

Flood Impact and Risk Assessment

**High Density Residential
Development
40 The Retreat
Bradfield NSW 2556**

SCG Developments

07/06/2024

23-1110

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1. Introduction

This Flood Impact Risk Assessment (FIRA) has been prepared by AT&L on behalf of SCG Developments in support of a State Significant Development Applications (SSDAs) for proposed development of the following site:

- 40 The Retreat, Bradfield NSW 2556, Australia. Development consent is being sought under [SSD-65729209](#)

The extent of the sites is presented in **Figure 1**.

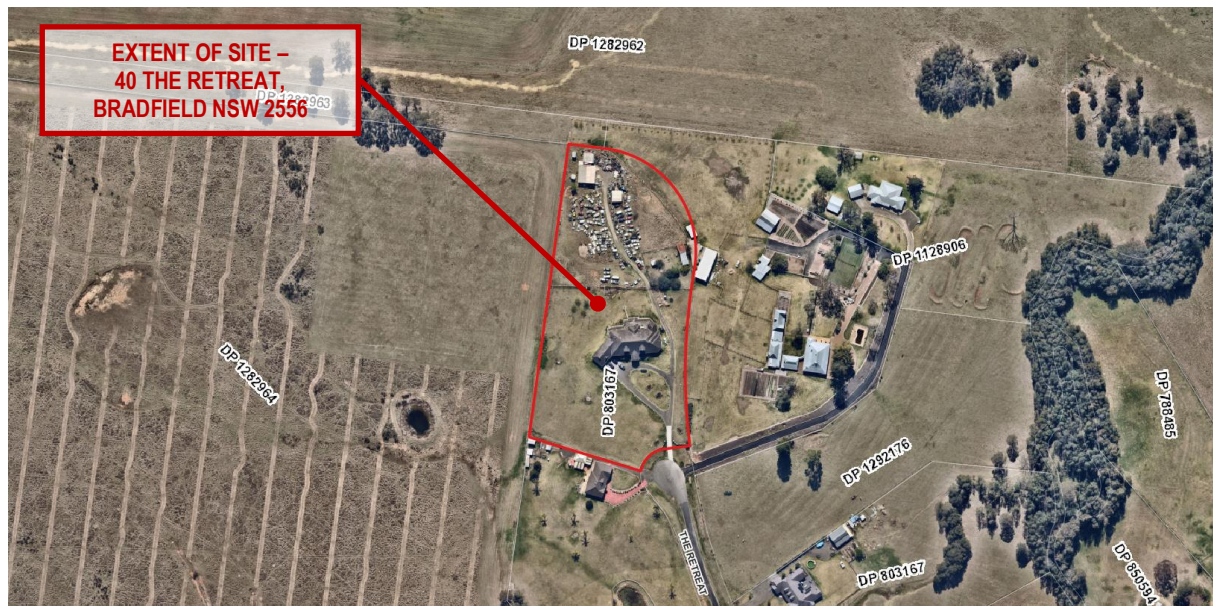


Figure 1: Site Extent (imagery from Nearmap dated 17 August 2023)

The development site is located in the suburb of Bradfield, within the Liverpool Local Government Area (LGA), approximately 690 metres south-west of Aerotropolis Metro Station and 4½ km north-west of the under-construction Western Sydney Airport. The site is made up of the following allotments:

- Lot 272 DP803167 (40 The Retreat, Bradfield)

1.1. Development Description

This State Significant Development Application seeks consent for the detailed design and delivery (including construction and use) of a new mixed use residential development, to be developed in two (2) stages. Specifically, development consent is sought for:

Stage 1

- Overall site clearing and preparation works, including demolition of all existing development on the Site;
- The redevelopment of the northern portion of the Site, comprising:
 - ▶ Temporary Site access to the northern portion of the Site from The Retreat;
 - ▶ Temporary bin enclosure adjacent the temporary access;
 - ▶ Excavation works and construction of a shared two (2) storey basement to a maximum depth of RL 60.60, with capacity for 311 vehicle car spaces;
 - ▶ Construction of three (3) individual mixed use buildings, comprising:
 - Maximum building heights between 30.4m and 39.8m;
 - A total Gross Floor Area (GFA) of 26, 204sqm, comprising 25,744 sqm of residential GFA, 248 sqm of non-residential GFA and 212 sqm of retail GFA, distributed across the three buildings;

- 254 residential units, distributed across the three buildings.
- ▶ Associated landscaping, communal open space and embellishment works; and
- ▶ Delivery and augmentation of services.

Stage 2

- The redevelopment of the southern portion of the Site, comprising:
 - ▶ Removal of the Stage 1 temporary access from The Retreat;
 - ▶ Connection and access of the Stage 1 basement to the western boundary (to become a future Collector Road);
 - ▶ Excavation works and construction of a shared three (3) storey basement to a depth of RL 56.35, with capacity for 336 vehicle car spaces;
 - ▶ Site and basement access from the western boundary (to become a future Collector Road);
 - ▶ Construction of three (3) individual mixed use buildings, comprising:
 - Maximum building heights between 23.8m and 39.9m;
 - A total Gross Floor Area (GFA) of 29,126 sqm, comprising 28,540 sqm of residential GFA, 212 sqm of retail GFA and 374 sqm of non-residential GFA, distributed across the three buildings;
 - 279 residential units, distributed across the three buildings.
- Associated landscaping, communal open space and embellishment works; and
- Delivery and augmentation of services.

A detailed description of the proposed development is detailed in Section 3.0 of the Environmental Impact Statement prepared by Ethos Urban.

Refer to Figure 2 for conceptual site plan of the proposed development.



Figure 2: Conceptual site plan of proposed development (Source: DKO DA Drawings)

1.2. Scope of this FIRA

This FIRA report has been prepared to document flood risk and flood impact pertaining to the proposed development of 40 The Retreat. This report outlines:

- Confirmation of compliance of the proposed developments against the controls listed in the *Western Sydney Aerotropolis Development Control Plan 2022*.
- Summary of other relevant planning documents and instruments that apply to the sites.
- Summary of the flood model development (hydrology and hydraulics) under pre-development and post-development conditions.
- Assessment of flood impacts relating to the proposed developments.

1.3. Key References

This FIRA references several standards and guidelines that prescribe the principles of floodplain risk management relevant to the proposed development of the Sites:

- [Australian Rainfall and Runoff: A guide to flood estimation](#)
- NSW Government [Flood Risk Management Manual](#)

1.4. Supporting Documentation

The following documentation is referred to throughout and should be read in conjunction with this report:

- a) 40 The Retreat:
 - i. Civil Drawings (AT&L)
 - ii. Civil Infrastructure Report (AT&L)
 - iii. Water and Stormwater Management Plan (AT&L)

2. Secretary’s Environmental Assessment Requirements

In accordance with section 4.39 of the Environmental Planning & Assessment Act 1979 (**EP&A Act**), Secretary’s Environmental Assessment Requirements (SEARs) for SSD 65729209 were issued on 18 January 2024. This report has been prepared to respond to the relevant issued SEARs, as set out in the table below.

SEAR	Response / Location in Report
<p>14. Flooding Risk</p> <p><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 Floodplain Development Manual.</i></p> <p><i>Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.</i></p>	<p>Refer to Section 6 and flood maps contained in Appendix A summarising the flood risk on site.</p> <p>Potential effects of climate change have been assessed by simulating the 0.2% AEP event as a proxy for the 1% AEP plus potential increase in rainfall intensity.</p> <p>Relevant provisions in the NSW Flood Risk Management Manual are incorporated into this FIRA report.</p> <p>The assessment of flood behaviour under existing and proposed development conditions concludes that the proposed development will not result in a significant change to flood risk within the site or beyond the site.</p> <p>The design, installation, and maintenance of major and minor system drainage (pits, pipes, drainage swales, OSD tanks) will manage surface water runoff and mitigate the impacts of flooding on the site and towards adjacent lands.</p> <p>No specific operational procedures will be required to mitigate flood risk on the site.</p>

3. Objectives and Development Controls

3.1. Western Sydney Aerotropolis Development Control Plan 2022

Appendix D of *Western Sydney Aerotropolis Development Control Plan 2022* outlines the objectives and controls that apply to flood prone land within the Western Sydney Aerotropolis Precinct. Compliance of the masterplans for the proposed developments against the DCP controls is summarised in **Table 1**.

Table 1: Appendix D.22 of Western Sydney Aerotropolis Precinct DCP controls relating to flood prone land

DCP Control	Comment
D.22 Flood Impact and Risk Assessment	
The Flood Impact and Risk Assessment (FIRA) as a minimum should:	
a) Address the relevant provisions of the NSW Floodplain Development Manual, and existing councils and government studies and guidance;	The Flood Impact and Risk Assessment (FIRA) addresses the relevant provisions of the NSW Floodplain Development Manual and incorporates findings from existing council and government studies to ensure compliance with local regulations.
b) Adopt the base case existing flood information identified in the INSW South Creek Sector Review Flood Assessment (Advisian 2020) to address existing flood behaviour and flood constraints on the site and its surrounding areas for the full range of events, including 5% AEP, 1% AEP, 0.5% AEP or 0.2% AEP and PMF and assessment on the compatibility of the development and its users with flood behaviour;	The base case existing flood information from the INSW South Creek Sector Review Flood Assessment (Advisian 2020) was referenced to assess existing flood behaviour and constraints on the site and surrounding areas for a range of events, including 5% AEP, 1% AEP, 0.2% AEP, and PMF. This analysis confirms the development's compatibility with expected flood conditions.
c) Address and document post developed case impacts within the site and external to the site. These include changes in post development flood behaviour, impacts of flooding on existing community and on the development and its future community for full range of events, 5% AEP, 1% AEP, PMF and 0.5% AEP or 0.2% AEP;	The FIRA documents impact of the proposed development both within the site and externally, analysing changes in flood behaviour and the effects on existing and future communities for events 5% AEP, 1% AEP, 0.2% AEP, and PMF.
d) Identify and propose management measures to post developed flood constraints and impacts due to development both on and offsite; and	Management measures are identified to address post-development flood constraints and impacts, focusing on mitigating the development's effects on flood behaviour both onsite and offsite.
e) Address the impacts of climate change on design flood modelling comparing the 0.2% AEP as a proxy for assessing sensitivity to an increase in rainfall intensity due to climate change.	The assessment includes an evaluation of climate change impacts on flood design by using the 0.2% AEP event to assess sensitivity to increased rainfall intensity, ensuring preparedness for future conditions.

Note:

* Addressing flood behaviour includes flood volume, extent, depth, level, velocity, duration, rate of rise, flood function and hazard.

*Addressing flood impacts include impacts on flood behaviour and emergency response management of the site and surrounding areas.

3.2. NSW Floodplain Development Manual

The [2023 Flood Risk Management Manual](#) (including the policy) replaces the Floodplain Development Manual (DIPNR 2005) as the NSW Government’s manual relating to the management of flood liable land in accordance with section 733 of the Local Government Act 1993 (LG Act).

3.3. INSW South Creek Sector Review Flood Assessment (Advisian 2020)

To support the SSDA application of the proposed development, Advisian developed the Wianamatta South Creek Catchment Flood Study Existing Conditions (May 2022). The study aims to define current flood conditions, assess the impact of future developments and blue-green grid infrastructure, and inform flood management and land use planning for projects in the Western Sydney Aerotropolis and Bradfield. It utilizes updated hydrologic and hydraulic models to evaluate flood characteristics under various development scenarios, incorporating recent topographic data and development extent in the catchment.

Based on the existing flood information identified in the study, the proposed development is located outside the extent of the 1% AEP and Probable Maximum Flood (PMF). The approximate PMF level adjacent to the Site on the upstream (southern) side of The Retreat is 60 mAHD, compared to a minimum ground level at the Site of approximately RL 63 mAHD.

Flood mapping showing the peak 1% AEP flood extent, depth and provisional hazard presented in Figure 3 and Figure 4.

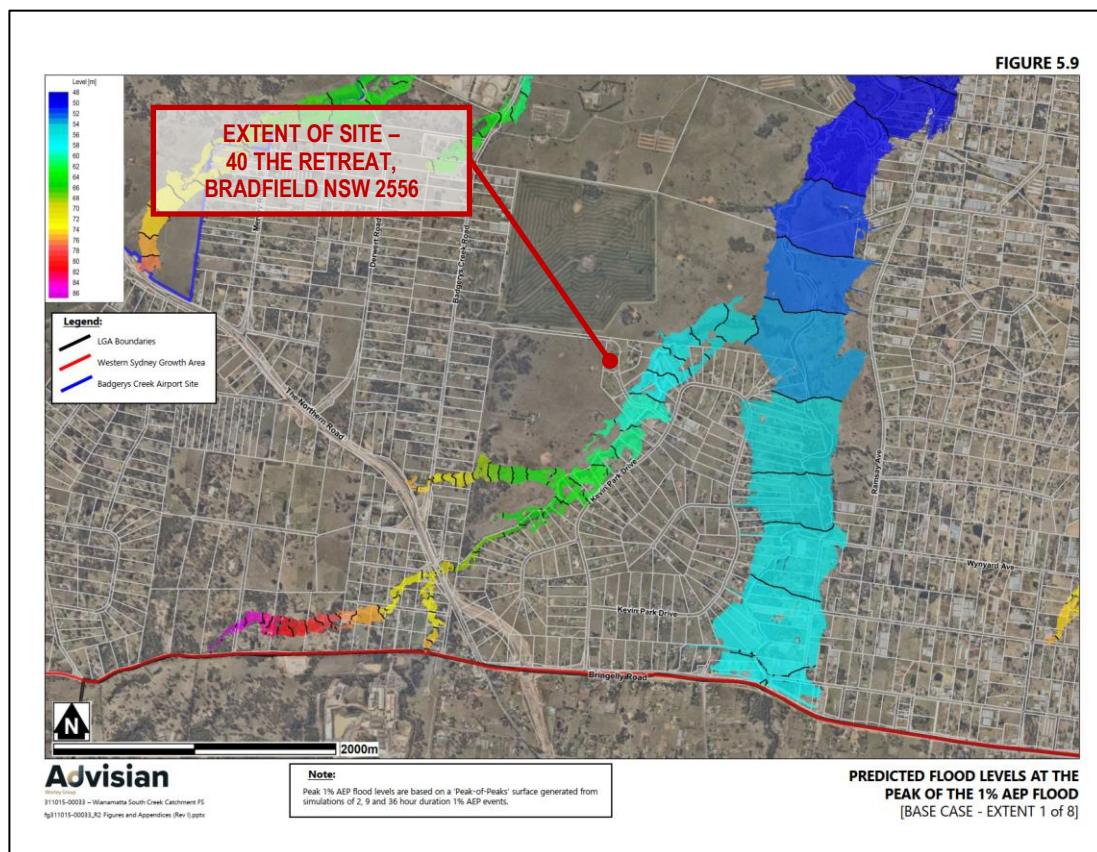


Figure 3: 1% AEP Flood Depth – Pre-development conditions (Advisian, 2022)

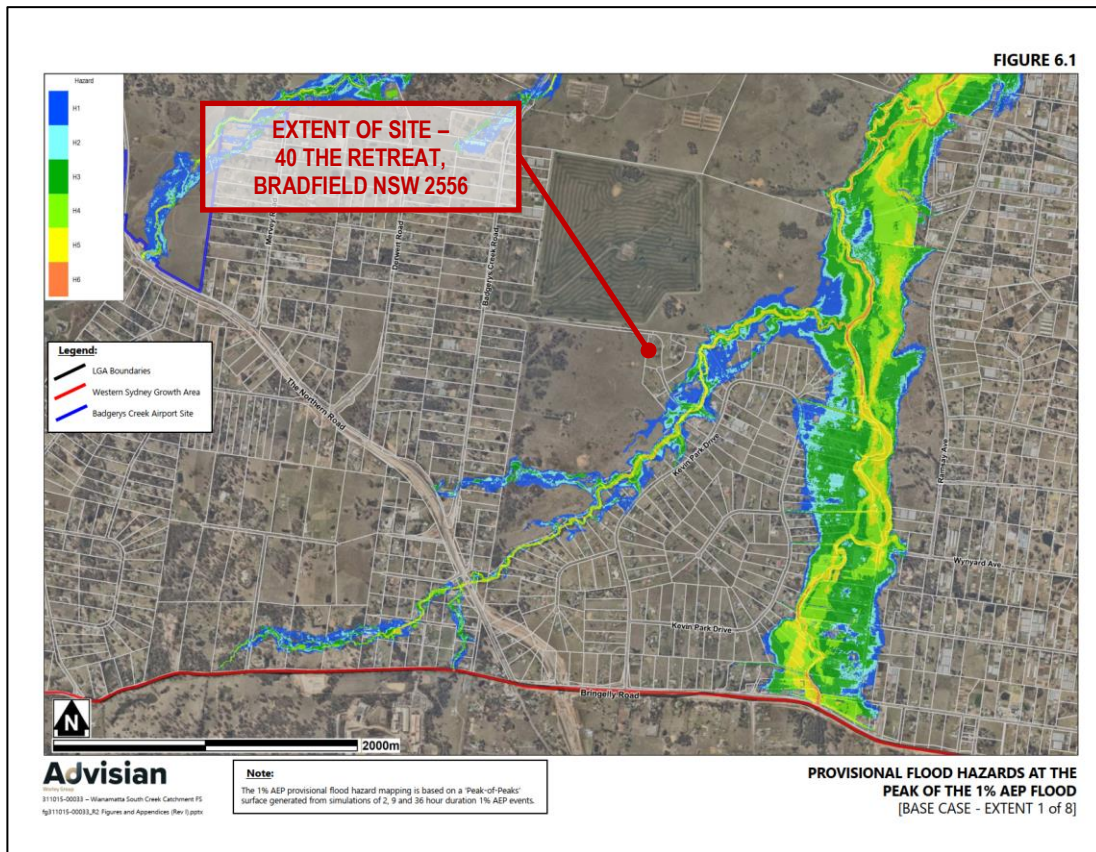


Figure 4: 1% AEP Provisional Hazard – Pre-development conditions (Advisian, 2022)

4. Hydrology

4.1. Pre-development conditions

A RAFTS model using the storage network routing module in the DRAINS software package has been developed to generate catchment flows from applied rainfall using the methodologies outlined in the Australian Rainfall and Runoff 2019. The process involves an analysis of catchments within and external to the site. The following information was used as inputs in the model:

- Digital Elevation Model (DEM) based on LiDAR sourced from ELVIS, used to delineate the sub-catchments.
- Percentage impervious for each sub-catchment based on assessment of aerial imagery.
- Rainfall Initial Losses are as per ARR2019 following its guidelines to use the available Probability Neutral Burst Initial Losses. It ranges from 1.0 mm to 38.0 mm for event durations and probability of interest.
- Rainfall Continuing Losses at 1.48 mm/hour are as per the ARR2019.
- Temporal Patterns are as per provided in the ARR2019 Datahub for the East Coast – South region.
- As the catchment area up to the subject site is less than 75 km², the point temporal pattern set was applied.
- Design Rainfall are as per the 2016 IFD curves sourced from the Bureau of Meteorology (BOM).

For the PMF event, the same RAFTS hydrological model was used but the rainfall data and temporal pattern are derived as per the GSDM method and assuming an initial loss of 1 mm and a continuing loss of 0 mm/hour.

The RAFTS models were simulated for a range of durations from 5 minutes to 2,160 minutes for the 5% AEP, 1% AEP, and 0.2% AEP events, and from 15 minutes to 360 minutes for the PMF event.

4.2. Proposed development conditions

Hydrology under the proposed development conditions has been determined using ILSAX models developed in DRAINS for the purpose of designing the stormwater network (minor system drainage), overland flow routes (major system drainage) OSD basins / tanks and trunk drainage channels that will service the development site.

4.2.1. Detention tanks within 40 The Retreat Site

The ultimate stormwater plan for proposed development incorporates two OSD tanks within the site (refer to Figure 6). These two OSD basins have been designed to attenuate inflows from proposed development and will discharge into a trunk drainage pipe (nominal diameter 375mm, subject to detailed design) that will ultimately discharge into discharge to existing table drain via level spreader south of the site. The detention tanks have been sized to attenuate peak flows for a range of design storm events between (and including) the 5% AEP and 1% AEP.

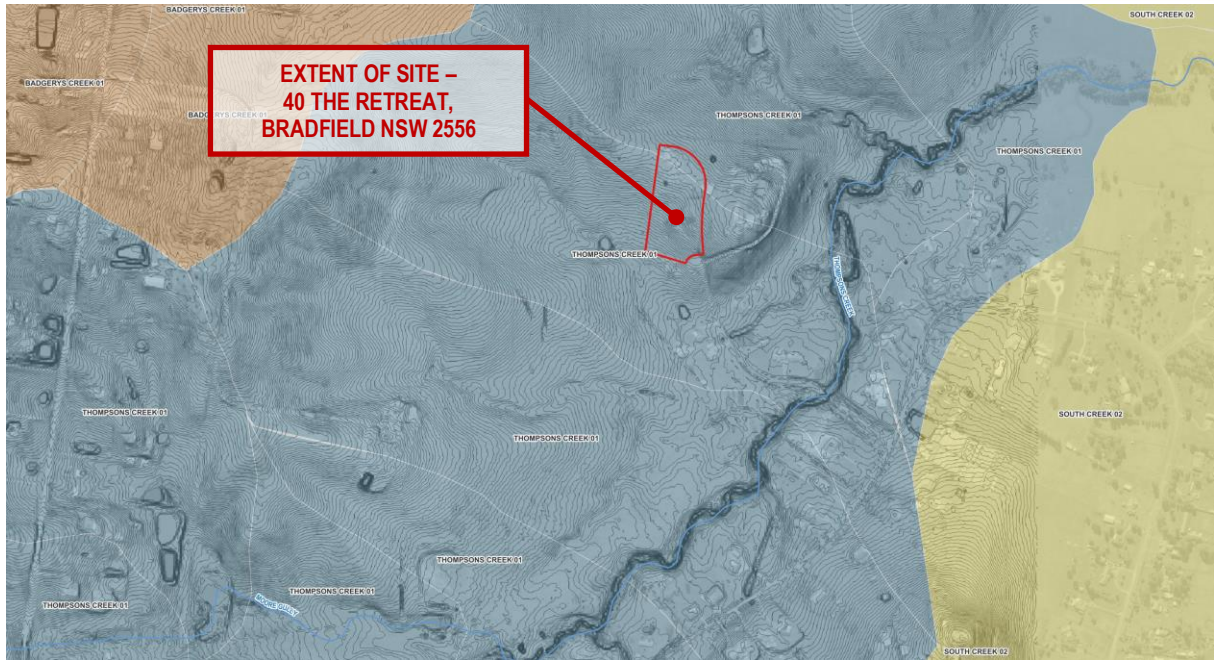


Figure 5: Pre-development catchment plan for 40 The Retreat site



Figure 6: Post-development catchment plan for 40 The Retreat site

5. Flood Assessment

5.1. Pre-development conditions

A local TUFLOW model has been developed to simulate flood behaviour under pre-development conditions. The digital elevation model (DEM) was created by combining available LiDAR data (from the online [ELVIS – Foundation Spatial Data](#) platform).

Rainfall on grid was utilised to simulate the inflows for pre-development conditions. This method directly applies rainfall data onto the DEM, representing the terrain under pre-development scenario. The downstream boundary condition was adopted as free discharge.

5.2. Proposed development conditions

The assessment of flooding under proposed development conditions was undertaken by modifying the TUFLOW model to represent the proposed site grading, built form, landscaping and surface drainage under the ultimate developed conditions for proposed development.

Inflows to the TUFLOW model were exported from the hydrological models and input as rainfall on grid to simulate the inflows for post-development conditions.

Downstream boundary conditions were adopted as free discharge at normal depth.

The proposed surface drainage swales within the proposed development, which are documented in the SSDA Civil Drawing package, have been incorporated into the proposed developed condition model.

6. Flood Impact Assessment

6.1. Changes in flood level, hazard, and risk to adjacent properties

Based on the results of hydrological (RAFTS) and hydraulic (TUFLOW) modelling described in this FIRA, the estimated impact of the proposed developments on flood extent, levels and hazard are presented in a series of maps contained in **Appendix A**.

The proposed development will result in changes to flood behaviour within the sites. The stormwater drainage system within the Site (incorporating landscaped open channels) have been designed to convey peak flows up to the 1% AEP. On-site stormwater detention tanks have been designed to satisfy the Western Sydney Aerotropolis DCP control for peak flow attenuation.

No measures other than the proposed stormwater drainage systems, drainage swales and OSD tanks that have been incorporated into proposed development site will be required to mitigate potential flood risks.

6.2. Conclusion

Based on the assessment of flood risk and flood impact documented in this report, the proposed plans for the development site address the relevant objectives and controls for flood prone land outlined in Appendix D of the Western Sydney Aerotropolis DCP. With measures to convey and attenuate surface water runoff within the development site, the site is appropriate for development as per the proposed plans for which consent is being sought under SSD-65729209.

It is acknowledged that the planned Bradfield City Centre development to the west of the Site has the potential to further alter flood behaviour and flood risk adjacent to the Site. Any impact or change in flood behaviour as a result of development of Bradfield City Centre would need to be considered as part of the masterplanning or individual development applications for land within the Bradfield City Centre. .

7. Summary of Mitigation Measures

A summary of mitigation measures relevant to flood risk management are summarised in **Table 2**.

Table 2: Summary of flood risk mitigation measures

ID	Mitigation Measure
Major and minor system drainage (pits, pipes, overland flow paths, drainage swales)	As documented in the Civil Works package of drawings
OSD Tanks (for peak flow attenuation)	As documented in the Civil Works package of drawings

8. References

Advisian, *Wianamatta South Creek Catchment Flood Study: Existing Conditions*, May 2022 (Revision I)

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) [*Australian Rainfall and Runoff: A Guide to Flood Estimation*](#), © Commonwealth of Australia (Geoscience Australia), 2019.

NSW DPE, [*Flood Risk Management Manual: The policy and manual for the management of flood liable land*](#)

NSW DPE, [*Flood impact and risk assessment, Flood risk management guideline LU01*](#)

Appendix A – Flood Mapping

Drawing No.	Drawing Title
Pre-development conditions	
E101	Pre-development – 5% AEP Flood Depth and Level
E102	Pre-development – 1% AEP Flood Depth and Level
E103	Pre-development – 0.2% AEP Flood Depth and Level
E104	Pre-development – PMF Flood Depth and Level
E105	Pre-development – 5% AEP Flood Velocity
E106	Pre-development – 1% AEP Flood Velocity
E107	Pre-development – 0.2% AEP Flood Velocity
E108	Pre-development – PMF Flood Velocity
E109	Pre-development – 5% AEP Flood Hazard
E110	Pre-development – 1% AEP Flood Hazard
E111	Pre-development – 0.2% AEP Flood Hazard
E112	Pre-development – PMF Flood Hazard
Post-development conditions	
D101	Post-development – 5% AEP Flood Depth and Level
D102	Post-development – 1% AEP Flood Depth and Level
D103	Post-development – 0.2% AEP Flood Depth and Level
D104	Post-development – PMF Flood Depth and Level
D105	Post-development – 5% AEP Flood Velocity
D106	Post-development – 1% AEP Flood Velocity
D107	Post-development – 0.2% AEP Flood Velocity
D108	Post-development – PMF Flood Velocity
D109	Post-development – 5% AEP Flood Hazard
D110	Post-development – 1% AEP Flood Hazard
D111	Post-development – 0.2% AEP Flood Hazard
D112	Post-development – PMF Flood Hazard
Differences – Post-development to Pre-development	
A100	Afflux – 5% AEP Event Flood Level Difference
A101	Afflux – 1% AEP Event Flood Level Difference
A103	Afflux – 0.2% AEP Event Flood Level Difference
A104	Afflux – PMF Event Flood Level Difference



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

Peak Flow Depth (m)

- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- > 2.00

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Pre-development
 5% AEP Event
 Flood Depths and Levels

Scale at A3



Project 23-1110	Figure Status DRAFT	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

Peak Flow Depth (m)

- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- > 2.00

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Pre-development
 1% AEP Event
 Flood Depths and Levels



Project 23-1110	Figure Status DRAFT
Drawing No. E102	Issue 1



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

Peak Flow Depth (m)

- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- > 2.00

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 Flood Depths and Levels

Scale at A3



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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

Peak Flow Depth (m)

- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- > 2.00

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Pre-development
PMF Event
Flood Depths and Levels

Scale at A3
1:3,000

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Drawing No. E104	Issue 1



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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Pre-development
 5% AEP Event
 Velocity



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Drawing No. E105		



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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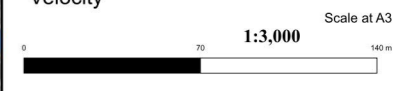


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Pre-development
 1% AEP Event
 Velocity



Project 23-1110	Figure Status DRAFT
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Drawing No. E106	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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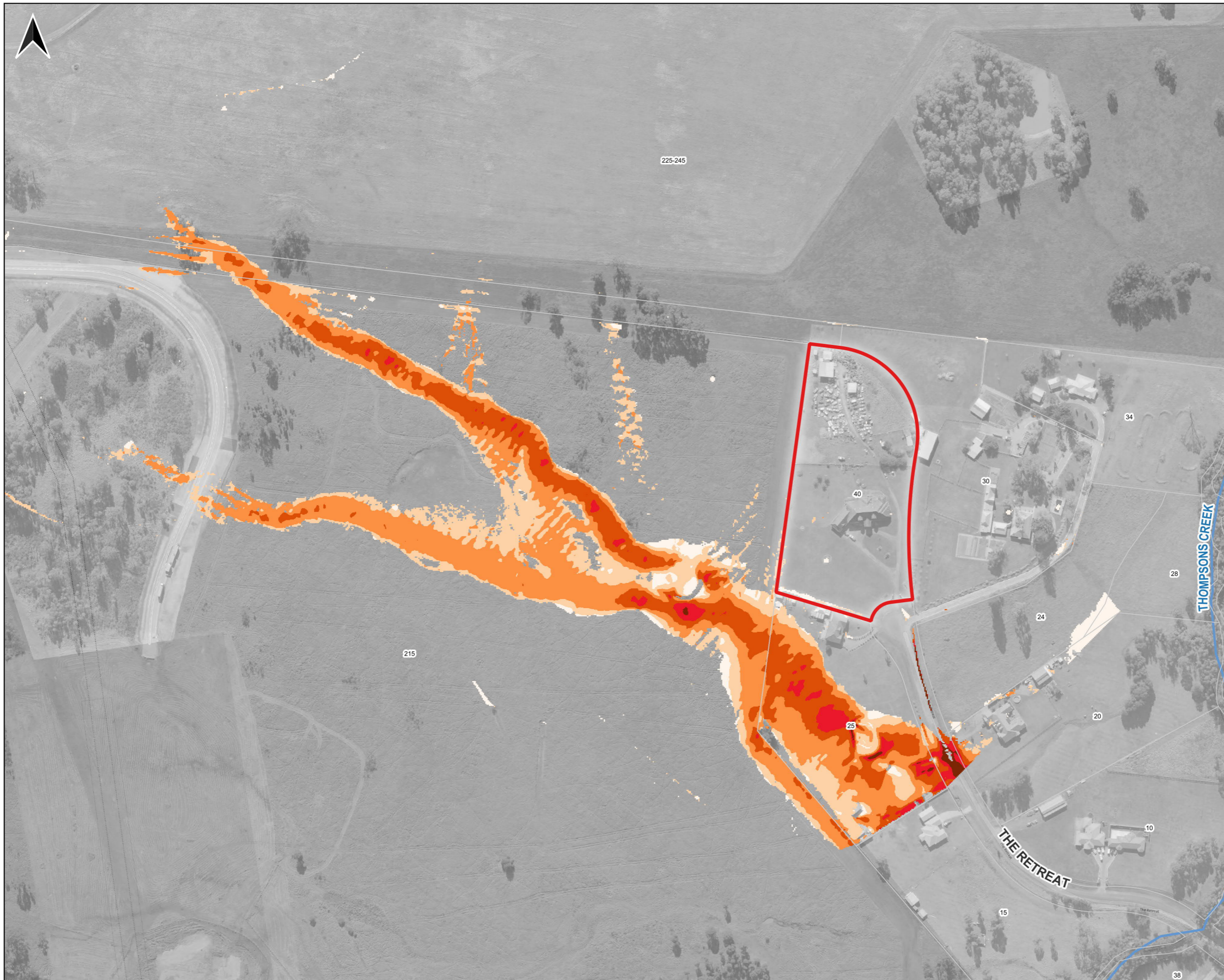
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Pre-development
 0.2% AEP Event
 Velocity



Project 23-1110	Figure Status DRAFT	Issue 1
Drawing No. E107		



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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Issue	Date	By	Chkd	Appd

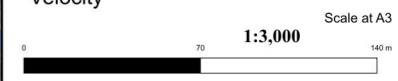


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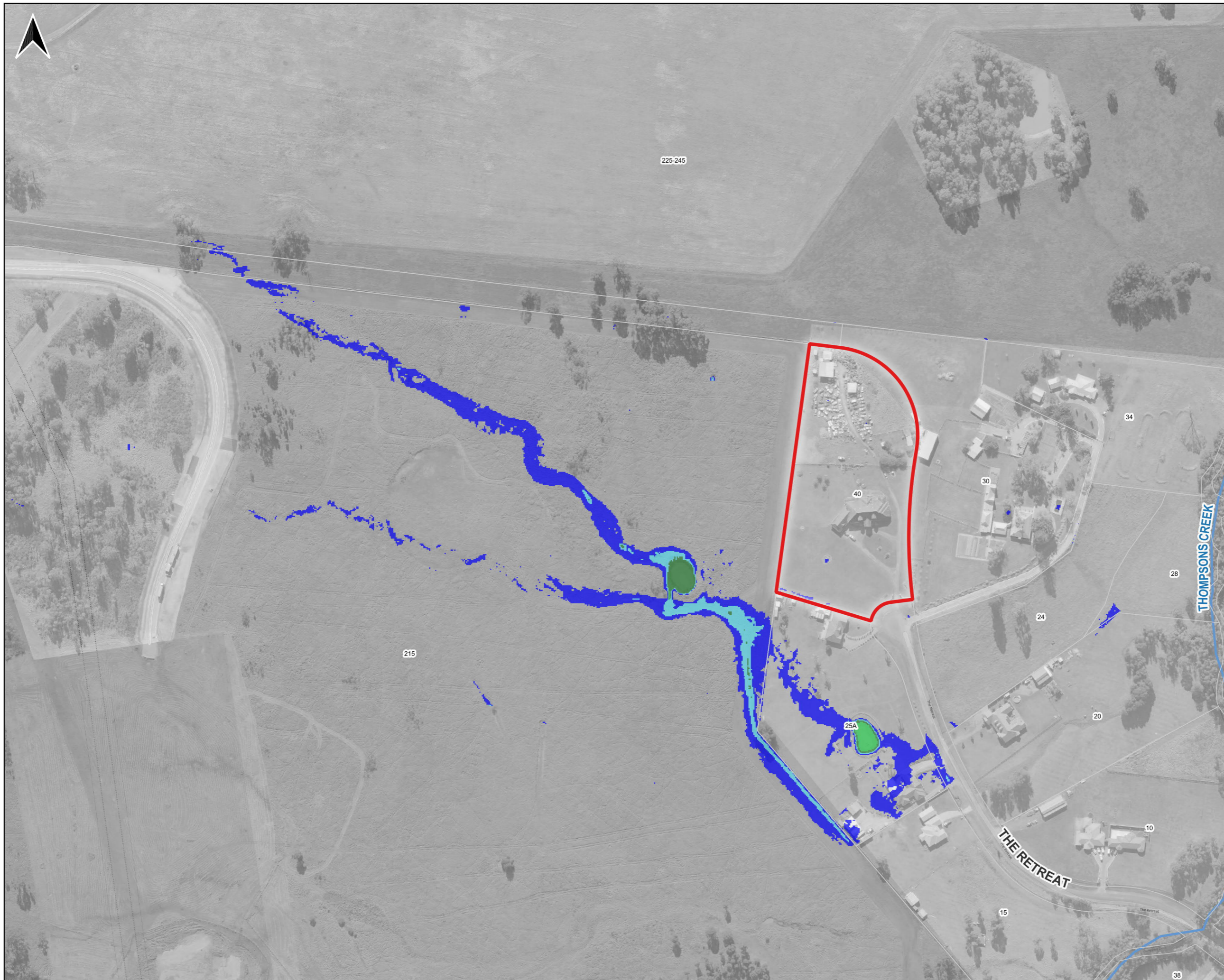
40 The Retreat
 Bringelly NSW 2556

Pre-development
 PMF Event
 Velocity



Project 23-1110	Figure Status DRAFT
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Drawing No. E108	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd

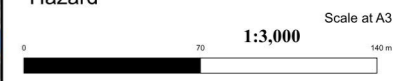


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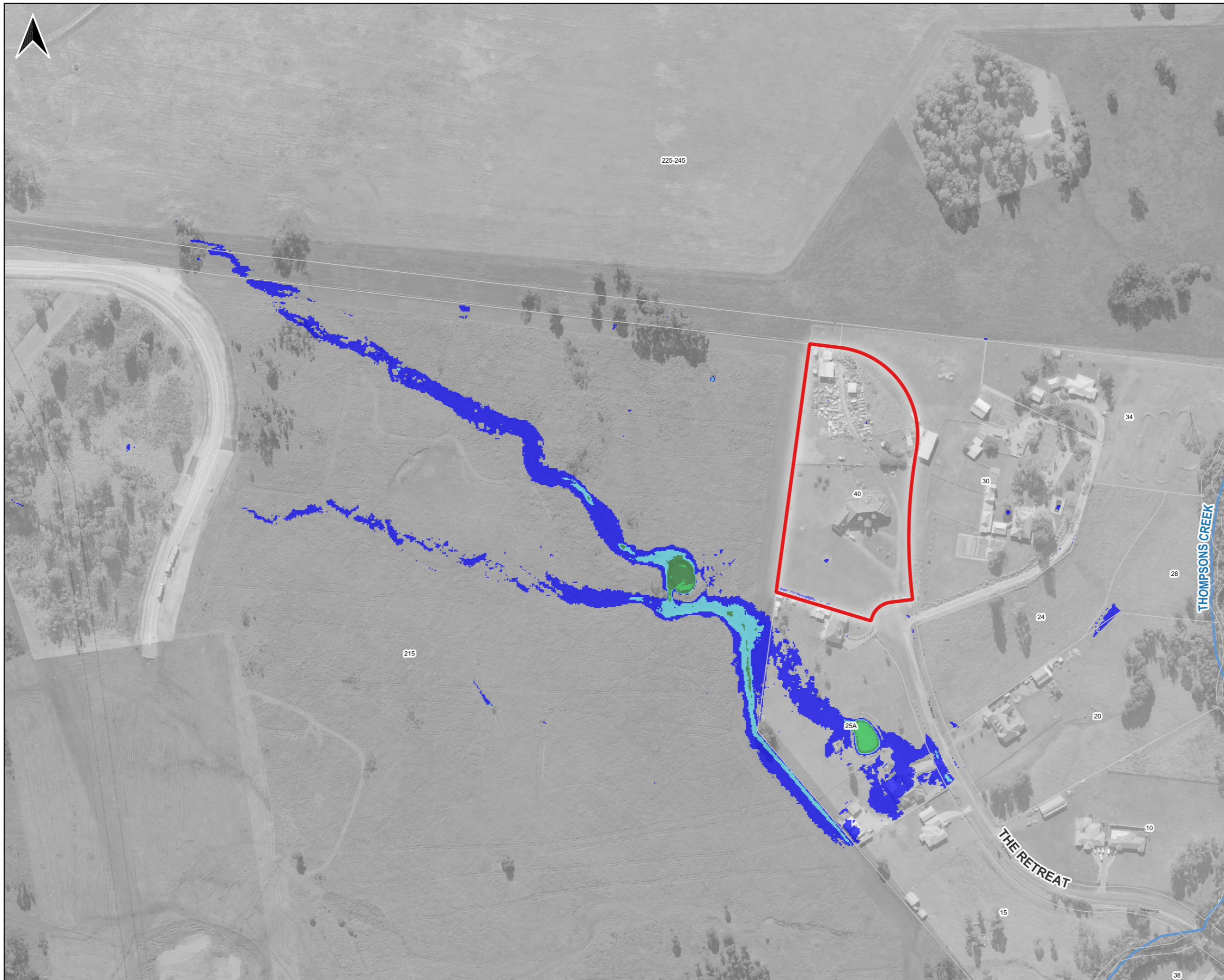
40 The Retreat
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Pre-development
 5% AEP Event
 Hazard



Project 23-1110	Figure Status DRAFT
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Drawing No. E109	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd

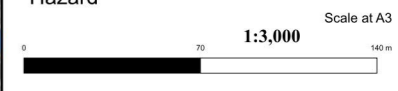


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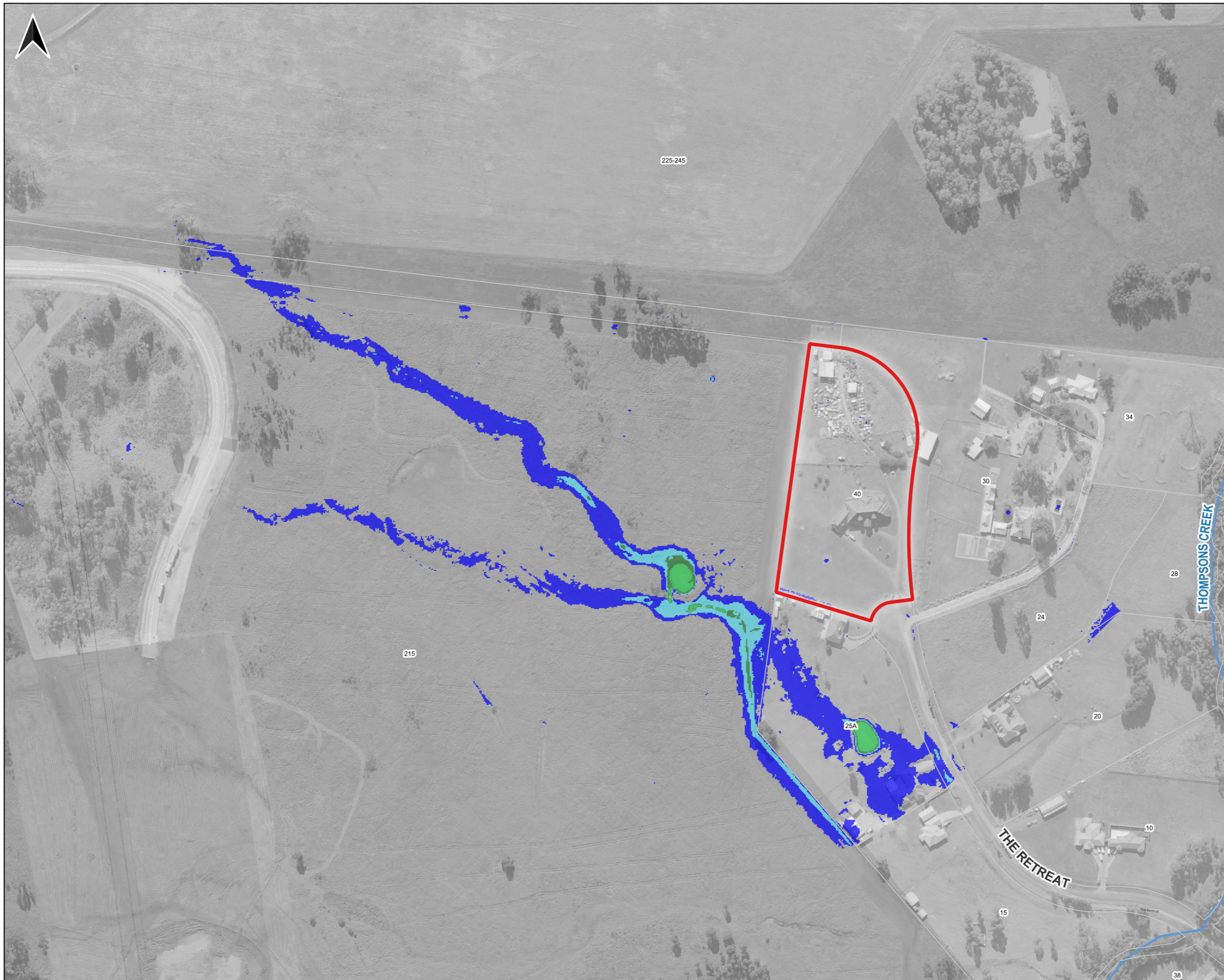
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Pre-development
 1% AEP Event
 Hazard



Project 23-1110	Figure Status DRAFT
--------------------	------------------------

Drawing No. E110	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd



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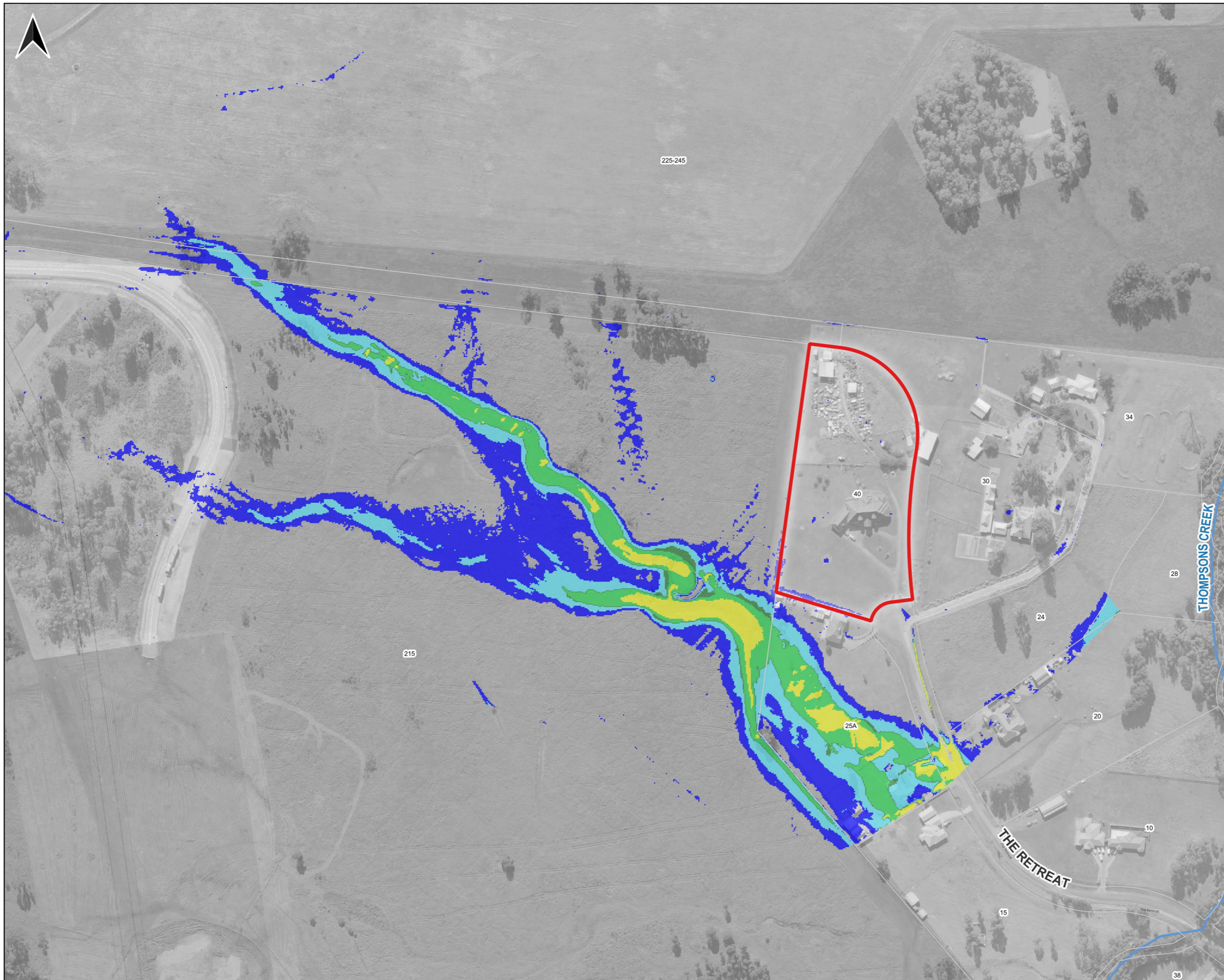
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Pre-development
 0.2% AEP Event
 Hazard



Project 23-1110	Figure Status DRAFT
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Drawing No. E111	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd

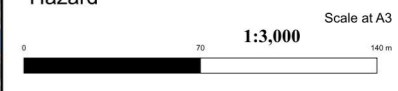


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Pre-development
 PMF Event
 Hazard



Project 23-1110	Figure Status DRAFT
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Drawing No. E112	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

Peak Flow Depth (m)

- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- > 2.00

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Post-development
 5% AEP Event
 Flood Depths and Levels

Scale at A3



Project 23-1110	Figure Status DRAFT	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

- Peak Flow Depth (m)
- 0.50 to 0.75
 - 0.75 to 1.00
 - 1.00 to 1.25
 - 1.25 to 1.50
 - 1.50 to 1.75
 - 1.75 to 2.00
 - > 2.00

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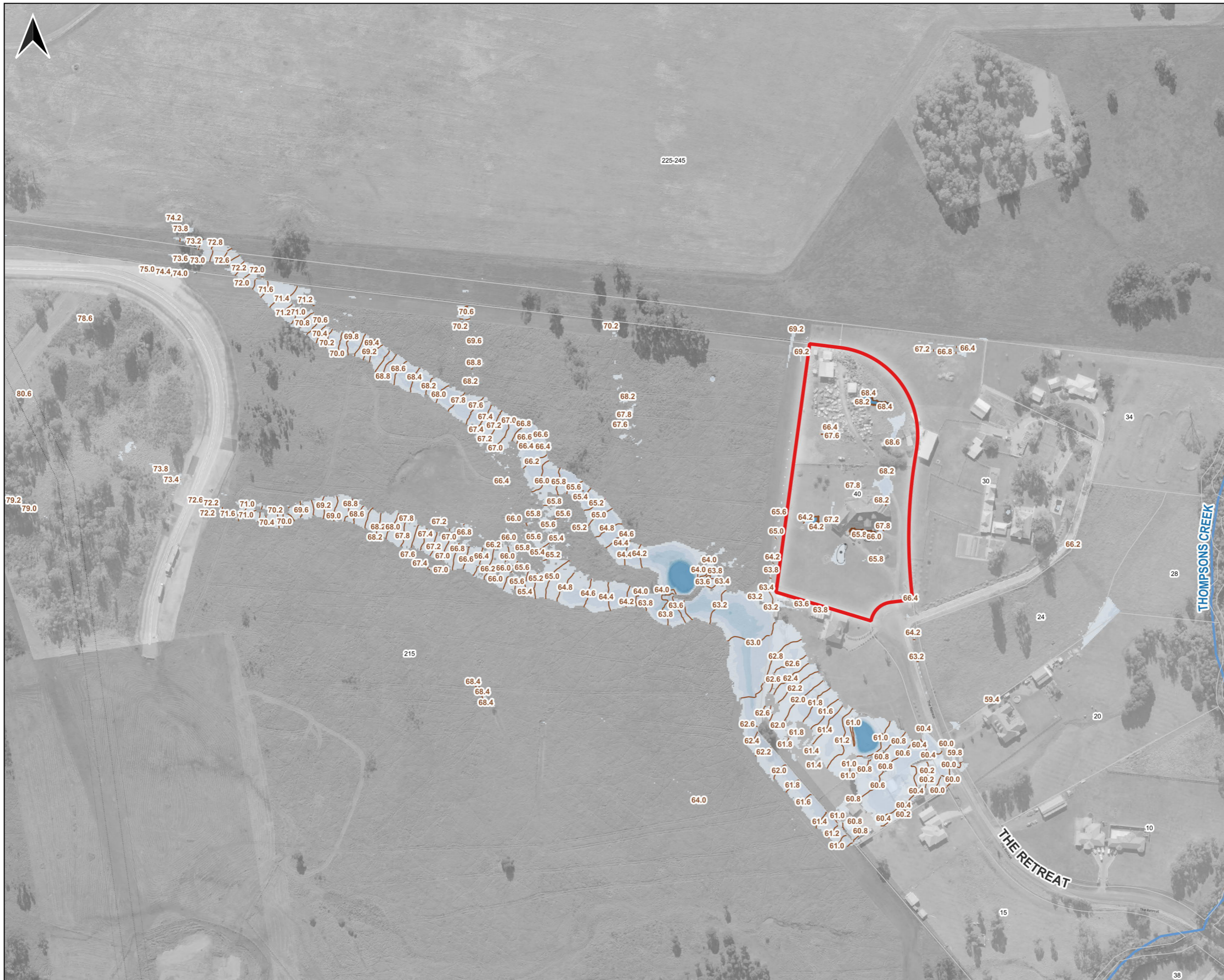
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 Bringelly NSW 2556

Post-development
 1% AEP Event
 Flood Depths and Levels

Scale at A3
1:3,000

Project 23-1110	Figure Status DRAFT	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

Peak Flow Depth (m)

- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- > 2.00

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Issue	Date	By	Chkd	Appd

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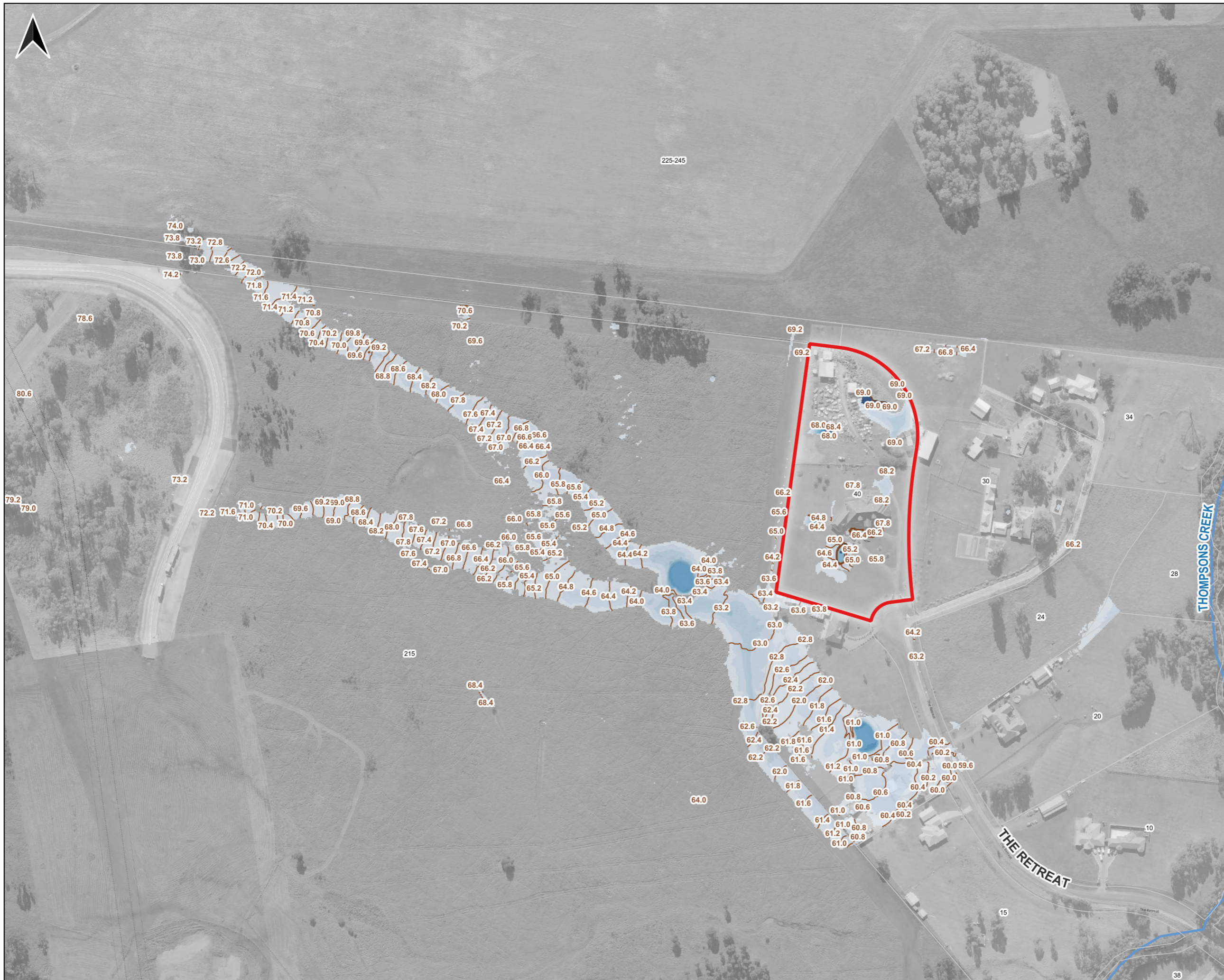
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Post-development
 0.2% AEP Event
 Flood Depths and Levels

Scale at A3



Project 23-1110	Figure Status DRAFT	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse
- Flood Level Contour - 0.2m interval (mAHD)

Peak Flow Depth (m)

- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- > 2.00

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Issue	Date	By	Chkd	Appd

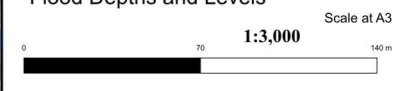


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Bringelly NSW 2556

Post-development
PMF Event
Flood Depths and Levels



Project 23-1110	Figure Status DRAFT	Issue 1
--------------------	------------------------	------------



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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Bringelly NSW 2556

Post-development
5% AEP Event
Velocity



Project 23-1110	Figure Status DRAFT	Issue 1
--------------------	------------------------	------------



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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Bringelly NSW 2556

Post-development
1% AEP Event
Velocity



Project 23-1110	Figure Status DRAFT	Issue 1
--------------------	------------------------	------------



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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Issue	Date	By	Chkd	Appd



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Post-development
 0.2% AEP Event
 Velocity



Project 23-1110	Figure Status DRAFT
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Drawing No. D107	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

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Issue	Date	By	Chkd	Appd

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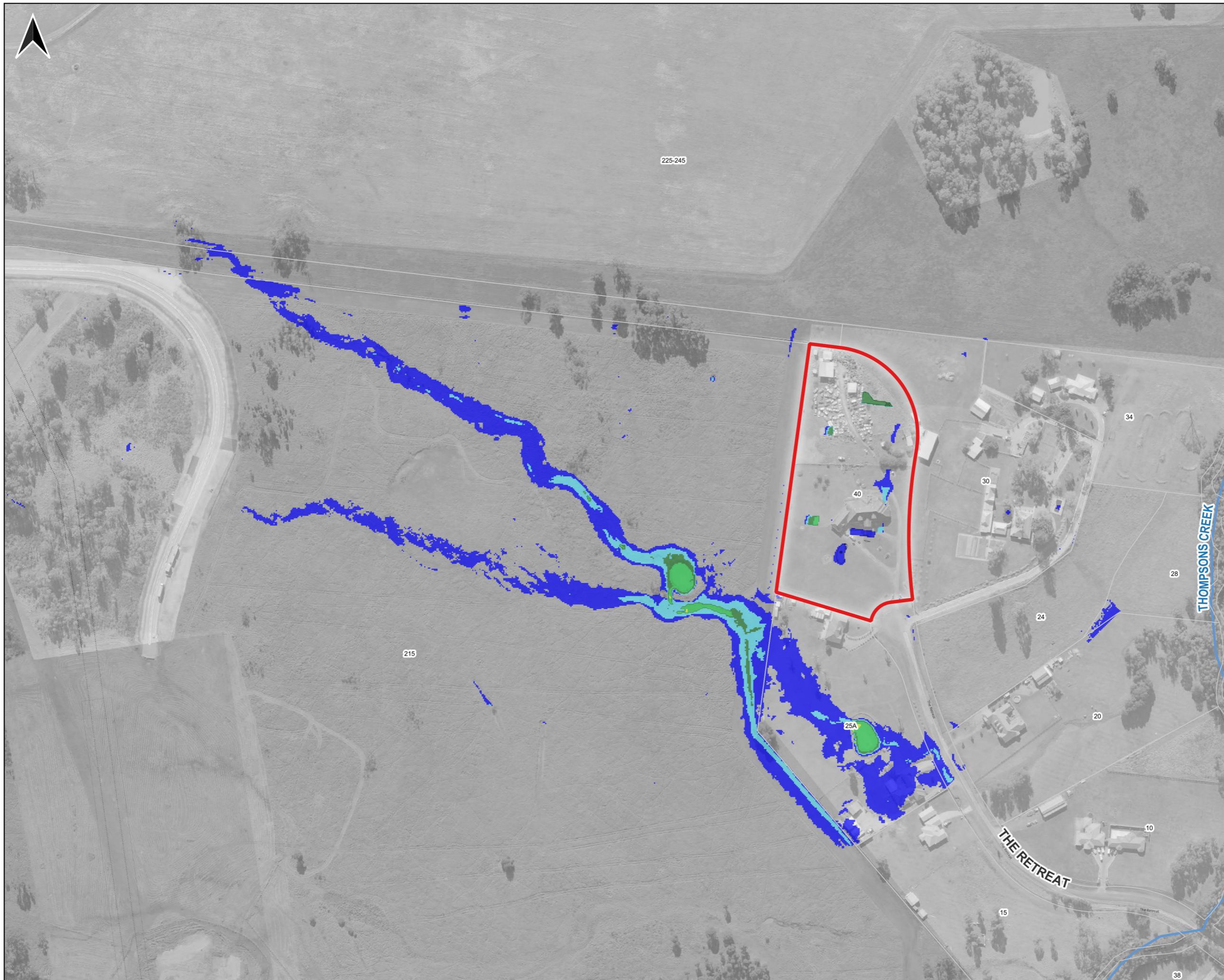
Sathio Group

40 The Retreat
 Bringelly NSW 2556

Post-development
 PMF Event
 Velocity



Project 23-1110	Figure Status DRAFT	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd

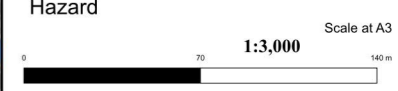


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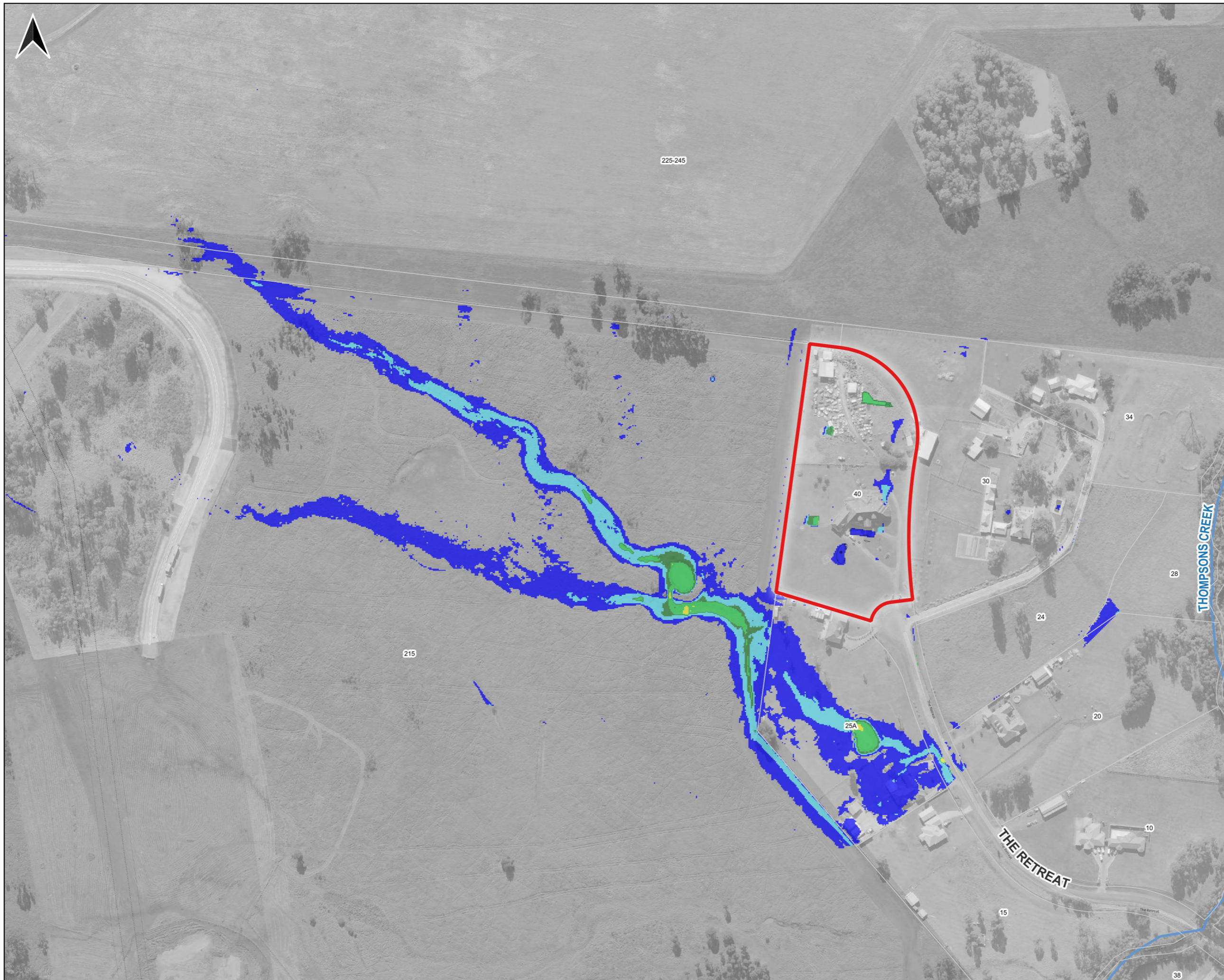
40 The Retreat
 Bringelly NSW 2556

Post-development
 5% AEP Event
 Hazard



Project 23-1110	Figure Status DRAFT
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Drawing No. D109	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd

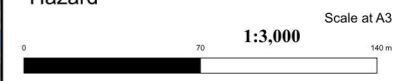


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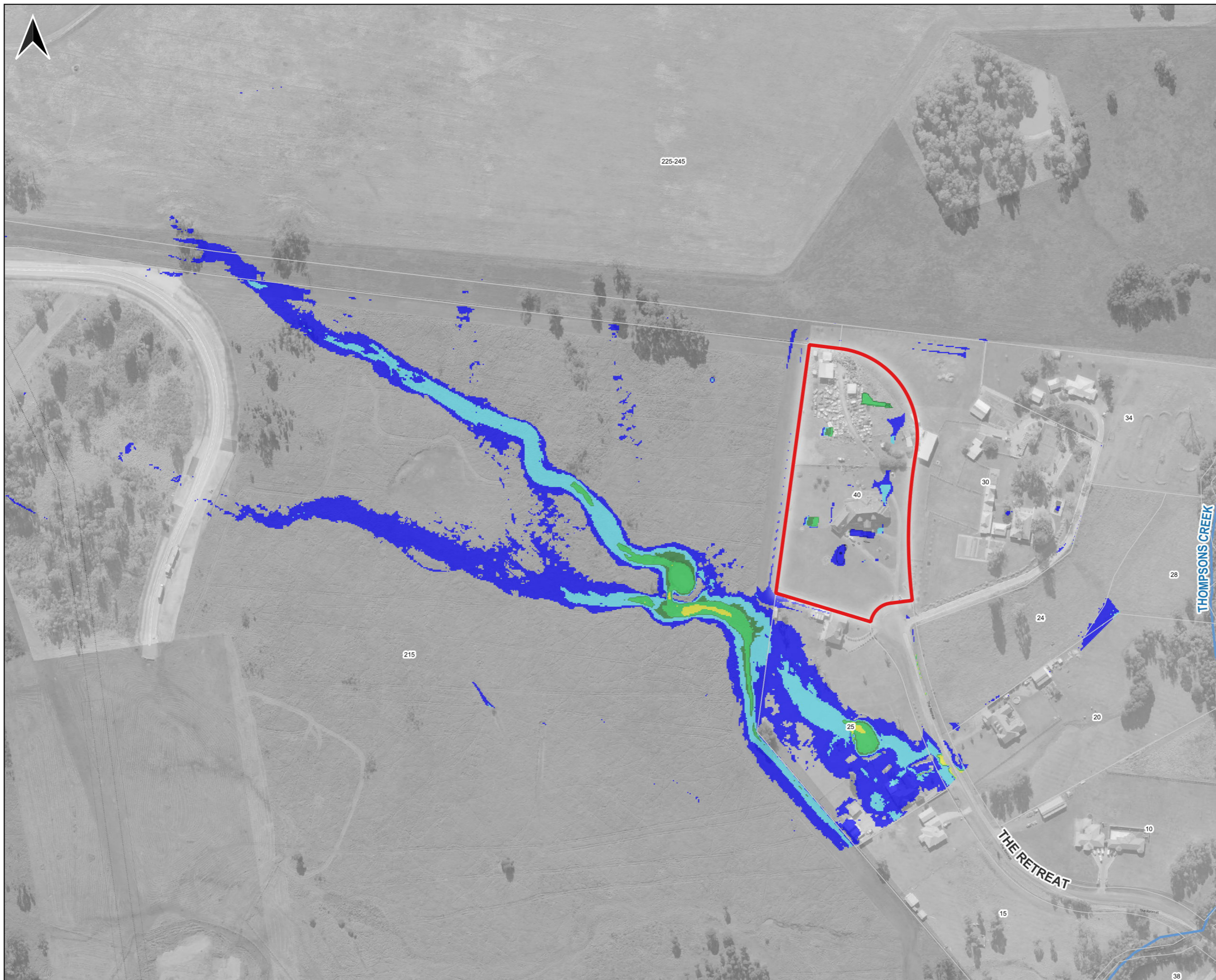
40 The Retreat
 Bringelly NSW 2556

Post-development
 1% AEP Event
 Hazard



Project 23-1110	Figure Status DRAFT
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Drawing No. D110	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd

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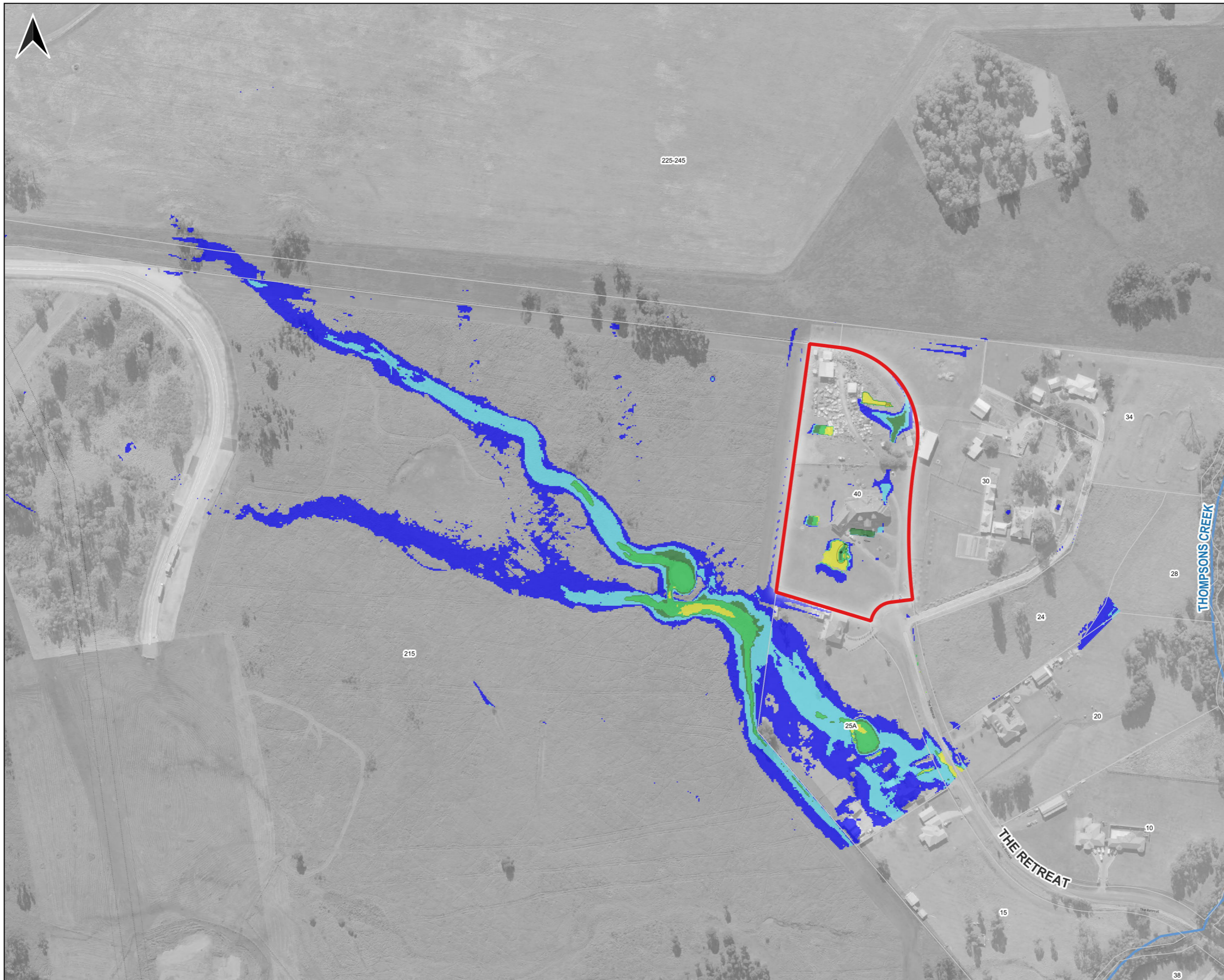
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40 The Retreat
 Bringelly NSW 2556

Post-development
 0.2% AEP Event
 Hazard



Project 23-1110	Figure Status DRAFT	Issue 1
Drawing No. D111		



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Hazard

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

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Issue	Date	By	Chkd	Appd

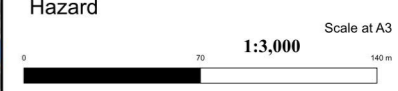


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Post-development
 PMF Event
 Hazard



Project 23-1110	Figure Status DRAFT
--------------------	------------------------

Drawing No. D112	Issue 1
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Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Flood Level Difference (m)

- < -0.50
- < -0.50 to -0.30
- < -0.30 to -0.05
- < -0.05 to -0.03
- 0.03 to -0.01
- 0.01 to 0.01
- 0.01 to 0.03
- 0.03 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- 0.30 to 0.50
- > 0.50

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Issue	Date	By	Chkd	Appd

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Afflux
 5% AEP Event
 Flood Level Difference

Scale at A3



Project 23-1110	Figure Status DRAFT	Issue 1
Drawing No. A101		



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Flood Level Difference (m)

- < -0.50
- < -0.50 to -0.30
- < -0.30 to -0.05
- < -0.05 to -0.03
- 0.03 to -0.01
- 0.01 to 0.01
- 0.01 to 0.03
- 0.03 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- 0.30 to 0.50
- > 0.50

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Issue	Date	By	Chkd	Appd

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 Bringelly NSW 2556

Afflux
 1% AEP Event
 Flood Level Difference



Project 23-1110	Figure Status DRAFT	Issue 1
Drawing No. A102		



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Flood Level Difference (m)

- < -0.50
- < -0.50 to -0.30
- < -0.30 to -0.05
- < -0.05 to -0.03
- 0.03 to -0.01
- 0.01 to 0.01
- 0.01 to 0.03
- 0.03 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- 0.30 to 0.50
- > 0.50

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Issue	Date	By	Chkd	Appd

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Afflux
 0.2% AEP Event
 Flood Level Difference



Project 23-1110	Figure Status DRAFT	Issue 1
Drawing No. A103		



Legend

- Site Extent
- Cadastre
- Proposed OSD Basins
- Proposed Rain Garden
- Watercourse

Flood Level Difference (m)

- < -0.50
- < -0.50 to -0.30
- < -0.30 to -0.05
- < -0.05 to -0.03
- 0.03 to -0.01
- 0.01 to 0.01
- 0.01 to 0.03
- 0.03 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- 0.30 to 0.50
- > 0.50

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Issue	Date	By	Chkd	Appd



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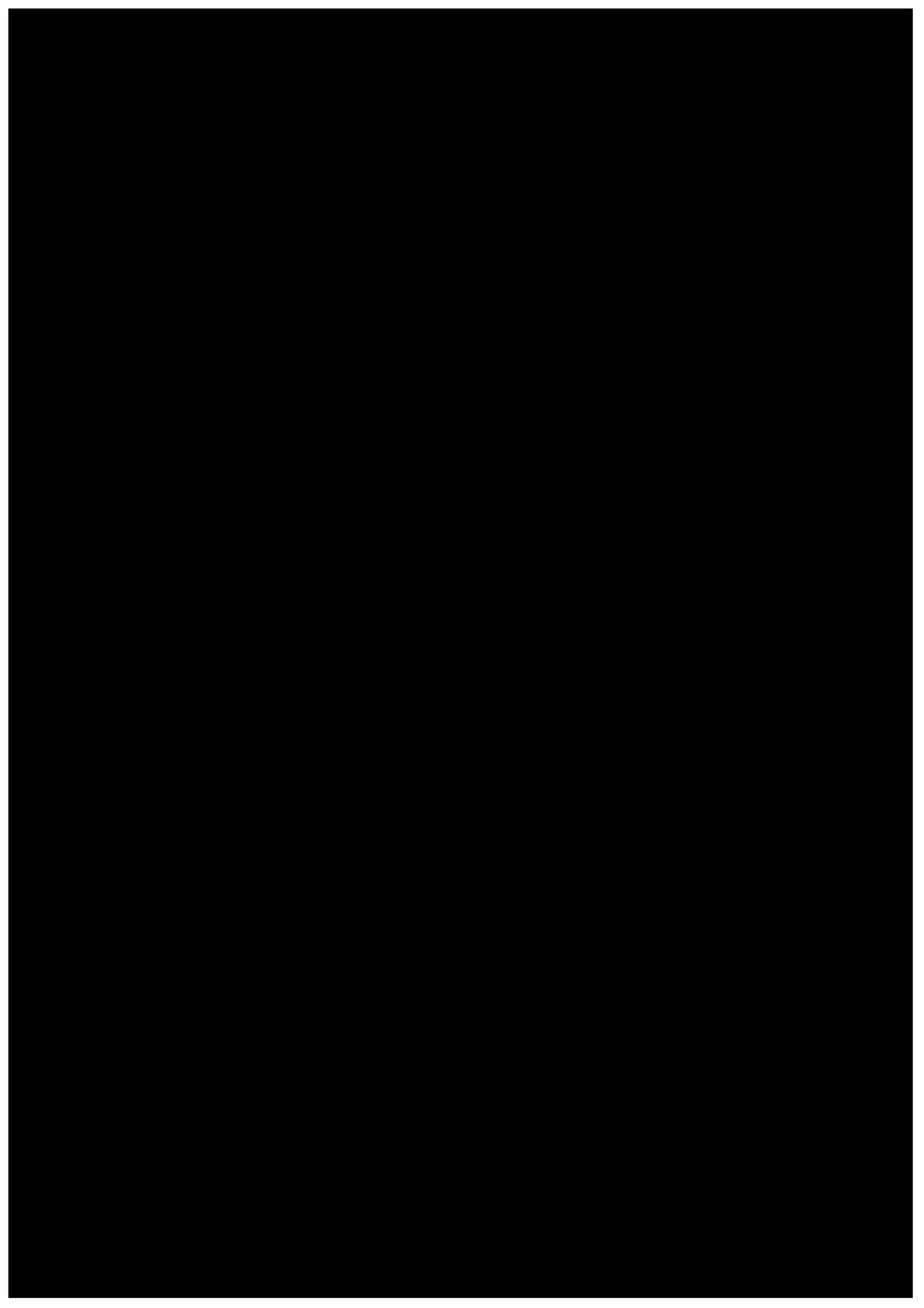
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Afflux
 PMF Event
 Flood Level Difference



Project 23-1110	Figure Status DRAFT
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Drawing No. A104	Issue 1
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