

26 June 2026

Your Ref:
Our Ref: H26019Av1

Brett Chivers
c/- Hesperia Projects Pty Ltd
PO Box 782
Subiaco, WA 6904

Dear Brett,

**LOT 822 STIRLING CRESCENT, HAZELMERE
SUBDIVISION AND DEVELOPMENT WATER MANAGEMENT REPORT (SDWMR)**

This Subdivision and Development Water Management Report (SDWMR) has been prepared by Hyd2o on behalf of Hesperia Projects Pty Ltd in support of the development of Lot 822 Stirling Crescent, Hazelmere (herein referred to as the site).

The site is located within the City of Swan and proposes the development of an industrial tenancy with warehouse and associated infrastructure with access via Stirling Crescent.

A copy of the site plan is included as Appendix A.

In relation to water management planning approvals, the recently released State Planning Policy 2.9 Water (WAPC,2025) typically requires a SDWMR to guide detailed site design where an overarching water management report does not exist to sufficient detail to do so. Based on the scale of the proposed development, a brief SWMWR is therefore considered to guide future stormwater management planning and engineering design at the site.

This SDWMR provides an assessment of the site and an overarching plan for stormwater and groundwater management. It contains mapping of groundwater levels and the required characteristics of the stormwater system based on site investigations and modelling outcomes. A key consideration in development of site design and stormwater management is the interface with the Helena River on the northeast boundary which is addressed accordingly following consultation with DBAC and DWER.

This SDWMR has been prepared to support the sites development application and meet the requirements of the City of Swan, Department of Water and Environmental Regulation (DWER), Department of Biodiversity Conservation and Attractions (DBCA) and State Planning Policy 2.9 Water (WAPC,2025).

1. SITE CHARACTERISTICS

A site conditions plan is included as Figure 1. The site is generally described as having the following existing characteristics:

- The site has been historically cleared for agricultural use with some remnant vegetation in area adjacent to the Helena River located on its north-eastern boundary. Agricultural use has since ceased with associated infrastructure either cleared or deteriorated. Adjacent lots on Stirling Crescent have similarly been historically cleared.

- A survey of the site was carried out by MNG in March 2026. Surveyed levels show that the topography of the site grades from a maximum elevation of approximately 14 mAHd in the south-eastern corner adjacent to Stirling Crescent down to a minimum elevation of approximately 7 mAHd on the northeast boundary as the land falls to the Helena River. The site survey is contained as Appendix B. DWER 1m LiDAR topography is shown on Figure 1 and generally aligns with the feature survey.
- According to the Perth Sheet 2034 II and Part Sheets 2034 II and 2134 III, Environmental Geology Series (Gozzard, 1986) the site is characterised by sand and pebbly silt. The sand is noted to be very light grey at the surface, yellow at depth, fine to medium grained, sub rounded quartz, moderately well sorted of eolian origin while the pebbly silt is a strong brown silt with common fine to occasionally coarse grained sub rounded laterite, quartz, heavily weathered granite pebbles, some fine-medium grained quartz sand, of alluvial origin. A site geotechnical investigation was undertaken by Galt Geotechnics in April 2026 (Appendix C) across Lots 821, 822 and 823 which describes the geological profile of the site in more detail. The general ground conditions across the pits excavated within Lot 822 is described as follows, with reference to the test locations (TP02, TP04 & TP06) shown in Appendix C:
 - o Surficial Topsoil: SAND (SP) and Clayey SAND (SC) at TP06, fine to medium grained, sub-angular to sub-rounded, brown, trace fines, trace organics, loose, up to depth of 0.2 m
 - o SAND (SP-SM) / Silty SAND (SM), fine to medium grained, sub-angular to sub-rounded, brown / orange, trace to with fines, typically dense, up to depths of 1.6 m; over
 - o Clayey SAND (SC) / Sandy CLAY (CL-CI), fine to medium grained, sub-angular to sub-rounded sand, brown / orange mottled grey and red, low to medium plasticity fines and increase with depths, trace gravel (iron indurated), typically stiff, present from depths of 0.3 m (TP06 only) and up to depths of 2.0 m

Overall the site was considered suitable for the proposed industrial development. With respect to stormwater, permeability testing indicated a large range between 0.2 to 14.9 m/day, reflecting the variability in the subsurface profile. As such the investigation reports the potential for stormwater disposal, albeit that design should consider conditions at individual locations.

- Published acid sulphate risk mapping indicates that the south eastern region of site is mapped as a low to moderate risk of acid sulphate soils occurring within 3 m of natural soil surface.
- There are no conservation category wetlands, resource enhancement wetlands, or natural waterways within the site. The Helena River northeast of the site is classified as a conservation category wetland.
- There are no existing groundwater licences within the site. According to DWER's online Water Register (DWER, 2026a) groundwater resources in the area are fully allocated in the Perth-Superficial Swan and Perth-Leederville aquifers.

2. SURFACE WATER

There are no natural streams or waterways within the site. There is an existing excavation in the northern area of the site which exposes groundwater as a remnant of historical agricultural landuse.

It is expected that given the general geotechnical conditions at the site that small events would have the capacity to be retained and infiltrated on site, with the rainfall excess in larger events occurring as diffuse overland flow consistent with site topography. This would include direct site discharge to the Helena River as well as discharge across the western boundary to the neighbouring rural property before ultimately draining to the Helena River. Consistent with this interpretation, the Hazelmere Enterprise Area District Stormwater Management Strategy (AECOM, 2010) shows the site as part of the direct catchment to the Helena River.

The Hazelmere Drainage Strategy (DWA, 2014) shows the site located in its Catchment 4 which proposed discharge to a future open drain running parallel to the Helena River before eventual having a combined discharge to the river further northwest of the site. This open drain is considered conceptual only and logistically all landowners to the northwest would require participation to bring it online for site connection. As such in terms of staged implementation of development and consistent with the adopted approach of other lots adjacent to the Helena River in the area since DWA(2014), this SDWMR considers a direct local discharge to the Helena River as appropriate.

DWER and DBCA were consulted on this basis to guide this strategy and drainage planning for the site. Both agencies support individual discharge to the Helena River with the implementation of appropriate setbacks and measures to provide water quality treatment and erosion control. Further detail in this regard is provided in Section 5.

DWER provided modelled flood mapping of the Helena River with the extent of 1% AEP inundation as shown on Figure 2. Flood elevations adjacent the site ranges approximately from 8 to 8.1 mAHD, with the floodway located outside of and not encroaching into the site.

3. GROUNDWATER

DWER's online Perth Groundwater Map (DWER, 2026b) provides mapping of the 2019 peak superficial aquifer groundwater level contours across the Perth Metropolitan area. These contours are shown in Figure 3 at the site, estimating the superficial aquifer groundwater levels to range from 8.3 to 9.1 mAHD with flow to the north west.

These contours near the site are however not considered reliable as:

- There are no superficial DWER bores located in proximity to the site, with the nearest bore being located approximately 3.5km to the north (Bore 3/85). The locations and hydrographs of the nearest DWER long term bores are included as Appendix D.
- There are no long term DWER monitoring bores east of the site.
- The contours do not consider the impact of the Helena River, showing the groundwater levels 5m above the invert of the Helena River and much of its foreshore under water.

- The groundwater level are actually higher than the DWER estimated 1% AEP flood level of the river.

Hyd2o have therefore assessed and refined the sites groundwater levels using the following additional local information available:

- There is an existing groundwater bore on site as shown on Figure 3. The recorded groundwater level at this bore on 8/4/2026 was 5.75 mAHD. This level is considered representative of an end of summer level (seasonal minimum).
- ENV previously installed and monitored several bores in the vicinity of the site in 2008 as part of the environmental assessment for the Hazelmere Enterprise Area structure plan which measured peak winter water levels. This data indicated a groundwater flow direction to the north west with a winter 2008 maximum level of approximately 6 to 7 mAHD at the site. Annual rainfall in 2008 via Perth Airport (009 021) was 828 mm which was above the long term average of 753 mm (1943-2026) for the station, indicating the levels as representative of above average condition.

Further monitoring during winter 2026 is considered beneficial to confirm these findings, further refine regional groundwater levels if required, and assess any perching above less permeable soils to inform any subsoil requirements in future engineering design.

4. WATER USE SUSTAINABILITY

Water supply will be provided via extension of the Water Corporation's Integrated Water Supply System. Given the large contributing roof areas, use of rainwater tanks as an additional water supply source for the site will also be considered.

Water conservation measures within the development will be consistent with Water Corporation's Waterwise land development criteria and include the implementation of waterwise practices and stormwater treatment and detention compliant with requirements as detailed in Section 5.

Landscape plans for the site will be submitted separately to this SDWMR for approval.

Wastewater will be via Department of Health approved Aerobic Treatment Units (ATU's), connected to flatbed leach drains. Galt (2026) reports a minimum clearance of 1.5 m from the base of any effluent disposal system to design groundwater levels will be required for compliance with SPP 2.9 (WAPC, 2025).

5. STORMWATER MANAGEMENT

The key elements of the stormwater management strategy for the site are as follows, consistent with DWER and DBCA advice, DBCA's Corporate Policy Statement No. 49 regarding stormwater management affecting the Swan Canning Development Control Area, and integrating principles of Water Sensitive Urban Design to the proposed development:

- Retention/treatment of first 15mm of hardstand runoff in a landscaped biofiltration area.
- Events in excess of treatment provisions permitted to discharge to the Helena River via vegetated overland flow paths.

- Flow management to target erosion protection, with all associated works to be contained outside of the foreshore boundary.

Stormwater modelling to align the proposed drainage layout with the stormwater management strategy was done using XP-Storm.

XP-Storm is an industry standard program that performs detailed hydraulic and hydrological calculations to simulate the performance of stormwater systems for a range of design storm events. The design storms modelled by XP-Storm were based on methodology in Australian Rainfall & Runoff (Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, 2016) and the Bureau of Meteorology Computerised Design Intensity Frequency Duration (IFD) Rainfall System. Storms modelled for the 1% AEP (Annual Exceedance Probability) event ranged from 10 minutes to 72 hours.

The landuse breakdown for the site is provided in Table 3 based on the site plan in Appendix A. The site consists of one catchment which drains to a stormwater treatment and management area adjacent to the Helena River foreshore (Figure 4, Appendix E). Runoff coefficients used are shown in Table 3, consistent with City of Swan guidelines and other known industrial stormwater management plans approved in the local area. A conservative permeability of 0.2 m/day was adopted for the storage sizing on the basis of the lowest tested value in Galt (2026).

Key design parameters and modelling outcomes shown in Table 1, with detailed modelling results provided as Appendix F.

A key outcome of the design is the low velocity for outflow to the Helena River, with the 1% Annual Exceedance Probability (AEP) event having a velocity of only 0.48 m/s, well below the threshold of potential erosive velocities.

6. GROUNDWATER MANAGEMENT

Proposed earthworks levels for the site are required to consider a range of factors including clearance to groundwater, flood storage levels, on site wastewater disposal, and integration with the existing surrounding infrastructure and natural surface level in relation to the Helena River foreshore.

As shown on the site plan in Appendix A and engineering drawings in Appendix E, the proposed warehouse will have a finished floor level of 12.2 mAHD. This is estimated to provide a minimum clearance of 5m above the winter regional groundwater table.

Further monitoring during winter 2026 is considered beneficial to further refine groundwater levels and assess any perching above less permeable soils to inform engineering design.

Biofiltration areas will be designed consistent with the Adoption Guidelines for Stormwater Biofiltration Systems (CRC for Water Sensitive Cities, 2015). This area will typically consist of native ephemeral plantings above a 0.3-0.5m biofilter media layer with high PRI. Further detail as to the landscaping of drainage areas will be detailed in landscape drawings lodged separately to this SDWMR.

Table 1: Stormwater Management

Catchment		Stormwater Storage Area
Drainage Area (ha) 95%RO		0.14
Foreshore Area (ha) 0%RO		0.10
Grass (ha) 25%RO		0.28
Road (ha) 95%RO		0.92
Roofed Area (ha) 95%RO		1.44
Total Area (ha)		2.88
Equiv Imp Area (ha)		2.45
Storage Characteristics		
Site AAMGL (mAHD)		6.0-7.0
Invert (mAHD)		8.0
Batter Slopes (1:v)		1:3
Base Area (m ²)		242
Spillway Outlet Level to Overland Flowpath (mAHD)		9.2
Design Perm (m/d)		0.2
15mm Event		
Flood Depth (m)		0.98
Volume (m ³)		354
TWL Area (m ²)		498
10% AEP Event		
Flood Depth (m)		1.27
Volume (m ³)		507
TWL Area (m ²)		588
Critical Storm (hr)		3
Spillway Outflow (m ³ /s)		0.12
Outflow Velocity (m/s)		0.34
1% AEP Event		
Flood Depth (m)		1.31
Volume (m ³)		532
TWL Area (m ²)		601
Critical Storm (hr)		1
Spillway Outflow (m ³ /s)		0.28
Outflow Velocity (m/s)		0.48

7. IMPLEMENTATION PLAN

Roles and responsibilities for implementation are detailed in Table 2.

Construction of the stormwater system within the site will be the responsibility of the developer. Maintenance and management of stormwater infrastructure will be the responsibility of the lot owner and tenants.

Maintenance will include but not be limited to street sweeping to reduce particulate build up, removal of sediment and rubbish in manholes and removal of debris and vegetation build up within biofiltration storage areas to prevent stormwater blockages.

Table 2: Actions and Responsibilities

Action	Responsibility		
	Developer	City of Swan	Lot Owner / Tenant
Preparation of SDWMR (this document)	✓		
Review and Assessment of SDWMR		✓	
Construction of stormwater infrastructure within the site	✓		
Maintenance and management of stormwater infrastructure within site boundaries			✓

8. REFERENCES

- AECOM (2010). Hazelmere Enterprise Area District Water Management Strategy
- Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) (2016). Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia
- Bureau of Meteorology (2026), Climate Data Online (online, accessed May 2026)
- City of Swan (2002). Development Design Specification (D5): Stormwater Drainage Design, February 2002
- City of Swan (2026), Intramaps (online, accessed May 2026)
- CRC for Water Sensitive Cities (2015), Adoption Guidelines for Stormwater Biofiltration Systems

Department of Parks and Wildlife and Swan River Trust (2016), Corporate Policy Statement No. 49 Planning for Stormwater Management Affecting the Swan Canning Development Control Area

Department of Environment Regulation (2015a), Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes

Department of Environment Regulation (2015b), Treatment and Management of Soil and Water in Acid Sulfate Soils Landscapes

Department of Water and Environmental Regulation (2022), Stormwater Management Manual for Western Australia

Department of Water & Environmental Regulation (2026a), Water Register (online, accessed May 2026)

Department of Water & Environmental Regulation (2026b), Perth Groundwater Map (online, accessed May 2026)

Department of Water & Environmental Regulation (2026c), Water Information Reporting (online, accessed May 2026)

Department of Water (2011), Water Sensitive Urban Design, Biofilters

DWA (2014), Hazelmere Drainage Strategy, Master Catchment Plan Drawing C01 Rev A

Galt Geotechnics (2026), Due Diligence Geotechnical Study Proposed Warehouse Lot 821 to 823 Stirling Crescent Hazelmere Prepared for Hesperia Projects Pty Ltd, April 2026

Gozzard, J.R. (1986) Perth, Sheet 2034 II and part 2034 III and 2134 III, Perth Metropolitan Region 1:50,000 Environmental Geology Series, Geological Survey of Western Australia

Western Australian Planning Commission (2008). Better Urban Water Management. Government of Australia, October 2008

Western Australian Planning Commission (2025a), State Planning Policy 2.9 Water, December 2025

Western Australian Planning Commission (2025b), Planning for Water Guidelines for the implementation of State Planning Policy 2.9 Water, December 2025

Should you have any queries regarding this report, please do not hesitate to contact Sasha Martens or Sean O'Sullivan or of this office.

Yours sincerely,



Sasha Martens,

Principal Hydrologist

Attachments

Figure 1: Site Conditions Plan

Figure 2: Surface Water Plan

Figure 3: Groundwater Plan

Figure 4: Stormwater Management Plan

Appendix A: Site Plan

Appendix B: Site Survey

Appendix C: Geotechnical Report

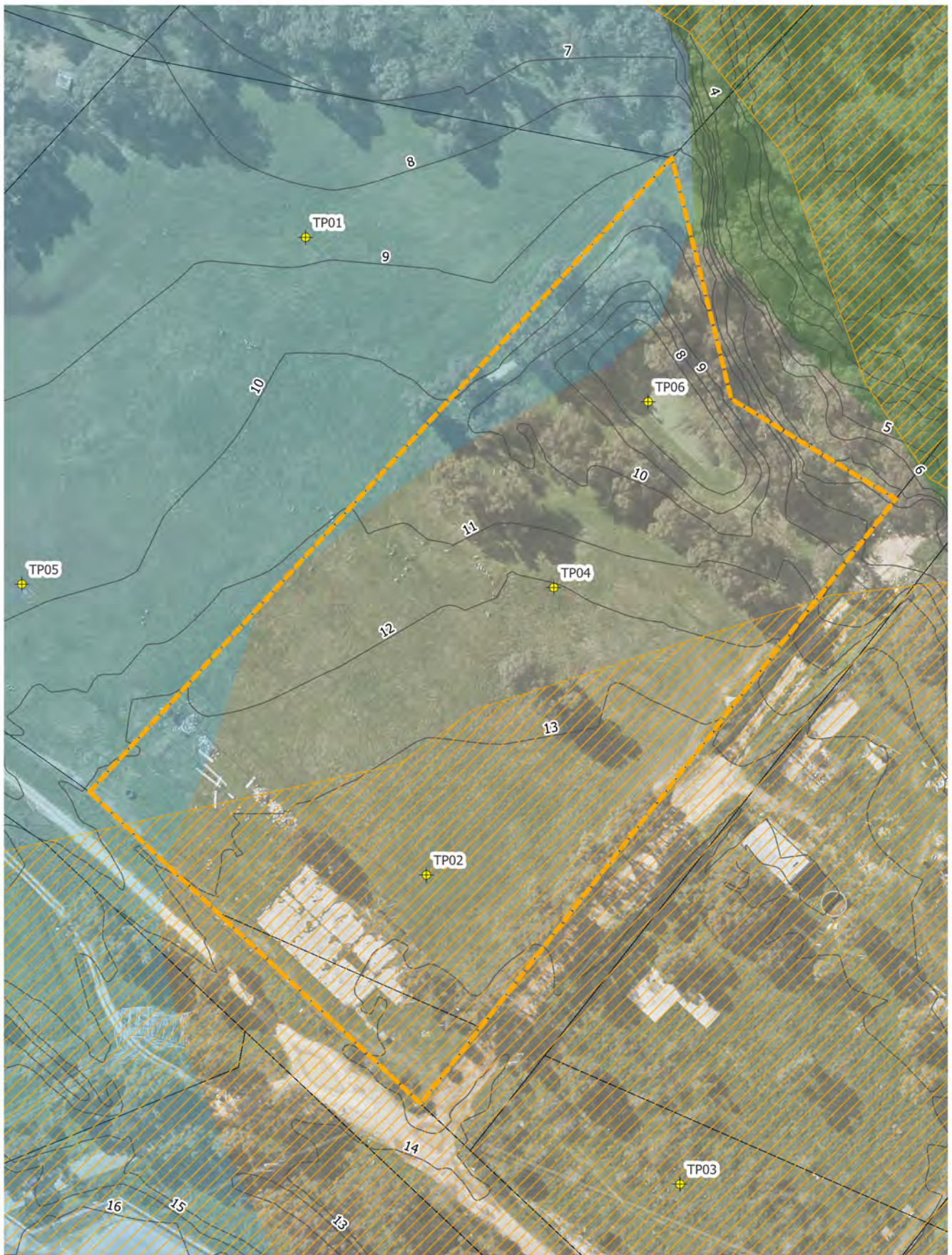
Appendix D: DWER Bore Hydrograph

Appendix E: Engineering Drawings

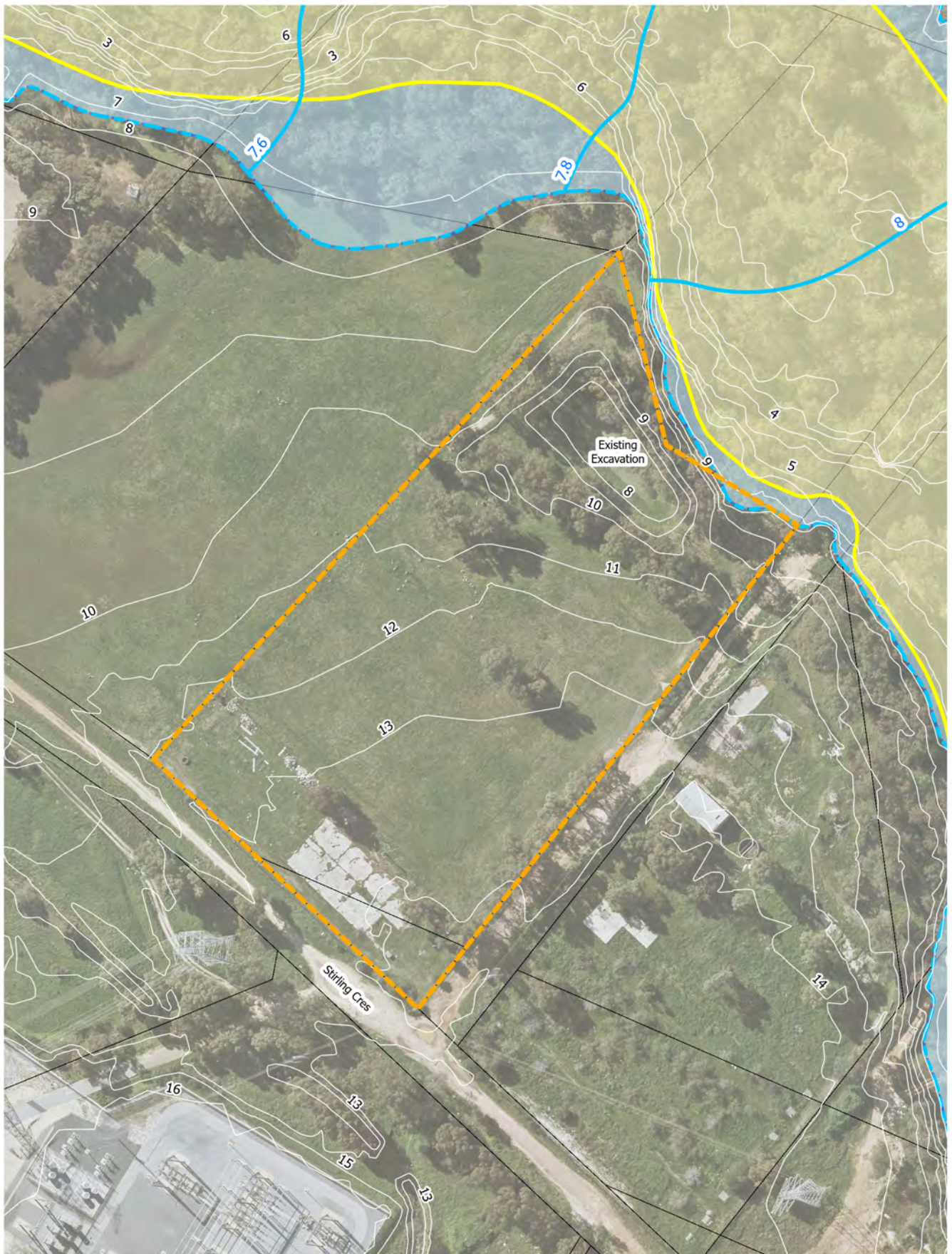
Appendix F: XP-Storm Stormwater Modelling

This document is published in accordance with and subject to an agreement between Hyd2o and the Client for whom it has been prepared, and is restricted to those issues that have been raised by the Client in its engagement of Hyd2o. It has been prepared using the skill and care ordinarily exercised by hydrologists in the preparation of such documents. Hyd2o recognise site conditions change and contain varying degrees of non-uniformity that cannot be fully defined by field investigation. Measurements and values obtained from sampling and testing in this document are indicative within a limited timeframe, and unless otherwise specified, should not be accepted as conditions on site beyond that timeframe. Any person or organisation that relies on or uses the document for purposes or reasons other than those agreed by Hyd2o and the Client does so entirely at their own risk. Hyd2o denies all liability in tort, contract or otherwise for any loss, damage or injury of any kind whatsoever (whether in negligence or otherwise) that may be suffered as a consequence of relying on this document for any purpose other than that agreed with the Client.

FIGURES



- | | |
|----------------------|-------------------------------|
| Site Boundary | High to moderate ASS risk |
| GALT Test Pits | Moderate to low ASS risk |
| DWER 1m LiDAR (mAHD) | Conservation Category Wetland |
| | Multiple Use Wetland |



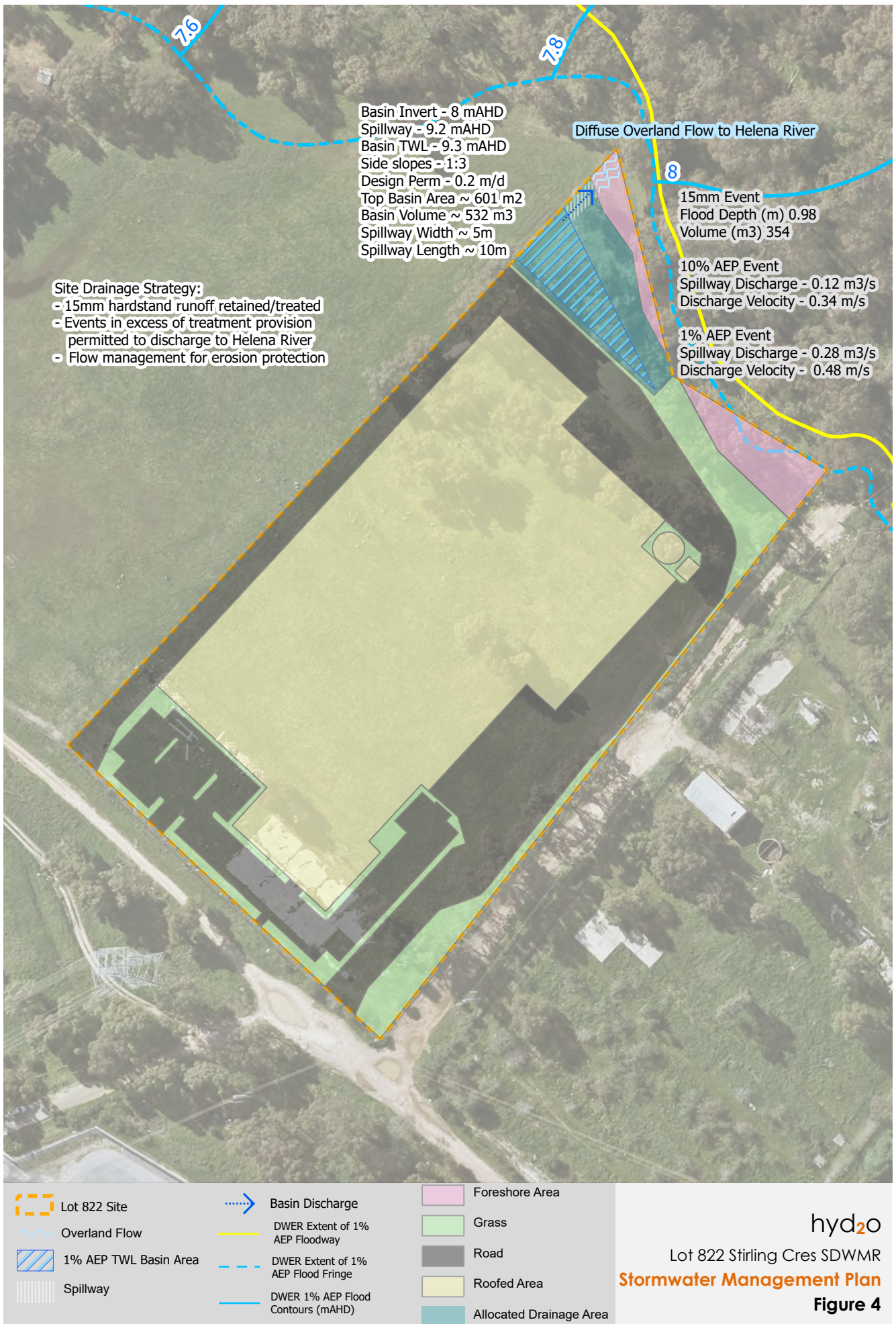
- | | | | | | |
|--|----------------------|--|------------------------------------|--|--------------|
| | Site Boundary | | DWER Extent of 1% AEP Floodway | | Floodway |
| | DWER 1m LiDAR (mAHD) | | DWER Extent of 1% AEP Flood Fringe | | Flood Fringe |
| | | | DWER 1% AEP Flood Contours (mAHD) | | |



 Site Boundary

 DWER 2019 Maximum Groundwater Contours (mAHD)

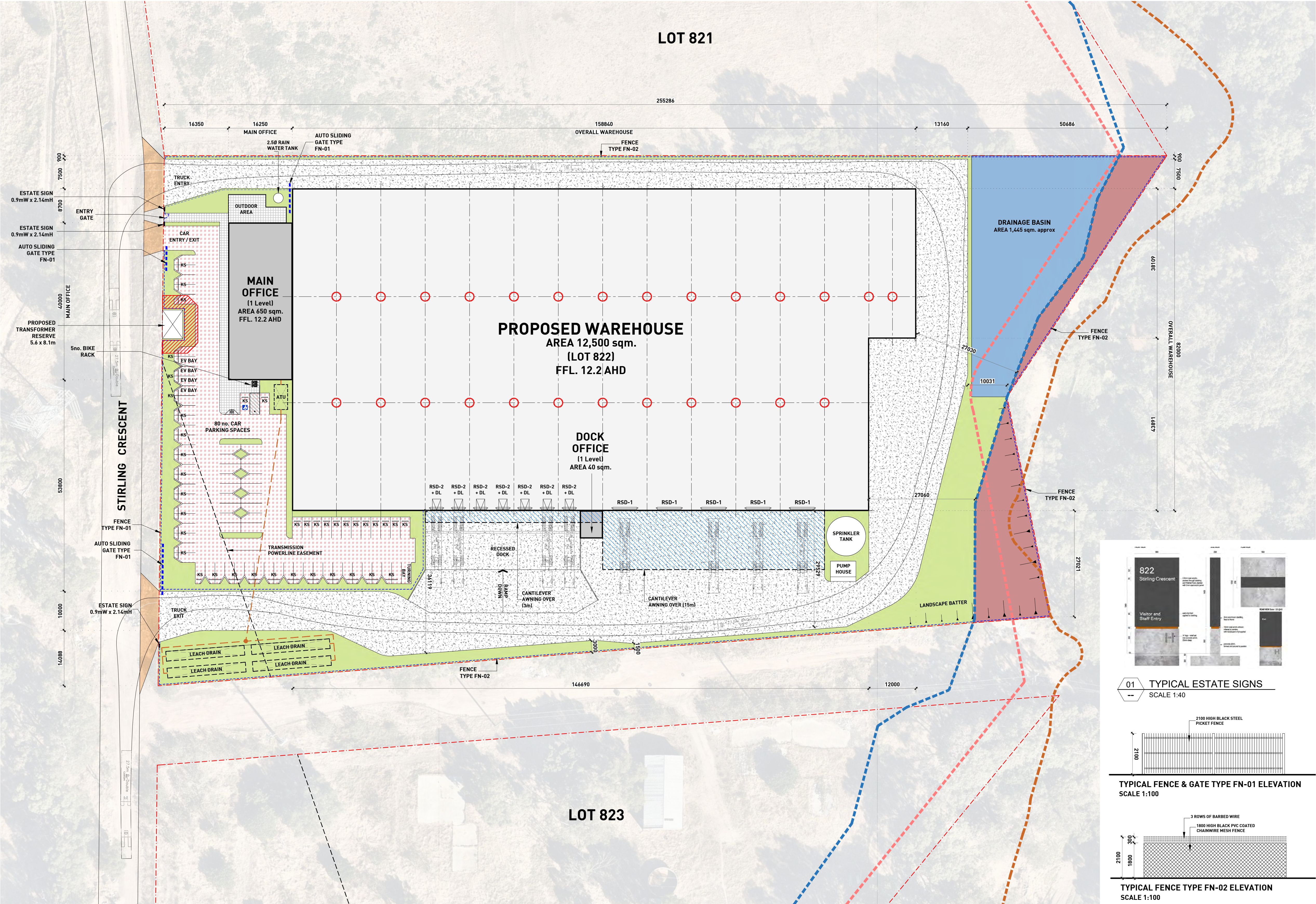
 DWER 1m LiDAR (mAHD)



hyd2o
 Lot 822 Stirling Cres SDWMR
Stormwater Management Plan
Figure 4

APPENDIX A

Site Plans



DEVELOPMENT SUMMARY

PROPOSED SITE AREA	28,837	sqm. approx.
Warehouse Area	12,500	sqm.
Main Office Area (1 Level)	650	sqm.
Dock Office Area (1 Level)	40	sqm.
TOTAL BUILDING AREA	13,190	sqm.
Total Heavy Duty Paving Area	7,620	sqm. approx.
Total Light Duty Paving Area	2,205	sqm. approx.
Total Landscape (incl. Drainage Basin Area & No works Area)	5,490	sqm. approx.
Total Warehouse Cantilever Awning Area	980	sqm. approx.
Total Car Parking Provided	80	spaces

- EXTENT OF HEAVY DUTY PAVING AREA
- EXTENT OF LIGHT DUTY PAVING AREA
- EXTENT OF LANDSCAPE
- EXTENT OF FORESHORE (NO WORKS)
- EXTENT OF DRAINAGE BASIN
- EXTENT OF WAREHOUSE AWNING AREA
- RSD-1 ROLLER SHUTTER DOOR 6mW x 6mH
- RSD-2 + DL ROLLER SHUTTER DOOR 3mW x 3.3mH WITH DOCK LEVELLER
- FORESHORE BOUNDARY (AECOM 2010)
- FLOOD PLAIN FRINGE
- DEVELOPMENT CONTROL AREA (DCA) BUFFER 10m
- INDICATIVE WAREHOUSE INTERNAL PORTAL PROP COLUMN LOCATION
- TREE PLANTING WELL AT 2.3m x 1.75m TO BE PROVIDED AT EVERY SECOND CAR PARKING BAY
- KS KERB STOP

LANDSCAPING
Landscaping to be in accordance with requirements of the relevant Statutory Authority. Refer to Landscape Consultant's drawings and specifications for full details.

LIGHTING
External lighting must be designed, baffled and located so as to prevent any adverse effect on adjoining land to the satisfaction of the relevant Statutory Authority. Building mounted flood lights to be provided within the car park area.

CAR PARKING
Car parking spaces to be 5400mm long x 2500mm wide (unless noted otherwise). Disabled car parking spaces to be 5400mm long x 2500mm wide, with a shared vacant space of equal size to one side of the allocated disabled space in accordance with A.S. 2890.6 (2009). All car parking bays to be line marked in 80mm wide white weatherproof paint in accordance with A.S. 2890.1 (2004).

VEHICLE CROSSINGS AND ACCESS
All new vehicle crossings shall be to the requirements of the relevant Statutory Authority.

PLANT & EQUIPMENT
All external plant and equipment to be screened or positioned to prevent unreasonable visual impact.

DISABILITY ACCESS
All building entrances are to be in accordance with A.S. 1428.1 (2009).

- NOTE:
- This concept plan is intended for Development Application purposes only. All setbacks, site coverage, car parking numbers, landscape areas and the like are subject to statutory approval.
 - No assurance is given as to the features, attributes, feasibility or accuracy of anything shown on or disclosed in this plan.
 - All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.

CLIENT:

HESPERIA

APPENDIX B

Site Survey



MNG Group Pty Ltd
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*THIS PLAN IS COMPILED FROM A VARIETY OF DATA SOURCES. REFER TO THE METADATA PANEL FOR FURTHER INFORMATION. THE CONTENTS OF THIS PLAN ARE CURRENT AND CORRECT AS OF THE DATE DRAWN. ALL PERSONS WISHING TO UTILISE THIS DATA SHOULD SATISFY THEMSELVES OF THE CURRENCY AND ACCURACY OF THE DATA SUPPLIED FROM THIRD PARTIES.



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Lots 821, 822 & 823 Stirling Crescent HAZELMERE

SCALE 1: 10,000 @ A1 - 1: 20,000 @ A3
200 0 800
ALL DISTANCES ARE IN METRES

SOURCE DATA	SOURCE	DATE	SCALE	EXPECTED ACCURACY*
AERIAL PHOTOGRAPHY	MNG	SEP 2021	7cm	±/-0.2m
CADASTRAL DATA	LANDGATE	JAN 2026	N/A	±/-0.2m
TOPOGRAPHY	MNG	SEP 2021	N/A	±/-0.05m
PROJECTION: PCG94				CONTOUR INTERVAL: 0.25/1m
DATE: 31/03/26	PROJECT MANAGER: MARK ROBOTHAM		DRAWN: DVP	CHECK: MR
FILE REF: IMAGERY SURVEY	107729-OPM-003-A			
	Job Number	Type	Plan Number	Version