

Final Report

East of Aberline PSP – Retarding Basin/Wetland Functional Designs and associated PSP flood modelling

Department of Transport and Planning

23 July 2026





Document Status

Version	Doc type	Reviewed by	Approved by	Date issued
01	Draft report	Aaron Vendargon	Aaron Vendargon	30 June 2026
02	Draft report	Gayani Chandrasena	Aaron Vendargon	14 July 2026
03	Final report	Aaron Vendargon	Aaron Vendargon	23 July 2026

Project Details

Project Name	East of Aberline PSP – Retarding Basin/Wetland Functional Designs and associated PSP flood modelling
Client	Department of Transport and Planning
Client Project Manager	Brianna Smillie
Water Technology Project Manager	Aaron Vendargon
Water Technology Project Director	Johanna Theilemann
Authors	Akshayaa Pasupathi, Gayani Chandrasena
Document Number	26010475_R02V03.docx



Department
of Transport
and Planning

COPYRIGHT

Water Technology Pty Ltd has produced this document in accordance with instructions from Department of Transport and Planning for their use only. The concepts and information contained in this document are the copyright of Water Technology Pty Ltd. Use or copying of this document in whole or in part without written permission of Water Technology Pty Ltd constitutes an infringement of copyright.

Water Technology Pty Ltd does not warrant this document is definitive nor free from error and does not accept liability for any loss caused, or arising from, reliance upon the information provided herein.

15 Business Park Drive
Notting Hill VIC 3168
Telephone (03) 8526 0800
ACN 093 377 283
ABN 60 093 377 283





ACKNOWLEDGEMENT OF COUNTRY

The Board and employees of Water Technology acknowledge and respect the Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of Country throughout Australia. We specifically acknowledge the Traditional Custodians of the land on which our offices reside and where we undertake our work.

We respect the knowledge, skills and lived experiences of Aboriginal and Torres Strait Islander Peoples, who we continue to learn from and collaborate with. We also extend our respect to all First Nations Peoples, their cultures and to their Elders, past and present.



Artwork by Maurice Goolagong 2023. This piece was commissioned by Water Technology and visualises the important connections we have to water, and the cultural significance of journeys taken by traditional custodians of our land to meeting places, where communities connect with each other around waterways.

The symbolism in the artwork includes:

- Seven circles representing each of the States and Territories in Australia where we do our work
- Blue dots between each circle representing the waterways that connect us
- The animals that rely on healthy waterways for their home
- Black and white dots representing all the different communities that we visit in our work
- Hands that are for the people we help on our journey



CONTENTS

1	INTRODUCTION	6
1.1	Scope	6
1.2	Locality and proposed masterplan	7
1.3	Key elements influencing the WLRB functional designs and proposed Russell Creek culverts	7
2	HYDROLOGICAL MODELLING	9
2.1	RORB modelling updates	9
2.2	Pre-development 1% AEP design flows	9
3	RETARDING BASIN DESIGN	10
3.1	Basin design	10
3.2	Basin performance (RORB results)	11
4	WETLAND DESIGN	13
4.1	Overview	13
4.2	Sediment ponds	13
4.2.1	Connection between sediment pond and macrophyte zone	13
4.2.2	Connection between sediment pond and wetland high flow bypass	14
4.3	Macrophyte zones	14
4.3.1	Extended detention controlled outlet	15
4.3.2	Overflow outlet	15
4.4	Stormwater pollutant removal performance (MUSIC modelling results)	16
4.5	Inundation frequency, residence time and velocity checks	16
5	RUSSELL CREEK PROPOSED CULVERTS	18
6	FLOOD MODELLING ASSESSMENT	20
6.1	Overview	20
6.2	Flood modelling updates	22
6.3	Flood model results	24
7	FLOODWAY OVERLAY AND LAND SUBJECT TO INUNDATION OVERLAY	37
8	WLRB RESERVE	1
8.1	Edge treatments	1
8.2	Maintenance access	1
8.3	Sediment drying area	1
8.4	WLRB reserve areas	1
9	SUMMARY AND CONSIDERATIONS FOR FURTHER WORK	2

APPENDICES

Appendix A RORB model updates

Appendix B MUSIC model changes

Appendix C Sediment Pond Outlet sizing



Appendix D Sediment Pond and Macrophyte Zone Velocity Checks
Appendix E Wetland Analysis Tool Reports
Appendix F 10% AEP and 20% AEP TUFLOW Result Plots
Appendix G WLRB Functional design plans

LIST OF FIGURES

Figure 1-1	Latest version of the PSP Place Based Plan (DTP, 2026)	8
Figure 5-1	Russell creek Proposed Culvert crossing	19
Figure 6-1	Downstream Gateway Rd catchment TUFLOW model setup	21
Figure 6-2	Localised fill areas downstream of Horne Road to keep these areas outside the 1% AEP 2100 floodplain	24
Figure 6-3	Upstream fill extent adopted in the model	26
Figure 6-4	1% AEP 2030 (SSP3-7.0) peak flood depth – Pre-development conditions	27
Figure 6-5	1% AEP 2030 (SSP3-7.0) peak flood depth – Developed conditions	28
Figure 6-6	1% AEP 2100 (SSP5-8.5) peak flood depth – Pre-development conditions	29
Figure 6-7	1% AEP 2100 (SSP5-8.5) peak flood depth – Developed conditions	30
Figure 6-8	1% AEP 2030 (SSP3-7.0) peak flood hazard – Pre-development conditions	31
Figure 6-9	1% AEP 2030 (SSP3-7.0) peak flood hazard – Developed conditions	32
Figure 6-10	1% AEP 2100 (SSP5-8.5) peak flood hazard – Pre-development conditions	33
Figure 6-11	1% AEP 2100 (SSP5-8.5) peak flood hazards – Developed conditions	34
Figure 6-12	1% AEP 2030 (SSP3-7.0) flood level difference plot	35
Figure 6-13	1% AEP 2100 (SSP5-8.5) flood level difference plot	36
Figure 7-1	Developed Conditions Flood Overlay and Land Subject to Inundation Overlay	38
Figure 9-1	Rainfall Comparison	3
Figure 9-2	Monthly PET Comparison	3
Figure 9-3	Monthly rainfall distribution with one year and 10 year modelling templates	4

LIST OF TABLES

Table 2.1	Pre-development 1% AEP flows	9
Table 3.1	Retarding basin functional design key details	11
Table 3.2	Retarding basin outfall functional design key details	11
Table 3.3	Retarding Basin performance in the 1% AEP (2030 SSP3-7.0)	12
Table 3.4	Retarding Basin performance in the 1% AEP Climate Change (2100 SSP5-8.5)	12
Table 3.5	Retarding Basin performance in the 10% AEP Climate Change (2100 SSP5-8.5)	12
Table 4.1	Sediment pond design key details	13
Table 4.2	Sediment pond transfer pit and pipe key details	14
Table 4.3	Sediment pond high flow bypass pit and pipe key details	14
Table 4.4	Wetland macrophyte zone design key details	15
Table 4.5	Wetland macrophyte zone side-winder penstock opening operational dimensions	15
Table 4.6	Wetland macrophyte overflow pit width	16
Table 4.7	Wetland pollutant removal performance	16
Table 4.8	Wetland inundation frequency, hydraulic residence time and velocity checks	17



Table 6.1	Selected storms for the hydraulic modelling	22
Table 6.2	Glenelg Hopkins CMA recommended flood planning risk criteria	24
Table 8.1	Updated WLRB reserve areas and previous SMEC WLRB reserve area	1
Table 9.1	RORB model validation results - pre-development Current Climate 1% AEP flows	5
Table 9.2	Percentage estimate of the 'residential roof area runoff' in each catchment	7



1 INTRODUCTION

1.1 Scope

Following on from the East of Aberline PSP Standing Advisory Committee hearing, the Department of Transport and Planning (DTP) have, in collaboration with Council and CMA, commenced an investigation into optimising the seven proposed PSP retarding basin/wetland (WLRB) assets and the six PSP Russell Creek culvert crossing sizes, accounting for the adoption of mandatory Roof Water Harvesting (RWH) in the PSP (following the panel's decision to adopt RWH in May 2026) and in consideration of developer feedback/proposals.

This report outlines the:

- Updated functional designs for the seven PSP WLRB assets, building off the latest PSP WLRB (with RWH) design work undertaken by SMEC¹.
 - The updated WLRB functional designs covered updated hydrological (RORB) modelling, updated water quality (MUSIC) modelling, updated hydraulic (TUFLOW) modelling and refinement of the WLRB functional designs.
 - The PSP drainage catchment breakup, general/broad locations of the seven WLRB assets, general WLRB inflow & outflow strategy, and the internal PSP catchment drainage, is unchanged from that designed by SMEC.
- Updated PSP flood/hydraulic modelling assessment, updated draft Floodway Overlay (FO) and Land Subject to Inundation Overlay (LSIO) derivation, and updated proposed Russell Creek culvert sizing assessment, building off the latest hydraulic modelling and creek culvert sizing undertaken by SMEC².

The following developer feedback has been considered in preparing the updated WLRB functional designs:

- Submission from Ingenia Communities³ on the excessive WLRB asset surface area and earthwork volumes shown in the '13 October 2025' Functional Design iteration, based on a check of WLRB D.
- Submission from Buildcap Aberline⁴ that consideration be given to move WLRB A further south, to the edge of the proposed Russell Creek 70m corridor, to help reduce asset batters and unused space between WLRB A and the creek corridor.
- Submission from Credence Group and Lotus Capital Investments⁵ that consideration be given to:
 - Relocate WLRB F closer to the edge of the proposed Russell Creek 70m corridor to optimise the assets earthworks and outfall pipe lengths.
 - Having two drainage outfall assets for Catchment F to help facilitate the upstream parcel developing independently.
 - Relocate WLRB G closer to the edge of the proposed Russell Creek 70m corridor and potentially lifting the base of the basin, to optimise the assets earthworks and outfall pipe lengths.

¹ East of Aberline Roof Water Harvesting Assessment memorandum (SMEC, 12 March 2026)

² Gateway Road Retarding Basin E Hydraulic Design Assessment technical memorandum (SMEC, 20 March 2026)

³ East of Aberline DCP - Preliminary DCP Review (Tomkinson, 13 March 2026)

⁴ Amendment C217warr to the Warrnambool Planning Scheme - East of Aberline Precinct Structure Plan - Drainage and Stormwater Expert Statement of Robert Swan (HARC, 16 March 2026)

⁵ Draft Amendment C217warr, East of Aberline Road Precinct Structure Plan – Hydrology Witness Report (Engeny, 16 March 2026).



The WLRB functional designs and proposed creek culvert crossing assessment has been based on LiDAR terrain data. Site investigations (geotechnical, survey, cultural heritage assessment etc.) are to be undertaken at a later design stage.

The updated WLRB functional design plans are provided in Appendix G.

1.2 Locality and proposed masterplan

The East of Aberline PSP is located north-east of the existing Warrnambool urban area. The precinct covers an area of ~410 ha, presently comprising largely undeveloped land. The latest version of the PSP Place Based Plan is shown in Figure 1-1.

Most of the PSP area drains towards Russell Creek, which runs centrally through the PSP area from east to west, except for the southwest corner that drains west towards Gateway Road.

1.3 Key elements influencing the WLRB functional designs and proposed Russell Creek culverts

The key existing and proposed site and PSP elements influencing the WLRB functional designs and the proposed Russell Creek culvert crossings include the:

- Site topography and property boundaries.
- Existing Horne Road and Aberline Road levels at the Russell Creek crossings.
- Proposed Horne Road and Aberline Road widening at the creek crossings.
- Proposed Gateway Road widening (along location of WLRB E) and Rodgers Road widening (along location of WLRB F).
- Proposed 70m riparian corridor along Russell Creek.
- Russell Creek alignment, cross section and invert levels.
 - The latest Russell Creek waterway modification concept design⁶ proposes for; revegetation along the 70m proposed creek riparian corridor, localised bank reprofiling, localised channel realignment, three small rock chutes and removal of fencing during development (with interim fencing established before development). No major creek realignment or major creek grade/level changes are proposed.
- Russell Creek floodplain:
 - Development works to ensure no worsening of flood conditions offsite for the 1% and 10% AEP flood events, including under the Year 2100 (SSP5-8.5) Climate Change case.
 - Proposed retarding basins to be outside the High to Extreme hazard⁷ areas of the 1% AEP Year 2100 Climate Change flood extent.
 - Proposed wetlands to be outside the 1% AEP Year 2100 Climate Change flood extent.
- Adoption of RWH for the PSP residential areas.
- Design of WLRB E to ensure no worsening of downstream flood risk in the 1% and 20% AEP events, as it's receiving system is an existing pipe network.

⁶ Russell Creek Waterway Modifications Design – Review and Update (Water Technology, June 2026)

⁷ Flood hazard classification based on Glenelg Hopkins CMA flood planning risk classification

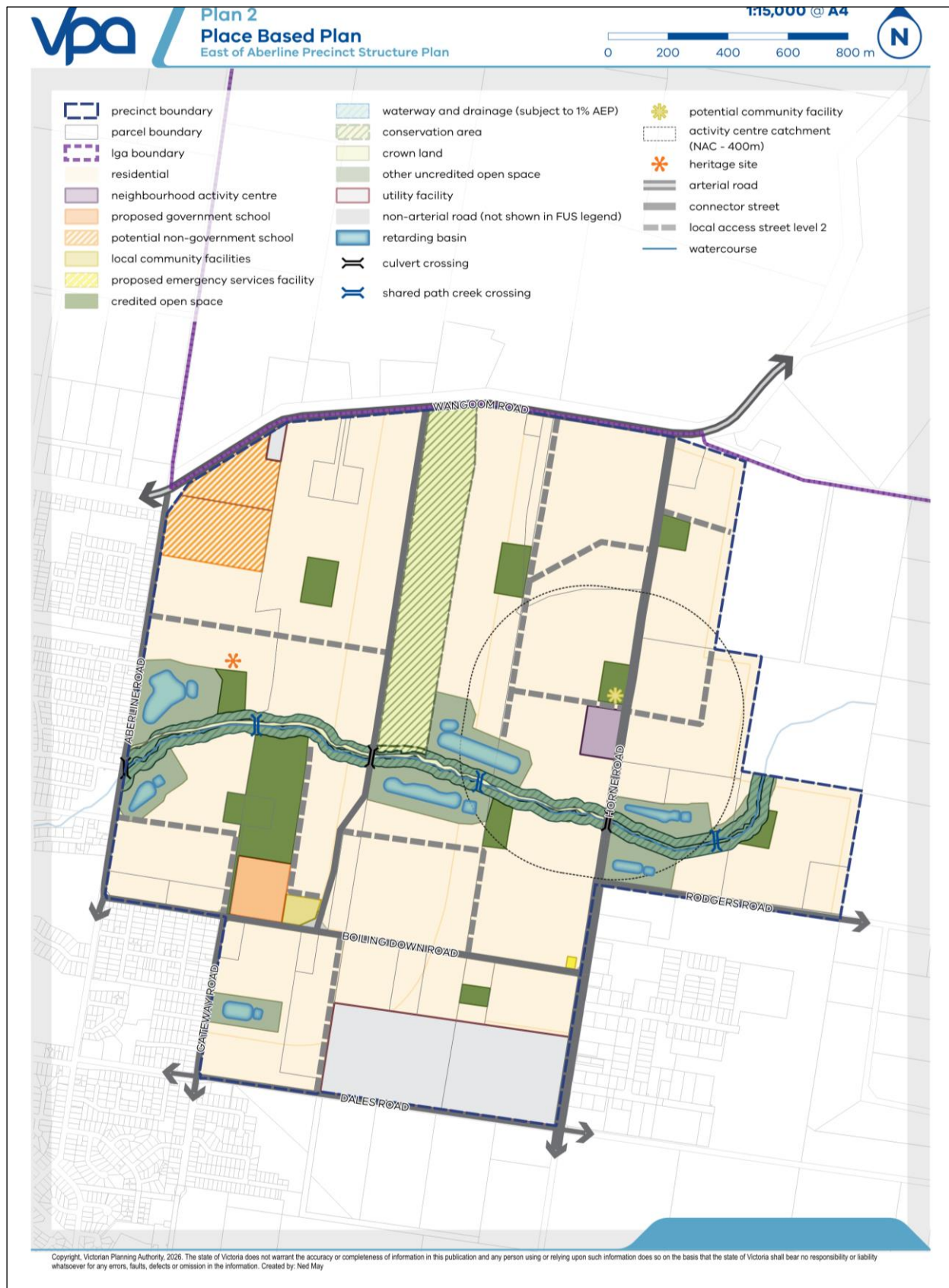


Figure 1-1 Latest version of the PSP Place Based Plan (DTP, 2026)



2 HYDROLOGICAL MODELLING

2.1 RORB modelling updates

The previous PSP pre-development and post-development RORB models were updated in line with the PSP RORB update recommendations from Incitus⁸, with the goal to better validate the modelled flows at the PSP's internal subcatchment outfalls and incorporate the latest best practice rainfall losses and pre-burst data. The PSP RORB models structure, inputs and validation updates are outlined in Appendix A.

The updated hydrological (RORB) modelling was undertaken:

- To reassess the pre and post development Year 2030 (SSP3-7.0) design flows and to resize the PSP retarding basins.
- For the Year 2100 (SSP5-8.5) Climate Change case, to assess retarding basin freeboard provisions, reassess design flows for the hydraulic modelling and assess downstream (Aberline Road) design flow changes.

2.2 Pre-development 1% AEP design flows

The updated pre-development 1% AEP base (Year 2030 SSP3-7.0) and 1% AEP Climate Change (Year 2100 SSP5-8.5) flows are presented in Table 2.1 at the respective outfalls.

Table 2.1 Pre-development 1% AEP flows

Location	Updated 1% AEP pre-development (2030 SSP3-7.0) peak flow	Updated 1% AEP pre-development Climate Change (2100 SSP5-8.5) peak flow
Catchment A outfall	4.8 m ³ /s (4.5 hrs)	8.1 m ³ /s (1.5 hrs)
Catchment B outfall	4.8 m ³ /s (2 hrs)	9.1 m ³ /s (1.5 hrs)
Catchment C outfall	2.1 m ³ /s (1.5 hrs)	3.9 m ³ /s (1.5 hrs)
Catchment D outfall	2.4 m ³ /s (1.5 hrs)	4.3 m ³ /s (1.5 hrs)
Catchment E outfall	3.8 m ³ /s (1.5 hrs)	6.9 m ³ /s (45 mins)
Catchment F outfall	2.0 m ³ /s (1.5 hrs)	3.7 m ³ /s (1.5 hrs)
Catchment G outfall	2.0 m ³ /s (1.5 hrs)	3.7 m ³ /s (1.5 hrs)
Aberline Road outfall	39.1 m ³ /s (9hrs)	53.5 m ³ /s (1.5 hrs)

⁸ East of Aberline PSP RORB Model Requirements (Incitus, April 2026)



3 RETARDING BASIN DESIGN

3.1 Basin design

The general/broad locations of the seven WLRB assets and the general/broad WLRB inflow & outflow strategy remain unchanged from that designed by SMEC.

The retarding basin sizing was initially undertaken in the hydrological (RORB) model package and then updated/finalised in the PSP's hydraulic (TUFLOW) model during this functional design stage.

The retarding basin update has been designed as follows:

- Sized to retard the 1% AEP 2030 (SSP3-7.0) post-development flow to be no higher than the corresponding (1% AEP 2030 SSP3-7.0) pre-development flow at the respective seven catchment outfalls and at the 'Aberline Road – Russell Creek' outfall.
 - WLRB E was also sized to retard peak flows under the 20% AEP 2030 (SSP3-7.0) flood event, given its receiving system is an existing pipe network.
- Sized to ensure the 10% AEP 2030 (SSP3-7.0) post-development flow is no higher than the corresponding (10% AEP 2030 SSP3-7.0) pre-development flow at the 'Aberline Road – Russell Creek' outfall.
- Sized to ensure that the 1% and 10% AEP Climate Change (2100 SSP5-8.5) post-development flows are no higher than the corresponding (1% and 10% AEP 2100 SSP5-8.5) pre-development flows at the 'Aberline Road – Russell Creek' outfall.
- Adoption of a minimum 300 mm freeboard above the 1% AEP 2030 (SSP3-7.0) flood level in the basin, to the basins spillway invert.
 - Nominal spillway width of 10m adopted (on assumption the proposed WLRB assets would have a Very Low ANCOLD Consequence Category rating). Given the WLRB assets low embankment heights (<3m) an ANCOLD Consequence Assessment can be undertaken at a later post PSP WLRB design phase.
- Adoption of a minimum 600 mm freeboard above the 1% AEP 2030 (SSP3-7.0) flood level in the basin, to the basins crest.
- Containment of the 1% AEP Climate Change (2100 SSP5-8.5) case within the basins 'minimum 600 mm freeboard'.

LiDAR terrain data has been utilised for the WLRB functional design. The key details of the updated retarding basins functional design are outlined in Table 3.1 and Table 3.2.



Table 3.1 Retarding basin functional design key details

Retarding basin asset ID	Base of the retarding basin (m AHD) ⁹	1% AEP ¹⁰ flood level (m AHD)	1% AEP ¹⁰ flood storage (m ³)	Spillway invert level (m AHD)	Embankment crest level (m AHD)	Embankment crest width (m)	Basin batter slopes
A	23.7	24.46	12,865	25.18	25.48	3	1 in 5
B	28.2	29.14	16,241	29.68	29.98	3	1 in 5
C	26.8	28.11	19,640	28.52	28.82	3	1 in 5
D	22.45	23.18	4,801	23.50	23.80	3	1 in 5
E	28.65	29.83	5,060	30.42	30.6	3	1 in 5
F	31.35	32.21	1,931	32.54	32.84	3	1 in 5
G	31.25	32.15	5,689	32.58	32.88	3	1 in 5

Table 3.2 Retarding basin outfall functional design key details

Retarding basin asset ID	RB outfall pipe size (m)	Number of pipes	Outfall US invert	Pipe grade (%)
A	0.9	3	22.5	1
B	0.75	3	27.06	0.9
C	0.525	3	25.98	0.6
D	0.525	3	21.62	0.8
E	0.6	2	27.75	2.2
F	0.6	3	30.45	0.7
G	0.525	3	30.43	1.3

3.2 Basin performance (RORB results)

The retarding basin peak flow performance in the 1% AEP and 1% AEP Climate Change case (along with peak flow performance in the 20% AEP and 20% AEP Climate Change case for retarding basin E) derived from the RORB modelling is presented in Table 3.3 and Table 3.4.

The 10% AEP Climate Change peak flows at the Aberline Road outfall are presented in Table 3.5.

The RORB modelling shows no increase in the peak post-development 1% AEP and 10% AEP flows at the Aberline Road outfall, under both the Year 2030 and the Year 2100 Climate Change Cases. The flood modelling assessment (refer Section 5) confirms that the 1% and 10% AEP flood risks immediately

⁹ Top Extended Detention Depth of the wetland macrophyte zone

¹⁰ 1% AEP Year 2030 SSP3-7.0



downstream of Aberline Road and downstream of WLRB E are not worsened with the proposed PSP development/works. At a post PSP design phase for Catchment E, further flood modelling should be undertaken to; review and update the stormwater drainage network assumptions adopted in the current PSP flood model for the local area downstream of Catchment E and to extend the PSP flood model past the downstream racecourse retention system, to better understand the downstream flood risks.

Table 3.3 Retarding Basin performance in the 1% AEP (2030 SSP3-7.0)

Asset/location	1% AEP pre-development flow (m ³ /s)	1% AEP post-development retarded flow (m ³ /s)
WLRB A	4.8	3.6
WLRB B	4.8	3.6
WLRB C	2.1	2.0
WLRB D	2.4	2.4
WLRB E ¹¹	3.8	2.0
WLRB F	2.0	2.0
WLRB G	2.0	1.7
Aberline Road outfall	39.1	37.5

Table 3.4 Retarding Basin performance in the 1% AEP Climate Change (2100 SSP5-8.5)

Asset/location	1% AEP pre-development flow (m ³ /s)	1% AEP post-development retarded flow (m ³ /s)
WLRB A	8.1	6.4
WLRB B	9.1	7.4
WLRB C	3.9	2.4
WLRB D	4.3	3.9
WLRB E ¹²	6.9	3.8
WLRB F	3.7	3.5
WLRB G	3.7	3.2
Aberline Road outfall	53.5	52.1

Table 3.5 Retarding Basin performance in the 10% AEP Climate Change (2100 SSP5-8.5)

Location	10% AEP pre-development flow (m ³ /s)	10% AEP post-development retarded flow (m ³ /s)
Aberline Road outfall	18.2	18.1

¹¹ WLRBE retards the 20% AEP (2030 SSP3-7.0) post-development flow at its outfall to 0.8 m³/s (below the 20% AEP (2030 SSP3-7.0) pre-development flow target of 0.95 m³/s.

¹² WLRBE retards the 20% AEP (2100 SSP5-8.5) post-development flow at its outfall to 1.3 m³/s (below the 20% AEP (2100 SSP5-8.5) pre-development flow target of 1.4 m³/s.



4 WETLAND DESIGN

4.1 Overview

As outlined above, the general/broad locations of the seven WLRB assets, and the general/broad WLRB inflow & outflow strategy remain unchanged from that designed by SMEC. Accordingly, each wetland retains the one sediment pond per wetland, and the general sediment pond location (relative to its contributing catchment) designed by SMEC is unchanged. A bypass pipe (sized for the 1EY minus the 'wetland design/treatment flow rate') is proposed around the wetlands macrophyte zone, as per SMEC's functional design.

The previous PSP MUSIC model's rainfall data, Potential Evapotranspiration (PET) data and soil parameters were updated following review. The models high flow bypass values were also updated to align with the latest RORB modelling. These MUSIC model changes are outlined in Appendix B.

4.2 Sediment ponds

The sediment pond has been sized using the; modified Fair and Geyer equation to determine the minimum surface area required to meet the settling velocity criteria for sediments (with a target of 95% removal rate for 125 µm particles), and a volume calculation to determine the accumulated sediment volume required within the sediment pond for a cleanout frequency of every 5 years. No changes were made to the preliminary sediment pond sizing determined during the revised WLRB concept design stage.

The minimum width across the sediment pond was determined to maintain velocity at ≤ 0.5 m/s during the 1% AEP event (Refer to Appendix D detailed calculations). The key sediment pond design parameters are outlined in Table 4.1.

Table 4.1 Sediment pond design key details

Sediment pond ID	Normal Water Level (m AHD)	Extended Detention Depth (m)	Sediment pond area at NWL (m ²)	Minimum sed basin width (m)	Required sediment accumulation volume for 5 year cleanout frequency (m ³)	Required sediment drying area (m ²)
A	23.45	0.35	1,800	20	970	1,940
B	27.95	0.35	1,908	22	980	1,960
C	26.55	0.35	1,707	23	740	1,480
D	22.2	0.35	1,028	20	360	720
E	28.4	0.35	911	20	360	720
F	31.1	0.35	903	20	230	460
G	31.0	0.35	1,019	20	330	660

4.2.1 Connection between sediment pond and macrophyte zone

The connection between the sediment pond and macrophyte zone is typically sized to transfer all flows up to the peak 4 EY event into the macrophyte zone. However, given the portion of catchment flows that are already diverted to the RWH scheme, the connection was sized based on optimisation of both treatment and hydraulic performance, including inundation frequency and hydraulic residence time, rather than the 4 EY flow criterion. Consequently, the hydraulic capacity of the connection is generally lower than the estimated peak 4 EY flow rate. In some instances, the minimum practical pipe diameter of 150 mm governed the connection capacity.



The sediment pond is proposed to be connected to the macrophyte zone via a transfer pit and pipe arrangement. The proposed sizing of transfer pits and pipes for each sediment pond are outlined in Table 4.2. Refer to Appendix C detailed calculations.

Table 4.2 Sediment pond transfer pit and pipe key details

Sediment pond ID	Design capacity (m ³ /s)	Transfer Pit Sill Level (m AHD)	Transfer Pit (Internal) Length x Width (m)	Transfer Pipe Upstream Invert (m AHD)	Transfer Pipe Diameter (mm)	No. of Pipes
A	0.06	23.45	0.9x0.9	22.725	225	1
B	0.06	27.95	0.9x0.9	27.05	300	1
C	0.03	26.55	0.9x0.9	25.825	225	1
D	0.011	22.2	0.9x0.9	21.55	150	1
E	0.011	28.4	0.9x0.9	27.75	150	1
F	0.011	31.1	0.9x0.9	30.45	150	1
G	0.011	31.0	0.9x0.9	30.35	150	1

4.2.2 Connection between sediment pond and wetland high flow bypass

The connection between the sediment pond and wetland high flow bypass is sized to convey the gap flow up to the peak 1 EY flow (i.e. the 1EY minus the 'wetland design/treatment flow rate') from the sediment pond into the bypass pipe around the wetland macrophyte zone when the water level in the macrophyte zone is at the TEDD. An overflow pit and pipe arrangement is proposed for sediment pond high flow bypass. The proposed sizing of high flow bypass pits and pipes are outlined in Table 4.3. Refer to Appendix C for the calculation details.

Table 4.3 Sediment pond high flow bypass pit and pipe key details

Sediment pond ID	Design capacity (m ³ /s)*	Bypass Pit Sill Level (m AHD)	Bypass Pit Length x Width (m)	Bypass Pipe Upstream Invert (m AHD)	Bypass Pipe Diameter (mm)	No. of Pipes
A	1.14	23.8	3.2x1.8	23.075	525	4
B	1.74	28.3	3.2x2.4	27.5	600	4
C	1.07	26.9	3.2x1.5	26.275	525	4
D	0.49	22.55	1.2x1	21.925	525	2
E	0.49	28.75	1.2x1.2	28.2	450	2
F	0.39	31.45	0.9x0.9	30.975	375	2
G	0.49	31.35	0.9x0.9	30.875	375	3

*taken as the difference between 1 EY peak flow rate and macrophyte zone connection design capacity (Table 4.2)

4.3 Macrophyte zones

The wetlands were sized to meet the current best practice performance objectives for stormwater quality as contained in the Urban stormwater management guidance (Environment Protection Authority - Publication



1739.1, 2021). Additionally, the minimum width across the macrophyte zone was determined to maintain velocity ≤ 0.05 m/s during the 4 EY event (Refer to Appendix D detailed calculations). No changes were made to the wetland macrophyte zone key details determined during the revised WLRB concept design stage, as outlined in Table 4.4.

Table 4.4 Wetland macrophyte zone design key details

Wetland/macrophyte zone ID	Normal Water Level (m AHD)	Extended Detention Depth (m)	Wetland area at NWL (m ²)	Minimum width at NWL (m)
A	23.35	0.35	10,075	28
B	27.85	0.35	9,800	42
C	26.45	0.35	7,250	26
D	22.1	0.35	2,880	20
E	28.3	0.35	2,900	20
F	31.0	0.35	1,650	20
G	30.9	0.35	2,700	20

4.3.1 Extended detention controlled outlet

The macrophyte zone extended detention controlled outlet is designed to achieve stormwater quality targets while maintaining the wetland water level and hydraulic residence time at acceptable range. A twin chamber outfall pit with a side-winder penstock weir is proposed as the extended detention controlled outlet. Proposed operational opening width of the side-winder penstock weir for each wetland is outlined in Table 4.5.

Table 4.5 Wetland macrophyte zone side-winder penstock opening operational dimensions

Wetland/macrophyte zone ID	Weir Opening Width (mm)
A	230
B	210
C	130
D	60
E	60
F	40
G	50

4.3.2 Overflow outlet

The macrophyte zone overflows are controlled by the retarding basin outlet. Refer to section 3.1 for details of the retarding basin outlet pipe details. The assumed minimum overflow pit width for each wetland is summarised in Table 4.6.



Table 4.6 Wetland macrophyte overflow pit width

Wetland/macrophyte zone ID	Overflow Pit Width (m)
A	3.3
B	4.5
C	2.2
D	3
E	4
F	3.2
G	2.2

4.4 Stormwater pollutant removal performance (MUSIC modelling results)

Table 4.7 summarises the pollutant removal performance at each subcatchment/wetland outfall. Pollutant removal performance was assessed based on the stormwater runoff entering the wetland system, excluding the runoff diverted to the RWH scheme. It is evident that stormwater quality targets are met at each wetland outfall.

Table 4.7 Wetland pollutant removal performance

Pollutant	Target Reduction (%)	Wetland Percentage Reduction						
		A	B	C	D	E	F	G
Total Suspended Solids (TSS)	80	82	82	82	86	84	89	85
Total Phosphorus (TP)	45	69	69	68	71	70	74	70
Total Nitrogen (TN)	45	47	47	46	49	48	52	48
Gross Pollutants (GP)	70	100	100	100	100	100	100	100

4.5 Inundation frequency, residence time and velocity checks

The wetland systems inundation frequency, hydraulic residence time (HRT) and velocity checks are summarised in Table 4.8. The recommended velocity thresholds are achieved within both the sediment pond and macrophyte zone for all wetlands.

The effective normal water level (eNWL), defined as the water level exceeded 50% of the time, is outside the current recommended criterion of ± 50 mm from the design normal water level (NWL). However, the predicted eNWL remains consistent with the water levels adopted in the previous SMEC wetland functional design (March 2026).

The 90th percentile HRT is generally 2 days across the wetland systems, except for WLRB C, which achieves an HRT of 3 days. Although the recommended design target is 3 days, an HRT of approximately 2 days is considered sufficient to achieve the required pollutant load reduction performance. Maintaining appropriate



wetland water levels to support vegetation health was considered the higher design priority, and therefore the design favoured achieving suitable inundation conditions over increasing HRT. Furthermore, the 72 hour residence time exceedance percentage for all seven wetlands (while not being at 90%) was found to be close, i.e. at a >80% exceedance, providing more confidence in the wetland assets treatment.

Table 4.8 Wetland inundation frequency, hydraulic residence time and velocity checks

Wetland ID	Sediment Pond Maximum 1% AEP Velocity (m/s)	Macrophyte Zone Maximum 4 EY Velocity (m/s)	Macrophyte Zone Maximum 1% AEP Velocity (m/s)	eNWL (50 th percentile water level above NWL) (mm)	90% exceedance HRT (days)	3 day HRT exceedance percentage
A	0.5	0.049	0.23	63	2	84%
B	0.49	0.049	0.25	67	2	86%
C	0.5	0.048	0.44	80	3	90%
D	0.49	0.047	0.45	84	2	81%
E	0.31	0.049	0.38	81	2	88%
F	0.49	0.025	0.49	86	2	81%
G	0.49	0.038	0.49	91	2	88%



5 RUSSELL CREEK PROPOSED CULVERTS

The updated sizing for the six proposed creek crossings (four new crossings and two existing crossings at Aberline Road and Horne Road) is shown in Figure 5-1. The type of crossing (bridge, culvert, boardwalks for the shared path crossings, etc) and the shared path crossings flood immunity level is to be developed and finalised post PSP to the satisfaction of the responsible authority and GHCA.

The creek culvert crossing sizes have reduced compared to the previous SMEC sizing, apart from the sizing of Culvert 4 which is unchanged.

A culvert upgrade is not required at Horne Road, as the updated flood modelling (outlined in section 5 below), showed that under post-development conditions, the existing Horne Road crossing is not overtopped in a 1% AEP 2030 flood event and remains safe under the 1% AEP 2100 SSP5-8.5 flood case.

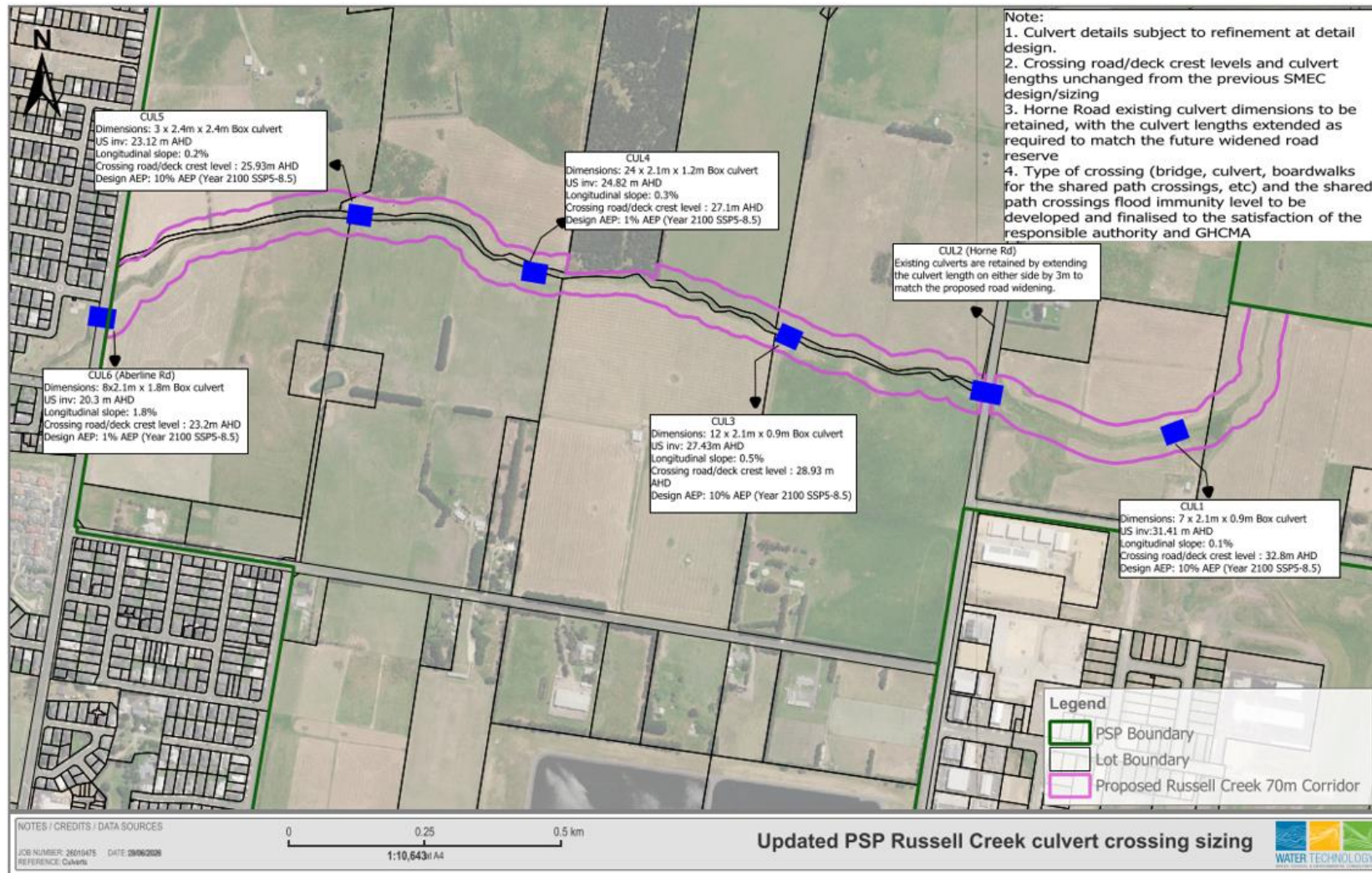


Figure 5-1 Russell creek Proposed Culvert crossing



6 FLOOD MODELLING ASSESSMENT

6.1 Overview

The hydraulic (TUFLOW) model for this assessment was established using the previous PSP TUFLOW modelling by SMEC.

The following scenarios have been modelled for this assessment:

- Base Climate (Year 2030 SSP3-7.0)
 - 1% AEP – Pre-development conditions
 - 1% AEP – Developed conditions
 - 10% AEP – Pre-development conditions
 - 10% AEP – Developed conditions
 - 20% AEP – Pre-development conditions
 - 20% AEP – Developed conditions
- Climate Change (Year 2100 SSP5-8.5)
 - 1% AEP Climate Change – Pre-development conditions
 - 1% AEP Climate Change – Developed conditions
 - 10% AEP Climate Change – Pre-development conditions
 - 10% AEP Climate Change – Developed conditions
 - 20% AEP Climate Change – Pre-development conditions
 - 20% AEP Climate Change – Developed conditions

The modelled Developed Conditions excludes the proposed Russell Creek waterway modification works (summarised in section 1.3). The proposed Russell Creek waterway works have been excluded from the hydraulic model at this stage, as no major creek realignment or creek grade/level changes are proposed and as these waterway works are expected to be designed to ensure no adverse flood impacts.

Figure 6-1 presents the TUFLOW model extent/schematisation for the Gateway Road catchment area located immediately downstream of PSP Catchment E. The assumptions and setup of the downstream modelled drainage network in this catchment are unchanged from that adopted by SMEC. At the downstream model extent in this catchment (near the corner of Aberline Road and Timms Cres) a fixed pipe/pit tailwater boundary was applied at the downstream most modelled pit (refer Figure 6-1), with the tailwater level in this pit set close to the ground surface level at this location under all modelled events/scenarios, in order to represent drowned conditions at the modelled downstream end of this pipe network.

At a post PSP design phase for Catchment E, further flood modelling should be undertaken to; review and update the stormwater drainage network assumptions adopted in the current PSP flood model for the local area downstream of Catchment E and to extend the PSP flood model past the downstream racecourse retention system, to better understand the downstream flood risks.

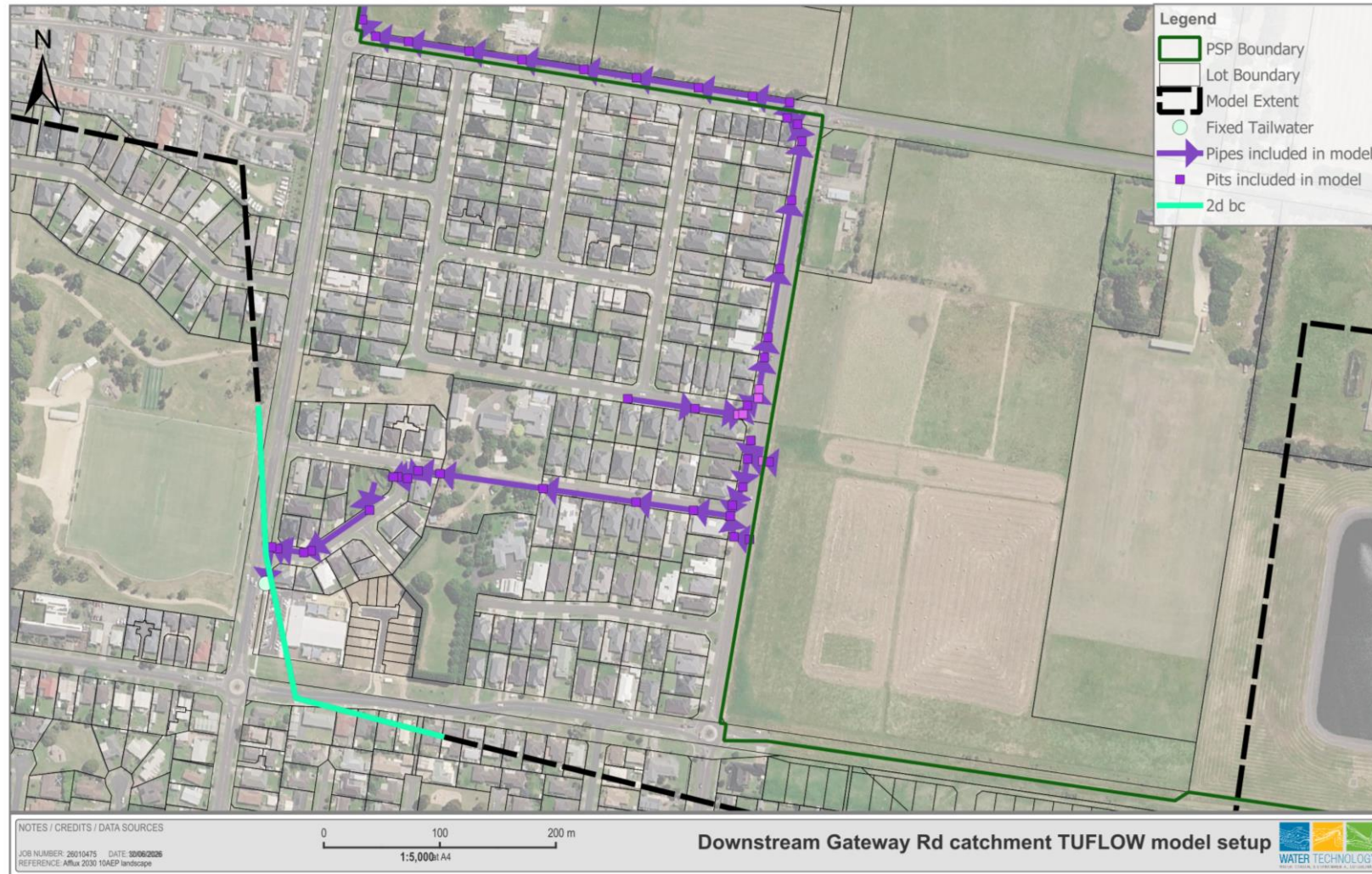


Figure 6-1 Downstream Gateway Rd catchment TUFLOW model setup



6.2 Flood modelling updates

The critical storm durations and temporal patterns selected for the flood modelling, for each event, (determined from the updated RORB modelling) is shown in Table 6.1.

Table 6.1 Selected storms for the hydraulic modelling

Event	Storms
1% AEP 2030 (SSP3-7.0)	1.5 hrs TP28 1.5 hrs TP30 2 hrs TP22 4.5 hrs TP27 9 hrs TP27
1% AEP 2100 (SSP5-8.5)	1.5 hrs TP22 1.5hrs TP27 1.5hrs TP30 45mins TP17
10% AEP 2030 (SSP3-7.0)	45mins TP15 1.5 hrs TP13 1.5 hrs TP18 3 hrs TP15 4.5 hrs TP18 6 hrs TP16
10% AEP 2100 (SSP5-8.5)	45mins TP25 1 hrs TP21 1 hrs TP25 1.5 hrs TP23 1.5 hrs TP25
20% AEP 2030 (SSP3-7.0)	1.5 hrs TP05 1.5 hrs TP10 4.5 hrs TP02 4.5 hrs TP07
20% AEP 2100 (SSP5-8.5)	45mins TP05 1 hrs TP06 1.5 hrs TP06 1.5 hrs TP01

The pre-development flood model was unchanged from SMEC's model, except for the following updates:

- The design hydrographs for the model's inflow boundaries were derived from the latest RORB modelling.
- The culverts at Horne Road, Aberline Road and Whites Road were modelled as 1D elements (switched from a layered flow constriction approach) to provide a better visual representation of the flood grid results at these crossings.

To represent Developed Conditions, the Existing Conditions TUFLOW model was modified as follows:

- Illegal fill east of Horne Road removed.



- The timing/requirement to remove this illegal fill is expected to be triggered by an enforcement order or during the development permit application phase (either for development across the parcels this fill lies in or if its removal is required to facilitate development of surrounding parcels).
- The existing Horne Road culvert lengths were extended by 3m on both the upstream and downstream side, to reflect potential culvert works to facilitate future road widening at this crossing.
- The sizing/details of the four new Russell Creek crossings (i.e. the new culvert dimensions, culvert inverts and indicative culvert pools) was updated, based on the updated design flows and corresponding updated hydraulic modelling assessment. The crossing road/deck crest levels and culvert lengths at these new crossings were unchanged from SMEC's modelling.
- The culvert dimensions for the proposed upgraded Aberline Road crossing was updated, based on the updated design flows and corresponding updated hydraulic modelling assessment. The proposed new Aberline Road crossing deck crest level, culvert inverts and culvert lengths was unchanged from SMEC's modelling.
- To represent the latest WLRB functional designs:
 - The seven WLRB assets Functional Design terrain was included in the model.
 - The WLRB inflow hydrographs (derived from the latest RORB modelling) were positioned inside the corresponding WLRB assets.
 - The retarding basin outfall pipe/pit structures were included and sized/refined in the hydraulic model.
 - Initial Water Levels (IWL) were set in all basins as follows:
 - IWL set at the respective wetland macrophyte zone Top Extended Detention Levels in WLRB A, B, C, D, F and G.
 - For WLRB E, the IWL was set at the wetland macrophyte zone's Top Extended Detention Level for the 1% AEP event, and the IWL was set at the wetland macrophyte zone Normal Water Level for the 10% and 20% AEP events. The wetland control outlet for WLRB E was also included in the model for the 10% and 20% AEP model runs.
 - Roughness values included for the seven WLRB assets, set to 0.035 (adopting the same WLRB roughness adopted by SMEC).
- The development precinct/lot filling upstream of Horne Road (to facilitate the proposed development in this location meeting flood risk/freeboard requirements) was retained in this Developed Conditions flood modelling, as it was still required based on the updated Existing Conditions 1% AEP 2100 flood modelling results, however the extent of this precinct/lot filling was refined as follows:
 - The upstream fill extent was refined to facilitate development of the proposed urban areas outside the latest proposed 70 m Russell Creek corridor, while not increasing 1% and 10% AEP flood levels offsite.
 - Fill extent adjusted along the creek and WLRB interface, to line up with the latest proposed 70m Russell Creek corridor line and the latest WLRB functional designs.
- Downstream of Horne Road, localised fill areas were included adjacent to the proposed 70m Russell Creek corridor line, as shown Figure 6-2, to facilitate these areas being outside the 1% AEP 2100 floodplain post-development.
- At the very upstream end of the PSP, an existing small creek crossing is proposed to be removed as part of this updated proposed PSP floodplain strategy.
 - The timing/requirement to remove this existing crossing is expected to be triggered during the development permit application phase, either for development across the parcel this existing crossing lies in or if its removal is required to facilitate development of surrounding parcels.

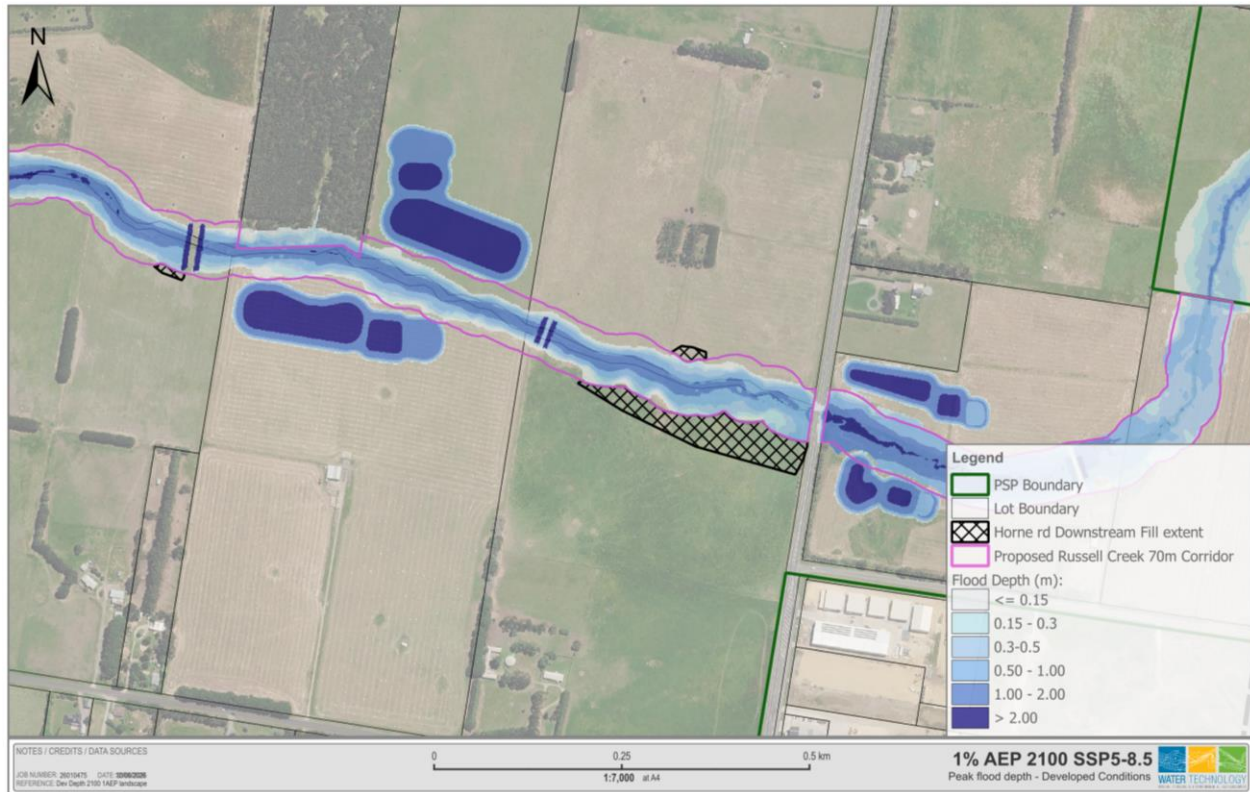


Figure 6-2 Localised fill areas downstream of Horne Road to keep these areas outside the 1% AEP 2100 floodplain

6.3 Flood model results

The result grids from the modelled individual storms (per event) were enveloped to create the flood grids and mapping for the assessment. The modelled 1% AEP 2030 and 1% AEP 2100 flood depths, flood hazards and flood level difference plots are shown in Figure 6-4 to Figure 6-13. The 10% and 20% AEP (2030 and 2100) flood depth and flood level difference plots are shown in Appendix F.

The classification used in the flood hazard maps is based on the Glenelg Hopkins CMA recommended flood planning risk criteria shown in Table 6.2.

Table 6.2 Glenelg Hopkins CMA recommended flood planning risk criteria

Thresholds	Low	Moderate	High	Very High	Extreme
Depth (m)	0.15	0.3	0.5	1.2	No threshold limit
Velocity (m/s)	1.5	2	2	2	No threshold limit
Velocity x Depth (m ² /s)	0.225	0.3	0.6	0.6	No threshold limit

This flood modelling has shown that:

- There are no offsite flood level increases under the 1% AEP and 10% AEP (2030 and 2100) flood events, except for:
 - Flood level increases along a section of Aberline Road. The flood level increases along this section of Aberline Road are due to the proposed raising of this road section. This is deemed acceptable as



the flood hazards over this stretch of Aberline Road are reduced under post-development conditions, and the higher 1% AEP 2100 flood levels along this raised road section do not adversely affect flood risk in the downstream reserve or flood freeboard requirements at the surrounding dwellings.

- A minor localised afflux within the reserve immediately downstream of the Aberline Road culvert crossing. This increase is confined to the reserve area and is considered acceptable as it does not increase flood hazards in the reserve, and does not impact flood freeboard requirements at the surrounding dwellings.
- Under Developed conditions, the WLRB assets together with the proposed Aberline Road crossing upgrades/works results in notable reductions in 1% AEP (2030 and 2100) flood levels; Properties at Lots 129–143 Whites Road experience flood level reductions of approximately 60–165 mm at both the front and rear of the lots under both the 2030 and 2100 1% AEP flood events.
- Regarding flood risks in the downstream Gateway Road catchment in the Minor 20% AEP (2030 and 2100) flood events, there are no increases in flood levels or flood hazards downstream of Catchment E post-development in this modelling.
 - It is noted that at a post PSP design phase for Catchment E, further flood modelling should be undertaken to review and update the downstream local/stormwater drainage network assumptions and extend the PSP flood model past the downstream racecourse retention system, to better understand the downstream flood risks.
- The respective proposed new and upgraded Russell Creek crossings have been sized to provide either a 1% AEP or 10% AEP flood immunity, in line with the previous SMEC culvert crossing design, except for the Horne Road crossing.
 - Under Developed Conditions, the existing Horne Road crossing is not overtopped during a 1% AEP 2030 flood event and remains safe under the 1% AEP 2100 (SSP5-8.5) flood case. As such, a culvert upgrade at this crossing and/or raising of Horne Road levels at this crossing was not required.
- There are localised areas at the upstream end of the PSP boundary, that are not proposed reserves or existing reserves, where the creek's post-development 1% AEP (2100 SSP5-8.5) floodplain extent is larger than the latest proposed 70m creek corridor line. The previous SMEC modelled precinct/lot fill extent at this upstream PSP area was refined/reduced, to remove offsite 1% and 10% AEP flood level increases.
 - At this upstream end of the PSP, areas outside the proposed fill extent along the creek corridor should be retained as part of the floodplain to avoid offsite flood impacts (as shown in Figure 6-3). While there are proposed abutting shared path sections in these areas (which could be located in the floodplain extent), sections of this future shared path alignment would need to be set outside the floodplain extent based on the modelled Russell Creek 10% AEP flood extents (in line with Council's requirements for shared paths in the floodplain).
- The proposed WLRB assets are all outside the High to Extreme hazard areas of the Russell Creek 1% AEP Year 2100 flood extent.
- The proposed wetlands are all outside the Russell Creek 1% AEP Year 2100 flood extent.

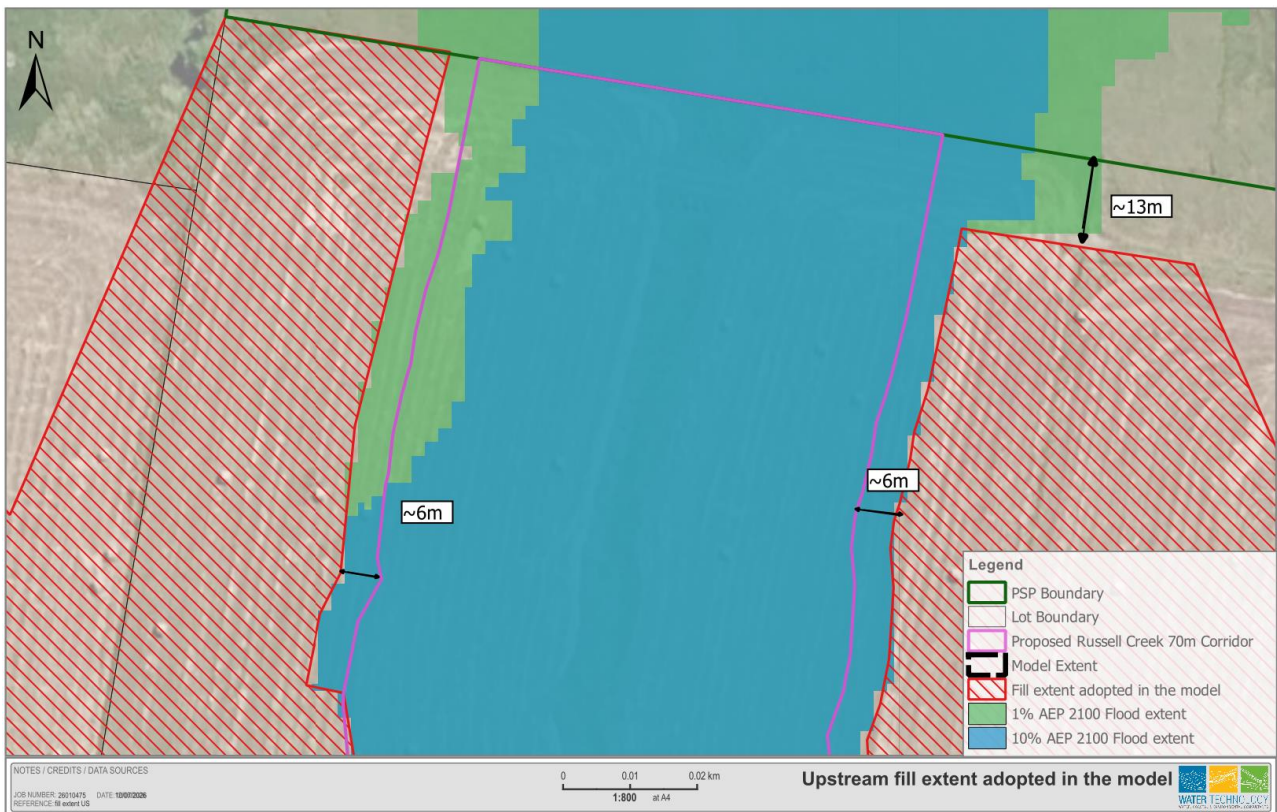


Figure 6-3 Upstream fill extent adopted in the model

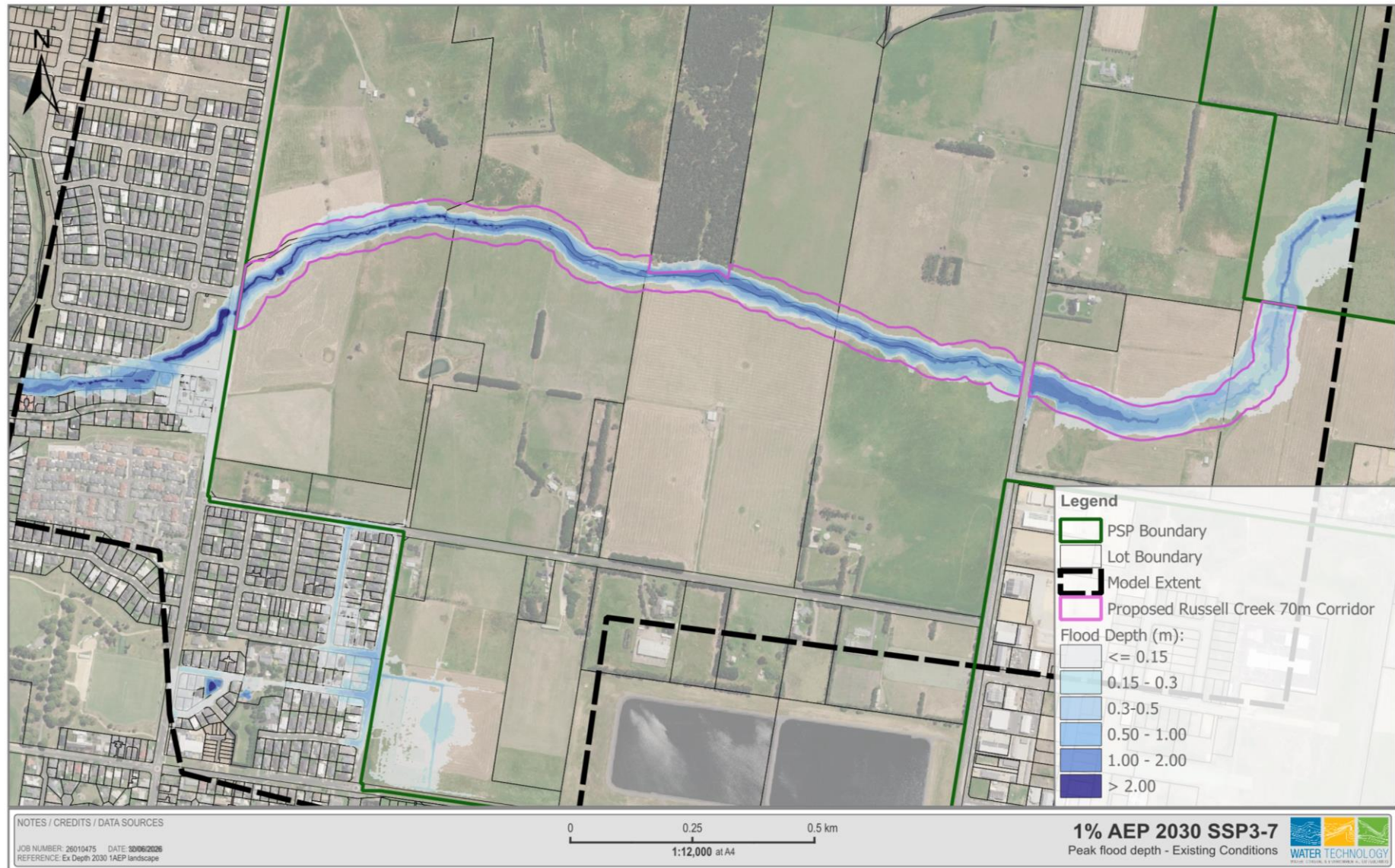


Figure 6-4 1% AEP 2030 (SSP3-7.0) peak flood depth – Pre-development conditions

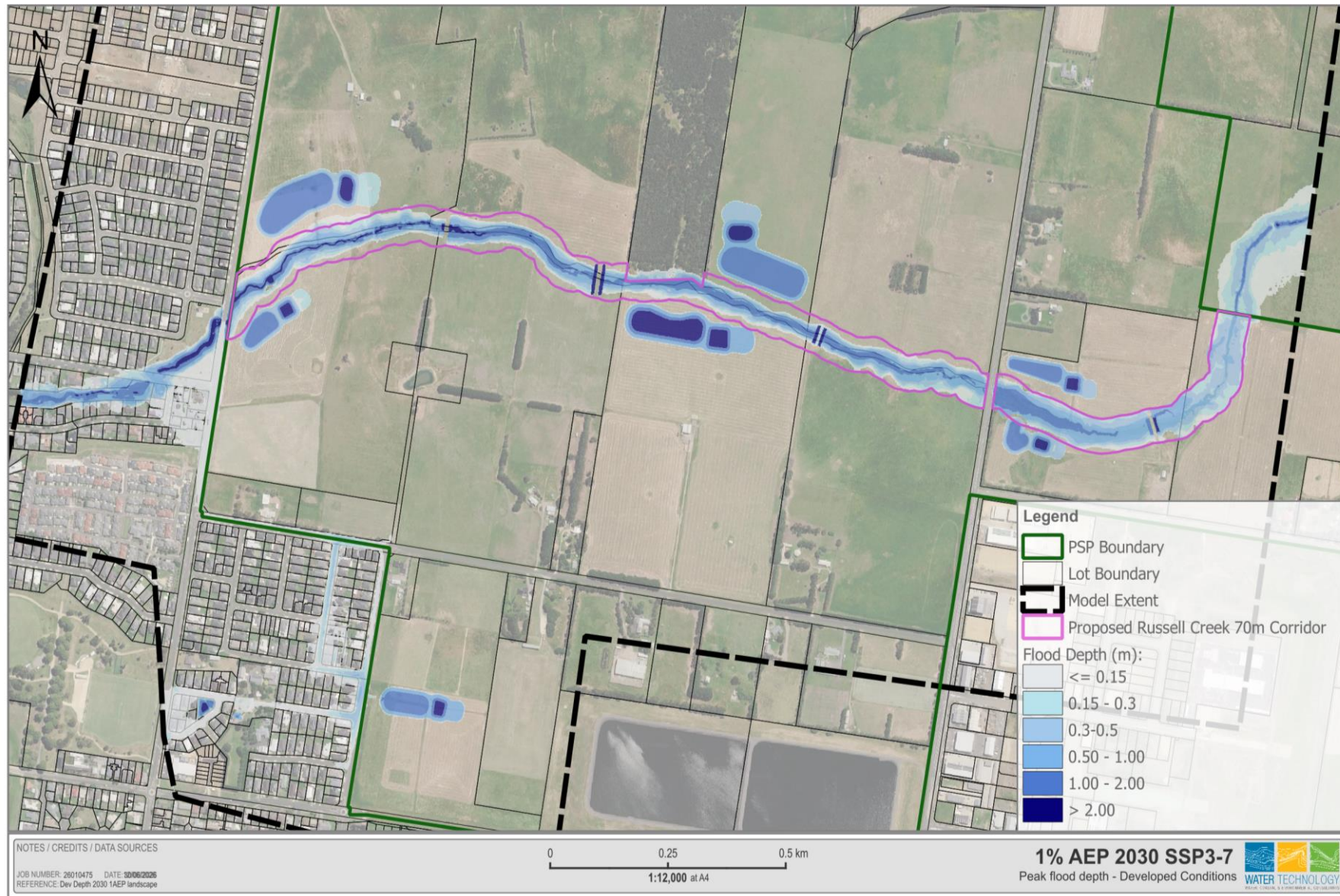


Figure 6-5 1% AEP 2030 (SSP3-7.0) peak flood depth – Developed conditions

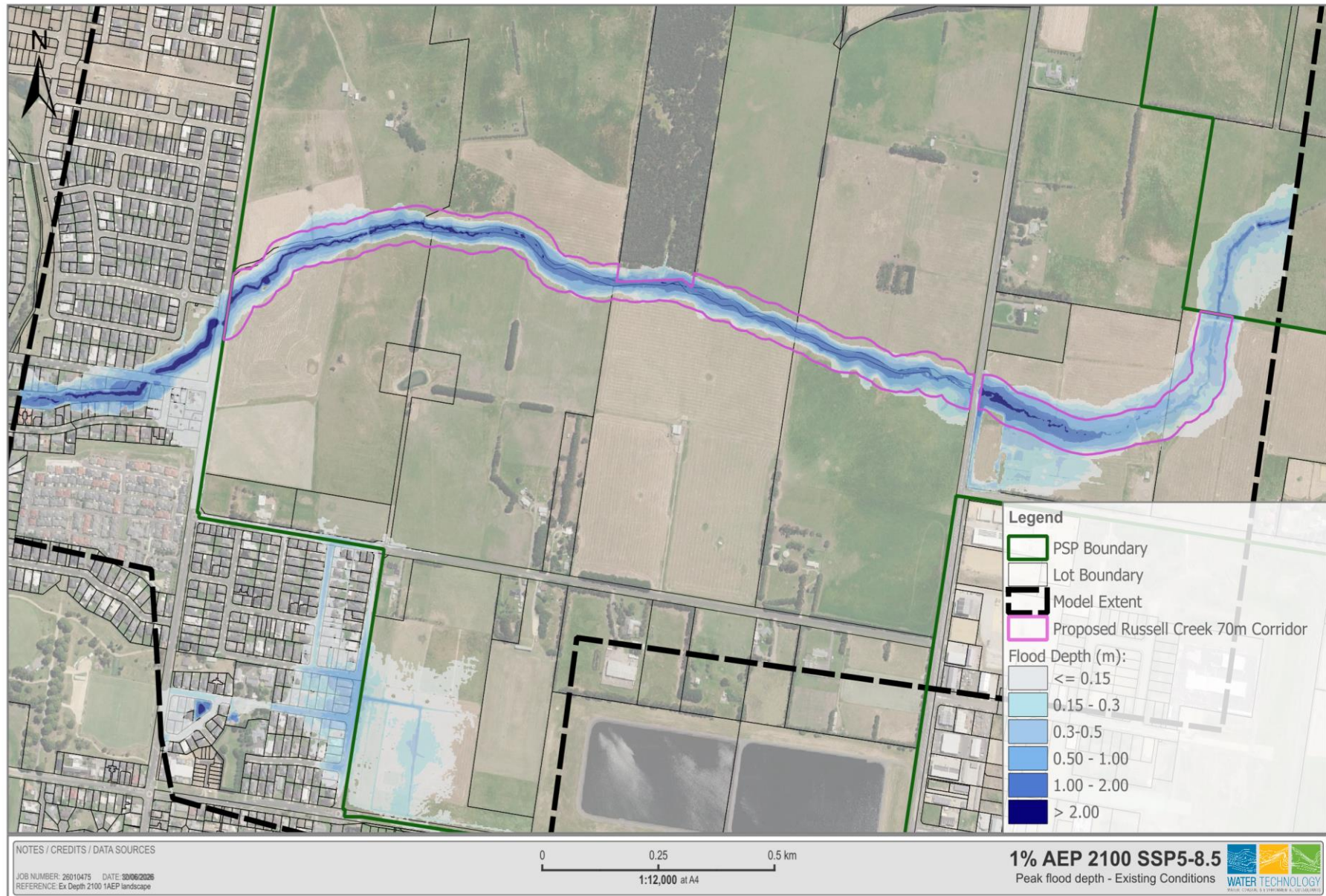


Figure 6-6 1% AEP 2100 (SSP5-8.5) peak flood depth – Pre-development conditions

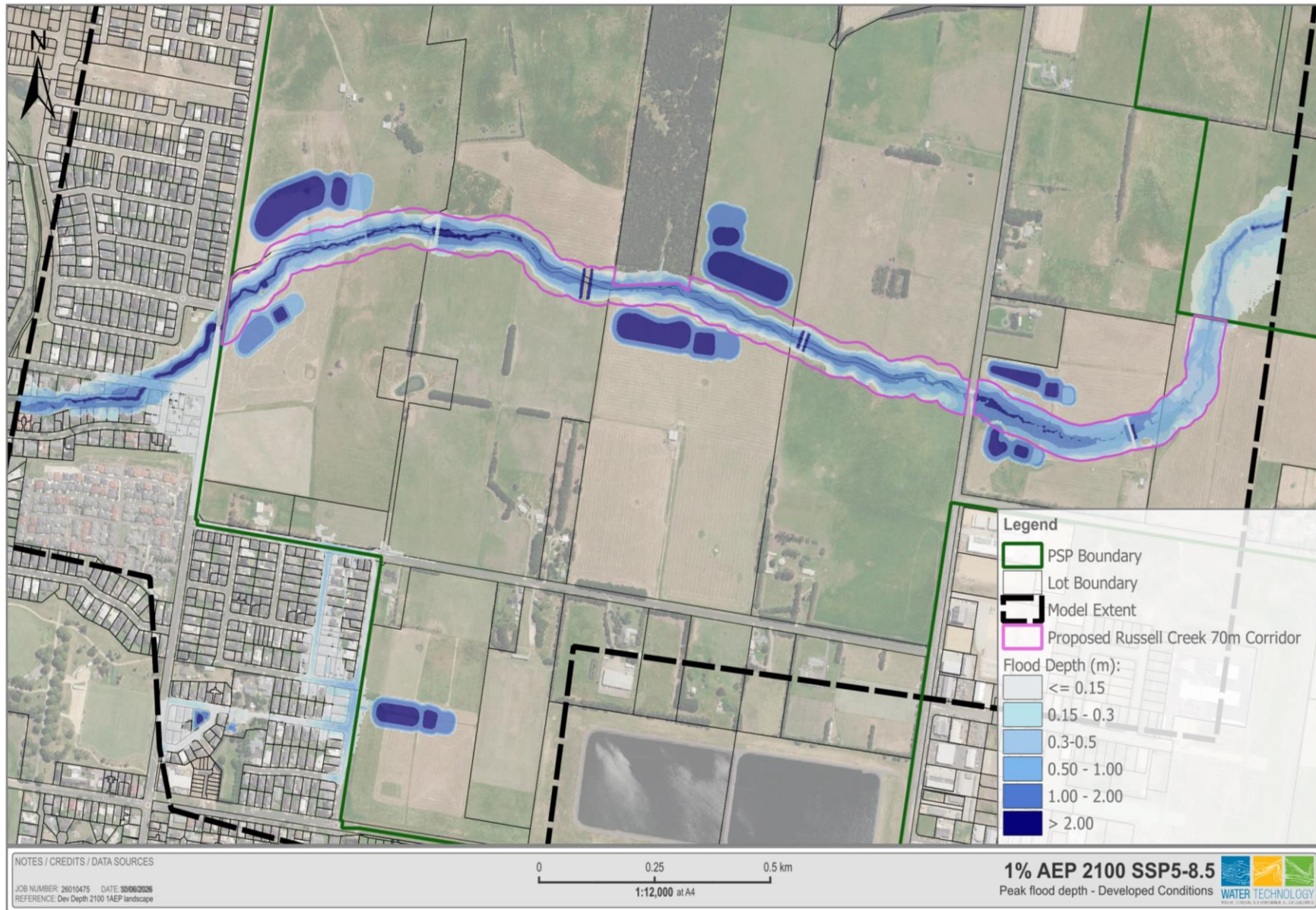


Figure 6-7 1% AEP 2100 (SSP5-8.5) peak flood depth – Developed conditions

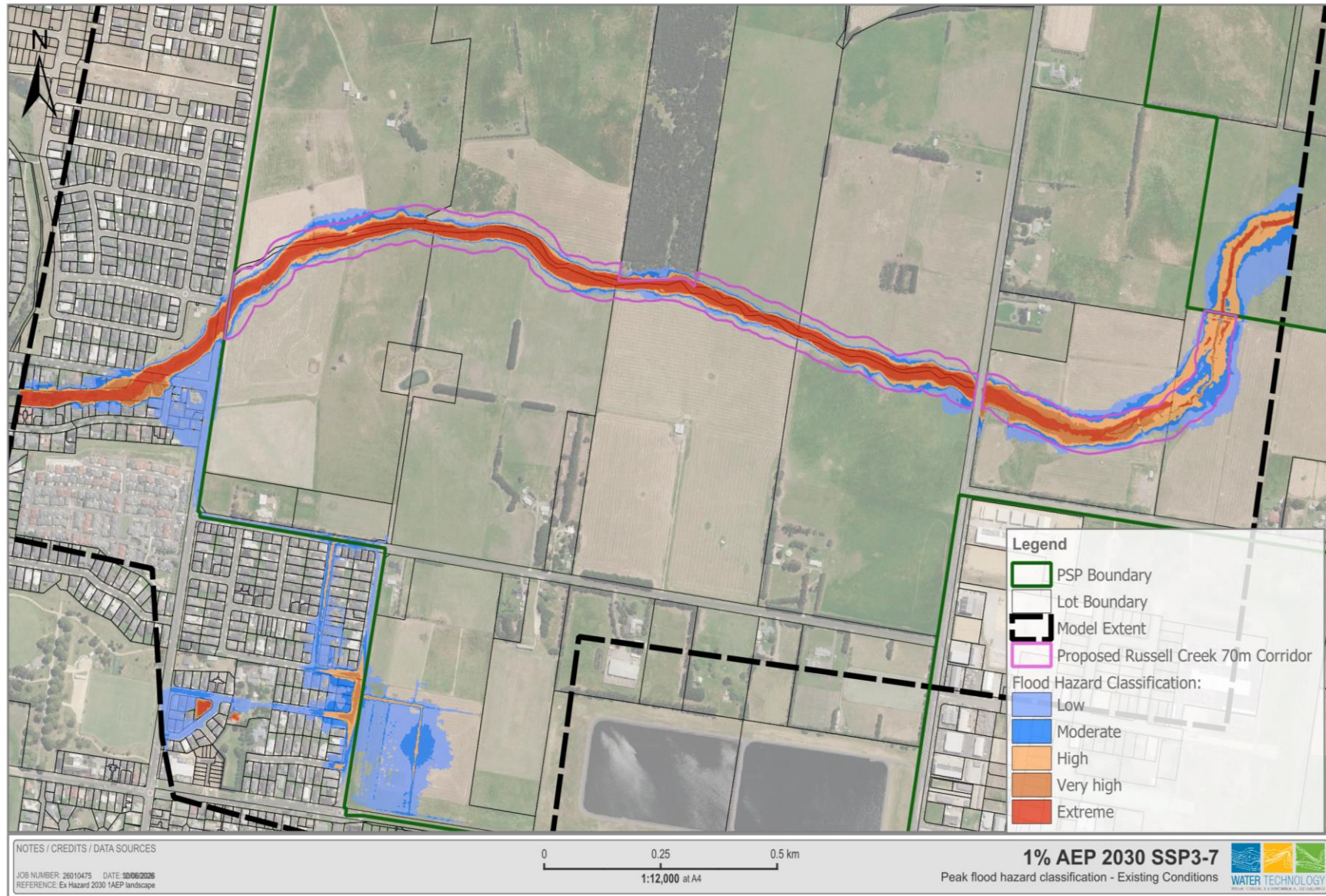


Figure 6-8 1% AEP 2030 (SSP3-7.0) peak flood hazard – Pre-development conditions

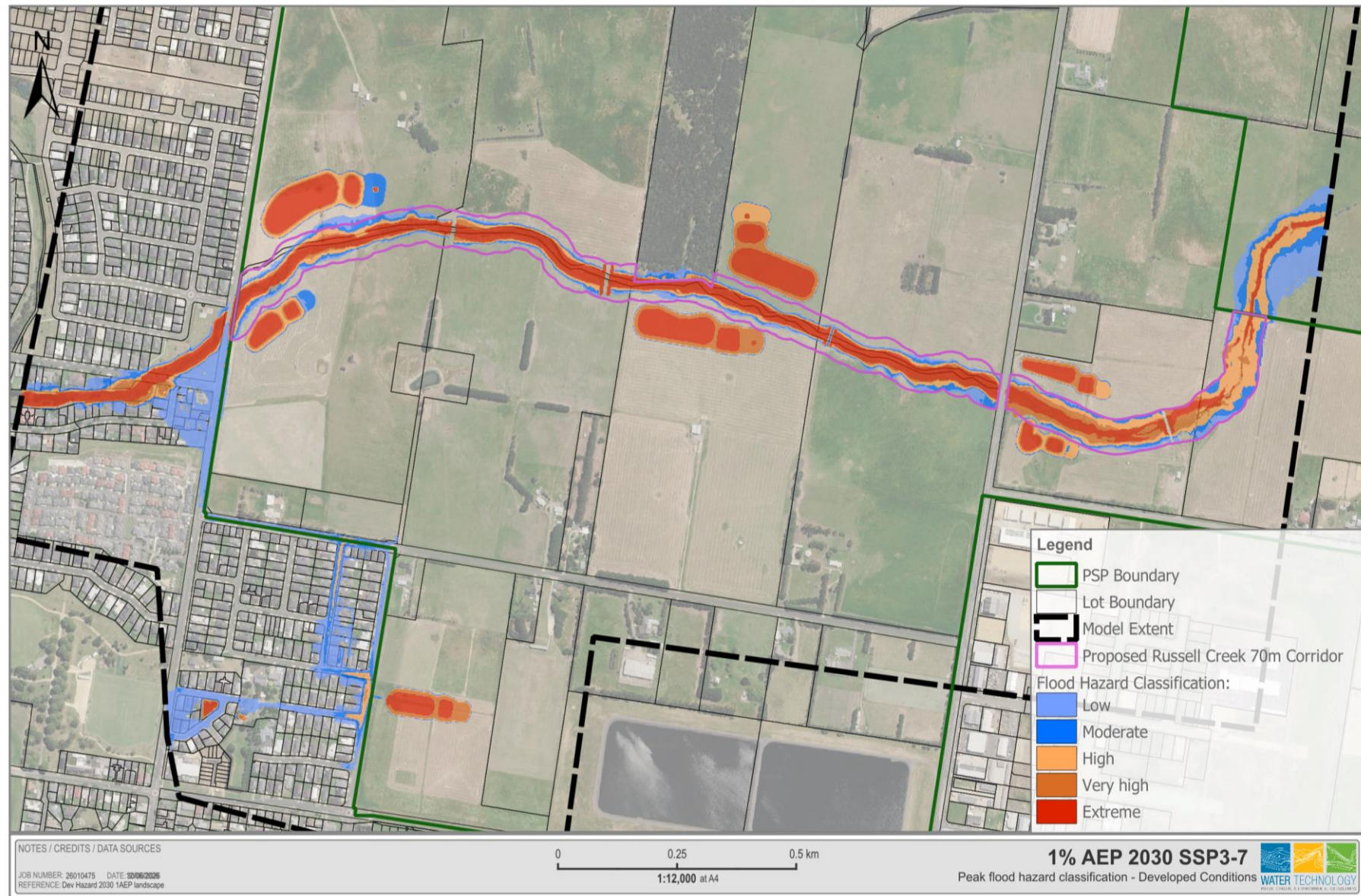


Figure 6-9 1% AEP 2030 (SSP3-7.0) peak flood hazard – Developed conditions

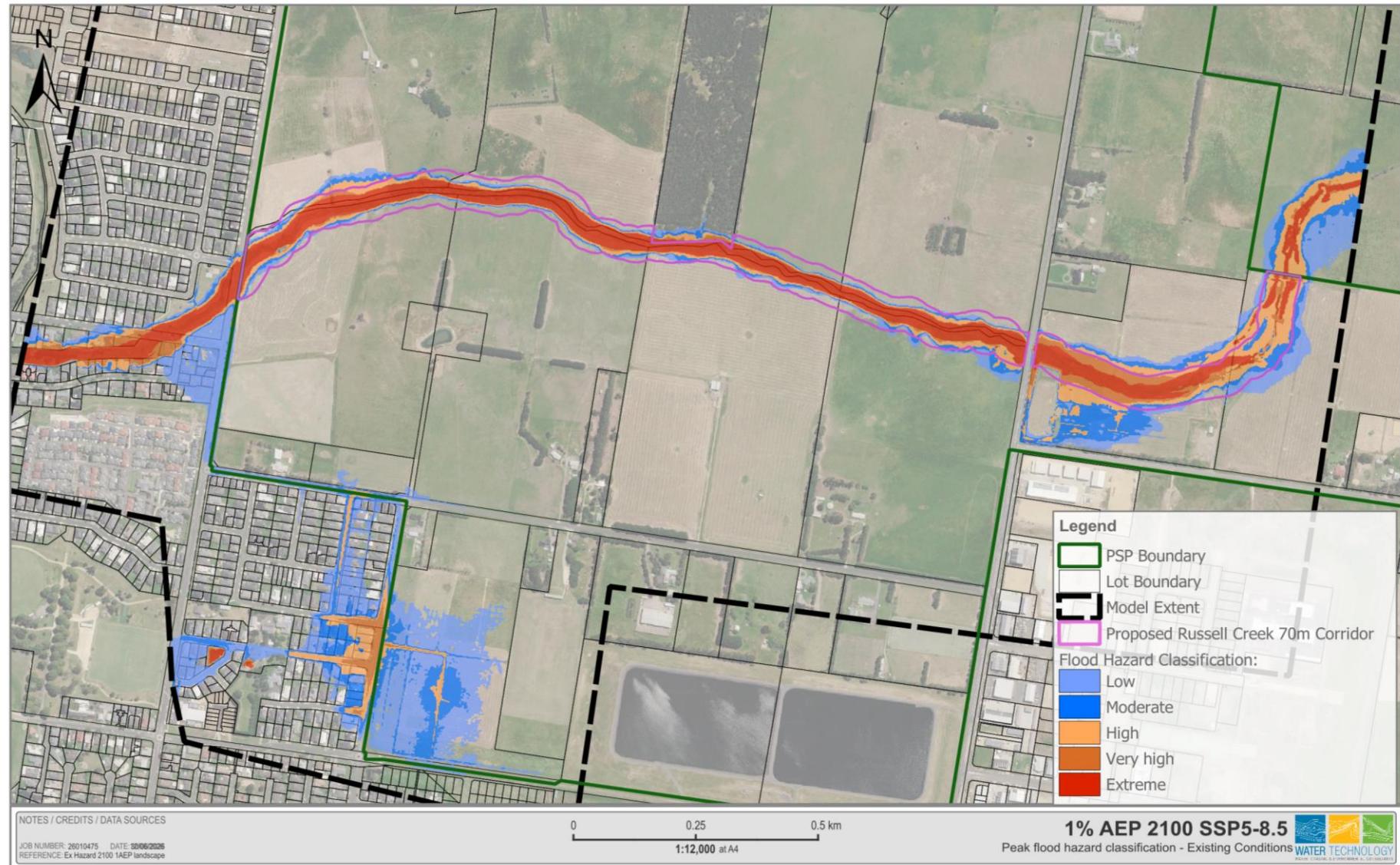


Figure 6-10 1% AEP 2100 (SSP5-8.5) peak flood hazard – Pre-development conditions

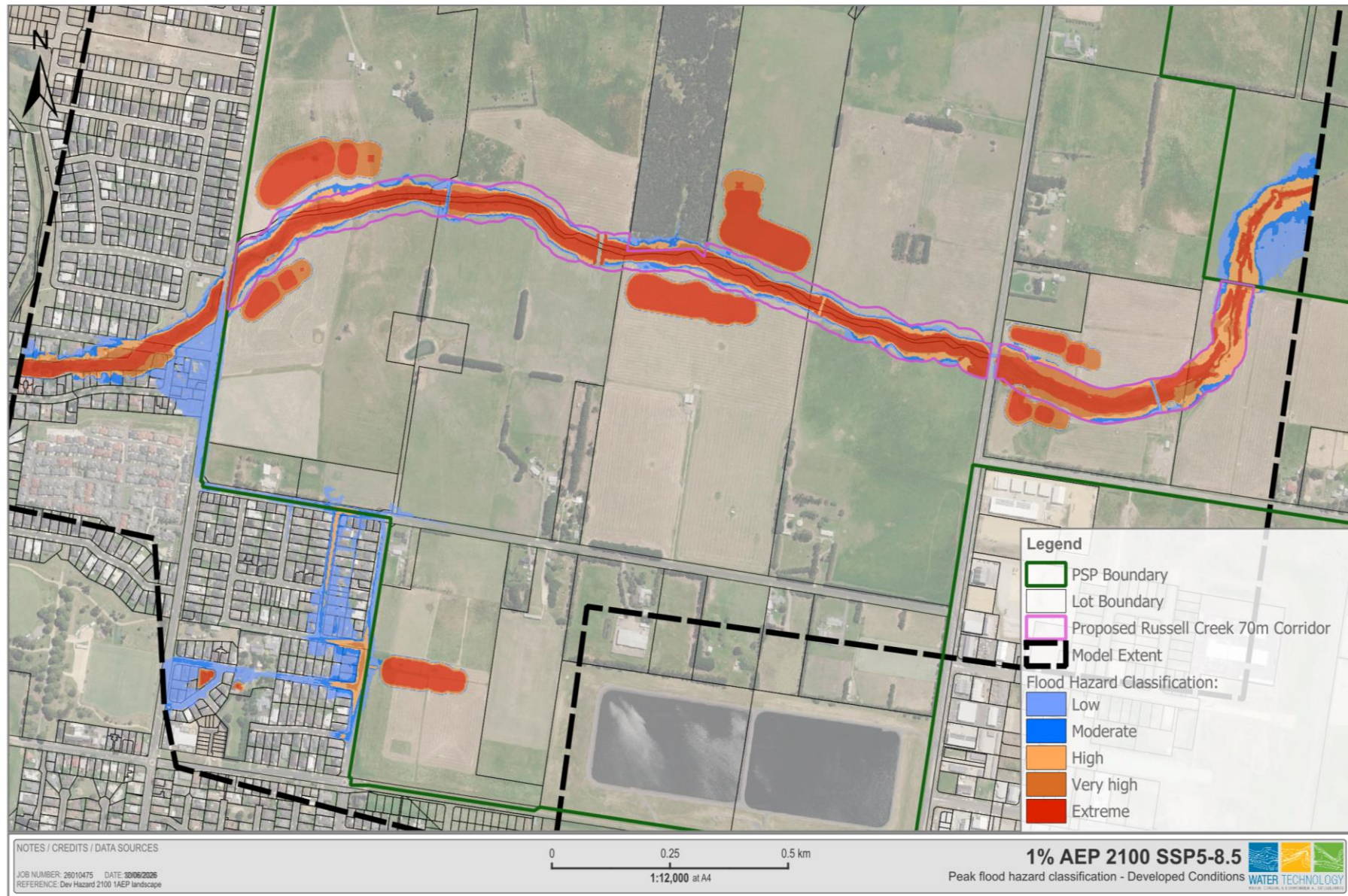


Figure 6-11 1% AEP 2100 (SSP5-8.5) peak flood hazards – Developed conditions

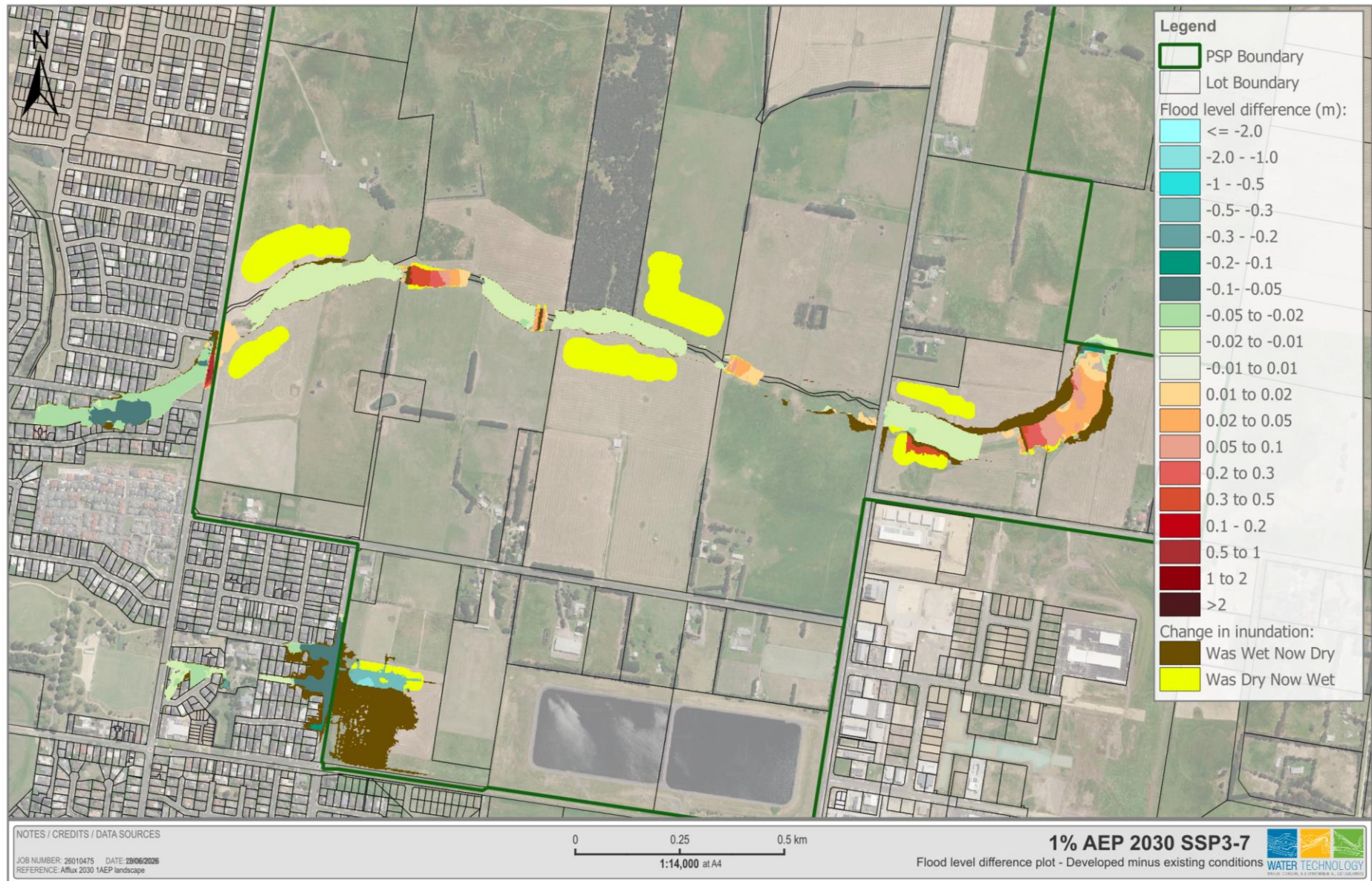


Figure 6-12 1% AEP 2030 (SSP3-7.0) flood level difference plot

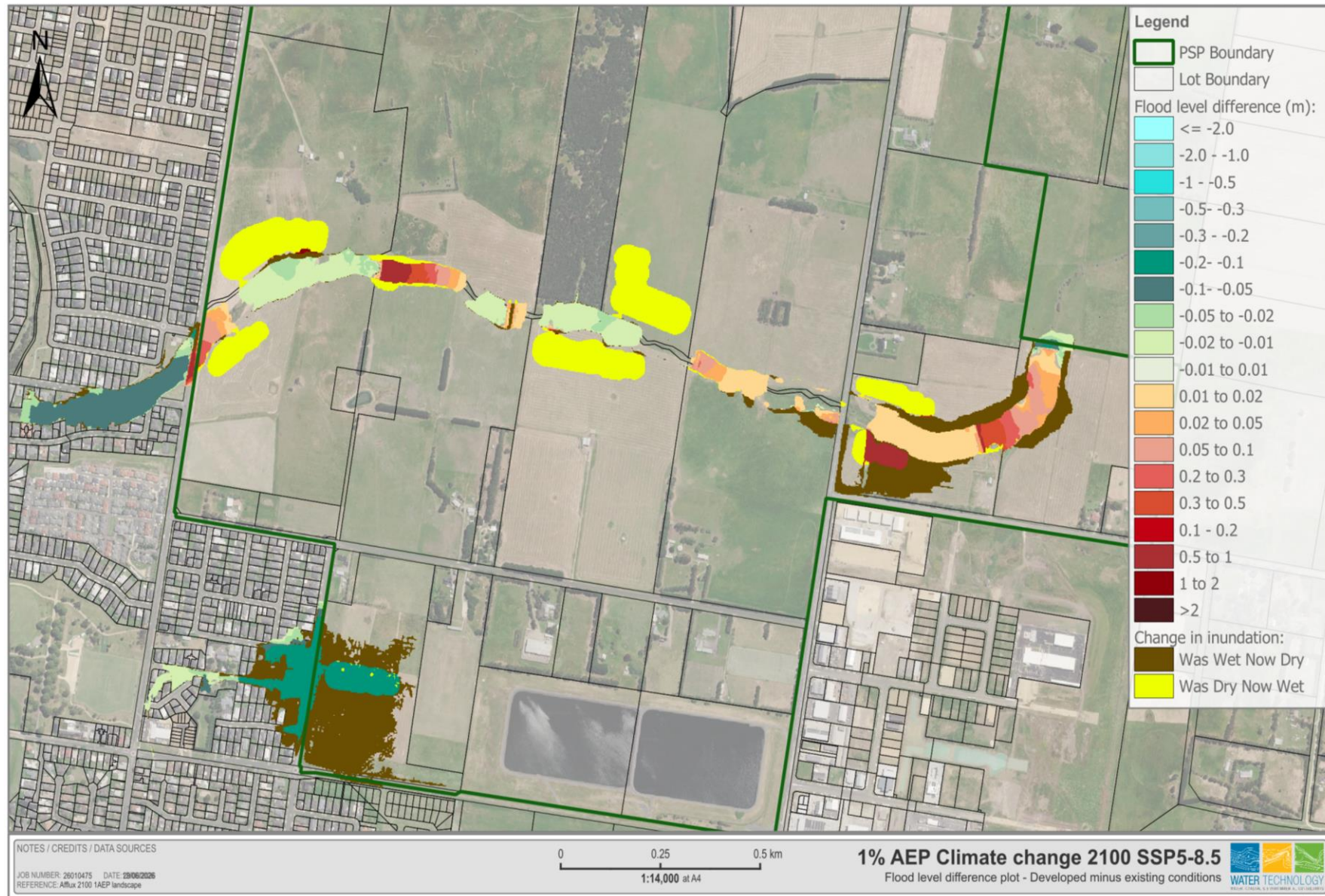


Figure 6-13 1% AEP 2100 (SSP5-8.5) flood level difference plot



7 FLOODWAY OVERLAY AND LAND SUBJECT TO INUNDATION OVERLAY

The proposed Floodway Overlay (FO) and Land Subject to Inundation Overlay (LSIO) extents along Russell Creek have been updated based on the revised post-development 1% AEP Climate Change Year 2100 SSP5-8.5 flood modelling enveloped raw results (i.e. no manual boundary adjustments were made to the FO and LSIO extents created from the raw TUFLOW enveloped grids, with the exception of terminating the FO and LSIO extents at the downstream PSP boundary, and removing the modelled flood extents inside the WLRB assets which are from local/stormwater flows).

The FO was applied across areas of the 1% AEP Year 2100 floodplain where depths $\geq 0.5\text{m}$, hazards $\geq 0.4\text{ m}^2/\text{s}$ or velocities $\geq 2\text{m/s}$. The LSIO was applied across areas of the 1% AEP Year 2100 floodplain outside of the FO.

The draft updated Development Conditions FO and LSIO along this section of Russell Creek is shown in Figure 7-1.

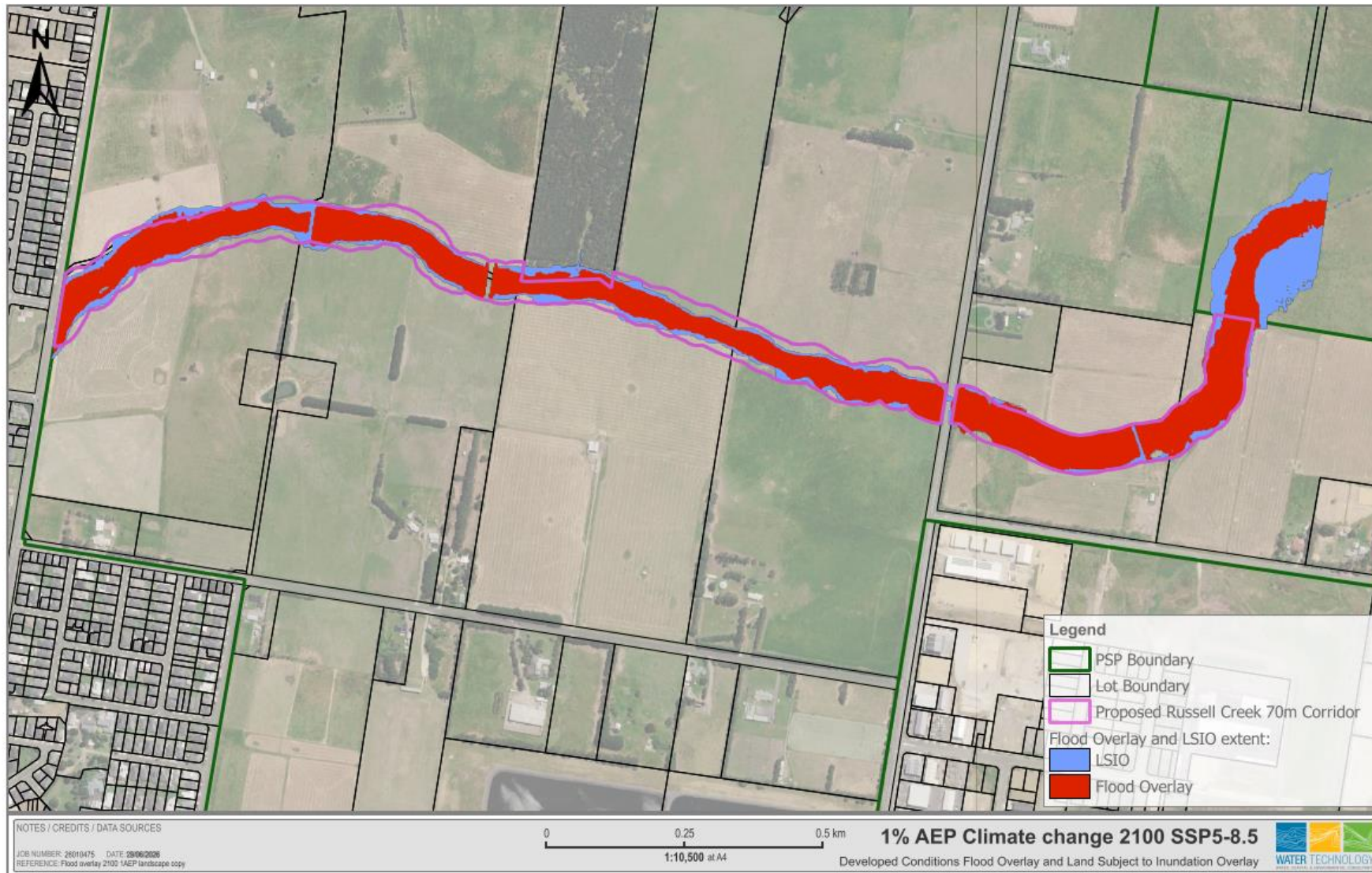


Figure 7-1 Developed Conditions Flood Overlay and Land Subject to Inundation Overlay



8 WLRB RESERVE

8.1 Edge treatments

Batter slopes above the NWL are set to 1 in 5.

The wetland bathymetry includes a 1 in 8 safety bench below the NWL to a depth of 350 mm. Batter slopes below the safety bench in the wetland are set to 1 in 3.

8.2 Maintenance access

A single 4 m wide maintenance track is provided around the full wetland perimeter, except for WLRB G where a 3 m wide maintenance track is provided along the north side of the wetland, as per the previous SMEC WLRB functional design. The maintenance track type is costed as a concrete track in the DCP costing.

Additionally, an outer basin 3m wide perimeter berm has also been maintained as per SMEC's WLRB functional design, providing flexibility in the WLRB maintenance track location at a subsequent design phase.

8.3 Sediment drying area

A single sediment drying area is proposed for each wetland asset and is set to a nominal level of 0.6m above the Top Extended Detention Depth level in the WLRB. The sediment drying area was sized to store the 5 year sediment volume build up when placed at a depth of 0.5m.

8.4 WLRB reserve areas

The WLRB Functional Design reserve areas (outside the proposed 70m Russell Creek corridor line) are shown on the WLRB Functional Design plans. The WLRB reserve areas were delineated in consideration of land fragments located between the WLRB assets and adjacent existing/future road and creek reserves.

The updated WLRB reserve areas outside the proposed 70m Russell Creek corridor line are presented in Table 8.1, along with a comparison against the previous SMEC reported WLRB (with RWH) reserve areas.

Table 8.1 Updated WLRB reserve areas and previous SMEC WLRB reserve area

Asset	Updated WLRB reserve area (ha)	SMEC reported WLRB reserve area (ha)
WLRB A	~3.8	4.9
WLRB B	~3.4	4.0
WLRB C	~3.0	4.1
WLRB D	~1.7	2.4
WLRB E	~1.8	2.0
WLRB F	~1.4	2.1
WLRB G	~1.8	2.0



9 SUMMARY AND CONSIDERATIONS FOR FURTHER WORK

This report outlines the updated functional designs for the seven PSP WLRB assets, the updated PSP flood modelling for the 1% AEP event, updated draft FO and LSIO, and updated Russell Creek culvert crossing assessment; based on revised hydrology and water quality modelling and accounting for the adoption of Roof Water Harvesting in the PSP.

The PSP drainage catchment breakup, general/broad locations of the seven WLRB assets, general WLRB inflow & outflow strategy, and internal PSP catchment drainage, are unchanged from that designed by SMEC.

The WLRB functional designs have been based on LiDAR terrain data. Site investigations (geotechnical, survey, cultural heritage assessment etc.) are to be undertaken at a later design stage.

The proposed retarding basins have been designed to restrict the 1% AEP 2030 post-development peak flow (and the 20% AEP 2030 post-development peak flow for WLRB E) to pre-development levels at the respective seven catchment outfalls, and to restrict the 1% AEP and 10% AEP 2030 and 2100 post-development peak flow to pre-development levels at the Aberline Road outfall.

The wetlands macrophyte zones were resized to achieve BPEM treatment targets, based on the updated water quality modelling inputs/parameters.

The updated flood modelling for the PSP, incorporating the updated PSP WLRB functional designs and the proposed new/upgraded creek crossings, and demonstrates that offsite flood levels and hazards are not worsened with the proposed PSP development and WLRB assets in place; under the 1% AEP and 10% AEP Year 2030 and 2100 (and 20% AEP events in the existing local catchment downstream of catchment E) flood events.

Considerations for further work:

- At a post PSP design phase for Catchment E, further flood modelling should be undertaken to; review and update the stormwater drainage network assumptions adopted in the current PSP flood model for the local area downstream of Catchment E and to extend the PSP flood model past the downstream racecourse retention system, to better understand the downstream flood risks.
- For the new and upgraded Russell Creek crossing designs, the type of crossing (bridge, culvert, boardwalks for the shared path crossings, etc) and the shared path crossings flood immunity level is to be developed and finalised post PSP to the satisfaction of the responsible authority and GHCM.
- At the very upstream end of the PSP, an existing small creek crossing is proposed to be removed as part of this updated proposed PSP floodplain strategy. The requirement to remove this existing crossing is expected to be triggered during the development permit application phase, either for development across the parcel this existing crossing lies in or if its removal is required to facilitate development of surrounding parcels.
- Regarding removal of the illegal fill east of Horne Road, the timing/requirement to remove this illegal fill is expected to be triggered by an enforcement order or during the development permit application phase (either for development across the parcels this fill lies in or if its removal is required to facilitate development of surrounding parcels).



APPENDIX A RORB MODEL UPDATES





The previous PSP pre-development and post-development RORB models were updated in line with the PSP RORB update recommendations from Incitus, with the goal to better validate the modelled flows at the PSP's internal subcatchment outfalls and incorporate the latest best practice rainfall losses and pre-burst data. All of Incitus's recommendations were adopted.

The PSP RORB models structure, inputs and validation were updated as follows:

- The previously separate Gateway Road RORB model/catchment (Catchment E) was combined into the main (upstream Russel Creek and remaining PSP internal catchments) RORB model. This was done by adding in the separate Catchment E RORB models subareas, reaches and junctions to the respective (existing and developed conditions) main RORB model using the RORB graphical editor.
- The previously separate Catchment E RORB model was combined into the main RORB model to improve the accuracy of design flows extracted at the outfalls from Catchments C and E, as the PSP drainage strategy has the northern portion of the existing Catchment E (which drains south under existing conditions) being redirected to outfall north through Catchment C under Developed conditions.
- Type 1 reaches and fraction impervious values of 0.1 were adopted globally across the pre-development/validation model.
- Rainfall temporal patterns from the Data Hub were adopted.
- The 2016 design rainfall depths were used for the pre-development/validation RORB model
- The 75th percentile pre-burst data was adopted.
- The baseline Initial Loss (24mm) and Continuing Loss (4.6mm/hr) values from the Data Hub were adopted for the pre-development validation model.
- A single interstation area was adopted for the model.
- The k_c parameter selection and model validation was updated:
 - The updated RORB models k_c value was selected by testing a range of k_c values (derived from regional k_c equations) and validating the updated pre-development RORB models Current Climate 1% AEP flows at the internal subcatchment outfalls and at the Aberline Road outfall, against a range of design flow estimates and previously reported (Water Technology 2017) 1% AEP flow of 32 m³/s (6 hour critical duration) at Aberline Road. The adopted k_c value was derived using the 'RORB Version6 Manual; equation 2-5'. The RORB validation results are presented in Table 9.1.

The revised pre-development Current Climate RORB modelling has produced 1% AEP peak flows that are largely lower than those reported by SMEC at the respective outfalls. This updated RORB modelling is deemed more suitable than the previous modelling; as it incorporates the latest AR&R recommended Initial Losses and pre-burst storm data, produces pre-development 1% AEP flows that are in range of the flow estimation checks and provides a closer match to the previously reported (Water Technology 2017) 1% AEP flow of 32 m³/s at the Aberline Road outfall.



Table 9.1 RORB model validation results - pre-development Current Climate 1% AEP flows

Location	RORB peak flow	RFFR estimate (m ³ /s)			Nikolaou/von't Steen estimate (m ³ /s)	Rural Rational Method estimate (m ³ /s)	SMEC reported 1% AEP pre-development peak flow (m ³ /s) ¹³
		Lower confidence limit (5%)	Discharge	Upper confidence limit (95%)			
Catchment A outfall	4.2 m ³ /s (4.5 hrs)	0.28	0.84	2.54	5.1	2.7	5.0 m ³ /s (1.5 hrs)
Catchment B outfall	4.3 m ³ /s (2 hrs)	0.24	0.74	2.25	4.6	2.3	3.8 m ³ /s (3 hrs)
Catchment C outfall	1.9 m ³ /s (2 hrs)	0.18	0.53	1.63	3.2	1.7	2.6 m ³ /s (2 hrs)
Catchment D outfall	2.0 m ³ /s (1.5 hrs)	0.11	0.32	0.96	1	1.05	3.7 m ³ /s (1 hr)
Catchment E outfall	3.0 m ³ /s (1.5 hrs)	0.15	0.46	1.4	2.8	1.5	3.8 m ³ /s (1.5 hrs)
Catchment F outfall	1.8 m ³ /s (2 hrs)	0.12	0.36	1.09	2.2	1.2	2.6 m ³ /s (1.5 hrs)
Catchment G outfall	1.8 m ³ /s (2 hrs)	0.12	0.37	1.14	2.3	1.3	2.7 m ³ /s (1.5 hrs)
Aberline Road outfall	34.8 m ³ /s (9 hrs)	3.7	11.2	34.1	46.3	21.1	38.4 m ³ /s (9 hrs)

The Existing Conditions models fraction impervious values and reach types were updated from that used in the Validation model, to reflect Existing Conditions. The supplied Existing and Developed Conditions PSP RORB models subarea breakup, fraction impervious values and reach details were left unaltered apart for the changes outlined below (to line up with the latest RORB modelling validation for the Current Climate pre-development case and to better reflect the current developed areas directly east of Horne Road and south of Rodgers Road):

- Existing conditions:
 - Models subarea fraction impervious values set to 0.05 throughout (as adopted by SMEC), except for subareas WT14 and WT19 (external subareas directly east of Horne Road) which were assigned a fraction impervious value of 0.15 as a reasonable approximation of the discharge from this catchment even once the industrial area east of Horne Road is fully developed with its own retarding basins in place.
 - A fraction impervious value of 0.05 was adopted for rural and open space areas, for conservatism in the pre-development and post-development comparison (as opposed to a fraction impervious value of 0.1) and to better line up with the calculated Developed subarea fraction impervious values from SMEC.
 - Reach type for the reach across subarea WT14 and it's outfall (along Horne Road) to Russell Creek set to Type 3.
 - Reach type for the reach across subarea WT19 set to Type 2.
- Developed conditions:

¹³ SMEC (6 March 2026). Exhibition Document – Functional Design Report. *East of Aberline PSP-Stormwater Drainage*.



- Subarea fraction impervious values for the external PSP subareas set to 0.05, except for subareas WT14 and WT19 (external subareas directly east of Horne Road) which were assigned a fraction impervious value of 0.15.
- Reach type for the reach across subarea WT14 and its outfall (along Horne Road) to Russell Creek set to Type 3.
- Reach type for the reach across subarea WT19 set to Type 2.
- For the Minor Flow model, Reach Type 3 was adopted across the future piped PSP areas.

A similar modelling approach adopted by SMEC, to simulate the diversion of residential roof runoff across the PSP to the RWH system, was used in this updated RORB modelling, i.e. by running the RORB model to estimate the 1EY residential roof runoff flow and then applying a diversion in the RORB model to divert this flow rate away from each retarding basin. The adopted percentage estimate of the 'residential roof area runoff' portion per catchment (for this modelling) was calculated based on the estimated roof area portion that was conservatively estimated based off the proposed PSP land use breakdown proposed across each catchment¹⁴, and is summarised in Table 9.2.

The d_{av} value in the Developed Conditions RORB model was checked and k_c was updated to 10.01 (slight increase of the k_c value of 9.99 from the Validation and Existing Conditions modelling) for the Developed Conditions modelling, to match the k_c/d_{av} ratio.

The Existing and Developed Conditions RORB models were run for the Year 2030 SSP3-7.0 and the Year 2100 SSP5-8.5 Climate Change case.

The Year 2030 SSP3-7.0 modelling is based on an increase in global temperature of 1.2 °C while the Year 2100 SSP5-8.5 modelling is based on an increase in global temperature of 4.5 °C, adopting the ARR 2019 v4.2 guidelines. For the Year 2100 SSP5-8.5 case, the same Global Warming Level as per SMEC's modelling has been adopted. SMEC have not modelled a Year 2030 scenario. For the Year 2030 and Year 2100 modelling, the baseline rainfall intensity and baseline losses were increased using the AR&R datahub factors. The adopted Year 2030 SSP3-7.0 and Year 2100 SSP5-8.5 rainfall losses are outlined below:

- Year 2030 SSP3-7.0
 - Initial loss = 25.2 mm
 - Continuing loss = 5.06 mm/hr
- Year 2100 SSP5-8.5
 - Initial loss = 28.56 mm
 - Continuing loss = 6.62 mm/hr

¹⁴ Proposed land use breakdown in each catchment outlined in Table 2 of the '*East of Aberline Roof Water Harvesting Assessment*'. Reference: 3004613-Tech Memo-2 (SMEC, 12 March 2026)'



Table 9.2 Percentage estimate of the 'residential roof area runoff' in each catchment

Catchment	Percentage estimate of the 'total catchment runoff in the 1EY 2030 SSP3-7.0' that is diverted away from the WLRB assets (to the RWH system)
A	38%
B	44%
C	42%
D	41%
E	46%
F	47%
G	44%



APPENDIX B MUSIC MODEL CHANGES





The previous PSP MUSIC modelling was undertaken to align primarily with the Warrnambool City Council (WCC) MUSIC Guidelines (Water Technology, 2013), with the Melbourne Water MUSIC Guidelines (2024) applied where guidance was not provided in the WCC guidelines.

Following review, some aspects of the previous model set-up are considered outdated and no longer aligned with best practise. In response to this, the following updates were applied to the MUSIC model set up:

- The rainfall data was updated to utilise a representative 10-year period from the Camperdown Donalds Hill pluviograph station (Station number: 090153).
 - A 6-minute timestep dataset from the 10-year period between 1980-1989 was chosen for use.
 - The mean annual rainfall over this period was 742.3mm, which closely aligns with the long-term mean annual rainfall and monthly reported by BOM at the Warrnambool Post Office (743.1mm; station number: 090082) (Figure 9-1).
- The PET data was updated using long-term average PET for Warrnambool locality using the BOM dataset¹⁵. This change resulted a mean annual PET of 1,011 mm (Figure 9-2). The PET data used in previous modelling was obtained from the SILO database for a single year and had a higher mean annual PET of 1,222 mm. As a conservative measure, the lower value from the BOM database has been chosen.
 - The use of BOM PET aligns with the WCC guidelines as it has used the same data source.
 - However, it is noted that the WCC guidelines report a mean annual PET of 1614 mm. Since the release of the guidelines, the resolution of the BOM data source has become finer which resulted in the difference in PET values.
- The soil storage capacity (SSC) and field capacity (FC) rainfall and runoff parameters were updated to the Melbourne Water MUSIC Guideline (2024) values of 120mm and 50mm, respectively.
 - The previous model adopted the SSC and FC values of 30mm and 20mm, respectively as per WCC guidelines. While these values were considered representative of Melbourne soil conditions at the time of guideline development and continue to be supported by eWater MUSIC documentation, the Melbourne Water MUSIC Guidelines (2024) represent current best practice. Accordingly, the values specified in the Melbourne Water guidelines have been adopted for the present modelling.
- Wetland high flow bypass 4 EY (3-month ARI) flows for each sub-catchment were updated to align with the latest RORB modelling results.
- The models 1EY RWH buffer tank high flow bypass values for each sub-catchment were updated to align with the latest RORB modelling results.

The changes made to the model resulted in a decrease in the wetland treatment effectiveness, largely due to the extension of the modelled rainfall period and changes in PET. Although the mean annual rainfall remained similar, extending the simulation period from 1 to 10 years introduced greater variability in monthly rainfall, including more frequent high-rainfall periods (refer Figure 9-3). These conditions increase flows leading to higher outflows and subsequently lowering the pollutant removal efficiency. In addition, reduced PET values decreased evapotranspiration losses, leading to higher outflows and further decline in treatment performance.

¹⁵ <https://www.bom.gov.au/climate/maps/averages/evapotranspiration/?maptype=ap&period=an>

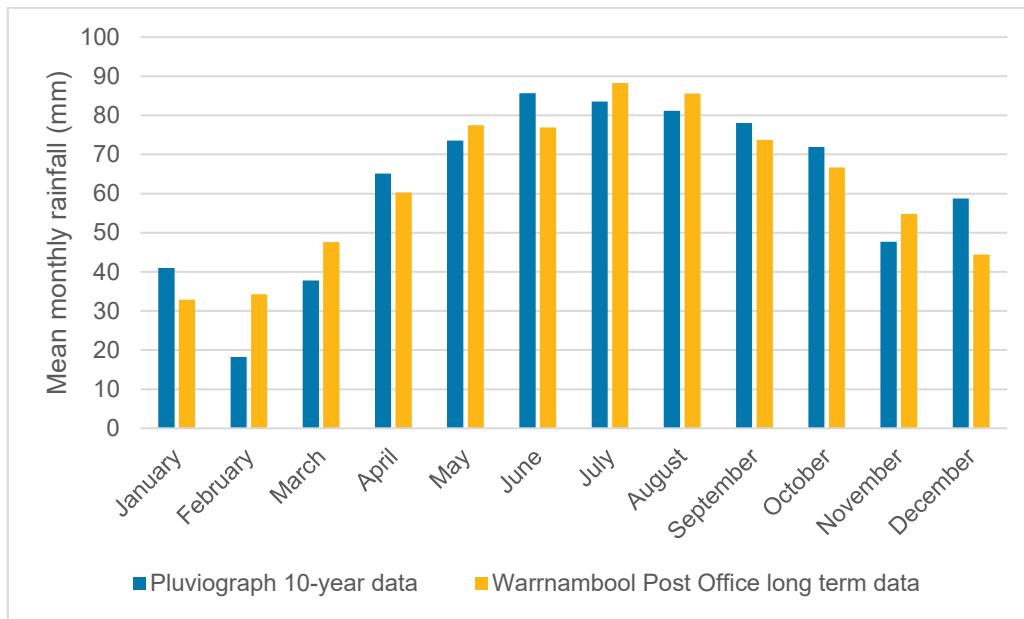


Figure 9-1 Rainfall Comparison

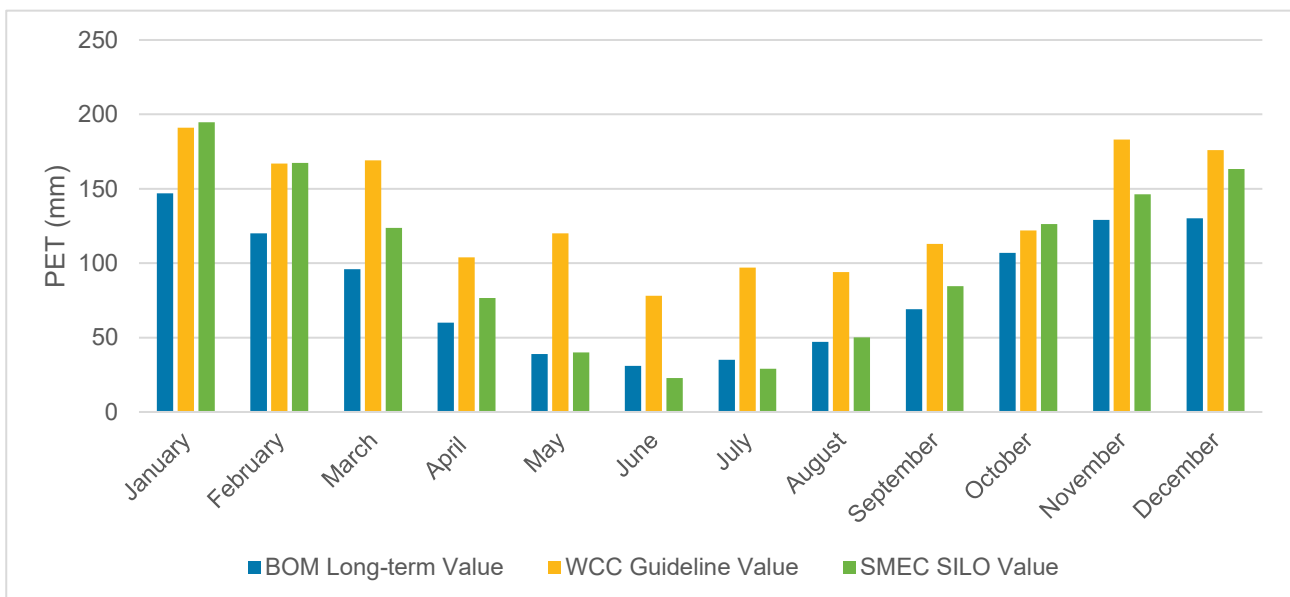


Figure 9-2 Monthly PET Comparison

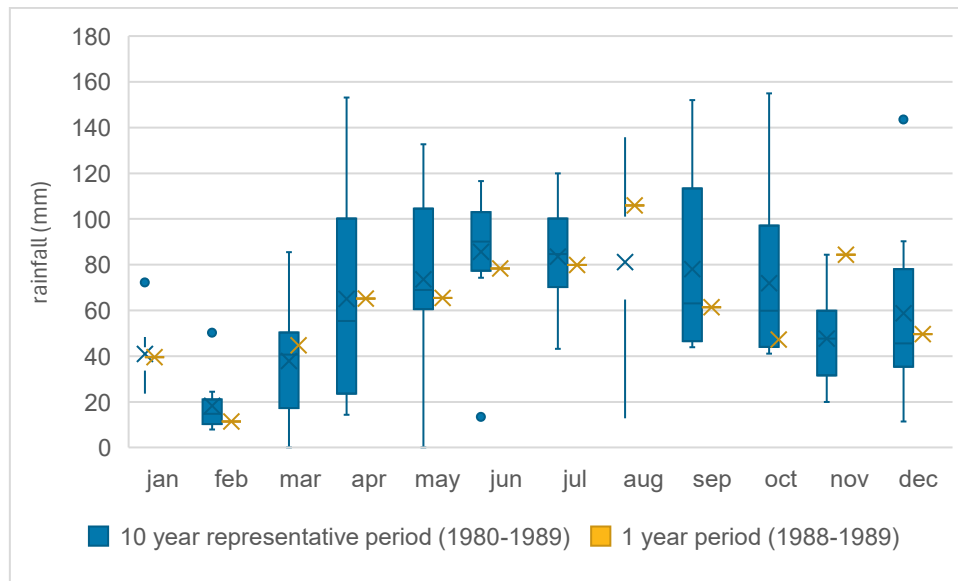


Figure 9-3 Monthly rainfall distribution with one year and 10 year modelling templates



APPENDIX C SEDIMENT POND OUTLET SIZING





C-1 Sediment Pond A

C-1-1 Transfer Pit and Pipe

Ignore the pit?? Yes/No					Are you Assuming INLET CONTROL??? Yes/No				
No					No				
PIT					PIPE				
Pit Sill Level	23.45	m AHD			Invert Level	22.725	m AHD	Ke	0.5
Width	0.9	m			Dia	0.225	m	Kex	1.0
Length	0.9	m			barrels	1		Length	15.0
Area	0.81	m ²			Area	0.040	m ²	Tailwater Level	23.35
portion not taken by ba	62	%							m AHD
Grill blockage factor	25	%				0.725		wetted perim	0.71
Weir blockage factor	25	%				-0.775		Hyd Radius	0.06
Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE
NWL	23.45	0	0.000	0.000	0.000	0.613	0.091	0.100	0.029
	23.5	0.05	0.246	0.051	0.051	0.663	0.095	0.150	0.035
	23.55	0.1	0.348	0.145	0.145	0.713	0.098	0.200	0.040
	23.6	0.15	0.426	0.267	0.267	0.763	0.102	0.250	0.045
	23.65	0.2	0.492	0.411	0.411	0.813	0.105	0.300	0.049
	23.7	0.25	0.551	0.574	0.551	0.863	0.108	0.350	0.053
	23.75	0.3	0.603	0.754	0.603	0.913	0.111	0.400	0.057
TEDD	23.8	0.35	0.651	0.950	0.651	0.963	0.114	0.450	0.061
	23.85	0.4	0.696	1.161	0.696	1.013	0.117	0.500	0.064
	23.9	0.45	0.739	1.386	0.739	1.063	0.120	0.550	0.067
	23.95	0.5	0.779	1.623	0.779	1.113	0.123	0.600	0.070
	24	0.55	0.817	1.872	0.817	1.163	0.125	0.650	0.073
	24.05	0.6	0.853	2.133	0.853	1.213	0.128	0.700	0.076
SED Bund	24.1	0.65	0.888	2.405	0.888	1.263	0.131	0.750	0.078
	24.15	0.7	0.921	2.688	0.921	1.313	0.133	0.800	0.081
	24.2	0.75	0.954	2.981	0.954	1.363	0.136	0.850	0.083
	24.25	0.8	0.985	3.284	0.985	1.413	0.138	0.900	0.086
	24.3	0.85	1.015	3.597	1.015	1.463	0.141	0.950	0.088
	24.35	0.9	1.045	3.919	1.045	1.513	0.143	1.000	0.090
	24.4	0.95	1.073	4.250	1.073	1.563	0.145	1.050	0.092
	24.45	1	1.101	4.590	1.101	1.613	0.148	1.100	0.095



C-1-2 High Flow Bypass Pit and Pipe

PIT						PIPE			INLET CONTROL		OUTLET CONTROL		
	Pit Sill Level	23.7	m AHD			Invert Level	23.075	m AHD	Ke	0.5	Square edge		
	Width	2	m			Dia	0.525	m	Kex	1.0			
	Length	1.2	m			barrels	3		Length	170.0	m		
	Area	2.4	m ²			Area	0.649	m ²	Tailwater Level	22.50	m AHD		
	portion not taken by ba	61	%										
	Grill blockage factor	25	%						wetted perim	4.95	m		
	Weir blockage factor	25	%						Hyd Radius	0.13	m		
	Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow		head loss	flow	TOTAL FLOW RATE		
TEDD	23.7	0	0.000	0.000	0.000	0.363	1.143		1.200	0.999	0.00	m ³ /s	
	23.75	0.05	0.718	0.091	0.091	0.413	1.219		1.250	1.020	0.09	m ³ /s	
	23.8	0.1	1.015	0.258	0.258	0.463	1.291		1.300	1.040	0.26	m ³ /s	
	23.85	0.15	1.243	0.474	0.474	0.513	1.359		1.350	1.060	0.47	m ³ /s	
	23.9	0.2	1.436	0.730	0.730	0.563	1.424		1.400	1.079	0.73	m ³ /s	
	23.95	0.25	1.605	1.020	1.020	0.613	1.486		1.450	1.098	1.02	m ³ /s	
SED Bund	24	0.3	1.758	1.341	1.341	0.663	1.545		1.500	1.117	1.12	m ³ /s	
	24.05	0.35	1.899	1.690	1.690	0.713	1.603		1.550	1.135	1.14	m ³ /s	
	24.1	0.4	2.030	2.064	2.030	0.763	1.658		1.600	1.153	1.15	m ³ /s	
	24.15	0.45	2.153	2.463	2.153	0.813	1.711		1.650	1.171	1.17	m ³ /s	
	24.2	0.5	2.270	2.885	2.270	0.863	1.763		1.700	1.189	1.19	m ³ /s	
	24.25	0.55	2.381	3.328	2.381	0.913	1.814		1.750	1.206	1.21	m ³ /s	
	24.3	0.6	2.486	3.792	2.486	0.963	1.863		1.800	1.223	1.22	m ³ /s	
	24.35	0.65	2.588	4.276	2.588	1.013	1.910		1.850	1.240	1.24	m ³ /s	
	24.4	0.7	2.686	4.779	2.686	1.063	1.957		1.900	1.257	1.26	m ³ /s	
	24.45	0.75	2.780	5.300	2.780	1.113	2.003		1.950	1.273	1.27	m ³ /s	
	24.5	0.8	2.871	5.839	2.871	1.163	2.047		2.000	1.290	1.29	m ³ /s	
	24.55	0.85	2.959	6.395	2.959	1.213	2.091		2.050	1.306	1.31	m ³ /s	
	24.6	0.9	3.045	6.967	3.045	1.263	2.133		2.100	1.321	1.32	m ³ /s	
	24.65	0.95	3.129	7.556	3.129	1.313	2.175		2.150	1.337	1.34	m ³ /s	
	24.7	1	3.210	8.160	3.210	1.363	2.216		2.200	1.353	1.35	m ³ /s	



C-2 Sediment Pond B

C-2-1 Transfer Pit and Pipe

Ignore the pit?? Yes/No		No		Are you Assuming INLET CONTROL??? Yes/No		No			
PIT				PIPE	INLET CONTROL	OUTLET CONTROL			
Pit Sill Level	27.85	m AHD	26.35	Invert Level	27.05	m AHD	0.5	Square edge	
Width	0.9	m		Dia	0.3	m	1.0		
Length	0.9	m		barrels	1		15.0	m	WL NWL =
Area	0.81	m ²		Area	0.071	m ²	Tailwater Level	28.10	m AHD WL TED = 2
portion not taken by ba	62	%							
Grill blockage factor	25	%			0.8		wetted perim	0.94	m
Weir blockage factor	25	%			-0.7		Hyd Radius	0.08	m
Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE
NWL	27.85	0	0.000	0.000	0.650	0.167	-0.250	#NUM!	#NUM! m ³ /s
	27.9	0.05	0.246	0.051	0.700	0.173	-0.200	#NUM!	#NUM! m ³ /s
	27.95	0.1	0.348	0.145	0.750	0.179	-0.150	#NUM!	#NUM! m ³ /s
	28	0.15	0.426	0.267	0.800	0.185	-0.100	#NUM!	#NUM! m ³ /s
	28.05	0.2	0.492	0.411	0.850	0.191	-0.050	#NUM!	#NUM! m ³ /s
	28.1	0.25	0.551	0.574	0.900	0.196	0.000	0.000	0.00 m ³ /s
	28.15	0.3	0.603	0.754	0.950	0.201	0.050	0.040	0.04 m ³ /s
TEDD	28.2	0.35	0.651	0.950	0.651	1.000	0.207	0.100	0.056 m ³ /s
	28.25	0.4	0.696	1.161	0.696	1.050	0.212	0.150	0.069 m ³ /s
	28.3	0.45	0.739	1.386	0.739	1.100	0.217	0.200	0.080 m ³ /s
	28.35	0.5	0.779	1.623	0.779	1.150	0.222	0.250	0.089 m ³ /s
	28.4	0.55	0.817	1.872	0.817	1.200	0.226	0.300	0.098 m ³ /s
	28.45	0.6	0.853	2.133	0.853	1.250	0.231	0.350	0.106 m ³ /s
	28.5	0.65	0.888	2.405	0.888	1.300	0.236	0.400	0.113 m ³ /s
	28.55	0.7	0.921	2.688	0.921	1.350	0.240	0.450	0.120 m ³ /s
SED Bund	28.6	0.75	0.954	2.981	0.954	1.400	0.245	0.500	0.126 m ³ /s
	28.65	0.8	0.985	3.284	0.985	1.450	0.249	0.550	0.132 m ³ /s
	28.7	0.85	1.015	3.597	1.015	1.500	0.253	0.600	0.138 m ³ /s
	28.75	0.9	1.045	3.919	1.045	1.550	0.257	0.650	0.144 m ³ /s
	28.8	0.95	1.073	4.250	1.073	1.600	0.261	0.700	0.149 m ³ /s
	28.85	1	1.101	4.590	1.101	1.650	0.265	0.750	0.155 m ³ /s



C-2-2 High Flow Bypass Pit and Pipe

Ignore the pit?? Yes/No			No			Are you Assuming INLET CONTROL??? Yes/No			No		
PIT						PIPE	INLET CONTROL		OUTLET CONTROL		
	Pit Sill Level	28.2	m AHD			Invert Level	27.5	m AHD	Ke	0.5	Square edge
	Width	3.2	m			Dia	0.6	m	Kex	1.0	
	Length	1	m			barrels	4		Length	120.0	m
	Area		3.2 m ²			Area	1.131	m ²	Tailwater Level	27.06	m AHD
	portion not taken by be	62	%								
	Grill blockage factor	25	%						wetted perim	7.54	m
	Weir blockage factor	25	%						Hyd Radius	0.15	m
Height		Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow		head loss	flow	TOTAL FLOW RATE
TEDD	28.2	0	0.000	0.000	0.000	0.400	2.091		1.140	2.099	0.00 m ³ /s
	28.25	0.05	0.973	0.120	0.120	0.450	2.218		1.190	2.145	0.12 m ³ /s
	28.3	0.1	1.376	0.339	0.339	0.500	2.338		1.240	2.189	0.34 m ³ /s
	28.35	0.15	1.685	0.622	0.622	0.550	2.452		1.290	2.233	0.62 m ³ /s
	28.4	0.2	1.945	0.958	0.958	0.600	2.561		1.340	2.276	0.96 m ³ /s
	28.45	0.25	2.175	1.339	1.339	0.650	2.666		1.390	2.318	1.34 m ³ /s
	28.5	0.3	2.383	1.760	1.760	0.700	2.766		1.440	2.359	1.76 m ³ /s
	28.55	0.35	2.574	2.218	2.218	0.750	2.863		1.490	2.400	2.22 m ³ /s
SED Bund	28.6	0.4	2.751	2.709	2.709	0.800	2.957		1.540	2.440	2.44 m ³ /s
	28.65	0.45	2.918	3.233	2.918	0.850	3.048		1.590	2.479	2.48 m ³ /s
	28.7	0.5	3.076	3.787	3.076	0.900	3.137		1.640	2.518	2.52 m ³ /s
	28.75	0.55	3.226	4.369	3.226	0.950	3.223		1.690	2.556	2.56 m ³ /s
	28.8	0.6	3.370	4.978	3.370	1.000	3.306		1.740	2.593	2.59 m ³ /s
	28.85	0.65	3.507	5.613	3.507	1.050	3.388		1.790	2.630	2.63 m ³ /s
	28.9	0.7	3.640	6.272	3.640	1.100	3.468		1.840	2.667	2.67 m ³ /s
	28.95	0.75	3.767	6.956	3.767	1.150	3.546		1.890	2.703	2.70 m ³ /s
	29	0.8	3.891	7.663	3.891	1.200	3.622		1.940	2.738	2.74 m ³ /s
	29.05	0.85	4.011	8.393	4.011	1.250	3.697		1.990	2.773	2.77 m ³ /s
29.1	0.9	4.127	9.144	4.127	1.300	3.770		2.040	2.808	2.81 m ³ /s	
	29.15	0.95	4.240	9.917	4.240	1.350	3.842		2.090	2.842	2.84 m ³ /s
	29.2	1	4.350	10.710	4.350	1.400	3.912		2.140	2.876	2.88 m ³ /s



C-3-1 Transfer Pit and Pipe

	Ignore the pit?? Yes/No		No		Are you Assuming INLET CONTROL??? Yes/No			No			
	PI				PIPE	INLET CONTROL	OUTLET CONTROL				
	Pit Sill Level	26.55	m AHD	25.05	Invert Level	25.825	m AHD	Ke	0.5	Square edge	
	Width	0.9	m		Dia	0.225	m	Kex	1.0		
	Length	0.9	m		barrels	1		Length	15.0	m	WL NWL =
	Area	0.81	m ²		Area	0.040	m ²	Tailwater Level	26.45	m AHD	WL TED =
	portion not taken by ba	62	%								
	Grill blockage factor	25	%			0.725		wetted perim	0.71	m	
	Weir blockage factor	25	%			-0.775		Hyd Radius	0.06	m	
	Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE	
NWL	26.55	0	0.000	0.000	0.000	0.613	0.091	0.100	0.029	0.00	m ³ /s
	26.6	0.05	0.246	0.051	0.051	0.663	0.095	0.150	0.035	0.03	m ³ /s
	26.65	0.1	0.348	0.145	0.145	0.713	0.098	0.200	0.040	0.04	m ³ /s
	26.7	0.15	0.426	0.267	0.267	0.763	0.102	0.250	0.045	0.05	m ³ /s
	26.75	0.2	0.492	0.411	0.411	0.813	0.105	0.300	0.049	0.05	m ³ /s
	26.8	0.25	0.551	0.574	0.551	0.863	0.108	0.350	0.053	0.05	m ³ /s
	26.85	0.3	0.603	0.754	0.603	0.913	0.111	0.400	0.057	0.06	m ³ /s
TEDD	26.9	0.35	0.651	0.950	0.651	0.963	0.114	0.450	0.061	0.06	m ³ /s
	26.95	0.4	0.696	1.161	0.696	1.013	0.117	0.500	0.064	0.06	m ³ /s
	27	0.45	0.739	1.366	0.739	1.063	0.120	0.550	0.067	0.07	m ³ /s
	27.05	0.5	0.779	1.623	0.779	1.113	0.123	0.600	0.070	0.07	m ³ /s
	27.1	0.55	0.817	1.872	0.817	1.163	0.125	0.650	0.073	0.07	m ³ /s
	27.15	0.6	0.853	2.133	0.853	1.213	0.128	0.700	0.076	0.08	m ³ /s
Sed Bund	27.2	0.65	0.888	2.405	0.888	1.263	0.131	0.750	0.078	0.08	m ³ /s
	27.25	0.7	0.921	2.688	0.921	1.313	0.133	0.800	0.081	0.08	m ³ /s
	27.3	0.75	0.954	2.981	0.954	1.363	0.136	0.850	0.083	0.08	m ³ /s
	27.35	0.8	0.985	3.284	0.985	1.413	0.138	0.900	0.086	0.09	m ³ /s
	27.4	0.85	1.015	3.597	1.015	1.463	0.141	0.950	0.088	0.09	m ³ /s
	27.45	0.9	1.045	3.919	1.045	1.513	0.143	1.000	0.090	0.09	m ³ /s
	27.5	0.95	1.073	4.250	1.073	1.563	0.145	1.050	0.092	0.09	m ³ /s
	27.55	1	1.101	4.590	1.101	1.613	0.148	1.100	0.095	0.09	m ³ /s



C-3-2 High Flow Bypass Pit and Pipe

Ignore the pit?? Yes/No		No		Are you Assuming INLET CONTROL??? Yes/No			No			
PIT					PIPE	INLET CONTROL	OUTLET CONTROL			
	Pit Sill Level	26.9	m AHD		Invert Level	26.275	m AHD	Ke	0.5	Square edge
	Width	3.2	m		Dia	0.525	m	Kex	1.0	
	Length	1.5	m		barrels	4		Length	173.0	m
	Area	4.8	m ²		Area	0.866	m ²	Tailwater Level	25.98	m AHD
	portion not taken by be	62	%							
	Grill blockage factor	25	%					wetted perim	6.60	m
	Weir blockage factor	25	%					Hyd Radius	0.13	m
	Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE
TEDD	26.9	0	0.000	0.000	0.000	0.363	1.524	0.925	1.161	0.00 m ³ /s
	26.95	0.05	1.459	0.134	0.134	0.413	1.626	0.975	1.192	0.13 m ³ /s
	27	0.1	2.063	0.379	0.379	0.463	1.722	1.025	1.222	0.38 m ³ /s
	27.05	0.15	2.527	0.696	0.696	0.513	1.812	1.075	1.251	0.70 m ³ /s
	27.1	0.2	2.918	1.072	1.072	0.563	1.899	1.125	1.280	1.07 m ³ /s
	27.15	0.25	3.263	1.498	1.498	0.613	1.981	1.175	1.308	1.31 m ³ /s
SED Bund	27.2	0.3	3.574	1.969	1.969	0.663	2.060	1.225	1.336	1.34 m ³ /s
	27.25	0.35	3.860	2.482	2.482	0.713	2.137	1.275	1.363	1.36 m ³ /s
	27.3	0.4	4.127	3.032	3.032	0.763	2.210	1.325	1.389	1.39 m ³ /s
	27.35	0.45	4.377	3.618	3.618	0.813	2.282	1.375	1.415	1.42 m ³ /s
	27.4	0.5	4.614	4.237	4.237	0.863	2.351	1.425	1.441	1.44 m ³ /s
	27.45	0.55	4.839	4.889	4.839	0.913	2.418	1.475	1.466	1.47 m ³ /s
	27.5	0.6	5.054	5.570	5.054	0.963	2.483	1.525	1.490	1.49 m ³ /s
	27.55	0.65	5.261	6.281	5.261	1.013	2.547	1.575	1.515	1.51 m ³ /s
	27.6	0.7	5.459	7.019	5.459	1.063	2.609	1.625	1.538	1.54 m ³ /s
	27.65	0.75	5.651	7.784	5.651	1.113	2.670	1.675	1.562	1.56 m ³ /s
	27.7	0.8	5.836	8.576	5.836	1.163	2.729	1.725	1.585	1.59 m ³ /s
	27.75	0.85	6.016	9.392	6.016	1.213	2.787	1.775	1.608	1.61 m ³ /s
	27.8	0.9	6.190	10.233	6.190	1.263	2.844	1.825	1.630	1.63 m ³ /s
	27.85	0.95	6.360	11.097	6.360	1.313	2.900	1.875	1.653	1.65 m ³ /s
	27.9	1	6.525	11.985	6.525	1.363	2.955	1.925	1.674	1.67 m ³ /s



C-4 Sediment Pond D

C-4-1 Transfer Pit and Pipe

	Ignore the pit?? Yes/No			No	Are you Assuming INLET CONTROL??? Yes/No			No			
	PIT				PIPE	INLET CONTROL	OUTLET CONTROL				
		Pit Sill Level	22.2	m AHD	20.7	Invert Level	21.55	m AHD	0.5	Square edge	
		Width	0.9	m		Dia	0.15	m	1.0		
		Length	0.9	m		barrels	1		15.0	m WL NWL =	
		Area	0.81	m ²		Area	0.018	m ²	22.10	m AHD WL TED =	
		portion not taken by ba	62	%							
		Grill blockage factor	25	%			0.65		wetted perim	0.47 m	
		Weir blockage factor	25	%			-0.85		Hyd Radius	0.04 m	
	Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow		head loss	flow	TOTAL FLOW RATE
NWL	22.2	0	0.000	0.000	0.000	0.575	0.039		0.100	0.011	0.00 m ³ /s
	22.25	0.05	0.246	0.051	0.051	0.625	0.041		0.150	0.013	0.01 m ³ /s
	22.3	0.1	0.348	0.145	0.145	0.675	0.042		0.200	0.015	0.01 m ³ /s
	22.35	0.15	0.426	0.267	0.267	0.725	0.044		0.250	0.017	0.02 m ³ /s
	22.4	0.2	0.492	0.411	0.411	0.775	0.045		0.300	0.018	0.02 m ³ /s
	22.45	0.25	0.551	0.574	0.551	0.825	0.047		0.350	0.020	0.02 m ³ /s
	22.5	0.3	0.603	0.754	0.603	0.875	0.048		0.400	0.021	0.02 m ³ /s
TEDD	22.55	0.35	0.651	0.950	0.651	0.925	0.050		0.450	0.022	0.02 m ³ /s
	22.6	0.4	0.696	1.161	0.696	0.975	0.051		0.500	0.024	0.02 m ³ /s
	22.65	0.45	0.739	1.386	0.739	1.025	0.052		0.550	0.025	0.02 m ³ /s
	22.7	0.5	0.779	1.623	0.779	1.075	0.054		0.600	0.026	0.03 m ³ /s
	22.75	0.55	0.817	1.872	0.817	1.125	0.055		0.650	0.027	0.03 m ³ /s
	22.8	0.6	0.853	2.133	0.853	1.175	0.056		0.700	0.028	0.03 m ³ /s
Sed Bund	22.85	0.65	0.888	2.405	0.888	1.225	0.057		0.750	0.029	0.03 m ³ /s
	22.9	0.7	0.921	2.688	0.921	1.275	0.058		0.800	0.030	0.03 m ³ /s
	22.95	0.75	0.954	2.981	0.954	1.325	0.059		0.850	0.031	0.03 m ³ /s
	23	0.8	0.985	3.284	0.985	1.375	0.061		0.900	0.032	0.03 m ³ /s
	23.05	0.85	1.015	3.597	1.015	1.425	0.062		0.950	0.033	0.03 m ³ /s
	23.1	0.9	1.045	3.919	1.045	1.475	0.063		1.000	0.033	0.03 m ³ /s
	23.15	0.95	1.073	4.250	1.073	1.525	0.064		1.050	0.034	0.03 m ³ /s
	23.2	1	1.101	4.590	1.101	1.575	0.065		1.100	0.035	0.04 m ³ /s



C-4-2 High Flow Bypass Pit and Pipe

Ignore the pit?? Yes/No				No		Are you Assuming INLET CONTROL??? Yes/No				No									
PIT						PIPE		INLET CONTROL		OUTLET CONTROL									
Pit Sill Level		22.55 m AHD				Invert Level		21.925 m AHD		Ke		0.5 Square edge							
Width		1.2 m				Dia		0.525 m		Kex		1.0							
Length		1 m				barrels		2		Length		95.0 m							
Area		1.2 m ²				Area		0.433 m ²		Tailwater Level		21.65 m AHD							
portion not taken by be		64 %								wetted perim		3.30 m							
Grill blockage factor		25 %								Hyd Radius		0.13 m							
Weir blockage factor		25 %																	
Height		Head		Orifice Flow		Weir Flow		total flow into pit		Head		Orifice Flow		head loss		flow		TOTAL FLOW RATE	
TEDD	22.55	0	0.000	0.000	0.000	0.363	0.762			0.900	0.729	0.00	m ³ /s						
	22.6	0.05	0.377	0.063	0.063	0.413	0.813			0.950	0.749	0.06	m ³ /s						
	22.65	0.1	0.532	0.177	0.177	0.463	0.861			1.000	0.769	0.18	m ³ /s						
	22.7	0.15	0.652	0.326	0.326	0.513	0.906			1.050	0.788	0.33	m ³ /s						
	22.75	0.2	0.753	0.502	0.502	0.563	0.949			1.100	0.806	0.50	m ³ /s						
	22.8	0.25	0.842	0.701	0.701	0.613	0.991			1.150	0.824	0.70	m ³ /s						
SED Bund	22.85	0.3	0.922	0.922	0.922	0.663	1.030			1.200	0.842	0.84	m ³ /s						
	22.9	0.35	0.996	1.162	0.996	0.713	1.068			1.250	0.860	0.86	m ³ /s						
	22.95	0.4	1.065	1.419	1.065	0.763	1.105			1.300	0.877	0.88	m ³ /s						
	23	0.45	1.130	1.693	1.130	0.813	1.141			1.350	0.893	0.89	m ³ /s						
	23.05	0.5	1.191	1.983	1.191	0.863	1.175			1.400	0.910	0.91	m ³ /s						
	23.1	0.55	1.249	2.288	1.249	0.913	1.209			1.450	0.926	0.93	m ³ /s						
	23.15	0.6	1.304	2.607	1.304	0.963	1.242			1.500	0.942	0.94	m ³ /s						
	23.2	0.65	1.358	2.940	1.358	1.013	1.274			1.550	0.957	0.96	m ³ /s						
	23.25	0.7	1.409	3.286	1.409	1.063	1.305			1.600	0.972	0.97	m ³ /s						
	23.3	0.75	1.458	3.644	1.458	1.113	1.335			1.650	0.988	0.99	m ³ /s						
	23.35	0.8	1.506	4.014	1.506	1.163	1.365			1.700	1.002	1.00	m ³ /s						
	23.4	0.85	1.552	4.396	1.552	1.213	1.394			1.750	1.017	1.02	m ³ /s						
	23.45	0.9	1.597	4.790	1.597	1.263	1.422			1.800	1.031	1.03	m ³ /s						
	23.5	0.95	1.641	5.195	1.641	1.313	1.450			1.850	1.046	1.05	m ³ /s						
	23.55	1	1.684	5.610	1.684	1.363	1.477			1.900	1.060	1.06	m ³ /s						



C-5 Sediment Pond E

C-5-1 Transfer Pit and Pipe

Ignore the pit?? Yes/No		No		Are you Assuming INLET CONTROL??? Yes/No		No			
PIT				PIPE	INLET CONTROL	OUTLET CONTROL			
	Pit Sill Level	28.4 m AHD		26.9	Invert Level	27.75 m AHD	Ke	0.5	Square edge
	Width	0.9 m			Dia	0.15 m	Kex	1.0	
	Length	0.9 m			barrels	1	Length	15.0 m	WL NWL =
	Area	0.81 m ²			Area	0.018 m ²	Tailwater Level	28.30 m AHD	WL TED =
	portion not taken by ba	62 %							
	Grill blockage factor	25 %				0.65	wetted perim	0.47 m	
	Weir blockage factor	25 %				-0.85	Hyd Radius	0.04 m	
Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE
NWL	28.4	0	0.000	0.000	0.575	0.039	0.100	0.011	0.00 m ³ /s
	28.45	0.05	0.246	0.051	0.625	0.041	0.150	0.013	0.01 m ³ /s
	28.5	0.1	0.348	0.145	0.675	0.042	0.200	0.015	0.01 m ³ /s
	28.55	0.15	0.426	0.267	0.725	0.044	0.250	0.017	0.02 m ³ /s
	28.6	0.2	0.492	0.411	0.775	0.045	0.300	0.018	0.02 m ³ /s
	28.65	0.25	0.551	0.574	0.825	0.047	0.350	0.020	0.02 m ³ /s
	28.7	0.3	0.603	0.754	0.875	0.048	0.400	0.021	0.02 m ³ /s
TEDD	28.75	0.35	0.651	0.950	0.925	0.050	0.450	0.022	0.02 m ³ /s
	28.8	0.4	0.696	1.161	0.975	0.051	0.500	0.024	0.02 m ³ /s
	28.85	0.45	0.739	1.386	1.025	0.052	0.550	0.025	0.02 m ³ /s
	28.9	0.5	0.779	1.623	1.075	0.054	0.600	0.026	0.03 m ³ /s
	28.95	0.55	0.817	1.872	1.125	0.055	0.650	0.027	0.03 m ³ /s
	29	0.6	0.853	2.133	1.175	0.056	0.700	0.028	0.03 m ³ /s
Sed Bund	29.05	0.65	0.888	2.405	1.225	0.057	0.750	0.029	0.03 m ³ /s
	29.1	0.7	0.921	2.688	1.275	0.058	0.800	0.030	0.03 m ³ /s
	29.15	0.75	0.954	2.981	1.325	0.059	0.850	0.031	0.03 m ³ /s
	29.2	0.8	0.985	3.284	1.375	0.061	0.900	0.032	0.03 m ³ /s
	29.25	0.85	1.015	3.597	1.425	0.062	0.950	0.033	0.03 m ³ /s
	29.3	0.9	1.045	3.919	1.475	0.063	1.000	0.033	0.03 m ³ /s
	29.35	0.95	1.073	4.250	1.525	0.064	1.050	0.034	0.03 m ³ /s
	29.4	1	1.101	4.590	1.575	0.065	1.100	0.035	0.04 m ³ /s



C-5-2 High Flow Bypass Pit and Pipe

Ignore the pit?? Yes/No		No		Are you Assuming INLET CONTROL??? Yes/No		No			
PIT				PIPE	INLET CONTROL	OUTLET CONTROL			
Pit Sill Level	28.75	m AHD		Invert Level	28.2	m AHD	Ke	0.5	Square edge
Width	1.2	m		Dia	0.45	m	Kex	1.0	
Length	1.2	m		barrels	2		Length	145.0	m
Area	1.44	m ²		Area	0.318	m ²	Tailwater Level	27.80	m AHD
portion not taken by ba	64	%					wetted perim	2.83	m
Grill blockage factor	25	%					Hyd Radius	0.11	m
Weir blockage factor	25	%							
Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE
28.75	0	0.000	0.000	0.000	0.325	0.530	0.950	0.427	0.00 m ³ /s
28.8	0.05	0.452	0.068	0.068	0.375	0.569	1.000	0.438	0.07 m ³ /s
28.85	0.1	0.639	0.194	0.194	0.425	0.606	1.050	0.449	0.19 m ³ /s
28.9	0.15	0.783	0.356	0.356	0.475	0.641	1.100	0.459	0.36 m ³ /s
28.95	0.2	0.904	0.547	0.547	0.525	0.674	1.150	0.470	0.47 m ³ /s
29	0.25	1.010	0.765	0.765	0.575	0.705	1.200	0.480	0.48 m ³ /s
29.05	0.3	1.107	1.006	1.006	0.625	0.735	1.250	0.490	0.49 m ³ /s
29.1	0.35	1.195	1.267	1.195	0.675	0.764	1.300	0.499	0.50 m ³ /s
29.15	0.4	1.278	1.548	1.278	0.725	0.792	1.350	0.509	0.51 m ³ /s
29.2	0.45	1.356	1.847	1.356	0.775	0.819	1.400	0.518	0.52 m ³ /s
29.25	0.5	1.429	2.164	1.429	0.825	0.845	1.450	0.527	0.53 m ³ /s
29.3	0.55	1.499	2.496	1.499	0.875	0.870	1.500	0.536	0.54 m ³ /s
29.35	0.6	1.565	2.844	1.565	0.925	0.894	1.550	0.545	0.55 m ³ /s
29.4	0.65	1.629	3.207	1.629	0.975	0.918	1.600	0.554	0.55 m ³ /s
29.45	0.7	1.691	3.584	1.691	1.025	0.941	1.650	0.562	0.56 m ³ /s
29.5	0.75	1.750	3.975	1.750	1.075	0.964	1.700	0.571	0.57 m ³ /s
29.55	0.8	1.807	4.379	1.807	1.125	0.986	1.750	0.579	0.58 m ³ /s
29.6	0.85	1.863	4.796	1.863	1.175	1.008	1.800	0.587	0.59 m ³ /s
29.65	0.9	1.917	5.225	1.917	1.225	1.029	1.850	0.596	0.60 m ³ /s
29.7	0.95	1.970	5.667	1.970	1.275	1.050	1.900	0.604	0.60 m ³ /s
29.75	1	2.021	6.120	2.021	1.325	1.070	1.950	0.611	0.61 m ³ /s



C-6 Sediment Pond F

C-6-1 Transfer Pit and Pipe

Ignore the pit?? Yes/No					Are you Assuming INLET CONTROL??? Yes/No				
PIT					PIPE				
Pit Sill Level	31.1	m AHD	29.6		Invert Level	30.45	m AHD	Ke	0.5
Width	0.9	m			Dia	0.15	m	Kex	1.0
Length	0.9	m			barrels	1		Length	15.0
Area	0.81	m ²			Area	0.018	m ²	Tailwater Level	31.35
portion not taken by ba	62	%							
Grill blockage factor	25	%				0.65		wetted perim	0.47
Weir blockage factor	25	%				-0.85		Hyd Radius	0.04
Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE
NWL	31.1	0	0.000	0.000	0.575	0.039	-0.250	#NUM!	#NUM!
	31.15	0.05	0.246	0.051	0.625	0.041	-0.200	#NUM!	#NUM!
	31.2	0.1	0.348	0.145	0.675	0.042	-0.150	#NUM!	#NUM!
	31.25	0.15	0.426	0.267	0.725	0.044	-0.100	#NUM!	#NUM!
	31.3	0.2	0.492	0.411	0.775	0.045	-0.050	#NUM!	#NUM!
	31.35	0.25	0.551	0.574	0.825	0.047	0.000	0.000	0.00
	31.4	0.3	0.603	0.754	0.875	0.048	0.050	0.007	0.01
TEDD	31.45	0.35	0.651	0.950	0.925	0.050	0.100	0.011	0.011
	31.5	0.4	0.696	1.161	0.975	0.051	0.150	0.013	0.01
	31.55	0.45	0.739	1.386	1.025	0.052	0.200	0.015	0.01
	31.6	0.5	0.779	1.623	1.075	0.054	0.250	0.017	0.02
	31.65	0.55	0.817	1.872	1.125	0.055	0.300	0.018	0.02
	31.7	0.6	0.853	2.133	1.175	0.056	0.350	0.020	0.02
Sed Bund	31.75	0.65	0.888	2.405	1.225	0.057	0.400	0.021	0.02
	31.8	0.7	0.921	2.688	1.275	0.058	0.450	0.022	0.02
	31.85	0.75	0.954	2.981	1.325	0.059	0.500	0.024	0.02
	31.9	0.8	0.985	3.284	1.375	0.061	0.550	0.025	0.02
	31.95	0.85	1.015	3.597	1.425	0.062	0.600	0.026	0.03
	32	0.9	1.045	3.919	1.475	0.063	0.650	0.027	0.03
	32.05	0.95	1.073	4.250	1.525	0.064	0.700	0.028	0.03
	32.1	1	1.101	4.590	1.575	0.065	0.750	0.029	0.03



C-6-2 High Flow Bypass Pit and Pipe

Ignore the pit??? Yes/No		No		Are you Assuming INLET CONTROL??? Yes/No			No			
PIT					PIPE	INLET CONTROL	OUTLET CONTROL			
	Pit Sill Level	31.45	m AHD		Invert Level	30.975	m AHD	Ke	0.5	Square edge
	Width	0.9	m		Dia	0.375	m	Kex	1.0	
	Length	0.9	m		barrels	2		Length	61.0	m
	Area	0.81	m ²		Area	0.221	m ²	Tailwater Level	30.45	m AHD
	portion not taken by be	62	%					wetted perim	2.36	m
	Grill blockage factor	25	%					Hyd Radius	0.09	m
	Weir blockage factor	25	%							
	Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow	TOTAL FLOW RATE
TEDD	31.45	0	0.000	0.000	0.000	0.288	0.346	1.000	0.391	0.00 m ³ /s
	31.5	0.05	0.246	0.051	0.051	0.338	0.375	1.050	0.401	0.05 m ³ /s
	31.55	0.1	0.348	0.145	0.145	0.388	0.402	1.100	0.411	0.15 m ³ /s
	31.6	0.15	0.426	0.267	0.267	0.438	0.427	1.150	0.420	0.27 m ³ /s
	31.65	0.2	0.492	0.411	0.411	0.488	0.451	1.200	0.429	0.41 m ³ /s
	31.7	0.25	0.551	0.574	0.551	0.538	0.473	1.250	0.438	0.44 m ³ /s
SED Bund	31.75	0.3	0.603	0.754	0.603	0.588	0.495	1.300	0.446	0.45 m ³ /s
	31.8	0.35	0.651	0.950	0.651	0.638	0.516	1.350	0.455	0.45 m ³ /s
	31.85	0.4	0.696	1.161	0.696	0.688	0.535	1.400	0.463	0.46 m ³ /s
	31.9	0.45	0.739	1.386	0.739	0.738	0.555	1.450	0.471	0.47 m ³ /s
	31.95	0.5	0.779	1.623	0.779	0.788	0.573	1.500	0.479	0.48 m ³ /s
	32	0.55	0.817	1.872	0.817	0.838	0.591	1.550	0.487	0.49 m ³ /s
	32.05	0.6	0.853	2.133	0.853	0.888	0.608	1.600	0.495	0.50 m ³ /s
	32.1	0.65	0.888	2.405	0.888	0.938	0.625	1.650	0.503	0.50 m ³ /s
	32.15	0.7	0.921	2.688	0.921	0.987	0.642	1.700	0.510	0.51 m ³ /s
	32.2	0.75	0.954	2.981	0.954	1.037	0.658	1.750	0.518	0.52 m ³ /s
	32.25	0.8	0.985	3.284	0.985	1.087	0.673	1.800	0.525	0.53 m ³ /s
	32.3	0.85	1.015	3.597	1.015	1.137	0.689	1.850	0.532	0.53 m ³ /s
	32.35	0.9	1.045	3.919	1.045	1.187	0.704	1.900	0.540	0.54 m ³ /s
	32.4	0.95	1.073	4.250	1.073	1.237	0.718	1.950	0.547	0.55 m ³ /s
	32.45	1	1.101	4.590	1.101	1.287	0.733	2.000	0.554	0.55 m ³ /s



C-7 Sediment Pond G

C-7-1 Transfer Pit and Pipe

	Ignore the pit?? Yes/No				No	Are you Assuming INLET CONTROL??? Yes/No				No		
	PIT					PIPE	INLET CONTROL	OUTLET CONTROL				
		Pit Sill Level	31	m AHD	29.5	Invert Level	30.35	m AHD	Ke	0.5	Square edge	
		Width	0.9	m		Dia	0.15	m	Kex	1.0		
		Length	0.9	m		barrels	1		Length	15.0	m	WL NWL =
		Area	0.81	m ²		Area	0.018	m ²	Tailwater Level	31.25	m AHD	WL TED =
		portion not taken by ba	62	%								
		Grill blockage factor	25	%			0.65		wetted perim	0.47	m	
		Weir blockage factor	25	%			-0.85		Hyd Radius	0.04	m	
	Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow		head loss	flow	TOTAL FLOW RATE	
NWL	31	0	0.000	0.000	0.000	0.575	0.039		-0.250	#NUM!	#NUM!	m ³ /s
	31.05	0.05	0.246	0.051	0.051	0.625	0.041		-0.200	#NUM!	#NUM!	m ³ /s
	31.1	0.1	0.348	0.145	0.145	0.675	0.042		-0.150	#NUM!	#NUM!	m ³ /s
	31.15	0.15	0.426	0.267	0.267	0.725	0.044		-0.100	#NUM!	#NUM!	m ³ /s
	31.2	0.2	0.492	0.411	0.411	0.775	0.045		-0.050	#NUM!	#NUM!	m ³ /s
	31.25	0.25	0.551	0.574	0.551	0.825	0.047		0.000	0.000	0.000	m ³ /s
	31.3	0.3	0.603	0.754	0.603	0.875	0.048		0.050	0.007	0.007	m ³ /s
TEDD	31.35	0.35	0.651	0.950	0.651	0.925	0.050		0.100	0.011	0.011	m ³ /s
	31.4	0.4	0.696	1.161	0.696	0.975	0.051		0.150	0.013	0.013	m ³ /s
	31.45	0.45	0.739	1.386	0.739	1.025	0.052		0.200	0.015	0.015	m ³ /s
	31.5	0.5	0.779	1.623	0.779	1.075	0.054		0.250	0.017	0.017	m ³ /s
	31.55	0.55	0.817	1.872	0.817	1.125	0.055		0.300	0.018	0.018	m ³ /s
	31.6	0.6	0.853	2.133	0.853	1.175	0.056		0.350	0.020	0.020	m ³ /s
Sed Bund	31.65	0.65	0.888	2.405	0.888	1.225	0.057		0.400	0.021	0.021	m ³ /s
	31.7	0.7	0.921	2.688	0.921	1.275	0.058		0.450	0.022	0.022	m ³ /s
	31.75	0.75	0.954	2.981	0.954	1.325	0.059		0.500	0.024	0.024	m ³ /s
	31.8	0.8	0.985	3.284	0.985	1.375	0.061		0.550	0.025	0.025	m ³ /s
	31.85	0.85	1.015	3.597	1.015	1.425	0.062		0.600	0.026	0.026	m ³ /s
	31.9	0.9	1.045	3.919	1.045	1.475	0.063		0.650	0.027	0.027	m ³ /s
	31.95	0.95	1.073	4.250	1.073	1.525	0.064		0.700	0.028	0.028	m ³ /s
	32	1	1.101	4.590	1.101	1.575	0.065		0.750	0.029	0.029	m ³ /s



C-7-2 High Flow Bypass Pit and Pipe

Ignore the pit?? Yes/No		No		Are you Assuming INLET CONTROL??? Yes/No		No			
PIT				PIPE		INLET CONTROL		OUTLET CONTROL	
	Pit Sill Level	31.35	m AHD		Invert Level	30.875	m AHD	Ke	0.5
	Width	1.8	m		Dia	0.375	m	Kex	1.0
	Length	0.9	m		barrels	3		Length	123.0
	Area	1.62	m ²		Area	0.331	m ²	Tailwater Level	30.43
	portion not taken by be	62	%						m AHD
	Grill blockage factor	25	%					wetted perim	3.53
	Weir blockage factor	25	%					Hyd Radius	0.09
	Height	Head	Orifice Flow	Weir Flow	total flow into pit	Head	Orifice Flow	head loss	flow
TEDD	31.35	0	0.000	0.000	0.000	0.288	0.519	0.925	0.424
	31.4	0.05	0.492	0.077	0.077	0.338	0.563	0.975	0.435
	31.45	0.1	0.696	0.218	0.218	0.388	0.603	1.025	0.446
	31.5	0.15	0.853	0.400	0.400	0.438	0.641	1.075	0.457
	31.55	0.2	0.985	0.616	0.616	0.488	0.676	1.125	0.468
	31.6	0.25	1.101	0.861	0.861	0.538	0.710	1.175	0.478
SED Bund	31.65	0.3	1.206	1.131	1.131	0.588	0.742	1.225	0.488
	31.7	0.35	1.303	1.426	1.303	0.638	0.773	1.275	0.498
	31.75	0.4	1.393	1.742	1.393	0.688	0.803	1.325	0.508
	31.8	0.45	1.477	2.078	1.477	0.738	0.832	1.375	0.517
	31.85	0.5	1.557	2.434	1.557	0.788	0.860	1.425	0.526
	31.9	0.55	1.633	2.808	1.633	0.838	0.886	1.475	0.536
	31.95	0.6	1.706	3.200	1.706	0.888	0.913	1.525	0.545
	32	0.65	1.775	3.608	1.775	0.938	0.938	1.575	0.553
	32.05	0.7	1.843	4.032	1.843	0.988	0.963	1.625	0.562
	32.1	0.75	1.907	4.472	1.907	1.038	0.987	1.675	0.571
	32.15	0.8	1.970	4.927	1.970	1.088	1.010	1.725	0.579
	32.2	0.85	2.030	5.396	2.030	1.138	1.033	1.775	0.588
	32.25	0.9	2.089	5.879	2.089	1.187	1.056	1.825	0.596
	32.3	0.95	2.146	6.375	2.146	1.237	1.078	1.875	0.604
	32.35	1	2.202	6.885	2.202	1.287	1.099	1.925	0.612



APPENDIX D SEDIMENT POND AND MACROPHYTE ZONE VELOCITY CHECKS





D-1 WLRB A

Sediment pond			Macrophyte Zone		
Q100yr =	8.42	m ³ /s	Q3month =	0.48	m ³ /s
			Q100yr =	8.42	m ³ /s
Width at the NWL =	13	m	Width at the NWL =	28	m
Width at the10Yr =	13	m	Width at the TED =	28.35	m
Average width =	13	m	Width at the10Yr =	28.35	m
NWL	22.8	m AHD	NWL =	22.8	m AHD
Water level at 10yr =	24.1	m AHD	TED =	23.15	m AHD
diff h =	1.3	m	Water level at 10yr =	24.1	m AHD
Cross section flow area =	16.9	m ²	Cross section flow area 3month =	9.86125	m ²
			Cross section flow area 100yr =	36.6275	m ²
V100yr	0.50	< 0.5 m/s	V100yr	0.23	< 0.5 m/s
			V3month	0.049	< 0.05 m/s

D-2 WLRB B

Sediment pond			Macrophyte Zone		
Q100yr =	9.34	m ³ /s	Q3month =	0.72	m ³ /s
			Q100yr =	9.34	m ³ /s
Width at the NWL =	22	m	Width at the NWL =	42	m
Width at the10Yr =	22	m	Width at the TED =	42.35	m
Average width =	22	m	Width at the10Yr =	42.35	m
NWL	27.85	m AHD	NWL =	27.85	m AHD
Water level at 10yr =	28.725	m AHD	TED =	28.2	m AHD
diff h =	0.875	m	Water level at 10yr =	28.725	m AHD
Cross section flow area =	19.25	m ²	Cross section flow area 3month =	14.76125	m ²
			Cross section flow area 100yr =	36.90313	m ²
V100yr	0.49	< 0.5 m/s	V100yr	0.25	< 0.5 m/s
			V3month	0.049	< 0.05 m/s



D-3 WLRB C

Sediment pond			Macrophyte Zone		
Q100yr =	8.3	m ³ /s	Q3month =	0.44	m ³ /s
			Q100yr =	8.3	m ³ /s
Width at the NWL =	23	m	Width at the NWL =	26	m
Width at the10Yr =	23	m	Width at the TED =	26.35	m
Average width =	23	m	Width at the10Yr =	26.35	m
NWL	26.45	m AHD	NWL =	26.45	m AHD
Water level at 10yr =	27.175	m AHD	TED =	26.8	m AHD
diff h =	0.725	m	Water level at 10yr =	27.175	m AHD
Cross section flow area =	16.675	m ²	Cross section flow area 3month =	9.16125	m ²
			Cross section flow area 100yr =	18.97688	m ²
V100yr	0.50	< 0.5 m/s	V100yr	0.44	< 0.5 m/s
			V3month	0.048	< 0.05 m/s

D-4 WLRB D

Sediment pond			Macrophyte Zone		
Q100yr =	3.26	m ³ /s	Q3month =	0.2	m ³ /s
			Q100yr =	3.26	m ³ /s
Width at the NWL =	11	m	Width at the NWL =	12	m
Width at the10Yr =	11	m	Width at the TED =	12.35	m
Average width =	11	m	Width at the10Yr =	12.35	m
NWL	22.1	m AHD	NWL =	22.1	m AHD
Water level at 10yr =	22.7	m AHD	TED =	22.45	m AHD
diff h =	0.6	m	Water level at 10yr =	22.7	m AHD
Cross section flow area =	6.6	m ²	Cross section flow area 3month =	4.26125	m ²
			Cross section flow area 100yr =	7.305	m ²
V100yr	0.49	< 0.5 m/s	V100yr	0.45	< 0.5 m/s
			V3month	0.047	< 0.05 m/s



D-5 WLRB E

Sediment pond			Macrophyte Zone		
Q100yr =	4.91	m ³ /s	Q3month =	0.28	m ³ /s
			Q100yr =	4.91	m ³ /s
Width at the NWL =	20	m	Width at the NWL =	16	m
Width at the10Yr =	20	m	Width at the TED =	16.35	m
Average width =	20	m	Width at the10Yr =	16.35	m
NWL	28.3	m AHD	NWL =	28.3	m AHD
Water level at 10yr =	29.1	m AHD	TED =	28.65	m AHD
diff h =	0.8	m	Water level at 10yr =	29.1	m AHD
Cross section flow area =	16	m ²	Cross section flow area 3month =	5.66125	m ²
			Cross section flow area 100yr =	12.94	m ²
V100yr	0.31	< 0.5 m/s	V100yr	0.38	< 0.5 m/s
			V3month	0.049	< 0.05 m/s

D-6 WLRB F

Sediment pond			Macrophyte Zone		
Q100yr =	3.54	m ³ /s	Q3month =	0.16	m ³ /s
			Q100yr =	3.54	m ³ /s
Width at the NWL =	18	m	Width at the NWL =	18	m
Width at the10Yr =	18	m	Width at the TED =	18.35	m
Average width =	18	m	Width at the10Yr =	18.35	m
NWL	31	m AHD	NWL =	31	m AHD
Water level at 10yr =	31.4	m AHD	TED =	31.35	m AHD
diff h =	0.4	m	Water level at 10yr =	31.4	m AHD
Cross section flow area =	7.2	m ²	Cross section flow area 3month =	6.36125	m ²
			Cross section flow area 100yr =	7.27	m ²
V100yr	0.49	< 0.5 m/s	V100yr	0.49	< 0.5 m/s
			V3month	0.025	< 0.05 m/s



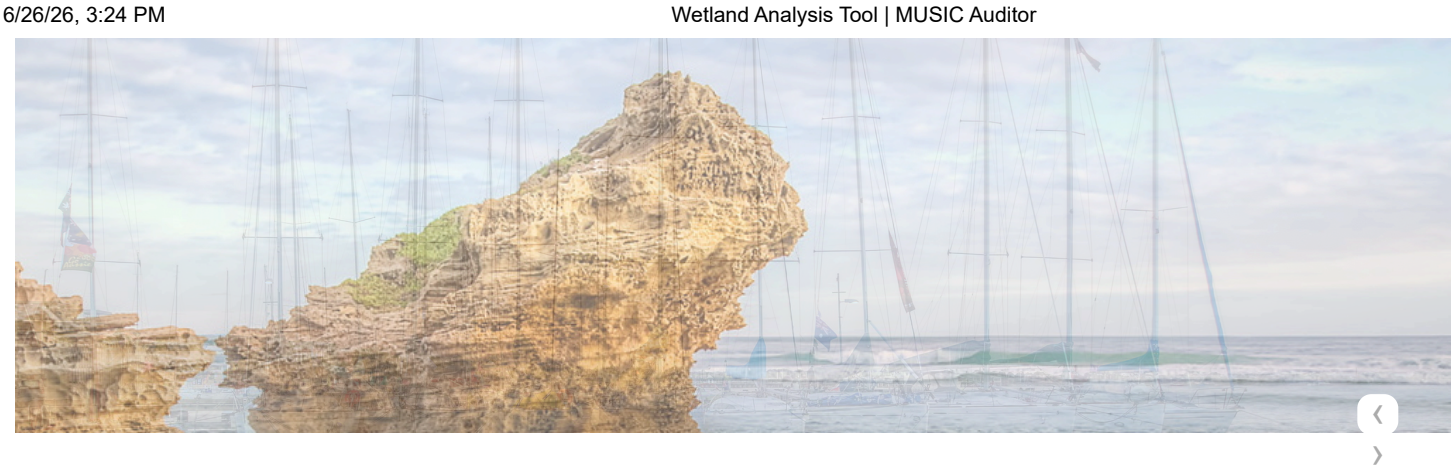
D-7 WLRB G

Sediment pond			Macrophyte Zone		
Q100yr =	3.32	m ³ /s	Q3month =	0.2	m ³ /s
			Q100yr =	3.32	m ³ /s
Width at the NWL =	15	m	Width at the NWL =	15	m
Width at the10Yr =	15	m	Width at the TED =	15.35	m
Average width =	15	m	Width at the10Yr =	15.35	m
NWL	30.9	m AHD	NWL =	30.9	m AHD
Water level at 10yr =	31.35	m AHD	TED =	31.25	m AHD
diff h =	0.45	m	Water level at 10yr =	31.35	m AHD
Cross section flow area =	6.75	m ²	Cross section flow area 3month =	5.31125	m ²
			Cross section flow area 100yr =	6.82875	m ²
V100yr	0.49	< 0.5 m/s	V100yr	0.49	< 0.5 m/s
			V3month	0.038	< 0.05 m/s



APPENDIX E WETLAND ANALYSIS TOOL REPORTS





Wetland Analysis Tool

Welcome to the Wetland Analysis Tool for checking compliance with the Melbourne Water Constructed Wetland Manual. This tool assesses the wetland depths relative to plant heights and the wetland residence time and advises whether the Deemed to Comply requirements are satisfied.

Please enter the 'Shallow marsh zone planting depth' and 'Deep marsh zone plating depth'.

Shallow Planting Depth0.15m

Deep Planting Depth0.35m

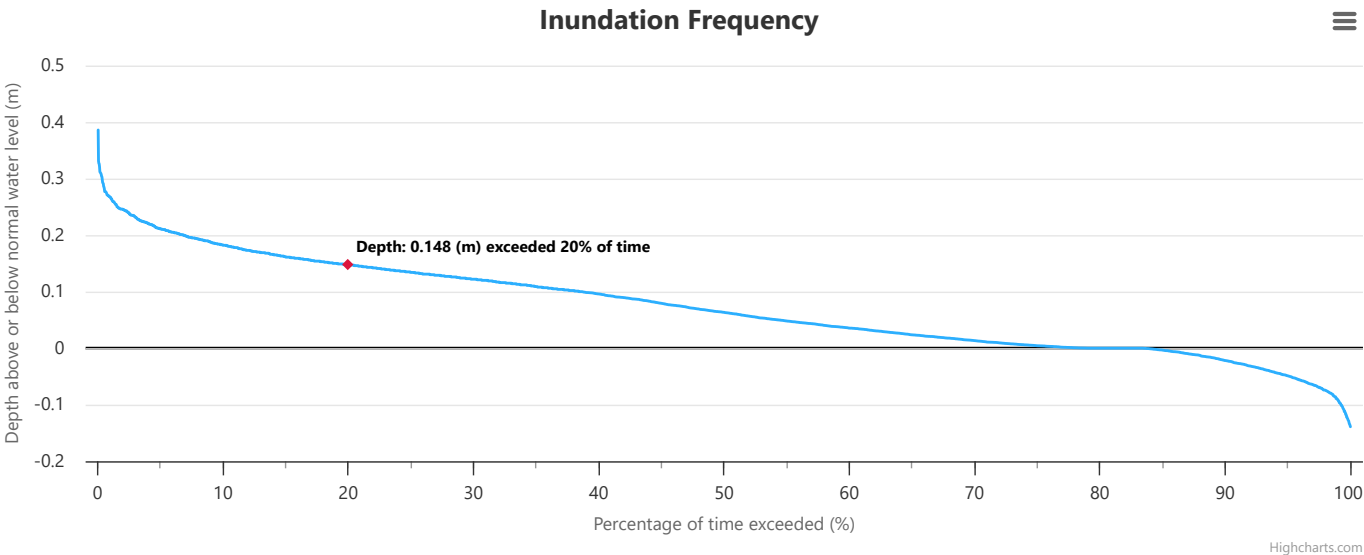
Please enter the permanent pool volume.

Permanent Pool Volume3500m

Please select the [daily flux file](#) generated in MUSIC for a wetland.
The file must be generated with MUSIC Version 6 and be a [DAILY](#) flux file. [Help](#)

Choose FileWetland A FD HSQ .csv

FILE IS UPLOADED



Highcharts.com

Please select at least 3 plants for each of the shallow and deep marsh zones.

Clear Selection

Name	Average plant height (m)	Shallow marsh plants	Deep marsh plants	Suitability
Sea Club-rush <i>Bolboschoenus caldwellii</i>	1	☐		Shallow Only
Jointed Club-rush <i>Baumea articulata</i>	1.8	☐	☐	Shallow and Deep

Tall Club-rush <i>Bolboschoenus fluviatilis</i>	1.8	☒	☐	
Marsh Club-rush <i>Bolboschoenus medianus</i>	1.5	☒	☐	
Leafy Twig-rush <i>Cladium procerum</i>	2	☒	☐	
River Club-rush <i>Schoenoplectus tabernaemontani</i>	1.8	☐	☐	
Water Ribbons <i>Triglochin procerum</i>	1	☐	☒	
Tall Spike-rush <i>Eleocharis sphacelata</i>	1.5		☒	Deep Only
Common reed <i>Phragmites australis</i>	2.5		☒	
Common Spike-rush <i>Eleocharis acuta</i>	0.5	☐		Unsuitable

Add user defined plant

Report

File: Wetland A FD HSQ .csv
Shallow marsh zone meets deemed to comply criteria

Deep marsh zone meets deemed to comply criteria

Water level exceeded for 20% of time: 0.148 m

Water level exceeded for 50% of time: 0.0634 m
·Warning: Effective normal water level is significantly above design normal water level. It is recommended that the effective water level of (xxx m) is adopted as the base for determining shallow and deep marsh zone depths and extents. It may be desirable to adjust the bypasses, outlet design or wetland size to reduce the difference in design and effective normal water level.

90th Percentile Residence Time: 2 days

☒ Spells Analysis?

Spells Analysis

Please see [water levels and spells for wetland plants](#) for preliminary guidance on suitable water level spells
Note: depth threshold of 0 corresponds to normal water level
Find spells with water level that is:

Depth threshold(m)

>= ▾

0.3

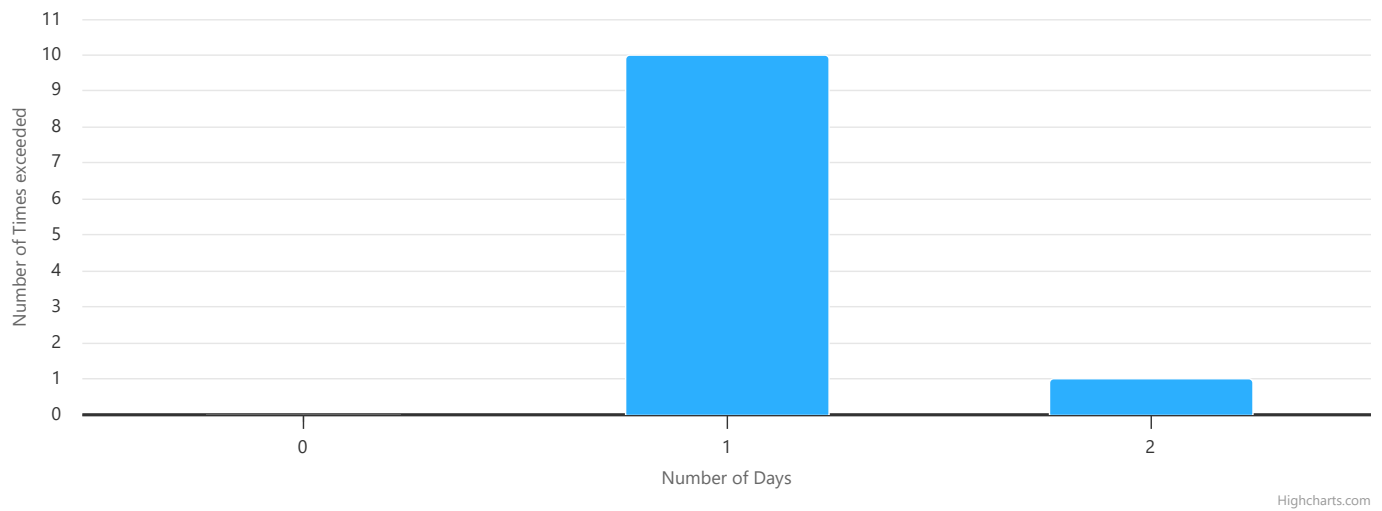
+

Add depth threshold

Clear Selection

Spells Threshold Results

Spells Threshold ≥ 0.3 m





Wetland Analysis Tool

Welcome to the Wetland Analysis Tool for checking compliance with the Melbourne Water Constructed Wetland Manual. This tool assesses the wetland depths relative to plant heights and the wetland residence time and advises whether the Deemed to Comply requirements are satisfied.

Please enter the '[Shallow marsh zone planting depth](#)' and '[Deep marsh zone plating depth](#)'.

Shallow Planting Depth m

Deep Planting Depth m

Please enter the permanent pool volume.

Permanent Pool Volume m³

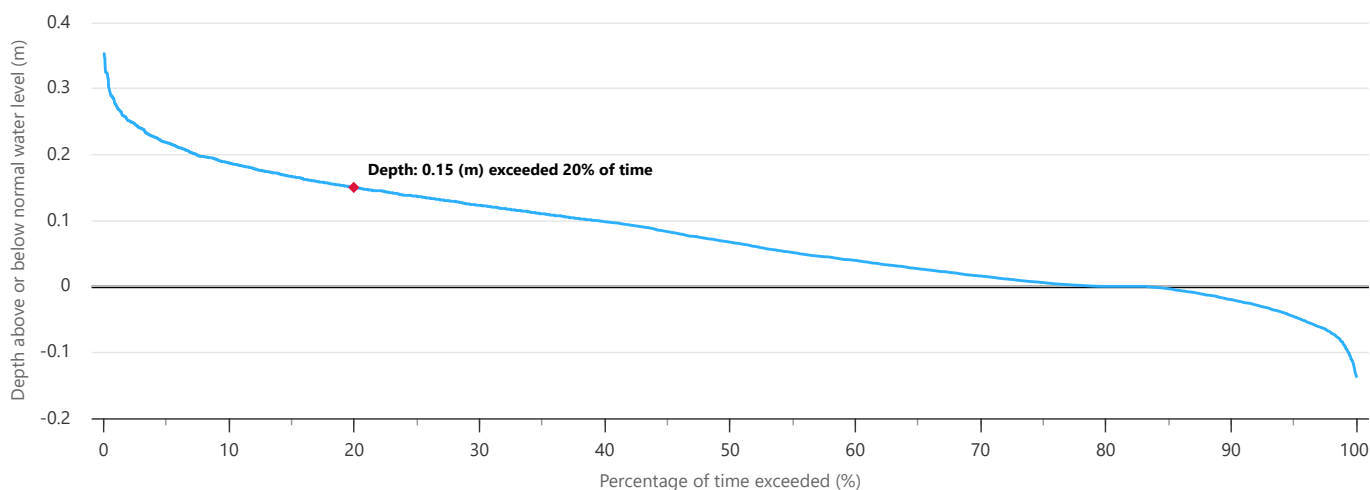
Please select the [daily flux file](#) generated in MUSIC for a wetland.

The file must be generated with MUSIC Version 6 and be a [DAILY](#) flux file. [Help](#)

Wetland B FD HSQ .csv

FILE IS UPLOADED

Inundation Frequency



Highcharts.com

Please select at least 3 plants for each of the shallow and deep marsh zones.

Name	Average plant height (m)	Shallow marsh plants	Deep marsh plants	Suitability
Sea Club-rush <i>Bolboschoenus caldwellii</i>	1	☐		Shallow Only
Jointed Club-rush <i>Baumea articulata</i>	1.8	☐	☐	Shallow and Deep

Tall Club-rush <i>Bolboschoenus fluviatilis</i>	1.8	☐	☐	
Marsh Club-rush <i>Bolboschoenus medianus</i>	1.5	☐	☐	
Leafy Twig-rush <i>Cladium procerum</i>	2	☐	☐	
River Club-rush <i>Schoenoplectus tabernaemontani</i>	1.8	☐	☐	
Water Ribbons <i>Triglochin procerum</i>	1	☐	☐	
Tall Spike-rush <i>Eleocharis sphacelata</i>	1.5		☐	Deep Only
Common reed <i>Phragmites australis</i>	2.5		☐	
Common Spike-rush <i>Eleocharis acuta</i>	0.5	☒		Unsuitable

Add user defined plant

Report

File: Wetland B FD HSQ .csv

Shallow marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Deep marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Water level exceeded for 20% of time: 0.15 m

Water level exceeded for 50% of time: 0.06705 m

·Warning: Effective normal water level is significantly above design normal water level. It is recommended that the effective water level of (xxx m) is adopted as the base for determining shallow and deep marsh zone depths and extents. It may be desirable to adjust the bypasses, outlet design or wetland size to reduce the difference in design and effective normal water level.

90th Percentile Residence Time: 2 days

☒ Spells Analysis?

Spells Analysis

Please see [water levels and spells for wetland plants](#) for preliminary guidance on suitable water level spells

Note: depth threshold of 0 corresponds to normal water level

Find spells with water level that is:

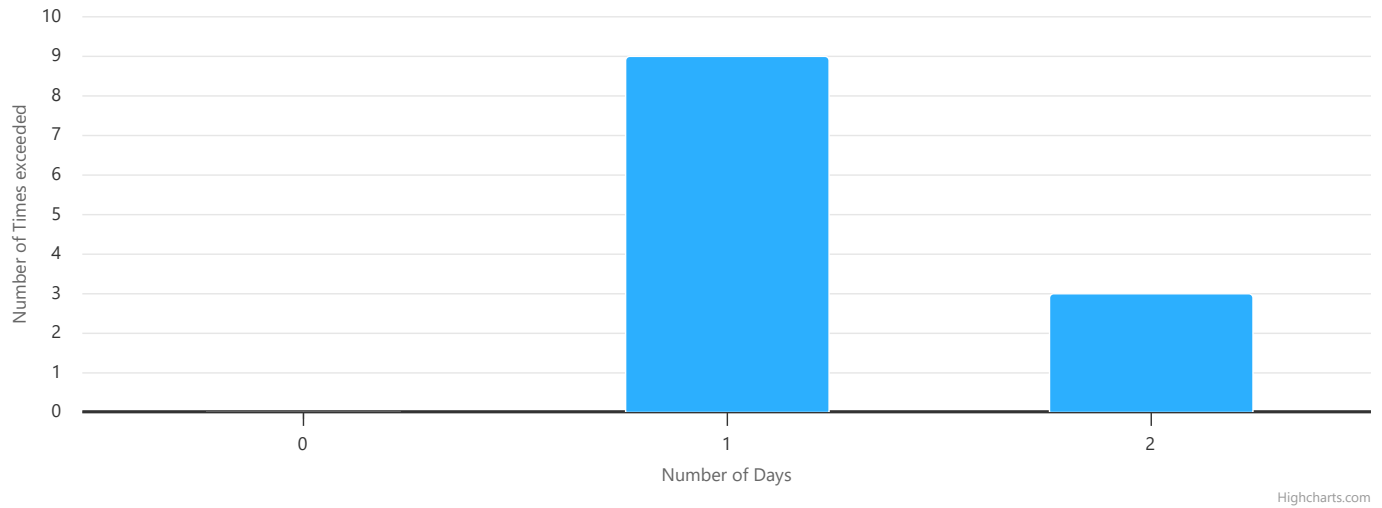
Depth threshold(m)

>= 0.3

Add depth threshold

Spells Threshold Results

Spells Threshold ≥ 0.3 m





Wetland Analysis Tool

Welcome to the Wetland Analysis Tool for checking compliance with the Melbourne Water Constructed Wetland Manual. This tool assesses the wetland depths relative to plant heights and the wetland residence time and advises whether the Deemed to Comply requirements are satisfied.

Please enter the 'Shallow marsh zone planting depth' and 'Deep marsh zone plating depth'.

Shallow Planting Depth m

Deep Planting Depth m

Please enter the permanent pool volume.

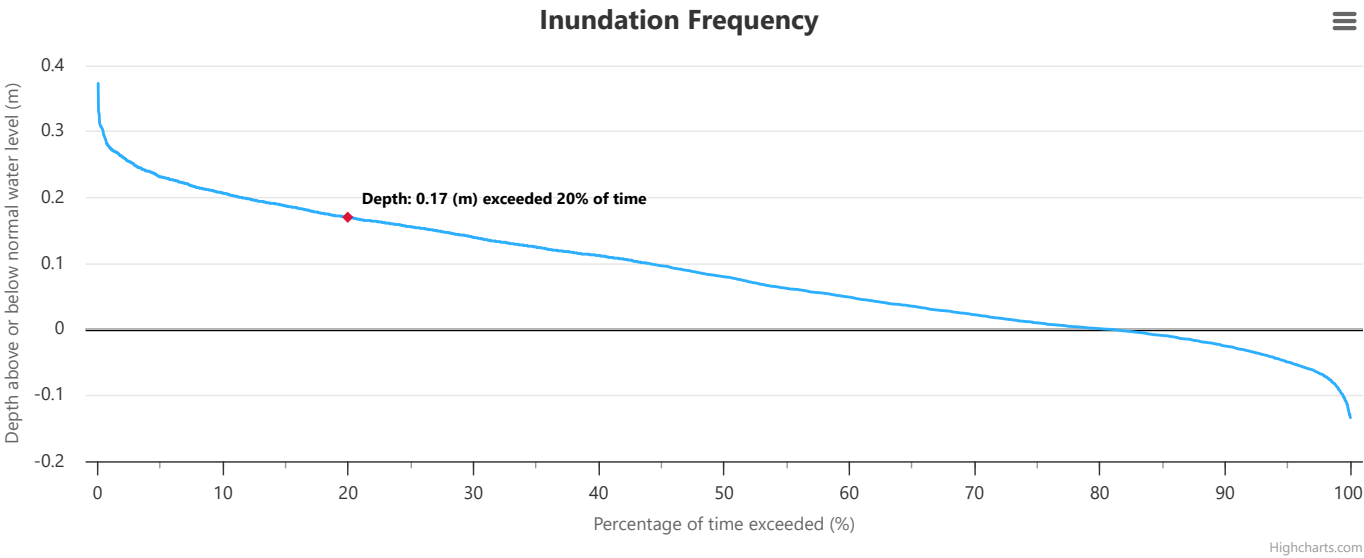
Permanent Pool Volume m³

Please select the [daily flux file](#) generated in MUSIC for a wetland.
The file must be generated with MUSIC Version 6 and be a [DAILY](#) flux file. [Help](#)

Choose File

Wetland C FD HSQ .csv

FILE IS UPLOADED



Please select at least 3 plants for each of the shallow and deep marsh zones.

Clear Selection

Name	Average plant height (m)	Shallow marsh plants	Deep marsh plants	Suitability
Sea Club-rush <i>Bolboschoenus caldwellii</i>	1	☐		Shallow Only
Water Ribbons <i>Triglochin procerum</i>	1	☐	☐	

Jointed Club-rush <i>Baumea articulata</i>	1.8	☐	☐	
Tall Club-rush <i>Bolboschoenus fluviatilis</i>	1.8	☐	☐	
Marsh Club-rush <i>Bolboschoenus medianus</i>	1.5	☐	☐	Shallow and Deep
Leafy Twig-rush <i>Cladium procerum</i>	2	☐	☐	
River Club-rush <i>Schoenoplectus tabernaemontani</i>	1.8	☐	☐	
Tall Spike-rush <i>Eleocharis sphacelata</i>	1.5		☐	Deep Only
Common reed <i>Phragmites australis</i>	2.5		☐	
Common Spike-rush <i>Eleocharis acuta</i>	0.5	☒		Unsuitable

Add user defined plant

Report

File: Wetland C FD HSQ .csv

Shallow marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Deep marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Water level exceeded for 20% of time: 0.17 m

Water level exceeded for 50% of time: 0.07975 m

·Warning: Effective normal water level is significantly above design normal water level. It is recommended that the effective water level of (xxx m) is adopted as the base for determining shallow and deep marsh zone depths and extents. It may be desirable to adjust the bypasses, outlet design or wetland size to reduce the difference in design and effective normal water level.

90th Percentile Residence Time: 3 days

☐ Spells Analysis?



Wetland Analysis Tool

Welcome to the Wetland Analysis Tool for checking compliance with the Melbourne Water Constructed Wetland Manual. This tool assesses the wetland depths relative to plant heights and the wetland residence time and advises whether the Deemed to Comply requirements are satisfied.

Please enter the 'Shallow marsh zone planting depth' and 'Deep marsh zone plating depth'.

Shallow Planting Depth m

Deep Planting Depth m

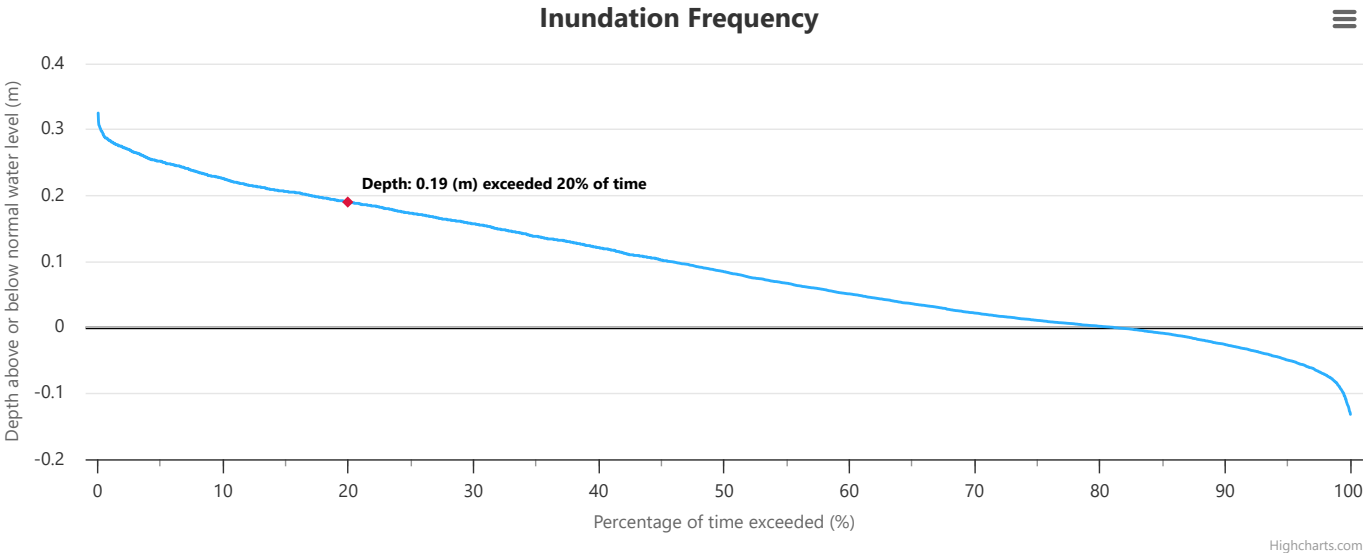
Please enter the permanent pool volume.

Permanent Pool Volume m³

Please select the [daily flux file](#) generated in MUSIC for a wetland.
The file must be generated with MUSIC Version 6 and be a [DAILY](#) flux file. [Help](#)

Choose File

FILE IS UPLOADED



Please select at least 3 plants for each of the shallow and deep marsh zones.

Clear Selection

Name	Average plant height (m)	Shallow marsh plants	Deep marsh plants	Suitability
Sea Club-rush <i>Bolboschoenus caldwellii</i>	1	☐		Shallow Only
Water Ribbons <i>Triglochin procerum</i>	1	☐	☐	

Jointed Club-rush <i>Baumea articulata</i>	1.8	☐	☐	
Tall Club-rush <i>Bolboschoenus fluviatilis</i>	1.8	☐	☐	
Marsh Club-rush <i>Bolboschoenus medianus</i>	1.5	☒	☐	Shallow and Deep
Leafy Twig-rush <i>Cladium procerum</i>	2	☐	☐	
River Club-rush <i>Schoenoplectus tabernaemontani</i>	1.8	☐	☐	
Tall Spike-rush <i>Eleocharis sphacelata</i>	1.5		☐	Deep Only
Common reed <i>Phragmites australis</i>	2.5		☐	
Common Spike-rush <i>Eleocharis acuta</i>	0.5	☐		Unsuitable

Add user defined plant

Report

File: Wetland D FD HSQ .csv

Shallow marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Deep marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Water level exceeded for 20% of time: 0.19 m

Water level exceeded for 50% of time: 0.08425 m

·Warning: Effective normal water level is significantly above design normal water level. It is recommended that the effective water level of (xxx m) is adopted as the base for determining shallow and deep marsh zone depths and extents. It may be desirable to adjust the bypasses, outlet design or wetland size to reduce the difference in design and effective normal water level.

90th Percentile Residence Time: 2 days

☒ Spells Analysis?

Spells Analysis

Please see [water levels and spells for wetland plants](#) for preliminary guidance on suitable water level spells

Note: depth threshold of 0 corresponds to normal water level

Find spells with water level that is:

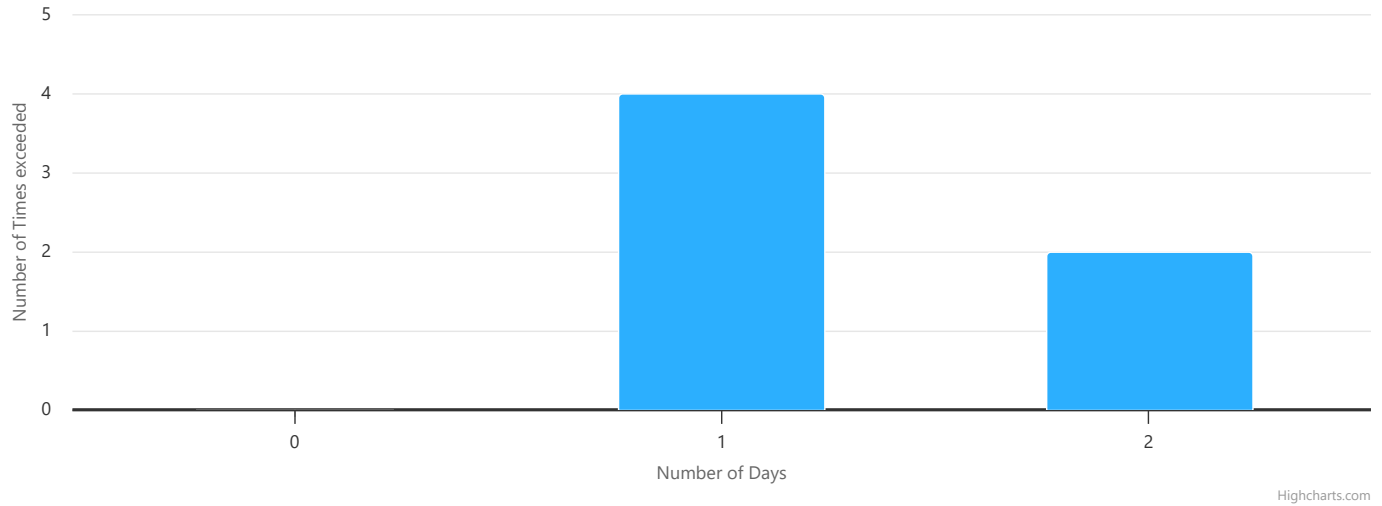
Depth threshold(m)

>= 0.3

Add depth threshold

Spells Threshold Results

Spells Threshold ≥ 0.3 m





Wetland Analysis Tool

Welcome to the Wetland Analysis Tool for checking compliance with the Melbourne Water Constructed Wetland Manual. This tool assesses the wetland depths relative to plant heights and the wetland residence time and advises whether the Deemed to Comply requirements are satisfied.

Please enter the 'Shallow marsh zone planting depth' and 'Deep marsh zone plating depth'.

Shallow Planting Depth m

Deep Planting Depth m

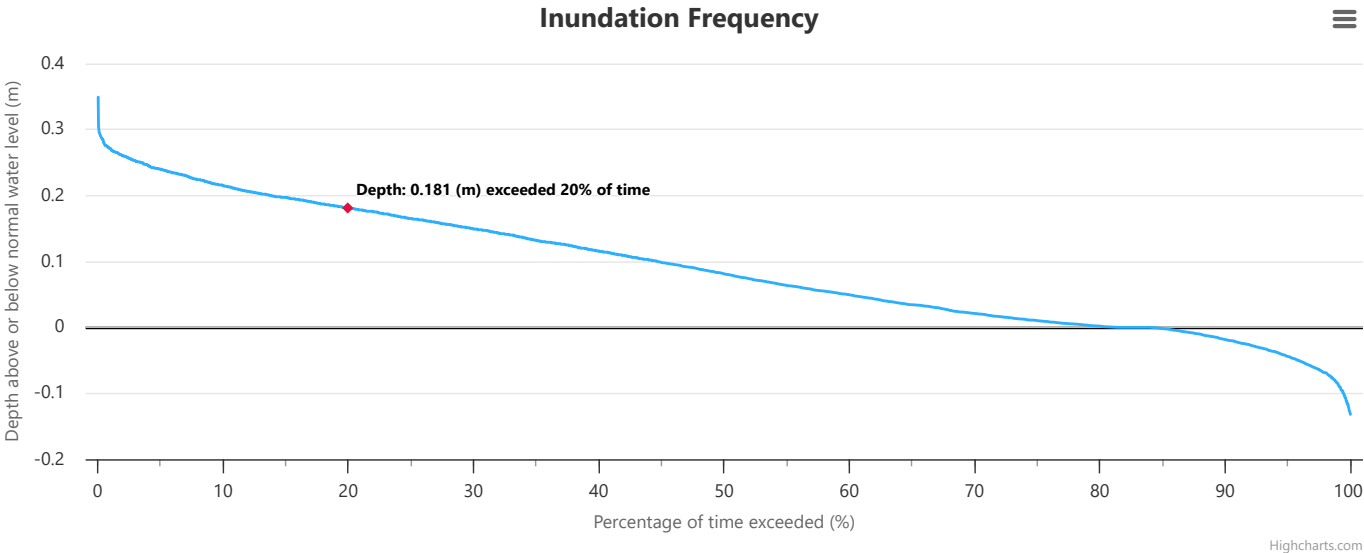
Please enter the permanent pool volume.

Permanent Pool Volume m³

Please select the [daily flux file](#) generated in MUSIC for a wetland.
The file must be generated with MUSIC Version 6 and be a [DAILY](#) flux file. [Help](#)

Choose File

FILE IS UPLOADED



Please select at least 3 plants for each of the shallow and deep marsh zones.

Clear Selection

Name	Average plant height (m)	Shallow marsh plants	Deep marsh plants	Suitability
Sea Club-rush <i>Bolboschoenus caldwellii</i>	1	☐		Shallow Only
Water Ribbons <i>Triglochin procerum</i>	1	☐	☐	

Jointed Club-rush <i>Baumea articulata</i>	1.8	☐	☐	
Tall Club-rush <i>Bolboschoenus fluviatilis</i>	1.8	☐	☐	
Marsh Club-rush <i>Bolboschoenus medianus</i>	1.5	☒	☐	Shallow and Deep
Leafy Twig-rush <i>Cladium procerum</i>	2	☐	☐	
River Club-rush <i>Schoenoplectus tabernaemontani</i>	1.8	☐	☐	
Tall Spike-rush <i>Eleocharis sphacelata</i>	1.5		☐	Deep Only
Common reed <i>Phragmites australis</i>	2.5		☐	
Common Spike-rush <i>Eleocharis acuta</i>	0.5	☐		Unsuitable

Add user defined plant

Report

File: Wetland E FD HSQ .csv
Shallow marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

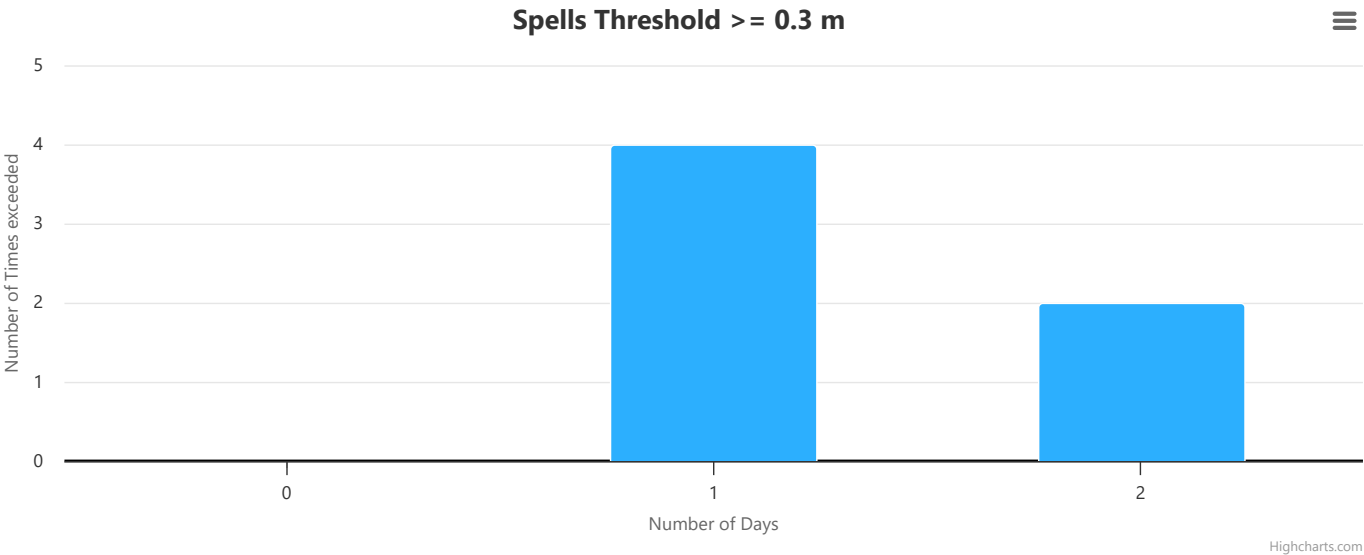
Deep marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Water level exceeded for 20% of time: 0.181 m

Water level exceeded for 50% of time: 0.08115 m
·Warning: Effective normal water level is significantly above design normal water level. It is recommended that the effective water level of (xxx m) is adopted as the base for determining shallow and deep marsh zone depths and extents. It may be desirable to adjust the bypasses, outlet design or wetland size to reduce the difference in design and effective normal water level.

90th Percentile Residence Time: 2 days

☒ Spells Analysis?
Spells Threshold Results





Wetland Analysis Tool

Welcome to the Wetland Analysis Tool for checking compliance with the Melbourne Water Constructed Wetland Manual. This tool assesses the wetland depths relative to plant heights and the wetland residence time and advises whether the Deemed to Comply requirements are satisfied.

Please enter the 'Shallow marsh zone planting depth' and 'Deep marsh zone plating depth'.

Shallow Planting Depth m

Deep Planting Depth m

Please enter the permanent pool volume.

Permanent Pool Volume m³

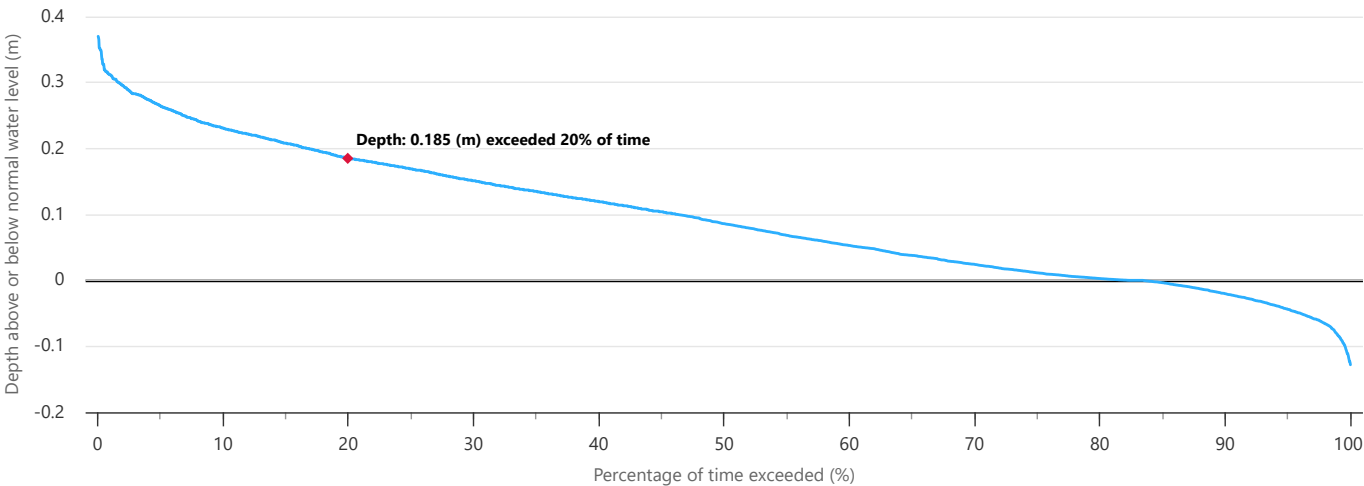
Please select the [daily flux file](#) generated in MUSIC for a wetland.
The file must be generated with MUSIC Version 6 and be a [DAILY](#) flux file. [Help](#)

Choose File

Wetland F FD HSQ .csv

FILE IS UPLOADED

Inundation Frequency



Highcharts.com

Please select at least 3 plants for each of the shallow and deep marsh zones.

Clear Selection

Name	Average plant height (m)	Shallow marsh plants	Deep marsh plants	Suitability
Sea Club-rush <i>Bolboschoenus caldwellii</i>	1	☐		Shallow Only
Water Ribbons <i>Triglochin procerum</i>	1	☐	☐	

Jointed Club-rush <i>Baumea articulata</i>	1.8	☐	☐	
Tall Club-rush <i>Bolboschoenus fluviatilis</i>	1.8	☐	☐	
Marsh Club-rush <i>Bolboschoenus medianus</i>	1.5	☒	☐	Shallow and Deep
Leafy Twig-rush <i>Cladium procerum</i>	2	☐	☐	
River Club-rush <i>Schoenoplectus tabernaemontani</i>	1.8	☐	☐	
Tall Spike-rush <i>Eleocharis sphacelata</i>	1.5		☐	Deep Only
Common reed <i>Phragmites australis</i>	2.5		☐	
Common Spike-rush <i>Eleocharis acuta</i>	0.5	☐		Unsuitable

Add user defined plant

Report

File: Wetland F FD HSQ .csv

Shallow marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Deep marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Water level exceeded for 20% of time: 0.185 m

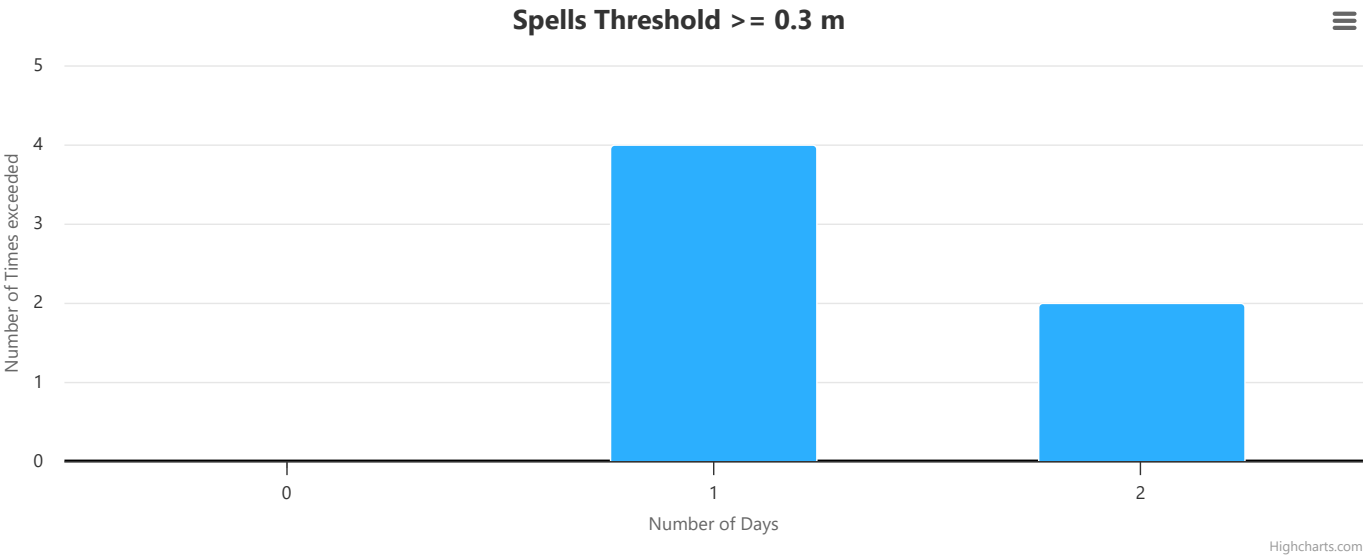
Water level exceeded for 50% of time: 0.0859 m

·Warning: Effective normal water level is significantly above design normal water level. It is recommended that the effective water level of (xxx m) is adopted as the base for determining shallow and deep marsh zone depths and extents. It may be desirable to adjust the bypasses, outlet design or wetland size to reduce the difference in design and effective normal water level.

90th Percentile Residence Time: 2 days

☒ Spells Analysis?

Spells Threshold Results





Wetland Analysis Tool

Welcome to the Wetland Analysis Tool for checking compliance with the Melbourne Water Constructed Wetland Manual. This tool assesses the wetland depths relative to plant heights and the wetland residence time and advises whether the Deemed to Comply requirements are satisfied.

Please enter the 'Shallow marsh zone planting depth' and 'Deep marsh zone plating depth'.

Shallow Planting Depth m

Deep Planting Depth m

Please enter the permanent pool volume.

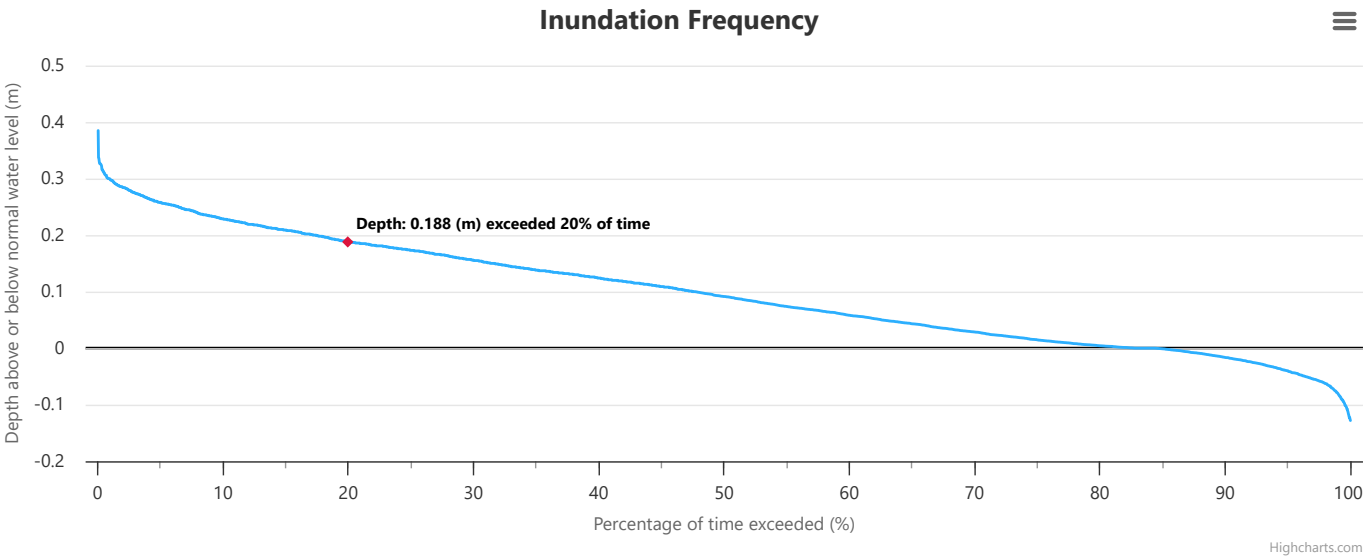
Permanent Pool Volume m³

Please select the [daily flux file](#) generated in MUSIC for a wetland.
The file must be generated with MUSIC Version 6 and be a [DAILY](#) flux file. [Help](#)

Choose File

Wetland G FD HSQ .csv

FILE IS UPLOADED



Please select at least 3 plants for each of the shallow and deep marsh zones.

Clear Selection

Name	Average plant height (m)	Shallow marsh plants	Deep marsh plants	Suitability
Sea Club-rush <i>Bolboschoenus caldwellii</i>	1	☐		Shallow Only
Water Ribbons <i>Triglochin procerum</i>	1	☐	☐	

Jointed Club-rush <i>Baumea articulata</i>	1.8	☐	☐	
Tall Club-rush <i>Bolboschoenus fluviatilis</i>	1.8	☐	☐	
Marsh Club-rush <i>Bolboschoenus medianus</i>	1.5	☒	☐	Shallow and Deep
Leafy Twig-rush <i>Cladium procerum</i>	2	☐	☐	
River Club-rush <i>Schoenoplectus tabernaemontani</i>	1.8	☐	☐	
Tall Spike-rush <i>Eleocharis sphacelata</i>	1.5		☐	Deep Only
Common reed <i>Phragmites australis</i>	2.5		☐	
Common Spike-rush <i>Eleocharis acuta</i>	0.5	☐		Unsuitable

Add user defined plant

Report

File: Wetland G FD HSQ .csv

Shallow marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Deep marsh zone does not meet the deemed to comply criteria, please select at least 3 plants

Water level exceeded for 20% of time: 0.188 m

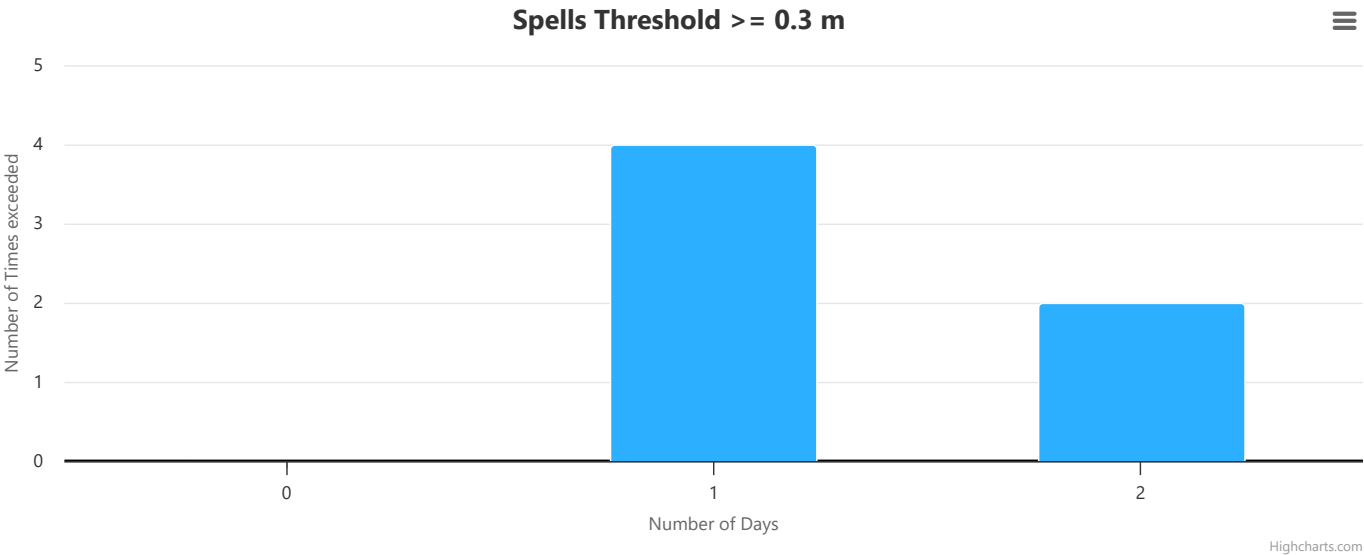
Water level exceeded for 50% of time: 0.0914 m

·Warning: Effective normal water level is significantly above design normal water level. It is recommended that the effective water level of (xxx m) is adopted as the base for determining shallow and deep marsh zone depths and extents. It may be desirable to adjust the bypasses, outlet design or wetland size to reduce the difference in design and effective normal water level.

90th Percentile Residence Time: 2 days

☒ Spells Analysis?

Spells Threshold Results

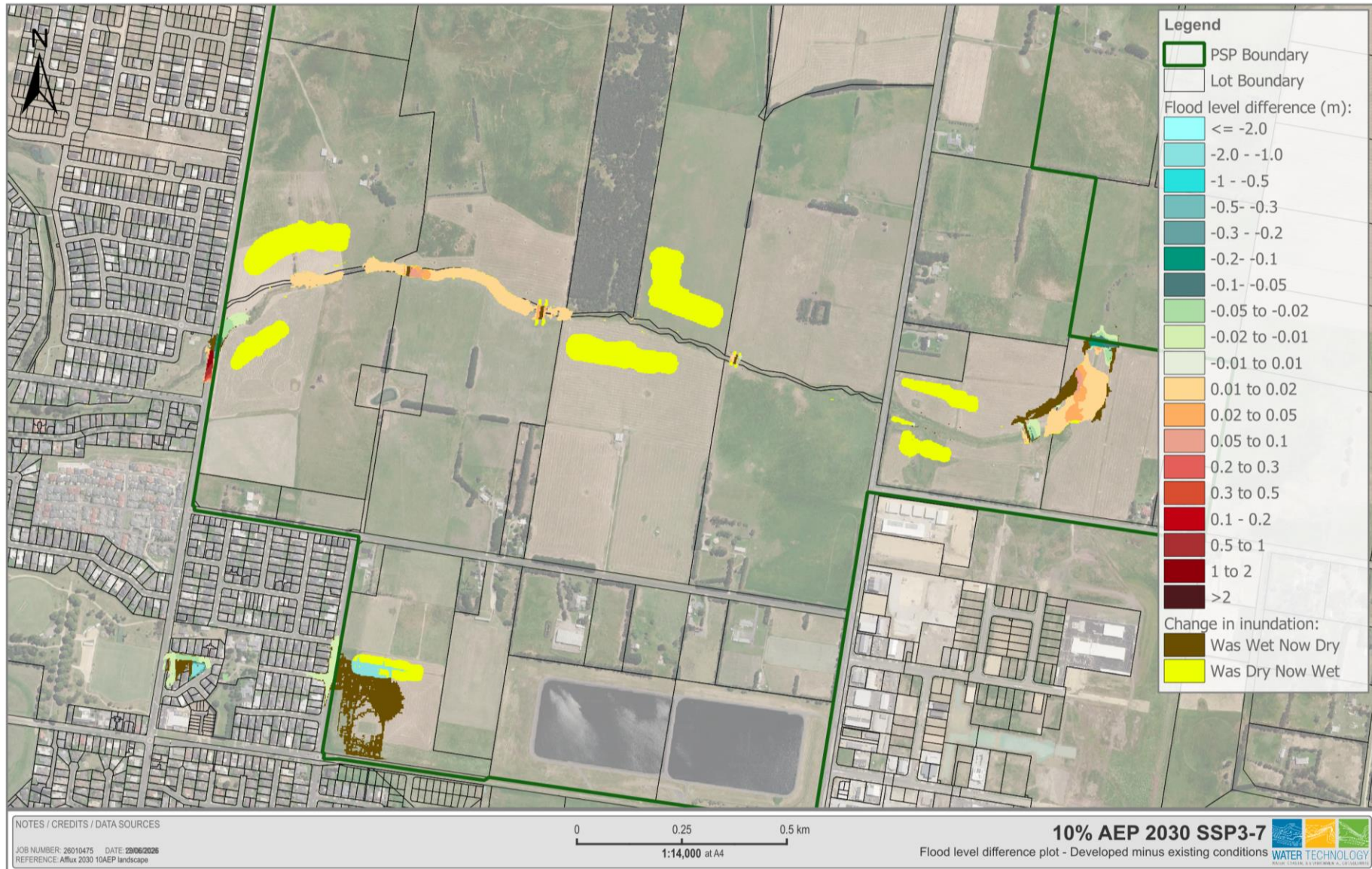


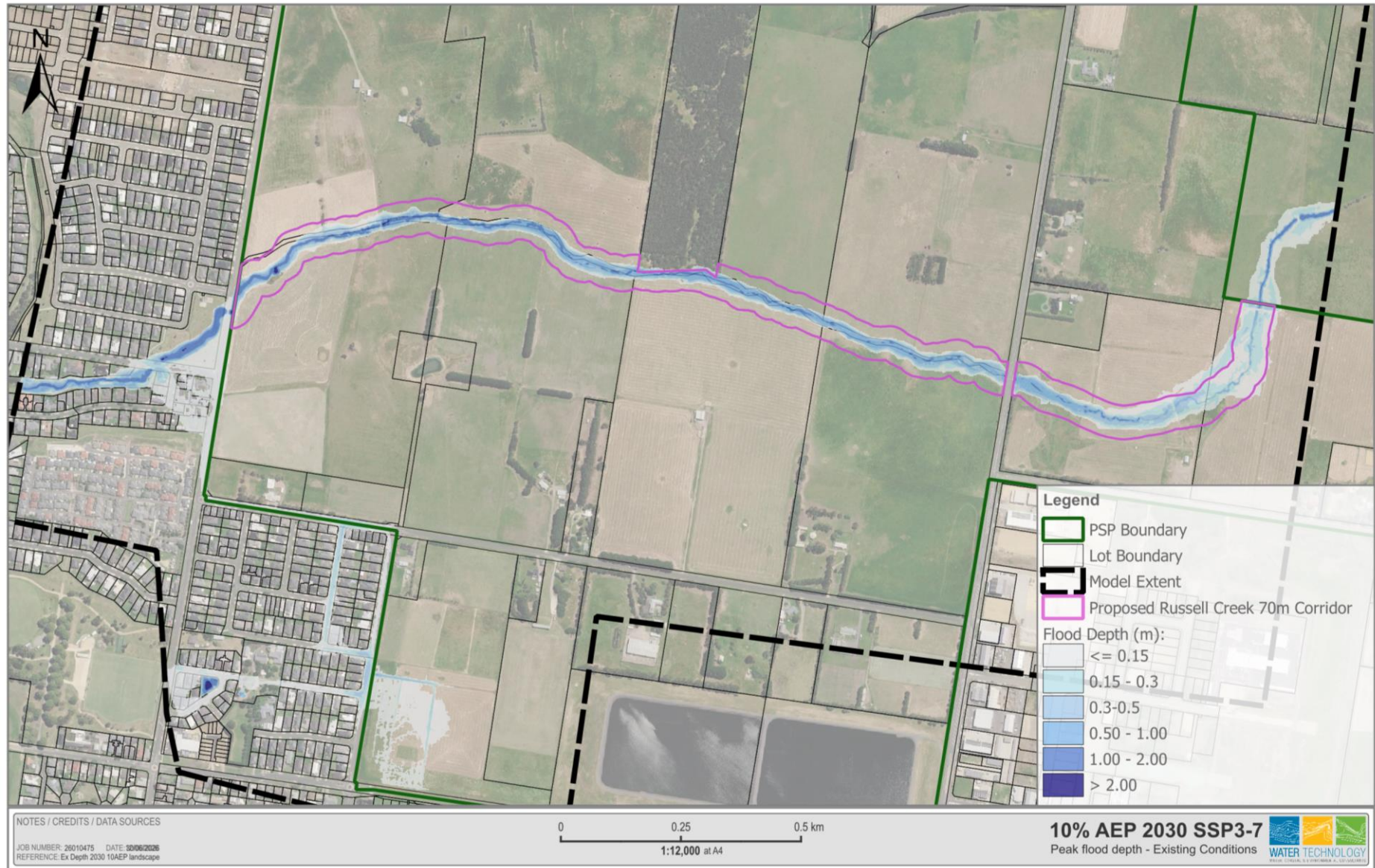


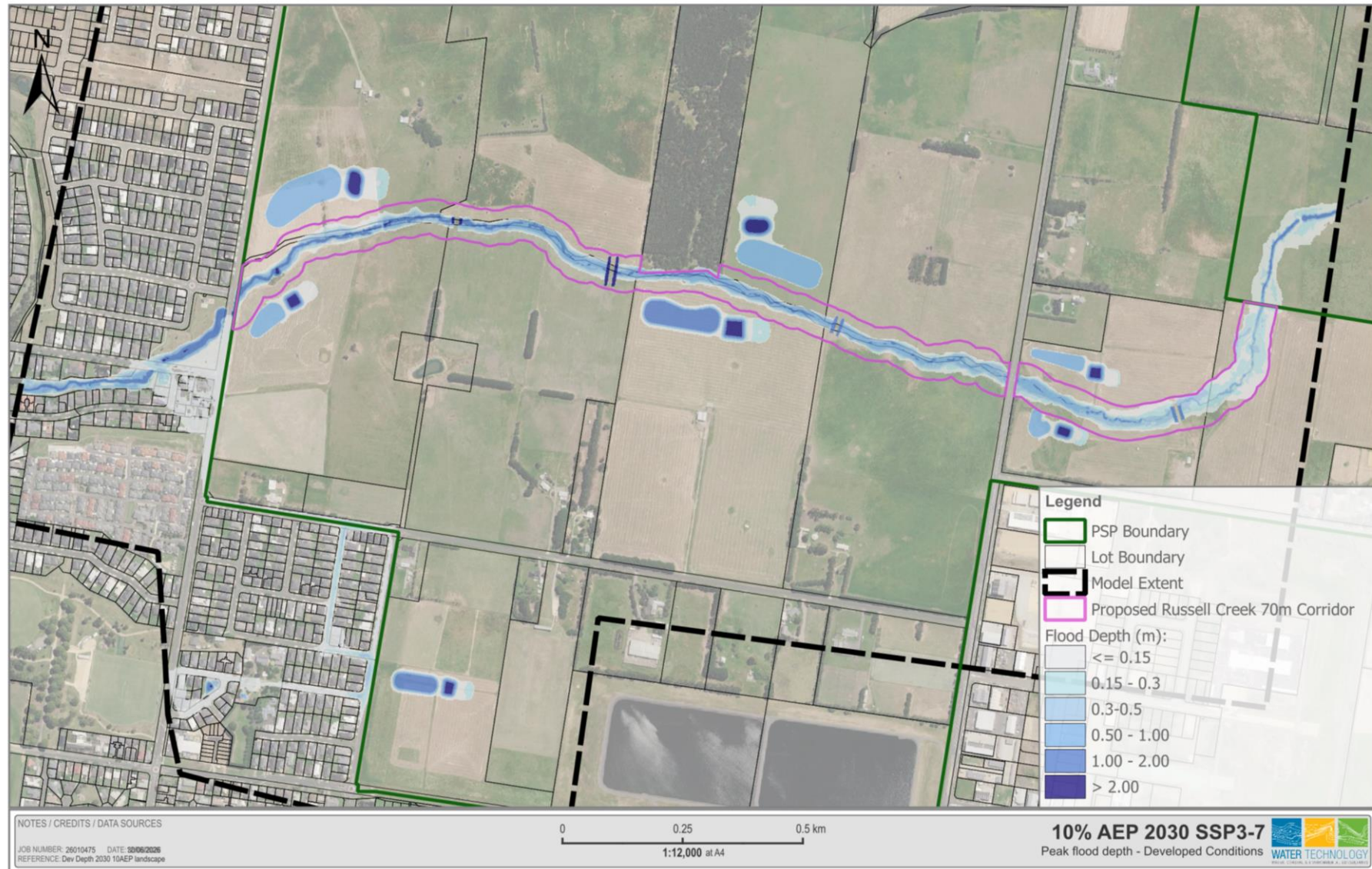
APPENDIX F

10% AEP AND 20% AEP TUFLOW RESULT PLOTS

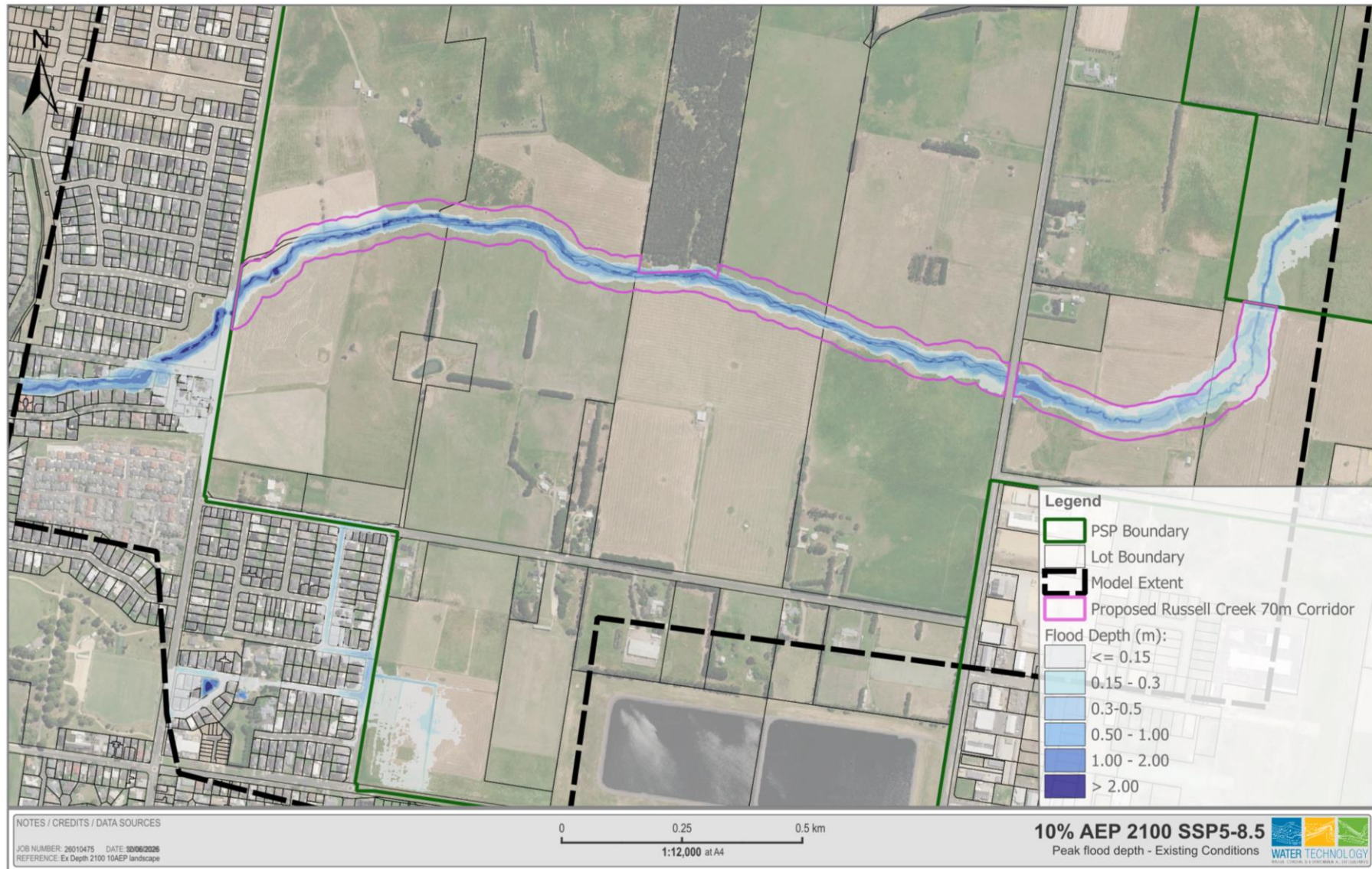


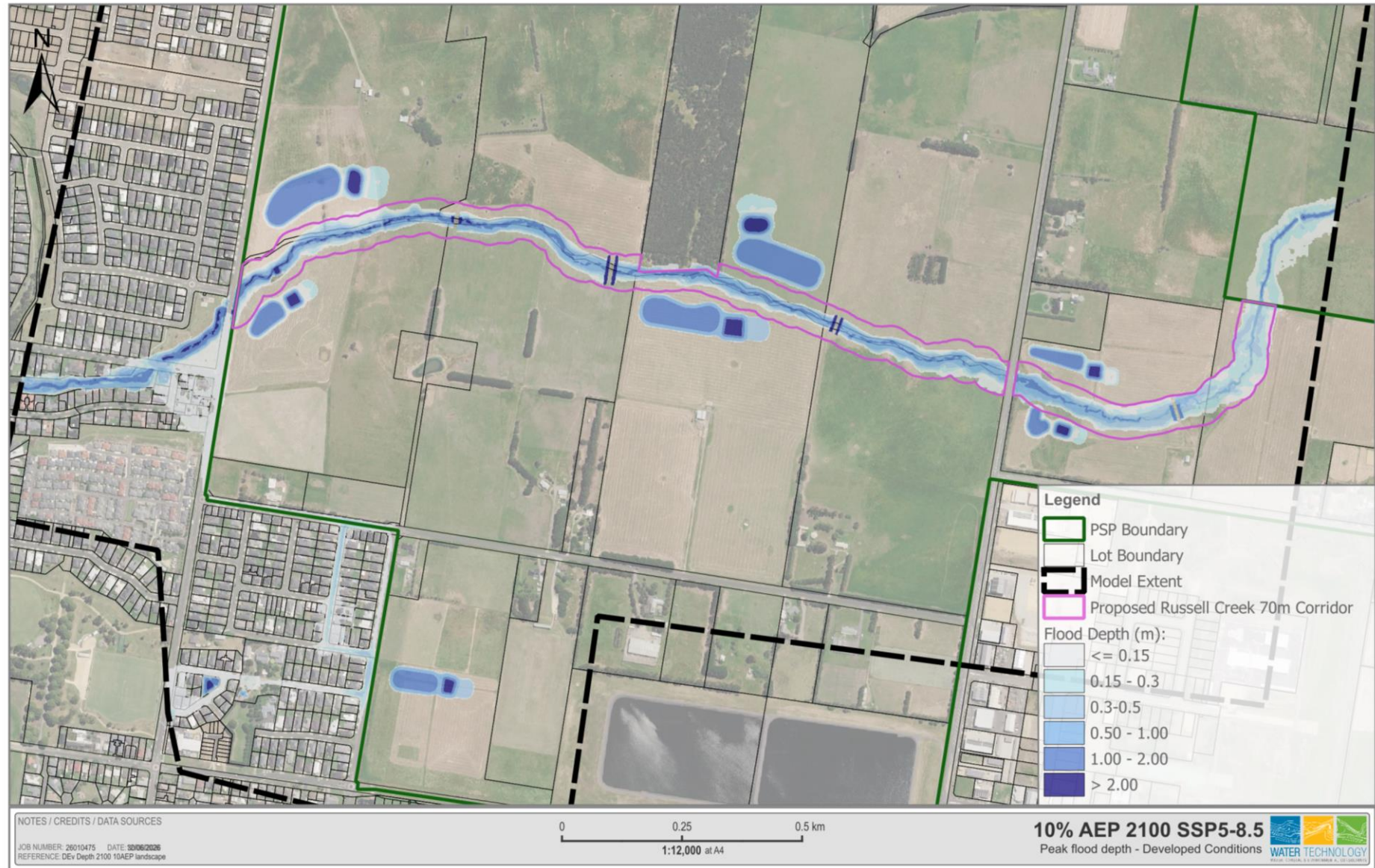


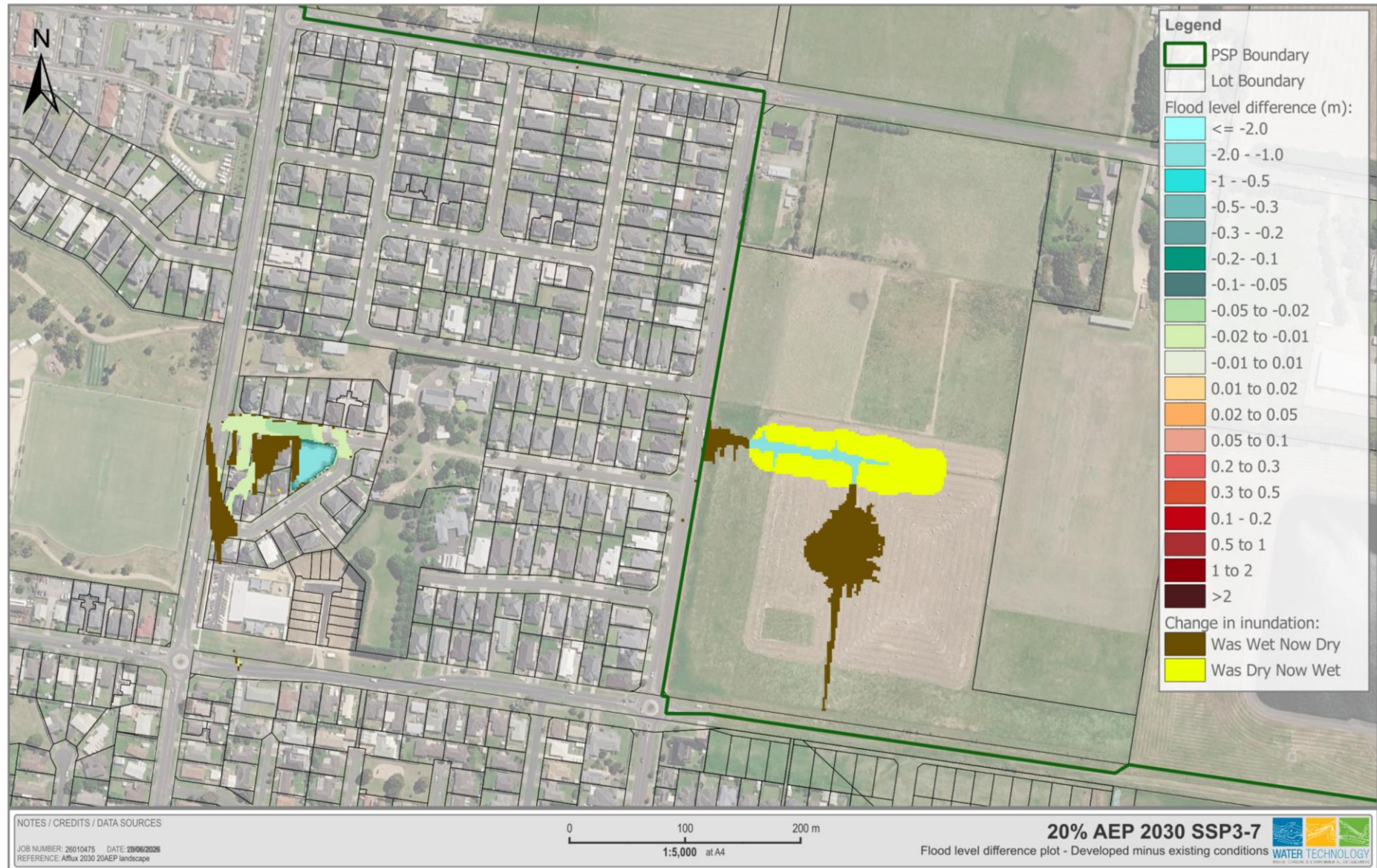


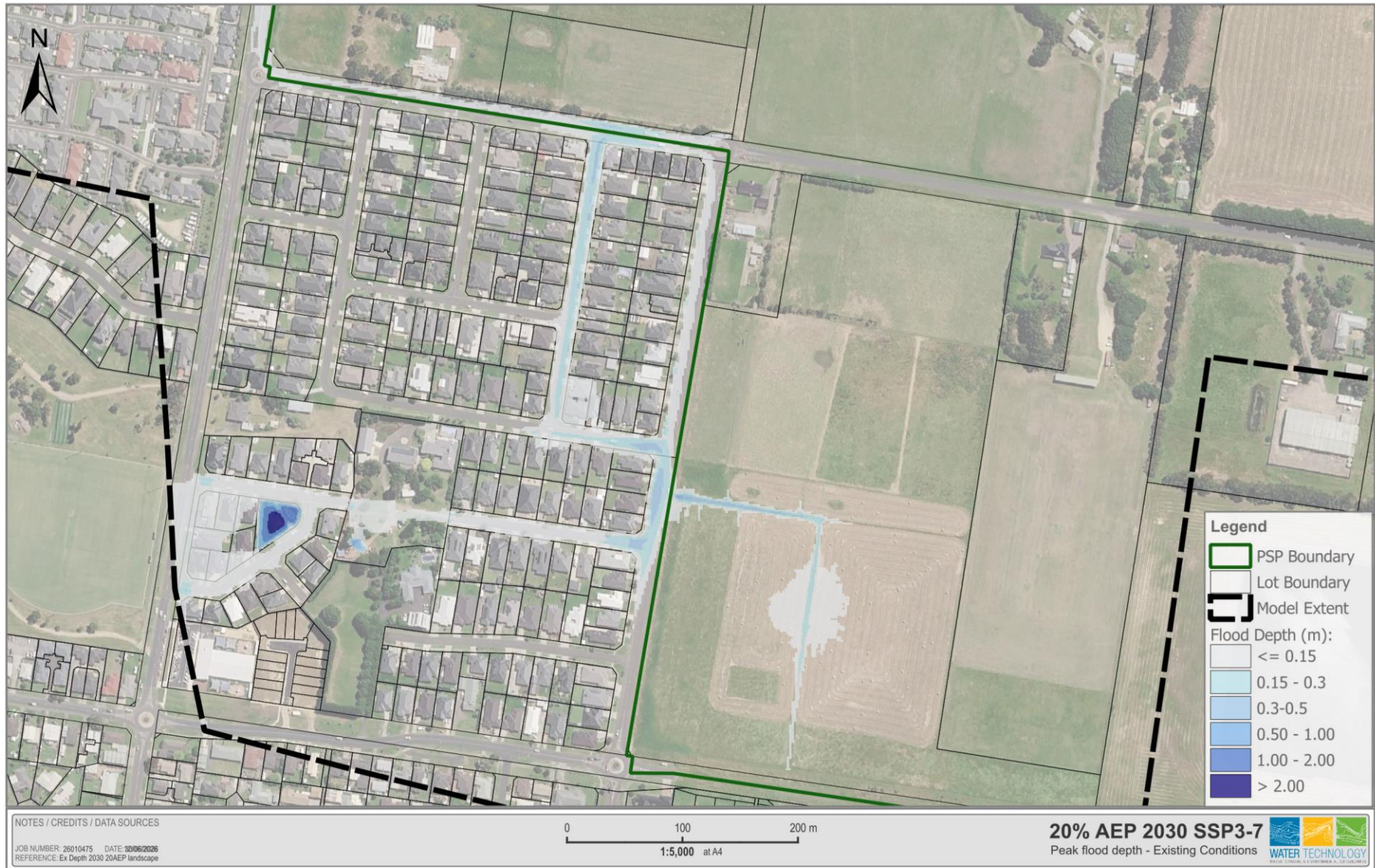


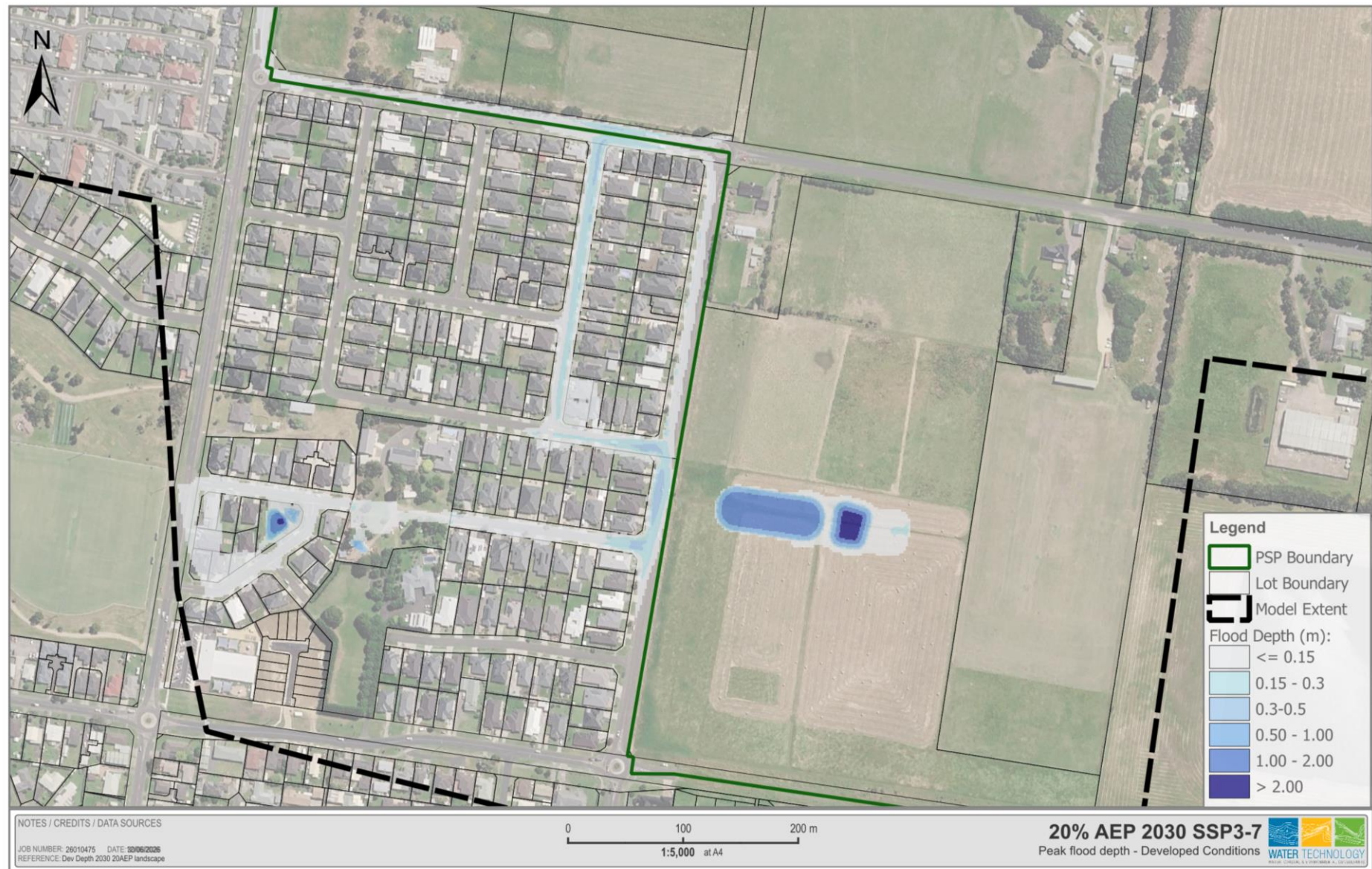




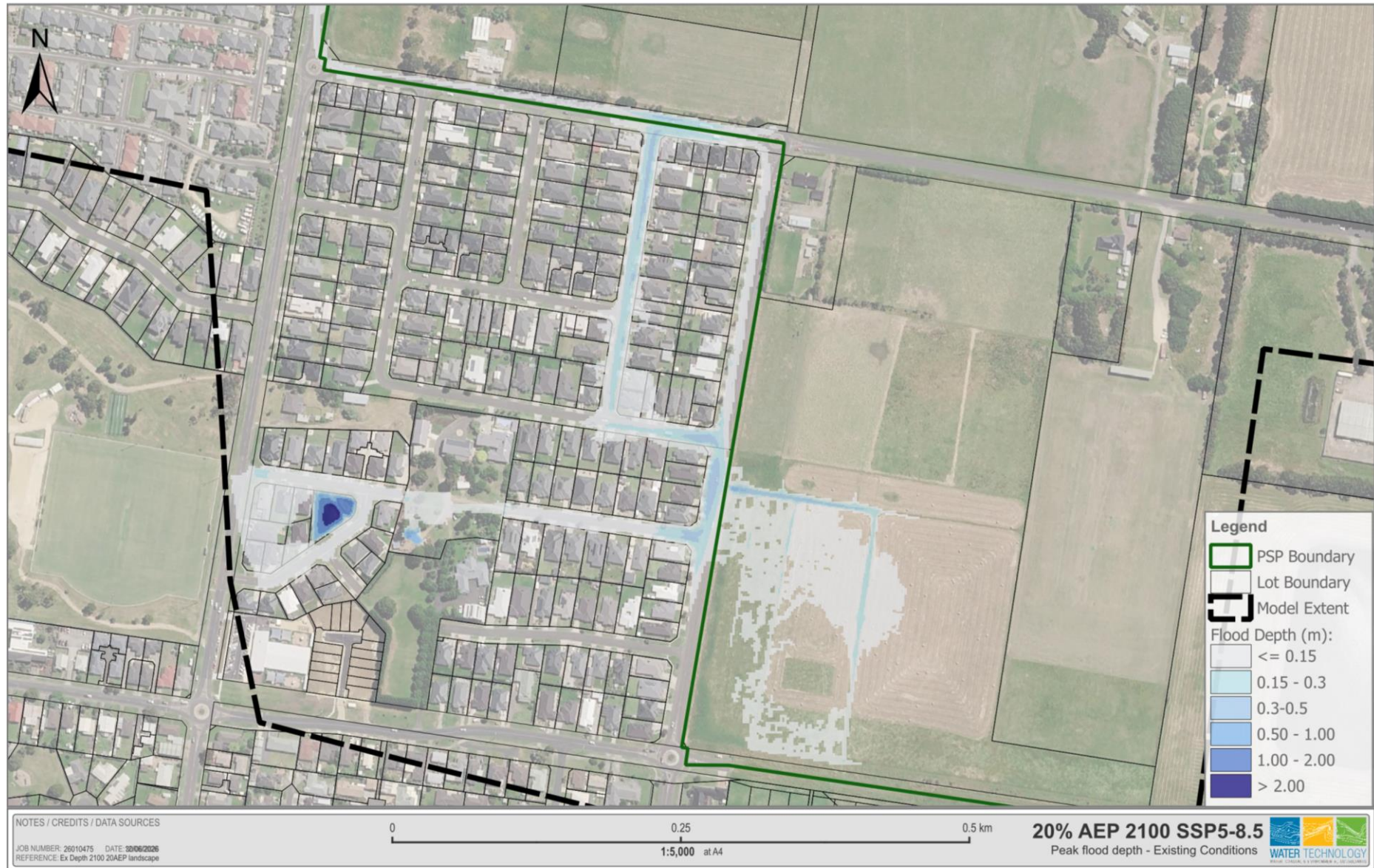


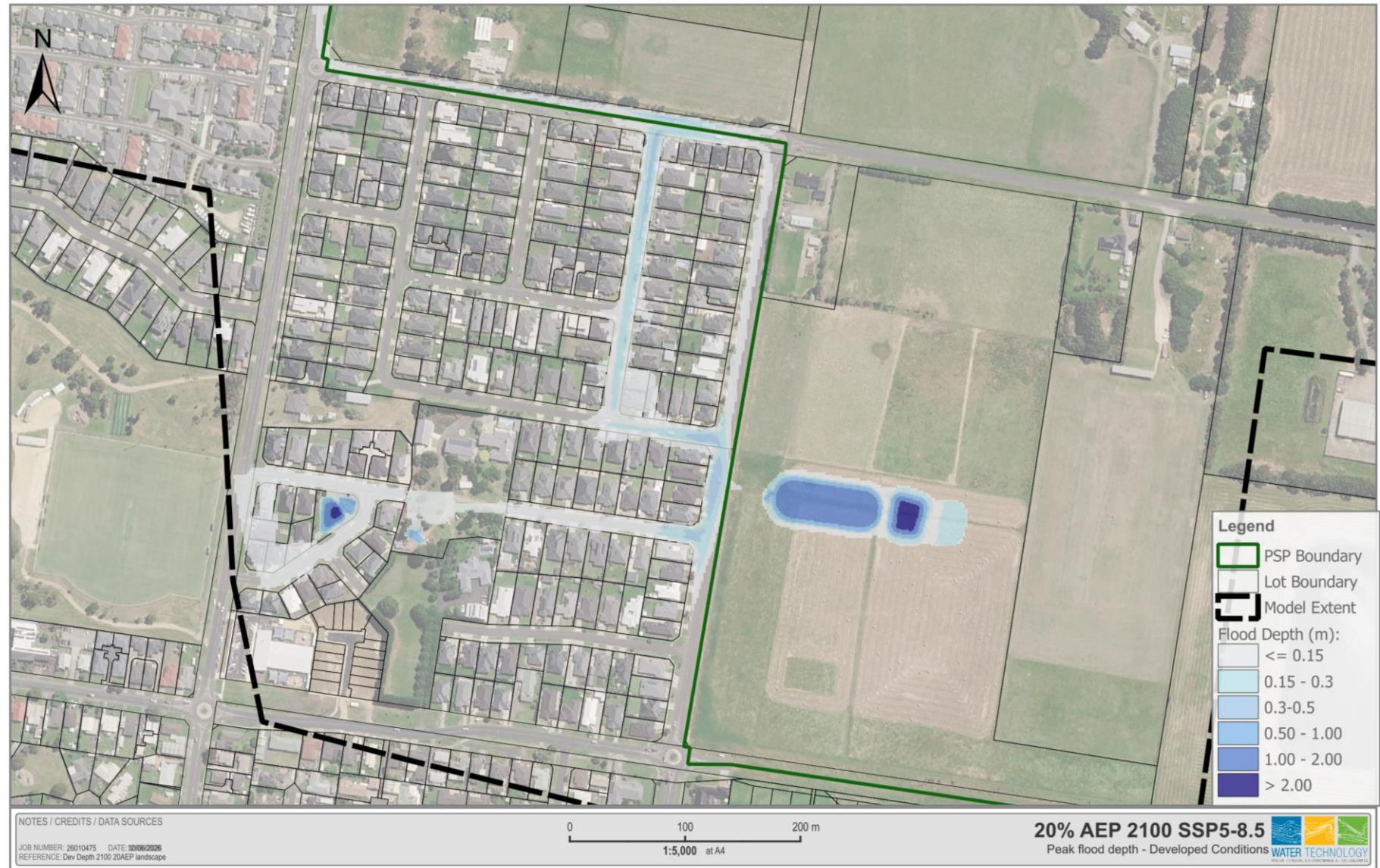














APPENDIX G WLRB FUNCTIONAL DESIGN PLANS



EAST OF ABERLINE PSP WLRB FUNCTIONAL DESIGN

WARRNAMBOOL, VIC

FOR THE
DEPARTMENT OF TRANSPORT AND PLANNING



DRAWING NO.	SHEET TITLE
D00	TITLE SHEET
D01	GENERAL NOTES & SITE LOCATION PLAN
D02	WETLAND A LAYOUT PLAN
D03	WETLAND B LAYOUT PLAN
D04	WETLAND C LAYOUT PLAN
D05	WETLAND D LAYOUT PLAN
D06	WETLAND E LAYOUT PLAN
D07	WETLAND F LAYOUT PLAN
D08	WETLAND G LAYOUT PLAN
D9	WETLAND A LONGITUDINAL SECTIONS
D10	WETLAND B LONGITUDINAL SECTIONS
D11	WETLAND C LONGITUDINAL SECTIONS
D12	WETLAND D LONGITUDINAL SECTIONS
D13	WETLAND E LONGITUDINAL SECTIONS
D14	WETLAND F LONGITUDINAL SECTIONS
D15	WETLAND G LONGITUDINAL SECTIONS

REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GCMCA FOR REVIEW AND COSTINGS



CLIENT:	 VICTORIA State Government	Department of Transport and Planning
---------	---	--------------------------------------

PROJECT:	EAST OF ABERLINE PSP WLRB FUNCTIONAL DESIGN WARRNAMBOOL, VIC
----------	--

DESIGNED BY: AP / CM	DRAWN BY: MJB	TITLE SHEET		
DRAWING DATE: 13.07.2026	CHECKED: AV			
SHEET SIZE A1	SCALE: NTS			
COPYRIGHT COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.		PROJECT No.	DRAWING No.	REV.
		26010475	D00	D

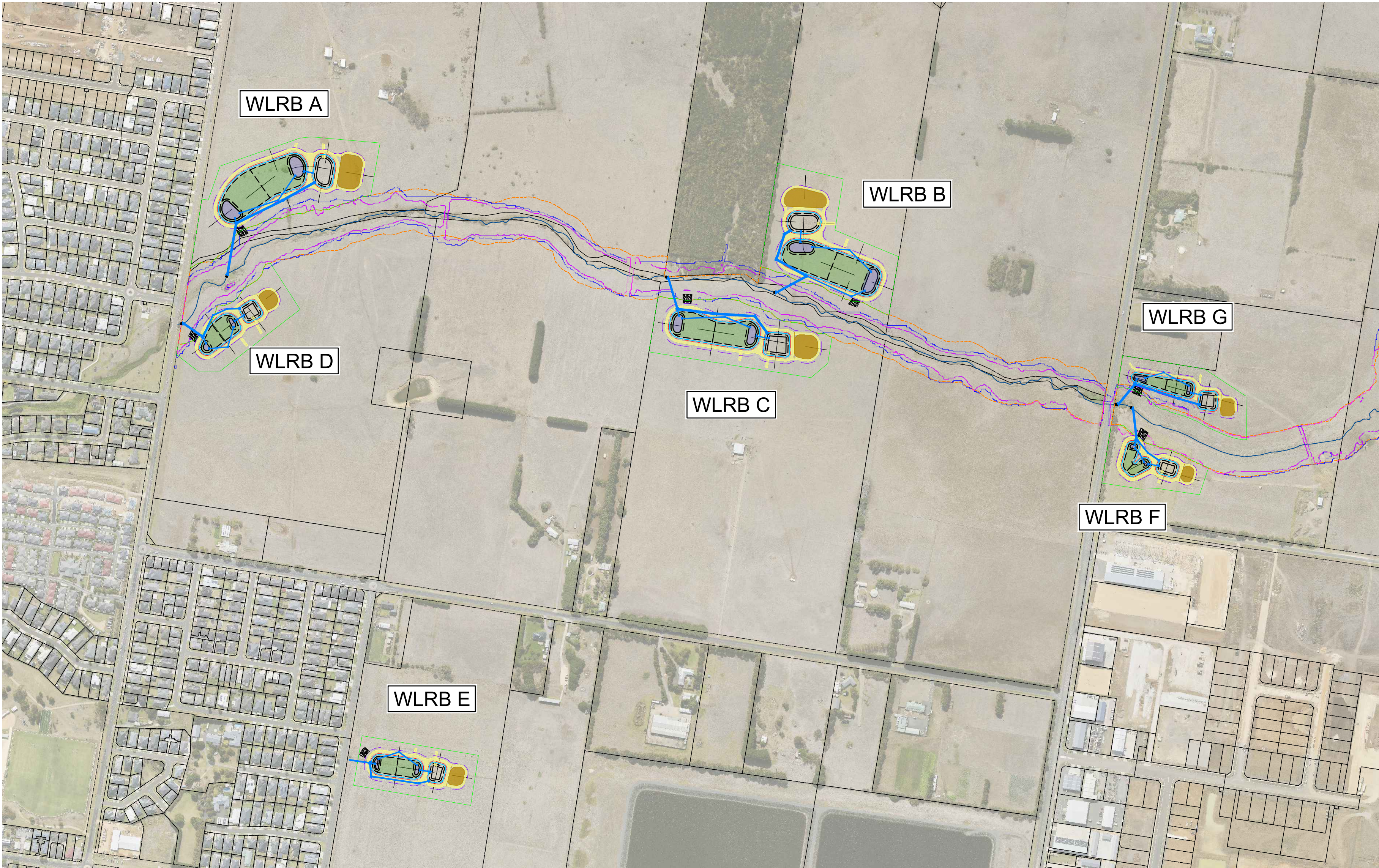
M:\26010475_EAST_OF_ABERLINE-PSP_WLRB_MODEL\SPATIAL\CADD\DWG\26010475 CONCEPT DESIGN V03-3 260713.DWG - 13 July 2026

GENERAL NOTES:

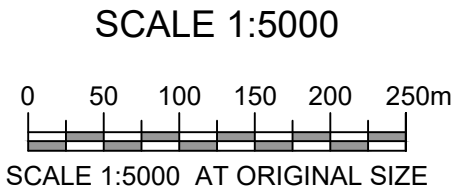
1. DO NOT OBTAIN DIMENSIONS BY SCALING FROM DRAWINGS.
2. PREPARED TO INFORM DTP, COUNCIL & CMA REVIEW & COSTINGS OF THE UPDATED WLRB FUNCTIONAL DESIGNS.
3. DESIGN LEVELS MAY CHANGE AS THE WLRB DESIGN PROGRESSES.
4. GPT UPSTREAM OF SEDIMENT PONDS NOT SHOWN ON THE DRAWINGS AND INLET PIPES TO SEDIMENT PONDS NOT SHOWN ON THE DRAWINGS.
INLET PIPE DESIGN/LEVEL SUBJECT TO DESIGN OF FUTURE UPSTREAM LOCAL DRAINAGE NETWORK.
OUTFALL INVERTS OF THE INLET PIPE(S) TO BE LOCATED ABOVE THE SEDIMENT ACCUMULATION ZONE IN THE SEDIMENT POND.
5. WLRB FUNCTIONAL DESIGN BASED ON LIDAR. SITE INVESTIGATIONS (GEOTECHNICAL, SURVEY, CULTURAL HERITAGE ASSESSMENT ETC.) TO BE UNDERTAKEN AT A LATER DESIGN STAGE.
6. MAINTENANCE TRACK COSTED AS CONCRETE TRACK IN THE DCP COSTING. OUTER BASIN 3.0m WIDE PERIMETER BERM INCLUDED, PROVIDING FLEXIBILITY IN THE MAINTENANCE TRACK LOCATION AT SUBSEQUENT DESIGN PHASE.
7. ALL THE SHALLOW MARSH PLANT SPECIES LISTED IN TABLE 2 OF MELBOURNE WATER'S WETLAND DESIGN MANUAL PART A2 CAN BE ADOPTED EXCEPT FOR COMMON SPIKE-RUSH (ELEOCHARIS ACUTA).
ALL THE DEEP MARSH PLANT SPECIES LISTED IN TABLE 3 OF MELBOURNE WATER'S WETLAND DESIGN MANUAL PART A2 CAN BE ADOPTED EXCEPT FOR SEA CLUB-RUSH (BOLBOSCHOENUS CALDWELLII) & WATER RIBBONS (CYCNOGETON PROCERUM).

LEGEND

- NORMAL WATER LEVEL (NWL)
- TOP OF EXTENDED DETENTION DEPTH (TEDD)
- RB 1% AEP (YEAR 2030 SSP 3-7.0) FLOOD LEVEL
- DRYING AREA
- MAINTENANCE TRACK
- WLRB INTERNAL PIPES
- SPILLWAY
- OPEN WATER AREA
- MARSH AREA
- RUSSELL CREEK 70m CORRIDOR
- DEVELOPED CONDITIONS FO
- DEVELOPED CONDITIONS LSIO
- UPDATED WLRB FUNCTIONAL DESIGN RESERVE AREA
- RUSSELL CREEK CENTRELINE WITH LATEST LOCALISED REALIGNMENTS
- EXISTING BOUNDARY



SITE LOCATION PLAN



REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



CLIENT:

VICTORIA

State Government

Department of Transport and Planning

PROJECT:

EAST OF ABERLINE PSP

WLRB FUNCTIONAL DESIGN

WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB	GENERAL NOTES & SITE LOCATION PLAN		
DRAWING DATE: 13.07.2026	CHECKED BY: AV			
SHEET SIZE: A1	SCALE: NTS			
PROJECT No. 26010475		DRAWING No. D01	REV. D	



PROPOSED DRYING AREA 1980m².

BYPASS INLET PIT
PIT (INTERNAL) SIZE
3.2m x 2.4m. PIT SILL
LEVEL 28.30 m AHD

BYPASS PIPE 4 x 600 mm Ø
US IL 27.500 m AHD
DS IL 27.104 m AHD
BYPASS PIPE TO BE CONNECTED
TO DOWNSTREAM CHAMBER OF
THE TWIN CHAMBER
OUTFALL/HIGH FLOW PIT

JUNCTION BOX

TWIN CHAMBER OUTFALL/HIGH FLOW PIT
AS PER MW STD DWG 7215/12/4015.
PIT SILL RL SET AT WETLAND TEDD LEVEL.
PENSTOCK WEIR/OPENING WIDTH OF 210
mm AS THE MACROPHYTE ZONE
CONTROL OUTLET.
MINIMUM PIT (INTERNAL) WIDTH OF 4.5m
(PIT SIZING TO BE FINALISED AT DETAIL
DESIGN).

WLRB OUTFALL PIPE 3 x 750 mm Ø
US IL 27.06 m AHD
DS IL 26.44 m AHD
ALTERNATIVE WLRB OUTFALL PIPE
ARRANGEMENT CAN BE ADOPTED
AT DETAIL DESIGN IF THE BASINS
HEIGHT-STAGE-DISCHARGE
RELATIONSHIP IS MAINTAINED.

OUTFALL ROCKWORK
TO BE FINALISED AT
DETAIL DESIGN

BALANCE PIPES.
REFER TO MW STD
DWG 7251/12/4018

WLRB B

WETLAND AREA= 9,800m²
WL NWL = 27.85m AHD
WL TEDD = 28.20m AHD

SED BASIN AREA = 1,908m²
SB NWL = 27.95m AHD
SB TEDD = 28.30m AHD

SED BASIN BASE PROFILE IN
ACCORDANCE WITH MW
STD DWG 7251/12/012

INDICATIVE SED BASIN
MAINTENANCE ACCESS RAMP AS
PER MW STD DWG 7251/12/013 (TO
BE FINALISED IN DETAIL DESIGN)

SED BASIN TRANSFER PIT.
PIT (INTERNAL) SIZE 0.9m x 0.9m.
PIT SILL LEVEL 27.95 m AHD.
REFER TO MW STD DWG 7251/12/008

SED BASIN TRANSFER PIPE
1 x 300 mm Ø
US IL 27.05 m AHD
DS IL 27.05 m AHD
REFER TO MW STD DWG 7251/12/001

BALANCE PIPE SUBMERGED
OFFTAKE PIT. REFER TO
MW STD DWG 7251/12/035

4m WIDE
MAINTENANCE
ACCESS TRACK

WLRB FUNCTIONAL
DESIGN RESERVE
AREA 34200m²

SUBMERGED OFFTAKE
PIT CONNECTED TO TWIN
CHAMBER OUTFALL PIT.
REFER TO MW STD DWG
7251/12/035

RETARDING BASIN SPILLWAY
SPILLWAY BASE WIDTH 10m
SPILLWAY IL 29.68 m AHD
SPILLWAY DETAIL TO BE
FINALISED AT DETAIL DESIGN.

LEGEND

- NORMAL WATER LEVEL (NWL)
- TOP OF EXTENDED DETENTION DEPTH (TEDD)
- RB 1% AEP (YEAR 2030 SSP 3-7.0) FLOOD LEVEL
- DRYING AREA
- MAINTENANCE TRACK
- WLRB INTERNAL PIPES
- SPILLWAY
- OPEN WATER AREA
- MARSH AREA
- RUSSELL CREEK 70m CORRIDOR
- DEVELOPED CONDITIONS FO
- DEVELOPED CONDITIONS LSIO
- UPDATED WLRB FUNCTIONAL
DESIGN RESERVE AREA
- RUSSELL CREEK CENTRELINE WITH LATEST
LOCALISED REALIGNMENTS
- EXISTING BOUNDARY

REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING.
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



CLIENT:



Department of
Transport
and Planning

PROJECT:

EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

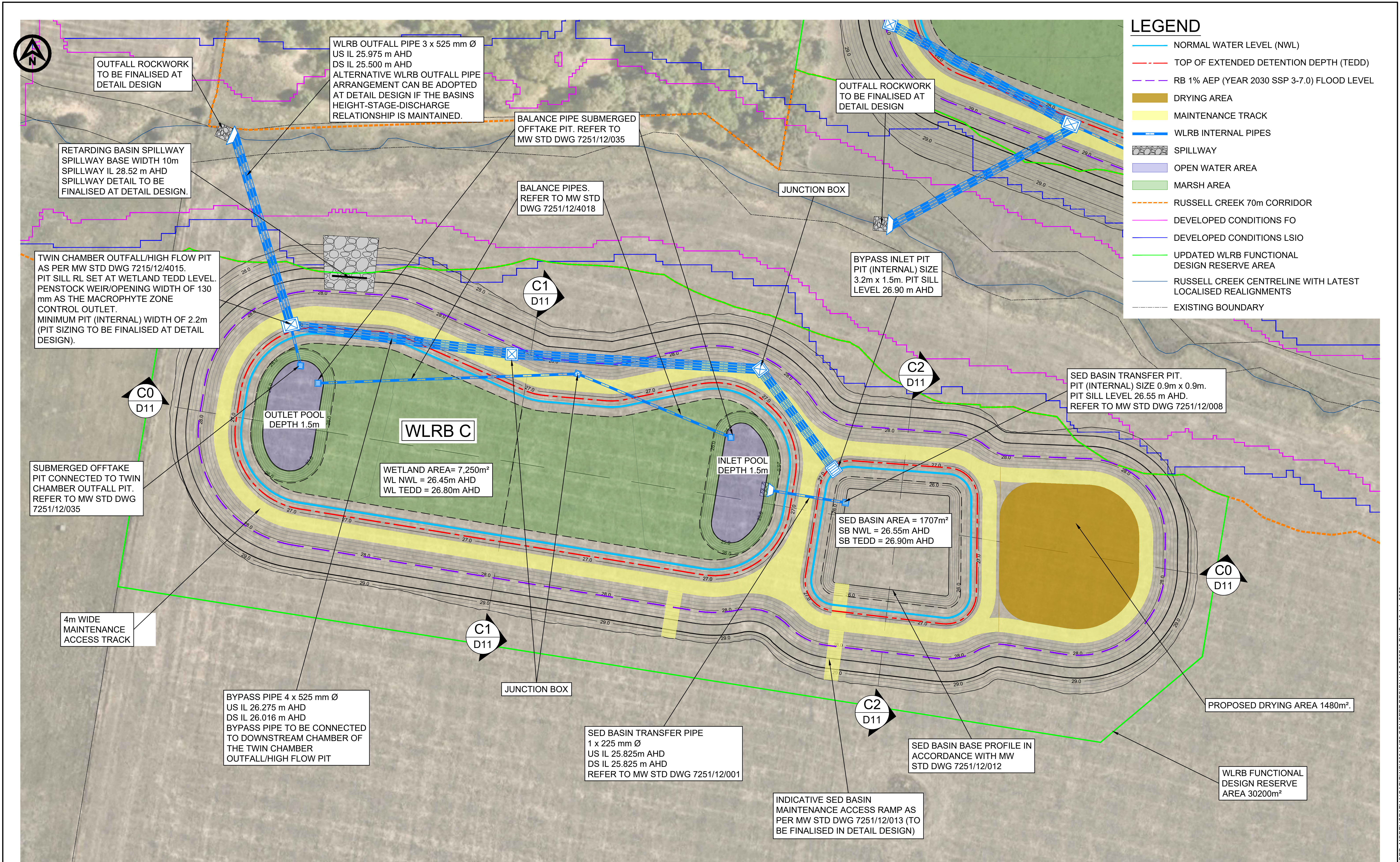
DESIGNED BY: AP / CM	DRAWN BY: MJB
DRAWING DATE: 13.07.2026	CHECKED BY: AV
SHEET SIZE: A1	SCALE: NTS

COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.

WETLAND B LAYOUT PLAN

PROJECT No.	DRAWING No.	REV.
26010475	D03	D

M:\26010475_EAST_OF_ABERLINE_PSP_MODEL\SPATIAL\CADD\DWG\26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



CLIENT:

VICTORIA
State Government

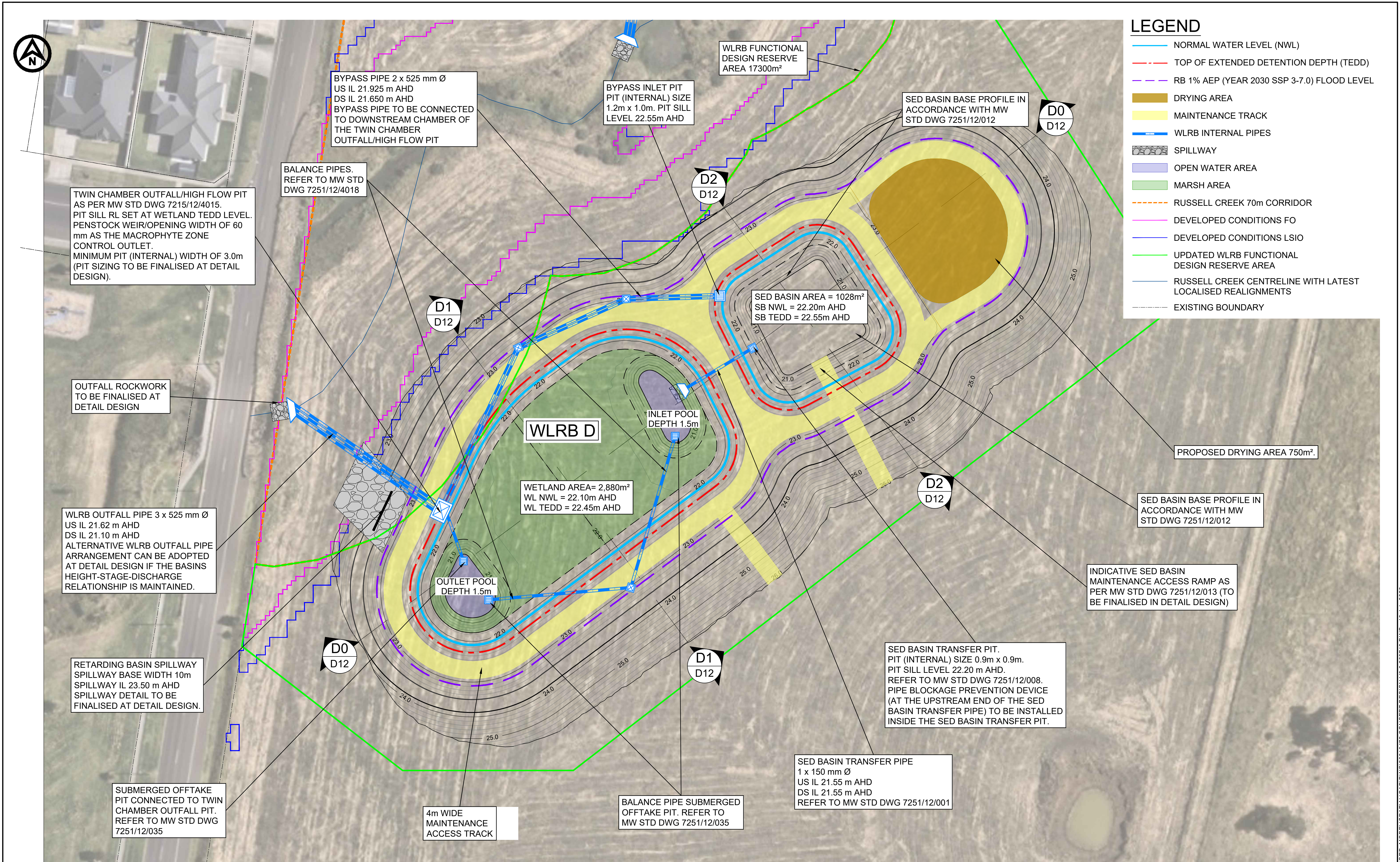
Department of Transport and Planning

PROJECT:

**EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC**

DESIGNED BY: AP / CM	DRAWN BY: MJB	WETLAND C LAYOUT PLAN		
DRAWING DATE: 13.07.2026	CHECKED BY: AV			
SHEET SIZE: A1	SCALE: NTS			
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.		PROJECT No. 26010475	DRAWING No. D04	REV. D

W:\26010475_EAST_OF_ABERLINE_PSP_MODEL\SPATIAL\CADD\DWG\26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GRCMA FOR REVIEW AND COSTINGS



CLIENT:

VICTORIA
State Government

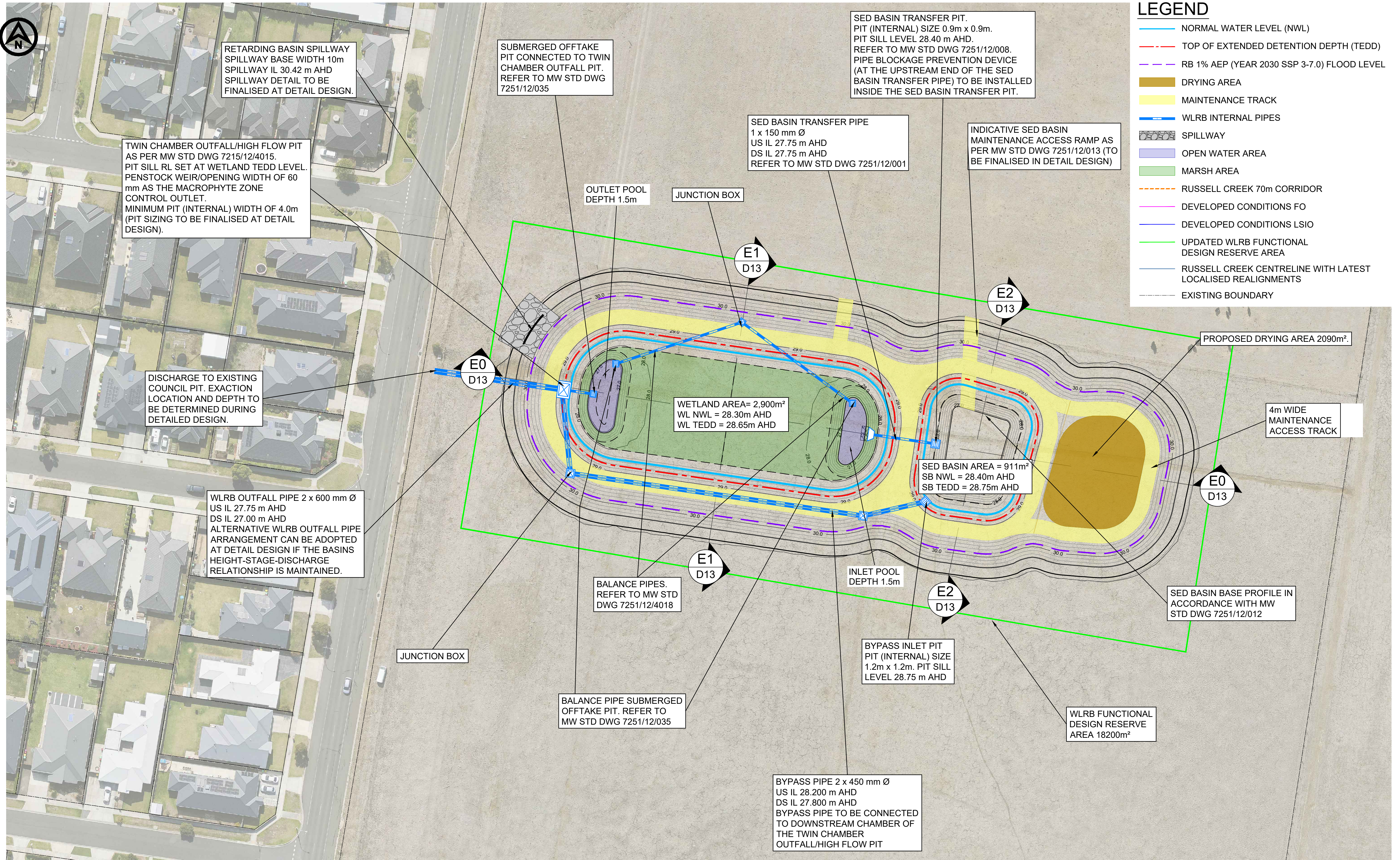
Department of Transport and Planning

PROJECT:

**EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC**

DESIGNED BY: AP / CM	DRAWN BY: MJB	WETLAND D LAYOUT PLAN	
DRAWING DATE: 13.07.2026	CHECKED BY: AV		
SHEET SIZE: A1	SCALE: NTS		
PROJECT No. 26010475		DRAWING No. D05	REV. D

W:\26010475_EAST_OF_ABERLINE_PSP_MODEL\SPATIAL\CADD\DWG\26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING.
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



CLIENT:



Department of Transport and Planning

PROJECT:

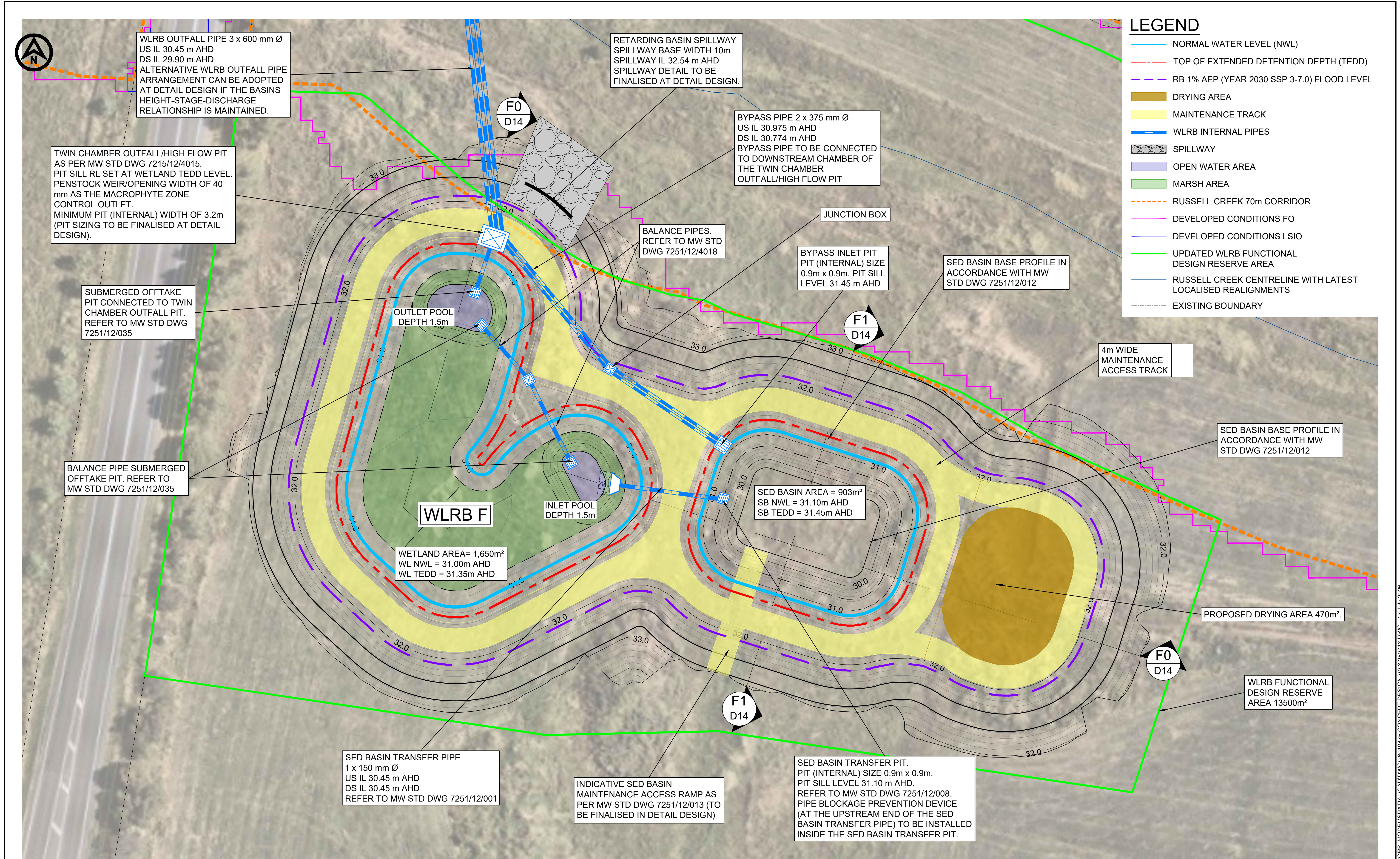
EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB
DRAWING DATE: 13.07.2026	CHECKED BY: AV
SHEET SIZE: A1	SCALE: NTS
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.	

WETLAND E LAYOUT PLAN

PROJECT No.	DRAWING No.	REV.
26010475	D06	D

M:\26010475_EAST_OF_ABERLINE_PSP_MODEL\SPATIAL\CADD\DWG\26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING.
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



CLIENT:



Department of Transport and Planning

PROJECT:

EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB
DRAWING DATE: 13.07.2026	CHECKED BY: AV
SHEET SIZE: A1	SCALE: NTS

COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.

WETLAND F LAYOUT PLAN		
PROJECT No.	DRAWING No.	REV.
26010475	D07	D

M:\26010475_EAST_OF_ABERLINE_PSP_MODEL\SPATIAL\CADD\DWG\26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



TWIN CHAMBER OUTFALL/HIGH FLOW PIT AS PER MW STD DWG 7215/12/4015. PIT SILL RL SET AT WETLAND TEDD LEVEL. PENSTOCK WEIR/OPENING WIDTH OF 50 mm AS THE MACROPHYTE ZONE CONTROL OUTLET. MINIMUM PIT (INTERNAL) WIDTH OF 2.2m (PIT SIZING TO BE FINALISED AT DETAIL DESIGN).

SUBMERGED OFFTAKE PIT CONNECTED TO TWIN CHAMBER OUTFALL PIT. REFER TO MW STD DWG 7251/12/035

BALANCE PIPE SUBMERGED OFFTAKE PIT. REFER TO MW STD DWG 7251/12/035

SED BASIN TRANSFER PIPE
1 x 150 mm Ø
US IL 30.35 m AHD
DS IL 30.35 m AHD
REFER TO MW STD DWG 7251/12/001

BALANCE PIPES.
REFER TO MW STD
DWG 7251/12/4018

SED BASIN TRANSFER PIT.
PIT (INTERNAL) SIZE 0.9m x 0.9m.
PIT SILL LEVEL 31.00 m AHD.
REFER TO MW STD DWG 7251/12/008.
PIPE BLOCKAGE PREVENTION DEVICE
(AT THE UPSTREAM END OF THE SED
BASIN TRANSFER PIPE) TO BE INSTALLED
INSIDE THE SED BASIN TRANSFER PIT.

LEGEND

- NORMAL WATER LEVEL (NWL)
- TOP OF EXTENDED DETENTION DEPTH (TEDD)
- RB 1% AEP (YEAR 2030 SSP 3-7.0) FLOOD LEVEL
- DRYING AREA
- MAINTENANCE TRACK
- WLRB INTERNAL PIPES
- SPILLWAY
- OPEN WATER AREA
- MARSH AREA
- RUSSELL CREEK 70m CORRIDOR
- DEVELOPED CONDITIONS FO
- DEVELOPED CONDITIONS LSIO
- UPDATED WLRB FUNCTIONAL DESIGN RESERVE AREA
- RUSSELL CREEK CENTRELINE WITH LATEST LOCALISED REALIGNMENTS
- EXISTING BOUNDARY

WLRB G

WETLAND AREA= 2,700m²
WL NWL = 30.90m AHD
WL TEDD = 31.25m AHD

INLET POOL
DEPTH 1.5m

SED BASIN AREA = 1019m²
SB NWL = 31.00m AHD
SB TEDD = 31.35m AHD

INDICATIVE SED BASIN
MAINTENANCE ACCESS RAMP AS
PER MW STD DWG 7251/12/013 (TO
BE FINALISED IN DETAIL DESIGN)

PROPOSED DRYING AREA 660m².

3m WIDE
MAINTENANCE
ACCESS TRACK

MAINTENANCE TRACK
GEOMETRY AND RADIUS AT THIS
BEND TO BE REVIEWED AND
FINALISED AT DETAIL DESIGN

SED BASIN BASE PROFILE IN
ACCORDANCE WITH MW
STD DWG 7251/12/012

OUTFALL ROCKWORK
TO BE FINALISED AT
DETAIL DESIGN

OUTFALL ROCKWORK
TO BE FINALISED AT
DETAIL DESIGN

WLRB OUTFALL PIPE 3 x 525 mm Ø
US IL 30.425 m AHD
DS IL 29.700 m AHD
ALTERNATIVE WLRB OUTFALL PIPE
ARRANGEMENT CAN BE ADOPTED
AT DETAIL DESIGN IF THE BASINS
HEIGHT-STAGE-DISCHARGE
RELATIONSHIP IS MAINTAINED.

RETARDING BASIN SPILLWAY
SPILLWAY BASE WIDTH 10m
SPILLWAY IL 32.58 m AHD
SPILLWAY DETAIL TO BE
FINALISED AT DETAIL DESIGN.

WLRB FUNCTIONAL
DESIGN RESERVE
AREA 17900m²

BYPASS PIPE 3 x 375 mm Ø
US IL 30.875 m AHD
DS IL 30.469 m AHD
BYPASS PIPE TO BE CONNECTED
TO DOWNSTREAM CHAMBER OF
THE TWIN CHAMBER
OUTFALL/HIGH FLOW PIT

BYPASS INLET PIT
PIT (INTERNAL) SIZE
1.8m x 0.9m. PIT SILL
LEVEL 31.35 m AHD

JUNCTION BOX

REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCM FOR REVIEW AND COSTINGS



CLIENT:



Department of
Transport
and Planning

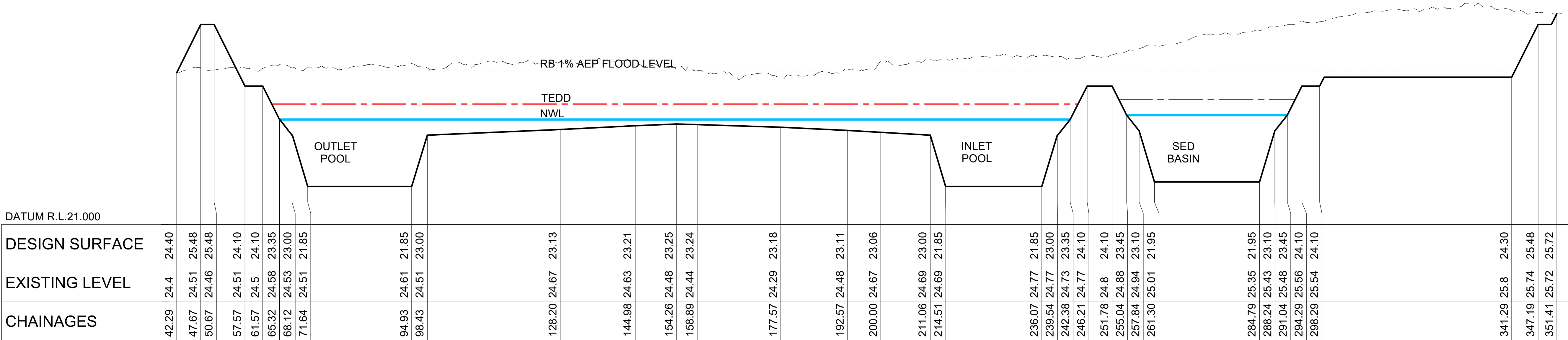
PROJECT:

EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

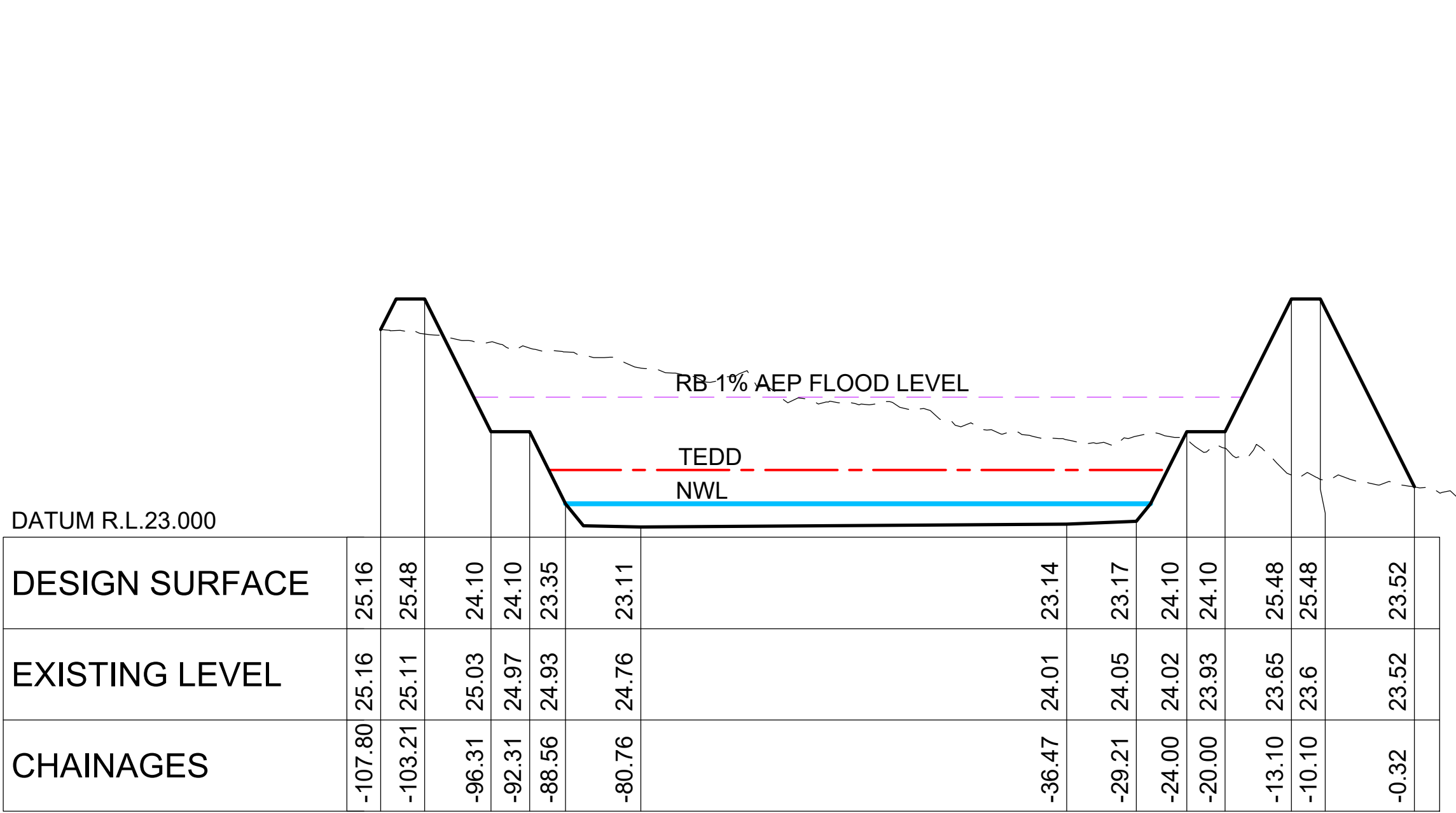
DESIGNED BY: AP / CM	DRAWN BY: MJB
DRAWING DATE: 13.07.2026	CHECKED BY: AV
SHEET SIZE: A1	SCALE: NTS

WETLAND G LAYOUT PLAN

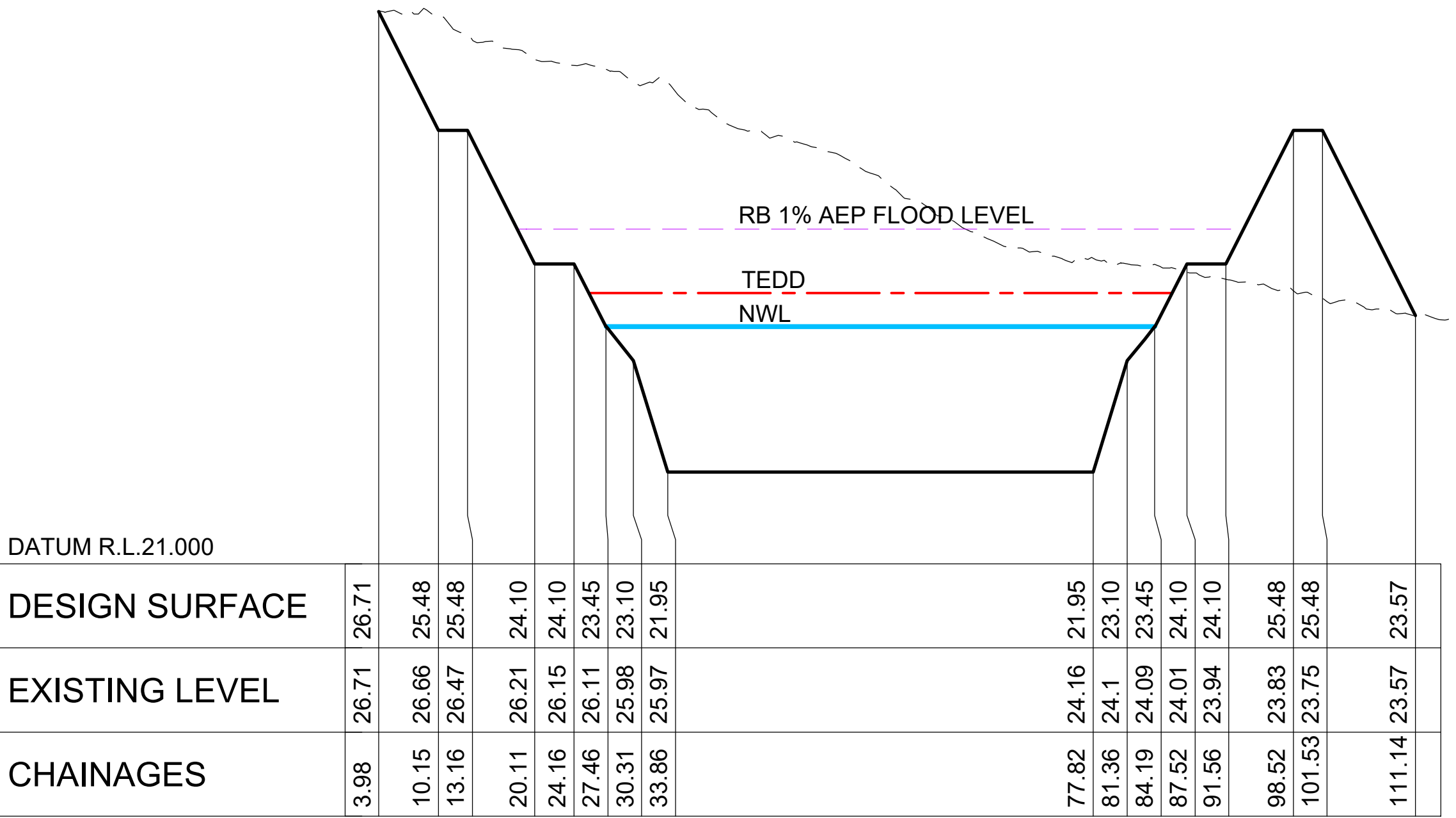
PROJECT No.	DRAWING No.	REV.
26010475	D08	D



A0 LONGITUDINAL SECTION
SCALE: HORIZ:500 VERT:50



A1 CROSS SECTION
SCALE: HORIZ:500 VERT:50



A2 CROSS SECTION
SCALE: HORIZ:500 VERT:50

D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS
REV	DATE	DESCRIPTION



CLIENT:



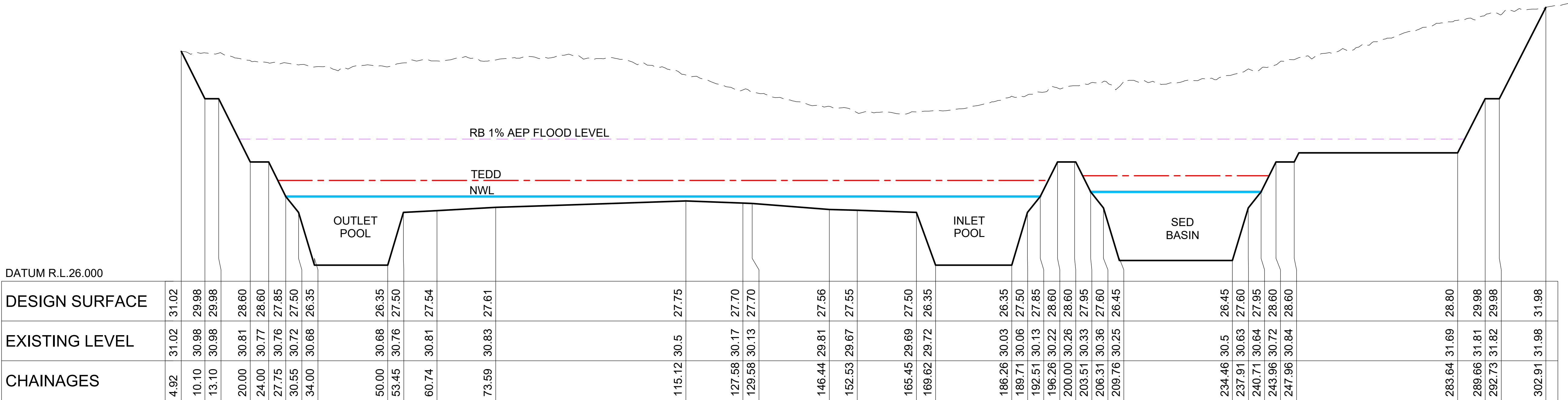
Department of Transport and Planning

PROJECT:

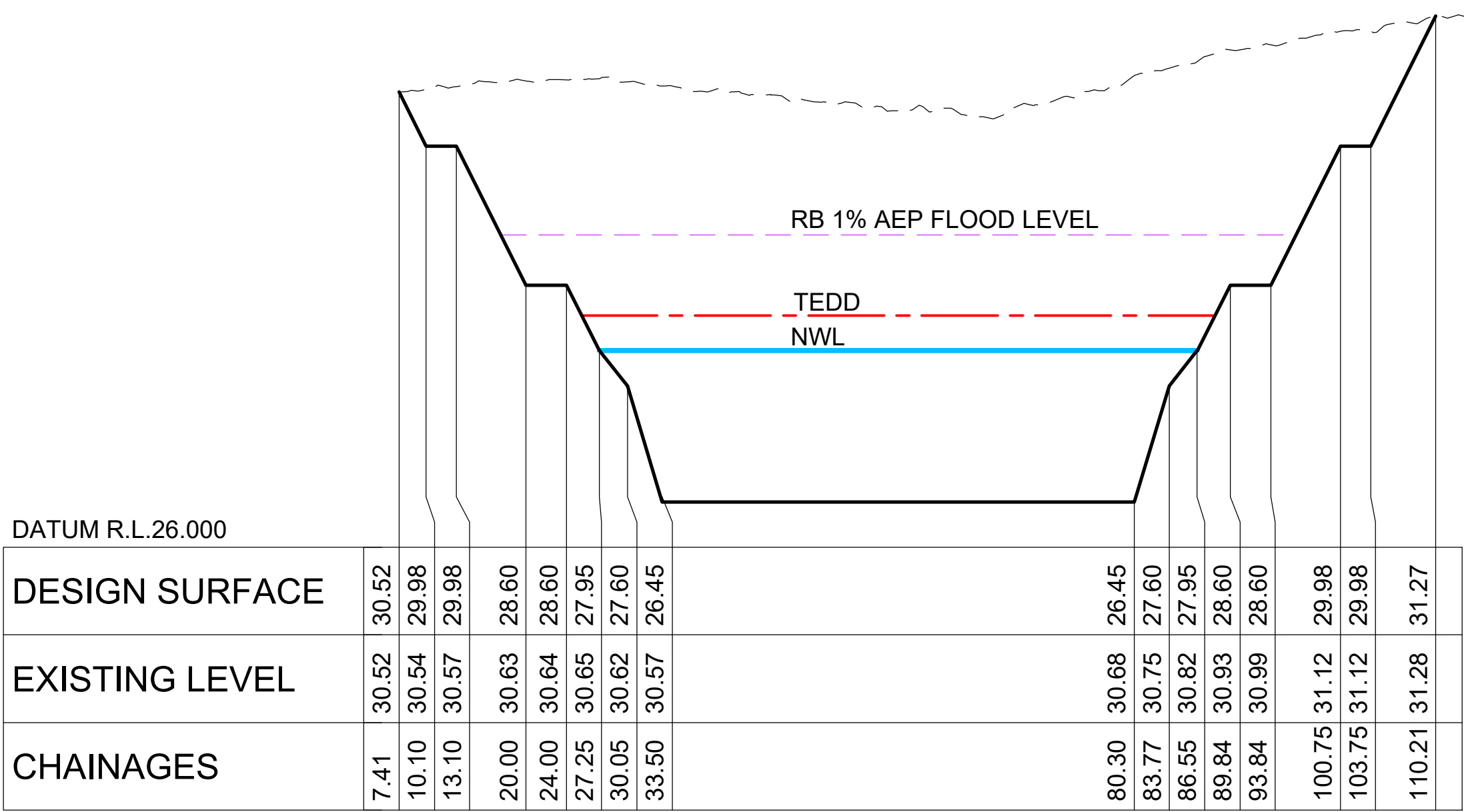
EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB	WETLAND A LONGITUDINAL SECTIONS		
DRAWING DATE: 13.07.2026	CHECKED: AV			
SHEET SIZE A1	SCALE: NTS			
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.		PROJECT No. 26010475	DRAWING No. D09	REV. D

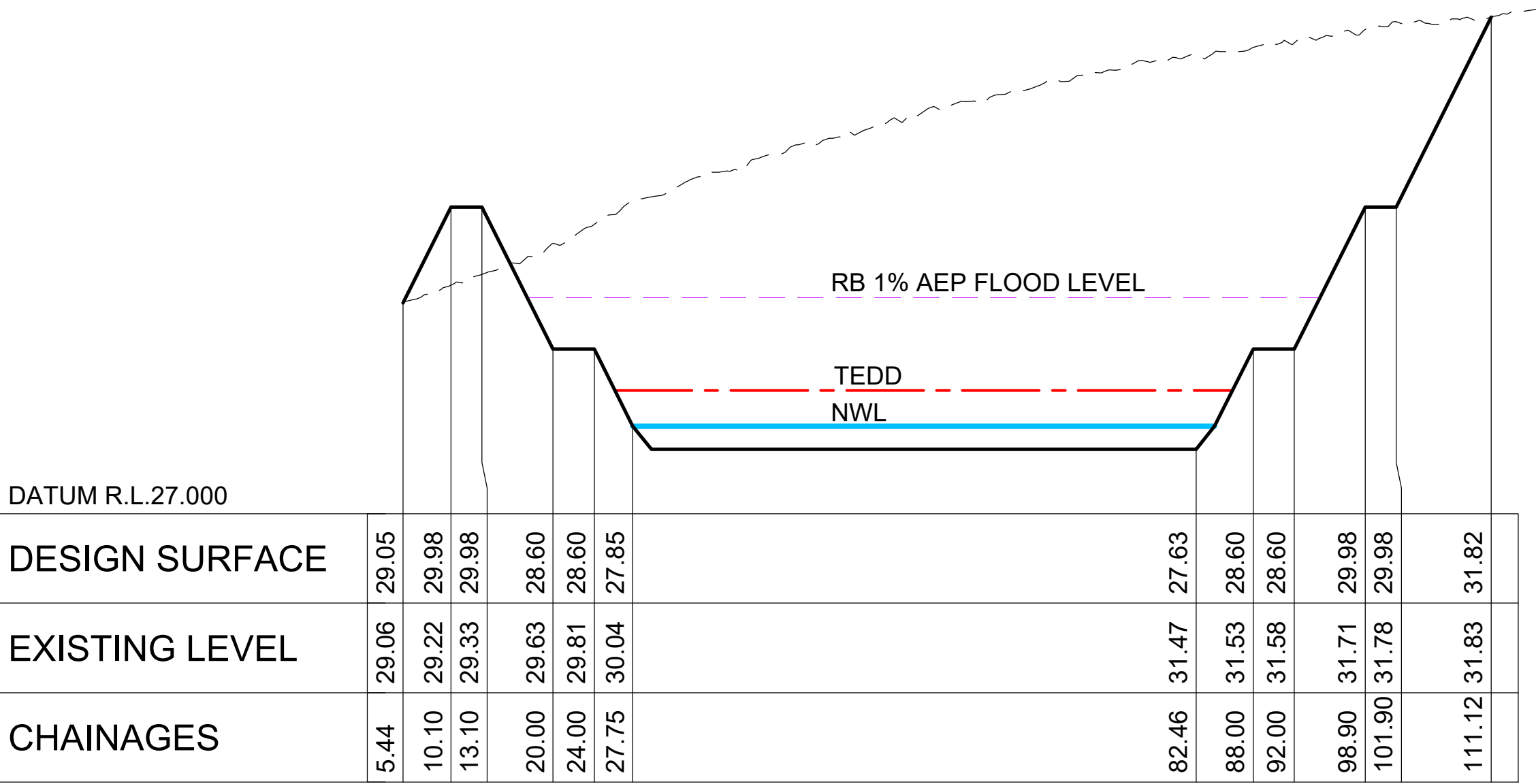
M:\26010475_EAST_OF_ABERLINE-PORB_MODEL\SPATIAL\CADD\WG26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



B0 LONGITUDINAL SECTION
SCALE: HORIZ:500 VERT:50



B1 CROSS SECTION
SCALE: HORIZ:500 VERT:50



B2 CROSS SECTION
SCALE: HORIZ:500 VERT:50

D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS
REV	DATE	DESCRIPTION



CLIENT:



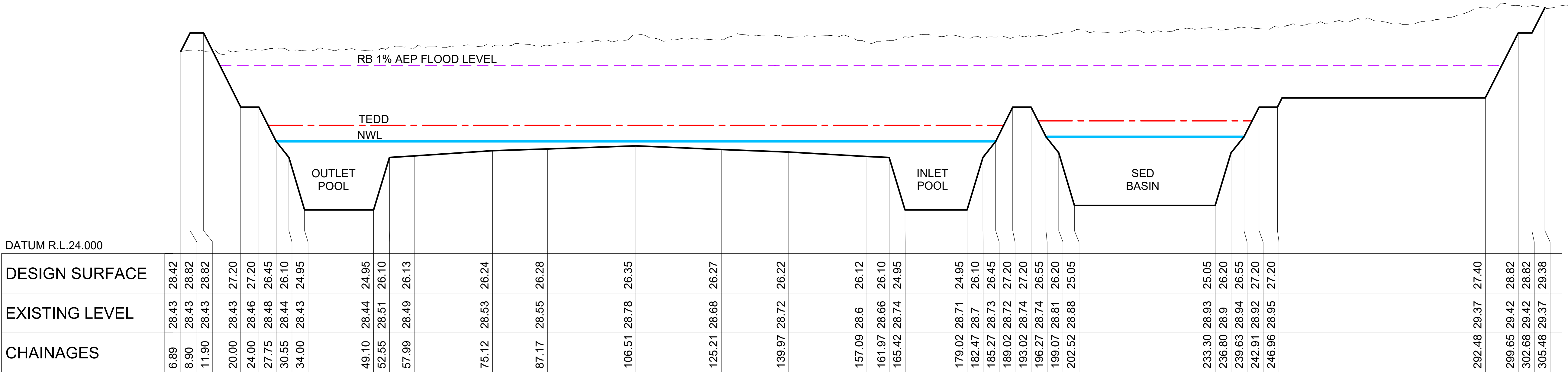
Department of Transport and Planning

PROJECT:

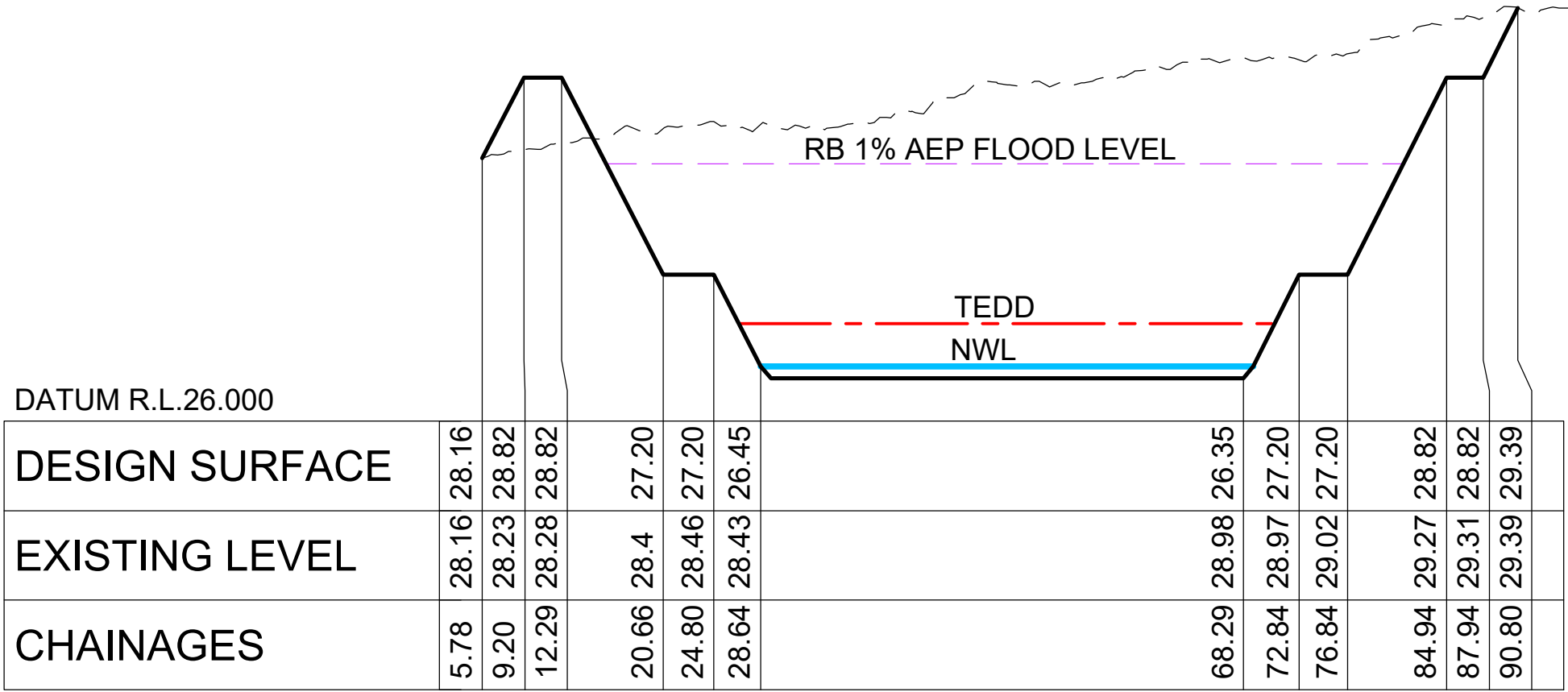
EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB	WETLAND B LONGITUDINAL SECTIONS		
DRAWING DATE: 13.07.2026	CHECKED: AV			
SHEET SIZE A1	SCALE: NTS			
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT		PROJECT No. 26010475	DRAWING No. D10	REV. D

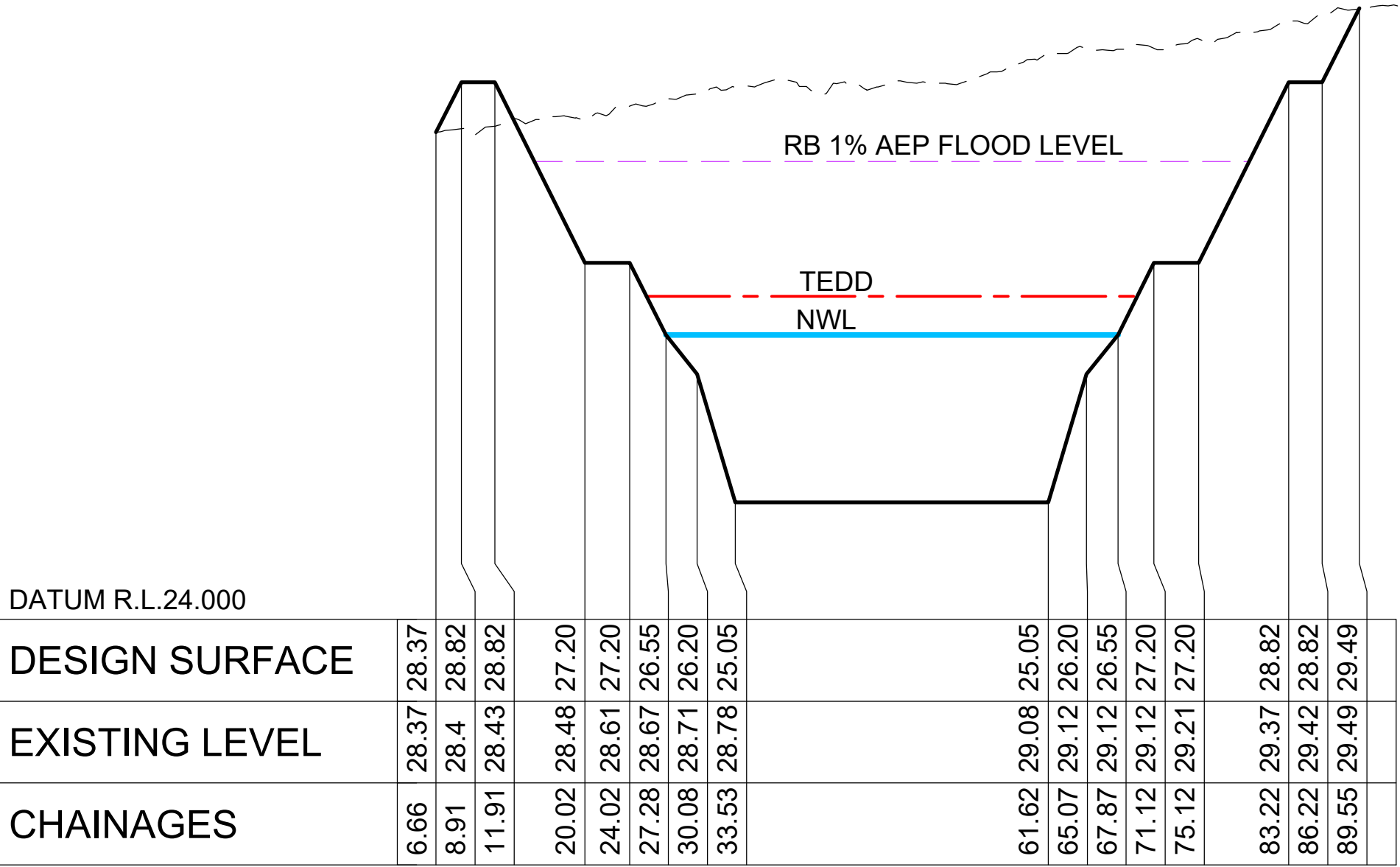
M:\26010475_EAST_OF_ABERLINE-PORB_MODEL\SPATIAL\CADD\WG26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



C0 LONGITUDINAL SECTION
SCALE: HORIZ:500 VERT:50



C1 CROSS SECTION
SCALE: HORIZ:500 VERT:50



C2 CROSS SECTION
SCALE: HORIZ:500 VERT:50

D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS
REV	DATE	DESCRIPTION



CLIENT:

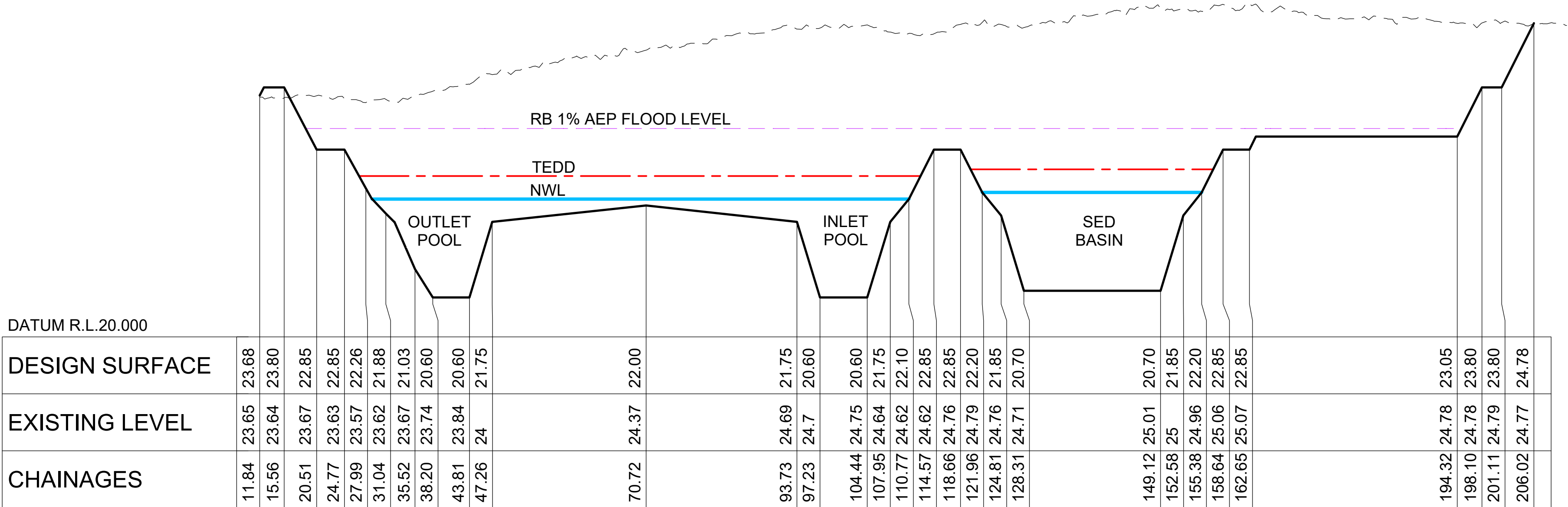
Department of Transport and Planning

PROJECT:

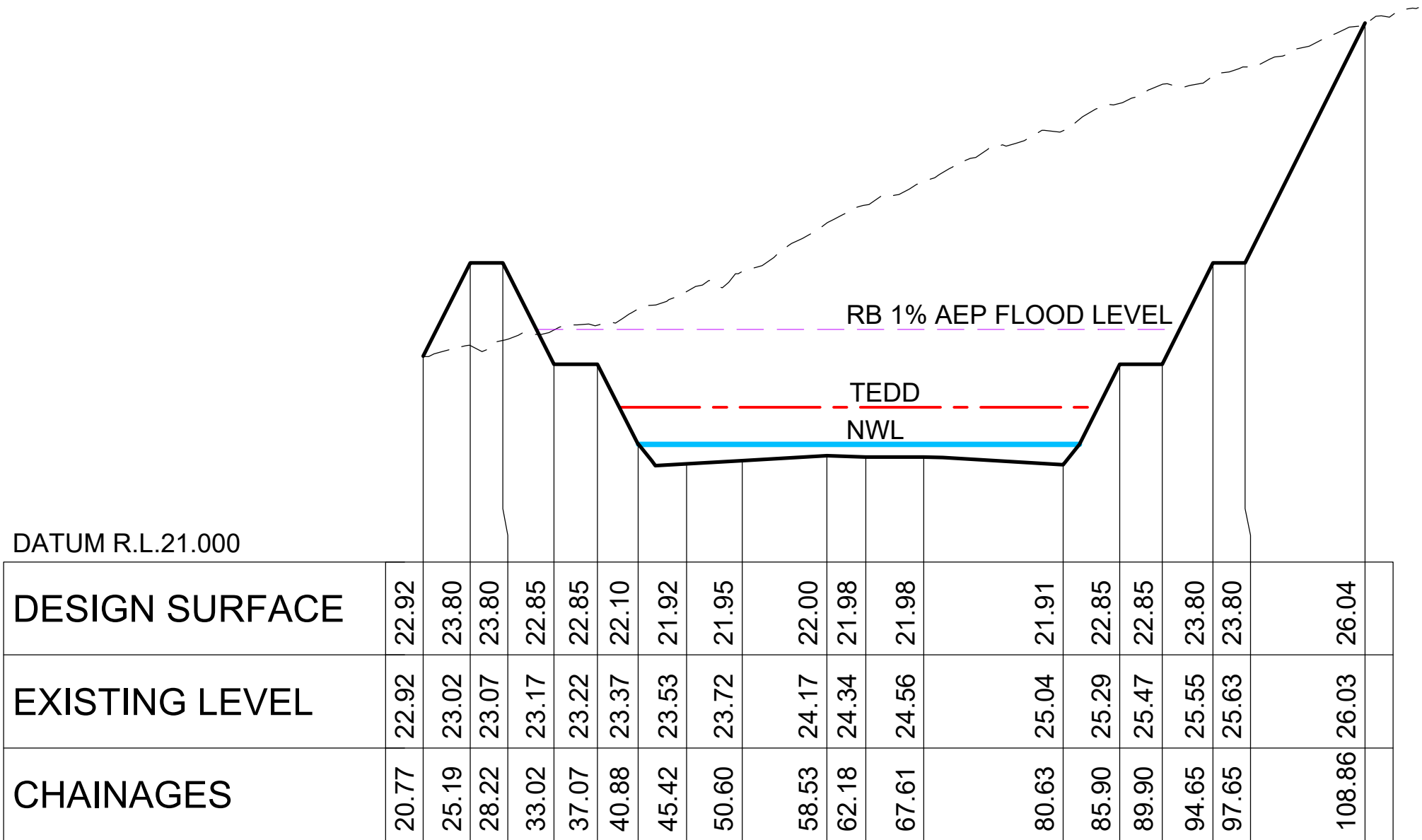
EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB	WETLAND C LONGITUDINAL SECTIONS		
CHECKED DATE: 13.07.2026	CHECKED: AV			
SHEET SIZE A1	SCALE: NTS			
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. NO PART OF THIS DOCUMENT IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY. ANY UNAUTHORIZED REPRODUCTION OR TRANSMISSION OF THIS DOCUMENT IS A BREACH OF THE COPYRIGHT ACT 1969 AND MAY BE PROSECUTED.		PROJECT No. 26010475	DRAWING No. D11	REV. D

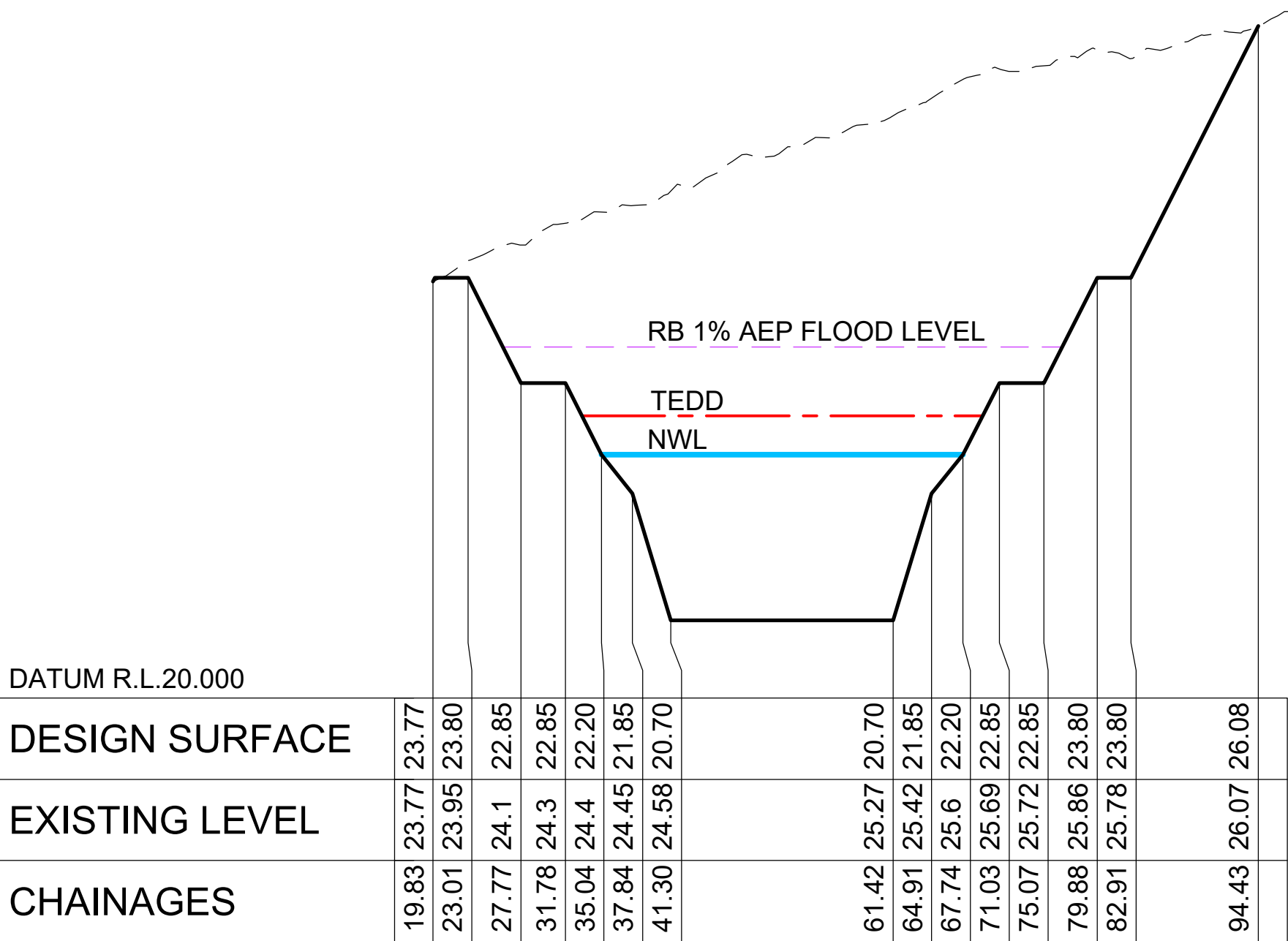
M:\26010475_EAST_OF_ABERLINE-PSPB_MODEL\SPATIAL\CADD\WG26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



D0 LONGITUDINAL SECTION
SCALE: HORIZ:500 VERT:50



D1 CROSS SECTION
SCALE: HORIZ:500 VERT:50



D2 CROSS SECTION
SCALE: HORIZ:500 VERT:50

REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

CLIENT:



Department of Transport and Planning

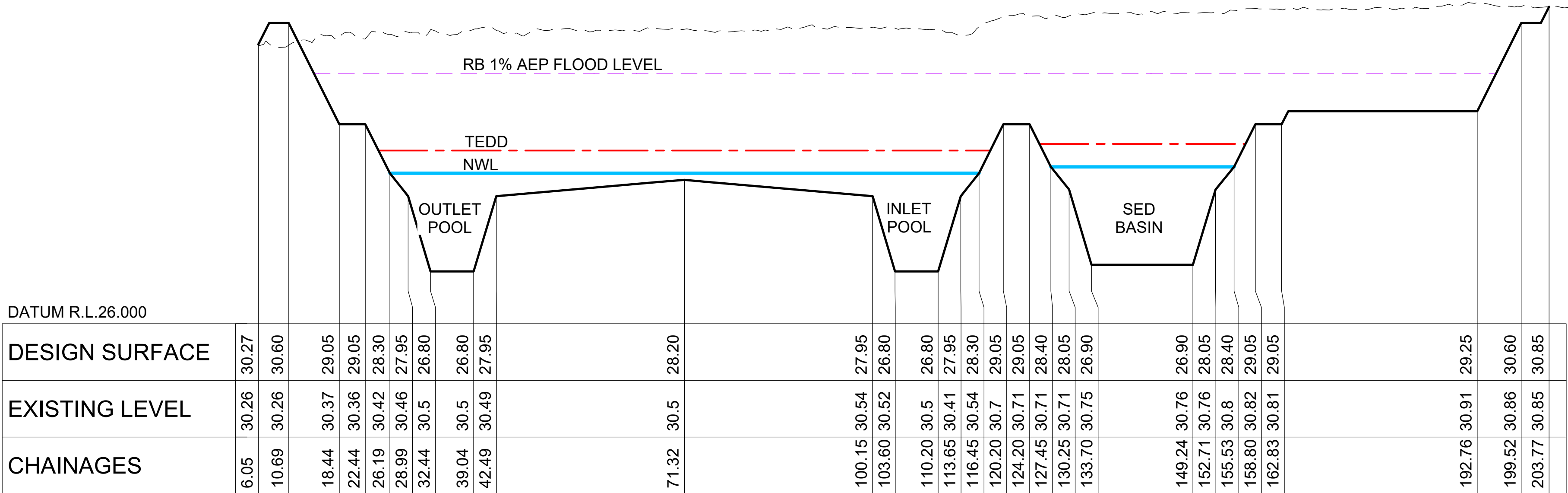
PROJECT:

EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

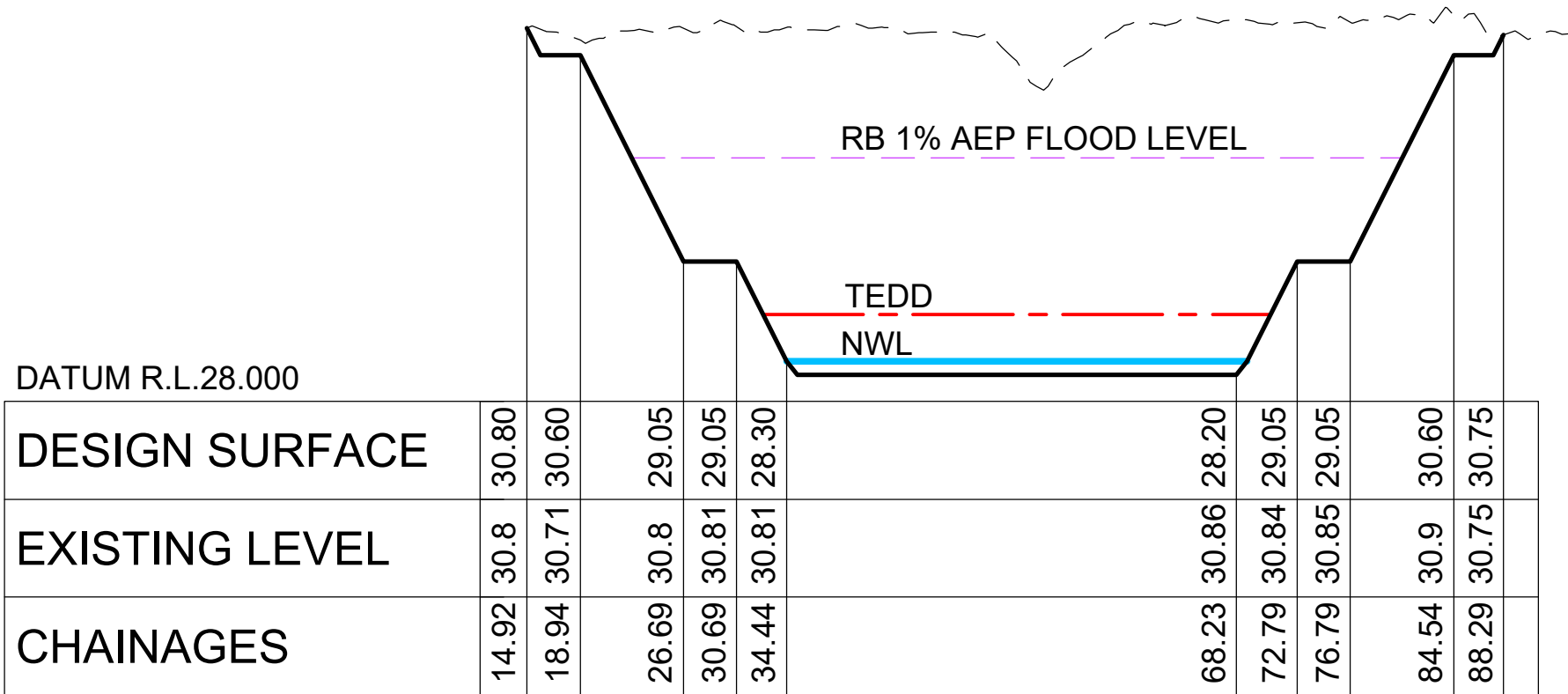
DESIGNED BY: AP / CM	DRAWN BY: MJB
DRAWING DATE: 13.07.2026	CHECKED BY: AV
SHEET SIZE A1	SCALE: NTS
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.	

WETLAND D LONGITUDINAL SECTIONS		
PROJECT No.	DRAWING No.	REV.
26010475	D12	D

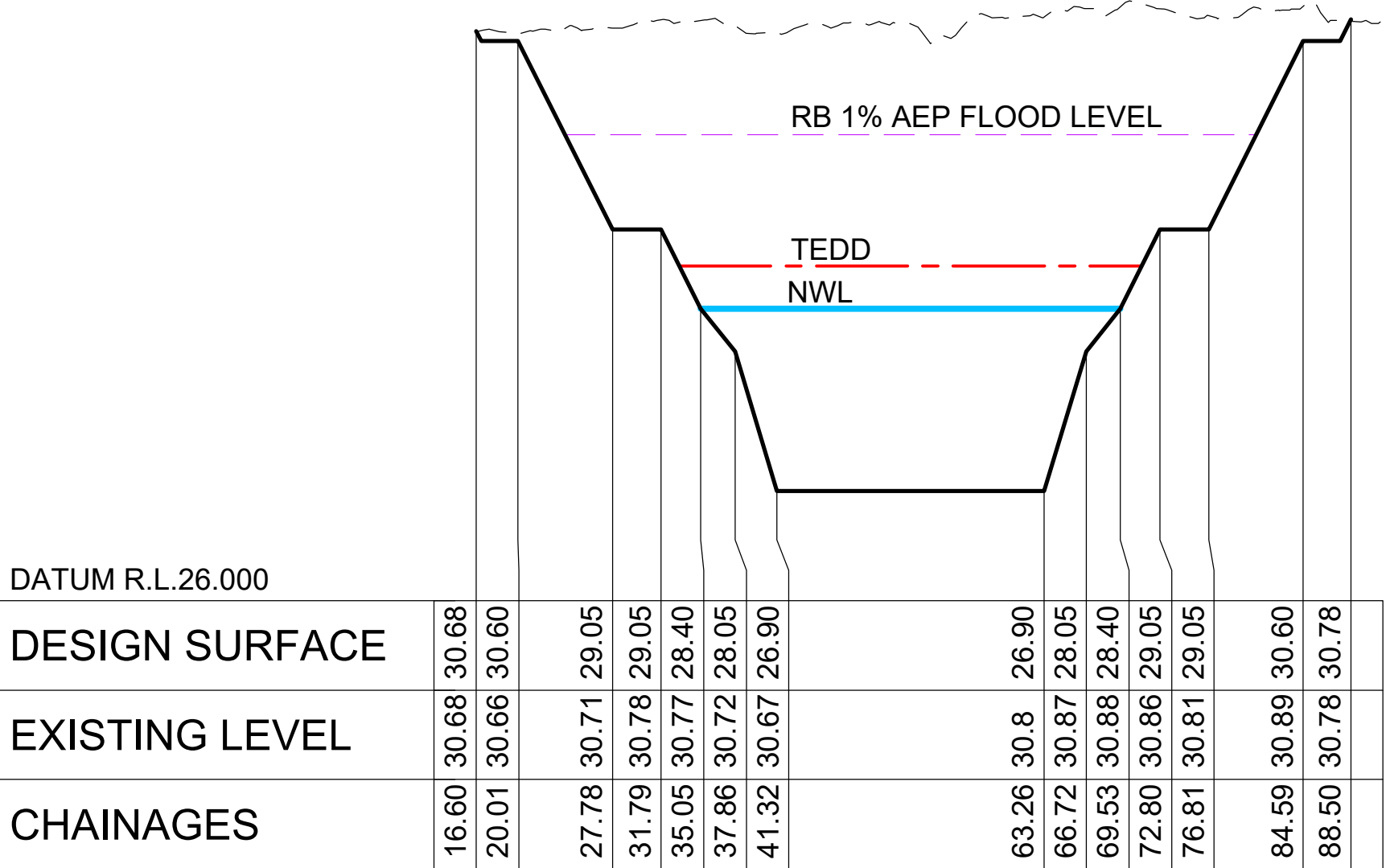
M:\26010475_EAST_OF_ABERLINE-PORB_MODEL\SPATIAL\CADD\WG26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



E0 LONGITUDINAL SECTION
SCALE: HORIZ:500 VERT:50



E1 CROSS SECTION
SCALE: HORIZ:500 VERT:50



E2 CROSS SECTION
SCALE: HORIZ:500 VERT:50

REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING.
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



CLIENT:



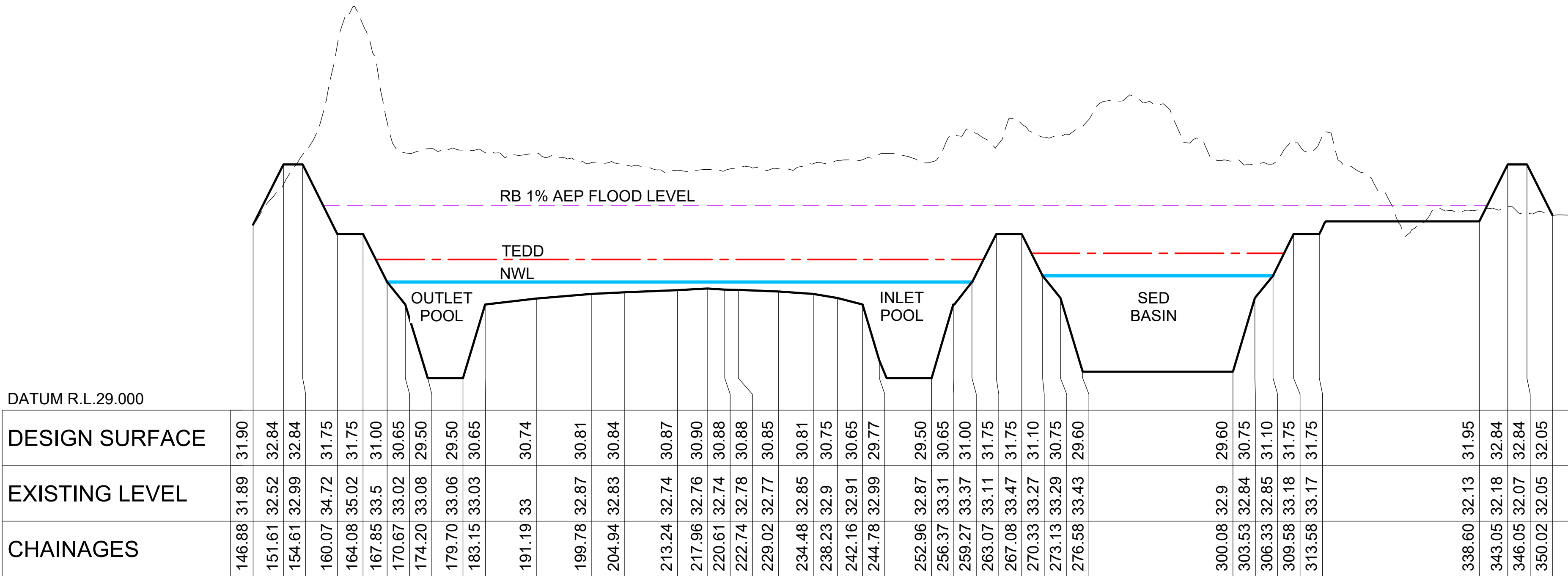
Department of Transport and Planning

PROJECT:

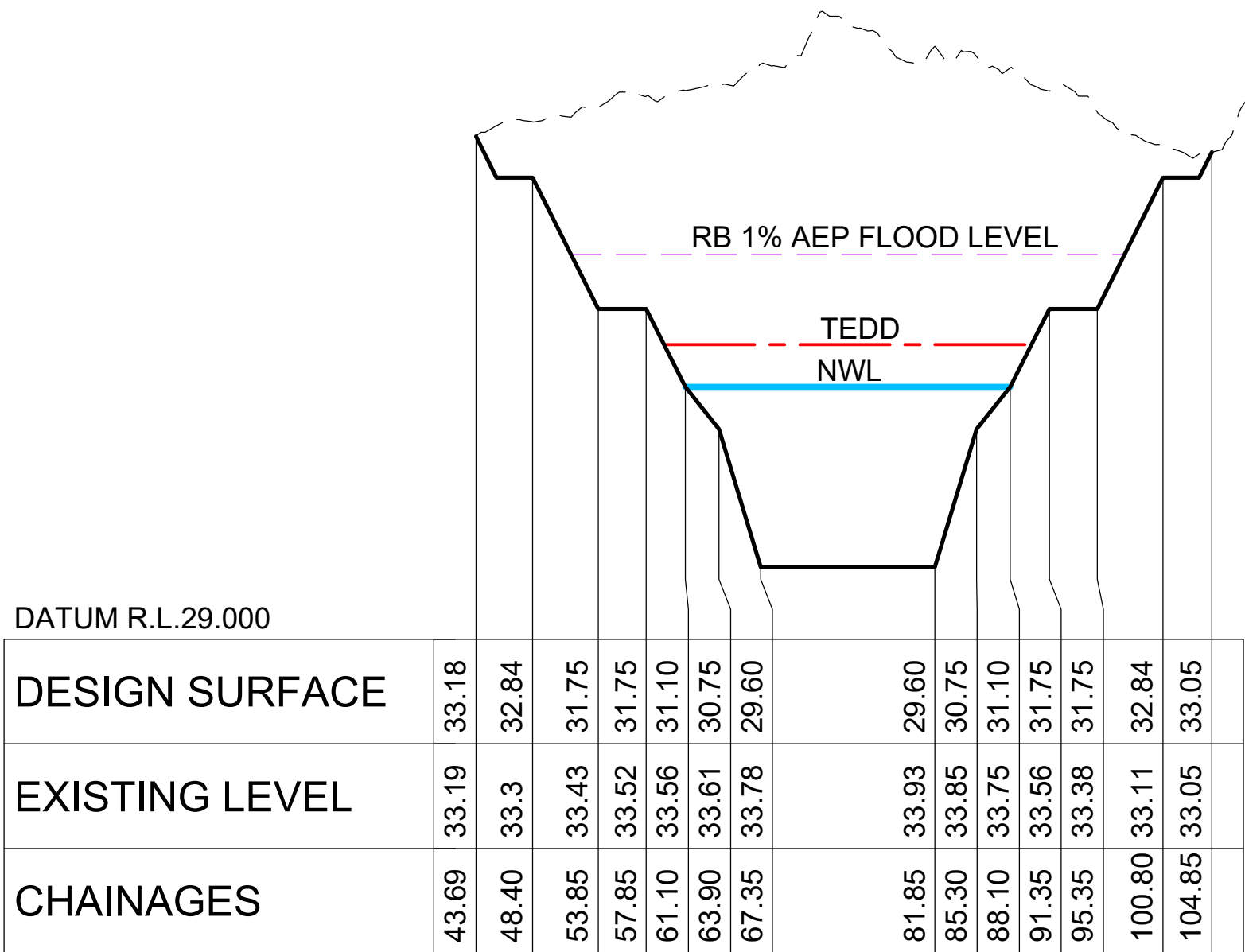
EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB	WETLAND E LONGITUDINAL SECTIONS		
DRAWING DATE: 13.07.2026	CHECKED BY: AV			
SHEET SIZE A1	SCALE: NTS			
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.		PROJECT No. 26010475	DRAWING No. D13	REV. D

M:\26010475_EAST_OF_ABERLINE-PORB_MODEL\SPATIAL\CADD\WG26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026



F0 LONGITUDINAL SECTION
SCALE: HORIZ:500 VERT:50



F1 CROSS SECTION
SCALE: HORIZ:500 VERT:50

D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS
REV	DATE	DESCRIPTION



WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

CLIENT:



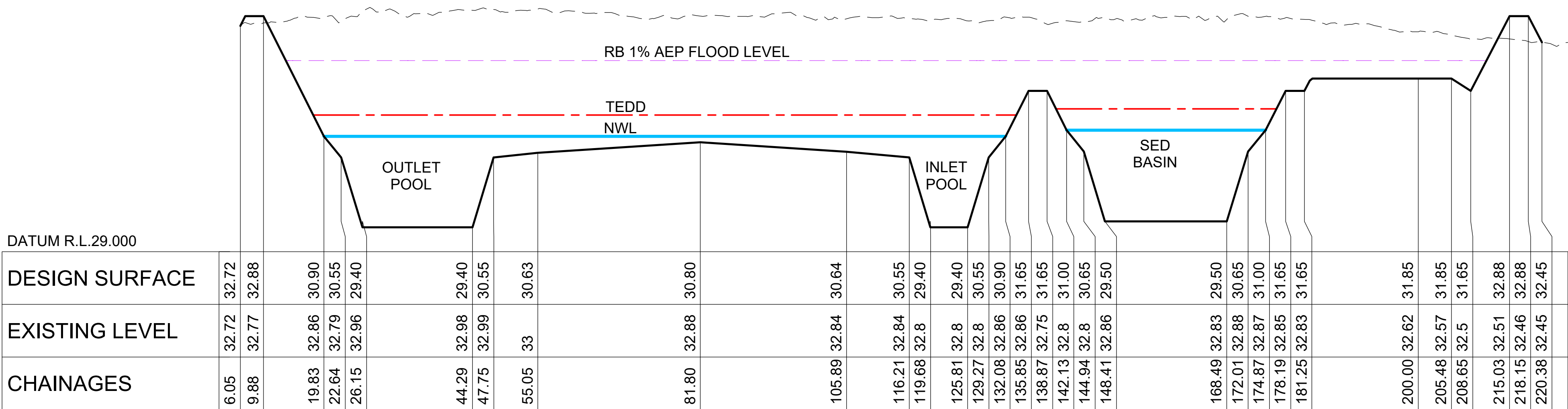
Department of Transport and Planning

PROJECT:

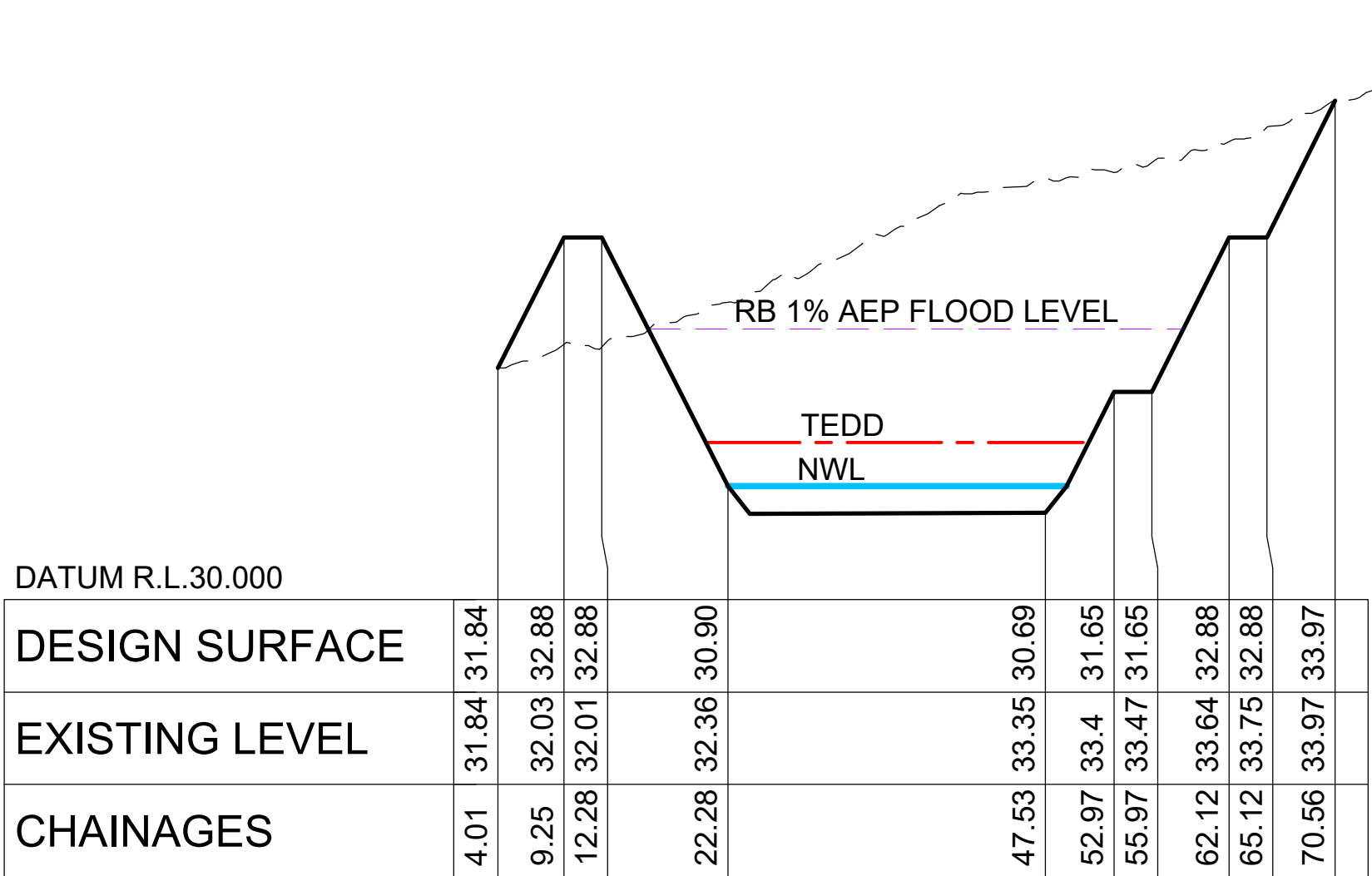
EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY: AP / CM	DRAWN BY: MJB
DRAWING DATE: 13.07.2026	CHECKED: AV
SHEET SIZE A1	SCALE: NTS
COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.	

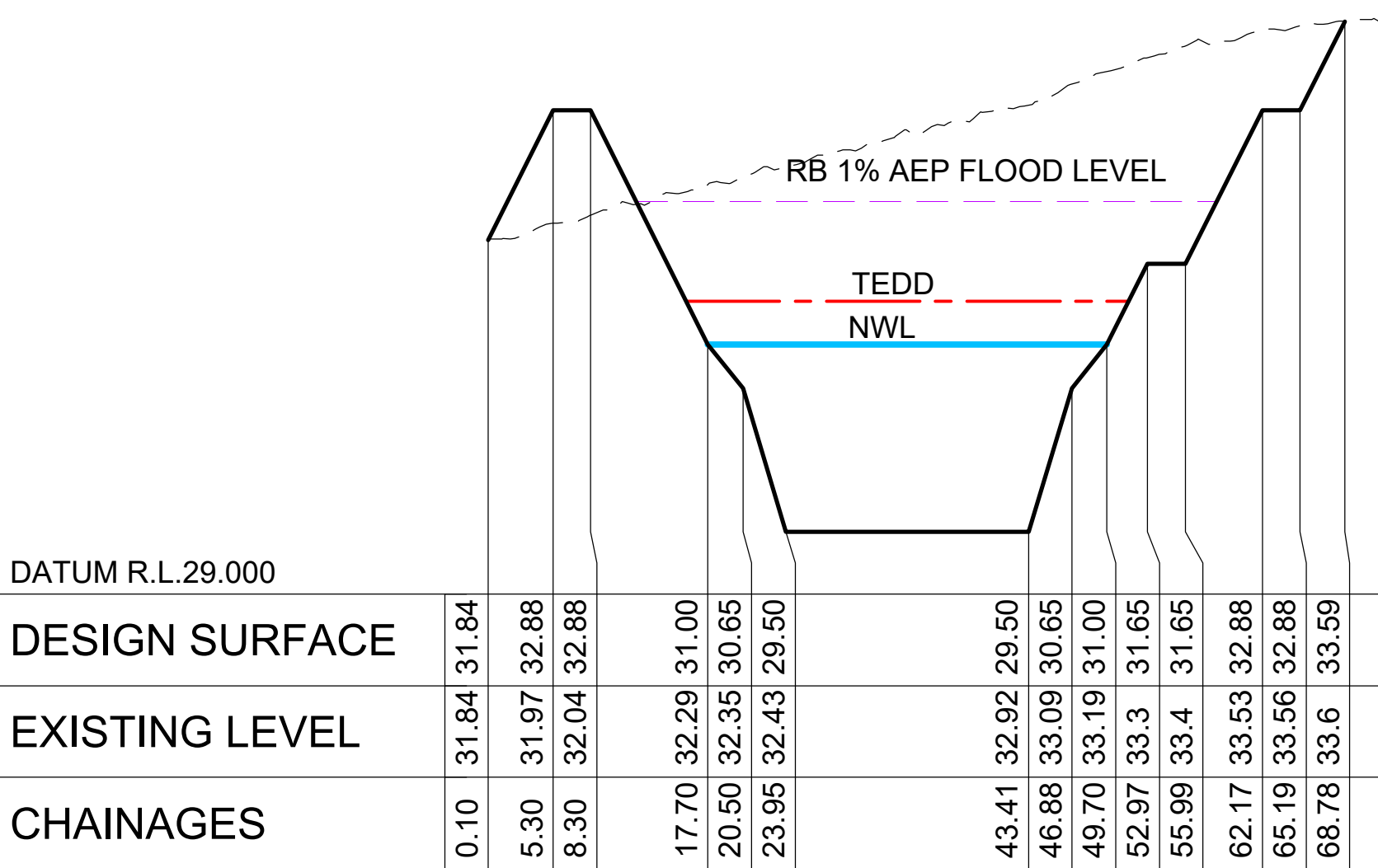
WETLAND F LONGITUDINAL SECTIONS	
PROJECT No.	DRAWING No.
26010475	D14
REV.	D



G0 LONGITUDINAL SECTION
SCALE: HORIZ:500 VERT:50



G1 CROSS SECTION
SCALE: HORIZ:500 VERT:50



G2 CROSS SECTION
SCALE: HORIZ:500 VERT:50

REV	DATE	DESCRIPTION
D	23.07.2026	MAINTENANCE TRACK TYPE NOTED AS CONCRETE TRACK AS PER THE DCP COSTING
C	13.07.2026	GENERAL NOTE 4 EXPANDED. GENERAL NOTE 7 ADDED. PIPE BLOCKAGE PREVENTION DEVICE NOMINATED AT UPSTREAM END OF SED BASIN TRANSFER PIPE FOR WETLANDS D, E, F & G. TRACK/RAMP ALIGNMENT FOR WLRB G REFINED TO BETTER FACILITATE VEHICLE ACCESS.
B	01.07.2026	WLRB EMBANKMENTS AMENDED
A	30.06.2026	ISSUED TO DTP, COUNCIL & GHCMA FOR REVIEW AND COSTINGS



CLIENT:

Department of Transport and Planning

PROJECT:

EAST OF ABERLINE PSP
WLRB FUNCTIONAL DESIGN
WARRNAMBOOL, VIC

DESIGNED BY:
AP / CM

DRAWN BY:
MJB

CHECKED:
AV

SHEET SIZE:
A1

SCALE:
NTS

COPYRIGHT - THIS DOCUMENT IS THE PROPERTY OF WATER TECHNOLOGY. USE OR COPYING OF THE DOCUMENT IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF WATER TECHNOLOGY CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.

WETLAND G LONGITUDINAL SECTIONS

PROJECT No.
26010475

DRAWING No.
D15

REV.
D

M:\26010475_EAST_OF_ABERLINE-PORB_MODEL\SPATIAL\CADD\WG26010475 CONCEPT DESIGN V0-3 260713.DWG - 13 July 2026

Melbourne

15 Business Park Drive
Notting Hill VIC 3168

Brisbane

Level 5, 43 Peel Street
South Brisbane QLD 4101

Sydney

Suite 3, Level 1, 20 Wentworth Street
Parramatta NSW 2150

Adelaide

2/39-40 Greenhill Road
Wayville SA 5034

New Zealand

4 Williamson Avenue
Ponsonby New Zealand 1021

Geelong

1/5 Bridge Street
Newtown VIC 3220

Gold Coast

Suite 37, Level 4, 194 Varsity Parade
Varsity Lakes QLD 4227

Sunshine Coast

4C 'Regatta Corporate', 2 Innovation Parkway
Birtinya QLD 4575

Melbourne – CBD

Suite 904, Carlow House, 289 Flinders Lane
Melbourne VIC 3000

Brisbane – Camp Hill

2a/4 Newman Avenue
Camp Hill QLD 4152

Ballina

Unit 1b/1 Hogan Street
Ballina NSW 2478

Perth

Level 1, 21 Adelaide Street
Fremantle WA 6160

Wangaratta

First Floor, 40 Rowan Street
Wangaratta VIC 3677

Wimmera

597 Joel South Road
Stawell VIC 3380

Darwin

Unit 40/29 Woods Street
Darwin City NT 0800

1300 198 413



watertech.com.au

