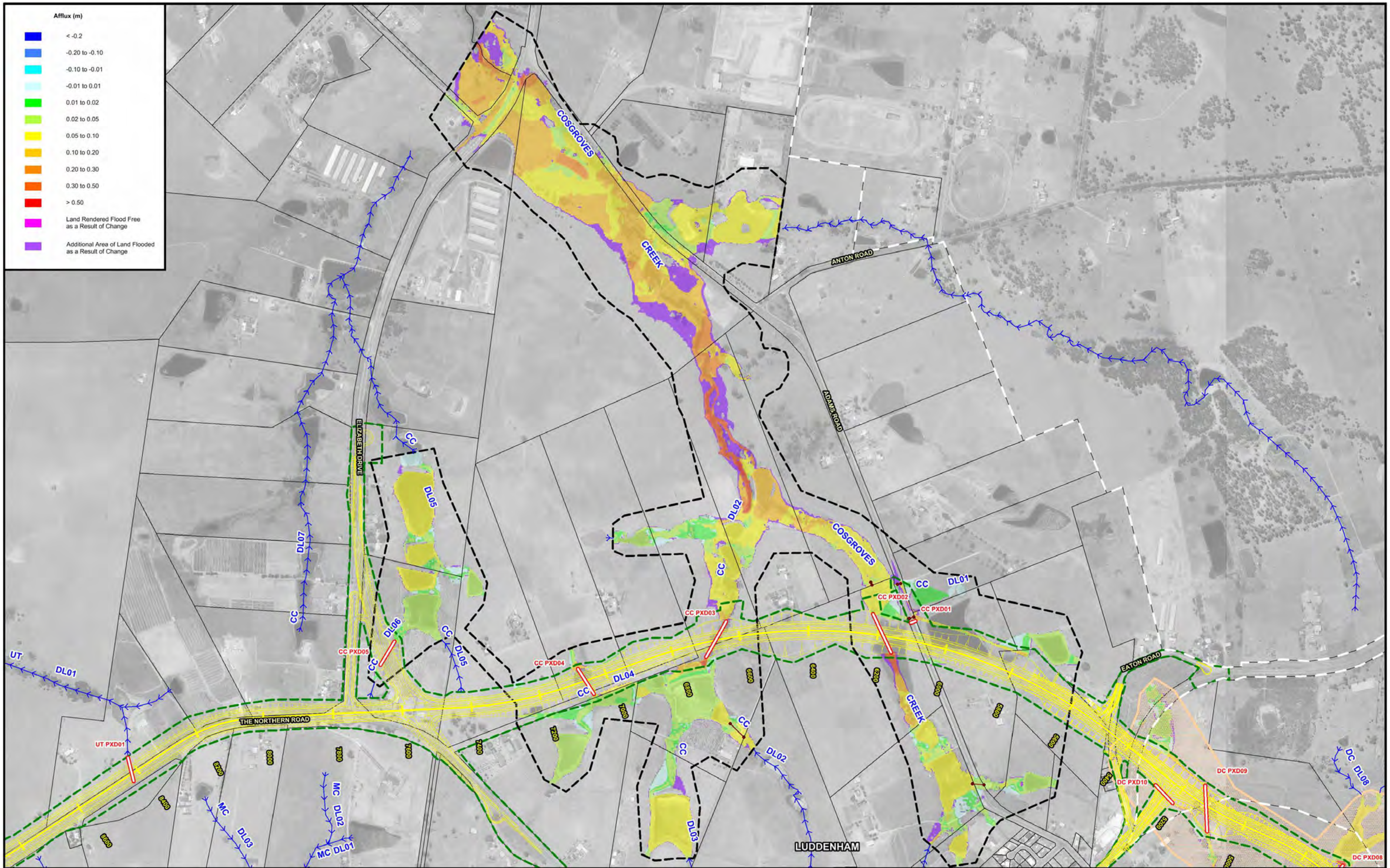

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Scale: 1:10,000

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LEGEND

Design Road Control String and Chainage

Extent of Duncans Creek TUFLOW Model (Refer Figure 7.36 for TUFLOW Model Results)

Modelled Stormwater Drainage Network

Design Strings

CC PXD01 Proposed Transverse Drainage Structure and Identifier (Refer Table 6.1 for Peak Flow in Individual Transverse Drainage Structures)

Two-Dimensional Model Extent

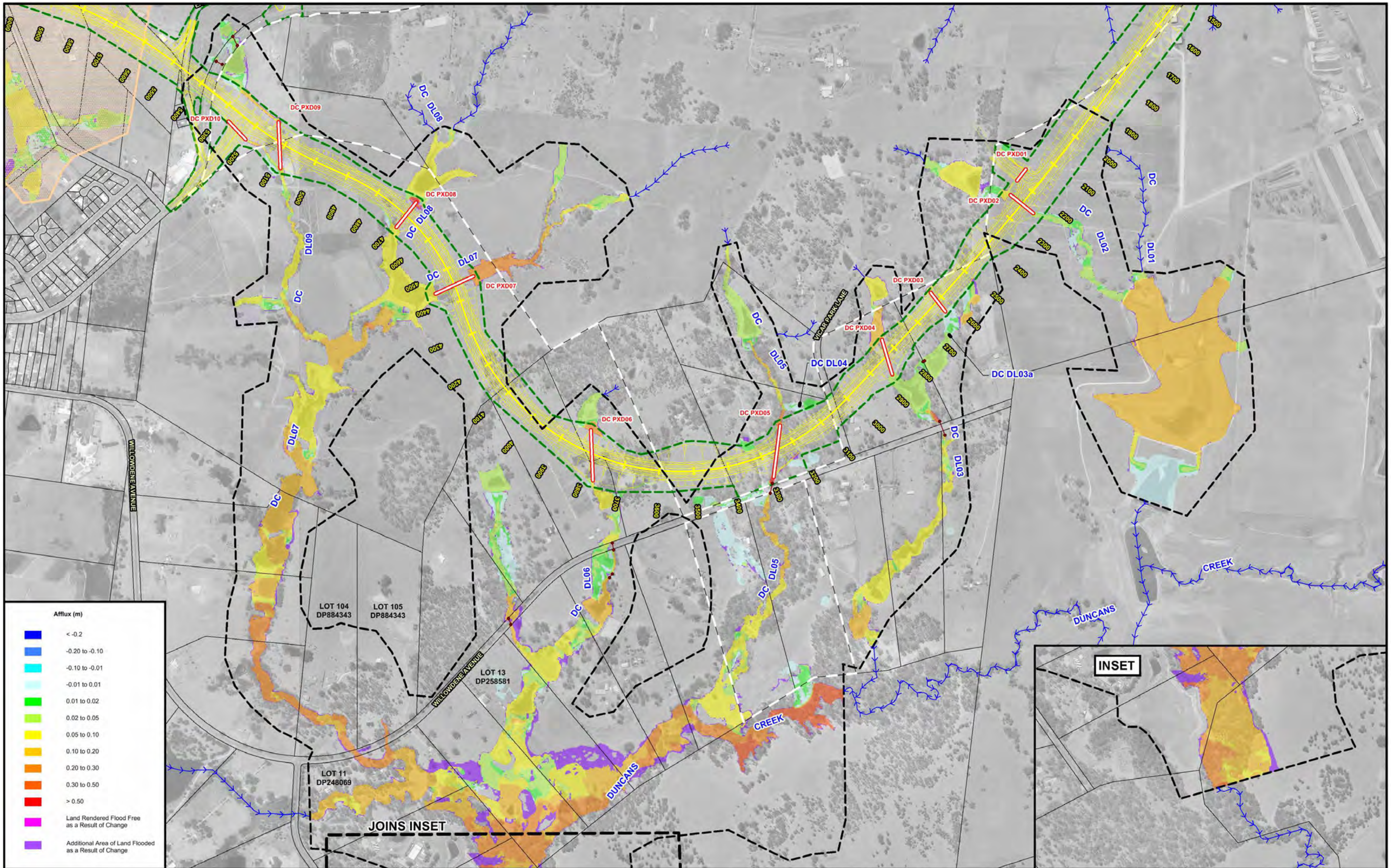
Proposed Western Sydney Airport Boundary

Project Boundary

THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure 7.37

IMPACT OF 30% INCREASE IN DESIGN RAINFALL INTENSITIES ON FLOODING BEHAVIOUR IN VICINITY OF PROJECT
COSGROVES CREEK CATCHMENT - POST PROJECT CONDITIONS - 100 YEAR ARI



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Scale: 1:10,000

LEGEND

Design Road Control String and Chainage

Extent of Cosgroves Creek TUFLOW Model (Refer Figure 7.35 for TUFLOW Model Results)

Modelled Stormwater Drainage Network

Design Strings

DC PXD01 Proposed Transverse Drainage Structure and Identifier (Refer Table 6.1 for Peak Flow in Individual Transverse Drainage Structures)

Two-Dimensional Model Extent

Proposed Western Sydney Airport Boundary

Project Boundary

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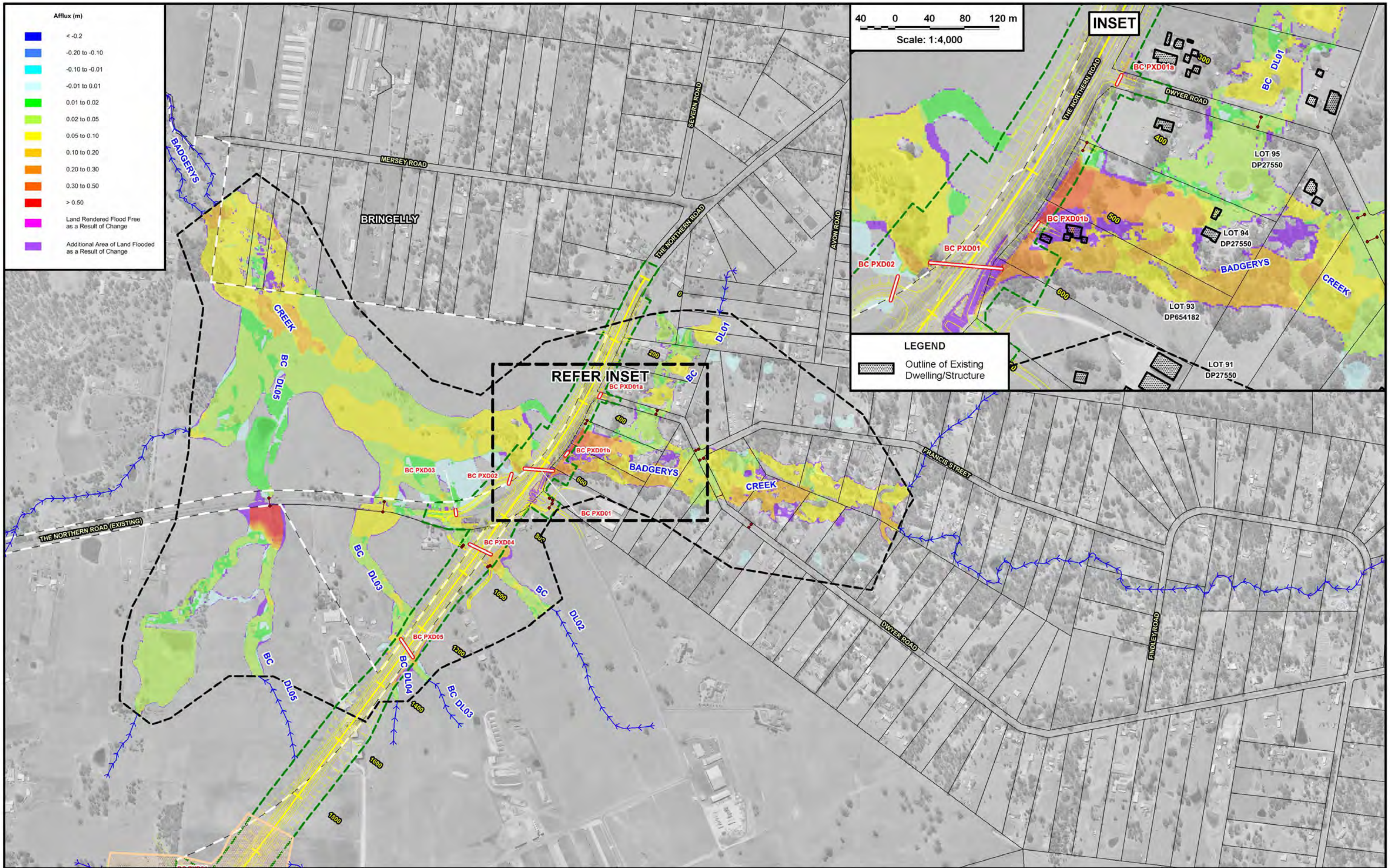
THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure 7.38

IMPACT OF 30% INCREASE IN DESIGN RAINFALL INTENSITIES ON FLOODING BEHAVIOUR IN VICINITY OF PROJECT
DUNCANS CREEK CATCHMENT - POST PROJECT CONDITIONS - 100 YEAR ARI



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Scale: 1:10,000

LEGEND

Design Road Control String and Chainage

Extent of Duncans Creek TUFLOW Model (Refer Figure 7.36 for TUFLOW Model Results)

Modelled Stormwater Drainage Network

Design Strings

BC PXD01 Proposed Transverse Drainage Structure and Identifier (Refer Table 6.1 for Peak Flow in Individual Transverse Drainage Structures)

Two-Dimensional Model Extent

Proposed Western Sydney Airport Boundary

Project Boundary

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THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure 7.39

IMPACT OF 30% INCREASE IN DESIGN RAINFALL INTENSITIES ON FLOODING BEHAVIOUR IN VICINITY OF PROJECT
BADGERYS CREEK CATCHMENT - POST PROJECT CONDITIONS - 100 YEAR ARI

APPENDIX A
BACKGROUND TO DEVELOPMENT OF FLOOD MODELS

TABLE OF CONTENTS

Page No.

FIGURES
(BOUND AT THE END OF THIS APPENDIX)

A1. SYNOPSIS

This Appendix provides background to the development of the hydrologic (RAFTS/ILSAX) and hydraulic (TUFLOW) computer models that were developed to define flooding behaviour in the vicinity of the project.

A2. HYDROLOGIC MODEL DEVELOPMENT

A2.1 General

This chapter of the Appendix provides a brief description of the ILSAX and RAFTS rainfall-runoff models that were developed as part the present investigation using the DRAINS software.

DRAINS is a simulation program which converts rainfall patterns to stormwater runoff and generates discharge hydrographs. These hydrographs are then routed through networks of piped drainage systems, culverts, storages and open channels to calculate hydraulic grade lines and analyse the magnitude of overflows. Alternatively, discharge hydrographs generated by DRAINS can be used as inflows to hydraulic models (such as the TUFLOW two-dimensional hydraulic modelling software) to determine flooding patterns. The latter approach is particularly appropriate for modelling complex flood behaviour involving multiple flow paths and has been used in the present study.

A number of hydrologic sub-models are available within the DRAINS software to simulate the conversion of rainfall to runoff. The RAFTS sub-model was used to assess the runoff characteristics of the semi-rural catchment which contributes to flow in the drainage system in the vicinity of the project, while the ILSAX sub-model was used to assess the runoff characteristics of the upgraded section of The Northern Road.

A2.2 DRAINS model layout

Figures A2.1 and **A2.2** show the layout of the sub-catchments which comprise the hydrologic models which represent pre- and post-project conditions, respectively. Sub-catchment boundaries were digitised based on contour information derived from the available LiDAR survey data. Sub-catchment slopes used as input data to the DRAINS model were derived using the average sub-catchment slope and equal area method for the ILSAX and RAFTS sub-models, respectively. Aerial photography was used to assess the degree of urbanisation present in the sub-catchments which comprise the DRAINS model.

A2.3 Design Storms

A2.3.1 Up to 500 year ARI

Rainfall intensities for the 2, 10, 100, 200 and 500 year ARI events were derived using procedures outlined in Australian Rainfall and Runoff (**ARR**) (IEAust, 1998) for storm durations ranging between 25 minutes and 12 hours. The design rainfalls were converted into rainfall hyetographs using the temporal patterns presented in ARR.

No Areal Reduction Factor (**ARF**) was applied to the design rainfall intensities obtained from ARR due to the relatively small size of the catchments which drain to the project corridor.

A2.3.2 Probable Maximum Flood

Estimates of Probable Maximum Precipitation (**PMP**) were made using the Generalised Short Duration Method (**GSDM**) as described in the BoM's update of _Bulletin 53_ (BoM, 2003). This method is appropriate for estimating extreme rainfall depths for catchments up to 1000 km^2 in area and storm durations up to 6 hours.

Given the relatively small size of the catchment that contributes to flow in the drainage system in the vicinity of the project (the largest being the 3 km^2 Badgerys Creek catchment), PMP rainfall applicable to the smallest ellipse shown on Figure 6 of BoM, 2003 (i.e. Ellipse A) was used as input to the model.

A2.4 Model parameters

Adopted RAFTS sub-model parameters comprised initial losses of 2 and 15 mm for paved and grassed areas, respectively, while continuing loss rates of 0 and 2.5 mm/h were adopted for paved and grassed areas, respectively.

A storage routing coefficient multiplier (Bx factor) of 1.0 was adopted after comparison of peak discharges from a range of sub-catchments with those derived from the PRM approach.

Lagging was used to model the translation of the discharge hydrographs between sub-catchment outlets within the ILSAX and RAFTS sub-models (referred to as links). This approach required a flow velocity to be assumed in each link. The sensitivity of the results to assumed flow velocities ranging between 1 and 2 m/s was tested for the 100 year ARI critical storm. After consideration of flow path slopes and comparison of results with those derived from the PRM approach, a flow velocity of 1 m/s was adopted for vegetated flowpaths while a flow velocity of 2 m/s was adopted for pipes and concrete lined flow paths.

Adopted ILSAX sub-model parameters comprised initial losses of 2 and 10 mm for paved and grassed areas, respectively. ILSAX uses the Hortonian loss modelling approach which does not require the user to input a continuing loss rate. Instead, a soil type and antecedent moisture condition (**AMC**) are used to define the continuing loss over time. The soil type was set equal to 3, which corresponds with a soil of comparatively high runoff potential while an AMC of 3 was adopted reflecting rather wet conditions prior to the onset of runoff producing rainfall.

A2.5 Comparison of peak flows

As the streams which drain across the project corridor are ungauged in their upper reaches, it was not possible to calibrate model parameters to reproduce recorded flows. A comparison of the peak flows generated by the hydrologic model representing pre-project conditions was therefore made with the Probabilistic Rational Method (PRM) of flood estimation as described in IEAust, 1998.

The peak flows derived by DRAINS were found to be higher than those derived using the PRM for design storms ranging between 2 and 100 year ARI. The adoption of the model parameters set out above will therefore result in the hydraulic model generating conservatively high peak flood levels and lead to the adoption of transverse drainage structures which are slightly larger than would be assessed should the designers rely on peak flows derived using the PRM for sizing the individual structures.

A3. HYDRAULIC MODEL DEVELOPMENT

A3.1 General

Detailed two-dimensional hydraulic modelling was undertaken using the TUFLOW software to define flooding behaviour in the vicinity of the project.

TUFLOW is a true two-dimensional (in plan), fully dynamic hydraulic modelling system which does not rely on a prior knowledge of the pattern of flood flows in order to set up the various fluvial and weir type linkages which describe the passage of a flood wave in a drainage system.

The basic equations of TUFLOW involve all of the terms of the St Venant equations of unsteady flow. TUFLOW solves the equations of flow at each point of a rectangular grid system which represent ground surface elevations throughout the model domain. TUFLOW allows for a dynamic linkage between the floodplain which is modelled by a two-dimensional grid and the creek and stormwater channels which may be modelled in a one-dimensional sense by cross sections normal to the direction of flow. Pipe networks can also be modelled using the software as one-dimensional elements which are linked dynamically to the two-dimensional domain at the location of surface inlet pits and headwalls.

The structure of a TUFLOW model can be adjusted to assess the impact works on the floodplain will have on flooding behaviour. It can also be adjusted to assess the benefits of various flood mitigation measures such as channel improvement works, levees and flood retarding basins.

A3.2 TUFLOW model structure

The layout of the TUFLOW models which were developed as part of the present investigation for the Cosgrove Creek, Duncan Creek and Badgerys Creek drainage systems are shown on **Figures A3.1**, **A3.2** and **A3.3**, respectively.

Data provided by Roads and Maritime were used to describe the key features of the local stormwater drainage system in the vicinity of the project corridor. These data were input to the TUFLOW model and included: internal dimensions of pipes and box culverts; number of conduits; and where available, invert levels.

An important consideration of two-dimensional modelling is how best to represent the roads, fences, buildings and other features which influence the passage of flow over the natural surface. Two-dimensional modelling is very computationally intensive and it is not practicable to use a mesh of very fine elements without incurring very long times to complete the simulation, particularly for long duration flood events. The requirement for a reasonable simulation time influences the way in which these features are represented in the model.

After initial model testing, a 2 metre grid spacing was found to provide the appropriate balance between the need to define features on the floodplain versus model run times. Grid elevations were based on available LiDAR survey data. Ridge and gully lines were added to the model where the grid spacing was considered too coarse to accurately represent important topographic features which influence the passage of overland flow, such as road centrelines and footpaths. It was important that the model recognised the ability of roads to capture overland flow and act as floodways.

The footprints of a large number of individual buildings located in the two-dimensional model domain were digitised and assigned a high hydraulic roughness value relative to the more hydraulically efficient roads and flow paths through allotments. This accounted for their blocking effect on flow whilst maintaining a correct estimate of floodplain storage in the model. It was not practicable to model the individual fences surrounding the many allotments in the study area. They comprised many varieties (brick, paling colorbond, etc) of various degrees of permeability and resistance to flow. It was assumed that there would be sufficient openings in the fences to allow water to enter the properties, whether as flow under or through fences and via openings at driveways.

A3.3 Model boundary conditions

Discharge hydrographs generated by DRAINS were applied at the inflow boundaries of the TUFLOW models. These comprised both inflows applied at the external TUFLOW model boundary and internal point source and region inflows[1] as shown on **Figures A3.1**, **A3.2** and **A3.3**.

The downstream boundary of the TUFLOW models comprised a tailwater level based on normal depth flow conditions. The model extents were selected to ensure the downstream boundary was located a sufficient distance downstream of the project to prevent any influence on flow behaviour within the vicinity of the proposed road works.

A3.4 Model parameters

The main physical parameter represented in TUFLOW is hydraulic roughness, which is required for each of the various types of surfaces comprising the overland flow paths in the two-dimensional domain, as well as for the culverts and pipes which were incorporated in the model as one-dimensional elements. In addition to the energy lost by bed friction, obstructions to flow also dissipate energy by forcing water to change direction and velocity, and by forming eddies. Hydraulic modelling traditionally represents all of these effects via the surface roughness parameter known as “Manning’s n”.

Hydraulic roughness values adopted for design purposes were selected based on site inspection, past experience and values contained in the engineering literature (refer **Table A3.1** over the page).

A3.5 Sensitivity of flood behaviour to increase in hydraulic roughness

Figures A3.4, **A3.5** and **A3.6** show the difference in peak flood levels (i.e. the “afflux”) for the 100 year ARI storm resulting from an assumed 20 per cent increase in hydraulic roughness compared to the “best estimate” values given in **Table A3.1** over the page for the Cosgrove Creek, Duncans Creek and Badgerys Creek drainage systems, respectively. The afflux is given in colour coded increments in metres. The figure also identifies areas where land is rendered flood free, or where additional areas of land are flooded.

[1] In parts of the model area, inflow hydrographs were applied over individual regions called “Rain Boundaries”. The Rain Boundaries act to “inject” flow into the one and two-dimensional domains of the TUFLOW model, firstly at a point which has the lowest elevation, and then progressively over the extent of the Rain Boundary as the grid in the two-dimensional model domain becomes wet as a result of overland flow.

The investigation found that there would only be a minor increase in peak 100 year ARI flood levels in the vicinity of the project as a result of a 20 per cent increase in the best estimate hydraulic roughness values set out in **Table A3.1**.

TABLE A3.1
"BEST ESTIMATE" OF HYDRAULIC ROUGHNESS VALUES
ADOPTED FOR TUFLOW MODELLING

Surface Treatment	Manning's n Value
Reinforced concrete pipes and box culverts	0.015
Roads	0.02
Concrete channel	0.03
Grassed channels and reserves	0.045
Remnant cleared pasture land	0.045
Stands of trees and macrophytes	0.06
Buildings	10

A3.6 Adjustments made to TUFLOW model to reflect post-project conditions

The concept road design model for the project, as well as details of the transverse drainage and flood mitigation strategy were incorporated in the model. The design discharge hydrographs generated by the hydrologic model representing post-project conditions were also applied to the adjusted model in order to:

- assess the impact the project would have on flooding behaviour; and
- assess the flood risks to the project.

Figure 6.2 (12 sheets) of the Technical Working Paper shows the key features of the proposed transverse drainage and flood mitigation strategy for the project, while **Table 6.1** in **Chapter 6** of the Technical Working Paper provides details of the upgraded transverse drainage.

A4. REFERENCES

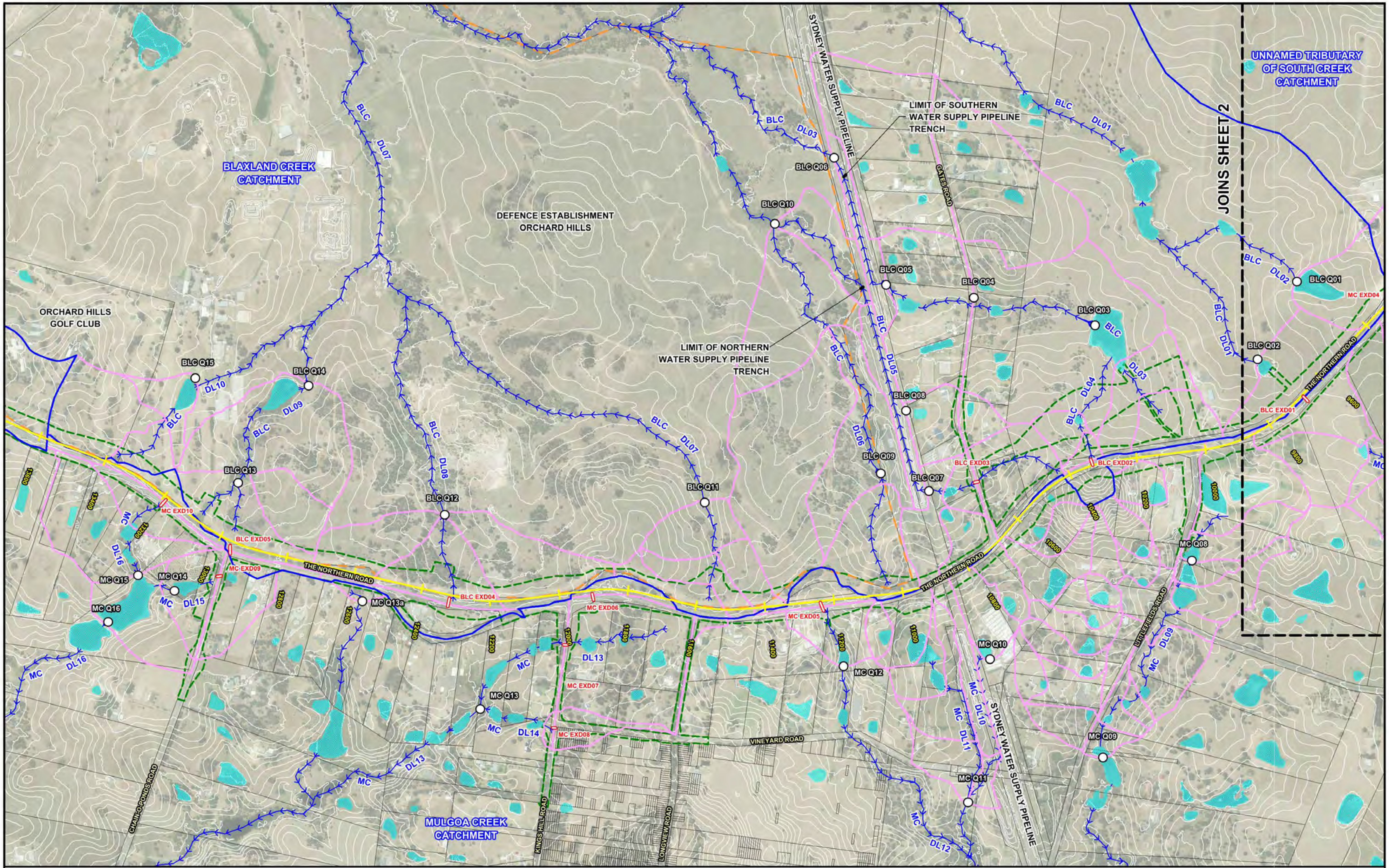
Bureau of Meteorology, 2003. *"The Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method"*.

The Institution of Engineers, Australia, 1998. *"Australian Rainfall and Runoff – A Guide to Flood Estimation"*.

Von Thun J. L. and Gillette D. R. (1990), "*Guidance on Breach Parameters – A Needs Assessment." Un-published U.S. Bureau of Reclamation document, Denver Colorado, 17 p.*

Wahl T. L. (1998), *"Prediction of Embankment Breach Parameters." DSO-98-044, U.S. Department of the Interior, Bureau of Reclamation – Dam Safety Office.*

FIGURES



100	0	100	200	300 m

Scale: 1:10,000

LEGEND

- MC EXD05 — Existing Transverse Drainage Structure and Identifier
- Design Road Control String and Chainage
- Existing Dam
- Existing Drainage Lines
- Catchment Boundary
- BLC Q12 — Peak Flow Location and Identifier (Refer Table D1 of Appendix D)
- Sub-Catchment Boundary
- Defence Establishment Orchard Hills Boundary
- Project Boundary

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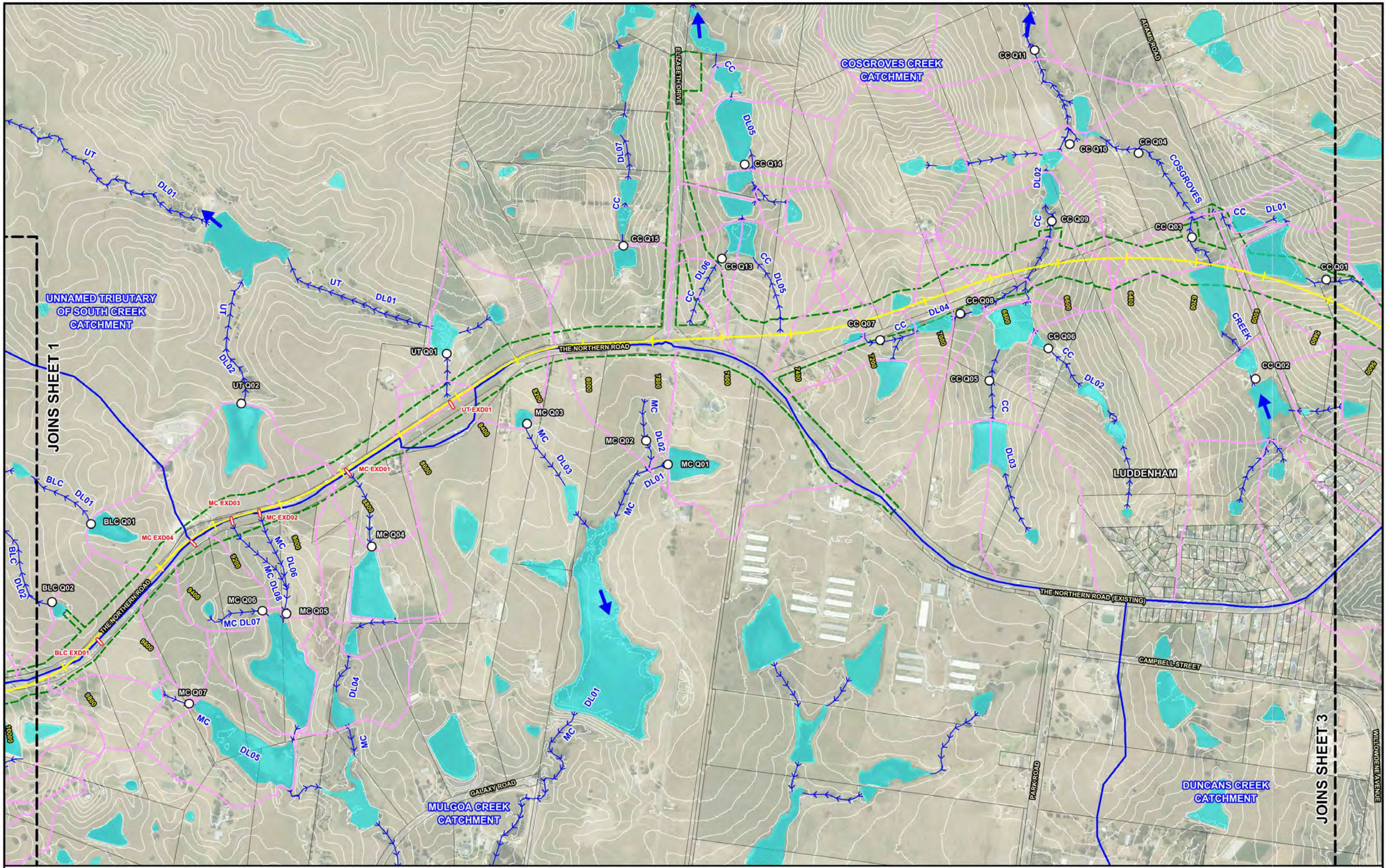
THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A2.1
Sheet 1 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL
PRE-PROJECT CONDITIONS



THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A2.1
Sheet 2 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL
PRE-PROJECT CONDITIONS

Scale: 1:10,000 (100 0 100 200 300 m)

LEGEND

MC EXD01	Existing Transverse Drainage Structure and Identifier
	Design Road Control String and Chainage
	Existing Dam
	Existing Drainage Lines
	Catchment Boundary
MC Q04	Peak Flow Location and Identifier (Refer Table D1 of Appendix D)
	Sub-Catchment Boundary
	Proposed Western Sydney Airport Boundary
	Project Boundary

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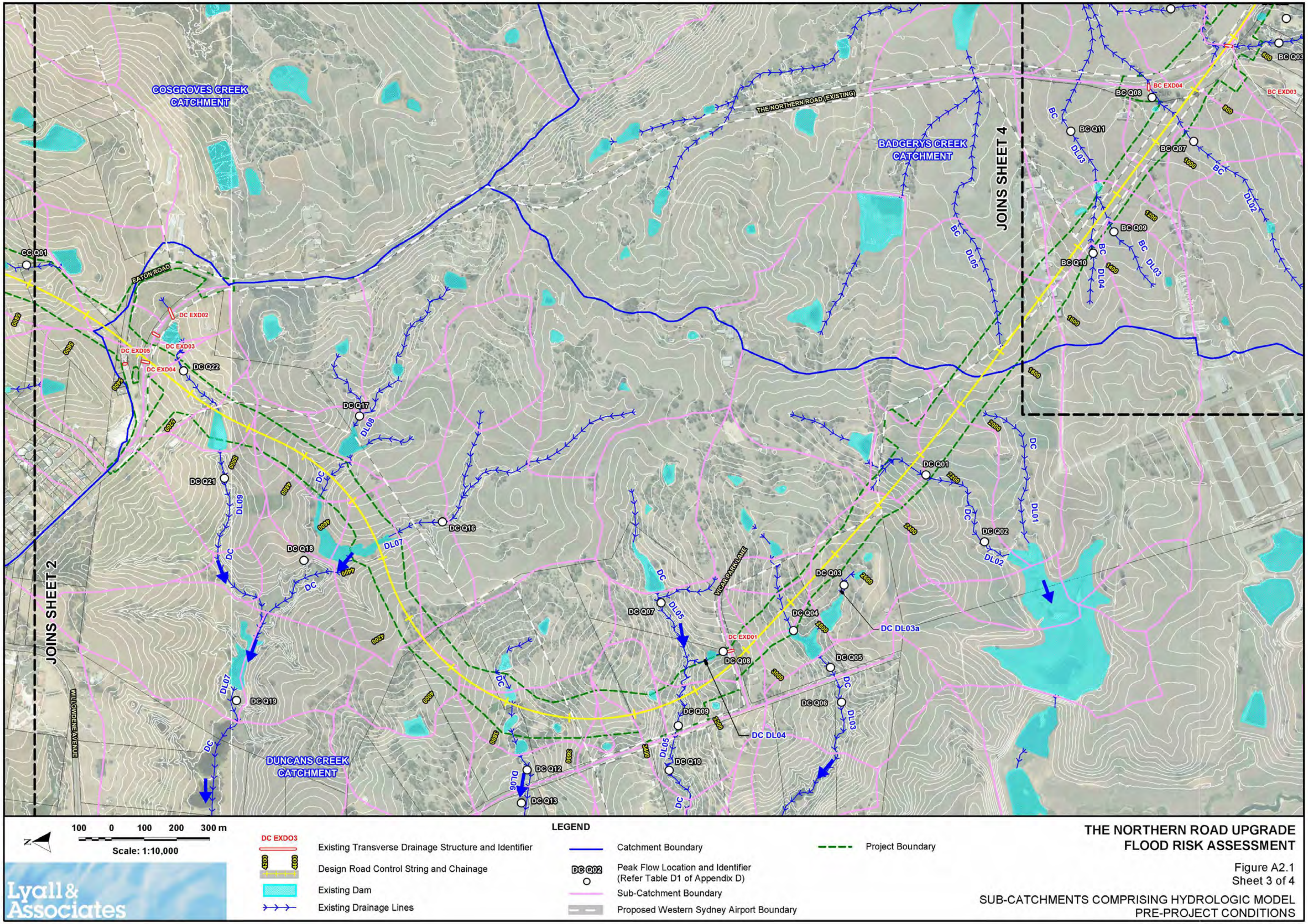
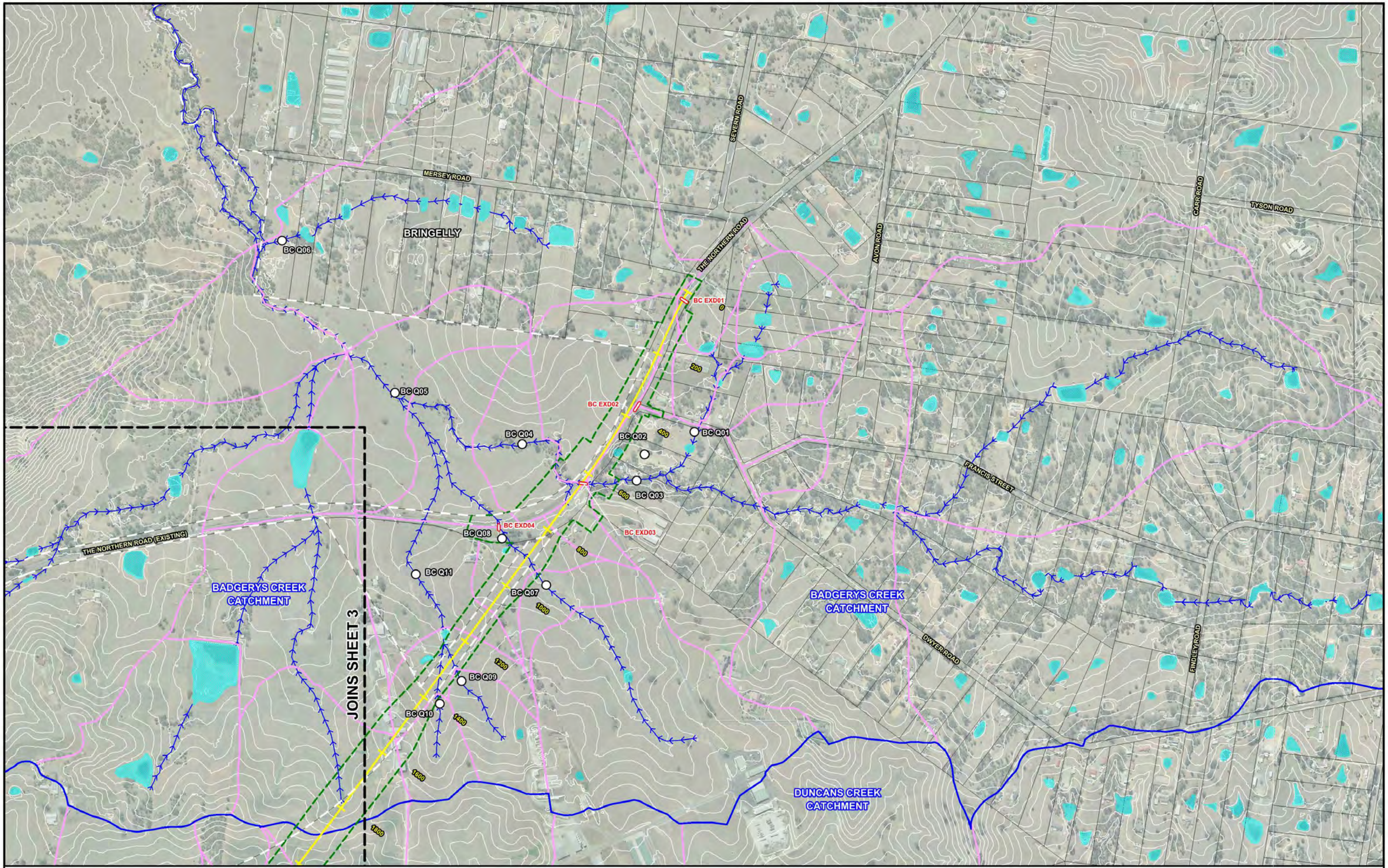


THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A2.1
Sheet 3 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL
PRE-PROJECT CONDITIONS



N

100 0 100 200 300 m

Scale: 1:10,000

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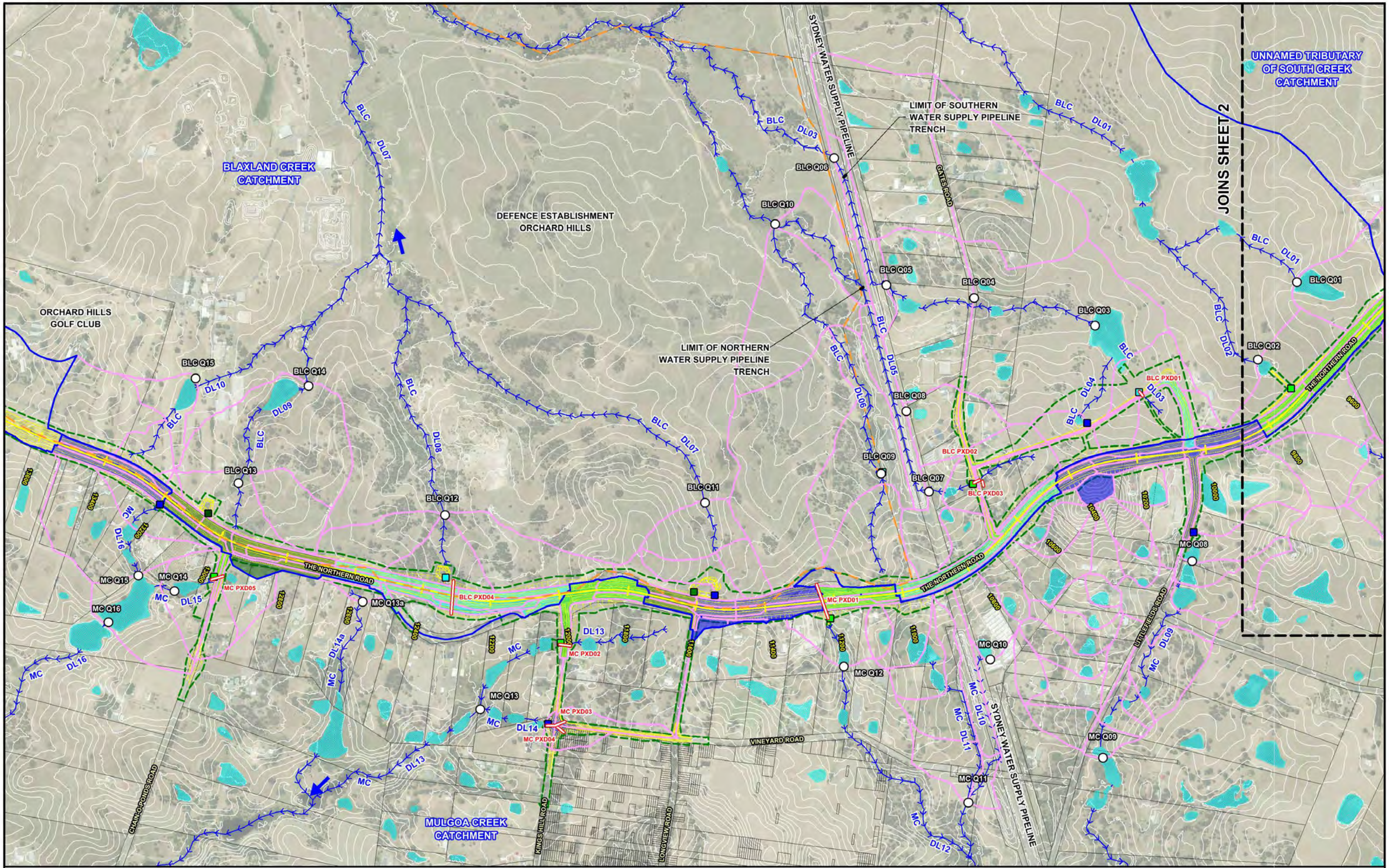
LEGEND

BC EXD03	Existing Transverse Drainage Structure and Identifier
1600 / 1400	Design Road Control String and Chainage
	Existing Dam
	Existing Drainage Lines
	Catchment Boundary
BC Q07	Peak Flow Location and Identifier (Refer Table D1 of Appendix D)
	Sub-Catchment Boundary
	Proposed Western Sydney Airport Boundary
	Project Boundary

THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A2.1
Sheet 4 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL
PRE-PROJECT CONDITIONS



MC PXD05	Proposed Transverse Drainage Structure and Identifier	
	Design Road Control String and Chainage	
	Existing Dam	
	Existing Drainage Lines	

LEGEND

- Sub-Catchment Boundary
- BLC Q12 — Peak Flow Location and Identifier (Refer Table D1 of Appendix D)
- Project Boundary
- Defence Establishment Orchard Hills Boundary
- Design Strings
- Pavement Drainage Outlet Location
- Extent of Catchment Controlled by Proposed Pavement Drainage
- Catchment Boundary

N

100 0 100 200 300 m

Scale: 1:10,000

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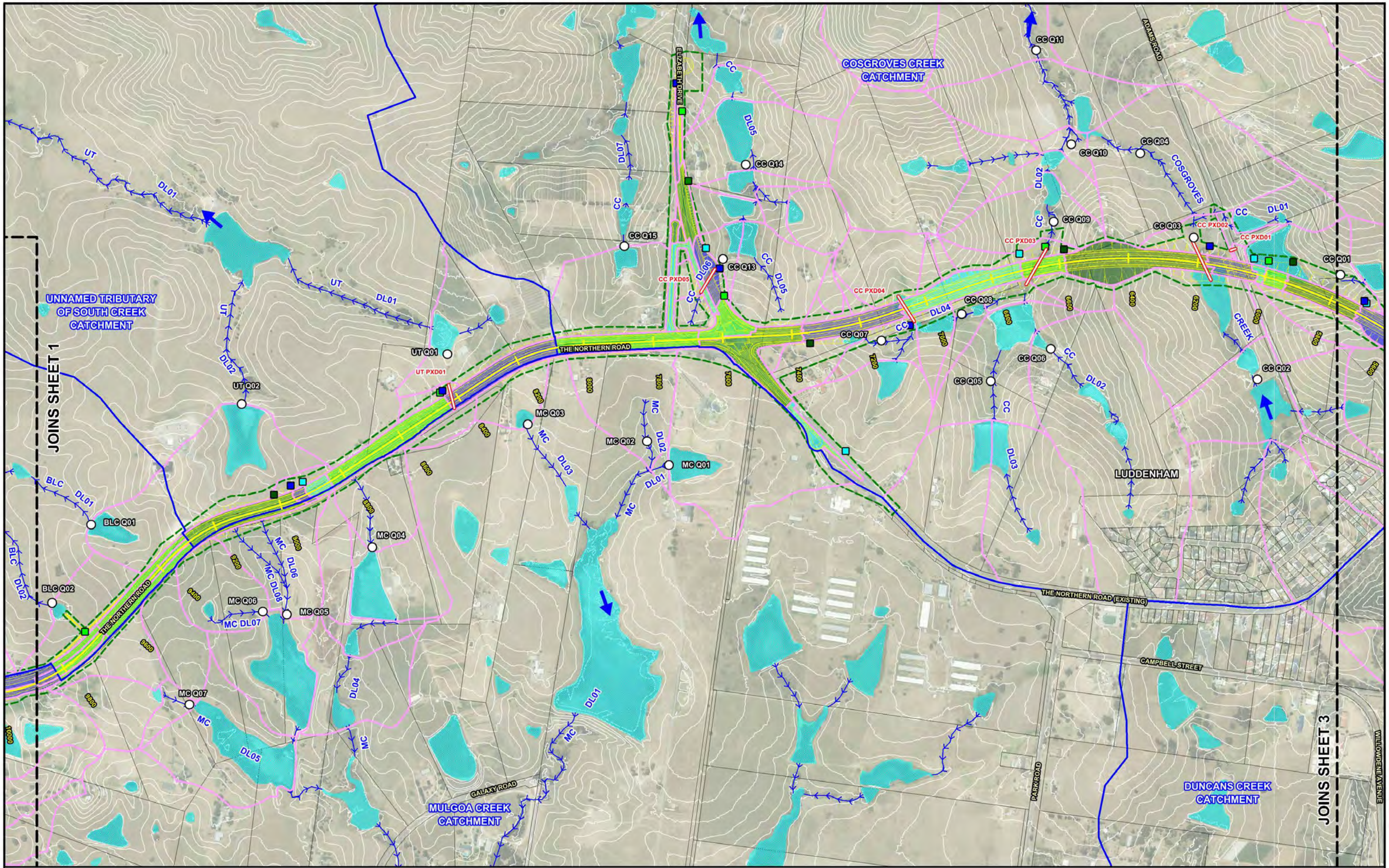
THE NORTHERN ROAD UPGRADE FLOOD RISK ASSESSMENT

Figure A2.2
Sheet 1 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL POST-PROJECT CONDITIONS



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Scale: 1:10,000

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LEGEND

MC PXD01 Proposed Transverse Drainage Structure and Identifier

Design Road Control String and Chainage

Proposed Western Sydney Airport Boundary

Existing Dam

Existing Drainage Lines

Sub-Catchment Boundary

MC Q04 Peak Flow Location and Identifier (Refer Table D1 of Appendix D)

Project Boundary

Design Strings

Pavement Drainage Outlet Location

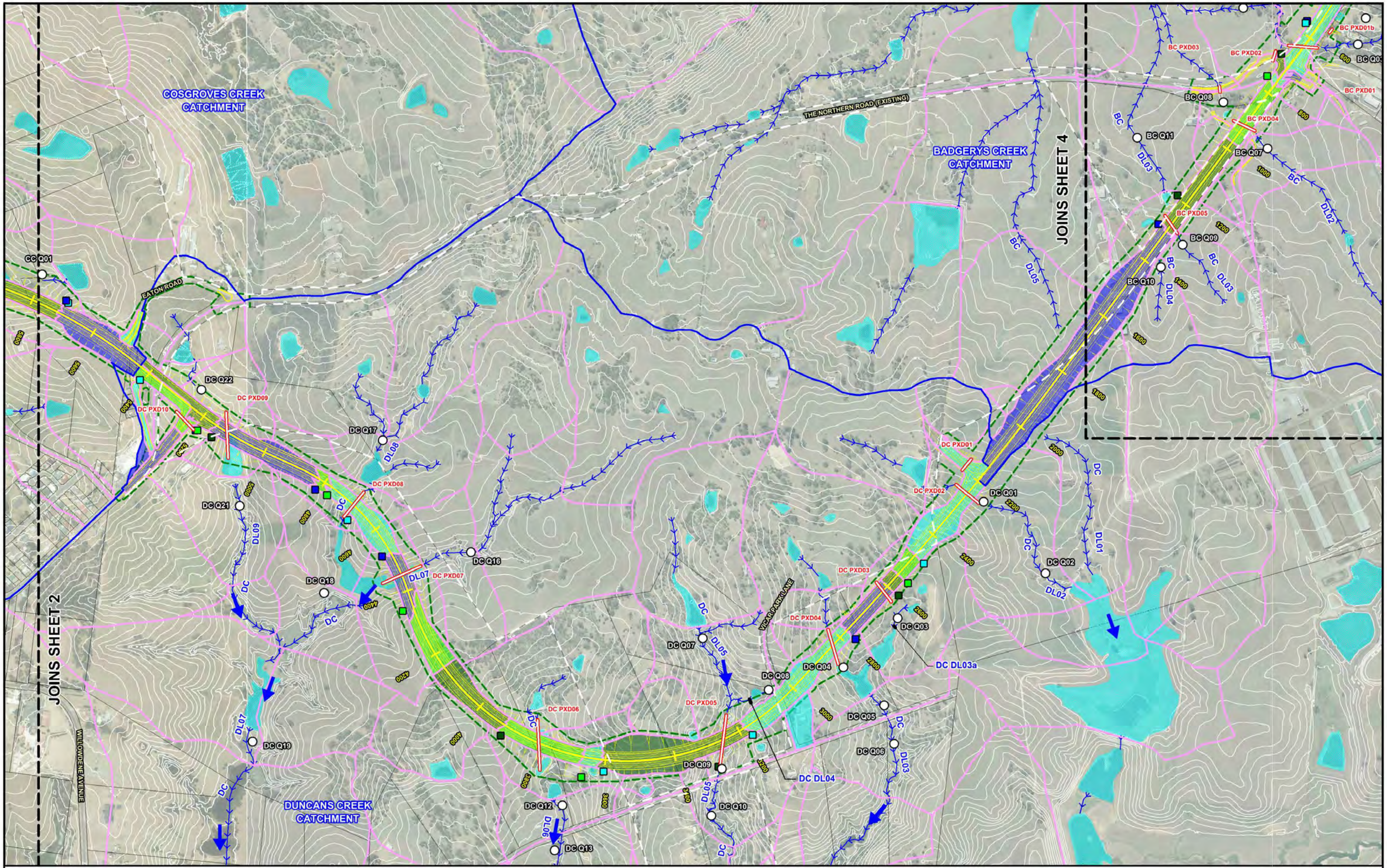
Extent of Catchment Controlled by Proposed Pavement Drainage

Catchment Boundary

THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A2.2
Sheet 2 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL
POST-PROJECT CONDITIONS



100 0 100 200 300 m

Scale: 1:10,000

LEGEND

DC PXD03	Proposed Transverse Drainage Structure and Identifier
	Design Road Control String and Chainage
	Proposed Western Sydney Airport Boundary
	Existing Dam
	Existing Drainage Lines
	Sub-Catchment Boundary
DC Q02	Peak Flow Location and Identifier (Refer Table D1 of Appendix D)
	Project Boundary
	Design Strings
	Pavement Drainage Outlet Location
	Extent of Catchment Controlled by Proposed Pavement Drainage
	Catchment Boundary

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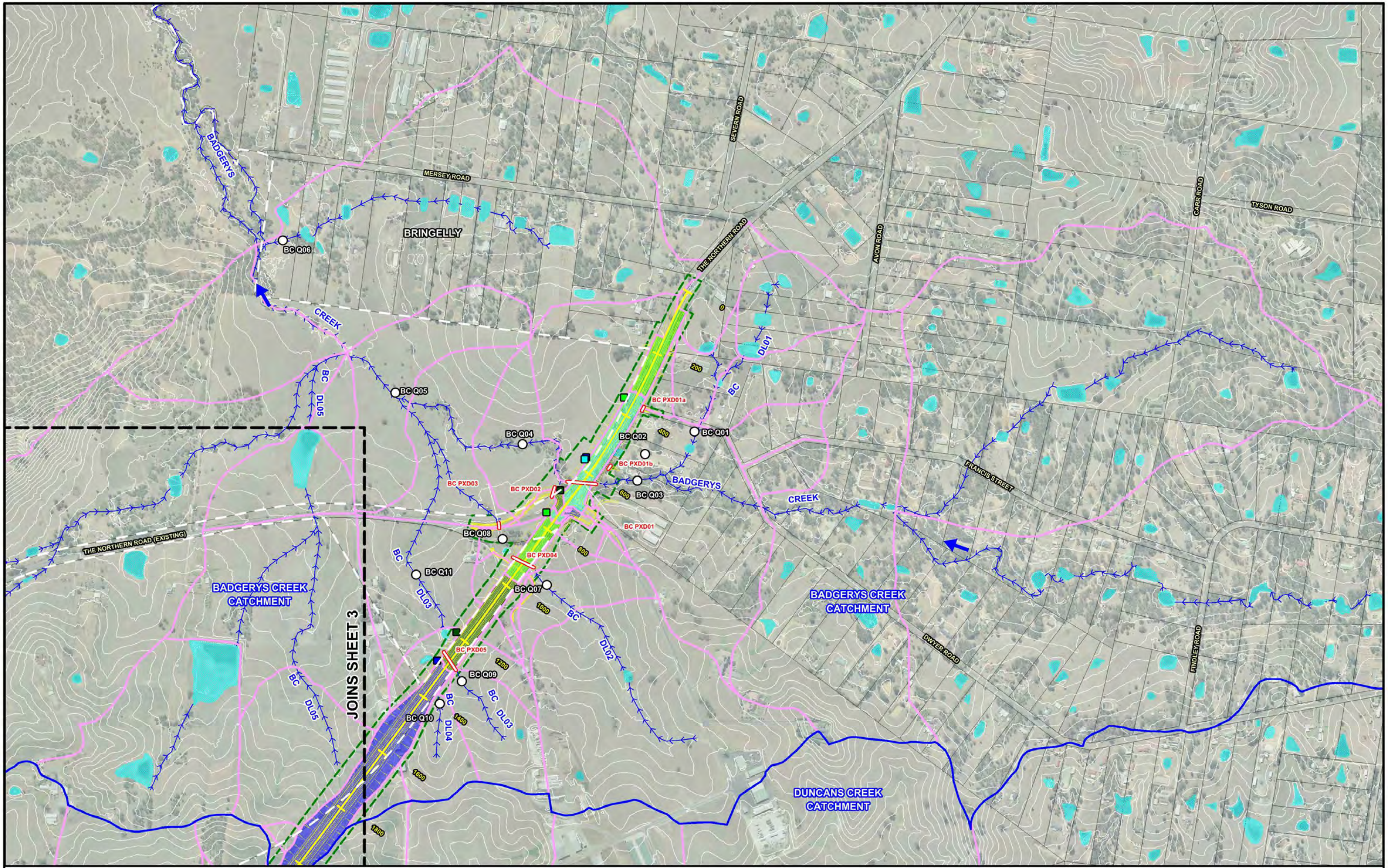
THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A2.2
Sheet 3 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL
POST-PROJECT CONDITIONS



Scale: 1:10,000

100 0 100 200 300 m

LEGEND

BC PXD03 Proposed Transverse Drainage Structure and Identifier

Design Road Control String and Chainage

Proposed Western Sydney Airport Boundary

Existing Dam

Existing Drainage Lines

Sub-Catchment Boundary

BC Q07 Peak Flow Location and Identifier (Refer Table D1 of Appendix D)

Project Boundary

Design Strings

Pavement Drainage Outlet Location

Extent of Catchment Controlled by Proposed Pavement Drainage

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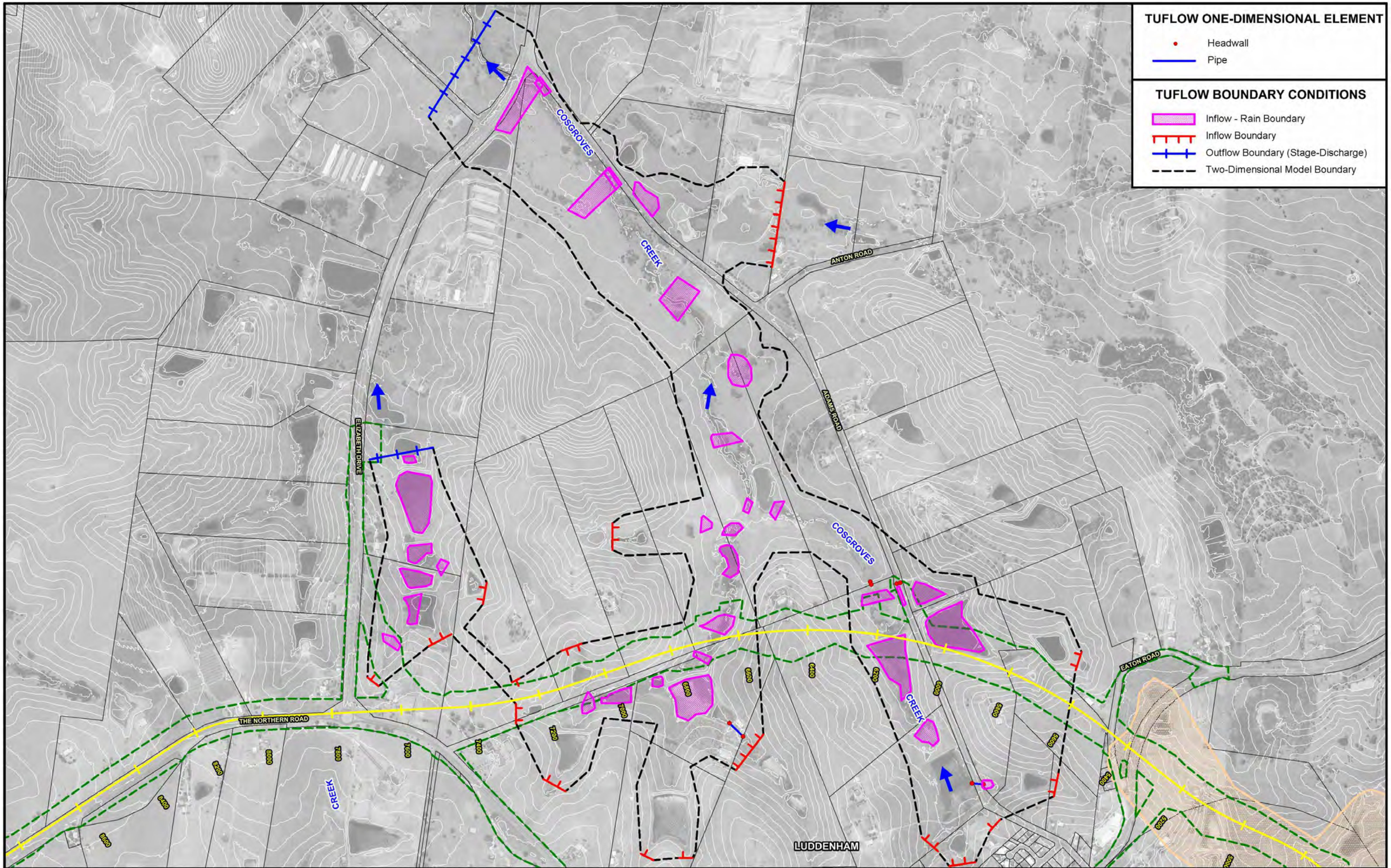
THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A2.2
Sheet 4 of 4

SUB-CATCHMENTS COMPRISING HYDROLOGIC MODEL
POST-PROJECT CONDITIONS



100 0 100 200 300 m
Scale: 1:10,000

LEGEND

Design Road Control String and Chainage

Extent of Duncans Creek TUFLOW Model
(Refer Figure B3.2 For Details)

Project Boundary

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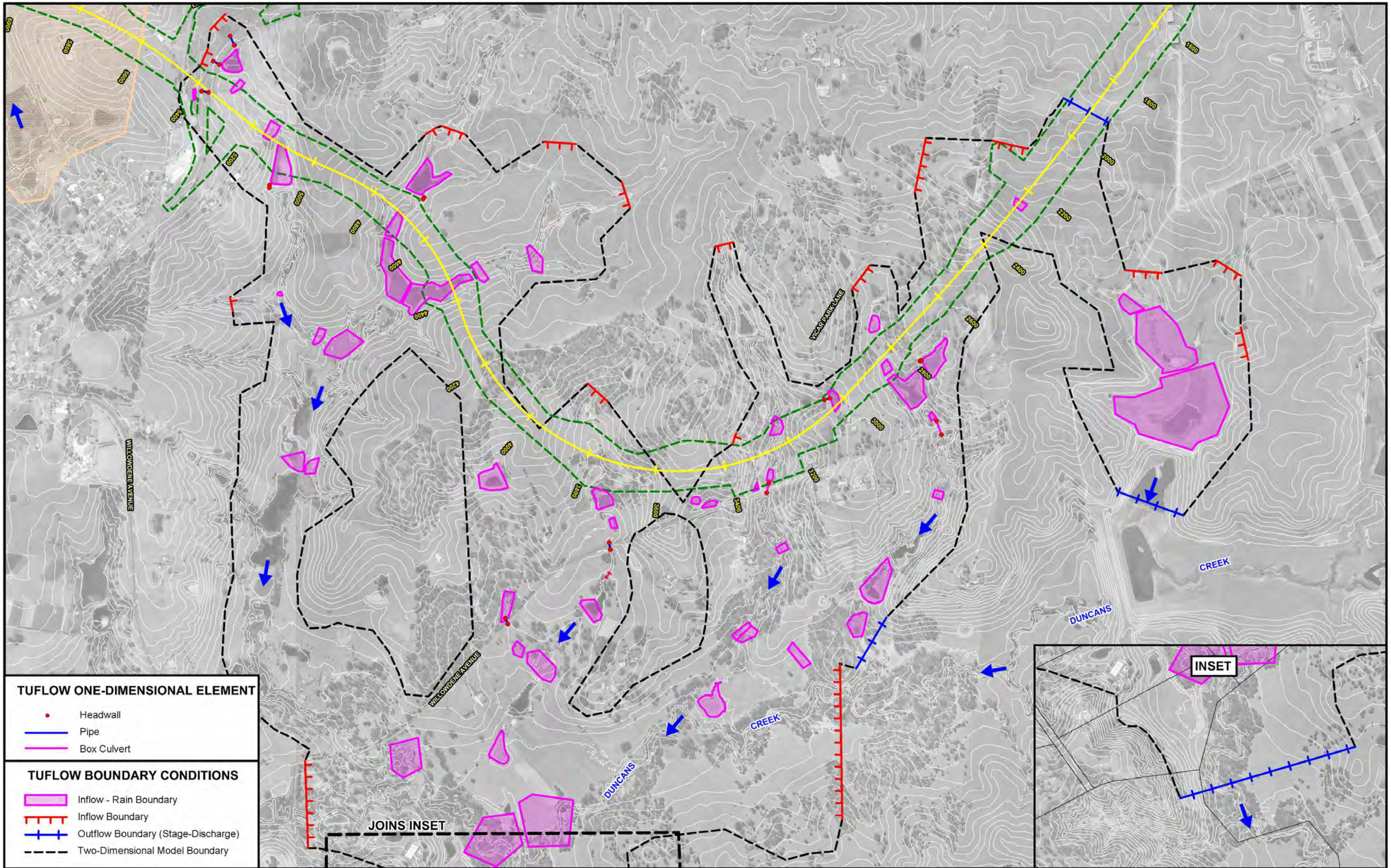
THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A3.1

TUFLOW MODEL LAYOUT - COSGROVES CREEK CATCHMENT
PRE-PROJECT CONDITIONS



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Scale: 1:10,000

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LEGEND

Design Road Control String and Chainage

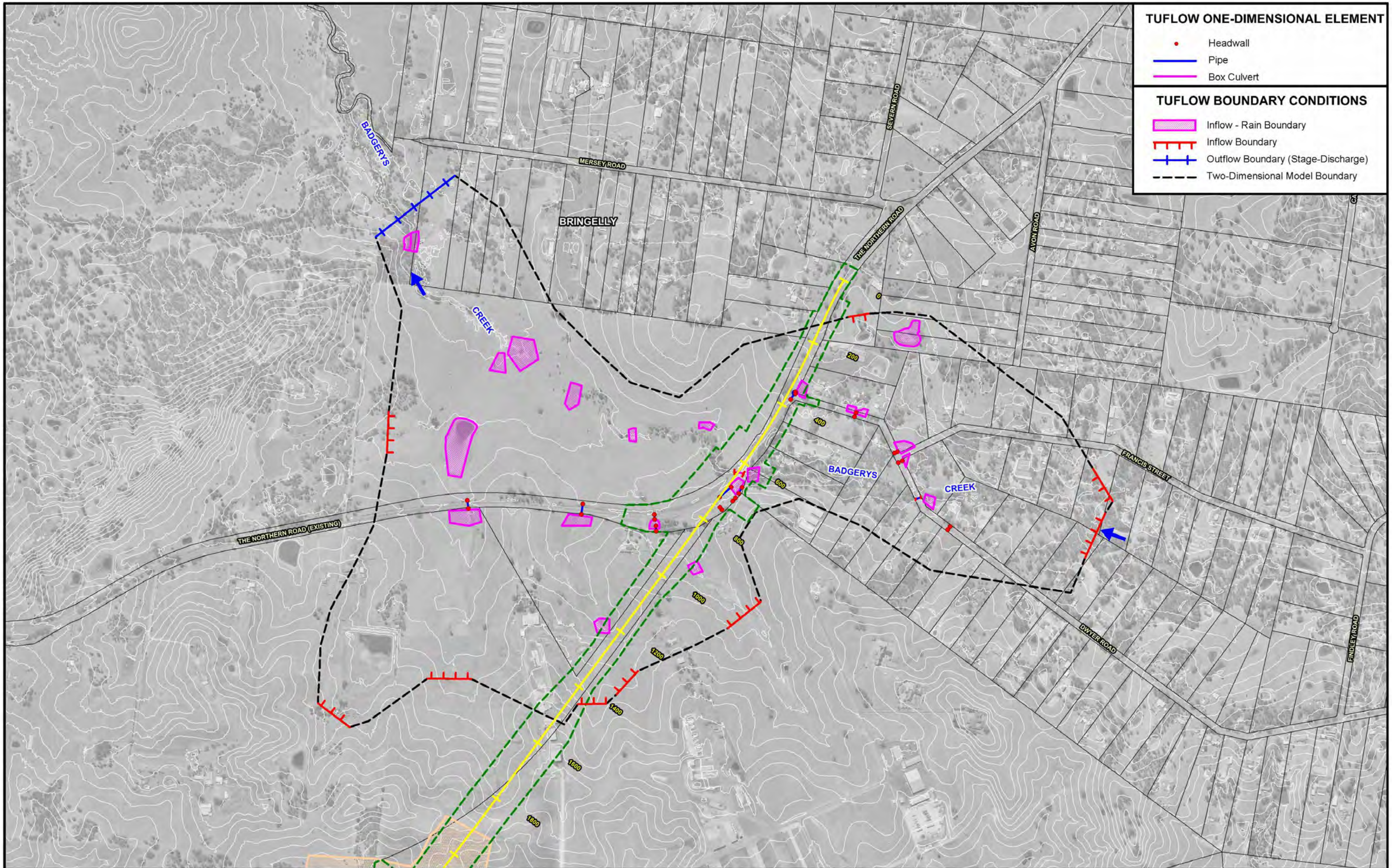
Extent of Cosgroves Creek TUFLOW Model (Refer Figure B3.1 For Details)

Project Boundary

THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A3.2

TUFLOW MODEL LAYOUT - DUNCANS CREEK CATCHMENT
PRE-PROJECT CONDITIONS



N

100 0 100 200 300 m

Scale: 1:10,000

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LEGEND

Design Road Control String and Chainage

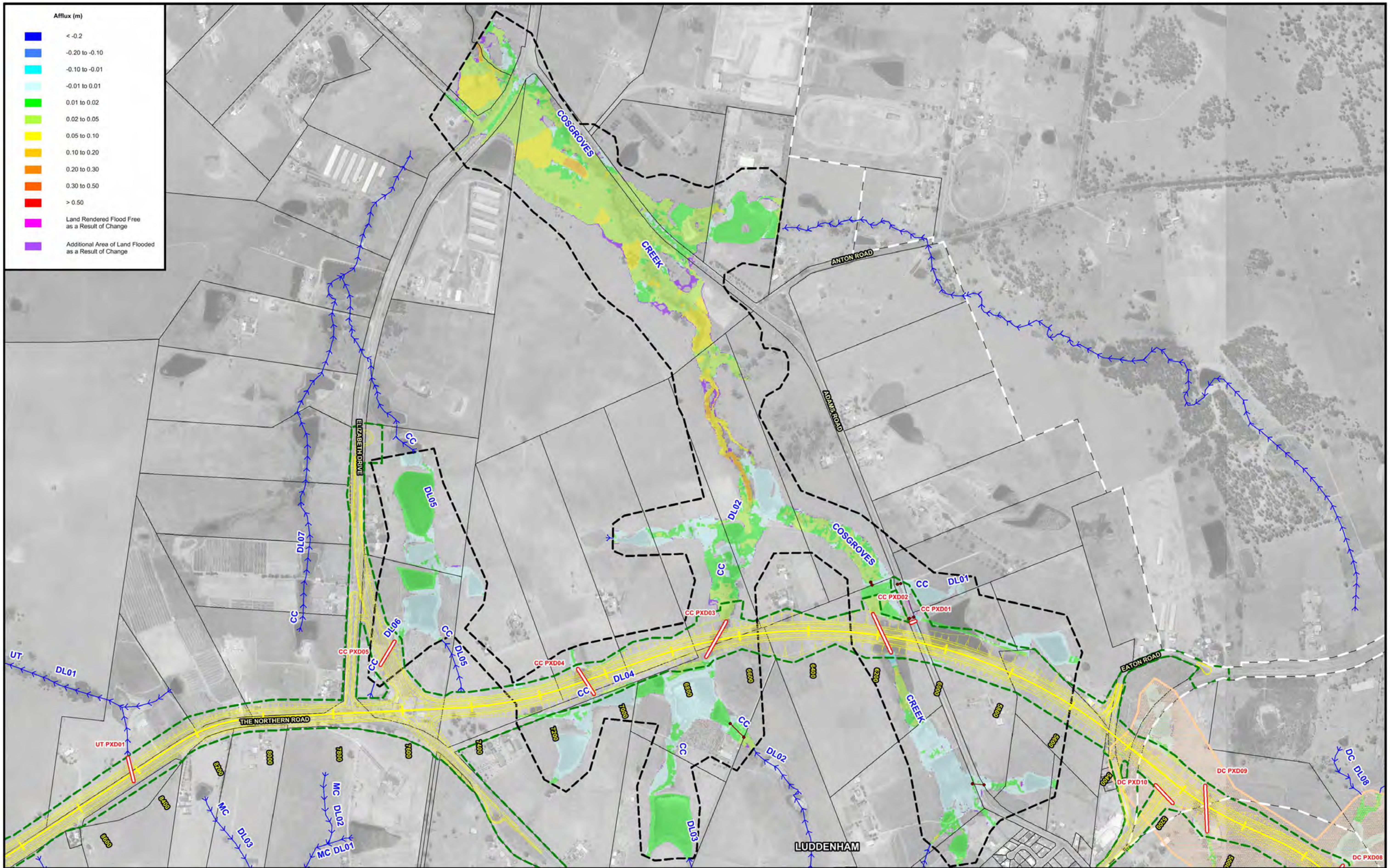
Extent of Duncans Creek TUFLOW Model (Refer Figure B3.2 For Details)

Project Boundary

THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A3.3

TUFLOW MODEL LAYOUT - BADGERYS CREEK CATCHMENT
PRE-PROJECT CONDITIONS



100 0 100 200 300 m

Scale: 1:10,000

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LEGEND

Design Road Control String and Chainage

Extent of Duncans Creek TUFLOW Model (Refer Figure B3.5 for TUFLOW Model Results)

Modelled Stormwater Drainage Network

Design Strings

CC PXD01 Proposed Transverse Drainage Structure and Identifier (Refer Table 6.1 for Peak Flow in Individual Transverse Drainage Structures)

Two-Dimensional Model Extent

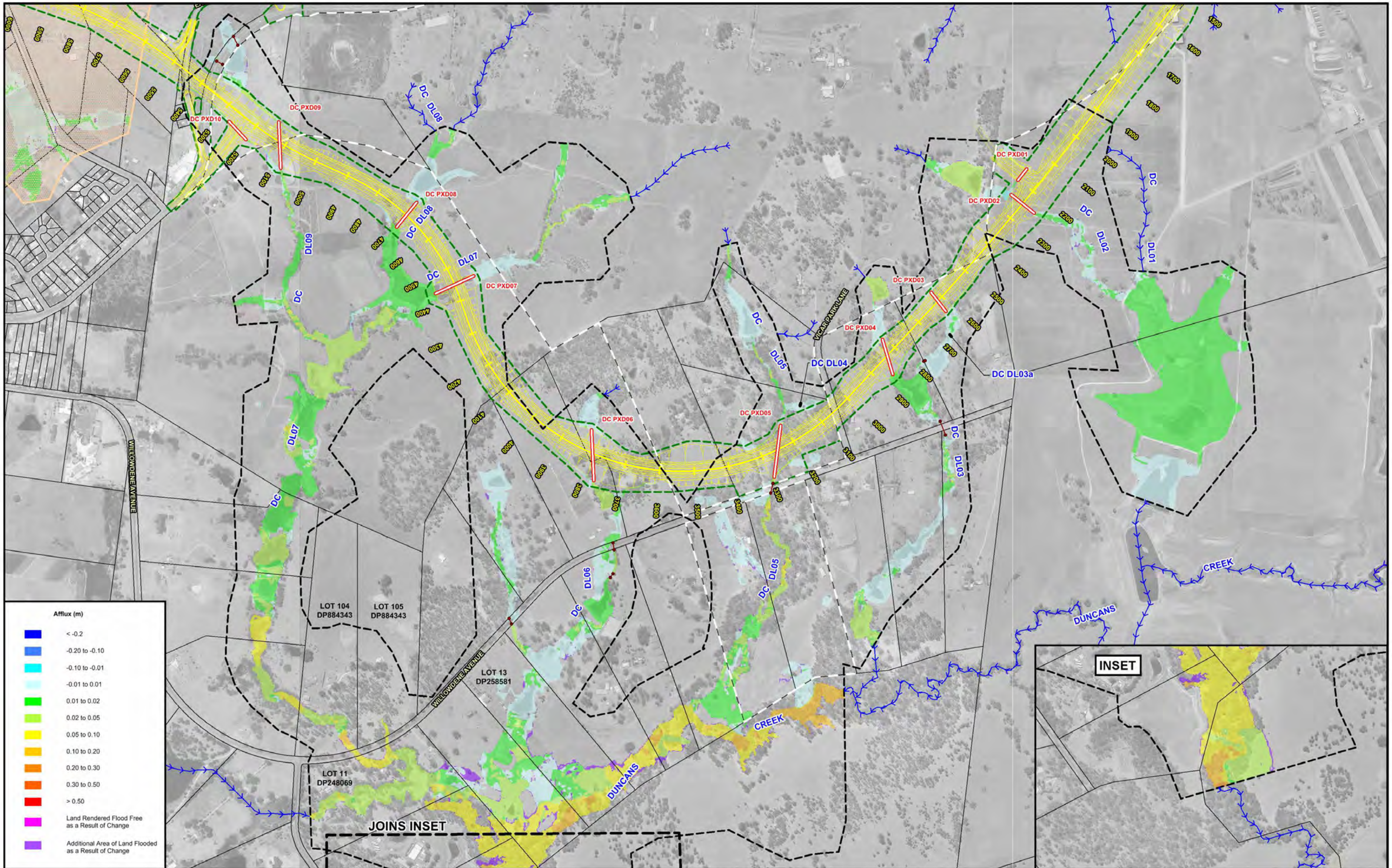
Proposed Western Sydney Airport Boundary

Project Boundary

THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A3.4

SENSITIVITY OF FLOOD BEHAVIOUR TO 20% INCREASE IN HYDRAULIC ROUGHNESS VALUES
COSGROVES CREEK CATCHMENT - 100 YEAR ARI



100 0 100 200 300 m

Scale: 1:10,000

LEGEND

- Design Road Control String and Chainage
- Extent of Cosgroves Creek TUFLOW Model (Refer Figure B3.4 for TUFLOW Model Results)
- Modelled Stormwater Drainage Network
- Design Strings
- DC PXD01 — Proposed Transverse Drainage Structure and Identifier (Refer Table 6.1 for Peak Flow in Individual Transverse Drainage Structures)
- Two-Dimensional Model Extent
- Proposed Western Sydney Airport Boundary
- Project Boundary

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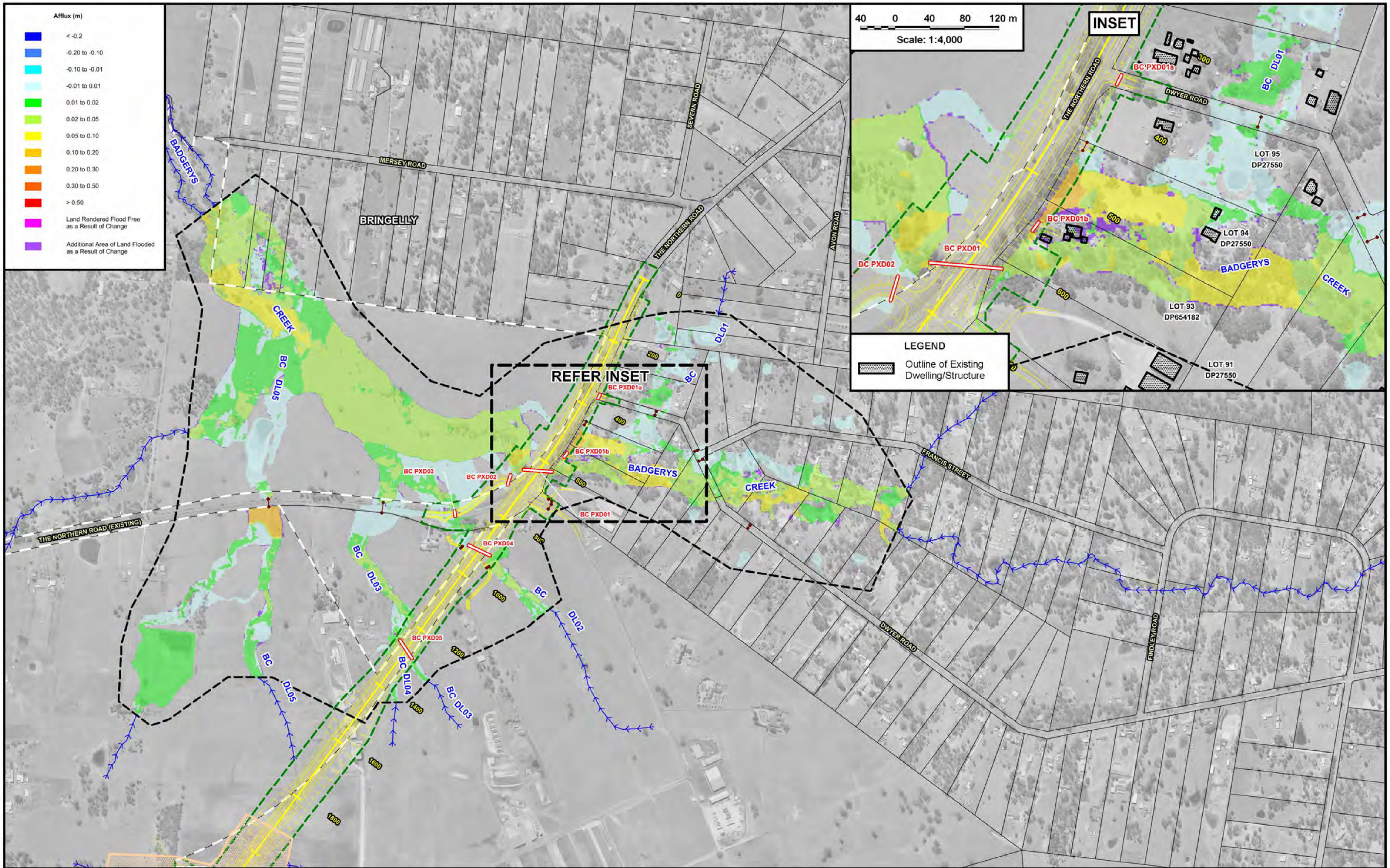
THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A3.5

SENSITIVITY OF FLOOD BEHAVIOUR TO 20% INCREASE IN HYDRAULIC ROUGHNESS VALUES
DUNCANS CREEK CATCHMENT - 100 YEAR ARI



100 0 100 200 300 m
Scale: 1:10,000

LEGEND

- Design Road Control String and Chainage
- Extent of Duncans Creek TUFLOW Model (Refer Figure B3.5 for TUFLOW Model Results)
- Modelled Stormwater Drainage Network
- Design Strings
- BC PXD01 — Proposed Transverse Drainage Structure and Identifier (Refer Table 6.1 for Peak Flow in Individual Transverse Drainage Structures)
- Two-Dimensional Model Extent
- Proposed Western Sydney Airport Boundary
- Project Boundary

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THE NORTHERN ROAD UPGRADE
FLOOD RISK ASSESSMENT

Figure A3.6

SENSITIVITY OF FLOOD BEHAVIOUR TO 20% INCREASE IN HYDRAULIC ROUGHNESS VALUES
BADGERYS CREEK CATCHMENT - 100 YEAR ARI

APPENDIX B
SKETCH SHOWING TYPICAL DETAILS
OF PROPOSED SECURITY MEASURE

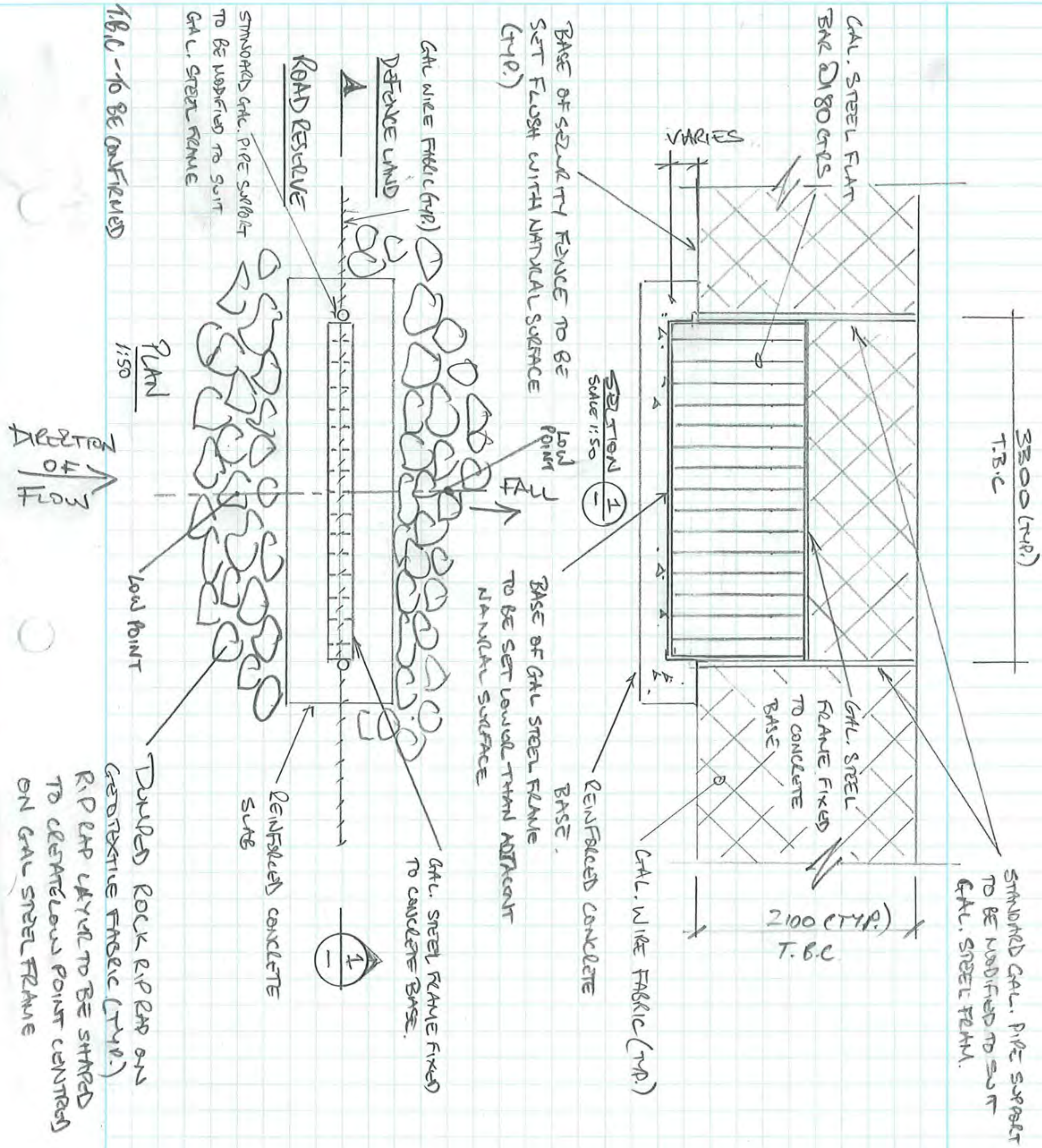
LYALL & ASSOCIATES CONSULTING WATER ENGINEERS

PROJECT: THE NORTHERN ROAD UPGRADE | PAGE No. 1

JOB No. AM399

TITLE: PROPOSED SECURITY MEASURE AT LOCATION OF CONCENTRATED FLOW PATHS. | PREPARED: SAB | DATE: 2/10/16

CHECKED: | DATE:



APPENDIX C
SUMMARY OF PEAK FLOWS
PRE- AND POST-PROJECT CONDITIONS

TABLE C1
COMPARISON OF PEAK FLOWS
(m^3/s)

Catchment	Drainage Line	Length of Carriageway Draining to Receiving Drainage Line		Peak Flow Location	Land Ownership	2 year ARI			10 year ARI			100 year ARI		
		Approximate Start Chainage	Approximate End Chainage			Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference
Blaxland Creek	BLC DL01	-	-	BLC Q01	P	0.32	0.30	-0.02 [-6%]	0.80	0.74	-0.06 [-8%]	1.51	1.39	-0.12 [-8%]
	BLC DL02	DRC 9280 (The Northern Road)	DRC 9840 (The Northern Road)	MCPB	P	Minor	0.41	0.41 [>100%]	Minor	0.71	0.71 [>100%]	Minor	1.12	1.12 [>100%]
	BLC DL02	DRC 9280 (The Northern Road)	DRC 9840 (The Northern Road)	BLC Q02	P	0.43	0.55	0.12 [28%]	0.84	1.19	0.35 [42%]	1.61	2.16	0.55 [34%]
	BLC DL03	DRC 10040 (Littlefields Road)	DRC 10440 (Littlefields Road)	LRPB	P	0.29	0.54	0.25 [86%]	0.67	1.19	0.52 [78%]	1.18	2.08	0.9 [76%]
	BLC DL03	DRC 10040 (Littlefields Road)	DRC 10440 (Littlefields Road)	BLC Q03	P	0.84	0.84	0 [0%]	1.96	1.88	-0.08 [-4%]	3.50	3.19	-0.31 [-9%]
	BLC DL03	DRC 10040 (Littlefields Road)	DRC 10440 (Littlefields Road)	BLC Q04	P	1.88	1.64	-0.24 [-13%]	3.87	3.80	-0.07 [-2%]	7.40	7.07	-0.33 [-4%]
	BLC DL03	DRC 10040 (Littlefields Road)	DRC 10440 (Littlefields Road)	BLC Q05	P/WNSW	2.40	1.99	-0.41 [-17%]	4.68	4.59	-0.09 [-2%]	9.31	8.91	-0.4 [-4%]
	BLC DL03	DRC 10040 (Littlefields Road)	DRC 10440 (Littlefields Road)	BLC Q06	WNSW/COM	3.93	3.10	-0.83 [-21%]	7.22	7.11	-0.11 [-2%]	14.00	13.60	-0.4 [-3%]
	BLC DL04	-	-	LRPB	P	0.26	0.10	-0.16 [-62%]	0.55	0.23	-0.32 [-58%]	0.83	0.39	-0.44 [-53%]
	BLC DL05	DRC 10440 (Littlefields Road)	DRC 10680 (Gates Road)	LRPB	P	0.39	0.41	0.02 [5%]	0.78	0.97	0.19 [24%]	1.48	1.71	0.23 [16%]
	BLC DL05	DRC 10440 (Littlefields Road)	DRC 10680 (Gates Road)	BLC Q07	P/WNSW	0.93	0.89	-0.04 [-4%]	2.10	1.99	-0.11 [-5%]	3.70	3.38	-0.32 [-9%]
	BLC DL05	-	-	BLC Q08	P/WNSW	0.33	0.36	0.03 [9%]	0.54	0.56	0.02 [4%]	0.63	0.65	0.02 [3%]
	BLC DL06	DRC 10440 (The Northern Road)	DRC 11020 (The Northern Road)	MCPB	COM	Minor	Minor	0.00 [%]	Minor	Minor	0.00 [%]	Minor	Minor	0.00 [%]
	BLC DL06	DRC 10440 (The Northern Road)	DRC 11020 (The Northern Road)	BLC Q09	COM	0.45	0.67	0.22 [49%]	0.94	1.42	0.48 [51%]	1.74	2.40	0.66 [38%]
	BLC DL06	DRC 10440 (The Northern Road)	DRC 11020 (The Northern Road)	BLC Q10	COM	3.49	3.42	-0.07 [-2%]	6.95	7.29	0.34 [5%]	12.40	12.70	0.3 [2%]
	BLC DL07	DRC 11240 (The Northern Road)	DRC 11740 (The Northern Road)	MCPB	COM	Minor	0.60	0.6 [>100%]	Minor	1.13	1.13 [>100%]	Minor	1.87	1.87 [>100%]
	BLC DL07	DRC 11240 (The Northern Road)	DRC 11740 (The Northern Road)	BLC Q11	COM	0.76	1.02	0.26 [34%]	1.72	2.14	0.42 [24%]	3.10	3.67	0.57 [18%]
	BLC DL08	DRC 11080 (The Northern Road)	DRC 12660 (The Northern Road)	MCPB	COM	0.21	0.62	0.41 [195%]	0.48	1.19	0.73 [159%]	0.79	2.02	1.19 [143%]
	BLC DL08	DRC 11080 (The Northern Road)	DRC 12660 (The Northern Road)	BLC Q12	COM	1.35	1.33	-0.02 [-1%]	2.74	3.00	0.26 [9%]	5.09	5.34	0.25 [5%]

Refer over for footnotes to **Table C1**.

TABLE C1 (Cont'd)
COMPARISON OF PEAK FLOWS
(m^3/s)

Catchment	Drainage Line	Length of Carriageway Draining to Receiving Drainage Line		Peak Flow Location	Land Ownership	2 year ARI			10 year ARI			100 year ARI		
		Approximate Start Chainage	Approximate End Chainage			Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference
Blaxland Creek	BLC DL09	DRC 12660 (The Northern Road)	DRC 13200 (The Northern Road)	MCPB	COM	0.09	0.46	0.37 [411%]	0.19	0.85	0.66 [347%]	0.32	1.38	1.06 [331%]
	BLC DL09	DRC 12660 (The Northern Road)	DRC 13200 (The Northern Road)	BLC Q13	COM	0.48	0.67	0.19 [40%]	1.01	1.38	0.37 [37%]	1.85	2.33	0.48 [26%]
	BLC DL09	DRC 12660 (The Northern Road)	DRC 13200 (The Northern Road)	BLC Q14	COM	1.24	1.20	-0.04 [-3%]	2.48	2.83	0.35 [14%]	4.79	5.27	0.48 [10%]
	BLC DL10	-	-	MCPB	COM	Minor	Minor	0.00 [%]	Minor	Minor	0.00 [%]	Minor	Minor	0.00 [%]
	BLC DL10	-	-	BLC Q15	COM	0.63	0.50	-0.13 [-21%]	1.23	1.20	-0.03 [-2%]	2.37	2.31	-0.06 [-3%]
Mulgoa Creek	MC DL01	-	-	MC Q01	P	0.64	0.62	-0.02 [-3%]	1.39	1.36	-0.03 [-2%]	2.59	2.52	-0.07 [-3%]
	MC DL02	-	-	MC Q02	P	0.39	0.37	-0.02 [-5%]	0.80	0.76	-0.04 [-5%]	1.60	1.52	-0.08 [-5%]
	MC DL03	-	-	MC Q03	P	0.37	0.22	-0.15 [-41%]	0.79	0.51	-0.28 [-35%]	1.29	0.93	-0.36 [-28%]
	MC DL04	-	-	MC Q04	P	0.31	0.29	-0.02 [-6%]	0.76	0.70	-0.06 [-8%]	1.42	1.32	-0.1 [-7%]
	MC DL06	-	-	MC Q05	P	0.36	0.33	-0.03 [-8%]	0.75	0.69	-0.06 [-8%]	1.49	1.38	-0.11 [-7%]
	MC DL07	-	-	MC Q06	P	0.28	0.27	-0.01 [-4%]	0.63	0.60	-0.03 [-5%]	1.24	1.19	-0.05 [-4%]
	MC DL05	-	-	MC Q07	P	0.70	0.66	-0.04 [-6%]	1.57	1.51	-0.06 [-4%]	3.09	2.96	-0.13 [-4%]
	MC DL09	DRC 9840 (The Northern Road)	DRC 10440 (The Northern Road)	MC Q08	P	1.13	1.61	0.48 [42%]	2.54	3.34	0.8 [31%]	4.68	5.77	1.09 [23%]
	MC DL09	DRC 9840 (The Northern Road)	DRC 10440 (The Northern Road)	MC Q09	P	3.69	4.04	0.35 [9%]	8.16	8.69	0.53 [6%]	14.20	14.70	0.5 [4%]
	MC DL10	-	-	MC Q10	P/WNSW	0.37	0.30	-0.07 [-19%]	0.80	0.74	-0.06 [-8%]	1.46	1.35	-0.11 [-8%]
	MC DL11	-	-	MC Q11	P/WNSW	1.36	1.12	-0.24 [-18%]	2.86	2.69	-0.17 [-6%]	5.23	4.96	-0.27 [-5%]
	MC DL 12	DRC 11020 (The Northern Road)	DRC 11240 (The Northern Road)	MCPB	P	0.22	0.23	0.01 [5%]	0.47	0.45	-0.02 [-4%]	0.74	0.75	0.01 [1%]
	MC DL 12	DRC 11020 (The Northern Road)	DRC 11240 (The Northern Road)	MC Q12	P	0.59	0.57	-0.02 [-3%]	1.23	1.10	-0.13 [-11%]	1.92	1.76	-0.16 [-8%]
	MC DL13	DRC 11740 (The Northern Road)	DRC 11980 (The Northern Road and Kings Hill Road (West))	LRPB	P	0.78	0.59	-0.19 [-24%]	1.58	1.23	-0.35 [-22%]	3.06	2.49	-0.57 [-19%]
	MC DL13	DRC 11740 (The Northern Road)	DRC 12040 (The Northern Road and Kings Hill Road (West))	MC Q13	P	0.94	0.79	-0.15 [-16%]	1.86	1.73	-0.13 [-7%]	3.63	3.25	-0.38 [-10%]

Refer over for footnotes to **Table C1**.

TABLE C1 (Cont'd)
COMPARISON OF PEAK FLOWS
(m^3/s)

Catchment	Drainage Line	Length of Carriageway Draining to Receiving Drainage Line		Peak Flow Location	Land Ownership	2 year ARI			10 year ARI			100 year ARI		
		Approximate Start Chainage	Approximate End Chainage			Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference
Mulgoa Creek	MC DL14a	-	-	MCPB	P	0.02	0.01	-0.01 [-50%]	0.05	0.02	-0.03 [-60%]	0.08	0.04	-0.04 [-50%]
	MC DL14a	-	-	MC Q13a	P	0.06	0.05	-0.01 [-17%]	0.15	0.11	-0.04 [-27%]	0.25	0.21	-0.04 [-16%]
	MC DL14	DRC 11960 (The Northern Road and Kings Hill Road (West))	DRC 12040 (The Northern Road and Kings Hill Road (West))	LRPB	P	0.15	0.31	0.16 [107%]	0.35	0.62	0.27 [77%]	0.63	0.95	0.32 [51%]
	MC DL15	DRC 12980 (Chain of Ponds Road)	DRC 12980 (Chain of Ponds Road)	LRPB	P	0.20	0.19	-0.01 [-5%]	0.40	0.43	0.03 [7%]	0.74	0.85	0.11 [15%]
	MC DL15	DRC 12980 (Chain of Ponds Road)	DRC 12980 (Chain of Ponds Road)	MC Q14	P	0.42	0.37	-0.05 [-12%]	0.83	0.90	0.07 [8%]	1.60	1.73	0.13 [8%]
	MC DL16	DRC 13200 (The Northern Road)	DRC 13540 (The Northern Road)	MCPB	P	0.29	0.25	-0.04 [-14%]	0.57	0.44	-0.13 [-23%]	0.88	0.69	-0.19 [-22%]
	MC DL16	DRC 13200 (The Northern Road)	DRC 13540 (The Northern Road)	MC Q15	P	0.79	0.64	-0.15 [-19%]	1.81	1.48	-0.33 [-18%]	3.25	2.81	-0.44 [-14%]
	MC DL16	DRC 12980 (Chain of Ponds Road)	DRC 13540 (The Northern Road)	MC Q16	P	1.51	1.28	-0.23 [-15%]	3.24	3.01	-0.23 [-7%]	6.06	5.72	-0.34 [-6%]
Unnamed Tributary of South Creek	UT DL01	DRC 8060 (The Northern Road)	DRC 8840 (The Northern Road)	MCPB	P	0.36	0.61	0.25 [69%]	0.77	1.06	0.29 [38%]	1.26	1.84	0.58 [46%]
	UT DL01	DRC 8060 (The Northern Road)	DRC 8840 (The Northern Road)	UT Q01	P	0.80	1.05	0.25 [31%]	1.93	2.18	0.25 [13%]	3.65	3.99	0.34 [9%]
	UT DL02	DRC 8840 (The Northern Road)	DRC 9280 (The Northern Road)	MCPB	P	0.14	0.39	0.25 [179%]	0.34	0.70	0.36 [106%]	0.56	1.17	0.61 [109%]
	UT DL02	DRC 8840 (The Northern Road)	DRC 9280 (The Northern Road)	UT Q02	P	0.57	0.70	0.13 [23%]	1.31	1.55	0.24 [18%]	2.60	2.92	0.32 [12%]
Cosgroves Creek	CC DL01	DRC 5440 (The Northern Road)	DRC 5740 (The Northern Road)	CC Q01	P	0.40	0.50	0.1 [25%]	0.60	0.80	0.2 [33%]	1.20	1.50	0.3 [25%]
	Cosgroves Creek	-	-	CC Q02	P	2.20	2.20	0 [0%]	3.90	3.90	0 [0%]	8.60	8.60	0 [0%]
	Cosgroves Creek	DRC 5440 (The Northern Road)	DRC 6200 (The Northern Road)	CC Q03	P	3.00	4.20	1.2 [40%]	5.30	7.30	2 [38%]	11.40	16.00	4.6 [40%]
	Cosgroves Creek	DRC 5440 (The Northern Road)	DRC 6200 (The Northern Road)	CC Q04	P	3.70	4.60	0.9 [24%]	6.70	7.80	1.1 [16%]	12.90	16.90	4 [31%]
	CC DL03	-	-	CC Q05	P	0.70	0.70	0 [0%]	1.40	1.40	0 [0%]	2.30	2.30	0 [0%]
	CC DL02	-	-	CC Q06	P	1.50	1.50	0 [0%]	2.30	2.30	0 [0%]	5.50	5.50	0 [0%]
	CC DL04	DRC 7400 (The Northern Road)	DRC 7520 (The Northern Road)	CC Q07	P	0.30	0.40	0.1 [33%]	0.80	0.80	0 [0%]	1.50	1.50	0 [0%]
	CC DL04	DRC 7100 (The Northern Road)	DRC 7520 (The Northern Road)	CC Q08	P	1.10	1.30	0.2 [18%]	2.10	2.30	0.2 [10%]	3.50	3.80	0.3 [9%]
	CC DL02	DRC 6200 (The Northern Road)	DRC 7520 (The Northern Road)	CC Q09	P	3.20	3.50	0.3 [9%]	6.60	7.10	0.5 [8%]	10.90	11.70	0.8 [7%]

Refer over for footnotes to **Table C1**.

TABLE C1 (Cont'd)
COMPARISON OF PEAK FLOWS
(m^3/s)

Catchment	Drainage Line	Length of Carriageway Draining to Receiving Drainage Line		Peak Flow Location	Land Ownership	2 year ARI			10 year ARI			100 year ARI		
		Approximate Start Chainage	Approximate End Chainage			Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference
Cosgroves Creek	CC DL02	DRC 5440 (The Northern Road)	DRC 7520 (The Northern Road)	CC Q10	P	4.00	4.50	0.5 [13%]	8.40	8.90	0.5 [6%]	13.90	14.70	0.8 [6%]
	Cosgroves Creek	DRC 5440 (The Northern Road)	DRC 7520 (The Northern Road)	CC Q11	P	8.80	10.10	1.3 [15%]	16.50	17.80	1.3 [8%]	27.20	31.90	4.7 [17%]
	Cosgroves Creek	DRC 5440 (The Northern Road)	DRC 7520 (The Northern Road)	CC Q12	P	19.10	20.40	1.3 [7%]	34.20	35.80	1.6 [5%]	55.10	57.50	2.4 [4%]
	CC DL06	DRC 7520 (The Northern Road)	DRC 8100 (The Northern Road)	CC Q13	P	0.40	0.80	0.4 [100%]	0.90	1.40	0.5 [56%]	1.50	2.50	1 [67%]
	CC DL05	DRC 7520 (The Northern Road)	DRC 8100 (The Northern Road)	CC Q14	P	0.80	0.90	0.1 [13%]	1.60	1.70	0.1 [6%]	2.60	2.80	0.2 [8%]
	CC DL07	-	-	CC Q15	P	0.60	0.43	-0.17 [-28%]	1.45	1.02	-0.43 [-30%]	2.72	1.97	-0.75 [-28%]
Duncans Creek	DC DL02	-	-	DC Q01	P	0.70	0.60	-0.1 [-14%]	1.20	1.10	-0.1 [-8%]	1.90	1.70	-0.2 [-11%]
	DC DL02	-	-	DC Q02	P	0.70	0.60	-0.1 [-14%]	1.20	1.00	-0.2 [-17%]	1.90	1.70	-0.2 [-11%]
	DC DL03a	DRC 2180 (The Northern Road)	DRC 2640 (The Northern Road)	DC Q03	P	Minor	0.50	0.5 [>100%]	Minor	0.90	0.9 [>100%]	Minor	1.30	1.3 [>100%]
	DC DL03	DRC 2640 (The Northern Road)	DRC 2800 (The Northern Road)	DC Q04	P	1.00	0.90	-0.1 [-10%]	1.60	1.50	-0.1 [-6%]	2.90	2.40	-0.5 [-17%]
	DC DL03	DRC 2180 (The Northern Road)	DRC 2800 (The Northern Road)	DC Q05	P	1.70	1.70	0 [0%]	2.90	2.90	0 [0%]	5.20	5.00	-0.2 [-4%]
	DC DL03	DRC 2180 (The Northern Road)	DRC 2800 (The Northern Road)	DC Q06	P	1.70	1.80	0.1 [6%]	3.00	3.00	0 [0%]	5.30	5.10	-0.2 [-4%]
	DC DL05	-	-	DC Q07	P	0.80	0.80	0 [0%]	1.40	1.40	0 [0%]	2.70	2.70	0 [0%]
	DC DL04	-	-	DC Q08	P	0.30	0.10	-0.2 [-67%]	0.50	0.20	-0.3 [-60%]	0.90	0.30	-0.6 [-67%]
	DC DL05	DRC 2800 (The Northern Road)	DRC 3620 (The Northern Road)	DC Q09	P	1.70	1.80	0.1 [6%]	2.90	3.40	0.5 [17%]	5.20	5.80	0.6 [12%]
	DC DL05	DRC 2800 (The Northern Road)	DRC 3620 (The Northern Road)	DC Q10	P	1.80	1.90	0.1 [6%]	3.20	3.80	0.6 [19%]	6.00	6.40	0.4 [7%]
	DC DL05	DRC 2800 (The Northern Road)	DRC 3620 (The Northern Road)	DC Q11	P	2.60	2.70	0.1 [4%]	4.60	5.30	0.7 [15%]	9.20	10.10	0.9 [10%]
	DC DL06	DRC 3620 (The Northern Road)	DRC 4180 (The Northern Road)	DC Q12	P	1.00	1.10	0.1 [10%]	1.80	1.90	0.1 [6%]	3.10	3.60	0.5 [16%]
	DC DL06	DRC 3620 (The Northern Road)	DRC 4180 (The Northern Road)	DC Q13	P	1.20	1.40	0.2 [17%]	2.10	2.30	0.2 [10%]	3.60	4.20	0.6 [17%]
	DC DL06	-	-	DC Q14	P	1.10	1.10	0 [0%]	2.30	2.20	-0.1 [-4%]	4.20	4.10	-0.1 [-2%]
	DC DL06	DRC 3620 (The Northern Road)	DRC 4180 (The Northern Road)	DC Q15	P	2.80	3.10	0.3 [11%]	4.90	5.10	0.2 [4%]	9.00	10.10	1.1 [12%]

Refer over for footnotes to **Table C1**.

TABLE C1 (Cont'd)
COMPARISON OF PEAK FLOWS
(m^3/s)

Catchment	Drainage Line	Length of Carriageway Draining to Receiving Drainage Line		Peak Flow Location	Land Ownership	2 year ARI			10 year ARI			100 year ARI		
		Approximate Start Chainage	Approximate End Chainage			Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference	Pre-Project Conditions	Post-Project Conditions	Difference
Duncans Creek	DC DL07	-	-	DC Q16	P	1.90	1.90	0 [0%]	3.00	3.00	0 [0%]	5.40	5.40	0 [0%]
	DC DL08	-	-	DC Q17	P	1.80	1.80	0 [0%]	3.50	3.50	0 [0%]	6.70	6.70	0 [0%]
	DC DL07	DRC 4180 (The Northern Road)	DRC 5160 (The Northern Road)	DC Q18	P	5.70	6.20	0.5 [9%]	10.00	10.00	0 [0%]	18.20	18.70	0.5 [3%]
	DC DL07	DRC 4180 (The Northern Road)	DRC 5440 (The Northern Road)	DC Q19	P	7.40	8.30	0.9 [12%]	14.10	14.00	-0.1 [-1%]	23.70	24.60	0.9 [4%]
	DC DL07	DRC 4180 (The Northern Road)	DRC 5440 (The Northern Road)	DC Q20	P	7.80	8.90	1.1 [14%]	15.80	15.80	0 [0%]	25.50	25.90	0.4 [2%]
	DC DL09	DRC 5160 (The Northern Road)	DRC 5440 (The Northern Road)	DC Q21	P	1.00	1.30	0.3 [30%]	1.90	2.50	0.6 [32%]	4.20	4.20	0 [0%]
	DC DL09	-	-	DC Q22	P	0.60	0.40	-0.2 [-33%]	1.10	0.70	-0.4 [-36%]	2.40	1.60	-0.8 [-33%]
Badgerys Creek	BC DL01	-	-	BC Q01	P	1.00	1.00	0 [0%]	1.80	1.80	0 [0%]	2.90	2.80	-0.1 [-3%]
	Badgerys Creek	-	-	BC Q02	P	0.90	0.90	0 [0%]	1.80	1.80	0 [0%]	5.10	5.10	0 [0%]
	Badgerys Creek	-	-	BC Q03	P	8.70	8.70	0 [0%]	15.00	15.00	0 [0%]	21.50	21.50	0 [0%]
	Badgerys Creek	DRC 0 (The Northern Road)	DRC 780 (The Northern Road)	BC Q04	P	10.40	10.60	0.2 [2%]	18.30	18.60	0.3 [2%]	29.10	29.60	0.5 [2%]
	Badgerys Creek	DRC 0 (The Northern Road)	DRC 2180 (The Northern Road)	BC Q05	P	14.40	14.80	0.4 [3%]	25.60	26.30	0.7 [3%]	40.50	41.60	1.1 [3%]
	Badgerys Creek	-	-	BC Q06	P	22.50	22.80	0.3 [1%]	40.40	40.90	0.5 [1%]	63.40	64.70	1.3 [2%]
	BC DL02	-	-	BC Q07	P	1.60	1.60	0 [0%]	2.70	2.70	0 [0%]	4.60	4.60	0 [0%]
	BC DL02	-	-	BC Q08	P/SG	1.70	2.00	0.3 [18%]	2.90	3.30	0.4 [14%]	5.20	5.60	0.4 [8%]
	BC DL03	-	-	BC Q09	P	0.40	0.40	0 [0%]	0.70	0.70	0 [0%]	1.30	1.30	0 [0%]
	BC DL04	-	-	BC Q10	P	0.30	0.30	0 [0%]	0.50	0.50	0 [0%]	1.00	1.00	0 [0%]
	BC DL03	DRC 1000 (The Northern Road)	DRC 2180 (The Northern Road)	BC Q11	P/SG	0.90	1.50	0.6 [67%]	1.80	3.00	1.2 [67%]	3.70	6.20	2.5 [68%]

1. A positive difference indicates an increase in peak flow attributable to the project (refer cells highlighted orange). Conversely, a negative difference indicates a decrease in peak flow attributable to the project (refer cells highlighted green).
2. Values in [ ] represent the percentage increase/decrease in peak flow attributable to the project.
3. MCPB = Main Carriageway Project Boundary LRPB = Local Road Project Boundary PFI = Peak Flow Identifier
4. Refer **Figures 4.1** and **6.1** (4 sheets each) for location of Peak Flow Identifiers.
5. P = Private SG = State Government COM = Commonwealth Government