ALLAN & DENNIS

11 EMU PARK RD LAKES CREEK

FLOOD IMPACT ASSESSMENT

JULY 2020

J18075/R1V1

PREPARED FOR
DILEIGH CONSULTING
ENGINEERS

DOCUMENT INFORMATION

Prepared for:
Dileigh Consulting Engineers

Job reference:
J18075

Report reference:
R1V1

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APPROVED

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Rick Dennis
Principal Engineer

REVISION HISTORY

Version	Date	Revision	Prepared	Approved
R1V1	31 July 2020	For Council Submission	L. Allan	R. Dennis

NOMENCLATURE

A&D	Allan & Dennis Pty Ltd
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALS	Aerial Laser Survey
ARI	Average Recurrence Interval
AR&R	Australia Runoff and Rainfall
Council	Rockhampton Regional Council
DA	Development Application
DCE	Dileigh Consulting Engineers
DFL	Defined Flood Level
DNRME	Department of Natural Resources, Mines and Energy
FIA	Flood Impact Assessment
FFL	Finished Floor Level
IEAust	The Institution of Engineers Australia
IR	Information Request
QT	QuadTree
SGS	Sub-Grid Sampling

In-line with the recent implementation of AR&R (Ball, et al., 2019) design storm events are described in terms of AEP, the probability of a storm event magnitude exceeded in any given year as a percentage. This terminology was implemented to replace the ARI, of which is commonly misinterpreted, for example, that a 1 in 10 year ARI will occur exactly once in every ten years. The reference equivalency of standard design storm events are presented below:

AEP (%)	ARI (year)	Shorthand
39	1 in 2	Q2 (AR&R 1987)
18	1 in 5	Q5 (AR&R 1987)
10	1 in 9.49	Q10
5	1 in 20	Q20
2	1 in 50	Q50
1	1 in 100	Q100

CONTENTS

FIGURES

REFERENCE DRAWINGS

APPENDICES

1 INTRODUCTION

A&D have been engaged by DCE to prepare a FIA to support the DA of 11 Emu Park Road, Lakes Creek, described as Lot 6 RP603373 (the site). The site covers an area of 1,985 m^2 and is bounded by Emu Park Road to the north, the Fitzroy River to the south and existing residential lots to the east and west.

The existing site condition is generally open space with a few small buildings located near the western site boundary. The site gently falls from approximately 6.5 to 5.7 mAHD at the northern to southern boundaries respectively.

The proposed development includes a two-storey marine workshop with a ground and mezzanine FFL of 6.74 and 9.44 mAHD respectively. An ancillary storage building is also proposed on piers with a FFL of 9.75 mAHD, below of which will remain open for flood storage and conveyance.

The site is located on the northern bank of the Fitzroy River and is within Council's mapped flood hazard extents (Map OM-8A-25). In accordance to the Council's Flood Hazard Overlay Code, proposed development must demonstrate no adverse impact external to the site. Accordingly, Council's Fitzroy River flood model was obtained with the agreed data provision dated 17 June 2020 (ref: 2020-3).

This report will demonstrate compliance to Council's Flood Hazard Overlay Code, with direct responses included in Appendix C.

2 REGIONAL FLOOD ASSESSMENT

2.1 SETUP

Council's Fitzroy River flood model was obtained for this assessment, and is detailed in the Aurecon (2011) report. It includes URBS hydrology and TUFLOW (Version 2012-05-AA-SP) hydraulic analysis. The TUFLOW model considered a 25 m grid, which, whilst suitable for a regional scale study, does not have the adequate resolution to assess the proposed site development effectively.

As such, a revised hydraulic model was created, as illustrated in Figure 1. Modifications include:

- Updated to TUFLOW HPC with SGS and QT (version 2020-01-AB);
- Removal of the 1D reaches external to the 2D domain, with model boundaries replaced with flood level time histories extracted from the unaltered Aurecon (2011) model;
- QT 50 m base grid representing the floodplains, 25 m grid of the main Fitzroy River conveyance area with 6.25 m refined grid around site;
- Refinement of topography and roughness of the site (refer Section □);
- SGS of 1 m within the site and 5 m external (available model data); and
- Optimised simulated period and revised outputs.

All other parameters were retained, with the exception of the "2d_lfcsh_FR_E009_Yeppen_R" layered flow constriction (due to yet to be resolved bug within TUFLOW QT). However, the adjacent and more significant Bruce Highway layered flow constriction is still included in the revised model. Nonetheless, these structures have no significant impact on flood levels at the site.

2.2 VALIDATION

Table 2-1 contains a comparison between peak flood levels produced by Council's Fitzroy River model and the revised model at the site.

TABLE 2-1 PEAK SITE FLOOD LEVEL COMPARISON (RP01*)

AEP (%)	Council model (mAHD)	Revised model (mAHD) (EX02)	Difference (m)
1	7.194**	7.092	-0.102
2	6.748	6.684	-0.064
5	6.302	6.268	-0.034
10	5.415	5.392	-0.023
18	4.592	4.559	-0.033
39	2.568	2.585	0.017

*Reporting point location RP01 is shown on the results maps within Appendix A and B.
** Site DFL

The results in Table 2-1 demonstrates that the revised model produces results congruent to Council's overall Fitzroy River flood model, and as such is considered suitable for this assessment.

2.3 SCENARIOS

The following scenarios were considered:

- **Pre-Developed (EX02):** Site topography was updated to use the DNRME ALS (conducted in 2015). The hydraulic roughness of the base model was modified to more accurately represent the existing site conditions (based on aerial imagery); and
- **Post-Developed (DE01):** The pre-developed model was updated to include topographic and roughness changes to represent the proposed structures.

2.4 RESULTS

Regional flood maps for the pre- and post-developed scenarios are contained within Appendix A and B respectively. **Error! Reference source not found.** presents the peak regional 1% AEP flood levels at and surrounding the site with each reporting point is displayed on the results maps included in Appendix A and B.

TABLE 2-2 REGIONAL FITZROY RIVER SUB-MODEL PEAK 1% AEP FLOOD LEVELS

Reporting Point	Pre-Developed (mAHD)	Post-Developed (mAHD)	Difference (m)
Site	7.081	7.083	0.002
RP01	7.075	7.075	0
RP02	7.075	7.074	-0.001
RP03	7.085	7.089	0.004
RP04	7.077	7.074	-0.003
FR_Ch27500	7.093	7.093	0

The results contained within Appendix B and **Error! Reference source not found.** demonstrate the proposed development is not predicted to cause adverse impacts external to the site during regional Fitzroy River flood events.

3 RESPONSE TO IR

Council issued an IR dated 20 December 2019 (ref: D/117-2019). Responses to relevant flooding items are detailed below.

2.1 Provide an assessment of the proposal against the Flood Hazard Overlay Code under version 1.2 of the Rockhampton Region Planning Scheme 2015.

Refer to Appendix C.

2.3 Demonstrate that work within the one per cent (1%) Annual Exceedance Probability defined flood extent does not result in:

2.3.1. Loss of flood storage;

2.3.2. Increase in flood levels;

2.3.3. Obstruction of flow paths;

2.3.4. Acceleration or retardation of flow; and

2.3.5. Actionable nuisances or worsening to surrounding land or infrastructure.

This must be accompanied by full calculations including electronic model files and results files from industry standard modelling software. All details of the modelling assumptions must be compiled in a report which is prepared and certified by a Registered Professional Engineer of Queensland (RPEQ).

This report demonstrates compliance with the above.

2.4 Provide details on the Earthworks (excavation and/or filling) that is required to facilitate the proposed development. All Earthworks located on flood prone land is to be carried out in accordance with an approved hydrology and hydraulics report which is prepared by an RPEQ. The report must demonstrate that any proposed filling, excavation or structures will not adversely affect flood levels or flows on the site, or upstream and downstream of the site.

This report demonstrates compliance with the above.

2.7 It is unclear whether there is trafficable access to the site during a flood event (given the site is affected by the High and Extreme Flood Hazard areas). Please provide an Evacuation Plan that addresses the following matters:

2.7.1. The evacuation time;

2.7.2. The types of vehicles which are necessary for evacuation purposes;

2.7.3. The distance to flood free land;

2.7.4. The evacuation route; and

2.7.5. Identifying at what stage of the flood event will the evacuation route be cut.

A site evacuation route is identified on the attached flood result maps, flood free land can be accessed by access via Emu Park Road on to Dorly Street (approximately 375 m) or by foot via crossing the rail line and Northbank Street to high ground in Cornick Street (approximately 155 m).

With flood depths generally less than 0.3 m, this route should remain trafficable up to the 1% AEP.

4 CONCLUSION & QUALIFICATIONS

This FIA has been prepared to support the DA of the site. Flood model results demonstrate the proposed development will not cause adverse impacts external to the site. Compliance to Council's Flood Hazard Overlay Code is included in Appendix C.

The analysis and overall approach was specifically catered for the particular project requirements, and may not be applicable beyond this scope. For this reason, any other third parties are not authorised to utilise this report without further input and advice from A&D.

The report is based on the following information provided by others:

- Fitzroy River flood model (Aurecon, 2011) supplied by Council;
- ALS elevation data (supplied by DNRME); and
- Proposed building plans prepared by Bael Building Design.

The accuracy of the report is dependent upon the accuracy of this information.

Whilst this report accurately assesses catchment hydraulic performance, using industry standard theoretical modelling techniques and engineering practices, actual future observed catchment flows, levels and extent of inundation may vary from those predicted herein.

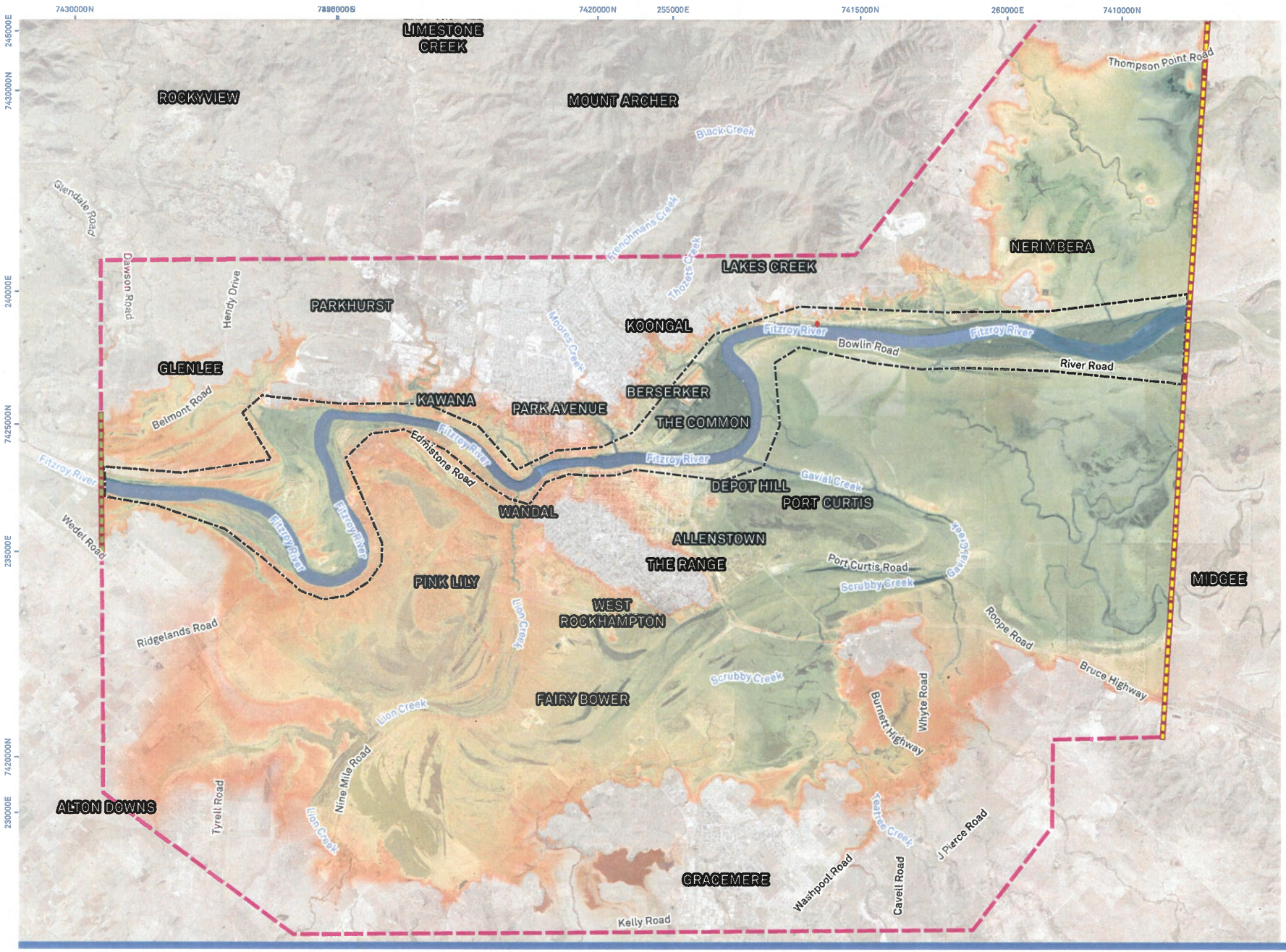
5 REFERENCES

AIDR. (2017). *Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia.* Australian Institute for Disaster Resilience, Commonwealth of Australia Attorney-General's Department. Australian Institute for Disaster Resilience, on behalf of the Australian Government Attorney-General's Department.

Aurecon. (2011). *Flood Study Report Fitzroy River Flood Study.* Brisbane: Aurecon Australia Pty Ltd.

Ball, J., Babister, M., Nathan, R., Weeks, W., Weinmann, E., Retallick, M., & Testoni, I. (Eds.). (2019). *Australian Rainfall and Runoff: A Guide to Flood Estimation.* Commonwealth of Australia (Geoscience Australia).

FIGURES



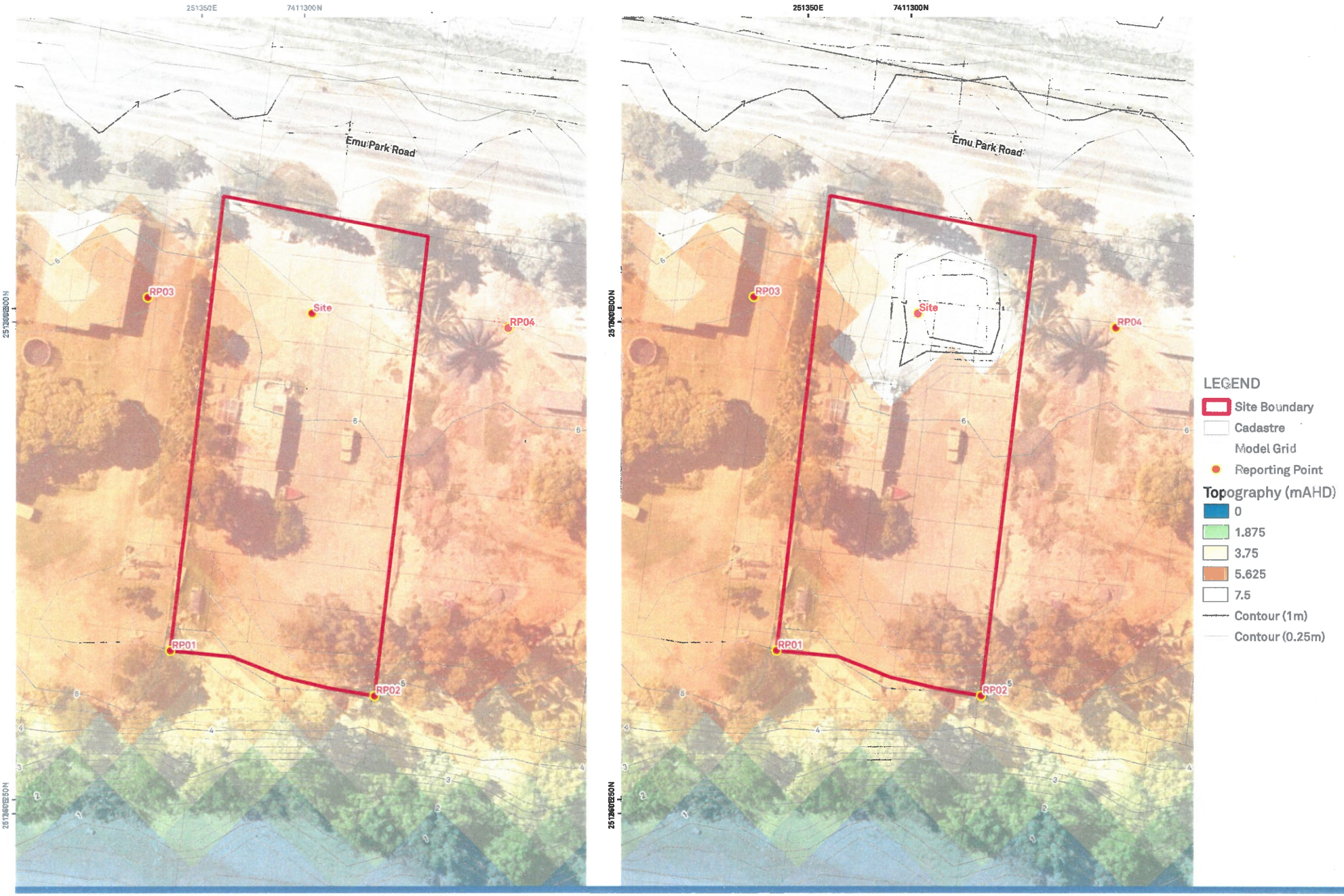
ALLAN & DENNIS

DATE 30 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:90,000

0 2 4 6 8 10 km

FIGURE 1
SITE LOCATION AND MODEL EXTENT

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



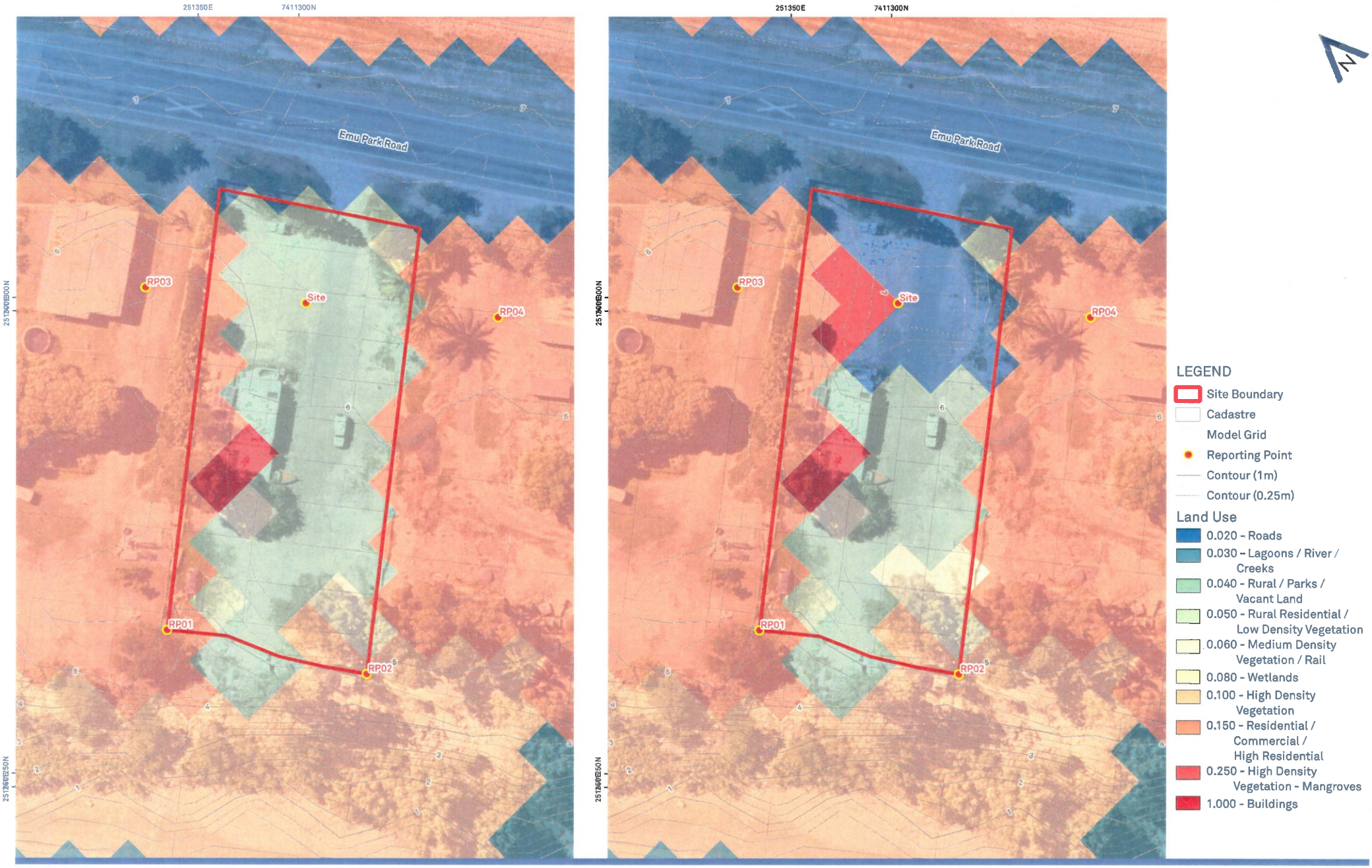
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:500

0 7 14 21 28 35 m

FIGURE 2
MODEL TOPOGRAPHY (LHS EXISTING, RHS DEVELOPED)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:500
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FIGURE 3

MODEL ROUGHNESS (LHS EXISTING, RHS DEVELOPED)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

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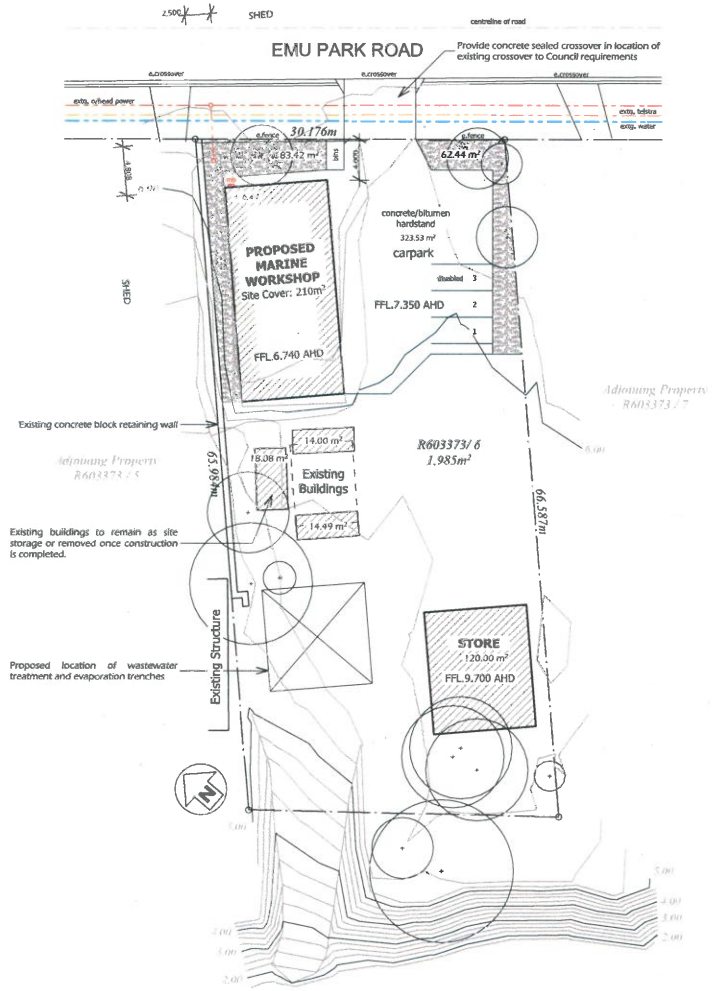
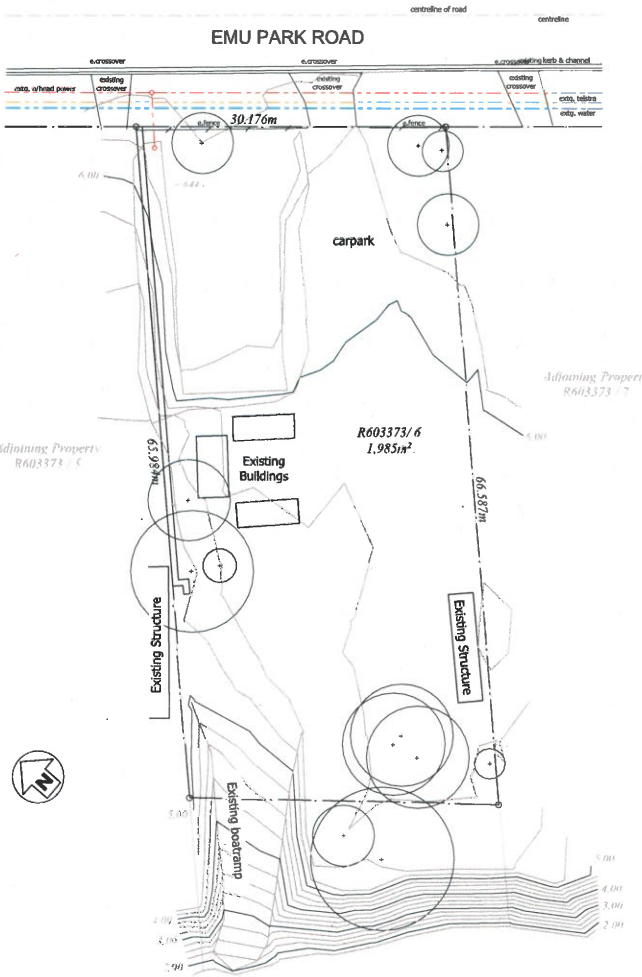
REFERENCE DRAWINGS

A1 DRAWING
NOTED SCALES RELATE TO A1 DRAWINGS



2 **PROPOSED SITE PLAN**
Scale 1:250 at A1 / 1:500 at A3



1 **EXISTING SITE PLAN**
Scale 1:250 at A1 / 1:500 at A3

rev	description	date
SK1.0	sketch issue	02.06.2016
DA1.0	development application issue	16.06.2016

Building Designers Association of Queensland Inc.

BAEL BUILDING DESIGN
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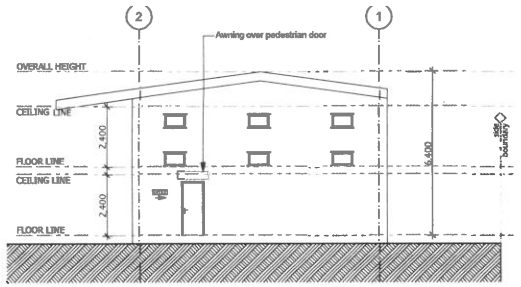
E: rebecca@bael.com.au
BSA Licence: #1198384
BDAQ Member:#0001235

Project Name:
PROPOSED MARINE WORKSHOP
Client:
F. FINNEGAN
Project Adress:
11 EMU PARK ROAD,
LAKES CREEK 4701
Drawing Title:
SITE PLANS: EXISTING & PROPOSED
Status: Sketch Issue
Issue #: SK1.0
Job Number: 1410-10
Scale: as shown
Page Number: DA1.1
Drawn By: rjd
Plot: 6:47 AM 17/7/2019

A1 DRAWING
NOTED SCALES RELATE TO A1 DRAWINGS



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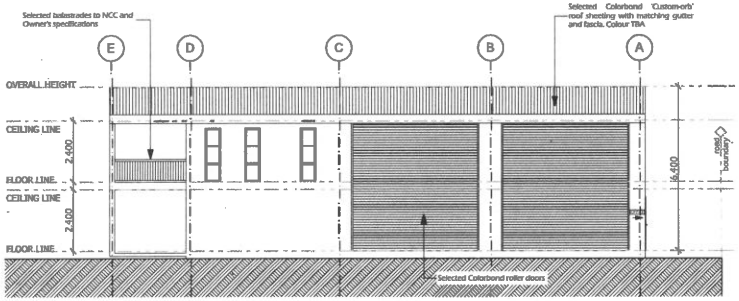

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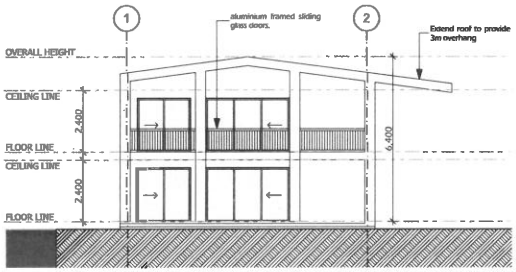
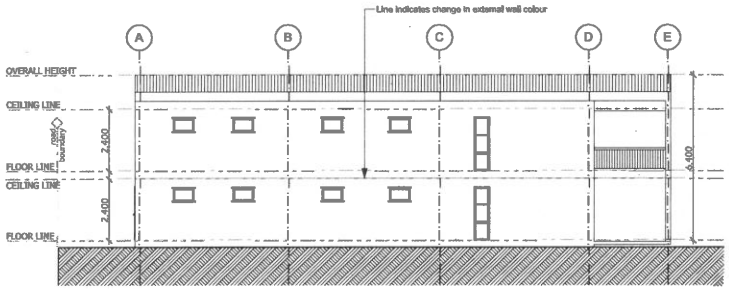
Scale 1:100 @ A1



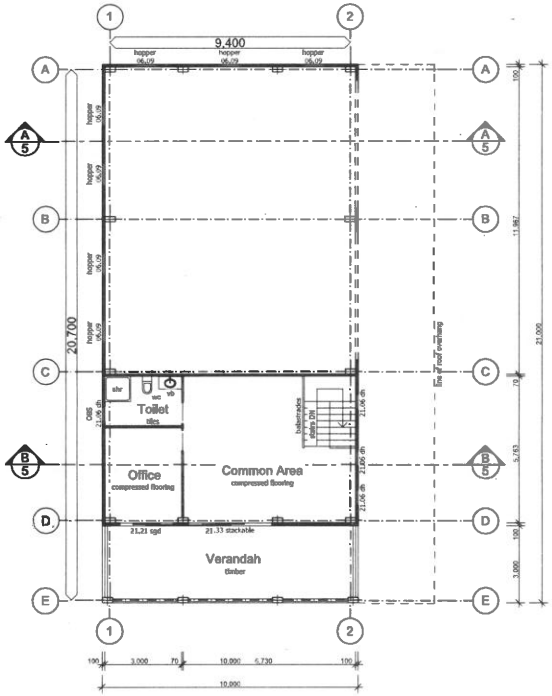
5 South-West Elevation
Scale 1:100 @ A1



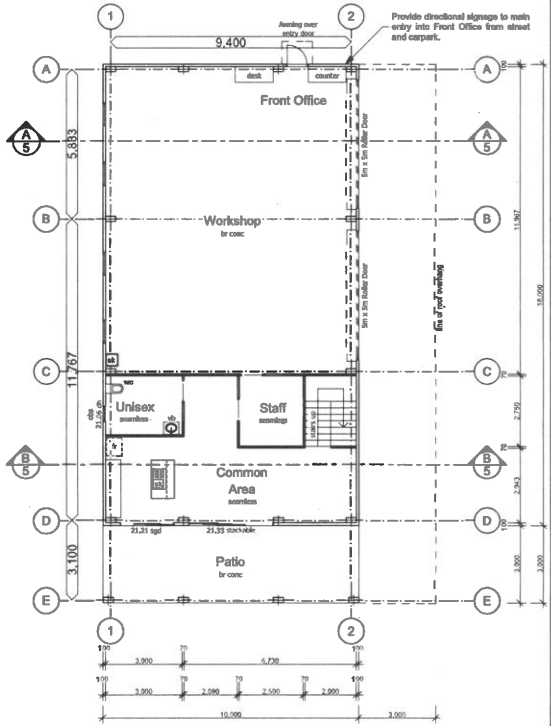
6 North-West Elevation
Scale 1:100 @ A1

GENERAL LEGEND

A/C	SELECTED AIR CONDITIONER UNIT
COL.	COLUMN
DP	90mm DIA. DOWNPIPE AS INDICATED
DR	DRYER
DW	DISHWASHER (UNDER BENCH)
F	FRIDGE
HWS	HOT WATER SYSTEM
P	PANTRY
SHR	SHOWER
SK	SINK
ST	STOVE / OVEN / RANGEHOOD
TUB	WASHTUB
VB	VANITY BASIN
W	WASHING MACHINE
WC	DUAL FLUSH TOILET



2 PROPOSED MEZZANINE FLOOR
Scale 1:100 @ A1



1 PROPOSED FLOOR PLAN
Scale 1:100 @ A1

rev	description	date
SK1.0	sketch issue	02.08.2016
DA1.0	development application issue	16.08.2016

Building Designers Association of Queensland Inc.

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E: rebecca@baeldesigns.au
BSA Licence: #1198384
BDAQ Member: #0001235

Project Name:
PROPOSED MARINE WORKSHOP
Client:
F. FINNEGAN
Project Adress:
11 EMU PARK ROAD,
LAKES CREEK 4701
Drawing Title:
LAYOUT PLANS : GROUND & MEZZANINE
Status: Sketch Issue
Issue #: SK1.0
Job Number: 1410-10
Scale: as shown
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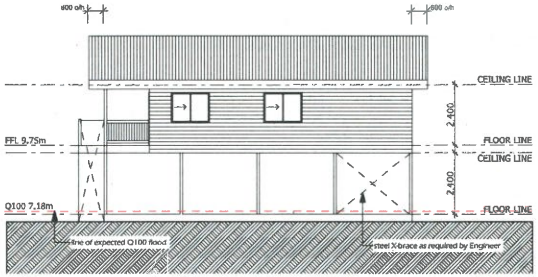
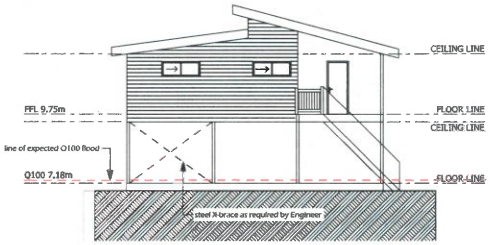
Drawn By: rjd
Plot: 6/47 AM 17/12/2016



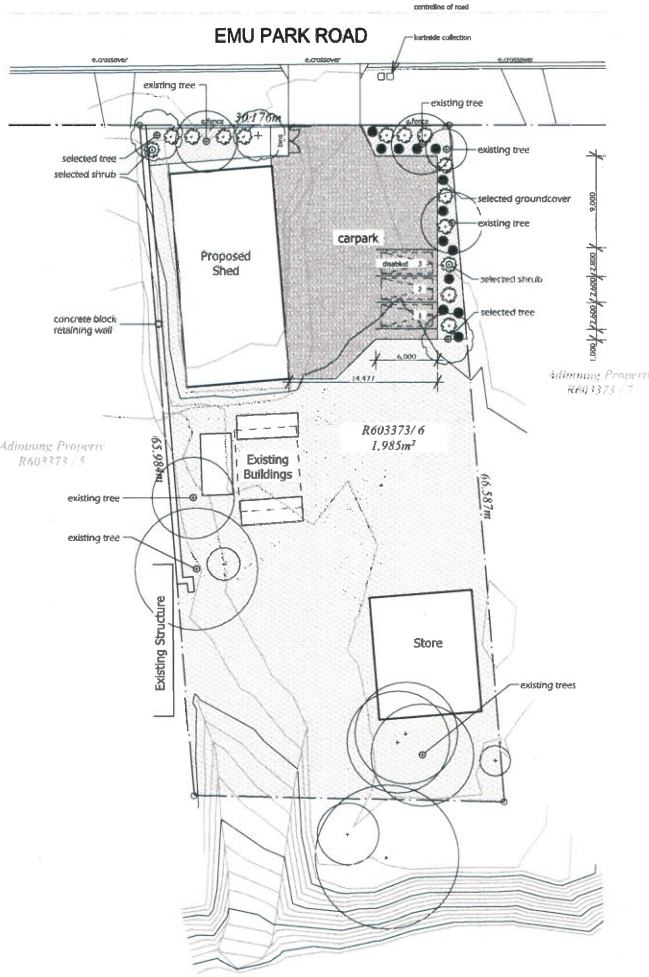
3 WESTERN ELEVATION



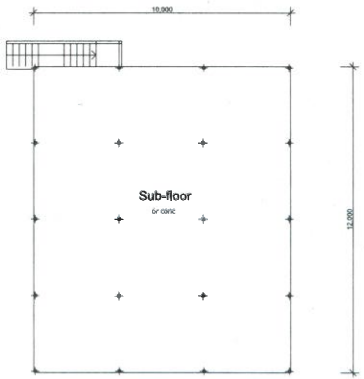
4 NORTHERN ELEVATION

LANDSCAPING LEGEND

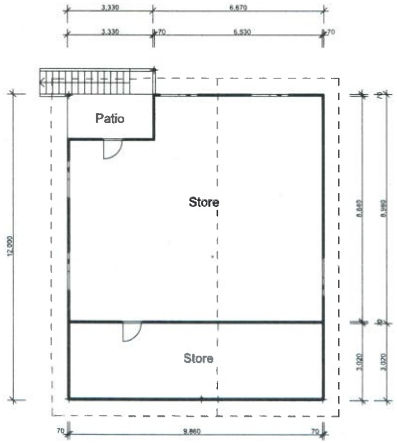
SURFACES	PREPARATION
Denotes grassed / lawn areas	PLANTED AREAS Cultivate sub grade to 100mm depth. Cultivate Gypsum @ 250g/m² into subgrade. Spread topsoil to a minimum 200mm depth. Provide selected mulch over to 100mm thick.
Denotes mulched garden areas planted with species as noted	
Denotes sealed concrete driveway, car parking and visible transounting areas	LAWN AREAS Cultivate subgrade to 10mm depth. Cultivate Gypsum @ 250 g/m² into subgrade. Spread topsoil to minimum 100mm depth. Pay turf to edges. Fill all gaps and roll.
Denotes selected shrub	
Denotes selected ground cover	GENERAL Provide a suitably timed, auto-matic water system to all lawn and garden areas.
Denotes selected tree	Extent of garden areas to be confirmed on-site by Owner. All species shown are indicative only, Owner to confirm exact size, species, location and number of plantings required.



5 PROPOSED LANDSCAPE PLAN



1 PROPOSED FLOOR PLAN



2 PROPOSED MEZZANINE FLOOR

rev	description	date
SK1.0	sketch issue	02.08.2016
DA1.0	development application issue	16.08.2016

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Drawing Title:
SITE PLANS : PARKING & LANDSCAPING

Status: Sketch Issue
Issue #: SK1.0
Scale: as shown
Drawn By: rjd
Job Number: 1410-10
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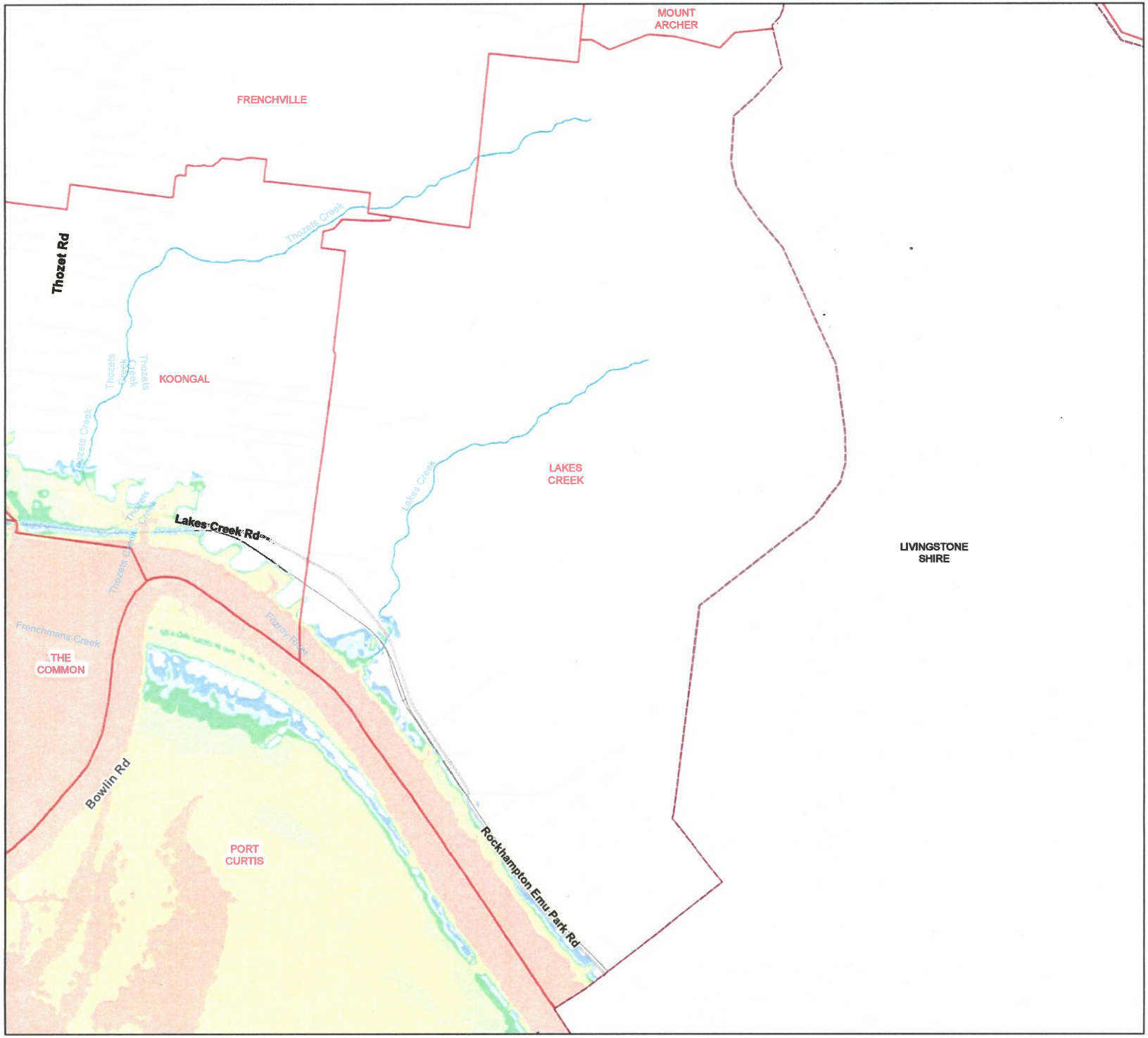


Legend

- Locality Boundaries

Hazard Classification

- H1 (Low)
- H2 (Medium)
- H3 (High)
- H4 (High)
- H5 (Extreme)
- H6 (Extreme)
- North Rockhampton Flood Management Area

Source: Aecom 2014 Fitzroy River Flood Study, 2014.
Note: For further flood mapping information please refer to the Floodplain Investigation Overlay Maps (OM-8B) or Creek Catchment Flood Overlay Maps (OM-8C). The Flood Hazard layer has been smoothed for visual purposes. A detailed flood search can be obtained through Council. The North Rockhampton Flood Management Area is designed up to and including 1% annual exceedance probability riverine flood where a residual risk may exist.

Planning Scheme provisions (overlay code) associated with an overlay map only apply to that part of the land which is affected by the overlay.

Approx Scale @A3 1:20,000

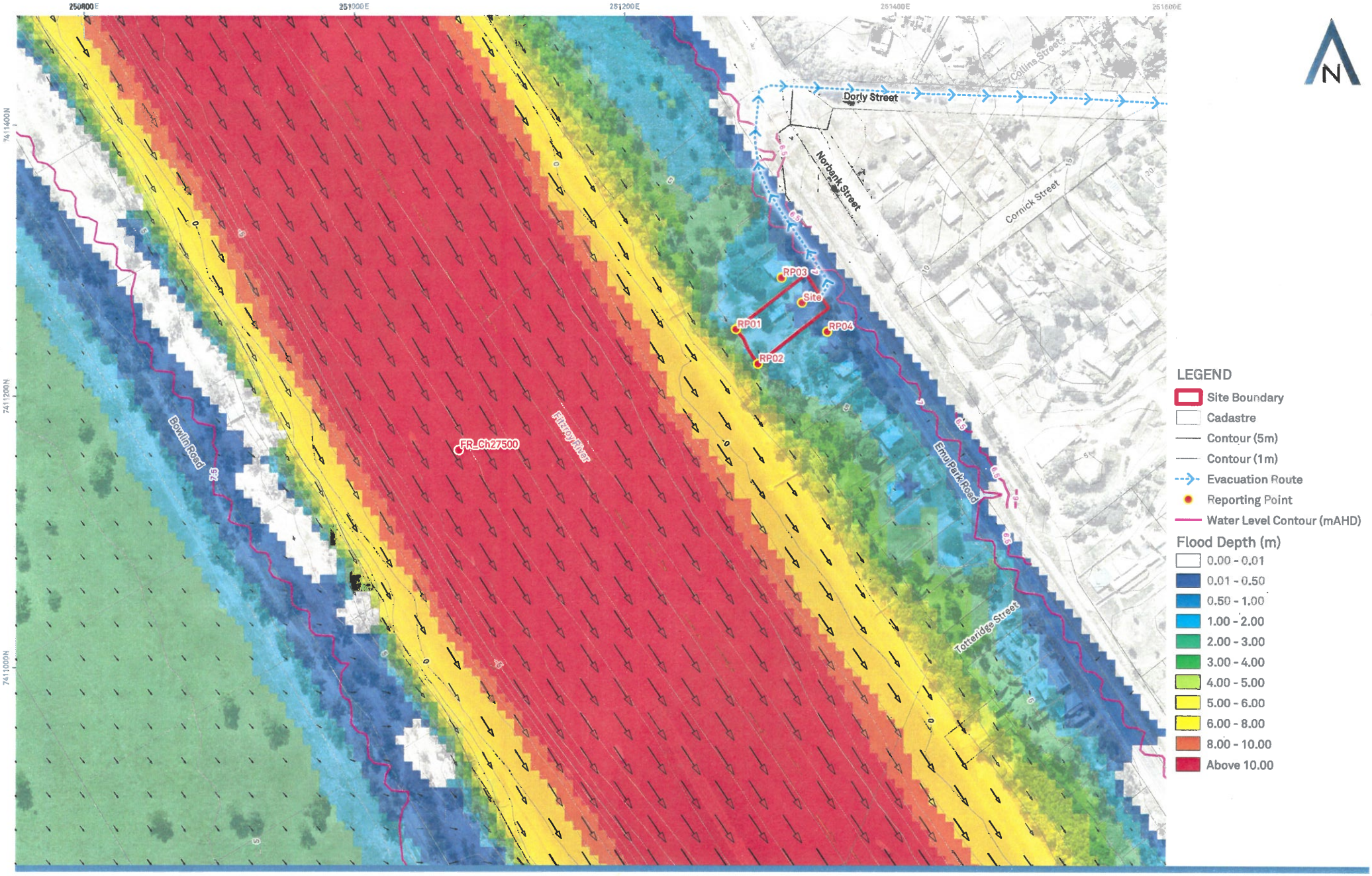
0 300 600 1,200 Metres

Map OM-8A-25
LAKES CREEK
Rockhampton Regional Council Planning Scheme Fitzroy River Flood Overlay Map

Feb 2018

APPENDIX A

FITZROY RIVER FLOOD RESULTS: PRE-DEVELOPED SCENARIO



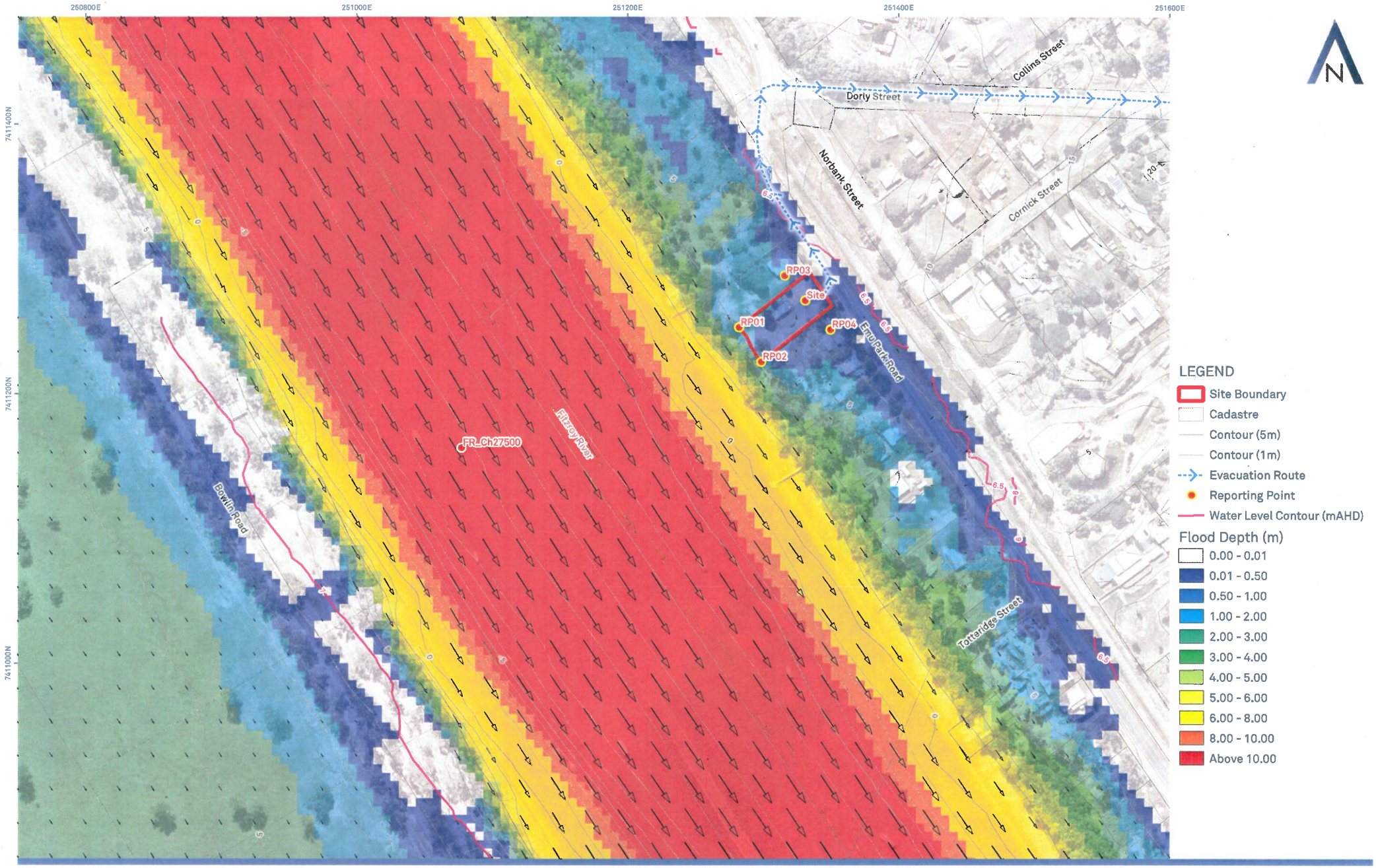
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.1.1

FITZROY RIVER PRE-DEVELOPED 1% AEP PEAK FLOOD DEPTH (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



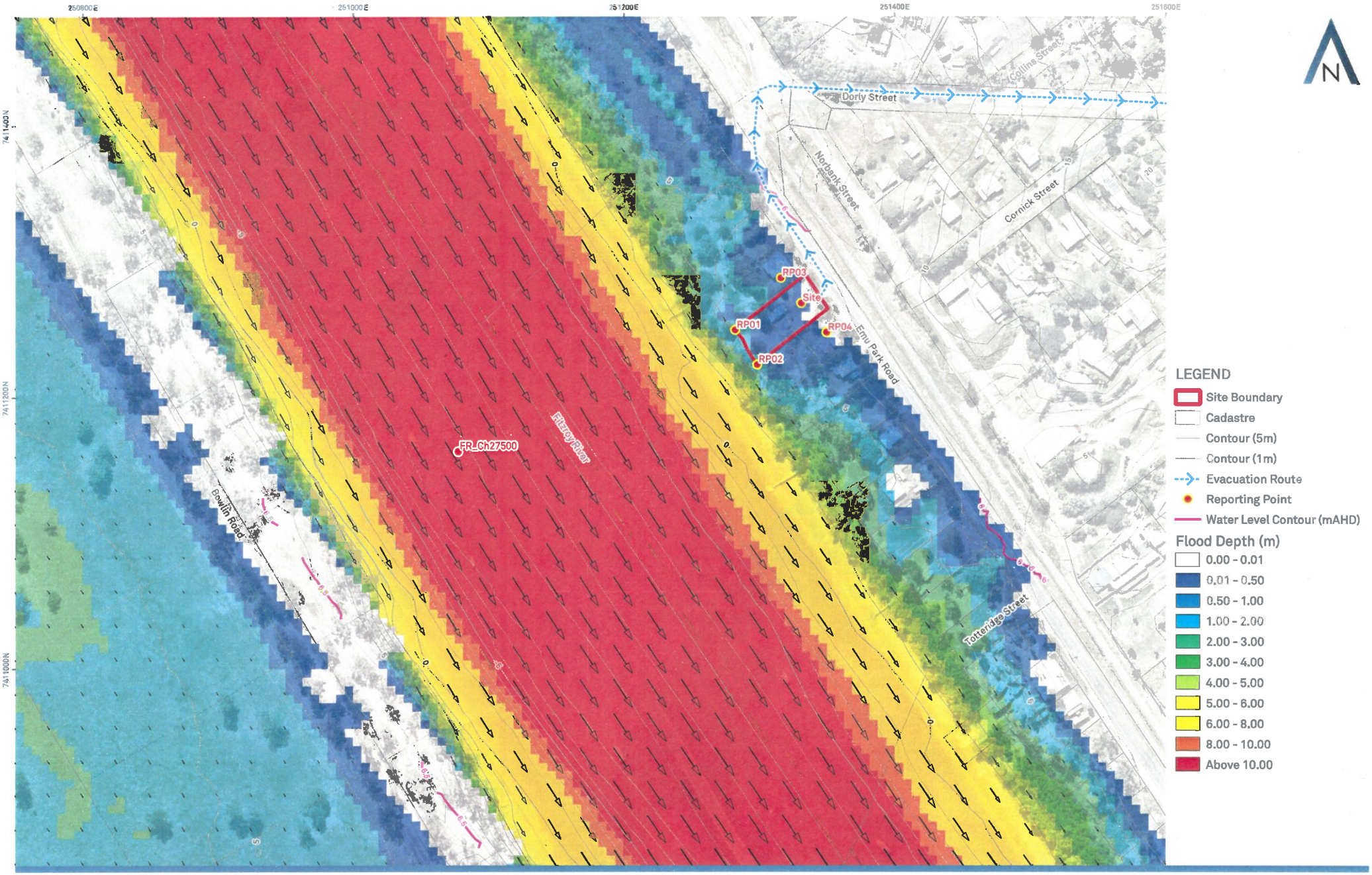
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.2.1

FITZROY RIVER PRE-DEVELOPED 2% AEP PEAK FLOOD DEPTH (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



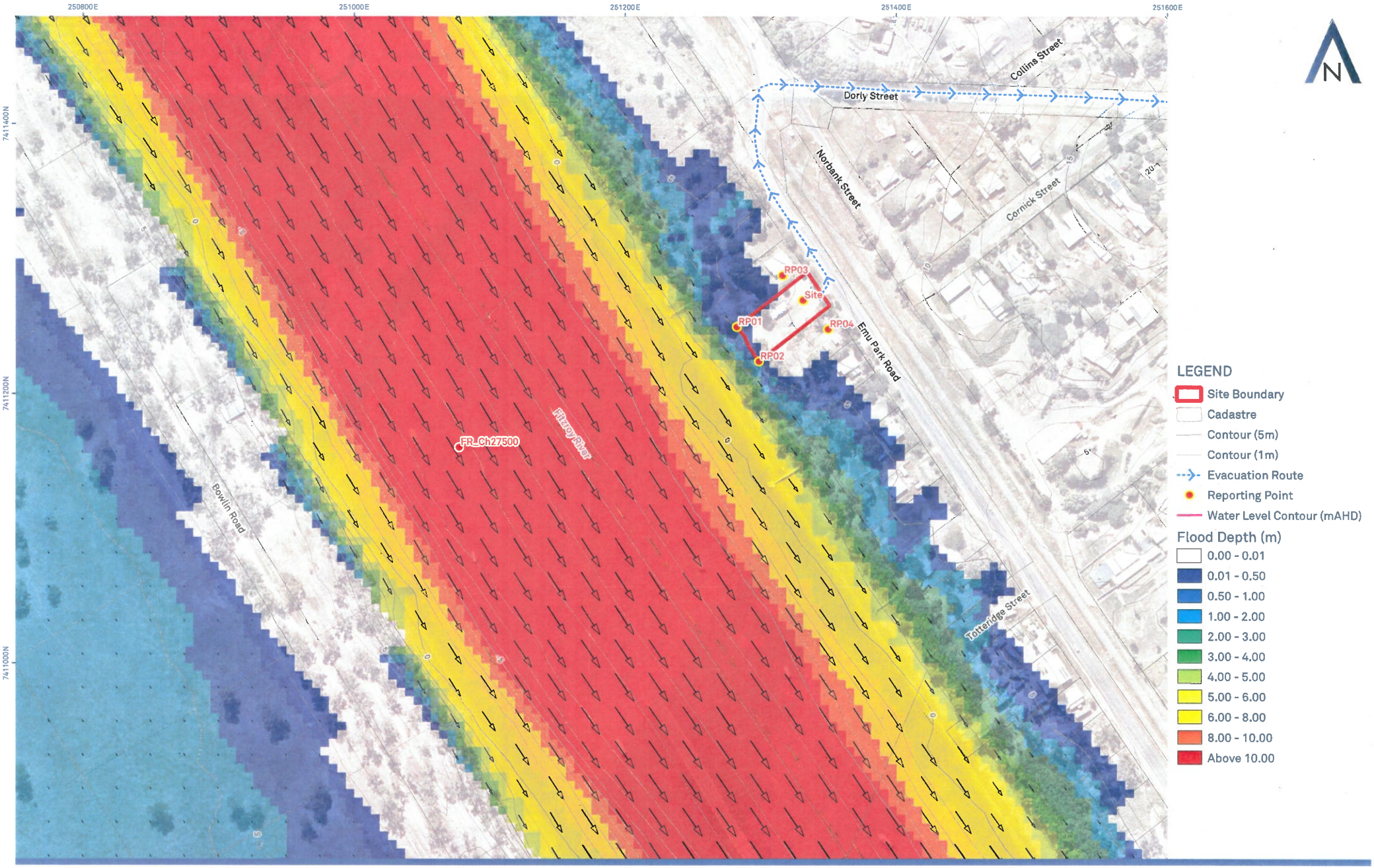
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.3.1

FITZROY RIVER PRE-DEVELOPED 5% AEP PEAK FLOOD DEPTH (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



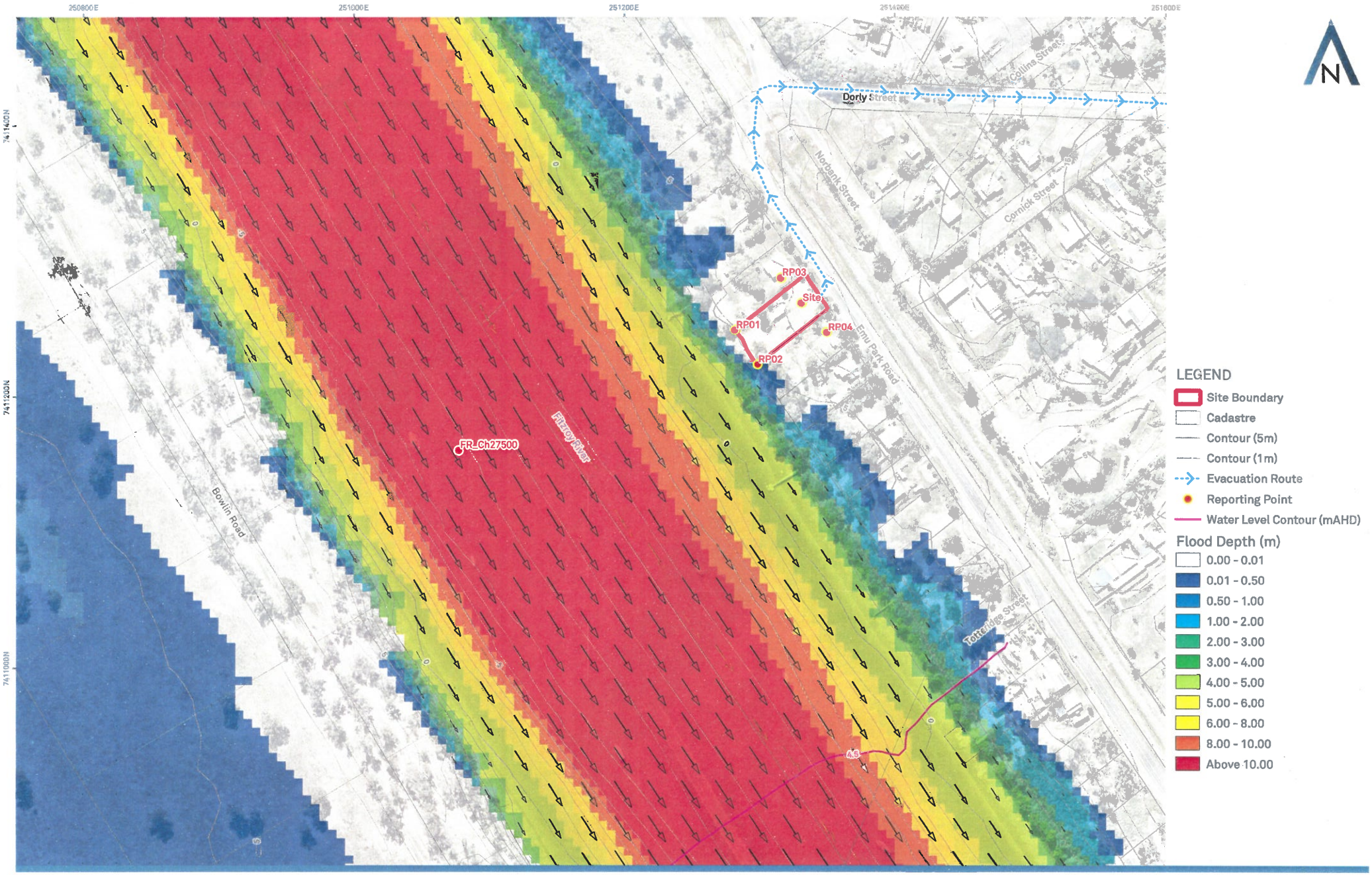
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.4.1

FITZROY RIVER PRE-DEVELOPED 10% AEP PEAK FLOOD DEPTH (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



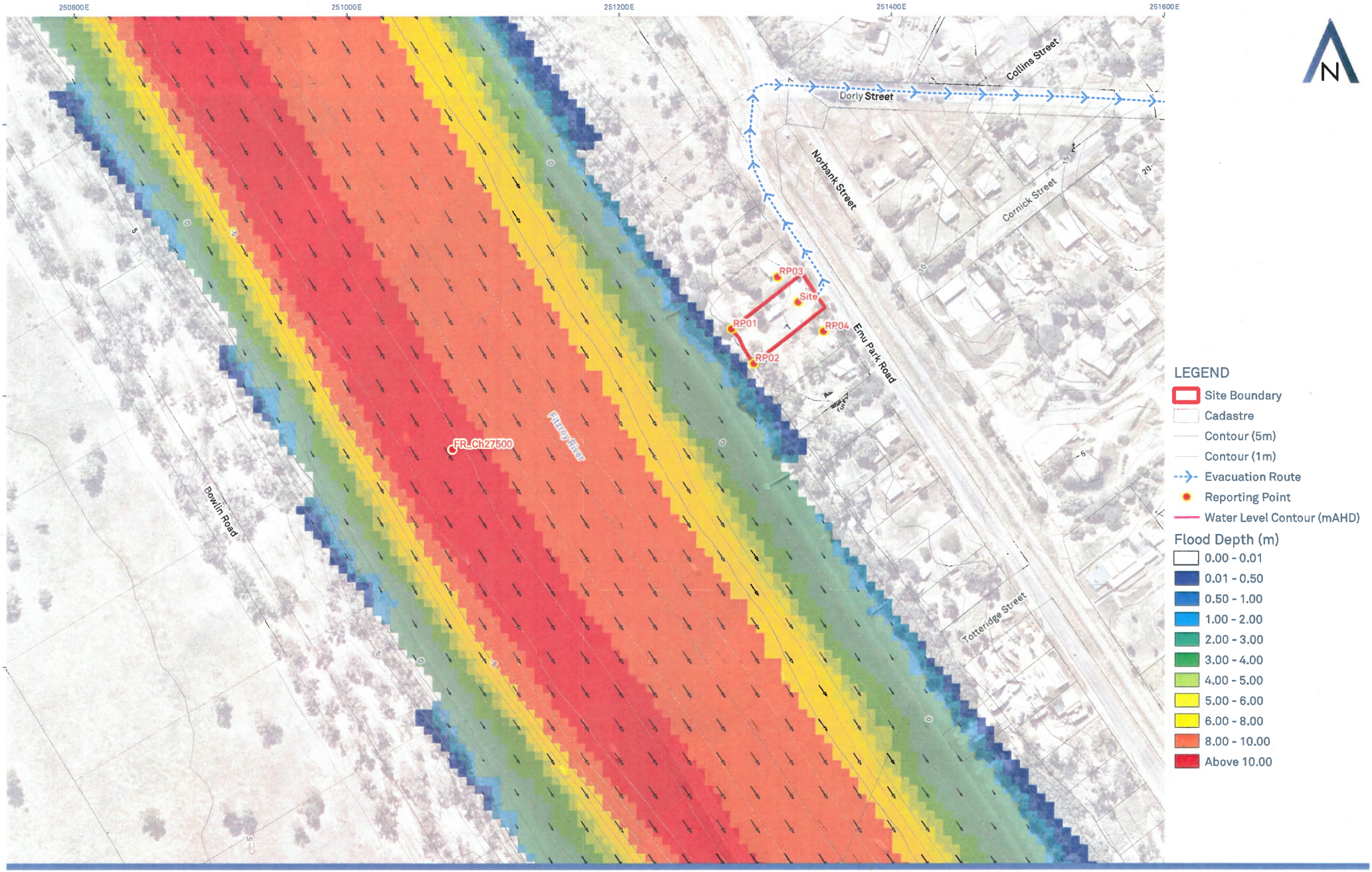
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.5.1

FITZROY RIVER PRE-DEVELOPED 18% AEP PEAK FLOOD DEPTH (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



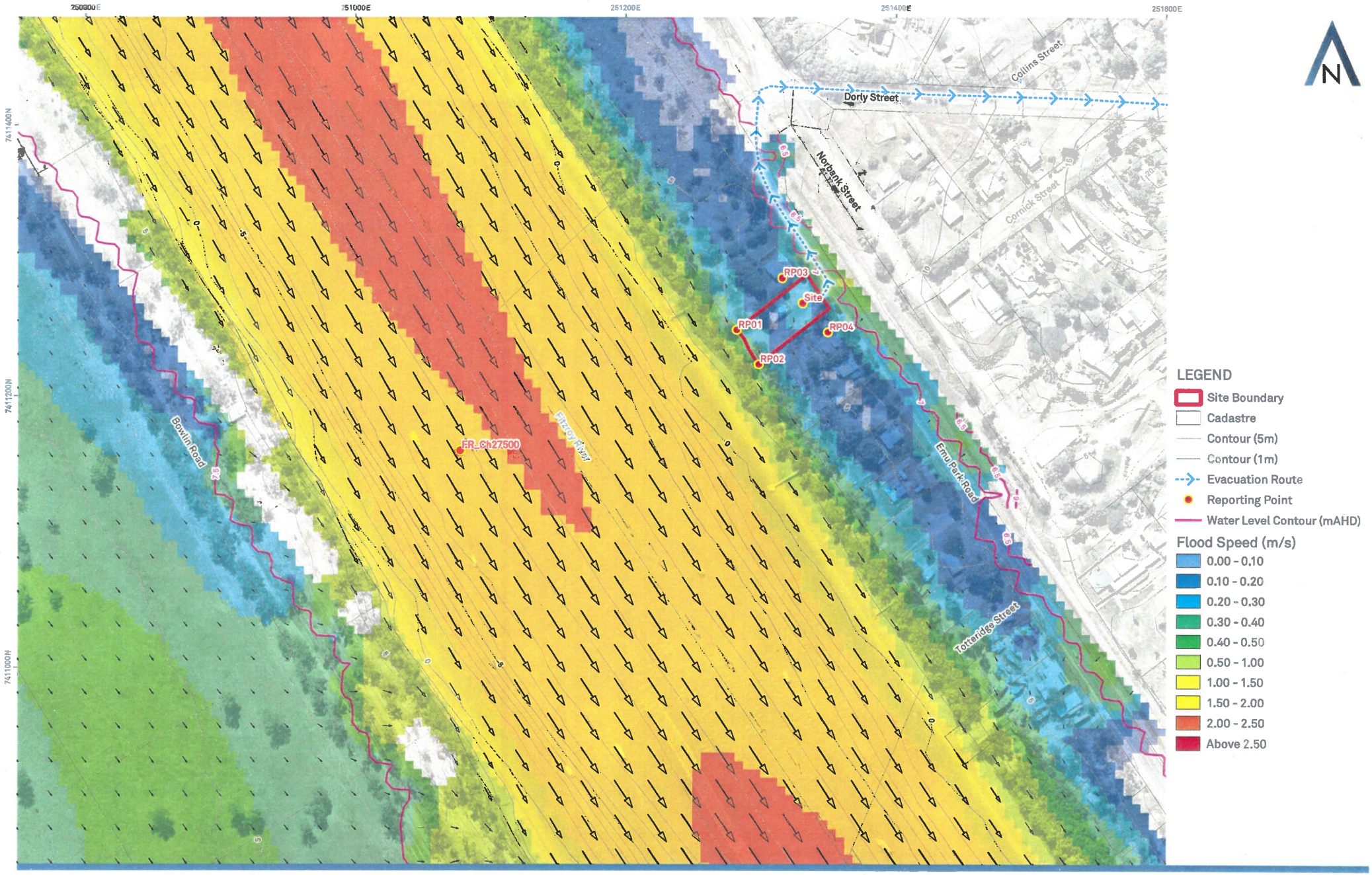
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.6.1

FITZROY RIVER PRE-DEVELOPED 39% AEP PEAK FLOOD DEPTH (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



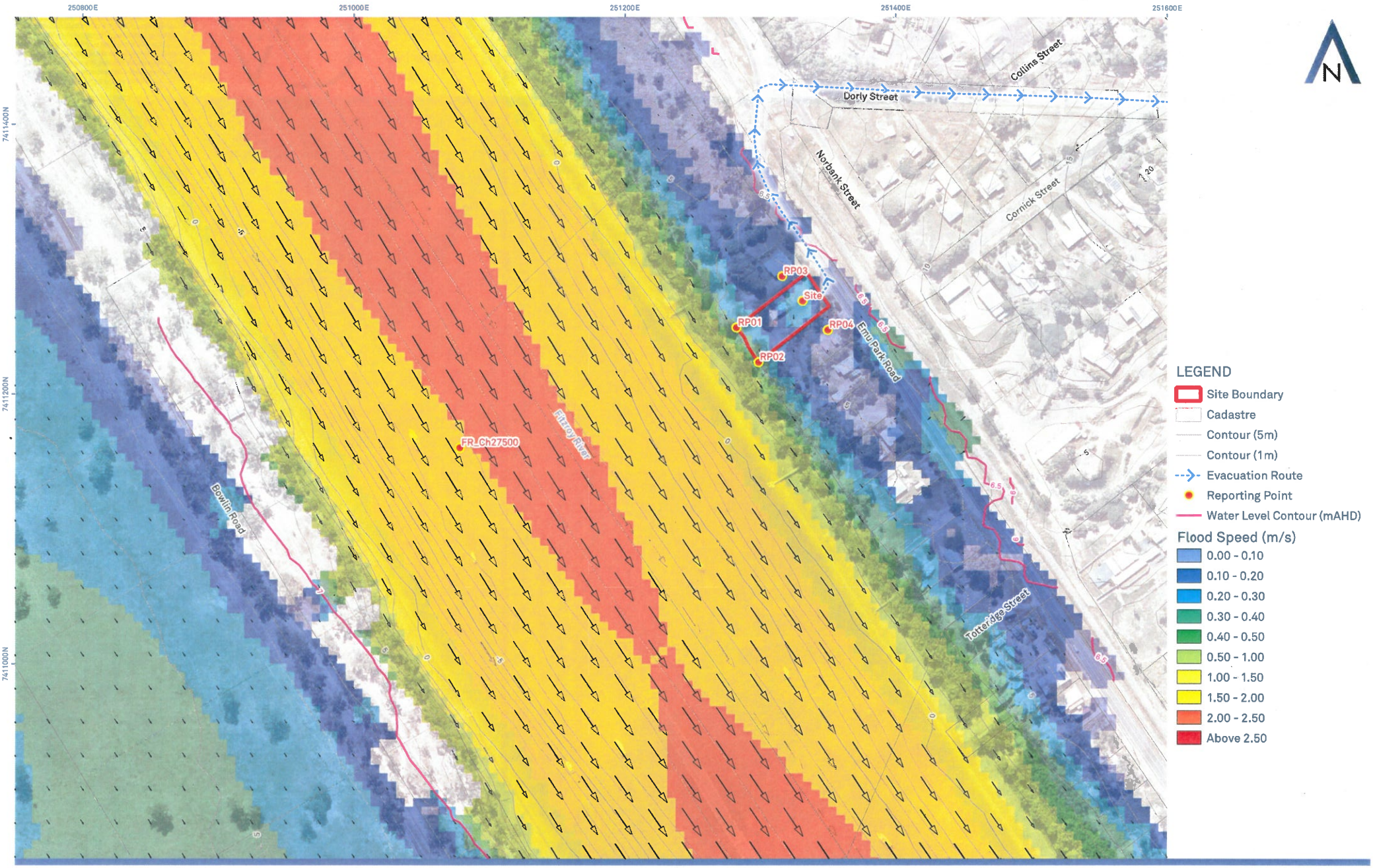
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.1.2

FITZROY RIVER PRE-DEVELOPED 1% AEP PEAK FLOOD SPEED (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



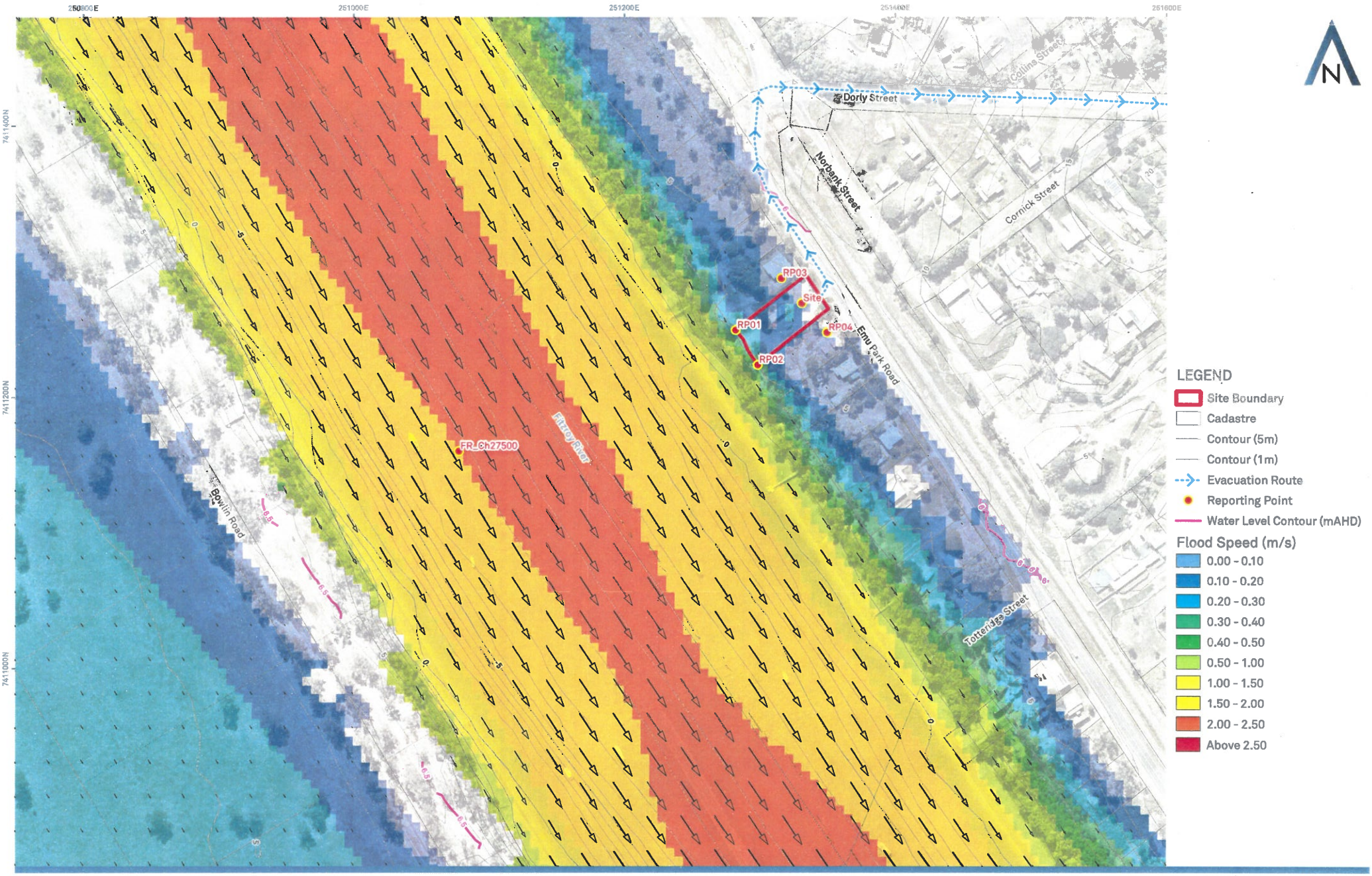
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.2.2

FITZROY RIVER PRE-DEVELOPED 2% AEP PEAK FLOOD SPEED (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



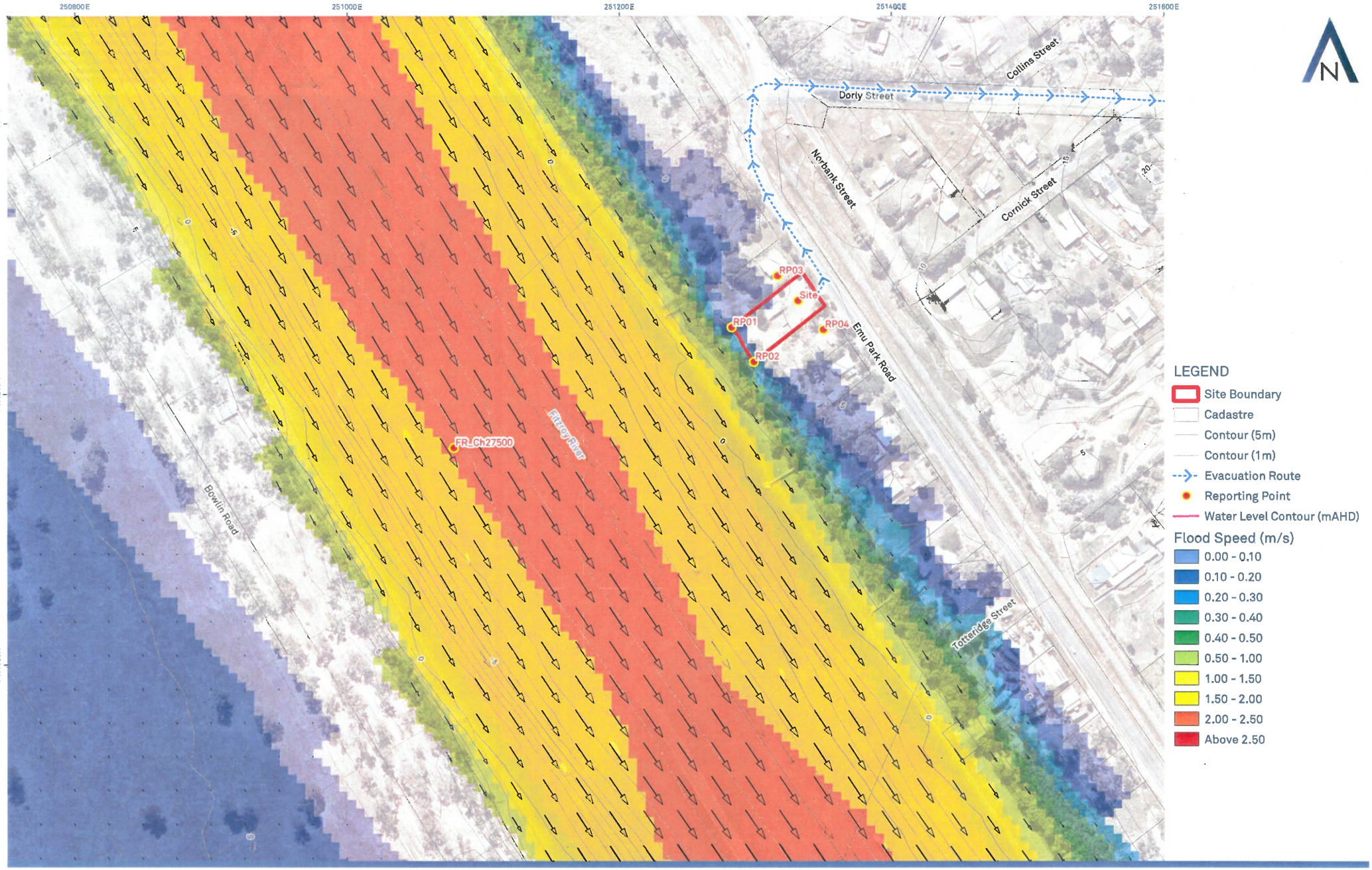
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.3.2

FITZROY RIVER PRE-DEVELOPED 5% AEP PEAK FLOOD SPEED (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



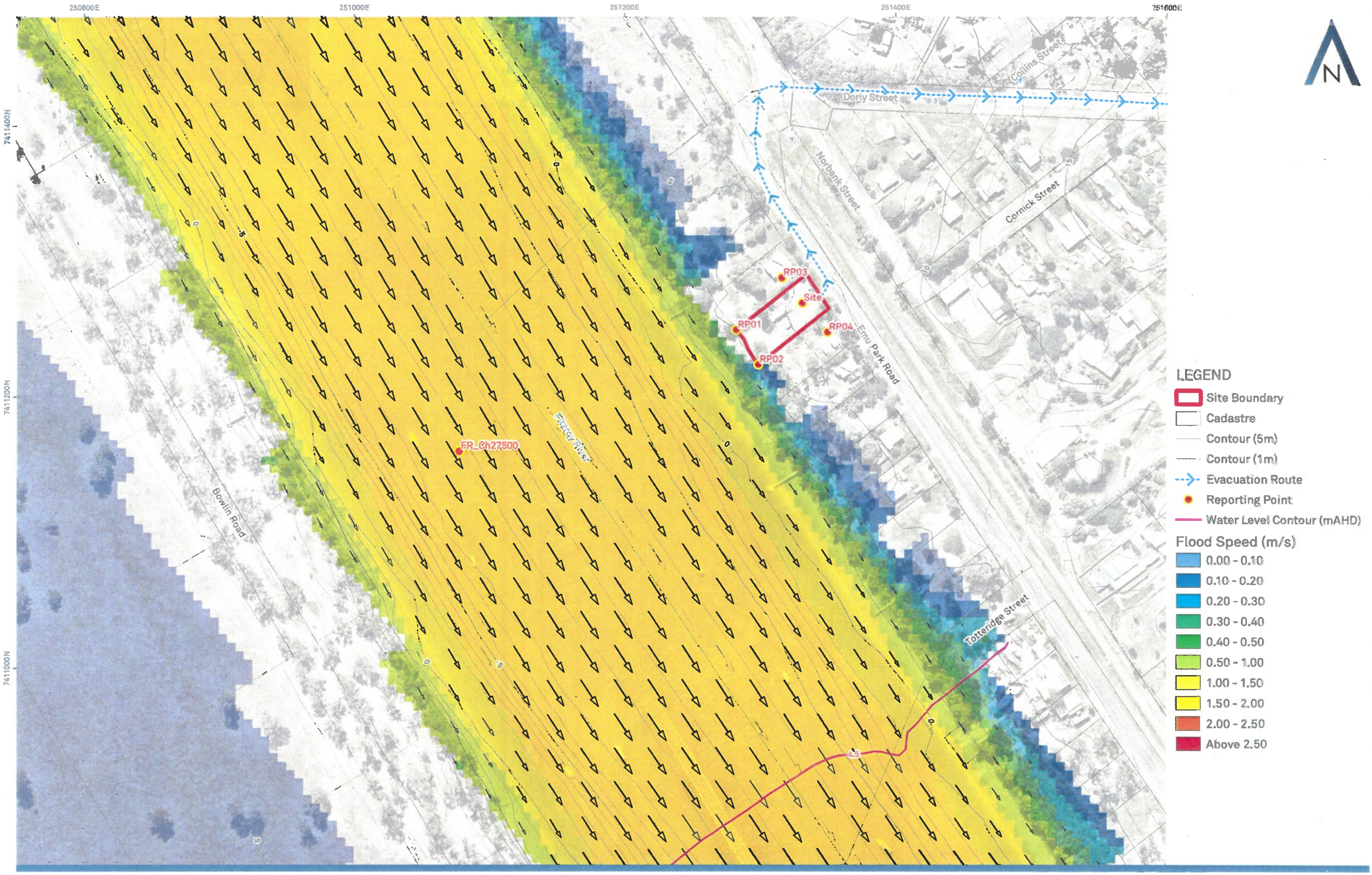
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.4.2

FITZROY RIVER PRE-DEVELOPED 10% AEP PEAK FLOOD SPEED (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

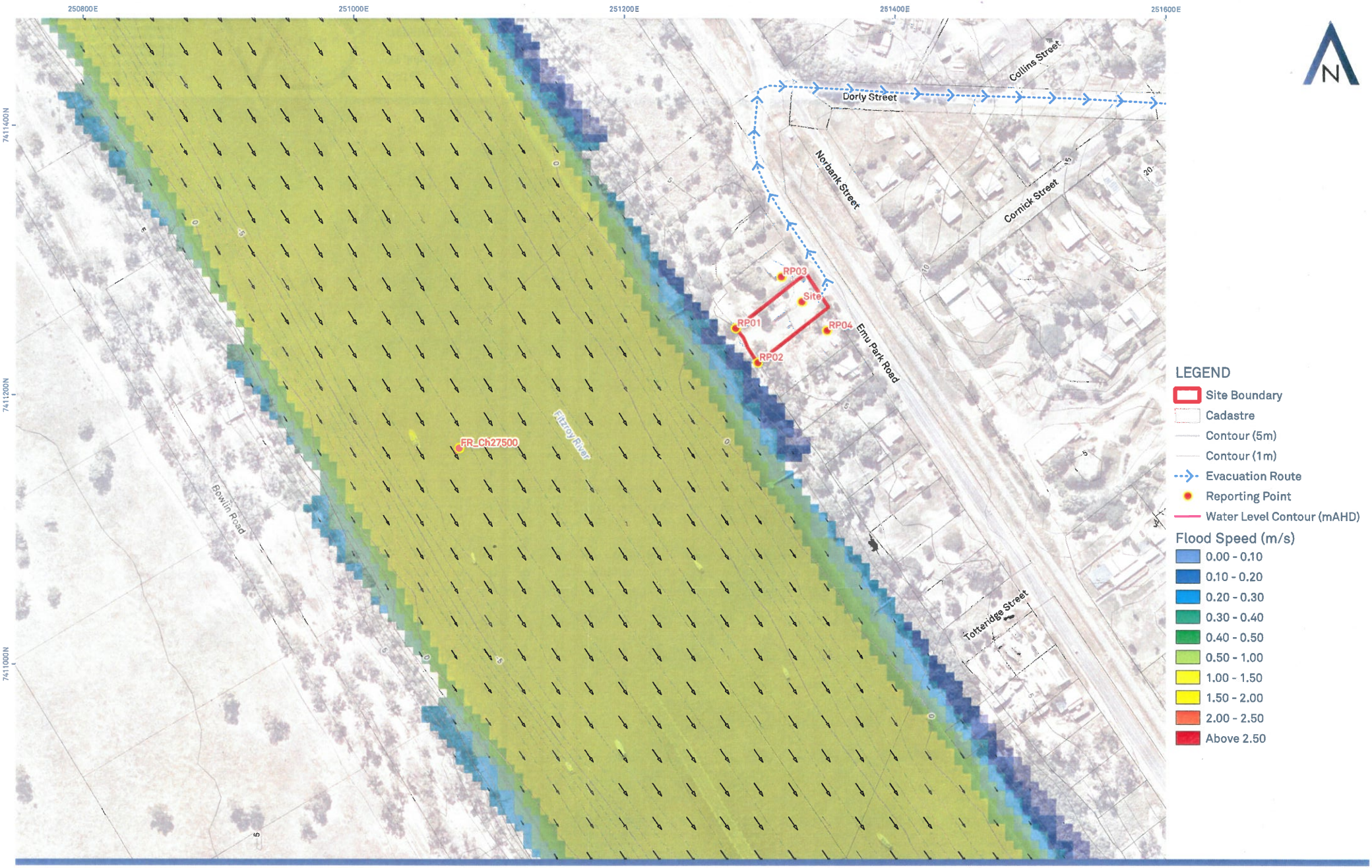


ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.5.2
FITZROY RIVER PRE-DEVELOPED 18% AEP PEAK FLOOD SPEED (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



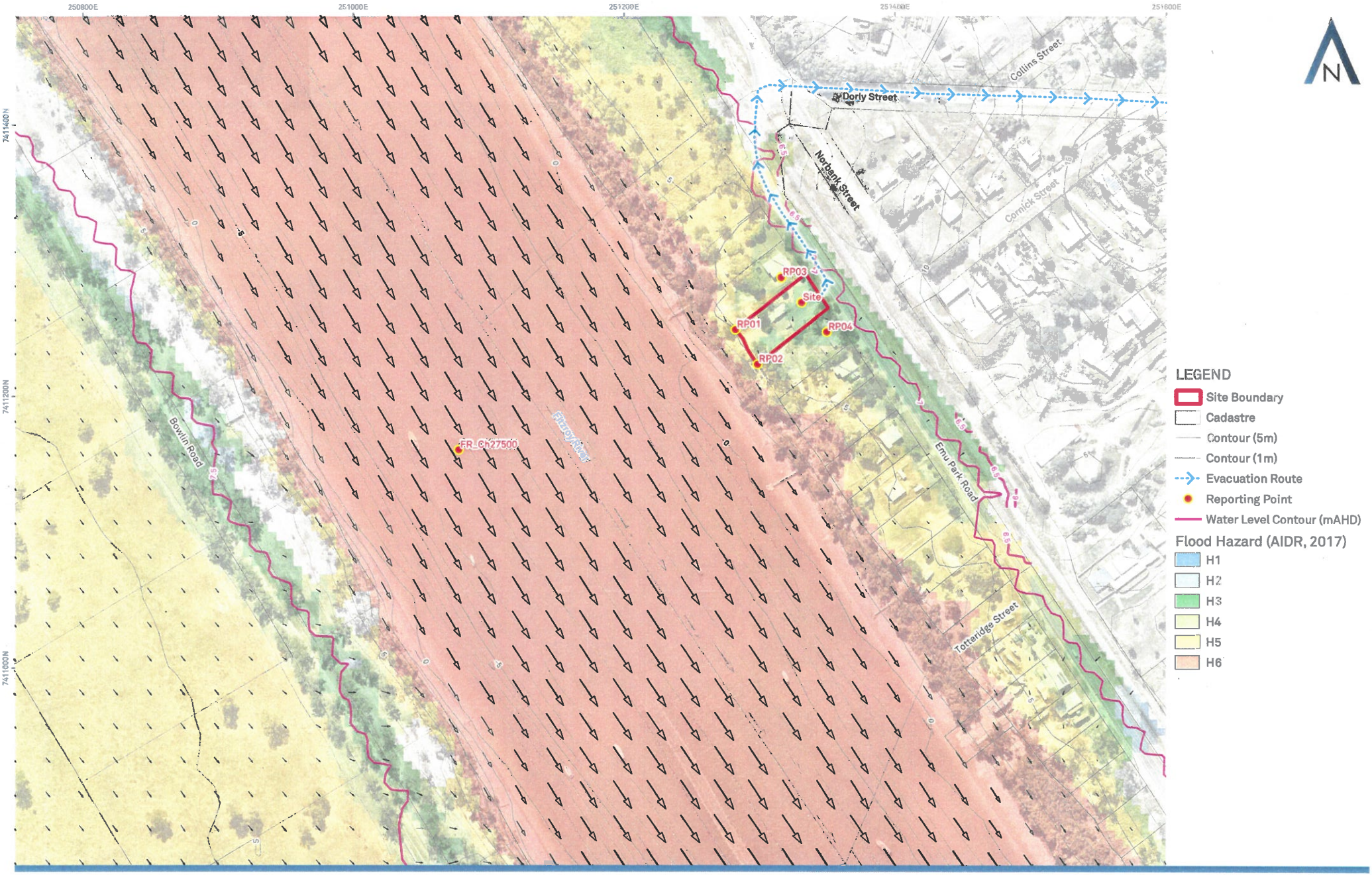
ALLAN DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.6.2

FITZROY RIVER PRE-DEVELOPED 39% AEP PEAK FLOOD SPEED (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



ALLAN & DENNIS

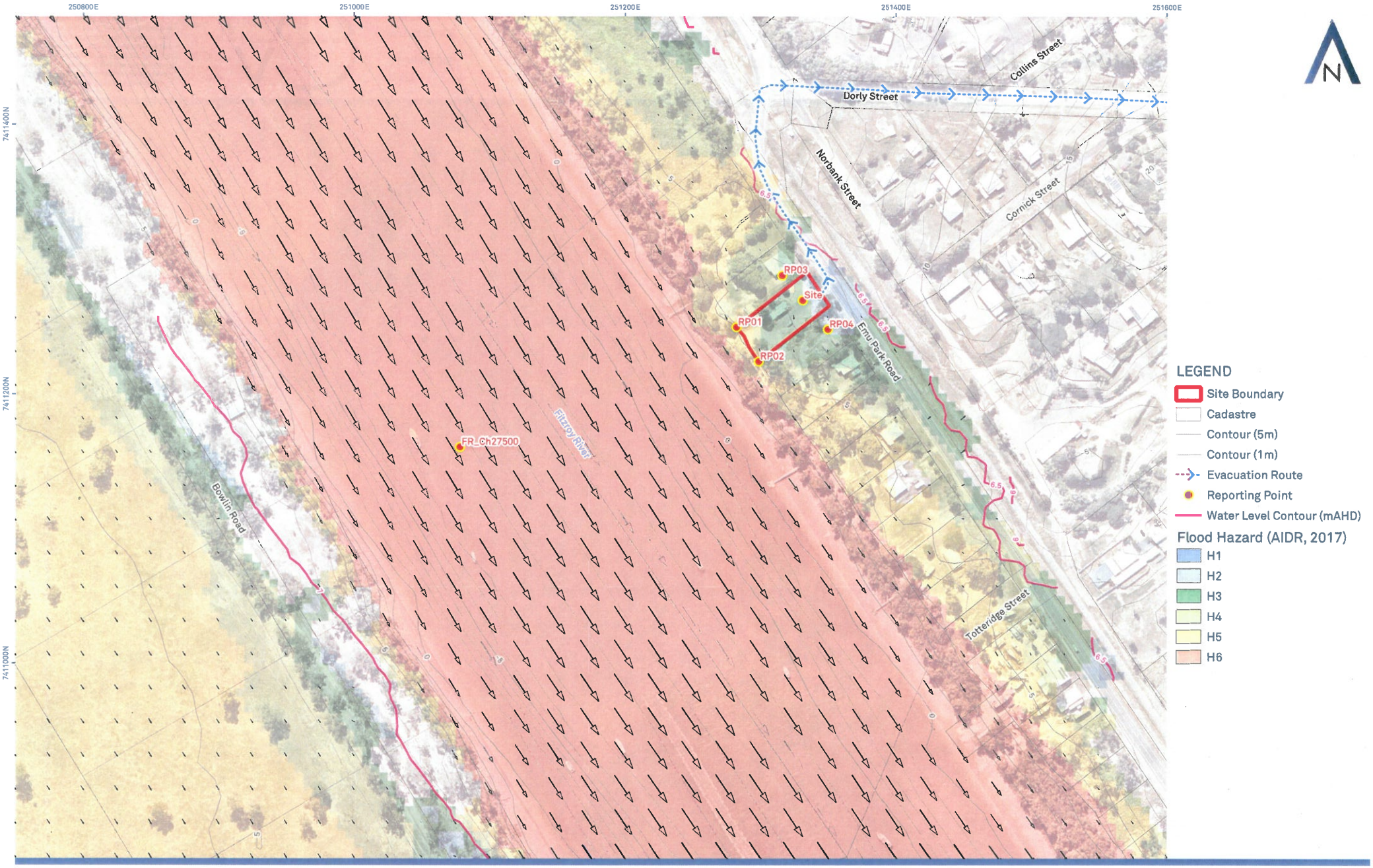
DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500

0 30 60 90 120 150 m

FIGURE A.1.3

FITZROY RIVER PRE-DEVELOPED 1% AEP PEAK FLOOD HAZARD (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



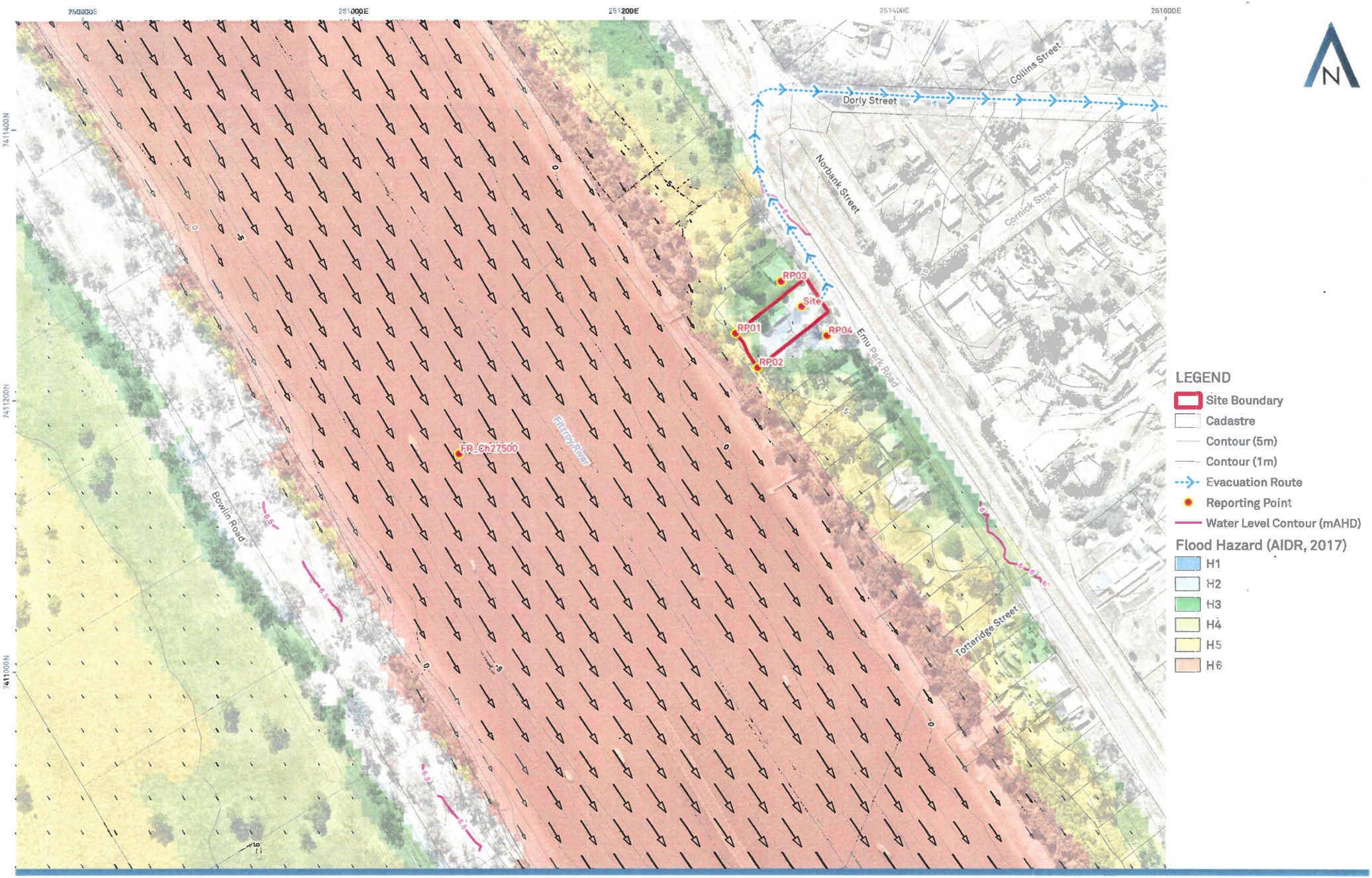
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.2.3

FITZROY RIVER PRE-DEVELOPED 2% AEP PEAK FLOOD HAZARD (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

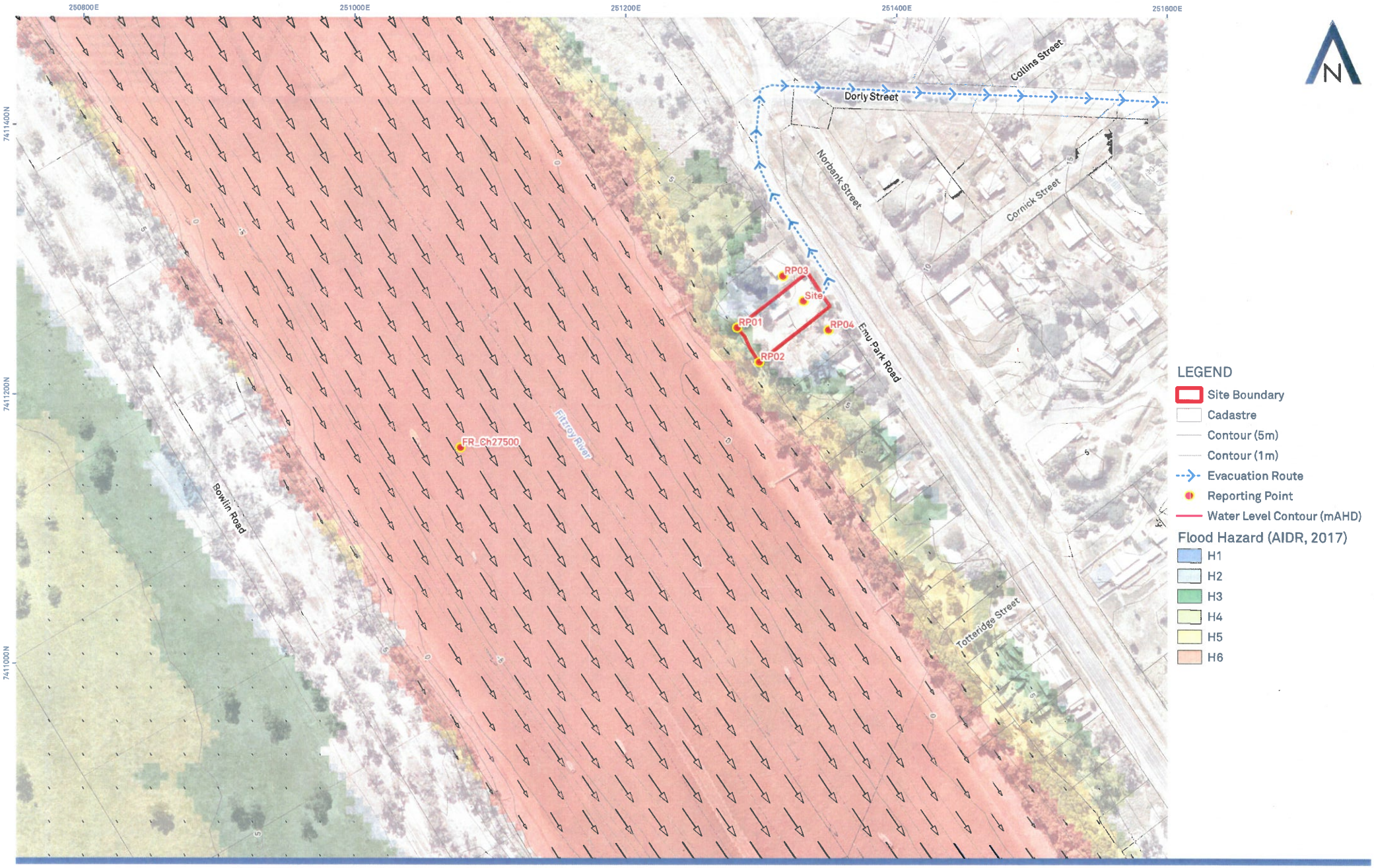


ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.3.3
FITZROY RIVER PRE-DEVELOPED 5% AEP PEAK FLOOD HAZARD (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



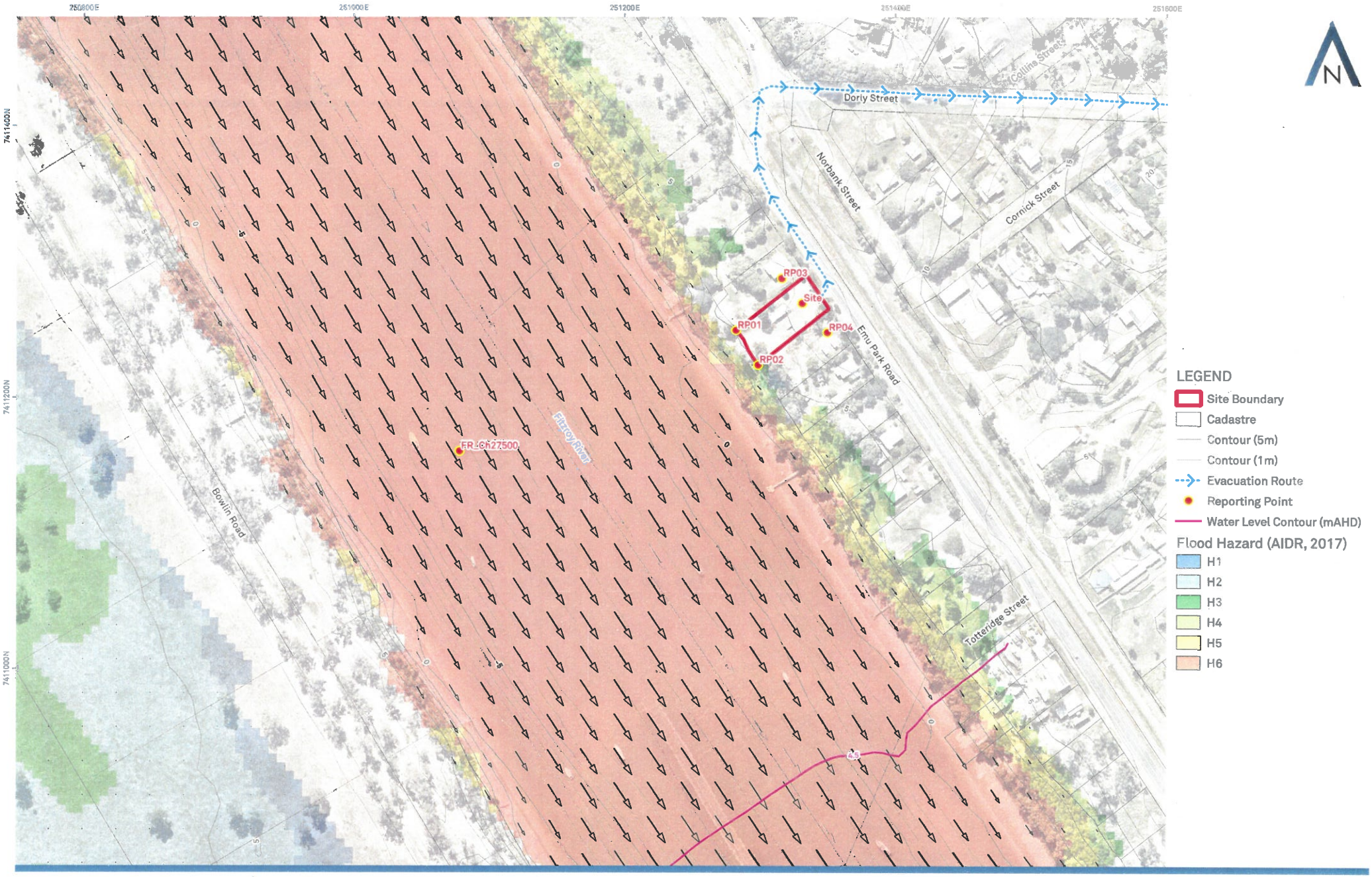
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE A.4.3

FITZROY RIVER PRE-DEVELOPED 10% AEP PEAK FLOOD HAZARD (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



ALLAN & DENNIS

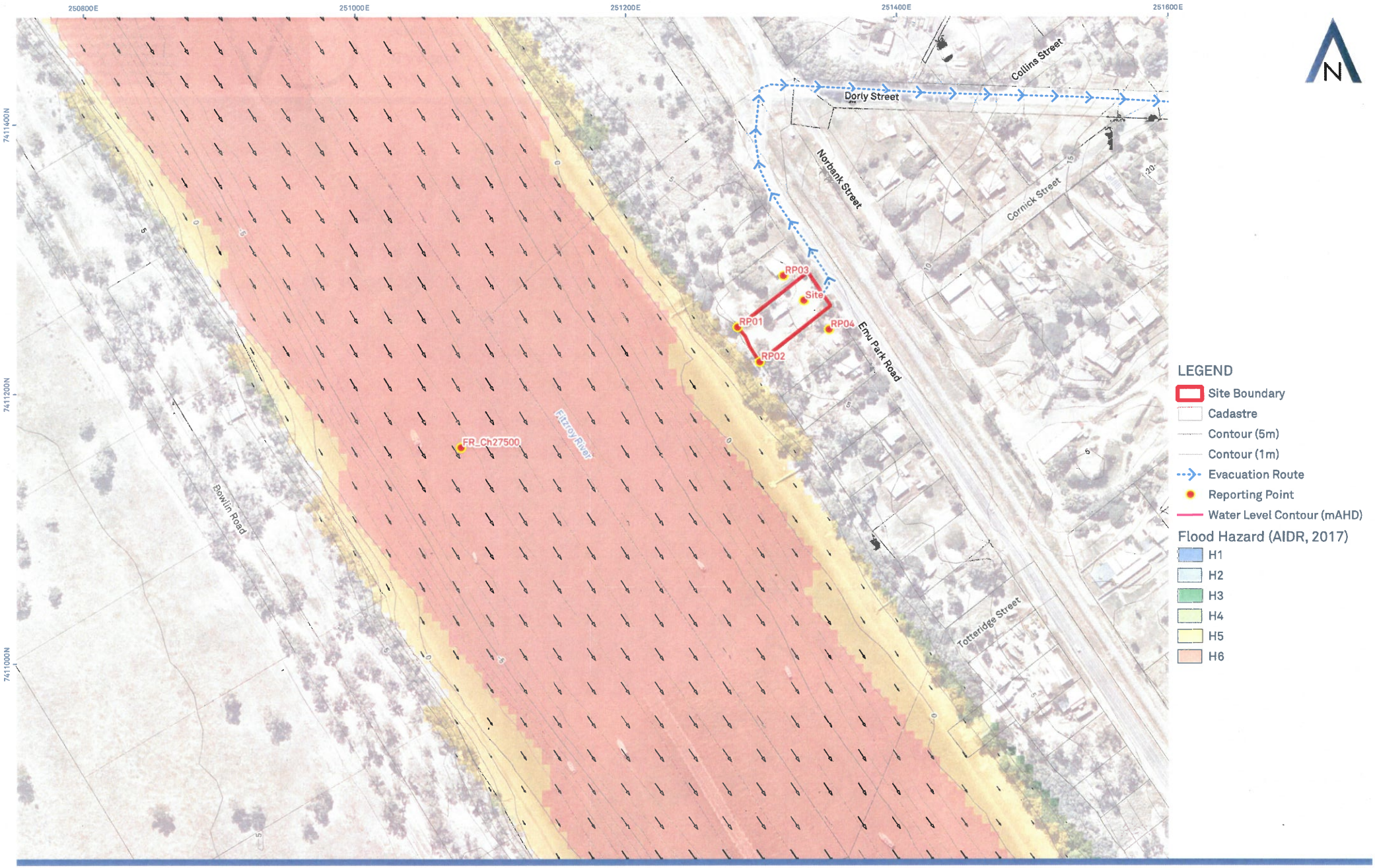
DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500

0 30 60 90 120 150 m

FIGURE A.5.3

FITZROY RIVER PRE-DEVELOPED 18% AEP PEAK FLOOD HAZARD (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

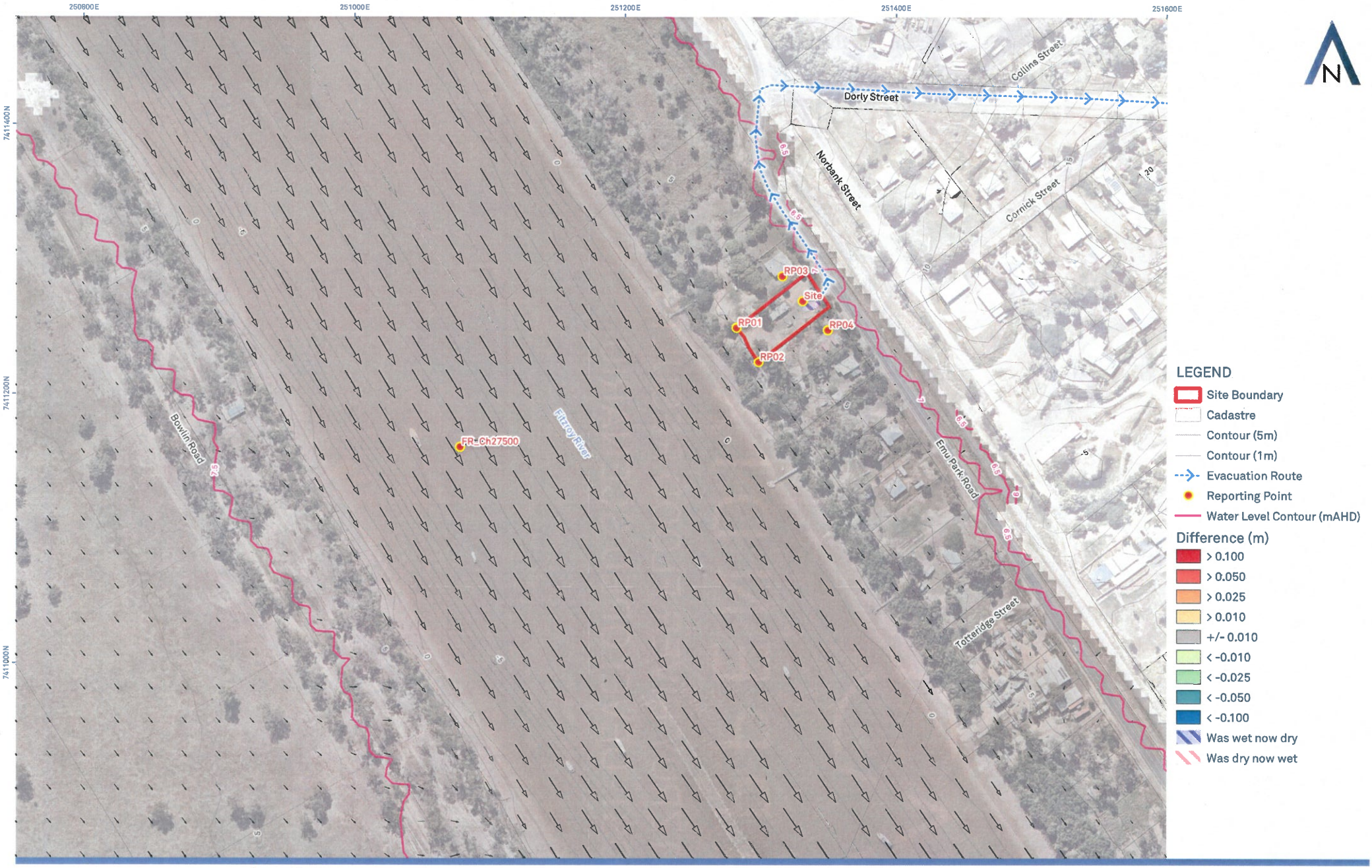
FIGURE A.6.3

FITZROY RIVER PRE-DEVELOPED 39% AEP PEAK FLOOD HAZARD (EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

APPENDIX B

FITZROY RIVER FLOOD RESULTS: POST-DEVELOPED SCENARIO



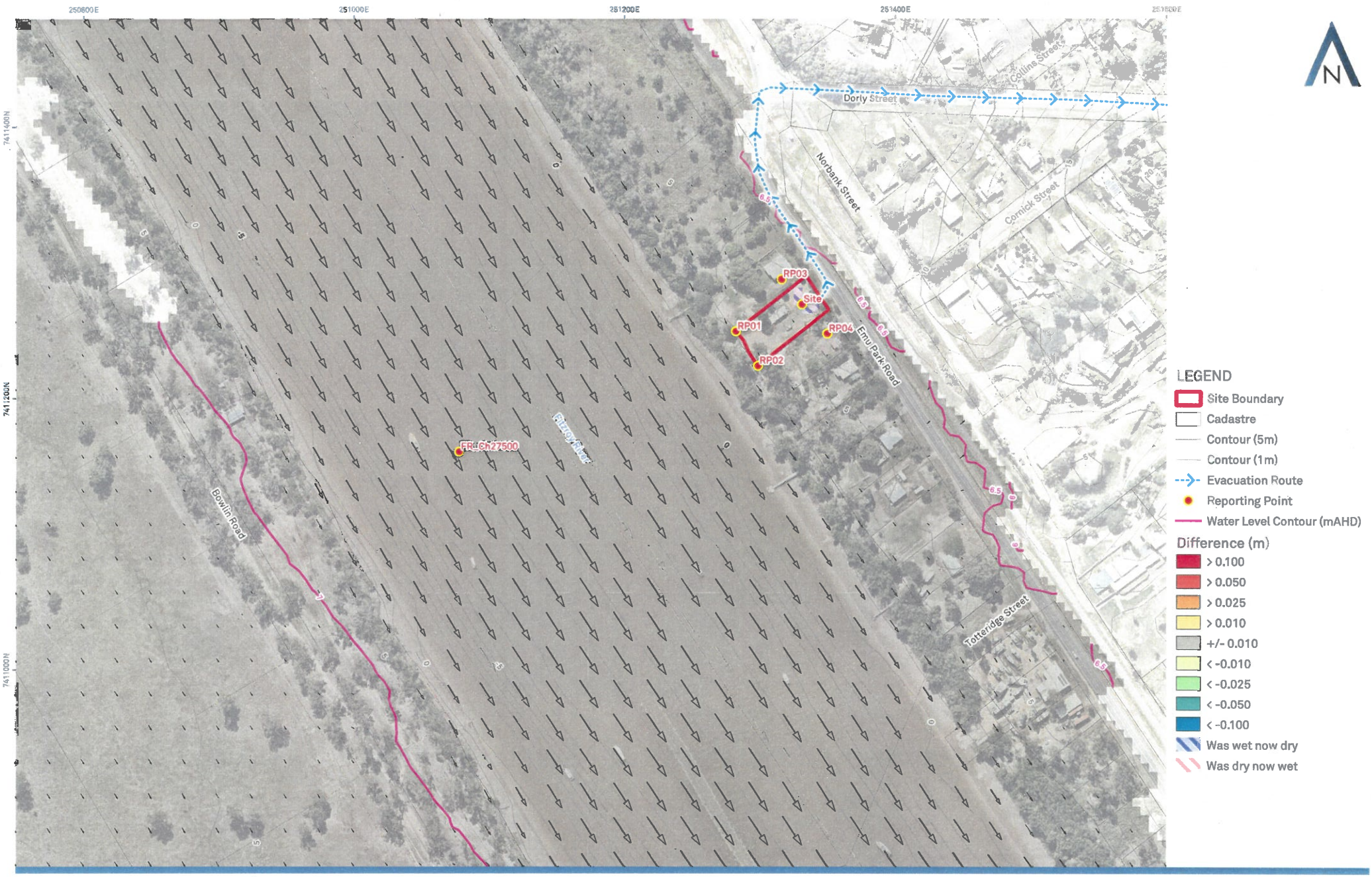
ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE B.1.4

FITZROY RIVER POST-DEVELOPED 1% AEP FLOOD DIFFERENCE (DE01-EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers



ALLAN DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE B.2.4

FITZROY RIVER POST-DEVELOPED 2% AEP FLOOD DIFFERENCE (DE01-EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

N

LEGEND

- Site Boundary
- Cadastre
- Contour (5m)
- Contour (1m)
- Evacuation Route
- Reporting Point
- Water Level Contour (mAHD)

Difference (m)

- > 0.100
- > 0.050
- > 0.025
- > 0.010
- +/- 0.010
- < -0.010
- < -0.025
- < -0.050
- < -0.100
- Was wet now dry
- Was dry now wet

ALLAN ✱ DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500

0 30 60 90 120 150 m

FIGURE B.3.4

FITZROY RIVER POST-DEVELOPED 5% AEP FLOOD DIFFERENCE (DE01-EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

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DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE B.4.4

FITZROY RIVER POST-DEVELOPED 10% AEP FLOOD DIFFERENCE (DE01-EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

ALLAN DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE B.5.4

FITZROY RIVER POST-DEVELOPED 18% AEP FLOOD DIFFERENCE (DE01-EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

ALLAN & DENNIS

DATE 31 July 2020
SIZE A3
REFERENCE J18075
SCALE 1:2,500
0 30 60 90 120 150 m

FIGURE B.6.4

FITZROY RIVER POST-DEVELOPED 39% AEP FLOOD DIFFERENCE (DE01-EX02)

11 Emu Park Road, Lakes Creek
Flood Impact Assessment
Dileigh Consulting Engineers

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APPENDIX C

RESPONSE TO FLOOD HAZARD OVERLAY CODE

FLOOD HAZARD OVERLAY CODE

FITZROY RIVER – H1 OR H2 OR NORTH ROCKHAMPTON FLOOD MANAGEMENT AREA OR CREEK CATCHMENT PLANNING AREA 2

TABLE 8.2.8.3.1 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT AND REQUIREMENTS FOR ACCEPTED DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Development in Fitzroy River flood areas – H1 (low hazard area) or H2 (medium hazard area) or North Rockhampton flood management area or Creek catchment flood - planning area 2		
PO1 Development (including extensions) for non-residential purposes is able to provide a safe refuge for people and for the storage of goods during times of flood inundation.	**AO1.1** For non-residential development, at least thirty (30) per cent of the gross floor area of all new buildings and structures is located a minimum of 500 millimetres above the defined flood level. AND **AO1.2** A report from a registered professional engineer of Queensland certifies that the development in the flood area will not result in a material increase in flood level or flood hazard on upstream, downstream or adjacent properties.	RO1.1 The Marine Workshop has more than 30% GFA above the Site DFL + 500mm. The Store FFL is entirely above the Site DFL + 500mm. RO1.2 This report demonstrates that the development in the flood area will not result in a material increase in flood level or flood hazard on upstream, downstream or adjacent properties.
PO2 Development is located to minimise susceptibility to and potential impacts of flooding.	**AO2.1** For residential uses the finished floor levels of all habitable rooms shall be constructed a minimum of 500 millimetres above the defined flood level. AND **AO2.2** A report from a registered professional engineer of Queensland certifies that the development in the flood area will not result in a material increase in flood level or flood hazard on upstream, downstream or adjacent properties.	RO2.1 Not applicable, the development does not include any new residential uses. RO2.2 Per RO1.2
PO3 Development avoids the release of hazardous materials into floodwaters.	**AO3** All hazardous materials and hazardous manufacturing equipment and hazardous containers are located and stored a minimum of 500 millimetres above the defined flood level.	RO3 Any hazardous materials and hazardous manufacturing equipment and hazardous containers will be located above the Site DFL + 500mm.

FITZROY RIVER – H3-H4 OR H5-H6 OR CREEK CATCHMENT FLOOD PLANNING AREA 1

TABLE 8.2.8.3.1 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT AND REQUIREMENTS FOR ACCEPTED DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Development in Fitzroy River flood areas – H3-H4 (high hazard areas) or H5-H6 (extreme hazard areas) or Creek catchment flood - planning area 1		
PO4 Development does not involve the further intensification of land uses and does not increase the risk to people and property.	**AO4.1** Development does not involve new buildings or structures. OR **AO4.2** Where involving the replacement or alteration to an existing non-residential building or structure: a) there is no increase in the existing or previous buildings' gross floor area; and b) the finished floor level of any replacement or alteration to an existing building is constructed a minimum of 500 millimetres above the defined flood level. OR **AO4.3** Where involving the replacement or alteration to an existing caretaker's accommodation, dwelling house or dwelling unit: a) there is no increase in the number of dwellings; b) there is no increase in the existing or previous buildings' gross floor area; and c) the finished floor level of all habitable rooms shall be constructed a minimum of 500 millimetres above the defined flood level. AND **AO4.4** Where located in the rural zone, the total floor area of class 10a buildings and structures on the site do not exceed a total of fifty (50) square metres, and are set back a minimum of twenty (20) metres from all site boundaries.	RO4 The development involve construction of two new non-habitable buildings.
PO5 Development avoids the release of hazardous materials into floodwaters.	**AO5** Materials manufactured, used or stored on site are not hazardous in nature.	RO5 Per RO3

FLOODPLAIN INVESTIGATION AREA

TABLE 8.2.8.3.1 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT AND REQUIREMENTS FOR ACCEPTED DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Development in floodplain investigation area		
PO6 Development is located to minimise susceptibility to and potential impacts of flooding.	**AO6** Flood resilience is optimised by ensuring new habitable rooms are located on the highest part of the site to minimise entrance of floodwaters.	RO6 Not applicable, the development is not located within the floodplain investigation area.
PO7 Development avoids the release of hazardous materials into floodwaters.	**AO7** Materials manufactured, used or stored on site are not hazardous in nature.	RO7 Not applicable, the development is not located within the floodplain investigation area.

FITZROY RIVER – ALL HAZARD AREAS, NORTH ROCKHAMPTON FLOOD MANAGEMENT AREA OR CREEK CATCHMENT – ALL PLANNING AREAS

TABLE 8.2.8.3.2 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Development in Fitzroy River flood areas – H1 (low hazard area) or H2 (medium hazard area) or North Rockhampton flood management area or Creek catchment flood - planning area 2		
PO8 Development is located to minimise susceptibility to and potential impacts of flooding.	No acceptable outcome is nominated.	RO8 As detailed in this report the development minimises potential impacts of flooding.
PO9 Underground car parks are designed to prevent the intrusion of floodwaters.	**AO9** Development with underground car parking is designed to prevent the intrusion of floodwaters by the incorporation of a bund or similar barrier a minimum of 500 millimetres above the defined flood level.	RO9 Not applicable, not underground carparks are proposed as part of the development.
PO10 Development: a) does not result in any reduction of onsite flood storage capacity; or b) does not result in any change to depth, duration or velocity of floodwaters within the premises; and	No acceptable outcome is nominated.	RO10 The development: a) Results in some loss of flood plain storage, however this small loss of floodplain storage results in no increase in flood levels.

Performance Outcomes	Acceptable Outcomes	Response
c) does not change flood characteristics outside the premises, including but not limited to causing: i. loss of flood storage; or ii. loss of or changes to flow paths; or iii. acceleration or retardation of flows; or iv. any reduction in flood warning times elsewhere on the floodplain.		b) Flood depths and velocities do not significantly change within the site. c) Does not significantly change the flood characteristics external to the site.
PO11 Essential community infrastructure and community facilities are protected from, and able to function effectively during and immediately after, a defined flood event.	**AO11** A use for a purpose listed in Table 8.2.8.3.3: a) is not located within the flood hazard area; and b) has at least one (1) flood free access road.	RO11 Not applicable, development does not include essential community facilities or infrastructure.
PO12 Development provides safe and trafficable access to the local evacuation centres and evacuation services and have regard to: a) evacuation time; b) number of persons affected; c) types of vehicles necessary for evacuation purposes; d) the distance to flood free land; and e) the evacuation route.	**AO12.1** Trafficable access to and from the development complies with the Capricorn Municipal Guidelines. AND **AO12.2** Trafficable access to and from the development within the creek catchment planning areas are in accordance with the Queensland Urban Drainage Manual.	RO12 The development does not significantly change the access to the site from the existing pre-developed conditions.

FITZROY RIVER – H3-H4 OR H5-H6, NORTH ROCKHAMPTON FLOOD MANAGEMENT AREA OR CREEK CATCHMENT – PLANNING AREA 1

TABLE 8.2.8.3.2 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Development in Fitzroy River flood areas – H3-H4 (high hazard areas) or H5-H6 (extreme hazard areas), North Rockhampton flood management area or Creek catchment flood – planning area 1		
PO13 Development that involves temporary or moveable residential structures (for example caravan parks and camping grounds) are not located with the Fitzroy River high and extreme hazard areas, North Rockhampton flood management area and Creek catchment planning area 1.	No acceptable outcome is nominated.	RO13 Not applicable, the development does not include any temporary or movable residential structures.

RECONFIGURING A LOT

FITZROY RIVER – ALL HAZARD AREAS, NORTH ROCKHAMPTON FLOOD MANAGEMENT AREA OR CREEK CATCHMENT – ALL PLANNING AREAS

TABLE 8.2.8.3.2 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Reconfiguring a lot		
Development in Fitzroy River flood area – all hazard areas, North Rockhampton flood management area or Creek catchment flood - all planning areas		
PO14	**AO14**	RO14
Development does not result in the creation of additional lots.	Reconfiguring a lot does not result in new lots.	Not applicable, the development does not create any additional lots.

FLOODPLAIN INVESTIGATION AREA

TABLE 8.2.8.3.2 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Development in floodplain investigation area		
PO15	No acceptable outcome is nominated.	RO15
Development provides vehicle access to a road network that is sufficient to enable safe access.		Not applicable, the development is not within the floodplain investigation area.
PO16	**AO16**	RO16
Onsite access is provided to a building envelope or fill area in which a building is to be constructed. The access is located on land classified as a low flood hazard in the defined flood event.	Onsite access to a building envelope or fill area is provided over land that is designated as a low flood hazard.	Not applicable, the development is not within the floodplain investigation area.

OPERATIONAL WORKS

TABLE 8.2.8.3.2 DEVELOPMENT OUTCOMES FOR ASSESSABLE DEVELOPMENT

Performance Outcomes	Acceptable Outcomes	Response
Operational work		
PO17 Development does not materially impede the flow of floodwaters through the site or worsen flood flows external to the site.	**AO17** Development does not involve: a) filling with a height greater than 100 millimetres; or b) block or solid walls or fences; or c) garden beds or other structures with a height more than 100 millimetres; or d) the planting of dense shrub hedges.	RO17 The development does not materially impede the flow of floodwaters through the site or worsen flood flows external to the site.

A1 DRAWING
NOTED SCALES RELATE TO A1 DRAWINGS

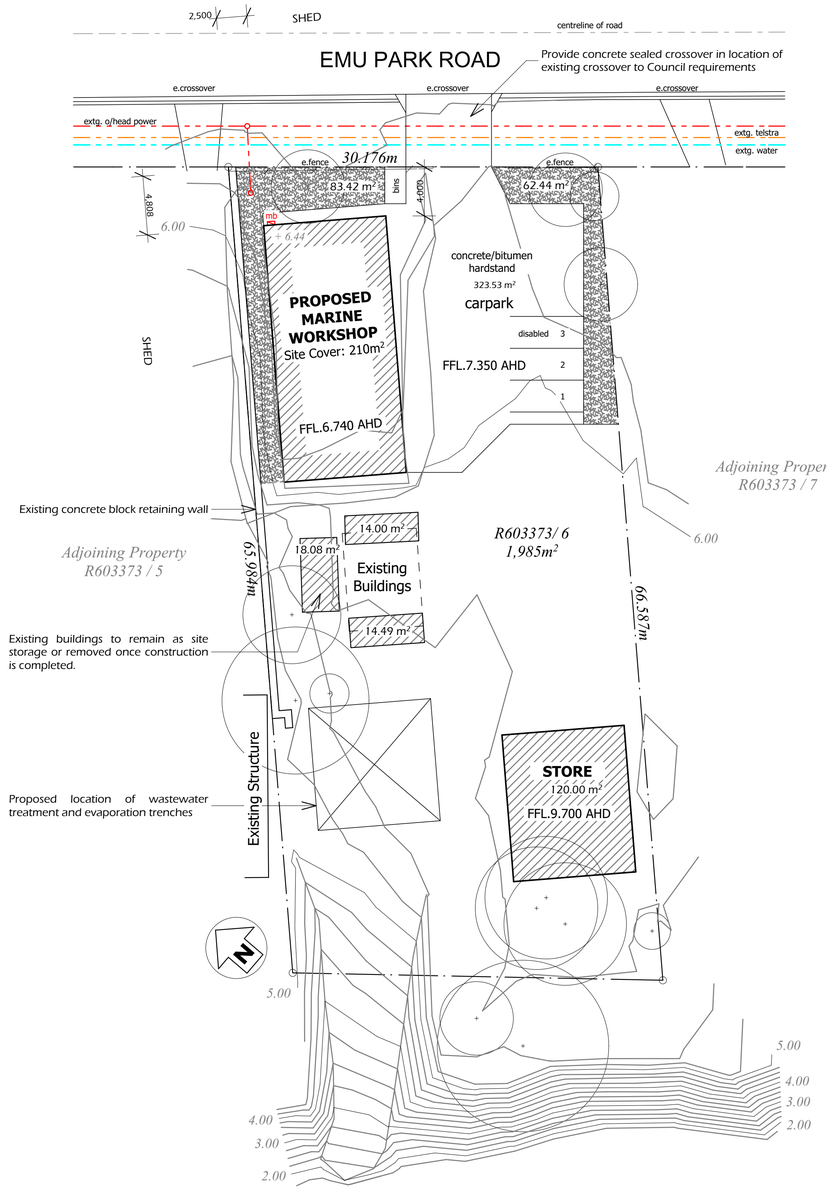
ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

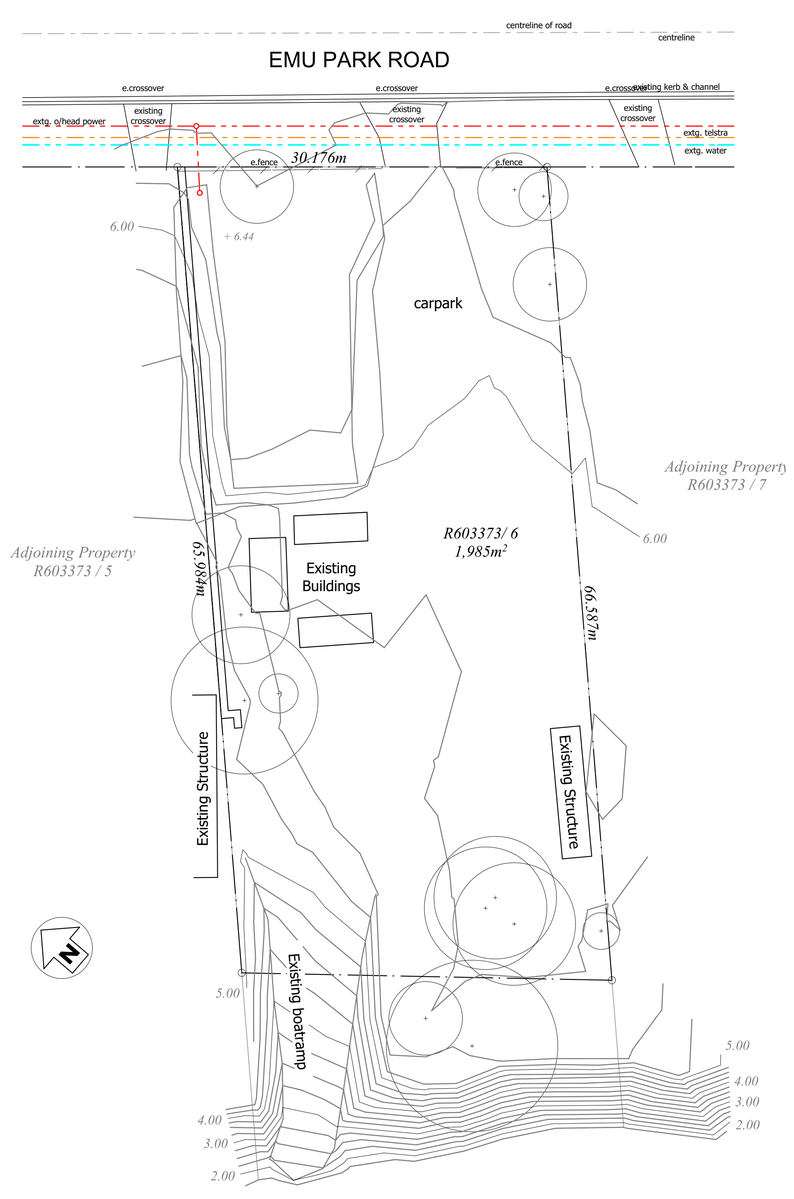
These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/117-2019

Dated: 30 October 2020



2 PROPOSED SITE PLAN
Scale 1:250 at A1 / 1:500 at A3



1 EXISTING SITE PLAN
Scale 1:250 at A1 / 1:500 at A3

rev	description	date
SK1.0	sketch issue	02.08.2016
DA1.0	development application issue	16.08.2016

Building Designers Association of Queensland Inc.

BAEL
BUILDING DESIGN

PO BOX 6267
RED HILL ROCKHAMPTON Q 4701
M: 0438 166 530
E: rebecca@bael.com.au
BSA Licence: #1198384
BDAQ Member: #0001235

Project Name:
PROPOSED MARINE WORKSHOP

Client:
F. FINNEGAN

Project Adress:
11 EMU PARK ROAD,
LAKES CREEK 4701

Drawing Title:
SITE PLANS: EXISTING & PROPOSED

Status: Sketch Issue

Issue #: SK1.0

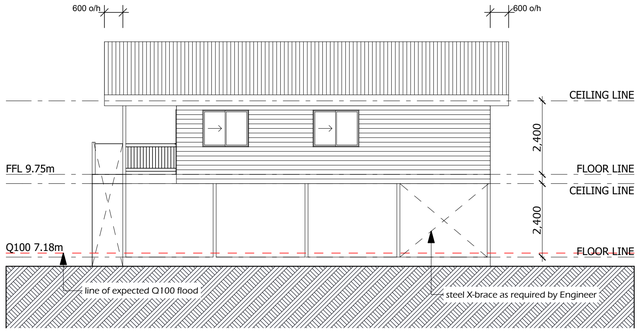
Job Number: 1410-10

Scale: as shown

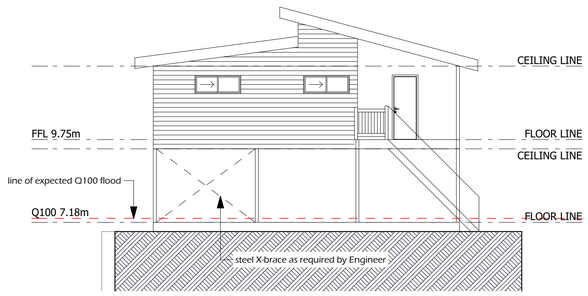
Page Number: DA1.1

Drawn By: rjd

Plot: 9:47 AM 17/12/2019



3 WESTERN ELEVATION



4 NORTHERN ELEVATION

LANDSCAPING LEGEND

SURFACES	PREPARATION
Denotes grassed / lawn areas Denotes mulched garden areas planted with species as noted Denotes sealed concrete driveway, car parking and vehicle maneouvring areas Denotes selected shrub Denotes selected ground cover Denotes selected tree	PLANTED AREAS Cultivate sub grade to 100mm depth. Culitvate Gypsuim @ 250g/m² into subgrade. Spread topsoil to a minimum 200mm depth. Provide selected mulch over to 100mm thick. LAWN AREAS Cultivate subgrade to 10mm depth. Cultivate Gypsum @ 250 g/m² into subgrade. Spread topsoil to minimum 100mm depth. Pay turf to edges. Fill all gaps and roll. GENERAL Provide a suitably timed, auto-matic water system to all lawn and garden areas. Extent of garden areas to be confirmed on-site by Owner. All species shown are indicative only. Owner to confirm exact size, species, location and number of plantings required.

ROCKHAMPTON REGIONAL COUNCIL

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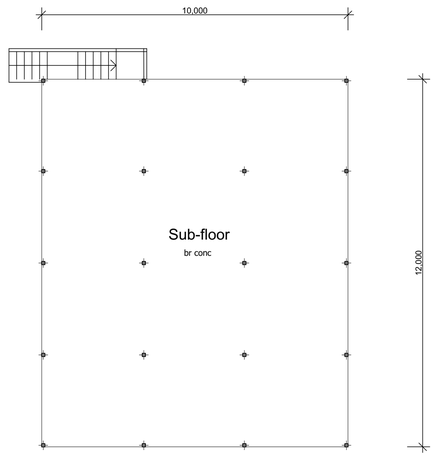
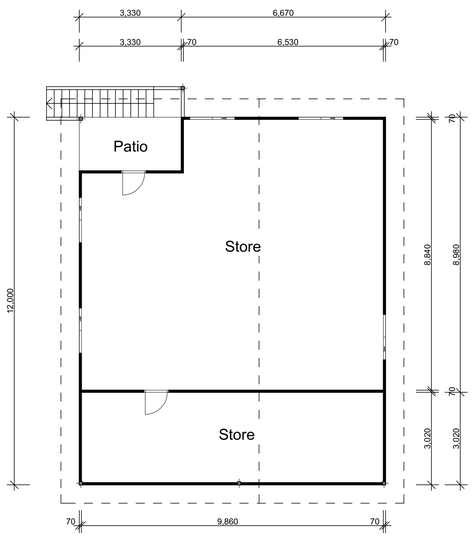
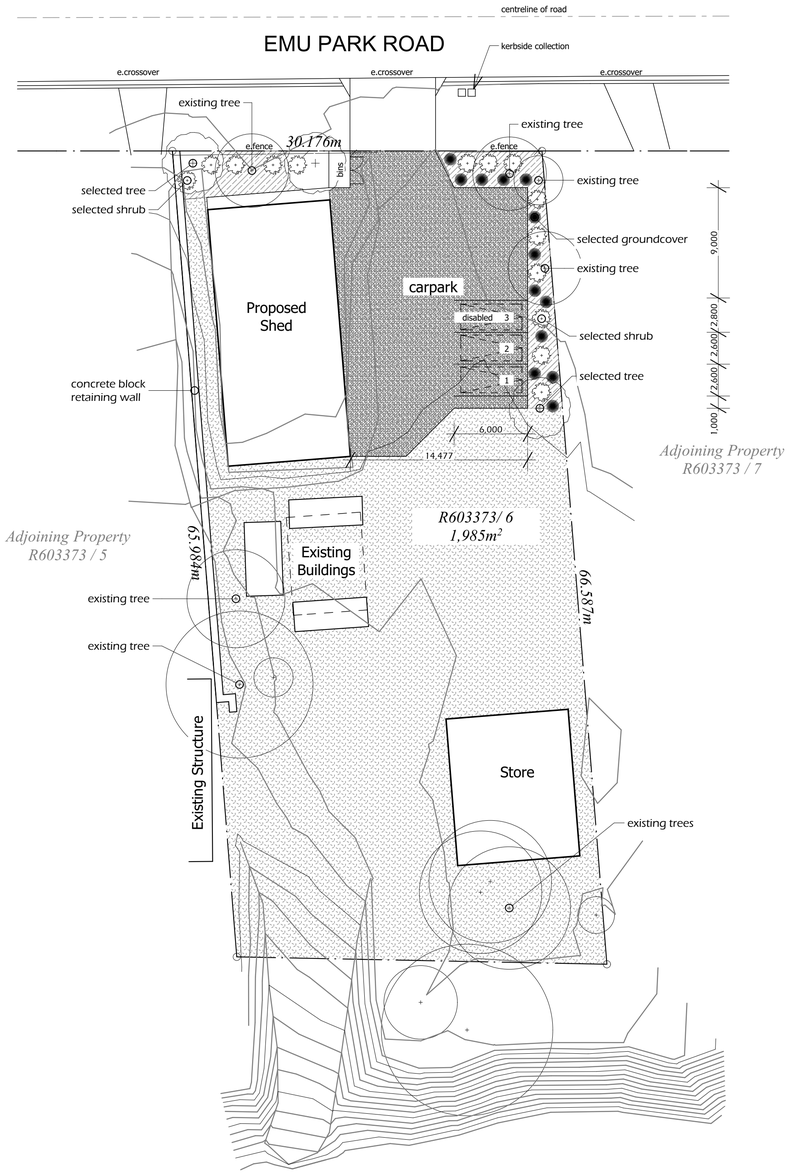
Dated: 30 October 2020



1 PROPOSED FLOOR PLAN



2 PROPOSED MEZZANINE FLOOR



5 PROPOSED LANDSCAPE PLAN

rev	description	date
SK1.0	sketch issue	02.08.2016
DA1.0	development application issue	16.08.2016

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Project Name:
PROPOSED MARINE WORKSHOP

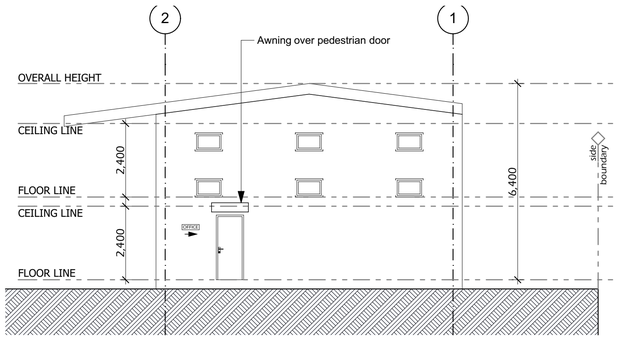
Client:
F. FINNEGAN

Project Adress:
11 EMU PARK ROAD,
LAKES CREEK 4701

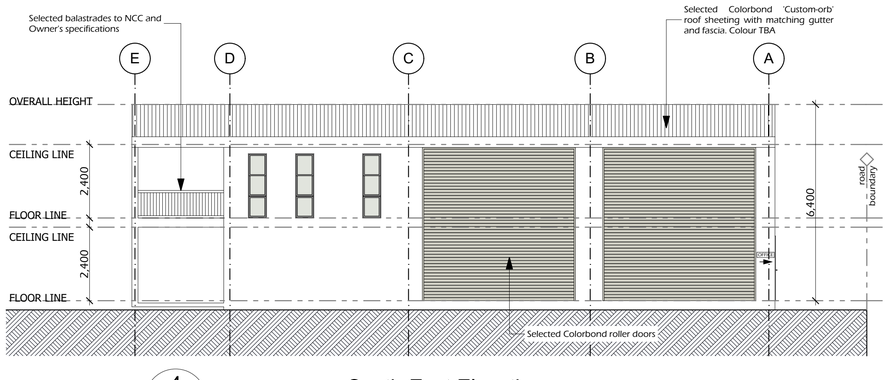
Drawing Title:
SITE PLANS : PARKING & LANDSCAPING

Status: Sketch Issue
Issue #: SK1.0
Scale: as shown
Drawn By: rjd
Job Number: 1410-10
Page Number: DA1.1
Plot: 9:47 AM 17/12/2019

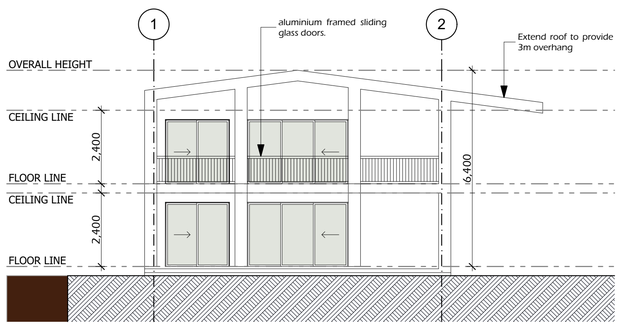
A1 DRAWING
NOTED SCALES RELATE TO A1 DRAWINGS



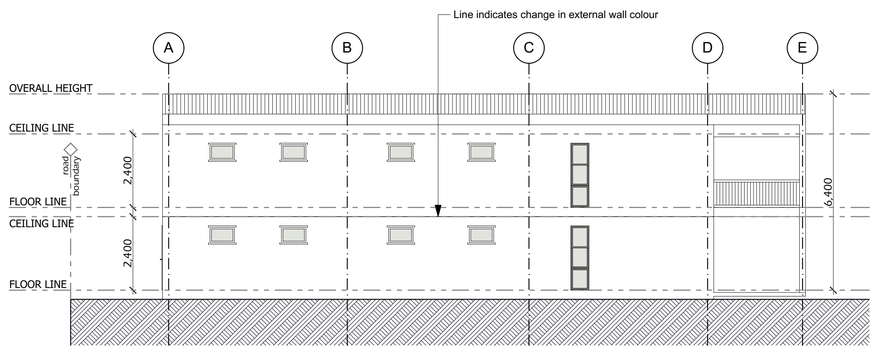
3 North-East Elevation
Scale 1:100 @ A1



4 South-East Elevation
Scale 1:100 @ A1

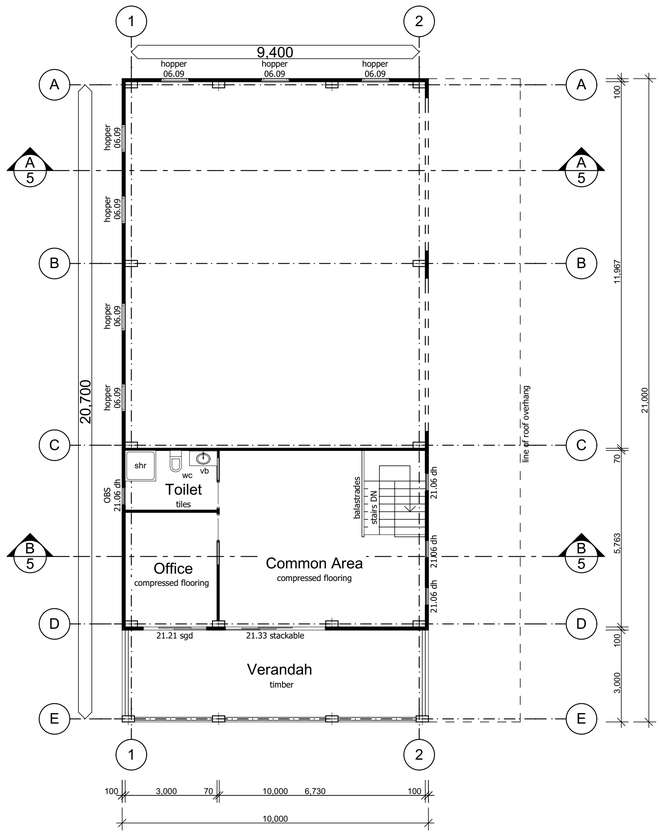


5 South-West Elevation
Scale 1:100 @ A1

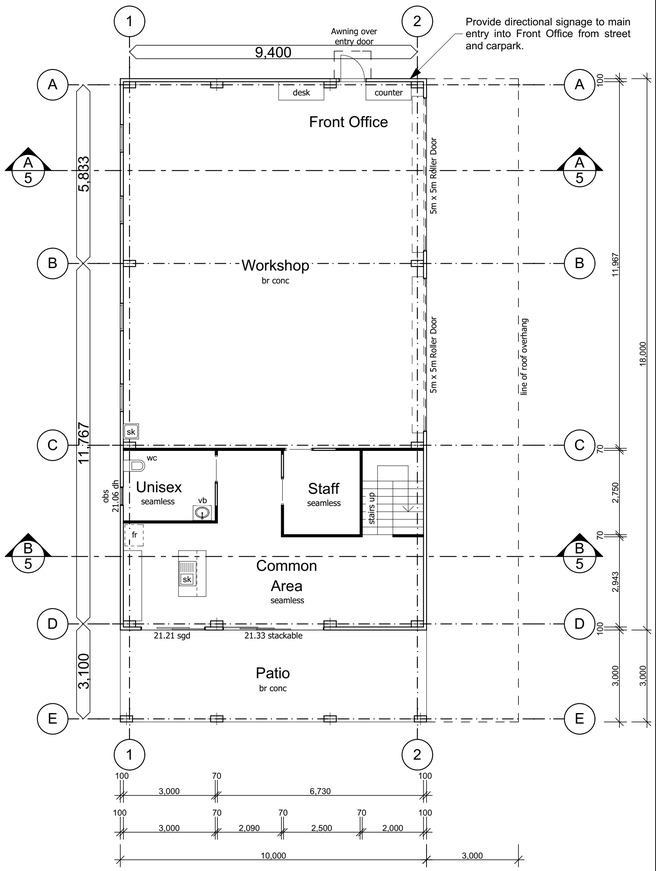


6 North-West Elevation
Scale 1:100 @ A1

GENERAL LEGEND	
A/C	SELECTED AIR CONDITIONER UNIT
COL.	COLUMN
DP	90mm DIA. DOWNPIPE AS INDICATED
DR	DRYER
DW	DISHWASHER (UNDER BENCH)
F	FRIDGE
HWS	HOT WATER SYSTEM
P	PANTRY
SHR	SHOWER
SK	SINK
ST	STOVE / OVEN / RANGEHOOD
TUB	WASHTUB
VB	VANITY BASIN
W	WASHING MACHINE
WC	DUAL FLUSH TOILET



2 PROPOSED MEZZANINE FLOOR
Scale 1:100 @ A1



1 PROPOSED FLOOR PLAN
Scale 1:100 @ A1

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