

Concord High School Upgrade 5 Stanley Street, Concord Flood Impact Assessment Report

1 June 2023 | 22-108 | Approved Issue [B]

Contents

Contents	2
Document control	3
1.0 Introduction	4
2.0 Existing Conditions.....	5
3.0 Proposed Works.....	6
4.0 Flood Investigation	6
5.0 Riverine Flooding	7
5.1 Catchment	7
5.2 Analysis of Upstream Stormwater Flow Rate.....	8
5.3 Analysis of Riverine Flow Flooding Through the Concrete Channel.....	9
6.0 Overland Flow Flooding	12
6.1 Catchment	12
6.2 Analysis of Stormwater Flow Rate through Stanley Street	13
6.3 Analysis of Existing Overland Flow Extent Through Stanley Street.....	14
7.0 Site Stormwater Management	16
8.0 Conclusions.....	17
Appendix A	18
Appendix B	19
Appendix C	20

Document control

Rev No	Date	Revision details	Approved	Verified	Prepared
A	05.05.2023	Approved issue	JC	JH	JH
B	01.06.2023	Site Address Updated	JC	JH	JH

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1.0 Introduction

It is proposed to upgrade the existing Concord High School (herein referred to as 'The Site'). The Site is located at 5 Stanley Street, Concord. The Site borders residential properties on the northern and western sides, St Lukes Oval on the eastern side, and St Luke Park on the southern side. There is an existing concrete channel along the eastern side of St Lukes Oval and the channel connects to Parramatta River at the northeast of The Site. Refer to Figure 1 below for The Site location.



Figure 1: Site Location Plan (Source: SIX MAPS)

The purpose of this report is to detail the following:

- Flood risk of the proposed development.
- Assess the impacts of the development, including any changes to flood risk onsite or off-site, and detail design solutions to mitigate flood risk where required.
- One-dimensional and two-dimensional flood modelling using HEC-RAS.

2.0 Existing Conditions

The Site has several existing buildings in the middle, two existing car parks on the southern boundary, and an existing oval and existing sports courts on the eastern boundary. The site slopes from the northwest towards the southeast at a grade of approximately 2-5%. Refer to Figure 2 below for the existing site plan.

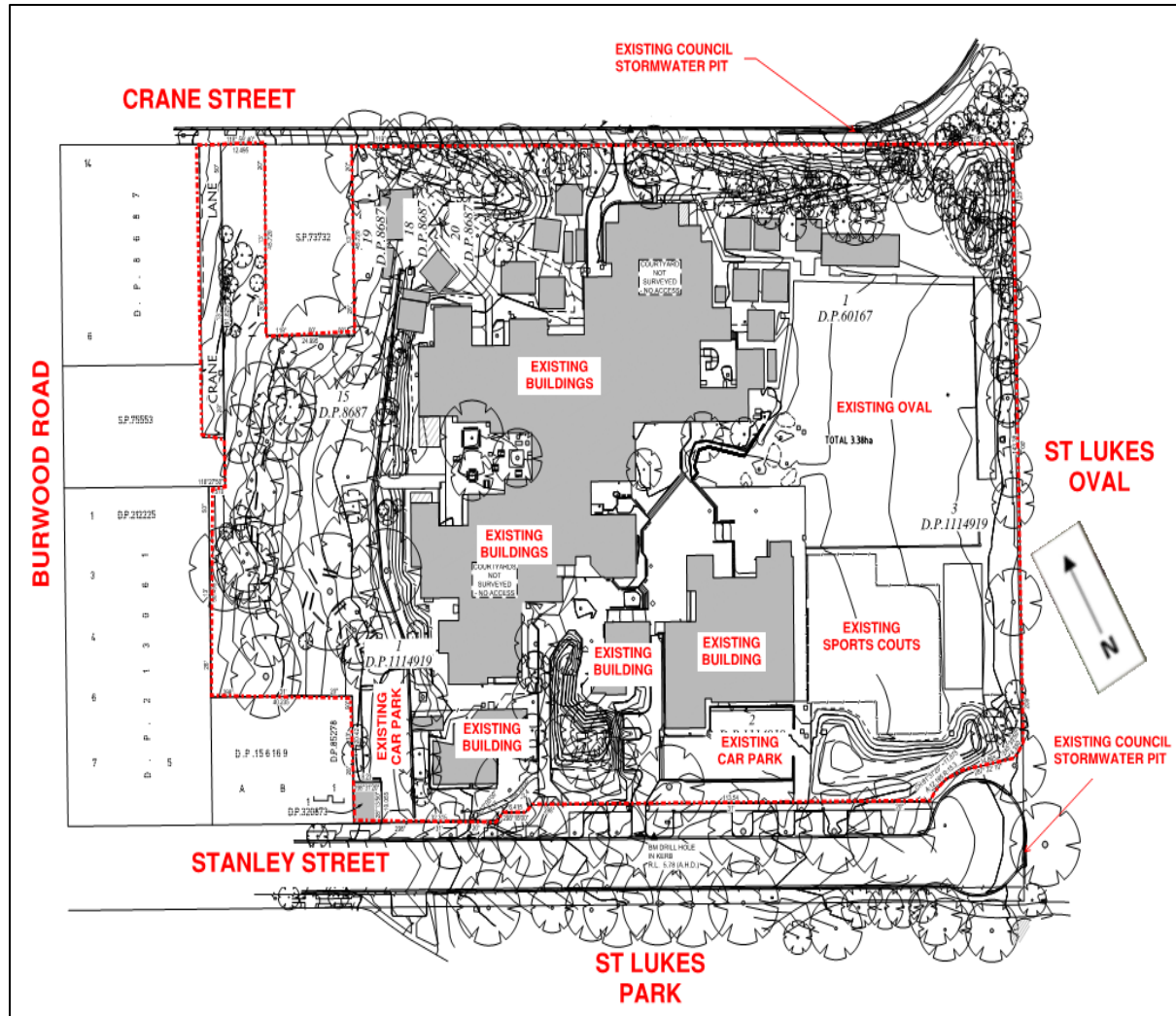


Figure 2: Existing Site Plan (Source Document: *Craig & Rhodes, Project – Detail Survey Over Concord High School, Dwg File Ref. 107-22G T01[00] – Detail Overall*)

Upon review of the existing stormwater management plans, verification via site inspections and review of survey information, the stormwater runoff from the existing site is collected via a series of grated inlet pits and pipes, discharging to Council's systems within Stanley Street, and Crane Street.

3.0 Proposed Works

The proposed development involves the construction of new buildings at the southeast corner of The Site, two new games courts at the northeast corner of The Site and their associated pavements and landscape areas. The existing car park on the western side of The Site will also be extended as part of the proposed development works. Refer to Figure 3 below for the proposed site plan.

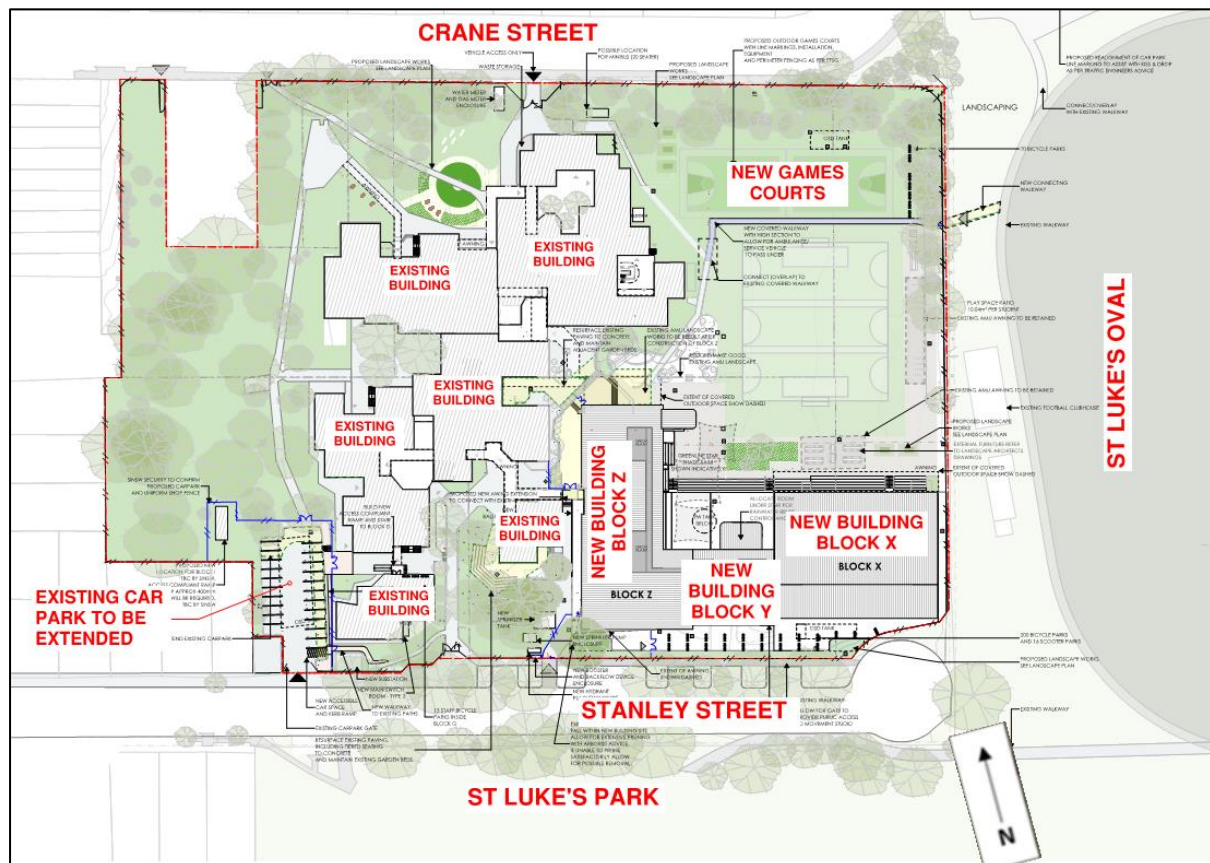


Figure 3 – Proposed Site Plan.

(Source Document: JDH Architecture, Job No. 1292, Sheet No. CHS-JDH-0013-ZZ-XX-DR-A-S3, Rev 15, Dated 03.04.2023)

4.0 Flood Investigation

Preliminary investigations have indicated that The Site is potentially affected by two sources of flooding: riverine flooding from the existing concrete channel along St Lukes Oval which is a tributary of Parramatta River and local overland flow flooding.

Riverine flooding occurs when heavy rainfall causes the water levels in a river/channel to rise and escape the main channel. Local overland flow flooding is run-off that travels over the land during heavy rainfall events, affected by urban features such as stormwater infrastructure, roads, fences, walls and other structures.

Correspondence with the City of Canada Bay Council has revealed that a flood study for the areas around the proposed development has not been undertaken and there is no flood information for The Site at this stage.

5.0 Riverine Flooding

It is noted that the existing concrete channel along the eastern side of St Lukes Oval is a major drainage channel that conveys overland flow from upstream catchments to Parramatta River. This section estimates the extent of mainstream flow flooding along the existing concrete channel east of The Site.

Two-dimensional flood modelling of the existing concrete channel using HEC-RAS has been undertaken to verify if the proposed development is affected by 1% Annual Exceedance Probability (AEP) storm event and Probable Maximum Flood (PMF) event. *(Note: The PMF is the largest flood that could conceivably occur at a particular location. The PMF defines the extent of the floodplain).*

5.1 Catchment

The first stage in determining the flow rate through the existing concrete channel along the eastern side of St Lukes Oval, involves the collection of data to determine catchment boundaries and site details. The data collected includes:

- Mecone Mosaic contour map

The total catchment area upstream of the section of the concrete channel along St Lukes Oval is approximately 215 hectares based on Mecone Mosaic contour map. Refer to Figure 4 below for the extent of the catchment. The arrows within the Figure indicate the overland flow direction. The average slope of the catchment is approximately 5%.



Figure 4 – Upstream Catchment of Concrete Channel

(Source: *Mecone Mosaic Contour Map*).

5.2 Analysis of Upstream Stormwater Flow Rate

The computer model XP-RAFTS was used to determine peak stormwater flows through the existing concrete channel for 1% AEP flood and PMF events. Manning's roughness coefficient for the impervious area and pervious area for the upstream catchment were nominated as 0.02 and 0.035 respectively. A range of storm durations was analysed to determine the peak flow through the concrete channel.

The peak flow rate through the existing concrete channel determined for 1% AEP storm event and PMF event are listed in Table 1.

Refer to Figure 5 below for the summary input of the XP-RAFTS model analysis.

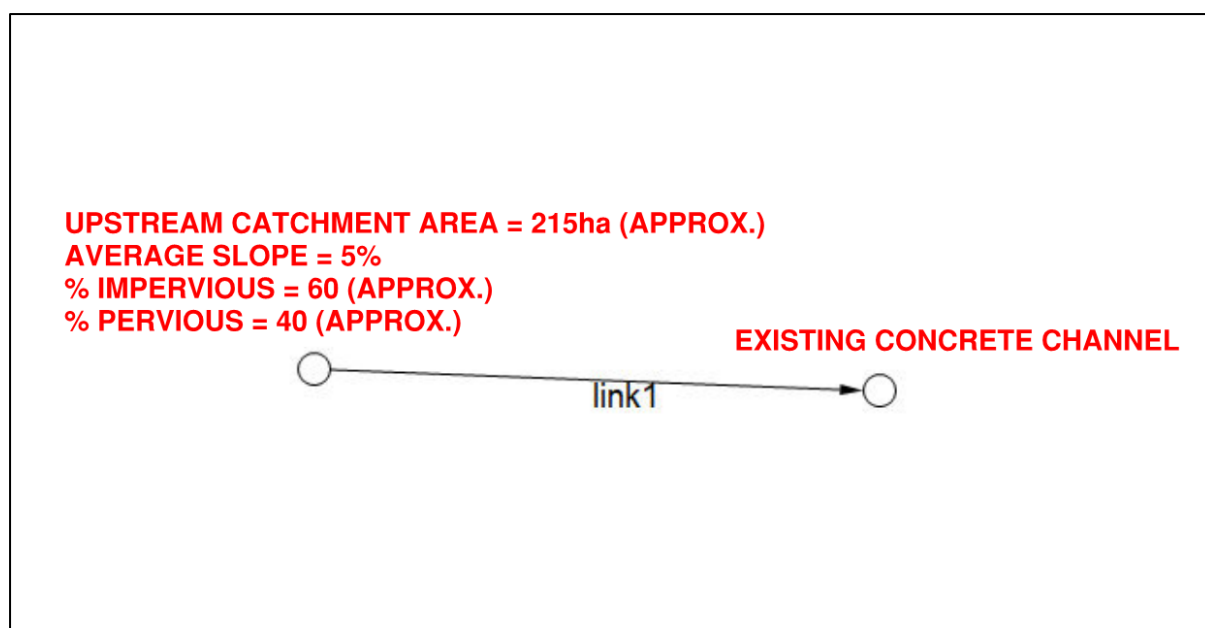


Figure 5 – XP-RAFS Input Summary for the Concrete Channel

Table 1.0 – Peak Flow Rate Through Concrete Channel	
1% AEP	76.44 m ³ /s
PMF	290.20 m ³ /s

5.3 Analysis of Riverine Flow Flooding Through the Concrete Channel

The computer model HEC-RAS was used to model the extent of the riverine flow flooding through the existing concrete channel. The estimated extent of the riverine flow flooding through the existing concrete channel along St Lukes Oval for 1% AEP storm event and PMF event is depicted in Figure 6 and Figure 7 respectively.

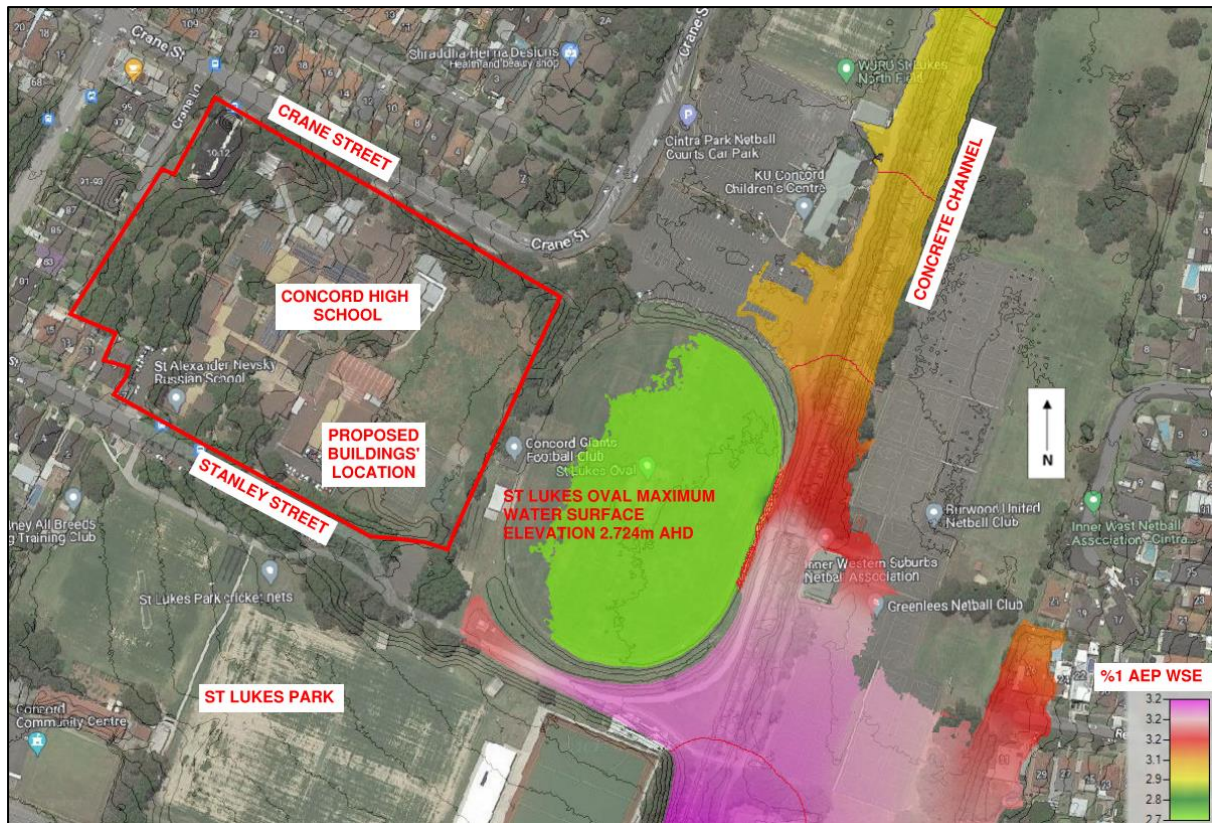


Figure 6 – Extent of 1% AEP Riverine Flow Flooding Through the Concrete Channel.

(Note: This flood extent is approximate only and not to be used for other design purposes)

Based on the HEC-RAS analysis, The Site is not impacted by 1% AEP riverine flow flooding through the concrete channel along St Lukes Oval as shown in Figure 6. St Lukes Oval is within the 1% AEP flood extent of the existing concrete channel and the 1% AEP flood top water surface level within the oval is 2.724m AHD approximately. The finished floor levels for the proposed new buildings at the south-eastern corner of The Site are 5.70m AHD and 5.90m AHD. The finished floor levels of the new buildings comply with the minimum freeboard requirement of 0.5m above 1% AEP flood levels within channels, creeks and rivers for educational development as outlined in the City of Canada Bay Council's Specification for the Management of Stormwater, Section 3.2.



Figure 7 – Extent of Probable Maximum Flood (PMF) Through the Concrete Channel.
 (Note: This flood extent is approximate only and not to be used for other design purposes)

The proposed site is partially impacted by riverine flooding from the PMF event based on HEC-RAS analysis. The maximum PMF top water level within The Site is 4.70m AHD approximately.

6.0 Overland Flow Flooding

Upon review of the existing topographic information around the proposed site, Stanley Street along the southern boundary of The Site, appears to be an overland flow path and the proposed site may be impacted by overland flow flooding through Stanley Street. Currently, there are stormwater pits and pipes along Stanley Street to collect stormwater from the surrounding residential areas, St Lukes Park, and The Site for storm up to 5% AEP and discharge to the existing concrete channel on the eastern side of St Lukes Oval. For 1% AEP storms, stormwater flows through Stanley Street along the southern boundary of The Site as surface runoff before discharging to the concrete channel via St Lukes Oval.

An overland flow flooding assessment of Stanley Street has been undertaken to determine the extent of overland flow flooding within the proposed site and this is detailed in the following sections.

6.1 Catchment

The first stage in determining the overland flow rate through Stanley Street adjacent to The Site involved the collection of data to determine catchment boundaries and site details. The data collected included:

- Existing site survey
- Mecone Mosaic contour map

The upstream catchment areas were determined using Mecone Mosaic contour map. Refer to Figure 8 below for the extent of the upstream catchments. The arrows within the Figure indicate the overland flow direction. The average slope of the upstream catchment is approximately 5.0%.

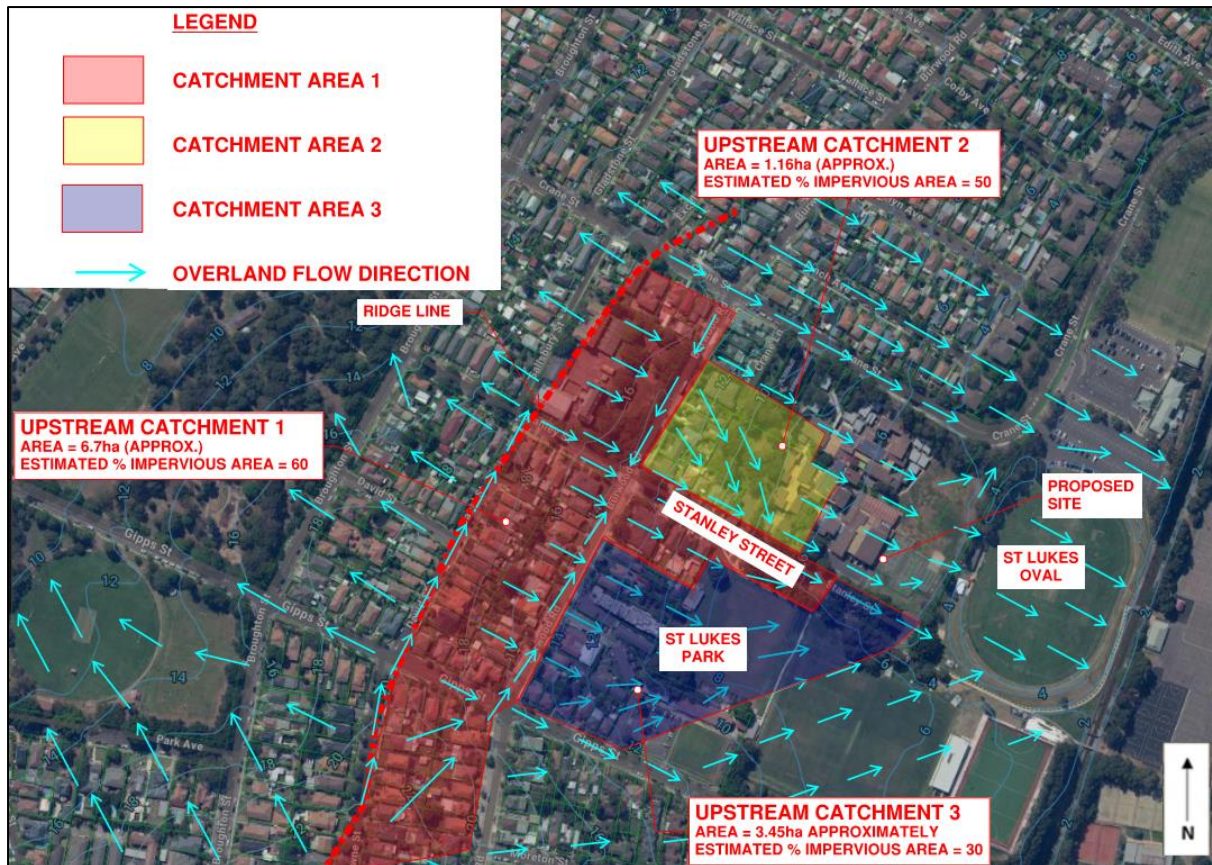


Figure 8 – Upstream Catchment Plan of Stanley Street

(Source: Mecone Mosaic's Contour Map).

Upstream Catchment Area 1 is approximately 6.70ha and it is within a residential area. The percentage impervious of Upstream Catchment Area 1 is assumed to be 60%.

Upstream Catchment Area 2 is approximately 1.16ha and it is within a residential area and The Site. The percentage impervious of Upstream Catchment Area 2 is assumed to be 50%.

Upstream Catchment Area 3 is approximately 3.45ha and it is within a residential area and St Luke's Park. The percentage impervious of Upstream Catchment Area 3 is assumed to be 30%.

6.2 Analysis of Stormwater Flow Rate through Stanley Street

The computer model XP-RAFTS was used to determine peak stormwater flows through the overland flow path adjacent to The Site for 1% AEP storm event. Manning's roughness coefficient for the impervious area and pervious area for the upstream catchments are 0.02 and 0.035 respectively.

Refer to Figure 9 below for the summary input of the XP-RAFTS model analysis.

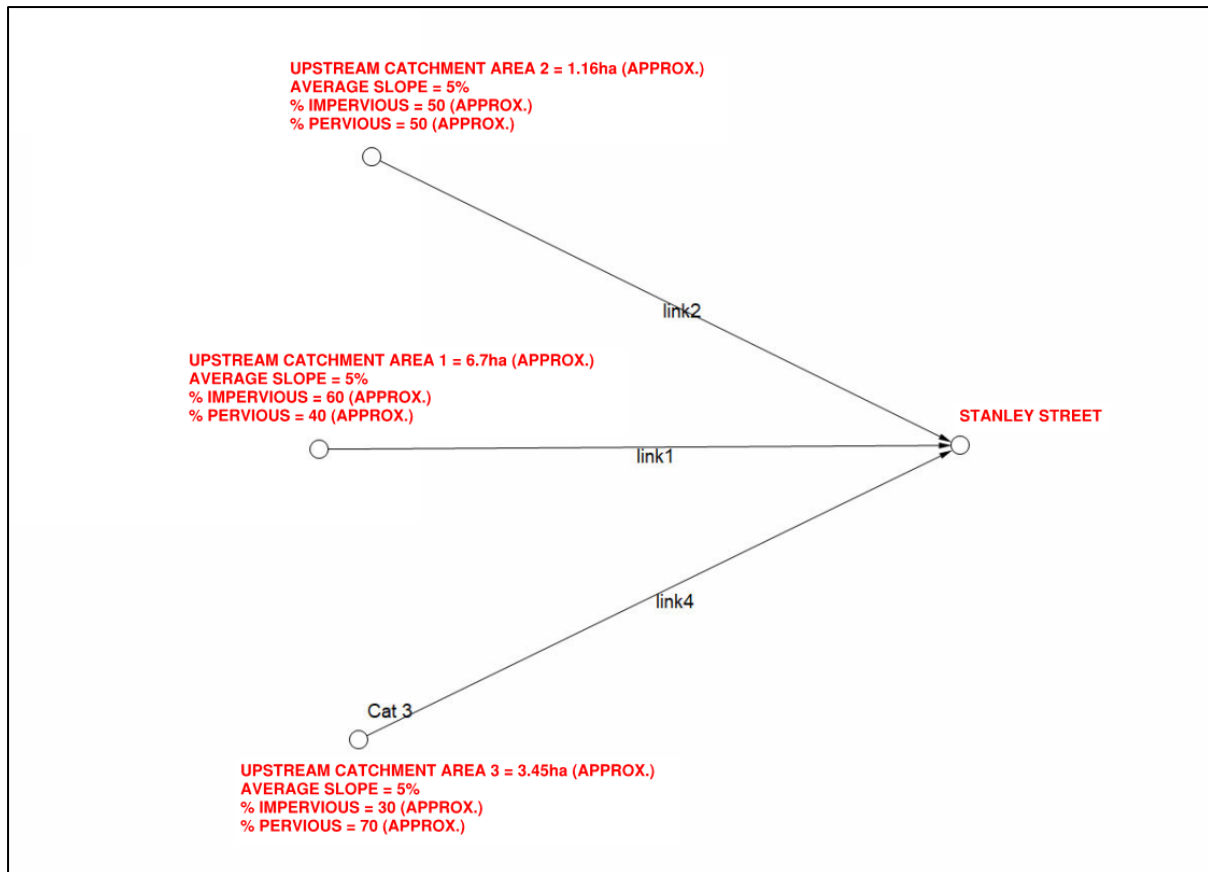


Figure 9 – XP-RAFTS Input Summary

A range of storm durations was analysed to determine the peak flow through Stanley Street adjacent to The Site.

The peak flow rate determined for 1%AEP storm events through Stanley Street adjacent to The Site is 3.41m³/s.

The 1%AEP storm is the selected worst case for the analysis, and it generates the highest design flow rate.

It is to be noted that the 1% AEP maximum flow rate through Stanley Street has been estimated without considering the stormwater pit and pipe network along the street and the actual 1% AEP maximum flow rate through Stanley Street will be lower than 3.41m³/s.

6.3 Analysis of Existing Overland Flow Extent Through Stanley Street

The estimated extent of the existing overland flow flooding through Stanley Street with 1% AEP (100-year ARI) storm top water levels is depicted in Figure 10 and the top water levels along the road are listed in Table 2.0. The computer model HEC–RAS was used to model the existing overland flow path across Stanley Street, to determine the water depth and level at sections A-A, B-B, C-C, D-D, E-E, F-F, G-G, H-H, I-I, J-J, and K-K.

7.0 Site Stormwater Management

Stormwater runoff from the proposed new buildings, games courts, car park extension and their associated pavements and landscape areas will be collected by pit and pipe networks and directed to On-Site Detention (OSD) systems before discharging to the council's stormwater asset at a permissible discharge rate as outlined in the City of Canada Bay Council's Specification for The Management of Stormwater, Section 2.2. Refer to Appendix B for civil works plans for further details.

The existing local overland flow paths within The Site will be maintained and a grassed swale along the southern side of new buildings has been proposed to capture local overland stormwater flow before discharging to the council's stormwater asset. The maximum top water levels within the grassed swale for 1% AEP storm event will be 300mm below the finished floor levels of the new buildings as required by the City of Canada Bay Council's Specification for The Management of Stormwater, Section 3.2. Refer to Figure 11 for the local overland flow paths around the proposed new buildings.

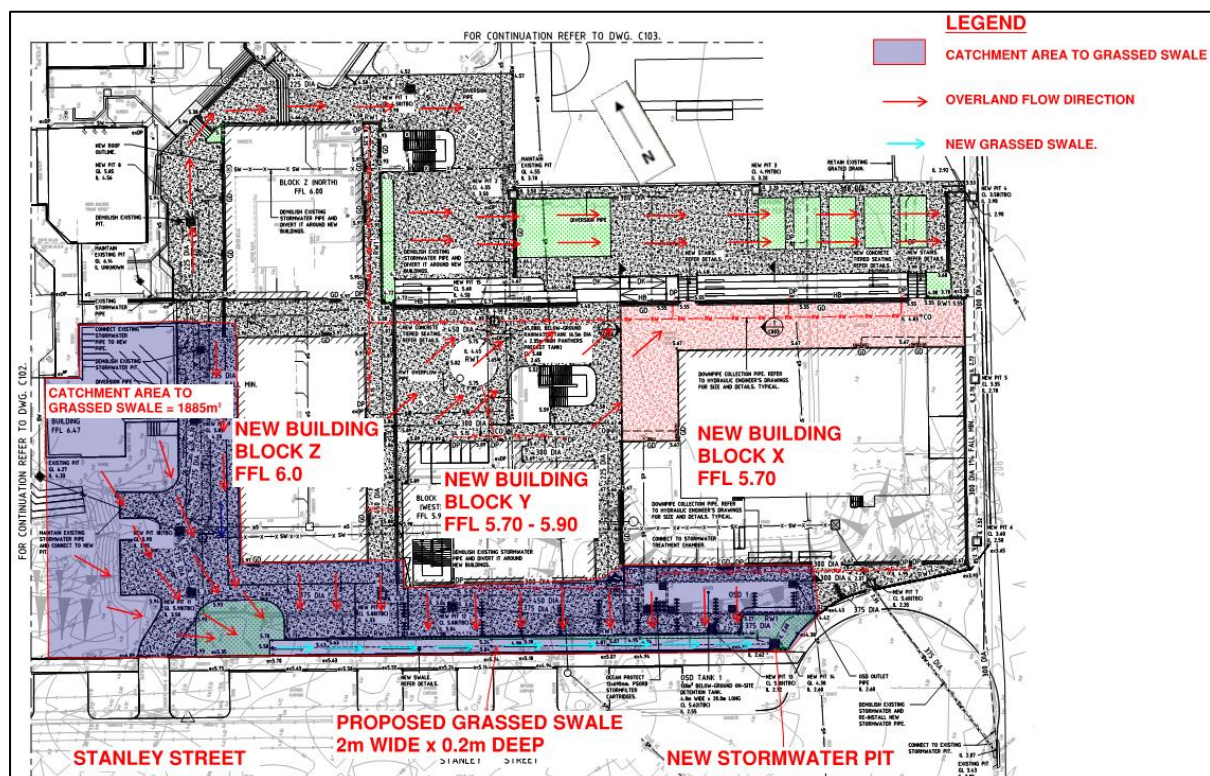


Figure 11 – Local Overland Flow Paths around The Proposed New Building

The proposed development will not worsen the existing flood condition downstream and upstream of The Site as OSD systems have been proposed to limit the post-development peak stormwater flow rates to pre-development flow rates.

8.0 Conclusions

Based on two-dimensional overland flow flood modelling using HEC-RAS, the proposed development is not impacted by 1% AEP riverine flood extent and the 1% AEP flood top water level within St Lukes Oval adjacent to the new buildings is 2.74m AHD approximately.

Stanley Street along the southern boundary of The Site is identified to be an existing overland flow path to convey overland stormwater surface runoff from the upstream catchments to the existing concrete channel east of The Site for up to 1% AEP storm events. The overland stormwater flows for up to 1% AEP storm events are fully contained within the existing Stanley Street and its road reserve.

The proposed finished floor levels of the new buildings at the south-eastern corner of The Site are 5.7m AHD for Block X, 5.70m-5.90m AHD for Block Y, and 6.0m AHD for Block Z.

The City of Canada Bay Council's Specification for the Management of Stormwater, Section 3.2 requires a minimum freeboard of 500mm above the 1% AEP flood level within channels, creeks and rivers. The proposed new buildings' finished floor levels are 2.96m higher than the 1% AEP flood top water level within St Lukes Oval and the proposed FFLs of the new buildings comply with the council requirements.

The City of Canada Bay Council's Specification for the Management of Stormwater, Section 3.2 requires a minimum freeboard of 300mm for 1% AEP overland flow top water levels within roadways. The FFLs of the proposed new buildings are over 300mm above the 1% AEP overland flow top water levels within Stanley Street and the proposed FFLs of the new buildings comply with the minimum freeboard requirements for buildings adjacent to roadways.

The proposed development is partially impacted by the PMF event and the PMF top water level within The Site is approximately 4.70m AHD. We recommend installing flood warning signage and flood depth indicators along the eastern boundary of The Site and developing a Flood Emergency Management Plan for the operational phase of the development.

The proposed development will not have a negative impact on the existing flood condition of the upstream and downstream properties as the development will provide OSD systems to limit the post-development peak stormwater discharge rate to pre-development discharge rate. The existing local overland flow paths within The Site will be maintained and a grassed swale along the southern boundary of The Site has been proposed to collect overland flow around the new buildings before discharging into the council's stormwater system.

Appendix A

Calculations

Job Concord HS upgrade

Date 05/06/2023

Design Information Summary

Project — Concord HS upgrade

Address — 3 Stanley Street, Concord

Reference — Australia Rainfall and Runoff (2019)

— City of Canada Bay Council — Specification for the Management of Stormwater

— Appendix 2 — Engineering Specification

— Rainwater Reuse Policy

IFD — BOM website.

Location — Latitude = -33.864

Longitude = 151.108

* The development will increase impervious area and OSD is required as per City of Canada Bay Council, Specification for the Management of Stormwater, Section 2.2.

OSD storage Volume required = $300m^3/ha$

Maximum permissible site discharge = $180L/s/ha$

* WSUD — All development encourage to implement WSUD principle. Refer to City of Canada Bay Council, Engineering Specification, page 316.

* Rainwater — 5000 L is required for all development.

Refer to CCB, Rainwater Reuse Policy, section 2.2.

Job concord HS upgrade

Date 05/05/2023

Flood Analysis for concrete channel along Eastern side of
SE Woods oval XP-RAFTS MODEL

upstream catchment area = 215 ha.
○ $\% \text{ Impervious} = 60$
↓
 $\% \text{ pervious} = 40$
average slope = 5%

○ concrete channel.

1% AEP Flow rate = 76.44 m³/s

PMF Flow rate = 290.20 m³/s



PARRAMATTA RIVER

SITE OF WORKS

CONCRETE CHANNEL

Catchment Area
= 214,98 ha

CATCHMENT AREA = 215ha
(APPROX.)
% IMPERVIOUS = 60
% PERVIOUS = 40
AVERAGE SLOPE = 5%

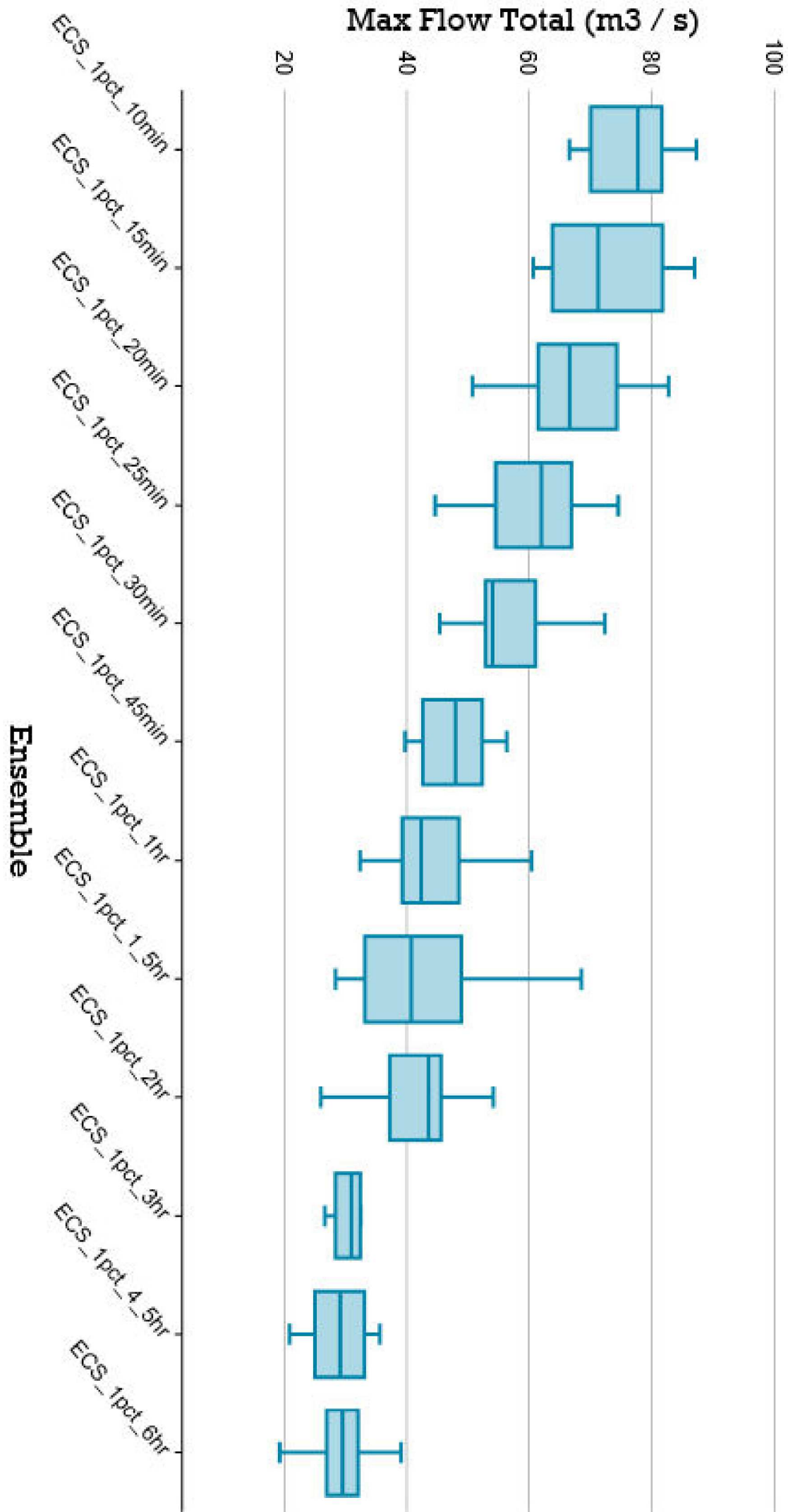
LEGEND

Overland Flow direction

Site

Catchment Drains to The Creek

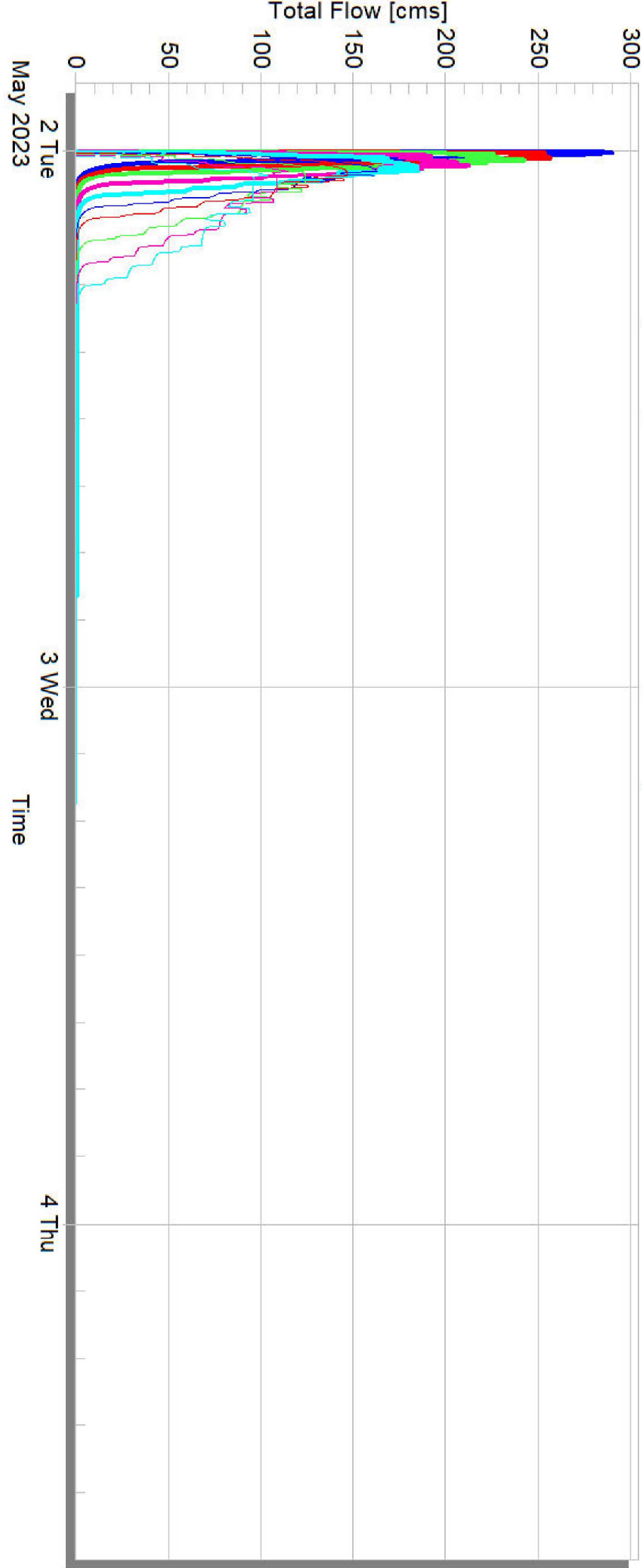
Comparison of Storm Ensembles of different durations for AEP = 1%



PMF FLOW RATE THROUGH CONCRETE CHANNEL

Total Flow

PMP 30min	max [290.191]	PMP 45min	max [257.228]	PMP 60min	max [242.661]	PMP 90min	max [212.961]
PMP 120min	max [184.774]	PMP 150min	max [162.615]	PMP 180min	max [146.877]	PMP 240min	max [124.354]
PMP 300min	max [114.628]	PMP 360min	max [103.776]				

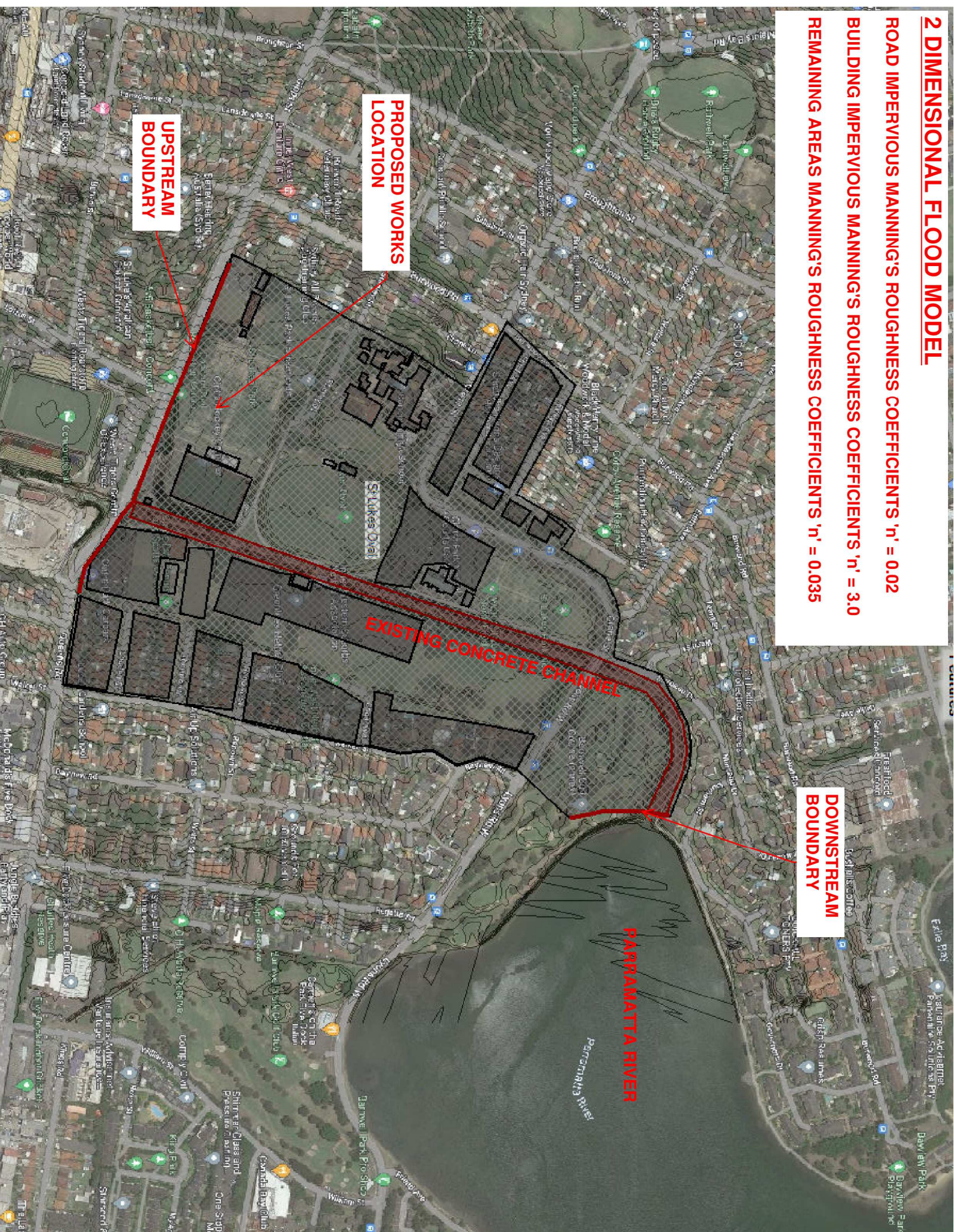


2 DIMENSIONAL FLOOD MODEL

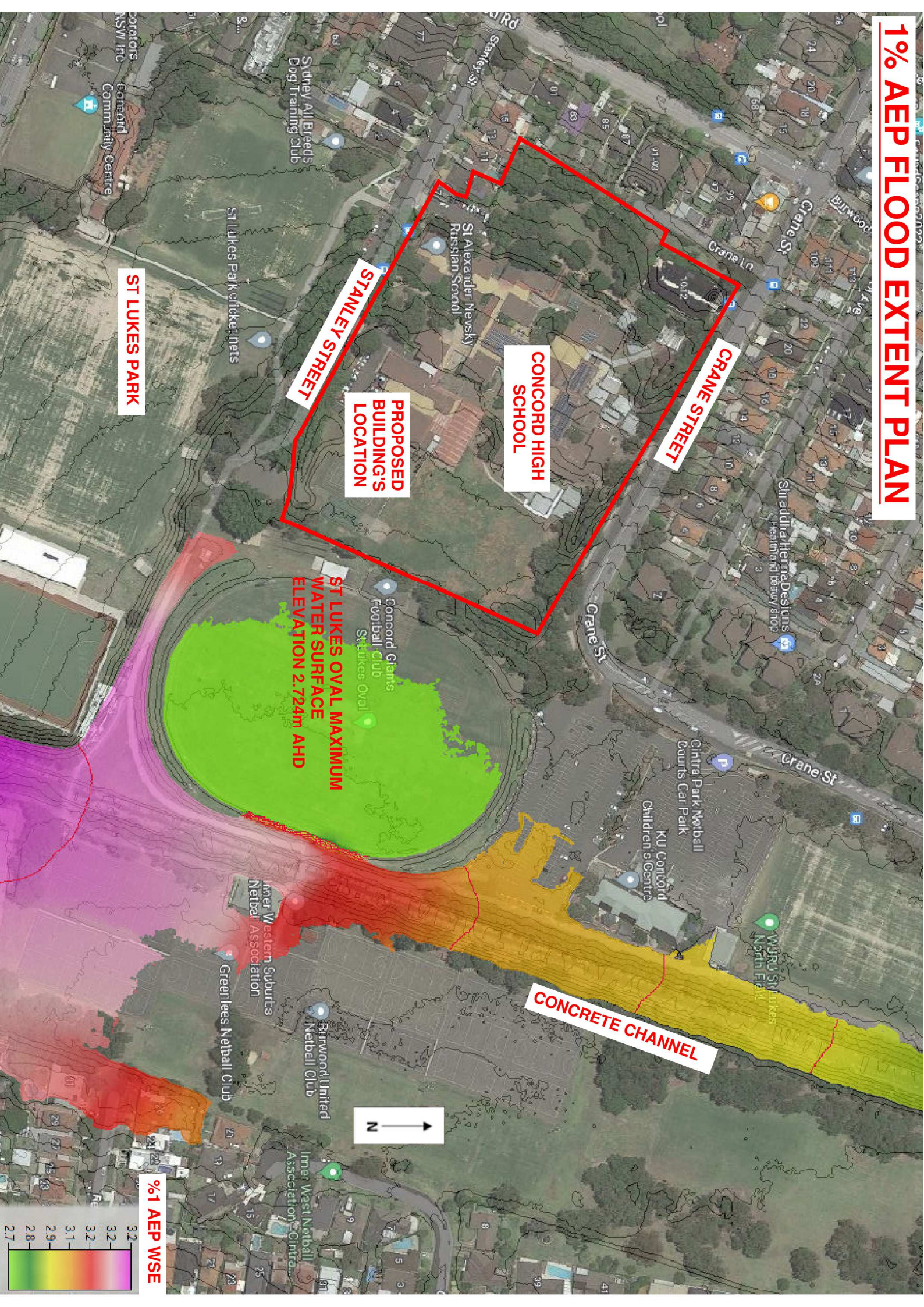
ROAD IMPERVIOUS MANNING'S ROUGHNESS COEFFICIENTS ' n ' = 0.02

BUILDING IMPERVIOUS MANNING'S ROUGHNESS COEFFICIENTS ' n ' = 3.0

REMAINING AREAS MANNING'S ROUGHNESS COEFFICIENTS ' n ' = 0.035



1% AEP FLOOD EXTENT PLAN



PROBABLE MAXIMUM FLOOD EXTENT PLAN



Job Concord HS upgrade

Date 05/06/2023

Overland Flow Analysis For Stanley Street along Southern
Boundary of the new Buildings. XP-RAFS MODEL

Upstream Catchment 3

Area = 3.45 ha

% ImperVIOUS = 30

% pervious = 70

slope = 5%

Upstream Catchment 1

Area = 6.7 ha

% ImperVIOUS = 60

% pervious = 40

slope = 5%

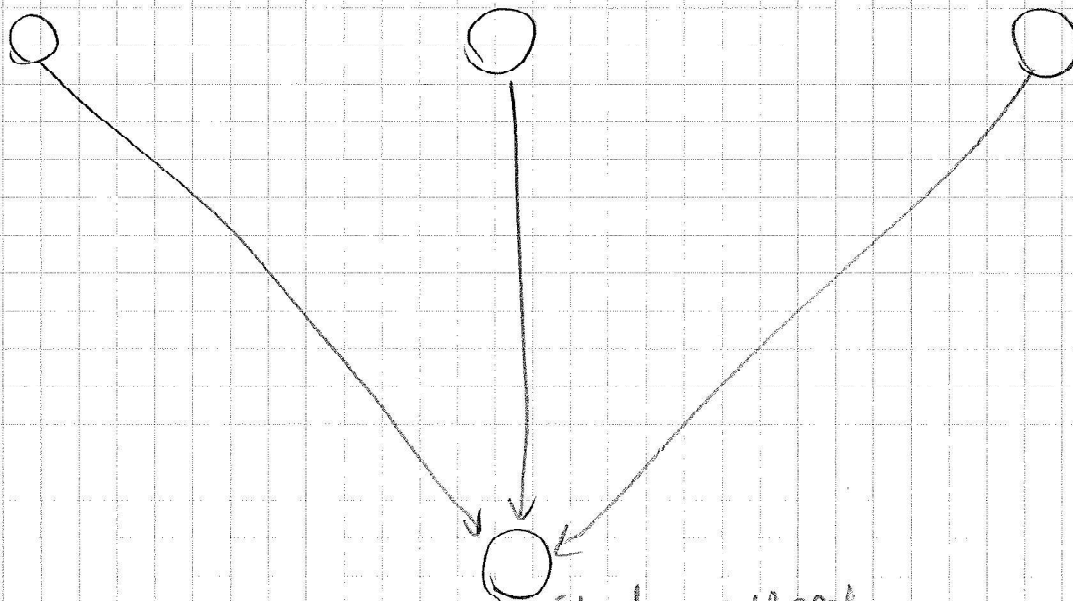
Upstream Catchment 2

Area = 1.1 ha

% ImperVIOUS = 50

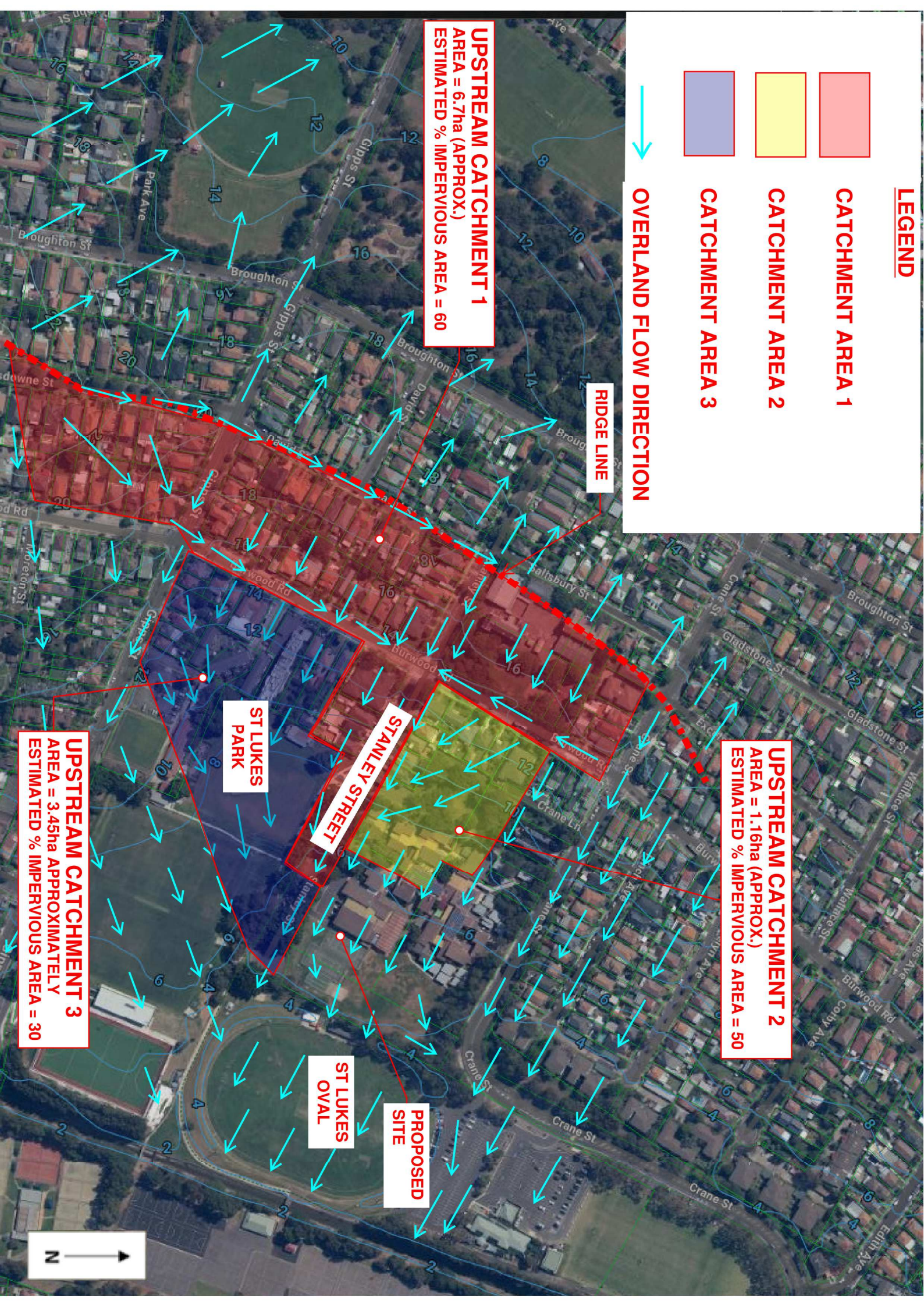
% pervious = 50

slope = 5%



Stanley Street

1% AEP Flow rate = 3.4 l/m³/s



LEGEND

CATCHMENT AREA 1

CATCHMENT AREA 2

CATCHMENT AREA 3

OVERLAND FLOW DIRECTION

RIDGE LINE

UPSTREAM CATCHMENT 1
AREA = 6.7ha (APPROX.)
ESTIMATED % IMPERVIOUS AREA = 60

UPSTREAM CATCHMENT 2
AREA = 1.16ha (APPROX.)
ESTIMATED % IMPERVIOUS AREA = 50

UPSTREAM CATCHMENT 3
AREA = 3.45ha APPROXIMATELY
ESTIMATED % IMPERVIOUS AREA = 30

ST LUKES
PARK

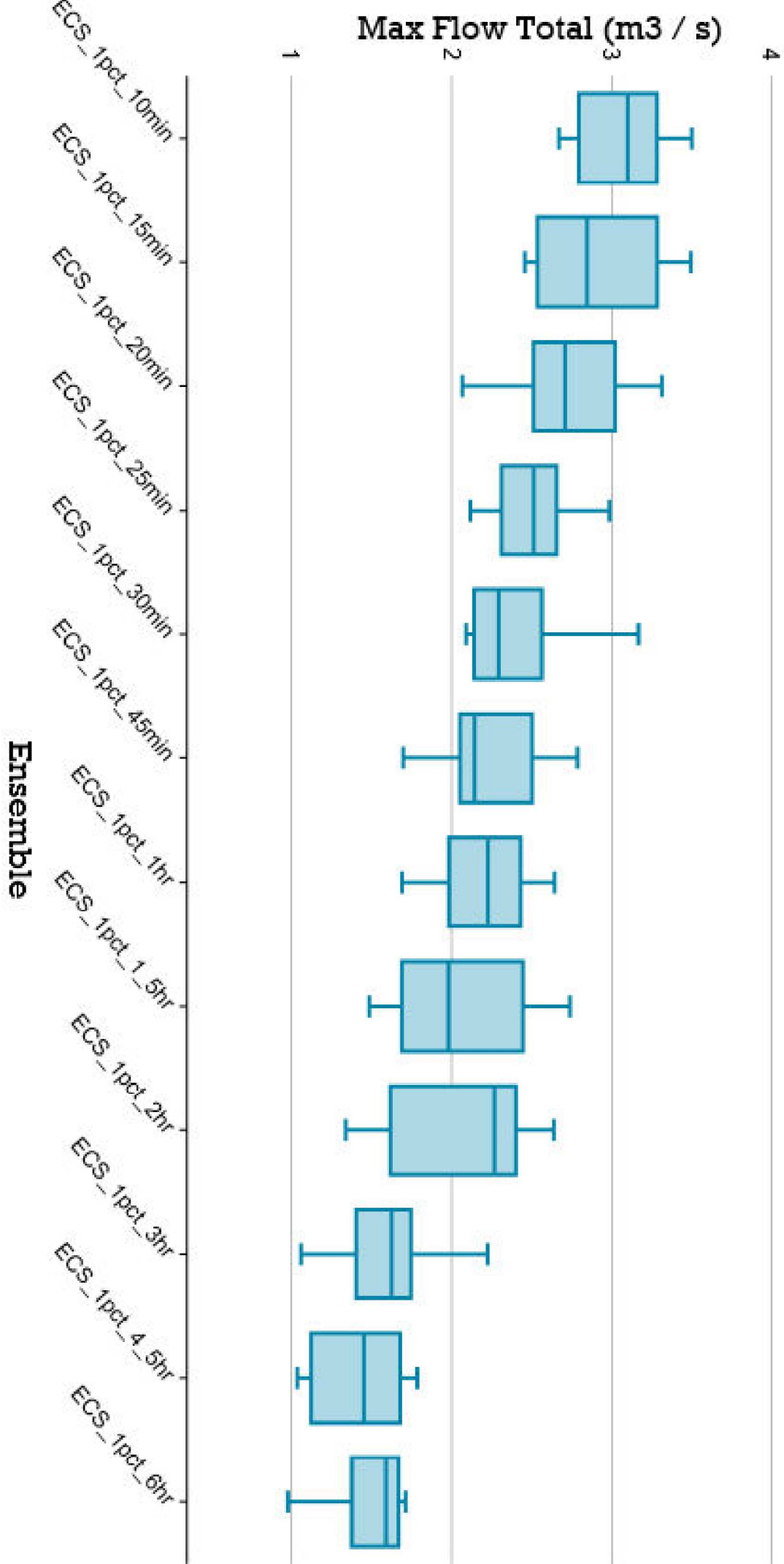
STANLEY STREET

ST LUKES
OVAL

PROPOSED
SITE



Comparison of Storm Ensembles of different durations for AEP = 1%

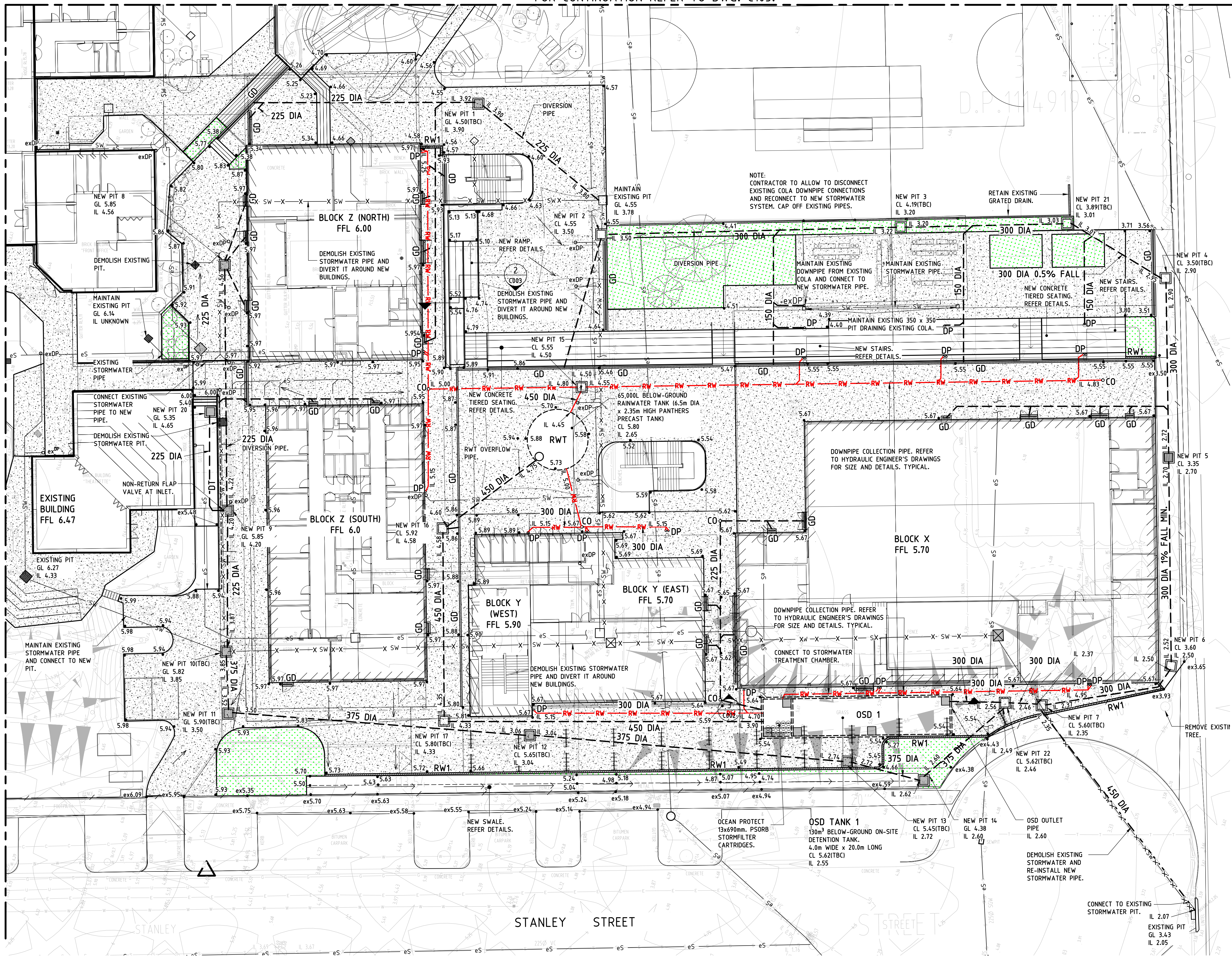


Appendix B

Civil Works Plans

FOR CONTINUATION REFER TO DWG. C103.

FOR CONTINUATION REFER TO DWG. C102.



LEGEND

- PROPERTY BOUNDARY
- NEW STORMWATER PIPE. 1% MINIMUM FALL UNO.
- SW EXISTING STORMWATER PIPE.
- eS EXISTING SEWER PIPE.
- RW NEW RAINWATER COLLECTION PIPE
- X-X-SW-X- DEMOLISH EXISTING STORMWATER PIPE
- NEW SWALE
- NEW OVERLAND FLOW PATH
- RWT NEW RAINWATER TANK
- RW1 NEW RETAINING WALL TYPE 1
- K0 NEW KERB ONLY
- K&G NEW KERB AND GUTTER
- GD NEW GRATED DRAIN
- 5.31 • DESIGN SPOT LEVEL
- ex5.14 • EXISTING LEVEL
- exDP • EXISTING DOWNPIPE
- DP • NEW DOWNPIPE
- EXISTING STORMWATER PIT.
- NEW STORMWATER GRATED PIT.
- NEW STORMWATER COVERED PIT.
- ABOVE-GROUND OSD STORAGE AREA
- CO NEW CLEAN-OUT
- DK NEW DOWELLED KERB
- NEW LANDSCAPING. REFER LANDSCAPE ARCHITECT'S DRAWING FOR SPECIFICATION.
- NEW PEDESTRIAN CONCRETE PAVEMENT. REFER DETAILS.
- NEW CONCRETE SLAB. REFER STRUCTURAL DRAWINGS FOR DETAILS.
- VEHICULAR ASPHALTIC CONCRETE PAVEMENT. REFER DETAILS.
- PLEXIPAVE ALLSPORT PAVEMENT. REFER DETAILS.
- HEAVY DUTY CONCRETE PAVEMENT: 180mm THICK N40 CONCRETE SLAB REINFORCED WITH S102 FABRIC (40 TOP COVER) ON 100mm COMPACTED BASECOURSE MATERIAL ON COMPACTED SUBGRADE. MIN. CBR OF 10%.
- HB NEW CONCRETE HOB. REFER STRUCTURAL DRAWINGS FOR DETAILS.
- DT NEW DOWNTURN. REFER DETAILS.

PIT GL AND CL NOTED WITH 'TBC' ARE INDICATIVE ONLY AND TO BE AMENDED TO SUIT LANDSCAPE LEVELS.

ALL ROOF DRAINAGE SYSTEM INCLUDING DOWNPIPES AND ROOF GUTTERS TO BE DESIGNED FOR 1% AEP STORM EVENTS.

NOTES:
1. FOR STANDARD NOTES REFER TO DWG. NO. C001
2. PAVEMENT JOINTS AND THEIR DETAILS WILL BE ADDED IN FUTURE DRAWINGS.

No.	Date	Description	Ver.	Appr.
P1	09.03.23	95% SCHEMATIC ISSUE		
P2	30.03.23	100% SCHEMATIC ISSUE		
A	05.05.23	ISSUED FOR DA	JH	JC
B	31.05.23	RE-ISSUED FOR DA	JH	JC
C	01.06.23	SITE ADDRESS UPDATED	JH	JC

NOT FOR
CONSTRUCTION

Architect
JDH ARCHITECTS
44 LITTLE OXFORD STREET
DARLINGHURST, NSW 2010

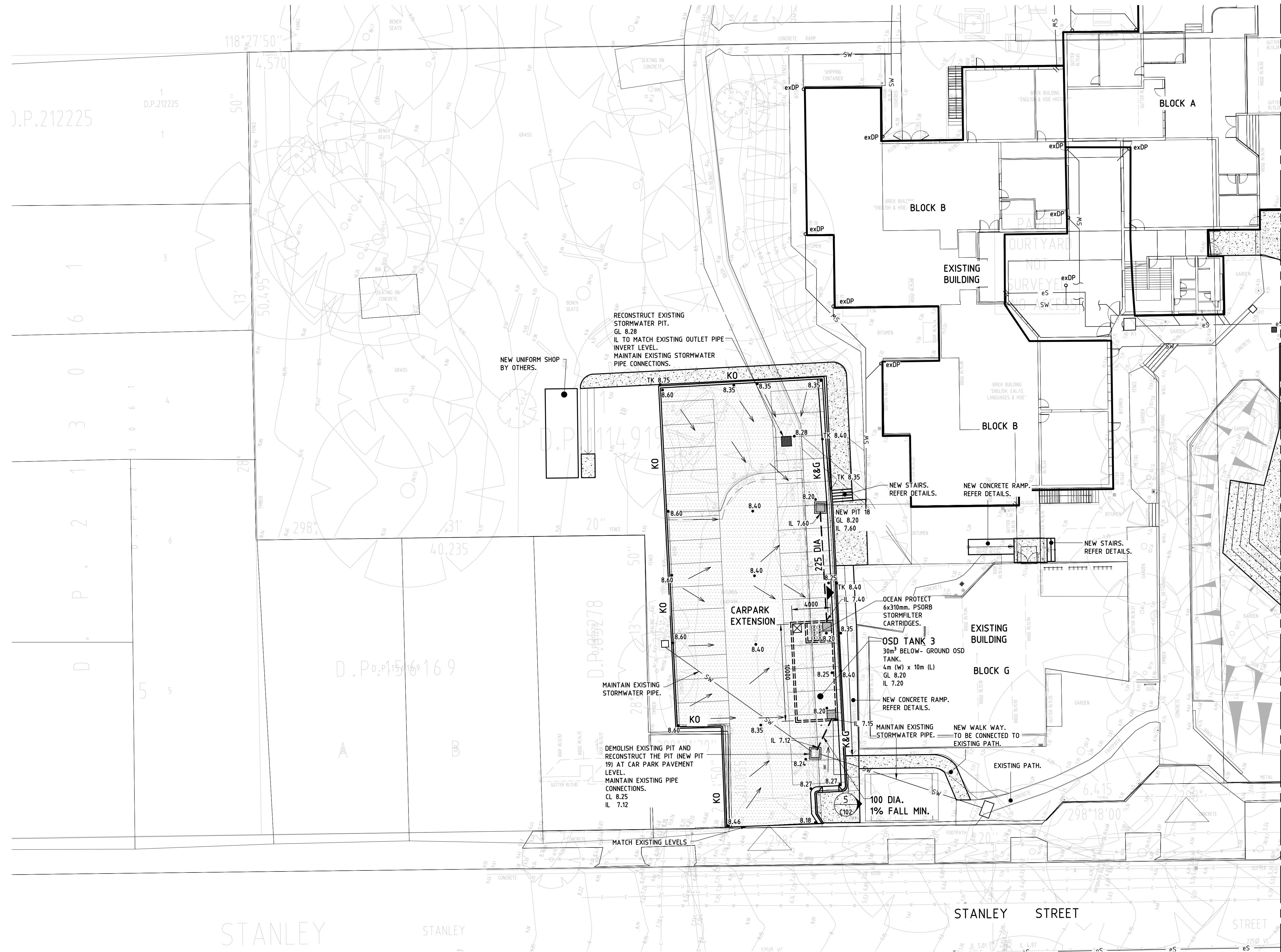
Woolacotts
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Suite 6.02 Level 6, 67 Albert Ave, Chatswood NSW 2067
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CONCORD HIGH SCHOOL
5 STANLEY STREET
CONCORD, NSW 2137

CIVIL WORKS PLAN
SHEET 1

Date	Scale	Job number	Drawing number	Amendment
MARCH 2023	1:200	22-108	C101	C
Approved JC 05.05.23	Verified JH 05.05.23	Prepared AD 05.05.23		



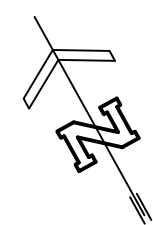
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NOT FOR
CONSTRUCTION



Architect
JDH ARCHITECTS
44 LITTLE OXFORD STREET
DARLINGHURST, NSW 2010

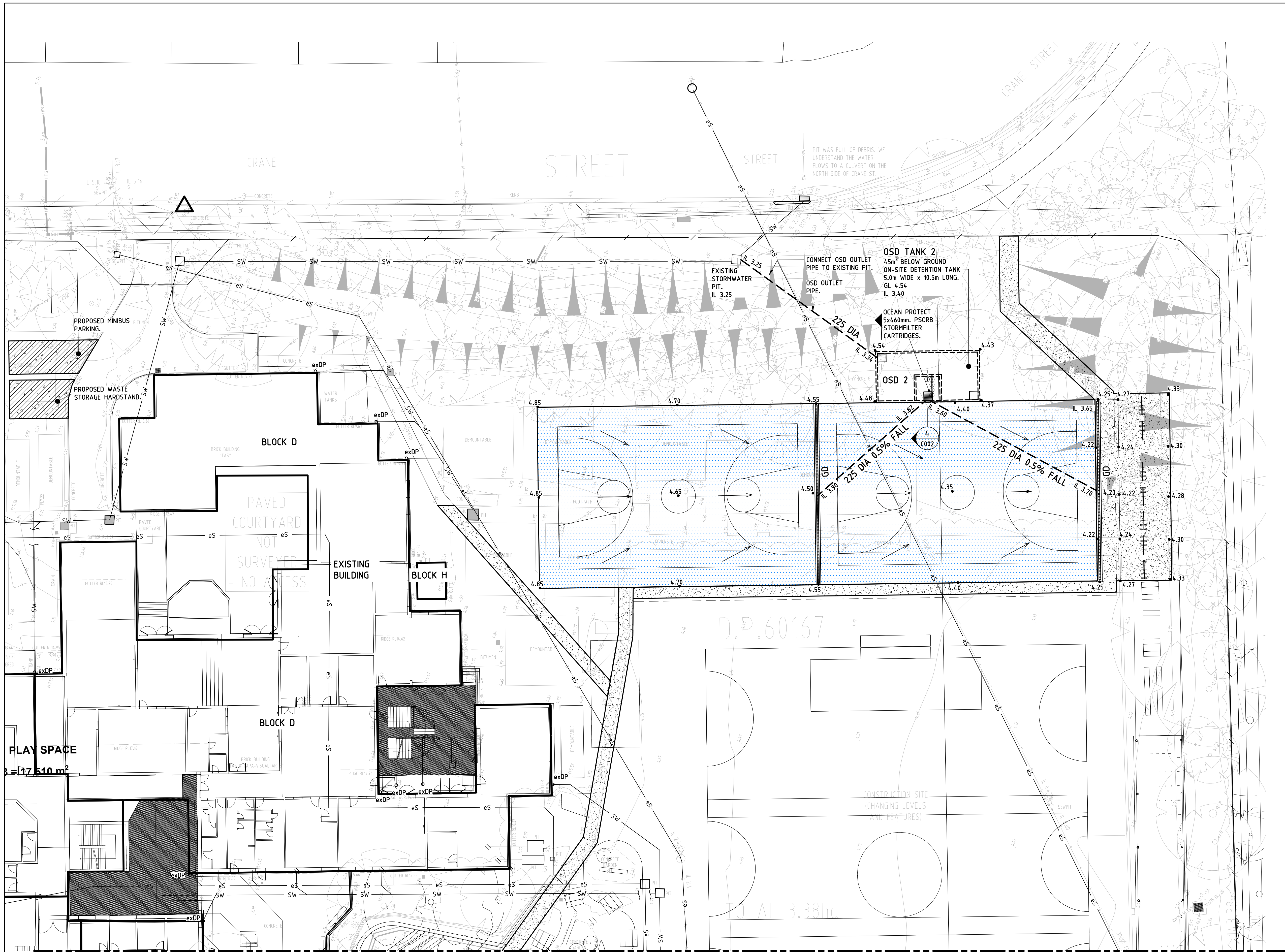
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CONCORD HIGH SCHOOL
5 STANLEY STREET
CONCORD, NSW 2137

CIVIL WORKS PLAN
SHEET 2

Date	MARCH 2023	Approved	Verified	Prepared
Scale @ A1	1:200	JC 05.05.23	JH 05.05.23	AD 05.05.23
Job number	22-108	Drawing number	C102	Amendment
				C



LEGEND

- PROPERTY BOUNDARY
- NEW STORMWATER PIPE. 1% MINIMUM FALL UNO.
- EXISTING STORMWATER PIPE.
- EXISTING SEWER PIPE.
- NEW RAINWATER COLLECTION PIPE
- DEMOLISH EXISTING STORMWATER PIPE
- NEW SWALE
- NEW OVERLAND FLOW PATH
- NEW RAINWATER TANK
- NEW RETAINING WALL TYPE 1
- NEW KERB ONLY
- NEW KERB AND GUTTER
- NEW GRATED DRAIN
- DESIGN SPOT LEVEL
- EXISTING LEVEL
- EXISTING DOWNPIPE
- NEW DOWNPIPE
- EXISTING STORMWATER PIT.
- NEW STORMWATER GRATED PIT.
- NEW STORMWATER COVERED PIT.
- ABOVE-GROUND OSD STORAGE AREA
- NEW CLEAN-OUT
- NEW DOWELLED KERB
- NEW LANDSCAPING. REFER LANDSCAPE ARCHITECT'S DRAWING FOR SPECIFICATION.
- NEW PEDESTRIAN CONCRETE PAVEMENT. REFER DETAILS.
- NEW CONCRETE SLAB, REFER STRUCTURAL DRAWINGS FOR DETAILS.
- VEHICULAR ASPHALTIC CONCRETE PAVEMENT. REFER DETAILS.
- PLEXIPAVE ALLSPORT PAVEMENT. REFER DETAILS.
- HEAVY DUTY CONCRETE PAVEMENT. 180mm THICK N40 CONCRETE SLAB REINFORCED WITH SL102 FABRIC (40 TOP COVER) ON 100mm COMPACTED BASECOURSE MATERIAL ON COMPACTED SUBGRADE. MIN. CBR OF 10%.
- NEW CONCRETE HOB. REFER STRUCTURAL DRAWINGS FOR DETAILS.
- NEW DOWNTURN. REFER DETAILS.

PIT GL AND CL NOTED WITH 'TBC' ARE INDICATIVE ONLY AND TO BE AMENDED TO SUIT LANDSCAPE LEVELS.

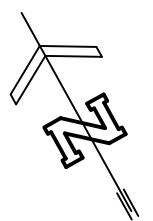
ALL ROOF DRAINAGE SYSTEM INCLUDING DOWNPIPES AND ROOF GUTTERS TO BE DESIGNED FOR 1% AEP STORM EVENTS.

FOR CONTINUATION REFER TO DWG. C101.

NOTES:
1. FOR STANDARD NOTES REFER TO DWG. NO. C001
2. PAVEMENT JOINTS AND THEIR DETAILS WILL BE ADDED IN FUTURE DRAWINGS.

No.	Date	Description	Ver.	Appr.
P1	09.03.23	95% SCHEMATIC ISSUE		
P2	30.03.23	100% SCHEMATIC ISSUE		
A	05.05.23	ISSUED FOR DA	JH	JC
B	31.05.23	RE-ISSUED FOR DA	JH	JC
C	01.06.23	SITE ADDRESS UPDATED	JH	JC

NOT FOR CONSTRUCTION



Architect
JDH ARCHITECTS
44 LITTLE OXFORD STREET
DARLINGHURST, NSW 2010

Woolacotts.
CONSULTING ENGINEERS

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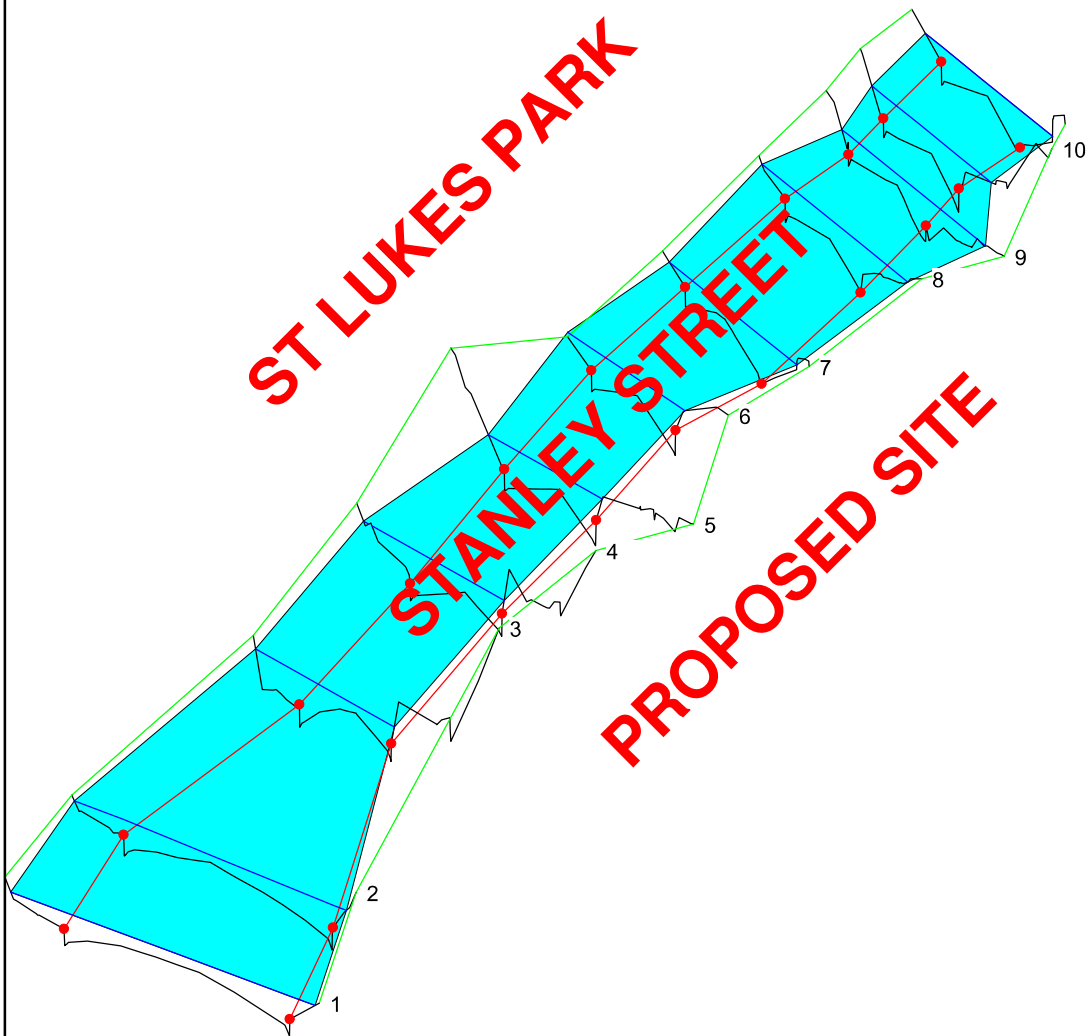
CIVIL WORKS PLAN
SHEET 3

Date	MARCH 2023	Approved	Verified	Prepared
Scale @ A1		JC 05.05.23	JH 05.05.23	AD 05.05.23
1:200				
Job number	22-108	Drawing number	C103	Amendment
				C

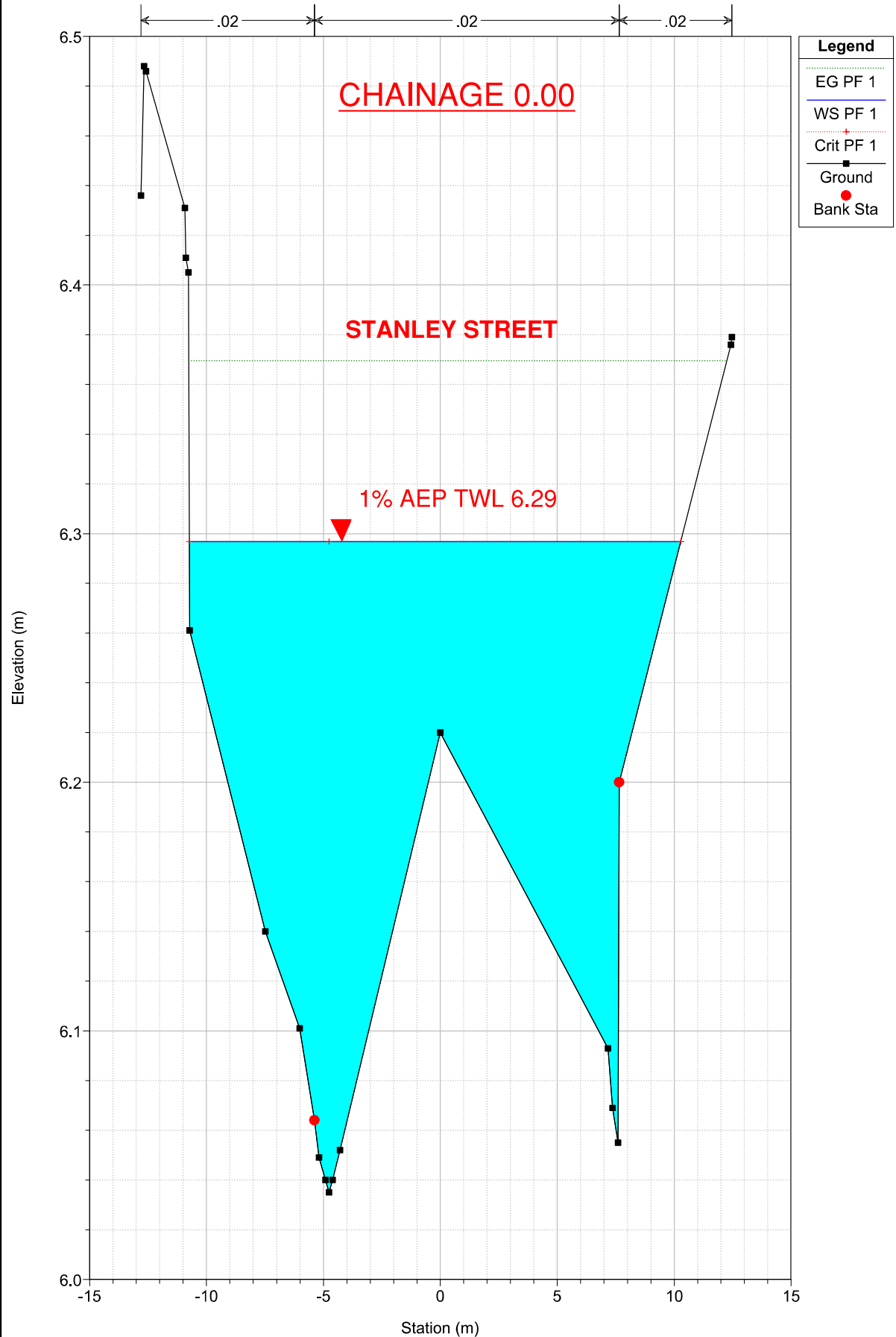
Appendix C

Stanley Street Plan and Cross-sections with 1% AEP Top Water Levels

Legend	
	WS PF 1
	Ground
	Bank Sta



A-A



B-B

-.02



