

Bomaderry Flood Impact and Risk Assessment

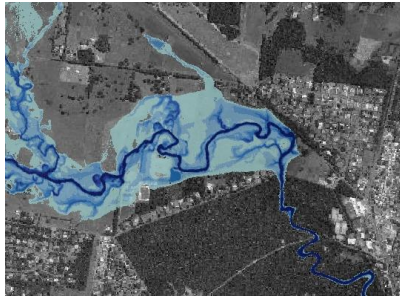
25 Moss Vale Road, Bomaderry — Supporting SSD-69257218

Prepared for:
EG

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Prepared by:
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Project/File:
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Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Independent Reviewer	Project Manager Final Approval
1	16/10/2025	For SSDA	FG	AA	AA	JL
2	30/01/2026	Update to reflect SSD layout	FG	AA	AA	JL

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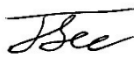


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1 Introduction

1.1 Background

On 20 December 2022, Shoalhaven City Council granted Southern Cross Community Housing (SCCH) (the proponent) a deferred-commencement consent (SF10851) for demolition, site remediation, and a seven-lot Torrens title subdivision (six lots and one public reserve), including new roads and services, at 25 Moss Vale Road, Bomaderry (the site).

A State Significant Development Application (SSDA) (SSD-69257218) has since been lodged. This Flood Impact and Risk Assessment (FIRA) is submitted to the Department of Planning, Housing and Infrastructure (DPHI) on behalf of SCCH in support of the SSDA, which seeks consent for a mixed-use development known as 'The Yards', which will comprise of a mixed-use affordable housing development at the site.

The proposed development will specifically comprise the following:

- Construction of a master planned community precinct, comprising a mix of land uses across 13 key areas. Specifically, the following is proposed:
 - Non-residential floor uses, including commercial and retail, a childcare centre, and a medical centre.
 - Residential uses that will be provided across a mix of affordable and market housing in the form of a range of different housing sizes and typologies, including attached dwellings, multi dwelling housing, boarding housing and apartments.
 - Communal amenity facilities located throughout the precinct to support the residential development.
- Delivery of the internal road network and off-street carparking.
- Torrens, Community and Strata Title subdivision to support the development.
- Associated landscaping and public domain works.
- Augmentation of, and connection to, existing utilities as required.

For a detailed project description, refer to the Environmental Impact Statement prepared by Beam Planning.

1.2 Purpose of this report

This report has been prepared by Stantec on behalf of the client to assess flood-related implications of the proposed development and to demonstrate consistency with the Flood Risk Management Manual (2023), the Considering Flooding in Land Use Planning Guideline (2021), and Clauses 5.21–5.22 of the Shoalhaven LEP 2014.

This report has been prepared for the client to address the following flood-related matters:

- Off-site flood impacts — potential changes to flood levels, velocities, and extents.
- Flood hazard — classification and any changes across the site and along the Bomaderry Creek frontage.
- Flood Planning Level compliance — finished floor levels and critical infrastructure relative to the Flood Planning Level (FPL).



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- Climate-change sensitivity — robustness under projected scenarios.
- Evacuation and access/egress — strategy, triggers, and compatibility with the surrounding road network.
- Residual risk to future users

This FIRA addresses the following relevant Secretary's Environmental Assessment Requirements (SEARs) and Request for Information (RFI) points, as set out in the table below.

Table 1-1 Response to SEARs and RFI

Item	Response/Location in Report
SEARs Request	
15. Flood Risk	
<i>Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Flood Risk Management Manual.</i>	Sections 2, 5 and 6
<i>Where the development could alter flood behaviour, affect flood risk to the existing community or expose its users to flood risk, provide a flood impact and risk assessment (FIRA) prepared in accordance with the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01.</i>	Achieved.
<i>Detail design solutions and operational procedures to mitigate flood risk where required.</i>	Refer Section 6
RFI Items	
Department of Planning, Housing and Infrastructure	
<i>Bomaderry Creek adjoins the western side boundary. The Floodplain Risk Management Study of Bomaderry Creek (2016) includes part of the site in the flood planning area, most of which is defined as a floodway. Land in the west of site, particularly including Lots 4, 5 and 6, are impacted in the Probable Maximum Flood Event.</i>	Achieved.
<i>The SEARs require a Flood Impact Risk Assessment (FIRA) to be prepared in accordance with the NSW Flood Risk Management Manual, and other key guidelines including Guideline LU01 (June 2013). The FIRA (FIRA 2021) submitted refers to a report completed for Subdivision Approval (SF10851), which was prepared under superseded guidelines.</i>	
<i>In this context, you will need to provide a new FIRA which:</i>	
<i>(a) assesses the impacts of the current proposal, noting that the proposal differs to that assessed under FIRA 2021, including the extent of landform modification. For example, the western boundary perimeter road is raised by around 450-500mm, resulting in fill depths of 2.5m to 2.9m.</i>	
<i>(b) considers the current Flood Risk Management Manual 2023 and its associated Toolkit.</i>	
<i>Provide a detailed response to each matter in Clause 5.21 Shoalhaven LEP 2014 (SLEP 2014) to demonstrate that the proposal would not adversely affect flood behaviour in a way that results in detrimental impacts on properties and the environment.</i>	Refer Table 1-2
<i>Provide a detailed response to each matter in Clause 5.22 SLEP 2014 to demonstrate the proposal is acceptable in relation to excavation, risk to life and environmental impacts. The assessment of the mandatory statutory matters provided at Section 6.5 of the EIS is inadequate.</i>	Refer Table 1-3
<i>Bomaderry Creek is mapped as a Category 1 (red) watercourse, while the drainage line from Moss Vale Road to Bomaderry Creek is mapped as a Category 3 (blue) watercourse.</i>	Not relevant to flooding
<i>Provide a detailed response to each matter in Clause 7.6 SLEP 2014 which applies to land within 50m of mapped watercourse category 1, 2, or 3.</i>	



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State Emergency Services

Recommend carefully considering the risks associated with the western portion of the proposal and would support a proposal which avoids placing vulnerable populations within the floodplain. Recommendation 22 and 15 of the NSW 2022 Flood Inquiry advocates for a planned retreat from areas at most risk on the floodplain. The proposed western portion of this development is essentially an advance into the floodplain. The flood and isolation risks of the lower Shoalhaven River region are significant, and any further development increases the burden on current and future communities and emergency services.

Refer Section 6.4

Recommend using the most recent Lower Shoalhaven River Flood Study (2022)2 along with the local catchment flooding studies to determine the flood risk and flood planning level.

Refer Section 4

Recommend pursuing site design which allows for rising road access from all Lots, away from flooding.

Achieved

Recommend consideration of flood warning and evacuation demand on existing and future access/egress routes considering potential impacts of localised flooding.

Refer Section 6.4

Recommend seeking advice from the Department of Climate Change, Energy the Environment and Water (DCCEE) regarding the proposal to place substantial amounts of fill within the floodplain, which may impact on flood behaviour.

Refer Section 6.1

Shoalhaven City Council

The subject site comprises flood prone land according to Council's adopted Bomaderry Creek Floodplain Risk Management Study and Plan (2016). The site is subject to a peak flood level of 32.2m AHD in a 1% AEP flood event, 37.0m AHD in a Probable Maximum Flood (PMF) event, and have a Flood Planning Level (FPL) of 32.7m AHD. The western part of the property backs onto Bomaderry Creek itself with a High Hazard Floodway hazard and hydraulic category in a 1% AEP event. Further, most of the flood impacted land of the site is mapped as High Hazard Floodway in a PMF event.

Refer Section 6

It is noted that the western part of the proposed development has been filled to raise the land above the FPL as part of SF10851 (approved December 2022). As such, the proposed development is not subject to the requirements of clause 5.21 of the Shoalhaven Local Environmental Plan (SLEP) 2014. However, the special flood considerations clause 5.22 came into force in November 2023 which applies to land between the FPL and PMF. In addition, there has been a number of guidance released on flood planning from the NSW State Government, and Australian Government, since the approval of SF10851 in December 2022, including, but not limiting:

- NSW Flood Risk Management Manual (2023) – June 2023;
- Flood Risk and Impact Assessment (2023) – Flood risk management guideline LU01 – June 2023;
- Planning Circular – PS24-001 – March 2024;
- Climate Change Considerations for Flood Estimation (Australian Rainfall and Runoff Version. 4.2) – August 2024; and
- Shelter in place for flash flooding (DPHI, 2024) – January 2025.

Assessment requirement 15 of the SEARs requires the applicant to consider flood risk, including:

- Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change and relevant provisions of the NSW Flood Risk Management Manual.
- Where the development could alter flood behaviour, affect flood risk to the existing community or expose its users to flood risk, provide a flood impact and risk assessment (FIRA) prepared in accordance with the Flood Impact and Risk Assessment – Flood Risk Management Guideline LU01.
- Detail design solutions and operational procedures to mitigate flood risk where required.

The submitted flood impact statement (D25/104131) is not considered to address SEARs requirement 15 as it has not considered potential effects of climate change, the exposure of future users of the site to flood risk, proposed detail design solutions and operational procedures to mitigate flood risk where required and documented this in a FIRA in accordance with the relevant guideline(s).

In relation to flood risk to future users of the site, the following is noted:

- The NSW Flood Risk Management Manual requires assessment of flood risk to consider the full range of events, up to and including the PMF.



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- *Peak flood level in a PMF is 37.0m AHD (>4m higher than the FPL).*
- *The flood impacted land in a PMF is largely High Hazard Floodway.*
- *The proposed underground carpark on Lot F1 has an entry at approx. 34.0 – 34.5m AHD, which is above the FPL and below the PMF. The flood risk to this carpark needs to be considered in the FIRA and management measures, as required, implemented. The Nowra Riverfront Precinct FIRA included suitable development controls to manage flood risk to underground carparks that can be referenced (LINK).*
- *Lot M has proposed a semi-enclosed carpark at RL 33.60m AHD. The flood risk to this carpark needs to be considered needs to be considered in the FIRA and management measures, as required, implemented. The Nowra Riverfront Precinct FIRA included suitable development controls to manage flood risk to open carparks that can be referenced.*
- *The Bomaderry Creek Floodplain Risk Management Study and Plan (2016) identifies the catchment as being a flash flooding catchment having a quick flood response to rainfall (generally <6hr). Further, there is currently no flood warning products available for the catchment to reliably inform emergency services or the public prior to flooding occurring. This may pose challenges to enable efficient evacuation of the area, as required by clause 5.22 of the SLEP, and needs to be considered in the FIRA.*
- *The Department of Planning, Housing and Infrastructure released earlier in January 2025 the Shelter in place for flash flooding guidelines which should be referenced when assessing the flood risk to future users of the site and when designing suitable mitigation measures in the FIRA to manage the flood risk and ensure the safe occupation requirements of clause 5.22 of the SLEP can be achieved.*
- *Access to Council's Bomaderry Creek flood model can be made available under a data licence agreement to assist with the development of the FIRA.*
- *Council's Bomaderry Creek Floodplain Risk Management Study and Plan (2016) did not consider impacts from increase in rainfall intensities. The guidance provided in ARR's Climate Change Considerations chapter should be followed and documented in the FIRA.*

Further information is required to demonstrate that the proposed development complies with SEARs assessment requirement 15 documented in a FIRA undertaken in accordance with the relevant guidelines.

The proposal will need to demonstrate through a FIRA that the following matters have been adequately addressed to the satisfaction of the consent authority with relation to floodplain risk management:

- *the impact of flooding on the development – including local overland flows and the range of possible floods up to the Probable Maximum Flood (PMF)*
- *the impact of the development on flood behaviour – including offsite flood impacts due to any land use and/or landform changes*
- *the impact of flooding on the safety of people for the full range of possible floods up to the PMF including emergency management, evacuation, flood access and isolation risks*
- *the implications of climate change on flooding – particularly increased rainfall intensity on flood behaviour and design flood planning levels.*

As presented, the proposal introduces a significant risk to public safety in rare flood events with residential development. This includes undercover and underground parking proposed in areas of high hazard floodway in events exceeding the 1% Average Exceedance Probability (AEP) event, with no consideration of emergency response measures to manage the associated risks to life and property. The FIRA will need to consider and address the full range of flood related risks, particularly those associated with public safety.

The planning authority should ensure that risks to life and emergency management measures are considered for all proposed residential areas over the full range of floods including those above the flood planning level up to the Probable Maximum Flood (PMF). It is understood that there is a considerable range (greater than 4m with limited flood warning time) between the 1%AEP design event and the PMF which presents a significant risk that should be addressed to inform planning decisions involving human occupation of the floodplain.

The FIRA should:

- *Include and demonstrate it has addressed the outcomes of consultation with the NSW SES on the adequacy of any proposed flood emergency response measures, flood isolation risks, evacuation, emergency access requirements and consistency with local emergency response planning.*

Refer Section 6



-
- *Consider council's best available flood information where available including Flood Planning Levels (FPLs), Flood Planning Areas (FPA), floodplain extents, flood hazard and hydraulic classification information over the full range of floods up to the PMF*
 - *Consider the impacts of climate change on the proposed development utilising the guidance provided in the Australian Rainfall and Runoff Climate Change Consideration Chapter.*
 - *Ensure consistency with Shoalhaven LEP and DCP controls for development on floodplains, particularly those which address adverse impacts and public safety risks for the full range of flood events up to and including the PMF. Shoalhaven City Council should be satisfied over the adequacy of the flood impact and risk assessment in meeting the flood related elements of council's Flood DCP and LEP.*
 - *Demonstrate that landform modifications for the proposal do not result in significant impacts to flood behaviour across the full range of flood events considering flood levels, velocities, flood volumes, hazards, categories and duration.*

Provide a clear pre and post landform change assessment (including batters) and demonstrate measures are in place to off-set adverse impacts on flooding and the environment over the full range of floods.

1.3 Site location

The site is located at 25 Moss Vale Road, Bomaderry within the Shoalhaven City Local Government Area (LGA). Figure 1-1 shows the site extent.

The site is located approximately 2.2km northwest of Bomaderry Station and 350m west of the A1 Princes Highway. Approximately 5.2km south of the site is the suburb of Nowra, a major commercial centre servicing the south coast suburbs of NSW. A summary of the surrounding development is provided below:

- **North:** The site is bound by Moss Vale Road to the north. Directly across the site is a large area of R5 Large Lot Residential zoned properties. Further north of the site is farmland, which is earmarked for future residential development as part of the Moss Vale Road North Urban Release Area.
- **East:** Immediately east of the site is bushland and Moss Vale Road. To the northeast of Moss Vale Road is detached residential dwellings, a kindergarten and highway retail uses along the Princes Highway. The Bomaderry Town Centre is located approximately 550m southeast of the site and comprises major services and facilities, including a supermarket, high school, aquatic centre, sporting oval and fast-food retailers. This area also contains slightly denser residential uses within low and medium residential zoned land.
- **South:** Immediately south of the site is the Bomaderry Creek nature reserve and Bomaderry Creek Regional Park. Further to the south is the suburb of North Nowra, which extends down to the Shoalhaven River, a perennial river running 327km in a north easterly direction from Braidwood to the Pacific Ocean east of Nowra.
- **West:** The Bomaderry creek riparian corridor runs along the western boundary of the property. Further west of this is the Waymount Farm, a rural property including tourist and visitor accommodation surrounded by Bomaderry Creek. Beyond this is the Moss Vale Road South Urban Release Area, which is a new subdivision currently being developed.



1 Introduction



2 Existing flood conditions

The site, adjoining Bomaderry Creek, is identified as flood-prone in Council's Bomaderry Creek Floodplain Risk Management Study and Plan (2016). Design flood levels are 32.2 m AHD (100 Year ARI) and 37.0 m AHD (PMF). Land along the western boundary is High Hazard and mapped as Floodway in the 100 Year ARI event; Under the PMF, most flood-affected areas are likewise High Hazard Floodway. The site is situated on the outer fringe of the Bomaderry Creek floodplain and serves as an overbank storage area immediately upstream of a natural hydraulic constriction, where flows from the broader floodplain converge into a deep, narrow gully approximately 100 m downstream, resulting in a rapid flood response.

3 Available information

The following data and information have been adopted or considered in the study:

- Topographic survey supplied by the Client on 19 December 2024.
- Proposed design digital terrain model (TIN), including internal roads, supplied by the Client on 9 July 2025.
- Drawing MP105 - Master Plan Concept – SSDA Development Mix, dated 25 July 2025
- Bomaderry Creek Floodplain Risk Management Study and Plan (Cardno, 2016) — design hydrology and TUFLOW model.
- NSW Flood Risk Management Manual (2023) – June 2023;
- Flood Risk and Impact Assessment (2023) – Flood risk management guideline LU01 – June 2023;
- Planning Circular – PS24-001 – March 2024;
- Climate Change Considerations for Flood Estimation (Australian Rainfall and Runoff Version. 4.2) – August 2024; and
- Shelter in place for flash flooding (DPHI, 2024) – January 2025.



4 Methodology and modelling

Council's Bomaderry Creek flood model (2016 Floodplain Risk Management Study and Plan) was adopted with minimal changes to preserve comparability. Key inputs and assumptions are summarised below.

- The model basis is Council's Bomaderry Creek flood model in the 2016 FRMS&P.
- The terrain for the existing-conditions baseline is updated using provided survey data (refer Section 3).
- Hydrologic inflows, downstream tailwater boundaries and model controls are retained from the source model.
- The simulated design events are the 10-year ARI, the 100-year ARI and the PMF.
- It is noted that the 2,000-year ARI flood level is interpolated to be approximately RL 34.0 m AHD, between the 100-year ARI and PMF levels.
- Based on Council's model results, the adopted critical storm durations are 6 hours for the 10- and 100-year ARI events and 2 hours for the PMF.
- Calibration is unchanged; no re-calibration was undertaken and differences reflect the terrain update.
- Proposed scenario was established by incorporating provided design 3d surface and proposed buildings (refer Section 3) to the baseline model.



5 Flood results

5.1 Existing conditions

Peak flood levels across the study area range from 29.90–31.36 m AHD in the 10-year ARI, 31.87–32.48 m AHD in the 100-year ARI, and 36.84–36.97 m AHD in the PMF. The proposed development area is located above the 10-year ARI flood level. In the 100-year ARI event, velocities in adjacent flow paths reach up to 0.60 m/s, with hazard levels up to H3 near the road. In the PMF, velocities are generally less than 1.00 m/s, with hazard levels up to H6. Refer to Appendix A — Flood Maps for peak flood level, velocity, and hazard mapping.

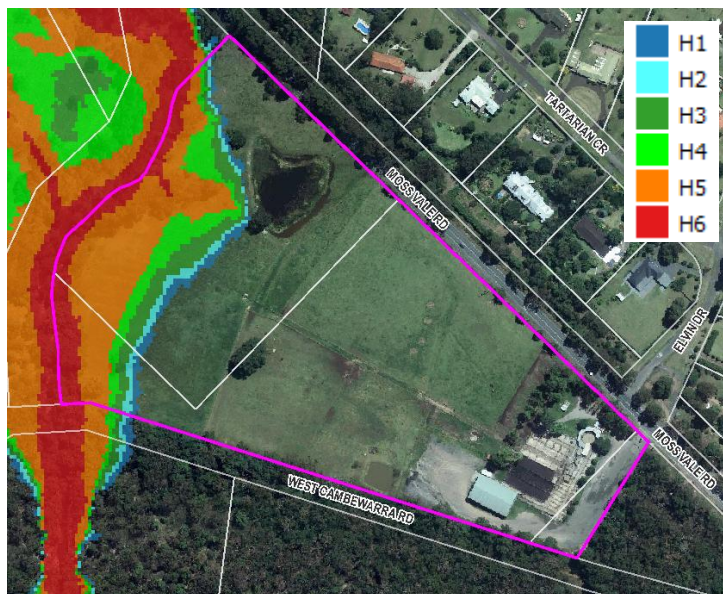


Figure 5-1 Existing 100 year ARI flood hazard

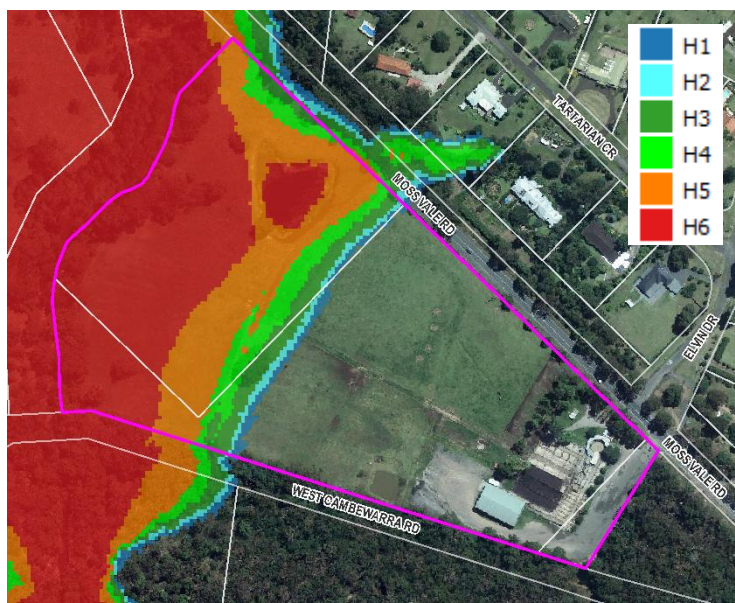


Figure 5-2 Existing PMF flood hazard



5.2 Developed conditions

Peak flood levels for the 10-year ARI, 100-year ARI, and PMF remain consistent with existing conditions. The proposed lots are designed above both the 10-year and 100-year ARI flood levels. In adjacent flow paths, velocities reach up to 0.70 m/s in the 100-year ARI event. In the PMF, velocities are generally less than 1.10 m/s, with hazard levels up to H5. Refer to Appendix A — Flood Maps for developed-condition peak flood level, velocity, and hazard mapping.

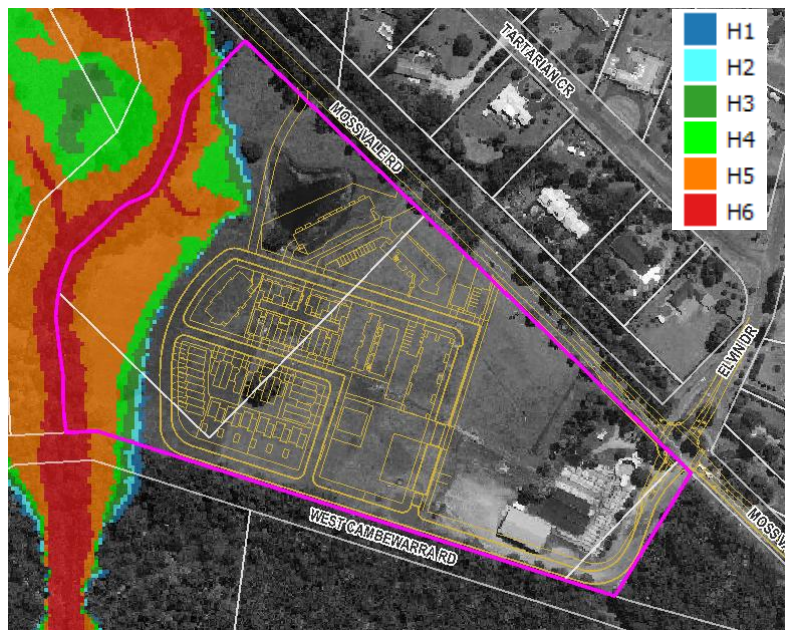


Figure 5-3 Proposed 100 year ARI flood hazard



Figure 5-4 Proposed PMF flood hazard



6 Flood Risk Management

6.1 Flood impacts

Flood impacts were assessed by comparing pre- and post-development peak flood levels for the 10-year ARI, 100-year ARI and PMF events.

There is only a marginal encroachment into the 10-year flood extent near the proposed cul-de-sac, and no measurable impacts are predicted. Small, localised increases in flood level are expected adjacent to the western side of the proposed road due to the minor volume of fill placed within the inundation area; these changes are confined and negligible. As anticipated for the PMF, water level increases are less than 30 mm, as the proposed earth fill and buildings are insignificant relative to the depth and extent of PMF inundation across the floodplain. The maximum PMF hazard along Moss Vale Road remains at H6. Overall, the predicted changes are minor, localised, and not considered detrimental.

It is noted that the impact assessment was undertaken using the GPU-based version of Council's hydraulic model, as the original CPU model exhibited over-sensitivity and instability near the downstream gully, resulting in unexplained anomalies.

6.2 Climate change

The climate-change sensitivity was undertaken in accordance with the latest Australian Rainfall and Runoff (ARR) guidance (27/08/24). A rainfall-intensity multiplier of 1.54 (SSP5-8.5, year-2100 worst case) was applied. The results (refer to Figure 6-1) indicate flood level increases of up to ~1.6 m near the site relative to the no-climate-change case. This response reflects the Bomaderry catchment geometry, where a broad floodplain funnels into a narrow gully, making water levels highly sensitive to increases in rainfall. It is confirmed that, under the climate change scenario, all proposed building ground floors are above the Flood Planning Level with climate change (100-year ARI + 500 mm freeboard + 1.6 m climate change allowance).



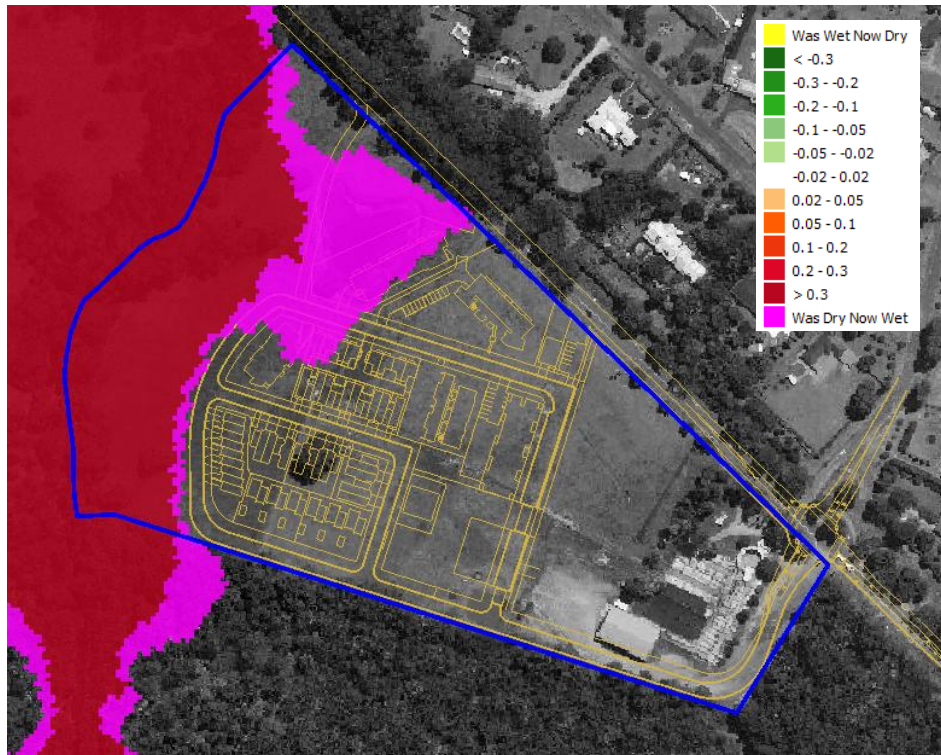


Figure 6-1 Climate Change Sensitivity

6.3 Flood planning Level

It is confirmed that, under the climate change scenario, all proposed building ground floors are above the Flood Planning Level with climate change (100-year ARI + 500 mm freeboard + 1.6 m climate change allowance).

6.4 Flood evacuation strategy

Shelter-in-place is not recommended under the new SIP policy. A PMF rising egress route is available and is shown on Figure 6-2 Proposed PMF hazard and egress route Figure 6-2 as pink arrows.

It is recommended that a detailed, site-specific Flood Emergency and Evacuation Plan (FEEP) be prepared at detailed design stages, aligned with Council and NSW SES guidance. The FEEP should include a site flood-warning system to enable timely self-evacuation and consider:

- Installation of on-site flood gauges;
- A third-party maintained flood communication/notification system; and
- Appointment of a Site Flood Manager and local flood wardens.

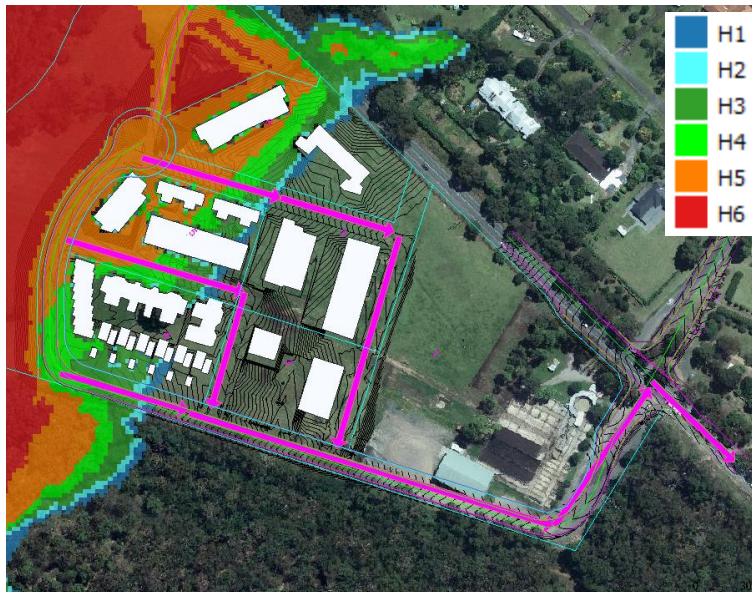


Figure 6-2 Proposed PMF hazard and egress route

6.5 Other Risk

To reduce residual flood risk, the basement car park entry and all other external openings is recommended to be designed with thresholds above the 2000-year ARI level, noting that protection to the PMF is not practical. The 2000-year water level of approximately RL 34.0 m AHD has been achieved in the proposed basement car park entry design (refer Drawing FA090).

Critical utilities and essential services should be located and protected as high as practicable, preferably at or above the PMF level, to maintain functionality during extreme flood events. The proposed substation (refer Figure 6-3) is designed to RL 36.0, which is below the PMF level (RL 37.0). Accordingly, the substation will be either relocated or raised to at least the PMF level during the detailed design phase.

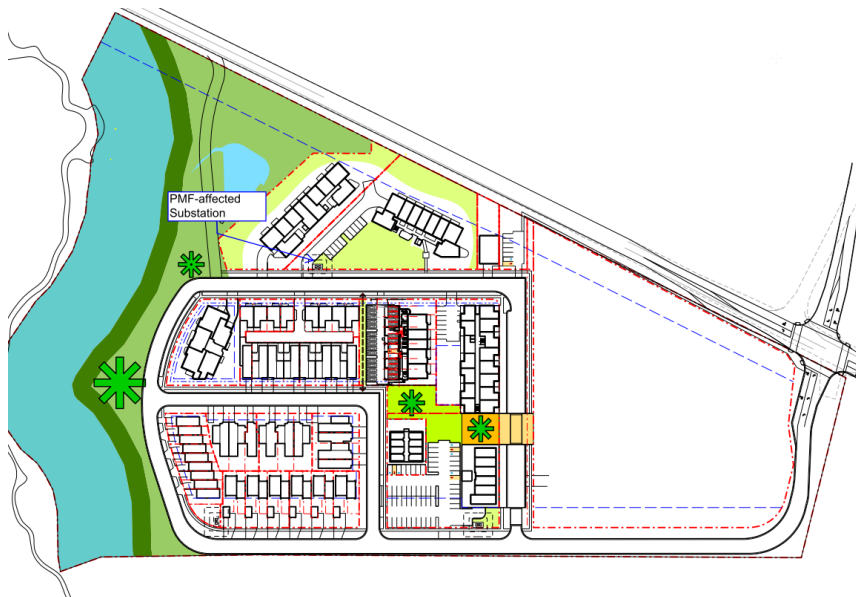


Figure 6-3 PMF-affected substation

6.6 Relevant LEP compliance

The proposed subdivision is considered consistent with the flood-related provisions of the LEP, specifically clauses 5.21 and 5.22. An assessment against each objective and consent requirement has been undertaken, with responses provided in Table 2 and Table 3 respectively to demonstrate compatibility of the development with the applicable considerations.

Table 6-1 Clause 5.21 Shoalhaven LEP 2014 – Flood Planning items and Response

LEP clause 5.21	Response
Objectives: (a) Minimise flood risk to life and property. (b) Allow development compatible with the land's flood function and behaviour, accounting for climate change. (c) Avoid adverse or cumulative impacts on flood behaviour and the environment. (d) Enable safe occupation and efficient evacuation during floods.	• The proposed development ensures all habitable areas are located above the FPL, significantly reducing flood exposure. Risk to life is further managed through compliant evacuation routes, preparation of a site-specific FEEP, and placement of critical services at or above design flood levels with additional flood-resilient measures. This approach minimises both personal risk and potential damage to property. • Flood modelling incorporates ARR 2019 climate change allowances, ensuring the development remains resilient under future rainfall intensification and that the design is consistent with long-term flood behaviour. All proposed habitable floor levels of the development are situated above the adopted climate change flood level. • Flood modelling shows that changes in flood behaviour from proposed earth filling and buildings are minor, localised, and non-detrimental, with no material off-site afflux or hazard increase. • Safe occupation is ensured by locating habitable floor levels above the FPL. Efficient evacuation is supported by egress routes that remain trafficable in design floods, with detailed procedures to be formalised in the site-specific FEEP. Together these measures ensure residents can safely evacuate during a flood.



LEP clause 5.21	Response
Development Consent: Consent must not be granted on land within the flood planning area unless the consent authority is satisfied the development: (a) is compatible with the land's flood function and behaviour, (b) will not adversely affect flood behaviour in a way that increases risk to other properties, (c) will not compromise safe occupation, evacuation, or exceed evacuation route capacity, (d) incorporates measures to manage risk to life, and (e) will not cause environmental harm such as erosion, siltation, riparian loss, or reduced watercourse stability.	• The subdivision layout and proposed finished levels are compatible with the land's flood function. Flood pathways are maintained, and development avoids obstructing or altering natural overland flow. • Flood modelling confirms that changes to flood behaviour due to site filling and proposed buildings are minor, localised, and non-detrimental, with no material off-site afflux, hazard increase, or worsening of flood risk to neighbouring properties. • Habitable floor levels are located above the FPL with climate change, and safe self-evacuation is achievable via designated egress routes. These arrangements will be formalised through a site-specific FEED. The proposed development will not exceed evacuation route capacity. • Risk to life is minimised by ensuring land and habitable areas are above the FPL with climate change, providing compliant evacuation routes, elevating and flood-proofing critical services, and incorporating flood-resilient design features. A FEED will further support risk management during extreme events. • Erosion, siltation, riparian loss, and reduced watercourse stability have not been assessed in detail as part of this report. However, based on the extent of proposed earthworks, it is considered unlikely that the development would worsen existing conditions in this regard.



LEP clause 5.21	Response
In deciding whether to grant consent, the authority must consider: (a) projected changes to flood behaviour due to climate change, (b) the intended design and scale of buildings, (c) measures to minimise risk to life and ensure safe evacuation, (d) potential to modify, relocate, or remove buildings if flooding or coastal erosion occurs.	Flood modelling has been completed in accordance with ARR 2019, incorporating climate change allowances. To ensure long-term resilience, habitable floor levels are above the climate change design flood level. The subdivision layout and proposed residential scale are compatible with the land's flood function. Building footprints and finished levels are configured to maintain overland flow paths, while the scale of development remains consistent with residential use in flood-affected areas. Risk to life is minimised by locating habitable areas above the FPL, establishing compliant evacuation routes, and incorporating flood-resilient service design. A site-specific FEEP will provide operational procedures to ensure safe evacuation during extreme events. The development has been designed to place residential development on elevated land above the FPL with climate change, reducing the likelihood of future modification or relocation.



Table 6-2 Clause 5.22 Shoalhaven LEP 2014 – Special Flood Considerations and Response

LEP clause 5.22	Response
Objectives	• All proposed building ground floors are above the Flood Planning Level with climate change
(a) Enable safe occupation and evacuation during floods.	• Safe self-evacuation is achievable via designated egress routes and will be formalised in a site-specific FEEP.
(b) Ensure development is compatible with flood behaviour.	
(c) Avoid adverse or cumulative impacts on flood behaviour.	• Finished levels and earthworks are configured to remain clear of the conveyance zone and to operate consistently with local flood behaviour for residential use.
(d) Protect the operation of emergency facilities and critical infrastructure during floods.	• The layout avoids creating new obstructions to overland flow.
(e) Avoid adverse environmental effects from hazardous development during floods.	• Modelled impacts from site filling and buildings are minor, localised and non-detrimental, with no material off-site afflux or worsening of hazard on adjoining land. • The ultimate proposed case, including earthworks and proposed buildings, has been modelled to demonstrate no detrimental cumulative effects. • Critical utilities and services will be located or protected as high as practicable, targeting the 2000-year ARI level; where PMF level is not feasible, flood-proofing, anchoring, backflow prevention and redundancy will be considered. • All retail and commercial type of developments are located above the PMF.



LEP clause 5.22	Response
Development Consent	All proposed building ground floors are above the Flood Planning Level with climate change and provides for safe self-evacuation, ensuring occupants can evacuate safely in flood conditions.
Consent must not be granted unless the consent authority has considered whether the development:	
(a) affects safe occupation and evacuation,	Risk to life will be managed by providing land above the FPL, establishing compliant evacuation routes, preparing a site-specific FEEP, and locating critical services and essential community infrastructure—such as substations—above the PMF level where practical, supplemented by flood-resilient design measures.
(b) incorporates measures to manage risk to life,	
(c) will adversely affect the environment during a flood.	The development is not expected to cause adverse environmental effects during floods. Any future land uses involving hazardous materials will be required to implement appropriate containment and spill-response measures to ensure protection of downstream environments.

7 Conclusions & Recommendations

It is concluded that:

- Flood modelling is consistent with the Council-adopted model.
- The proposed development does not result in detrimental flood impacts.
- Key flood levels are: RL 32.2 m AHD for the 100 Year ARI, RL 33.8 m AHD for worst-case 100 Year ARI climate change, approximately RL 34.0 m AHD for the estimated 2000-year event, and 37.0 m AHD for the PMF.
- All proposed building ground floors are above the Flood Planning Level with climate change (100-year ARI + 500 mm freeboard + 1.6 m climate change allowance).
- A rising egress route to the Princes Highway is available for the PMF.
- The 2000-year water level of approximately RL 34.0 m AHD is achieved for the proposed basement car park entry of Building F.

It is concluded that recommended that:



Bomaderry Flood Impact and Risk Assessment

7 Conclusions & Recommendations

- **Vehicle flotation controls:** Configure basement access (e.g., raised ramp crest, bund, wheel stops, guide rails, or deployable barriers) to prevent floating vehicles from obstructing doors or gates during floods.
- **Structural soundness:** Design all structures to resist hydrostatic and hydrodynamic forces, debris impact, and buoyancy effects up to and including the PMF.
- **Critical utilities:** Locate substation in Area N and protect essential services as high as practicable, preferably above the PMF level in the detailed design phase.
- **Emergency management:** Prepare a site-specific Flood Emergency and Evacuation Plan (FEEP) to outline operational measures, evacuation procedures, and responsibilities during a flood event.



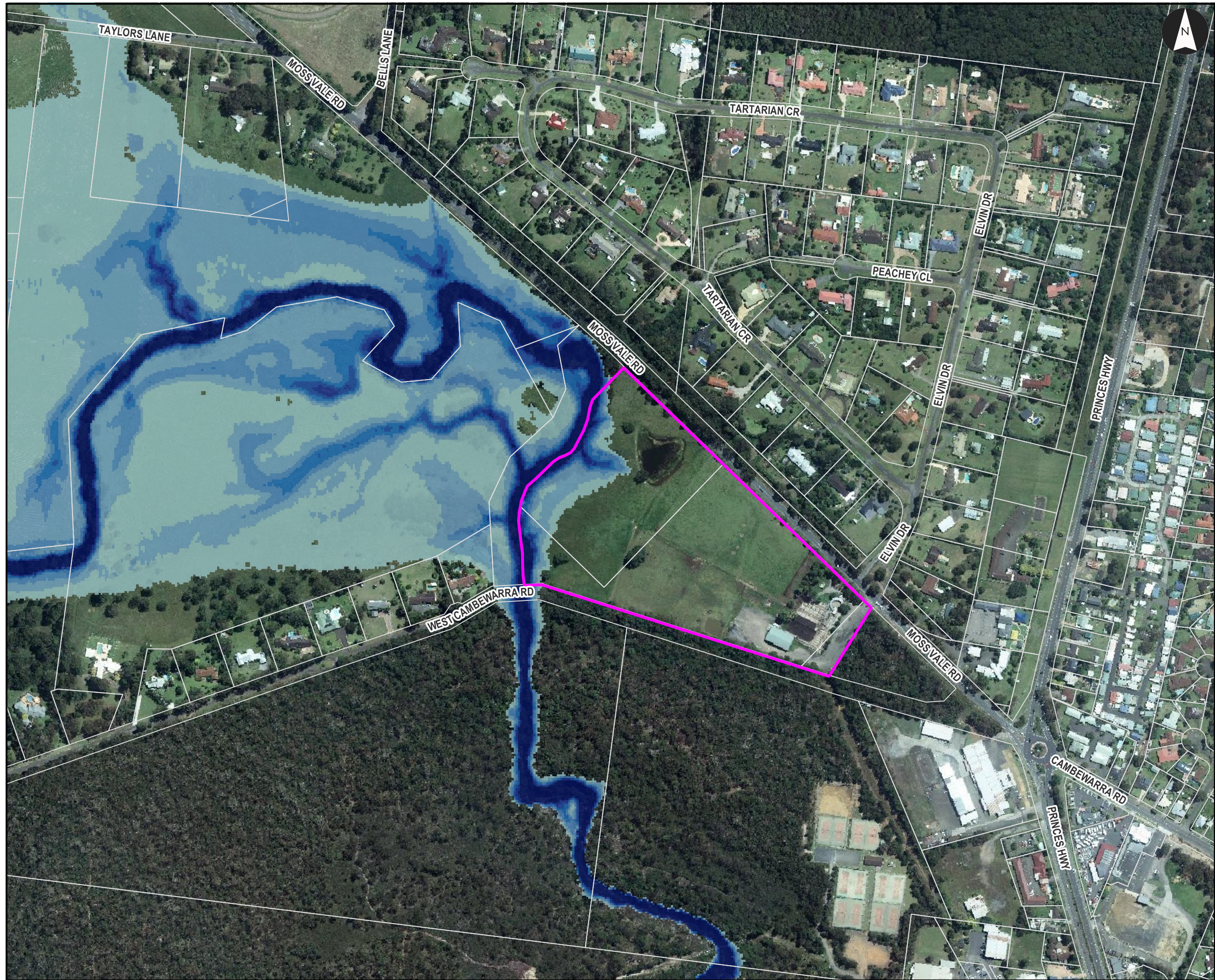
Appendices



Appendix A Flood Maps



U:\304001598\technical\food\097_GIS_Mapping\20250904\304001598_STN_Q01_FIRA.qgz | 304001598_STN_Q01_DR_FIRA(A3_L_S_A) | A3_Landscape_Square_v1_20250815c



Existing Flood Depth 10 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A1

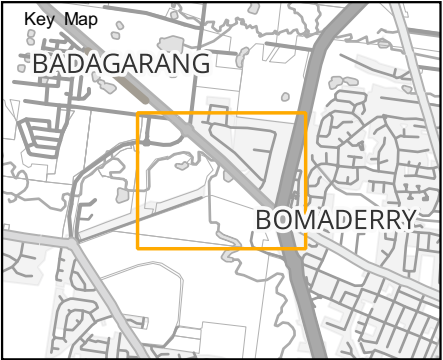
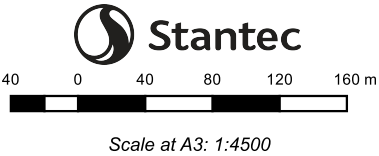
Legend

-  Site Boundary
- Flood Depth (m)**
-  0 - 0.5
 -  0.5 - 1.0
 -  1.0 - 1.5
 -  1.5 - 2.0
 -  2.0 - 2.5
 -  2.5 - 3.0
 -  > 3.0

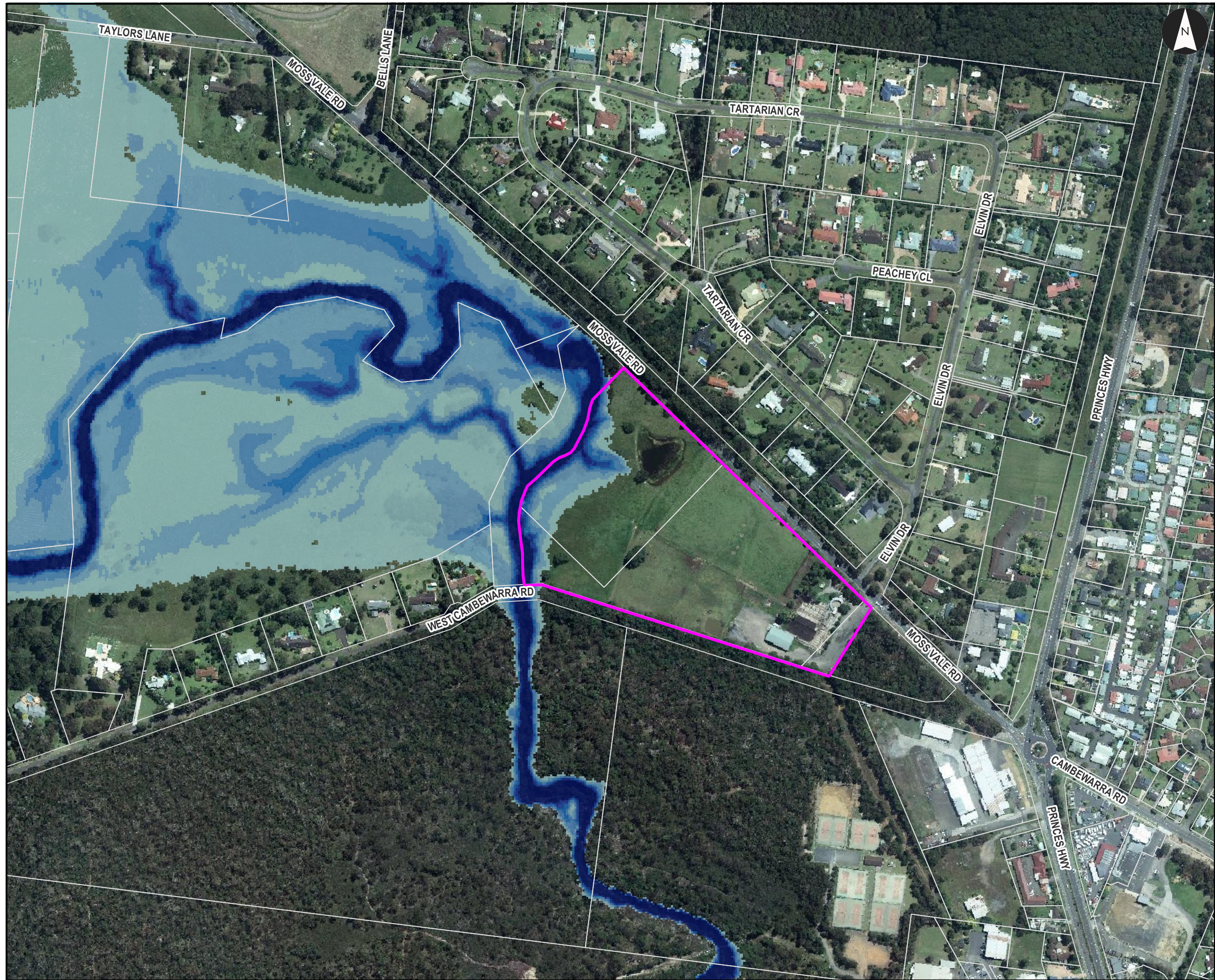
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



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Existing Flood Depth 10 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A1

Legend

-  Site Boundary
- Flood Depth (m)**
-  0 - 0.5
 -  0.5 - 1.0
 -  1.0 - 1.5
 -  1.5 - 2.0
 -  2.0 - 2.5
 -  2.5 - 3.0
 -  > 3.0

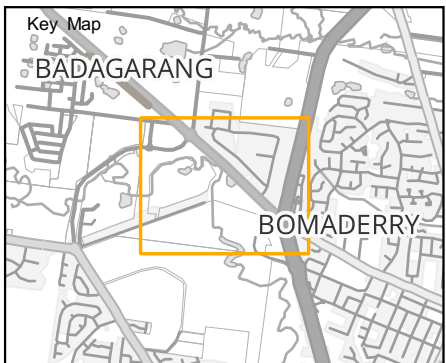
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Notes:
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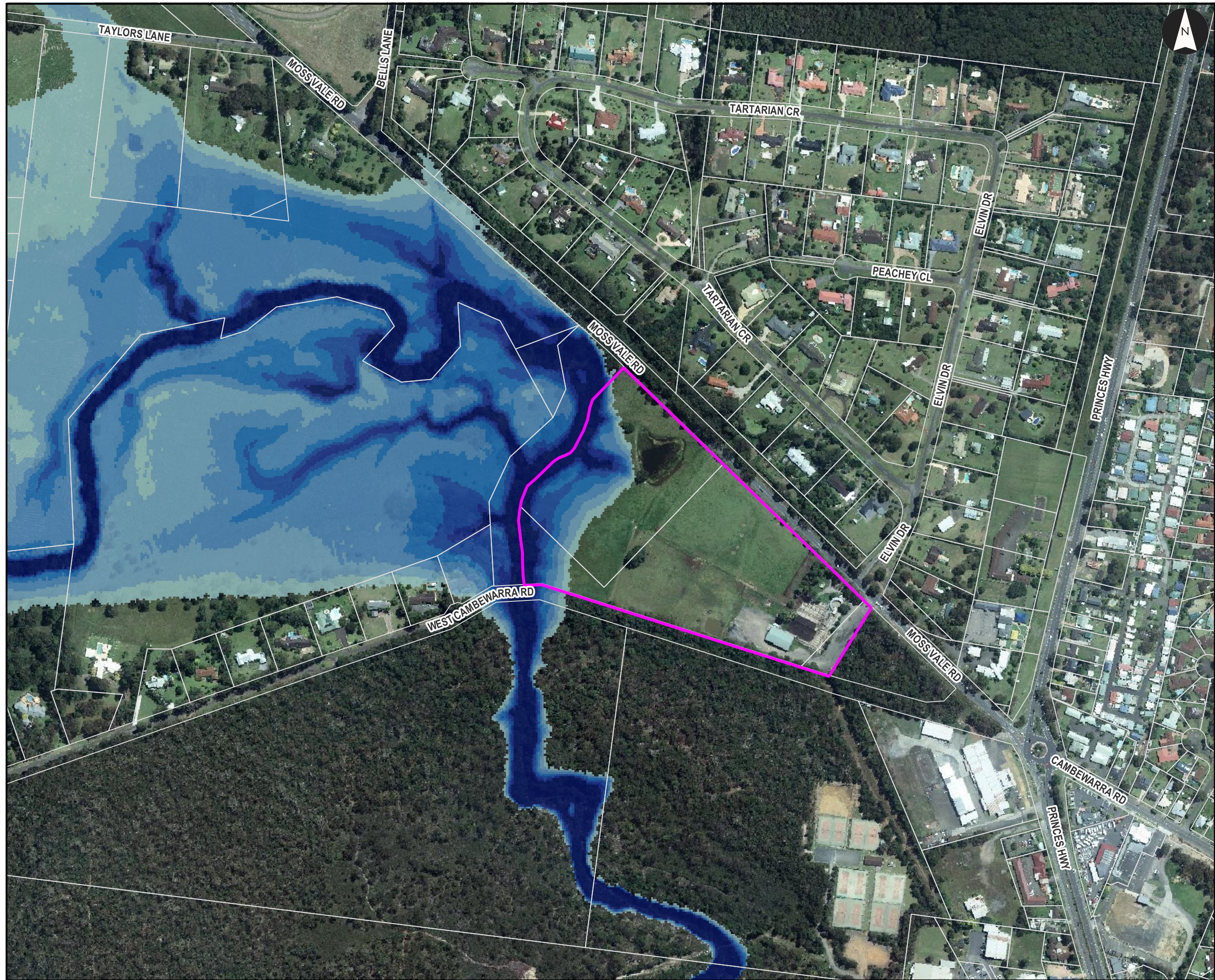
References:
1. Aerial photo: Sixmap



Scale at A3: 1:4500



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Existing Flood Depth 100 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A2

Legend

Site Boundary

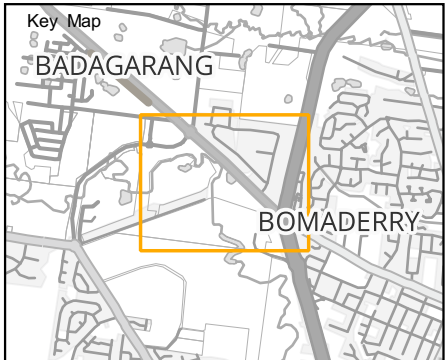
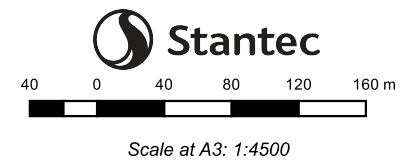
Flood Depth (m)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- > 3.0

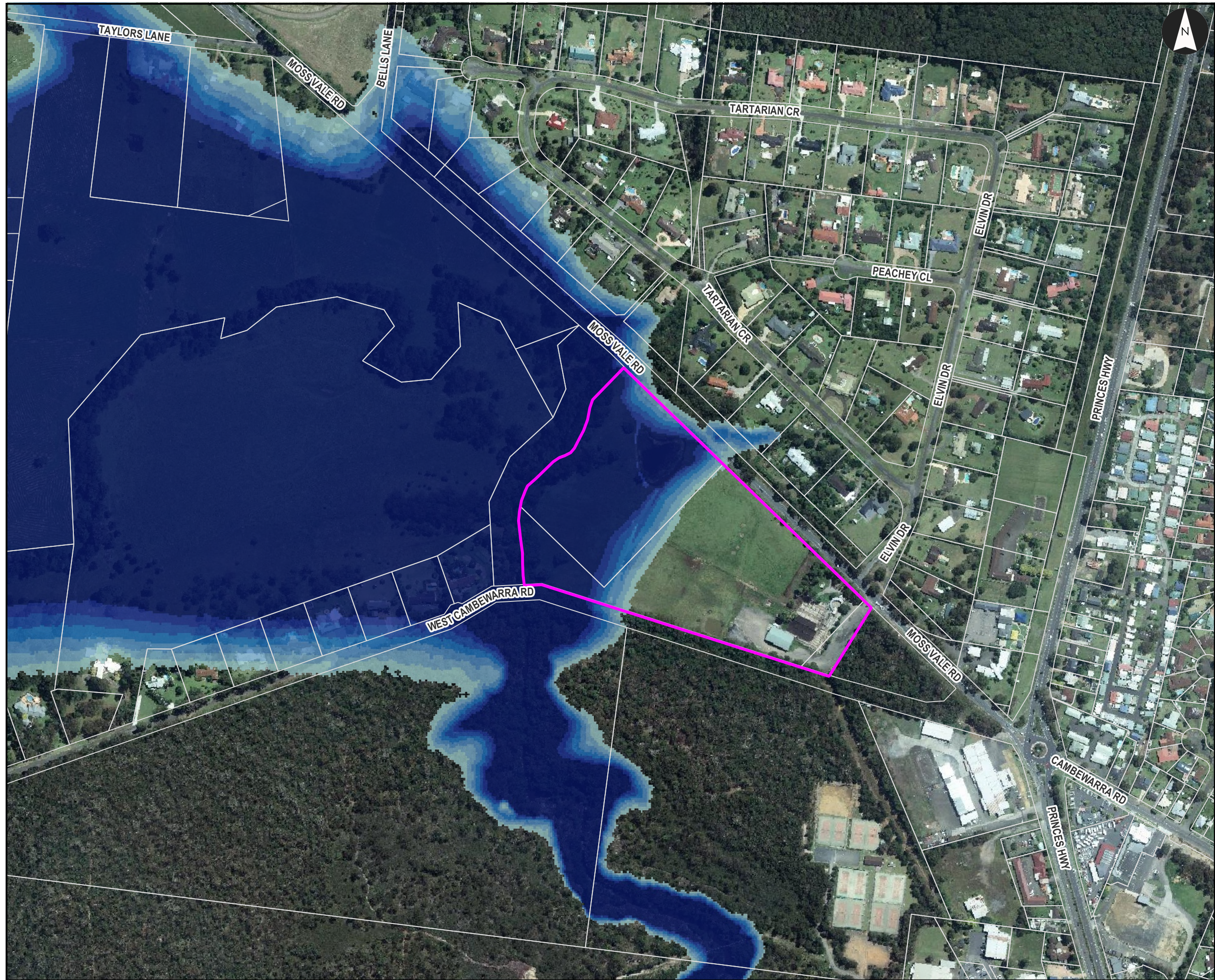
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



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Existing Flood Depth PMF
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A3

Legend

 Site Boundary

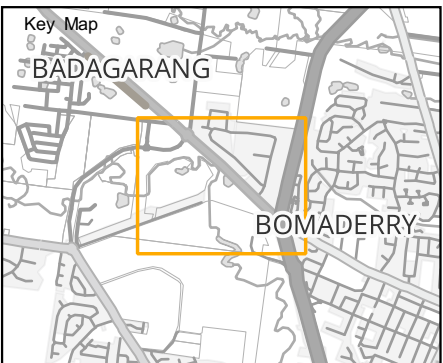
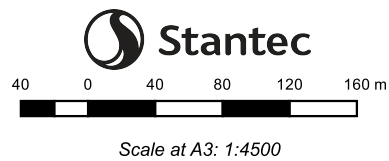
Flood Depth (m)

-  0 - 0.5
-  0.5 - 1.0
-  1.0 - 1.5
-  1.5 - 2.0
-  2.0 - 2.5
-  2.5 - 3.0
-  > 3.0

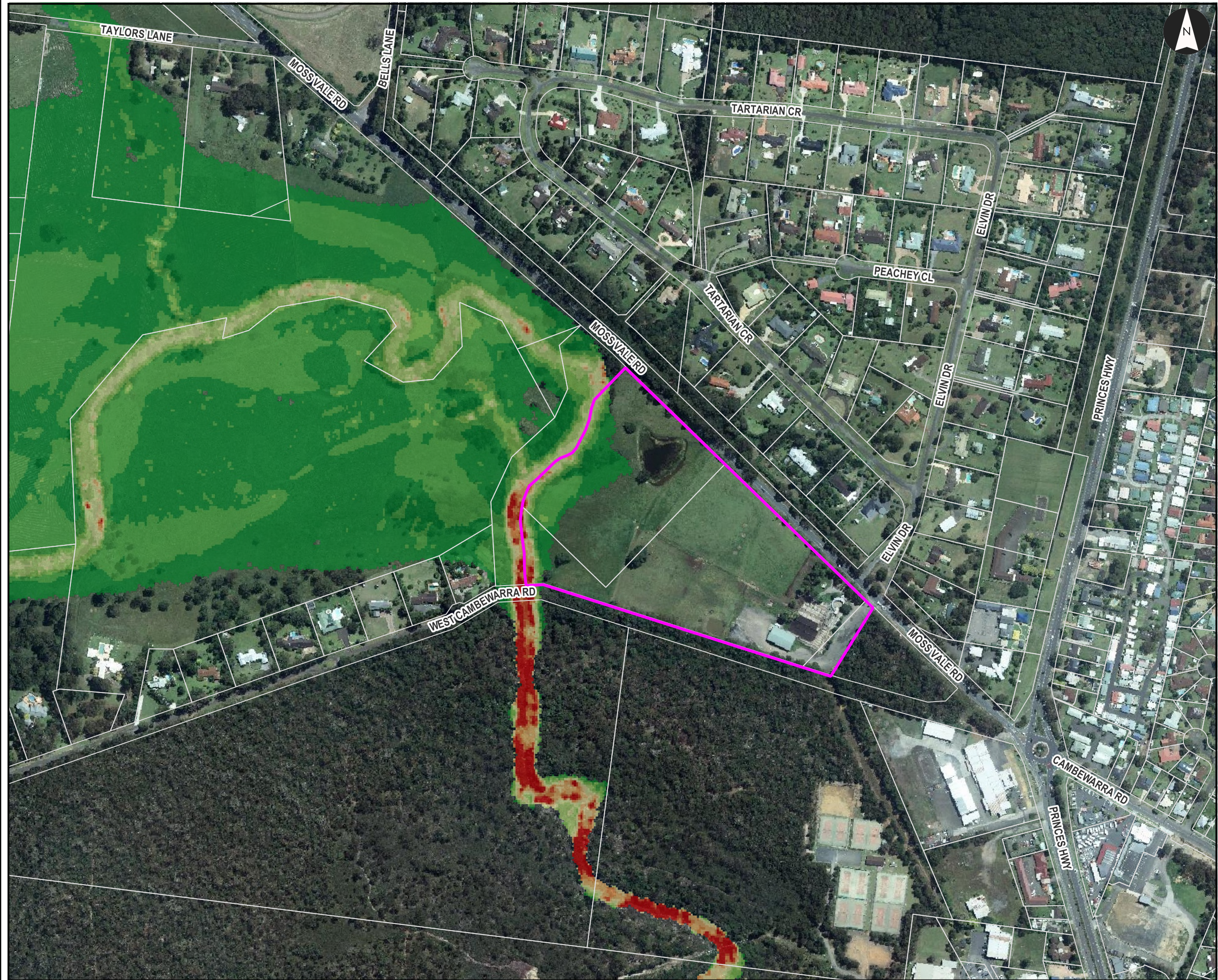
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Notes:
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References:
1. Aerial photo: Sixmap



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Existing Flood Velocity 10 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A4

Legend

-  Site Boundary
- Flood Velocity (m/s)**
-  0 - 0.5
 -  0.5 - 1
 -  1 - 1.5
 -  1.5 - 2
 -  2 - 2.5
 -  2.5 - 3
 -  3 - 3.5
 -  3.5 - 4
 -  4 - 4.5
 -  > 4.5

DRAFT - Not For Construction

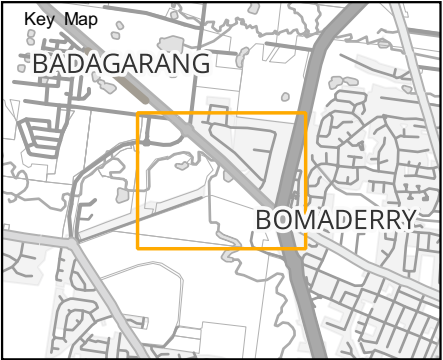
Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap

 **Stantec**

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Scale at A3: 1:4500



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Existing Flood Velocity 100 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A5

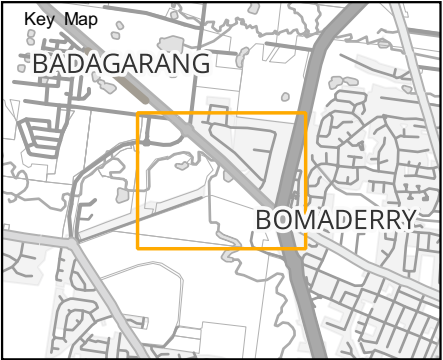
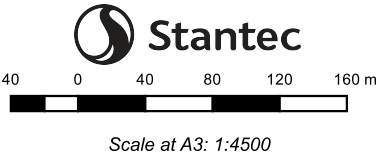
Legend

-  Site Boundary
- Flood Velocity (m/s)**
-  0 - 0.5
 -  0.5 - 1
 -  1 - 1.5
 -  1.5 - 2
 -  2 - 2.5
 -  2.5 - 3
 -  3 - 3.5
 -  3.5 - 4
 -  4 - 4.5
 -  > 4.5

DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



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Existing Flood Velocity PMF
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A6

Legend

 Site Boundary

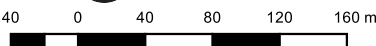
Flood Velocity (m/s)

-  0 - 0.5
-  0.5 - 1
-  1 - 1.5
-  1.5 - 2
-  2 - 2.5
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-  3 - 3.5
-  3.5 - 4
-  4 - 4.5
-  > 4.5

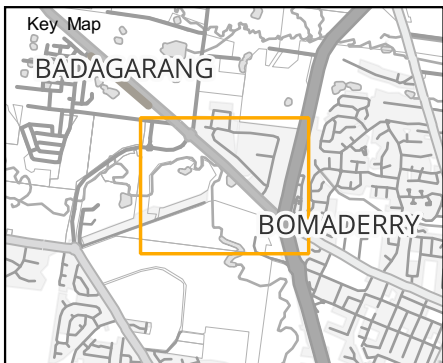
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Notes:
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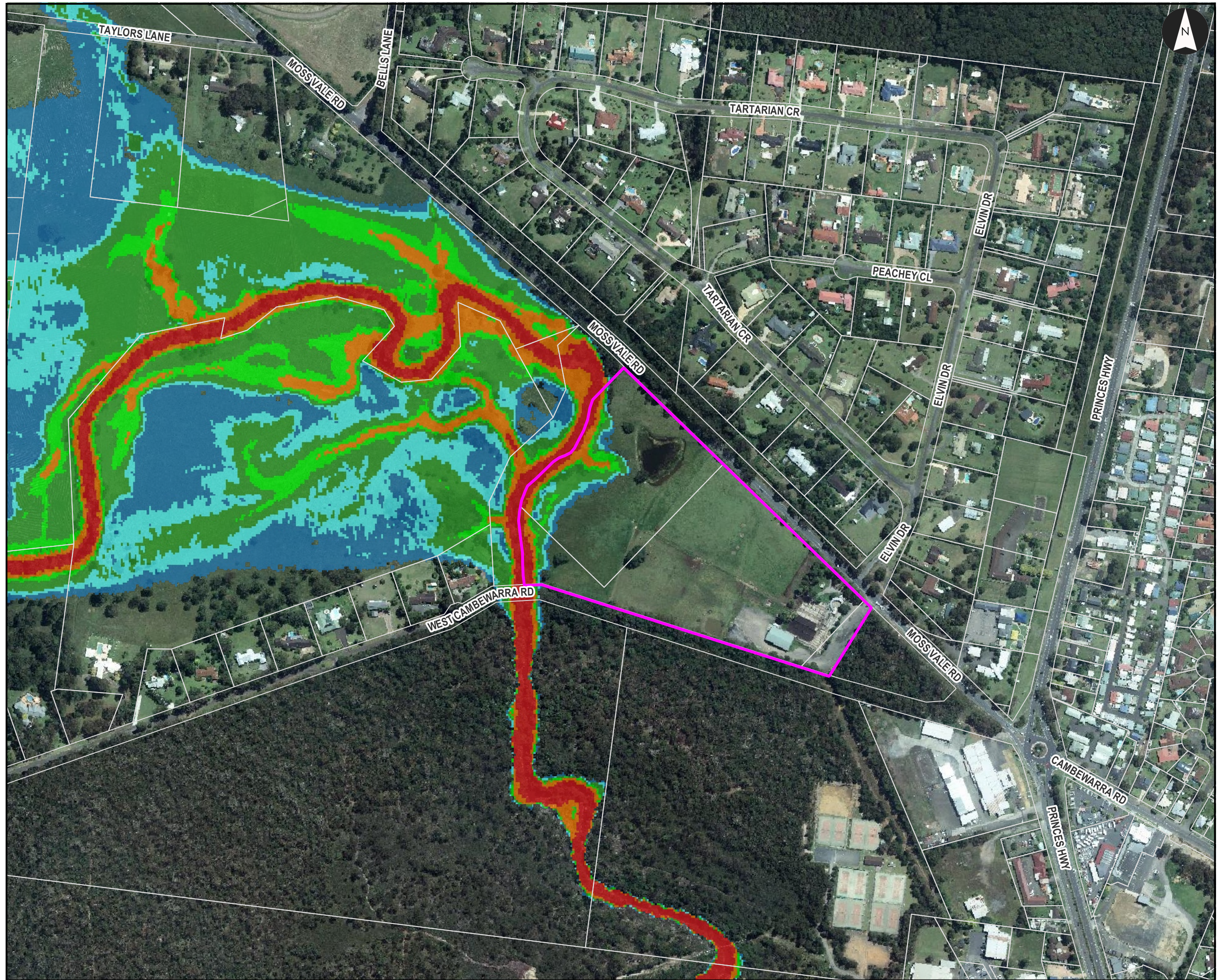
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1. Aerial photo: Sixmap



Scale at A3: 1:4500



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Existing Flood Hazard 10 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A7

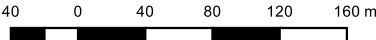
Legend

- Site Boundary
- Hazard(H1 to H6)**
- H1
 - H2
 - H3
 - H4
 - H5
 - H6

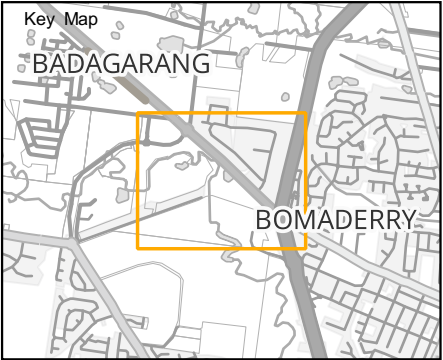
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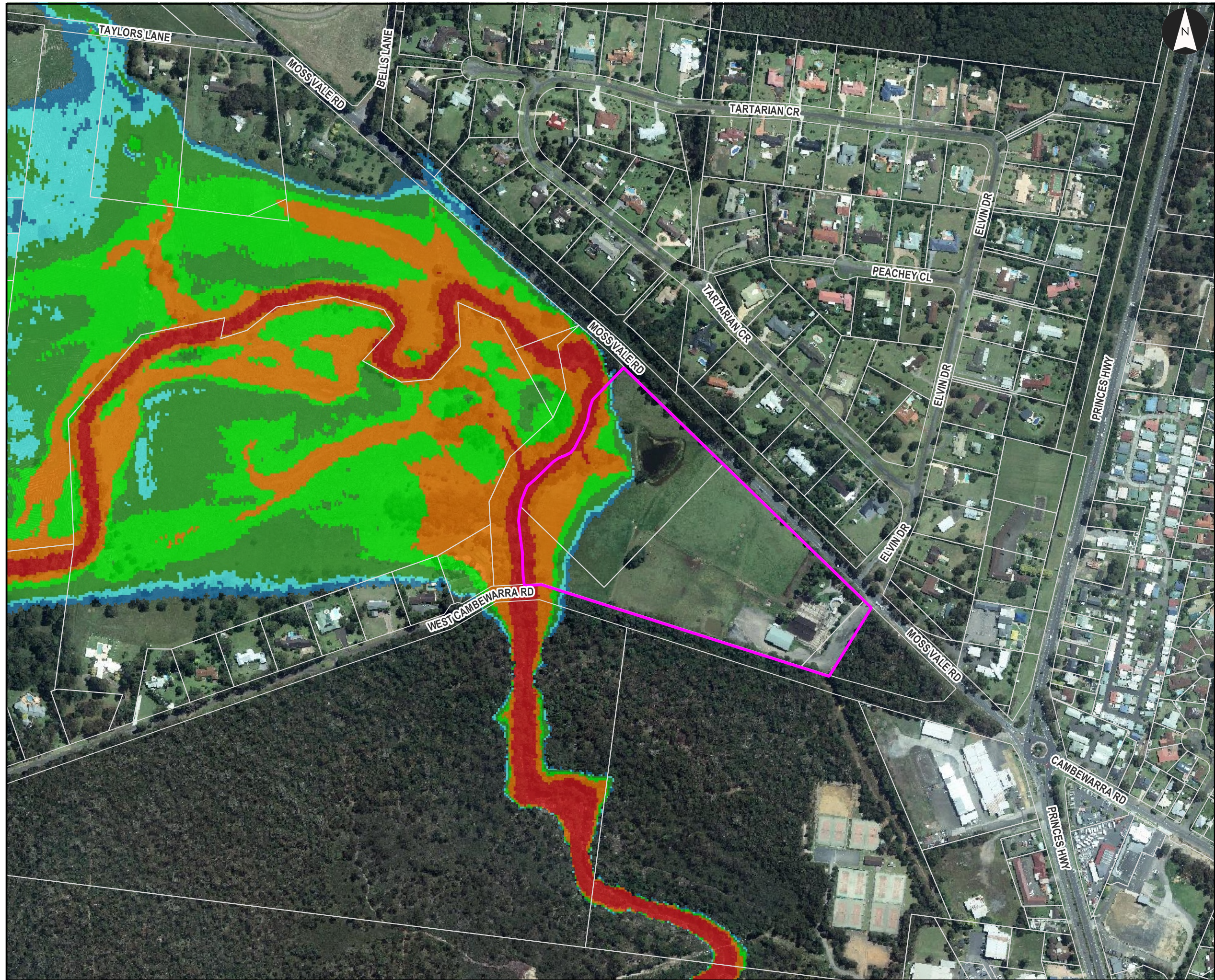
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Existing Flood Hazard 100 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A8

Legend

- Site Boundary
- Hazard(H1 to H6)
- H1
 - H2
 - H3
 - H4
 - H5
 - H6

DRAFT - Not For Construction

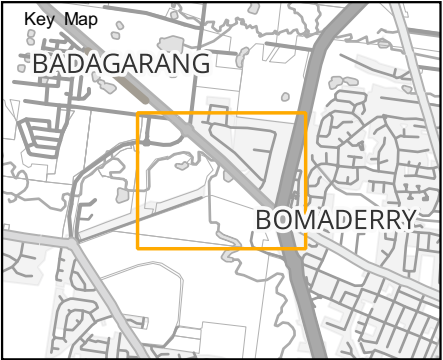
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References:
1. Aerial photo: Sixmap

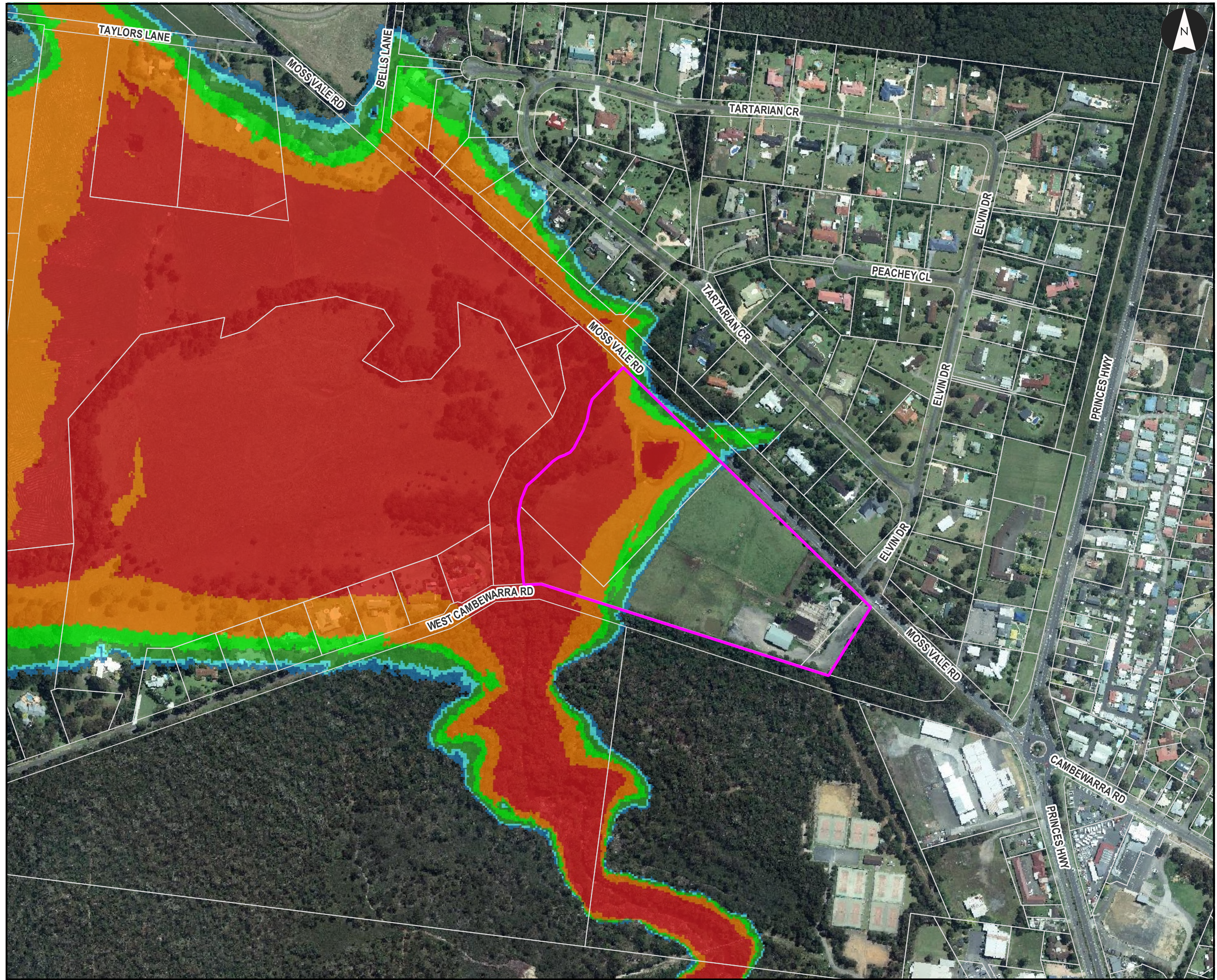
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Scale at A3: 1:4500



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Existing Flood Hazard PMF

25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A9

Legend

 Site Boundary

Hazard(H1 to H6)

-  H1
-  H2
-  H3
-  H4
-  H5
-  H6

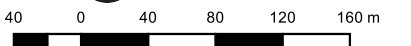
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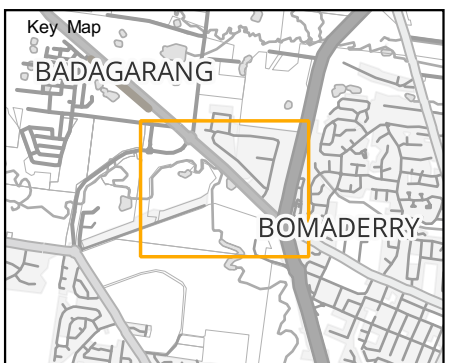
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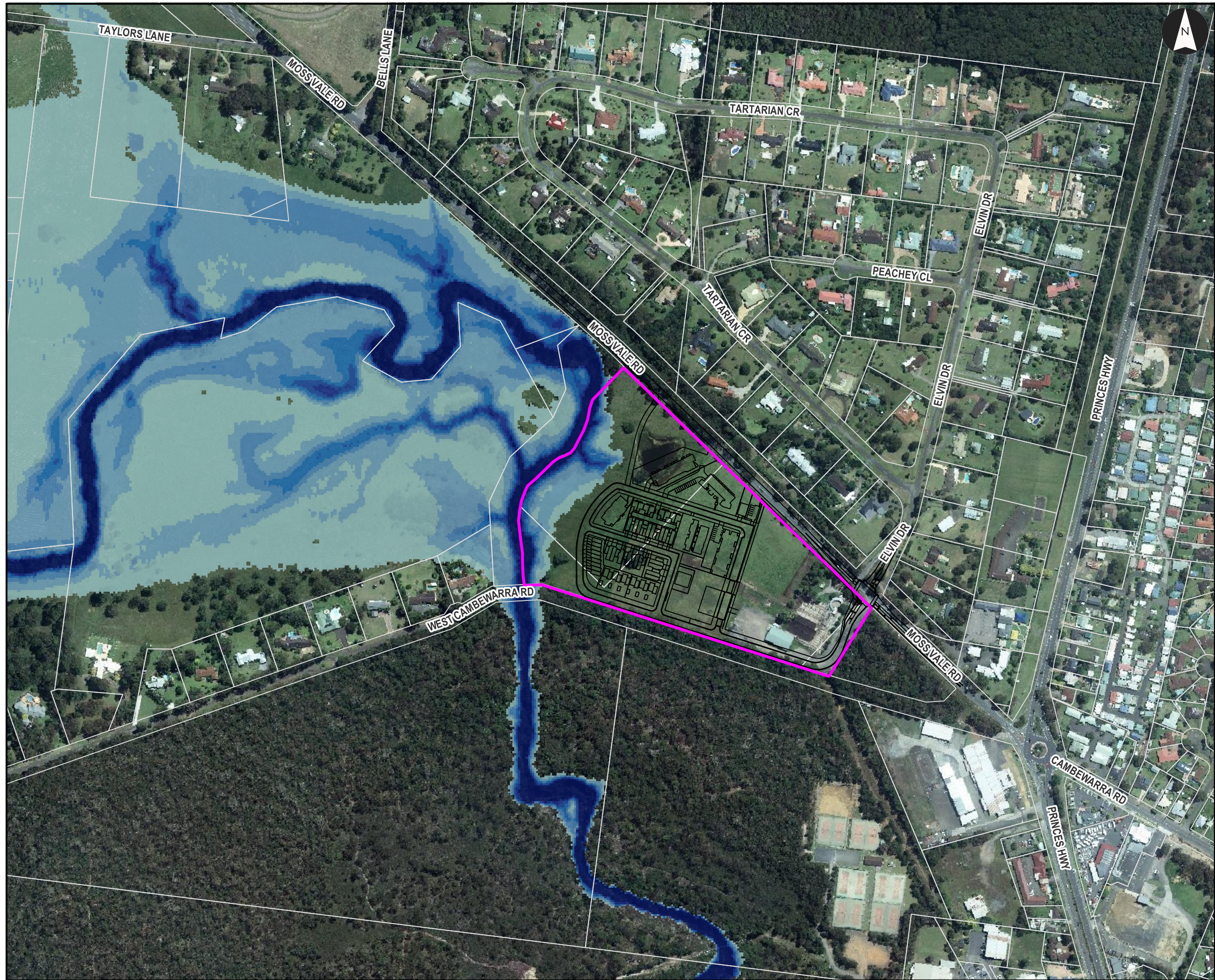
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Scale at A3: 1:4500



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Proposed Flood Depth 10 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A10

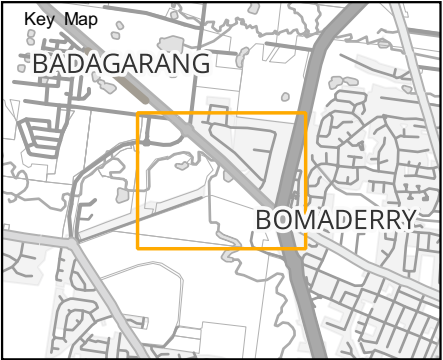
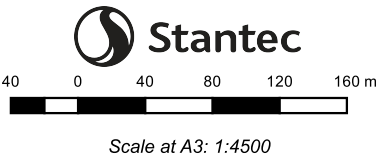
Legend

-  Site Boundary
- Flood Depth (m)**
-  0 - 0.5
 -  0.5 - 1.0
 -  1.0 - 1.5
 -  1.5 - 2.0
 -  2.0 - 2.5
 -  2.5 - 3.0
 -  > 3.0

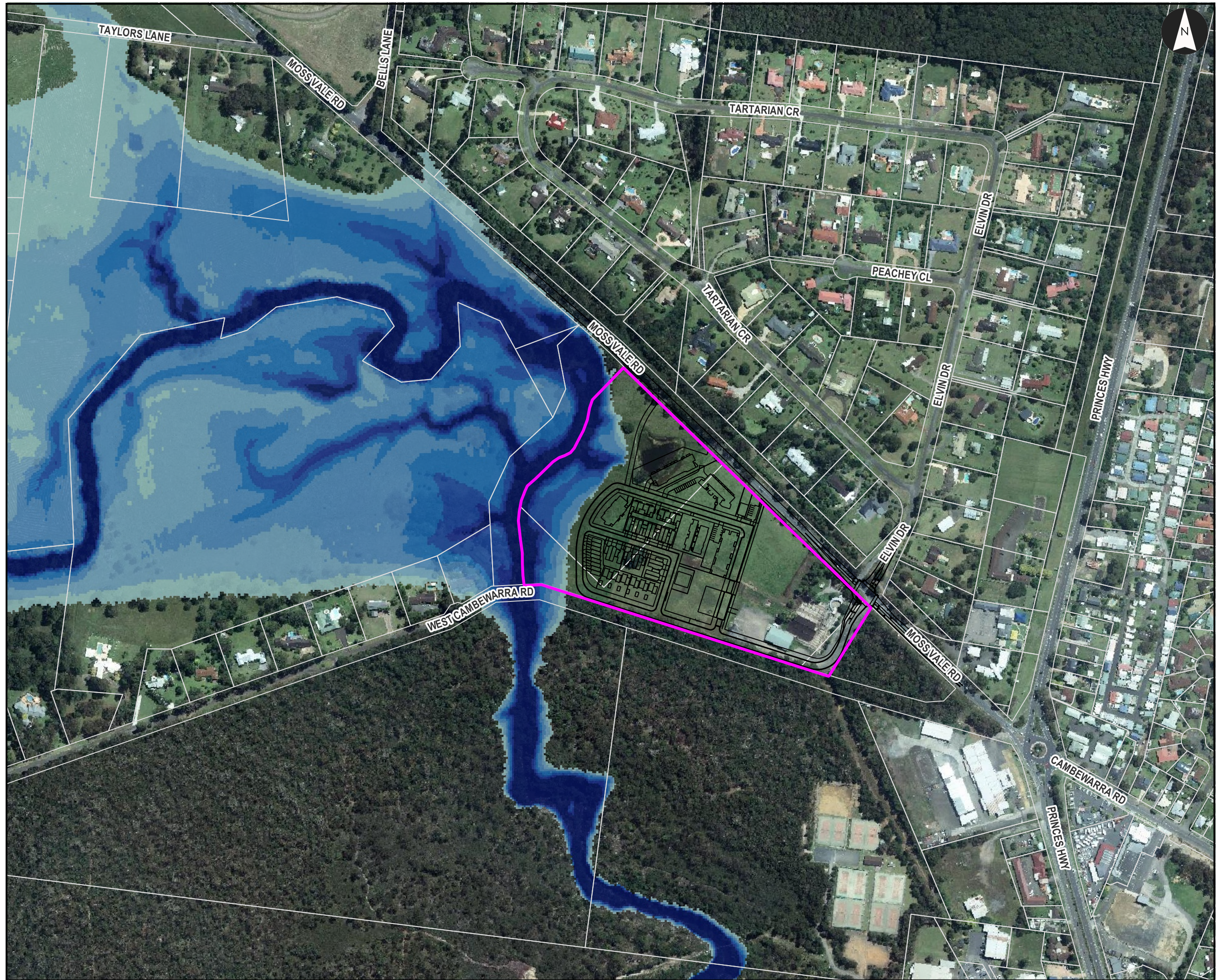
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



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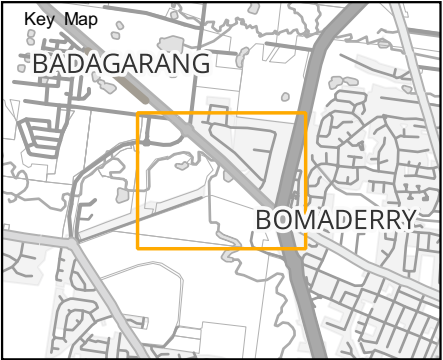
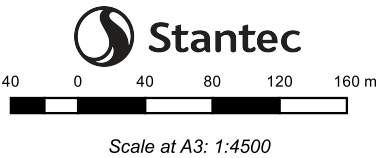
Proposed Flood Depth 100 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A11

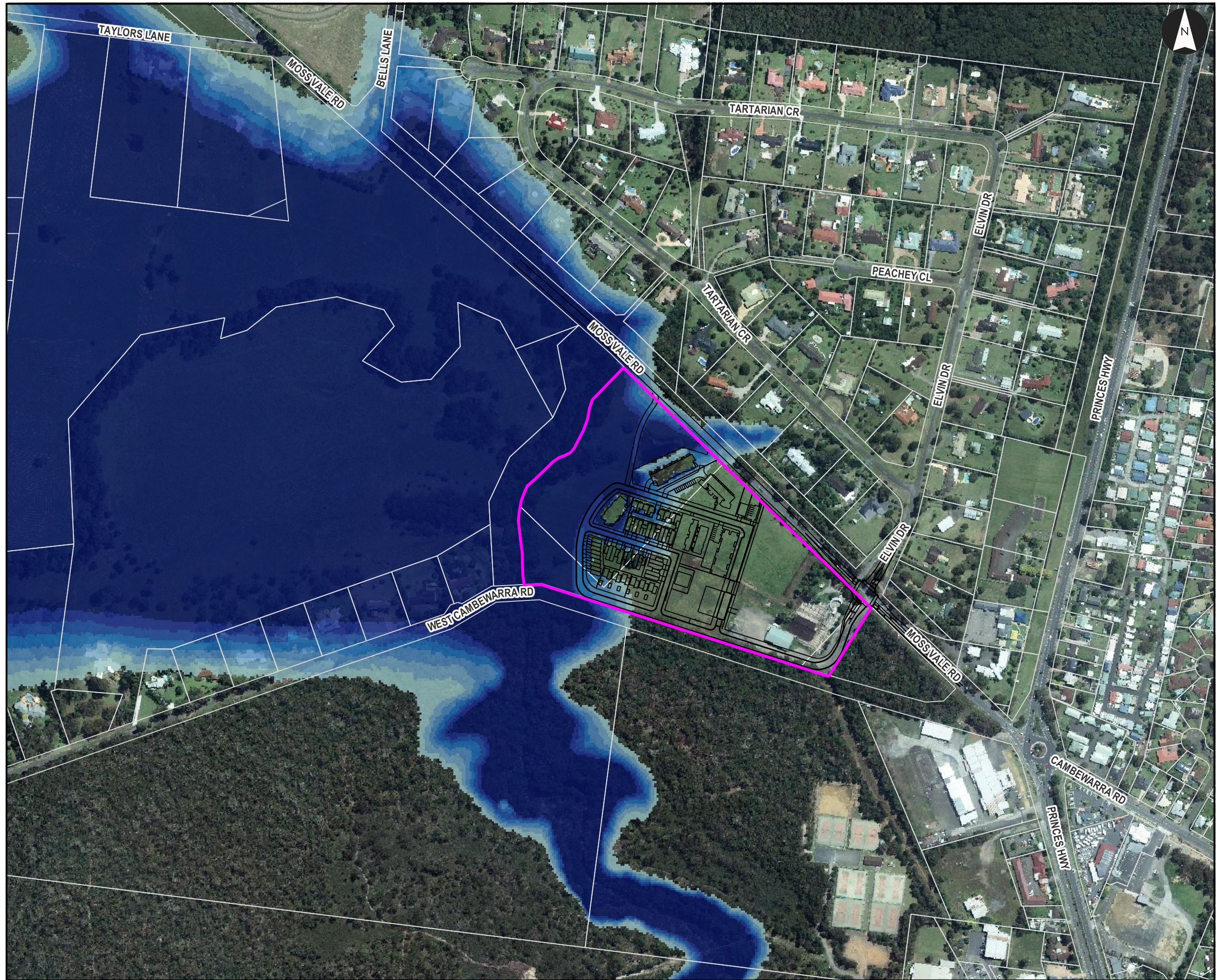
- Legend**
- Site Boundary
 - Flood Depth (m)**
 - 0 - 0.5
 - 0.5 - 1.0
 - 1.0 - 1.5
 - 1.5 - 2.0
 - 2.0 - 2.5
 - 2.5 - 3.0
 - > 3.0

DRAFT - Not For Construction

- Notes:
1. Map displayed in GDA94 / MGA zone 56
- References:
1. Aerial photo: Sixmap



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Proposed Flood Depth PMF
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A12

Legend

Site Boundary

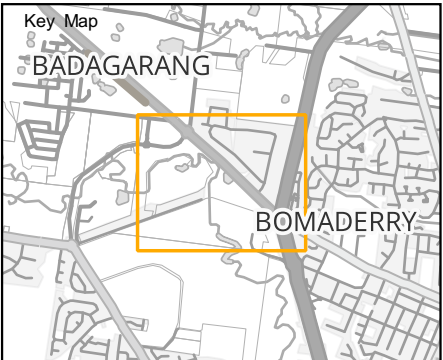
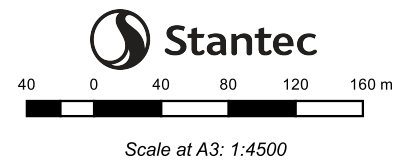
Flood Depth (m)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- > 3.0

DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



U:\304001598\technical\food\097_GIS_Mapping\20250904\304001598_STN_Q01_FIRA.qgz | 304001598_STN_Q01_DR_FIRA(A3_L_S_A) | A3_Landscape_Square_v1_20250815c



Proposed Flood Velocity 10 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A13

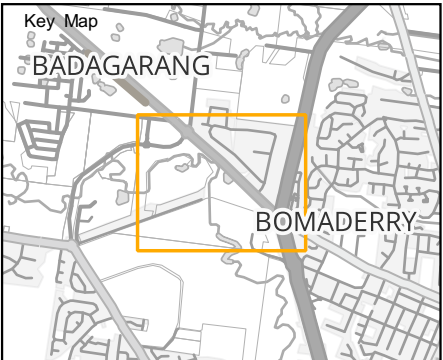
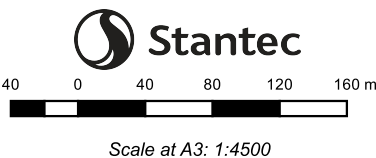
Legend

-  Site Boundary
- Flood Velocity (m/s)**
-  0 - 0.5
 -  0.5 - 1
 -  1 - 1.5
 -  1.5 - 2
 -  2 - 2.5
 -  2.5 - 3
 -  3 - 3.5
 -  3.5 - 4
 -  4 - 4.5
 -  > 4.5

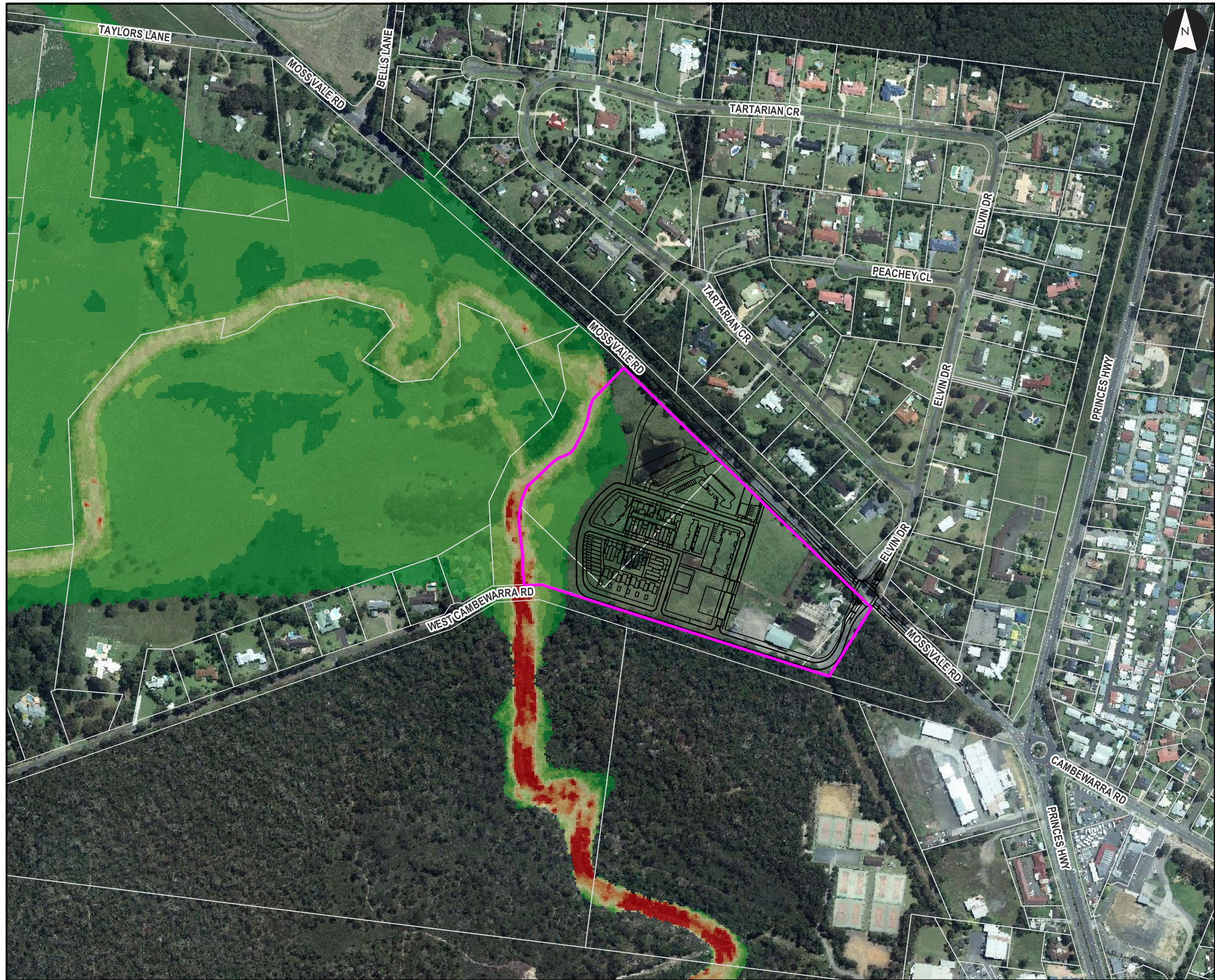
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



U:\304001598\technical\food\097_GIS_Mapping\20250904\304001598_STN_Q01_FIRA.qgz | 304001598_STN_Q01_DR_FIRA(A3_L_S_A) | A3_Landscape_Square_v1_20250815c



Proposed Flood Velocity 100 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A14

Legend

 Site Boundary

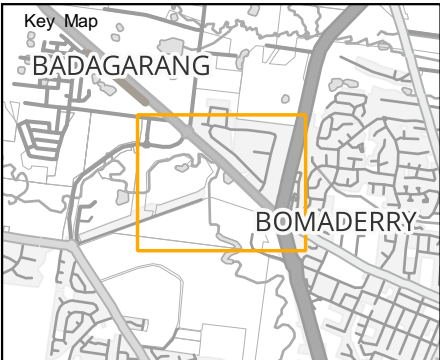
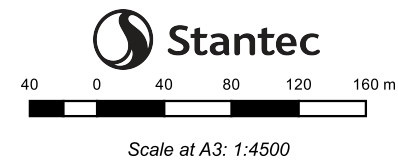
Flood Velocity (m/s)

-  0 - 0.5
-  0.5 - 1
-  1 - 1.5
-  1.5 - 2
-  2 - 2.5
-  2.5 - 3
-  3 - 3.5
-  3.5 - 4
-  4 - 4.5
-  > 4.5

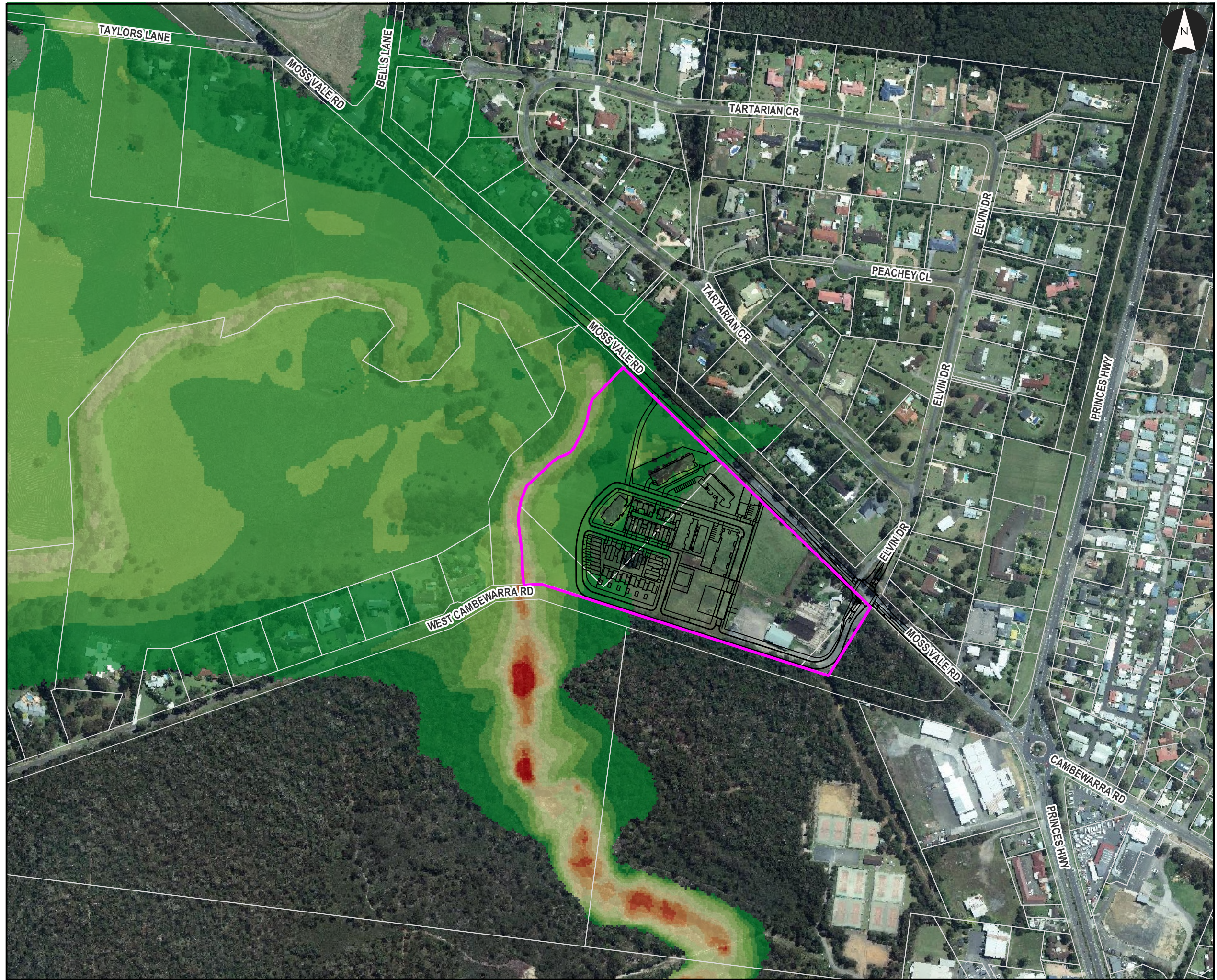
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



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Proposed Flood Velocity PMF
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A15

Legend

Site Boundary

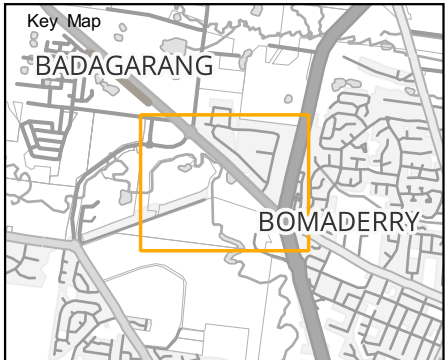
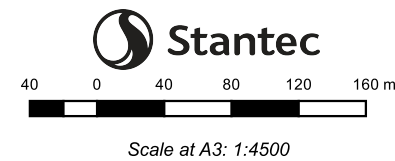
Flood Velocity (m/s)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 4.5
- > 4.5

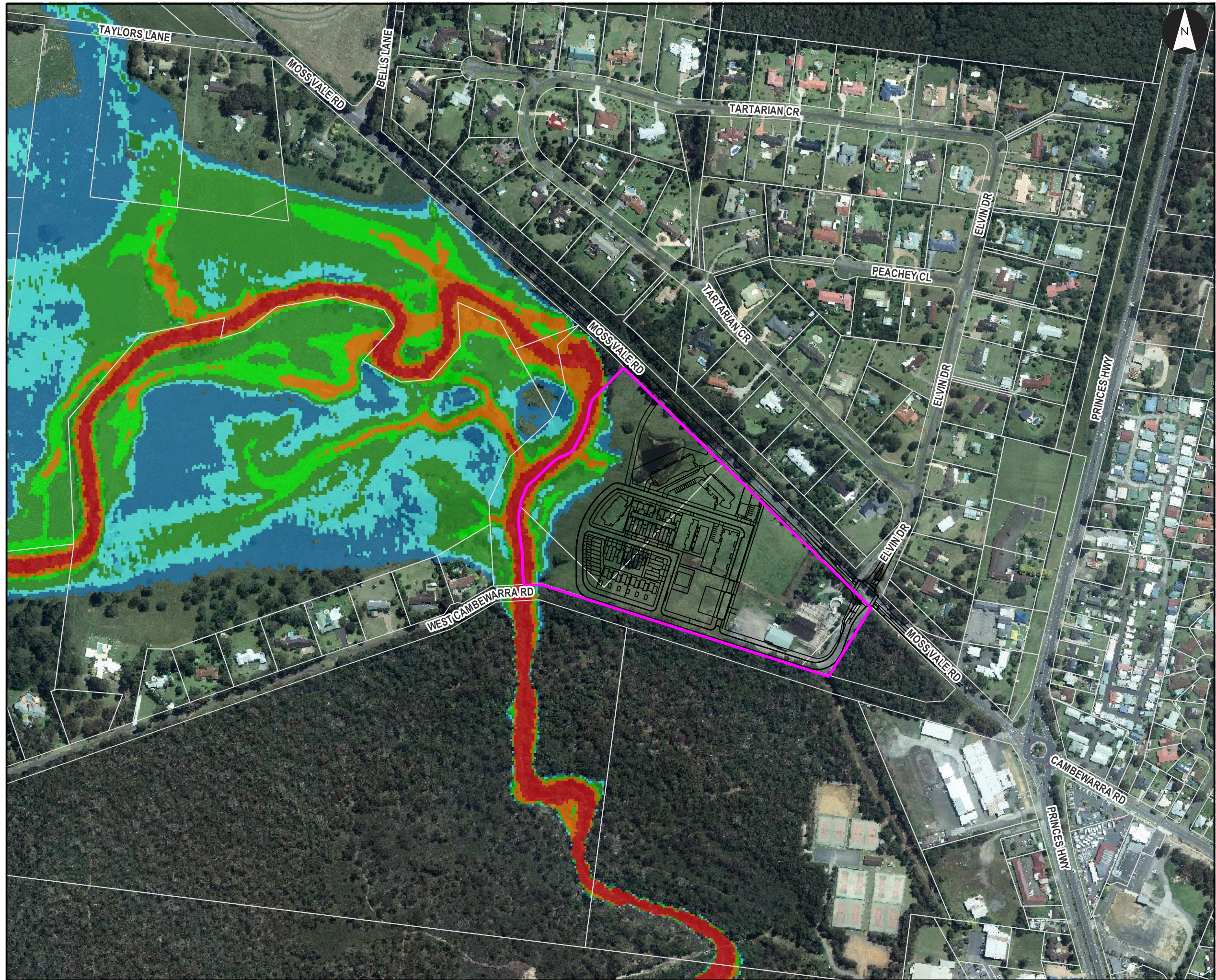
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



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Proposed Flood Hazard 10 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A16

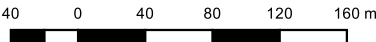
Legend

- Site Boundary
- Hazard(H1 to H6)**
- H1
 - H2
 - H3
 - H4
 - H5
 - H6

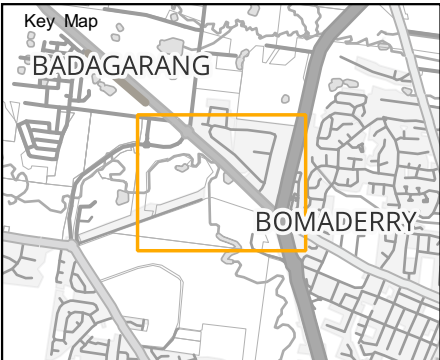
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

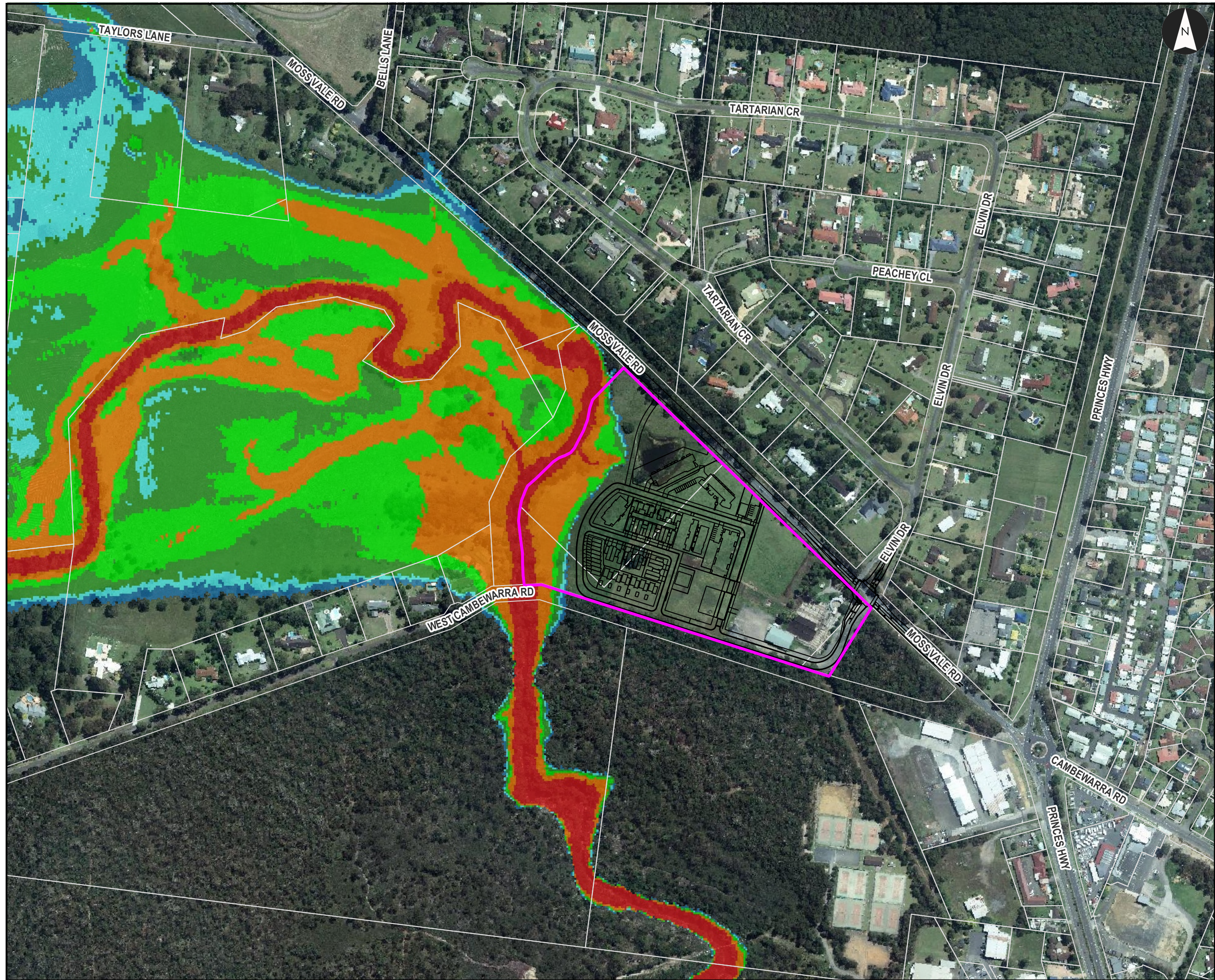
References:
1. Aerial photo: Sixmap



Scale at A3: 1:4500



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Proposed Flood Hazard 100 Year ARI
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A17

Legend

 Site Boundary

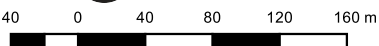
Hazard(H1 to H6)

-  H1
-  H2
-  H3
-  H4
-  H5
-  H6

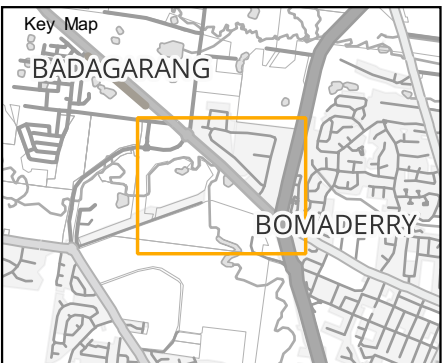
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

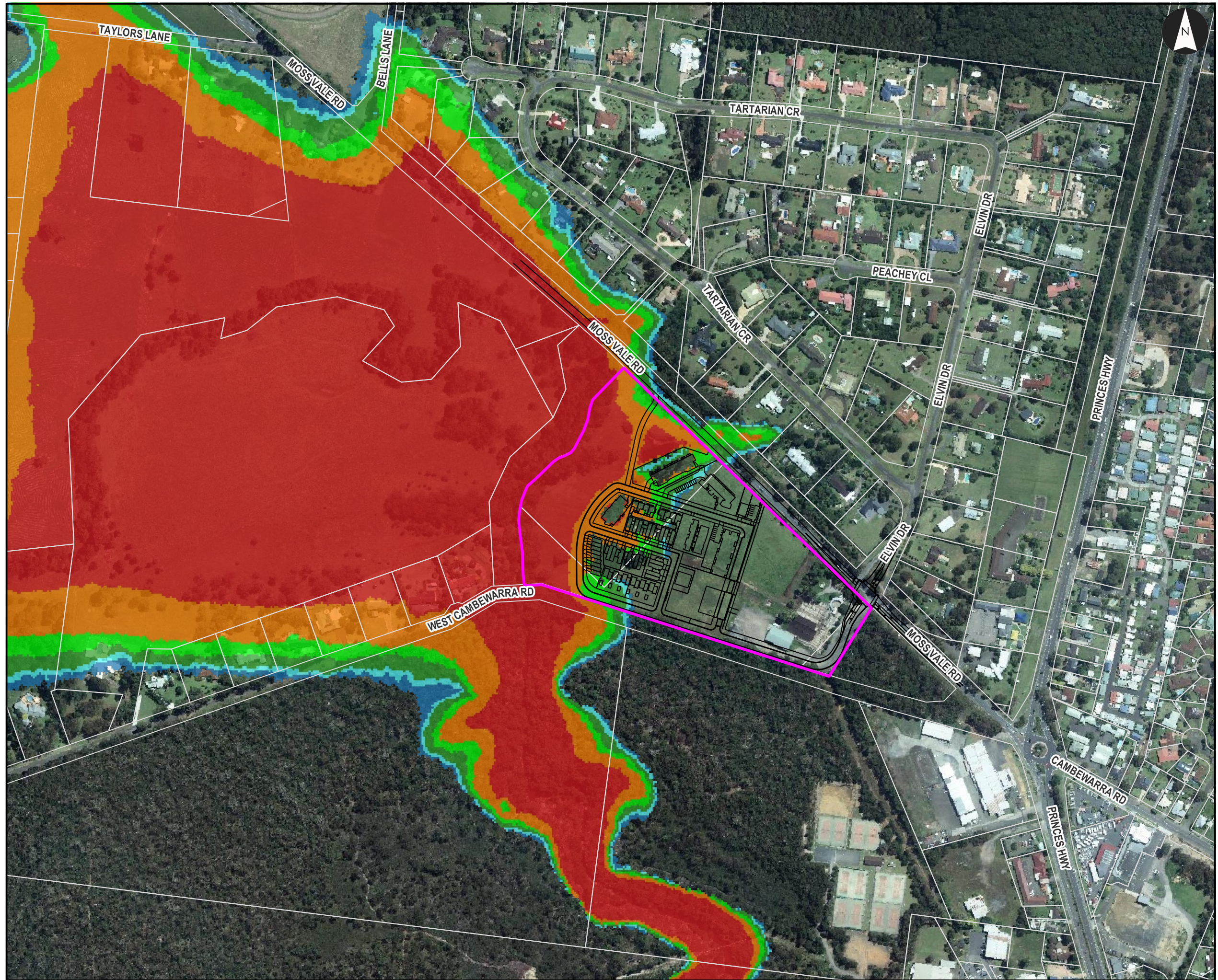
References:
1. Aerial photo: Sixmap



Scale at A3: 1:4500



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Proposed Flood Hazard PMF
25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A18

Legend

Site Boundary

Hazard(H1 to H6)

H1

H2

H3

H4

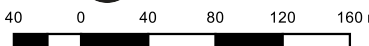
H5

H6

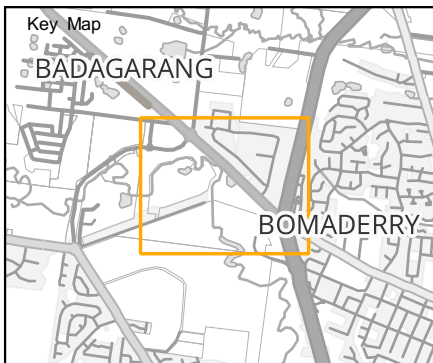
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



Scale at A3: 1:4500



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Flood Impact (Developed minus Existing) 10 Year ARI

25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A19

Legend

 Site Boundary

Change in Flood Levels (m)

 Was Wet Now Dry

 < -0.3

 -0.3 - -0.2

 -0.2 - -0.1

 -0.1 - -0.05

 -0.05 - -0.02

 -0.02 - 0.02

 0.02 - 0.05

 0.05 - 0.1

 0.1 - 0.2

 0.2 - 0.3

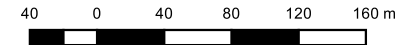
 > 0.3

 Was Dry Now Wet

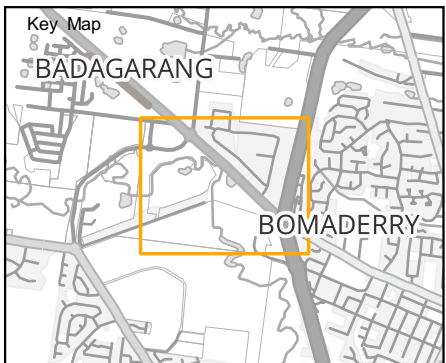
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



Scale at A3: 1:4500



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Flood Impact (Developed minus Existing) 100 Year ARI

25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A20

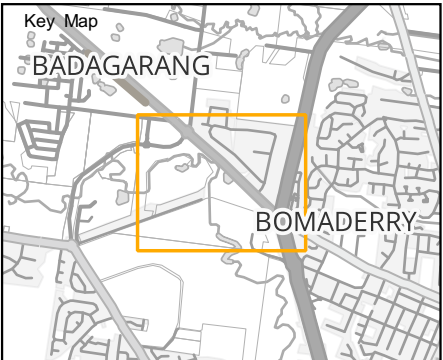
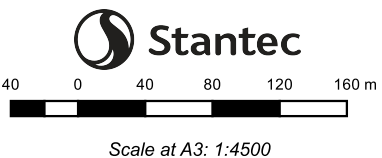
Legend

- Site Boundary
- Change in Flood Levels (m)**
 - Was Wet Now Dry
 - < -0.3
 - 0.3 - -0.2
 - 0.2 - -0.1
 - 0.1 - -0.05
 - 0.05 - -0.02
 - 0.02 - 0.02
 - 0.02 - 0.05
 - 0.05 - 0.1
 - 0.1 - 0.2
 - 0.2 - 0.3
 - > 0.3
 - Was Dry Now Wet

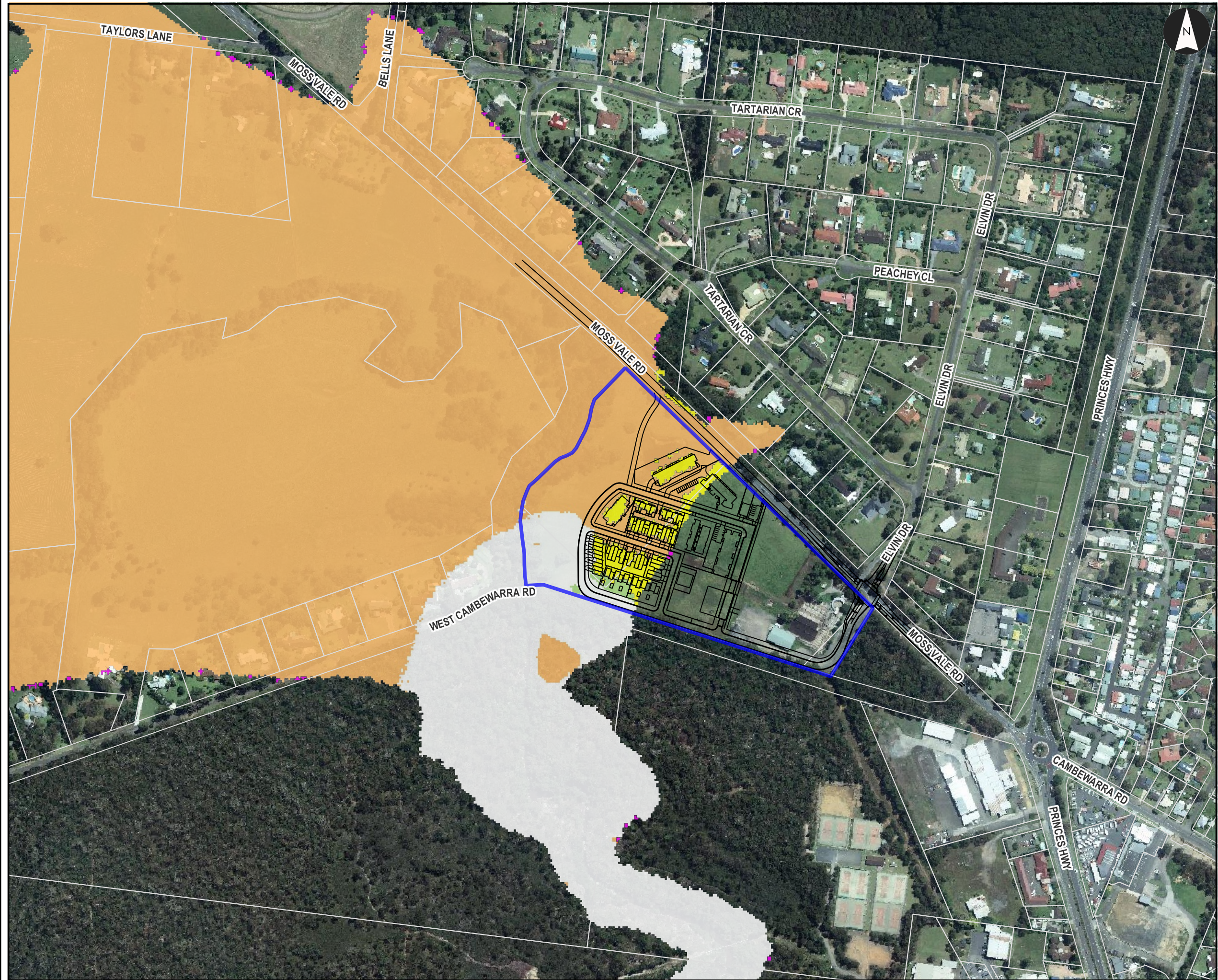
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA94 / MGA zone 56

References:
1. Aerial photo: Sixmap



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Flood Impact (Developed minus Existing) PMF

25 Moss Vale Road, Bomaderry

Project: Flood Impact and Risk Assessment
Client: Southern Cross Community Housing
Project Code: 304001598
Drawn By: FG, Checked By: AA
Date: 2026-01-30 Rev: 1
Figure No: A21

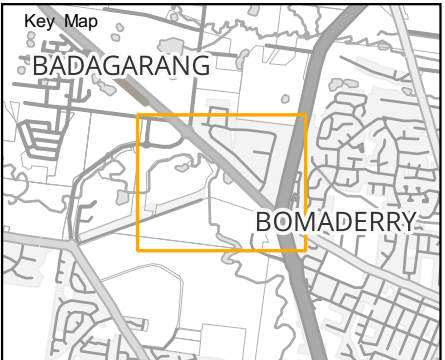
Legend

- Site Boundary
- Change in Flood Levels (m)
 - Was Wet Now Dry
 - < -0.3
 - 0.3 - -0.2
 - 0.2 - -0.1
 - 0.1 - -0.05
 - 0.05 - -0.02
 - 0.02 - 0.02
 - 0.02 - 0.05
 - 0.05 - 0.1
 - 0.1 - 0.2
 - 0.2 - 0.3
 - > 0.3
 - Was Dry Now Wet

DRAFT - Not For Construction

- Notes:
- Map displayed in GDA94 / MGA zone 56
- References:
- Aerial photo: Sixmap


40 0 40 80 120 160 m
Scale at A3: 1:4500





Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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