

Hume Planning Scheme Amendment C205

Expert Witness report provided to Planning Panels Victoria

Drainage Evidence

(Property 1 and 2)

Prepared for Satterley Property Group

Prepared by Jonathon McLean

12 February 2017

1 **Witness Details**

I, Jonathon McLean of Alluvium Consulting Australia (Alluvium), 105 – 115 Dover Street, Cremorne, Victoria 3121, prepared this report. I hold the position of Senior Consultant.

I have a Bachelor of Engineering (Civil) from Monash University 1990, Graduate Diploma Water Resources and Environmental Engineering Monash University 1994, Graduate Diploma MBA Program Technology Management APESMA Deakin University 2001.

I am a member of the River Basin Management Society (RBMS) and a former 10 year committee member of the Victorian Stormwater Industry Association (2001-2010).

My major fields of expertise and interest are hydrology, hydraulics, urban drainage, catchment planning and management, flood estimation, surface water modelling, stormwater treatment and waterway management.

Related Experience:

- Over a period of 20 years I have regularly been involved with the design and strategic planning of drainage strategies and systems within residential, commercial and industrial developments.
- My expert advice has been sought by both the private sector (eg developers) and the public sector (catchment management authorities and local government).
- I have been actively involved in the development of the Best Practice Environmental Guidelines for Urban Stormwater.
- I have attended and presented at various industry conferences and seminars.
- I have a sound understanding of the role of Local Government, Catchment Management Authorities, Environment Protection Authority and other agencies in stormwater planning and management.

Therefore my expertise and experience in flood modelling and urban stormwater management associated with civil engineering and development projects, qualifies me to make this report.

2 Instructions

Alluvium has provided stormwater management advice to the proponent – Satterley Property Group (herein referred to as Satterley) – to address the issues associated with future residential development on their landholdings of interest within the Lindum Vale PSP.

I have been instructed by Linda Choi from Norton Rose Fulbright to provide expert evidence advice on the drainage issues related to the Satterley landholdings (identified as property nos. 1, 2 in the Lindum Vale PSP) taking into account:

- the exhibited C205 documents, background reports and submissions

In particular I have been briefed to specifically address the following issues:

- the role of drainage and stormwater in supporting the health and sustainability of existing trees and vegetation on the site
- the appropriateness of the wetland/basin assets located within the vicinity of the eastern PSP boundary. In particular the concern raised by submission 4.

This evidence report responds directly to the above issues by providing a summary of the investigations, assumptions and assessments that have been undertaken in defining the proposed stormwater management strategy.

3 Information / Documentation

In preparing this evidence Jonathon McLean has had regard to:

Reports:

- PSP 1202 Lindum Vale Precinct Structure Plan – VPA (Public exhibition Aug 2017)
- Part A Submission – Amendment C205 to the Hume Planning Scheme (VPA Feb 2018)
- Plan 3 Future Urban Structure Plan, Lindum Vale PSP – VPA (draft for discussion 16/01/2018)
- 1960 & 2040 Mickleham Road, “Surface/Stormwater Management Strategy” by Alluvium (February 2018)
- Lindum Vale Mickleham, “Independent Hydrologic Assessment” by Stormy Water Solutions (May 2015)
- “Stormwater Strategy, Lindum Vale” by Dalton Consulting Engineers (September 2014)

Other Information:

- Site Inspections
- Aerial Photography
- Constructed Waterways in New Urban Developments – Melbourne Water (2013)
- Australian Rainfall & Runoff (1997) – Engineers Australia
- Urban Stormwater Best Practice Environmental Management Guidelines (1999)
- Melbourne Water’s “*Design, Construction and Establishment of Constructed Wetlands: Design Manual (Draft, 2016)*”;
- Melbourne Water’s “*MUSIC Guidelines (2016)*”;

Jonathon McLean adopts this evidence as a true and correct statement of his opinions and the facts he believes to be true in this matter.

4 Facts, Matters and Assumptions

This report is based upon an assessment and review of the information provided to me as referenced in Section 3 and the numerous site visits undertaken.

Satterley acts on behalf of Satterley Mickleham Pty Ltd in relation to properties 1 and 2 of the Lindum Vale Precinct Structure Plan (PSP), being 1960 and 2040 Mickleham Road, Mickleham. The site comprises the majority of the land subject to Hume Planning Scheme Amendment C205.

Alluvium prepared a drainage strategy for the Lindum Vale PSP, on behalf of Satterley, in 2017 with a final revision in February 2018. This report was presented as an alternative decentralised drainage strategy in comparison to the earlier 2014 work undertaken by Dalton Consulting Engineers, which had previously been used to inform the PSP. The Alluvium strategy features a system of retarding basins along the eastern boundary with a drainage reserve in the north, a single drainage reserve in the central open space area and a drainage reserve in the south as well as a 60m wide drainage reserve from the north south boulevard connector to the central drainage reserve (refer to Figure 1).

The VPA, Melbourne Water and Council have agreed “in-principle” to adopt the Alluvium drainage strategy. This outcome is reflected in the VPA’s draft revised FUS (16/01/2018) and has resulted in a reduction in the large central wetland/retarding basin area. Consequently some of this land is now identified as areas of landscape values in order to protect the large number of indigenous trees present and to maintain north-south and east-west open space links.

All of the drainage and hydrological assumptions are detailed within the Alluvium drainage strategy titled “1960 & 2040 Mickleham Road, Surface/Stormwater Management Strategy (February 2018)”.

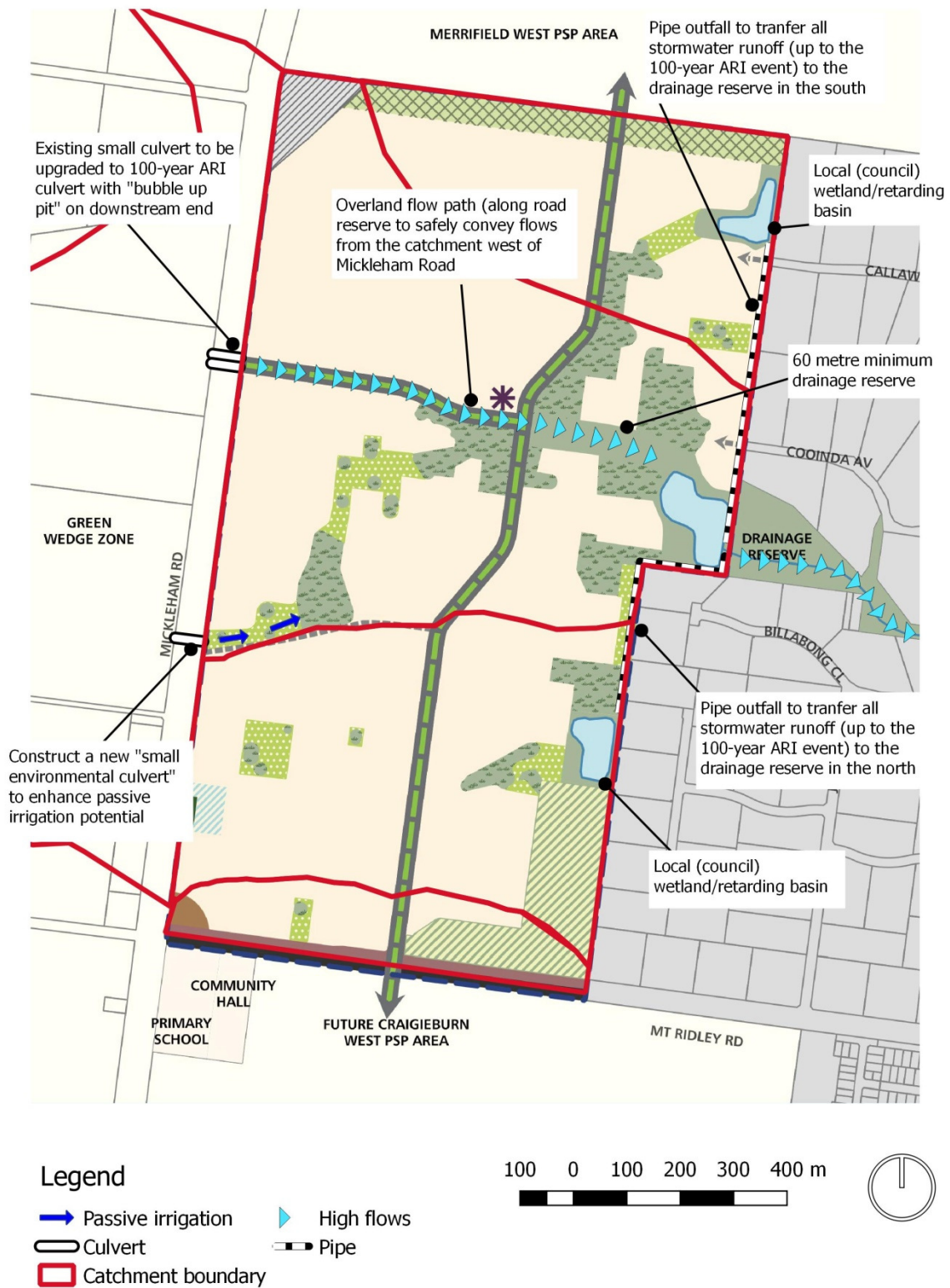


Figure 1: Proposed drainage strategy

5 The role of stormwater in supporting sustainable vegetation

5.1 The issue

The Lindum Vale PSP includes a significant number of existing trees through the precinct and the future urban structure plan has responded by allocating reserves to retain a relatively large population. Urbanisation and land use change will alter the natural hydrology and the movement of surface water across the landscape. In addition to the preservation of land that surrounds the trees it is important to consider the water needs of the vegetation to support a healthy and sustainable landscape.

5.2 Discussion

The traditional servicing approach for urban drainage is to consider the required infrastructure for the minor drainage system (low flows) and major drainage system (high flows). However the opportunity exists to integrate the requirements of trees and vegetation as part of a Water Sensitive Urban Design (WSUD) approach to the drainage configuration. In my opinion urban stormwater runoff provides a potential source of supply for future irrigation of the native vegetation. The configuration and design for the subdivisional drainage system should consider the potential for alternative and innovative approaches to integrate water and passive irrigation into the landscape. However in my view a “one size fits all approach” is not possible at the Lindum Vale site. The various groups of trees are spread across diverse topographic and subsequently varying hydrologic regimes. For example some trees are currently located on “high ground” with very little surface runoff contributing to its moisture profile, whereas others are located within the low point and depression that meanders through the landscape (refer to Figure 2).

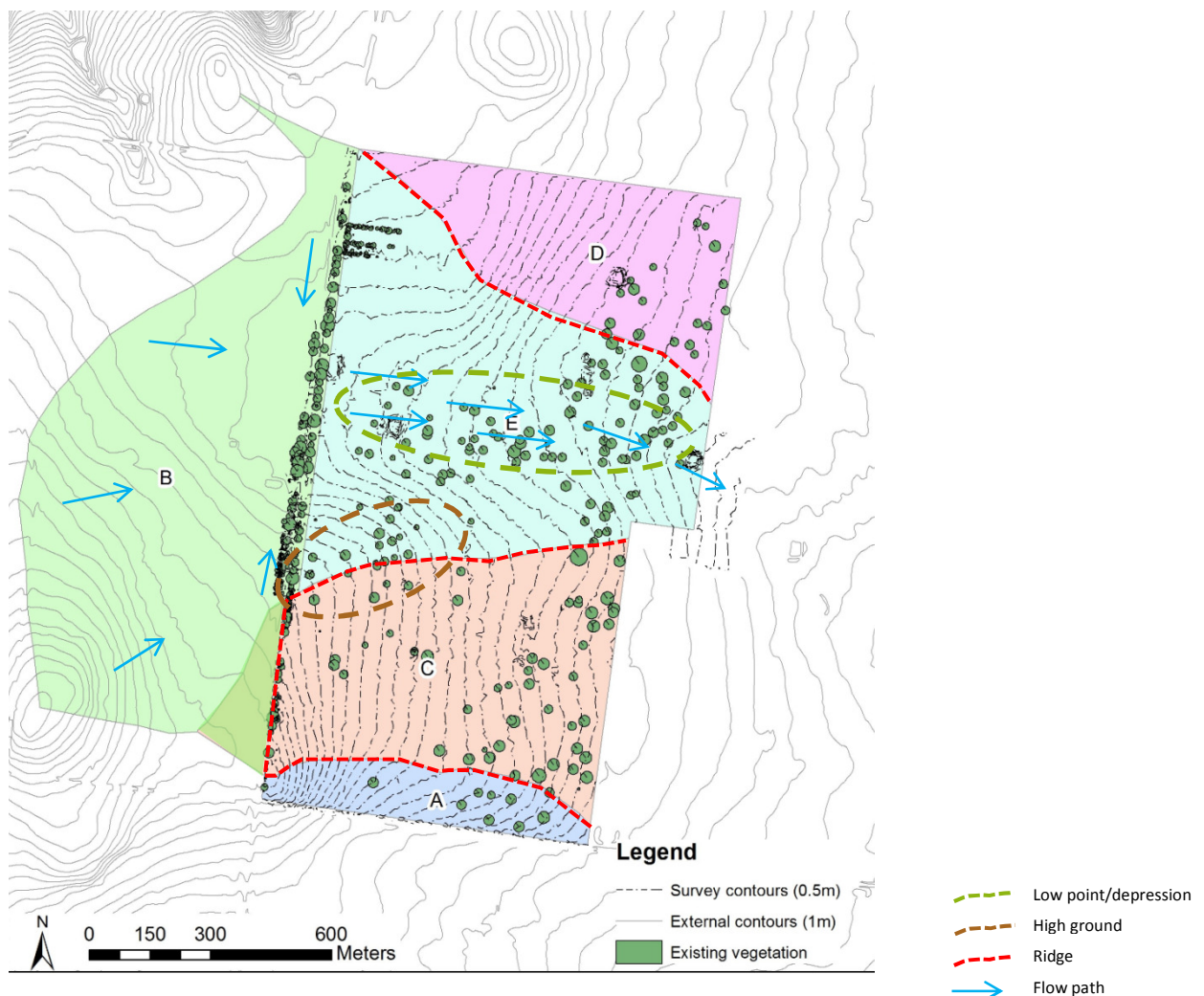


Figure 2: Existing catchment and flow paths

In my opinion it is therefore essential that any consideration to integrate any stormwater runoff into the reserve is informed by the eco-hydrology needs of the existing tree communities. As a result it would be necessary to identify the key tree locations that may require additional moisture based upon an ecological assessment of the species key hydrologic needs and characteristics. This would then enable options to be considered for the supply of water to meet those ecological needs. In my view this level of analysis and assessment is beyond the PSP phase and should be undertaken at the subdivisional functional/detailed design stage where the site specific benefits and costs can be evaluated.

Some possible ways that the drainage infrastructure could integrate with the landscape are as follows:

Passive irrigation by “shedding”

Passive irrigation by “shedding” surface runoff from roads into the open space reserves. This could potentially be enhanced by providing a “gravel trench” as a storage reservoir for specific trees.



Figure 3: Water sensitive road reserve with edge strip to “shed” surface runoff to tree reserve

Passive irrigation by “bubble up”

Passive irrigation via a drainage mechanism where flow “bubbles up” out of the pits in most storm events and is distributed as sheet flow into the reserves to water the trees. Such an approach is likely to require a low flow drain to ensure upstream pipelines are dry between storm events.

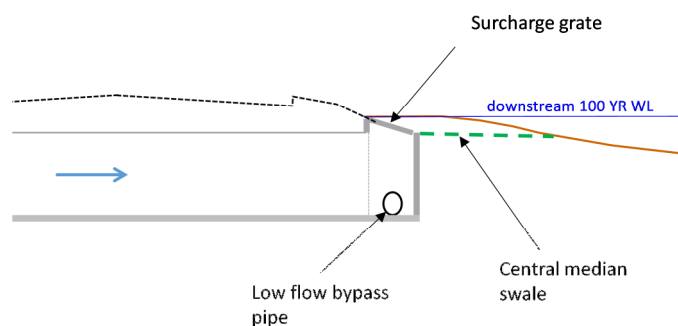


Figure 4: Water sensitive pipe design to “bubble up” flows to the surface

Passive irrigation by wetland “trickle feed”

Utilise a trickle feed from the constructed stormwater treatment wetland to supply a deep “banking” of water via a linear gravel trench that meanders through a tree community. The supply source could be a portion of the “extended detention” treated outflow water from the wetland.



Figure 4: Possible trickle feed from the constructed wetland

5.3 Recommendation

It is my understanding that the VPA intends to include the following requirements within the PSP to support the objective of providing urban design measures to assist with the long term sustainability of existing trees and vegetation.

The design and construction of drainage infrastructure must include measures to protect and enhance the long term viability of vegetation, particularly the River Red Gums, through the use of Water Sensitive Urban Design and passive watering initiatives. The design must be based on a vegetation survey and assessment undertaken in conjunction with Council.

Development must reduce reliance on reticulated non-potable water for irrigation of vegetation, including existing River Red Gums, through utilisation of passive irrigation facilitated by appropriate subdivision and road design, where practical.

Water Sensitive Urban Design (WSUD) principles must be used so that excess stormwater runoff from within, or where appropriate, external to the park, is directed to support park planting and/or raingardens, to the satisfaction of the responsible authority. Any WSUD must complement the open space function and quality.

In my opinion the proposed PSP requirements, coupled with the Alluvium drainage strategy, provide appropriate measures to facilitate the integration of stormwater to support the health and sustainability of existing trees and vegetation. This will result in Council and the developer working together during the functional and detail design of the stormwater system to consider and evaluate the benefits and costs (capital and maintenance) of passive irrigation in site specific locations.

6 Location of wetland/basin assets

6.1 The issue

The Lindum Vale PSP, based upon the Alluvium drainage strategy, includes three wetland/retarding basin assets distributed along the eastern boundary of the PSP. Submission “4” to the VPA stated that “retarding basins should be positioned a minimum of 50 metres from existing property boundary due to increased hazards from mosquitos, frogs and snakes. The area between the basin and the property should be landscaped to retain privacy”.

6.2 Discussion

Mosquitos, frogs and snakes are a natural component of any wetland system, natural or constructed. The construction of any waterbody will potentially create a habitat suitable for mosquito breeding and growth. However a healthy, well vegetated wetland will function as a balanced ecosystem and have predators that control mosquito populations. Melbourne Water has prepared a constructed wetland design manual that considers safety in design and pest management. For example the manual addresses the risk of mosquito breeding through:

- Ensuring all parts of the wetland are well connected to provide access for mosquito predators to all inundated areas of the wetland;
- Providing areas of permanent open water that provide refuges for mosquito predators (even during long dry periods);
- Ensuring wetland water quality is adequate to support of mosquito predators such as macroinvertebrates and fish (this is normally the case for wetlands where stormwater is the dominant inflow);
- Providing a bathymetry that ensures that regular wetting and drying is achieved and water draws down evenly so isolated pools are avoided;

Melbourne Water completed its recent wetland manual review in 2016, and established a minimum offset of 15 metres from the edge of the water to any allotment boundary.

6.3 Recommendation

In my opinion the location of the wetland/basins as shown in the Alluvium drainage strategy and the Lindum Vale PSP is appropriate as it meets Melbourne Water’s minimum 15 metre offset criteria between an allotment boundary and the edge of the water body.

Based upon my own personal experience in the design of over 40 constructed wetlands across greater Melbourne, good design and maintenance will enable the establishment of a resilient and balanced ecosystem to control pest populations.

7 Conclusion

In summary, my findings with respect to the Lindum Vale PSP are provided below.

In my opinion the proposed PSP requirements, coupled with the Alluvium drainage strategy, provide appropriate measures to facilitate the integration of stormwater to support the health and sustainability of existing trees and vegetation. This will result in Council and the developer working together during the functional and detail design of the stormwater system to consider and evaluate the benefits and costs (capital and maintenance) of passive irrigation in site specific locations.

In my opinion the location of the wetland/basins as shown in the Alluvium drainage strategy and the Lindum Vale PSP is appropriate as it meets Melbourne Water's minimum 15 metre offset criteria between an allotment boundary and the edge of the water body.

Based upon my own personal experience in the design of over 40 constructed wetlands across greater Melbourne, good design and maintenance will enable the establishment of a resilient and balanced ecosystem to control pest populations.

I have made all the enquiries that I believe are desirable and appropriate and that no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.