra floodplain. • Investigate opportunities to re-engage natural floodplain wetlands in key locations to meet ecological watering objectives, improve ecosystem services, cultural and social values.
Street scale	Urban heat Streetscape amenity	To employ street scale WSUD and passive irrigation of street trees, particularly along key boulevards and other major streets that connect residential and commercial areas, train station access routes and green links to the township of Wallan. The aim will be to have significant canopy cover to support urban cooling across the PSP and to improve the stormwater treatment contribution of those assets as well as improved amenity.
Train Station Precinct	High density living / high proportion of impervious surfaces / potential for urban heat (e.g. large car park) / connectivity (including walkability to and from)	Intensification of WSUD and greening in and around the station precinct to respond to the potential risks of urban heat associated with densely developed landscapes, including the car park associated with the station.
Biodiversity / connection		Eco-hydrology principles to be adopted to support providing treated stormwater to Red Gums along the eastern drainage line to improve health and longevity of these trees and associated ground-storey vegetation. Rehabilitation prospects are seen as being high (with ongoing management). 'Green link' connection between Wallan Station and Wallan township, potentially utilising harvested stormwater stored at Wallan STP for irrigation Wallan East Part 2 - Seasonal Herbaceous Wetlands along the Merri (within the Austral Bricks property) are remnants of the once extensive Hearnes Swamp. Environmental water may benefit. But careful nuanced attention to the response of this community is required to sustain it in the face of urbanisation. This will be more challenging than the rehabilitation of Red Gums to the east. Recreational corridor within the PSP and along the AP gas pipe easement

5 IWM Opportunities and Issues Summary Map



alluvium

Legend

- Stormwater infiltration / harvesting opportunities
- Wallan train station
- Blue/Green corridor
- Possible flood detention locations
- Swamps
- Meade Swamp (indicative extent)
- 100 yr Flood extent (Merri Creek flood modelling)
- MSA BSC Conservation Area
- PSP Boundaries
- MSA BCS extent
- Waterway buffer
- Waterways
- Channels
- Roads
- Railways

0 1 2 km

N

6 Discussion

There are a range of IWM opportunities and issues across Wallan South and East PSPs that are deserving of further discussion and investigation. The following discussion is drawn from the tables above to highlight the key areas for investigation. This also takes into account the timing and urgency of those investigations.

Completion of the drainage services schemes (DSS)
The completion of relevant DSSs will be critical to define the location of key surface water management assets.

Upper Merri Creek IWM and place making investigations
At the time of writing Yarra Valley Water were undertaking investigations as to what may constitute a Water Sensitive City within the Upper Merri Creek. Engagement with Yarra Valley Water on there initiatives (some of which overlap with the opportunities identified in this report), is recommended to understand their feasibility from a planning perspective.

Identifying locations for infiltration and / or harvesting of stormwater, and quantifying their impact
The Healthy Waterways Strategy sets challenging stormwater infiltration and harvesting targets. There is currently no plan that sets out what the critical assets and approaches may be in achieving these targets. Opportunities do exist within each PSP for stormwater harvesting; however, it is critical that the PSP considers opportunities beyond the PSP boundary. Some examples identified in this document include

- ecohydrology watering of assets including Hearnes Swamp, Meade Swamp and the Red Gum swamp identified within Wallan East Part 2.
- Utilising YVW's Wallan STP 165 ML storage and integrating this (if possible) with the proposed Hazelwynde stormwater treatment plant creating a stormwater network between those two locations.

It will be important to identify all opportunities on a development corridor scale to inform VPA plans and future work ahead of time. Melbourne Water have potential funding support for these initiatives and collaboration with them on this topic is highly recommended.

Cultural values
The cultural flows study for the sub-catchment is underway. Until the outcomes are available, there are tangible initiatives that can be implemented. Some have been listed in this report; however, it is recommended that the VPA engage with Yarra Valley Water who are leading the finalisation of the 'Place Making' report and the Cultural Flows work.

Stormwater to support ecological values
As touched on above, HWS targets will drive us to identify a range of stormwater infiltration / harvesting initiatives. There have also been a number of ecohydrology opportunities identified within the *Wallan-Beveridge Pre-planning Waterways Assessment (2020),* where stormwater is used to support the health of unique assets such as Hearnes Swamp and Red Gum Swamp.

Designing waterways for sodic soils
Sodic soils are a highly publicised risk across each PSP. The geomorphology investigations undertaken as part of the *Wallan-Beveridge Pre-planning Waterways Assessment (2020)* highlight design considerations particularly for constructed waterways, including Strathaird Creek where there are existing erosion issues.

From an IWM perspective this is likely to require design changes / recommendations to ensure that constructed and natural waterways, retarding basins and wetlands are robust into the future. Melbourne Water has Constructed Waterway Design Guidelines. These could be revisited for these PSPs to take into account sodic conditions.

Designing waterways for liveability
One implication of designing waterways for sodic soils is that the required corridors may need to be wider. If this is the case it offers an opportunity for those corridors to accommodate active transport and potentially biodiversity / rewilding values. These waterways will also be critical to connecting these PSPs to surrounding PSPs and their communities.

Collaboration with water authorities
Melbourne Water's HWS is driving stormwater management opportunities as described above. Yarra Valley Water have plans and supporting analysis for a stormwater to potable scheme. There is a lot of work to do to move this forward, however, these type of larger scale initiatives are necessary to meet the HWS targets. Also, their Wallan sewage treatment plant storage (165 ML) is also the type of opportunity that will be critical to broader uptake of stormwater harvesting / infiltration.

Street and lot scale opportunities
This Issues and Opportunities report looked primarily at precinct scale opportunities. There are also street and lot scale opportunities that will contribute to the overarching objectives of documents like the HWS and IWM Forum Strategic Direction Statement, from rainwater tanks, WSUD and passive irrigation of street trees. The adoption of these initiatives should be considered in the context of other opportunities as per the points below:

- Growth corridor scale – identifying those key landforms or areas that are likely to be critical for stormwater and waterway management requirements (e.g. Hearnes Swamp)
- PSP scale – like stormwater harvesting schemes, like that proposed in Wallan South PSP
- Street and lot scale – WSUD, passive irrigation and rainwater tanks.

7 References

Alluvium (2020), Wallan-Beveridge Pre-planning Waterways Assessment

IWM Forum (2018), Yarra Strategic Directions Statement

Jacobs (2020), Wallan East Utility Services Assessment

Jacobs (2020), Wallan East Utility Services Assessment

Jacobs (2020), Wallan South and Wallan East Precinct Structure Plans: Land Capability Assessment

Melbourne Water (2018), Co-Designed Catchment Program for the Yarra Catchment

Planning Panels Victoria (2020), Beveridge North West Precinct Structure Plan: Panel Report

SMEC (2020), Technical Memo: BIFT Stormwater Management Strategy

Tree Logic (2020), Arboricultural Assessment and Report Precinct Structure Plans - Wallan South and Wallan East Precincts

VPA (2020), Wallan South Place Based Plan (Co-design Workshop summary)

VPA (2020), Wallan East (Part 1) Precinct Structure Plan Pitching Summary Report

VPA (2020), Wallan South PSP: Summary of Co-design Workshop

WSP (2020), Flora and Fauna Assessment Wallan East Precinct

WSP (2020), Flora and Fauna Assessment Wallan South Precinct

Yarra Valley Water, Melbourne Water, Mitchell Shire, Hume City Council, City of Whittlesea (2020), Place Making in the Upper Merri Creek: Integrated Water Management Plan (Draft)

Yarra Valley Water (2019), Beveridge North West Precinct Structure Plan – Hazelwynde

Yarra Valley Water, Melbourne Water, Office of Living Victoria, An integrated water future for Melbourne's North

Attachment A
Interview Summaries

Interview summary

In support of the literature review and attendance at workshops, a number of interviews were held to better understand the context of work completed by each organisation and their IWM aspirations for Wallan South and East PSP. The following provides a summary of the key points from those discussions.

Mitchell Shire

Organisation	Issue	Opportunity	Comments
Mitchell Shire	Hanna Swamp		There needs to be a position on the **viability of Hanna Swamp** being retained and an understanding what form the swamp might take post-development (if retained) including the land take associated with that asset/
		Cultural flows	The **cultural flows** study presents a significant opportunity; however, the priorities need to be made clear
		Waterway amenity	Key objective to ensure water provides amenity in association with the built form. Council's view is that Wallan South PSP will be relatively high density. **Central waterway to facilitate passive transport** and be a built form element with a relatively hard edge. The waterway / surface water could be an impactful **gateway into Wallan**
		Streetscale WSUD	There is an opportunity to think about **streetscapes** differently and to provide best practice examples to developers. Provide a balance of prescriptive opportunities (e.g. rainwater tanks, passive irrigation) where appropriate to support smaller developers. Larger developers can afford to invest more in investigating IWM opportunities.
		Community / Social factors	IWM initiatives need to respond to future community needs, particularly regarding **urban cooling**

Melbourne Water

Organisation	Issue	Opportunity	Comments
Developer Services	Draft DSS		DSS under review, so no definitive requirements yet
	Retarding basin location		Retarding basin: current Mesh plan has no retarding basin. Likely to require an RB at: - Darraweit Road / Strathaird Creek intersection - Northern Highway / Meades Swamp intersection
	WSUD location		WSUD not incorporated yet
	Sodic soils		Need to take a conservative approach with soils
	Lake management		MW won't mange urban lakes. This would need to be the responsibility of Council
	Hanna Swamp		The MW vision is to retain all swamps / Hanna Swamp is a DELWP mapped wetland feature (MW must report on these) / however there is no clear funding mechanism to retain it / biodiversity values are under review
		Waterway corridors	Intent is for DSS to **retain Strathaird Creek** / **retain Taylors Creek** and waterway at end of Taylors Lane. Incorporate wide corridors to **accommodate sodic soils**
		HWS	To meet Healthy Waterways Strategy targets within the sub-catchment
Organisation	**Issue**	**Opportunity**	**Comments**
Integrated Planning		HWS	The **Healthy Waterways Strategy (HWS)** targets are guiding the approach and the opportunity is to meet those targets The opportunity is for Melbourne Water to support initiatives that contribute to those targets. There is a question around what scale is appropriate e.g. a regional scale stormwater harvesting scheme may be appropriate to meet those targets, however this needs to be determined.
		HWS	**Hearnes, Hanna, Meads Swamp**: Hanna Swamp is particularly degraded (MW undertaking study). There may be greater benefit associated with Hearnes Swamp (in terms of infiltration, harvesting, evaporation, ecology etc). Opportunity to marry the flow regimes associated with ecological health and HWS targets. MW has funding mechanism to support realisation of a mutually beneficial outcome.
		Strathfield Creek	To protect the upper reaches of **Strathaird Creek** (within Wallan East) and retain as a community asset
	Sodic soils		**Sodic soils**: *a critical issue*. Current land use planning may not be sufficiently considering the sodic soil issue. There is a corresponding opportunity to use the need to manage sodic soils to drive water management initiatives (much like Sunbury), to protect waterways and swamps using stormwater management. The question is what would that look like and is there an opportunity to rethink the urban form in response?
	Timing and collaboration		The outcomes of the Upper Merri Place Making document are yet to be universally agreed. Collaboration with the VPA is required to define and realise some of those initiatives.

Yarra Valley Water

Organisation	Issue	Opportunity	Comments
Francis Pamminger, Chris Saliba and Paul Curtis (Developer Services)		An IWM approach	To use IWM to address catchment scale problems and meet **multiple objectives**. Stormwater harvesting / recycled water use are logical approaches to meeting Healthy Waterways Strategy targets. Retain water within the landscape to green corridors, reduce urban heat, provide green open spaces and support community health
		Catchment scale SWH	Need to remove **4.5ML/ha/year** at Hazelwynde (or ~ 2 GL) at full development. Opportunity to achieve ~ 50% through drainage modifications and a stormwater to potable water plant. Existing **165 ML (Class C) storage at the Wallan treatment plant** can be converted to a SW storage (at the headwaters of the waterway providing a significant benefit downstream) **Green corridor** between storages.
		Stormwater to potable	Philosophically there is agreement across parties as to the outcomes. Issue: who pays / timing / roles and responsibilities. YVW are responsible for Hazelwynde, but not the whole catchment.
	Stormwater to potable: timing		YVW have reviewed financial & community cost but questions remain **When to build**? Size and flexibility of assets? Risk of stranded assets and inequity between organisations and between catchments (i.e. work in Kalkallo may benefit communities downstream). Requires incentives to go beyond BPEM plus changes to drainage scheme costs. *There is an optimum solution between water use, plant size, extent to which HWS targets are met.*
	Achieving HWS		There has been **no demonstration that HWS targets can be met** as the work has not gone into detail.
		Developer support	Developers are generally supportive as long as there are incentives along with marketable liveability benefits Balance flexibility in how they might achieve targets alongside equity. Lead or demonstration projects are valuable however to show the industry what is possible and to understand cost and reduce risk.

Spiire (on behalf of Wallan East)

Organisation	Issue	Opportunity	Comments
Spiire (Landowner consultant)	Landowners		Fragmented landholding
	Flood and fill		Within flood plain / There is a potentially significant fill requirement
	Scale		Relatively small PSP in the scheme of things