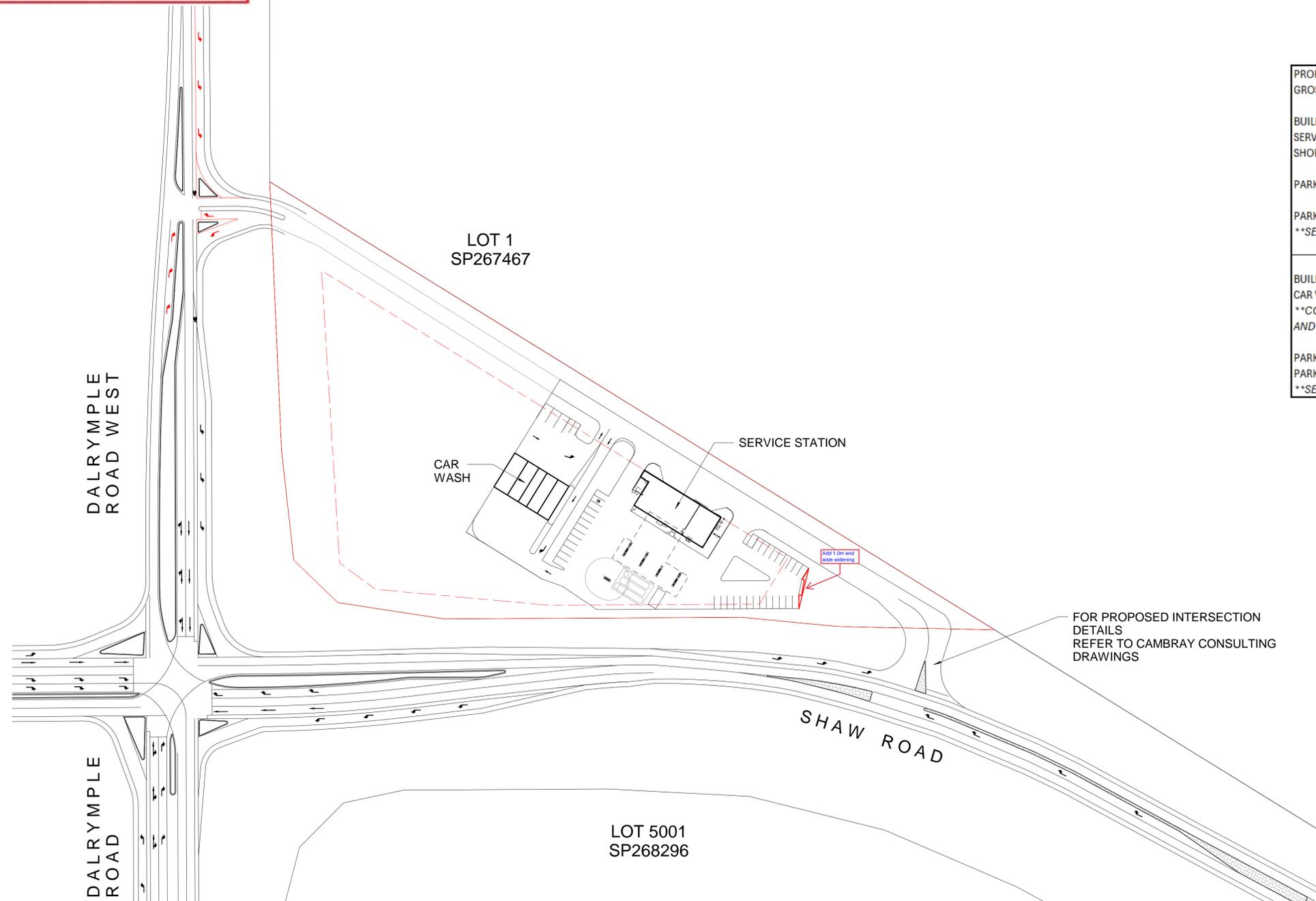




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Date: 22 September 2025

PROPOSED COMMERCIAL DEVELOPMENT LOT 19 SP107219, SHAW ROAD. SHAW. QLD.



PROPOSED LAYOUT AREA SCHEDULE	
GROSS FLOOR AREA - GFA	
BUILDING 1	
SERVICE STATION	= 356 sqm.
SHOP / FOOD AND DRINK OUTLET	= 150 sqm.
PARKING SPACES REQUIRED	= 17
PARKING SPACES PROVIDED	= 34
SEE TRAFFIC REPORT FOR DETAIL	
BUILDING 2	
CAR WASH	= 522 sqm.
CONSERVATIVELY INCLUDES PLANT, OFFICE AND WASH BAYS	
PARKING SPACES REQUIRED	= 2
PARKING SPACES PROVIDED	= 2
SEE TRAFFIC REPORT FOR DETAIL	

SITE PLAN
Scale: 1 : 1000

REAL PROPERTY DESCRIPTION

LOT No: 19
PLAN No: SP107219
AREA: 2.56 Ha

Date	Revision	Description
06.04.24	A	FOR APPROVAL DTMR
14.06.24	B	SITE BUILDINGS REVISED

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All dimensions are to be verified on site prior to any commencement of any construction works.

BRETT HODKINSON
BUILDING DESIGN

BHBD Pty. Ltd.
QBCC Lic. No. 15007761 Medium Rise
ABN 52 609 527 451

M: 0402 255 609
E: brett@bhbd.com.au

Drawn	B.H.	KINGSUN
Checked	B.H.	PROPOSED COMMERCIAL DEVELOPMENT
Scale	As shown	LOT 19 SP107219, SHAW ROAD, SHAW, QLD.
Date	APRIL 2024	Project No. 24-06 KIN
		Sheet No. A01

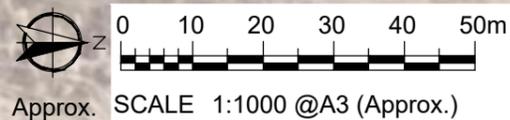
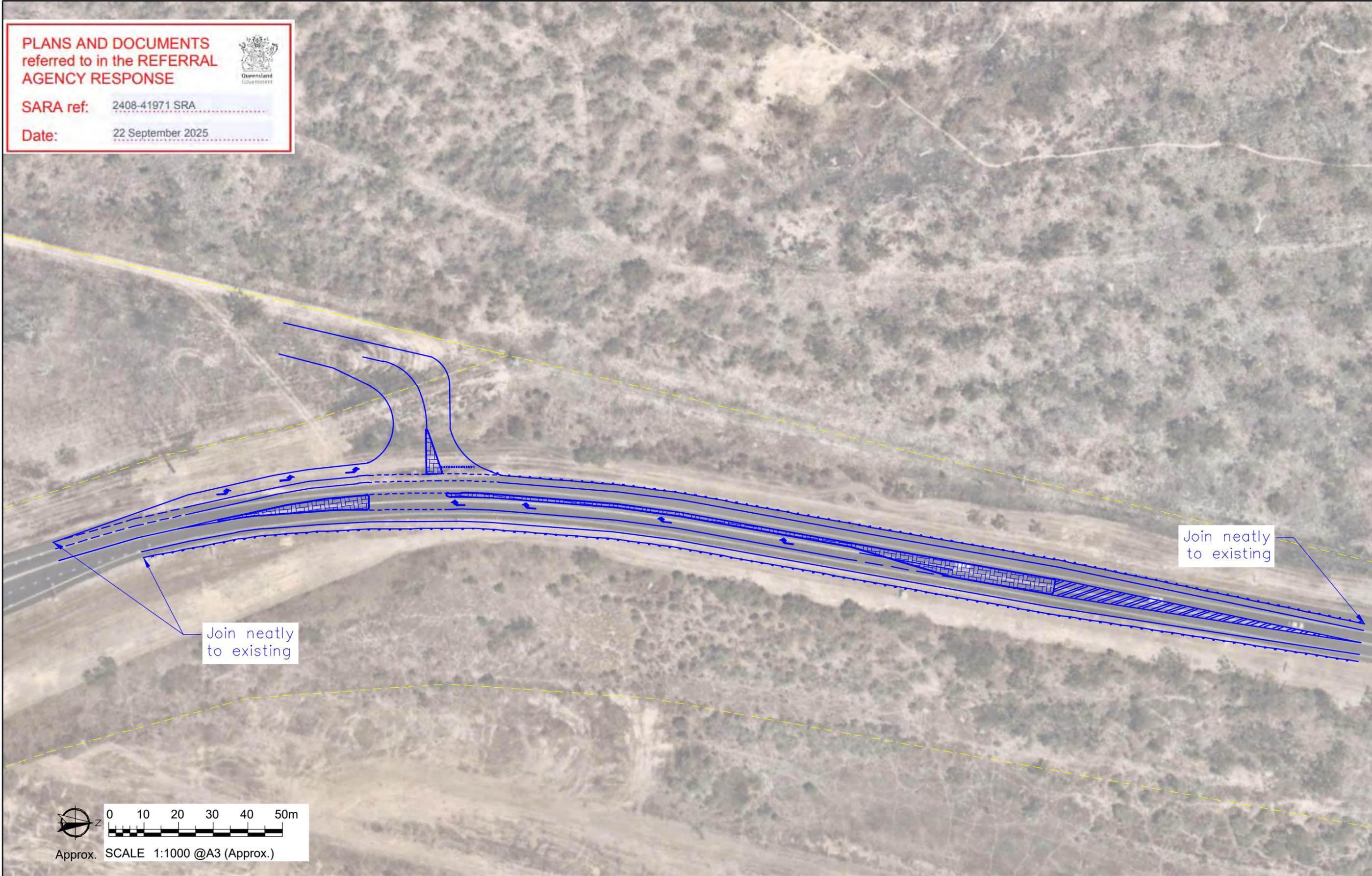
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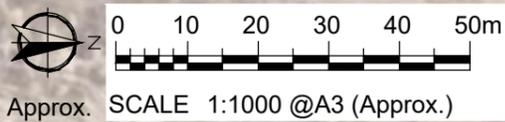
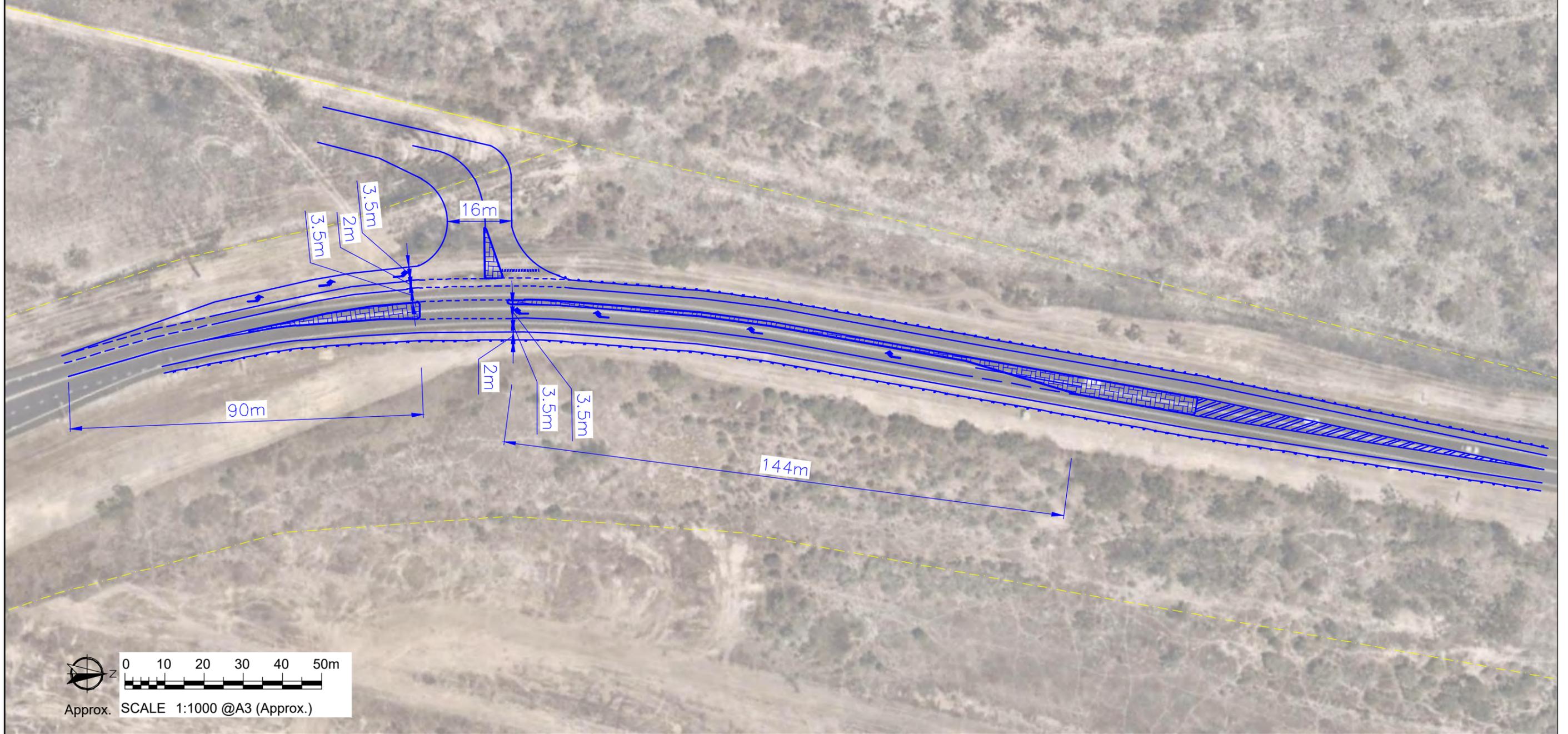
 <p>CAMBRAYconsulting Traffic Engineering and Transport Planning Suite 2601, 21 Mary Street Brisbane Q 4000 t : 07 3221 3503 e : contact@cambray.com.au</p>	DRAWING TITLE Proposed Commercial Development Functional Layout Shaw Road	LOCATION 325 Shaw Road Shaw, QLD 4817	<table border="1"> <thead> <tr> <th>REV</th> <th>DATE</th> <th>AMENDMENT / ISSUE</th> <th>DWN</th> <th>CHK</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	REV	DATE	AMENDMENT / ISSUE	DWN	CHK	A	-	-	-	-											PRELIMINARY NOT FOR CONSTRUCTION	JOB No. // DRAWING No. KIN0323-01// SK01
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DRAWING TITLE
Proposed Commercial Development
Functional Layout
Shaw Road
Dimensions

LOCATION
325 Shaw Road
Shaw, QLD 4817

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
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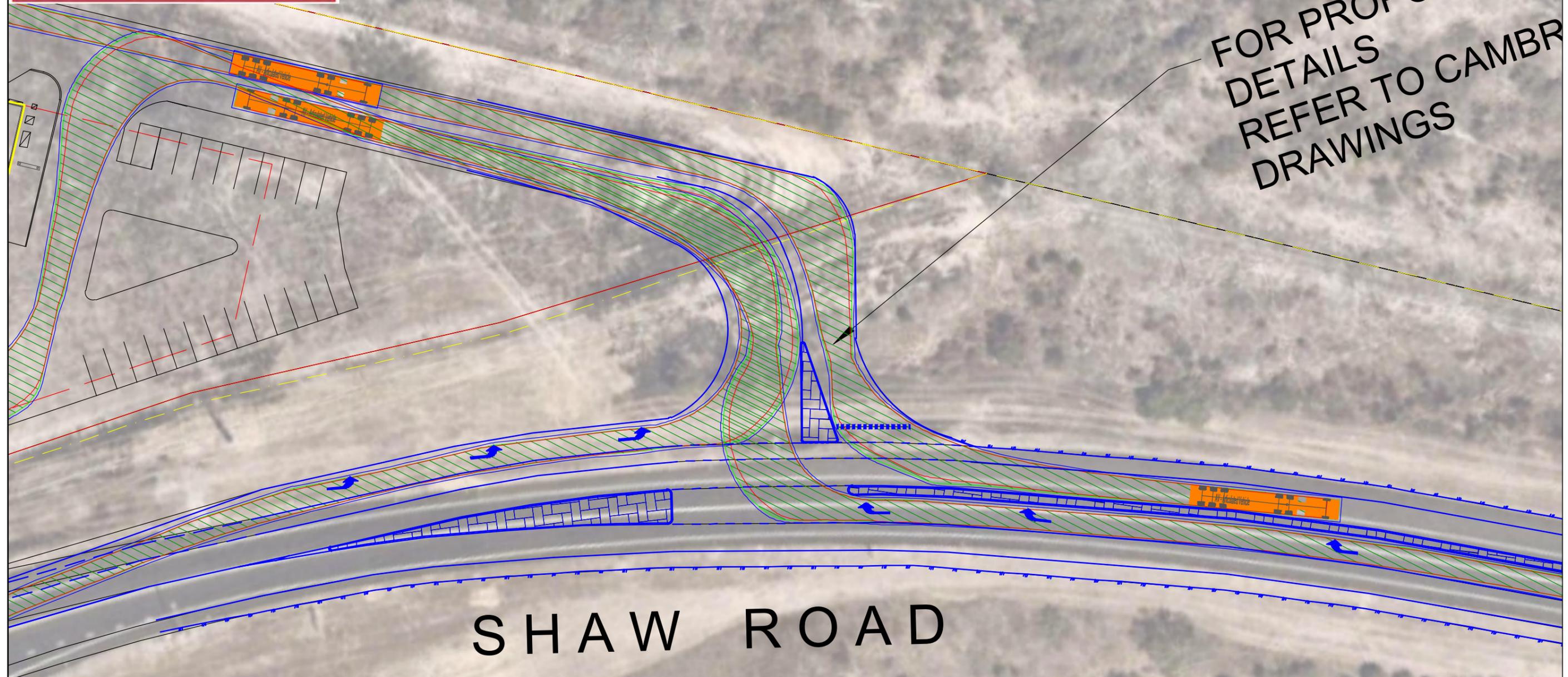
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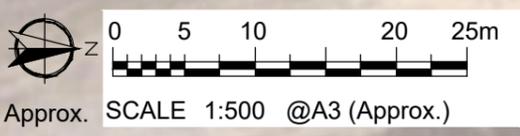
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SHAW ROAD



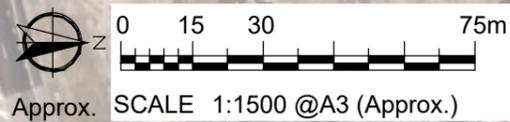
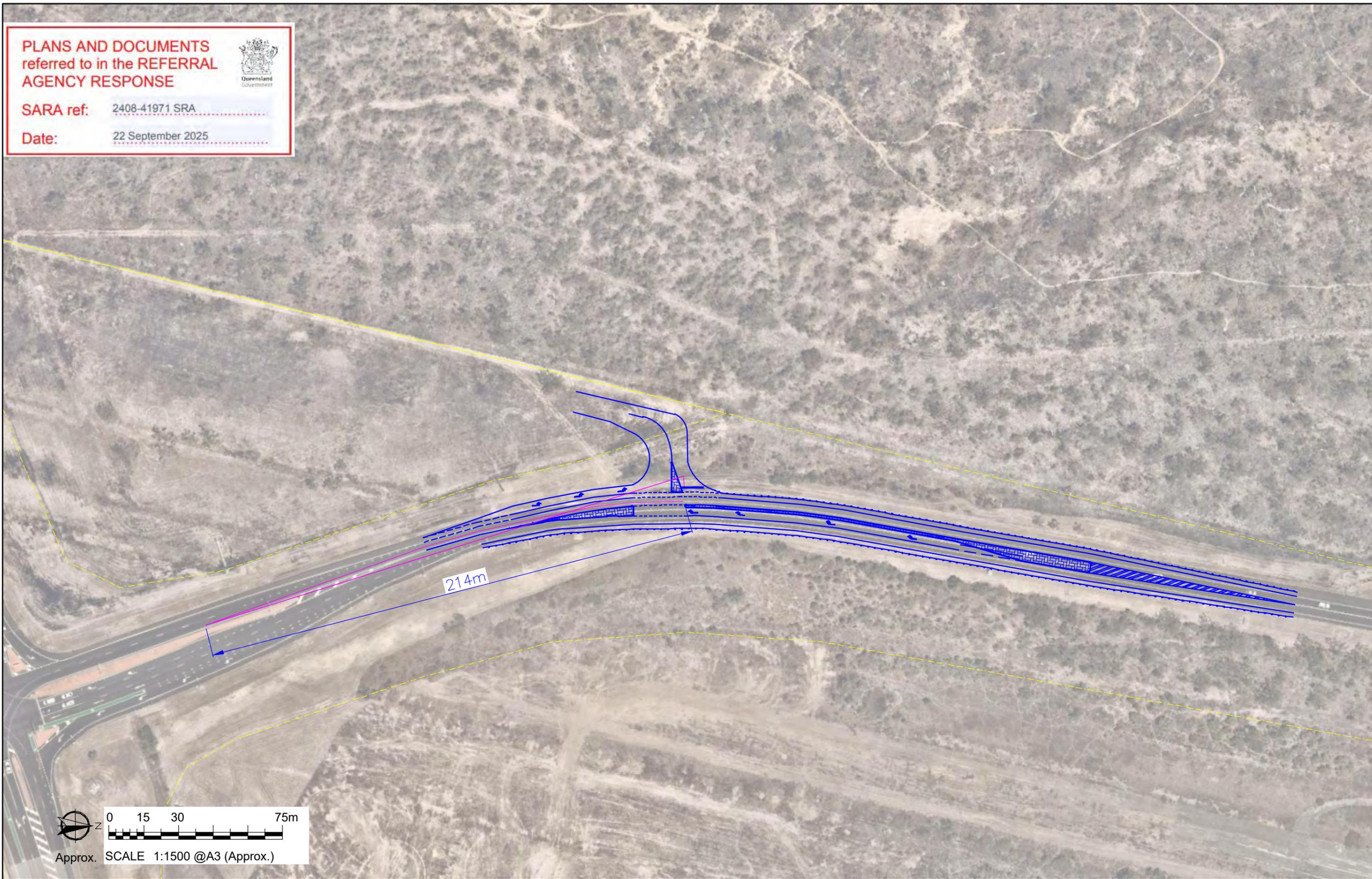
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325 Shaw Road Development Flood Impact Assessment

Reference No. LCJ005-325SR-002

Prepared for LCJ Engineers

14th May 2025

Flood Impact Assessment

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Date: 22 September 2025



Document	Flood Impact Assessment
Project Name:	325 Shaw Rd FIA
Project Number:	LCJ005

Issue Register

Distribution List	Date Issued	Revision No.
LCJ Engineers Pty Ltd	9 th May2025	0 (Draft for comment)
LCJ Engineers Pty Ltd	14 th May 2025	1
LCJ Engineers Pty Ltd	14 th May 2025	2 (Updated Appendix)

Company Details

Name	Imbris Australia Pty Ltd
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This Report is provided for the exclusive use of the Client (LCJ Engineers Pty Ltd) pursuant to the Scope of Works which requires Imbris Australia Pty Ltd (IMBRIS) to provide Services relating to preparing a preliminary flood impact assessment for a proposed subdivision at 325 Shaw Road, Shaw. The development designs studied herein are conceptual in nature, this work is not a detailed design nor intended for construction. Further, more detailed assessments supported by detailed survey collection are expected.

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Date: 22 September 2025



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Table of Contents 3

Executive Summary 4

1.0 Introduction 7

1.1 Background7

1.2 Subject Property7

1.3 Scope of Works8

1.4 Data and Information Provided.....8

2.0 Flood Impact Assessment..... 9

2.1 Approach9

2.2 Catchment Hydrology.....9

2.3 Existing Flood Hazard 11

2.4 Developed Case Flood Impact Assessment..... 12

2.5 Results and Discussion 16

3.0 Conclusions 18

List of Figures

Figure 1 Aerial view of subject property and surrounds (subject property shown in green) 7

Figure 2 Catchment upstream and including 325 Shaw Road (Proposed development sketch shown in pink and described further in Section 2.0). 10

Figure 3 Catchment outlet culverts under Shaw Road 10

Figure 4 Flood Hazard Risk at 325 Shaw Road, Shaw. Subject lot highlighted in blue. (Source: TCC Flood Information Portal, retrieved 15/04/25) 11

Figure 5 1% AEP with climate change maximum flood depths at 325 Shaw Road, Shaw (Subject site highlighted in blue) 12

Figure 6 Conceptual Site Development Plan 13

Figure 7 Hydraulic Model Topography (Existing and Developed) 14

Figure 8 Hydraulic Model Manning Roughness (Existing and Developed) 15

Figure 9 Predicted developed case 0.5% AEP maximum flood depths 17

Executive Summary

A flood impact assessment has been completed relating to the proposed development of Lot 19 on SP107219 at 325 Shaw Road, Shaw, Queensland 4818. The proposal involves the Material Change of Use of vacant land into a Service Station and Car Wash Facility. The development site is located within the Townsville Local Government Area and involves development within the Queensland state-controlled road environment.

Townsville City Plan 2014 (Version 2024/01) Part 8.2.6.3 and Schedule 6.7.3.1.1 outlines the Townsville City Council (TCC) Local Government Area planning scheme policy in relation to flood hazard. Queensland State Development Assessment Provisions (SDAP) State Code 1 outlines the state’s requirement for development in a state-controlled road environment.

Under the assumptions described within this report, the outcomes from the flood impact assessment in relation to the TCC and Queensland state assessment benchmarks and performance outcomes are summarised in Table 1 and Table 2, respectively.

Table 1 – TCC Planning Scheme Policy (SC6.7.3.1.1) Performance Outcomes.

	Performance Outcome	Response
1	Development in medium and high hazard areas is designed and located to minimise susceptibility to and potential impacts of flooding.	No development is proposed within the high flood hazard area. The site is within the low and medium flood hazard areas on the existing TCC flood hazard overlay. Flood risk mapping indicates that a central portion of the site is subject to medium flood risk. The proposed development has been designed to locate proposed infrastructure away from floodwaters and incorporate raised building pads where required.
2	Development in high hazard areas does not significantly impede the flow of flood waters through the site or worsen flood flows external to the site.	No development is proposed in the high hazard area.
3	Development does not intensify use in high hazard areas, in order to avoid risks to people and property.	No development is proposed in the high hazard area.
4	Siting and layout of development maintains the safety of people and property in medium hazard areas.	The developed case flood hazard area has been mapped using 2D modelling. The hazard mapping shows that the proposed building pads and driveway accesses are within the “Generally safe for vehicles, people and buildings” hazard category, based on Australian Emergency Management Institute definitions.
5	Signage is provided within high and medium flood hazard areas to alert residents and visitors to the flood hazard.	Signage to be confirmed as part of wider development application.
6	Development within high and medium flood hazard areas ensures any changes to the depth, duration, velocity of flood waters are contained within the site.	No development is proposed in the high flood hazard area. To confirm adverse impacts on flood levels/depths, flow velocities and time of inundation are contained to the site; a pre- and post-development scenario was assessed. Except for the proposed road access entry/exit points, no change in flood levels or flow velocity occurs outside of the site up to the 1% Annual Exceedance Probability (AEP) with climate change flood event.
7	Development within high and medium flood hazard does not directly, indirectly or cumulatively worsen flood characteristics outside the development site, having regard to:	No development is proposed in the high hazard area. To evaluate the potential for worsening of flooding outside the development site; pre- and post-development scenarios were assessed.

	<ol style="list-style-type: none"> 1. increased scour and erosion; or 2. loss of flood storage; or 3. loss of or changes to flow paths; or 4. flow acceleration or retardation; or reduction in flood warning times.	No change in flood level or flow velocity is predicted outside of the site up to the 1% Annual Exceedance Probabilities (AEP) with climate change flood event. Predicted flow velocities across the site remain below 0.5 m/s at the 1% AEP to reduce the risk of erosion/scour.
8	Facilities with a role in emergency management and vulnerable community services are able to function effectively during and immediately after flood events.	N/A.
9	Public safety and the environment are not adversely affected by the detrimental impacts of flooding on hazardous materials manufactured or stored in bulk.	N/A

Table Z – Queensland SDAP State Code 1 Performance Outcomes and Acceptable Outcomes

	Performance Outcome	Response
8	Stormwater run-off or overland flow from the development site does not create or exacerbate a safety hazard for users of the state-controlled road.	Negligible change in water depths, flow velocities and time of submergence of the state-controlled road is expected due to the proposed development for all flood events up to 1% annual exceedance probability (including climate change).
9	Stormwater run-off or overland flow from the development site does not result in a material worsening of the operating performance of the state-controlled road or road transport infrastructure.	Negligible change in water depths, flow velocities and time of submergence of the state-controlled road is expected due to the proposed development for all flood events up to 1% annual exceedance probability (including climate change).
10	Stormwater run-off or overland flow from the development site does not adversely impact the structural integrity or physical condition of the state-controlled road or road transport infrastructure.	Negligible change in water depths, flow velocities and time of submergence of the state-controlled road is expected due to the proposed development for all flood events up to 1% annual exceedance probability (including climate change).
11	Development ensures that stormwater is lawfully discharged.	The development does not create any new points of discharge to a state-controlled road environment. Overland flowpaths from much of the development site are maintained as existing except where road-widening or a new access to the state-controlled road is proposed.
12	Development does not result in a material worsening of flooding impacts within a state-controlled road.	For all flood events up to 1% annual exceedance probability (including climate change) the proposed development <ul style="list-style-type: none"> • results in negligible impacts (within +/- 10mm) to existing flood levels within the state-controlled road • results in negligible impacts (less than 10% increase) to existing peak velocities within a state-controlled road • results in negligible impacts to existing time of submergence of a state-controlled road.
13	Drainage infrastructure does not create a safety hazard for users in the state-controlled road.	A new box culvert (1 x 1.2 m wide x 0.6 m high) and existing drain re-alignment will be required at the property access road intersection with Dalrymple Road West. Drain realignment will be required at the property access road intersection with Shaw Road. Proposed road intersections and the new culvert will be designed in accordance with Queensland road drainage standards and specifications. No other new drainage infrastructure is expected to be located outside the property boundary.
14	Drainage infrastructure associated with, or within, a state-controlled road is constructed and designed to ensure the structural integrity and physical condition of existing drainage infrastructure and the surrounding drainage network.	A new box culvert (1 x 1.2 m wide x 0.6 m high) and existing drain re-alignment will be required at the property access road intersection with Dalrymple Road West. Drain realignment will be required at the property access road intersection with Shaw Road. Proposed road intersections and the new culvert will be designed in accordance with Queensland road drainage standards and specifications.



1.0 Introduction

1.1 Background

A flood impact assessment has been completed for LCJ Engineers Pty Ltd in relation to the proposed Material Change of Use (MCU) at 325 Shaw Road, Shaw (Lot 19 on SP107219) in the Townsville City Council (TCC) Local Government Area (LGA). This report describes the assumptions and outcomes of the flood impact assessment to address TCC Planning Guidelines (Townsville City Plan, 2014) and Queensland State Development Assessment Provisions (SDAP) State Code 1.

1.2 Subject Property

Lot 19 on SP107219 at 325 Shaw Road is a 2.56 hectare site in the suburb of Shaw, north of Townsville. The property is adjacent to the Townsville Ring Road and Dalrymple Road West. The property is zoned as rural and has previously been modified from its natural condition, the lot is mowed pasture with low-medium density vegetation. The entire lot area is flat, with no distinct formal or informal watercourse channels through the property (Figure 1).

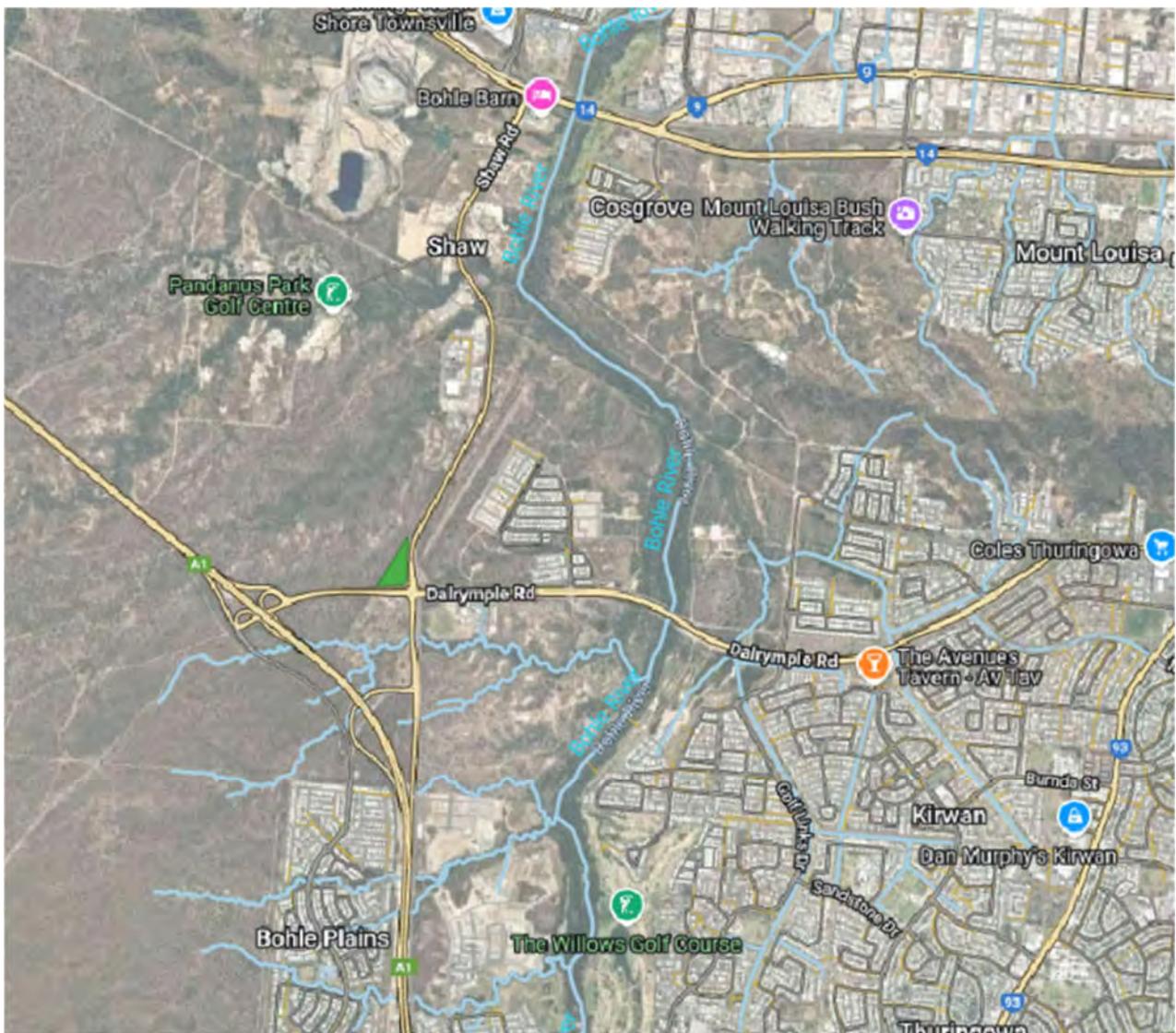


Figure 1 Aerial view of subject property and surrounds (subject property shown in green)



Works

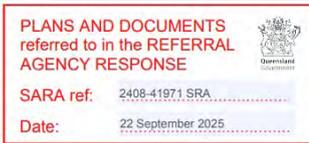
The scope of works undertaken for this flood impact assessment is described below.

- Review of the available background data including publicly available mapping data, reports and the previous flood modelling for the site.
- Undertake a site visit to confirm existing conditions at the site and the location/dimensions of existing drainage infrastructure in the vicinity of the site (where accessible).
- Following review and inclusion of any required flood model updates identified by Imbris, confirm the existing case 1% Annual Exceedance Probability (AEP) flood extent, flow velocities, water depth and flood hazard for the subject site and immediate surrounds based on ARR 2019 Guidelines.
- Determine the existing case 2%, 5%, 10%, 20% and 50% Annual Exceedance Probability (AEP) flood extent, flow velocities, water depth and revised 1% AEP flood hazard for the subject site and immediate surrounds based on ARR 2019 Guidelines.
- Determine the developed case 1% 2%, 5%, 10%, 20% and 50% Annual Exceedance Probability (AEP) flood extent, flow velocities, water depth and revised 1% AEP flood hazard for the subject site and immediate surrounds based on ARR 2019 Guidelines.
- Determine the potential flood impact (developed case minus existing case flood depths) of the proposed development.
- Determine the 0.5% AEP maximum flood depths to assist with planning of locations for bulk storage of hazardous materials.

1.4 Data and Information Provided

The following data and documents were sourced to support this study:

- Detailed site feature survey undertaken in April 2024 provided in AutoCAD format (BHBD Pty Ltd).
- Preferred site design layout provided in AutoCAD format.
- Aerial LiDAR Survey at a 1 m horizontal resolution (2018/2016). Aerial survey data used to develop the topography for the hydraulic model has a vertical accuracy of ± 0.15 m on clear, hard surfaces and a horizontal accuracy of ± 0.45 m.
- Previous flood modelling for the 1% AEP flood event and accompanying reports for the Bohle River catchment provided by TCC, which was undertaken as part of the *TCC Townsville Recalibrated Flood Modelling and Mapping Project – Bohle River Flood Study* (Water Technology, August 2023).



Impact Assessment

2.1 Approach

The TCC City Plan specifies a preference that proposed development flood impacts are assessed using the latest 2D hydraulic models developed for Council's flood hazard overlay. TCC commissioned the development of a 2D TUFLOW flood model in 2020 (later updated in 2023) for the Bohle River catchment.

TCC has provided access to their 2D flood model for the purpose of undertaking this flood impact assessment. This report details the use of the TCC flood model for evaluating potential flood impacts in relation to the proposed development.

The development and previous calibration of the TUFLOW flood model is documented in detail within the Townsville Recalibrated Flood Modelling and Mapping – Bohle River (Rev V02, August 2023) report for TCC. This report is freely available online via the TCC Flood Information Portal and these details are not repeated herein. The study was undertaken based on the Australian Rainfall and Runoff 2019 (ARR2019) Guidelines.

It is noted that updates to Australian Rainfall and Runoff 2019 (ARR2019) Guidelines were made in October 2024. These updates include new recommendations in relation to the consideration of climate change for flood risk planning. Similarly, the Queensland State Flood Risk Management Framework (2021) now recommends the incorporation of climate change and the latest TCC Flood Risk Mapping is based on the 1% AEP incorporating an increase in rainfall intensity for a year 2100 climate change scenario.

In this study flood impacts were assessed up to the 1% AEP flood event incorporating a 15.4% increase in rainfall intensity, as adopted in the Bohle River Flood Study (2023).

2.2 Catchment Hydrology

The catchment area upstream of the subject site is approximately 7.5 hectares and is characterised by a low hill range with runoff onto a large flat floodplain. The flat area of the upstream catchment comprises the minority of the catchment area, with no defined flow channel immediately upstream of the site.

The road drainage features and existing table drains within the road corridor are the major drainage feature in the area, these receive overland flow from across the project site and control flow to the catchment outlet culverts under Shaw Road. An additional catchment area south of Dalrymple Road West flows into the table drain south of the project site via a single 1.2 m x 0.45 m Reinforced Concrete Box Culvert (RCBC) under Dalrymple Road West.

The existing flood hazard across the site can broadly be described as ponding due to the very flat nature of the site and once the capacity of the Shaw Road culverts is exceeded. The catchment is bounded to the east by Shaw Road (Figure 2). Since Shaw Road and Dalrymple Road West are not predicted to be inundated up to the 1% AEP, the catchment outlet is seven x 1.2 m wide and 0.45 m high RCBCs under Shaw Road (Figure 3).

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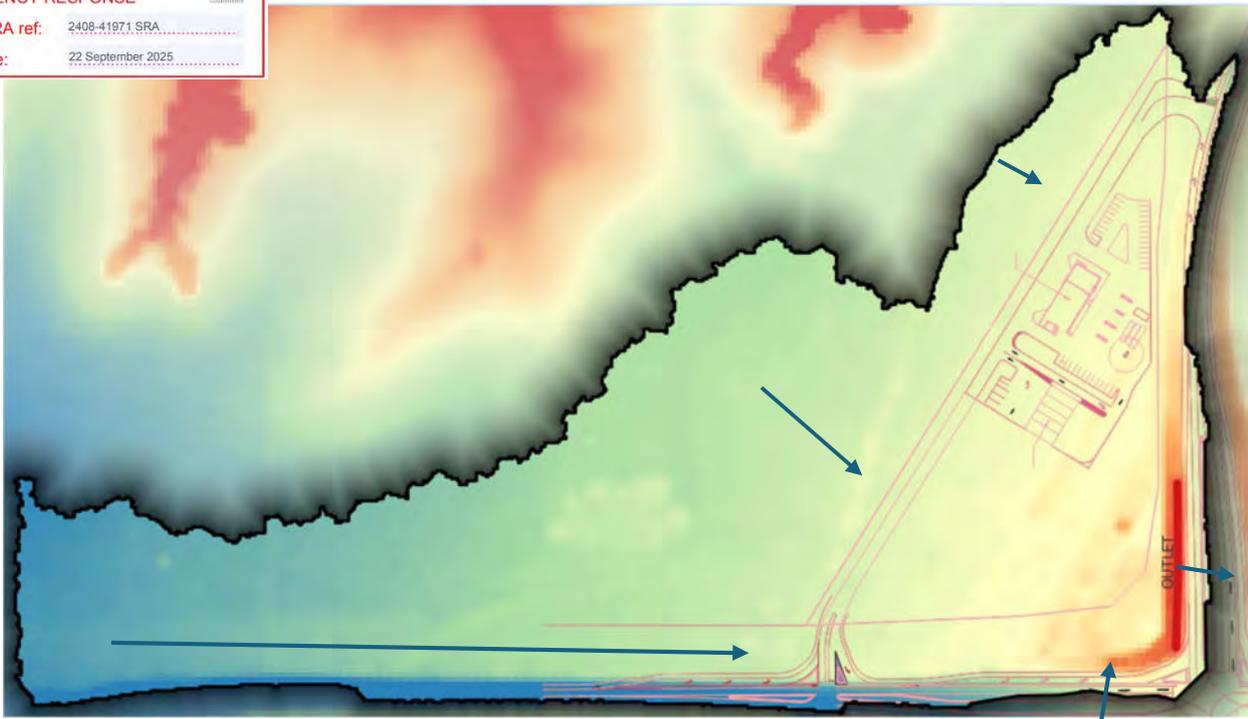


Figure 2 Catchment upstream and including 325 Shaw Road (Proposed development sketch shown in pink and described further in Section 2.4).



Figure 3 Development site looking north-east from Dalrymple Road West to the existing catchment outlet culverts under Shaw Road.

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Flood Hazard

The latest flood risk mapping shows that the central portion of the subject property is within the Medium Flood Risk area (Figure 4). No part of the site is within the High or Very High Flood Risk area.

Dalrymple Road West and Shaw Road are not predicted to be inundated up to the 1% AEP flood event in the immediate vicinity the subject site under existing conditions.

The hydraulic model was updated to include standard minor flood events up to the 1% AEP (i.e. the 2%, 5%, 20% and 50% AEP flood events). The catchment hydrology is modelled entirely within the 2D TUFLOW model using the rain-on-grid approach.

The baseline flood events were simulated for the critical durations and temporal patterns as defined in the Townsville Recalibrated Flood Modelling and Mapping – Bohle River (Rev V02, August 2023). These were the 90-minute-hour/TP06 for 50% AEP, 20% AEP, 10% AEP, 5% AEP and 90-minute/TP01 storm for the 2% and 1% AEP with climate change flood events.

Figure 5 shows the predicted existing-case flood depths for the 1% AEP with climate change flood event. Due to the lack of any formal drainage channel immediately upstream of 325 Shaw Road, flooding across the site is characterised as shallow overland flow ranging from 0.1 - 0.3 m depth across central section of the site. Maps of the existing flood extents for all events up to the 1% AEP with climate change are provided in Appendix A.



Figure 4 Flood Hazard Risk at 325 Shaw Road, Shaw. Subject lot highlighted in blue. (Source: TCC Flood Information Portal, retrieved 15/04/25)

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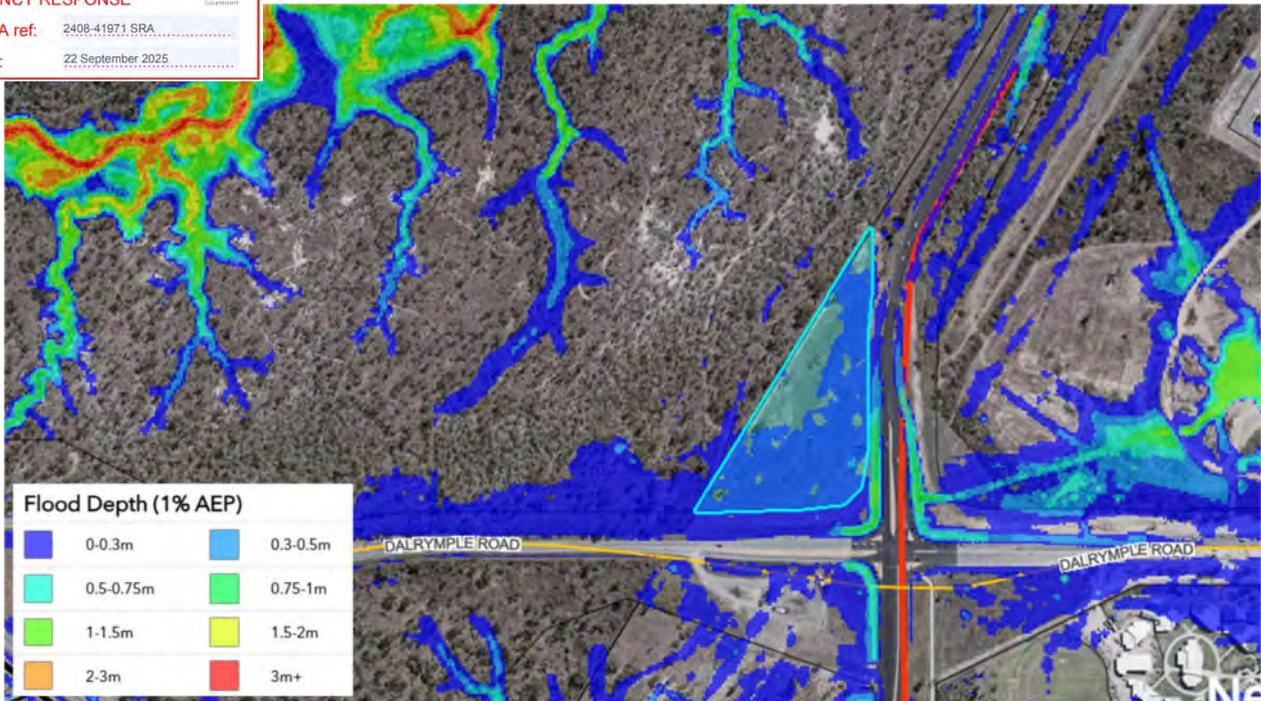



Figure 5 1% AEP with climate change maximum flood depths at 325 Shaw Road, Shaw (Subject site highlighted in blue)

2.4 Developed Case Flood Impact Assessment

The existing case flood model was updated to reflect the development layout under the assumptions described below. The impacts on floods up to the 1% AEP flood event were evaluated for the storm durations and temporal patterns identified as being critical in the existing case assessment. The 0.5% AEP flood event was also simulated to confirm flood levels in the vicinity of hazardous material storage locations.

Figure 6 provides a conceptual overview of the proposed development plan for the site provided by Kingsun Developments for a service station with car wash facility. Figure 7 and Figure 8 illustrate the corresponding hydraulic model refinements which were made to reflect the developed site, these assumptions are discussed in more detail below.

The proposed development has been designed with a layout such that much of the development is on land outside of the existing flood risk area (refer to Figure 4). Access roads are proposed to Dalrymple Road West and Shaw Road which will require associated road drainage features.

The drainage features of the development and assumptions made in the hydraulic model include:

- All parts of the development are at the existing site elevation, with the exception of raised surfaces as highlighted on (Figure 7). Raised surfaces include
 - road access intersections to Dalrymple Road West and Shaw Road which require widening for turning lanes and topographic modifications in order for the existing site elevation to transition the existing road elevation.
 - building pad locations immediately surrounding the Service Station and Car Wash and forecourts and hazardous material storage locations raised to 15.3 m AHD.
- Re-alignment of the existing road drain which runs parallel to Shaw Road due to accommodate road widening for a left-turnout lane.
- Re-alignment of the existing road drain which runs along the site boundary parallel to Dalrymple Road West due to road widening to accommodate a left-turnout lane and direct flow towards to a proposed single 1.2 m wide x 0.6 m high RCBC under the property access road.
- Manning roughness changes to reflect smooth surface of the road and development site (Figure 8).

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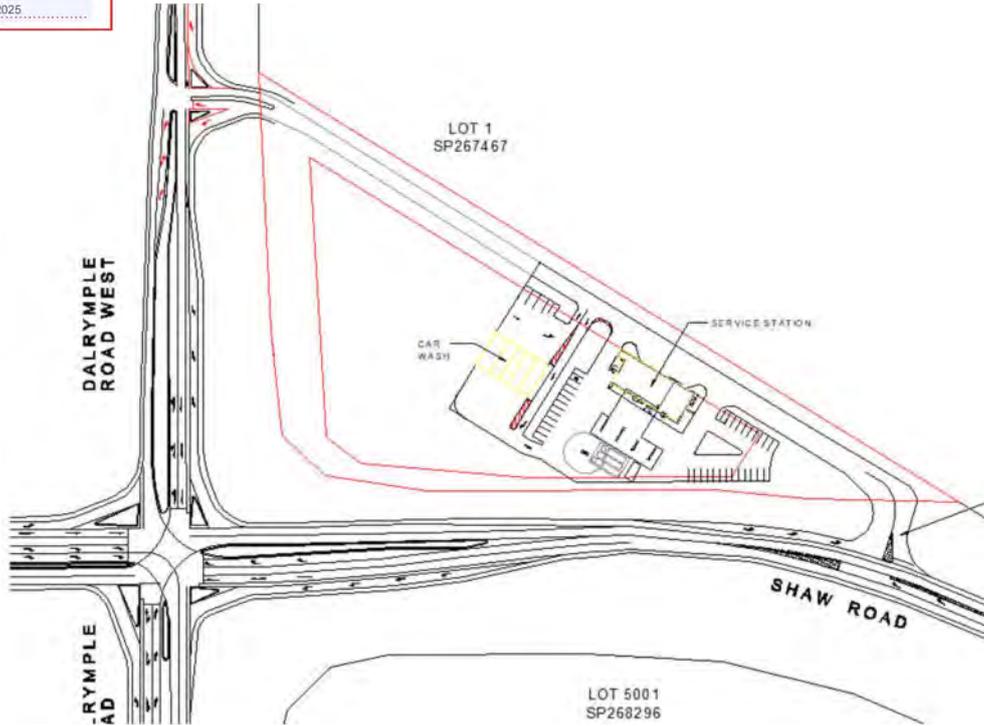



Figure 6 Conceptual Site Development Plan

As shown in Figure 8, the 2D mapping of the Mannings roughness of the proposed roads and paved areas within the development site were modified to a value 0.03. All other areas of the lot were maintained at the calibrated model existing case value 0.055, which reflects the current low-density vegetation across the lot.

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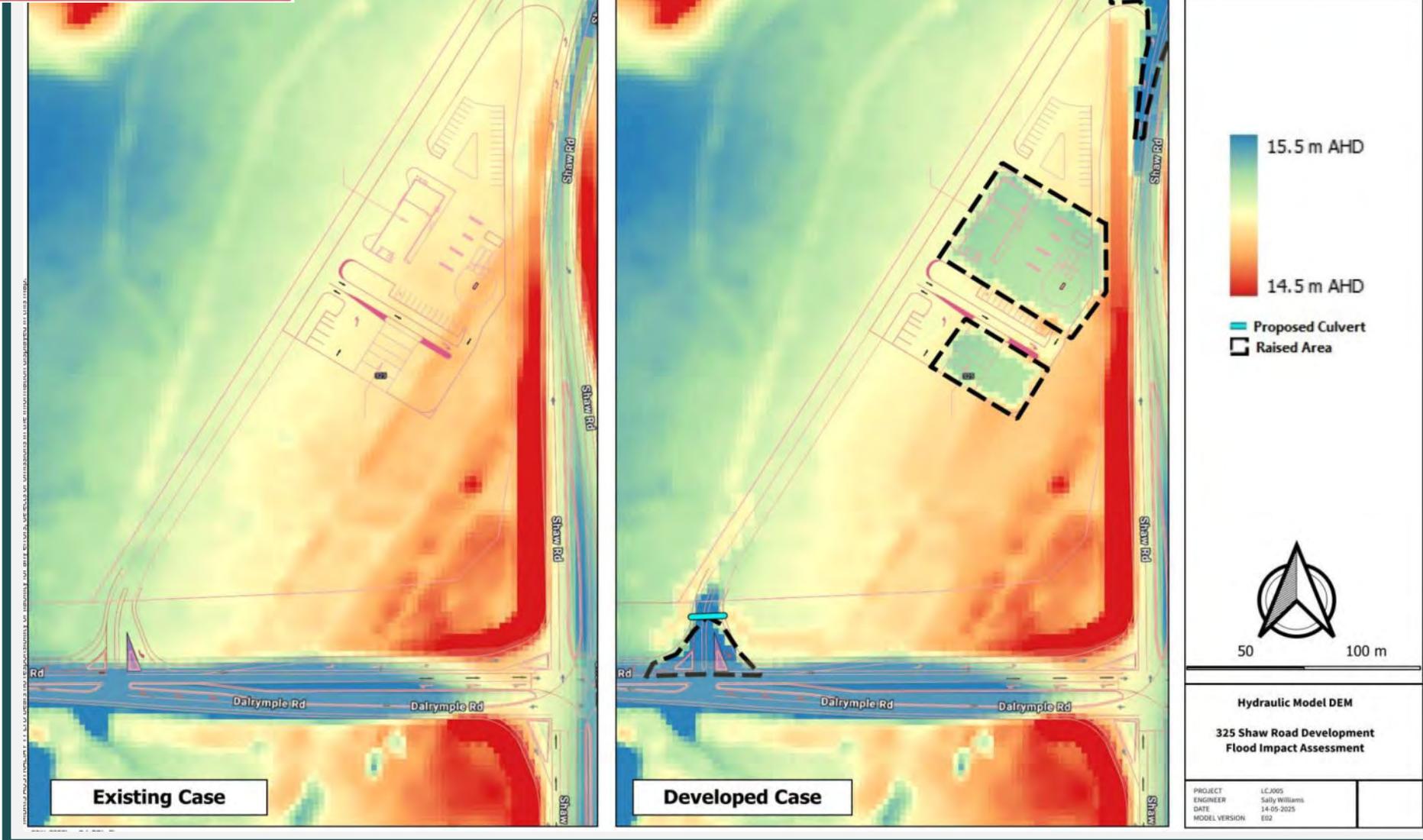



Figure 7 Hydraulic Model Topography (Existing and Developed)

PLANS AND DOCUMENTS referred to in the REFERRAL AGENCY RESPONSE

SARA ref: 2408-41971 SRA

Date: 22 September 2025

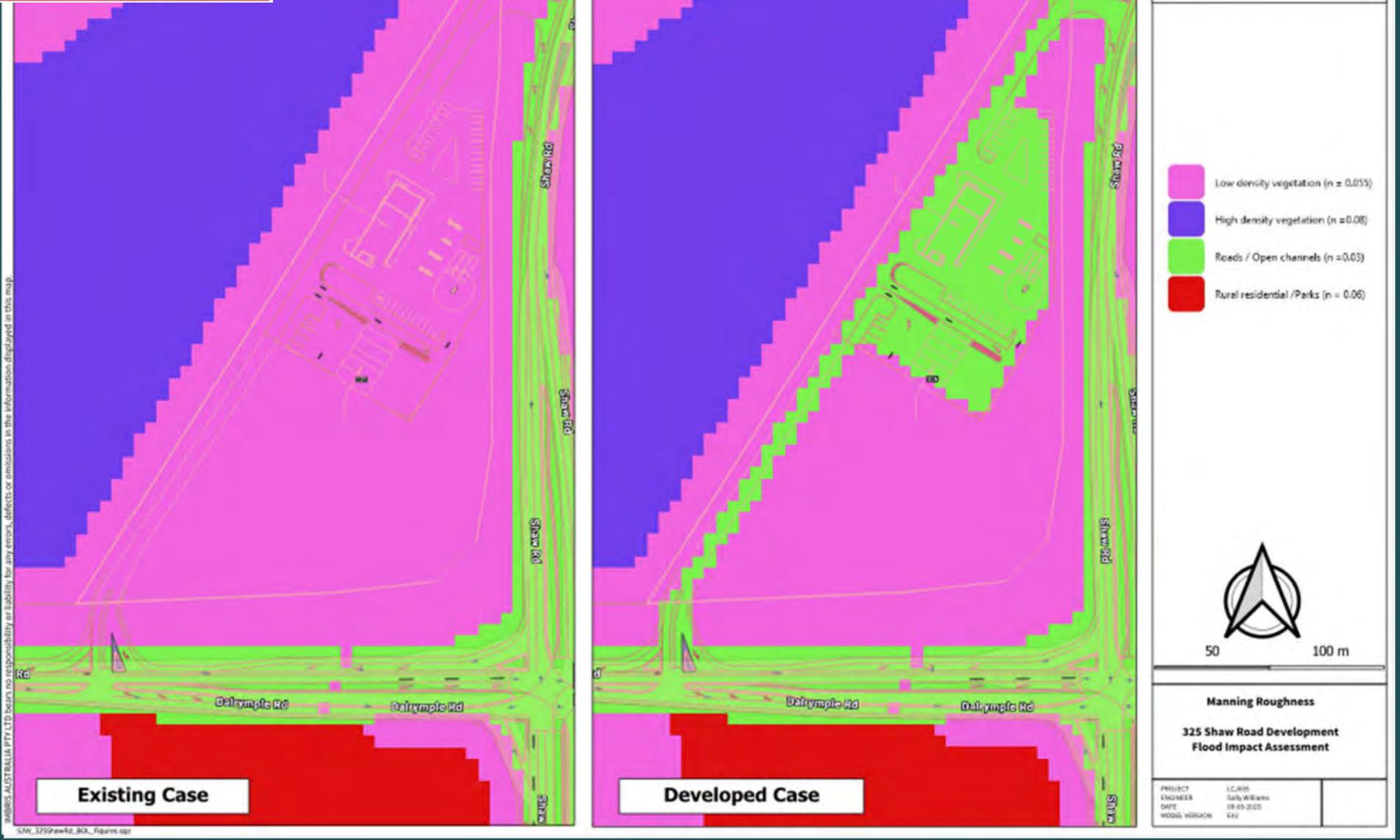



Figure 8 Hydraulic Model Manning Roughness (Existing and Developed)



Findings and Discussion

The developed case model was run for the same critical durations and for all AEPs as the existing case. Maps of the maximum water depth and flow velocity, and the difference in water surface level (afflux) between the developed case and the existing case are provided in Appendix A.

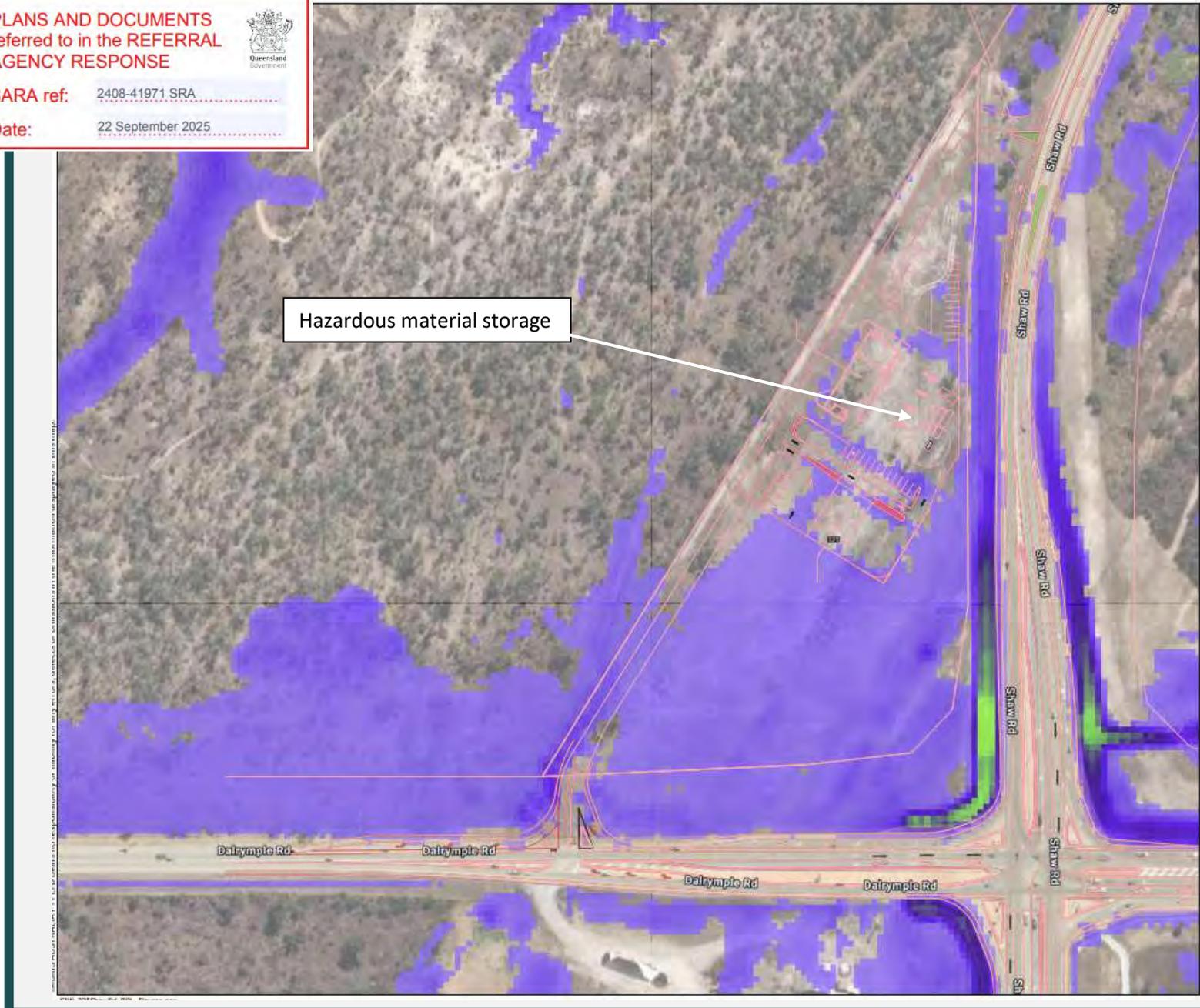
Key outcomes of the developed case flood impact assessment include:

- Up to the 1% Annual Exceedance Probability all building pads are above the predicted peak flood level. Peak water depths surrounding pads are in the order of 0.1 - 0.25 m.
- No increases in peak flood levels are predicted outside of the proposed development lot up to the 1% AEP incorporating climate change except in the immediate vicinity of road access points (Map A13).
- Overland flow velocities across the site remain below 0.5 m/s, assuming that adequate vegetation is maintained across the primary flow areas. This minimizes the risk of erosion and scour (Map A7-A12).
- The access road within the property is expected to remain trafficable (based on water depth below 0.15 m and flow velocity below 0.5 m/s) up to the 1% AEP flood event.
- Flood immunity in hazardous storage area is predicted to exceed 0.5% AEP flood event (Figure 9). The 0.5% AEP flood level in the vicinity of the proposed hazardous material storage is 15.30 m AHD. It is recommended that bunding and an additional freeboard is provided above this level.

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referred to in the REFERRAL
AGENCY RESPONSE

SARA ref: 2408-41971 SRA

Date: 22 September 2025



0.5% AEP Maximum Water Depth

325 Shaw Road Development
Flood Impact Assessment

PROJECT	LC 2005
ENGINEER	Sally Williams
DATE	09-09-2025
MODEL VERSION	ED2

Figure 9 Predicted developed case 0.5% AEP maximum flood depths

PLANS AND DOCUMENTS referred to in the REFERRAL AGENCY RESPONSE

SARA ref: 2408-41971 SRA

Date: 22 September 2025



5.0 Conclusions

This flood impact assessment has been undertaken in relation to the proposed development of Lot 19 on SP107219 at 325 Shaw Road, Shaw, Queensland 4818.

The assessment has been completed in accordance with TCC Guidelines for Preparation of Flood Studies (Townsville City Plan, 2014). The base-line flood modelling study that was used for deriving the TCC flood hazard overlay was used for evaluating development impacts.

The impacts on floods have been evaluated up to the 1% AEP including climate change to confirm no adverse impacts on flood levels, depths, flow velocities and time of inundation external to the site, except in the vicinity of new road access points.

Townsville City Council (TCC) Flood Hazard Planning Scheme Policy (Part 8.2.6.3 and Schedule 6.7.3.1.1) outlines several assessment benchmarks associated for proposed developments. The development outcomes in relation to these benchmarks are summarised in Table 1.

Queensland SDAP State Code 1 outlines several assessment benchmarks associated for proposed developments. The development outcomes in relation to these benchmarks are summarised in Table 2.

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AGENCY RESPONSE



SARA ref: 2408-41971 SRA

Date: 22 September 2025

Appendix A - Mapping

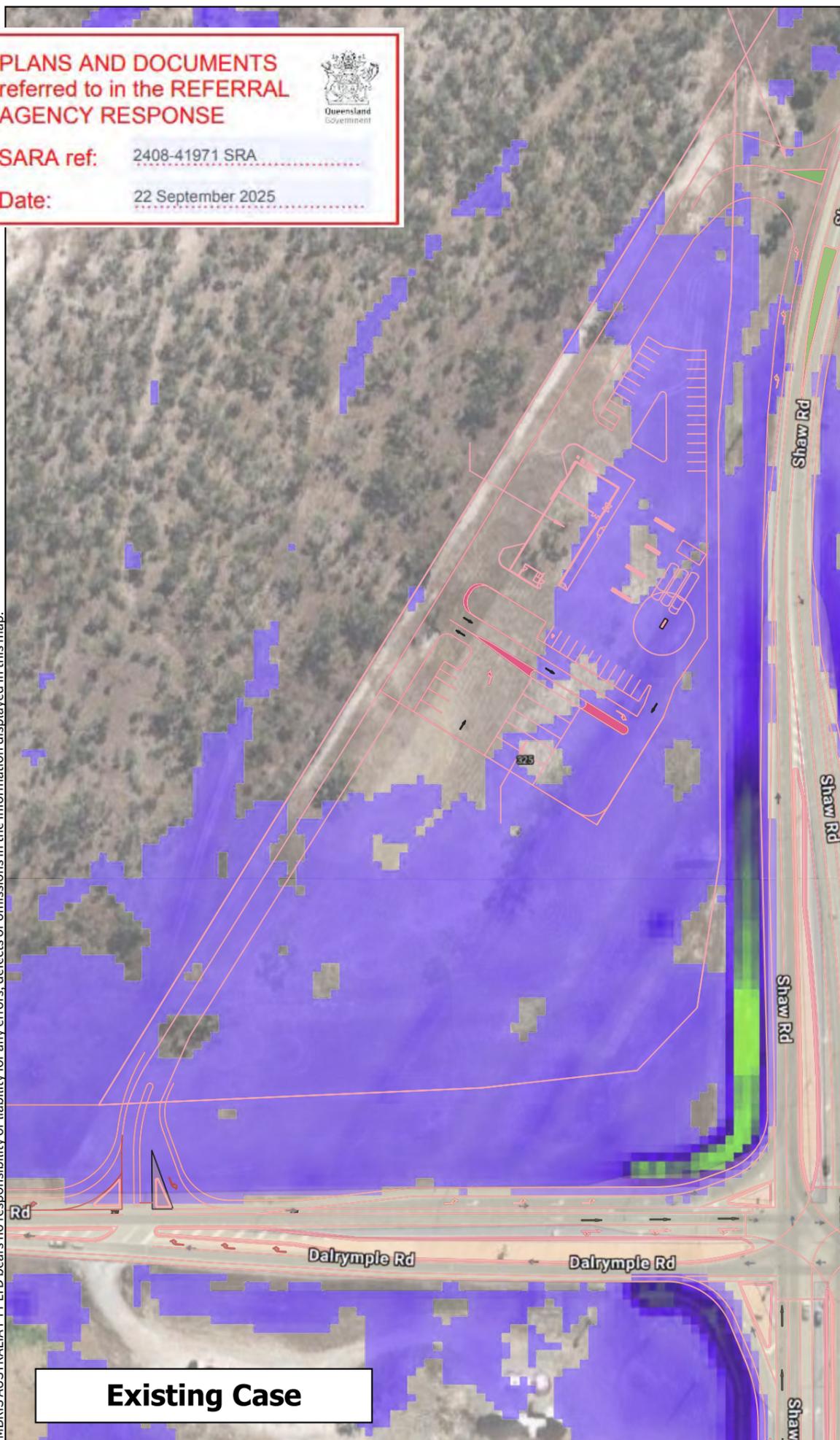
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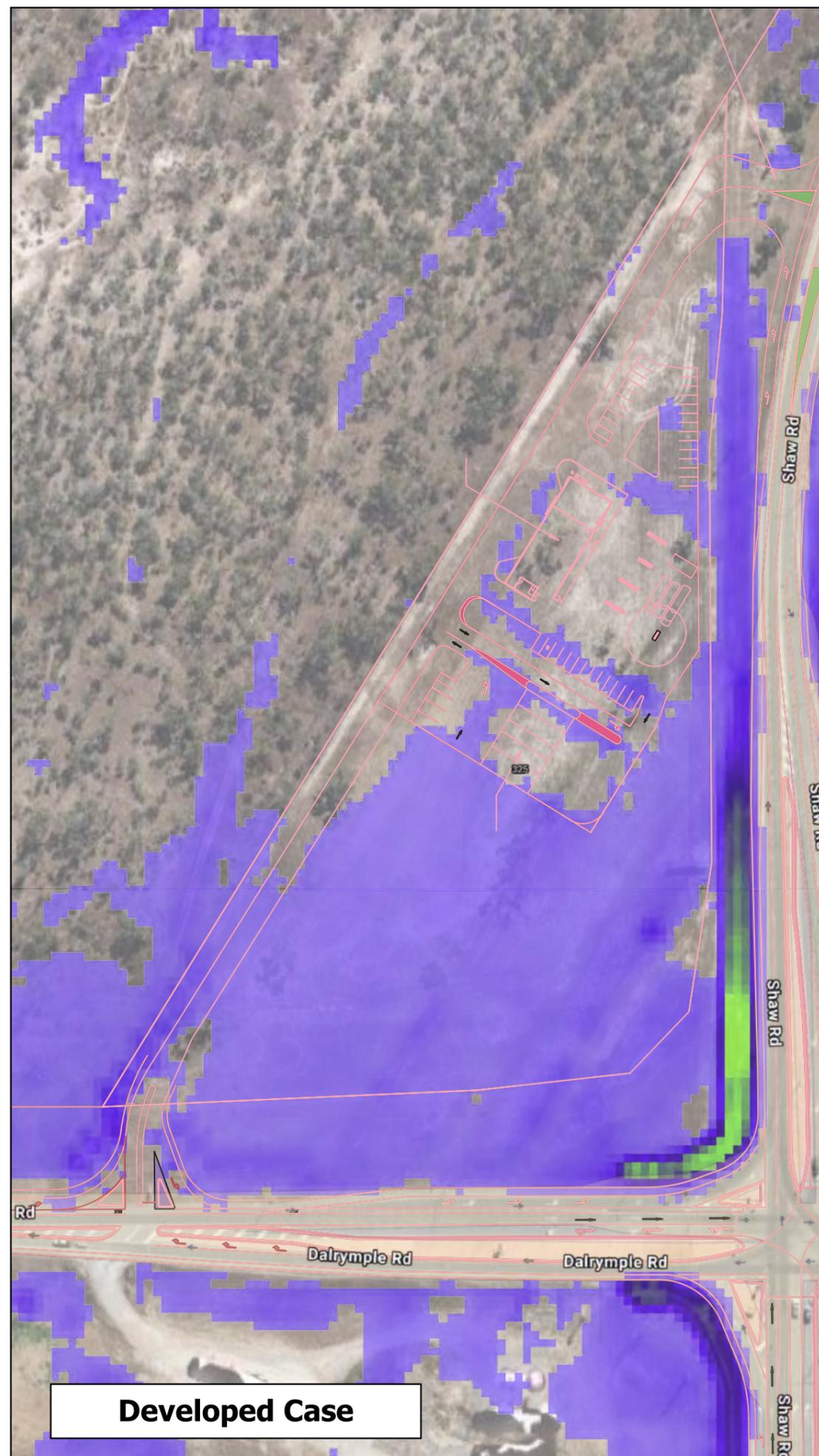
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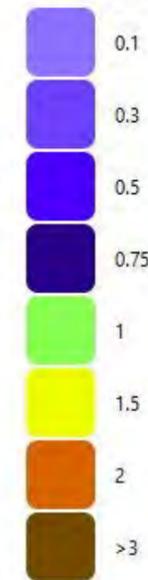
Existing Case



Developed Case



Water Depth (m)



50 100 m

1% AEP - Maximum Water Depth

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A1**

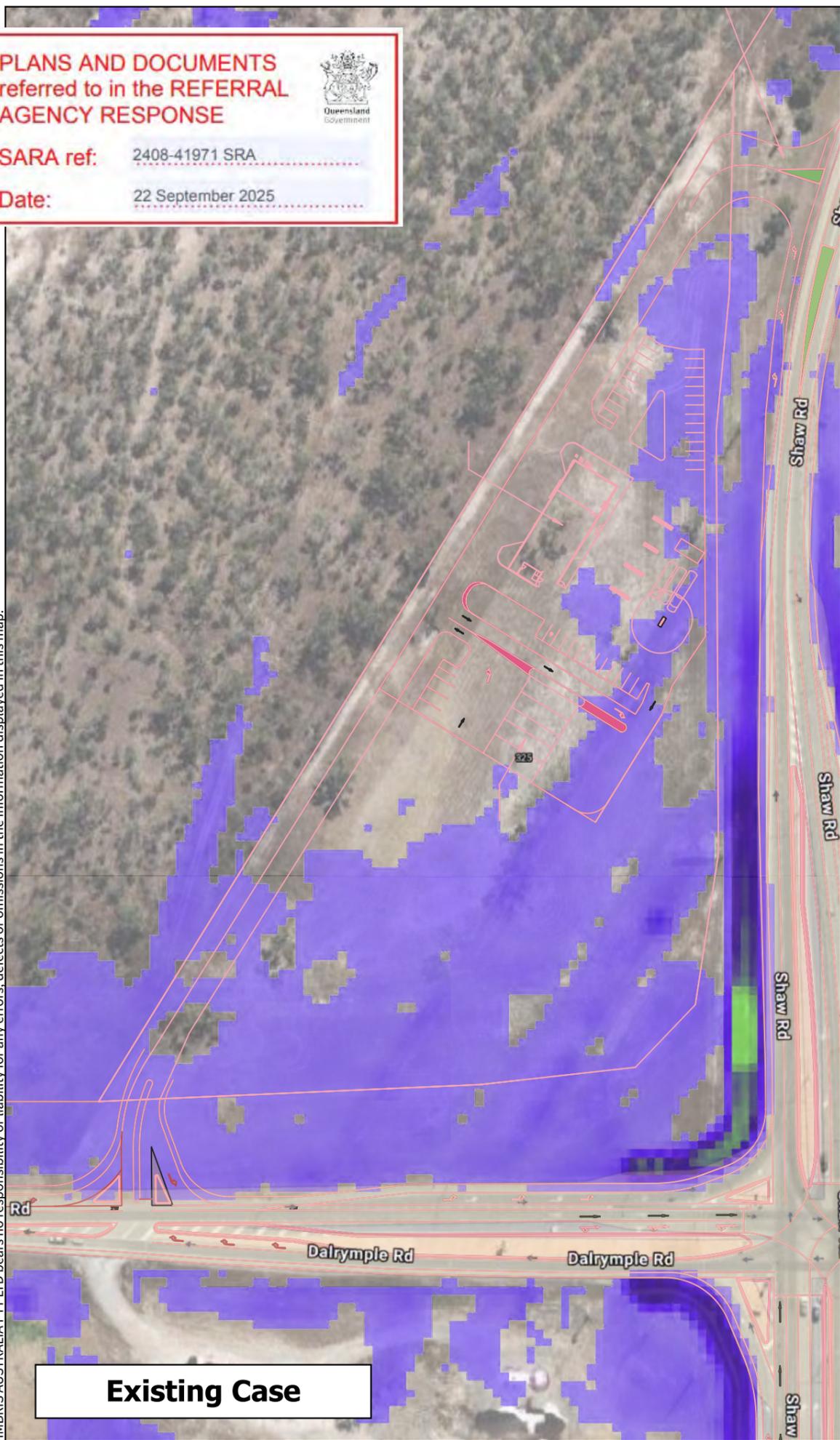
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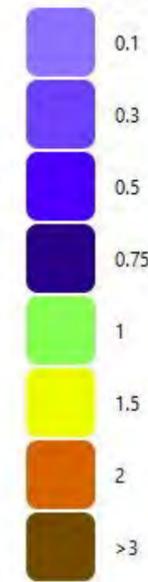
Existing Case



Developed Case



Water Depth (m)



50 100 m

2% AEP - Maximum Water Depth

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-05-2025
MODEL VERSION E02

**Map
A2**

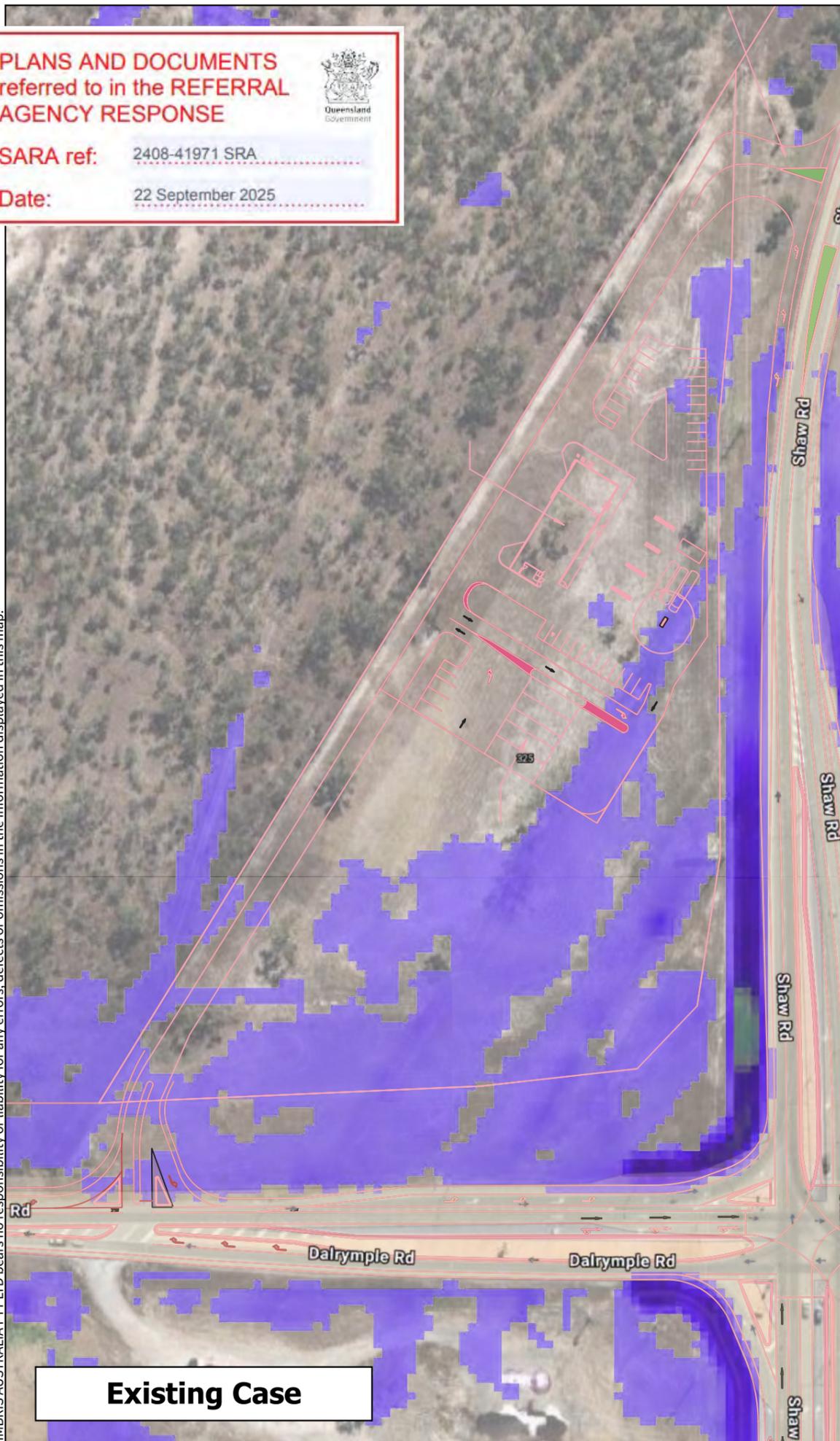
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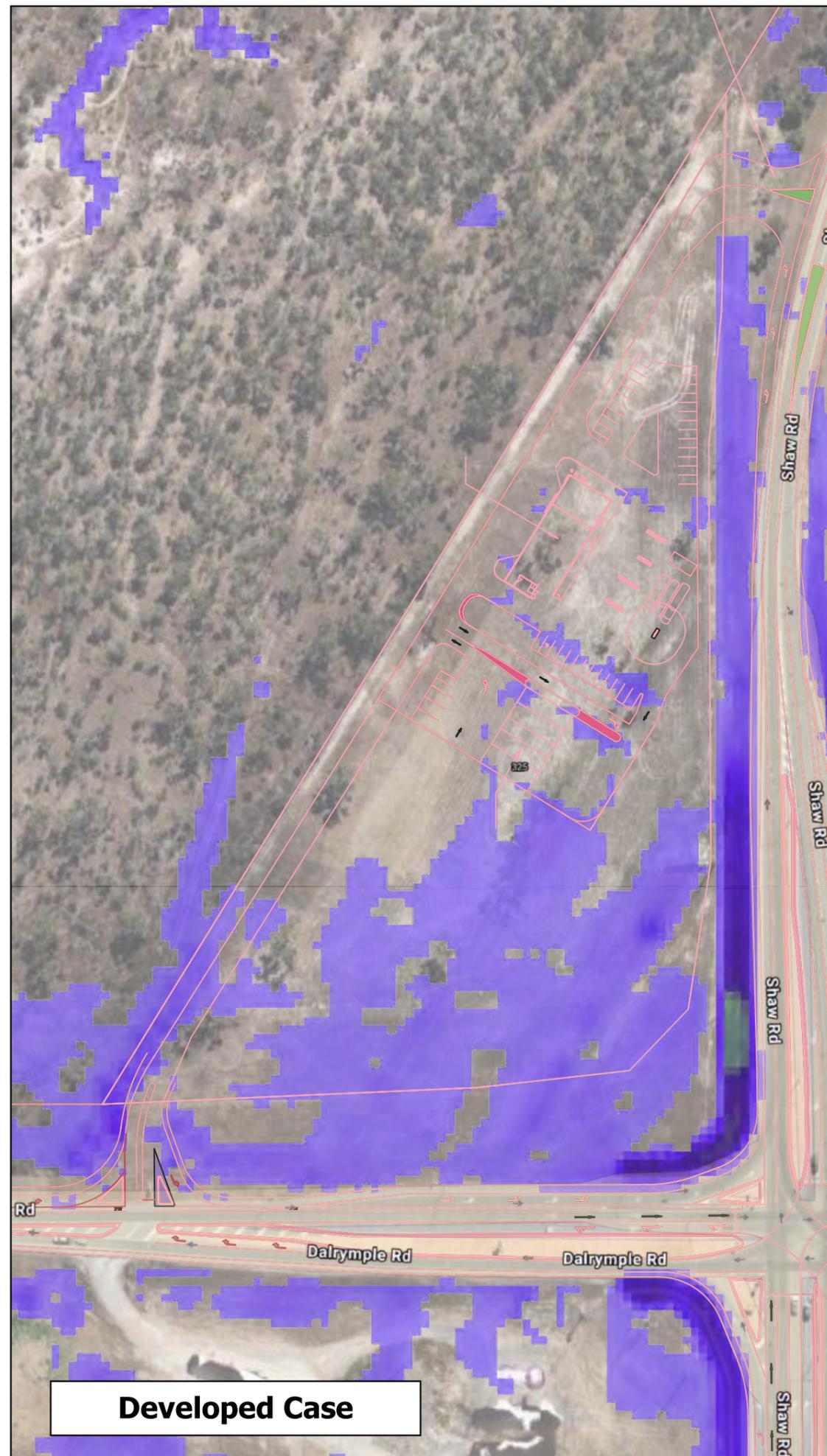
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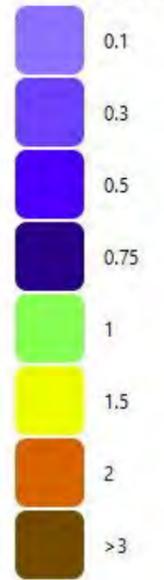
Existing Case



Developed Case



Water Depth (m)



50 100 m

5% AEP - Maximum Water Depth

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-05-2025
MODEL VERSION E02

**Map
A3**

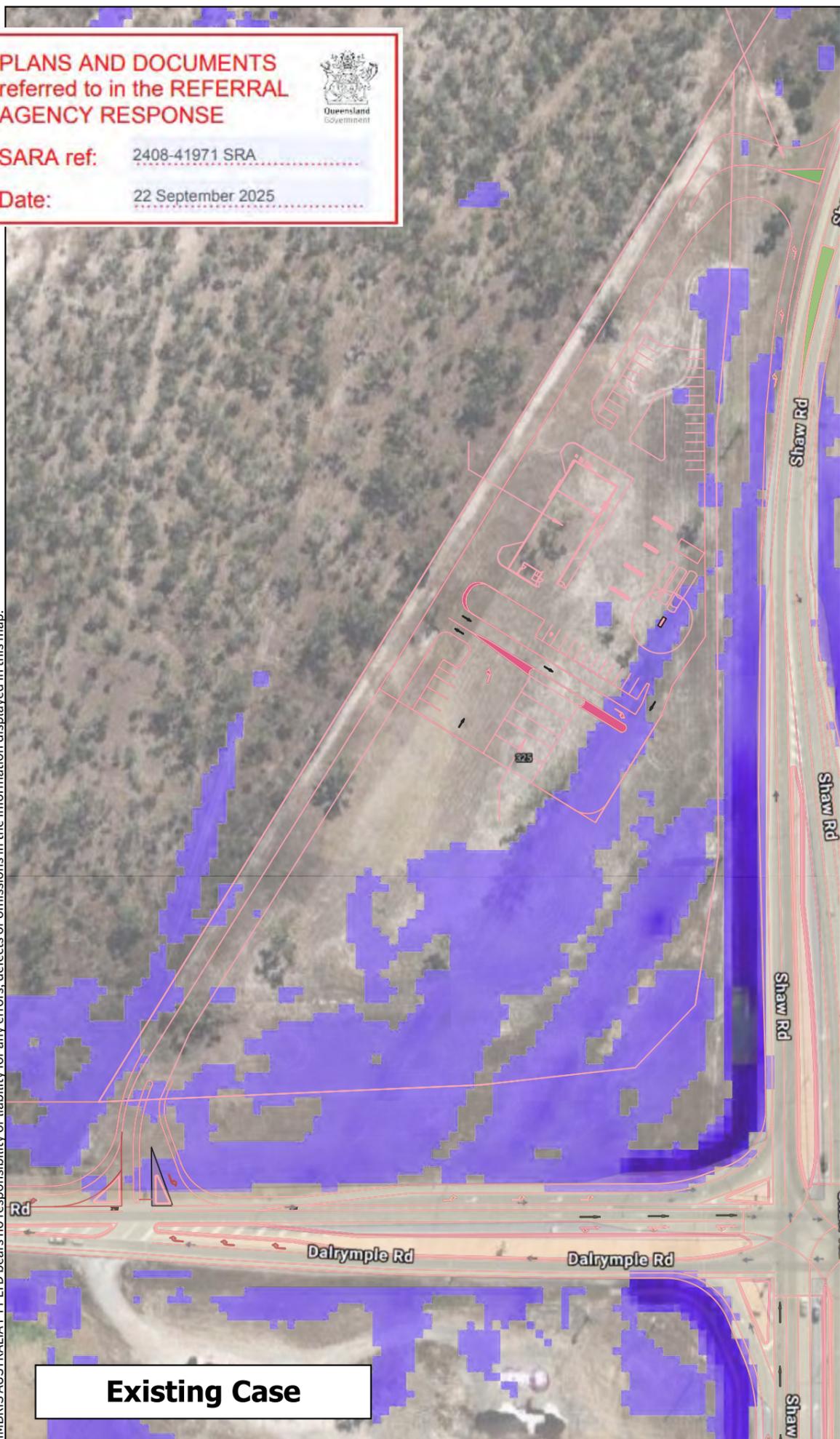
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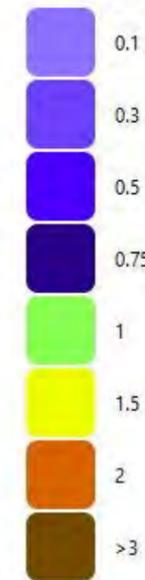
Existing Case



Developed Case

imbris

Water Depth (m)



50 100 m

10% AEP - Maximum Water Depth

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A4**

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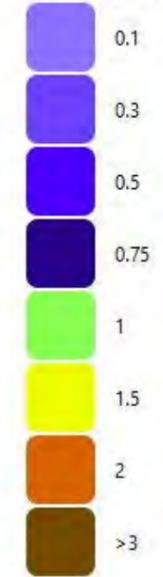
Existing Case



Developed Case



Water Depth (m)



50 100 m

20% AEP - Maximum Water Depth

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A5**

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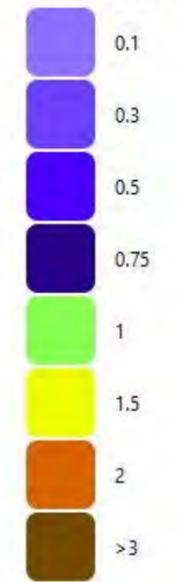
Existing Case



Developed Case



Water Depth (m)



50 100 m

50% AEP - Maximum Water Depth

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT	LCJ005
ENGINEER	Sally Williams
DATE	09-05-2025
MODEL VERSION	E02

**Map
A6**

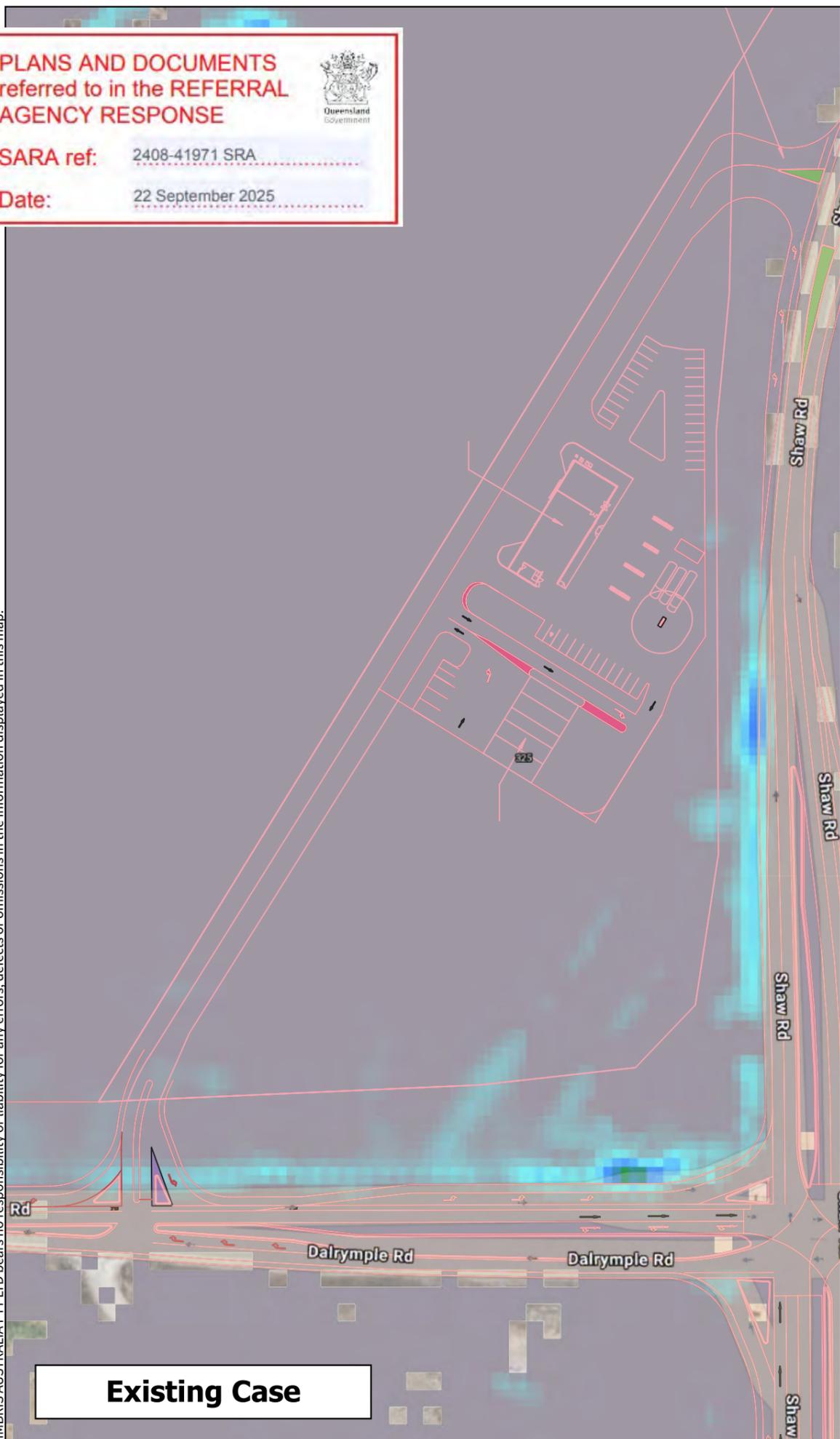
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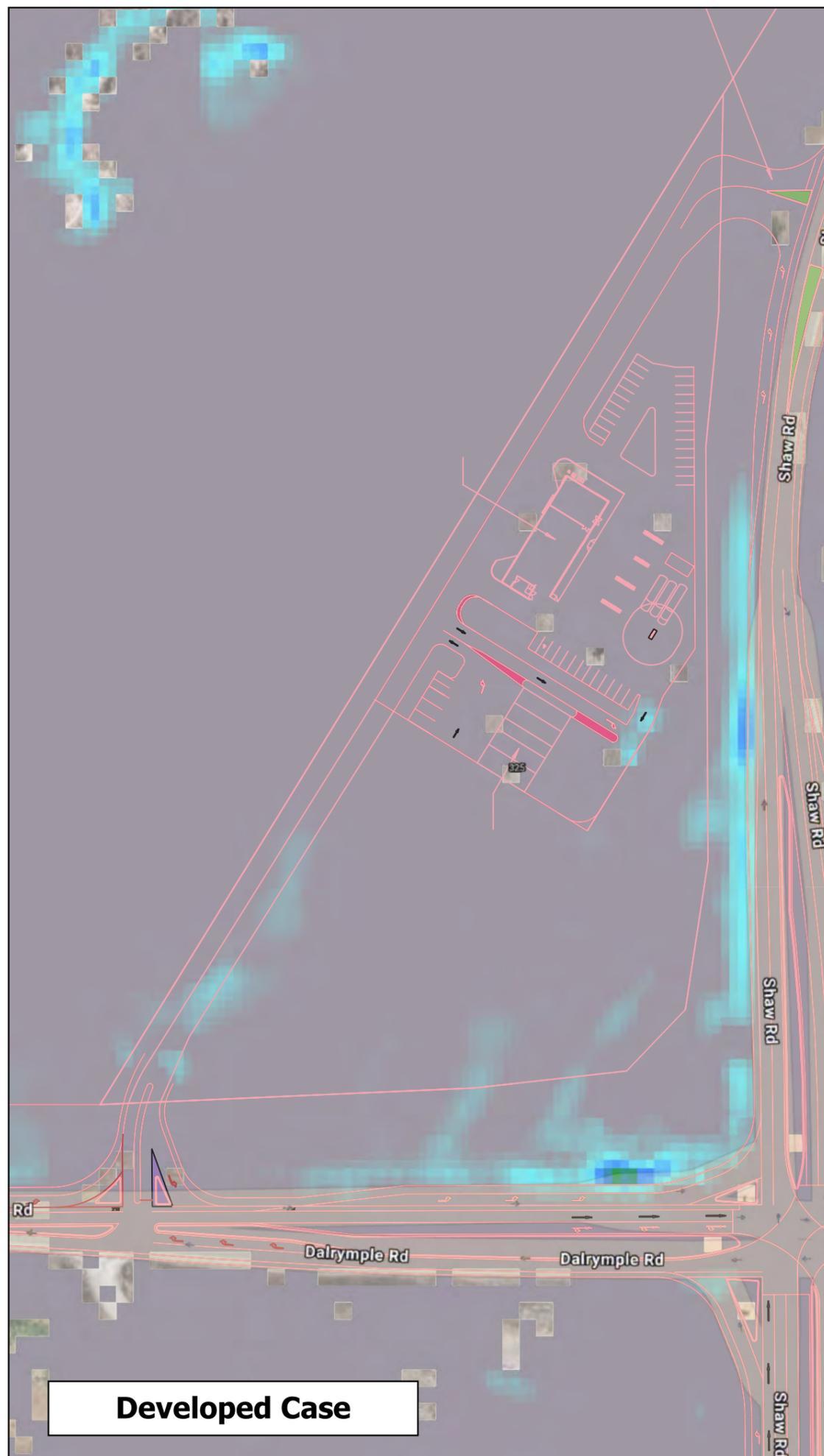
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Existing Case



Developed Case



Velocity (m/s)

- <math>< 0.25</math>
- $0.25 - 0.50$
- $0.50 - 0.75$
- $0.75 - 1.00$
- $1.00 - 1.25$
- $1.25 - 1.50$
- $1.50 - 2.00$
- $2.00 - 2.50$
- $2.50 - 3.00$
- > 3.00



50 100 m

1% AEP - Peak Flow Velocity

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A7**

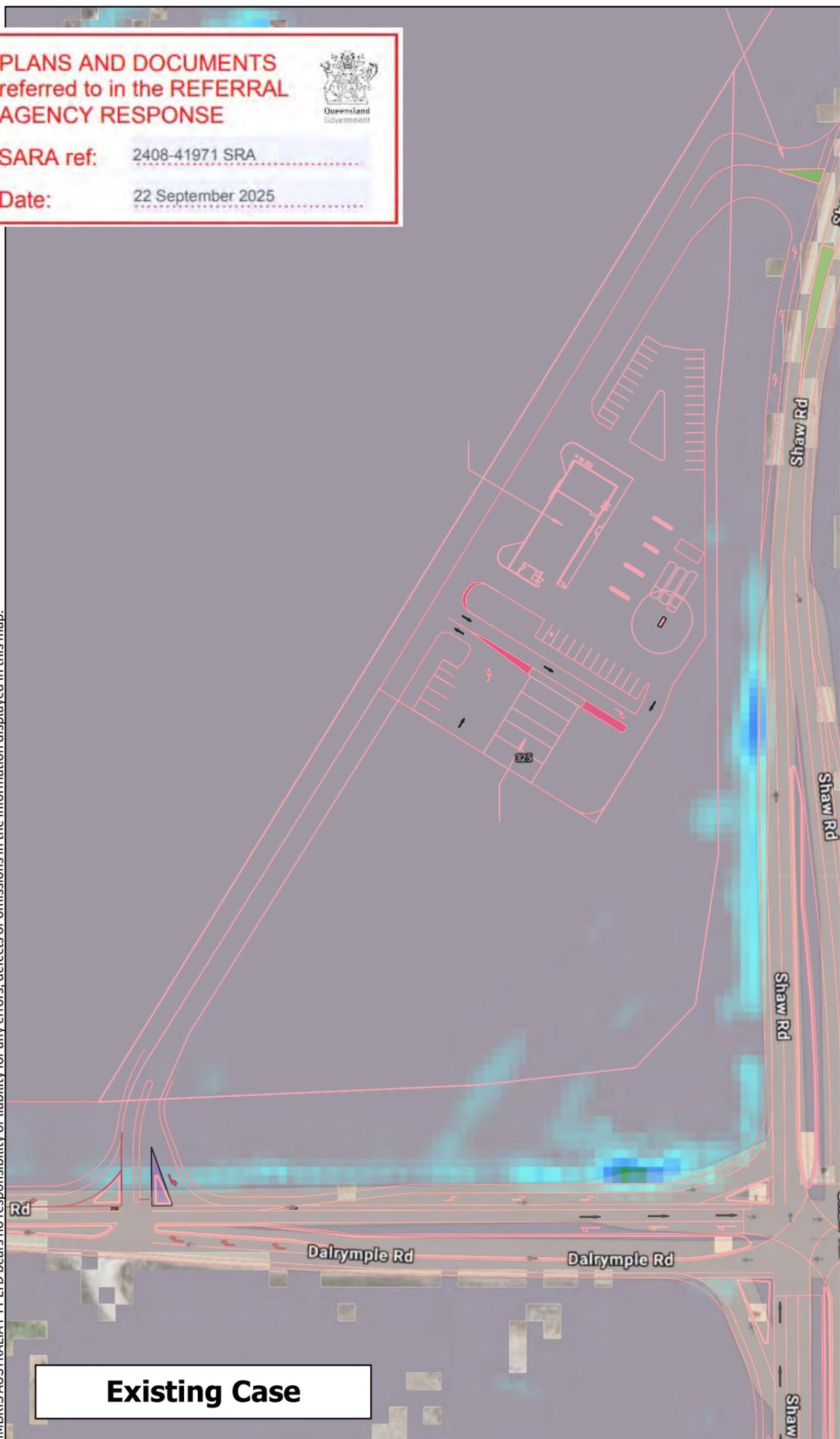
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Existing Case



Developed Case



50 100 m

2% AEP - Peak Flow Velocity

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A8**

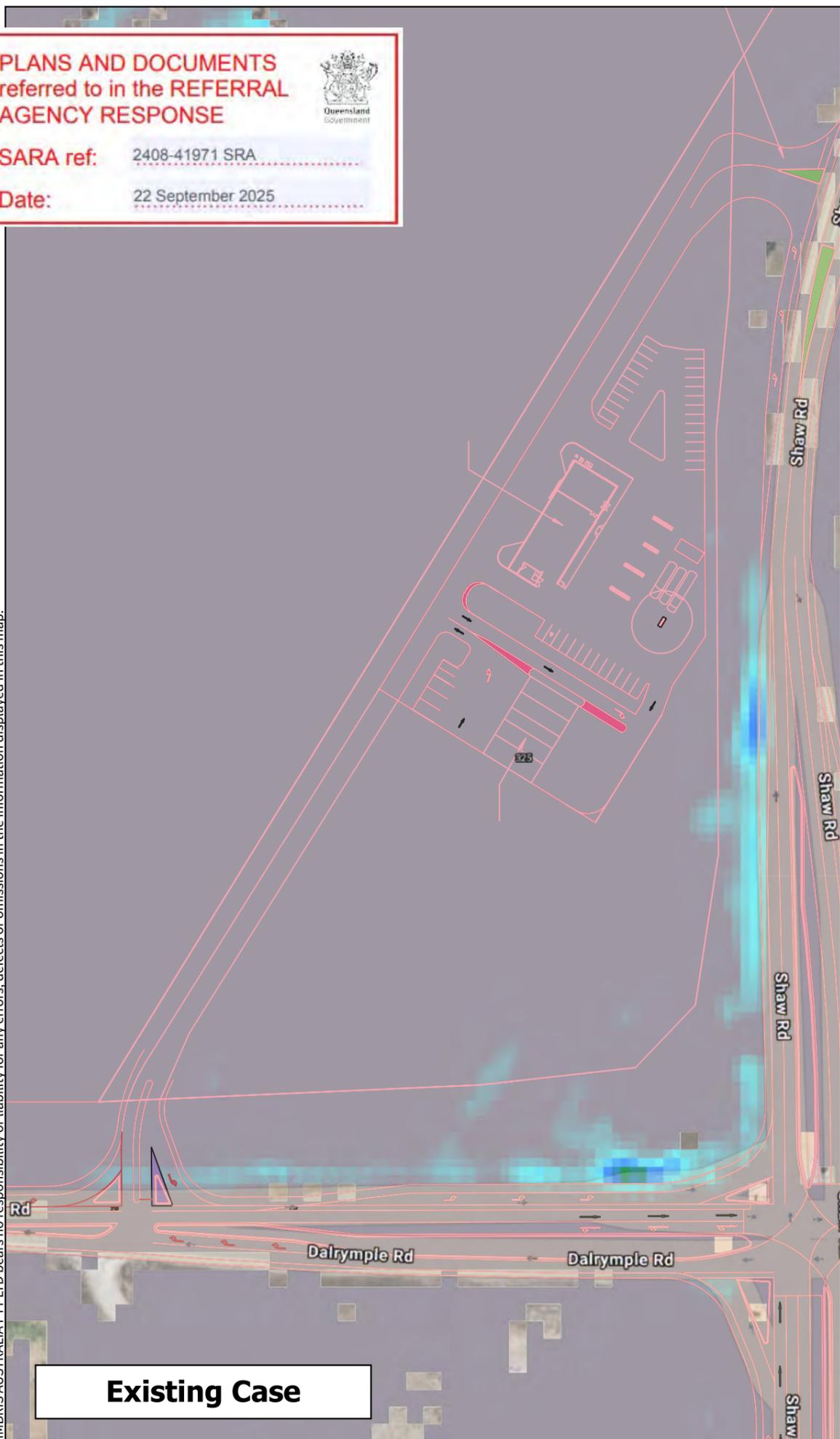
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Velocity (m/s)

- < 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- > 3.00



50 100 m

5% AEP - Peak Flow Velocity

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A9**

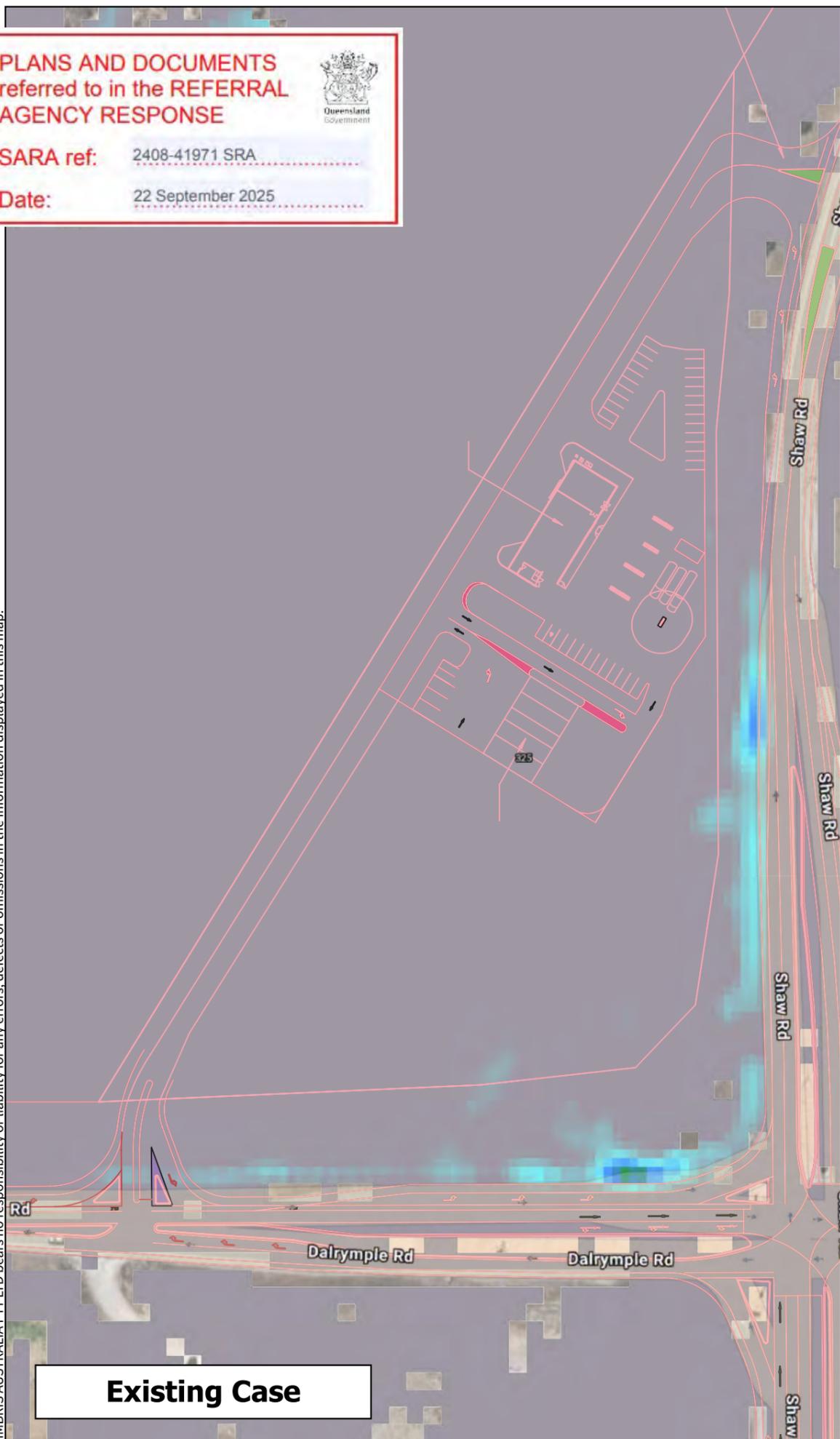
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Existing Case



Developed Case

imbris

Velocity (m/s)

- < 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- > 3.00



50 100 m

10% AEP - Peak Flow Velocity

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A10**

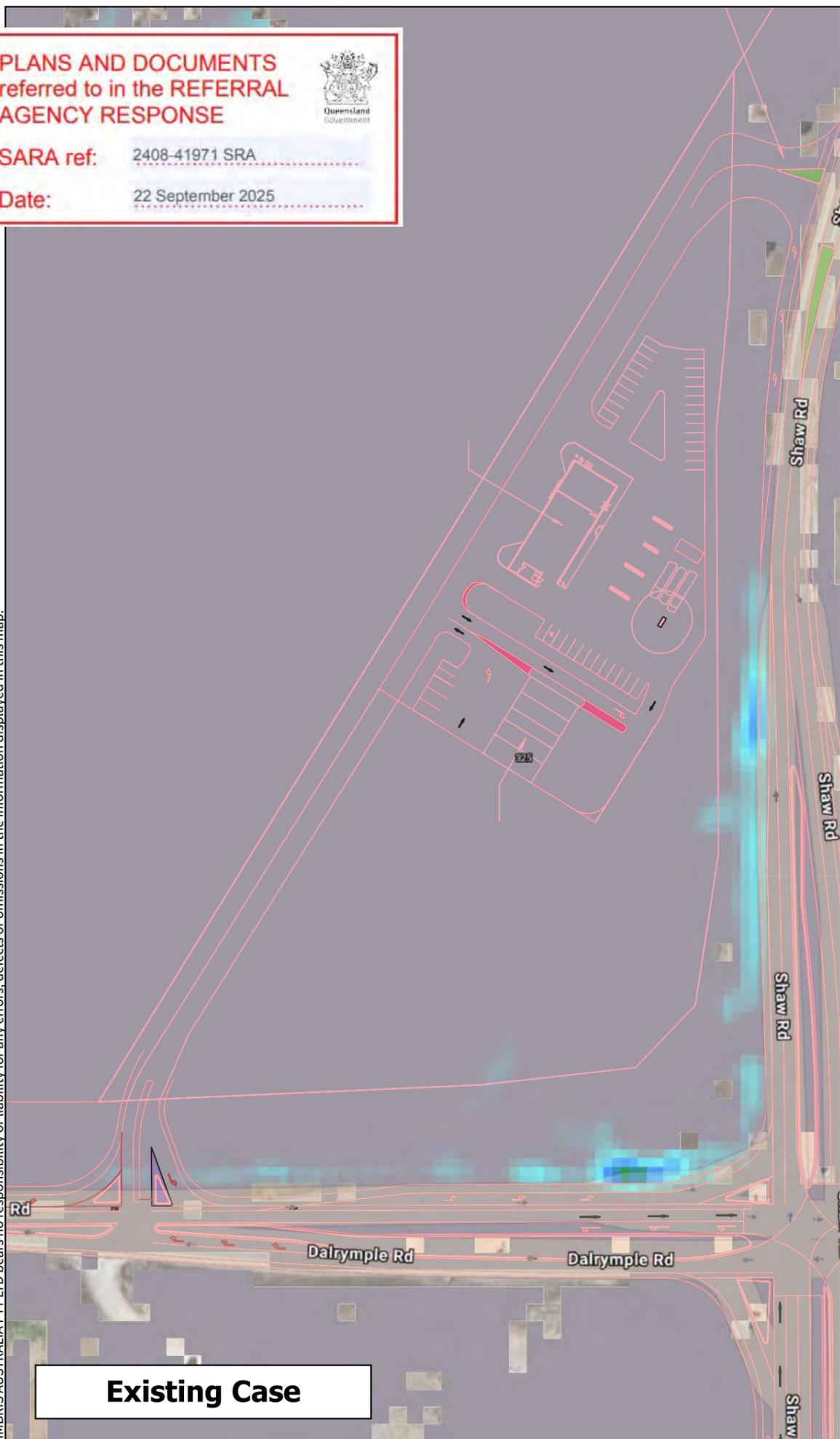
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Existing Case



Developed Case



50 100 m

20% AEP - Peak Flow Velocity

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A11**

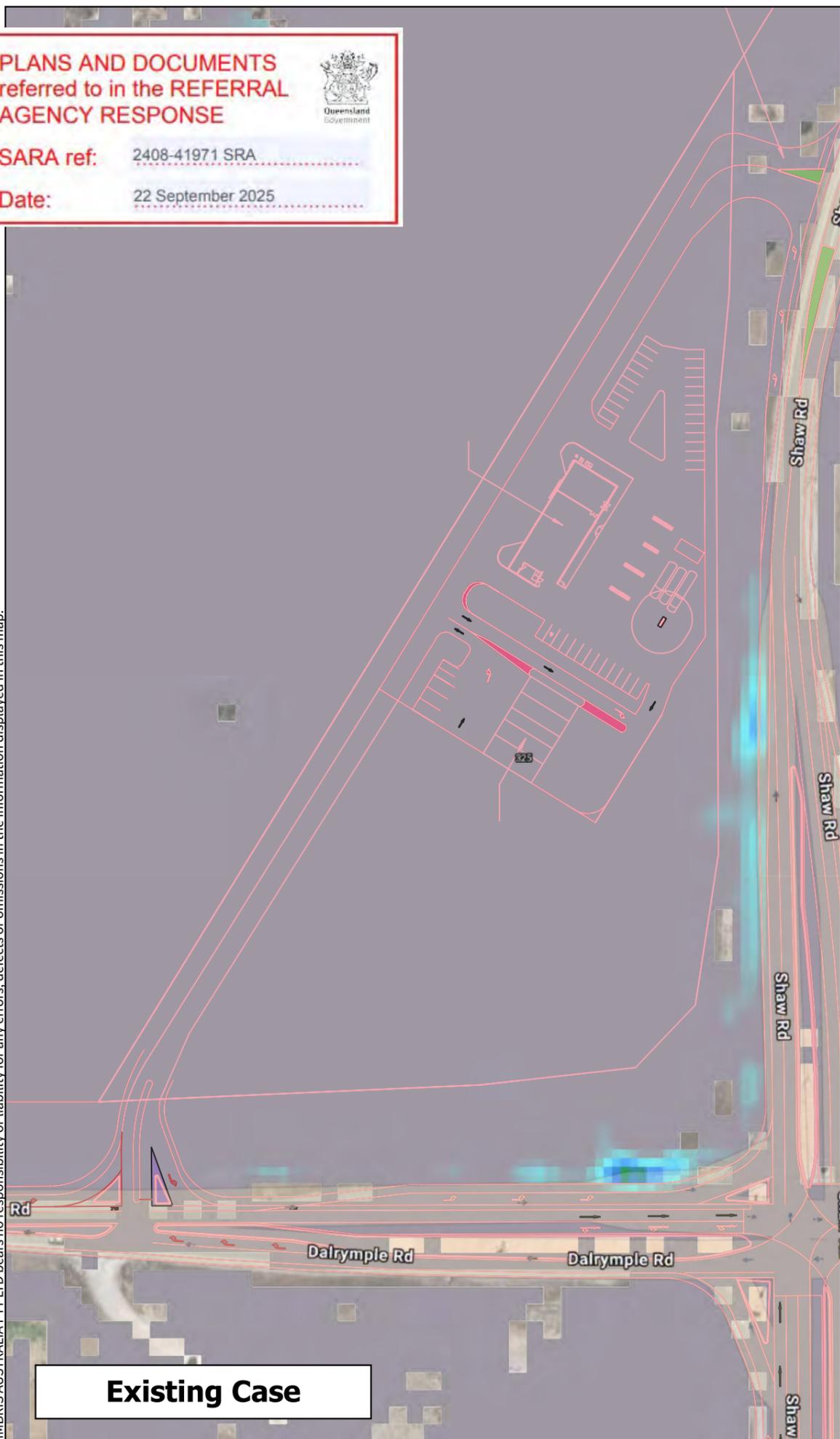
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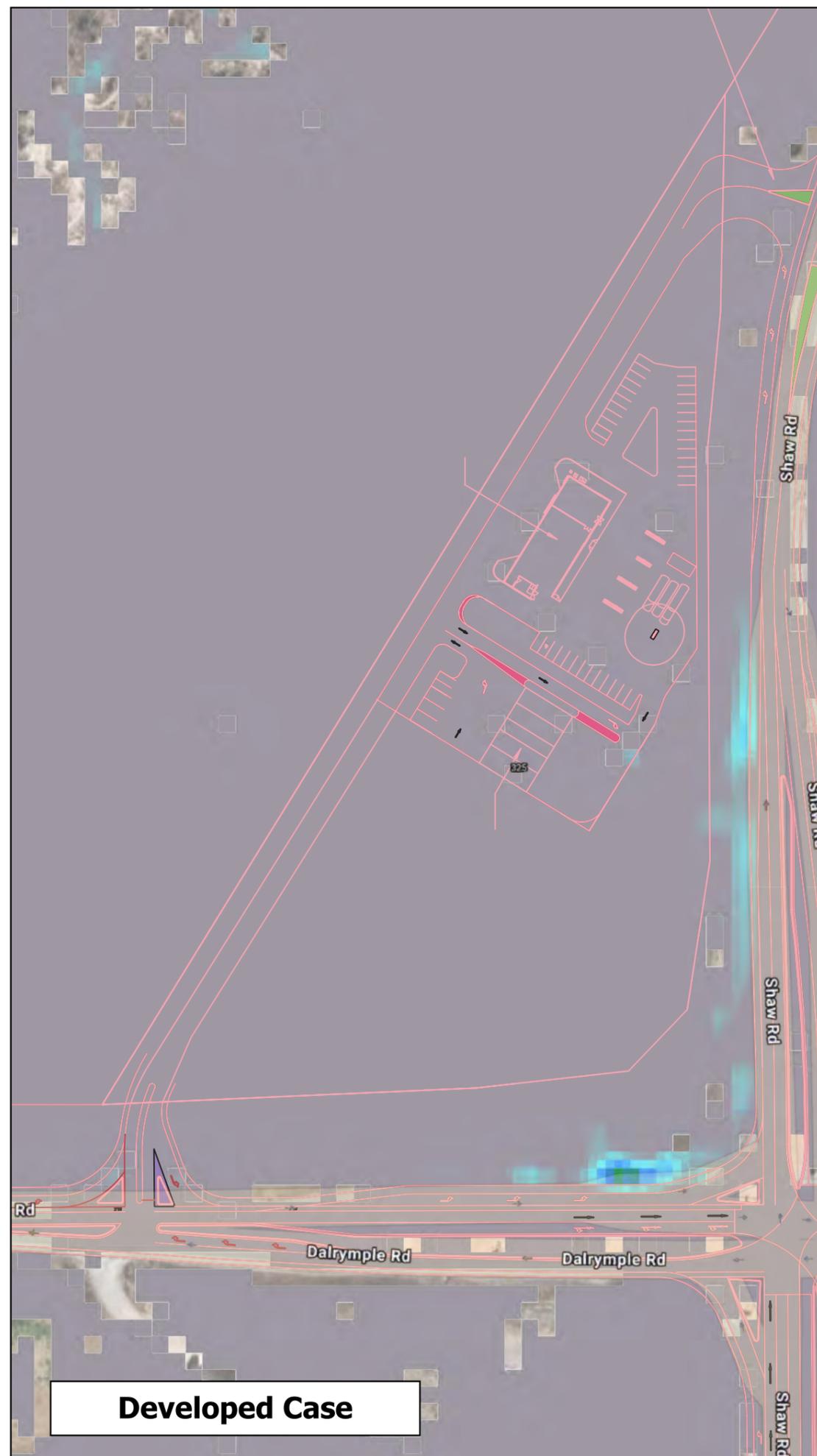
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Existing Case



Developed Case



Velocity (m/s)

- < 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- > 3.00



50 100 m

50% AEP - Peak Flow Velocity

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A12**

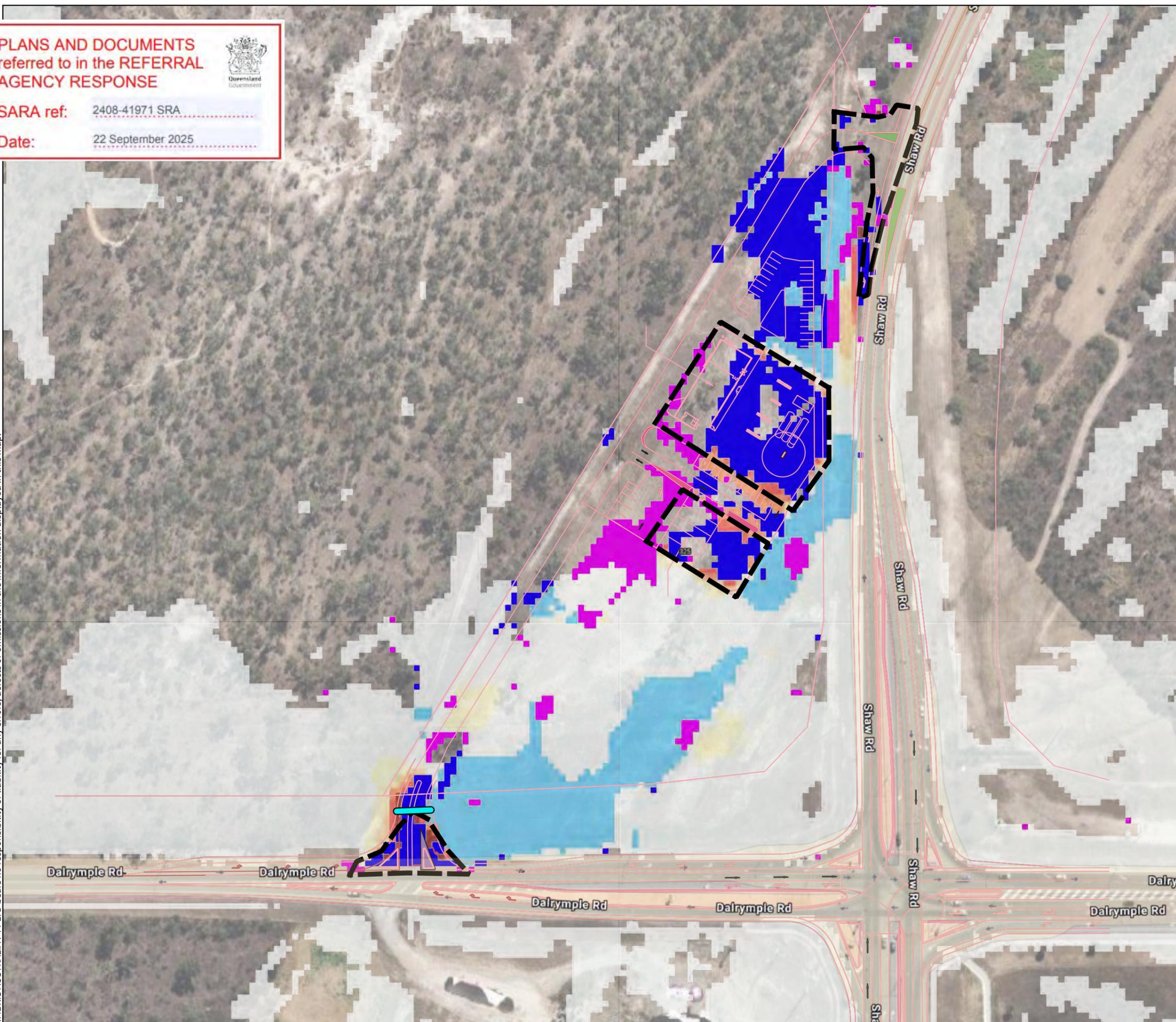
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Water Level Difference (m)

- <-0.01
- 0.01 - 0.01
- 0.01 - 0.025
- 0.025 - 0.05
- 0.05 - 0.10
- 0.10 - 0.20
- >0.2
- Was Wet Now Dry
- Was Dry Now Wet

- Proposed Culvert
- Raised Area



50 100 m

1% AEP Afflux

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-05-2025
MODEL VERSION E02

**Map
A13**

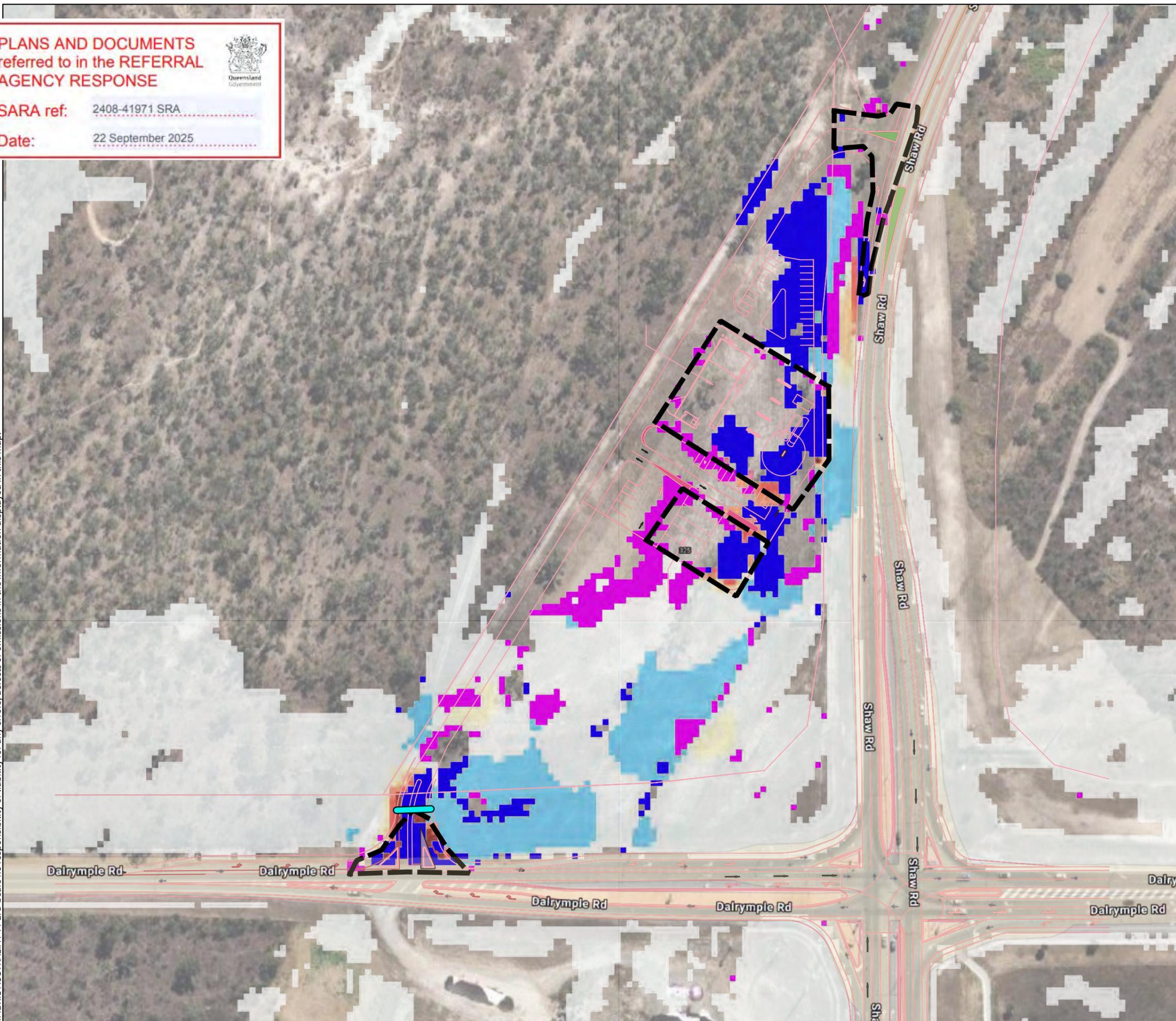
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Water Level Difference (m)

- <-0.01
- 0.01 - 0.01
- 0.01 - 0.025
- 0.025 - 0.05
- 0.05 - 0.10
- 0.10 - 0.20
- >0.2
- Was Wet Now Dry
- Was Dry Now Wet

- Proposed Culvert
- Raised Area



50 100 m

2% AEP Afflux

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-05-2025
MODEL VERSION E02

**Map
A14**

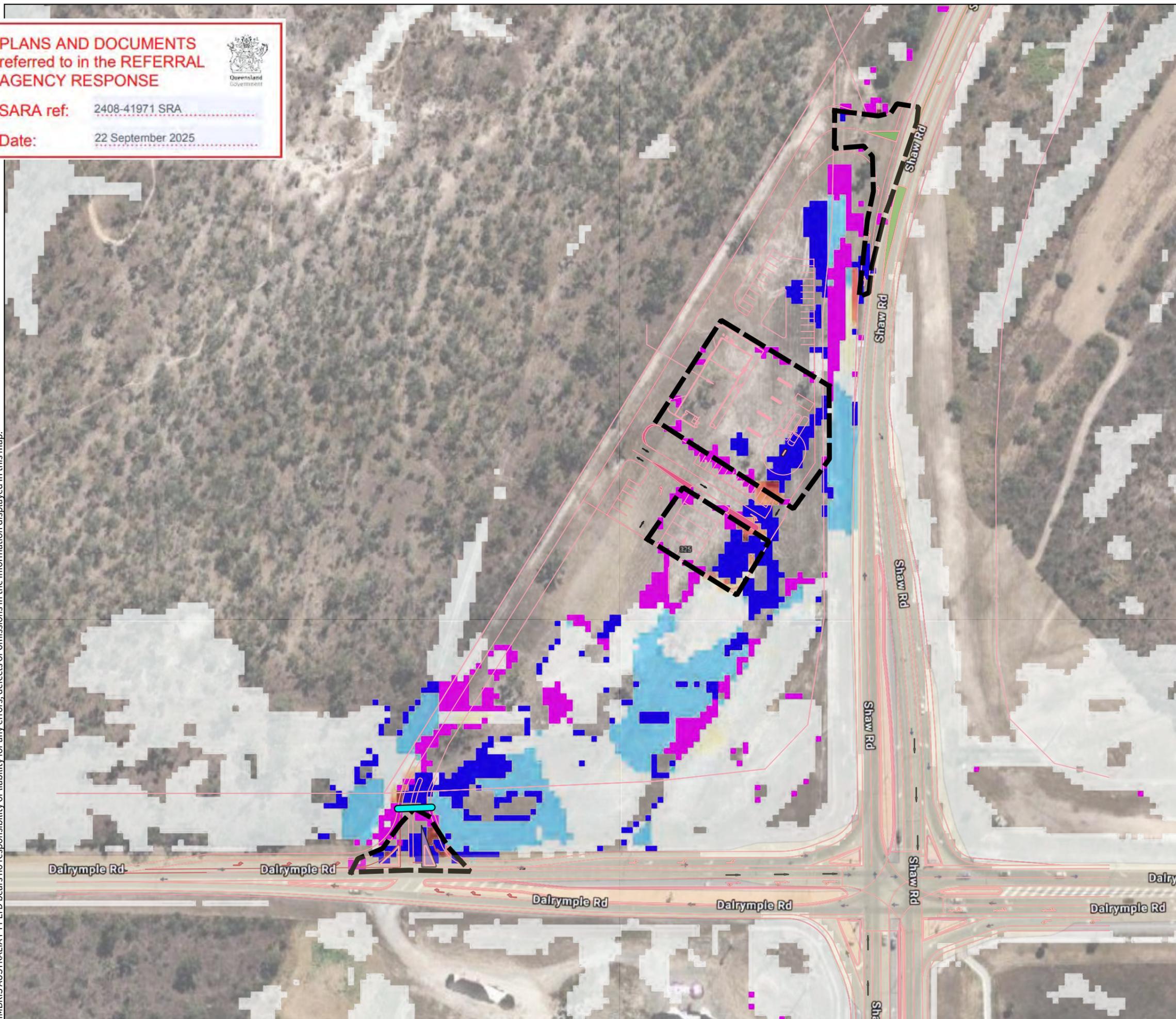
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Date: 22 September 2025

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Water Level Difference (m)

- <-0.01
- 0.01 - 0.01
- 0.01 - 0.025
- 0.025 - 0.05
- 0.05 - 0.10
- 0.10 - 0.20
- >0.2
- Was Wet Now Dry
- Was Dry Now Wet

- Proposed Culvert
- Raised Area



50 100 m

5% AEP Afflux

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-05-2025
MODEL VERSION E02

**Map
A15**

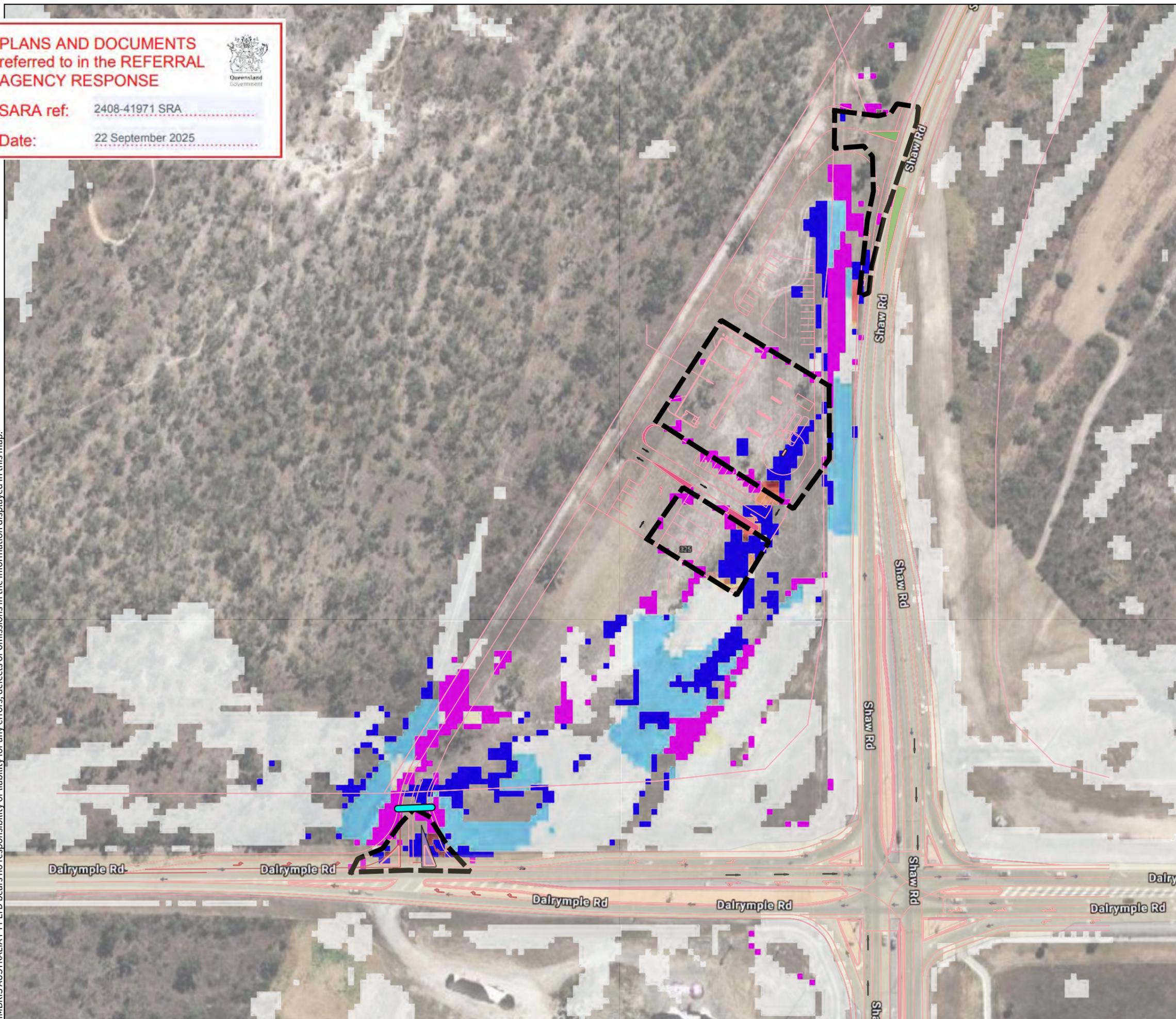
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Date: 22 September 2025

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Water Level Difference (m)

- <-0.01
- 0.01 - 0.01
- 0.01 - 0.025
- 0.025 - 0.05
- 0.05 - 0.10
- 0.10 - 0.20
- >0.2
- Was Wet Now Dry
- Was Dry Now Wet

- Proposed Culvert
- Raised Area



50 100 m

10% AEP Afflux

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 09-05-2025
MODEL VERSION E02

**Map
A16**

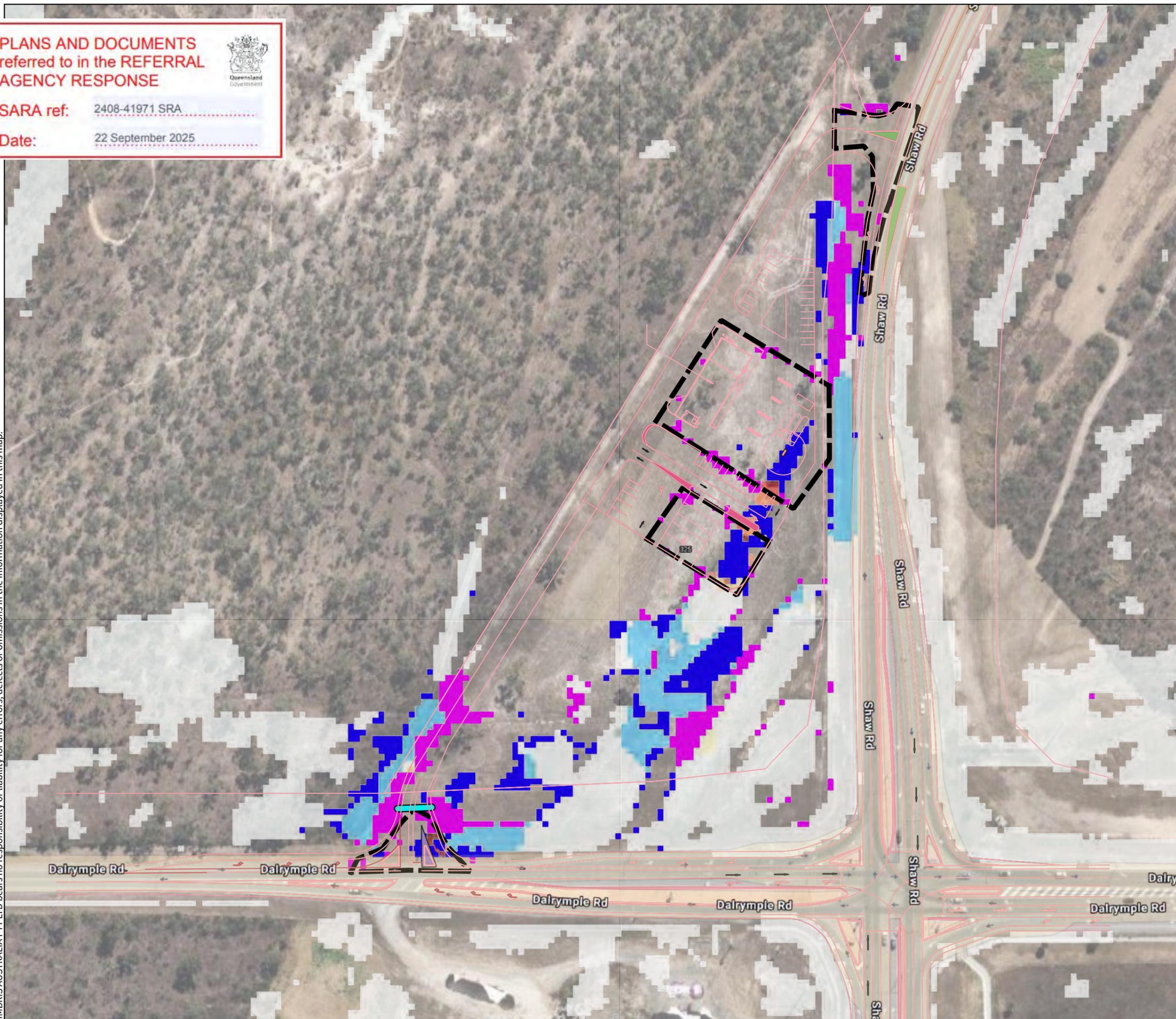
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Date: 22 September 2025

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Water Level Difference (m)

- <-0.01
- 0.01 - 0.01
- 0.01 - 0.025
- 0.025 - 0.05
- 0.05 - 0.10
- 0.10 - 0.20
- >0.2
- Was Wet Now Dry
- Was Dry Now Wet

- Proposed Culvert
- Raised Area



50 100 m

20% AEP Afflux

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-05-2025
MODEL VERSION E02

**Map
A17**

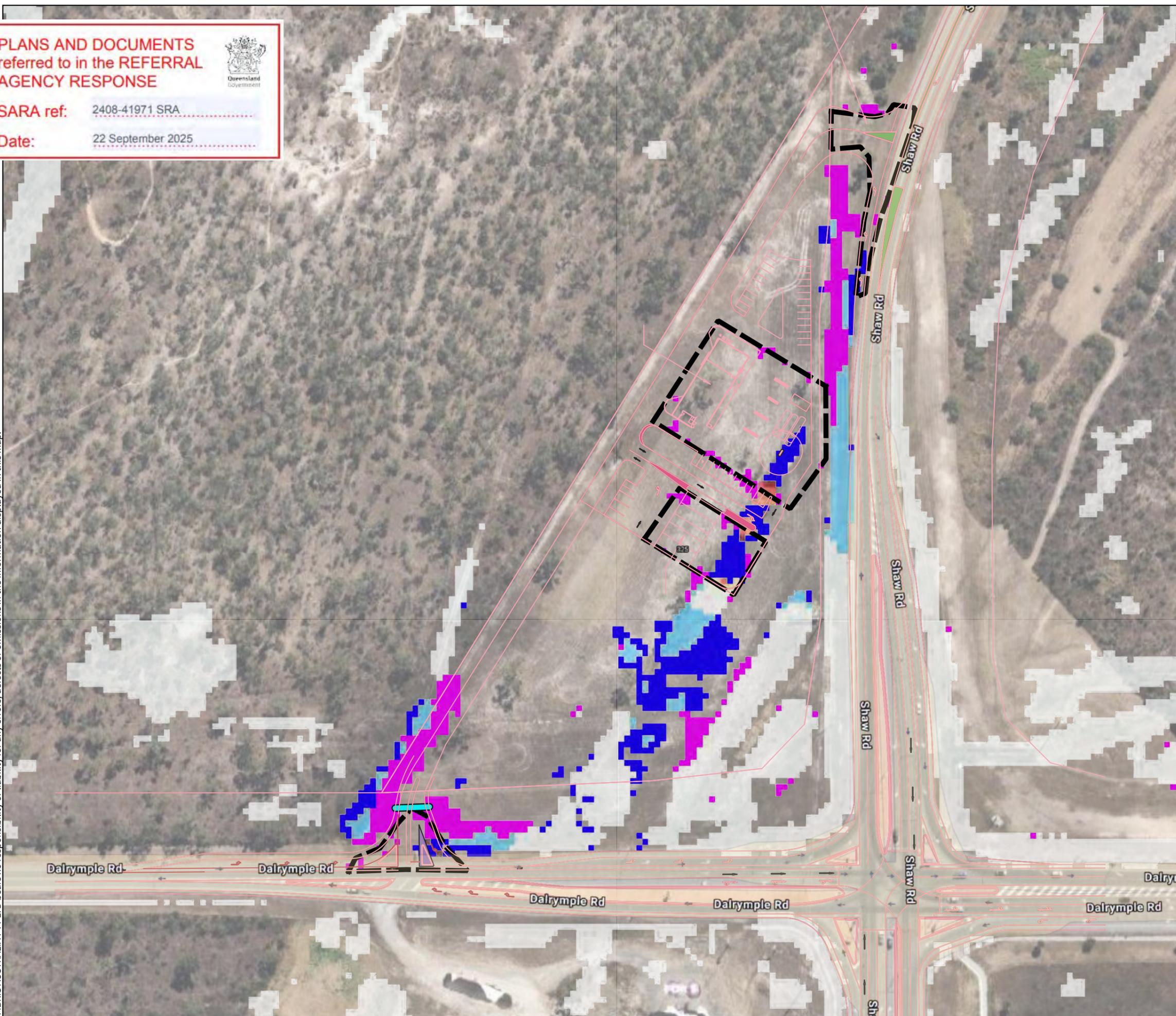
PLANS AND DOCUMENTS
referred to in the REFERRAL
AGENCY RESPONSE



SARA ref: 2408-41971 SRA

Date: 22 September 2025

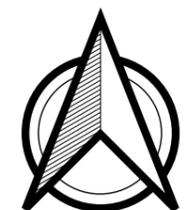
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Water Level Difference (m)

- <-0.01
- 0.01 - 0.01
- 0.01 - 0.025
- 0.025 - 0.05
- 0.05 - 0.10
- 0.10 - 0.20
- >0.2
- Was Wet Now Dry
- Was Dry Now Wet

- Proposed Culvert
- Raised Area



50 100 m

50% AEP Afflux

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-05-2025
MODEL VERSION E02

**Map
A18**

ADDENDUM TO 325 SHAW RD DEVELOPMENT FLOOD IMPACT ASSESSMENT REPORT

TO	LCJ Engineers Pty Ltd
FROM	Sally Williams
REFERENCE	LCJ005-325SR-002-ADD1
PAGES (incl. this page)	4
SUBJECT	325 Shaw Rd Development Flood Impact Assessment
DATE	15 th August 2025

1.0 Introduction

This addendum to the 325 Shaw Road Flood Impact Assessment (FIA) Report (Ref: LCJ005-325SR-002, 14/05/2025) is provided in response to “Item 2: Flood Impact Assessment” of the Queensland State Assessment and Referral Agency (SARA) advice notice (Ref: 2408-41971 SRA, 18/07/2025) that was issued in relation to Townsville City Council (TCC) material change of use application (MCU21/009.003) relating to Lot 19 on SP107219 at 325 Shaw Road, Shaw (4818).

2.0 ISSUE/ACTION 1: PEAK FLOWS

Important parameters such as flood extent, flow velocities, water and flood hazard were used in the FIA to demonstrate no worsening of flood impacts on the state-controlled road relative to pre-development conditions. SARA also requests peak runoff calculations are provided from the model results.

Table ADD1 provides a comparison of the predicted peak flows within the road drainage reserve from the existing case and post-development TUFLOW model simulations for a range of flood events. Figure ADD1 shows the locations of cross-sections used to extract the discharge hydrographs from the model.

Table ADD1 demonstrates that flows remain largely unchanged upstream of the new culvert at the proposed Dalrymple Road access (DR1). Flows in the drain are reduced relative to existing flows immediately downstream of the proposed embankment and culvert however further downstream towards the Shaw Road crossing (DR3) peak flows in the Dalrymple Road drain are similar.

Table ADD1 also shows that post-development peak flows in the Shaw Road drain are generally reduced relative to existing. Figure ADD2 provides the timeseries flow hydrographs within the drain adjacent to Shaw Road (location SR1 on Figure ADD1). Although initial runoff is higher post-development, the peak flows are generally reduced relative to existing. The overall catchment critical storm duration remains at 90 minutes despite the increase in impervious area and initial fast runoff response.

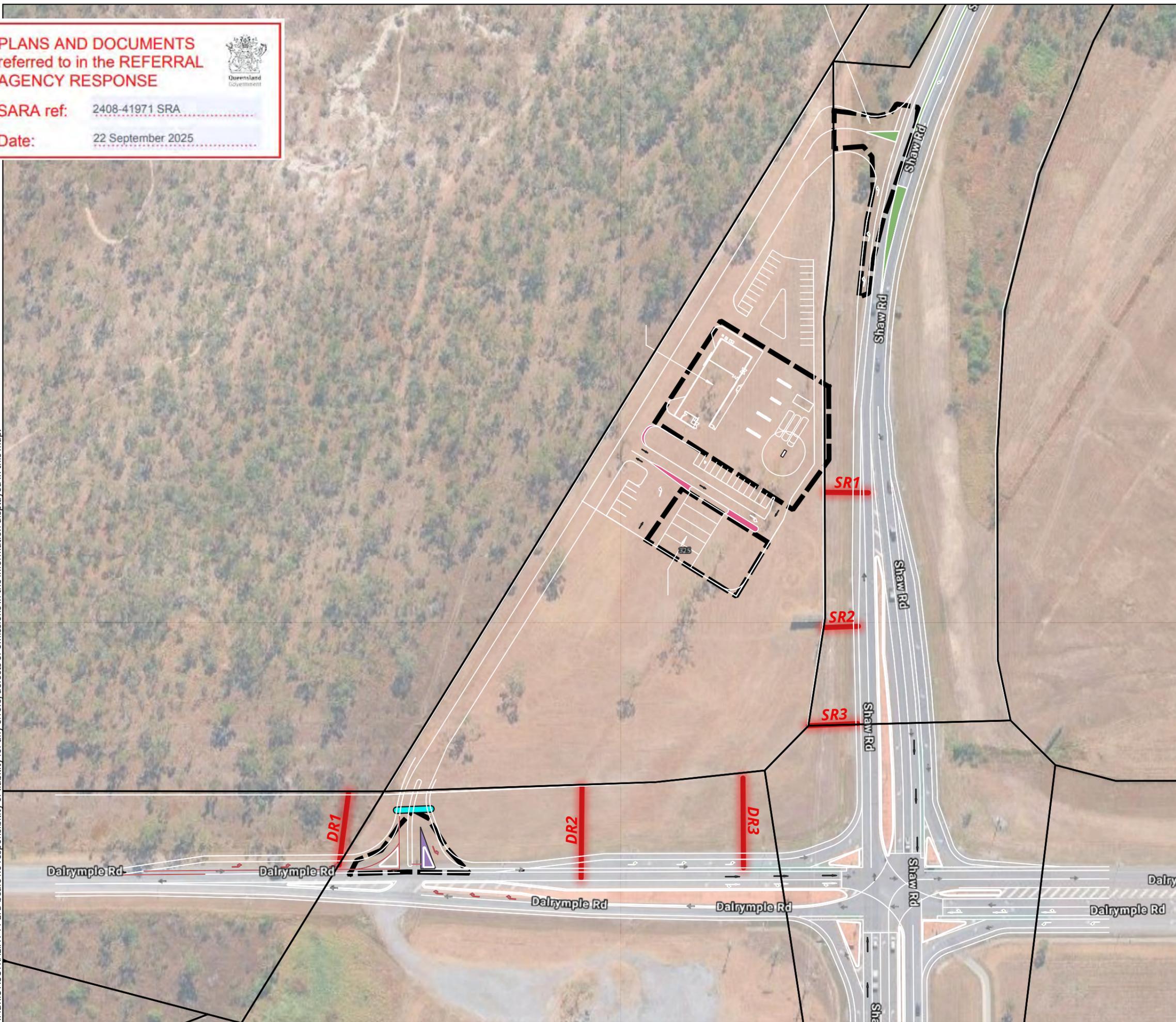
PLANS AND DOCUMENTS
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SARA ref: 2408-41971 SRA

Date: 22 September 2025

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- ✓ Proposed Culvert
- ✓ Raised Area
- ✓ Flow Locations



50 100 m

FLOW EXTRACTION LOCATIONS

**325 Shaw Road Development
Flood Impact Assessment**

PROJECT LCJ005
ENGINEER Sally Williams
DATE 14-08-2025
MODEL VERSION E02

**Figure
ADD1**



Extracted from the TUFLOW model

	Post-Development Flow (m ² /s)						Pre-Development Flow (m ² /s)						Difference					
	DR1	DR2	DR3	SR1	SR2	SR3	DR1	DR2	DR3	SR1	SR2	SR3	DR1	DR2	DR3	SR1	SR2	SR3
1% AEP (+CC)	0.81	0.73	1.43	0.80	1.77	2.42	0.81	0.87	1.43	0.87	1.92	2.55	0%	-19%	0%	-10%	-8%	-6%
2% AEP	0.65	0.59	1.15	0.64	1.41	1.83	0.64	0.70	1.15	0.69	1.51	1.96	1%	-19%	0%	-8%	-7%	-7%
5% AEP	0.49	0.45	0.86	0.44	1.09	1.40	0.48	0.53	0.85	0.51	1.15	1.46	1%	-18%	1%	-15%	-6%	-4%
10% AEP	0.43	0.40	0.75	0.35	0.89	1.13	0.43	0.48	0.74	0.44	0.96	1.20	1%	-18%	1%	-25%	-7%	-6%
20% AEP	0.36	0.35	0.63	0.30	0.76	0.95	0.36	0.40	0.61	0.37	0.81	1.01	1%	-16%	2%	-22%	-7%	-6%
50% AEP	0.24	0.25	0.39	0.21	0.51	0.59	0.24	0.27	0.38	0.25	0.54	0.62	1%	-9%	5%	-22%	-7%	-6%

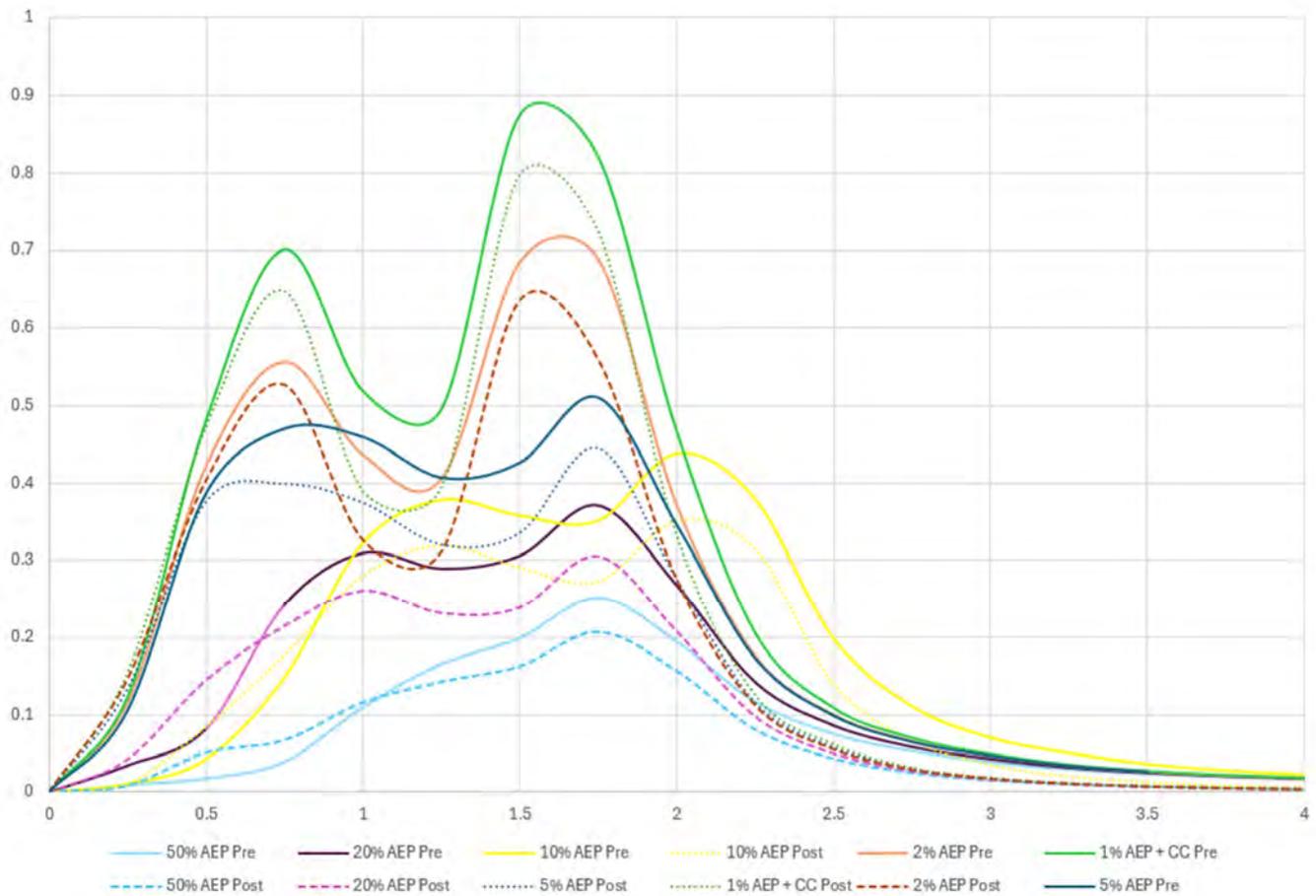


Figure ADD2 – Peak Flow Hydrographs Extracted from the TUFLOW model for Shaw Road Drain (SR1)



AFFLUX

Proposed works “are causing some localised afflux at 1% and 2% AEP (refer to Maps A13 and A14 of the FIA). Although the afflux has not been mentioned in the report, the coloured banding on the maps suggests up to greater than 100mm adjacent to Shaw Road pavement. The latter is not only caused by the new access, but also the adjacent car park filling, which is causing a restriction that is resulting in some residual afflux”.

The afflux and an area that “was dry now wet” is caused by the necessary re-alignment of the existing table drain to accommodate a new access turnout lane. The proposed development car park area has 5% AEP flood immunity under existing conditions and therefore significant filling of the car park area is not proposed.

The afflux occurs due to how the TUFLOW interprets and interpolates wet/dry surfaces on sloping embankments when direct rainfall and sub-grid sampling are used. A similar afflux can be observed at the edges some raised parts of the proposed development.

Figure ADD3 shows a cross-section of pre and post-development water and ground surface elevations through the area of afflux on Map A13. It is shown that the post-development freeboard at the edgeline of the state-controlled road (which is moved west in the developed case) remains above 200 mm.

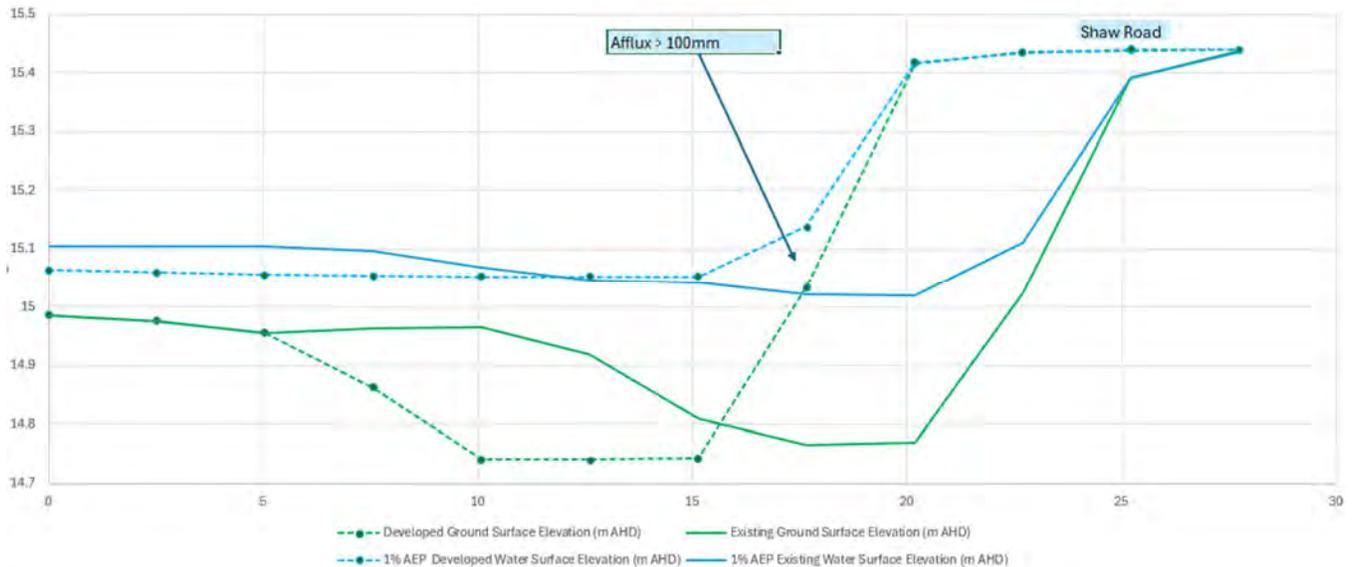


Figure ADD3 – Profile of pre- and post-development surface water levels adjacent to Shaw Road where afflux is present

Yours faithfully
for Imbris Australia Pty Ltd

Sally Williams
Principal (RPEQ: 19353)
Date: 15th August 2025