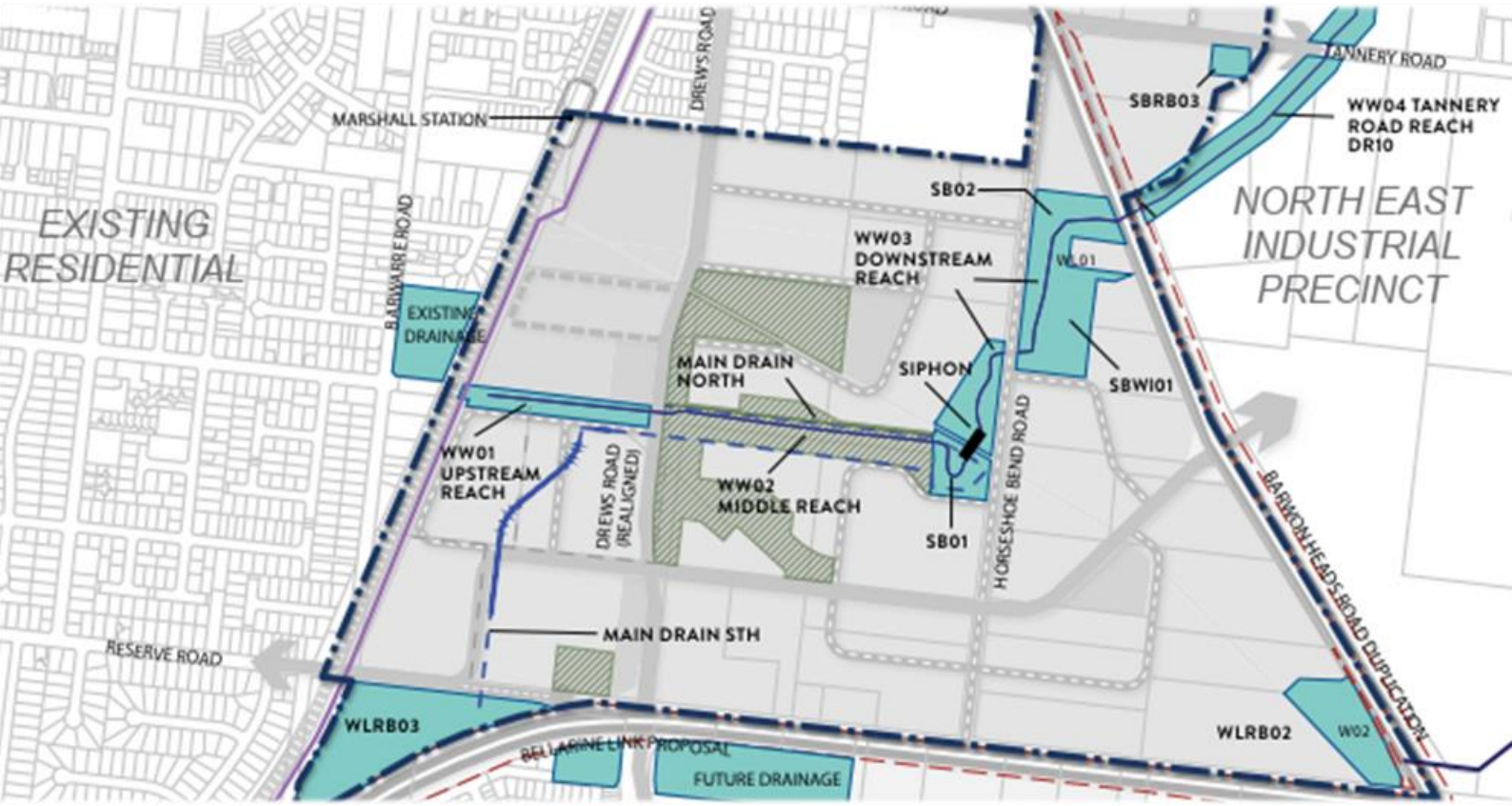

Expert Services - Marshall PSP

Expert Witness Statement of Robert Swan - Drainage

Amendment C278ggee to the Geelong Planning Scheme - Marshall PSP and DCP

25 October 2024

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1. Name and Address

Mr Robert Campbell Swan

Hydrology and Risk Consulting

Suite 3, 41 Railway Road

Blackburn VIC 3130

2. Position

Principal Engineer, Flooding and Stormwater

3. Area of Expertise

My area of expertise is hydrology and hydraulics, particularly the areas relating to the flow of and characteristics of surface water and flood dynamics.

Specifically, I:

a) Have been the project manager, project director and technical director for more than 50 flood studies undertaken across Victoria.

b) Contributed to the development of Melbourne Water's flood mapping technical specifications.

c) Have developed flood risk management plans for a range of clients, with scales ranging from individual lots through to townships and regions.

d) Have developed stormwater management plans for a range of clients, with scales ranging from individual lots through to townships and regions.

e) Have managed the design process for drainage infrastructure, including retarding basins, constructed wetlands, waterway channels and pipeline works.

f) Developed drainage strategies for redevelopment areas in and around Melbourne for the Victorian Planning Authority, including East Village and Prahran Market.

g) Developed drainage strategies for redevelopment areas around Victoria including Warrnambool West, Dennington, Benalla and Shepparton.

h) Developed flood planning layers used in various Planning Schemes, including City of Manningham, Moorabool Shire Council, Southern Grampians Shire and others.

i) Am a member of the Queensland Reconstruction Authority's peer review panel for flood modelling and flood risk assessment.

j) Am a Level 3 Flood Specialist for the Victorian State Emergency Services expert hydrology panel to provide flood advice and analysis during flood related emergencies. Most recently, I was deployed to the Shepparton Incident Control Centre for the 2022 Goulburn River Flood event.

My qualifications are detailed in Appendix A. I am Fellow of the Institute of Engineers Australia, a Chartered Professional Engineer, and appear on the National Professional Engineering Register for Civil and Environmental Engineering. I am a Registered Professional Engineer in the Civil category in the State of Victoria.

4. Instructions

My instructions were provided by Mr Greg Tobin of Harwood Andrews and are attached at Appendix B. Specifically I was instructed to:

1) review the enclosed materials in your project brief and meet with Council and its legal team to discuss your preliminary views;

2) prepare an expert witness statement, participate in any relevant conclave and provide evidence at the upcoming planning panel hearing;

3) Address the following specific items:

   a) Do you agree with the conclusions of the background technical work on drainage which supports the Amendment?

   b) Do you support Council's proposed approach to submissions in respect of management of stormwater volume?

   c) The issues raised in submissions and Council's response to those submissions;

   d) Whether you are able to support the Amendment, either as exhibited or subject to any changes you may recommend.

At all times, I have been aware of the requirements of PPV Practice Note 1 – Expert Evidence.

5. Documents Examined

I have examined a range of documents as described in my brief The key documents included:

- Marshall Precinct Structure Plan
- Marshall Development Contributions Plan
- Stormwater Management Strategy, December 2022

Although not included in my brief, I have also had consideration of the Horseshoe Bend Precinct Stormwater Management Strategy (Version 8) and the associated Horseshoe Bend Precinct Structure Plan.

I have met with Mr Alan Davidson of Spire Consulting. Mr Davidson was the lead engineer for the development of the Marshall Creek Stormwater Management Strategy. Mr Davidson provided additional background information regarding the development of the stormwater strategy and insight into the decision-making processes behind certain aspects of the strategy. He also provided a written response to some design queries regarding aspects of the SWMS.

6. Marshall PSP and Stormwater Strategy

Amendment C278ggee seeks to facilitate residential and commercial development in accordance with the Marshall Precinct Structure Plan (PSP) prepared by the City of Greater Geelong. The Marshall Precinct consists of 123 hectares of fragmented rural living land, some lots developed with dwellings and some vacant. The amendment also applies to land outside the Marshall PSP boundary at 137 Barware Road, Marshall, located west of the railway line.

The amendment proposes to apply the Urban Growth Zone Schedule 7 (UGZ7) to the Marshall Precinct (note: the precinct is currently zoned UGZ with no schedule) in the Greater Geelong Planning Scheme. The amendment also incorporates the Marshall Precinct Structure Plan, Marshall Development Contributions Plan and Marshall Native Vegetation Precinct Plan; as well as applying overlays to manage potentially contaminated land and development design.

The amendment applies to land within the Marshall Precinct Boundary and to 137 Barwarre Road Marshall, as shown in Figure 1.

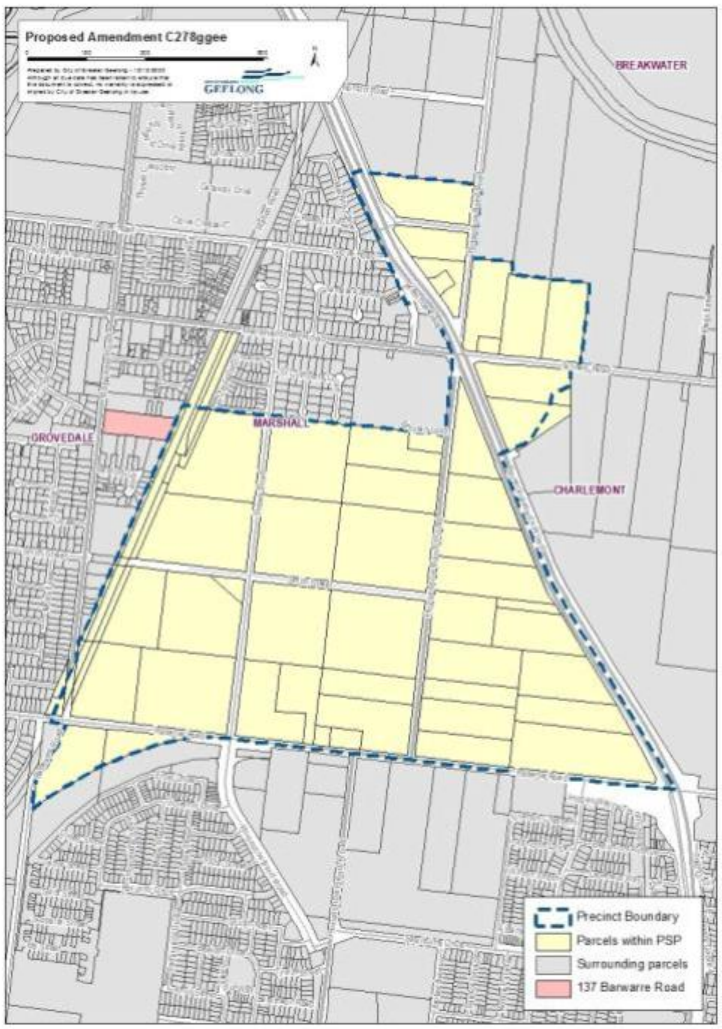


Figure 1 - Subject Land (PSP area in yellow, 137 Barwarre in orange)

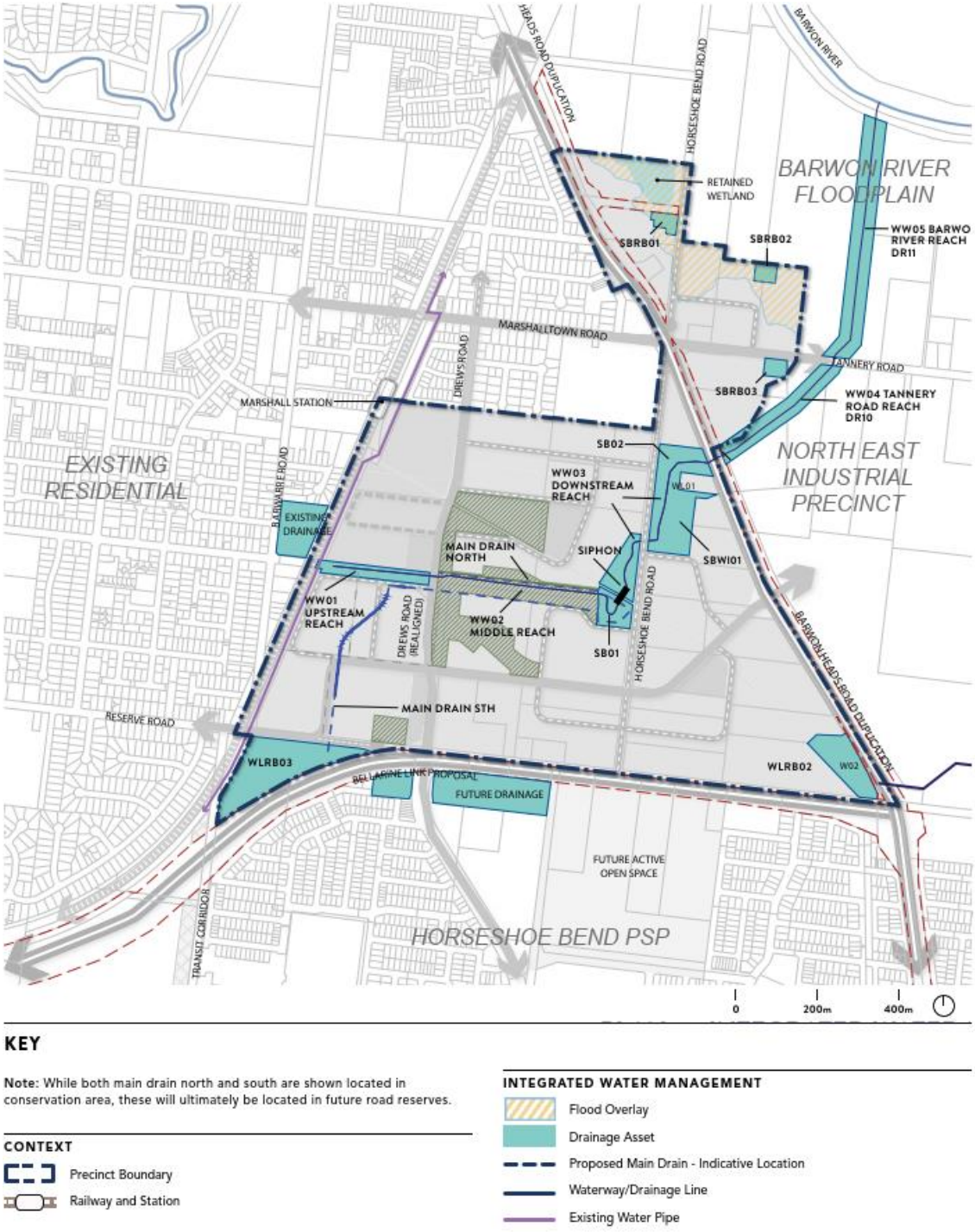
6.1 Marshall PSP

The Marshal PSP deals with drainage and stormwater in Section 3.5, Integrated Water Management. The plan includes a range of requirements (R55 to R72) to effect water management outcomes in the precinct. Key requirements that directly impact the stormwater management and drainage approach to the land include:

- R55 –All lots must be connected to a reticulated recycled water system to provide for the supply of recycled water from a suitable scheme for toilet flushing and garden watering.
- R56 – All works must be designed in accordance with Plan 12 (reproduced below at Figure 2) and the Marshall Stormwater Management Strategy to meet a range of detailed requirements.
- R57 - Stormwater conveyance and treatment must be designed in accordance with the Marshall Stormwater Management Strategy, December 2022, to the satisfaction of the Responsible Authority.
- R68 - Development staging and sequencing must provide for the timely and coordinated delivery of ultimate waterway and drainage infrastructure, including stormwater quality treatment, in accordance with the drainage staging requirements of the Precinct Infrastructure Plan and the Marshall Stormwater Management Strategy, December 2022, in a manner that facilitates development of adjacent land holdings.
- R69 - Where R68 is demonstrated to not be practically possible, and subject to R121, development proposals must demonstrate how any interim solution manages and treats storm water generated from the development and how this will enable delivery of the ultimate drainage solution. Interim drainage infrastructure will be limited to works that form part of the ultimate solution (e.g. partial construction of a basin).
- R70 - An Integrated Water Management Plan must be provided at the planning permit application stage

The other requirements are primarily concerned with design requirements for proposed infrastructure once it is to be designed as part of precinct works.

The staging of drainage infrastructure is considered at requirement R68 and at Requirement R115 which states '*The delivery of drainage infrastructure must be guided by the sequencing outlined in the Stormwater Management Strategy and Table 9 Precinct Infrastructure Plan.'* There is a note that allows for some flexibility in the approach and advises that this staging is not definitive and a different sequence to that presented below may be appropriate, subject to approval by the Responsible Authority.



KEY

Note: While both main drain north and south are shown located in conservation area, these will ultimately be located in future road reserves.

CONTEXT

- Precinct Boundary
- Railway and Station

INTEGRATED WATER MANAGEMENT

- Flood Overlay
- Drainage Asset
- Proposed Main Drain - Indicative Location
- Waterway/Drainage Line
- Existing Water Pipe

Figure 2 - Marshall PSP Plan 12 Integrated Water Management

6.2 Stormwater Management Strategy

The Stormwater Management Strategy (SWMS) for the Marshall Precinct has been completed by Spiire. The document is well constructed and provides details on the existing conditions drainage in the precinct, the constraints relating to drainage design and provides a technically feasible and suitable response to manage the drainage in the Marshall Precinct.

6.2.1 Existing Drainage conditions

The existing drainage catchments that contribute flows to the Marshall Precinct are shown in Figure 3, reproduced from the Spiire report.

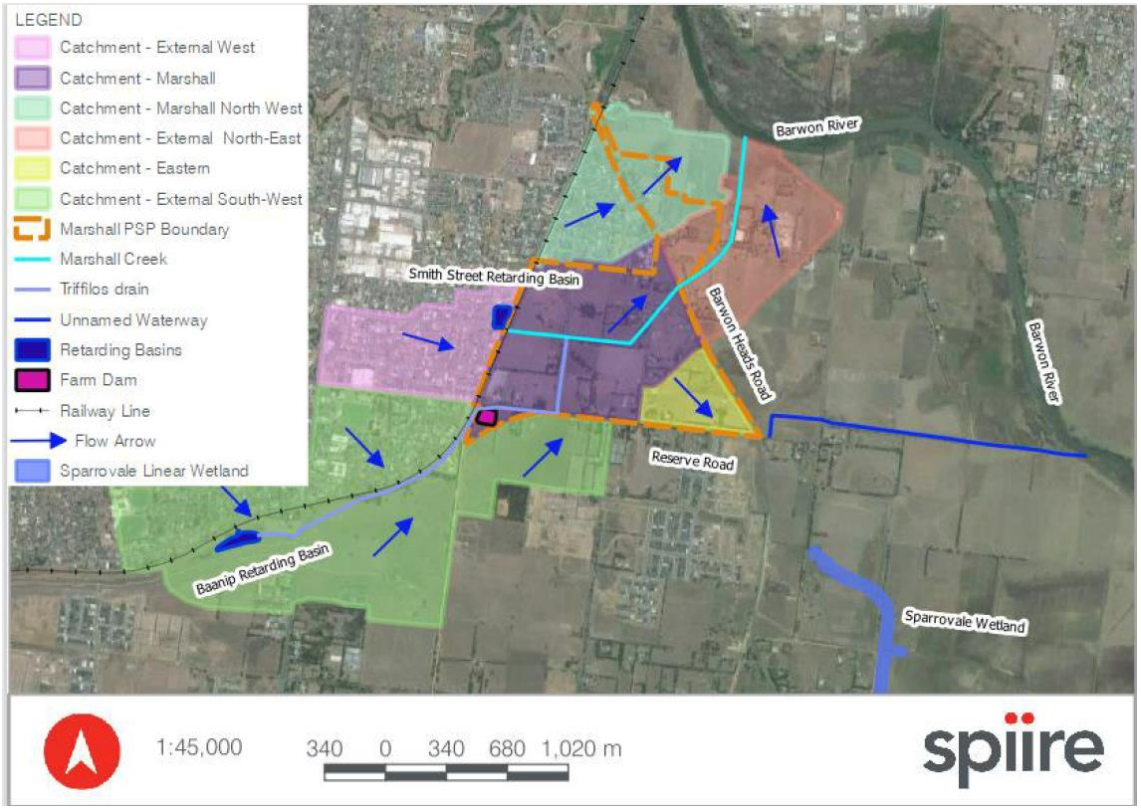


Figure 3 - Marshall Precinct, existing drainage catchments (Spiire)

Flows from the existing developed areas of Grovedale enter the precinct via the Triffilos Drain to the southwest and the Smith Street Retarding Basin from the west. There are some external flows indicated as flowing to the Marshall Precinct from the Horseshoe Bend Precinct, south of Reserve Road and the railway line.

6.2.2 Proposed Drainage conditions

The Marshall Precinct SWMS proposed a range of works to provide the for the future drainage associated with development of the precinct. The strategy has been developed with consideration of other projects and engineering constraints in the area, including works associated with the Horseshoe Bend Precinct and North East Industrial Precinct (NEIP), the South Geelong to Waurn Ponds Rail Duplication and the Barwon Head Road duplication,

amongst others. The SWMS aligns with the Future Urban Structure plan, described in the Marshall PSP.

The SWMS aims to provide drainage infrastructure that has capacity to manage flows up to the 1% AEP and provide stormwater quality treatment consistent with EPA guidelines for pollutants.

As described in the Spiire Report, the key features of the plan are:

- The upgrade of Marshall Creek to a constructed waterway down to the confluence with Barwon River.
- A siphon arrangement to pass flows under the MOS to mitigate excessive filling across the Precinct.
- Three wetlands for water quality treatment:
  - WLRB03 at the southwest (upstream) corner of the Precinct. This includes a sediment pond, constructed wetland and retarding basin.
  - WL01, a constructed wetland and associated sediment pond at the downstream end of the Precinct, between Horseshoe Bend Road and Barwon Heads Road.
  - An outfall arrangement from WLRB02 to Sparrovale Linear Wetland, which comprises a piped outfall transitioning to an open waterway.
- Three additional standalone sediment ponds, to provide primary treatment of stormwater before discharge to waterways. SB1 is located immediately upstream of the siphon and SB02 is located immediately upstream of Barwon Heads Road.
- Three sediment ponds co located with retarding basins are located north of Barwon Heads Road, to service the Commercial/Bulky Goods Precinct.
- A main drain (Main Drain South) to convey flows from WLRB03 to the siphon.
- A main drain (Main Drain North) to convey excess flows around the middle reach of Marshall Creek (which has low capacity and cannot be altered) to the siphon.
- WLRB02 which serves the southeast catchment of the Precinct. This includes a sediment pond, wetland and retarding basin.

These items are shown in Figure 4, reproduced from the Spiire report. A preliminary design of the assets was also completed by Spiire.

Figure 4 - Marshall PSP SWMS Layout

7. Review of Marshall PSP and SWMS

I have considered the requirements of the Marshall PSP relating to drainage and stormwater and the overall approach of the PSP to stormwater infrastructure. Overall, it is my view that the PSP provides a framework that appropriately manages the stormwater quantity and quality through the Marshall Precinct.

The plan heavily relies on the technical guidance provided in the SWMS. The SWMS has been developed in accordance with best practice standards and provides a practical outcome that can be delivered on the ground without material changes.

There are some areas that may require additional consideration. I have discussed these below.

7.1 Approach to Climate Change

Climate change is expected to have several impacts on stormwater. Typically, the expectation is for average annual rainfall to decrease, but there is typically expected to be an increase in rainfall intensity from thunderstorm events. The magnitude of the change is dependent on the increase in temperature over the design life of the infrastructure. For every degree of temperature increase, rainfall intensity in rare storms is expected to increase by at least 7%.

There is no specific guidance on how to design infrastructure to account for the change in rainfall intensities over time. If the high temperature increase targets are adopted, then there is a risk that infrastructure is overdesigned for its design life and is more expensive to construct. If no allowance is made, then there is a risk that as the impacts of climate change are realised, the infrastructure will not be able to meet the design standards that would be expected.

For the Marshall PSP, this risk is mostly around overtopping of retarding basins, leading to flooding in rare flood events and the capacity of drains and waterways to meet a specific design standard. Design of these assets usually allows for freeboard or similar to provide for uncertainty and this could include climate change.

Figure 5 shows the expected increase in global mean temperature under a range of climate scenarios. A reasonable design approach may be to adopt a 2.5 degree increase above the 1990 baseline value. This would be the mid-point of the design life of the assets for the high temperature (SSP5-8.5 business as usual) pathway, but would not be reached under some lower emissions pathways. Should those pathways be achieved, then the assets would end up being overdesigned.

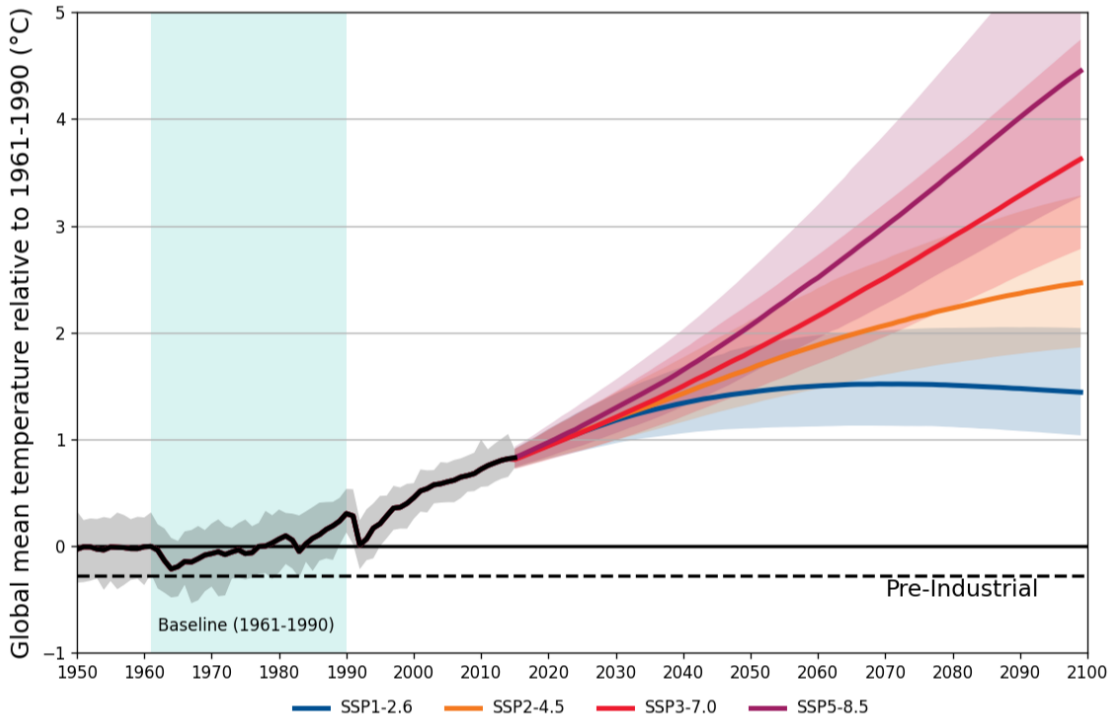


Figure 5 - Expected change in global mean temperature

In the Marshall PSP it is not the case that the drainage network would fail under future climate conditions, or that it would cease to operate effectively for most rainfall events. The cost of future-proofing the system would need to be weighed against the impacts of the change. These impacts could also be managed by applying addition freeboard measures; for example, by requiring lots to be constructed 450mm above the adjacent flood levels as opposed to 300mm.

Allowing for climate change in the design may lead to an increase in the area required for retarding basins, if the intent is to match the present day design flows.

7.2 Volumetric Flow Reduction

The PSP at R55 requires that all lots must be connected to a reticulated recycled water system to provide for the supply of recycled water from a suitable scheme for toilet flushing and garden watering. I understand recycled water in this case refers to the treated sewerage.

215 The replacement uses for recycled water are the same as those that could be used for stormwater. The adoption of a recycled water scheme means that ability to meet the stormwater volume reduction targets identified in the EPA guidelines is almost impossible for the wider precinct.

The water from the southeastern areas of the precinct is directed to the Sparrovale Wetland
220 system. This will provide for evaporation of stormwater from those wetlands and is likely to meet the EPA targets. However, for the remaining areas, there is limited opportunity to provide additional volumetric reduction methods that would meet the EPA targets.

The EPA guidelines do require that mitigation measures be reasonably practicable and relevant to the local conditions. The Marshall PSP discharges to the Barwon River, which already drains
225 significant urban areas of Geelong. The PSP works provide additional stormwater treatment to existing drainage flows from Grovedale, resulting in an improvement in water quality, well in excess of the guideline targets. The relatively low flow rates from the PSP area are unlikely to significantly impact the magnitude or duration of flow events in the Barwon River, as they represent less than 1% of the total catchment area. In my view, it is unlikely to be reasonably
230 practicable to undertake precinct scale stormwater harvesting, as the use case for the water has already been filled by recycled water.

In the Horseshoe Bend Stormwater Management Strategy, there was an option to divert up to 0.5m^3/s from the outlet of WLRBO3 in the Marshall PSP to the Horseshoe Bend Precinct. This would potentially increase the volume of water directed to the Sparrovale Wetlands and reduce
235 the discharge volumes from the Marshall Precinct to the Barwon. There are a number of potential constraints, including the design of the Bellarine Link that could impact this option.

Mr Davidson of Spiire has undertaken an analysis that indicates the reduction in flow rate could slightly reduce the size of the proposed pipeline between the outlet of WLRB3 and the Main Outfall Sewer, where a siphon is required. This reduction is a change in pipe diameter from
240 1650mm to 1500mm. Mr Davidson notes in his advice that this size may be able to be reduced in both cases as part of detailed design, per section 6.14.1 of the SWMS.

I have undertaken some preliminary very simplified cost assessments using standard rates for pipes to determine if there is a significant change to the DCP. The DCP indicates that this drain will cost approximately $2.5 million. A reduction is size to 1500 would reduce that cost to
245 something in the order of $2.3 million, but additional costs would need to be added for the diversion pipe to the Horseshoe Bend Precinct. This pipeline to have expected to have costs in the order of $200,000, based on 250 metres of 600mm pipe, using Melbourne Water's drainage reimbursement rates for the west of Melbourne. There would be no significant change to the DCP costs in my opinion.

7.3 Staging and Implementation of the Drainage Works

The staging of the drainage works is well considered and reasonable. The only minor concern is that the outfall channel on Marshall Creek is not within the PSP and the method to ensure that these works are completed prior to 50% development of the precinct is not specified. There is an allowance in the DCP for the acquisition of land associated with the outfall channel. Whilst not specifically a concern for the PSP itself, I am satisfied that Council has considered how that land is to be secured, either by negotiation or through the use of a Public Acquisition Overlay, similar to that used for the Sparrovale Wetlands. I note that there may be powers under the Water Act for the works to be completed by Council under the waterway management and works provisions, prior to acquisition of the land.

Mr Davidson provided additional information on the expected staging of works and confirmed that there is no impact to flood behaviour in the Marshall Creek Channel post the development of works. He advised that the channel works are to formalise the flows through that area and to ensure that Marshal Creek is designed such that it would not be subject to erosion under fully developed conditions.

7.4 Proposed land use change – Commercial Bulky Goods to Residential

I am aware of a proposed change to the PSP, redesignating areas that were expected to be commercial and bulky goods to residential. This area is discussed in the SWMS at Section 6.11. Part of this area is within the Land Subject to Inundation Overlay and the Floodway Overlay associated with the Barwon River. The SWMS proposes retarding basins and sediment ponds at three locations in this area to manage flows and water quality.

The conversion of this land from Commercial Bulky Goods to Residential will have no impact on the proposed drainage aspects of the PSP. The same controls that would apply to commercial land are still relevant for residential land. There may be a slight reduction in asset size as typical residential areas are less impervious than commercial areas and would be expected to generate slightly less runoff. This is a matter for detailed design.

8. Response to specific questions

8.1 Do I agree with the conclusions of the background technical work on drainage which supports the Amendment?

Yes. The technical work described in the Marshall PSP Stormwater Management Strategy is robust and completed to a high standard. In my view, it provides sufficient certainty that the objectives of the amendment can be met with regards to drainage. I consider that the strategy as proposed can be implemented in the Marshall Precinct without significant change to the proposed works, described in the SWMS and PSP documentation.

8.2 Do you support Council's proposed approach to submissions in respect of management of stormwater volume?

I support Council's approach to management of stormwater volumes. As described above, there is limited opportunity to provide meaningful stormwater volume reductions in the Marshall PSP, which is acknowledged by Council, due to the use of recycled water.

There is volumetric reduction for water from the south east portion of the PSP that drains to the Sparrovale Wetlands. Significant volumes of water are held on the Sparrovale site as the outflows are controlled by a regulator. There will be significant losses to evaporation and no water is directed to the sensitive Hospital Swamp.

8.3 The issues raised in submissions and Council's response to those submissions

With regard to stormwater, there are four issues that are considered in submissions:

- Submissions 2 and 25, regarding stormwater volume and the application of EPA publication 1739.1, the application of 'Order for Obligations of managers of land or infrastructure (Urban stormwater management and On-site wastewater management)' made under section 156 of the Environment Protection Act
- Submission 2, stating that urbanisation, without appropriate stormwater management (including volume reduction), will negatively impact physical, ecological and social values of waterways and will result in the loss of high value wetlands.
- Submission 12 - submits there is a lack of certainty about whether the outfall to Sparrovale (DCP drainage item DI_DR_14), in terms of flow rate and volume, is acceptable to Council and other stakeholders. In its addendum submission, Mesh is concerned Council may be planning a different approach to the exhibited Marshall SWMS and requests any additional stormwater assets required within the Sparrovale Wetlands be identified prior to resolving the Marshall DCP.
- Submissions 10, 16, 17 Staging and acquisition of land for drainage works
- Submission1, 9 and 11 – relating to the location of drainage works

I have read each relevant submission and Council's response.

8.3.1 Stormwater Management (submission 2 and 25)

Whilst it is acknowledged that the EPA guideline 1739.1 provides a general duty of care for stormwater, and specific requirements for stormwater pollutant treatment and volume reduction, the guidance is also clear that any such measures must be reasonably practicable and proportionate to the risk. Section 1.3 of the guideline is clearly states that it is not a compliance document.

The CCMA has not identified that the development will pose a risk to the health of the Barwon River, and is supportive of the PSP. It is difficult to see how the Marshall PSP will significantly

impact flow regimes and stream stability in the lower Barwon, especially considering the significant direct stormwater connections to the river through Geelong and the relative size of the Barwon River catchment at 8590 square kilometres.

The proposed works include reconfiguration of Marshall Creek into a constructed waterway; this type of waterway is designed to be resilient to flow velocities and regimes generated by urban stormwater catchments.

The treatment measures proposed by the SWMS do result in volumetric reductions from the Marshall PSP area. These are identified in the SWMS as 5% for the Marshall PSP area draining to the Barwon River and 8% for areas draining to the Sparrovale Wetlands. I consider that there will be an additional reduction in the volumes from the area draining to the Sparrovale wetlands as a result of evaporation in those wetlands, before they ultimately discharge to the Barwon River. I note that these volume reduction percentages also do not consider any reductions associated with passive irrigation, which is proposed as an IWM measure.

Council's response indicates that DEECA has agreed the volumetric reduction targets do not have the strength of guidance. I agree with council that the requirement to provide for recycled water precludes the use of stormwater for reuse via rainwater tanks. In the EPA guideline, every example relies on some form of wide scale stormwater harvesting or reuse to met the volumetric reduction targets. At Marshall, these opportunities are not available. In my view, the SWMS and PSP have adopted reasonably practicable solutions that exceed the stormwater quality targets for pollutant reduction and do provide limited volumetric reduction.

I agree with Council's response that the Marshall PSP does satisfy the general environmental duty with regard to volume reduction.

8.3.2 Submission 12 – Sparrovale Outfall

With regards to Submission 12, regarding the NEIP-Marshall PSP interaction via the drainage channel outlet to Sparrovale, there does not appear to be any need for additional drainage infrastructure to meet the pollutant reduction targets of the EPA guideline. The SWMS indicates that the WLRB2 catchment achieves the pollutant reduction targets before discharge to the Sparrovale wetland.

Council is the owner and manager of the Sparrovale Wetlands area. As I understand it, apart from the linear wetland to treat stormwater for the Horseshoe Bend Precinct and the diversion from Armstrong Creek, there are no water quality treatments proposed for the Sparrovale Wetlands site at this stage. Water that is directed to the storage area, which is controlled by a levee and regulator, will evaporate over time. As described in Council's response to submissions, this area could be expanded as part of the design of the area but would not need to be attributed to the stormwater management requirements associated with the Marshall PSP or the NEIP.

I do not consider there is any need to modify the proposed response. There may be an opportunity to shorten the channel, such that it outlets at an alternate location into the storage area at Sparrovale.

8.3.3 Staging of Works

With regards to submission 10, the land it applies to is for the drainage reserve that will treat flows from the Triffilos Drain. The landholder requests that Council accelerate the acquisition process. This area will need to be constructed early in the development process, as is identified in the DCP. The timing is a matter for Council. The council response is appropriate.

Submission 16 and 17 are identical in their commentary on the timing of drainage works. Council's response is reasonable and it appears that these concerns can be ameliorated through minor drafting changes. I agree with this approach.

8.3.4 Location of Works

8.3.4.1 Submission 1

Submission 1 indicates that the land to be acquired includes a house and pond and will be replaced by a settling pond. This is described as the best part of the land. The SWMS indicates that SB02, WL01 and the drainage channel are proposed for the site. These works are required for the scheme to function and achieve the required drainage outcomes. The process of valuation would occur as per normal practice and is unrelated to necessity of the drainage works.

8.3.4.2 Submission 9

This submission is from property 40 and objects to the location of sediment basin SBRB2 as it is located across two landholdings and located on existing infrastructure. The catchment area this basin is intended to service is shown in Figure 6.

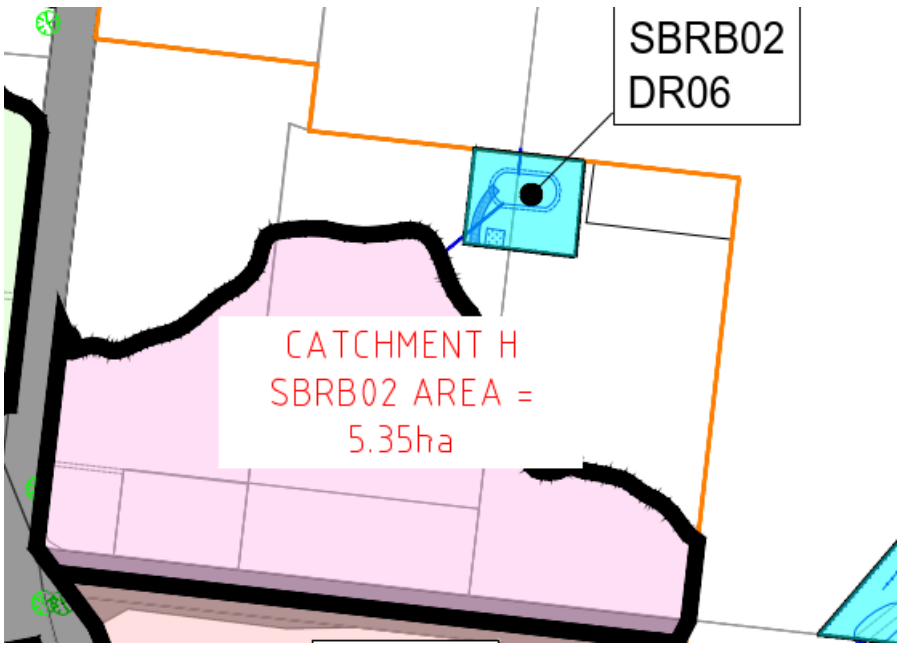


Figure 6 - Location and Catchment of SBRB2

The basin is in a location that allows connection to the swale drain running north to the Barwon River. The basin is also within the Floodway Overlay. The submission requests that the basin be placed wholly on the property 41 (the eastern property). The basin is only required once development occurs on these landholdings. It may be possible for the basin to be moved fully on the property 41, subject to detailed design considerations. I would recommend this be considered by Council. It would have the benefit of fully tying the basin to the piece of land that contributes the majority of the catchment area to its construction, provided the basin was fully maintained within the Floodway Overlay.

I have not considered the valuation aspects in the submission.

8.3.4.3 Submission 11

Submission 11 is the property at 1-39 Tannery Rd, Charlemont, which is outside the PSP and raises a number of drainage concerns. This land contains or is adjacent to the proposed outfall of Marshall Creek to the Barwon River. These key concerns are:

- Timing of when waterways WW04 & WW05 are constructed – this is triggered when the Marshall PSP catchment development is 50%. In extreme rainfall events, this presents an immediate threat and therefore construction timing should be revised forward.
- Location of Tannery Rd culvert – this is proposed to be opposite the SE corner of our property with the open waterway angling to the adjoining property after the rest of the drain has been refilled. The design will apply resistance to the flow of water and presents as an aesthetic impediment. Requests the culvert be located east of property boundary and the earthen bank to the west of the existing drain be left intact, when the old drain is refilled.
- The lowest point of Tannery Rd – This is located 70m west of the present culvert, and in extreme rainfall events the creek can back-up and flow over the road and across our property. Suggest building a piped storm water drain on the north side of Tannery Rd so the SBRB02 pipe can connect into it. Also the swale drain in front of our property is inadequate and is now receiving more runoff from the Barwon Heads Rd duplication.
- Farm dam on the flood plain – a significant bird and potentially growling grass frog habitat. So to maintain this water body, the pipe will need to be extended east to the invert of the proposed new waterway, as the dam has no other water source.
- The channel on western boundary of our property's river flats – this is a private channel to drain a low laying area. SBRB03 discharges into this channel and we consider that this may impede its function and cause more flooding on our property.

The construction of the watercourse is triggered at 50% development, however, there are other triggers in the PSP that require items such as retarding basins to be constructed as individual drainage areas develop. There are interim requirement to manage flows. In my view the requirements of the PSP, if properly enacted, should ensure flooding is no worse on the subject land.

The Tannery Road culverts are to be upgraded as part of the works. The channel will replace the existing drainage line. The waterway is designed and has been modelled as part of the SWMS.

Tannery Road is significantly higher than the outlet to SRRB2. SRRB3 includes a piped connection to the Marshall Creek channel. Council may need to assess the flows at Tannery Road to see if there is an issue with drain capacity, but it is outside the scope of the PSP works.

Regarding the existing Farm Dam, I agree with Council's officer that a connection to that dam should be considered in the design.

Regarding the channel on the western boundary, I presume this relates to the proposed outfall from SBRB2, not SBRB3. If this channel is a private drain, that does not capture water from upstream properties, then the PSP should be modified to include formalisation of this swale drain. SBRB3 is intended to limit the outflows from the area to no more than the existing conditions, although this will happen more frequently. Council should include outlet drainage to the Barwon in the PSP from SBRB2 if the drain is not currently servicing upstream land.

9. Findings and Recommendations

Based on my experience and investigations, it is my opinion that:

- The Marshall PSP provides a reasonable and practical approach to drainage and stormwater management that will facilitate residential and commercial development.
- The Marshal PSP Stormwater Management Strategy has been developed to a high standard using best practice principles.
- The SWMS provides a concept design that provides certainty that the works can be delivered in accordance with their sizes indicated in the PSP and DCP.
- Some consideration may need to be given to assessing the impact of climate change on the proposed drainage works.
- The conversion of land in the PSP from Commercial/Bulky Goods to Residential will have not have a significant impact on the PSP drainage works.
- Council should consider the following amendments to the drainage works:
  - The relocation of SRBR2 to be fully on property 41
  - The provision of outfall drainage from SBRB2 to the Barwon.
- The PSP appropriately responds to the requirements of EPA Publication 1739.1 – Urban Stormwater Management Guideline.
- Modification to the wording of the PSP with regard to the expected timing for construction of drainage infrastructure, as described in Council's response to submissions is recommended to improve the clarity of the PSP.

Overall, I am supportive of the Amendment and its approach to stormwater.

10. Declaration

I have made all the inquiries that I believe are desirable and appropriate and that no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

25 October 2024

Appendix A CV of Robert Campbell Swan

Appendix B Instructions

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