6.7 From IH 108 Table 7.1:

Curve 10: Q95(1) percentage of 10.0% is closest to Q95(1) of 10.7% given by soil

Percentile	% Mean Flow	Flow (m^3/s)
2	428.96	0.0425
5	303.93	0.0301
50	52.46	0.0052
80	21.25	0.0021
90	13.75	0.0014
95	10.00	0.0010
99	5.89	0.0006

Table 5: Flow duration

6.8 Flow duration curve is shown in Figure 8.

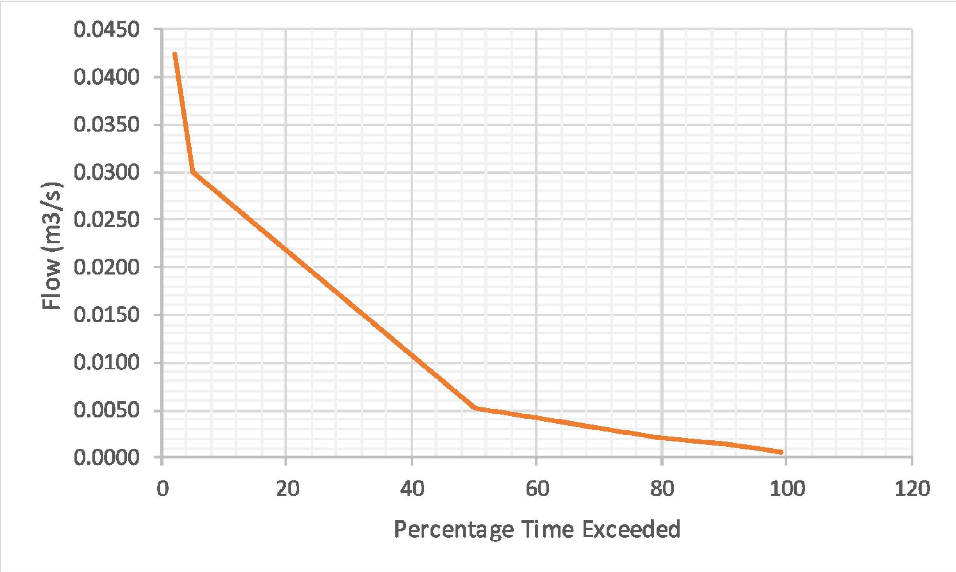

Figure 8: Flow Duration Curve

6.9 The Q95(1) flow of 0.001 m^3/s is too low to be run in the hydraulic model, and so a Manning's equation calculation has been undertaken on a typical cross section to determine the typical water level. The typical cross section is shown in Figure 9.

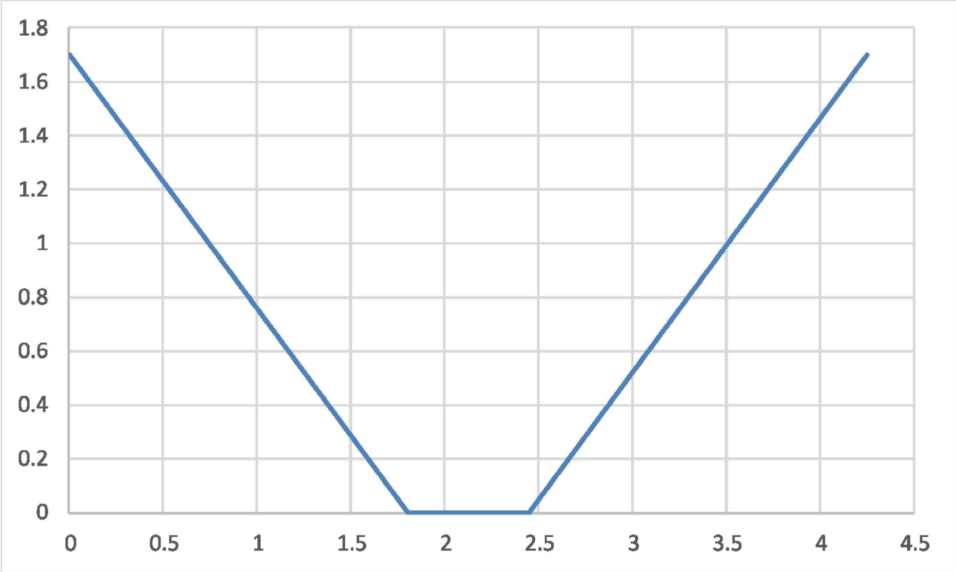

Figure 9: Typical cross section

6.10 Manning's equation is as follows:

$$Q = \frac{AR^{2/3}\sqrt{S}}{n}$$

where Q is flow, A is area of flow, R is hydraulic radius and S is gradient.

6.11 Using the average gradient of 0.025 and a Manning's roughness coefficient of 0.06, Manning's equation yields:

$$A = \frac{Qn}{R^{2/3}\sqrt{S}}$$

$$A = \frac{0.01 \times 0.06}{0.011^{2/3}\sqrt{0.025}}$$

$$A = 0.008\ m^3$$

6.12 The flow area of 0.008m³ corresponds to a depth in the typical channel cross section of 0.012m. It is therefore recommended that the invert levels of surface water outfalls be set at 300mm above this level.

7.0 CONCLUSIONS

6.1 The hydraulic assessment has indicated that peak water levels in the watercourses remain largely within banks for events up to the 1% AEP plus climate change.

6.2 A thorough sensitivity analysis of key parameters has been undertaken and has shown that the model results are not significantly affected by changes in those parameters.

6.3 A low flow analysis was undertaken to determine the Q95(1) flow. The Q95(1) flow was calculated to be $0.001m^3/s$.

6.4 A Manning's equation calculation provided a typical depth in the channel of 0.012m. It is recommended that the invert levels of the surface water outfalls be set at 300mm above the Q95(1) water level.

BIBLIOGRAPHY & REFERENCES

National Planning Policy Framework, CLG (2012).
Planning Practice Guidance, CLG (2014)
Institute of Hydrology Report No. 108 (1992)

Web-based References

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British Geological Survey – http://www.bgs.ac.uk/opengeoscience/home.html
Chronology of British Hydrological Events – www.dundee.ac.uk/
CIRIA – http://www.ciria.org/
Cranfield University – http://www.landis.org.uk/soilscapes/
Environment Agency – www.environment-agency.gov.uk/
FloodProBE – http://www.floodprobe.eu/
Flood Forum – http://www.floodforum.org.uk/
Flood London – http://www.floodlondon.com/
Flood Resilience Group – http://www.floodresiliencegroup.org/frg/
Fylde Borough Council– http://www.fylde.gov.uk/
Google Maps – http://maps.google.co.uk/
Lancashire County Council- http://www.lancashire.gov.uk/home/2010/classic/index.asp
Streetmap – http://www.streetmap.co.uk/
United Utilities - http://www.unitedutilities.com/default.aspx

APPENDIX A: LOCATION PLAN

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OS X (Eastings) 360073
OS Y (Northings) 437980
Nearest Post Code PR3 2NA
Lat (WGS84) N53:50:12 (53.836529)
Long (WGS84) W2:36:30 (-2.608205)
Lat,Long 53.836529,-2.608205
Nat Grid SD600379 / SD6007337980

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APPENDIX B: INDICATIVE PLANNING LAYOUT

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WARNING TO HOUSE PURCHASERS
Property Misdescriptions Act 1991

Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the specified matters prescribed by any Order made under the above act. The contents of this drawing may be subject to change at any time, and alterations and variations can occur during the progress of the works without revisions of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract, or warranty.

SCHEDULE OF ACCOMMODATION

Abb	House Type	Range	Description	Sqft	No	Total sqft	Percentage
AFFORDABLE TYPES							
ASH	Ashford	CLASSIC	2 bedroom traditional house	634	15	9510	13
BAM	Bampton	CLASSIC	3 bedroom traditional house	737	12	8844	10
BEA	Beadle	CLASSIC	2 Bedroom LTH bungalow	594	5	2970	4
FOX	Foxton	CLASSIC	1 bedroom elderly apartment	653	2	1306	2
FOX	Foxton 1st	CLASSIC	1 bedroom elderly apartment	665	2	1330	2
AFFORDABLE TOTAL					36	23960	31
PRIVATE SALE TYPES							
FOX	Foxton	CLASSIC	1 bedroom elderly apartment	653	2	1306	2
FOX	Foxton 1st	CLASSIC	1 bedroom elderly apartment	665	2	1330	2
BEA	Beadle	CLASSIC	2 Bedroom LTH bungalow	594	5	2970	4
ASH	Ashford	CLASSIC	2 bedroom traditional house	634	3	1902	3
BAR	Barwick	CLASSIC	3 bed traditional house	831	10	8310	8
MOR	Morpeth	CLASSIC	3 bed dual aspect house	956	16	15296	14
CHE	Cheadle	CLASSIC	3 bed detached house	939	6	5634	5
DEWS	Dewsbury	CLASSIC	3 bedroom traditional house	795	2	1590	2
HELMD	Helmsley	CLASSIC	4 bed 2.5 storey townhouse	1100	[illegible]	[illegible]	[illegible]
SOM	Somerton	CLASSIC	4 bed detached house	1159	7	8113	6
THO	Thornbury	CLASSIC	4 bed detached house	1203	2	2406	[illegible]
KEN	Kennington	CLASSIC	4 bed detached house	1270	6	7620	5
FAR	Farringdon	CLASSIC	3 bed detached house	1082	2	2164	2
LIN	Lincoln	CLASSIC	4 bed dual aspect corner house	1243	10	12430	8
TOTAL					82	81043	69
GRAND TOTAL					118	105003	100

PHASE 1 SITE GROSS AREA:	13.22 ACRES
NON DEVELOPABLE AREA	7.13 ACRES
NET DEVELOPABLE AREA	6.09 ACRES
DENSITY	17242 Sq.ft/acre

Rev	Description	Date	Drawn	Chk'd

BARRATT HOMES MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job: CHIPPING LANE LONGRIDGE			
Title: PHASE 1 PLANNING LAYOUT			
Design By: AA	Date: 25/11/15	Drawing Number: 459-PL01	Rev
Drawn By: AA	Scale @ A1: 1:500		

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APPENDIX C: FEH CATCHMENT DATA & DESCRIPTIONS

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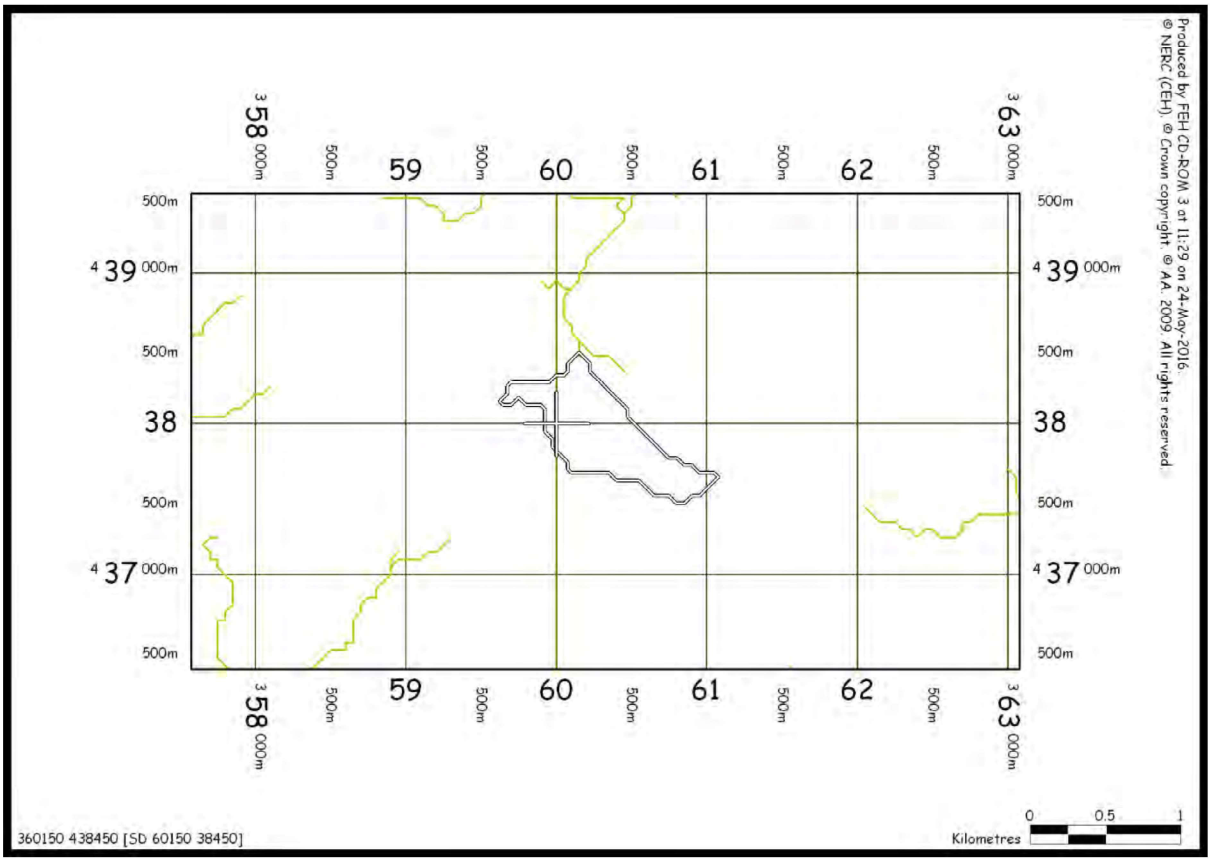
Higgin Brook catchment and catchment characteristics



AREA	0.52	URBLOC1990	1.515
ALTBAR	115	C	-0.025
ASPBAR	325	D1	0.40671
ASPVAR	0.65	D2	0.33211
BFIHOST	0.417	D3	0.41529
DPLBAR	0.77	E	0.29629
DPSBAR	22.3	F	2.45864
FARL	1	C(1 km)	-0.025
LDP	1.58	D1(1 km)	0.404
PROPWET	0.51	D2(1 km)	0.33
RMED-1H	10.5	D3(1 km)	0.417
RMED-1D	39.7	E(1 km)	0.296
RMED-2D	51.6	F(1 km)	2.453
SAAR	1200		
SAAR4170	1137		
SPRHOST	35.03		
URBCONC1990	0.964		
URBEXT1990	0.1643		

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APPENDIX D: REVITALISED FLOOD HYDROGRAPH METHOD OUTPUTS [PEAK FLOW ESTIMATES]

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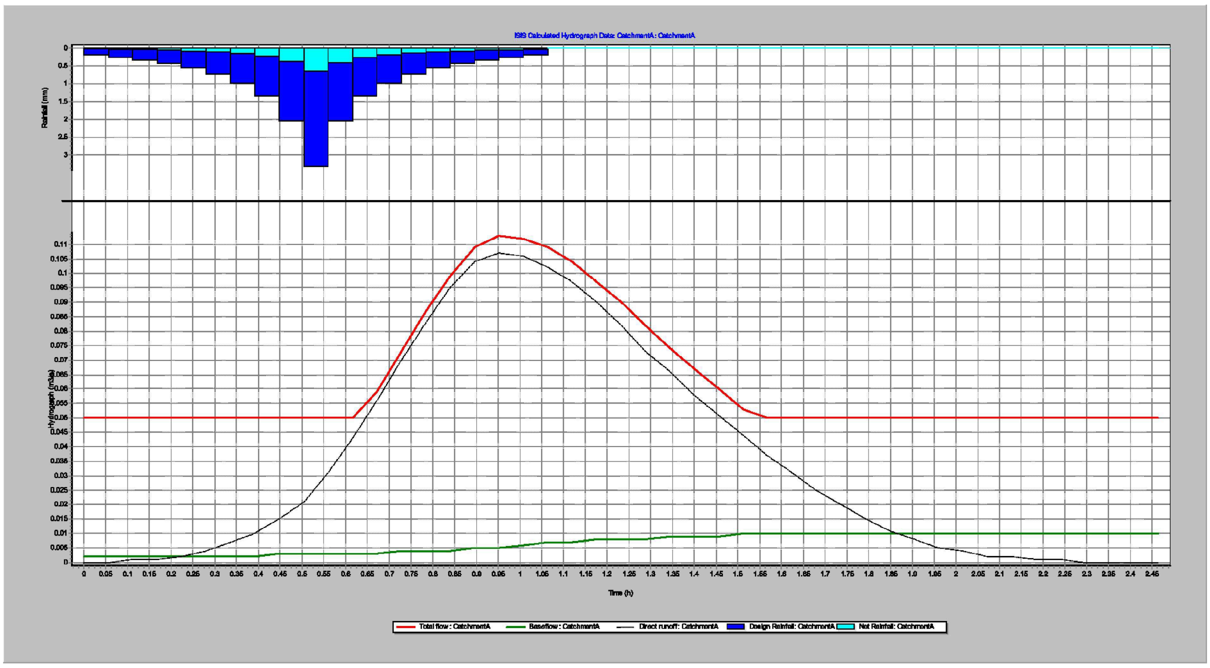

Figure D.1 Sub-catchment A 1 in 5 year (20% AEP) flow hydrograph

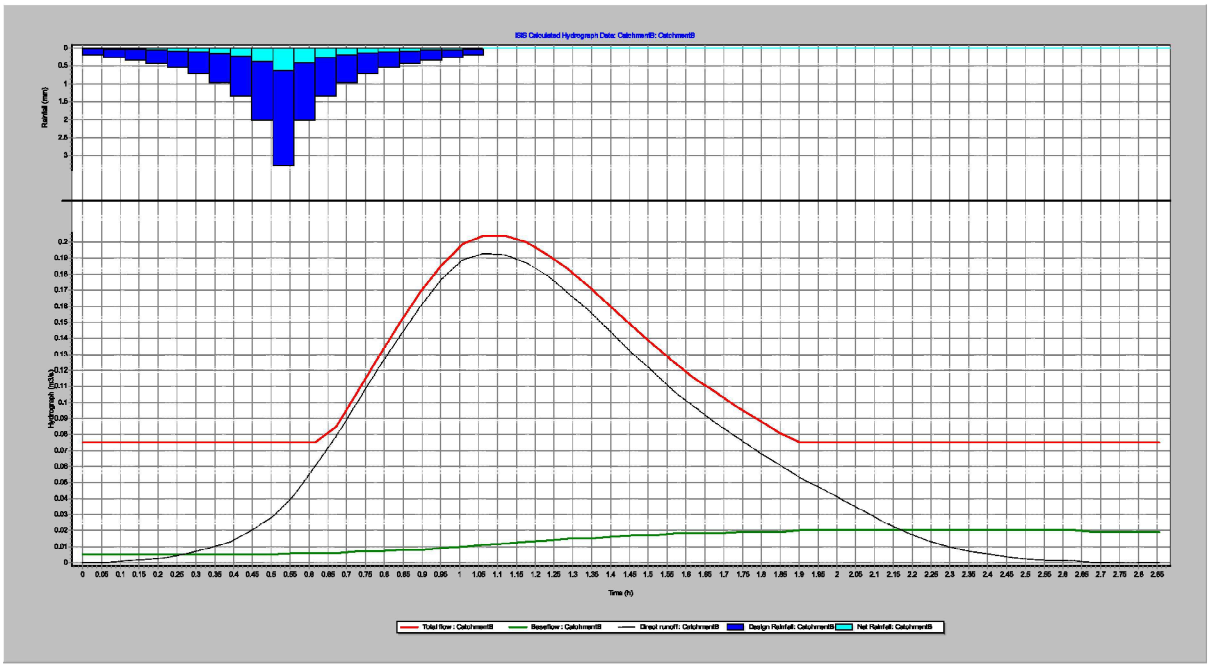

Figure D.2 Sub-catchment B 1 in 5 year (20% AEP) flow hydrograph

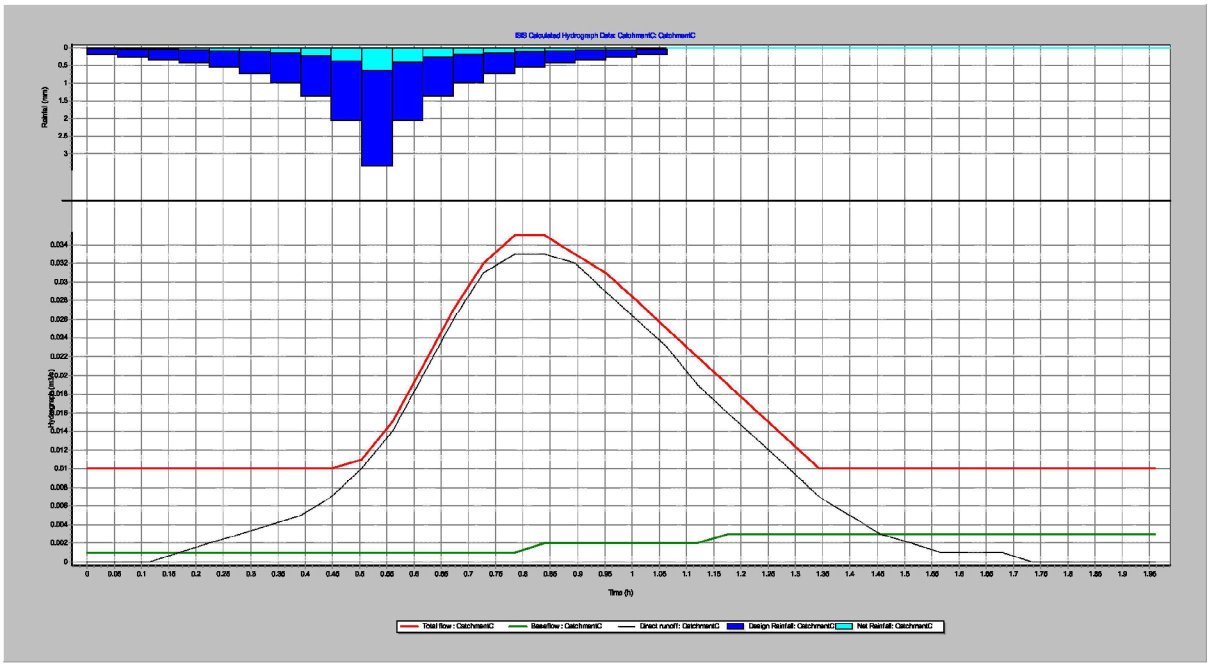

Figure D.3 Sub-catchment C 1 in 5 year (20% AEP) flow hydrograph

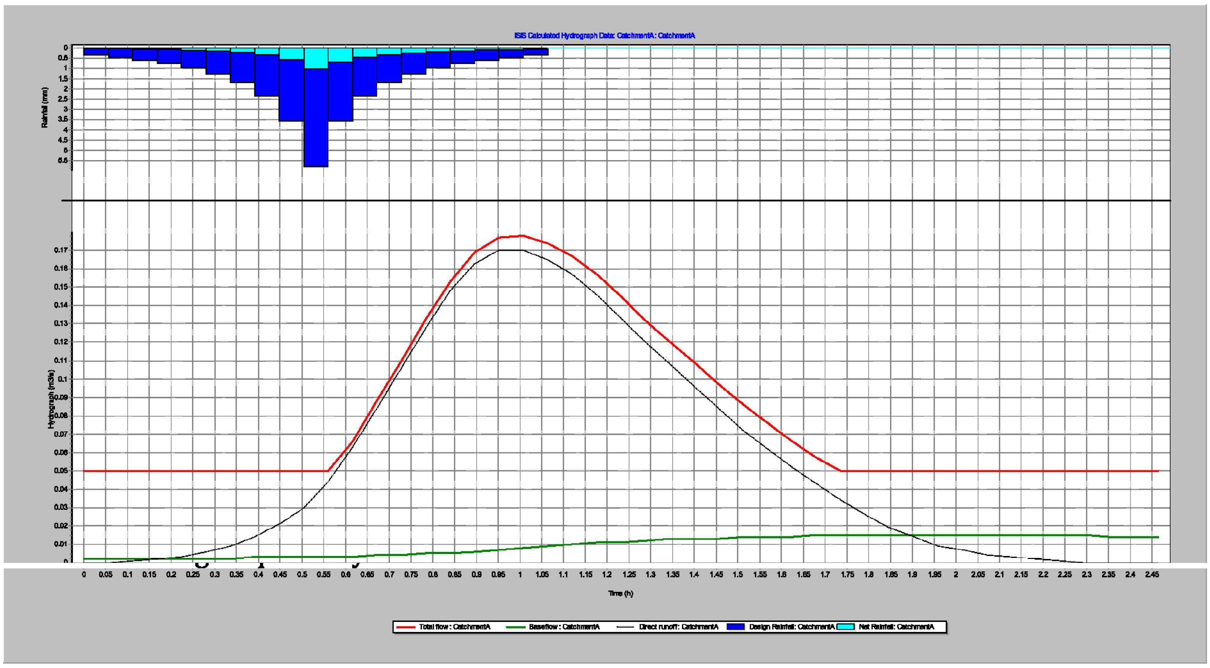

Figure D.4 Sub-catchment A 1 in 30 year (3.3% AEP) flow hydrograph

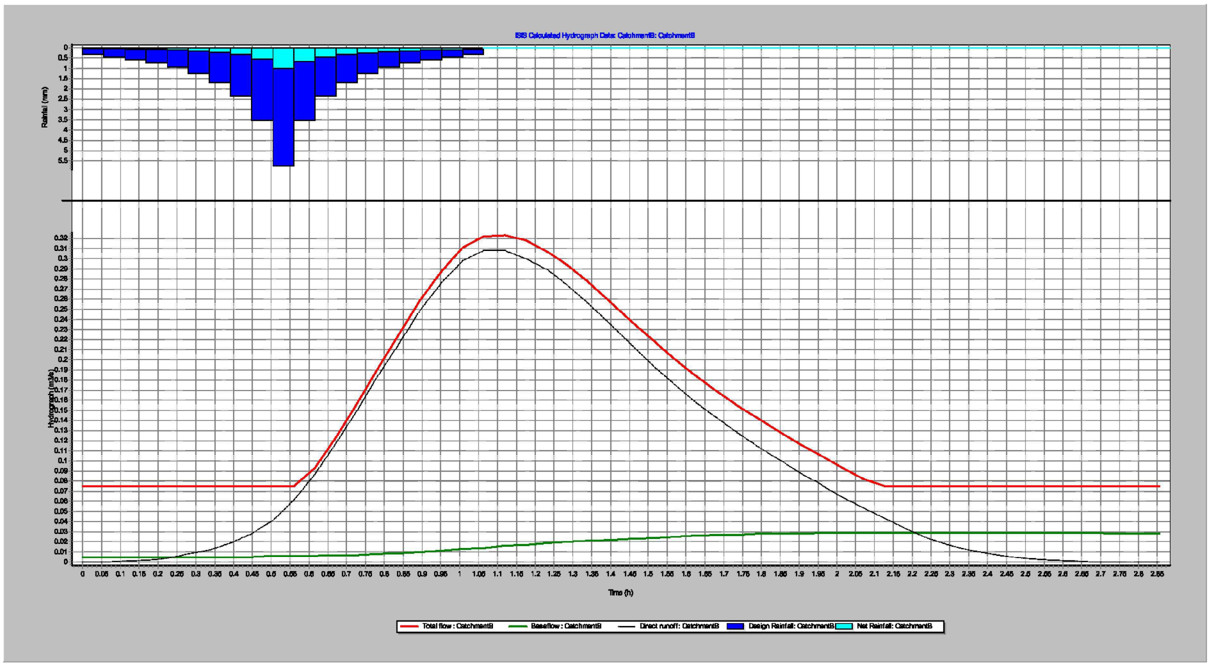

Figure D.5 Sub-catchment B 1 in 30 year (3.3% AEP) flow hydrograph

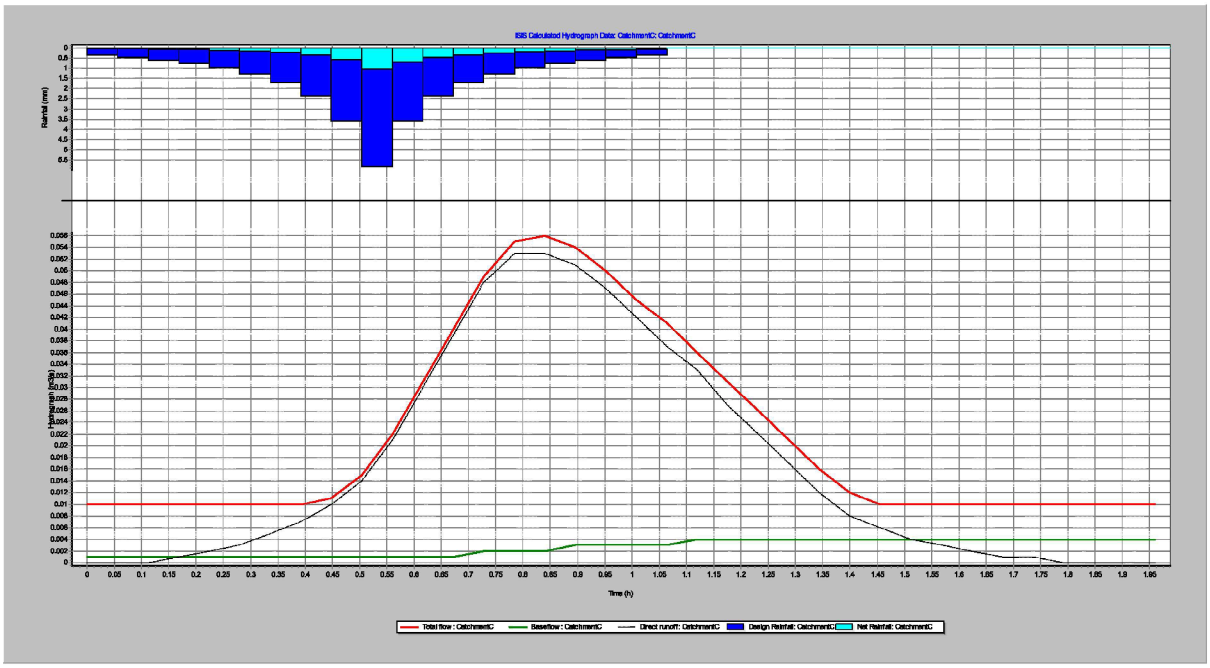

Figure D.6 Sub-catchment C 1 in 30 year (3.3% AEP) flow hydrograph

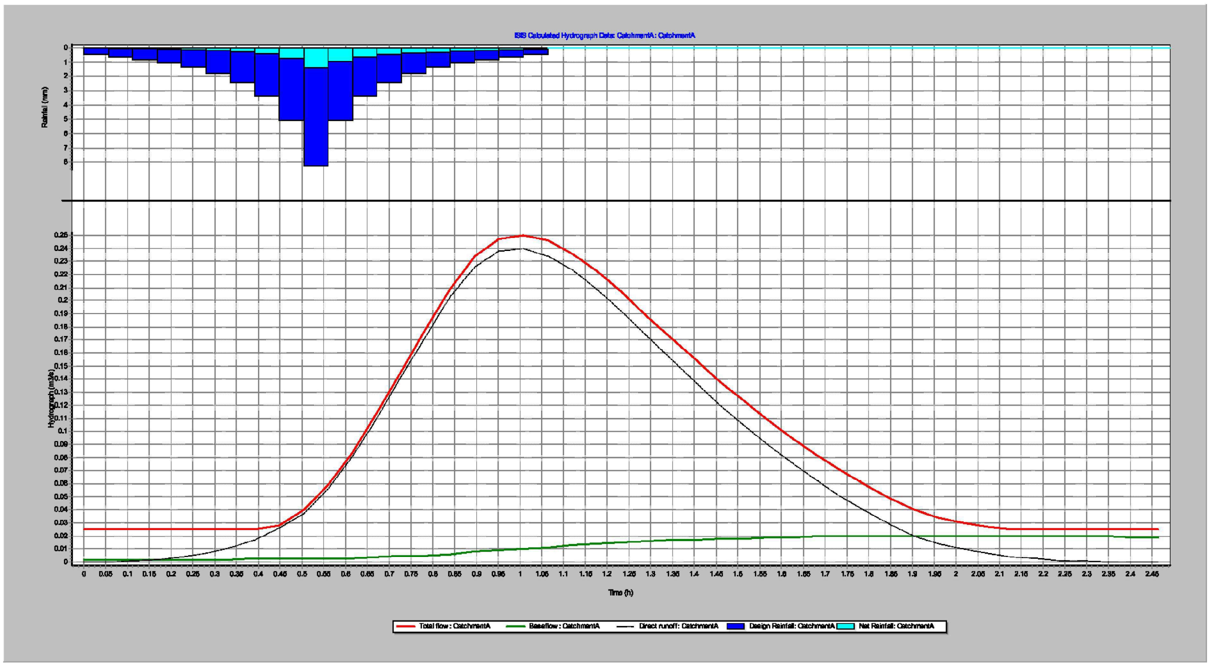

Figure D.7 Sub-catchment A 1 in 100 year (1% AEP) flow hydrograph

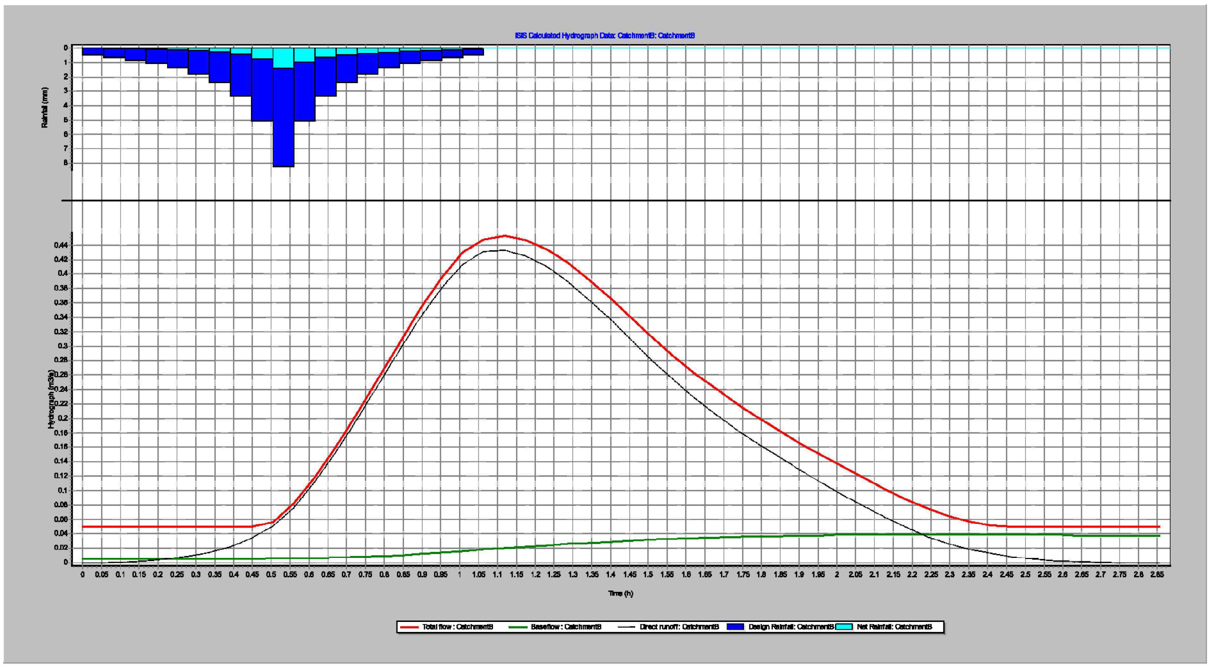

Figure D.8 Sub-catchment B 1 in 100 year (1% AEP) flow hydrograph

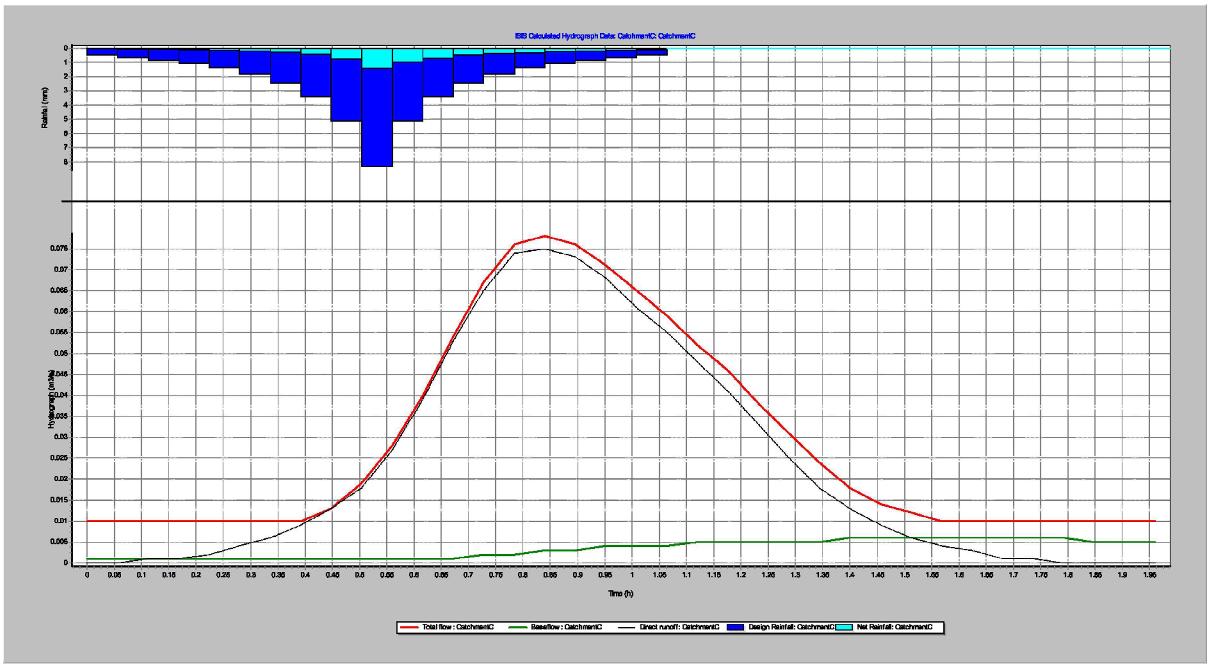

Figure D.9 Sub-catchment C 1 in 100 year (1% AEP) flow hydrograph

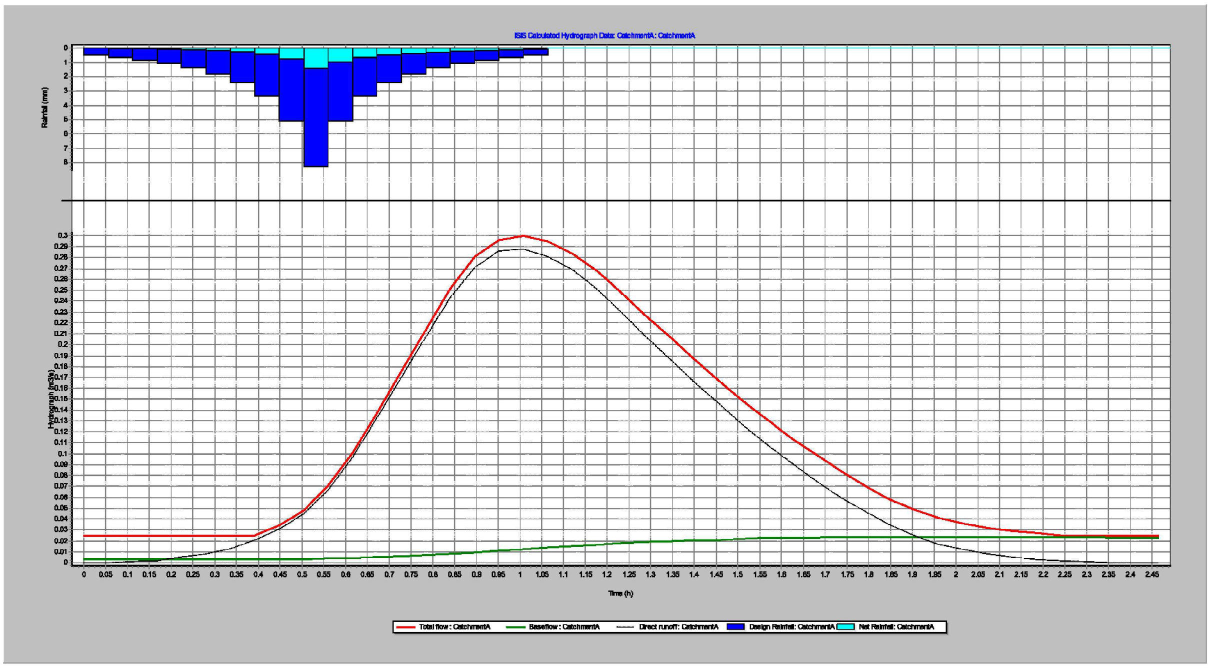

Figure D.9 Sub-catchment A 1 in 100 year (1% AEP) plus climate change flow hydrograph

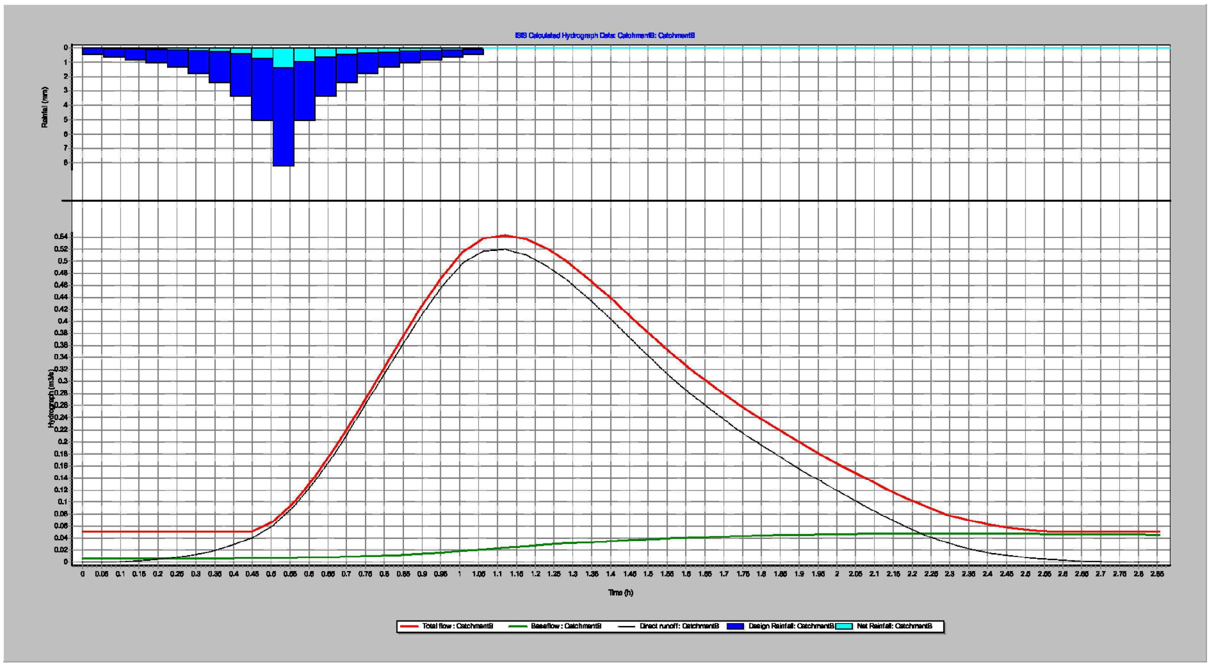

Figure D.9 Sub-catchment B 1 in 100 year (1% AEP) plus climate change flow hydrograph

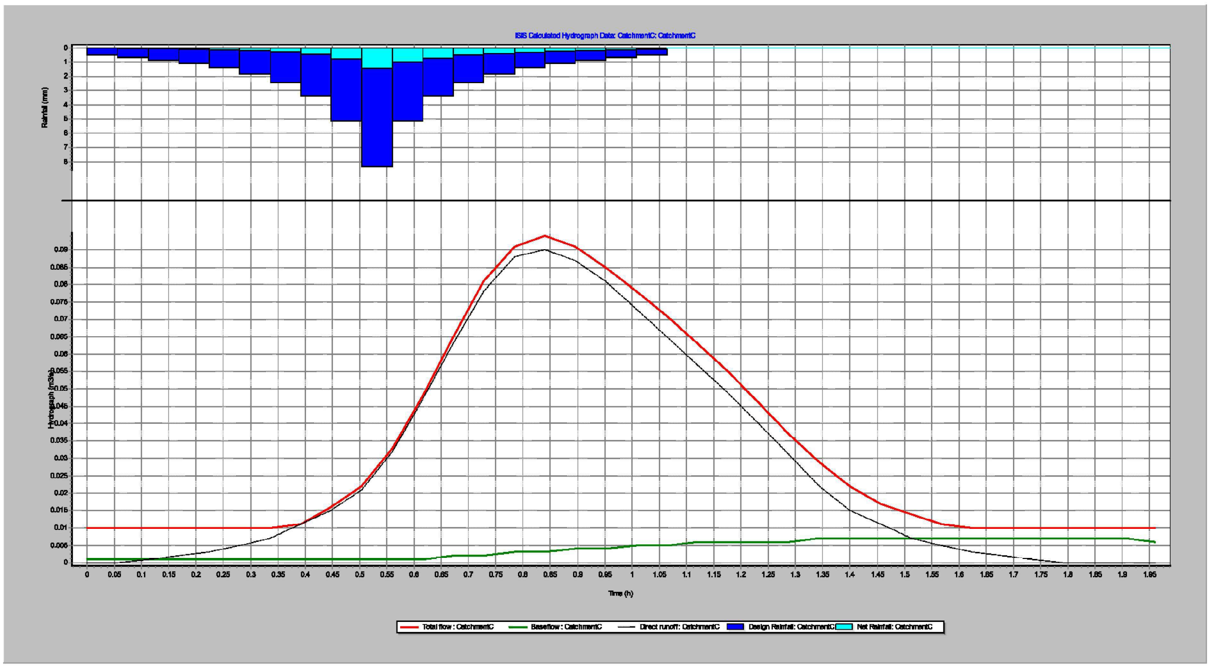

Figure D.10 Sub-catchment C 1 in 100 year (1% AEP) plus climate change flow hydrograph

APPENDIX E: ISIS OUTPUTS: EXISTING SCENARIO SCHEMATIC, LONG-SECTION AND CROSS-SECTIONS

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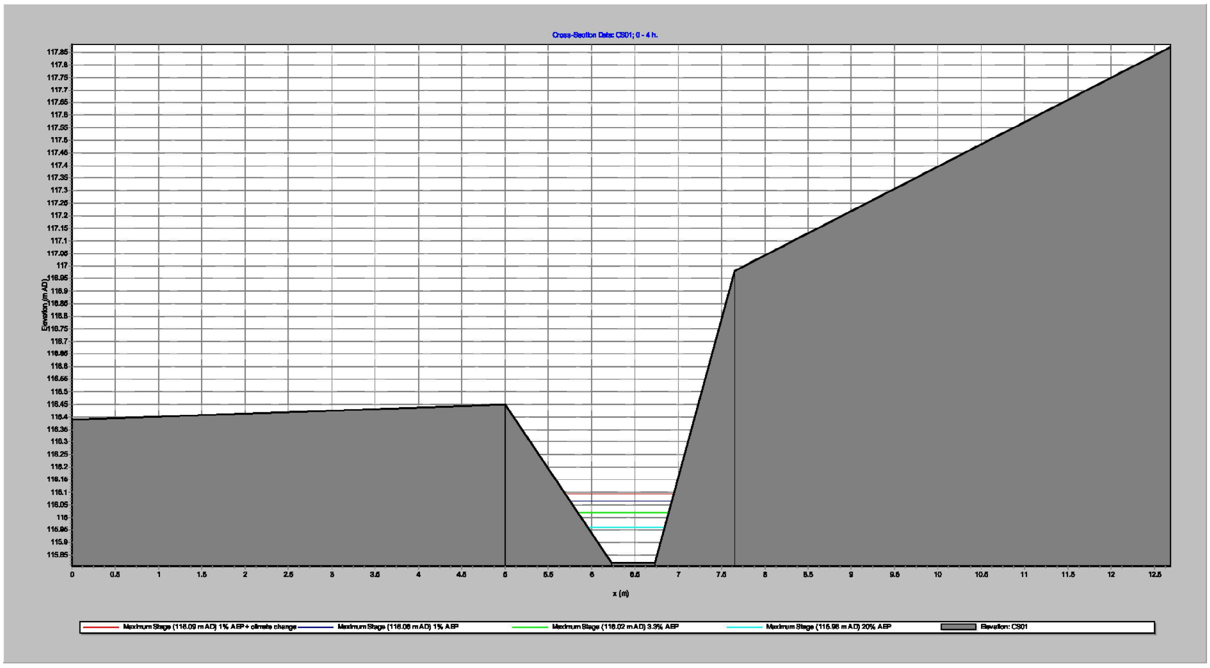

Figure E.1 Peak levels at cross section CS01

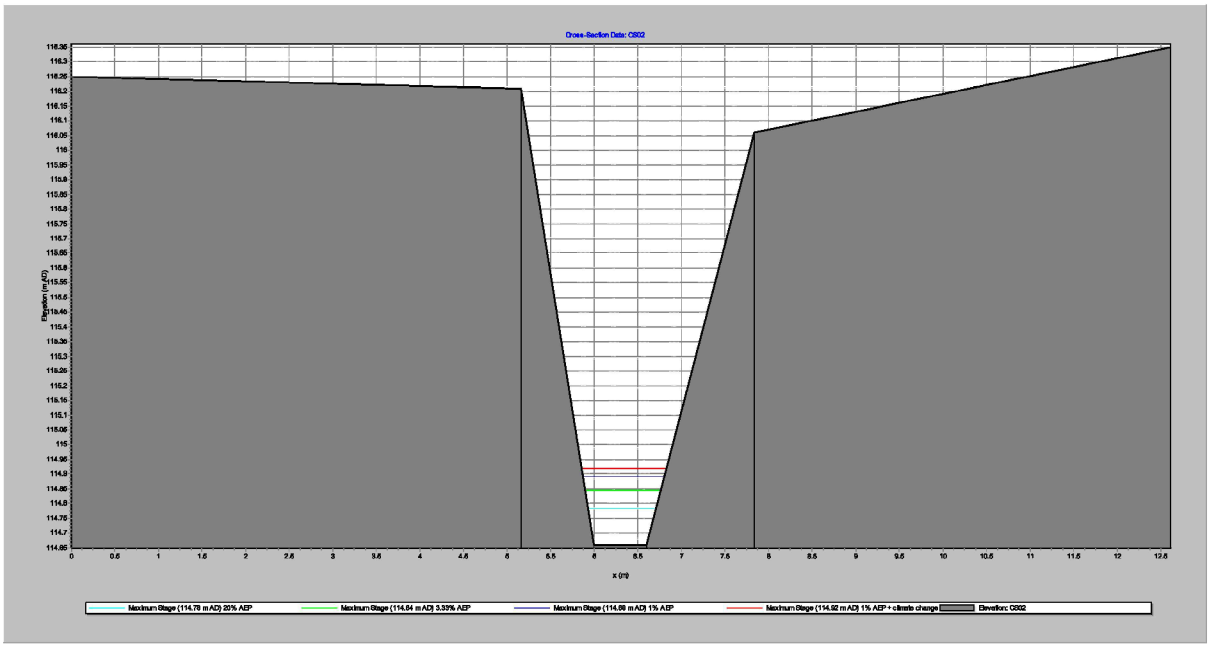

Figure E.2 Peak levels at cross section CS02

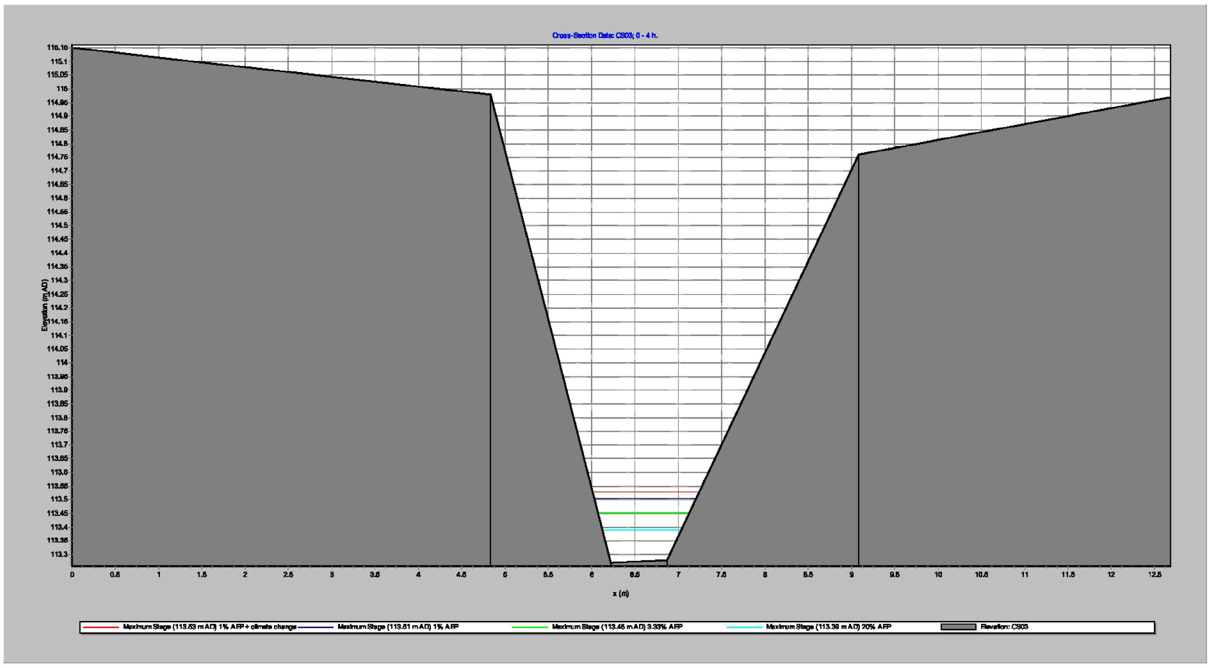

Figure E.3 Peak levels at cross section CS03

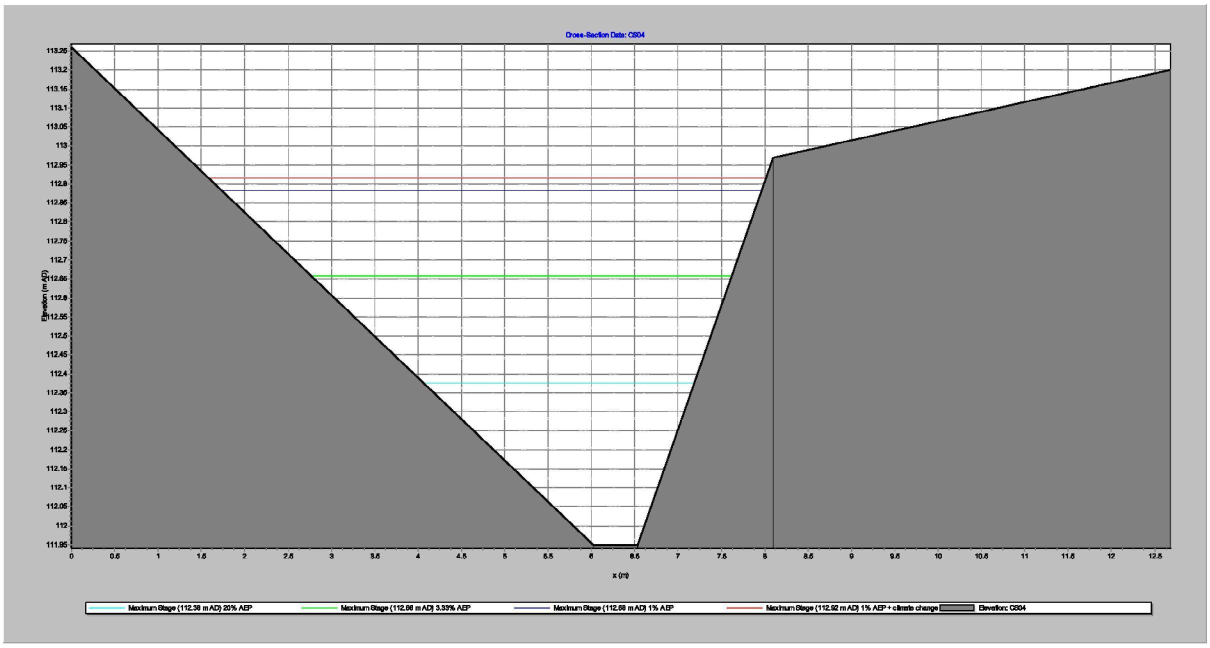

Figure E.4 Peak levels at cross section CS04

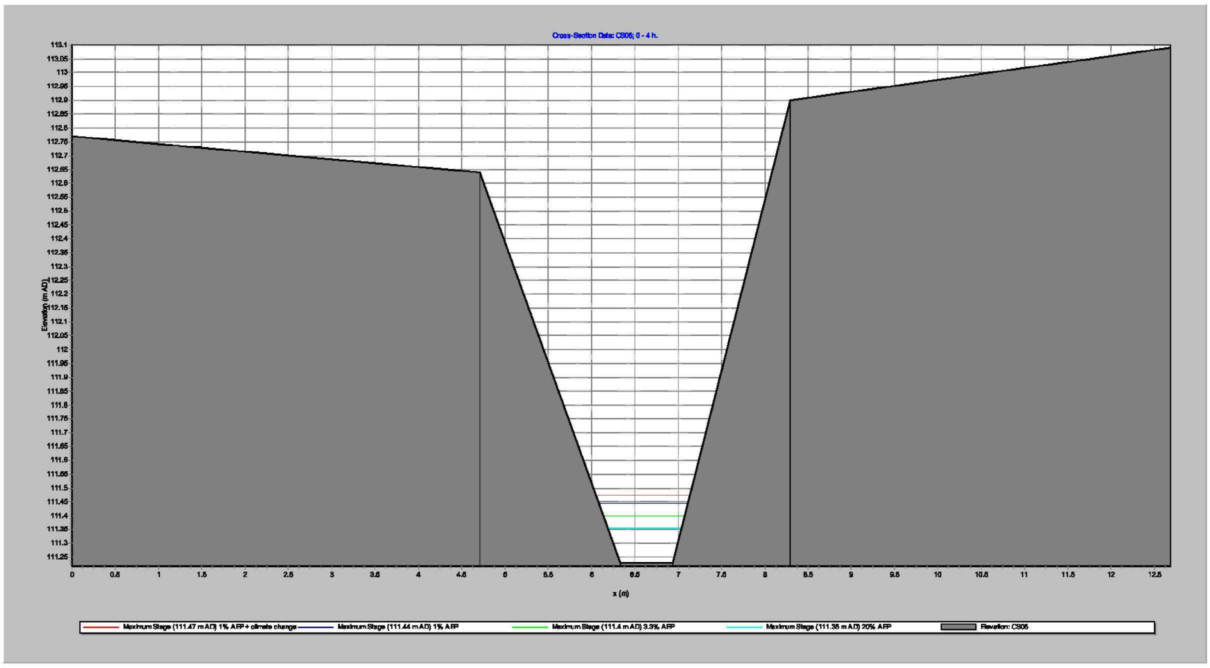

Figure E.5 Peak levels at cross section CS05

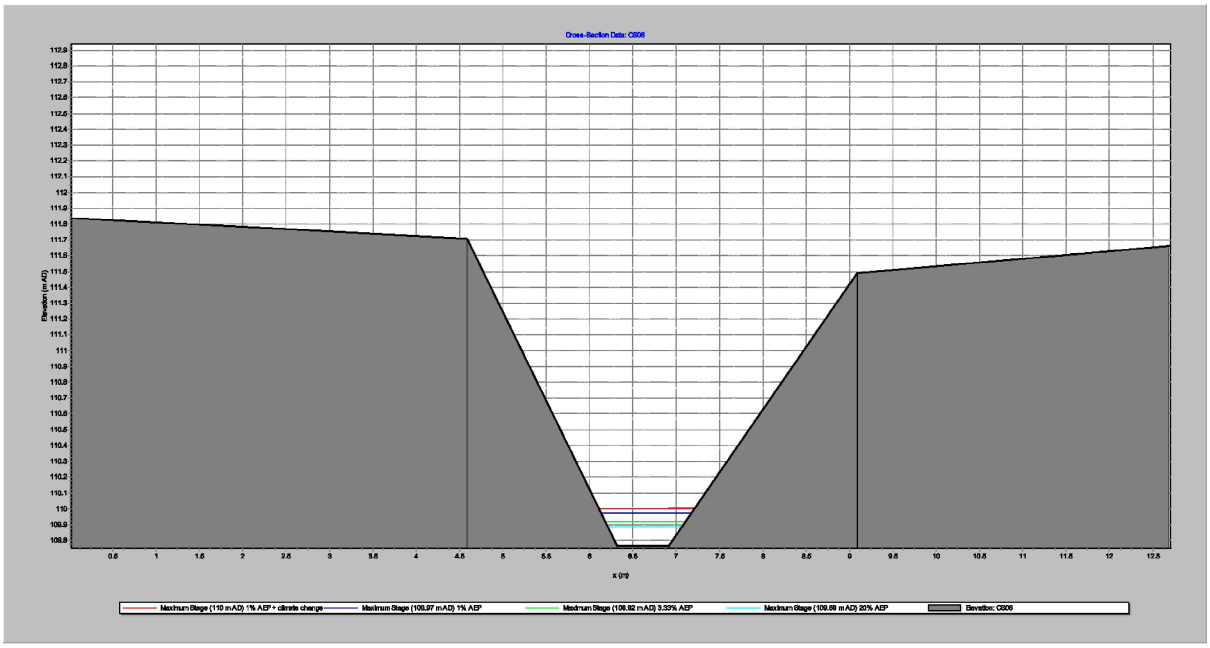

Figure E.6 Peak levels at cross section CS06

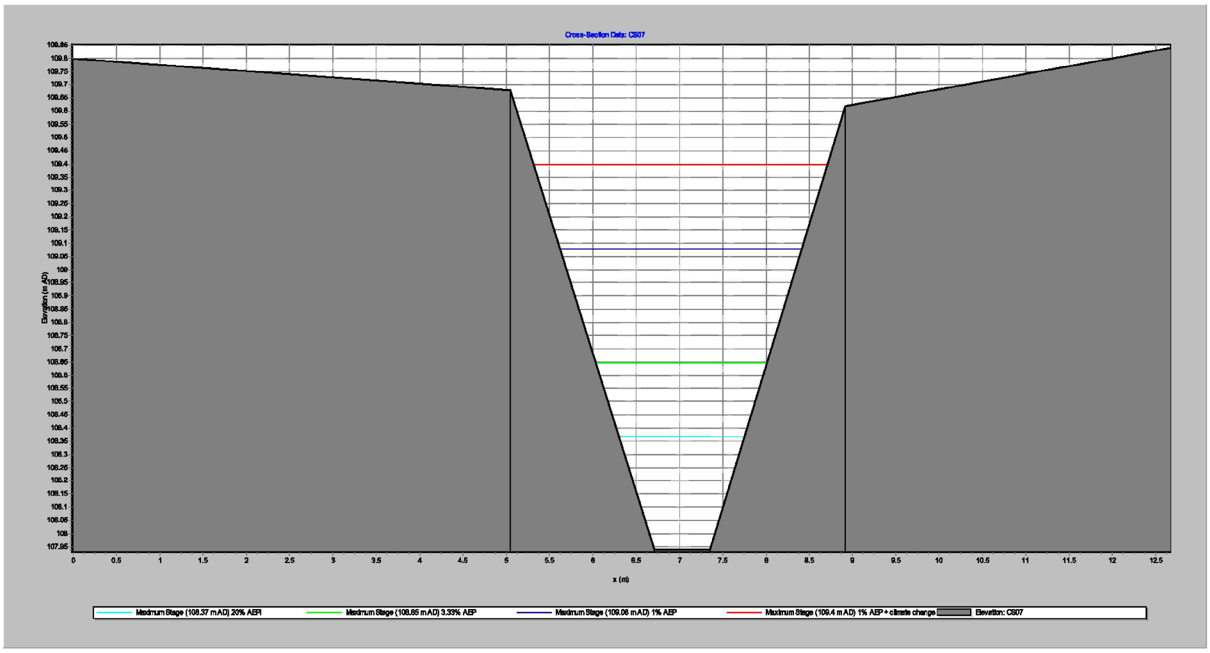

Figure E.7 Peak levels at cross section CS07

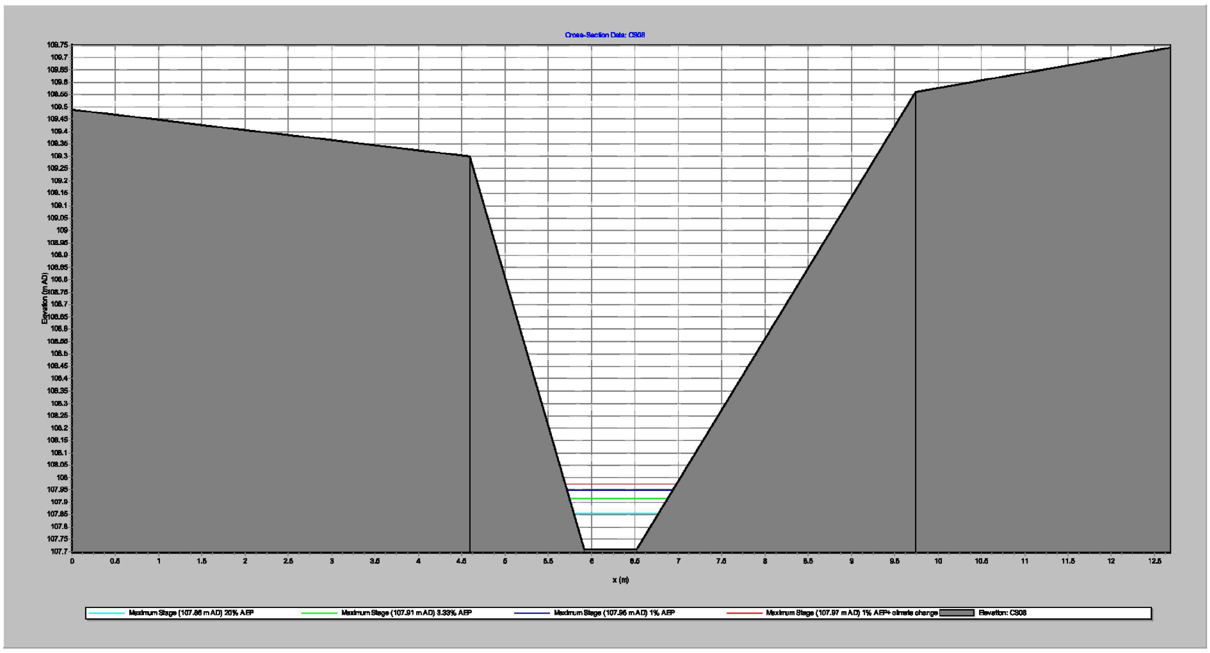

Figure E.8 Peak levels at cross section CS08

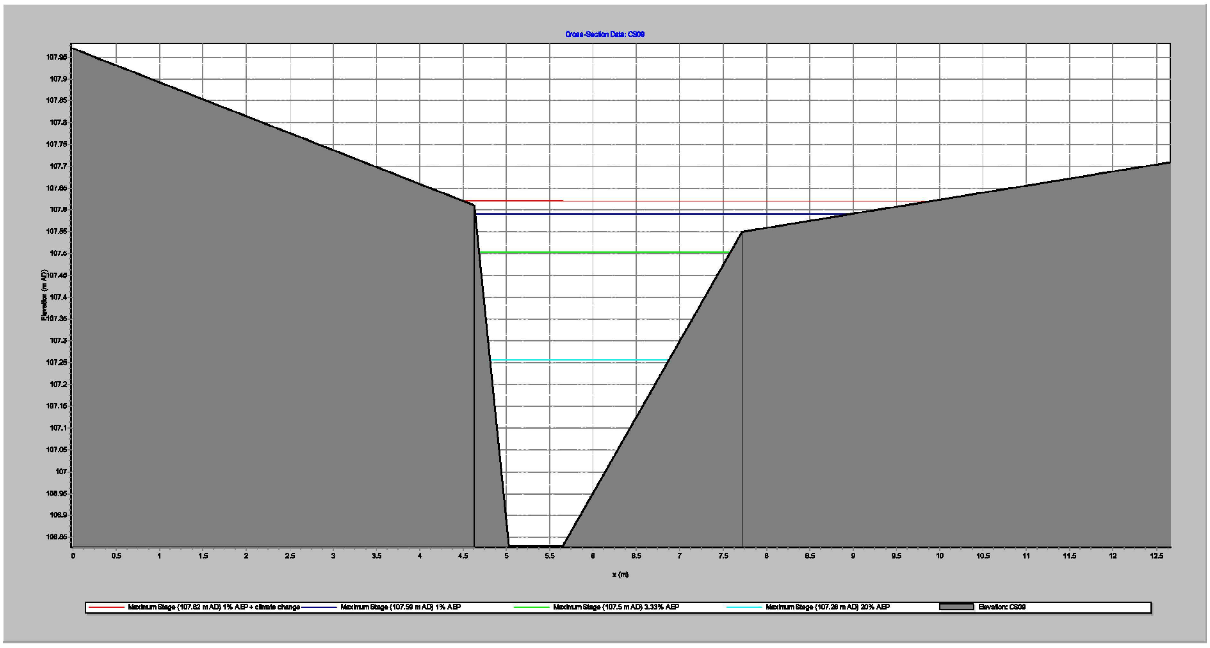

Figure E.9 Peak levels at cross section CS09

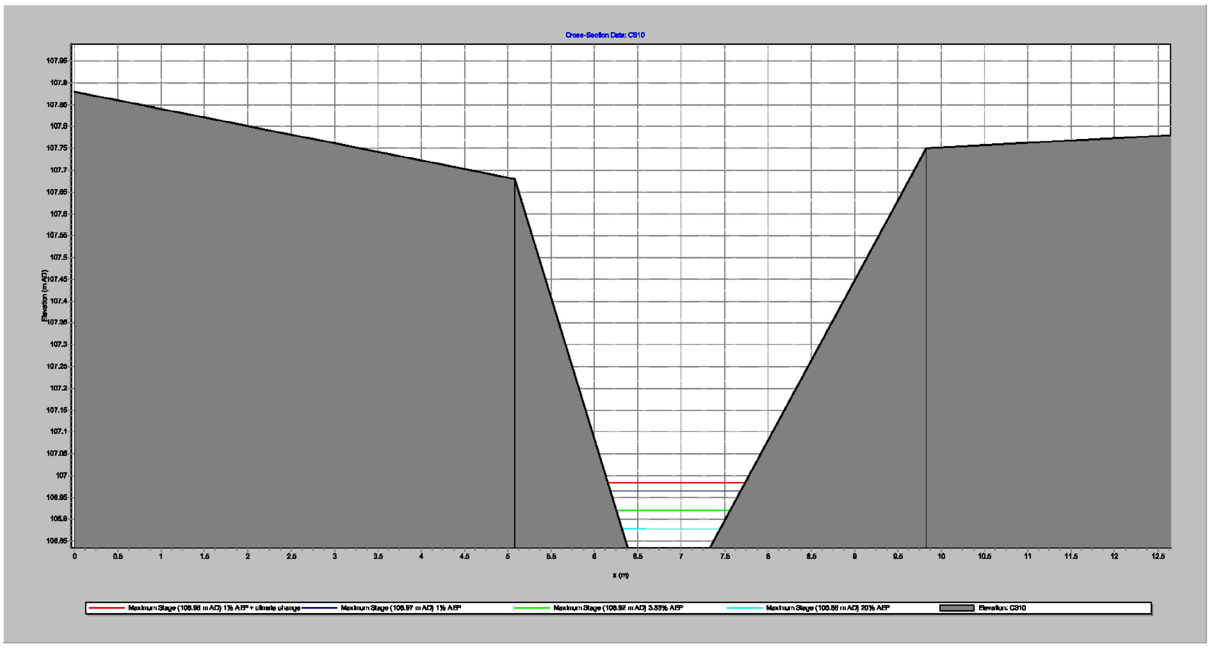

Figure E.10 Peak levels at cross section CS10

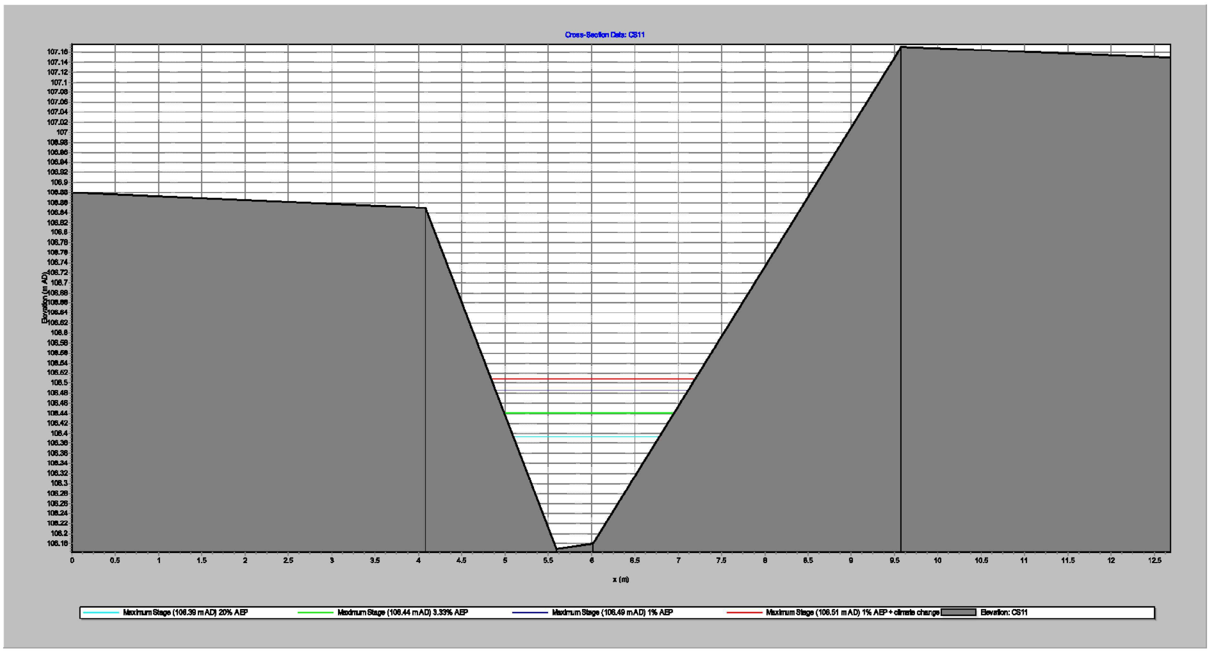

Figure E.11 Peak levels at cross section CS11

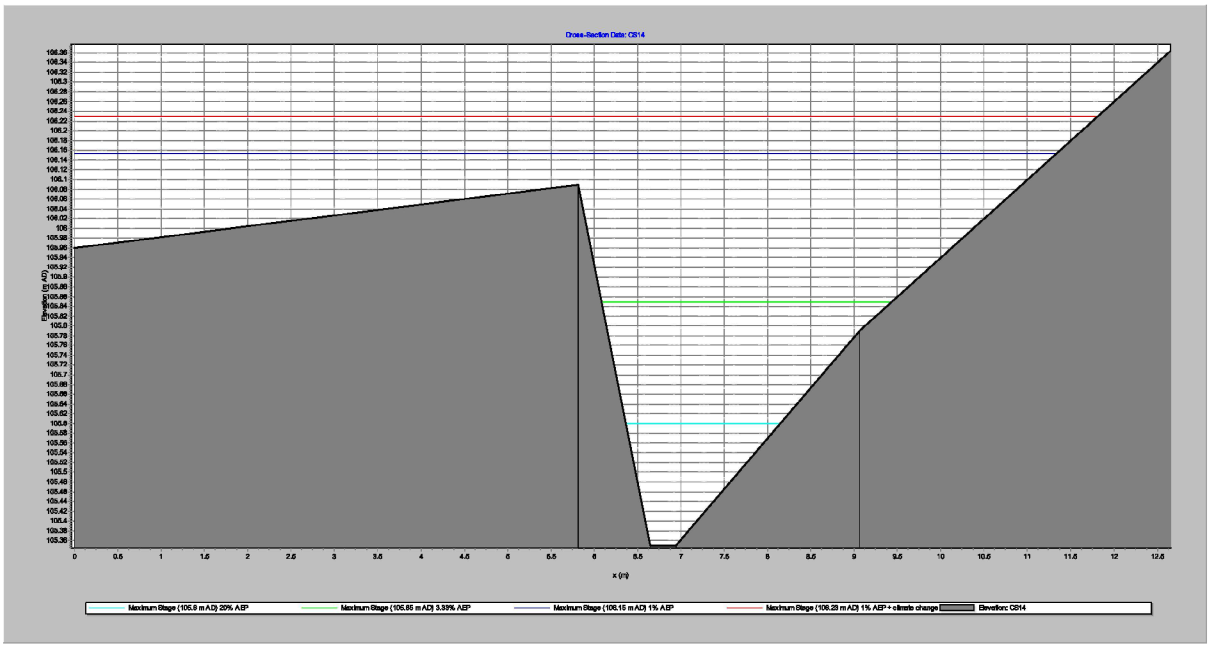

Figure E.12 Peak levels at cross section CS14

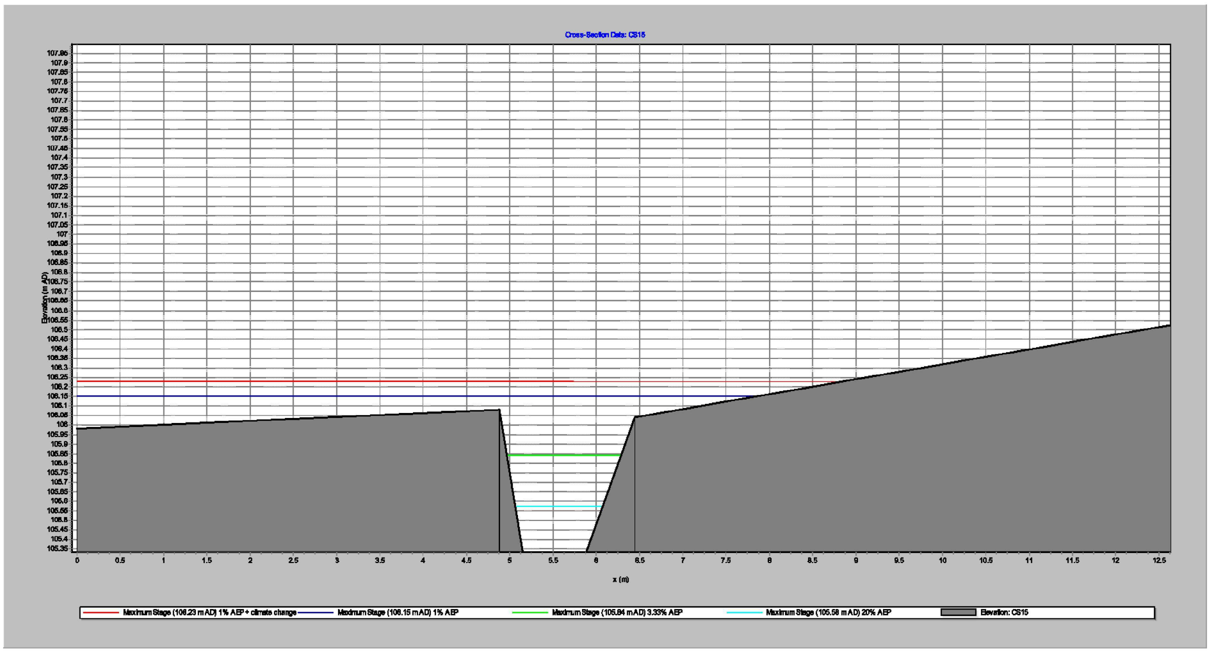

Figure E.13 Peak levels at cross section CS15

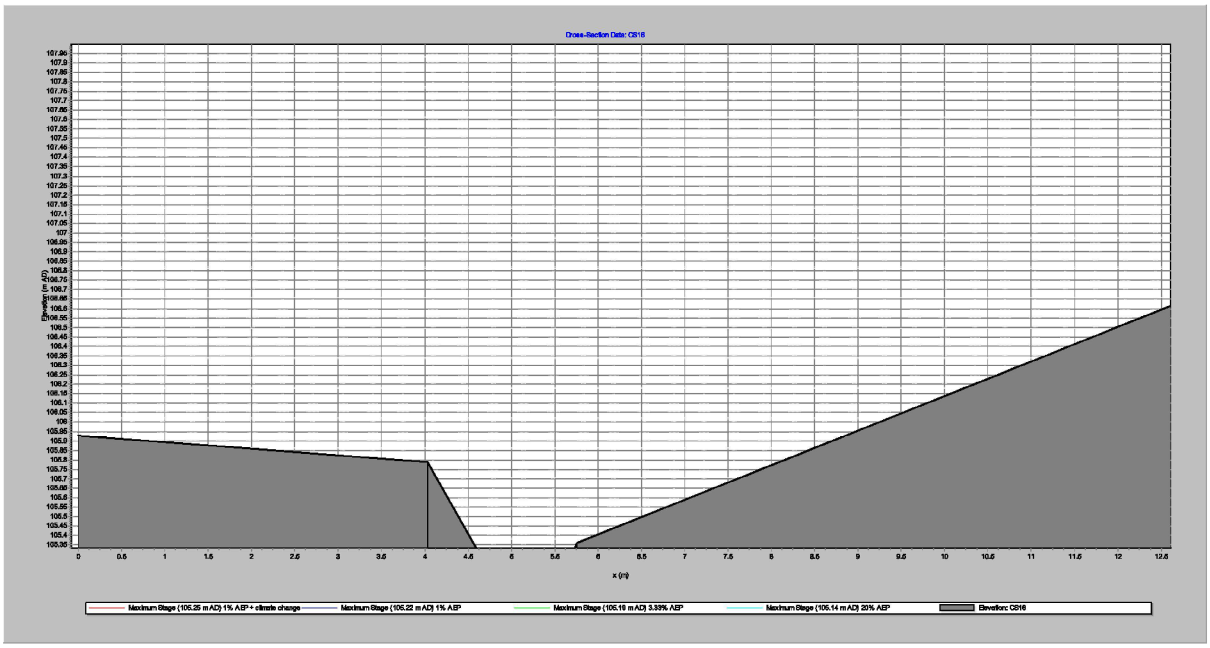

Figure E.14 Peak levels at cross section CS16

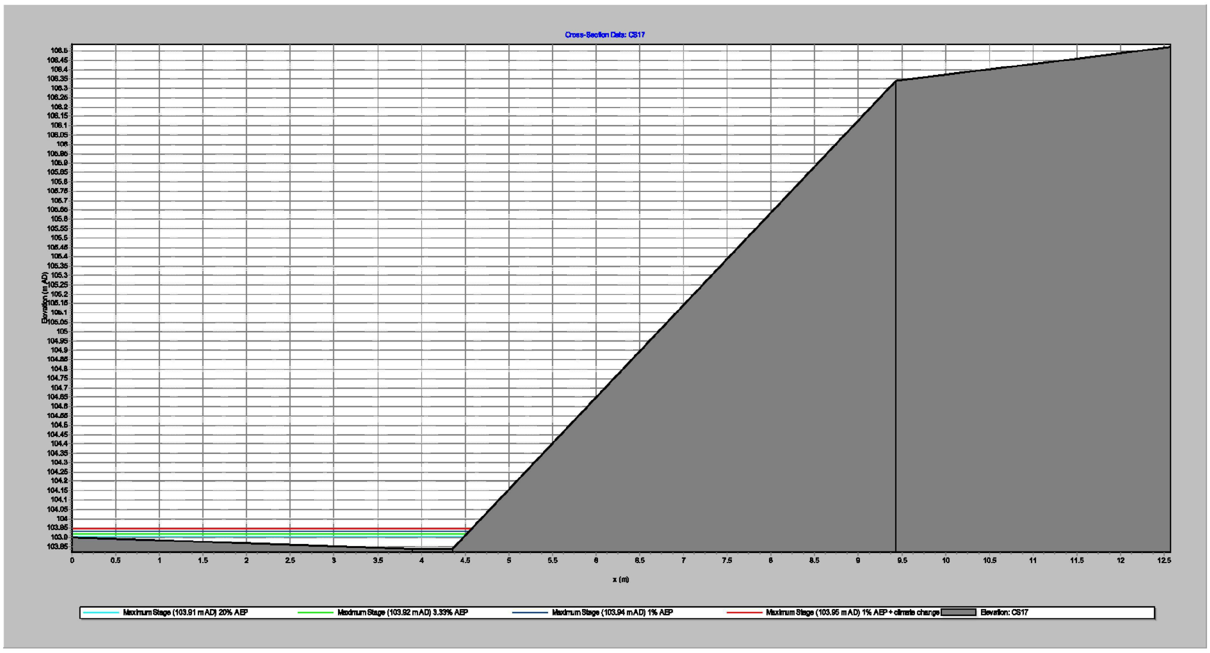

Figure E.15 Peak levels at cross section CS17

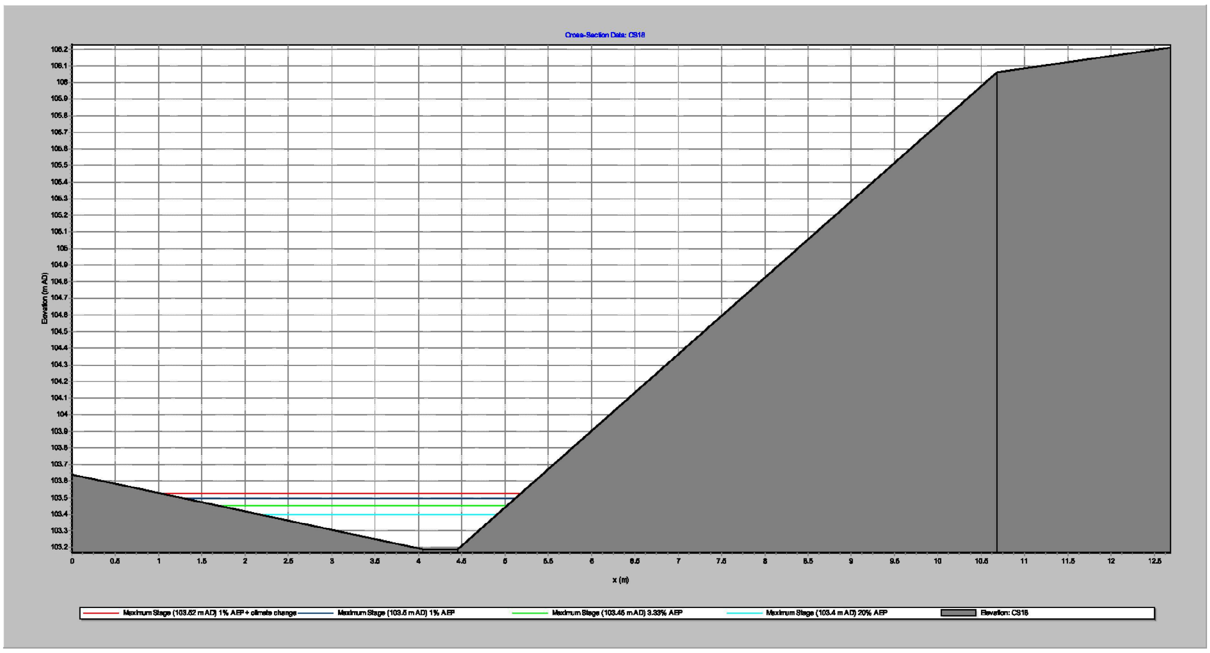

Figure E.16 Peak levels at cross section CS18

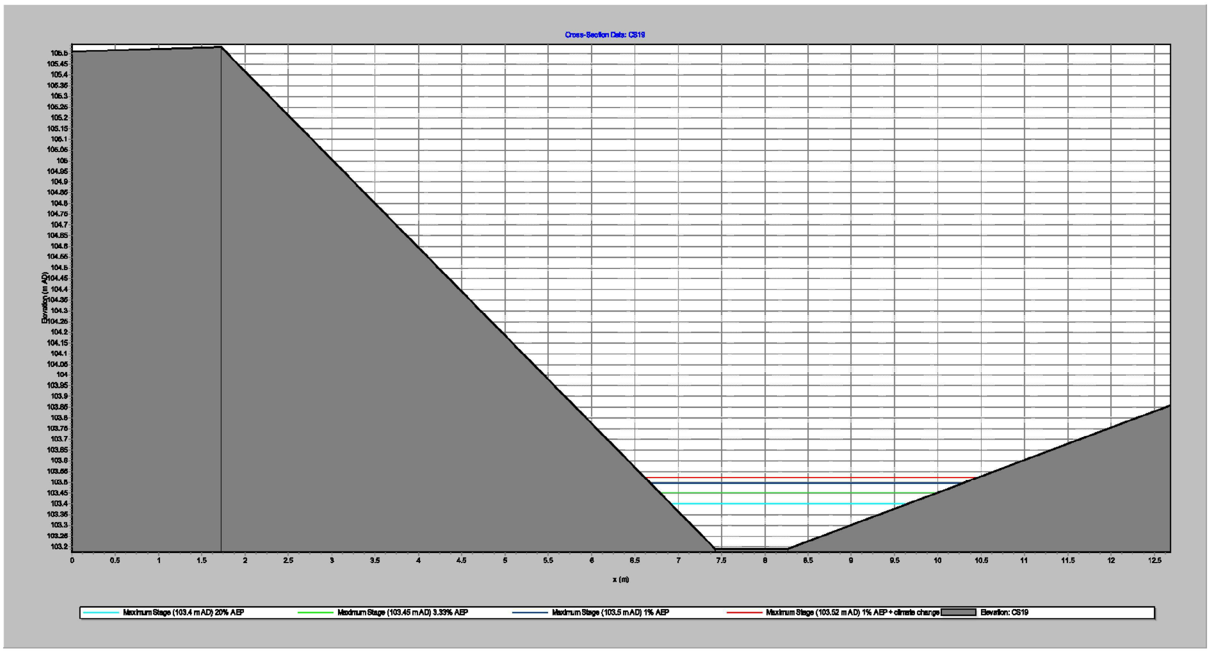

Figure E.17 Peak levels at cross section CS19

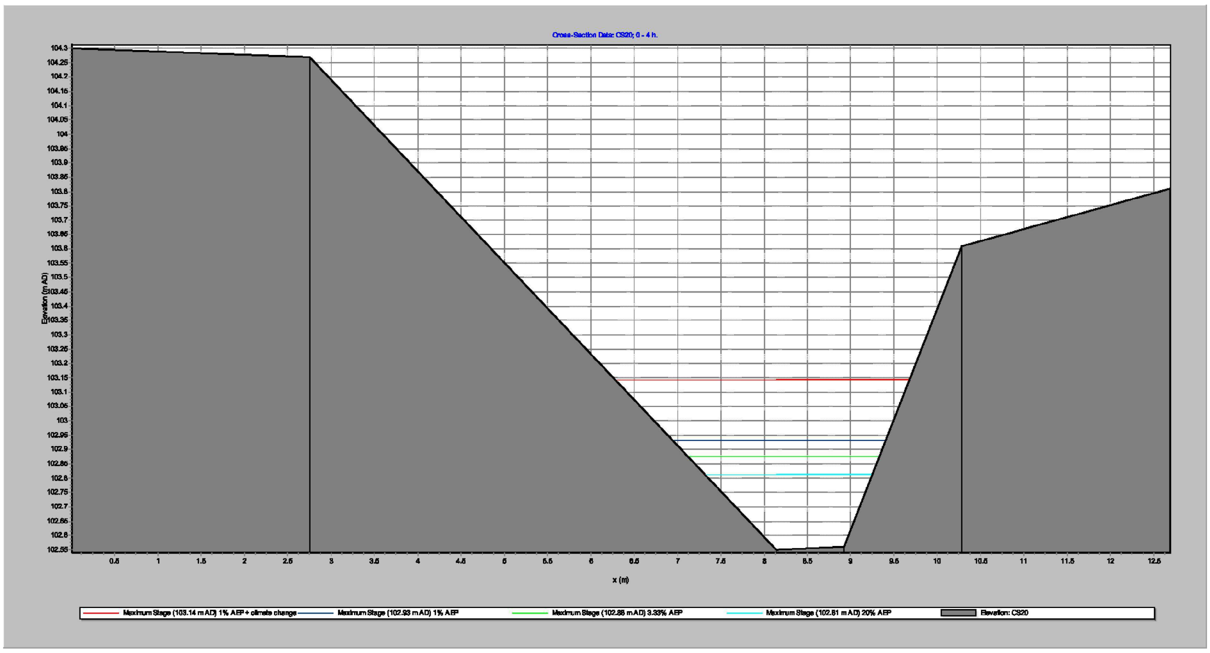

Figure E.18 Peak levels at cross section CS20

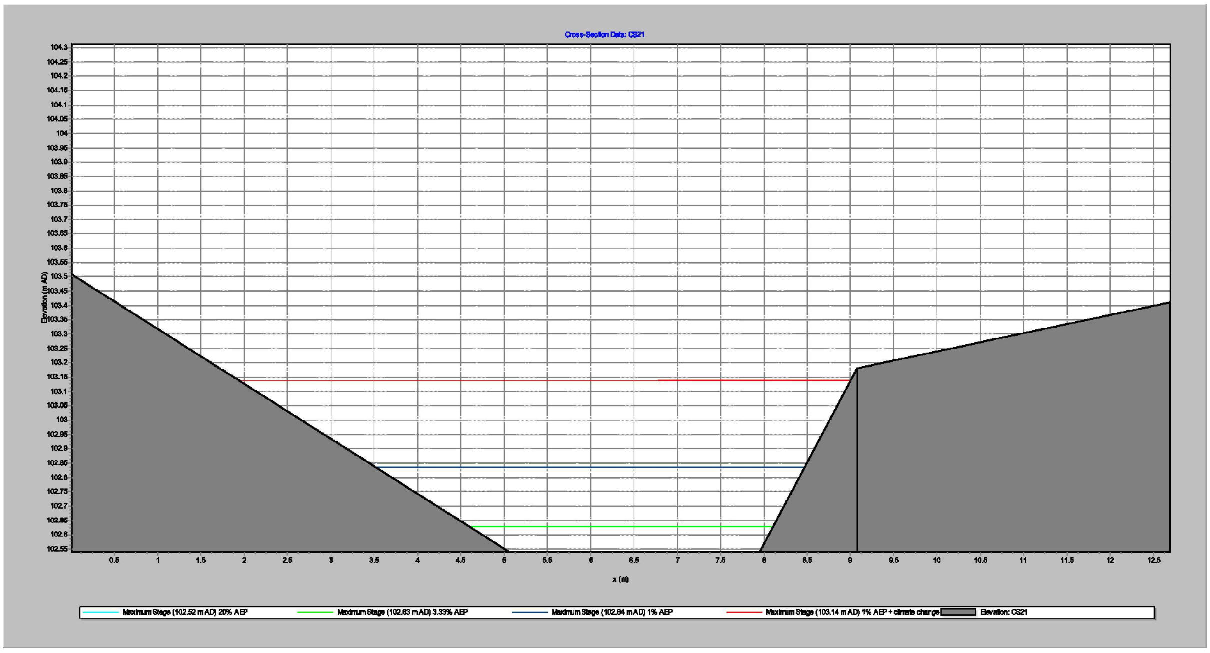

Figure E.19 Peak levels at cross section CS21

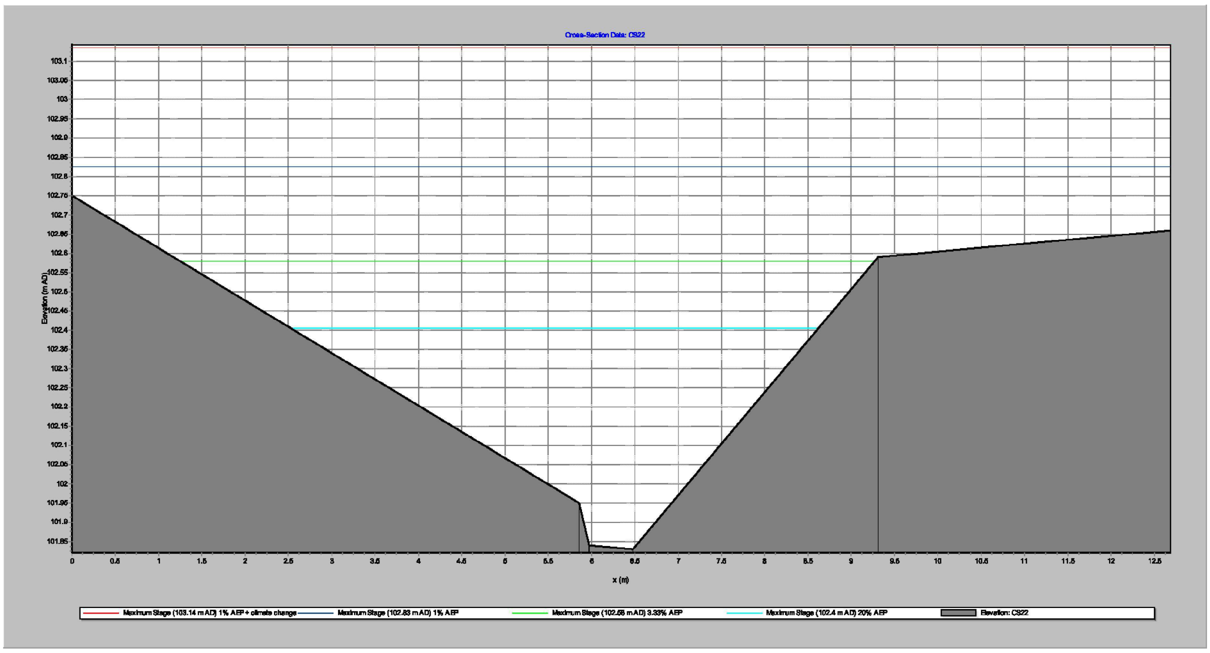

Figure E.20 Peak levels at cross section CS22

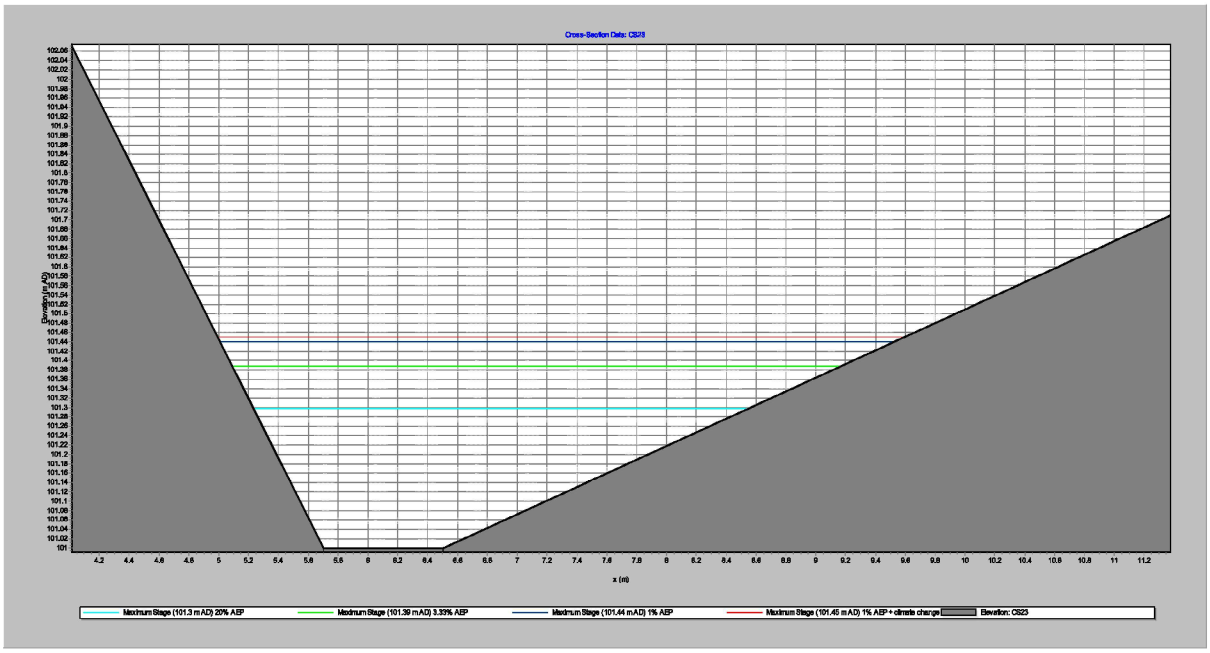

Figure E.21 Peak levels at cross section CS23

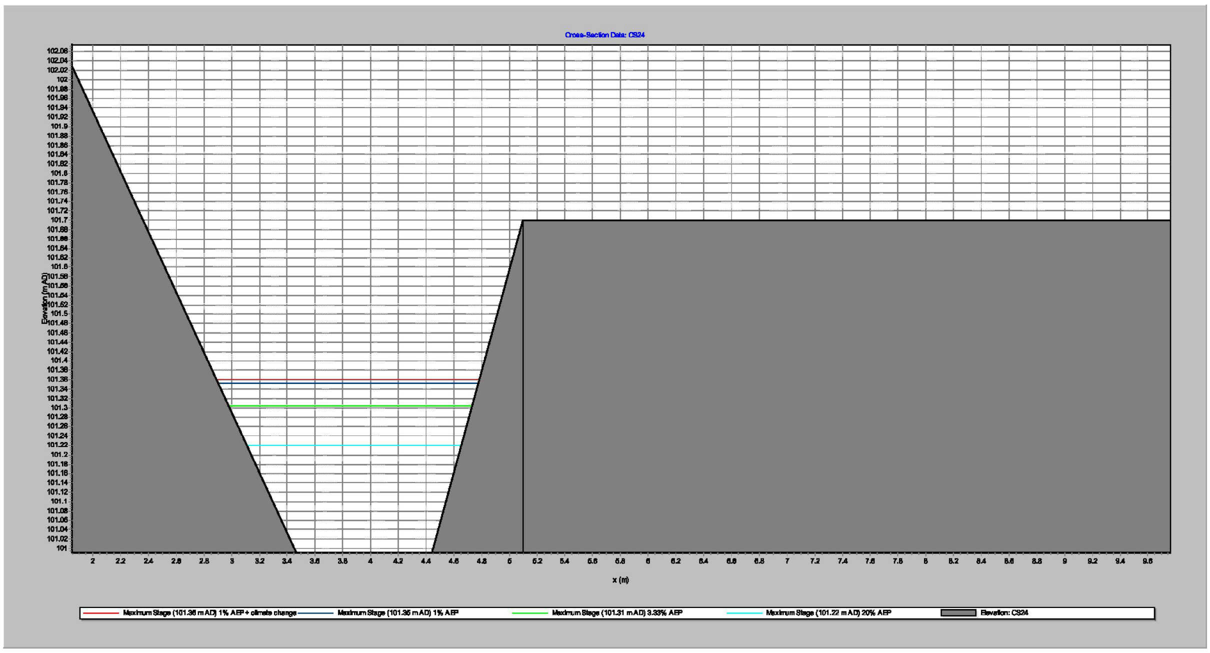

Figure E.22 Peak levels at cross section CS24

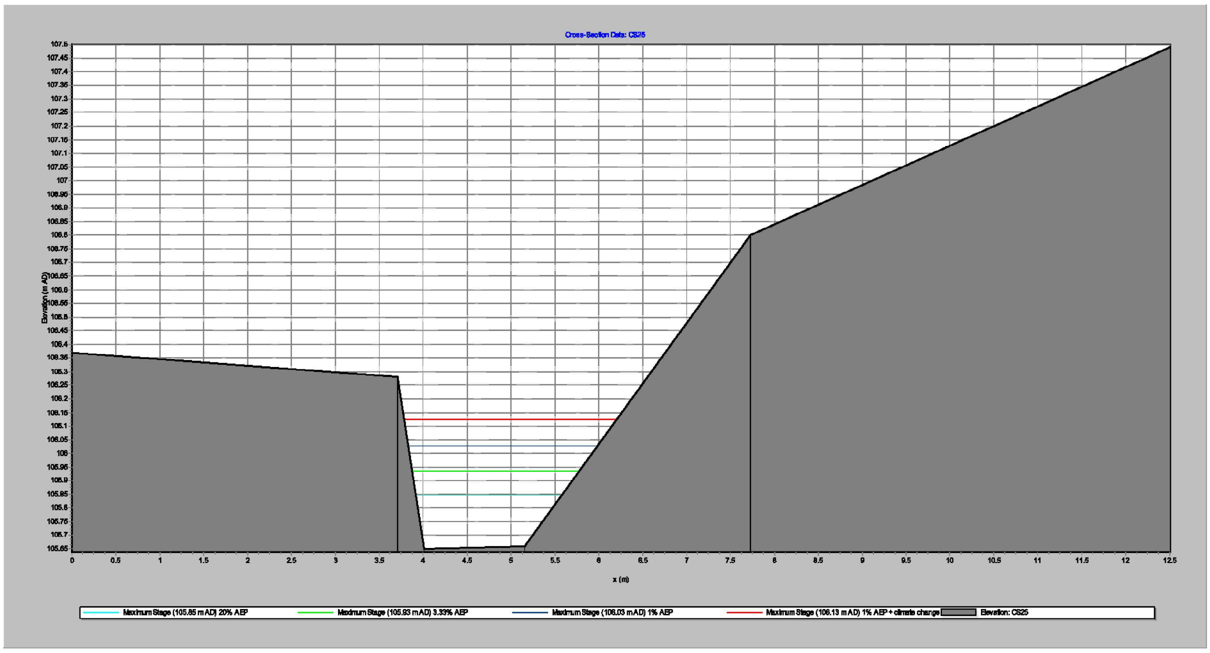

Figure E.23 Peak levels at cross section CS25

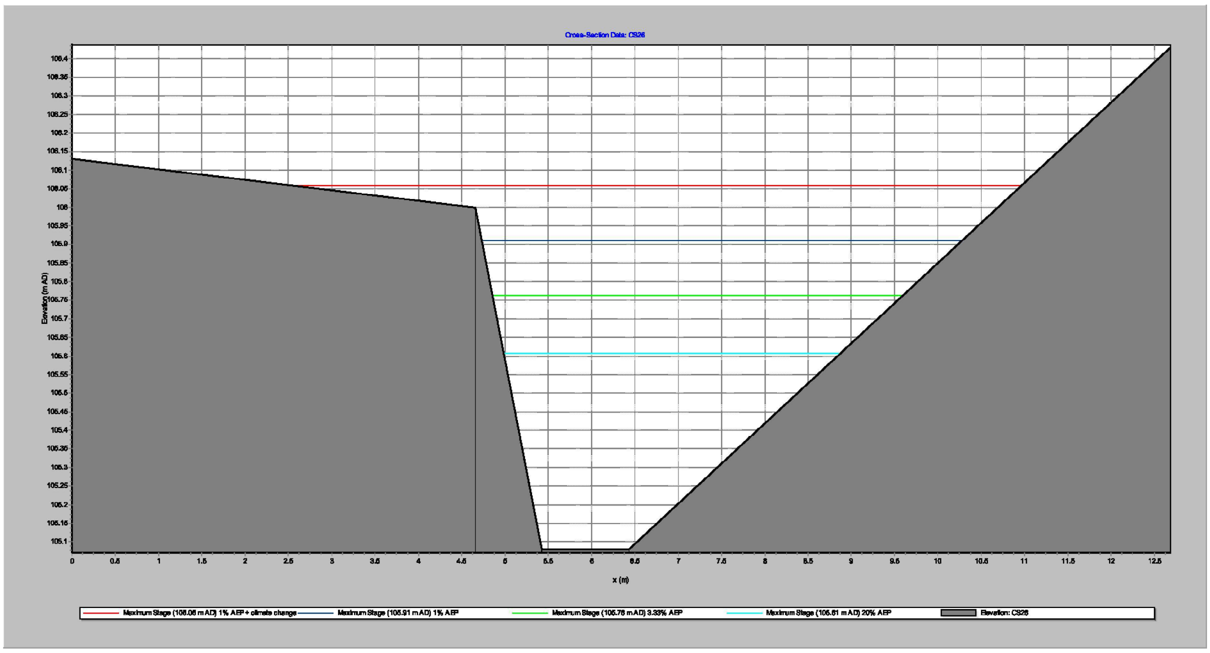

Figure E.24 Peak levels at cross section CS26

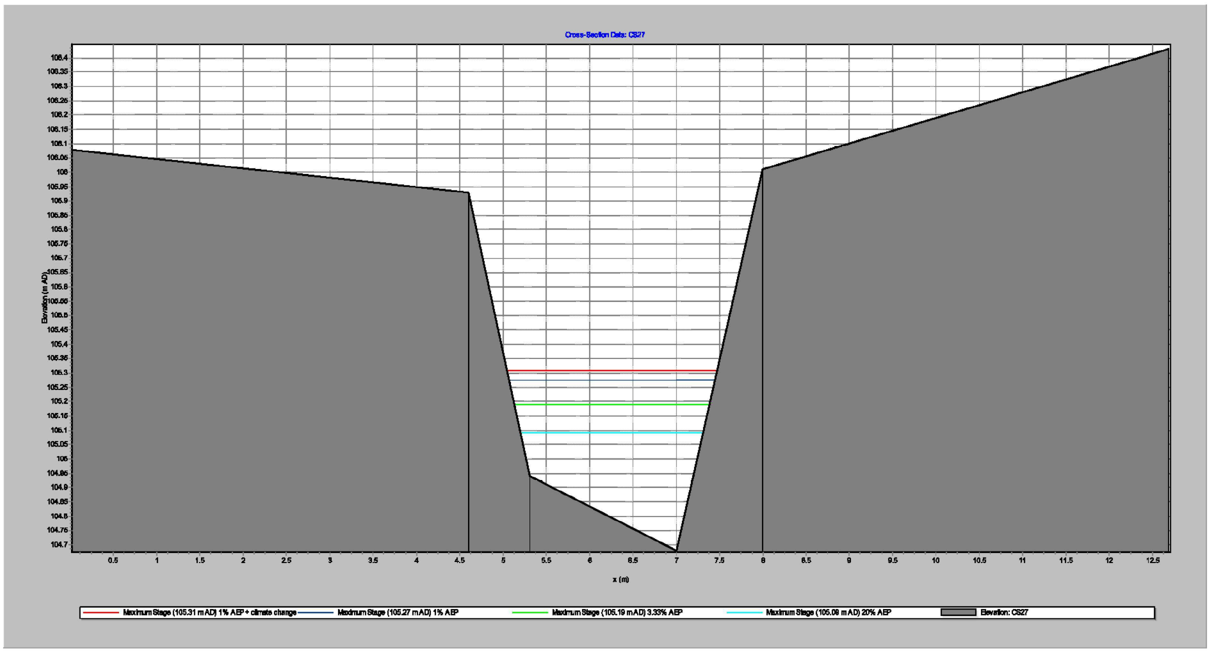

Figure E.25 Peak levels at cross section CS27

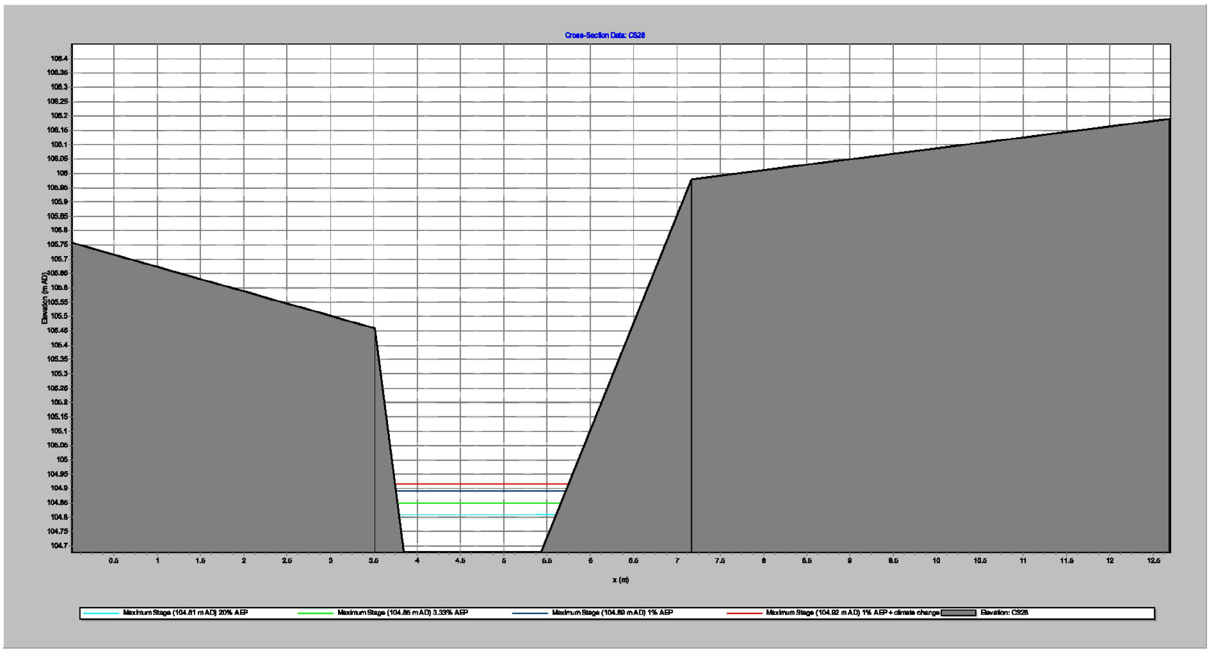

Figure E.26 Peak levels at cross section CS28

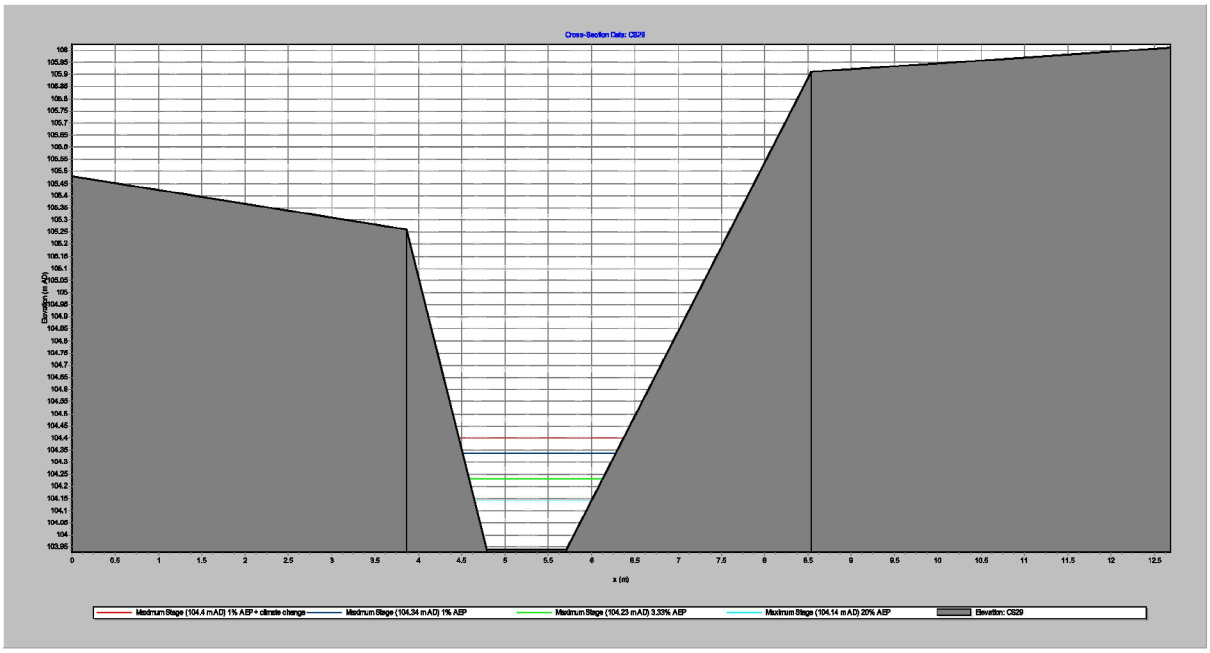

Figure E.27 Peak levels at cross section CS29

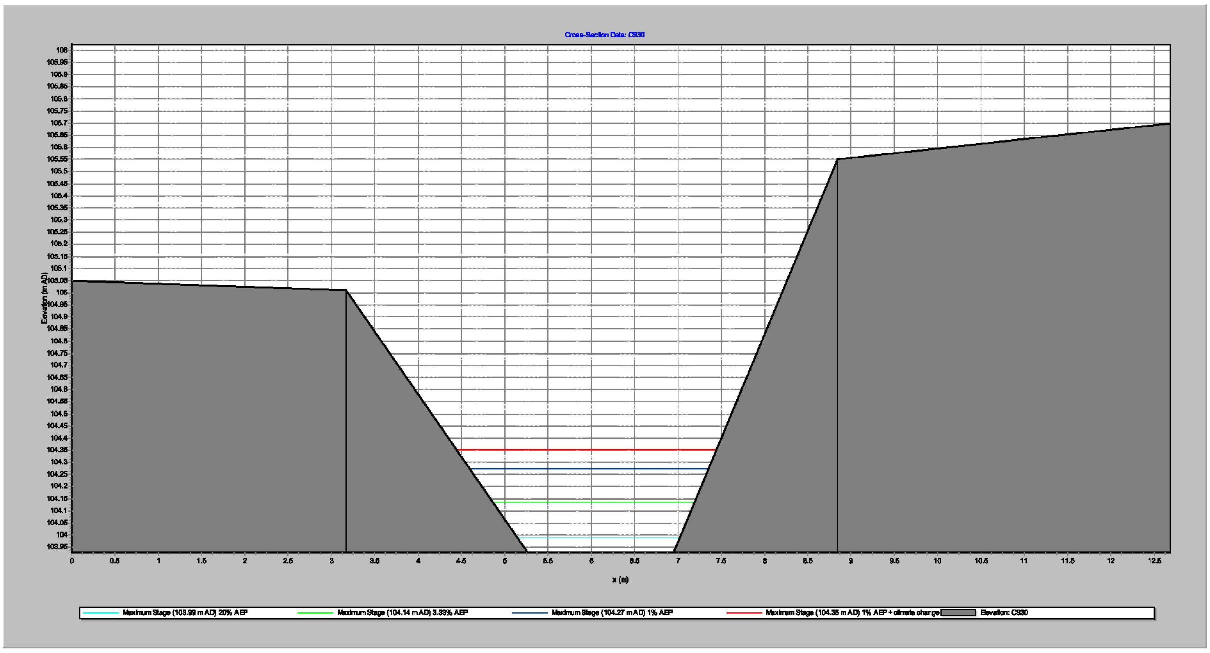

Figure E.28 Peak levels at cross section CS30