Byron Industrial Estate STP Discharge Drain Modelling

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Synopsis:	**This report presents the outcomes of modelling work undertaken by BMT to assess the drainage capacity of internal drains within the industrial estate and the implications of STP drainage singularly and in combination with local catchment events. The hydraulic effects of changes to hydraulic structures and downstream tailwater levels are also considered.**	

REVISION/CHECKING HISTORY

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1 Introduction

Byron Shire Council is establishing a new alternative flow path through the Byron Industrial Estate for treated effluent discharges from the Byron Sewage Treatment Plant (STP). This project has developed a hydraulic model of the catchments and drains of the Industrial Estate and completed a variety of drainage and flooding assessments to determine potential effects of the discharge. Additionally, the project has sought to establish predicted water levels within the drainage lines for the two main options of a present-day constant 3 ML/ 18 hours (herein referred to as 3ML) flow and a predicted future 7 ML/ 18 hours (herein referred to as 7ML) flow from the STP.

The effects of the continuous daily discharges are to be considered in combination with the effects of local runoff events, as combined these may be sufficient to cause overtopping of the drains in the Industrial Estate and exacerbate local flooding onto private property. Ultimately, Council wish to install water level sensors in the drains of the industrial estate, along with a telemetry system to the STP that may be utilised by Council to allow them to discontinue pumping to the Industrial Estate when a trigger level is reached and divert water to the original western flow path.

1.1 Background

In 2014, BMT and Australian Wetland Consulting completed an assessment of the capacity of major drainage lines in the Belongil Creek catchment. The study was focused on assessing the impacts of the current Byron STP discharge arrangements and impacts of alternative discharge arrangements.

Modelling considered current day and future discharges through to around 2050. The outcome of the study was that the existing flow path was contributing to excessive water in parts of the western Belongil Creek catchment and that an alternative discharge path through the Byron Industrial Estate should be further investigated.

Council in progressing this option have sought to combine this outcome with an enhancement of the existing drain line's appearance, function and potential to treat stormwater flows through implementation of WSUD approaches.

1.2 Scope of Work

BMT's role in this project has been to:

- Develop a high resolution 2D hydraulic rainfall on grid model for the Industrial Estate (and drainage lines) and surrounding areas as applicable. The hydraulic model accepts inflows from the STP;
- Establish critical durations for the 10 yr ARI event to points of interest;
- Determine water levels in the drains for current day 3 ML and future 7ML discharges at Council's identified discharge point;
- Assess the flood impacts of STP flows in combination with a large local rainfall event, i.e. 10 yr ARI event; and

- Extract relevant information from the flood model at identified locations which may include water depth, velocity, level and flood hazard. This information will inform Council on channel capacity, flood implications and water levels within drains.

There are a few variables which were foreseen to potentially affect the modelling outcomes. These include the following:

- West Byron Development;
- Ewingsdale Road Upgrade; and
- Downstream tailwater level assumptions at the model boundary.

Downstream of the industrial estate exists the potential West Byron development areas. These developments are currently seeking DA, and as such drainage from these areas to the main drain are uncertain. For the purposes of this assessment no increase in development of West Byron Urban Release Area land has been assumed to impact upon flows to the drain line from the Industrial estate.

Ewingsdale Road is proposed to be upgraded to dual carriageway by Byron Shire Council at some stage in the future. This proposal may result in upgrades to drainage infrastructure from the Industrial Estate catchment (under Ewingsdale road). As such, this assessment has considered the implications of the upgraded drainage infrastructure.

Tailwater assumptions for the flood assessments have been assumed for the purposes of the study. Previous modelling of the Belongil Creek catchment has applied tailwater levels assumptions at the downstream catchment boundary, i.e. ocean. Due to the cut-down modelling extent adopted for this study which does not extend to the ocean, downstream tailwater level assumptions have been applied as described later in this report.

2 Model Development

2.1 Introduction

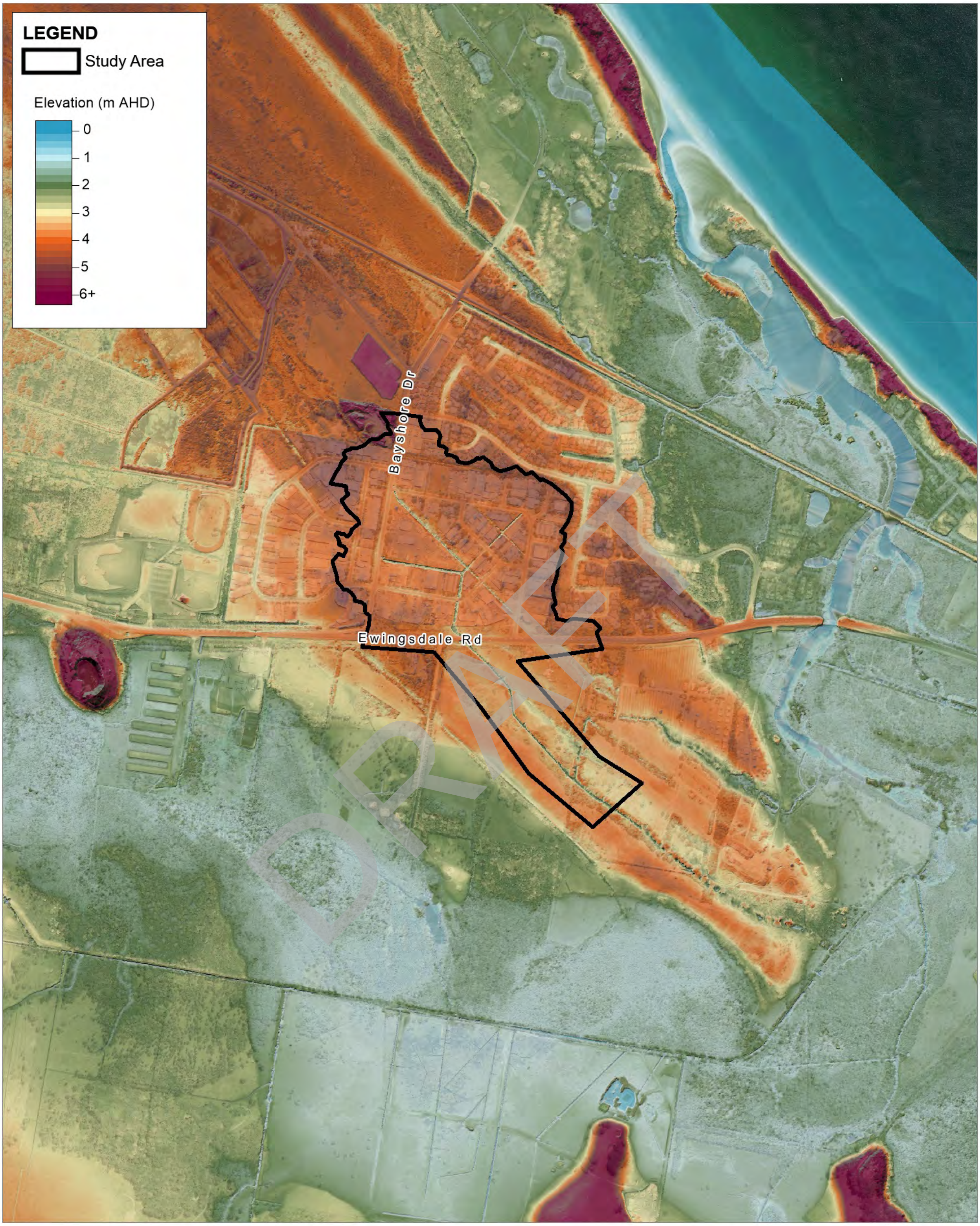
In 2009, the *Belongil Creek Flood Study (*SMEC, 2009) was completed for the Belongil Creek System including the Belongil Creek estuary, Union Drain as well as the Byron Bay Industrial Estate area (SMEC, 2009). The existing flood conditions developed in this model formed the basis for the *Belongil Creek Floodplain Risk Management Study and Plan* (FRMS&P) (BMT WBM, 2015). The modelling data from this study has been used herein.

For the purposes of this assessment, a TUFLOW rainfall on grid hydraulic model was developed to assess design rainfall conditions and various STP discharge rates drawing on information from the Belongil Creek FRMS&P and data provided by the client.

The development of the hydraulic models is discussed further below.

2.2 Study Area and Catchment Topography

The locality of the site is shown in Figure 2-1. The site is located within the Industrial Estate of Byron Bay. The site is bounded by Ewingsdale Road to the south, residential properties to the north and east and further industrial development to the west. The total catchment upstream of Ewingsdale Road is approximately 32.2 ha in size. Within the study area, there are four main open channel drainage lines that converge upstream of Grevillea Street. The flowpath is then conveyed south travelling under Ewingsdale Road and continues in a south east direction to Belongil Creek. The open channel drainage line of interest originates at the corner of Banksia Drive and Bayshore Drive. The STP discharge is proposed to enter the drainage system at this location.



Title:
Site Locality and Topography

Figure: 2-1

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2.3 Hydraulic Model

BMT has applied the 2D software modelling package TUFLOW to simulate the overland flow paths associated with local catchment runoff as well as the STP discharge. To assess the flood behaviour under various conditions of development, the following TUFLOW models have been developed and utilised:

- Existing scenario model. This scenario establishes a baseline for local catchment runoff within the site, this is reflective of the existing local landforms, land use and hydraulic structures; and
- Design scenario model. This scenario includes two options; the initial option revises the topography of the drainage line. The second option uses revised topography and includes the upgrade of the hydraulic structures under Ewingsdale Road as part of the Ewingsdale Road Upgrade.

2.4 Model Topography

A 2D model cell size of 1 m was adopted to provide an accurate definition of the overland flow path, including local topographical controls (e.g. road embankments). TUFLOW samples elevation points at the cell centres, mid-sides and corners, so a 1 m cell size results in DEM elevations being sampled every 0.5 m.

The underlying 1m DEM elevations were sourced from the Belongil FRMS&P (BMT WBM, 2015). This resolution was selected to provide the necessary detail required for accurate representation of the catchment topography. The topography was modified for all industrial building footprints within the study area to remove the effects of artificial triangulation. All buildings were set to a ground level approximately 100-200 mm above the surrounding ground level.

Several other sources of ground elevation for the drainage lines were provided and utilised as follows:

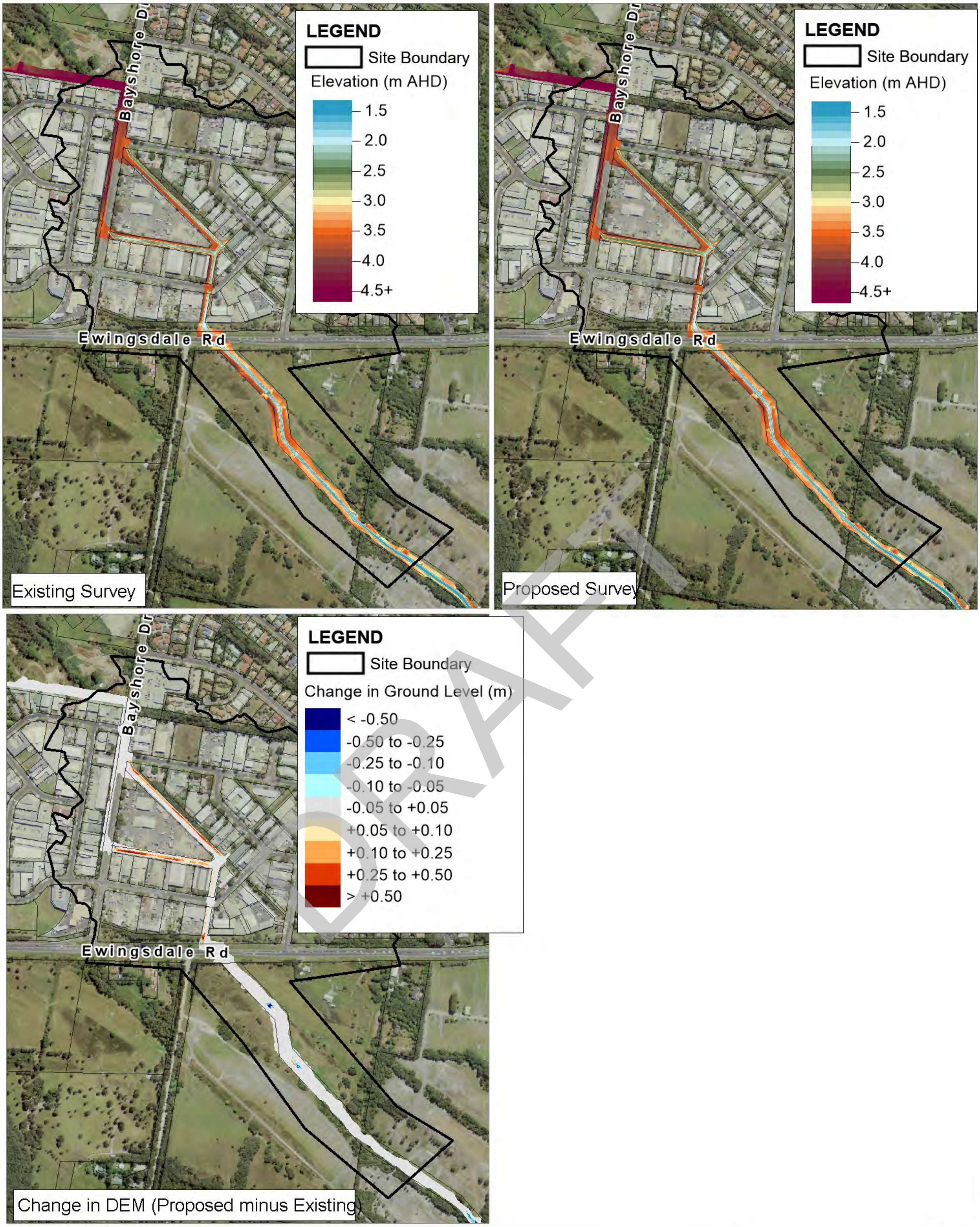
Existing Scenario Model

- The Digital Elevation Model (DEM) for the existing drainage ground levels was updated using a surveyed ground surface Triangular Irregular Network (TIN) provided by Planit Consulting (file reference: *39344_DET.dwg*).

Design Scenario Model

- The ground surface elevation grid was updated to include the proposed ground surface elevations for the drainage line. Details of the proposed drainage line surface elevations were provided by Planit Consulting (file reference: *39344_DET.dwg*).

Figure 2-2 shows the DEM of the existing scenario and design scenario, as well as the comparison between the two DEM's local to the site.



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Survey Data Current and Design Scenario	**2-2**	**A**

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2.5 Hydraulic Roughness

The development of a TUFLOW model requires the assignment of different hydraulic roughness (Manning's 'n') zones. For this study, hydraulic roughness zones have been delineated based on the aerial topography for the study area. Each roughness zone adopts a separate Manning's n value. This study's Manning's n values were determined off roughness values used as part of the Belongil Creek FRMS&P (BMT WBM, 2015) and well as industry standards (e.g. Chow, 1959). The Manning's 'n' roughness values are listed in Table 2-1. The spatial distribution of the hydraulic roughness zones is shown on Figure 2-3.

Table 2-1 Adopted Hydraulic Model Roughness Values

Material Description	Model Roughness (Manning's 'n')
Open Vegetated Area	0.035
Roads	0.020
Paved Surfaces within Industrial Precinct	0.030
Industrial Lots	0.080
Dense Vegetation	0.090
Residential Lots with buildings	0.040

2.6 Hydraulic Structures

There are numerous structures present that will influence the flooding behaviour within the study area. Road crossings over Ewingsdale Road, Grevillea Street and Banksia Drive were represented as 1-D culvert elements embedded within the 2-D model domain. The existing data was sourced from the Belongil Creek FRMS&P. Data provided by Planit Engineering (file: 39344_DET.pdf) provided surveyed data for Grevillea Street and Banksia Drive. This data was used as part of the existing case. Design plans for Ewingsdale Road were also incorporated as part of the design case where the data was provided by Byron Shire Council (via Lambert and Rehbein Engineers) (file: B15408-DR-04_A.pdf). The general configuration of the hydraulic structures at Ewingsdale Road are as follows:

- Existing Design: 3 x 1000 mm RCP & 2 x 700 mm RCP; and
- Proposed Design (as part of road upgrade): 3 x 1500 mm W x 900mm H RCBC.

The general location of the structures is presented in Figure 2-4.

2.7 Local Catchment Run-off

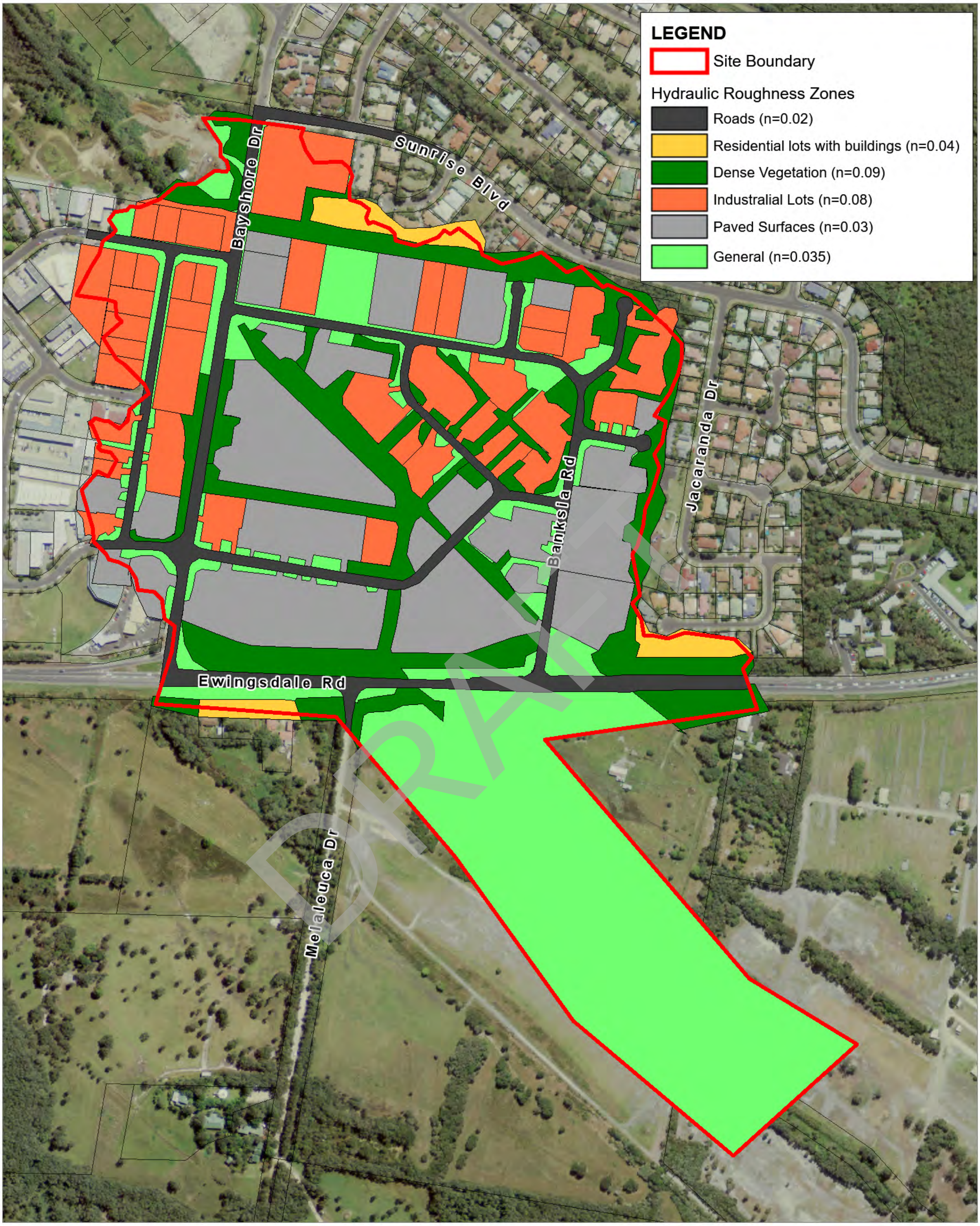
The catchment area that drains to the hydraulic structures under Ewingsdale Road is approximately 32 ha. This was verified using a larger 1 m rainfall on grid TUFLOW model to determine the total catchment area that drains towards Ewingsdale Road and flow that discharges to external locations. The area of the local catchment run-off is shown in Figure 2-4.

2.8 STP discharge

The location of the STP discharge point is at the corner of Banksia Drive and Bayshore Drive. The location of discharge is shown in Figure 2-4.

2.9 Downstream Boundary

The location of the downstream boundary is approximately 650 m downstream of Ewingsdale Road. It is sufficiently located away from the area of interest to not have any influence on the flood behaviour. The location of the downstream boundary is shown in Figure 2-4.



Title:

Hydraulic Roughness Zones

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TUFLOW Model Schemetisation

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3 Design Flood Conditions

Design storm events are hypothetical events that are used to estimate design flood conditions. They are based on having a probability of occurrence specified by either Annual Exceedance Probability (AEP) expressed as a percentage, or Average Recurrence Interval (ARI) expressed in years.

The recently released Australian Rainfall and Runoff (AR&R) 2016 update revised a number of design rainfall estimate recommendations including temporal patterns and loss rates. For simplicity and consistency with earlier modelling approaches this study has adopted the 1987 AR&R modelling guidance. This includes the use of the 1987 IFDs (design rainfall), temporal patterns and initial and continuing loss guidance to ensure consistency with previous modelling (Belongil Creek FRMS&P) undertaken in the study area.

3.1 Design Rainfall Depths

Design rainfall depth is based on the generation of intensity-frequency-duration (IFD) design rainfall curves utilising the procedures outlined in AR&R (2001). These curves provide rainfall depths for various design magnitudes (up to the 100 year ARI) and for durations from 5 minutes to 72 hours. Table 3-1 shows the average design rainfall depths based on 1987 AR&R adopted for the modelled 10 year ARI event.

Table 3-1 Average Design Rainfall Depth (mm)

Duration	10 year ARI
10 mins	27.8
20 mins	41.3
30 mins	51.5
1 hour	70.7
2 hours	93.4
3 hours	108.3
6 hours	139.2
12 hours	182.4

3.2 Temporal Patterns

The IFD data presented in Table 3-1 provides the average intensity that occurs over a given storm duration. Temporal patterns are required to define what percentage of the total rainfall depth occurs over a given time interval throughout the storm duration. The temporal patterns adopted in the current study are based on the standard patterns presented in AR&R (2001).

3.3 Rainfall Losses

The rainfall loss parameters adopted for the design floods were an initial loss of 10mm and a continuing loss of 2.5mm/hr for pervious areas of the catchment and no losses for the impervious areas of the catchment. The adopted rainfall losses are consistent with the recommended design event losses presented in AR&R (2001) for a NSW catchment.

3.4 Critical Duration

An ensemble of durations from 10 minute to 12 hours were modelled within the TUFLOW model for the 10 year ARI event to identify the critical storm duration for the study catchment. The storm duration resulting in the peak design flood levels for the 10 year ARI event was found to be the 2-hour duration. This duration was adopted as the pattern for the remainder of the assessment.

3.5 Boundary Conditions

The model boundary conditions for catchment flooding were derived as follows:

- Local catchment Inflows: the rainfall runoff was determined by applying rainfall on grid across the catchment.
- STP discharge: discharge from the STP which includes 3ML/d for current day discharges, and 7ML/d for potential future STP discharges. The full daily STP discharge was provided across a 20 hour window as per the instruction of Council. Conservatively, the peak catchment runoff was timed to coincide with periods of STP discharge to the drainage lines.
- Downstream boundary: A constant water level of 1.0m AHD was applied at the downstream boundary located approximately 1.5 km downstream of Ewingsdale Road. This water level represents the lowest topographical elevation across the downstream boundary. That is, this tailwater level does not impede into the study area. At this level there is so standing water within the drainage line south of Ewingsdale Road from the Industrial Estate.

  Sensitivity assessments have been completed on other tailwater levels which have occurred resulting from catchment flood events. Separately, tailwater levels of 1.8m AHD and a 2.33m AHD have been assessed.

  The level of 1.8m AHD was conservatively derived from a review of water level monitoring data maintained by Byron Shire Council at the Ewingsdale Road bridge crossing of Belongil Creek. This data has been collected by Council for a number of years (AWC, 2017) and 1.6 m AHD represents an upper bound of recorded water levels at this location which is approximately 3 kilometres downstream of the downstream model boundary (conservatively 1.8 m AHD has been adopted). At 1.8 m AHD, there is standing water within the main drainage line south of Ewingsdale Road but it does not cross over to the north side of the culverts into the Industrial Estate.

  The level of 2.33 m AHD represents the approximate 100 year peak flood level derived as part of the Belongil Creek FRMS&P (BMT WBM, 2015) in this portion of the Belongil Creek catchment. At 2.33 m AHD, there is standing water within the main drainage line south of Ewingsdale Road and it is sufficient to cross into the Industrial Estate, where it extends up around 100m.

4 Flood Modelling

4.1 Modelled Events

To assess the impacts that the STP discharge will have on the existing flood behaviour, a number of scenarios were modelled. These are listed in Table 4-1.

Peak flood depth maps for each scenario for the modelled design flood events are presented in Appendix A.

Table 4-1 Modelled Events

Scenario Number	Flood \ STP Combinations	Survey Data	Ewingsdale Road Culvert	Downstream boundary (m AHD)
S1	10 year ARI Design Event	Existing Terrain	Existing	1.0
S2	3ML STP Discharge	Existing Terrain	Existing	1.0
S3	7ML STP Discharge	Existing Terrain	Existing	1.0
S4	10 year ARI Design Event & 3ML STP Discharge	Existing Terrain	Existing	1.0
S5	10 year ARI Design Event & 7ML STP Discharge	Existing Terrain	Existing	1.0
S6	10 year ARI Design Event & 7ML STP Discharge	Design Terrain	Existing	1.0
S7	10 year ARI Design Event & 7ML STP Discharge	Design Terrain	Design	1.0
S8	10 year ARI Design Event & 7ML STP Discharge	Existing Terrain	Existing	1.8
S9	10 year ARI Design Event & 7ML STP Discharge	Existing Terrain	Existing	2.33

4.2 Peak Flood Level Impacts

A selection of events outlined in Table 4-1 were compared to determine peak flood level impacts. Details on which events were compared and well as the results are discussed in Table 4-2.

Table 4-2 Modelling Results

Scenarios Assessed	Purpose	Impact Outcome	Figure Reference
S3 minus S2	Assesses the difference between a STP discharge of 7ML and 3ML with no modelling of a design event.	There is a small increase in the order of 0.05 to 0.10 m across the study area	Figure B1
S4 minus S1	Assesses the difference between a 10 year ARI design event with a STP discharge of 3ML against a 10 year ARI design event with no STP discharge.	There is a minor difference in the peak flood levels across the study area when an STP discharge of 3ML is included. There are two small areas contained within the creek that increase in the order of 0.02 - 0.05 m	Figure B-2
S5 minus S4	Assesses the difference between a 10 year ARI design event with an STP discharge of 7ML against a 10 year ARI design event with a STP discharge of 3ML.	There is no change in the peak flood level across the study area	Figure B-3
S6 minus S5	Assesses the difference between the existing and design terrain in a 10 year ARI design event with a STP discharge of 7ML	There is a small change to the flood behaviour between the existing and design terrain. In two of the primary open channel drainage channels, the peak flood levels decrease in the order of 0.10 – 0.20 m whilst an increase is observed within a smaller drainage channel	Figure B-4
S7 minus S5	Assesses the difference between the existing and design terrain with design culverts at Ewingsdale Road in a 10 year ARI design event with a STP discharge of 7ML.	The design configuration for Ewingsdale Road decreases the peak flood level for a small area directly upstream of the road in the order of 0.02 – 0.05 m	Figure B-5
S8 minus S5	Assesses the difference between a 1m AHD and a 1.8m AHD downstream tailwater in a 10 year ARI design event with an STP discharge of 7ML	There is no change to the peak flood levels when considering a higher downstream tailwater of 1.8m AHD compared to 1m AHD adopted boundary	Figures B-6
S9 minus S5	Assesses the difference between a 1m AHD and a 2.33m AHD downstream tailwater in a 10 year ARI design event with an STP Discharge of 7ML	There is an increase in the peak flood levels at the downstream boundary when considering a higher downstream tailwater of 2.33m AHD compared to 1m AHD adopted boundary. No change in peak flood levels are observed upstream of Ewingsdale Road.	Figures B-7

4.3 Reported Locations

Modelled peak flood depths and levels for a selected reporting location near Ewingsdale Road at the 'bottom' of the Industrial Estate area are shown in Table 4-2 and Figure 4-1. Figure 4-2 shows the reporting location.

Table 4-3 Peak Flood Levels and Depths – Report Location 1

Scenario	Peak Flood Level	Peak Flood Depths
S1	3.46	1.43
S2	2.66	0.63
S3	2.67	0.63
S4	3.49	1.45
S5	3.50	1.47
S6	3.49	1.46
S7	3.47	1.43
S8	3.50	1.47
S9	3.50	1.47

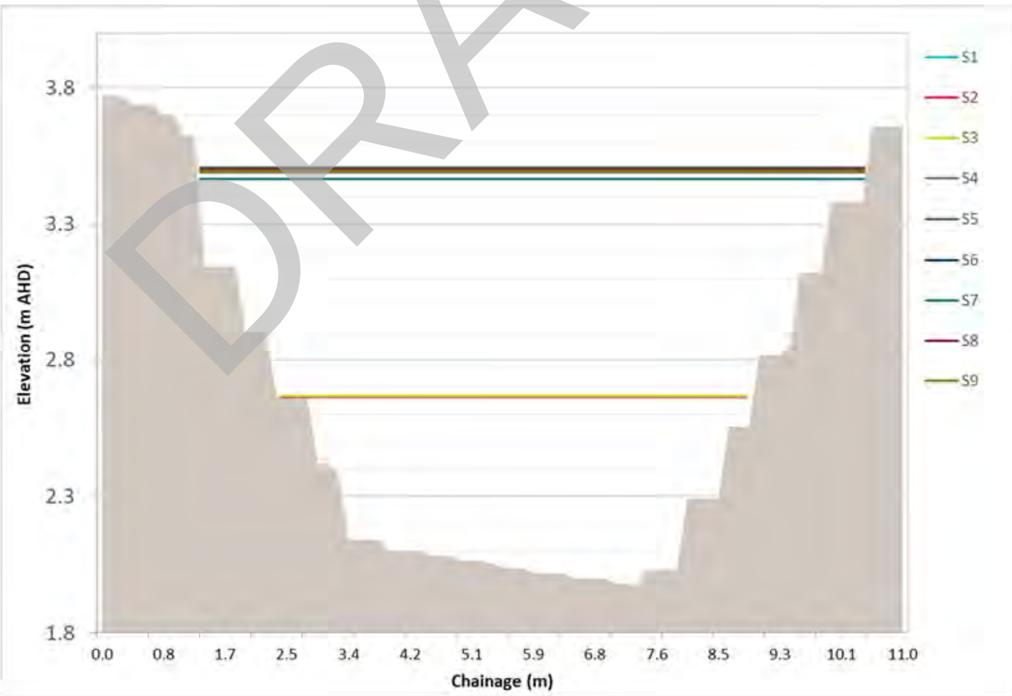

Figure 4-1 Location 1 – Cross Section with Peak Flood Level Profile

Title:

Location of Results

Figure: **4-2**

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5 Summary and Findings

Assessments completed on the proposed revisions to the Industrial Estate drainage lines to allow for the addition of treated effluent from the Byron Bay STP have been completed. These have considered the effects of the STP drainage alone and in combination with local catchment runoff events up to a 10 year ARI. It has also considered the effects of the design changes to the drainage lines, upgrades of culverts under Ewingsdale Road and effects of higher tailwater levels in the downstream drainage line.

The effects of the additional STP drainage alone are negligible and have minimal effect on water levels in the drainage lines during dry conditions, these flows are well within the limits of the capacity of these drains.

When the current day STP discharge is combined with a 10 year ARI event, minor increases are observed in the downstream drainage line (south of Ewingsdale Road). The increase of the STP discharge to 7ML has no additional impact beyond the 3ML discharge (when considered in combination with a 10 yr ARI discharge event).

The upgraded drainage lines modify flood levels in the drainage channels of the Industrial Estate with increases observed in the secondary channel and decreases observed in the primary channel.

The upgraded culverts under Ewingsdale Road decrease flood levels for a 10 year ARI event within the Industrial Estate.

Tailwater level changes to 1.8m AHD and 2.33m AHD have no effect on affluxes upstream of Ewingsdale Road.

Predicted peak water levels in the drainage lines (with STP flow and a 10 year ARI catchment event) extend up to around 3.5m AHD. At this level there remains freeboard within the drainage line.

Overall, the addition of flow to the STP drainage lines has not been observed to impact on flooding in the Industrial Estate up to a 10 year ARI event. There have been minor changes in flood level predominantly within the drainage lines resulting from the reconfiguration of the drains and upgrades to culverts under Ewingsdale Road.

6 References

Institution of Engineers, Australia (1987) *Australian Rainfall and Runoff: A Guide to Flood Estimation*, Vol. 1, Editor-in-chief D.H. Pilgrim, Revised Edition 1987 (Reprinted edition 1998), Barton, ACT

Chow, V.T., 1959, *Open-Channel Hydraulics*, McGraw-Hill

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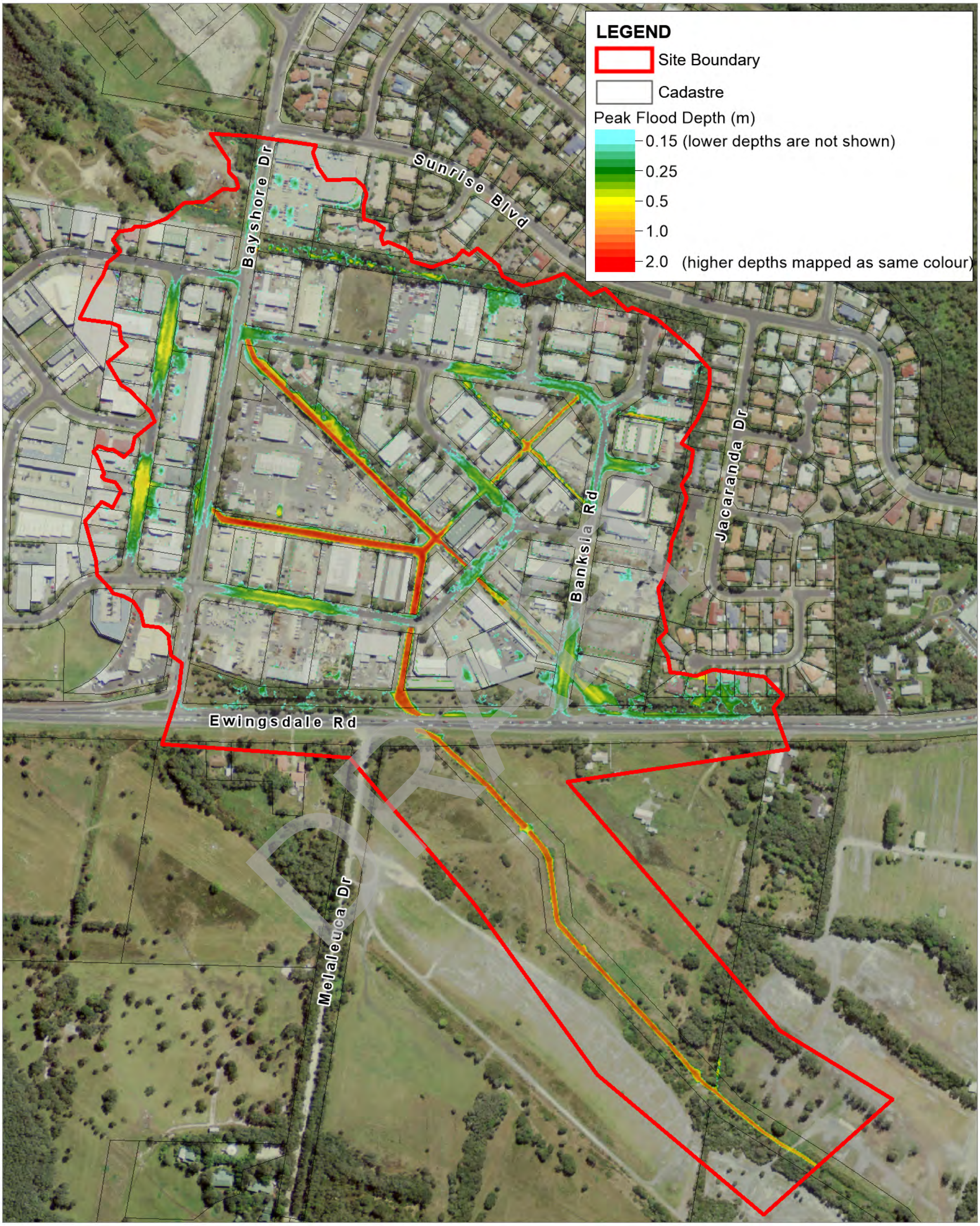
BMT WBM, 2015, *Belongil Creek Floodplain Risk Management Study and Plan*

Appendix A Peak Flood Depths



Title:

Existing: Design Event (10 YEAR ARI)
Existing Terrain, Existing Ewingsdale Rd, 1m AHD Tailwater

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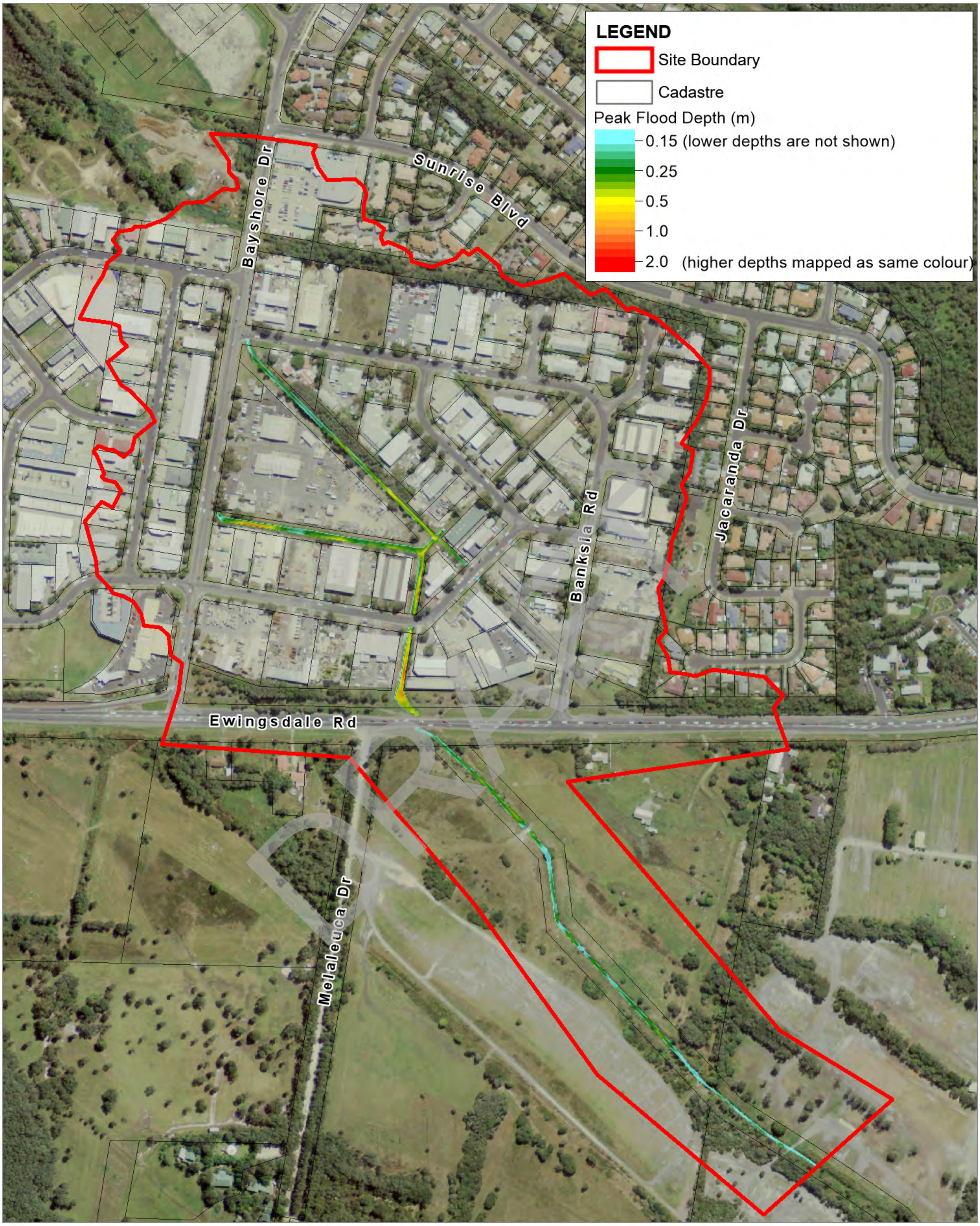

Title:

Existing: STP (3ML)

Existing Terrain, Existing Ewingsdale Rd, 1m AHD Tailwater

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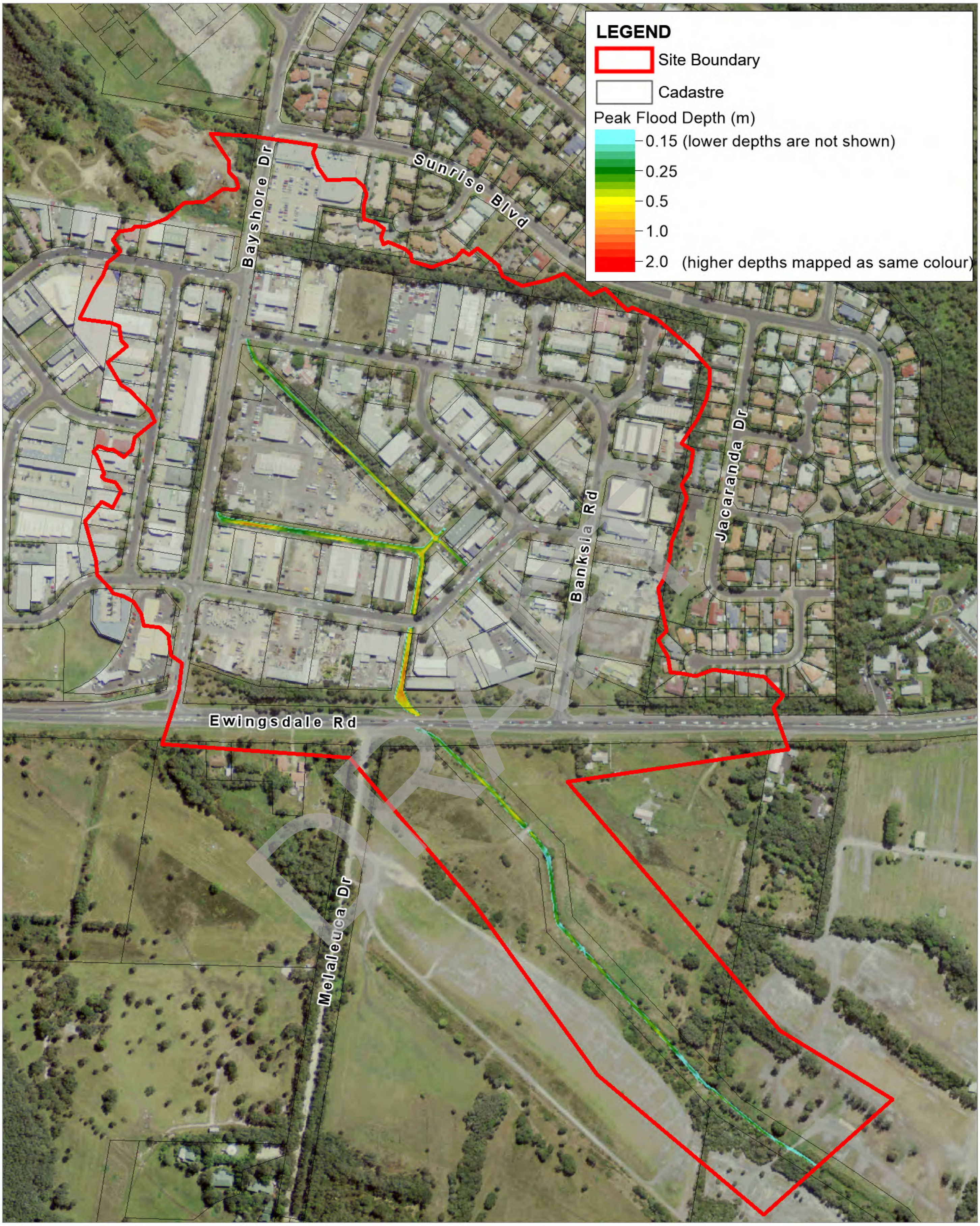

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Existing: STP (3ML)
Existing Terrain, Existing Ewingsdale Rd, 1m AHD Tailwater

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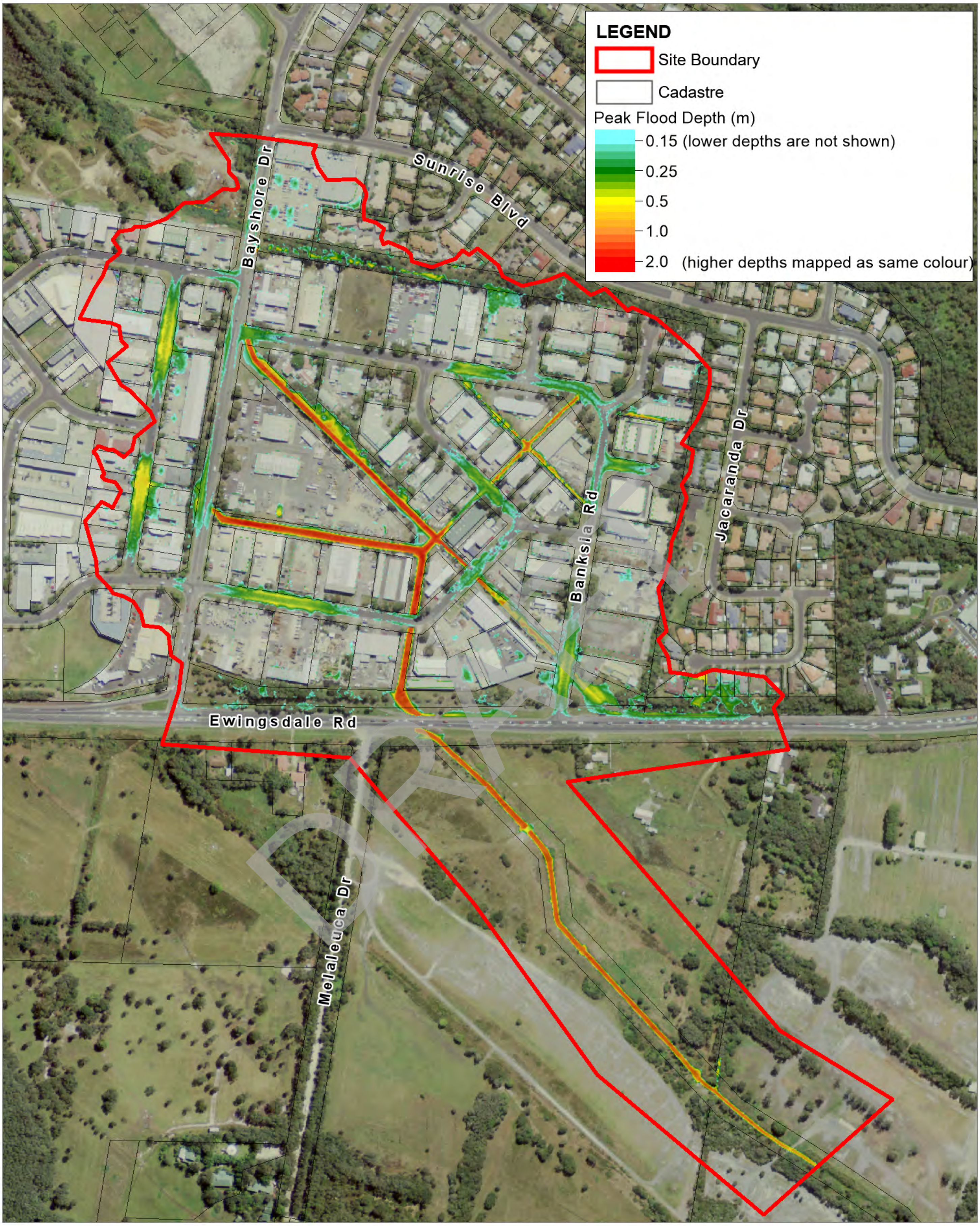

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Existing: Design Event (10 YEAR ARI) and STP (3ML)
Existing Terrain, Existing Ewingsdale Rd, 1m AHD Tailwater

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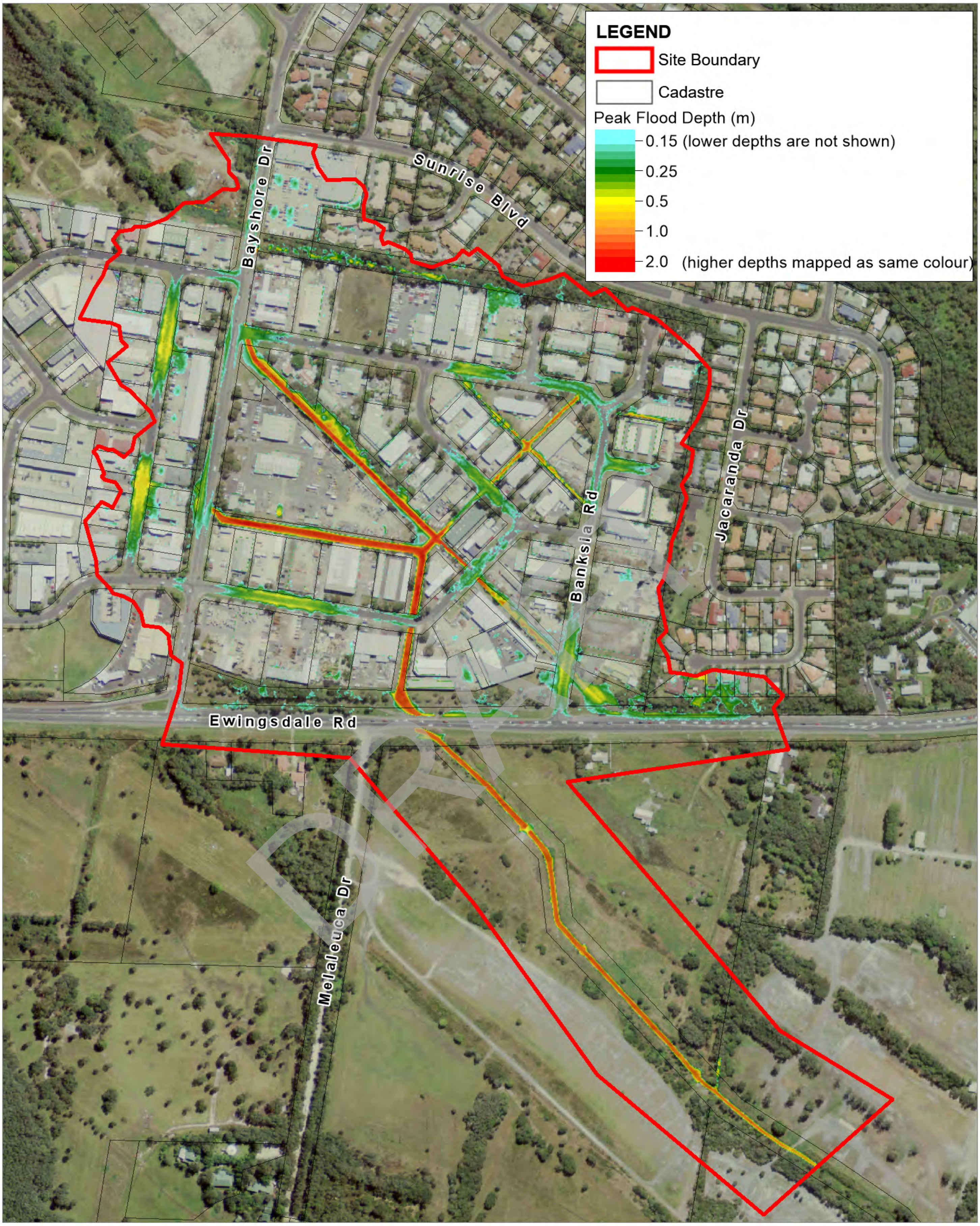

Title:

Existing: Design Event (10 YEAR ARI) and STP (7ML)
Existing Terrain, Existing Ewingsdale Rd, 1m AHD Tailwater

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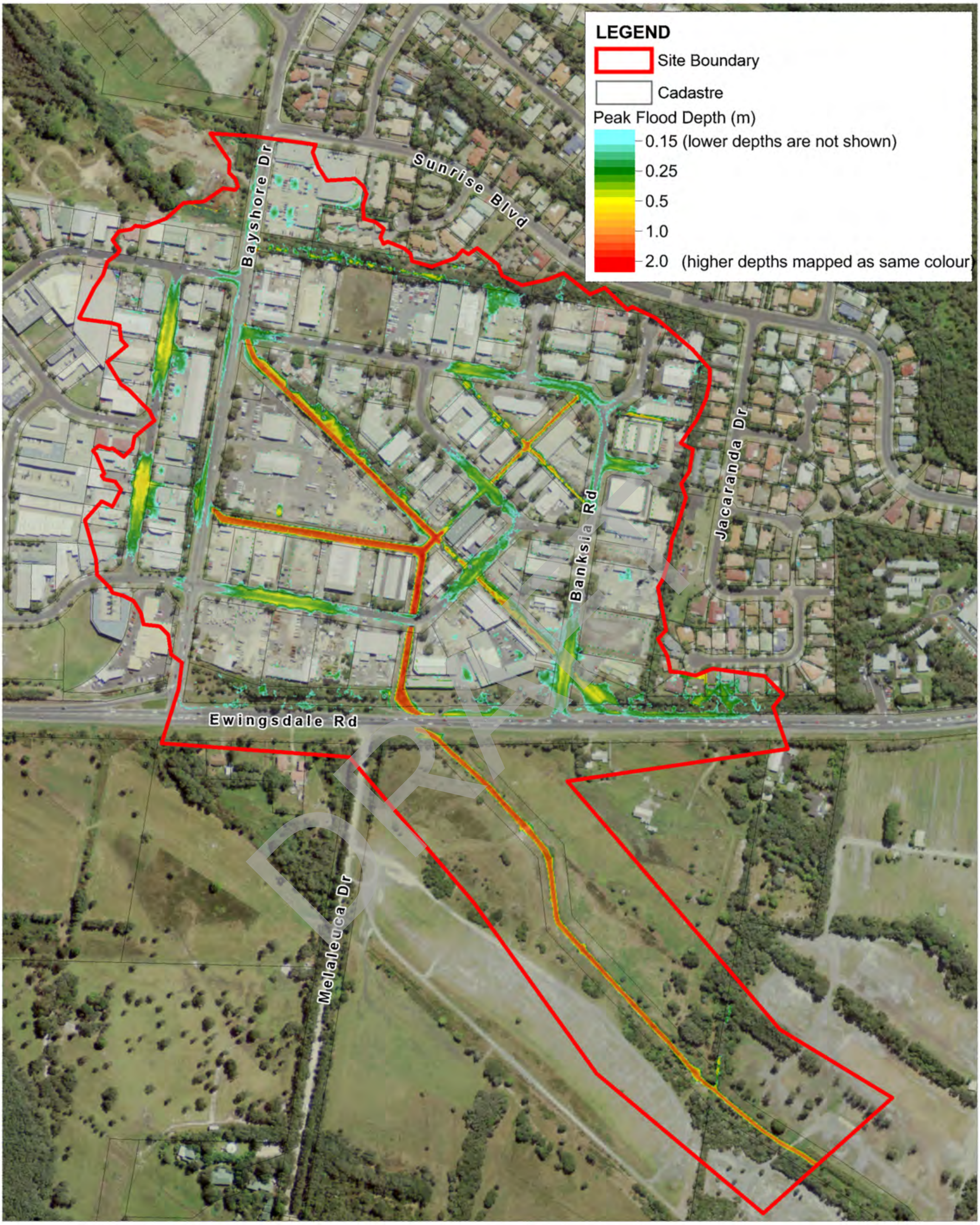

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Design: Design Event (10 year ARI) and STP (7ML)
Design Terrain, Existing Ewingsdale Rd, 2.33m AHD TW

Figure: **A-6**

Rev: **A**

N

0 125 250m

Approx. Scale

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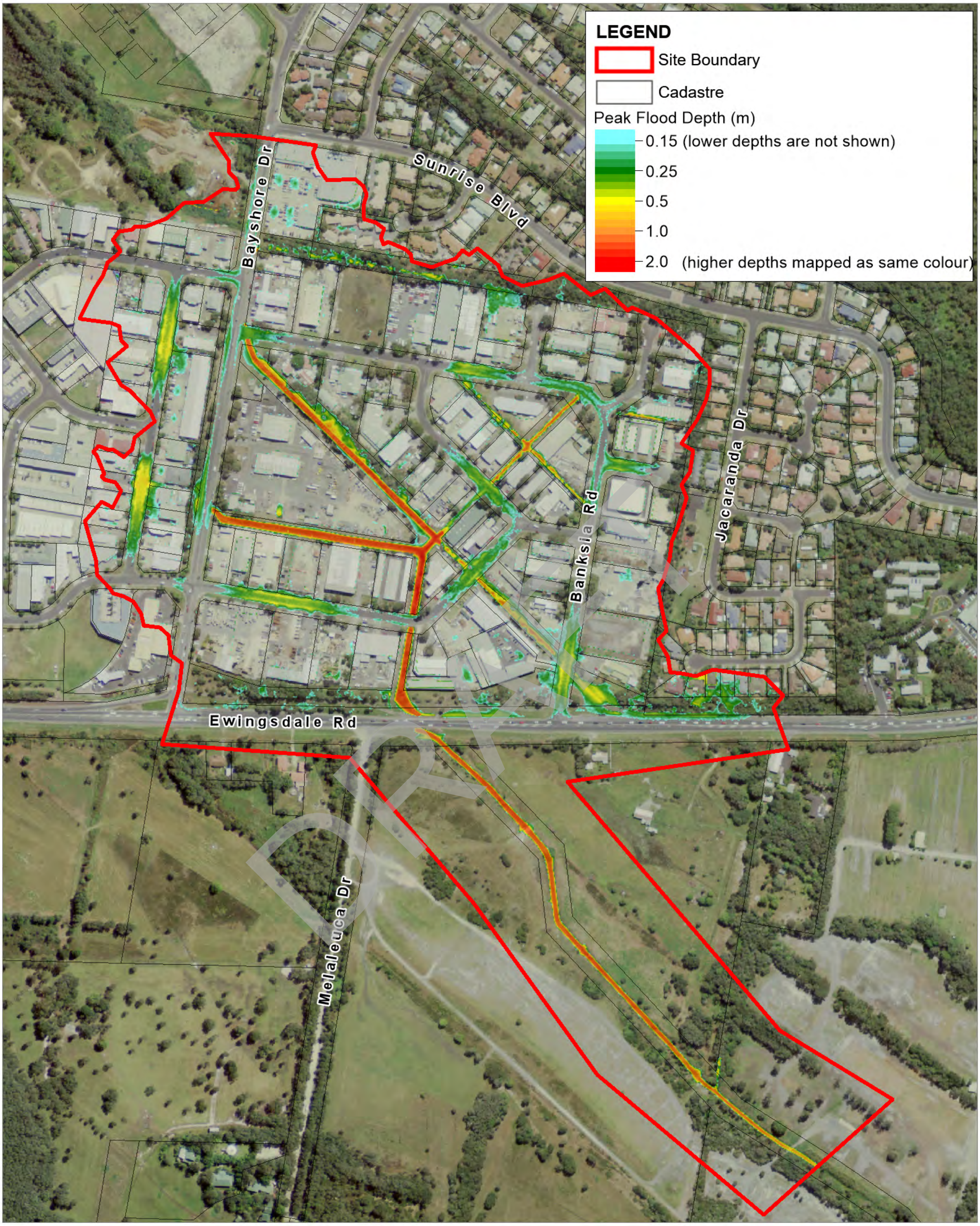
Filepath: WorkspacesPrelim_ExistingFigureA06_Design_Design_10_YEAR_ARI_STP_7ML_DESTERRAIN_EXEWINGS_2330TW.wor



Title:

Design: Design Event (10 year ARI) and STP (7ML)
Design Terrain, Design Ewingsdale Rd, 1.0m AHD Tailwater

Figure: A-7

Rev: A

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N

0 125 250m

Approx. Scale

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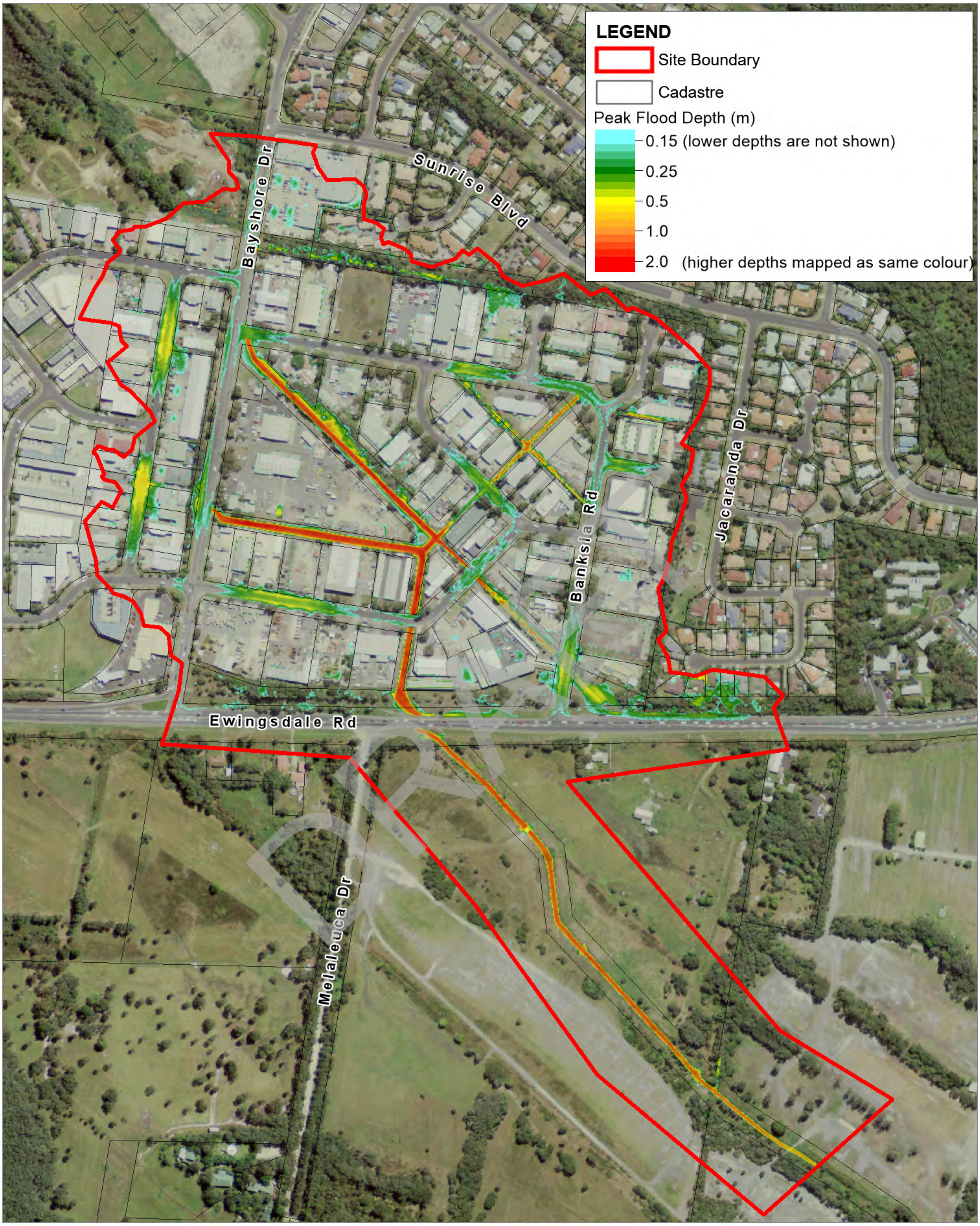
Filepath: WorkspacesPrelim_ExistingFigureA07_Design_Design_10_YEAR_ARI_STP_7ML_DESTERRAIN_DESEWINGS.wor



Title:

Design: Design Event (10 year ARI) and STP (7ML) Existing Terrain & Ewingsdale Rd, 1.8m AHD Tailwater

Figure: **A-8**

Rev: **A**

N

0 125 250m

Approx. Scale

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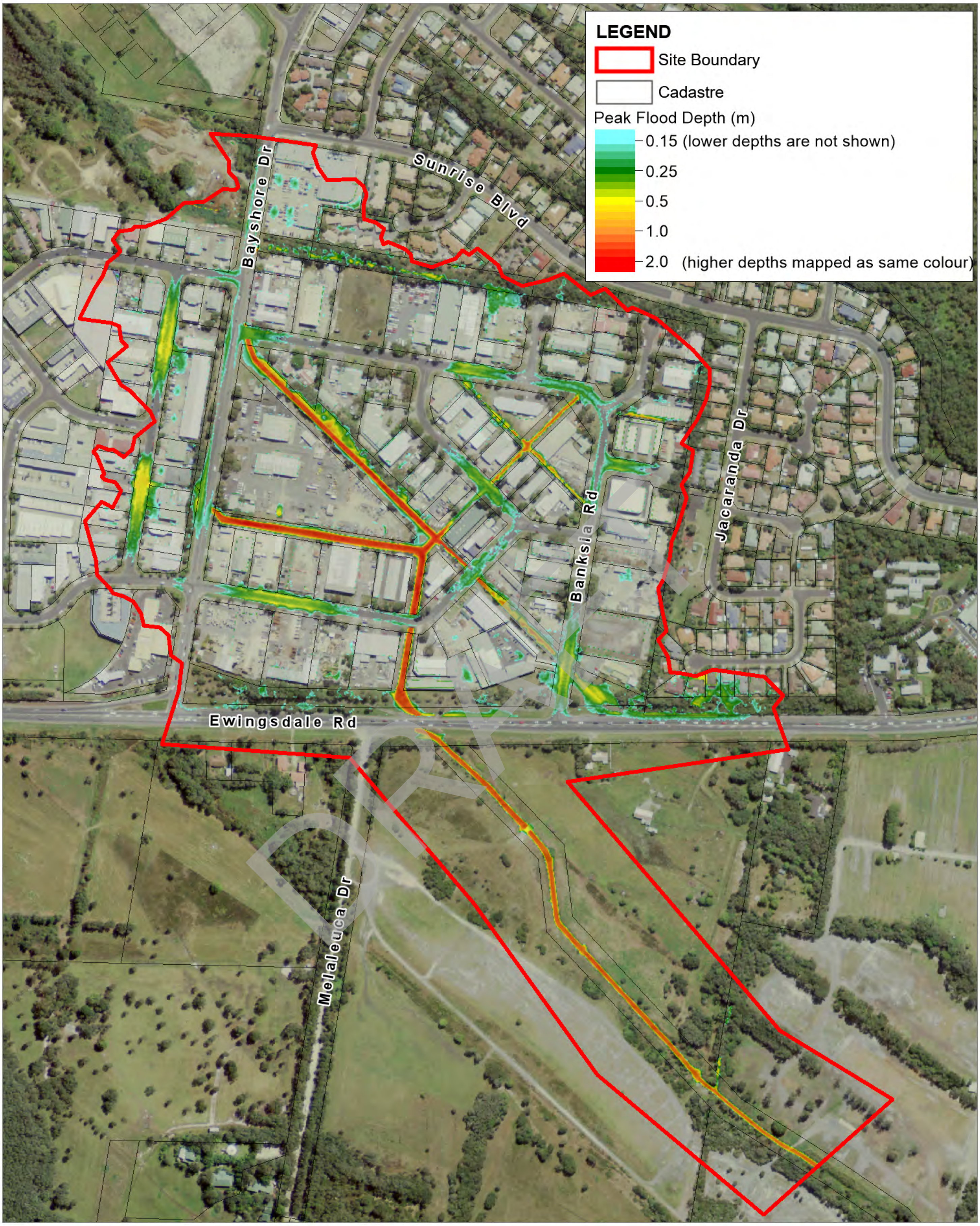
Filepath: WorkspacesPrelim_ExistingFigureA08_Design_Design_10_YEAR_ARI_STP_7ML_DESTERRAIN_DESEWINGS_1800TW.wor



Title:

Design: Design Event (10 year ARI) and STP (7ML)
Existing Terrain & Ewingsdale Rd, 2.33m AHD Tailwater

Figure: **A-9**

Rev: **A**

N

0 125 250m

Approx. Scale

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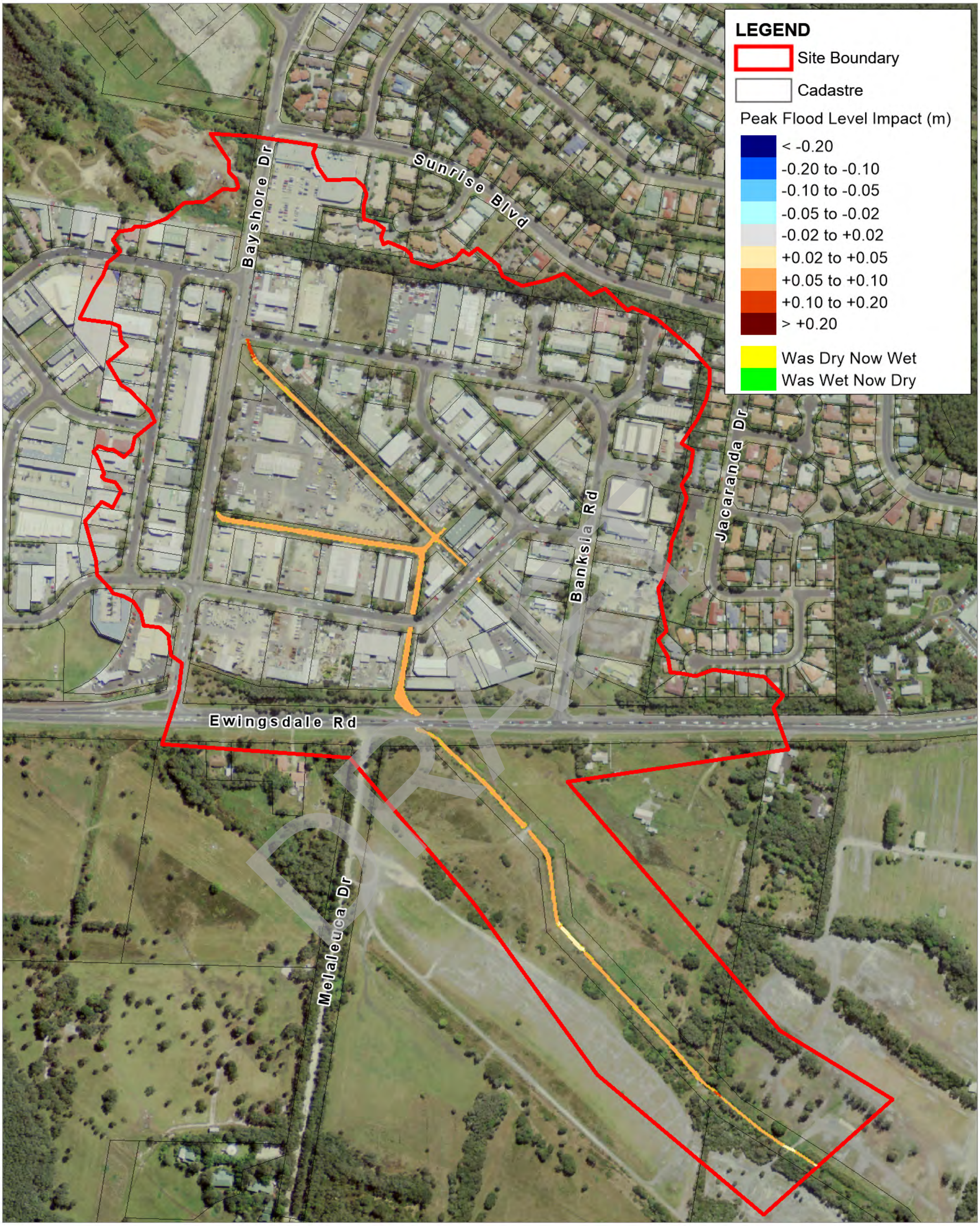
Filepath: WorkspacesPrelim_ExistingFigureA09_Design_Design_10_YEAR_ARI_STP_7ML_DESTERRAIN_DESEWINGS_2330TW.wor

Appendix B Peak Flood Level Impacts



Title:

Peak Flood Level Impacts S3 minus S2

Figure: B-1

Rev: A

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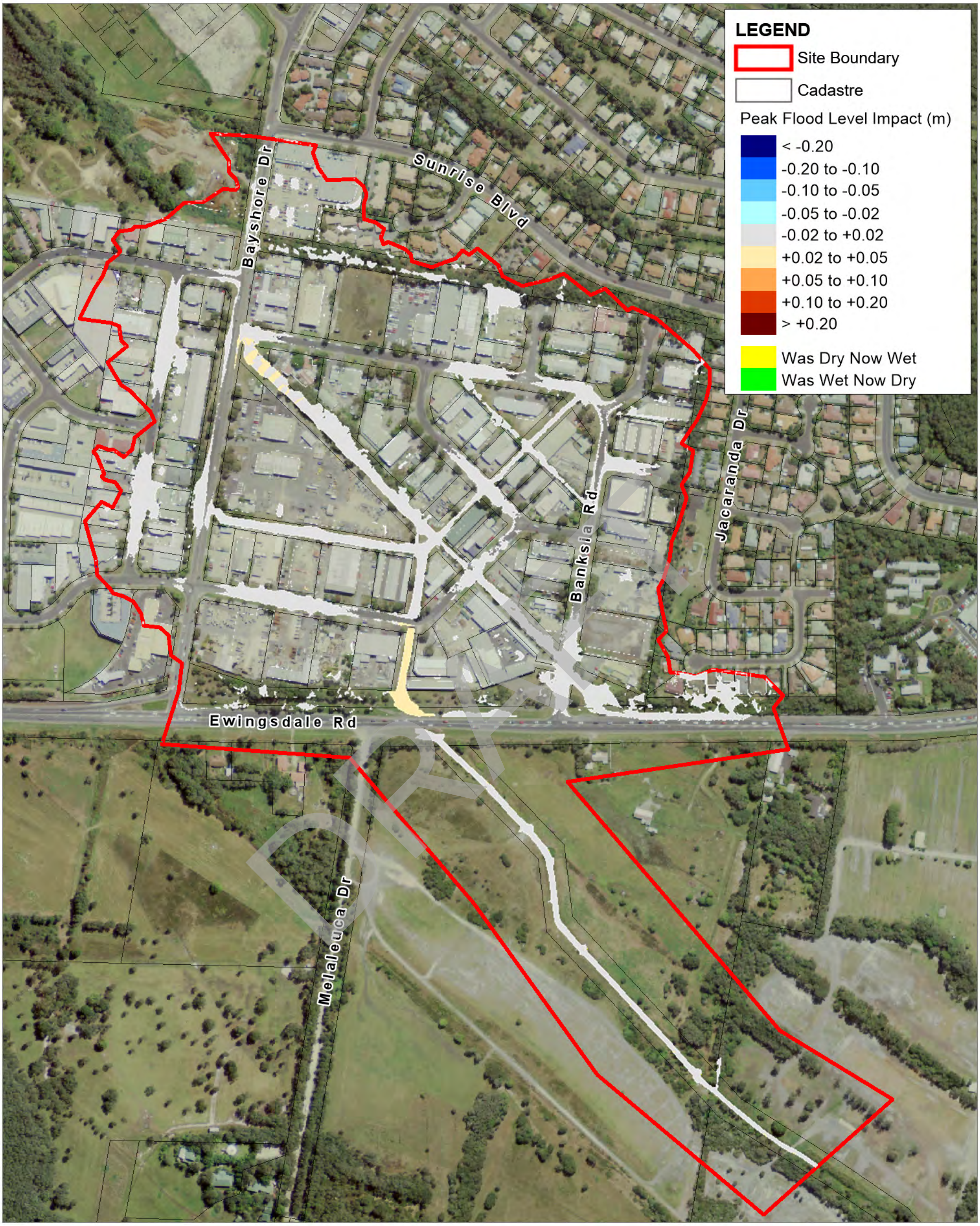
Filepath: S:WATERPROJECTSB23533_IndustrialEstateMainDrainageLineMIWorkspacesPrelim_ExistingFigure_B01_Peak_Flood_Level_Impact_S3_minus_S2.wor



Title:

Peak Flood Level Impacts S4 minus S1

Figure: B-2

Rev: A

N

0 125 250m

Approx. Scale

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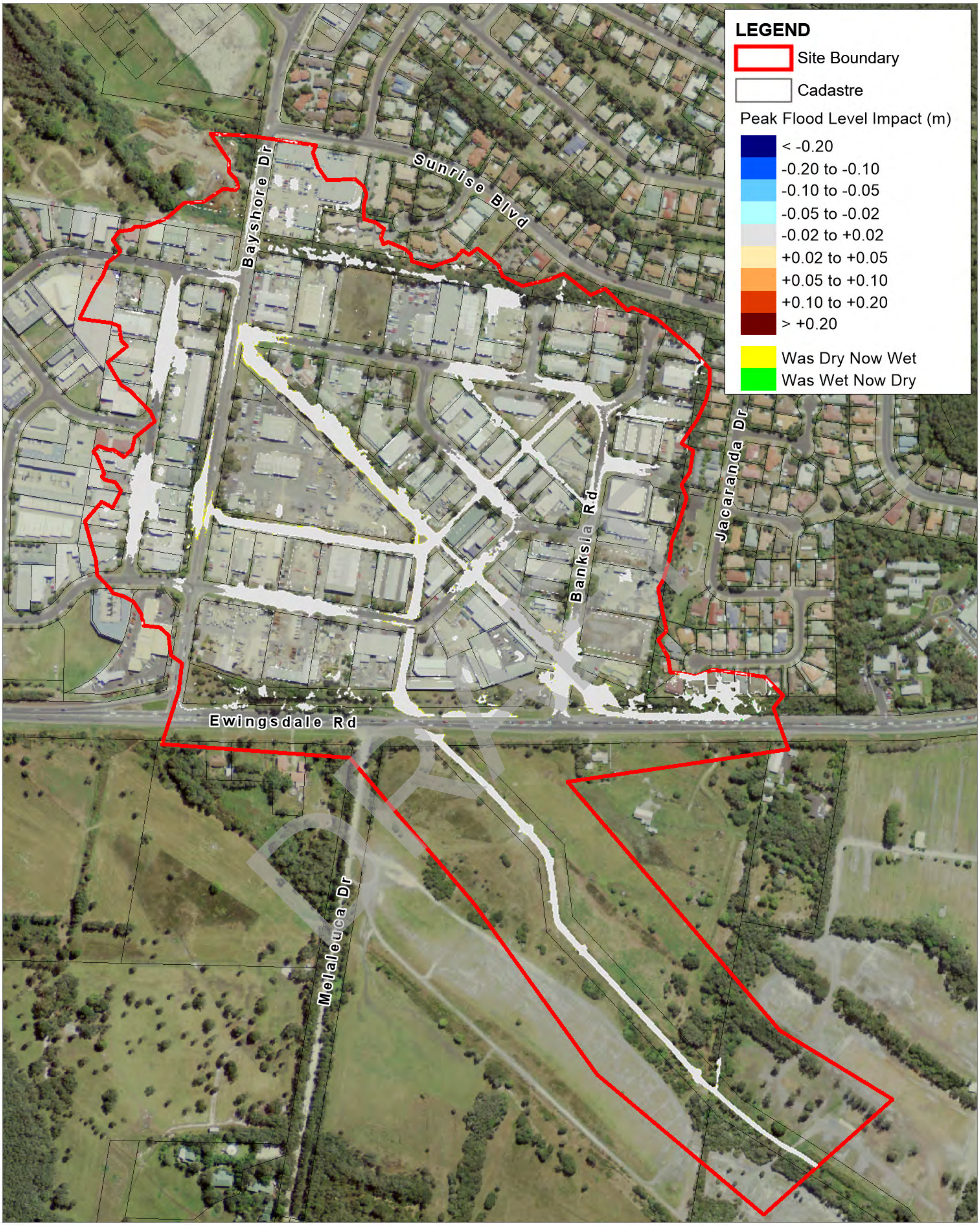

Title:

Peak Flood Level Impacts
S5 minus S4

Figure: **B-3**

Rev: **A**

N

0 125 250m

Approx. Scale

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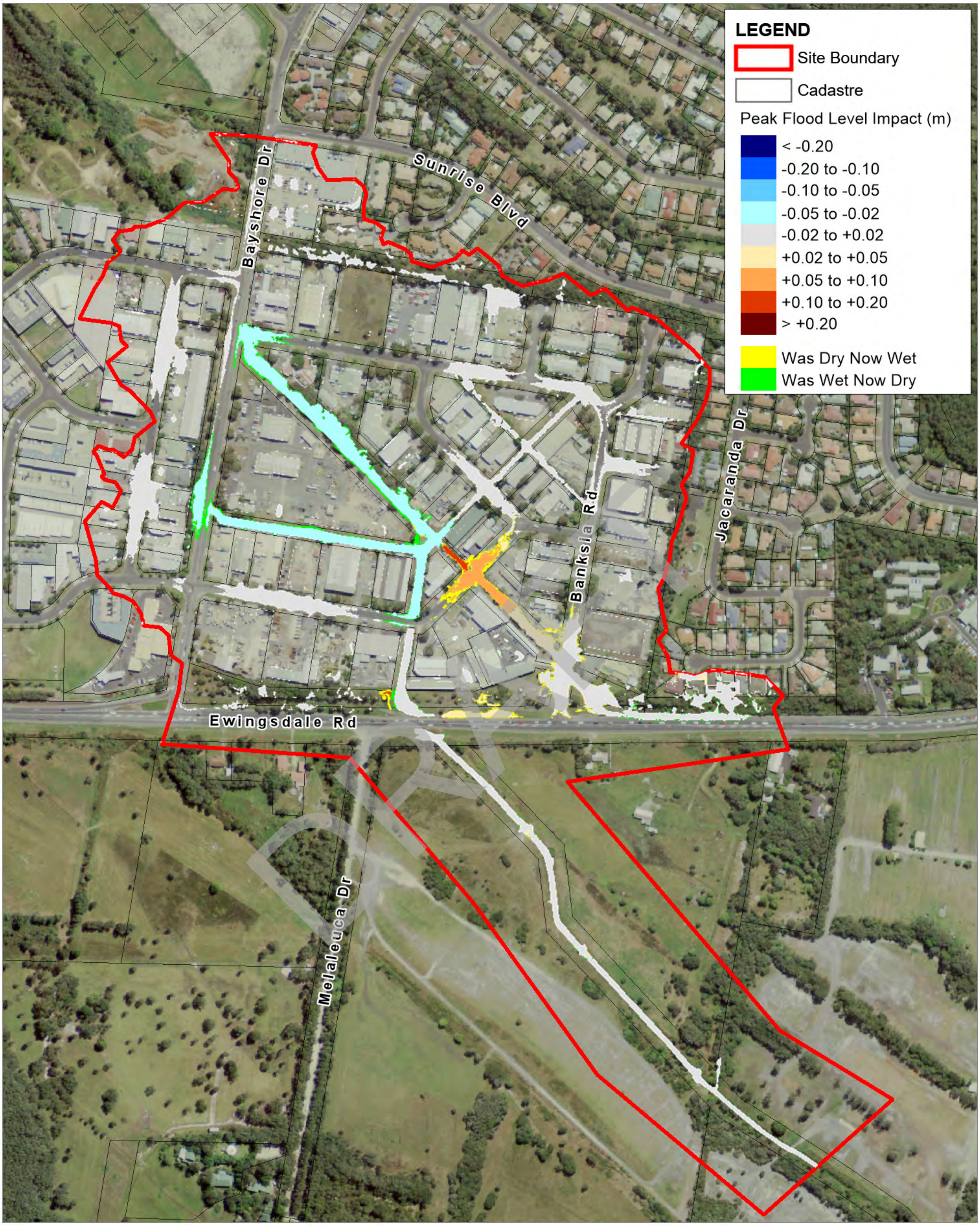
Filepath: S:WATERPROJECTSB23533_IndustrialEstateMainDrainageLineMIWorkspacesPrelim_ExistingFigure_B03_Peak_Flood_Level_Impact_S5_minus_S4.wor



Title:

Peak Flood Level Impacts S6 minus S5

Figure: B-4

Rev: A

N

0 125 250m

Approx. Scale

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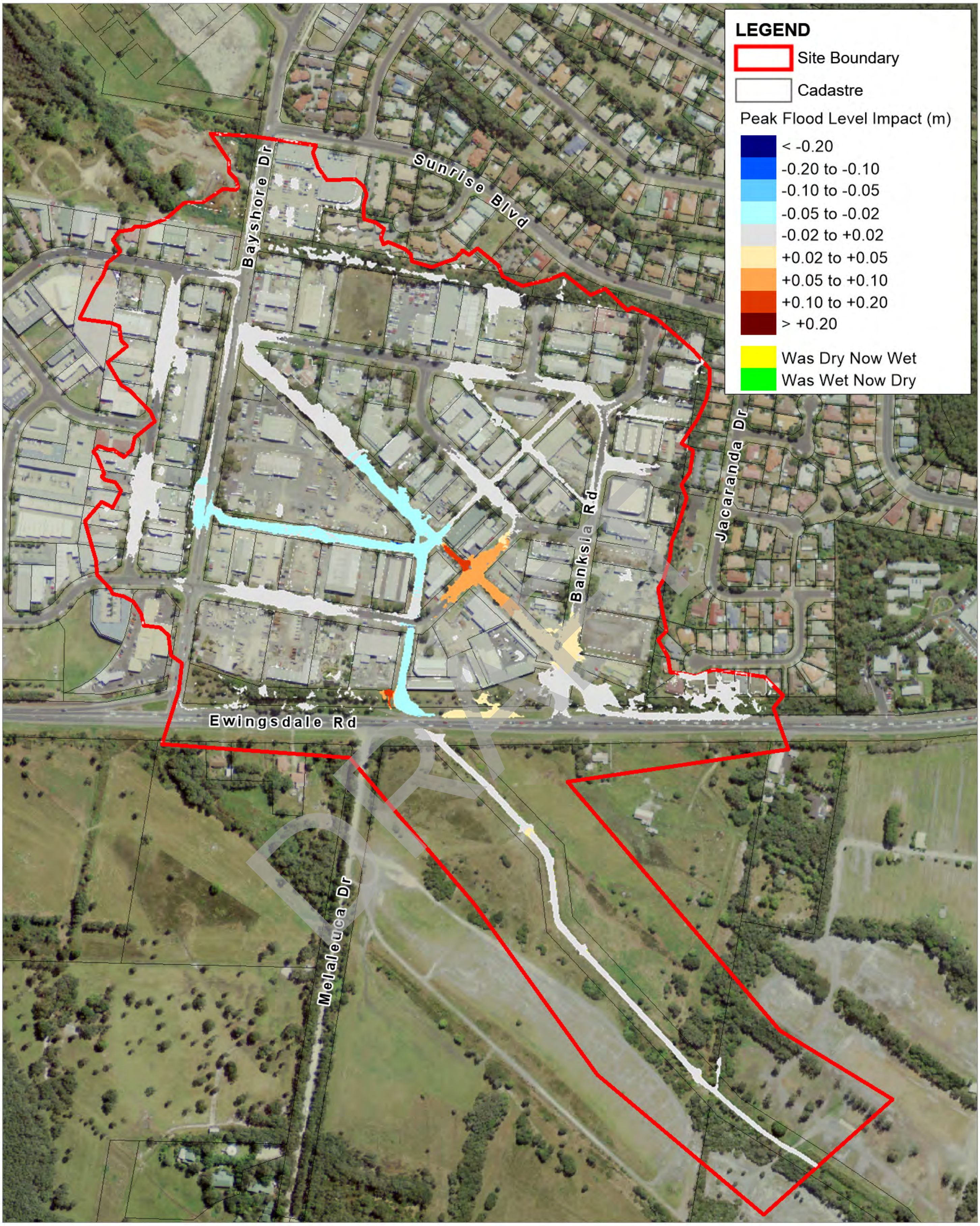

Title:

Peak Flood Level Impacts S7 minus S5

Figure: B-5

Rev: A

N

0 125 250m

Approx. Scale

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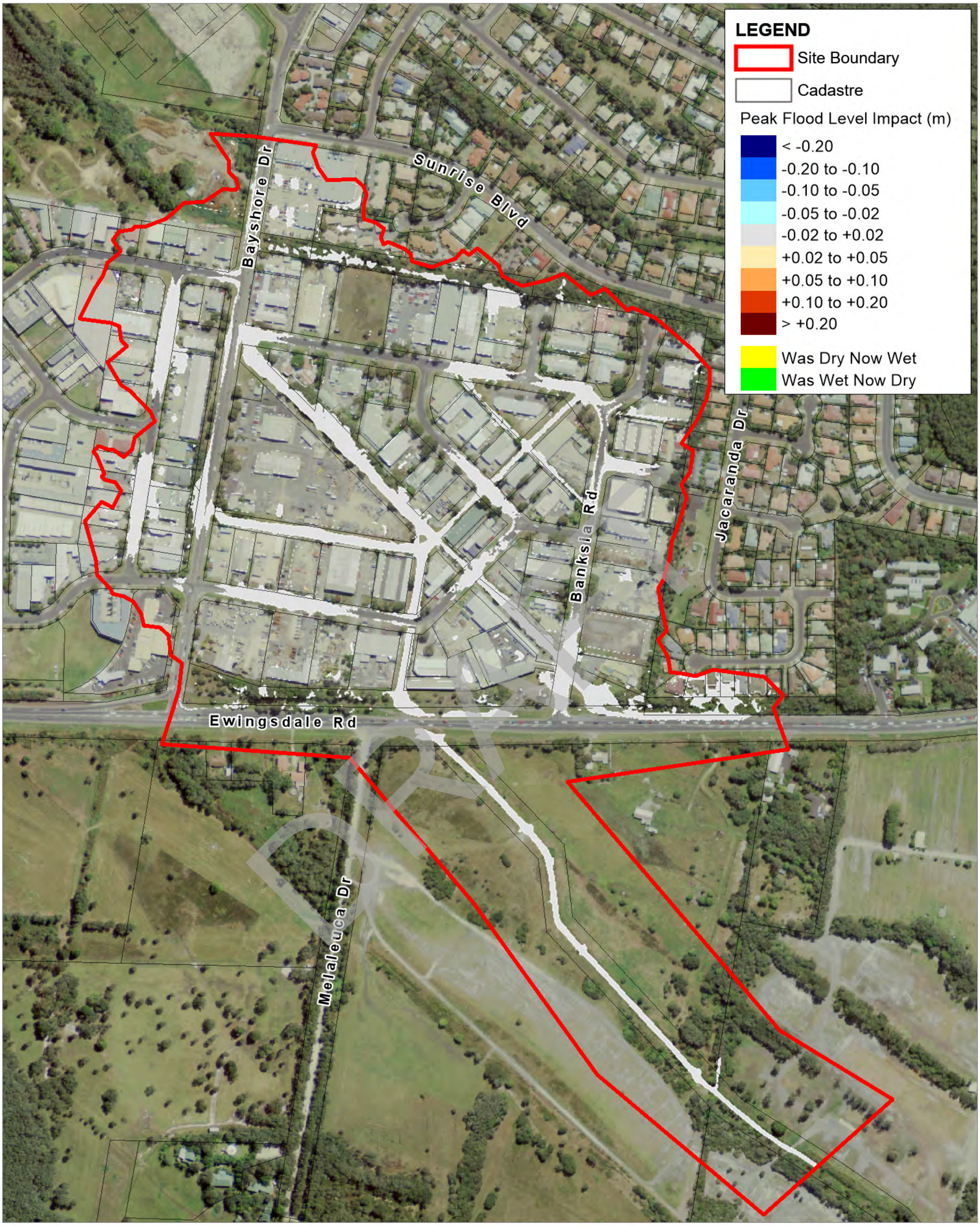
Filepath: S:WATERPROJECTSB23533_IndustrialEstateMainDrainageLineMIWorkspacesPrelim_ExistingFigure_B05_Peak_Flood_Level_Impact_S7_minus_S5_.wor



Title:

Peak Flood Level Impacts S8 minus S5

Figure: **B-6**

Rev: **A**

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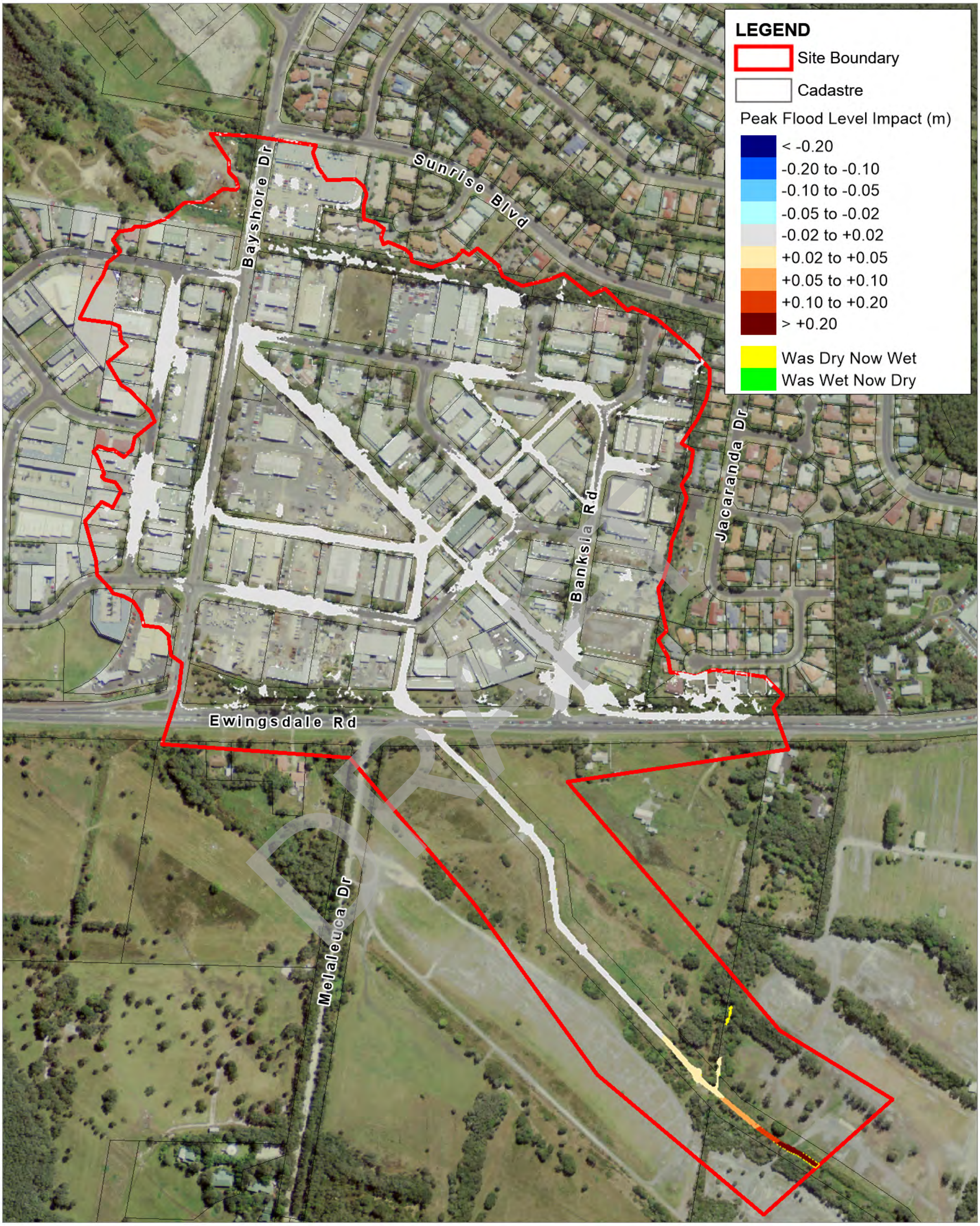
Filepath: S:WATERPROJECTSB23533_IndustrialEstateMainDrainageLineMIWorkspacesPrelim_ExistingFigure_B06_Peak_Flood_Level_Impact_S8_minus_S5.wor



Title:

Peak Flood Level Impacts S9 minus S5

Figure: B-7

Rev: A

N

0 125 250m

Approx. Scale

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Filepath: S:WATERPROJECTSB23533_IndustrialEstateMainDrainageLineMIWorkspacesPrelim_ExistingFigure_B07_Peak_Flood_Level_Impact_S9_minus_S5.wor

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