

Report

Flooding Assessment - 39-65 Old Castlereagh Road, Castlereagh

Morson Group

25 June 2025





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ACKNOWLEDGEMENT OF COUNTRY

The Board and employees of Water Technology acknowledge and respect the Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of Country throughout Australia. We specifically acknowledge the Traditional Custodians of the land on which our offices reside and where we undertake our work.

We respect the knowledge, skills and lived experiences of Aboriginal and Torres Strait Islander Peoples, who we continue to learn from and collaborate with. We also extend our respect to all First Nations Peoples, their cultures and to their Elders, past and present.



Artwork by Maurice Goolagong 2023. This piece was commissioned by Water Technology and visualises the important connections we have to water, and the cultural significance of journeys taken by traditional custodians of our land to meeting places, where communities connect with each other around waterways.

The symbolism in the artwork includes:

- Seven circles representing each of the States and Territories in Australia where we do our work
- Blue dots between each circle representing the waterways that connect us
- The animals that rely on healthy waterways for their home
- Black and white dots representing all the different communities that we visit in our work
- Hands that are for the people we help on our journey



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1 INTRODUCTION

1.1 Overview

Water Technology (WT) have been commissioned by Morson Group to undertake a detailed assessment of flooding behaviour at the proposed development site located at 39-65 Old Castlereagh Road, Castlereagh. The proposed development is located within the Penrith Lakes Scheme and is therefore subject to the State Environmental Planning Policy (Precincts—Western Parkland City) 2021 and the Penrith Lakes Development Control Plan – Stage 1 (DCP).

The site is comprised of three lots, as shown in Figure 1-1 with a regional perspective provided in Figure 1-2:

- Lot 12/DP793163;
- Lot 14/DP793163; and
- Lot 16/DP793163.



Figure 1-1 39-65 Old Castlereagh Road Lot Layout

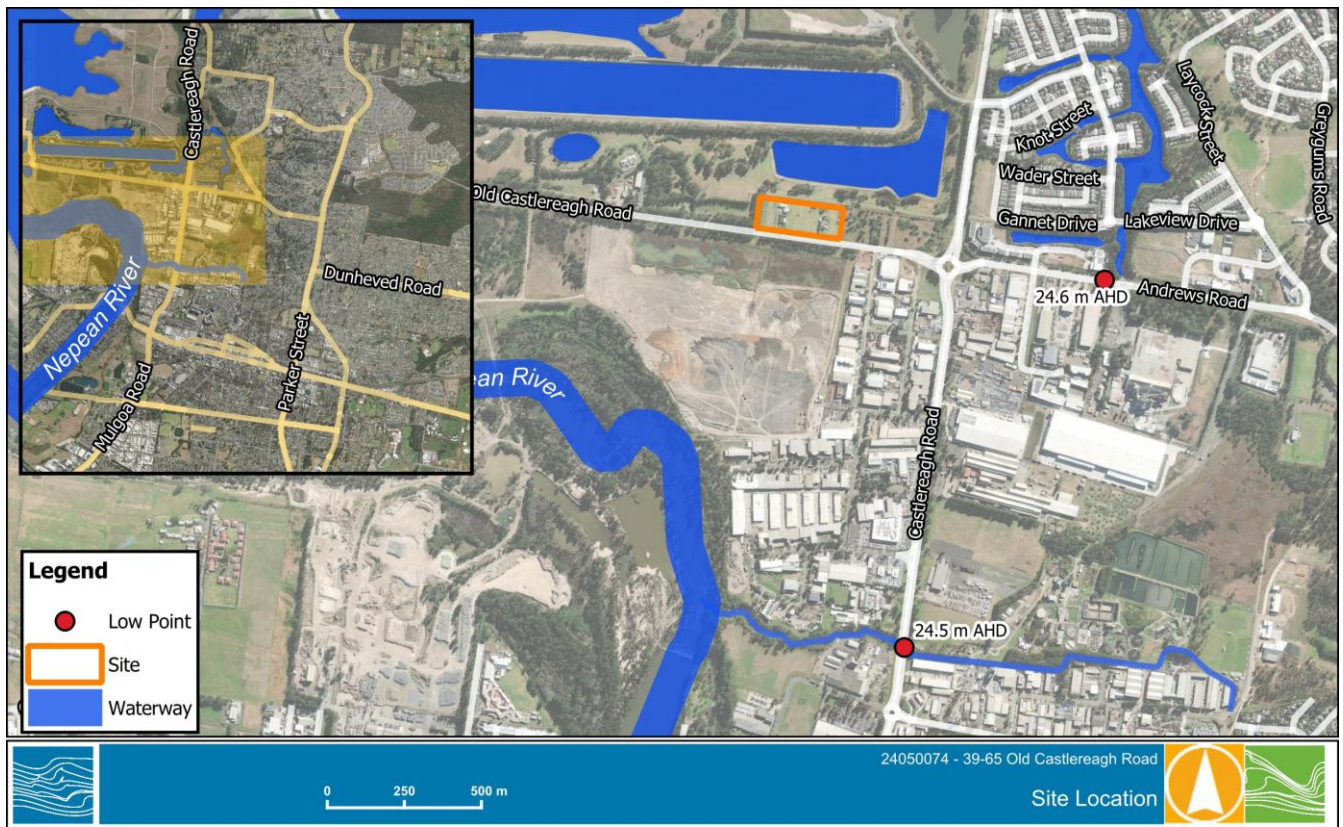


Figure 1-2 Site Location

1.2 Context and Purpose

The proposed mixed-use tourism development at 39 – 65 Old Castlereagh Road, Castlereagh includes a club on the western portion of the site, an indoor recreation facility in the centre and a hotel with capacity for 147 hotel rooms on the eastern portion of the site. The hotel would include a restaurant, kitchen, swimming pool and gym. The development would include 50 staff and could have up to 1,610 visitors during operation.

This report has been prepared to solely document the flood impact assessment undertaken for the proposed development. The analysis of flood evacuation and stormwater management has been undertaken separately. The following sections of this report present the methodology and the results of the assessment.



2 BACKGROUND

2.1 Overview

The proposed development site is impacted by both local (overland) and regional (riverine) flooding sources.

The following model datasets have been utilised for this assessment:

1. Cranebrook Overland Flow Flood Study (2023) – Sourced from Penrith City Council (PCC); and
2. Hawkesbury – Nepean River Flood Study (2024) – Sourced from NSW Reconstruction Authority (NSWRA).

Flooding behaviour from both sources is complex and is summarised below:

- The proposed development site is not impacted by riverine flooding in events up to and including the 2% Annual Exceedance Probability (AEP).
- Flooding is widespread throughout the immediate study area during riverine flood events of a 1% AEP magnitude and higher, with significant inundation of properties to depths exceeding 4.0+ m in larger magnitude flood events.
- Although impacted by overland flooding, flooding behaviour on the proposed development can be typified by slow moving, shallow sheet flow in all design flood events.
- Flood level property reports obtained from PCC for the three (3) lots on the site indicate the following elevations for the 1% AEP flood event:
 - Lot 12/DP793163 – 23.8 mAHD;
 - Lot 14/DP793163 – 24.6 MAHD (western boundary) and 23.8 mAHD (eastern boundary); and
 - Lot 16/DP793163 – 24.6 mAHD.
- Flood mapping for the 1% AEP design flood event, extracted from the Cranebrook Overland Flow Flood Study report (PCC, 2023), is presented in Figure 2-1. It should be noted that the mapping presented in the supplied report has been clipped to exclude shallow depths of less than 150 mm. This is an appropriate methodology when undertaking flood studies in large urban areas but the available mapping presented in Figure 2-1 underestimates the flooding constraints on the site.

A review of the hydraulic models associated with the Cranebrook Overland Flow Flood Study and Hawkesbury – Nepean River Flood Study was undertaken to determine their suitability in this assessment. The model associated with the Hawkesbury – Nepean River Flood Study is regional in nature and adopts a 15.0 m grid which, although appropriate for the assessment of a large riverine system, would result in discrete flow paths and drainage arrangements not being accurately represented. As such, the model associated with the Cranebrook Overland Flow Flood Study, which adopts a finer 2.0 m model grid and assess flooding behaviour for smaller, more frequent flood events, was adopted for this assessment.

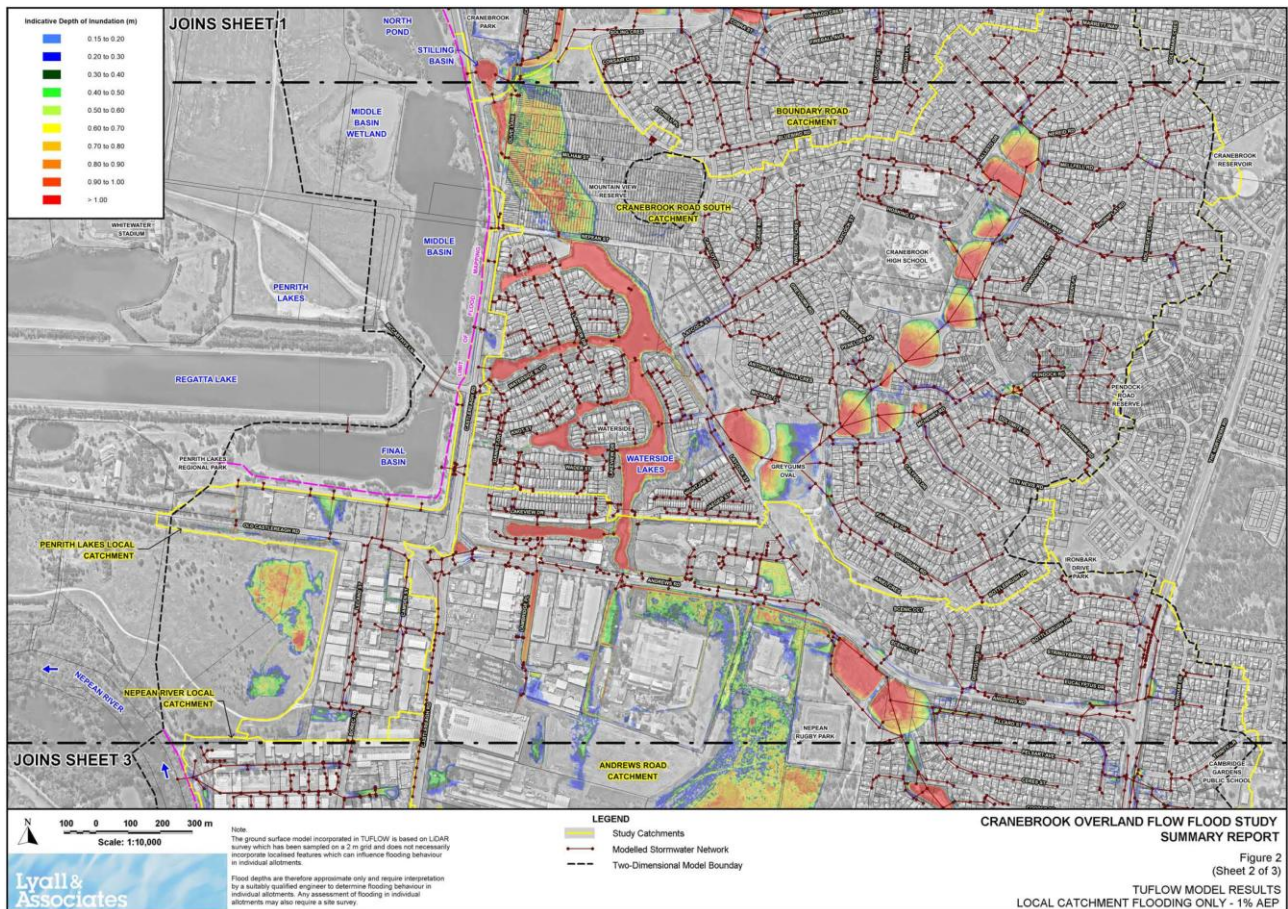


Figure 2-1 Peak Flood Depth - 1% AEP - Overland Flooding (Source: PCC)

2.2 Site Conditions

The general topography of the site is presented in Figure 2-2. Ground elevations on all three (3) lots range from 23.0 mAHD to 24.9 mAHD with a slight slope from west to east. An elevated bund, approximately 1.5 m to 2.5 m in height has been constructed on the land to the immediate north of the site to assist in detaining flows in the adjacent lake system. An ill-defined flow path is located adjacent to the eastern boundary of Lot 12 on DP793163. This flow path conveys local catchment flows from the south of Castlereagh Road to the lake system with a small pipe (circa 0.3 m diameter) constructed through the raised embankment.

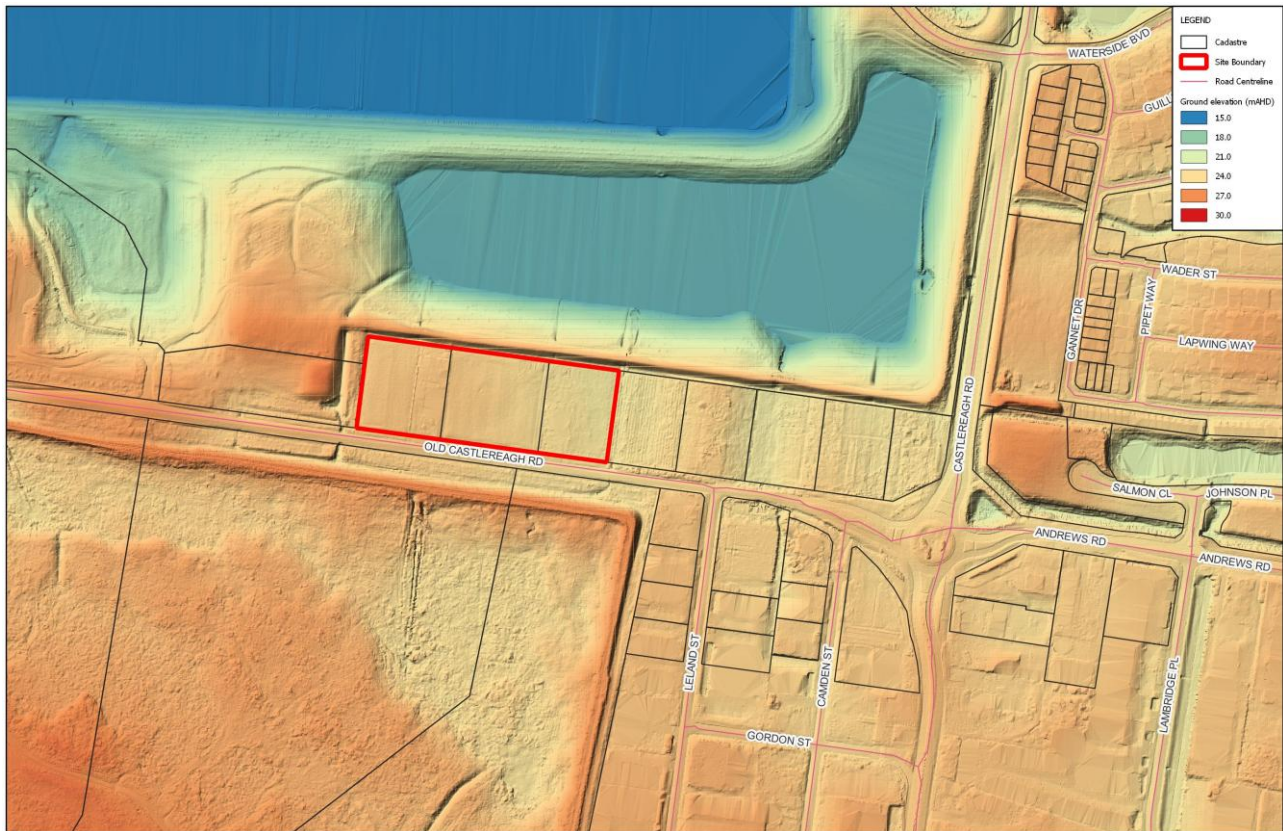


Figure 2-2 Site Topography

2.3 Proposed Development

The ground level layout for the proposed development is shown in Figure 2-3.

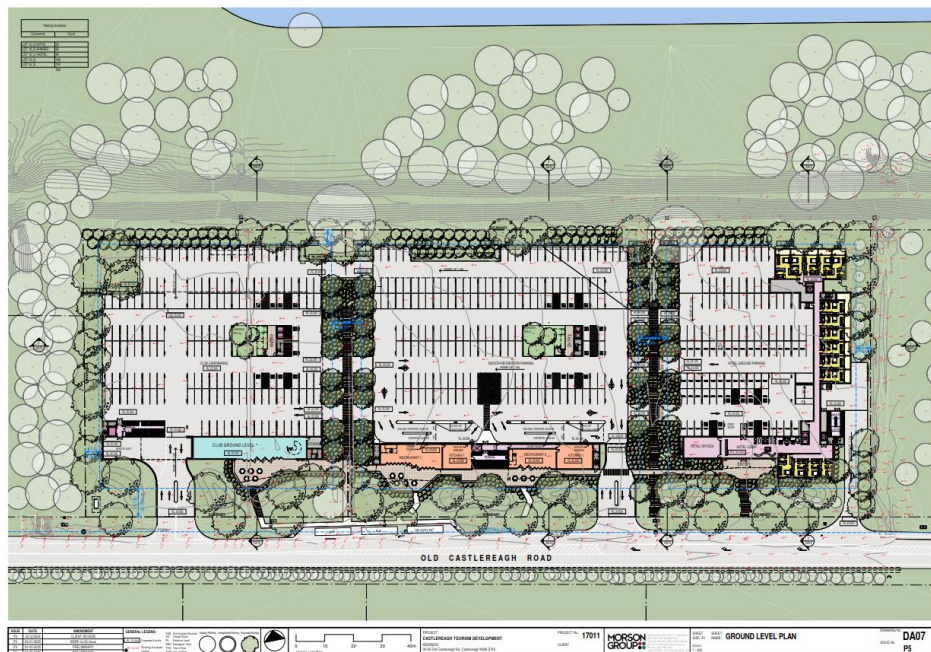


Figure 2-3 Proposed Development Layout (source: Morson Group)



3 FLOODING ASSESSMENT

3.1 Overview

The TUFLOW model associated with the Cranebrook Overland Flow Flood Study (COFFS) was obtained under licence and used for this assessment. As outlined, a review of the supplied model results indicates that the outputs were clipped by Council to remove shallow overland flow and ponding on properties within the study area. This is an appropriate methodology when undertaking hydraulic modelling in an urban area but it underestimates the flooding constraints on the site. As such, the supplied model was re-run without the clipping filter for full range of design flood events from the 50% AEP to the Probable Maximum Flood (PMF). The model was reviewed and found fit for purpose for this assessment.

3.2 Existing Case

The supplied model was modified to include ground survey data for the existing site. Amendments to the supplied model to represent existing site conditions were limited to:

- DEM representing surveyed ground surface levels within and immediately surrounding the site (including the bund immediately to the site's north).
- Updated pit and pipe details (elevations and dimensions where survey differed from supplied model) for:
 - 2 pipes under Old Castlereagh Road immediately upstream of the site (RHCO_2 and RHCO_4); and
 - 4 pipe outlets through the bund immediately north of the site (RHCO_3, RHCO_5, LA_51 and LA_52).
 - Event-based blockage assumptions for the pits and pipes were maintained from the supplied model.

The existing case model inputs are shown on Figure 3-1. With the exception of the survey data described above, the model was adopted as supplied with no additional alterations or changes to model parameters. The existing case model was simulated for the full range of design storm events used in the COFFS.



Figure 3-1 Model Inputs – Existing Site Conditions



3.3 Developed Case

The Existing Case model was subsequently modified to reflect developed site conditions. The proposed development was represented by:

- Design surface DEM of proposed finished surface levels for the site (from 3D architectural model) clipped to the site boundary (and excluding walkway access subject to detailed design).
- Modified surface roughness mapping to reflect the proposed development layout (using pre-defined surface roughness values from the COFFS model).
- Duplication of the existing 300mm diameter pipe outlet at RHCO_5 to assist with alleviating impacts and improving conveyance.
 - Additional pipe assumed to connect into existing pit (i.e. no change to field inlet pit).
 - Event-based blockage factors as per as existing case.

The developed case model inputs are shown on Figure 3-2 with the model being simulated for the same range of events as the existing case.

Note: the developed case model only considers landform changes and proposed mitigation measures to offset impacts from changes to the landform. It does not address changes to stormwater runoff quantity/volumes from the developed site. These will need to be considered separately at the detailed design stage and may require additional measures, such as on-site-detention storage, to mitigate any corresponding impacts.

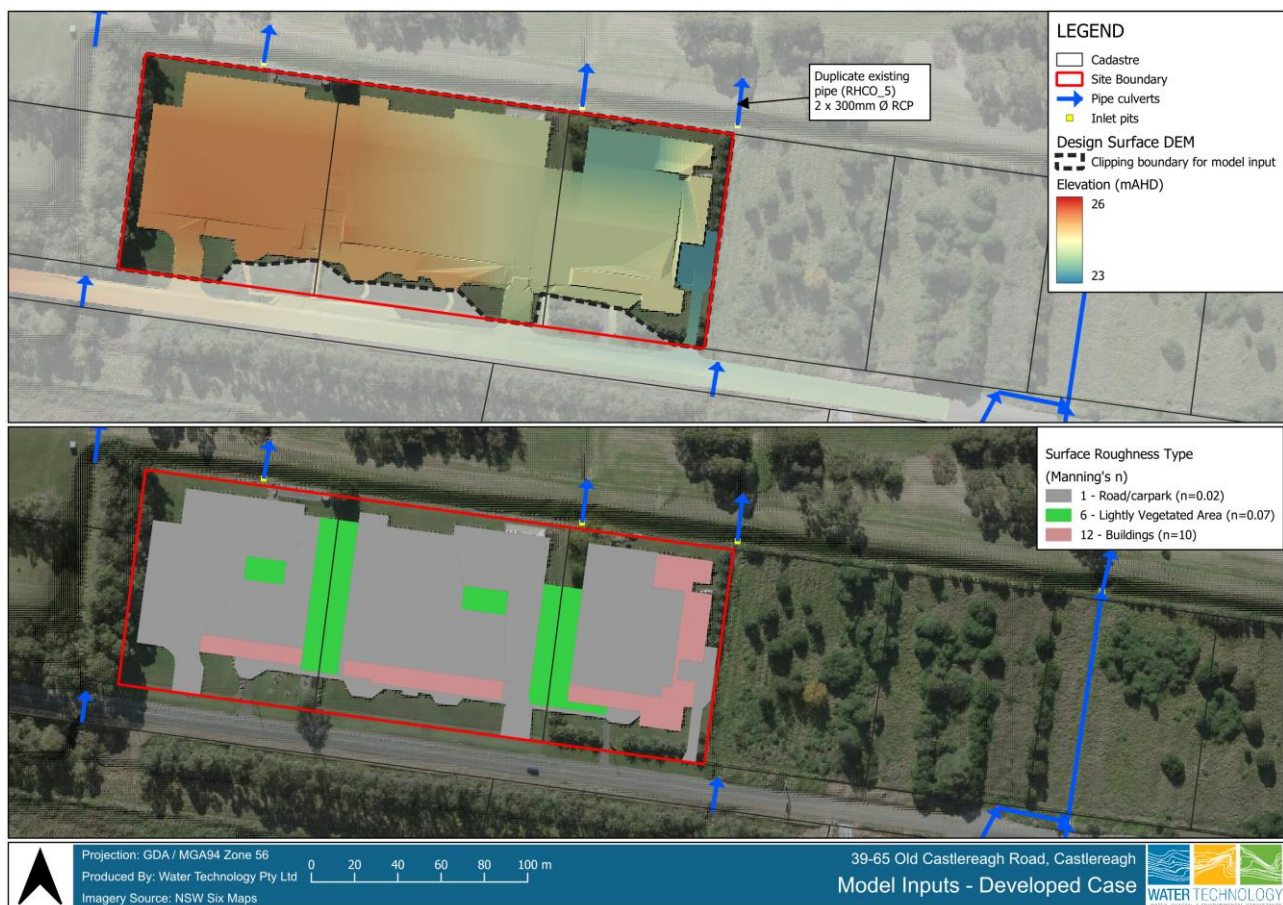


Figure 3-2 Model Setup – Developed Site Conditions



4 RESULTS

4.1 Existing Case Model Results

Maps depicting the enveloped existing case model results for each modelled design event are provided in Appendix A. This includes:

- Peak flood levels
- Peak flood depths
- Peak velocities
- Flood Hazard Classification.

4.1.1 Existing Flood Behaviour

The model results indicate that:

- The eastern lot (Lot 12 on DP793163) is impacted by overland flow flooding across the full range of design events:
 - Flooding over the southwestern part of this lot is typically characterised by shallow overland flow as local runoff from Old Castlereagh Road and the southern part of the site travels to the flowpath along the eastern site boundary. Note: this overland flow is typically less than 0.15 metres in depth and has been filtered out of Council's published overland flow flood mapping.
 - Flooding in the northeast of this lot occurs as a result of flow from the upstream catchment (south of Castlereagh Road) accumulating and ponding against the constructed bund immediately north of the site.
 - Discharge from the overland flowpath to the lake north of the site is limited by the capacity of the existing pipe (RHCO_5) through the bund - which the site survey and supplied COFFS model both indicate is a single 300mm diameter pipe.
 - An additional 300mm diameter pipe (LA_52) located 70m to the west provides some additional discharge capacity through the bund, however the inlet to this pipe is elevated higher in the landform such that it only plays a role in larger events when ponded water backing up against the primary outlet becomes widespread and deep enough to reach this location.
 - Peak flood depths and levels increase progressively with larger design events with:
 - Negligible flooding (exceeding 0.15 m depth) in the 50% AEP.
 - Approximately 40% of the lot impacted with depths of up to 0.63 metres in the 1% AEP.
 - The entire lot (plus about half of lot 14) impacted by depths of up to 1.64 m in the PMF.
 - Old Castlereagh Road remains flood free up to the 2% AEP design event with discharge from the upstream catchment to the south being confined to the existing culvert crossing (RHCO_4). The road overtops during larger events with overland flow directly entering and traversing the site.
- The western (Lot 12 on DP793163) and central (Lot 14 on DP793163) lots are elevated higher in the landform and predominantly flood free in all events up to the 0.02% AEP.
 - A bund separates the site from a creek to its west and the lake to the north. A swale drain around the western and northern sides of the site conveys local surface runoff to a pipe outlet (LA_51) through the bund to the lake with discharge limited by the capacity of the 300mm diameter pipe.
 - Minor ponding occurs upstream of the pipe during moderate to extreme flood events, with shallow (<0.15 m depth) ponding impacting a small portion of site in the 5% AEP and above.



- Flood depths exceeding 0.15m only impact the site in the 1% AEP and above and remain confined to a small area within 6 m of the northern site boundary up to the 0.2% AEP.
- In the PMF, flood depths of up to 0.5m occur in the north of the site.
- Overland flow in the drain to the west of the site is fully contained within the drain for events up to the 0.5% AEP.
 - In the 0.2% AEP, the capacity of the drain is exceeded and shallow (<0.15 m) inundation extends around the perimeter of the site (including the full length of its frontage to Old Castlereagh Road), however the western site lots remain predominantly flood free.
 - In the PMF, inundation is more substantial, however the majority of Lot 16 and approximately half of Lot 14 remain either flood free or impacted by depths of no more than 0.15 m.

4.1.2 Existing Site Access

The model results indicate that Old Castlereagh Road, adjacent to the site, remains flood free up to the 2% AEP design flood event. In the 1%AEP and 0.5% AEP design events, a small section of the road (approximately 50m in length) is inundated to a shallow depth, with a flood hazard vulnerability classification of H1 (generally safe for vehicles people and buildings). In the 0.2% AEP there is inundation along the site's entire road frontage to Old Castlereagh Road, however flood hazard remains low at H1.

In the PMF, overland flow flood depths along Old Castlereagh Road are significant and the flood hazard increases to H3 (unsafe for vehicles, children and the elderly).

East of the site (and excepting the inundation described above), Old Castlereagh Road has flood free connectivity to Castlereagh Road in all events up to the 0.2% AEP but is inundated with varying levels of hazard in the PMF.

(The COFFS model extent terminates approximately 200m west of the site and overland flow flooding impacting Old Castlereagh Road and site access from the west has not been addressed by this modelling).

4.2 Developed Case Model Results

Maps depicting the enveloped developed case model results for each modelled design event are provided in Appendix B. This includes:

- Peak flood levels
- Peak flood depths
- Peak velocities
- Flood Hazard Classification
- Flood level impacts

4.2.1 Developed Case Flood Behaviour

The results of the Developed Case modelling indicate that the proposed development footprint within the site is entirely flood free up to the 0.5% AEP design event, with the exception of the driveway access to the refuse area adjacent to the eastern site boundary, which is inundated to varying depths in all design flood events.

In the 0.5% AEP design event, a portion of the hotel carpark (in the north of Lot 12) is impacted by flood inundation. Flood depths in the carpark do not exceed 0.3 metres and the flood hazard is low (H1).

In the PMF, the entire development footprint within Lot 12 and approximately one third of Lot 14 will be inundated. Flood hazard over the majority of the developed site is low (H1), however increased hazard is seen



in the northern portion of hotel carpark in Lot 12 (H3) and along the driveway access in the southeast of the site (H4 – Unsafe for vehicles and people).

4.2.2 Developed Case Flood Impacts

Afflux maps for the full range of design events are provided in Appendix C.

Impacts of the proposed development (earthworks and mitigation measures) on overland flow flooding are generally minor and localised to the site and its immediate surrounds. They are summarised as:

- Northeast corner of site and adjacent lot to the east:
 - The proposed mitigation measure (duplicating 300 mm pipe outlet at RHCO_5) results in a reduction of peak flood levels in the northeast corner of the site and across the adjacent lot to the east, in all events up to and including the 0.5% AEP.
 - In the 0.2% AEP event, an afflux of 22 mm extends over the inundated area of the site and the adjacent lot to the east, noting that this impact does not extend onto dwellings, buildings or similar structures.
 - In the PMF, the afflux over the adjacent lots to the east of the site is lower, at 11mm.
 - A minor afflux is noted in the flowpath immediately downstream of the pipe outlet, associated with the increased discharge capacity, however there is no measurable impact on flood levels in the lake itself
 - It is expected that localised scour protection measures will need to be installed between the pipe outlet and the lake to protect from erosion associated with increased pipe discharge.
- Old Castlereagh Road and southern site frontage:
 - The model results show localised changes to inundation extent and flood levels across the full range of modelled events.
 - For events up to the 0.5% AEP, the afflux external to the site and within the Old Castlereagh Road corridor is predominantly less than 10mm and flood depths in addition areas of inundation (mapped as 'was dry now wet') are equally as small. These 'impacts' need to be considered in the following context:
 - Inundation within this area occurs as a result of local stormwater runoff from the road reserve (& southern portion of the site) draining towards the overland flowpath along the eastern site boundary. It is directly related to the location where the local sub-catchment runoff hydrograph has been applied to the model (which has not been adjusted for this assessment).
 - The modelling does not address stormwater drainage along Old Castlereagh Road or within the site itself (this is outside the scope of the flood assessment). Future detailed design of the driveway crossovers providing access to the site and drainage within the site will need to consider and accommodate any road runoff entering the site.
 - Flood depths (existing and developed) do not exceed 0.15 m.
 - If the mapping were to adopt the same filtering criteria used for Council's flood mapping, this area would be excluded from the mapped results for both existing and developed site conditions and no inundation or impacts would be apparent.
 - For the 0.2% AEP and the PMF, there is effectively no hydraulic grade across the site and flooding over Old Castlereagh Road is directly a result of floodwater backed up against the bund and constrained by the pipe outlets.
 - An afflux of 23 mm is seen over the southern side of the road reserve in the 0.2% AEP event. There is no significant change in the extent of inundation and the flood hazard remains low (H1).



- In the PMF, a very small afflux of 12mm impacts the full width of the road reserve and property to its south. The extent of inundation and the hazard associated with that inundation does not change.
- Northwest corner of site:
 - There are no material impacts in events up to and including the 0.5% AEP.
 - The proposed mitigation measure (duplicating 300 mm pipe outlet at RHCO_5) results in a reduction of peak flood levels in the northeast corner of the site and across the adjacent lot to the east, in all events up to and including the 0.2% AEP.
 - In the PMF, an afflux of 10-30mm is contained within the swale drain along the western and northern site boundaries. Flood waters at this location are confined between the proposed fill in the site and the existing bund located just outside the site and impacts do not pose any risk to property outside this area.

Overall, impacts of the development on overland flow flooding are minor and can generally be managed by duplication of the existing 300mm pipe outlet (RHCO_5) through the bund at the northeast corner of the site. Some residual impacts may occur during extreme flood events and these can be addressed further at the detailed design stage of the project. Given the increased in flow conveyance, the inclusion of an additional pipe reduces water levels on the site with a slight increase downstream in the adjacent lake area. As such, it would be anticipated that works on the downstream site will be required to ensure that this increase does not result in concurrent adverse impacts such as an increase in erosion potential. This could include but is not limited to scour protection or the formalisation of a headwall structure

Impacts of overland flow flooding on the proposed development will be limited to rare and extreme flood events and predominantly impact designated carparking areas. Suitable flood emergency management measures will need to be implemented to manage flood risk to persons and property at the site during extreme flood events.



5 REGIONAL FLOODING BEHAVIOUR

5.1 Overview

As indicated in Section 2.1, the model adopted for the assessment of flooding under existing and developed case conditions was the model utilised in the Cranebrook Overland Flow Flood Study. Given that this model is of a resolution that allows for the inclusion of discrete flowpaths and critical features such as road crests, it was deemed suitable for this assessment. The model associated with the Hawkesbury – Nepean River flood study is regional in nature and adopts a 15.0 m grid. As such, a model of this resolution is not capable of reflecting the minor changes in the site arrangement under developed conditions. Additionally, the site is only impacted by riverine flooding in events of a 1% AEP and larger and regional flooding behaviour at the site is dominated by slow moving backflow as the lake system to the north equalises. As such, the regional model was not used explicitly for this flood impact assessment but has been utilised to inform other reports.

5.2 Regional Model Results

Although not explicitly utilised in this assessment, a review of flooding behaviour during a regional (riverine) flood event was undertaken. The model results obtained from the supplied Hawkesbury – Nepean River Flood Study (2024) indicate that the proposed development site is not inundated in events smaller than a 1% AEP design flood event. A summary of flooding behaviour during regional flood events is outlined below:

- Events up to and including the 2% AEP design flood event: not inundated
- 1% AEP design flood event: depths of up to 0.8 m at north-eastern boundary with northern bund not overtopped. Shallow inundation from 0.3 to 0.6 m on Lot 12 on DP793163. Lots 14 and 16 on DP793163 not inundated.
- 0.5% AEP: Lot 12 on DP793163 fully inundated to a maximum depth of 1.3 m with partial inundation of Lot 14 on DP793163 to depths up to 0.75 m. Northern bund not overtopped.
- 0.2% AEP: Lot 12 and 14 on DP793163 fully inundated with depth of up to 1.9 m on Lot 12 and 1.5 m on Lot 14. Lot 16 on DP793163 partially inundated to depths up to 0.5 m. Northern bund is overtopped and interaction between riverine flows and water in the lake system occurs.
- 0.1% AEP: All lots inundated with Lot 12 on DP793163 inundated to depths in excess of 2.0 m. Lot 16 on DP793163 inundated to depth ranging from 0.25 m to 0.8 m. Widespread inundation of numerous properties in the adjacent region occurs.
- 0.05% AEP: All three (3) lots on DP793163 inundated to depths exceeding 2.2 m with depths on Lot 12 on DP793163 reaching 4.0 m adjacent to the north-eastern boundary.
- 0.02% AEP: All three (3) lots on DP793163 inundated to depths exceeding 3.0 m with depths on Lot 12 on DP793163 exceeding 5.3 m adjacent to the north-eastern boundary.
- PMF: All three (3) lots on DP793163 inundated to depths exceeding 7.0 m with depths on Lot 12 on DP793163 exceeding 9.0 m adjacent to the north-eastern boundary.

Plans showing the peak flood depth for the 2% AEP design flood event up to and including the Probable Maximum Flood are presented in Appendix D.



6 FLOOD PLANNING LEVELS

The relevant planning instrument that applies to development at the site is the State Environmental Planning Policy (Precincts—Western Parkland City) 2021. Clause 5.6 of the SEPP includes the following definition:

- **Flood Planning Level** means the level of a 1:100 ARI (average recurrence interval) flood event plus 1 metre freeboard.

Council's flood certificates for each lot (provided in Appendix E) do not distinguish various flood sources and define overall 1% AEP flood levels for each lot as:

- Lot 12 – 23.8 mAHD
- Lot 14 – 24.6 mAHD
- Lot 16 – 24.6 mAHD

The site is impacted by two sources of flooding – overland flow and riverine. Modelled flood levels from both sources have been reviewed to confirm 1% AEP flood levels and define FPLs across the site. Specifically, this includes:

- Overland: 1% AEP overland flow flood levels for developed site conditions from the results of the modelling described in this report and presented in Appendix B; and
- Riverine: 1% AEP riverine flood levels (for existing site conditions) obtained from the supplied Hawkesbury – Nepean River Flood Study (2024) and presented in Appendix D.

Furthermore, for the purpose of defining FPL's that apply to development at the site, the overland flow flood model results have been interpreted reference to the same depth filtering criteria used in Council's flood mapping. That is, areas impacted by overland flow flooding with a peak depth of less than 0.15 m (refer to flood depth mapping in Appendix B) have been excluded from the analysis. This includes the entire southern site frontage along Old Castlereagh Road.

A description of 1% AEP flooding impacting each of the lots within the site follows:

- Lot 12:
 - Overland: impacted along eastern and northern lot boundaries with a flood level of 23.5 mAHD. (Mapped overland flow along southern lot boundary is less than 0.15m deep and has been excluded).
 - Regional: majority of the lot is impacted with flood levels ranging from 23.7 to 23.8 mAHD.
- Lot 14:
 - Overland: impacted along northern lot boundary with flood levels ranging from 23.5 to 24.6 mAHD. (Mapped overland flow in southeast corner of lot is less than 0.15m deep and has been excluded).
 - Regional: flooding impacts a small area near the northeastern lot boundary at a level of 23.7 mAHD.
- Lot 16:
 - Overland: impacted along northern lot boundary only with a flood level of 24.6 mAHD.
 - Regional: not impacted.

Table 6-1 provides a summary of the peak 1%AEP flood levels (confirming the levels on Council's flood certificates) and corresponding flood planning levels applicable to the developed site. It should be noted that that flood planning levels outlined are not associated with the required floor levels. The Penrith Lakes Development Control Plan has various provisions in Clauses 3.1 and 4.12 relating to development below the FPL but does not outline the minimum floor level requirements. However, this report demonstrates that the proposed development can be constructed in a way which satisfies all of the conditions of those clauses.



Table 6-1 Flood Planning Levels

Location	Overland 1% AEP Flood Level (mAHD)	Regional 1% AEP Flood Level (mAHD)	Flood Planning Level (mAHD)
Lot 12	23.5	23.8	24.8
Lot 14	24.6	23.7	25.6
Lot 16	24.6	-	25.6



7 SUMMARY

Water Technology (WT) was commissioned by Morson Group to undertake a detailed assessment of flooding behaviour at the proposed development site located at 39-65 Old Castlereagh Road, Castlereagh. The proposed development is located within the Penrith Lakes Scheme and is therefore subject to the State Environmental Planning Policy (Precincts—Western Parkland City) 2021 and the Penrith Lakes Development Control Plan – Stage 1 (DCP).

The proposed development site is impacted by both local (overland) and regional (riverine) flooding sources. Flooding from both sources has previously been modelled and the following established model datasets were utilised for this assessment.

- Cranebrook Overland Flow Flood Study (2023) (COFFS) – Sourced from Penrith City Council (PCC); and
- Hawkesbury – Nepean River Flood Study (2024) – Sourced from NSW Reconstruction Authority (NSWRA).

Due to the coarse nature of the modelling associated with the Hawkesbury – Nepean (HN) River Flood Study, detailed modelling of the proposed development and associated impacts has only been undertaken in reference to the COFFS model package.

The modelling was first used to confirm existing flood behaviour at the site – indicating the extent of flooding over the site is significantly greater than Council's filtered mapping suggests.

Subsequent modelling of proposed developed site conditions showed that overland flow flooding impacts can be mitigated for all events up to and including the 0.5% AEP design flood event, by duplicating the existing 300mm pipe outlet adjacent to the northeastern corner of the site. Some minor residual impacts are expected to occur during rare and extreme flood events (0.2% AEP and PMF) however these impacts are noted to be small, do not occur on dwellings or buildings and do not represent a fundamental change to flooding behaviour in the wider study area.



APPENDIX A EXISTING CASE FLOOD MAPS







LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Depth - 5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Depth - 2% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Depth - 1% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Depth - 0.5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Depth - 0.2% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh

Overland Flow Flooding

Existing Flood Depth - PMF





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Levels - 20% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



LEGEND

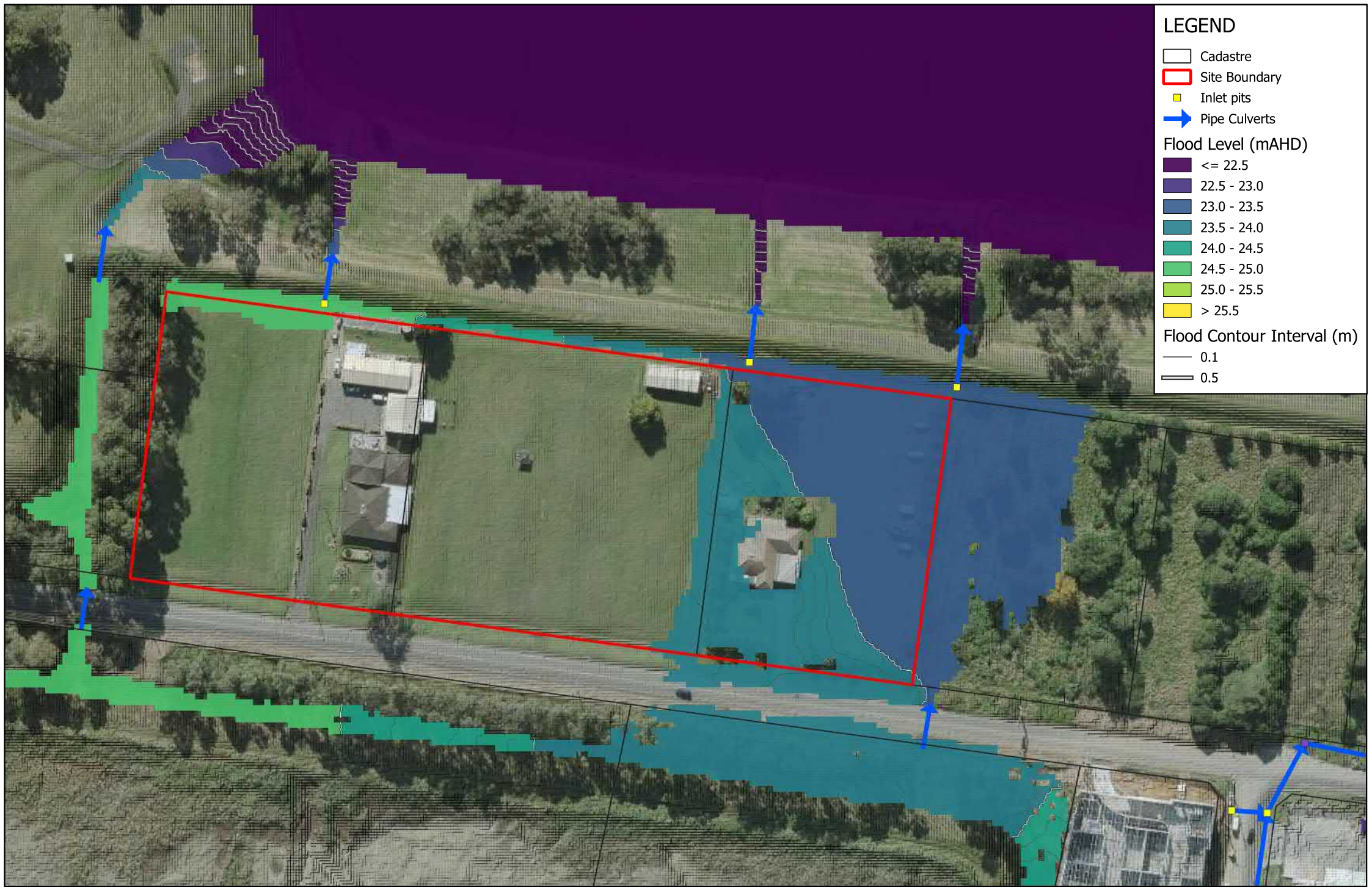
- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



LEGEND

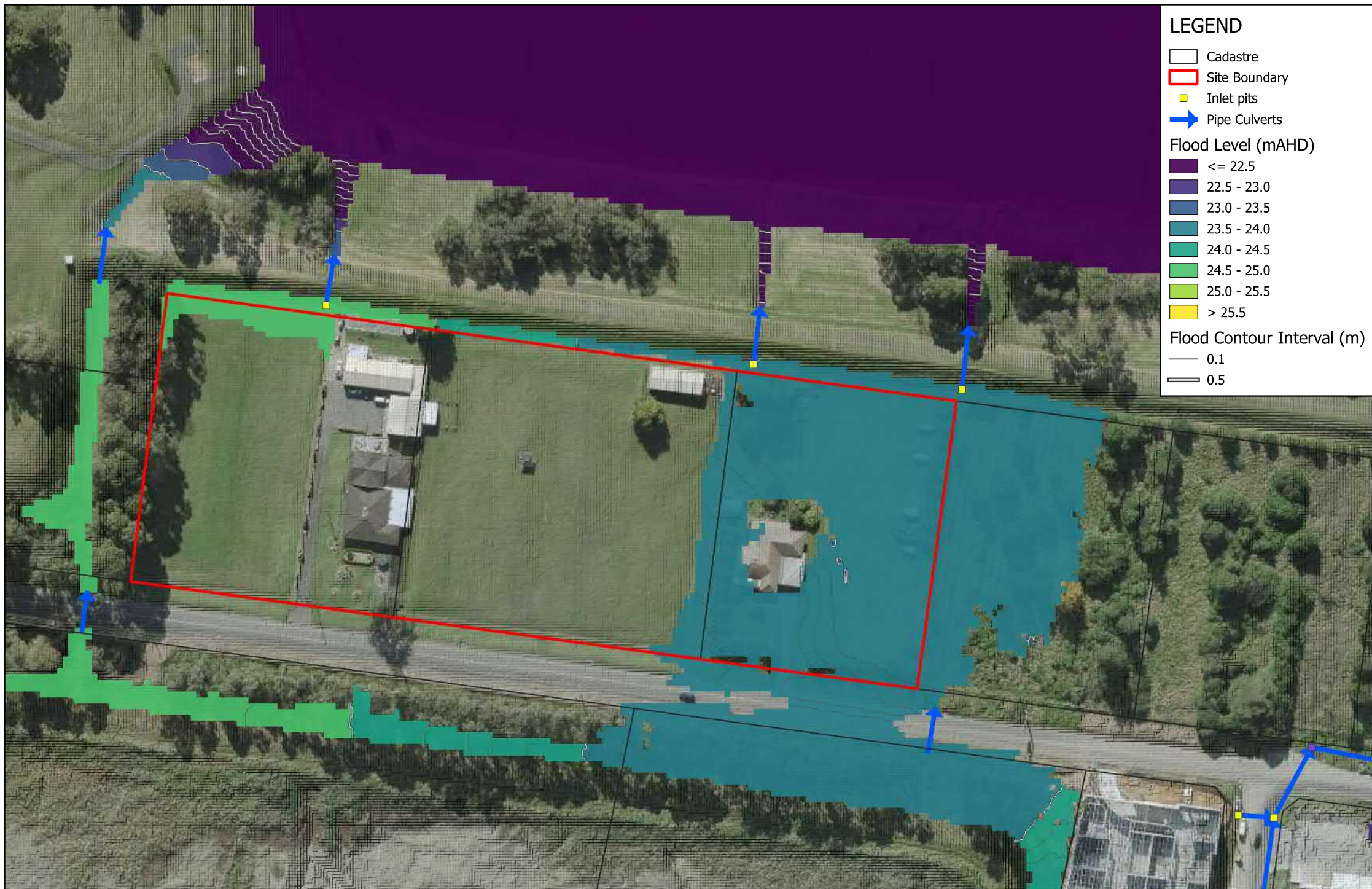
- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

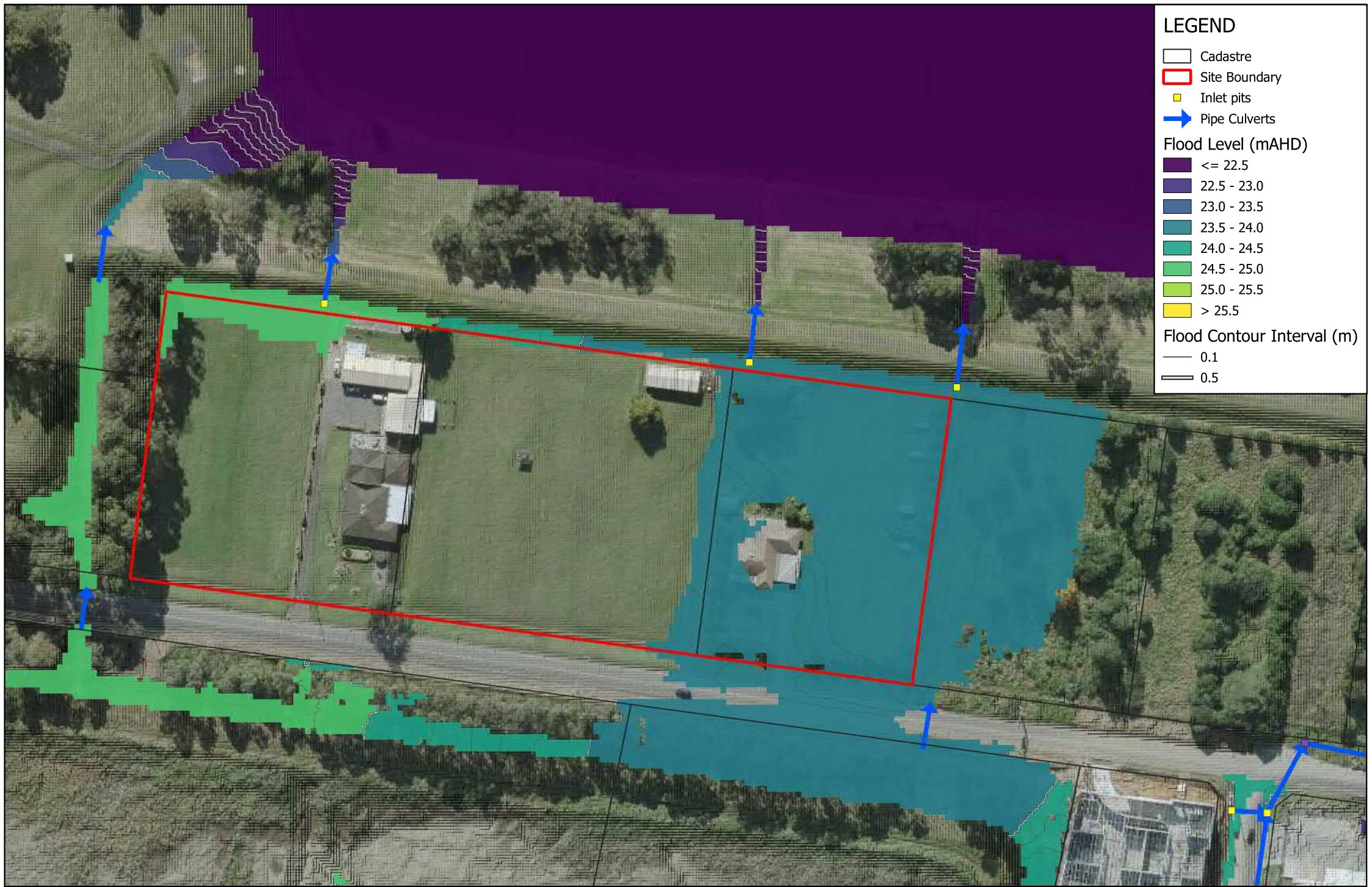
Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

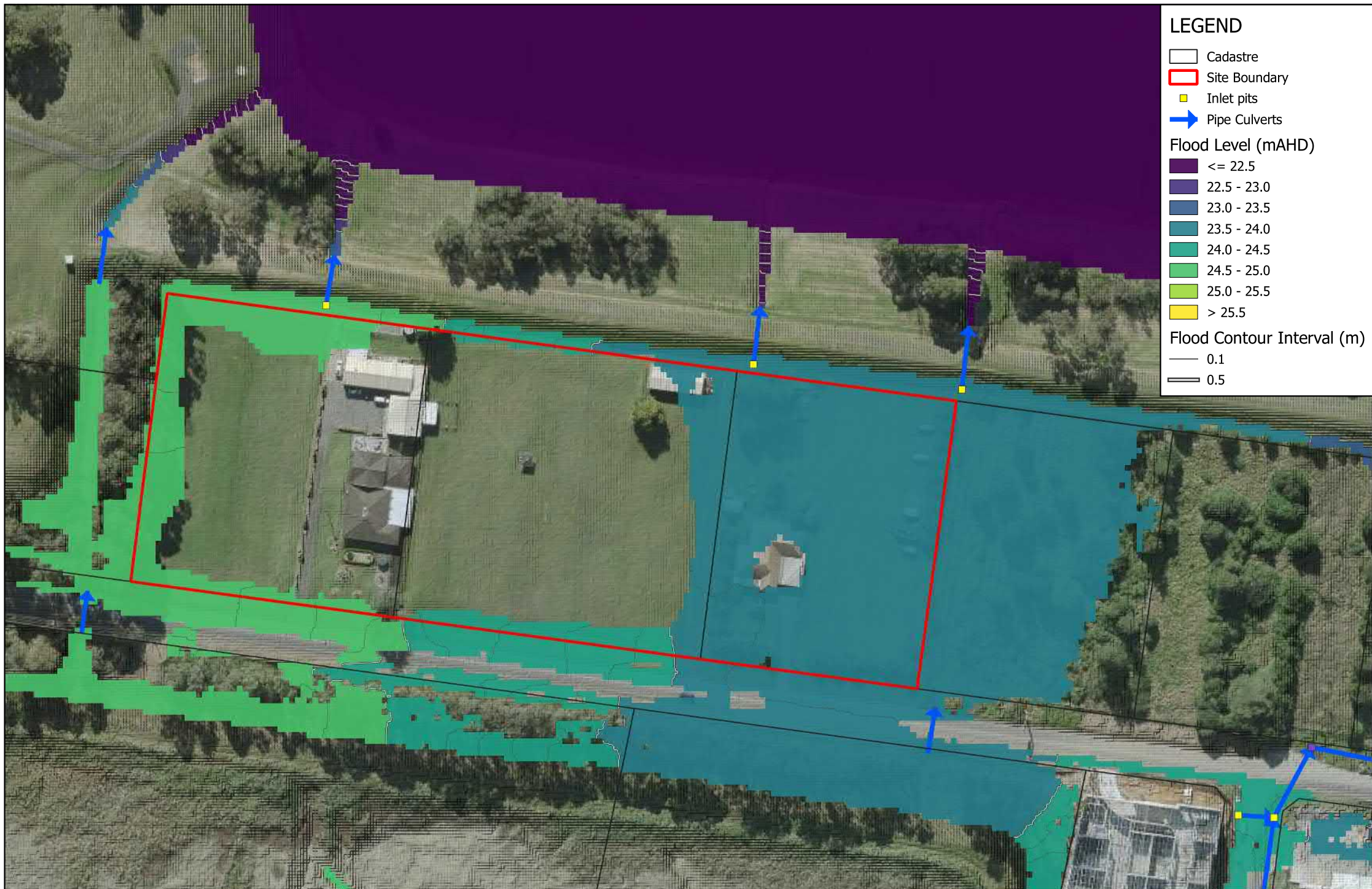
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Levels - 0.5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Level (mAHd)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

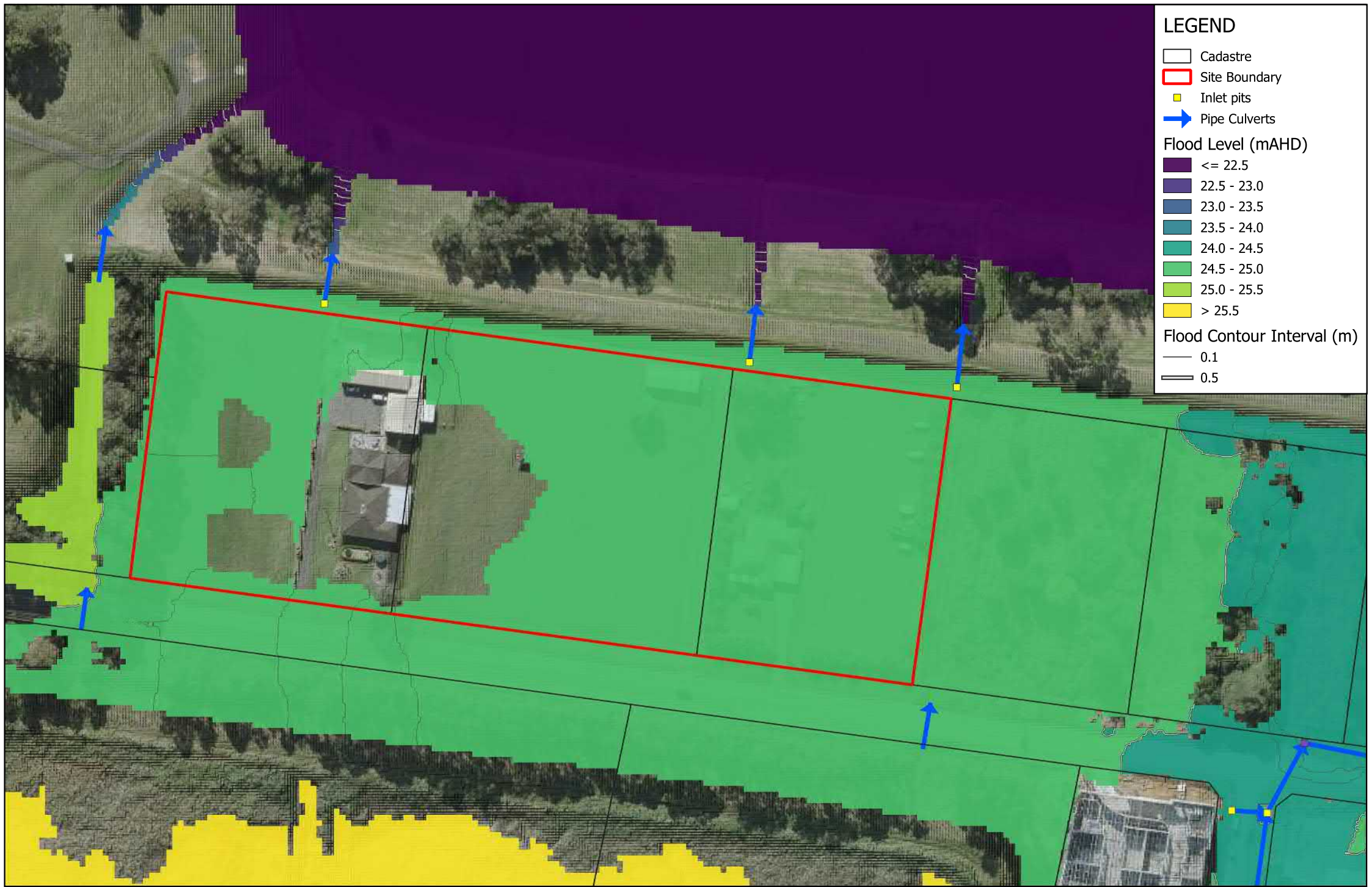
Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Levels - 0.2% AEP



WATER TECHNOLOGY
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LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Level (mAHd)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



LEGEND

- Cadastre
 - Site Boundary
 - Inlet pits
 - Pipe Culverts
- Velocity (m/s)
- | |
|-----------|
| <= 0.1 |
| 0.1 - 0.2 |
| 0.2 - 0.3 |
| 0.3 - 0.4 |
| 0.4 - 0.5 |
| 0.5 - 0.6 |
| 0.6 - 0.7 |
| 0.7 - 0.8 |
| 0.8 - 0.9 |
| 0.9 - 1.0 |
| > 1.0 |



Projection: GDA / MGA94 Zone 56
Produced By: Water Technology Pty Ltd
Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Velocity - 50% AEP





LEGEND

Cadastre

Site Boundary

Inlet pits

Pipe Culverts

Velocity (m/s)

<= 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.6

0.6 - 0.7

0.7 - 0.8

0.8 - 0.9

0.9 - 1.0

> 1.0



LEGEND

Cadastre

Site Boundary

Inlet pits

Pipe Culverts

Velocity (m/s)

<= 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.6

0.6 - 0.7

0.7 - 0.8

0.8 - 0.9

0.9 - 1.0

> 1.0



LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh

Overland Flow Flooding

Existing Velocity - 5% AEP



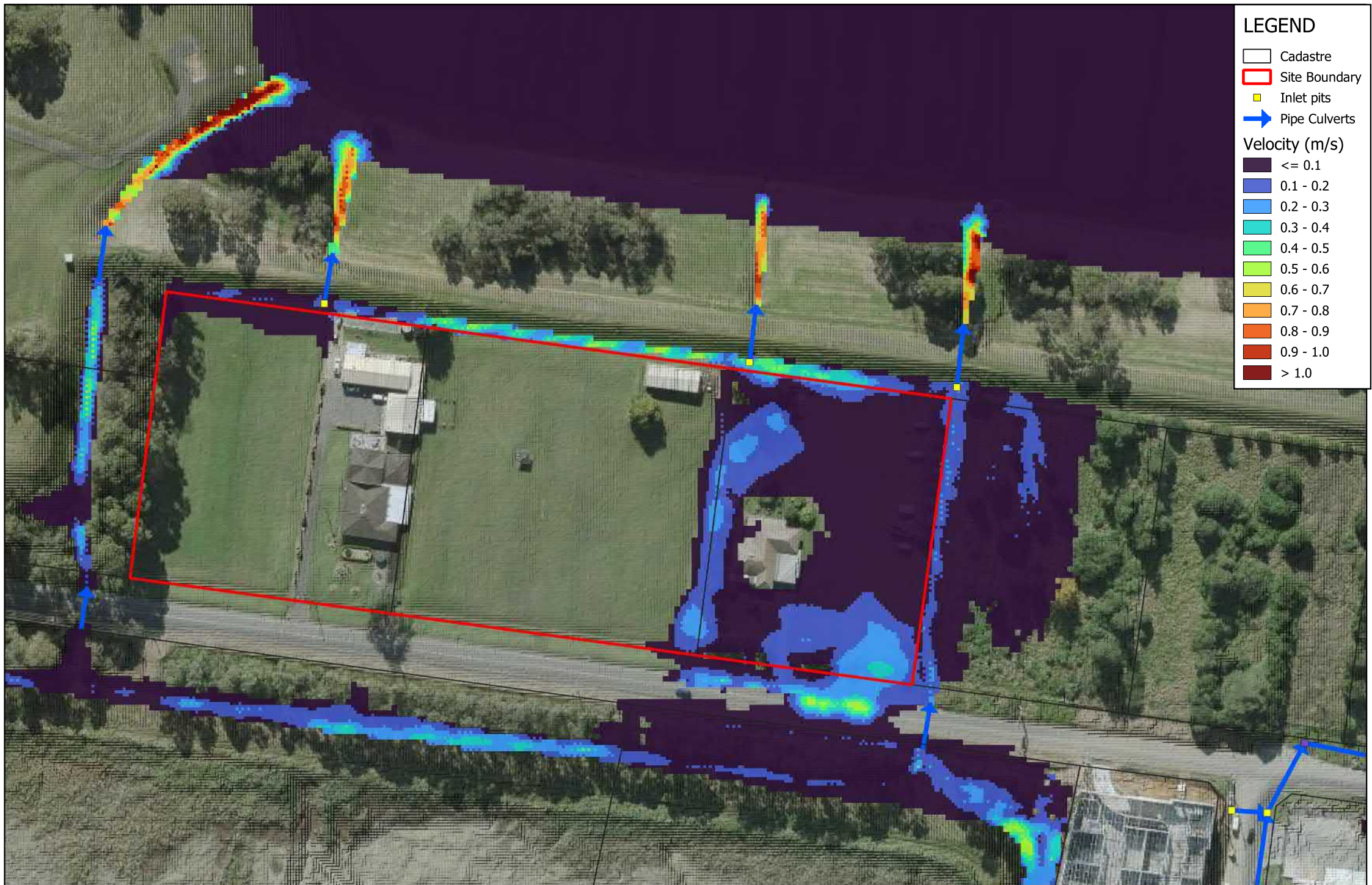


LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Velocity (m/s)

<= 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
> 1.0



LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

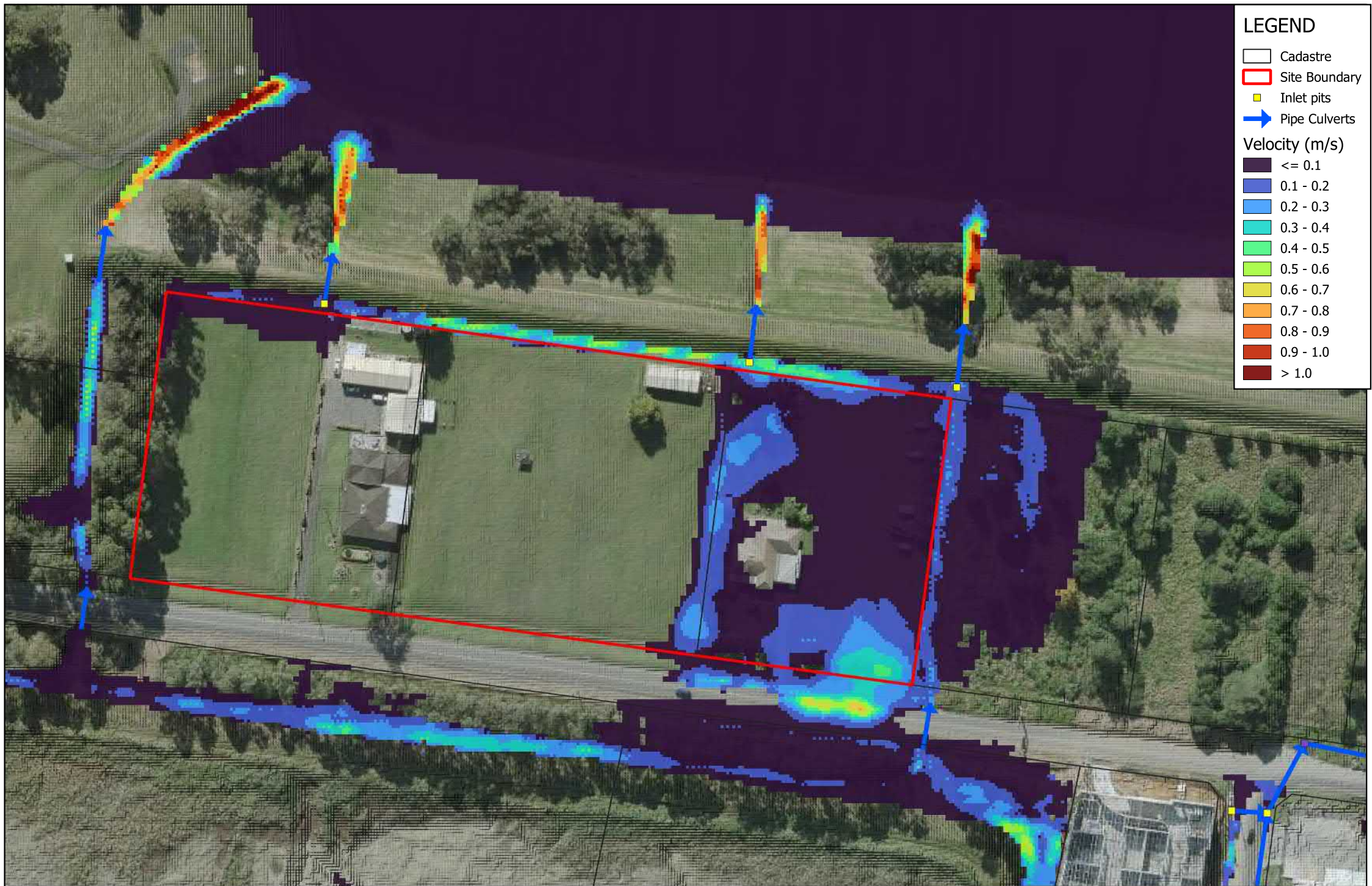
0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh

Overland Flow Flooding

Existing Velocity - 1% AEP





LEGEND

Cadastre

Site Boundary

Inlet pits

Pipe Culverts

Velocity (m/s)

<= 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.6

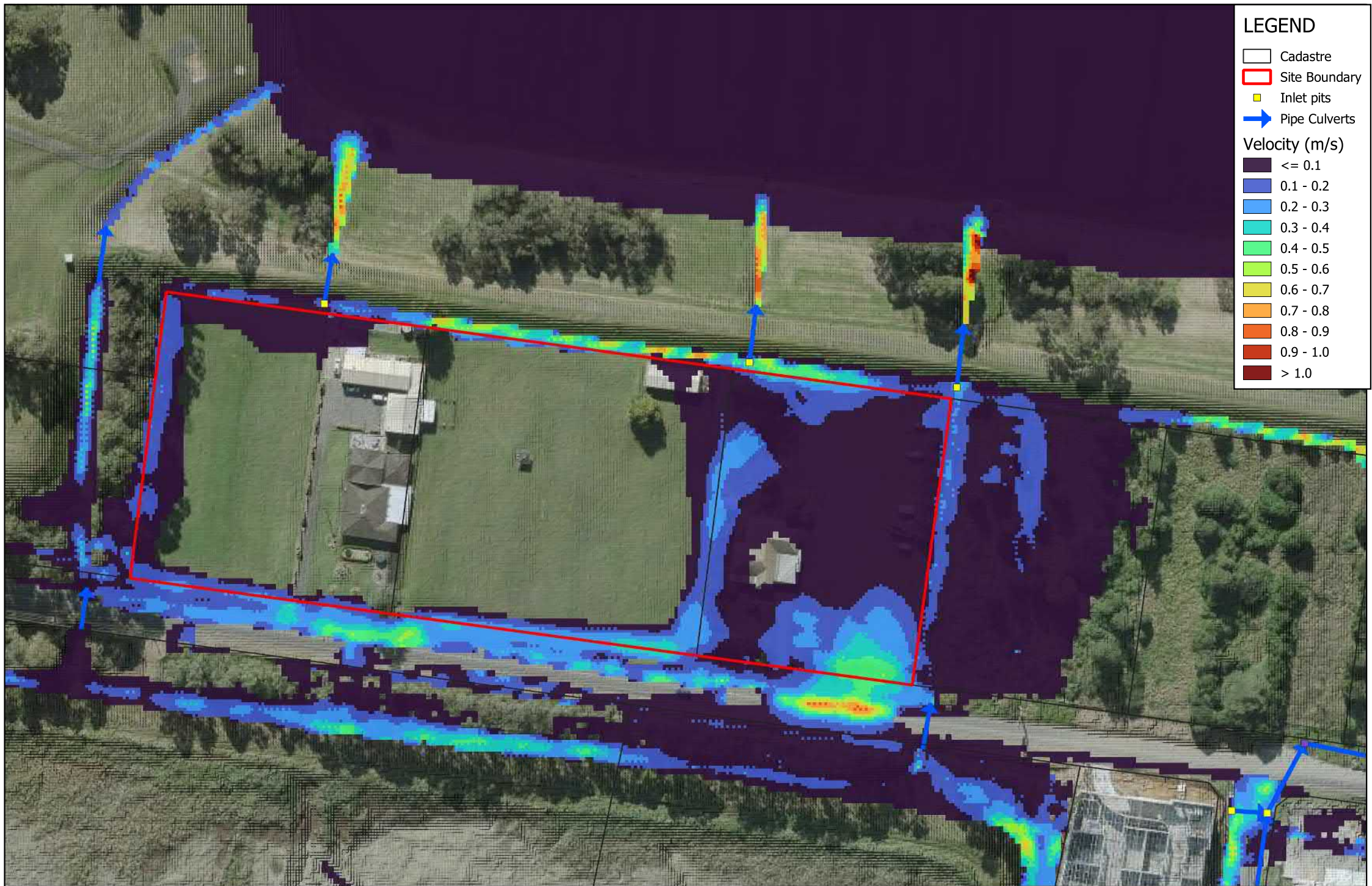
0.6 - 0.7

0.7 - 0.8

0.8 - 0.9

0.9 - 1.0

> 1.0



LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

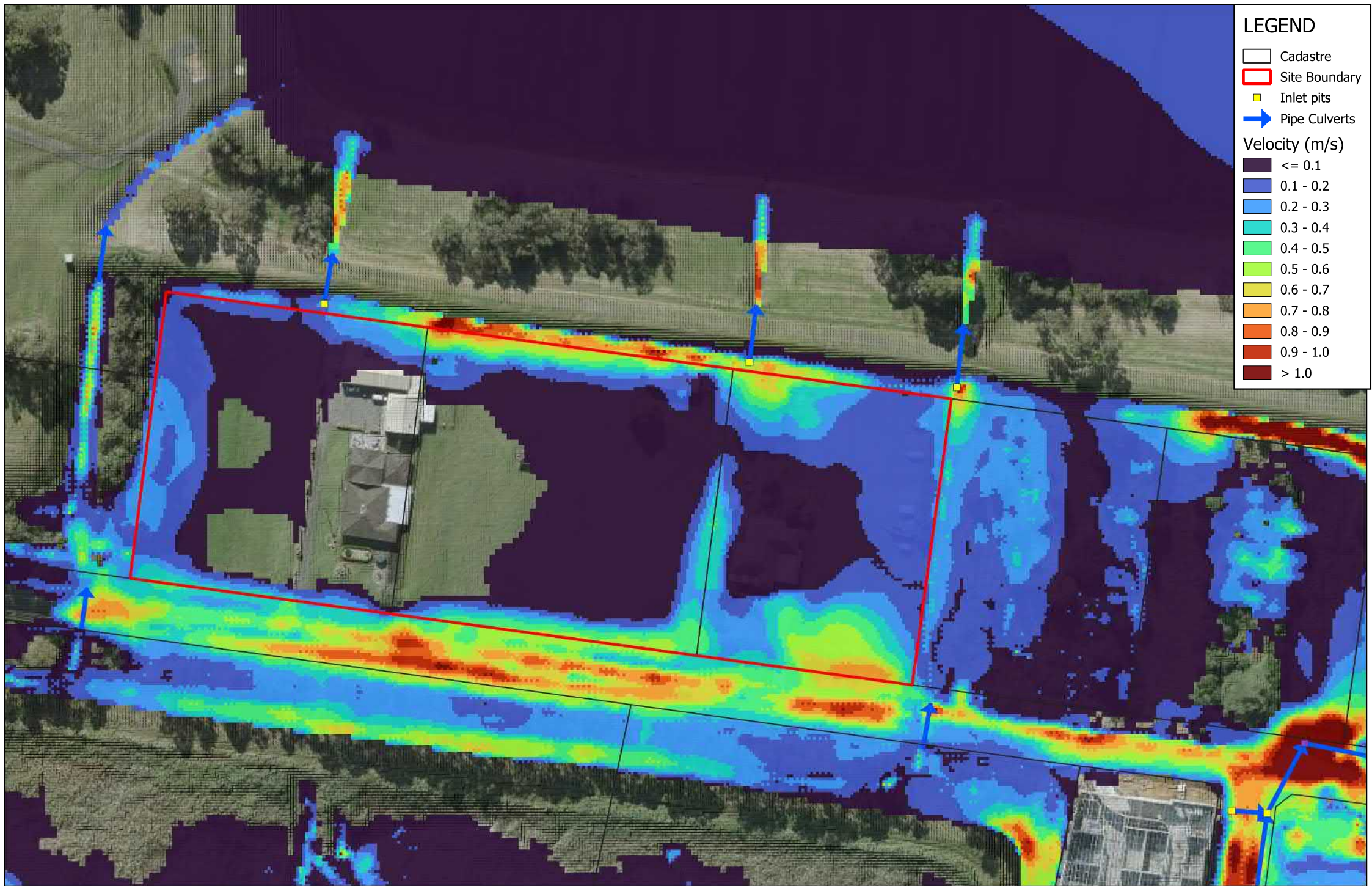
0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh

Overland Flow Flooding

Existing Velocity - 0.2% AEP



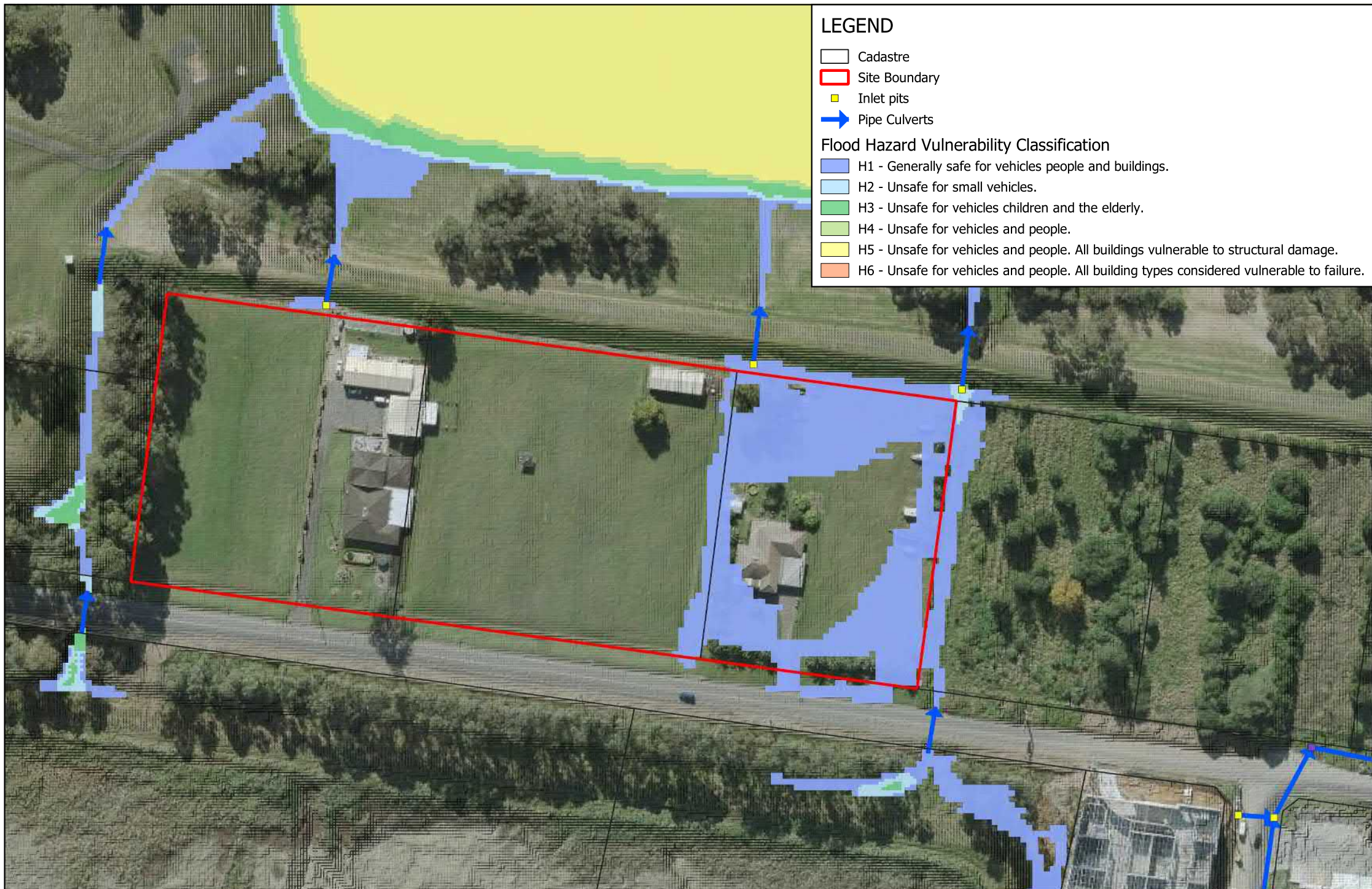


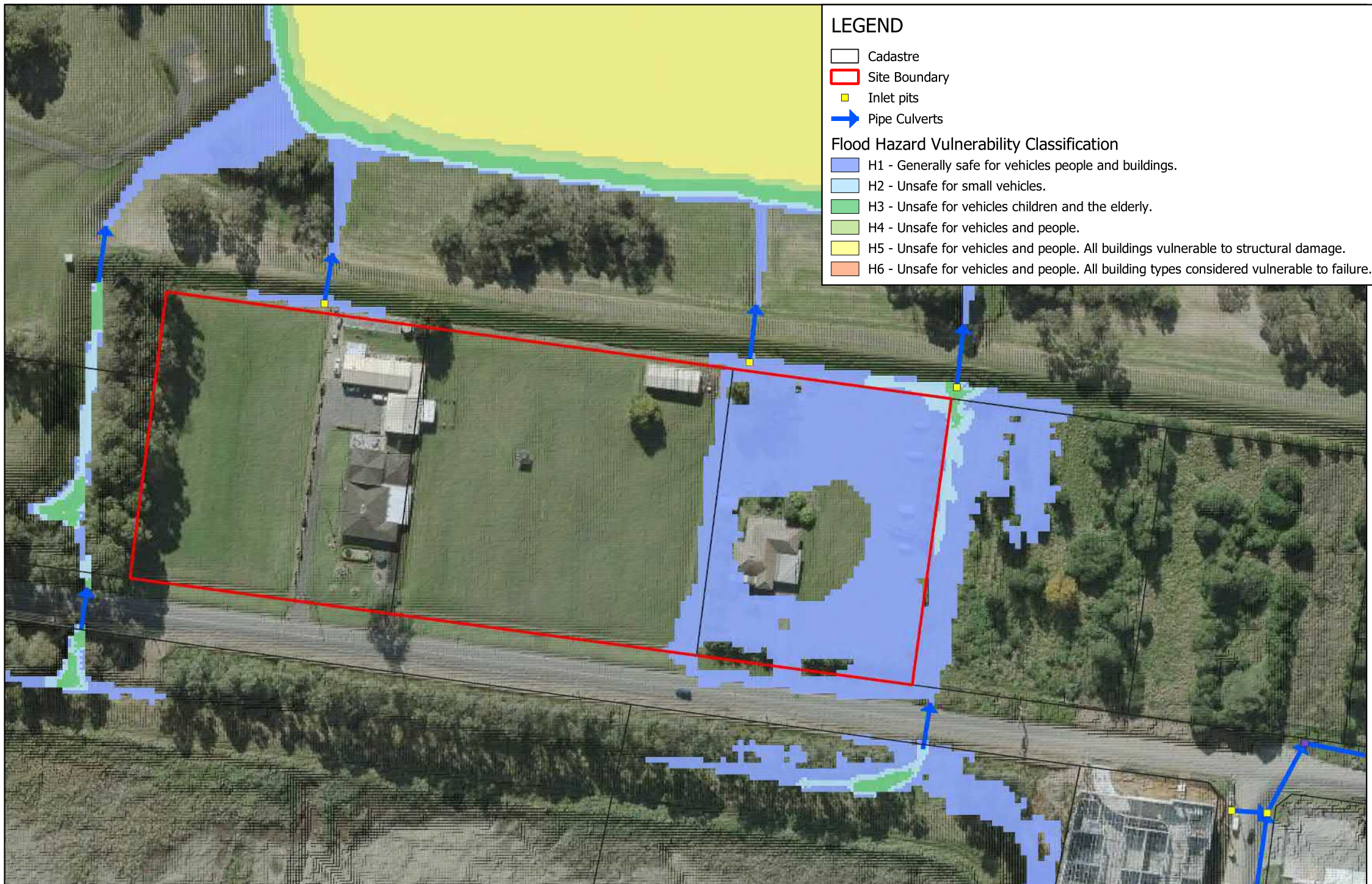
LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

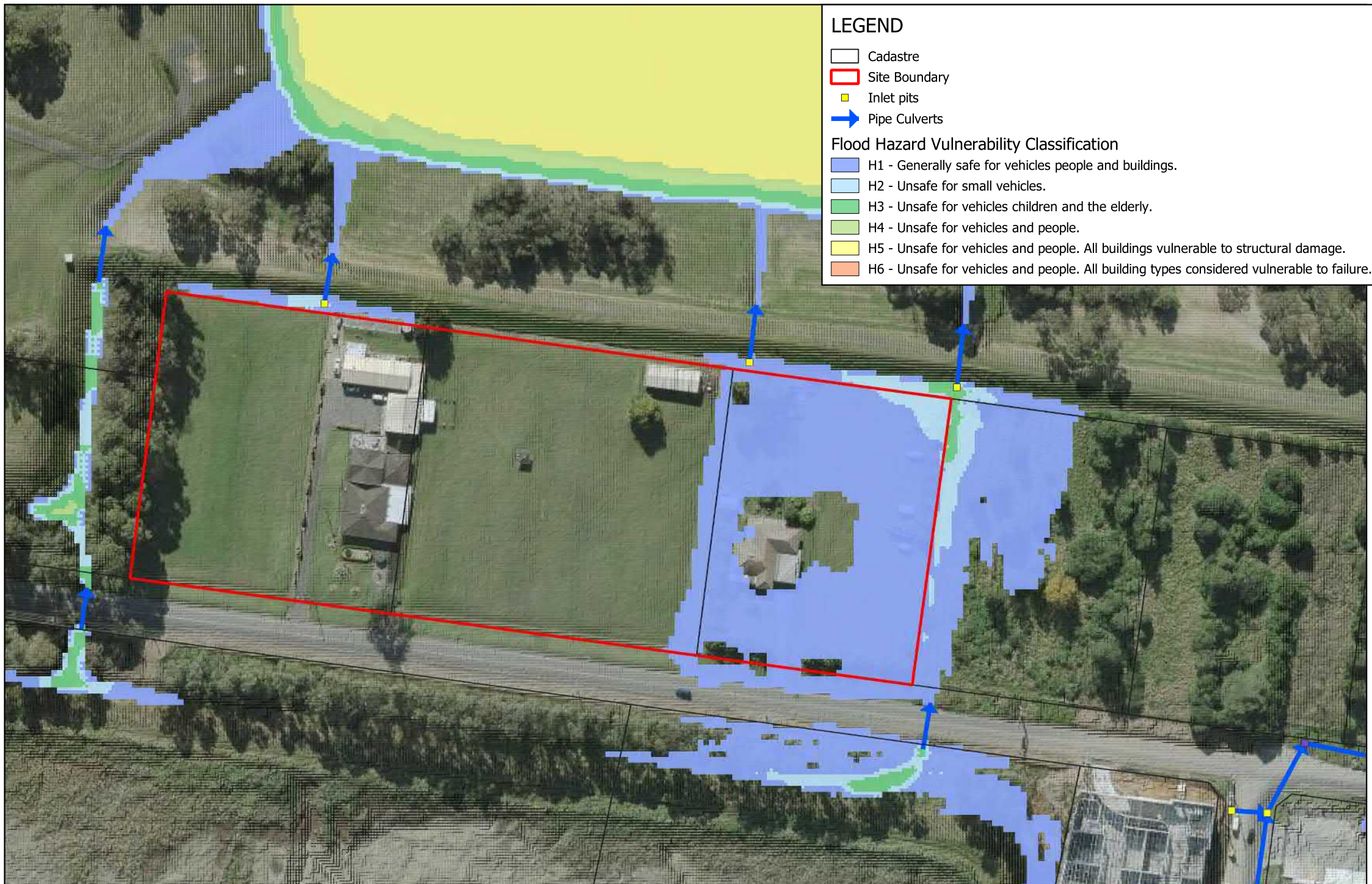
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Hazard - 20% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

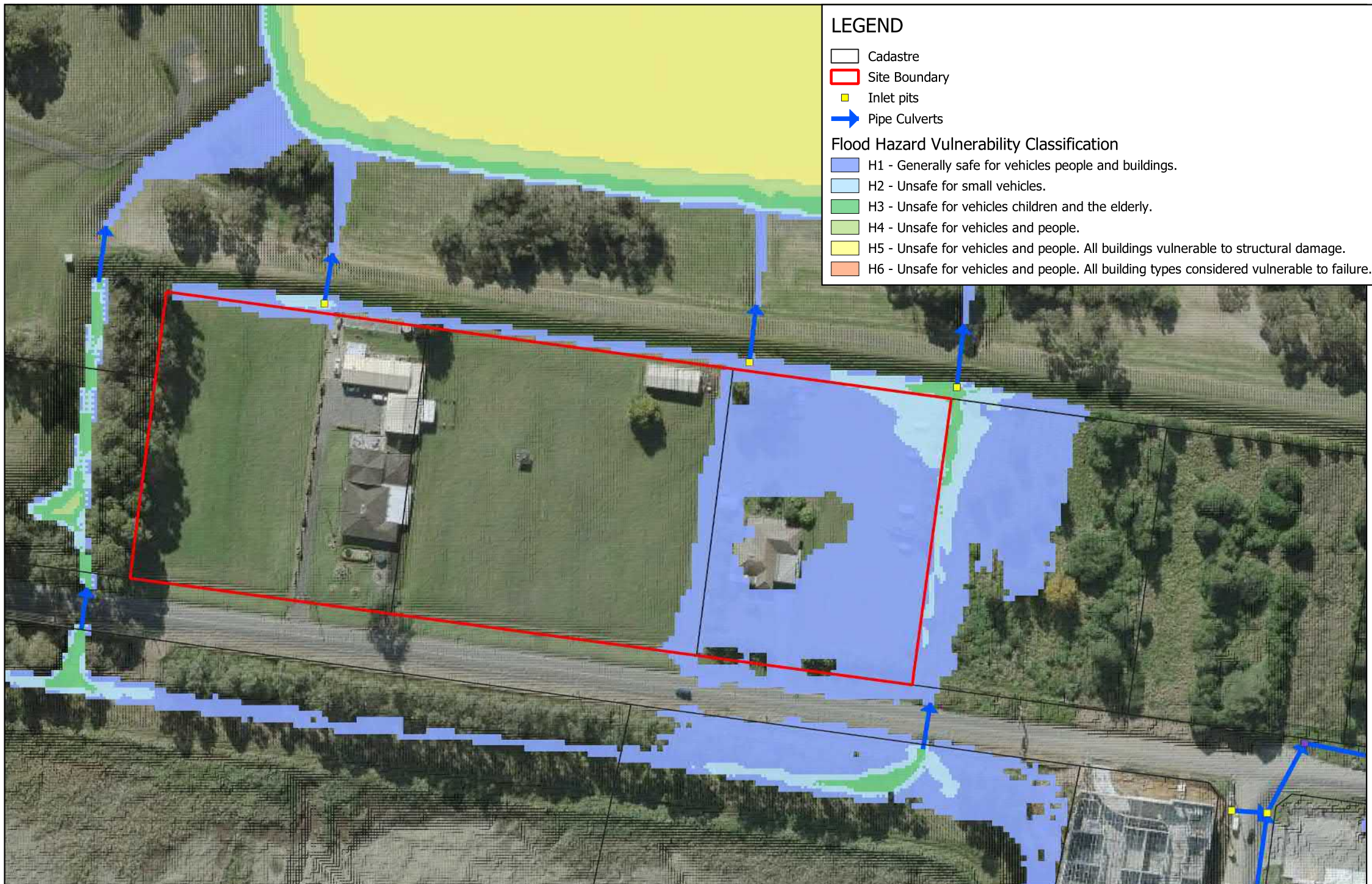
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Hazard - 10% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

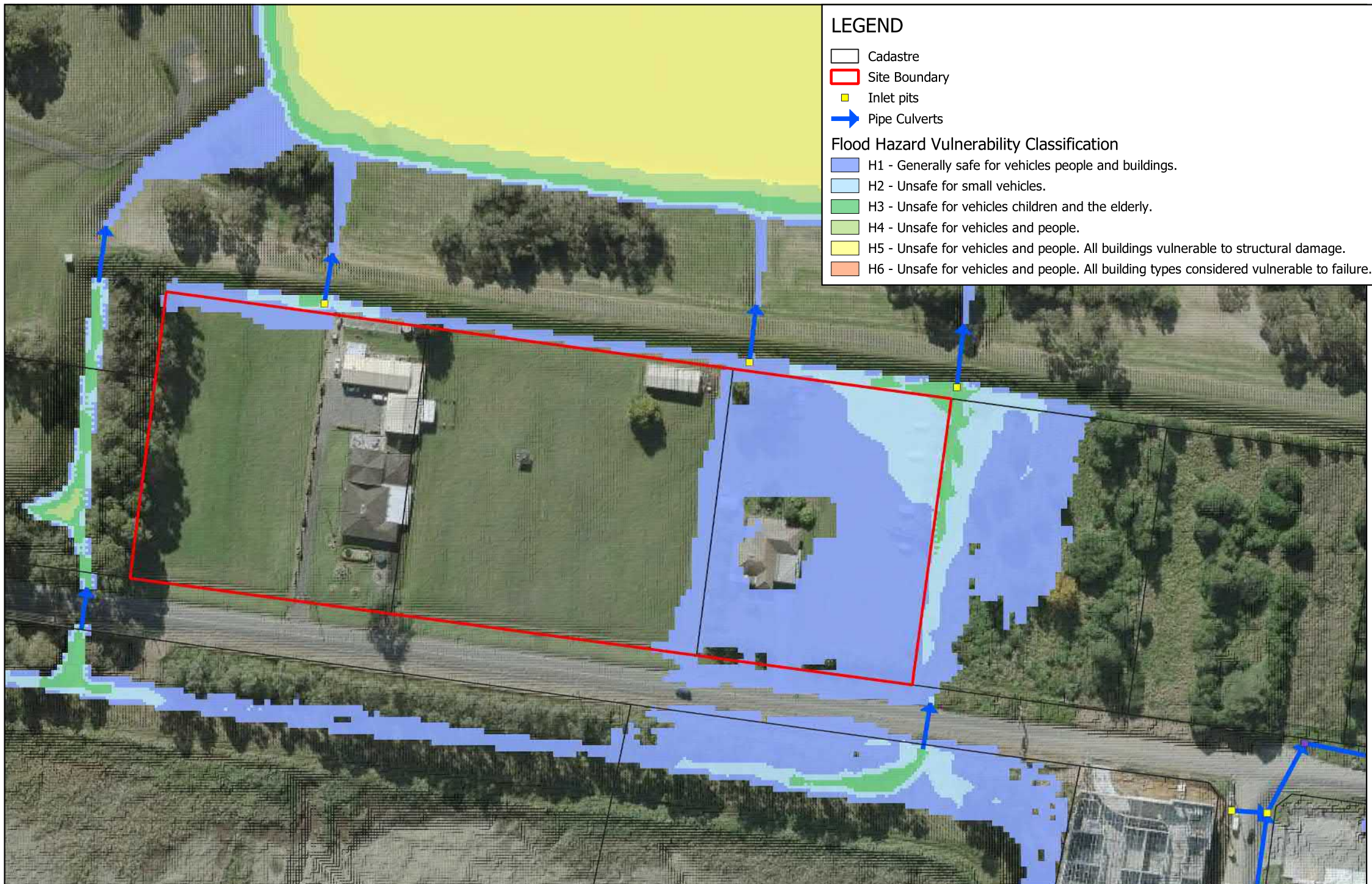
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Hazard - 5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

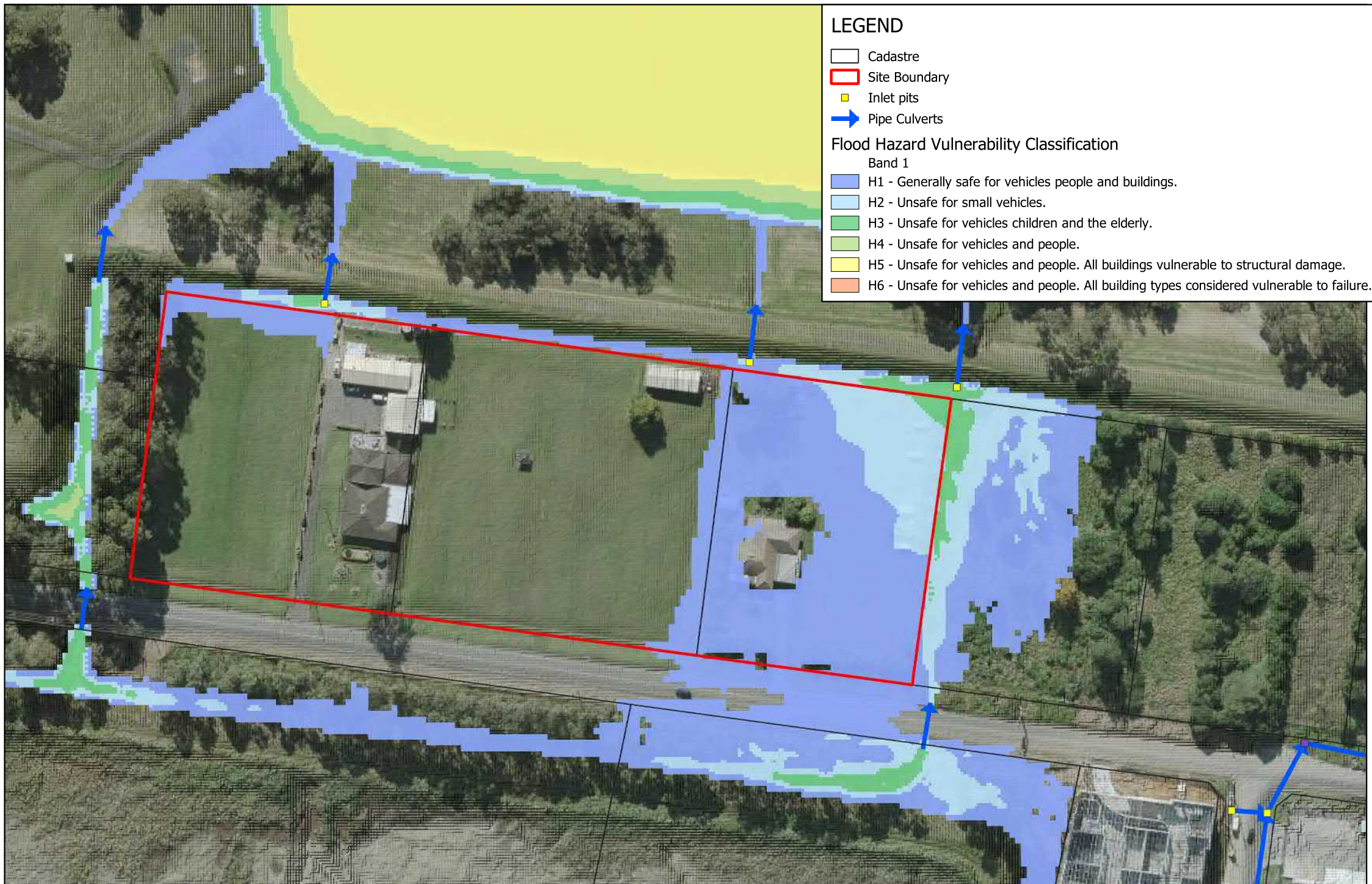
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Hazard - 2% AEP





LEGEND

□ Cadastre

□ Site Boundary

■ Inlet pits

→ Pipe Culverts

Flood Hazard Vulnerability Classification

Band 1

■ H1 - Generally safe for vehicles people and buildings.

■ H2 - Unsafe for small vehicles.

■ H3 - Unsafe for vehicles children and the elderly.

■ H4 - Unsafe for vehicles and people.

■ H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.

■ H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

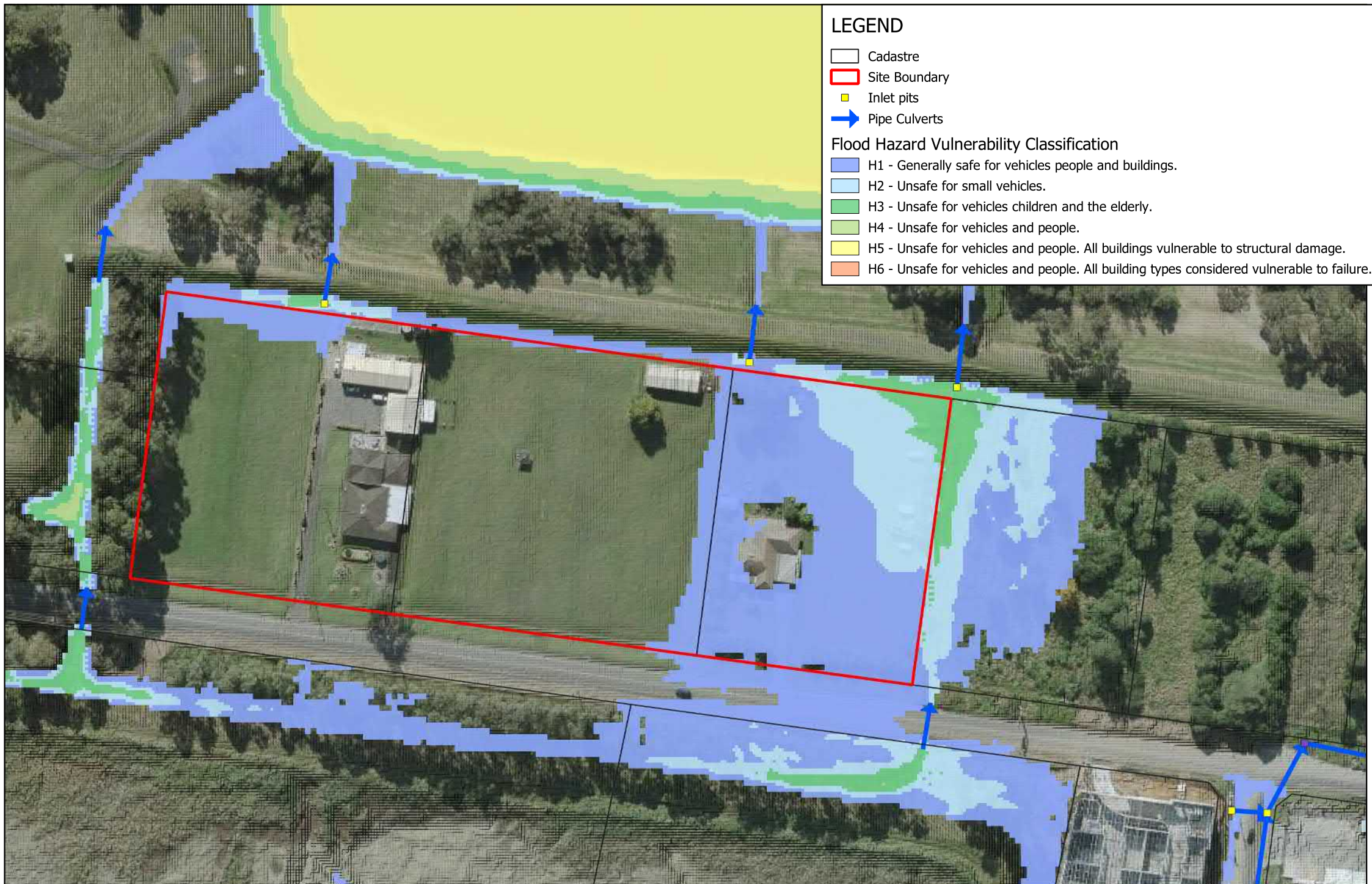
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Hazard - 1% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

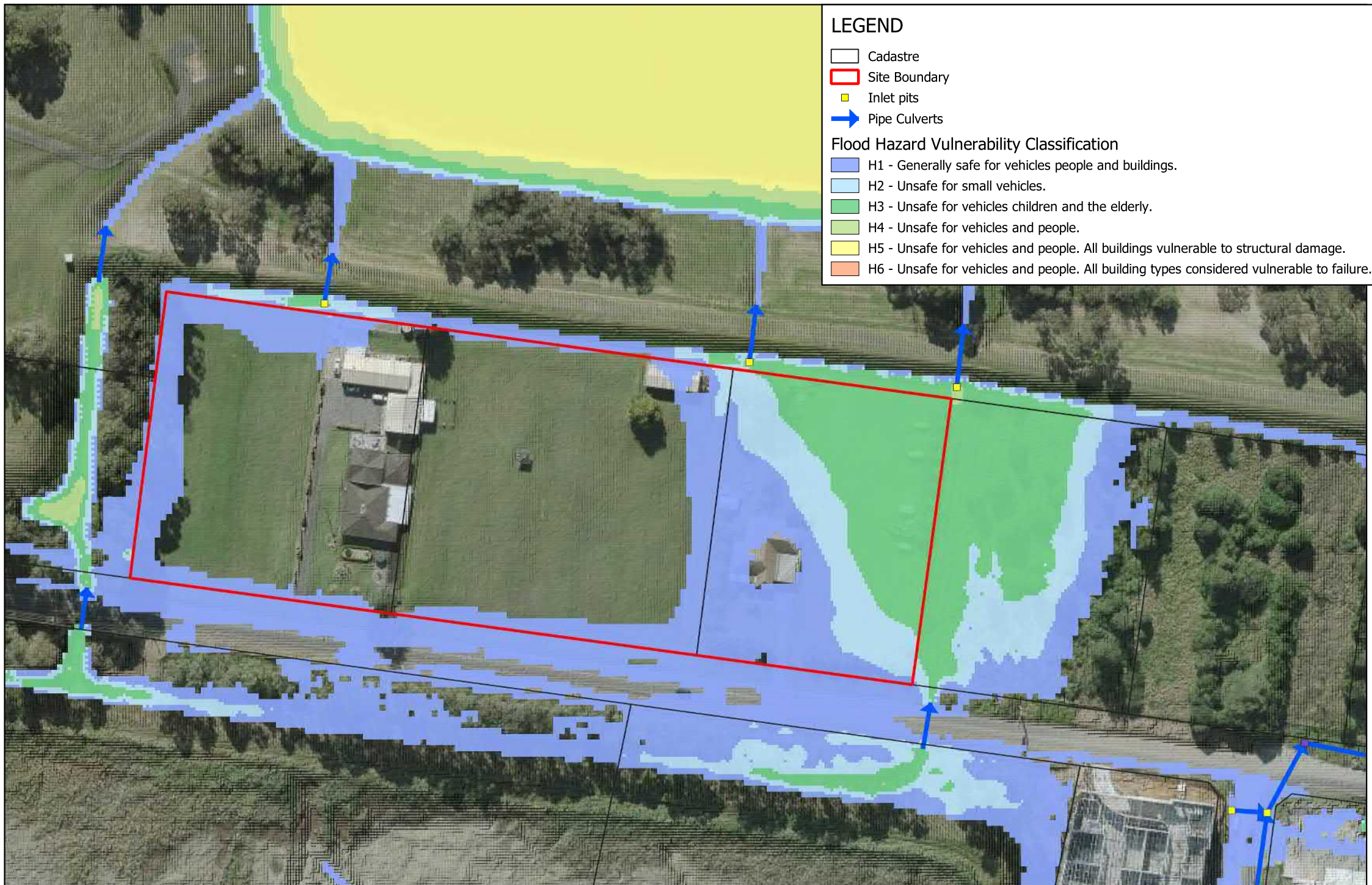
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Hazard - 0.5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

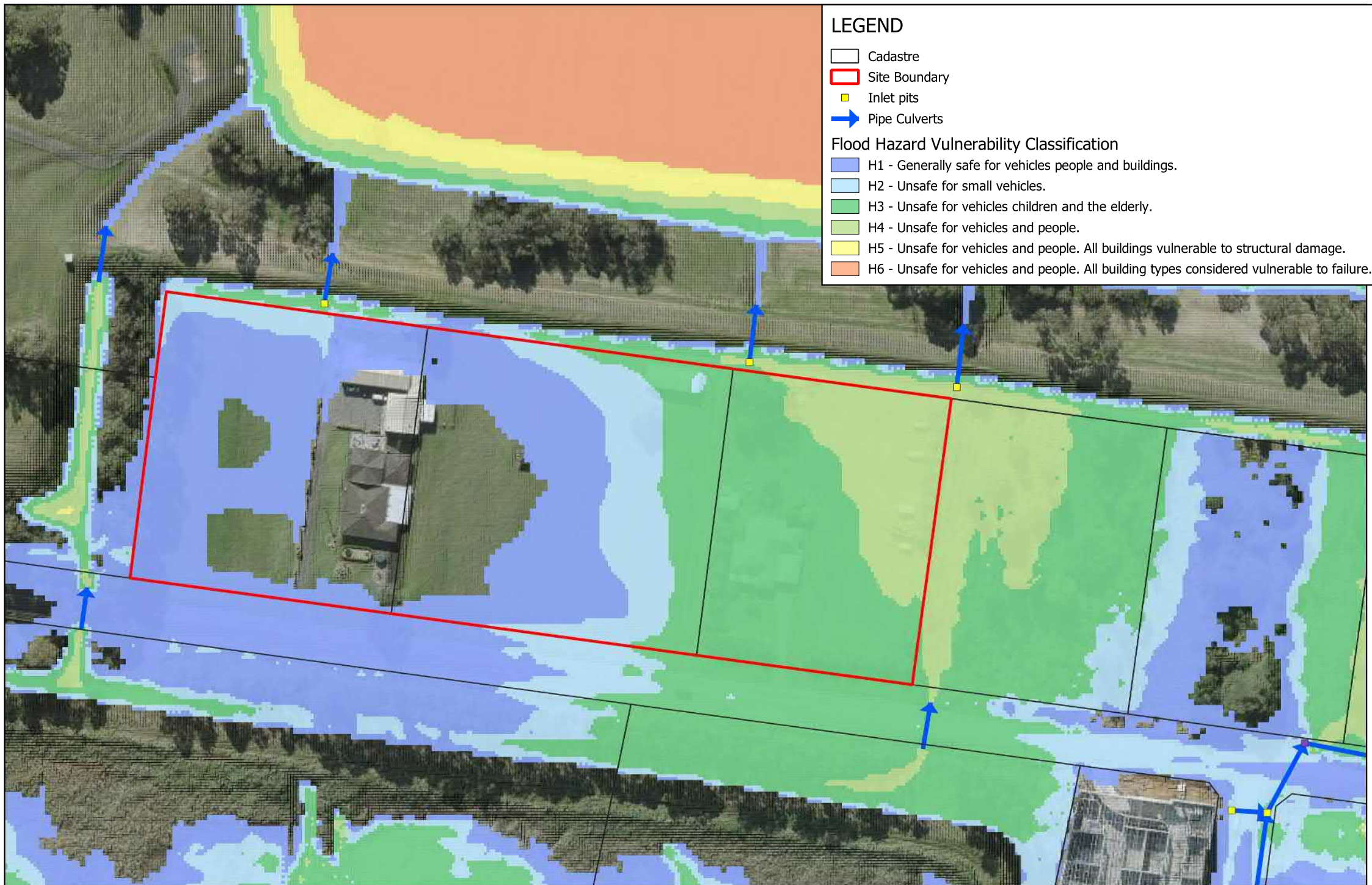
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Existing Flood Hazard - 0.2% AEP





LEGEND

▭ Cadastre

▭ Site Boundary

■ Inlet pits

➔ Pipe Culverts

Flood Hazard Vulnerability Classification

■ H1 - Generally safe for vehicles people and buildings.

■ H2 - Unsafe for small vehicles.

■ H3 - Unsafe for vehicles children and the elderly.

■ H4 - Unsafe for vehicles and people.

■ H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.

■ H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh

Overland Flow Flooding

Existing Flood Hazard - PMF





APPENDIX B DEVELOPED CASE FLOOD MAPS





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 50% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

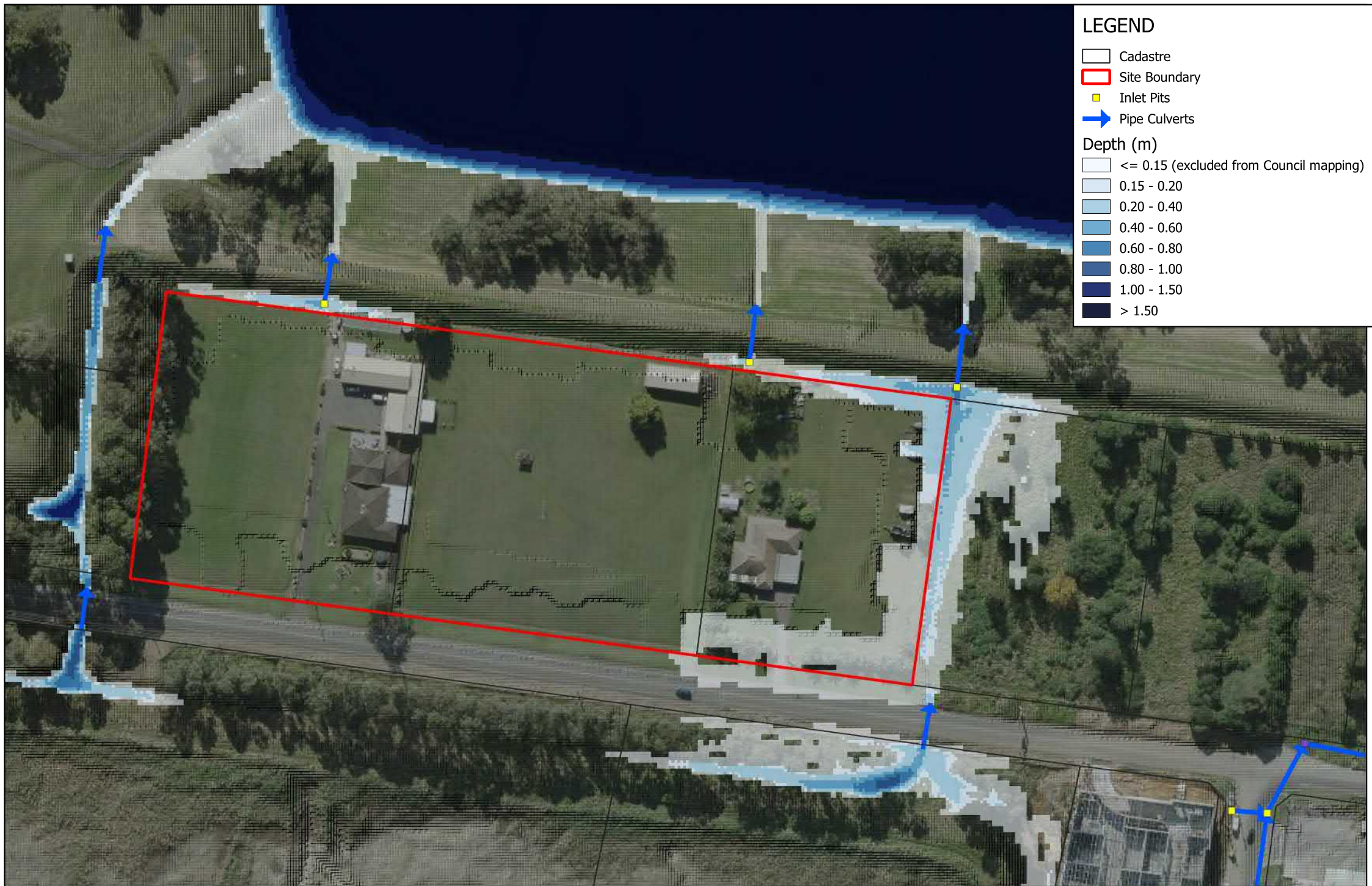
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 20% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 10% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 2% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 1% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 0.5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - 0.2% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Depth (m)

- ≤ 0.15 (excluded from Council mapping)
- 0.15 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- > 1.50



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Depth - PMF





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Levels - 50% AEP



WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Levels - 10% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Levels - 5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

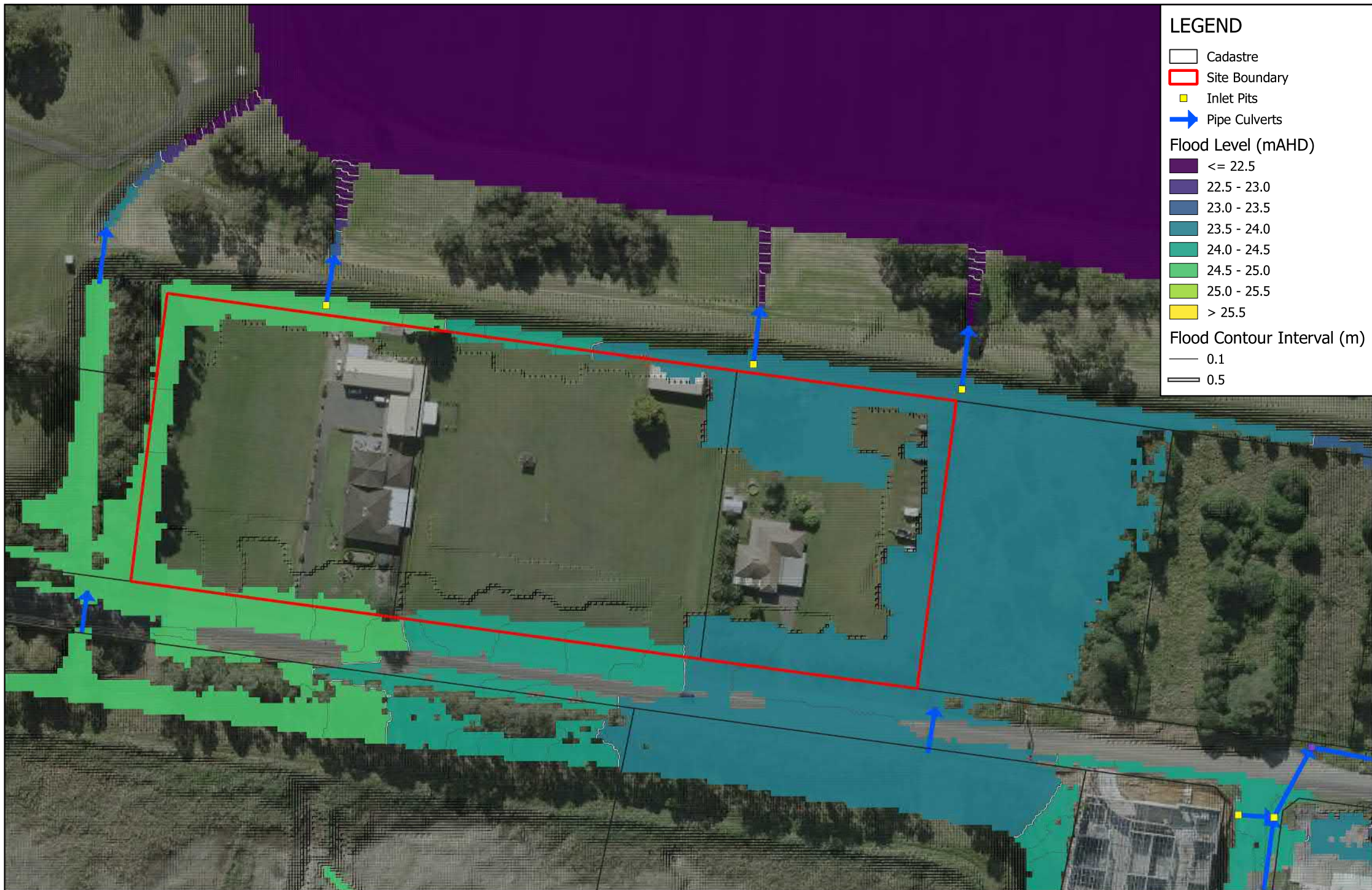
0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Levels - 2% AEP









LEGEND

- Cadastral
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Level (mAHd)

- <= 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



Projection: GDA / MGA94 Zone 56

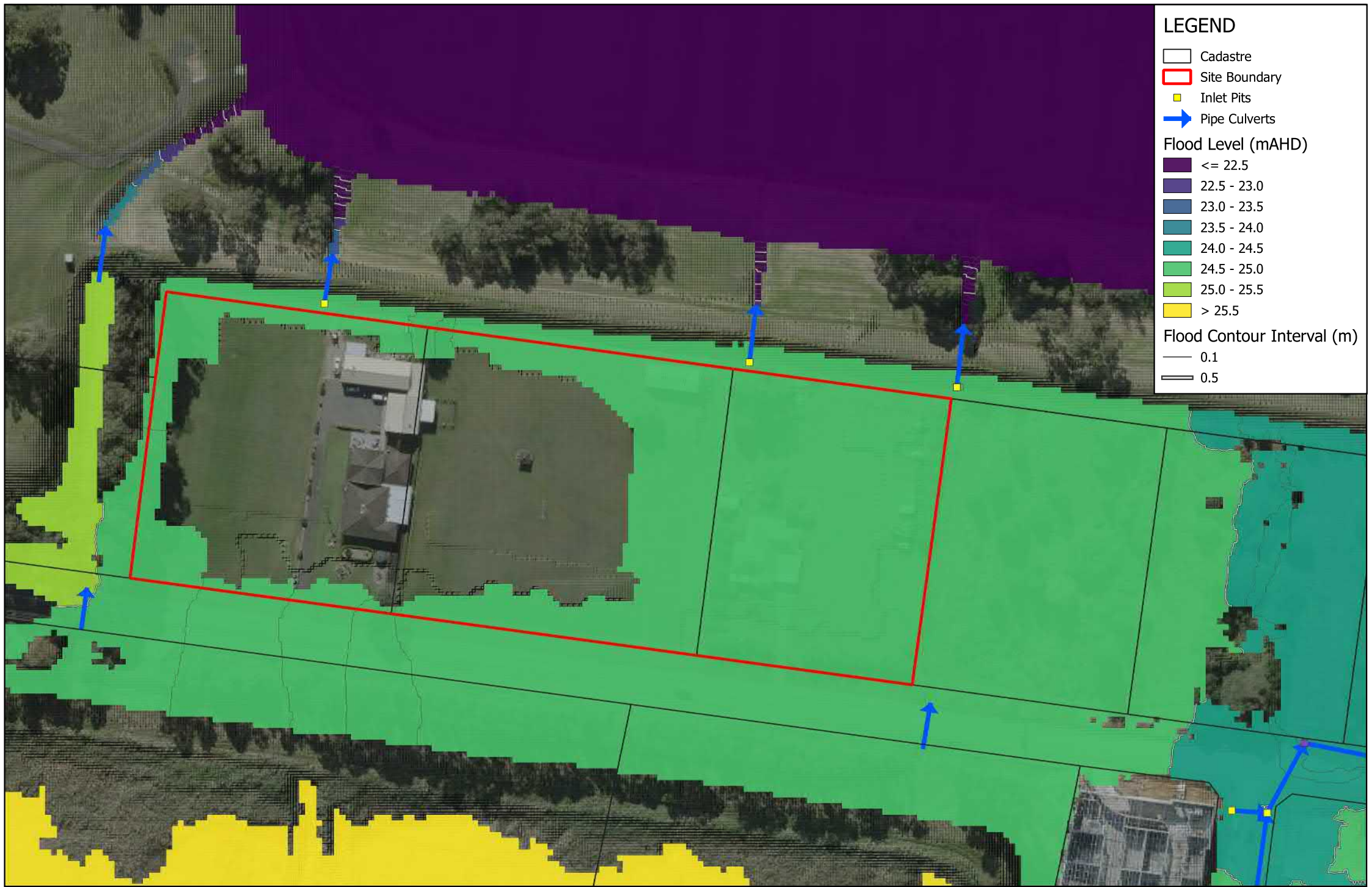
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Levels - 0.2% AEP





LEGEND

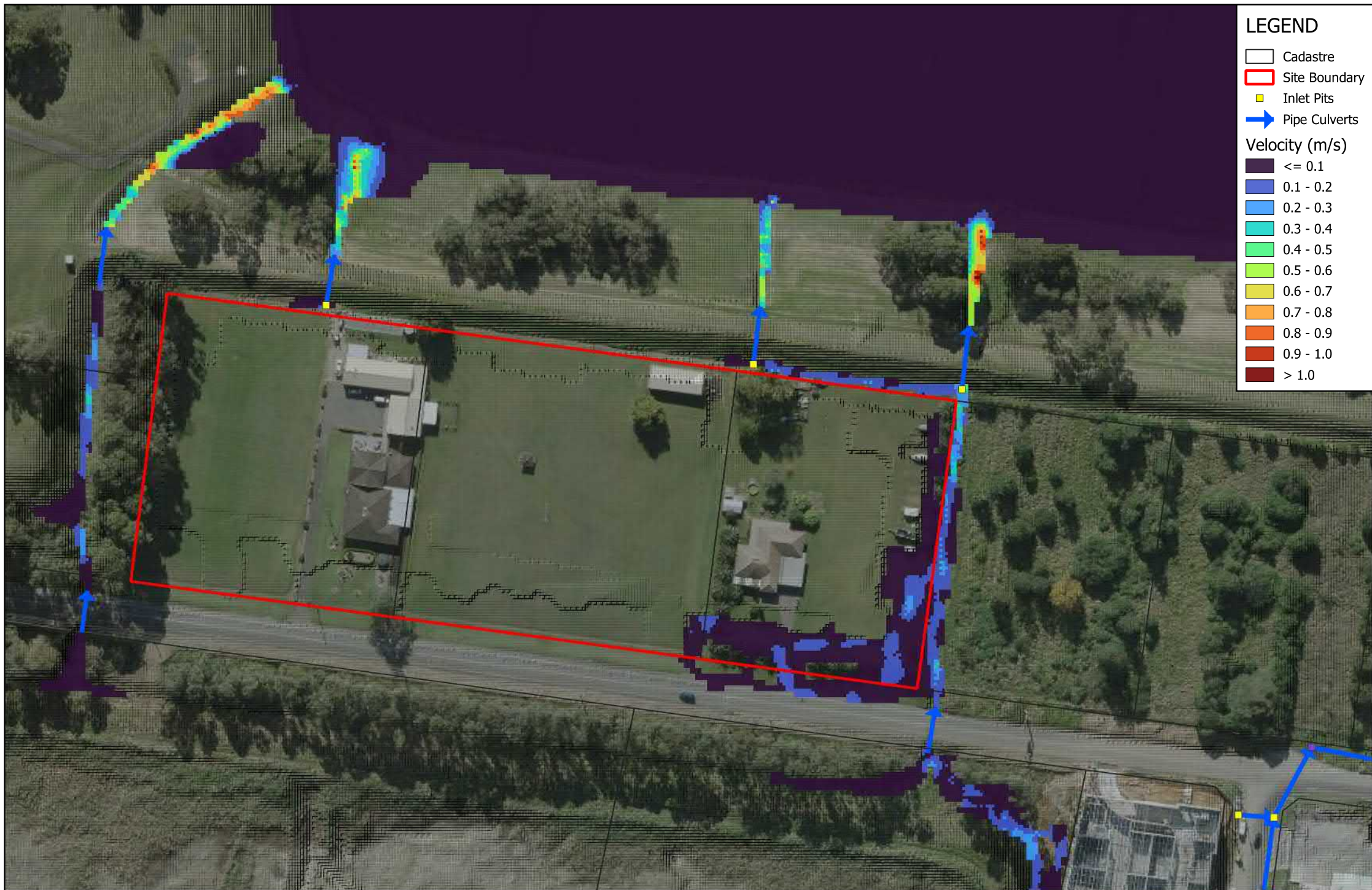
- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Level (mAHD)

- ≤ 22.5
- 22.5 - 23.0
- 23.0 - 23.5
- 23.5 - 24.0
- 24.0 - 24.5
- 24.5 - 25.0
- 25.0 - 25.5
- > 25.5

Flood Contour Interval (m)

- 0.1
- 0.5



LEGEND

- Cadastre
 - Site Boundary
 - Inlet Pits
 - Pipe Culverts
- Velocity (m/s)
- | |
|-----------|
| <= 0.1 |
| 0.1 - 0.2 |
| 0.2 - 0.3 |
| 0.3 - 0.4 |
| 0.4 - 0.5 |
| 0.5 - 0.6 |
| 0.6 - 0.7 |
| 0.7 - 0.8 |
| 0.8 - 0.9 |
| 0.9 - 1.0 |
| > 1.0 |



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Velocity - 50% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Velocity - 20% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Velocity - 10% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Velocity - 5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

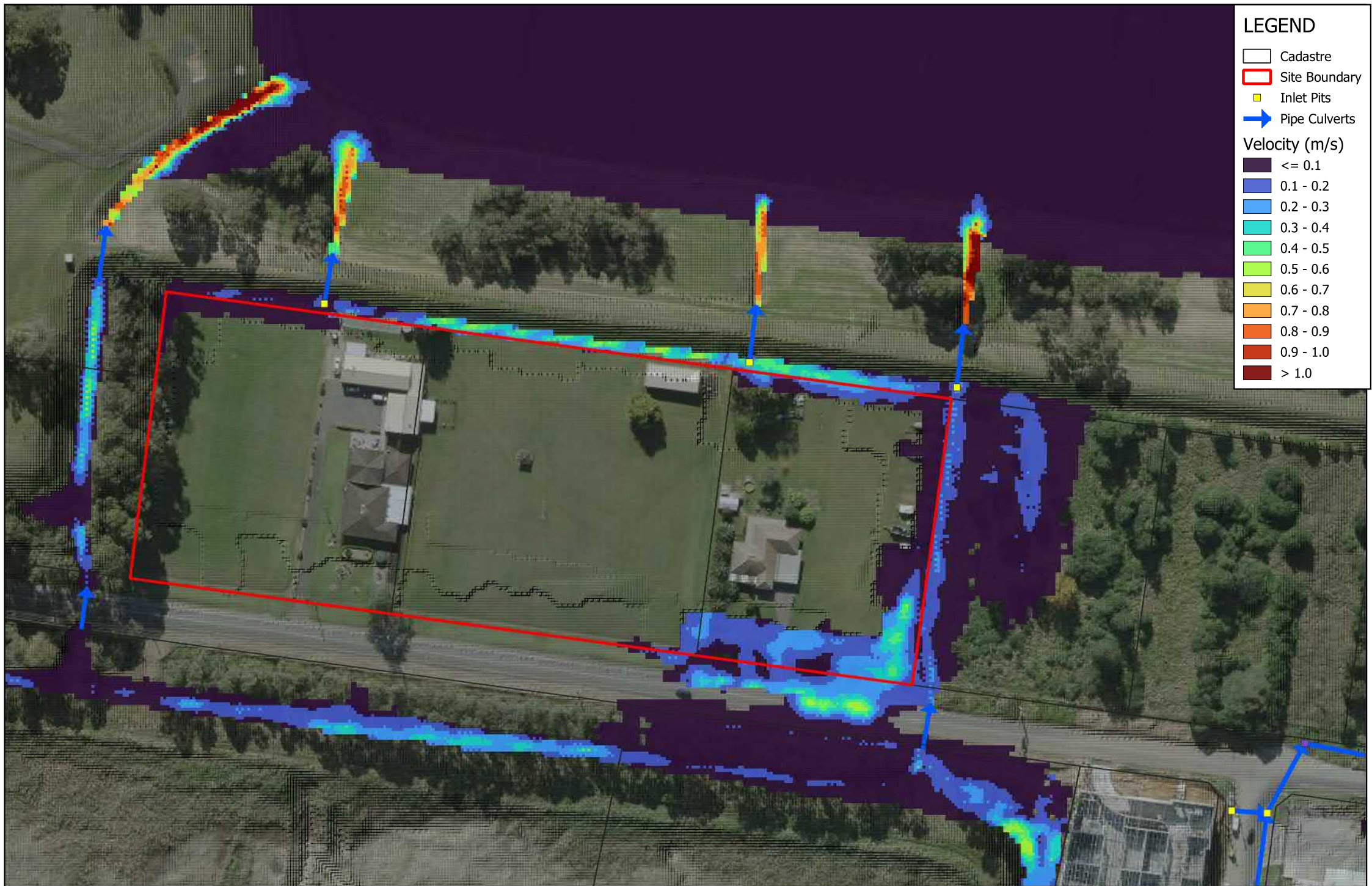
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Velocity - 2% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

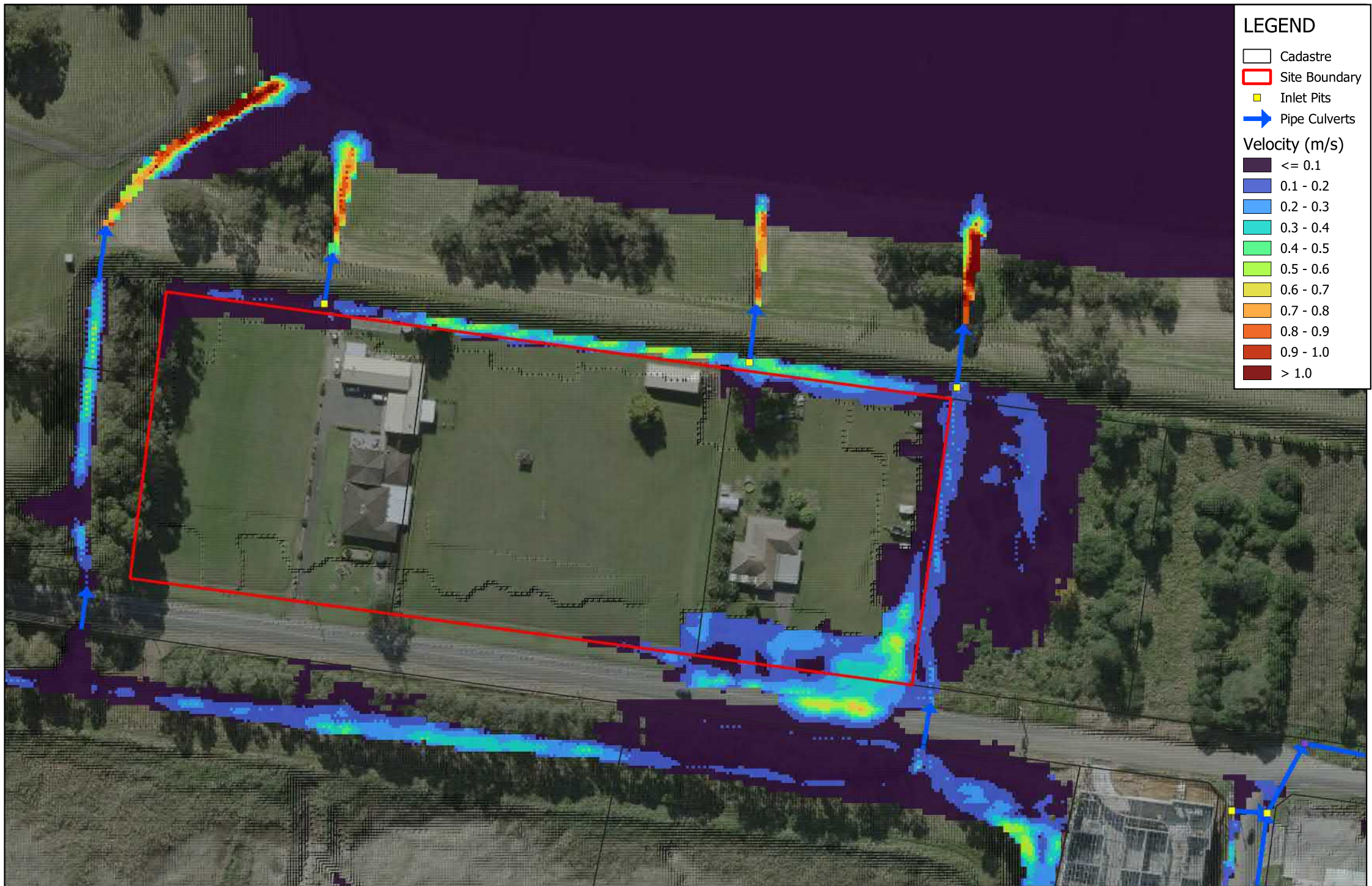
Produced By: Water Technology Pty Ltd

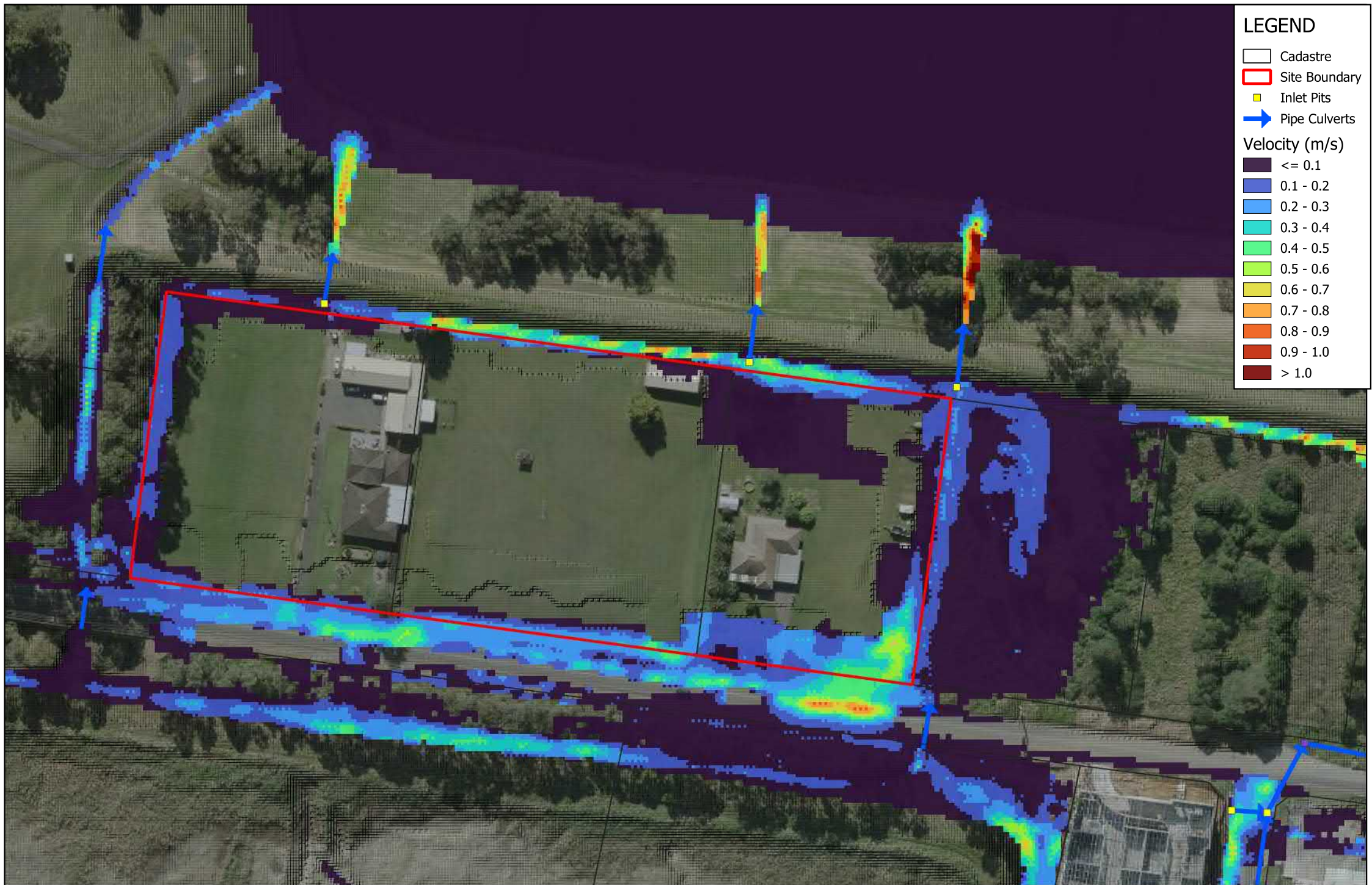
Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Velocity - 1% AEP







LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

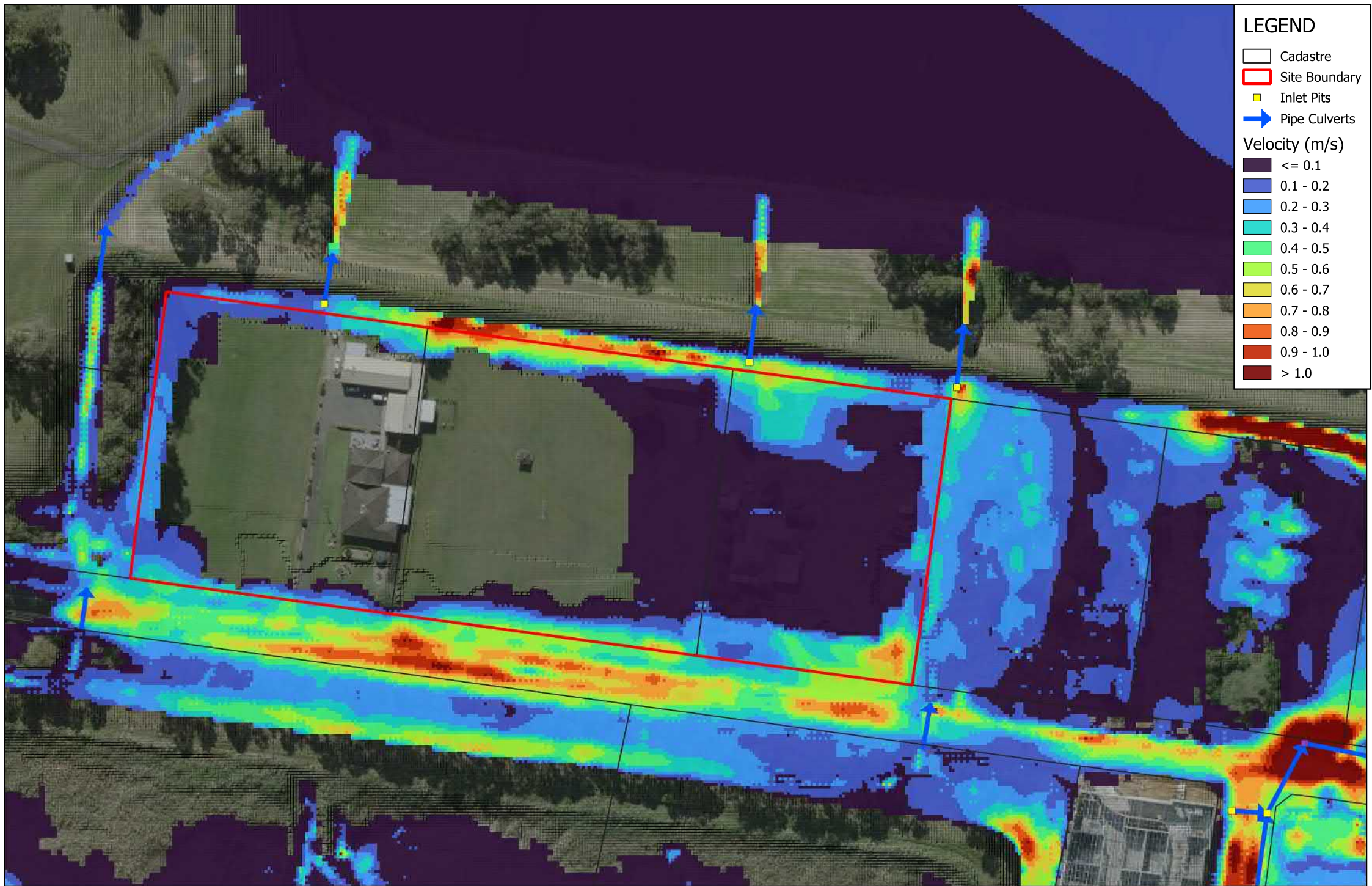
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Velocity - 0.2% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Velocity (m/s)

- ≤ 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1.0
- > 1.0



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

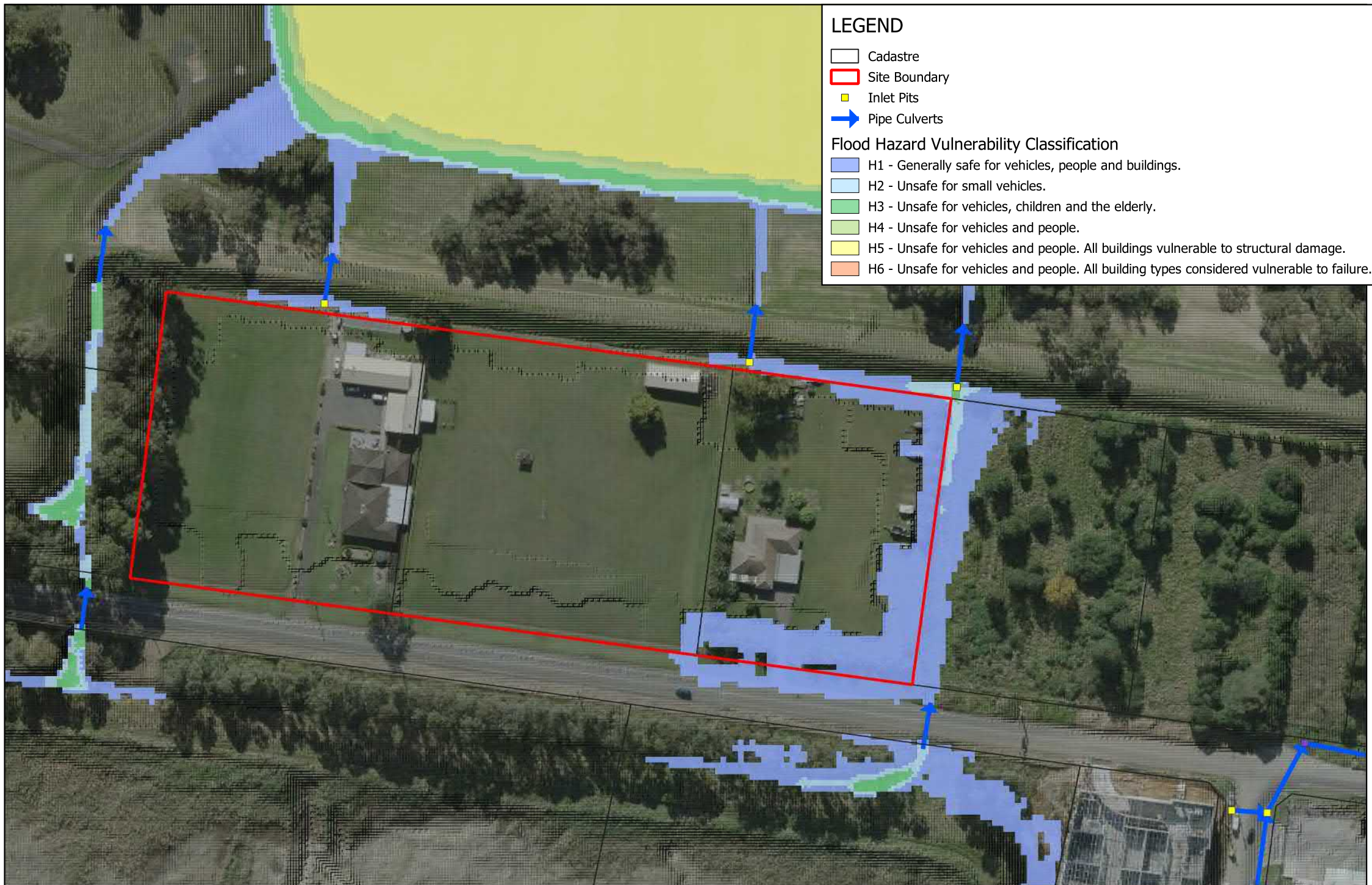
39-65 Old Castlereagh Road, Castlereagh

Overland Flow Flooding

Developed Velocity - PMF









LEGEND

▭ Cadastre

▭ Site Boundary

■ Inlet Pits

➔ Pipe Culverts

Flood Hazard Vulnerability Classification

■ H1 - Generally safe for vehicles, people and buildings.

■ H2 - Unsafe for small vehicles.

■ H3 - Unsafe for vehicles, children and the elderly.

■ H4 - Unsafe for vehicles and people.

■ H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.

■ H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Hazard - 10% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

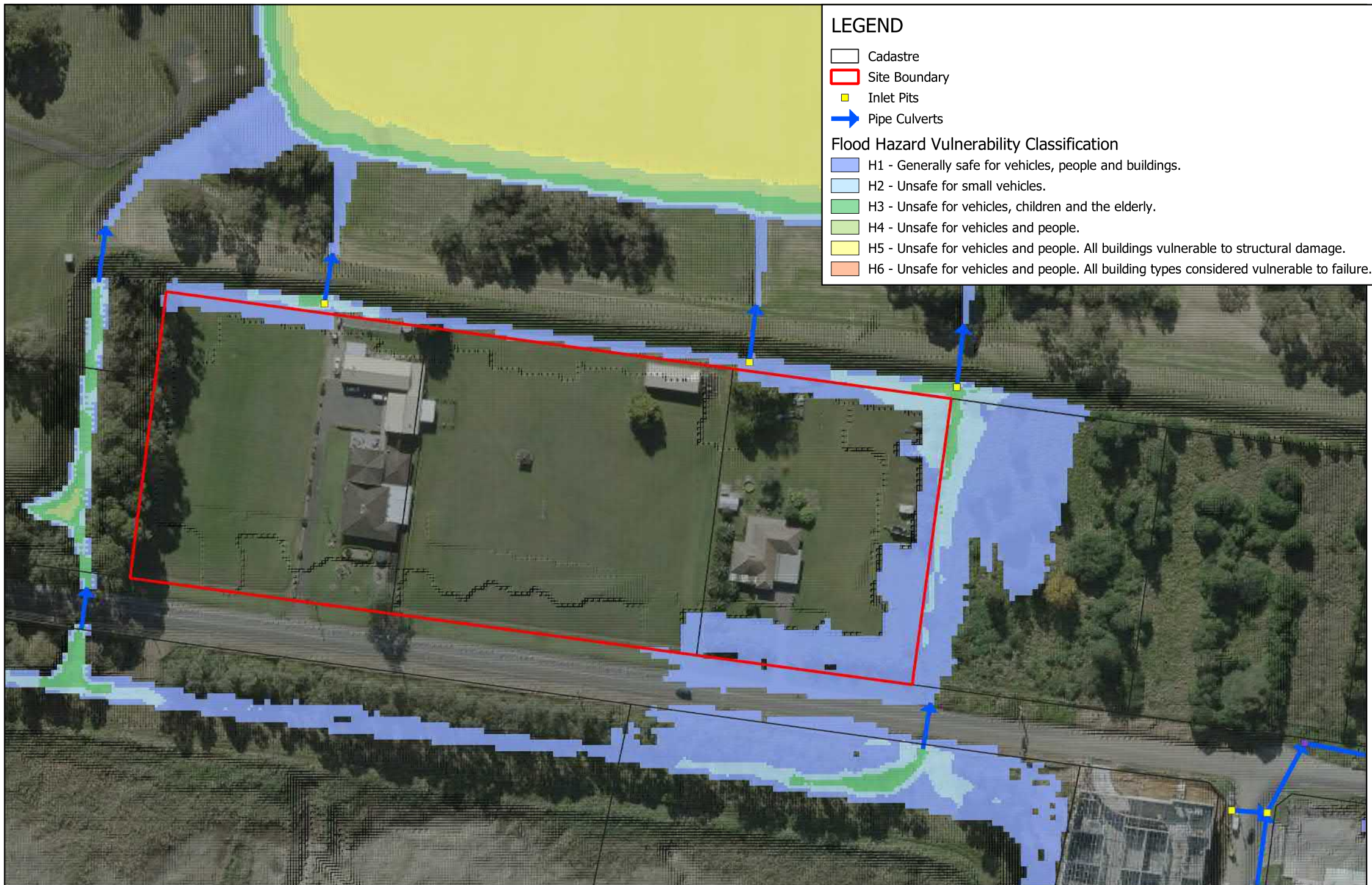
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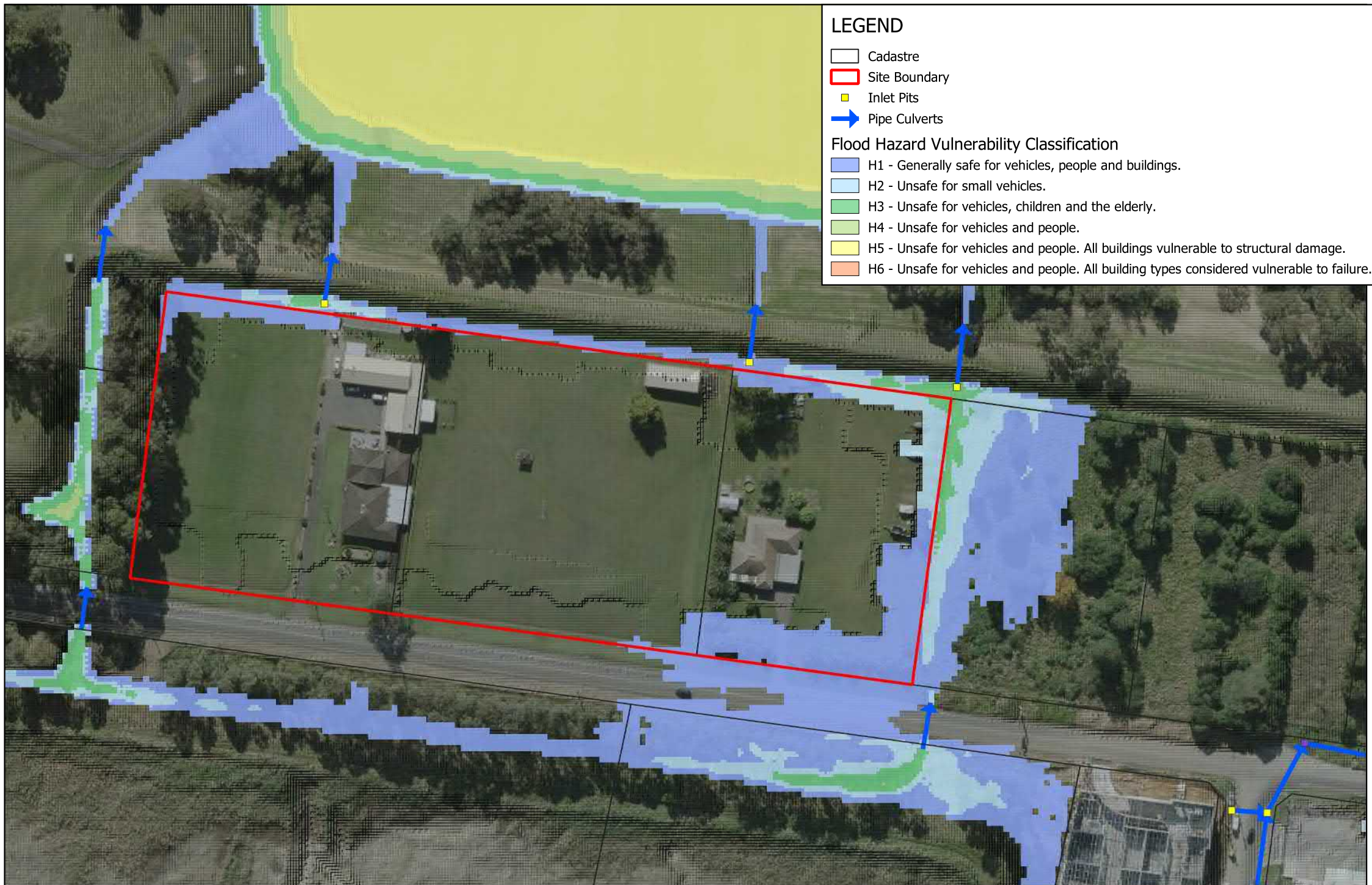
Imagery Source: NSW Six Maps

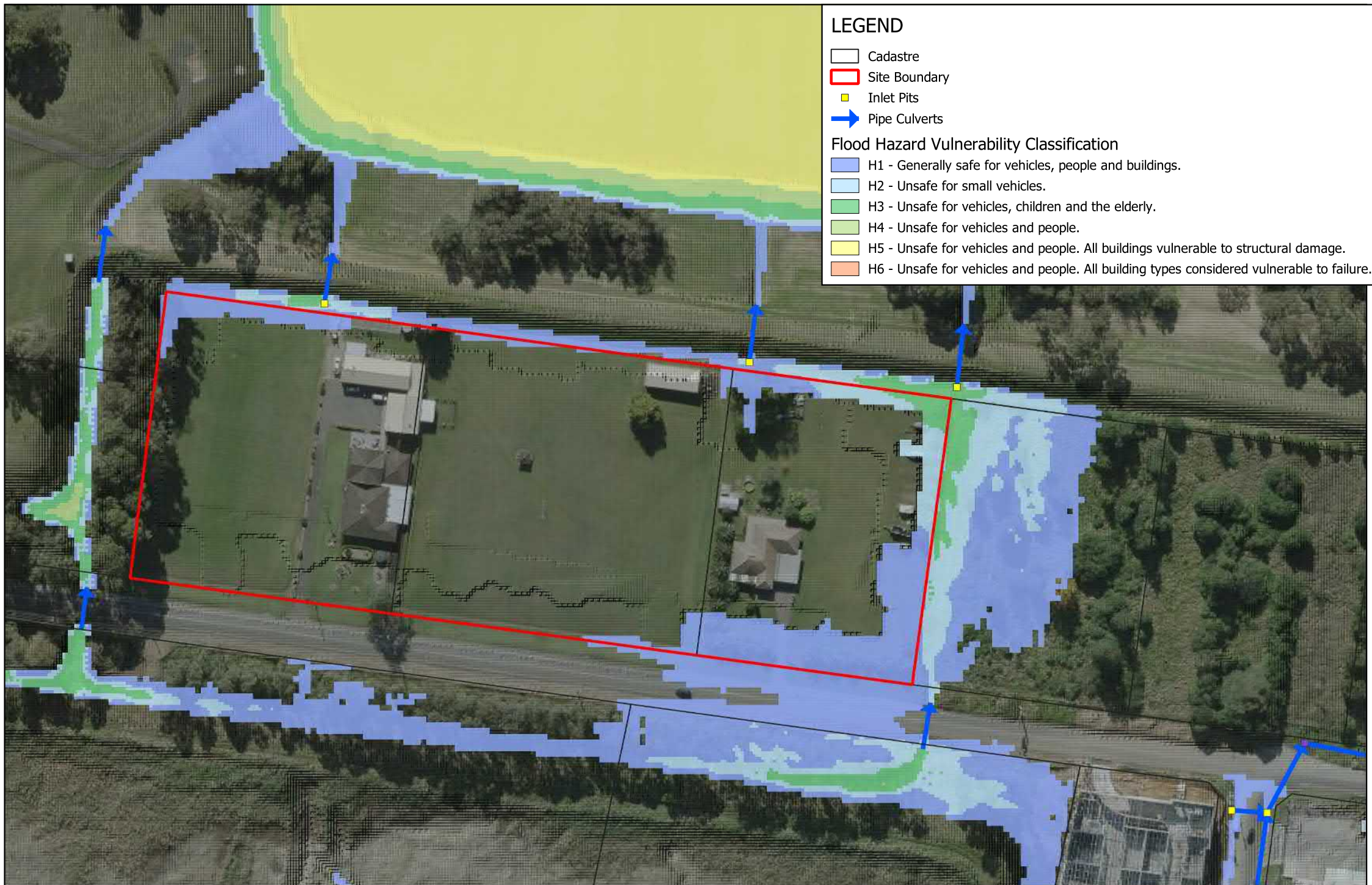
0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Hazard - 5% AEP









LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

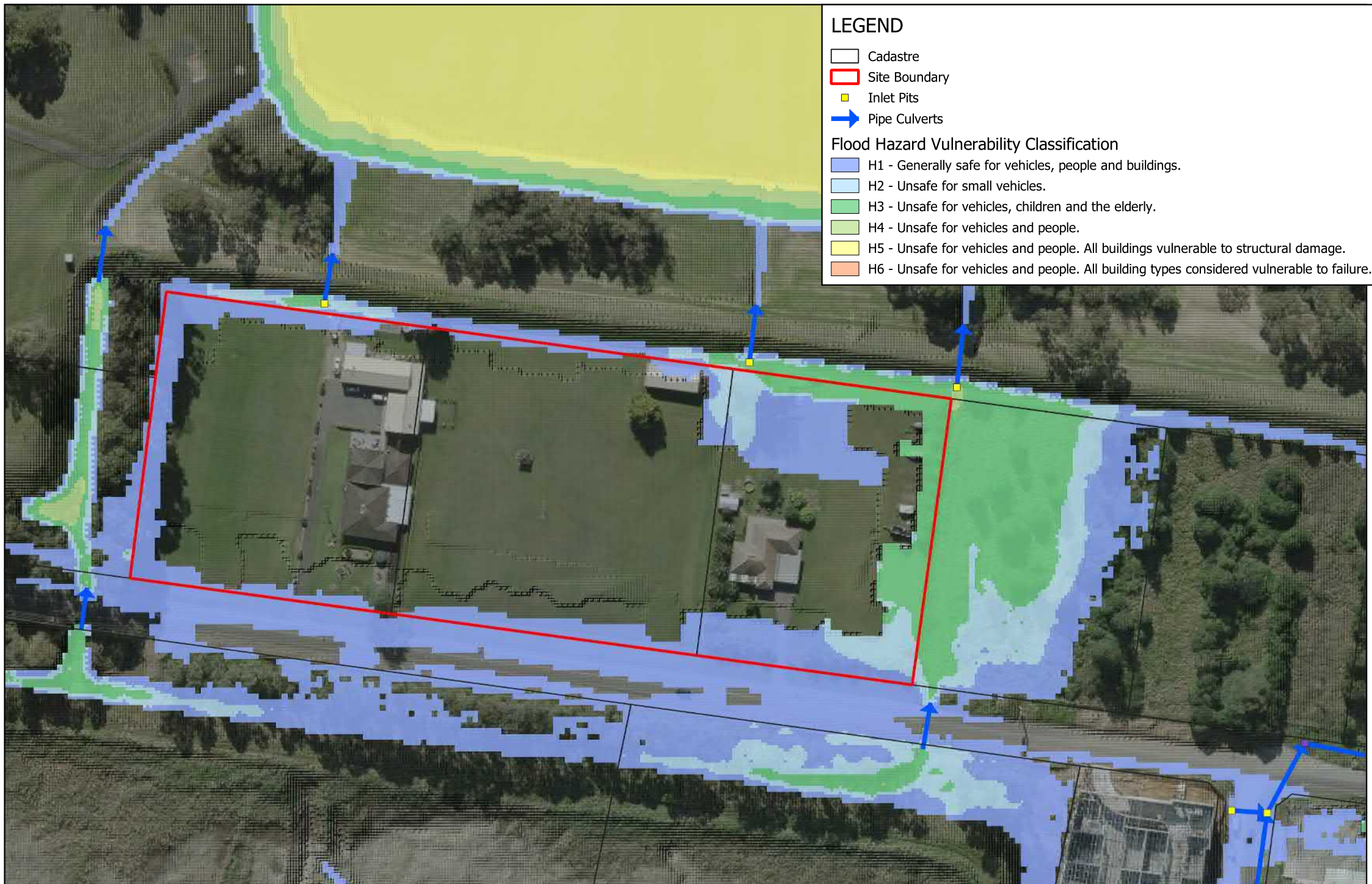
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Hazard - 0.5% AEP





LEGEND

- Cadastre
- Site Boundary
- Inlet Pits
- Pipe Culverts

Flood Hazard Vulnerability Classification

- H1 - Generally safe for vehicles, people and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for vehicles and people.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.



Projection: GDA / MGA94 Zone 56

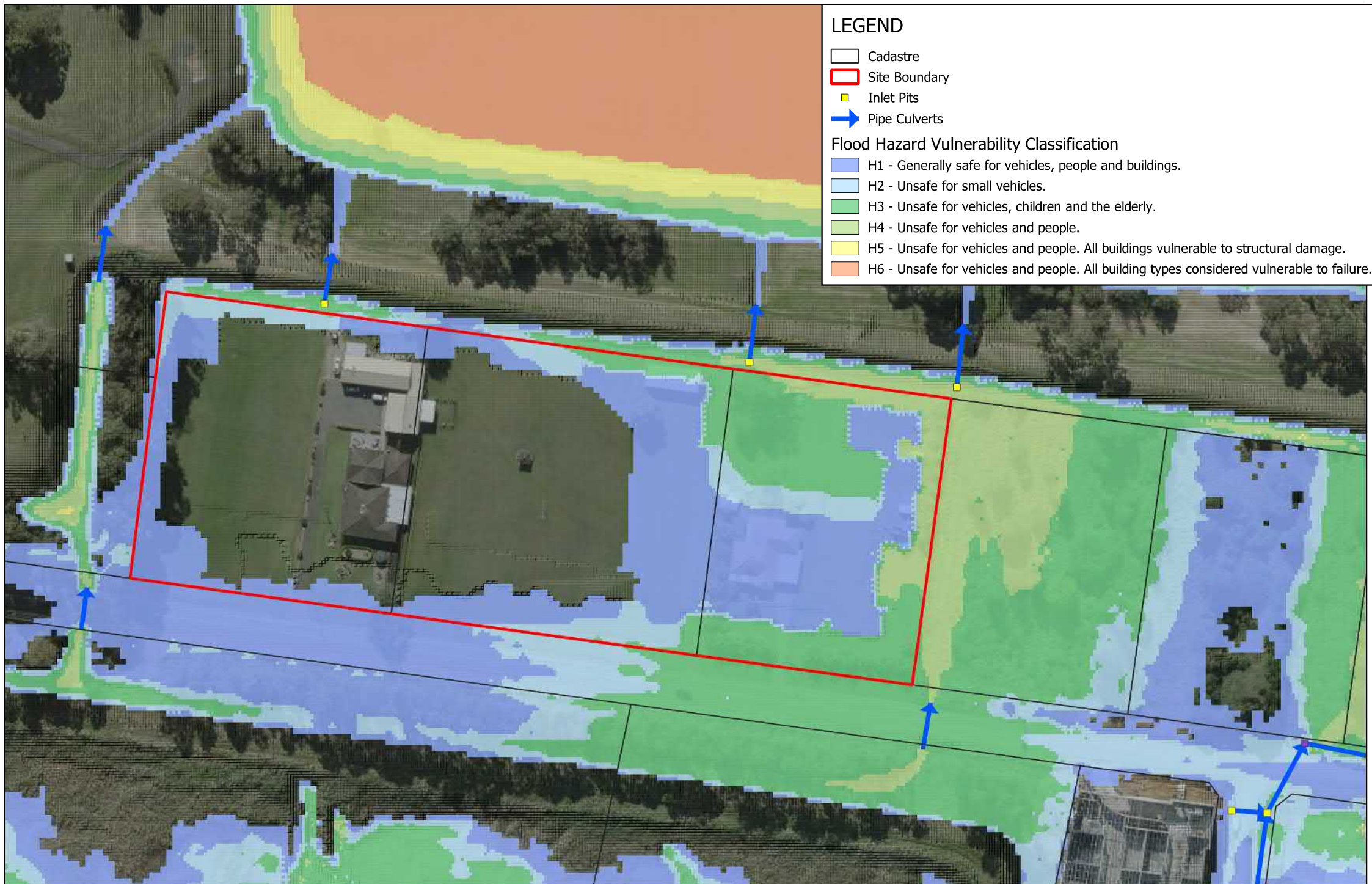
Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 10 20 30 40 50 m

39-65 Old Castlereagh Road, Castlereagh
Overland Flow Flooding
Developed Flood Hazard - 0.2% AEP

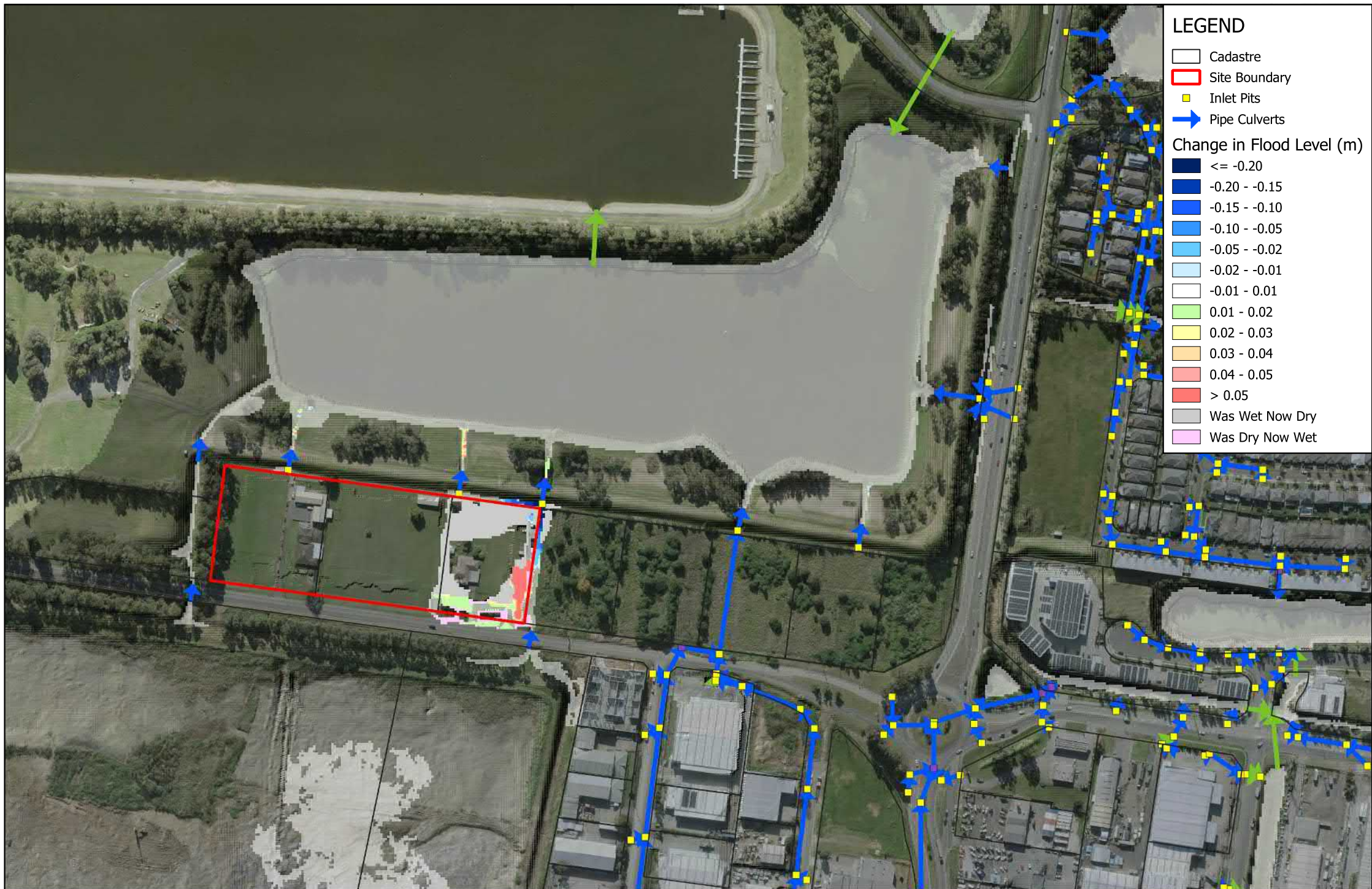






APPENDIX C FLOOD IMPACT MAPS

















Projection: GDA / MGA94 Zone 56

Produced By: Water Technology Pty Ltd

Imagery Source: NSW Six Maps

0 50 100 150 200 250 m

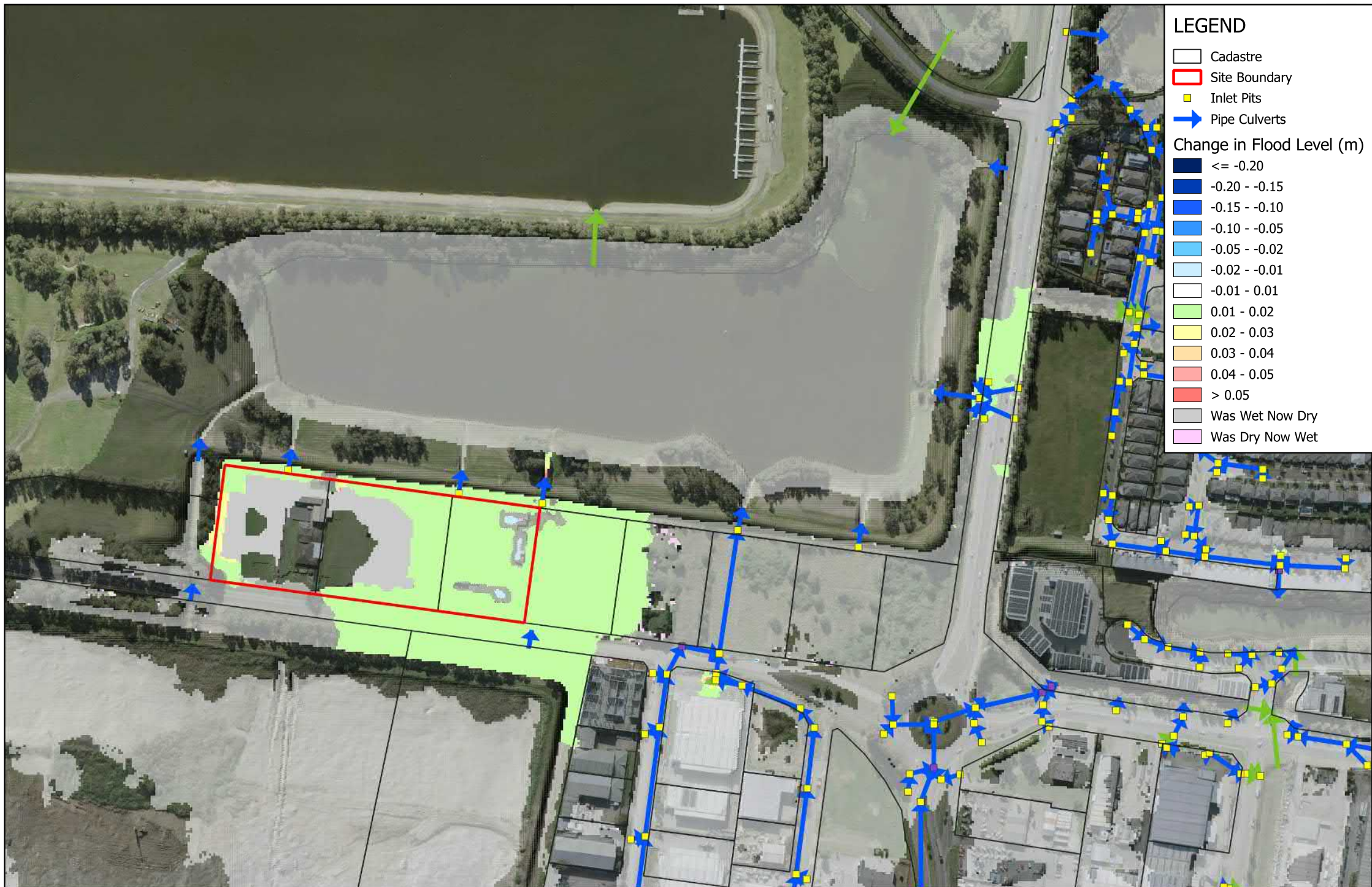
39-65 Old Castlereagh Road, Castlereagh

Overland Flow Flooding

Developed Flood Level Impacts - 0.5% AEP



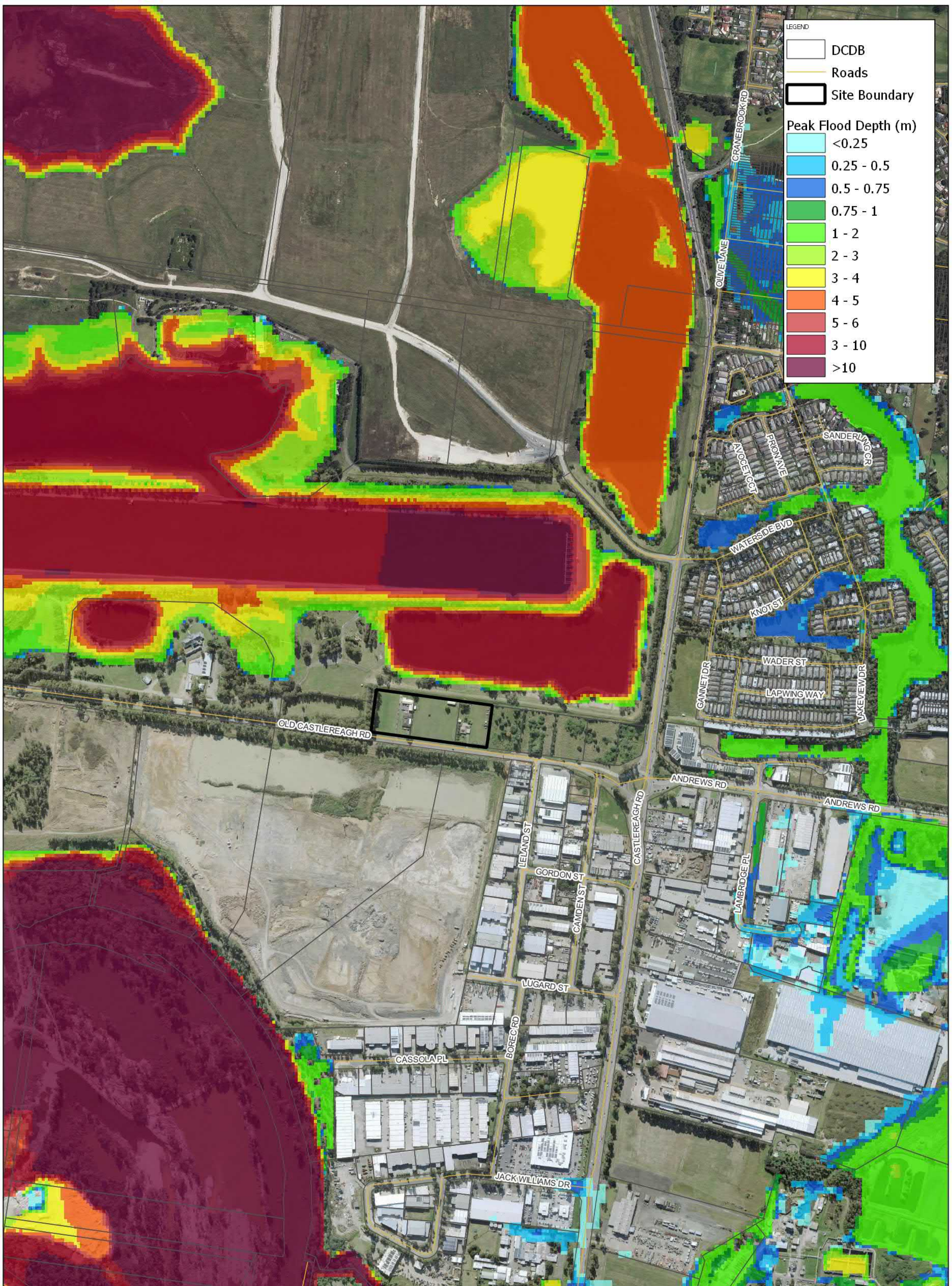






APPENDIX D REGIONAL FLOOD MAPS



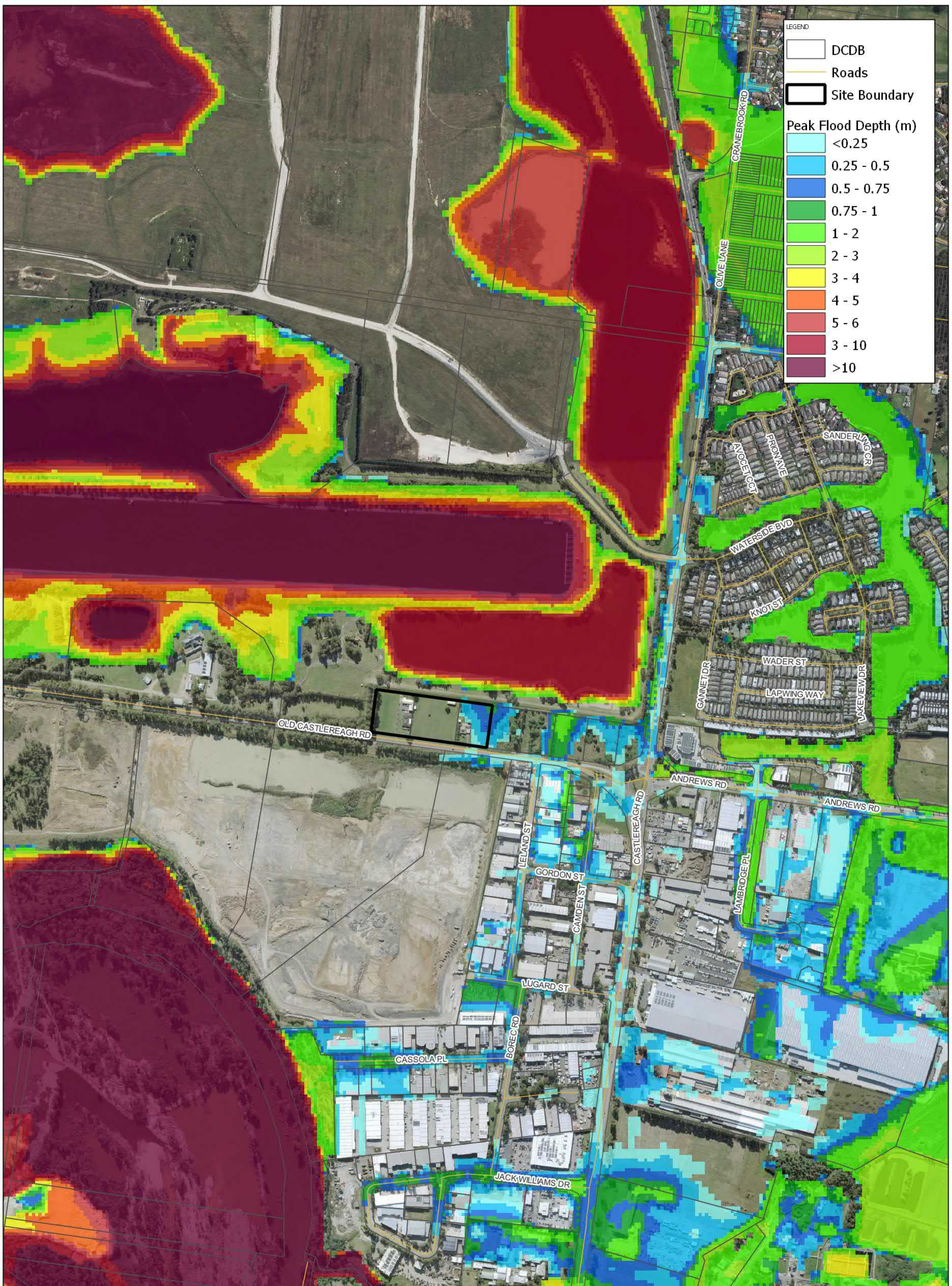


LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

- <0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 3 - 10
- >10

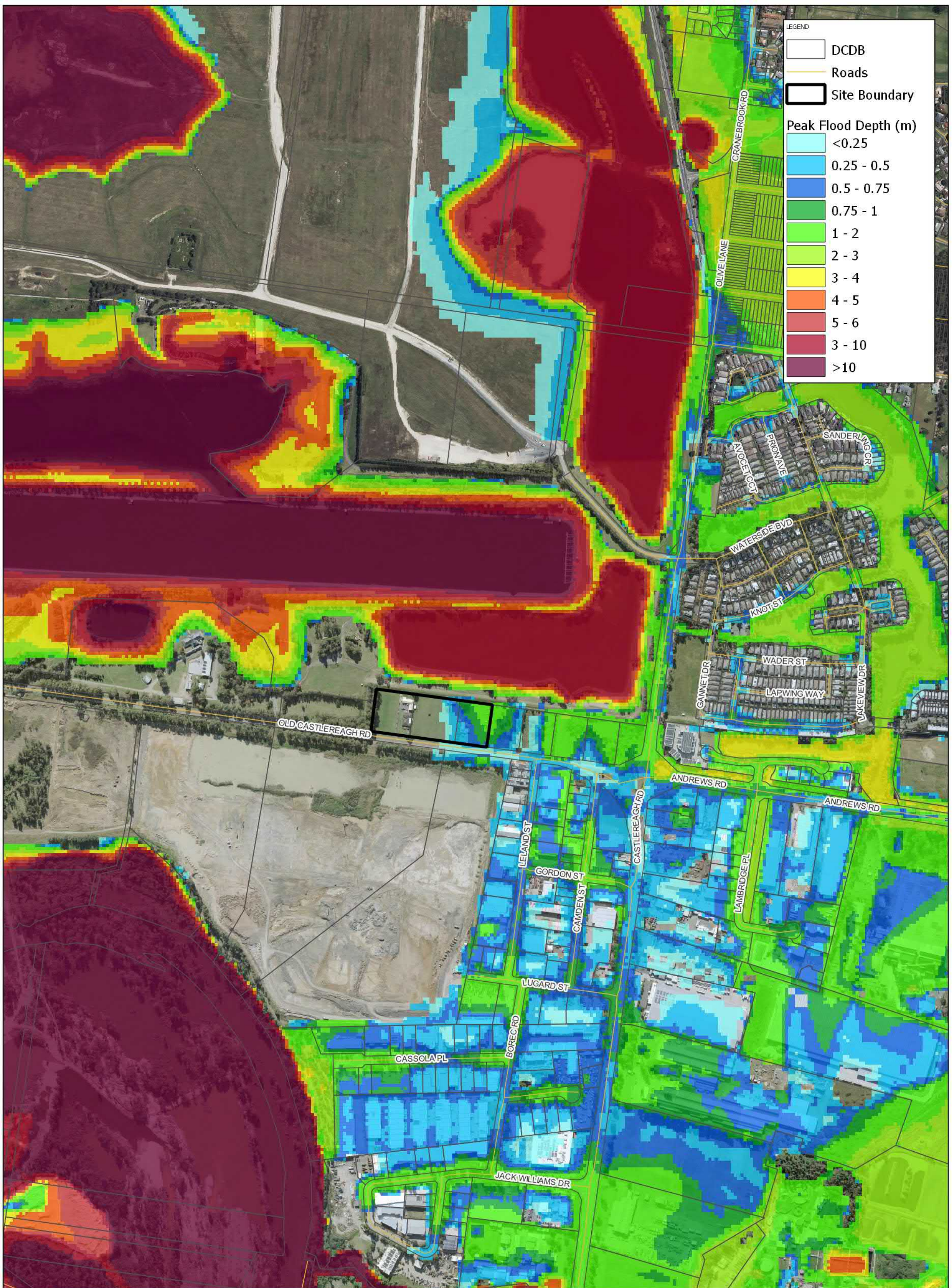


LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

<0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 2
2 - 3
3 - 4
4 - 5
5 - 6
3 - 10
>10

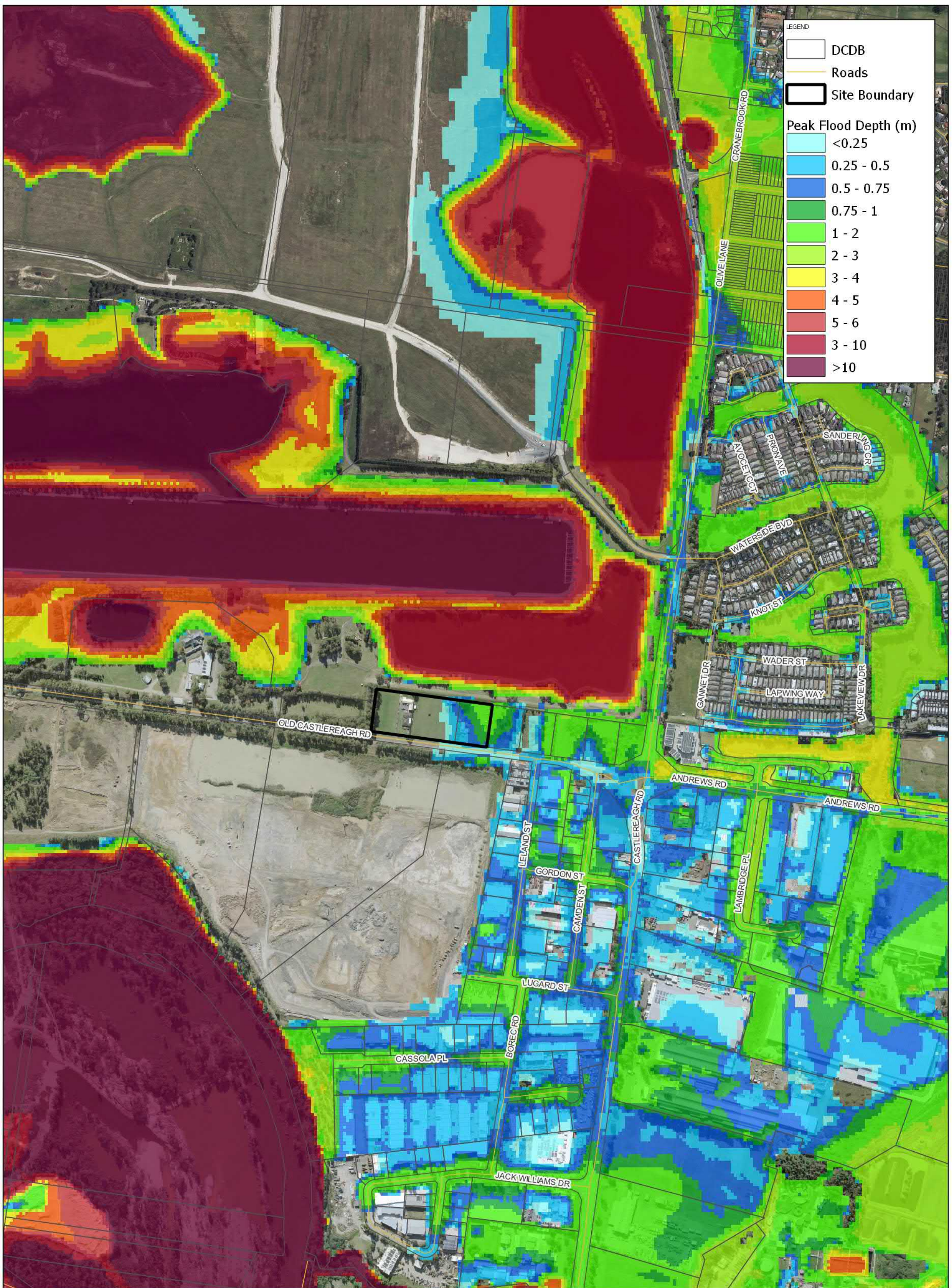


LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

- <0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 3 - 10
- >10

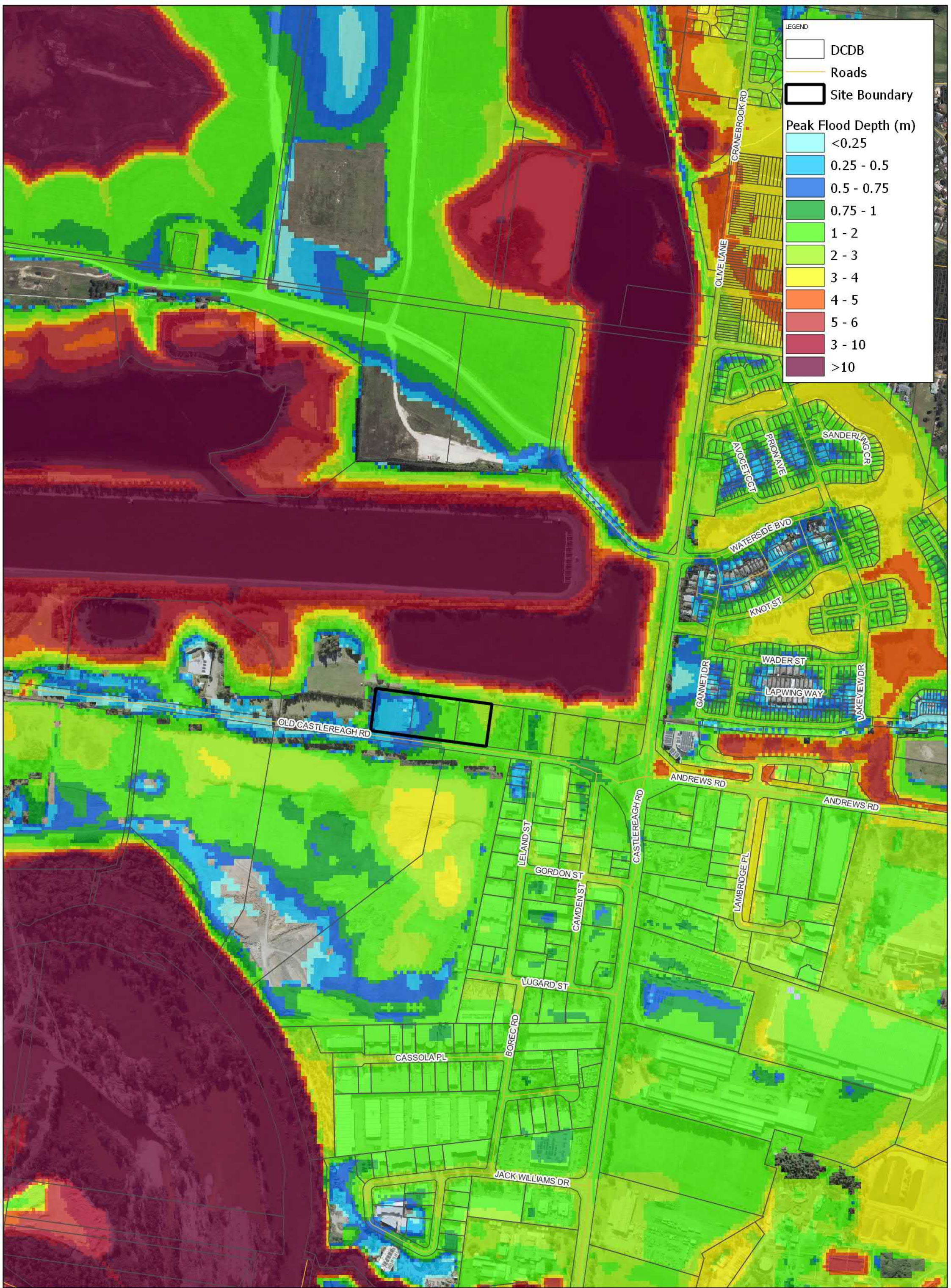


LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

- <0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 3 - 10
- >10

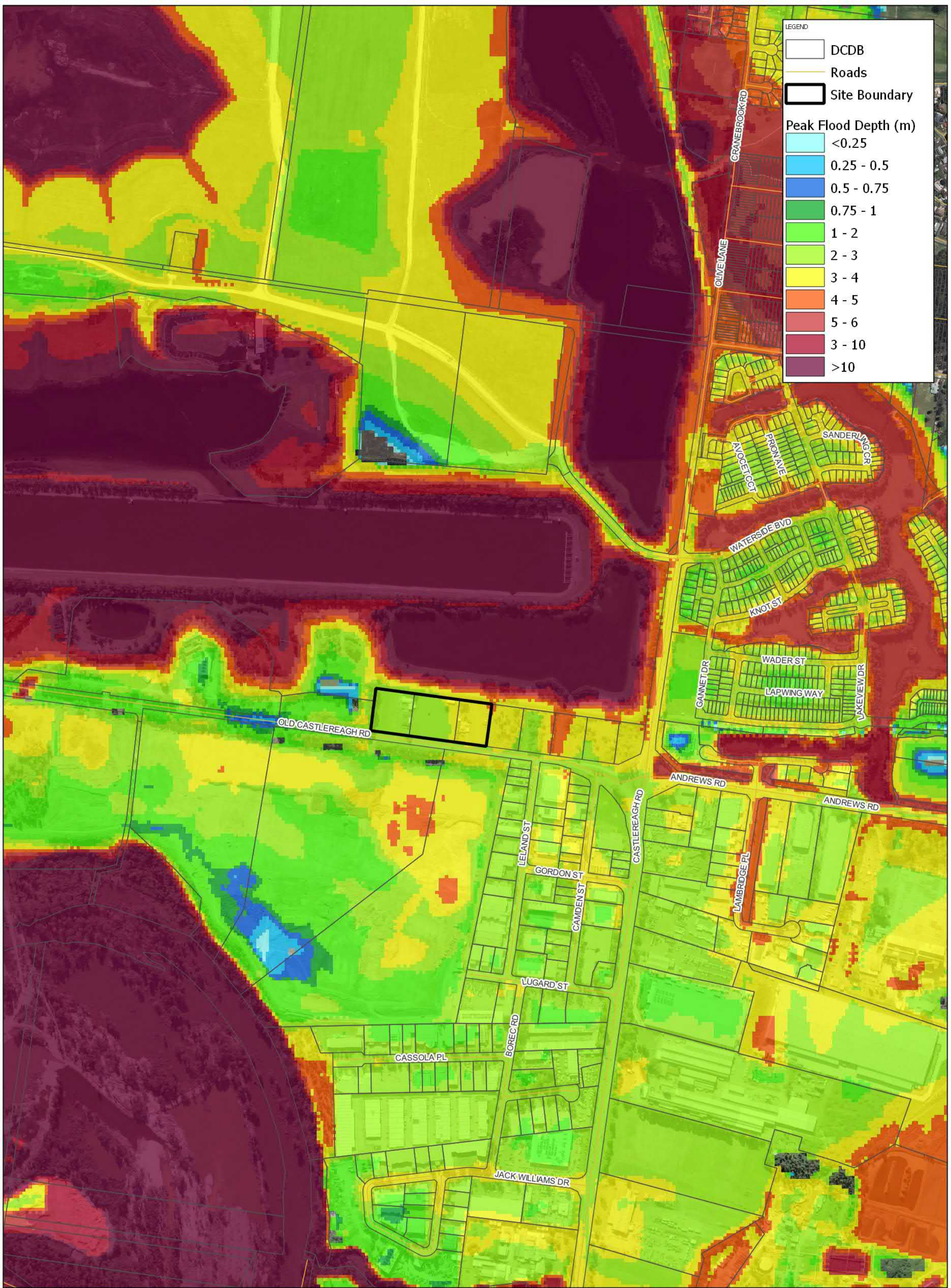


LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

- <0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 3 - 10
- >10



LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

<0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 2
2 - 3
3 - 4
4 - 5
5 - 6
3 - 10
>10

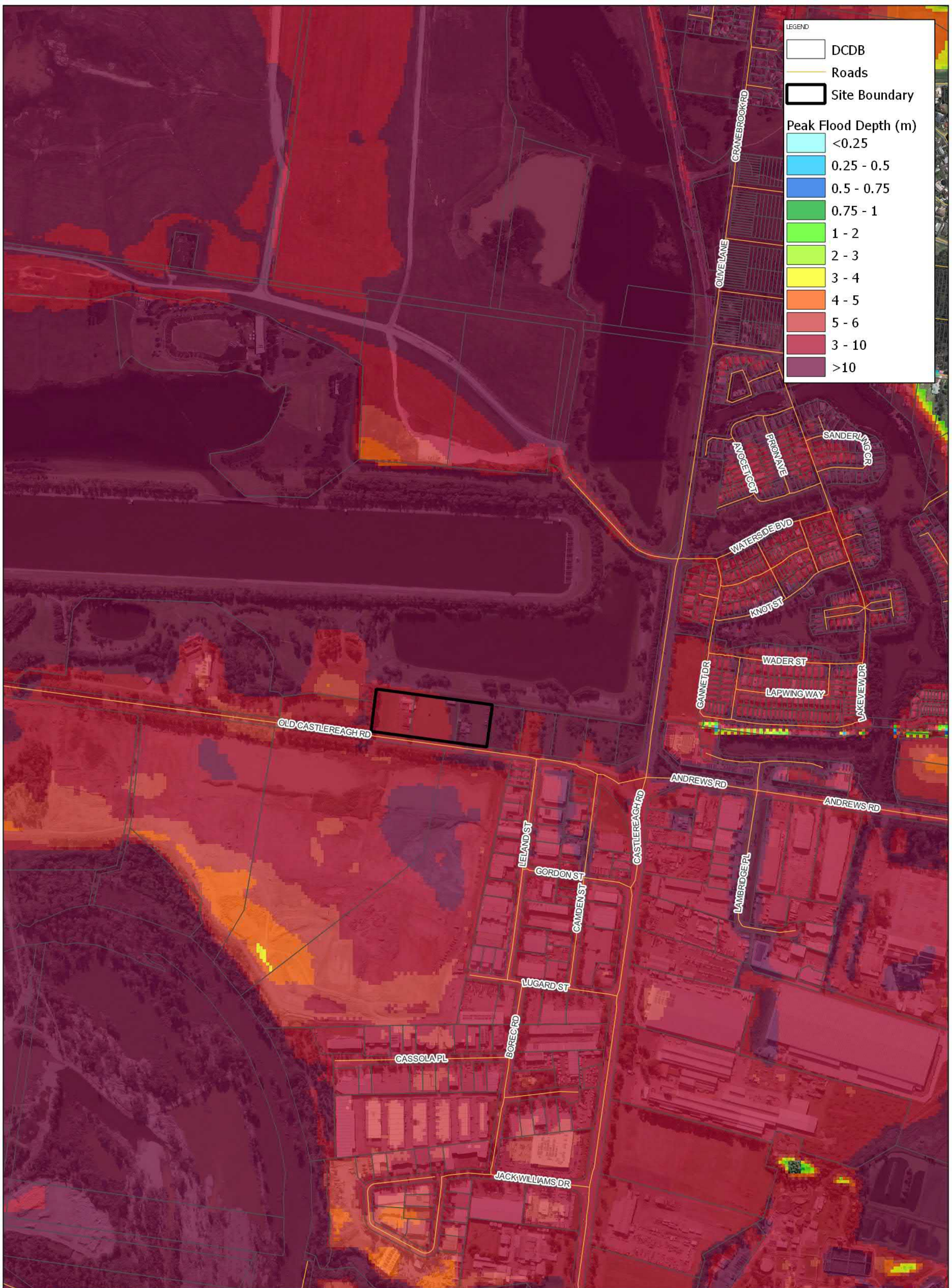


LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

<0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 2
2 - 3
3 - 4
4 - 5
5 - 6
3 - 10
>10



LEGEND

- DCDB
- Roads
- Site Boundary

Peak Flood Depth (m)

- <0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 3 - 10
- >10



APPENDIX E PENRITH CITY COUNCIL FLOOD CERTIFICATES



Our reference: P-597743-V8Y6
Contact: Dr Elias Ishak
Telephone: 4732 7579

4 December 2023

Courtney Smith
Water Technology
Suite 3, Level 1, 20 Wentworth Street
PARRAMATTA NSW 2150

Dear Sir/Madam,

Flood Level Enquiry

Lot 12 DP 793163 – No 39–45 Old Castlereagh Road Castlereagh

Lot 14 DP 793163 – No 47–55 Old Castlereagh Road Castlereagh

Lot 16 DP 793163 – No 57–65 Old Castlereagh Road Castlereagh

Please find enclosed Flood Level information for the above property.

Should you require any further information please do not hesitate to contact me on 4732 7579.

Yours sincerely



Dr Elias Ishak

Senior Engineer – Floodplain Management

Flood Information

Lot 12 DP 793163 – No 39–45 Old Castlereagh Road Castlereagh

Date of Issue: 4 December 2023

The mainstream 1%AEP flood level affecting the above property is estimated to be RL23.8m AHD.

In addition, this locality has been investigated in regard to flooding from the local catchment and the property has been identified as flood affected by the 1%AEP overland flow-path.

Please note that the NSW State Government is currently undertaking a flood study for the Hawkesbury-Nepean River.

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website [penrith.city](https://www.penrith.city).



Definitions

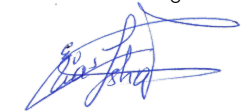
AEP – Annual Exceedance Probability – the chance of a flood of this size occurring in any one year.

AHD – Australian Height Datum – A standard level datum used throughout Australia, approximately equivalent to mean sea level.

Notes:

1. The contours shown above in yellow numbering are at 0.5m intervals and are based on Aerial Laser Scanning (ALS) Survey undertaken in 2002. The contour levels are approximate and for general information only. Accurate ground levels should be obtained by a Registered Surveyor.
2. The flood level is based on current information available to Council at the date of issue. The flood level may change in the future if new information becomes available. The 1% AEP flood is the flood adopted by Council for planning controls. Rarer and more extreme flood events will have a greater effect on the property.
3. Council's studies are reflected in flood mapping for the City which show properties potentially affected by overland flows in excess of 150mm.
4. This property is shown on Council's flood mapping as potentially so affected.
5. Council imposes flood related development controls where, in its opinion, such controls are justified. Such controls may or may not be imposed with respect to this property in the event of an application for development consent.
6. If a development proposal is submitted with respect to this property, Council will consider the possibility of flood or overland flow in the context of the application. Council may impose a requirement that the applicant for development consent carry out a detailed assessment of the possible overland water flows affecting the property (a flood study) and/or may impose other controls on any development designed to ameliorate flood risk.
7. You are strongly advised if you propose to carry out development upon the property, that you retain the assistance of an experienced flooding engineer and have carried out a detailed investigation.
8. Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this certificate, having regard to the information disclosed in Notes "1" to "4". As such you should carry out and rely upon your own investigations.

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Dr Elias Ishak
Senior Engineer – Floodplain Management

Flood Information

Lot 14 DP 793163 – No 47-55 Old Castlereagh Road Castlereagh

Date of Issue: 4 December 2023

The 1%AEP flood levels in the vicinity of the above property are estimated to be RL24.6m AHD at the western boundary and RL23.8m AHD at the eastern boundary.

Please note that the NSW State Government is currently undertaking a flood study for the Hawkesbury-Nepean River.

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website [penrith.city](https://www.penrith.city).



Flood Information

Lot 16 DP 793163 – No 57-65 Old Castlereagh Road Castlereagh

Date of Issue: 4 December 2023

The 1%AEP flood level affecting the above property is estimated to be RL24.6m AHD.

Please note that the NSW State Government is currently undertaking a flood study for the Hawkesbury-Nepean River.

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website [penrith.city](https://www.penrith.city).



Definitions

AEP – Annual Exceedance Probability – the chance of a flood of this size occurring in any one year.

AHD – Australian Height Datum – A standard level datum used throughout Australia, approximately equivalent to mean sea level.

Notes:

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3. Council's studies are reflected in flood mapping for the City which show properties potentially affected by overland flows in excess of 150mm.
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7. You are strongly advised if you propose to carry out development upon the property, that you retain the assistance of an experienced flooding engineer and have carried out a detailed investigation.
8. Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this certificate, having regard to the information disclosed in Notes "1" to "4". As such you should carry out and rely upon your own investigations.

Dr Elias Ishak
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