



REQUEST FOR TENDER DOCUMENTS
SECTION 3 – SPECIFICATION

Rochester Flood Management Plan Review and
Update

C24012



Closes: 2pm, 26 March 2024

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1. Purpose of Brief

Campaspe Shire Council has received funding from the Department of Energy, Environment and Climate Action (DEECA) to deliver a review and update of the Rochester Flood Management Plan (2013). This is in response to the devastating flood of October 2022 that significantly impacted the township of Rochester. The October 2022 flood event inundated the majority of the township, including most homes and businesses, the hospital, all three schools and majority of the community infrastructure.

The October 2022 flood exceeded all flood events modelled in the previous 2013 study, which modelled floods up to and including the 0.5% Annual Exceedance Probability (AEP), or the 1 in 200 year Average Recurrence Interval (ARI). There is now an urgent need to better understand the flood risk for Rochester for the full range of flood events, to update flood mapping and investigate potential mitigation options for the town. This includes but is not limited to previously considered mitigation options and the results of the technical assessment of the operating and infrastructure arrangements at Lake Eppalock.

This project also presents an opportunity to update the original modelling by calibrating to the largest flood in recorded history, utilising the improved modelling practices introduced by Australian Rainfall and Runoff 2019 and recent advances in flood modelling software, and incorporating the latest guidance climate change considerations.

The project will involve modelling and analysis to define existing flood behaviour in the study area and the identification and evaluation of measures to mitigate and manage flood risk in the study area - including recommendations for flood planning overlays, investigating potential mitigation works, reviewing the flood warning systems and emergency management plans.

The project will also consider the Lake Eppalock Technical Assessment Report prepared by HARC for DEECA. That report examines potential changes to operating rules and infrastructure at Lake Eppalock to increase flood mitigation along the Campaspe River. It provides a high level assessment of the impacts on Rochester, other properties and wider community. If required, it is envisaged the principal will engage a separate specialist consultant to work in close consultation with the consultant to undertake a more detailed assessment of the socio-economic impacts of any proposed alterations to the operation and infrastructure of Lake Eppalock.

The study area is to be confirmed by the appointed contractor and will generally include the Campaspe River and associated flood plain from downstream of Lake Eppalock where the floodplain is relatively confined through to Echuca. An indicative study area is shown in Figure 1 below

The study does not include modelling of urban stormwater runoff within Rochester.

Detailed modelling is required for the Rochester township and adjoining area around Rochester.

The rural community between Rochester and Echuca was also significantly impacted. Modelling of a sufficient detail is sought in this area to inform flood warning, planning scheme amendments and understand the impact of existing infrastructure and possible mitigation works.

Boundaries need to extend sufficiently on both sides of the Campaspe River to enable accurate modelling of flood characteristics of the entire Campaspe River floodplain and model the full extent and length of any breakout flow paths from the Campaspe River.

Campaspe Shire is seeking proposals from suitably qualified organisations or individuals to undertake the required investigations and develop an updated Rochester Flood Management Plan.

The intention at the completion of this study is to have updated and sufficient flood information that is capable of being used by a variety of stakeholders including authorities and community for land use and development planning, flood management planning, emergency response and flood education.

The purpose of this brief is to provide a specification on which interested parties can base their submissions and set out the *minimum* required project tasks and deliverables.

2. Background:

Prior to the October 2022 flood event, Rochester experienced significant flooding from the Campaspe River in January 2011. The January 2011 flood was the largest recorded flood at the time, impacting 80% of the town. This flood was in the order of a 1% Annual Exceedance Probability (AEP) flood or 1 in 100 year Annual Recurrence Interval (ARI). The October 2022 flood was substantially larger than January 2011, exceeding previously modelled floods including the 0.5% AEP flood by 300mm at the Rochester Town Gauge. Initial predictions indicate this flood was in the order of the 1 in 500 year AEP flood event.

In 2013, a flood management plan was produced for Rochester. Many of the recommendations of this plan were introduced, including updating the total flood warning system for the town and some minor mitigation works south of the town. Large structural flood mitigation options were explored and modelled however they were not pursued due to either not being economically viable, not being supported by the community or both.

The Department of Energy, Environment and Climate Action (DEECA) lead a study by HARC Consultants providing a technical assessment of the operating and infrastructure arrangements at Lake Eppalock. The aim of that project was to determine if changing the operating rules or infrastructure of Lake Eppalock could improve protection for downstream communities from future flooding. That assessment examined a range of options – including whether the installation of gates, other infrastructure (such as a bigger release valve) or altered operations could enable Lake Eppalock to provide improved flood mitigation as well as the costs associated with any changes. The Lake Eppalock project will support this review and update of the Rochester Flood Management Plan. It is expected that the Consultant use the results to incorporate into developing and comparing a full suite of options for flood mitigation at Rochester.

In addition to the devastating impacts to the Rochester community, there were significant impacts to the rural communities of Strathallan and Bamawm. Flood modelling is required to understand the potential risk of flooding, enable relevant and specific future flood warnings for these areas, update flood related planning controls, understand the impact of infrastructure (roads, rail, water supply channels) and assess the impact and benefit of works to provide individual protection to critical assets on impacted rural properties.

Figure 1 below shows the indicative study area. The detailed mapping boundary shows the area where detailed modelling is required of the Rochester township to directly downstream of the Waranga Western Channel to ensure that all existing urban and future growth areas are covered. It is expected to extend upstream to Elmore with the objective of ensuring all key effluent flow paths are accurately mapped.

The regional mapping boundary shows the estimated area of the balance of the Campaspe River floodplain that includes all other known breakout flow paths. It extends from downstream of Lake Eppalock to Elmore and from the Waranga Western Channel down to Echuca. Modelling of the regional mapping boundary needs to be of sufficient detail to map the flood risk of the area, assess the impact of features in the landscape (e.g. railways, water supply channels, levees) and assess the impact of identified mitigation options.

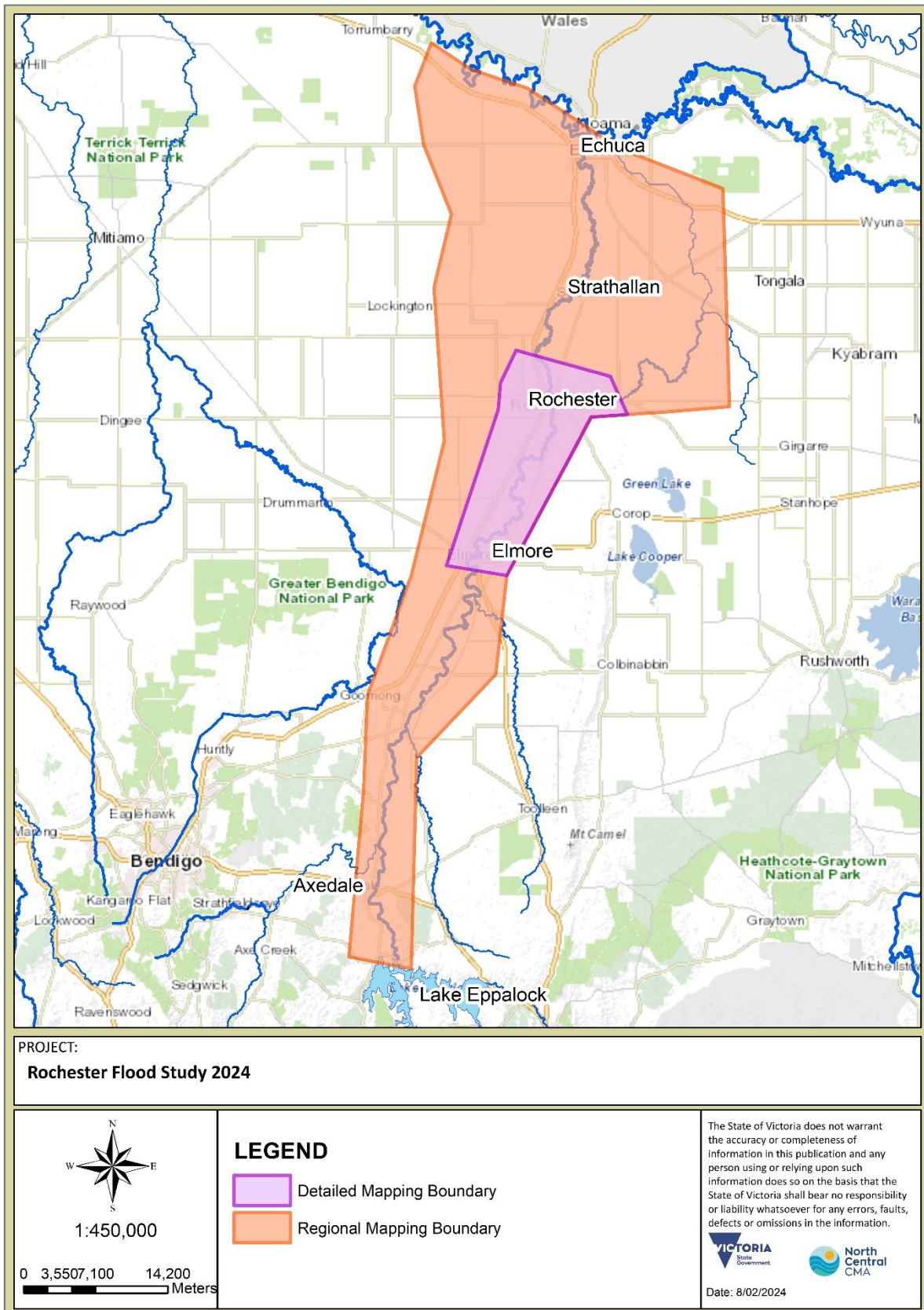


Figure 1 Indicative Rochester Study Boundaries

2.1. Overview of Arrangements:

Campaspe Shire Council is the Principal to this Contract. The Contract will be managed by a Project Manager appointed by the Principal.

The Project will be overseen by a Project Control Group comprising representatives from Campaspe Shire Council and other agency representatives such as North Central CMA, Goulburn Murray Water, VicSES and DEECA.

A CEO Group comprising CEO's (or delegates) of organisations represented on the Project Control Group shall be established and briefed along with the Campaspe Shire councillors and a Flood Study Reference Committee (FSRC) as the project progresses. The Project Manager shall coordinate these briefings. The FSRC comprising community and public authority representatives shall function as a sounding board during the project.

Campaspe Shire Council is funding the study through funding provided by the Victorian Government.

3. Study Objectives:

The Rochester Flood Management Plan Review and Update is designed to meet a range of floodplain management requirements. This project will include a full flood study and assessment of mitigation options for Rochester and the downstream rural communities (between Rochester and Echuca).

The intention at the completion of this study is to have updated and sufficient flood information that is capable of being used by a variety of stakeholders including authorities and community for land use and development planning, flood management planning, emergency response and flooding education.

This brief sets out 8 Tasks to be completed in undertaking this Contract. In general, it is intended that each Task be carried out concurrently for both components. Section 4 sets out the potential division of these Tasks.

It is expected this project will result in two reports:

- Flood Study Report –It will include details of the hydrology, hydraulic model development and calibration and design flood modelling and mapping; and
- Floodplain Risk Management Study and Plan –It will include mapping, flood risk assessment, and identification and assessment of mitigation options.

In summary, this project will include:

- Calibration with historical flood events including the October 2022 flood event.
- Update existing flood information for the full range of riverine flooding events up to and including the probable maximum flood across the study area. (Note - Does NOT include local urban storm water runoff effects).
- Modelling of climate change scenarios.

- Identify flooding risks and consequences including the extent of impact to properties within the townships and satellite development areas and associated damages costs,
- Assessment of the feasibility of a range of potential mitigation options.
- Undertake community and public authority consultation and gain input into the preparation of the Flood Management Plan.

Outputs from the Flood Management Plan Review will be used to:

- Refine flood related controls in the Campaspe Planning Scheme.
- Develop flood intelligence products and inform emergency response planning.
- Seek further funding for the implementation of community supported and feasible mitigation options.
- Assist in the preparation of community flood awareness and education products.
- Update flood warning services provided by the BoM.
- Support the assessment of flood risk for insurance purposes.

4. Detailed Terms of Reference

Consultants shall provide a methodology and timeframe, including hold points, to address each task in the Detailed Terms of Reference. The methodology shall also describe how the Consultant anticipates compliance with the study objectives set out in Section 3.

The Consultant must carry out the study in accordance with current floodplain management policies and guidelines in consultation with the FSRC, described in Section 6. The Consultant is required to have regard for the recommendations described in *Australian Rainfall and Runoff: A Guide to Flood Estimation (Commonwealth of Australia (Geoscience Australia), 2019* in the context of the *Victorian Floodplain Management Strategy (DELWP), 2016*. The Consultant is also expected to have regard for current state floodplain management policy and land use planning provisions as set out in the Victorian Planning Provisions as follows:

- *Victoria Planning Provisions: Applying for a Planning Permit under the Flood Provisions: A Guide for Councils, Referral Authorities and Applicants (DELWP, 2015)*
- *Victoria Planning Provisions: Applying the Flood Provisions in Planning Schemes: A Guide for Councils (DELWP, 2015).*

At each hold point a stage report must be submitted to and signed off by the Campaspe Shire Council Project Manager before any work on subsequent stages of the investigations may be recognized or invoiced, unless approved in advance in writing by the Project Manager. The Project Manager may refer to independent experts before signing off on any stage report. Note - The hold point relating to approval of the final Flood Management Plan requires approval by the Council prior to Project Manager approval.

4.1 Data Collection and Assessment (Task 1)

The Consultant is required to research and document existing available information of relevance to the study. This includes the collection and collation of information on:

- a) Hydrographic and flood records and past studies relevant to the study area; Observations from October 2022 and other significant flood events to identify events that may be suitable for model calibration;
- b) Information provided by the Flood Study Reference Committee and other stakeholders/members of the community;
- c) Changes to land form (e.g. cut, fill, etc.), infrastructure (e.g. new buildings, bridges, culverts, channels, roads, drains, etc.) including channel decommissioning sufficient to account for any variations of flood behaviour over time;
- d) Existing survey data, for example describing relevant bridge, culvert and other significant structures;
- e) LIDAR data. LIDAR data has been captured for the entire study area through a number of projects led by DEECA through the coordinated imagery project. It is expected that some manipulation will be required by the Consultant to combine these datasets where required to ensure the most accurate information is utilised. It is not expected that any additional LIDAR data is required to undertake the study.

Campaspe Shire Council and North Central Catchment Management Authority (NCCMA) will endeavour to ensure data provided is accurate, however the Consultant is required to confirm that all data relied on for delivery of the Study is of suitable quality and accuracy to provide a reliable product.

The Consultant shall provide recommendations and specifications for agreed additional data sourcing, such as the survey of bridge/culvert structures and property floor level data if required. Sourcing of the agreed additional data shall be arranged and funded by Council.

The Consultant should allow 20 working days within the project schedule for completion of the field survey requirements by Council.

4.2 Hydrology (Task 2)

The Consultant shall undertake suitable analysis to determine the following:

- a) Historical flood hydrographs where required for hydraulic model calibration (i) at key inflow locations to the hydraulic model and (ii) to describe within-model inflows.
- b) Design flood hydrographs at key inflow locations to the hydraulic model.

In their submissions tenderers shall describe clearly and in detail the proposed approach to the hydrologic modelling/analysis, calibration and validation and describe any limitations along with associated advantages or disadvantages.

The flood frequency is to be carried out in accordance with procedures outlined in Australian Rainfall and Runoff (2019).

The stream gauging data used for flood frequency analysis should be checked for consistency and accuracy. Issues to be considered include:

- a) Any relocation of the gauge though its recording history,
- b) Any change of gauge zero datum,
- c) Any change of gauge equipment, and
- d) Any change of channel cross-section at the control point.

- e) The rating curve and its accuracy especially in the upper range and extrapolation of the rating curve.

The rating curve for the Rochester Township gauge is based on hydraulic modelling undertaken as part of the Rochester Flood Management Plan 2013. An updated rating curve for this gauge is a desired output of this study.

The results of the flood frequency analysis should be consistent with that of the hydrologic model (if one is set up) in keeping with the relevant sections of Australian Rainfall and Runoff. To this end the hydrologic model parameters should be adjusted to fit the flood frequency curve, if warranted not the frequency analysis adjusted to suit the model.

The Consultant will select historic events for analysis in consultation with the PCG.

Outputs from the hydrologic investigation shall include:

- a) Simulation of and calibration to selected historic events.
- b) An estimation of the average recurrence interval of the selected historic events.
- c) Sensitivity analysis demonstrating the suitability of the calibration methodology, boundary conditions and assumptions.
- d) Design flood discharge and hydrographs for the 0.05%, 0.1%, 0.2%, 0.5%, 1%, 2%, 5%, 10% and 20% AEP and Probable Maximum Flood events at key locations and appropriate durations.
- e) Provision of model input and output files for review
- f) Discussion on effective flood warning time and the rate of rise.
- g) Sensitivity testing of the impacts of climate change, based on best practice modelling of climate change scenarios as outlined in ARR2019.
- h) Sensitivity analysis of the influence of Lake Eppalock at various storage levels

Where sensitivity analyses are required, the Consultant is required to assign confidence limits and to justify their basis by discussing assumptions made for model parameters, design hydrographs and the catchment response characteristics they infer.

Following completion of the hydrologic modelling component of the study, a report shall be submitted detailing the methodology, all assumptions, findings and conclusions made. The report shall include the calibration and output design hydrographs along with a full and complete discussion of their interpretation.

This report shall contain sufficient information for the PCG or delegate to assess completion of this Task. The report may be subject to independent peer review, at the discretion of the PCG. Submission and approval of the report will constitute completion of this milestone and eligibility for payment under Schedule 1 – Pricing Schedule of the Contract.

4.3 Hydraulic Model Development and Calibration (Task 3)

In their submissions tenderers should nominate their proposed choice of hydraulic modelling technique, the model to be used and a sound basis for doing so. The preferred hydraulic modelling package is TUFLOW. This proposed approach should consider the use of the model in assessing mitigation options in later parts of the project.

The modelling methodology should take into account the following issues/ considerations:

- a) The large study area and the need for practical run times:
- b) The need for high resolution flood mapping in and around the township of Rochester and identified growth areas.
- c) Potential lower resolution flood mapping upstream of Campaspe Weir to Lake Eppalock and downstream from Rochester through to the Murray River.

The Consultant shall calibrate and validate the hydraulic model using available data from historical flood event(s). Where sufficient data is available, at least 3 flood events, the selection of which is to be approved by PCG, are to be used for calibration and validation.

Model parameters for calibration events should reflect the relevant catchment and floodplain conditions at the time of these events. The differences between the current situation and that at the time of the selected events are to be clearly outlined. A clear outline of the modelling parameters used for each event is to be given.

Calibration outputs for the entire study area shall include (as a minimum) sensitivity analysis demonstrating the suitability of boundary conditions and any other parameter assumptions. Typical parameters sensitivity tested are:

- a) Structure losses (inlet/outlet).
- b) Roughness.
- c) Hydrological losses.
- d) Hydrological parameters for routing/roughness; and
- e) Boundary conditions, particularly downstream water level or stage-flow boundaries.

It is expected that the Consultant will liaise closely with the PCG throughout model development, calibration and validation.

The consultant shall prepare a calibration report, to be submitted to the Project Manager for review and approval. The calibration report will provide a full and complete discussion of the methods and outcomes of the model development and calibration stage as described above.

This report shall contain sufficient information for the PCG or delegate to assess completion of this Task. The report may be subject to independent peer review, at the discretion of the PCG. Submission and approval of the report will constitute completion of this milestone and eligibility for payment under Schedule 1 – Pricing Schedule of the Contract.

In addition to the calibration report, the Consultant shall prepare a selection of draft historic and design flood extent maps for presentation to and review by the community.

4.4 Design Flood Modelling (Task 4A)

The Consultant shall model and provide flood mapping and associated risk profiling for existing conditions in accordance with the Victorian Flood Data and Mapping Guidelines for the study area noting the relative levels of accuracy:

- a) Higher levels of resolution and accuracy are required in the Rochester township.
- b) Modelling of a sufficient resolution is required to provide a good understanding of the impact of existing infrastructure and possible mitigation works in the rural area between Rochester and Echuca.
- c) Flood modelling will consider the results of the technical assessment of the operating and infrastructure arrangements at Lake Eppalock project.

Map outputs for the study area shall include:

- a) Flood information (including extents, flood levels, depths, velocities and hazard) for the calibration events under existing conditions.
- b) Additional flood mapping linked to regular gauge height intervals. In particular mapping for Rochester Township for gauge heights in 100mm increments between 114.1m AHD (20% AEP) to 115.2m AHD (2%AEP). (Required as number of houses inundated increases exponentially as the level increases in this range)
- c) Flood mapping linked to various antecedent storage levels in Lake Eppalock.
- d) Hydraulic category mapping (floodway, flood storage, flood fringe)
- e) Provisional flood hazard categorisation; and
- f) Interim flood planning overlays.

For each event that has been modelled the Consultant will also assess the number of properties with above floor level inundation. The Consultant will indicate the method proposed to undertake this assessment and present the findings, figures and tabulations in the Flood Study report.

Further details describing the required mapping and data products to be produced in this Task, and presented in the Flood Study report, are described in Section 4.8.

4.5 Climate Change Projections (Task4B)

The Consultant shall consider the effect of climate change under Representative Concentration Pathways (RCPs) 4.5 and 8.5 on future flood event probabilities in accordance with Australian Rainfall and Runoff 2019.

By comparing the modelled hydrographs of present-day events with projected hydrographs that factor in increases in rainfall intensity, the time until an 'increase in AEP level' under RCP 4.5 and 8.5 can be estimated (i.e., the timeframe over which present day 1% AEP magnitude events could be occurring at a 2% AEP frequency). These comparisons are to be made for the 10% AEP and 1% AEP modelled events under each climate change scenario.

In addition to the above comparison, the projected 1% AEP events in the year 2100 under RCP 4.5 and 8.5 shall be modelled.

4.6 Sensitivity Analysis (Task 4C)

Sensitivity analysis shall be undertaken which will include, but not limited to, the following model parameters:

- Rainfall – spatial variations, temporal variations and losses
- Catchment storage (including Lake Eppalock levels)
- Roughness coefficients
- Blockage factors
- Boundary conditions

Sensitivity analysis results shall be incorporated into the relevant Hydrology or Hydraulic Model Reports.

4.7 Flood Animations (Task 4D)

Flood progression animation is a required project output to provide a resource for use in community consultation, information and flood response purposes.

Animations must clearly show a timeframe from the time the flood peak(s) first arrive at the upstream hydraulic model boundary(s) to the time(s) when flood water has receded back into the main stream channels. It is desirable for the animation to show major structures or points of interest as points that light up on the map as the flood progresses as well as display the maximum gauge height reached at any existing or proposed gauge sites.

The Consultant shall allow for a minimum of four (4) design flood event animations in the quoted price.

4.8 Draft Flood Study Report (Task 5)

Following completion of the hydraulic modelling, a draft final report shall be submitted detailing the methodology, all assumptions, findings and conclusions made. The report shall be accompanied by draft maps showing flood extents and related information under existing development conditions.

The Flood Study report shall be a stand-alone document that sets out in detail:

- a) An executive summary (in plain English) that summarises the results of the study and is both concise and informative.
- b) Background information describing flooding information and history relevant to the study.
- c) Details of data and information collected and used for the study.
- d) The methodology, processes and results for the survey component of the study including achieved accuracies.
- e) Details of all hydrologic and hydraulic modelling and analyses including discussion on confidence limits and achieved accuracies, including sensitivity analysis and allowances for the impacts of climate change.
- f) Maps and other information as described in Task 4 and in accordance with relevant requirements in Section 5.3

- g) Details of the community consultation program including a summary of the formal consultation process, submissions and associated responses
- h) All study findings, conclusions and recommendations
- i) The details of all changes and /or additions to work scope and / or deliverables agreed during the course of the study.

The draft Flood Study report will be reviewed by the PCG and comments provided to the Consultant. The Consultant will revise the report to address those comments.

This report shall contain sufficient information for the PCG to assess completion of this stage of the study. Submission and approval of the report will constitute completion of this milestone, eligibility for payment under Schedule 1 – Pricing Schedule of the Contract and approval to proceed with the flood risk assessment.

Consultation shall be organised by the Project Manager with the Consultant required to attend and present to the FSRC, community consultation and councillor briefing meetings. The CEO Group briefings will generally be via Teams and the Project Manager will attempt to coordinate on-site meetings on the same day for multiple groups.

The Consultant will review submissions and comments received through community consultation and make any necessary changes to the report in consultation with the PCG.

4.9 Flood Risk Assessment (Task 6)

Using the results from Task 5 the Consultant is to undertake an assessment of the flood risk, having regard for the economic, social and environmental costs of flooding and the benefits of any identified solutions. The assessment will be in accordance with the risk management procedures set out in AS/NZS 4360:2004 Risk Management.

4.10 Flood Damage Assessment (Task 7)

The consultant will undertake a flood damage assessment(s) to determine the cost of flooding within the study area under existing conditions, with the following elements:

- a) Preparation of a detailed flood damages model which includes estimates of total existing flood damages and average annual damages (potential and actual) using ANUFLOOD, the “Rapid Appraisal Method for Floodplain Management” (NRE, 2000) or some other recognised method. Both direct and indirect damages are to be included in the assessment.
- b) Determination of the total flood damage for the range of floods covered under Task 3 and having regard for surveyed floor levels.
- c) Determination of average annual damages for all modelled flood events up to and including the PMF event.
- d) Assessment of intangible flood damages and their relative importance
- e) Identification of any social and environmental costs or benefits of flooding.

Flood damage data shall be presented as clear and detailed tabulations and graphs. Damages shall be itemised for residential, commercial/industrial and public holdings and include details of the number, description and location of properties affected along with information on flood depth and the likelihood of over-floor flooding. The number and location of existing buildings with little or no freeboard above the 1% AEP flood level shall also be reported. The Consultant is required to specify in their proposal how this information is to be reported.

Categories of damage shall be specified separately (e.g., urban and rural damages). The Consultant shall also provide evidence of successful application of the proposed model in other flood studies.

4.11 Flood Response Plan Review and Update (Task 8)

The consultant is to review and update the flood response plan as part of the relevant Municipal Emergency Plans for sections of Campaspe River modelled and relevant to the waterways/drains flood mapped by this project. The Consultant is required to prepare a draft flood response plan for consideration by Campaspe Shire and the Victoria State Emergency Service. MFEP Appendices A, B, C, D and F will be completed. This will be provided in Word, Excel and pdf formats. (Refer Attachment 2 for sample Appendices)

The flood response plan should consider:

- a) The location of any significant flood flow breakouts (consider the AEP at which they commence and critical locations such as low points along roads where access to populated or popular areas might be cut, etc. This and other study outputs will be used by Campaspe Shire to inform and assist an update of the Municipal Emergency Management Plan Flood Sub-Plan in order to facilitate improved flood preparedness and a more targeted and effective response in the event of flood.
- b) The location of essential services and high-risk facilities (e.g. caravan park, retirement village, schools).

4.12 Flood Intelligence and Consequence Information (Task 9)

The Consultant shall prepare flood intelligence and consequence information for the use by emergency services, including Vic SES, for the purposes of planning and responding to future flood events.

Flood intelligence information is to be recorded for the following scenarios: 0.05%, 0.1%, 0.2%, 0.5%, 1%, 2%, 5%, 10% and 20% AEP and Probable Maximum Flood events, as well as any additional mapping of intermediate gauge height intervals as referred to in Section 4.4.

This will include but not be limited to the following for all scenarios specified above:

- Flood/No Flood Tool – rainfall intensity and flooding indicator (riverine)
- Flood Peak Calculator - river gauge correlations (riverine)
- Flood peak travel time calculator/warning time available (riverine)
- Modelled/calibrated hydrographs at gauging stations (if available)
- Flood Intelligence Cards produced according to the template provided in Appendix A of this brief

- Property Inundation and Road Inundation tables. Tables shall list impacted properties in order of timing (i.e. first to last impacted).
- Property and road inundation tables as well as maps must include all properties and roads impacted up to and including the mapped scenario.
- Note: it has been past practice to exclude details of assets impacted at lower flood levels from tables relating to a particular AEP event. This has been shown to be ineffective in Incident Control Centre (ICC) situations.
- Property and road inundation data (inundation depth, time, and mapping) for all properties and roads impacted by flooding. It is desirable that maps are colour-coded for flood depths and impacted properties and roads are labelled with above/below floor flooding depths.

All tables shall be provided in Word format supported by GIS layers (in ESRI format) of affected buildings (above and below floor level) and roads. These tables shall contain polygons for buildings and polygons or lines for “at risk” roads. The tables will contain suitable columns for identifying all data and flood data for each scenario (depth, water elevation, surveyed floor level etc.).

Flood class levels are to be reviewed on the basis of the new inundation and hazard mapping and revised flood level recommendations provided based on the category definitions.

Consultants are encouraged to propose additional and / or alternative intelligence products that satisfy the underlying requirement that they add to local understanding of flooding behaviours and characteristics and / or assist planning, mitigation and / or response to floods.

4.13 Flood Related Review of Land Use & Development Controls (Task 10)

Flood Related Campaspe Planning Scheme Review

The Consultant shall review flood related aspects and provisions of the Campaspe Planning Scheme relevant to the waterways flood mapped by this project. The Consultant is required to recommend revisions to the planning scheme based on the flood mapping outcomes from this project. These recommendations may address the use of flood related planning zone and overlays and revisions to the provisions of the scheme. As noted in Section 5.5, Campaspe Shire Council in conjunction with North Central CMA, Goulburn Broken CMA and DEECA will prepare maps and other material relating to the Planning Scheme Amendment process.

4.14 Identification and Assessment of Mitigation Options (Task 11)

The Consultant will identify potential structural mitigation measures within the study area, taking on board options identified through community consultation processes and including those in previous studies and the results of the technical assessment of the operating and infrastructure arrangements at Lake Eppalock. The possible measures to be assessed may include waterway structure improvements (culverts/bridges), waterway enlargements, levee bank construction and retarding basins.

The Consultant will undertake an initial feasibility assessment of the mitigation options identified including determining the potential for the reduction of damages, likely current costs, and any environmental and cultural heritage considerations. This will require reconsideration of those issues and recalculation of those costs as they relate to mitigation options considered and / or proposed in the previous studies.

Following completion of the initial feasibility assessment the consultant will prepare a report summarising the options considered and the outcomes of the assessment. The report will enable the PCG to review and obtain community input to the assessment of options, and the selection of a preferred set of options to be considered in further detail, to be presented in the Floodplain Risk Management Plan report.

Following on from the initial feasibility assessment, the Consultant will be required to:

- a) Model a range of design floods for the structural mitigation options proposed.
- b) Assess the impact of each of the structural mitigation measures and discuss feasibility, including mapping of the impacts on flood extents and depths.
- c) Provide flood damage assessment for the structural mitigation options.
- d) Prepare preliminary costing of the structural mitigation options. This is to include the additional costs not currently addressed in the Lake Eppalock Technical Report including increased O&M costs (to be supplied by the Principal) and inundation compensation. If required, the Principal shall provide a socio-economic assessment of the impacts of any proposed changes Lake Eppalock's operation to be prepared by a specialist consultant engaged by the Principal or DEECA to close any related gaps in the Lake Eppalock Technical Assessment report. The Principal shall prepare the required brief in consultation with the Consultant.
- e) Provide a benefit-cost analysis of the structural mitigation options.

Assessment of the mitigation options is to be:

- a) Directed by the Project Control Group,
- b) Undertaken in consultation with the FSRC, and
- c) Include briefings of the CEO Group and at least one briefing of Campaspe Shire councillors.

4.15 Floodplain Risk Management Plan Reports (Task 12)

Following the completion of Task 7, the Consultant will prepare a Draft Floodplain Risk Management Plan report covering all aspects of the Tasks 6 and 7, and including:

- a) An executive summary (in plain English) that summarises the results of the study and is both concise and informative.
- b) A summary of the Flood Study report that gives sufficient context to the Floodplain Risk Management report, including relevant maps.
- c) The risk assessment and treatment analyses
- d) A description of the mitigation options considered, and the outcomes of the feasibility assessment, including mapping of the impacts on flood extents and depths, flood damages assessment, preliminary costings and benefit cost analysis.
- e) Details of the community consultation program including a summary of the formal consultation process, submissions and associated responses

- f) All study findings, conclusions and recommendations
- g) Copy of Council determinations relating to the study following the formal consultation process.
- h) The details of all changes and /or additions to work scope and / or deliverables agreed during the course of the study.

This Draft Report is to be submitted to the Project Manager for distribution for comment. This report shall contain sufficient information for the PCG or delegate to assess completion of this stage of the study. Submission and approval of the Draft Report shall constitute completion of this milestone and eligibility for payment under Schedule 1 – Pricing Schedule of the Contract.

It is expected this Draft Report will undergo a formal community exhibition and consultation process. Consultation shall be organised by the Project Manager with the Consultant required to attend and present to the community consultation meetings.

Feedback from this process will be discussed with the PCG and Consultant following which the Consultant is to prepare the Draft Final Report incorporating a summary of the consultation process, submissions and associated responses in accordance with the requirements of Section 5.2. The Draft Final Report will be submitted to Council for endorsement.

Once the Draft Final Report is endorsed, the Consultant shall prepare the Final Report reflecting the determinations of Council.

The Consultant should allow 4 months for community consultation, review and approval of the Flood Study. This may occur in parallel to preparation of the Floodplain Risk Management Study and Plan

5. Study Deliverables

5.1. Major Reports and Deliverables

Table 5.1 below lists the major reports to be delivered during the course of the project.

Table 5.1: Major Deliverables

Report / deliverable	Requirements	Delivery date
1. Inception Report	Section 6.5	14 days after project commencement
2. Recommendations and specifications for agreed additional data sourcing	Section 4.1	To be defined in Inception Report
3. Hydrology Report (Task 2)	Section 4.2	To be defined in Inception Report
4. Hydraulic Modelling Calibration Report including draft historic and design flood extent maps (Task 3,4A-4D)	Section 4.3 to Section 4.7	To be defined in Inception Report
5. Draft Flood Study report (Task 5)	Section 4.8	To be defined in Inception Report
6. Flood Risk Assessment (Task 6)	Section 4.9	To be defined in Inception Report
7. Flood Damages Assessment and methodology (Task 7)	Section 4.10	To be defined in Inception Report
8. Flood Mitigation Options Assessment (Task 11)	Section 4.14	To be defined in Inception Report
9. Flood Response Plan, Intelligence and Land Use Control Review (Tasks 8,9 & 10)	Sections 4.11 to Section 4.13	To be defined in Inception Report
10. Final Flood Risk Management Plan Report (Tasks 6-12)	Section 4.15	To be defined in Inception Report

5.2. Final Reports

Flood Study and Floodplain Risk Management Plan reports shall have the following features:

- a) A4 format (A3 sized plans and maps can be included)
- b) Pages appropriately numbered.
- c) Sections appropriately numbered.
- d) Maximum file size of the report must not be more than 500Mb. A lower resolution file must also be provided that can be easily downloaded from Council's website by members of the community.

All important data (e.g. building and floor level data, flood levels and extents, flood damages assessment, flood risk reduction measures, costs, benefits, etc.) shall be shown clearly in easily readable tables and where appropriate, on suitable plans.

Final reports shall not be produced until after formal consideration by Council and inclusion of their determination.

The Consultant shall supply electronic copies in both Microsoft WORD and Adobe PDF formats. All photographs used in study documents shall also be provided in JPEG format. Hard copies of the report are not required.

Campaspe Shire Council together with North Central CMA and Goulburn Broken CMA shall take ownership of all outputs from this study and may use extracts from the Final Report for its own purposes in other documents, reports and approvals. Campaspe Shire, NCCMA and GBCMA will endeavour to acknowledge any such use in the appropriate manner. The final report and documents shall be made freely available within the public domain.

5.3. Hydrologic and Hydraulic model files

At the completion of the project the Consultant will provide the Client with a complete set of both hydrologic and hydraulic model files and associated outputs. For all calibration, validation, design events and scenarios associated with potential mitigation options developed during the course of the project, including:

- Complete model results including flood heights, flow distributions, velocities and flood storage variations.
- Electronic model output files for all design runs and scenarios.
- Model data including adopted design inflows, recorded flood levels, flow paths, major floodways, development data and major infrastructures.

The Consultant will also provide sufficient notation to allow anybody trained in the use of the model to adjust parameters and set-up files as required (or parameter files and set-up files along with appropriate read-me and set-up documentation if the model used is not freely available).

The Consultant's proposal shall clearly state the extent to which this requirement will be met.

5.4. Spatial Data Sets

All flood related and surveyed data and information (e.g., newly captured historic and modelled flood levels, flood and floodway extents, limit of study lines, etc) shall be provided in ArcGIS and MapInfo format on hard drive at the completion of the study.

All final data must be consistent with DEECA's Spatial Data Specifications ready to be updated to Floodzoom. Prior to the formatting and delivery of the project outputs, the Consultant should request a copy of the most recently updated specifications. Outputs which do not meet the specifications will be returned to the Consultant for reformatting at the expense of the Consultant.

All relevant details regarding scenarios modelled and the associated files are to be provided in a metadata README.txt file.

The Consultant must quality assure their own data and not rely on the Council or North Central CMA to detect or correct errors. As a minimum, the Consultant must check:

- All model methods, models, and project outputs have been peer reviewed within the Consultant's organisations.
- All files have been provided.
- Data is projected correctly.
- All grids have the same origin.
- Various data extents match up for each AEP provided (i.e., Contours, Extents, Grids).
- Flood water velocities and depths are within a feasible range.
- Water depths, surface water elevations and velocities increase with decreasing AEP.

Final payment will not be made to the Consultant until such time it has been confirmed by the North Central CMA that the data has been supplied and is in a format suitable to be loaded into Floodzoom.

5.5. Mapping

The Consultant is not required to supply hardcopy maps but shall provide electronic copies of all final maps in ESRI format as well as Adobe PDF format. The mapping must be formatted in accordance with DEECA and VicSES guidelines. The Consultant shall deliver map outputs specified in each of the project tasks.

The Consultant is encouraged to propose additional and/or alternative mapping outputs that satisfy the underlying requirement that may add to local understanding of flooding behaviours and characteristics and/or assist planning, mitigation and/or response to floods while being of a sufficient scale and quality to enable the extent and/or impact of flooding to be clearly identified on a property-by-property basis.

All maps showing flood extents shall be suitably endorsed with a statement that appropriately qualifies the accuracy of the information presented, e.g.:

“No two floods behave in exactly the same manner even though they may rise to the same maximum height at a given location. The information given shall be regarded as only representing typical conditions”.

Consultants are encouraged to propose additional and / or alternative mapping outputs that satisfy the underlying requirement that they add to local understanding of flooding behaviours and characteristics and / or assist planning, mitigation and / or response to floods while being of sufficient scale and quality to enable the extent and / or impact of flooding to be clearly identified on a property-by-property basis.

5.6. Branding

Organisation logos (i.e., Campaspe Shire Council, North Central CMA and Victorian Government) are to be appropriately displayed on all study outputs including maps and the final report.

6. Project Management and Community Consultation

6.1. Council Briefings

The project is to be managed by the Campaspe Shire Council. Briefing of the councillors is necessary at key stages of the project to facilitate understanding and support.

The Consultant shall also attend and brief the councillors in Echuca on **at least three occasions** comprising presentation of the draft final Flood Study, identification and assessment of mitigation options stage and draft final Floodplain Risk Management Plan.

Attendance at these briefings including all associated expenses shall be included in the lump sum price.

6.2. CEO Project Group

Key milestones of the study will require presenting to for direction from the Chief Executive Officer Project Group. This Group will provide guidance on issues that arise during the Risk Management Plan stage of the study that may have serious political implications for the organisations involved.

Membership will comprise the Chief Executives / Managing Directors / Departmental Heads or their delegates of Campaspe Shire Council, North Central Catchment Management Authority, Goulburn Murray Water, Department of Energy, Environment and Climate Action and the Victorian State Emergency Service.

The Consultant shall attend and brief the CEO Project Group on **at least three occasions** comprising presentation of the identification and assessment of mitigation options stage and draft final Floodplain Risk Management Plan. These meetings shall be conducted online and shall be for a duration of no longer than 1.5 hours.

Attendance at these briefings including all associated expenses shall be included in the lump sum price. Additional meetings and meetings requiring on-site attendance will be paid at the scheduled rate.

6.3. Project Control Group and Meetings

A Project Control Group (PCG) will be formed to oversee the project. The Project Control Group will oversee the proper governance and management of the project and ensure that community interests are properly considered in the development of the plan. The Committee will notionally comprise a representative from each of:

- a) Campaspe Shire Council

- b) North Central CMA
- c) VicSES
- d) DEECA
- e) Goulburn Murray Water

The Project Control Group will **meet three-weekly throughout the life of the project**. These meetings shall be conducted online and shall be for an average duration of no longer than 1 hour.

The Project Control Group requires ongoing reporting and access to available information throughout the study.

Attendance at these briefings including all associated expenses shall be included in the lump sum price. Additional meetings and meetings requiring on-site attendance will be paid at the scheduled rate.

6.4. Community consultation

The Consultant will be required to contribute to and participate in a Community Communication and Consultation Program, to be led by Campaspe Shire Council. The Program's objectives are to:

- a) Receive information from the community of historical flooding knowledge, issues and concerns.
- b) Receive feedback from the community on flooding information developed.
- c) Receive input to identify potential mitigation options.
- d) Receive feedback on recommended mitigation options.

The Consultant's tender proposal should make provision for the following items/activities (as a minimum):

- a) **Public meeting at the outset** of the project to capture local knowledge regarding experience of historic flooding events, identify relevant flooding issues and potential mitigation options for later consideration.
- b) Regular progress newsletters to the community to provide an update on the progress of the study.
- c) Consultation and routine meetings with a Flood Study Reference Committee (FSRC, further information below).
- d) At least **three additional public meeting / community drop in sessions** - one to review the calibration and draft 1% AEP modelling and seek suggestions for flood mitigation options, one to review initial assessment of mitigation options and one to explain the report during the exhibition period prior to formal adoption.

The Consultant will be required to participate and provide input in all stages of the consultation process. The cost of all work undertaken by the Consultant shall be included in the lump sum price.

6.4.1. Flood Study Reference Committee

A Flood Study Reference Committee (FSRC) will be formed to provide a focus and forum for discussion of technical, social, economic and ecological issues throughout the course of the study. It will provide a link between the community, agency representatives and the Consultant team.

Its goals are to:

- a) Ensure a 'balanced study' i.e., to ensure all important aspects of the study are given due consideration, and
- b) Provide guidance to development and implementation of a joint floodplain risk management plan.

The FSRC is anticipated to comprise a 'base representation' from:

- a) Traditional Owner Groups (Dja Dja Wurrung, Yorta Yorta and Taungurung)
- b) VicSES
- c) Regional DEECA
- d) Goulburn Murray Water
- e) Coliban Water
- f) North Central Catchment Management Authority
- g) Goulburn Broken Catchment Management Authority
- h) Bureau of Meteorology Representative.
- i) Department of Transport and Planning
- j) Local Government Engineering
- k) Local Government Land Use Planning
- l) Councillors
- m) Urban Community representatives (To include representatives from development industry, local industry leaders, flood affected landowners (residential & commercial / industrial), community organisations, local knowledge)
- n) Rural community representatives

The Project Manager is responsible for forming the FSRC, co-ordinating its meetings and will bring in Subject Matter Experts as required. The FSRC shall be chaired by a councillor.

The Consultant shall report to and liaise with the FSRC during the course of the study. The Consultant shall provide for attendance at a **minimum of eight FSRC meetings** to be held at Rochester in their proposal. The cost for attendance at any additional meetings requested by Campaspe Shire Council shall be provided as an additional item. These meetings shall include commencement, review of calibration and design modelling, review of draft Flood Study Report, seeking mitigation suggestions, review of preliminary mitigation assessment, reviews of mitigation assessments as investigation proceeds and review of draft Risk Management Report

The Consultant is expected to propose a meeting schedule that supports their proposed methodology. As a guide, the sequence of meetings should be framed around the key deliverables of the project as defined in **Section 5.1**.

The final report and other deliverables shall have due regard for community and agency feedback and input arising from community forum and other consultation processes.

The FSRC will expect ongoing reporting and access to available information throughout the study.

The FSRC will advise other agencies with an active interest in flood study outcomes of study status and expected deliverables prior to the public exhibition process. Feedback from these agencies will be gathered by the FSRC and shall be consolidated and actioned appropriately by the Consultant.

6.5. Progress Reporting

Within 14 days of the project commencement date, the Consultant shall prepare, in consultation with the client, an Inception Report providing an adequately detailed overview of the tasks, methodology, timing and expenditure profile of the project.

The Inception Report shall provide the basis of two-monthly progress reporting to the Client to be submitted by the first Friday of the following month.

The Inception Report shall also provide the basis of three-weekly progress reporting to the Project Control Group. A summary of progress shall be presented at each scheduled Project Control Group meeting.

The Inception Report (timing schedule and expenditure) shall be reviewed periodically for the duration of the project, and if there are substantial changes to the project scope, they shall be amended accordingly.

The Consultant shall email each two-monthly progress report to the Project Manager by the dates specified in the Tenderer's response and agreed at the project inception meeting. Reports will be delivered electronically and shall be approved in writing by the Project Manager before the next stage of the project is undertaken.

The Consultant shall allow the Project Manager five working days to review each two-monthly progress report. The Project Manager may refer the report to the PCG for advice before approving any report.

Routine delivery of the progress reports will be a key performance indicator. Failure to submit reports may result in delayed milestone delivery payments.

6.6. Peer Review

The hydrologic modelling and hydraulic model and associated reports may be subject to independent peer review. The Consultant shall make the models including background information available for peer review by an independent expert as determined by the Project Manager in consultation with the Consultant and Project Control Group. The Consultant shall provide time for review in the submitted Project Schedule.

The Consultant shall not proceed with further stages of the project that are reliant on the approved hydrologic model or the approved hydraulic model until the respective model has been satisfactorily peer reviewed and approval to proceed issued by the Project Manager

7. Management of Contract and Term of Contract

7.1. Project Management

The Consultant shall report directly to the Campaspe Shire Council Project Manager:

Name TBA
 Title Project Manager
 Address PO Box 35, Echuca 3564
 Phone: TBA
 Email: TBA

The Consultant shall designate a Project Manager and a primary point of contact.

7.2. Project Timeline

It is expected that the Plan will commence within eight weeks after closing date for submissions and shall be completed to final draft stage no later than the completion date approved in the agreed program (target date **30 September 2025**). The Consultant shall submit a timeline in the form of a Gantt chart or similar in the proposal. This timeline may be updated in the Inception Report if needed.

7.3. Contract Details

Details of the proposed Contract for this study can be found in the attached “Conditions of Contract” and “Conditions of Tendering”. The contract documentation has been attached for information purposes only and Consultants are to note that completion of the attached contract documentation is not a requirement of this tender.

Contract documentation will need to be completed and signed by the Consultant only after formal acceptance of a tender by Campaspe Shire Council. A clean copy of the Contract will be forwarded to the Consultant at that stage.

7.4. Intellectual Property

Any contract awarded or entered into by Campaspe Shire Council with any Consultant shall be on the basis that all output produced directly or indirectly from the work or services that are the subject of the contract shall become and remain the sole property and copyright of the State of Victoria, Campaspe Shire Council, North Central CMA and Goulburn Broken CMA and shall be freely available for their use in their absolute discretion for any purpose.

All data and information produced by the Consultant during the course of this study, including all model parameter and input / output files, as well as maps, results and reports, will become the property of the State of Victoria, Campaspe Shire Council, North Central CMA and Goulburn Broken CMA.

All data shall be delivered in a form and / or format that enables its later independent use if and as required (including digital files of hydrologic and hydraulic models). The subsequent use of delivered files and documents shall not be restricted by password, code or otherwise.

The Consultant must insert a copyright notice into the deliverables indicated below in accordance with the form and instructions in **Attachment 9.1.1**. The Consultant must particularise New Contract Material and Existing Contract Material, as specified in the instructions in Attachment 4. The deliverables this refers to are as follows:

- a) project report(s) and associated figures (excluding any sections highlighted as confidential by the council); and
- b) spatial flood extent layers for key events.

7.5. Quality Requirements

The Consultant shall undertake quality assurance processes of a standard and level accepted by and commensurate with the profession in order to meet best practice standards for strategic management projects. Campaspe Shire Council reserves the right to request proof of the Consultant's quality assurance processes if needed.

The Consultant must comply with the requirements of the OH&S Act 1985 (Vic) and meet the minimum requirements of the Campaspe Shire Council OH&S policies and procedures.

Consultants must have the following insurance:

- a) Professional Indemnity \$5,000,000 (min)
- b) Public Liability \$20,000,000 (min)

7.6. Fees and Payments

The indicative budget for Consultant fees (excluding field survey and LiDAR costs) to complete the project as set out in this brief is \$480,000.

Payments to the Consultant will be based on satisfactory completion of milestones as set out in the Inception Report and included in Schedule 1 – Pricing Schedule of the Contract. The Consultant will be required to submit an official Tax Invoice for work conducted during the invoice period.

Invoices must comply with Campaspe Shire Council account requirements, and include the following information:

- a) Purchase order or contract number
- b) Project Manager name
- c) Project name
- d) Itemised quantity and unit cost

The final payment will not be made until formal advice has been received from North Central CMA's Floodplain Manager that all flood related outputs from the study have been received and validated for uploading to Floodzoom.

The Consultant shall supply an Australian Business Number and provide a Tax Invoice for GST purposes.

8. Available Information

The Consultant will be given access to any relevant information held by Campaspe Shire Council, North Central CMA, Goulburn Broken CMA and DEECA at no cost.

The following is a list of information known to be available. It is not exhaustive and may be incomplete / limited in its coverage. Tenderers are required to make their own assessment of available data. In addition, Stage 1 of this project requires the Consultant to identify all available data and provide recommendations for additional survey / data collection.

8.1. Digital Cadastral Information

Digital cadastral information may be obtained from Campaspe Shire Council in electronic format. Digital cadastral information for the Victorian region may also be obtained directly from Data Vic.

8.2. Ground Level and Survey Information

There is survey information available for the entire study area from a number of different LiDAR acquisition projects. LiDAR held by North Central CMA, which covers the indicative study area, will be made available to the Consultant.

Stage 1 of the project involves the Consultant researching and sourcing all available relevant LiDAR data.

8.3. Drainage Information

The following drainage information is available:

- a) Location plans of Shire drainage infrastructure within the study area generally comprising cross-road culverts and limited information on Shire owned bridges (available from Campaspe Shire Council as GIS layer with attributes). Note this does not include VicTrack, GMW or Department of Transport bridges or drainage structures which will require sourcing by the Consultant.

8.4. Hydrologic Model

The calibrated RORB model developed as part of the 2013 Rochester Flood Management Plan is available for use and/or modification by the Consultant.

An uncalibrated RORB model developed as part of the 2023 Campaspe River Rapid Flood Risk Assessment (HARC) is also available for use and/or modification by the Consultant.

8.5. Hydraulic Model.

MikeFlood was the hydraulic model developed as part of the 2013 Rochester Flood Management Plan. This model will be made available to the Consultant; however it is anticipated that a new hydraulic model (preferably TUFLOW) be developed for the study area.

An uncalibrated TUFLOW model was also developed as part of the 2023 Campaspe River Rapid Flood Risk Assessment (HARC) is also available for use and/or modification by the Consultant. This model extends from Lake Eppalock to immediately upstream of Rochester and includes several major tributaries such as Axe Creek and Mount Pleasant Creek.

A TUFLOW model developed as part of the current Echuca Moama Torrumbarry Flood Study provides preliminary modelling of the Campaspe River downstream of the Waranga Western Syphon through to just south of Echuca. Further downstream through Echuca, it is more accurately calibrated for the purpose of that study. This model is available for use and/or modification by the Consultant.

8.6. Flood Levels, Grids and Flood Extents

Available flood level, grids and flood extent information that was produced as part of the 2013 Rochester Flood Management Plan and the 2023 Campaspe River Rapid Flood Risk Assessment can be provided if required in ESRI format.

8.7. Historical Flood Records

Campaspe Shire Council and the CMAs hold various flood records of several past flood events including photos, aerial and satellite imagery and surveyed flood heights.

8.8. Streamflow and Storage Data

The Campaspe River is a regulated river system with major storages located upstream of the study area.

River gauging stations are located on these systems up and downstream stream of Rochester. River gauging information for these sites is freely available on the Victorian Data Warehouse website.

8.9. Rainfall Data

Rainfall data for a number of rainfall stations in the general vicinity of the study area and the upper catchments of these river systems is available, on payment of a fee, from the Bureau of Meteorology.

8.10. Non-Flood Aerial Photography

Campaspe Shire Council holds aerial photography covering the Campaspe Shire portion of Study Area dated 2021 that can be made available to the Consultant at study start up if and as required.

8.11. Selected References Relevant to the Study

Reports and documents considered relevant to the study are listed in Table 9.2 below. This list should not be considered exhaustive.

Table 9.2– Reference Reports and Documents

Title	Author	Location
Victorian Flood Data and Mapping Guidelines	Jacobs Group Australia with DEECA (2016)	https://www.water.vic.gov.au/_data/assets/pdf_file/0036/661788/victorian-flood-data-and-mapping-guidelines.pdf
Victorian Floodplain Management Strategy	DELWP (2016)	https://www.water.vic.gov.au/our-programs/floodplain-management/victorian-floodplain-management-strategies
Rochester Flood Management Plan, 2013.	Water Technology Pty Ltd	https://www.nccma.vic.gov.au/sites/default/files/publications/nccma-81011_rochester_flood_management_plan_final_study_report.pdf
Rochester Mitigation Study – Feasibility Report March 2018	Water Technology Pty Ltd	https://www.campaspe.vic.gov.au/files/assets/public/strategies-and-plans/rochester-mitigation-study-feasibility-report.pdf
Lake Eppalock Technical Assessment Report – November 2023	Hydrology and Risk Consulting Pty Ltd	https://www.water.vic.gov.au/our-programs/floodplain-management/lake-eppalock-operating-arrangements-assessment
Campaspe River Rapid Flood Risk Assessment 2023	HARC	Contact North Central CMA

Title	Author	Location
Echuca Moama Flood Study 2024 (in progress)	Water Technology	Contact Campaspe Shire Council
Victoria Planning Provisions and Victoria Planning Provisions Practice Notes.	DTP	https://www.planning.vic.gov.au/guides-and-resources/guides/planning-practice-notes/applying-the-flood-provisions-in-planning-schemes
North Central Regional Floodplain Management Strategy and Mid Term Snapshot	North Central CMA	https://www.nccma.vic.gov.au/regional-floodplain
Campaspe Planning Scheme.	Campaspe Shire Council	Council Offices or https://www.planning.vic.gov.au/planning-schemes/browse-planning-schemes
Rapid Appraisal Method (RAM) for Floodplain Management. May 2000.	NRE (2000)	GBCMA or NCCMA library
Risk Management Standard (AS/NZS 4360:2004).	Standards Australia / Standards New Zealand (2004)	http://www.saiglobal.com/shop/
Technical assessment of the operating and infrastructure arrangements at Lake Eppalock.	HARC	TBC

9. Attachments

Attachment 1: - Copyright

9.1.1. Schedule A

This copyright notice is to be incorporated into the Deliverable Services. It can be downloaded MS Word format from: <https://goo.gl/dsuQD5>. It should replace any other copyright notice in the document(s), which are generally located inside the front cover.

Instructions

- *Ensure that the hyperlink under the Creative Commons Logo is maintained.
<https://creativecommons.org/licenses/by/4.0/>*
- *Replace [Title of document] [Year] with the appropriate content*
- *Replace [Purchaser] [Year] with the appropriate content*
- *Obtain the particulars required by the Purchaser for inclusion under the heading: **Further Information***
- *In the Disclaimer section, replace **[Consultant]** and **[Council]** with the appropriate content. Please note that the Purchaser appears twice.*
- *You are required to particularise the Existing Contract Material (this includes third party material and material provided by the Purchaser) that is **incorporated** into the Deliverable Services, in a Table of References. (See above and Clause 23) Each reference shall particularise the title of the material being reproduced, Author or Copyright Holder, Year of Publication, Page number (if appropriate), Copyright Licence (if any – E.g. CC Attribution Licence), or 'All Rights Reserved'*

9.1.3. Copyright Notice



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Attachment 2 – Sample MFEP Appendices A, B, C, D & F (Refer Sections 4.11 & 4.12)

Attachment 2: - APPENDIX A – Flood Intelligence Card Template Sample

Observed Rainfall (see graph)	AEP of flood / year of peak	Water level at Wickliffe (m) (mAHD)	Consequence / Impact	Action Actions may include (but not limited to) evacuation, closure of roads, sandbagging, issue of warnings and who is responsible
□ It is important that the decision to mobilise to remove furniture etc from buildings is made early and that, in general, sandbagging is reserved for non-weatherboard buildings.				
USING THIS INTELLIGENCE CARD. Obtain rainfall data and use the flood guidance tool to determine the approximate flood severity. Consider the appropriate flood inundation tables and map. Review all consequences and actions in this table, from the first row down to the approximate expected severity of flooding. Initiate all actions in a logical sequence. Note that that some actions may need to be initiated in an order that is different from their relative placement in this table.				
If response has been initiated locally, the first action should be a call to VICSES, followed by a call to the MERO at the Rural City of Ararat. Note time available – see below.				
Note that: the Hopkins River will begin to rise 6 to 8 hours after start of heavy rain (initial rise likely to be driven by local inflows) and peak some 30 to 75 hours later. See Appendix B.				
x mm in y hours	1972	4.13	No consequences observed in September 2010.	Actions to be inserted by others and not part of this contract
x mm in y hours	2010	201.75		
~40mm in 12 hours to ~80mm in 48 hours	20% AEP (5-year ARI)	4.28 201.9	The flood peak is contained in the immediate floodplain although it also flows under the Glenelg Highway and into the area between the Willaura – Wickliffe Road and Floate Lane. No roads overtopped in the immediate vicinity of Wickliffe.	
		4.4 202.02	Proposed minor flood level.	
~65mm in 18 hours to ~90mm in 48 hours	10% AEP (10-year ARI)	4.48 202.1	Flood peak continues to be largely contained on the floodplain. Depths increased by around 200mm over the 20% AEP event. Water beginning to encroach on the Glenelg Highway on the west side of town and a short section (~10m) overtopped to a depth of around 50mm.	
Flood peak 9 September 1983		4.5 202.12	No reports of significant damage or of road closures.	
ETC	ETC	ETC	ETC	

Notes:
<ul style="list-style-type: none"> Historical events should be linked to observed rainfall where possible.
<ul style="list-style-type: none"> This card to be used with the inundation tables. Any actions necessary that are NOT in the inundation tables will be included here. This may include sandbagging infrastructure (e.g. pump stations), evacuating areas etc.
<ul style="list-style-type: none"> There should be an action to notify the downstream municipalities.

Attachment 2: - APPENDIX B – Property & Road Inundation Table Template

USING THE INUNDATION TABLES: the % AEP Flood (Annual Exceedance Probability) depends on a variety of factors such as catchment saturation, antecedent stream levels and rainfall intensity/duration. The "flood/no Flood Calculator can provide a rough estimate of the flood magnitude. The CMA or a competent flood analyst should be consulted to assist in estimating the likely event magnitude.

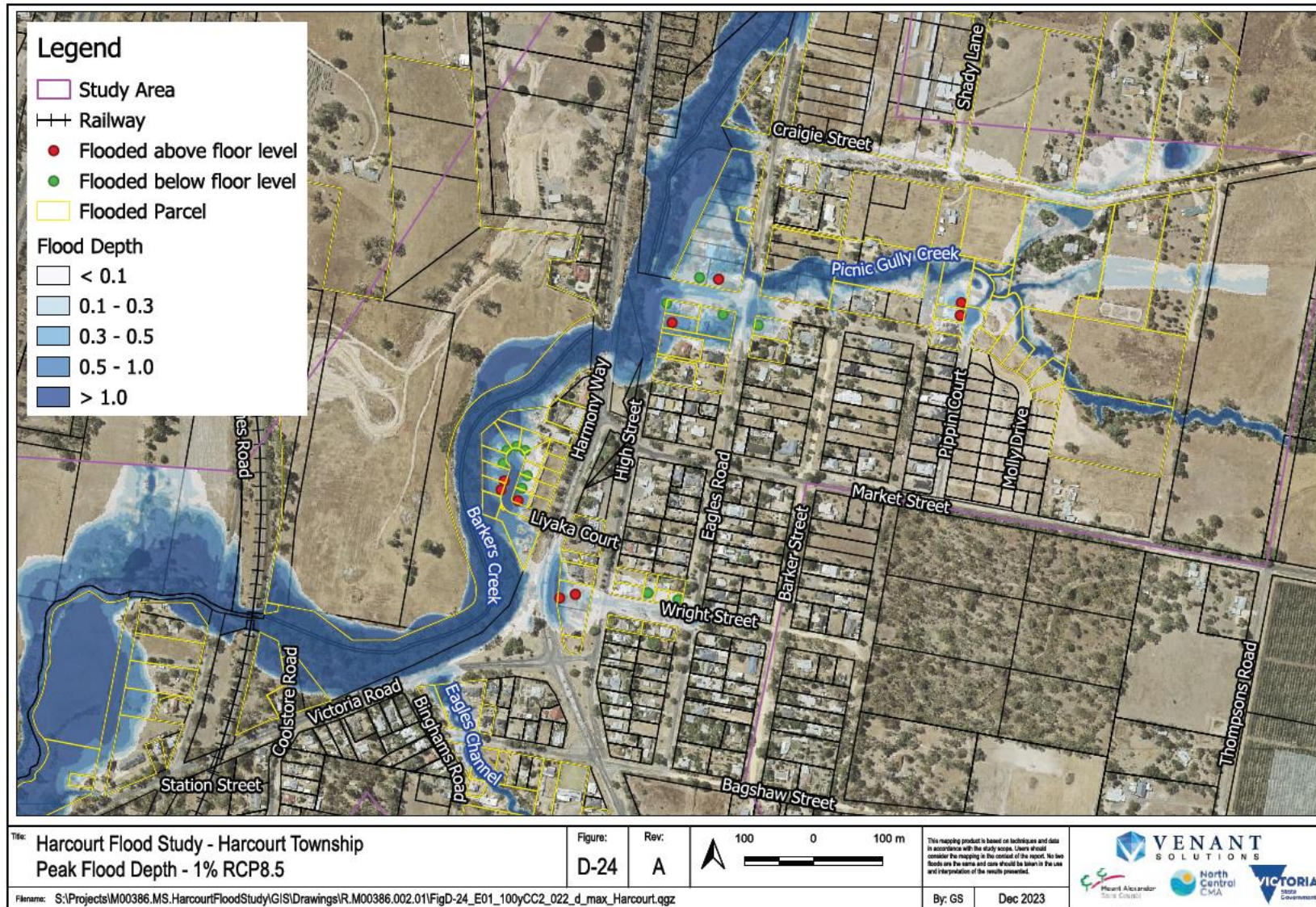
AEP of Flood	Properties Impacted by Overfloor Flooding [Note 1, 2, 7]	Depth over floor (m)	Type of Building	Sandbag? (Yes/No) [Note 3]	Properties whose access is impacted by flooding [Note 4,5]	Depth over access (m)	Time of isolation	Type of Building	Roads impacted by flooding and approximate location [Note 6]	Maximum Depth over road (m)	Action [Note 8]
20% AEP											
	21 Jones Street	0.3	Dwelling	No	17-21 Jones Street (odd # only)	0.25	1 hour	Dwelling	Jones Street x Skene Street intersection	0.1	Water over road signs
	15 Smith Street	0.32	Primary School	Yes	13 Smith Street	0.27	6.5 hours	Dwelling	Smith Street near no. 52	0.35	Road closed signs
	38 Wilson Street	Within 100mm	Aged Care Centre	Yes	15 Smith Street	0.3	3 days	Primary School	Henty Highway 1km Southwest of Hamilton	0.12	Water over road signs
	etc				etc				etc		

10% AEP											
	21 Jones St	0.32	Dwelling	No	17-21 Jones Street (odd # only)	0.25	1.5 hours	Dwelling	Jones Street x Skene St	0.5	Road closed signs
	15 Smith St	0.4	Primary School	Yes	13 Smith Street	0.27	8 hours	Dwelling	Smith Street between 52 and 90 (both sides)	0.8	Road closed signs
	38 Wilson St	0.05	Aged Care Centre	Yes	15 Smith Street	0.3	3.2 days	Primary School	Henty Highway 1km Southwest of Hamilton	0.5	Road closed signs
	1 Jones St	Within 100mm	Dwelling	No	etc				etc		

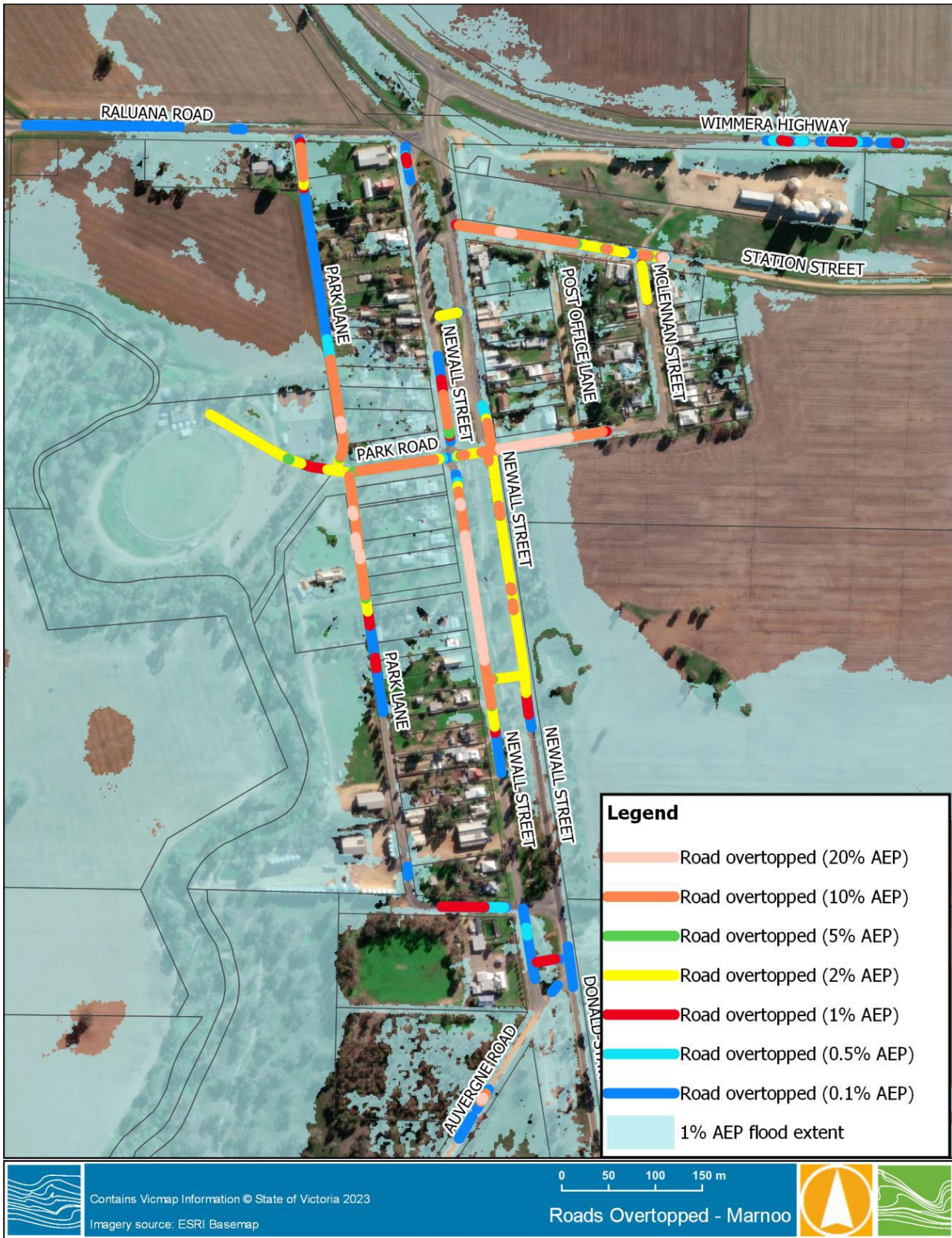
5% AEP											
2% AEP											
1% AEP											

0.5% AEP	
NOTES:	
[1]	Ordered alphabetically by street name - emergency response will likely be street by street. Properties that come within an appropriate model accuracy (e.g. 100mm) should be included.
[2]	Properties will be listed at every AEP they are affected. i.e. if a property floods at all AEPs, it will be included in every table. Intention is for a single inundation table to be printed without having to reference actions from smaller events. Note this is in contrast to the flood intelligence card.
[3]	This will depend on the building type, perimeter etc. Can also include indicative number of sandbags required
[4]	Can group similar properties (i.e. dwellings) together. See example
[5]	Isolated properties. If large numbers of properties in a single area are isolated (i.e. by one or two roads flooding, blocking the entire area) it may be more appropriate to list them as 'Area A', 'Area B' etc. with further detail provided in a separate section/map
[6]	For roads with long stretches of inundation/patchy inundation, will need to specify where signs will go i.e. Jones Street (Signs at Skene St and Smith St inclusive)
[7]	Public infrastructure and high risk facilities (e.g. aged care) should be highlighted.
[8]	Actions to be decided in consultation with SES through the PCG.

Attachment 2: - APPENDIX C – “At Risk” Buildings and Critical Infrastructure GIS Map Example



Attachment 2: - APPENDIX D – “At Risk” Roads example GIS map Output



Attachment 2: - APPENDIX F – “At Risk” Buildings and Infrastructure GIS Table Structure

Column Headings
Flood Study
X_Coordinate
Y_Coordinate
Address
Building_Type
Public/Private
Flr_level
wse_5y_max
wse_10y_max
wse_20y_max
wse_50y_max
wse_100y_max
wse_200y_max
wse_500y_max
wse_PMF_max
Depth_Above_FI5yr
Depth_Above_FI10yr
Depth_Above_FI20yr
Depth_Above_FI50yr
Depth_Above_FI100yr
Depth_Above_FI200yr
Depth_Above_FI500yr
Depth_Above_FIPMF
Depth_Access_5yr
Depth_Access_10yr
Depth_Access_20yr
Depth_Access_50yr
Depth_Access_100yr
Depth_Access_200yr
Depth_Access_500yr
Depth_Access_PMF