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Stormwater Structural Civil
abn 13124694917 acn 124694917

FLOOD INUNDATION & RISK ASSESSMENT REPORT PROPOSED NEW RESIDENCE 12A JOHN ST AVALON

Job No 181005
Nov 2019
Prepared by
Lucas Molloy
BE CPEng NER

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INTRODUCTION

This report has been prepared in support of the proposed Development Application for a new residence at No 12A John St Avalon in respect to potential flood inundation / impacts and Northern Beaches Councils DCP requirements - Pittwater 21 DCP Section B3.11 Flood Prone Land and Section B3.13 Flood Hazard Flood Emergency Response planning.

It is proposed to construct a new residence as detailed in the architectural plans by *THW Architects* refer Appendix A.

Barrenjoey Consulting Engineers p/l inspected the site on 30th Sept 2019.

The extent of flooding is as summarized in the "Flood Information Request" data as supplied by Northern Beaches Council, refer Appendix D.
The Flood Planning Level varies across the site and at worst case is 3.05m AHD.

For the 1% AEP event the site is classified -

Flood Hazard	varies across site H1 – H5
Flood Hydraulic Category	Fringe + storage
Flood Risk Precinct	varies across site Low / Medium / High
Land Use Group	Residential – Dwelling House

Aerial Image of No 12A / 12B John St Avalon
(Northern Beaches Council web site)

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Pittwater 21 Development Control Plan - 2014
B3.11 Flood Prone Land
1.2 Prescriptive Controls

A. FLOOD EFFECTS CAUSED BY DEVELOPMENT

A1	Jetty **na to this development**
A2	**na**
A3	The applicant shall include in their submission, calculations to illustrate that any fill or other structures that reduce the total flood storage are replaced by Compensatory Works. **No fill / structures proposed within flood storage areas**
A4	**na**

B. DRAINAGE INFRASTRUCTURE AND CREEK WORKS

B1	Flood mitigation works or stormwater devices that modify a major drainage system, stormwater system, natural water course, floodway or flood behaviour within or outside the development site may be permitted subject to demonstration through a Flood Management Report that they comply with the Flood Prone Land Design Standard found on Council's webpage. **No flood mitigation works are proposed.**
B2	A Section 88B notation under the Conveyancing Act 1919 may be required to be placed on the title describing the location and type of flood mitigation works with a requirement for their retention and maintenance. **No flood mitigation works are proposed.**

C. BUILDING COMPONENTS AND STRUCTURAL SOUNDNESS

C1	All buildings shall be designed and constructed as flood compatible buildings in accordance with Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas, Hawkesbury-Nepean Floodplain Management Steering Committee (2006). **Achievable using conventional building practices.**
C2	All structures must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Structural certification shall be provided confirming the above. Where shelter-in-place refuge is to be provided the structural integrity is to be to the Probable Maximum Flood level. **Achievable using conventional building and engineering practices.**
C3	All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected. **Achievable using conventional building practices.**

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D. STORAGE OF GOODS

D1	Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards. **Achievable using conventional building practices**
D2	Goods, materials or other products which may be highly susceptible to water damage are to be located/stored above the Flood Planning Level. **Achievable using conventional building practices**

E. FLOOD EMERGENCY RESPONSE

E1	Development shall comply with Council's Flood Emergency Response Planning for Development in Pittwater Policy and the outcomes of any Flood Risk Emergency Assessment Report where it applies to the land. **Achievable by adhering to this report.**
E2	New development must provide an appropriately sized area to safely shelter in place above the Probable Maximum Flood level and appropriate access to this area should be available from all areas within the development. **The first floor FFL 6.05m AHD > the PMF level 3.58m AHD and therefore will provide appropriately sized areas to safely shelter in place**
E3	**na**
E4	**na**

F. FLOOR LEVELS

F1	New floor levels within the development shall be at or above, the Flood Planning Level.A reduced Flood Planning Level may be considered only where it is permitted in this Development Control Plan. The structure must be flood proofed (wet or dry) to the Flood Planning Level. This control cannot be applied to critical or vulnerable uses. **The ground floor FFL 3.05m AHD is at the FPL level 3.05m AHD**
F2	All development structures must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no loss of flood storage in a 1% AEP Event. **The building is sited/elevated as not to effect the floodway or flood conveyance on the site** Where the dwelling is located over a flow path it must be elevated on suspended pier/pile footings such that the level of the underside of all floors including balconies and decks within the flood affected area are at or above, or raised to the Flood Planning Level to allow clear passage of the floodwaters under the building. The development must comply with the Flood Prone Land Design Standard. **The dwelling is not located over a flowpath**
F3	Where the lowest floor has been elevated to allow the passage of flood waters, a restriction shall be imposed on the title of the land, pursuant to S88B of the Conveyancing Act confirming that the undercroft area is not to be enclosed. **na to this development**
F4	A one- off addition or alteration below the Flood Planning Level of less than 30 square metres or an increase of less than 10% of the ground floor area (whichever is the lesser) for residential development may be considered only where: (a) it is an extension to an existing room (b) the Flood Planning Level is incompatible with the floor levels of the existing room

	This control will not be permitted if this provision has previously been utilised since the making of this Plan. The structure must be flood proofed to the Flood Planning Level. **na to this development**
F5	**na**
F6	Any existing floor level may be retained below the Flood Planning Level when undertaking a first floor addition provided that: (a) it is not located within a floodway; (b) there is no increase to the building footprint below the Flood Planning Level; (c) it is flood proofed to the Flood Planning Level; **na to this development**
F7	**na**
F8	The minimum floor level of any first floor additions shall be at or above the Probable Maximum Flood Level **na to this development**
F9	Foyers – consideration may be given to a minimum floor level of a foyer being set at the 5% AEP flood level, provided it can be demonstrated that it complies with the Flood Prone Land Design Standard. **na to this development**
F10	**na**
F11	**na**

G. CAR PARKING

G1	Open carpark areas and carports shall not be located within a floodway. **No open carpark areas and carports are located within a floodway**
G2	The lowest floor level of open carparks and carports (unroofed or with open sides) shall be constructed no lower than the natural ground levels. **na to this development**
G3	All enclosed car parks must be protected from inundation up to the relevant flood planning level. For example, basement carparks must be provided with a crest at the entrance, the crest of which is at the relevant Flood Planning Level. All access, ventilation and any other potential water entry points to any enclosed car parking shall be above the relevant Flood Planning Level. Council will not accept any options that rely on electrical, mechanical or manual exclusion of the floodwaters from entering the enclosed carpark **na to this development**
G4	**na**
G5	Enclosed Garages must be located at or above the 1% AEP level **The Proposed garage is located at the 1% AEP level 2.55m AHD**
G6	Carports must comply with the Flood Prone Land Design Standard **na to this development**
G7	Where a driveway is required to be raised it must be demonstrated that there is no loss to flood storage in the 1% AEP flood event and no impact on flood conveyance through the site **na to this development**
G8	Multi Dwelling Housing and Shop Top Housing residential carparking – consideration may be given to a minimum floor level for open or covered carparking being set at the 5% AEP flood level, provided it can be demonstrated that it complies with the Flood Prone Land Design Standard

	na to this development
G9	**na**
G10	**na**

H. FENCING

H1	Fencing, including pool fencing, shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. Appropriate fencing must comply with the Flood Prone Land Design Standard in addition to other regulatory requirements of pool fencing. **Achievable using conventional building practices**

I. POOLS

I1	Pools located within the 1% AEP flood extent are to be in-ground, with coping flush with natural ground level. Where it is not possible to have pool coping flush with natural ground level, it must be demonstrated that the development will result in no net loss of flood storage and no impact on flood conveyance on or from the site. All electrical equipment associated with the pool (including pool pumps) is to be All chemicals associated with the pool are to be stored at or above the flood planning level. **na to this development**

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FLOOD RISK ASSESSMENT

A flood risk assessment was carried out for the 1% AEP and PMF event adopting the following

- Likehood of the hazard occurring
  - Almost Certain 1:10
  - Likely 1:100
  - Possible 1:1000
  - Unlikely 1:10000
  - Rare 1:100000
- Consequence of the hazard to persons and property
  - Insignificant no injury / $ 0 - low
  - Minor first aid injury / $ low - medium
  - Moderate medical treatment required / $ medium – high
  - Major serious injuries / $ major
  - Catastrophic death / $ major ++

	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain					
Likely (1%)					
Possible					
Unlikely (PMF)					
Rare					

Legend

Low - acceptable
Moderate – tolerable
Sever – unacceptable

1 Risk to persons 'shelter in place' provisions as per the *Flood Risk Management Report* specified / ensured, therefore risk assessment -
1% event – minor injuries possible therefore moderate / tolerable risk assessment
PMF event – minor injuries possible therefore low / acceptable risk assessment
2 Risk to structures adequate structural capacity to resist the flood forces (water and debris) as per the *Flood Risk Management Report* specified / ensured, therefore risk assessment -
1% event – insignificant therefore low /acceptable risk assessment
PMF event – minor damage to structures therefore low / risk assessment
2 Risk to vehicles vehicles protected from flood exposure, therefore risk assessment -
1% event – insignificant therefore low /acceptable risk assessment
PMF event – moderate damage therefore low / acceptable risk assessment
3 Risk to services protection of services from flood exposure as per the *Flood Risk Management Report* specified / ensured, therefore risk assessment -
1% event – insignificant therefore low /acceptable risk assessment
PMF event – minor damage therefore low / acceptable risk assessment

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SUMMARY

Assessment of Impacts Compliance Table

	Compliance		
	Not Applicable	Yes	No
A Flood effects caused by Development	X	-	-
B Drainage Infrastructure & Creek Works	X	-	-
C Building Components & Structural	-	X	-
D Storage of Goods	-	X	-
E Flood Emergency Response	-	X	-
F Floor Levels	-	X	-
G Car Parking	-	X	-
H Fencing	-	X	-
I Pools	X	-	-

The proposed works if carried out in accordance with recommendations within this *Flood Inundation & Risk Assessment Report* by Barrenjoey Consulting dated Sept 2019 will satisfy the intent of Clause 1.1 Performance Criteria of Pittwater 21 DCP Section B3.11 Flood Prone Land by complying with Clause 1.2 Prescriptive Controls. Noting the following measures are to be implemented into the works –

- **All occupants are to be informed of the sites flooding potential / impact and available warning services (ie : Councils *Floodwatch*, SES services etc).**
- **All occupants are to be informed of the sites flooding potential / impact and the residences 'shelter in place' capacity.**
- **All structures must be designed and constructed to ensure structural integrity up to the Flood Planning Level**
- **All occupants are to be informed of the sites flooding potential and requirements for goods / valuables storage etc.**

It is to be noted that, due to the many complex factors that can affect a site, the subjective nature of a risk analysis, and the imprecise nature of the science of flood analysis, the risk of persons being injured, to life and property cannot be completely removed. The recommendations within this Report do not remove the risk associated with the predicted flooding event, though lower those risks to an acceptable level reasonably anticipated by the community in everyday life.

Regards
BARRENJOEY CONSULTING ENGINEERS pty ltd

Per
Lucas Molloy (Director)
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Appendix A

Architectural plans
THW Architects

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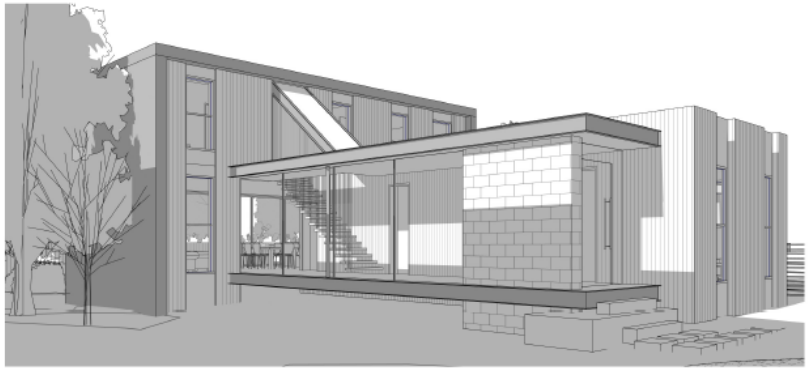
12A JOHN STREET
AVALON, NSW, 2107

WINDOWS & DOORS

NUM#	HEIGHT	WIDTH	AREA
W01	2400	800	1.92m2
W02	2400	800	1.92m2
W03	1200	2400	2.88m2
W04	1200	1800	2.34m2
W05	1200	2400	2.88m2
W06	1200	2400	2.88m2
W07	800	2830	2.26m2
W08	800	2830	2.26m2
W09	2700	800	2.16m2
W10	2000	800	1.60m2
W11	2313	3278	3.68m2 (TRIANGLE)
W12	1914	2710	2.56m2 (TRIANGLE)
W13	2000	800	1.60m2
W14	2000	800	1.60m2
W15	2000	1000	2.00m2
W16	2700	1200	3.24m2
W17	2100	800	1.68m2
W18	800	1700	1.36m2
W19	700	2700	1.89m2
W20	2600	800	2.08m2
W21	800	1700	1.36m2
W22	2600	1000	2.08m2
D01	2700	1855	4.99m2
D02	2100	900	1.89m2
D03	2700	8300	22.41m2
D04	2700	9585	25.86m2
D05	2700	6410	17.30m2
D06	2700	2895	7.80m2
D07	2100	900	1.89m2
D08	2100	900	1.89m2
D09	2600	5700	14.82m2

SHEET LIST:

Building Component	Construction Materials		Insulation	Colour - Solar Absorpt.	Other Detail/Requirements
External Walls	Fibre Cement	Plasterboard lined	R2.5	Medium (0.475 to 0.70)	
Internal walls (within)	Plasterboard on studs		None		SECONDARY Dwelling
	Plasterboard on studs		R1.5		MAIN Dwelling
Windows	Alum SG Clear: U = 6.70; SHGC = 0.70				SECONDARY: Garage: W17, W18
	Alum DG High Solar Gain low-E -Clear: U = 4.50; SHGC = 0.58				SECONDARY: All other-W19, D9, W20, W21, W22
	Alum SG Clear: U = 6.70; SHGC = 0.70 Al Thermally Broken DG Air Fill High Solar Gain low-E -Clear: U = 3.3; SHGC = 0.49				MAIN Dwelling: Bath (W4) & Laundry (W7,W8)
	Alum DG Low Solar Gain low-E -Clear: U = 4.90; SHGC = 0.55				MAIN Dwelling: D3, W6, D4 , D5 MAIN Dwelling: All other windows
Roof	Metal Deck		R4.0	Medium (0.475 to 0.70)	
Ceiling	Plasterboard				
Floor Structure	Timber		R2.0		Ground Floor MAIN dwelling
	Timber		None		Upper level MAIN Dwelling
	Timber		R2.0		Upper level SECONDARY dwelling
Floor Covering	Ceramic Tiles	Wet areas			
	Timber	All other rooms			
Ceiling/Wall Penetrations	Must be sealed				
External Shading Devices	External Louvres/Blinds				SECONDARY Dwelling - Kitchen/Living and bedrooms
	External Louvres/Blinds				MAIN Dwelling - D03 & D04



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PROJECT
PROPOSED DWELLING
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CLIENT
TIM DONOVAN
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IS	DATE	COMMENTS
C	16/10/2019	DA
B	30/09/2019	PRELIMINARY DA
A	13/09/2019	CONSULTANTS SET

JOB NUM#	DRAWN BY	CHK. BY	PAGE SIZE
142	MV	TW	A3

PROJECT NAME: 12A JOHN ST
SCALE: 1 : 100
DRAWING NAME: COVER PAGE
DRAWING NUMBER: A 00 -C

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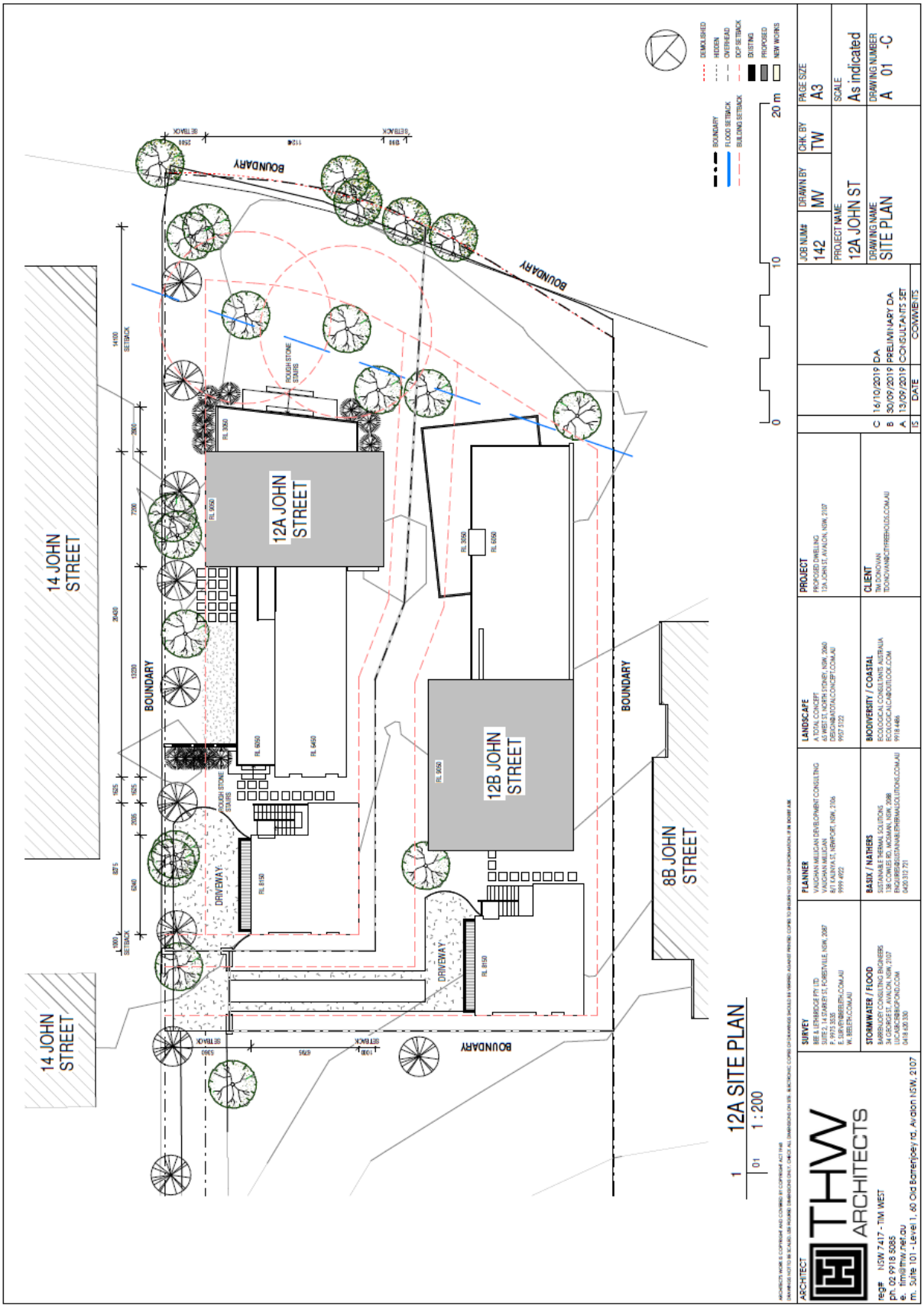

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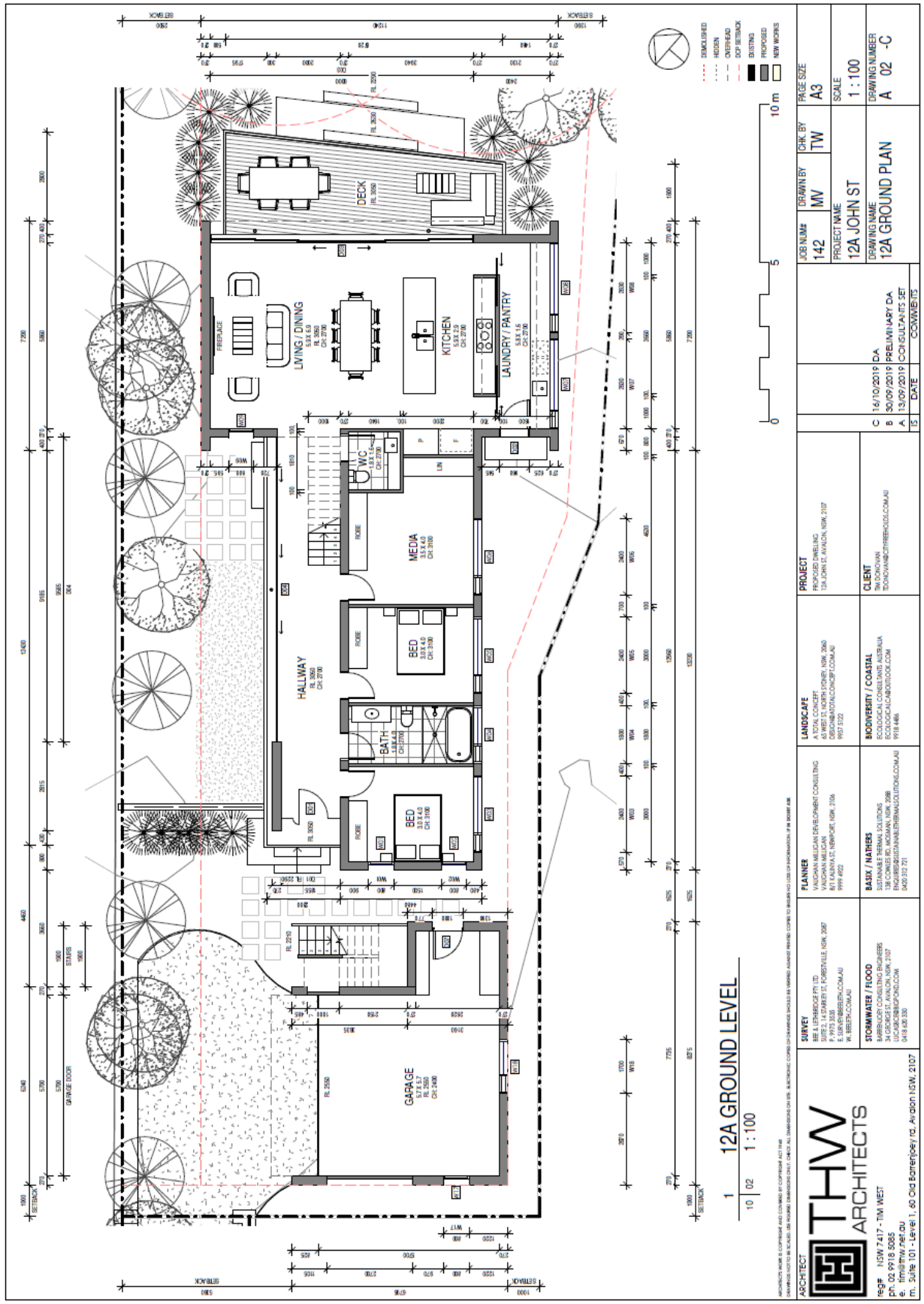

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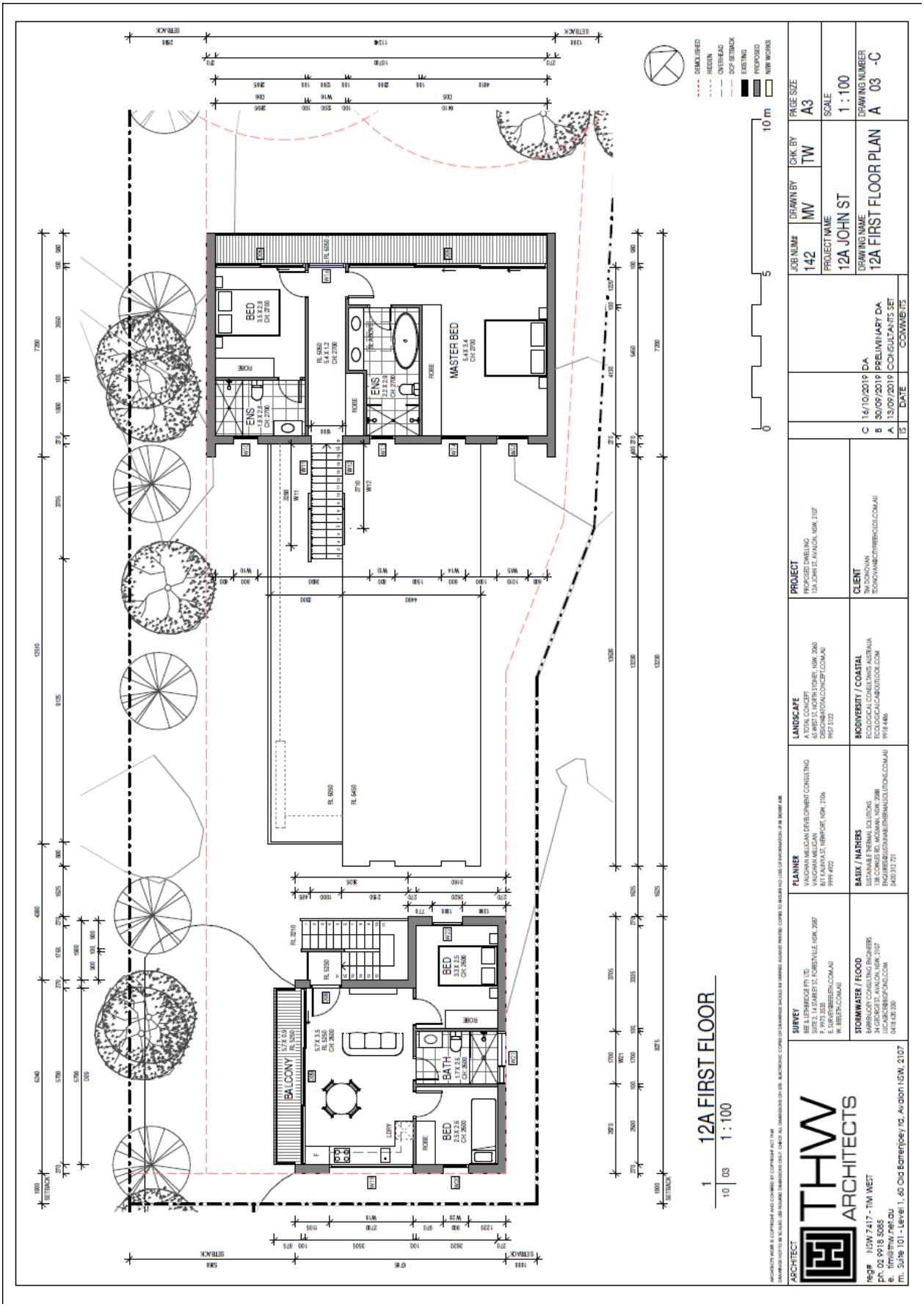

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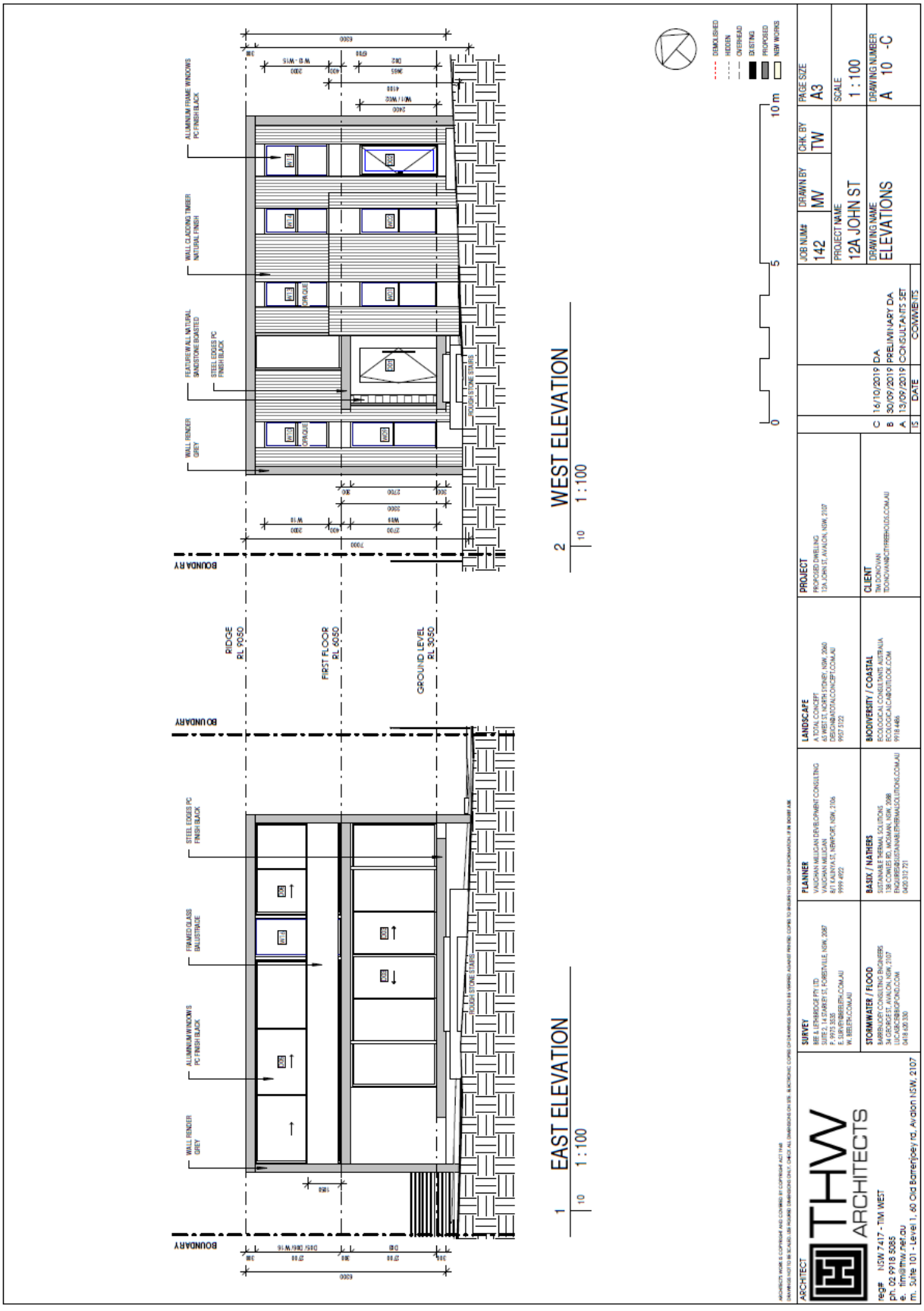

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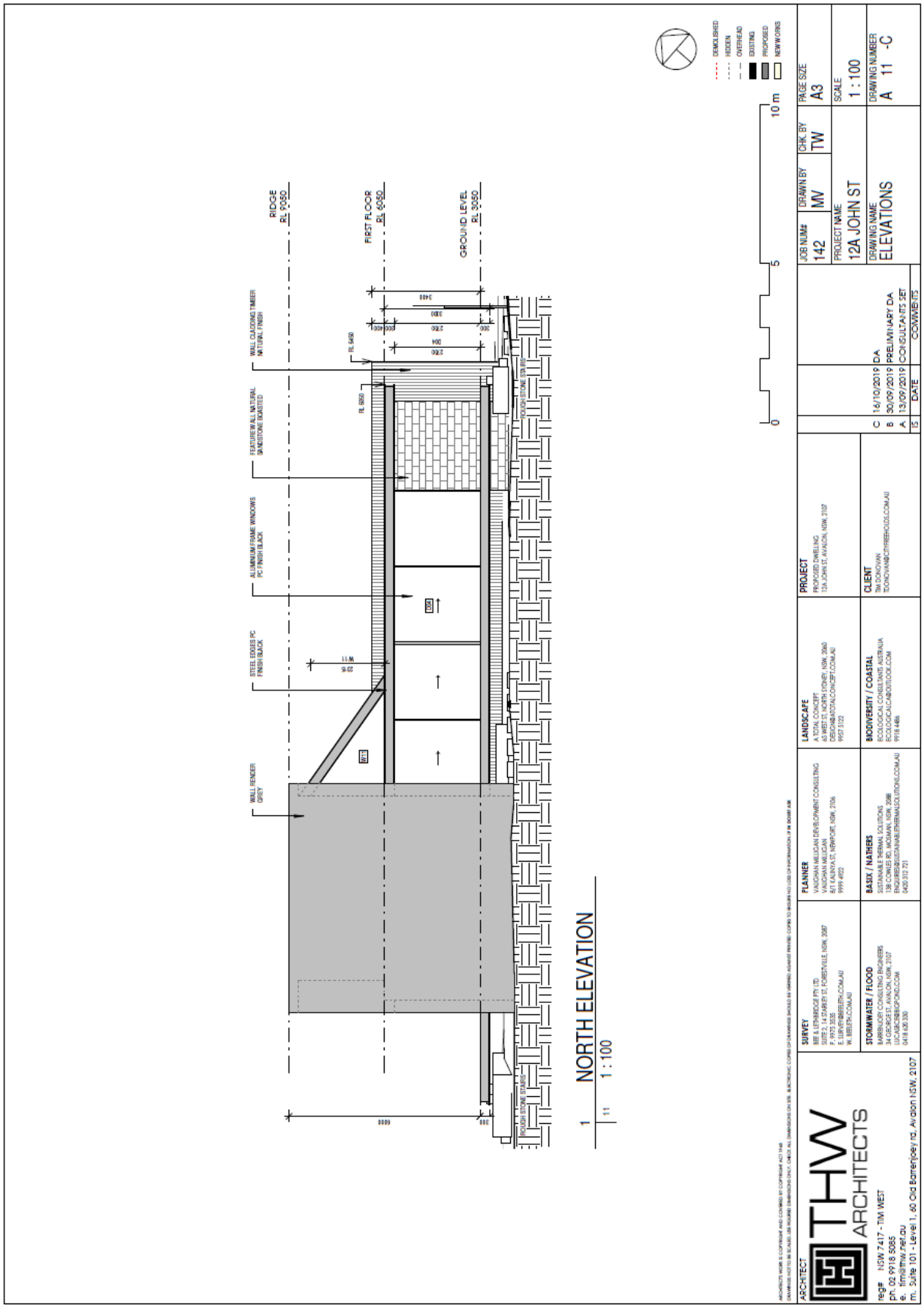

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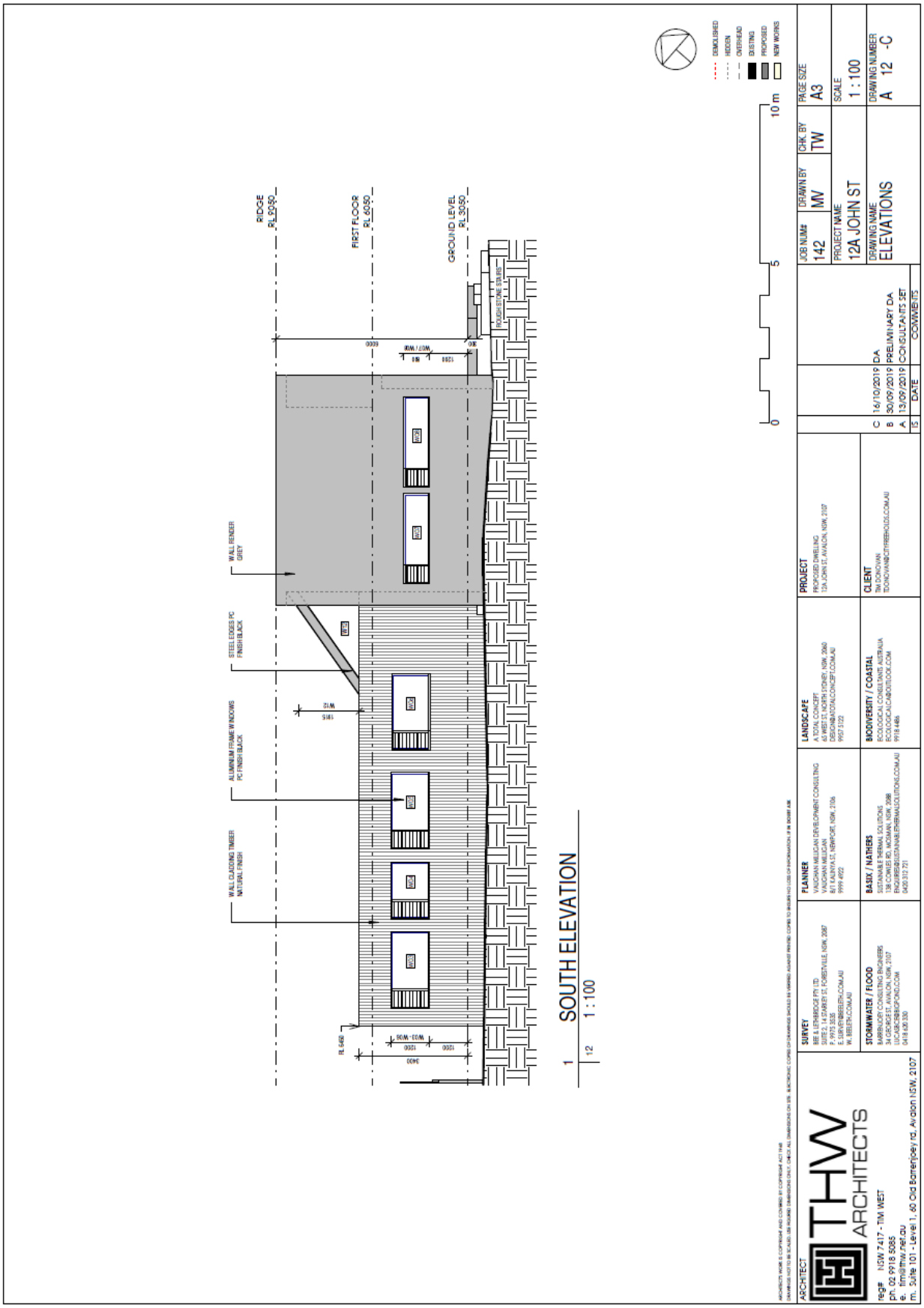

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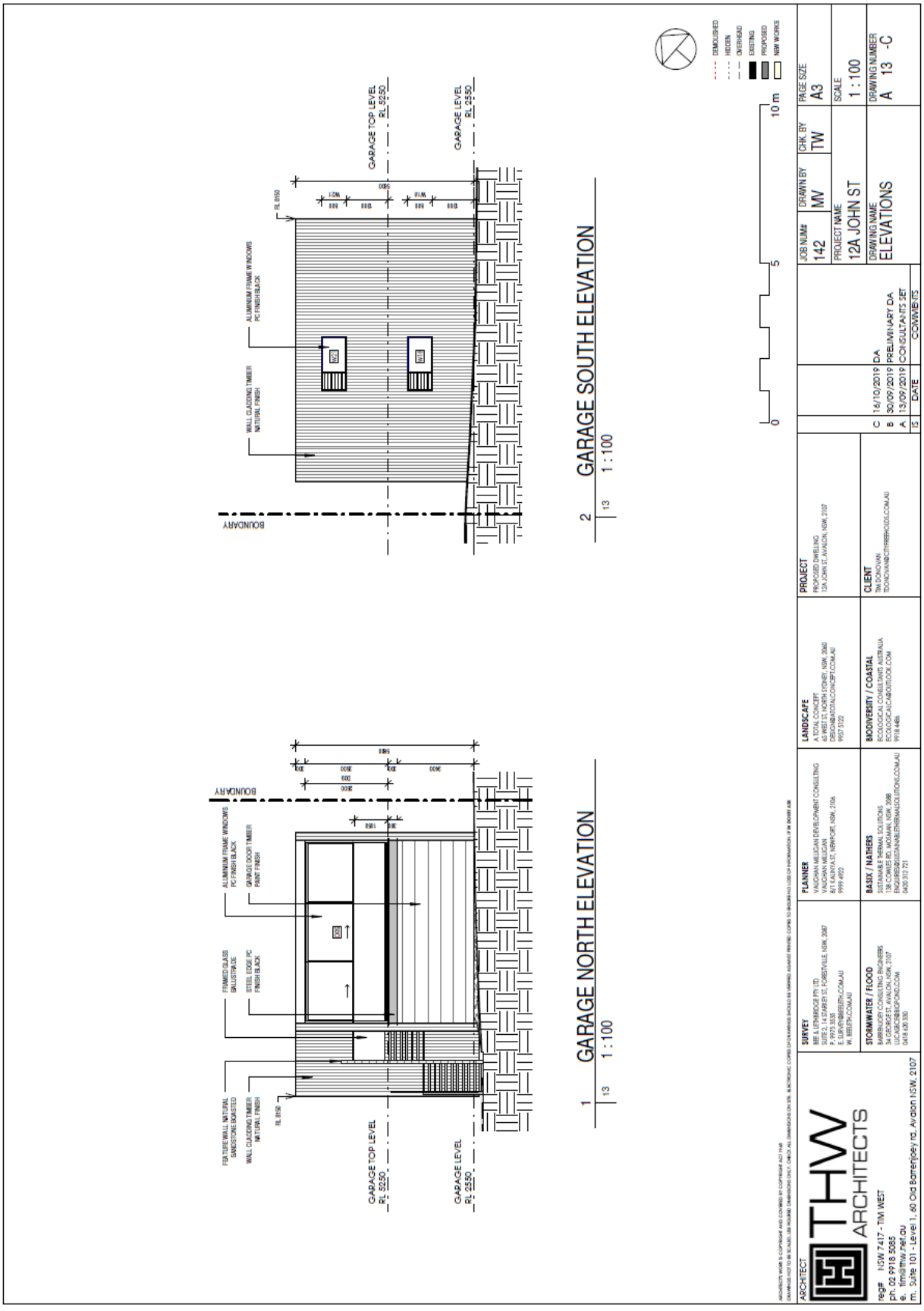

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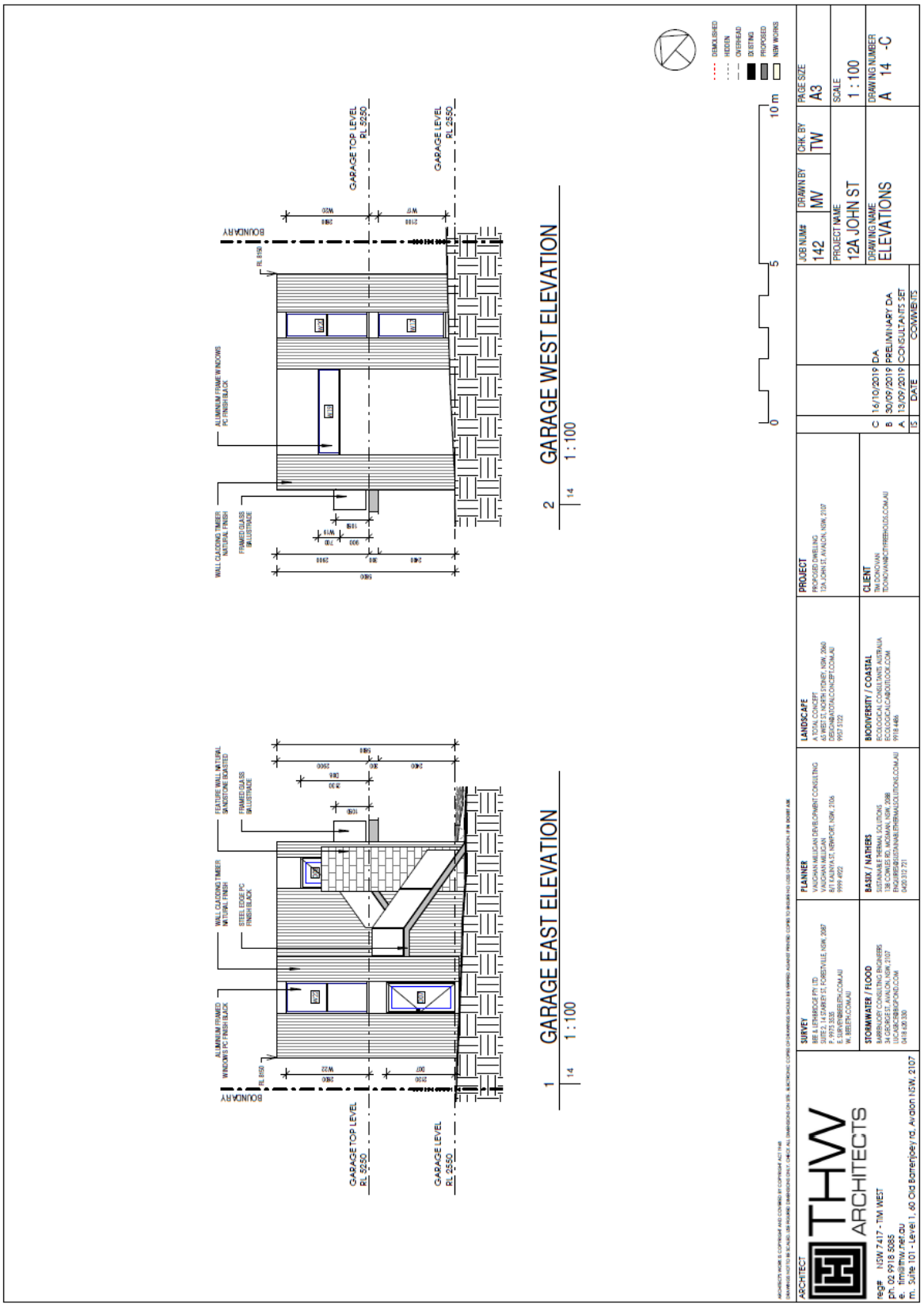

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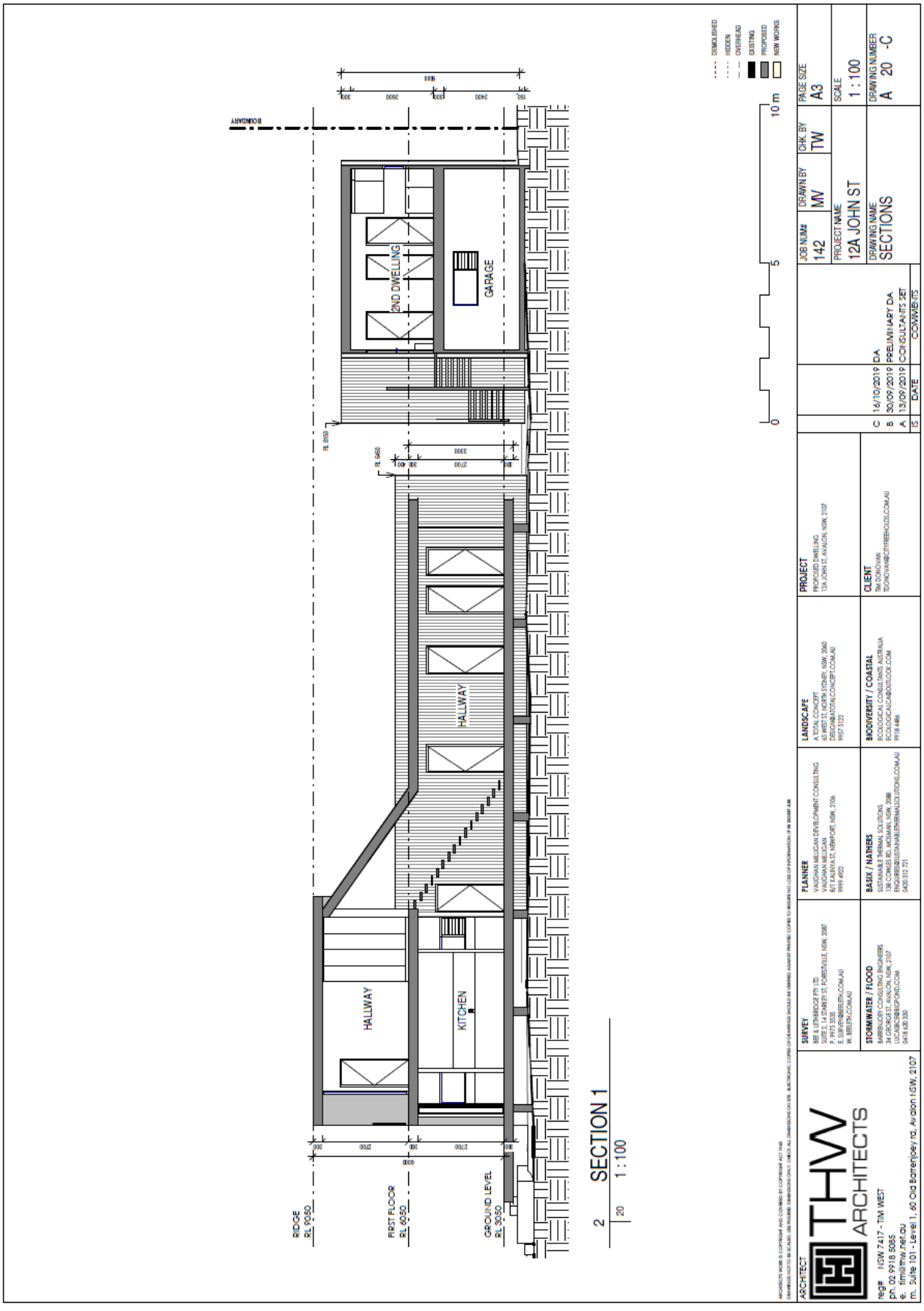

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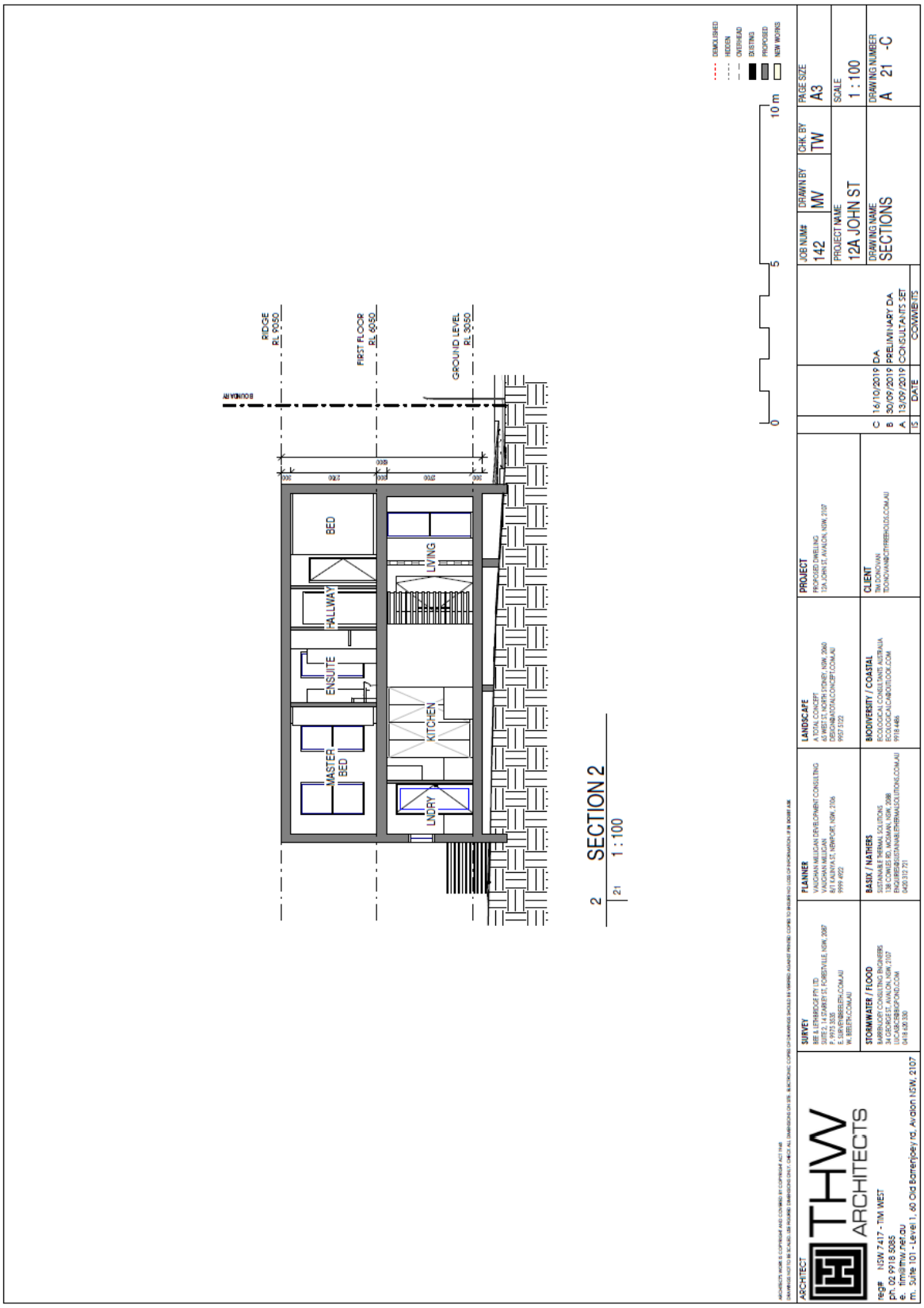

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Appendix B

Site Survey
Bee & Lethbridge

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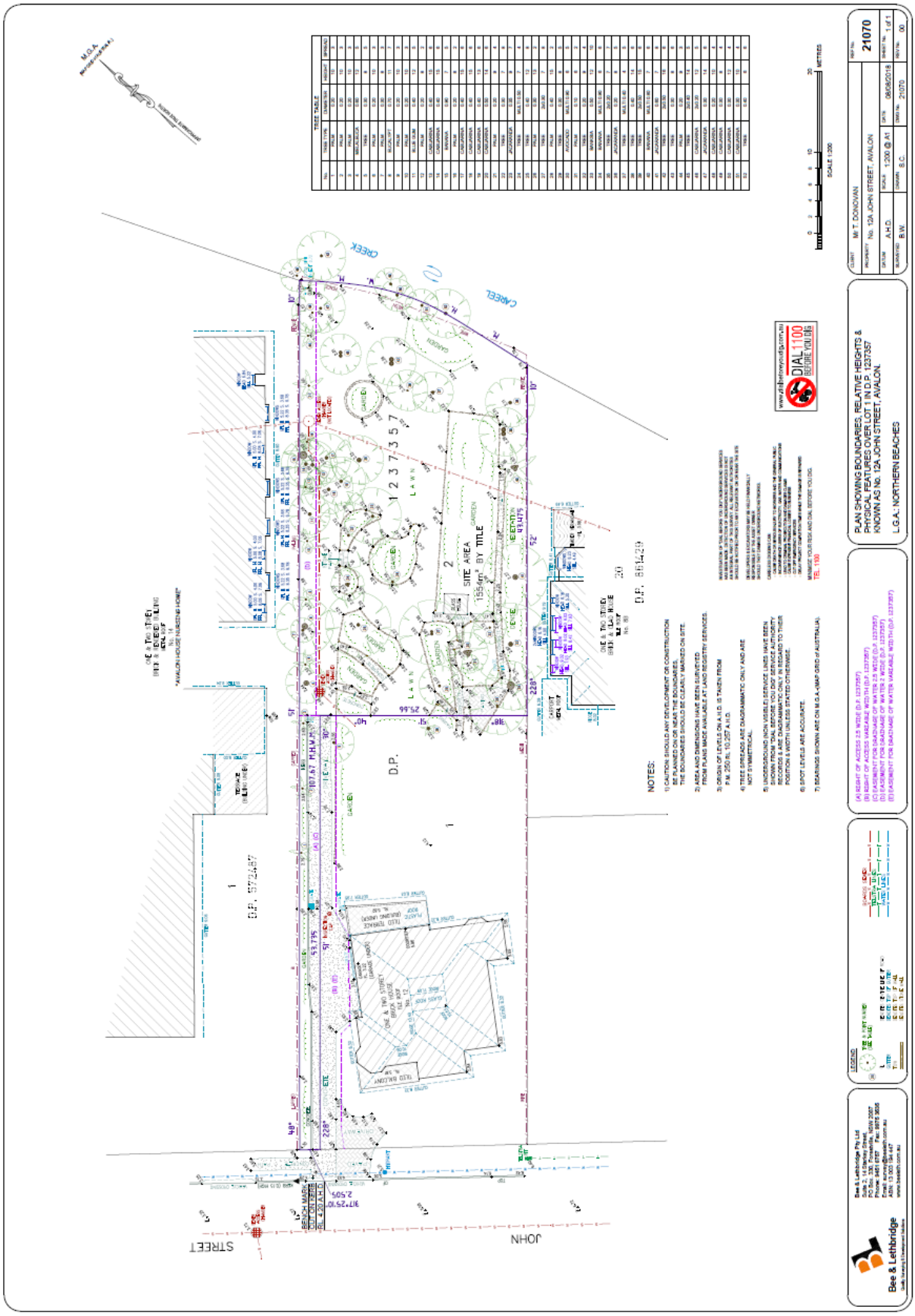

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Appendix C

Flood Information Request – Basic
Northern Beaches Council

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northern beaches council

FLOOD INFORMATION REQUEST - BASIC

Property: 12 and 12A John St Avalon Beach
Lot DP: 1//1101318
Issue Date: 14/10/2019
Flood Study Reference: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory

Flood Information for lot:

Flood Life Hazard Category – See Map A

1% AEP – See Flood Map B

1% AEP Maximum Water Level[3]: 2.55 mAHD

1% AEP Maximum Peak Depth from natural ground level[3]: 1.38 m

1% AEP Maximum Velocity: 1.19 m/s

1% AEP Hydraulic Categorisation: Floodway **See Flood Map E**

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL) [1, 2, 3 & 4]: 3.05 m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level[2]: 3.58 m AHD

PMF Maximum Depth from natural ground level: 2.36 m

PMF Maximum Velocity: 3.08 m/s

Flood Risk Precinct – See Map F

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[1]The flood information does not take into account any local overland flow issues nor private stormwater drainage systems.
[2]Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site.
[3]Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels than those indicated on this flood advice.
[4]Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or Flood Planning Level

General Notes:

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- This is currently the best available information on flooding; it may be subject to change in the future.
- Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a registered surveyor to determine any features that may influence the predicted extent or frequency of flooding. It is recommended you compare the flood level to the ground and floor levels to determine the level of risk the property may experience should flooding occur.
- Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's Local Environmental Plans and Development Control Plans.
- Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.
- The Flood Studies on which Council's flood information is based are available on Council's website.

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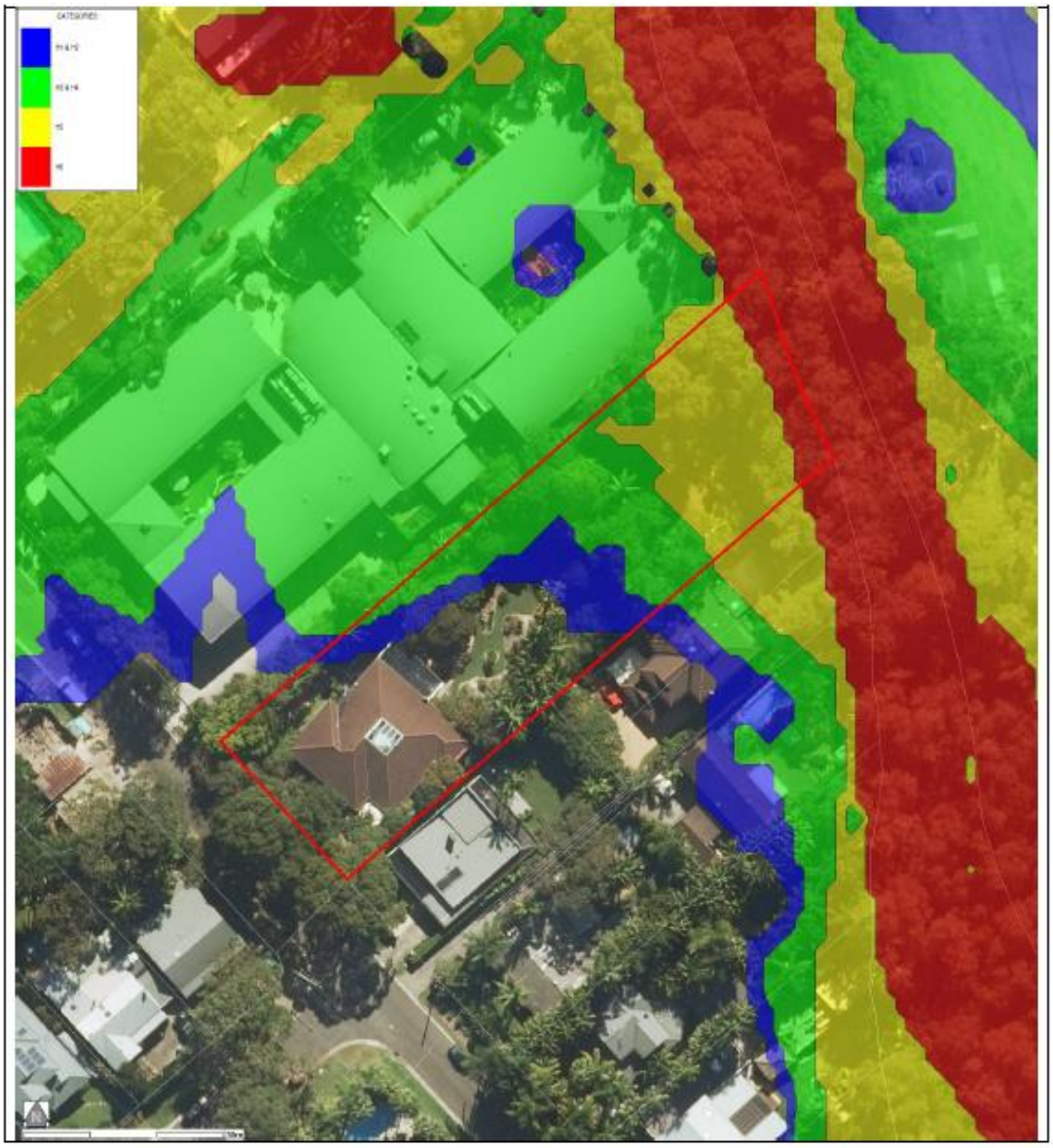
FLOOD MAP A: FLOOD LIFE HAZARD CATEGORY



Notes:

- Refer to 'Flood Emergency Response Planning for Development in Pittwater Policy' for additional information on the Flood Life Hazard Categories and Pittwater 21 DCP Control B3.12.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

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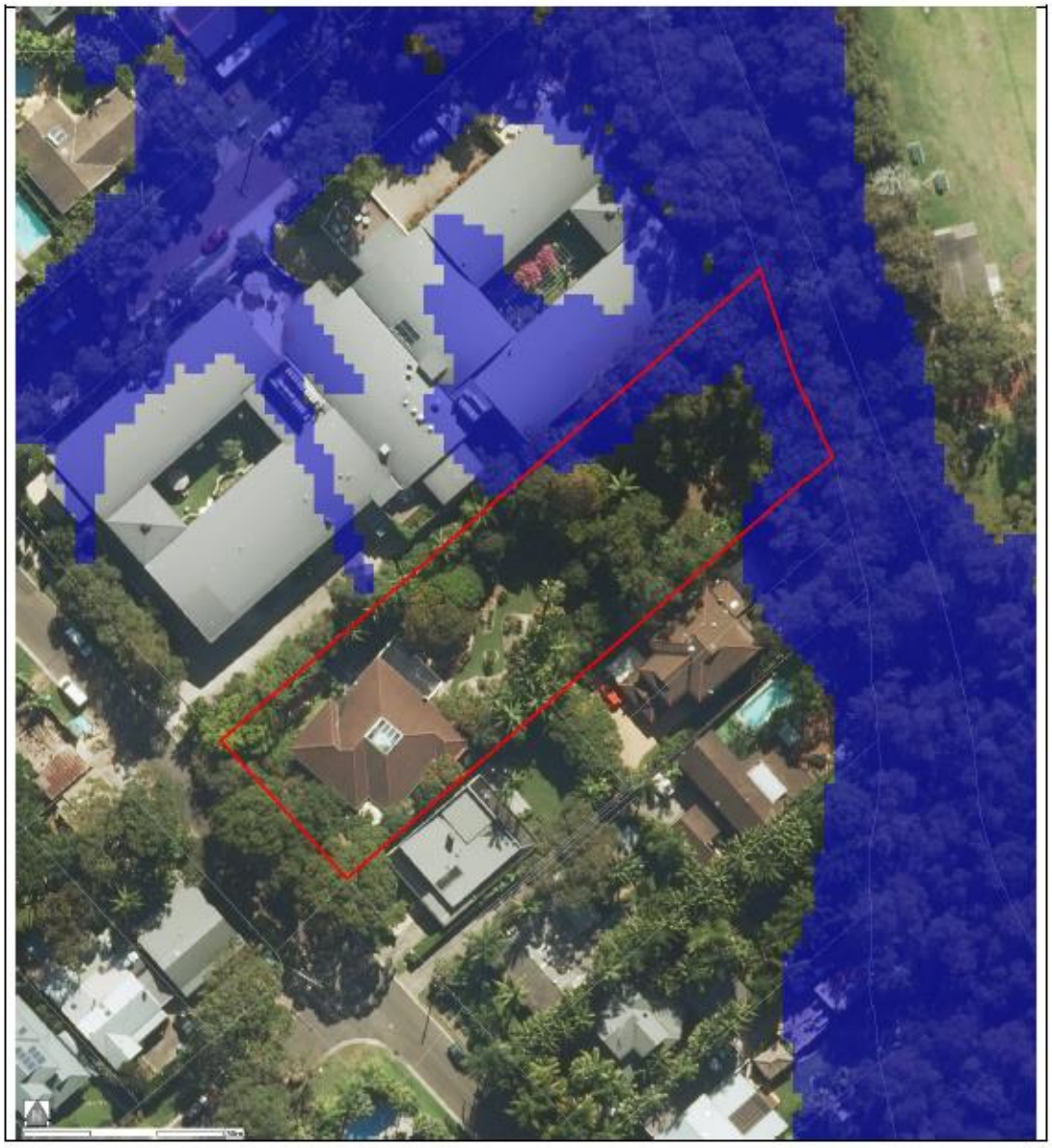
FLOOD MAP B: FLOODING - 1% AEP EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- Flood events exceeding the 1% AEP can occur on this site.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

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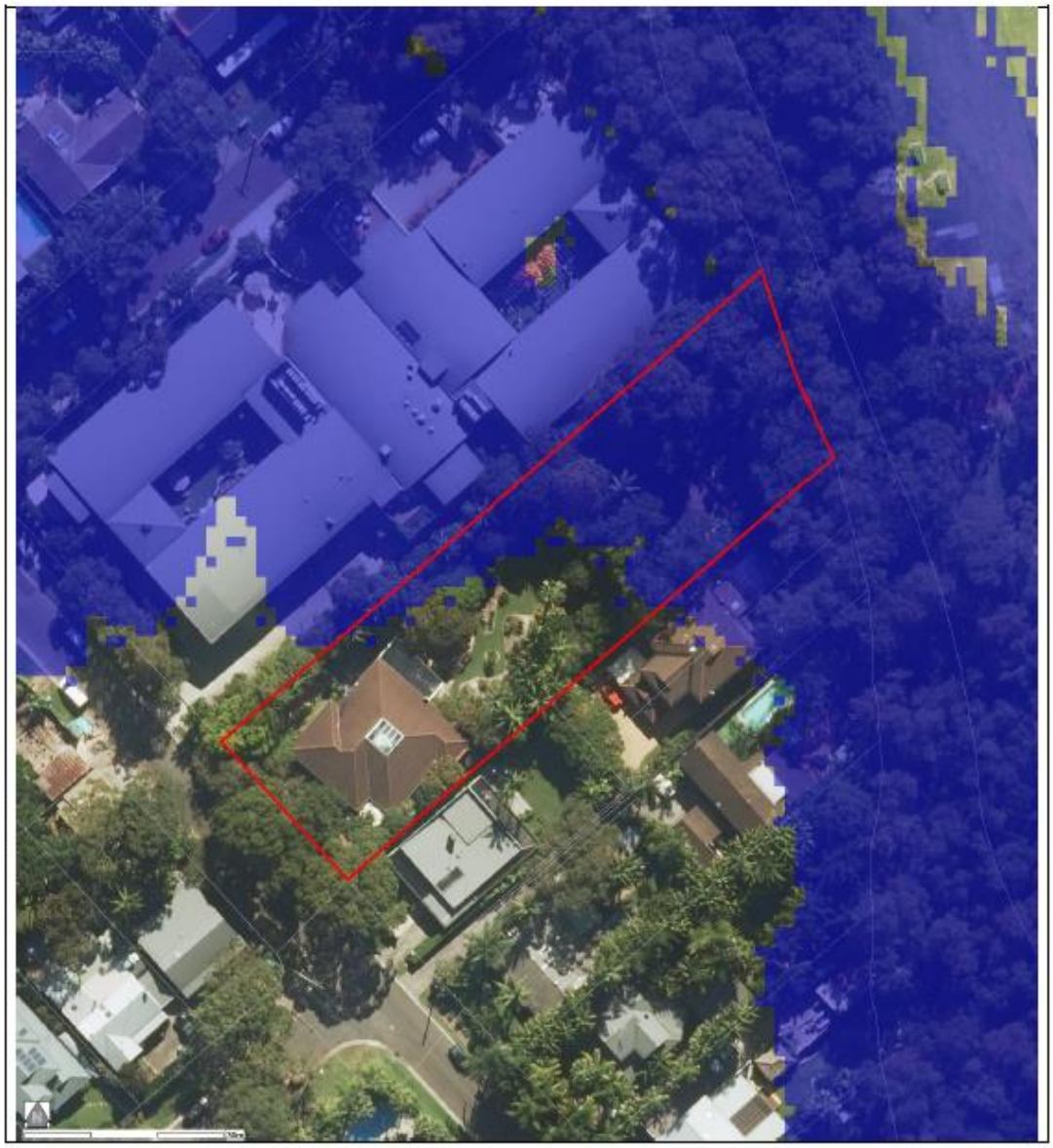
FLOOD MAP C: FLOOD PLANNING AREA EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

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FLOOD MAP D: PROBABLE MAXIMUM FLOOD EXTENT

Notes:

- Extent represents the Probable Maximum Flood (PMF) flood event.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

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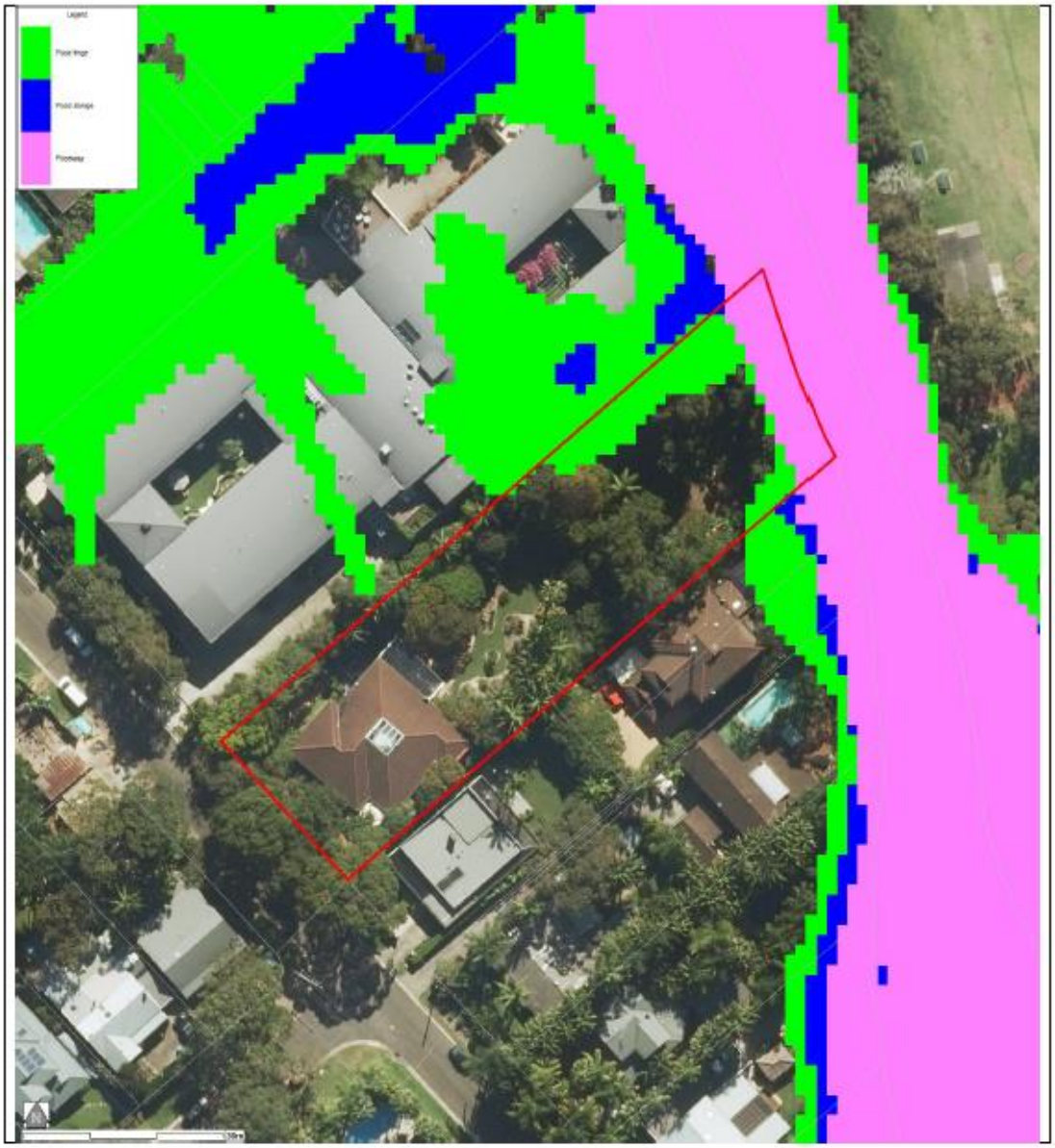
FLOOD MAP E: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

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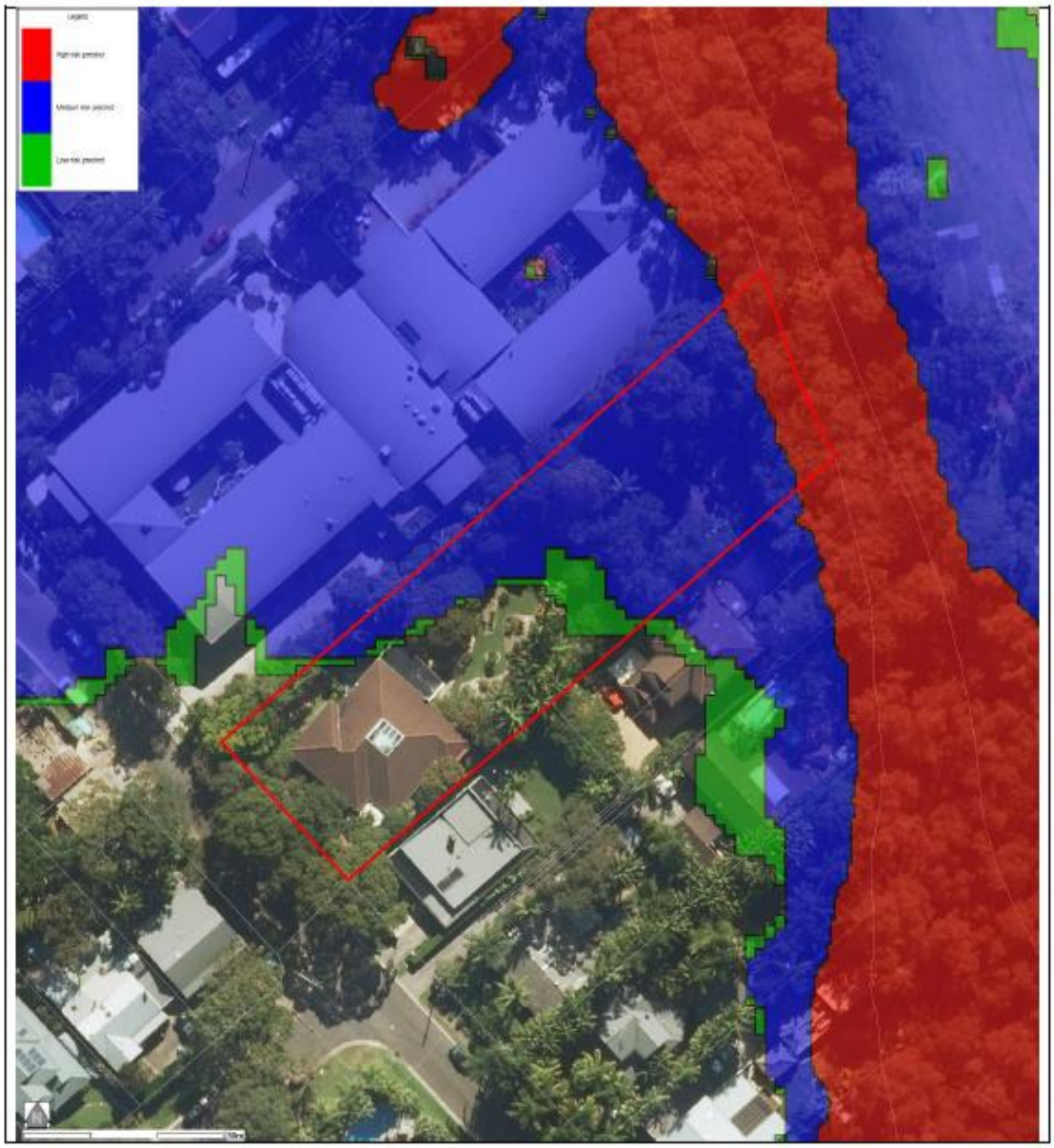
FLOOD MAP F: FLOOD RISK PRECINCT MAP



Notes:

- **Low Flood Risk precinct** means all flood prone land not identified within the High or Medium flood risk precincts.
- **Medium Flood Risk precinct** means all flood prone land that is (a) within the 1% AEP Flood Planning Area; and (b) is not within the high flood risk precinct.
- **High Flood Risk precinct** means all flood prone land (a) within the 1% AEP Flood Planning Area; and (b) is either subject to a high hydraulic hazard, within the floodway or subject to significant evacuation difficulties (H5 and or H6 Life Hazard Classification)

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GUIDELINES for Preparing a Flood Management Report

Introduction

These guidelines are intended to provide advice to applicants on preparing a Flood Management Report. The purpose of a Flood Management Report is to help applicants measure and manage the flood risk to life and property on their site.

When is a Flood Management Report required?

A Flood Management Report must be submitted with any Development Application on flood prone land, for Council to consider the potential flood impacts and controls. For Residential or Commercial development, it is required for development on land identified within the Medium or High Flood Risk Precinct. For Vulnerable or Critical development, it is required if it is within any Flood Risk Precinct.

Note that the flood extents shown on the mapping are indicative only. It is recommended that flood levels are compared to registered ground survey to more accurately determine the flood extent.

There are some circumstances where a Flood Management Report undertaken by a professional engineer may not be required. However, the relevant parts of the DCP and LEP would still need to be addressed, so as to demonstrate compliance. Examples where this may apply include:

- If all proposed works are located outside the relevant Flood Risk Precinct extent
- First floor addition only, where the floor level is above the Probable Maximum Flood level
- Internal works only, where habitable floor areas below the Flood Planning Level are not being increased

Note that development on flood prone land will still be assessed for compliance with the relevant DCP and LEP, and may still be subject to flood related development controls.

What is in a Flood Management Report?

The aim of a Flood Management Report is to demonstrate how a proposed development will comply with the flood related development controls outlined in the relevant LEP and DCP clauses. The report must detail the design, measures and controls needed to achieve compliance, following the steps outlined below.

A Flood Management Report should reflect the size, type and location of the development, proportionate to the scope of the works proposed, and considering its relationship to surrounding development. The report should also assess the flood risk to life and property.

Technical requirements of a Flood Management Report

The technical requirements of a Flood Management Report should include (where relevant):

1. ***Description of development***

   The description of development should identify:
   - Outline of the proposed development, with plans if necessary for clarity
   - Use of the building, hours of operation, proposed traffic usage or movement
   - Type of use, ie, critical, vulnerable, subdivision, residential, business, industrial, recreational, environmental or concessional

2. ***Flood analysis***

   The flood analysis should include:
   - Predicted 1 in 100 year flood level
   - Flood Planning Level (FPL)
   - Probable Maximum Flood (PMF) level
   - Flood Risk Precinct, ie High, Medium or Low
   - Flood Life Hazard Category (in former Pittwater Council area only)
   - Mapping of relevant extents
   - Flood characteristics for the site, eg depth, velocity, hazard and hydraulic category, and the impact these have on the proposed development

Note that if the property is affected by estuarine flooding or other coastal issues, these need to be addressed separately under the relevant DCP.

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3. ***Assessment of impacts***

The assessment of impacts should address the various elements of the relevant LEP and DCP. A simple compliance table should be provided, similar to the table one below.

	Compliance		
	Not Applicable	Yes	No
A Flood effects caused by Development			
B Drainage Infrastructure & Creek Works			
C Building Components & Structural			
D Storage of Goods			
E Flood Emergency Response			
F Floor Levels			
G Car Parking			
H Fencing			
I Pools			

Further details of what is required for each of these categories can be found in the *Development Control Plan for Flood Prone Land*.

For any of these categories which are applicable, the assessment should demonstrate how the development complies, or if it doesn't, provide an explanation of why the development should still be considered.

Reporting requirements for a Flood Management Report

The Flood Management Report should include:

a) Executive summary
b) Location plan, at an appropriate scale, that includes geographical features, street names and identifies all waterways and Council stormwater pipes, pits and easements
c) Plan of the proposed development site showing the extent of the predicted 100 year, any high hazard or floodway conditions and the PMF flood event
d) Development recommendations and construction methodologies
e) Calculation formulae (particularly for flood storage)
f) Clear referencing using an accepted academic referencing system (eg. Harvard)
g) Analysis of development against relevant State Environmental Planning Policies
h) Analysis of development against relevant Local Environment Plan and Policies
i) Conclusion detailing key points
j) Standard Hydraulic Certification (Form A/A1)
k) Qualifications of author
l) Any flood advice provided by Council
m) Any other details which may be relevant

NOTE: Qualifications of Author

Council requires that the Flood Management Report be prepared by a suitably qualified Engineer with experience in flood design / management who has, or is eligible for, membership to the Australian Institute of Engineers.

For further information please contact Stormwater and Floodplain Team on 1300 434 434 or via email at floodplain@northernbeaches.nsw.gov.au

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Attachment A

NORTHERN BEACHES COUNCIL STANDARD HYDRAULIC CERTIFICATION FORM

FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: _____

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, _____ on behalf of _____
(Insert Name) (Trading or Business/ Company Name)

on this the _____ certify that I am engineer or a
(Date)

professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document and to certify that the organisation/ company has a current professional indemnity policy of at least $2 million.

***Flood Management Report* Details:**

Report Title: .....

Report Date: .....

Author: .....

Author's Company/Organisation: .....

I: _____
(Insert Name)

Please tick all that are applicable (more than one box can be ticked)

☐ have obtained and included flood information from Council (must be less than 12 months old) **(This is mandatory)**

☐ have followed Council's Guidelines for Preparing a Flood Management Report

☐ have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature .....

Name .....

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Barrenjoey Consulting Engineers pty ltd
Stormwater Structural Civil
abn 13124694917 acn 124694917

Appendix E

Northern Beaches Council
Standard Hydraulic Certification Form

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abn 13124694917 acn 124694917

NORTHERN BEACHES COUNCIL
STANDARD HYDRAULIC CERTIFICATION FORM

FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: **12A John St Avalon**

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, **Lucas Molloy** on behalf of **Barrenjoey Consulting Engineers p/l** on this the **8th Nov 2019** certify that I am engineer or a professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document and to certify that the organisation/ company has a current professional indemnity policy of at least $2 million.

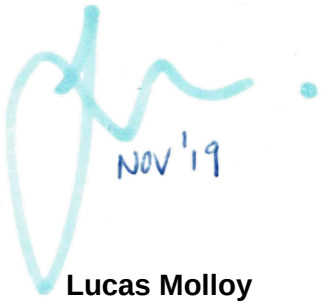
Flood Management Report Details:

Report Title: **FLOOD INUNDATION & RISK ASSESSMENT REPORT PROPOSED NEW RESIDENCE 12A PARK ST AVALON**
Report Date: **Nov 2019**
Author: **Lucas Molloy**
Author's Company/Organisation: **Barrenjoey Consulting Engineers p/l**

I: **Lucas Molloy**

Please tick all that are applicable (more than one box can be ticked)
X have obtained and included flood information from Council (must be less than 12 months old)
X have followed Council's Guidelines for Preparing a Flood Management Report
na have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature



Name **Lucas Molloy**
BE CPEng NER 788184
Director
Barrenjoey Consulting Engineers p/l

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End

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