Consulting Engineers

STRUCTURAL - CIVIL - STORMWATER - REMEDIAL

... STRUCTURALLY SOUND

Flood Risk Management Report

44 Kooloora Avenue, Freshwater

Job no. 2407112

Issue A

10 October 2024

Prepared for: Emma Macindoe Interior Design

Prepared by: Sarah Raaff

Flood Risk Management Report

Project no: 2407112

Issue: A

Date: 10/10/2024

Client: Emma Macindoe Interior Design

Engineer: Sarah Raaff

Principal review: Michael Wachjo

Council: Northern Beaches Council (Region 2)

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Document History

Issue	Engineer	Checked	Description	Date
A	S. Raaff	M.Wachjo	Flood Risk Management Report	10.10.2024

Contents

Figures

Summary

Northern Beaches Consulting Engineers were engaged by Emma Macindoe Interior Design to prepare a Flood Risk Management report. The purpose of the report is to determine the effects of a proposed development on the existing flooding regime within the development site and neighbouring properties. The development site is located at 44 Kooloora Avenue in Freshwater. The subject site is located within an existing flood zone, however, the area within which the development site is located has not been identified as a flood affected area in any of Council's available land zoning mapping or flood information, and therefore has not been strictly assessed against the Northern Beaches Council (Warringah area) flood controls. The criteria used in this report was established in the Stormwater Pre-DA meeting (SPLM2020/0001) with Northern Beaches Council.

To effectively assess the anticipated flooding effects, a hydraulic model was constructed using DRAINS software to determine the peak flood depth within the subject site up to the 1% Annual Exceedance Probability (AEP) storm event. The hydraulic modelling results were used to determine any potential adverse flooding effects associated with the development up to the 1% AEP storm event.

The development is not expected to cause a net loss of flood storage or adverse flooding effects to neighbouring properties should the recommendations in this report be adopted. The results from the analysis are detailed in the report below.

1. Introduction

Northern Beaches Consulting Engineers were engaged by Emma Macindoe Interior Design to undertake a hydrologic and hydraulic investigation into the effects of proposed carport privacy screening and new boundary fencing development at 44 Kooloora Avenue in Freshwater. The assessment involved analysing localised flooding behaviour within the Freshwater catchment up to the 1% AEP storm event.

Christian Ferry and Michael Wachjo of Northern Beaches Consulting Engineers (NBCE) conducted a site inspection at the above address on 13 November 2019. The site inspection was carried out to both observe and measure the existing drainage infrastructure within the development site and critical elements of Council's stormwater drainage infrastructure within the Freshwater catchment. The premises have been assessed in accordance with the requirements of the Stormwater Pre-DA meeting minutes (SPLM2020/0001) dated 02/07/2020, the Council supplied flood information and the *NSW Government Floodplain Management Manual 2005*.

1.1 Aim

The purpose of this report is to determine the peak flood depth within the subject site up to the 1% AEP storm event within an acceptable design criterion and assess the potential flooding impacts within the development site and neighbouring properties as a result of the proposed works. An analysis was undertaken to assess the extent of flooding envisaged to occur through the subject site and examine strategies to mitigate any impacts from flood waters during heavy rainfall events. Note, the analysis utilised the results of 1% AEP storm event modelling using IFD (Intensity Frequency Duration) design rainfall data based on AR&R 2019 (Australian Rainfall & Runoff) methodology.

The calculations and recommendations presented in this report have been prepared in general accordance with the following policies:

- *Australian Rainfall and Runoff: A Guide to Flood Estimation 2019*
- *NSW Government Floodplain Management Manual 2005*

1.2 Site Characteristics

The 573m^2 site is located on Kooloora Avenue in Freshwater within the Northern Beaches Council (Warringah) LGA and is bounded by residential properties along the north-eastern, north-western and south-eastern boundaries of the site.

Topographical information indicates that the subject site is located within a flood storage area at the bottom of the Freshwater catchment. The base of the Freshwater catchment forms a localised basin, bounded by the vegetated sand dunes west of the Freshwater Beach foreshore which becomes a temporary flood storage zone in heavy rainfall events. The primary cause of flooding is due to the inadequate hydraulic capacity of the existing Council stormwater drainage infrastructure which discharges to Freshwater beach. The impact of the inadequate discharge capacity is exacerbated when peak storm events occur in conjunction with high tides.

The existing stormwater drainage network consists of a series of pits and pipes which conveys public stormwater from the upstream catchment through to the catchment discharge point at the northern end of the Freshwater Beach foreshore. There are currently 2 x 1650mm & a 450mm diameter Council owned reinforced concrete pipeline (RCP) which extends through the subject property frontage towards Freshwater Beach (refer Appendix B for details). These pipes discharge into 2 x 1800mm diameter pipes which outlet onto the Freshwater Beach foreshore. These outlet pipelines convey collected runoff from the upstream catchment which extends west of 44 Kooloora Avenue up to the crest on McDonald street approximately 1350m away.

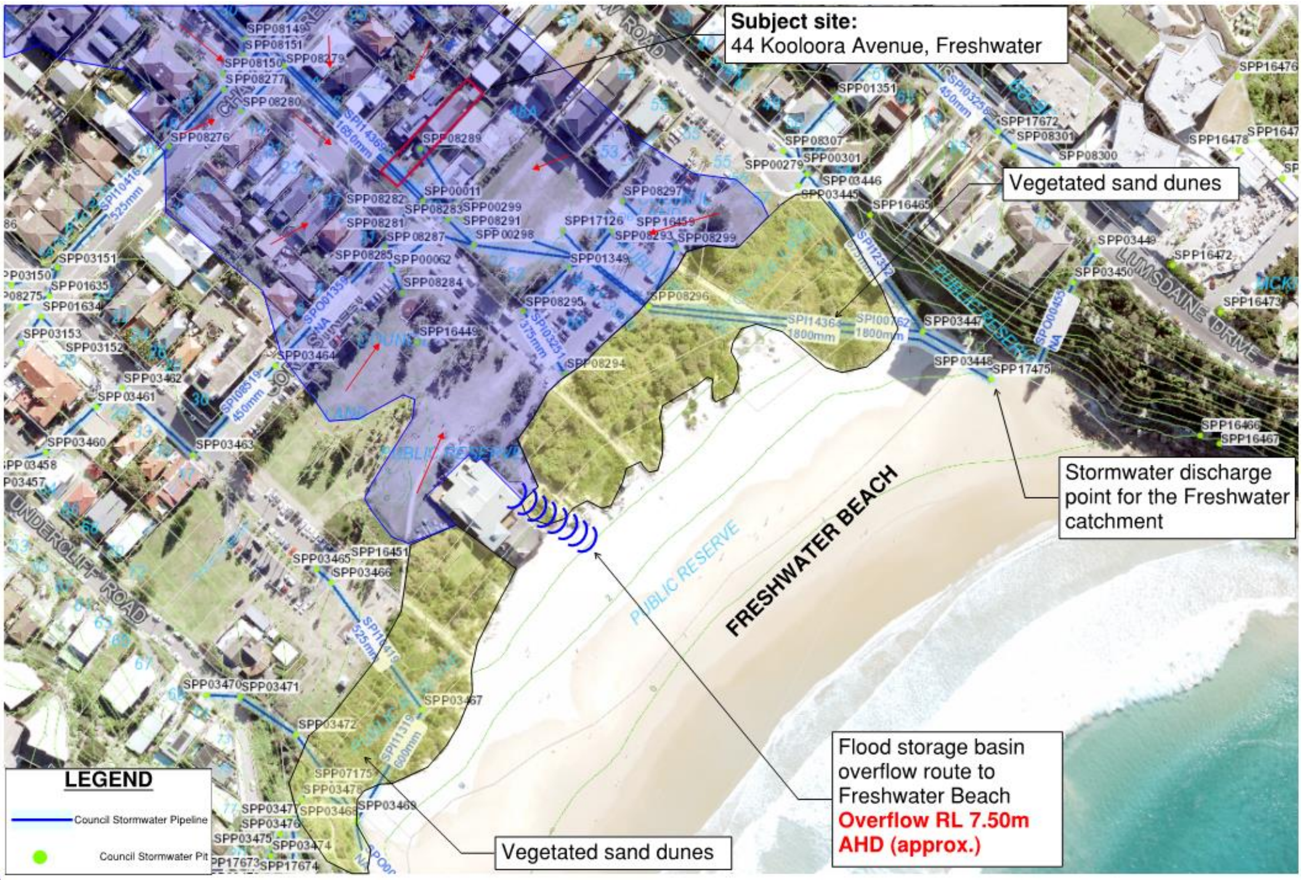

Figure 1 - Subject Site Location and Surroundings. Source: SIX Maps (NSW)

2. Flooding

2.1 Methodology

The flooding extent was modelled using the computer program DRAINS. A combination of LiDAR (Light Detection and Ranging) survey data, survey levels prepared by TTS Total Surveying Solutions and SIX Maps (NSW) government website information were used to estimate the total catchment area. The peak stormwater runoff rates within each of the contributing sub-catchments upstream of the subject site and the resulting flood depth within the flood storage area was modelled in the computer program DRAINS for the 1% AEP storm event.

2.2 Hydraulic Modelling Parameters

Multiple assumptions and parameters were considered in the construction of the hydraulic model. The modelling assumptions and parameters used are based on available survey data and on-site investigations.

2.2.1 Sub-Catchment Assumptions

Five sub-catchments were used in the analysis to effectively determine the flood behaviour within the wider catchment. The following assumptions are based on available survey information and recommended guidelines.

- An impervious ratio of 75% was used for 4 of the upper sub-catchment nodes (refer to Figure 2).
- An impervious ratio of 67% was used for the lower sub-catchment node at the bottom of the freshwater catchment (refer to Figure 2). This catchment also includes large grass park areas at the eastern end of Kooloora avenue.
- A roughness retardance coefficient of 0.012 and 0.33 was used for the impervious and pervious areas, respectively.

2.2.2 Pit and Pipe Blockage Factors

The following assumptions are based on available survey information and accepted guidelines. The below parameters are based upon an approved criterion set by Northern Beaches Council in the Stormwater Pre-Lodgement Meeting Notes (SPLM2020/0001 dated 20/07/2020).

- No blockage factors have been applied to the pipe in the hydraulic model. The velocities through the 2 x 1800mm diameter outlets at Freshwater beach are expected to fall between 3-4m/s during peak storm events. These high velocity rates will facilitate self-cleaning of the pipelines (refer to Appendix D for details).
- A blockage factor of 80% was applied to all sag pits within the hydraulic model.
- A constant outlet water level of 1.475m AHD was used to represent the king tide tailwater condition for the 2 x 1800mm diameter outlets at Freshwater Beach. The king tide level has been conservatively taken as the highest tidal level ever recorded in the Sydney area (refer to Figure 2 below). Source: Manly Hydraulics Laboratory (NSW Government website)

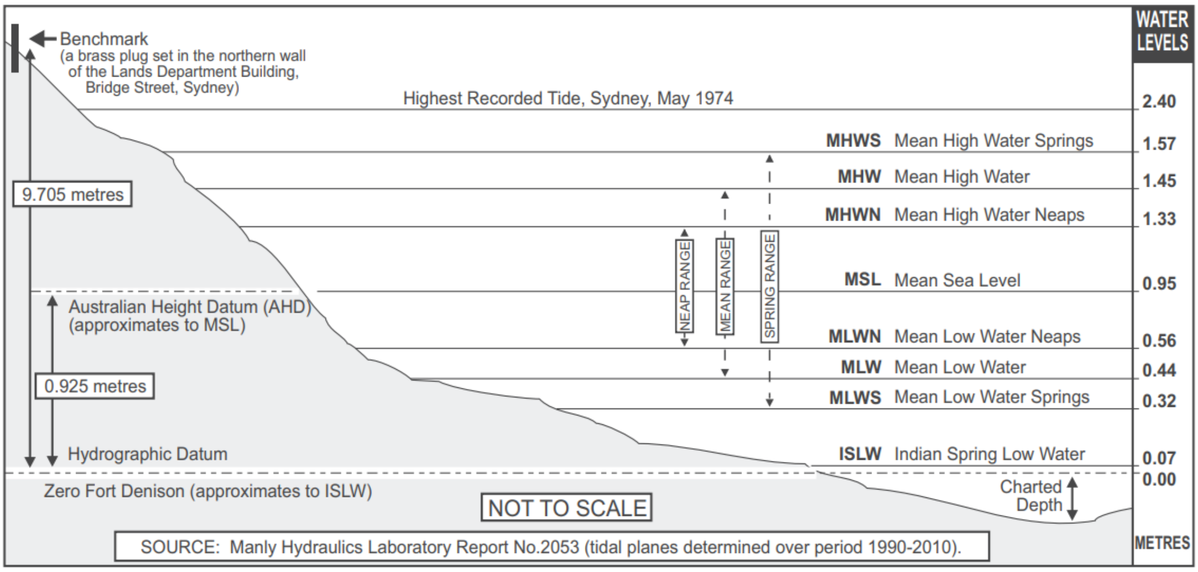

Figure 2 - NSW Tidal Charts (2020). Source: Manly Hydraulics Laboratory (NSW Government website)

2.2.3 Flood Storage Basin Parameters

To effectively represent the flood storage areas within the wider Freshwater catchment, storage basin nodes were used in a hydraulic model to accurately represent each of the critical temporary detention basins within the catchment, as these have a considerable impact on the hydraulic behaviour of stormwater runoff within the wider catchment. For the purpose of this report the following assumptions are made based on the available survey information and on site observations:

- Jacka Park Storage Basin 1 and Jacka Park Storage Basin 2 (Refer Figure 3) are located in Freshwater and are bound by Wyndora Avenue, Eric Street, Glen Street and Oliver Street. The two storage basins at Jacka Park are assumed to collect stormwater runoff from sub catchment A (refer Figure 4).
- Freshwater Storage Basin (Refer Figure 3) is located in Freshwater and bound by Albert Street, Moore Road and Ocean View Road. The Freshwater storage basin is assumed to collect stormwater runoff from sub-catchment E (refer Figure 4) and discharges through the council pipe at Freshwater beach.

Figure 3 - Storage Basin Locations within the Freshwater Catchment. Source: QGIS

2.2 Catchment Analysis

The subject site is located within the Freshwater catchment which conveys stormwater runoff to Freshwater Beach via Council's stormwater drainage infrastructure. The total contributing catchment affecting the subject site was measured in the computer program QGIS 2.18.8 using LiDAR data and is approximately 89.215 Ha.

The contributing catchment consists predominately of low-medium residential development. The catchment extends approximately 1500m upstream and reaches an elevation of approximately 68m AHD. QGIS 2.18.8 was also used to measure the average catchment slope. The manning's roughness 'n' values used for the analysis have been approximated based on observed site conditions (refer Table 1 below). Modelled results from a DRAINS analysis have been used to estimate the peak flow flood depth for the 1% AEP storm event.

Table 1 - Roughness Parameters used for DRAINS

Surface Type	Manning's Roughness (n)
Road / Paving	0.012
Grass	0.33

Five sub-catchments were considered in the analysis to appropriately represent the wider Freshwater catchment. The wider catchment was reduced to five critical sub-catchments for the purpose of providing a more accurate representation of the wider catchment flow behaviour. Each of the sub-catchments are listed below (refer to Figure 4).

- Jacka Park Sub-Catchment (Sub-Catchment A)
- Soldiers Avenue Sub-Catchment (Sub-Catchment B)
- Alfred Street Sub-Catchment (Sub-Catchment C)
- Ocean View Road Sub-Catchment (Sub-Catchment D)
- Freshwater Sub-Catchment (Sub-Catchment E)

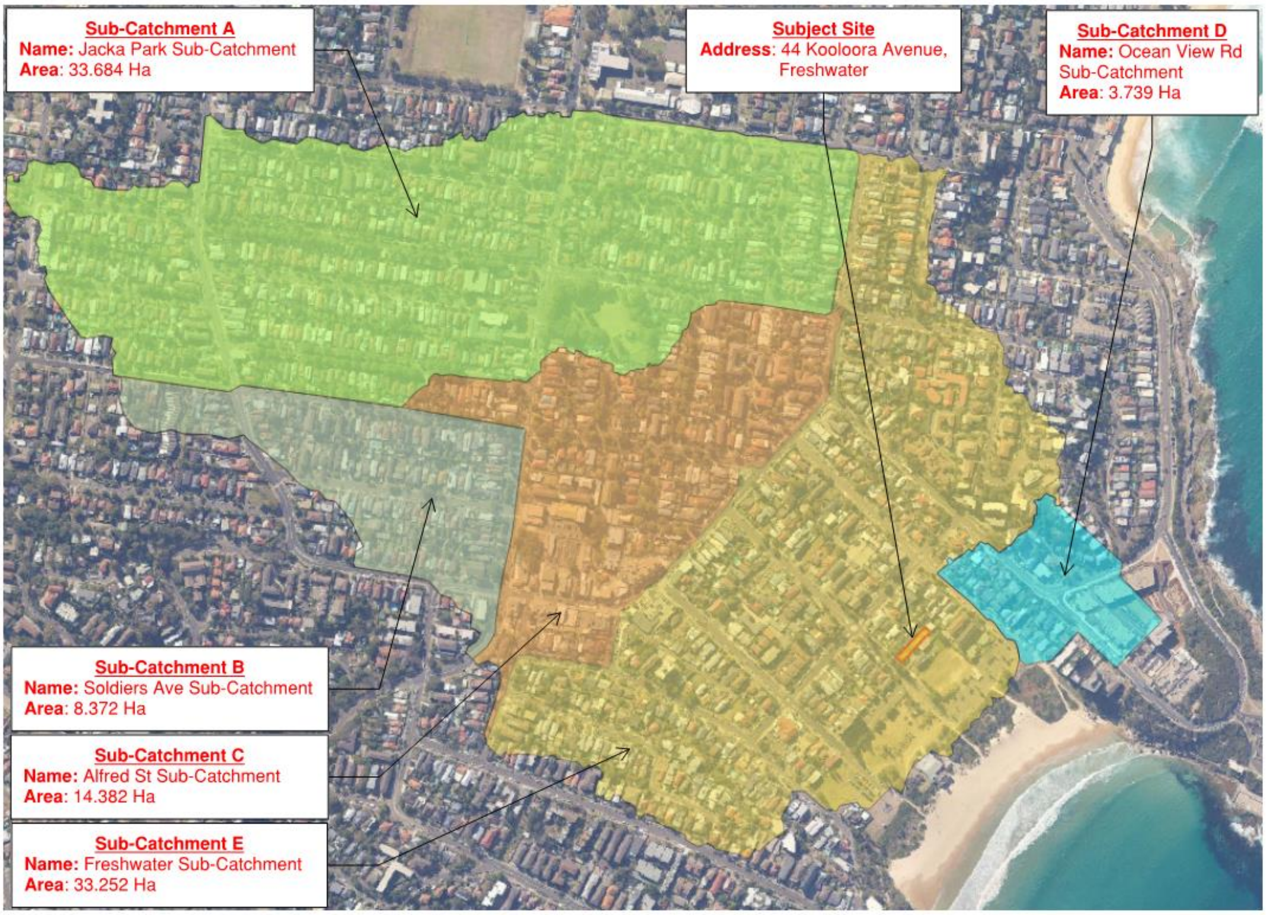

Figure 4 – Critical Sub-Catchments within the Freshwater Catchment. Source: QGIS

3. Analysis & Results

3.1 Peak Flow Results

A DRAINS computation analysis was completed to determine the anticipated runoff through the subject site. The 1% AEP storm event was computed, and the peak runoff rates are shown in Table 2 below:

Table 2 - Catchment Flow Rates for the 1% AEP Storm Event

AEP	Sub-Catchment	Area (Ha)	Piped Flow (m^3/s)	Overflow (m^3/s)
1%	A	33.684	6.82	2.52
1%	B	8.372	0.131	4.02
1%	C	14.382	7.06	9.32
1%	D	3.739	2.13	0
1%	E	33.252	20.2	0

For further detail refer Appendix A.

3.2 Flooding Extent

The 1% AEP peak flood depth has been estimated using the computer program DRAINS. The 1% AEP storm event was computed, and the peak flood depths within the Freshwater Storage Basin within the Freshwater sub-catchment are shown in Table 3 below:

Table 3 - Flood Depths for the 1%, 2%, 5% & 0.2EY Storm Events

AEP / EY	Flood Depth (m AHD)
1% AEP	5.05
2% AEP	4.86
5%	4.63
0.2EY	4.20

4. Recommendations

4.1 Carport Privacy Screening

The proposed carport screening has been designed so as to be a minimum 50% open (proposed approx. 60% open) up to the 1% AEP Flood Level (RL 5.05m AHD). The perimeter of the carport is to be restricted from being used for storage and kept clear from obstructions so as to allow flood waters to freely enter the carport. Therefore, the above carport privacy screening is not anticipated to impact the conveyance of flood waters across the site or impact neighbouring properties. Further, the carport privacy screening is to be designed to cater for flood loads up to the FPL and so as to withstand the impact of a floating vehicle up to the 1% AEP flood event. This is to prevent floating vehicles from leaving the site. A velocity of 1m/s can be assumed as the velocity for the 1% AEP.

4.2 Boundary Fencing

The proposed fencing along the boundaries is to be of an open design from natural ground level up to the 1% AEP flood level (5.05m AHD). At least 50% of the fence must be open, with openings a minimum of 75mm x 75mm so that flood waters can flow through unimpeded.

Where the existing boundary fencing is solid masonry wall this can be retained or replaced, however it should not be built up or extended beyond its existing extent.

The fencing is to be certified and/or designed by a civil engineer to withstand hydrostatic forces up to and including the 1% AEP storm event.

4.3 Building Components and Structural Soundness

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 FPL and conduits must be laid such that they are free draining. New structures located below the FPL are to be adequately flood proofed.

All new development should be designed and constructed of flood compatible materials in accordance with "Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas", Hawkesbury-Nepean Floodplain Management Steering Committee (2006).

5. Conclusion

In accordance with accepted engineering practice, NBCE has undertaken a flood study of the stormwater drainage system at 44 Kooloora Avenue in Freshwater and can confirm the accuracy of the calculated results based on the DRAINS modelling. The proposed development will be safeguarded from flooding and will not adversely affect other structures or properties as a result of the proposed development. Please contact the author if further clarification is required.

NORTHERN BEACHES CONSULTING ENGINEERS P/L

Author:

Sarah Raaff
Engineer 2

Reviewed By:

Michael Wachjo
Director | B.E.(Civil), MIEAust.

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APPENDIX A

DRAINS Results

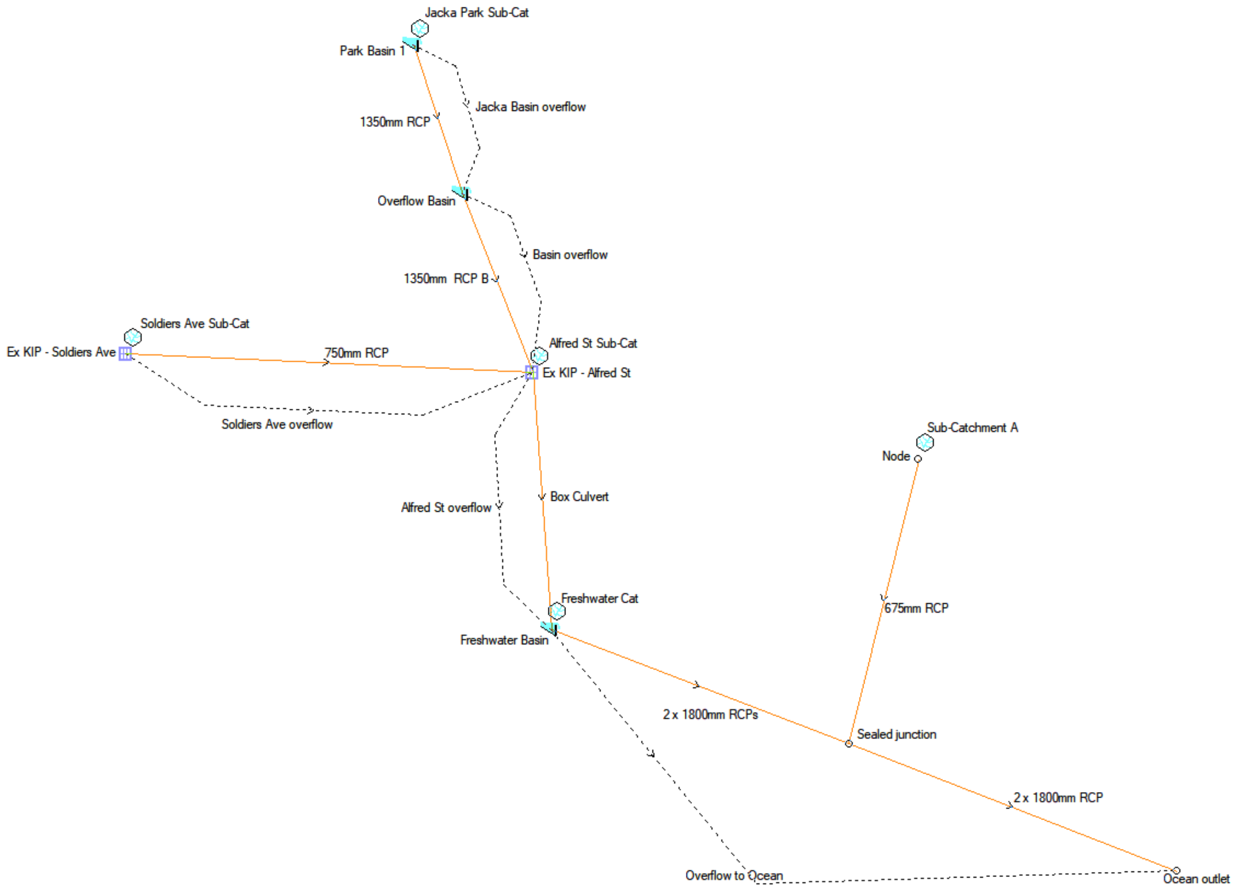


Figure 5 - DRAINS model: Catchment configuration

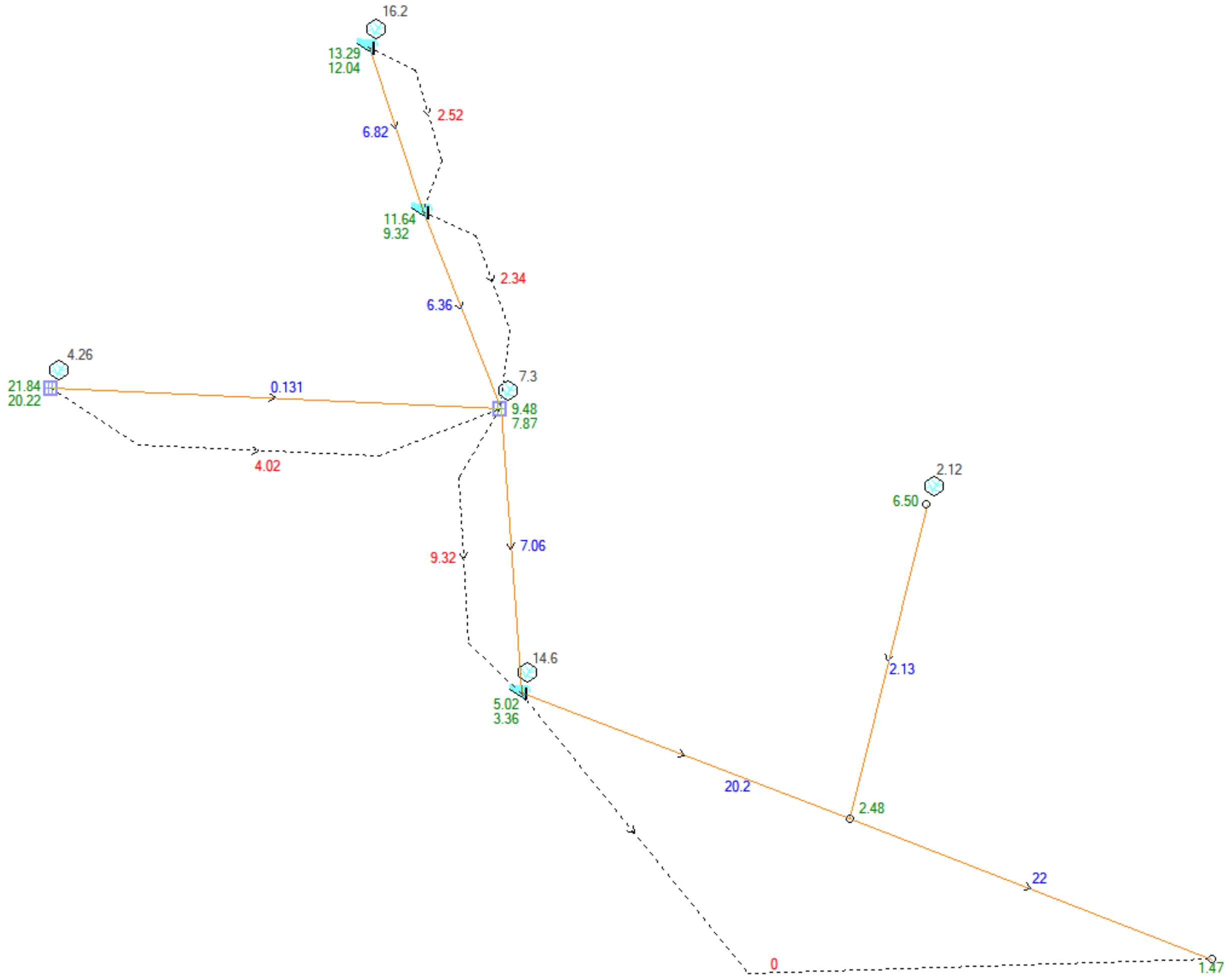
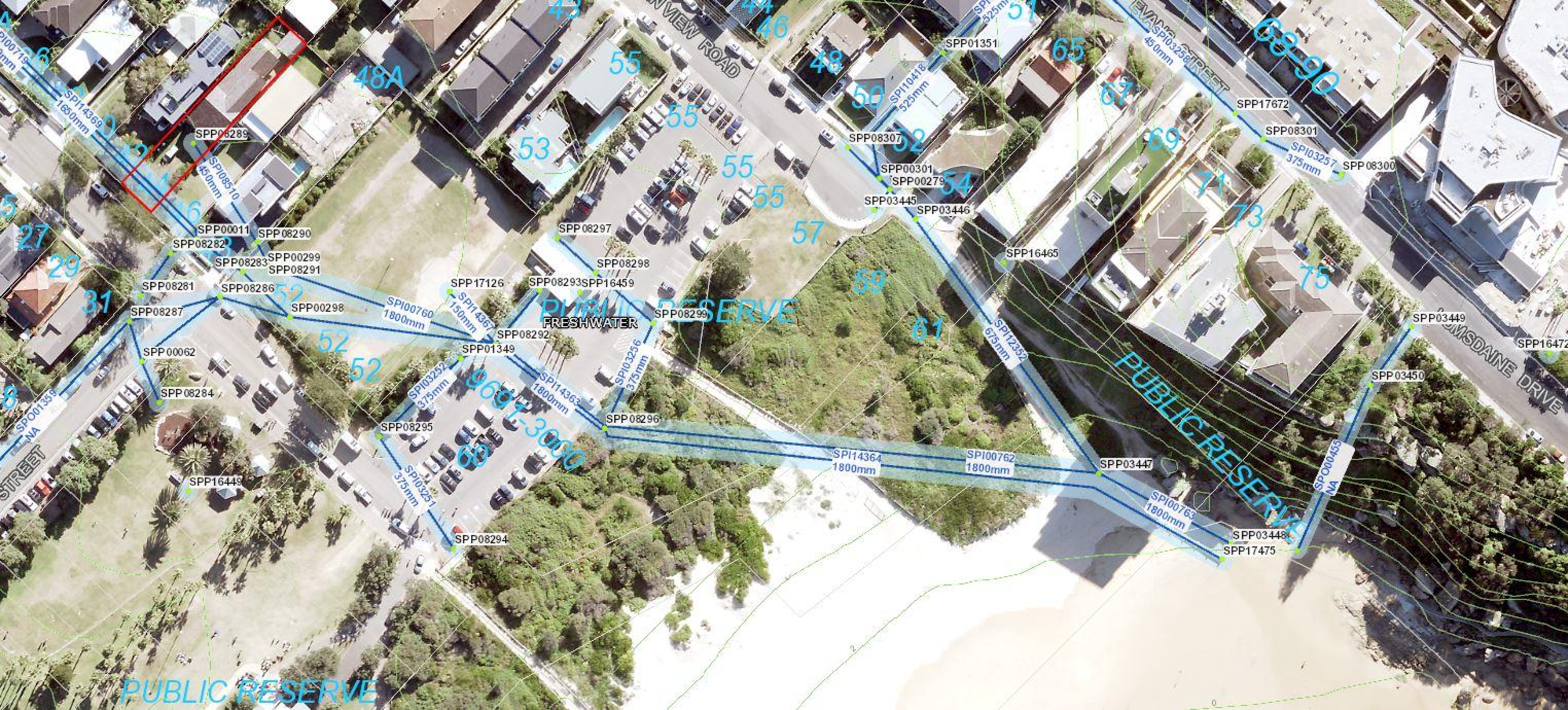


Figure 6 - DRAINS model: Catchment Flows for 1% AEP Storm Event. Source: DRAINS

APPENDIX B

Council Mapping Information



VIEW ROAD
EVANS STREET
LUMSDAINE DRIVE
STREET
PUBLIC RESERVE
FRESHWATER
PUBLIC RESERVE
PUBLIC RESERVE
9691-3000
48A
46
48
50
52
53
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59
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71
73
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68-90
27
29
31
SPP08289
SPI08510 450mm
SPI14369 1650mm
SPP00011
SPP08290
SPP08282
SPP08283
SPP00299
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SPP08295
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SPI14367 150mm
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SPP16459
SPP08297
SPP08298
SPP08299
SPI03256 375mm
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SPP03449
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SPI12352 675mm
SPP03445
SPP03446
SPP00301
SPP00279
SPP08307
SPI10418 525mm
SPP01351
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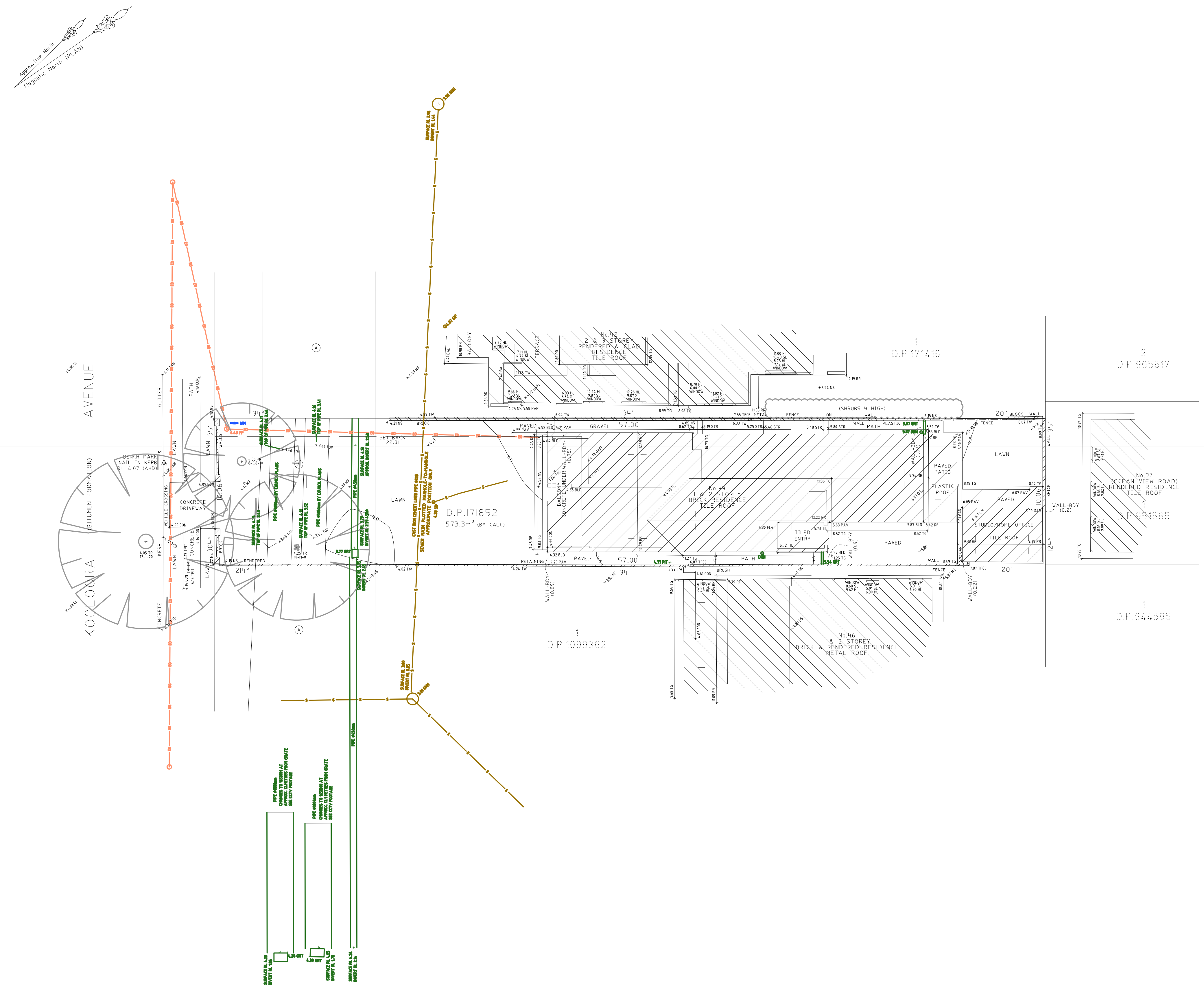
SPP17672
SPP08301
SPI03257 375mm
SPP08300

APPENDIX C

Site survey plan & Architectural plans

A0



Ⓐ PROPOSED EASEMENT TO DRAIN WATER 6m TO 7.7m WIDE & VARIABLE WIDTH BY DP636528.

TITLE INDICATES THAT LOT 1 IN D.P.171852 IS SUBJECT TO:

- RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S).

0 1 2 3 4 5 6 7 8 9 10

SCALE 1:100

NOTES

- A FIELD SURVEY OF THE BOUNDARIES HAS BEEN CONDUCTED.
- WALL TO BOUNDARY DIMENSIONS SHOWN HEREON MUST NOT BE USED FOR CONSTRUCTION.
- IF CONSTRUCTION ON OR NEAR BOUNDARIES IS REQUIRED IT IS RECOMMENDED THAT THE BOUNDARIES OF THE LAND BE MARKED OR THE BUILDING SET OUT.
- TREE SIZES ARE ESTIMATES ONLY.
- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF ADRIAN & NICOLE STEWART.
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- EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- ONLY VISIBLE SERVICES HAVE BEEN LOCATED. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED. DIAL BEFORE YOU DIG SERVICES (ph 1100) SHOULD BE USED AND A FULL UTILITY INVESTIGATION, INCLUDING A UTILITY LOCATION SURVEY, SHOULD BE UNDERTAKEN BEFORE CARRYING OUT ANY CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA.
- SEWER MAIN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
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MURRAY LEARMONT
REGISTERED SURVEYOR BOSSI NUMBER 1462

MURRAY LEARMONT
REGISTERED SURVEYOR BOSSI NUMBER 1462

LEGEND:

BAL = BALCONY
BLD = EXTERNAL BUILDING
CL = CENTRELINE
CON = CONCRETE
DS = DOOR SILL LEVEL
FL = FLOOR LEVEL
GAFL = GARAGE FLOOR LEVEL
GAR = GARAGE
GRT = GRATE
HL = HEAD LEVEL
NS = NATURAL SURFACE
PAR = PARAPET
PAV = PAVING
PIT = TOP OF PIT
RF = TOP OF ROOF
RR = ROOF RIDGE
SIP = SEWER INSPECTION PIT
SL = SILL LEVEL
SMH = SEWER MAN HOLE
STR = STAIRS
SWSL= STORMWATER SURFACE LEVEL
SSL = SEWER UNDERGROUND
TFCE = TOP OF FENCE
TG = TOP OF GUTTER
TIL = TILE
TKB = TOP OF KERB
TPIT = TELSTRA PIT
TR = TREE
TW = TOP OF WALL
WM = WATER METER
= ELECTRICITY OVERHEAD
= SEWER UNDERGROUND
TREE
SPREAD-DIAMETER-HEIGHT

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: ASSUMED
MARKS ADOPTED: N/A

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 772
R.L. 4.254 (ORDER L2)
SOURCE: S.C.I.M.S. (07/02/19)

4	TITLE NOTES UPDATED	13/11/2021
3	STORMWATER UPDATED	30/01/20
2	STORMWATER & SEWER INVESTIGATION	17/01/20
1	FIRST ISSUE	15/02/19

CLIENT:
ADRIAN & NICOLE STEWART
c/- BREWSTER HJORTH ARCHITECTS
L1 4-14 FOSTER STREET
SURRY HILLS NSW 2000

BOUNDARY IDENTIFICATION
SHOWING DETAIL & LEVELS
OVER LOT 1 IN D.P.171852
No. 44 KOOLOORA AVENUE
FRESHWATER NSW 2096

PO Box 463 Dee Why
NSW 2099
2/99A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

LGA: NORTHERN BEACHES		SHEET 1 OF 2	
SURVEYED H.H./M.E.	DRAWN R.N.	CHECKED H.H./M.E.	APPROVED A.F.
SURVEY INSTRUCTION 18354A	SCALE 1:100 @ A0	DATE OF SURVEY 08/02/19 & 10/01/20	
DRAWING NAME 18354Adetail		ISSUE 4	
CAD FILE 18354Adetail 4.dwg			

DEVELOPMENT APPLICATION

44 KOOLOORA AVENUE, FRESHWATER NSW

PREPARED ON BEHALF OF:

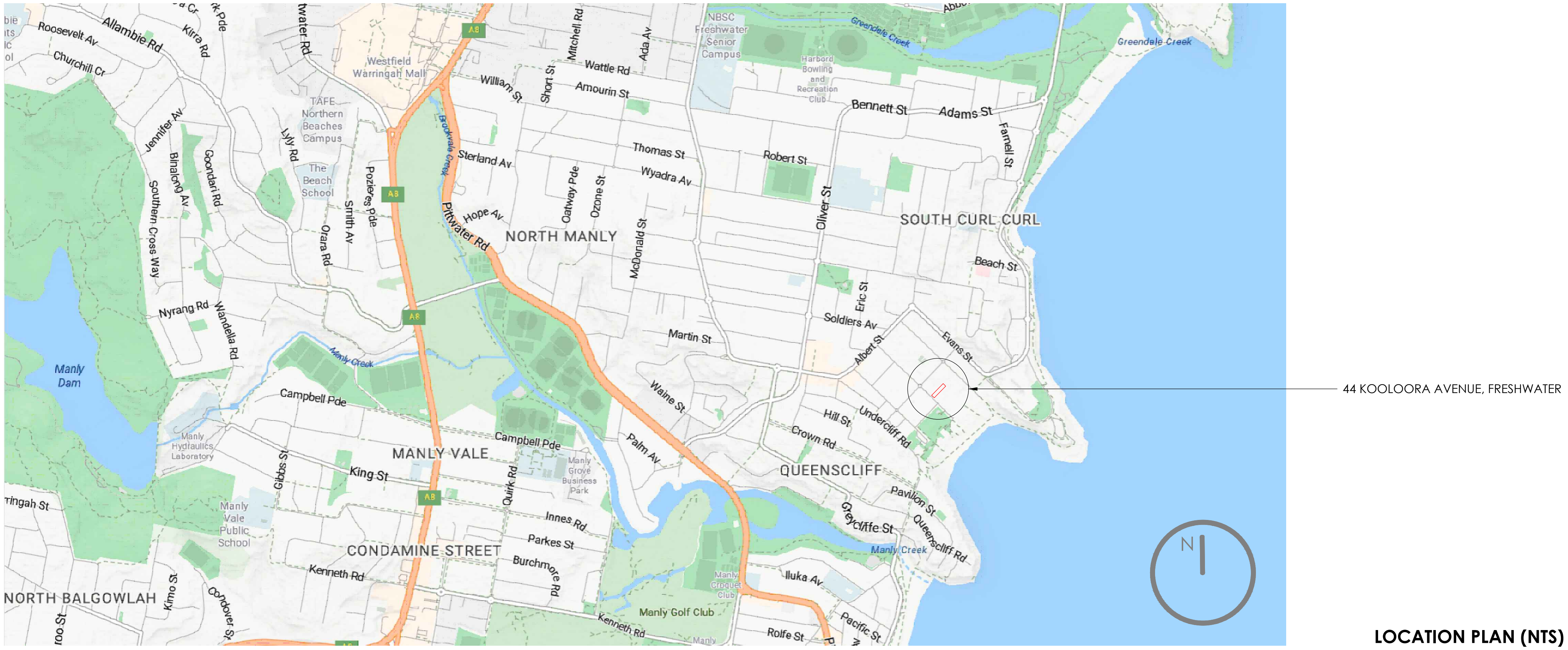
JOSH LARGE

STREET VIEW (FOR REFERENCE ONLY)

CARPORT VIEW (FOR REFERENCE ONLY)

GENERAL NOTES

1. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION, CONSULTANT DRAWINGS & DOCUMENTATION AND THE REQUIREMENTS OF THE RELEVANT AUTHORITIES.
2. DO NOT OBTAIN DIMENSIONS BY SCALING. VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION COMMENCEMENT.
3. IN THE EVENT OF A DISCREPANCY, ERROR OR OMISSION, INCONSISTENCY, AMBIGUITY OR OTHER FAULT, THE DESIGNER IS TO BE IMMEDIATELY NOTIFIED AND CLARIFICATION SOUGHT.
4. ALL WORKMANSHIP & MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT NCC, BCA & REQUIREMENTS OF THE RELEVANT BUILDING AUTHORITIES.
5. COMPLY WITH THE REQUIREMENTS OF THE NATSPEC BUILDING SPECIFICATION AS A MINIMUM.



LOCATION PLAN (NTS)

emma macindoe
interior design
0413069379 emmamacdesigns@gmail.com

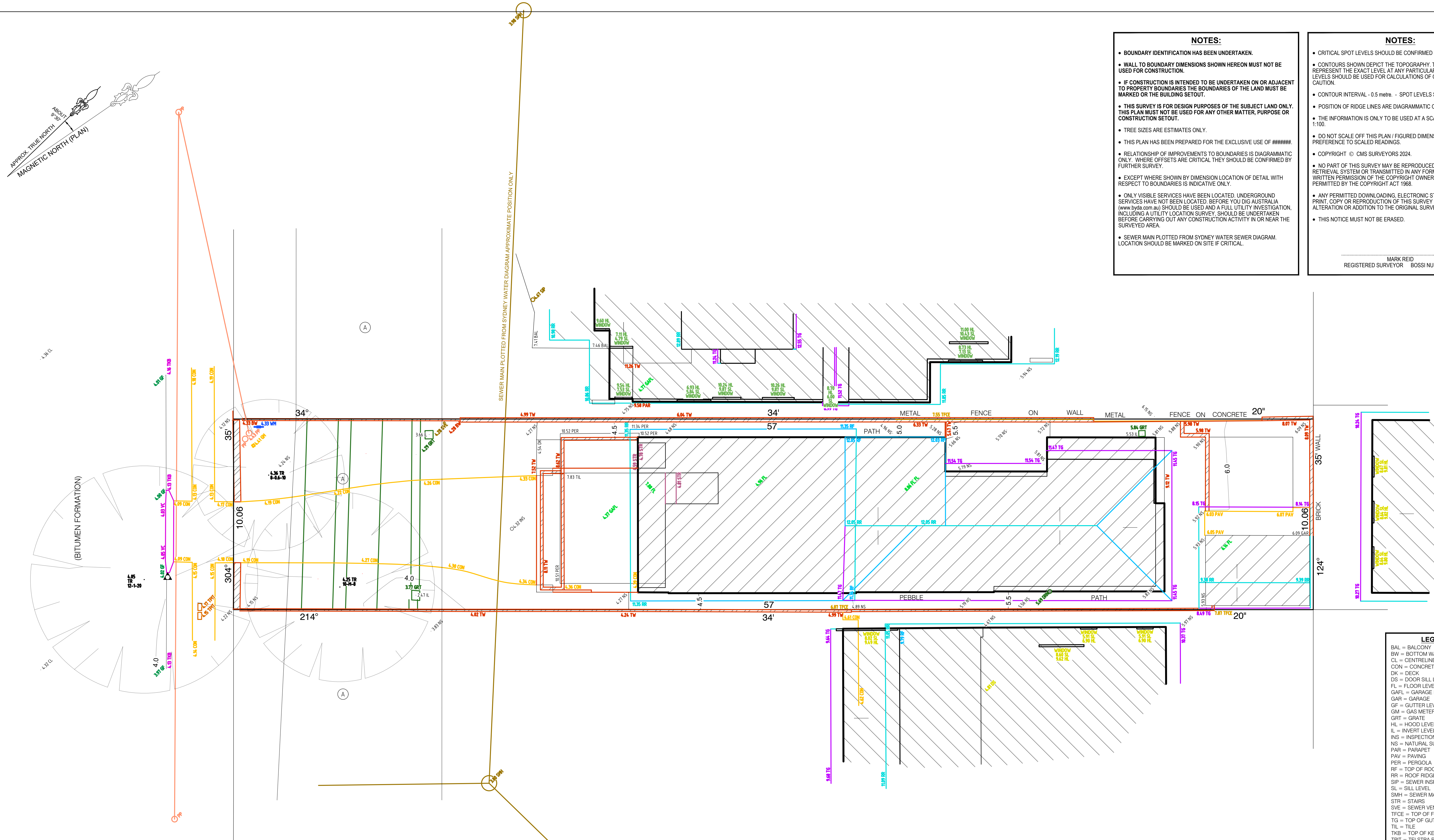
EXTERNAL FENCING AND CARPORT		TITLE	COVER PAGE
CLIENT	JOSH LARGE	ADDRESS	44 KOOLOORA AVENUE, FRESHWATER NSW

GENERAL NOTES
All works to be in accordance with Australian Standards, The Building Code of Australia, other relevant codes and with manufacturers' instructions.

Do not scale off drawing. Verify all dimensions on site prior to construction.
To be read in conjunction with all other consultants' drawings.
The designer to be immediately notified of any discrepancies.

DEVELOPMENT APPLICATION

DRAWING	ISSUE	SCALE
C01	1.2	1:200 @ A3 1:100 @ A1
	DATE 03/10/2024	DRAWN BY F.G.R.



NOTES:

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- **THIS SURVEY IS FOR DESIGN PURPOSES OF THE SUBJECT LAND ONLY. THIS PLAN MUST NOT BE USED FOR ANY OTHER MATTER, PURPOSE OR CONSTRUCTION SETOUT.**
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....
MARK REID
REGISTERED SURVEYOR BOSSI NUMBER 183

LEGEND:

BAL = BALCONY
BW = BOTTOM WALL
CL = CENTRELINE
CON = CONCRETE
DK = DECK
DS = DOOR SILL LEVEL
FL = FLOOR LEVEL
GAFL = GARAGE FLOOR LEVEL
GAR = GARAGE
GF = GUTTER LEVEL
GM = GAS METER
GRT = GRATE
HL = HOOD LEVEL
IL = INVERT LEVEL
INS = INSPECTION PIT
NS = NATURAL SURFACE
PAR = PARAPET
PAV = PAVING
PER = PERGOLA
RF = TOP OF ROOF
RR = ROOF RIDGE
SIP = SEWER INSPECTION PIT
SL = SILL LEVEL
SMH = SEWER MAN HOLE
STR = STAIRS
SVE = SEWER VENT
TFCE = TOP OF FENCE
TG = TOP OF GUTTER
TIL = TILE
TKB = TOP OF KERB
TPIT = TELSTRA PIT
TR = TREE
TW = TOP OF WALL
VC = VEHICLE CROSSING
WM = WATER METER
= ELECTRICITY OVERHEAD
= SEWER UNDERGROUND
TREE
SPREAD-DIAMETER-HEIGHT
M = MULTIPLE TRUNKS

(A) PROPOSED EASEMENT TO DRAIN WATER 6m TO 7.7m WIDE & VARIABLE WIDTH BY DP636528.(THIS IS NOTED ON TITLE IN NOTATIONS)

TITLE INDICATES THAT LOT 1 IN D.P.171852 IS SUBJECT TO:
- RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- AT663522 POSITIVE COVENANT (NOT INVESTIGATED)
- AT663523 RESTRICTION(S) ON THE USE OF LAND

1	FIRST ISSUE	7/08/2024

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: ASSUMED
MARKS ADOPTED: N/A

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 772
R.L. 4.254 (ORDER L2)
SOURCE: S.C.I.M.S. (7/02/2019)

BEFORE YOU DIG www.byda.com.au Zero Damage - Zero Harm

0 1 2 3 4 5
SCALE 1:100

CLIENT:
J.LARGE

LGA: NORTHERN BEACHES

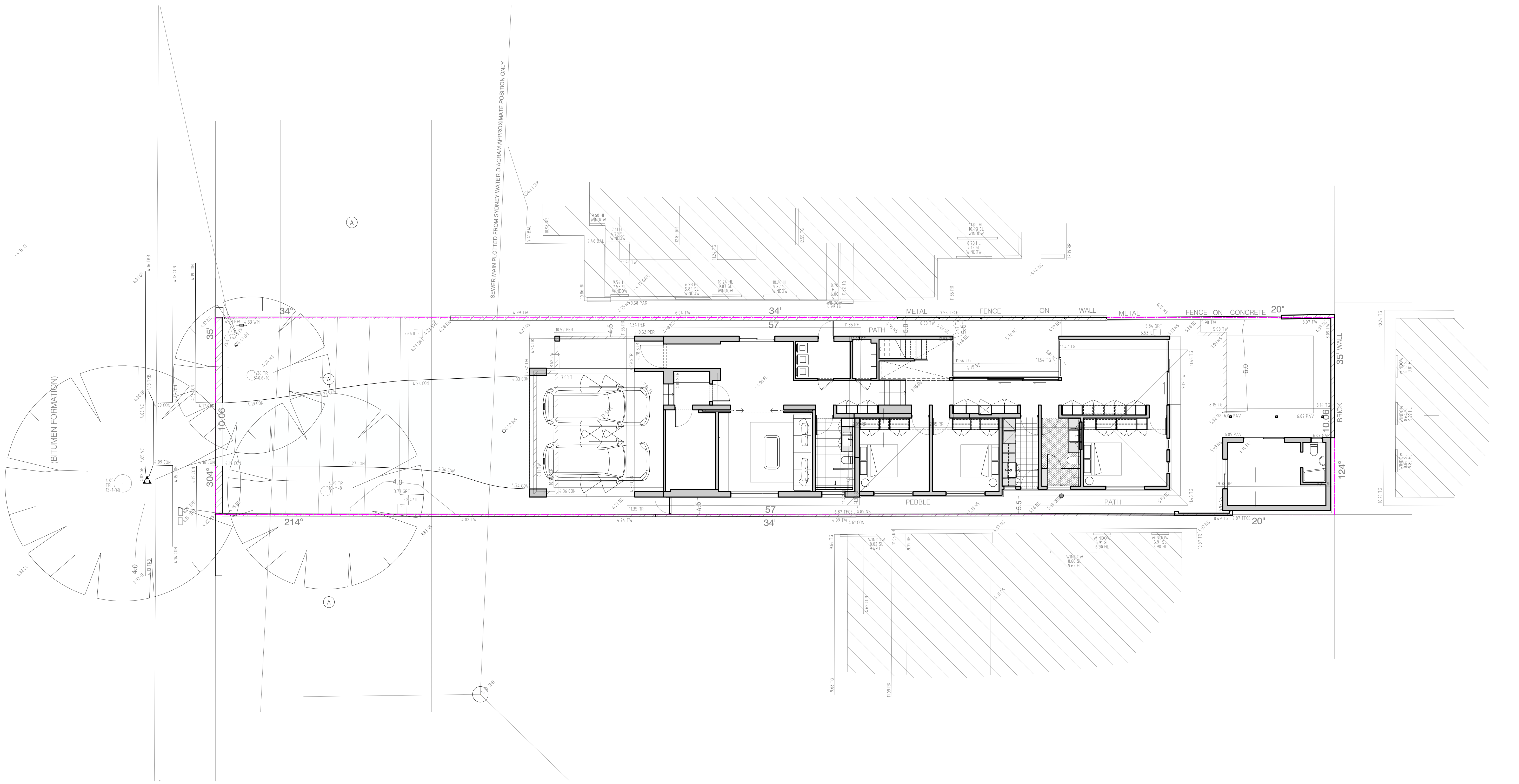
BOUNDARY IDENTIFICATION AND DETAIL & LEVEL SURVEY OVER LOT 1 IN DP171852 No.44 KOOLOORA AVENUE FRESHWATER, NSW, 2096

CMS SURVEYORS PTY LTD
ACN 096 240 201
PO Box 463 Dee Why, NSW, 2099
2/99A South Creek Road, Dee Why, NSW, 2099
☎ (02) 9971 4802
info@cmssurveyors.com.au
www.cmssurveyors.com.au

SURVEYED	DRAWN	CHECKED	APPROVED
HH	GP	HH	MR

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
18354E	1:100@A1	1/08/2024

DRAWING NAME **18354Edetail**
CAD FILE 18354Edetail 1.dwg
SHEET 1 OF 1
ISSUE 1



GROUND FLOOR PLAN

emma macindoe
interior design
0413069379 emmamacdesigns@gmail.com

EXTERNAL FENCING AND CARPORT

TITLE: EXISTING GROUND FLOOR PLAN

CLIENT: JOSH LARGE

ADDRESS: 44 KOOLOORA AVENUE, FRESHWATER NSW

GENERAL NOTES
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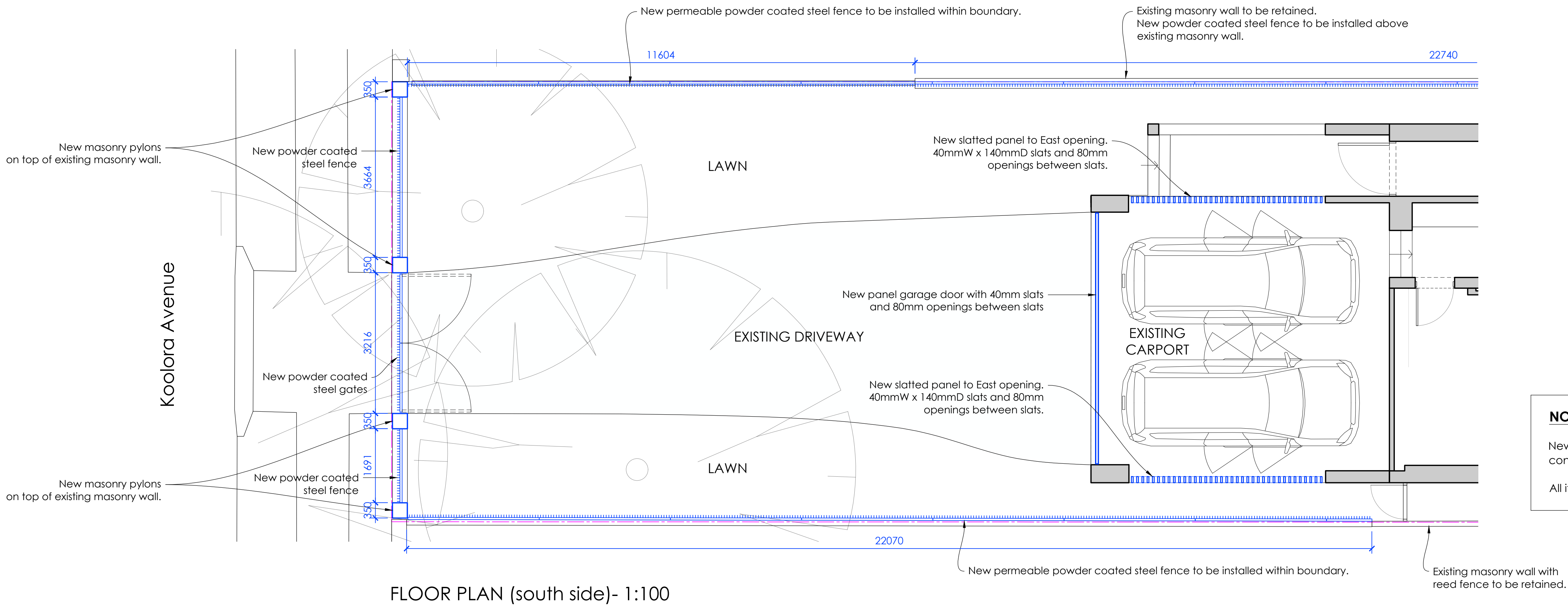
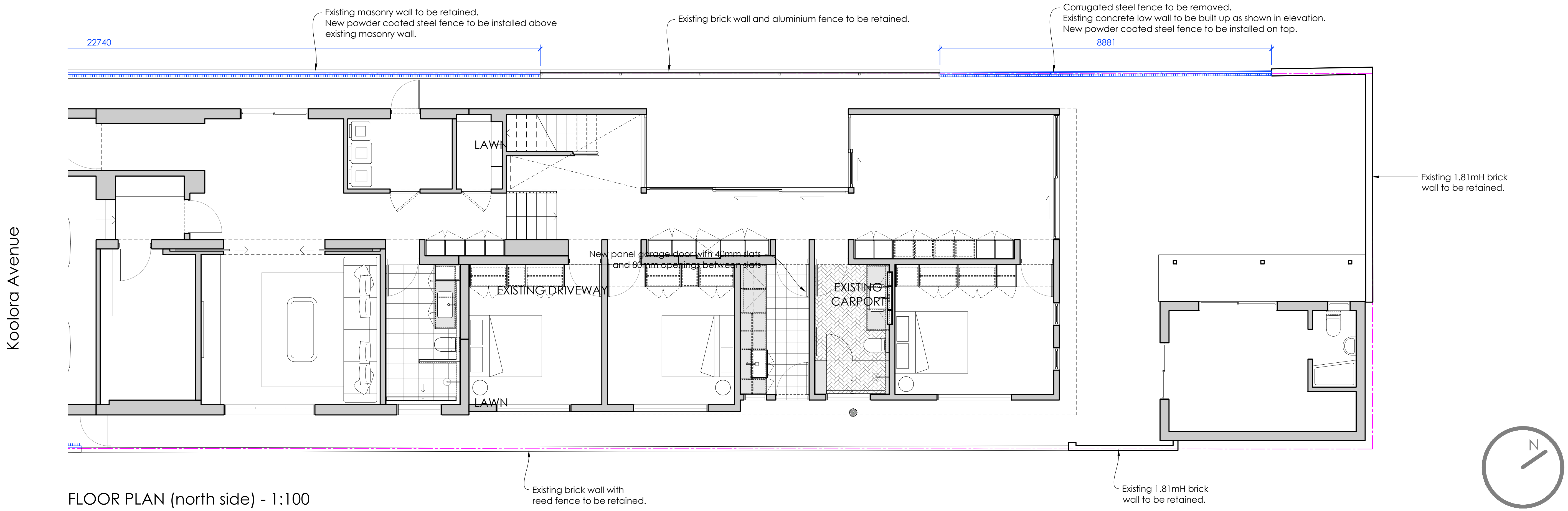
The designer to be immediately notified of any discrepancies.

DEVELOPMENT APPLICATION

DRAWING	ISSUE	DATE	SCALE	DRAWN BY
C03	1.2	03/10/2024	1:200 @ A3 1:100 @ A1	F.G.R.



FLOOR PLAN (south side)- 1:100



FLOOR PLAN (north side) - 1:100

NOTES

New slatted walls to carport must comply with flood control regulations to allow flood water through.

All items in **BLUE** indicate new fencing or screens.

emma macindoe
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0413069379 emmamacdesigns@gmail.com

EXTERNAL FENCING AND CARPORT		TITLE	PROPOSED FLOOR PLAN
CLIENT	JOSH LARGE	ADDRESS	44 KOOLOORA AVENUE, FRESHWATER NSW

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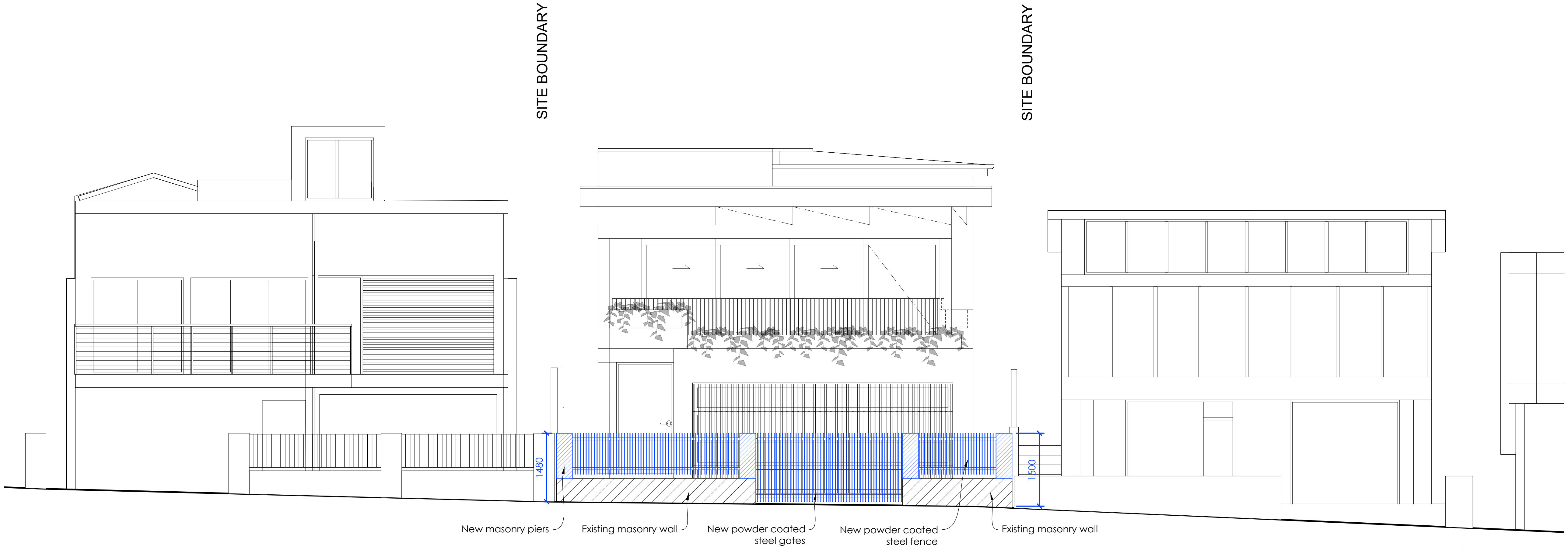
DEVELOPMENT APPLICATION

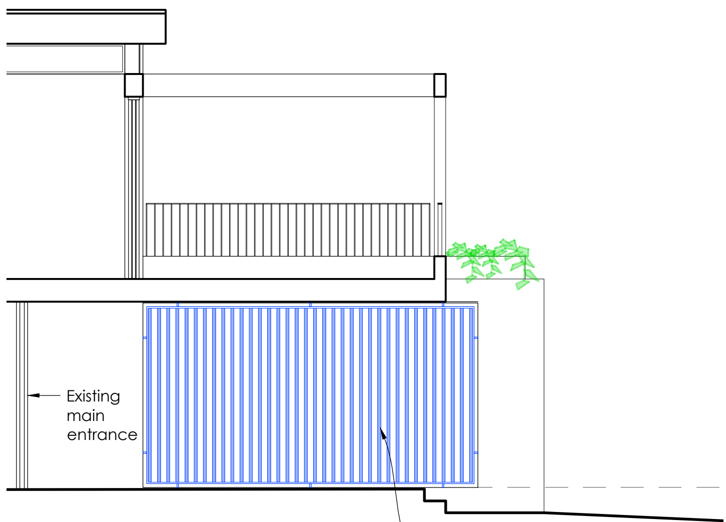
DRAWING	A01	ISSUE	1.2
		SCALE	1:200 @ A3 1:100 @ A1
		DATE	03/10/2024
		DRAWN BY	F.G.R.



NOTES

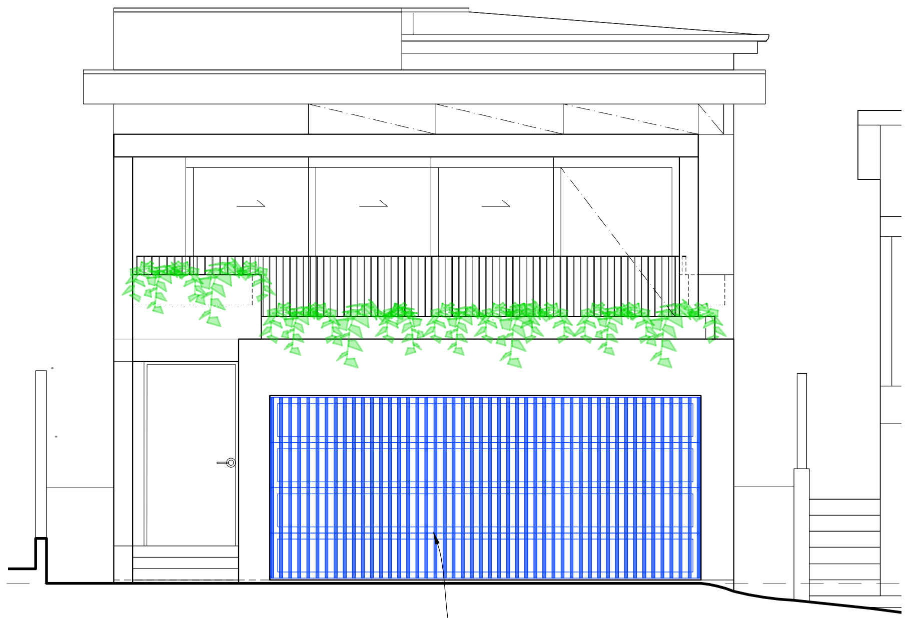
New slatted walls to carport must comply with flood control regulations to allow flood water through.

All items in **BLUE** indicate new fencing or screens to existing house.



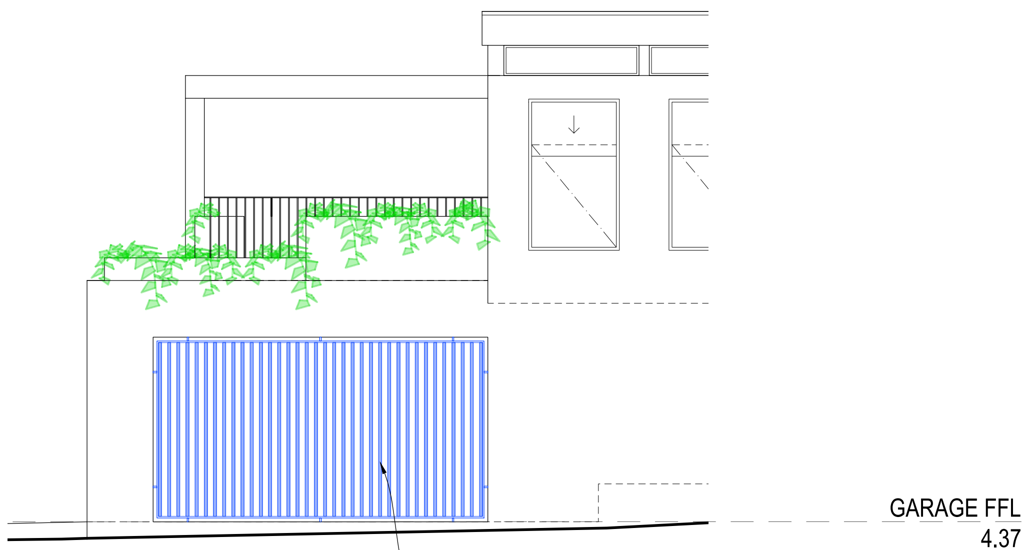
CARPORT WEST ELEVATION
1:100

New timber slatted panel to East opening. 40mmW x 140mmD slats and 80mm openings between slats.



CARPORT SOUTH ELEVATION
1:100

New timber slatted panel garage door with 40mm slats and 80mm openings between slats



CARPORT EAST ELEVATION
1:100

New timber slatted panel to West opening. 40mmW x 140mmD slats and 80mm openings between slats.

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EXTERNAL FENCING AND CARPORT		TITLE	CARPORT & FRONT ELEVATION
CLIENT	JOSH LARGE	ADDRESS	44 KOOLOORA AVENUE, FRESHWATER NSW

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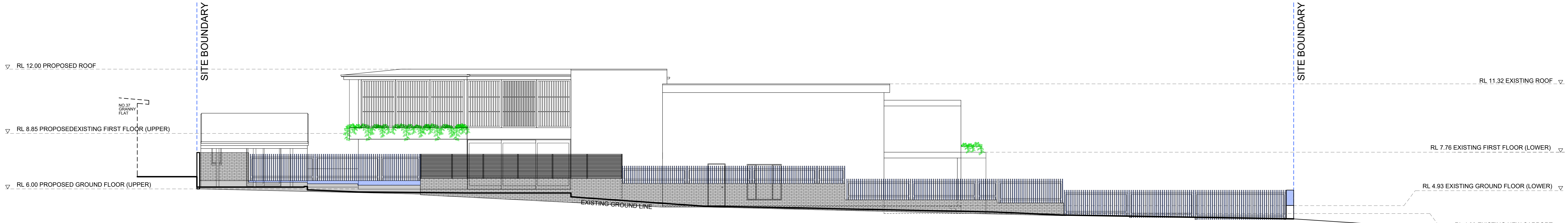
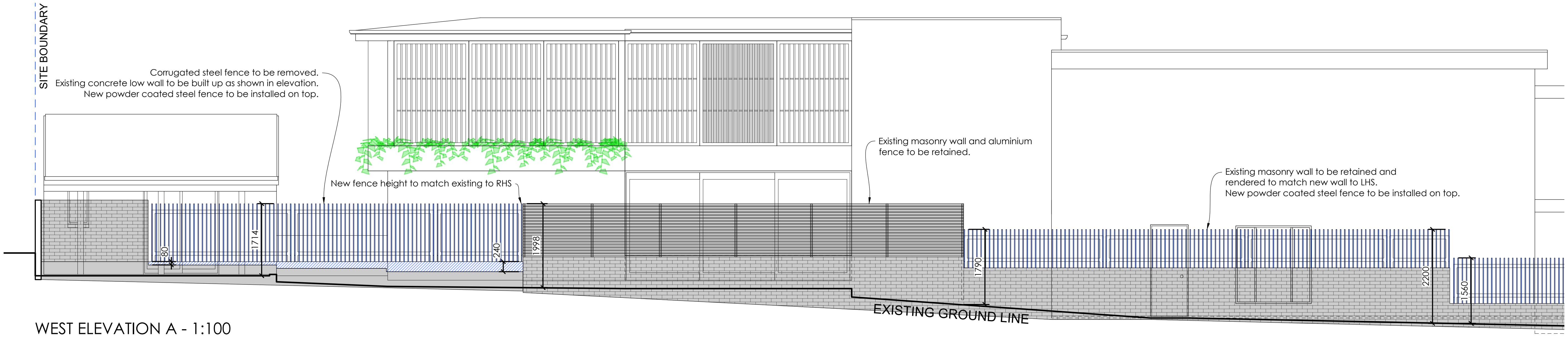
DEVELOPMENT APPLICATION

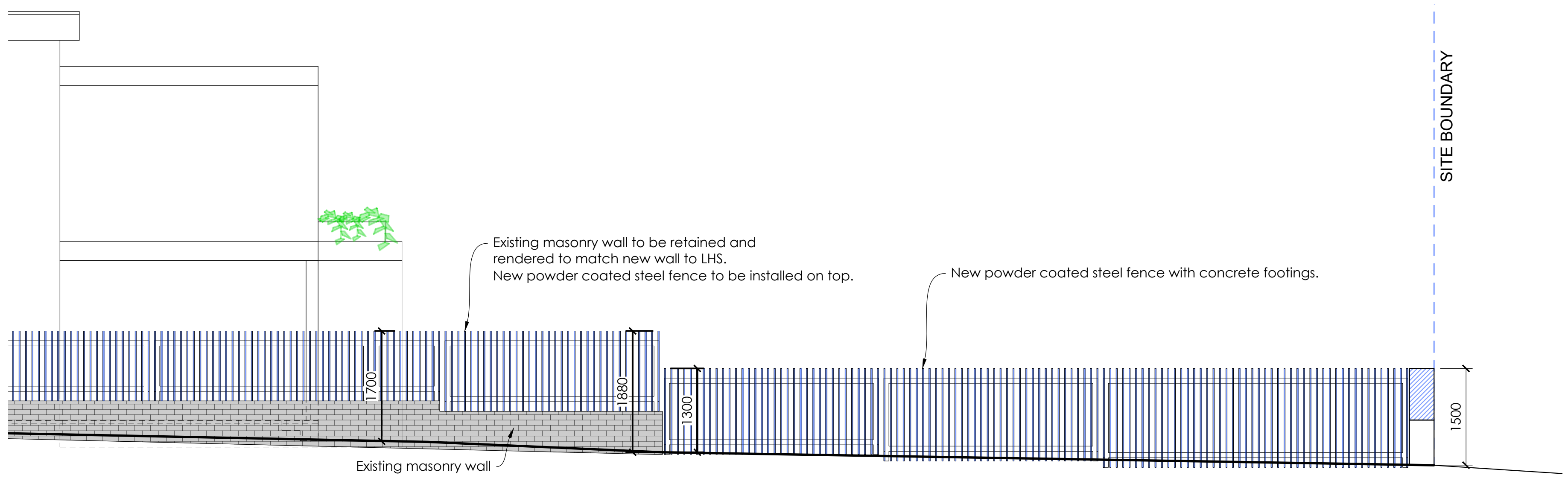
DRAWING	A02	ISSUE	1.2
SCALE	1:200 @ A3 1:100 @ A1	DATE	03/10/2024
DRAWN BY	F.G.R.		



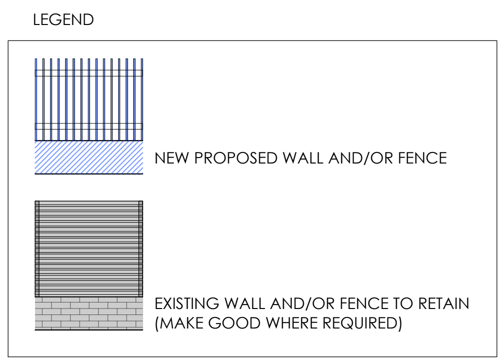
WEST ELEVATION - 1:200



WEST ELEVATION A - 1:100



WEST ELEVATION B - 1:100



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EXTERNAL FENCING AND CARPORT

TITLE	WEST ELEVATION
CLIENT	JOSH LARGE
ADDRESS	44 KOOLOORA AVENUE, FRESHWATER NSW

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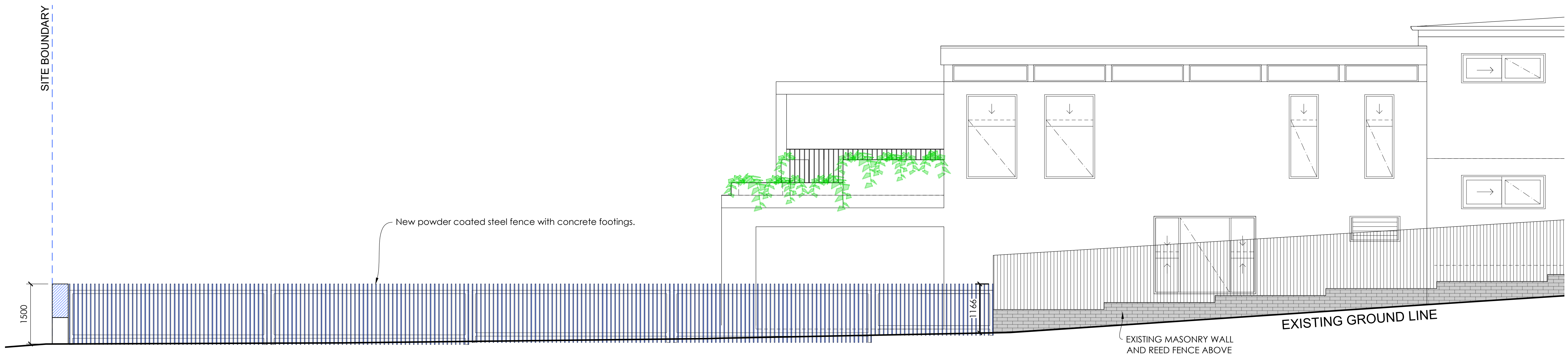
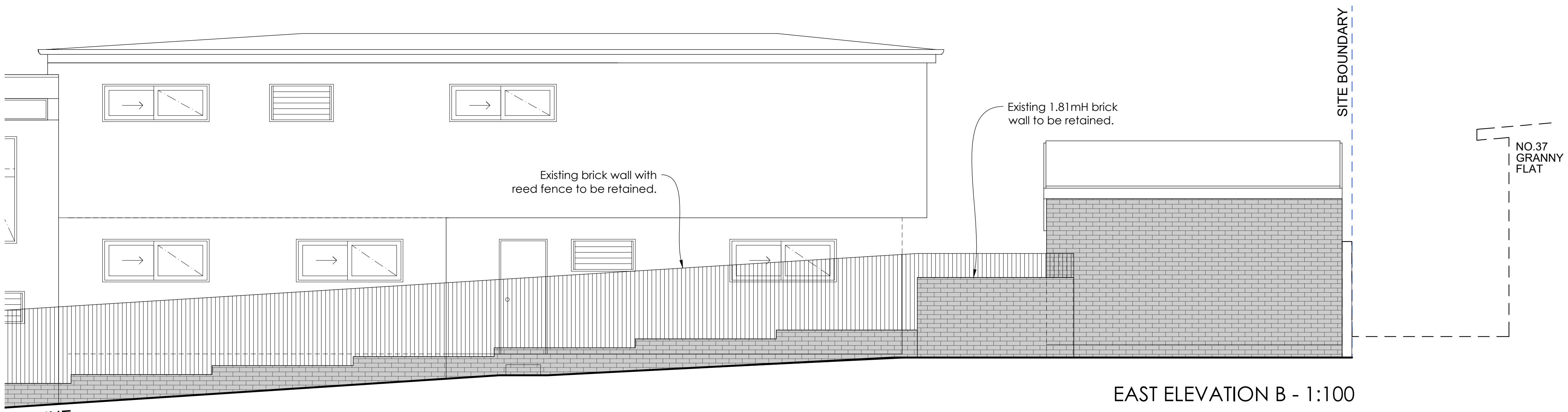
DEVELOPMENT APPLICATION

DRAWING	A03
ISSUE	1.2
DATE	03/10/2024
SCALE	1:200 @ A3 1:100 @ A1
DRAWN BY	F.G.R.

EAST ELEVATION - 1:200



EAST ELEVATION A - 1:100



EAST ELEVATION B - 1:100

LEGEND

NEW PROPOSED WALL AND/OR FENCE

EXISTING WALL AND/OR FENCE TO RETAIN
(MAKE GOOD WHERE REQUIRED)

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0413069379 emmamacdesigns@gmail.com

EXTERNAL FENCING AND CARPORT

TITLE: EAST ELEVATION

CLIENT: JOSH LARGE

ADDRESS: 44 KOOLOORA AVENUE, FRESHWATER NSW

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DEVELOPMENT APPLICATION

DRAWING	ISSUE	SCALE
A04	1.2	1:200 @ A3 1:100 @ A1
	DATE: 03/10/2024	DRAWN BY: F.G.R.

APPENDIX D

Pipeline Velocity Self-Cleaning Information

Pg 1: Brisbane City Council, "Stormwater Outlets in Parks and Waterways [Guidelines]", Version 2, 2003, Chapter 3, pg 5

Pg 2: Concrete Pipe Association of Australasia , "Hydraulics of Precast Concrete Conduits", Reprinted 2012, Pg 42

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS

- Consequences of adverse flooding impacts are investigated for full grate blockage.

A4.6 Detention Storage

Where the public space is also used for stormwater detention storage, the design intents and safety aspects satisfy the requirements of Council's Subdivision and Development Guidelines.

A4.7 Pipe Velocity

The velocity of stormwater flows in pipes or box sections is adequate to maintain self-cleaning, and the velocity prevents scouring and erosion of the conduit especially the invert.

- The desirable minimum design velocities are limited to 1.2 m/s for partial flow and 1.0 m/s for full flow conditions.
- The desirable maximum design velocities are limited to 4.7 m/s for partial flow and 4.0 m/s for full flow conditions (energy dissipation may be required).

A4.8 Outlet Velocity

The average outlet velocity (V_o) for the nominated design discharge (Q_o) is determined. Typically Q_o also corresponds to the design storm event for the pipe. However, for reasons of cost or practicality, it may be necessary to design scour protection for a lower discharge event. The permissible maximum flow velocities (m/s) for the different types of exposed soil immediately downstream of the outlet are given below. These figures assume slope gradient <10%, peak velocities maintained for period less than 6 hours, and good (ie 80%) ground cover. Soil erodibility factor, $K \leq 0.019$ corresponds to low erodibility. $0.020 \leq K \leq 0.045$ and $K>0.045$ correspond to moderate and high erodibilities respectively.

	Permissible maximum flow velocity (m/s)		
	Soil erodibility (K) - Low	Moderate	High
Bare soil	0.7	0.5	0.3
Tussock grasses	1.3	0.9	0.5
Other improved perennials	1.6	1.3	0.9
Couch, carpet & other sward-forming grass	2.0	1.8	1.4
Kikuyu grass	2.5	2.2	1.9

Visual intrusion of this stormwater outlet is minimised

4. STORMWATER DRAINAGE

4.1 INTRODUCTION

4.1.1 HEAD LOSSES

The design flow is established as outlined in Section 2, and it is customary in the hydraulic design to assume the pipes flowing full.

The design must take into consideration:

(i) resistance to flow in conduits

(ii) losses at inlets and junction pits, bends and other deviations from straight lines of uniform cross section and flow.

Investigations have shown that the latter source of losses can be of greater significance than the energy losses on uniform straight runs, particularly on short lengths of pipeline [4.1, 4.2].

4.1.2 MINIMUM AND MAXIMUM VELOCITIES

Much of the debris entering stormwater drains is heavier than water, and to ensure some measure of self cleansing a minimum velocity of about 0.5 to 1 m/s at full and half full flow or a boundary shear of 1.5 N/m^2 is recommended [4.1, 4.3]. (Refer also to Section 1.4 and 3.4.4.)

Maximum velocities are discussed in Section 3.4.3. Generally velocities should be kept below 8 m/s if possible.

4.1.3 TOPOGRAPHY

Topographic conditions are significant for the design. In very flat country of minimal fall, layout and details minimising head losses are important in order to avoid excessively deep drains.

In hilly country with steep grades design must consider the possibility of erosion.

4.2 RESISTANCE TO FLOW IN CONDUITS

4.2.1 STRAIGHT DRAINS

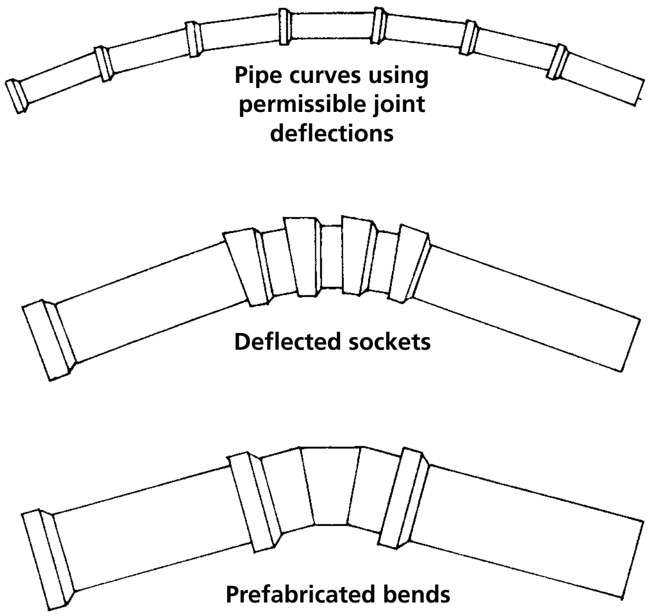
For straight, precast concrete pipes or box culverts flowing full with clean water a k value of 0.15 would be appropriate when using the Colebrook-White equation. Having regard to the effect of the debris a value of 0.6 seems reasonable (Figure 1.10) but it must be realised that no tests under these conditions are known to exist.

Figures 1.8 – 1.11 can be used for box culverts (full or part-full flowing) by substituting 4R for diameter D, where R is the hydraulic radius for the cross section.

4.2.2 CURVED DRAINS

4.2.2.1 PIPES

It is common for drainage pipelines to be laid straight, but there are circumstances when curves or bends are desirable. Concrete pipes can be laid satisfactorily with deflections at the joints to construct curved pipelines with curve radii of 100–300 pipe diameters. Joint deflections range from 0.6 to 3.0° dependent on diameter. (See Figure 4.1.)



PIPE CURVES AND BENDS
Figure 4.1

Splayed pipes and bends can be produced to provide curve radii down to about 5 pipe diameters.

Energy losses in curves formed by joint deflections are only slightly higher than those in straight lines and can be treated as such or an extra allowance of

$$0.1\,\frac{v^2}{2g}$$

can be added for curve deflections over 20°.

Lobster-back bends show losses with k_b –values ranging up to 1.3 for 90° single splay bends. This and other examples are shown in Table 1.2.

4.2.2.2 BOX CULVERTS

Most box culverts are made with simple butt joints without any claims to watertightness. The joint itself, consequently, offers little scope for joint deflection.