HJ CONSULT

Integrated Water Management Report - SSD-88113706

46-52 Nicholson Street and 59-67 Christie Street, St Leonards NSW 2065

DOCUMENT CONTROL DATA

TITLE	Integrated Water Management Report – 46-52 Nicholson Street and 59-67 Christie Street, St Leonards NSW 2065
AUTHOR	GJ
REVIEWER	SH
REFERENCE	24-1018
CLIENT	CORONATION

DOCUMENT REVISION TABLE

REVISION	DESCRIPTION	DATE	AUTHORISED
A	Issued For Review	10-09-25	GJ
B	Issued For Approval	11-09-25	GJ
C	Issued For Approval	17-09-25	GJ

Contents

1. Executive Summary

Haycock James Consulting Pty Ltd has been engaged by Coronation to prepare an Integrated Water Management Plan for the Residential Development (Build to Rent) at 46-52 Nicholson Street and 59-67 Christie Street, St Leonards.

This report will support the delivery of the site as it will identify opportunities, constraints, and risks related to civil design. The scope of this report summarises the existing and proposed stormwater drainage design as well as the design approach, key assumptions, relevant references, and standards that will be applied to the development of concept civil design documentation for the proposed development. The report is to be read in conjunction with the civil engineering plans within Appendix A.

This Integrated Water Management Plan Report accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act), in support of a State Significant Development Application (SSDA) for the construction of a residential development, reference SSD-88113706.

This report addresses the Secretary's Environmental Assessment Requirements (SEARs) issued for the project, notably:

Table 1 – SEARS Declaration

Declaration		
Name	Glen James	
Qualifications	Bachelor Engineering Civil, NER, CPEng	
	The undersigned declares that this [report name] has been prepared in response to the following SEARs requirements issued for the Project on 31/07/2025 for SSD-88113706:	
SEARs item no.	**SEARs Requirement**	**Relevant Section of this Report**
11. Water Management	• Detail the proposed drainage design and servicing infrastructure to be incorporated as part of the development (stormwater and wastewater) • Demonstrate how the development complies with council's drainage requirements and identify proposed stormwater treatment and water quality management measures to minimise adverse environmental impacts	Section 4.1 Stormwater Management Strategy Section 4.1.2 On Site Detention Section 4 Water Sensitive Urban Design Section 4.1 Rainwater Tanks
Signed		
Dated	10/09/2025	

2. Introduction

Haycock James Consulting Pty Ltd has been commissioned by Coronation to prepare a Stormwater Management Report for the proposed redevelopment of 46-52 Nicholson Street and 59-67 Christie Street, St Leonards. The total site area is approximately 0.23 ha and it is proposed to construct a multi-level residential development and associated works.

This report is to ensure that the proposed development can meet the Lane Cove Council Development Control Plan 2010 and Part O Stormwater Management.

3. Existing Site

The subject site is located approximately 5km north of the Sydney Central Business District and currently consists of multiple commercial office buildings on multiple lots (which will be consolidated as part of this application). The site is bounded by Nicholson Street (to the north and east), a commercial building (to the south) and developed Christie Street (to the west), refer to the site survey contained under Appendix A for details.

3.1. Existing Conditions

Figure 1: Location Plan (Source: Nearmap)

The existing site consists of (refer to Figure 1 and 2 for details):

- Vacant land covered in concrete hardstand
- Stormwater pit and pipe servicing the Nicholson Street sag point draining via a stormwater culvert to Christie Street (this is being diverted as part of the Early Works Development Application)
- Pavement hardstand
- Various commercial buildings
- Vehicular crossing in Christie Street
- Vehicular crossing in Nicholson Street

3.2. Topography

The topography is undulating and generally falls from the eastern to the western boundary, with the high-point being the south-east corner of the site (RL 78.48mAHD) and the low-point of the site being the west-middle (RL 71.43 mAHD) refer to Appendix A for details.

3.3. Surface Water and Drainage Network

Based upon the existing site survey (Appendix A) prepared by 'SDG', the existing overland flow path is generally from the eastern boundary to the western boundary of the site, contained within Easement A, refer to Appendix A for details.

The existing Council underground drainage network collects surface water via kerb inlet pits from Nicholson Street and pipes it to Christie Street. Refer to Figure 2 for underground drainage flow direction (blue arrows) and surface water grading direction (red arrows).

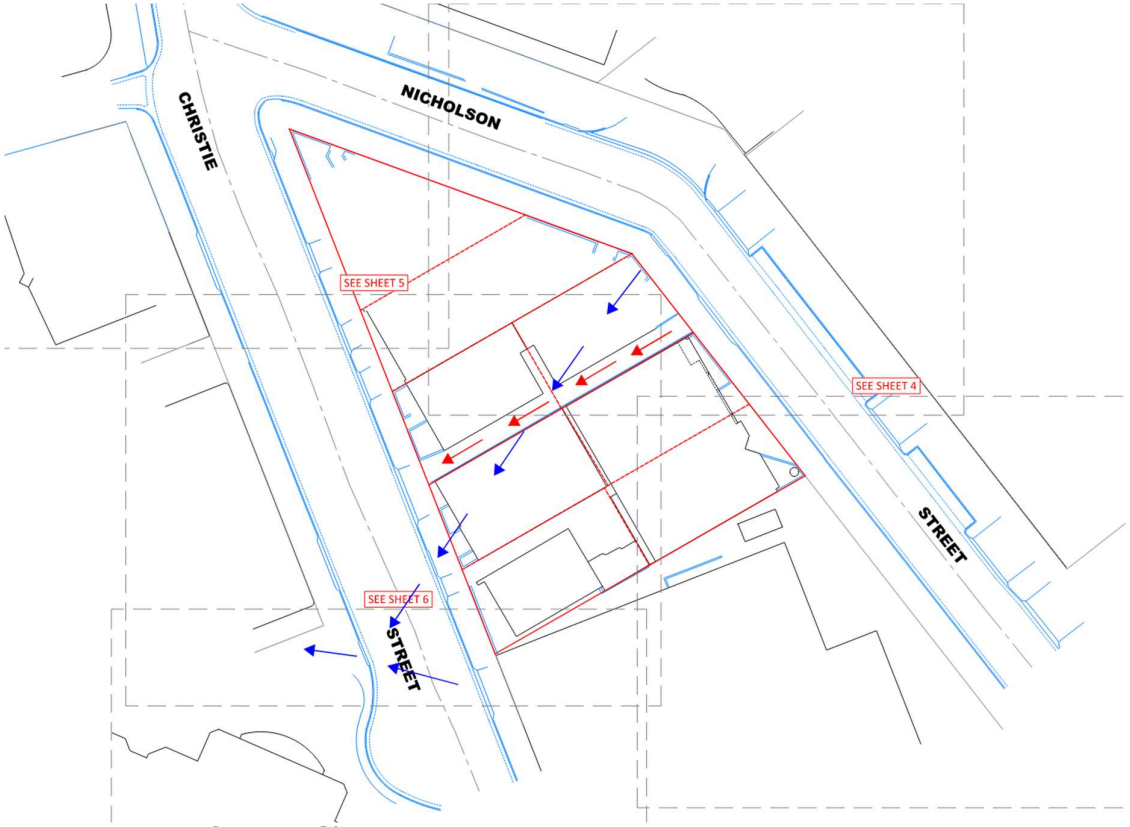

Figure 2: Existing Drainage Plan

3.4. Impervious Area Versus Pervious Area

Based upon the existing site survey (Appendix A) prepared by SDG dated 1st July 2021, the existing site consists of 94.81% impervious area (orange) and 5.19% pervious area (green) for the 0.23 ha site, refer to Figure 3 for details.

Figure 3: Impervious area versus Pervious area

3.5. Flooding

Refer to Appendix C Flood Report by Mott Macdonald for information regarding the flooding constraints on the development.

4. Proposed Development

The proposed development seeks approval for the rezoning of the site and construction of a BTR development. The SSDA specifically involves the following works:

- A single 36-storey tower including a 4-storey podium comprising approximately 500 units,
- Three levels of basement parking,
- BTR amenity provided in lower ground, upper ground, podium, tower and rooftop levels,
- Vehicular access from Christie Street and loading access from Nicholson Street,
- Site landscaping and public domain improvements, and
- Utility and services augmentation as required.

To accommodate the proposed SSDA, a concurrent rezoning is sought to increase the site's maximum building height and floor space ratio.

Separate development approvals have been sought with Lane Cove Council. These relate to demolition of existing structures, tree removal, excavation, shoring wall and capping beam.

The site has an existing concept State Significant Development Approval (SSD-56527976). The proposed development does not rely on this approval and will be surrendered upon consent being granted.

Figure 4: Proposed Upper Ground Floor Plan (Source - Cox)

4.1. Stormwater Management Strategy

This Proposed Stormwater Management Strategy has been designed to generally follow the existing natural features of the site and to maintain the existing overland flow principle.

All proposed stormwater drainage from the development will be designed in accordance with Lane Cove Council's Part O Stormwater Management 2010.

The proposed stormwater strategy is to direct a large portion of the roof water into the 50 kL rainwater tank, with overflow directed to the proposed in-line OSD tank located within the lower ground floor. The OSD outlet will connect into the site's Legal Point of Discharge within Christie Street, refer to section 4.1.4 for details.

Refer to the Civil Drawings in Appendix B for layout and details for the proposed stormwater network across the site.

Stormwater generated within the proposed site will be treated to Sydney Waters water quality treatment targets using proprietary treatment devices and green infrastructure. This is discussed further in Section 5 'Water Sensitive Urban Design of this report.

4.1.1. Pre. and Post Development Flows

As per the Lane Cove Council's Part O Stormwater Management 2010, the post-development stormwater flows are not to exceed the rate of runoff for pre-development flows for the storms nominated in Table 1.

An ILSAX (DRAINS) model has been prepared to accurately analyse the proposed stormwater system connection to the existing stormwater system contained within Christies Street.

Table 1 - Site Discharges

Pre. VS Post. Site Stormwater Discharge		
AEP	**PRE Development Flow (m^3/s)**	**POST Development Flow (m^3/s)**
20%	0.087	0.021
5%	0.120	0.028
1%	0.162	0.035

As per Table 1 above, analysis of the design storm event in DRAINS software indicates that the post development peak flows are less than the pre-development flows for the storms nominated.

In accordance with Council requirements, the 1% AEP site discharge is compliant with the 140 L/s/ha requirement with the site discharge being 32 L/s in the 1% AEP post-development, and the PSD being 37 L/s.

4.1.2. On Site Detetention

As per the Lane Cove Council's Part O Stormwater Management 2010., the post-development stormwater flows are not to exceed the rate of runoff for pre-development flows for all storms up to and including the 1% AEP.

Table 2 - OSD Tank Details

OSD Tank Details				
Contributing Catchment to Tank (ha)	**OSD Volume (Min.) (m3)**	**Low-Flow Outlet**	**Emergency Weir (m)**	**Emergency Outlet**
0.204	100	75mm Orifice Plate	75.73m AHD	Overflow Weir

In accordance with Council requirements, the SSR is compliant with the $0.025m^3/m^2$ requirement with the volume

of detention provided within the OSD tank being 100m^3.

4.1.3. Proposed Stormwater Network

Refer to Figure 5 below for the proposed stormwater network layout and Figure 6 for the proposed 1% AEP results.

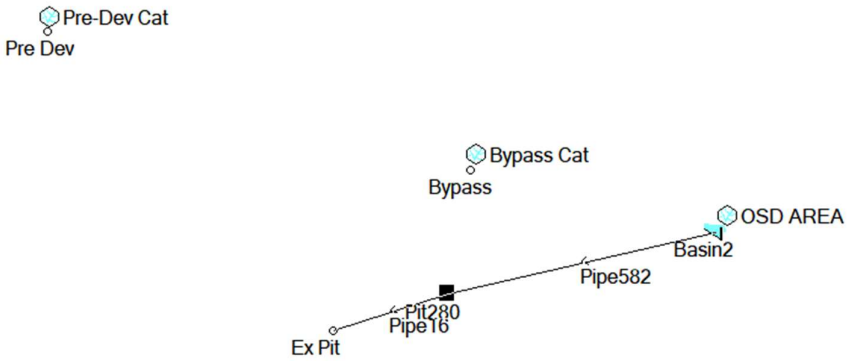

Figure 5: Proposed Stormwater Network and Catchment Areas

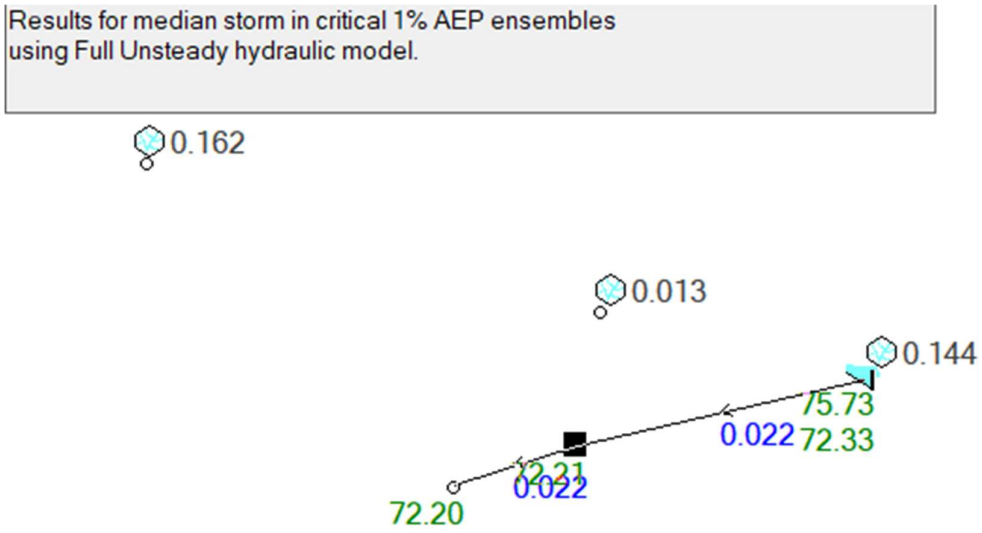

Figure 6: Proposed 1% AEP Stormwater Discharge

4.1.4. Legal Point of Discharge

The proposed Legal Point of Discharge for the subject site will be the existing underground stormwater system within Christie Street operated by Lane Cove Council. This system was augmented as part of the Early Works DA package for the subject site.

The existing subsurface drainage network on site will be augmented by the proposed internal drainage system (sizing to be confirmed during detailed design) to convey the 5%/1% AEP storm events to the Legal Point of Discharge via the proposed OSD tank, refer to the Civil drawings within Appendix B for details.

4.1.5. Subject Site Overland Flow

Overland flows generated in the case of stormwater system failure will be directed to Christie Street via stormwater pit surcharge located along the western boundary of the site.

5. Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) encompasses all aspects of urban water cycle management, including water supply, wastewater and stormwater management. WSUD is intended to minimise the impacts of development upon the water cycle and to achieve more sustainable forms of urban development.

Lane Cove Council does not currently have a WSUD pollutant reduction target, however as per the concept DA, Sydney Water's pollutant reduction targets have been adopted for the development. As such, Proprietary treatment devices will treat the water to satisfy the water quality requirements. These devices have been modelled as Ocean Protect Stormfilters.

By utilising these treatment devices, stormwater draining from the development will meet the required water quality treatment rates before discharge into the existing stormwater network within Christie Street.

A summary of the required number and position of the treatment devices is indicated within the stormwater drainage plans within Appendix B. Refer to Figure 7 for a summary of the MUSIC model undertaken to meet to the Sydney Water treatment rates.

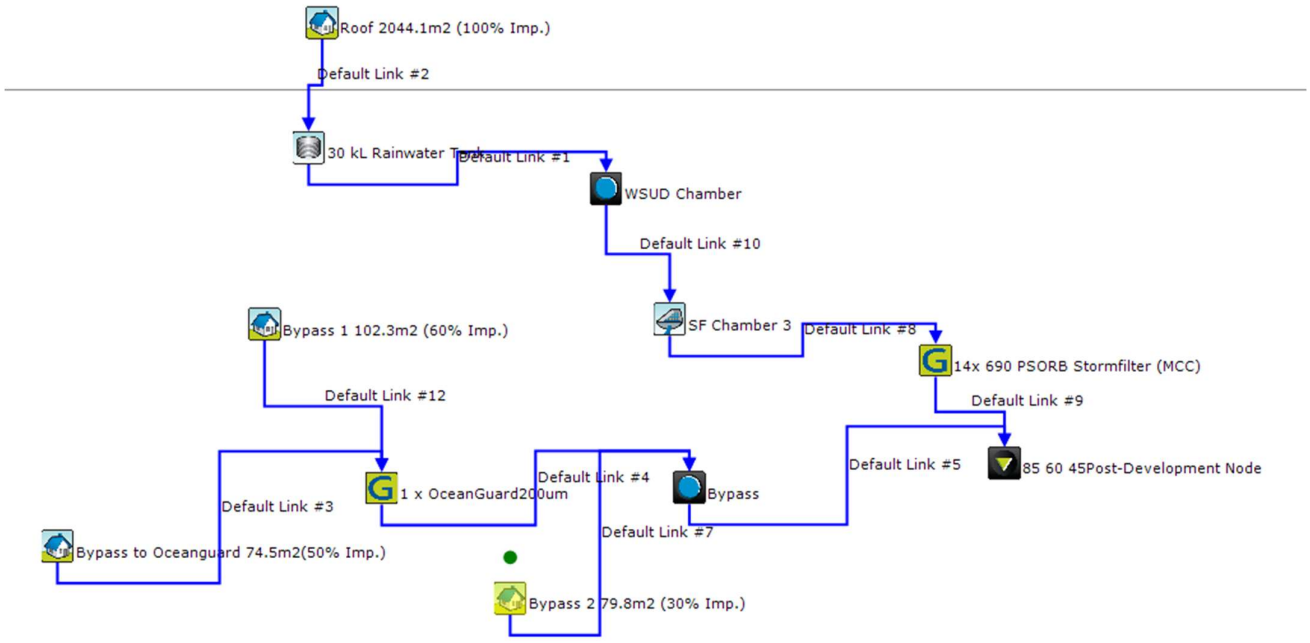

Figure 7: MUSIC Model Setup

5.1. Rainwater Tanks

It is proposed to utilise a rainwater tank on site to minimise the potable water demand for the development. It is proposed to connect a percentage of the roof to the rainwater tank located adjacent the OSD tank on the Lower Ground Floor. Refer to MUSIC catchment plan within Appendix B for details.

The proposed 50 kL rainwater tank will service the following:

- Irrigation for landscaping inside the property boundary (0.4 kL/year/m^2)

5.2. WSUD Modelling – MUSIC Model

The MUSIC Model for Urban Stormwater Improvement Conceptualisation (MUSIC X) was used to evaluate pollutants loads from the site.

A conceptual view of the MUSIC model used in this report can be seen in Figure 7 above.

5.2.1. MUSIC Parameters

MUSIC model source node parameters for this site included rainfall-runoff, base-flow concentration and storm-flow concentration parameters. The parameters used for the catchment area(s) can be seen in Table 2 and 3 below

Table 2 – Rainfall-Runoff Parameters Urban Mixed/Roof Catchment Area

Parameter	Unit	Figure
Rainfall Threshold	mm/day	0.30
Soil Storage Capacity	mm	120.00
Initial Storage	% of Capacity	30.00
Field Capacity	mm	80.00
Infiltration Capacity Coefficient	a	200
Infiltration Capacity Coefficient	b	1.00
Initial Depth (Ground Water)	mm	10.00
Daily Recharge Rate	%	25.00
Daily Baseflow Rate	%	5.00
Daily Seepage Rate	%	0.00

Table 3 – Stormwater Quality Parameters

Land Use	Storm Flow						Base Flow					
	TSS		TP		TN		TSS		TP		TN	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
(All values expressed as log_{10}mg/l)												
Urban Mixed	2.15	0.32	-0.60	0.25	0.30	0.19	1.20	0.17	-0.85	0.19	0.11	0.12
Roof	1.30	0.32	-0.89	0.25	0.30	0.19	-	-	-	-	-	-

5.2.2. MUSIC Results

MUSIC modelling results presented as mean annual loads at the receiving node indicate that adopted target reductions are achieved, as shown in Table 4.

Table 4 - Pollutant Reduction

Pollutant Reductions				
Pollutant	**Sources (Kg/yr)**	**Residual Load (Kg/yr)**	**Reduction (%)**	**Target Reduction (%)**
Flow (ML/year)	2.686	2.395	10.81	N/A
Total Suspended Solids	90.66	12.87	85.80	80
Total Phosphorus	0.4318	0.0883	79.55	60
Total Nitrogen	5.914	2.516	57.46	45
Gross Pollutants	66.01	0.3836	99.42	90

6. Stormwater System Maintenance

6.1. Ocean Protect Maintenance

The maintenance frequency of the Ocean Protect Stormfilter is dependent upon several factors:

- Catchment area
- Surrounding land use
- Vegetation type
- Traffic loading
- Rainfall patterns

It is recommenced that during the first year of operation the units should be monitored monthly, with maintenance as required.

Additional monitoring should be conducted following moderate to extreme rainfall events when preceding months have had little to no rainfall. This monitoring is considered necessary to accommodate for higher volumes of runoff generated during major rainfall events. It is anticipated greater accumulation of surface contamination during low rainfall periods and to ensure that the units have not been damaged due to high pipe velocities.

Upon completion of the WSUD maintenance the monitoring/maintenance checklist is to be completed and kept for records, as per Ocean Protect manufacturers guidelines.

Table 5 – Stormfilters Maintenance

Unit	Inspection/Minor Maintenance (Months)	Major Maintenance (Times/Year)
Stormfilters	6 (and after major storms)	12 (expect in case of a spill)

6.2. Stormwater Network Maintenance

6.2.1. Inspection Frequency and Procedure

The pit and pipe network shall be inspected at intervals after all major storm event and not exceeding twelve (12) months. Inspections should be undertaken by suitably qualified persons with an understanding and experience in the operation of similar systems with the requisite qualifications.
Inspections should be undertaken as a minimum after every rainfall events

- Check that all grates, covers and lintels are in sound condition and are undamaged. Any signs of deterioration should be noted for repairs to be undertaken
- Check all pits/forebays for accumulation of sediment, debris or litter
- If pits are found to be affected by sediment, debris or litter, an assessment should be made as to whether the upstream and downstream pipes require cleaning
- Inspect outlet headwall and ensure it is in a sound, undamaged condition
- Inspect upflow pits and ensure it is in a sound, undamaged condition
- Check the area immediately surrounding the outlet headwall for signs of scour and/or sediment collection. If evidence of scour is found, rock lining or similar scour protection may need to be installed or replaced. The accumulation of sediment at the headwall may be an indication of system problems further upstream and additional investigations should be undertaken.

6.2.2. Maintenance Frequency and Procedure

Maintenance of the pit and pipe system should be undertaken as required following the above inspections. Typical maintenance procedures that would need to be undertaken include

- Remove sediment, debris and litter from pits including lintels as required
- Remove sediment or other foreign material from pipes.

6.2.3. Removal of Sediment, Debris or Litter from Pits

Should sediment, debris or litter be detected within the stormwater pits, it is important that the foreign material be removed to ensure proper operation of the system.

- Do not undertake maintenance works during periods of rain or when rain is likely
- Set up warning signs and/or tape around the works to inform the public-by that maintenance works are in progress and to stay clear. Traffic controls/temporary fencing are to be installed in accordance with AS1742 and Council requirements as required
- Open all grates and covers to ensure access is gained to all chambers of the pit
- Remove any large debris or litter manually and dispose of off-site
- If possible, remove the accumulated sediment manually and dispose of off-site
- If manual sediment removal is not possible, sediment will need to be removed by a vacuum truck and disposed of off-site
- Following removal of the foreign material, the condition of the pit internally and any weir or diversion structure should be noted. Any damaged structure should be repaired
- At the completion of the work the access grates and covers should be closed ensuring that all locking devices are securely in place
- Remove all warning signage on completion of the works.

6.2.4. Removal of Sediment, Debris or Litter from Pipes

Should sediment, debris or litter be detected within the stormwater pipes, it is important that the foreign material be removed to ensure proper operation of the system.

- Do not undertake maintenance works during periods of rain or when rain is likely
- Set up warning signs and/or tape around the works to inform the public-by that maintenance works are in progress and to stay clear. Traffic controls/temporary fencing are to be installed in accordance with AS1742 and Council requirements as required
- The removal of any foreign material is to be undertaken in stages with each stage clearing only a single reach of pipe
- Open all grates and covers to ensure clear access is gained to upstream and downstream pipes
- Using a timber board or similar means, block off the outlet pipe from the downstream pit to prevent sediment from discharging further down the system
- At the upstream pit, use pressurised water or a similar method to flush the accumulated material to the downstream pit. Note that non-potable water may be suitable for this purpose
- Using a vacuum truck or similar method to collect the flushing water and associated foreign material from the downstream pit
- Repeat the above steps for downstream reaches of the pipe network
- At the completion of the work the access grates and covers should be closed ensuring that all locking devices are securely in place
- Remove all warning signage on completion of the works.

Other non-routine maintenance operations that may need to be undertaken include

- Repair or replacement of pit grates and covers
- Repair of damaged weirs or other diversion structures
- Rectification or addition of scour protection at the outlet headwalls or up-flow pits

6.2.5. Reporting Requirements

These reports should be kept on file as a record of when inspections were undertaken and what conditions were found on site.

Table 5 – Stormwater Network Maintenance

Inspected Item	Y	N	Action/Comments
Pit grates and lids in sound, undamaged condition? Pits free from accumulated sediment, debris or litter? Pipes unaffected by sediment accumulation or other foreign materials? Weirs and other diversion devices free from damage/debris? Headwall in sound, undamaged condition? Area around headwall free from sediment and/or scour?			
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7. Conclusion

This report identifies an overall stormwater management strategy for the proposed development of 46-52 Nicholson Street and 59-67 Christie Street, St Leonards. This strategy is preliminary only and is subject to detailed design and feedback from the relevant authorities.

Stormwater is to be managed on site by implementation of the following measures:

- On Site Detention (OSD) Tank
- Water Sensitive Urban Design (WSUD) measures
- Rainwater Tank

Appendix A – Survey Drawings

A1

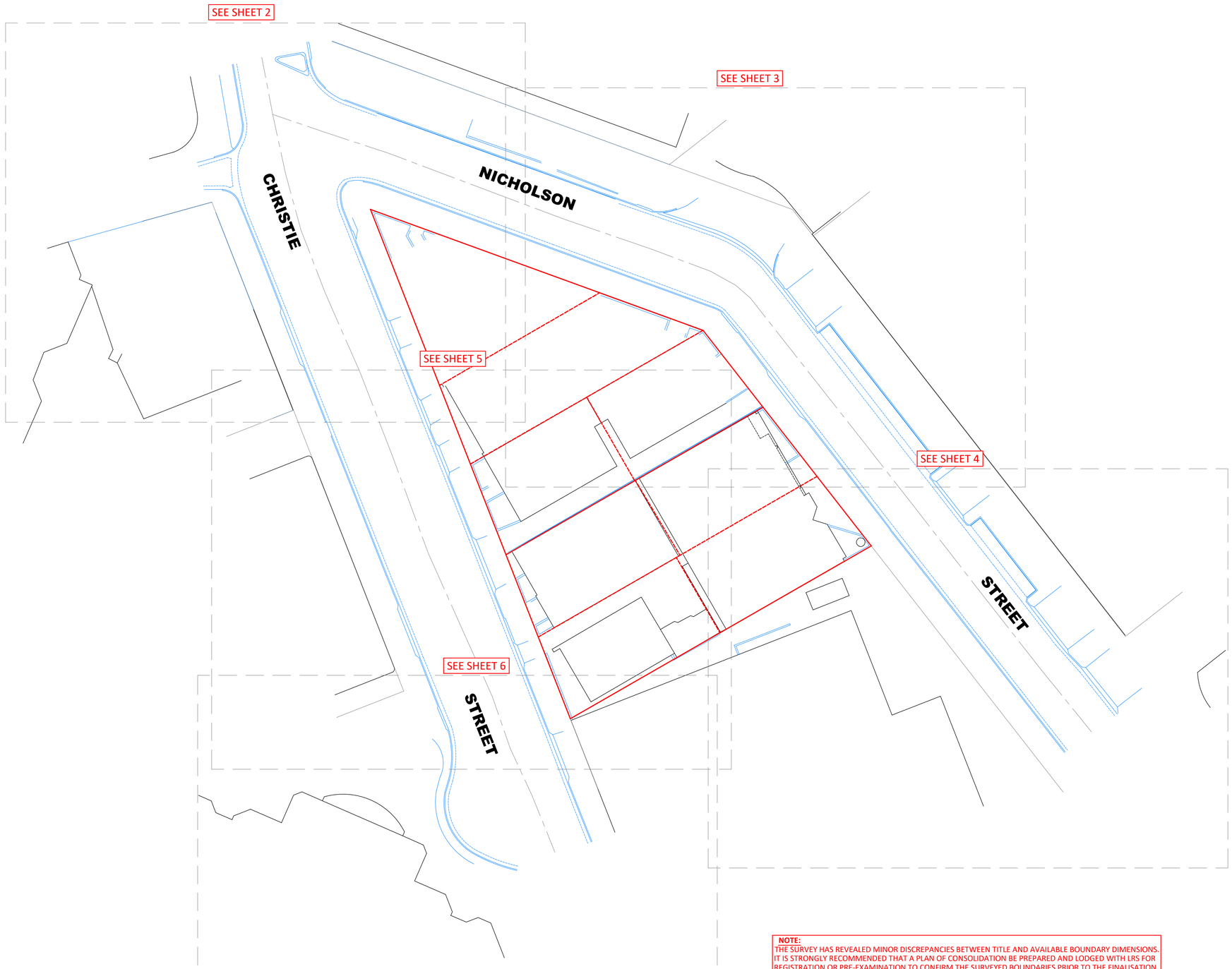
MGA

TN

BEARINGS SHOWN ARE ON MGA ORIENTATION

APPROX 1°00'

Schedule of Easements & Restrictions	
No	Description
(A)	RIGHT OF CARRIAGEWAY 3.05 WIDE (DP528060)
(B)	EASEMENT TO PERMIT ENCHROACHING STRUCTURE 0.04 WIDE (SP54127)



NOTE:
THE SURVEY HAS REVEALED MINOR DISCREPANCIES BETWEEN TITLE AND AVAILABLE BOUNDARY DIMENSIONS. IT IS STRONGLY RECOMMENDED THAT A PLAN OF CONSOLIDATION BE PREPARED AND LODGED WITH LRS FOR REGISTRATION OR PRE-EXAMINATION TO CONFIRM THE SURVEYED BOUNDARIES PRIOR TO THE FINALISATION OF ANY DESIGN DOCUMENTATION.

2 4 6 8 10 20 30
1:300

GENERAL NOTES

ONLY TREES GREATER THAN 3.5 METRES IN HEIGHT ARE SHOWN ON THIS PLAN AND THEIR POSITIONS ARE DIAGRAMMATIC ONLY AND MAY REQUIRE ADDITIONAL SURVEY WHERE CRITICAL TO DESIGN.

CONTOURS ARE INDICATIVE AT GROUND FORM ONLY. SPOT LEVELS ONLY SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.

LEVELS ARE ON AUSTRALIAN HEIGHT DATUM (AHD).

ALL SETOUT LEVELS MUST BE REFERRED TO THE BENCH MARK SHOWN ON THIS PLAN.

BOUNDARY NOTES

A BASIC BOUNDARY SURVEY HAS BEEN DONE SUITABLE FOR DA LODGEMENT PURPOSES.

BOUNDARIES HAVE NOT BEEN MARKED.

SURVEY INFORMATION NOTES

THE ORIGIN OF COORDINATES COMES FROM SSM86492 E333200.010 N6255722.037 CLASS B POSITIONAL UNCERTAINTY (PU) 0.02 (MGA2020) ADOPTED FROM SCIMS DATED 19/05/2025.

THE ORIGIN OF LEVELS COMES FROM SSM86492 RL83.697 CLASS LB POSITIONAL UNCERTAINTY (PU) 0.02 ADOPTED FROM SCIMS DATED 19/05/2025.

THE ORIENTATION OF THIS PLAN IS MGA NORTH WHICH HAS BEEN DETERMINED BY DP1267230.

CERTIFICATE OF TITLE NOTES

THE FOLLOWING INFORMATION RELATES TO THE RESPECTIVE CERTIFICATE OF TITLE OF EACH LOTS:

- LOT 1 IN DP945933
  (CT EDITION 14 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT 11 IN DP654462
  (CT EDITION 8 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT A IN DP334878
  (CT EDITION 10 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT B IN DP334878
  (CT EDITION 15 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT 1 IN DP949064
  (CT EDITION 15 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT CP IN SP18047
  (CT EDITION 1 DATED 04/10/1995 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE

- LOT 2 IN DP528060
  (CT EDITION 17 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  - AFFECTED BY:
    - RIGHT OF CARRIAGEWAY 3.05 WIDE SHOWN (A) (DP528060)
    - EASEMENT TO PERMIT ENCROACHING STRUCTURE 0.04 WIDE SHOWN (B) (SP54127)
- LOT CP IN SP54127
  (CT EDITION 1 DATED 07/04/1997 SEARCH DATE 20/05/2025)
  - BENEFITED BY:
    - RIGHT OF CARRIAGEWAY 3.05 WIDE SHOWN (A) (DP528060)
    - EASEMENT TO PERMIT ENCROACHING STRUCTURE 0.04 WIDE SHOWN (B) (SP54127)

COVENANTS AND RESTRICTIONS NOTED ON THE TITLE HAVE NOT BEEN INVESTIGATED. THESE SHOULD BE INVESTIGATED PRIOR TO DESIGN TO ENSURE ANY FUTURE DEVELOPMENT COMPLIES.

SERVICES NOTES

ONLY THOSE SERVICES VISIBLE AT THE TIME OF SURVEY HAVE BEEN LOCATED AND ARE QUALITY LEVEL A AS DEFINED BY AS 5488.1:2022.

UNDERGROUND SERVICES HAVE BEEN PLOTTED FROM 'DIAL-BEFORE'YOU-DIG' PLANS, ARE QUALITY LEVEL D AS DEFINED BY AS 5488.1:2022 AND ARE ONLY CURRENT AT THE DATE OF SEARCH.

ALL RELEVANT AUTHORITIES MUST BE CONTACTED TO DETERMINE THE FULL EXTENT OF SERVICES PRIOR TO ANY PLANNING OR WORKS NEAR THE SITE.

LEGEND

TAG	DESCRIPTION	TAG	DESCRIPTION
B	BOLLARD	PC	PEDESTRIAN CROSSING
CL	CENTRELINE	PP	POWER POLE
COM	COMMUNICATIONS PIT	PTM	PARKING TICKET MACHINE
CP	COMMUNICATIONS PILLAR	RW	RETAINING WALL
D:S:H	DIAMETER, SPREAD & HEIGHT OF TREES	RWT	RAIN WATER TANK
ELP	ELECTRICITY PILLAR	SIP	SEWER INSPECTION PIT
EP	ELECTRICITY PIT	SMH	SEWER MANHOLE
FL	FLOOR LEVEL	SS	STREET SIGN
GAS	GAS MARKER/LID	SV	STOP VALVE
GUT	KERB GUTTER	TK	TOP OF KERB
HYD	HYDRANT	US	UNCLASSIFIED SERVICE
LIN	DRAINAGE LINTEL	VC	VEHICLE CROSSING
LIP	LIP LINE	WM	WATER METER
LP	LIGHT POLE		

PROJECT:
DETAIL AND LEVEL SURVEY OF
LOTS 2 IN DP945933, 2 IN DP528060, A & B IN DP334878
1 IN DP949064, 11 IN DP654462, SP54127 & SP18047

46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS

CLIENT: CORONATION PROPERTY CO

FILE: 9368 DETAIL SURVEY ISSUE A 46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS

LGA: LANE COVE

REF: 9368	CONTOURS: 0.5m
ISSUE: A	DATUM: AHD
SURVEY DATE: 01/07/2021	AZIMUTH: MGA2020
SCALE: 1:300	SHEET 1 OF 6 SHEETS

ISSUE	DATE	AMENDMENT	SURV	CHK
A	14/05/25	ORIGINAL ISSUE	DG	MP

BEFORE YOU DIG www.byda.com.au

GDA2020

QMS Management System ISO 9001 Quality Management ISO 14001 Environment Management ISO 45001 Global-Mark.com.au

MATTHEW PLOWMAN ID: SU005915
REGISTERED LAND SURVEYOR

SDG Pty Ltd
abn 85 213 523 621
Suite 1, 3 Railway Street, Baulkham Hills NSW 2153
t: (02) 9630 7955 w: sdg.net.au
Liability limited by a scheme approved under Professional Standards Legislation

A1

NOTE:
THE SURVEY HAS REVEALED MINOR DISCREPANCIES BETWEEN TITLE AND AVAILABLE BOUNDARY DIMENSIONS. IT IS STRONGLY RECOMMENDED THAT A PLAN OF CONSOLIDATION BE PREPARED AND LODGED WITH LRS FOR REGISTRATION OR PRE-EXAMINATION TO CONFIRM THE SURVEYED BOUNDARIES PRIOR TO THE FINALISATION OF ANY DESIGN DOCUMENTATION.

MGA

TN

BEARINGS SHOWN ARE ON MGA ORIENTATION

1°00' APPROX

Schedule of Easements & Restrictions	
No	Description
(A)	RIGHT OF CARRIAGEWAY 3.05 WIDE (DP528060)
(B)	EASEMENT TO PERMIT ENCROACHING STRUCTURE 0.04 WIDE (SP54127)

UNDERGROUND SERVICES LEGEND
QUALITY LEVEL D (AS 5488.1:2022)

- W — POTABLE WATER MAIN
- R — RECYCLED WATER MAIN
- D — STORMWATER PIPE
- S — SEWER MAIN
- C — COMMUNICATIONS CABLES
- E — ELECTRICITY CABLES
- G — GAS MAIN

CAUTION: FIBRE OPTIC CABLES ARE PRESENT IN THIS AREA.

APPROXIMATE POSITION ONLY VIDE 'DIAL-BEFORE-YOU-DIG' PLANS JOB No. 50141562 SEARCH DATE 09/05/2025. WHERE CRITICAL TO DESIGN, UNDERGROUND SERVICES SHOULD BE LOCATED BY MORE ACCURATE METHODS.

SERVICES NOTES:-

1. ONLY THOSE SERVICES VISIBLE AT THE TIME OF SURVEY HAVE BEEN LOCATED AND IF SHOWN AS "± *89.67*" ARE QUALITY LEVEL A AS DEFINED BY AS 5488.1:2022. LEVELS SHOWN ARE SURFACE LEVELS UNLESS NOTED OTHERWISE.
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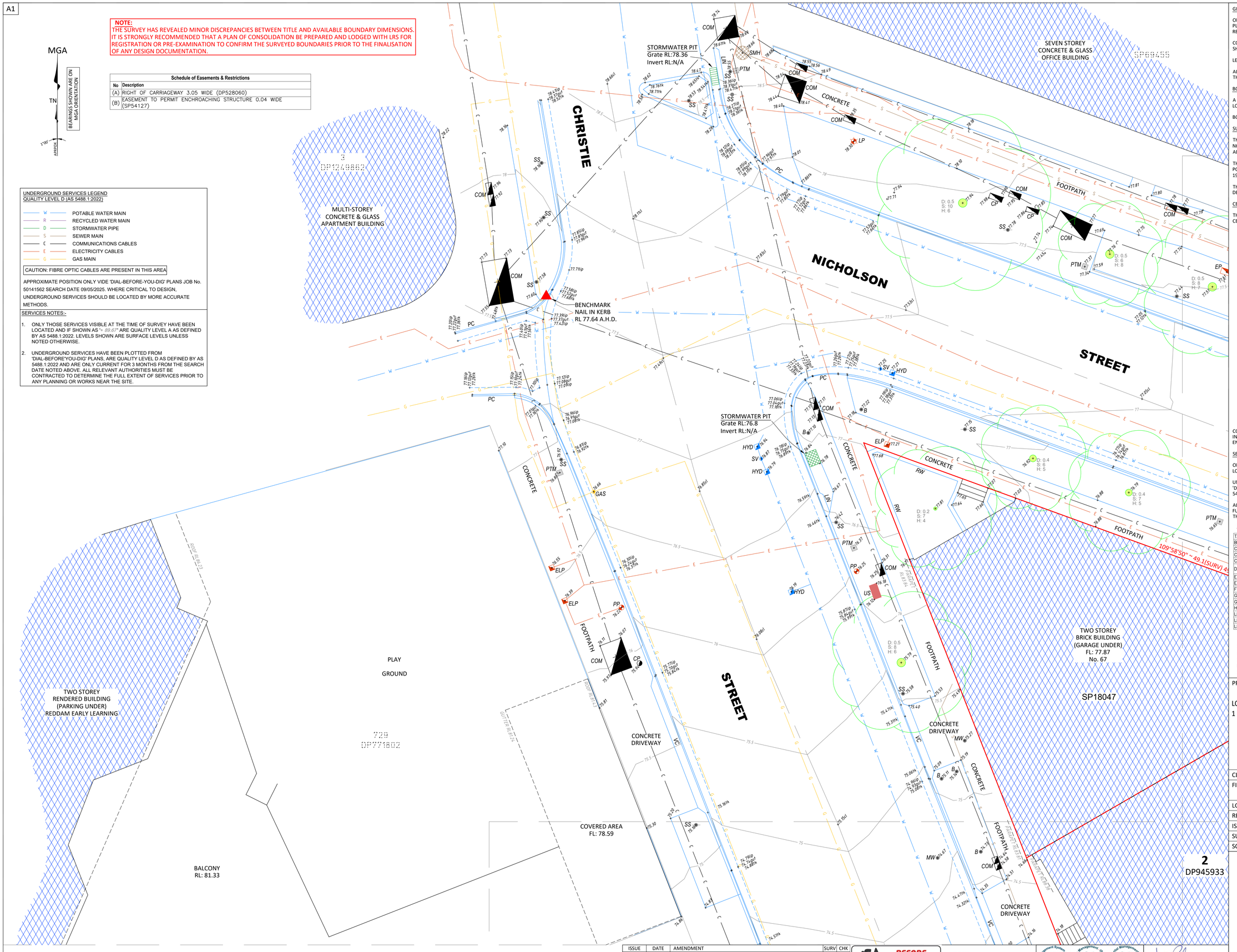

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ISSUE	DATE	AMENDMENT	SURV	CHK
A	14/05/25	ORIGINAL ISSUE	DG	MP

BEFORE YOU DIG www.byda.com.au

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REGISTERED LAND SURVEYOR

GENERAL NOTES

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CONTOURS ARE INDICATIVE AT GROUND FORM ONLY. SPOT LEVELS ONLY SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.

LEVELS ARE ON AUSTRALIAN HEIGHT DATUM (AHD).

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BOUNDARY NOTES

A BASIC BOUNDARY SURVEY HAS BEEN DONE SUITABLE FOR DA LODGEMENT PURPOSES.

BOUNDARIES HAVE NOT BEEN MARKED.

SURVEY INFORMATION NOTES

THE ORIGIN OF COORDINATES COMES FROM SSM86492 E333200.010 N6255722.037 CLASS B POSITIONAL UNCERTAINTY (PU) 0.02 (MGA2020) ADOPTED FROM SCIMS DATED 19/05/2025.

THE ORIGIN OF LEVELS COMES FROM SSM86492 RL83.697 CLASS LB POSITIONAL UNCERTAINTY (PU) 0.02 ADOPTED FROM SCIMS DATED 19/05/2025.

THE ORIENTATION OF THIS PLAN IS MGA NORTH WHICH HAS BEEN DETERMINED BY DP1267230.

CERTIFICATE OF TITLE NOTES

THE FOLLOWING INFORMATION RELATES TO THE RESPECTIVE CERTIFICATE OF TITLE OF EACH LOTS:

- LOT 1 IN DP945933
  (CT EDITION 14 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT 11 IN DP654462
  (CT EDITION 8 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT A IN DP334878
  (CT EDITION 10 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT B IN DP334878
  (CT EDITION 15 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT 1 IN DP949064
  (CT EDITION 15 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT CP IN SP18047
  (CT EDITION 1 DATED 04/10/1995 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE

- LOT 2 IN DP528060
  (CT EDITION 17 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  - AFFECTED BY:
    - RIGHT OF CARRIAGEWAY 3.05 WIDE SHOWN (A) (DP528060)
    - EASEMENT TO PERMIT ENCROACHING STRUCTURE 0.04 WIDE SHOWN (B) (SP54127)
- LOT CP IN SP54127
  (CT EDITION 1 DATED 07/04/1997 SEARCH DATE 20/05/2025)
  - BENEFITED BY:
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LEGEND

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GUT	KERB GUTTER	TK	TOP OF KERB
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PROJECT:
DETAIL AND LEVEL SURVEY OF
LOTS 2 IN DP945933, 2 IN DP528060, A & B IN DP334878
1 IN DP949064, 11 IN DP654462, SP54127 & SP18047

46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS

CLIENT: CORONATION PROPERTY CO

FILE: 9368 DETAIL SURVEY ISSUE A 46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS

LGA: LANE COVE

REF: 9368	CONTOURS: 0.5m
ISSUE: A	DATUM: AHD
SURVEY DATE: 01/07/2021	AZIMUTH: MGA2020
SCALE: 1:100	SHEET 2 OF 6 SHEETS

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MGA
TN
BEARINGS SHOWN ARE ON MGA ORIENTATION
1°00'
SCALE FACTOR

UNDERGROUND SERVICES LEGEND
QUALITY LEVEL D (AS 5488.1:2022)

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SEVEN STOREY CONCRETE & GLASS OFFICE BUILDING
SP69455
PARAPET RL 83.83
104 DP1267230
3 DP1242076
MULTI-STOREY CONCRETE & GLASS APARTMENT BUILDING
NICHOLSON STREET
STREET
CONCRETE DRIVEWAY
FOOTPATH
GARDEN
RETAINING WALL
PORCH
VERANDAH
CONCRETE
STORMWATER PIT
Grate RL:76.53
Invert RL:75.93
STORMWATER PIT
Grate RL:76.77
Invert RL:75.65
STORMWATER PIT
Grate RL:76.75
Invert RL:75.82
STORMWATER PIT
Grate RL:76.09
Invert RL:74.85
STORMWATER PIT
Grate RL:76.85
Invert RL:76.35
STORMWATER PIT
Grate RL:77.93
Invert RL:76.01
BENCHMARK
NAIL IN KERB
RL 76.97 A.H.D.
THREE STOREY BRICK BUILDING (GARAGE UNDER) FL: 75.64 No. 52 (NICHOLSON sTREET)
THREE STOREY BRICK BUILDING (GARAGE UNDER) FL: 76.65 No. 50
THREE STOREY BRICK & CONCRETE BUILDING (PARKING UNDER) No. 46-48
TWO STOREY BRICK BUILDING (PARKING UNDER) FL: 74.82 No. 63
2 DP945933
SP54127
2 DP528060
A DP334878
TOTAL AREA
2282.7m² (Deed)
2301.8m² (Calc)
142°03'10" 37.935(SURV) 37.89(TITLE)
49.1(SURV) 49.095(TITLE)
(A)
(B)
2 4 6 8 10 20 30
1:300

ISSUE	DATE	AMENDMENT	SURV	CHK
A	14/05/25	ORIGINAL ISSUE	DG	MP

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  (CT EDITION 15 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT CP IN SP18047
  (CT EDITION 1 DATED 04/10/1995 SEARCH DATE 20/05/2025)
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- LOT 2 IN DP528060
  (CT EDITION 17 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  - AFFECTED BY:
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- LOT CP IN SP54127
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46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS

CLIENT: CORONATION PROPERTY CO
FILE: 9368 DETAIL SURVEY ISSUE A 46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS
LGA: LANE COVE

REF: 9368	CONTOURS: 0.5m
ISSUE: A	DATUM: AHD
SURVEY DATE: 01/07/2021	AZIMUTH: MGA2020
SCALE: 1:100	SHEET 3 OF 6 SHEETS

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A1

A
DP334878

11
DP654462

THREE STOREY
BRICK & CONCRETE
BUILDING
FL:78.98
(PARKING UNDER)
No. 46-48

BRICK
BUILDING

SIX STOREY
BRICK & GLASS
OFFICE BUILDING
(PARKING UNDER)
No. 63
(CHRISTIE STREET)

1
DP773652

3
DP1242675

MULTI-STOREY
CONCRETE & GLASS
APARTMENT BUILDING

TWO STOREY
RENDERED
BUILDING
No. 65

SP81234

NICHOLSON STREET

CHRISTIE STREET

BENCHMARK
NAIL IN KERB
RL 78.98 A.H.D.

CONCRETE DRIVEWAY

FOOTPATH

VERANDAH

Schedule of Easements & Restrictions	
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REGISTERED LAND SURVEYOR

CLIENT: CORONATION PROPERTY CO	
FILE: 9368 DETAIL SURVEY ISSUE A 46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS	
LGA: LANE COVE	
REF: 9368	CONTOURS: 0.5m
ISSUE: A	DATUM: AHD
SURVEY DATE: 01/07/2021	AZIMUTH: MGA2020
SCALE: 1:100	SHEET 4 OF 6 SHEETS

SDG Pty Ltd
abn 85 213 523 621
Suite 1, 3 Railway Street, Baulkham Hills NSW 2153
t: (02) 9630 7955 w: sdg.net.au
Liability limited by a scheme approved under Professional Standards Legislation

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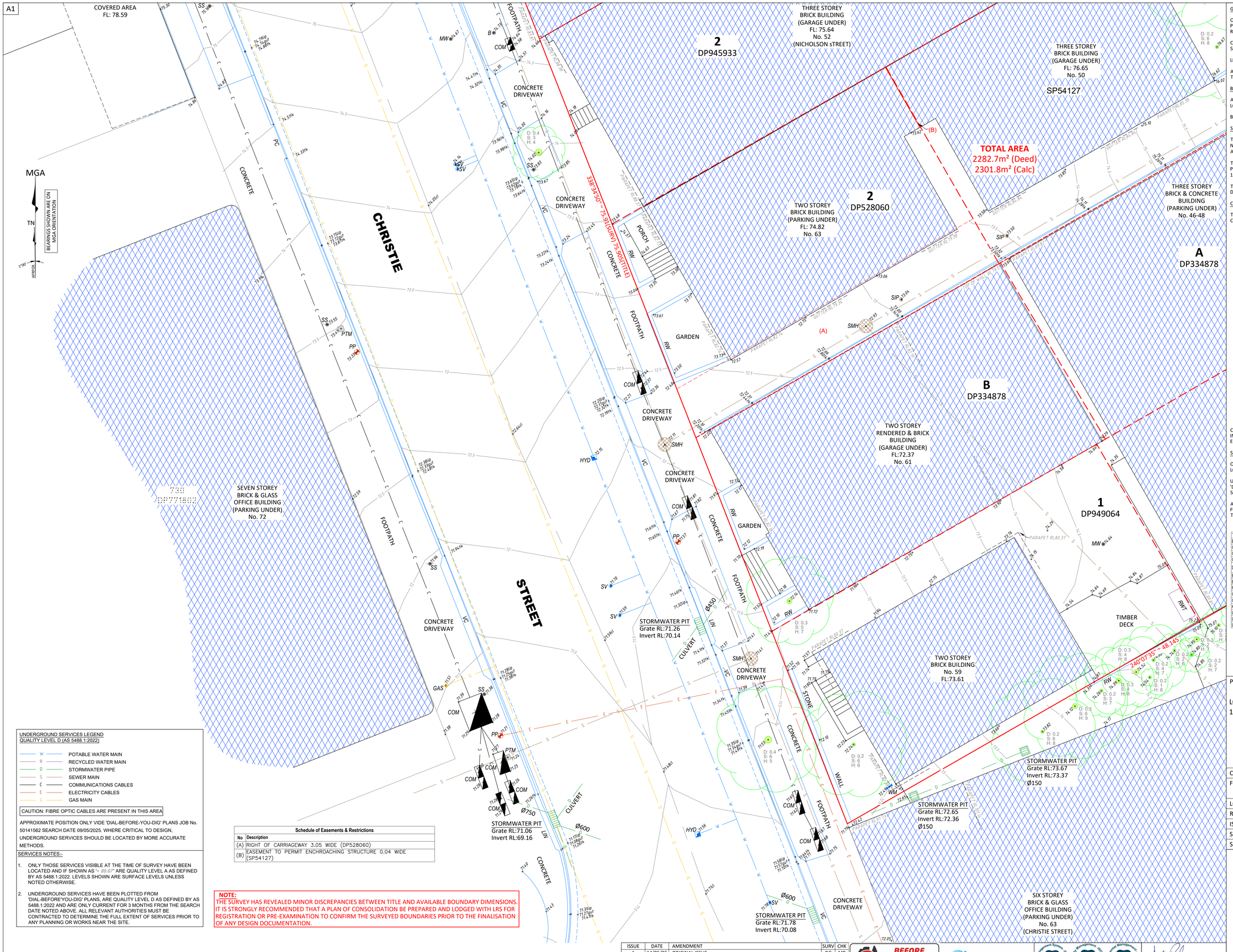
A1



UNDERGROUND SERVICES LEGEND
QUALITY LEVEL D (AS 5488.1:2022)

W	POTABLE WATER MAIN
R	RECYCLED WATER MAIN
D	STORMWATER PIPE
S	SEWER MAIN
C	COMMUNICATIONS CABLES
E	ELECTRICITY CABLES
G	GAS MAIN

CAUTION: FIBRE OPTIC CABLES ARE PRESENT IN THIS AREA

APPROXIMATE POSITION ONLY VIDE 'DIAL-BEFORE-YOU-DIG' PLANS JOB No. 50141562 SEARCH DATE 09/05/2025. WHERE CRITICAL TO DESIGN, UNDERGROUND SERVICES SHOULD BE LOCATED BY MORE ACCURATE METHODS.

SERVICES NOTES:-

1. ONLY THOSE SERVICES VISIBLE AT THE TIME OF SURVEY HAVE BEEN LOCATED AND IF SHOWN AS *'+ 89.67'* ARE QUALITY LEVEL A AS DEFINED BY AS 5488.1:2022. LEVELS SHOWN ARE SURFACE LEVELS UNLESS NOTED OTHERWISE.
2. UNDERGROUND SERVICES HAVE BEEN PLOTTED FROM 'DIAL-BEFORE'YOU-DIG' PLANS, ARE QUALITY LEVEL D AS DEFINED BY AS 5488.1:2022 AND ARE ONLY CURRENT FOR 3 MONTHS FROM THE SEARCH DATE NOTED ABOVE. ALL RELEVANT AUTHORITIES MUST BE CONTRACTED TO DETERMINE THE FULL EXTENT OF SERVICES PRIOR TO ANY PLANNING OR WORKS NEAR THE SITE.

Schedule of Easements & Restrictions

No	Description
(A)	RIGHT OF CARRIAGEWAY 3.05 WIDE (DP528060)
(B)	EASEMENT TO PERMIT ENCHROACHING STRUCTURE 0.04 WIDE (SP54127)

NOTE:
THE SURVEY HAS REVEALED MINOR DISCREPANCIES BETWEEN TITLE AND AVAILABLE BOUNDARY DIMENSIONS. IT IS STRONGLY RECOMMENDED THAT A PLAN OF CONSOLIDATION BE PREPARED AND LODGED WITH LRS FOR REGISTRATION OR PRE-EXAMINATION TO CONFIRM THE SURVEYED BOUNDARIES PRIOR TO THE FINALISATION OF ANY DESIGN DOCUMENTATION.

2 4 6 8 10 20 30
1:300

ISSUE	DATE	AMENDMENT	SURV	CHK
A	14/05/25	ORIGINAL ISSUE	DG	MP

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GDA2020

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MATTHEW PLOWMAN ID: SU005915
REGISTERED LAND SURVEYOR

GENERAL NOTES

ONLY TREES GREATER THAN 3.5 METRES IN HEIGHT ARE SHOWN ON THIS PLAN AND THEIR POSITIONS ARE DIAGRAMMATIC ONLY AND MAY REQUIRE ADDITIONAL SURVEY WHERE CRITICAL TO DESIGN.

CONTOURS ARE INDICATIVE AT GROUND FORM ONLY. SPOT LEVELS ONLY SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.

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BOUNDARY NOTES

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BOUNDARIES HAVE NOT BEEN MARKED.

SURVEY INFORMATION NOTES

THE ORIGIN OF COORDINATES COMES FROM SSM86492 E333200.010 N6255722.037 CLASS B POSITIONAL UNCERTAINTY (PU) 0.02 (MGA2020) ADOPTED FROM SCIMS DATED 19/05/2025.

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THE FOLLOWING INFORMATION RELATES TO THE RESPECTIVE CERTIFICATE OF TITLE OF EACH LOTS:

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  (CT EDITION 14 DATED 08/11/2024 SEARCH DATE 20/05/2025)
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  (CT EDITION 8 DATED 08/11/2024 SEARCH DATE 20/05/2025)
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- LOT A IN DP334878
  (CT EDITION 10 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT B IN P334878
  (CT EDITION 15 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT 1 IN DP949064
  (CT EDITION 15 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT CP IN SP18047
  (CT EDITION 1 DATED 04/10/1995 SEARCH DATE 20/05/2025)
  -THERE ARE NO NOTATIONS ON THE CERTIFICATE OF TITLE
- LOT 2 IN DP528060
  (CT EDITION 17 DATED 08/11/2024 SEARCH DATE 20/05/2025)
  - AFFECTED BY:
    - RIGHT OF CARRIAGEWAY 3.05 WIDE SHOWN (A) (DP528060)
    - EASEMENT TO PERMIT ENCROACHING STRUCTURE 0.04 WIDE SHOWN (B) (SP54127)
- LOT CP IN SP54127
  (CT EDITION 1 DATED 07/04/1997 SEARCH DATE 20/05/2025)
  - BENEFITED BY:
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LEGEND

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COM	COMMUNICATIONS PIT	PTM	PARKING TICKET MACHINE
CP	COMMUNICATIONS PILLAR	RW	RETAINING WALL
D:S:H	DIAMETER, SPREAD & HEIGHT OF TREES	RWT	RAIN WATER TANK
ELP	ELECTRICITY PILLAR	SIP	SEWER INSPECTION PIT
EP	ELECTRICITY PIT	SMH	SEWER MANHOLE
FL	FLOOR LEVEL	SS	STREET SIGN
GAS	GAS MARKER/LID	SV	STOP VALVE
GUT	KERB GUTTER	TK	TOP OF KERB
HYD	HYDRANT	US	UNCLASSIFIED SERVICE
LIN	DRAINAGE LINTEL	VC	VEHICLE CROSSING
LIP	LIP LINE	WM	WATER METER
LP	LIGHT POLE		

PROJECT:
DETAIL AND LEVEL SURVEY OF
LOTS 2 IN DP945933, 2 IN DP528060, A & B IN DP334878
1 IN DP949064, 11 IN DP654462, SP54127 & SP18047

46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS

CLIENT: CORONATION PROPERTY CO
FILE: 9368 DETAIL SURVEY ISSUE A 46-52 NICHOLSON STREET & 59-67 CHRISTIE STREET ST LEONARDS
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A1

MGA

TN

BEARINGS SHOWN ARE ON MGA ORIENTATION

1°00'

APPROX

SP61234

MULTI-STOREY
RENDERED & BRICK
APARTMENT BUILDING

CHRISTIE STREET

STORMWATER PIT
Grate RL:71.06
Invert RL:69.16

STORMWATER PIT
Grate RL:72.03
Invert RL:70.94

STORMWATER PIT
Grate RL:71.78
Invert RL:70.08

STORMWATER PIT
Grate RL:72.65
Invert RL:72.36
Ø150

STORMWATER PIT
Grate RL:73.67
Invert RL:73.37
Ø150

CULVERT

CONCRETE DRIVEWAY

SIX STOREY
BRICK & GLASS
OFFICE BUILDING
(PARKING UNDER)
No. 63
(CHRISTIE STREET)

1
DP773862

BENCHMARK
NAIL IN KERB
RL 72.14 A.H.D.

FOOTPATH

WALL

CONCRETE

HYD

COM

PP

PTM

Ø750

Ø600

Ø375

UNDERGROUND SERVICES LEGEND
QUALITY LEVEL D (AS 5488.1:2022)

W	POTABLE WATER MAIN
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ISSUE	DATE	AMENDMENT	SURV	CHK
A	14/05/25	ORIGINAL ISSUE	DG	MP

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GDA2020

Global-Mark.com.au

MATTHEW PLOWMAN ID: SU005915
REGISTERED LAND SURVEYOR

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DETAIL AND LEVEL SURVEY OF
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Appendix B – Civil Drawings

NICHOLSON PLACE, ST LEONARDS

59-67 CHRISTIE STREET AND 46-50 NICHOLSON STREET, ST LEONARDS

CIVIL WORKS AND STORMWATER APPROVAL DRAWINGS

CLIENT:

CORONATION

LOT(S): LOT 1 on DP949064, LOT B on DP334878, LOT 2 on DP528060, LOT 2 on DP945933, SP18047, SP54127, LOT A on DP334878 & LOT 11 on DP654462

LGA: LANE COVE

PLAN INDEX

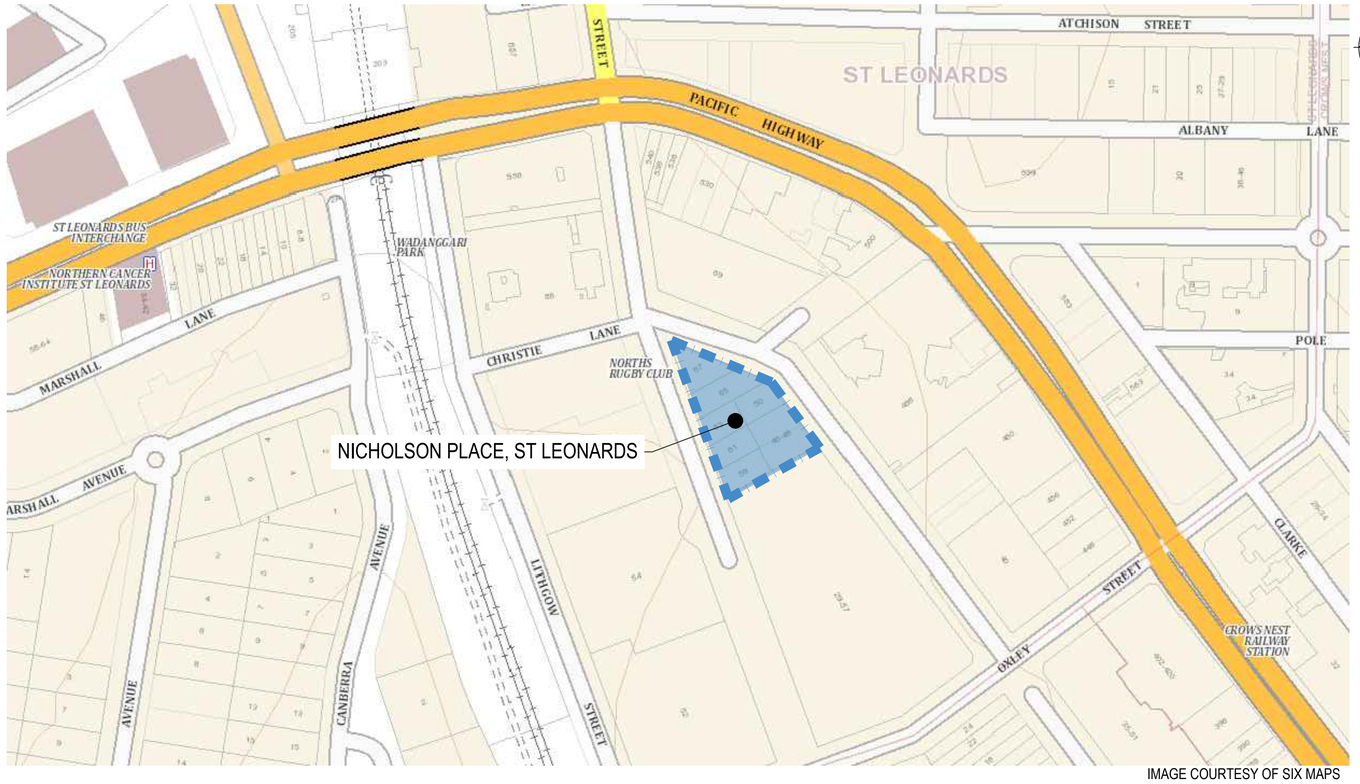

IMAGE COURTESY OF SIX MAPS

SITE LOCATION PLAN

NOT TO SCALE

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	11-09-25

Scales

Surveyor: SDG

Architect: COX

Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures

Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project: NICHOLSON PLACE ST LEONARDS

Title: COVER SHEET

HJ CONSULT
email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1000

Issue A

SURVEY NOTES

ORIGIN OF SURVEY

PROJECT:	NICHOLSON PLACE ST LEONARDS
SURVEYOR:	SDG PTY LTD
SSM/PM:	SSM86492 83.697
LOCATION:	-
RL:	83.697 (mAHD)

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EARTHWORKS

1. AT THE COMMENCEMENT OF THE CUT AND FILLING OPERATIONS FOR BULK EARTHWORKS A GEOTECHNICAL ENGINEER IS TO VISIT THE SITE AND CONFIRM THE SUITABILITY OF THE METHODOLOGY OF ACHIEVING THE REQUIRED BUILDING PLATFORMS AND COMPACTION REQUIREMENTS.SUBSEQUENTLY, THE HEAD CONTRACTOR IS TO CONFIRM, IN WRITING TO THE SUPERINTENDENT THAT THE METHODOLOGY APPROVED AT THE TIME OF THE GEOTECHNICAL ENGINEERS VISIT WAS MAINTAINED DURING ALL THE BULK EARTHWORKS PROCESS.
2. STRIP TOPSOIL, ORGANIC MATTER AND RUBBLE FROM CONSTRUCTION AREA TO EXPOSE NATURALLY OCCURRING MATERIAL AND STOCKPILE ON SITE AS DIRECTED BY THE SUPERINTENDENT.
3. WHERE FILLING, STRUCTURAL SLABS OR PAVEMENTS ARE REQUIRED, PROOF ROLL THE EXPOSED NATURAL SURFACE WITH A MINIMUM OF TEN PASSES OF A SMOOTH DRUM NON-VIBRATING ROLLER (MINIMUM STATIC WEIGHT OF 10 TONNES) TO DETECT THEN REMOVE SOFT SPOTS (AREAS WITH MORE THAN 2mm MOVEMENT UNDER ROLLER) IN THE PRESENCE OF THE SUPERINTENDENT. THE CONTRACTOR IS TO ALLOW TO REMOVE AND REPLACE A PROVISIONAL QUANTITY OF UNSUITABLE SUBGRADE MATTER.
4. ALL SOFT, WET OR UNSUITABLE MATERIAL IS TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS LISTED BELOW.
5. EXCAVATED MATERIAL IS NOT TO BE USED AS STRUCTURAL FILL UNLESS APPROVED BY THE GEOTECHNICAL ENGINEER.
6. THE CONTRACTOR IS TO PROVIDE CERTIFICATES VERIFYING THE QUALITY OF IMPORTED MATERIAL FOR THE SUPERINTENDENTS APPROVAL.
7. ALL FILL MATERIAL SHALL BE PLACED IN MAXIMUM LAYER THICKNESS TO COUNCIL SPECIFICATIONS AND COMPACTED AT OPTIMUM MOISTURE CONTENT (+ OR - 2%) TO ACHIEVE A DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1289 E3.1 OF NOT LESS THAN THE FOLLOWING STANDARD MINIMUM DRY DENSITY IN ACCORDANCE WITH AS1289 E5.1.1.1:

LOCATION	COMPACTION REQUIREMENT
UNDER BUILDING SLABS	98% SMDD
LANDSCAPED AREAS	95% SMDD
ROADS & PAVED AREAS	100% SMDD

8. FOR NON COHESIVE MATERIAL, COMPACT TO NOT LESS THAN

LOCATION	COMPACTION REQUIREMENT
UNDER ROAD	80% DENSITY
OTHER AREA	75% DENSITY

9. THE CONTRACTOR IS TO ALLOW FOR COMPACTION TESTING BY NATA REGISTERED LABORATORY FOR PLATFORMS AND FILL LAYERS IN ACCORDANCE WITH THE LATEST VERSION OF AS3798 - FOR TYPE 1 OPERATIONS (MINIMUM 3 TESTS PER LAYER).
10. FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN:
    10.1. 1 TEST PER 200m² OF FILL PLACED PER LAYER OF FILL
    10.2. 3 TESTS PER VISIT
    10.3. 1 TEST PER 1000m² OF EXPOSED SUBGRADE
11. TESTING SHALL BE "LEVEL 1" UNDERTAKEN IN ACCORDANCE WITH AS 3798.
12. WHERE TEST RESULTS ARE BELOW THE SPECIFIED COMPACTION, RECOMPACT AND RETEST UNTIL SPECIFIED COMPACTION STANDARD IS ACHIEVED.
13. ALLOW FOR EXCAVATION IN ALL MATERIALS AS FOUND U.N.O. NO ADDITIONAL PAYMENTS WILL BE MADE FOR EXCAVATION IN WET OR HARD GROUND.
14. WHERE THERE IS INSUFFICIENT EXCAVATED MATERIAL SUITABLE FOR FILLING OR SUBGRADE REPLACEMENT, THE CONTRACTOR IS TO ALLOW TO IMPORT FILL. IMPORTED FILL SHALL COMPLY WITH THE FOLLOWING:
    14.1. MAXIMUM SIZE 50mm. PASSING 75 MICRON SIEVE (<25%).
    14.2. PLASTICITY INDEX BETWEEN 2-15% AND CBR>8.
    14.3. FREE FROM ORGANIC AND PERISHABLE MATTER.
15. THE CONTRACTOR SHALL PROGRAM THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS, ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED AT THEIR COST.
16. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE AND MAINTAIN THE INTEGRITY OF ALL SERVICES, CONDUITS AND PIPES DURING CONSTRUCTION. SPECIFICALLY DURING THE BACKFILLING AND COMPACTION PROCEDURE. ANY AND ALL DAMAGE TO NEW OR EXISTING SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXTRA COST.
17. PROTECT FINAL SURFACE WITH EITHER A TEMPORARY LOOSE SOIL LAYER OR A GRANULAR SUB-BASE LAYER TO PREVENT DRYING OUT PRIOR TO ON-GROUND SLAB CONSTRUCTION.

DETAILS AND SPECIFICATIONS

1. ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH LANE COVE COUNCIL TECHNICAL SPECIFICATIONS

2. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH OTHER SUCH WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPNACY SHALL BE REFERRED TO THE SUPERINTENDENT OR PROJECT MANAGER BEFORE PROCEEDING WITH THE WORK

3. DO NOT OBTAIN DIMENSIONS BY SCALING THE DRAWINGS. ALL LEVELS ARE IN IN METRES (m) U.N.O AND TO THE AUSTRALIAN HEIGHT DATUM (AHD)

CIVIL WORKS

1. ALL WORKS TO BE IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS, SPECIFICATIONS AND AUSTRALIAN STANDARDS. CONFLICTS SHALL BE REFERRED TO THE SUPERINTENDENT FOR DIRECTION.
2. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO THE SUPERINTENDENT OR PROJECT MANAGER
3. THE CONTRACTOR IS TO DESIGN, OBTAIN APPROVALS AND CARRY OUT REQUIRED TEMPORARY TRAFFIC CONTROL PROCEDURES DURING CONSTRUCTION IN ACCORDANCE WITH TINSW AND LOCAL AUTHORITY REGULATIONS AND REQUIREMENTS.
4. THE CONTRACTOR IS TO OBTAIN ALL AUTHORITY APPROVALS AS REQUIRED.
5. RESTORE ALL PAVED, COVERED, GRASSED AND LANDSCAPED AREAS TO THEIR ORIGINAL CONDITION ON COMPLETION OF WORKS.
6. ON COMPLETION OF ANY TRENCHING WORKS, ALL DISTURBED AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL, GRASSED AREAS AND ROAD PAVEMENTS.
7. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
8. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO LODGMENT OF TENDER AND ON SITE WORKS. THE PRICE AS TENDERED SHALL BE INCLUSIVE OF ALL WORKS SHOWN ON THE TENDER PROJECT DRAWINGS. ADDITIONAL PAYMENTS FOR WORKS SHOWN ON THE TENDER PROJECT DRAWINGS WILL NOT BE APPROVED.
9. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE ENGINEERING PLANS AND SPECIFICATIONS, AND ANY OTHER WRITTEN INSTRUCTIONS THAT MAY BE ISSUED RELATING TO DEVELOPMENT OF THE SUBJECT SITE.
10. THESE PLANS SHALL BE READ IN CONJUNCTION WITH ALL APPROVED DRAWINGS AND SPECIFICATIONS PREPARED BY OTHER PROJECT CONSULTANTS.
11. DO NOT OBTAIN DIMENSIONS BY SCALING THE DRAWINGS. ALL LEVELS ARE IN METRES (m), UNO. ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (AHD).
12. IN CASE OF DOUBT OR DISCREPANCY REFER TO THE SUPERINTENDENT FOR CLARIFICATION OR CONFIRMATION PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. OTHERWISE THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF REMEDIATION WORKS.
13. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED.
14. THE CONTRACTOR SHALL COMPLY WITH ALL STATUTORY AND INDUSTRIAL REQUIREMENTS FOR PROVISION OF A SAFE WORKING ENVIRONMENT INCLUDING TRAFFIC CONTROL.
15. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES ACCESS TO ALL BUILDINGS ADJACENT THE WORKS IS NOT DISRUPTED.
16. WHERE NECESSARY THE CONTRACTOR SHALL PROVIDE SAFE PASSAGE OF VEHICLES AND/OR PEDESTRIANS THROUGH OR BY THE SITE.
17. WHERE NOTED ON THE DRAWINGS THAT WORKS ARE TO BE CARRIED BY OTHERS, (eg. ADJUSTMENT OF SERVICES), THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THESE WORKS.
18. ALL VARIATIONS TO SPECIFIED PRODUCTS OR DESIGNS SHALL BE REFERRED TO THE DESIGN ENGINEER IN WRITING FOR APPROVAL.
19. EPA AND COUNCIL REQUIREMENTS MUST BE ADHERED TO REGARDING THE LEVEL OF NOISE AND WORKING HOURS, TO ENSURE THAT RESIDENTS AND OTHER APPLICABLE NEIGHBOURS TO THE SITE ARE NOT DISTURBED UNREASONABLY. THE GENERATION OF NOISE MUST BE MINIMISED.

STORMWATER DRAINAGE

1. STORMWATER DESIGN CRITERIA:
   1.1. ANNUAL EXCEEDANCE PROBABILITY :
        1% AEP ROOF TO OSD/RWT
        5% AEP EXTERNAL ROAD/GROUND FLOOR
   1.2. RAINFALL INTENSITIES
        TIME OF CONCENTRATION: 5 MINS
        1% AEP: 265 mm/hr
        5% AEP: 200 mm/hr
   1.3. RUNOFF COEFFICIENT:
        EXTERNAL HARDSTAND: C_{100}= 1.0
2. PIPES 375 DIA. AND LARGER TO BE REINFORCED CONCRETE CLASS '4' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS. U.N.O.
3. WHERE WORKING METHODS REQUIRE HIGHER CLASS PIPE, THE CONTRACTOR SHALL REFER TO AS 3725 TO DETERMINE THE APPROPRIATE PIPE CLASS. ANY CHANGES IN PROPOSED PIPE CLASS SHALL BE SUBMITTED TO THE SUPERINTENDENT AND PROJECT MANAGER FOR APPROVAL PRIOR TO INSTALLATION.
3. PIPES UP TO 375 DIA SHALL BE SEWER GRADE uPVC WITH SOLVENT WELDED JOINTS
4. EQUIVALENT STRENGTH BLACKMAXX (OR EQUIVALENT) OR FRC PIPES MAY BE USED, SUBJECT TO THE APPROVAL BY DESIGN ENGINEER INTERNAL TO THE SITE
5. ALL STORMWATER DRAINAGE LINES UNDER PROPOSED BUILDING SLABS TO BE uPVC PRESSURE PIPE GRADE ENSURE ALL VERTICALS AND DOWNPIPES ARE uPVC PRESSURE PIPE, GRADE 6 FOR A MIN OF 3.0m IN HEIGHT.
6. ENLARGERS, CONNECTIONS AND JUNCTIONS TO BE PREFABRICATED FITTINGS WHERE PIPES ARE LESS THAN 300 DIA.
7. PIPES WITHIN ROAD RESERVE ARE TO BE INSTALLED IN ACCORDANCE WITH LOCAL COUNCIL OR TINSW STANDARDS AS APPLICABLE
8. ALL INTERNAL WORKS WORKS WITHIN PROPERTY BOUNDARIES ARE TO COMPLY WITH THE REQUIREMENTS OF AS3500.1-3
9. GRATES AND COVERS SHALL CONFORM WITH AS 3996 AND AS 1428.1 FOR ACCESS REQUIREMENTS.
   9.1. USE HOT DIPPED GALVANISED GRATES AND CONCRETE FILLED COVERS WITH HINGES AND HOLD DOWN BOLTS COMPLYING WITH AS3996 AND OTHER RELEVANT AUSTRALIAN AND COUNCIL STANDARDS.
   9.2. ALL COVERS AND GRATES TO BE POSITIONED IN A FRAME AND MANUFACTURED AS A UNIT.
   9.3. ALL COVERS AND GRATES TO BE FITTED WITH POSITIVE COVER LIFTING KEYS AND BOLT LOCKABLE
   9.4. OBTAIN SUPERINTENDENT'S APPROVAL FOR THE USE OF CAST IRON SOLID COVERS AND GRATES. CAST IRON SOLID COVERS (IF APPROVED) TO CONSIST OF CROSS-WEBBED, CELLULAR CONSTRUCTION WITH THE RIBS UPPERMOST TO ALLOW INFILLING WITH CONCRETE. INSTALL POSITIVE COVER LIFTING KEYS AND PLASTIC PLUGS.
   9.5. UNLESS DETAILED OR SPECIFIED OTHERWISE COVERS ANDGRATES TO BE CLASS "D" IN VEHICULAR PAVEMENTS AND CLASS "B" ELSEWHERE.
10. AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS.
11. SUBSOIL Ø100mm DRAINAGE LINES SHALL BE CONNECTED TO A STORMWATER DRAINAGE PIT AND PROVIDED IN THE FOLLOWING LOCATIONS:
    11.1. ADJACENT ALL TRAFFICKED AND CARPARK PAVEMENT AREAS (BEHIND KERB);
    11.2. ALL PLANTER AND TREE BEDS PROPOSED ADJACENT TO PAVEMENT AREAS;
    11.3. BEHIND RETAINING WALLS (IN ACCORDANCE WITH DRAWINGS);
    11.4. BELOW ALL TRAFFICABLE DISH DRAINS;
    11.5. ALL OTHER AREAS SHOWN ON THE DRAWINGS.
12. THE CONTRACTOR SHALL INSTALL FLUSHING POINTS TO ALL SUBSOIL DRAINAGE LINES AND DOWNPIPE LINES AS SPECIFIED ON DRAWINGS, AT MAXIMUM CENTRES TO COUNCIL SPECIFICATION AND AT ALL UPSTREAM ENDPOINTS.
13. PROVIDE 3.0m LENGTH OF Ø100 SUBSOIL DRAINAGE PIPE WRAPPED IN ANON-WOVEN GEOTEXTILE FABRIC, TO THE UPSTREAM SIDE OF STORMWATER PITS, LAID IN STORMWATER PIPE TRENCHES AND CONNECTED TO THE DRAINAGE PIT.
14. SUBSOIL TRENCHES SHALL BE BACKFILLED WITH SINGLE SIZED 10mm AGGREGATE WRAPPED IN NON-WOVEN GEOTEXTILE FABRIC. SUBSOIL TRENCHES BELOW TRAFFICABLE PAVEMENTS SHALL BE BACKFILLED WITH NO FINES CONCRETE WRAPPED IN NON-WOVEN GEOTEXTILE FABRIC, U.N.O.
15. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES ARE NOT TO BE REDUCED WITHOUT APPROVAL.
16. THE CONTRACTOR SHALL ENSURE AND PROTECT THE INTEGRITY OF ALL STORMWATER PIPES DURING CONSTRUCTION. ANY AND ALL DAMAGE TO THESE PIPES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT, AND AT NO EXTRA COST
17. ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT FOR FURTHER DIRECTIONS.
18. CONCRETE TO HAVE A MIN. COMPRESSIVE STRENGTH (F'c) OF 32 MPa AT 28 DAYS.
19. REINFORCEMENT REFER TO STORMWATER DETAILS
20. ALL STORMWATER PITS ARE TO BE CAST IN-SITU IN ACCORDANCE WITH THE STORMWATER DETAILS, UNLESS APPROVED BY THE COUNCIL/PCA.
21. IF APPROVED BY THE DESIGN ENGINEER, PRE-CAST STORMWATER PITS CAN BE USED WITHIN THE SITE BOUNDARIES. ALL PRE CAST PITS TO BE PLACED ON A 150mm LAYER OF COMPACTED GRANULAR BEDDING MATERIAL FOUNDED ON SUBGRADE WITH A MINIMUM ALLOWABLE BEARING CAPACITY OF 100kPA. UP TO 3.0M DEPTH TO INVERT OR 150kPA FROM 3.0m TO 6.0m DEPTH TO INVERT. (MIN 100mm DEEP 25MPA OR DEEPER TO ENSURE MINIMUM SPECIFIED BEARING CAPACITY IS ACHIEVED).
22. PIT INSTALLATION AND JOINTING PIPES TO PITS SHALL BE UNDERTAKEN IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS.
23. ANY ADDITIONAL PENETRATIONS SHALL BE CORE DRILLED. DEMOLITION SAWS ARE NOT TO BE USED IN ANY CIRCUMSTANCES.
24. FINAL INTERNAL PIT DIMENSIONS ARE TO COMPLY WITH AS 3500.3

EXISTING SERVICES

1. ALL UTILITY SERVICES INDICATED ON THE DRAWINGS ORIGINATE FROM SUPPLIED DATA, THEREFORE THEIR ACCURACY AND COMPLETENESS IS NOT GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE AND CONFIRM THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
2. CARE TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER ALL LIVE SERVICES. HAND EXCAVATION ONLY IN THESE AREAS.
3. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING SERVICES THAT ARE TO BE RETAINED IN THE VICINITY OF THE PROPOSED WORKS. ANY AND ALL DAMAGE TO THESE SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT, AND AT NO EXTRA COST.
4. THE CONTRACTOR SHALL ALLOW IN THE PROGRAM FOR ADJUSTMENT (IF REQUIRED) OF EXISTING SERVICES IN AREAS AFFECTED BY WORKS.
5. THE CONTRACTOR SHALL ALLOW IN THE PROGRAM FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF EXISTING SERVICES IN AREAS AFFECTED BY WORKS UNLESS DIRECTED OTHERWISE ON THE DRAWINGS OR BY THE SUPERINTENDENT.
6. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED.
7. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN APPROVAL OF THE PROGRAM FOR THE RELOCATION AND/OR CONSTRUCTION OF TEMPORARY SERVICES AND FOR ANY ASSOCIATED INTERRUPTION OF SUPPLY.
8. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
9. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION A THOROUGH SEARCH OF ALL SERVICE AUTHORITIES SHOULD BE MADE TO DETERMINE THE POSSIBLE LOCATION OF ANY FURTHER UNDERGROUND SERVICES.
10. AUTHORITY PLANS GENERALLY SHOW ONLY THE PRESENCE OF CABLES AND PLANT AND DO NOT WARRANT OR GUARANTEE THAT SUCH PLANS ARE ACCURATE. DO NOT ASSUME DEPTH OR ALIGNMENT OF CABLES OR PLANT AS THESE VARY SIGNIFICANTLY. THE CONTRACTOR HAS A DUTY OF CARE WHEN EXCAVATING NEAR EXISTING SERVICES AND PLANT. BEFORE USING MACHINE EXCAVATORS SERVICES MUST FIRST BE PHYSICALLY EXPOSED BY SOFT DIG POTHOLING TO IDENTIFY IT'S LOCATION.
11. THE CONTRACTOR IS TO UNDERTAKE A DIAL-BEFORE-YOU-DIG SEARCH PRIOR TO ANY EXCAVATION AND MAINTAIN A CURRENT SET ON-SITE DURING EXCAVATION WORKS.
12. THE LOCATIONS OF UNDERGROUND SERVICES SHOWN IN THIS SET OF DRAWINGS HAVE BEEN PLOTTED FROM SURVEY INFORMATION AND SERVICE AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE. HJ CONSULT CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN FROM ANY CAUSE WHATSOEVER.
13. CONTRACTORS SHALL TAKE DUE CARE WHEN EXCAVATING ONSITE INCLUDING HAND EXCAVATION WHERE NECESSARY. CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION WORKS. CONTRACTORS ARE TO UNDERTAKE A SERVICES SEARCH, PRIOR TO COMMENCEMENT OF WORKS ON SITE. SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES

PAVEMENT AND TRENCHES

1. MAKE SMOOTH CONNECTION WITH EXISTING WORKS. MATCH NEW PAVEMENT LAYERS NEATLY AND FLUSH WITH EXISTING WHERE REQUIRED.
2. THE CONTRACTOR SHALL CONFIRM THE DESIGN CBR WITH A MINIMUM OF 3 TESTS TAKEN AT SUBGRADE LEVEL. WHERE DISCREPANCY IS FOUND, CONTACT THE SUPERINTENDENT AND PROJECT MANAGER
3. ALLOW FOR COMPACTION TESTING BY NATA REGISTERED LABORATORY FOR: BASE LAYER, SUBBASE LAYER, SUBGRADE IN ACCORDANCE WITH THE LATEST VERSION OF AS3798 FOR PAVEMENTS. ALLOW FOR AT LEAST TWO SUCCESSFUL COMPACTION TESTS IN EACH LAYER.
4. 6. KEY NEW BASE AND SUBBASE LAYERS INTO EXISTING WITH 150mm WIDE STEPS. ASPHALTIC CONCRETE WEARING COURSE IS TO EXTEND 150mm (MIN) PAST BASECOURSE INTERFACE.
5. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENT SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MIN 50mm IN BITUMINOUS PAVING.
6. ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL
7. ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)
8. PROVIDE 10mm WIDE EXPANSION JOINTS BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVEMENTS.
9. ALL ASPHALTIC CONCRETE (AC) WORK TO BE PREPARED AND CARRIED OUT IN ACCORDANCE WITH GOOD ASPHALTIC PAVING PRACTICE AS DESCRIBED IN AS2734 "ASPHALT (HOT-MIXED) PAVING - GUIDE TO GOOD PRACTICE" AND CURRENT TINSW SPECIFICATIONS (R116).
10. WHERE NOMINATED, THE CONTRACTOR SHALL ALLOW FOR ALL COMPONENTS OF PROPRIETARY JOINTING SYSTEMS INCLUDING FIXING,TEMPLATES & PEGGING TO ENSURE THAT ALL DOWEL BARS REMAIN IN THE CORRECT ALIGNMENT AND POSITION.
11. ALL BASE COURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH TINSW. FORM 3051 (UNBOUND), RMS. FORM 3052 (BOUND) COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1 FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m³ OF BASECOURSE MATERIAL PLACED.
6. ALL SUB-BASE COURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH RMS. FORM 3051 (UNBOUND), TINSW. FORM 3052 (BOUND) COMPACTED TO MINIMUM 95% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1 FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m³ OF BASECOURSE MATERIAL PLACED.
7. AS AN ALTERNATIVE TO THE USE OF IGNEOUS ROCK AS A SUB-BASE MATERIAL AS PER ABOVE A CERTIFIED RECYCLED CONCRETE MATERIAL COMPLYING WITH TINSW. SPECIFICATION 3051 WILL BE CONSIDERED. SUBJECT TO MATERIAL SAMPLES AND APPROPRIATE CERTIFICATIONS BEING PROVIDED TO THE SATISFACTION OF HJ CONSULT
8. SHOULD THE CONTRACTOR WISH TO USE A RECYCLED PRODUCT THIS SHALL BE CLEARLY INDICATED IN THEIR TENDER AND THE PRICE DIFFERENCE BETWEEN AN IGNEOUS PRODUCT AND A RECYCLED PRODUCT SHALL BE CLEARLY INDICATED.

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales

Surveyor: SDG

Architect: COX

Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project: NICHOLSON PLACE
ST LEONARDS

Title: GENERAL NOTES
SHEET 1

HJ CONSULT
email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1001

Issue: A

CONCRETE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. CONCRETE QUALITY
   ALL REQUIREMENTS OF THE CURRENT ACSE CONCRETE SPECIFICATION DOCUMENT 1 SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND CONCRETE UNLESS NOTED OTHERWISE.

ELEMENT	AS 3600 F'c MPa AT 28 DAYS	SPECIFIED SLUMP	NOMINAL AGG. SIZE
VEHICULAR BASE	32	60	20
KERBS, PATHS, AND PITS	32	80	20

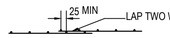
   - CEMENT TYPE SHALL BE (ACSE SPECIFICATION) TYPE SL
   - PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379.
3. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING BY HJ CONSULT
4. CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE 40mm TOP AND 70mm FOR EXTERNAL EDGES UNLESS NOTED OTHERWISE.
5. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.
6. THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED AND CURED IN ACCORDANCE WITH TINSW SPECIFICATION R83.
7. REINFORCEMENT SYMBOLS:

N DENOTES GRADE 450 N BARS TO AS/NZS 4671 GRADE N
R DENOTES 230 R HOT ROLLED PLAIN BARS TO AS/NZS 4671
SL DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS/NZS 4671

NUMBER OF BARS IN GROUP — BAR GRADE AND TYPE
17 N 20 250
NOMINAL BAR SIZE IN mm — SPACING IN mm

THE FIGURE FOLLOWING THE FABRIC SYMBOL SL IS THE REFERENCE NUMBER FOR FABRIC TO AS/NZS 4671.

8. FABRIC SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING DETAIL:



KERBING NOTES

1. ALL CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 32MPa U.N.O IN REINFORCED CONCRETE NOTES.
2. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON 100mm GRANULAR BASECOURSE COMPACTED TO MINIMUM 95% MODIFIED DRY DENSITY (AS 1289 5.2.1).
3. EXPANSION JOINTS (E.J) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILLER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
4. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
5. BROOMED FINISH TO ALL RAMPED AND VEHICULAR CROSSINGS. ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
6. IN THE REPLACEMENT OF KERB AND GUTTER :-
   EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm U.N.O FROM THE LIP OF GUTTER. UPON COMPLETION OF THE NEW KERB AND GUTTER NEW BASECOURSE AND SURFACE TO BE LAID 600mm WIDE U.N.O.

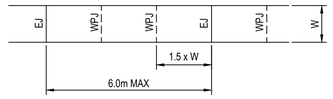
   EXISTING ALLOTMENT DRAINAGE PIPES ARE TO BE BUILT INTO THE NEW KERB AND GUTTER WITH 100mm DIA HOLE.

   EXISTING KERB AND GUTTER IS TO BE COMPLETELY REMOVED WHERE NEW KERB AND GUTTER IS SHOWN

JOINTING NOTES

PEDESTRIAN PAVEMENT

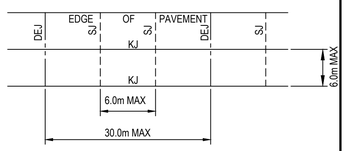
1. ALL PEDESTRIAN PAVEMENTS ARE TO BE JOINTED AS FOLLOWS. (U.N.O)
2. EXPANSION JOINTS ARE TO BE LOCATED WHERE POSSIBLE AT TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX. 6.0m CENTRES.
3. WEAKENED PLANE JOINTS ARE TO BE LOCATED AT A MAX. SPACING OF 1.5 x WIDTH OF THE PAVEMENT.
4. WHERE POSSIBLE JOINTS SHOULD BE LOCATED TO MATCH KERBING AND OR ADJACENT PAVEMENT JOINTS.
5. PEDESTRIAN PAVEMENT JOINT DETAIL.



NOTE: COUNCIL STANDARDS TAKE PRECEDENCE WITHIN ROAD RESERVE.

VEHICULAR PAVEMENT

6. ALL VEHICULAR PAVEMENTS TO BE JOINTED AS FOLLOWS. (U.N.O)
7. TIED KEYED CONSTRUCTION JOINTS SHOULD GENERALLY BE LOCATED AT A MAX OF 6.0m CENTRES LONGITUDINALLY
8. SAWN JOINTS SHOULD GENERALLY BE LOCATED AT A MAX OF 6.0m CENTRES WITH DOWELED EXPANSION JOINTS AT MAX 30.0m CENTRES
9. TYPICAL VEHICULAR PAVEMENT JOINT DETAIL.



NOTE: COUNCIL STANDARDS TAKE PRECEDENCE WITHIN ROAD RESERVE.

10. PROVIDE 10mm EXPANSION FOAM BETWEEN NEW CONCRETE WORKS AND EXISTING STRUCTURES
11. DOWELS TO BE PLACED ON PROPRIETARY CRADLES TO ENSURE CORRECT SPACING AND ALIGNMENT

EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

1. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO CONTROL EROSION AND DOWNSTREAM SEDIMENTATION DURING ALL STAGES OF CONSTRUCTION INCLUDING THE MAINTENANCE PERIOD.
2. THE EXTENT AND POSITION OF THE EROSION AND SEDIMENT CONTROL MEASURES TO BE DETERMINED ON SITE BY THE CONTRACTOR TO SUIT THE CONSTRUCTION PROGRAM.
3. THESE PLANS PRESENT CONCEPTS ONLY AND THE MEASURES SHOWN ON THIS DRAWING(S) ARE MINIMUM REQUIREMENTS ONLY.
4. THE CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR THE ESTABLISHMENT, MANAGEMENT AND MAINTENANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES TO MEET COUNCIL/EPA STANDARDS.
5. LARGE OPEN AREAS OR STEEP BATTERS SHOULD NOT BE LEFT EXPOSED/UNSTABILISED FOR MORE THAN 10 DAYS OR IF WET WEATHER IS FORECAST.
6. EXPOSED AREAS INCLUDING BATTERS WHICH REMAIN UN-WORKED FOR MORE THEN 10 DAYS SHOULD BE STABILISED USING TEMPORARY HYDROMULCHING, HYDROSEEDING OR MULCHING, EVEN IF AREAS WILL BE WORKED AT A LATER TIME.
7. ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH :-
   a) LOCAL AUTHORITY REQUIREMENTS
   b) NSW DEPARTMENT OF HOUSING MANUAL "MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTIOJN" 4th EDITION, MARCH 2004
   b) EPA REQUIREMENTS
8. THE CONTRACTOR SHALL BE AWARE OF ITS RESPONSIBILITIES FOR PROTECTING THE DOWNSTREAM ENVIRONMENT AND RECEIVING WATER FROM POLLUTION AND ENVIRONMENTAL HARM, UNDER THE ENVIRONMENTAL PROTECTION ACT 1994.
9. ADDITIONALLY THE CONTRACTOR SHALL BE AWARE OF ITS DUTY TO NOTIFY THE LOCAL AUTHORITY AND THE ENVIRONMENTAL PROTECTION AGENCY (NSW) OF A POTENTIAL OR ACTUAL INCIDENT OF ENVIRONMENTAL HARM, UNDER THE ENVIRONMENTAL PROTECTION ACT 1994.

RECOMMENDED IMPLEMENTATION SEQUENCE:

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND FUNCTIONAL PRIOR TO WORKS COMMENCING AND IN THE FOLLOWING SEQUENCE.
   a. CONSTRUCT TEMPORARY STABILISED SITE ACCESS, ENSURING ADJACENT STORMWATER RUN OFF IS DIVERTED AWAY FROM ACCESS
   b. INSTALL SEDIMENT FENCING AND/OR BARRIER FENCING TO CONFINE INGRESS TO AND EGRESS FROM THE SITE TO STABILISED ACCESS POINT(S) ONLY.
   c. PROVIDE INLET PROTECTION TO STORMWATER INLETS AND GULLIES ON ALL ROADS ADJOINING THE SITE.
   d. CONSTRUCT BARRIER FENCING AROUND RESTRICTED 'NO-GO' ZONES OF RETAINED VEGETATION, AREAS NOT TO BE DISTURBED AND AREAS WHICH WILL REMAIN UN-WORKED AS REQUIRED.
   e. CONSTRUCT UPSTREAM DIVERSION CHANNELS TO DIVERT CLEAN WATER AROUND WORKSITE, AND INSTALL APPROPRIATE CHANNEL STABILISATION.
   f. CONSTRUCT LOW FLOW EARTH BANKS AS CATCH DRAINS PARALLEL TO CONTOURS TO LIMIT LARGE SLOPE LENGTHS (SLOPES SHOULD BE LESS THEN 80M IN LENGTH).
   g. INSTALL ALL TEMPORARY SEDIMENT FENCES.
   h. CONSTRUCT ANY NOMINATED SEDIMENT BASINS AND SEDIMENT TRAPS.
   i. STABILISE ALL DISTURBED AREAS ASAP AND PROGRESSIVELY AS WORKS ARE COMPLETED. TEMPORARY STABILISATION TO BE DONE USING MULCHING, HYDROMULCHING, HYDROSEEDEDING OR DIRECT SEEDING TO GIVE A 70% COVERAGE OF GROUND SURFACE WITHIN 14 DAYS OF WORKS COMPLETING (EVEN IF WORKS MAY CONTINUE LATER).
2. UNDERTAKE SITE DEVELOPMENT WORKS SO THAT LAND DISTURBANCE IS CONFINED TO MINIMUM WORKABLE AREAS.
3. DISTURBED AREAS TO EXTEND NO MORE THAN 5 METRES (PREFERABLY 2 METRES) FROM ESSENTIAL WORKS AREAS.
4. WORK AREAS TO BE DELINEATED BY BARRIER FENCING AND DIVERSION CHANNEL UPSLOPE AND SEDIMENT FENCING DOWNSLOPE.
5. THE CONTRACTOR SHALL ENSURE THAT THE EXISTING VEGETATION AND GROUNDCOVER IS RETAINED AS MUCH AS POSSIBLE.
6. TOPSOIL SHALL BE STRIPPED AND STOCKPILED FOR LATER USE ONSITE.
7. SITE VEGETATION APPROVED FOR CLEARING SHOULD BE MULCHED AND STOCKPILED FOR LATER USE IN LANDSCAPING, STABILISATION AND/OR SITE REHABILITATION WORKS.
8. AT ALL TIMES THE CONTRACTOR SHALL MONITOR THE PREVAILING WEATHER CONDITIONS AND PROTECT ANY DOWNSTREAM CONSTRUCTION AND RECEIVING ENVIRONMENTS.
9. EROSION AND SEDIMENT CONTROL PROTECTION MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR THROUGHOUT CONTRACT.
10. PLANS AND CONTROL MEASURES FOR LARGE SITES WILL NEED TO BE REVISED AND UPDATED TO REFLECT THE SITE STAGES AND PROGRESSION OF WORKS.
11. MEASURES INCLUDING SEDIMENT FENCES SHOULD BE MOVED AND REINSTATED AS WORKS PROGRESS.
12. FOOT AND VEHICULAR TRAFFIC TO BE RESTRICTED IN RECENTLY STABILISED AREAS INCLUDING THOSE HYDROSEEDED, TURFED OR SEEDED.

DUST CONTROL

1. DURING WINDY AND DRY WEATHER ANY UNPROTECTED AREAS SHALL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL. WHERE WATER IS NOT AVAILABLE IN SUFFICIENT QUANTITIES, SOIL BINDERS OR DUST RETARDANTS TO BE USED FOR DUST SUPPRESSION.
2. EXPOSED SURFACES INCLUDING BATTERS SHOULD BE LEFT ROUGH TO REDUCE WIND SPEEDS AND POTENTIAL FOR WIND EROSION.
3. USE OPEN WEAVE BARRIER FENCING ON WINDWARD SIDE OF SITE IF REQUIRED. FENCING IS GENERALLY REQUIRED WHERE AREA OF DISTURBANCE IS >5000m².

CONTROL MEASURES

1. FINAL SITE LANDSCAPING SHALL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS OF CONSTRUCTION COMPLETION.
2. SEDIMENT LADEN WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM BY USING INLET PROTECTION.
3. ALL PERIMETER BANKS AND CHANNEL DRAINS SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
4. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED ONCE SITE IS STABILISED AND UPSTREAM WORKS HAVE BEEN COMPLETED.
5. AT CONSTRUCTION COMPLETION ALL TEMPORARY EARTH STRUCTURES, INCLUDING SOIL STOCKPILES ARE TO BE TRACK ROLLED AND SEEDED. THE CONTRACTOR IS TO ENSURE A 70% COVERAGE WITHIN 14 DAYS.

OTHER MATTERS

1. ACCEPTABLE RECEPTORS AND DISPOSAL PRACTICES WILL BE USED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHERS, LITTER AND GENERAL WASTE MATERIALS.
2. ANY EXISTING TREES WHICH ARE NOT REQUIRED OR APPROVED TO BE CLEARED FOR THE WORKS AND/OR FORM PART OF THE FINAL LANDSCAPING PLAN SHOULD BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY:
   a. PROTECTING THEM WITH BARRIER FENCING OR MARKERS.
   b. ENSURING NOTHING IS NAILED TO THEM
   c. PROHIBITING PAVING, GRADING OR PLACING OF STOCKPILES WITHIN DRIP LINE.
3. ALL VEHICLE AND EQUIPMENT WASHING SHOULD BE CONTAINED IN SPECIFIC BUNDED AREAS, DISCONNECTED FROM CONCENTRATED FLOW PATHS AND THE STORMWATER SYSTEM.
4. ANY NECESSARY VEHICLE OR EQUIPMENT REFUELING SHOULD BE UNDERTAKEN AWAY FROM CONCENTRATED FLOW PATHS AND PREFERABLY WITHIN A BUNDED AREA.
5. ANY ONSITE FUEL STORAGE AREAS SHOULD BE COVERED AND BUNDED.

MAINTENANCE OF PUBLIC ROADS

1. ALL CONSTRUCTION VEHICLES DEPARTING FROM THE SITE SHALL HAVE THEIR TYRES WASHED DOWN OR SEDIMENT REMOVED BY A STABILISED SITE ACCESS DEVICE.
2. THE STABILISED SITE ACCESS AREAS SHALL BE LOCATED SUCH THAT SILTED WATER IS FILTERED THROUGH A SUITABLE SEDIMENT TRAP (SUCH AS A SEDIMENT FENCE) INSTALLED DOWNSTREAM OF ACCESS.
3. THE CONTRACTOR SHALL INSPECT THE PUBLIC ROADS ADJACENT TO THE SITE DAILY AND MANUALLY REMOVE ANY SEDIMENT DEPOSITS (BY SWEEPING NOT WASH DOWN).

SITE INSPECTION AND MAINTENANCE

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED REGULARLY, IMMEDIATELY BEFORE SITE CLOSURE, PRIOR TO PREDICTED LARGE STORM EVENTS AND AFTER EVERY SIGNIFICANT (> 5mm) RAINFALL EVENT OR AT LEAST ON A WEEKLY BASIS.
2. THE CONTRACTOR WILL AS A MINIMUM CONDUCT EACH INSPECTION IN LINE WITH THE FOLLOWING
   a. RECORD TYPE OF DEVICE/CONTROL MEASURE BEING INSPECTED AND ITS LOCATION;
   b. RECORD THE CONDITION OF EVERY CONTROL MEASURE;
   c. RECORD MAINTENANCE REQUIREMENTS FOR EVERY CONTROL DEVICE;
   d. RECORD SEDIMENT VOLUMES REMOVED FROM SEDIMENT TRAPPING DEVICES;
   e. RECORD DETAILS OF SEDIMENT BASIN TREATMENT, FLOCCULANT DOSAGE AND CLEANOUT;
   f. RECORD SEDIMENT DISPOSAL PROCEDURES AND LOCATION.
3. REPAIRS AND MAINTENANCE OF ALL DEVICES AND MEASURES INCLUDING DIVERSION CHANNELS SHALL BE UNDERTAKEN AS REQUIRED, ENSURING ALL MEASURES ARE FULLY FUNCTIONAL AT ALL TIMES.
4. ENSURE SEDIMENT LADEN WATER HAS NOT BEEN DIVERTED AROUND DEVICES.
5. REPAIR SCOUR DAMAGE TO SEDIMENT CONTROL MEASURES AFTER RAINFALL EVENTS AND REINSTATE DEVICES AS NECESSARY.
6. SEDIMENT FENCES WILL REQUIRE CLEANING WHEN SEDIMENT REACHES 300MM DEPTH OR ONE-HALF THE HEIGHT OF THE FILTER FABRIC AND ALL OTHER SEDIMENT TRAPS WILL REQUIRE CLEANING OUT WHEN 30% OF DESIGN CAPACITY IS REACHED.
7. ALL INLET AND GULLY TRAPS TO BE CLEANED NOT HOSED AFTER EVERY RAINFALL EVENT, (1>5mm) OR AT LEAST ON A WEEKLY BASIS.
8. SEDIMENT REMOVED FROM ANY TRAPPING DEVICE TO BE RELOCATED,
   ENSURING FURTHER POLLUTION TO DOWNSTREAM ENVIRONMENTS WILL NOT OCCUR.
9. ALL SEEDING, HYDROSEEDING AND TURFING REQUIRES REGULAR WATERING, UNTIL EFFECTIVE COVER ESTABLISHED AND PLANTS ARE GROWING VIGOROUSLY. WATERING SHOULD VARY DEPENDING ON WEATHER AND SOIL CONDITIONS.
10. WATERING SHOULD START IMMEDIATELY AFTER PLANTING AND SHOULD COMPLY WITH THE FOLLOWING AS A MINIMUM:
    WEEK 1 3 WATERINGS/WEEK
    WEEK 2-6 2 WATERINGS/WEEK
    WEEK 7-12 1 WATERING/WEEK
11. EXCESSIVE VEGETATION GROWTH WILL BE CONTROLLED THROUGH MOWING OR SLASHING.
12. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE INSPECTION, MAINTENANCE AND TESTING OF DEVICES IS UNDERTAKEN ON SITE.
13. THE CONTRACTOR TO KEEP DETAILED AND LEGIBLE RECORDS OF ALL INSPECTION AND MAINTENANCE UNDERTAKEN ON THE EROSION AND SEDIMENT CONTROL DEVICES.
14. ALL SITE WASTE INCLUDING GENERAL RUBBISH TO BE DISPOSED OF IN AN ENVIRONMENTALLY RESPONSIBLE MANNER IN ACCORDANCE WITH THE ENVIRONMENTAL PROTECTION (WASTE MANAGEMENT) POLICY 2000 AND ENVIRONMENTAL PROTECTION (WASTE MANAGEMENT) REGULATION 2000.
15. THE CONTRACTOR SHALL CONSTRUCT AND IMPLEMENT ADDITIONAL MEASURES AS NECESSARY TO ENSURE PROTECTION OF DOWNSTREAM ENVIRONMENTS.

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales

Surveyor: SDG

Architect: COX

Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project: NICHOLSON PLACE
ST LEONARDS

Title: GENERAL NOTES
SHEET 2

HJ CONSULT
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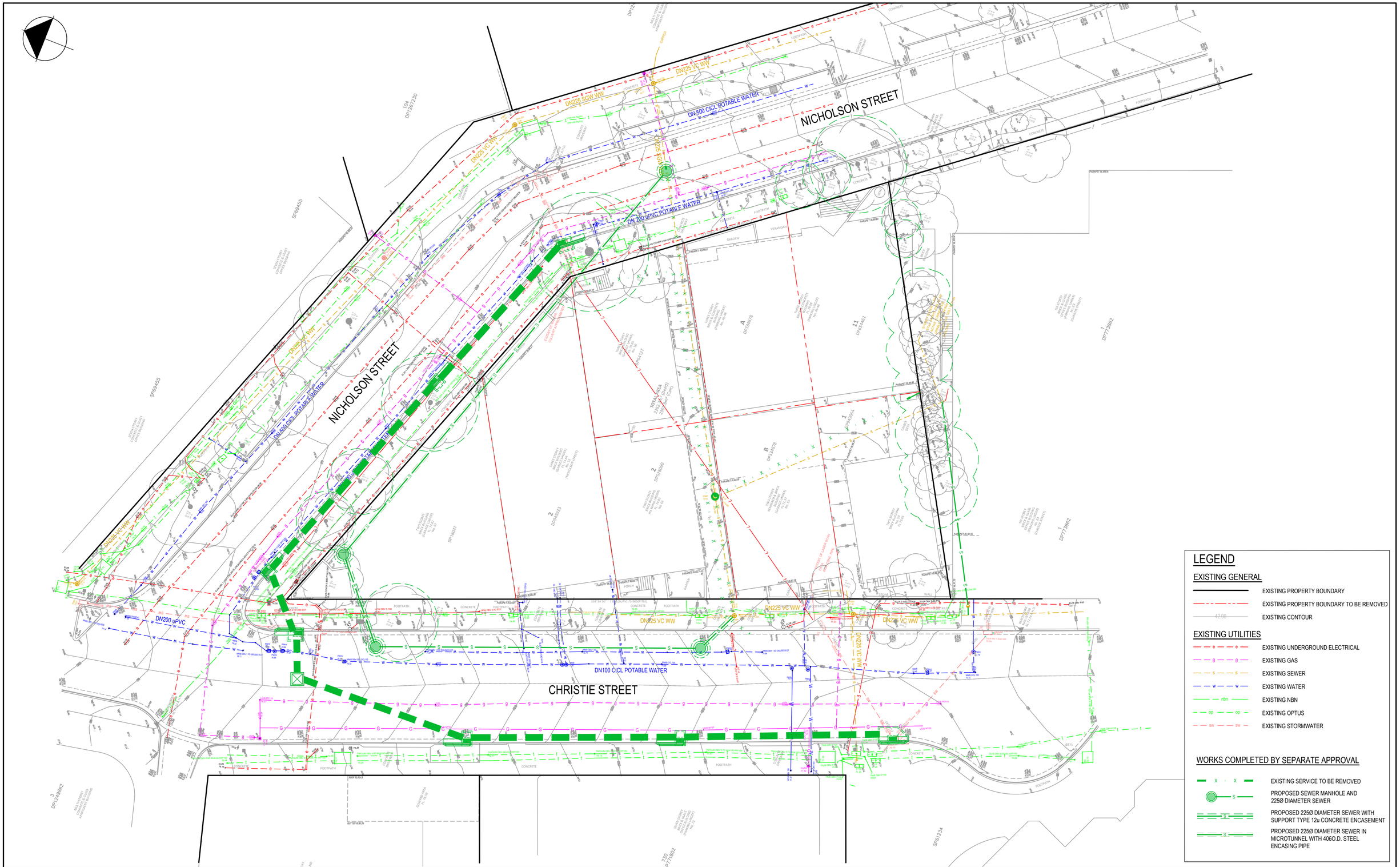
Drawing No. 24-1018-CIV-1002

Issue A



LEGEND

EXISTING GENERAL

▬	EXISTING PROPERTY BOUNDARY
— · —	EXISTING PROPERTY BOUNDARY TO BE REMOVED
42.00	EXISTING CONTOUR

EXISTING UTILITIES

— e — e	EXISTING UNDERGROUND ELECTRICAL
— g — g	EXISTING GAS
— s — s	EXISTING SEWER
— w — w	EXISTING WATER
— nbn	EXISTING NBN
— op — op	EXISTING OPTUS
— sw — sw	EXISTING STORMWATER

WORKS COMPLETED BY SEPARATE APPROVAL

— x — x —	EXISTING SERVICE TO BE REMOVED
◎ — s	PROPOSED SEWER MANHOLE AND 225Ø DIAMETER SEWER
═ S ═	PROPOSED 225Ø DIAMETER SEWER WITH SUPPORT TYPE 12u CONCRETE ENCASEMENT
— S —	PROPOSED 225Ø DIAMETER SEWER IN MICROTUNNEL WITH 406O.D. STEEL ENCASING PIPE

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor

sds

Architect

COX

Client

CORONATION

Status

FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project

NICHOLSON PLACE
ST LEONARDS

Title

EXISTING SITE
PLAN

HJ CONSULT

email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1004

Issue A

NICHOLSON STREET

NICHOLSON STREET

CHRISTIE STREET

DN 500 CICL POTABLE WATER

DN 250 CICL POTABLE WATER

DN200 uPVC

DN100 CICL POTABLE WATER

CAR PARK SUPPLY FAN ROOM
FFL 72.500
61 m²

SWIMMING POOL PLANT
FFL 72.500
55 m²

SWIMMING POOL AC PLANT
FFL RL 72.500
25 m²

MAIN SWITCH ROOM
FFL 72.500
72 m²

COMMS ROOM
FFL 72.500
28 m²

FIRE TANKS
FFL 72.500
58 m²

FIRE PUMP ROOM
FFL 72.500
58 m²

PLUNGE POOLS
FFL 72.500

GAS METER ROOM
FFL 72.500
20 m²

LEGEND

EXISTING GENERAL

- EXISTING PROPERTY BOUNDARY
- EXISTING PROPERTY BOUNDARY TO BE REMOVED
- 42.00 EXISTING CONTOUR

EXISTING UTILITIES

- EXISTING UNDERGROUND ELECTRICAL
- EXISTING GAS
- EXISTING SEWER
- EXISTING WATER
- EXISTING NBN
- EXISTING OPTUS
- EXISTING STORMWATER

WORKS COMPLETED BY SEPARATE APPROVAL

- EXISTING SERVICE TO BE REMOVED
- PROPOSED SEWER MANHOLE AND 225Ø DIAMETER SEWER
- PROPOSED 225Ø DIAMETER SEWER WITH SUPPORT TYPE 12u CONCRETE ENCASEMENT
- PROPOSED 225Ø DIAMETER SEWER IN MICROTUNNEL WITH 406O.D. STEEL ENCASING PIPE

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor: SDG

Architect: COX

Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures

Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

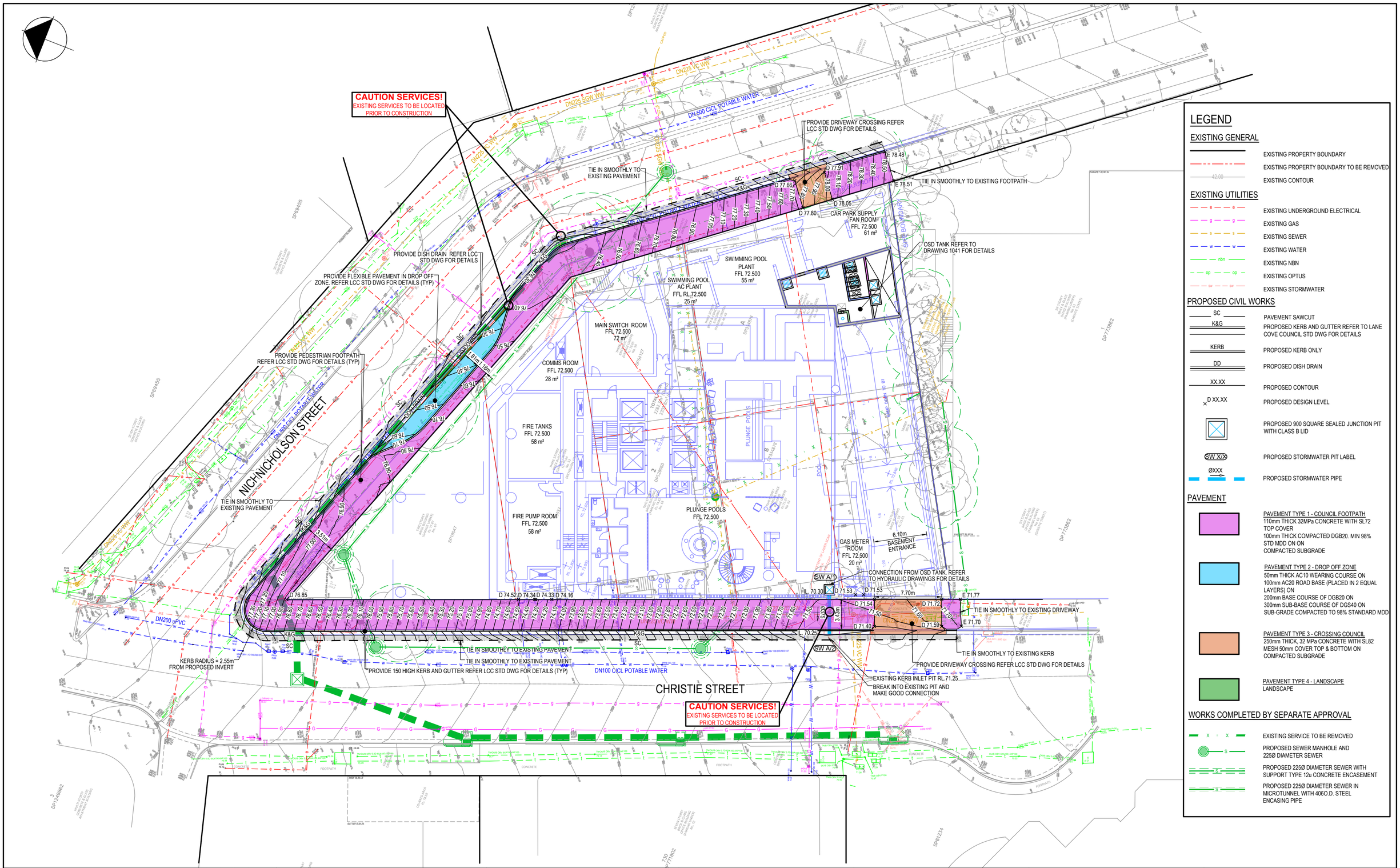
Project: NICHOLSON PLACE
ST LEONARDS

Title: GENERAL ARRANGEMENT PLAN

HJ CONSULT
email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1005

Issue A



LEGEND

EXISTING GENERAL

- EXISTING PROPERTY BOUNDARY
- EXISTING PROPERTY BOUNDARY TO BE REMOVED
- 42.00 EXISTING CONTOUR

EXISTING UTILITIES

- EXISTING UNDERGROUND ELECTRICAL
- EXISTING GAS
- EXISTING SEWER
- EXISTING WATER
- EXISTING NBN
- EXISTING OPTUS
- EXISTING STORMWATER

PROPOSED CIVIL WORKS

- SC PAVEMENT SAWCUT
- K&G PROPOSED KERB AND GUTTER REFER TO LANE COVE COUNCIL STD DWG FOR DETAILS
- KERB PROPOSED KERB ONLY
- DD PROPOSED DISH DRAIN
- XX.XX PROPOSED CONTOUR
- D XX.XX PROPOSED DESIGN LEVEL
- PROPOSED 900 SQUARE SEALED JUNCTION PIT WITH CLASS B LID
- SW X/X PROPOSED STORMWATER PIT LABEL
- ØXXX PROPOSED STORMWATER PIPE

PAVEMENT

- PAVEMENT TYPE 1 - COUNCIL FOOTPATH
  110mm THICK 32MPa CONCRETE WITH SL72 TOP COVER
  100mm THICK COMPACTED DGB20. MIN 98% STD MDD ON ON COMPACTED SUBGRADE
- PAVEMENT TYPE 2 - DROP OFF ZONE
  50mm THICK AC10 WEARING COURSE ON 100mm AC20 ROAD BASE (PLACED IN 2 EQUAL LAYERS) ON
  200mm BASE COURSE OF DGB20 ON 300mm SUB-BASE COURSE OF DGS40 ON SUB-GRADE COMPACTED TO 98% STANDARD MDD
- PAVEMENT TYPE 3 - CROSSING COUNCIL
  250mm THICK, 32 MPa CONCRETE WITH SL82 MESH 50mm COVER TOP & BOTTOM ON COMPACTED SUBGRADE
- PAVEMENT TYPE 4 - LANDSCAPE
  LANDSCAPE

WORKS COMPLETED BY SEPARATE APPROVAL

- EXISTING SERVICE TO BE REMOVED
- PROPOSED SEWER MANHOLE AND 225Ø DIAMETER SEWER
- PROPOSED 225Ø DIAMETER SEWER WITH SUPPORT TYPE 12u CONCRETE ENCASEMENT
- PROPOSED 225Ø DIAMETER SEWER IN MICROTUNNEL WITH 406O.D. STEEL ENCASING PIPE

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor: SDG

Architect: COX

Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures

Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

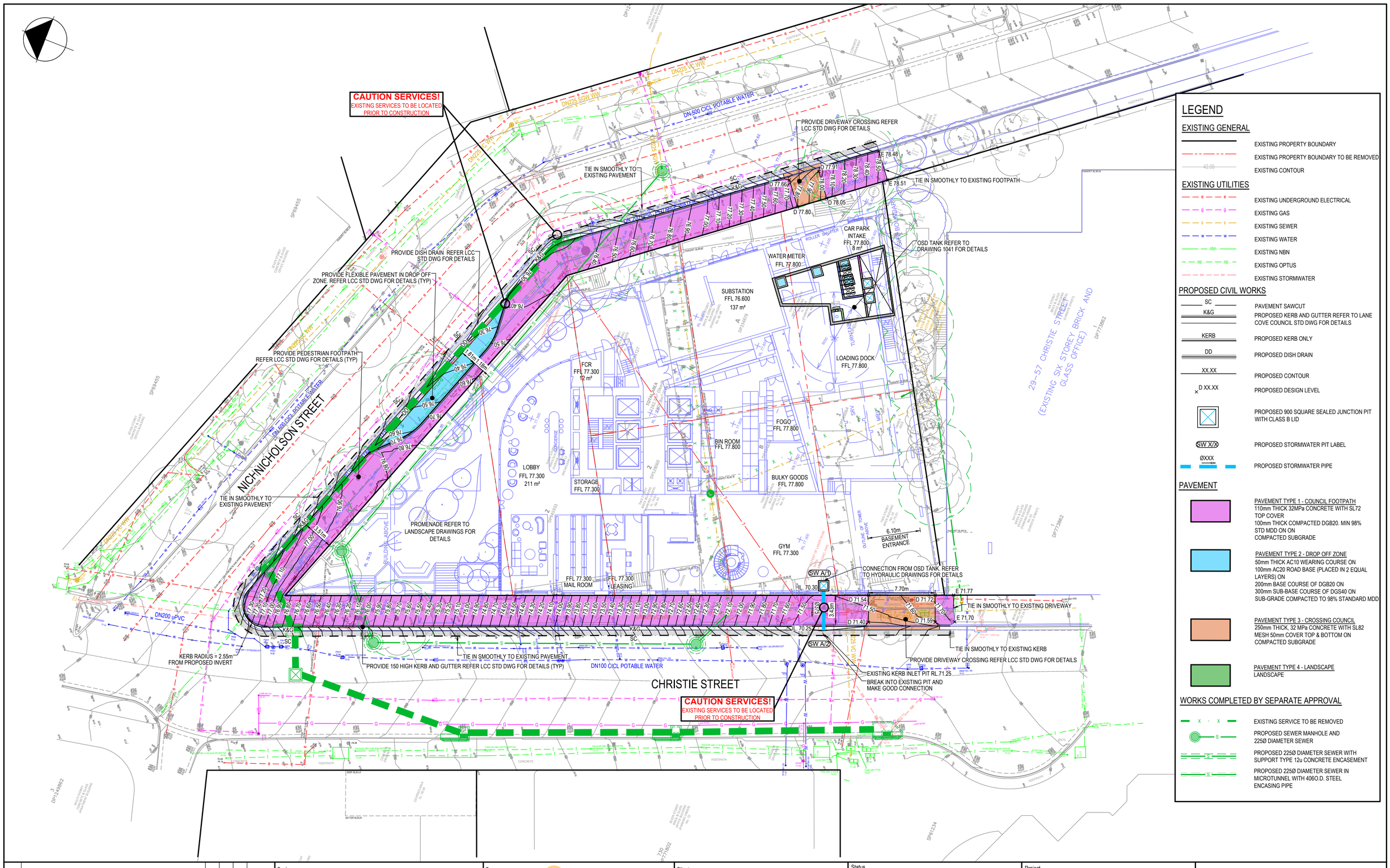
Project: NICHOLSON PLACE
ST LEONARDS

Title: CIVIL WORKS
PLAN SHEET 1
LOWER GROUND

HJ CONSULT
email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1020

Issue A



LEGEND

EXISTING GENERAL

	EXISTING PROPERTY BOUNDARY
	EXISTING PROPERTY BOUNDARY TO BE REMOVED
42.00	EXISTING CONTOUR

EXISTING UTILITIES

e e	EXISTING UNDERGROUND ELECTRICAL
g g	EXISTING GAS
s s	EXISTING SEWER
w w	EXISTING WATER
nbn	EXISTING NBN
op op	EXISTING OPTUS
sw sw	EXISTING STORMWATER

PROPOSED CIVIL WORKS

SC	PAVEMENT SAWCUT
K&G	PROPOSED KERB AND GUTTER REFER TO LANE COVE COUNCIL STD DWG FOR DETAILS
KERB	PROPOSED KERB ONLY
DD	PROPOSED DISH DRAIN
XX.XX	PROPOSED CONTOUR
× D XX.XX	PROPOSED DESIGN LEVEL
☒	PROPOSED 900 SQUARE SEALED JUNCTION PIT WITH CLASS B LID
SW X/X	PROPOSED STORMWATER PIT LABEL
ØXXX	PROPOSED STORMWATER PIPE

PAVEMENT

🟪	PAVEMENT TYPE 1 - COUNCIL FOOTPATH 110mm THICK 32MPa CONCRETE WITH SL72 TOP COVER 100mm THICK COMPACTED DGB20. MIN 98% STD MDD ON ON COMPACTED SUBGRADE
🟦	PAVEMENT TYPE 2 - DROP OFF ZONE 50mm THICK AC10 WEARING COURSE ON 100mm AC20 ROAD BASE (PLACED IN 2 EQUAL LAYERS) ON 200mm BASE COURSE OF DGB20 ON 300mm SUB-BASE COURSE OF DGS40 ON SUB-GRADE COMPACTED TO 98% STANDARD MDD
🟧	PAVEMENT TYPE 3 - CROSSING COUNCIL 250mm THICK, 32 MPa CONCRETE WITH SL82 MESH 50mm COVER TOP & BOTTOM ON COMPACTED SUBGRADE
🟩	PAVEMENT TYPE 4 - LANDSCAPE LANDSCAPE

WORKS COMPLETED BY SEPARATE APPROVAL

x x	EXISTING SERVICE TO BE REMOVED
S	PROPOSED SEWER MANHOLE AND 225Ø DIAMETER SEWER
S	PROPOSED 225Ø DIAMETER SEWER WITH SUPPORT TYPE 12u CONCRETE ENCASEMENT
S	PROPOSED 225Ø DIAMETER SEWER IN MICROTUNNEL WITH 406O.D. STEEL ENCASING PIPE

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales
0 1 2 3 4 6 8 12 16 20m
1 : 200 - A1 1 : 400 - A3

Surveyor
Architect
COX
Client
CORONATION

Status
FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures

Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project
NICHOLSON PLACE
ST LEONARDS

Title
CIVIL WORKS
PLAN SHEET 2
UPPER GROUND

HJ CONSULT
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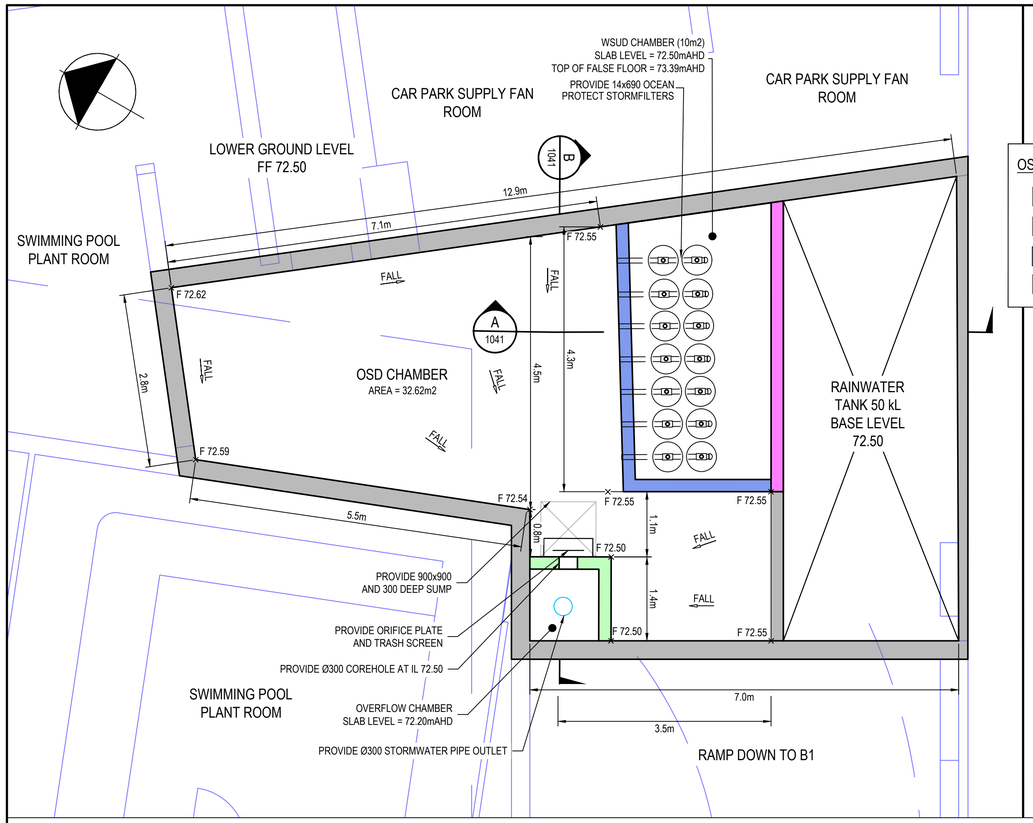
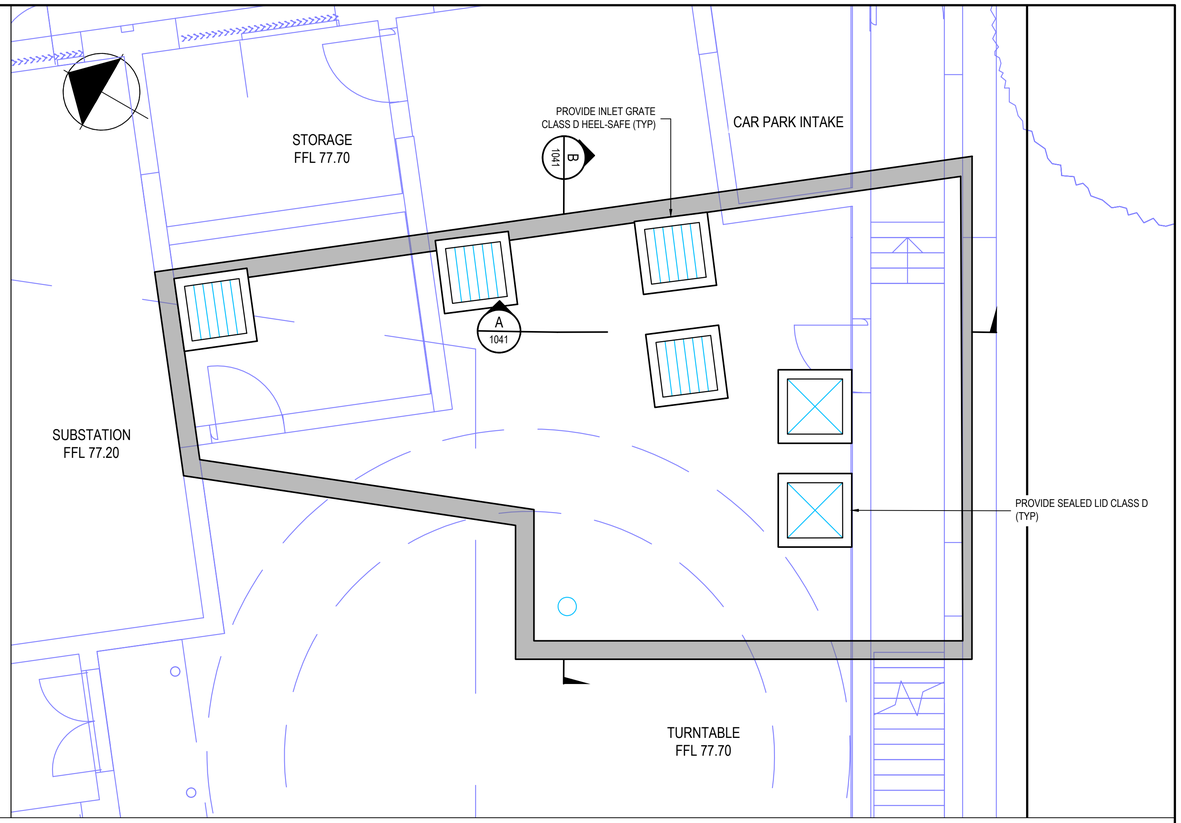
Drawing No. 24-1018-CIV-1021
Issue A



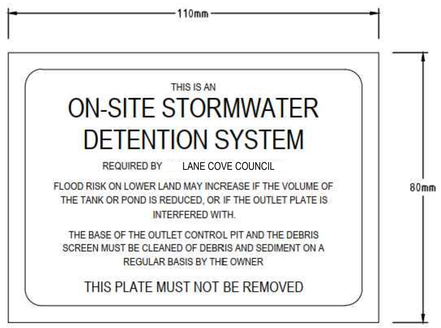
OSD PLAN
1 : 50



OSD ROOF PLAN
1 : 50

CONFINED SPACE DANGER SIGN

NOTES:
1. A CONFINED SPACE DANGER SIGN SHALL BE PLACED NEXT TO EACH AND EVERY ACCESS POINT SO THAT THEY ARE VISIBLE TO PERSONS ENTERING ANY BELOW GROUND TANK OR PIT.
2. COLOURS:
   "DANGER" AND BACKGROUND - WHITE
   ELLIPTICAL AREA - RED
   RECTANGLE CONTAINING ELLIPSE - BLACK
   LETTERING AND BORDER - BLACK
3. MINIMUM DIMENSIONS OF THE SIGN:
   LARGE ENTRIES: - 300mm x 450mm
   SMALL ENTRIES: - 250mm x 180mm
4. SIGN TO BE MADE FROM COLOUR BONDED ALUMINIUM OR POLYPROPYLENE.
5. SIGN FIXED USING HILTI CHEMSETS OR EXPOXY



ON SITE STORMWATER DETENTION SYSTEM SIGN

NOTES:
1. CORNERS SQUARE
2. COLOURS:
   ETCHED AND FILLED BLACK LEDGEND ON A NATURAL SILVER BACKGROUND.
3. CONSTRUCTED FROM ALUMINIUM 0.9mm MILL.
4. THIS SIGN SHALL BE PLACED IN A VISIBLE LOCATION NEAR A DISCHARGE CONTROL PIT OR AT THE ACCESS TO ONE.
5. SIGN FIXED USING HILTI CHEMSETS OR EXPOXY

ON SITE STORMWATER DETENTION WARNING SIGN

NOTES:
1. SIGN SHALL BE PLACED IN A CLEAR AND VISIBLE LOCATION AT EACH DETENTION BASIN.
2. COLOURS:
   TRIANGLE AND "WARNING" - RED
   WATER - BLUE
   FIGURE AND LETTERING - BLACK
3. SIGN TO BE MADE FROM COLOUR BONDED ALUMINIUM OR POLYPROPYLENE.
4. SIGN FIXED USING HILTI CHEMSETS OR EXPOXY

Issue	Description	DR	CH	VE	Date
A	ISSUED FOR APPROVAL	AM	GJ	GJ	08-09-25

Scales
0 0.5 1 1.5 2 3 4 5m
1 : 50 - A1 1 : 100 - A3

Surveyor: SDG
Architect: COX
Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project: NICHOLSON PLACE ST LEONARDS
Title: OSD TANK PLAN

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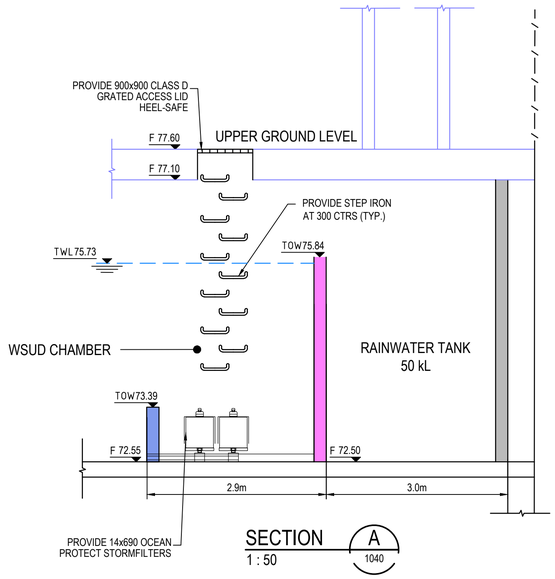
email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1040
Issue A



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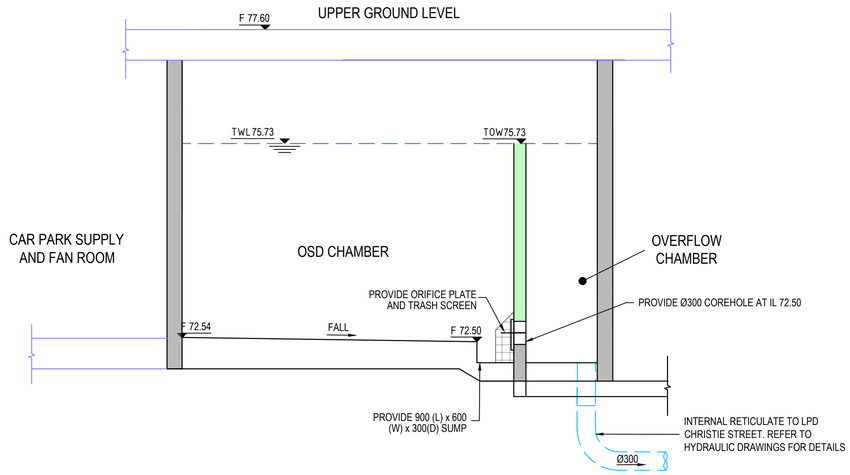
1 : 50
1040



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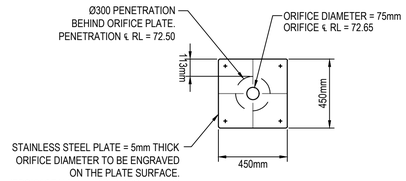
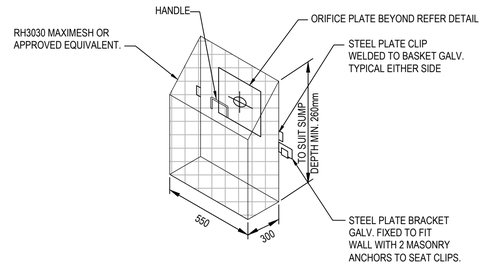
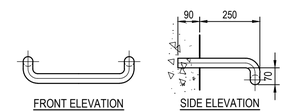
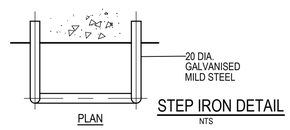


ORIFICE PLATE DETAIL
1 : 20



TRASH SCREEN DETAIL
N.T.S





STEP IRON DETAIL
NTS

Issue	Description	DR	CH	VE	Date
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Scales

0 200 500 750 1000 1500 2000mm
1 : 20 - A1 1 : 40 - A3

0 0.5 1 1.5 2 3 4 5m
1 : 50 - A1 1 : 100 - A3

Surveyor: SDG

Architect: COX

Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project: NICHOLSON PLACE
ST LEONARDS

Title: OSD TANK
SECTIONS AND DETAILS

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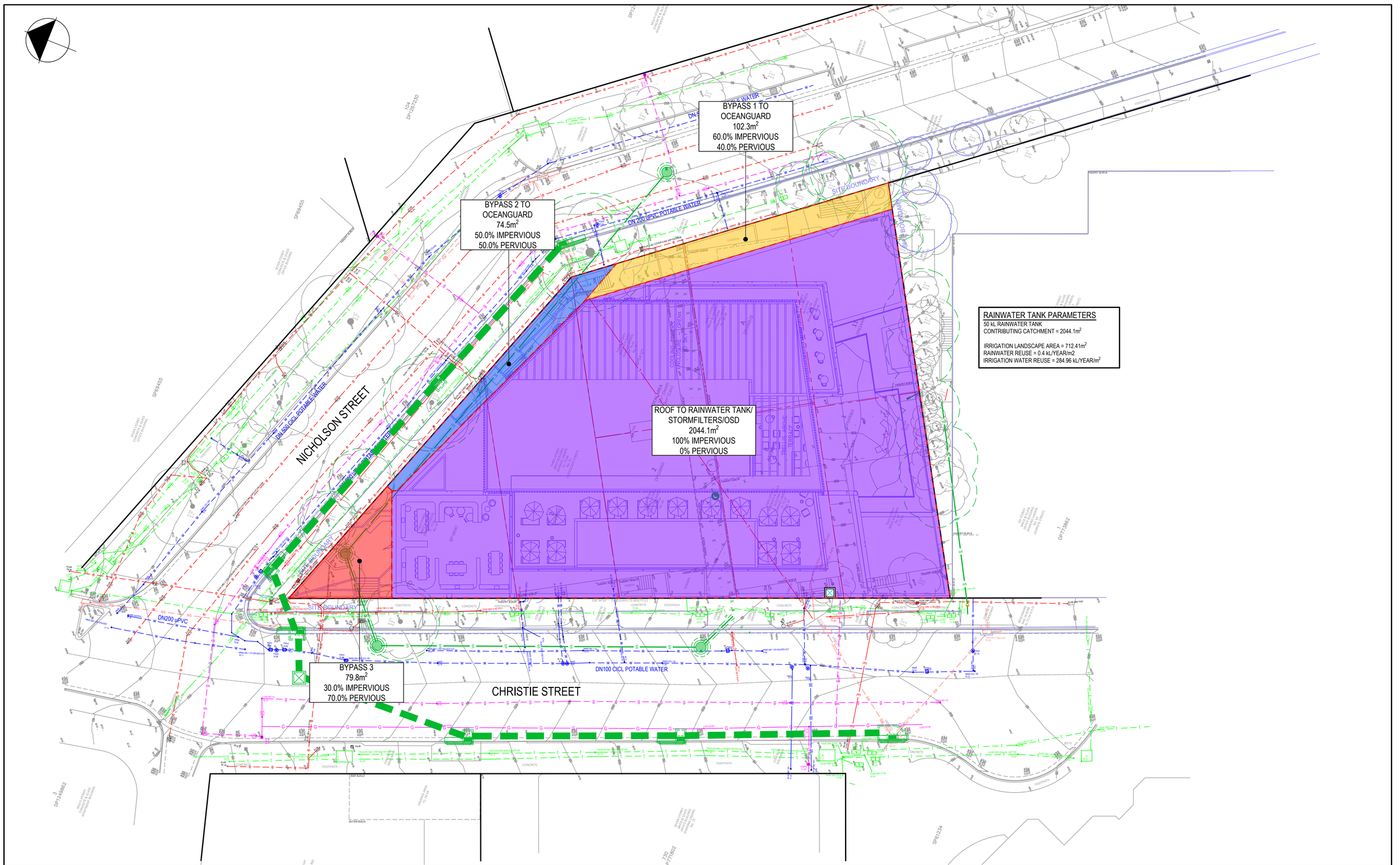
Drawing No. 24-1018-CIV-1041

Issue A



Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	05-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor

Architect

Client

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project: NICHOLSON PLACE
ST LEONARDS

Title: MUSIC CATCHMENT
PLAN

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Drawing No. 24-1018-CIV-1050

Issue A

NICHOLSON STREET

CHRISTIE STREET

CATCHMENT LEGEND

PERVIOUS AREA
119.53m² (5.19%)

IMPERVIOUS AREA
2209.21m² (94.81%)

TOTAL SITE AREA
2302.26m2

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	05-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor

Architect

Client

CORONATION

Status
FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project
NICHOLSON PLACE
ST LEONARDS

Title
STORMWATER CATCHMENT
PRE-DEVELOPMENT PLAN

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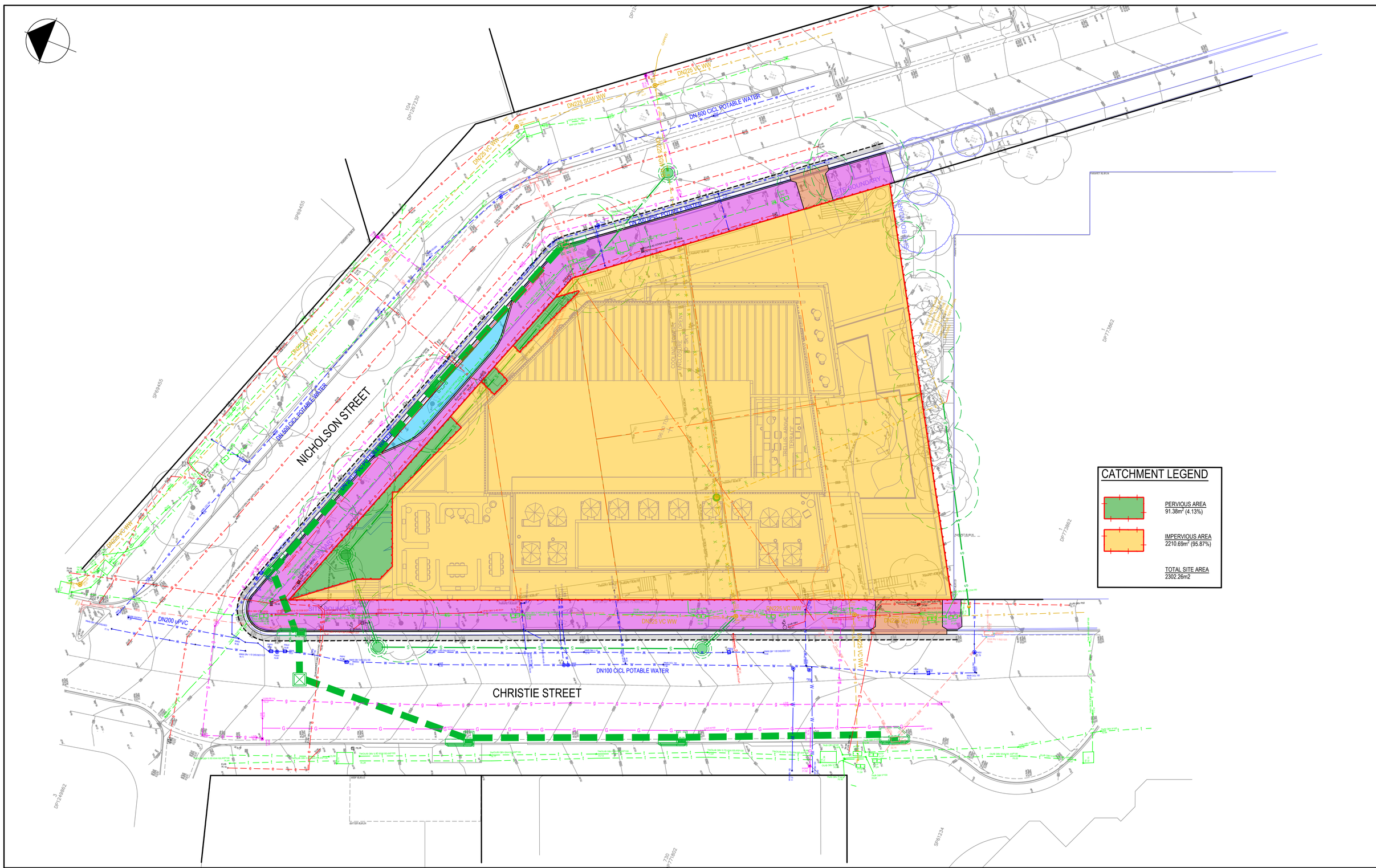
Drawing No. 24-1018-CIV-1051

Issue A



Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	05-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor

Architect

Client

CORONATION

Status

FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures			
Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project

NICHOLSON PLACE
ST LEONARDS

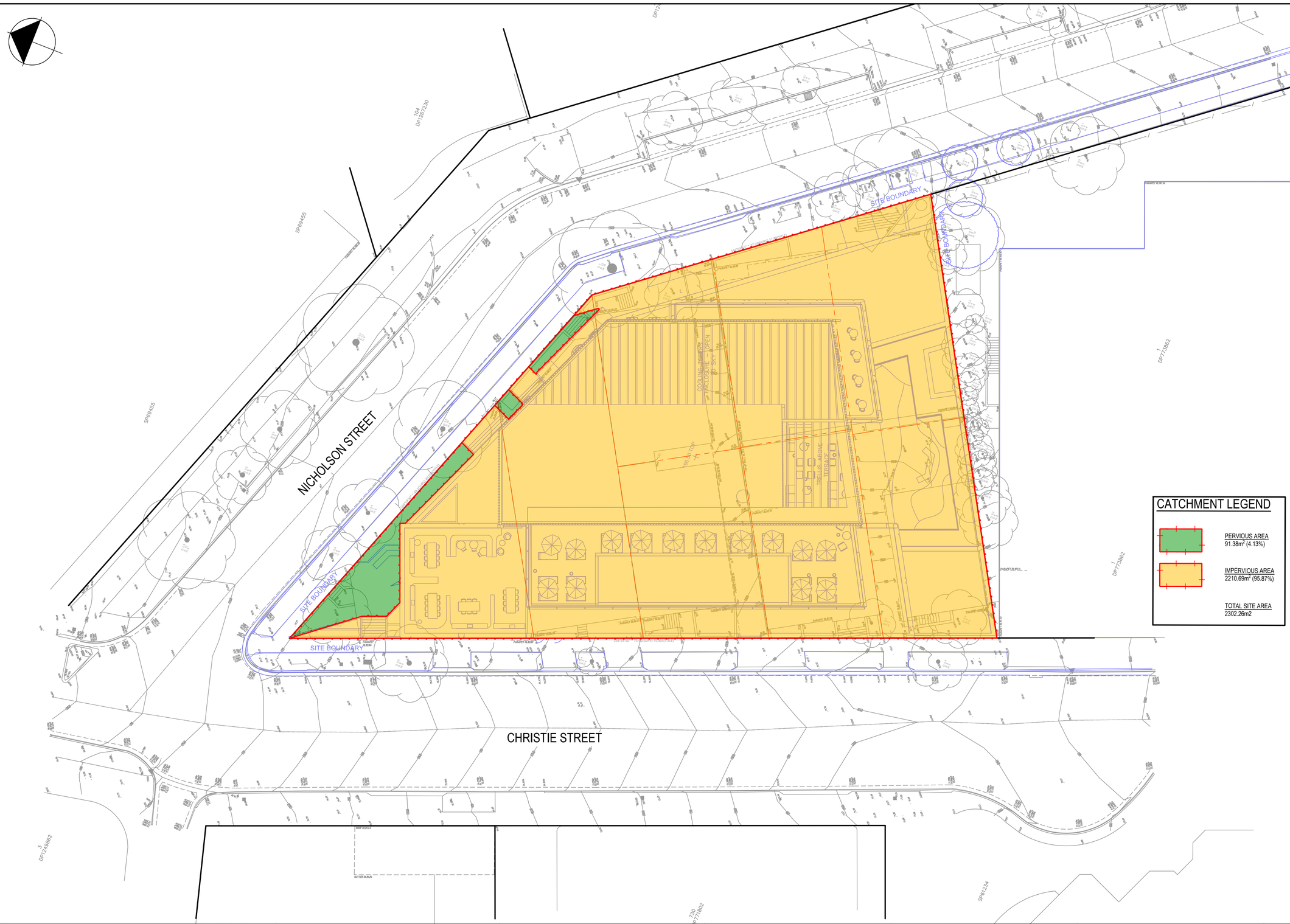
Title

STORMWATER CATCHMENT
POST-DEVELOPMENT PLAN

HJ CONSULT
email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1052

Issue A



CATCHMENT LEGEND

🟩	PERVIOUS AREA 91.38m² (4.13%)
🟨	IMPERVIOUS AREA 2210.69m² (95.87%)
	TOTAL SITE AREA 2302.26m2

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	05-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor

sds

Architect

COX

Client

CORONATION

Status

FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures

Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project

NICHOLSON PLACE
ST LEONARDS

Title

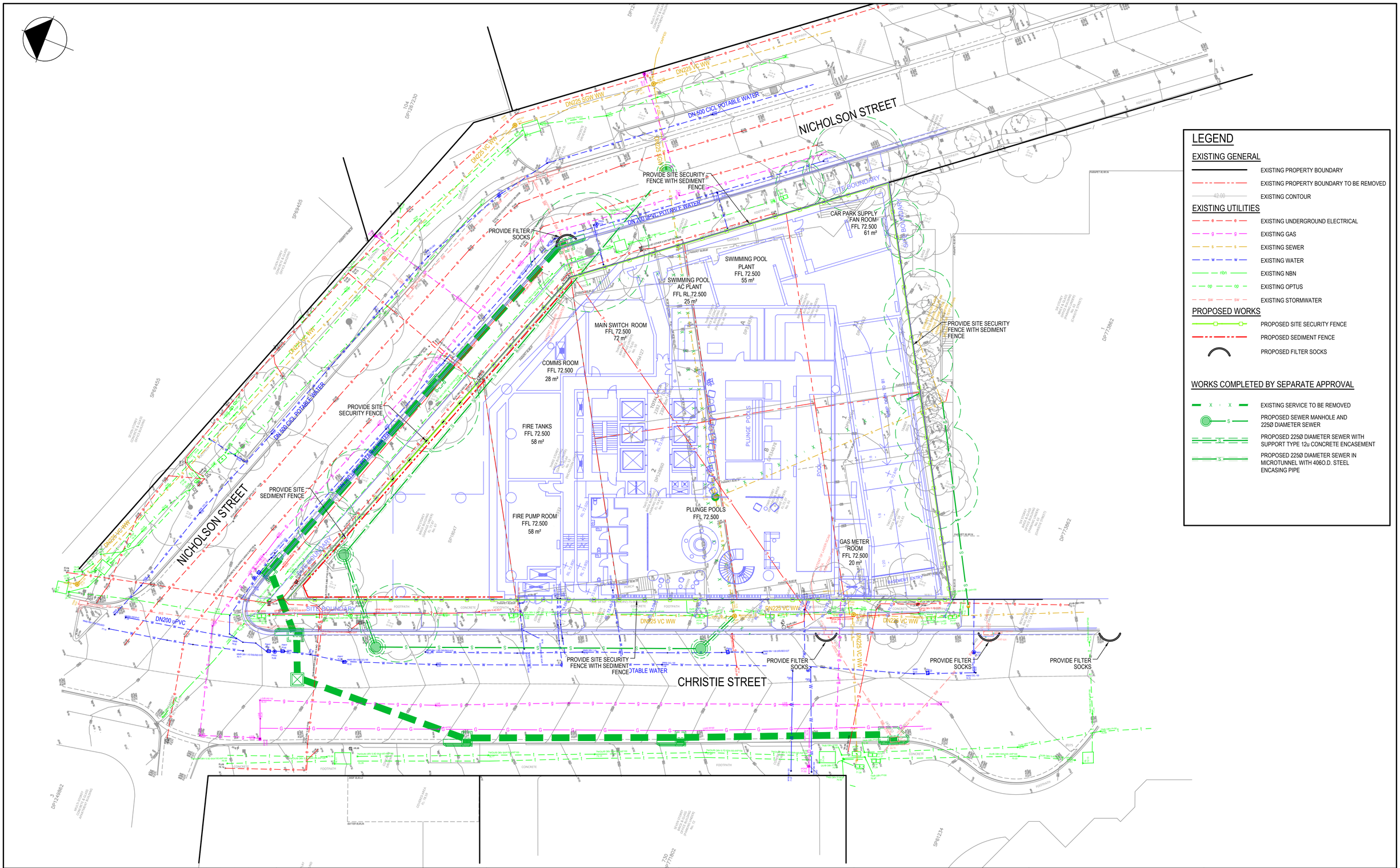
STORMWATER CATCHMENT
POST-DEVELOPMENT PLAN

HJ CONSULT

email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1052

Issue A



LEGEND

EXISTING GENERAL

▬	EXISTING PROPERTY BOUNDARY
— - - —	EXISTING PROPERTY BOUNDARY TO BE REMOVED
42.00	EXISTING CONTOUR

EXISTING UTILITIES

— e — e —	EXISTING UNDERGROUND ELECTRICAL
— g — g —	EXISTING GAS
— s — s —	EXISTING SEWER
— w — w —	EXISTING WATER
— nbn —	EXISTING NBN
— op — op —	EXISTING OPTUS
— sw — sw —	EXISTING STORMWATER

PROPOSED WORKS

—☐—☐—	PROPOSED SITE SECURITY FENCE
— - - —	PROPOSED SEDIMENT FENCE
⌒	PROPOSED FILTER SOCKS

WORKS COMPLETED BY SEPARATE APPROVAL

▬ X X ▬	EXISTING SERVICE TO BE REMOVED
● — S —	PROPOSED SEWER MANHOLE AND 225Ø DIAMETER SEWER
═ S ═	PROPOSED 225Ø DIAMETER SEWER WITH SUPPORT TYPE 12u CONCRETE ENCASEMENT
═ S ═	PROPOSED 225Ø DIAMETER SEWER IN MICROTUNNEL WITH 406O.D. STEEL ENCASING PIPE

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales

0 1 2 3 4 6 8 12 16 20m

1 : 200 - A1 1 : 400 - A3

Surveyor

Architect

Client

Status

FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures

Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project

NICHOLSON PLACE
ST LEONARDS

Title

EROSION AND SEDIMENT
CONTROL PLAN

HJ CONSULT

email: info@hjconsult.com.au www.hjconsult.com.au ABN: 70 676 907 841

Drawing No. 24-1018-CIV-1060

Issue P4

SEDIMENT FENCE

1. SEDIMENT FENCE TO BE INSTALLED ALONG A LINE OF CONSTANT GROUND ELEVATION WHEREVER PRACTICAL.
2. BOTH ENDS OF THE SEDIMENT FENCE TO EXTEND UP THE SLOPE AT LEAST 1m.
3. SUPPORT POST TO BE SPACED A MAXIMUM 2m UNLESS THE FENCE IS SUPPORTED BY A TOP WIRE OR MESH BACKING, IN WHICH CASE 3m MAXIMUM SPACING.
4. FENCE 'RETURNS' SHALL BE INSTALLED AT MAXIMUM 20m SPACING IF FENCE IS INSTALLED ALONG THE CONTOUR, OTHERWISE 5 TO 10m MAXIMUM SPACING DEPENDING ON SLOPE.
5. MINIMUM 4 STAPLES OR TIE WIRES PER STAKE.

MATERIALS:

1. FABRIC: POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER, OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 140GSM. ALL FABRICS TO CONTAIN ULTRAVIOLET INHIBITORS AND STABILISERS TO PROVIDE A MINIMUM OF 6 MONTHS OF USEABLE CONSTRUCTION LIFE (ULTRAVIOLET STABILITY EXCEEDING 70%).
2. FABRIC REINFORCEMENTS: WIRE OR STEEL MESH MINIMUM 14-GAUGE WITH A MAXIMUM MESH SPACING OF 200mm.
3. SUPPORT POSTS/STAKES: 1500mm² (MIN.) HARDWOOD, 2500mm² (MIN.) SOFTWOOD, OR 1.5kg/m (MIN) STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC.

INSTALLATION OF A SPILL-THROUGH WEIR:

1. LOCATE THE SPILL-THROUGH WEIR SUCH THAT THE WEIR CREST WILL BE LOWER THAN THE GROUND LEVEL AT EACH END OF THE FENCE.
2. ENSURE THE CREST OF THE SPILL-THROUGH WEIR IS AT LEAST 300mm ABOVE THE GROUND ELEVATION.
3. SECURELY TIE A HORIZONTAL CROSS MEMBER (WEIR) TO THE SUPPORT POSTS/STAKES EACH SIDE OF THE WEIR. CUT THE FABRIC DOWN THE SIDE OF EACH POST AND FOLD THE FABRIC OVER THE CROSS MEMBER AND APPROPRIATELY SECURE THE FABRIC.
4. INSTALL A SUITABLE SPLASH PAD AND/OR CHUTE IMMEDIATELY DOWN-SLOPE OF THE SPILL-THROUGH WEIR TO CONTROL SOIL EROSION AND APPROPRIATELY DISCHARGE THE CONCENTRATED FLOW PASSING OVER THE WEIR.

FILTER SOCKS-CONCENTRATED FLOW

MATERIALS:

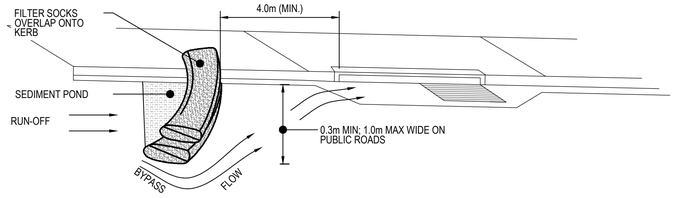
1. SOCKS: MINIMUM Ø200mm SYNTHETIC OR BIODEGRADABLE TUBES MANUFACTURED FROM NON-WOVEN OR COMPOSITE FABRIC SUITABLE FOR THE "FILTRATION" OF COURSE SEDIMENT.
2. FILL MATERIALS: STRAW, CANE MULCH, COMPOSTED MATERIAL (AS4454), COARSE SAND, OR CLEAN AGGREGATE

INSTALLATION:

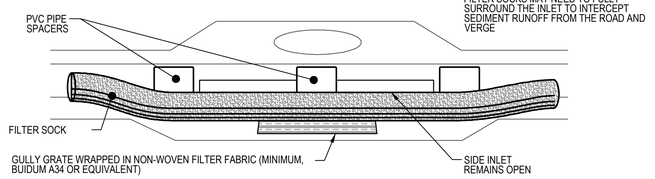
3. ENSURE THE SOCKS ARE PLACED INDIVIDUALLY OR COLLECTIVELY (AS A SINGLE SEDIMENT TRAP) SUCH THAT:
   - i) LEAKAGE AROUND OR UNDER THE SOCKS IS MINIMISED;
   - ii) ADJOINING SOCKS ARE TIGHTLY BUTTED OR OVERLAPPED AT LEAST 450mm.
   - iii) THE SURFACE AREA OF POTENTIAL WATER PONDING UP-SLOPE OF EACH SEDIMENT TRAP IS MAXIMISED.
   - iv) TO THE MAXIMUM DEGREE PRACTICAL, ALL SEDIMENT-LADEN WATER WILL PASS THROUGH THE FORMED POND BEFORE FLOWING OVER THE DOWN-SLOPE END OF THE SEDIMENT TRAP.

DRAINAGE CONTROL

1. WHEREVER REASONABLE AND PRACTICABLE, STORMWATER RUNOFF ENTERING THE SITE FROM EXTERNAL AREAS, AND NON-SEDIMENT LADEN (CLEAN) STORMWATER RUNOFF ENTERING A WORK AREA OR AREA OF SOIL DISTURBANCE, MUST BE DIVERTED AROUND OR THROUGH THAT AREA IN A MANNER THAT MINIMISES SOIL EROSION AND THE CONTAMINATION OF THAT WATER FOR ALL DISCHARGES UP TO THE SPECIFIED DESIGN STORM DISCHARGE.
2. DURING THE CONSTRUCTION PERIOD, ALL REASONABLE AND PRACTICABLE MEASURES MUST BE IMPLEMENTED TO CONTROL FLOW VELOCITIES IN SUCH A MANNER THAT PREVENTS SOIL EROSION ALONG DRAINAGE PATHS AND AT THE ENTRANCE AND EXIT OF ALL DRAINS AND DRAINAGE PIPES DURING ALL STORMS UP TO THE RELEVANT DESIGN STORM DISCHARGE.
3. TO THE MAXIMUM DEGREE REASONABLE AND PRACTICABLE, ALL WATERS DISCHARGED DURING THE CONSTRUCTION PHASE MUST DISCHARGE ONTO STABLE LAND, IN A NON-EROSIVE MANNER, AND AT A LEGAL POINT OF DISCHARGE.
4. DURING THE CONSTRUCTION PERIOD, ROOF WATER MUST BE MANAGED IN A MANNER THAT MINIMISES SOIL EROSION THROUGHOUT THE SITE, AND SITE WETNESS WITHIN ACTIVE WORK AREAS.

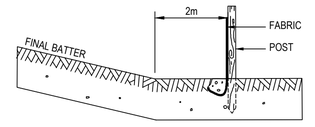


ON-GRADE KERB INLET SEDIMENT TRAP

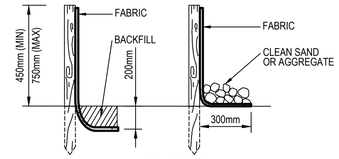


SAG INLET SEDIMENT TRAP

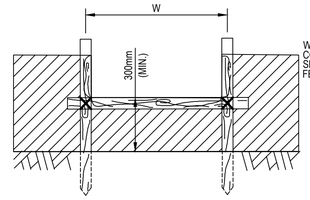
FILTER SOCKS - CONCENTRATED FLOWS



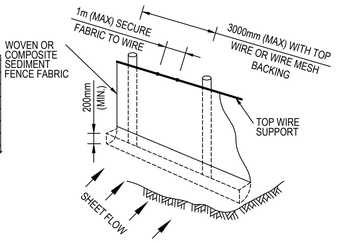
LOCATION OF FENCE RELATIVE TO BASE OF SLOPE



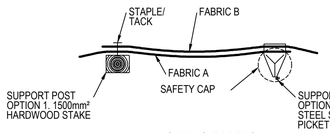
ANCHORING BASE OF FABRIC



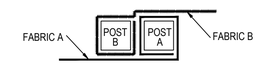
SPILL THROUGH WEIR



INSTALLATION WITH TOP WIRE SUPPORT

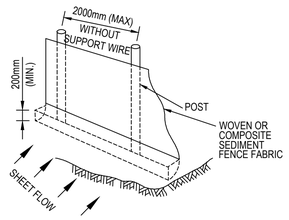


JOINING FABRIC- METHOD 2

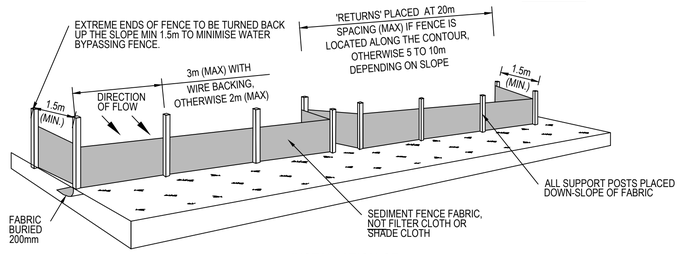


FABRIC TO FOLD AROUND EACH STAKE ONE FULL TURN.
STAKE B TO BE DRIVEN TIGHTLY AGAINST STAKE A.
THE TOPS OF BOTH STAKES TO BE SECURED WITH WIRE.

JOINING FABRIC - METHOD 1



INSTALLATION WITHOUT BACKING SUPPORT



INSTALLATION OF SEDIMENT FENCE

SEDIMENT FENCE

Issue	Description	DR	CH	VE	Date
A	ISSUE FOR APPROVAL	GJ	SH	SH	10-09-25

Scales

Surveyor: SDG

Architect: COX

Client: CORONATION

Status: FOR APPROVAL
NOT FOR CONSTRUCTION

Original Issue Signatures

Drawn	GJ	Original Size	A1
Designed	GJ	Height Datum	AHD
Checked	SH	Grid	MGA(GDA20)
Approved	SH		

Project: NICHOLSON PLACE
ST LEONARDS

Title: EROSION AND SEDIMENT CONTROL DETAILS

HJ CONSULT
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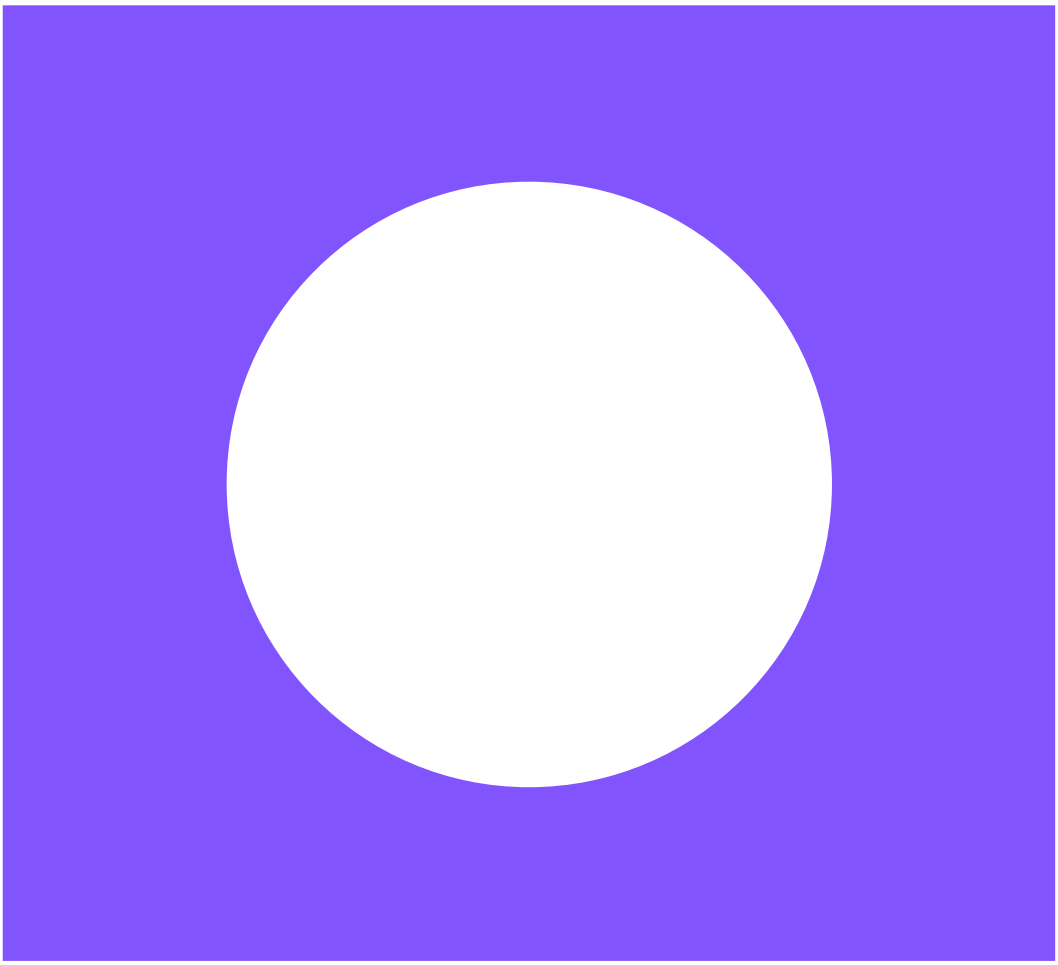
Drawing No. 24-1018-CIV-1061

Issue P2

Appendix C – Mott Macdonald Flood Report

MOTT MACDONALD



46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards

Flood Impact and Risk Assessment

September 2025

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Flood Impact and Risk Assessment

September 2025

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	12/09/2025	N. McNamara	J. Mail	S. Reilly	Initial Draft

Document reference: 703104098 | 01 | A

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Contents

Tables

Figures

Executive summary

This Flood Impact and Risk Assessment (FIRA) has been prepared by Mott MacDonald Pty Ltd (Mott MacDonald) on behalf of Coronation for the construction of a new 34-storey residential podium for 541 Build-to-Rent apartments.

The FIRA aims to support the development proposal where specific elements of the design may alter flood behaviour or introduce additional flood risk, to identify and analyse:

- the potential impacts of the proposed development on the flood risk to the existing community
- the impacts and risks of flooding on the development and its users
- how these impacts can be managed to minimise the growth in risk to the community due to the development.

The 1% AEP and probable maximum flood (PMF) have been assessed as they relate to the flood planning levels for the development and inform design for safety and amenity. The PMF is the largest flood that could conceivably occur at a location and defines the maximum extent of flood-prone land. Dry habitable areas above the PMF level are expected to be free from flooding under all scenarios.

Flood Impact Assessment

The key parameters of the flood assessment are summarised below:

- Changes in peak 1% AEP water level:
  - Negligible increases in water level outside the project boundary
  - A negligible increase in peak water level is predicted as a consequence of the development; this is deemed to be acceptable.
- Change in 1% AEP flood velocity
  - Flood water velocities are not significantly changed by the proposed development
- Change in 1% AEP flood hazard
  - There are minimal changes in flood hazard outside the site boundary and flood hazard is limited to H3 within the site boundary

Development Controls

The Lane Cove Environmental Plan (LEP) 2009 outlines flood planning provisions in Clauses 5.21 Flood Planning and 5.22 Special Flood considerations.

The Flood Planning Level (FPL) for dwellings is to be greater than or equal to the 1% AEP flood level + 300mm, or if required, 500 mm freeboard. These are in accordance with Part O – Section 10.5 of the Lane Cove Development Control Plan (DCP) FPLs. Site-specific flood planning levels are listed in Table 6.1 within the body of the report.

This FIRA has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Infrastructure (DPHI) for the subject State Significant Development Application (SSDA). Whilst the Flood Risk SEAR requests a FIRA for the site (Table 1.1) the housing development falls within land identified by the Peak flood 1% AEP Design event, meaning the standard LEP clauses related to flooding apply. To ensure a robust design, this FIRA has been developed to support the SSDA as outlined by Flood Risk Management Guideline LU01 (FIRA guide).

By implementing the design recommendations outlined in this report, direct flood risk to any person could be reduced and the residual flood risk could also be reduced by complying with the Lane Cove DCP, 2009. Compliance can be achieved without negatively affected the existing flood risk to the surrounding areas.

To summarise the outcome of the design:

- Flood Planning Level requirements and other Development Controls,
    - The minimum finished floor level of all habitable room(s) is to be at the height of the 100-year Average Recurrence Interval flood level plus 0.3m, or, if required, 0.5 metre freeboard.
    - Basement car parks must be physically protected from inundation by floods equal to or greater than the 1% AEP flood level plus 0.3 freeboard.

The flood emergency management (EM) strategy for the development has been assessed following advice provided in the relevant Willoughby/Lane Cove flood emergency sub-plan from the NSW SES (2023). At the time of writing, there is no dedicated flood study or floodplain risk management study for the area available from NSW Government.

The assessment established that the site is at risk of flash flooding as critical storm durations are less than 6 hours for a high intensity, 1% AEP event. Inundation caused by flash flooding can typically occur with little or no warning and cause a rapid rise in water level over a brief period. Flood events of this nature do not last more than a few hours.

Flood impacts are present in the adjacent streets due to overland flow across all events. The proposed building within the site is identified as being flood-prone from the 1% AEP event, and including events greater than 1% AEP.

Based on the 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards FIRA, shelter in place policy during a flood emergency is deemed to be the most logical EM approach to protect life, given the following constraints:

- The site is at risk from flash flooding; the interval between the observable causative event and the flood is less than 6 hours. Consequently, there is insufficient warning time to adequately evacuate the population of the precinct. Additionally:
    - The opportunities for horizontal evacuation during a storm are limited as surrounding streets are subject to high flood hazards that present an unacceptable risk to people. NSW SES advice is not to venture out during a storm or cross any area of flood inundation.
    - The rate of rise and extent of flooding in the most extreme events means that emergency evacuation centres may not get set up and evacuees would generally have to take shelter in private premises.

- The time of isolation is short, based on the duration of flooding around the precinct. A development which is isolated for a few minutes by low-hazard flood water in PMF does not pose a significant risk to life.
- The redevelopment affords a means of creating a safe, on-site shelter above the 1% + 0.5m levels and PMF levels suitable for vertical evacuation
    - redevelopment which caters for sheltering in place can be used to reduce existing risk to life for individuals who currently occupy the floodplain
- additional Development Controls can be imposed which seek to manage the residual secondary risks to life caused by flood isolation to ensure that risks remain tolerable.

1 Introduction

1.1 Aims and Objectives

This Flood Impact and Risk Assessment (FIRA) has been prepared by Mott MacDonald Pty Ltd on behalf of Coronation for a State Significant Development Application (SSD-56527976) for the construction of a new residential flat building up to 34 storeys, equating to 541 social dwellings located at 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards, NSW.

The purpose of this FIRA is to support the proposed redevelopment where specific elements of the design may alter flood behaviour or introduce additional flood risk and to address the Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 2 May 2025, which identified the following specific assessment requirements:

Table 1.1: Site Specific SEARs

SEAR	SEAR Description	Section of Report where response is provided
19. Flood Risk	• Identify the flood planning area and level as set out in the relevant EPI and other supporting documents to determine. • The flood extent and velocity up to the Probable Maximum Flood and risk on-site having regard to adopted flood studies and, floodplain risk management studies and plans • The site access and egress routes • the potential effects of climate change, • any relevant provisions of the NSW Flood Risk Management Manual, and any other relevant guidelines	1.3 5.2 6.3.1 5.3 4
	• Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01. When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered. • Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).	6.1 6.2 6.3 6.4

1.2 Background

The proposed development site, located at 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards, is owned by Coronation. The location of the site is shown in Figure 1.1. The site is in a well-located area that is serviced by a high level of amenities, services and public transport.

1.3 The Site

The site is located at 46–52 Nicholson Street and 59–67 Christie Street, St Leonards, in the Lane Cove Council local government area (LGA). The site has a total area of 38,829 m^2 and has two one street frontages: Nicholson St and Christie St, refer to Figures 1.1 and 1.2. The site aerial imagery shows the site occupied by some former dwellings and a few existing trees. The scheme

includes approximately three basement levels for vehicle and bicycle parking with end-of-trip facilities, vehicular access from Christie Street, and loading dock access from Nicholson Street, along with associated landscaping and public domain works.

Figure 1.1: Site Location

Source: Google Maps, 2025

Figure 1.2: Site Plan

Source: Architectural reference base plan for ground floor – COX Architecture

1.4 FIRA Requirements

This FIRA will demonstrate compatibility of the development with any existing relevant state environmental planning policies (SEPPs), local environmental plans (LEPs), Development Control Plans (DCP) or policies, as well as existing industry guidance, government guidance and reference documents.

For this FIRA, to meet the desired aims of the guidance, it requires an understanding of:

- A range of flood risk examining minor, major and extreme storms events
- The constraints that flood places on the land (floodways, flood storage, flood hazard and emergency response issues)
- The appropriateness of the development or development types for the location based on the flood constraints on the land.
- The adequacy of management measures and controls to:
  - Effectively address these constraints to ensure the flood risks to the proposed development and its users are acceptable.
  - Manage flood and associated emergency management (EM) impacts to the existing community due to the development.

2 Background

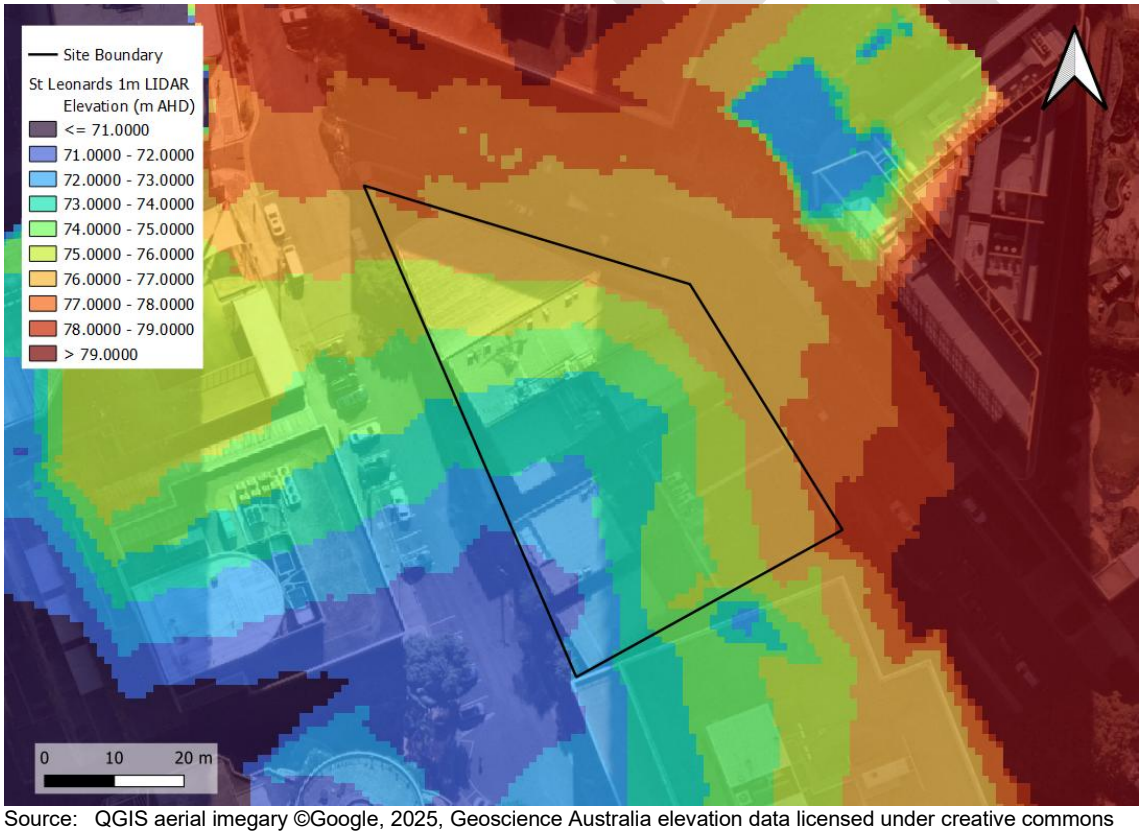
2.1 Study Area

The subject site location is identified in Figure 1.1 and topography in Figure 2.1, located adjacent to Nicholson and Christie road reserves, with an approximate area of 38,829m^2.

The area around the site has a slope from North to South slope of around 7 - 8%, with the eastern road levels of Nicholson Street elevated over the site levels, which in turn are elevated above the western Christie Street road levels:

- the area of Christie Street adjacent the site is relatively low lying, within the vicinity of a notable sag point,
- elevations across the site itself ranging from 71.0m AHD in the Southwest of the site, up to levels adjacent Nicholson Street in the range up to 78.00m AHD in the East.
- Nicholson Street also has a sag located in adjacent the site

Figure 2.1: 46–52 Nicholson Street and 59–67 Christie Street, St Leonards, Site Boundary Location and Topography



Source: QGIS aerial imegary ©Google, 2025, Geoscience Australia elevation data licensed under creative commons

2.2 Existing Flood Behaviour

The Nicholson Street development is subject to a single source of flood risk: flooding from rainfall over the local catchment (overland flooding).

2.2.1 Overland Flow

Overland flow occurs when rainfall intensity exceeds the capacity of stormwater systems. It is the most prominent flood scenario around the site area, particularly where flat terrain and drainage of limited capacity lead to ponding and shallow flooding under lower AEP events.

Areas around Christie Street, including the site of development for this study and nearby rail track, are impacted by overland flow paths that develop due to the flat terrain and limited drainage capacity. In a 1% AEP event, the floodplain expands significantly. Floodwaters overtop trunk drainage channels upstream, and the area around Christie Street becomes inundated, resulting in the subject site being impacted by the 1% AEP overland flow flooding.

As the local sag point in Christie Street is overtopped, overland flow progresses west toward the rail corridor. This is a similar pattern of localise overland flow flooding that is observed in the adjacent catchment flood study discussed in section 2.3.

2.3 Flood History

From the Flat Rock Creek Floodplain Risk Management Study and Plan - Report, 2018, it is highlighted that the Council has limited information on flooding from events exceeding the capacity of the drainage network and flooding due to overland flow. Historic newspaper articles, SES reports, the Bureau of Meteorology (BoM) and council websites also indicate minimal historic flooding evidence, although the PMF mapping for the adjacent catchment to the site shows ponding at the adjacent rail track line, see Figure 2.2.

Figure 2.2: PMF - Flat Rock Creek FRMSP

Source: Flat Rock Creek Floodplain Risk Management Study and Plan

3 Methodology Approach

3.1 Available information

No existing Council flood studies or catchment models covered the site, so a site-specific hydraulic model was prepared to accurately assess flood behaviour and establish appropriate design levels.

3.1.1 Basis of Flood Model

A detailed TUFLOW hydraulic model was developed specifically for this assessment, incorporating the latest high-resolution LiDAR topography, surveyed site levels, and the surrounding drainage network. The model simulates overland flow paths and local catchment hydrology under design storm conditions, providing a robust platform for determining flood levels, freeboard requirements and stormwater management measures in accordance with current industry and Council standards.

3.1.2 TUFLOW Software Package

TUFLOW is a one and two-dimensional (1D/2D) hydraulic modelling program that simulates the flow of water across a landscape and through any conveyance structures such as pipes or culverts.

The 2D component of the TUFLOW software package determines overland flow paths by dividing the landscape into a grid of individual cells. The flow of water between cells is then computed repeatedly at regular time steps by solving two-dimensional shallow water equations to estimate the spread and flow of the water. Flows are routed in the direction water that will naturally follow the modelled topography.

The 1D component (called ESTRY) is a separate calculation engine incorporated into TUFLOW to manage flows through structures which cannot be accurately represented with 2d grid cells. ESTRY is a network dynamic flow program suitable for mathematically modelling floods and tides (and/or surges) in a virtually unlimited number of combinations. ESTRY has been developed in conjunction with TUFLOW to resolve complex 1D-2D flows across the floodplain interface.

3.1.3 Modelling Scenarios

3.1.3.1 Existing Flooding Conditions

The 1% AEP and probable maximum flood (PMF) have been assessed as they relate to the flood planning levels for the development and all events from the 1% AEP and greater inundate the site. The PMF is the largest flood that could conceivably occur at a location and defines the maximum extent of flood-prone land.

4 Flood Related Requirements

The following guidelines and standards relate to civil works as they potentially influence flood behaviour and form the basis of engineering decisions regarding stormwater management and the provision of overland flow.

4.1 Australian Rainfall and Runoff (v4.2)

Prepared by the Institution of Engineers, Australian Rainfall, and Runoff – *A Guide to Flood Estimation* was written to provide "*Australian designers with the best available information on design flood estimation.*" It contains procedures for estimating stormwater runoff for a range of catchments and rainfall events as well as design methods for urban stormwater drainage systems. The document has been updated with major revision in the 2016 version (v4.0) with a more refined methodology for hydrological analysis based on the latest hydrological data gathered. Subsequent updates including the previous 2019 version (v4.1) and current revision progress the technical guidance further, in particular with regard to the understanding of climate change effects.

4.2 Lane Cove Council Documents

4.2.1 Lane Cove Council Local Environment Plan (2009)

Lane Cove Local Environmental Plan 2009 outlines the flood planning provisions in accordance with the relevant standard environmental planning instrument under Section 5.21. Additionally Lane Cove Council has not adopted Clause 5.22 *Special Flood Considerations* as part of their LEP 2009.

1. The Objectives of this clause are as follows-
    a. To minimise the flood risk to life and property associated with the use of land,
    b. To allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a results of climate change,
    c. To avoid adverse or cumulative impacts on flood behaviour and the environment,
    d. To enable the safe occupation and efficient evacuation of people in the event of a flood.
2. Development consent must not be granted to development on land the consent authority to be within the flood planning area unless the consent authority is satisfied the development-
    a. Is compatible with the flood function and behaviour on the land, and
    b. Will not adversely affect flood behaviour in a way that results in detrimental increase in the potential flood affectation of other development or properties, and
    c. Will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and
    d. Incorporates appropriate measures to manage risk to life in the event of a flood, and
    e. Will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourse.

3. In deciding whether to grant development consent on land to which this clause applies, the consent authority must consider the following matters-
    a. The impact of the development on projected changes to flood behaviour as a result of climate change
    b. The intended design and scale of buildings resulting from the development,
    c. Whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood,
    d. The potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flood or coastal erosion.

4.2.2 Lane Cove Council Development Control Plans (2009)

Development control plans (DCP) support the implementation of the objectives of the LEP, providing specific guidance for the design and assessment of proposed developments. Part O of the Lane Cove DCP 2009 addresses flood planning requirements. Clause 10.5 Freeboard includes general flood planning requirements.

Table 4.1: Lane Cove DCP Extracts

DCP Requirement	Required Level (m AHD)	Adopted Level	Compliance
The minimum finished floor level to be at the height of the 100-year Average Recurrence Interval (ARI) flood level plus 0.3 / 0.5 metre freeboard	77.30	77.30	Yes – in combination with the fact that all higher elevation access points are flood protected to the equivalent flood level + 0.3 / 0.5m freeboard

4.2.2.1 10.5 Freeboard

Floor levels of dwellings, including garages, should be at a level that will ensure they are not subject to stormwater inundation or nuisance flooding. To prevent stormwater from entering buildings the finished floor levels must be set at least 150mm above the adjacent ground levels.

The entire outside perimeter of all buildings must have overland escape routes which will protect all finished floor levels from flooding in the event of the complete blockage of the surrounding drainage system.

Where it is proposed to build in an area known to be affected by overland flow, all spaces are to have a minimum freeboard of 300mm (except parking and storage areas which are to have a freeboard of 150mm), above the calculated top water level for the 1 in 100 year ARI storm event.

Freeboard may need to be increased to 500mm or greater where there are high flow rates, high flow depths or low confidence in the accuracy of the flood model.

For this study, it has been assumed that 500mm is the benchmark based on providing a reasonably high level of protection from overland flow rates and associated hazard around the site.

4.3 Crows Nest Transport Oriented Development Precinct Guidance

The Crows Nest Transport Oriented Development (TOD) Precinct Design Guide (Nov 2024), referenced in SEPP (Crows Nest TOD Precinct) 2024, cl. 8.4, sets mandatory design outcomes for proposed development in the precinct.

The key requirements within the Finalisation Report are as follows:

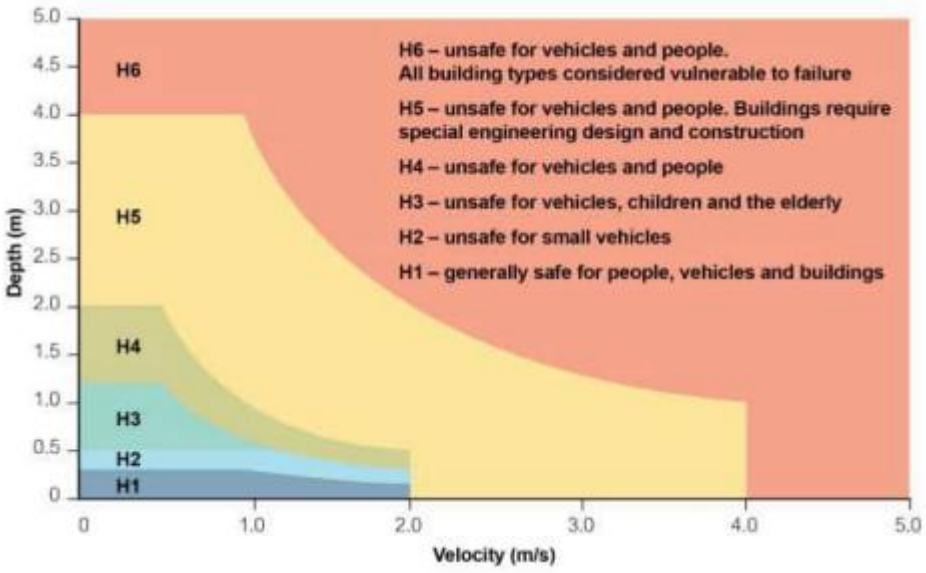
- Set appropriate building floor levels to maintain flood safety.
- Provide flood exclusion measures and basement flood protection.
- Ensure all basement entry points are at least 0.3 m above surrounding ground level.
- Prepare a flood impact assessment that considers gaps in Council flood mapping.
- Demonstrate no increased flood risk to neighbouring properties.
- Adopt shelter-in-place as the default strategy where evacuation is not feasible.
- Incorporate Water Sensitive Urban Design (WSUD) measures into the design.

4.4 NSW Flood Risk Management Manual (June 2023)

The NSW Government's manual supersedes the previous *Floodplain Development Manual – the Management of Flood Liable Land* (2005) and is concerned with the management of the consequences of flooding as they relate to the human occupation of urban and rural developments. The manual outlines the floodplain risk management process and assigns roles and responsibilities for the various stakeholders.

The manual applies to all development and provides additional guidelines for ensuring safe overland flow paths are provided. These guidelines adopt the hazard categorisation which was developed by the Australian Emergency Management Institute in 2014, defining hazards into six categories. The categories relate to the flood vulnerability curves shown in Figure 4.1.

Figure 4.1: General Flood Hazard Vulnerability Curve



Source: Australian Emergency Management Institute (2014)

4.5 Flood Risk Management Guideline LU01 (2023)

Published by the Department of Planning and Environment (DPE), this guideline provides advice on the scope and scale of a flood impact and risk assessment. It does not replace the processes or requirements of the consent authority. It should be read in conjunction with and address any other assessment requirements for the development proposal/application.

It should be read in conjunction with and address any other assessment requirements for the development proposal/application, including those of referral authorities. For example, for state significant development proposals being considered by the NSW Government, this guideline should be read in conjunction with the Planning Secretary's environmental assessment requirements (SEARs) issued for the development.

4.6 Shelter in Place Guideline for Flash Flooding (2025)

Published by the Department of Planning, Housing and Infrastructure (DPHI), this guideline aims to assist consent authorities to undertake site specific, risk-based assessment to assess if shelter in place is a suitable emergency management strategy for development proposed in flash flood environments.

The intent of the guideline is to:

- guide proponents on where shelter in place may be considered in land use planning
- provide consent authorities guidance on matters that may be considered in assessing planning proposals and development applications where shelter in place is proposed
- assist councils when considering the role of shelter in place within their own local guidelines, policies, and development control plans.

The shelter in place guideline defines the following:

- Shelter in place - the internal movement of a building's occupants to an area within the building above the probable maximum flood (PMF) level before their property becomes inundated by flood waters
- Flash flooding – flash flooding is "flooding that occurs within 6 hours of the precipitating weather event, and often involves rapid water level changes and flood water velocity"[1]
- Flood behaviour
  - Flash flooding is the only flood risk present at the site, whether it be from overland flooding, a nearby creek or riverine flooding
  - The flooding occurs within less than 6 hours from the commencement of causative rain and the duration of shelter in place due to isolation by floodwaters is less than 12 hours from the commencement of rainfall
  - The development is not subject to high hazard flooding (e.g. floodways, high hazard H5 or H6 areas) or surrounding roadways are not subject to high hazard flooding[2]

[1] Flash flooding as defined in Emergency Planning and Response to Protect Life in Flash Flood Events (2018) AFAC (Australasian Fire and Emergency Service Authorities Council)

[2] Flood Risk Management Guideline FB03 Flood Hazard, DCCEEW, 2023

5 Hydraulic Modelling

5.1 Existing Flood Behaviour

5.1.1 Design Storm Events

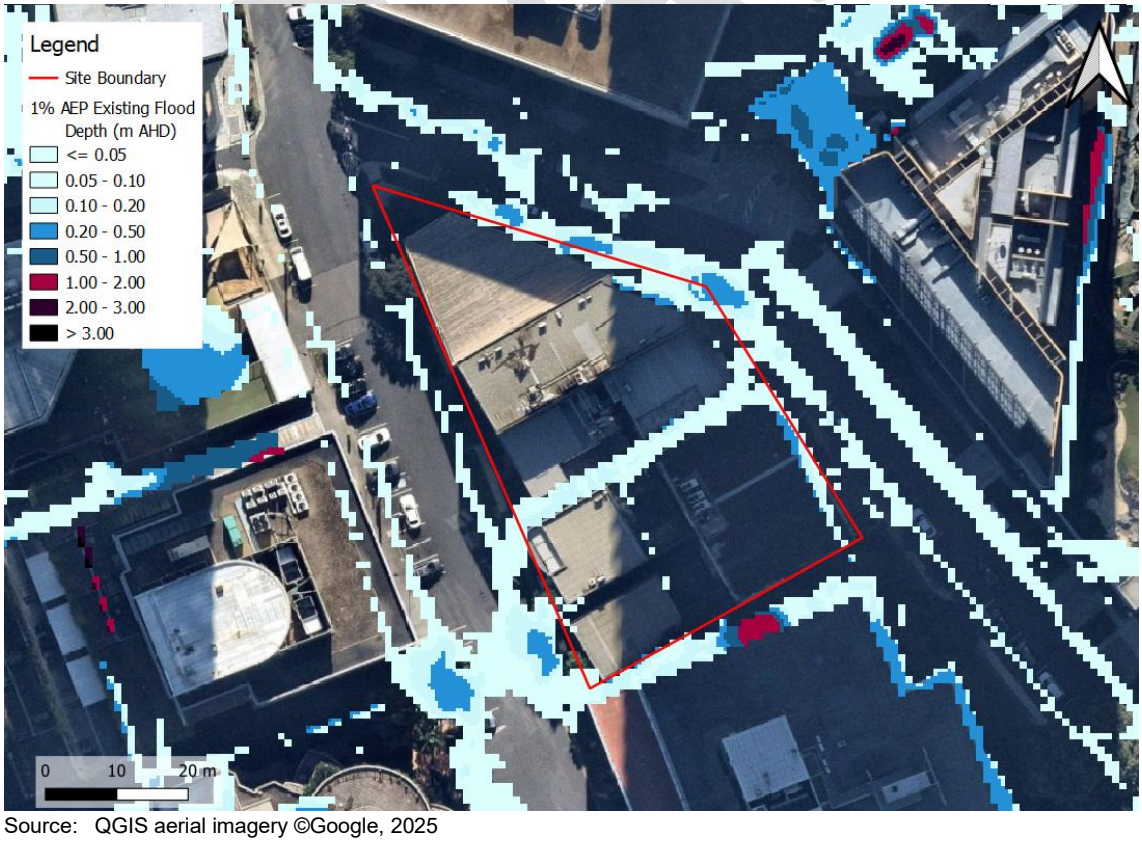
5.1.1.1 1% AEP Storm (1 in 100 year)

The 1% AEP storm forms the basis of Council's flood planning levels. The storm is very rare, having a 1% chance of occurring during any given year. It is equivalent to the 1 in 100-year Average Recurrence Interval (ARI).

The modelling for St Leonards shows significant flooding to the subject site. Flooding occurs on the surrounding land, with the South and Southeast areas experiencing the greatest depths, up to 1.80m within the narrow area between existing buildings, while depths outside this on Christie Street channel rise to 0.35m. Nicholson Street shows generally shallow flooding, from 0.1 m to 0.31 m predicted, to a peak level of 77.70 mAHD, directly adjacent to the South East building and road boundary.

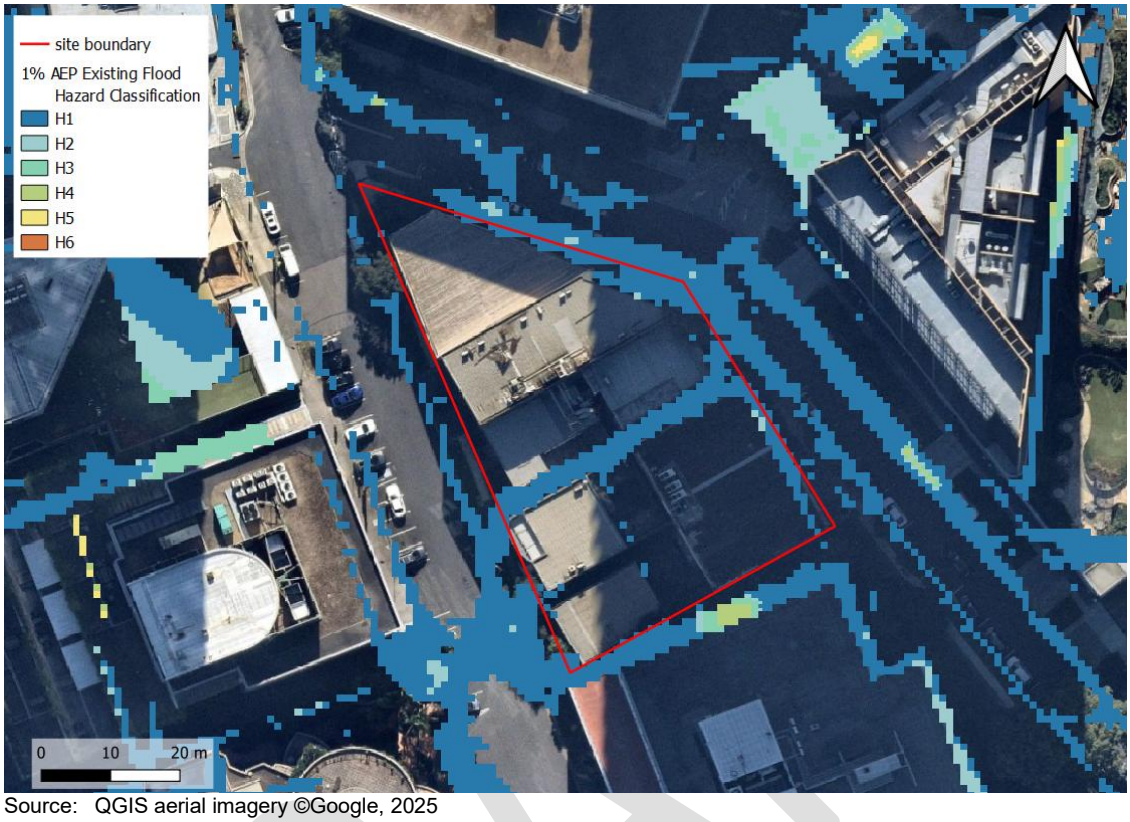
The velocities in the existing scenario are less than 1 m/s across the entire site and velocities in all adjacent roads are less than 2 m/s. Based on both the flood depths and velocities, the resulting provisional hydraulic hazard is shown as H1 – no constraints (Figure 5.2), the narrower sections between buildings indicate up to H4.

Figure 5.1: 1% AEP Storm Flood Depth and Extent



Source: QGIS aerial imagery ©Google, 2025

Figure 5.2: 1% AEP Storm Flood Hazard



Source: QGIS aerial imagery ©Google, 2025

5.2 Design Flood Behaviour

To represent the site post development case, a new building block out was included in the model covering the proposed structure, landscape finished levels introduced and the drainage was upsized to reduce overland flow volumes. This design approach achieves immunity of the structures from flooding in the 1% AEP storm by adopting the Council Flood Planning Level (1% AEP + 500 mm freeboard), preventing any water ingress towards the structure itself.

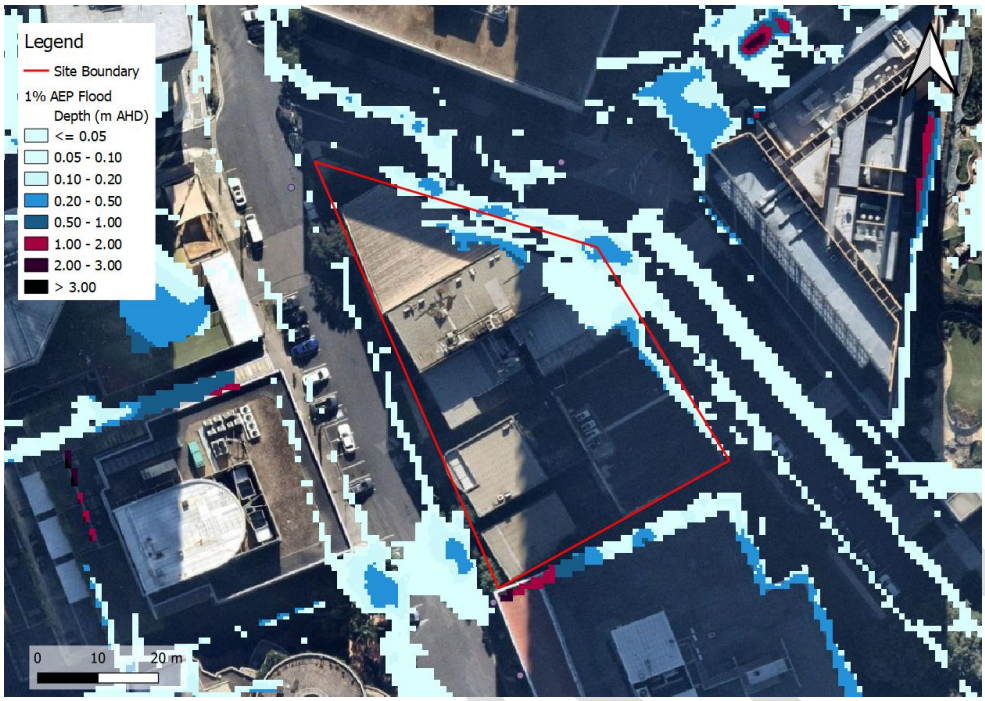
5.2.1.1 1% AEP Storm (1 in 100 year)

The Southern areas, like in the existing flooding scenario, experience the greatest depths, up to 2.5 m within narrow areas between existing buildings, while depths outside this on Christie Street channel rise to 0.34m. Nicholson Street also shows generally shallow flooding, from 0.1 m to 0.35 m to a peak level of 78.09 mAHD, directly adjacent to the building boundary. Within the site boundary, the maximum depth is 0.76m in the area adjacent to the 77.9m raised landscaped area North of the main building.

Based on both the flood depths and velocity, the resulting provisional hydraulic hazard for almost all of the site and the surrounding area is shown as H1 – no constraints (Figure 5.4) and a few minor instances of H2 and H3 – minor flooding hazard. As such, any water within the site should be considered localised nuisance flooding that is inconsequential relative to the surrounding floodway. The only area which shows hazard of concern is the narrow (inaccessible) opening between buildings comprising a 0.5m clear space to the adjacent existing building face at the southern site boundary. A small area of H5 is noted at the narrowest point, relieved by spill into the sag location of the adjacent Christie Street. This clear opening to

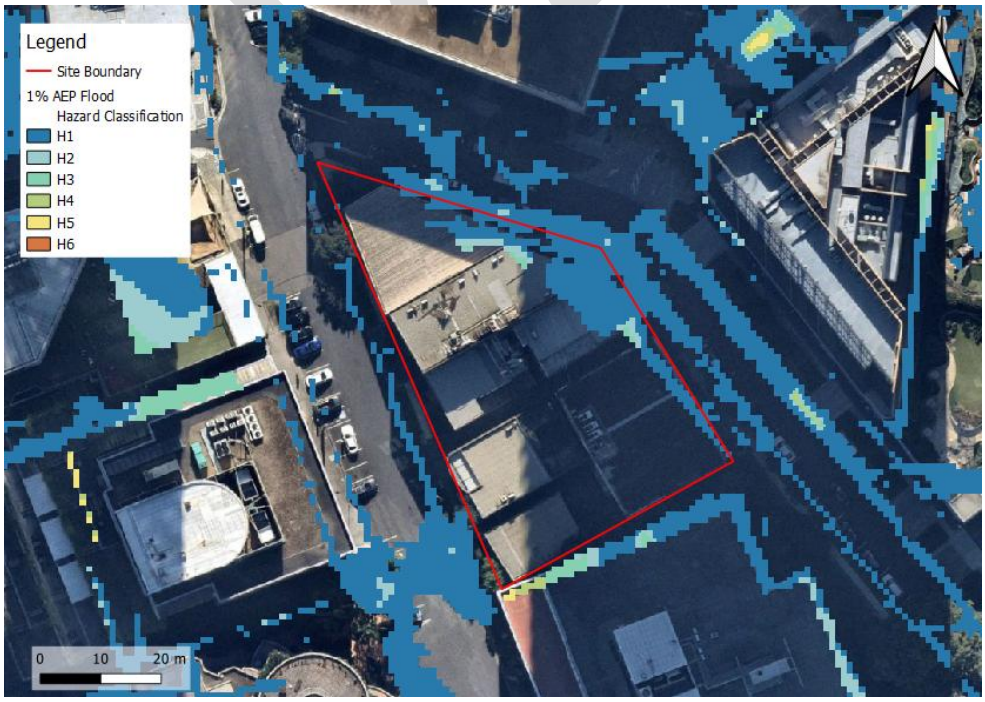
drain ponded water from against the neighbouring building to the south is the subject of further design refinement in detailed design to lower hazard as much as is practical.

Figure 5.3: 1% AEP Design Storm Flood Depth and Extent



Source: QGIS, 2025

Figure 5.4: 1% AEP Design Storm Flood Hazard

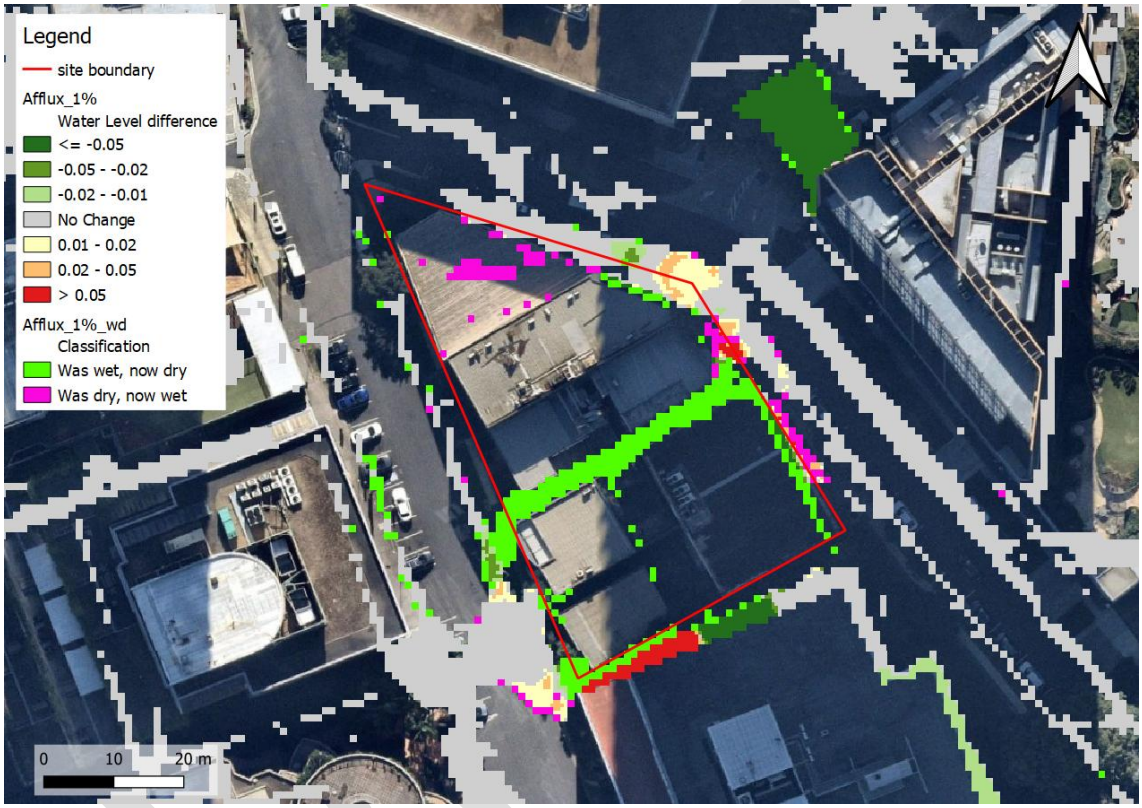


Source: QGIS, 2025

5.2.1.2 1% AEP Flood Afflux

The footprint of the building diverts some area that was wet to dry. Impacts to other areas outside the site footprint are generally minor, with some water level reduction evidenced North of the site, likely due to the upsized pipework providing more volume in the below-ground drainage pipework and removal of the flow path between the two existing buildings that the proposed site will overlay. There is depth addition in the single-narrowed stretch between adjacent building to the south; however, the depth difference is under design consideration to reduce hazard and allow the area to be drained beyond the channel onto Christie Street road reserve.

Figure 5.5: Afflux / Change in Flood Levels at the site



Source: QGIS aerial imagery ©Google, 2025

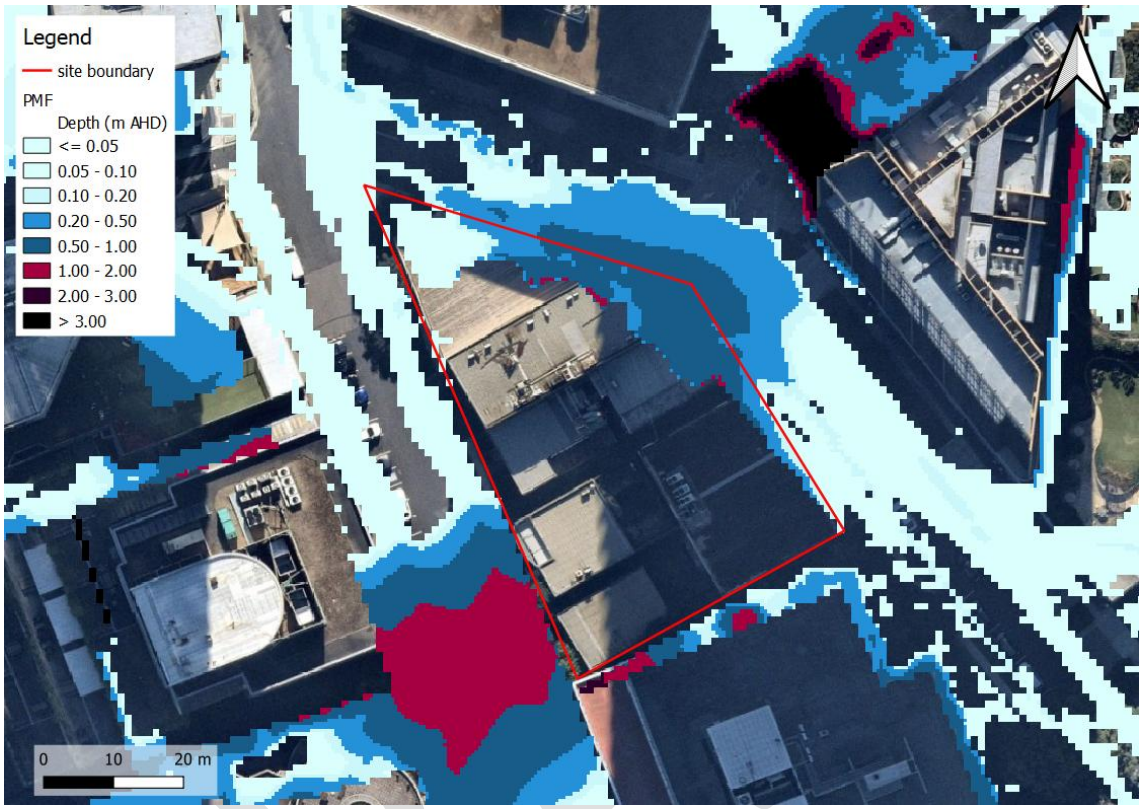
5.2.1.3 Probable Maximum Flood (PMF)

PMF results are provided for flood planning requirements and assessment of flooding changes in the PMF are reviewed to confirm that flooding conditions are not changed that would impart meaningful change in hazard. The PMF is a theoretical maximum flood that can occur at a location with previous studies having approximated a probability of occurring between 1 in 100,000 and 1 in 10,000,000 chance in any year.

Modelling suggests the PMF may cause some inundation to the fringe of the development site and the overland flow route curves round the North of the proposed building from East to West (Figure 5.6). The site is shown to have a depth of up to 2.5m within the narrowed section between buildings previously discussed, whereas within the site boundary, depths peak at 1.15m depth and to a peak water level of 78.08m AHD on the South Eastern corner of the site. Peak velocities within the site lie between 0 to 1.25 m/s and outside the site can exceed 2 m/s

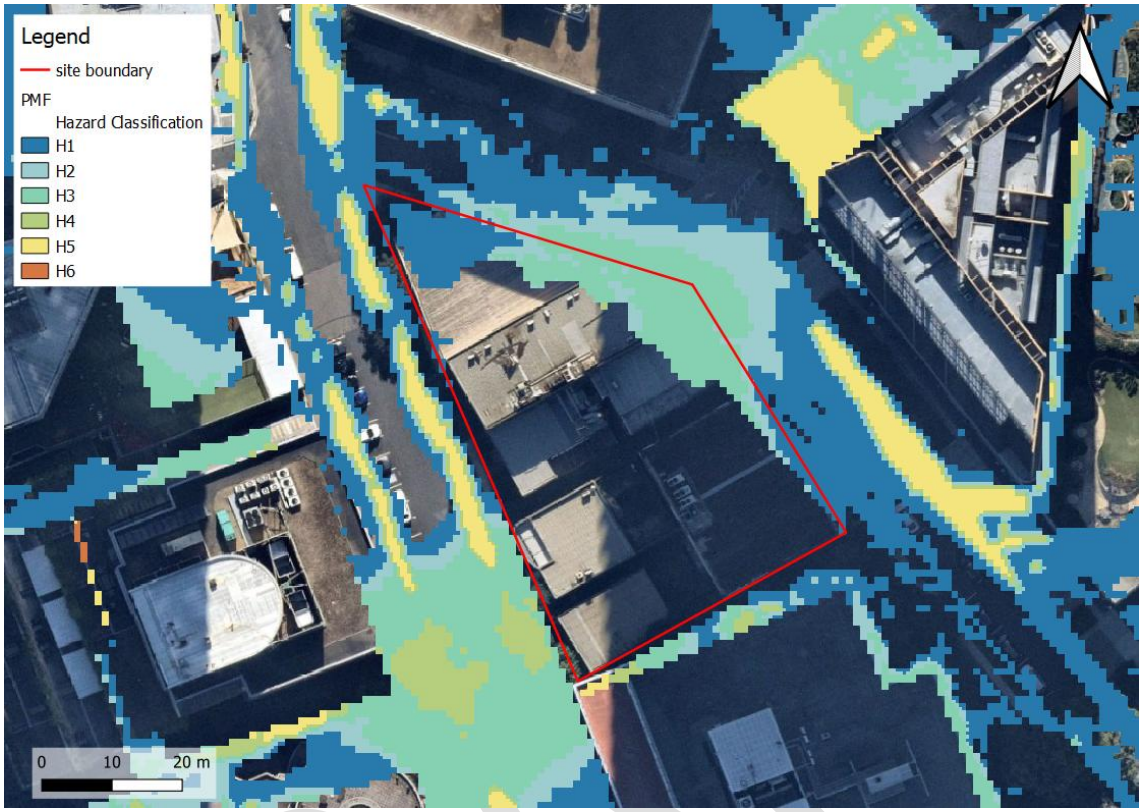
but remain less than 3 m/s. Flood hazards around the site range between H1 and H3, but extend to H5 on adjacent roads in the areas of higher velocities (Figure 5.7)

Figure 5.6: PMF Flood Depth and Extent



Source: QGIS, 2025

Figure 5.7: PMF Design Storm Flood Hazard



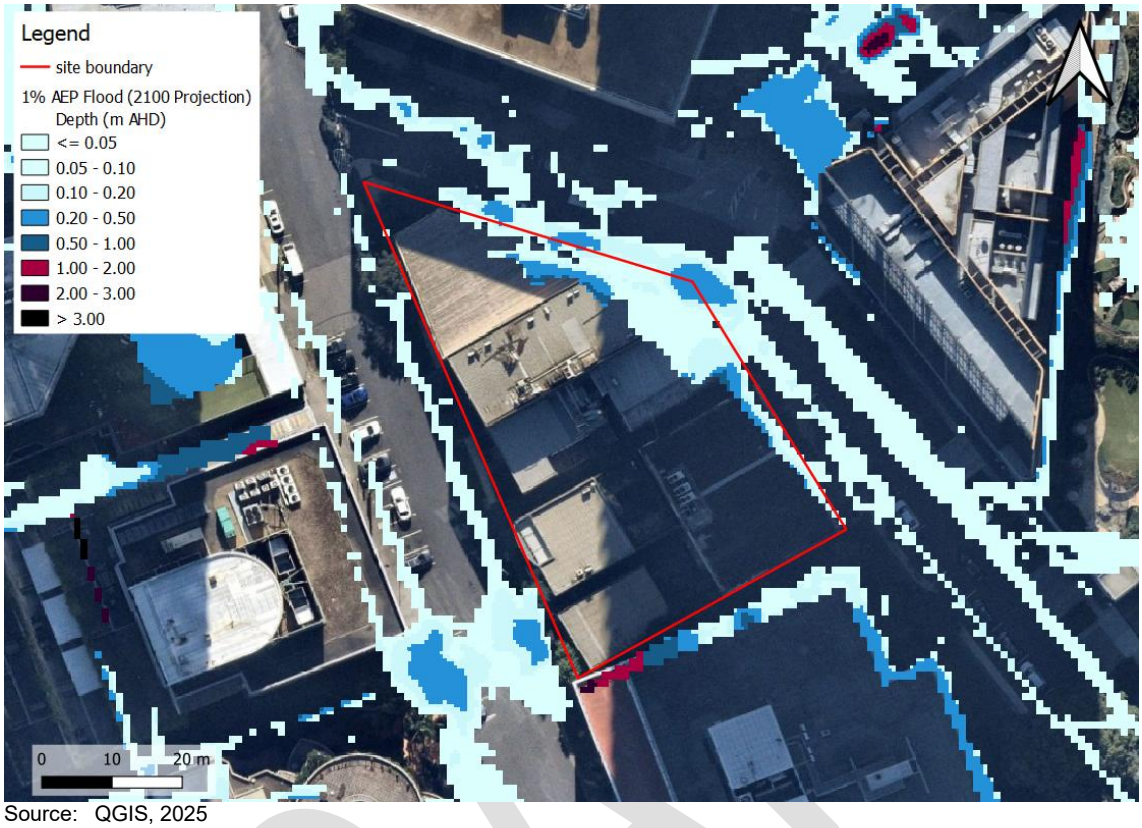
Source: QGIS, 2025

5.3 Climate Change

5.3.1.1 1% AEP Storm (1 in 100 year) under year 2100 projection

The 1% Annual Exceedance Probability (AEP) event was re-simulated under the projected 2100 climate conditions using the Intergovernmental Panel on Climate Change's (IPCC) Assessment Report 6 (AR6) summarised Shared Socioeconomic Pathway (SSP) 4.5 scenario to account for future flow increases. The resulting impacts are illustrated in Figure 5.8, showing a flood depth of 0.80 metres within the site, inundation reaching up to 2.43 metres at the site boundary down the narrow stretch, a peak flood level of 78.10 m AHD and a hazard classification slightly more significant than the today's 1% AEP results, but with the same H1-H3 breakdown within the site.

Figure 5.8: 1% AEP Flood Depth and Extent - 2100 Projection



Source: QGIS, 2025

5.4 Managing Flood Risks

The flood risk does not impact the proposed building footprint significantly; however, it should be advised that, in line with the Australian Disaster Resilience Handbook, Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, the structure should be designed for flood impacts with suitable water-resistant structural materials up to the PMF level.

5.4.1 Amplification of Existing Stormwater Networks

The formalised pipe and pit drainage network commences along Nicholson Road and Christie Street Parade, converging at the road intersection and continuing to the area where ponding on Christie Street is expected as the drainage network is near capacity. Upgrading the capacity has been incorporated as part of the design, upsizing the pipework from 300mm to 750mm diameter pipework along this network area (See Civil Drawing: 24-1018-CIV-021 for more details).

6 Design Recommendations

6.1 Flood Planning Levels

The Flood Planning Level is to be greater than or equal to the 1% AEP flood level + 500mm freeboard according to the Lane Cove DCP 2009, guidelines and best practice.

Table 6.1: Flood Planning Levels

Location ID	Description	1% AEP Flood Hazard	1% AEP Water Level (mAHD)	PMF Water Level (mAHD)	Flood Planning Level (1% AEP + 0.3m mAHD)	Flood Planning Level (1% AEP + 0.5m mAHD)	Adopted Flood Planning Level (mAHD)	Compliance
A – West access to the courtyard	Route to communal courtyard	Low	75.22	75.28	75.58	75.78	77.30	Yes
B – Northeast Access to Courtyard	Route to communal courtyard	Low	76.52	76.94	76.82	77.02	77.30	Yes
C – East Doorway 1	Building access Doorway	Low	76.57	76.94	76.87	77.07	77.20	Yes
D – East Doorway 2	Building access Doorway	Low	76.65	76.97	76.95	77.15	77.20	Yes
E – Vehicle Access point	Roller Shutter for vehicle basement access	Med	77.28	77.66	77.58	77.78	77.90	Yes
F – Access Southeast corner	Stairway Access	Med	78.10	78.16	78.40	78.60	78.60	Yes
G – Vehicle Access Point	Vehicle basement access	Med	71.52	72.59	71.82	72.02	72.00	Yes
H – Vehicle Access Point	Vehicle basement access	Med	71.49	72.59	71.82	71.99	72.00	Yes

6.1.1 Habitable Floor Levels

All habitable floors are located on the ground floor level of the development or above. Due to the gradient of the site, the building ground floor level varies but generally lies between 77.20 and 77.30. Access points to the building have been cross-checked at different locations across the site to determine the relevant flood levels and impact of flooding. Compliance with the 300mm freeboard requirement in a 1% event is met throughout the building; however, in the Southeast corner, levels suggest that complete 500mm freeboard of the building above the 1%

AEP event will not meet the potential ceiling requirement highlighted in the DCP (of extension of 300mm to 500mm requirement) however given all access points are at a suitable level to prevent ingress into lower floors, this is deemed acceptable. See Figure 6.11 for details on access point locations assessed.

6.1.2 Vehicle entry

The DCP from 2009 specifies a freeboard requirement for parking and storage areas which are to have a freeboard of 150mm.

The basement entry requirements have been specified by the Crows Nest TOD Precinct Design guide, which specifies that all basement entry points are to be set to at least 0.3 m above the surrounding ground level and protected from the effects of flooding.

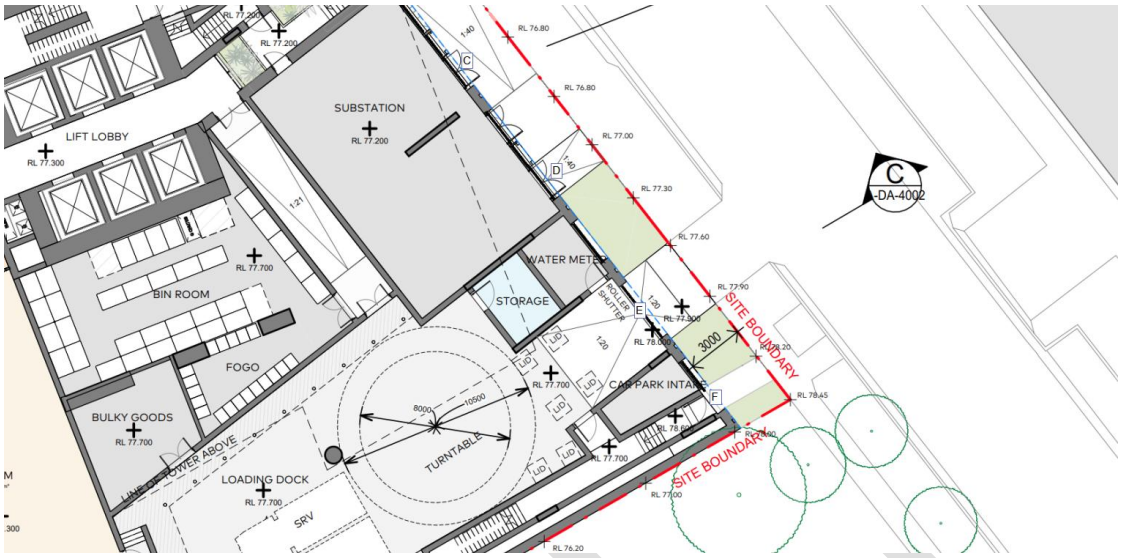
Basement and Loading DockEntry

The roller shutter access point satisfies this (See E within Table 6.1) across Nicholson street (see Figure 66.2), with Christie Street's below ground access requiring at a minimum access level of 72.00 m AHD to fully comply with Council requirements. (Figure 6.3).

Figure 6.11: Plan of Access Locations

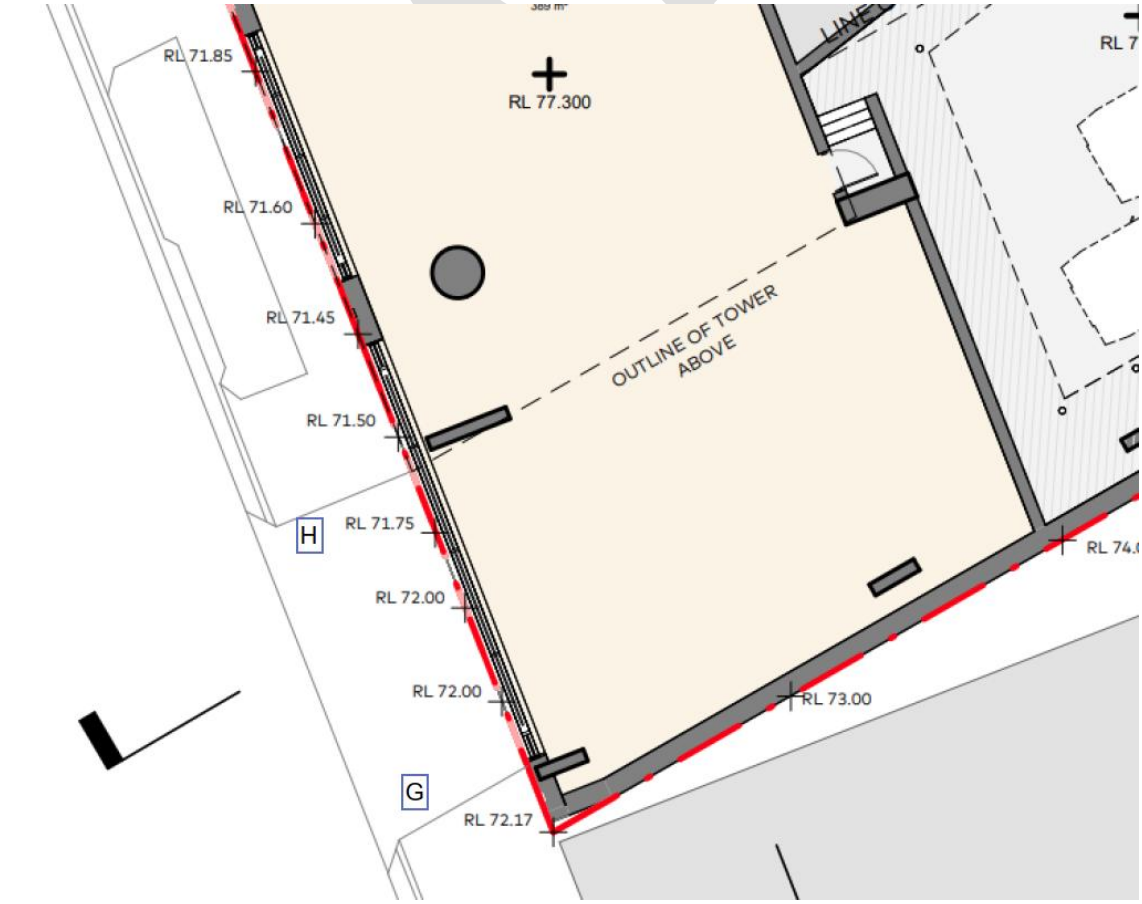
Source: Cox Architecture

Figure 66.22: Key Building Access Locations (Nicholson Street)



Source: Cox Architecture

Figure 6.3: Key Building Access Locations (Christie Street)



Source: COX Architecture

6.2 Flood Emergency Management

The flood emergency management (EM) strategy for the site has been assessed following advice provided in Flood risk management guideline EM01 - Support for emergency management planning (DPE 2023), Lane Cove Local Emergency Management Plan (2021), and Willoughby/Lane Cove Flood Emergency Sub-Plan (2023) from the NSW SES.

The EMPlan details arrangements for prevention, preparation, response and recovery to emergencies within the Lane Cove Emergency Management Region (LCMR). The objectives of this plan are to:

- Support Local Emergency Management Plans (EMPLANs) and augment them when required.
- Identify trigger points for regional level activation, escalation and demobilisation.
- Define participating organisation and Functional Area roles and responsibilities in preparation for, response to and recovery from emergencies.
- Set out the control, co-ordination, support and liaison arrangements at the Regional level.
- Detail activation and alerting arrangements for involved agencies at the regional level; and
- Detail arrangements for the acquisition and coordination of resources at the regional level.

The NSW SES leads flood EM planning and has the following legislative responsibilities in accordance with the State Emergency Service Act 1989:

- To protect persons from dangers to their safety and health, and to protect property from destruction or damage, arising from floods, storms and tsunamis
- to function as the combat agency for dealing with floods (including the establishment of flood warning systems) and to coordinate the evacuation and welfare of affected communities

The role of the NSW SES includes community education, collation of flood intelligence, flood EM planning and flood response, including the evacuation and welfare of affected communities.

To help minimise the flood risk to future occupants, it is important that developments consider flood emergency response. There are two main forms of response that may be adopted:

- Evacuation
  - Horizontal evacuation of occupants from the floodplain before the properties and/or evacuation routes become flooded
- Shelter-in-place
  - Vertical evacuation of occupants in a building to a level higher than the PMF level, who then shelter from the flood until it is safe to return to the ground floor and external areas

6.3 Emergency Planning

It has been established that roads around the site are at risk of flash flooding as critical storm durations cause inundation within less than 6 hours. Inundation caused by flash flooding can occur with little or no warning and cause a rapid rise in water level over a brief period of time. Flood events of this nature do not last more than a few hours.

Severe storms can arrive with little warning or intensify over a short period of time posing a challenge to evacuation as an EM strategy. An EM strategy for the site has been considered for two separate time periods with the emphasis of self-preparation and self-evacuation:

- The period of time prior to the arrival of a storm when surrounding roads are free from flooding
- The period of time during and after the storm when surrounding roads may be inundated

6.3.1 Emergency Management Strategy – Prior to Storm

SES advises that when flash flooding is likely, the best action to take is to leave low-lying homes and businesses (evacuation) well before flooding begins, but only if it is safe to do so. This self-evacuation would need to take place in the hours preceding a predicted storm event before flooding begins to impact the road network.

Evacuation arrangements for the St Leonards area fall under the Willoughby–Lane Cove Local Emergency Management Plan (EMPLAN), which is coordinated by NSW SES and Lane Cove Council. In the event of an emergency, designated evacuation centres are activated based on the scale and location of the incident. The advised evacuation centre for the site is Royal North Shore Hospital, which lies within 500m of the site. However, the surrounding arterial roads do not provide the means of moving to safer locations, whether that is the nominated evacuation centre or away from a forecasted storm area. Evacuation centres are set up at the discretion of the SES incident controller however they may not be operating or may take time to get up and running in the event of a flash flood.

Enacting this strategy would require local monitoring of forecasts issued by Bureau of Meteorology (BoM), including the daily Thunderstorm Forecast and the more specific Regional Severe Thunderstorm Warning and Detailed Severe Thunderstorm Warnings. This could be undertaken by a nominated flood warden for the precinct via the PA system for the buildings.

The forecasts have the following approximate lead times:

- Thunderstorm Forecast
    - 24-48 hours – forecasts likelihood of severe thunderstorms developing across NSW from ‘possible’ through to ‘likely’
    - if the forecast indicates severe thunderstorms are likely then advice should be issued to residents to prepare accordingly. This may entail more active monitoring of BoM forecasts, activating a Home FloodSafe Plan, preparing their property (if located on ground floor) or preparing to self-evacuate

- Regional Severe Thunderstorm Warning
    - 3 hours - forecasts broad areas where severe thunderstorms are occurring or may occur in the next 3 hours
    - the regional warning indicates severe storms are likely, giving less than three hours warning. This time period is the last feasible window where occupants could evacuate to safer areas prior to the storm arriving. However, due to local storm activity and storm tracks, arterial roads surrounding the precinct area may already be affected by flooding
    - a previous state of readiness should allow the rapid mobilisation to evacuate to a nearby hub or to seek shelter in higher parts of the buildings prior to the arrival of a severe storm

- Detailed Severe Thunderstorm Warning
    - less than 60 minutes - detailed warnings are issued when individual severe thunderstorms are within range of the city weather radars
    - they indicate the forecast direction of movement for 60 minutes and immediate Threat Area ahead of the storm
    - if the Detailed Severe Thunderstorm Warning or Threat Area encompasses the site then it is likely too late to safely evacuate before the storm arrives

6.3.2 Emergency Management Strategy – Evacuations during a Storm

The site is located in an area of flooding concern. It is noted that the rate of rise, resulting flood depths and the size of the floodplain would make it unsafe to evacuate through the surrounding roads during a storm. A particular risk is the narrow straight between buildings which shows higher flood depths and velocities, this area should be avoided in a flood event.

Evacuation by either vehicle or on foot from this area will be difficult for affected occupants. SES and emergency access to the site during flooding may also be difficult as it is adjacent to the roads within areas of the floodplain with significant flood depths. Due to these problems special shelter-in-place provisions should be provided as the primary evacuation method if conditions to not allow for safe horizontal evacuation to higher, non-inundated roads.

The short warning time, rapid rate of rise and short duration of flooding in the catchment mean evacuation improvements would have little benefit, and focus should be placed on education and preparedness", reinforcing the need for a shelter in place strategy.

6.3.3 Emergency Management Strategy – Shelter in Place (SIP) during a Storm

NSW SES StormSafe advises the following during a storm:

- never enter or travel through floodwater,
- stay indoors,
- stay clear of creeks, drains, causeways, gutter and streams.

Section 5.1.7 in the NSW State Flood Plan describes Shelter in Place (SIP) is an appropriate strategy to be considered where significant constrains to evacuation exist. Shelter-in-place is determined as a refuge occurring above the PMF level and may occur when there is a risk to public safety and other means of evacuation are not possible.

The site is embedded within an existing road network that was not designed to be free from flooding during extreme storms. It is beyond the scope of the proposal to consider upgrades to local drainage networks to provide flood-free evacuation routes. Consequently, SES advice would preclude evacuating when local roads are flooded as it poses a significant risk to life as entering flood waters is the main cause of death during a flood event.

6.3.4 Compatibility with Shelter in Place Guideline for Flash Flooding

The Shelter in place guideline for flash flooding (DPHI 2025) indicates that SIP is a suitable emergency management strategy for development proposed in flash flood environments. Table 6.1 outlines the decision-making process for the proposed development, based on the advice provided in the Shelter in place guideline for flash flooding.

Table 6.2: Compatibility with Shelter in Place Guideline

Shelter in Place Consideration	Decision	Relevant FIRA Section
Understanding the full range of flood behaviour up to, and including the PMF	A range of storms has been assessed to understand the range of flood behaviour up to 1% AEP and the PMF	5.2
Does shelter in place align with existing emergency management strategies for the area	Yes – There is no formal evacuation procedure or routes identified for the site, other than those proposed in the NSW SES Local Flood Plan (2023)	6.3.1
Has evacuation off-site (the primary emergency management strategy) been investigated and determined to be unachievable	Yes – Access has been investigated and is unachievable in both 1% and PMF events.	6.3.2
Does the development include medical centres, emergency service and community facilities, and	No	6.3.2

Shelter in Place Consideration	Decision	Relevant FIRA Section
sensitive and hazardous land uses, some of which may not be suitable for shelter in place		
Shelter in place for greenfield development is not supported	The site is not a greenfield development	2.1
Whether there is existing government developed flood warning systems that give advanced detailed forecasts of flash flooding to allow sufficient time to evacuate to the proposed refuge locations	Due to the flash flood nature, warning times are limited, especially during rapidly rising events. There is no evidence of sufficient warning time.	6.3.1
Can the community effectively be informed of the risks associated with the emergency management strategy	Yes	6.3.1
Detailed assessment of evacuation off-site to determine that evacuation off-site is not achievable	Yes, the surrounding road networks are not free from flooding.	6.3.1
Flash flooding is the only flood risk present at the site	Yes, critical storm durations are up to 6 hours for the site	5**Error! Reference source not found.**

6.3.5 Emergency management strategy – Residual risks

6.3.5.1 Education

Community awareness of flooding is a significant issue within the floodplain due to the infrequency of severe floods and the anticipated depths of these floods in a PMF event. The Precinct Manager need to be aware of the flood risk and their obligation to evacuate the basement car park and ground floor levels when inundation begins to occur. Residents need to be aware of the flood risk and the response requirement during a PMF flood event. As part of this procedure, evacuation drills should be conducted regularly to ensure residents are aware of the procedures for sheltering within the site.r

6.3.5.2 PA System

The building PA system can be used to communicate evacuation directions and safety messages to the population in the lead-up to and during a flood to assist in improving the safety of the community.

6.3.5.3 Medium and high-density residential buildings

Make buildings as safe as possible to occupy during flood events. An area of habitable floor of any residential development should be located above the PMF with the building structurally designed for the likely flood and debris impacts. The buildings should include:

- Alternative power source, with capacity for at least 8h for essential needs
- Automatic fire suppression systems
- Emergency telecommunication system
- Toilet facilities accessible to people with disabilities
- First-aid kit
- Emergency supplies kit
- Shelf-stable food

6.3.6 Emergency Management Considerations

Table 6.3 details key considerations and the advised outcomes related to each flood risk emergency management.

Table 6.3: Emergency Management Considerations

Shelter in Place Consideration	Decision and Evidence	Relevant FIRA Section	Outcome
Is warning time available to onset of flooding?	No - The time to flooding and flood duration are typically very short with minimal warning time. Critical storm durations around the site are less than 6 hours with flood warnings limited to severe weather warnings for the area and no specific advice on local impacts of flash flooding	6.3.1	Unable to evacuate in rapid onset event
Can development be modified to allow evacuation?	No	6.3.2	Stormwater drainage system amendments cannot be improved enough to enable evacuation as the primary advised emergency management solution; the outcome should revolve around safe evacuation either to a communal location outside the floodplain or shelter in place.
Is time of isolation short?	The period of worst-case inundation in the area surrounding the site is within 6 hours.	6.3.1	Consider development types and apply controls
Are occupants able to be safe and self-sufficient for duration of flooding	Yes - FPLs are designed to keep the buildings free from flooding under the most extreme circumstances. Flood-free areas exist within the precinct that could be used as muster points in the event of a flood emergency	6.1	Consider development types and apply controls
Are residual risks associated with SIP tolerable	Yes - Low flood hazard predicted within the precinct during the most extreme storms FPLs are designed to keep the buildings and below ground car parks free from flooding under the most extreme circumstances Flood-free areas located within the precinct could be used as a muster point or shelter location Building PA system can be used to relay emergency information to residents	6.1 6.3.5	Consider development types and apply controls

6.4 Compatibility with Design Controls

The Design Recommendations within this FIRA have been proposed to meet the requirements of the Design Controls applicable to the site. A summary of the site compatibility is presented below:

- The NSW Flood Prone Land 2021 package notes a planning proposal must not rezone land within the flood planning area from Recreation, Rural, Special Purpose or Environmental Protection Zones to a Residential, Business, Industrial or Special Purpose Zones. These land use changes represent an intensification in zoning which could potentially increase flood risk
    - The rezoning does not propose changes to any land zoned as Recreation, Rural, Special Purpose or Environmental Protection Zones
    - The zoning will remain as Residential under which residential flats are permitted in both the existing and the proposed zones. The main purpose of the rezoning is to increase the permissible density of the land.
- This FIRA has been undertaken in accordance with the NSW Government's Flood Prone Land Policy and the principles of the Flood Risk Management Manual

The precinct rezoning enables the increase in density in line with endorsed NSW Government strategies. While the NSW Flood Prone Land 2021 package notes a planning proposal must not permit a significant increase in development density, the proposed intensification of the proposed site at 46-52 Nicholson Street & 59-67 Christie Street is required to accommodate the additional residents in St Leonards over the near future. The proposed intensification will be in the form of vertical development with maximum height and Floor Space Ratio (FSR) increases to accommodate the growing population.

It is possible that direct flood risk to any person could be reduced by implementing the design recommendations and that the residual flood risk could be also reduced. To summarise:

- **Intensification within a brownfield site,**
  - this type of development can elevate the higher risk residential use above the PMF level and can make allowance for shelter-in-place refuge and vertical evacuation which is considered an improvement on the current flood exposure
  - intensified development offers more shelter-in-place opportunities as it will likely provide more floor space for refuge above the PMF level compared to the existing residential dwellings
  - the expected number of persons located on ground floors can be limited to current occupation or increased if the raised ground floor level reduces the risk to future occupants
- **FPL requirements and other Development Controls,**
  - the Upper Ground level and all first-floor storeys would be above the PMF level in most instances
  - it is expected that new multi-storey buildings will be stable during flooding up to the PMF and that all non-ground floor residents in multi-storey residential development would be only exposed to an indirect flood risk

- **Implementation of Flood Emergency Response Plan (FERP),**
  - A developed site specific FERP could address the flood risk faced directly and indirectly by future residents in contrast to the flood risks faced by existing residents in flood affected locations. It is likely most of these properties have no established site-based flood emergency response plan.
  - it is conceivable that a high-rise residential development with an effective flood emergency response plan and vertical evacuation opportunities may have a lower residual flood risk than existing housing limited opportunities for vertical evacuation

6.5 Summary of Flood Emergency Management

Section 6.3 outlines the relative flood risk that the site at 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards is exposed to. The site is affected by flash flooding coupled with overland flow. This is largely due to the short times associated with flash flood events, the speeds and depths associated with these events, and difficulties associated with evacuation to a safe location.

In flash flood catchments, the time to flooding and flood duration are typically short with minimal warning time. Warnings to the community are often limited to severe weather warnings or flood watches for the general area. There is often no specific advice available on the local impacts of flash flooding and there may be little time between the start of flood-producing rainfall and flooding of roads, property and potentially buildings.

To help minimise the flood risk to future occupants, the first response that should be adopted in a flood emergency event for 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards is shelter in place as the flood warning time and flood duration are both less than six hours for the

site. Flooding along Nicholson Street and Christie Street also limits the horizontal evacuation potential for the area. The lack of pre-determined evacuation locations and the rapid onset of flooding in the catchment led to sheltering being the most suitable means of emergency management.

7 Conclusions

This FIRA has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Infrastructure (DPHI) for the subject SSDA.

The Flood Risk SEAR requests a FIRA for the site to support the SSDA in accordance with the principles of the Flood Risk Management Manual and Flood Risk Management Guideline LU01.

Flood model scenarios for 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards were based on the following:

- Existing conditions
    - An assessment of the current flooding conditions based on existing survey of the site
- Design conditions with mitigation measures:
    - An amendment to the existing conditions model was built to incorporate the proposed development layout as building block-outs.

The 1% AEP and PMF have been assessed as they relate to the Lane Cove DCP 2009 Flood Planning Levels and emergency management measures for the development. The PMF is the largest flood that could theoretically occur at a location and defines the maximum extent of flood-prone land. Dry areas above the PMF level are expected to be free from flooding under all scenarios.

There is flooding predicted within the site and surrounding roads of 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards. The stormwater networks have relatively low capacity with excess flows being conveyed along adjacent roads to the rail corridor West of the site. 1% AEP flood depths in the precinct of the proposed development are typically up to 0.8m with this value increasing between the narrow sections between buildings.

To represent 46-52 Nicholson Street & 59-67 Christie Street, Saint Leonards design case, a new building block out was included in the model covering the proposed site. This assumes that the site will be immune from flooding in the 1% AEP storm by adopting the Council Flood Planning Level (1% AEP + 500 mm freeboard, selecting the stretch target for freeboard).

The flood model highlights the following:

- Changes in peak 1% AEP water level
    - the changes in peak water level because of the development do not exceed the recommended thresholds for habitable buildings or residential zoned land
    - no cumulative impacts predicted
    - there is no new flooding to existing properties
- Changes in peak 1% AEP flow
    - the changes in peak flow are negligible
- Changes in 1% AEP inundation duration
    - there are no increases in duration of inundation that exceed the recommended times
- Change in 1% AEP flood velocity
    - flood water velocities are insignificantly changed by the proposed development

- there are no changes in flood water velocity outside the site boundary

- Change in 1% AEP flood hazard
  - there are no significant changes in flood hazard outside the site boundary. The flood emergency management (EM) strategy for the site has been assessed following advice provided in Flood Risk Management Guideline EM01 - Support for emergency management planning (DPE 2023) and relevant plans from the NSW SES.

Aspects of this development are required to meet flood related development controls, and the key risks as addressed through design are noted here:

Flood Levels and Appropriate Immunity

The design Flood Levels in Table 6.1 highlight the minimum required floor levels to appease this requirement. According to the development-specific advice and development controls of the Council relating to the habitable rooms, 1% AEP + 0.3m, or if required, 0.5m freeboard is required to meet the Lane Cove Council Flood Policy to enable a level of flood resilience for the residences and provide a reasonable level of flood mitigation. The proposed minimum entrance levels being 77.30 m AHD for the building habitable floor levels and basement car park entrances/stairways. As noted on the architectural drawings, the habitable floor levels of 77.30 m AHD for the Social building would suit the habitable floor levels.

The guidance from the DCP requires a minimum 1% AEP + 300, or if required in high flow cases, 500mm minimum freeboard level for basement car parks and habitable floor levels. This equates floor levels and minimum access as shown in Table 6.1. With the development of drainage in the surrounding site in the next design stage, the development's current proposal follows both Lane Cove Council's LEP 2009 and DCP 2009 and be in line with FIRA guidance that requires consideration of relevant planning instruments and local council standards.

Emergency and potential evacuation during flood events

The required emergency and potential evacuation during flooding events for the site have been considered regarding both the severity of flooding and duration of flooding events. The site is affected by mainstream flooding and there is only risk of extended periods of flood risk that could lead to isolation or a need for prior preparations of flooding provisions in the modelled rare PMF event.

Based on this FIRA, an evacuation strategy and a shelter in place policy during a flood emergency is the most logical EM approaches to protect life, given the following constraints:

- the roads surrounding the site are at risk from flash flooding; flooding that has a relatively high discharge over a short duration – the interval between the observable causative event and the flood is less than six hours. Given the site does not have sufficient warning time to adequately evacuate the population of the building, this should be preferable, however it should be made clear that:
  - the opportunities for horizontal evacuation during a storm are limited as surrounding streets are subject to high flood hazards that present an unacceptable risk to people. NSW SES advice is not to venture out during a storm or cross any area of flood inundation
  - the rate of rise and extent of flooding in the most extreme events means that emergency evacuation centres may not get set up and evacuees would generally have to take shelter in other private premises that may not have robust flood controls
- the time of isolation is short, based on the duration of flooding around the precinct. A development which is isolated for a few hours by flood water in PMF does not pose a significant risk to life

    - redevelopment affords a means of creating a safe, on-site shelter above the PMF – redevelopment which caters for sheltering in place can be used to reduce existing risk to life for individuals who currently occupy the floodplain, but it is likely to increase the number of individuals at risk
- additional Development Controls can be imposed which seek to manage the residual secondary risks to life caused by flood isolation to ensure that risks remain tolerable