

Flood Assessment Addendum

**Burrah Park, 1953-2109 Elizabeth Drive,
Badgerys Creek**

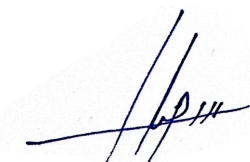
June 2025

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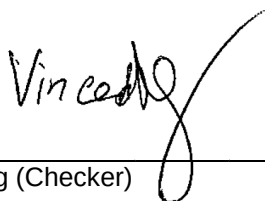
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30206389-EF002-01-Flood
Assessment



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Executive Summary

This addendum to the Flood Assessment Report originally prepared by Arcadis supports the continued assessment of the proposed warehouse and logistics estate at 1953–2109 Elizabeth Drive, Badgerys Creek. It specifically addresses comments received from public agencies as part of the Response to Submissions (RTS) process for SSD-70316465.

The purpose of this addendum is to respond to feedback from Liverpool City Council (LCC), Sydney Water Corporation (SWC), and the Department of Planning, Housing and Infrastructure (DPHI), and to document the additional flood modelling and clarifications undertaken in response. Key elements of the updated assessment include:

- A revised proposed development TIN issued by Henry & Hymas Consulting Engineers. All developed-case flood modelling was re-run to reflect the updated ground and development levels.
- Updated flood storage volume calculations, demonstrating that the proposed development does not result in any net loss of flood storage for all flood events, including the PMF, addressing LCC's comments regarding compensatory excavation.
- Revised climate change assessments, consistent with ARR 2019 Version 4.2, confirming that flood level changes are localised and remain within acceptable tolerances.
- Clarification on internal flood-prone areas, confirming these fall outside the scope of this assessment and are addressed separately by Henry & Hymas through internal stormwater and basin design.
- No proposed creek crossings are included in this development stage and have therefore not been considered in the current flood assessment.
- Updated flood emergency management context, confirming that evacuation is the preferred response strategy, and that each lot should prepare a site-specific flood emergency plan in line with Guideline EM01.

Overall, the updated assessment confirms that the proposed development continues to meet the relevant planning objectives outlined in the Aerotropolis Development Control Plan (DCP), the SEPP (Precincts – Western Parkland City), and the SEARs. The original findings remain valid, and the updated modelling and clarifications reinforce the suitability of the proposed development with respect to flood risk, stormwater management, and emergency response planning.

Contents

Executive Summary.....	2
Contents	3
Figures	3
Tables.....	3
1 Introduction and Purpose of Addendum.....	4
2 Additional Work Undertaken	5
2.1 Updated Developed Case Design Surface and Model Results	5
2.2 Climate Change Assessment	9
2.3 PMF flood Storage Analysis	11
2.4 Flood Emergency Management.....	12
3 Conclusions	13
Appendix A – Flood Maps.....	14
Appendix B – Response to Submissions Summary Table.....	15

Figures

Figure 1 Development Layout	5
Figure 2 Flood Impacts: 1% AEP Flood Level Design vs. Existing (Cosgroves Creek).....	7
Figure 3 Flood Impacts: PMF Flood Level Design vs. Existing (Cosgroves Creek).....	8
Figure 4 Flood Impacts: 1% AEP Climate Change Flood Level Design vs. Existing (Cosgroves Creek).....	10

Tables

Table 1 Climate Change Factors – SSP5-8.5	9
Table 2 - PMF Flood Storage Volume	11

1 Introduction and Purpose of Addendum

This document is an addendum to the original Flood Assessment Report (30206389-EF001-03) submitted as part of the State Significant Development Application (SSD-70316465) for a Warehouse and Logistics Estate at 1953–2109 Elizabeth Drive, Badgerys Creek. The site is legally described as Lot 1 in Deposited Plan 1306448.

The addendum has been prepared in response to submissions made by public authorities during the exhibition phase. These submissions include formal comments from:

- Liverpool City Council (LCC)
- Sydney Water Corporation (SWC)
- Department of Planning, Housing and Infrastructure (DPHI)

The purpose of this addendum is to:

- Summarise the flood-related issues raised in submissions
- Describe any further modelling or analysis undertaken
- Demonstrate how each submission item has been addressed or clarified

As part of the Response to Submissions (RTS) process, an updated development surface (TIN) was issued by Henry & Hymas Consulting Engineers. This required the re-running of all developed case flood modelling to reflect the revised surface levels and site layout.

It is noted that this flood assessment continues to focus solely on external overland flow paths, particularly Cosgroves Creek. Internal site drainage, including flood-prone areas and detention basin sizing, has been addressed separately by Henry & Hymas and is not covered within this addendum. Similarly, there are no proposed creek crossings forming part of the current development application.

The findings of this addendum reaffirm the conclusions of the original report and confirm that the proposed development complies with relevant flood risk management policies and performance outcomes.

Key comments from public authorities primarily related to climate change, flood storage, and emergency flood management. In response, further modelling and analysis have been undertaken and are presented in Section 2 of this addendum. A detailed summary of all submissions and corresponding responses is provided in Appendix B.

2 Additional Work Undertaken

In response to agency comments received during the exhibition phase and the subsequent revision of the proposed development surface by Henry & Hymas Consulting Engineers, a range of further modelling and analysis tasks were undertaken. This section summarises the additional work completed as part of the flood assessment addendum. A detailed summary of agency submissions and corresponding responses is provided in Appendix B.

2.1 Updated Developed Case Design Surface and Model Results

Following receipt of a revised design surface (TIN) on 13 May 2025, which incorporated updated lot layouts, internal roads, drainage channels, and detention basin locations, the flood modelling for the developed scenario was re-run to reflect these changes (refer to Figure 1). The changes most relevant to the flood assessment include the detention basin located adjacent to the Cosgroves Creek flow path and adjustments to the development footprint in the north-west corner of the site, near the M12 Motorway. The updated TUFLOW model incorporated the revised design surface overlaid onto the existing terrain, ensuring that all developed-case results were based on the most current development layout.

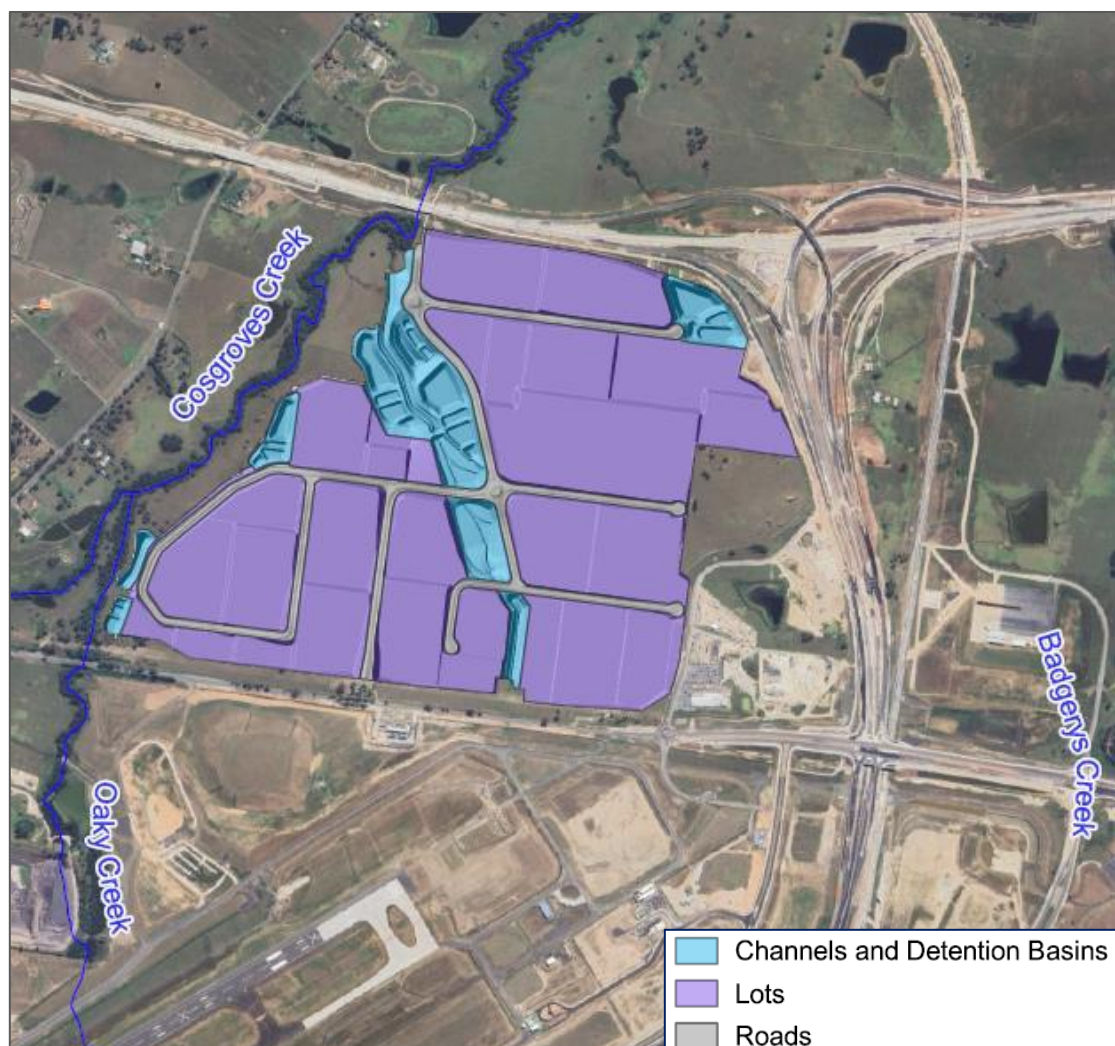


Figure 1 Development Layout

Urbanisation of the site, converting predominantly pervious rural land to impervious surfaces, is expected to increase both flow volumes and peak discharges. In addition, reduced surface roughness (lower Manning's 'n' values) associated with new roads and built form accelerates the timing of peak flows compared to existing conditions.

To mitigate these effects, detention basins have been incorporated into the development design by others. These are assumed to replicate pre-development discharge patterns for storm events up to and including the 1% AEP event. This flood assessment, however, excludes detailed analyses of internal site drainage and basin sizing, which are addressed separately in the stormwater design prepared by Henry & Hymas.

Importantly, the TUFLOW model has been conservatively configured with an initial water level that assumes the quarry area north of the site is already filled with water prior to the simulation. This approach, which was applied to both existing and developed scenarios, ensures that the future filling of the quarry will not alter the flooding outcomes presented in this assessment, and no further sensitivity testing was required.

Modelling results indicate:

- For the 1% AEP event, flood level increases are minimal, with localised rises of a few millimetres near the site boundary. These increases are attributed to slight encroachment into the existing Cosgroves Creek floodplain (see Figure 2).
- For the PMF event, the impacts of development are more pronounced (see Figure 3). Observed effects include:
 - Peak flood level increases of 15 to 50 mm, with the greatest changes occurring upstream of the M12 and some minor impacts on properties west of Cosgroves Creek.
 - No change in flood hazard categories across most areas, with only small localised zones seeing a one-category increase.
 - The M12 Motorway is not expected to be overtopped, with flood levels remaining below the road surface. However, this assessment is subject to confirmation based on future detailed design information for the M12.

Overall, PMF impacts are considered minor and are not expected to result in adverse effects on surrounding properties or public infrastructure.

A full set of updated flood mapping, including depth, velocity, and hazard plots for key design events, is provided in Appendix A.

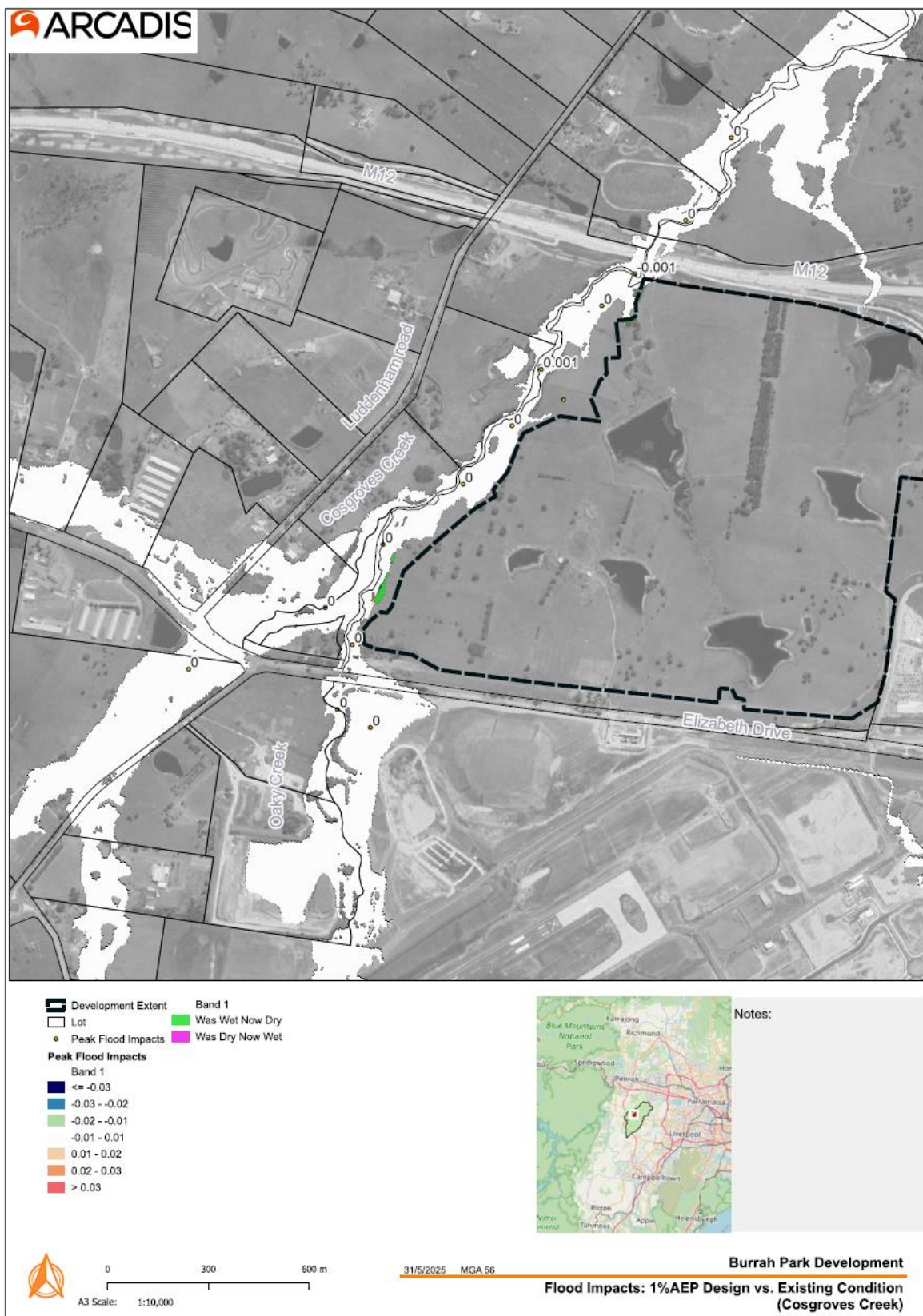


Figure 2 Flood Impacts: 1% AEP Flood Level Design vs. Existing (Cosgroves Creek)

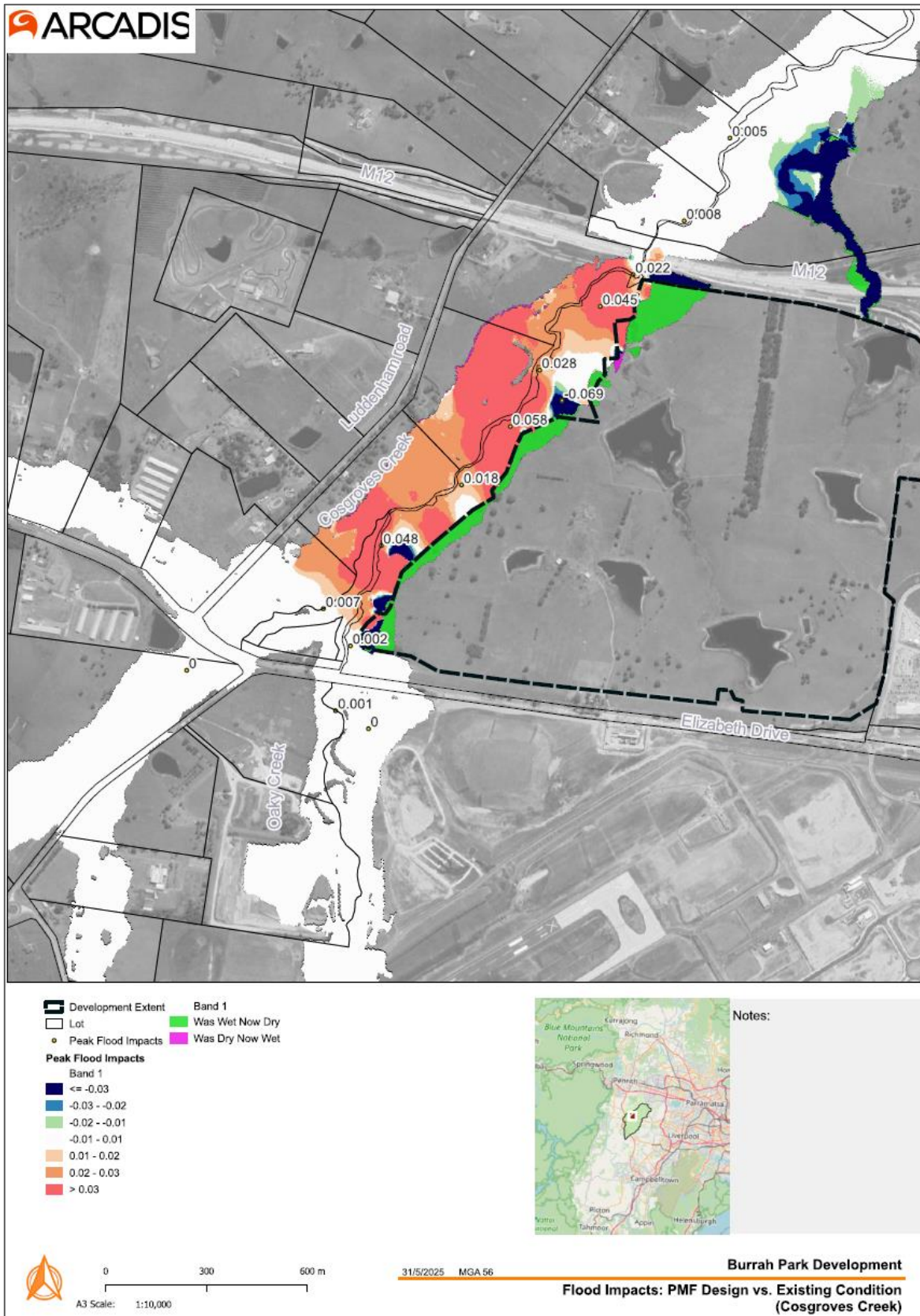


Figure 3 Flood Impacts: PMF Flood Level Design vs. Existing (Cosgroves Creek)

2.2 Climate Change Assessment

The climate change assessment has been updated in line with the latest methodology from Australian Rainfall and Runoff (ARR 2019), Version 4.2, adopting the SSP5-8.5 scenario for the year 2100. The applied values are summarised in the table below.

Table 1 Climate Change Factors – SSP5-8.5

Parameter	SSP5-8.5 – Year 2100
Climate Change Rainfall Factor	1.5
Initial Loss Adjustment Factor	1.09
Continuing Loss Adjustment Factor	1.18

These values were applied to the 9-hour storm event, which remains critical for the site based on hydrological analysis of the Badgerys Creek catchment.

Results indicate that:

- Peak flood levels in Cosgroves Creek slightly decrease under the climate change scenario. This is attributed to the earlier timing of peak discharges from the developed catchment, resulting in reduced coincidence with downstream peak flows.
- Minor localised increases in flood levels are observed adjacent to the southern detention basin and areas where the proposed development encroaches slightly into the existing floodplain (Figure 4). These increases do not extend across the creek and are not considered significant.

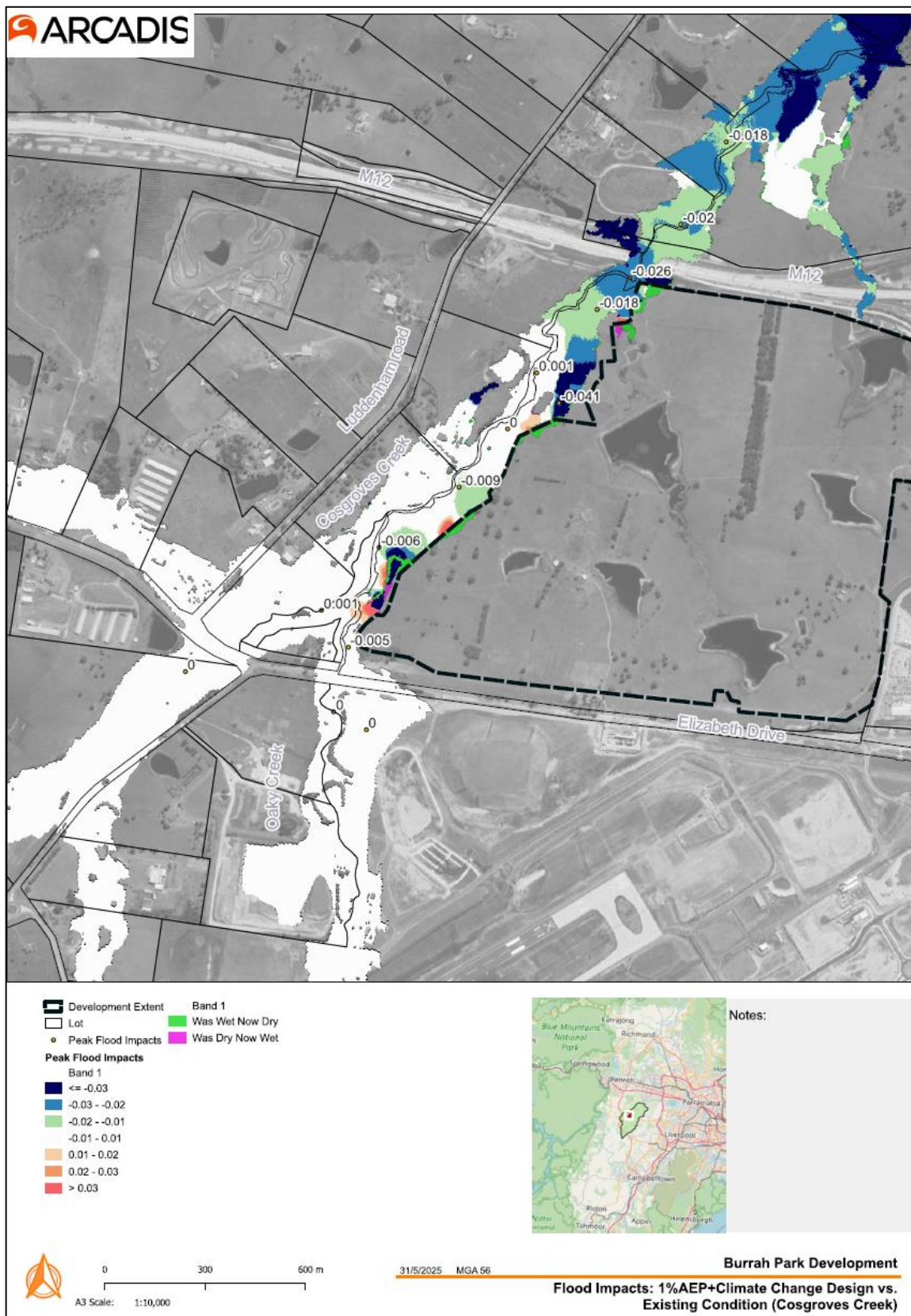


Figure 4 Flood Impacts: 1% AEP Climate Change Flood Level Design vs. Existing (Cosgroves Creek)

2.3 PMF flood Storage Analysis

The following methodology has been implemented to demonstrate compliance with Performance Outcome PO8, Section 2.5.1 (Flood Management) of the Development Control Plan (DCP). As the proposed development generally remains outside the 1% AEP flood extent, flood storage was assessed for the Probable Maximum Flood (PMF) event.

Existing Scenario

- Flood storage volumes were calculated using the existing site survey topography.
- Calculations were based on PMF flood levels for the existing scenario.
- The 12d Model software's volume calculation functions were used for this assessment.

Developed Scenario

- Flood storage volumes were calculated based on the modelled finished surface levels of the proposed development.
- The volume required for stormwater detention adjacent to Cosgroves Creek has been included in the flood storage calculations.
- Calculations were based on PMF flood levels for the developed scenario.
- The 12d Model software's volume calculation functions were again used for this scenario.

Flood Storage Comparison

Table 2 summarises the existing and developed flood volumes for the site.

Table 2 - PMF Flood Storage Volume

Defined Flood Level	Flood Storage (m ³)		
	Existing	Developed	Difference
PMF	8,515,471	8,573,947	+58,476

The assessment confirms that, despite development encroachment, the proposed works result in a net increase in flood storage across the site due to the inclusion of the stormwater detention area near Cosgroves Creek. This outcome demonstrates full compliance with the flood storage provisions of the DCP.

2.4 Flood Emergency Management

Flood emergency management planning is a critical component of flood-resilient development, particularly in areas subject to rare but high-consequence events such as the PMF. This section addresses the feedback received from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and its Biodiversity, Conservation and Science (BCS) Group, which raised concerns about reliance on a shelter-in-place strategy, noting that this approach is not endorsed by the NSW State Emergency Service (SES).

To clarify, shelter-in-place is not the primary flood emergency response strategy proposed for the site. Rather, the assessment highlights that the development area remains entirely outside the PMF flood extent, significantly reducing flood exposure and the risk of direct inundation. This level of immunity improves the site's overall resilience, but it does not replace the need for active evacuation planning and emergency response measures consistent with SES protocols.

The appropriate strategy for the site is evacuation in advance of hazardous flood conditions, coordinated with regional emergency management systems and SES directives. This approach is consistent with broader emergency management strategies applied across Western Sydney, including those adopted for the nearby Western Sydney Airport precinct.

Flood modelling confirms that Elizabeth Drive, the site's primary access route, remains generally trafficable under the 1% AEP event, with flood depths not exceeding 100 mm at the Cosgroves Creek crossing and classified as Hazard Category H1 (safe for vehicles and pedestrians). However, the road becomes non-trafficable during rarer events such as the 0.2% AEP and PMF, and evacuation is therefore expected to occur prior to road inundation based on early warnings and SES-issued evacuation orders.

To further support emergency planning:

- The site benefits from topographic elevation and direct access to regional transport infrastructure, which provides flexibility in evacuation timing.
- Emergency response should integrate with the NSW SES total flood warning system, including alerts issued by the Bureau of Meteorology and local agencies.
- Site-specific Flood Emergency Response Plans should be prepared for each lot as part of future detailed design and operational planning. These plans should:
 - Identify flood triggers and thresholds for evacuation.
 - Establish roles and responsibilities for on-site personnel.
 - Account for the number of occupants and site operations.
 - Integrate with broader Council and SES emergency management frameworks.

This approach aligns with the intent of NSW Flood Risk Management Guideline EM01, which recommends early evacuation over shelter-in-place strategies where feasible and encourages proactive planning tailored to the use, scale and exposure of individual developments.

3 Conclusions

This addendum has been prepared to address comments received from relevant agencies during the exhibition of the State Significant Development Application (SSD-70316465) for the proposed warehouse and logistics estate at 1953–2109 Elizabeth Drive, Badgerys Creek.

In response to the submissions, further hydraulic modelling and flood impact assessments were undertaken using an updated design surface (TIN) issued by Henry & Hymas Consulting Engineers in May 2025. The revised developed scenario was assessed for key flood events, including the 1% AEP, PMF, and climate change scenarios in accordance with the latest version of Australian Rainfall and Runoff (ARR 2019, Version 4.2).

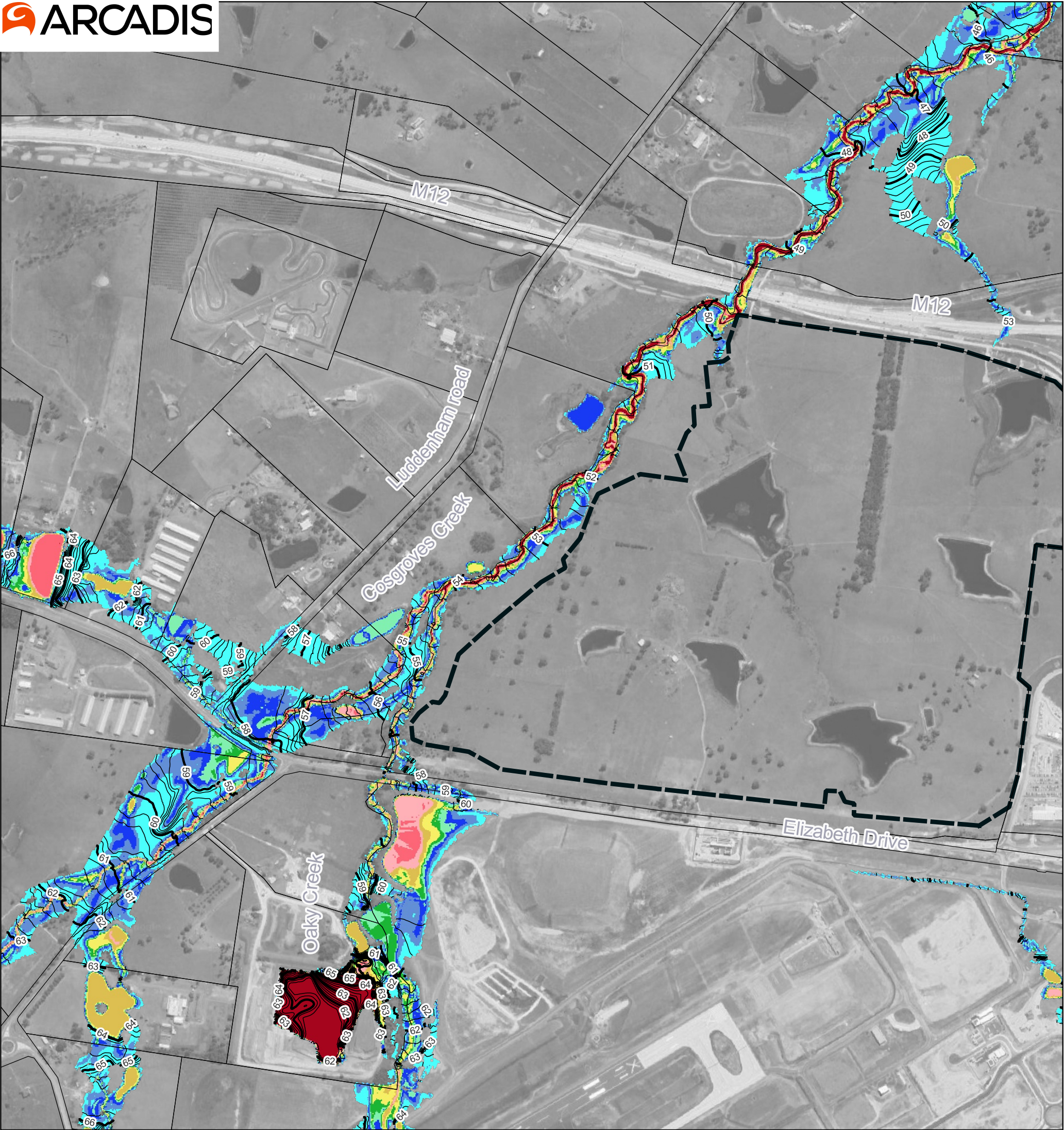
Key outcomes of the updated assessment include:

- The inclusion of detention basins, although assessed separately, is assumed to mitigate increased flows for events up to the 1% AEP, with minimal localised flood level increases observed caused by the development footprint.
- Under the revised PMF scenario, minor peak flood level increases (typically less than 50 mm) are confined to localised areas and do not result in adverse hazard or evacuation impacts.
- A net increase in PMF flood storage is achieved, ensuring compliance with DCP Performance Outcome PO8.
- The site remains trafficable during the 1% AEP event, and emergency access to Elizabeth Drive is maintained under this scenario. For larger events, evacuation should occur prior to loss of access.
- Emergency response planning is supported by the site's topographic advantages and should be further detailed in site-specific evacuation and emergency response plans at the lot level.

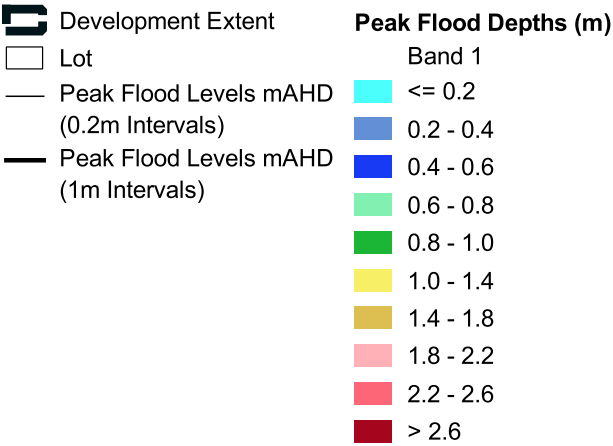
This addendum confirms that all relevant flood-related comments have been addressed through targeted analysis and clarification. The proposed development continues to comply with applicable floodplain risk management planning controls and is considered appropriate from a flood impact, safety, and emergency management perspective.

A detailed summary of submission responses is provided in Appendix B.

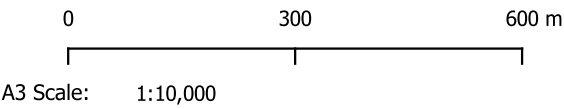
Appendix A – Flood Maps

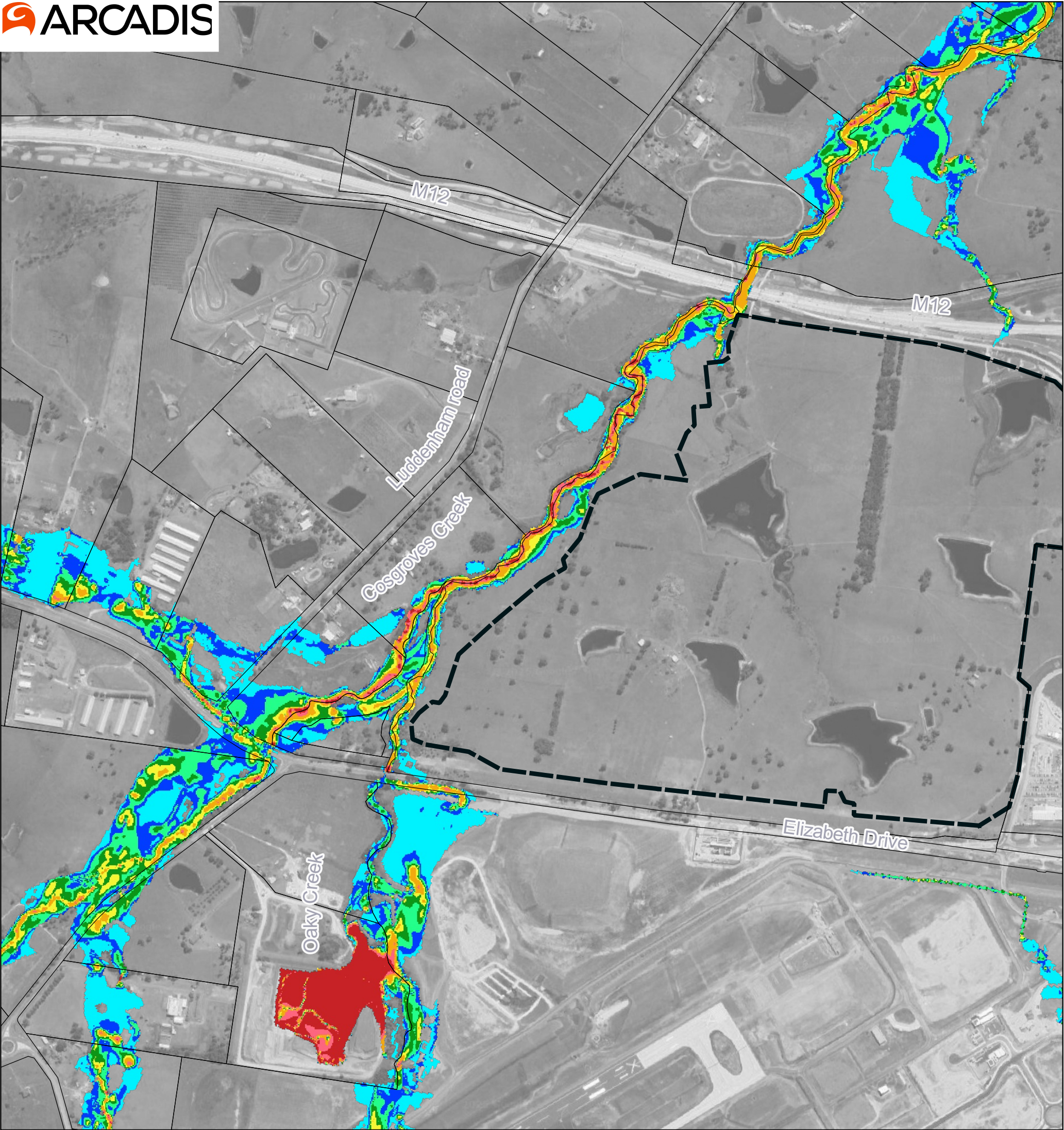


Map by: Sepideh Jafari

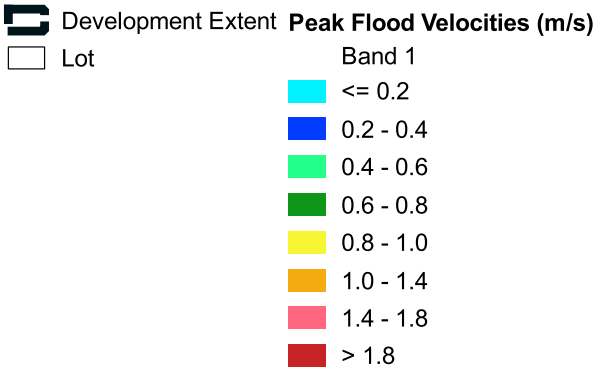


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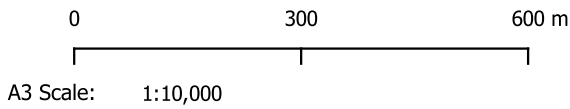


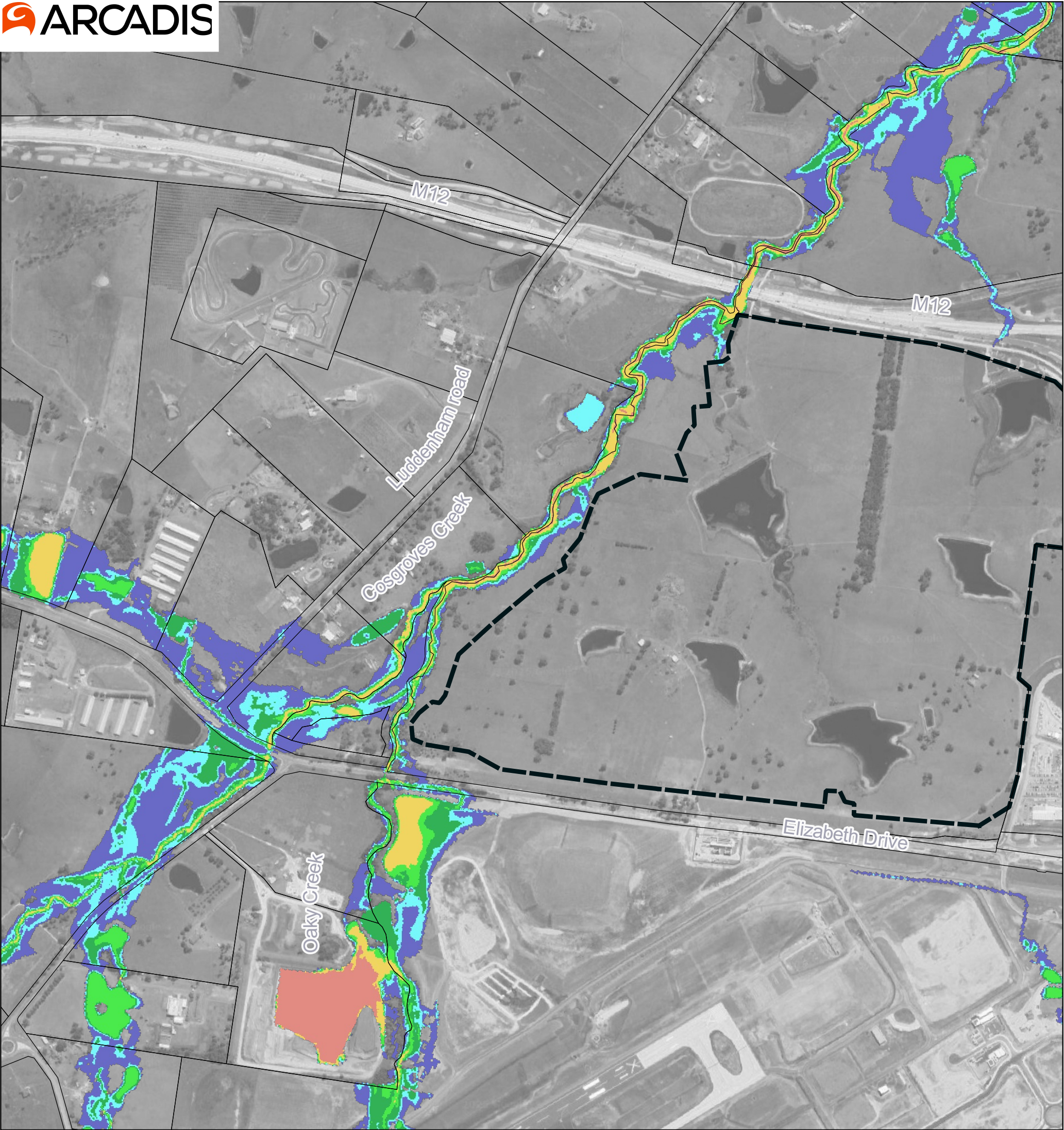


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Development Extent

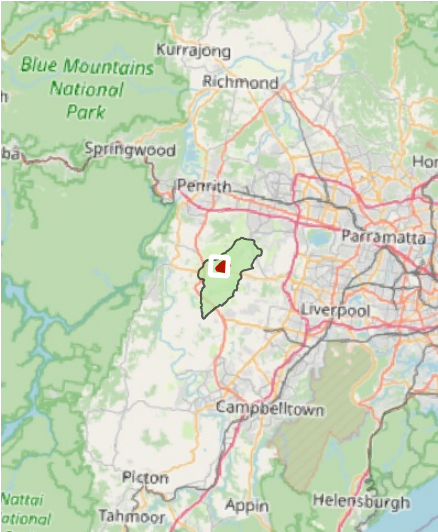


Lot

Peak Flood Hazard Categories

Band 1

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
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- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure



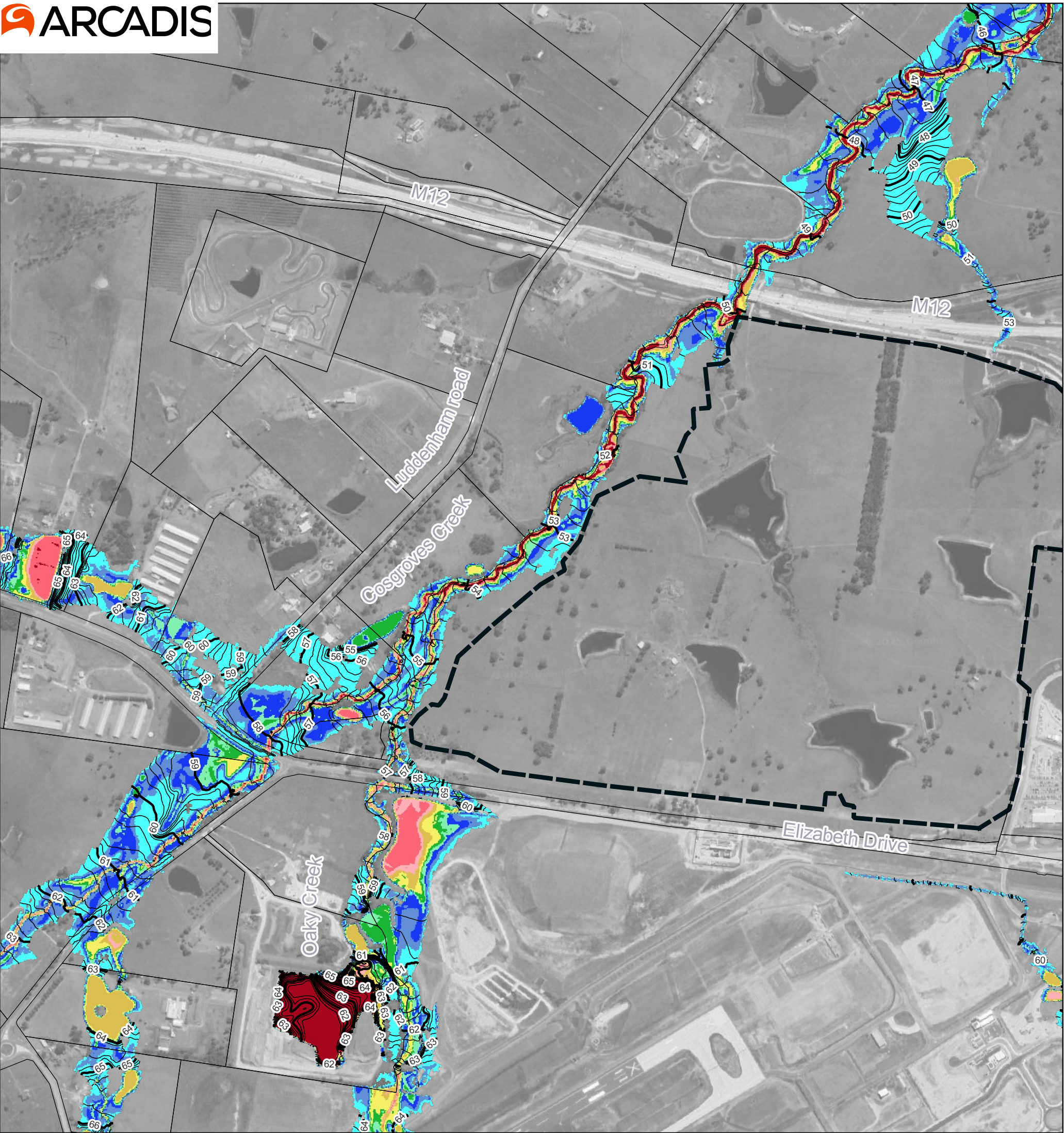
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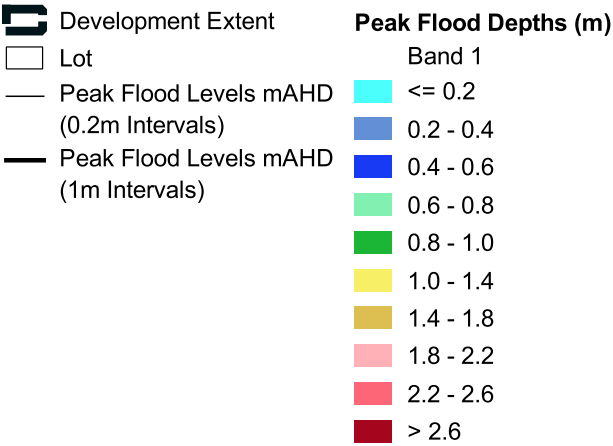
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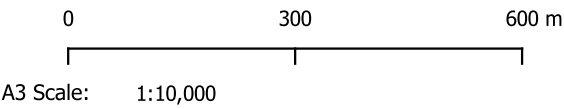
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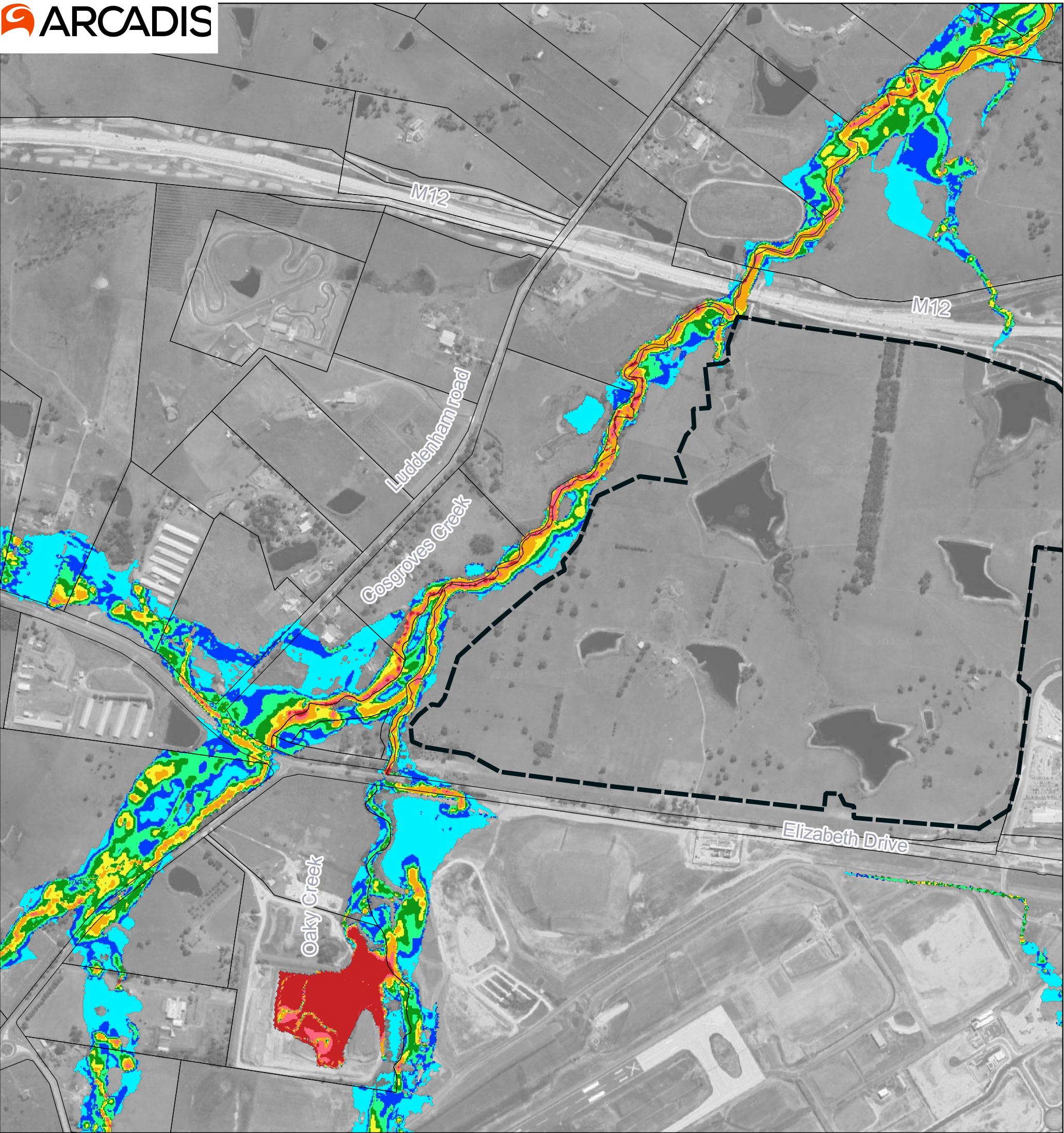


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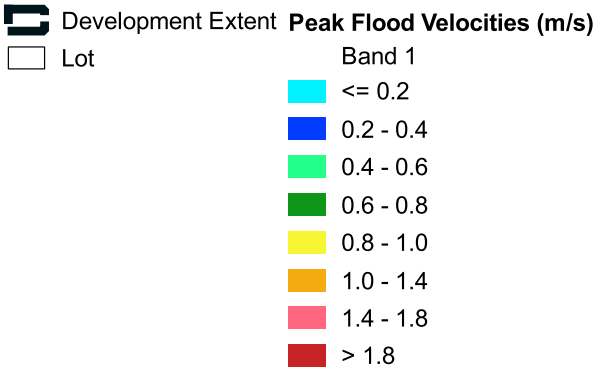


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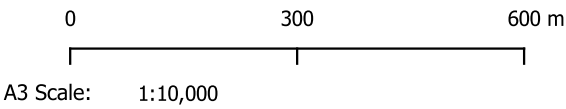


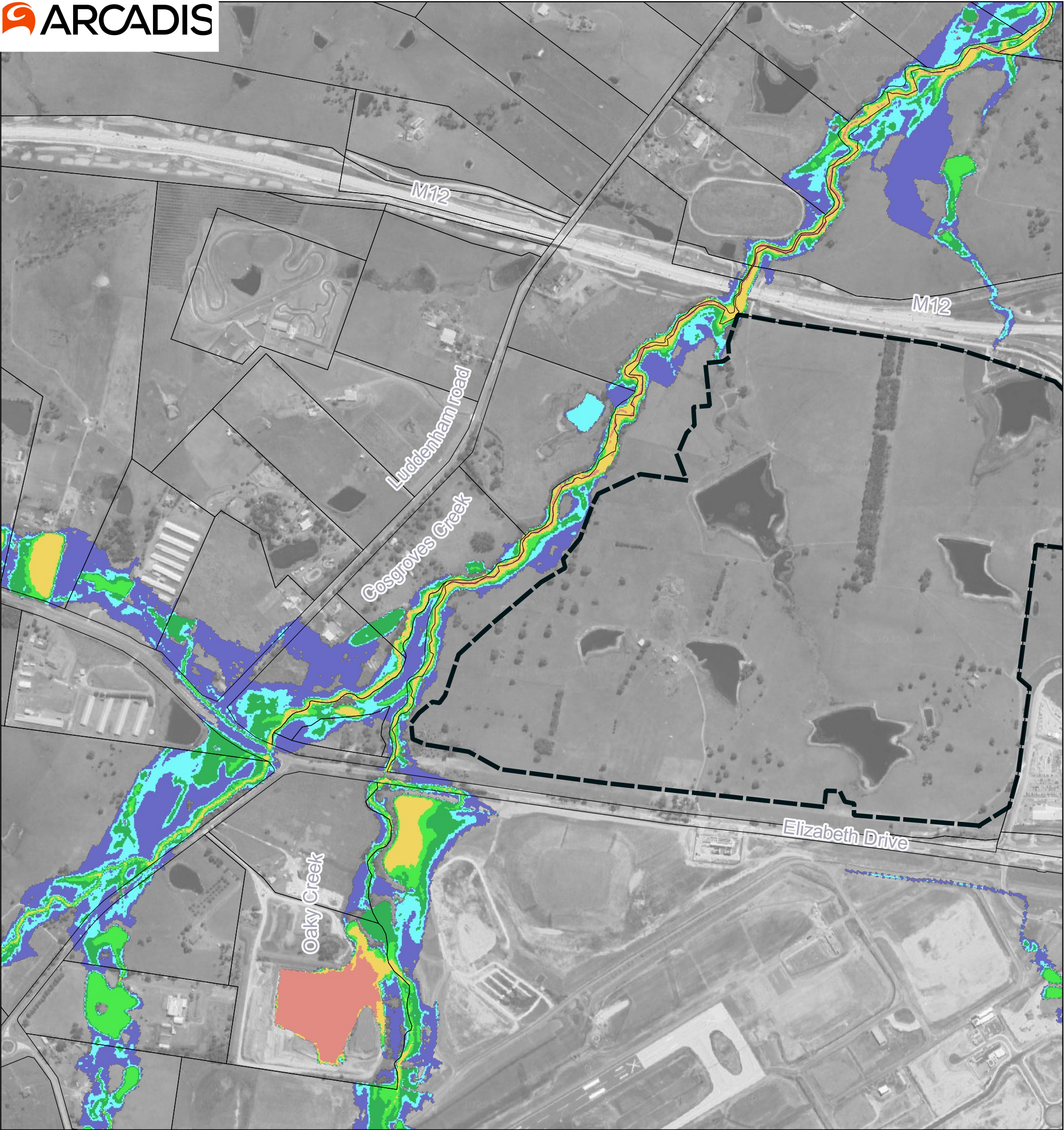


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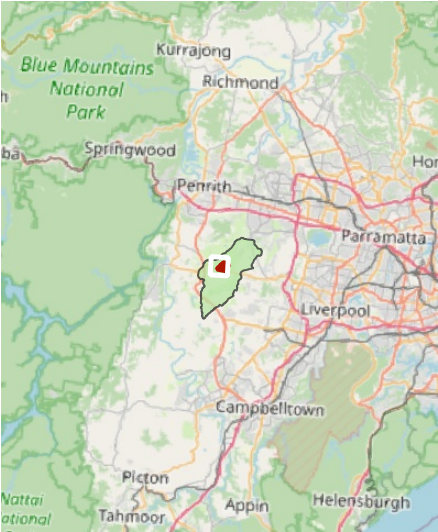


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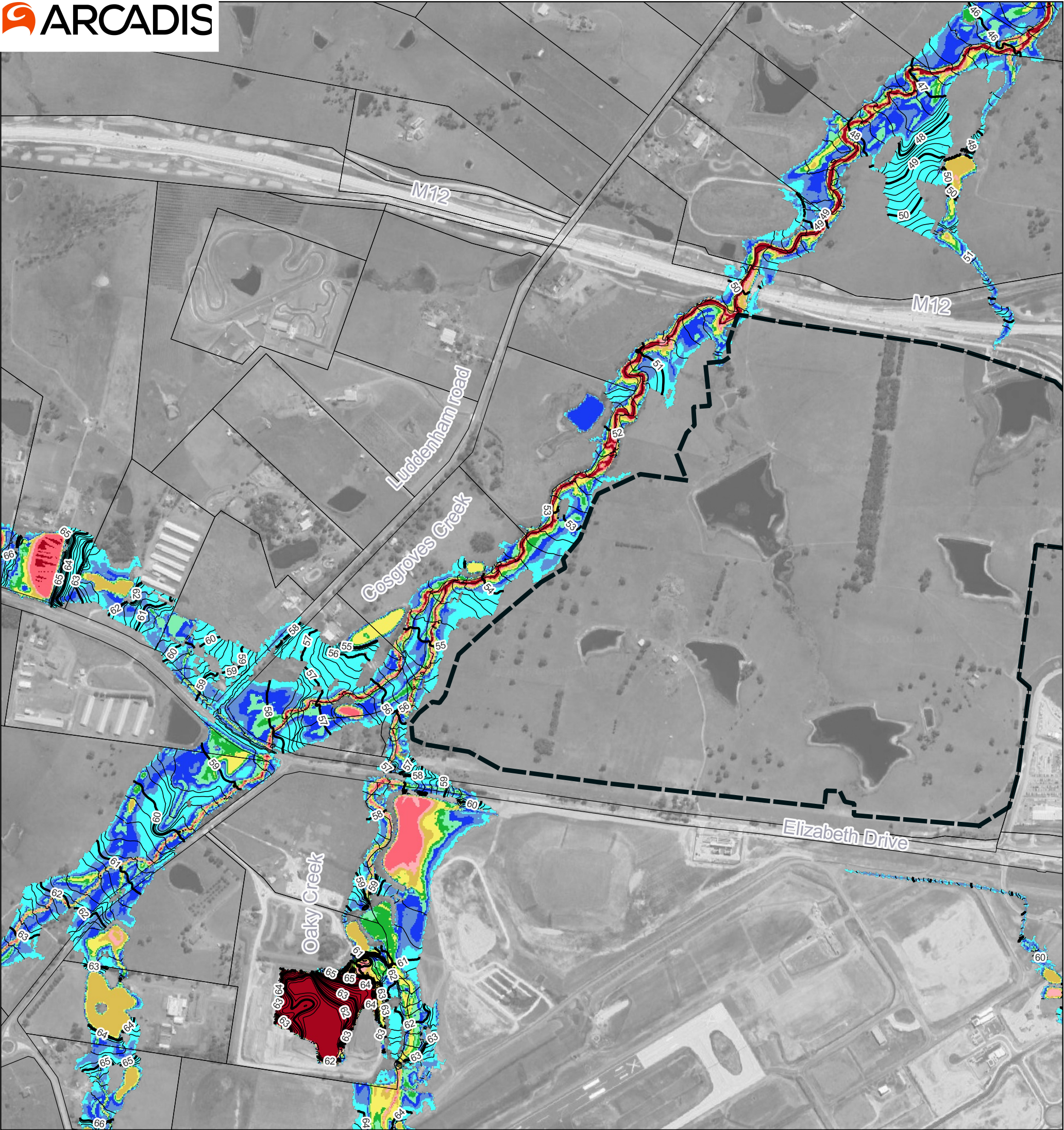


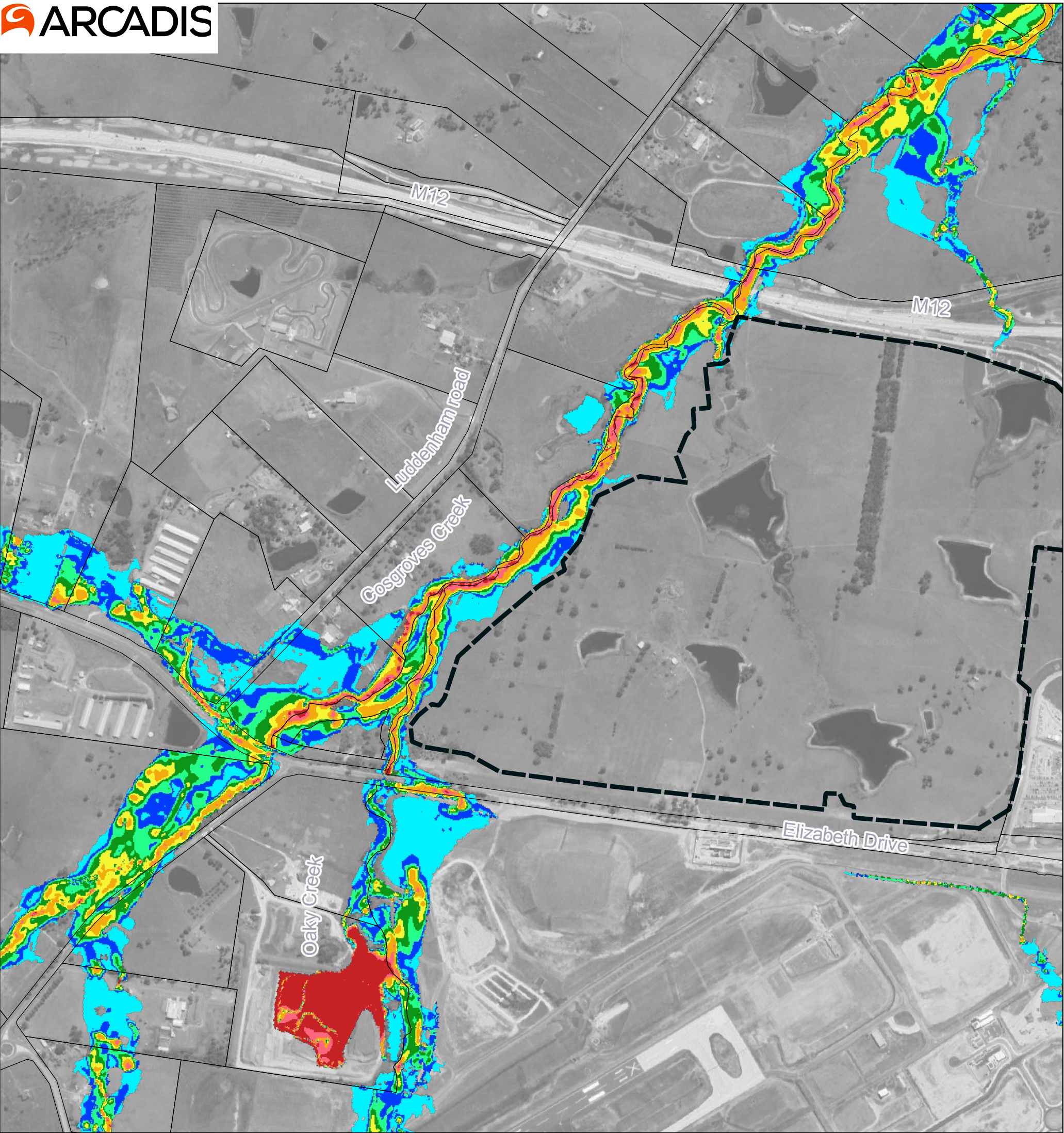
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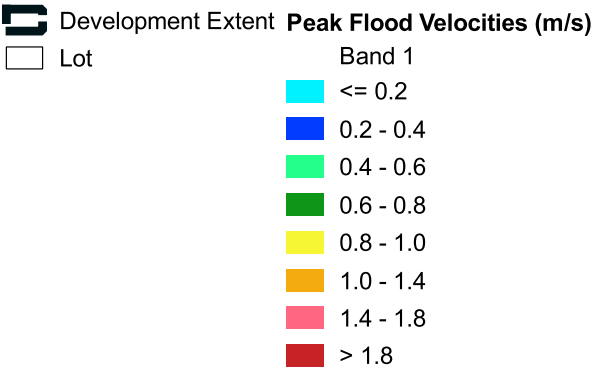
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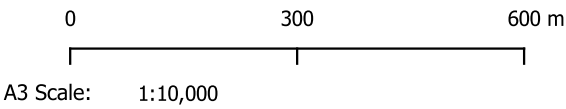




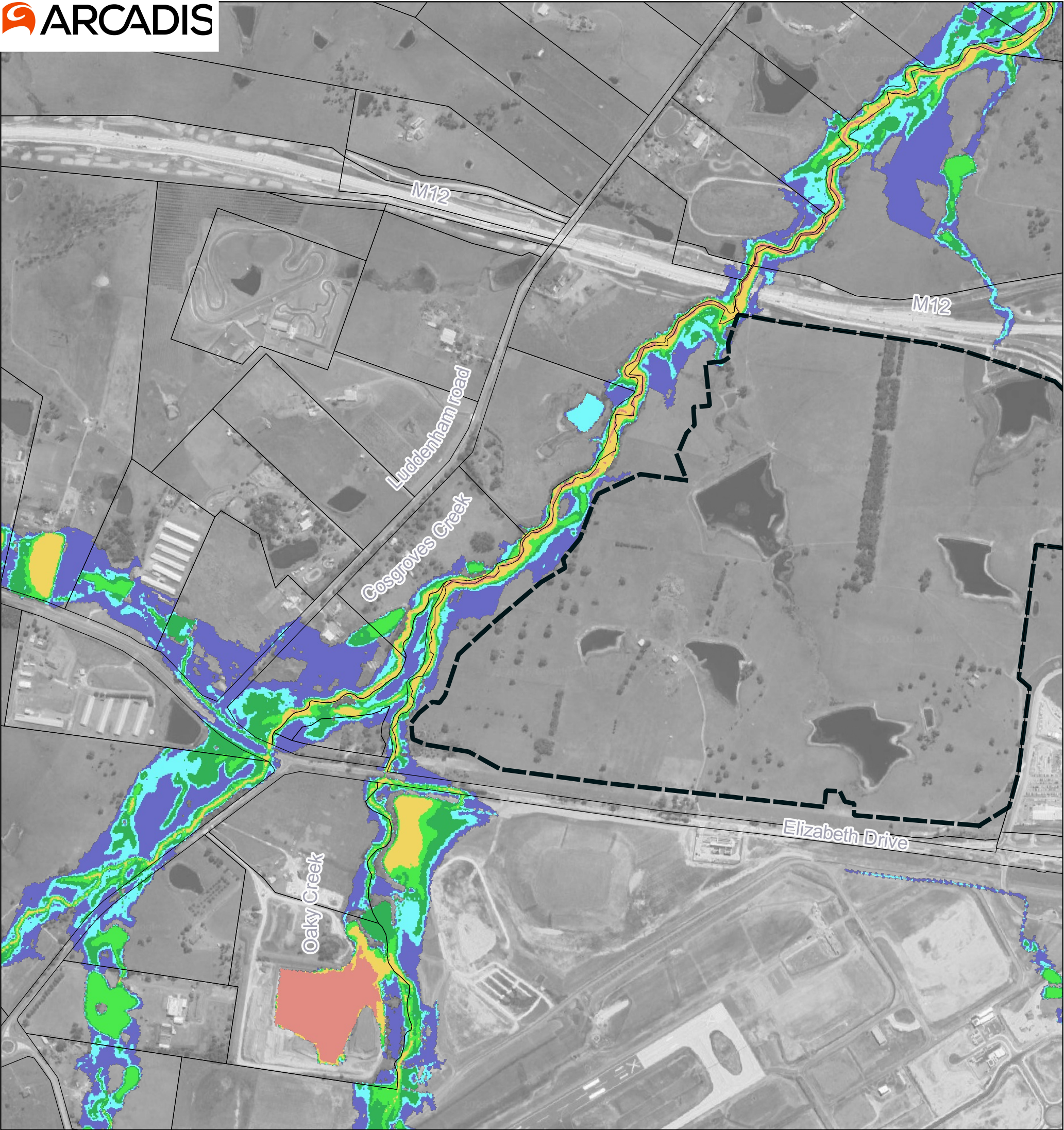
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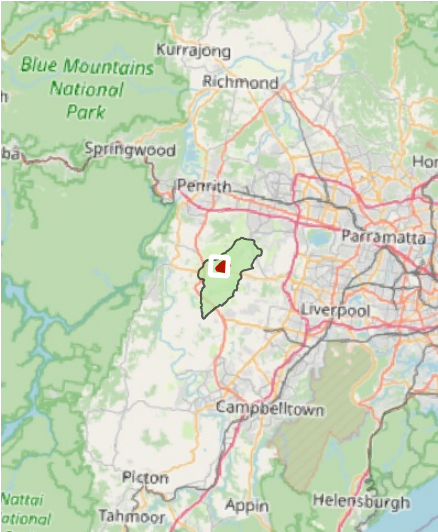


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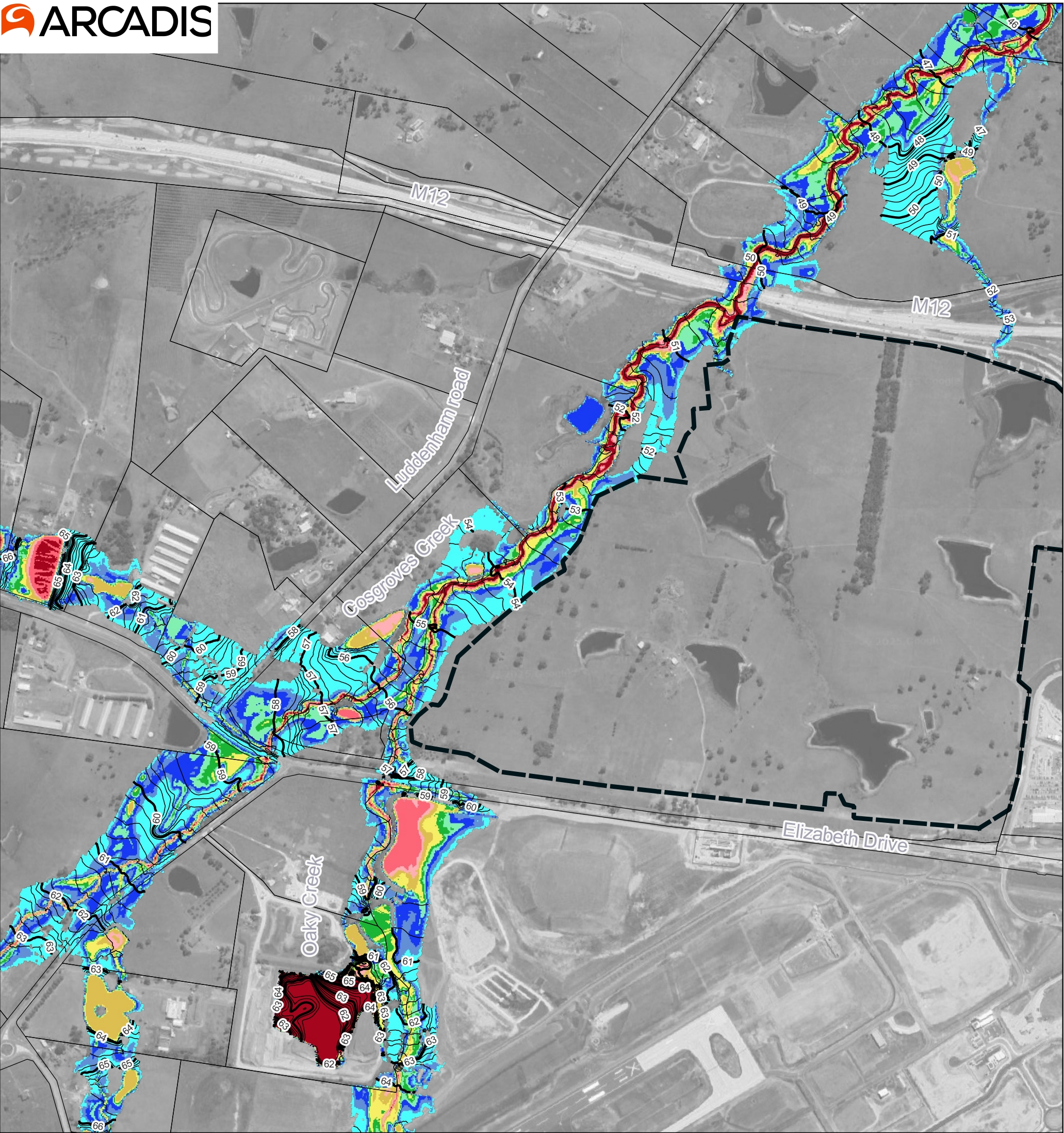
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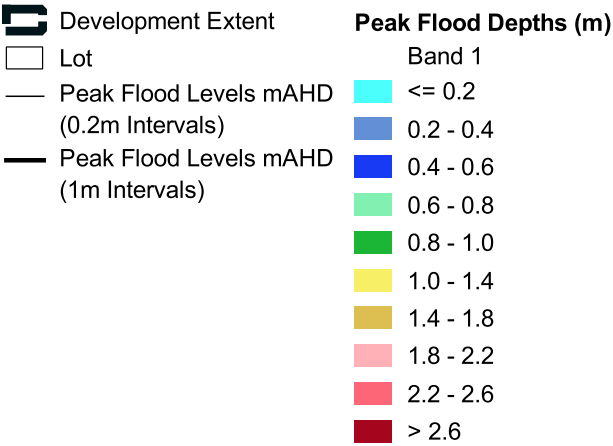
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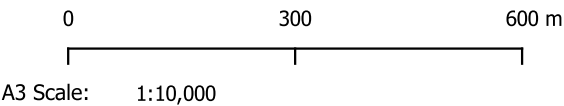
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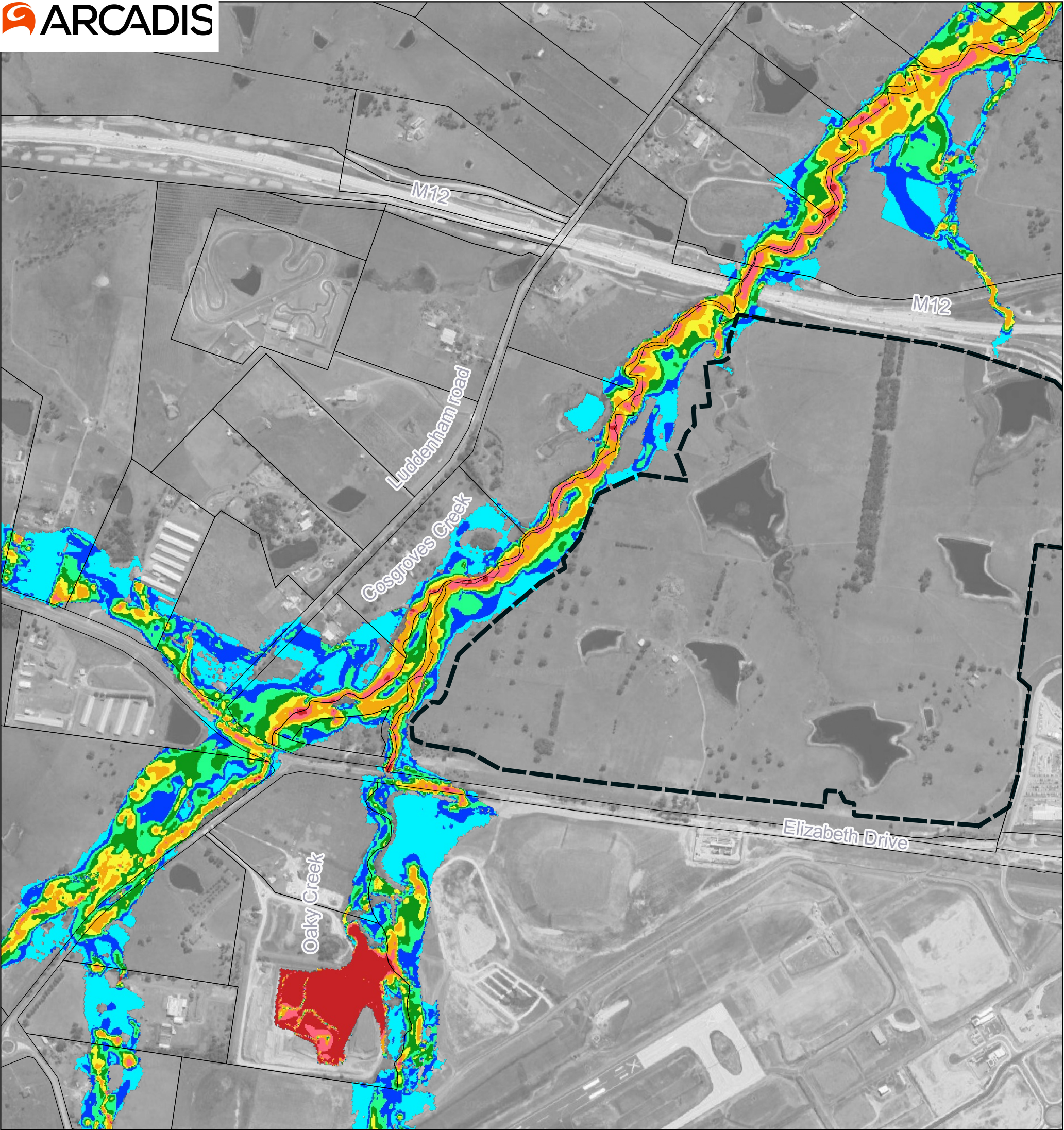


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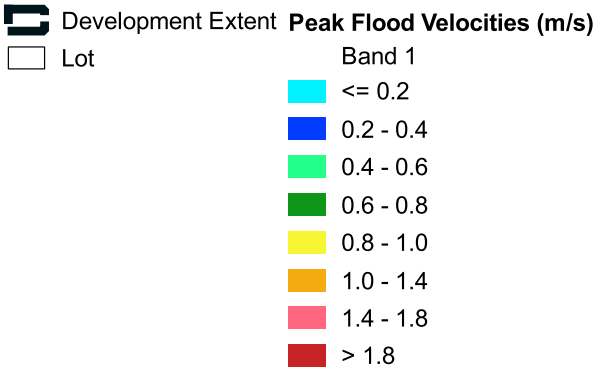


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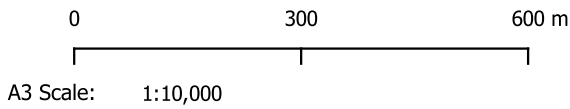




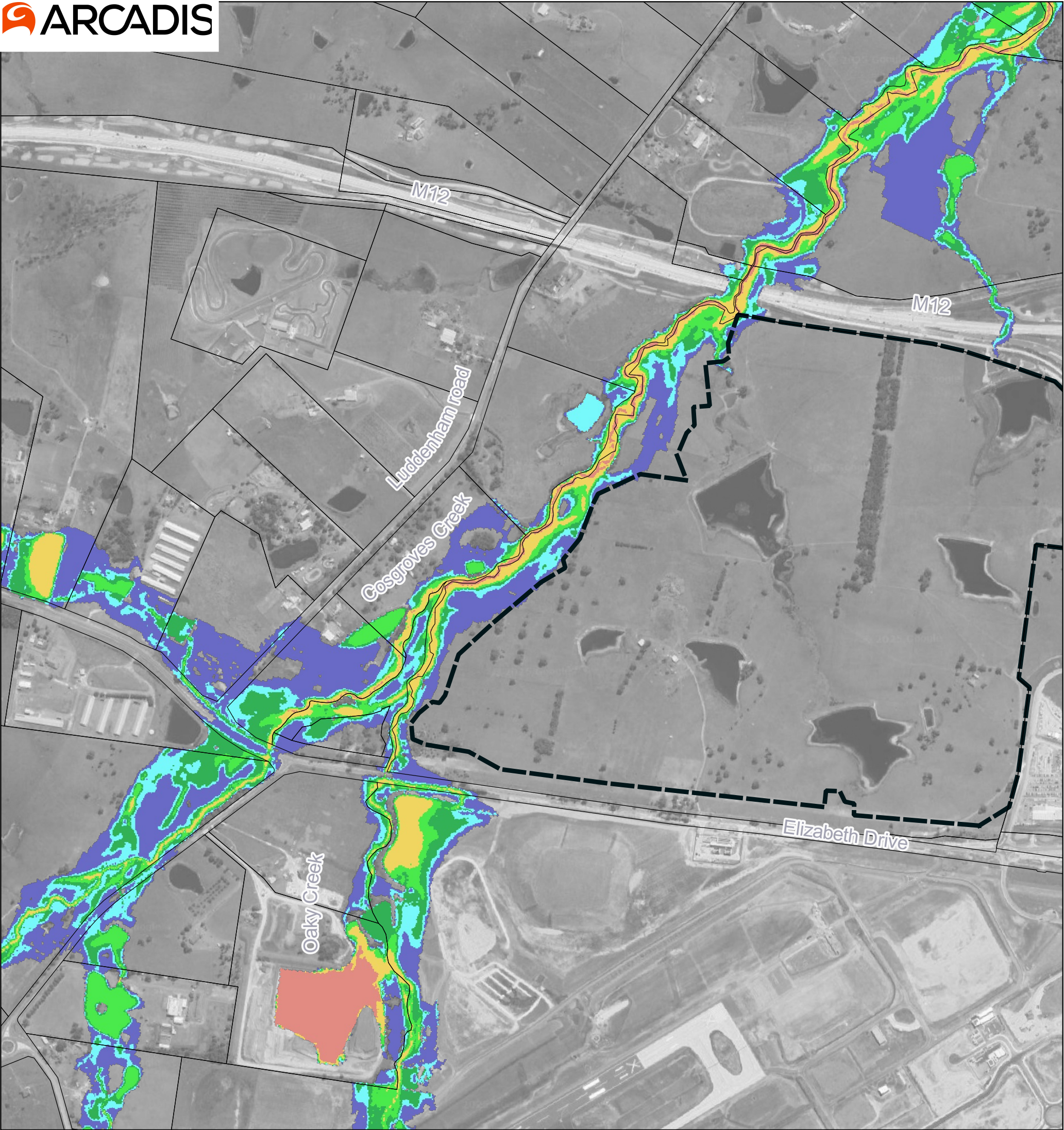
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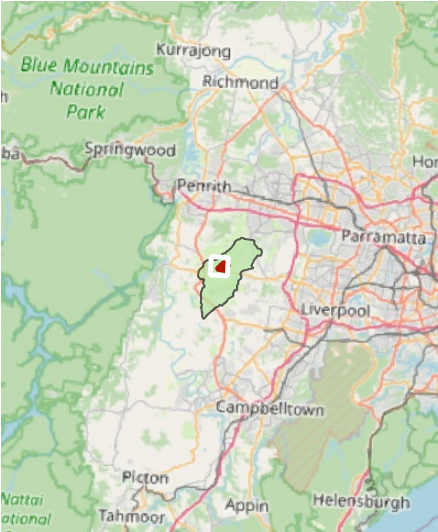


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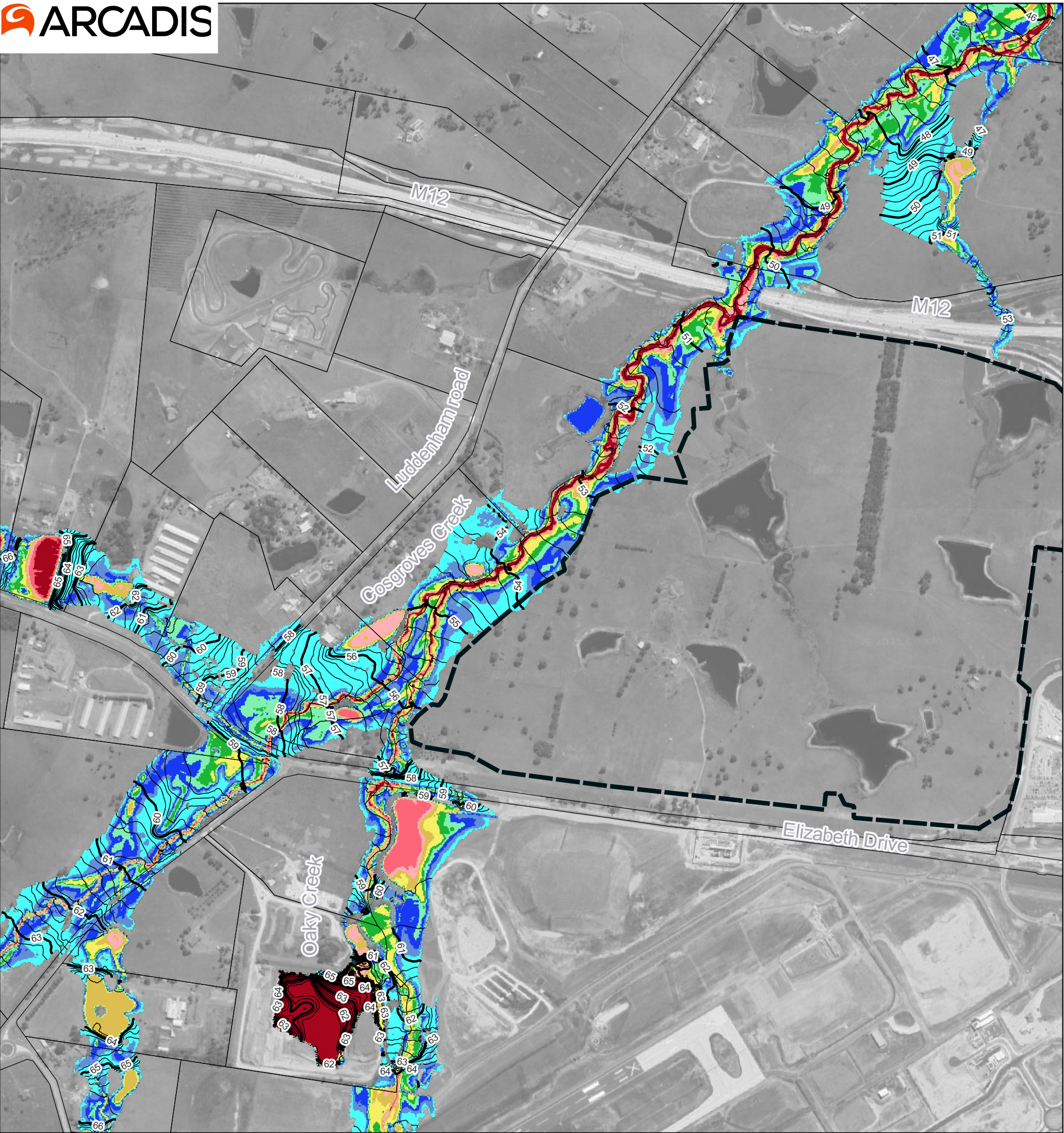


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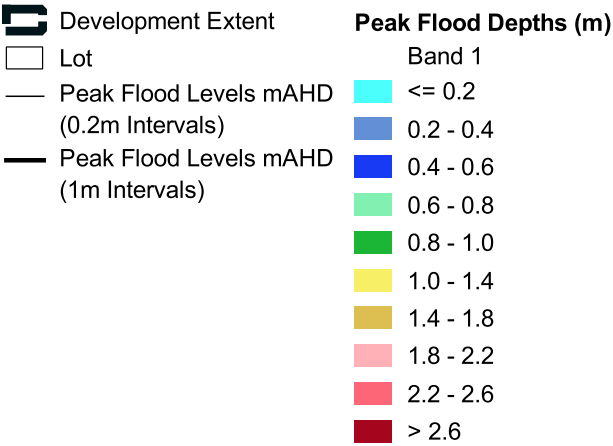


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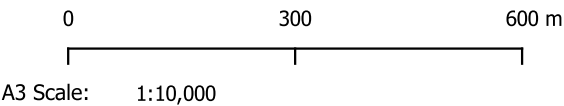
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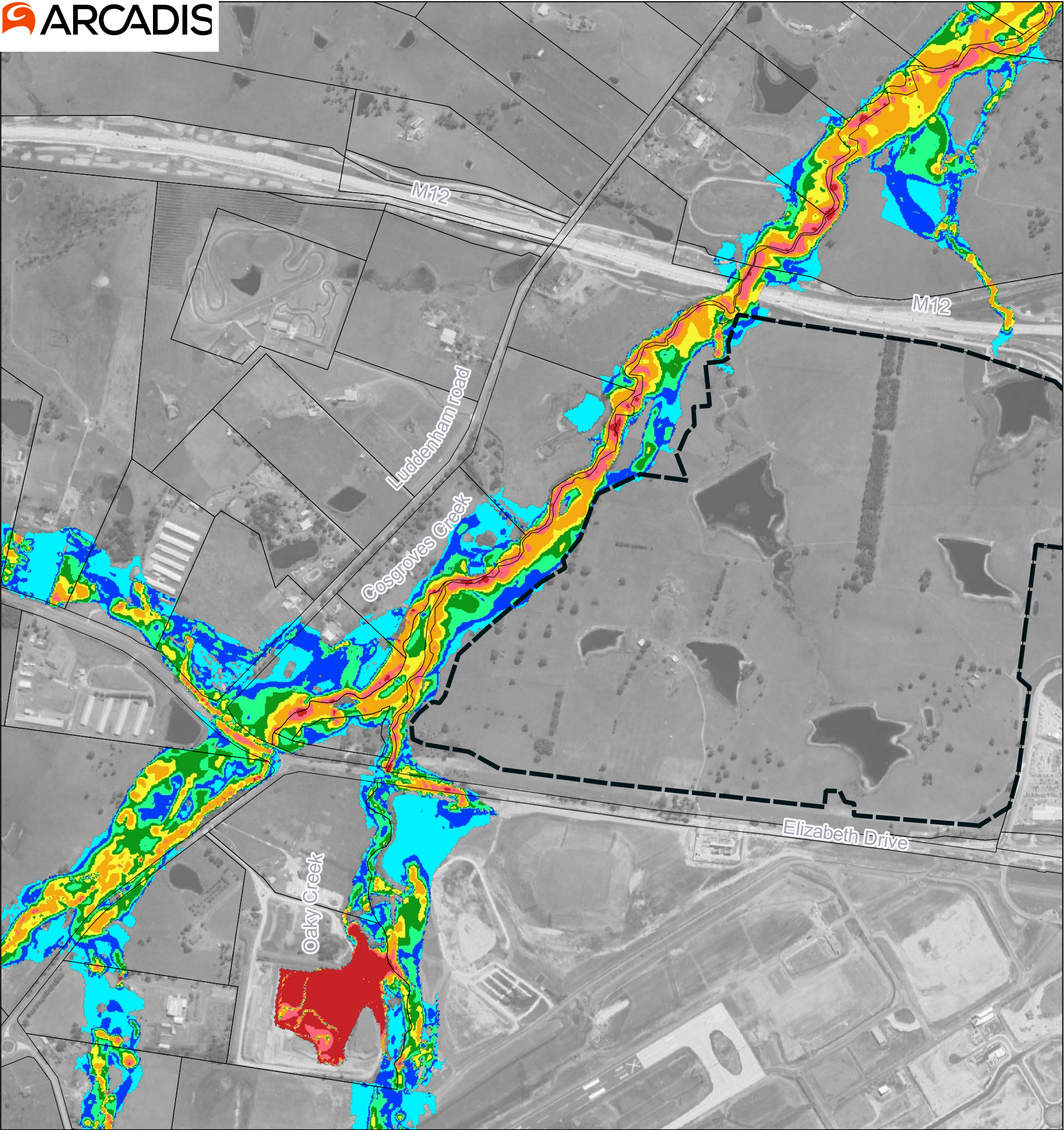


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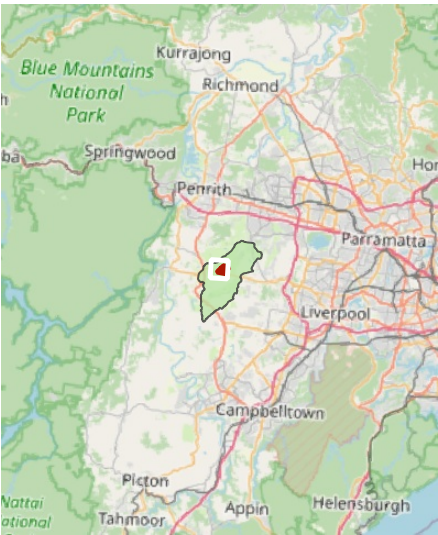
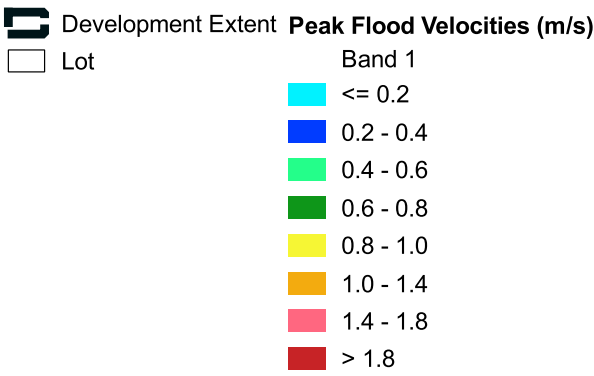


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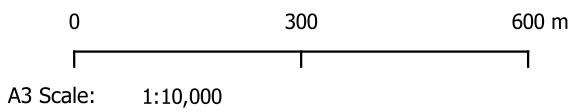




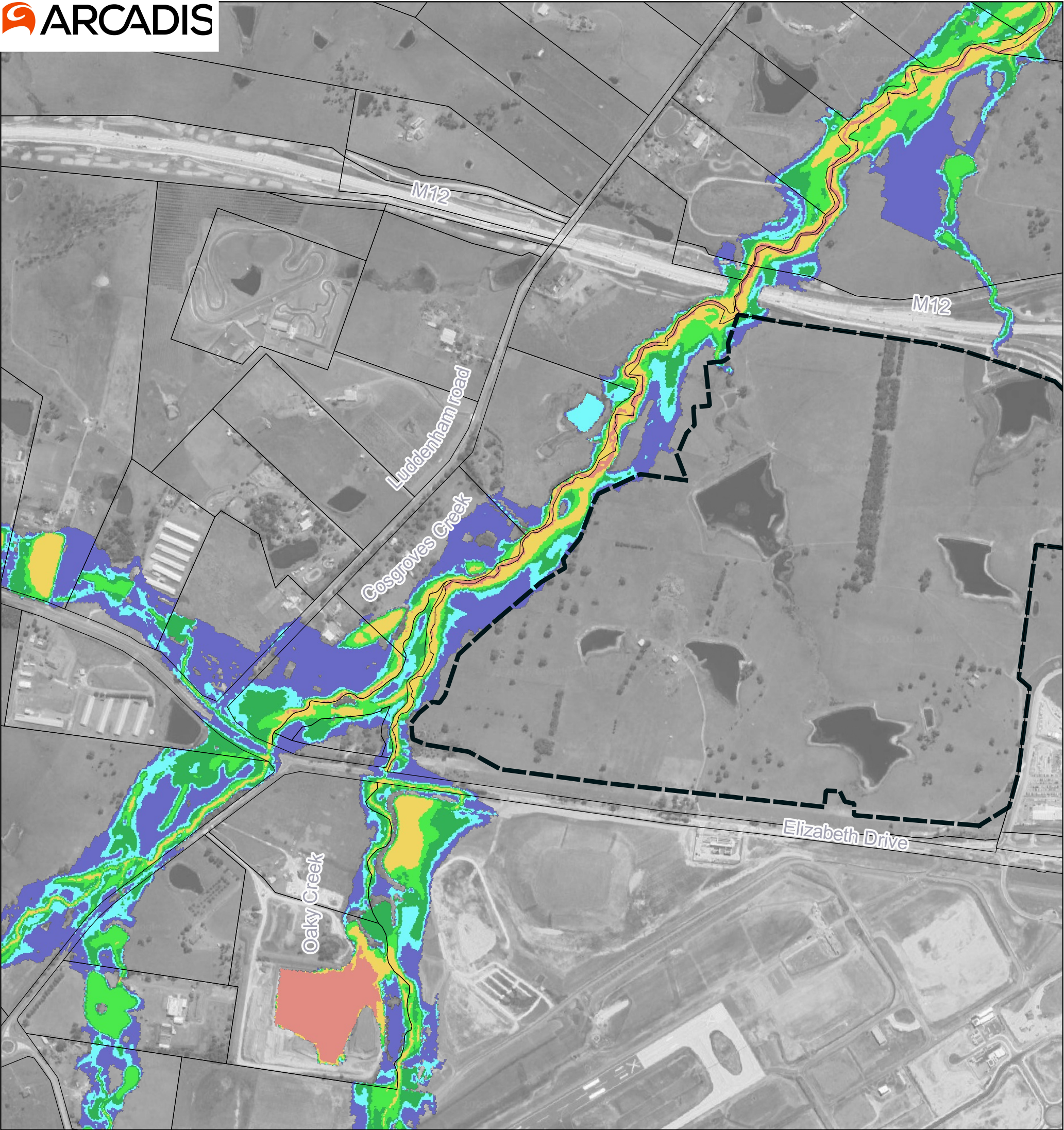
Map by: Sepideh Jafari



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31/5/2025 MGA 56



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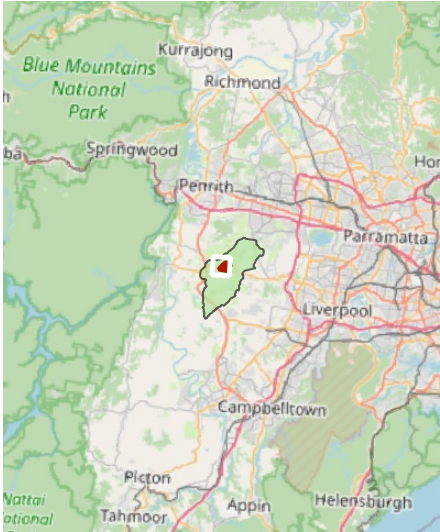
Development Extent



Lot

Peak Flood Hazard Categories

- Band 1
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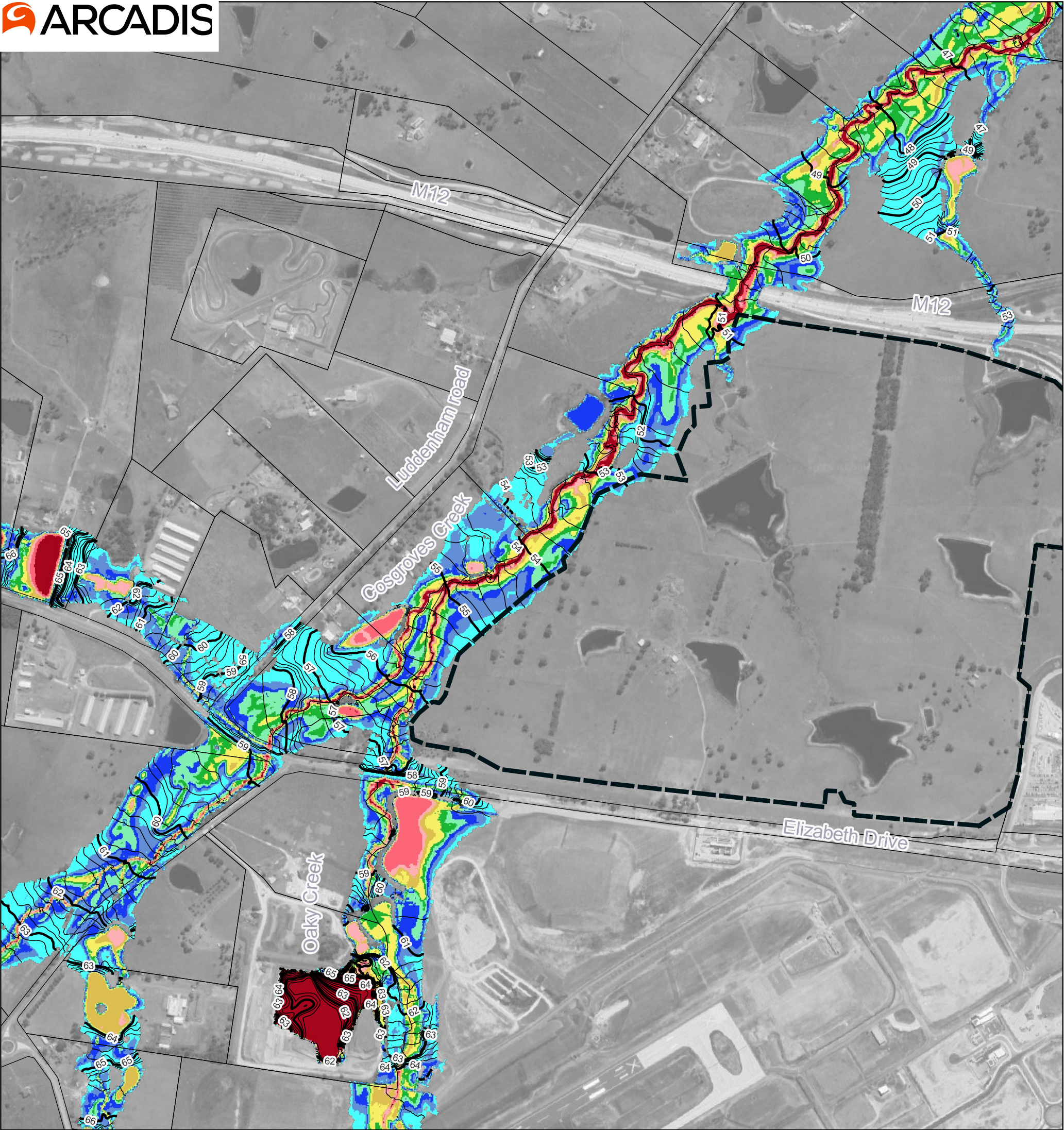


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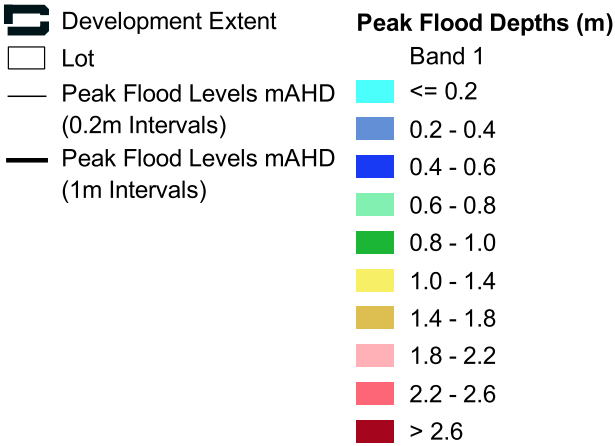


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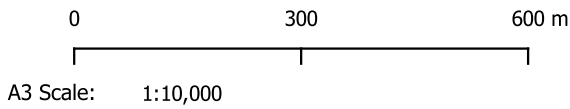
31/5/2025 MGA 56



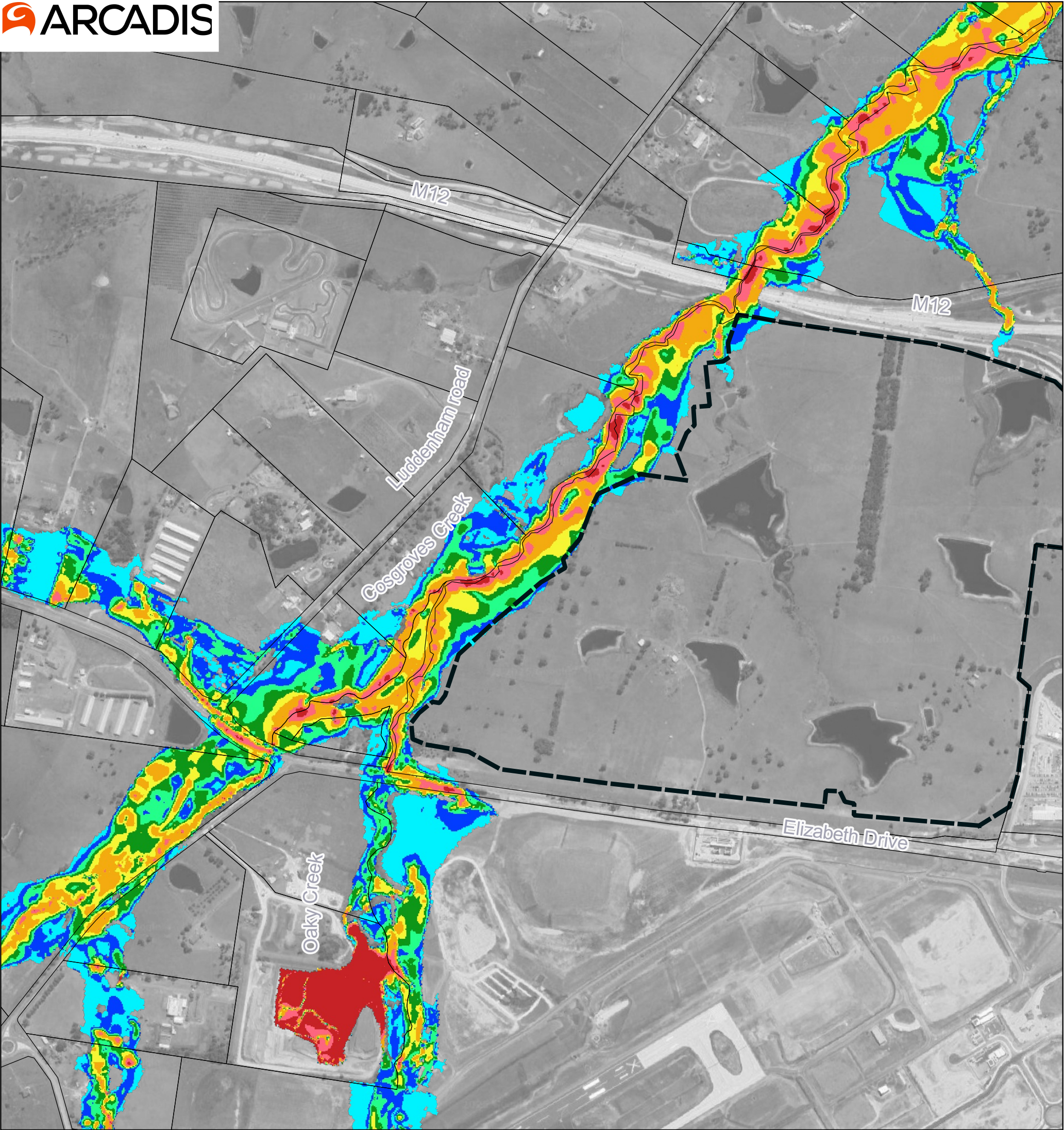
Map by: Sepideh Jafari



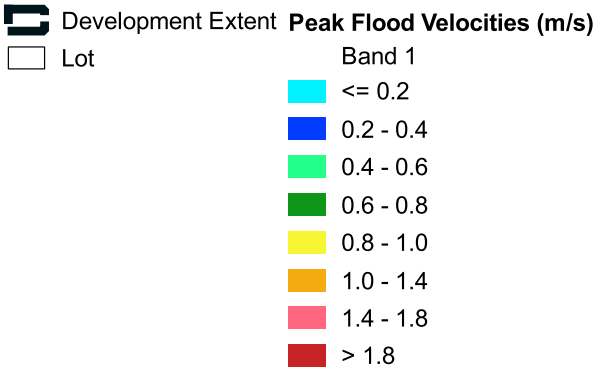
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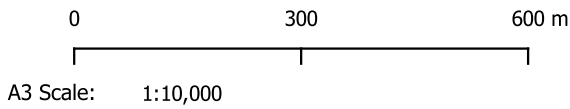
31/5/2025 MGA 56

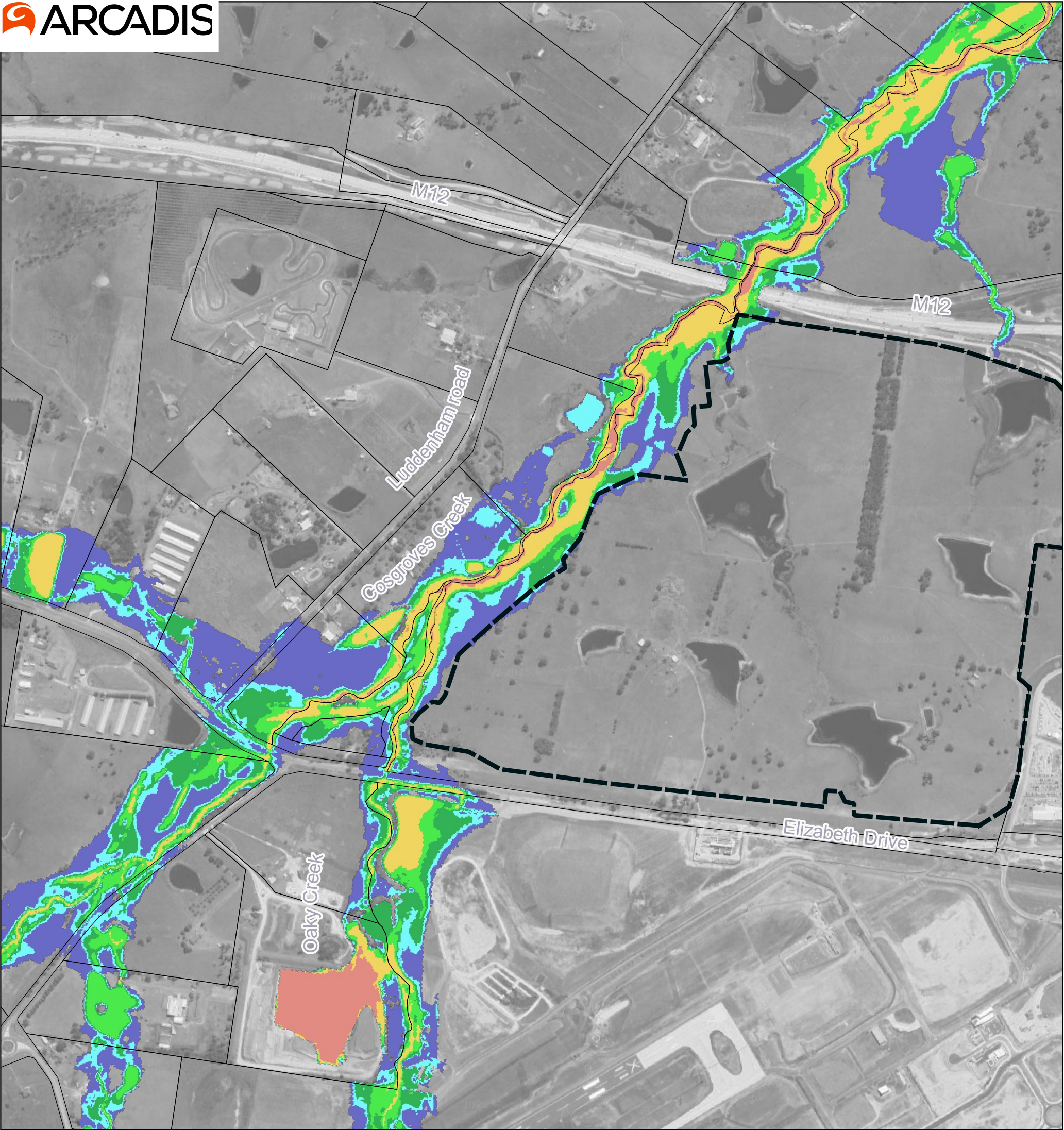


Map by: Sepideh Jafari



Notes:





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Development Extent

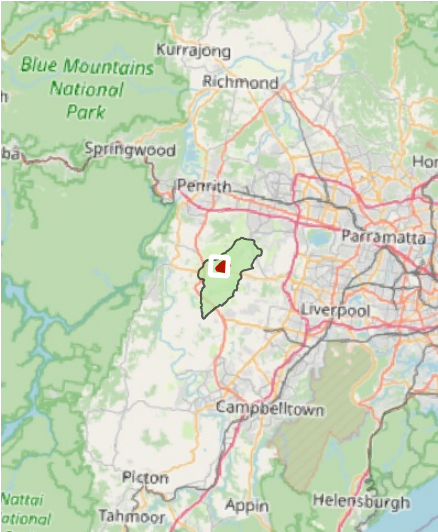


Lot

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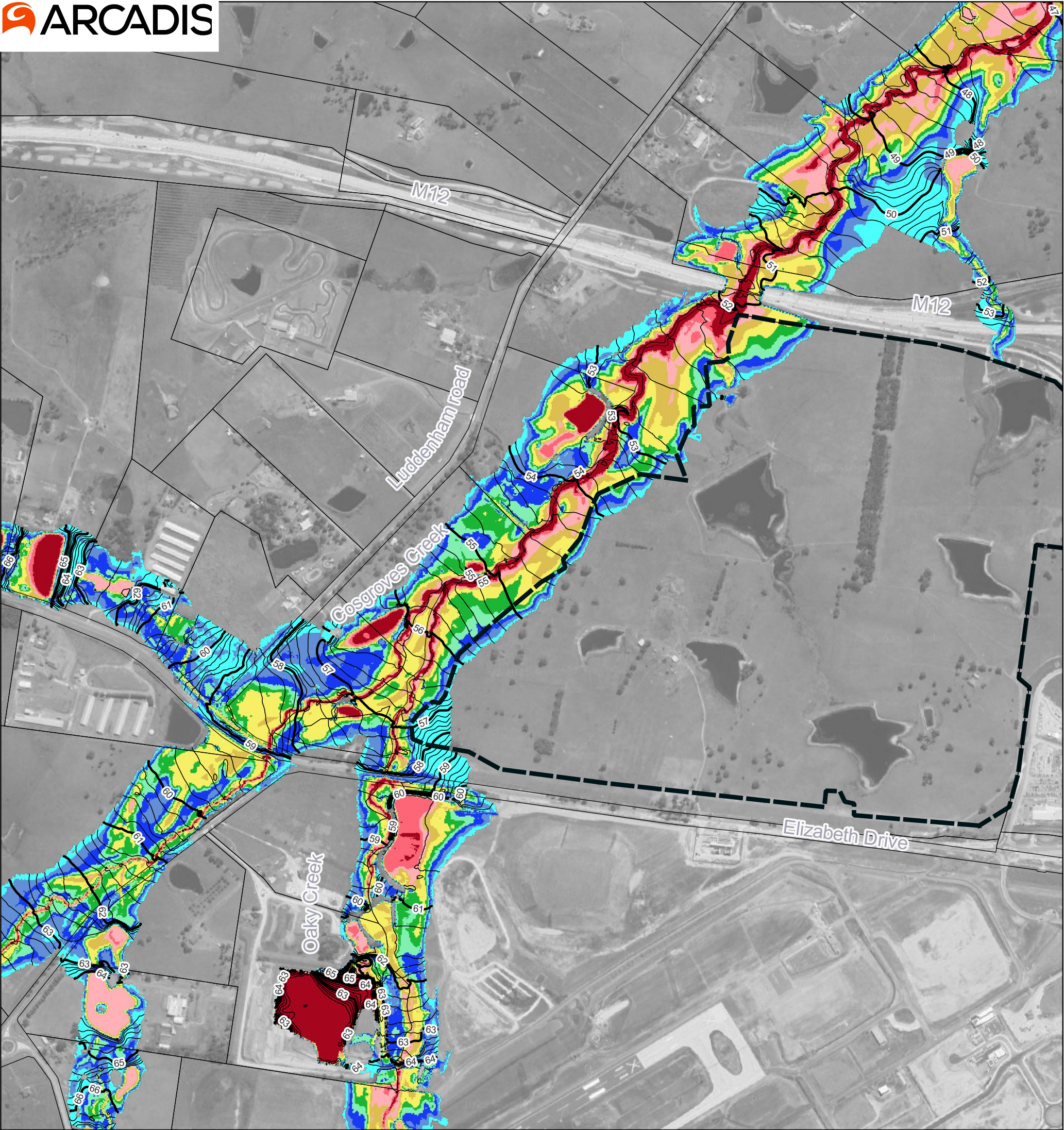
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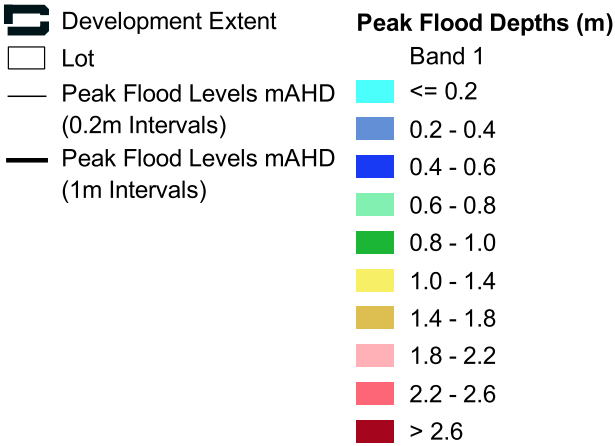
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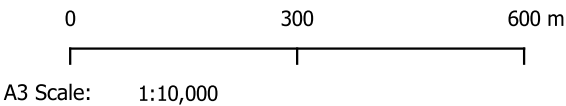
31/5/2025 MGA 56

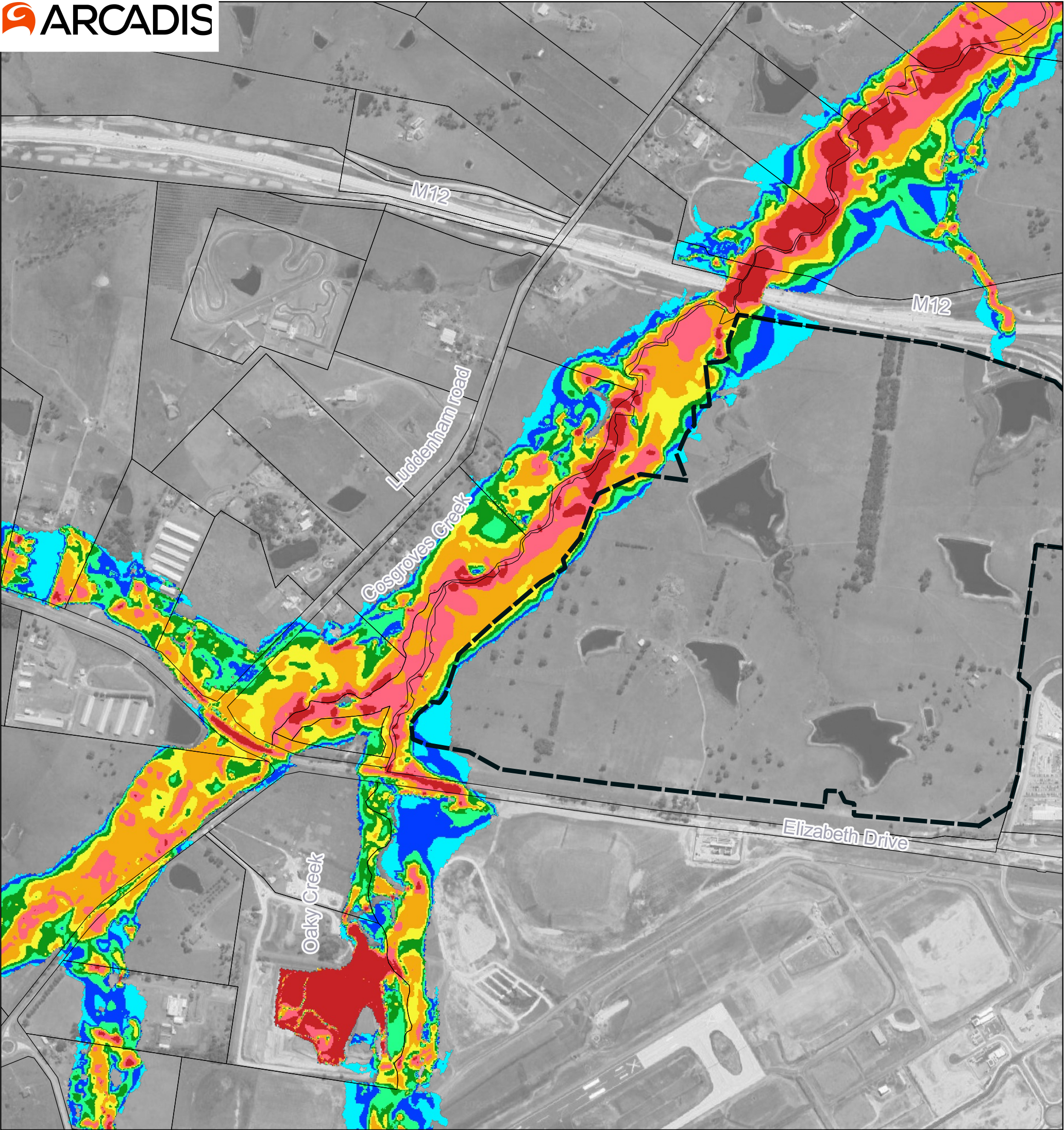


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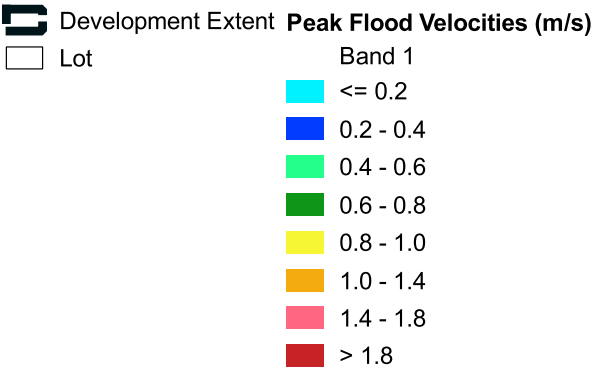


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Map by: Sepideh Jafari



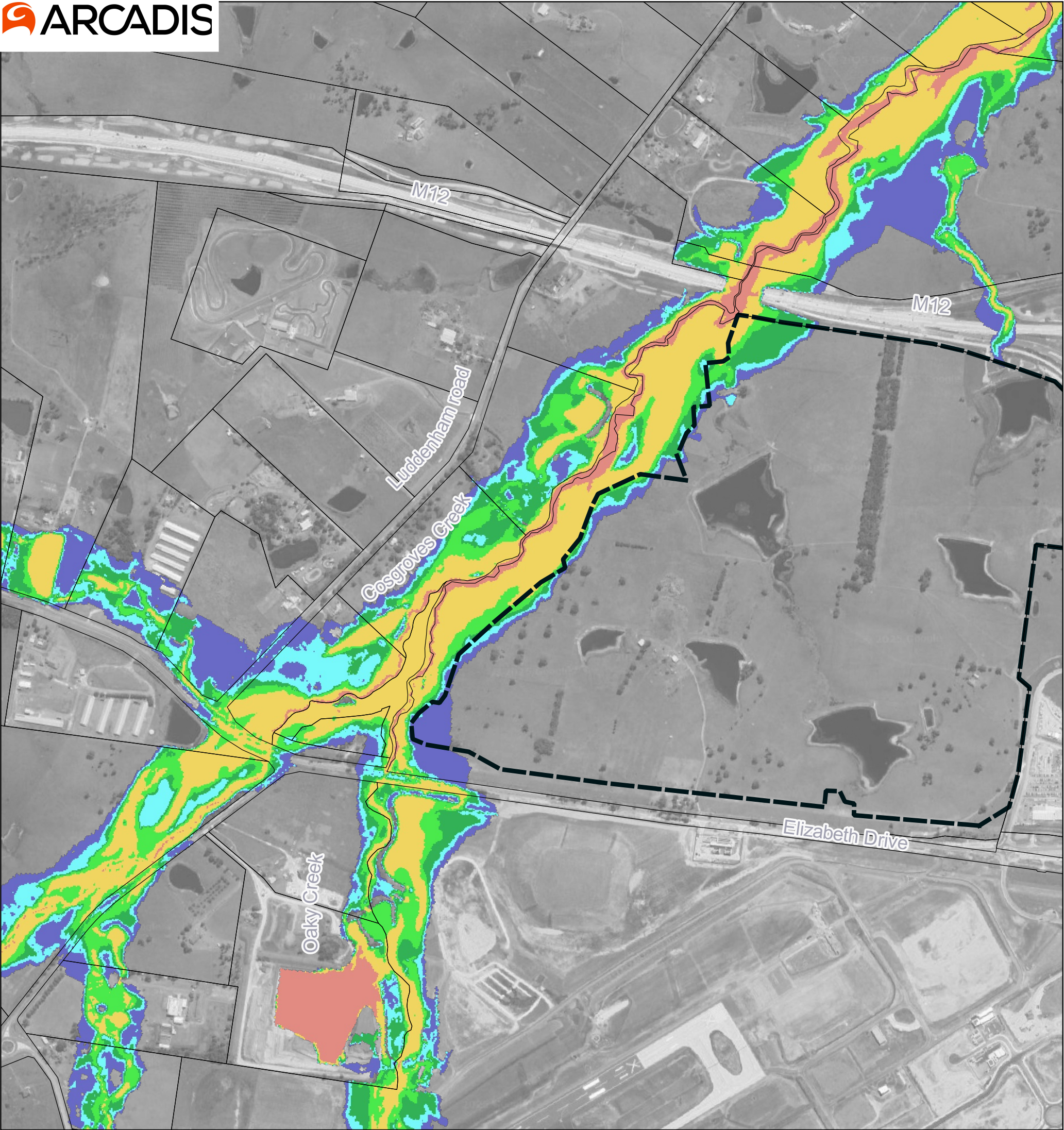
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31/5/2025 MGA 56

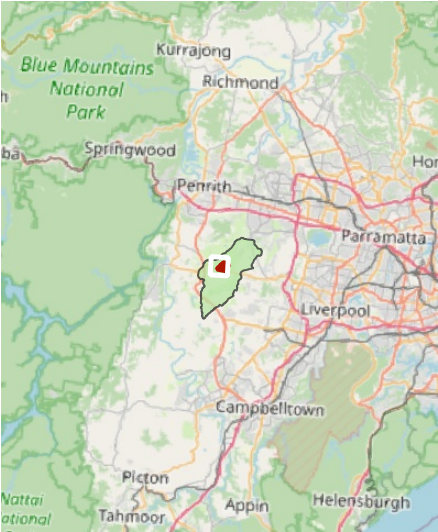


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Development Extent
Lot

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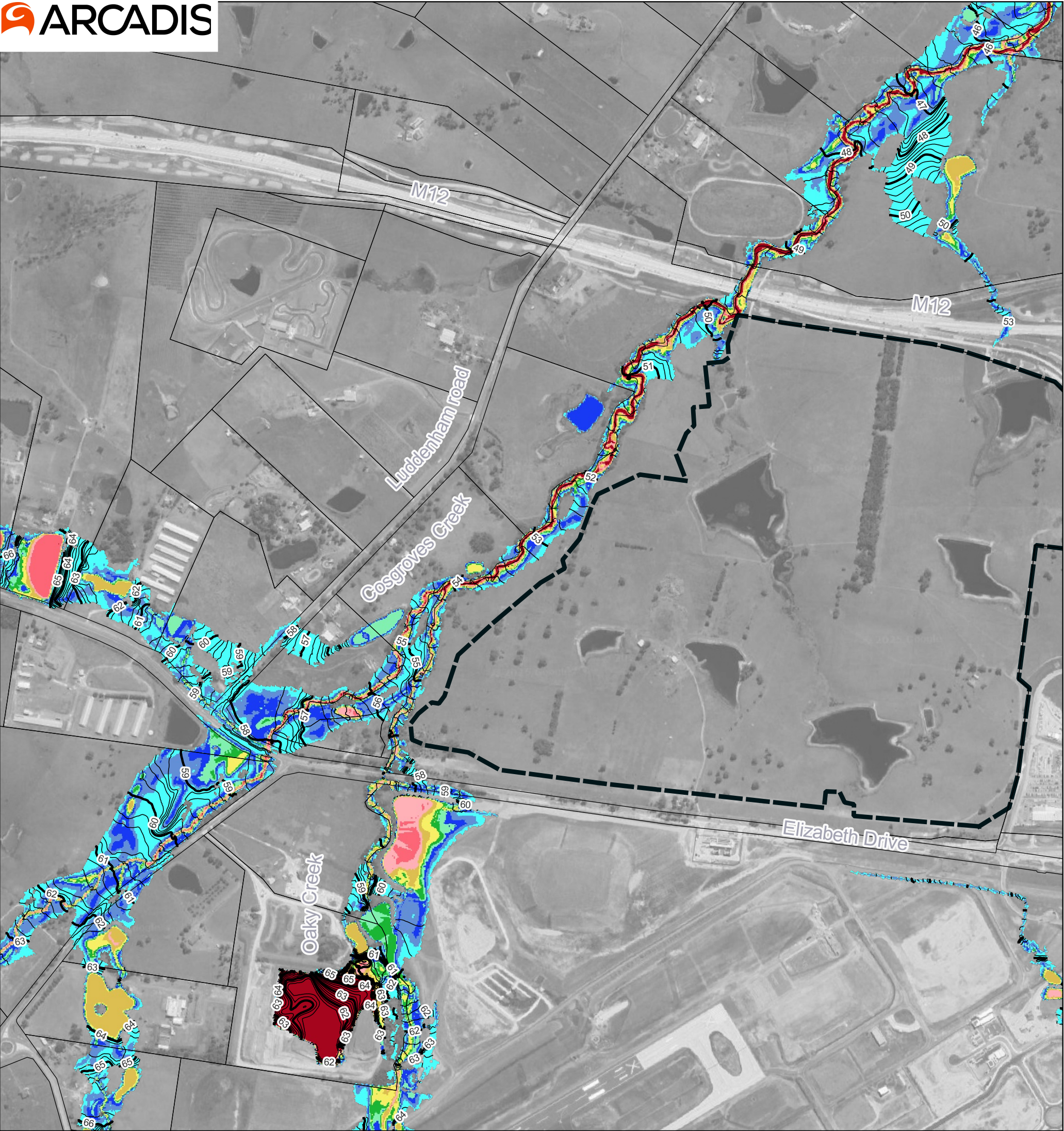


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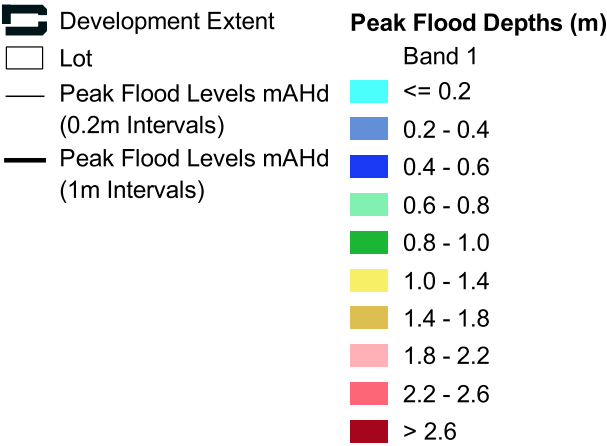


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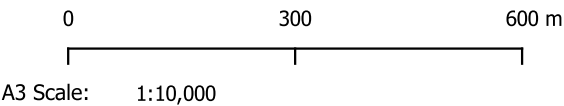
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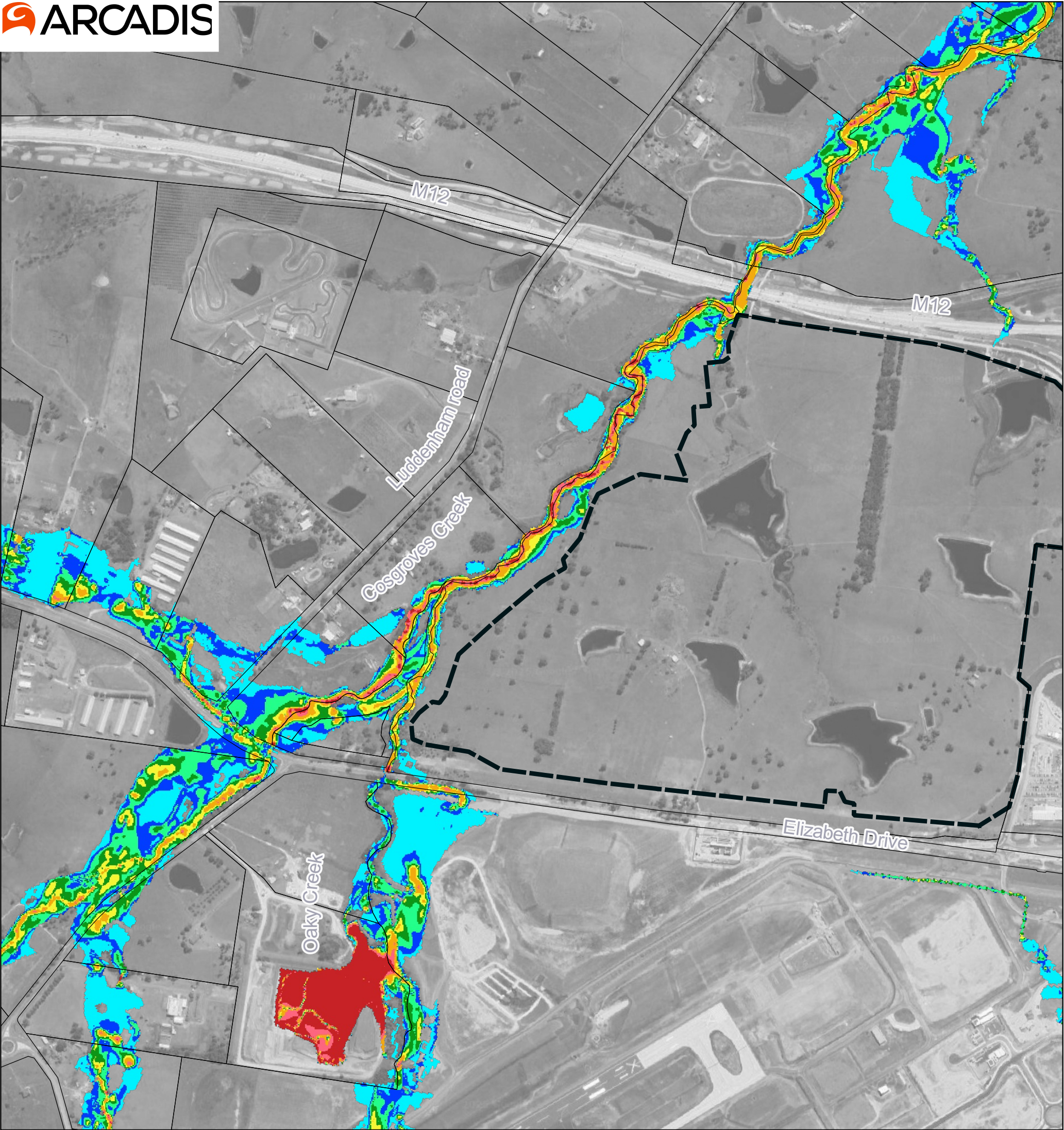


Map by: Sepideh Jafari

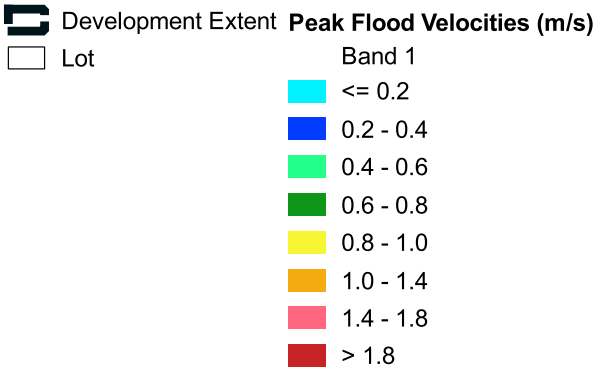


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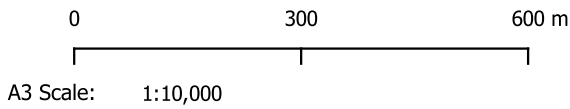


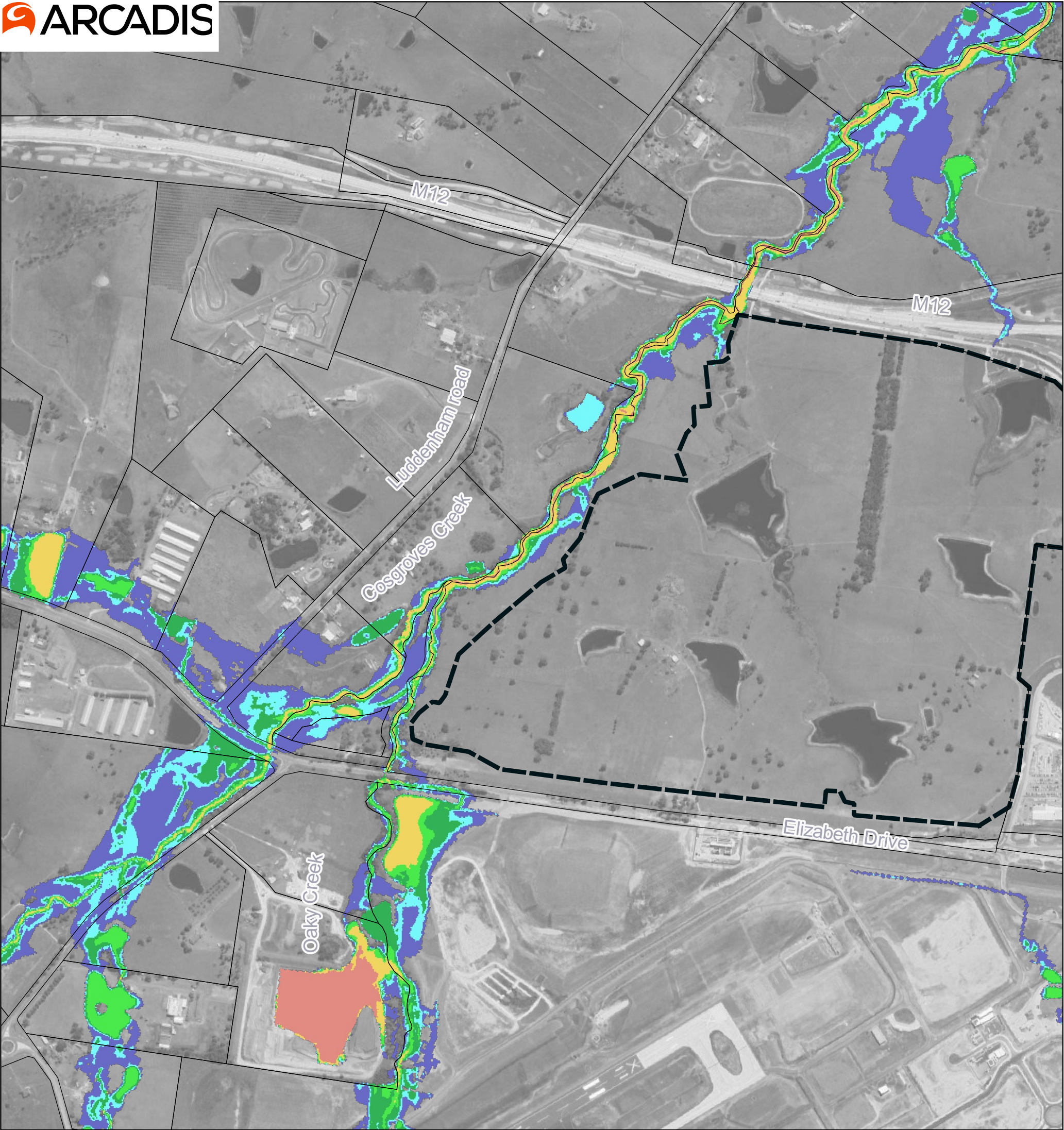


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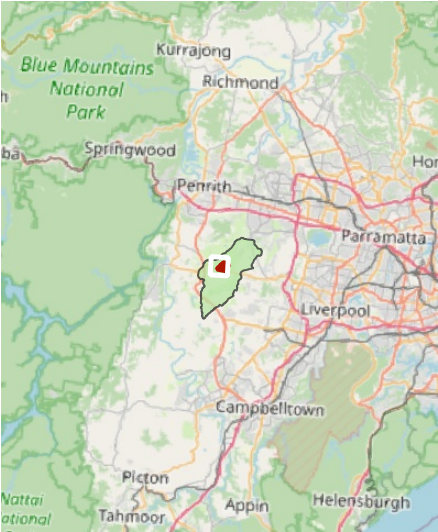


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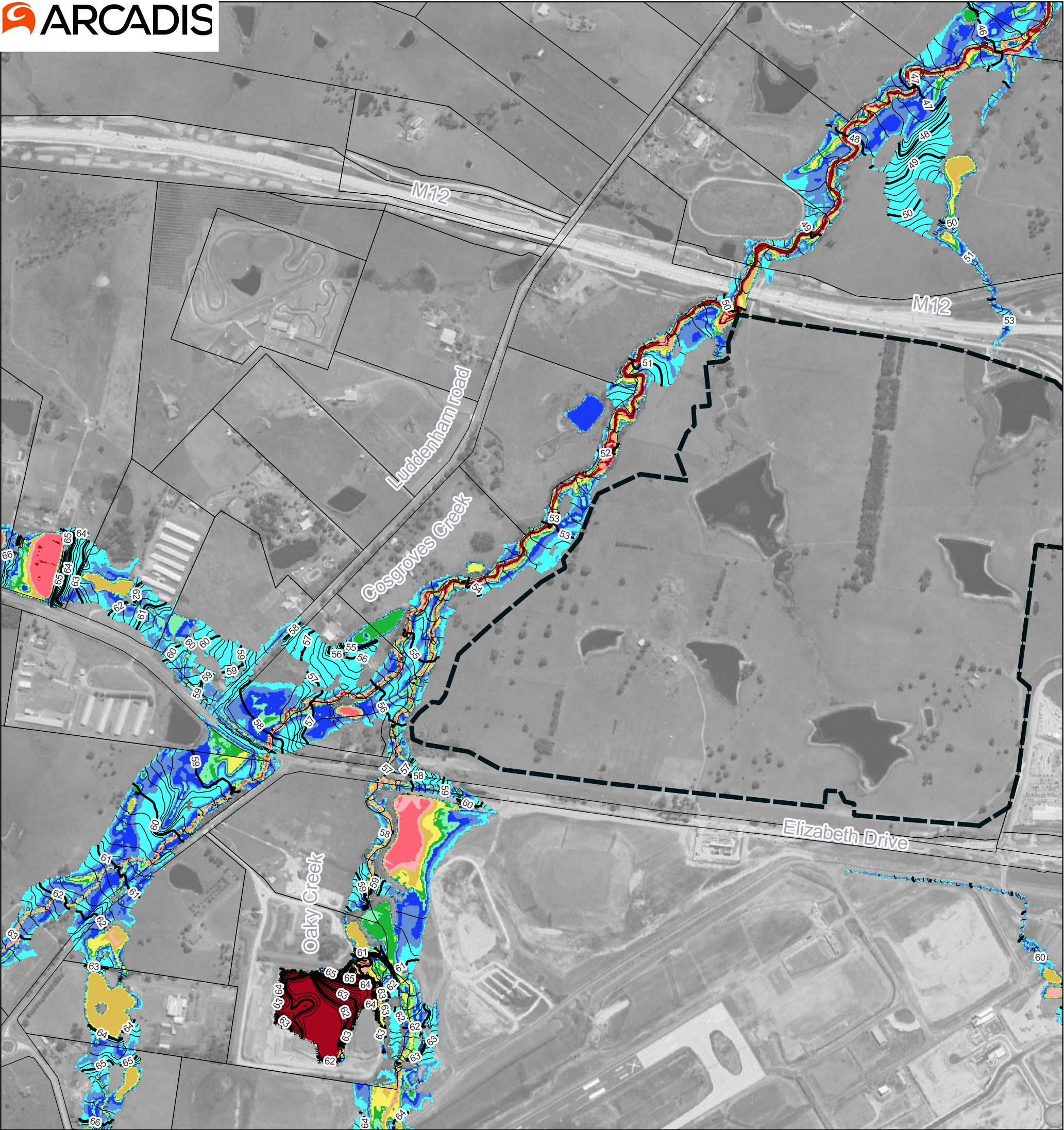


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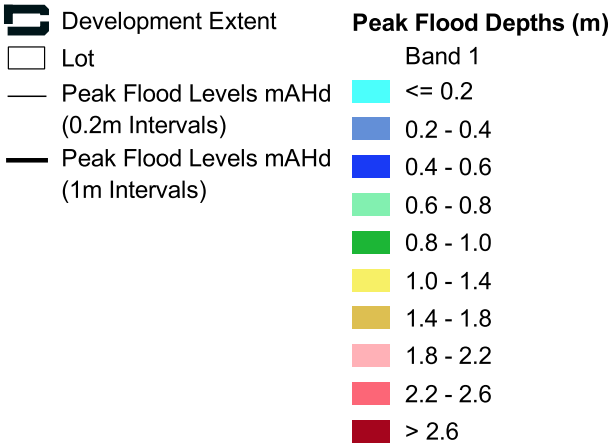


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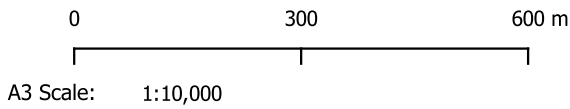
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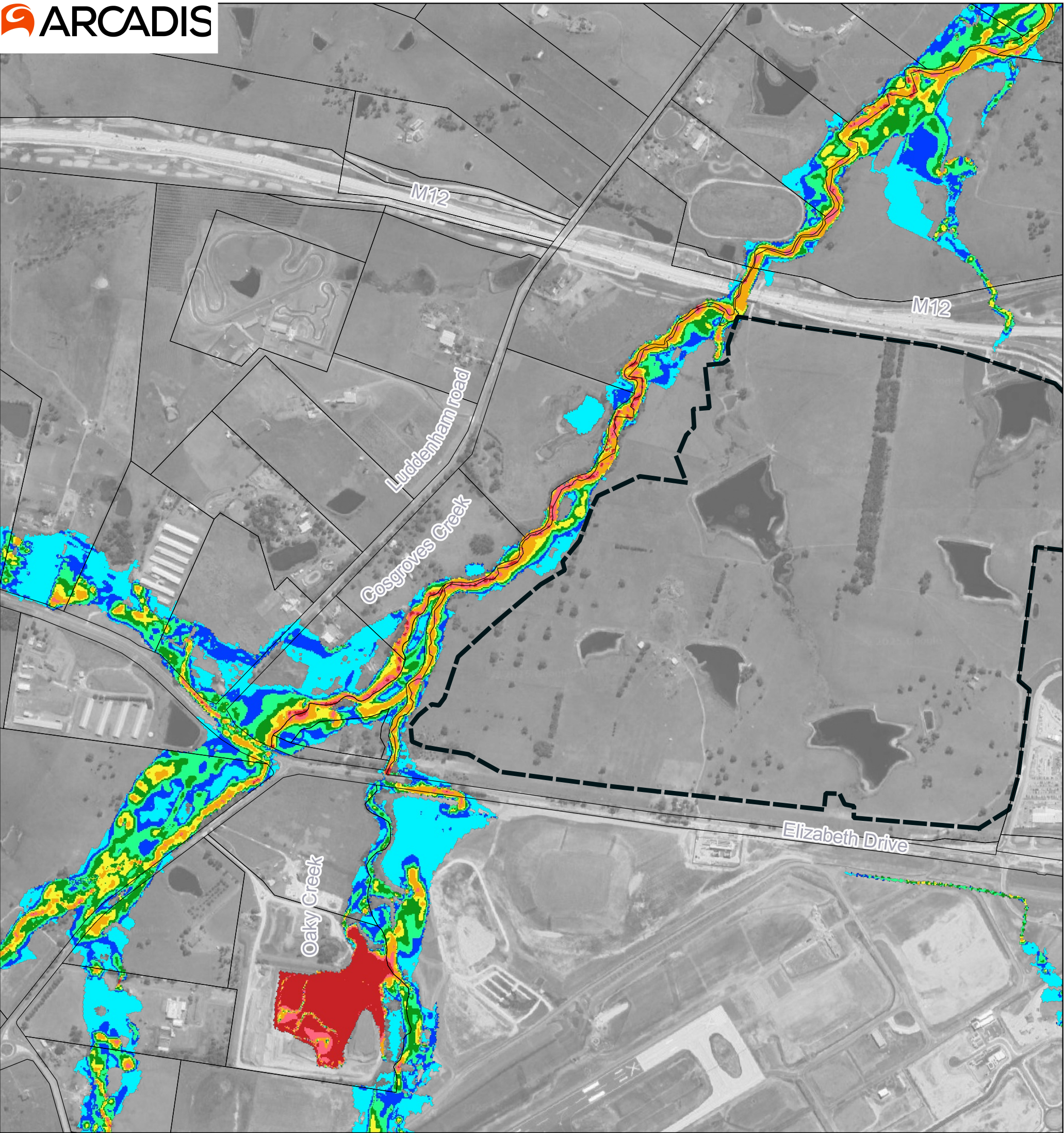


Map by: Sepideh Jafari

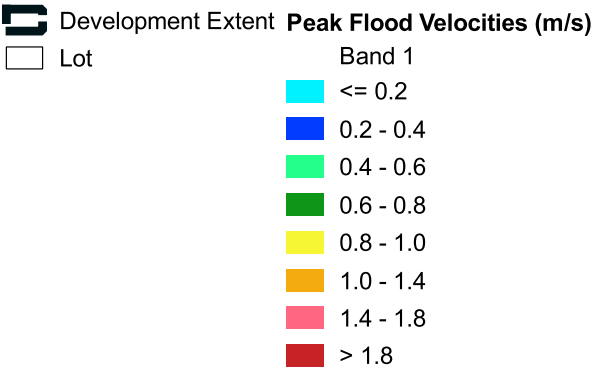


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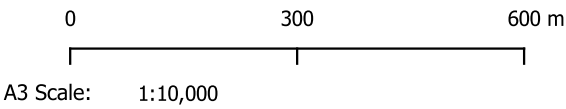


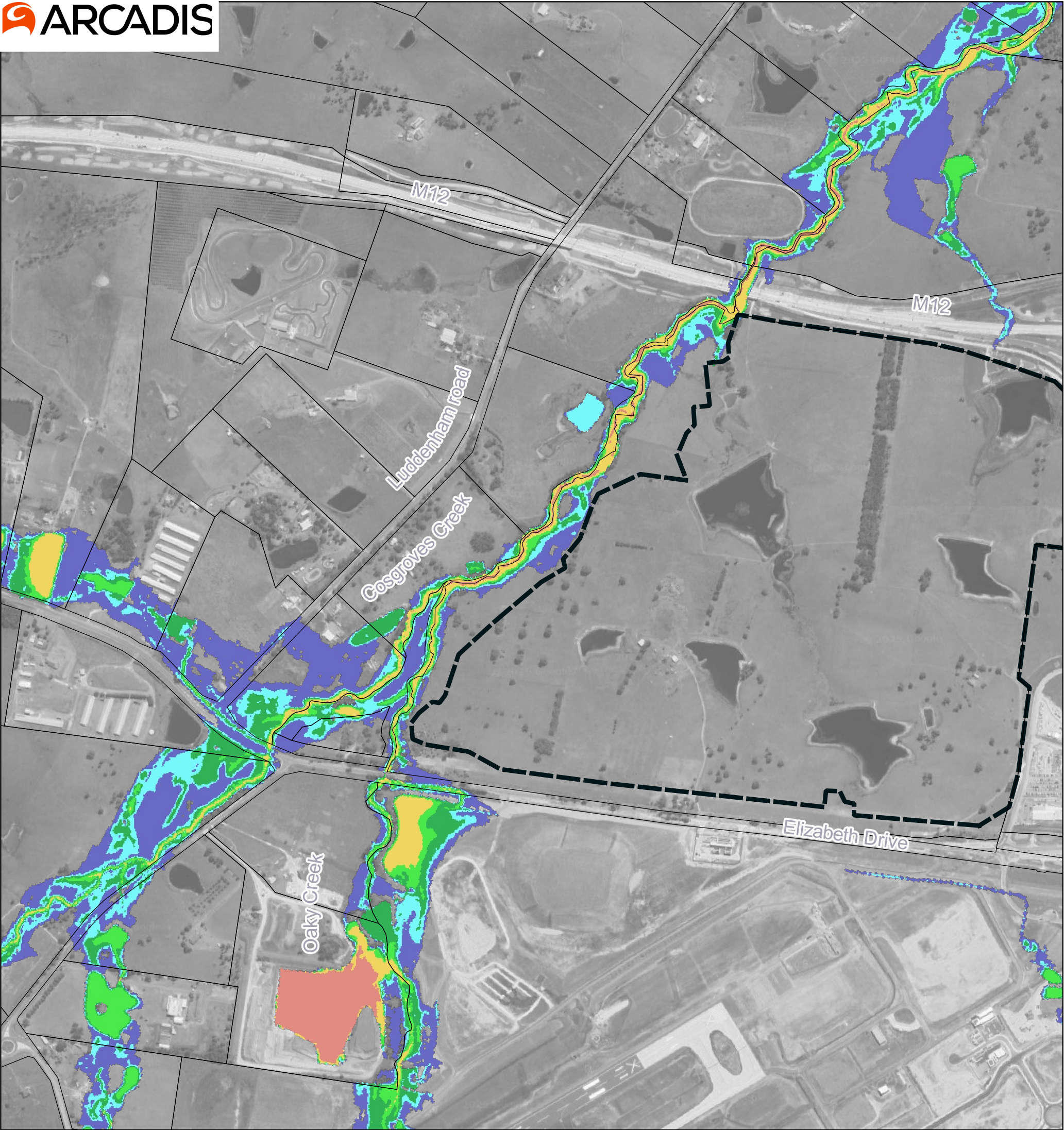


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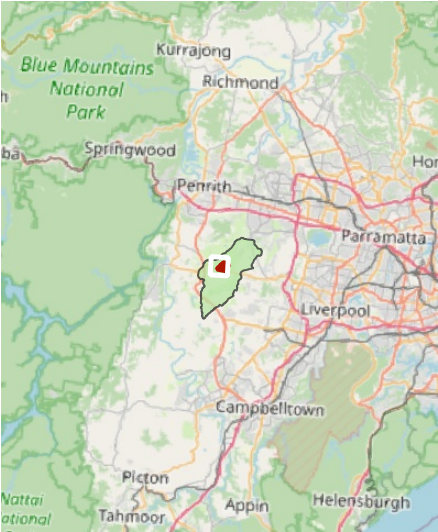


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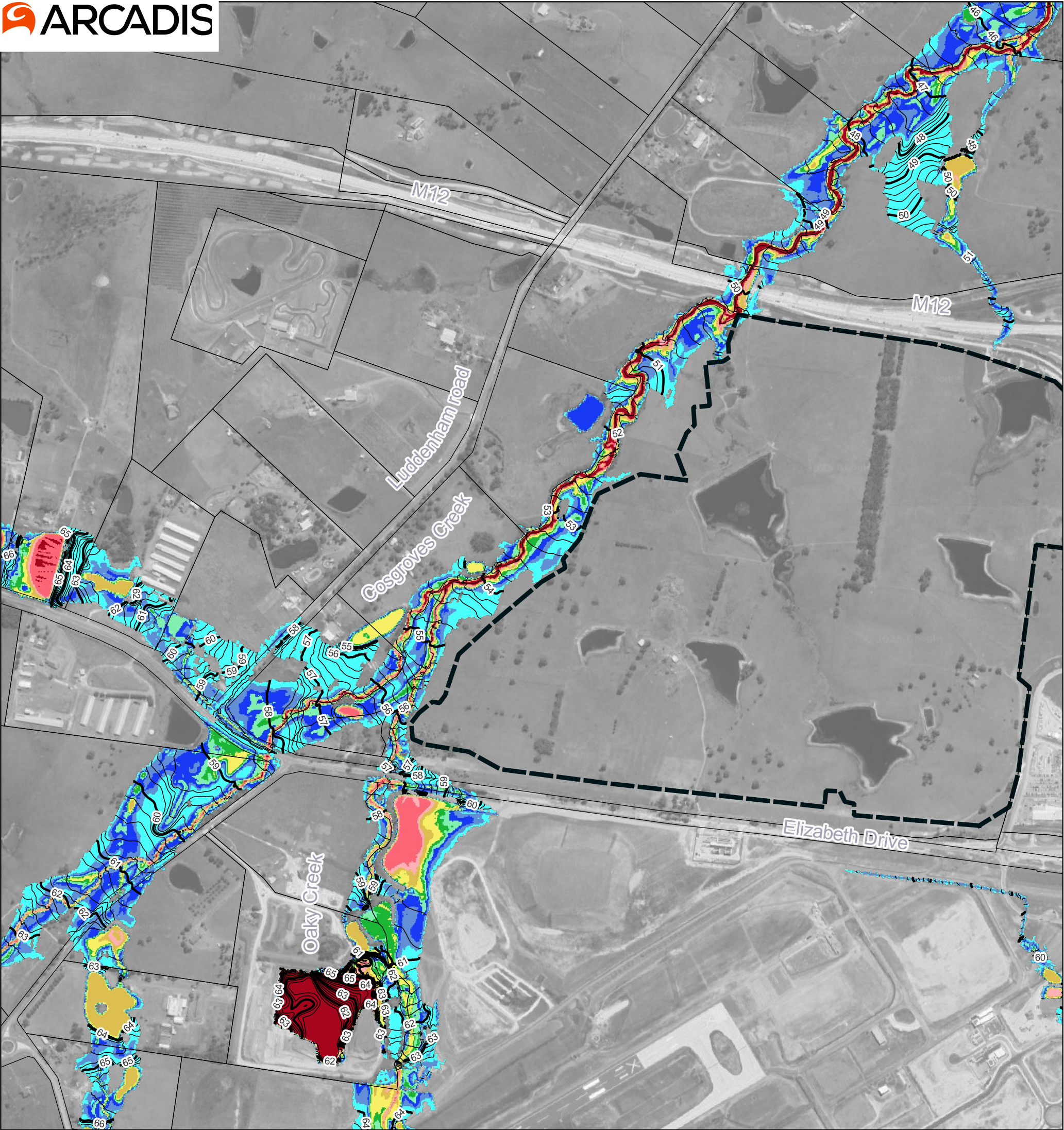


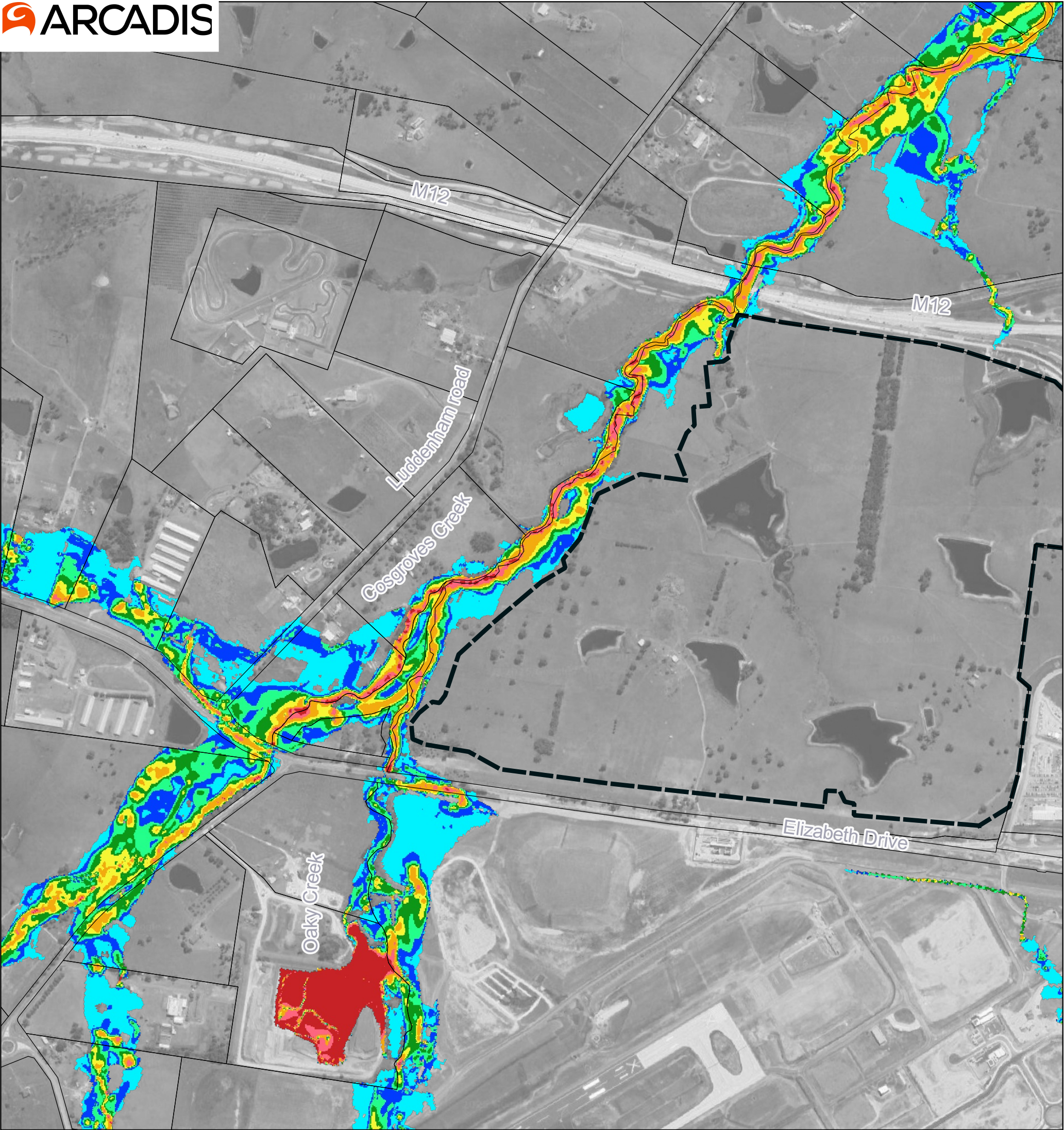
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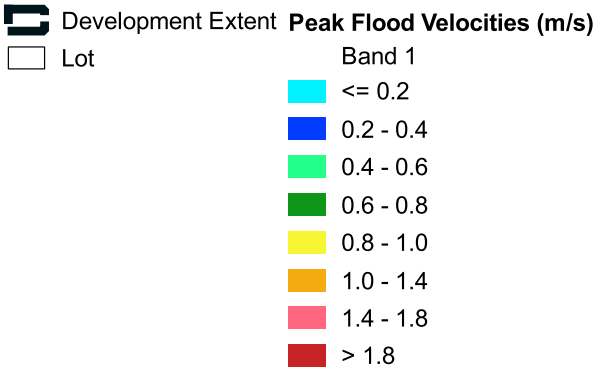
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31/5/2025 MGA 56

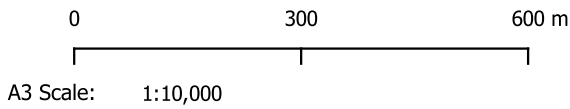




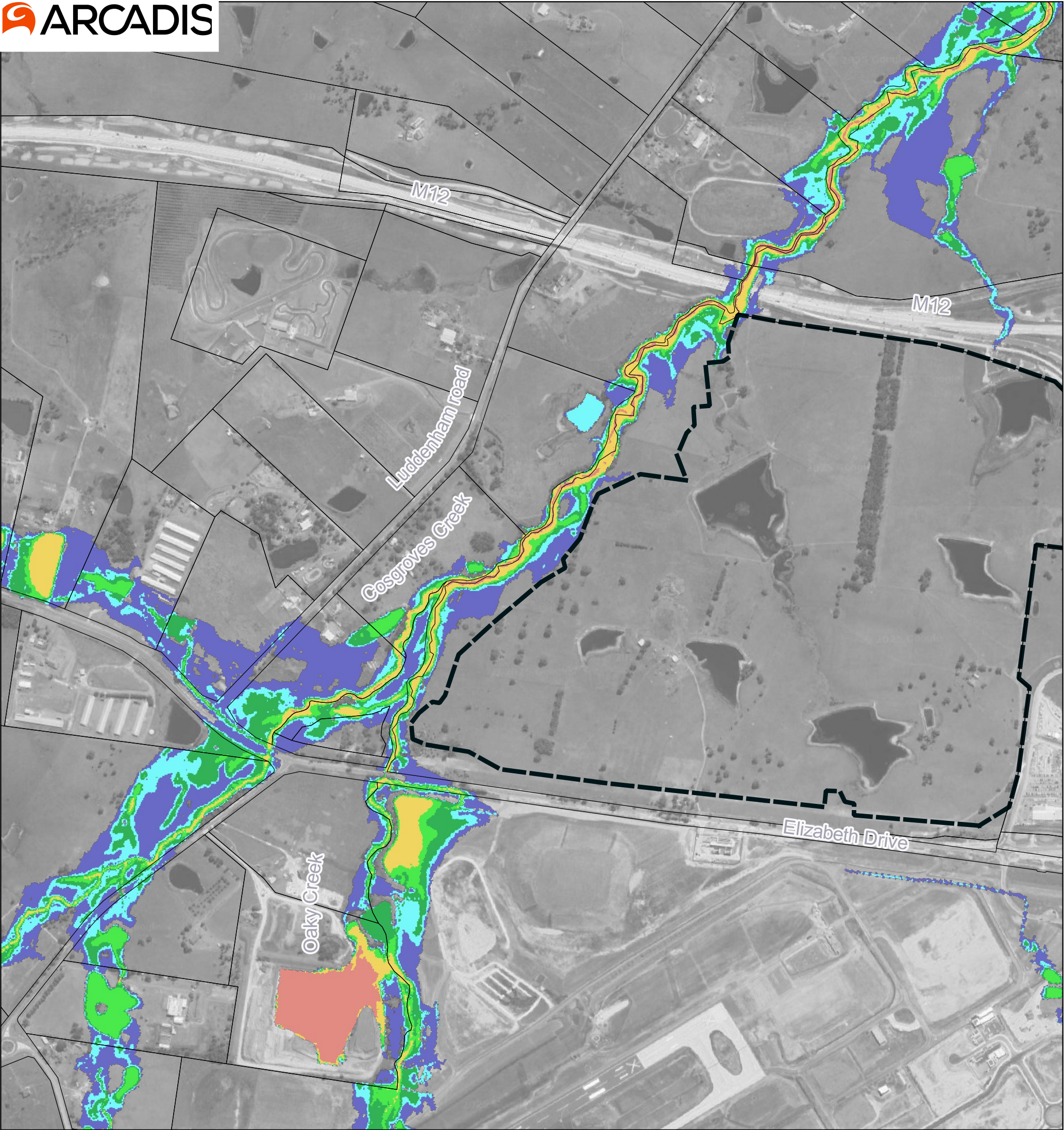
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Notes:



31/5/2025 MGA 56



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Development Extent

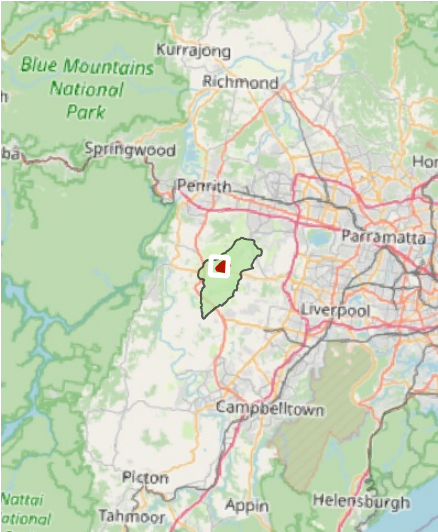


Lot

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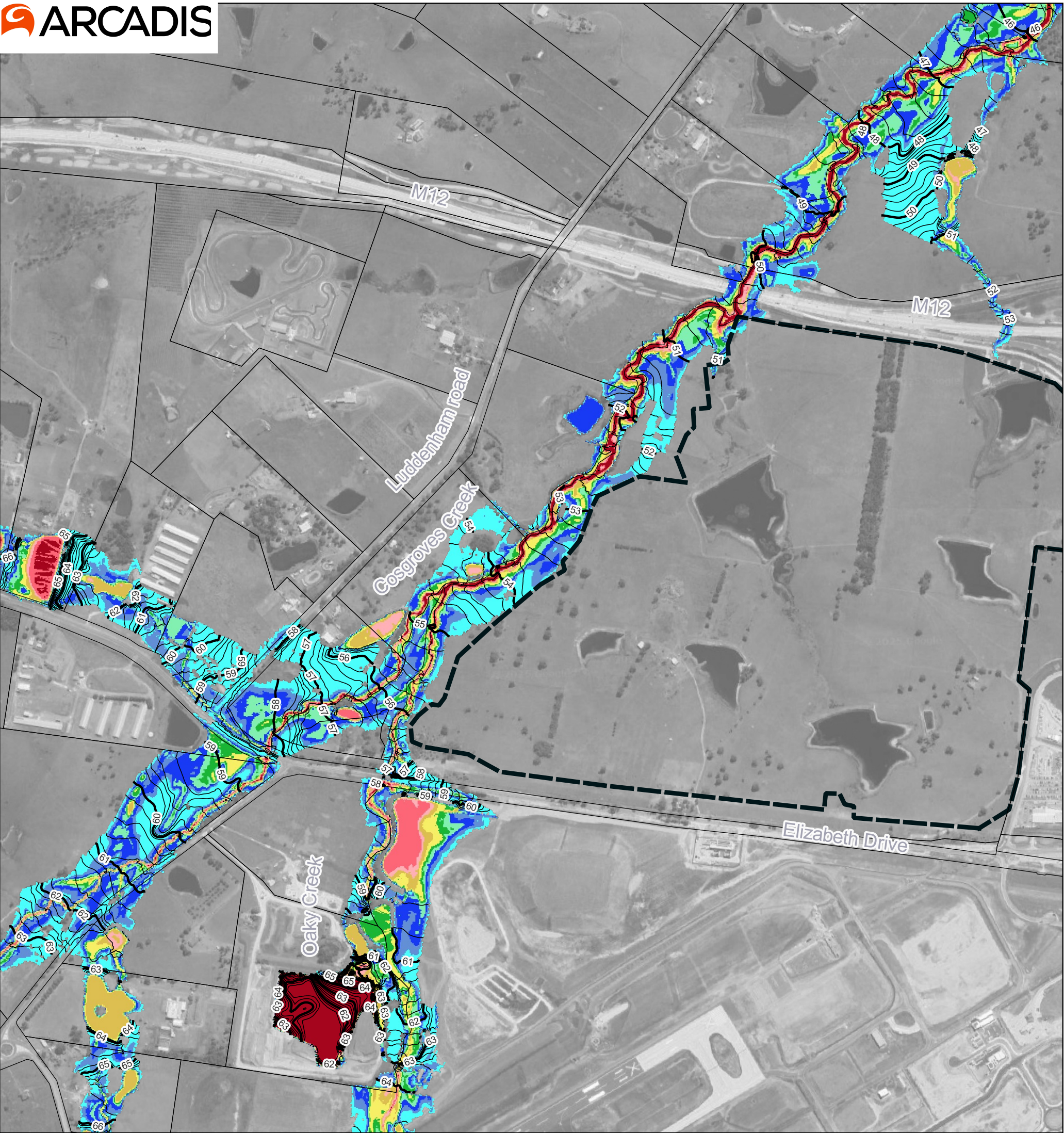
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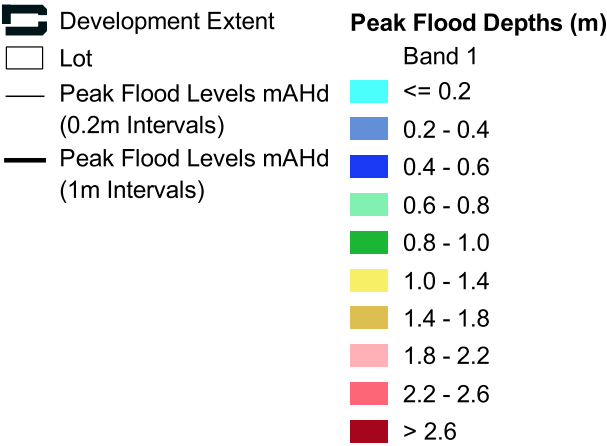
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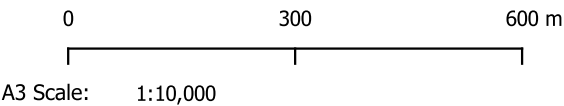
31/5/2025 MGA 56

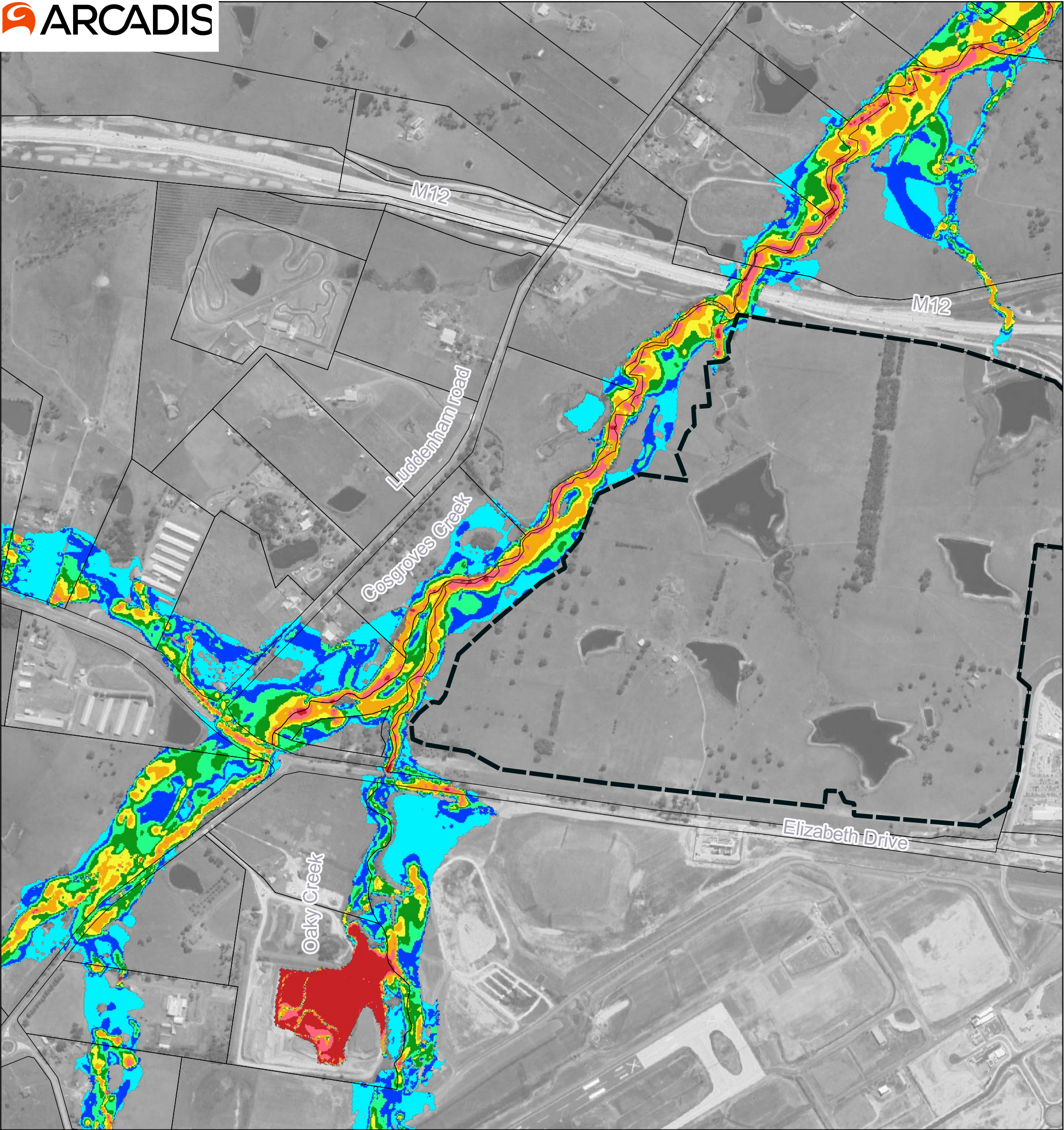


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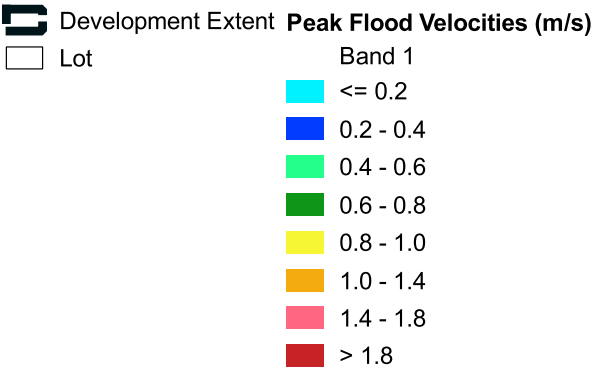


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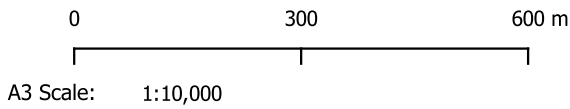




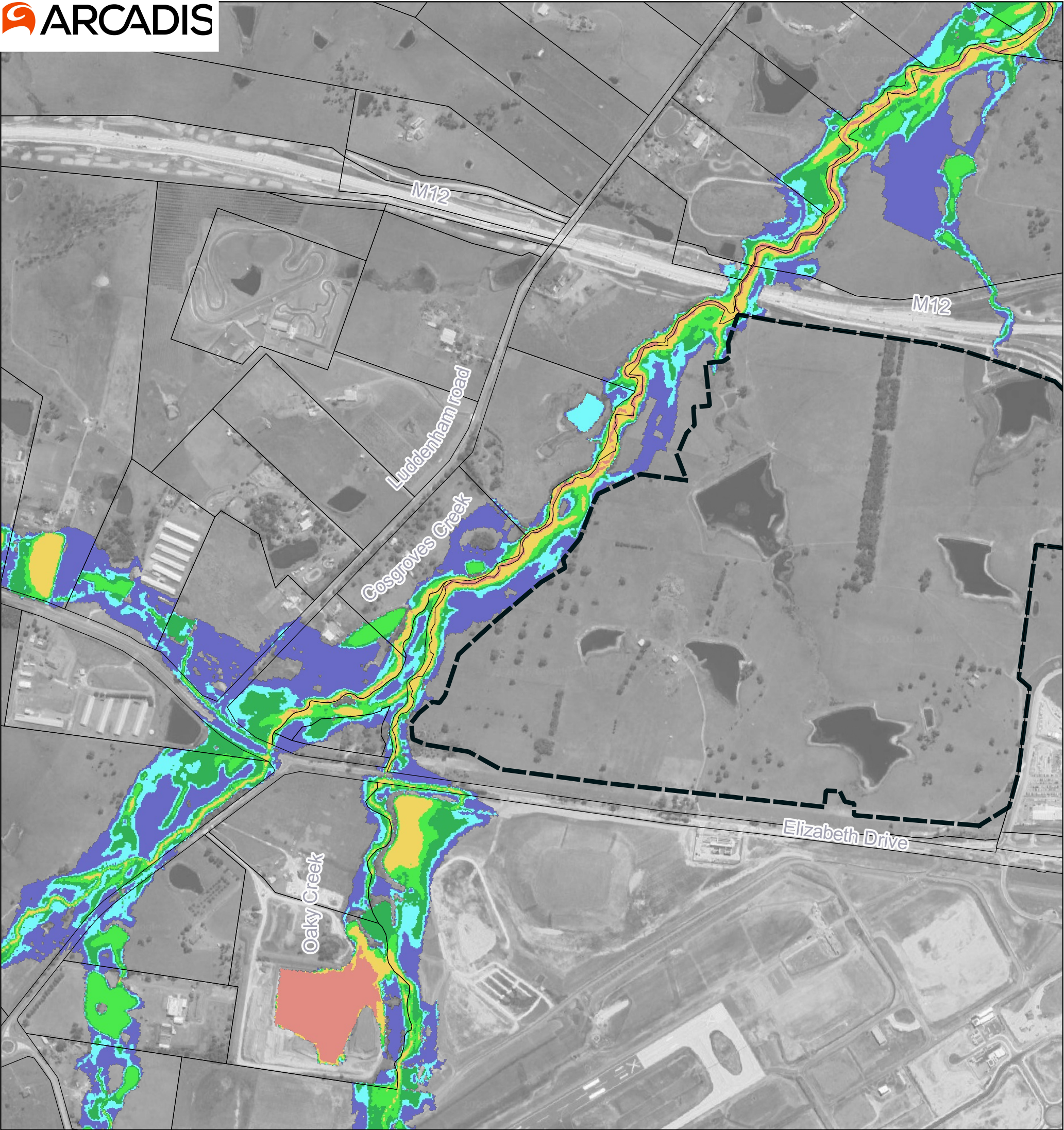
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Notes:



31/5/2025 MGA 56



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Development Extent

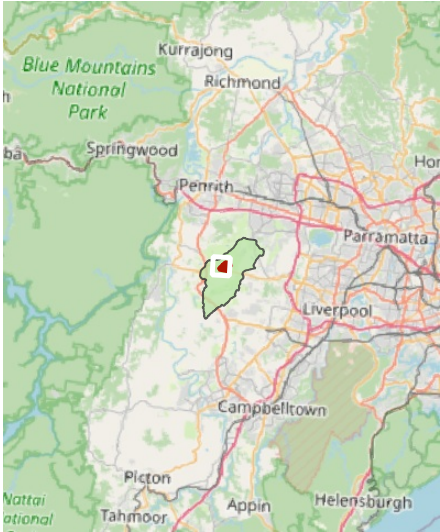


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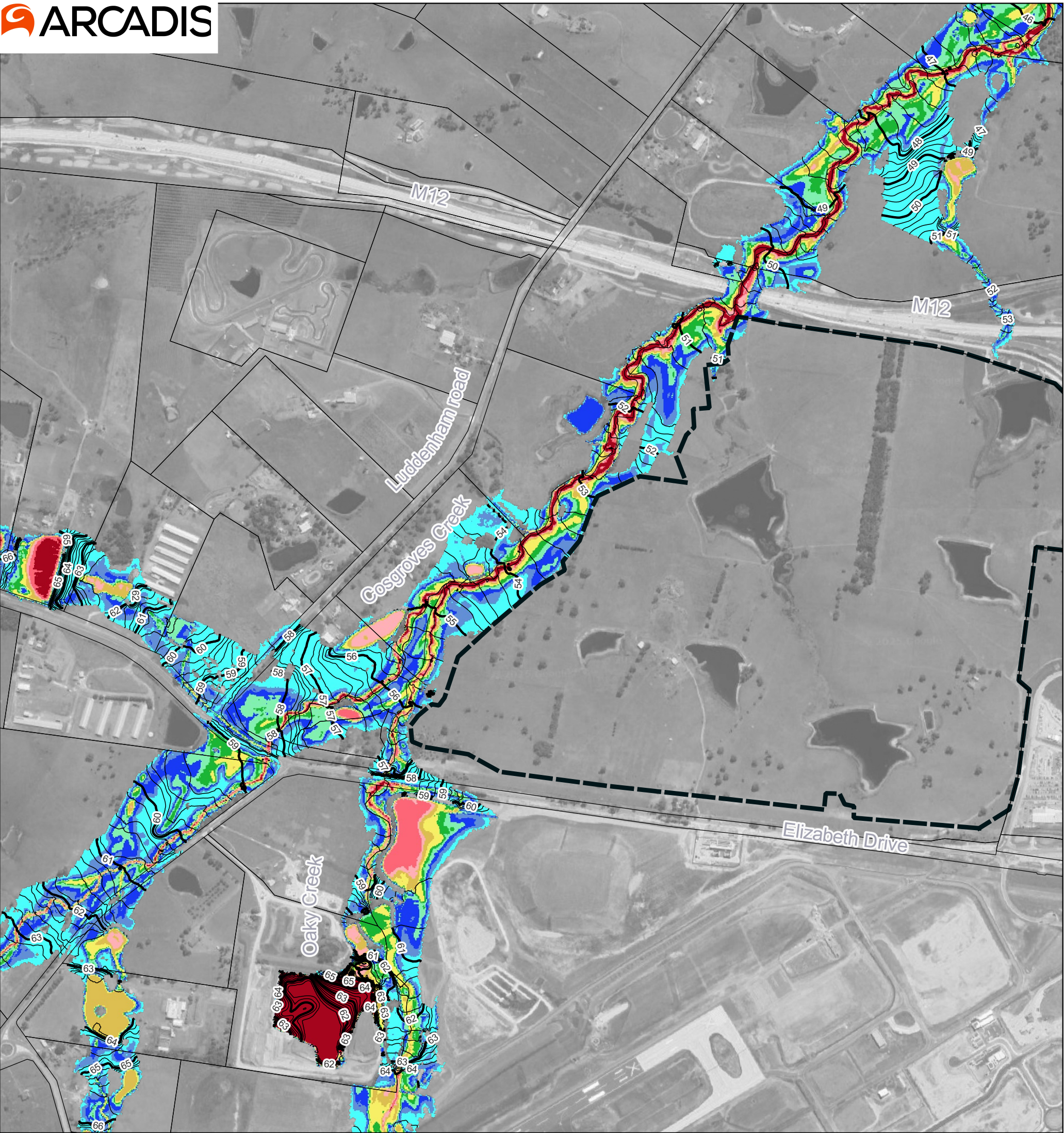
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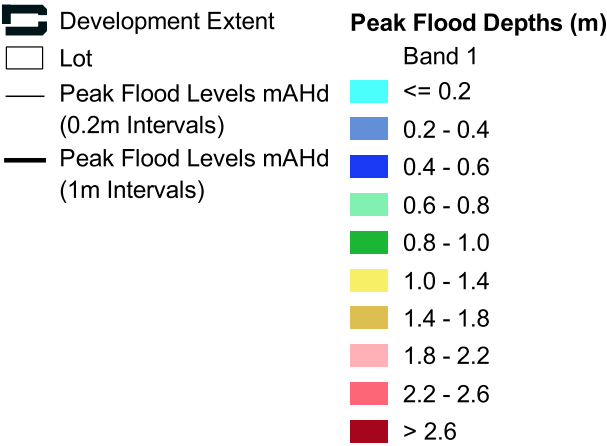
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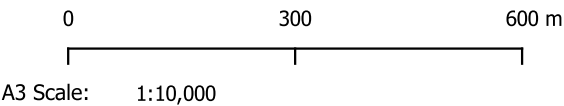
31/5/2025 MGA 56

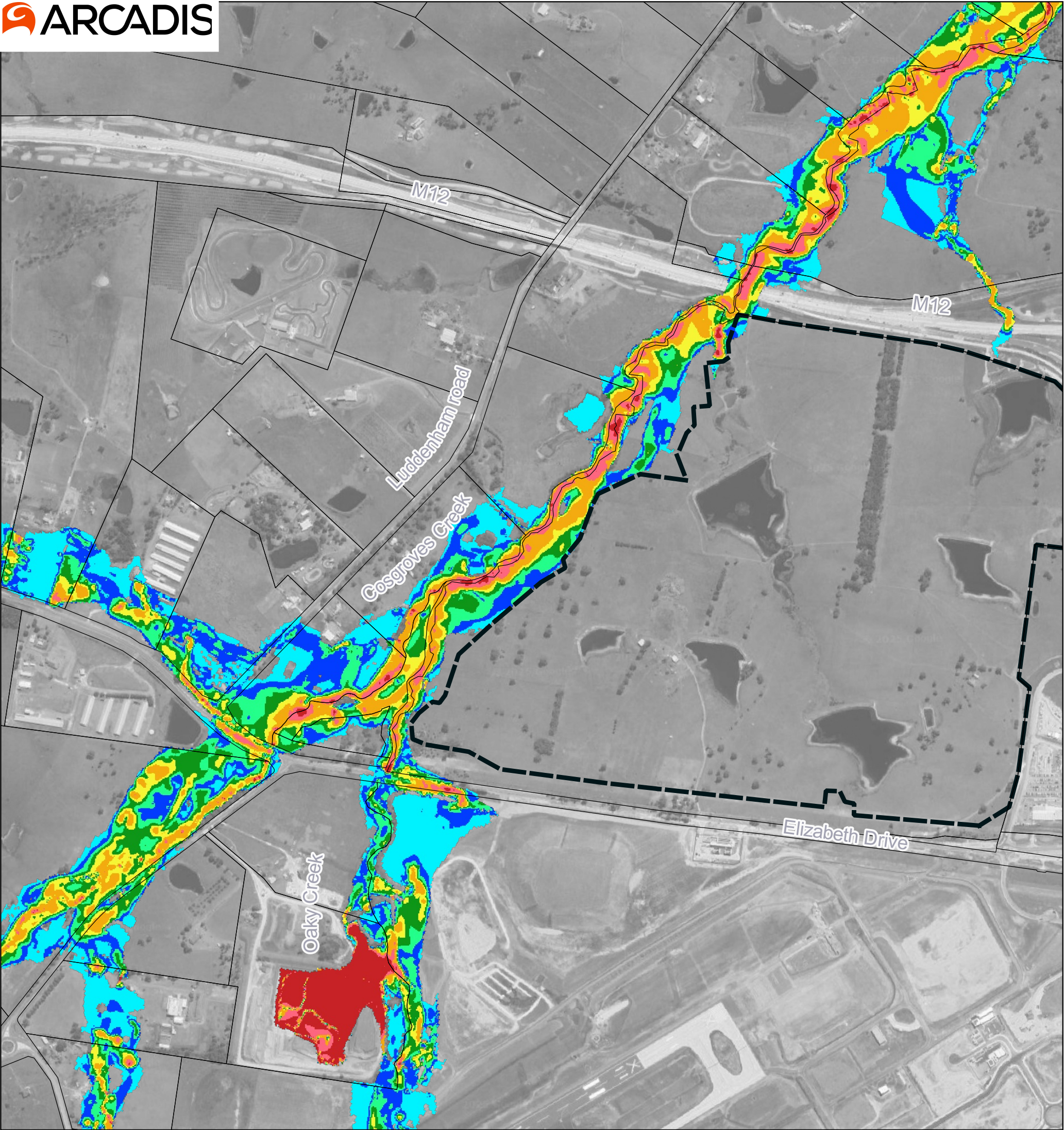


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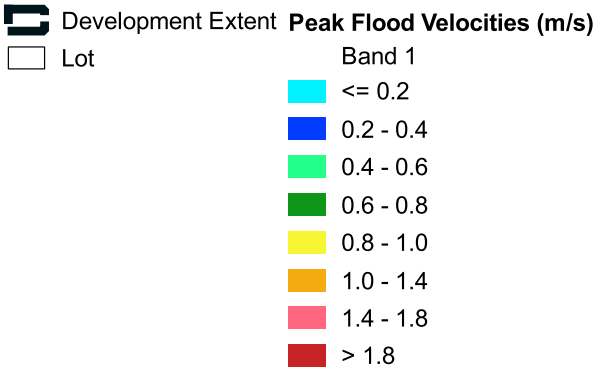


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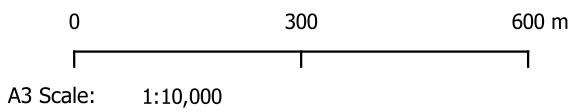




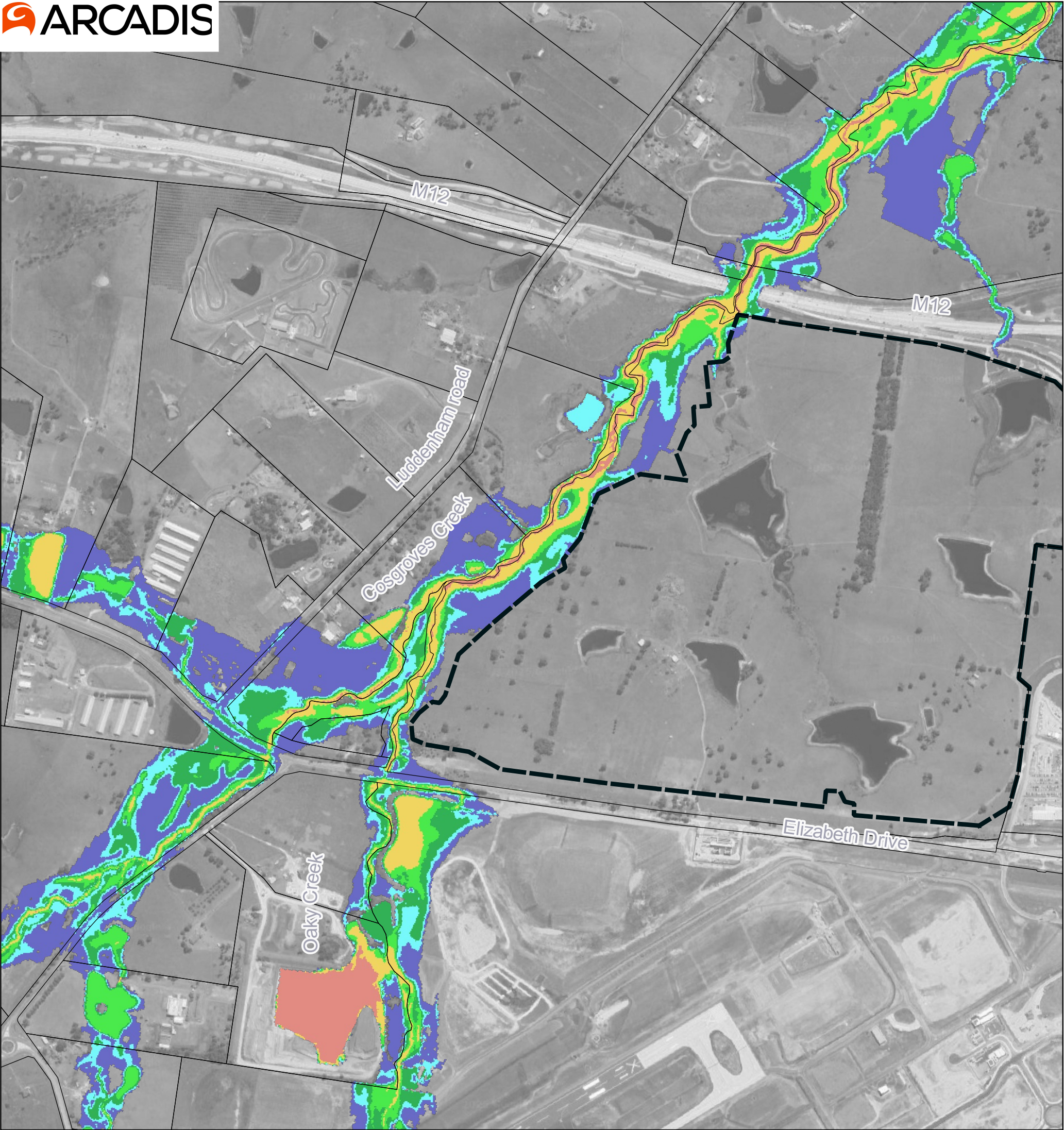
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31/5/2025 MGA 56



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Development Extent

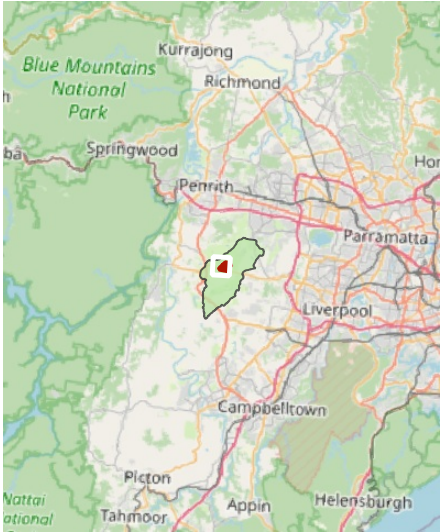


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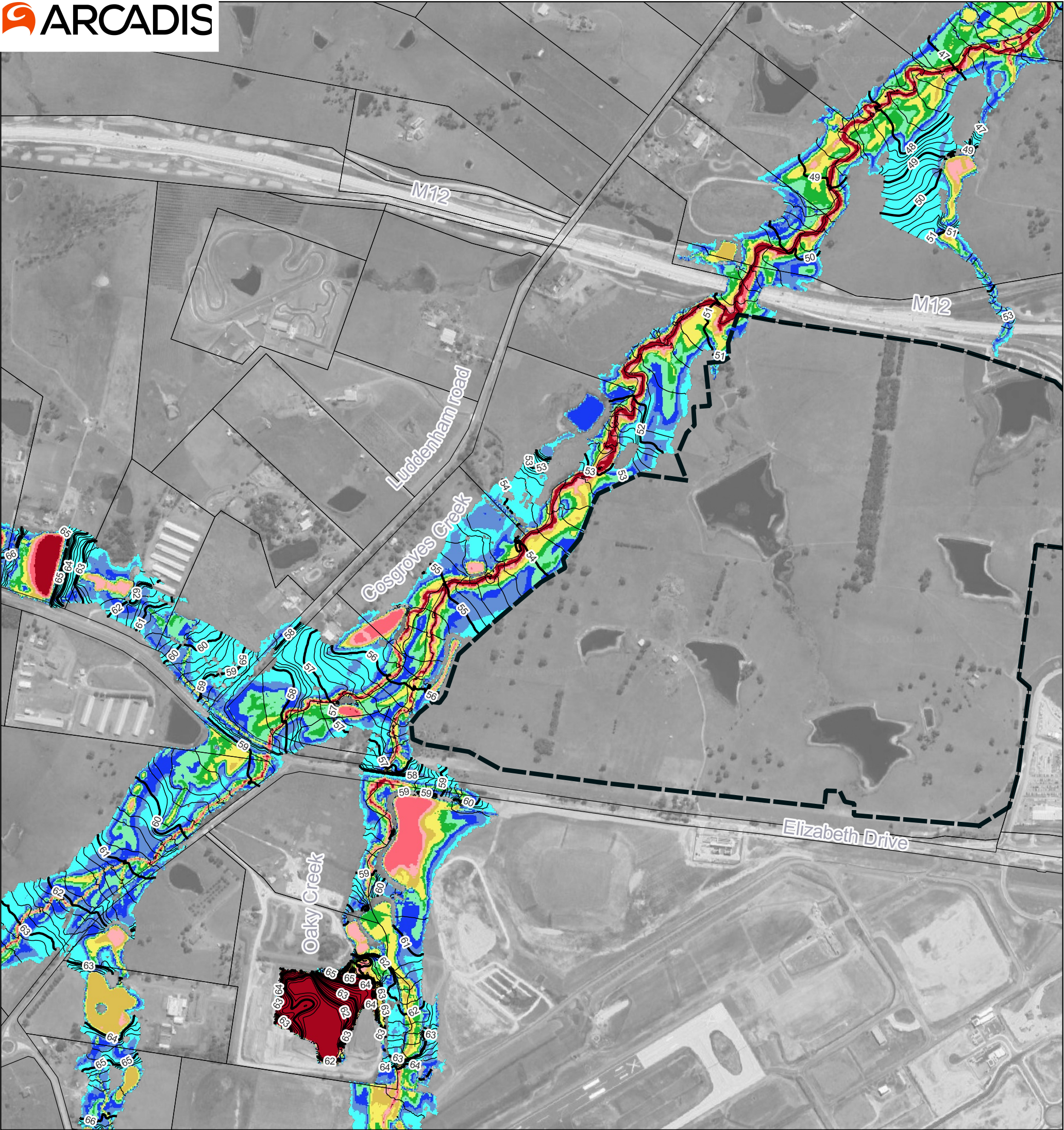
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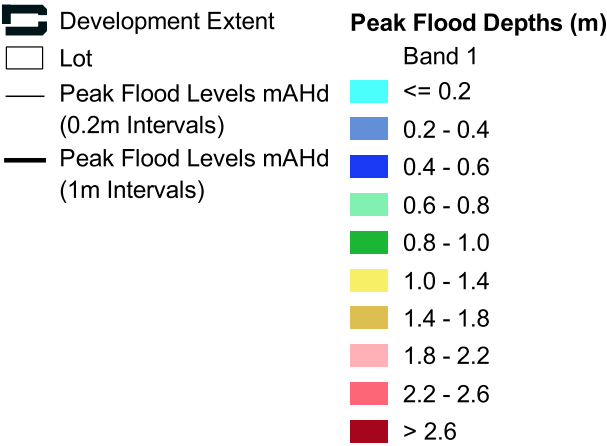
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31/5/2025 MGA 56



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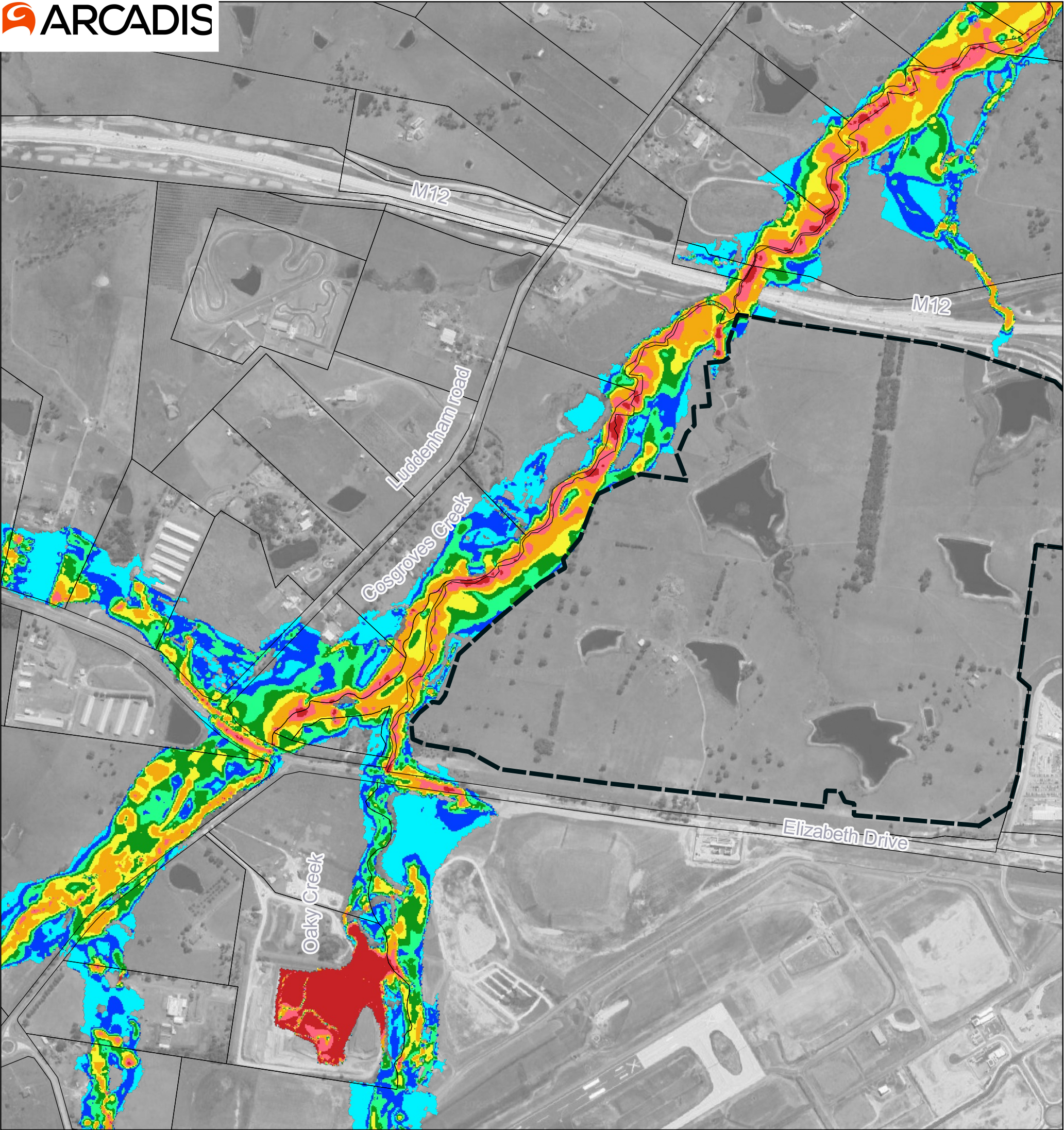


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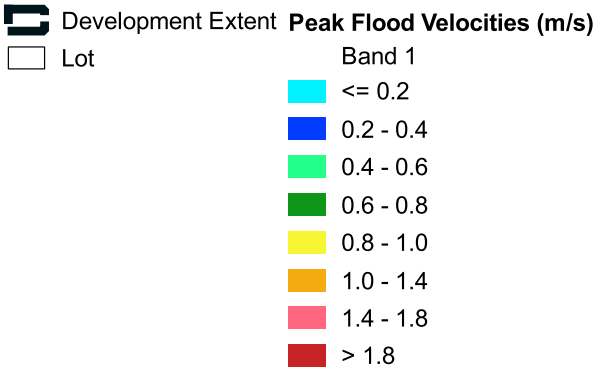


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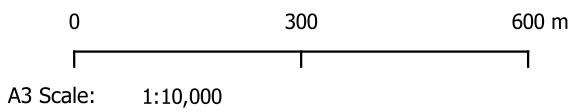
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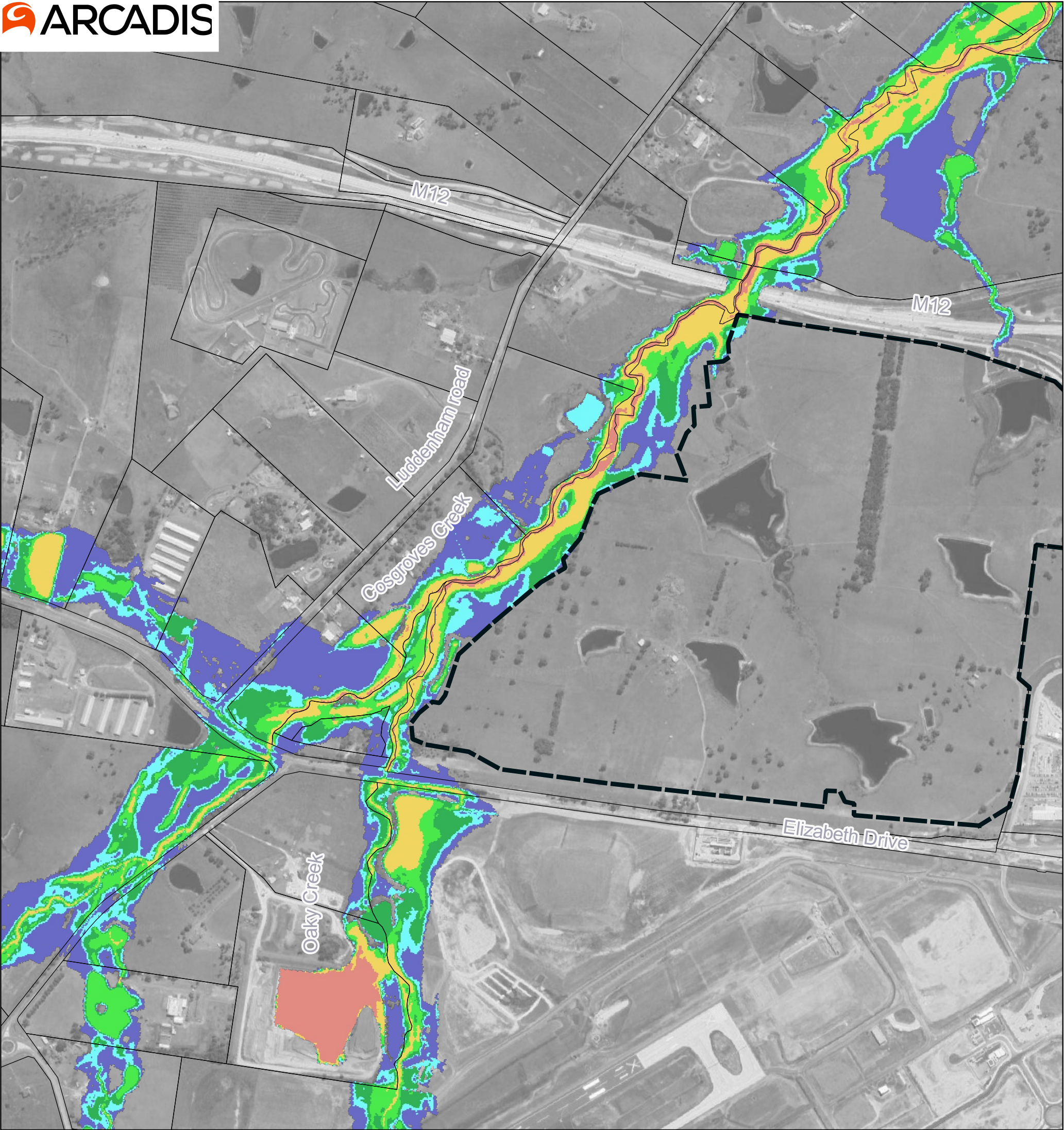


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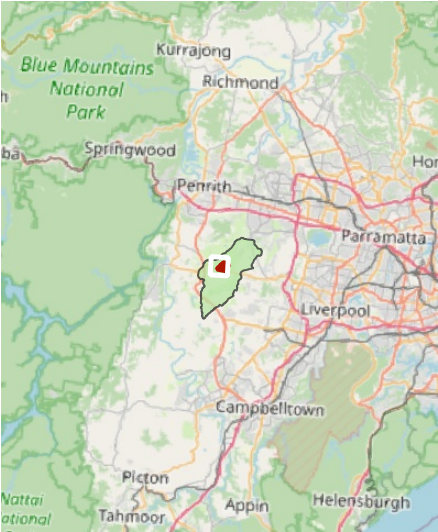


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Development Extent
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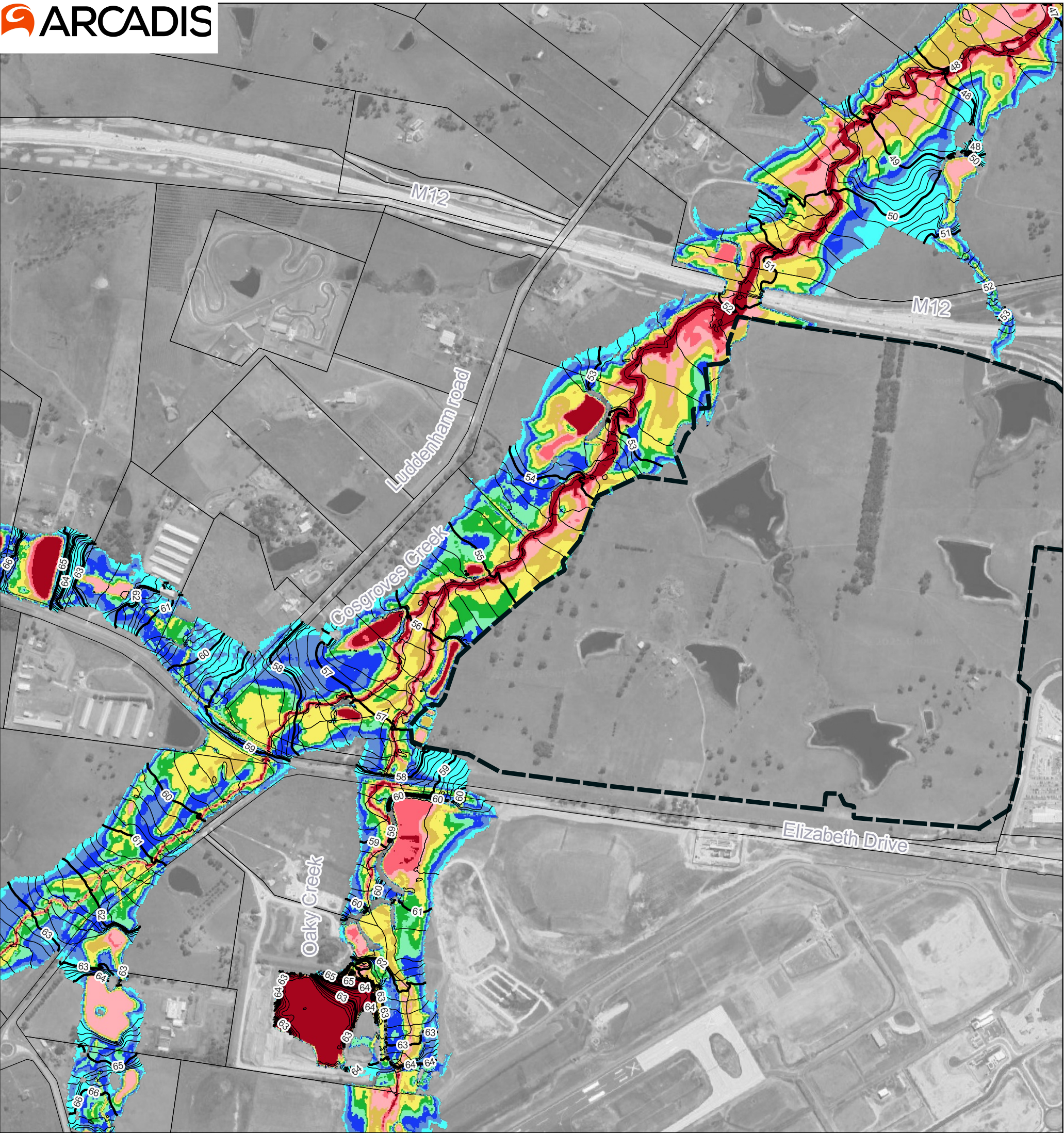


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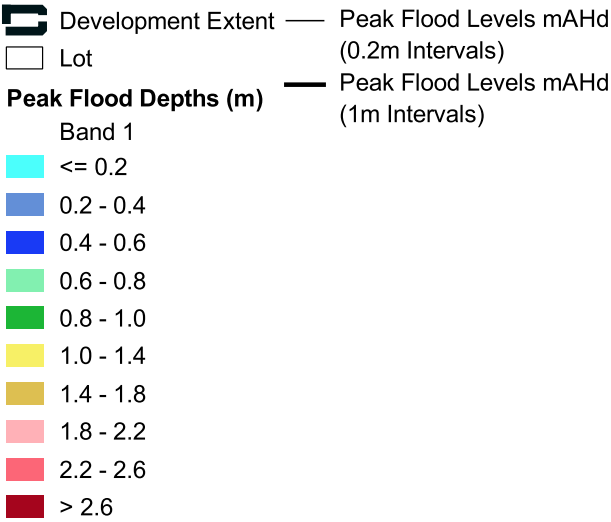


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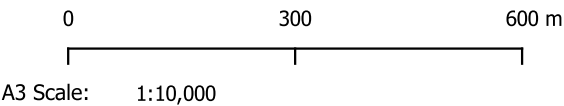
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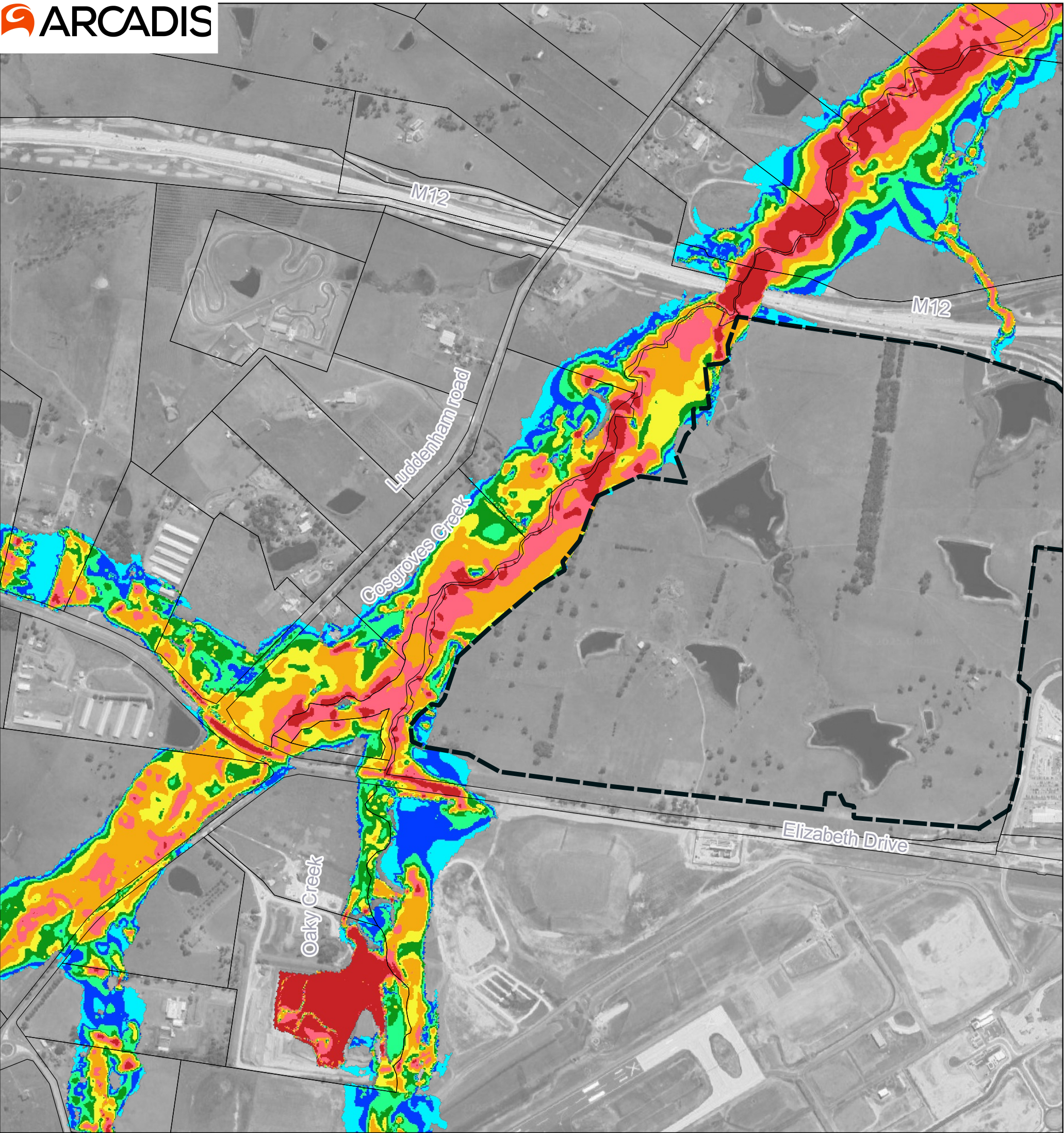


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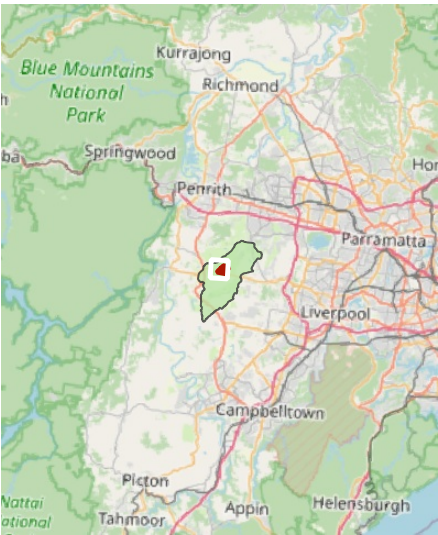
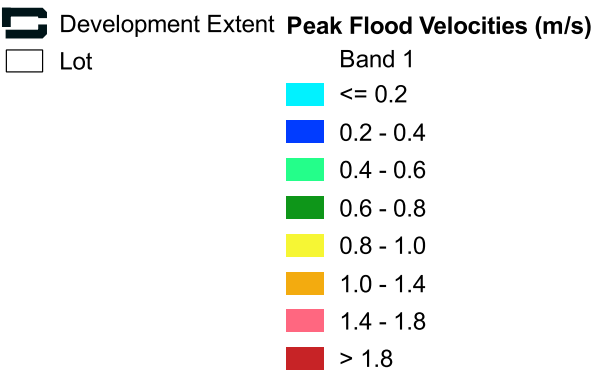


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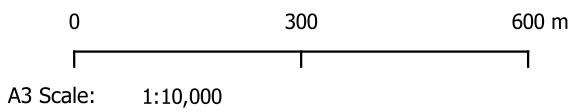




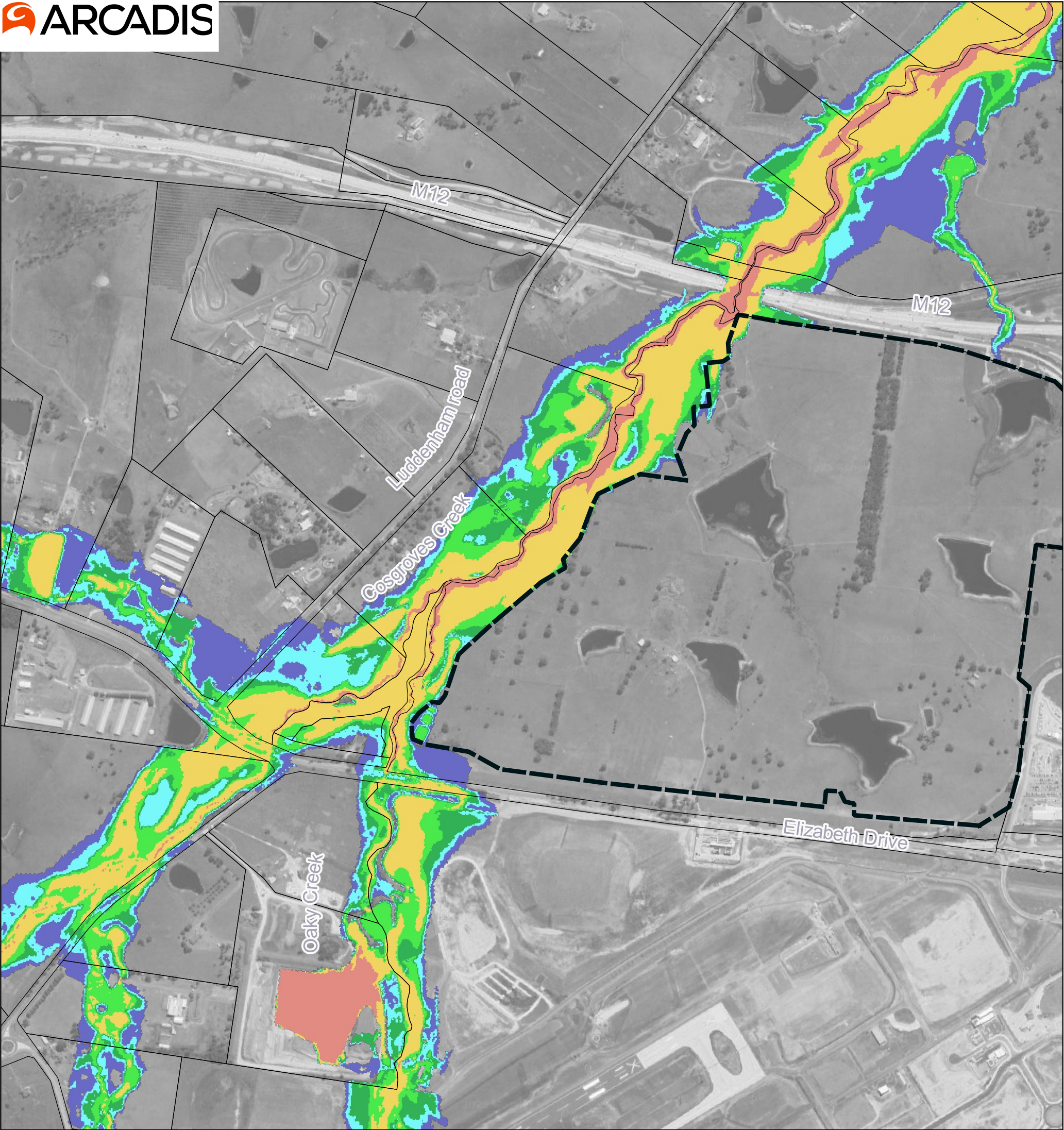
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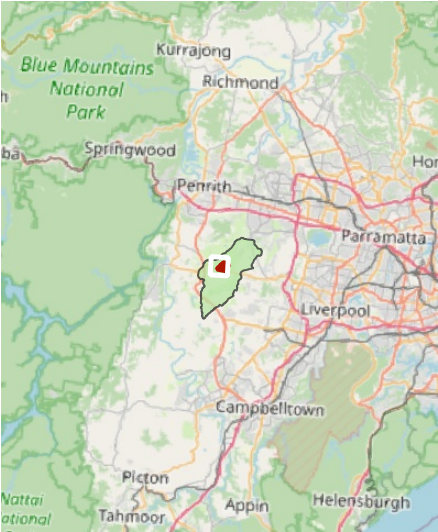


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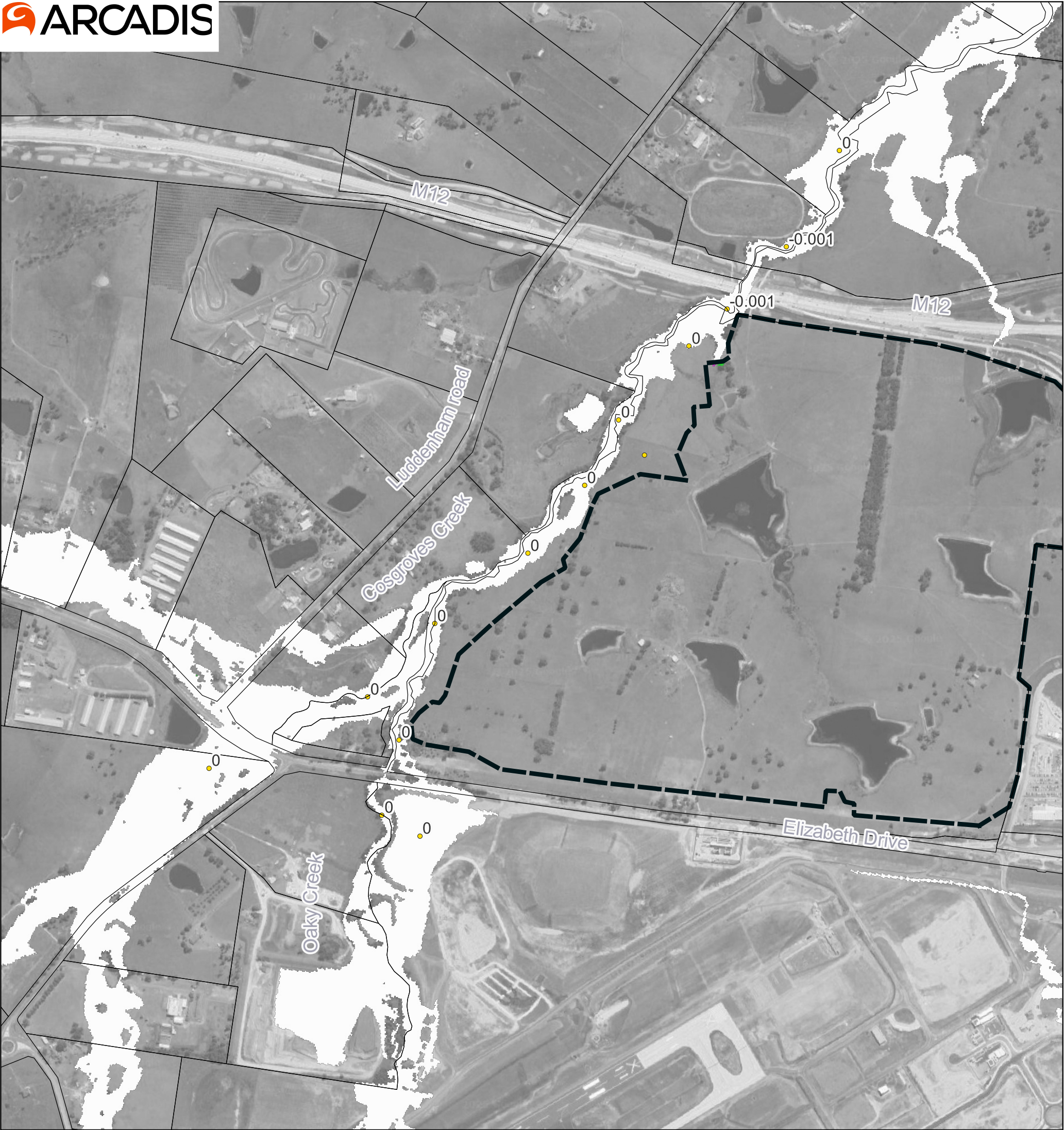


Notes:



0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56



Map by: Sepideh Jafari

-  Development Extent

 Lot

 Peak Flood Impacts
- Band 1

 Was Wet Now Dry

 Was Dry Now Wet
- Peak Flood Impacts**
Band 1
 -  ≤ -0.03
 -  $-0.03 - -0.02$
 -  $-0.02 - -0.01$
 -  $-0.01 - 0.01$
 -  $0.01 - 0.02$
 -  $0.02 - 0.03$
 -  > 0.03

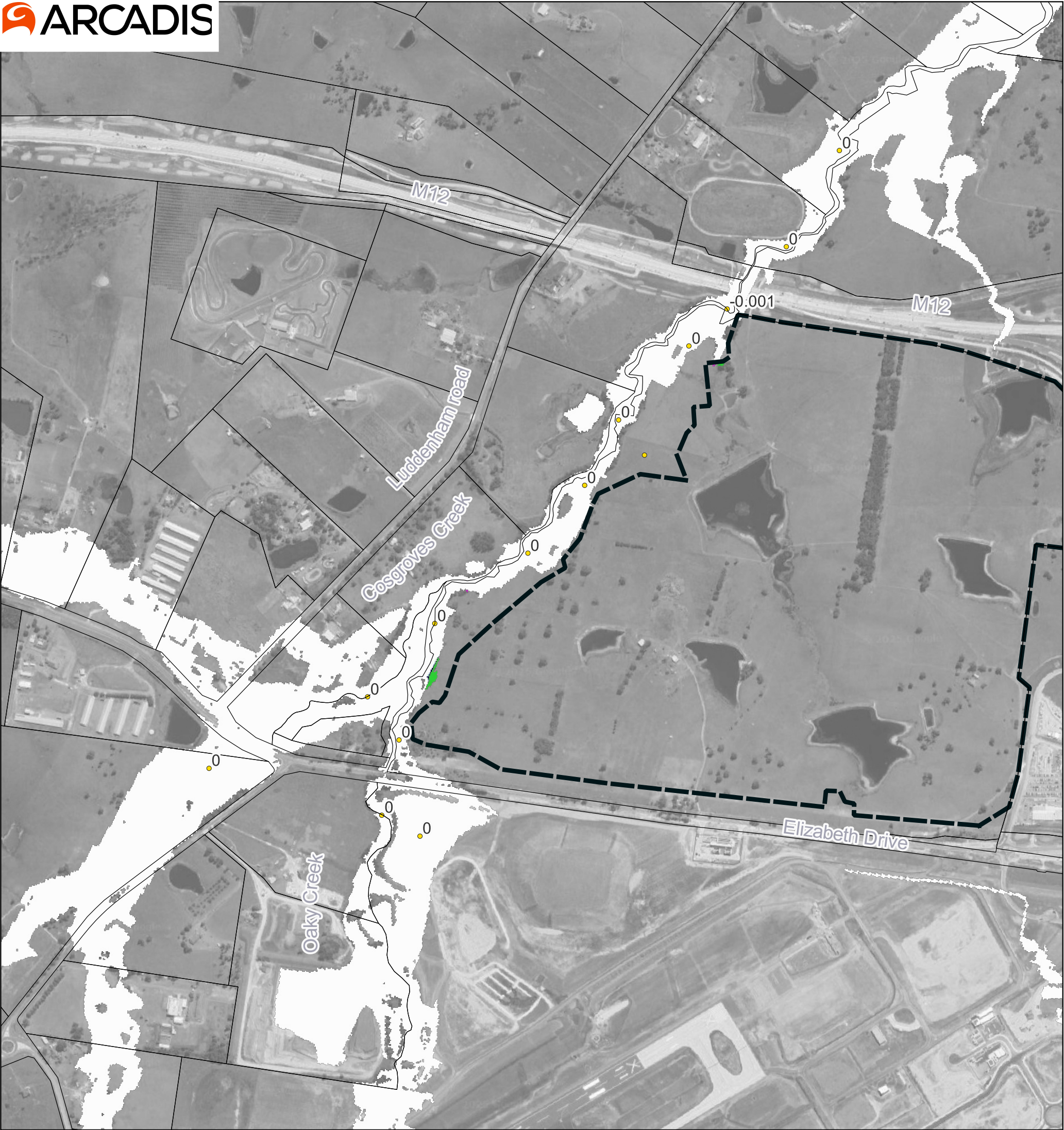


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0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56



Map by: Sepideh Jafari

-  Development Extent

 Lot

 Peak Flood Impacts
-  Band 1

 Was Wet Now Dry

 Was Dry Now Wet
- Peak Flood Impacts**

Band 1

 -  ≤ -0.03
 -  $-0.03 - -0.02$
 -  $-0.02 - -0.01$
 -  $-0.01 - 0.01$
 -  $0.01 - 0.02$
 -  $0.02 - 0.03$
 -  > 0.03

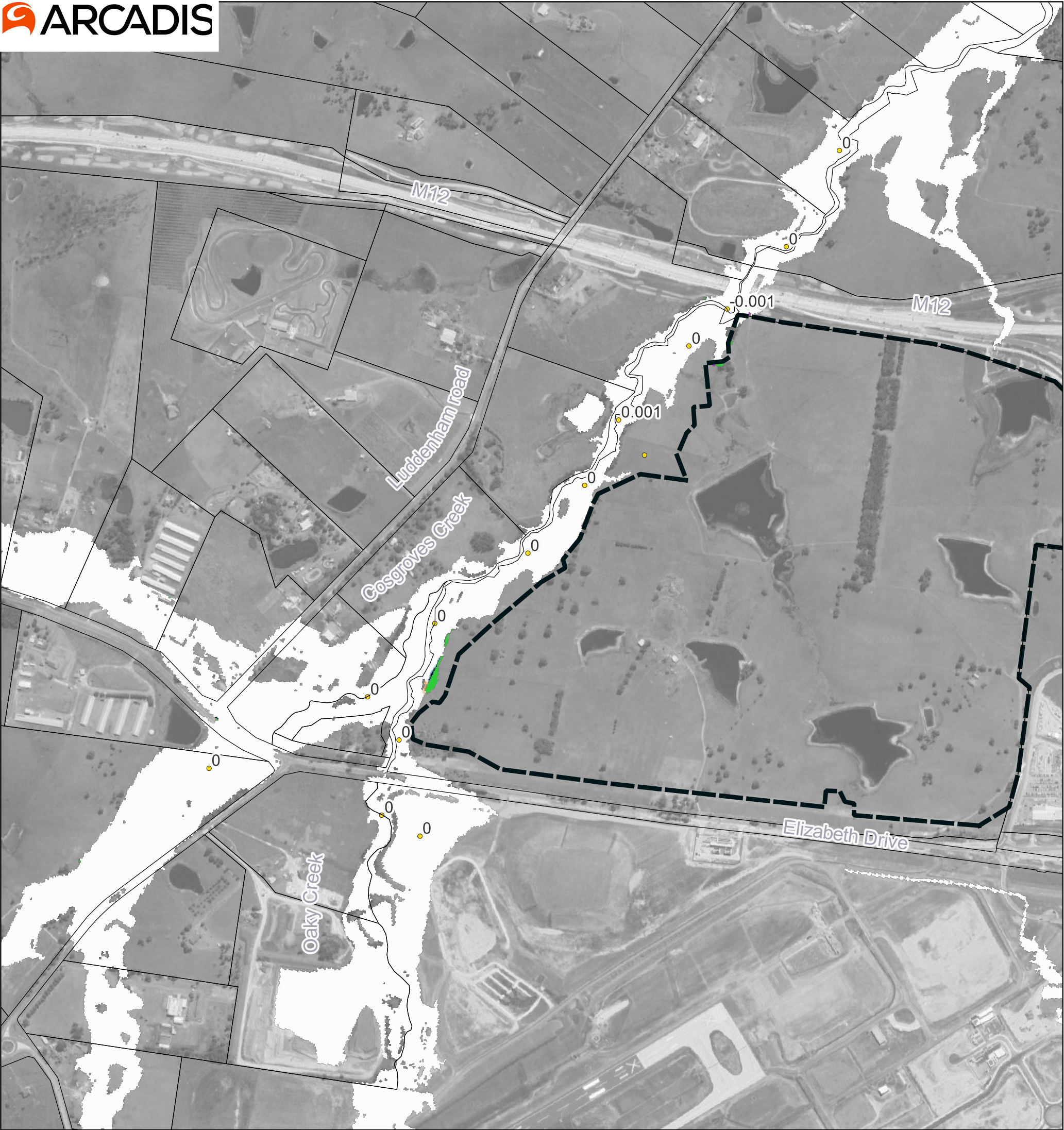


Notes:



0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56



Map by: Sepideh Jafari

-  Development Extent

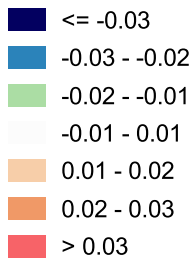
 Lot

 Peak Flood Impacts
- Band 1**

 Was Wet Now Dry

 Was Dry Now Wet
- Peak Flood Impacts**

Band 1



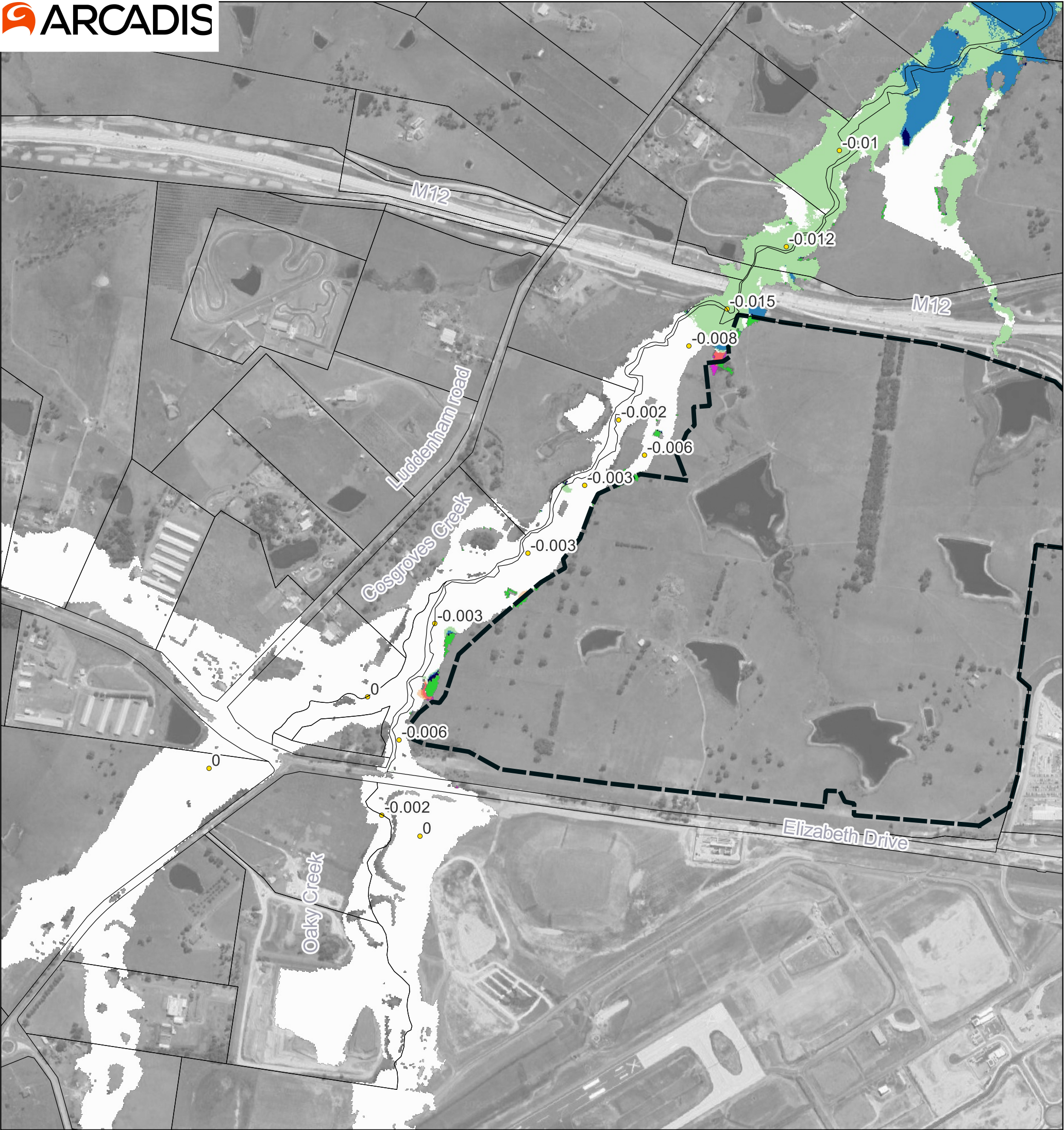


Notes:



0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56



Map by: Sepideh Jafari

-  Development Extent

 Lot

 Peak Flood Impacts
- Band 1

 Was Wet Now Dry

 Was Dry Now Wet
- Peak Flood Impacts**
Band 1
 -  <= -0.03
 -  -0.03 - -0.02
 -  -0.02 - -0.01
 -  -0.01 - 0.01
 -  0.01 - 0.02
 -  0.02 - 0.03
 -  > 0.03

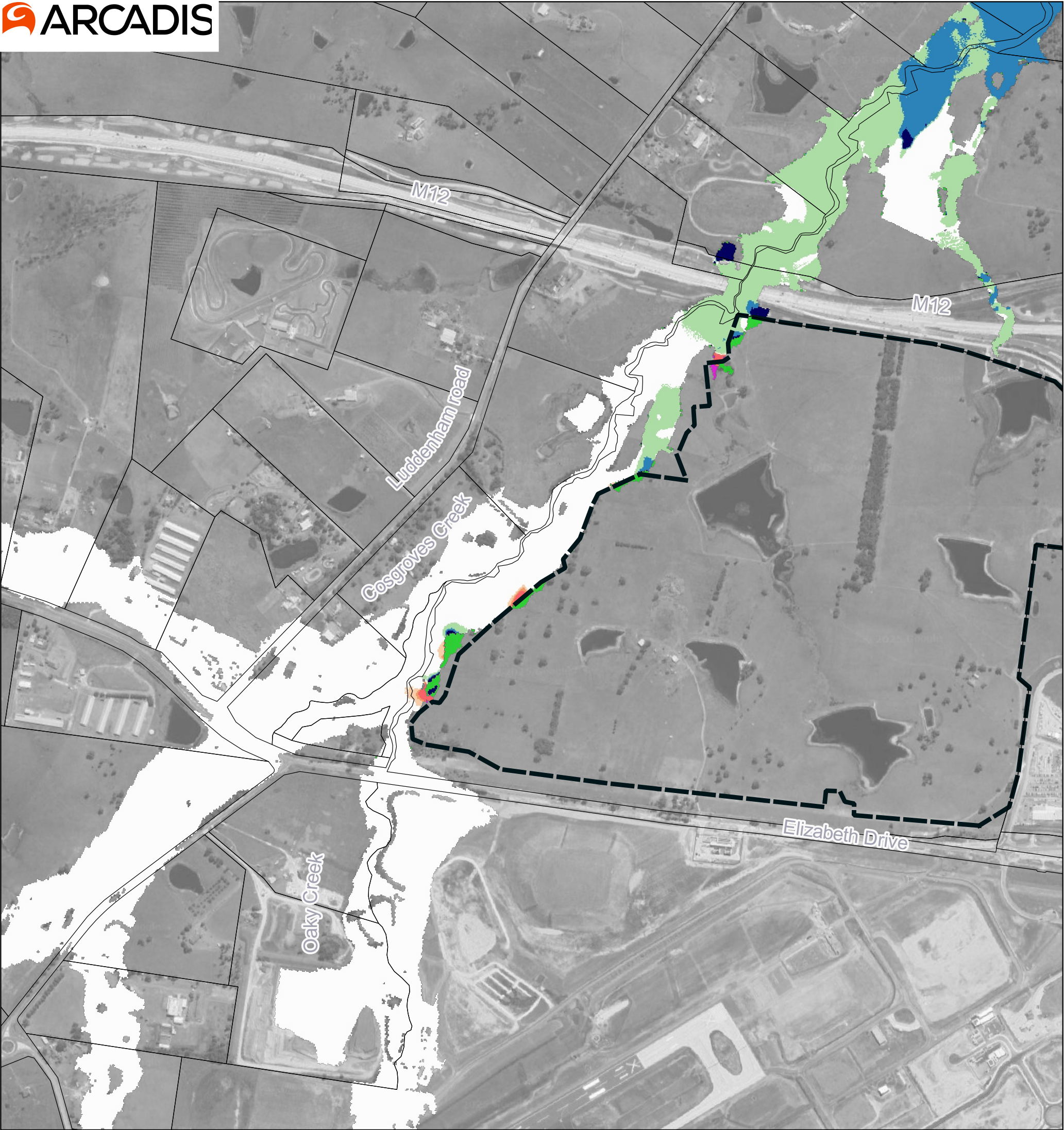


Notes:



0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56



Map by: Sepideh Jafari

-  Development Extent

 Lot
- Peak Flood Impacts**

Band 1

 ≤ -0.03

 $-0.03 - -0.02$

 $-0.02 - -0.01$

 $-0.01 - 0.01$

 $0.01 - 0.02$

 $0.02 - 0.03$

 > 0.03
- Band 1

 Was Wet Now Dry

 Was Dry Now Wet

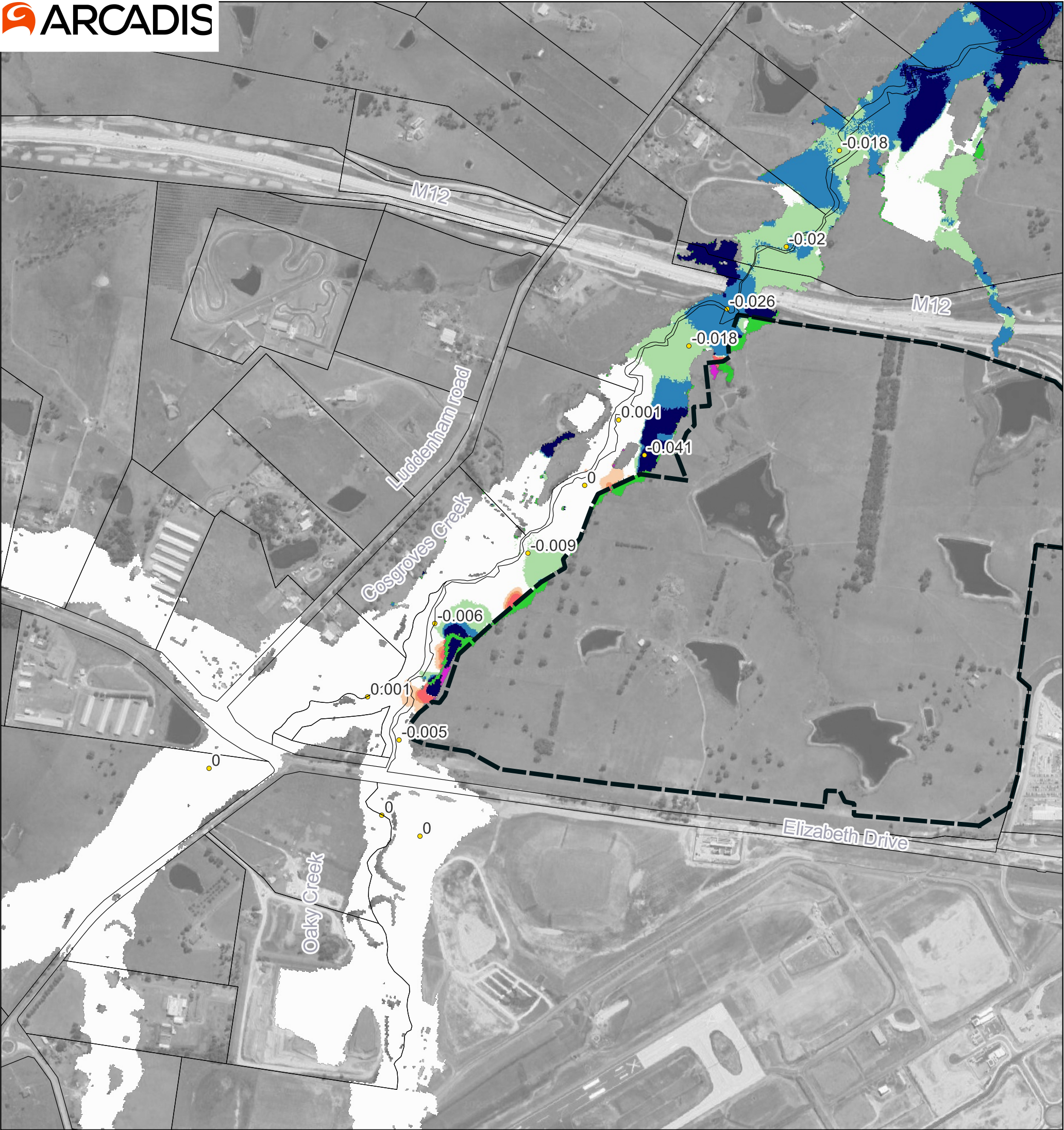


Notes:



0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56



Map by: Sepideh Jafari

-  Development Extent

 Lot

 Peak Flood Impacts
- Band 1**

 Was Wet Now Dry

 Was Dry Now Wet
- Peak Flood Impacts**

Band 1

 ≤ -0.03

 $-0.03 - -0.02$

 $-0.02 - -0.01$

 $-0.01 - 0.01$

 $0.01 - 0.02$

 $0.02 - 0.03$

 > 0.03

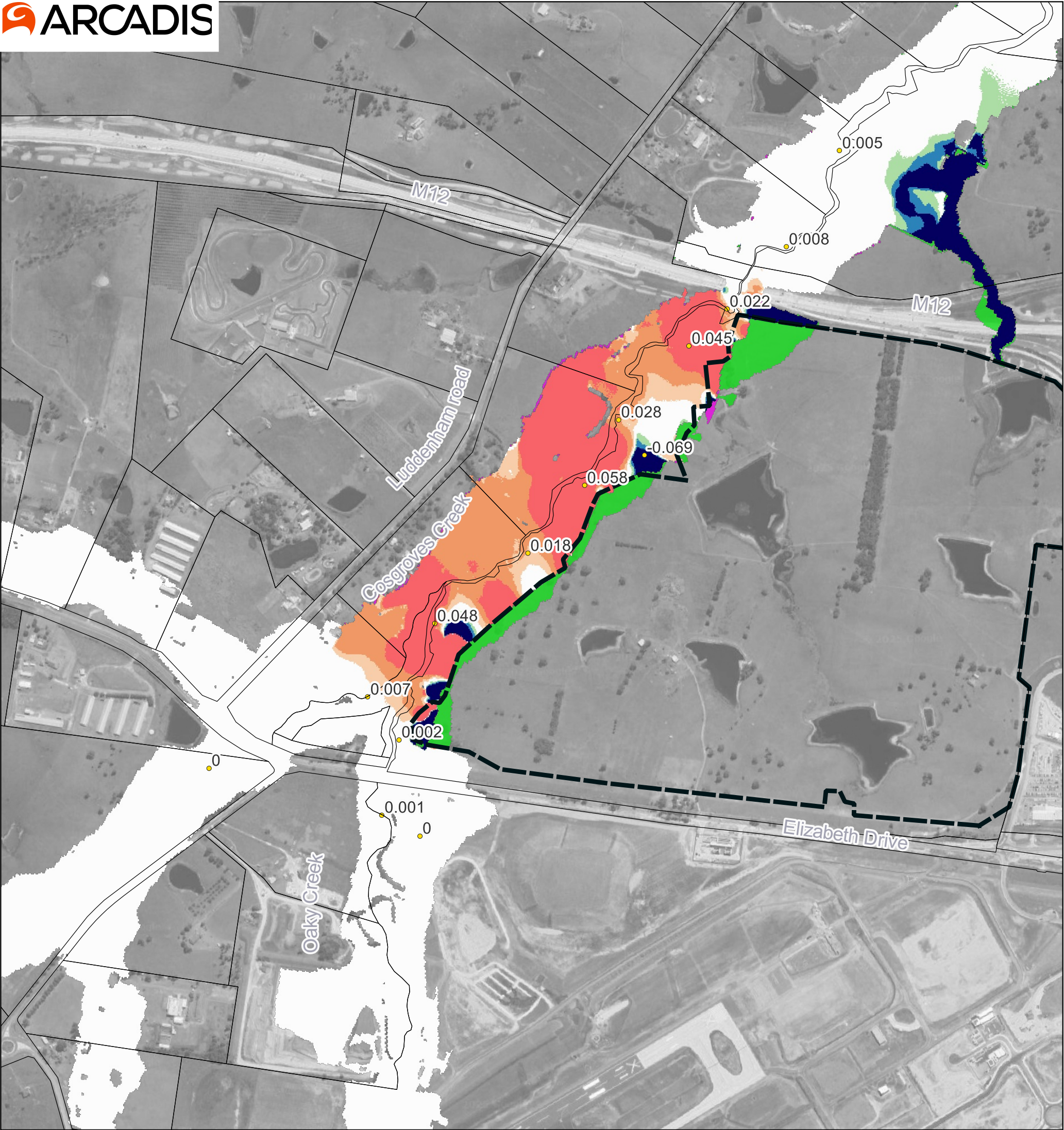


Notes:



0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56



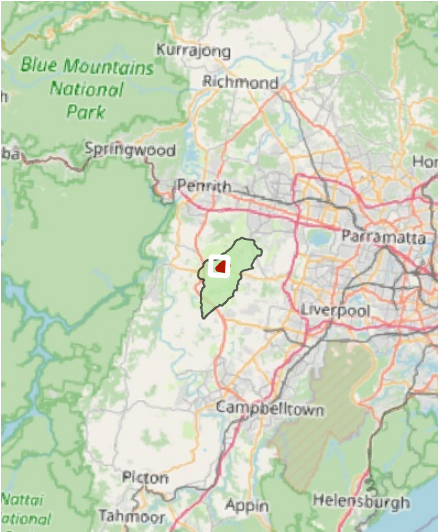
Map by: Sepideh Jafari

- Development Extent
- Lot
- Peak Flood Impacts
- Band 1
- Was Wet Now Dry
- Was Dry Now Wet

Peak Flood Impacts

Band 1

- ≤ -0.03
- $-0.03 - -0.02$
- $-0.02 - -0.01$
- $-0.01 - 0.01$
- $0.01 - 0.02$
- $0.02 - 0.03$
- > 0.03



Notes:



0 300 600 m
A3 Scale: 1:10,000

31/5/2025 MGA 56

Appendix B – Response to Submissions Summary Table

Agency	Item	Comment	Arcadis Response
Liverpool City Council (LCC)	8, 3(c)	The proposed development involves filling within the floodplain, resulting in a loss of flood storage volumes. The flood impact assessment does not show how this will be compensated. To meet PO8 of the DCP, compensatory excavation is required for all flood events, including the PMF. The report should include cut and fill volume calculations and plans/sections of compensatory works.	The flood assessment has been updated to include a detailed flood storage volume analysis, demonstrating that the proposed development does not result in any net loss of flood storage for all relevant flood events, including the PMF.
	8, 3(d)	The PMF flood impact map indicates flood level increases along Cosgroves Creek. Suitable mitigation measures must be provided to ensure no increase in peak water level during all flood events.	The updated assessment confirms minor increases in PMF peak flood levels (generally less than 100 mm), which are confined to localised areas within the existing flood extent. These changes do not alter hazard classifications or flood behaviour and are considered acceptable given the extreme rarity of the PMF. No adverse effects on evacuation or safety are expected.
	8, 3(e)	A revised climate change assessment should be undertaken in line with ARR 2019, Version 4.2.	A revised climate change assessment consistent with ARR 2019 Version 4.2 has been completed. Results indicate a slight reduction in peak flood levels due to earlier peak flows under the developed case. No adverse effects on surrounding properties are anticipated.
Sydney Water Corporation (SWC)	17	Flood mapping indicates attenuation from the quarry at 275 Adams Road. The impact of future quarry filling should be checked, particularly for its effect on the Oaky Creek culvert and downstream flooding at Burrah Park.	The flood model has been conservatively configured assuming the quarry is already filled with water prior to simulation. This ensures future filling will not affect flood outcomes. Flood impacts on Elizabeth Drive and Burrah Park, including contributions from Western Sydney Airport stormwater, have been accounted for.
Department of Planning, Housing and Infrastructure (DPHI)	71	The WPC SEPP flood planning map shows areas beyond Cosgroves Creek as flood-affected. Further justification is required for why these areas were not assessed.	Internal flood-prone areas and drainage within the site are outside the scope of this flood assessment. These have been addressed separately by Henry & Hymas through internal stormwater and detention basin design.
	72	Clarify whether the assessment considered: (a) impacts on pedestrian/shared pathways and open space embellishment;	While pedestrian/shared pathways and open space embellishment are not specifically assessed in this study, the

Agency	Item	Comment	Arcadis Response
		and (b) flooding from the proposed road crossing of Cosgroves Creek towards Luddenham Road.	flood modelling outputs include flood level, depth, velocity, and hazard mapping that can inform the design and location of these features. These outputs are intended to support future detailed design. The proposed road crossing of Cosgroves Creek towards Luddenham Road does not form part of the current development application and has not been included in this assessment.
	73	Update the evacuation strategy in accordance with Guideline EM01 and DCCEEW BCS comments, particularly regarding reliance on shelter-in-place.	Shelter-in-place is not proposed as the primary strategy. The assessment highlights that the site is flood-free during the PMF, which reduces overall flood risk. Evacuation remains the preferred strategy, supported by trafficable access during the 1% AEP event. Lot-specific emergency response plans should be prepared during future stages in accordance with Guideline EM01.