

Appendix A  
Data Register



<b>Document Reference</b>	<b>Source of Data</b>	<b>Data Flag (See Section 5.1)</b>	<b>Data Quality Score (See Section 5.1.2)</b>	<b>Incoming Data Supplied</b>
INC001	Environment Agency	EA Local Data	2	EA Geostore – flood zones and defences, main rivers, historic flood maps, areas susceptible to SW flooding, detailed river network, railways, roads, designated sites, LiDAR files, Threshold & Wrackmarks, E-planning tool dataset
INC002	Severn Trent Water	Partner Organisation	2	GIS datasets of STW assets across Shropshire Towns study area
INC003	Environment Agency	EA Local Data	2	EA Geostore – National Receptor Database DatasetsVersion 1.0
INC004	Shropshire Council	Local Authority	2	Historical Flooding Data – GIS data from Shropshire Flood Forums
INC005	Severn Trent Water	Partner Organisation	2	AMP3 GIS datasets on CSOs, Pumping Stations and Balancing Ponds
INC006	Cambridgeshire County Council	Local Authority	1	Extract from glian Water LAMPS database 2003.
INC007	Environment Agency	EA Local Data	1	GIS dataset of the Detailed River Network and inspection reports for structures and bridges in three Shropshire Towns study area
INC008	Shropshire Council	Local Authority	1	Mapping including 50k, address point, aerial photography, historic mapping, Land use, mastermap and streetview mapping (in various forms for 3 Shropshire Towns)
INC009	Shropshire Council	Local Authority	1	GIS dataset of the six Shropshire Flood Forum Areas
INC010	Shropshire Council	Local Authority	1	GIS dataset of all Shropshire watercourses
INC011	Shropshire Council	Local Authority	1	Shropshire – historic flooding records
INC012	Shropshire Council	Local Authority	1	GPS data collated of Gully cleansing Activity
INC013	Shropshire Council	Local Authority	1	GIS Dataset of Points of Interest (crossing on rivers, etc)
INC014	Shropshire Council	Local Authority	3	Asset dataset of SC Assets as of October 2010 – limited entries
INC015	Shropshire Council	Local Authority	1	GIS datasets of Geological maps from Water Cycle Strategy Report
INC016	Shropshire Council	Local Authority	2	GIS datasets of areas at risk of SW flooding maps from Water Cycle Strategy Report
INC017	Environment Agency	Partner Organisation	1	Severn CFMP Policy Unit GIS files
INC018	Environment Agency	Partner Organisation	2	GIS dataset - Reservoirs in and near Shropshire
INC019	Environment Agency	EA National Dataset	1	GIS dataset – Shropshire catchments.

Document Reference	Source of Data	Data Flag (See Section 5.1)	Data Quality Score (See Section 5.1.2)	Incoming Data Supplied
INC020	Environment Agency	EA National Dataset	1	GIS dataset - Source Protection Zones – 50k
INC021	Environment Agency	EA National Dataset	1	GIS datasets of US Water Management
INC022	Highways Agency	External Data Provider	3	Available asset Data for the three Towns – including the M50 near Shifnal
INC023	Severn Trent Water	Partner Organisation	2	GIS dataset – further
INC024	Shropshire Council	Local Authority	2	Consultation document for Shifnal and Sheriffhales Area Site Allocations
INC025	Shropshire Council	Local Authority	2	Consultation document for Church Stretton Area Site Allocations
INC026	Shropshire Council	Local Authority	2	Former Bridgnorth DC – Level 1 SFRA
INC027	Telford & Wrekin Council	Local Authority	2	Level 2 SFRA
INC028	Shropshire Council	Local Authority	2	Map of flood forum areas
INC029	Shropshire Council	Local Authority	2	Former South Shropshire DC – Level 1 SFRA
INC030	Shropshire Council	Local Authority	2	Photos and drawing of culvert dimensions for Clun Road Railway Bridge
INC031	Shropshire Council	Local Authority	2	Photos and drawing of culvert dimensions for Clun Road Railway Bridge
INC032	Shropshire Council			
INC033	Shropshire Council	Local Authority	2	Comments on Report template
INC035	Shropshire Council	Local Authority	2	GIS dataset of Local Property Gazetteer for Shropshire - extract
INC036	Shropshire Council	Local Authority	2	GIS dataset of SC freehold in Shropshire
INC037	Shropshire Council	Local Authority	2	GIS dataset of substations within Shropshire Towns study areas.
INC038	Environment Agency	Partner Organisation	2	Revised LiDAR (Flown JUNE 2010) for Shifnal
INC039	Environment Agency	Partner Organisation	1	MORECS datasets Square 124 data from 1961 - 2010
INC040	Environment Agency	Partner Organisation	2	2 <sup>nd</sup> Generation Surface Water Maps (FRMfSW – 30 return period maps)
INC041	Environment Agency	Partner Organisation	1	2 <sup>nd</sup> Generation Surface Water Maps (FRMfSW – 200 return period maps)

<b>Document Reference</b>	<b>Source of Data</b>	<b>Data Flag (See Section 5.1)</b>	<b>Data Quality Score (See Section 5.1.2)</b>	<b>Incoming Data Supplied</b>
INC042	Severn Trent Water	Partner Organisation	2	Hydrological & Hydraulic Study of Priorslee Reservoir – October 2010
INC043	Shropshire Council	Local Authority	2	Drawing & Photos of Church Stretton Town Culvert from archives
INC044	Surveyors	External Data Provider	1	Survey of Wesley Brook and Silvermere lake (2010 – 2011)
INC045	Surveyors	External Data Provider	1	CCTV survey of culverts in the Three Towns (2010 – 2011)
INC046	Surveyors	External Data Provider	1	Survey of watercourses in Church Stretton (2010 – 2011)
INC047	Surveyors	External Data Provider	1	Survey of watercourses in Craven Arms (2010 – 2011)
INC048	Natural England	External Data Provider	1	GIS mapping of the Environmental Sites & Receptors
INC049	Environment Agency	Partner Organisation	2	Planned improvements to Flood Warning Services in Midlands West area – Including the Wesley Brook in Shifnal
INC050	Shropshire Council	Local Authority	2	Drawing of new Silvermere Pond high level outfall and culvert
INC051	Shropshire Council	Local Authority	2	Additional topographic and channel survey of watercourse around Park Lane, Shifnal
INC052	Shropshire Council	Local Authority	2	Additional topographic and channel survey of watercourse around Aston Road, Shifnal
INC053	Shropshire Council	Local Authority	2	Details of current sewer re-lining being undertaken in Church Stretton
INC054	Shropshire Council	Local Authority	2	Update of Flood forum information (February 2011)
INC055	Shropshire Council	Local Authority	2	CCTV of Ludlow Road culverts from the EA
INC056	Shropshire Council	Local Authority	2	South West Shropshire Flood Forum Notes of meeting 16/09/10
INC057	Shropshire Council	Local Authority	2	Shifnal and Albrighton Flood Forum Notes of meeting 16/10/10
INC058	Shropshire Council	Local Authority	2	National Order for Surface Water Risk – taken from Environment Agency datasets based on Areas Susceptible to Surface water flooding.



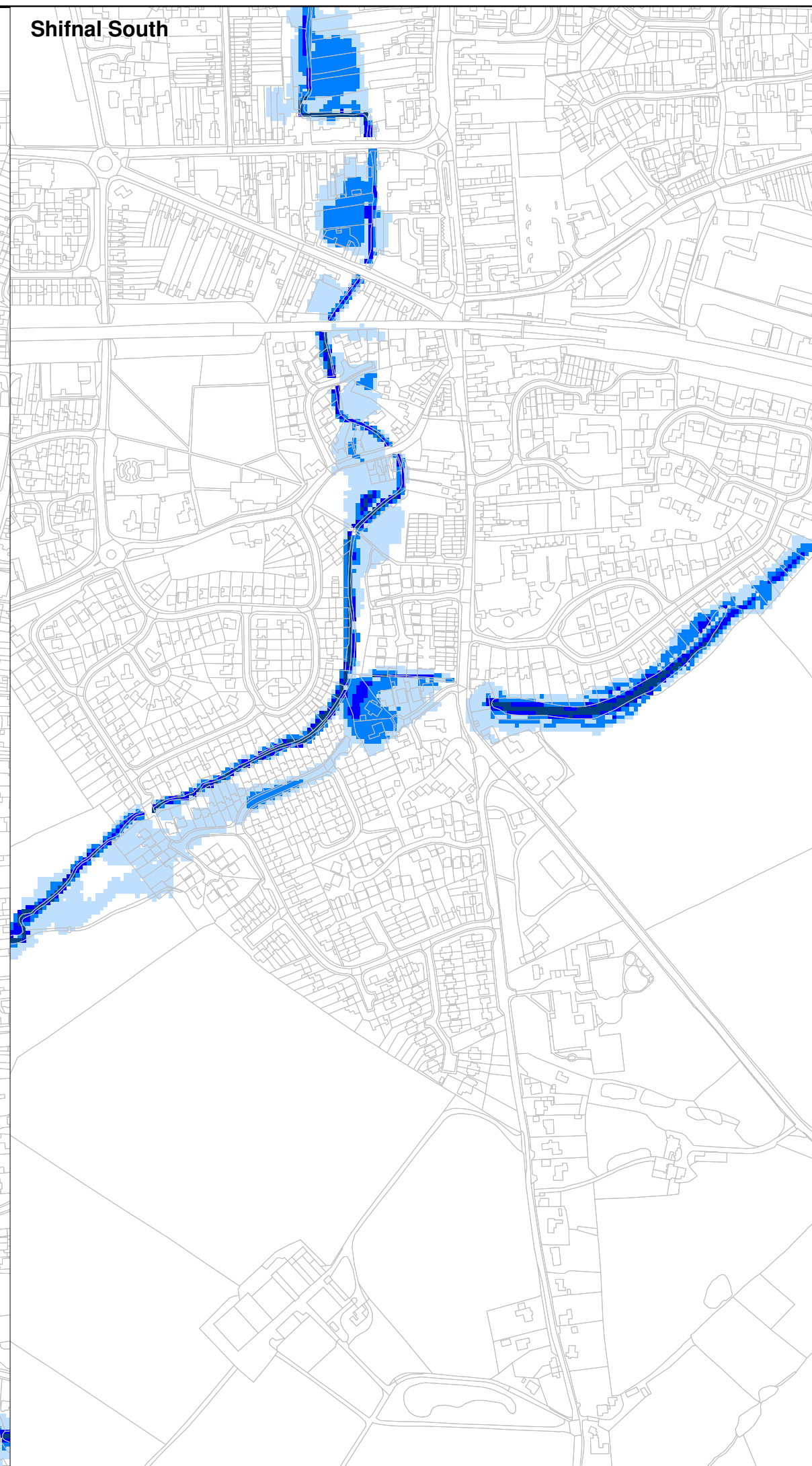
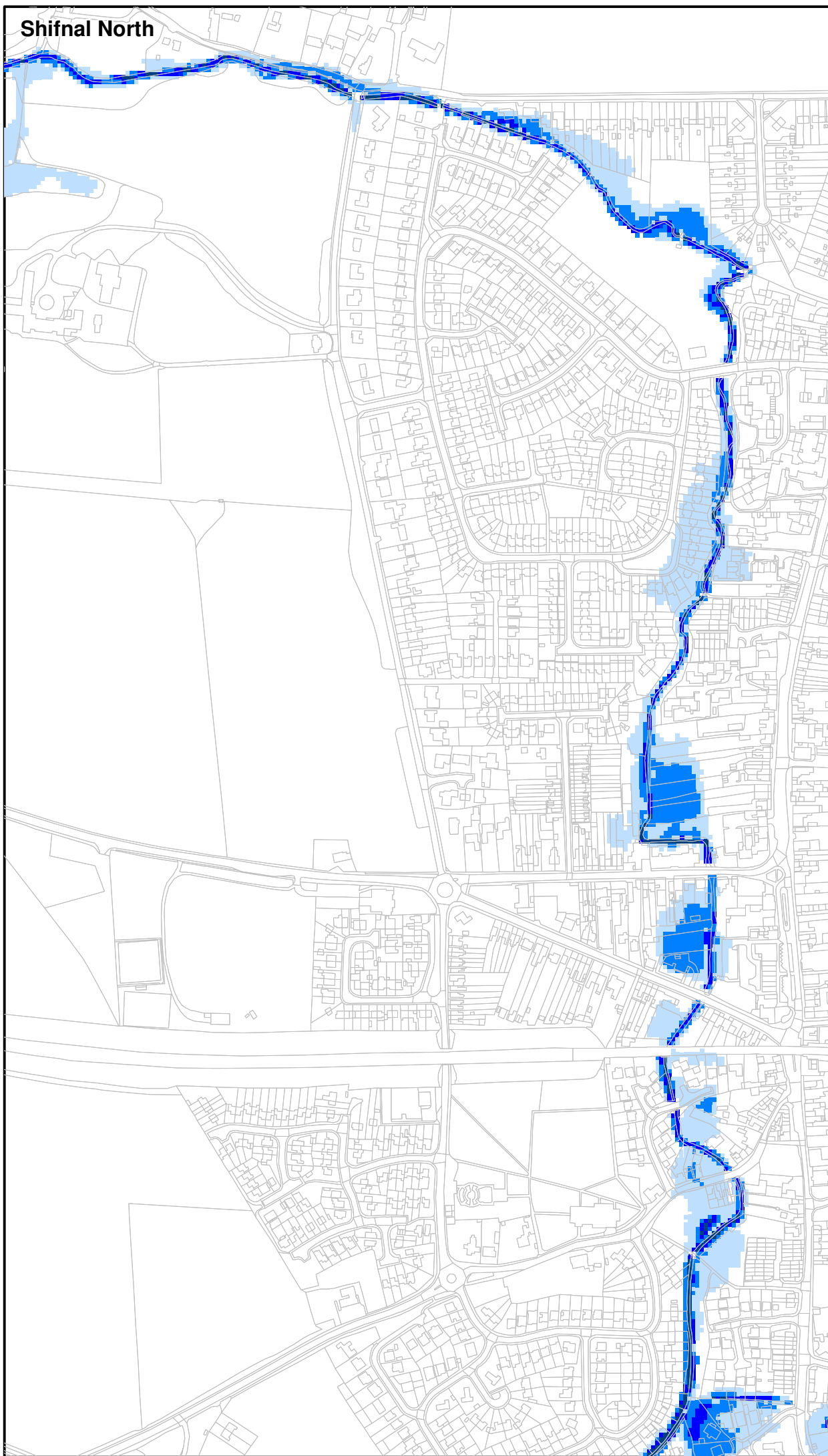
# Appendix B

## Drawings

Flood Depth and Hazard Maps – Baseline

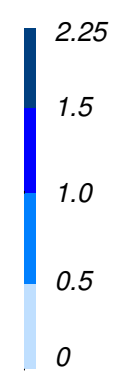






**LEGEND**

Depth (m)



Model version 24

Map not suitable to assess flood risk to individual properties.

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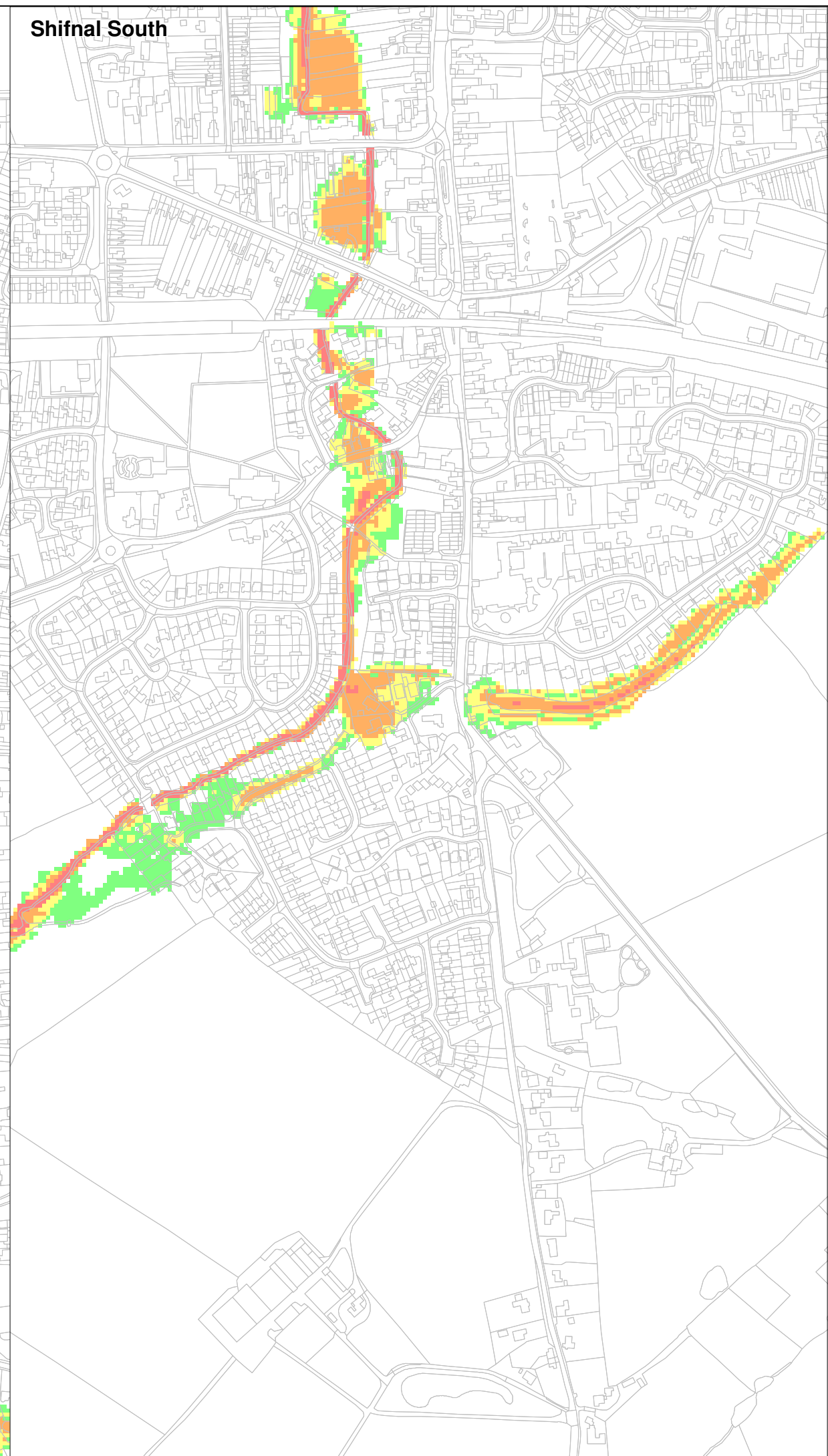
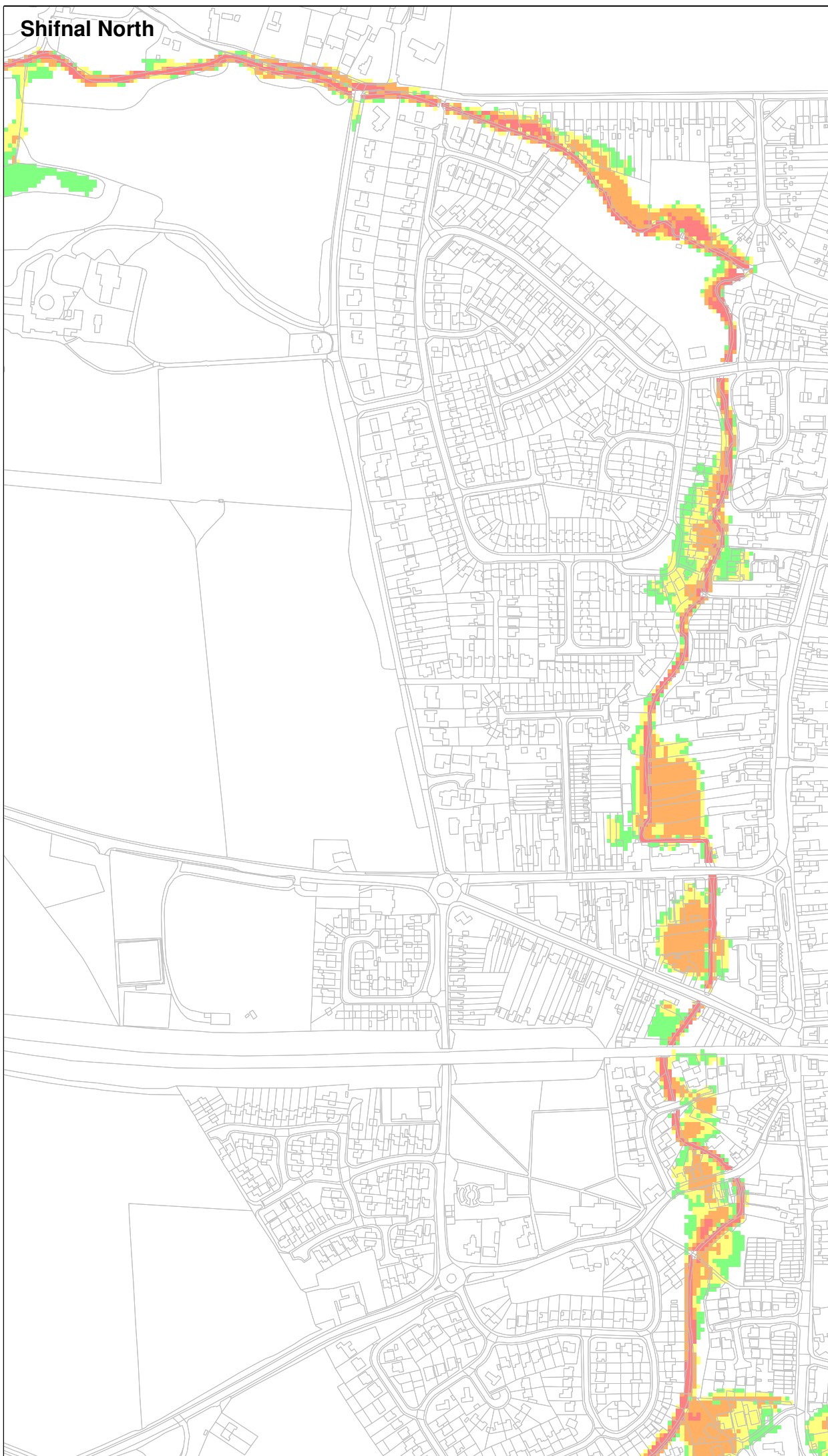
**SHIFNAL SURFACE WATER MANAGEMENT PLAN**

**SHIFNAL: WESLEY BROOK**  
**PREDICTED FLOOD EXTENTS 1% AEP**  
*(1 in 100 chance of occurring in any given year)*

SCALE 1:5,000 @ A3	Produced	CLG	02-02-12
	Checked	LAF	02-02-12
	Approved	LAF	02-02-12

DRAWING NO.  
0118-UA002182-BMD-03





**LEGEND**

*Hazard Rating*

- Very Low Hazard - Caution
- Moderate Hazard - Danger for Some
- Significant Hazard - Danger for Most
- Extreme Hazard - Danger for All

*Model version 24*

*Map not suitable to assess flood risk to individual properties.*

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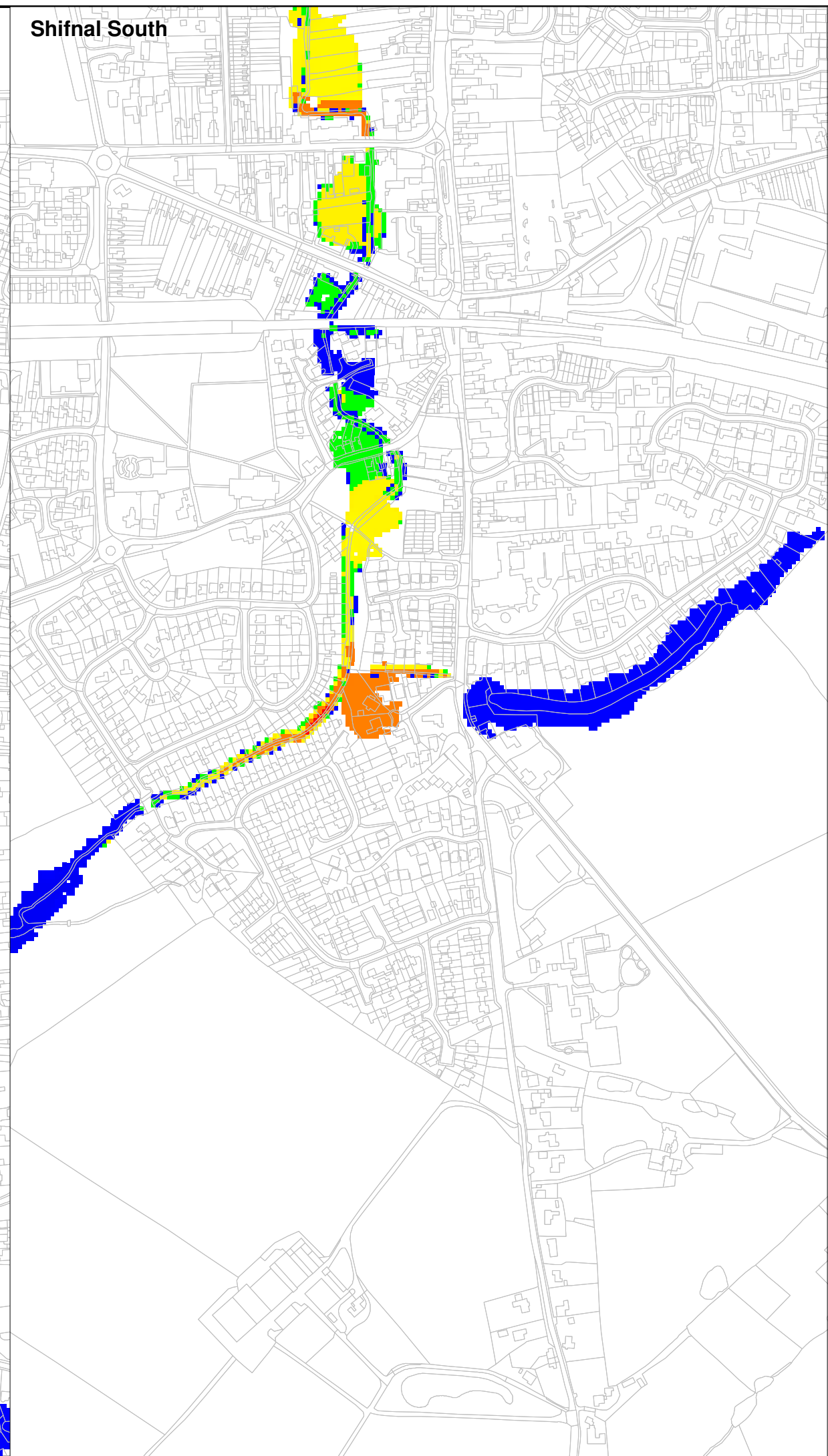
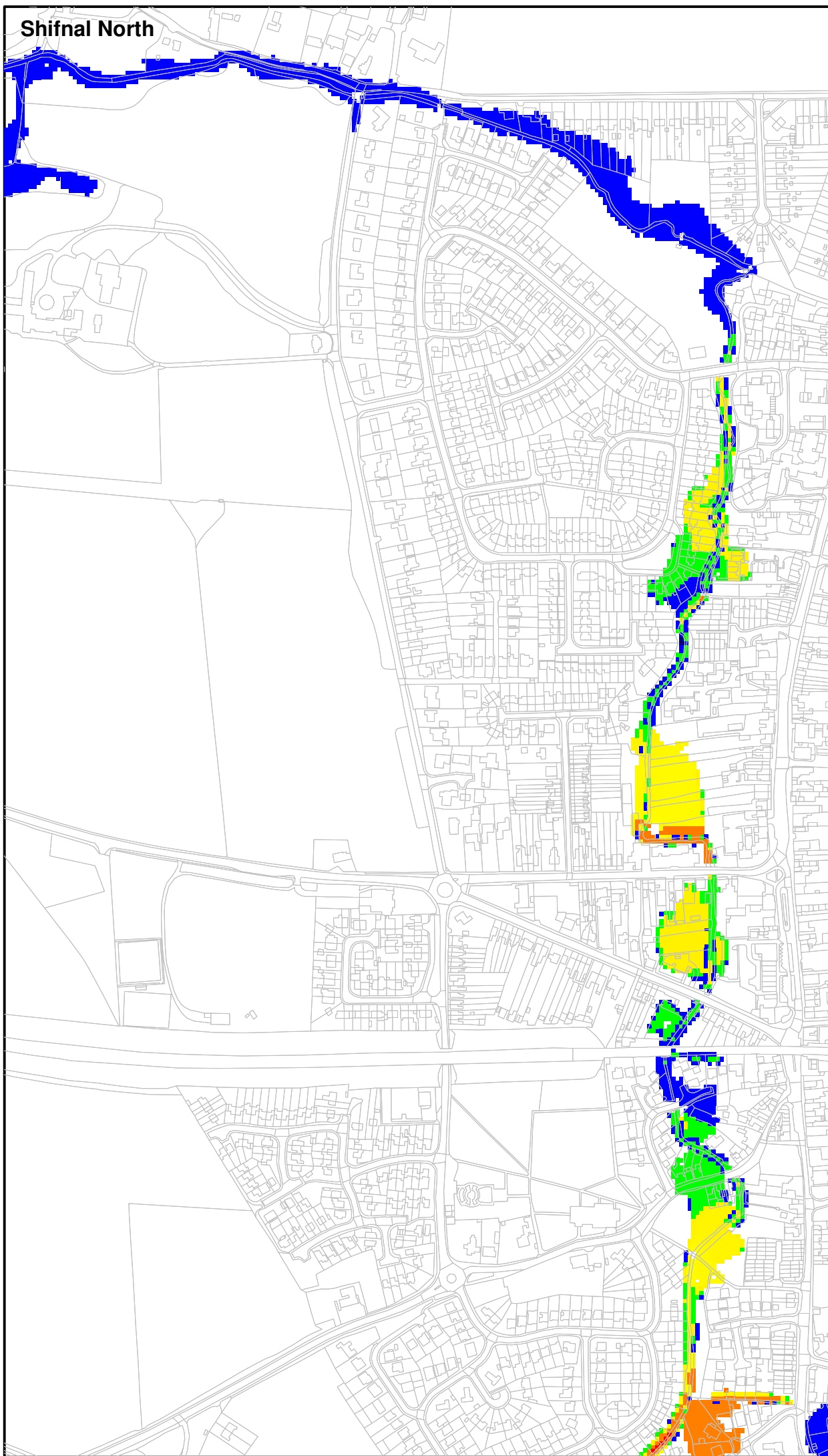
**SHIFNAL SURFACE WATER MANAGEMENT PLAN**

**SHIFNAL: WESLEY BROOK**  
**PREDICTED FLOOD HAZARD 1% AEP**  
*(1 in 100 chance of occurring in any given year)*

SCALE 1:5,000 @ A3	Produced	CLG	02-02-12
	Checked	LAF	02-02-12
	Approved	LAF	02-02-12

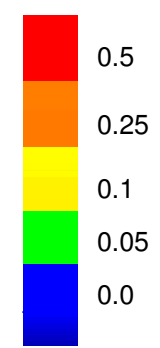
DRAWING NO.  
0132-UA002182-BMD-03





**LEGEND**

Depth Reduction (m)



Model version 24

Map not suitable to assess flood risk to individual properties.

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**Shropshire Council**

Shirehall, Abbey Foregate, Shrewsbury, SY2 6ND

**SHIFNAL SURFACE WATER MANAGEMENT PLAN**

**SHIFNAL: WESLEY BROOK CHANNEL WIDENING OPTION  
DEPTH REDUCTION 1% AEP**

*(1 in 100 chance of occurring in any given year)*

SCALE 1:5,000 @ A3	Produced	CLG	02-02-12
	Checked	LAF	02-02-12
	Approved	LAF	02-02-12

DRAWING NO.  
0125-UA002182-BMD-03



# Appendix C

## Multi Criteria Analysis Data

C1 Type Weightings



MCM Code	Type of use	Number in Wetspot	Suggested Multi Criteria Weighting	Majority Social Class	Social Weighting (Assumed Unity)	Flood Susceptibility				Basis of weighting
						Shallow	Deep	Total Score	MC Score	
<b>Domestic Properties</b>										
1	Detached		2.34	AB	1			0	0	The overall multi-criteria score is commensurate with an approximation of the number of household units inundated.
1	Semi-Detached		2.34	AB	1			0	0	
1	Terrace		2.34	AB	1			0	0	
1	Flat		2.34	AB	1			0	0	
	Upper middle and middle class	AB	0.74							Weighting used in the Multi-Coloured Manual. (Relatively easy to apply and can also be applied separately)
	Lower middle class	C1	1.12							
	Skilled working class	C2	1.22							
	Working class and those at the lowest level of subsistence	DE	1.64							
<b>Flood Susceptibility</b>										
		Number in Wetspot	Suggested Multi Criteria Weighting			Shallow	Deep	Total Score	MC Score	
610	School/College/University/Nursery	0	50					0	0	
620	Surgery/Health Centre - Urban	0	50					0	0	
	Surgery/Health Centre - Rural	0	100					0	0	
625	Residential / Care Home	0	50					0	0	
650	Fire/Ambulance station									
	Fire (Regional HQ)		100					0	0	
	Fire station (District)		50					0	0	
	Fire station (Local/Retained)		20					0	0	
	Ambulance station (Regional HQ)		100					0	0	
	Ambulance Station		50					0	0	
651	Police Station									
	Police Station (Constabulary HQ)		100					0	0	Based upon estimate of relative importance.
	Police Station (District HQ)		50					0	0	
	Police Station (Local)		20					0	0	
660	Hospitals									Based upon approximate number of beds within hospital.
	Large Regional Hospital (>1000 beds) with A&E		1125					0	0	
	Large Regional Hospital (>1000 beds)		1000					0	0	
	Medium Sized Hospital (500 to 1000 beds) with A&E		950					0	0	
	Medium Sized Hospital (500 to 1000 beds)		750					0	0	
	Small Hospital (200 to 500 beds) with A&E		600					0	0	
	Small Hospital (200 to 500 beds)		350					0	0	
	Cottage Hospital (Up to 200 beds) with A&E		250					0	0	
	Cottage Hospital (Up to 200 beds)		100					0	0	
901	Emergency Response Centre		1					0	0	
911	Integrated Pollution Prevention Control IPPC (Active)		25					0	0	
912	Waste Licence REGIS Site		25					0	0	
913	Historic Landfill Site		25					0	0	
914	Radioactive RAS Sites (Active Licence)		25					0	0	
915	Radioactive RAS Sites (Active Disposal)		25					0	0	
921/922	Pumping Station (Foul/SW) - In-line		50					0	0	
921/922	Pumping Station (Foul/SW) - Small TPS		100					0	0	
921/922	Pumping Station (Foul/SW) - Trunk TPS		500					0	0	
931	Pumping Station (Potable Water)		1					0	0	
840	Wastewater Treatment Works		500					0	0	
932	Water Treatment Works		1500					0	0	
933	Oil & Gas Refineries		1					0	0	
934	Power Stations		1500					0	0	
935	Electricity Sub-Stations		10					0	0	
936	Telephone Exchange		100					0	0	
211	(High Street) Shop		1					0	0	
213	Superstore/Hypermarket		10					0	0	
214	Retail Warehouse		1					0	0	
215	Showroom		1					0	0	
216	Kiosk		1					0	0	
217	Outdoor market		1					0	0	
218	Indoor Market		1					0	0	
221	Vehicle Repair Garage		1					0	0	
222	Petrol Filling Station		1					0	0	
223	Car Showroom		1					0	0	
224	Plant Hire		1					0	0	
231	Hairdressing Salon		1					0	0	
232	Betting Shop		1					0	0	
233	Laundrette		1					0	0	
234	Pub/Social club/wine bar		1					0	0	
235	Restaurant		1					0	0	
236	Café/Food Court		1					0	0	
237	Post Office		1					0	0	
238	Garden Centre		1					0	0	
310	Offices (non specific)		1					0	0	
311	Computer Centres (Hi-Tech)		1					0	0	
320	Bank		1					0	0	
410	Warehouse (including store)		1					0	0	
411	Warehouse Electrical		1					0	0	
412	Warehouse Non Frozen		1					0	0	
413	Warehouse Frozen		1					0	0	
420	Land Used for Storage		1					0	0	
430	Road Haulage		1					0	0	
511	Hotel		1					0	0	
512	Boarding House		1					0	0	
513	Caravan Mobile		1					0	0	
514	Caravan Static		1					0	0	
515	Self catering Unit		1					0	0	
516	Hostel (including prisons)		1					0	0	
517	Bingo hall		1					0	0	
518	Theatre/Cinema		1					0	0	
519	Beach Hut		1					0	0	
521	Sports Grounds and Playing Fields		1					0	0	
522	Golf Courses		1					0	0	
523	Sports and Leisure centres		1					0	0	
524	Amusement Arcade/Park		1					0	0	
525	Football Ground and Stadia		1					0	0	
526	Mooring/Wharf/Marina		1					0	0	
527	Swimming Pool		1					0	0	
630	Community Centres/Halls		1					0	0	
640	Library		1					0	0	
670	Museum		1					0	0	
680	Law court		1					0	0	
690	Church		1					0	0	
810	Workshop		1					0	0	
820	Factory/Works/Mill		1					0	0	
830	Extractive/Heavy Industry		1					0	0	
850	Sewage treatment works		1					0	0	
920	Laboratory		1					0	0	
950	Dock hereditament		1					0	0	
960	Electricity Hereditament		1					0	0	
999	General Commercial		1					0	0	
	National Trust Site		1					0	0	
	English Heritage Listed Buildings Site		1					0	0	

CADW Listed Buildings Site		1					0	0	
Article 4 Designations		1					0	0	
					Flood Susceptibility				
		Number in Wetspot	Suggested Multi Criteria Weighting		Shallow	Deep	Total Score	MC Score	
Motorway			500				0	0	The MCA for Transport infrastructure is based upon the length affected multiplied by the weighting. The MCA for 50m flooding on the M11 flooded to a depth of between 0.1 and 0.3m would therefore be 100.
Trunk Road			400				0	0	
County Highway			100				0	0	
Priority Route (to Emergency Services Centres or rural communities)			500				0	0	
Railway			600				0	0	
Metro / Underground Railway			1				0	0	
Tramway			1				0	0	
National (Footpath or Cycle) Trail			1				0	0	
					Flood Susceptibility				
		Number in Wetspot	Suggested Multi Criteria Weighting		Shallow	Deep	Total Score	MC Score	
Special Area of Conservation (SAC)			25				0	0	The MCA for Land and Open Space is based upon the area affected, multiplied by the weighting. The use of weightings has to be considered carefully for this group. For example the impact of Surface Water "Flooding" to wetlands such as the Norfolk Broads and Wicken Fen may not be consider to be a problem and a higher weighting which indicate that it is detrimental may not necessarily be valid. SACs, SPAs, RAMSAR sites may all fall within this category and if flooding is not consider detrimental they may be excluded from the analysis by assigning a flood susceptibility weighting of 0 if appropriate.
Special Areas of Protection (SPA)			25				0	0	
RAMSAR Site			25				0	0	
Site of Special Scientific Interest (SSSI)			25				0	0	
Area of Outstanding Natural Beauty (AONB)			15				0	0	
National Nature Reserves (NNR)			15				0	0	
County & City Wildlife Site			10				0	0	
County & City Nature Reserve			10				0	0	
RSBP Reserve			10				0	0	
WWF Reserve			10				0	0	
Woodland			10				0	0	
Ancient Woodland, Fens & ESAs (Natural England)			10				0	0	
World Heritage Site			10				0	0	
Heritage Coast			10				0	0	
English Heritage Battlefield Site			10				0	0	
National Park			10				0	0	
County Park			10				0	0	
Parks and Gardens of Special Historical Interest			10				0	0	
Scheduled Ancient Monuments (SAMs)			10				0	0	
Grade 1 Agricultural Land			5				0	0	
Grade 2 Agricultural Land			4				0	0	
Grade 3 Agricultural Land			2				0	0	
Grade 4 Agricultural Land			0				0	0	
Grade 5 Agricultural Land			0				0	0	
Non-Agricultural Land			0				0	0	
							0	0	



Flood Risk Area	Multi-Criteria Analysis							Area	Area Weighted						Rank on weighted total	Historic Score	Final Score	Final Ranking	
	Domestic	Critical	Non-Domestic	Transport	Cultural	Environmental	Total		Domestic	Critical	Non-Domestic	Transport	Cultural	Environmental					Total
Admiral's Way	14	0	0	0	0	0	14	3.509	4.00	0.00	0.00	0.00	0.00	0.10	4.1	3	4	12	9
Beech Drive	70	0	0	0	0	1	72	1.821	38.55	0.00	0.00	0.00	0.00	0.82	39.4	9	13	117	2
Bluegate	66	0	5	0	0	4	74	2.976	22.02	0.00	1.68	0.00	0.00	1.24	24.9	8	1	8	12
Broadway	26	0	0	0	0	2	27	3.942	6.53	0.00	0.00	0.00	0.00	0.44	7.0	4	6	24	8
Brooklands Avenue	12	0	0	0	0	1	12	1.575	7.43	0.00	0.00	0.00	0.00	0.35	7.8	6	12	72	4
Church Meadow	35	100	6	100	6	4	251	3.425	10.25	29.20	1.75	29.20	1.75	1.13	73.3	12	10	120	1
East Shifnal	484	50	1	0	0	17	553	10.33	46.88	4.84	0.10	0.00	0.00	1.67	53.5	11	1	11	11
Haughton Road	26	0	0	0	0	8	33	4.687	5.49	0.00	0.00	0.00	0.00	1.61	7.1	5	10	50	6
Newfield Close	9	0	0	0	0	0	10	2.417	3.87	0.00	0.00	0.00	0.00	0.08	4.0	2	6	12	9
Shifnal Schools	0	0	3	0	0	2	5	16.68	0.00	0.00	0.18	0.00	0.00	0.14	0.3	1	1	1	13
Shrewsbury Road	56	100	1	100	2	4	263	2.69	20.88	37.17	0.37	37.17	0.74	1.33	97.7	13	6	78	3
Silvermere Park	89	0	0	100	0	6	195	4.515	19.69	0.00	0.00	22.15	0.00	1.43	43.3	10	6	60	5
Wesley Crescent	9	0	0	0	0	1	10	1.039	9.01	0.00	0.00	0.00	0.00	0.70	9.7	7	4	28	7

Wetspot	Reason	Size_Ha	No. Of Historical Reports	No. Of Properties in "Deep" Map	Rank on Historic Floods
Admiral's Way	Historical Flooding	3.509	1	0	4
Beech Drive	Future Flood Risk	1.821	16	6	13
Bluegate	Future Flood Risk	2.976	0	3	1
Broadway	Historical Flooding	3.942	2	0	6
Brooklands Avenue	Historical Flooding	1.575	4	0	12
Church Meadow	Historical Flooding	3.425	3	15	10
East Shifnal	Future Flood Risk	10.333	0	40	1
Haughton Road	Historical Flooding	4.687	3	2	10
Newfield Close	Historical Flooding	2.417	2	-	6
Shifnal Schools	Future Flood Risk	16.684	0	-	1
Shrewsbury Road	Historical Flooding	2.69	2	11	6
Silvermere Park	Historical Flooding	4.515	2	17	6
Wesley Crescent	Historical Flooding	1.039	1	-	4



## Appendix D

# Hydraulic Modelling

D1 Wesley Brook Section 105 Model Review

D2 Wesley Brook Option Modelling Report



# Appendix D1

## Section 105 Model Review

### **Purpose of the Review**

Hyder Consulting have been provided with the 2003 Section 105 ISIS model for the Wesley Brook, constructed by Black and Veatch and reviewed by Jacobs. This memo outlines the findings from a high level review carried out by Hyder in October 2010. The scope of the review comprises:

- Identification of any missing structures in the Shifnal urban area
- Spot checks on matching survey data with ISIS river sections

A detailed review has not been carried out as the model was originally reviewed by a second consultant and subsequently signed off by the Environment Agency.

### **Model Extents**

The full model extends from Priorslee Lake, north of the M54 to the confluence of the Wesley Brook with the River Worfe. The river chainage of interest is from the upstream limit (10422) to 4195 at downstream of the sewage works.

### **Omitted Structures**

The model includes notes where structures have been omitted from the study. The following structures within the reach of interest have been omitted.

Section	Type	Easting	Northing	Location	Reason for Omission	HCL	Suggested Actions
131408_9643	Bridge	373261	309079	North of M54	Negligible impact on flood levels during flood conditions	None	
131408_8189	Bridge	374457	308599	Haughton Village Farm, north Shifnal	Negligible impact on flood levels during flood conditions		Include in model (already surveyed)
131408_7823	Bridge	374773	308462	Wheatfield Drive Recreation Ground	Negligible impact on flood levels during flood conditions		Include as it could block and increase flood risk to surrounding properties. (survey data already available)
131408_7750	Bridge	374839	308428	Woolpack Close	Causing severe instabilities and hydraulic influence of it was very localised. Cross section also removed from model	model and the influence of it was surrounding properties. (survey data already available)	Include as it could block and increase flood risk to surrounding properties. (survey data already available)
131408_6898	Bridge			Railway	Negligible impact on flood levels during flood conditions	None;	Large viaduct which can be left out of the model

**Table C1-1 Omitted structures (chainage 10422 to 4195)**

### Interpolated Data

Comments in the model make reference to a number of structures where data was interpolated, these are listed in Table C1-2.

Section	Type	Easting	Northing	Location	Interpolated	HCL	Suggested Actions
131408_9627	Weir	373269	309064	M54 bridge, upstream side	Upstream, crest and downstream	None;	there are a number of restrictions downstream which will impact on Shifnal flood risk.
131408_8849	Weir	373842	308657	Upstream Haughton Mill	Upstream, crest and downstream		Survey this as there may be scope for inclusion in a potential alleviation scheme further down the line
131407_8626	Weir	374041	308632	Haughton Mill	Upstream, crest and downstream		Obtain further survey data to refine model. Noted that significant amounts of interpolation were not required.
131407_8448	Weir	374208	308614	Shiloh Cottage, Downstream Haughton Mill	Upstream, crest and downstream		Obtain further survey data to refine model

**Table C1-2 Interpolated Structures**

## Survey Checks

Section ID	Source	Discrepancies	Notes
131406_8111	Total Surveys	-	Section checked, soffit level of bridge checked
131406_7632	Total Surveys	-	Section checked, soffit level of bridge checked
131406_7042	Total Surveys	-	Section checked
131406_6693	Total Surveys	-	Section checked, soffit level of bridge checked
131406_6197	Total Surveys	-	Section checked, soffit level of bridge checked
131406_4951	Total Surveys	-	Section checked, soffit level of bridge checked

**Table C1-3 Survey Data checks**

### Weirs

Checked Haughton Mill Weir; represented as a spill unit. Crest level correct.

Checked Shiloh Cottage Weir; represented as a spill unit. Crest level correct.

### New Survey Data

It is recommended that since the survey data used in the Section 105 model was obtained in 2002, some new cross sections are obtained and compared. Details are given in Table C1-4.

Section ID	Easting	Northing	Notes
131406_8111	374533	308587	Check bridge soffit as well
131406_7632	374816	308333	Check bridge soffit as well
131406_7042	374797	307844	Section check only
131406_6693	374820	307537	Check bridge soffit as well
131406_6197	374587	307177	Check bridge soffit as well
131406_5085	374136	306297	Section check only
131406_4601	374087	305831	Section check only

**Table C1-4 Survey Checks**

In addition, new sections at the locations shown in Table 5 are required following site visit and model review.

Section ID	Easting	Northing	Notes
131406_6370	374743	307250	Known flooding issues in this location
131406_6403	374768	307273	Known flooding issues in this location
131406_6450	374785	307318	Known flooding issues in this location – need to pick up the details of the flapped outfall
131406_7200	374741	307938	New development
131406_7160	374741	307899	New development
131406_8626	374041	308632	Further detail on weir required
131406_8448	374208	308613	Further detail on weir required
131406_6500	374782	307367	
131406_6555	374783	307422	
131406_7124	374732	307862	
131406_7160	374741	307898	
131406_8849	3738	308658	
Outfall_1	374839	308426	Invert levels, diameter
Outfall_2	374782	307311	Invert levels, diameter
Threshold Levels	374722	307914	New development
Trib_000	374807	307308	
Trib_040	374847	307308	
Trib_075	374882	307305	
Trib_115	374921	307284	
Trib_218	375023	307274	
Trib_320	375110	307328	
Trib_380	375147	307375	

**Table C1-5 Additional Survey Sections**

### Hydrology

The hydrological assessment was carried out in 2003; subsequently there have been a number of developments in hydrology including updated versions of the FEH CDROM and WINFAP-FEH, the replacement of the Flood Studies Report Rainfall Runoff (FSR RR) method with the Revitalised Flood Hydrograph (ReFH) and the new FEH Statistical procedures. Additionally, the release and subsequent updating of the Environment Agency hi-flows database has also occurred since the model was issued.

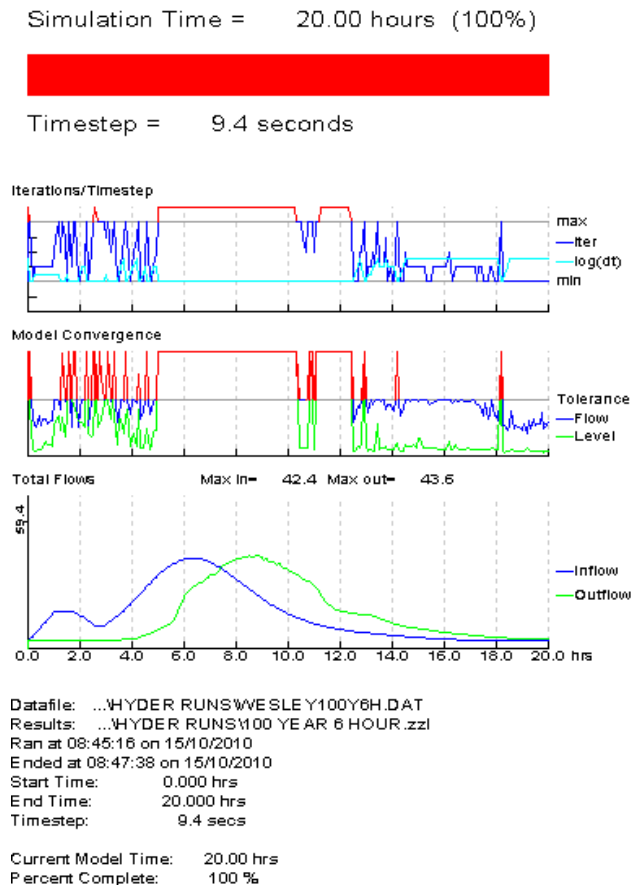
It is therefore recommended that a review of the hydrology is carried out and revised in accordance with current best practice methodology.



## Model Runs

No run files (.ief) have been provided with the model. Review of the .zsd file indicates that the model was run as 'unsteady adaptive' for 20 hours with an initial timestep of 10 seconds and a minimum timestep of 1 second.

Hyder have replicated these parameters and re-run the model with initial conditions taken from the .dat file. The maximum iterations and dflood are default values of 6 and 3m respectively. The model runs to completion but exhibits non convergence for much of the simulation as illustrated by Figure 1. The nodes at which non convergence occurs are distributed throughout the model.



**Figure C1-1 100-year 6-hour convergence plot**

A comparison of the results given by the Environment Agency and the Hyder re-run results indicates that the maximum difference at a given node is 0.76m although the majority of values (modal value) are 0.003m. The largest differences occur from chainage 1188 to 1289 (towards the downstream extent of the model).

# Appendix D2

## Options Modelling

### Upstream Storage

An assessment of the potential volume of upstream storage required for the following scenarios was made:

- No out of bank flooding (50% AEP) (scenario A flows)
- No property flooding (1 in 2 annual chance of flooding) (Beech Drive used as an indicator as these are the first properties to flood)

In each case the difference in event volumes over a 10 hour duration (this is the point at which flows for a 1% and 20% AEP reach the peak scenario A flows) was assessed to determine the overall storage required. Results are shown in Table D2-1.

Event	No Out of Bank Flooding	No Property Flooding
1%AEP	143,961	117,444
20%AEP	76,894	50,377
50%AEP	26,517	N/A

**Table D2-1 Estimated storage volumes**

The magnitude of these volumes is such that any individual scheme the dam would be classified under the Flood and Water Management Act (over 10,000m<sup>3</sup>). It is considered that the safety, spatial and cost implications of providing this storage are not commensurate with the reduction of flood risk in Shifnal.

### Channel Widening

The channel geometry of the existing Wesley Brook through Shifnal is variable. Therefore to improve conveyance and thus reduce predicted water levels the potential to widen the channel base to a more constant width through the town has been modelled.

Modifications have been made to channel sections from Wheatfield Drive to Stafford Avenue; no change has been made to the existing bank tops however where base widths were less than 4m these have been increased to approximately 4m where practical. No changes to structures were made either as it is recognised that this would be considerably more costly and disruptive. Figure D2-1 shows the extent of channel modifications.



Figure D2-1 Extent of Channel Widening

The model was run for the 20% AEP (1 in 5 annual chance), 4% AEP (1 in 25 annual chance), 2% AEP (1 in 50 annual chance) and 1% AEP (1 in 100 annual chance). Long section plots are shown in Figures D2-2 to D2-4 below. In each case, baseline levels are shown in blue and proposed (widened channel) levels in red.



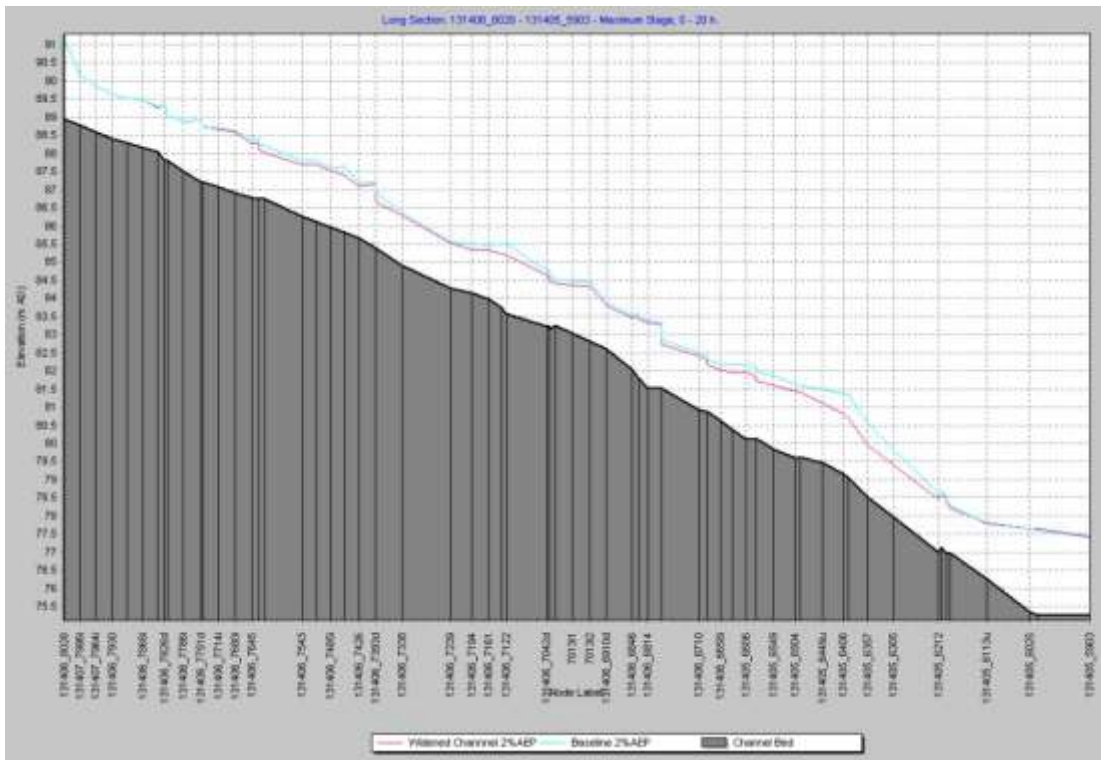


Figure D2-3 2% AEP Long Section

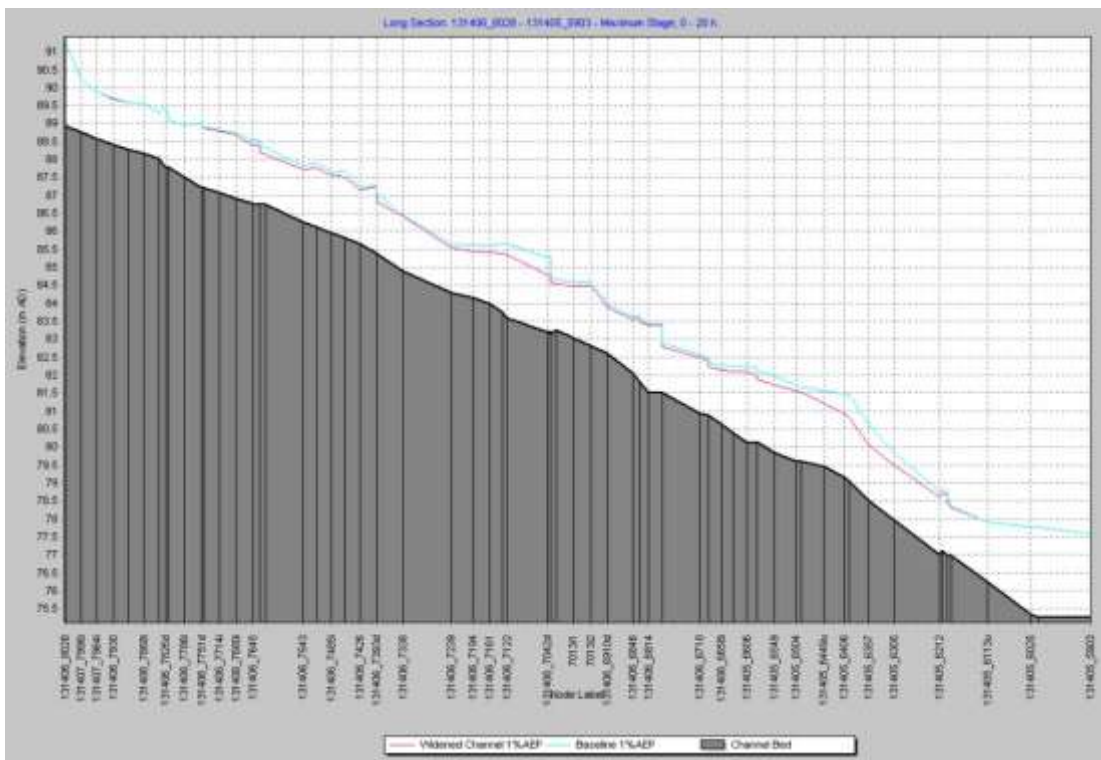


Figure D2-4 1% AEP Long Section

Drawings in Appendix B show the potential reduction in depths on the floodplain as a result of widening the channel for each event.

Model results demonstrate that by widening the channel base and thus improving the conveyance of the Wesley Brook through Shifnal, predicted flood depths are reduced. Notable improvements are observed on the left bank near Brook Drive and at Shrewsbury Road and Victoria Road.

The long sections and maps demonstrate that the proposed widening does not increase flood risk to third parties upstream or downstream of the works.

### **Silvermere Culvert**

The Wesley Brook model was used to investigate the impact of culverting the final reach of the Silvermere Stream where from Park Street to its confluence with the Wesley Brook. The modelling was undertaken to determine if keeping the flows within a culvert could reduce flooding to the properties on Brook Drive.



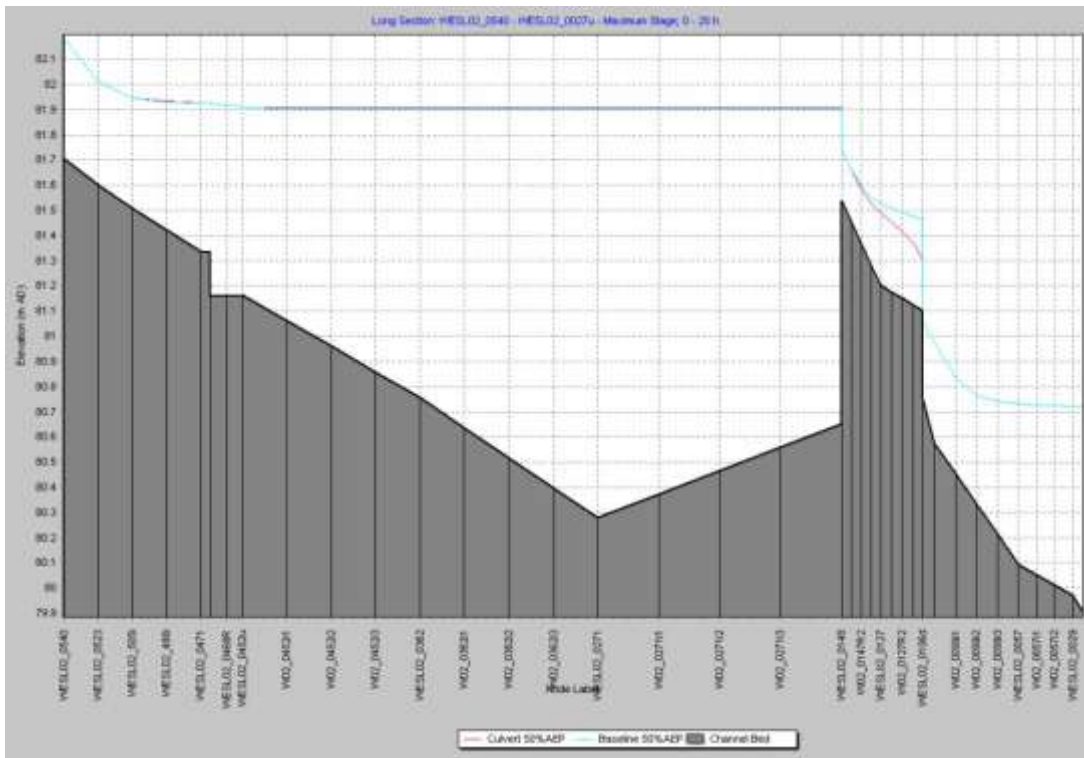


Figure D2-5 50%AEP Silvermere Long Section

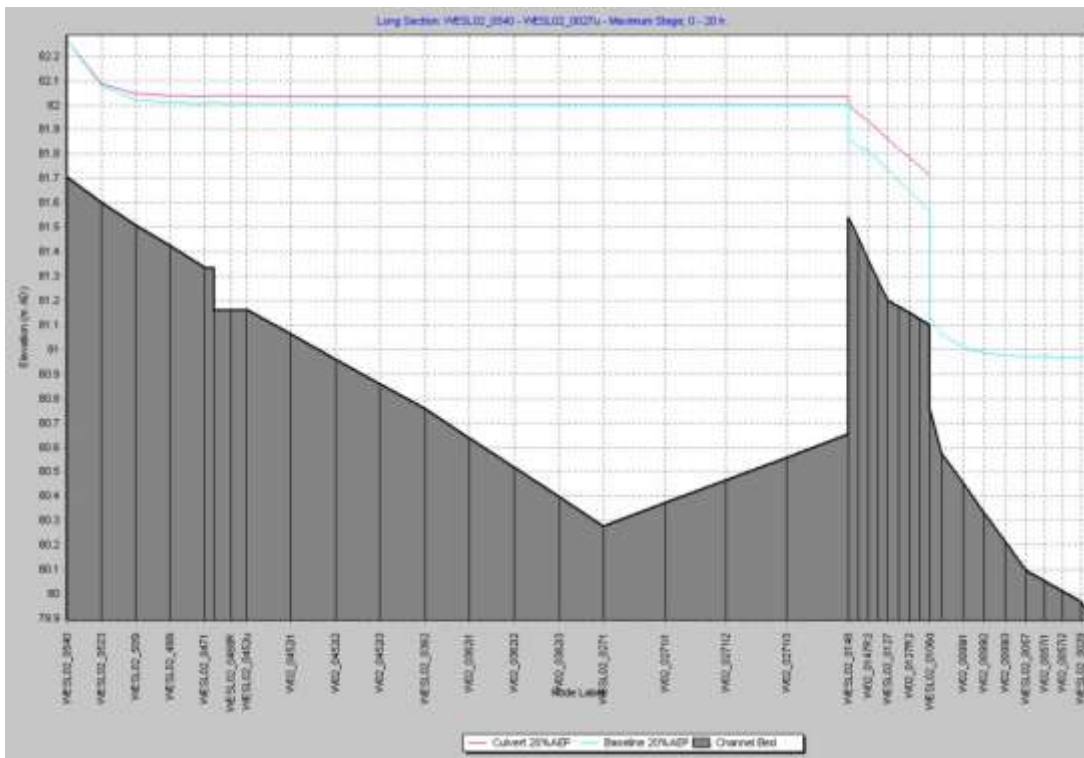


Figure D2-6 20%AEP Silvermere Long Section

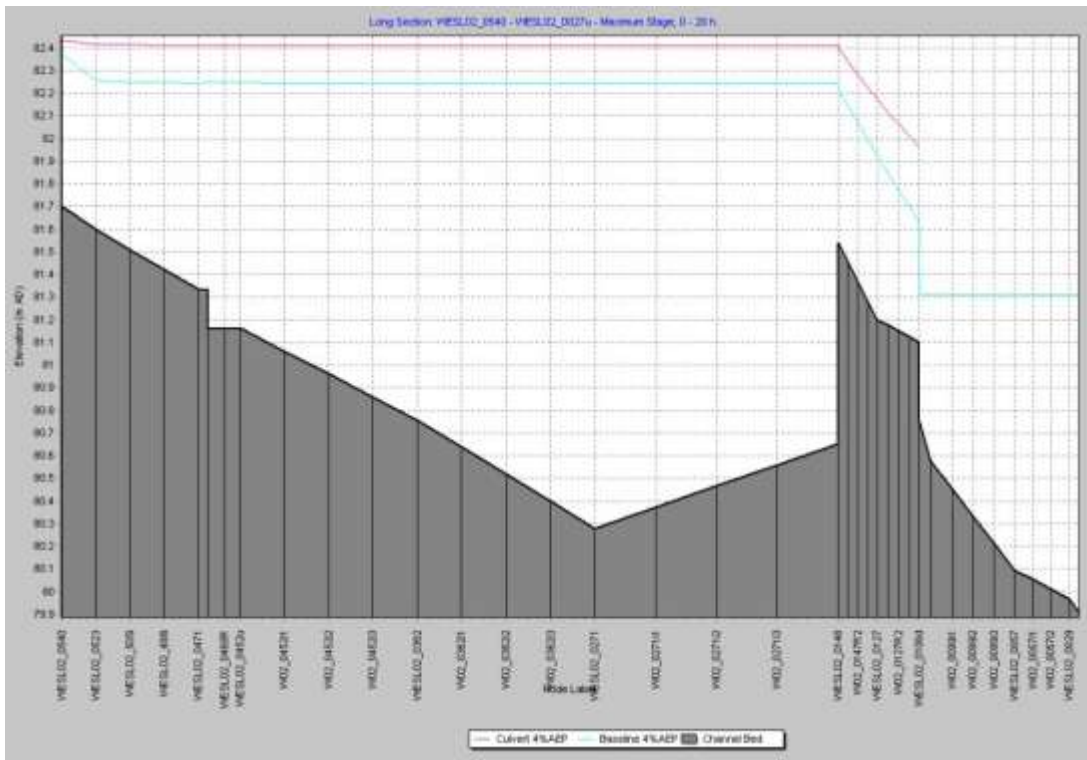


Figure D2-7 4%AEP Silvermere Long Section

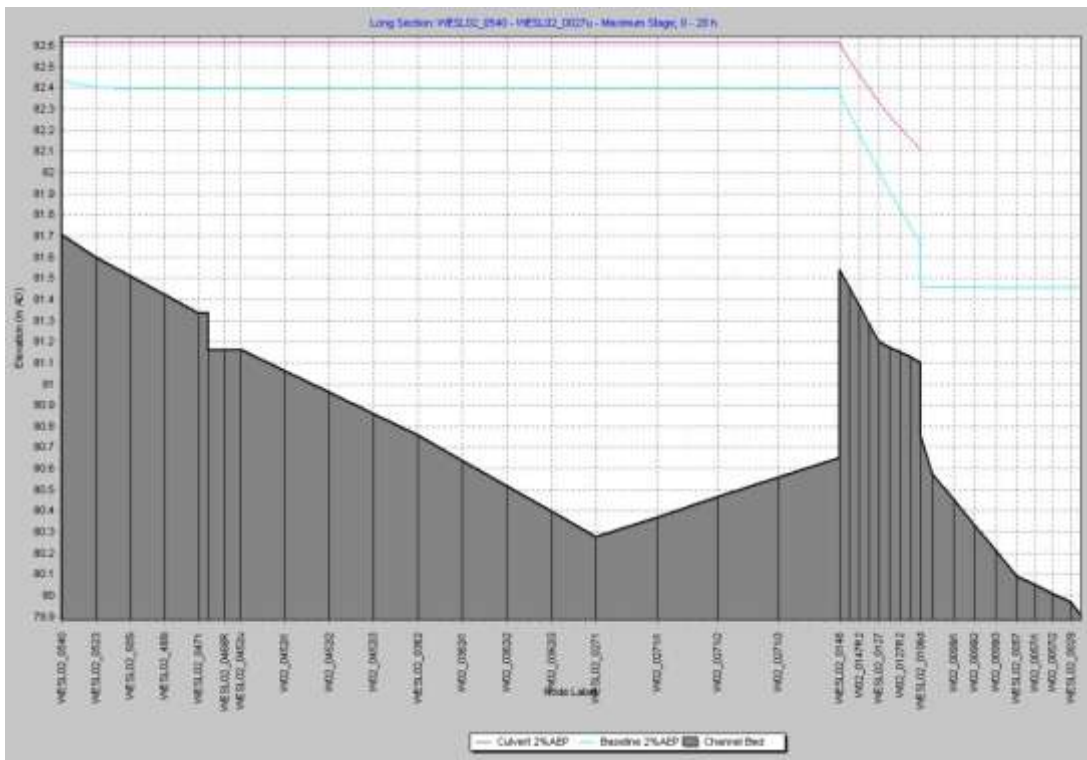


Figure D2-8 2%AEP Silvermere Long Section



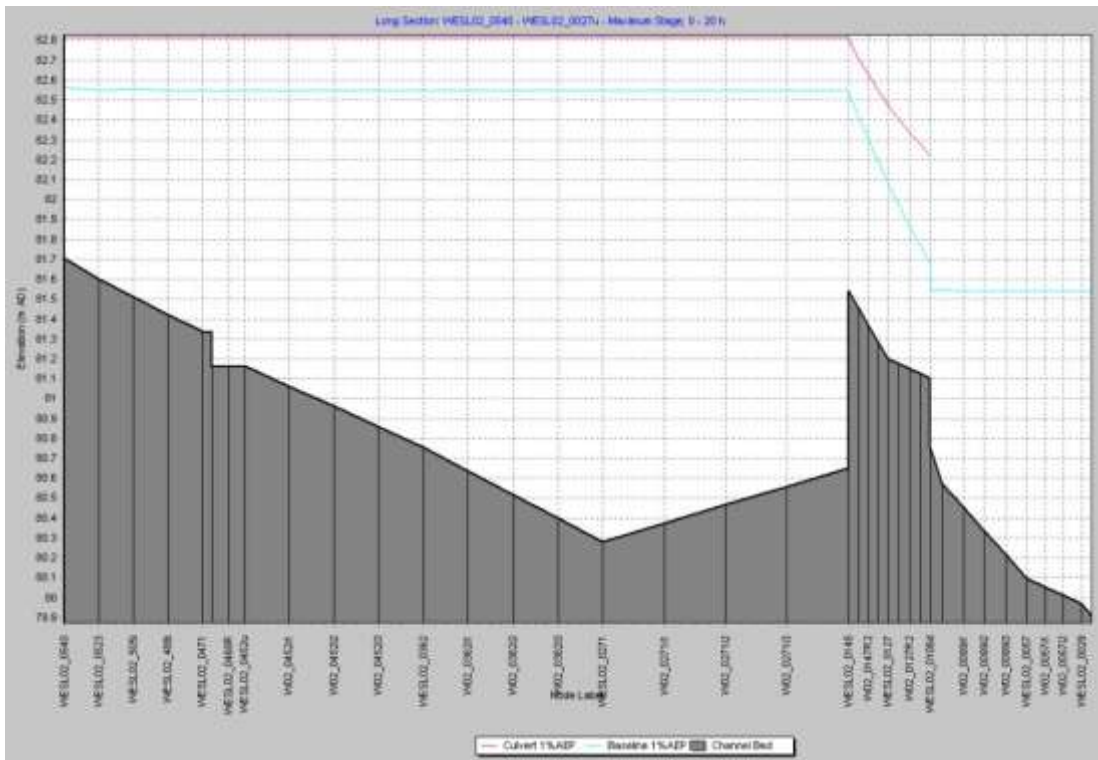


Figure D2-9 1%AEP Silvermere Long Section

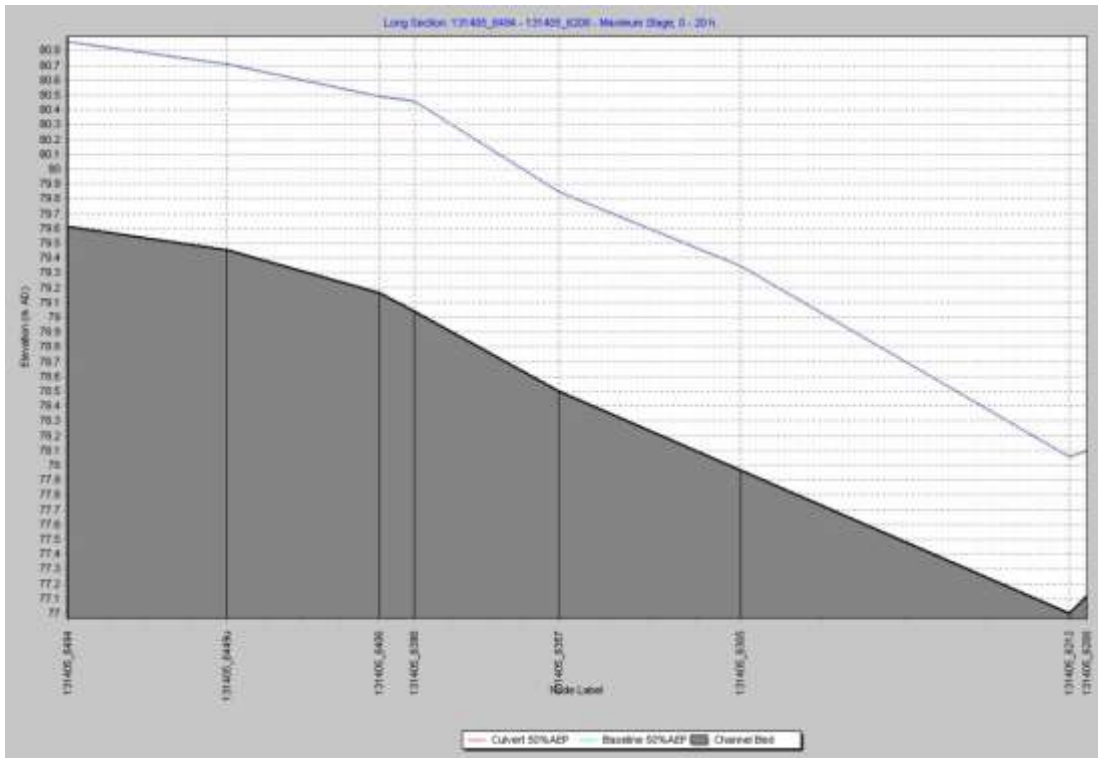


Figure D2-10 50%AEP Wesley Brook at Confluence with Silvermere Long Section

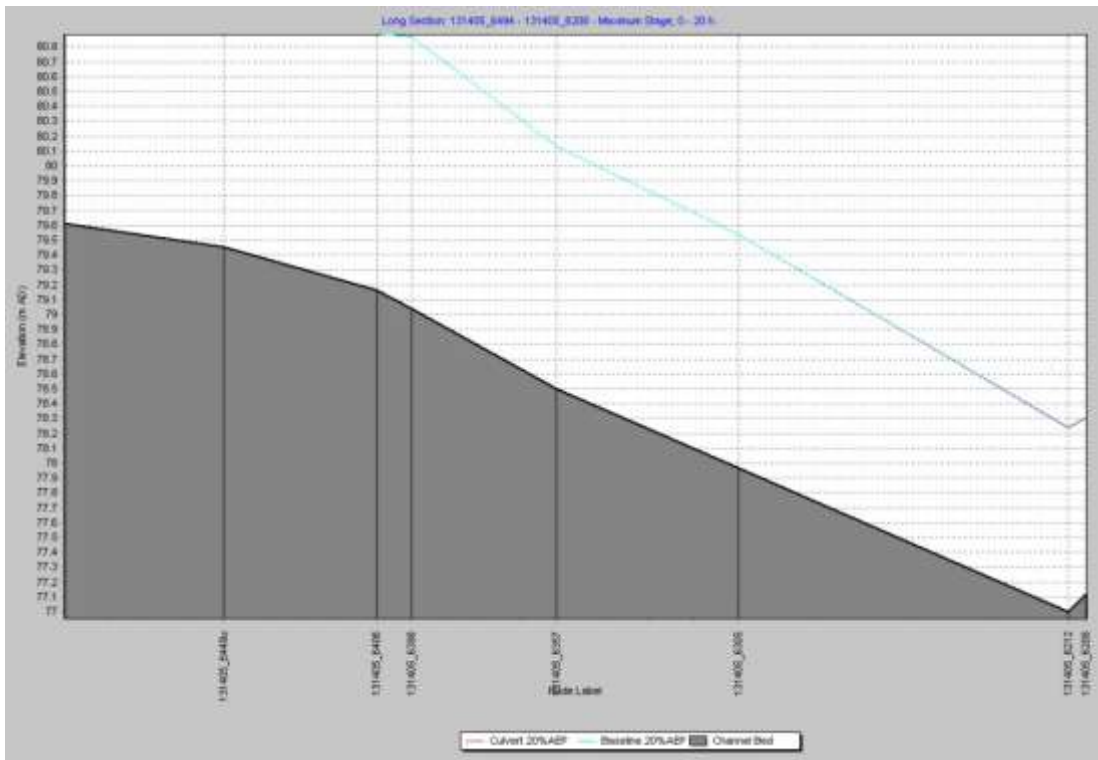


Figure D2-11 20% AEP Wesley Brook at Confluence with Silvermere Long Section

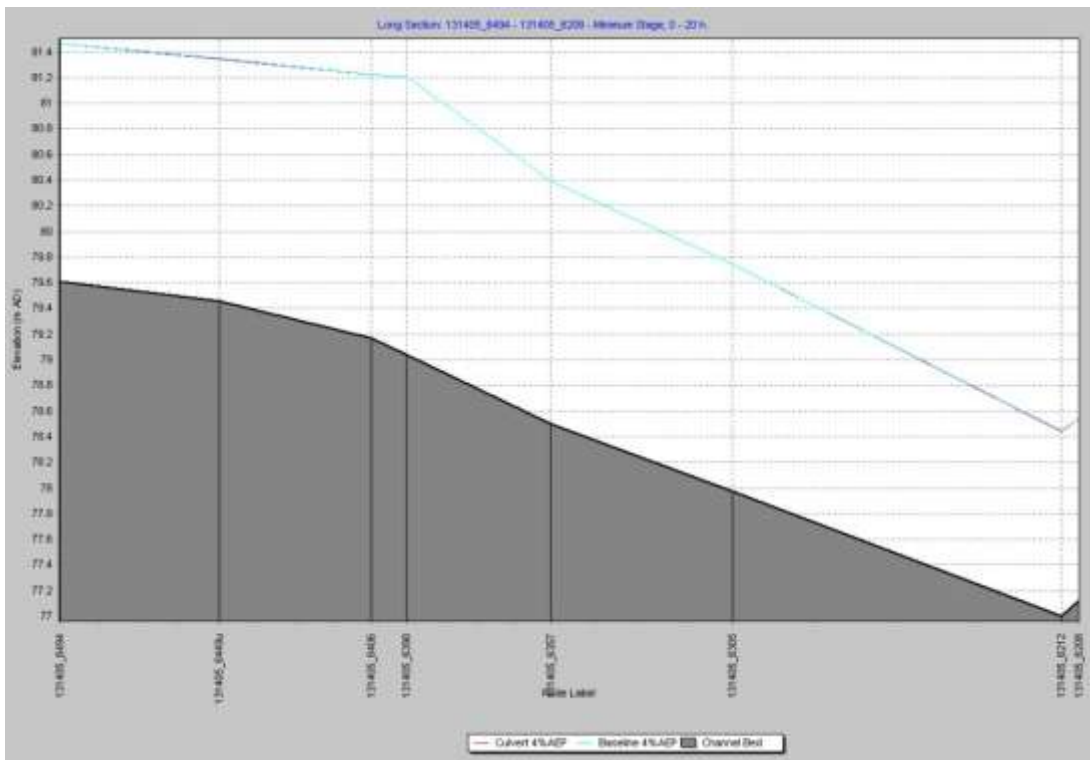


Figure D2-12 4% AEP Wesley Brook at Confluence with Silvermere Long Section

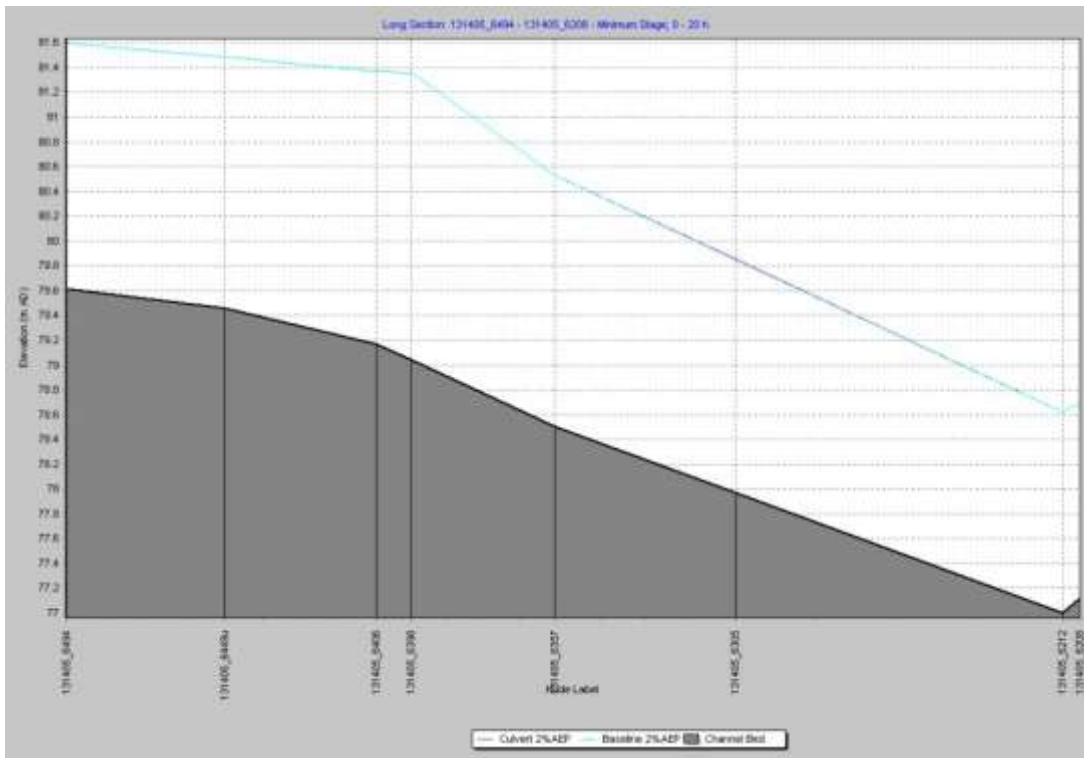


Figure D2-13 2% AEP Wesley Brook at Confluence with Silvermere Long Section

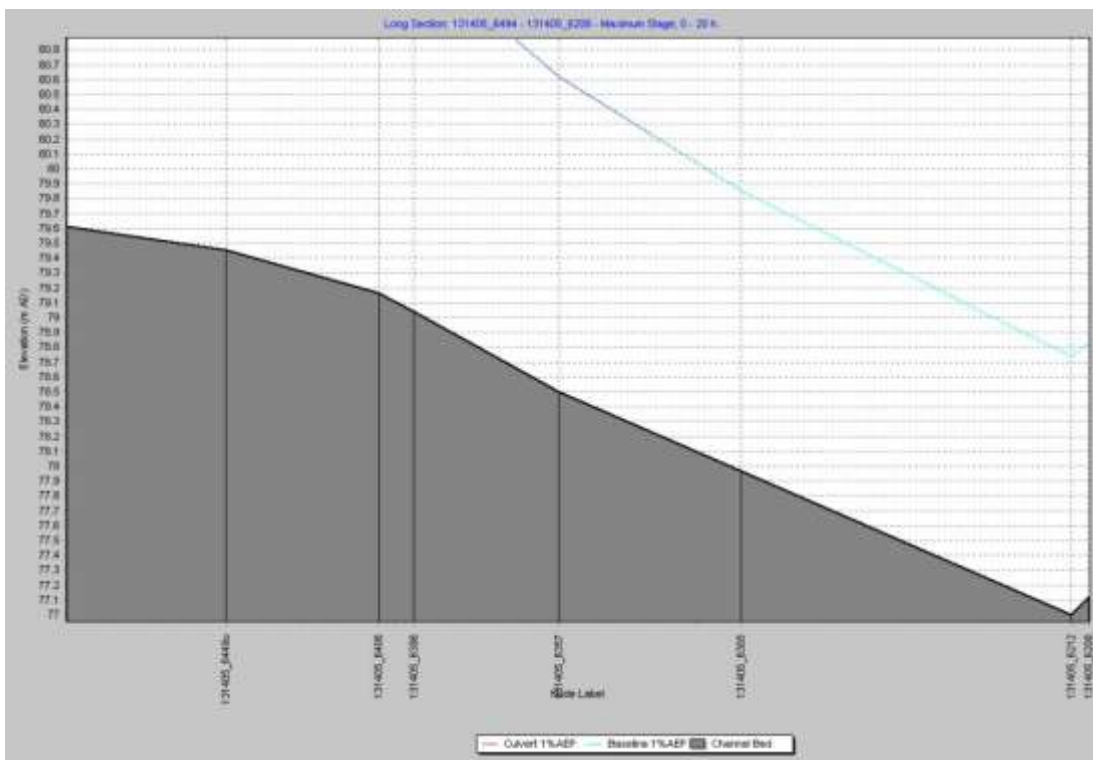


Figure D2-14 1% AEP Wesley Brook at Confluence with Silvermere Long Section

Long sections demonstrate that water levels in the Silvermere Stream are increased upstream of Park Street as a result of culverting the downstream reach. Predicted water levels in the Wesley Brook remain unaffected. Predicted flood depths on the floodplain at Brook Drive are reduced by a negligible amount (reducing with increased magnitude of event) as illustrated in Figures D2-15 and D2-16.

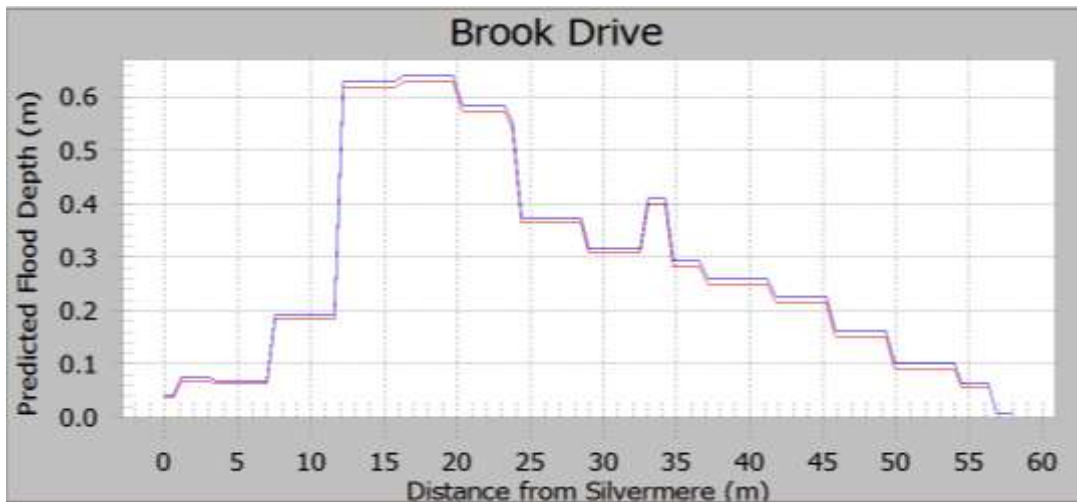


Figure D2-15 20%AEP flood depth reduction at Brook Drive (culvert results in red, baseline in blue)

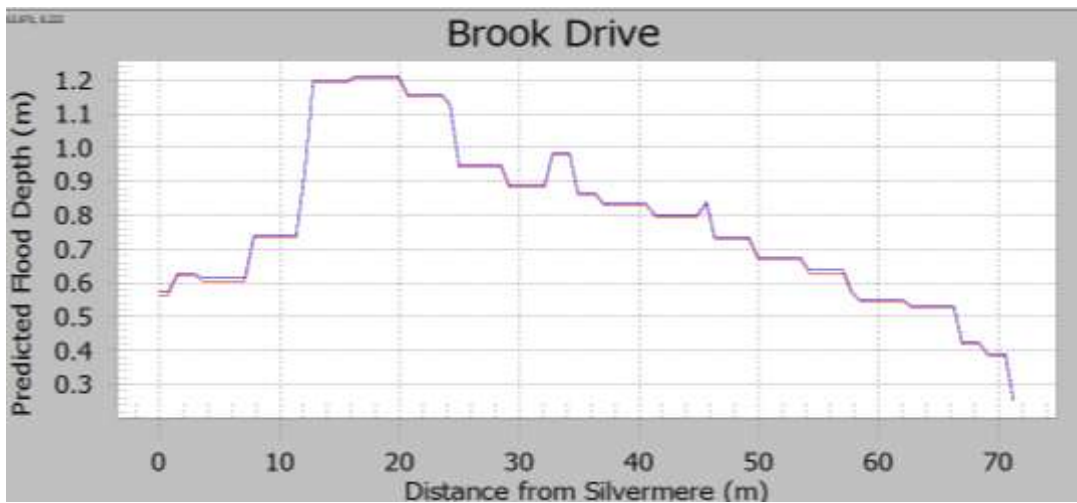


Figure D2-16 1%AEP flood depth reduction at Brook Drive (culvert results in red, baseline in blue)