

MEMO

To:	Stephen James (Civilisation)
From:	Alan Davidson (Spiire)
Date:	18 June 2025
Reference:	307575
Project name:	Marshall Planning Scheme Amendment
Subject:	DI_DR_14 Redesign

1. INTRODUCTION

The City of Greater Geelong (the City) is proposing to amend the City's planning scheme to incorporate Marshall PSP and DCP, and for that purpose exhibited documents prior to convening a Panel to consider the proposed planning scheme amendment in November 2024. Exhibited documents included the Developer Contribution Plan (DCP) and *Marshall Precinct Structure Plan Stormwater Management Strategy* Revision B (Spiire, 2022).

A key element of the Marshall Stormwater Management Strategy (SWMS) and DCP was the proposed stormwater outfall for the Marshall South East catchment. This is shown in Figure 1 and as follows:

- ▶ DCP item DI_DR_1A (DI_DR_1A): a proposed 825 dia main drain which conveys 1% AEP stormwater flows from the Marshall South East catchment. This drains in an easterly direction along Goodman Road, before discharging to DI_DR_14.
- ▶ DCP item DI_DR_14 (DI_DR_14): a proposed constructed waterway which conveys stormwater flows from DI_DR_1A at Goodman Road in the north to the low point in Sparrovale Wetland in the south. The waterway was sized to convey flows from both Marshall Precinct (via DI_DR_1A) and the southern catchments of the North East Industrial Precinct (NEIP).

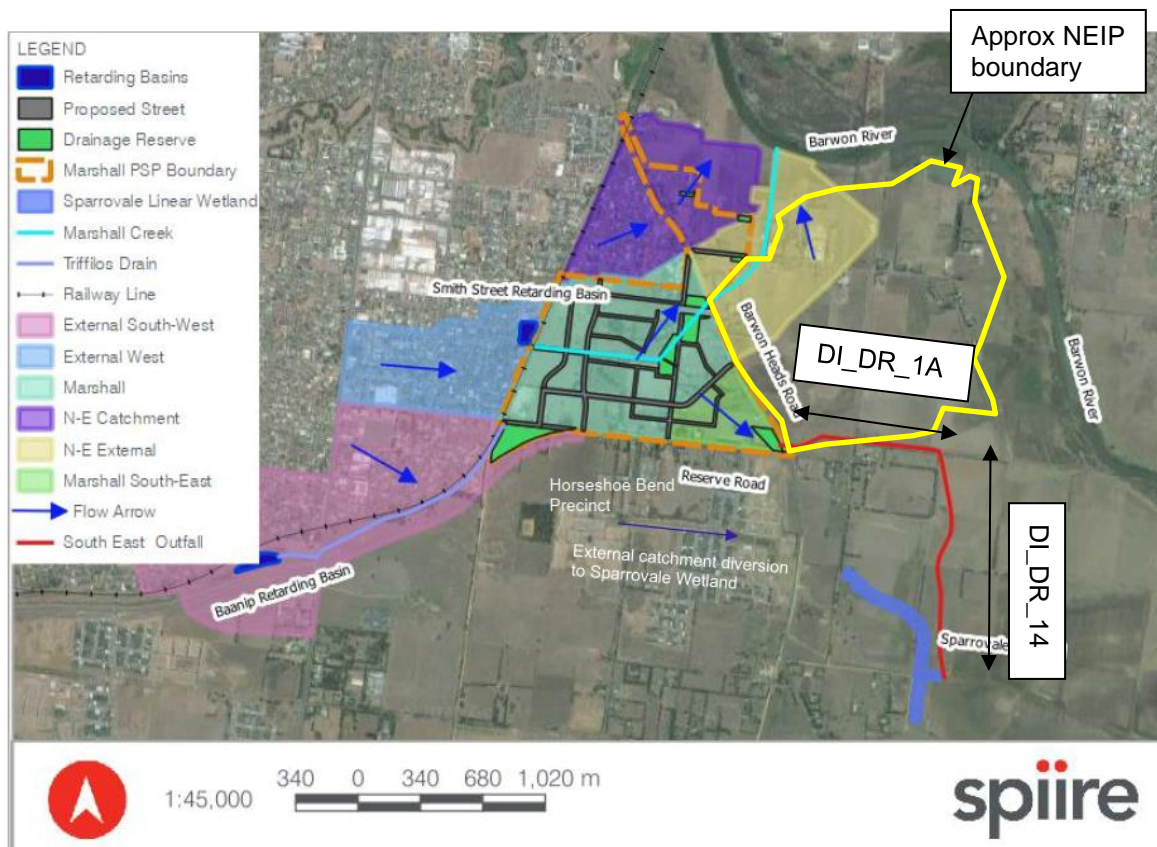


Figure 1. Marshall developed catchments (adapted from Spiire 2022)

The Panel recommended that the exhibited DI_DR_14 be adopted subject to adjustment of the cost included in the DCP item to include cultural heritage consultancy and flora and fauna consultancy.

The Panel report also noted. *Council acknowledged the ongoing management and operational issues associated with the Wetlands. As noted by experts, the operation and timing of gates being opened and closed to ensure optimal outcomes are realised for Hospital Swamps is not occurring. While it is beyond the scope of the Panel to make recommendations about management issues associated with the Wetlands, it is noted that the management issues need to be resolved.*

This was in response to observed water levels within the main Sparrovale Wetland being deeper, for longer durations than was designed and planned for. These conditions may have implications for existing native vegetation within the main wetland.

After the Panel concluded its hearings, the City decided to consider alternative designs to the exhibited DI_DR_14. The City's intent in seeking to revise the exhibited DI_DR_14 was to capture stormwater generated by the Marshall/NEIP southern catchments before it reaches the main Sparrovale wetland and maximise reduction of stormwater volume through a large evaporative wetland, thus reducing volume discharging to the main Sparrovale Wetland, while creating new and diverse habitat within a previously farmed area of Sparrovale Wetlands reserve.

The City had a number of designs prepared. Another one of the alternative designs considered by the City, was a concept prepared by Spiire which includes a 24.5Ha wetland (the Refined Concept) which is the subject of this memo.

Figure 2 shows an adapted Ngubiti yoorree Wetlands Master Plan incorporating the Refined Concept. This comprises proposed 24.5ha evaporative wetland, bunds, a constructed waterway and a fill

embankment. For the Preliminary design drawing set, which includes all elements of the proposed design, please refer to Appendix A.

At the time of writing, the NEIP SWMS project is ongoing. As such, proposed stormwater drainage system details (such as drainage basin locations, design flow rates etc.) are still a work in progress. Therefore, some assumptions made for the DI_DR_14 redesign presented here (such as 1% AEP flow rate from the NEIP) are conservative. These assumptions will be refined through progression of the NEIP SWMS and DI_DR_14 detailed design. Having said all of that, there has been robust investigation of the NEIP in the development of the Refined Concept and the City can be confident that the Refined Concept is sound.

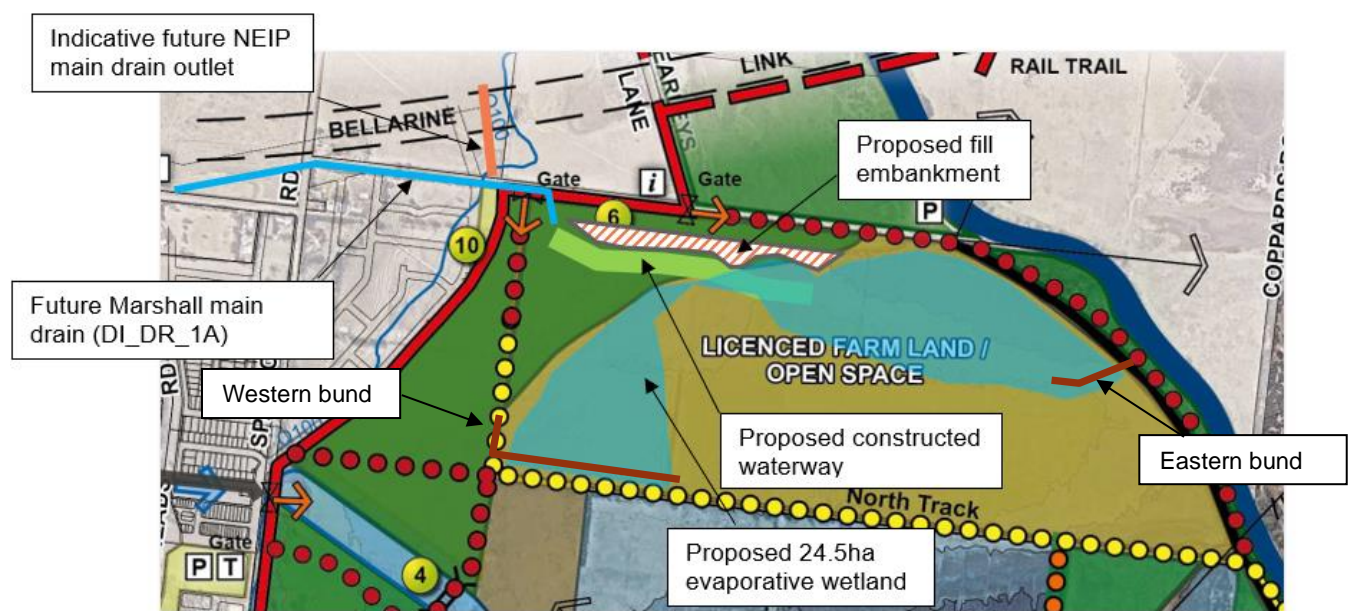


Figure 2. Sparrovale – Nubijt Yooree Wetlands Master Plan showing concept evaporative wetland (adapted from City of Greater Geelong)

2. DESIGN OVERVIEW

The preliminary Refined Concept is summarised below, and should be read in conjunction with the design plans in Appendix A. A depth heat map which shows areas of different depths across the design, is presented in Appendix B.

- ▶ A 24.5ha evaporative wetland with an estimated volume of 63,000m³ at Top Water Level (TWL) of 1.5m AHD, MUSIC modelling has demonstrated that this will achieve a mean annual volume reduction of 75% for the southern catchments of Marshall and NEIP Precincts.
- ▶ Two earthen bunds (~0.5m in height) along low lying areas to form the 24.5ha evaporative wetland.
 - The proposed western bund follows the alignment of an existing access track. This access track will be reconstructed in crushed rock to a minimum width of 4m and integrated with the raised bund. Minimum crest level will be 1.6m AHD. As such, access tracks will not be impacted but will instead be upgraded, with improved flood immunity.
 - The proposed eastern bund connects to the existing Barwon River levee on the eastern boundary of Sparrovale Wetlands reserve. Minimum crest level will be 1.6m AHD.

- The bund material and construction specification will be provided by a suitably qualified geotechnical engineer. Material will be imported if necessary. Where material is imported, a corresponding volume of material won from excavations will be exported to maintain floodplain storage capacity.
- As the earthen bunds will cause some localised filling within the Barwon River floodplain, together with possible impediment to shallower floodplain flows, CCMA requested that a Flood Impact Assessment (FIA) be undertaken. This was subsequently carried out by Water Technology with the FIA report presented in Appendix C. This assessment demonstrated that flood impacts will be relatively minor in nature and isolated to the proposed evaporative wetland in the northern Sparrovale Wetlands reserve. Therefore, no detrimental flood impacts to neighbouring properties will occur as a result of the proposed bunding.
- ▶ The proposed western wetland covers approximately 50% of the total evaporative wetland area. Minimum level is approximately 1.2m AHD and Top Water Level (TWL) is 1.5m AHD (maximum depth 0.3m). A shallow excavation in the centre will enhance connectivity between the north and south segments of the proposed western wetland. It will be topsoiled and hydromulched.
- ▶ The proposed eastern wetland covers approximately 50% of the total evaporative wetland. Minimum level is approximately 0.6m AHD and TWL is 1.5m AHD (maximum depth 0.9m).
- ▶ The future proposed 825dia main drain DI_DR_1A conveys flows from the Marshall Precinct to Sparrovale Wetlands reserve via Goodman Road. The last section (approximately 115m) of pipe will be increased in capacity to cater for NEIP flows. Note that as the Marshall PSP DCP only caters for Marshall flows, the upgraded section of pipe will be delivered by the NEIP PSP.
- ▶ A constructed waterway to convey flows from DI_DR_1A outlet to the proposed evaporative wetland.
 - The 1% AEP design flow adopted is 4.5m³/s and full 1% AEP capacity is provided in the design.
 - A 700m² outlet pool is proposed at the upstream end of the waterway. This will transition flows from the main drain to the waterway, providing energy dissipation.
 - The channel will be 300m long at 1 in 600 longitudinal grade, with a top width of 20m. Bank grades will be 1 in 5 maximum.
 - The low flow channel will provide 1EY capacity, with a base width of 5m and approximate height of 1m.
 - Benches will be set at the 1EY level, with a width of approximately 4m.
 - The City's intent is to reduce ongoing maintenance requirements, and for this reason has directed that the waterway be topsoiled and hydromulched only, rather than planted with riparian vegetation. Grass species within the hydromulch to be nominated by The City.
- ▶ A distribution pool to allow flows to spread out across the broad, flat western wetland.
 - Top of southern bank of the distribution pool is approximately 1.3m, which represents spill level to the western wetland.
- ▶ The western control gate is a pen stock located at the downstream end of the distribution pool. Allows flows to be conveyed to either the western wetland or eastern wetland.

- Invert level is 0.4m AHD and crest/spill level is 1.5m AHD.
 - When closed, this gate isolates the eastern wetland from the catchment, until the western wetland is full and overspill commences. This provides a TWL of the western wetland of 1.5m AHD
 - When open, this gate isolates the western wetland from the catchment, allowing flows to bypass through the waterway to the eastern wetland.
 - Can be accessed from Goodman Road to the north, via the existing maintenance access gate.
- ▶ The waterway outlet pool is located downstream of the western control gate.
 - Downstream invert level is 0.4m AHD, top of batter (and thus spill level to eastern wetland) is 1.0m AHD.
- ▶ The eastern control gate is a layflat gate and will be integrated to the eastern bund, to control the eastern wetland.
 - Invert level is 0.9m AHD and crest/spill level is 1.5m AHD.
 - When closed, the eastern wetland will fill to 1.5m AHD, before spilling over a designated spillway.
 - When fully open, the eastern wetland can be drained to 0.9m AHD. The layflat gate provides the ability to adjust TWL between 0.9m – 1.5m as required.
 - Will discharge to the existing open channel down to the decommissioned pump station.
 - Can be accessed by the existing access track on the Barwon River levee.
- ▶ A proposed fill embankment along the northern boundary of Sparrovale Wetland reserve, using fill won from the excavation works.
 - Will be further developed into an access track and viewing platform under a future project (by The City).
 - It is understood that CCMA have provided In Principle support for the proposed fill embankment, however, a Flood Impact Assessment has not been undertaken. In the instance that a Flood Impact Assessment is required, flood impacts caused by the embankment may be found to be unacceptable.
 - Where flood impacts are unacceptable, or the won excavation material is found to be geotechnically unsuitable for use as an engineered embankment, the material will be stockpiled at a location in Sparrovale Wetland reserve located outside the 1% AEP floodplain. The location is to be nominated by the City. The City's intent is to retain the material for other future alternative purposes (by The City), such as revegetation of areas within Sparrovale Wetland reserve.
 - Otherwise, if flood impacts are acceptable and the excavation material is found to be geotechnically suitable, the detailed design of the Refined Concept will include the fill embankment.
 - The embankment construction specification will be provided by a suitably qualified geotechnical engineer.

3. MODELLING SUMMARY

To understand how the Refined Concept will perform hydrologically, water balance modelling was undertaken. MUSIC was used to obtain volumetric inflows and evapotranspiration rate at a 6 minute timestep (across a 20 year period), which was imported to a spreadsheet. This spreadsheet incorporated the bathymetry of the evaporative wetland and was built to calculate water level and water surface area for each timestep. In this way, Mean Annual volume reduction via evapotranspiration was calculated to be 75%.

The water balance modelling was based on the assumption that the western control gate is open. Under this configuration, flows bypass the western wetland via the constructed waterway and enter the eastern wetland. This is until such time as levels in the eastern wetland reach the spill level of the western wetland distribution pool (1.3m AHD) and filling of the western wetland commences.

In accordance with the EPA 1739.1 Guideline, stormwater volume reduction targets for Sparrovale are as follows:

- ▶ Adopting the subject catchment as a “Priority Catchment” for the Geelong rainfall band of 500mm gives a total volume reduction target of 82% Mean Annual Impervious Runoff (MAIR). This is comprised of 77% MAIR reduction through harvesting/evapotranspiration and 5% MAIR reduction through infiltration to groundwater.
- ▶ MUSIC modelling has shown that Mean Annual Impervious Runoff (MAIR) is 85% of MAR, for 70% average catchment imperviousness within the Geelong region. Hence, the 1739.1 target for Sparrovale is $82 \times 0.85 = 70\%$.
- ▶ Roofwater storage and reuse has been modelled in Geelong as achieving up to 20% reduction in MAR from residential development at 70% imperviousness. Given this option is ruled out by the Barwon Water recycled supply mandate, achieving the priority target (so far as is reasonably practicable) under 1739.1 implies removal of up to 50% of MAR.

Therefore, the proposed Refined Concept volume reduction (MAR 75%) exceeds the implied EPA 1739.1 volume reduction target by 50%.

Using the results of the water balance modelling, a level duration curve was created, as presented in Figure 3. The orange curve represents the proposed evaporative wetland (note, the blue line shows an alternative design which The City is no longer exploring). As shown, the proposed evaporative wetland is predicted to sit at 1.5m (TWL) for 9% of the time, at 1.4m AHD for 60% of the time and 1.2m AHD for approximately 95% of the time.

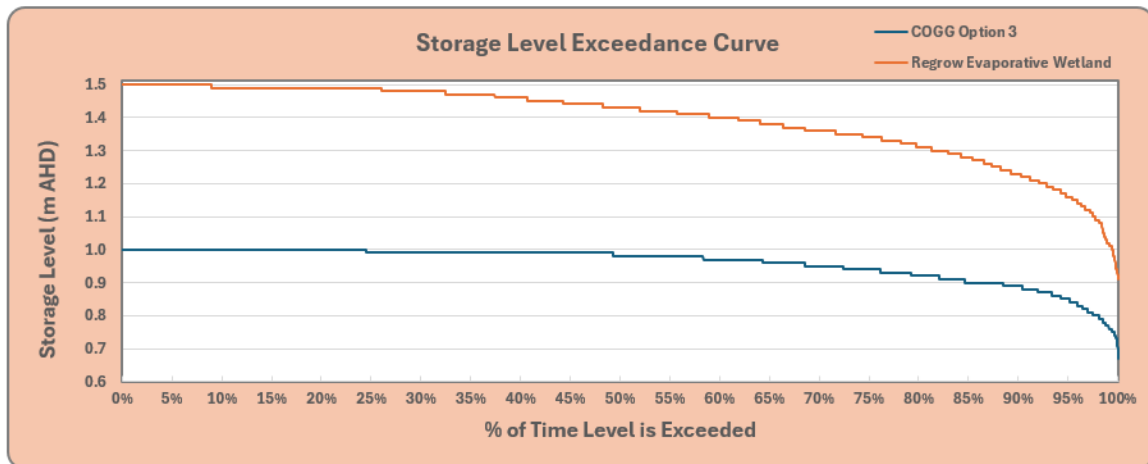


Figure 3. Level duration curve

Figure 4 presents a time series of the water level within the proposed evaporative wetland, as calculated through the water balance modelling. As shown, the water level rarely drops below 1.1m AHD, forming the permanent pool and providing additional habitat for species such as large water birds.

Levels fluctuate more frequently between 1.3m AHD – 1.5m AHD creating an ephemeral zone.

Between 1.25m and 1.5m (TWL), the Refined Concept has an area of 155,700m² created predominantly by the existing undulating topography with a perimeter of 5.5km at 1.25m and 9.4km at 1.5m (TWL). Please refer to the Refined Concept Depth Heat Map in Appendix 2.

Water balance modelling also predicts that overtopping to the main wetland occurs in most years analysed (once levels reach 1.5m AHD). It should be noted, however, that the overall volume spilling to the main wetland is small when compared to volume lost (75% Mean Annual Reduction) to evapotranspiration.

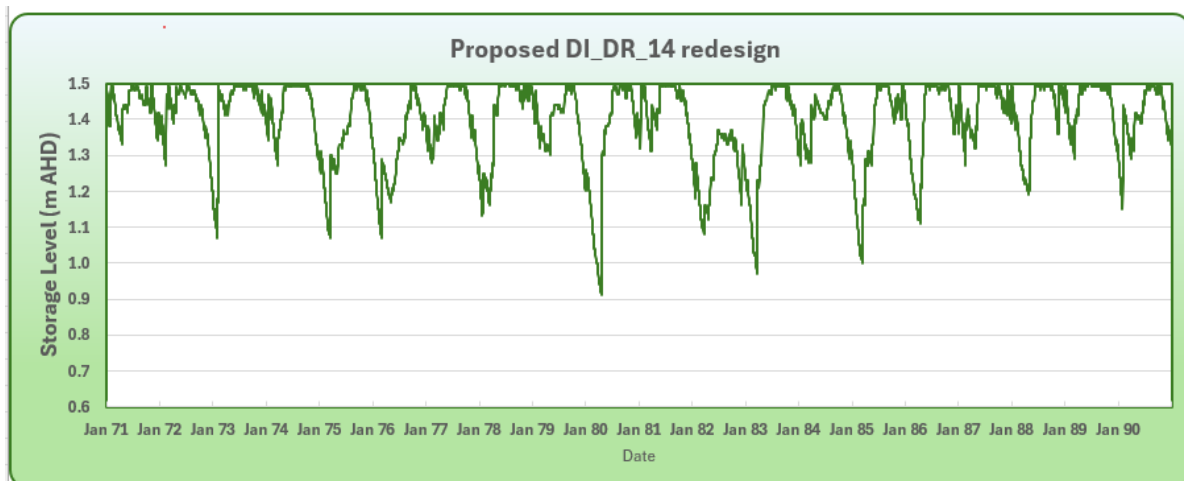


Figure 4. Proposed DI_DR_14 revised concept: modelled water level time series

The characteristics and hydrologic conditions of the Refined Concept will provide a diverse range of permanent pool, marsh and ephemeral zones within the proposed wetland. Please refer to Biodiversity Opportunities letter prepared by AECOM presented in Appendix D.

4. BIODIVERSITY

The project will deliver many benefits to the City, the public and other stakeholders. It will also provide many other benefits including capturing stormwater before it reaches Sparrovale main wetland while symptoms (unrelated to exhibited DI_DR_14) therein exist, controls to allow active management, exemplary volumetric reduction outcomes, and the rehabilitation of farmland to permanent water bodies and ephemeral areas providing a diversity of habitats for significant wetland-dependant fauna species and the opportunity for the reestablishment of a range of wetland Ecological Vegetation Classes. The project also requires little disturbance compared to the exhibited DI_DR_14 design and other re-designs contemplated by the City.

The project is located in a heavily disturbed and modified part of the Sparrovale property which has been subject to agricultural disturbance since 1907, and used before that for horse racing from 1851. The project area has been farmed and cleared in recent years since the EHP Biodiversity Assessment carried out in May, June and August 2018 and published April 2019. The City confirmed 8 May 2025 that the only EVC in the works area (EVC647) mapped by EHP in 2018 is no longer present and as such, any other native vegetation that may be present is regrowth.

Please refer to Biodiversity Opportunities letter prepared by AECOM presented in Appendix D.

5. COSTINGS

A construction cost estimate has been prepared for the Refined Concept, based on the plans presented in Appendix A. The schedule of quantities and costing is presented in Appendix D. Once endorsed by The City, this costing will supersede the current DI_DR_14 DCP cost, as follows:

- ▶ Exhibited DI_DR_14 costing (now superseded): \$2,429,555.22 noting that this excludes the addition of allowances for cultural heritage and flora and fauna recommended by the Panel.
- ▶ Revised DI_DR_14 costing: \$2,262,827.53 noting that this includes an allowance for cultural heritage but not flora and fauna which is not required and as such excluded.

Note that a 15% contingency has been applied to all items in the revised costing.

The Refined Concept provides a substantial cost saving when compared with exhibited DI_DR_14.

6. SUMMARY

This memo has been written as a supplement to the Spiire 2022 SWMS report and supersedes all sections and plans of the 2022 report which make reference to DI_DR_14. Once endorsed by The City, this memo will formally supplement the Marshall SWMS and form part of the PSP supporting documentation.

APPENDIX A
REVISED CONCEPT

MARSHALL PRECINCT - DI_DR_14 CONCEPT DESIGN

EVAPORATIVE WETLAND CONCEPT DESIGN

RE-GROW GEELONG / CITY OF GREATER GEELONG

GENERAL NOTES

SURVEY

- ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM AND ALL COORDINATES ARE TO MAP GRID OF AUSTRALIA (MGA) 2020, ZONE 55
- TBM'S TO BE RE-ESTABLISHED BY THE LICENSED SURVEYOR IF FOUND TO BE MISSING AT THE COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR CARE AND MAINTENANCE OF TBM'S THEREAFTER.
- ALL EXISTING SURFACE LEVELS SHOWN ON THE ENGINEERING DRAWINGS HAVE BEEN INTERPOLATED FROM A DIGITAL TERRAIN MODEL. THESE LEVELS HAVE BEEN USED AS THE BASIS FOR ALL ENGINEERING DESIGN AND DETERMINATION OF QUANTITIES AND ARE ACCURATE TO WITHIN ±0.05m.

EARTHWORKS

- THE LOCATION OF EXISTING SERVICES SHOULD BE DETERMINED BY THE CONTRACTOR PRIOR TO COMMENCING ANY EXCAVATION BY CONTACTING ALL LOCAL SERVICE AUTHORITIES. ANY EXISTING SERVICES SHOWN ON THESE DRAWINGS ARE OFFERED AS A GUIDE ONLY AND ARE NOT GUARANTEED AS CORRECT. ANY DISTURBANCE OR DAMAGE TO EXISTING SERVICES SHALL BE AT THE CONTRACTOR'S EXPENSE.
- FILLING MATERIAL IS TO BE IN ACCORDANCE WITH THE SPECIFICATION, AS 3798-2007 & TO THE SATISFACTION OF COUNCIL AND THE SUPERINTENDENT.
- ALL BATTERS SHALL BE 1 IN 6, UNLESS OTHERWISE SHOWN.
- TBM'S TO BE RE-ESTABLISHED BY THE LICENSED SURVEYOR IF FOUND TO BE MISSING AT THE COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR CARE AND MAINTENANCE OF T.B.M.'S THEREAFTER.
- AT LEAST 3 DAYS PRIOR TO COMMENCING WORK ON EXCAVATIONS IN EXCESS OF 1.50m DEEP, A NOTIFICATION FORM MUST BE SENT TO WORKSAFE. THE CONTRACTOR IS TO COMPLY WITH WORKSAFE, THE MINES (TRENCHES) REGULATION 1982, THE MINES ACT 1958 AND OCCUPATIONAL HEALTH AND SAFETY ACT 1985, 2004.
- WHERE REQUIRED, ALL EXISTING DAMS, DEPRESSIONS AND DRAINS ARE TO BE BREACHED, DRAINED, DESLUDGED AND SHALL BE EXCAVATED TO A CLEAN FIRM BASE. THE SURFACE SHALL BE INSPECTED, APPROVED AND LEVELED BY THE ENGINEER PRIOR TO COMMENCEMENT OF FILLING. THE FILL SHALL BE APPROVED SELECTED ON SITE MATERIAL OR APPROVED IMPORTED MATERIAL. THE FILL SHALL BE PLACED UNDER CONTROLLED MOISTURE CONDITIONS IN ACCORDANCE WITH THE SPECIFICATION.
- NO BLASTING TO BE CARRIED OUT WITHIN THE MUNICIPALITY WITHOUT OBTAINING COUNCILS PERMISSION.
- THE CONTRACTOR SHALL OBTAIN A ROAD OPENING PERMIT FROM THE RELEVANT AUTHORITY FOR ANY WORKS WITHIN EXISTING ROAD RESERVES AND COMPLY WITH THE REQUIREMENTS.
- THE CONTRACTOR IS TO HAND OR HYDROEXCAVATE PROVE ALL EXISTING SERVICES EFFECTING THE WORKS PRIOR TO COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR IS TO NOTIFY THE SUPERINTENDENT OF ANY SERVICES THAT MAY HINDER THE SAFE CONSTRUCTION OF THE WORKS SUCH THAT THE DESIGN CAN BE ALTERED AS REQUIRED.
- FOR THE DURATION OF PROCLAIMED WATER RESTRICTIONS THE CONTRACTOR SHALL CONFORM TO THE RESTRICTIONS AND ANY OTHER WATER CONSERVATION REQUIREMENTS IMPOSED BY THE WATER AGENCY.

STORM WATER DRAINAGE

- ALL STORMWATER DRAINS ARE TO BE CLASS '2' R.C. PIPES UNLESS OTHERWISE SHOWN. ALL R.C. JOINTS ARE TO BE RUBBER RING JOINTED (R.R.J.).

SIGNAGE AND LINEMARKING

- ALL TEMPORARY WARNING SIGNS USED DURING CONSTRUCTION SHALL BE SUPPLIED AND MAINTAINED IN ACCORDANCE WITH AS 1742-3.

ENVIRONMENTAL

- CONTRACTOR TO PREPARE AN ENVIRONMENTAL MANAGEMENT PLAN (SEMP) AND FORWARD TO THE SUPERINTENDENT PRIOR TO THE COMMENCEMENT OF WORKS.
- THE CONTRACTOR MUST CONSTRUCT THE WORKS IN ACCORDANCE WITH THE APPROVED SEM. ALL TREES AND SHRUBS ARE TO BE RETAINED UNLESS OTHERWISE SHOWN. IF CONSTRUCTION NECESSITATES THEIR REMOVAL, WRITTEN PERMISSION MUST BE OBTAINED FROM THE SUPERINTENDENT.
- TREES NOT SPECIFIED FOR REMOVAL ARE TO BE PROTECTED WITH APPROPRIATE EXCLUSION FENCING PRIOR TO COMMENCEMENT OF ANY WORKS.
- DURING THE CONSTRUCTION AND MAINTENANCE PERIOD SILT FENCES ARE TO BE PLACED DOWNSTREAM OF ALL EXPOSED AREAS, AND SILT BARRIERS ARE TO BE PLACED UPSTREAM OF ALL PITS. THE SILT FENCES AND SILT BARRIERS ARE TO BE CHECKED AND MAINTAINED UNTIL THE END OF THE MAINTENANCE PERIOD.

ASSET RECORDING

- UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT, THE PRINCIPAL'S PROJECT SURVEYOR WILL UNDERTAKE 'AS CONSTRUCTED' SURVEYS OF VARIOUS PARTS OF THE WORKS THROUGHOUT THE CONSTRUCTION AND PREPARE THE ASSET RECORDING INFORMATION NECESSARY TO SATISFY THE REQUIREMENTS OF THE RELEVANT AUTHORITIES. REFER TO THE SPECIFIC CLAUSES WHERE 'AS CONSTRUCTED' SURVEY IS REQUIRED TO BE UNDERTAKEN.

PROPOSED WATERWAY

- AS THE NEIP STORMWATER MANAGEMENT STRATEGY IS CURRENTLY IN PROGRESS, DISCHARGE RATES TO THE WATERWAY HAVE NOT YET BEEN DETERMINED.
- IN THE ABSENCE OF FINALISED DESIGN FLOWS, DESIGN FLOWS USED FOR THE WATERWAY CONCEPT DESIGN ARE CONSERVATIVE TO AVOID UNDERESTIMATES FOR THE DCP.
- INSTEAD OF A WATERWAY REVEGETATED WITH RIPARIAN SPECIES, THE CITY HAS SPECIFIED, FOR MAINTENANCE REASONS, A GRASSSED CHANNEL ONLY. IT IS NOTED THAT A GRASSSED CHANNEL HAS A LOWER SHEAR RESISTANCE THRESHOLD THAN A CHANNEL PLANTED WITH WOODY VEGETATION AND RISK OF EROSION IS THEREFORE HIGHER. SPIIRE HAS UNDERTAKEN SHEAR STRESS ANALYSIS WHICH SHOWS THAT FOR A WATERWAY FULLY REVEGETATED WITH GRASS, SUFFICIENT SHEAR RESISTANCE WILL BE PROVIDED TO LIMIT EROSION.
- THE DESIGN ALLOWS FOR HYDROSEEDING OF THE WATERWAY POST CONSTRUCTION, WITH GRASS SPECIES NOMINATED BY THE CITY. WATER LEVELS WITHIN THE WATERWAY WILL FLUCTUATE WITH THE WETLAND, SO VEGETATION SPECIES WILL NEED TO TAKE THIS INTO ACCOUNT.
- THE FINISHED SURFACE WILL BE STABILISED WITH 100mm TOPSOIL AND HYDROMULCHED WITH GRASS SPECIES SPECIFIED BY THE CITY.

- THE OUTLET POOL AT THE UPSTREAM END OF THE WATERWAY PROVIDES ENERGY DISSIPATION FOR FLOWS DISCHARGING FROM THE UPSTREAM MAIN DRAIN WHILE THE POOL WILL ALSO PROVIDE ADDITIONAL SEDIMENT REMOVAL UPSTREAM OF THE WATERWAY. THIS IS INFORMAL AND NO CLAY LINER, ROCK BASE OR ACCESS TRACKS TO THE BASE ARE PROVIDED IN THE DESIGN.

PROPOSED DISTRIBUTION POOL

- THE PROPOSED DISTRIBUTION POOL IS DESIGNED TO SPREAD OUT FLOWS FROM THE WATERWAY TO THE WESTERN WETLAND. THE DESIGN SPILL LEVEL WILL BE APPROXIMATELY 1.3M - 1.4M, BEING CONTROLLED BY TOP OF BANK FOR THE DISTRIBUTION POOL.

PROPOSED WESTERN CONTROL GATE

- THIS PENSTOCK CONTROLS THE INLET TO THE EASTERN AND WESTERN WETLAND. THE MINIMUM OPERATING LEVEL IS 0.4M AHD AND OVERFLOW LEVEL IS 1.5M AHD.
- WHEN OPEN, FLOWS BYPASS THE WESTERN WETLAND AND SPILL TO THE EASTERN WETLAND AT 1.0M AHD.
- WHEN CLOSED, FLOWS BUILD UP IN THE DISTRIBUTION POOL AND SPILL TO THE WESTERN WETLAND AT 1.3M AHD.
- WHEN CLOSED AND THE WESTERN WETLAND IS AT CAPACITY, FLOWS WILL SPILL OVER A SPILLWAY AT 1.5M AHD TO THE EASTERN WETLAND.

PROPOSED EASTERN CONTROL GATE

- THIS LAYFLAT GATE CONTROLS THE EASTERN WETLAND WITH A MINIMUM OPERATING LEVEL OF 0.9M AND OVERFLOW LEVEL OF 1.5M AHD.
- WHEN OPEN, FLOWS WILL DISCHARGE FROM THE EASTERN WETLAND TO THE EXISTING DOWNSTREAM OPEN CHANNEL AND DRAIN TO 0.9M AHD.
- THE LAYFLAT GATE GIVES THE ABILITY TO ADJUST OUTLET WEIR LEVEL (AND TWL OF EASTERN WETLAND) FROM 0.9M - 1.5M AHD.

PROPOSED WESTERN CONNECTION POOL

- THIS IS REQUIRED TO ENSURE FREE DRAINAGE THROUGH A NARROW AREA OF WESTERN WETLAND WHERE LEVELS ARE APPROXIMATELY 1.45M AHD. BY EXCAVATING DOWN 300MM, BROAD HYDRAULIC CONNECTION WILL BE CREATED.

PROPOSED FILL EMBANKMENT

- FILL WILL BE GENERATED FROM EXCAVATION OF THE WATERWAY AND WESTERN CONNECTION POOL. IT IS PROPOSED TO USE THIS FILL ON SITE, BY CONSTRUCTING A FILL EMBANKMENT ADJACENT TO GOODMAN ROAD. THIS WILL BE USED AS A FUTURE ACCESS TRACK AND VIEWING PLATFORM (AS PART OF FUTURE PROJECT).
- IT IS POSSIBLE THAT THE FILL MATERIAL WILL BE FOUND TO BE GEOTECHNICALLY UNSUITABLE FOR USE AS A COMPACTED EMBANKMENT. IN THIS INSTANCE, THE CITY WILL NOMINATE A SUITABLE LOCATION FOR THE STOCKPILE (ON SITE) FOR OTHER FUTURE PURPOSES, SUCH AS REVEGETATION OF AREAS WITHIN SPARROVALE.
- IT IS UNDERSTOOD THAT CMA HAVE PROVIDED IN PRINCIPLE SUPPORT FOR THE PROPOSED FILL EMBANKMENT, HOWEVER, A FLOOD IMPACT ASSESSMENT HAS NOT BEEN UNDERTAKEN. IN THE INSTANCE THAT A FLOOD IMPACT ASSESSMENT IS REQUIRED, FLOOD IMPACTS CAUSED BY THE EMBANKMENT MAY BE FOUND TO BE UNACCEPTABLE. IF SO, AN ALTERNATIVE ON SITE STOCKPILE LOCATED OUTSIDE THE 1% AEP FLOODPLAIN WILL BE NOMINATED BY THE CITY.
- THE STOCKPILE WILL BE PLACED AND TREATED APPROPRIATELY TO ENSURE THAT NO EROSION FROM THE STOCKPILE WILL OCCUR, IN ACCORDANCE WITH EPA GUIDELINES AND TO THE SATISFACTION OF THE CITY. THE STOCKPILE DESIGN WILL BE INCLUDED IN THE ENVIRONMENTAL MANAGEMENT PLAN WHICH WILL BE PREPARED BY SPIIRE AS PART OF THE DI_DR_14 DETAILED DESIGN PACKAGE.
- OTHERWISE, IF THE FILL IS FOUND TO BE SUITABLE, THE DETAILED DESIGN WILL INCLUDE A FILL EMBANKMENT AS SHOWN ON THESE PLANS. THE SIZE, FINISHED LEVELS AND FOOTPRINT OF THE EMBANKMENT WILL BE SUBJECT TO THE VOLUME OF USEABLE FILL WON THROUGH EXCAVATION WORKS. THE EMBANKMENT WILL BE CONSTRUCTED IN ACCORDANCE WITH A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER SPECIFICATION.

PROPOSED WESTERN BUND

- A SMALL EARTHEN BUND (APPROXIMATELY 0.5M HIGH) WILL BE USED TO FORM THE SOUTHWEST CORNER OF THE WETLAND TO 1.6M AHD (100MM ABOVE TWL OF THE WETLAND).
- INTEGRATES WITH EXISTING ACCESS TRACK. UPGRADE OF THE ACCESS TRACK WILL BE PROVIDED BY CONSTRUCTING CRUSHED ROCK OVER THE BUND CREST, TO A MINIMUM WIDTH OF 4M.
- SHOULD SITE WON MATERIAL BE FOUND TO BE GEOTECHNICALLY UNSUITABLE FOR BUND CONSTRUCTION, SUITABLE FILL WILL BE IMPORTED TO SITE. IN THIS INSTANCE, THE WORKS WILL ENSURE NO NET LOSS OF FLOODPLAIN STORAGE, BY EXCAVATING AN EQUIVALENT VOLUME, AND EXPORTING FROM SITE IF NECESSARY.

PROPOSED EASTERN BUND

- A SMALL EARTHEN BUND (APPROXIMATELY 0.5M HIGH) WILL BE USED TO FORM THE SOUTHEAST CORNER OF THE SITE TO 1.6M AHD (100MM ABOVE TWL OF THE WETLAND).
- INTEGRATES WITH THE EASTERN WETLAND CONTROL GATE AND SPILLWAY.
- SHOULD SITE WON MATERIAL BE FOUND TO BE GEOTECHNICALLY UNSUITABLE FOR BUND CONSTRUCTION, SUITABLE FILL WILL BE IMPORTED TO SITE. IN THIS INSTANCE, THE WORKS WILL ENSURE NO NET LOSS OF FLOODPLAIN STORAGE, BY EXCAVATING AN EQUIVALENT VOLUME, AND EXPORTING FROM SITE IF NECESSARY.

LIDAR DATA

- THE DATE AND ACCURACY OF LIDAR DATA PROVIDED BY THE CITY IS UNKNOWN (NO META DATA PROVIDED BY THE CITY ON SUPPLY OF DATA). GIVEN SUBJECT AREA IS VERY FLAT, ANY INACCURACIES IN THE SURVEY DATA COULD AFFECT DESIGN.
- TO MITIGATE THIS RISK, THE PROJECT WILL OBTAIN NEW FEATURE AND LEVEL SURVEY OF THE DESIGN AREA, TO INFORM DETAILED DESIGN.



LOCALITY PLAN

SCALE: NOT TO SCALE

DRAWING SCHEDULE

DRAWING	DESCRIPTION	SHEET No.	REVISION
310848WF200	REGROW EVAPORATIVE WETLAND - SHEET 1	1	C
310848WF201	REGROW EVAPORATIVE WETLAND - SHEET 2	2	E
310848WF202	REGROW EVAPORATIVE WETLAND - WATERWAY DETAIL	3	C
310848WF203	REGROW EVAPORATIVE WETLAND - WEST BUND DETAIL	4	C
310848WF204	REGROW EVAPORATIVE WETLAND - EAST BUND DETAIL	5	C
310848WF300	REGROW EVAPORATIVE WETLAND - WATERWAY SECTIONS	6	C
310848WF301	REGROW EVAPORATIVE WETLAND - BUND SECTIONS	7	C

BIODIVERSITY

- THE PROJECT WILL DELIVER MANY BENEFITS TO THE CITY, THE PUBLIC AND OTHER STAKEHOLDERS. IT WILL ALSO PROVIDE MANY OTHER BENEFITS INCLUDING PROTECTING THE SPARROVALE MAIN WETLAND FROM EXACERBATION OF CURRENTLY EXPERIENCED SYMPTOMS, CONTROLS TO ALLOW ACTIVE MANAGEMENT, EXEMPLARY VOLUMETRIC REDUCTION OUTCOMES, THE REHABILITATION OF FARMLAND TO PERMANENT WATER BODIES AND EPHEMERAL AREAS, PROVIDING A DIVERSITY OF HABITAT FOR FROGS, FISH AND BIRDS AND THE OPPORTUNITY FOR THE REMERGENCE OF NATIVE VEGETATION FROM THE SEEDBANK. THE PROJECT ALSO REQUIRES LITTLE DISTURBANCE COMPARED TO THE ORIGINAL MARSHALL SWMS_DI_DR_14 DESIGN AND OTHER RE-DESIGNS CONTEMPLATED BY THE CITY.
- THE CITY ACKNOWLEDGES THAT THE PROJECT IS LOCATED IN A HEAVILY DISTURBED AND MODIFIED PART OF SPARROVALE FARMED SINCE 1907 AND USED BEFORE THAT FOR EQUINE RACING FROM 1851. THE CITY ALSO ACKNOWLEDGES THAT THE PROJECT AREA HAS BEEN FARMED AND CLEARED IN RECENT YEARS SINCE THE EHP BIODIVERSITY ASSESSMENT IN 2018, WHICH WAS PUBLISHED APRIL 2019.



MGA 2020
ZONE 55

DESCRIPTION	EXISTING	PROPOSED
STORMWATER DRAINAGE - PIPE AND PIT (SWD)		
STORMWATER JUNCTION PIT		
HEADWALL/ENDWALL		
STORMWATER GATE		
NORMAL WATER LEVEL (INWL)		
EXTENDED DETENTION DEPTH (EDD)		
WATER LEVEL AEP 1%		
WATER LEVEL AEP 10%		
WATER LEVEL AEP		
OVERLAND FLOW PATH		
ANCILLARY FLOW PATH		
PIPE FLOW PATH		
ELECTRICAL EASEMENT		
TRUNK SEWER EASEMENT		
BATTER LINE		
BATTER TOP		
1m AHD CONTOURS		
0.25m CONTOURS		
EASEMENT		
NEIP SITE BOUNDARY		
ACCESS TRACK		
ROCKWORK (ROCK BEACHING)		
EVAPORATION WETLAND		
FILL EMBANKMENT AREA		
INDICATIVE OPEN WATER		
INDICATIVE FLOODING EXTENT		
CLAY FILL		
FUTURE FOOTPATH		



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BEWARE OF UNDERGROUND/OVERHEAD SERVICES
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Rev	Amendments	Approved	Date
D	BIODIVERSITY NOTES UPDATED	L.H.	18/06/25
C	ISSUED TO AUTHORITY	L.H.	22/05/25
B	ISSUED TO CLIENT	L.H.	16/05/25
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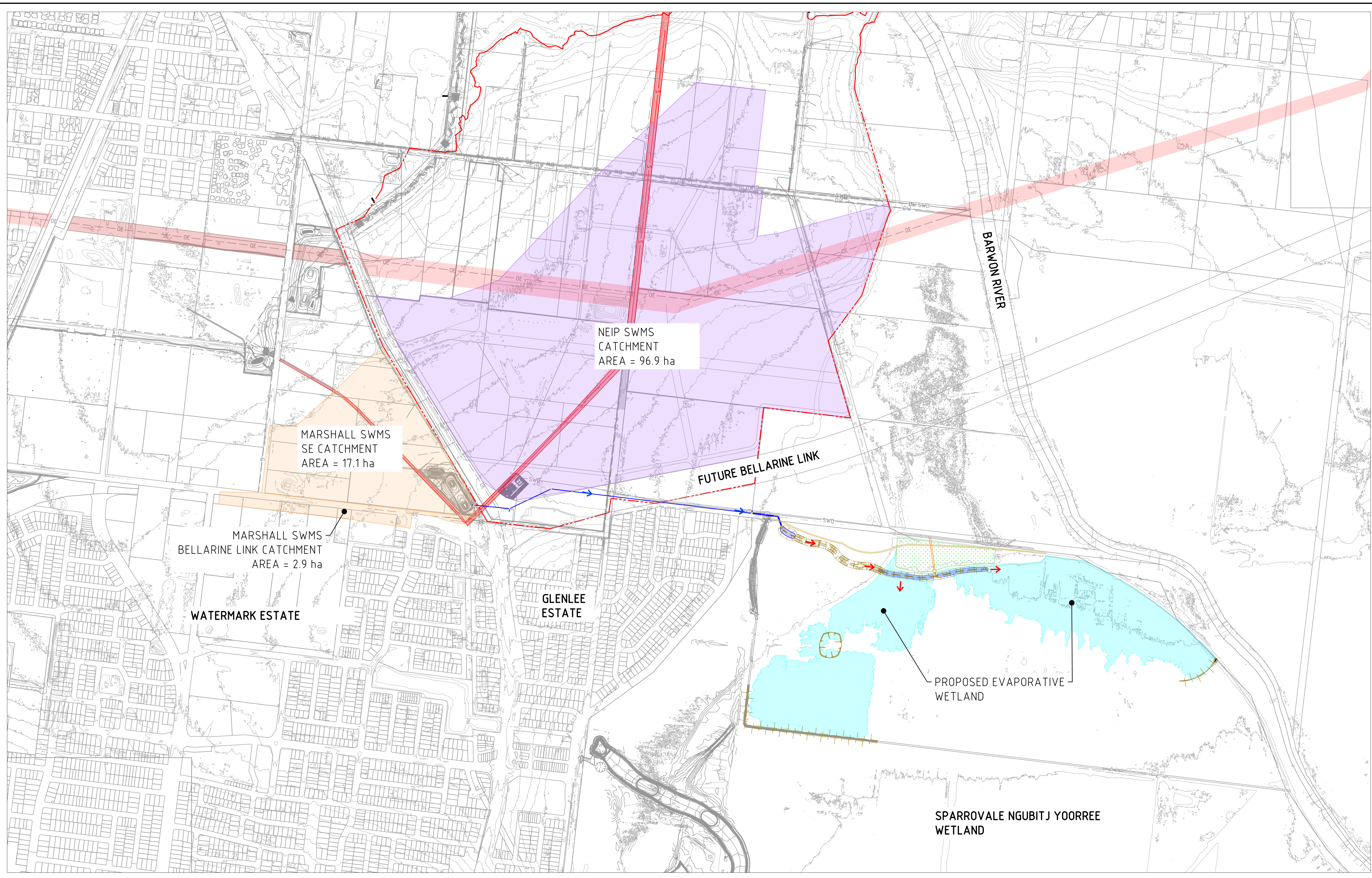
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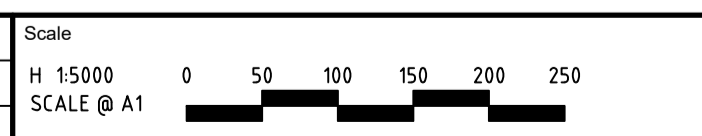
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Authorised L. HOLMES	Date 16/05/2025

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STORMWATER DRAINAGE GENERAL NOTES
 CITY OF GREATER GEELONG
 RE-GROW GEELONG
PRELIMINARY Drg No **310848WF100** Rev **D**



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Rev	Amendments	Approved	Date
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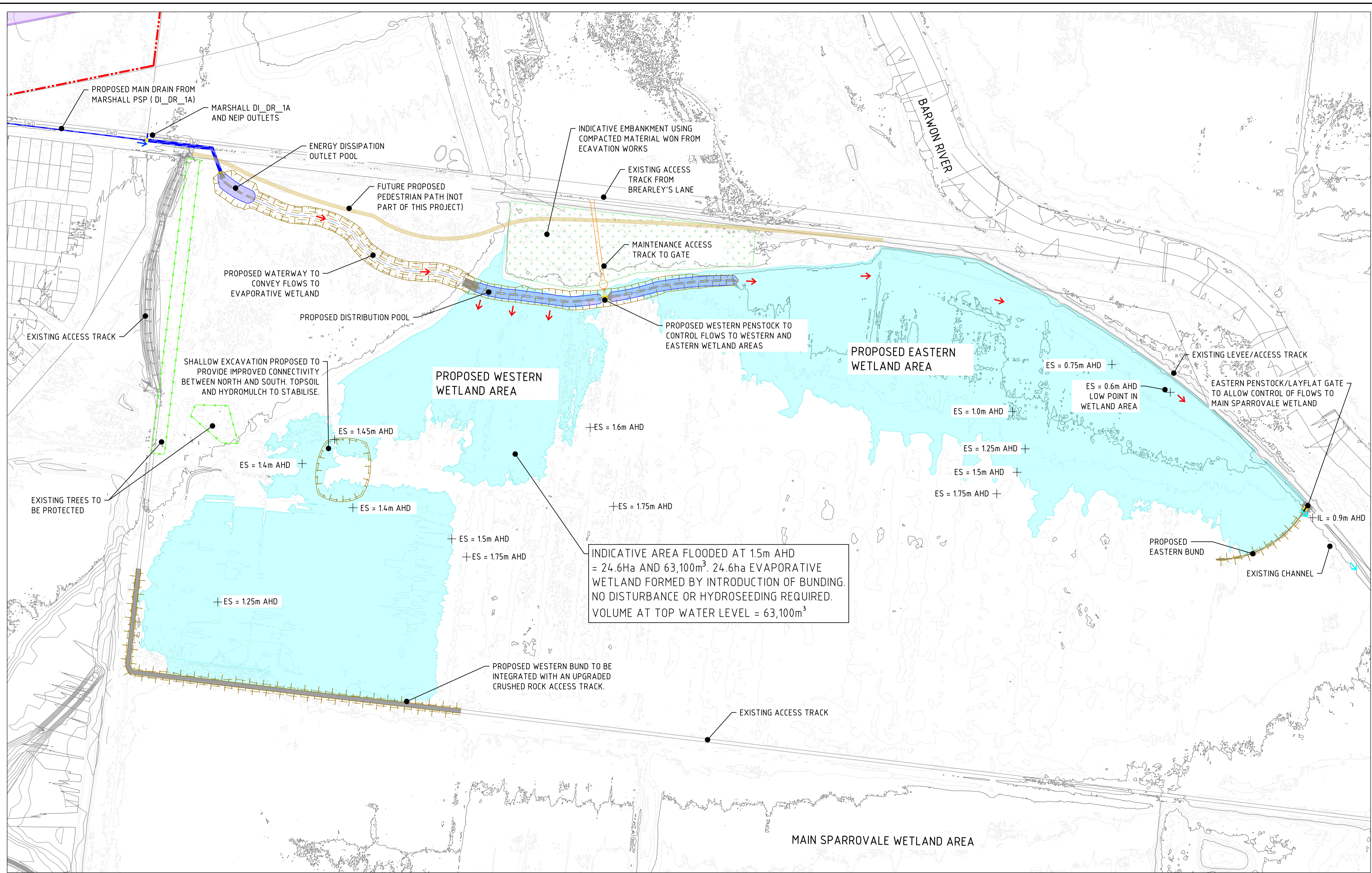
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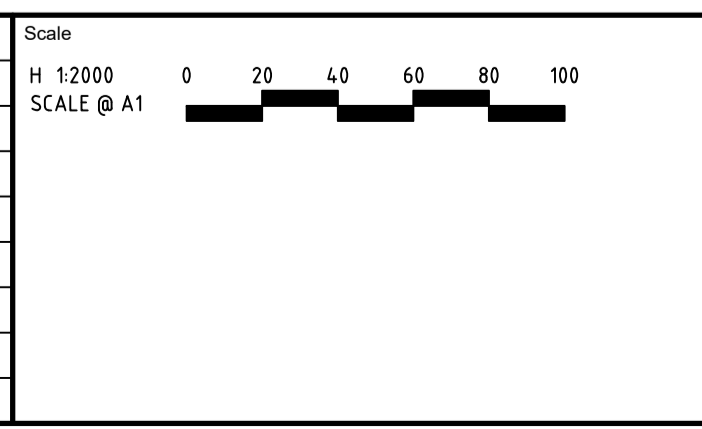
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 CITY OF GREATER GEELONG
 RE-GROW GEELONG

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E	ISSUED TO AUTHORITY	L.H.	22/05/25
D	ISSUED TO CLIENT	L.H.	16/05/25
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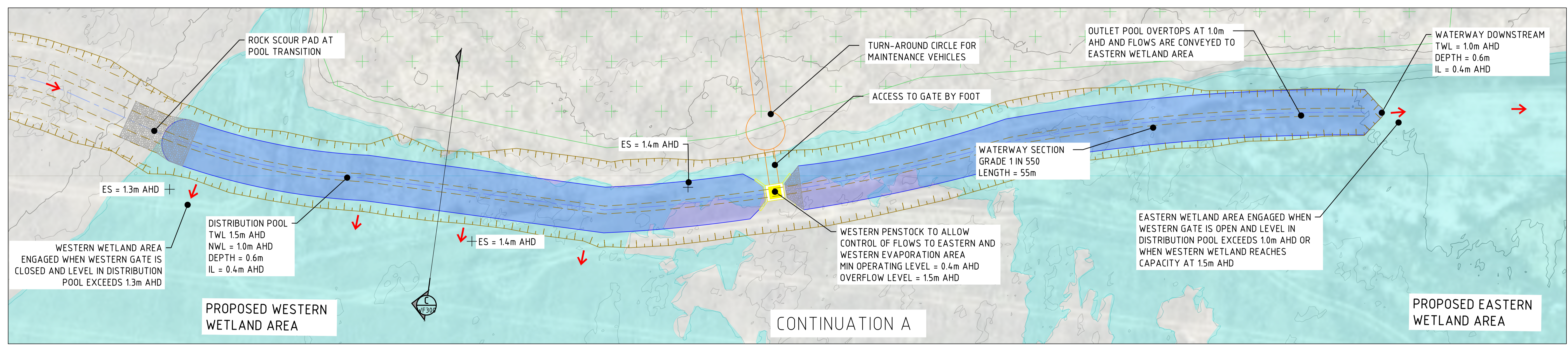
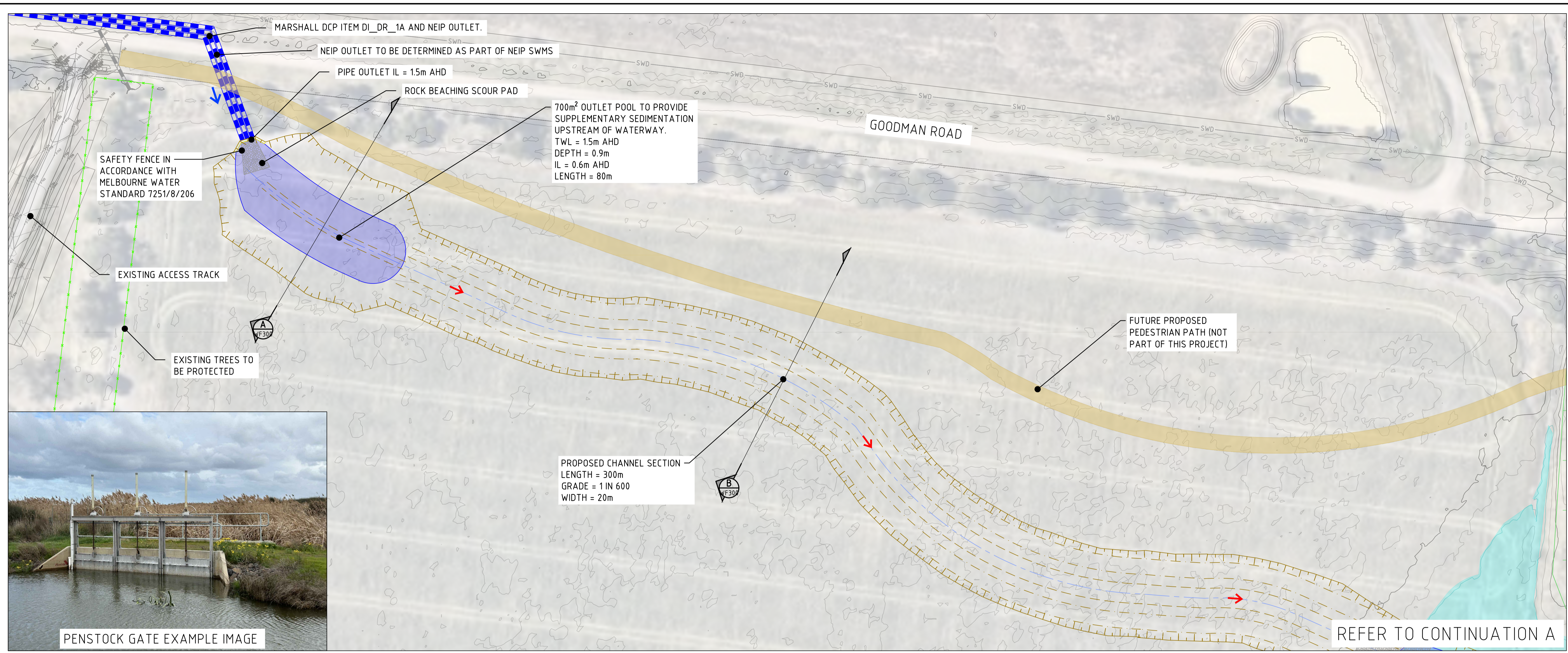
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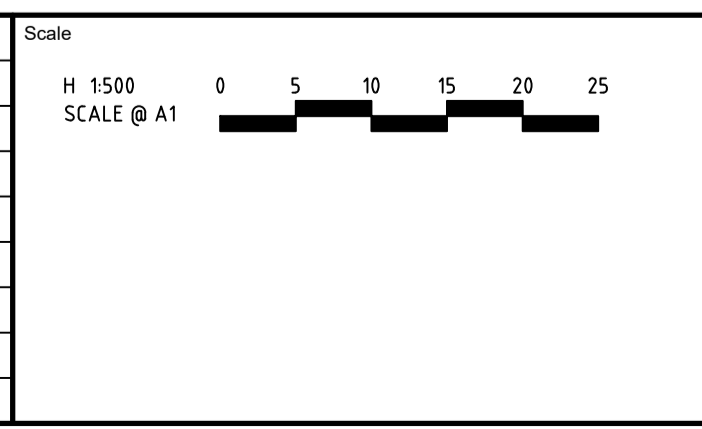
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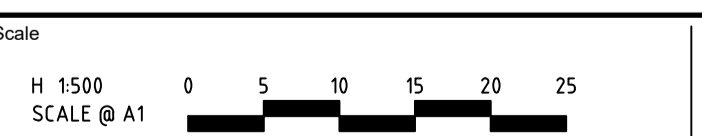
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CITY OF GREATER GEELONG
RE-GROW GEELONG

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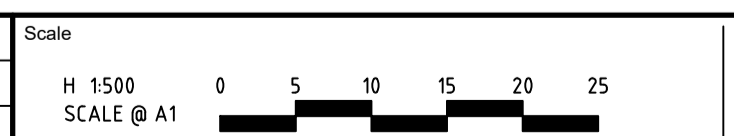
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LAYFLAT GATE EXAMPLE IMAGE
SOURCE: AWMA WATER CONTROL SOLUTIONS

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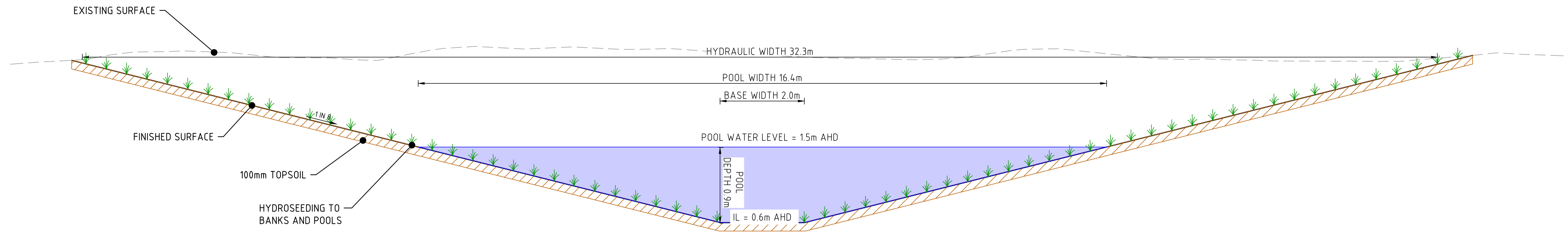
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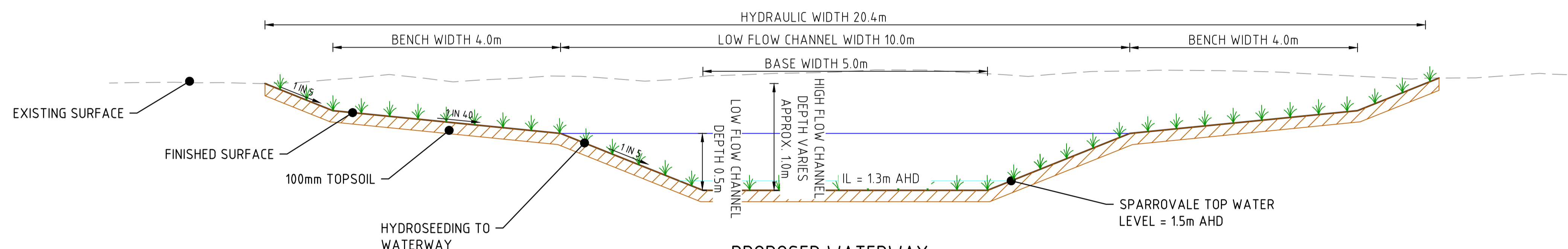
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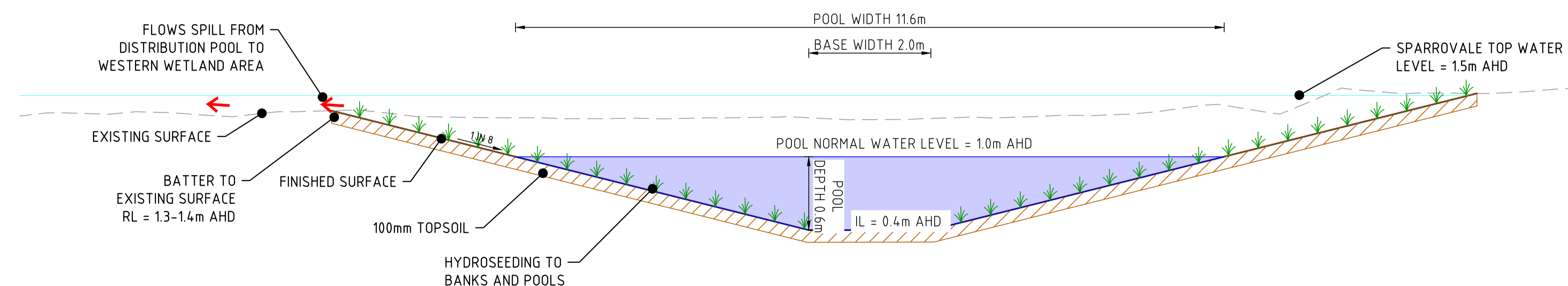
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PROPOSED WATERWAY CULVERT POOL
TYPICAL SECTION
SECTION A



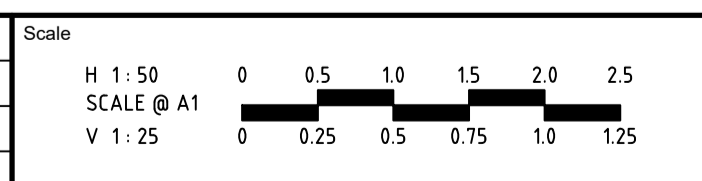
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TYPICAL SECTION
SECTION B



PROPOSED WATERWAY DISTRIBUTION POOL
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SECTION C

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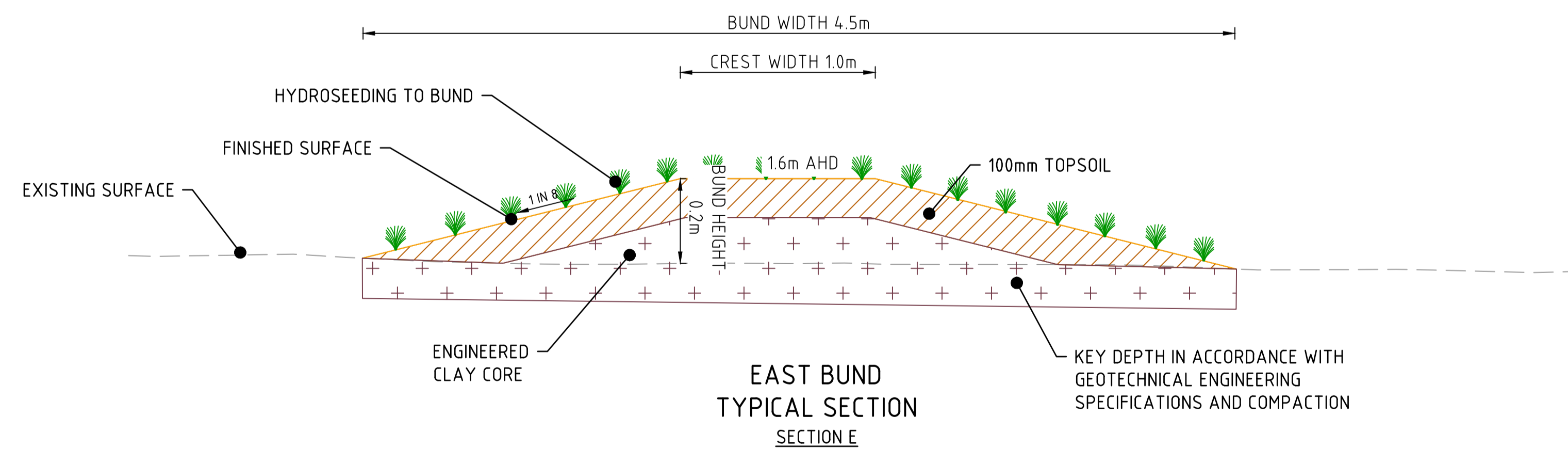
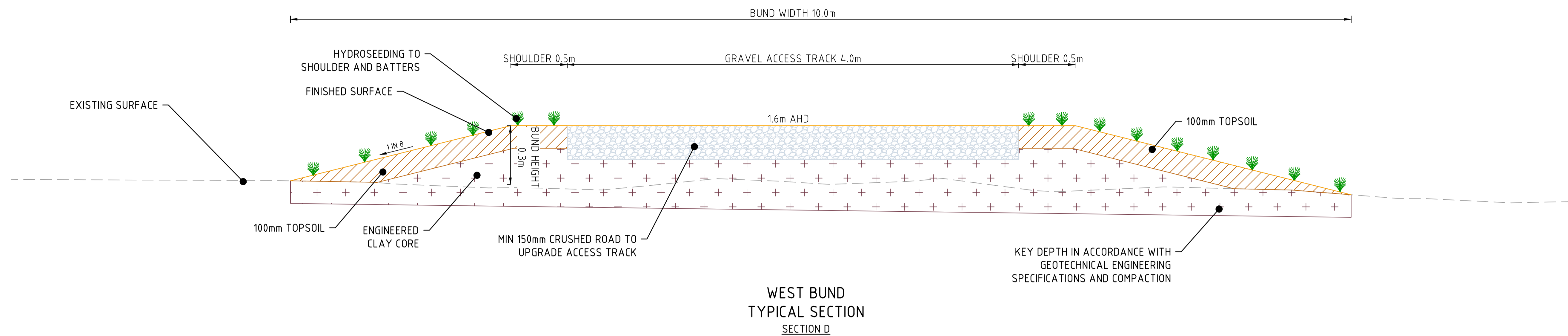
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 CITY OF GREATER GEELONG
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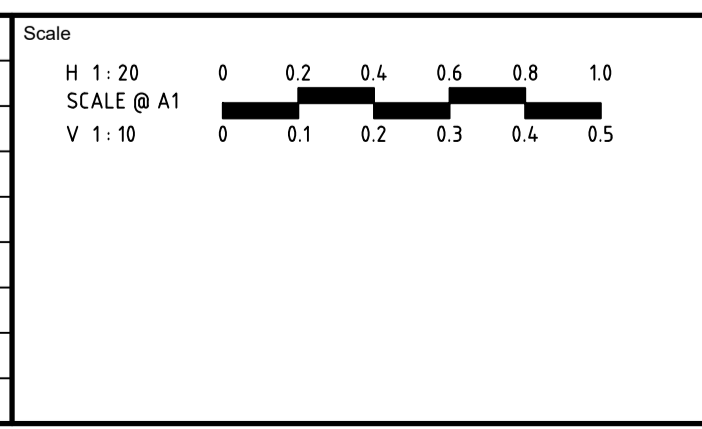
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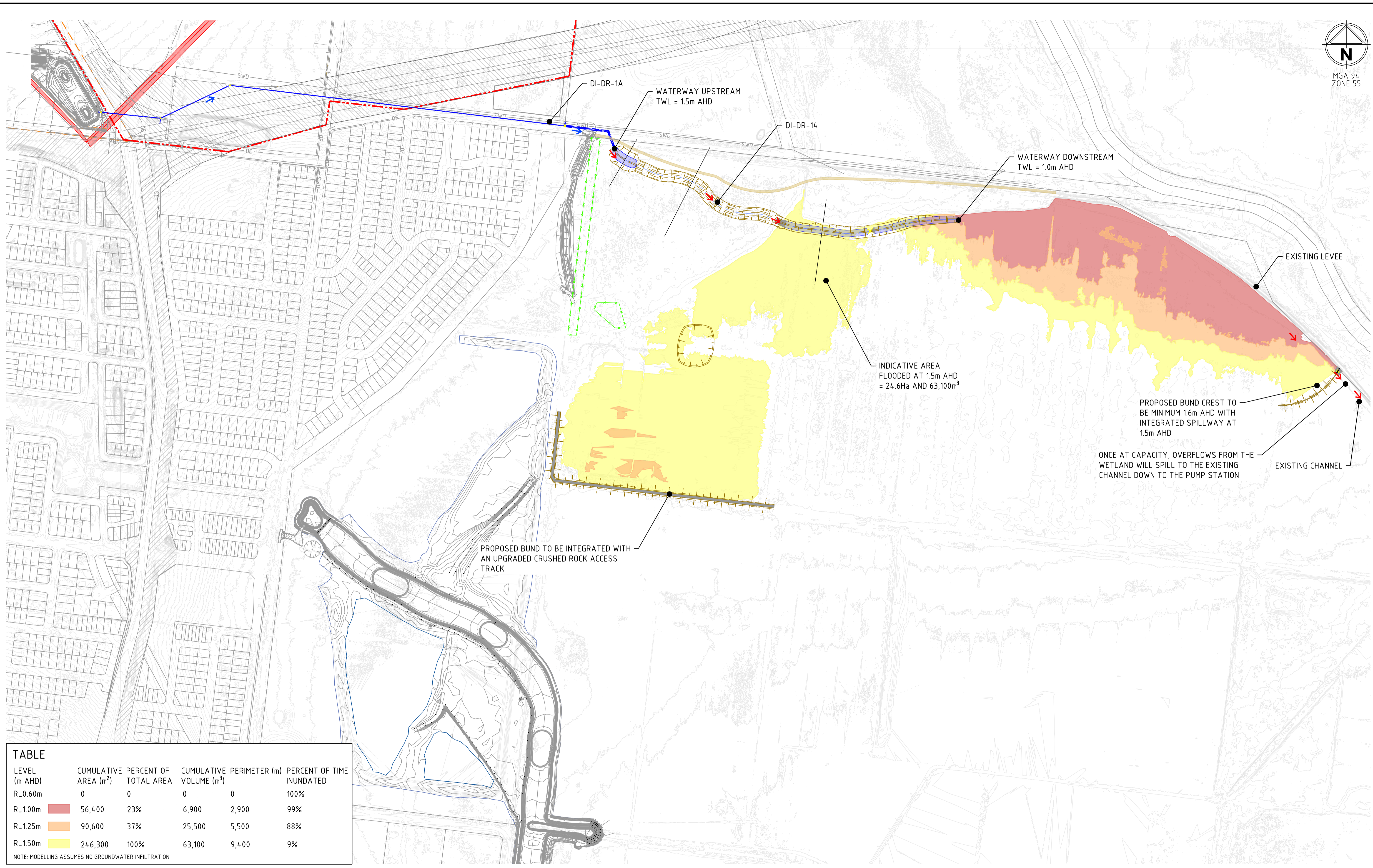
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 RE-GROW GEELONG

PRELIMINARY Dwg No **31084WF301** Rev **C**



APPENDIX B

REVISED CONCEPT DEPTH HEAT MAP



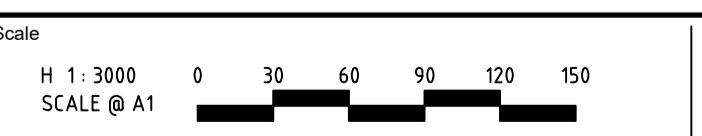
TABLE

LEVEL (m AHD)	CUMULATIVE AREA (m ²)	PERCENT OF TOTAL AREA	CUMULATIVE VOLUME (m ³)	PERCENT OF TIME INUNDATED
RL0.60m	0	0	0	100%
RL1.00m	56,400	23%	6,900	99%
RL1.25m	90,600	37%	25,500	88%
RL1.50m	246,300	100%	63,100	9%

NOTE: MODELLING ASSUMES NO GROUNDWATER INFILTRATION

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 file location: G:\310848\Water\WCAD.plt date: 22/05/2025 2:59:15 pm sheet: 1 of 11 sheets

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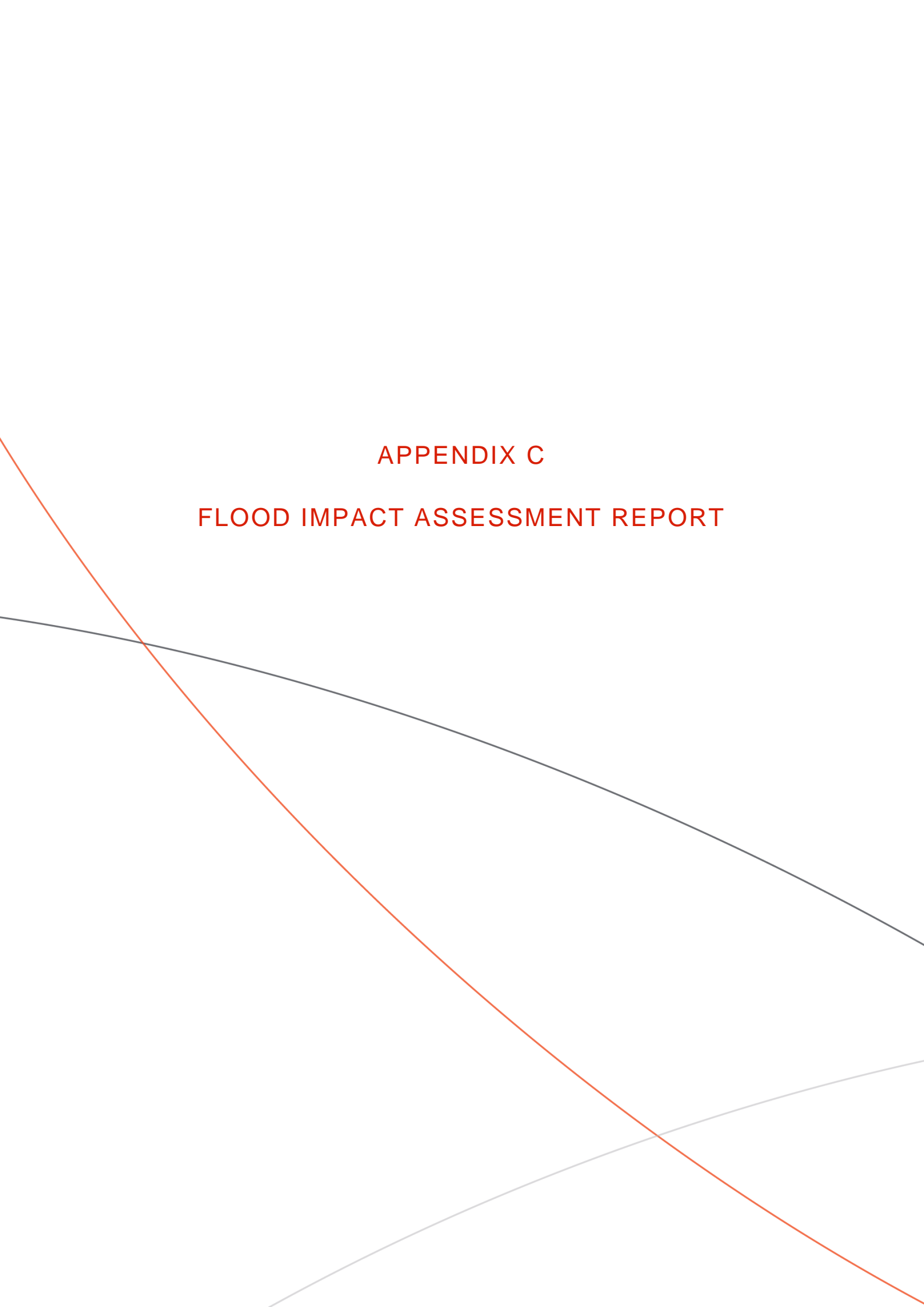
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MARSHALL PSP
DI_DR_14 REDESIGN
CONCEPT DESIGN
FLOOD AREA LEVEL MAP
CITY OF GREATER GEELONG
RE-GROW GEELONG

PRELIMINARY Dwg No **310848WC040** Rev **B**



APPENDIX C
FLOOD IMPACT ASSESSMENT REPORT



Flood Impact Assessment

Alternative Concept DI_DR_14 – Evaporative Wetland

22 May 2025



Document Status

Version	Doc type	Reviewed by	Approved by	Date issued
V01	Report	J Theilemann	J Theilemann	22 May 2025

Project Details

Project Name	Alternative Concept DI_DR_14 – Evaporative Wetland
Client	Re-Grow Geelong Pty Ltd
Client Project Manager	Civilisation Pty Ltd
Water Technology Project Manager	Johanna Theilemann
Water Technology Project Director	Lachlan Inglis
Authors	Andrew Bezzina
Document Number	25010473_V01

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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	5
2	HYDRAULIC MODELLING	7
2.1	Hydraulic Inflow Configuration	7
2.2	Local Drainage Inflow	9
2.3	Topography	9
2.4	Event Selection	10
3	RESULTS	12
3.1	Local Catchment Only	12
3.1.1	1% AEP	12
3.1.2	2% AEP	14
3.1.3	10% AEP	16
3.2	Riverine Only	19
3.2.1	1% AEP	19
3.2.2	2% AEP	19
3.2.3	10% AEP	20
3.3	Combined Local Catchment and Riverine	21
3.3.1	1% AEP	21
3.3.2	2% AEP	21
3.3.3	10% AEP	22
4	SUMMARY AND DISCUSSION	24

LIST OF FIGURES

Figure 1-1	Proposed evaporative wetland (alternative DI_DR_14 concept) (Spiire, March 2025)	6
Figure 2-1	Hydraulic Model Set-up (Far View)	8
Figure 2-2	Hydraulic Model Set-up (evaporative wetland view)	8
Figure 2-3	Evaporative Wetland Channel Flow (Spiire, 2025)	9
Figure 2-4	Topography Comparison (Pre-Development v Post-Development)	10
Figure 3-1	1% AEP 30 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	13
Figure 3-2	1% AEP 60 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	13
Figure 3-3	1% AEP 120 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	14
Figure 3-4	2% AEP 30 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	15
Figure 3-5	2% AEP 60 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	15
Figure 3-6	2% AEP 120 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	16
Figure 3-7	10% AEP 30 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	17



Figure 3-8	10% AEP 60 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	17
Figure 3-9	10% AEP 120 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only	18
Figure 3-10	1% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Riverine Only	19
Figure 3-11	2% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Riverine Only	20
Figure 3-12	10% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Riverine Only	20
Figure 3-13	1% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Plus Riverine	21
Figure 3-14	2% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Plus Riverine	22
Figure 3-15	10% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Plus Riverine	23

LIST OF TABLES

Table 2-1	Flow Scaling Factor	9
Table 2-2	Simulations Tested (Local Catchment Only)	10
Table 2-3	Simulations Tested (Riverine Only)	11
Table 2-4	Simulations Tested (Local Catchment and Riverine)	11
Table 3-1	Flood Level Change Summary	12
Table 3-2	Flood Level Change Summary	14
Table 3-3	Flood Level Change Summary	16
Table 3-4	Flood Level Change Summary	22



1 INTRODUCTION

The City of Greater Geelong is proposing to amend the City's planning scheme to incorporate Marshall PSP and DCP. Marshall DCP includes item DI_DR_14 which comprises a drainage outfall located within the Sparrovale Wetlands that serves both the Marshall and North East Industrial Precinct southern catchments. DI_DR_14 was conceptualised as part of the Marshall SWMS previously prepared by Spiire.

Since exhibiting the Marshall PSP and DCP, and after convening a Panel to consider the proposed planning scheme amendment, the City resolved to consider alternative designs for DI_DR_14. One of the alternative designs being considered by the City, was a concept prepared by Spiire which includes a 24.5Ha wetland within the Sparrovale Wetland reserve (the Refined Concept).

At a meeting convened by the City of Greater Geelong 16 April 2025, the Refined Concept was presented to CCMA. CCMA provided in-principle support of the Refined Concept by email on 17 April 2025 noting the following in relation to the Refined Concept:

The approach requires ~1000m³ of fill for the earthen bunds which can be sourced from within the floodplain and thus no fill will be imported into to the site. The level of the bunds which range between 200-500mm in height at the levels proposed are likely to have no off site hydraulic impacts up to and including a 1% AEP flood event. This should however be verified with a flood impact assessment which would be a very simple process of adding the proposed works into the existing flood model which is owned by CoGG and CCMA.

Water Technology have been engaged to assess the impact within Sparrovale Wetland reserve and neighbouring landowners as a result of the proposed evaporative wetland. To assess this impact, Water Technology have re-run the Lower Barwon and Lower Moorabool River TUFLOW models (Water Technology, 2018¹ & 2025²) including the proposed evaporative wetland within the Sparrovale Wetland reserve.

The proposed evaporative wetland concept within Sparrovale Wetland reserve as prepared by Spiire is presented in Figure 1-1. As shown in this concept plan, there are three key elements to the proposed design which have the potential to impact flooding conditions from both the local catchment and the overall Lower Barwon catchment perspective:

- Drainage channel in the northern region of Sparrovale Wetlands reserve – linking flows discharging from the NEIP/Marshall development areas to the proposed evaporative wetland (Estimated excavation volume of 8,100m³).
- A bund along the north eastern region of Sparrovale Wetlands reserve (connecting to an existing levee that is adjacent to the Barwon River) (enabling managed stormwater retention)
- A bund along the north western region of Sparrovale Wetlands reserve (enabling managed stormwater retention)(Estimated fill volume for both north eastern and north western bunds combined of 930m³).

Water Technology have been provided with these proposed design surface modifications and have incorporated this into the corresponding hydraulic model used as the basis of this assessment.

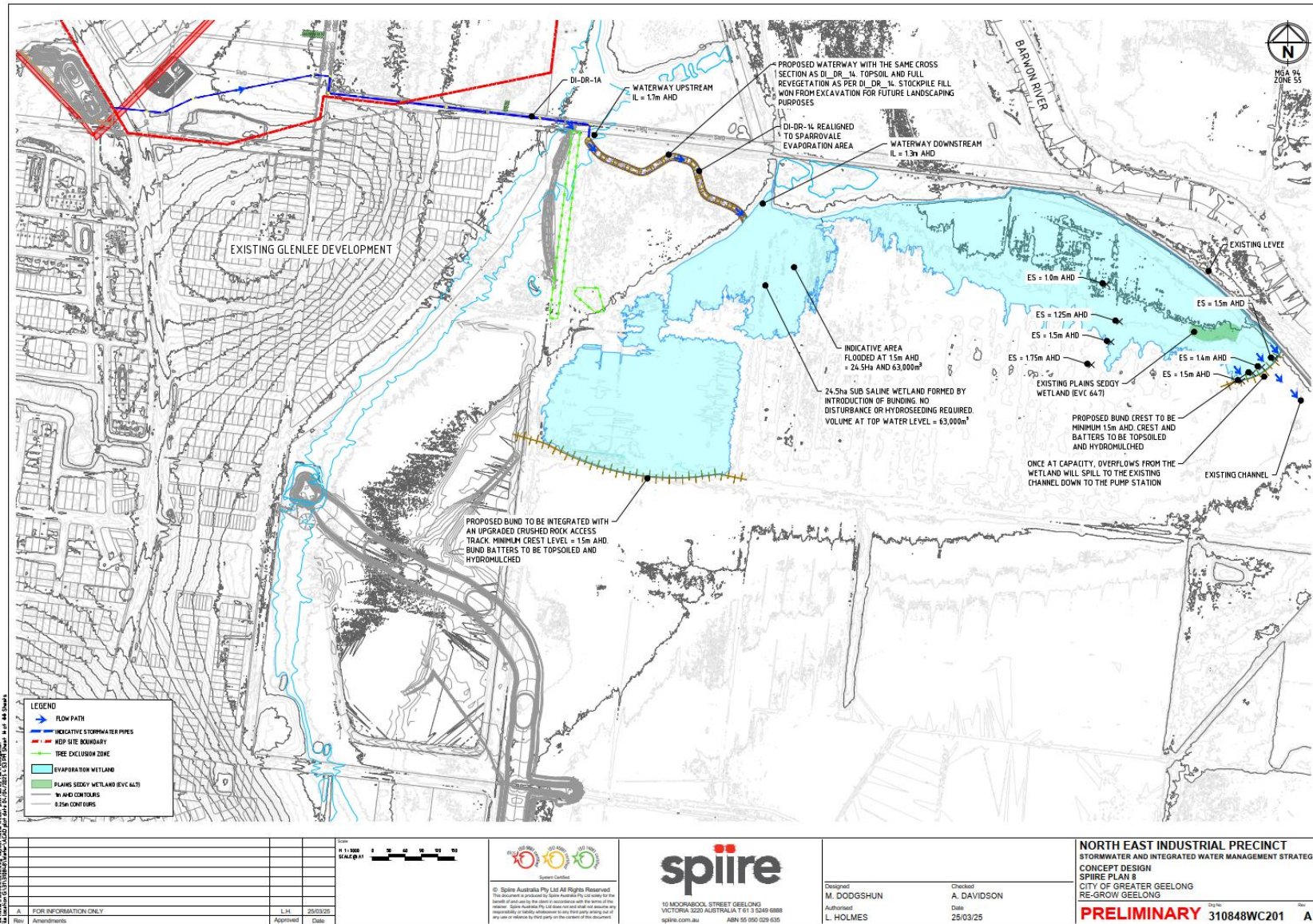


Figure 1-1 Proposed evaporative wetland (alternative DI_DR_14 concept) (Spiire, March 2025)



2 HYDRAULIC MODELLING

Hydraulic modelling was completed to reflect both pre- and post-proposed development for a range of proposed scenarios, including:

- 1%AEP, 2% AEP and 10% AEP Riverine Only Flooding
- 1%AEP, 2% AEP and 10% AEP Local Only Flooding
- Combined Riverine and Local Flooding for 1%AEP and 10% AEP

The Lower Barwon River hydraulic modelling, previously completed by Water Technology in partnership with the Corangamite CMA was adopted for this assessment.

A one and two dimensional Rain-on-Grid (RoG) and direct inflow combined hydraulic modelling approach was employed for this assessment using the UFLOW hydraulic flood modelling software. Simulations were completed using TUFLOW HPC (Highly Parallelised Computations) Single Precision with HPC solution scheme on a GPU solver.

2.1 Hydraulic Inflow Configuration

The overall Lower Barwon hydraulic model set-up for this impact assessment is presented in Figure 2-1 below. As shown, there are four inflow locations that flow through the overall model (indicated by the pink lines). These inflows have been adopted from the Lower Barwon and Lower Moorabool River Flood Study¹ and include:

- Waurn Ponds Creek;
- Barwon River;
- Moorabool River; and
- Ocean tide @ Barwon Heads.

This hydraulic configuration has been adopted to represent the riverine component of flows in this model (ie. riverine only scenario and combined scenario).

Figure 2-2 shows a close-up view of the evaporative wetland local catchment area hydraulic model set-up. The inflow configuration for the local catchment consists of:

- Two external upstream inflow locations, extracted from a previous Water Technology flood study³;
 - Denoted by the two light blue lines in the west
- Client supplied upstream inflows (from local developed catchment) at the proposed drainage channel; and
 - Denoted by the one dark blue line in the north
- Rainfall directly applied to the immediate local catchment extent.
 - Denoted by the red polygon extent

This hydraulic configuration has been adopted to represent the local catchment component of flows in this model (ie. local catchment only scenario and the combined scenario).

³ Barwon Heads Road Duplication Hydraulic Modelling Report, prepared for SMEC & Major Roads Projects Victoria, 2023

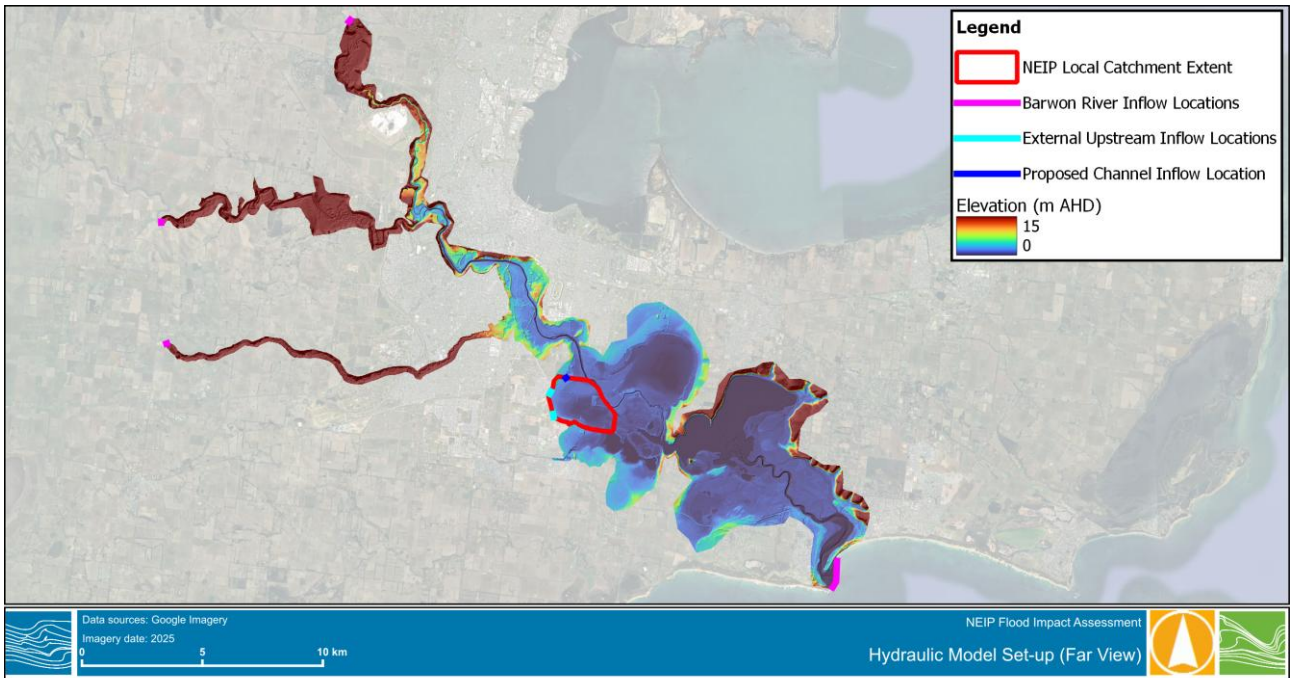


Figure 2-1 Hydraulic Model Set-up (Far View)

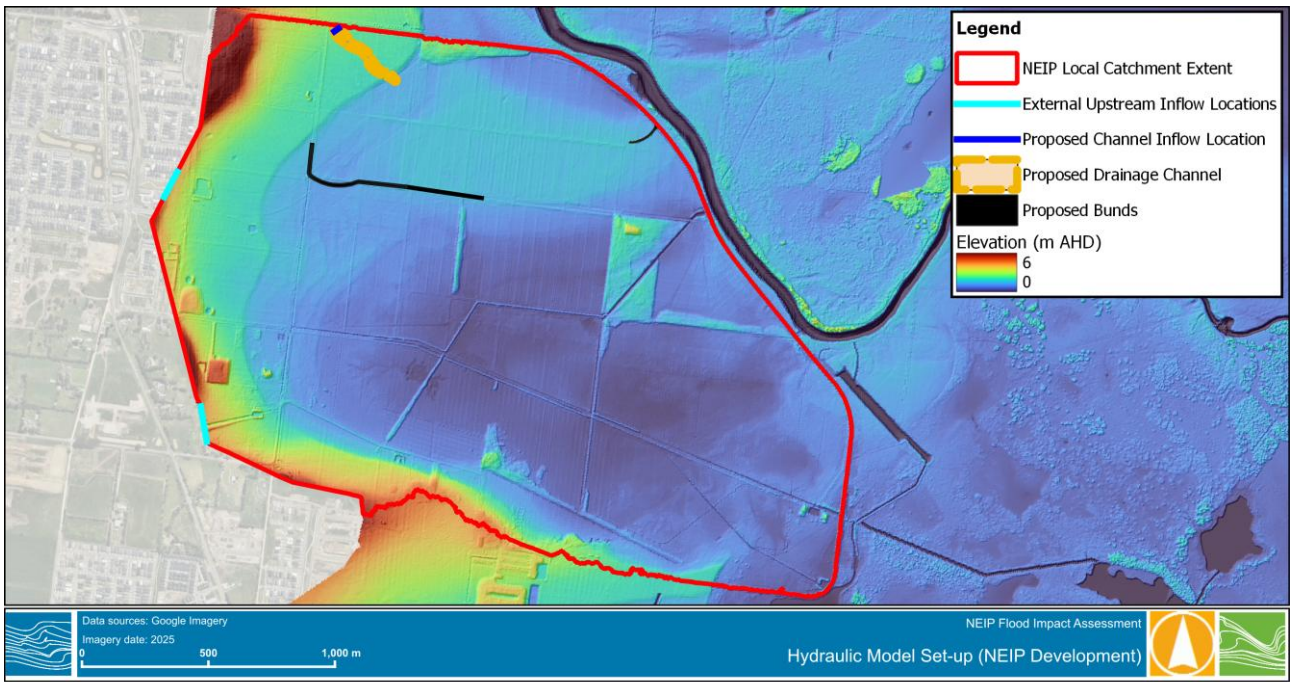


Figure 2-2 Hydraulic Model Set-up (evaporative wetland view)

It should be noted that the proposed western bund was extended in an eastern direction within the hydraulic model to reduce afflux that was initially demonstrated within the hydraulic modelling completed for the local contributing catchment.



2.2 Local Drainage Inflow

The flow hydrograph provided to Water Technology is representative of the 1% AEP event only. Therefore, in order to correctly represent and assess the 2% AEP and 10% AEP events, the flow hydrograph was scaled by the factors listed in Table 2-1, representing the corresponding AEP event.

Table 2-1 Flow Scaling Factor

AEP	Scaling Fator
1% AEP	1.0
2% AEP	0.80
10% AEP	0.45

The flow hydrograph provided by Spiire for the 1% AEP event is presented in Figure 2-3 below (yellow line). Further to this and as noted in Table 2-1, a scaling factor (provided by Melbourne Water) was applied to represent the 2% AEP and 10% AEP events. The flow hydrographs for these AEP events are presented in Figure 2-3.

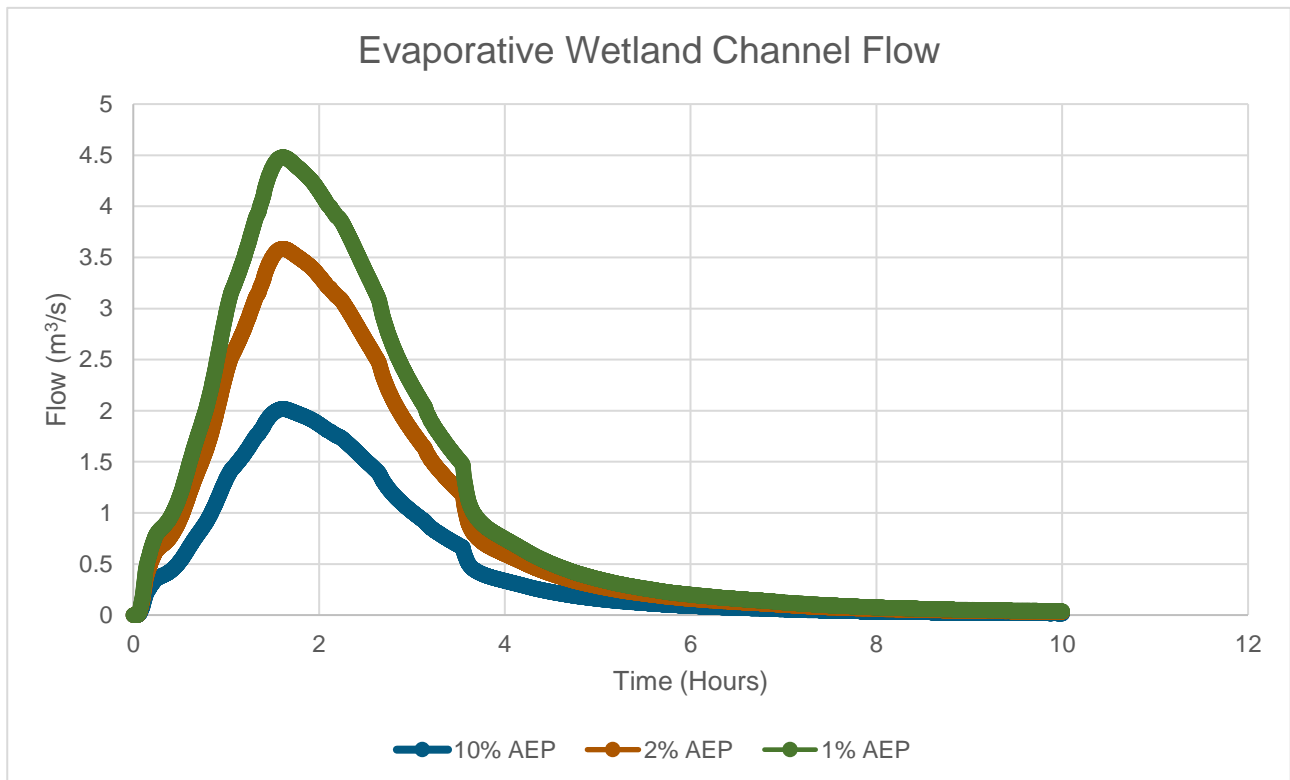


Figure 2-3 Evaporative Wetland Channel Flow (Spiire, 2025)

2.3 Topography

A comparison of the surface topography assessed in the pre-development and post-development scenarios hydraulic modelling is presented in Figure 2-4 below. The aforementioned proposed evaporative wetland surface changes can be seen in this figure to understand locality of change between the two scenarios.

The proposed drainage channel sits at elevations as low as 0.6 m AHD, compared to elevations of the surrounding banks which sits at elevations as high as 2.5 m AHD.



The proposed eastern bund has been designed to an elevation of approximately 1.5 m AHD.

The proposed western bund has been designed to an elevation of approximately 1.5 m AHD also. However, it is noted that the hydraulic modelling demonstrated that local catchment flows begun to overtop the bund (minimally) in all AEP events simulated. Therefore, in order to prevent afflux, the western bund was raised to an arbitrary elevation of 2.5 m AHD. Additionally, and as mentioned above, the western bund was extended to prevent some further afflux along the eastern portion of this bund.

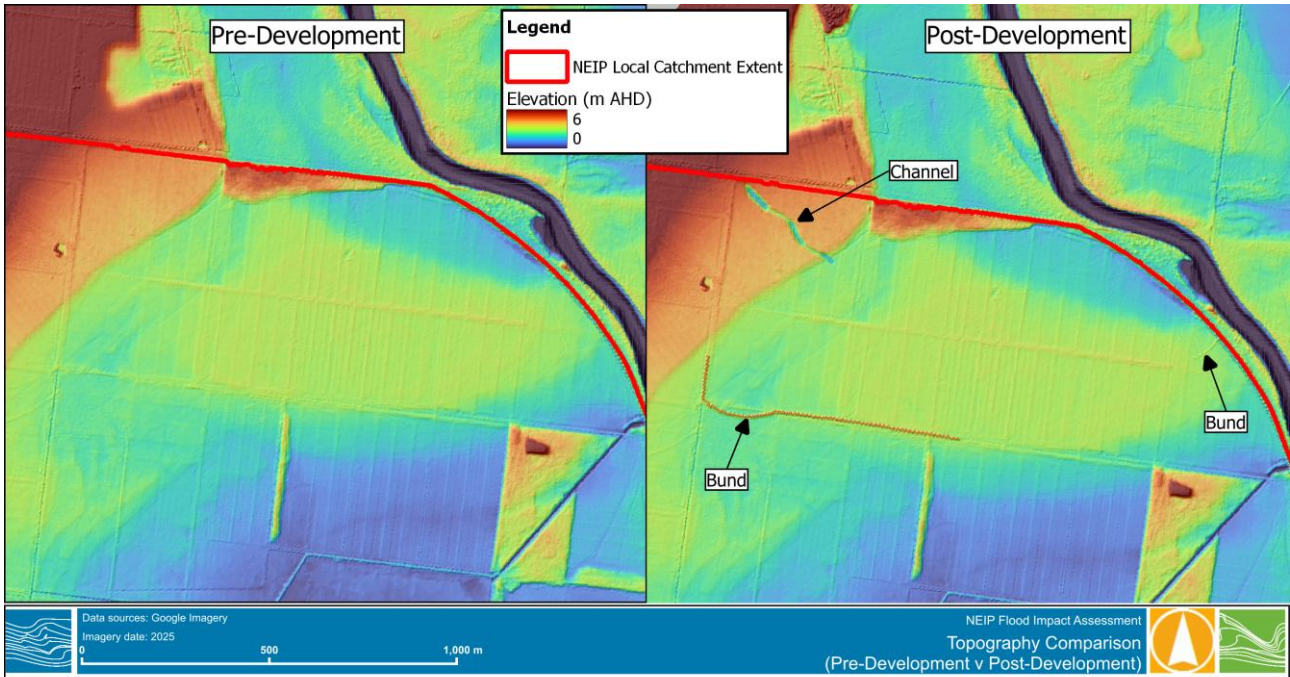


Figure 2-4 Topography Comparison (Pre-Development v Post-Development)

2.4 Event Selection

A summary of model simulations completed in this assessment is presented below for the three respective scenarios tested; 1. local catchment flooding only (Table 2-2), 2. riverine flood only (Table 2-3) and 3. local & riverine flooding (simultaneously) (Table 2-4).

Table 2-2 Simulations Tested (Local Catchment Only)

Local catchment only	Duration	Temporal Pattern
1% AEP	30 minutes	TP03, TP05 & TP10
	60 minutes	TP02, TP09 & TP10
	120 minutes	TP02, TP09, TP10
2% AEP	30 minutes	TP03, TP05 & TP10
	60 minutes	TP02, TP09 & TP10
	120 minutes	TP02, TP09, TP10
10% AEP	30 minutes	TP06, TP08 & TP10
	60 minutes	TP02, TP08 & TP09
	120 minutes	TP02, TP06 & TP07



Table 2-3 Simulations Tested (Riverine Only)

Riverine only	Critical Event
1% AEP	Critical event corresponding to each AEP was determined in previously established TUFLOW model and adopted directly within this model
2% AEP	
10% AEP	

Table 2-4 Simulations Tested (Local Catchment and Riverine)

Local catchment and Riverine	Duration	Temporal Pattern
1% AEP	120 minutes	TP02
2% AEP	120 minutes	TP02
10% AEP	120 minutes	TP06

The three temporal patterns for each AEP and corresponding duration were compared to determine the maximum local catchment flooding impact across the evaporative wetland area across a front-, mid- and rear-distributed rainfall application. The temporal patterns highlight red in Table 2-2 were selected based on this approach.

It was observed that the 120-minute duration also resulted in the maximum local catchment flooding impact across the evaporative wetland area from all durations simulated across the AEP events. Therefore, the 120-minute duration was adopted to represent the local catchment flows as part of the combined (local catchment and riverine) hydraulic model.



3 RESULTS

This section examines the changes in water surface elevation elevations (afflux) between the pre-development and post-development conditions across the three modelled scenarios: Local Catchment Only (3.1), Riverine Only (3.2) and Local Catchment Plus Riverine (3.3) scenarios.

A full set of the peak water level, depth, velocity and hazard results for the simulated scenarios has been provided within the report appendix.

3.1 Local Catchment Only

The local catchment only scenario assesses changes in water surface elevation from flows within the local contributing catchment and does not consider riverine flows.

3.1.1 1% AEP

A comparison of the post-developed and pre-developed flood levels indicate that the evaporative wetland site, adjoining floodplain and neighbouring landholders is predominantly affected by local contributing flows in the 1% AEP event. This is evident for 30-minute, 60-minute and 120-minute duration events, as shown in Figure 3-1, Figure 3-2 and Figure 3-3 respectively.

A summary of flood level changes is presented in Table 3-1.

Table 3-1 Flood Level Change Summary

Location	30-minute Duration	60-minute Duration	120-minute Duration
1	+0.29m	+0.27m	+0.26m
2	+0.12m	+0.12m	+0.12m
3	+0.20m	+0.20m	+0.25m
4	-0.32m	-0.32m	-0.30m

- Location 1 refers to the area of afflux located along the western bund, where flows are shown to backup and pool at this location. Increases in water levels within this location are expected as a result of the proposed use of the area for stormwater retention (as designed).
- Location 2 refers to the area west of the western bund.
 - While this is outside of the direct works area, this is not a result of flows overtopping the proposed bund.
 - Overland flows / generated by local rainfall flow in a western to eastern direction and are shown to be pooling against the western side of the bund within this location. Increases are shown to be in the order of 0.12m and are maintained within the greater Sparrovale Reserve.
- Location 3 refers to the area along the eastern boundary of the site. Noting that flows at this location are contained by the existing perimeter bund/levee and proposed eastern bund (as designed). Increases in water levels within this area are expected as a result of the proposed use of the area for stormwater retention.
- Location 4 refers to the area within the proposed channel. Water levels within the channel are expected to change as a result of the proposed flows from the developed area discharging to site at this location and the formalised channel that has been created (as designed).

These locations are illustrated on the flood level difference plots in the following figures.

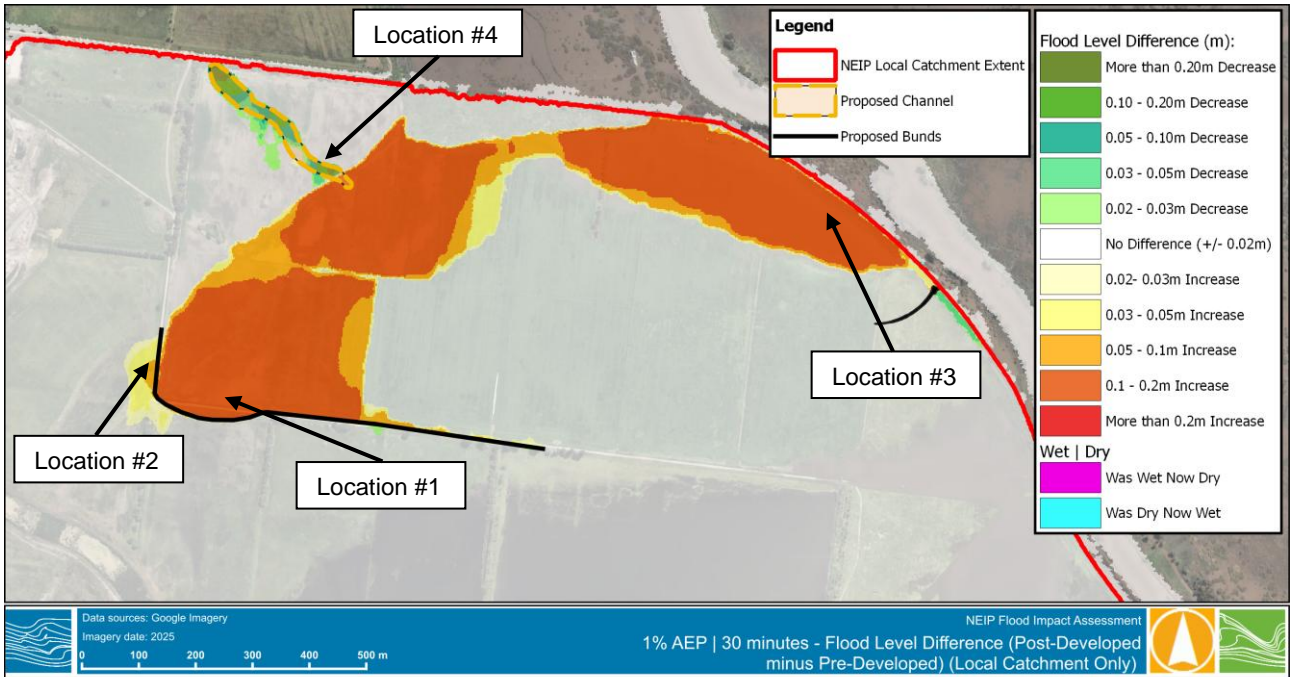


Figure 3-1 1% AEP | 30 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

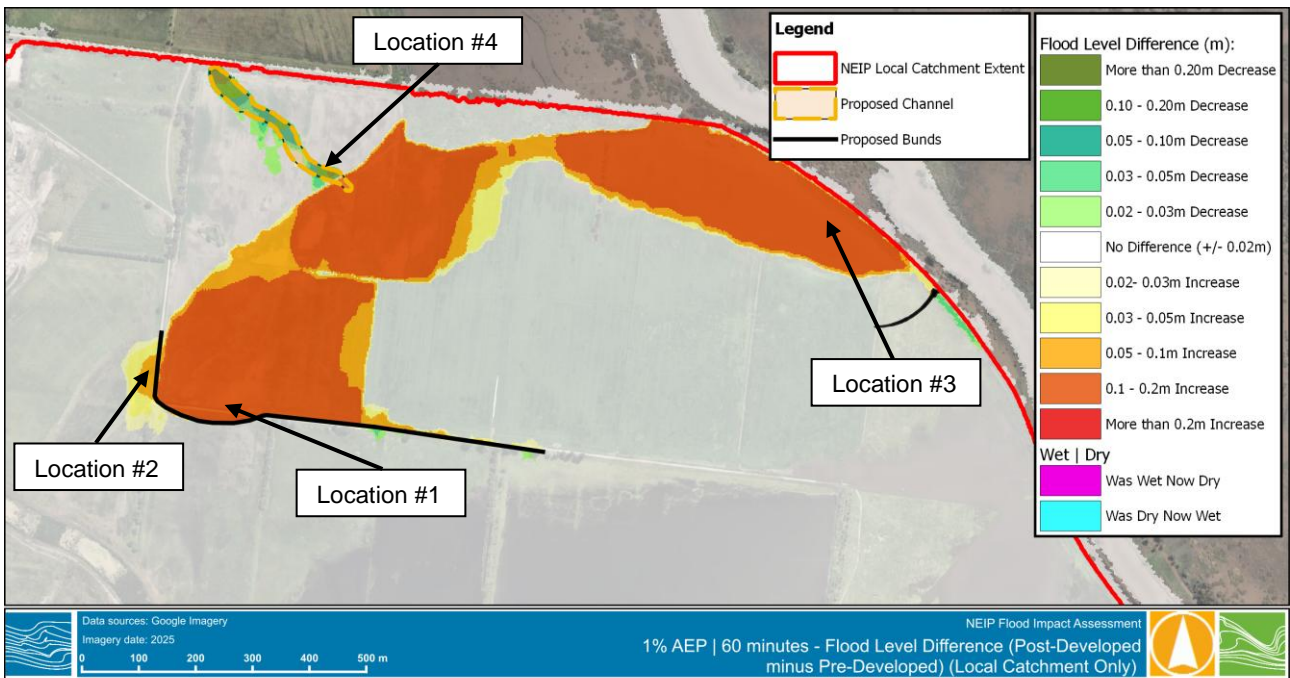


Figure 3-2 1% AEP | 60 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

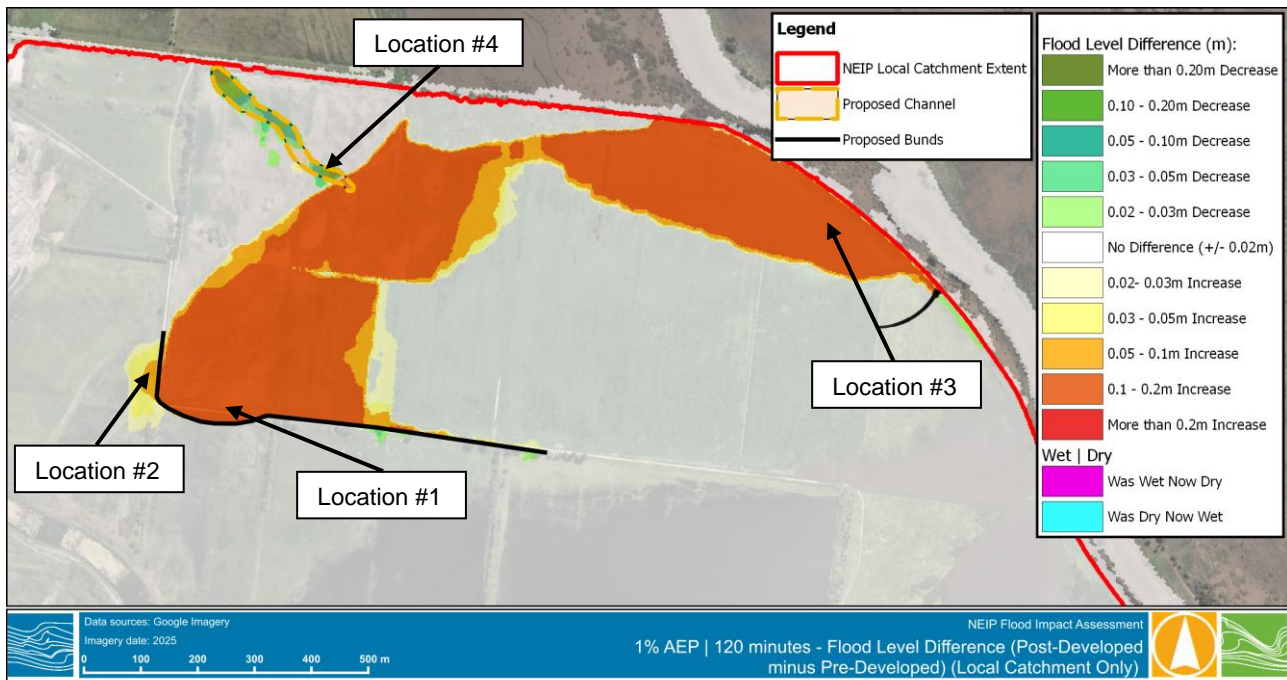


Figure 3-3 1% AEP | 120 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

3.1.2 2% AEP

A comparison of the post-developed and pre-developed flood levels indicate that the site, adjoining floodplain and neighbouring landholders is predominantly affected by local contributing flows in the 2% AEP event. This is evident for 30-minute, 60-minute and 120-minute duration events, as shown in Figure 3-4, Figure 3-5 and Figure 3-6 respectively.

A summary of flood level changes include is presented in Table 3-2.

Table 3-2 Flood Level Change Summary

Location	30-minute Duration	60-minute Duration	120-minute Duration
1	+0.29m	+0.25m	+0.27m
2	+0.13m	+0.12m	+0.11m
3	+0.15m	+0.15m	+0.18m
4	-0.36m	-0.35m	-0.35m

- Location 1 refers to the area along the western bund, where flows are backing up and pooling at this location (as designed).
- Location 2 refers to the area west of the western bund.
 - While this is outside of the evaporative wetland area, this is not a result of flows overtopping the proposed bund.
 - Rainfall generated runoff flows in a western to eastern direction which is pooling against the western side of this bund.
- Location 3 refers to the eastern region of the site. Noting that flows at this location are contained by the existing perimeter bund and proposed eastern bund (as designed).



- Location 4 refers to within the proposed channel (as designed).

These locations are illustrated on the flood level difference plots in the following figures.

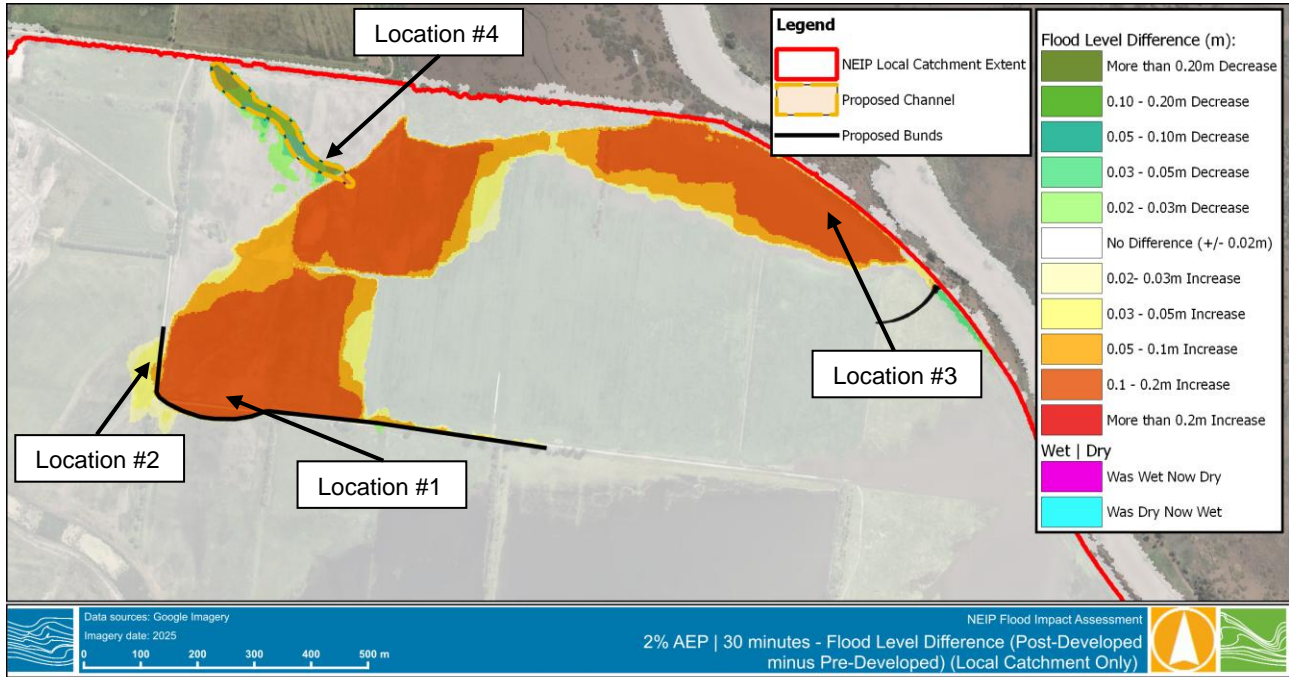


Figure 3-4 2% AEP | 30 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

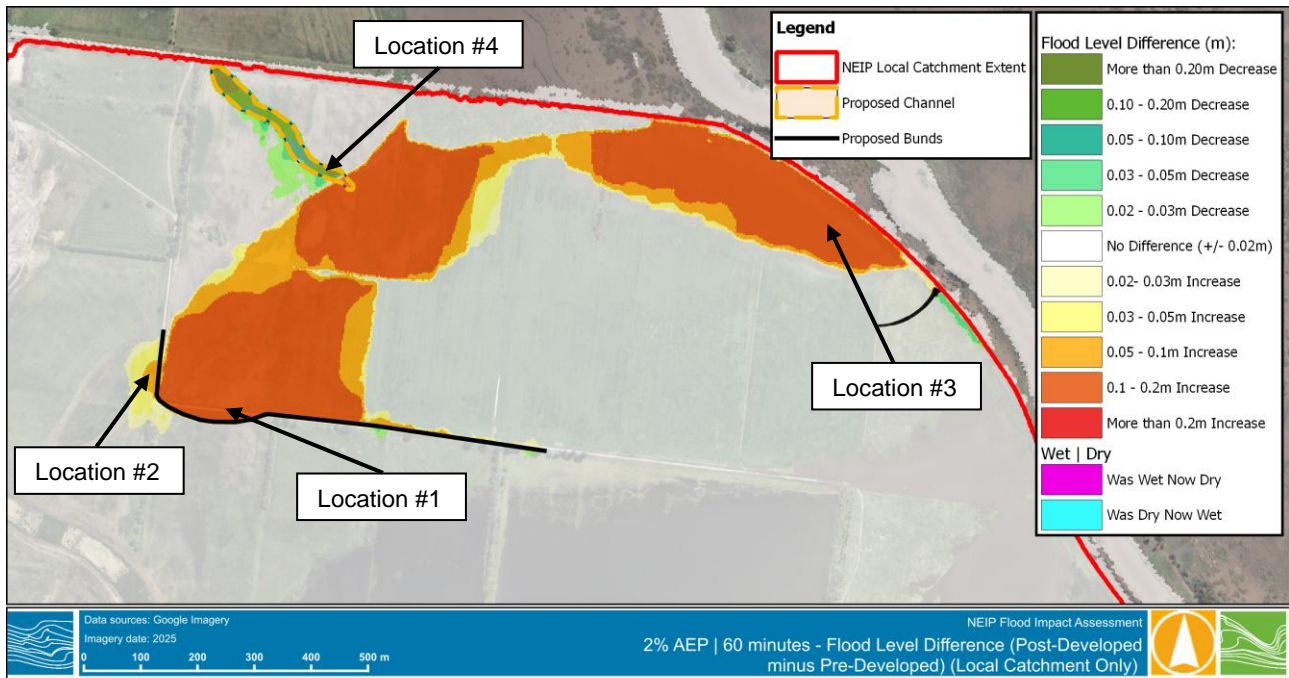


Figure 3-5 2% AEP | 60 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

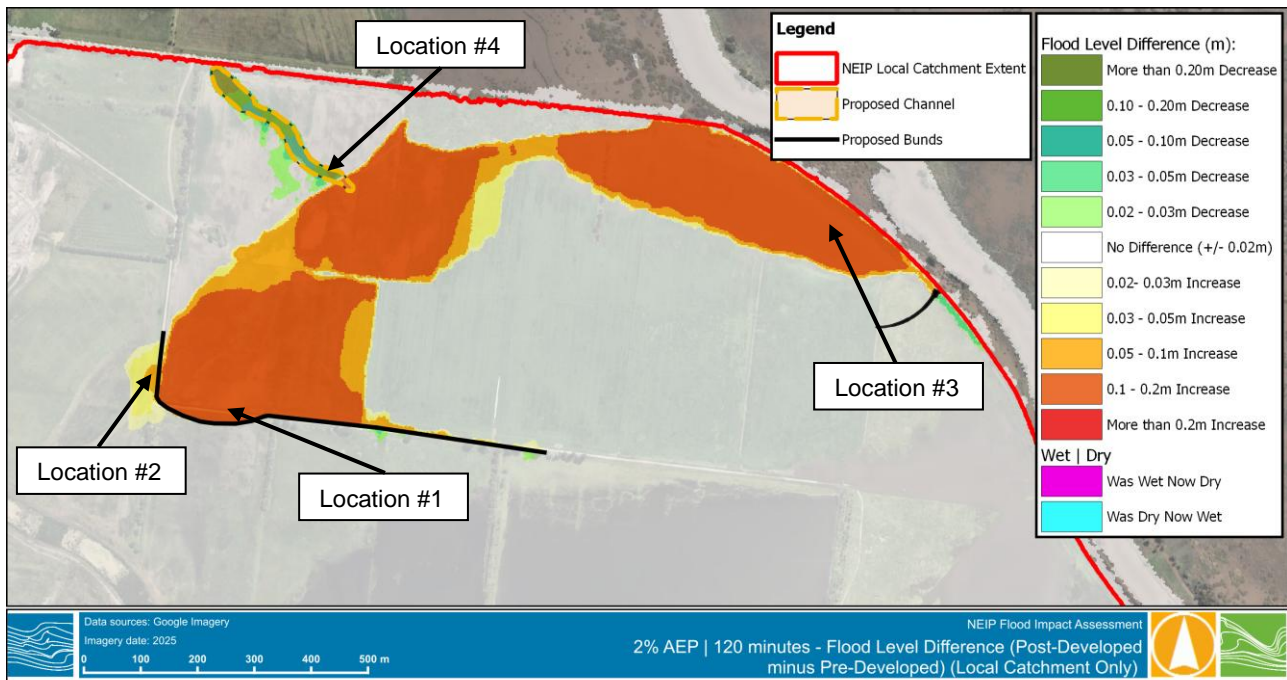


Figure 3-6 2% AEP | 120 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

3.1.3 10% AEP

A comparison of the post-developed and pre-developed flood levels indicate that the site, adjoining floodplain and neighbouring landholders is predominantly affected by local contributing flows in the 10% AEP event. This is evident for 30-minute, 60-minute and 120-minute duration events, as shown in Figure 3-7, Figure 3-8 and Figure 3-9 respectively.

A summary of flood level changes include is presented in Table 3-3.

Table 3-3 Flood Level Change Summary

Location	30-minute Duration	60-minute Duration	120-minute Duration
1	+0.27m	+0.28m	+0.28m
2	+0.12m	+0.12m	+0.13m
3	+0.09m	+0.08m	+0.12m
4	-0.52m	-0.52m	-0.51m

- Location 1 refers to along the western bund, where flows are backing up and pooling at this location (as designed).
- Location 2 refers to west of the western bund.
 - While this is outside of the site, this is not a result of flows overtopping the proposed bund.
 - Overland flows in a western to eastern direction are pooling against the western side of this bund.
- Location 3 refers to the eastern region of the area. Noting that flows at this location are contained by the existing perimeter bund and proposed eastern bund (as designed).
- Location 4 refers to within the proposed channel.



These locations are illustrated on the flood level difference plots in the following figures.

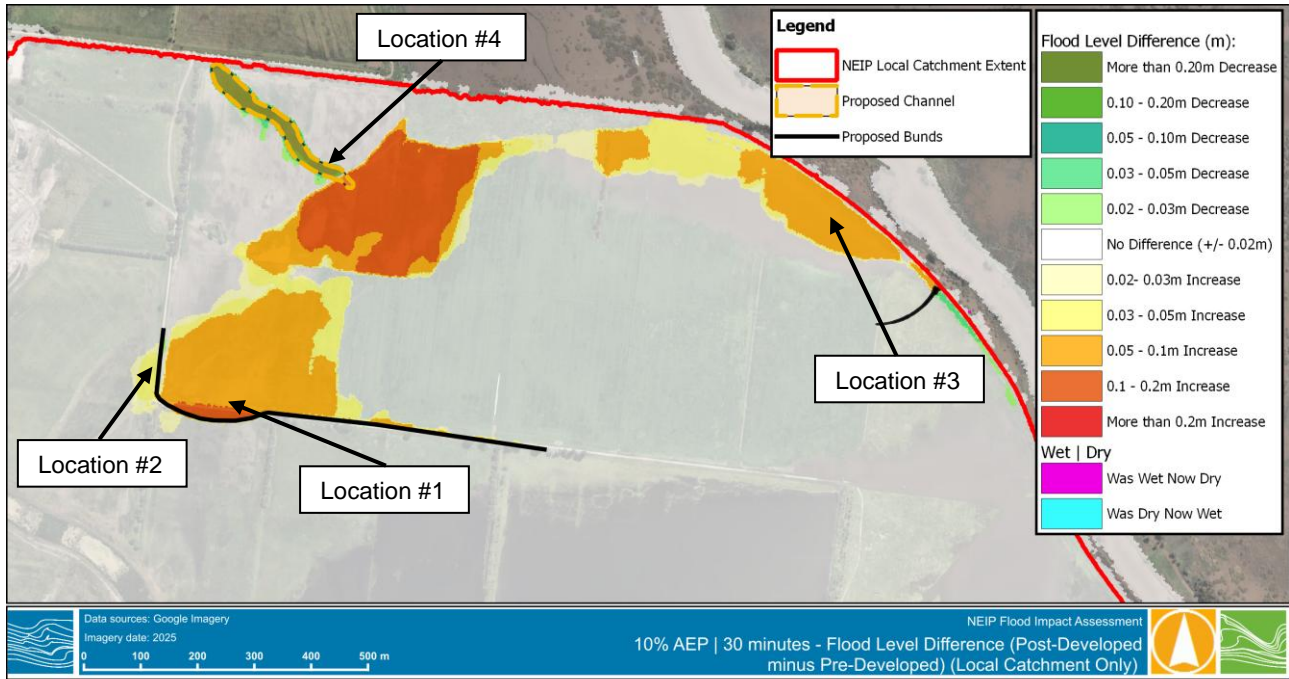


Figure 3-7 10% AEP | 30 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

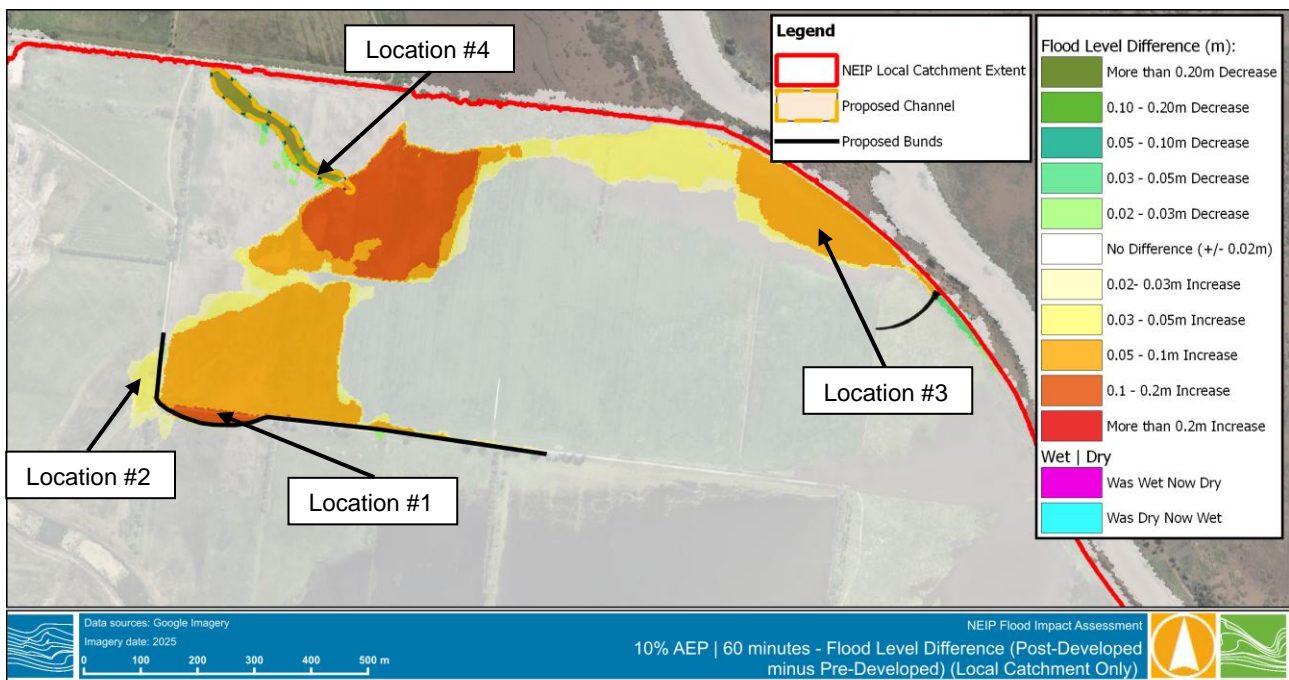


Figure 3-8 10% AEP | 60 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only

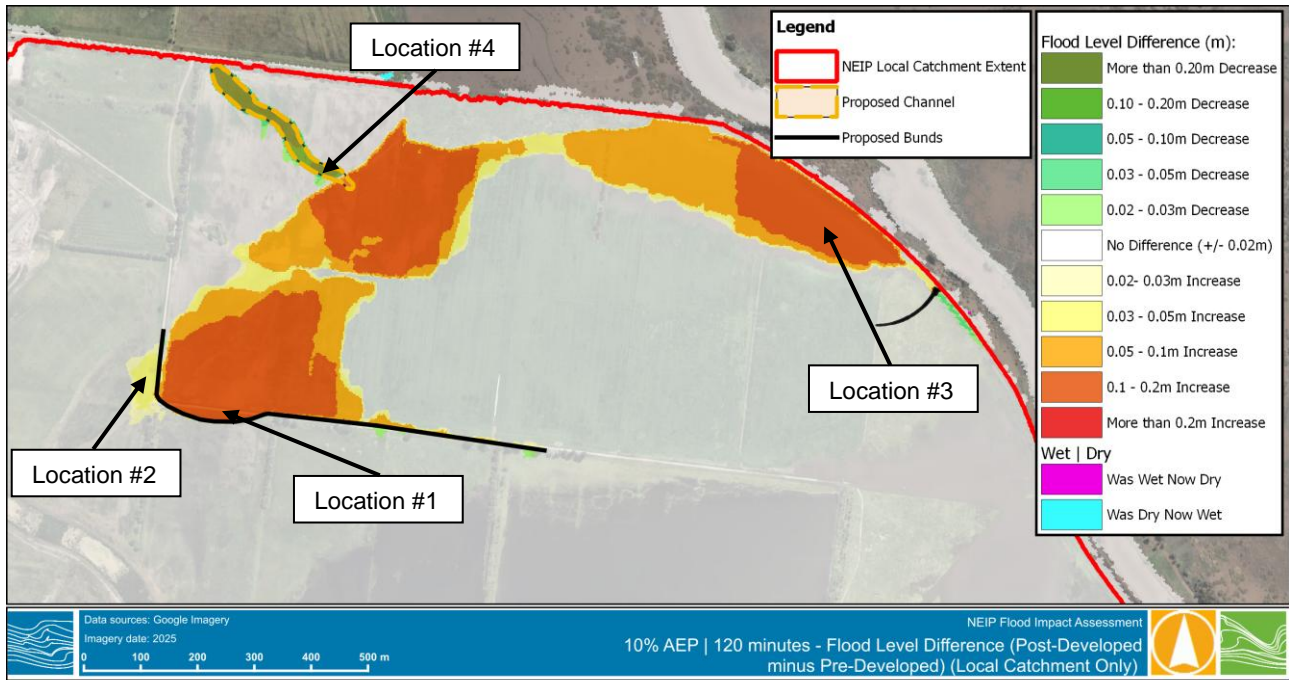


Figure 3-9 10% AEP | 120 minutes Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Only



3.2 Riverine Only

The riverine only scenario assesses changes in water surface elevation from flows within the Barwon River only and does not consider local catchment flows.

3.2.1 1% AEP

A comparison of the post-developed and pre-developed flood levels indicate very minor changes within the site, adjoining floodplain and neighbouring landholders as shown in Figure 3-10.

Due to the nature of the proposed channel being in 'cut', there is in fact a flood level decrease of up to 0.084m within the channel as there is some additional flood storage being provided in this specific location during the 1% AEP event.

Outside of this, there are no changes observed in flood level between the pre-developed and post-developed conditions.

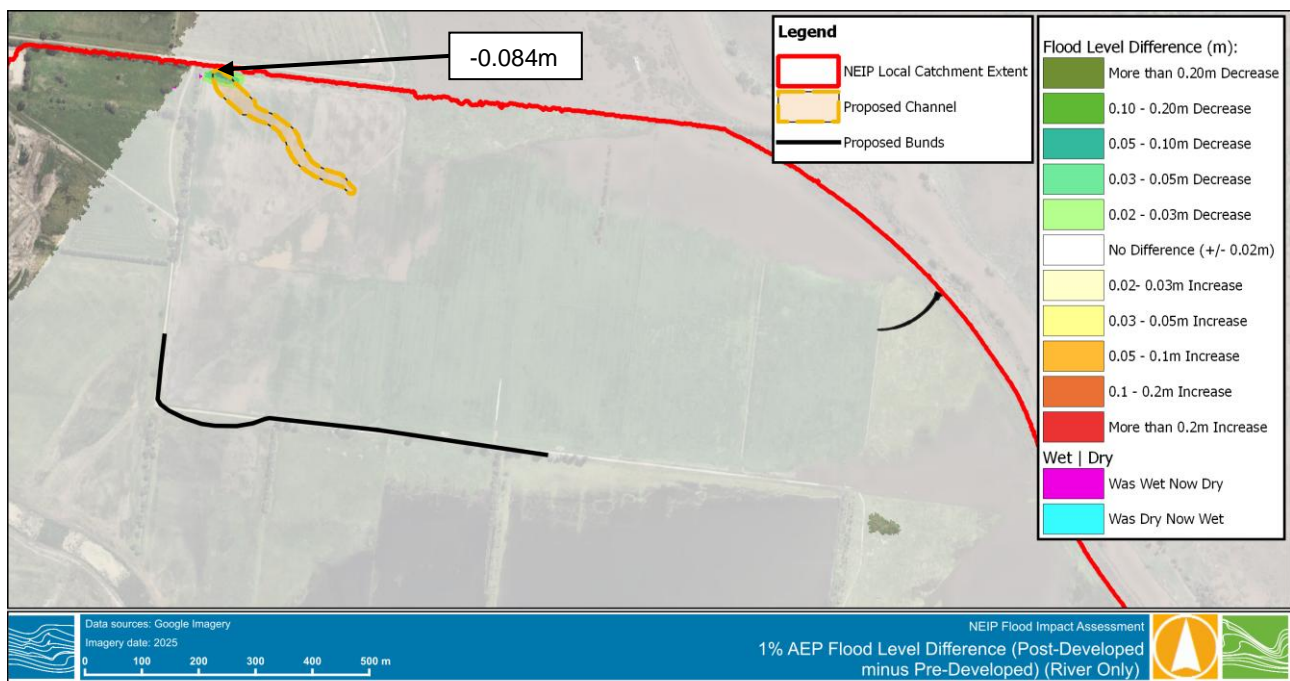


Figure 3-10 1% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Riverine Only

3.2.2 2% AEP

A comparison of the post-developed and pre-developed flood levels indicate very minor changes within the site, adjoining floodplain and neighbouring landholders as shown in Figure 3-11.

Due to the nature of the proposed channel being in 'cut', there is minor flood level decrease of up to 0.36m within the channel due to the additional flood storage within this location during the 2% AEP event. A minor decrease in flood extent during this event is also observed (noted by the pink shading)

Outside of this, there are no changes observed in flood level between the pre-developed and post-developed conditions.

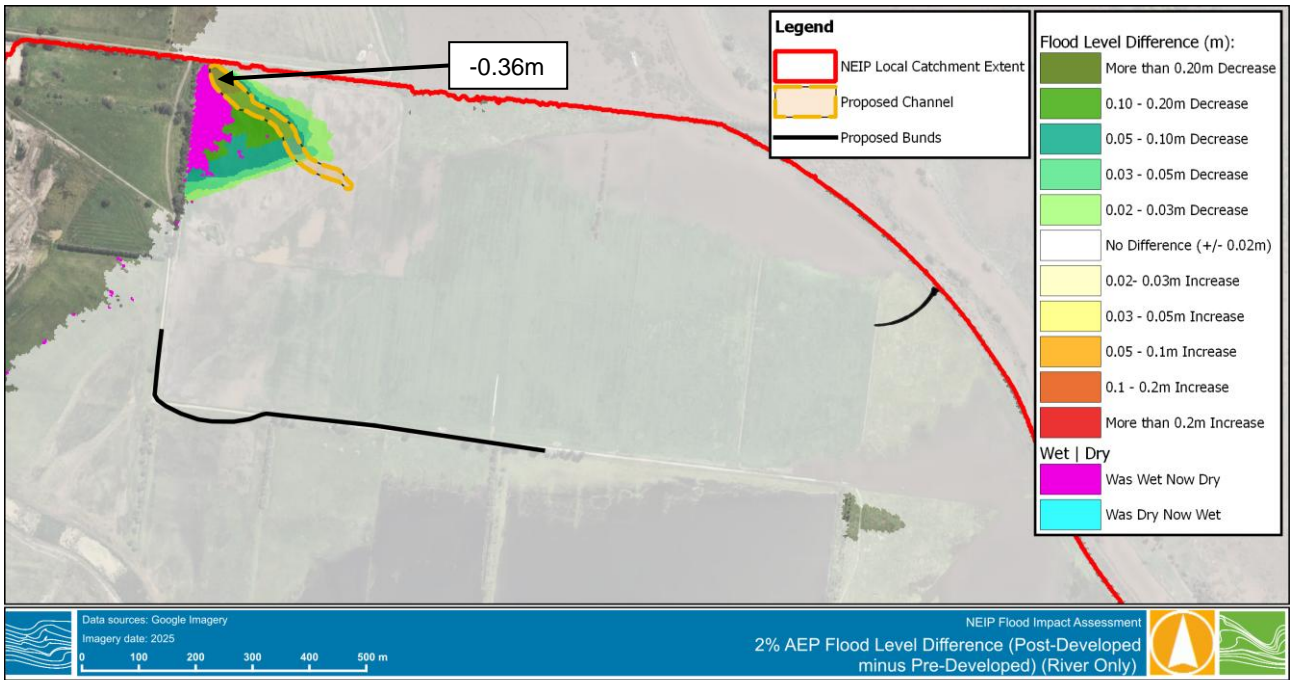


Figure 3-11 2% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Riverine Only

3.2.3 10% AEP

A comparison of the post-developed and pre-developed flood levels is presented in Figure 3-12. It can be seen that the riverine only flood extent in the 10% AEP event does not impact the evaporative wetland area.

Therefore, it can be concluded that in the 10% AEP riverine only event, there are no flood level changes in the site, adjoining floodplain and neighbouring landholders.

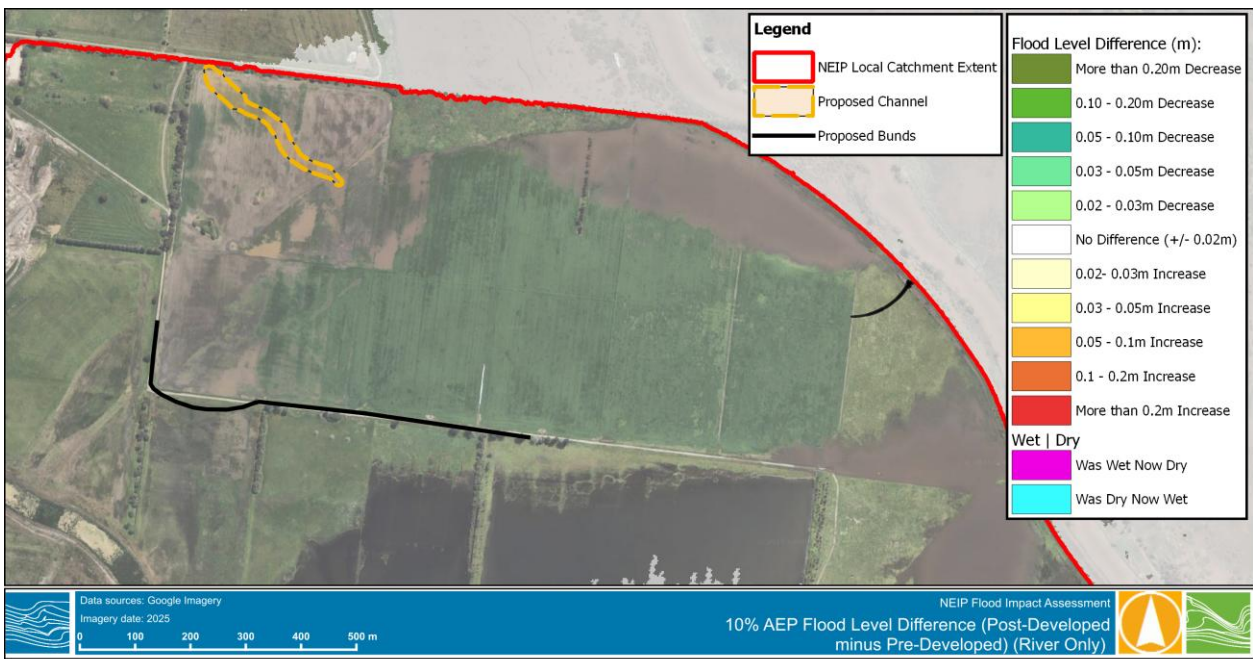


Figure 3-12 10% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Riverine Only



3.3 Combined Local Catchment and Riverine

The combined local catchment and riverine scenario assesses changes in water surface elevation from flows within the local contributing catchment and Barwon River simultaneously.

3.3.1 1% AEP

A comparison of the post-developed and pre-developed flood levels indicate that the site, adjoining floodplain and neighbouring landholders in a combined, local catchment plus riverine scenario shows no increase in flood levels in the 1% AEP event as seen in Figure 3-13.

This is because in a 1% AEP event, floodwaters from the Barwon River overtop the existing levee that separates the evaporative wetland site from the Barwon River, drowning out the property. Flows also overtop the proposed bunds that aim to contain the local catchment flows, thus covering the site and surrounding lands in the post-developed conditions to a flood level matching that of the pre-developed conditions. The proposed channel provides some additional flood storage in the 1% AEP event, thus resulting in a minor flood level decrease up to 0.082m within the proposed channel of the wetland area.

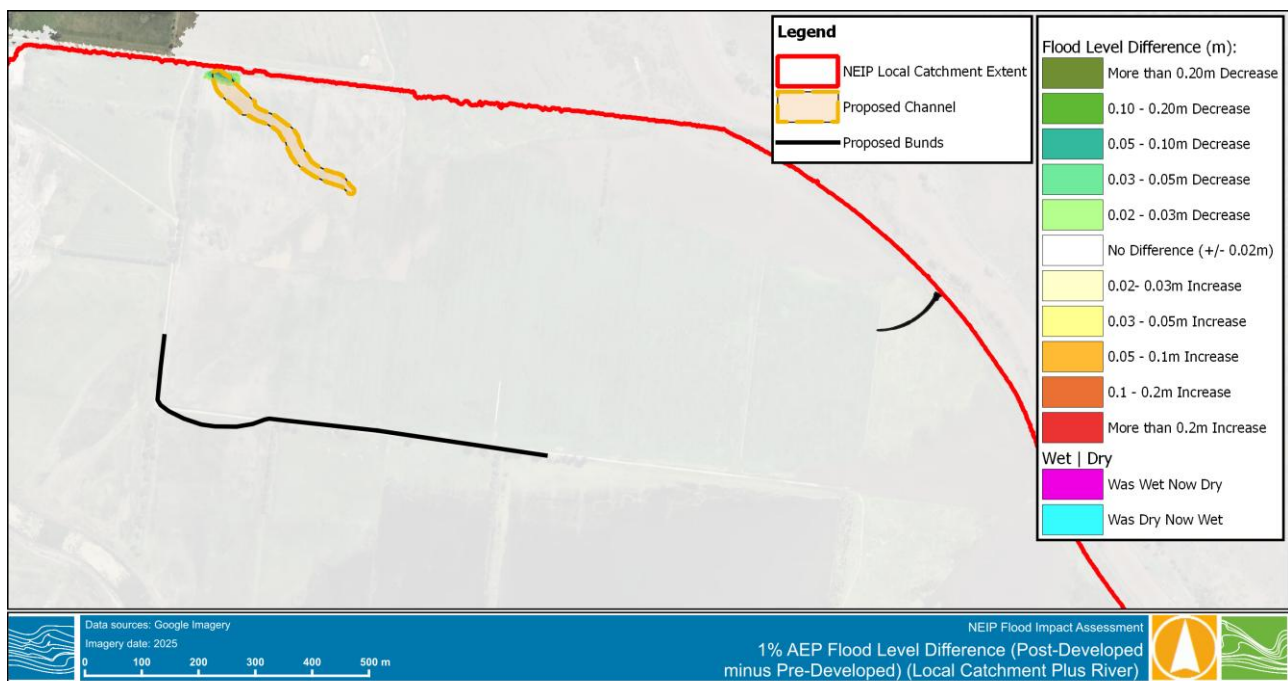


Figure 3-13 1% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Plus Riverine

3.3.2 2% AEP

A comparison of the post-developed and pre-developed flood levels indicate that the site, adjoining floodplain and neighbouring landholders in a combined scenario shows no increase in flood levels in the 2% AEP event as shown in Figure 3-14.

This occurs because during a 2% AEP event, floodwaters from the Barwon River overtop the existing levee that separates the site from the Barwon River. Flows also overtop the proposed bunds that aim to contain the local catchment flows, thus covering the site and surrounding lands in the post-developed conditions to a flood level the same as in the pre-developed conditions. The proposed channel provides some additional flood storage in the 2% AEP event, thus resulting in a flood level decrease up to 0.38m within the proposed channel of the wetland area.

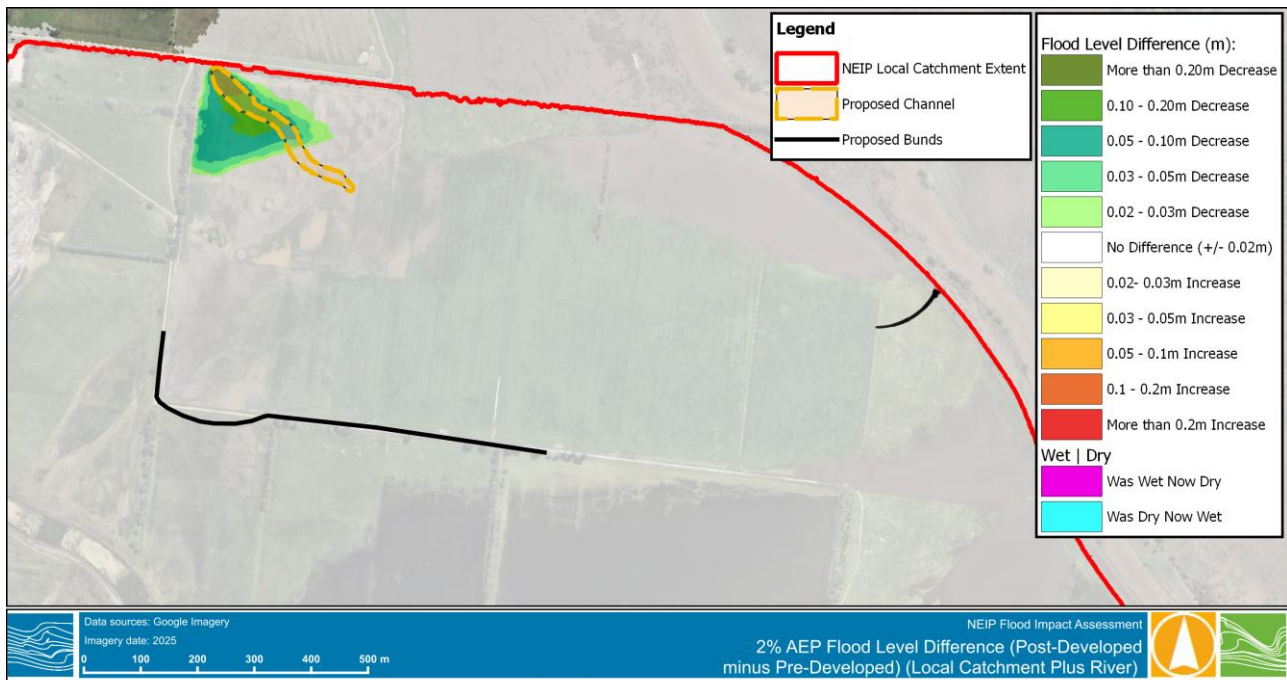


Figure 3-14 2% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Plus Riverine

3.3.3 10% AEP

A comparison of the post-developed and pre-developed flood levels indicate that the site, adjoining floodplain and neighbouring landholders in a combined, local catchment plus riverine scenario shows a flood level difference the same as that observed in the local catchment only scenario in the 10% AEP event. Refer to Figure 3-15 below with a comparison to Figure 3-9 (10% AEP, 120-minute local catchment only) above.

This occurs because during the 10% AEP riverine flows from the Barwon River do not overtop the existing levee that separates the wetland area from the Barwon River. Therefore, the flooding conditions within the site are solely influenced by the local catchment flows only.

A summary of flood level changes include is presented in Table 3-4.

Table 3-4 Flood Level Change Summary

Location	120-minute Local Catchment Duration 90-hour Riverine Duration
1	+0.28m
2	+0.13m
3	+0.19m
4	-0.46m

Noting that there are some changes in flood level experienced in the combined 10% AEP scenario when compared to the local catchment only 10% AEP scenario for locations 3 & 4, due to the increase in run time of the combined hydraulic model.

Changes to flood level are still comparable between both scenarios with flooding ponding across the site.



- Location 1 refers to the area along the western bund, where flows are backing up and pooling at this location (as designed).
- Location 2 refers to the area west of the western bund.
 - While this is outside of the site, this is not a result of flows overtopping the proposed bund.
 - Overland flows in a western to eastern direction are pooling against the western side of this bund.
- Location 3 refers to the eastern region of the site. Noting that flows at this location are contained by the existing perimeter bund and proposed eastern bund (as designed).
- Location 4 refers to within the proposed channel.

These locations are illustrated on the flood level difference plot in the following figure.

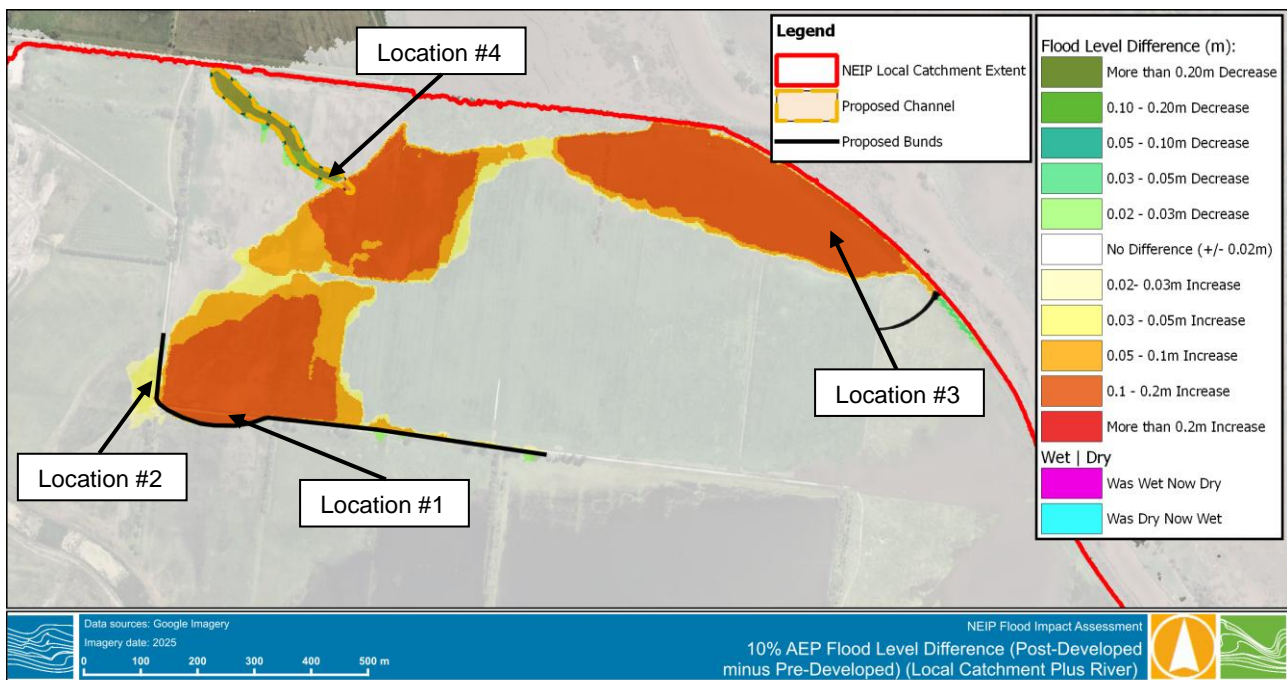


Figure 3-15 10% AEP Water Surface Elevation Difference Plot (Post-Dev minus Pre-Dev) – Local Catchment Plus Riverine



4 SUMMARY AND DISCUSSION

Water Technology have been engaged to assess the impact within Sparrovale Wetland reserve and neighbouring landowners as a result of the proposed evaporative wetland.

Hydraulic modelling was completed to assess changes to flood levels reflected in three scenarios:

- Local contributing catchment flows only;
- Riverine flows only; and
- A combination of local contributing catchment flows and riverine flows, simultaneously.

Post-developed flood levels were compared to pre-developed flood levels to determine any observed impacts as a result of the proposed development.

Results from the local contributing catchment flows only scenario are similar across the AEPs and duration simulated and can be summarised as:

- Flows are predominantly contained within the evaporative wetland (as designed) by the proposed bunds
- Some minor localised afflux is observed west of the western bund in the order of +0.11m to +0.13m.
 - Rainfall generated runoff flows in a western to eastern direction, pooling against the western side of this bund. Noting that the minor afflux occurring in this location is contained within the broader Sparrovale reserve.
- Refer to Section 3.1 for a comprehensive assessment of flood level changes across each AEP and duration simulated.

Results from the riverine flows scenario can be summarised as:

- Similar in the 1% AEP and 2% AEP events.
 - A decrease in flood levels is observed within the proposed channel, due to the channel providing extra flood storage.
 - No increase in flood level is observed across the site in this simulation.
- During the 10% AEP event, riverine flows do not overtop the existing levee that separates the site from the Barwon River, meaning there is no change observed between the pre-developed and post-developed conditions.

Results from the combined local contributing catchment and riverine flows scenario can be summarised as:

- The 1% AEP and 2% AEP events flood level difference is similar to that of the riverine only flood level differences
 - This is because the 1% AEP and 2% AEP riverine flows overtop the existing levee that separates the site from the Barwon River. These flows also overtop the proposed bunds within the site drowning out and existing or proposed drainage infrastructure onsite.
 - A decrease in flood levels exists within the proposed channel, due to the channel providing extra flood storage.
 - No increase in flood level is observed in this simulation.



- The 10% AEP event flood level difference is similar to that of the local contributing catchment only flood level differences
 - This is because in the 10% AEP event, riverine flows do not overtop the existing levee that separates the site from the Barwon River
 - Changes in flood levels within the site are solely influenced by the local catchment flows only

Based on an assessment of the three scenarios above it can be seen that the proposed evaporative wetland does not result in any adverse flood level impacts associated with displacement of floodwater from the Barwon River across the AEP events simulated.

Changes to local catchment contributing flows has a more significant impact on flood levels experienced within the Sparrovale Reserve. Having said this, increases in flood levels caused by this proposed evaporative wetland is entirely contained within Sparrovale Wetlands reserve (as designed). The key instance of afflux outside of the evaporative wetland area exists (west of the western bund), caused by overland flows in a western to eastern direction pooling against the western side of the bund. This afflux is relatively minor and localised within the broader Sparrovale reserve.



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APPENDIX D
BIODIVERSITY OPPORTUNITIES

23rd May 2025

Stephen James
 Director- Civilisation
 Level 34, 1 Eagle Street
 Brisbane, Qld, 4000

Dear Stephen,

DI_DR_14 Redesign- biodiversity opportunities

This letter is provided as a follow-up to recent meetings between Re-Grow Geelong Pty Ltd ('Re-Grow'), the City of Greater Geelong ('the City') and relevant consultants and stakeholders that have expressly focussed on the proposal for the creation of a new evaporation pond within the area of the land at the northern boundary of the Sparrovale property. The evaporation pond responds to the initiative of the City to consider alternative designs for DI_DR_14 following the exhibition of the Marshall Precinct Structure Plan and subsequent panel established to consider the Planning Scheme Amendment. We note the City's Option 3 proposal and refer to the refinement of that concept prepared by Re-Grow ('Refined Concept') which is the subject of this letter.

This letter focusses on four key ecological themes considered relevant as the design progresses to eventual endorsement by the City.

1- Clause 52.17 of the City of Greater Geelong planning scheme

Work undertaken by the City's ecological consultants in May, June and August 2018 to inform the Sparrovale Wetlands Masterplan (EHP, 2019) identified that the area proposed for the Refined Concept may have (in the past) supported patches of indigenous vegetation. It is considered likely that such patches regenerated opportunistically within areas of the agricultural land that were rendered unsuitable during some cropping seasons, likely as a result of inundation. Aerial imagery captured after 2019 shows that the entire area of the site proposed for the Refined Concept was regularly sown to pasture and cropped, continuing a land use that has been consistent at the site since 1907. Figure 1 (below) shows the area of the Refined Concept overlying an aerial image of the site taken in December 2019. This aerial image clearly shows the extent of agricultural disturbance across the property in dry seasons.

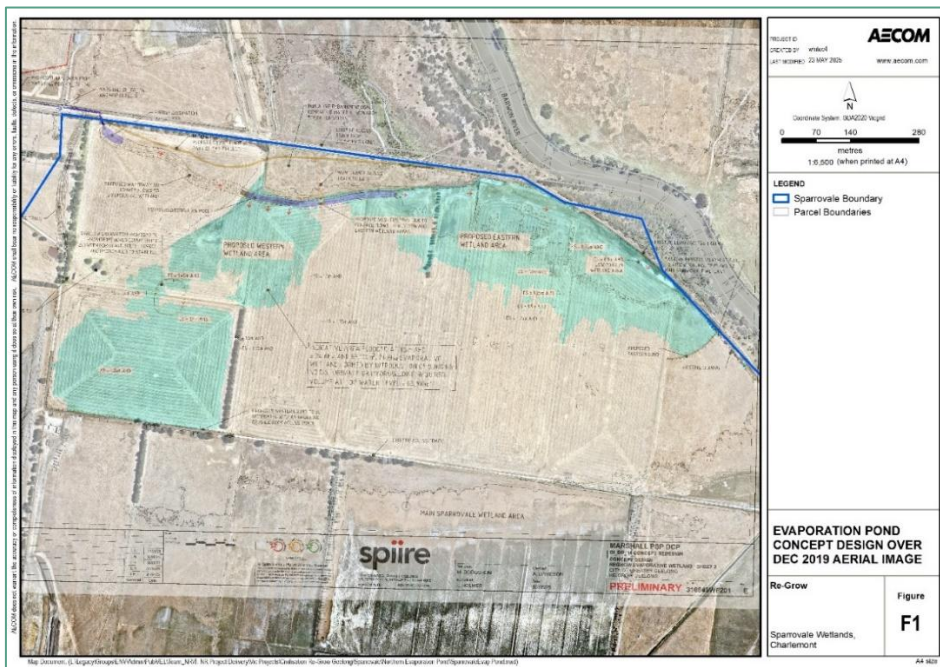


Figure 1- Concept plan and indicative flooded area over December 2019 aerial image

The regular cropping and/or slashing that is evident in Figure 1 has been to the detriment of any indigenous vegetation that may have regenerated between cropping cycles.

We note the City's advice from the 8th May 2025 that indigenous vegetation mapped by EHP in 2018 in the footprint of the Refined Concept is no longer present. It is suggested that the continuing consideration of the approval of the Refined Concept needn't be influenced by the possible existence of any patch of native vegetation that may have regrown in response to changed cropping/agricultural regimes. Indeed, such vegetation may be considered exempt from the need for a permit under clause 52.17 of the City of Greater Geelong Planning Scheme.

Clause 52.17-7 of the scheme provides the following relevant exemption from the need for a permit for native vegetation removal:

Regrowth- *Native vegetation that is to be removed, destroyed or lopped that has naturally established or regenerated on land lawfully cleared of naturally established native vegetation and is:*

- *Less than 10 years old.*

It is easily demonstrated through the analysis of time-series aerial photography that any indigenous vegetation that may be present within the area of the proposed Refined Concept is regrowth. Considering the long-term use of the site for agricultural activities, it is further assumed that the land was (and continues to be) lawfully cleared. As such, it is appropriate that this exemption should be a relevant consideration for the City as they contemplate the approval of the proposal.

2- Opportunity for the establishment of numerous wetland EVC's

The proposed hydrological regime that will prevail following the construction of the Refined Concept will provide a unique opportunity to encourage the re-establishment of a variety of wetland Ecological Vegetation Classes (EVC's). This is an outcome that is intended by the design. Areas within the broader inundation extent will likely hold water on a permanent basis according to the hydrological graphs produced to support the proposal. Around the perimeter of these areas of permanent open water, the land will be subject to a wetting and drying regime that will fluctuate in response to inflow regularity and volume and to the topography of the site. Areas closer to the open pools will likely retain soil moisture for longer than land further from the waterbody. This creates the possibility of the formation of wetland ecosystem with the variability that will closely mimic that originally provided by the existing Sparrovale wetland prior to its current period of prolonged inundation.

In a regional context, the distribution and extent of these wetland vegetation communities has been greatly depleted as a result of either direct removal or in response to altered the hydrological regimes that have enabled the land use changes to allow for residential land development or for agricultural activities. Thus, any proposal that may assist in the recovery of such valuable and scarce ecological assets should be given significant consideration.

The permanent water body created by the Refined Concept will allow emergent vegetation such as Narrow-leaf Cumbungi *Typha domingensis* to establish, representative of the Tall Marsh EVC that is prevalent within the existing Sparrovale Wetland. The damp perimeter of the waterbody will favour species that are more tolerant of regular wetting/drying cycle and these species are likely to be representative of Plains Sedgy Wetland EVC or similar. Australian Lilaepsis *Lilaeopsis polyantha* and Swamp Crassula *Crassula helmsii* have been recorded previously within Sparrovale (EHP, 2019) and are therefore likely to establish as a result of the Refined Concept. Seasonally Inundated Sub-saline Herbland is the most common EVC within the main Sparrovale Wetland and is considered likely to colonise the slightly drier edges of the evaporation pond. Beaded Glasswort *Sarcocornia quinqueflora*, Australian Salt-grass *Distichlis distichophylla*, Karkalla *Carpobrotus rossii* and Austral Seablite *Suaeda australis* are common species within this EVC.

The speed with which this passive recovery will occur is dependent on a range of factors including the quality and quantity of seed stock within the soil seed bank, and the ability of new seed stock to arrive via vectors. There are few examples in literature of the analysis of the effectiveness of wetland restoration, and none identified in Australia (Roberts et al, 2017). What is known is that (in addition to supply from the soil seed bank) the distance to potential propagule sources is important (Robert et al, 2017). With the existing Sparrovale Wetland considered a reliable propagule source and being only

~500 metres south of the Refined Concept, this wetland vegetation will play a significant role in encouraging the colonisation of the evaporation pond within indigenous species.

3- Opportunity for the creation of a habitat for significant wetland-dependant fauna species

The creation of the evaporation pond and the subsequent establishment of a diverse range of wetland-dependant indigenous vegetation types will increase the potential for wetland-dependant fauna species to re-colonise the site on a permanent basis, and for migratory species to be attracted to the site during their non-breeding periods.

In their 2019 assessment, EHP did not record any significant fauna species within the Sparrovale Wetland, however identified that the site does provide suitable habitat for nationally significant species such as Orange Bellied Parrot *Neophema chrysogaster*, Yarra Pygmy Perch *Nannoperca obscura*, Australian Grayling *Prototroctes maraena*, Dwarf Galaxias *Galaxias pusilla* and Growling Grass Frog *Litoria raniformis* (EHP, 2019). During their assessment, many common species that rely on wetland ecosystems were recorded including White-faced Heron *Egretta novaehollandiae*, Australian White Ibis *Threskiornis molucca*, Pacific Black Duck *Anas superciliosa*, Purple Swamphen *Porphyrio porphyrio*, Pied Cormorant *Phalacrocorax varius*, Eastern Dwarf Tree Frog *Litoria fallax* and Common Froglet *Crinia signifera*.

Wetland-dependant fauna species are capable of rapid and long-distance dispersal, allowing them to rapidly populate recently re-wet habitats. The proximity of the proposed evaporation pond to the existing Sparrovale Wetland and to the Barwon River suggests that these common species are likely to quickly colonise the site following the completion of the construction of the Refined Concept and subsequent receipt and capture of stormwater. The areas of the pond that exist as permanent open water will attract waterfowl and frog species, and the gradual establishment of fringing vegetation will encourage species that rely on adequate vegetative cover for foraging. Sparse or low-growing vegetation that will establish along the fringes of the permanent waterbody will attract migratory wading species such as Sharp-tailed Sandpiper *Calidris acuminata* and Latham's Snipe *Gallinago hardwickii* that arrive over the austral summer. Sub-saline Herbland (once prevalent within the existing Sparrovale wetland) may readily establish along the southern edge of the evaporation pond. Beaded Glasswort, an indicative species of this EVC, is a known feed source for Orange-bellied Parrot which is listed as critically endangered under the *Environment Protection and Biodiversity Conservation Act, 1999*. Orange-bellied Parrot is known to overwinter in the Bellarine, and an increase in the extent of this vegetation community will benefit the continued presence of this species in the local area.

The evaporation pond will also serve to provide fauna species already present on the property with more consistent habitat availability should the challenges with managing the volume of water in the existing wetland continue. It is noted that these challenges are unrelated to the exhibited DI_DR_14. The long-term inundation currently experienced in Sparrovale (which at normal top water level is approximately 10 times the size of the Refined Concept) reduces the variability in habitats that many wetland species depend on, and a hydrologically separated alternate wetland provides an important, geographically proximal substitute habitat/s.

4- Alignment with the overarching objectives of the Sparrovale Wetland Masterplan and Sparrovale Wetland Monitoring Plan 2020-2030

It is considered that the Refined Concept responds appropriately to the existing ecological values of site, and reflects the vision of the City of Greater Geelong's *Sparrovale Ngubiti yoorree Wetlands Masterplan* that the transition is encouraged in the land that is currently use for agricultural grazing and cropping into 'rehabilitated floodplain conservation reserve to complement the biodiversity values of the natural and new wetlands and the Barwon River' (CoGG, 2021).

Similarly, a relevant objective highlighted in the monitoring plan requires that '*Sparrovale Wetlands will continue to provide suitable habitat values for significant faunal species (waterbirds, frogs and fish) based on 2019/2020 baselines through the abatement of threatening processes.*

The Refined Concept responds appropriately to this objective by providing an alternative solution to increased stormwater input by establishing an alternative wetland ecosystem to the that which already exists. Being 'offline' to (or hydrologically separated from) the existing wetland ecosystem, the ecological resilience of the Sparrovale property will be increased, providing increased confidence in

the ability of the property to continue to provide significant and valuable ecological functionality into the future.

I trust that this provides further relevant context for consideration, but should you have any further questions, please let me know.

Yours faithfully



Christopher White
Technical Director- Environment
christopher.white@aecom.com

Mobile: 0401 483 141

References

- Arthur Rylah Institute (2016) *A guide to the water regime, salinity ranges and bioregional conservation status of Victorian Wetland Ecological Vegetation Classes*. Department of Environment, Land, Water and Planning, Heidelberg, Victoria
- Ecology and Heritage Partners (2019) *Biodiversity Assessment: 1-87 Groves Road, Armstrong Creek, and 109-215 Sparrovale Road, Charlemont, Victoria (Sparrovale Wetland)*, EHP, Victoria.
- J. Roberts, M.T. Casanova, K. Morris, P. Papas (2017) *Vegetation recovery in inland wetlands: an Australian perspective*. Arthur Rylah Institute for Environmental Research. Technical Report Series No. 270. Department of Environment, Land, Water and Planning, Heidelberg, Victoria.
- Thompson Berrill Landscape Design (2021) *Sparrovale Ngubitj yoorree Wetlands Master Plan*. On behalf of the City of Greater Geelong (Masterplan)



APPENDIX E
REVISED CONCEPT COSTING

Schedule of Prices - DI-DR-14 Refined Concept

Note: Any altered schedule will be deemed to be non-conforming.

City of Greater Geelong

Marshall PSP Planning Scheme Amendment C278ggee

Contract No 310848

Date: 17/06/2025

Rev: B

Note that all figures exclude GST

Rev	Item	Description	Qty	Unit	Rate	Amount
	1	PRELIMINARY SITE & EARTHWORKS				
	1.1	Site establishment including site facilities, compound, temporary fencing and service proving.	1	Item	\$34,500.00	\$34,500.00
	1.2	Site Preparation including removal of existing fencing, rubbish and rock, construction of temporary access tracks and ramps, protection of existing trees and cultural heritage areas, preparation and implementation of site safety plan including identification of site hazards, all necessary training, signage, temporary or permanent works to meet legislative, WorkCover and construction industry guidelines all as required. (Excluded demolition works) Rate includes implementation of EMP requirements and control of site stormwater runoff.	1	Item	\$57,500.00	\$57,500.00
	1.3	Setout of all works as shown on the design plans ; and all associated infrastructure. Includes Setout and pegging of site compound.	1	Item	\$23,000.00	\$23,000.00
	1.4	As constructed survey of all works as shown on the design plans. Rate to include provision of digital as con model of finished surface to Authorities.	1	Item	\$23,000.00	\$23,000.00
	1.5	Stripping and stockpiling of topsoil				
	1.5.1	Waterway (200mm depth)	13291	sq.m	\$2.88	\$38,278.08
	1.5.2	Bunds (100mm depth)	4742	sq.m	\$2.88	\$13,656.96
	1.5.3	Stockpile Area (200mm depth)	20303	sq.m	\$2.88	\$58,472.64
	1.5.4	Western connection pool	4071	sq.m	\$2.88	\$11,724.48
	1.6	Excavate and disposal of all material to fill embankment. Excavation to make allowance for over-excavation to form finished surface. Excavation rate to make allowance for rock. Rock shall be disposed to a tip.	8621	cu.m	\$40.25	\$346,995.25
Carried Forward						\$607,127.41

Contract No 310848

Rev: B

Note that all figures exclude GST

Rev	Item	Description	Qty	Unit	Rate	Amount
Brought Forward						\$607,127.41
	1.7	Fill using suitable material derived from excavation as specified on the plans. Allowance to be made for compaction as specified by geotechnical engineer				
	1.7.1	Bunds (using suitable imported clay)	2048	cu.m	\$46.00	\$94,208.00
	1.7.2	Fill embankment bounding Goodman Road	8621	cu.m	\$23.00	\$198,283.00
	1.8	Additional temporary site stormwater management for above the 10 year ARI. Incorporating control of discharge, including all pumping and diversions as required to facilitate works, and diversion channels as required.	1	Item	\$34,500.00	\$34,500.00
	2 CONTROL GATES					
	2.1	Western Gate				
	2.2	Manually operated penstock with vertical operating range of 1.1m. Capacity/sizing tbc. Concrete box culverts with concrete spillway above set at 1.5m AHD. Precast headwall with wingwalls x 2. Allow for safety fencing over spillway.	1	Item	\$172,500.00	\$172,500.00
	2.3	Eastern Gate				
	2.4	Manually operated layflat with vertical operating range of 0.6m. Capacity/sizing tbc. Concrete box culverts with concrete spillway above set at 1.5m AHD. Precast headwall with wingwalls x 2. Allow for safety fencing over spillway.	1	Item	\$230,000.00	\$230,000.00
	2.5	Allow for 10m long concrete spillway above the Eastern Gate, which will form the ultimate control for the entire Evaporative Wetland.	1	Item	\$57,500.00	\$57,500.00
	3 TOPSOIL					
	3.1	SITE DERIVED TOPSOIL Topsoil to be placed in accordance with design drawings and specification. All topsoil to be tested and remediated if necessary to ensure it is in accordance with the specification requirements.				
Carried Forward						\$1,394,118.41

Contract No 310848

Rev: B

Note that all figures exclude GST

Rev	Item	Description	Qty	Unit	Rate	Amount
Brought Forward						\$1,394,118.41
	3.1.1	Waterway (100mm depth)	13291	sq.m	\$4.60	\$61,138.60
	3.1.2	Bunds (100mm depth)	2612	sq.m	\$4.60	\$12,015.20
	3.1.3	Fill Embankment bounding Goodman Road (100mm depth)	20302	sq.m	\$4.60	\$93,389.20
	3.1.4	Western connection pool (100mm depth)	4071	sq.m	\$4.60	\$18,726.60
	4	ROCKWORK				
		Placement of approved graded angular rocks for beaching in waterway and embankment spillway as detailed in drawings. Supply & installation of material to MWC standard, and as specified including plant and labour.				
	4.1	Fill rocks. 300-600mm ø, well graded rocks interlocked in place	254	sq.m	\$57.50	\$14,605.00
	4.2	Embedment layer 150mm (MIN.) thick layer, compacted well 40mm NDCR (Non-descript crushed rock)	254	sq.m	\$46.00	\$11,684.00
	4.3	Voids rocks 60-195mmø Angular, locked, well graded rocks interlocked in place. Ensure all voids are filled.	254	sq.m	\$57.50	\$14,605.00
	4.4	Edge/Toe rocks. Minimum 600mm diameter edge/toe rocks, 2/3 embedded into finished surface.	110	Lm	\$115.00	\$12,650.00
	4.5	Supply and construct, 4m wide crushed rock maintenance access track to the Western Bund and Western Gate in accordance with the Design Plans	2032	sq.m	\$51.75	\$105,156.00
	5	MISCELLANEOUS				
	5.1	Hydromulch all earth surfaces as specified on the plans				
	5.1.1	Waterway	13291	sq.m	\$1.73	\$22,993.43
	5.1.2	Bund	2710	sq.m	\$1.73	\$4,688.30
	5.1.3	Fill embankment bounding Goodman	20302	sq.m	\$1.73	\$35,122.46
	5.1.4	Western connection pool	4071	sq.m	\$1.73	\$7,042.83
	5.2	Safety fencing around outlet headwall, as shown in drawings and in accordance with MW STD 7521/8/206.	1	No.	\$4,600.00	\$4,600.00
Carried Forward						\$1,812,535.03

Contract No 310848

Rev: B

Note that all figures exclude GST

Rev	Item	Description	Qty	Unit	Rate	Amount
Brought Forward						\$1,812,535.03
	6	DESIGN				
	6.1	Strategy and concept for proposed evaporative wetland. Includes all hydrologic and hydraulic modelling, meetings, production of concept design plans, costings and meetings	1	Item	\$51,000.00	\$51,000.00
	6.2	Civil/Integrated Water Engineering (Based on ACEA rates)	1	Item	\$171,660.00	\$171,660.00
	6.3	Geotech Engineering	1	Item	\$10,000.00	\$10,000.00
	6.4	Structural Engineering large structures	1	Item	\$20,000.00	\$20,000.00
	6.5	Feature Survey and Surround establishment	1	Item	\$30,000.00	\$30,000.00
	6.6	Flood Impact Assessment consultant	1	Item	\$28,150.00	\$28,150.00
	6.7	Flora, Fauna & Cultural Heritage Assessments	1	Item	\$200,000.00	\$200,000.00
	6.9	Civil/Landscape Works Defects Maintenance Period (12months)	12	No.	\$1,500.00	\$18,000.00
Total - DI-DR-14 Refined Concept Construction						\$2,341,345.03