



Appendix 6

Local Water Management Strategy Addendum

4 February, 2019

Your Ref:
Our Ref: H17047Av1

Department of Water and Environmental Regulation
Swan Avon Region
7 Ellam St
Victoria Park WA 6100

ATTENTION: Jim MacKintosh

Dear Jim,

**RE: CATALINA GROVE
LOCAL WATER MANAGEMENT STRATEGY ADDENDUM**

This Local Water Management Strategy (LWMS) addendum has been prepared by Hyd2o on behalf of Tamala Park Regional Council in support of the revised Catalina Grove Local Structure Plan (LSP).

The addendum report has been initiated through amendments made to the Catalina Grove LSP and has been prepared to review and refine the overall stormwater management strategy and stormwater modelling across the western part of LSP area. This modelling will later be used to guide subdivision planning and the development of Urban Water Management Plans (UWMPs) within the site.

This report is intended to be read in conjunction with the previously approved Tamala Park Local Water Management Strategy Amendment (LWMS) (ENV, 2011) and Tamala Park Local Water Management Strategy (MWH, 2009). The modelling outcomes in this report supersede post development stormwater modelling outcomes detailed in the previous LWMS. The key principles and objectives of the approved LWMS remain current.

The LSP area (herein referred to as the site) is approximately 53 ha in area and located within the City of Wanneroo. The site is comprised of Lot 9023 on Plan 54969 and is bound by Neerabup Drive to the north, Connolly Drive to the west, Mitchell Freeway to the East and a vegetated area to the south (Figure 1). The Catalina Residential Estate extends west towards the ocean with construction of many stages complete consistent with their respective urban water management plans (Hyd2o 2013a, Hyd2o 2013b and Hyd2o 2016).

The site is zoned 'urban' under the Metropolitan Region Scheme (WAPC, 2009) and 'urban development' under the City of Wanneroo Town Planning Scheme No. 2 (CoW, 2001).

This document provides a total water cycle management approach to development and has been prepared consistent with the approved Tamala Park Local Water Management Strategy (ENV, 2011) and Better Urban Water Management (Western Australian Planning Commission, 2008).

The revised LSP is included as Figure 2.

1. Site Characteristics

The site is generally described as having the following predevelopment characteristics:

- The majority of the site consists of partially cleared vegetation and has been used for lay down for construction purposes. There are no buildings or informal structures located within the site (Figure 1).
- The topography is remnant of undulating coastal sand dunes and ranges from around 8 mAHD near Connolly Drive to 24 mAHD in the northeast corner.
- A geotechnical investigation was undertaken by Douglas Partners in 2009, which included 28 test pits across the site. Generally, the site was characterised as being sandy with limestone predominantly occurring more than 2.5m below the ground surface (Douglas Partners, 2009). A copy of the geotechnical report was previously submitted with the approved LWMS (ENV, 2011).
- Field hydraulic conductivity testing was undertaken by Hyd2o in April 2018. Testing was undertaken at two different locations across the LSP (Figure 3), to support proposed areas for drainage within the LSP. Testing produced rates ranging from 63.9 m/day to 85.5 m/day in suggesting soils are suitable for infiltration in both conditions.
- The *Perth Groundwater Atlas Second Edition* (Department of Environment, 2004) indicates that end of summer groundwater levels beneath the site are approximately 1 mAHD. Groundwater monitoring was not required for this site as separation between groundwater to natural surface was between 7-23m.
- There are no defined waterways, watercourses, or drains within the site. All surface water runoff infiltrates through the subsurface profile.
- There are no wetlands or water dependant ecosystems within the site.

2. Modified Local Structure Plan

A copy of the revised LSP for the site is included as Figure 2. Proposed land use within the site is generally consistent with that shown in the LWMS (RPS, 2010), albeit with realignment of roads, lots and POS across the site. These changes have resulted in modifications to post development drainage routes and local catchment boundaries.

3. Stormwater Management

Stormwater management is proposed to be undertaken consistent with water sensitive design practices and City of Wanneroo Drainage Guidelines (City of Wanneroo, 2015).

The system will consist of a series of lot soakwells, piped road drainage system, bioretention areas for water quality treatment and infiltration areas for water quantity management within POS areas.

Runoff from the first 15mm will be retained and infiltrated within soakwells on the lot. The first 15mm runoff from within the road reserve will be managed for quantity and quality using a treatment train before it enters the flood storage receiving environment. The

location of street scale treatment and infiltration to achieve this will be negotiated in consultation with CoW at the commencement of the detailed design process.

Based on the revised structure plan, updated post-development drainage catchments are shown in Figure 4.

Catchments A and B, are all proposed to retain and infiltrate stormwater up to and including the 1 in 100 year ARI event within POS/drainage areas. The Local Centre and group housing lots are proposed to manage their own drainage on site post development.

3.1 Stormwater Modelling

Stormwater modelling for the POS/drainage reserve was undertaken by Hyd2o and performed using the PONDS groundwater infiltration model to determine flood storage requirements and provide an assessment of areas required for distributed stormwater infiltration. PONDS is a program specifically designed for modelling groundwater/surface water interactions for the design of stormwater infiltration areas, based on the finite difference computer program MODFLOW, development by the U.S. Geological Survey.

The design storms modelled by PONDS were calculated with reference to the methodology in Australian Rainfall and Runoff (AR&R) (Institute of Engineers Australia, 2000) and the Bureau of Meteorology Computerised Design IFD Rainfall System (CDIRS). The rainfall temporal pattern was assumed to be spatially uniform across the catchment. Storm durations modelled ranged from 1 hour to 72 hours.

Hydraulic conductivities used for modelling were reduced from the high rates recorded on on site to 10 m/day to allow for a soil moderation/clogging factor and future landscaping works (as per City of Wanneroo, 2015).

The following runoff rates were used for modelling:

- Residential Lots >300m² – 10%
- Residential Lots <300m²- 95%
- Internal Roads and road reserve- 80%
- POS and Conservation Area- 0%

Consistent with City of Wanneroo requirements, minimum habitable floor levels are to be set in accordance with the following:

- 0.5 m above the 100 year ARI storm event flood storage area levels and
- 0.3 m above the 100 year ARI interval flood level in local drainage network.

A stormwater event plan for the site is shown in Figure 4 and a table of modelling results contained in Table 1.

The total storage volume and area across the site are estimated as approximately 5977 m³ and 0.65 ha, and 2667 m³ and 0.51 ha, for the 5 and 100 year ARI events respectively. This equates to 1.25 % and 1.9 % of the total contributing catchment areas for 5 and 100 year ARI events respectively.

Note that storage shapes shown in Figure 4 is indicative only for determination of area requirements and representation of the storage area required.

The final flood attenuation area configuration (side slopes etc.), locations, and elevations will be documented in future UWMPs and will be dependent on final earthworks, drainage, landscaping and road design levels for the development. Minor refinements to catchment areas shown in this report are considered likely to occur as detailed design proceeds, and stormwater modelling will be updated accordingly during the UWMP process.

Table 1: Stormwater management

Catchment	Catchment A	Catchment B
Residential lots >300m ² (ha)	5.01	14.16
Residential lots <300m ² (ha)	0.56	4.49
Internal road & road reserve (ha)	2.61	11.01
Public open space (ha)	0.59	3.11
Conservation (ha)	0	4.90
Total contributing area (ha)	8.78	37.64
Equivalent impervious area (15mm event) (ha)	2.62	13.07
Equivalent impervious area (5yr &100yr event) (ha)	3.13	14.49
Basin characteristics		
Basin invert (mAHD)	9.0	7.2
Base area (m ²)	600	3150
Side slopes (v:h)	6	6
Unsaturated vertical K (m/day)	10	10
15mm Event		
Volume (m ³)	197	802
1 in 5 year ARI		
Flood rise (m)	0.64	0.60
TWL (mAHD)	9.64	7.80
Volume (m ³)	519	2148
TWL surface area (m ²)	1043	4029
Critical storm (hr)	3	1
1 in 100 year ARI		
Flood rise (m)	1.19	1.18
TWL (mAHD)	10.19	8.38
Volume (m ³)	1220	4757
TWL surface area (m ²)	1517	4978
Critical Storm (hr)	3	1

4. Conclusions/Recommendations

This addendum provides revised stormwater modelling for the site to address proposed LSP changes since the approval of the Local Water Management Strategy (ENV, 2011).

The updated stormwater management strategy and modelling takes into consideration onsite soil infiltration testing undertaken by Hyd2o.

It is recommended that modelling contained in this addendum be used as the basis for guiding future subdivision development within the site and the development of future UWMPs.

Aside from the revised stormwater strategy and modelling detailed in this report, all principles and objectives of the approved LWMS (ENV, 2011) remain valid for implementation.

5. References

- City of Wanneroo (2001). City of Wanneroo Town Planning Scheme No. 2.
- City of Wanneroo (2015). Development Design Specifications, WD5, Stormwater Drainage Design.
- Department of Environment (2004) Perth Groundwater Atlas Second Edition
- Department of Water (2007). Stormwater Management Manual for Western Australia
- Douglas Partners (2009) Proposed Tamala Park Residential Subdivision, Mindarie, WA. Prepared for TPG on behalf of the Tamala Park Regional Council, January 2009
- ENV Australia (2011) Tamala Park Local Water Management Strategy Amendment. Prepared for the Tamala Park Regional Council.
- Hyd2o (2013a) Catalina Residential Development Central Cell: UWMP. July 2013
- Hyd2o (2013b) Catalina Residential Development Stages 9-11 UWMP. December 2013
- Hyd2o (2016) Catalina Residential Development Western Cell UWMP. August 2016
- MWH (2009) Tamala Park Local Water Management Strategy. Prepared for the Tamala Park Regional Council. June 2009.
- Western Australian Planning Commission (2008). Better Urban Water Management. Government of Australia, October 2008.
- Western Australian Planning Commission (2009). Perth Metropolitan Regional Scheme. Government of Western Australia.

Should you have any queries regarding this report, please do not hesitate to contact Suzanne Smart or Sasha Martens of this office.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Suzanne Smart', written in a cursive style.

Suzanne Smart

Senior Environmental Hydrologist

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Source: Google Maps



hyd₂o
Catalina Grove LWMS Amendment
Location Plan

Figure 1



StudyArea

Landuse



Local Centre



R80-100



R30-R60



<300m2 lots



Roads



POS





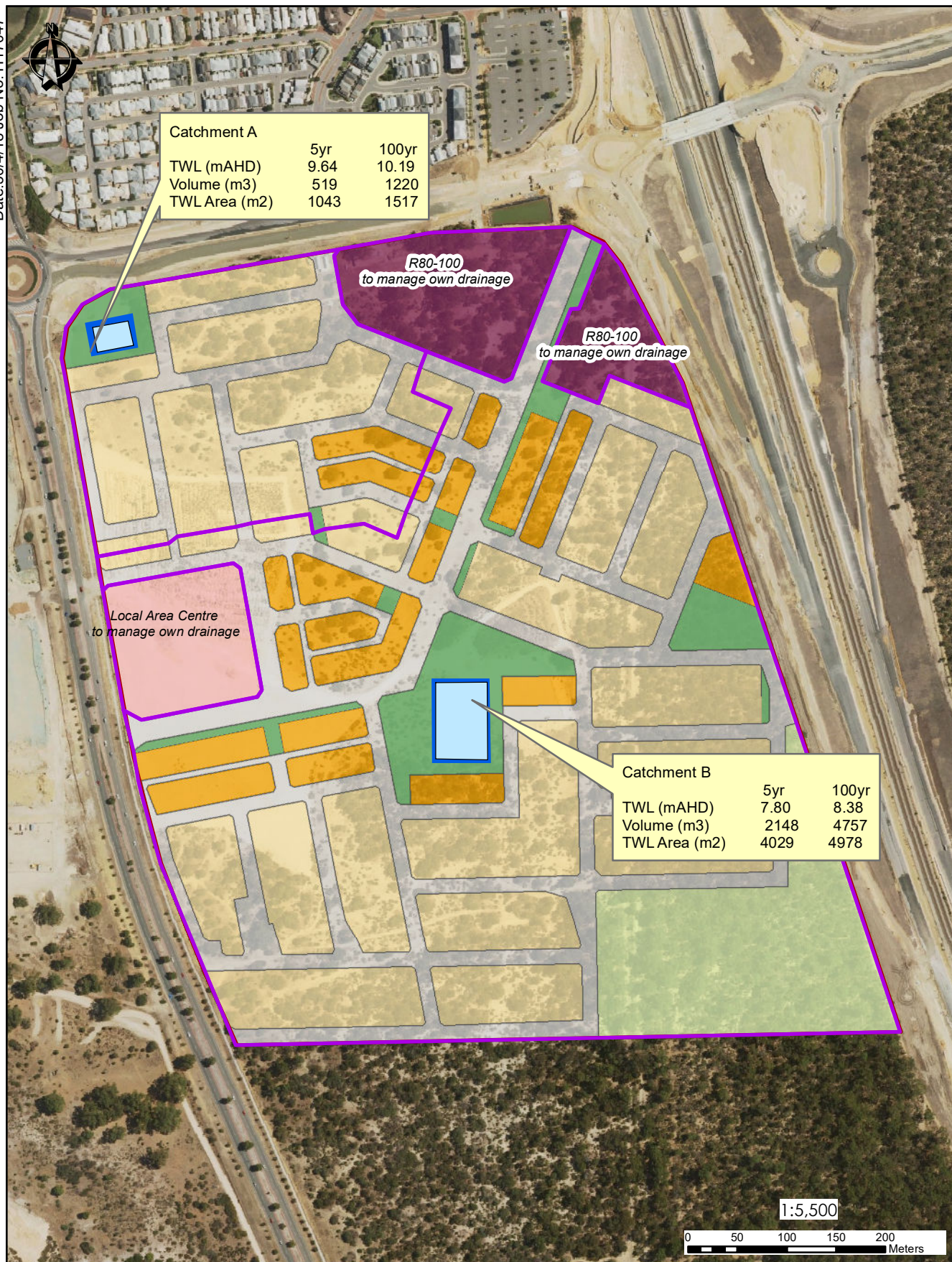
Conservation

Source: CLE, 2018

hyd2o
Catalina Grove LWMS Amendment
Local Structure Plan
Figure 2



-  Study Area
-  Test Location



- Study Area
- 5 year Basin
- 100yr Basin