



Our Ref: 764015:L02
Contact: Cara van Megchelen

20 November 2018

Logan Water Infrastructure Alliance
Logan City Council
PO Box 1183
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Attention: Matt Petersen

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Dear Matt,

**SITE BASED STORMWATER MANAGEMENT PLAN
FOR SPS152 SEWAGE PUMP STATION,
FLAGSTONE CENTRAL TO CEDAR GROVE WWTP CONVEYANCE SYSTEM**

1. Introduction

This Site Based Stormwater Management Plan (SBSMP) has been prepared by Cardno for Logan Water Infrastructure Alliance, for the proposed Sewage Pumping Station SPS152 Flagstone Central to Cedar Grove WWTP Conveyance System.

The purpose of this SBSMP is to assess the potential impacts arising from the proposed development, as a result of altered hydrology and stormwater quantity and determine measures required to mitigate these impacts, if required.

The development is located in the Logan River drainage catchment, and hence requires compliance with the SEQ Water *Land and Water Development Guidelines* (June 2012). This SBSMP has also been prepared in accordance with the following policies and guidelines:

- > *Queensland Urban Drainage Manual*, Department of Natural Resources and Water, 2016;
- > *State Planning Policy*, Department of Infrastructure, Local Government and Planning (DILGP), July 2017; and
- > *Water Sensitive Urban Design Technical Design Guidelines for South East Queensland*, Healthy Waterways, June 2006.

2. NFI and Response

On 3 May 2018, the Department of Development, Manufacturing, Infrastructure and Planning (DSDMIP), represented by Brandon Bouda, issued a letter titled "Further issues for PDA development application for a PDA development permit for a material change of use for a utility installation (wastewater pump station) at Lot 3 Wyatt Road, Kagaru described as Lot 3 on RP49296.

The issues identified are presented below, along with statements of response.

The proposed development is located within the water supply buffer area for the Cedar Grove Weir which is a future drinking water supply associated with the planned Wyaralong Water Treatment Plant and additional information to manage any impacts on the drinking water supply is sought.

- The development is located at the confluence of several watercourses, being stream order 1 (southern) and stream order 2 (northern). Confirm the separation distance of the development meets the required separation distance of 50m as shown on Table 6: Example separation distance and other locational criteria of the State Planning Policy – State Interest Guidance: Water Quality.**

Where separation distances cannot be met, please demonstrate how such watercourses and associated risks will be managed to achieve the performance outcome.

Table 6, as referred to above, is provided below. Table 6 contains the example separation distances and is part of an example code for Water Resource Catchment overlay. The assessment benchmark for this item is that development in a water supply buffer area avoids adverse impacts on drinking water supply environmental values. Compliance with this benchmark has been demonstrated in this SBSMP.

Table 6: Example separation distance and other locational criteria

Development type and activities	Stream Order 1 To 3	Stream Order 4 or greater	Full supply level of a dam, lake or reservoir or watercourse that serves as a potable water supply	Flood immunity
Intensive animal industry	50m	100m	800m	AEP 1%
Aquaculture	Case-by-case basis	Case-by-case basis	N/A	N/A
All other agricultural or forestry land uses	50m	100m	400m	Buildings – AEP 1% Other areas – AEP 20%
Extractive industry	50m	100m	400m	AEP 1%
All other industrial uses	100m	100m	800m	
Motor sport facility	50m	100m	400m	Buildings – AEP 1% Other infrastructure (e.g. trails) – AEP 20%
Outdoor sport and recreation				
Major sport, recreation and entertainment facility				
Service station	50m	100m	800m	AEP 1%
All other development types	50m	100m	400m	AEP 1%

Based on the site location and layout, the separation distances outlined in Table 6 cannot be met. As shown on Figure 1, the site is located within 50 m of two stream order 1's and one stream order 2. It is therefore proposed that as part of the Stormwater Management Plan risks, be managed to achieve the performance outcome. It is noted that the *State Planning Policy (SPP) – State interest guidance material – Water quality* is intended to be read in conjunction with the SPP and the relevant state interest. The SPP guidance material is not statutory in its effect and does not contain any new policy. It is not mandatory for local governments to use the guidance material but it is provided to assist with the interpretation and application of the state interest policies and the assessment benchmarks contained in the SPP.

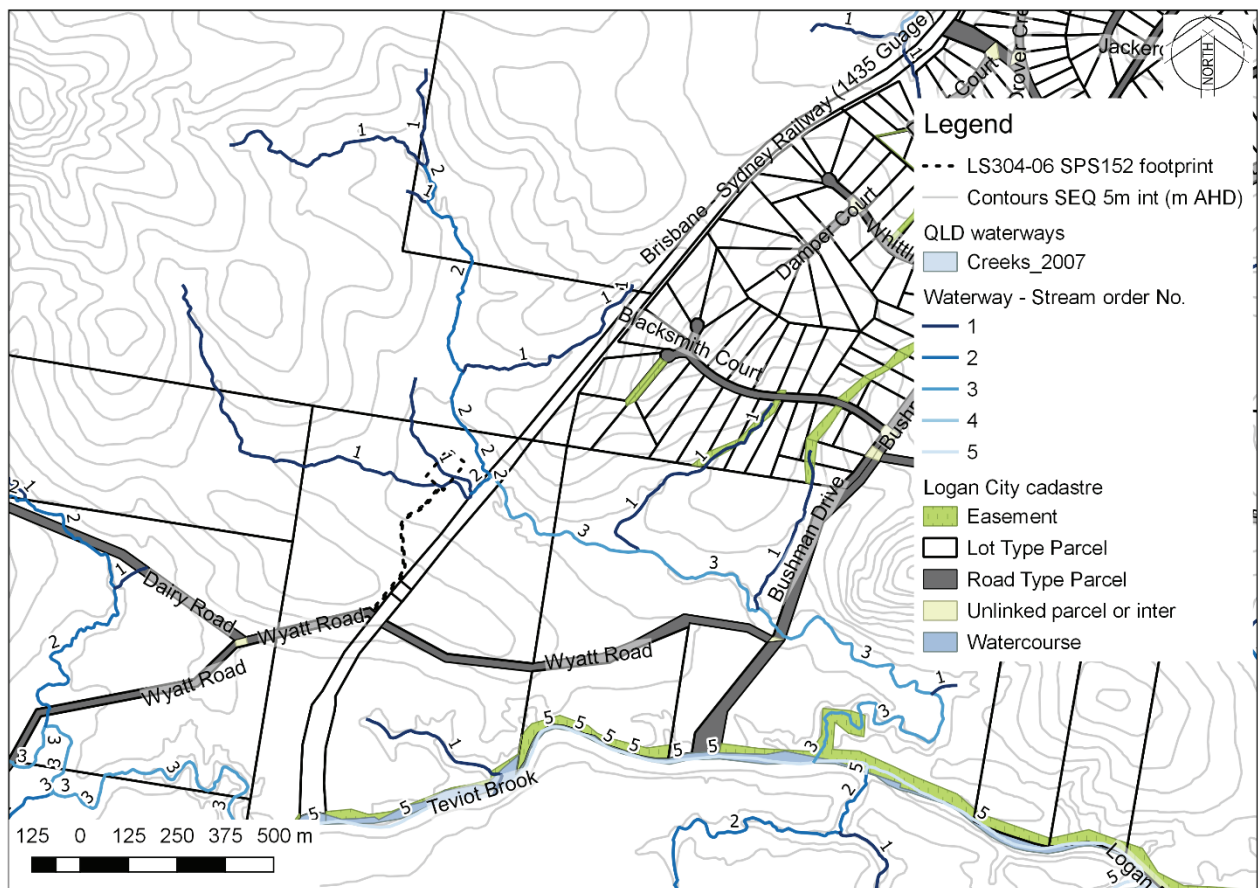


Figure 1 Site location and waterway overlay

2. ***The planning report specifies that the pump station is designed above the Q100 flood level (Section 4.6.9). In accordance with the assessment criteria for sewerage infrastructure in a drinking water catchment, such infrastructure is to be at or above the 0.5% AEP flood event (State Planning Policy – State Interest Guidance: Water Quality, AO5.3). Please confirm that the proposed pump station is at or above the 0.5% AEP flood event.***

Two flood assessments have been completed for the site, one by ADG and another by Cardno (August 2018 and updated October 2018). The flood assessment by ADG determined the design levels for the site. While the assessment undertaken by Cardno predominantly sought to determine inundation depths across the development and the velocity of overland flow during more infrequent and frequent events. The flood assessment undertaken by Cardno is provided as Attachment B. As a result of these flood studies, the pump station design has been amended to ensure that sewerage infrastructure is above the 0.5% AEP flood event.

3. ***It is noted the development is proposed to hold a maximum of 15,000 litres of magnesium hydroxide and ferrous chloride. Please submit a risk assessment demonstrating that there will be minimal risk to drinking water quality.***

Item 3 has not been addressed in this SBSMP as this has been addressed by LWiA.

4. ***The application has provided limited information relating to stormwater management. Please provide an assessment against the stormwater criteria for development in a drinking water catchment (State Planning Policy – State Interest Guidance: Water Quality, PO7 to PO12).***

Further information related to stormwater management is provided within this SBSMP, refer to Section 3 to Section 6.

3. Site Description

Location

The proposed development is located north of Wyatt Road, parallel with the Brisbane – Sydney Railway, as shown on Figure 2. The site is within the Logan River drainage catchment, listed as an SEQ Water source catchment under the *Land and Water Development Guidelines*.

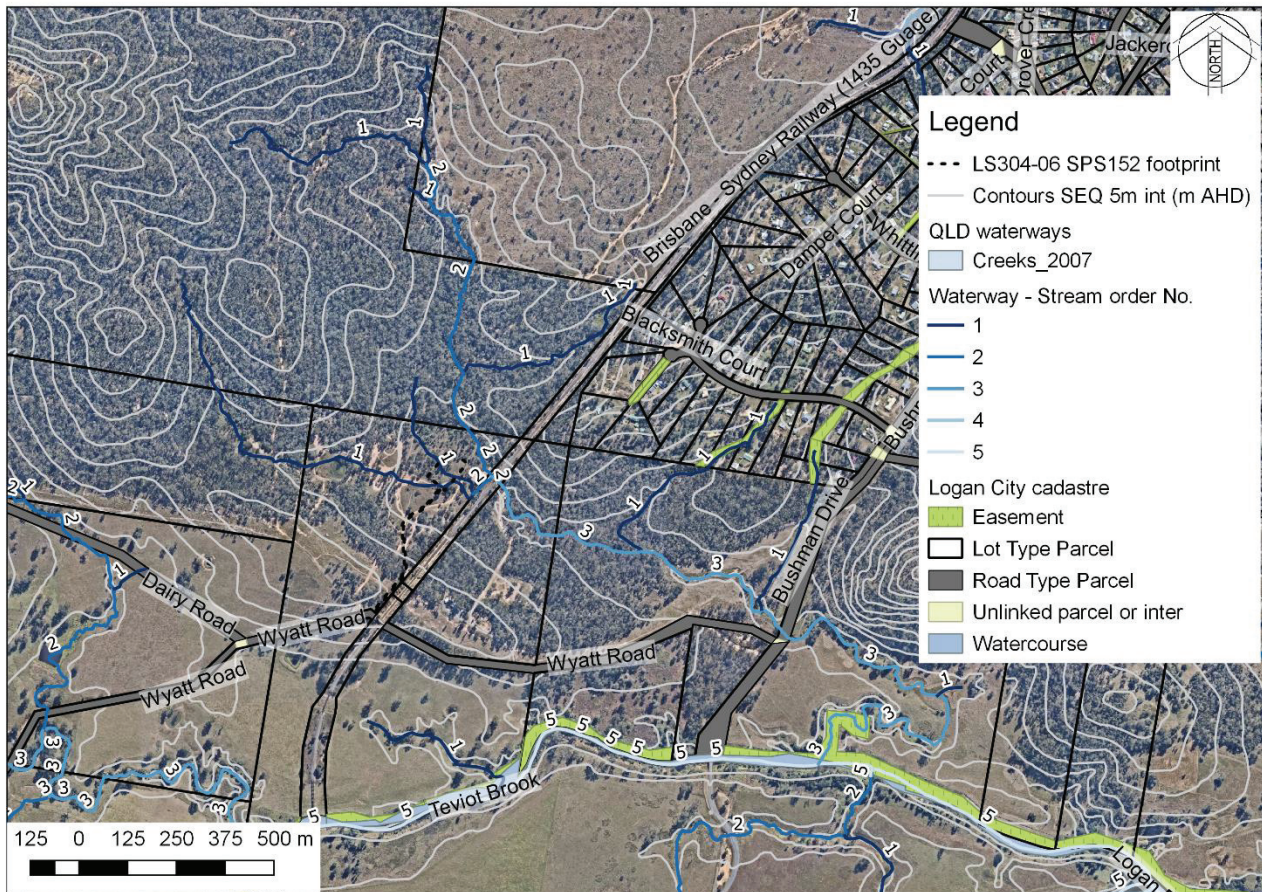


Figure 2 Aerial Photograph view of the Site

Existing site

The existing site is mostly undeveloped with a high coverage of grasses and sparse trees and numerous unmaintained sealed access tracks throughout, as can be observed in Figure 3 and the site photos taken 11 January 2018 (Table 1).



Figure 3 Location of site photos¹

Table 1 Site visit photos in the vicinity of the proposed SPS

Site visit photos – location shown on per Figure 3	
	
Facing north	Facing north
	
Facing east	Facing south east

¹ Photos provided by Emily Shaw via email on 25/9/2018

Proposed development

The development is proposed to be located within Lot 3 on RP49296. The area of this lot is approximately 20 ha and it is proposed to acquire a portion of this lot for the purpose of the pump station and access track. The development is located at the confluence of a stream order 1 (southern stream) and stream order 2 (northern stream). The confluence with the closest major watercourse, Teviot Brook, is located approximately 900 metres south-east of the proposed development as shown on Figure 2.

The proposed development involves the construction of a sewage pump station (SPS), with the bulk to be located underground. The pump station site covers an area of 0.51 ha. The SPS fill pad and access track design drawings are provided in Attachment A, showing details of the proposed earthworks extent and reinstatement. A temporary access track is proposed to connect the SPS pad to Wyatt Road to the south west, shown in Attachment A. A culvert crossing (4 No. 0.6 m H x 1.5 m W) is proposed to be located under the access track close to the SPS fill pad to allow flow to pass underneath the roadway.

Although predominantly underground, the SPS will be constructed on a fill pad above the 1% AEP flood level and constructed with a net fill volume of approximately 1,761 m³ (based on design drawing LS304-02-S-DWG-CI-2125 Rev B), shown on Figure 4.

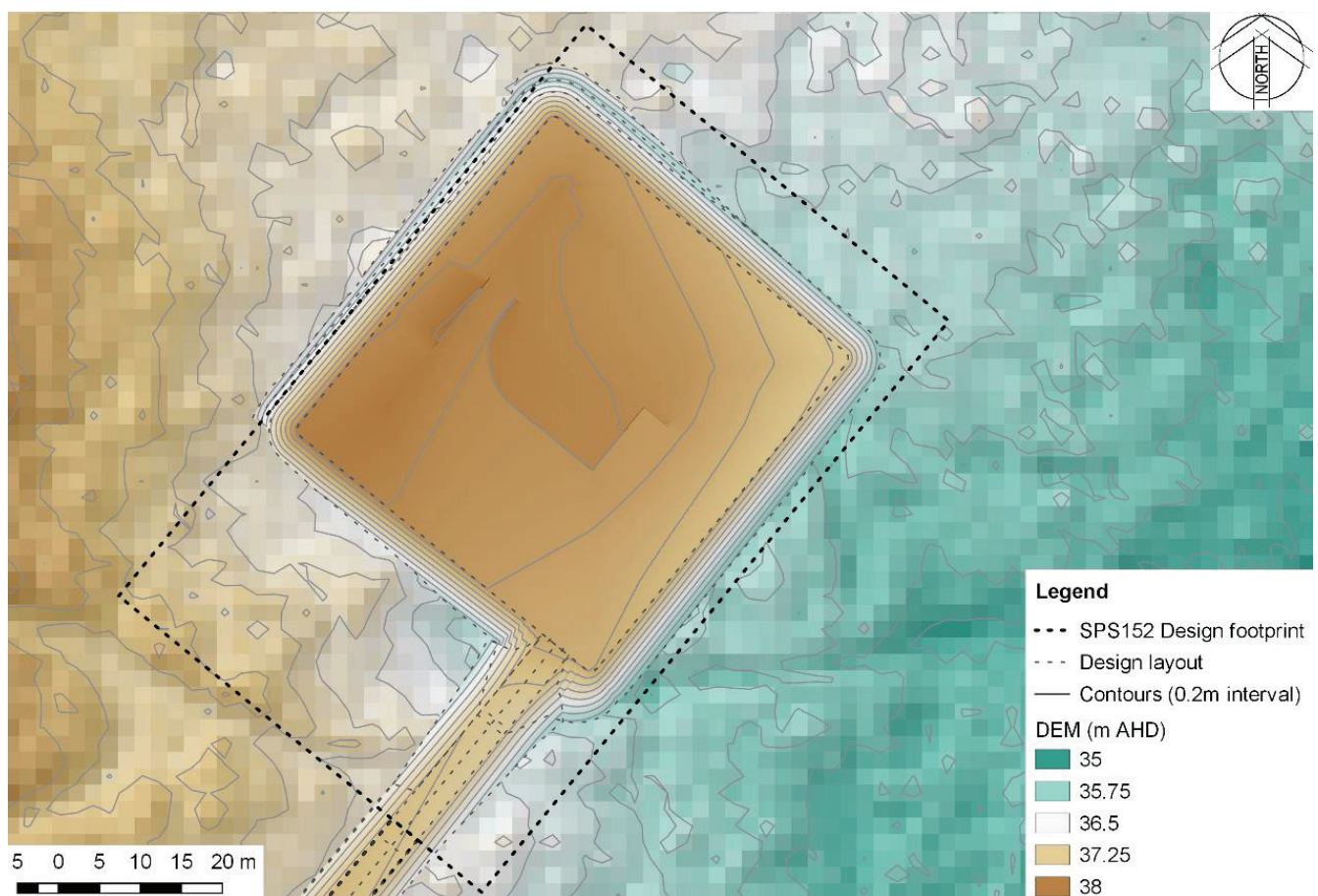


Figure 4 SPS152 fill pad DEM contour plan (0.2m interval contours)

The SBSMP and flood assessment undertaken were based on the SPS development earthworks as of November 2018, presented in Figure 4, and included the proposed culvert crossing. The top of the SPS fill pad level is 37.9 m AHD, based on the most recent design. Flood assessment maps are provided in Attachment B of this letter.

4. Assessment against the stormwater criteria for development in a drinking water catchment (PO7 to PO12)

Assessment against the stormwater criteria for development in a drinking water catchment, in accordance with item 4 of the DSDMIP Further Issues letter, has been provided in the table below.

SPP Table 5: Assessment benchmarks for assessable development (SPP)

Performance outcomes	Acceptable outcomes	Response
Stormwater quality and hydrology		
PO7 Manage stormwater at the construction phase to protect drinking water supply environmental values and facilitate the achievement of water quality objectives for receiving waters. Note: <i>Drinking water supply environmental values are contained within Schedule 1 of the Environmental Protection Policy (Water) 2009.</i>	AO7.1 At the construction stage, an erosion and sediment control program (ESCP) demonstrates that stormwater achieves the design objectives listed in table A of the SPP (appendix 2): Construction Phase – Stormwater management design objectives (all parts). OR AO7.2 An ESCP demonstrates how stormwater quality will be managed at the construction stage in accordance with an acceptable regional or local guideline so that target contaminants are treated to a design objective at least equivalent to table A of the SPP (all parts). OR AO7.3 Stormwater run-off generated during operation is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site.	An erosion and sediment control program will be implemented for the site to manage stormwater runoff during construction phase in accordance with this outcome (refer Section 5 of this SBSMP).
PO8 Manage stormwater during operational (post-construction) stages to protect drinking water supply environmental values and facilitate the achievement of water quality objectives for receiving waters. Note: <i>Drinking water supply environmental values are contained within Schedule 1 of the Environmental Protection Policy (Water) 2009.</i>	AO8.1 <i>Development does not involve an impervious area greater than 1,000m².</i> OR AO8.2 <i>Development is for reconfiguring a lot that;</i> (a) <i>will not create more than two additional lots;</i> or (b) <i>involves a land area less than 1000m².</i> OR AO8.3 <i>Stormwater run-off generated during operation (postconstruction) demonstrates a minimum reduction in mean annual load from unmitigated development that achieves the following stormwater management design objectives:</i> a) <i>85% reduction in total suspended solids</i> b) <i>65% reduction in total phosphorus</i> c) <i>45% reduction in total nitrogen</i> d) <i>95% reduction in gross pollutants.</i> OR AO8.4 <i>Stormwater run-off generated during operation is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site.</i> Note: <i>A Site Stormwater Quality Management Plan is to be prepared by a suitably qualified individual such as a Civil Engineer or an Environmental Professional and is to be certified by a Registered Professional Engineer (RPEQ) (Civil or Environmental) to demonstrate compliance with the stormwater design objectives.</i>	Impervious area does not exceed 1,000m ² .

Performance outcomes	Acceptable outcomes	Response
Stormwater quality and hydrology		
PO9 Development maintains or improves the quality of surface water by adopting measures that exclude livestock from entering a water body where a site is being used for animal husbandry and animal-keeping activities.	No acceptable outcome is nominated.	Not applicable.
PO10 Development avoids and minimises changes to the existing surface water natural hydrological regime so that: a) there is no change to the reference high-flow and low-flow duration frequency curves, low-flow spells frequency curve and mean annual flow to and from waterways as a result of the development b) any relevant flows into waterways comply with the relevant flow objectives of the applicable water plan for the area c) the collection and re-use of stormwater occurs so there is no increase to the velocity or volume of stormwater flows entering a waterway.	No acceptable outcome is nominated.	The site is located such that the hydrological regime downstream of the railway crossing is not changed due to the development. Refer to flood assessment figures in Attachment B.
PO11 The design and location of artificial waterways: a) use natural channel design principles to minimise erosion, flooding and maintenance while maximising ecological and aesthetic values of waterways b) are compatible with any existing natural waterways c) are designed to ensure surface water hydrological regimes are maintained.	No acceptable outcome is nominated. Note: <i>The Ipswich City Council Waterway and Channel Rehabilitation Guidelines (version 3 or as updated) or Brisbane City Council Natural Channel Design Guidelines (2003 or as updated) demonstrate best practice natural channel design works.</i>	Not applicable
PO12 Development maintains the existing groundwater hydrological regime.	AO12.1 Development does not change the existing groundwater hydrological regime by lowering or raising the water table and hydrostatic pressure outside the bounds of variability of existing predevelopment conditions. AND AO12.2 Development does not result in the ingress of saline water into freshwater aquifers. Note: Where development is likely to impact on the water table, a hydrological assessment undertaken by a suitably qualified professional may be required to demonstrate no adverse impact on the groundwater hydrological regime.	Pervious areas onsite and permeable pavements help to maintain the groundwater hydrological regime. Saline water not present.

Table reference:

Table 5, Queensland Government Department of Infrastructure, Local Government and Planning (July 2017). *State Planning Policy – state interest guidance material Water quality* [Online]. Available from <https://dilgpprd.blob.core.windows.net/general/spp-guidance-water-quality-july-2017.pdf> [Accessed 7 June 2018].

5. Assessment against SPP

Construction Phase Management

Design objectives for the construction phase are provided in the *State Planning Policy* (DILGP, July 2017) and presented in Table A Part 1 of the SPP and provided next. An Erosion and Sediment Control Plan will be required during the construction phase, which will address the objectives listed in Table A below.

Table A: Construction phase – stormwater management design objectives

Part 1 Construction phase – stormwater management design objectives¹²:

Issue	Desired outcomes
Drainage control	1. Manage stormwater flows around or through areas of exposed soil to avoid contamination. 2. Manage sheet flows in order to avoid or minimise the generation of rill or gully erosion. 3. Provide stable concentrated flow paths to achieve the construction phase stormwater management design objectives for temporary drainage works (part 2). 4. Provide emergency spillways for sediment basins to achieve the construction phase stormwater management design objectives for emergency spillways on temporary sediment basins (part 3).
Erosion control	1. Stage clearing and construction works to minimise the area of exposed soil at any one time. 2. Effectively cover or stabilise exposed soils prior to predicted rainfall. 3. Prior to completion of works for the development, and prior to removal of sediment controls, all site surfaces must be effectively stabilised¹³ using methods which will achieve effective short-term stabilisation.
Sediment control	1. Direct runoff from exposed site soils to sediment controls that are appropriate to the extent of disturbance and level of erosion risk. 2. All exposed areas greater than 2500 metres² must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated (i.e. 80% hydrological effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5).
Litter, hydrocarbons and other contaminants	1. Remove gross pollutants and litter. 2. Avoid the release of oil or visible sheen to released waters. 3. Dispose of waste containing contaminants at authorised facilities.
Waterway stability and flood flow management	1. Where measures are required to meet post-construction waterway stability objectives (specified in table B), these are either installed prior to land disturbance and are integrated with erosion and sediment controls, or equivalent alternative measures are implemented during construction. 2. Earthworks and the implementation of erosion and sediment controls are undertaken in ways which ensure flooding characteristics (including stormwater quantity characteristics) external to the development site are not worsened during construction for all events up to and including the 1 in 100 year ARI (1% AEP).

¹² Note: Drainage, erosion and sediment controls should be appropriate to the risk posed by the activity for the relevant climatic region e.g. considering the potential soil loss rate, monthly erosivity or average monthly rainfall.

¹³ Note: An effectively stabilised surface is defined as one that does not, or is not likely to result in visible evidence of soil loss caused by sheet, rill or gully erosion or lead to sedimentation water contamination.

Operational Phase Management

The SPP provides stormwater management design objectives for post-construction. These are applicable as follows:

- (1) A material change of use for an urban purpose that involves premises 2500 metres² or greater in size and:
 - (a) will result in six or more dwellings; or
 - (b) an impervious area greater than 25 per cent of the net developable area.
- (2) Reconfiguring a lot for urban purposes that involves premises 2500 metres² or greater in size and will result in six or more lots.

As this application is for a material change of use, the SPP applies for stormwater management design if the area is greater than 2500 m² and the impervious area is greater than 25% of the total developable area

Post development, the 5,141m² SPS site surface landscape will include areas of turf, permeable pavement and a small area of planted native vegetation. The effective impervious fraction of each of these surface types was determined based on standard practice and an overall percentage impervious determined for the site. The effective impervious surface areas are summarised in Table 2 and illustrated in Figure 5. This calculation takes into consideration roof areas and concrete infrastructure.

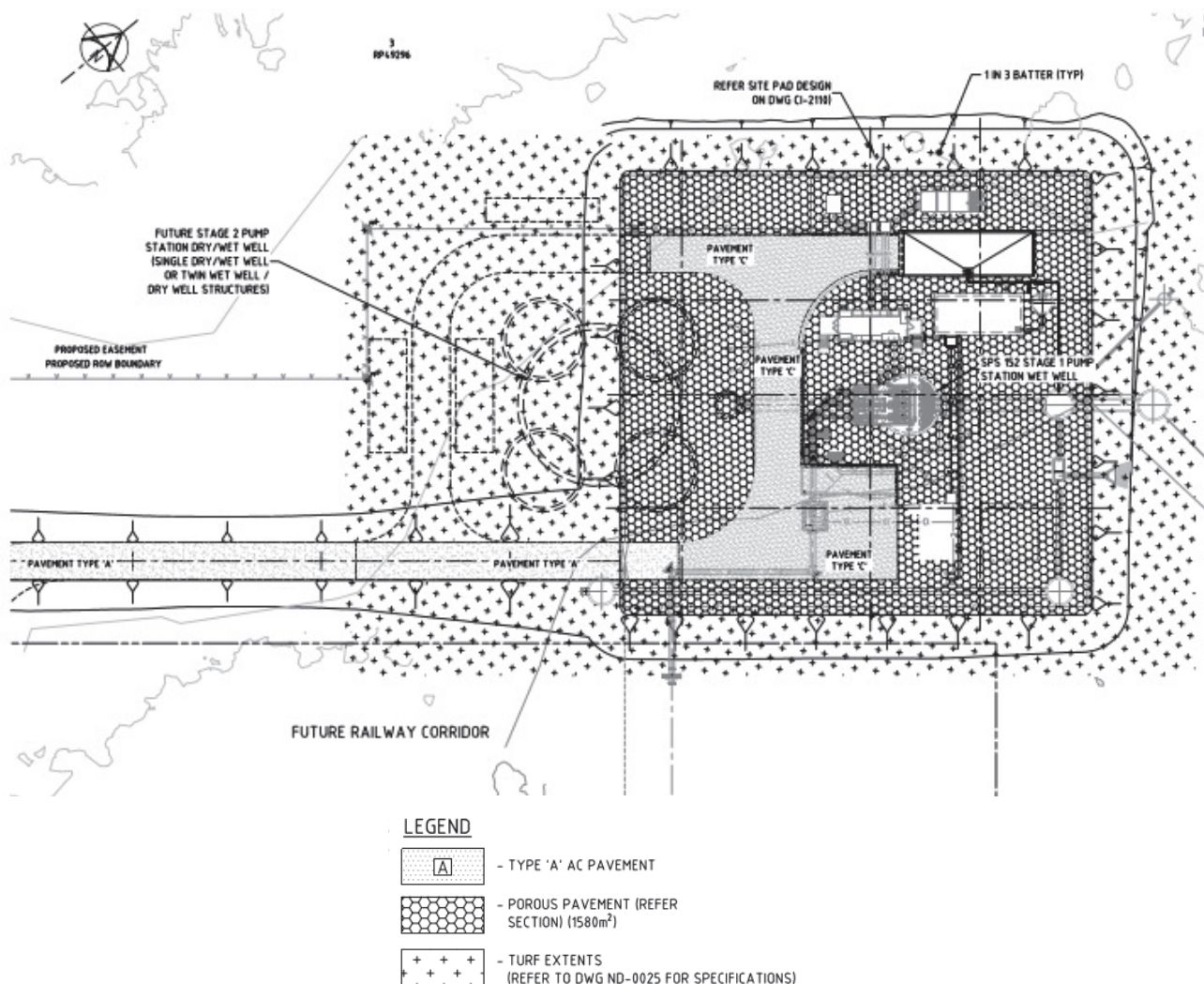


Figure 5 SPS152

Table 2 SPS152 impervious surfaces

Surface	Total area (m ²)	Effective impervious area (m ²)	Impervious area (%)
Concrete / roof & hard stands	750	750	100%
Access track within SPS site area	160	160	100%
Porous pavement	1,590	0	0%
Turf/vegetation	2,641	0	0%
Total site area	5,141	910	18%

The SPP stormwater management objectives therefore do not apply to this site and no stormwater quality treatment is required.

6. Separation distance from watercourses

As noted earlier, the separation distances recommended in Table 6 of the SPP cannot be met at this site. However, risk management strategies have been assessed to ensure water quality impacts are minimised, as per EDQ letter advice “Where separation distances cannot be met, please demonstrate how such watercourses and associated risks will be managed to achieve the performance outcome.”

The primary risk associated with the proximity to the watercourse is increased velocities and hence increased scour and erosion. The risk of the site contributing sediment laden runoff can be minimised by preventing erosion and scour. To achieve this, thorough site reinstatement is required.

Erosion and scour is typically initiated by a number of contributing factors, including:

- > Infrastructure location relative to hydrological features (e.g. higher if located within flow paths);
- > Slope steepness (e.g. higher flow velocities on steeper slopes);
- > Soil type (e.g. sodic soils very erosive);
- > Cover type (e.g. bare soil is more erodible); and
- > Hydraulic capacity (e.g. undersized channels).

Velocity is a key parameter to consider when evaluating the erosion potential of a site. Table 3 summarises indicative acceptable velocities for several cover types, including bare soil and turf and excluding other considerations such as slope. These velocities are based on various literature including International Erosion Control Association (IECA) guidelines.

Table 3 Maximum acceptable velocity by cover type

Soil cover type	Maximum acceptable Velocity (m/s)
Bare soil – extremely erodible	0.3
Bare soil – highly erodible	0.5
Bare soil – low erodible	0.7
Turf	1.5
Concrete	7.0

The flood assessment conducted for the site demonstrated that the SPS fill pad will increase velocities for a range of events, both within the site extent and also outside of the site boundary. The catchment area contributing flow to the development is illustrated in Figure 6. Flood assessment maps are provided within Attachment B, noting that detailed design is underway at the time of preparing this SBSMP, which may result in changes to these velocities.

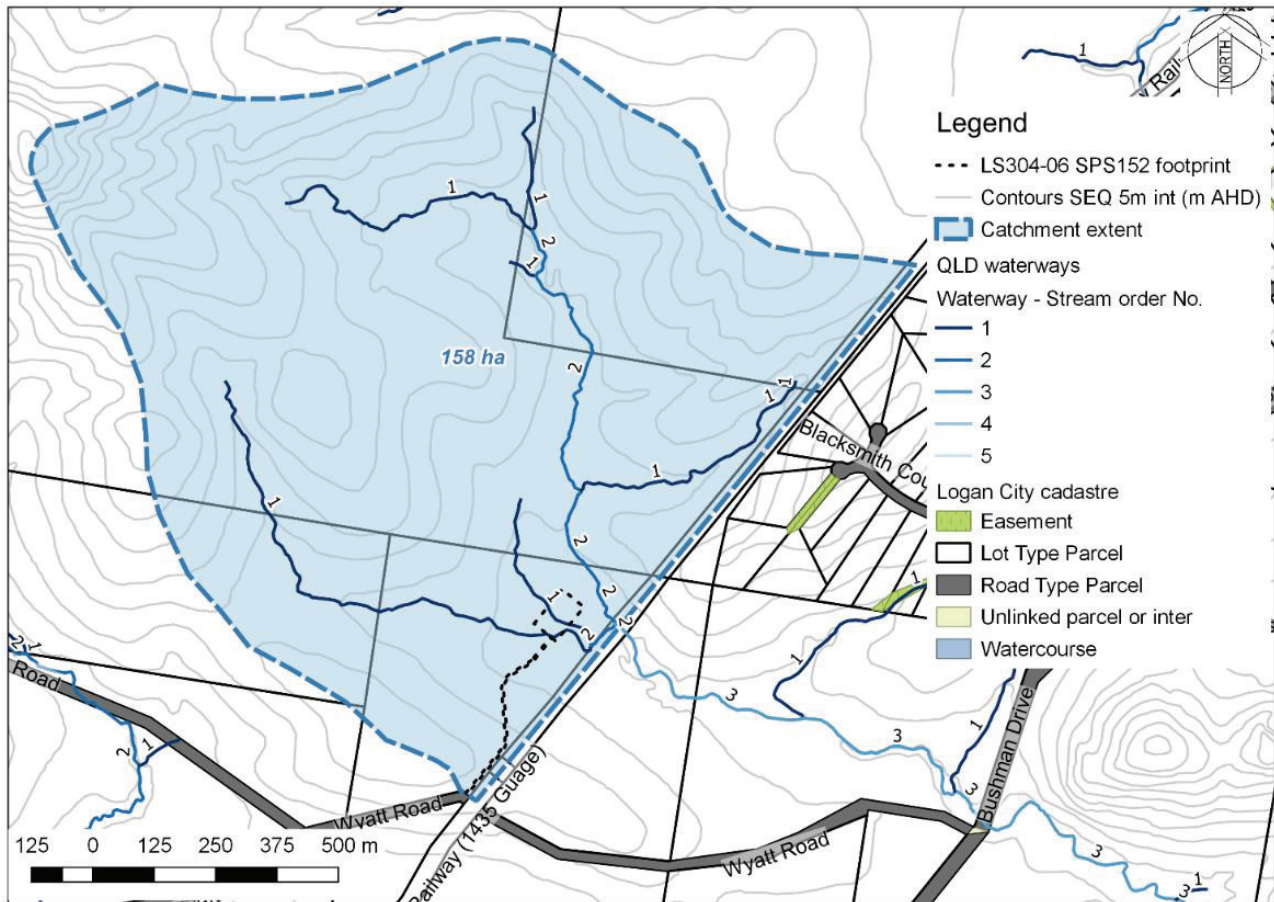


Figure 6 Catchment plan

The consequence of increased velocities outside of the site boundary is that areas outside of the site will experience higher velocities more frequently than in the existing case. Areas with an increase in velocity (> 0.5 m/s) will require adequate reinstatement to mitigate the potential for erosion, both for the integrity of the pump station and to ensure the requirements of the SPP are met with regards to stormwater quality.

As shown in Figure 7 and Figure 8, the highest velocities were observed along the access track at the junction with the south west corner of the fill pad (Zone B) and on the northern edge of the proposed SPS (Zone A).

The higher velocities in Zone A are difficult to mitigate due to requirements relating to the pad level and the fact that the pad is located within an overland flow path. Therefore, reinstatement of the Zone A area to prevent erosion for the velocities predicted is necessary. For Zone B there are several options to manage the higher velocities, including reinstatement and protection of the area and / or a combination of utilising stormwater diversion and dissipation management options. It is considered that adequate reinstatement of these areas will prevent erosion and manage water quality to address the performance outcome relating to separation distances.

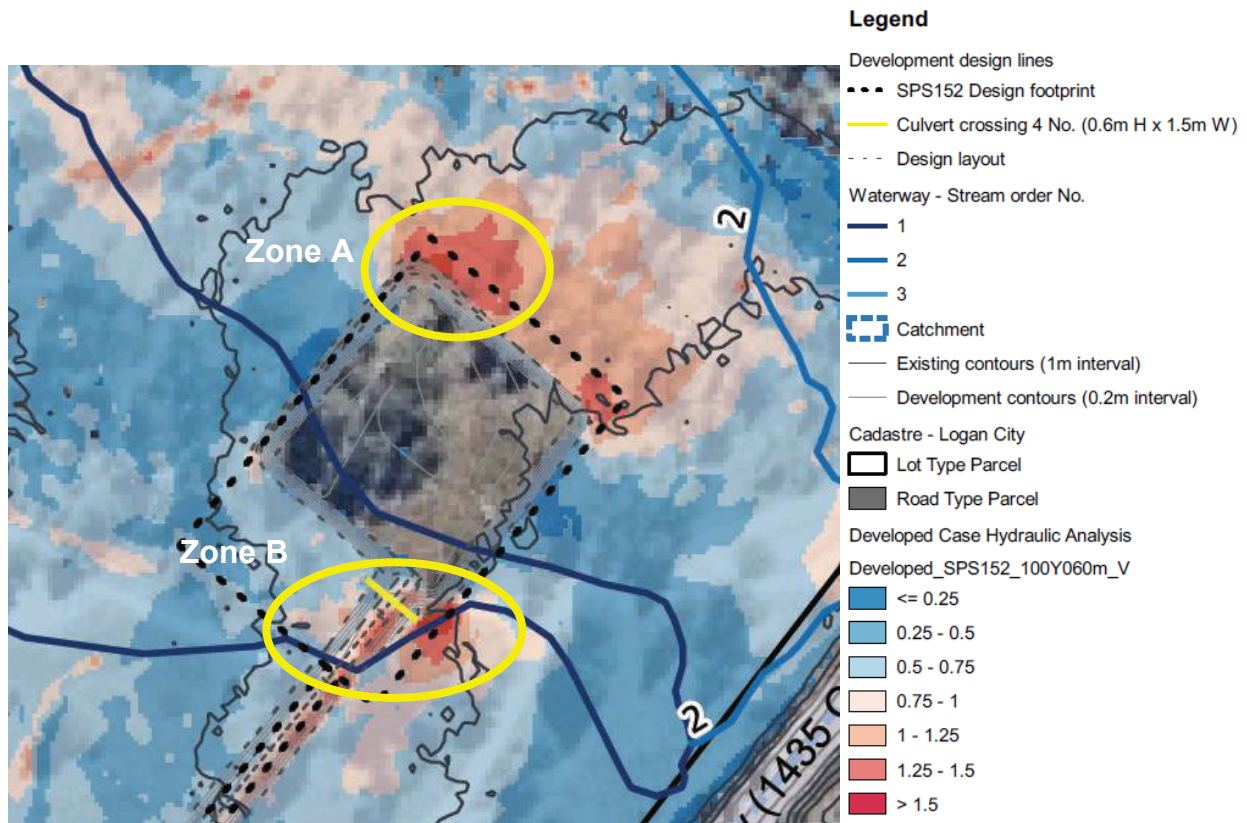


Figure 7 Estimated velocity (m/s) during 1% AEP

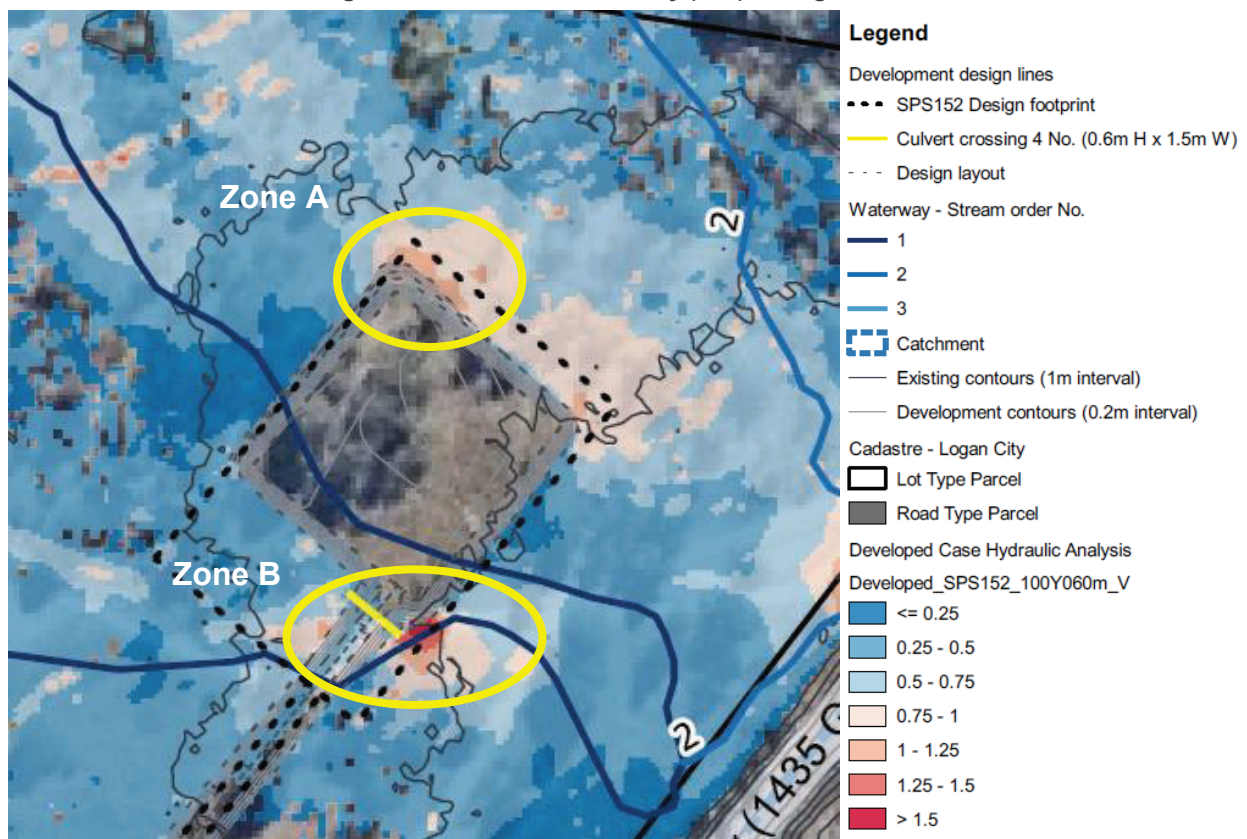


Figure 8 Estimated velocity (m/s) during 39% AEP

The extent of the reinstatement areas for Zone A and Zone B are illustrated in Figure 9. Exposed soils and areas with insufficient vegetation in this area will need to be adequately vegetated to prevent erosion. The extent of reinstatement required will be more accurately determined during detailed design.

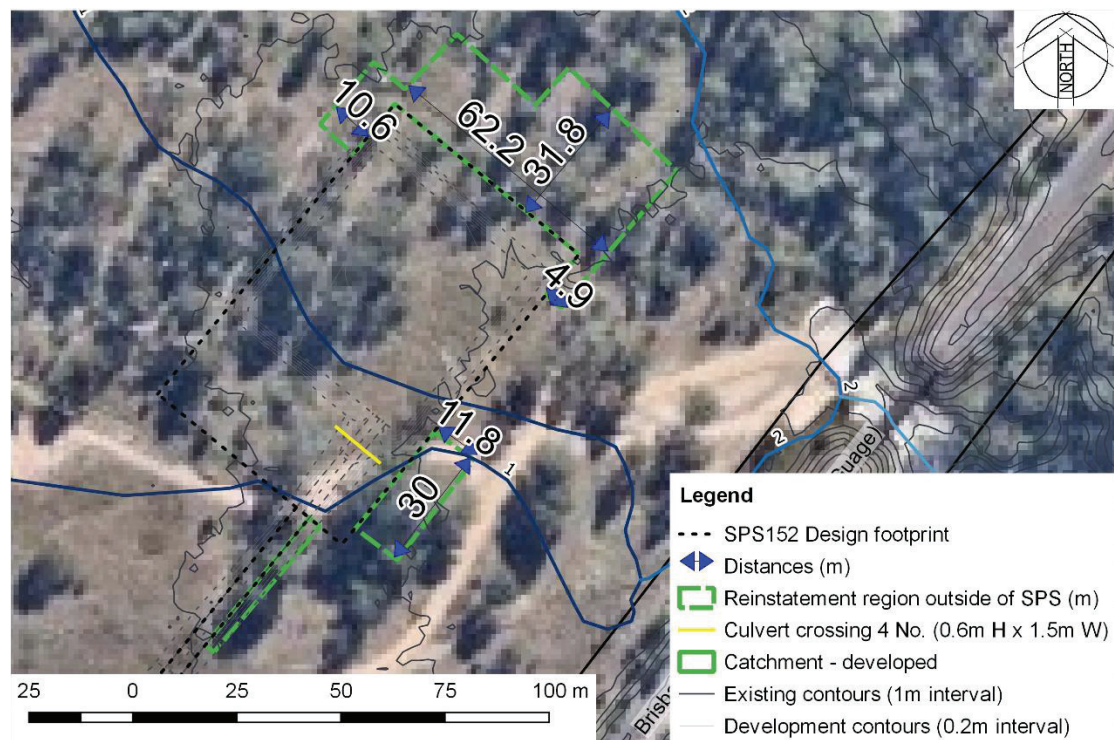


Figure 9 Reinstatement regions outside of SPS boundary

7. Flooding Impacts

The development location in the context of the surrounding catchment and the impact on flowpaths and runoff was initially assessed by ADG. Cardno undertook additional flood modelling and assessment of the proposed development (November 2018) and the results are provided in Attachment B. The afflux maps (Figure 4-1 and Figure 4-2) demonstrate that flooding impacts are limited to the general vicinity of the site. It can be noted that although the flood modelling has shown impacts upstream of the site, these impacts do not increase the extent of flooding in the area and do not affect the use of the land in which they occur.

8. Conclusion

Investigation into the location of the development has shown that the development is unlikely to result in a significant increase in stormwater flows, nor will upstream catchments be adversely impacted. It is recommended that the site be adequately reinstated to mitigate erosion, both inside and outside of the site boundary due to the location of the site within a floodplain. The reinstatement of the site is to be designed by a suitably qualified engineer and shall ensure the changes to stormwater runoff post-development are minimised.

Should you require any further information, please do not hesitate to contact the undersigned.

Yours sincerely,



Cara van Megchelen
Senior Engineer
for Cardno
Direct Line: +61 7 3877 6929
Email: cara.vanmegchelen@cardno.com.au

Enc: Attachment A - Design drawings
Attachment B - Flood Assessment Maps

Attachment A – Design drawings

PLANT SCHEDULE

NATIVE GROUND COVER MIX

AREA OF PLANTING = 407m²

DENSITY (PER m²) = 1

BOTANICAL NAME	COMMON NAME	FORM	SIZE	SPECIES %	No. OF
GROUND-STORY					
CYMOPOGON REFRACTUS	BARBED WIRE GRASS	GRASS	50mm TUBESTOCK	20%	81
THEMEDA TRIANDRA	KANGAROO GRASS	GRASS	50mm TUBESTOCK	20%	81
LOMANDRA HYSTRIX	CREEK MAT-RUSH	TUFTED PERENNIAL HERB	50mm TUBESTOCK	30%	122
LOMANDRA LONGIFOLIA	MAT-RUSH	TUFTED PERENNIAL HERB	50mm TUBESTOCK	30%	122

NOTES

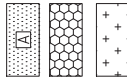
- A. NO SUBSTITUTION OF SPECIES UNLESS FIRST APPROVED BY THE LOGANWIA IN WRITING.
- B. FINAL NUMBER OF PLANTS TO BE DETERMINED ONCE AREA HAS BEEN DISTURBED.
- C. ALL TO BE INSTALLED AT 1 PER SQUARE METRE (1 METRE CENTRES).
- D. NO TREE GUARDS REQUIRED.

TOTAL TUBES 406

NOTES

1. REMOVE ANY TOPSOIL, DELETERIOUS, SOFT OR FIRM, WET OR HIGHLY COMPRESSIBLE SOILS OR MATERIALS RICH IN ORGANICS OR ROOT MATTER.
2. PROOF ROLL THE EXPOSED SUBGRADE BENEATH THE PROPOSED FILL PLATFORM WITH AT LEAST SIX PASSES OF A SMOOTH DRUM ROLLER WITH A MINIMUM STATIC WEIGHT OF 12 TONNES TO DETECT THE PRESENCE OF ANY SOFT OR LOOSE ZONES. THESE ZONES SHOULD BE EXCAVATED AND REPLACED WITH COMPACTED SELECT FILLING, AS APPROPRIATE.
3. PLACE APPROVED FILLING IN LAYERS NOT EXCEEDING 300mm LOOSE THICKNESS, WITH EACH LAYER COMPACTED TO A MINIMUM DRY DENSITY RATIO OF 98% STANDARD WITHIN 2% OF OMC DURING AND AFTER COMPACTION. SUITABLE FILLING WOULD COMPRISE A LOW PLASTICITY CLEAN FILLING FREE OF UNSUITABLE MATERIALS AND WITH A MINIMUM CBR VALUE OF 8%.
4. SEAL OR COVER ANY COMPACTED CLAY FOUNDATION SOIL CLOSE TO ANY FOOTING FORMATION LEVELS WITH A MINIMUM 150 MM OF SELECT GRANULAR FILL (MINIMUM CBR 15%) AS SOON AS PRACTICABLE, TO REDUCE THE OPPORTUNITY FOR OCCURRENCE OF DESICCATION AND CRACKING UNDER TAKE LEVEL 1 INSPECTION AND TESTING, AS DETAILED IN AS3798-2007 (REF. 3), ON THE FILLING.
5. REFER TO DWG ND-0030 FOR PUMP STATION SETOUT COORDINATES.
6. REFER TO DWG LS304-00-S-DWG-ND-0021 FOR LANDSCAPE MATERIALS DETAILS.

LEGEND



DRAWING HISTORY

CI-2140 PREVIOUSLY CI-2130

REV. No.	DESCRIPTION	MR	DS	APPR.	DATE
0	FOR CONSTRUCTION				

DESIGNED BY	D. SEECEL
DRAFTED BY	M. RODGER
DESIGN CHECKED BY	RPEQ
APPROVED BY	RPEQ

REFERENCES	PROJECT No.	FILE REFERENCE	SHEET SIZE	DATUM AND GDA 94 ZONE 56
	LS304-06		A1	



LOGAN CITY COUNCIL



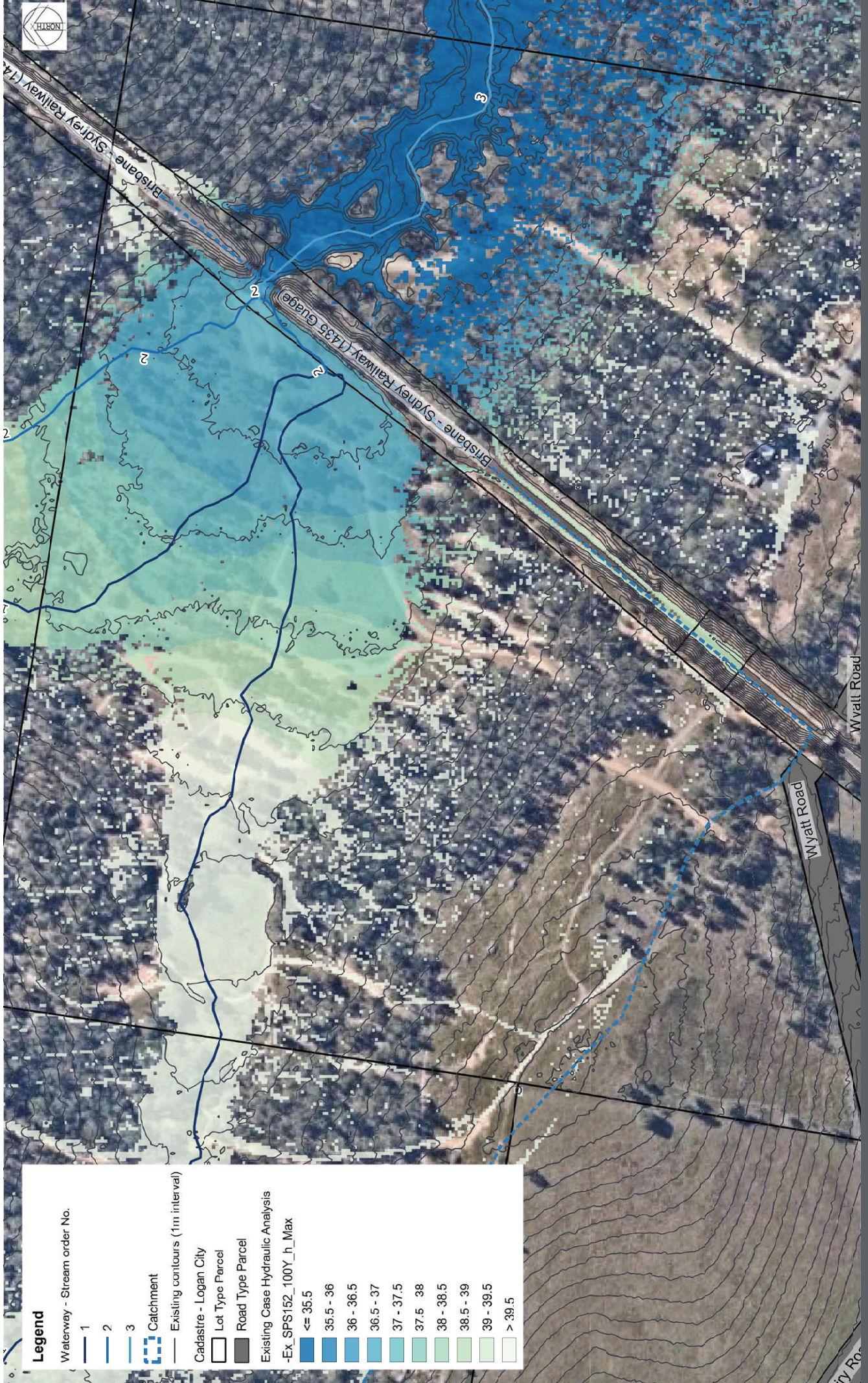
LOGAN WATER INFRASTRUCTURE ALLIANCE

PROJECT	FLAGSTONE CENTRAL TO CEDAR GROVE WWTP CONVEYANCE SYSTEM
DRAWING TITLE	SPS152 SEWAGE PUMP STATION
DRAWING No.	LS304-06-S-DWG-CI-2140
DESIGN COMPANY	Loganwvia
TECH SERVICE LOGO	
REV.	0

SITE PAD LANDSCAPE AND PAVEMENT DETAILS

DRAFT

Attachment B Flood Assessment Maps



Size
A3
03
Revision

Scale
1:2,250

Date
16/11/2018

LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: EXISTING WATER SURFACE ELEVATION (m AHD)
1% AEP
FIGURE 1-1

0 30 60 90 120 m

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- Legend**
- Waterway - Stream order No.
 - 1
 - 2
 - 3
 - Catchment
 - Existing contours (1m interval)
 - Cadastral - Logan City
 - Lot Type Parcel
 - Road Type Parcel
 - Existing Case Hydraulic Analysis
 - Ex SPS152_100Y_h_Max
 - <= 35.5
 - 35.5 - 36
 - 36 - 36.5
 - 36.5 - 37
 - 37 - 37.5
 - 37.5 - 38
 - 38 - 38.5
 - 38.5 - 39
 - 39 - 39.5
 - > 39.5



Legend

Development design lines

--- SPS152 Design footprint

--- Culvert crossing 4 No. (0.6m H x 1.5m W)

--- Design layout

Waterway - Stream order No.

1

2

3

Catchment

Existing contours (1m interval)

Development contours (0.2m interval)

Cadastral - Logan City

Lot Type Parcel

Road Type Parcel

Developed Case Hydraulic Analysis

Developed_SPS152_100Y060m_h

<= 35.5

35.5 - 36

36 - 36.5

36.5 - 37

37 - 37.5

37.5 - 38

38 - 38.5

38.5 - 39

39 - 39.5

> 39.5

Hillshade_SPS and AT

1

241

0 30 60 90 120 m

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LOGAN WATER INFRASTRUCTURE ALLIANCE

SPS152 AND ACCESS TRACK

FLOOD ASSESSMENT: DESIGN WATER SURFACE ELEVATION (m AHD) 1% AEP

FIGURE 1-2

Date

16/11/2018

Scale

1:2,250

Size

A3

03

Revision



Size
A3
03
Revision

Scale
1:2,250

Date
16/11/2018

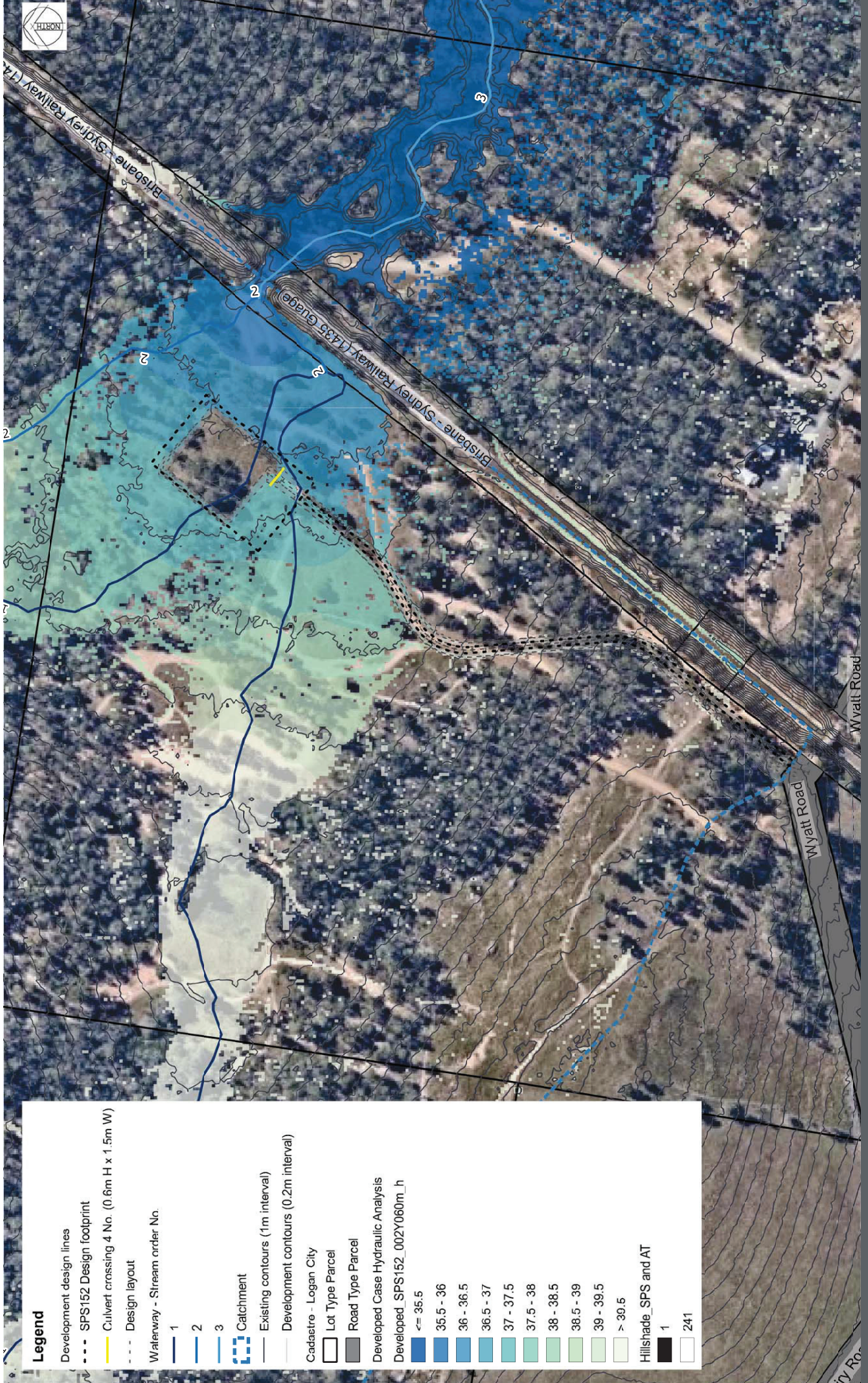
LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: EXISTING WATER SURFACE ELEVATION (m AHD)
39% AEP
FIGURE 1-3

0 30 60 90 120 m

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- Legend**
- Waterway - Stream order No.
 - 1
 - 2
 - 3
 - Catchment
 - Existing contours (1m interval)
 - Cadastral - Logan City
 - Lot Type Parcel
 - Road Type Parcel
 - Existing Case Hydraulic Analysis
 - Ex SPS152_002Y_h_Max
 - <= 35.5
 - 35.5 - 36
 - 36 - 36.5
 - 36.5 - 37
 - 37 - 37.5
 - 37.5 - 38
 - 38 - 38.5
 - 38.5 - 39
 - 39 - 39.5
 - > 39.5



Legend

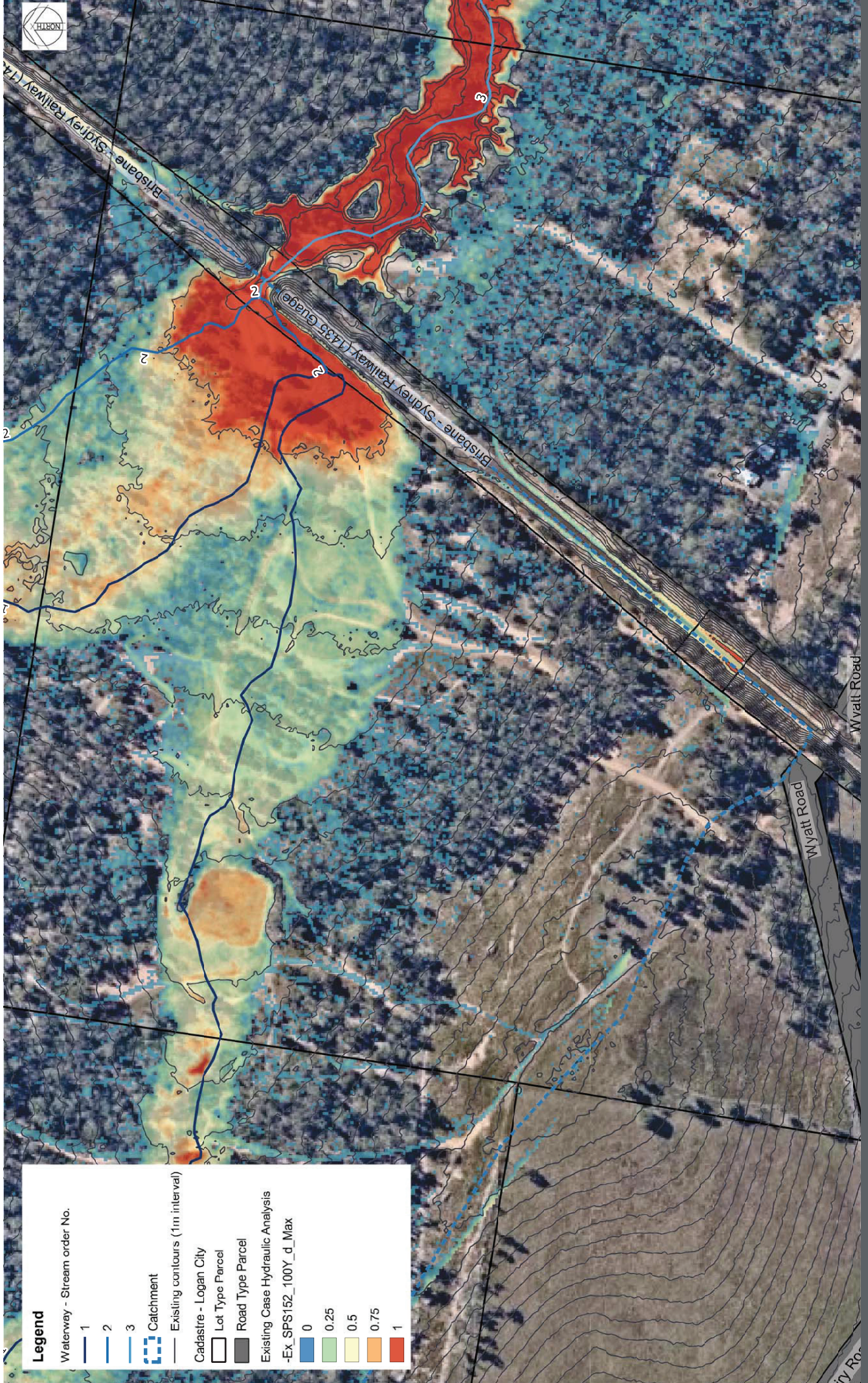
- Development design lines
- SPS152 Design footprint
 - Culvert crossing 4 No. (0.6m H x 1.5m W)
 - Design layout
 - Waterway - Stream order No.
 - 1
 - 2
 - 3
- Catchment
- Existing contours (1m interval)
 - Development contours (0.2m interval)
- Cadastral - Logan City
- Lot Type Parcel
 - Road Type Parcel
- Developed Case Hydraulic Analysis
- Developed_SPS152_002Y060m_h
- <= 35.5
 - 35.5 - 36
 - 36 - 36.5
 - 36.5 - 37
 - 37 - 37.5
 - 37.5 - 38
 - 38 - 38.5
 - 38.5 - 39
 - 39 - 39.5
 - > 39.5
- Hillshade_SPS and AT
- 1
 - 241

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LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: DESIGN WATER SURFACE ELEVATION (m AHD)
39% AEP
FIGURE 1-4

Size A3
Scale 1:2,250
Date 16/11/2018
Revision 03



Size
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03
Revision

Scale
1:2,250

Date
16/11/2018

LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: EXISTING WATER DEPTH (m)
1% AEP
FIGURE 2-1

0 30 60 90 120 m

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Legend

Waterway - Stream order No.

1

2

3

Catchment

Existing contours (1m interval)

Cadastral - Logan City

Lot Type Parcel

Road Type Parcel

Existing Case Hydraulic Analysis

-Ex_SPS152_100Y_d_Max

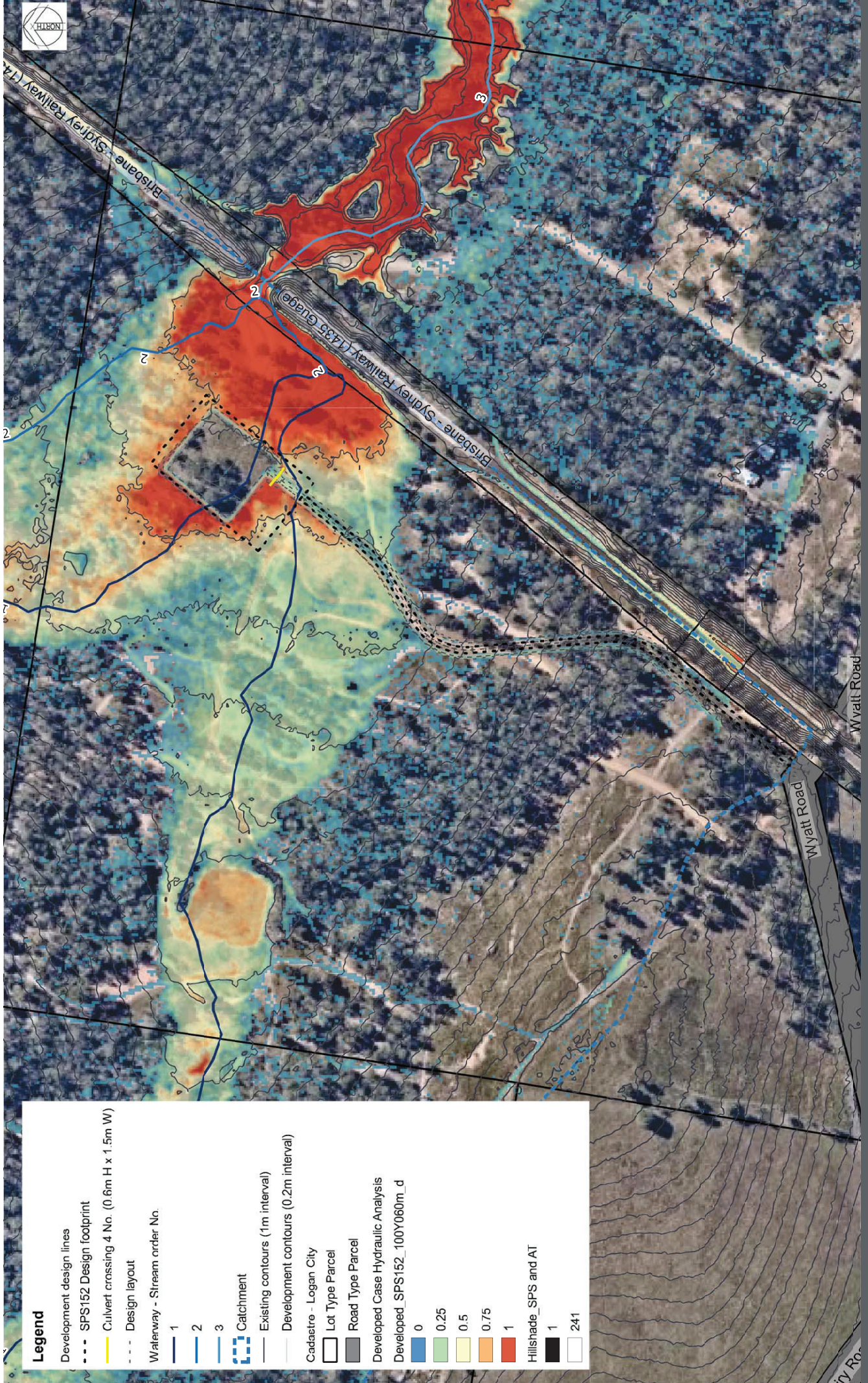
0

0.25

0.5

0.75

1



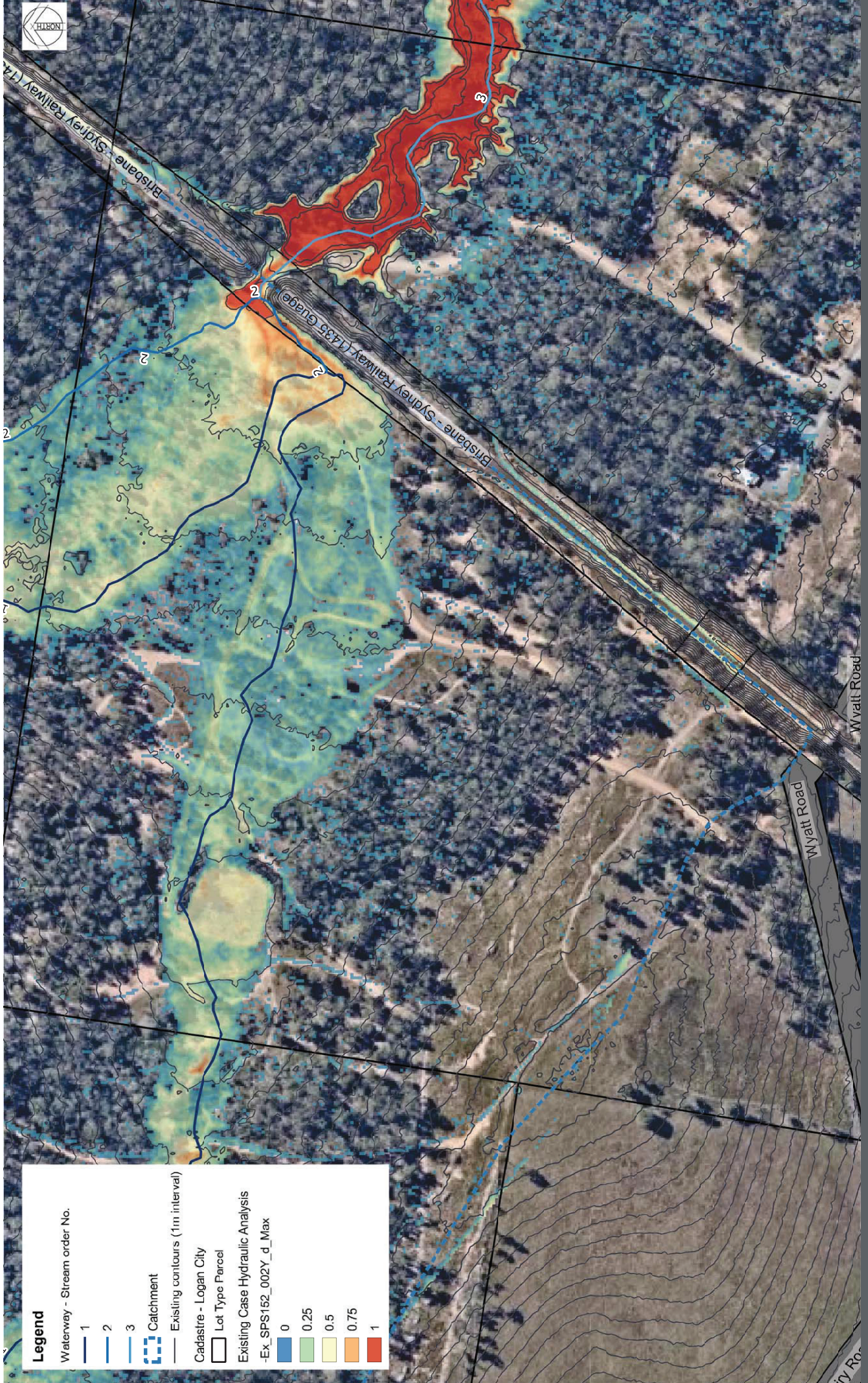
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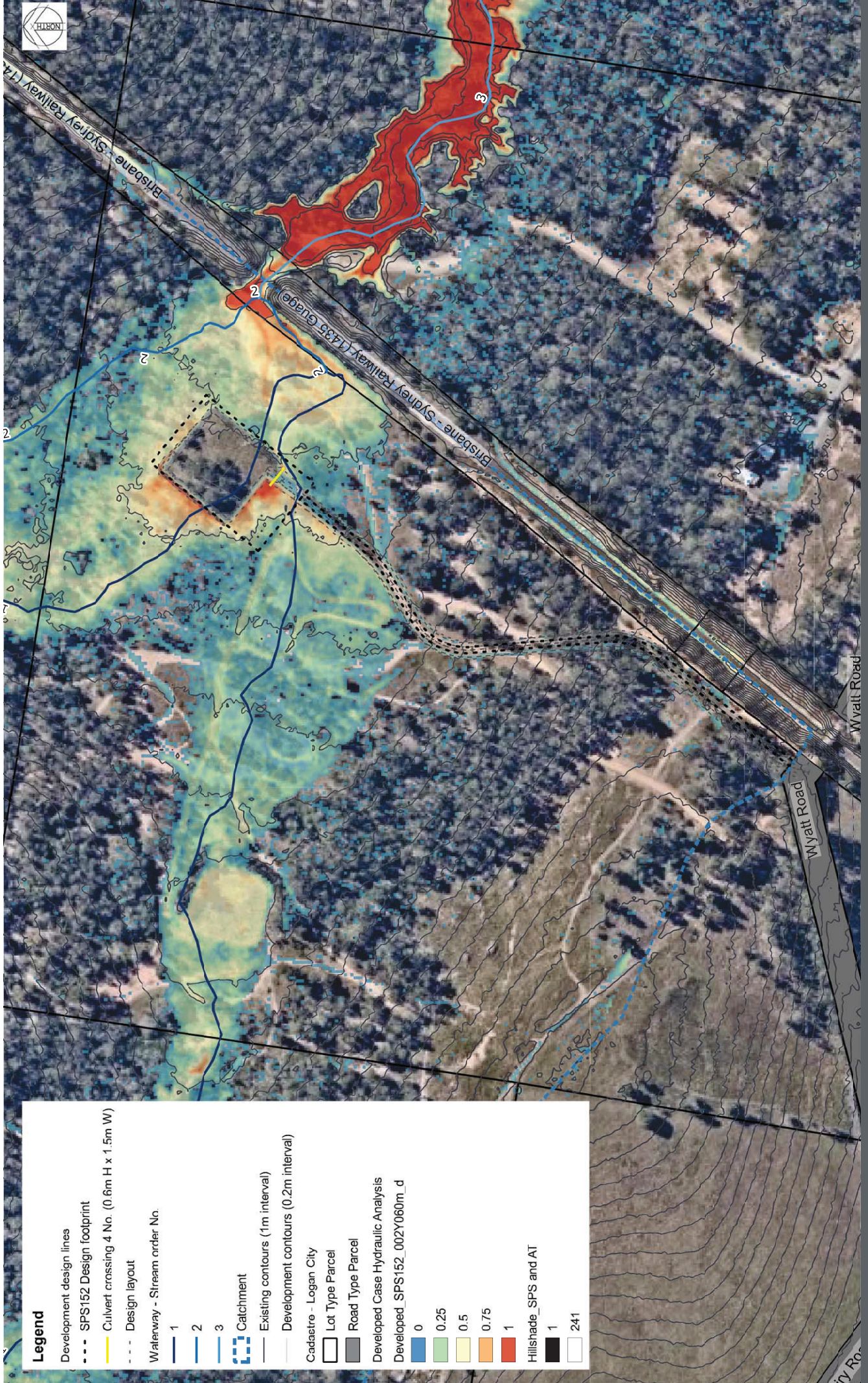
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Date
16/11/2018

Revision
03

LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: DESIGN WATER DEPTH (m)
1% AEP
FIGURE 2-2





Size
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Revision

Scale
1:2,250

Date
16/11/2018

LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: DESIGN WATER DEPTH (m)
39% AEP
FIGURE 2-4

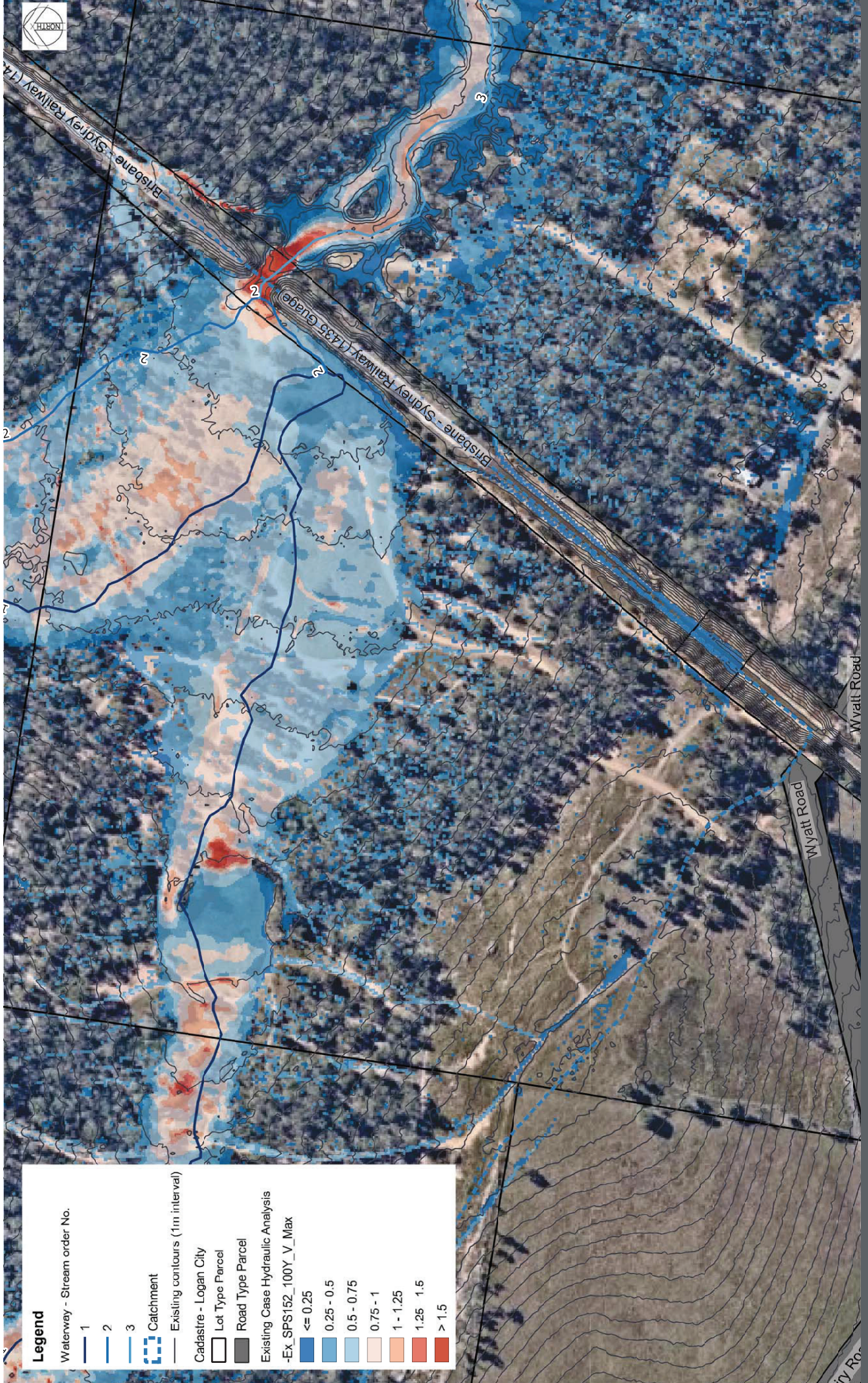
0 30 60 90 120 m

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Legend

- Development design lines
- SPS152 Design footprint
 - Culvert crossing 4 No. (0.6m H x 1.5m W)
 - Design layout
 - Waterway - Stream order No.
 - 1
 - 2
 - 3
 - Catchment
 - Existing contours (1m interval)
 - Development contours (0.2m interval)
 - Cadastral - Logan City
 - Lot Type Parcel
 - Road Type Parcel
 - Developed Case Hydraulic Analysis
 - Developed_SPS152_002Y060m_d
 - 0
 - 0.25
 - 0.5
 - 0.75
 - 1
 - Hillshade_SPS and AT
 - 1
 - 241



Size
A3
03
Revision

Scale
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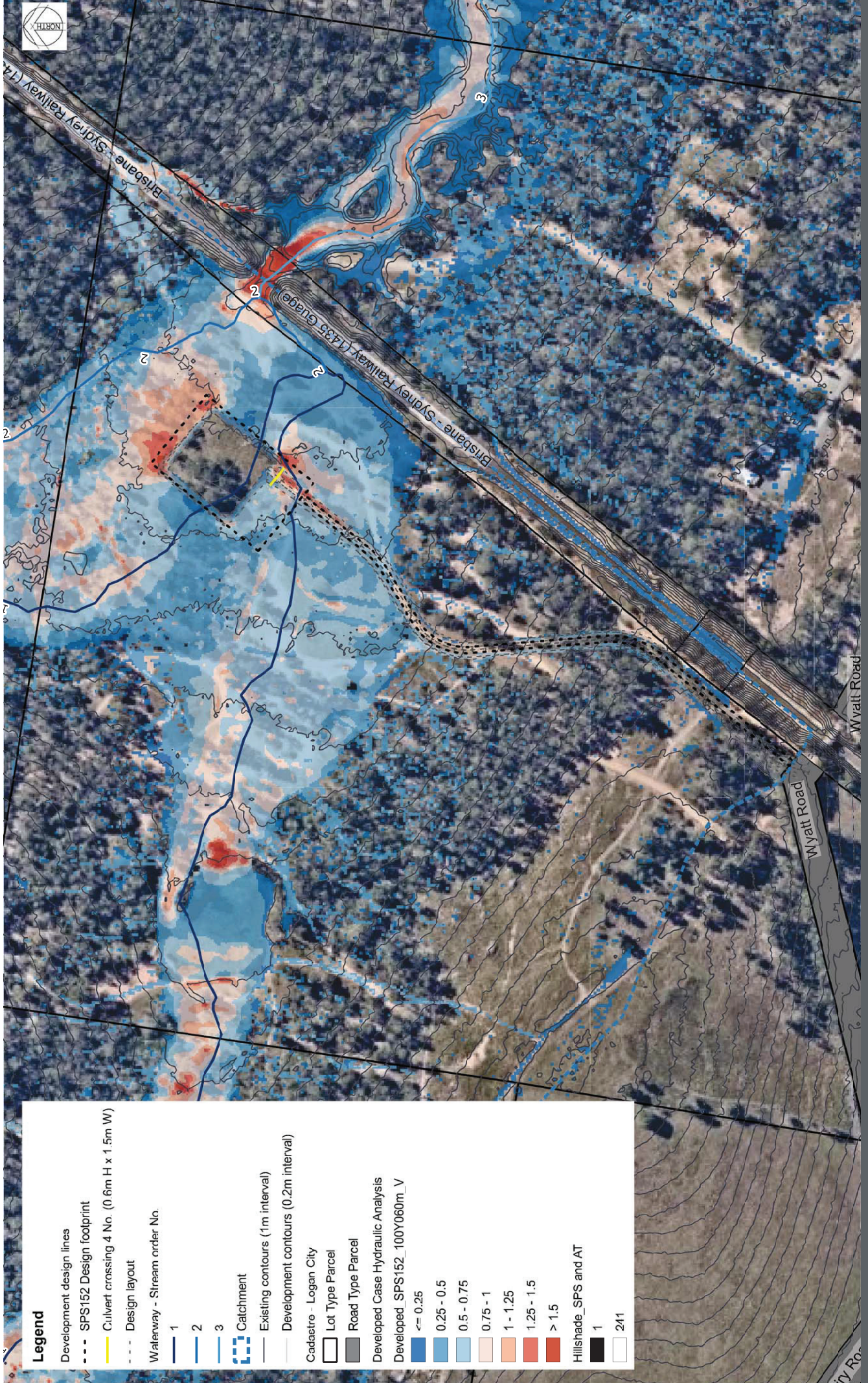
Date
16/11/2018

LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: EXISTING VELOCITY (m/s)
1% AEP
FIGURE 3-1

0 30 60 90 120 m

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LOGAN WATER INFRASTRUCTURE ALLIANCE

SPS152 AND ACCESS TRACK

FLOOD ASSESSMENT: DESIGN VELOCITY (m/s)

1% AEP

FIGURE 3-2

Scale

1:2,250

Date

16/11/2018

Size

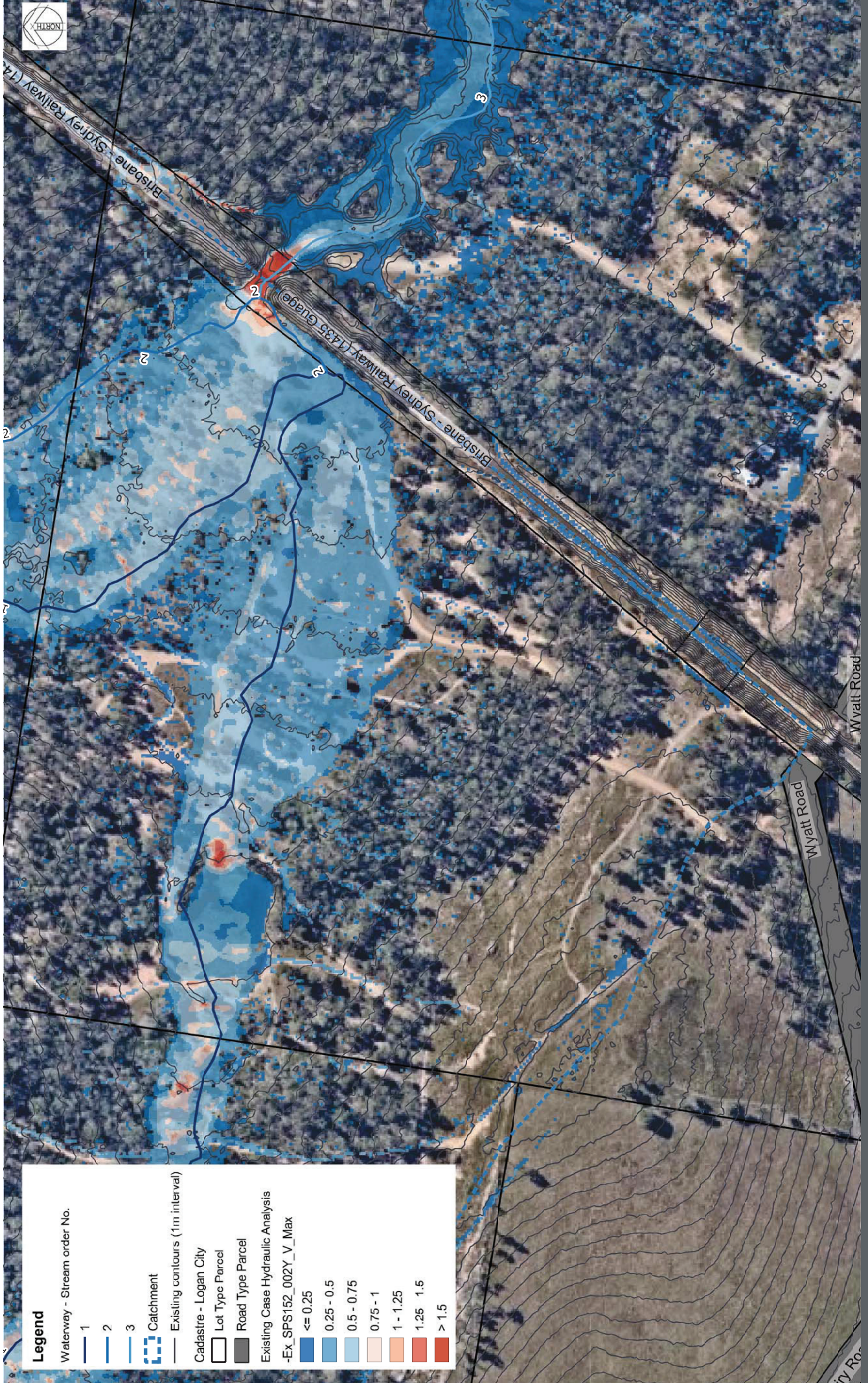
A3

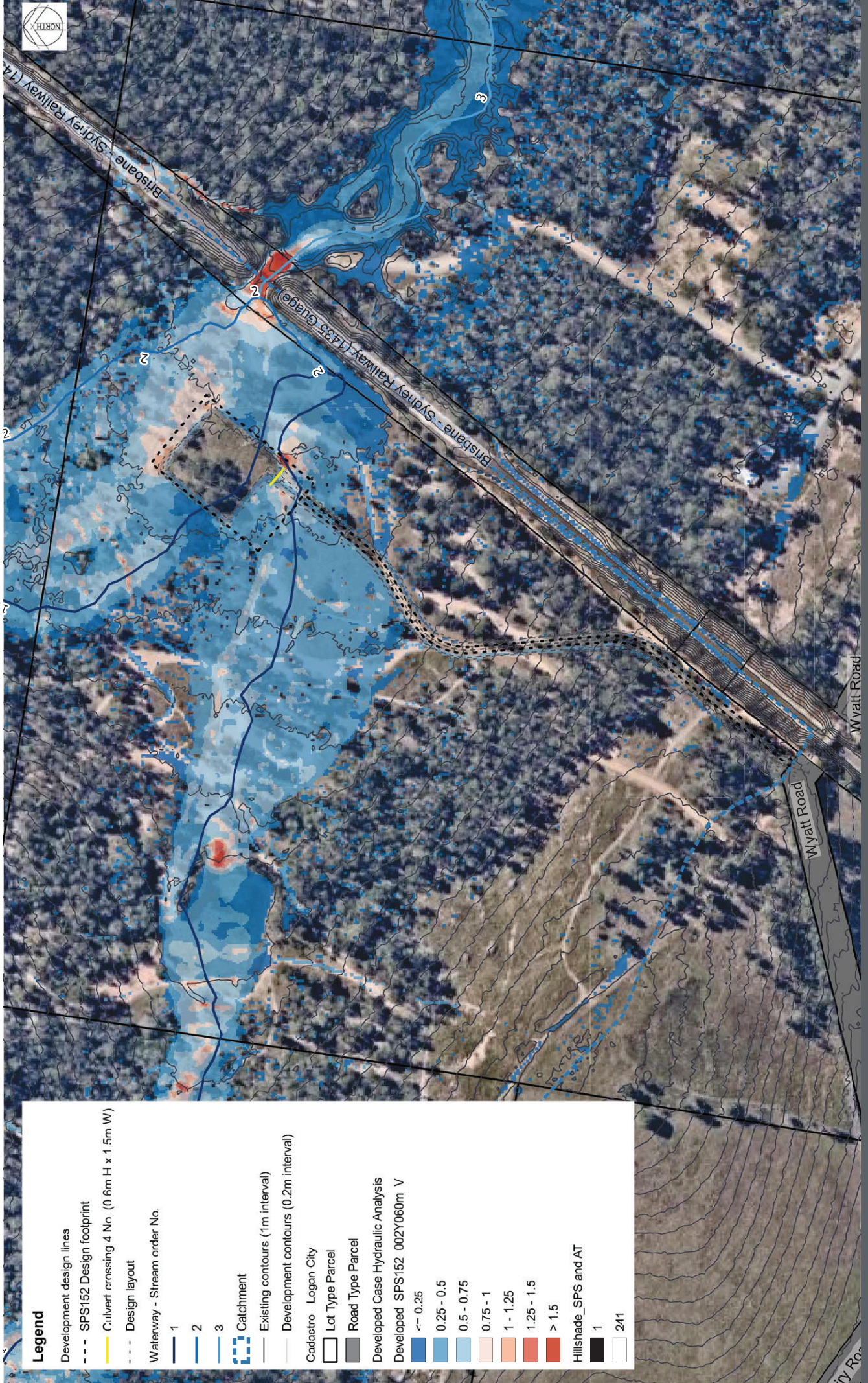
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Size
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Scale
1:2,250

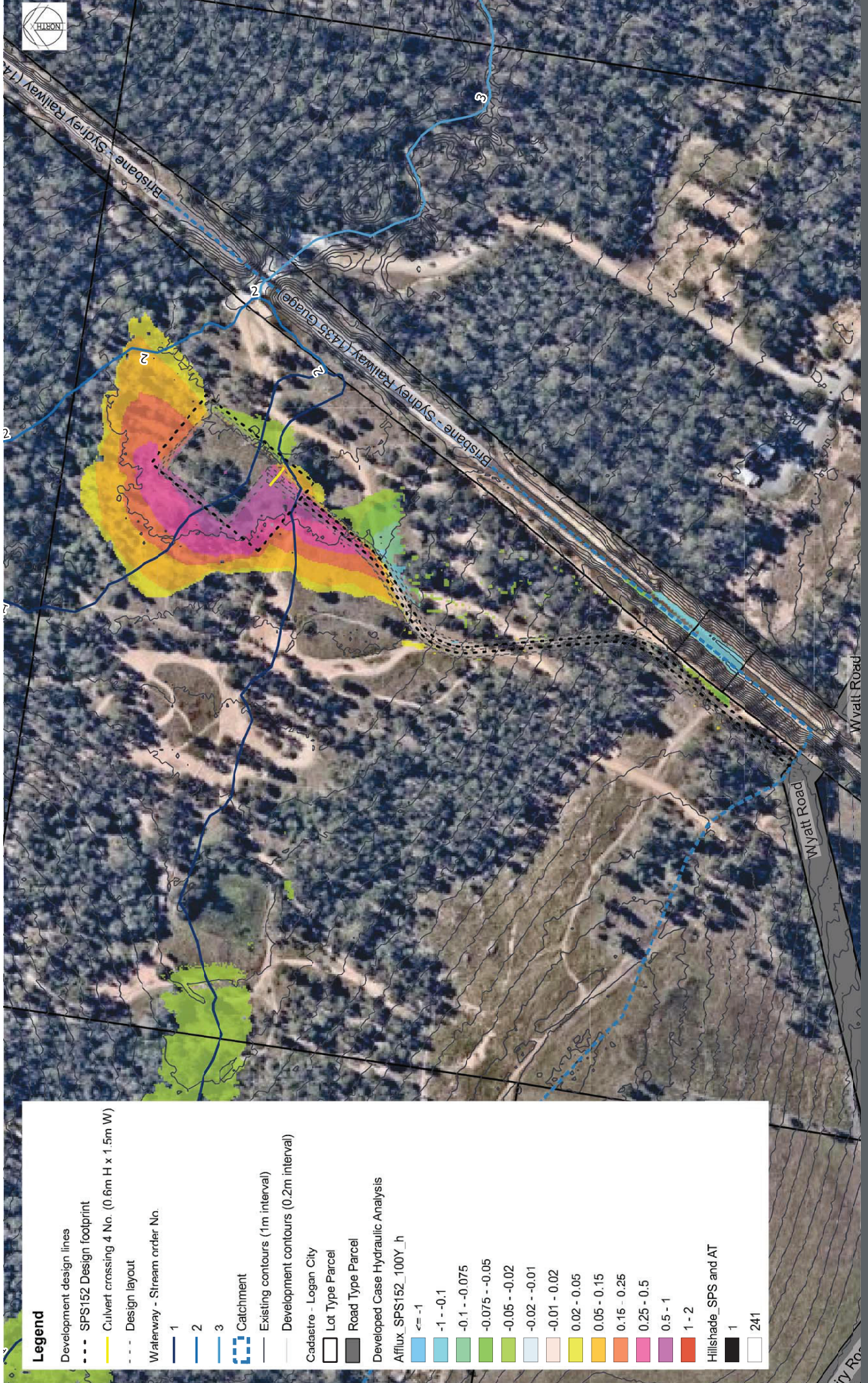
Date
16/11/2018

Revision
03

LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: DESIGN VELOCITY (m/s)
39% AEP
FIGURE 3-4

0 30 60 90 120 m

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Scale
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Date
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Revision
03

LOGAN WATER INFRASTRUCTURE ALLIANCE

SPS152 AND ACCESS TRACK

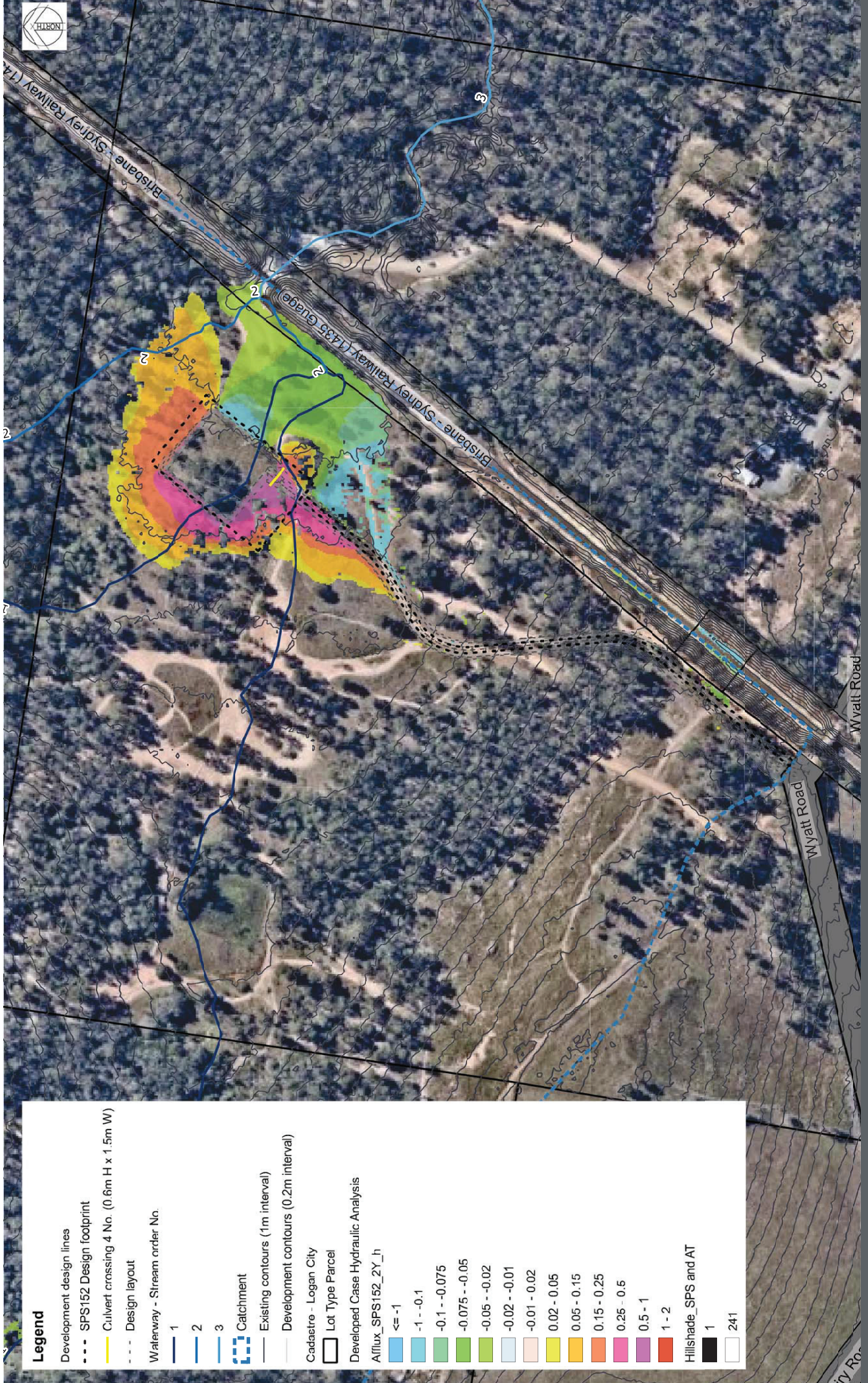
FLOOD ASSESSMENT: AFFLUX DEVELOPMENT MINUS EXISTING (m)

1% AEP

FIGURE 4-1

0 30 60 90 120 m

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Legend

- Development design lines
- SPS152 Design footprint
 - Culvert crossing 4 No. (0.6m H x 1.5m W)
 - Design layout
 - Waterway - Stream order No.
 - 1
 - 2
 - 3
- Catchment
- Existing contours (1m interval)
 - Development contours (0.2m interval)
- Cadastral - Logan City
- Lot Type Parcel
- Developed Case Hydraulic Analysis
- Afflux_SPS152_2Y_h
- <= -1
 - 1 - -0.1
 - 0.1 - -0.075
 - 0.075 - -0.05
 - 0.05 - -0.02
 - 0.02 - -0.01
 - 0.01 - 0.02
 - 0.02 - 0.05
 - 0.05 - 0.15
 - 0.15 - 0.25
 - 0.25 - 0.5
 - 0.5 - 1
 - 1 - 2
- Hillshade_SPS and AT
- 1
 - 241



LOGAN WATER INFRASTRUCTURE ALLIANCE
SPS152 AND ACCESS TRACK
FLOOD ASSESSMENT: AFFLUX DEVELOPMENT MINUS EXISTING (m)
39% AEP
FIGURE 4-2

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Scale 1:2,250
Date 16/11/2018
Revision 03

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