

5th April 2018

Melbourne Water drainage explanatory brief, Minta Farm PSP

1. Melbourne Water is the Waterway, Floodplain and Regional Drainage Management Authority for the Port Phillip and Western Port Bay catchments, as defined in Part 10 of the *Water Act 1989*.

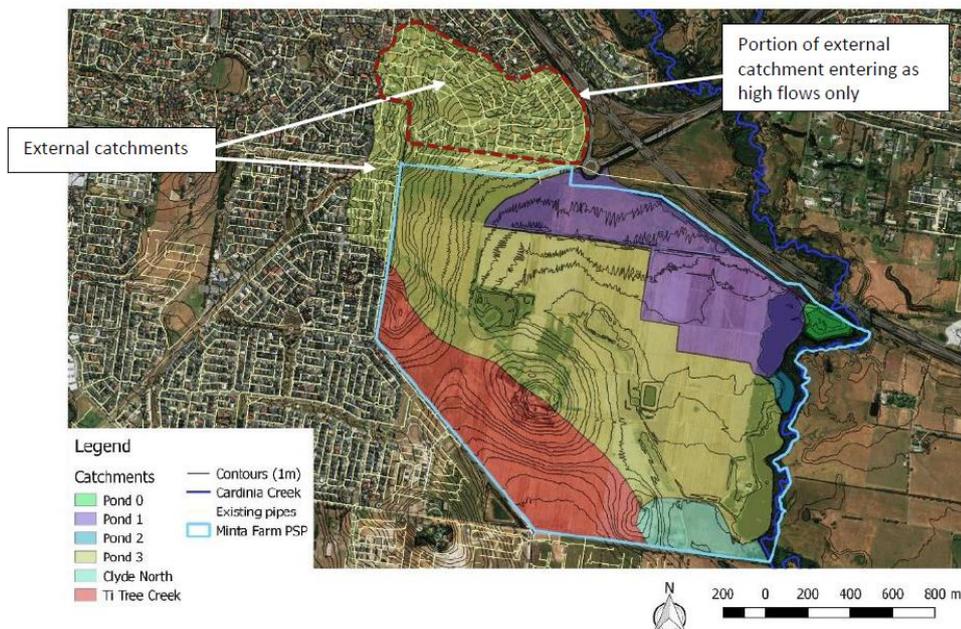
Drainage and Waterway Overview

2. There is one major waterway, Cardinia Creek, which interfaces with the proposed Minta Farm PSP.
3. A series of four large waterbodies, originally constructed as farm dams, form an interface between Cardinia Creek and the PSP developable area. The embankments of these waterbodies extend up to a height of 5 m above Cardinia Creek level.



4. There are four distinct sub-catchments within the Minta Farm PSP site. Two of these outfall across the PSP boundary and do not contribute inflows to the existing waterbodies (the blue and red catchments shown on the below plan), whereas the yellow and purple catchments drain to the waterbodies.





Conservation Area 36

5. The riparian area of Cardinia Creek is a unique and sensitive environment with high ecological values. This is formally recognised in Conservation Area 36 which is located along Cardinia Creek including within the Minta Farm PSP area, where it covers three of the existing large waterbodies (Pond 0, 2 and 3). The Conservation Area supports national (Matters of National Environmental Significance) and state listed species including:
 - Dwarf Galaxias
 - Australian Grayling
 - Latham’s Snipe
 - Growling Grass Frog
 - State listed waterbirds

6. The Department of Environment, Land, Water and Planning (DELWP) has advised Melbourne Water (email dated 26/03/2018) that in relation to the Melbourne Strategic Assessment:
 - Under Condition 2 of the 2014 approval under Part 10 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), DELWP requires that no action be taken that would result in a net loss of habitat for Matters of National Environmental Significance (MNES) listed under the EPBC act.
 - Under Condition 1 of the 2014 approval, any actions must be undertaken in accordance with the *Biodiversity Conservation Strategy for Melbourne’s Growth Corridors* (BCS). The BCS makes commitments for the protection of matters of national and state environmental significance; identifying matters of state significance as “species listed on the DEPI’s [DELWP] Rare and Threatened Species Advisory Lists.”

7. DELWP have advised Melbourne Water (email dated 26/03/2018) that it is acknowledged that to facilitate drainage for the Minta Farm Precinct, outfalls will be required to pass through the Conservation Area, which will impact Matters of National Environmental Significance.

Drainage Strategies

8. Melbourne Water designs Development Services Schemes (DSSs) to masterplan the drainage and waterway infrastructure required to service future urban development. There are more than 200 DSSs across greater Melbourne.

9. A DSS is comprised of a drainage strategy (a catchment-based conceptual masterplan of drainage infrastructure) and a pricing arrangement (contribution rates) to fund the construction of these assets.

10. If the area covered by the DSS is owned by a minimal number of different landholders, Melbourne Water may choose to not implement a pricing arrangement to accompany the drainage strategy. In those instances, the full cost of implementing the drainage strategy is the responsibility of the individual landholders.

11. Drainage strategy works are constructed by developers, usually at the time of subdivision.
12. A common set of objectives and hydraulic and environmental performance criteria are incorporated into the design of drainage strategies. These are outlined in *Principles for Provision of Waterway and Drainage Services for Urban Growth* and include the following:¹
 - Stormwater will be treated to best practice in accordance with *Best Practice Stormwater Management Guidelines*.²
 - All new developments will achieve current flood protection standards, generally being 1-in-100 year flood protection.
 - The minor drainage system will have a capacity to service a 1-in-5 year storm event.
 - Assets are designed to a standard to the satisfaction of the ultimate asset owner, usually Council or Melbourne Water.
 - All landowners will receive an equivalent level of service.
 - A robust consultation process will govern the creation of DSSs.
 - The environmental, social and economic site-specific and system-wide values of waterways will be protected.
 - Drainage strategies should propose infrastructure to service development that is optimal in terms of cost and performance, while protecting environmental and other waterway values.
13. Drainage strategies are a conceptual design and provide for flexibility at functional design, subject to achievement of the drainage strategies and any identified site specific objectives (including securing approval by other agencies as required).
14. The ultimate drainage strategy design must be to the satisfaction of Melbourne Water and other responsible authorities.
15. Where flood event overland flow conveyance is proposed through a pipe and road drainage system, it must be managed safely and meet Melbourne Water's floodway safety criteria contained within the *Land Development Manual*.
16. The design of drainage strategies are informed and guided by scientifically rigorous and industry-accepted reference documents. These include:
 - *Wetland Design Manual: design, construction and establishment of Wetlands* (Melbourne Water, 2017);
 - *Healthy Waterways Strategy: A Melbourne Water strategy for managing rivers, estuaries and wetlands* (Melbourne Water, 2013);
 - *MUSIC Guidelines: input parameters and modelling approaches for MUSIC users in Melbourne Water's service area* (Melbourne Water, 2016);
 - *Constructed Waterways in Urban Development Guidelines* (Melbourne Water, 2009);
 - *Waterway Corridors: guidelines for greenfield development areas within the Port Phillip and Westernport Region* (Melbourne Water, 2013);
 - Support resources available from the Melbourne Water 'Planning and Building' website; and
 - others as appropriate to specific sites.
17. Melbourne Water routinely undertakes background investigations to understand the site-specific waterway form, values and conditions for those waterways contained within a proposed drainage strategy. These studies inform the design of the drainage strategy.

Drainage Strategies servicing the Minta Farm PSP area

18. The Minta Farm PSP area will be serviced by three drainage strategies, the Minta Farm Drainage Strategy, Ti-Tree Creek Drainage Strategy and Clyde North Drainage Strategy. The Ti-Tree Creek and Clyde North Drainage Strategies primarily service areas external to the Minta Farm PSP and have been finalised.
19. The area covered by the Minta Farm Drainage Strategy has had several previous strategies prepared by entities other than Melbourne Water:
 - Charlton Degg and Water Technology prepared *Minta Farm, Berwick Cardinia Creek Catchment Stormwater Management Strategy* for Mutual Trust in 2016

¹ Melbourne Water, June 2007.

² CSIRO, 1999. Currently 45% in total nitrogen and phosphorus, 80% reduction in total suspended solids.

- Engeny Water Management *Minta Farm Precinct Structure Plan Surface Water Management Strategy* for the VPA, with this being finalised in 2017

20. Melbourne Water reviewed both of these previous strategies and identified significant design gaps:
- Ultimate drainage outfalls for the strategies were not identified, with both strategies indicating discharge to the Pond system, but not to Cardinia Creek
 - Consideration of the specific ecological requirements of the habitat within the Conservation Area was not incorporated into the design. In particular, with regard to (i) managing changes in the hydrological regime caused by increased runoff associated with development, and (ii) minimising disturbance to high value habitat when selecting infrastructure locations. Neither strategy had received in-principle support/approval from DELWP.
 - The structural integrity and safety considerations of the current waterbody embankments were not assessed.

21. To address these gaps Melbourne Water commissioned an environmental values assessment and functional design project. Key goals of this project are:
- To design a drainage strategy that meets Melbourne Water's objectives,
 - Is supported by DELWP and therefore likely to receive approval from DELWP and/or the Commonwealth in relation to potential impacts to Conservation Area 36 and,
 - Provides for safe assets, including the embankments.

It was acknowledged at project inception that the ultimate proposed drainage strategy may differ significantly from both of the previous strategies.

22. Specific design parameters of this project include:
- Provide ultimate outfall from the Minta Farm drainage strategy to Cardinia Creek
 - Achieve Melbourne Water's drainage strategy objectives as outlined in paragraph 12.
 - Support an appropriate hydrologic regime within the Conservation Area that will continue to support the viability of habitat for identified national and state listed species within the Conservation Area (achieves ongoing environmental watering regime within the Conservation Area waterbodies). The appropriate hydrologic regime for each of the waterbodies to be determined as part of this project.
 - Minimise the disturbance footprint required for asset construction to identified habitat within the Conservation Area
 - Satisfactorily addresses any structural integrity and safety concerns associated with the embankments
 - Consideration of water turnover and residence time within the waterbodies to minimise risk of future algae bloom risk
 - The creation of an appropriate interface with the future urban layout
 - Optimisation of land take required for drainage assets.

23. In August 2017 Melbourne Water commissioned an Alluvium led consortium to undertake this project with other consulting partners being Biosis (specialist ecological advice), A.S. James (geotechnical engineering) Newman Engineering (geotechnical assessment).

24. Melbourne Water has sought to undertake this project in a collaborative manner, working closely with DELWP, the VPA and landowners.

25. The Melbourne Water project was not sufficiently progressed by October 2017 to inform the PSP urban form at public exhibition, and as a result the drainage strategy that was incorporated into the PSP design was the previous Engeny work commissioned by the VPA.

Minta Farm Drainage Strategy – work to date on Melbourne Water project

26. The Melbourne Water project is ongoing. All work currently remains in a draft form with further review of the underlying modelling, of potential interactions Cardinia Creek flood extents and design work being required prior to acceptance of the work as final. Melbourne Water is working to complete this assessment.

27. The identified key habitat values have been identified, with DELWP expressing support for the habitat mapping prepared by Biosis (email dated 26/03/2018). This mapping is contained as part of Melbourne Water's information package.

28. The ecological values assessment has been completed, and has identified a significant risk to the ecological values within the Conservation Area if the post-development hydrological regime is not managed appropriately.
29. A preliminary geotechnical assessment was undertaken and included site and subsurface (four sample bores) assessments of the embankments. These assessments indicate that the embankments are generally in poor condition, which combined with ongoing development of the downstream catchment (and planned public assets within the waterway corridor) indicates they are unlikely to meet current safety standards without undergoing rehabilitation works. This report is contained as part of Melbourne Water's information package.
30. The retention of the Baillieu family house adjacent to the most southern waterbody has been identified as a priority by the Minta Group.
31. The Alluvium work to date has provided two concept scenarios for alternative drainage asset layouts, with each of these having an additional option that is compatible with retaining the Baillieu house; Scenario 1 includes a northern east-west waterway corridor draining into Cardinia Creek south of Pond 1, and Scenario 2 includes a southern northwest- southeast waterway corridor draining to Cardinia Creek south of Pond 3.

Melbourne Water's preferred Scenario

32. Options 1 and 2 were assessed against the design parameters outlined in paragraph 19, with input sought from DELWP, VPA and landholders.
33. Melbourne Water supports the retention of the Baillieu house with the adjusted wetland option but would like to explore the practical design and maintenance to the proposed constructed wetland north west of the dwelling so that sufficient maintenance distance is provided in the PSP for the future maintenance of the assets as well as other planning considerations such as shared paths.
34. In reviewing the draft options presented, Melbourne Water's preference is for Scenario 1 (northern east-west waterway corridor) for the management of flow conveyance from the PSP development for low, environmental and flood flow management.
 - This option satisfied the design parameters, in particular of being able to deliver an appropriate hydrologic regime within the Conservation Area. In comparison, Scenario 2 has a reduced size of catchment draining to Pond 1, thereby potentially making Pond 0 more susceptible to 'drying out' which could impact habitat values.
 - Scenario 1 is assessed at having least impact to high value native vegetation within the Conservation Area
 - Scenario 1 has a consolidation of drainage strategy assets, whereas Scenario 2 would require additional smaller sediment basins to provide treatment to sub-catchments.
 - Scenario 1 has a reduced length of overall embankment to be retained due to Pond 2 embankment being reduced to facilitate outfall of the waterway into Cardinia Creek. This would reduce initial capital cost to rehabilitate the embankment and ongoing maintenance costs.
 - Scenario 1 has reduced land take impacting on developable land, primarily due to a shorter waterway length
 - DELWP have indicated their preference for Scenario 1
 - The Minta Group and Stockland have indicated their preference for Scenario 1

Scenario 1 does not follow Melbourne Water's standard scheme approach of aligning the waterway corridor with the existing valley floor, and as such will necessitate the proposed norther east-west waterway to be a constructed waterway and will require additional cut and fill. However, the benefits of this Scenario are considered significant (as outlined in paragraph 34 above).

35. For Scenario 1 to satisfactorily meet Melbourne Water's floodway safety criteria for overland flow conveyance for 1% AEP rainfall events, the area immediately upstream of SB2 will require several parallel roads graded to safely convey overland flows to SB2. These will be required through the superlots, as indicated by the blue arrows in the diagram below (note that these are indicative only, with the number of roads and required width to be determined through functional design). The road design needs to convey peak flows through a combination of pipe drains and overland flows down the roads.



Constructed waterway form – Scenario 1 northern east-west waterway

36. The ultimate channel form (depth/width) is governed by (i) the capacity required to convey flood flows, (ii) the available grade between the upstream extent of the waterway and its outfall to Cardinia Creek, and (iii) the batters slope of the waterway banks.
37. The proposed constructed waterway outlined in Scenario 1 meets Melbourne Water’s guidelines; *Constructed Waterways in Urban Developments Guidelines* and *Waterway Corridors: guidelines for greenfield development areas within the Port Philip and Westernport Region*.
 - Waterway corridor width is 60m, with this being conditional on having an active edge (road) interfacing on each side of the waterway
 - Waterway meander is allowed for. The proposed constructed waterway form includes a low-flow pilot channel at the base of the waterway. This pilot channel will be designed to meander within the greater flood flow channel, resulting in local widening and narrowing of the intermediate benches. This will contribute to create a more naturalistic waterway form.
 - The batters for waterbody are no steeper than 1:5 for (V:H) for ease of construction and safety.

Ultimate ownership of the retained waterbodies

38. The proposed drainage strategy has been designed to best meet the drainage and environmental objectives of the Minta Farm site. This has resulted in recommendations that include the construction of drainage assets and the retention of large waterway bodies for environmental purposes (with recommended embankment rehabilitation works to ensure they meet current safety standards).
39. Melbourne Water is not in a position to accept the ongoing ownership of those waterbodies within the Conservation Area that are proposed to be retained for environmental purposes. Waterbodies that are retained for drainage and environmental purposes are as follows:
 - Pond 0 – Environmental waterbody
 - Pond 1 – Drainage asset
 - Pond 2 – proposed to be decommissioned to allow free draining outfall of constructed waterway to Cardinia Creek.
 - Pond 3 – Environmental waterbody

Of the above, only Pond 1 and the future constructed waterway would become drainage assets managed by Melbourne Water. Note that this does not identify all drainage assets within the Minta Farm PSP area.