

The Trustee for Y&Z TRD TRUST

# Proposed Childcare Centre 16 Terry Road, Eastwood



Location of subject site at 16 Terry Road, Eastwood

Flood Assessment Report

December 2023



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Flood Assessment Report

December 2023

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# 1 INTRODUCTION

FloodMit Pty Ltd was commissioned by the Whitestone Group, on behalf of the Trustee for Y&Z TRD TRUST, to prepare a flood assessment report for a proposed childcare centre at 16 Terry Road, Eastwood (Lot 1 DP 324937).

A locality sketch is shown on Figure 1.

The site occupies an area of approximately 1,500m<sup>2</sup>. It is located within the Ryde City Council LGA and is zoned R2 – Low Density Residential under Ryde LEP 2014.

A development application for alterations and additions to an existing dwelling house, and change of use to a childcare centre, was previously approved by Council for the site during 2016. The approval included a childcare centre with 43 places over two levels, and outside parking for 10 cars. Whilst development has commenced, it has not been completed.

Further changes to the proposed childcare centre have now been proposed, which is the subject of a new development application. The new application includes the demolition of the existing dwelling and the construction of a new childcare centre with 126 places over two levels, and basement car parking for 24 cars.

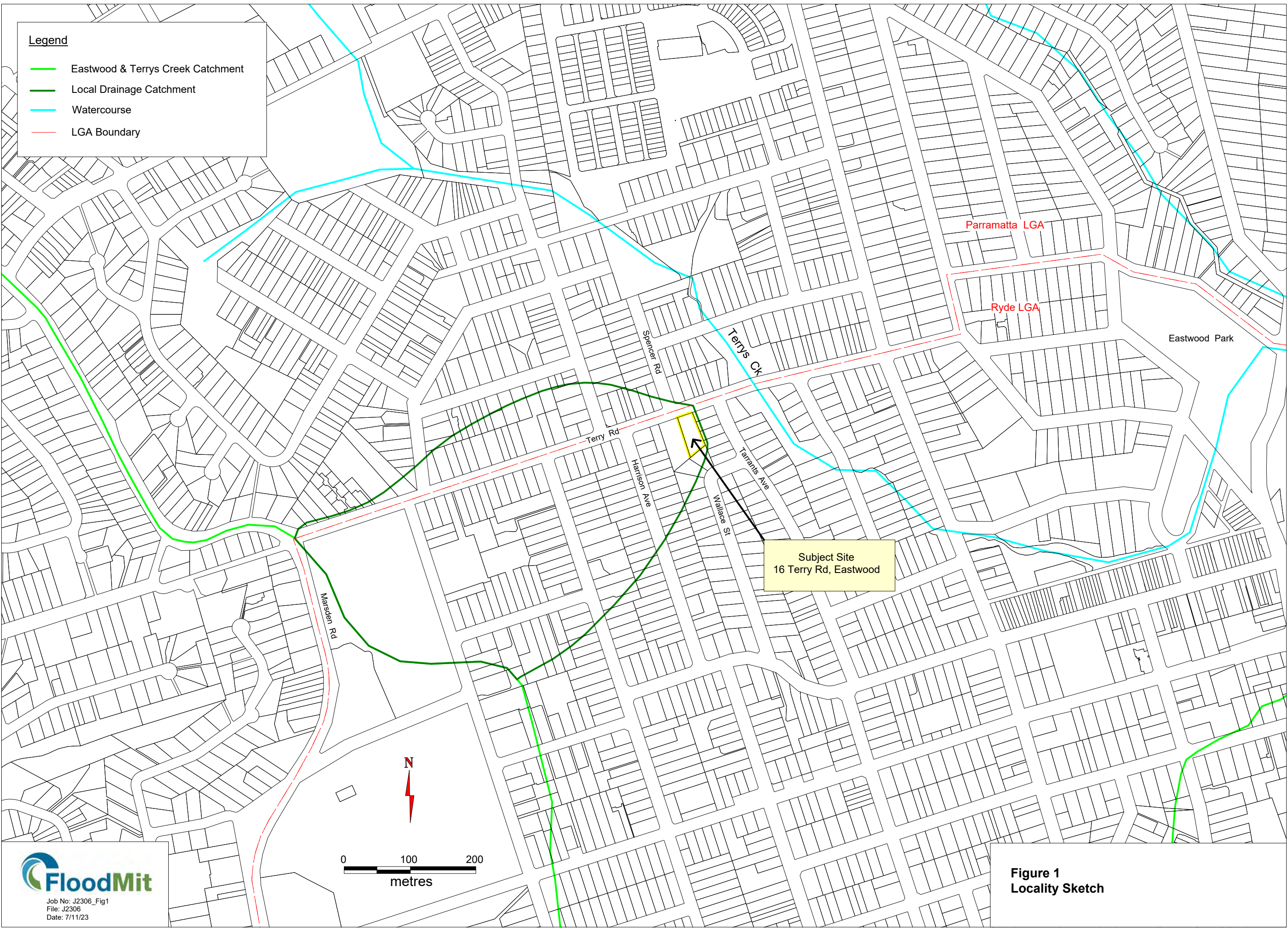
The site is within the Eastwood and Terrys Creek catchment, and is partially impacted by overland flow down Terry Road to Terrys Creek. Flooding is therefore a consideration to the proposed development.

This flood assessment report provides:

- i) A review of site conditions and the proposed development;
- ii) A review of flood behaviour and flood risk that is experienced within the vicinity of the site;
- iii) A flood impact assessment of the proposed development; and
- iv) An assessment as to whether the proposed development complies with the flood risk management controls specified in Ryde LEP 2014 and Ryde DCP 2014.

**Legend**

- Eastwood & Terrys Creek Catchment
- Local Drainage Catchment
- Watercourse
- - - LGA Boundary



Parramatta LGA

Ryde LGA

Eastwood Park

Terry Rd

Terry's Ck

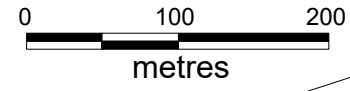
Tarrant's Ave

Wallace St

Harrison Ave

Marsden Rd

Subject Site  
16 Terry Rd, Eastwood



**Figure 1**  
**Locality Sketch**

## **2 BACKGROUND INFORMATION**

### **2.1 CATCHMENT PLAN AND LOCAL DRAINAGE**

The site is within the upper reaches of the Eastwood and Terrys Creek catchment. It is located within a small local subcatchment that drains stormwater runoff down Terry Road to Terrys Creek.

The local catchment area is shown on Figure 2.

The local catchment is closely aligned with Terry Road, and includes areas within the City of Parramatta (north side of Terry Road) and the City of Ryde (south side of Terry Road). The contributing catchment area to the subject site is 17.4Ha, which represents less than 2% of the total Terrys Creek catchment.

Details of the stormwater drainage system are included on Figure 2. This consists of a 600mm diameter pipeline on the north side of the road, and a 900mm diameter pipeline on the south side of the road, adjacent to the subject site. Both pipelines drain to Terrys Creek, approximately 120m to the east of the site. The gradient of the road and pipeline is relatively steep at approximately 3.4%.

The site is not directly impacted by floodwater in Terrys Creek, but could potentially be impacted by overland flow down Terry Road towards the creek.

### **2.2 SITE DESCRIPTION**

A site inspection was undertaken on 27<sup>th</sup> September 2023.

Detailed site survey plans for the site (Innovative Surveying Associates, 11<sup>th</sup> October 2023) were also reviewed, and are attached at Figure 3.

The site consists of an existing dwelling which is in the process of having alterations and additions made to it, in line with the current development approval for a 43 place childcare centre. The work is largely incomplete.

A site photo is included at Photo 1.

The floor level of the existing dwelling ranges from RL 76.43 to RL 76.49m AHD.

Retaining walls have been constructed inside the rear property boundary, and partly down both sides of the property. The area behind the existing building has been significantly excavated. Current ground levels within the site generally vary from RL 76.3m (inside of rear retaining wall) to RL 75.5m AHD (near the front boundary).



Photo 1  
Existing Site at 16 Terry Road, Eastwood (Google Streetview, Nov 2021)

## 2.3 DETAILS OF PROPOSED DEVELOPMENT

Proposed development is shown on architectural plans prepared by Janssen Designs, dated 1<sup>st</sup> Sept 2023 (Issue A). The most relevant drawings to this flood assessment report are the Basement Plan and the Ground Floor Plan, which are included in this report as Figure 4 (2 sheets). The ground floor plan has been digitised and is included on subsequent flood mapping plans that have been prepared.

It is proposed to completely demolish the existing dwelling and, in its place, construct a new 126 place childcare centre over two levels, with basement parking underneath.

The proposed basement provides parking for 24 cars. Entry to the basement is from Terry Road. The entry ramp is aligned with the existing driveway, and follows a similar upward grade to the former garage. The ramp grades from Terry Road (RL 75.85 at the property boundary) to a crest level of RL 76.40 before sloping down to the basement level at RL 73.65m AHD.

The main access from the basement to the ground floor and first floor levels is provided by a single lift. There are also two stairwell exits to the front of the property.

The ground floor includes the main reception area, office, 66 childcare places, and outdoor play areas. Entry is from the front street, or via the lift from the basement. The ground floor level is proposed at RL 76.70m AHD. This is approximately 0.27m higher than the floor level of the existing dwelling.



The first floor includes staff room, kitchen, 60 childcare places, and outdoor play areas. Access from the ground floor is via the lift or internal stairwell. There are also two exterior side exits from the first floor. The first floor level is proposed at RL 80.25m AHD.

Key levels are summarised in Table 1.

**Table 1  
Proposed Development Levels**

Description	Level (m AHD)
Basement Parking	73.65
Ramp to Basement (at boundary)	75.85
Ramp to Basement (at crest)	76.40
Stairwell entry #1 to basement	76.70
Stairwell entry #2 to basement	76.70
Bin Room	76.50
Ground Floor Level	76.70
First Floor Level	80.25

## 2.4 INFORMATION ON FLOOD BEHAVIOUR

Information on flood behaviour is available from a number of studies and investigations. These include:

- i) Eastwood & Terrys Creek Floodplain Risk Management Study & Plan – Flood Study Report (Bewsher, 2008);
- ii) Eastwood & Terrys Creek Floodplain Risk Management Study and Plan – Main Report (Bewsher, 2009);
- iii) Eastwood & Terrys Creek Floodplain Risk Management Study and Plan – Flood Mapping refinements (Bewsher, 2010);
- iv) Flood Information Request – No, 16 Terry Road, Eastwood (City of Ryde, 10<sup>th</sup> July 2023);
- v) Flood Harmonisation Study – Flood Study Update (WMA Water, draft, Jan 2023); and
- vi) Flood Impact Assessment – Proposed Development of a New Childcare Centre 16 Terry Road, Eastwood (Umbrella Civil Consulting Engineers, Feb 2014).

### 2.4.1 Eastwood & Terrys Creek Flood Study (Bewsher, 2008)

The Eastwood & Terrys Creek flood study represents the first stage in the floodplain management process for the Eastwood and Terrys Creek catchment. The study is based on a DRAINS hydrologic model to estimate catchment runoff and flows in the stormwater pipe network, and a TUFLOW hydraulic model to analyse overland and floodplain behaviour.

The models were calibrated to the November 1984 flood and verified against the April 1988 and February 1990 storm events. Design flood behaviour was assessed for the 5 year, 20 year, 100 year and Probable Maximum Flood (PMF).

The study forms the technical basis for the subsequent floodplain management study and plan (discussed below). It also forms the source of flood level data currently issued by the City of Ryde within this catchment, including the subject site.

#### **2.4.2 Eastwood & Terrys Ck Floodplain Management Study & Plan (Bewsher, 2009)**

The floodplain management study provides a further review of flood behaviour and provides recommended actions and measures to manage the flood risk within the catchment. The study uses the same flood models that were developed during the earlier flood study.

Areas subject to flooding were classified into three different flood risk management precincts (High/Medium/Low), depending on the frequency of the event; the flood hazard experienced; and evacuation issues. Properties at risk of overland flow were also identified. A range of development controls were formulated, based on the type of development proposed and the flood risk precinct where that development is located. The majority of these development controls are now incorporated within Council's LEP and DCP.

Some filtering of the flood risk management mapping was undertaken during the floodplain management study to remove those areas subject to a minor or trivial flood affectation. This included filtering of shallow overland flow areas within some properties, including the subject site.

#### **2.4.3 Eastwood & Terrys Creek Flood Mapping Refinements (Bewsher, 2010)**

Further refinement to the flood mapping was undertaken by Bewsher Consulting for Ryde Council in 2010. This principally involved re-sampling the model flood grid from 3m to 1m in order to improve the resolution of the flood mapping.

Flood maps provided in this report are based on the refined mapping provided by Bewsher Consulting in 2010.

#### **2.4.4 Flood Information Request (City of Ryde, July 2023)**

A Flood Information Request was lodged by the applicant for the site in Jul 2023. The report provided by Council is included in Appendix A.

The report provides tabulated flood levels for the 100 year and PMF floods at various locations within the property. These levels have been extracted from the unfiltered flood grids (referred to in Section 2.4.1) and are relevant at the front of the property only. Levels quoted at the sides and back of the property are not relevant as these relate to very shallow overland flow, typically less than 0.05m, that was subsequently removed from the mapping.

The report also provides a flood risk map in the vicinity of the site. This indicates a Medium Flood Risk on Terry Road, along the front property boundary. The mapping is based on the refined flood mapping provided by Bewsher Consulting in 2010 (Section 2.4.3). The property itself is not included in the flood risk mapping due to its minor flood affectation.

#### **2.4.5 Draft Flood Study Update (WMA Water, draft 2023)**

A draft Flood Study Update has been prepared by WMA Water for the City of Ryde. The new study applies to 14 catchments throughout the Ryde LGA, and includes the Eastwood & Terrys Creek catchment. The draft Flood Study Update was on public exhibition until 3<sup>rd</sup> December 2023.

Differences from the previous study include:

- i) A 2m grid Tuflow model has been adopted for the assessment;
- ii) The model includes new design rainfall intensities and patterns provided in the 2019 edition of Australian Rainfall & Runoff;

- iii) Terrain data is based on 2019/20 LiDAR survey;
- iv) The model incorporates new development and drainage improvements throughout the catchment.

The draft flood study generally provides lower flood levels throughout the Terrys Creek catchment. The design 100 year flood level in the vicinity of the subject site is reduced by approximately 0.1m. The lower flood levels are subject to formal adoption by Council, and have not been relied upon for this flood assessment report.

#### **2.4.6 Flood Impact Assessment for 16 Terry Road (Umbrella Consulting, 2014)**

A flood impact assessment (Umbrella Consulting, 2014) was provided as part of the previously approved DA for a 43 place childcare centre within the subject site.

The study is based on a site-specific investigation of the stormwater catchment area centred on Terry Road. The study used a DRAINS hydrologic model to estimate catchment runoff, and a HEC-RAS hydraulic model to estimate flood levels adjacent to the road.

Flood level results from the study are relatively higher than levels provided from both the currently adopted flood study (Bewsher, 2008) and the draft Flood Study Update (WMA Water, 2023). This is largely due to the more simplified hydraulic model used for the assessment of flood levels, and an underestimation in the capacity of the stormwater pipes in Terry Road.

Whilst the absolute flood levels appear to be overestimated, the study does consider both pre and post-developed flood behaviour, and concludes that the proposed development would not have an adverse impact on flood behaviour.



**Legend**

- Eastwood & Terrys Creek Catchment
- Local Drainage Catchment
- Watercourse (Terrys Creek)
- Stormwater Pipe Drainage
- Ground Contours (2m interval)

N  
  
  
 0      50      100  
 metres

Job No: J2306\_Fig2  
 File: J2306  
 Date: 7/11/23

**Figure 2**  
**Catchment and Local Drainage Plan**

**NOTE:**

DETAIL AND BOUNDARY SURVEY HAVE BEEN CARRIED ON 26/07/2023.

PRIOR TO ANY DESIGN OR CONSTRUCTION WORK, WHICH RELIES ON CRITICAL SETBACKS FROM THE STREET OR BOUNDARIES, SURVEY MARKS SHOULD BE PLACE TO DEFINE THE PROPERTY BOUNDARIES.

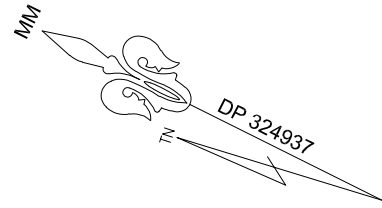
NO INVESTIGATION OF UNDERGROUND SERVICES HAVE BEEN CONDUCTED. SERVICES SHOWN HAVE BEEN PLOTTED FROM 'DIAL BEFORE YOU DIG' (DBYD) AND ARE INDICATIVE ONLY. OTHER SERVICES MAY EXIST WHICH ARE NOT SHOWN. CONFIRMATION OF THE EXACT POSITION SHOULD BE MADE PRIOR TO ANY EXCAVATION WORK.

ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM SSM 108453 WITH RL 68.42 (AHD).

RIDGE AND GUTTER HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ± 0.05m.

CONTOURS ARE INDICATIVE ONLY. EXCEPT AT SPOT LEVELS SHOWN THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR ACCURATE CALCULATION.

FOR ANY POSITIVE CONVENTS AND RESTRICTIONS, NO FURTHER INVESTIGATIONS CARRIED OUT INTO CONTENT OF THE DEALING.



W-B DENOTES WALL TO BOUNDARY

BENCHMARK  
NAIL IN KERB  
RL 75.73 AHD

*(Martin) Xin Ma*  
Registered Surveyor  
N° 9000

**LEGEND**

- △ BENCH MARK
- COMMUNICATION PIT
- ⊙ GAS METER
- ⊕ STOP VALVE
- ⊙ SEWER VENT
- ⊙ WATER TAP
- E — ELECTRICITY POWER LINE
- ⊙ POWER POLE
- GF : TOP OF GUTTER
- BW : BOTTOM OF WINDOW
- TW : TOP OF WINDOW
- S: 3 (SPREAD)
- φ: 0.3 (DIAMETER)
- H: 10 (HEIGHT)

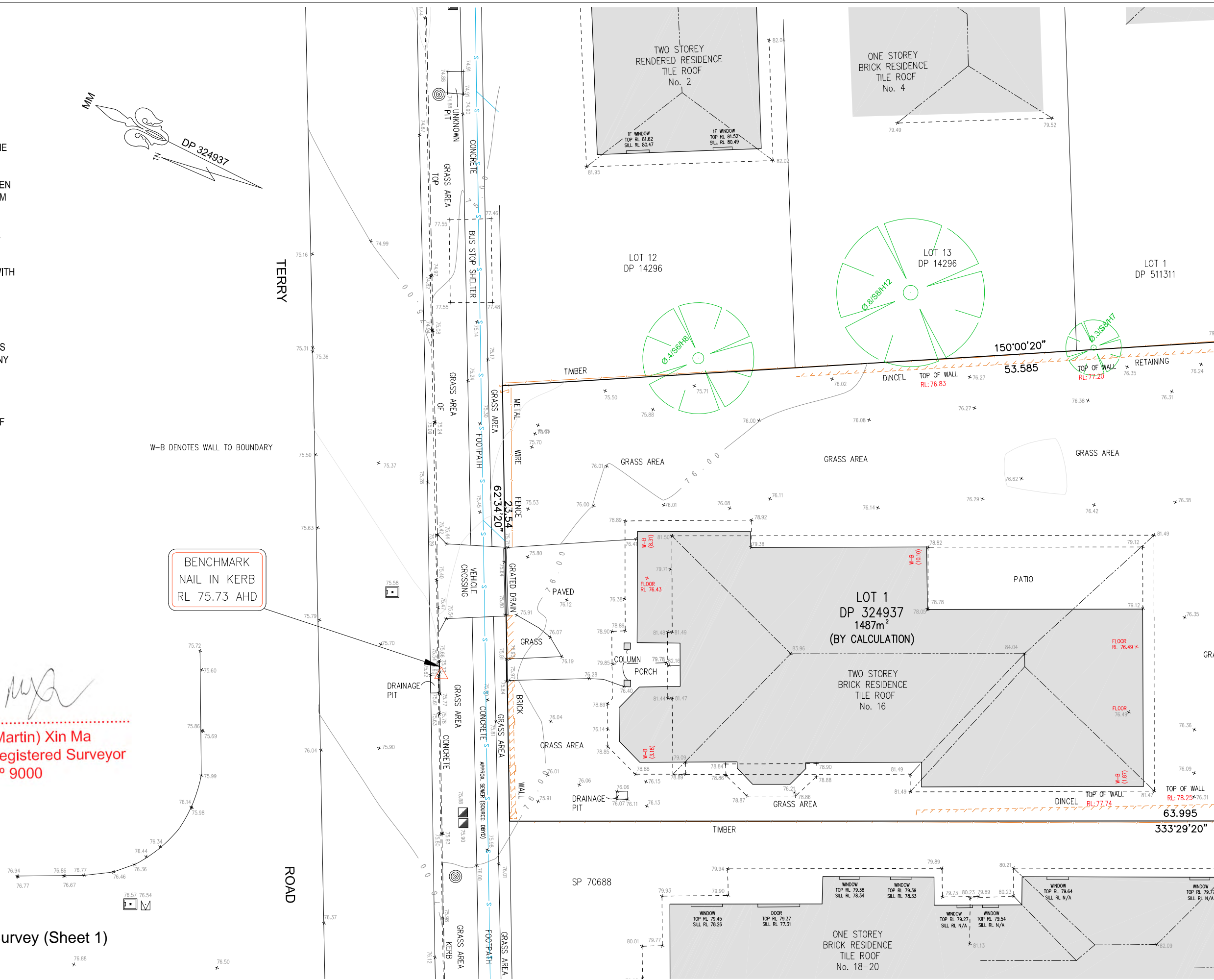


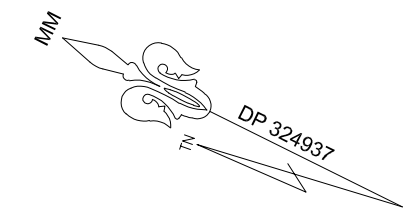
Figure 3  
Detailed Site Survey (Sheet 1)

DATE:	AMENDMENT:
11.10.2023	UPDATE DETAIL SURVEY
16.11.2023	UPDATE DETAIL SURVEY
01.12.2023	UPDATE DETAIL SURVEY

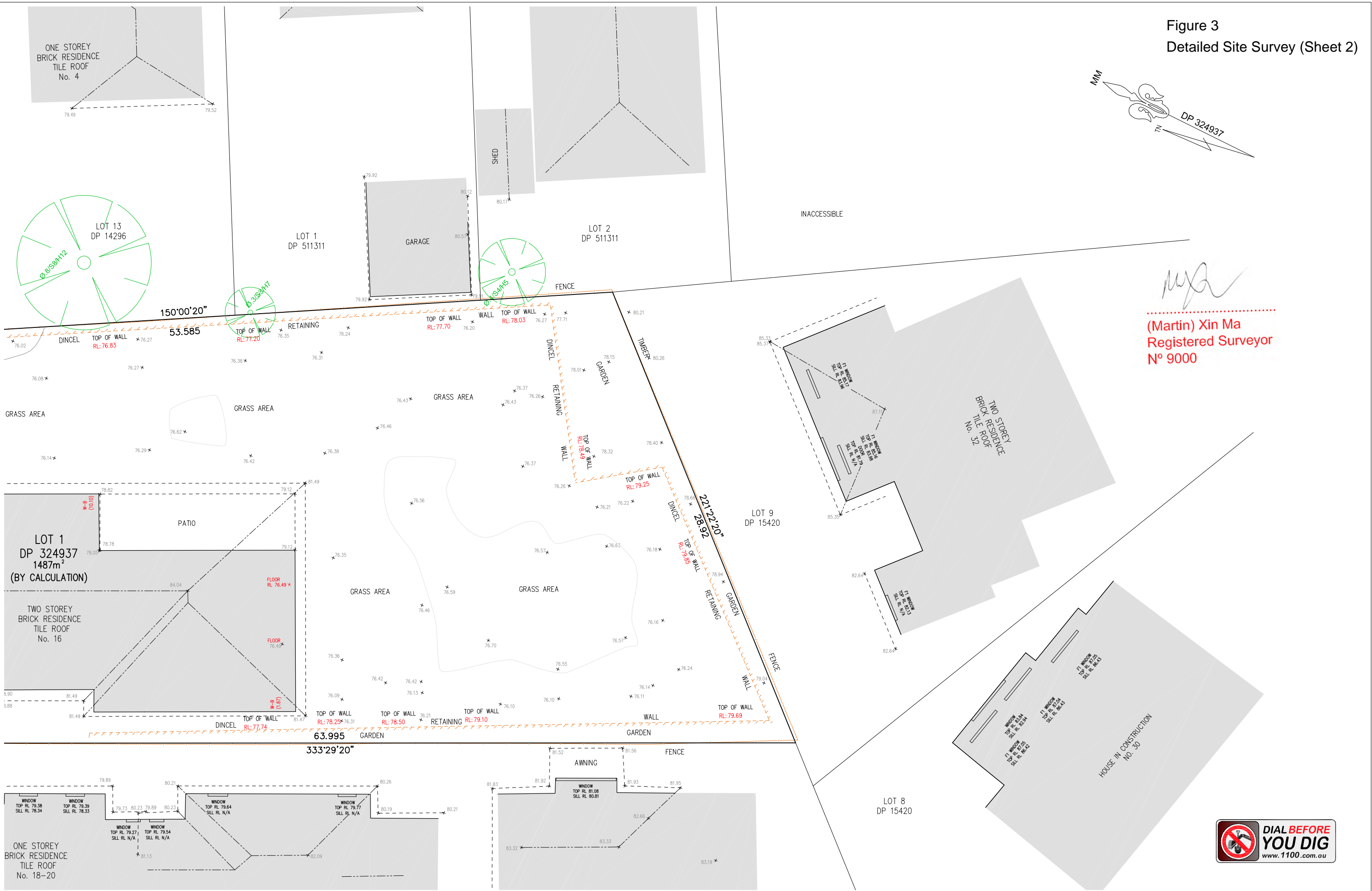
PLAN SHOWING DETAIL & LEVELS OVER LOT 1 IN DP 324937	
CLIENT:	THE TRUSTEE FOR Y&Z TRD TRUST
PROJECT:	DETAIL SURVEY / EASTWOOD
ADDRESS:	16 TERRY ROAD, EASTWOOD

JOB No.:	700849	LG: A:	RYDE
PLAN No.:	700849_A	DATUM:	AHD
DATE:	03/08/2023	SCALE:	1:200@A3
DRAWN:	XC/CJ	CONT. INTERVAL:	0.5m
CHK:	LW	SHEET	1 OF 2

Figure 3  
Detailed Site Survey (Sheet 2)



*(Signature)*  
**(Martin) Xin Ma**  
Registered Surveyor  
N° 9000



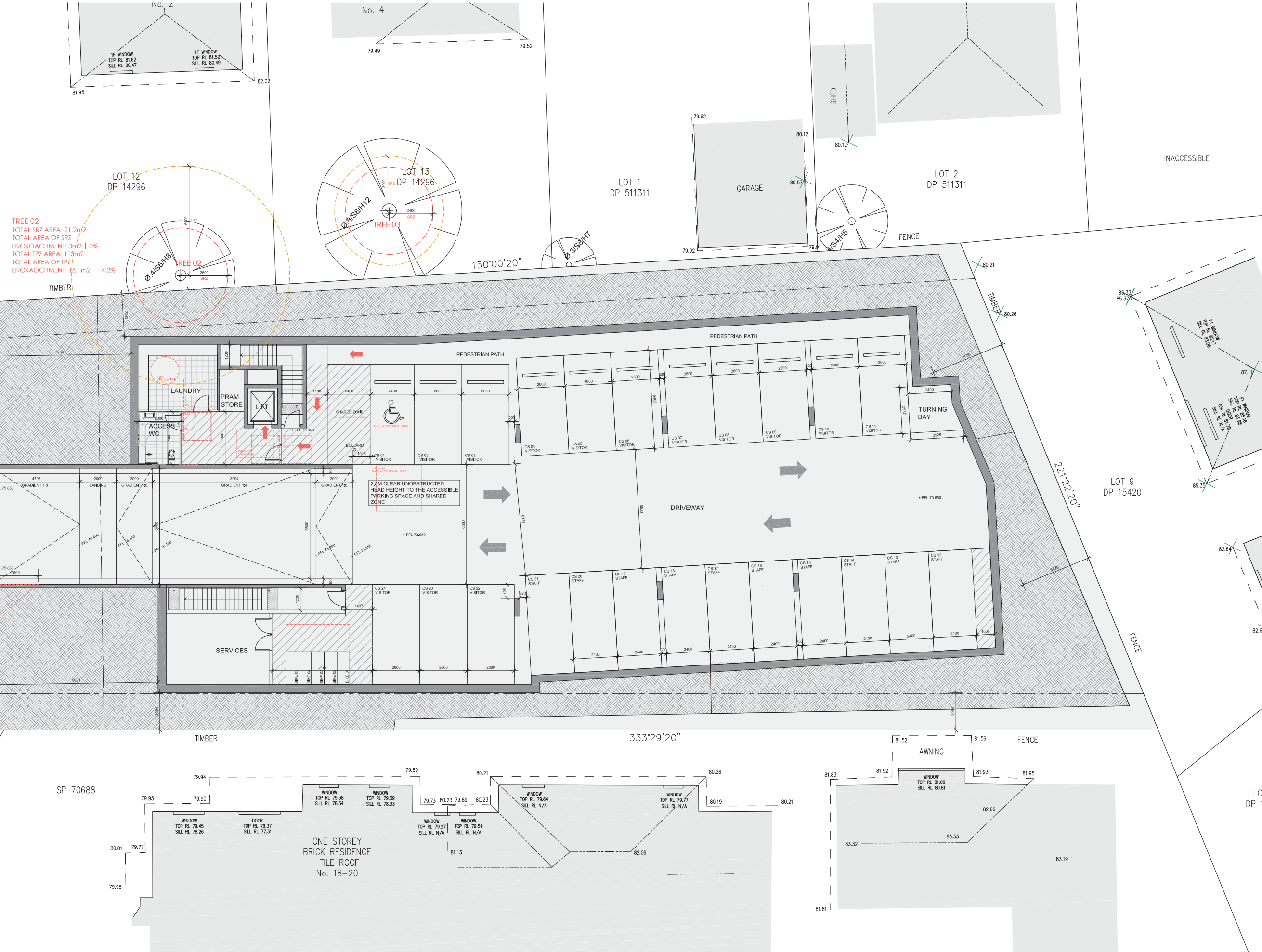
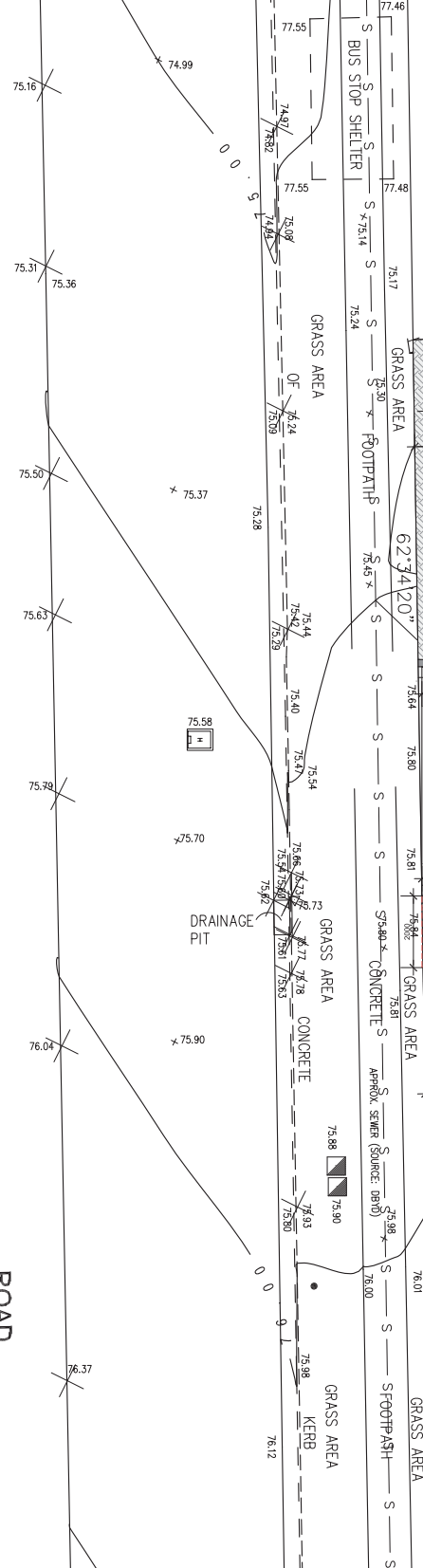
DATE:	AMENDMENT:
11.10.2023	UPDATE DETAIL SURVEY
16.11.2023	UPDATE DETAIL SURVEY
01.12.2023	UPDATE DETAIL SURVEY

PLAN SHOWING DETAIL & LEVELS OVER LOT 1 IN DP 324937	
CLIENT:	THE TRUSTEE FOR Y&Z TRD TRUST
PROJECT:	DETAIL SURVEY / EASTWOOD
ADDRESS:	16 TERRY ROAD, EASTWOOD

JOB No.:	700849	LGA:	RYDE
PLAN No.:	700849_A	DATUM:	AHD
DATE:	03/08/2023	SCALE:	1:200@A3
DRAWN:	XC/CJ	CONT. INTERVAL:	0.5m
CHK:	LW		SHEET 2 OF 2

NOTE: ALL WORK TO BE CARRIED OUT BY ACCORDANCE WITH LOCAL COUNCILS CONDITIONS OF CONSENT. DO NOT SCALE OFF ARCHITECTURAL DRAWINGS. THESE NOTES MUST BE READ IN CONJUNCTION WITH CONDITIONS OF CONSENT. FOR ADDITIONAL DETAILS ON APPLIANCES, FC ITEMS & SHOWER SEALS SHOW ON PLAN ARE REFER TO DIMENSIONS SHOWN ON DRAWINGS. DIMENSIONS INSIDE OF FOR BUILDINGS MAY BE REQUIRED TO ACCOMMODATE DIMENSIONS & STAIR BEAMS POSITION TO BE DETERMINED ON SITE. USE REQUIRED DIMENSIONS ONLY. DO NOT SCALE. FINISHED GROUND LEVELS ON PLANS ARE TO BE USED FOR ALL CALCULATED DIMENSIONS ARE SUBJECT TO SITE SURVEY. DURING CONSTRUCTION & NO ALLOWANCE HAS BEEN MADE FOR SHIMMING OR BUILDING POSITION. ELECTRICAL METER TO BE DETERMINED ON SITE IN ACCORDANCE TO THE TUBED POSITION FRONT GARDEN MAP ON METER ENERGY SMART DESIGN AS A RATED WATER CONSERVATION DEVICES INCLUDE RAINWATER TANKS SHOWER HEADS WATER TAP FLOW REGULATORS, DUAL FLUSH TOILET CISTERNS COMPLIANT HOT WATER SYSTEMS WITH MINIMUM GREENHOUSE SCORE OF 3.5. USE TO BE USED IN THE DEVELOPMENT. OCCUPANTS ARE ENCOURAGED TO USE ENERGY RATED WASHING MACHINES WITH FRONT LOADING WHERE POSSIBLE. OWNER/BUILDER MUST READ ALL PLANS IN CONJUNCTION WITH THE ASSESSMENT REPORT.

DO NOT SCALE OFF ARCHITECTURAL DRAWINGS

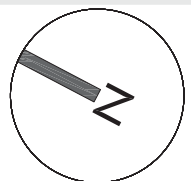


**JANSSSEN  
DESIGNS**

Info@janssendedesigns.com.au | PO Box 41, Kenthurst 2156 | m: 0423 216 436  
Nominated Architect: Jake Janssen NSW ARB 11575

BASEMENT PLAN -  
1:100 @ A1

Figure 4  
Proposed Development (Sheet 1 - Basement)



AMENDMENTS		
ISSUE	DESCRIPTION	DATE

Project Title:  
Proposed Child Care  
Centre

DRAWING TITLE:  
Basement Plan

ADDRESS:  
16 Terry Road, Eastwood

CLIENT DETAILS:  
Zhong

LOCAL GOVERNMENT AREA:  
Ryde Council

Issue For: DA	Issue: A
Date: 17/2023	Scale: 1:100
Drawing #: A006	Project #: 10258

NOTE: ALL WORK TO BE CARRIED OUT BY ACCORDANCE WITH BCA, LOCAL COUNCILS CONDITIONS OF DEVELOPMENT, DO NOT SCALE OFF ARCHITECTURAL DRAWINGS. THESE NOTES MUST BE READ IN CONJUNCTION WITH CONDITIONS OF DEVELOPMENT. THESE NOTES MAY BE REQUIRED TO ACCOMMODATE THE REQUIREMENTS OF A STATE BEAMS POSITION TO BE DETERMINED ON SITE. USE REQUIRED DIMENSIONS ONLY. DO NOT SCALE. FINISHED GROUND LEVELS ON PLANS ARE TO BE USED FOR ALL CALCULATED DIMENSIONS AND ARE SUBJECT TO SITE SPECIFIC CONDITIONS. ALL CALCULATED DIMENSIONS ARE SUBJECT TO SITE SPECIFIC CONDITIONS. THE POSITION OF ELECTRICAL METER TO BE DETERMINED ON SITE IN ACCORDANCE TO THE TUBER POSITION FRONT GARDEN MAP ON METER ENERGY SMART CHECK AS A RATED WATER CONSERVATION DEVICE INCLUDE RAINWATER TANKS SHOWER HEADS, WATER TAP FLOW REGULATORS, DUAL FLUSH TOILET CISTERNS, COMPLIANT HOT WATER SYSTEMS WITH MINIMUM GREENHOUSE SCORE OF 3.33 AS SET TO BE USED IN THE DEVELOPMENT. OCCUPANTS ARE ENCOURAGED TO USE ENERGY EFFICIENT WASHING MACHINES WITH FRONT LOADING WHERE POSSIBLE. OWNER/BUILDER MUST READ ALL PLANS IN CONJUNCTION WITH THE ASSOCIATED REPORT.

DO NOT SCALE OFF ARCHITECTURAL DRAWINGS

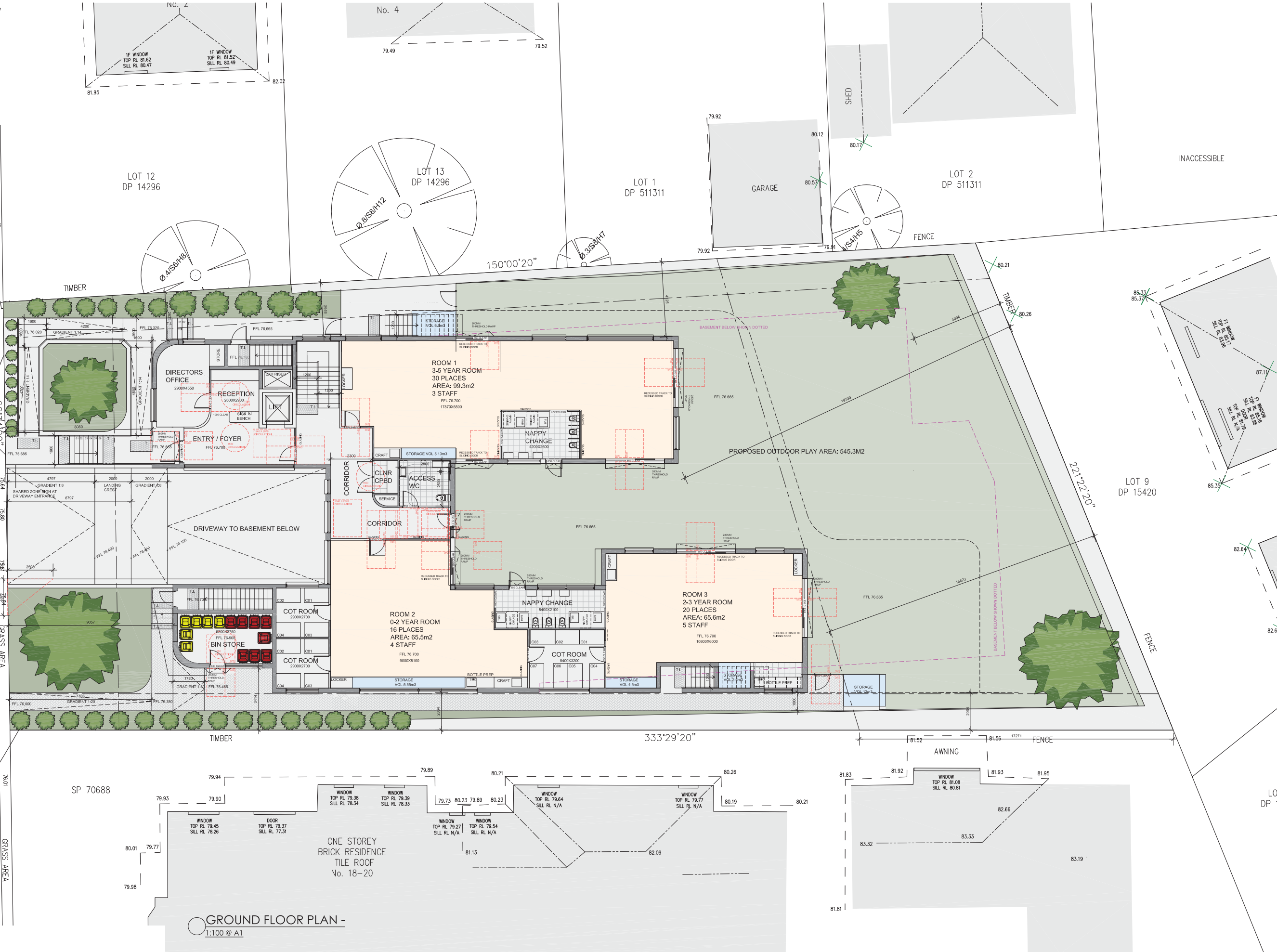
ROAD



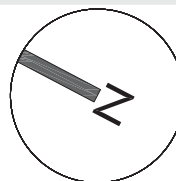
**JANSSEN  
DESIGNS**

Info@janssengdesigns.com.au | PO Box 41, Kenthurst 2156 | m: 0423 216 636  
Nominated Architect: Jake Janssen NSW ARB 11575

Figure 4  
Proposed Development (Sheet 2 - Ground Floor Plan)



GROUND FLOOR PLAN -  
1:100 @ A1



AMENDMENTS		
ISSUE	DESCRIPTION	DATE

Project Title:  
Proposed Child Care Centre

DRAWING TITLE:  
Ground Floor Plan

ADDRESS:  
16 Terry Road, Eastwood

CLIENT DETAILS:			
Zhong			
LOCAL GOVERNMENT AREA:			
Ryde Council			
Issue For:	Issue:	Project #:	
DA	A	10258	
Date:	Scale:	Drawing #:	Project #:
1.7.2023	1:100	A007	10258



### 3 FLOOD RISK ASSESSMENT

#### 3.1 SOURCE OF INFORMATION

Information on flood behaviour has been extracted from the Eastwood & Terrys Creek Floodplain Management Study and Plan (Bewsher, 2009). This forms the basis of flood levels currently adopted by Council within this catchment.

Reference has been made to the draft City of Ryde Flood Study Update (WMA Water, 2023), which was on public exhibition until the 3<sup>rd</sup> December 2023. Flood levels from this later study are significantly lower than levels provided in the former study in the vicinity of the subject site.

Flood behaviour is discussed in terms of:

- i) Design flood levels and extents;
- ii) Flood hazard;
- iii) Flood Risk Management precincts;
- iv) Impact of Climate Change; and
- v) Potential impacts of the Proposed Development.

#### 3.2 DESIGN FLOOD LEVELS AND EXTENTS

The extent of flooding and flood level contours for the 100 year ARI flood is shown on Figure 5. The extent of flooding and flood level contours in a more extreme flood event, known as the Probable Maximum Flood (PMF), is shown on Figure 6.

The floodplain management study shows flooding confined to the road reserve adjacent to the subject site. The boundary of flooding within the subject site has been further reviewed by comparing flood level contours with the detailed site survey. The estimated extent of flooding in the 100 year flood marginally encroaches within the north-west (upstream) corner of the subject site, and then closely follows the property boundary adjacent to Terry Road. The PMF event encroaches further within the subject site, but remains well clear of both the existing and proposed development footprints.

The draft Flood Study Update shows significantly reduced flooding on Terry Road. No flooding is evident adjacent to the site in the 100 year event. This indicates that the flow is either contained to the stormwater pipe system, or is less than 0.1m in depth (the adopted threshold depth to indicate flooding). The PMF event shows a continuous flowpath down Terry Road, and this marginally impacts on the north-west corner of the subject site.

Design flood levels for the subject site are summarised in Table 2.

**Table 2**  
**Design Flood Levels for 16 Terry Road, Eastwood**

Location	100 Year ARI Flood	PMF Flood
Upstream Property Boundary (maximum)	76.2	76.4
Ramp to Proposed Basement	76.0	76.2
Downstream Property Boundary (minimum)	75.3	75.5

Source: Bewsher, 2009

### 3.3 FLOOD DEPTH AND VELOCITY

The depth of flooding and peak flood velocity in a 100 year event is shown on Figure 7.

The maximum depth of inundation in the north-west corner of the site is less than 0.2m, and peak velocities are less than 0.5m/s. This is confined to a minor portion of the site and constitutes relatively safe conditions.

The maximum depth of flooding on Terry Road increases to just over 0.2m near the kerb-side gutter, and reduces to 0.1 to 0.2m over the majority of the road in front of the site. Flood velocities on the road generally vary from 1.0 to 2.0m/s. Flood depths reduce to the west along Terry Road, and the road is free from inundation within 30m of the site.

The depth of inundation increases along Terry Road to the east, towards Terrys Creek. The maximum depth over the road at Terrys Creek is 0.7m. Access to the east may be limited in major storm events.

The draft Flood Study Update shows no flooding within the subject site, or within the adjacent road reserve. This indicates that the depth of flooding is less than 0.1m in a 100 year flood. Significant inundation is still shown to occur to the east of the site, at Terrys Creek.

### 3.4 PROVISIONAL FLOOD HAZARD

A provisional flood hazard categorisation was undertaken as part of the floodplain management study. This was based on a hazard rating chart provided in Appendix L of the Floodplain Development Manual (NSW Govt, 2005). This classifies an area subject to flooding as either High Hazard or Low Hazard, depending on the combination of velocity and depth of floodwater. The flood hazard is termed “provisional” as there are other factors that can influence the true flood hazard of an area, including flood warning time, rate of rise of floodwater, isolation factors, and distance to high ground.

The flood hazard in the vicinity of the subject site is shown on Figure 8.

All areas subject to flooding in the vicinity of the subject site, and along Terry Road to the west, would be classified as having a Low Flood Hazard in a 100 year storm event. A high flood hazard exists on Terry Road to the east, near Terrys Creek.

### 3.5 FLOOD RISK MANAGEMENT PRECINCTS

The Floodplain Management Study adopted a flood risk classification that divides the floodplain into the following flood risk precincts:

High Flood Risk – Land below the 100 year flood that is subject to a high hydraulic hazard or where there are significant evacuation issues;

Medium Flood Risk – Land that is below the 100 year flood that is not subject to a high hydraulic hazard and where there are no significant evacuation issues;

Low Flood Risk – All other land that could be potentially inundated up to the Probable Maximum Flood (PMF).

Overland Flow Properties – Properties that are distant from watercourses that are affected by shallow overland flow, with depths typically greater than 0.1 to 0.2m in a 100 year flood.

The flood risk classification is used by Council to determine the controls that apply to future development. All development is mostly restricted from the high flood risk area; development within the medium flood risk area is usually permissible subject to satisfying various flood related development controls; and most development is permitted within the low flood risk area with minimal flood related development controls.

A map showing the adopted flood risk precincts in the vicinity of the site is provided on Figure 9.

The subject site has been excluded from the flood risk management precinct mapping due to its minor flood affectation. Nevertheless, the adjacent road reserve is affected by a Medium Flood Risk, and future development of the site will need to consider the availability of safe access to the site, and that floor levels have an appropriate freeboard above the 100 year flood.

The draft Flood Study Update shows a small portion of the site, and adjacent road reserve, to be located within a Low Flood Risk precinct.

### **3.6 POTENTIAL FLOOD IMPACT FROM THE DEVELOPMENT**

The proposed development footprint has been digitised and included on the flood mapping provided at Figures 5 to 9.

The proposed development footprint is located above both the 100 year flood and the PMF flood extents. Any increased runoff from the site is also to be mitigated through an on-site detention basin, which is included in the stormwater design plans for the site. The proposed building will therefore have no impact on flood behaviour under all flooding scenarios.

Only works between the building and the street could potentially have an impact on flooding. These works include:

- i) The ramp from the street to the basement

The driveway ramp is already above the 100 year flood extent at the street boundary, so will have no impact on flood behaviour in such an event. Only the first 2-3m of the driveway ramp would be inundated in the PMF event. As the driveway ramp is aligned with the existing driveway, and closely follows the same levels until it is above the PMF level, it will have minimal impact in a PMF event. Based on the draft Flood Study Update, there would be no impact in all floods up to the PMF event.

- ii) The pedestrian access to the building in the north-east corner of the site

This includes stairs and a disabled ramp access, both of which are above the 100 year flood extent, but marginally impacted in a PMF event. These facilities will have no impact in floods up to a 100 year event, but could have a very minor impact in more extreme flood events that would be confined to the subject site. Based on the draft Flood Study Update, there would be no impact in all floods up to the PMF event.




- iii) The fence along the northern property boundary

A solid fence along the front property boundary could potentially have an impact on flood behaviour. This was considered as part of the previous development application for the site, and a condition of consent (LDA2015/0219) required that *“the front fence must be constructed in a manner that does not impede the flow of floodwaters, so as to detrimentally change flood behaviour or increase flood levels on adjacent properties. To achieve this, the lower portion of the fence below the estimated*

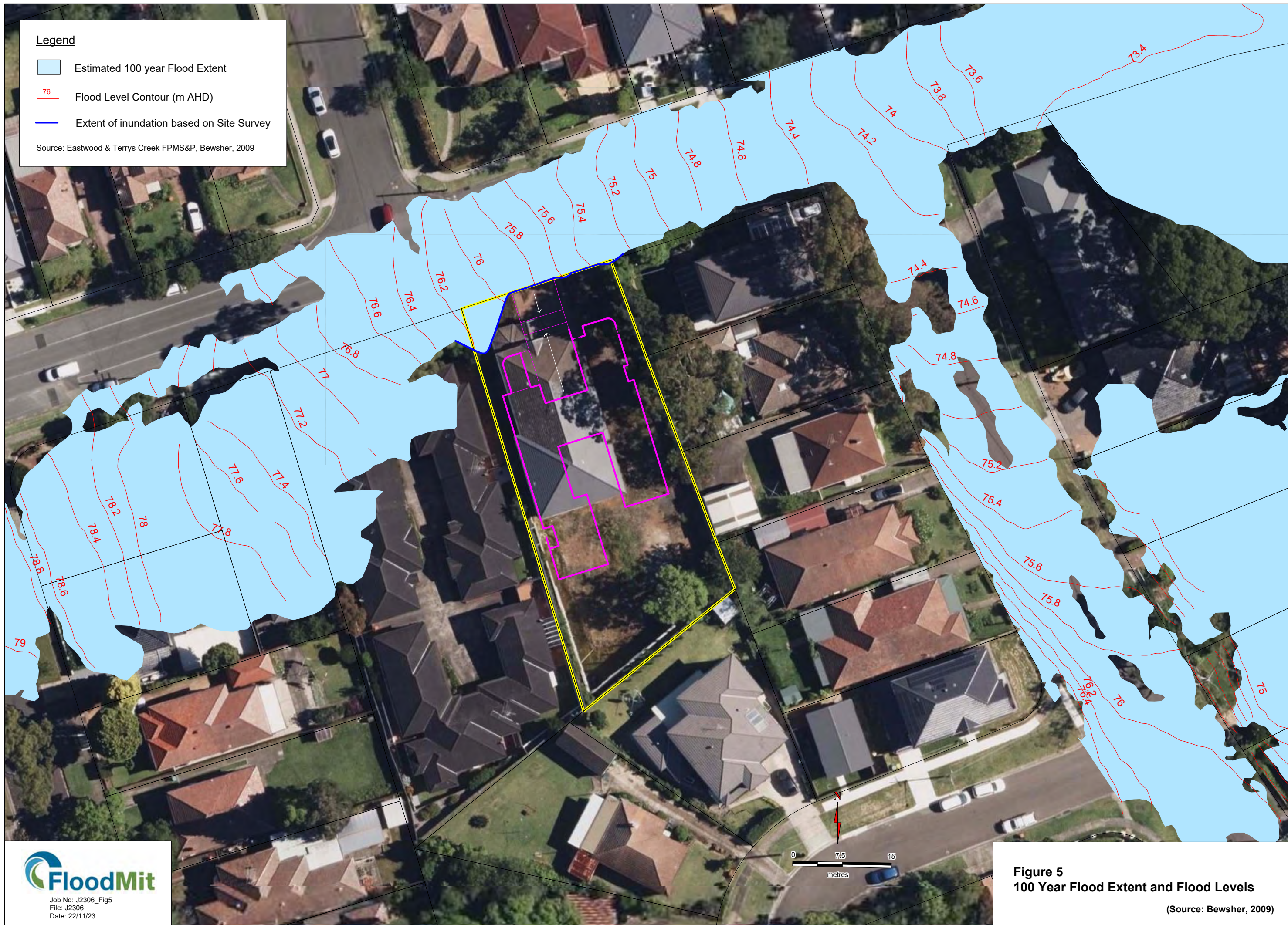
*100 year ARI (flood) must be constructed such to be permeable, leaving a clear gap between column supports, using louvres, flaps or a frangible paling system that can break away under hydrostatic force".* There would be some merit in providing a similar condition for the current proposal.

Subject to consideration of the front fencing, it is considered that the development proposal will have no impact on flood behaviour for storm events up to the 100 year event, and minimal impact in more extreme flood events up to the PMF event.

**Legend**

-  Estimated 100 year Flood Extent
-  Flood Level Contour (m AHD)
-  Extent of inundation based on Site Survey

Source: Eastwood & Terrys Creek FPMS&P, Bewsher, 2009






Job No: J2306\_Fig5  
File: J2306  
Date: 22/11/23

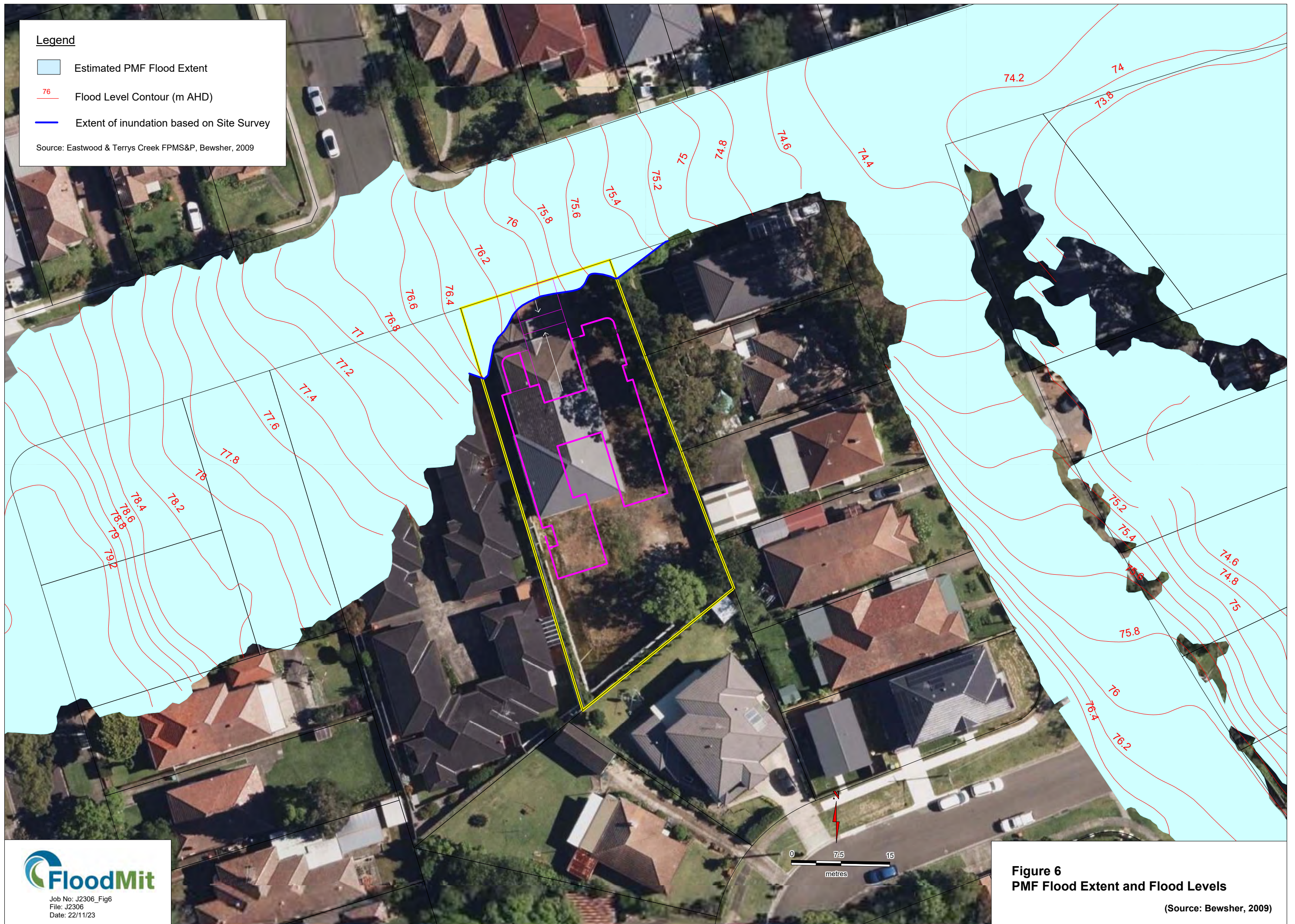
**Figure 5**  
**100 Year Flood Extent and Flood Levels**

(Source: Bewsher, 2009)

**Legend**

-  Estimated PMF Flood Extent
-  Flood Level Contour (m AHD)
-  Extent of inundation based on Site Survey

Source: Eastwood & Terrys Creek FPMS&P, Bewsher, 2009



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Date: 22/11/23

**Figure 6**  
**PMF Flood Extent and Flood Levels**

(Source: Bewsher, 2009)

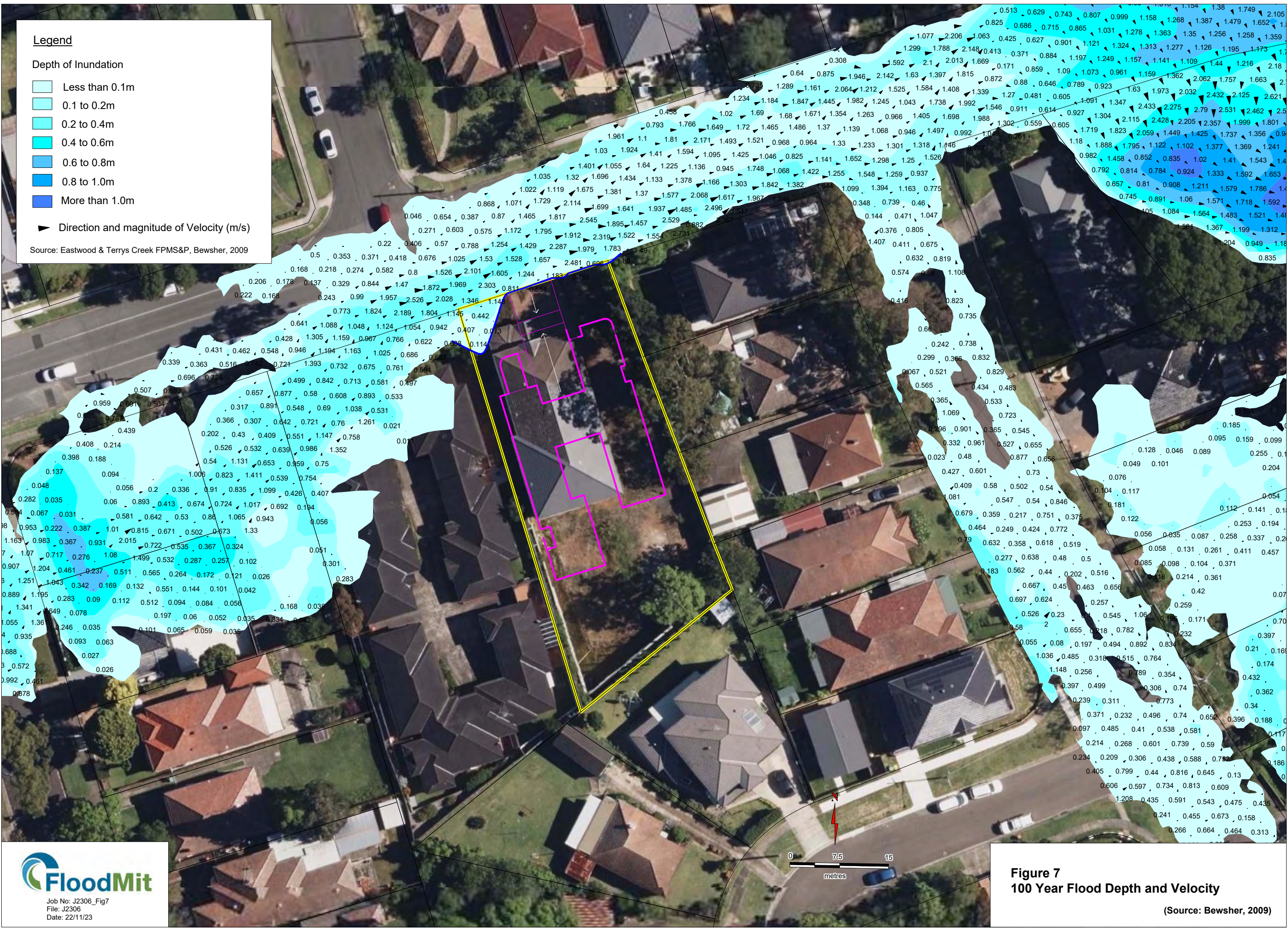
**Legend**

**Depth of Inundation**

- Less than 0.1m
- 0.1 to 0.2m
- 0.2 to 0.4m
- 0.4 to 0.6m
- 0.6 to 0.8m
- 0.8 to 1.0m
- More than 1.0m

▶ Direction and magnitude of Velocity (m/s)

Source: Eastwood & Terrys Creek FPMS&P, Bewsher, 2009




Job No: J2306\_Fig7  
File: J2306  
Date: 22/11/23


**Figure 7**  
**100 Year Flood Depth and Velocity**

(Source: Bewsher, 2009)

**Legend**

Provisional Flood Hazard (100 Year Flood)

 High Hydraulic Hazard

 Low Hydraulic Hazard

Source: Eastwood & Terrys Creek FPMS&P, Bewsher, 2009



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File: J2306  
Date: 22/11/23

**Figure 8**  
**100 Year Provisional Flood Hazard**

(Source: Bewsher, 2009)



**Legend**

- High Flood Risk precinct
- Medium Flood Risk precinct
- Low Flood Risk precinct
- Properties affected by Overland Flow Risk
- Mapping Limit

Source: Eastwood & Terrys Creek FPMS&P, Bewsher Update 2010



Job No: J2306\_Fig9  
File: J2306  
Date: 22/11/23

**Figure 9**  
**Flood Risk Management Precincts**

(Source: Bewsher, 2010)

## 4 COMPLIANCE WITH FLOOD POLICIES AND PLANS

Flood-related development controls are outlined in:

- i) Ryde LEP 2014;
- ii) Part 8.2 *Stormwater and Floodplain Management* of Ryde DCP 2014; and
- iii) Section 2.2 of Council's *Stormwater and Floodplain Management Technical Manual*.

A review of these controls, including specific recommendations for the Eastwood and Terrys Creek catchment, is included in the floodplain management study and plan (Bewsher, 2009). These controls are discussed below under the following headings:

- i) Minimum floor levels
- ii) Building components and methods
- iii) Structural soundness
- iv) Flood Impacts
- v) Parking and driveway access
- vi) Evacuation
- vii) Management and design principles

### 4.1 MINIMUM FLOOR LEVELS

The main objective of Council's flood planning clause in Ryde LEP 2014 is to "*minimise the flood risk to life and property associated with the use of land*". In urban catchments, this is most commonly achieved by appropriate siting and floor level controls to minimise the risk of flooding.

The subject property has not been mapped as having a flood risk in the floodplain management study (Bewsher, 2009) but is adjacent to an overland flowpath down Terry Road, which has been categorised as having a Medium Flood Risk. This flowpath is downgraded to Low Flood Risk in the draft Flood Study Update (WMA Water, 2023).

The proposed childcare centre would be classified as a residential type development (Table 1, Part 8.2, Ryde DCP 2014). Minimum floor level controls (ie the flood planning level) that apply to residential development located within or adjacent to a Medium Flood Risk precinct is the 100 year flood level plus freeboard. Table 2.1 of Council's Stormwater Technical Manual nominates a freeboard on 0.5m for habitable floor levels, and 0.3m for non-habitable floor levels.

The maximum 100 year flood level that could affect the property is RL 76.2m AHD (refer to Table 2 and Figure 5). The flood planning level for the property is therefore RL 76.7m AHD for habitable areas and RL 76.5m AHD for non-habitable areas.

Proposed floor levels and the applicable flood planning levels are shown in Table 3.

**Table 3  
Compliance with Minimum Floor Level Controls**

Description	Flood Planning Level	Proposed Level	Comment
Ground Floor Bin Store (non-habitable)	76.5	76.5	Complies
Outdoor Play Areas (non-habitable)	76.5	76.665	Complies
Ground Floor (entrance, office & rooms)	76.7	76.7	Complies

All proposed floor levels are at or above the flood planning level.

#### **4.2 BUILDING COMPONENTS AND METHODS**

Section 4.4.5 (c) of Part 8.2 of Council's DCP requires that all parts of the development located below the flood planning level, that could be potentially exposed to floodwater, are constructed of flood compatible building components in accordance with Council's Stormwater and Floodplain Management Technical Manual.

The proposed building footprint is located clear of both the 100 year and PMF flood extents. Consequently, no part of the development is exposed to floodwater.

This requirement is not applicable.

#### **4.3 STRUCTURAL SOUNDNESS**

Section 4.4.5 (c) of Part 8.2 of Council's DCP notes that new structures subject to flooding and overland flow must be designed and constructed to withstand the forces of floodwater, debris, and buoyancy forces anticipated in a 100 year flood.

No part of the proposed building footprint is inundated in the 100 year flood.

This requirement is not applicable.

#### **4.4 FLOOD IMPACTS**

Section 4.5.5 (d) of Part 8.2 of Council's DCP requires that development must not divert major overland flows or reduce flood storage or flow conveyance that could adversely impact on neighbouring properties.

Potential flood impacts are discussed under Section 3.6 of this flood assessment report.

Only a minor portion of the north-west corner of the site is estimated to be inundated in the 100 year flood based on adopted flood levels (Bewsher, 2009). The proposed development footprint is well clear of both the 100 year and PMF flood extents (shown on Figures 5 and 6 respectively), and consequently the development will have no impact on flood behaviour. No part of the site, including the adjacent road reserve, is shown to be inundated in the 100 year flood in the draft Flood Study Update (WMA Water, 2023).

A condition of consent from the previous application for the site required that the front boundary fence be either permeable, or raised above natural ground level, to ensure that stormwater runoff can freely flow through the flood storage area at the front of the property. Whilst the storage volume is relatively minor, there is some benefit in maintaining this requirement. A permeable or raised fence would ensure that any stormwater flow from the adjacent upstream property can freely flow onto the street, rather than being deflected towards the driveway ramp prior to draining to the street.

It is recommended that the new front boundary fence be either permeable, or raised a minimum of 0.20m above natural ground level.

Subject to consideration of the front fencing, it is considered that the development proposal will have no impact on flood behaviour for storm events up to the 100 year event, and minimal impact in more extreme flood events up to the PMF event.

#### 4.5 PARKING AND DRIVEWAY ACCESS

Section 4.4.2 of Part 8.2 of Council's DCP provides controls on carparking areas. The following requirements are applicable to the current proposal:

- i) For enclosed parking areas, the parking area must be no less than the 100 year ARI flood level plus 150mm freeboard;
- ii) Basement parking or parking at levels below the adjacent flood levels, a bunded crest at the estimated PMF (probable maximum flood) level prior to descent into the parking area, must be provided such that inundation of the area is prevented; and
- iii) New parking areas must not divert overland flow or reduce flood storage such to adversely impact the surrounding area.

Enclosed parking areas and basement parking are considered to be essentially similar. Therefore, all openings to the basement will need to be above (or protected to) the 100 year flood plus 0.15m freeboard, or the PMF flood level with no freeboard, whichever is the greatest.

Proposed levels and the corresponding design flood level at all openings to the basement are shown in Table 4.

**Table 4  
Compliance of Basement Parking**

Location	Proposed Level	Design Flood Level at Location <sup>1</sup>		Comment
		100 Year Flood	PMF Flood	
Stairwell #1 exit from basement	76.7	76.0	76.2	Complies
Crest level in ramp to basement	76.4	76.0	76.2	Complies
Lift from main floor to basement	76.7	75.8	76.0	Complies
Stairwell #2 exit from basement	76.7	75.4	75.6	Complies

<sup>1</sup> Refer to 100 year and PMF Flood Levels shown on Figures 5 and 6 respectively

The crest level in the ramp to the basement is 0.4m above the 100 year flood, and 0.2m above the PMF flood level at this location. This exceeds council's requirements, and has been recommended due to the sensitive nature of the proposed childcare development. All other openings to the basement provide similar or greater level of protection as the driveway ramp.

The driveway ramp leading from the street to the crest level in the ramp is on ground that is already above the 100 year flood, and so will not have a detrimental impact on flood behaviour.

## 4.6 EVACUATION

Section 2.1.2 of Part 3.2 *Childcare Centres* of Council's DCP notes that childcare centre developments are not to be located on land which is affected by overland flow as identified by Council for reasons of safety considerations of the children using the centre.

Section 2.1.2 c) also notes that consideration may be given to development proposed on sites affected by overland flow in the front setback area only if it can be demonstrated that the extent of overland flow does not constitute a flood hazard as described under Part 8.2 of the DCP.

Overland flow occurs down the road reserve towards Terrys Creek, and only a minor portion of the subject site would be inundated in a 100 year storm event. All buildings and play areas are located outside the area that could be inundated in both the 100 year and PMF events.

The overland flowpath down Terry Road has been categorised as having a Low hydraulic flood hazard in a 100 year flood (Figure 9). No flowpath adjacent to the site is shown in the draft Flood Study Update (WMA Water, 2023), indicating that the depth of inundation is less than 0.1m in this event. Safe evacuation from the site, along Terry Road to the west, is anticipated to be available for storms up to the 100 year event.

Extreme storms between the 100 year and PMF events could result in more hazardous conditions on Terry Road. There may be instances where evacuation from the site becomes hazardous in extreme events. In these circumstances it will be safer to shelter within the Centre until the flood risk on Terry Road abates. Flooding is the result of severe thunderstorm activity, and is anticipated to have a duration of less than 1 hour.

It is considered that the proposed development complies with evacuation requirements.

## 4.7 MANAGEMENT AND DESIGN PRINCIPLES

These requirements relate to subdivision of land, or covenants on the title of the land to prevent further alterations to approved works where these may impact on flooding.

These requirements are not applicable to the current application.

## 5 CONCLUSIONS

FloodMit Pty Ltd was commissioned by the Whitestone Group, on behalf of the Trustee for Y&Z TRD TRUST, to prepare a flood assessment report for a proposed childcare centre at 16 Terry Road, Eastwood (Lot 1 DP 324937).

The site is within the Eastwood and Terrys Creek catchment, and is partially impacted by overland flow down Terry Road to Terrys Creek. Flooding is therefore a consideration to the proposed development.

The assessment of flood risk is based on model results from the Eastwood and Terrys Creek Floodplain Risk Management Study and Plan (Bewsher, 2009). Design flood levels and flood extents for the 100 year and PMF events are provided at Figures 5 and 6 respectively, the depth and velocity of flooding shown on Figure 7; flood hazard categorisation shown on Figure 8; and Flood Risk Management precinct mapping shown on Figure 9.

Only a small corner of the subject site (35m<sup>2</sup> or 2.3% of the total site) is estimated to be inundated in the 100 year storm. This increases slightly in the extreme PMF event (909m<sup>2</sup> or 6.0% of the total site). The proposed building footprint and all play areas are located above the PMF flood. Further information on flood behaviour is available from a draft Flood Study Update (WMA Water, 2023), which was on public exhibition until 3<sup>rd</sup> December 2023. Flooding in the draft Flood Study Update is lower than the previously adopted levels. No part of the site, or the road reserve immediately adjacent to the site, is shown to be inundated in the 100 year flood in the latter study.

A development application for alterations and additions to an existing dwelling house, and change of use to a childcare centre, was previously approved by Council for the site during 2016. The approval included a childcare centre with 43 places over two levels, and outside parking for 10 cars.

Further changes to the proposed childcare centre have now been proposed, which is the subject of a new development application. Changes from the previous application include:

- i) An increase in size from 43 places to 126 places;
- ii) The removal of the existing dwelling and construction of a new two-storey building in its place. The new footprint has a slightly increased set-back distance from Terry Road, which moves it further away from areas potentially affected by overland flow;
- iii) The proposed ground floor level is raised from RL 76.43m (existing dwelling) to RL 76.7m AHD to provide a minimum 0.5m freeboard above the maximum 100 year flood levels on Terry Road adjacent to the site. The floor level is also 0.3m above the PMF flood level;
- iv) Basement parking has been proposed for 24 cars. The crest in the driveway ramp to the basement is at RL 76.4m AHD. This is approximately 0.4m above the 100 year overland flow levels on Terry Road at this location, and 0.2m above the PMF overland flow levels. All other openings to the basement will have similar or greater level of protection.
- v) No part of the new building footprint, or outside play areas, are located on land potentially affected by flooding.

The current proposal has been assessed against Council's flood risk management controls that are outlined in Ryde LEP 2014 and Ryde DCP 2014. It is considered that the proposed development complies, or can comply with these requirements, subject to the following recommendations:

- i) that the front boundary fence be made permeable, or raised 0.20m above natural ground level, so that the fence does not restrict floodwater that enters the site from the upstream property from freely flowing on to Terry Road.

## 6 REFERENCES

Bewsher Consulting, 2008, *“Eastwood & Terrys Creek Floodplain Risk Management Study and Plan – Flood Study Report”*, prepared for City of Ryde

Bewsher Consulting, 2009, *“Eastwood & Terrys Creek Floodplain Risk Management Study and Plan – Main Report”*, prepared for City of Ryde

Bewsher Consulting, 2010, *“Eastwood & Terrys Creek Floodplain Risk Management Study and Plan – Flood Mapping Refinements”*, prepared for City of Ryde

City of Ryde, 2023, *“City of Ryde Development Control Plan 2014 – Section 8.2 Stormwater and Floodplain Management”*

Innovative Surveying Associates, Nov 2023, *“Plan showing Detail & Levels over Lot 1 in DP 324937”*

Institution of Engineers Australia, 1987, *“Australian Rainfall and Runoff – A guide to Flood Estimation”*

Institution of Engineers Australia, 2019, *“Australian Rainfall and Runoff – A guide to Flood Estimation”*

Janssen Designs, Nov 2023, Issue A, *“Proposed Child Care Centre – 16 Terry Road, Eastwood”*, 23 sheets

New South Wales Government, 2005, *“Floodplain Development Manual – The Management of Flood Liable Land”*

New South Wales Government, 2023, *“Flood Risk Management Manual – The Management of Flood Liable Land”*

Umbrella Consulting, 2014, *“Proposed Development of a New Childcare Centre – 16 Terry Road, Eastwood”*, prepared for Ms Silvia Li

WMA Water, draft Jan 2023, *“Flood Harmonisation Study – Flood Study Update”*, prepared for City of Ryde



**Appendix A**  
**Flood Information Request**

[REDACTED]  
[REDACTED]  
[REDACTED]

10 July 2023

Our ref: D23/98843

Dear [REDACTED]

**RE: Request for Flood Information – No. 16 Terry Road, Eastwood**

Reference is made to your application received on 10 July 2023 seeking flood level information pertaining to the above-mentioned address.

Please find attached flood level data sheet providing flood levels for the 100 year ARI (Average Recurrence Interval) flood event and the PMF (Probable Maximum Flood) event.

The DRAINS model 100 Year ARI (Average Recurrence Interval) peak overland flow rate near the site is approximately 2.61 m<sup>3</sup>/s (1.96 m<sup>3</sup>/s pipe flow). For more detailed information, refer to DRAINS model extract at the end of this report.

This information is derived from models established as part of the Eastwood & Terrys Creek Flood Study Report and Floodplain Risk Management Study and Plan.

Council's database indicates the presence of a Ø900mm drainage pipe within the site.

Please be advised that flood models are approximate. Care and expertise is required in the interpretation of these flood levels. In addition, this flood information does not take into account any local overland flow issues.

Any person or organisation who acts on the information provided does so at his / her / its own risk. To the extent permitted by law, the City of Ryde accepts no responsibility and excludes all liability whatsoever in respect of any use of or reliance upon this information.

Should you require any further information, please feel free to contact me on (02) 9952 8105.

Yours sincerely,



**Anil Shrestha**  
**Senior Stormwater Engineer**



## FLOOD INFORMATION REQUEST

**Property Address:** No. 16 Terrys Road, Eastwood  
**Issue Date:** 10 July 2023  
**Flood Study Reference:** Eastwood & Terrys Creek Flood Study Report (November 2008)  
**Flood Model Reference:** TUFLOW Model (April 2010)

### Flood Level Location Map



### Flood Level Data Table

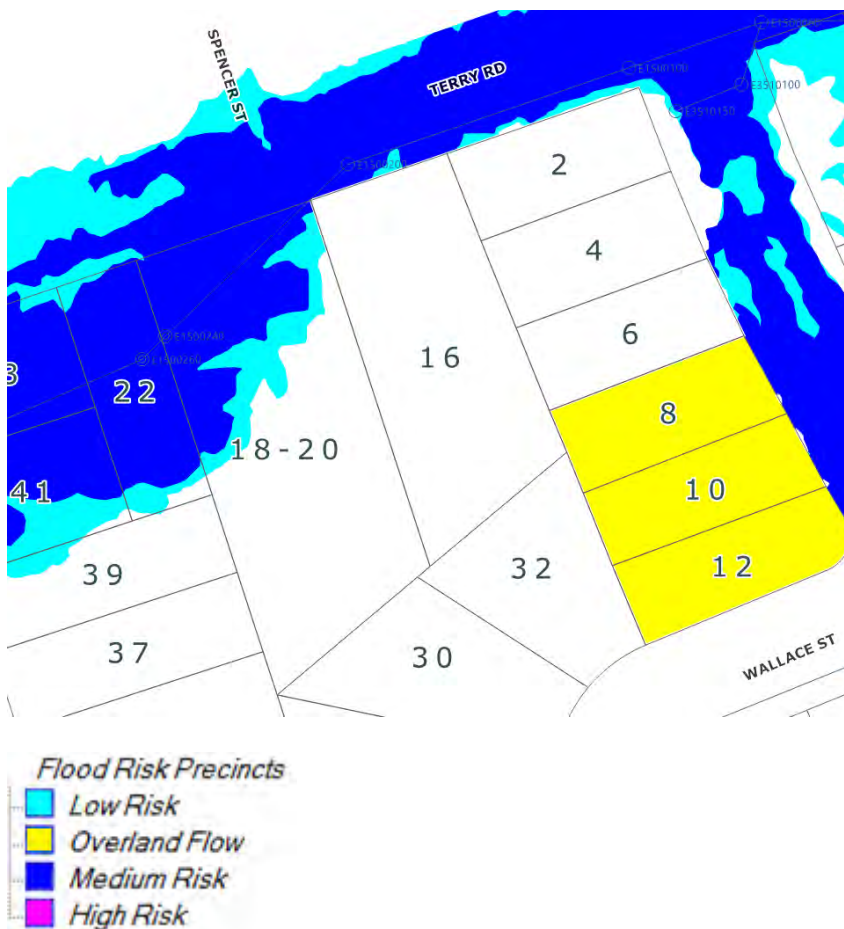
Location	100 Year ARI Flood Event (m AHD)	Probable Maximum Flood (m AHD)
A	75.34	75.53
B	76.15	76.31
C	75.70	75.83
D	76.15	76.25
E	76.06	76.08
F	Nil	Nil
G	76.51	76.50
H	Nil	Nil
I	77.84	77.84
J	78.11	78.11
K	Nil	Nil



**Notes:**

- All levels are based on Australian Height Datum (AHD).
- Flood levels are indicative only.
- The flood levels were derived using Aerial Laser Survey (ALS) data which is considered as approximate.
- This flood level information is for existing site conditions only.
- Concept plans are required for all new development proposals.
- The floor levels of the proposed habitable floor area should be set with a freeboard of 300 mm (Overland Flow and Low Risk) and 500 mm (Medium Risk and High Risk) to the 100 year ARI flood level. A freeboard of 150 mm (Overland Flow and Low Risk) and 300 mm (Medium Risk and High Risk) is applicable for non-habitable floor areas. Refer City of Ryde Development Control Plan 2014.
- A site specific flood study / risk assessment may be required for any future development. Engage a suitably qualified engineer to assist you in this matter. Any study or assessment shall be in accordance with the NSW Government's Floodplain Development Manual 2005 and the City of Ryde Development Control Plan 2014.
- Site specific ground and building survey levels should be used to relate flood levels and to assess the impact of flooding.

**Flood Risk Map**





**Flood Extent (100 Year ARI Event)**



**Flood Extent (Probable Maximum Flood)**



