PREPARED FOR YUHU PROPERTY (AUSTRALIA) PTY LTD
22 JULY 2016
15-003643
DRAFT
WATER & ENVIRONMENT

Eastwood Town Centre Redevelopment
Flood Study

COMMERCIAL IN CONFIDENCE

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DOCUMENT CONTROL

15-003643

Issue	Date	Issue Details	Author	Checked	Approved
A	22 July 2016	DA submission	NWB	TE	CV

EXECUTIVE SUMMARY

This flood study report has been prepared to support the Development Application (DA) for the proposed multiunit, mixed use development at Eastwood. This report is to accompany the application for the development on the site being prepared by YuHu Property (Australia) Pty Ltd. This report outlines flooding issues on the site and includes descriptions of:

- The site and the existing flooding issues review of the existing available flood study information
- The proposed development for the site
- The results of hydrologic and hydraulic modelling undertaken to determine flood levels on the site and local catchment
- Preliminary flood planning levels for the proposed building design and site layout
- Preparation of the information in a suitable format for DA submission to Ryde City Council.

This report discusses the impacts of flooding resulting from the 1 in 100 year Average Recurrence Interval (ARI) storm event; referred to as the 100 year event or the 1% Annual Exceedance Probability (AEP) event, for existing and developed conditions, along with a discussion of the Probable Maximum Flood (PMF).

This investigation used the development of flow rates within the Terrys Creek sub-catchment using the rainfall-on-the-grid method to determine flows in the two–dimensional hydraulic model within the *TUFLOW* flood modelling software (Build: 2013-12-AC), using the *SMS* interface (Version 11.2.5).

The minimum floor elevations for the building layout shown on the ground floor architectural plan for the proposed development prepared by Rice Daubney Architects, dated 14/06/2016

Building	Flood Level (m AHD)		Habitable Floor Level (m AHD)		Non-Habitable Floor Level (m AHD)	
AA (Rowe Street, west)	68.90 west	68.70 east	69.20 west	69.0 east	69.05 west	68.85 east
BA (Rowe Street, east)	68.80 east	68.35 east	69.10 east	68.65 east	68.95 east	68.5 east
BB (Rowe Street, east)	68.3		68.6		68.45	
CA (Rutledge Street)	74.40 west	73.85 east	74.70 west	74.05 east	74.65 west	74.0 east
CB (West Parade)	70.60 north	73.35 south	70.90 north	73.65 south	70.75 north	73.50 south
DA (Rutledge Street)	74.6		74.9		74.75	
DB (Rutledge Street)	74.9		75.2		75.05	

This flood study investigates the impacts of the proposed development on flooding in accordance with Ryde City Council's *Development Control Plan*.

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1 INTRODUCTION

This flood study report has been prepared to support the Development Application (DA) for the proposed multiunit, mixed use development at Eastwood. This report is to accompany the application for the development on the site being prepared by YuHu Property (Australia) Pty Ltd. This report outlines flooding issues on the site and includes descriptions of:

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This report discusses the impacts of flooding resulting from the 1 in 100 year Average Recurrence Interval (ARI) storm event; referred to as the 100 year event or the 1% Annual Exceedance Probability (AEP) event, for existing and developed conditions, along with a discussion of the Probable Maximum Flood (PMF).

1.1 BACKGROUND

The site is located within the catchment of Terrys Creek, within Ryde City Council local government area. Ryde City Council engaged Bewsher Consulting Pty Ltd to prepare flood maps in 2008, with the modelling calculating that the 100 year peak event results in flooding on the site. The results of this previous investigation are discussed in detail in Section 2.1.

Ryde City Council require a flood study be carried out to accompany this development application to determine the impact of the proposal on flooding in the catchment. Information from the flood extents of Terrys Creek shown on Council's mapping indicates that the site will be partially inundated during the 100 year flood event. Analysis of this localised area is required to assist in the setting of appropriate floor levels to provide for the 100 year event, with allowances made for freeboard.

The catchment analysis of Terrys Creek for this report includes the development of sub-catchment flows from upstream of the site, along with downstream water levels within Terrys Creek from the 2008 report by Bewsher, provided by Ryde City Council.

1.2 DESCRIPTION OF STUDY AREA

The site is located within the town centre of Eastwood. The site is located within the block bounded to the north by Rowe Street, to the west by Trelawney Street, to the south by Rutledge Street and to the east by West Parade, shown on Figure 1-1. The Main Northern Rail Line is located to the west of the site, with Eastwood Railway Station approximately 150 metres to the north.

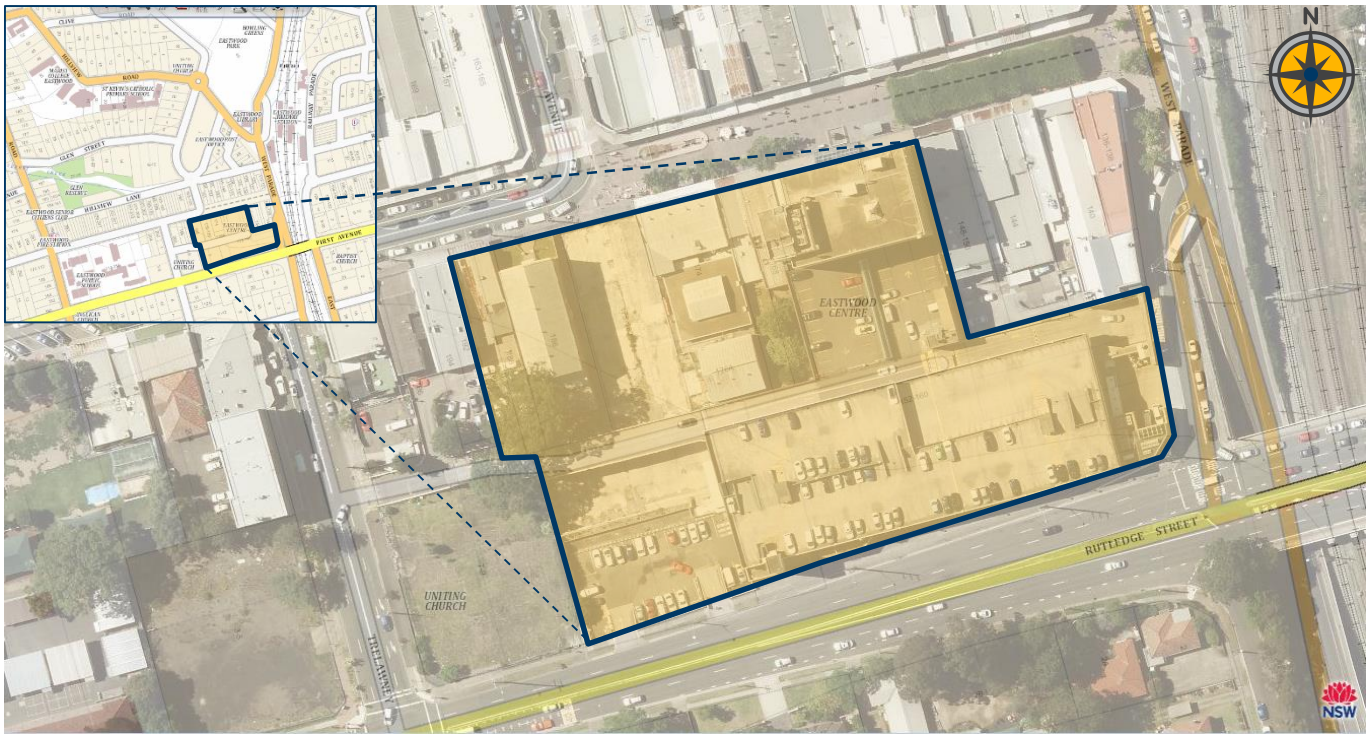


Figure 1-1: Site location

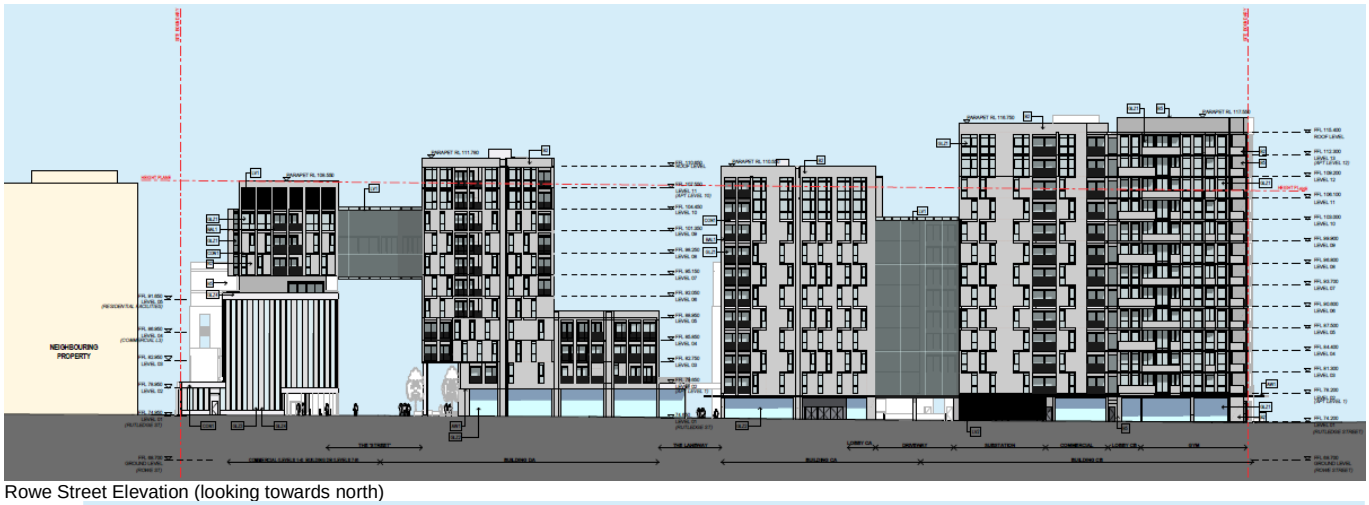
The total site area is approximately 1.3 hectares with approximately 95 per cent of the site area currently impervious. The site includes the lots:

- Lot 201 DP1134152
- Lot 1 DP331280
- Lot 8 DP1098697
- Lot A DP317789
- Lot 1 DP173607
- Lot 7 DP656027
- Lots 1 & 2 DP211809
- Lot 1 DP105344
- Lots 1 & 2 DP583398
- Lot 1 DP315919
- Lot A DP342118
- Lots 1 &2 DP15579
- Lots 1, 2 & 3 DP1082714
- Lot A DP374497
- Lot 25 DP4231

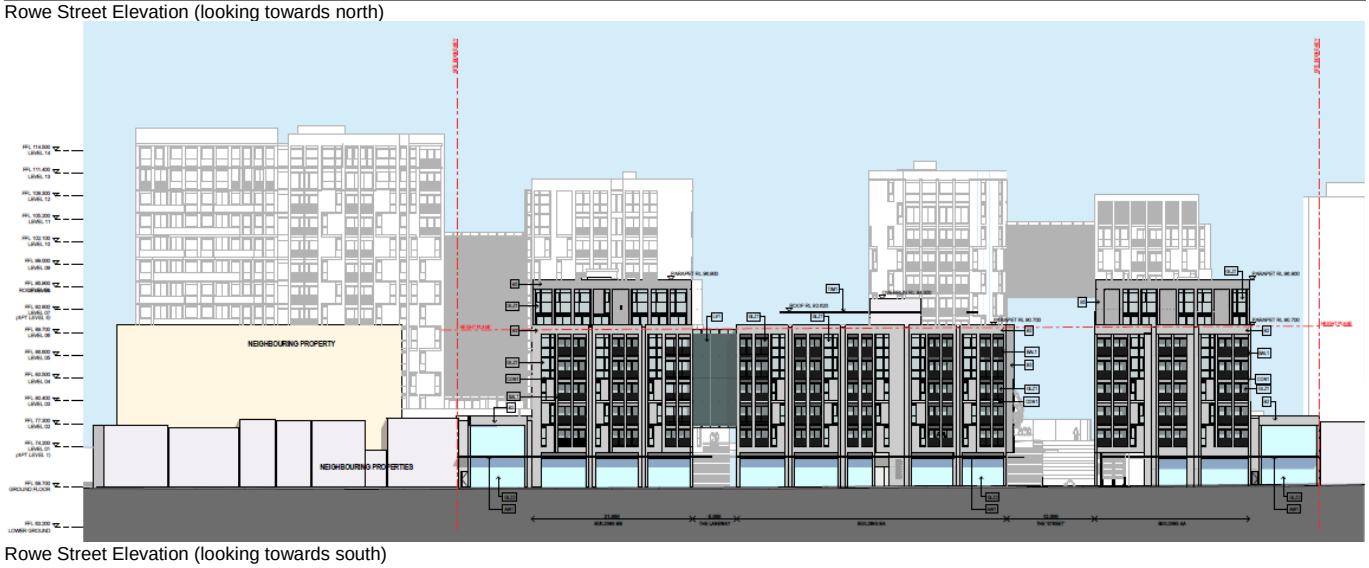
The site is located in the Eastwood sub-catchment of Terrys Creek, immediately upstream of the hydraulic control of the culvert under the Main Northern Rail Line. The main channel of Terrys Creek is a concrete trapezoidal channel located approximately 70 metres to north of the site, parallel to the northern boundary, flowing west to east.

1.3 PROPOSED DEVELOPMENT

The proposed development involves major construction works on a large, 1.3 hectare site, located within Eastwood Town Centre. Architectural elevations of the proposed development prepared by Rice Daubney Architects, dated 14/06/2016 are shown on Figure 1-2, with the site layout and building naming shown on Figure 1-3.



Rowe Street Elevation (looking towards north)



Rowe Street Elevation (looking towards south)

Figure 1-2: Architectural Elevations

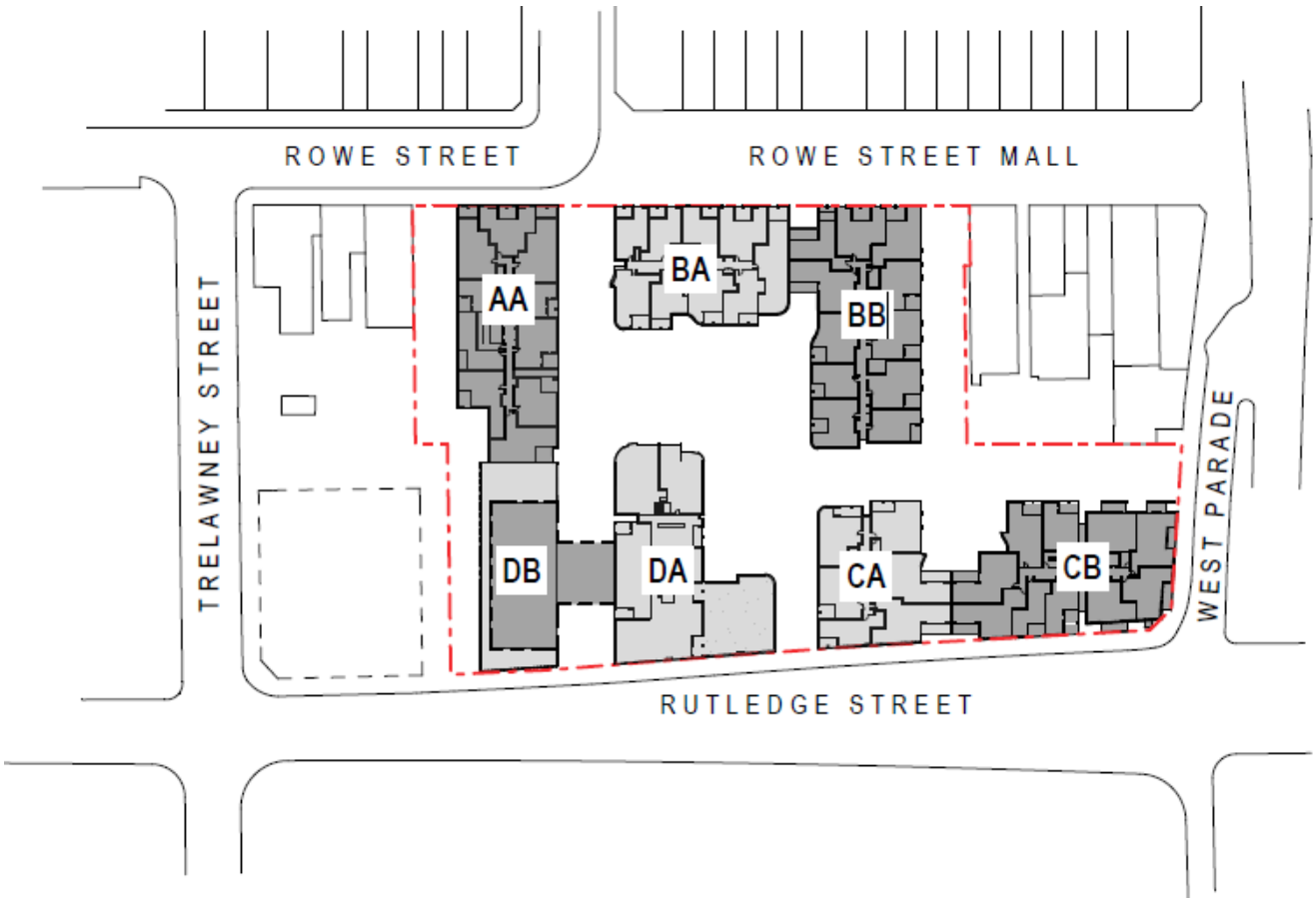


Figure 1-3: Building layout plan

The proposed development shown in the architectural drawings on Figure 1-2 and Figure 1-3 will include:

- Seven 6 to 13 storey residential buildings
- Retail spaces
- Medical centre
- Gym
- Commercial suites
- Food court and restaurants
- Landscaped terrace and public park
- Supermarkets and fresh food outlets

1.4 STUDY OBJECTIVES

The objectives of the flooding assessment of this report are:

- Review all available existing flooding information for the site
- Review and assessment of previous investigations into the sub-catchment of Terrys Creek
- Determine current flooding situation for the 100 year storm event
- Calculate the flooding situation for the 100 year storm event and the Probable Maximum Flood for proposed conditions
- Determine limitations on the proposed development due to flooding, including risk management during events up to the Probable Maximum Flood
- Presentation of the information in a suitable format for application of the DA submission to Ryde City Council.

2 FLOOD PLANNING CONTEXT

This chapter introduces previous investigations into flooding that are relevant to the site, outlines the legislative framework relevant to the proposal, along with policies, applicable guidelines and presents the design criteria in a table.

2.1 PREVIOUS INVESTIGATIONS

2.1.1 *EASTWOOD & TERRYS CREEK FLOODPLAIN RISK MANAGEMENT STUDY & PLAN – FLOOD STUDY REPORT* (NOVEMBER 2008) – BEWSHER CONSULTING PTY LTD

This report was prepared by Bewsher Consulting Pty Ltd in November 2008 for Ryde City Council's Eastwood and Terrys Creek Floodplain Management Committee. The report documents the nature and extent of flooding throughout the Terrys Creek catchment, using *DRAINS* hydrologic and *TUFLOW* hydraulic modelling. The report assessed catchment-wide flows and catchment flood behaviour for both the November 1984 flood and a range of design flood events including the 100 year average recurrence interval (ARI) and probable maximum floods (PMF). The modelling indicated that there are flooding issues in the western portion of the Eastwood town centre, immediately to the north of the development site, within the depression forming the Terrys Creek floodplain.

The results of the 100 year flood modelling at the site from Figure 7 of the Bewsher report is presented in Figure 2-1.

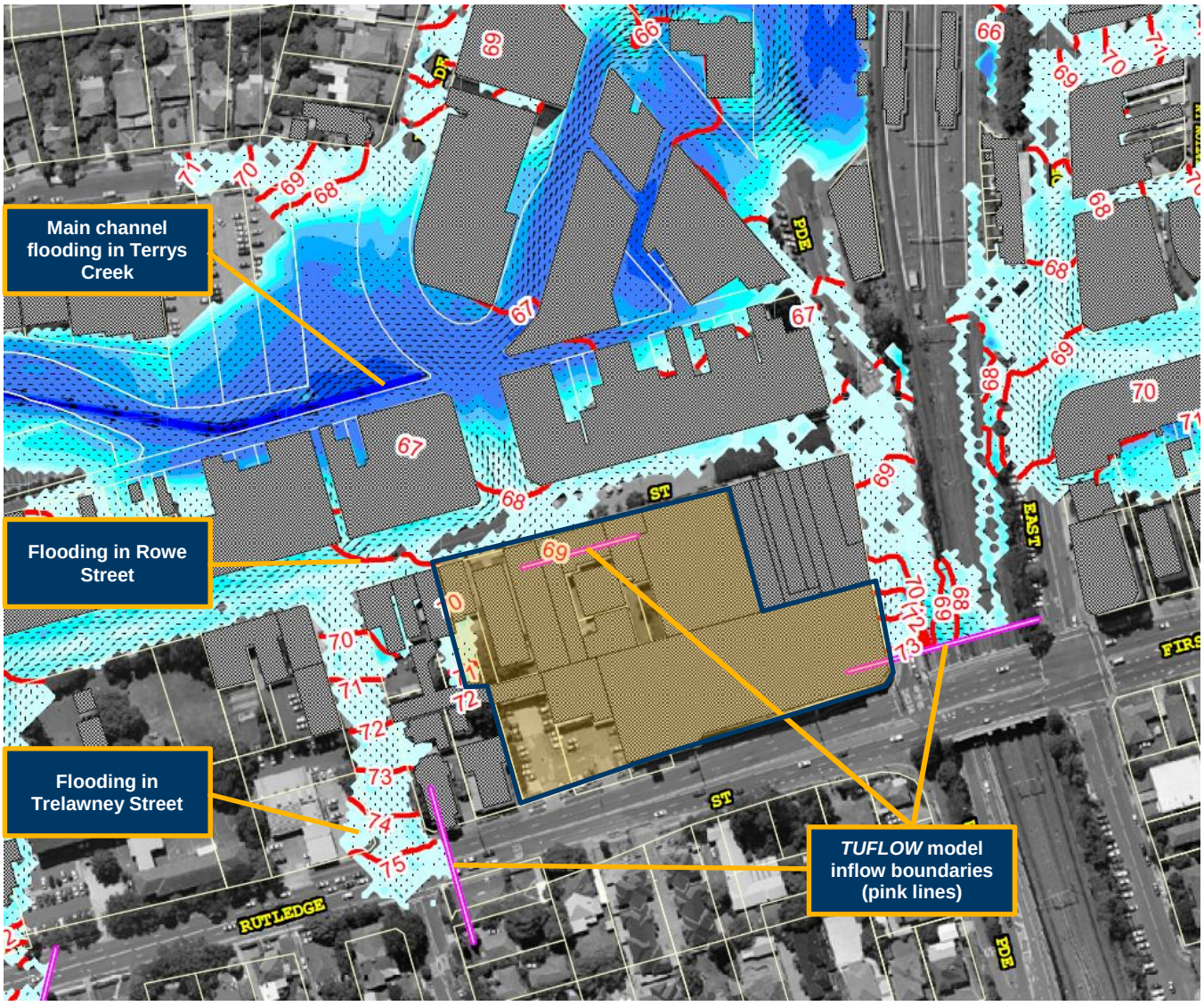


Figure 2-1: 100 year Flood Mapping from Bewsher (2008)

The results in Figure 2-1 show flooding within Trelawney Street, Rowe Street, West Parade, with main channel flooding in Terrys Creek at an elevation of approximately 67 metres AHD. The *TUFLOW* model developed by Bewsher has been constructed with inflow boundaries from the *DRAINS* modelling, shown as pink lines on Figure 2-1, located on Rutledge Street and West Parade. The location of these inflow boundaries, while appropriate for the overall catchment flow conditions, has resulted in the flow patterns shown on Figure 2-1 that indicate the site is flood affected in the 100 year event.

2.2 REGULATORY FRAMEWORK

This section outlines:

- The legislative framework within which the proposal has been developed
- Policies and guidelines applicable to the development
- Introduces the design objectives for the site and outlines the design criteria to be taken into consideration.

2.2.1 *LOCAL GOVERNMENT ACT* 1993

This Act creates local governments and grants them the power necessary to perform their functions, among which are the management, development, protection, restoration, enhancement and conservation of the environment of the area the local government is responsible for, in a manner that is consistent with and promotes the principles of ecologically sustainable development. The *Local Government (Ecologically Sustainable Development) Act 1997* amended the *Local Government Act* so that ecologically sustainable development, including the sustainable use of resources, is now a guiding operational principle.

The NSW Floodplain Development Manual: the management of flood liable land relates to the management of flood liable land in accordance with Section 733 of the *Local Government Act*.

2.2.2 *ENVIRONMENTAL PLANNING AND ASSESSMENT ACT* 1979

This Act is the primary piece of land use and planning legislation in New South Wales. It allows for the creation, at various levels of government, of environmental planning instruments to control land use and planning. State environmental planning policies, regional environmental plans, local environment plans (LEPs), development control plans (DCPs), and council codes and policies can all be established under the Act.

When property is sold in NSW the vendor must attach to the contract documents a copy of a certificate issued by the local council under Section 149(2) of the Act. Certificates issued under Section 149 of the *Environmental Planning and Assessment Act 1979* provide details to prospective property purchasers about zonings and other council policies which may affect the land. This is referred to as a *Section 149(2) Certificate* and contains a list of matters prescribed under Schedule 4 of the *Environmental Planning and Assessment Regulation 2000.* The *NSW Floodplain Development Manual* recommends that councils should only provide information on flood development controls where these controls are imposed by council policies in accordance with the requirements of the *Local Government Act 1993*.

Additional information on flooding can be provided by councils under Section 149(5) of the Act. This information can be from flood studies or historical flood events and is at the discretion of council to provide. The *NSW Floodplain Development Manual* states that 'to become fully aware of flood risk prospective purchasers need to rely upon the use of information provided on planning certificates under both Sections 149(2) and 149(5) of the Act, using either planning certificates or other appropriate means'.

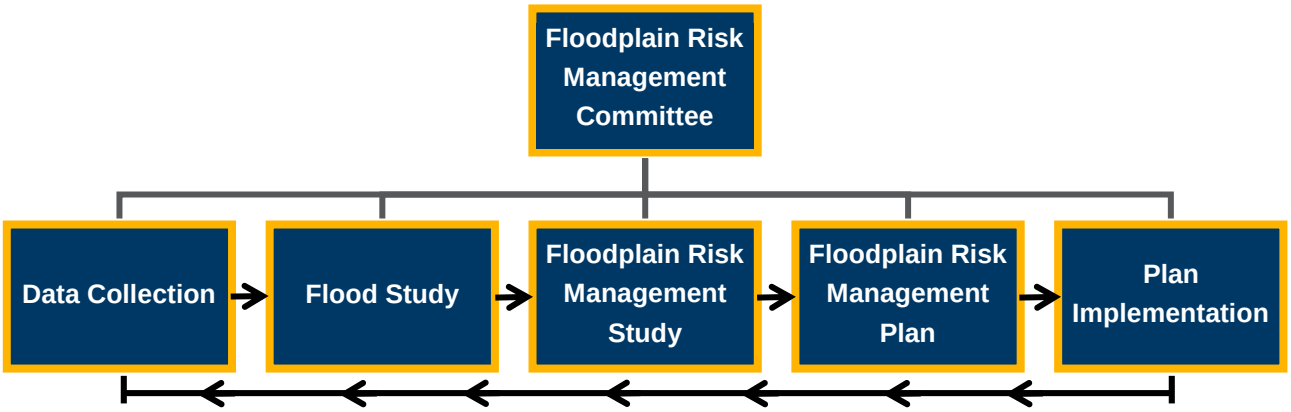
Details of flood behaviour outlined in this flood study will form the basis of the information provided by Council on the Section 149(2) and (5) Certificates. This information includes tagged properties and flood planning levels.

2.2.3 NSW FLOODPLAIN DEVELOPMENT MANUAL: THE MANAGEMENT OF FLOOD LIABLE LAND

The *Floodplain Development Manual* has been produced by the New South Wales Government to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property. The document is intended to guide Councils in the development and implementation of detailed local floodplain risk management plans. The manual, for residential developments, suggests a freeboard of 0.5 metres for a 100 year flood event.

This manual supports the NSW Government's Flood Prone Land Policy in providing for the development of sustainable strategies for managing human occupation and use of floodplains based on a risk management hierarchy of avoidance, minimisation and mitigation. The manual provides the framework for councils to implement this policy, considering the cost and benefits associated with occupation of floodplains in an integrated approach.

The NSW *Floodplain Development Manual: the management of flood liable land* relates to the management of flood liable land in accordance with Section 733 of the *Local Government Act*. This process is outlined in Figure 2-2, recreated from the Manual.



From NSW Floodplain Development Manual: the management of flood liable land

Figure 2-2: The floodplain risk management process

Data Collection: Compilation of existing data and collection of additional data.
Flood Study: Defines the nature and extent of the flood problem, in technical rather than map form.
Floodplain Risk Management Study: Determines options in consideration of social, ecological and economic factors relating to flood risk.
Floodplain Risk Management Plan: Council publicly exhibits the preferred options from the studies. The Floodplain Risk Management Plan is subject to responses and subsequent revision. Council formally approves the Plan after public exhibition
Plan Implementation: Council undertakes measures including mitigation works, planning controls, flood warnings, flood readiness and response plans, environmental rehabilitation along with ongoing data collection and monitoring.
The study will incorporate aspects of the data collection, flood study phases making use of the findings of previous investigations, studies and management plans.

2.2.4 AUSTRALIAN RAINFALL AND RUNOFF

Engineers Australia (The Institution of Engineers, Australia) publish *Australian Rainfall and Runoff* to provide guidance on the application of stormwater and flooding design procedures and values along with analysis of likely accuracies. At the time of publishing this report, the temporal patterns for the 2016 update to *Australian Rainfall and Runoff* have not been released, and are unable to be used in this study.

2.2.5 *SYDNEY WATER ACT* 1994

The *Sydney Water Act 1994* establishes a State owned corporation in relation to the supply of water, the provision of sewerage and stormwater drainage systems and the disposal of waste water in Sydney and other regions. A Section 73 Compliance Certificate is issued under Section 73 of the Act to demonstrate that a development has satisfied Sydney Water's requirements.

2.2.6 CITY OF RYDE *DEVELOPMENT CONTROL PLAN* 2014

2.2.6.1 PART: 4.1 — EASTWOOD TOWN CENTRE

Part 4.1 of the DCP provides development controls relating to the future development of Eastwood Town Centre. Section 3 of Part 4.1 refers to Eastwood Village Precinct and contains development controls which address stormwater management. Section 3.2 outlines objectives and controls for flooding and stormwater management, providing links to Part 8.2 of the DCP. Section 3.2 b) set the control that floor levels within any new development should be a minimum of 300 millimetres above the calculated flood level for the 100 year ARI event.

2.2.6.2 PART: 8.2 — STORMWATER AND FLOODPLAIN MANAGEMENT

This part of the DCP has been prepared to guide development in the management of stormwater runoff and drainage, and on land susceptible to flooding or overland flow within the City of Ryde. The objective of Part 8.2 are:

- To ensure that the collection and conveyance of stormwater from development is undertaken in a safe manner without adverse impact to property or public safety and does not adversely impact downstream conditions.
- To minimise or prevent degradation of the environment from stormwater drainage systems, by implementing water sensitive urban design (WSUD) principals.
- To ensure that development is designed with consideration for overland flows and/ or flooding that may potentially occur during large storm events, so as to minimising property damage and maintain public health and safety

An amendment to the DCP in June 2015 combined the stormwater and floodplain management sections. All references within Council documents to the former Section 8.6 Floodplain Management now refer to Section 8.2 Stormwater and Floodplain Management.

Section 4.0 relates to flooding and overland flow and seeks to ensure development and future occupants are appropriately protected from the impacts of stormwater inundation on land identified as being flood affected as defined under Ryde LEP 2014 clause 6.3 *Flood planning.*

2.2.6.3 PART: 8.2 — STORMWATER MANAGEMENT TECHNICAL MANUAL

Section 2.1 of the manual provides freeboard requirements for floor levels to drainage systems and overland flow paths. Section 2.2 of the manual sets requirements for the preparation of a flood impact statement, including methodologies for determining flood risk and flood hazard, along with planning considerations and evacuation measures.

Section 4 outlines methods for hydrologic analysis, including the use of computer modelling software and recurrence interval requirements for drainage items. Section 4 provides hydrologic parameters, including hydrologic roughness coefficients for various surface types. Hydraulic roughness coefficients are provided in Section 5.

2.2.6.4 PART: 8.2 — WATER SENSITIVE URBAN DESIGN GUIDELINES

The overall aim of this document is to provide the relevant parties with the necessary detail to design a WSUD solution that meets the objectives of the City of Ryde's DCP 2014 - Part 8.2. The DCP requires a WSUD Strategy be submitted for development applications lodged within City of Ryde, for development of land located in a mixed use business zone, include residential flat buildings and mixed use developments, as is the case with this proposed development.

2.3 DESIGN CRITERIA

Finished Floor Levels for the building will be designed in accordance with the requirements of Ryde City Council's *Development Control Plan 2014* (DCP). The requirements of this DCP are presented in Table 2-1.

Table 2-1: Summary of DCP Requirements for Freeboard

Drainage System	Residential			Industrial/Commercial	
	Land level	Habitable floor level	Non-habitable floor	Land level	Floor level
Surface drainage/ adjoining ground level	-	0.15 metres	-	-	0.15 metres
Public drainage infrastructure, creeks and open channels	0.5 metres	0.5 metres	0.1 metres	0.3 metres	0.3 metres
Flooding and Overland Flow (Overland Flow Precincts and Low Risk)	N/A	0.3 metres	0.15 metres	N/A	0.3 metres
Flooding and Overland Flow (Medium Risk and greater)	N/A	0.5 metres	0.3 metres	N/A	
Onsite Detention	N/A	0.2 metres	0.1 metres	N/A	0.2 metres
Road Drainage Minor Systems (Gutter and pipe flow)		0.15 metres			

These freeboard requirements will be incorporated into the design of the building, driveways and car parks on the site. The ground floor plan prepared by Rice Daubney Architects, shown on drawings *15R DA 1100* and *DA 1201* dated 14/06/2016 is provided in Appendix A.

3 TWO-DIMENSIONAL FLOOD MODELLING

This chapter outlines the methodology used to model flood behaviour at the site, including a description of the catchment information and modelling parameters.

3.1 METHODOLOGY

This investigation used the application of rainfall directly onto the grid of the two–dimensional hydraulic model within the *TUFLOW* flood modelling software (Build 2013-12-AA), using the *SMS* interface (Version 11.1). This methodology is known as the direct rainfall approach or 'rainfall on the grid'. This approach removes the need for a separate hydrological modelling package.

In traditional flood modelling, separate hydrological and hydraulic models are constructed. The hydrological model has inputs of rainfall, area losses and roughness within a lumped or partially distributed sub–catchment, calculating runoff hydrographs for modelled storm events. This hydrograph is then applied to the hydraulic model, which performs flow calculations based on hydraulic features to develop estimations of flood behaviour across the study area.

In the direct rainfall approach, the hydrological model is either partially or completely removed from the process. The hydrological routing is undertaken in the distributed two–dimensional model, rather than in a lumped hydrological package.

In addition to catchment flows using the direct rainfall approach, flows from the development site were modelled using the rational method for individual lots for existing condition outflows and on-site-detention calculations for developed condition outflows. These flows were entered into the model at lot boundaries.

3.2 DATA SOURCES

3.2.1 RAINFALL DATA

3.2.1.1 *AR&R* INTENSITY-FREQUENCY-DURATION

Rainfall intensities for the 100 year recurrence interval events were taken from the Bureau of Meteorology *Rainfall Intensity-Frequency-Duration Data System* http://www.bom.gov.au/hydro/has/cdirswebx/cdirswebx.shtml. Rainfall temporal patterns were developed from *Australian Rainfall and Runoff* 1987 (ARR 1987). Eastwood is located within Zone 1, shown on Figure 3-1.

Figure 3-1: ARR Rainfall Zones

Temporal patterns were used to develop incremental rainfall depths, in millimetres for each time period of the storm event. Storms from 10 minutes to two hours duration were split into 5 minute intervals, 3 and 4.5 hour events into 15

minute intervals, with the 6 hour event split into half hour intervals. Temporal patterns and rainfall depths from *Australian Rainfall and Runoff* 1987 for each storm event were used in the modelling.

No spatial variation in rainfall pattern was modelled as part of this investigation. The catchment size of around 15 hectares does not require areal reduction to be applied, with *Australian Rainfall and Runoff* (2001) recommending that lumped rainfall models are suitable for catchments up to 4.0 square kilometres.

This investigation assumed rainfall probability neutrality with recurrence interval, i.e. that the rainfall event with a probability of 1 in 100 years (1% Annual Exceedance Probability [AEP]) generates the flood event with a probability of 1 in 100 years.

3.2.1.2 PROBABLE MAXIMUM PRECIPITATION

Rainfall depths and temporal patterns for the Probable Maximum Flood (PMF) were developed using the Bureau of Meteorology *Generalised Short Duration Method* (GSDM). Rainfall intensities were developed for the durations presented in Table 3-1.

Table 3-1: Probable Maximum Precipitation depths

Duration (minutes)	Rainfall depth (mm)	Duration (minutes)	Rainfall depth (mm)
15	98	120	314
20	112	150	348
25	126	180	384
30	141	240	436
45	177	270	458
60	207	300	480
90	267	360	507

The rainfall depths were split using the temporal patterns provided in the GSDM manual and manually created in the rainfall-on-the-grid hydrologic modelling within *TUFLOW*.

3.2.2 TOPOGRAPHIC AND SURVEY DATA

Topographic data for the model was obtained from the NSW Department of Land and Property Information, Spatial Data Services. Land and Property Information (LPI) have medium and high resolution orthorectified digital imagery from their Digital Image Acquisition System (ADS40) and Leica ALS50 (Airborne Laser Scanner) as well Digital Elevation Data across NSW using the latest Light Detection and Ranging Systems Technology (LiDAR), ADS40 Imagery, Radar, and or Satellite Technologies.

The airborne digital imagery, on tile SydneyNorth2013_3226258_56, used in this investigation was sourced from the LPI and has a 100 millimetre horizontal and 150 millimetre vertical resolution. The data obtained from LPI was sampled at one–metre grid spacings for the entire catchment.

A representation of this data, showing contour and relief information is presented on Figure 3-2.

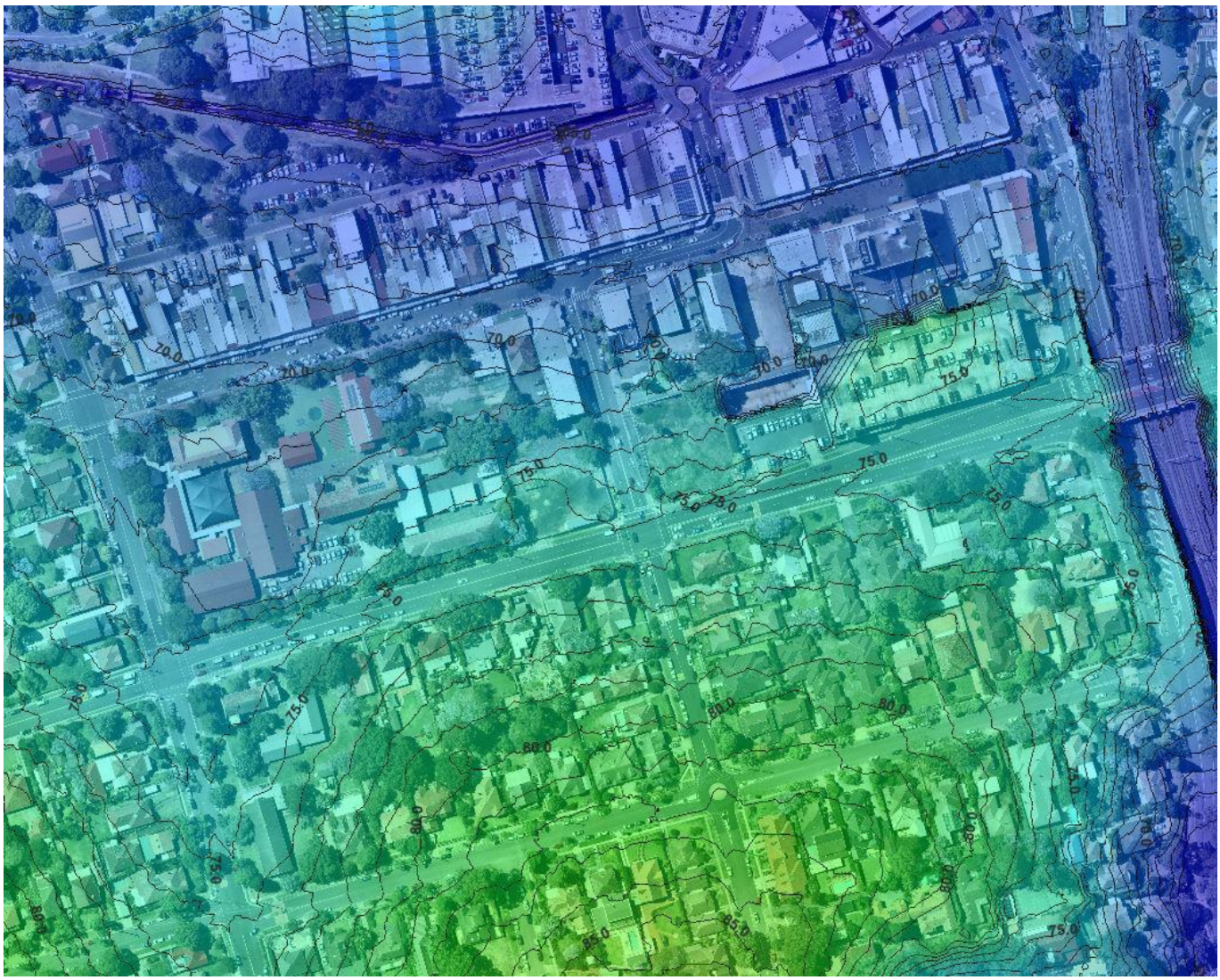


Figure 3-2: LiDAR topographic information

Buildings and other obstructions were modelled by mapping using aerial photography. The pit and pipe network was ignored in the hydraulic modelling, with all modelled as flow travelling overland.

Survey information for the site has been obtained by Rygate & Company Pty Ltd and is provided as an attachment to this report on plan 77399, dated 18/04/2016, sheets 1–6. The survey shows that the frontage to the Rowe Street has an elevation of approximately 68.5 metres AHD. The location of the proposed car park entrance is at around 74 metres AHD on Rutledge Street, with the entrance on West Parade is at a level of around 73.8 metres AHD.

3.2.3 MODEL PARAMETERS

Hydrologic and hydraulic parameters used in the modelling have been taken from the City of Ryde *Development Control Plan* 2014 — Part: 8.2 — Stormwater Management Technical Manual and from the *Eastwood & Terrys Creek Floodplain Risk Management Study & Plan – Flood Study Report* (November 2008) by Bewsher Consulting.

Land use categorisation mapping was used to define the spatially varying hydraulic roughness and hydrological losses within the *TUFLOW* model. This involves breaking up the study area into surface categories by digitising recent aerial

photography and assigning each surface category its own parameters. The parameters adopted are summarised in Table 3-2.

Table 3-2: Manning's 'n' Roughness used

Land Use Type	Hydrologic Manning's 'n*'
Urban – units and strata titles land	0.2
Roads and paved/concrete areas	0.025

The use of extreme Manning's roughness to model buildings used in the 2008 Bewsher study has not been used in this investigation. The approach to modelling buildings has been discussed by the Institution of Engineers Australia in two documents that provide guidance on incorporation of building obstructions: *Project 15: Two Dimensional Modelling in Urban and Rural Floodplains* and *Project 15: Two Dimensional Simulations In Urban Areas Representation of Buildings in 2D Numerical Flood Models*, which make recommendations to not use this method. This investigations approach to modelling building obstructions is discussed in Section 3.2.4

The spatial distribution of the digitised surface categories is shown on Figure 3-3.

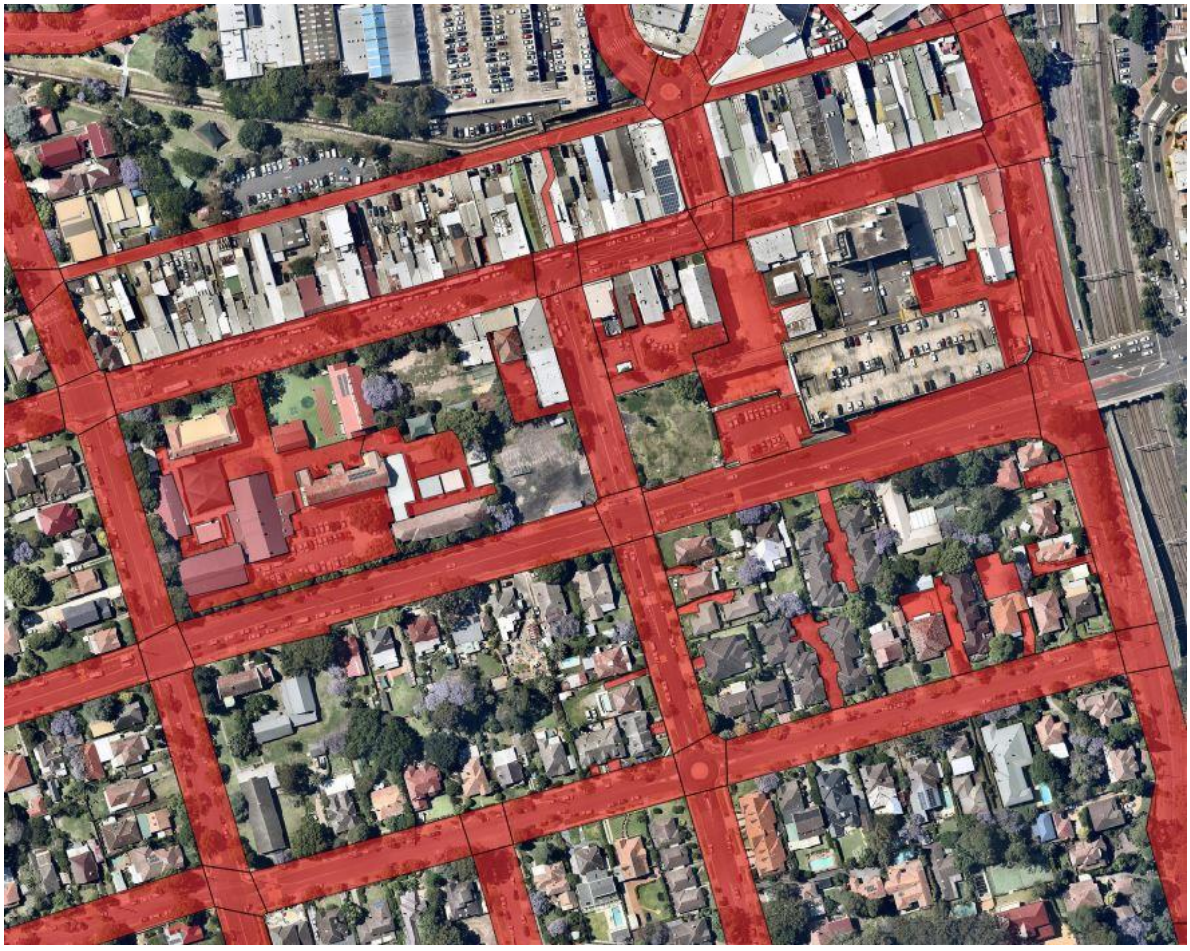


Figure 3-3: Spatial representation of surface categories

The red areas show areas classified as 'Roads and paved/concrete areas', with remaining area classified as 'Urban – units and strata titles land'.

3.2.4 BUILDING OBSTRUCTIONS

Buildings and other obstructions were modelled by mapping using aerial photography. The pit and pipe network was ignored in the hydraulic modelling, with all modelled as flow travelling overland. A map showing the buildings identified within the model is shown in Figure 3-4.

Pre-development Developed

Figure 3-4: Building obstructions

The update to *Australian Rainfall and Runoff* currently released in draft form by the Institution of Engineers Australia includes two documents that provide guidance on incorporation of building obstructions: *Project 15: Two Dimensional Modelling in Urban and Rural Floodplains* and *Project 15: Two Dimensional Simulations In Urban Areas Representation of Buildings in 2D Numerical Flood Models*. These documents recommend completely removing building from models where rainfall volumes within building footprints are not significant. The approach to remove buildings has been used in this modelling investigation

3.2.5 BOUNDARY CONDITIONS

The rainfall over the catchment was applied using the rainfall–on–the–grid method which applies the specified rainfall depths over time to all cells within the study area. The rainfall intensities used are discussed in 3.2.1.

The downstream boundary conditions adopted for the two-dimensional domain is located in the floodplain of Terrys Creek. The two-dimensional overland flow boundary conditions adopted a computed water surface elevation versus time which uses a set water surface elevations for the duration of the storm. The fixed water surface downstream one-dimensional and two-dimensional boundary condition was adopted from the Bewsher studies as 67 metres AHD for the 100 year event and 69 metres AHD for the probable maximum flood.

Flows from the development site were modelled using the rational method for individual lots for existing condition outflows and on-site-detention calculations for developed condition outflows. These flows were entered into the model at lot boundaries, shown on Figure 3-5.

Pre-development

Developed

Figure 3-5: Site inflow boundaries

Flow rates calculated for existing and developed conditions entered into the model at the flow boundaries are provided in Table 3-3.

Table 3-3: Site flow rates

Inflow Location	Pre-development flow rate (m^3/s)	Post-development flow rate (m^3/s)	
Rowe Street	0.53	West	East
		0.146	0.2505
West Parade	0.11	0.273	

Flow rates in Table 3-3 were entered as constant flow rates as the methodologies used to develop the flows do not produce hydrographs. This conservative approach does not require analysis of time to peak flow rates.

3.2.6 PROVISIONAL FLOOD HAZARD CATEGORISATION

Hazard categories were determined in accordance with Appendix L of the NSW Floodplain Development Manual, the graphical representation of this categorisation methodology is shown in Figure 3-6.

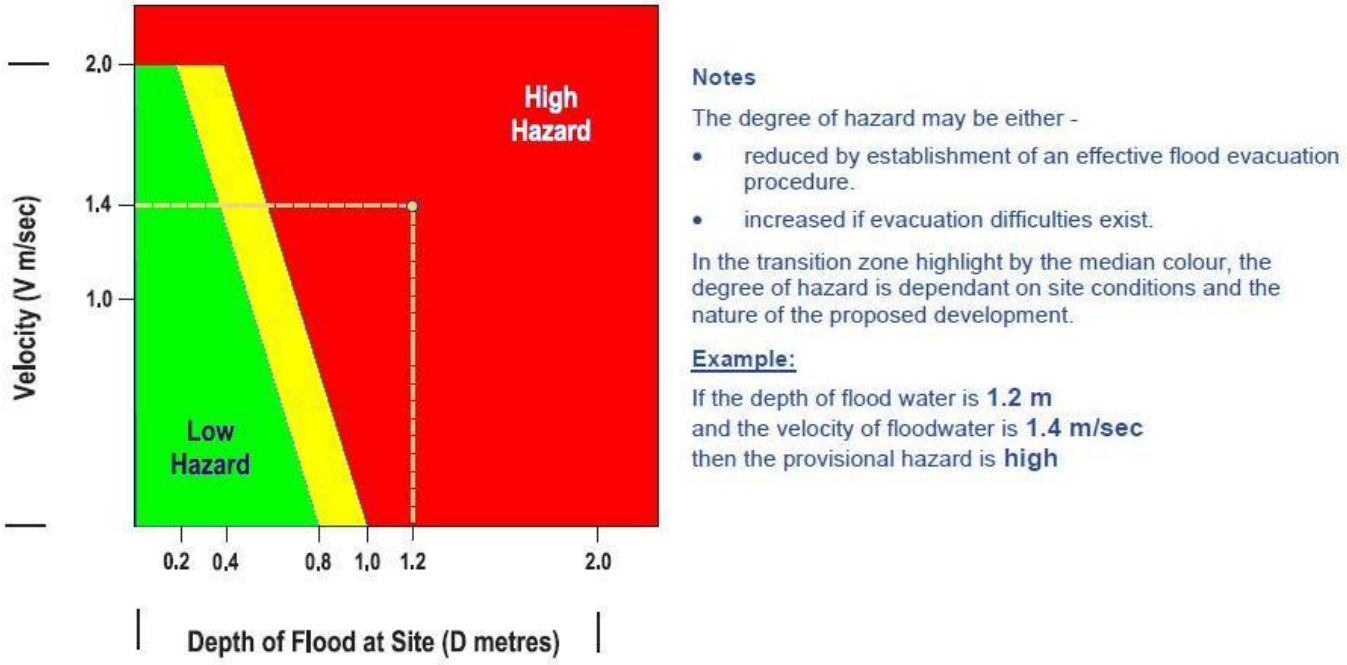


Figure 3-6: Provisional Hydraulic Hazard Categories (Figure L2 from NSW Floodplain development manual (2005))

Flood hazard is mapped using this methodology by multiplying the flood depth by the velocity of the flow. Hazard categories are broken down into high and low hazard for each hydraulic category. These are defined in the *NSW Floodplain Development Manual* as:

- high hazard possible danger to personal safety; evacuation by trucks difficult; able-bodied adults would have difficulty in wading to safety; potential for significant structural damage to buildings.
- low hazard should it be necessary, truck could evacuate people and their possessions; able-bodied adults would have little difficulty in wading to safety.

Maps of provisional flood hazard categorisation at the site for the developed 100 year event are presented in Section 3.4.1 of this report. These maps were developed using the *ArcGIS* geographic information system software package using velocity depth product.

3.3 PRE-DEVELOPMENT FLOOD MODELLING

The pre-development flood model was developed using the data described in Section 3.2, including the upstream catchment area from ALS data with a 1.0 metre grid spacing, shown on Figure 3-2. Models were run for the 100 year recurrence interval for the following rainfall events:

- 30 minute storm
- 1 hour storm
- 2 hour storm
- 3 hour storm
- 6 hour storm.

Peak flow elevations were extracted from the modelled events, with the results discussed in Section 3.3.1, with flows under 0.1 metres deep removed from the model. This is lower than the 0.15 metre removal recommended in the *NSW*

Floodplain development manual and *Australian Rainfall and Runoff* and has been used for this investigation in order to present more extensive flood inundation mapping in the Rowe Street pedestrian mall.

3.3.1 PRE DEVELOPMENT MODELLING RESULTS

Peak flood surface elevations and flow depths were calculated for each of the modelled storm events. Extents and depths of overland flow paths have been mapped on the digital terrain model, with flood surface elevations mapped for areas at risk from flooding calculated in using the *ArcGIS* geographic information system software package.

The results of the modelling demonstrated that for a 100 year recurrence interval, the 1 hour storm event creates peak flood elevations in roadways adjacent to the site, in particular in Rowe Street to the north of the site. These peak flood elevations have been mapped and are presented on Figure 3-7. The peak flooding map presented on Figure 3-7 shows that for the 100 year 1 hour flood, the peak existing water surface elevation at the northern site boundary is approximately 68–69 metres AHD. Flows in streets to the south and east of the site

The results of the modelling indicate that there is no continuous flow across the site from south to north.

calibre CONSULTING

LEGEND

- Buildings
- Water Surface Contour (m AHD)

x100y1hdClip2

Flood Depth (m)

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- >2

NOTES:

0 10 20 40 m
1:1,500 (A3)
N

PROJECT:
EASTWOOD CENTRE REDEVELOPMENT

CLIENT: **YUHU PROPERTY (AUSTRALIA) PTY LTD**

Drawing Title:
FIGURE 3-7
100 Year 1 Hour Storm Event - Existing Flood Depth and Water Surface Contours with

DRAWING NO: 15-003643 ISSUE:
EXISTING DEPTH **01**

ISS	BY	CHK	DATE	DETAILS
01	DKH	_	14/07/16	-

H:\15\15-003643 - Eastwood Shopping Centre Redevelopment - Flooding\GIS\revised_with_inflow... Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994

3.4 DEVELOPED SITE MODELLING

The existing flood model was adjusted to include new building layout shown on the ground floor plan prepared by Rice Daubney Architects, shown on drawings *15R DA 1100* and *DA 1201* dated 14/06/2016. Ground levels around the proposed buildings were set to the existing surface elevation.

3.4.1 DEVELOPED CONDITIONS MODELLING RESULTS

Peak flood surface elevations and flow depths were calculated for each of the modelled storm events. Extents and depths of overland flow paths have been mapped on the digital terrain model, with flood surface elevations mapped for areas at risk from flooding calculated in using the *ArcGIS* geographic information system software package.

The results of the flood modelling for the developed conditions, with the building layout shown in Appendix A, is presented in Figure 3-8, showing flood extents, flood surface water elevation and flood depth for the peak 100 year storm event. A flood difference map, showing the change in water surface elevation between existing conditions and following the proposed development is presented in Figure 3-10.

The flood extents calculated in the *TUFLOW* modelling for the existing and design conditions indicates that the proposed development reduces flow in Rowe Street Mall to the north of the site by between 0 and 0.0075 metres. The proposed development does not increase flood depths outside the proposed lot boundaries. This change in flood level of less than 0.1 metres is within the limits of accuracy achievable using the methodology described in Section 3.1.

The flood hazard map on Figure 3-10 indicates that there are areas of high hazard on Rowe Street, with medium hazard within the Rowe Street mall, to the north of the site. There are no areas of low hazard shown on the mapping as these flows are below 0.1 metres and have been excluded from the flood extents mapping.

Flood extents for the developed site during the probable maximum flood are presented in Figure 3-11. These are provided for reference for flood evacuation and are not required to be used for flood planning in accordance with Ryde City Council's *Development Control Plan.*

calibre CONSULTING

LEGEND

Developed Buildings

Water Surface Contour (m AHD)

d100y1hdclip

Flood Depth (m)

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- >2

NOTES:

0 10 20 40 m

1:1,500 (A3)

N

PROJECT:

EASTWOOD CENTRE REDEVELOPMENT

CLIENT: **YUHU PROPERTY (AUSTRALIA (PTY PTD)**

Drawing Title:

FIGURE 3-8
100 Year 1 Hour Storm Event - Developed Flood Depth and Water Surface Contours with

DRAWING NO: 15-003643 ISSUE:

DEVELOPED DEPTH **01**

ISS	BY	CHK	DATE	DETAILS
01	DKH	_	15/07/16	-

H:\15\15-003643 - Eastwood Shopping Centre Redevelopment - Flooding\GIS\revised_with_inflows\Developed Depth 160714v3.mxd

Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994

H:\15\15-003643 - Eastwood Shopping Centre Redevelopment - Flooding\GIS\revised_with_inflows\developed_afflux_100y_1h.mxd GDA 1994 MGA Zone 56 Datum: GDA 1994

calibre CONSULTING

LEGEND

- Developed Buildings

aff_100y_1h_h

Flood Afflux (m)

- < -0.1
- -0.1 - -0.05
- -0.05 - -0.01
- -0.01 - -0.005
- -0.005 - 0
- 0 - 0.005
- 0.005 - 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.15
- 0.15 - 0.2
- 0.2 - 0.25
- 0.25 - 0.3
- 0.3 - 0.4
- > 0.4

NOTES:

0 10 20 40 m

1:1,500 (A3)

N

PROJECT:

EASTWOOD CENTRE REDEVELOPMENT

CLIENT: **YUHU PROPERTY (AUSTRALIA) PTY LTD**

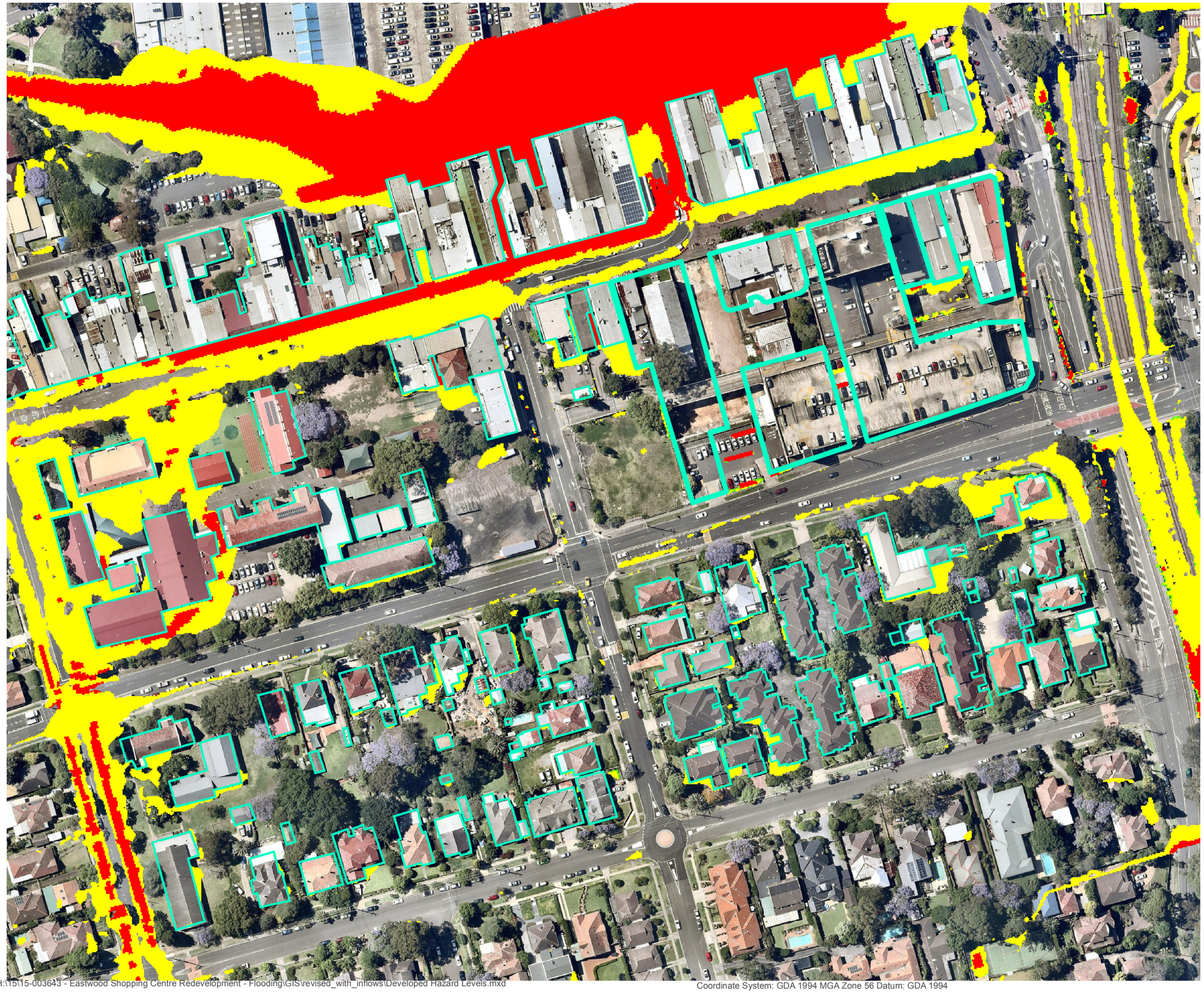
Drawing Title:

FIGURE 3-9
100 Year 1 Hour Storm Event - Developed Flood Afflux

DRAWING NO: 15-003643 ISSUE:

DEVELOPED AFFLUX **01**

ISS	BY	CHK	DATE	DETAILS
01	DKH	_	14/07/16	-



calibre CONSULTING

LEGEND

- Developed Buildings

hazard_clip

Australian Hazard Level

- Low Hazard
- Site Dependant
- High Hazard

NOTES:

0 10 20 40 m

1:1,500 (A3)

N

PROJECT:

EASTWOOD CENTRE REDEVELOPMENT

CLIENT: **YUHU PROPERTY (AUSTRALIA) PTY LTD**

Drawing Title:

FIGURE 3-10
100 Year 1 Hour Storm Event - Developed Flood Hazard for Flood Depths above 100mm

DRAWING NO: 15-003643 ISSUE:

DEVELOPED HAZARD **01**

ISS	BY	CHK	DATE	DETAILS
01	DKH	_	15/07/16	-

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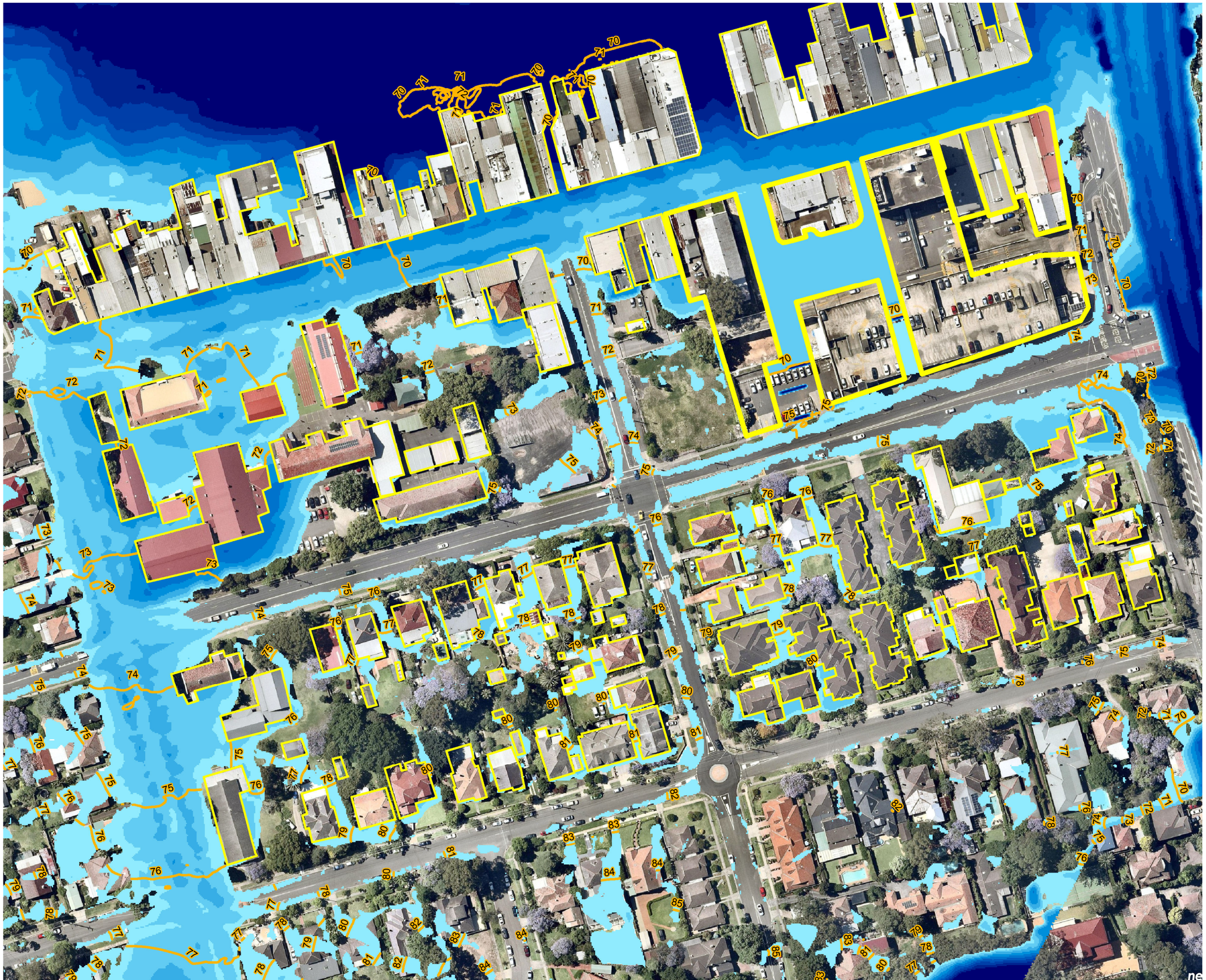
Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994



LEGEND

- Developed Buildings
- Water Surface Contour (m AHD)

pmp_d_clip

Flood Depth (m)

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2
- >2

NOTES:

0 10 20 40 m

1:1,500 (A3)

N

PROJECT:

EASTWOOD CENTRE REDEVELOPMENT

CLIENT: **YUHU PROPERTY (AUSTRALIA) PTY LTD**

Drawing Title:

FIGURE 3-11
PMP Storm Event - Developed Flood Depth and Water Surface Contours with 100mm

DRAWING NO: 15-003643 ISSUE:

PMF DEPTH **01**

ISS	BY	CHK	DATE	DETAILS
01	DKH	_	15/07/16	-

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Coordinate System: GDA 1994 MGA Zone 56 Datum: GDA 1994

4 FLOOD RISK MANAGEMENT

This section describes flood risk at the site and outlines emergency management, flood warning and flood evacuation measures to be incorporated in the proposal.

4.1 FLOOD PLANNING LEVELS

The minimum habitable floor level of buildings will be 0.3 metres above the 100 year ARI flood level, as presented on Figure 3-8. These floor levels are set in order to meet the requirements of Ryde City DCP, provided in Table 2-1. All access paths and common areas, particularly the residential lobbies. All residential lobbies and retail areas will be located above the 100 year flood level to allow for evacuation during flood events. The ground floor plan prepared by Rice Daubney Architects, shown on drawings *15R DA 1100* and *DA 1201* dated 14/06/2016 is provided in Appendix A. The minimum floor elevations for the building layout shown on Figure 1-3 are provided in Table 4-1.

Table 4-1: Finished Flood Levels

Building	Flood Level (m AHD)		Habitable Floor Level (m AHD)		Non-Habitable Floor Level (m AHD)	
AA (Rowe Street, west)	68.90 west	68.70 east	69.20 west	69.0 east	69.05 west	68.85 east
BA (Rowe Street, east)	68.80 east	68.35 east	69.10 east	68.65 east	68.95 east	68.5 east
BB (Rowe Street, east)	68.3		68.6		68.45	
CA (Rutledge Street)	74.40 west	73.85 east	74.70 west	74.05 east	74.65 west	74.0 east
CB (West Parade)	70.60 north	73.35 south	70.90 north	73.65 south	70.75 north	73.50 south
DA (Rutledge Street)	74.6		74.9		74.75	
DB (Rutledge Street)	74.9		75.2		75.05	

The entrance to the underground car park is recommended to be set 0.15 metres above the flood level in West Parade in accordance with Council's DCP. This recommendation is made as the flows within West Parade at the location of the car park entrance are not above the gutter height. A standard driveway entrance plus an additional 0.15 metre freeboard in this location will provide the necessary flood protection for the car park. Design floor levels set at or above the levels provided in Table 4-1 would be appropriate to meet the Ryde City Council requirement to be 0.3 metre above the 100 year flood level.

4.2 FLOOD RISK MANAGEMENT

This flood extents mapping provided in Figure 3-8 shows that no overland flow is directed on to the site from the upstream catchment area during the 100 year flow, with Figure 3-11 indicating that the site will be partially inundated during the probable maximum flood.

4.2.1 EMERGENCY MANAGEMENT

An emergency management plan will be required for the development of the project. This management plan will address the issues of flood warning, flood prediction and associated evacuation logistics. Correspondence with local emergency services and the State Emergency Services (SES) will be required during the design of building and access layouts and incorporated into local disaster management planning.

4.2.2 POTENTIAL EVACUATION ROUTES AND INTERNAL SITE LAYOUT

The layout of the buildings and access paths within the site will need to incorporate the potential usage as evacuation routes during extreme flood events. Roads and footpaths should be designed to allow a direct path from lower ground to higher ground. There should be no areas of the development that will be isolated or cut-off during periods of high flow, in particular the residential lobbies. All residential lobbies and retail areas have been designed to be above the 100 year flood level and not to create any isolated premises during the flood events, up to the probable maximum flood, shown on Figure 3-11. This will provide an evacuation route from the building in periods of high flow.

4.2.2.1 FLOOD WARNING AND FLOOD PREDICTION

Detailed plans of management to be enacted during storm events are not feasible for this development, due to the short duration of the peak storm events for the catchment and Terrys Creek stormwater channel. Areas on the northern boundary of the site, closest to the flow path of the Terrys Creek stormwater channel that will be inundated during high flow events (i.e. within the 100 year flood extent presented on in Figure 3-8 and probable maximum flood shown on Figure 3-11) will be signposted with flood warning signs. These signs will warn of potential inundation during large rainfall events and provide depth indicators in areas subject to flooding.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

This flood study report has been prepared to support the Development Application (DA) for the proposed multiunit, mixed use development at Eastwood. This report is to accompany the application for the development on the site being prepared by YuHu Property (Australia) Pty Ltd. This report outlines flooding issues on the site and includes descriptions of:

- The site and the existing flooding issues review of the existing available flood study information
- The proposed development for the site
- The results of hydrologic and hydraulic modelling undertaken to determine flood levels on the site and local catchment
- Preliminary flood planning levels for the proposed building design and site layout
- Preparation of the information in a suitable format for DA submission to Ryde City Council.

This report discusses the impacts of flooding resulting from the 1 in 100 year Average Recurrence Interval (ARI) storm event; referred to as the 100 year event or the 1% Annual Exceedance Probability (AEP) event, for existing and developed conditions, along with a discussion of the Probable Maximum Flood (PMF).

This investigation used the development of flow rates within the Terrys Creek sub-catchment using the rainfall-on-the-grid method to determine flows in the two–dimensional hydraulic model within the *TUFLOW* flood modelling software (Build: 2013-12-AC), using the *SMS* interface (Version 11.2.5).

5.2 RECOMMENDATIONS

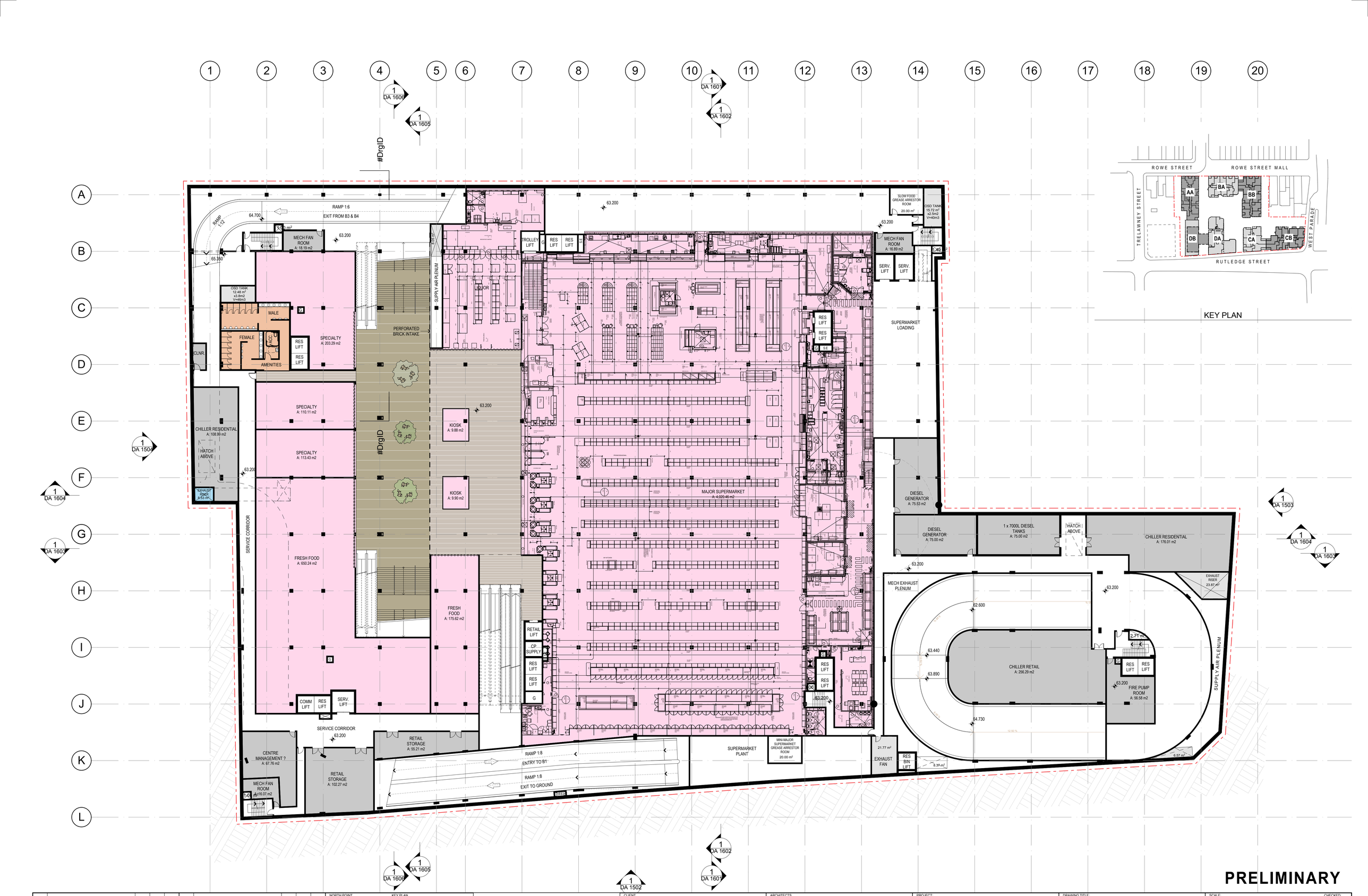
The minimum floor elevations for the building layout shown on the ground floor architectural plan for the proposed development prepared by Rice Daubney Architects, dated 14/06/2016.

Building	Flood Level (m AHD)		Habitable Floor Level (m AHD)		Non-Habitable Floor Level (m AHD)	
AA (Rowe Street, west)	68.90 west	68.70 east	69.20 west	69.0 east	69.05 west	68.85 east
BA (Rowe Street, east)	68.80 east	68.35 east	69.10 east	68.65 east	68.95 east	68.5 east
BB (Rowe Street, east)	68.3		68.6		68.45	
CA (Rutledge Street)	74.40 west	73.85 east	74.70 west	74.05 east	74.65 west	74.0 east
CB (West Parade)	70.60 north	73.35 south	70.90 north	73.65 south	70.75 north	73.50 south
DA (Rutledge Street)	74.6		74.9		74.75	
DB (Rutledge Street)	74.9		75.2		75.05	

This flood study recommends these floor levels for the proposed development in accordance with Ryde City Council's *Development Control Plan*.

APPENDICES

APPENDIX A ARCHITECTURAL DRAWINGS



PRELIMINARY

REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE
00	FOR REVIEW	LK	MVS	14/06/16

NORTH POINT

KEY PLAN

CLIENT
YUHU GROUP (AUSTRALIA) Pty. Ltd.

STREET ADDRESS
SUBURB AND POSTCODE

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The Rice Daubney Group (NSW) P/L as trustee for The Rice Daubney Trading Trust
ABN 56 880 304 993

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F: 02 0000 0000
xx@xxxxxxxx.com.au

PROJECT:
EASTWOOD CENTRE
144-186 ROWE STREET
EASTWOOD, NSW, 2122

DRAWING TITLE:
LOWER GROUND PLAN

SCALE:	CHECKED:
1:250 @ A1 1:500 @ A3	MVS
PROJECT NUMBER:	DRAWING NUMBER:	ISSUE:
15R	DA 1100	00

teamwork://AUSNSYD-BIM01/15R Eastwood MASTER


ROWE STREET
ROWE STREET MALL
WEST PARADE
SPECIALTY A: 96.67 m2
SPECIALTY A: 121.88 m2
SLOW FOOD A: 155.37 m2
RES. LOBBY A: 34.09 m2
SLOW FOOD A: 98.48 m2
SLOW FOOD A: 119.32 m2
SLOW FOOD A: 149.80 m2
SLOW FOOD A: 207.93 m2
SPECIALTY A: 242.38 m2
SLOW FOOD A: 116.64 m2
SLOW FOOD A: 130.15 m2
SLOW FOOD A: 121.76 m2
SLOW FOOD A: 132.50 m2
RETAIL STORAGE A: 32.52 m2
SUPERMARKET LOADING
RES. LOBBY A: 54.22 m2
RES. LOBBY A: 20.45 m2
SPECIALTY A: 114.61 m2
FAST FOOD A: 151.29 m2
KIOSK A: 15.00 m2
SPECIALTY A: 128.94 m2
FAST FOOD A: 113.10 m2
FAST FOOD A: 73.14 m2
TURNTABLE
SPECIALTY A: 117.49 m2
SPECIALTY A: 54.21 m2
SPECIALTY A: 60.25 m2
SPECIALTY A: 114.43 m2
MINI-MAJOR SUPERMARKET A: 1,646.67 m2
MINI-MAJOR BACK OF HOUSE
3 x TRANSFORMER SUBSTATION
MAIN SWITCH ROOM A: 106.49 m2
MECH FAN ROOM A: 20.03 m2
RESI BULKY GOODS STORE A: 25.91 m2
EXHAUST RISER
SUPPLY AIR PLENUM
400KL FIRE SERVICE TANK A: 171.92 m2
TANK AT HIGH LEVEL OVER RAMP
RESI LOADING
RESIDENTIAL BINS
RETAIL & COMM BINS
MED. WASTE
LANDSCAPED TERRACE
TRAVELATOR LANDING
AMENITIES
MALE
FEMALE
PARENTS
COMMS 1
NBN 1
SERVICE CORRIDOR
RAMP 1:5.6 - RESIDENTIAL EXIT FROM B3 & B4
RETAIL EXIT FROM B1 RAMP 1:8
RETAIL ENTRY TO B1 RAMP 1:8
RAMP STRUCTURE TO BE REMOVED
EXISTING LEVELS TO BE CONFIRMED
NEW TRANSITION RAMP TO NEIGHBOUR
6.25% (1:16) 10m
12.5% (1:8) 10m
11.25% (1:886) 10m
5% (1:20) 14.5m -19m AV WHEELBASE
ROWE STREET
ROWE STREET MALL
TRELAWNEY STREET
RUTLEDGE STREET
WEST PARADE

PRELIMINARY

REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE	REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE
					00	FOR REVIEW	LK	MVS	14/06/16

NORTH POINT

KEY PLAN

CLIENT
YUHU GROUP (AUSTRALIA) Pty. Ltd.
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ABN 56 880 304 993

PROJECT:
EASTWOOD CENTRE
144-186 ROWE STREET
EASTWOOD, NSW, 2122

DRAWING TITLE:
GROUND PLAN - ROWE ST

SCALE: 1:250 @ A1 1:500 @ A3
CHECKED: MVS
PROJECT NUMBER: 15R
DRAWING NUMBER: DA 1201
ISSUE: 00

teamwork://AUSNSYD-BIM01/15R Eastwood MASTER

PRELIMINARY

REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE	REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE
					00	FOR REVIEW	LK	MVS	14/06/16

NORTH POINT

KEY PLAN

CLIENT:
YUHU GROUP (AUSTRALIA) Pty. Ltd.

STREET ADDRESS
SUBURB AND POSTCODE
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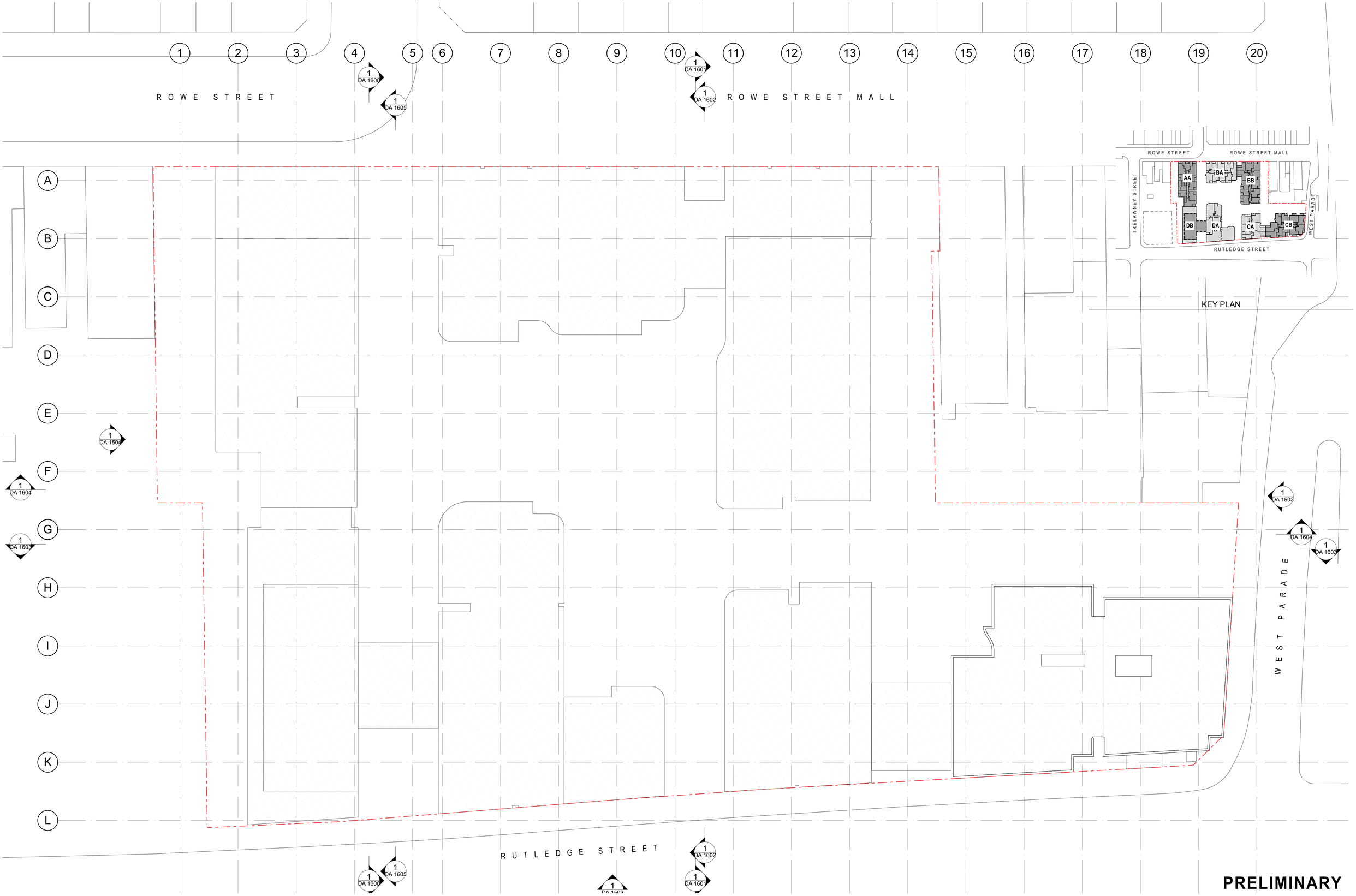
The Rice Daubney Group (NSW) P/L as trustee for The Rice Daubney Trading Trust
ABN 56 880 304 993

PROJECT:
EASTWOOD CENTRE
144-186 ROWE STREET
EASTWOOD, NSW, 2122

DRAWING TITLE:
LEVEL 1 - RUTLEDGE ST

SCALE: 1:250 @ A1 1:500 @ A3
CHECKED: MVS
PROJECT NUMBER: 15R
DRAWING NUMBER: DA 1301
ISSUE: 00

teamwork://AUSNSYD-BIM01/15R Eastwood MASTER



PRELIMINARY

REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE
00	FOR REVIEW	LK	MVS	14/06/16

NORTH POINT

KEY PLAN

CLIENT
YUHU GROUP (AUSTRALIA) Pty. Ltd.

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SUBURB AND POSTCODE

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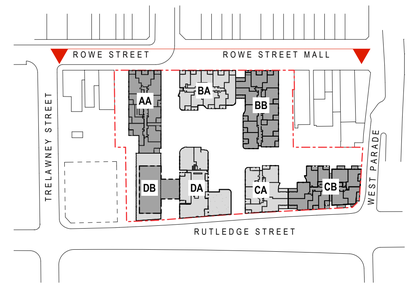
ABN 56 880 304 993

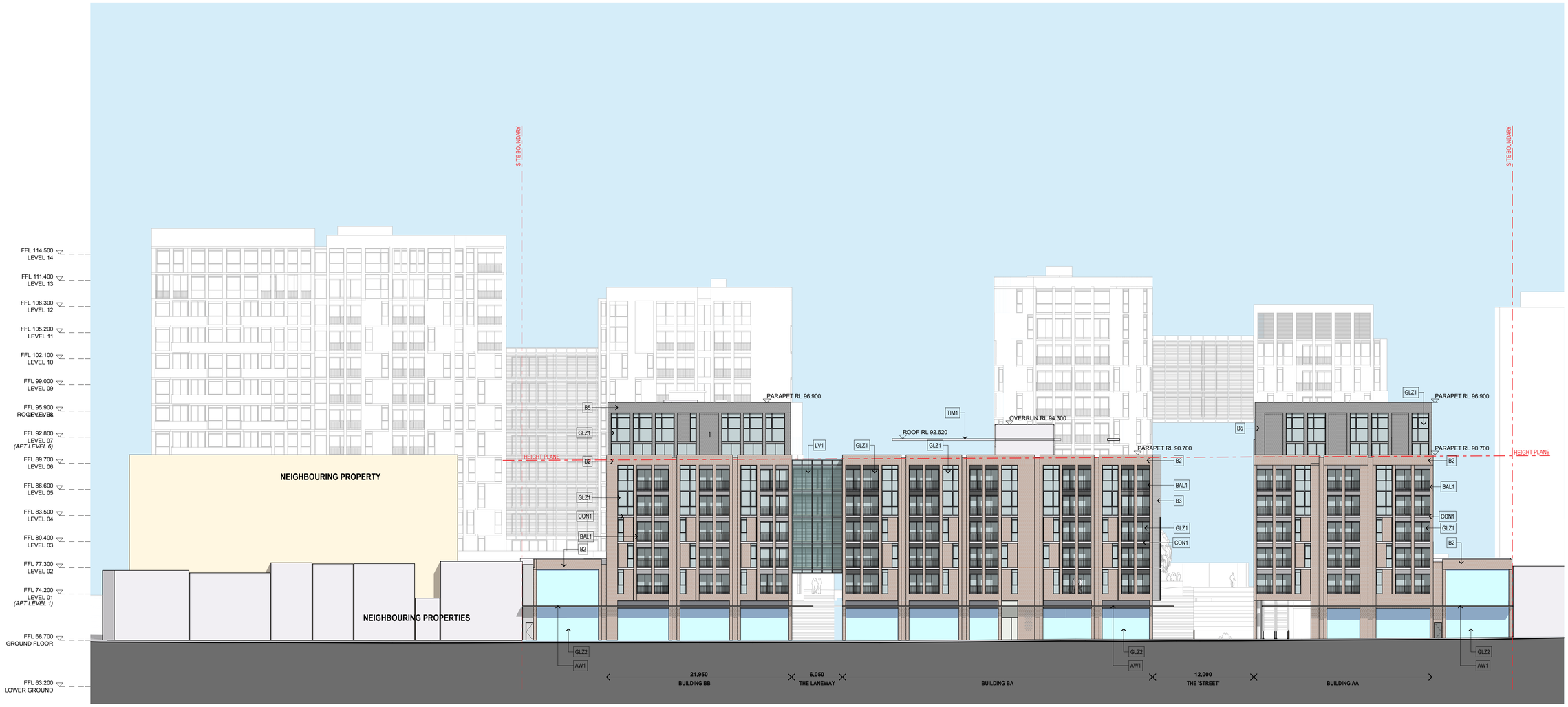
PROJECT:
EASTWOOD CENTRE
144-186 ROWE STREET
EASTWOOD, NSW, 2122

DRAWING TITLE:
ROOF LEVEL

SCALE: 1:250 @ A1 1:500 @ A3
CHECKED:
PROJECT NUMBER: 15R
DRAWING NUMBER: DA 1401
ISSUE:



KEY PLAN



PRELIMINARY

REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE
00	FOR REVIEW	LK	MVS	14/06/16

NORTH POINT

KEY PLAN

CLIENT
YUHU GROUP (AUSTRALIA) Pty. Ltd.

STREET ADDRESS
SUBURB AND POSTCODE

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F: 02 0000 0000
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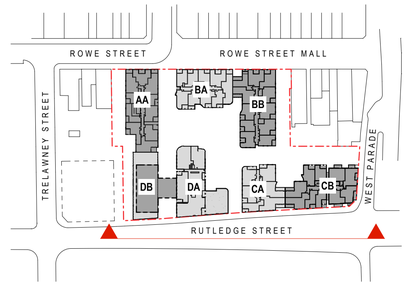
The Rice Daubney Group (NSW) P/L as trustee for The Rice Daubney Trading Trust
ABN 56 880 304 993

PROJECT:
EASTWOOD CENTRE
144-186 ROWE STREET
EASTWOOD, NSW, 2122

DRAWING TITLE:
ELEVATION ROWE STREET

SCALE: 1:250 @ A1 1:500 @ A3
CHECKED: MVS
PROJECT NUMBER: 15R
DRAWING NUMBER: DA 1501
ISSUE: 00



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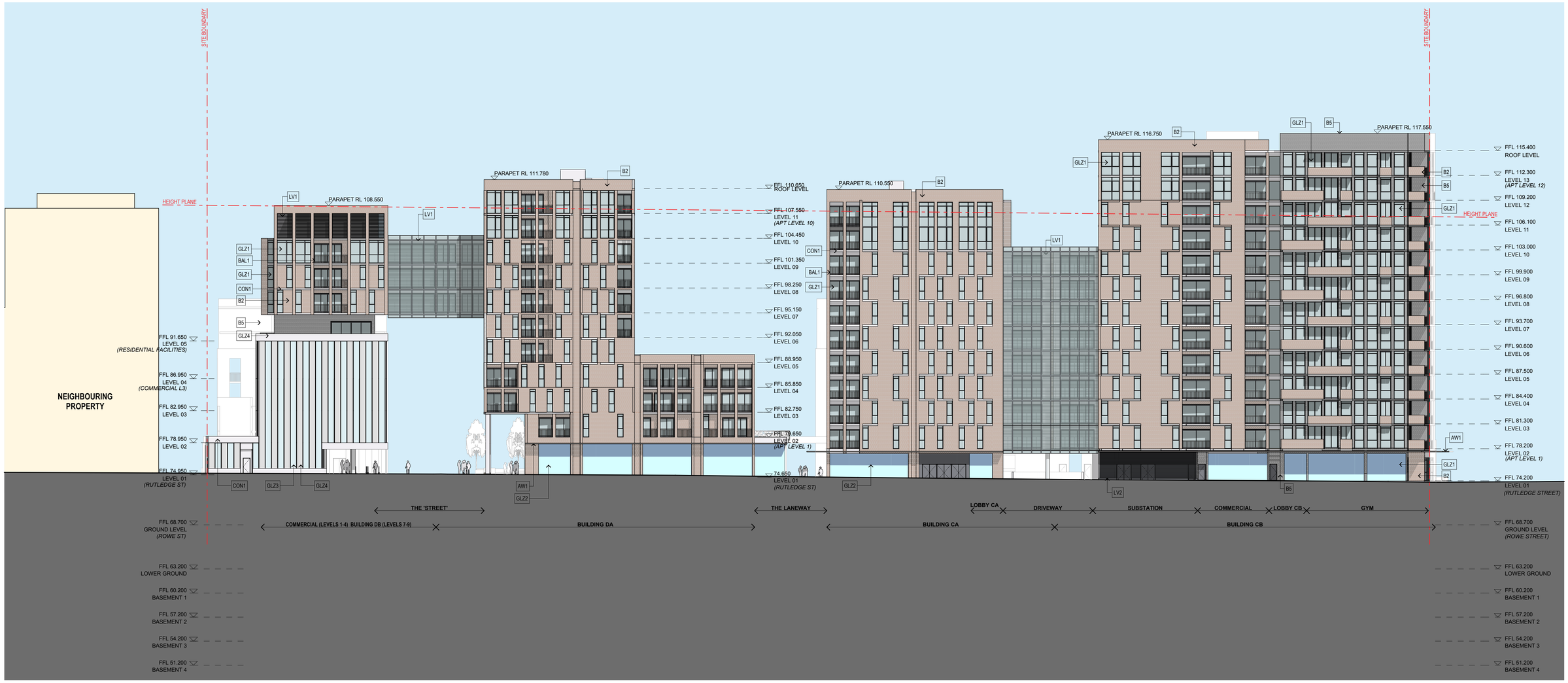

PRELIMINARY

REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE
00	FOR REVIEW	LK	MVS	14/06/16

NORTH POINT

KEY PLAN

CLIENT
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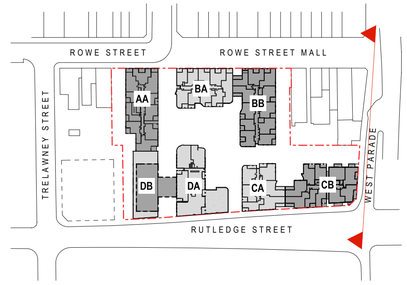
PROJECT:
EASTWOOD CENTRE
144-186 ROWE STREET
EASTWOOD, NSW, 2122

DRAWING TITLE:
ELEVATION RUTLEDGE STREET

SCALE: 1:250 @ A1 1:500 @ A3
CHECKED: MVS
PROJECT NUMBER: 15R
DRAWING NUMBER: DA 1502
ISSUE: 00



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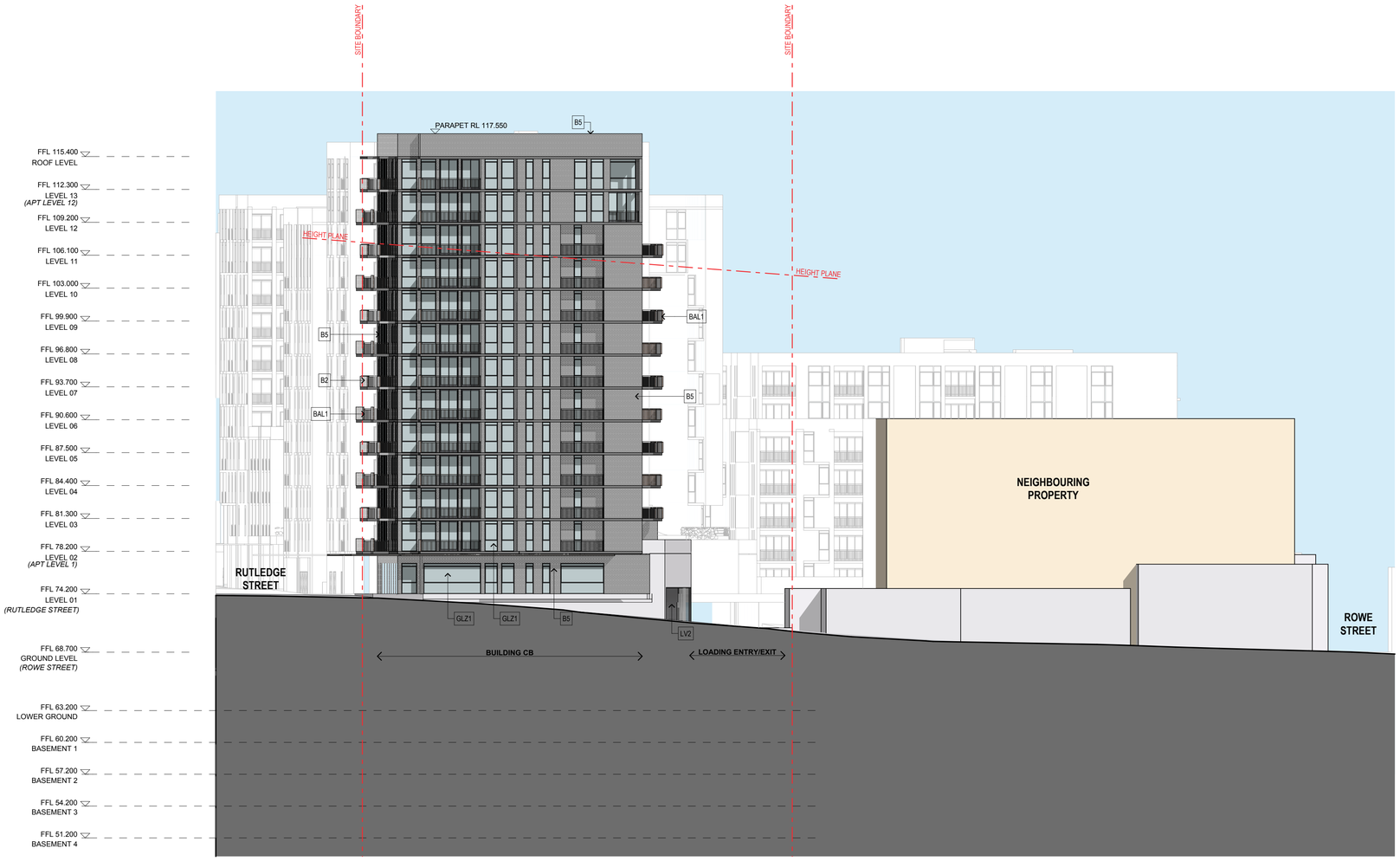

PRELIMINARY

REV	DESCRIPTION OF CHANGE	DRAWN	CHECK	DATE
00	FOR REVIEW	LK	MVS	14/06/16

NORTH POINT

KEY PLAN

CLIENT
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PROJECT:
EASTWOOD CENTRE
144-186 ROWE STREET
EASTWOOD, NSW, 2122

DRAWING TITLE:
ELEVATION WEST PARADE

SCALE: 1:250 @ A1 1:500 @ A3
CHECKED: MVS
PROJECT NUMBER: 15R
DRAWING NUMBER: DA 1503
ISSUE: 00