



FLOOD RISK ASSESSMENT

UNIT 3, OXSPRING WIREMILLS, OXSPRING, S36 8YW

Our Ref: ENV/0311/12FRA

JUNE 2012

FLOOD RISK ASSESSMENT

CONTENTS	PAGE
1.0 INTRODUCTION.....	3
2.0 SITE AS EXISTING.....	4
2.0 HISTORICAL FLOODING.....	5
3.0 FLUVIAL FLOODING.....	6
5.0 CONCLUSION.....	9

APPENDICES:

APPENDIX A: TOPOGRAPHICAL SURVEY

APPENDIX B: ENVIRONMENT AGENCY FLOOD DATA

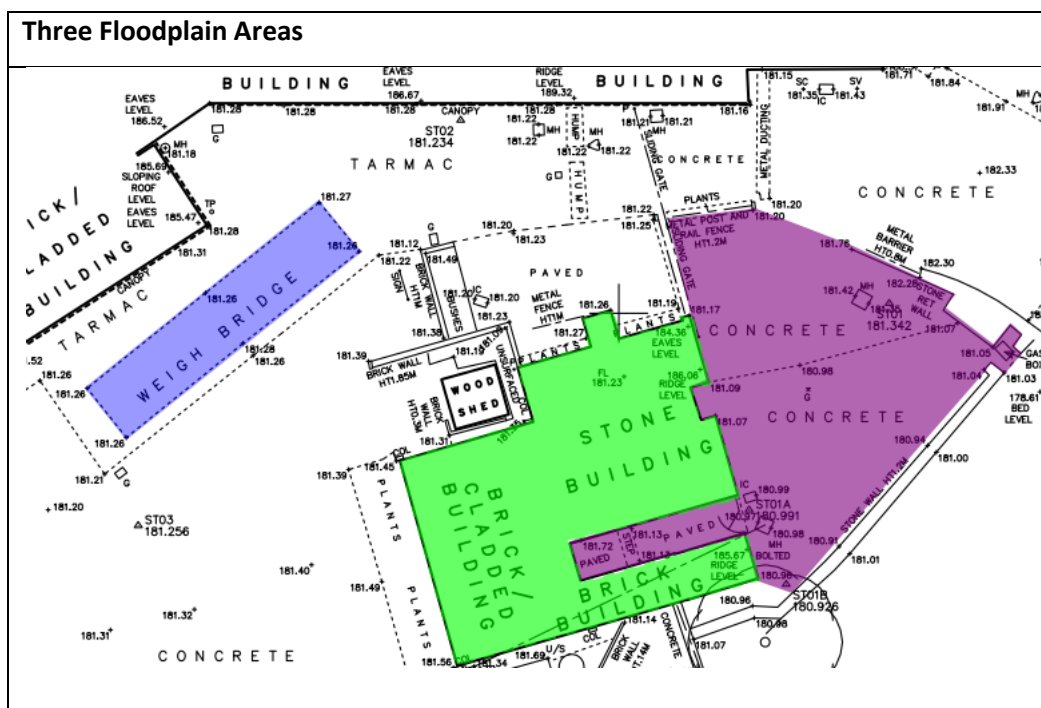
1.0 Introduction

- 1.1 AAH Planning Consultants have been commissioned to perform a Flood Risk Assessment (FRA) of the property known as Unit 3, Oxspring Wiremills, Oxspring, S36 8YW approximately 1.1km east of Penistone town centre. This report has been commissioned by the existing site owners Wintwire Ltd, specifically their representative Ms Louise Wilson, our client, with its purpose to quantify the risk of flooding to this building and adjacent hardstanding from the fluvial (non tidal) River Don located immediately south of the site. It is understood that the report will be used for insurance purposes and our client's own personal reference.
- 1.2 The National Planning Policy Framework Technical guidance summarises modern day classification of flood risk, vulnerability of specific class uses to flooding, and design requirements for new development. Unit 3 of Oxspring Wiremills is in an area classified as Flood Zone 3, the 'high flood risk' area with an annual probability of flooding greater than 1.0%. The B2 'General Industry' class use of the building on the site is classified as 'less vulnerable' development to flooding in accordance with table 2 of this guidance document.
- 1.3 A site levels survey has been undertaken by Ellam Surveys of Dewsbury to accompany our report, with level data GPS Verified and referenced to the Ordnance Survey network, OS Net as is good practice.
- 1.4 Flood levels cited within the report are from data supplied by the Environment Agency, taken from their '*Environment Agency - North East Region Upper Don Flood Warning Improvements ISIS Hydraulic Model Summary Sheets*' specifically those associated with the model at the node point OS national grid reference SE 26317 02773. The above information was the most accurate information available relating to the site however the accuracy/margin of error within this model is unavailable at the time of assessment.

2.0 The Site as Existing

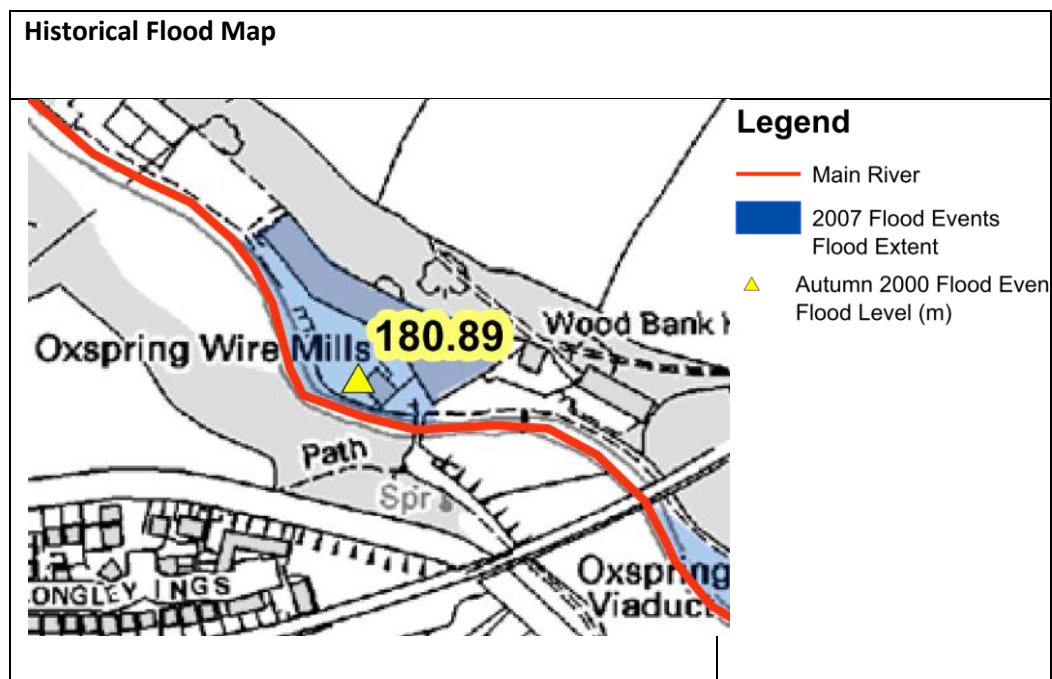
- 2.1 The site is known as Unit 3, Oxspring Wiremills, Oxspring, S36 8YW a mid-sized industrial unit used for the manufacture of specialist wires from various materials. Adjacent to the building on the site are areas of concreted hardstanding, metal tanks, a wooden shed and a weigh bridge area.
- 2.2 The site draws access from a private road which subsequently adjoins the B6462 Sheffield Road highway approximately 0.2km to the southeast of the Oxspring Wiremills site, this is the only means of access to the units.
- 2.3 As discussed a site levels survey has been undertaken by Ellam Surveys of Dewsbury to accompany our report, with level data GPS Verified, referenced to the Ordnance Survey network, OS Net. Unit 3 of the Wiremills site have been divided in to three floodplain areas; Eastern Hardstanding (purple), Building (green) and Weigh Bridge (blue), and a low site level taken from each of these areas.

Eastern Hardstanding Site Level (mAOD)	Building Floor Level (mAOD)	Weigh Bridge Site Level (mAOD)
180.91	181.23	181.26



3.0 Historical Flooding

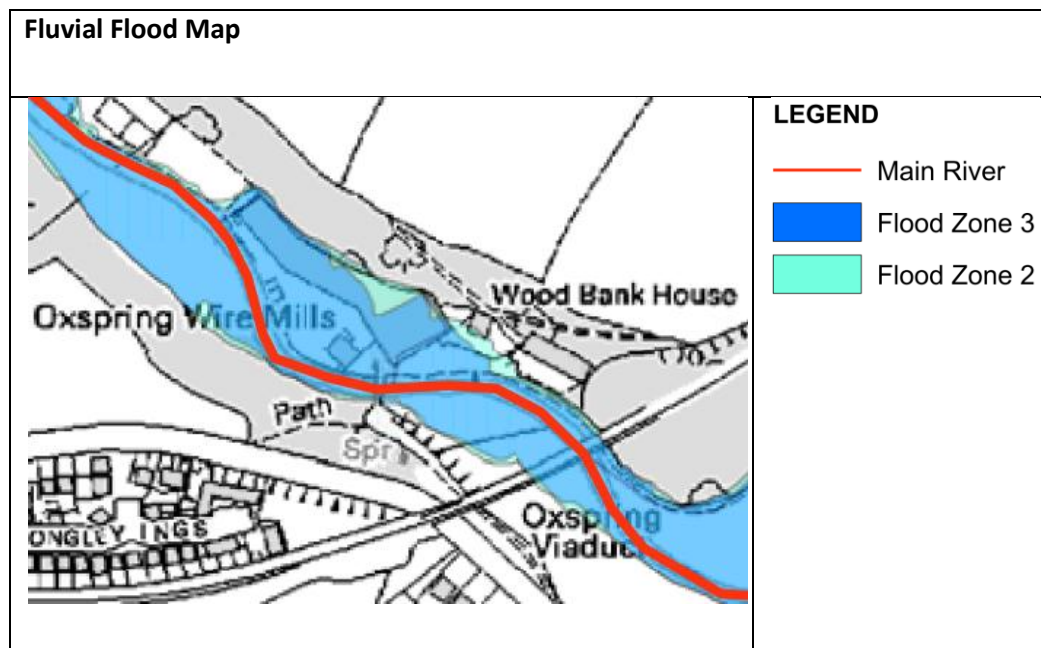
- 3.1 The Environment Agency hold records of historic flood events from rivers, and flood outlines associated with the River Don have been provided to our office for the 2007 event which is shown to encompass the Oxspring Wiremills site. A level of flooding which occurred in Autumn 2000 have also been provided by the Environment Agency this is 180.89m AOD adjacent to the site. The Autumn 2000 flood level is above all those site levels cited within the three defined floodplain areas, and as such it is anticipated that flooding of these areas will have occurred during this event.



- 3.2 The Environment Agency acknowledge that their records are not comprehensive, with the historic flood event record outlines an indication of the geographical extent of a modelled or observed flood event rather than providing any information regarding flood levels for individual properties. For this reason more weight within this flood risk assessment is given to the hydraulic modelling data rather than the historical data provided by the Environment Agency.

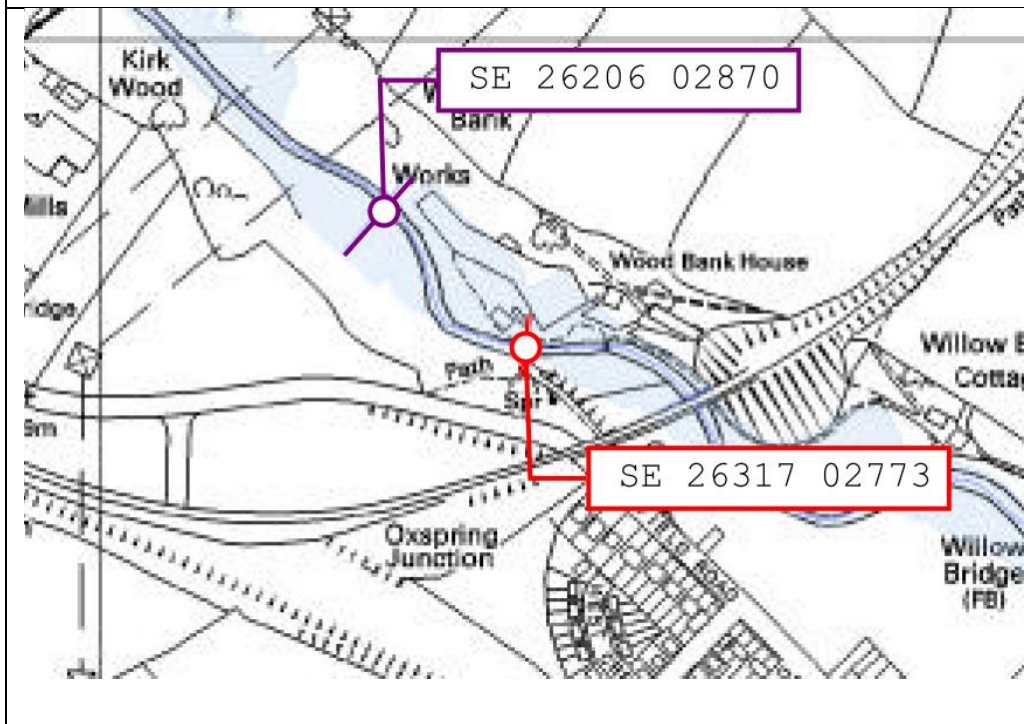
4.0 Fluvial Flooding

- 4.1 Unit 3 of Oxspring Wiremills is in an area broadly classified as Flood Zone 3, the high fluvial flood risk area with an annual probability of flooding greater than 1.0% from the River Don which comprises the southern site boundary.



- 4.2 Modelled flood levels have been produced for this watercourse by JBA Consulting as part of the Environment Agency - North East Region Upper Don Flood Warning Improvements ISIS Hydraulic Model. Model node points are located 0.1km northwest/upstream of the site at national grid reference SE 26206 02870, and 0.01km southeast of the site at SE 26317 02773. The flood levels from the node point located at SE 26317 02773 are considered most representative of the flood risk to the floodplain area subject to flood risk assessment in this report, due to the relatively flat topography of the area immediately surrounding Unit 3 of Oxspring Wiremills. The model node locations and flood levels are summarised in the map and table below respectively;

Model Node Locations



Modelled Flood Levels for OS NGR SE 26317 02773	
Annual Exceedance Probability (%)	Flood level (mAOD)
20.0	180.69
10.0	180.92
4.0	181.28
2.0	181.57
1.3	181.72
1.0	181.79
0.5	182.00
0.1	182.56

- 4.3 Notional flood depths have been calculated through a comparison of the lowest site survey levels located within the three floodplain areas; 'Eastern Hardstanding' (purple), 'Building' (green) and 'Weigh Bridge' (blue) with the modelled flood levels for OS NGR SE 26317 02773. These are summarised in the table below, with red data inferring a flood depth above site level and green data showing the level of freeboard of the flood plain above the modelled flood level.

Annual Exceedance Prob (%)	Flow (m³/s)	Flood level (mAOD)	Eastern Hardstanding		Building		Weigh Bridge	
			Flood Depth (m)	Site Level (mAOD)	Flood Depth (m)	Floor Level (mAOD)	Flood Depth (m)	Site Level (mAOD)
20	25.7	180.69	-0.22	180.91	-0.54	181.23	-0.57	181.26
10	30.7	180.92	0.01	180.91	-0.31	181.23	-0.34	181.26
4	38.6	181.28	0.37	180.91	0.05	181.23	0.02	181.26
2	45.9	181.57	0.66	180.91	0.34	181.23	0.31	181.26
1.3	50.9	181.72	0.81	180.91	0.49	181.23	0.46	181.26
1.0	54.4	181.79	0.88	180.91	0.56	181.23	0.53	181.26
0.5	65	182	1.09	180.91	0.77	181.23	0.74	181.26
0.1	95.9	182.56	1.65	180.91	1.33	181.23	1.3	181.26

- 4.4 Based on the above table, the annual probability of flooding has been derived, with this percentage expressed as the range of Annual Exceedance Probability (AEP) return periods between the 'flood' and 'no flood' AEP return period events.
- 4.5 **The annual percentage chance of the eastern hardstanding area adjacent to the building is between 11-20% each year assuming a low site level of 180.91m AOD.**
- 4.6 **The annual percentage chance of the internal building area flooding is between 5-10% each year assuming a finished floor level of 181.23m AOD.**
- 4.7 **The annual percentage chance of the weigh bridge area flooding is between 5-10% each year assuming a low site level of 181.26m AOD.**
- 4.8 Over time flood levels within the River Don will increase due increased fluvial flows attributable to climate change, as outlined within Table 5 of the National Planning Policy Framework Technical Guidance *"Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights"*.
- 4.9 Based on the above, the annual percentage chance of the property and its adjacent hardstanding flooding will also increase over the lifetime of the development and it is noted that over this period, that the Upper River Don may be subject to revised hydraulic modelling, these works would supersede the results of the Environment Agency - North East Region Upper Don Flood Warning Improvements ISIS Hydraulic Model works and should be considered for subsequent insurance purposes.

5.0 Conclusion

- 5.1 The annual percentage chance of flooding to the areas considered within this flood risk assessment is between 11-20% each year assuming a low site level of 180.91m AOD. The annual percentage chance of the internal building area flooding is between 5-10% each year assuming a finished floor level of 181.23m AOD as shown in the site levels survey.
- 5.2 In the absence of robust raised flood defences adjacent to the site, this chance of flooding is considered representative of the 'actual flood risk' to the site. Over time the risk of flooding to the site will increase due increased fluvial flows attributable to climate change, as outlined within Table 5 of the National Planning Policy Framework Technical Guidance "Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights". It is noted that over the lifetime of the development on the site, the Upper River Don may be subject to revised hydraulic modelling, these works would supersede the results of the Environment Agency - North East Region Upper Don Flood Warning Improvements ISIS Hydraulic Model works and should be considered for future insurance purposes.
- 5.3 Baseline data comprises a site levels survey undertaken by Ellam Surveys of Dewsbury, with level data GPS Verified and referenced to the Ordnance Survey network, OS Net. Flood levels cited within the report are from data supplied by the Environment Agency, taken from their Environment Agency - North East Region Upper Don Flood Warning Improvements ISIS Hydraulic Model Summary Sheets, specifically those associated with the model at the node point OS national grid reference SE 26317 02773. The above was the most accurate information at the time of assessment, however the accuracy/margin of error within this model is currently unavailable.

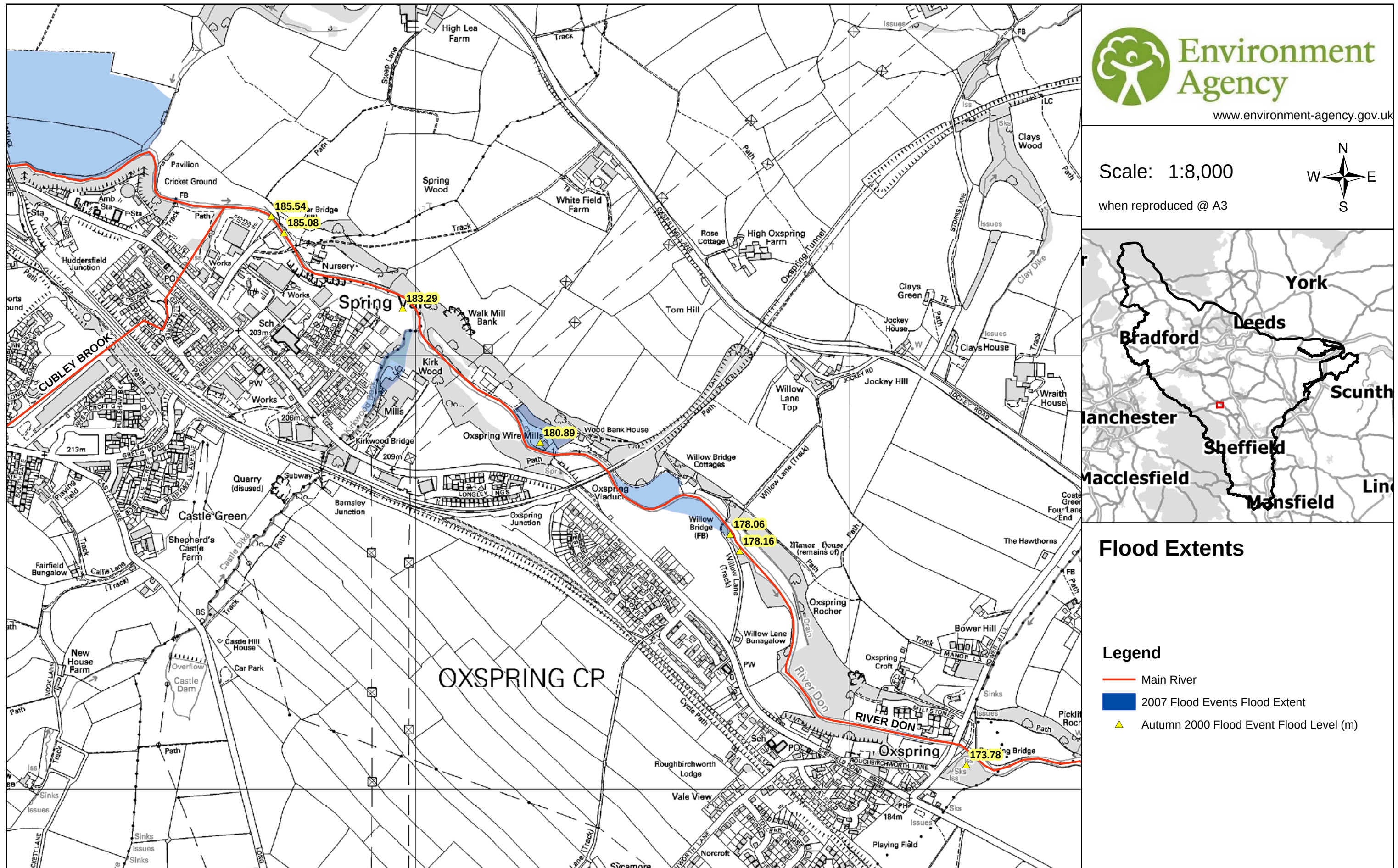
APPENDIX A

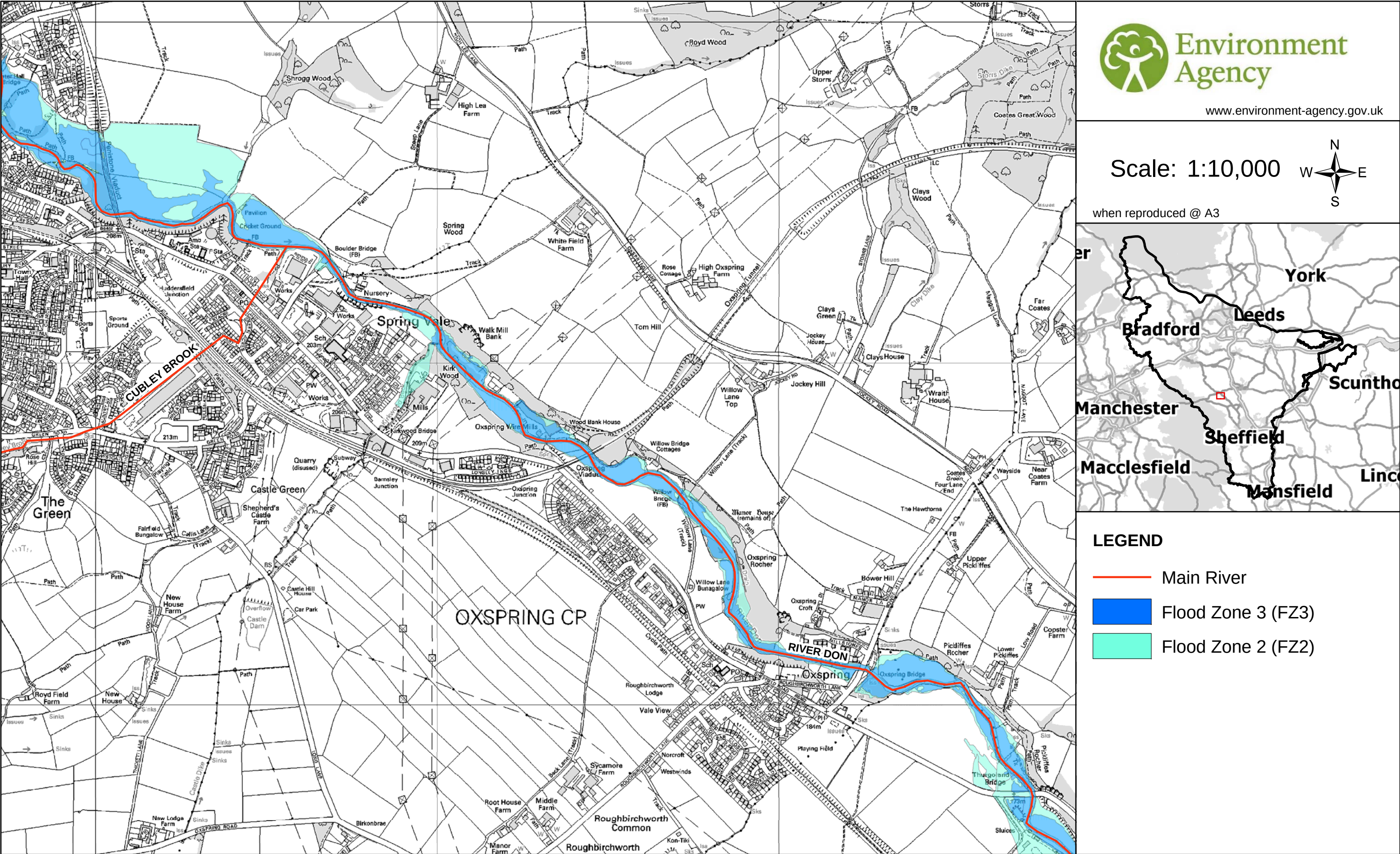
TOPOGRAPHICAL SURVEY

APPENDIX B

ENVIRONMENT AGENCY FLOOD DATA

Flood History Map for Sheffield Road, Oxspring - dated: 04/12/2012 [Ref: 24260]





Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 24602

Section Type: SECTION

OS NGR: SE 26858 02414

Survey Dwg Ref: N/A

Photograph Ref: DON18_24602.JPG

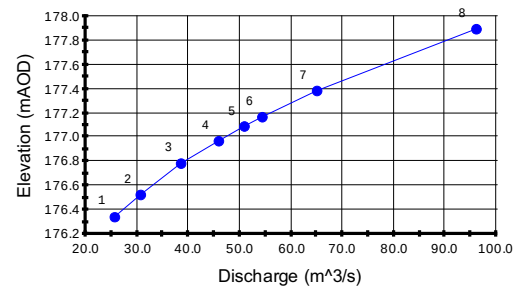
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Section d/s: 24418

Section u/s: 24856d



Rating Curve



Number represents model profile number

Summary of Results

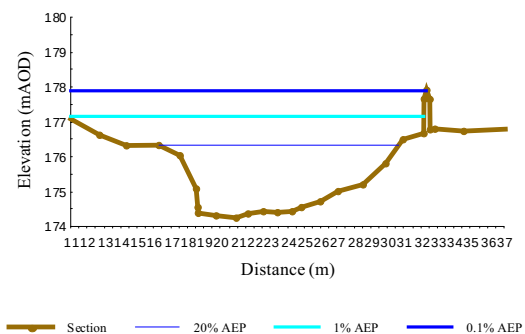
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.7	176.346	1.31
2	10.0	30.7	176.529	1.35
3	4.0	38.6	176.786	1.35
4	2.0	45.9	176.972	1.35
5	1.3	50.9	177.091	1.35
6	1.0	54.3	177.168	1.35
7	0.5	65.0	177.385	1.35
8	0.1	95.9	177.893	1.35

Level of Left Bank 176.348 mAOD

Level of Right Bank 177.928 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



RIVER DON: REACH 18: CROSS SECTION NUMBER 24602

Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 24856

Section Type: BRIDGE, SECTION, SPILL

OS NGR: SE 26707 02613

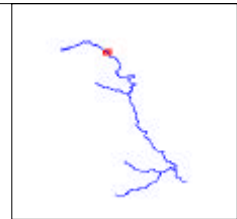
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Photograph Ref: DON18_24856.JPG

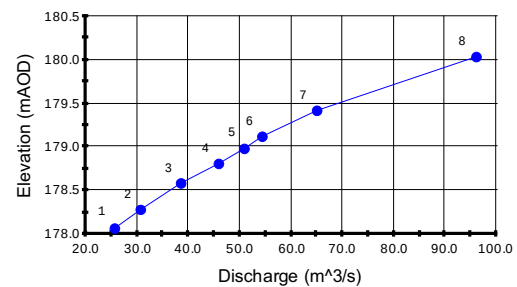
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Section d/s: 24856d

Section u/s: 25198d



Rating Curve



Number represents model profile number

Summary of Results

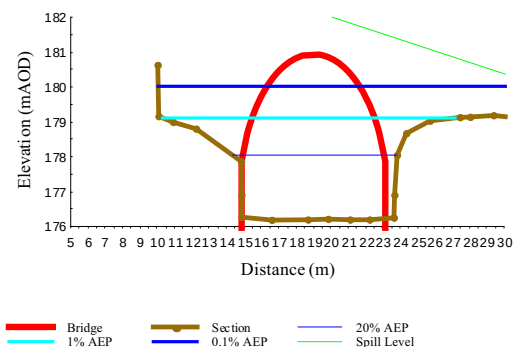
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.7	178.070	1.58
2	10.0	30.7	178.285	1.67
3	4.0	38.6	178.587	1.79
4	2.0	45.9	178.811	1.89
5	1.3	50.9	178.984	1.89
6	1.0	54.3	179.123	1.89
7	0.5	65.0	179.417	1.89
8	0.1	95.9	180.033	1.89

Level of Left Bank 180.638 mAOD

Level of Right Bank 179.041 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



RIVER DON: REACH 18: CROSS SECTION NUMBER 24856u

Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 25198

Section Type: BRIDGE, SECTION

OS NGR: SE 26439 02734

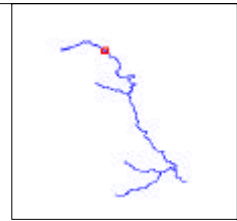
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Photograph Ref: DON18_25198.JPG

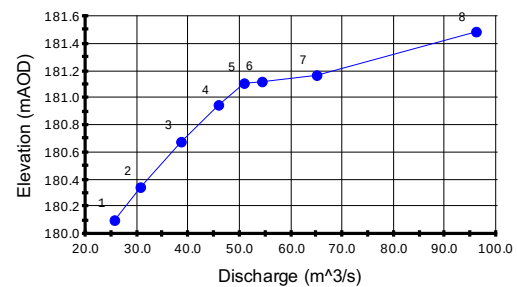
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Section d/s: 25198d

Section u/s: 25334d



Rating Curve



Number represents model profile number

Summary of Results

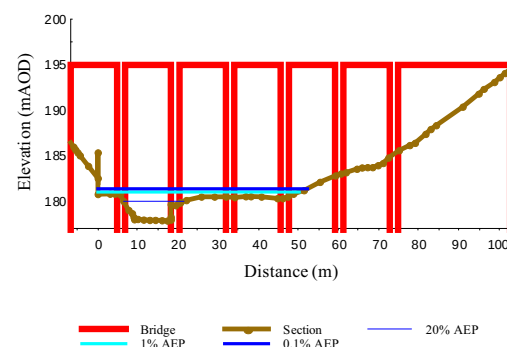
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.7	180.104	1.18
2	10.0	30.7	180.346	1.18
3	4.0	38.6	180.679	1.20
4	2.0	45.9	180.947	1.20
5	1.3	50.9	181.106	1.20
6	1.0	54.4	181.118	1.20
7	0.5	65.0	181.164	1.20
8	0.1	95.9	181.484	1.30

Level of Left Bank 180.834 mAOD

Level of Right Bank 179.746 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

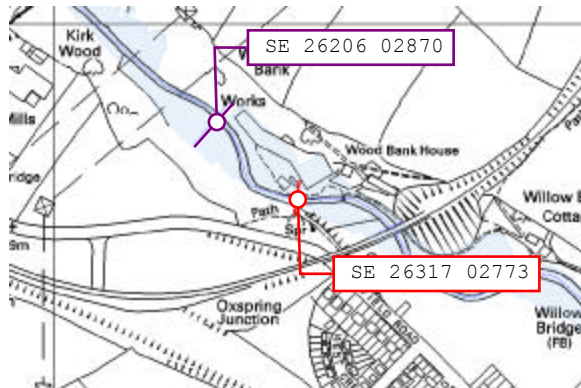
Cross Section Profile



Bridge 1% AEP Section 0.1% AEP 20% AEP

RIVER DON: REACH 18: CROSS SECTION NUMBER 25198u

Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 25334

Section Type: BRIDGE, SECTION, SPILL

OS NGR: SE 26317 02773

Survey Dwg Ref: N/A

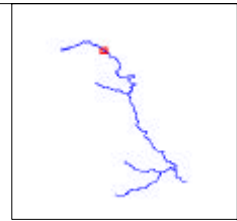
SE 26206 02870

Photograph Ref: DON18_25334.JPG

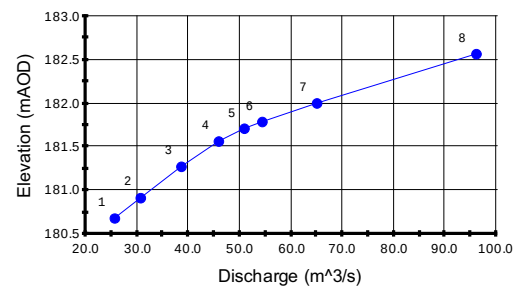
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Section d/s: 25334d

Section u/s: 25498



Rating Curve



Number represents model profile number

Summary of Results

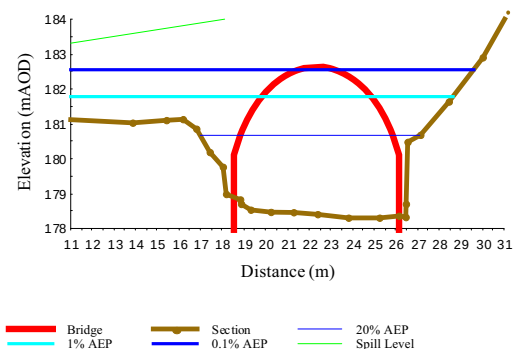
Profile No	AEP (%)	Flow (m ³ /s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.7	180.685	1.34
2	10.0	30.7	180.921	1.42
3	4.0	38.6	181.278	1.47
4	2.0	45.9	181.566	1.48
5	1.3	50.9	181.715	1.48
6	1.0	54.4	181.790	1.48
7	0.5	65.0	182.003	1.48
8	0.1	95.9	182.564	1.48

Level of Left Bank 181.140 mAOD

Level of Right Bank 180.495 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

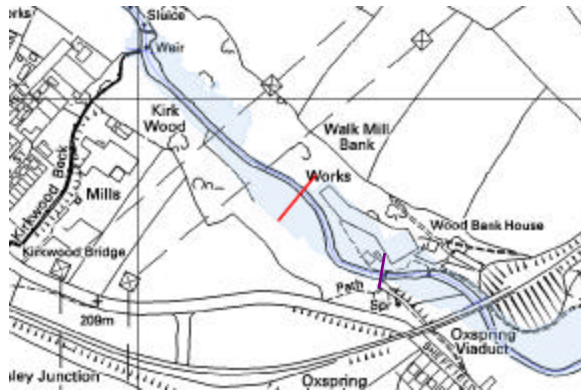
Cross Section Profile



Bridge 1% AEP Section 0.1% AEP 20% AEP Spill Level

RIVER DON: REACH 18: CROSS SECTION NUMBER 25334u

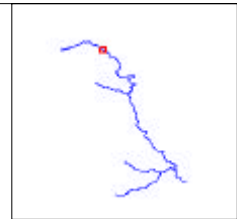
Location Plan



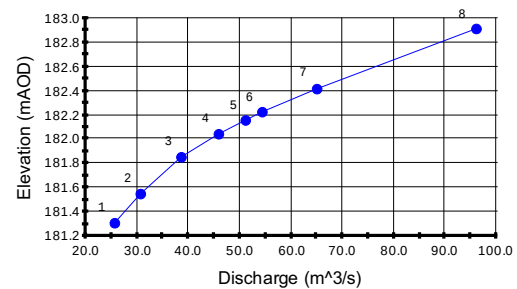
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Cross Section References

River: RIVER DON
Reach: REACH 18
Chainage: 25498
Section Type: SECTION
OS NGR: SE 26206 02870
Survey Dwg Ref: N/A
Photograph Ref: DON18_25498.JPG
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Section d/s: 25334u
Section u/s: 25782



Rating Curve



Number represents model profile number

Summary of Results

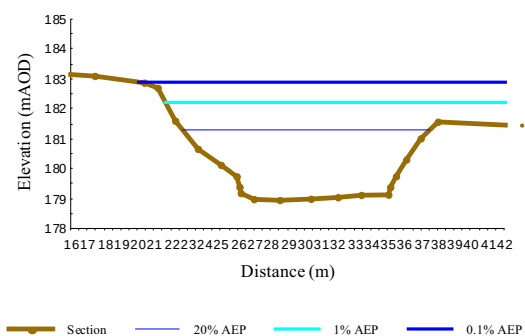
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.7	181.310	1.06
2	10.0	30.7	181.552	1.06
3	4.0	38.7	181.855	1.06
4	2.0	45.9	182.045	1.06
5	1.3	51.2	182.158	1.06
6	1.0	54.4	182.226	1.06
7	0.5	65.0	182.417	1.06
8	0.1	95.9	182.910	1.06

Level of Left Bank 182.715 mAOD

Level of Right Bank 181.575 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



Section 20% AEP 1% AEP 0.1% AEP

RIVER DON: REACH 18: CROSS SECTION NUMBER 25498

Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 25782

Section Type: SECTION

OS NGR: SE 26002 03062

Survey Dwg Ref: N/A

Photograph Ref: DON18_25782.JPG

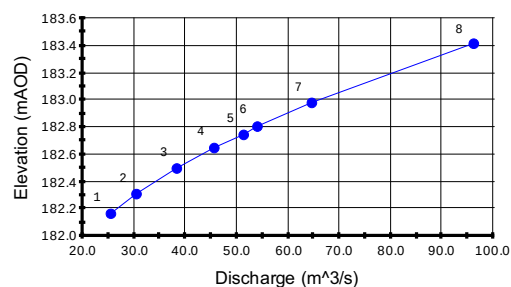
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Section d/s: 25498

Section u/s: 25967



Rating Curve



Number represents model profile number

Summary of Results

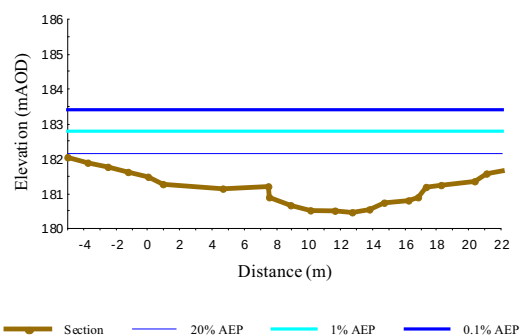
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.5	182.168	1.06
2	10.0	30.5	182.314	1.06
3	4.0	38.3	182.500	1.06
4	2.0	45.6	182.651	1.06
5	1.3	51.3	182.747	1.06
6	1.0	54.0	182.807	1.06
7	0.5	64.5	182.979	1.06
8	0.1	95.9	183.414	1.06

Level of Left Bank 181.505 mAOD

Level of Right Bank 181.208 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



RIVER DON: REACH 18: CROSS SECTION NUMBER 25782

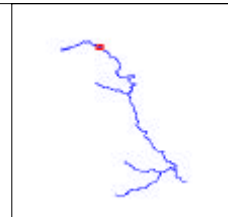
Location Plan



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Cross Section References

River: RIVER DON
Reach: REACH 18
Chainage: 25967
Section Type: SECTION
OS NGR: SE 25880 03156
Survey Dwg Ref: N/A
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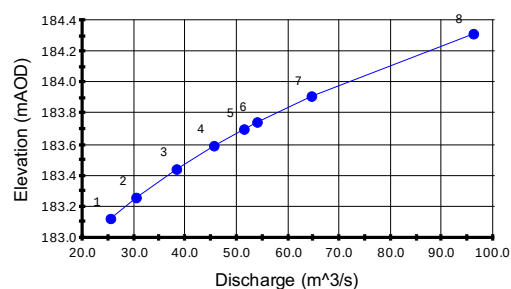


Next

Section d/s: 25782
Section u/s: 26170d



Rating Curve



Number represents model profile number

Summary of Results

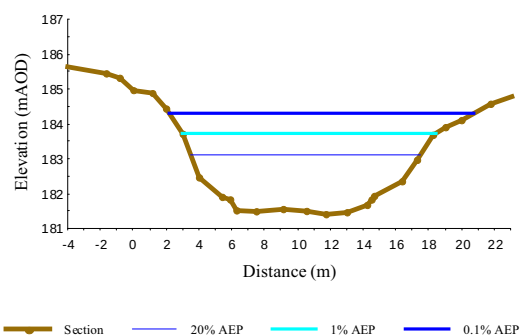
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.5	183.126	1.43
2	10.0	30.5	183.261	1.54
3	4.0	38.4	183.445	1.71
4	2.0	45.6	183.594	1.85
5	1.3	51.5	183.700	1.96
6	1.0	54.0	183.745	2.01
7	0.5	64.5	183.911	2.19
8	0.1	95.9	184.310	2.63

Level of Left Bank 184.891 mAOD

Level of Right Bank 183.695 mAOD

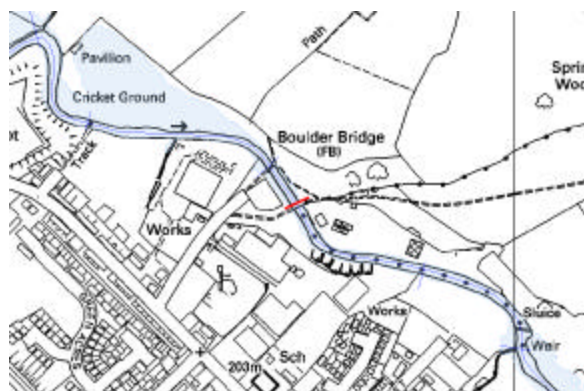
AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



RIVER DON: REACH 18: CROSS SECTION NUMBER 25967

Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 26170

Section Type: BRIDGE, SECTION

OS NGR: SE 25718 03251

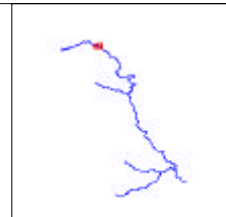
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Photograph Ref: DON18_26170us.JPG

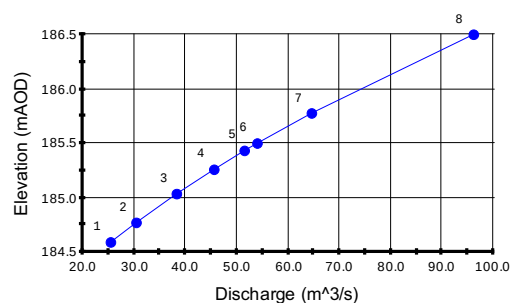
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Section d/s: 26170d

Section u/s: 26231d



Rating Curve



Number represents model profile number

Summary of Results

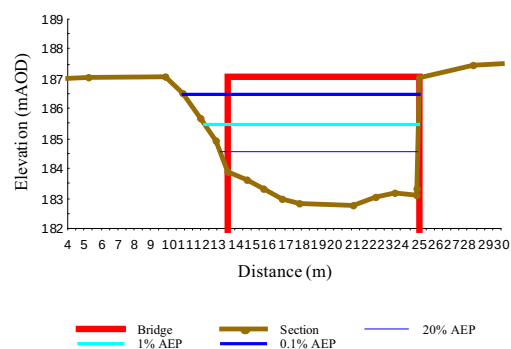
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.5	184.594	1.52
2	10.0	30.5	184.775	1.61
3	4.0	38.4	185.037	1.73
4	2.0	45.6	185.259	1.83
5	1.3	51.5	185.434	1.90
6	1.0	54.0	185.500	1.93
7	0.5	64.5	185.775	2.05
8	0.1	96.0	186.495	2.32

Level of Left Bank 187.084 mAOD

Level of Right Bank 187.054 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

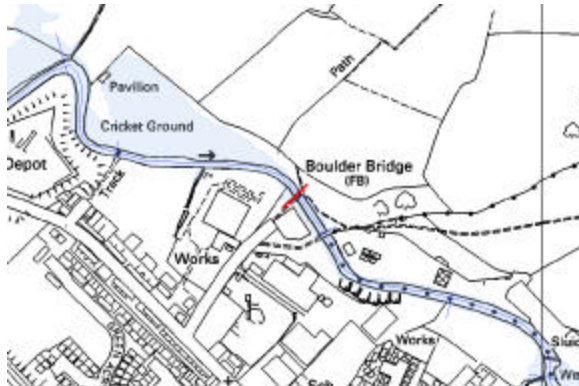
Cross Section Profile



Bridge 1% AEP 0.1% AEP 20% AEP

RIVER DON: REACH 18: CROSS SECTION NUMBER 26170u

Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 26231

Section Type: BRIDGE, SECTION, SPILL

OS NGR: SE 25679 03298

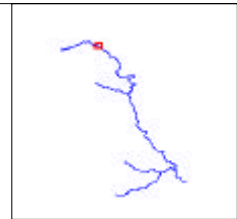
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Photograph Ref: DON18_26231.JPG

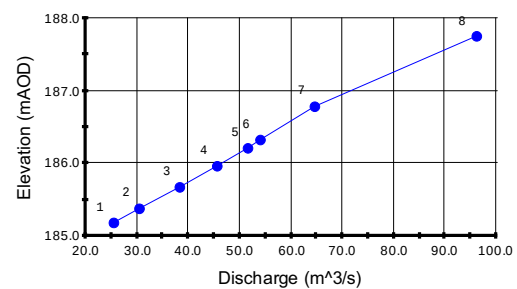
Next

Section d/s: 26231d

Section u/s: 26483d



Rating Curve



Number represents model profile number

Summary of Results

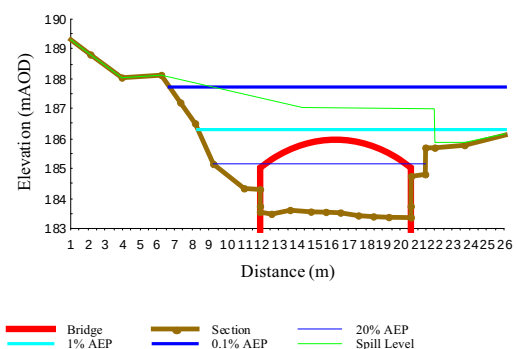
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.5	185.188	1.57
2	10.0	30.5	185.384	1.63
3	4.0	38.4	185.678	1.72
4	2.0	45.6	185.969	1.73
5	1.3	51.5	186.217	1.73
6	1.0	54.0	186.328	1.73
7	0.5	64.5	186.784	1.73
8	0.1	96.0	187.748	1.73

Level of Left Bank 188.142 mAOD

Level of Right Bank 185.724 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



Bridge 1% AEP Section 0.1% AEP 20% AEP Spill Level

RIVER DON: REACH 18: CROSS SECTION NUMBER 26231u

Location Plan



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Cross Section References

River: RIVER DON

Reach: REACH 18

Chainage: 26483

Section Type: BRIDGE, SECTION, SPILL

OS NGR: SE 25446 03358

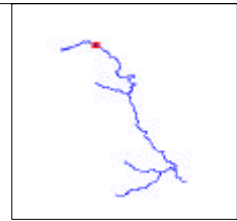
Survey Dwg Ref: N/A

Photograph Ref: DON18_26483.JPG

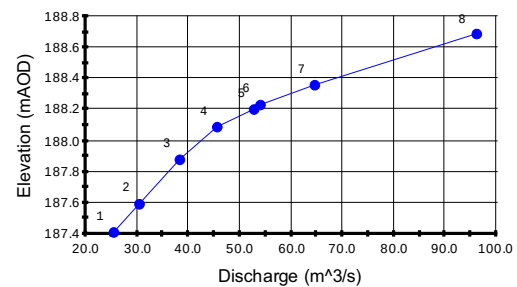
Next

Section d/s: 26483d

Section u/s: 26643



Rating Curve



Number represents model profile number

Summary of Results

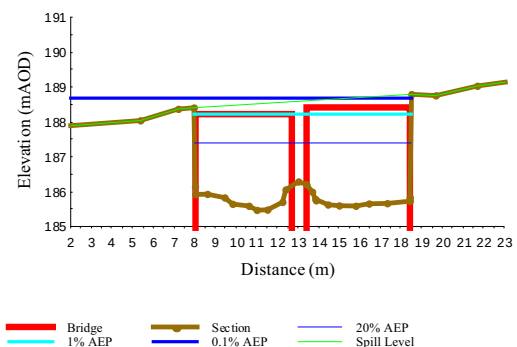
Profile No	AEP (%)	Flow (m³/s)	Water Level (mAOD)	Velocity (m/s)
1	20.0	25.5	187.414	1.49
2	10.0	30.5	187.596	1.60
3	4.0	38.4	187.880	1.72
4	2.0	45.6	188.090	1.72
5	1.3	52.8	188.202	1.72
6	1.0	54.0	188.231	1.72
7	0.5	64.6	188.357	1.72
8	0.1	96.0	188.686	1.72

Level of Left Bank 188.418 mAOD

Level of Right Bank 188.801 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



RIVER DON: REACH 18: CROSS SECTION NUMBER 26483u