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Independent research and consulting

Hydrological expert evidence statement

Review of stormwater management and flooding for the proposed development

1 Buckland Street, 20 Montis Lane, 18-46 Saade Street, adjoining reserves and road reserves, Epsom

Instructed by Russell Kennedy Lawyers

Greater Bendigo Planning Scheme Amendment C248gben

Planning Permit Application No. DS/207/2019

14 October 2024

Peter Coombes

Urban WaterCycle Solutions
Independent research and consulting

peter@uwcs.com.au

70 Howden Street Carrington NSW 2294 ■ Tel: 0419 439 124 ■ [redacted] ■ www.urbanwatercyclesolutions.com

About the Author

Professor Peter Coombes

Peter Coombes is a director of Urban Water Cycle Solutions, an honorary and visiting Professor in Crawford School of Public Policy at the Australian National University, a Fellow of Engineers Australia and Certified Practicing Engineer in Civil and Environmental Engineering, Leadership and Management at the Engineering Executive (EngExec) level. He was awarded the 2018 GN Alexander Medal for scientific contributions to Hydrology and Water Resources by Engineers Australia and the 2019 Presidents Medal for his role as a lead editor of the Urban Book of Australian Rainfall and Runoff. Peter holds a PhD in Civil and Environmental Engineering, degrees in Civil Engineering (Hons), Surveying (Hons) and Economics, and a Diploma of Legal Studies. He is a Registered Professional Engineer in Victoria (PE0007360) and has over 30 years experience in hydrology (surface and groundwater) and water resources.

Peter was recently the Associate Dean (Education) and Professor of Water Resources Engineering at Southern Cross University. He is a Member of Systems Research Steering Committee at Imperial College London and is an editor the Urban Book of Australian Rainfall and Runoff published by Engineers Australia. He has held senior academic positions at University of Newcastle, University of Melbourne and Swinburne University. Peter was a Chief Scientist in the Victorian Government and contributed to inquiries into stormwater management and flooding by the Senate of the Australian Parliament and into water resources by the Productivity Commission.

Peter was a managing director of Bonacci Water, a member of the water advisory group to the Prime Ministers Science, Engineering and Innovation Council, the advisory council on alternative water sources for the Victoria Government's Our Water Our Future policy, a member of the advisory panel on urban water resources to the National Water Commission, an advisor on alternative water policy to the United Nations and a national research leader of innovative WSUD strategies in the eWater CRC. He has generated over 250 scientific publications and designed more than 120 sustainable projects including settlements that generate all of their water resources and manage flooding. Professor Coombes was also a co-author of Australian Runoff Quality and a former chair of the Stormwater Industry Association. More information can be found at http://urbanwatercyclesolutions.com.

Statement

The above discussion highlights that I have the appropriate qualifications, skills and experience in hydrology, stormwater and flood management, and water resources to make this expert witness report. I do not have any private or business relationship with the parties that are the subject of this report. I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel. This report has been made in accordance with the requirements of Planning Panels Victorian Practice Note 1 (PPV PN1). I am the sole author of this report.

Professor Peter Coombes 14/10/2024

Executive Summary

A development with 78 residential allotments is proposed for the properties at Buckland Street, Montis Lane and Saade Street in Epsom. The subject land is situated to the west of Bendigo Creek and is subject to LSIO1 and LSIO2 flood overlays.

The proposed development is the subject of the Greater Bendigo Planning Scheme Amendment C248gben and Planning Permit Application DS/207/2019.

Russell Kennedy Lawyers instructed Professor Peter Coombes from Urban Water Cycle Solutions to review the flooding and hydraulics considerations of the proposed development.

The Stormwater Management Strategy for the development provides acceptable approaches to managing stormwater runoff, flooding and urban stormwater quality. This approach is consistent with the minor and major stormwater management strategy provided in the current version of the Australian Rainfall and Runoff (ARR2019) guidelines.

Stormwater runoff from minor rain events is conveyed by the pipe drainage network to detention and water quality improvement facilities that discharge to Bendigo Creek. Grass swales and rainwater tanks assist the performance of the minor system.

Stormwater runoff from major rain events is safely conveyed within the road profiles to detention facilities and Bendigo Creek. Major flows from external urban catchments discharge via high flow pipes to Bendigo Creek.

The potential for flood hazard and damage is mitigated by compliance with the DELWP 2019 Guidelines for Development in Flood Affected Areas. The finished ground surface levels and habitable floor levels in the development are set at 0.3 m and 0.6 m above the 1% AEP flood level. These design levels provide a substantive margin for error that also accounts for uncertainty about climate change and flood behaviours.

The hydraulic analysis underpinning the stormwater strategy reproduced the flood shape provided by the Bendigo Urban Flood Strategy (BUFS) and incorporated the joint probability of local and Bendigo Creek flooding. A levee and bicycle path situated between the development and Bendigo Creek provides additional flood mitigation. Bendigo Creek has sufficient capacity to convey 1% AEP flows.

On 27 August 2024, the ARR2019 guidelines were updated to include national multipliers that increase design rainfall depths to account for current conditions and future climate change scenarios. The Stormwater Management Strategy for the development was created prior to these recent proposed changes in design rainfall depths.

These recent changes to the ARR2019 design rainfall depths were incorporated in this assessment of the proposed development. The Author also examined local weather

data (rather than national averages) to estimate the multipliers of ARR2019 design rainfall that apply at Bendigo. Inclusion of local data in the analysis resulted in smaller increases in design rainfall. These results for future increases in design rainfall depths were consistent with the SSP2-4.5 medium emissions climate change scenario.

The Author's high level analysis of the proposed development indicates that the Stormwater Management Strategy can be designed to accommodate the potential impacts of climate change.

The following recommendations are proposed:

1. The ultimate design of the proposed development incorporates the latest methods and data from Australian Rainfall and Runoff (ARR2019).
2. Include the ARR2019 ratios of increases in design rainfall to consider the SSP2-4.5 climate change scenario for 2030 and 2100 on the design of the urban stormwater infrastructure and shape of the land form.
3. Assume a combination of 1% AEP local stormwater with 10% AEP peak flows in Bendigo Creek to approximate of the joint probability effects for the design of the stormwater infrastructure in the proposed development.
    a. The analysis should assume that the hydrographs for local stormwater runoff and Bendigo Creek commence at the same time.
    b. Otherwise, the design of the stormwater infrastructure and assessment of flooding could undertake an analysis of the joint probability of flooding in Bendigo Creek and at the proposed development using the methods provided in Australian Rainfall and Runoff (ARR2019)
4. The effect of 1% AEP flows in Bendigo Creek should be incorporated in the assessment of the proposed development. This analysis should incorporate the ARR2019 ratios of increases in design rainfall to consider the SSP2-4.5 climate change scenario for 2030 and 2100
5. A flood Resilience (Emergency) Plan should be provided for the development that is consistent with the local SES strategy.
6. The Bendigo Creek and receiving environment should be protected from sediment loads during the subdivision construction and house building phases of the development. An Environmental Management Plan should also be provided for the proposed development.

Table of Contents

1 Introduction

The Proponent, Lawserve, Beardall and Smith, proposes a subdivision (78 allotments) of the land at 1 Buckland Street, 20 Montis Lane, 18 – 46 Saarde Street and adjoining reserves at Epsom. The subject land is situated to the west of Bendigo Creek and is within LSIO1 and LSIO2 flood overlays.

The proposed development is the subject of the Greater Bendigo Planning Scheme Amendment C248gben with respect to Planning Permit Application DS/207/2019.

Russell Kennedy Lawyers instructed Professor Peter Coombes from Urban Water Cycle Solutions to review the flooding and hydraulics considerations of the proposed development (see Appendix C for instructions). This report provides:

- a review background material,
- a peer review with any necessary field work, and
- provides an expert evidence report.

This report provides a summary of background issues and considers the proposed Stormwater Management Strategy. These discussions are followed by a more detailed discussion of hydrology, hydraulics and flooding. Then the management of stormwater quality and recent changes to the Australian Rainfall and Runoff (ARR2019) guidelines are considered. The report is summarised by conclusions and recommendations.

This report has considered all available versions of the following sources of information:

i. Spiire (2019), Town Planning Report, Revision C, 10 October 2019

ii. Terraco (2022), Stormwater Management Plan, Saade Street, Epsom – Re-Zoning Proposal, Proposed 78 Lot (Approx) Residential Subdivision, October 2022

iii. Terraco (2023), 1 Buckland Street Overall Layout Plan, 14 December 2023

iv. VicPlan (2024), Planning Property Report, 1 Buckland Street; 18-26 Saade Street; 20 Montis Lane; 36-46 Saade Street; Lot 2 LP210213, Montis Lane; Epsom 3551, 4 October 2024

v. North Central Catchment Management Authority (2024), Flood information report, 1 Buckland Street Epsom.

vi. Water Technology, (2013), Bendigo Urban Flood Study, Final Report, November 2013, North Central Catchment Management Authority & City of Greater Bendigo

vii. British Maritime Technologies (2019), Epsom Ascot Huntly Floodplain Management Study - Detailed Mitigation Assessment Summary, February 2019

viii. Terraco (2024), 1 Buckland Street Feature Survey Plan, 4 October 2024.

ix. Afflux (2022), Elmwood revised SWMP 2022, 6 March 2022

x. Coombes, P., and Roso, S. (Editors), (2019), Runoff in Urban Areas, Book 9 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia, © Commonwealth of Australia (Geoscience Australia)

xi. DELWP, (2019), Guidelines for development in flood affected areas, The State of Victoria, Department of Environment, Land, Water and Planning

xii. CSIRO (1999), Urban Stormwater: Best Practice Environmental Management Guidelines, as amended

xiii. EPA Victoria (2021), Urban stormwater management guidelines, Publication 1739.1, June 2021

xiv. Victorian Planning Provisions, Clause 56.08 site management provisions of residential subdivision

xv. ARR2019 DataHub, https://data.arr-software.org/

xvi. Coombes P.J., (2023), Application of joint probability to respond to climate change and avoid cumulative extreme assumptions, Hydrology & Water Resources Symposium 2023, Engineers Australia

xvii. North Central Catchment Management Authority (2024), 1% AEP peak flow in Bendigo Creek at Buckland Street Epsom. Provided on 4/10/2024.

xviii. Bureau of Meteorology (2024), Rainfall intensity records at Bendigo Air Port; Heathcote, Cairn Curran Reservoir, Laanecoorie Weir and Redesdale; Streamflow records for Bendigo Creek at Bendigo and Huntly.

xix. Australian Institute of Disaster Resilience (2017), Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, Australian Disaster Resilience Handbook 7, © Commonwealth of Australia 2017 third edition

xx. Victorian SES (2023), Epsom, Huntly and Ascot Local Flood Guide, August 2023

xxi. The State of Queensland (Department of Energy and Public Works) (2022), Industry Guidance for Flood Resilient Homes, November 2022

xxii. North Central Catchment Management Authority (2024), Property Flood Reports

xxiii. Intergovernmental Panel on Climate Change, 2023, AR6 Synthesis Report Climate Change 2023

xxiv. Hausfather, Z; Peters, G. P., (2020). Emissions – the 'business as usual' story is misleading. Nature. 577 (618–620): 618–6202 Background

2 Background

The development is proposed for residual rural land within Farming Zone Schedule 1 adjacent to Bendigo Creek that is surrounded by urban settlement in Epsom as presented in Figure 1.

Figure 1: Location of the proposed development

Figure 1 shows the site is adjacent to residential development to the west (Elmwood Estate and Robertson Street), Buckland Street to the south, an existing Council reserve to the north and the Bendigo Creek to the west.[1] Stormwater runoff from the subject land flows in a northerly direction to the existing detention basin within the Council reserve immediately north of the land before discharging to the Bendigo Creek.[2]

An existing bicycle path and levee approximately 0.6 m high is situated at the eastern boundary of the site adjacent to Bendigo Creek. The levee provides protection from

[1] Spiire (2019), Town Planning Report, Revision C, 10 October 2019
[2] Terraco (2022), Stormwater Management Plan, Saade Street, Epsom – Re-Zoning Proposal, Proposed 78 Lot (Approx) Residential Subdivision, October 2022

higher flows in Bendigo Creek and restricts the easterly discharge of stormwater from the site. A culvert under the bicycle path, near Buckland Street, permits the discharge of stormwater from upstream catchments to Bendigo Creek. A plan of the proposed new development of 78 allotments with stormwater management assets on 8.91 ha of land is provided in Figure 2.[3]

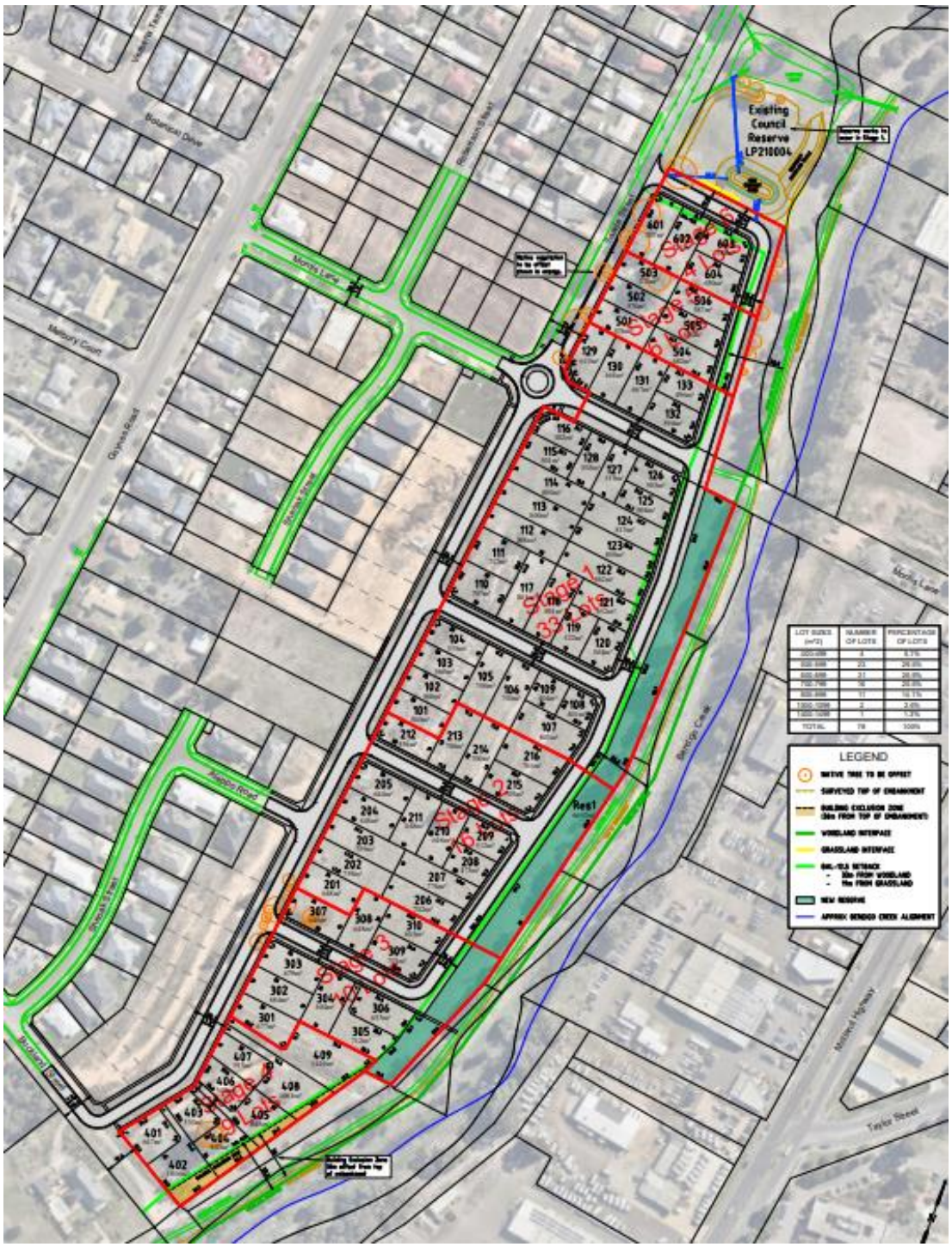

Figure 2: Layout of the proposed development

[3] Terraco (2023), 1 Buckland Street Overall Layout Plan, 14 December 2023

Most of the subject land is within the Land Subject to Inundation Overlay – Schedule 1 (LSIO1) that is associated with flooding from waterways at depths up to and including 0.35 m as shown in Figure 3.[4] A small northern portion of the subject land is also subject to LSIO2 that related to depths of flooding greater than 0.35 m.

Figure 3: The extent of land subject to inundation overlay LSIO1 and LSIO2

The LSIO identifies the site within a flood storage or flood fringe area affected by 1% AEP flood events. In this situation, the proposed development is required to maintain the free passage and temporary storage of flood waters, and not cause a significant rise in flood level or flow velocity.

The proposed development must also minimise flood damage and be compatible with flood hazard and local drainage conditions. The proposed development must maintain or improve river and wetland health, waterway protection and waterway health.

The North Central Catchment Management Authority (NCCMA) provides the current

[4] VicPlan (2024), Planning Property Report, 1 Buckland Street Epsom 3551, 4 October 2024

estimates of the 1% AEP flood levels for the site as shown in Figure 4.[5]

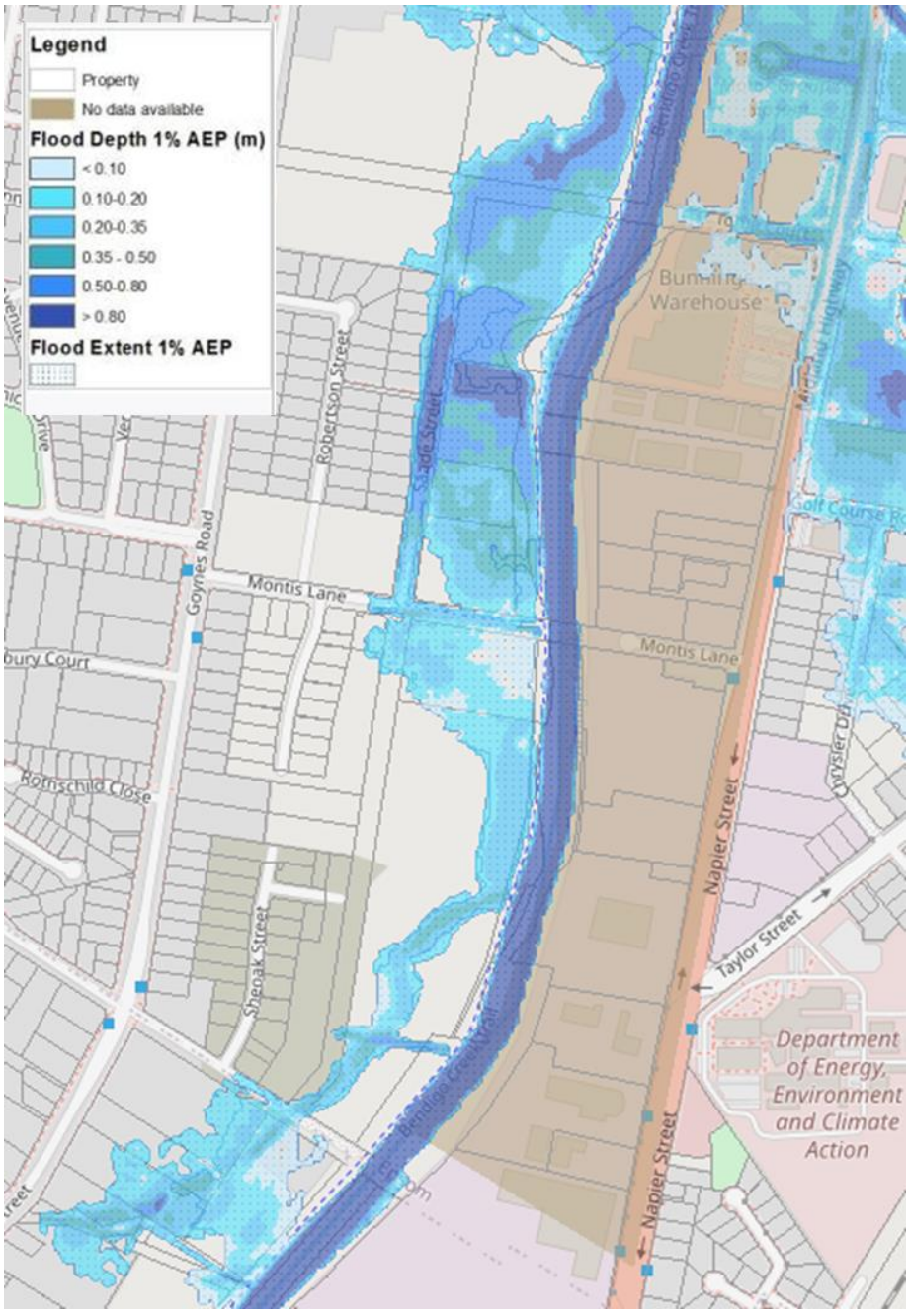

Figure 4: The existing 1% AEP flood extents and levels

Figure 4 shows that shallow depths of urban stormwater flow across Buckland Street into the site from the south and streamflow in Bendigo Creek is mostly conveyed within the creek channel. These estimated 1% AEP flood levels are based on the Bendigo Urban Flood Study (BUFS)[6] and the Epsom Huntly Ascot Flood Mitigation Study.[7]

[5] NCCMA (2024), Flood information report, 1 Buckland Street Epsom.
[6] Water Technology, (2013), Bendigo Urban Flood Study, Final Report, November 2013, North Central CMA & City of Greater Bendigo
[7] BMT (2019), Epsom Ascot Huntly Floodplain Management Study - Detailed Mitigation Assessment Summary, February 2019

The North Central Catchment Management Authority estimates that 1% AEP flood level ranges from 190.8 m AHD to 192.5 m AHD for the property at 1 Buckland Street. This property (for example) is adjacent to Bendigo Creek and extends from Buckland Street to the southern boundary of land fronting Montis Lane.

The feature survey of the property demonstrates that the height of the levee ranges from 191.5 m AHD to greater than 193.5 m AHD along the eastern boundary with Bendigo Creek.[8] The levee provides 0.7 – 1.0 m freeboard above the 1% AEP flood levels under existing conditions.

[8] Terraco (2024), 1 Buckland Street Feature Survey Plan, 4 October 2024.

3 Stormwater management strategy

The stormwater management requirements of the development are addressed by Stormwater Management Plans provided by Afflux[9] and Terraco.[10] An overview of the proposed stormwater management infrastructure is shown in Figure 5.

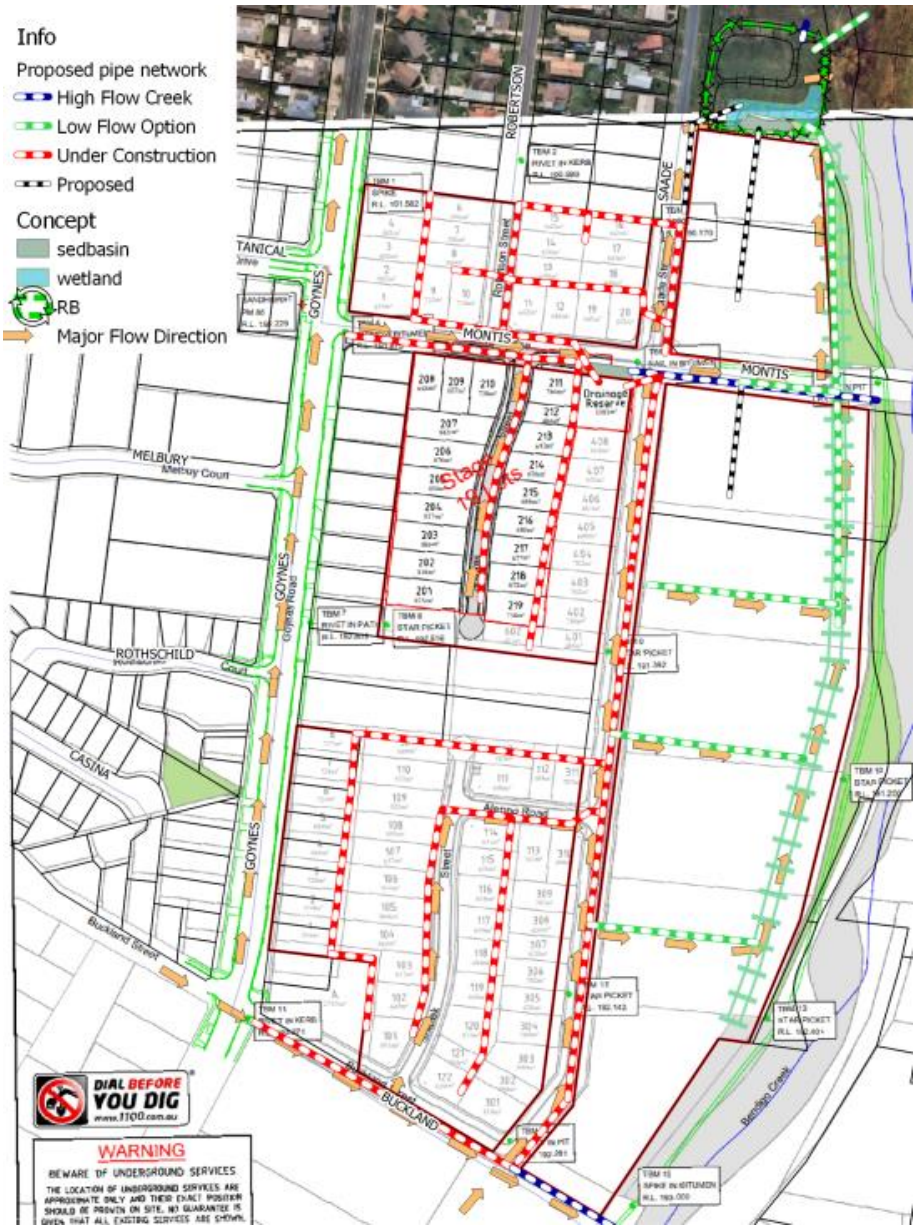

Figure 5: The existing 1% AEP flood extents and levels

Figure 5 shows that the drainage strategy includes the management of stormwater runoff from minor and major rainfall events. It includes the recently constructed pipe network in the adjoining Elmwood Estate, proposed pipe drainage for the new development and overland flow paths. Stormwater runoff from external catchments

[9] Afflux (2022), Elmwood revised SWMP 2022, 6 March 2022

[10] Terraco (2022), Stormwater Management Plan, Saade Street, Epsom – Re-Zoning Proposal, Proposed 78 Lot (Approx) Residential Subdivision, October 2022

discharge via Buckland Street and Montis Lane to Bendigo Creek.

The stormwater runoff from the development and residual flows from the existing catchments are directed via the sediment basin and extended detention basin in the reserve north of the development to Bendigo Creek.

Objectives

The design follows the minor and major stormwater management guidance provided by Australian Rainfall and Runoff (ARR2019).[11] The minor system conveys stormwater runoff from 20% AEP (annual exceedance probability) rain events in a pits and pipes drainage network.[12] The major system conveys surface flows from rain events larger than 20% AEP and up to 1% AEP in road profiles and designated overland flow paths.

The strategy aims to meet the requirements of the Guidelines for Development in Flood Affected Areas to mitigate flood risks and damage as follows:[13]

- Provide flood depths less than 0.3 m,
- Limit flood velocities to less than 2 m/s,
- Ensure that flood hazard (velocity times depth) is less than 0.3 m^2/s, and
- All finished surface levels on allotments are 0.3 m above the 1% AEP flood.

Diversion of stormwater runoff from external catchments to Bendigo Creek via pipes in Buckland Street (0.75 m diameter) and Montis Lane (1.2 m diameter) further reduces the potential for flood hazard within the development.

Catchment flood storage is maintained to achieve no worsening of 1% AEP flows from the site and in Bendigo Creek by extending the capacity of the existing detention basin to 1650 m^3 and the retention of the existing outflow pipes. The design land form of the development, including road profiles, contributes positively to local floodplain storage.

Compliance with best practice water quality thresholds using sediment basin (200 m^3) and the grass swale characteristics of the extended detention basin contributes to the objective to protect the health of Bendigo Creek.[14] It is also an objective to mitigate the impacts of the sediment loads of urban development on receiving environments during the subdivision construction and house building phases of the development.[15]

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[11] Coombes, P., and Roso, S. (Editors), (2019), Runoff in Urban Areas, Book 9 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia, © Commonwealth of Australia (Geoscience Australia), for example see Figs 9.3.7 and 9.5.2, and pp. 38 - 40

[12] A 20% AEP rain event has one change in twenty (1 in 20) of occurring in any year, A 1% AEP rain event has one change in one hundred (1 in 100) of occurring in any year

[13] DELWP, (2019), Guidelines for development in flood affected areas, The State of Victoria, Department of Environment, Land, Water and Planning

[14] CSIRO (1999), Urban Stormwater: Best Practice Environmental Management Guidelines, as amended; EPA Victoria (2021), Urban stormwater management guidelines, Publication 1739.1, June 2021

[15] Victorian Planning Provisions, Clause 56.08 site management provisions of residential subdivision

4 Hydrology

The hydrology processes that are relevant to the site are influenced by the interactions between flows in Bendigo Creek and stormwater runoff from local urban catchments. The Bendigo Urban Flood Study (BUFS) describes the characteristics of Bendigo Creek at the Bendigo and Huntly gauge locations as shown in Table 1.[16]

Table 1: 1% AEP peak flows and critical duration at the gauges on Bendigo Creek

Location	1% AEP Peak flow (m^3/s)	Critical Duration (hours)	Catchment Area (km^2)
Bendigo Creek @ Bendigo	156.9	3	62
Bendigo Creek @ Huntly	260.6	6	142

The proposed development at Epsom is located between the Bendigo and Huntly flow gauges. A 1% AEP peak flow between 156.9 m^3/s and 260.6 m^3/s for a critical duration between 3 hours and 6 hours is expected in Bendigo Creek near the development. The peak flow in Bendigo Creek will take up to 6 hours to arrive at the development.

The configuration of the local urban sub-catchments that are associated with the development were defined in the Stormwater Management Strategy as shown in Figure 6.[17]

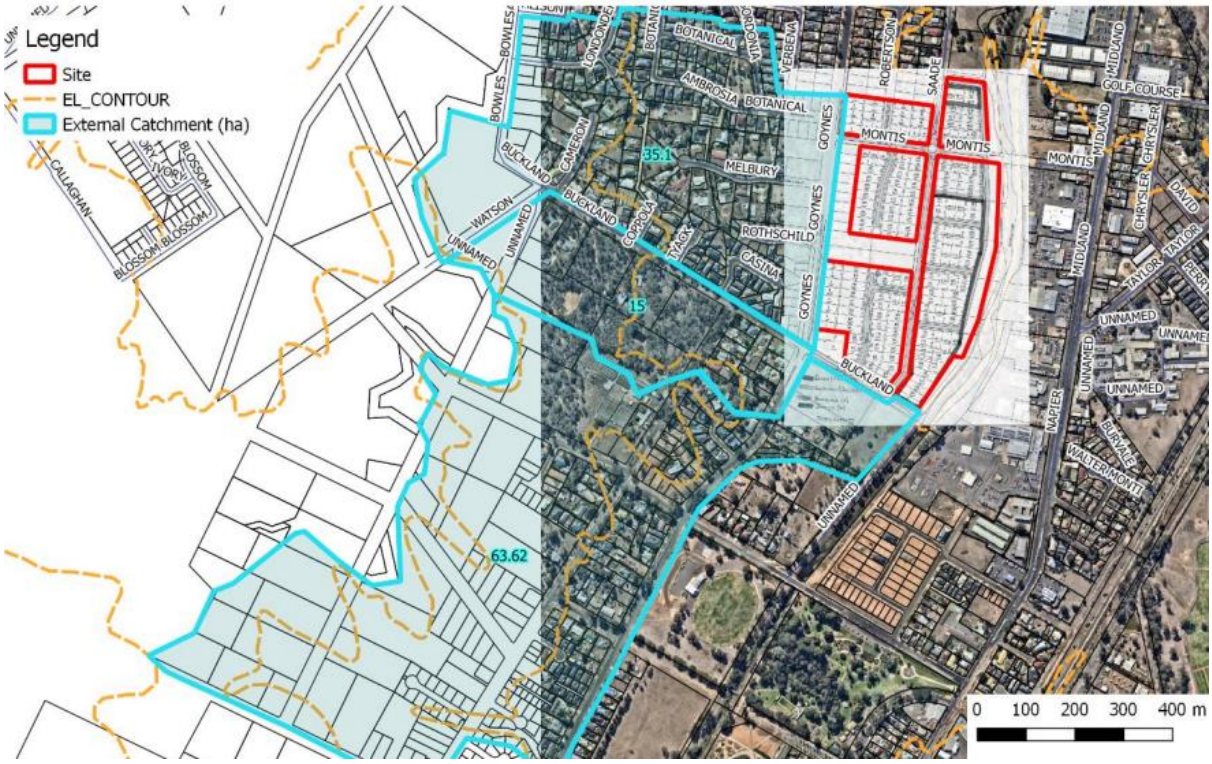

Figure 6: Configuration of the external and site catchments in the Stormwater Management Plan

[16] Water Technology, (2013), Bendigo Urban Flood Study, Final Report, November 2013, North Central CMA & City of Greater Bendigo

[17] Afflux (2022), Elmwood revised SWMP 2022, 6 March 2022

Figure 6 demonstrates that four local hydrology sub-catchments are associated with the proposed development. The external sub-catchments (Ex 1 to Ex 3) flow to the development and the local sub-catchment (Site) combines the Elmwood Estate and the proposed development as presented in Table 2.

Table 2: Characteristics of the local sub-catchments associated with the development

Catchment	Area (ha)	Critical duration (minutes)	Impervious ratio	1% AEP peak flow (m^3/s)
Ex 1	63.2	60	0.2	4.3
Ex 2	15	15	0.1	1.6
Ex 3	35.1	60	0.25	3.4
Site	14.9	15	0.7	5.6

The hydrology analysis of the urban area employed the catchment initial losses of 15 mm for pervious surfaces and 1 mm for impervious surfaces. A continuing loss of 2 mm/hour was also employed in the hydrology models. These values are consistent with the advice provided by ARR2019 for urban areas.

The ARR2019 Datahub provides values for rural initial and continuing losses of 26 mm and 4.1 mm/hour for Epsom.[18] The urban surfaces contributing to stormwater runoff can be defined as Effective Impervious Area (EIA) and Indirectly Connected Areas (ICA). The catchment losses for IDA can be described as 0.6 – 0.8 times the rural initial loss (15.6 – 20.8 mm) and continuing loss is expected to be 1 – 3 mm/hr.[19]

Table 2 reveals that the critical duration of local stormwater runoff associated with the development ranges from 15 minutes to 60 minutes. This information highlights that 1% AEP peak flows in the local external sub-catchments, local urban sub-catchment and Bendigo Creek are driven by different storm events that arrive at the development at different times and magnitude.

The impacts of the complex interaction of these hydrology events at the property can be evaluated using joint probability methods in accordance with the ARR2019 guidelines.[20] The peak flows from external, local and Bendigo Creek catchments will not occur at the same time or magnitude.

There is a need to estimate the 1% AEP peak flows from the perspective of Bendigo Creek (storm events with 3 – 6 hour durations) and from the perspective of the local urban catchments (storm events with 15 – 60 minute durations).

[18] ARR2019 DataHub, https://data.arr-software.org/

[19] Coombes, P., and Roso, S. (Editors), (2019), Runoff in Urban Areas, Book 9 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia, © Commonwealth of Australia (Geoscience Australia), for example see Figs 9.3.7 and 9.5.2, and pp. 38 - 40

[20] Coombes P.J., (2023), Application of joint probability to respond to climate change and avoid cumulative extreme assumptions, Hydrology & Water Resources Symposium 2023, Engineers Australia

The Stormwater Management Strategy combines the local (Ex and Site) sub-catchments in a single hydrology model to estimate the combined local catchment processes. The joint probability of local urban stormwater runoff and Bendigo Creek flows was also estimated by combining the 1% AEP local urban stormwater runoff (1 hour critical duration) with 10% AEP flows in Bendigo Creek in the hydraulic model.

The Author considers that this an acceptable, albeit conservative, approximation of the local joint probability impacts of flooding at the development. It is likely that the timing of urban and Bendigo Creek flows will be different. In addition, a one hour local storm event is expected to generate less than 10% AEP peak flows in Bendigo Creek.

It is noteworthy that this estimated joint probability relationship was agreed with the North Central Catchment Management Authority. The perspective of 1% peak flows in Bendigo Creek near the property was provided by the North Central Catchment Management Authority as shown in Figure 4.

5 Hydraulics and Flooding

The Stormwater Management Strategy is informed by hydraulic modelling that was underpinned by a 1 m grid of Lidar topography with inflows from the hydrology model. This analysis included 10% AEP flows in Bendigo Creek, roughness values for different land uses, and the pits and pipes drainage infrastructure. The result from the investigation of existing conditions is provided in Figure 7.

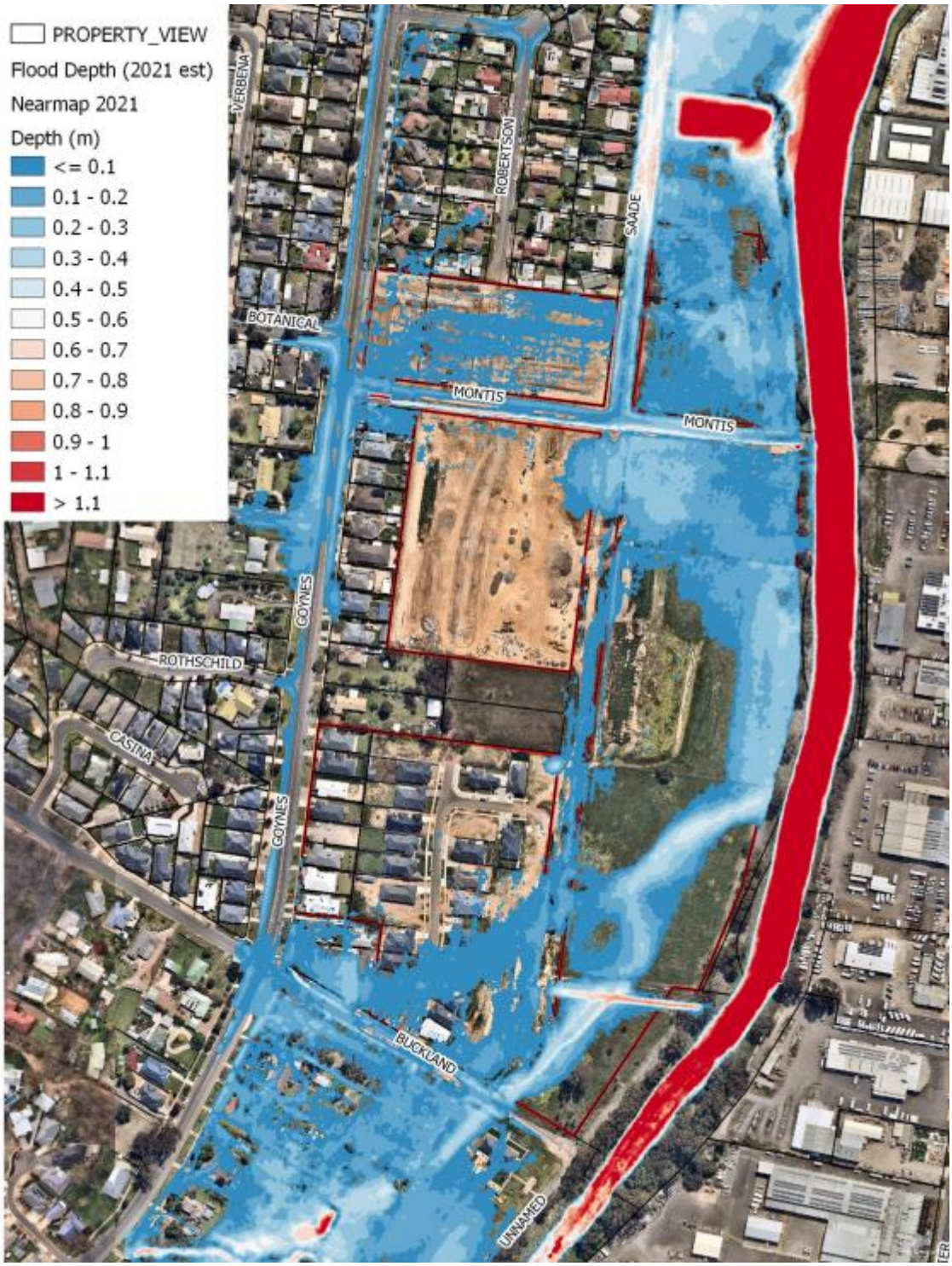

Figure 7: Local stormwater inundation from 1% AEP rain events under existing conditions

Figure 7 demonstrates that the hydraulic modelling produced similar flood shapes and depths to the flood maps provided by North Central Catchment Management Authority NCCMA (see Figure 4). The differences in the flood shapes around Buckland Street indicate that the hydraulic model includes more stormwater than the Bendigo Urban Flood Study in 2013. The flood shapes are also influenced by changes in the land surfaces and infrastructure within the external catchments. The flood shapes and depths of developed conditions are presented in Figure 8.

Figure 8: Local stormwater inundation from 1% AEP rain events under developed conditions

Figure 8 demonstrates that stormwater inundation from 1% AEP rain events is retained within the road profiles and in the reserve adjoining Bendigo Creek. Most of the depths of stormwater inundation are less than 0.3 m.

An acceptable flood hazard is defined as a maximum value of flow velocity (V) times depth of inundation (D) that is less than 0.3 m^2/s. The Stormwater Management Strategy has estimated the maximum flood hazard as shown in Figure 9.

Figure 9: Flood hazards from 1% AEP rain events under developed conditions

Figure 9 demonstrates that the proposed development will experience acceptable levels of flood hazards. The shape of the road profiles and the adjoining reserves act to mitigate the potential for hazard.

6 Water quality and environmental controls

Compliance with best practice water quality thresholds at the proposed development will assist to protect the health of the Bendigo Creek.[21] The requirements for improvement in the quality of urban stormwater are defined by the Victorian EPA Best Practice Environmental Management (BPEM) Guidelines as:

- 80% reduction in Total Suspended Solids (TSS)
- 45% reduction in Total Nitrogen
- 45% reduction in Total Phosphorus
- 70% capture of Gross Pollutants

The existing detention basin was modified to incorporate a greater area of shallow flow to perform at water treatment function. It was modelled as a 55 m long swale that is 30 m wide (area: 1650 m^2). A sediment basin was also provided with a volume of 200 m^3. These combined measures are expected to provide stormwater discharges from the development that are consistent with best practice stormwater quality improvements.

The MUSIC software was employed to investigate the performance of the stormwater quality improvement measures in accordance with the current City of Greater Bendigo MUSIC Guidelines (V01 - 30/11/2012). This guideline specified the weather station data that was used as inputs for the analysis.

It is also important to mitigate the impacts of urban development on receiving environments during the subdivision construction and house building phases of the development.[22]

The Stormwater Management Strategy includes a new sediment basin which will significantly mitigate the release of sediment from the development site into Bendigo Creek. The early construction of this sediment basin and the implementation of measures outlined in Clause 56.08 site management provisions fof residential subdivision will assist to protect the receiving environment from additional sediment loads. A site environmental management plan (EMP) should be provided for the development.

[21] CSIRO (1999), Urban Stormwater: Best Practice Environmental Management Guidelines, as amended; EPA Victoria (2021), Urban stormwater management guidelines, Publication 1739.1, June 2021
[22] Victorian Planning Provisions, Clause 56.08 site management provisions of residential subdivision

7 Proposed changes to ARR2019 climate change factors

The previous investigations into flooding in Bendigo, such as the Bendigo Urban Flood Study, were underpinned by assumptions and methods from the 1987 version of Australian Rainfall and Runoff (ARR1987). The current 2019 version of Australian Rainfall and Runoff (ARR2019) is based on 30 years of additional data, knowledge and advances in professional practice.

On 27 August 2024, the ARR2019 proposed ratios to increase design rainfall depths to account for effects of climate change. These updates aimed to address the potential changes in rainfall intensity since the Bureau of Meteorology (BOM) created the intensity frequency duration (IFD) information prior to 2016. The effect of these changes on the analysis and design of the proposed development are considered in this section.

The Stormwater Management Strategy for the proposed development is consistent with the current ARR2019 version 4.1 of Australian Rainfall and Runoff. This strategy was completed prior to the recent proposed increases in design rainfall depths in version 4.2 of ARR2019.

The updated ARR2019 data and the new ratios for changing the design rainfall depths can be downloaded from the ARR2019 Datahub. The climate change ratios are used to multiply design rainfall depths, initial (IL) and continuing (CL) losses based on national relationships for changes in maximum temperatures since 1961 – 1990.

It is noteworthy that the temperature and rainfall regimes vary throughout Australia. The time periods of the rainfall data used to make the BOM 2016 design IFD information is different to the selected baseline for temperature changes.

The SSP5-8.5[23] very high emissions and the SSP2-4.5 medium emissions climate change scenarios provided by Australian Rainfall and Runoff (ARR2019 version 4.2) is assumed in the changes to design rainfall and catchments losses provided in Table 3.

The SSP5-8.5 scenario represents a very high emissions pathway with complete dependence on fossils fuel that is considered to be highly unlikely by the Intergovernmental Panel on Climate Change.[24] The medium or middle of the road emissions scenario SSP2-4.5 is considered to be the most likely pathway.[25] Adoption of the worst case scenario for climate warming as the most likely outcome is not considered to be good policy.

[23] The IPCC (2023) Sixth Report defines the Shared Socioeconomic Pathways (SSP) of different responses to climate change.
[24] Intergovernmental Panel on Climate Change, (2023), AR6 Synthesis Report Climate Change 2023
[25] Hausfather, Z; Peters, G. P., (2020). Emissions – the 'business as usual' story is misleading. Nature. 577 (618–620): 618–620

Table 3: Proposed ARR2019 changes to design rainfall and losses with respect to the 1961 – 1990 temperature baseline at Epsom

Criteria	SSP5-8.5		SSP2-4.5	
	2030	2100	2030	2100
1 hour storm (increase in rainfall depth)	1.2	1.86	1.18	1.41
3 hour storm (increase in rainfall depth)	1.14	1.64	1.14	1.32
6 hour storm (increase in rainfall depth)	1.13	1.54	1.12	1.27
Temperature change (°c)	1.3	4.5	1.2	2.5
Initial loss (% change/°c)	1.04	1.15	1.04	1.08
Continuing loss (% change/°c)	1.09	1.33	1.08	1.17

Table 3 demonstrates that the proposed changes to design rainfall depths and catchment losses are based on global changes in temperature from a 1961 – 1990 baseline. The ARR2019 methods for estimating stormwater runoff include the design burst and preburst rainfall inputs, and design catchment losses as summarised in Table 4 for the SSP5-8.5 very high emissions climate change assumptions.

Table 4: Results of proposed design rainfall changes for relevant rainfall durations under the SSP5-8.5 very high emissions climate change scenario

Duration	Burst rain (mm)		Preburst rain (mm)		Losses	
	20% AEP	1% AEP	20% AEP	1% AEP	IL (mm)	CL (mm/hr)
2016						
15 mins	14.7	31.6	3.1	1.3	26	4.1
1 hour	24.4	54.9				
3 hours	33.9	72.5				
6 hours	41.7	82.5				
2030						
15 mins	17.64	37.92	3.72	1.5	26.4	4.16
1 hour	29.28	65.88				
3 hours	38.6	82.7				
6 hours	47.1	93.2				
2100						
15 mins	27.34	58.78	5.77	2.42	27.6	4.31
1 hour	45.34	102.11				
3 hours	52.2	118.9				
6 hours	64.2	127.1				

For example, a 1.3 °C increase in daily maximum temperature results in a 20% increase in the design rainfall depth of a one hour event and a 7% (1.3 times 1.04) increase in catchment initial loss under the SSP5-8.5 scenario

The information in Table 4 shows significant increases in design burst rainfall for 2030 and 2100 under the SSP5-8.5 very high emissions climate change scenario. The one hour design rainfall event indicates the impacts on local urban areas whilst the 3 or 6 hour storm indicates the effect on the Bendigo Creek catchment. These are very high estimates.

The likely SSP2-4.5 medium emissions climate change scenario provides increases in design rainfall bursts in 2100 that are half the predictions associated with the SSP5-8.5 scenario for 2100.

The nearby temperature observations at Castlemaine, Maryborough and Bendigo were examined to determine the temperature changes that should be applied in the Bendigo region as shown in Table 5.

Table 5: The behaviour of maximum temperatures at gauges near Bendigo

Location	From	to	Change from 1966 (°C)	Change from 1991 (°C)
Castlemaine	1966	2024	-1.02	-0.27
Maryborough	1965	2024	+0.11	+0.4
Bendigo	1991	2024	-	+0.94

Table 5 indicates that the local changes in maximum temperatures since 1991 ranged from -0.27 °C to +0.94 °C. These results indicate a wide range of changes in temperature that are all significantly less than the ARR2019 proposed changes.

The proposed ARR2019 version 4.2 increases in design rainfall depths are related to national changes in maximum temperatures since the 1961 – 1990 period. The Intergovernmental Panel on Climate Change (IPCC) employs this reference period of maximum temperatures.[26]

The ARR2019 propose that the national temperature changes since 1961 – 1990 are used to increase the currently available design rainfall depths that were provided in 2016. The difference in the changes in maximum temperatures and design rainfall depths are significant for the different baselines

It is important to evaluate the locally relevant changes in rainfall intensity and the time from the middle (or centroid) of the local rainfall intensity data used to make the ARR2019 design rainfall prior to 2016. The changes in rainfall intensity should be based on the local changes in temperature since the year at the centroid of the data used to make the design rainfall depths.

[26] Intergovernmental Panel on Climate Change, 2023, AR6 Synthesis Report Climate Change 2023

The Author is currently working on the regional changes in rainfall intensity (design rainfall depths) and the results will be available outside of the time constraints of this report. It is anticipated that these estimates of design rainfall depths may be available at the Planning Panel hearing.

The lengths of all available rainfall intensity data (Bureau of Meteorology 6 and 1 minute rainfall data)[27] within a 50 km distance from Bendigo was evaluated to determine that the time centroid of the rainfall intensity data used to make the ARR2019 design rainfall is 2003. A combination of maximum change in temperature at Bendigo Airport with the time since 2003 results in the temperature change of 0.74 °C to 2030 and 2.68 °C to 2100 under the SSP5-8.5 very high emissions climate change scenario.

These evidence based inputs were used to estimate the changes in rainfall intensity that may apply to the Bendigo region under the SSP5-8.5 very high emissions climate change scenario as provided in Table 6.

Table 6: The estimated rations of changes in design rainfall from 2003 based on data relevant to Bendigo

Year	Temperature change (°C)	Changes in design rainfall		
		< 1 hour	3 hours	6 hours
2030	0.74	1.11	1.09	1.07
2100	2.68	1.45	1.35	1.3

Table 6 shows that use of local data relevant to Bendigo results in estimated ratios of changes in design rainfall under the SSP5-8.5 very high emissions climate change scenario that are significantly less than the increases derived from the ARR2019 national changes in design rainfall. These values are consistent with the SSP2-4.5 medium emissions climate change scenario and may be further amended by the author's investigation into local rainfall intensity observations.

Summary

The ARR2019 recently proposed ratios to increase the currently available design rainfall depths that are used for estimation of stormwater runoff and flooding. These changes in August 2024 occurred after completion of the Stormwater Management Strategies for the proposed development.

The use of national relationships for changes in maximum temperatures and rainfall intensities proposed by ARR2019 result in substantial increases in design rainfall depths. Use of local weather data relevant to Bendigo produces increases in design rainfall intensity that are substantively less than the proposed ARR2019 changes. These local results are similar to the likely SSP2-4.5 climate change scenario.

[27] Rainfall intensity records at Bendigo Air Port; Heathcote, Cairn Curran Reservoir, Laanecoorie Weir and Redesdale

Local urban drainage

The design of the local stormwater infrastructure should employ the minor and major stormwater design from ARR2019 Urban Book:[28]

- Minor system: Stormwater runoff from 20% AEP design rain events conveyed in drainage infrastructure.
- Major system: Stormwater runoff from design rain events greater than 20% AEP conveyed as surface flows in road profiles and open space. This design "gap flow" is the excess stormwater runoff that is not conveyed in the pipe drainage network.

The recommended approach to estimating the flood levels in the design of urban areas also includes the use of median preburst rainfall in the modelling approach. In complex urban areas where flooding is a critical design consideration, the critical duration is chosen from the maximum of the means of flood elevations from ten rainfall temporal patterns in each rainfall duration as shown in Figure 10.[29] These urban catchments are often impacted by the volumes of stormwater runoff.

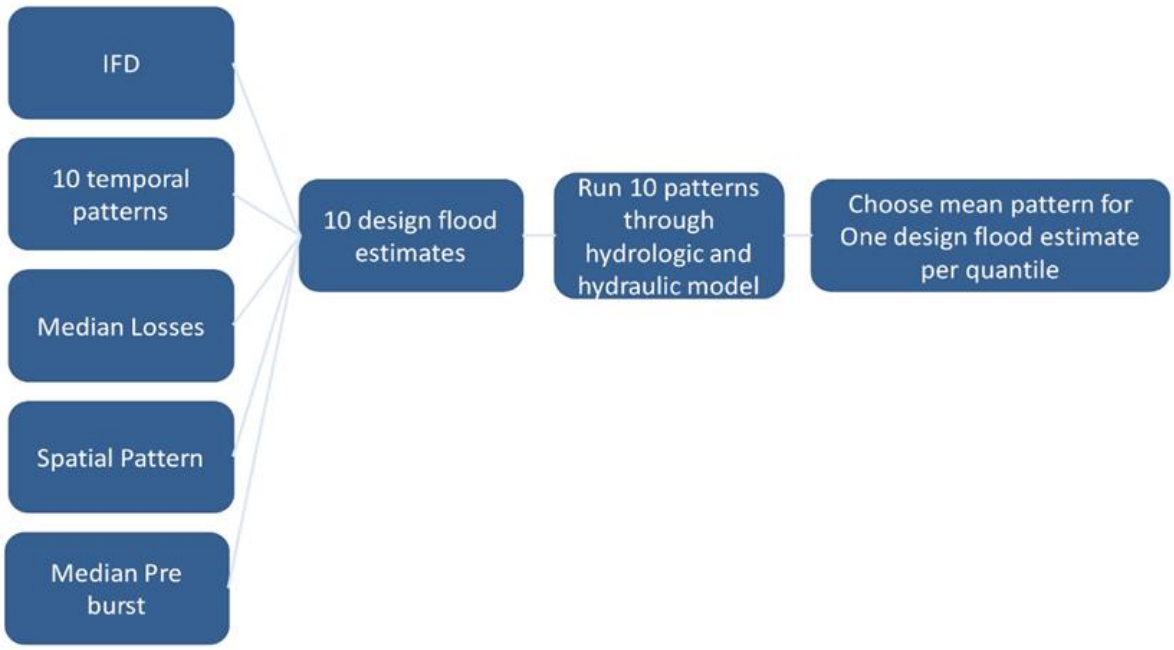

Figure 10: Design Process that Utilises Rainfall Ensembles in Hydrology and Hydraulic Simulations to Select the Mean Temporal Pattern for Analysis of Flooding

Figure 10 is an overview of the preferred ARR2019 design process for complex urban catchments where coupled hydrology and hydraulic models are employed. This design

[28] Coombes, P., and Roso, S. (Editors), (2019), Runoff in Urban Areas, Book 9 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia

[29] Coombes, P., and Roso, S. (Editors), (2019), Runoff in Urban Areas, Book 9 in Australian Rainfall and Runoff - A Guide to Flood Estimation, Commonwealth of Australia, © Commonwealth of Australia (Geoscience Australia), Chapter 6 Modelling Approaches, Figure 9.6.11, pp. 191 - 194

process requires median or design inputs for catchment losses and preburst rainfall. The design process is also delivered by use of ten rainfall temporal patterns as inputs and enables the choice of the mean flood elevation which is the design flood.

The effect of the increases in design rainfall proposed by ARR2019 were estimated for the SSP5-8.5 very high emissions climate change scenario using a RORB hydrology model of the local urban area (see Appendix A). This hydrology model was based on details provided in the Afflux stormwater management strategy and included the current ARR2019 design inputs.

The estimated changes in stormwater runoff volumes arriving at the proposed development and changes in the depths of inundation are presented in Table 7.

Table 7: The estimated changes in stormwater runoff volumes and inundation at the development for the highest (SSP5-8.5) ARR2019 climate change scenario

Year	1% AEP		20% AEP	
	Volume (m^3)	Depth (m)	Volume (m^3)	Depth (m)
2016	26800	-	5970	-
2030	36800	0.07	7540	0.01
2100	51100	0.16	24900	0.13

Table 7 demonstrates the increases in stormwater runoff volumes at the development that are mitigated by the planned diversions to high flow pipes in Buckland Street and Montis Lane for 1% AEP rain events. The stormwater volumes and depths of inundation for 20% AEP rain events do not include diversions to Bendigo Creek.

These results indicate that the higher design rainfall depths may require increases in the size of pipe drainage infrastructure, number of inlet pits and the size of drainage outfalls to Bendigo Creek for 20% AEP events.

Some of the stormwater runoff from external catchments are diverted as high flows to Bendigo Creek via Montis and Buckland street outfalls during 1% AEP rain events. There may be a requirement to provide additional stormwater and outflow capacity at the retarding basin and potentially an additional high flow outlet to Bendigo Creek.

The additional volumes of stormwater runoff could be accommodated at low points in the reserve at the eastern boundary of the development and by varying the road profiles in the development. The performance of the local stormwater management strategies will also be dependent on the joint probability of local stormwater runoff and flows in Bendigo Creek.

It is noteworthy that the ARR2019 estimates of increases in local design rainfall for the SSP5-8.5 very high emissions climate change scenario are 50% higher than indicated using data that is relevant to Bendigo. The likely SSP2-4.5 medium emissions climate

change scenario also provides increases in design rainfall depths that are similar to local estimates.

It is expected that the current ARR2019 urban design methods and changes in design rainfall that is relevant to Bendigo will be used in the design of the proposed development. Alternatively, the SSP2-4.5 climate change scenario could be adopted for 2030 and 2100.

Summary

The Stormwater Management Strategy is underpinned by the ARR2019 minor and major design approach that can be adapted to accommodate the proposed increases in ARR2019 design rainfall depths. These proposed increases in ARR2019 design rainfall are expected to increase the volume of stormwater runoff that arrives at the development.

In the minor system, the potential for increased depths stormwater inundation can be managed by changes in the sizing and configuration of drainage infrastructure for 20% AEP events.

In the major system, the potential for increases in the depth of inundation and hazard can be mitigated by larger capacity diversions to Bendigo Creek, changes in the road profile and the provision of additional catchment storage in the proposed new reserve.

It is noteworthy that the Author has examined the worst case scenario of the ARR2019 estimated increases in design rainfall depths for the SSP5-8.5 very high emissions scenario in 2100.

The choice of local data to derive that changes in design rainfall depths or a lower emissions scenario or different design year (say 2070) will produce lesser impacts on the design of the proposed development. Alternatively, the SSP2-4.5 medium emissions climate change scenario could be adopted for selection of design rainfall.

Bendigo Creek

The design and assessment of proposed development at Epsom is also dependent on the peak flows in Bendigo Creek. These peak flows in Bendigo Creek impact on performance of the urban drainage strategy and the potential for flooding from 1% AEP flood events.

A comparison of the estimates 1% AEP peak flows in Bendigo Creek at Bendigo and Huntly from the Bendigo Urban Flood Study (BUFS) and flood frequency analysis (FFA) using the observed data is provided in Table 8.

Table 8: The 1% AEP peak flows from the Bendigo Urban Flood Study (BUFS) and flood frequency analysis (FFA)

Location	1% AEP peak flows (m^3/s)	
	BUFS	FFA
Bendigo Creek @ Bendigo	156.9	128 (92, 226)
Bendigo Creek @ Huntly	260.6	123 (97, 182)

Table 8 shows that the 1% AEP peak flows from the BUFS are significantly higher than the flood frequency analysis of the observed data (1977 – 2024) from the gauges on Bendigo Creek.

The author employed the FLIKE software and the Log Pearson III method to estimate the flood frequency analysis and the small range of the confidence intervals (for example: 92, 226) demonstrates a good fit to the observed data.

The similar peak flow between the Bendigo and Huntly gauges does seem to be irregular given the greater catchment area (142 km^2) that contributes to the Huntly gauge. The BUFS indicated that the observations at the Huntly gauge may be unreliable.

The North Central Catchment Management Authority provided an estimate of the 1% AEP flows of 199.7 m^3/s and flood level of 193.3 m AHD in Bendigo Creek at 220 m upstream of Buckland Street Epson as shown in Figure 11.[30] The North Central Catchment Management Authority explain that these values are derived from the BUFS and are based on older information from Australian Rainfall and Runoff.

[30] NCCMA (2024), 1% AEP peak flow in Bendigo Creek at Buckland Street Epsom. Provided on 4/10/2024.

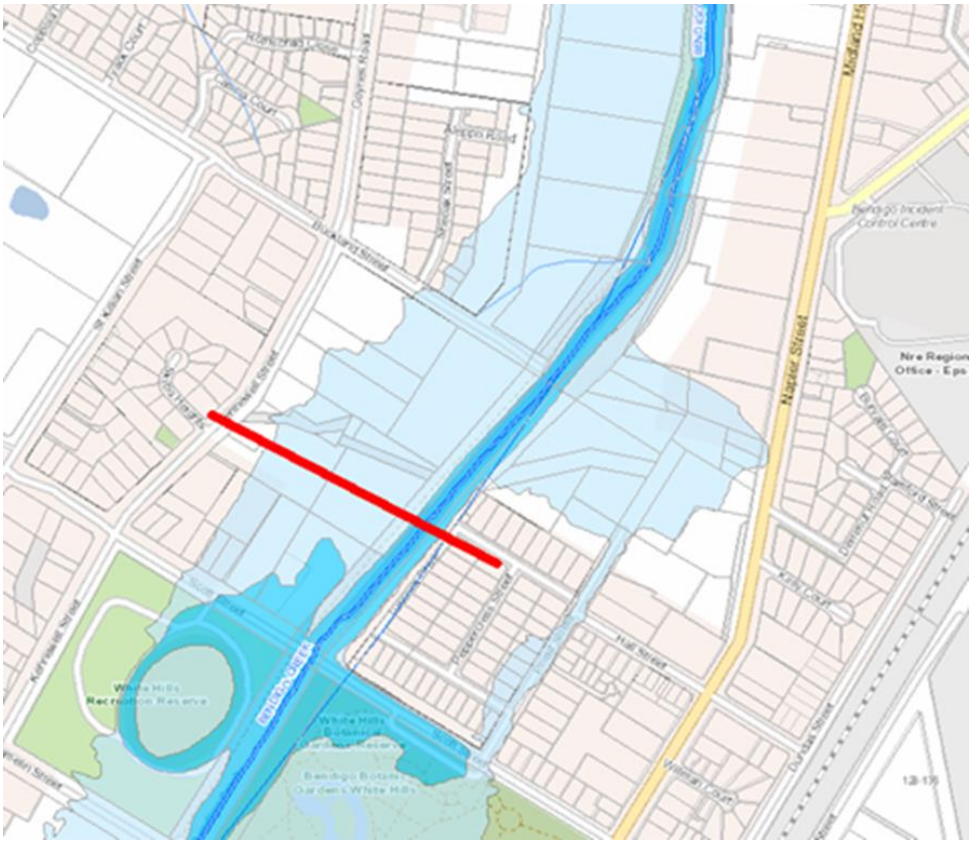

Figure 11: The location of the 1% AEP flows and flood level in Bendigo Creek provided by the NCCMA

The Author combined the VicMap Elevation DEM10m (10 m grid) data and the feature survey for the property to derive the capacity of Bendigo Creek at Buckland Street (see Appendix B). The invert of the creek was estimated at 190 m AHD and the top of the bank (or path) was 193.5 m AHD.

The hydraulic grade line (s) of flood flows in Bendigo Creek between the Scott Street and Montis Lane was estimated at 0.003 m/m. The Manning's roughness (n) of the Bendigo Creek channel was estimated at 0.06. The 1% AEP flood flows and elevations were then estimated for the Bendigo Creek at Buckland Street using the Mannings equation as shown in Table 9.

Table 9: The capacity of Bendigo Creek at Buckland Street

Year	Flood level (m AHD)	Flows (m^3/s)	Scenario
2016	192.6	199.7	Existing
2030	192.71	228	SSP5-8.5
2100	192.97	328	SSP5-8.5
2016	193.5	467	Maximum capacity

The 1% AEP peak flows for 2030 and 2100 were derived using the ARR2019 climate change multipliers for 3 hours events (see Table 3 above). Table 8 demonstrates that Bendigo Creek has the capacity of convey the 2030 and 2100 peak flows that were

based on the ARR2019 ratios for the SSP5-8.5 very high emissions scenario. It is noteworthy that the local results presented in Table 6 indicate that the 2100 peak flows may be 21% less than those generated using the ARR2019 national ratios. The SSP2-4.5 medium emissions scenario expected to produce 1% AEP peak flows that are 20% less than the SSP5-8.5 scenario in 2100 (Table 3).

There is approximately 0.5 m freeboard to the 2100 flood level at this location. The derivation of the 2030 and 2100 peak flows using the climate change ratios derived in this report at Table 6 indicates that greater freeboard may be available in 2100.

All communities are subject to a residual or background level of flood risk that cannot be mitigated or eliminated.

The design of the proposed (or any) development should include modern flood resilience measures that are consistent with national guidelines on managing floodplains.[31]

The practical outcome of this consideration may be local flood resilience and emergency management plan that is consistent with advice of the Victorian SES.[32] This plan could also provide advice on the provision of flood resilient homes that is consistent with the Industry Guidance for Flood Resilient Homes.[33]

Summary

Bendigo Creek near the proposed development may have sufficient capacity to convey future increases in stormwater runoff within the waterway channel. This investigation indicates that the design of the proposed development should be evaluated using:

1. Design rainfall derived from the SSP2-4.5 medium emissions climate change scenario;
2. Tailwater conditions in Bendigo Creek (currently 10% AEP events) derived for 2030 and 2100;
3. The 1% AEP events in Bendigo Creek for 2030 and 2100.

[31] Australian Institute of Disaster Resilience (2017), Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, Australian Disaster Resilience Handbook 7, © Commonwealth of Australia 2017 third edition

[32] Victorian SES (2023), Epsom, Huntly and Ascot Local Flood Guide, August 2023

[33] The State of Queensland (Department of Energy and Public Works) (2022), Industry Guidance for Flood Resilient Homes, November 2022

8 Insights and recommendations

A development with 78 allotments is proposed for the subject land adjacent to Bendigo Creek and existing urban areas at Epsom.

Key insights:

The subject land is subject to the LSIO1 planning overlay for depths of flood inundation less than 0.35 m. Most of this inundation is caused by stormwater runoff from urban catchments that are south and west of the proposed development.

A bicycle path (0.6 m high) is situated on a levee along the western side of the Bendigo Creek at the interface with the proposed development. This levee provides additional protection from flood events that may originate from Bendigo Creek. There is also a need improve the quality of urban stormwater runoff to protect the health of Bendigo Creek.

Stormwater Management Strategies provided by Terraco and Afflux provide acceptable approaches to managing stormwater runoff and flooding at the proposed development. The strategies have reproduced the expected flood shape and employed the ARR2019 minor major strategies for management stormwater at the development.

Stormwater runoff from minor events (20% AEP) is conveyed by pits and pipe drainage infrastructure to stormwater quality infrastructure that discharges to Bendigo Creek. The performance of the minor systems is assisted by swales and rainwater tanks.

Major stormwater runoff events (1% AEP) are safely conveyed in road profiles to detention facilities and to Bendigo Creek. Major runoff events from external catchments are also conveyed by high flow pipes to Bendigo Creek. The strategy makes the conservative assumption that a 10% AEP flood in Bendigo Creek occurs at the same time as the local 1% AEP event.

These minor and major stormwater strategies provide acceptable flood hazards based on the Australian Rainfall and Runoff (ARR2019) guideline. The potential for flood damage is mitigated by setting the finished ground surface levels at 0.3 m above the 1% AEP flood level and by minimum building floor levels that are 0.3 m above the ground level (0.6 m above the 1% AEP flood level). This approach provides a substantial margin of error that can account for climate change and uncertainty.

The ARR2019 guidelines were updated during August 2024 to include national ratios to increase design rainfall depths to account for current conditions and future climate change scenarios. The Stormwater Management Strategy for the development was created prior to these recent proposed changes in design rainfall depths.

These recent changes to the ARR2019 design rainfall depths were incorporated in this assessment of the proposed development. The Author also examined local weather data (rather than national averages) to estimate the multipliers of ARR2019 design

rainfall that apply at Bendigo. Inclusion of local data in the analysis resulted in smaller increases in design rainfall. These results for future increases in design rainfall depths were consistent with the SSP2-4.5 medium emissions climate change scenario.

The Author's high level analysis of the proposed development indicates that the Stormwater Management Strategy can be designed to accommodate the potential impacts of climate change.

Recommendations:

1. The ultimate design of the proposed development incorporates the latest methods and data from Australian Rainfall and Runoff (ARR2019).
2. Include the ARR2019 ratios of increases in design rainfall to consider the SSP2-4.5 climate change scenario for 2030 and 2100 on the design of the urban stormwater infrastructure and shape of the land form.
3. Assume a combination of 1% AEP local stormwater with 10% AEP peak flows in Bendigo Creek to approximate of the joint probability effects for the design of the stormwater infrastructure in the proposed development.
    a. The analysis should assume that the hydrographs for local stormwater runoff and Bendigo Creek commence at the same time.
    b. Otherwise, the design of the stormwater infrastructure and assessment of flooding could undertake an analysis of the joint probability of flooding in Bendigo Creek and at the proposed development using the methods provided in Australian Rainfall and Runoff (ARR2019)
4. The effect of 1% AEP flows in Bendigo Creek should be incorporated in the assessment of the proposed development. This analysis should incorporate the ARR2019 ratios of increases in design rainfall to consider the SSP2-4.5 climate change scenario for 2030 and 2100
5. A flood Resilience (Emergency) Plan should be provided for the development that is consistent with the local SES strategy.
6. The Bendigo Creek and receiving environment should be protected from sediment loads during the subdivision construction and house building phases of the development. An Environmental Management Plan should also be provided for the proposed development.

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Appendix A: RORB model of local urban catchment

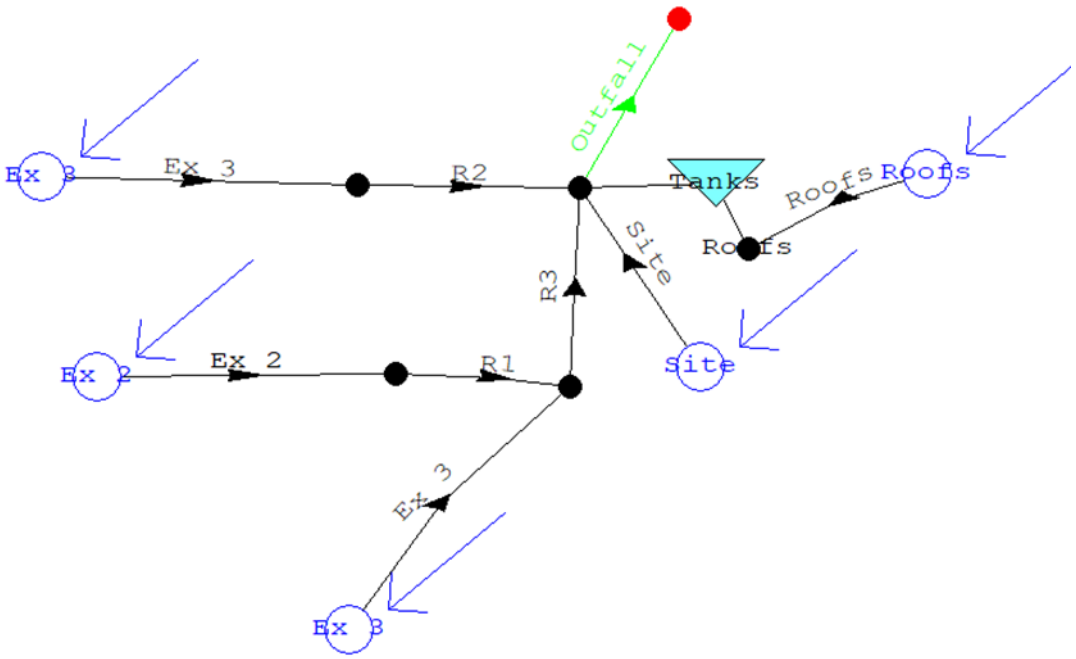


Figure A1: Schematic of the local catchments and the RORB model used to examine the changes in ARR2019 design rainfall

Appendix B: Bendigo Creek at Buckland Street

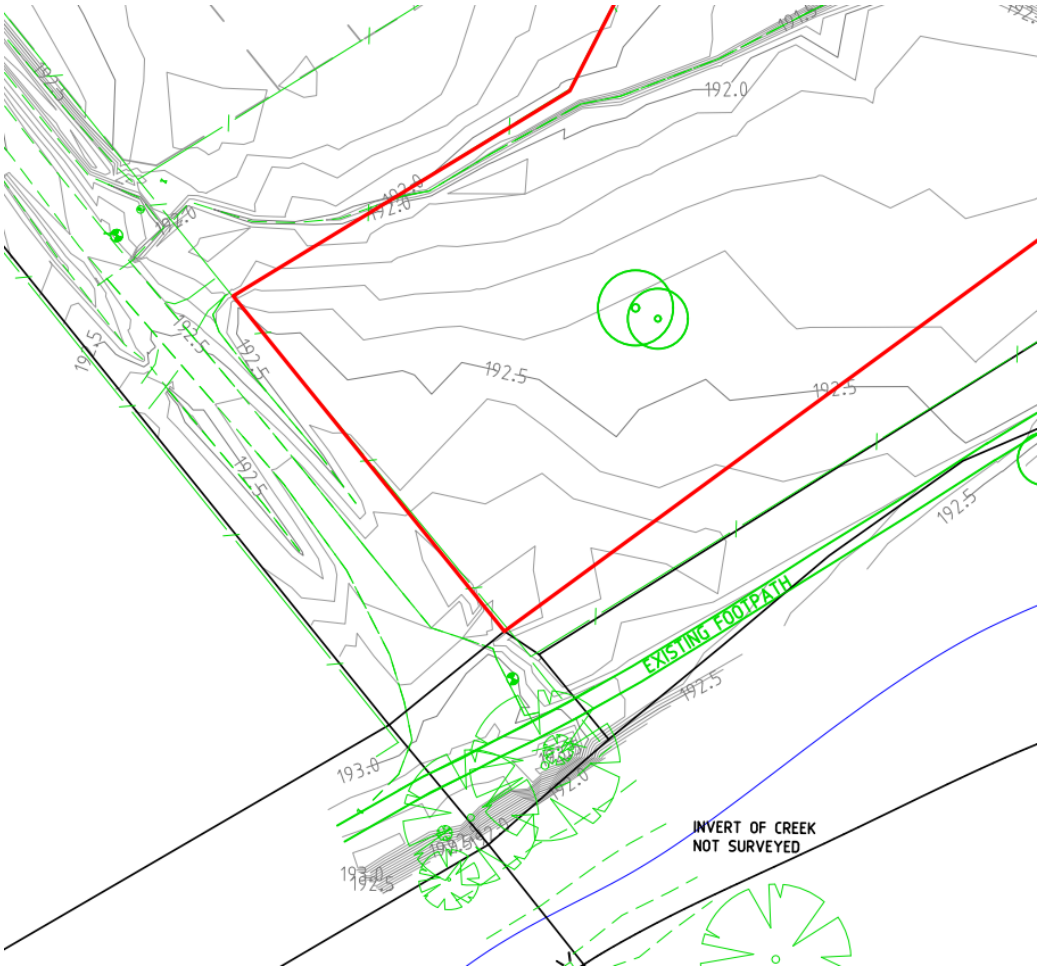


Figure B1: Extract from the Terraco feature survey showing the contours of ground levels and the raised bicycle path near Buckland Street and Bendigo Creek

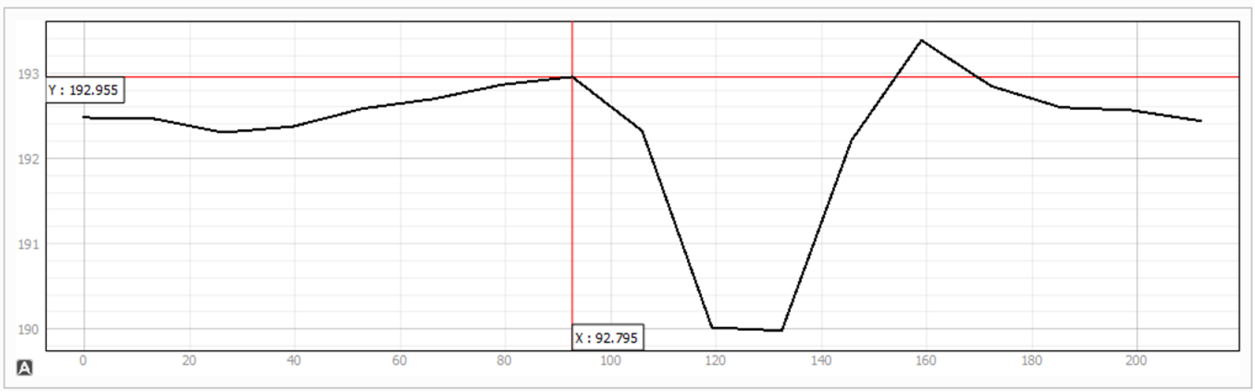


Figure B2: Cross section of Bendigo Creek at Buckland Street that was extracted from the older VicMap DEM10 data. Note that the greater detail in the more recent feature survey includes the additional height of the levee and bicycle path

Appendix C: Instructions from Russell Kennedy Lawyers

Russell Kennedy

RK reference DZV 362064-00001

David Vorchheimer
T +61 3 8640 2308
E dvorchheimer@rk.com.au

Stefan Fiedler
T +61 3 9609 1672
E sfiedler@rk.com.au

Sonia Narduzzo
T +61 3 8640 2300
E snarduzzo@rk.com.au

18 September 2024

BY EMAIL peter@uwcs.com.au

Professor Peter Coombes
Director
Urban Water Cycle Solutions

Dear Peter

Letter of Instruction
Greater Bendigo Planning Scheme Amendment C248gben
Planning Permit Application No. DS/207/2019
1 Buckland Street, 20 Montis Lane, 18-46 Saade Street, adjoining reserves and road reserves, Epsom

1 We act on behalf of Lawserve, Beardall and Smith (**Proponent / Client**) in the above matter.

2 This matter concerns a combined Planning Scheme Amendment (**Amendment C248gben**) and Planning Permit Application No. DS/207/2019 (**Planning Application**) which aims to facilitate residential development at 1 Buckland Street; 20 Montis Lane; 18-26, 28-34, 36-46 Saade Street, adjoining reserves and road reserves, Epsom (**Subject Land**). The combined request was made on behalf of our Client under section 96A of the *Planning and Environment Act 1987* (Vic) (**PE Act**).

3 Greater Bendigo City Council (**Council**) is the Planning Authority for Amendment C248gben.

4 This correspondence outlines your instructions to provide expert evidence in relation to flooding / hydrological issues in this matter.

The Proposal

Amendment C248gben

5 Amendment C248gben concerns the entirety of the Subject Land being the land at Buckland Street, 20 Montis Lane, 18-26, 28-34 and 36-46 Saade Street and Montis Lane, Epsom as well as the adjoining reserves and road reserves. It proposes to:

(a) rezone the land at 1 Buckland Street, 20 Montis Lane, 28-34, 36-46 Saade Street, Epsom, and parts of the adjoining road reserves of Buckland Street, Montis Lane and Saade Street from the Farming Zone (**FZ**) to the Neighbourhood Residential Zone 2 (**NRZ2**) as shown on Planning Scheme Map No. 15;

(b) rezone the land immediately abutting the western side of the Bendigo Creek which includes part of the land at 18-26 Saade Street, Crown Allotment 19, No Section, Township of Epsom, Crown Allotment 20, No Section, Township of Epsom and Crown Allotment 2024, No Section, Township of Epsom, Parish of Sandhurst from the Farming Zone (**FZ**) to the Public Park and Recreation Zone (**PPRZ**) as shown on Planning Scheme Map No. 15 and

(c) rezone the reserves and road reserves adjoining the land to reflect the zone of the adjoining private property.

6 The existing planning overlays are not proposed to be changed by Amendment C248gben.

Planning Application

7 The Planning Application concerns the land at 1 Buckland Street, 20 Montis Lane, 18-26, 28-34 and 36-46 Saade Street and Montis Lane, Epsom. It seeks approval to:

(a) subdivide the land into 78 residential lots and an open space reserve in six stages;

(b) remove 0.812 hectares of native vegetation, including dead vegetation;

(c) carry out works including earthworks, roadworks, fences, and other works ancillary to the subdivision; and

(d) create a drainage reserve.

Subject Land

8 The Subject Land comprises thirteen parcels with a total area of approximately 8.91 hectares within the suburb of Epsom, located immediately west of the Bendigo Creek, described as follows:

(a) 1 Buckland Street, Epsom which is comprised in Certificate of Title Volume 8274 Folio 871 and formally described as Crown Allotment 20A, Township of Epsom, Parish of Sandhurst;

(b) 20 Montis Lane, Epsom which is comprised in Certificate of Title Volume 11335 Folio 620 and formally described as Lot 1 on Title Plan No. TP949533H;

(c) 18-26 Saade Street, Epsom which is comprised in Certificate of Title Volume 9792 Folio 960 and formally described as Reserve 1 on Plan of Subdivision No. LP210004M;

(d) 28-34 Saade Street, Epsom which is comprised in Certificate of Title Volume 9792 Folio 962 and formally described as Lot 2 on Plan of Subdivision No. PS210213C;

(e) 36-46 Saade Street, Epsom which is comprised in Certificate of Title Volume 9792 Folio 963 and formally described as Lot 3 on Plan of Subdivision No. PS210213C, and Certificate of Title Volume 9792 Folio 964 and formally described as Lot 4 on Plan of Subdivision No. PS210213C;

(f) the land comprised in Certificate of Title Volume 5061 Folio 015 and formally described as Lots 1 and 2 on Title Plan No. TP747978S;

(g) the land comprised in Certificate of Title Volume 8782 Folio 139 and formally described as Lots 1 and 2 on Title Plan No. TP743178Y;

(h) the land comprised in Certificate of Title Volume 11796 Folio 179 and formally described as Crown Allotment 2024, Township of Epsom, Parish of Sandhurst;

(i) the land formally described as Crown Allotment 19, No Sec, Township of Epsom (General Law Land); and

(j) the land formally described as Crown Allotment 20, No Sec, Township of Epsom (General Law Land).

9 The Subject Land is shown in the red outline below:

Figure 1: NearMap satellite image showing the Subject Land in red as at 30 July 2024.

10 The Subject Land is located within the Farming Zone (**FZ**). In terms of overlays:

(a) the site is almost entirely affected by the Land Subject to Inundation Overlay - Schedule 1 (**LSIO1**) for flooding from waterways with depths up to and including 350 millimetres], or the Land Subject to Inundation Overlay - Schedule 2 (**LSIO2**) for flooding from waterways with depths greater than 350 millimetres. The area within the site proposed for residential development / zoning is only affected by the LSIO1; and

(b) the site is also partially affected be the Environmental Significance Overlay - Schedule 1 (**ESO1**).

11 The Subject Land has previously been used for farming purposes and is largely cleared of vegetation, with no existing dwellings or structures present. Scattered trees exist throughout the site, with vegetation present along the eastern boundary adjacent to Bendigo Creek and within the northern portion of the site. The Montis Lane road reserve extends through a portion of the site (at the northern end). This road reserve is currently used as a shared path which provides a link to the Bendigo Creek Trail, which runs along the Bendigo Creek from the Epsom Shopping Centre to Lake Weeroona.

12 The surrounding area includes a mixture of residential and commercial land uses, with public open space along Bendigo Creek. The land immediately west of the site is within the General Residential Zone (**GRZ**) with developed and developing residential lots as part of the 'Elmwood Estate'. The Bendigo Creek adjoins the site to the east and separates it from land within the Commercial 2 Zone (**C2Z**) further east. The land to the south of the site is within the Low Density Residential Zone (**LDRZ**) and comprises larger residential lots. The land to the north of the site is also within the FZ and includes an existing drainage basin, owned and managed by the Council, which is proposed to be utilised as part of this proposal.

Background and Chronology

Lodgement of combined Planning Application and Amendment C248gben application

13 In August 2018, Spiire reached out to Council seeking a pre-application meeting in relation to a combined permit application and rezoning of the Subject Land. On 11 September 2018, Council provided its response indicating its support. **(See Tab 2)**

14 On 22 March 2019, the combined application was lodged on behalf of our Client seeking to use and develop the Subject Land for the Proposal. **(See Tab 3)**

15 On 26 March 2019, Council issued an acknowledgement letter. **(See Tab 4)**

Request for Further Information

16 On 15 April 2019, Council issued a Request for Further Information (**RFI**). **(See Tab 5)**

17 On 11 October 2019, a response to Council's RFI was submitted which included an updated Town Planning Report, a Preliminary Environmental Site Assessment, a Soil Management Plan, Explanatory Report, Amendment Instruction Sheet and Amendment Map. **(See Tab 6)**

Referrals / Key Issues

18 The application was referred internally to Council's Drainage Engineer, Traffic Engineer, Sustainable Design Officer. **(See Tab 7)**

19 The application was referred externally to the North Central Catchment Management Authority (**NCCMA**), the Country Fire Authority (**CFA**), the Department of Environment, Energy and Climate Action (DEECA), the Environment Protection Authority (**EPA**), the Department of Transport and Planning (**DTP**), Coliban Water, Dja Dja Wurrung, Downer Utilities and Goulburn Murray Water. **(See Tab 8)**

20 On 17 December 2019, a response to the EPA referral was submitted. There was a range of correspondence between the EPA and Edwards Environmental to determine if a Soil Management Plan (**SMP**) was in fact required for the site, given the background arsenic levels and placement of clean fill on the site. The EPA ultimately advised that they don't

review SMP's and that Council should undertake a peer review of the submitted Preliminary Environmental Site Assessment (**PESA**) and SMP. Council arranged for a peer review of the revised SMP which confirmed that the originally proposed Post Construction Management Measures were not required. Council was satisfied with the updated information provided by our Client in response to the EPA's advice. **(See Tab 9)** In July 2024, Edwards Environmental prepared an updated PESA. **(See Tab 24)**

21 Although, DEECA initially consented to the Proposal subject to conditions, following receipt of the various referral responses the treatment of the open space area along the Bendigo Creek was reviewed. Specifically, the engineering design was revised to avoid the removal of vegetation, with the initial swale drain proposed along the site's eastern boundary replaced with a piped drainage system discharging to the drainage reserve. The non-swale design has avoided the clearance of various trees and as such, an updated Ecological Report was provided to Council on 28 August 2020. **(See Tab 10)**

22 On 14 March 2023, DEECA provided its review and comments on the updated report. On 22 March 2023, Practical Ecology provided its response. On 29 March 2023, DEECA provided its final referral response which reinstated its consent to the Proposal subject to conditions. **(See Tab 11)**

23 On 28 August 2020, a response to the NCCMA referral response (which comprised of an updated Stormwater Management Strategy prepared by Afflux and dated August 2020) was submitted. On 20 October 2020, NCCMA provided a further response requesting further information. In response, Afflux updated their report (dated March 2022) and Terraco prepared a subsequent SMP which provides proof of concept for stormwater detention and treatment solution, in particular for the existing drainage basin. On 1 March 2023, the NCCMA issued a final referral response. **(See Tab 12)**

24 Correspondence regarding the use of Council's Drainage Reserve is provided at **Tab 13**.

25 The site has a Heritage Inventory listing HI as the Epsom Hotel, H7724-0637. On 17 May 2021, Heritage Victoria wrote to the Applicant's project team acknowledging that the site may formerly have been the location of the Epsom Hotel known to have operated during the gold rush years of the mid-late 1850s. It is possible that significant archaeological remains of the hotel complex survive buried at depth across the site.

26 On 9 July 2024, Heritage Victoria wrote to Council confirming that it does not object to the issuing of the planning permit application, but it is important that any interested parties are aware of the requirement to obtain a Heritage Act Consent that applies to this site. **(See Tab 14)**

Council's resolution to prepare

27 On 24 July 2023, Council resolved at its Ordinary Meeting to request the Minister for Planning to authorise Council to prepare a combined planning scheme amendment and planning permit application under section 96A of the PE Act. **(See Tab 15)**

Minister's authorisation to proceed

28 On 28 November 2023, DTP, on behalf of the Minister for Planning, authorised Council to prepare the combined application subject to a range of conditions. **(See Tab 16)**

29 The explanatory report addresses DTP's authorisation conditions in tracked changes, a copy of which is provided at **Tab 17**. There have subsequently been some minor changes

to the report prior to exhibition. Other authorisation conditions were addressed through changes to the subdivision layout plan and the draft permit conditions.

Exhibition of combined Planning Application and Amendment C248gben application

30 On 22 February 2024, Amendment C248gben and the Planning Application were exhibited. The exhibition process comprised of letters to affected landowners / occupiers, a notice in the Bendigo Advertiser, an A3 notice on the subject site and a notice in the Government Gazette. A copy of the notice in the Government Gazette and a list of the landowners/occupiers that were notified in the post is provided at **Tab 18**.

31 A copy of the exhibited documents is provided at **Tab 19**.

32 During exhibition, fifteen submissions were received in total. Thirteen submissions opposed the combined application or sought clarification / changes, and two were in support. **(See Tab 20)**

33 Following exhibition, the Applicant was required to obtain written consent from the landowners of 28-34 Saade Street, Epsom. **(See Tab 21)**

34 A response to the submitters and DEECA is provided at **Tab 22** and a response to the EPA is provided at **Tab 23**.

Council's Resolution to Refer to Panel

35 On 26 August 2024, Council resolved at its Ordinary Meeting to refer all submissions to an independent planning panel. **(See Tab 25)**

Panel Hearing

36 On 6 September 2024, Planning Panels Victoria (**PPV**) confirmed the referral and set out draft directions for the Hearing in this matter. On 9 September 2024, PPV confirmed that the Panel for this matter has now been appointed. Kathy Mitchell AM will be the Panel Chair, with Rodger Eade as the member. **(See Tab 26)**

Key Dates

37 This matter is listed for a Directions Hearing at 10:00am on 23 September 2024. The purpose of the Directions Hearing is to consider procedural requirements and conduct for the Hearing, in addition to confirming key dates ahead of the Hearing.

38 At present, the Panel has proposed the following dates:

Time	Date	Action
12:00pm	19 September 2024	Parties to file *Request to be Heard* form
10:00am	23 September 2024	Directions Hearing
12:00pm	23 September 2024	Parties to provide expert witness details
12:00pm	9 October 2024	Proponent to file expert witness report(s)

Time	Date	Action
12:00pm	9 October 2024	Council to file Part A (background and context) submission
12:00pm	14 October 2024	Council must provide a submitter location map to the Panel only
12:00pm	14 October 2024	Other parties to file expert witness report(s)
12:00pm	18 October 2024	Any parties not appearing at the Hearing to file supplementary submission
12:00pm	18 October 2024	Council to file 'Day 1' version of the Amendment documentation
12:00pm	18 October 2024	Parties to file documents or material to be presented at the hearing
TBC	TBC	Accompanied site inspection
All day	21 October 2024, 22 October 2024, 23 October 2024 (AM only), 28 October 2024 (if required), 29 October 2024 (if required)	Hearing

39 We will provide an update to you once procedural dates have been confirmed.

Brief of Materials

40 Please find enclosed to this letter an index of documents which includes material for you to consider to the extent that you deem relevant.

41 The material can be accessed at the below link:

https://russellkennedylawyers.sharefile.com/d-sbab69bc69cc74f3bb169ef798e080f85.

Please note that this link will expire on **26 March 2025**.

Instructions

42 You are instructed to:

(a) review background materials as necessary and relevant to your expertise;

(b) undertake a peer review, any necessary field work, and prepare an expert evidence report for circulation by 9 October 2024. If this date is not feasible, but a similar date is feasible, please note this; and

(c) appear as an expert witness at the hearing of this matter on 21, 22, 23, 28 and 29 October 2024. If you are only partly available, please let us which dates are suitable for timetabling purposes.

43 At this stage, we are required to circulate your expert witness by **9 October 2024**. We request that you provide your draft expert report to us at least 2 business days ahead of circulation.

44 The content, format, and layout of your expert report, the manner of expression, and the way in which you seek to address yourself to the tasks you have been engaged to undertake are all matters for you. However, your report must be prepared in compliance with *Planning Panels Victoria – Practice Note 1 – Expert Evidence* (**PPV PN1**) and the duties outlined therein.

45 It will be apparent to you that not all the materials which have been provided to you will be necessarily relevant to the task which you have been asked to undertake. You are instructed to examine the material and to determine for yourself what is relevant to the formulation of your conclusions, including any other matters you consider relevant. If you require any further information to complete the tasks you have been instructed to undertake, or if you require any assistance in understanding the nature of the tasks you have been asked to undertake, please contact us.

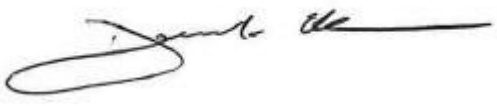
Billing

46 In the first instance, please provide us with your fee estimate addressed to our firm as follows:

Lawserve, Beardall and Smith
C/- David Vorchheimer
Russell Kennedy
Level 18, 500 Bourke Street
Melbourne VIC 3000

47 Please contact us if you have any queries.

Yours faithfully
RUSSELL KENNEDY



David Vorchheimer
Partner

Stefan Fiedler
Partner

INDEX TO BRIEF OF MATERIALS

Tab	Document
Subject Land	
1.	Planning Property Reports.
Combined Planning Application and Amendment C248gben Application	
2.	Council's Response to Proponent's Pre-Application Request, dated 11 September 2018.
3.	Lodgement of Combined Application, dated 22 March 2019, including: • Cover Letter, prepared by Spiire, dated 22 March 2019; • Application for a Planning Permit Form, prepared by Spiire, dated 22 March 2019; • Current Certificates of Title for the Subject Land; • Town Planning Report, Revision No. B, prepared by Spiire, dated March 2019; • Overall Layout Plan, Version 2, prepared by Terraco Pty Ltd, dated 19 March 2019 (*refer to Appendix B of Town Planning Report*); • Clause 56 Assessment, prepared by Spiire (*refer to Appendix C of Town Planning Report*); • Traffic Impact Assessment, Version 2, prepared by Trafficworks Pty Ltd, dated 18 September 2018; • Flora and Fauna Assessment and Native Vegetation Impact Assessment, Version 1.0, prepared by Practical Ecology, dated 19 March 2019; • Bushfire Risk Assessment, Version 1.0, prepared by Practical Ecology, 28 dated February 2018; • Stormwater Management Plan, Version V02a, prepared by Afflux Consulting Pty Ltd, dated 14 September 2018; and • Cultural Heritage Management Plan Approval Letter, prepared by Dja Dja Wurrung Clans Aboriginal Corporation, dated 6 March 2019.
4.	Council's Acknowledgement Letter, dated 26 March 2019.
Request for Further Information	
5.	Council's Request for Further Information, dated 15 April 2019.

Tab	Document
6.	Proponent's Response to Request for Further Information, dated 11 October 2019, including: • Cover Letter, prepared by Spiire, dated 11 October 2019; • Town Planning Report, Revision No. C, prepared by Spiire, dated 10 October 2019; • Preliminary Environmental Site Assessment, Version 2.0, prepared by Edwards Environmental, dated September 2019; • Soil Management Plan, Version 1.0, prepared by Edwards Environmental, dated September 2019; • Native Vegetation Removal Report, Report ID: PRE_2019_020, issued 5 March 2019; • Draft Combined Application Explanatory Report, prepared by Spiire, undated (*PDF and Word versions*); • Draft Amendment C248gben Instruction Sheet, prepared by Spiire, undated (*PDF and Word versions*); and • Amendment C248gben Map No. 15, Version 1, dated 10 October 2019.
Referrals / Key Issues	
7.	Internal Referrals, including: • Internal Referral Comments, prepared by ESD Department, dated 17 December 2019; • Internal Referral Comments, prepared by Traffic Engineering Department, dated 20 December 2019; • Internal Referral Comments, prepared by Parks and Open Space Department, dated 20 December 2019; • Internal Referral Comments, prepared by Drainage Engineering Department, dated 7 February 2020.
8.	External Referrals, including: • External Referral Comments, prepared by Downer, dated 9 November 2019; • External Referral Comments, prepared by Coliban Water, dated 4 December 2019; • External Referral Comments, prepared by CFA, dated 5 December 2019;

Tab	Document
	• External Referral Comments, prepared by Regional Transport Planning Loddon Mallee c/- Department of Transport, dated 5 December 2019; • External Referral Comments, prepared by Head, Transport for Victoria c/- Department of Transport, dated 5 December 2019; • External Referral Comments, prepared by Dja Dja Wurrung Clans Aboriginal Corporation, dated 5 December 2019; • External Referral Comments, prepared by EPA, dated 6 December 2019; • External Referral Comments, prepared by North Central CMA, dated 6 December 2019; • External Referral Comments, prepared by Goulburn Murray Water, dated 14 January 2020; • External Referral Comments, prepared by DELWP / DEECA, dated 28 April 2020; • DELWP / DEECA Mapping Request.
9.	Proponent's Response to EPA External Referral Comments, including: • Emails between Council and EPA, dated between 2 February 2023 – 22 March 2023; • Peer Review of Proposed Soil Management Plan, prepared by Tetra Tech Coffey, dated 6 June 2021; • Letter to Spiire, prepared by Edwards Environmental, dated 17 December 2019; • Soil Management Plan, Version 2.0, prepared by Edwards Environmental, dated February 2020; • Email attaching Updated Soil Management Plan from Edwards Environmental to EPA, dated 12 March 2020; • Emails between Edwards Environmental and EPA, dated between 12 March 2020 – 7 April 2020; • Emails between Spiire, Edwards Environmental and EPA, dated between 12 March 2020 – 19 May 2020.
10.	Proponent's Response to DELWP / DEECA External Referral Comments, including: • Flora and Fauna Assessment and Native Vegetation Impact Assessment, Version 2.0, prepared by Practical Ecology, dated 27 August 2020.
11.	Correspondence between Practical Ecology and DELWP / DEECA, including:

Tab	Document
	• Flora and Fauna Assessment and Native Vegetation Impact Assessment, Version 2.0, prepared by Practical Ecology, dated 21 March 2023; • Letter from DELWP / DEECA to Council, dated 14 March 2023; • Letter from DELWP / DEECA to Council, dated 29 March 2023.
12.	Proponent's Response to North Central CMA External Referral Comments, including: • Letter from North Central CMA to Council, dated 6 December 2019; • Stormwater Management Plan & Future Strategy, prepared by Afflux Consulting, Version V01c, dated 24 August 2020; • Letter from North Central CMA to Council, dated 20 October 2020; • Revised Stormwater Management Plan, Version 7, prepared by Afflux Consulting, dated 6 March 2022; • Stormwater Management Plan, Version 1, prepared by Terraco Pty Ltd, dated October 2022; • Letter from North Central CMA to Council, dated 1 March 2023.
13.	Correspondence regarding Council Drainage Reserve, including: • Proponent's Written Agreement, dated between 3 January 2023 – 12 January 2023; • Council Meeting Minutes, dated 22 May 2023 (*refer to PDF page 44*); • Council Meeting Agenda, dated 22 May 2023 (*refer to PDF page 144*); • Letter from Council to Spiire, dated 30 June 2021; • Letter from Spiire to Council, dated 22 April 2021.
14.	Heritage Inventory Listing, including: • Letter from Heritage Victoria c/- DELWP / DEECA to Terraco Pty Ltd, dated 17 May 2021; • Letter of Advice, prepared by Heritage Insight, dated 15 July 2021; • Site History Report Advice, prepared by Dr Susan Walter, dated November 2021; • Letter from Heritage Victoria to Council, dated 9 July 2024; • Historical Archaeological Site Card Form, undated;

Tab	Document
	• Obtaining a Heritage Act Consent Brochure, prepared by Heritage Victoria c/- DELWP / DEECA, undated.
Council's Resolution to Prepare	
15.	Council Meeting, dated 24 July 2023, including: • Council Meeting Minutes, dated 24 July 2023 (*refer to PDF page 33*); • Council Meeting Agenda, dated 24 July 2023 (*refer to PDF page 90*).
Minister's Authorisation to Proceed	
16.	Authorisation to Prepare Amendment and Conditions, dated 28 November 2023, including: • Letter under Delegation from the Minister for Planning c/- Department of Transport and Planning, dated 28 November 2023.
17.	Response to Preparation of Amendment Conditions, including: • Draft Updated Combined Application Explanatory Report, prepared by Spiire, dated 7 December 2023.
Exhibition of Combined Planning Application and Amendment C248gben Application	
18.	Notice Documents, including: • Map of Notified Landowners and Occupiers, prepared by Strategic Planning, dated 9 February 2024; • Notice in Government Gazette, No. G 8, dated 22 February 2024 (*refer to PDF page 279*).
19.	Amendment C248gben Exhibition Documents, including: • Explanatory Report; • Instruction Sheet; • Map No. 15; • Schedule 2 to Clause 32.09 – Neighbourhood Residential Zone; • Draft Conditions for Planning Permit No. DS/207/2019; • Overall Layout Plan, Version 12, prepared by Terraco Pty Ltd, dated 14 December 2023; • Stormwater Management Plan, Version 2, prepared by Terraco Pty Ltd, dated December 2023;

Tab	Document
	• Town Planning Report, Rev No. J, prepared by Spiire, dated 10 January 2024; • Bushfire Risk Assessment, Version 2.0, prepared by Practical Ecology, dated 22 January 2024; • Flora and Fauna Assessment and Native Vegetation Impact Assessment, Version 2.0, prepared by Practical Ecology, dated 22 January 2024; • Preliminary Environmental Site Assessment, Version 3.1, prepared by Edwards Environmental, dated January 2024.
20.	Submissions, including: • Collated Submissions, dated between February 2024 – March 2024; • Letter from DELWP / DEECA to Council, dated 11 April 2024; • Letter from EPA to Council, dated 30 April 2024.
21.	Written Consent of Maria and Giuseppe Dimasi, dated 19 April 2024.
22.	Proponent's Response to Submissions, including: • Native Vegetation Impact Assessment Amendment, prepared by Practical Ecology, dated 7 June 2024; • Letter from Spiire to Council, dated 21 June 2024.
23.	Proponent's Response to EPA Submission, dated 26 June 2024, including: • Email from Edwards Environmental to EPA, dated 26 June 2024; • Table regarding Derivation of Investigation Levels HIL A Calculations, undated; • Determination of As Bioaccessibility in Impacted Soil, prepared by University of South Australia, dated 24 June 2024.
24.	Updated Preliminary Environmental Site Assessment, including: • Preliminary Environmental Site Assessment, Version 4.0, prepared by Edwards Environmental, dated July 2024; • Sample Exceedance Map, Rev. D, prepared by Edwards Environmental, dated 16 August 2024.
Council's Resolution to Refer to Panel	
25.	Council Meeting, dated 26 August 2024, including: • Council Meeting Minutes, dated 26 August 2024 (*refer to PDF page 86*);

Tab	Document
	• Council Meeting Agenda, dated 26 August 2024 (*refer to PDF page 114*).
Panel Hearing	
26.	Panel's Directions, including: • Directions Hearing Notification, prepared by Planning Panels Victoria, dated 6 September 2024.