RIVERSIDE *Parramatta*—

Flood Assessment

FOR / PCC DevCo1 Pty Ltd

DOCUMENT NO / S13013-REP-S-0001 REV / 0 DATE / 13/01/14

PROJECT NO / S13013

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CONTENTS

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1 INTRODUCTION

1.1 Background

The proposed Riverside Parramatta development is located on the southern bank of the Parramatta River between Lennox Bridge (Church Street) and Bernie Banton Bridge (Marsden Street) in Parramatta, as shown in Figure 1.

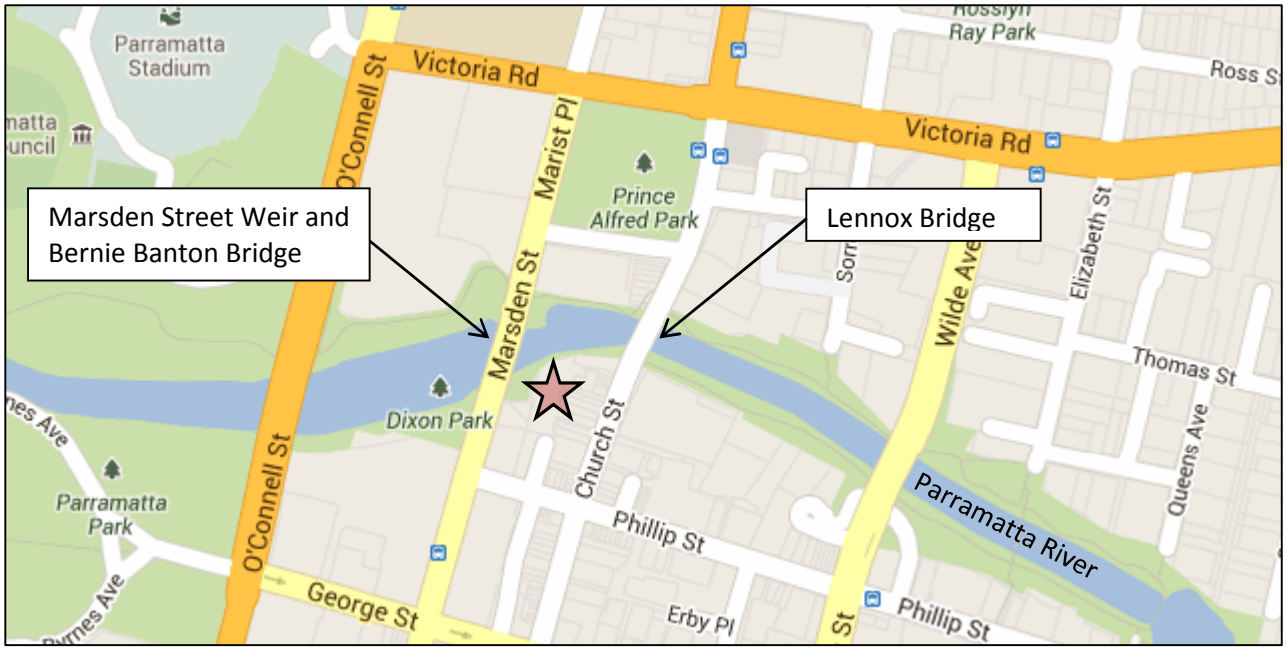


Figure 1 – Locality Plan

The proposed development incorporates a mixture of residential, retail and commercial uses and public infrastructure upgrades. A preliminary site plan for the development is attached in Appendix A. An application for Development Approval is currently being prepared by the architectural firm Johnson Pilton Walker (JPW). This report has been prepared to support the application.

1.2 Scope and Objectives

The principal objective of this study is to assess the potential impact to flood storage, flood levels and flood velocities within the Parramatta River as a result of the proposed development.

The following scope of works was undertaken:

- Compile previous studies defining the existing flood behaviour within the Parramatta River;
- Develop a hydraulic model suitable for assessing flood impacts adjacent to the site;
- Calibrate the hydraulic model based on the outcomes of previous studies;

- Undertake pre- and post-development hydraulic modelling to observe changes in flood behaviour for the 100 year average recurrence interval (ARI) design event and probable maximum flood (PMF).

ARI is a statistical estimate of the average period in years between the occurrence of a flood of a given size or larger; for example a 100 year ARI flood will occur on average once every 100 years. The PMF is the largest flood that could conceivably occur at a given location.

It should be noted that this study does not seek to re-define flood planning levels, flood extents or flood hazard categories for the site or areas within the Upper Parramatta River catchment. The flood modelling contained within this report has been used to inform the design decisions for the development, including form of public domain, public access to river and floor levels for various elements within the development.

1.3 Previous Studies

The following information formed a basis for this flood impact assessment:

Upper Parramatta River Flood Study (Draft 8), Upper Parramatta River Catchment Trust

The Upper Parramatta River Catchment Trust (UPRCT) undertook hydrologic and hydraulic modelling to define flood planning levels, flood extents and flood hazard categories for the Upper Parramatta River catchment. Requests were made to the UPRCT and the Parramatta City Council to obtain copies of the flood study and associated models (hydrologic and hydraulic) and topographic data (surface levels, river bathymetry). However, this study handover has not been finalised and hence has not been released as a public document.

Parramatta City Council Site Flood Map and Hydraulic Hazard Map

As part of the study a flood enquiry for the site was lodged with Parramatta City Council. The provided flood map shows estimated flood extents and flood levels for the 20 year and 100 year ARI design events and the probable maximum flood (PMF). Design flood levels and extents were based on the results of the *Upper Parramatta River Flood Study (Draft 8)* and do not include the influence of the proposed Lennox Bridge Portals. These portals are expected to reduce 100 year ARI design flood levels adjacent to the site. Hydraulic hazard categories and surface level contours at 1 metre intervals are also shown. This information is attached in Appendix B.

Lennox Bridge Bikeway Portals – Hydraulic Impact/Hazard Assessment, COMPLETE Urban Pty Ltd, August 2011

COMPLETE and the Sydney Metro Catchment Management Authority (CMA) undertook a hydraulic assessment of the shared access portals (tunnels) proposed to be constructed within the Lennox Bridge. The one-dimensional hydraulic model used in the assessment appears consistent with the model developed for the *Upper Parramatta River Flood Study (Draft 8)*. Design flows and flood levels were used as a basis for this study.

2 FLOOD MODELLING & IMPACT ASSESSMENT

This section of the report outlines hydraulic modelling which was undertaken to assess the potential impact to flood storage, flood levels and flood velocities within the Parramatta River as a result of the proposed development.

2.1 Model Scenarios

The following scenarios were modelled for the 100 year ARI design event and the PMF:

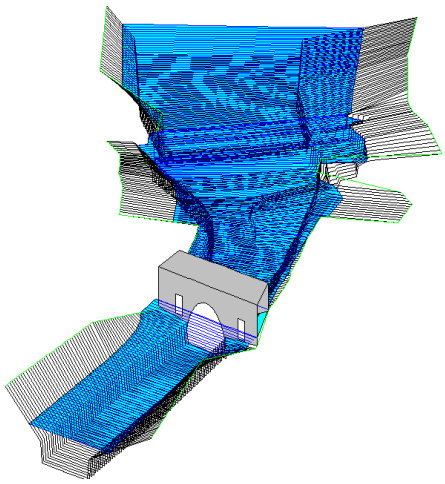
- The **pre-development** scenario was based on current topographic information (field survey obtained for the site), incorporating the proposed bikeway Portals within the Lennox bridge;
- The **post-development** scenario involved adjusting the surface levels along the river banks to reflect the proposed finished levels and building locations for the development.

2.2 Model Development

A one-dimensional (1D) steady-state hydraulic model was developed using the HEC-RAS software package to simulate flooding within the Parramatta River adjacent to the site. HEC-RAS has been designed by the U.S. Army Corps of Engineers to perform 1D hydraulic calculations for a full network of natural and constructed channels.

The model extends approximately 100 m upstream of the Marsden Street Weir and downstream of the Lennox Bridge. The location of model cross sections and surface profiles for pre- and post-development scenarios are shown in Appendix 3.

Cross sections were manually created where changes in the floodplain were observed. Additional cross sections were interpolated with a maximum spacing of 2 metres to improve the resolution of the model.



HEC-RAS Model

2.3 Structures

For the 100 year ARI design event, flood levels adjacent to the site are primarily influenced by backwater from the Lennox Bridge. The arch bridge was incorporated into the 1D model with a soffit level of 7.29 mAHD, approximately 0.6 m above the 100 year ARI pre-development peak water level. During the PMF the bridge deck is expected to become submerged by several metres.

In addition to the arch itself, two portals were included in the bridge crossing to reflect current planning for the Lennox Bridge Bikeway Portals development. These portals generally result in a decrease in flood levels upstream of the Lennox Bridge (adjacent

Lennox Bridge

to the site) and an increase in flood levels downstream of the bridge (COMPLETE, 2011).

Upstream of the site, the Marsden Street Weir has been constructed across the Parramatta River, with a crest level of 3.7 mAHD. During the 100 year ARI event, the weir itself becomes submerged by approximately 3 metres due to backwater from the Lennox Bridge. The weir appears to have little influence on peak water levels for major events.

The Bernie Banton Bridge crosses the Parramatta River at the western boundary of the site, with a skew angle of about 30 degrees. Peak water levels for the 100 year ARI event are approximately 0.2 m below the bridge soffit. During the 100 year ARI design event, the bridge piers and deck appear to have little influence on peak water levels, which are dominated by backwater from the Lennox Bridge. During the PMF the bridge deck is expected to become submerged by several metres.

Marsden Street Weir
Bernie Banton Bridge

2.4 Topographic Data

Field survey for the site was provided by Denny Linker and JPW, the extent of which is shown in Figure 1 (Appendix C). In the absence of more detailed information, levels within the Parramatta River and outside of the survey extents were assumed based on the surface contours shown on the site Flood Map (Appendix B) and site observations.

2.5 Model Inflows and Calibration

Design flows for the site were adopted from the *Lennox Bridge Bikeway Portals – Hydraulic Impact/Hazard Assessment* report. As part of the study, the CMA estimated the following peak flows at Lennox Bridge:

- Q_{100} – 733 m^3/s
- PMF – 1227 m^3/s

CMA also undertook hydraulic modelling to estimate the change in flood levels for the 100 year ARI design event and PMF. Flood levels at Stn. 2211 (western end of the site) and Stn. 2323.7 (eastern end of the site) were used to calibrate the BG&E hydraulic model by adjusting the model inflow to achieve comparable flood levels between the two models. Calibration results are shown in Tables 1 and 2.

	CMA (2011)	BG&E	Difference
Model Inflow	733 m^3/s	680 m^3/s	-53 m^3/s
Upstream WSL	7.09 mAHD (*Stn. 2211)*	7.12 mAHD (*Stn. 281)*	+0.03 m
Downstream WSL	6.71 mAHD (*Stn. 2323.7)*	6.71 mAHD (*Stn. 177)*	+0.00 m

Table 1 – 100 year ARI Model Calibration Data

	CMA (2011)	BG&E	Difference
Model Inflow	1227 m^3/s	1520 m^3/s	+293 m^3/s
Upstream WSL	12.44 mAHD (*Stn. 2211)*	12.47 mAHD (*Stn. 281)*	+0.03 m
Downstream WSL	12.00 mAHD (*Stn. 2323.7)*	11.89 mAHD (*Stn. 177)*	-0.11 m

Table 2 – PMF Model Calibration Data

The revised inflows listed in Tables 1 and 2 were adopted for the assessment to account for differences in model topography and extents for the respective studies which directly influence flood levels. The source and accuracy of the topographic information used for the CMA model is unknown. The BG&E model is considered appropriate for the purpose of this assessment, which is to estimate relative changes in flood behaviour due to the proposed development.

2.6 Impact Assessment

2.6.1 Flood Storage

A terraced profile is proposed for the public domain areas along the southern river bank in order to facilitate pedestrian access. The walkways have been designed to mimic the natural surface levels along the river bank, and will be below the 100 year ARI design flood level in several areas.

Earthworks associated with establishing the terraced walkways is expected to be less than 1% of the existing floodplain storage for the 100 year ARI design event. Pre- and post-development cross sections of the banks are shown in Appendix C. Hydraulic modelling confirms that flood storage will not be impacted by the proposed development.

2.6.2 Flood Levels

Comparisons of the peak water levels for the 100 year ARI design event and PMF are shown in Tables 3 and 4. On average the model shows a slight decrease in peak water levels upstream of the Lennox Bridge for the 100 year ARI design event, with a maximum decrease of 0.03 m. This can be attributed to minor changes in earthworks levels associated with the public domain area.

For the PMF scenario the model shows a maximum decrease in peak water level of 0.14 m. It should be noted that during the PMF flooding will extend outside of the cross sections which have been used for this study. The widths of these cross sections have been limited by available topographic data. To reliably define flood depths and extents during the PMF, a larger model would be required covering the floodplain, which is outside of the scope of this study. Nevertheless, it appears the proposed development will have little impact on flood extents and levels during the PMF.

No change in peak water levels was observed downstream of the Lennox Bridge as a result of the development.

River Station	Pre-dev Peak WSL (mAHD)	Post-dev Peak WSL (mAHD)	Difference (m)
402	7.11	7.10	-0.01
350	7.13	7.12	-0.01
310	7.13	7.12	-0.01
305	7.00	6.97	-0.03
296	7.03	7.01	-0.02
295	7.11	7.09	-0.02
282	7.11	7.09	-0.02
281	7.12	7.10	-0.02
268	7.08	7.07	-0.01
267	7.07	7.05	-0.02
258	7.02	7.01	-0.01
257	7.03	7.01	-0.02
250	6.96	6.94	-0.02

River Station	Pre-dev Peak WSL (mAHD)	Post-dev Peak WSL (mAHD)	Difference (m)
234	6.93	6.92	-0.01
232	6.92	6.91	-0.01
213	6.87	6.85	-0.02
212	6.86	6.85	-0.01
200	6.82	6.82	0.00
186	6.77	6.75	-0.02
177	6.71	6.69	-0.02
166	6.57	6.57	0.00
155	6.38	6.38	0.00
131	5.39	5.39	0.00
75	5.31	5.31	0.00
0	5.25	5.25	0.00

Table 3 – 100 year ARI Peak Water Levels

River Station	Pre-dev Peak WSL (mAHD)	Post-dev Peak WSL (mAHD)	Difference (m)
402	12.44	12.39	-0.05
350	12.45	12.39	-0.06
310	12.44	12.38	-0.06
305	12.43	12.37	-0.06
296	12.45	12.39	-0.06
295	12.47	12.41	-0.06
282	12.47	12.41	-0.06
281	12.47	12.41	-0.06
268	12.45	12.39	-0.06
267	12.41	12.34	-0.07
258	12.36	12.29	-0.07
257	12.39	12.30	-0.09
250	12.35	12.24	-0.11

River Station	Pre-dev Peak WSL (mAHD)	Post-dev Peak WSL (mAHD)	Difference (m)
234	12.32	12.19	-0.13
232	12.24	12.12	-0.12
213	12.20	12.06	-0.14
212	12.08	12.06	-0.02
200	12.02	12.02	0.00
186	11.96	11.92	-0.04
177	11.89	11.85	-0.04
166	11.76	11.77	+0.01
155	11.66	11.65	-0.01
131	8.62	8.62	0.00
75	8.25	8.25	0.00
0	8.30	8.30	0.00

Table 4 – PMF Peak Water Levels

2.6.3 Flood Velocities

A comparison of pre- and post-development flood velocities within the main channel for the 100 year ARI design event is shown in Table 5. Generally any changes in flood velocities within the main channel are less than 0.05 m/s.

River Station	Pre-dev Velocity (m/s)	Post-dev Velocity (m/s)	Difference (m/s)
402	1.76	1.76	0.00
350	1.60	1.60	0.00
310	1.52	1.52	0.00
305	2.27	2.27	0.00
296	1.95	1.95	0.00
295	1.24	1.25	+0.01
282	1.24	1.25	+0.01
281	1.11	1.12	+0.01
268	1.37	1.36	-0.01
267	1.44	1.45	+0.01
258	1.70	1.67	-0.03
257	1.69	1.73	+0.04
250	1.99	2.03	+0.04

River Station	Pre-dev Velocity (m/s)	Post-dev Velocity (m/s)	Difference (m/s)
234	2.13	2.12	-0.01
232	2.19	2.19	0.00
213	2.39	2.39	0.00
212	2.41	2.40	-0.01
200	2.54	2.53	-0.01
186	2.73	2.75	+0.02
177	2.92	2.94	+0.02
166	3.36	3.33	-0.03
155	3.87	3.86	-0.01
131	4.23	4.23	0.00
75	3.94	3.94	0.00
0	4.03	4.03	0.00

Table 5 – 100 year ARI Channel Flood Velocities

Note that the pre- and post-development velocities listed in Table 5 are shown for the purpose of observing relative change. Actual flood velocities in the main channel will be dependent on the profile and slope of the channel bed itself which has been assumed for this study in the absence of bathymetric data.

2.7 Flood Evacuation

Preparation of a flood evacuation strategy (or similar document) is outside of the scope of this study. The following observations are made:

- The ground floor FFL is nominated as 8.55 mAHD, providing access to Phillip Street to the south and Church Street to the east (via stairs). The 100 year ARI flood level shown on Council's Flood Map is 7.92 mAHD (Stn. 2196), with some flooding of Church Street shown south of the Lennox Bridge. Phillip Street has a pavement level of approximately 8.5 mAHD at the entrance to the development (increasing to 9.0 mAHD towards Marsden Street) providing suitable refuge for the 100 year ARI flood.
- The PMF level shown on Council's Flood Map is 12.96 mAHD, approximately 0.5 metres below the proposed first floor FFL (13.50 mAHD). During the PMF the ground floor, external colonnade and surrounding streets will be inundated by approximately 5 metres, with flooding of the basement

levels occurring via the carpark ramps. The first floor (or above) would provide on-site refuge above the PMF level. The extent of the PMF would need to be confirmed to nominate off-site refuge areas.

- Based on the *Lower Parramatta River Flood Study Review (SKM, 2005),* the Parramatta River itself takes approximately 6 hours to develop peak flood levels in the vicinity of the site during a major flood event. Feedback from the relevant catchment management authority (CMA) should be sought to confirm flood behaviour to ensure effective evacuation planning.

Note that a specialist consultant (Molino Stewart Environmental Consultants) has been commissioned to prepare a flood management and evacuation strategy as part of the Development Approval (DA) process. The strategy will address how the risk of flooding is to be managed in the public domain, potential exit points from the walkways and potential flood evacuation measures and/or warning systems.

2.8 Flood Hazard

The majority of the development will be located within the low hazard area shown on the Parramatta City Council Hydraulic Hazard Map (Appendix B). The development will seek to comply with the planning and development controls outlined in Councils *Local Floodplain Risk Management Policy.*

The layout of the proposed development is currently being reviewed as part of the Development Application (DA) to ensure building structures are not located within the high hazard areas. Only walkways and open space (public domain) is proposed for these areas. These structures will be resilient to withstand flooding and designed and constructed in accordance with Council's *Local Floodplain Risk Management Policy.*

3 CONCLUSIONS

Hydraulic modelling has been used to assess the potential impact to flood storage, flood levels and flood velocities within the Parramatta River as a result of the proposed development. Based on the results of the modelling, the following conclusions are made:

- The proposed development has little impact to **flood storage** within the Parramatta River. Earthworks associated with the public areas along the northern and southern river banks is expected to represent less than 1% of the existing floodplain storage for the 100 year ARI design event;
- On average the model shows a slight decrease in peak **flood levels** upstream of the Lennox Bridge, with a maximum decrease of 0.03 m for the 100 year ARI design event and 0.13 m for the PMF. Flood levels adjacent to the site are primarily influenced by backwater from the Lennox Bridge for major events. No change in flood levels was observed downstream of the bridge;
- Generally any changes in **flood velocities** in the main channel are less than 0.05 m/s.

The flood modelling contained within this report has been used to inform the design decisions for the development, including form of public domain, public access to river and floor levels for various elements within the development. It is recommended that a review of the proposed development be undertaken to confirm compliance with the Planning and Development Controls outlined in the Local Floodplain Risk Management Policy (City of Parramatta, 2011), considering:

- Flood levels shown on the Parramatta City Council Flood Map were determined as part of the Upper Parramatta River Flood Study (UPRCT) and do not include the influence of the proposed Lennox Bridge Portals. These portals are expected to reduce 100 year ARI design flood levels adjacent to the site.
- The outdoor dining and retail area has a FFL of 8.55 mAHD, 0.1 metres above the flood planning level (8.4 mAHD).
- Multi-level basement car-parking is proposed. Ramp levels are 8.5 mAHD, above the flood planning levels. FFL's for the lowest basement floor is -10.2 mAHD.
- For the development, evacuation via ground floor levels to the nominated surrounding streets would provide suitable refuge during the 100 year ARI flood. During the PMF the ground floor, external areas and surrounding streets will be inundated by several metres, with flooding of the basement levels occurring via the carpark ramps.

APPENDIX A

Site Layout

PRINCE ALFRED PARK

MARKET STREET

MARSDEN STREET

RIVERSIDE THEATRE

PARRAMATTA RIVER

LENNOX BRIDGE

RIVERSIDE TERRACE

LENNOX BRIDGE PORTAL

SEATING STEPS

PUBLIC SPACE

DECK

PUBLIC COLONNADE

BERNIE BANTON BRIDGE

MARSDEN STREET WIER

RETAINING WALL

POTENTIAL FUTURE RIVERSIDE PATH CONNECTION

OYSTER LANE

CHURCH STREET

VEHICLE ACCESS POINTS

LIGHTS

SHARED ZONE IN LANE

BOLLARDS

PHILLIP LANE

OPEN STORM WATER INVERT

PHILLIP STREET

4.20
8.55
8.45
5.55
3.93
8.55
8.55
3.93
3.93
8.55
8.42
8.76
8.55
8.38
7.35
8.90
8.70

Indicative finishes selection

- Paving — PCC standard City Centre Footpath
- Paving — Asphalt Concrete pavement
- Paving — Granite Setts - Black Exfoliated finish
- Paving — Natural Granite - Black Exfoliated finish
- Decks, Paving, Ramps and Steps — Precast concrete planks over steel structures Suspended pavement Off form finish to concrete
- In situ concrete paving — Exposed aggregate finish Aggregate mix to match existing foreshore paths Saw-cut joints
- Grass
- Planting Bed — shrubs and groundcovers
- Existing tree
- Proposed tree

General Notes

1) Do not scale from drawing, use marked dimensions and levels.
2) Builder / contractor to verify all dimensions and coordinate services and components prior to commencement of site work or off-site fabrication and installation.
3) To be read in conjunction with all consultants' documentation.
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01	KL	AC	Pre DA review	28-10-13
02	JB	AC	For information	29-10-13
03	AC	AC	For information	05-11-13
04	AC	AC	For information	14-11-13
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06	AC	AC	For information	06-12-13
07	AC	AC	For DA	11-12-13
08	AC	AC	For DA	07-01-14

Scale / North Point

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Legend

LIDIS PARRAMATTA FUTURE GENERATION

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RIVERSIDE Parramatta

PUBLIC DOMAIN PLAN

Project Number	Documentation Stage
13002	FINAL
Drawing Number	Revision
DA-L-100	08

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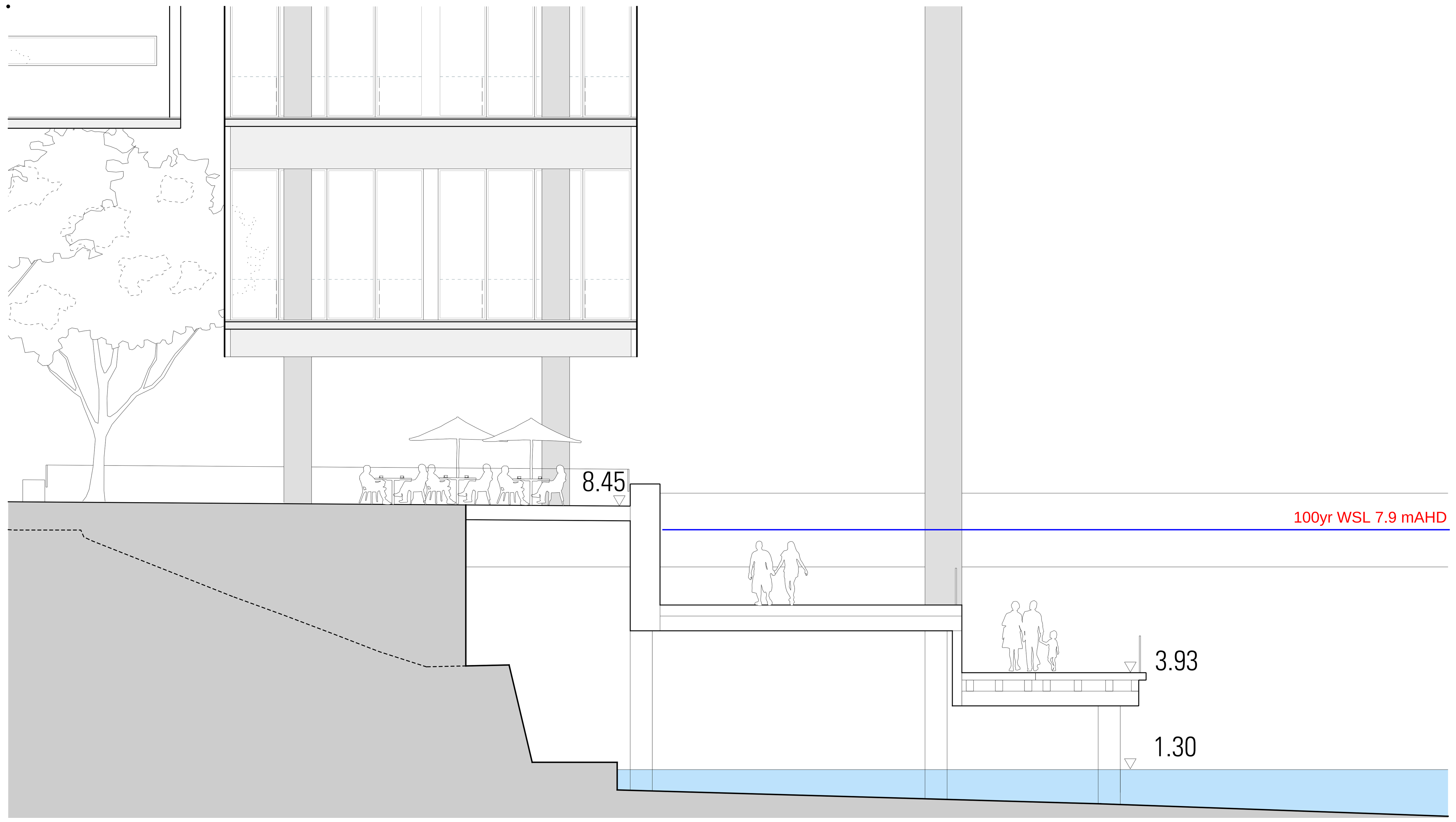

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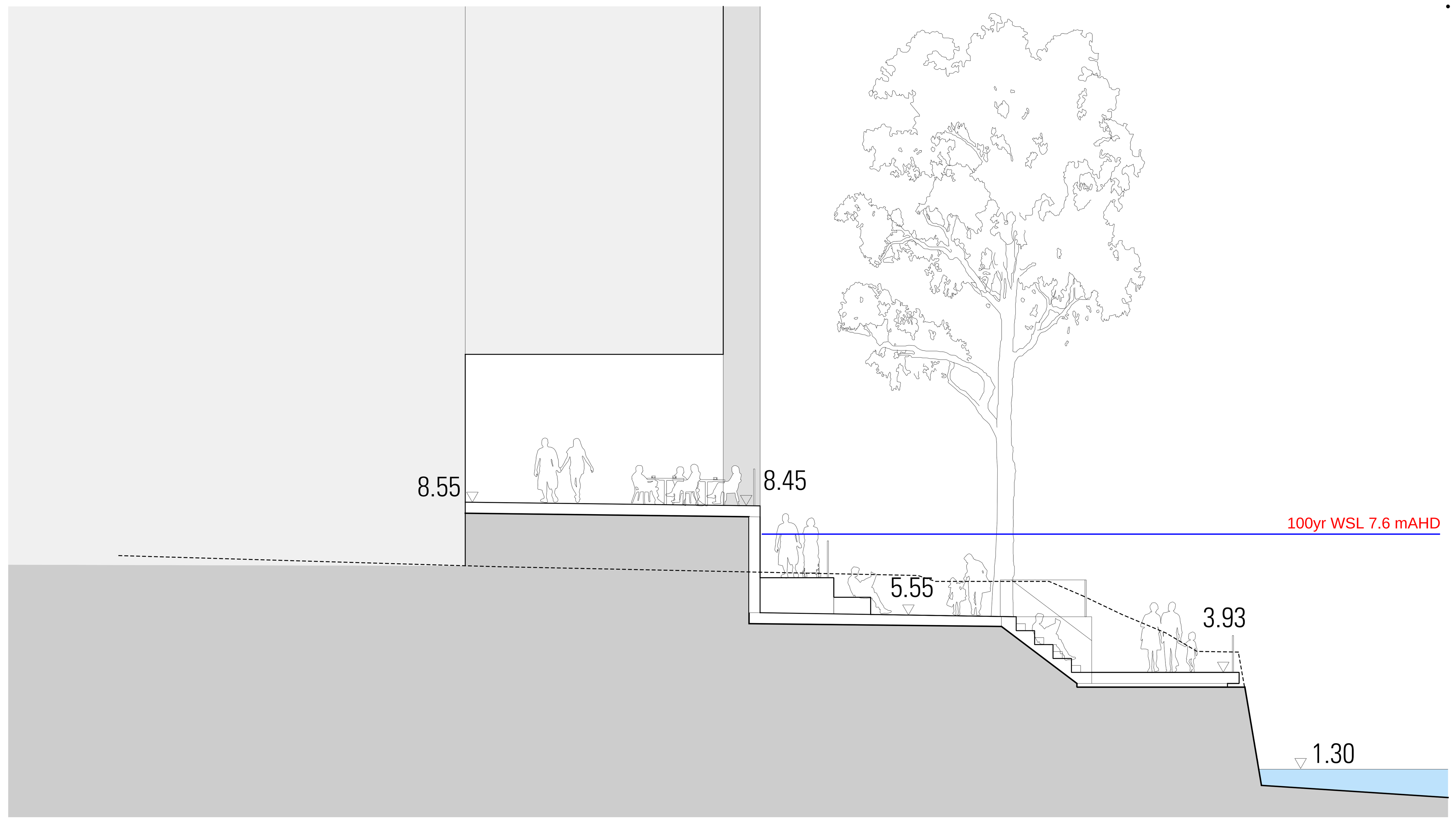

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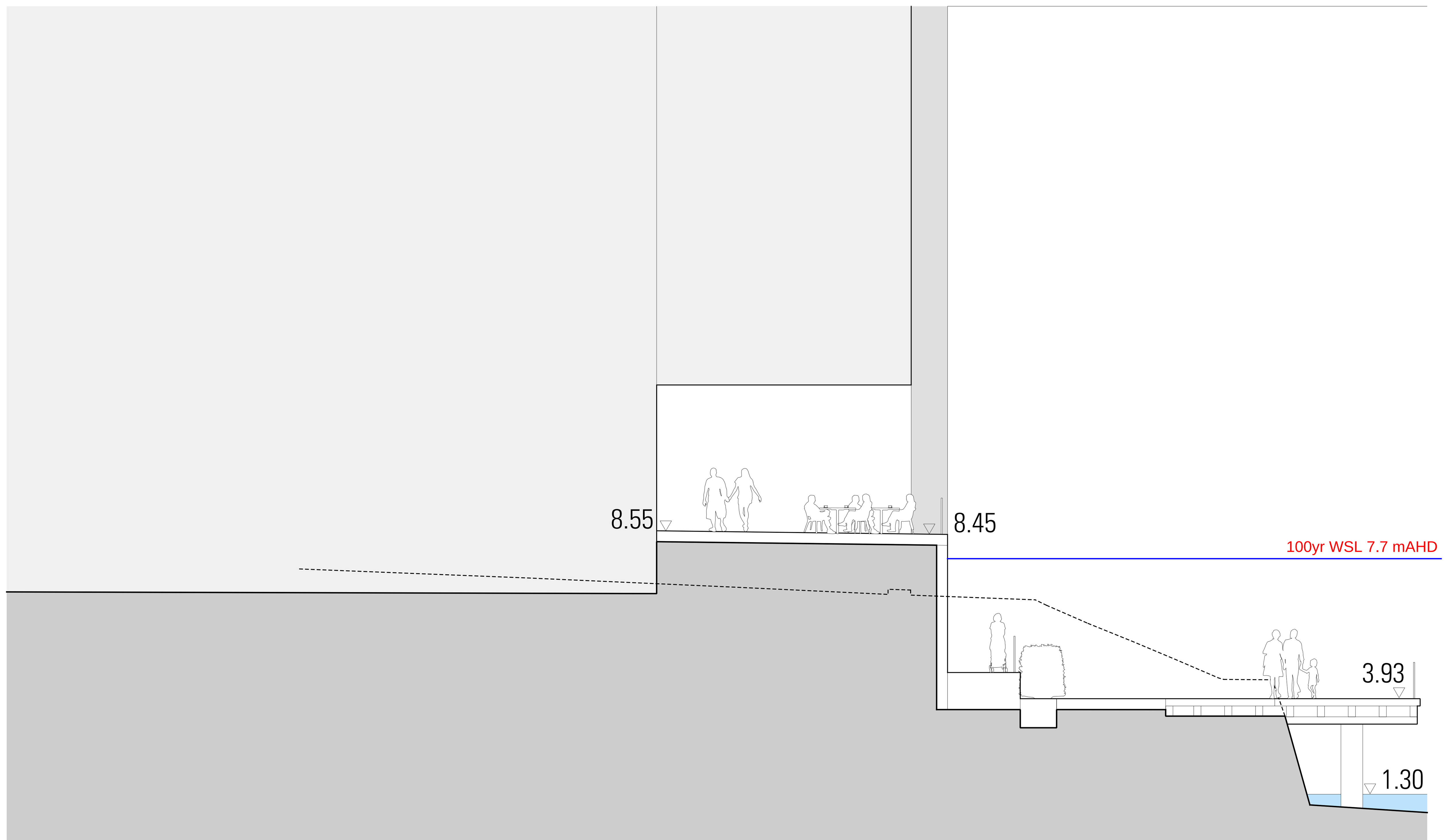

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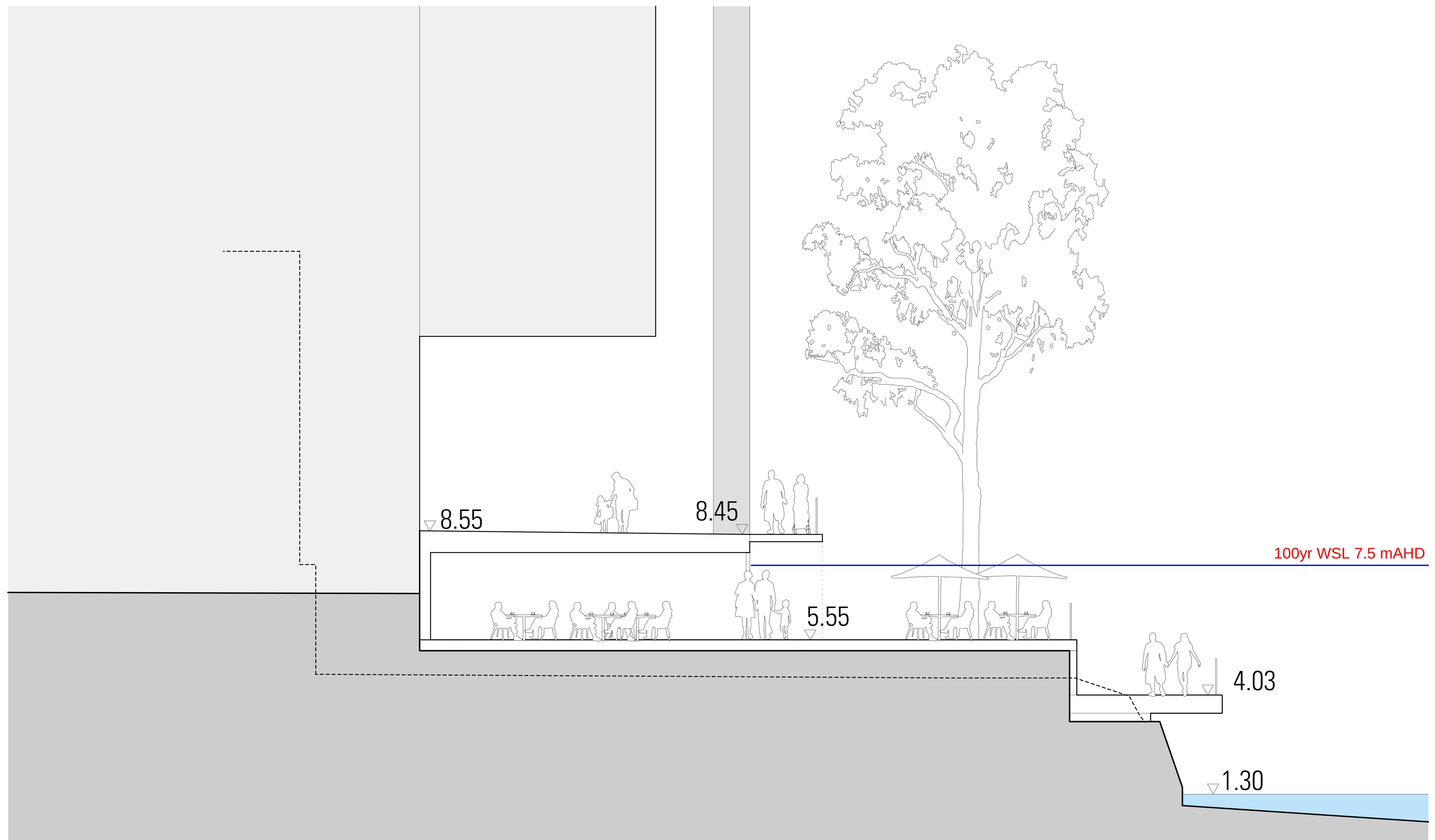

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Scale
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1:100 @ A1 0 1 2 3 5m

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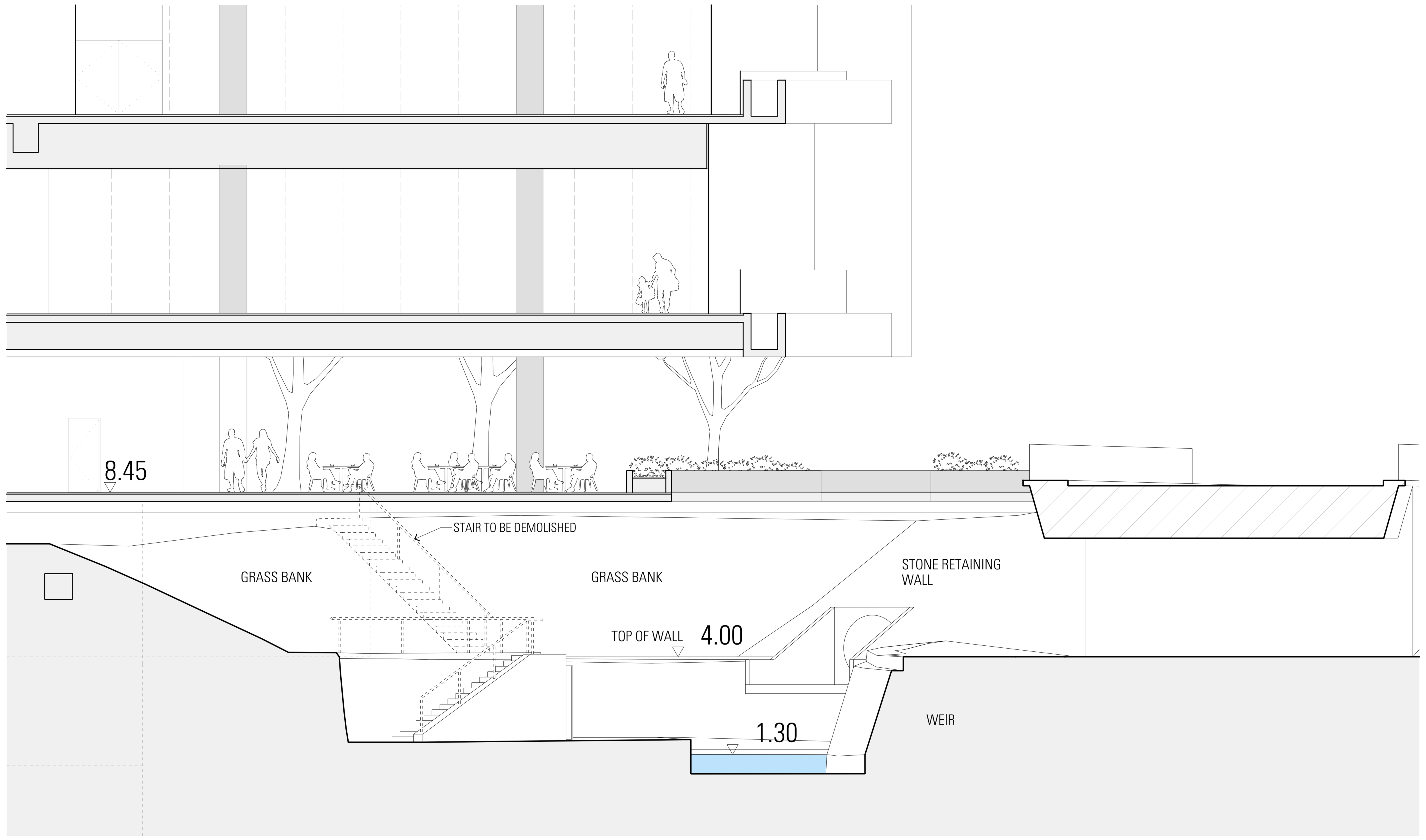
RIVERSIDE Parramatta

SOUTH BANK
SECTIONS

Project Number
13002
Drawing Number
DA-L-200
Documentation Stage
PRELIMINARY
Revision
02



1 SOUTH BANK
SCALE 1:100

2 PHILLIP LANE
SCALE 1:100

General Notes
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01	AC	AC	For information	14-11-13

Scale / North Point
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LIDIS
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RIVERSIDE Parramatta

SOUTH BANK
SECTIONS

Project Number 13002
Documentation Stage PRELIMINARY
Drawing Number DA-L-202
Revision 01

APPENDIX B

Site Flood Enquiry (Parramatta City Council)

Flood Enquiry Application 2012 / 2013

Property Details

Address	House No: 335-337 CHURCH ST 315 CHURCH ST 101 MARSDEN ST	*This form applies for up to three adjoining sites relating to the same development. A separate Flood Enquiry form and fee will be required for more than 3 or separate lots*
	Street:	
	Suburb: PARRAMATTA	Postcode: 2150
	Are you the owner of this property? ☐ Yes	☒ No

Applicant Details

Name	Family Name (or Company Name) BG & E	
	Given Name:	
	OR Company Contact Person: NICHOLAS KELLY	
Contact Details	Address: 8 WINDMILL ST, MILLERS POINT, 2000	
	Home Phone: —	Office Phone: 9770 3300
	Mobile: 0403982795	Fax: —
	Email: nicholas.kelly@bgeeng.com	Date: 27/6/13

How would you like this information to be provided to you *(Please tick)*

☐ Collection ☐ Posted ☒ Emailed ☐ Faxed

Reason for Enquiry *(Please tick)*

- ☑ Proposed re-development of property
- ☐ Purchase of property
- ☐ Flood drainage investigation
- ☐ Change of use within an existing development
- ☐ Other (Please specify)
- ☐ Alterations and additions to existing dwelling
- ☐ Property Valuation
- ☐ Subdivision
- ☐ Owner Enquiry

Property Type *(Please tick)* ***Prices include GST****

Residential (single residential dwelling and/or granny flat	☐ $185.25
Development Duplex (includes other residential such as dual occupancies, multi-unit housing and residential flat building)	☐ $253.20
Commercial (including industrial and mixed use)	☑ $444.65

Disclaimer: Flood levels and flood extent lines are based on current information held by Council. Council does not accept responsibility for the accuracy of this information. Any pipe sizes and location of pits and pipe lines should be confirmed by site investigation.
The flood levels shown on the back of this form are only an approximate guide and have been derived using the current computer simulated model.
The information provided in this document is presented in good faith to assist the public in understanding Council's drainage requirements that apply within the Parramatta Local Government Area. It is the responsibility of reach individual using this information to undertake their own checks and confirm this information prior to its use.
Parramatta City Council, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement, or advice referred to above.

Customer Acknowledgement: I hereby acknowledge that I have read and understood the above Disclaimer:

Signature		Date	27/6/13

Office Use Only – RC 682

Amount	Receipt No.	Date	Accepted By:
$			

Refer to back of this form for level information issued

PARRAMATTA CITY COUNCIL
30 Darcy Street, Parramatta NSW 2150
PO Box 32, Parramatta NSW 2124
Catchment Management Section:
Ground Floor, 1A Civic Place, Parramatta
Phone: 02 9806 5050
Fax: 02 9806 5917
Email: council@parracity.nsw.gov.au
www.parracity.nsw.gov.au
TRIM Ref: D02342153

Flood Enquiry Information Issued *(To be completed by Council Officer)*

Mainstream Flooding

Is this property affected by mainstream flooding?	☑ Yes ☐ No

Flood Levels	Closest Cross Sections: *(Please refer to Flood Study)*: REFER TO TABLE ON FLOOD MAP	
☑ 1:20 year ARI	m AHD	**Comments:**
☑ 1:100 Year ARI	M AHD	
☑ PMF	m AHD	SEE NOTE ON FLOOD MAPS
☑ Refer to flood maps provided for detailed flood levels.		

The above flood level information is obtained from the following flood study report:
UPPER PARRAMATTA RIVER FLOOD STUDY – DRAFT 8 (UPPER PARRAMATTA RIVER CATCHMENT TRUST)

Note: Flood inundation can be verified by detail survey to AHD undertaken by a Registered Surveyor.

Local Flooding *(Please tick)*

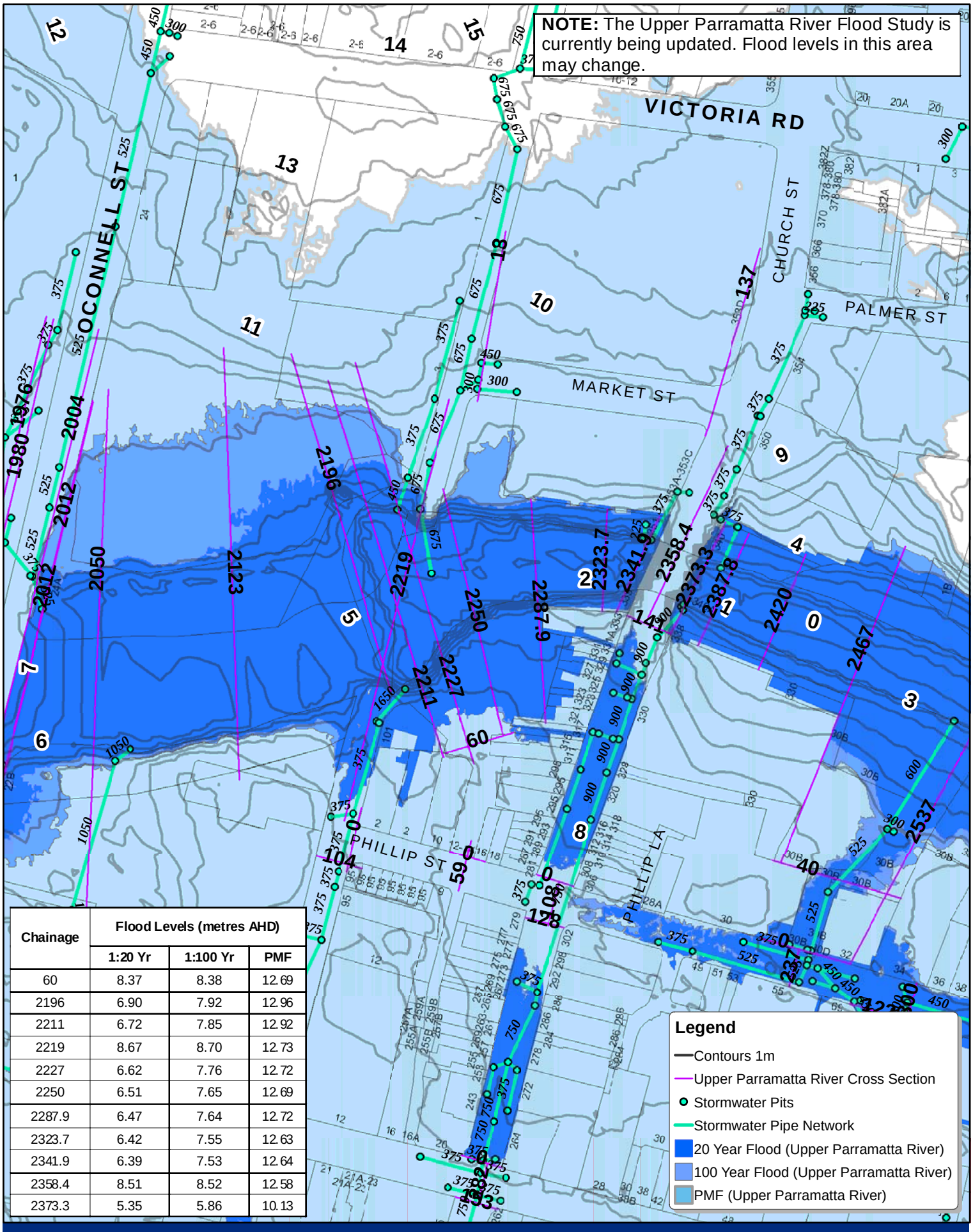
Is the property located within a Hatched Grey Area? *Properties located within a **Hatched Grey Area** are subjected to flooding from the local catchment.*	☐ Yes ☑ No
Is the property located within a Grey Area? *Properties located within a **Grey Area** are subjected to additional site drainage controls to manage flooding in the local catchment.*	☐ Yes ☑ No
Is the property affected by overland stormwater run-off from the local catchment?	☐ Yes ☑ No
***Note:** You are required to contact Council's Development Service Engineer for any details and requirements relating to development that is affected by local flooding.*	

Additional Recommended Actions *(Please tick)*

☑	The Applicant needs to discuss the proposal to re-develop this site with Council's Town Planner and Development Services Engineer.
☑	The Applicant needs to contact Council's Town Planner and organise a pre-lodgement meeting to discuss any proposal to redevelop this property.
☑	The Applicant needs to refer to Council's Local Floodplain Risk Management policy for details relating to developing a land affected by flooding.

Definitions: (As per NSW Floodplain Development Manual dated April 2005)

1. **AHD** – a common national surface level datum approximately corresponding to mean sea level.
2. **ARI** – the long term average number of years between the occurrences of a flood as big as or larger than, the selected event.
3. **PMF** – is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation.
4. **AEP** – Annual Exceedance Probability is the change of a flood of a given or larger size occurring in any one year, usually expressed as a percentage.



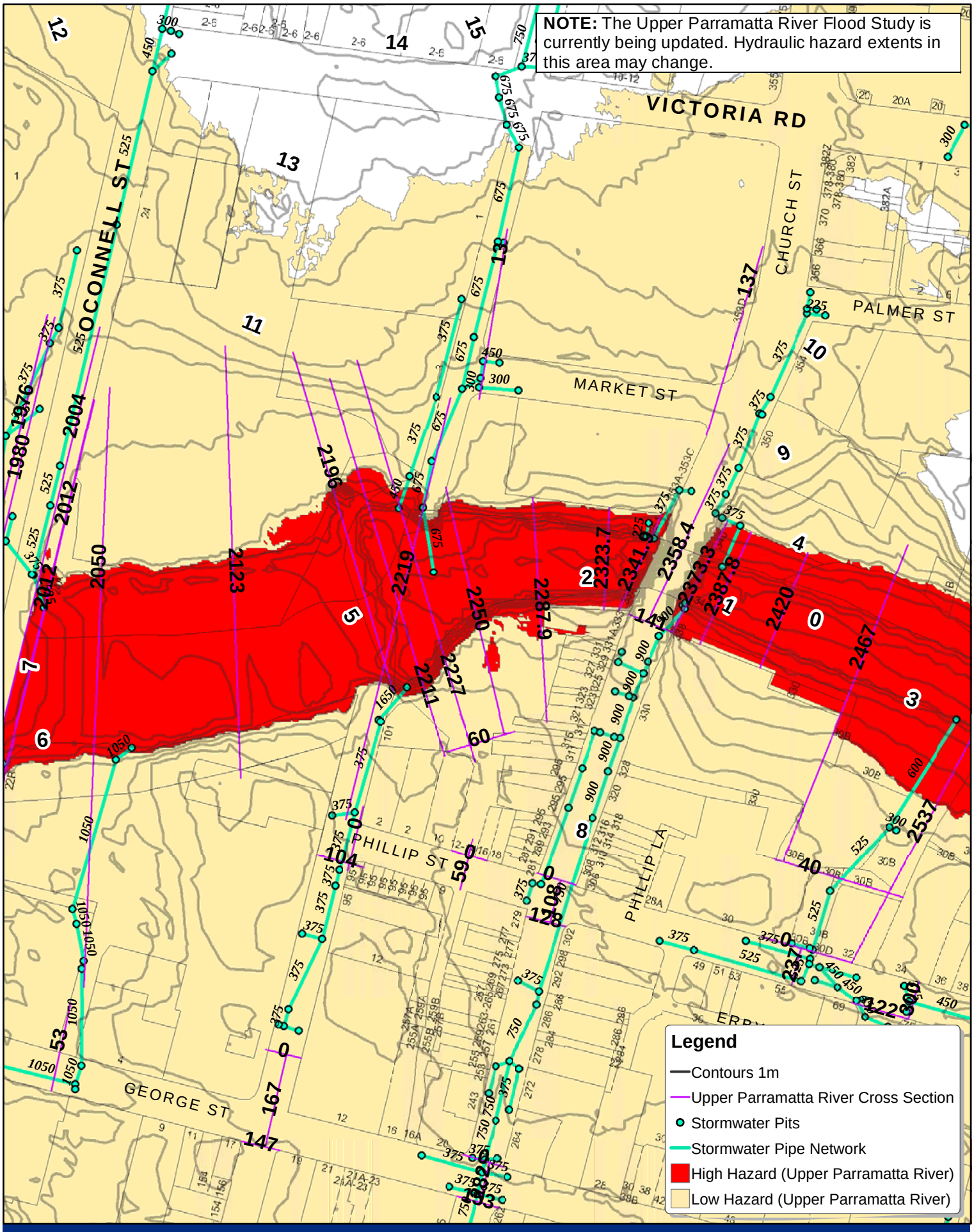
Chainage	Flood Levels (metres AHD)		
	1:20 Yr	1:100 Yr	PMF
60	8.37	8.38	12.69
2196	6.90	7.92	12.96
2211	6.72	7.85	12.92
2219	8.67	8.70	12.73
2227	6.62	7.76	12.72
2250	6.51	7.65	12.69
2287.9	6.47	7.64	12.72
2323.7	6.42	7.55	12.63
2341.9	6.39	7.53	12.64
2358.4	8.51	8.52	12.58
2373.3	5.35	5.86	10.13

Parramatta City Council Flood Map

1:2,500

N

Printed 8/07/2013



Parramatta City Council Hydraulic Hazard Map

1:2,500

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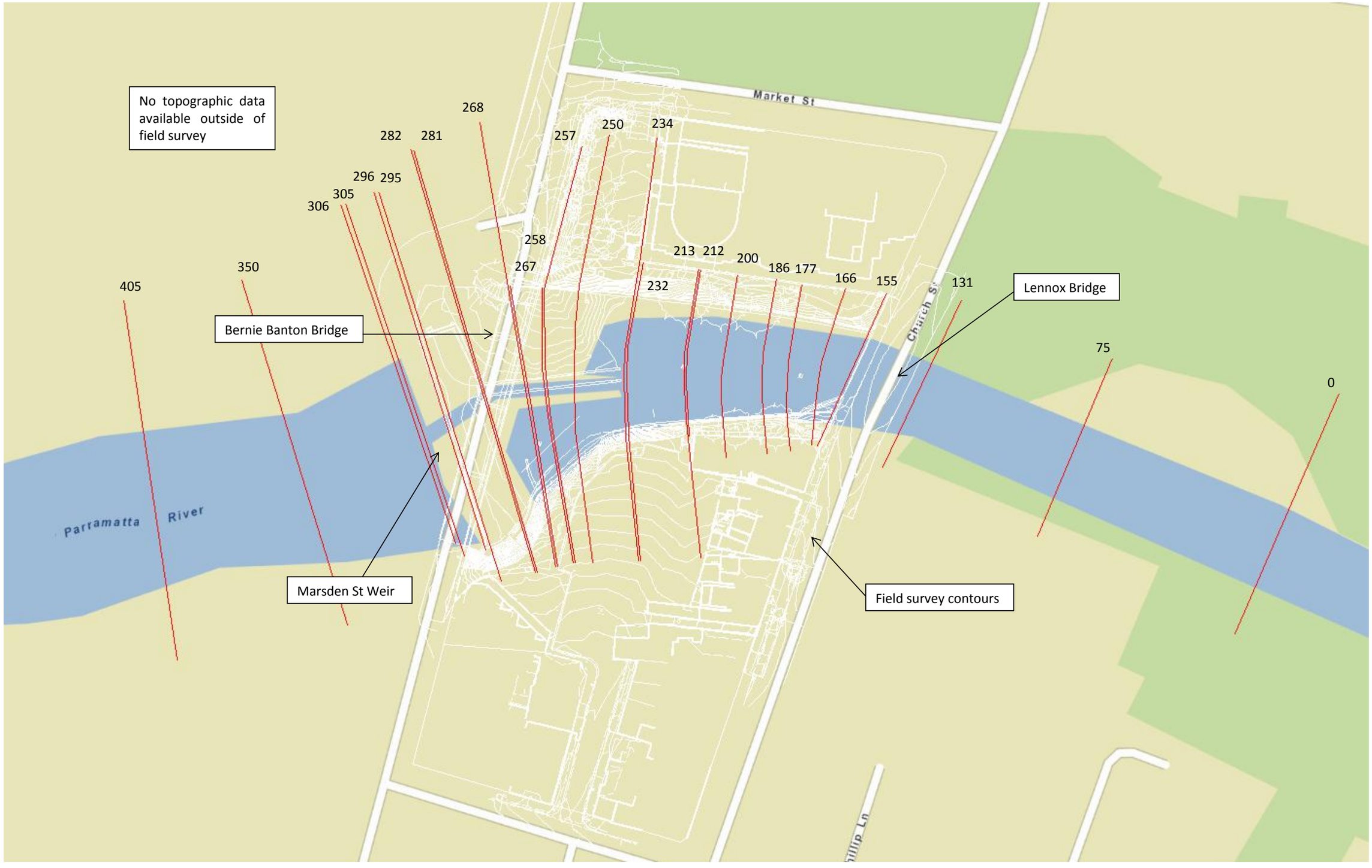
Printed
8/07/2013

APPENDIX C

Flood Model Results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Market St
Church St
Parramatta River
Bernie Banton Bridge
Lennox Bridge
Marsden St Weir
Field survey contours
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306
305
296
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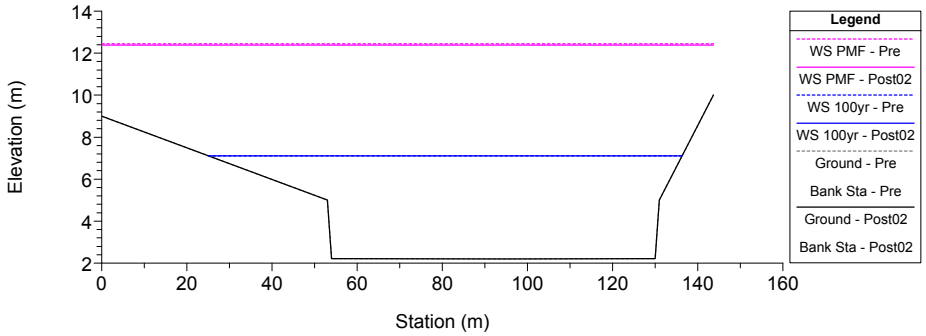

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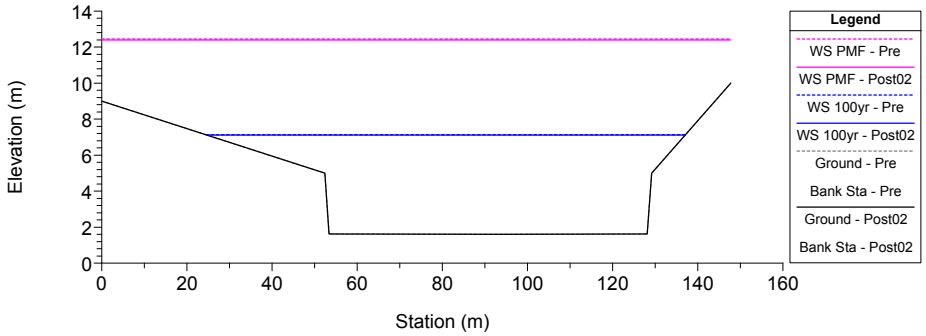

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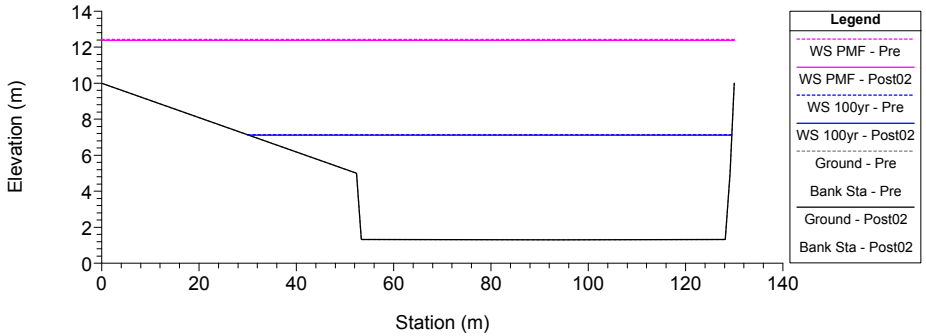

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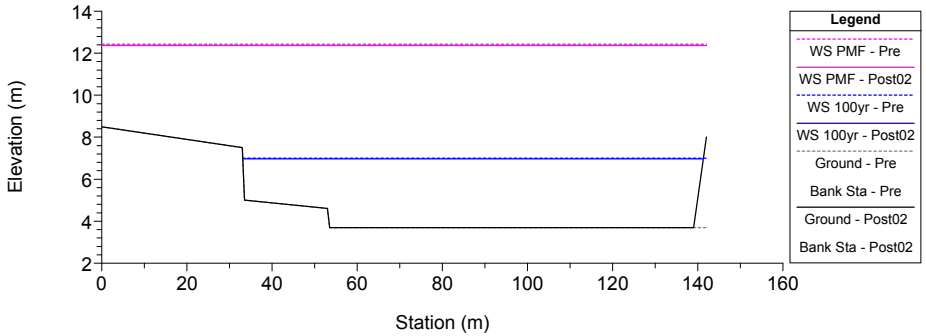

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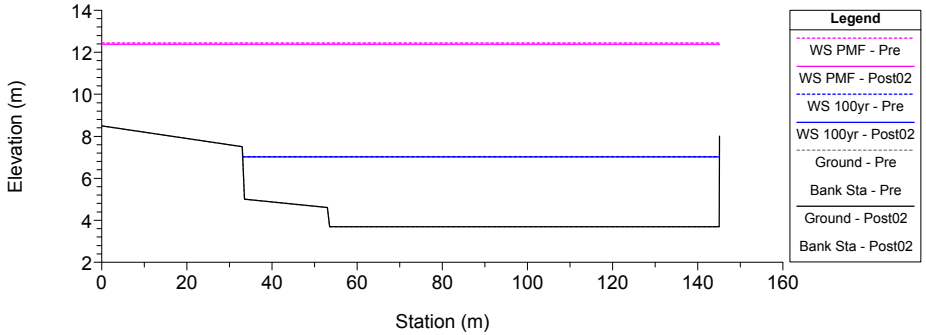

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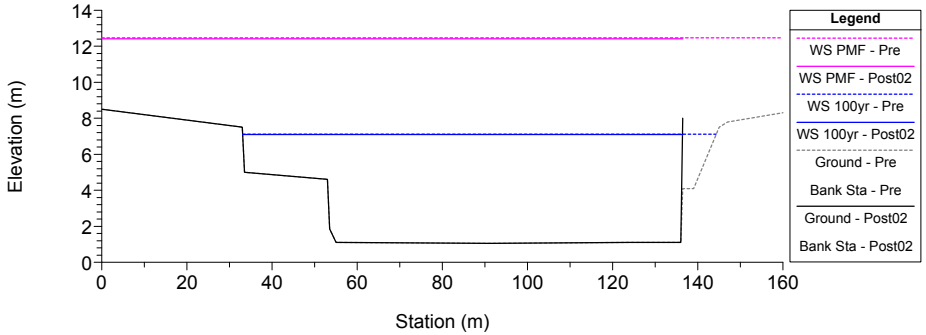

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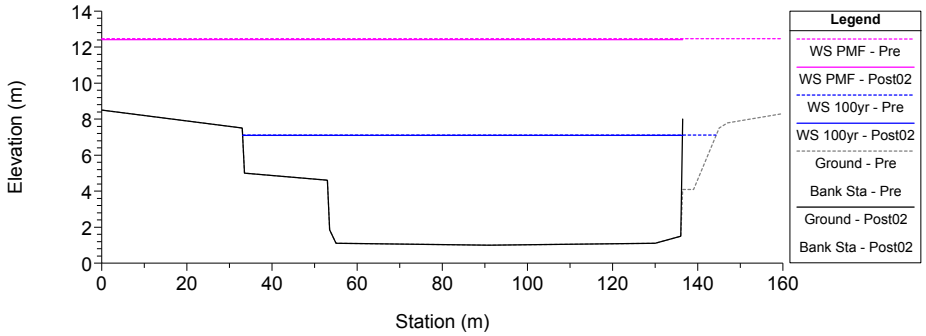

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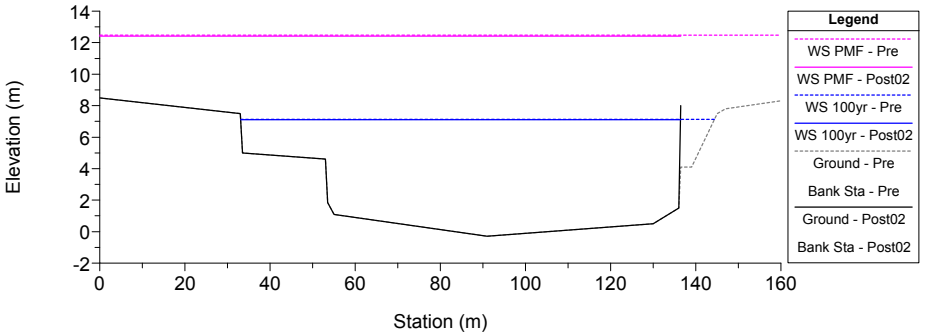

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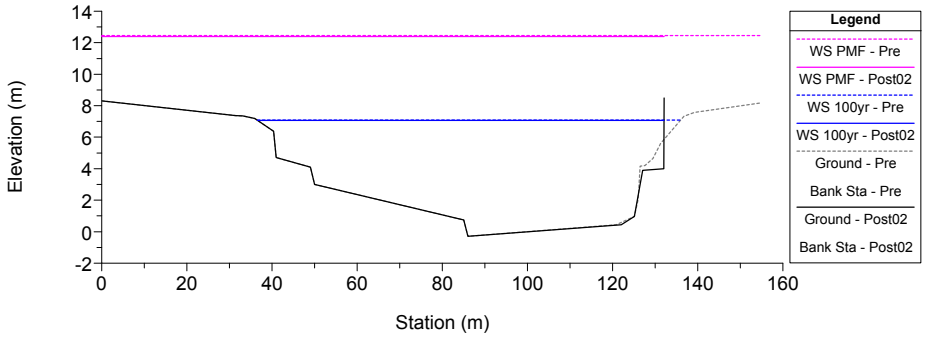

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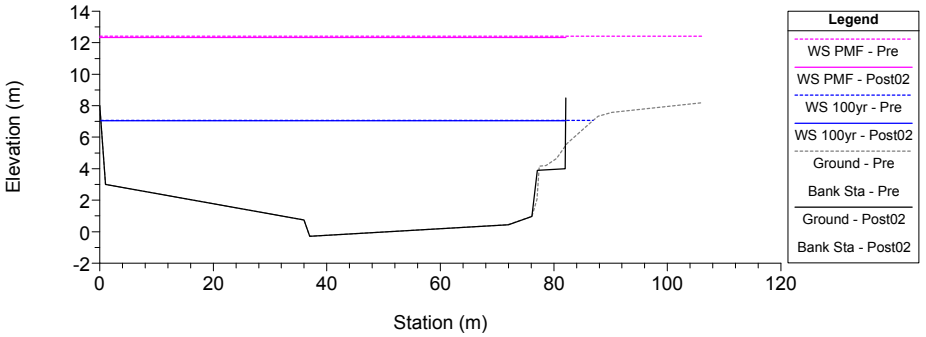

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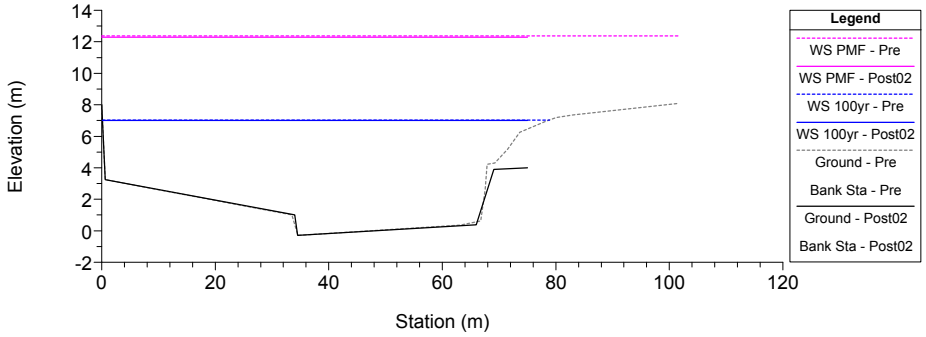

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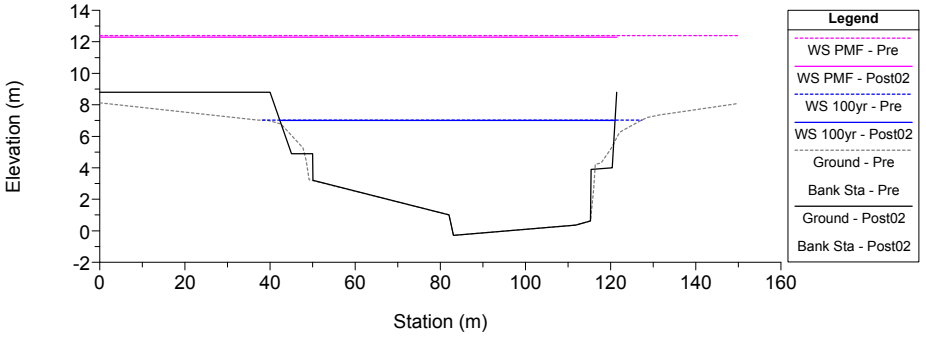

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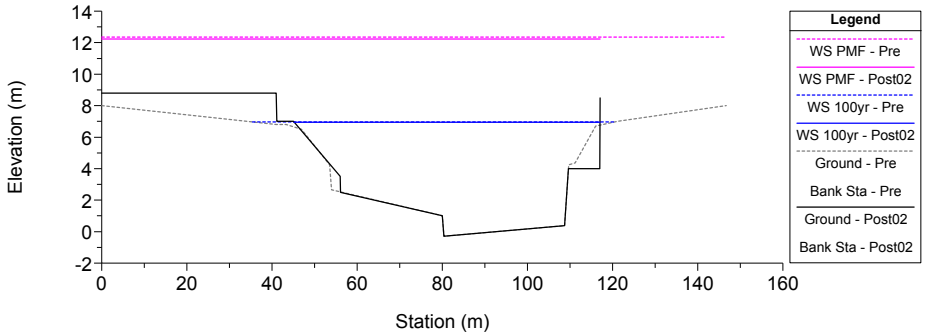

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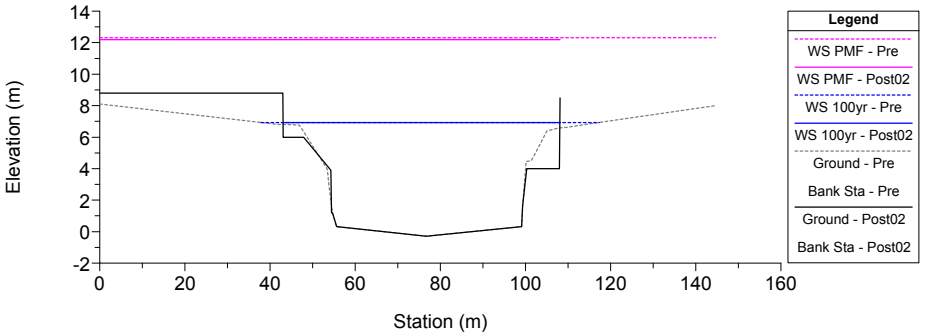

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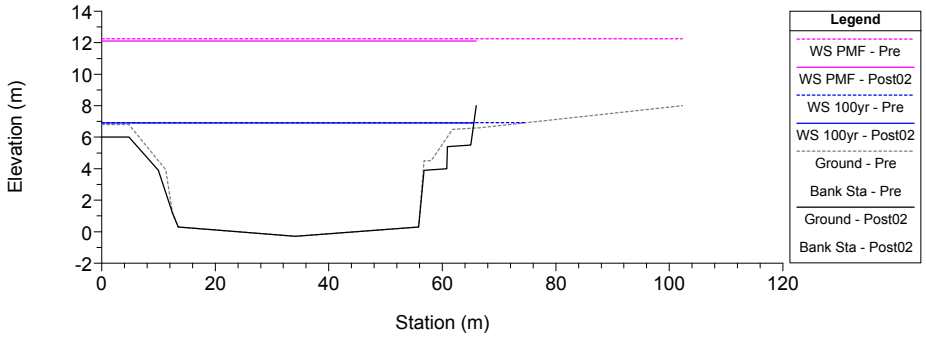

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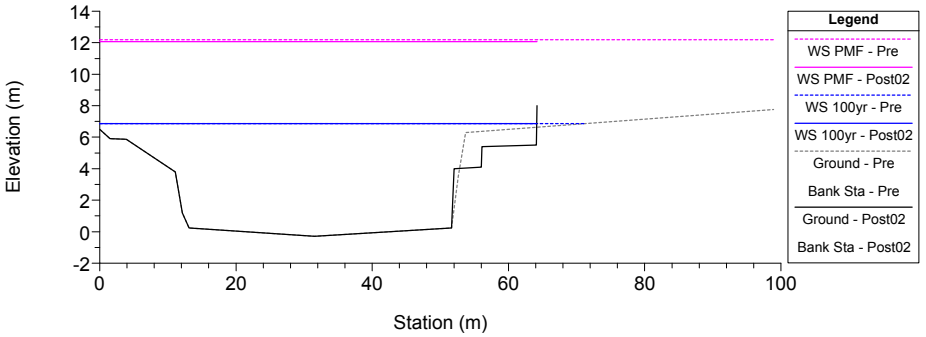

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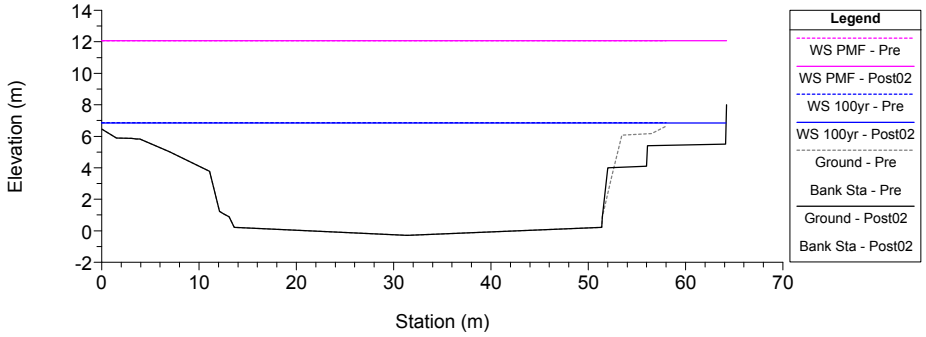

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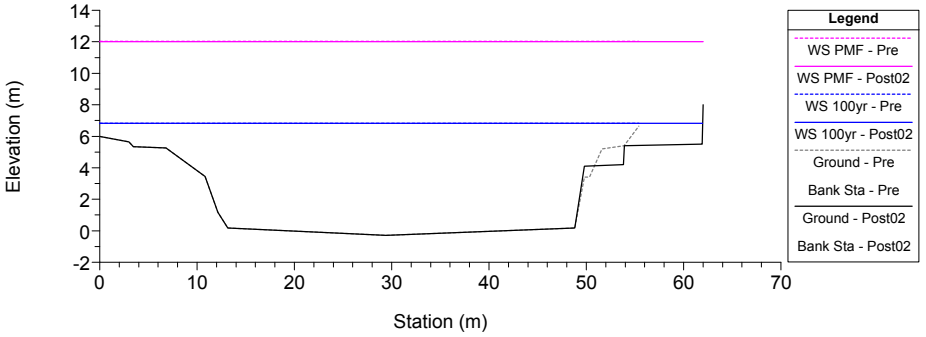

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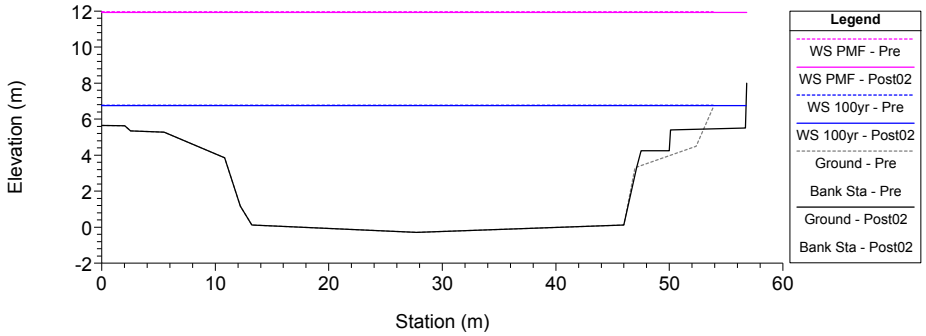

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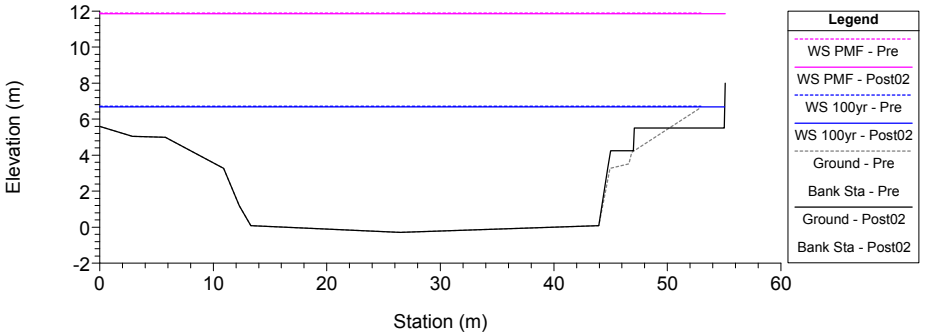

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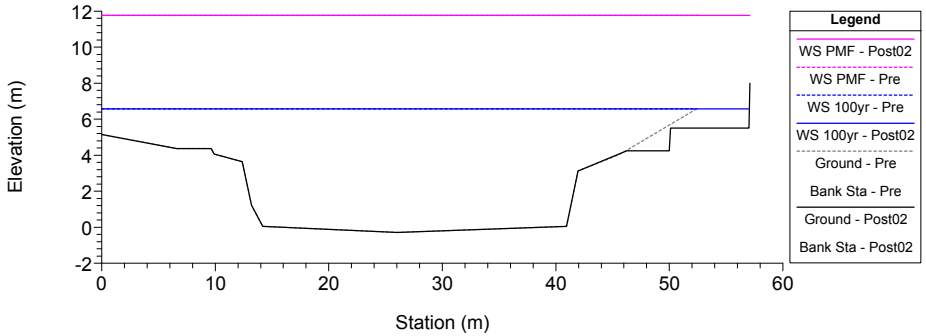

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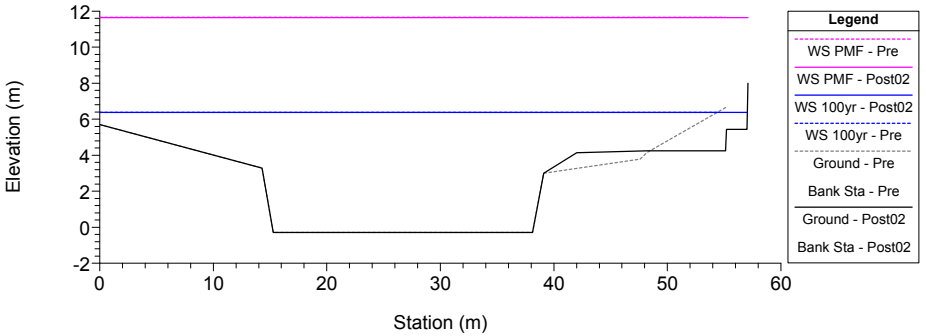

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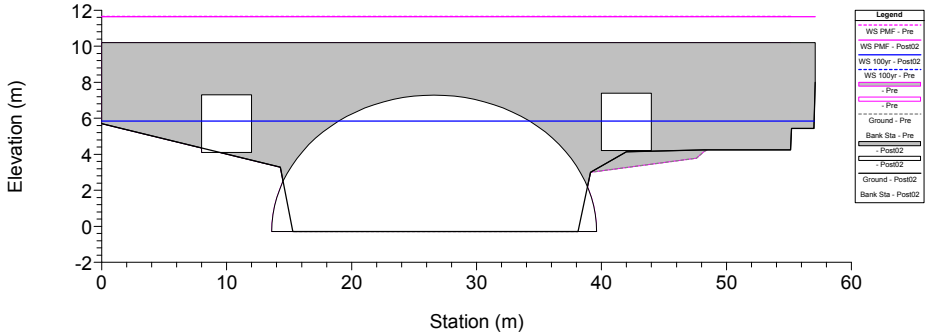

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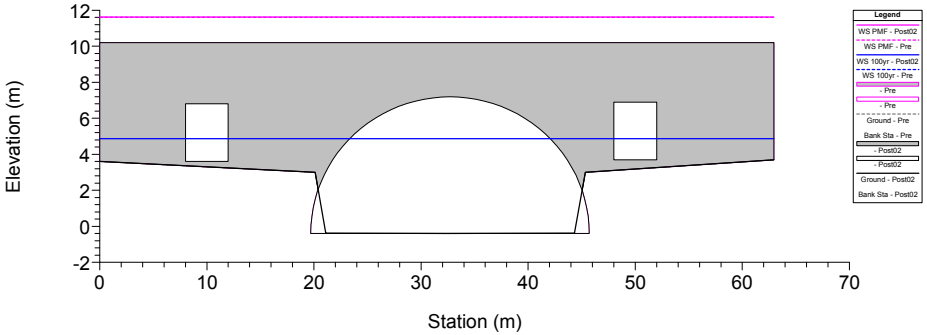

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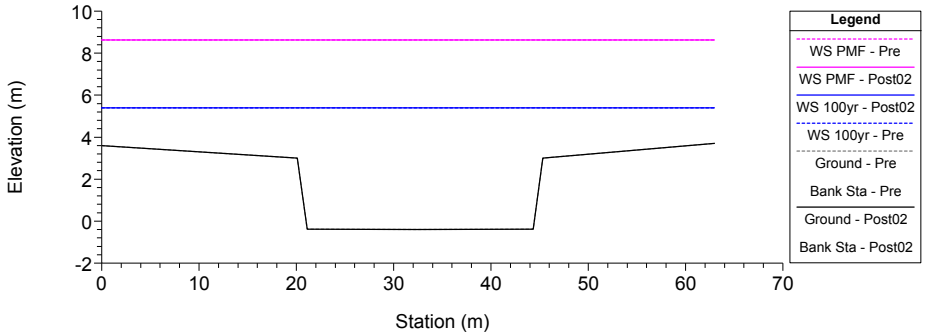

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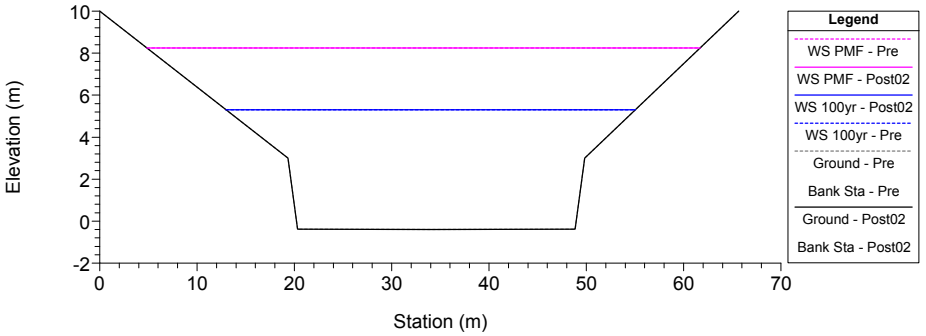

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