

Ref # 21-0519- L001-REVA

Mr Greg Mailman
212/20 Dale St,
BROOKVALE NSW 2100

14 July 2021

Flood Risk Assessment Report. **Proposed Subdivision at** **6 Brighton St Freshwater**

EXECUTIVE SUMMARY

Peninsula Consulting Engineers have been commissioned to undertake the required Flood Risk Assessment Report. This Report has relied upon the following documentation:

- Survey of proposed Subdivision prepared by Stutchbury Jaques Pty Ltd, dated 23rd November 2020, Ref 11008 and a Survey of Site by Stutchbury Jaques Pty Ltd, Job No.11008 of 15/02/2020. [refer Appendix A.]
- Survey of surrounding area prepared by Stutchbury Jaques Pty Ltd, dated 30th June 2021, Ref 11008/20 [refer Appendix A.]
- Flood Information provided by Northern Beaches Council available on Council website "Dee Why & Curl Cool Lagoons Floodplain Risk Management Plan" by Lyall & Associates, November 2005.
- The property & its immediate surrounds do not appear on Council's Flood Hazard Maps.

The premises have been assessed in accordance with the requirements of Warringah Councils LEP 2011 and Section E11 of the Warringah Development Control Plan (DCP), Council's Flood Advice information, and the NSW Government Floodplain Development Manual (April 2005.)

AIM OF REPORT

This report aims at investigating the water surface profile and flooding extent for the 100-year ARI (Average Recurrence Interval) Storm and outlines the methods used. The general information regarding pipe locations & sizes was obtained from Northern Beaches Council's Stormwater Map. This was overlaid in an Autocad drawing and scaled up, to show sub catchments. A *DRAINS* model was then used to determine corresponding catchment runoff and flows through the subject site. The HEC-RAS computer program was used to determine the 100-year ARI water surface profile, for the area around the subject site, for the existing situation and to determine the impact that the proposed development will have on the predicted

overland flow path at the subject property and determine the most suitable method of alleviating the flooding issues on the site.

FLOOD INFORMATION OBTAINED FROM COUNCIL

Details of existing stormwater infrastructure and a contributing catchment area was assessed on site and obtained from Council webpage information and This information was utilised to determine catchment flows. The results were incorporated in the *DRAINS* model, with 100% pipe blockage used, to be conservative, for pipes in the catchment and through the subject site.

All calculations in this report have been prepared in accordance with Australian Rainfall and Runoff and Council's Drainage Manual.

DETAILS OF CATCHMENT AREA

The area is located between Brighton and Corella Street, to the west and Seaview Avenue to the east, and upstream from Brighton Street, to a summit in Corella Street, through Cooksey Avenue and up to Seaview Avenue, Freshwater. The Subdivision is of Lot A, DP359775.

EXISTING COUNCIL DRAINAGE INFRASTRUCTURE

The Pits upstream of the site were approximately 3 in number, and an 100% blocking factor was applied to the *DRAINS* calculations, on the pits upstream of the site. At the east side of the subject subdivision a 450mm, diameter Council Pipe conveys stormwater to the north, and then down Brighton Street to the west. The catchment area under assessment includes a catchment of 4.2 Hectares as shown on Appendix B. The inflow adjacent to the site was calculated to be 1.7m³/sec. this was assessed as overland flow in the subject area, and no allowance was made for pipe capacity. The numbering system of nodes corresponds with the *DRAINS* model on Appendix C.

Council did not have Flood Data for this catchment. The stormwater conveyance through the site was assessed from the survey mentioned above.

DESCRIPTION OF PROPOSED DEVELOPMENT & IMPACT ON LOCAL FLOOD BEHAVIOR

The proposed development is a subdivision with demolition of existing residence, and constuction of two residences, of mirror image, each on an individual block of land, with the new boundary being central to existing, and running north south. Refer Appendix A for plan of footprint of new residences on subdivision plan.

It was suggested to Council's Development Engineer by phone, on 7/07/21, that a solution to the flooding of the subject property would be to erect a boundary fence upon the eastern boundary, of sufficient height and bulk, to re-direct the flood

waters into the Council Reserve adjacent to the site. This proposal was accepted verbally by Council, and consequently the proposed development will include this flood proof fence.

COUNCIL CRITERIA TO BE ADDRESSED

Council requires a minimum freeboard of 500mm above the predicted 1 in 100 year ARI water surface level for the floor of habitable rooms.

Council also require that no further impedance of flows are to be caused by the development, and flood storage volume is to be maintained within the site.

None of this was necessary as upstream flooding was eliminated on the site by introduction of the flood proof boundary fence.

HEC RAS RESULTS

The HEC RAS model was set up, with 9 cross sections to model flows coming into the site, and a 100 Year ARI inflow of $1.7\text{m}^3/\text{sec}$. Extent of 100Yr ARI flooding, both pre & post development are shown at Appendix D, together with numerical HEC RAS results. It was found that the boundary fence proposal would solve the flooding issues, without any restrictions on the floor elevations of the new development.

CONCLUSIONS

This residential development is satisfactory from a flood risk point of view. Key points are as follows.

1. The provision of a waterproof reinforced masonry fence along the eastern boundary of the subject property, connecting to the front boundary fence of No. 22 Corella Street, and being at least 300mm in height above the 1% AEP top water level. Refer attached wall elevation.
2. This is to be constructed on the private property side of the boundary, at the Developer's cost. The structural Engineer is to design a suitable flood compatible wall off a suitable footing to resist the proposed flood loads.
3. This will ensure that flood flows from Corella Street and other public areas uphill from the subject property, will not affect the subject property in any storm up to & beyond the 1% AEP Storm.
4. No further requirements are necessary for the subject property, in respect of floor levels related to flooding.
5. The installation of a flood proof fence along the eastern boundary will improve the flooding outcomes for existing properties to the west of the subject site.

REPORT'S AUTHOR & REVIEWER

This Report's Author and Reviewer have had a combined 70 years experience, in the engineering profession, including periods of employment in the Consulting, Government Instrumentalities, and Construction areas. The author's last full time employment was as Principal Technical Specialist [Stormwater] with Kellogg, Brown & Root, International Consulting Engineers. He carried out recent investigations for:

- Sydney Desalination Pipeline
- Victorian Highways
- Pilbara Railway
- NSW Railways

Peninsula Consulting Engineers has carried out Flood Risk Assessment Reports on a residential scale for Councils, Including Warringah, Pittwater, Willoughby, Wollongong, & Manly. Bruce Lewis, our Principal is - B.E. (Civil), CP Eng, NPER.

For any questions or queries on this report, please contact Peninsula Consulting Engineers.



Bruce Lewis

Principal BE(Civil) Cpeng NPER

Peninsula Consulting Engineers

Bruce Lewis (Reviewer)

M: 0424 253 818 or

E: Bruce@peninsulaconsulting.com.au.

Appendices

Appendix A – Proposed Subdivision & Survey

Appendix B – Plan of Catchment

Appendix C- DRAINS Model

Appendix D – HEC RAS Results

Appendix E – Proposed Fence Longitudinal Section.



ABN 60 493 390 399

NOTE:

- THE PROPOSED PLAN OF SUBDIVISION HAS BEEN PREPARED FOR DEVELOPMENT APPLICATION PURPOSES ONLY.
- DIMENSIONS AND AREAS SHOWN ON THIS PLAN HAVE BEEN COMPILED FROM D.P. 359775 AND ARE SUBJECT TO FINAL SURVEY.
- THE LOCATION AND EXTENT OF PROPOSED EASEMENTS IS SUBJECT TO APPROVAL OF THE DEVELOPMENT APPLICATION AND SUBSEQUENT CONDITIONS OF CONSENT.

REGISTERED SURVEYOR
STUTCHBURY JACOBS P/L
Land Surveying Consultants
P.O. Box 7248
BROOKVALE NSW 2100
TEL: (02) 8976 1600
FAX: (02) 8976 1655

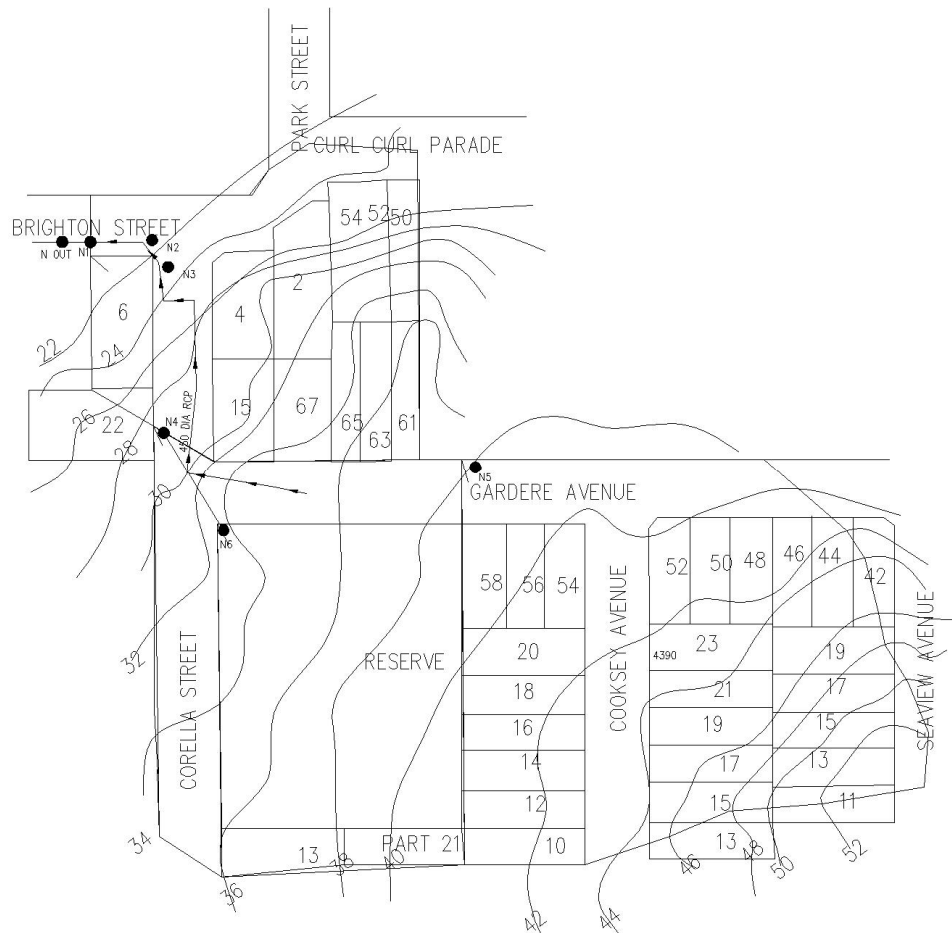
DATE: 23/11/2020 REF: 11008/20



ABN 60 493 390 399



Appendix B Plan of Catchment





Peninsula Consulting
Coastal Structural Engineers

Peninsula Consulting Engineers

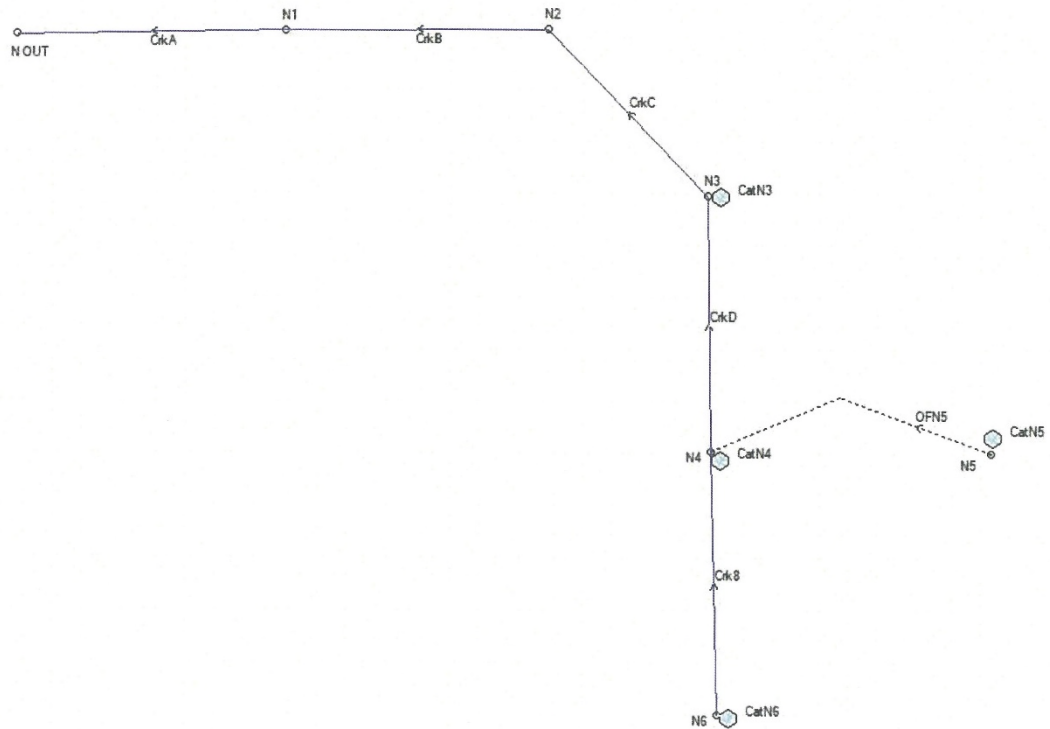
39 McKillop Rd
Beacon Hill NSW 2100

PO Box 6491
Frenchs Forest NSW 2086

M 0424 253 818
F (02) 9982 4722
E bruce@peninsulaconsulting.com.au

ABN 60 493 390 399

Appendix C DRAINS Model





Peninsula Consulting
Coastal Structural Engineers

Peninsula Consulting Engineers

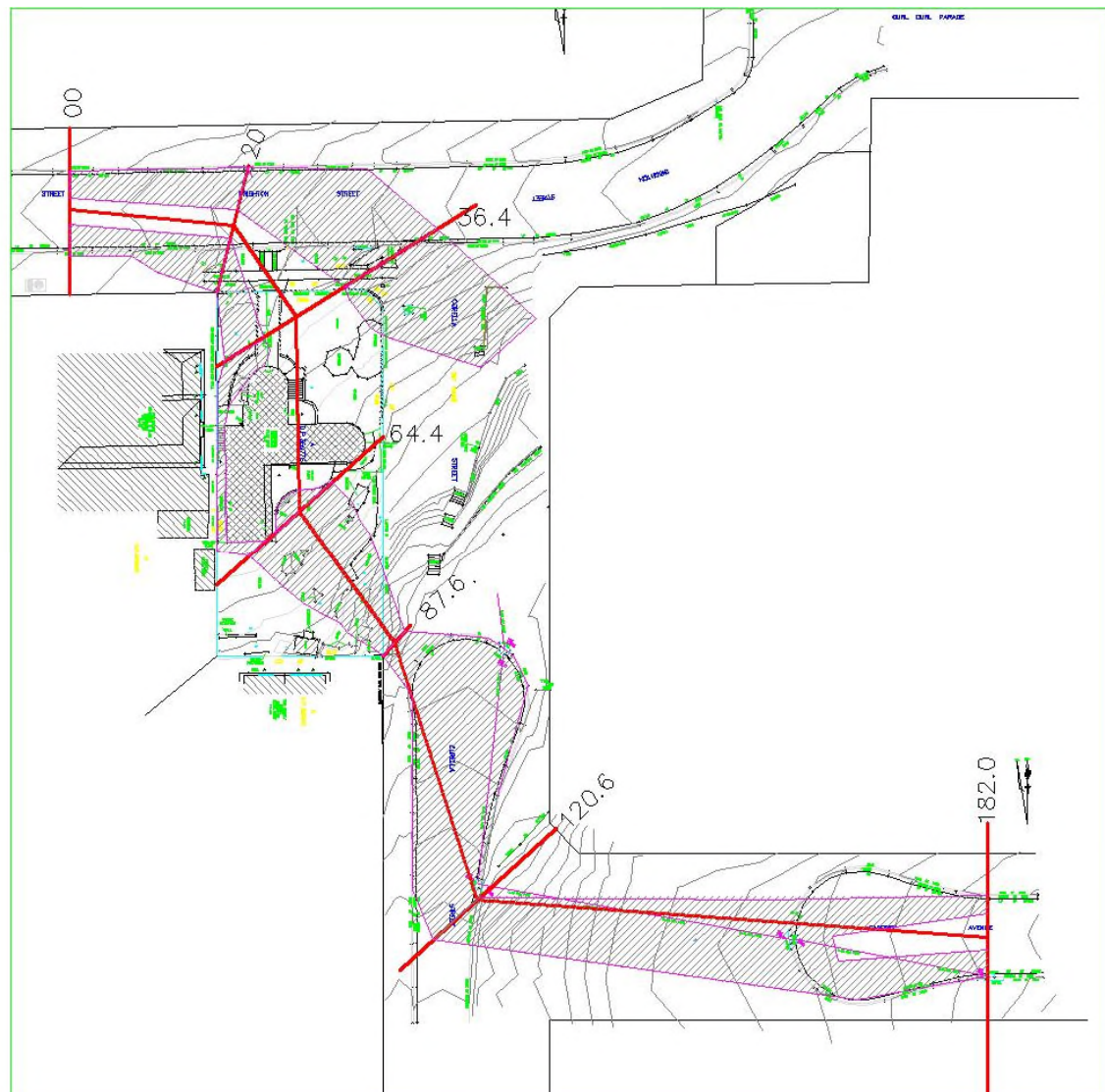
39 McKillop Rd
Beacon Hill NSW 2100

PO Box 6491
Frenchs Forest NSW 2086

M 0424 253 818
F (02) 9982 4722
E bruce@peninsulaconsulting.com.au

ABN 60 493 390 399

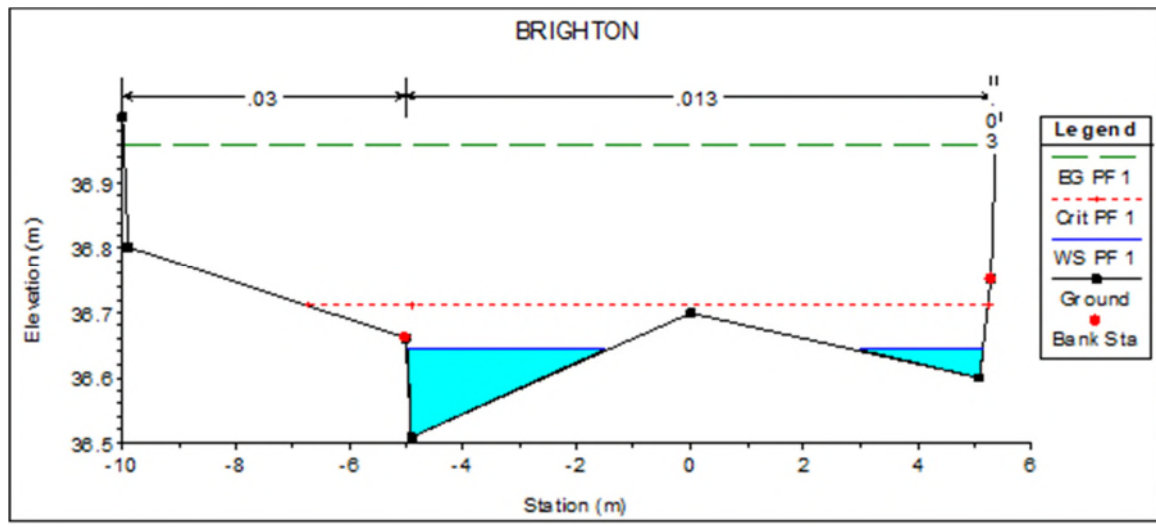
Appendix D- HEC RAS Results **Predevelopment**



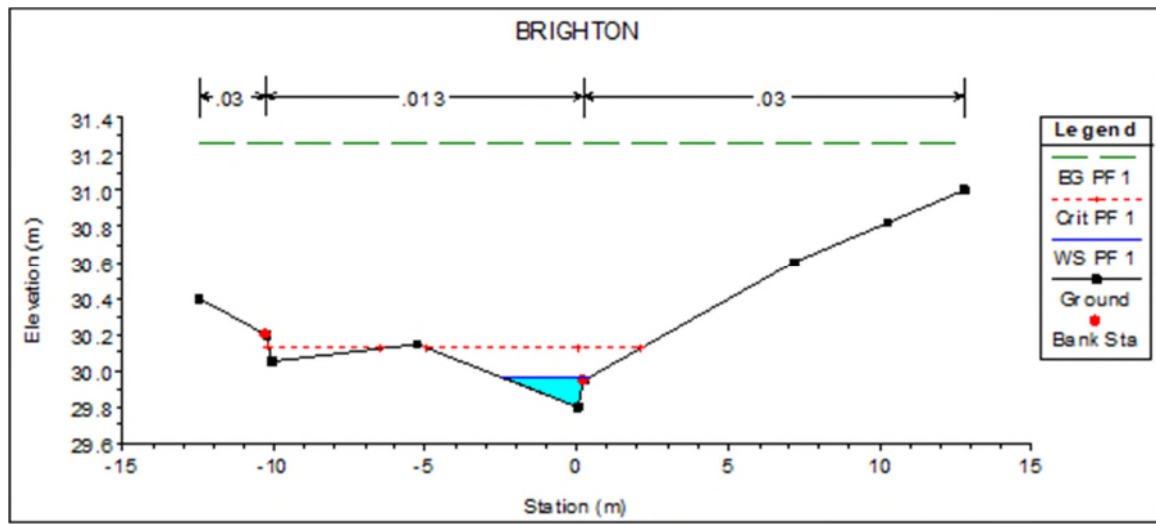
Location of Cross Sections & Area of Inundation **– Pre Development**



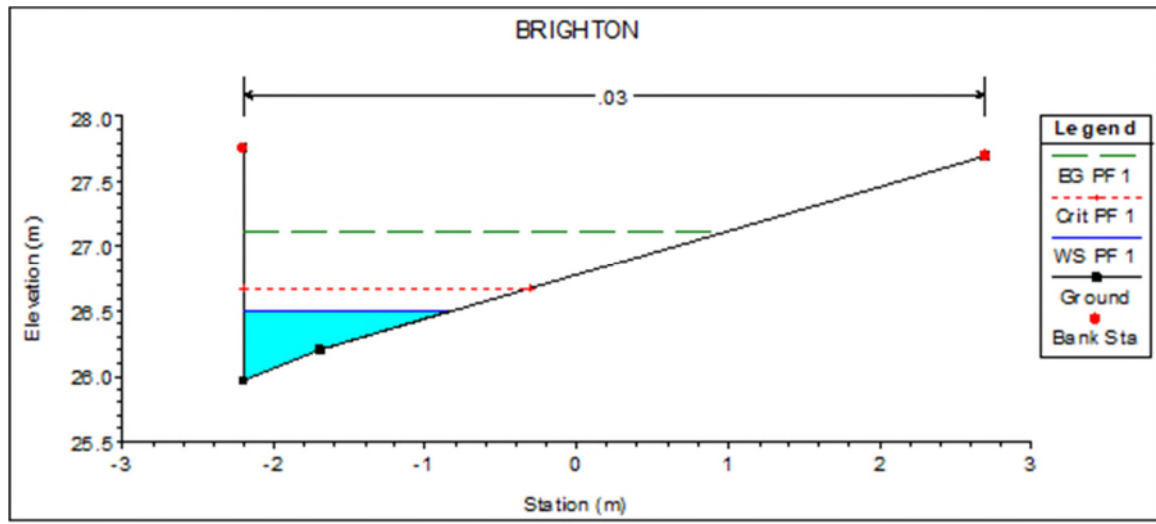
Hec Ras Cross Sections



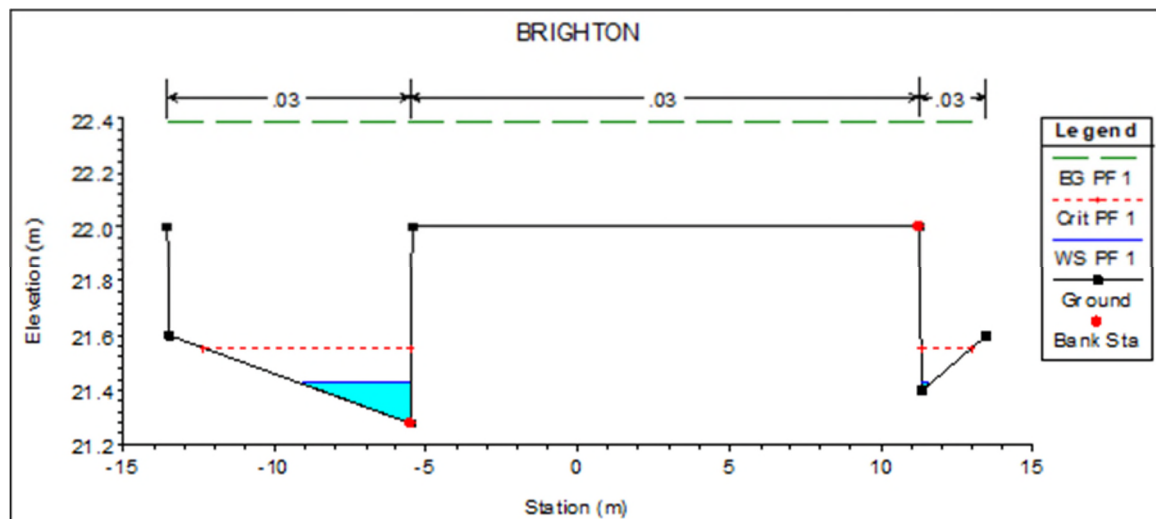
Ch 182



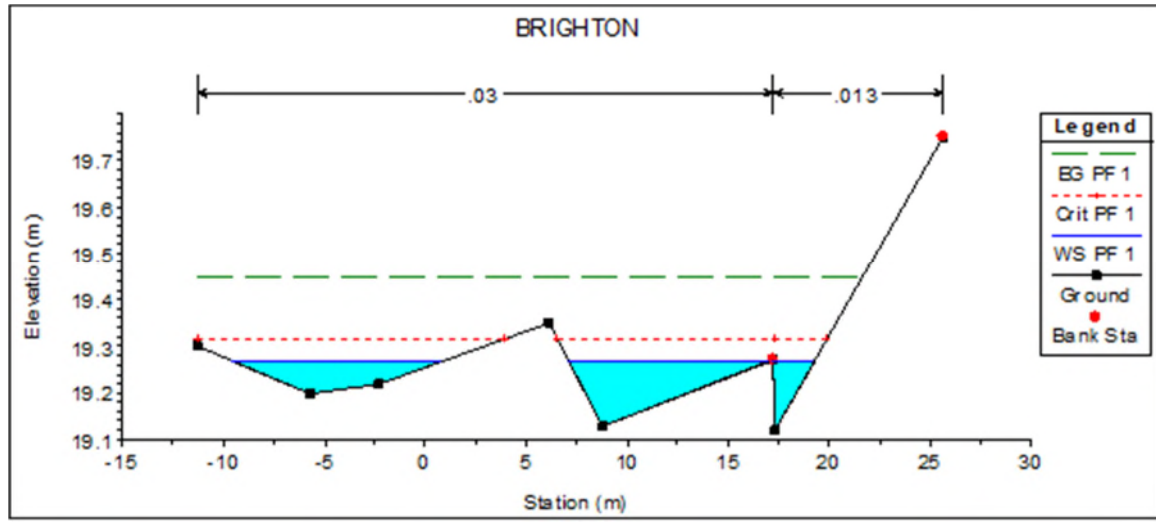
Ch 120.6



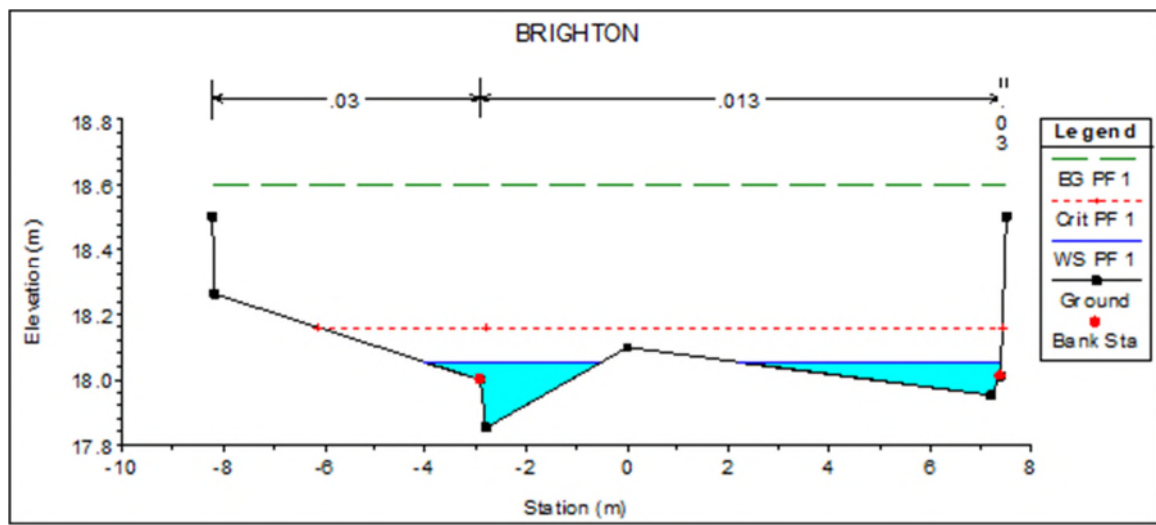
Ch 87.6



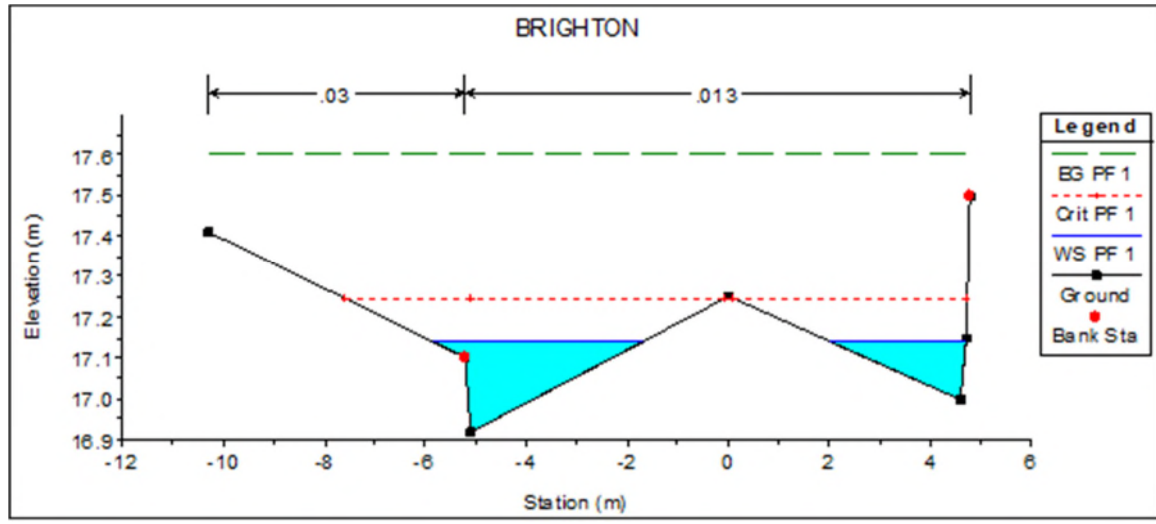
Ch 64.4- Flows around Existing Residence



Ch 36.4



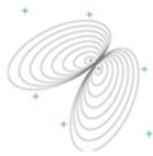
Ch 20



Ch 00

River Sta	Q Total (m ³ /s)	Min Ch El (m)	W.S. Elev (m)	Depth (m)	Crit W.S. (m)	E.G. Elev (m)	Vel Chnl (m/s)	Flow Area (m ²)	Top Width (m)	Froude # Chl
182	0.69	36.51	36.64	0.13	36.71	36.96	2.49	0.28	5.68	3.6
120.6	1.14	29.8	29.96	0.16	30.13	31.26	5.04	0.23	2.89	5.6
87.6	1.14	25.97	26.49	0.52	26.68	27.11	3.49	0.33	1.35	2.27
64.4	1.14	21.28	21.42	0.14	21.55	22.38	0.25	0.26	3.89	0.3
36.4	1.74	19.12	19.27	0.15	19.32	19.45	3.06	1.26	22.53	3.58
20	1.74	17.85	18.05	0.2	18.16	18.6	3.3	0.55	8.69	4.03
0	1.74	16.92	17.14	0.22	17.25	17.6	3.01	0.59	6.86	3.15

HEC RAS Numerical Results Pre Development



Peninsula Consulting
Coastal Structural Engineers

Peninsula Consulting Engineers

39 McKillop Rd
Beacon Hill NSW 2100

PO Box 6491
Frenchs Forest NSW 2086

M 0424 253 818
F (02) 9982 4722
E bruce@peninsulaconsulting.com.au

ABN 60 493 390 399

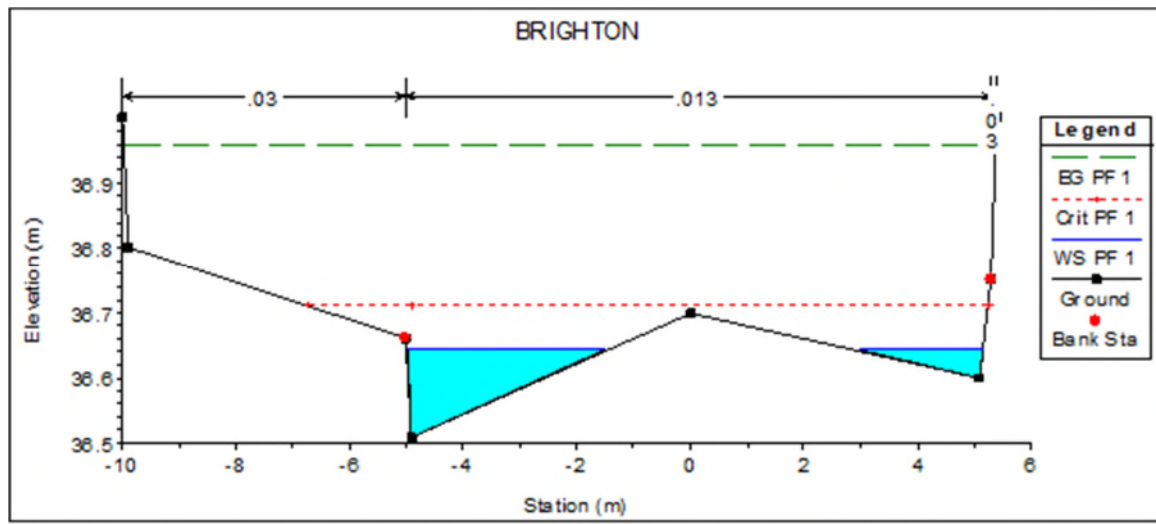
Appendix D - HEC RAS Results **Post Development**



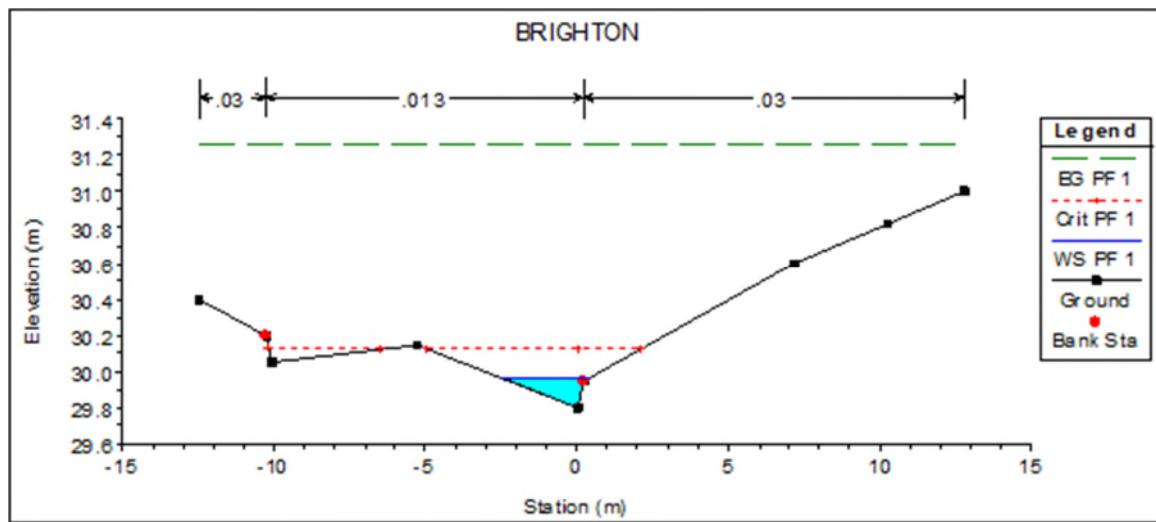
Location of Cross Sections & Area of Inundation **– Post Development**



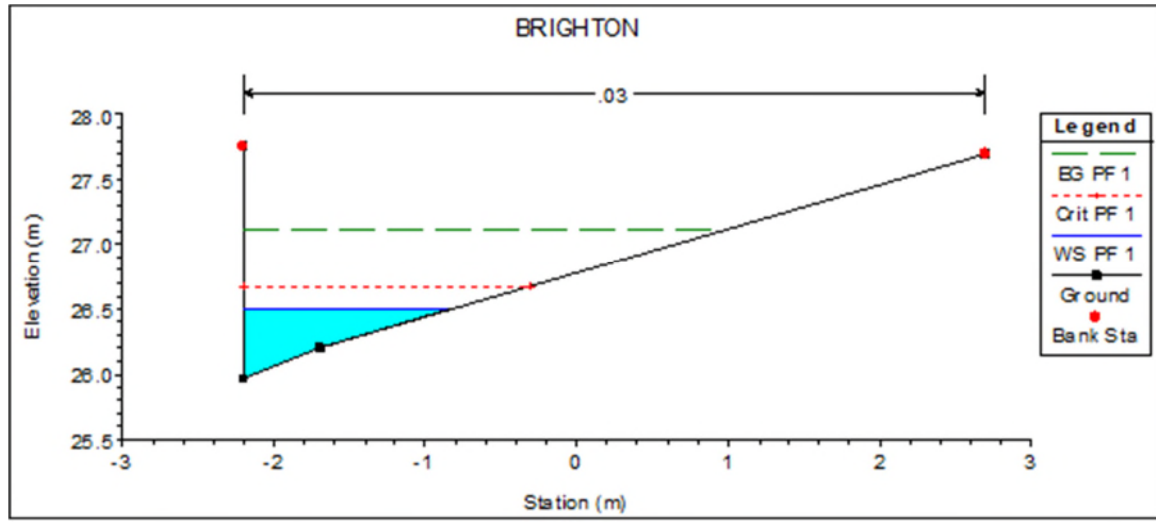
Hec Ras Cross Sections



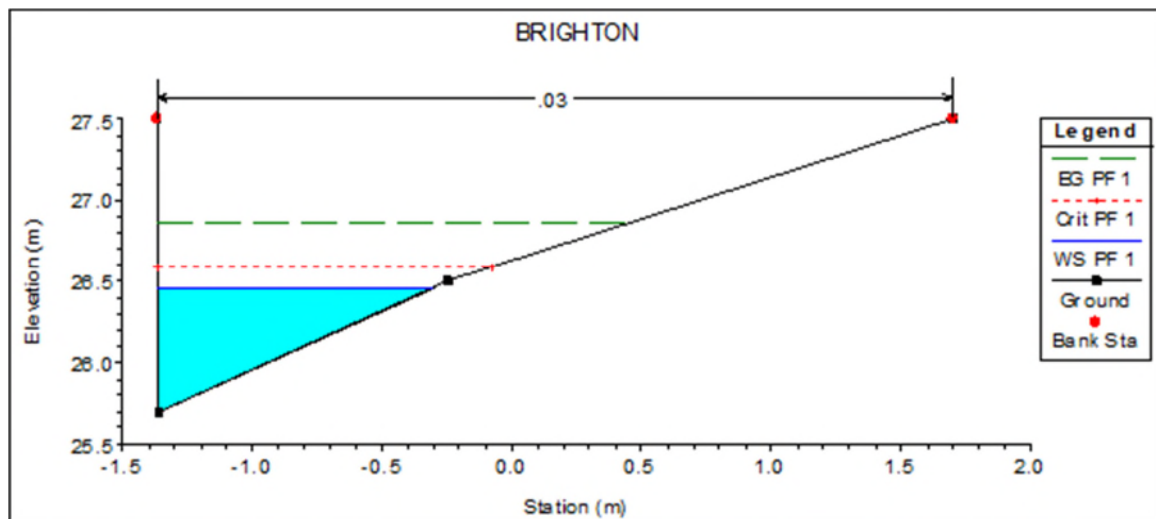
Ch 182



Ch 120.6



Ch 87.6 – Start of Proposed Wall



Ch 85.4 – Wall Continued



Peninsula Consulting
Coastal Structural Engineers

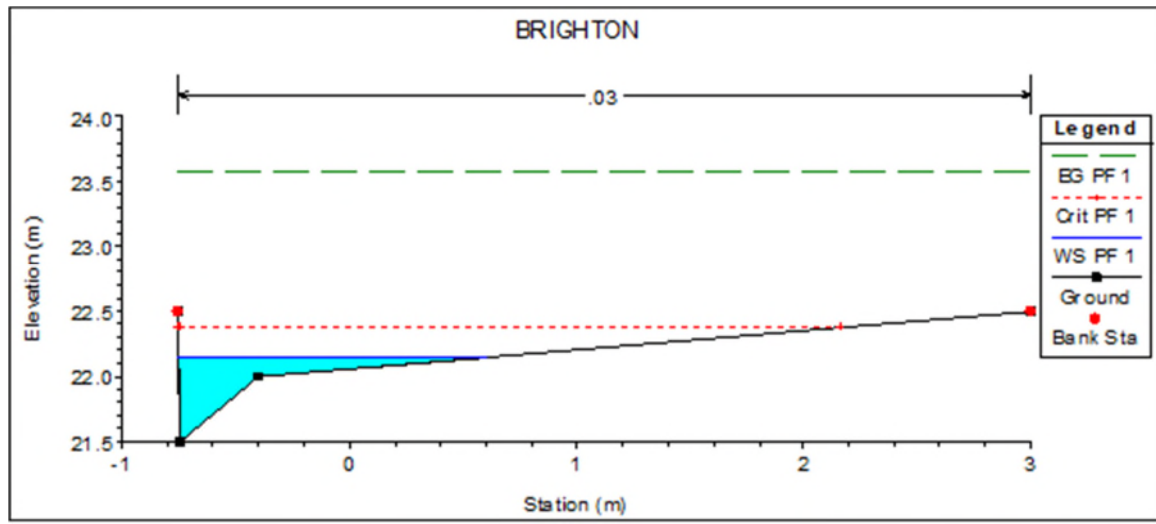
Peninsula Consulting Engineers

39 McKillop Rd
Beacon Hill NSW 2100

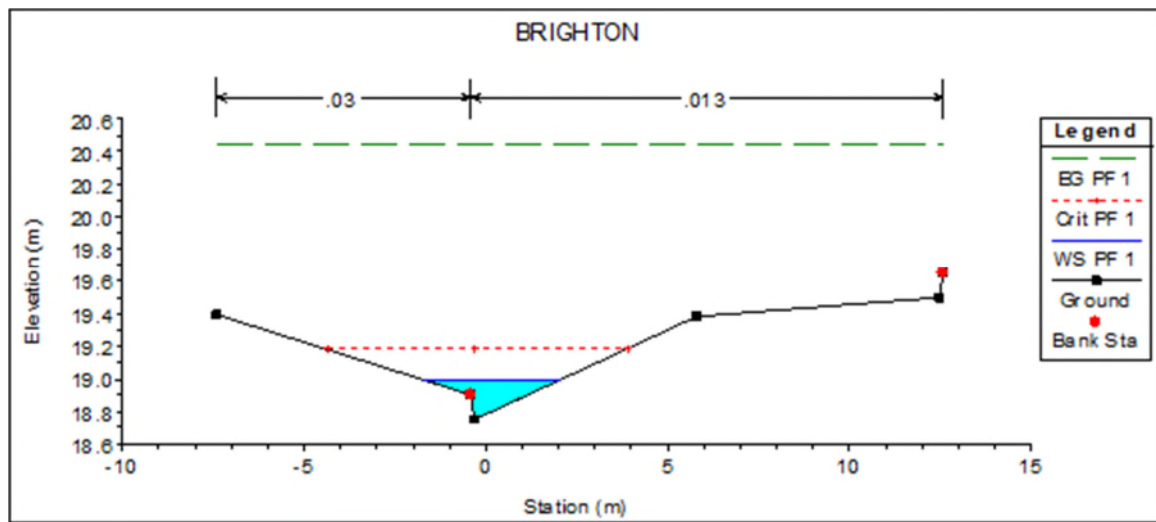
PO Box 6491
Frenchs Forest NSW 2086

M 0424 253 818
F (02) 9982 4722
E bruce@peninsulaconsulting.com.au

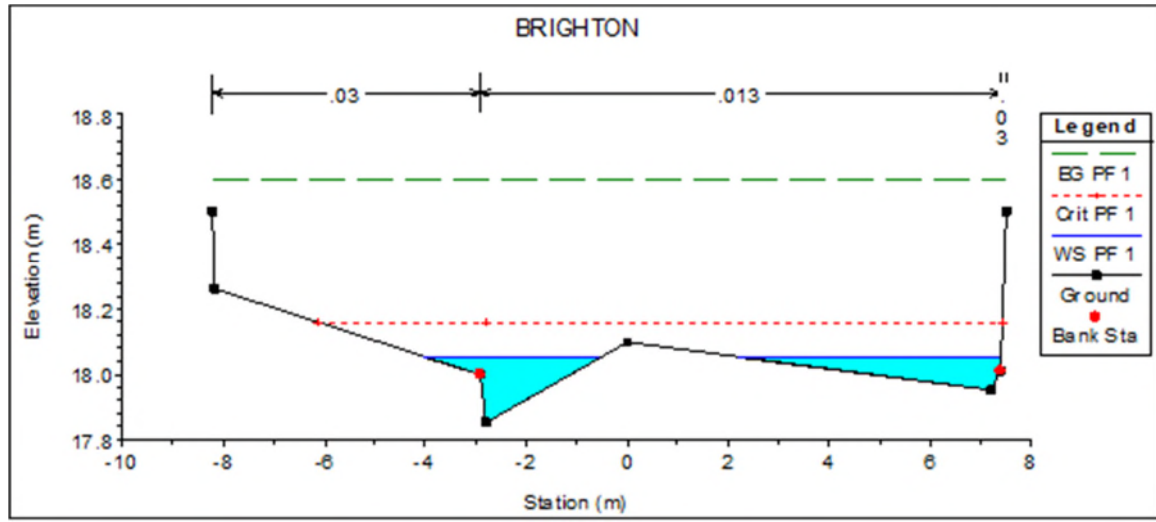
ABN 60 493 390 399



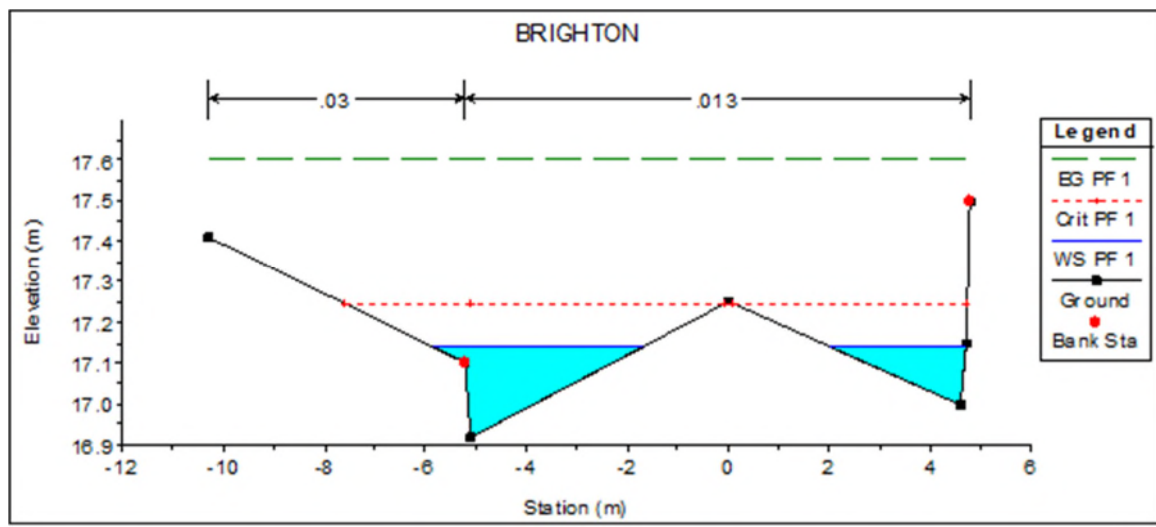
Ch 62.7 – Wall Continued



Ch 39.2 – Wall End



Ch 20



Ch 00



Peninsula Consulting
Coastal Structural Engineers

Peninsula Consulting Engineers

39 McKillop Rd
Beacon Hill NSW 2100

PO Box 6491
Frenchs Forest NSW 2086

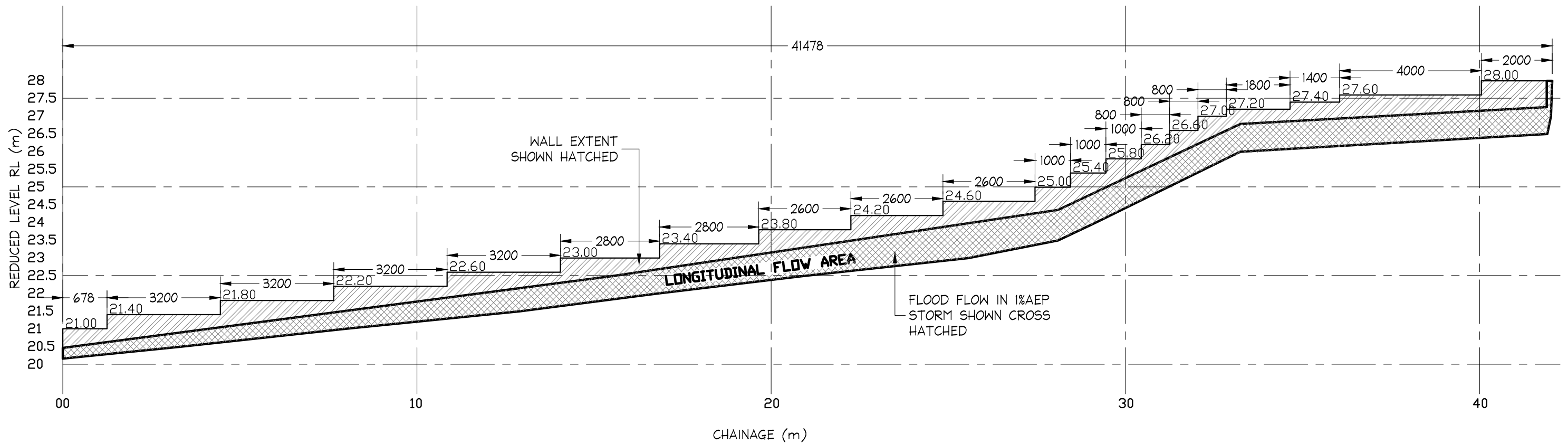
M 0424 253 818
F (02) 9982 4722
E bruce@peninsulaconsulting.com.au

ABN 60 493 390 399

River Sta	Q Total (m ³ /s)	Min Ch El (m)	W.S. Elev (m)	Depth (m)	Crit W.S. (m)	E.G. Elev (m)	Vel Chnl (m/s)	Flow Area (m ²)	Top Width (m)	Froude # Chl
182	0.69	36.51	36.64	0.13	36.71	36.96	2.49	0.28	5.68	3.6
120.6	1.14	29.8	29.96	0.16	30.13	31.26	5.04	0.23	2.89	5.6
87.6	1.14	25.97	26.49	0.52	26.68	27.11	3.49	0.33	1.35	2.27
85.4	1.14	25.7	26.46	0.76	26.59	26.86	2.8	0.41	1.06	1.45
62.7	1.14	21.5	22.15	0.65	22.38	23.57	5.28	0.22	1.36	4.24
39.2	1.74	18.75	18.99	0.24	19.18	20.45	5.46	0.37	3.78	4.95
20	1.74	17.85	18.05	0.2	18.16	18.65	3.45	0.53	8.46	4.24
0	1.74	16.92	17.14	0.22	17.25	17.59	2.99	0.6	6.89	3.12

HEC RAS Numerical Results Post Development

Appendix E – Proposed Fence – Longitudinal Section



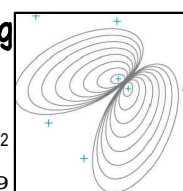
CONCEPT PROPOSED WALL LONGITUDINAL SECTION

SCALE = NTS

0 1:100 5 m		
0 1:20 1 m		
Date:	Rev:	Amendment:

Peninsula Consulting Engineers

PO Box 6491,
Frenchs Forest, NSW, 2086
Ph: 0424 253 818 Fax: (02) 9982 4722
E : bruce@peninsulaconsulting.com.au
A.B.N. 60 493 390 399



The copyright of this drawing remains with Peninsula Consulting Engineers.

Project:

**PROPOSED WORKS
at: 6 BRIGHTON STREET
FRESHWATER
for: MR MAILMAN**

Drawing Title:

**CONCEPT PROPOSED WALL
LONGITUDINAL SECTION**

Job No:

21-0519

Drawing No:

SK01

Rev:

-