Appendix A

EA flood maps

Stephen Foster

From: Beech, Cheryl <Cheryl.Beech@environment-agency.gov.uk>
Sent: 24 April 2014 12:29
To: stephen.foster@smfassociates.co.uk
Subject: Your Enquiry: RFI/2014/29112
Attachments: Standard_Notice sept 2012.pdf; Flood Map.pdf; Flood History Map.pdf; VAT Receipt.pdf

Our Ref: RFI/2014/29112

Your Ref:

Dear Stephen

RE: Oak Mills, Cliff Hollins Lane BD12 7ER

Thank you for your enquiry which was received on 16 April 2014 and subsequent payment received on 23 April 2014.

1. Copy of current flood map

Attached is a copy of the flood map which shows the site to be in mostly in FZ1 , but partially in FZ3

2. Flood level data for the site for flood frequencies to include 1, 20, 100 years

We have no modelled flood levels available as the nearest watercourse is non-main river.

3. Detail of any flood defences in the area

There are no flood defences in this area.

4. Any other flood data/historic flooding/model data for the site.

There is no flood history please see the attached map which shows this. We have no other data available.

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive:

http://feedback1.environmentagency.uk.com/s3/b85d5292267d

If you require any further help, please do not hesitate to contact me.

Yours sincerely

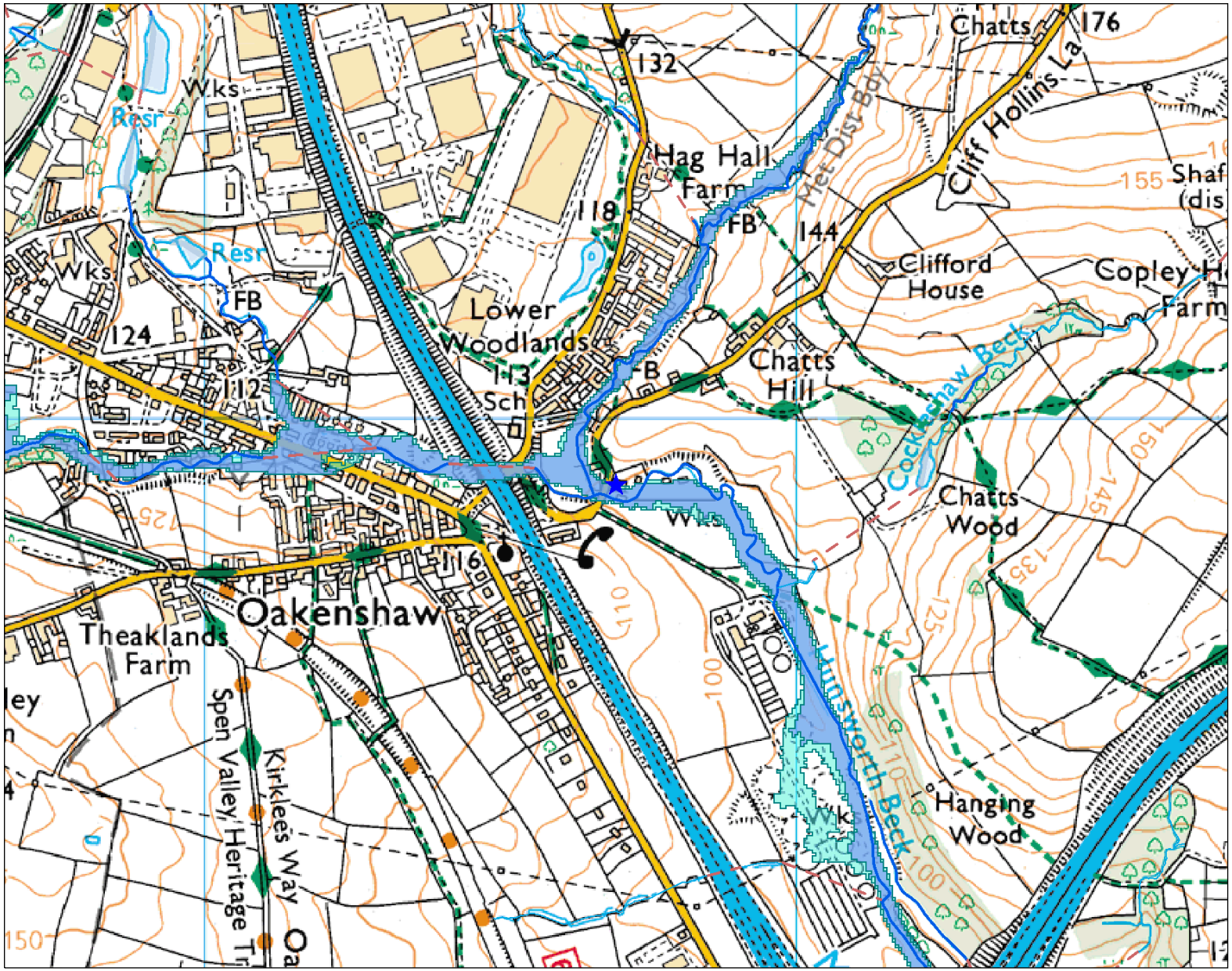
Cheryl Beech
Customers and Engagement Team
Direct Dial 0113 8196360
Email neyorkshire@environment-agency.gov.uk

Please note: I work part time - my usual working days are Tuesday, Wednesday & Thursday

Yorkshire Area
Environment Agency
Lateral
8 City Walk
Leeds
LS11 9AT

NEW: Charging for planning advice
From 3rd March 2014 we will begin charging for some of our planning advice.
For more information please see our web pages at http://www.environment-agency.gov.uk/research/planning/33580.aspx or speak to your local Sustainable Places team.

Flood Map Centred on Oak Mills, BD12 7ER - Created on 24/4/14/ Enquiry Ref RFI/2014/29112



Environment Agency

Scale 1:10,001

N W E S

Flood Map for Planning (Rivers and Sea)

- Sealed Main Rivers
- Detailed River Network
- Primary River
- Secondary River
- Tertiary River
- Lake / Reservior
- Canal
- Culvert
- Canal Tunnel
- Underground River (inferred)
- Underground River (local knowledge)
- Underground River (Potential Sewer)
- Flood Map - Defences
- Areas Benefiting from Flood Defences
- Flood Map - Flood Storage Areas
- Flood Map - Flood Zone 3

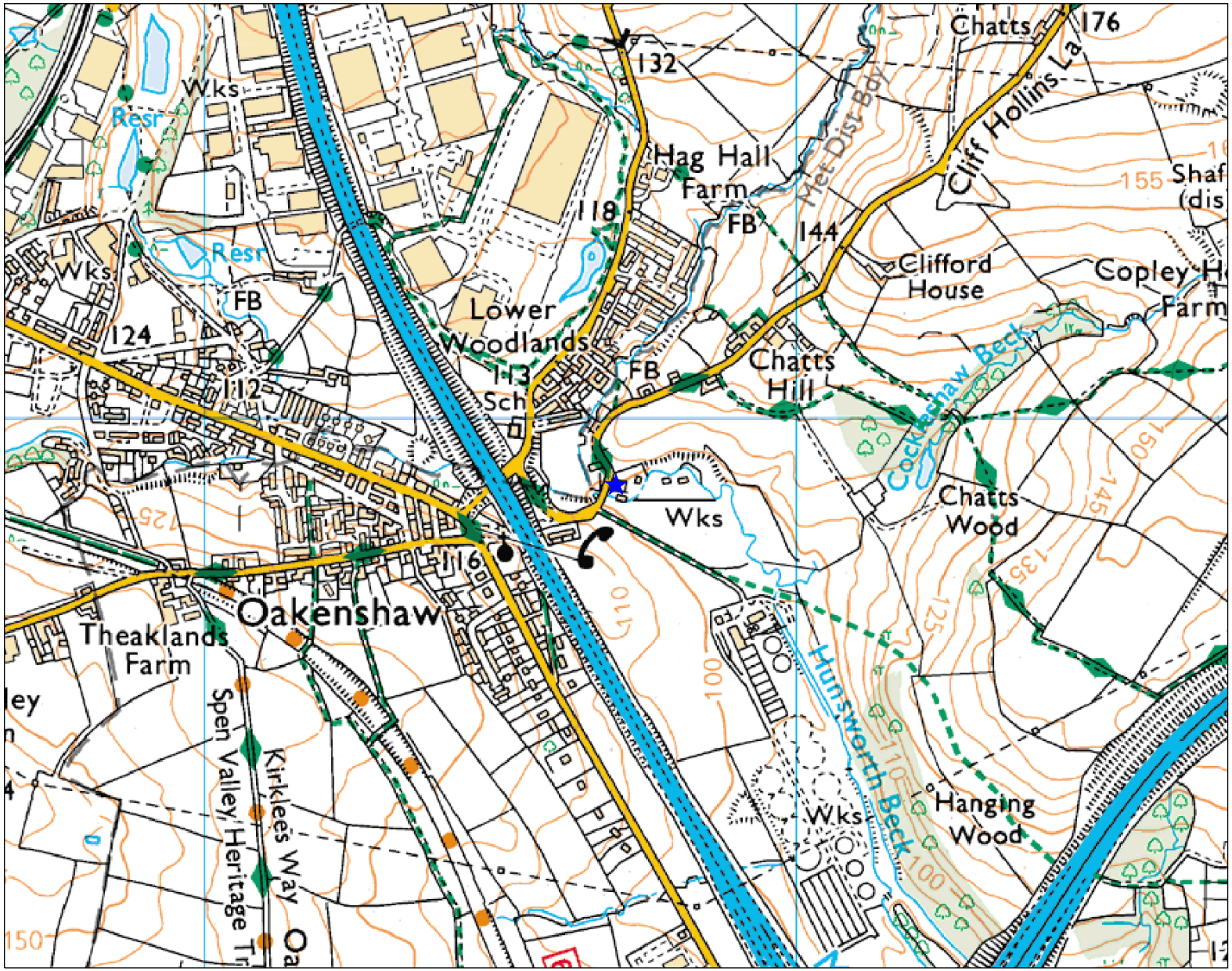
Flood Map for Planning (Rivers and Sea) (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Flood Map Centred on Oak Mills, BD12 7ER - Created on 24/4/14 - Enquiry Ref RFI/2014/29112



Environment Agency

Scale 1:10,001

N
W E
S

Flood Map for Planning (Rivers and Sea)

Historic Flood Map

Flood Map for Planning (Rivers and Sea)

(assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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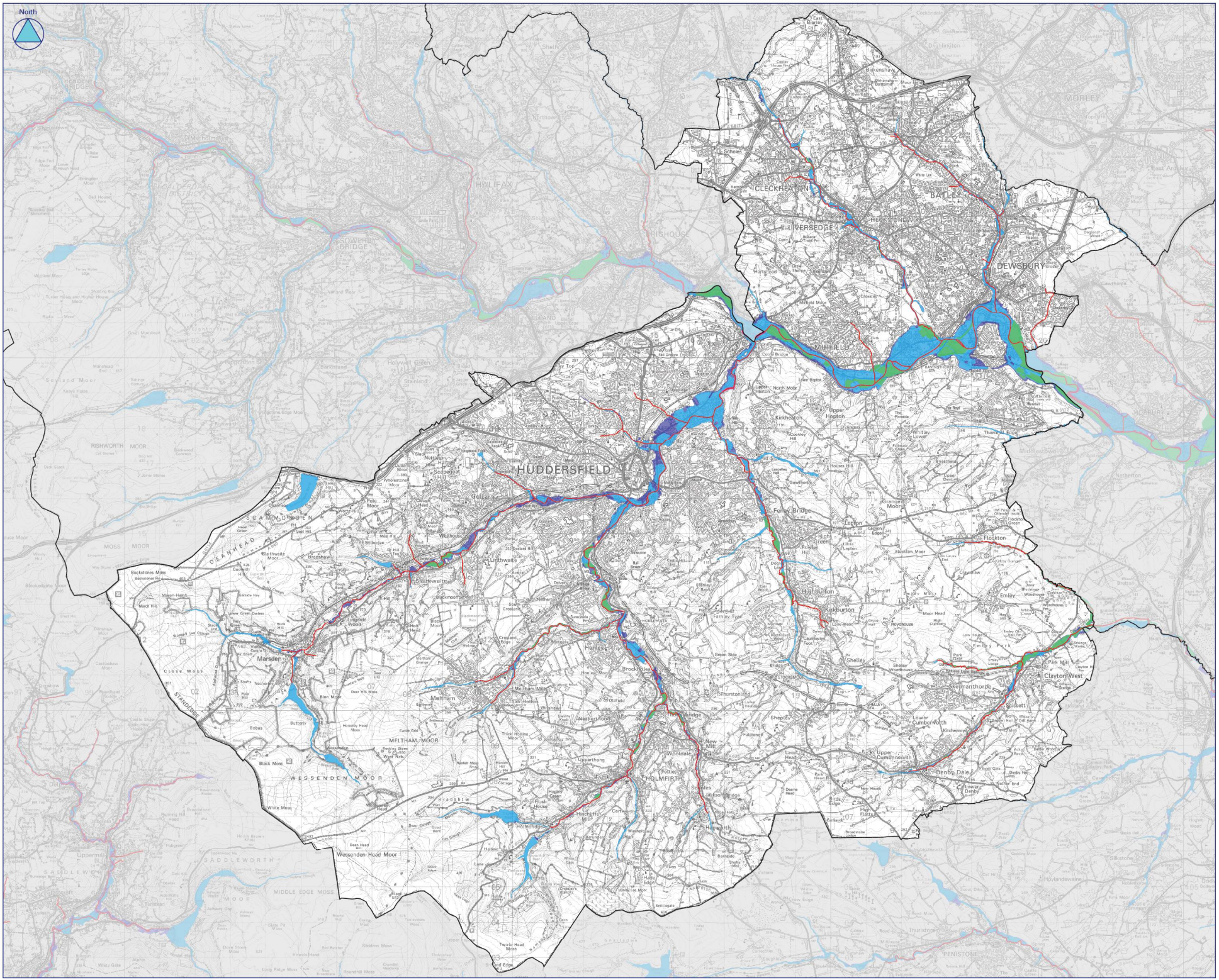
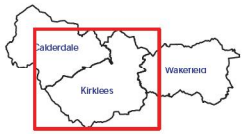
Appendix B

SFRA flood map



Location Plan



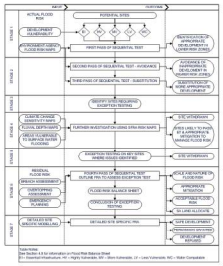
Legend

- Calderdale MBC Boundary
- Kirklees MBC Boundary
- Wakefield MDC Boundary
- Main River Centrelines
- NFCDD
- EA ABDs (version 1.13)
- SFRA Flood Zone 3b (Functional Floodplain, in SFRA only)
- EA Flood Zone 3a (version 3.8)
- EA Flood Zone 2 (version 3.8)

How to use the SFRA Maps

The flood zones are based on version 3.8 of the Environment Agency's Flood Maps. Therefore they refer to the probability of flooding from rivers, the sea and tidal sources (where appropriate) and ignore the presence of existing defences, because these can be breached.

This key map should be used for the facilitating the of the Sequential Test by planners and developers according to PPS 25, as discussed in Section 4.5 of the SFRA Report. This Map should also be used within Stage One of the Sequential Test Skewing Process illustrated below and discussed within Section 4.5 of the SFRA Report.



Flood Zone Descriptions

Flood Zone 1

PPS 25 considers areas within Flood Zone 1 to be at low risk to flooding. The annual probability of flooding within this zone is less than 0.1% or can be easily defined as areas within the District/Borough Council area located outside either Flood Zone 2 or 3.

Generally there is no constraint to development, in terms of flood risk, within Flood Zone 1 although, to stay in line with Environment Agency Standing Advice, any development over 1 ha should be accompanied by a site-specific Flood Risk Assessment.

Areas Vulnerable to Surface Water Flooding Map should also be consulted for allocations within this zone. Localised drainage arrangements should be discussed and consideration of drainage needs to ensure that development will be safe and there will be no increase in flood risk elsewhere.

Flood Zone 2

The annual probability of fluvial flooding within this zone is between 0.1% and 1% (or between 0.5% and 0.1% for tidal flooding). In general, Flood Zone 2 is considered suitable for most development except highly vulnerable land uses where the Exception Test is required, such as police stations, fire stations and ambulance stations.

A Flood Risk Assessment will be required for all development in this zone. The Flood Risk Assessment will need to assess the current level of flood risk as well as the level of flood risk following development. Development plans for the site will need to demonstrate that flood risk can be effectively and safely managed without increasing flood risk elsewhere.

Flood Zone 3

PPS 25 considers areas within Flood Zone 3 to be at high risk of flooding. PPS 25 defines High Risk Flood Zone 3 as two sub-zones 3a and 3b, which correspond to:

- Flood Zone 3a: High Probability
- Flood Zone 3b: The Functional Floodplain

Developers should primarily focus on lower risk Flood Zones in preference to Flood Zone 3. Any proposals for development within Flood Zone 3 should have gone through the Sequential Test and Exceptions Test where required. The site will also require developers to undertake a detailed Flood Risk Assessment.

Rev.		Date	Drawn	Checked	Approved

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KIRKLEES METROPOLITAN BOROUGH COUNCIL

CALDER VALLEY STRATEGIC FLOOD RISK ASSESSMENT PPS 25 FLOOD ZONE MAPS

Scale:	Drawn	C Isherwood	November '08
0 250 500 1,000 Miles	Checked	J Cooper	November '08
	Approved	J Cooper	November '08

Digital File Name: A 2-1 Kirklees Flood Flood Map.mxd

Drawing Number:	Sheet No.:	Status:	Rev.:
Figure A 2-1	1 of 1	FINAL	1

Original at A0

Appendix C

Topographic survey

Station	Easting	Northing	Level
ST01	417674.747	427880.443	100.354
ST02	417688.404	427899.747	100.471
ST03	417712.676	427905.614	99.709
ST04	417728.178	427891.038	99.014
ST05	417747.058	427881.720	98.981
ST06	417692.323	427871.702	99.032
ST07	417723.403	427876.343	100.279
ST08	417668.611	427850.086	101.251
ST10	417790.044	427864.229	98.138
ST11	417840.578	427871.177	97.799
ST10B	417812.049	427904.055	98.067
ST3A	417717.104	427899.702	99.558

CT Surveys
Topographic & Building Surveys

THE OLD MILL
HIGHFIELD, TINGLEY
WAKEFIELD
WF3 1LA

Tel : 0113 259 7023
Mob : 07949 195764
email : mail@ct-surveys.com
Web Site : www.ct-surveys.com

ABBREVIATIONS

AR	ASSUMED ROUTE	P	POST / POLE
AV	AIR VALVE	PR	PIPE RISER
B	BOLLARD	RE	RODDING EYE
BH	BOREHOLE	RS	ROAD SIGN
BT	BRITISH TELECOM CHAMBER	RWP	RAINWATER PIPE
CATV	CABLE TV	S	STAY
CP	CABLE PIT	SC	STOP COCK
CL	COVER LEVEL	ST	STOP TAP
CR	CABLE RISER	SV	STOP VALVE
DP	DOWN PIPE	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	TC	TRAFFIC CONTROL
ER	EARTH ROD	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TFR	TAKEN FROM RECORDS
G	GULLY	TH	THRESHOLD LEVEL
GPR	TRACED BY G.P.R.	TL	TRAFFIC LIGHTS
GV	GAS VALVE	TP	TELEGRAPH POLE
IC	INSPECTION CHAMBER	UTGA	UNABLE TO GAIN ACCESS
IL	INVERT LEVEL	UTL	UNABLE TO LOCATE
JB	JUNCTION BOX	UTR	UNABLE TO RAISE
KW	KERB WEIR	UTS	UNABLE TO SURVEY
LB	LITTER BIN	UTT	UNABLE TO TRACE
LP	LAMP POST	WL	WATER LEVEL
MH	MANHOLE	VP	VENT PIPE
NL	NOT LOCATED	VR	VAPOUR RECOVERY
NT	NO TRACE	WM	WATER METER
OSA	OUTSIDE SURVEY AREA	WO	WASH OUT VALVE

b	BEAM HEIGHT
c	CILL HEIGHT
cht	CEILING HEIGHT
dht	DOOR HEIGHT
fcht	FALSE CEILING HEIGHT
FL	FLOOR LEVEL
h	HEAD HEIGHT
sp	SPRING POINT
←	STEPS / STAIRS UP

All services to be field verified.

CT SURVEYS IS A MEMBER OF:

THE SURVEY ASSOCIATION

constructionline

SURVEY NOTES:
The survey is fitted to National Grid and Datum using GPS, and has been drawn at a scale factor of 1,000.
Due to the scale factor any setting out or design works should strictly use the control co-ordinates as shown on the drawing.

SURVEY REVISIONS

PREVIOUS DWG NO:

REVISION NO:

ORIGINAL SURVEY DATE:

REVISION NOTES:

LAYOUT VIEWS

CLIENT: John Fawthrop

PROJECT TITLE: Oak Mills, Cliff Hollins Lane
Oakenshaw, Bradford, BD12 7ER

DRAWING NUMBER: 2799IS/1

INDICATIVE N

SCALE: 1:200 @ A0	SURVEY DATE: June 2014
LEVEL DATUM: OSGB by GPS	GRID DATUM: OSGB fixed at ST04
BENCH MARK USED: Nail at ST04 surveyed by GPS	BM VALUE: 99.014m / SHEET NUMBER: 1 of 1

Appendix D

Indicative site layout

Notes:
Contractors must verify all dimensions on site before commencing any work or shop drawings. This drawing is not to be scaled. Use figured dimensions only.

Subject to statutory approvals and survey.

AREAS
Building areas are liable to adjustment over the course of the design process due to the ongoing construction detailing developments.

XX xxxxxxxxxxxxxxxxxxxxxxxxxx XX.XX.XX XXX

group ginger

Project Status		PLANNING
Project		Oakenshaw, Oak Hill
Client		
Drawing No.	PL-003	Rev -
Scale		500@A3
Drawn		DP

Proposed Site Plan

0 10m 25m
1:500
N

Appendix E

Hydraulic model configuration and results

Appendix E1

Pooling Group

Hunsworth Beck Pooling Group

	Station	Years	L-CV	L-Skewne	L-Kurtosis	Discordancy	Distance
1	41028 (Chess Stream @ Chess Bridge)	27	0.190	0.199	0.161	0.732	0.349
2	40017 (Dudwell @ Burwash)	17	0.225	-0.028	0.221	1.252	0.425
3	12004 (Girnock Burn @ Littlemill)	26	0.235	0.016	0.032	0.315	0.453
4	41026 (Cockhaise Brook @ Holywell)	11	0.299	0.147	-0.107	1.366	0.528
5	28058 (Henmore Brook @ Ashbourne)	9	0.241	-0.096	-0.086	1.624	0.558
6	27058 (Riccal @ Crook House Farm)	17	0.254	-0.045	-0.051	0.957	0.604
7	52020 (Gallica Stream @ Gallica Bridge)	8	0.289	0.015	0.255	2.081	0.621
8	41807 (Bevern Stream @ East Chiltington)	12	0.229	0.269	0.135	0.712	0.665
9	28055 (Ecclesbourne @ Duffield)	14	0.262	0.212	0.046	0.391	0.674
10	53017 (Boyd @ Bitton)	21	0.261	0.175	0.177	0.286	0.682
11	41022 (Lod @ Halfway Bridge)	21	0.263	0.238	0.201	0.604	0.685
12	27042 (Dove @ Kirkby Mills)	22	0.273	0.049	0.064	0.169	0.730
13	15809 (Muckle Burn @ Eastmill)	20	0.242	0.034	-0.005	0.399	0.739
14	15004 (Inzion @ Loch of Lintrathen)	44	0.192	0.038	0.110	0.496	0.773
15	52016 (Currypool Stream @ Currypool Farm)	23	0.320	0.328	0.066	1.493	0.801
16	68015 (Gowy @ Huxley)	19	0.293	0.192	0.217	0.930	0.857
17	20006 (Biel Water @ Belton House)	20	0.381	0.076	0.002	2.130	0.893
18	15002 (Newton Burn @ Newton)	24	0.202	0.274	0.110	1.184	0.894
19	15005 (Melgan @ Loch of Lintrathen)	38	0.132	0.042	0.228	1.881	0.902
20							
21	Total	393					
22	Weighted means		0.242	0.103	0.095		

Appendix E2

Cockleshaw Beck ReFH

UK Design Flood Estimation

Generated on Wednesday, August 12, 2015 12:45:21 AM by SMF
Printed from the ReFH Flood Modelling software package, version 2.0.5531.36183

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH)

Site details Checksum: 6FEA-4650

Site name: cockleshaw

Easting: 418000

Northing: 427750

Country: England, Wales or Northern Ireland

Catchment Area (km²): 1.05

Using plotscale calculations: No

Site description: None

Model run: 100 year

Summary of results

FEH DDF Rainfall (mm):	50.89	Total runoff (ML):	6.59
Total Rainfall (mm):	32.18	Total flow (ML):	19.32
Peak Rainfall (mm):	4.39	Peak flow (m³/s):	1.01

Parameters

** Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.*

Rainfall parameters

Name	Value	User-defined?
Duration (hr)	1.9	No
Timestep (hr)	0.1	No
SCF(Seasonal correction factor)	0.65	No
ARF(Areal reduction factor)	0.97	No
Seasonality	Winter	n/a

Loss model parameters

Name	Value	User-defined?
Cini (mm)	95.22	No
Cmax (mm)	500.3	No
Use alpha correction factor	Yes	No
Alpha correction factor	0.86	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.03	No
BL (hr)	30.37	No
BR	1.93	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Urban runoff factor	0.7	No
Imperviousness factor	0.3	No
Tp scaling factor	0.5	No
Sewered area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00	0.364	0.000	0.059	0.000	0.031	0.031
00:06	0.491	0.000	0.081	0.001	0.031	0.031
00:12	0.662	0.000	0.110	0.002	0.031	0.033
00:18	0.891	0.000	0.149	0.006	0.031	0.037
00:24	1.197	0.000	0.202	0.012	0.031	0.043
00:30	1.602	0.000	0.275	0.022	0.031	0.052
00:36	2.138	0.000	0.375	0.036	0.031	0.066
00:42	2.836	0.000	0.512	0.056	0.031	0.087
00:48	3.715	0.000	0.695	0.084	0.031	0.116
00:54	4.388	0.000	0.856	0.125	0.032	0.156
01:00	3.715	0.000	0.755	0.179	0.033	0.212
01:06	2.836	0.000	0.595	0.248	0.034	0.282
01:12	2.138	0.000	0.459	0.328	0.036	0.364
01:18	1.602	0.000	0.350	0.415	0.038	0.453
01:24	1.197	0.000	0.265	0.506	0.041	0.546
01:30	0.891	0.000	0.199	0.597	0.044	0.641
01:36	0.662	0.000	0.149	0.685	0.048	0.733
01:42	0.491	0.000	0.111	0.768	0.052	0.820
01:48	0.364	0.000	0.083	0.839	0.057	0.896
01:54	0.000	0.000	0.000	0.894	0.063	0.956
02:00	0.000	0.000	0.000	0.926	0.068	0.994
02:06	0.000	0.000	0.000	0.934	0.074	1.008
02:12	0.000	0.000	0.000	0.923	0.080	1.002
02:18	0.000	0.000	0.000	0.896	0.085	0.981
02:24	0.000	0.000	0.000	0.858	0.090	0.948
02:30	0.000	0.000	0.000	0.811	0.095	0.907
02:36	0.000	0.000	0.000	0.759	0.100	0.859
02:42	0.000	0.000	0.000	0.704	0.104	0.809
02:48	0.000	0.000	0.000	0.648	0.108	0.756
02:54	0.000	0.000	0.000	0.593	0.112	0.705
03:00	0.000	0.000	0.000	0.541	0.115	0.656
03:06	0.000	0.000	0.000	0.494	0.118	0.612
03:12	0.000	0.000	0.000	0.451	0.121	0.572
03:18	0.000	0.000	0.000	0.412	0.123	0.535
03:24	0.000	0.000	0.000	0.375	0.125	0.500

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
03:30	0.000	0.000	0.000	0.340	0.127	0.467
03:36	0.000	0.000	0.000	0.306	0.129	0.434
03:42	0.000	0.000	0.000	0.274	0.130	0.403
03:48	0.000	0.000	0.000	0.242	0.131	0.373
03:54	0.000	0.000	0.000	0.212	0.132	0.344
04:00	0.000	0.000	0.000	0.183	0.133	0.316
04:06	0.000	0.000	0.000	0.154	0.134	0.288
04:12	0.000	0.000	0.000	0.127	0.134	0.261
04:18	0.000	0.000	0.000	0.101	0.134	0.236
04:24	0.000	0.000	0.000	0.078	0.134	0.212
04:30	0.000	0.000	0.000	0.058	0.134	0.192
04:36	0.000	0.000	0.000	0.041	0.134	0.175
04:42	0.000	0.000	0.000	0.028	0.134	0.162
04:48	0.000	0.000	0.000	0.019	0.134	0.153
04:54	0.000	0.000	0.000	0.012	0.133	0.146
05:00	0.000	0.000	0.000	0.008	0.133	0.141
05:06	0.000	0.000	0.000	0.004	0.133	0.137
05:12	0.000	0.000	0.000	0.002	0.132	0.134
05:18	0.000	0.000	0.000	0.001	0.132	0.133
05:24	0.000	0.000	0.000	0.000	0.131	0.132
05:30	0.000	0.000	0.000	0.000	0.131	0.131
05:36	0.000	0.000	0.000	0.000	0.131	0.131
05:42	0.000	0.000	0.000	0.000	0.130	0.130
05:48	0.000	0.000	0.000	0.000	0.130	0.130
05:54	0.000	0.000	0.000	0.000	0.129	0.129
06:00	0.000	0.000	0.000	0.000	0.129	0.129
06:06	0.000	0.000	0.000	0.000	0.128	0.128
06:12	0.000	0.000	0.000	0.000	0.128	0.128
06:18	0.000	0.000	0.000	0.000	0.128	0.128
06:24	0.000	0.000	0.000	0.000	0.127	0.127
06:30	0.000	0.000	0.000	0.000	0.127	0.127
06:36	0.000	0.000	0.000	0.000	0.126	0.126
06:42	0.000	0.000	0.000	0.000	0.126	0.126
06:48	0.000	0.000	0.000	0.000	0.126	0.126
06:54	0.000	0.000	0.000	0.000	0.125	0.125
07:00	0.000	0.000	0.000	0.000	0.125	0.125

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
07:06	0.000	0.000	0.000	0.000	0.124	0.124
07:12	0.000	0.000	0.000	0.000	0.124	0.124
07:18	0.000	0.000	0.000	0.000	0.123	0.123
07:24	0.000	0.000	0.000	0.000	0.123	0.123
07:30	0.000	0.000	0.000	0.000	0.123	0.123
07:36	0.000	0.000	0.000	0.000	0.122	0.122
07:42	0.000	0.000	0.000	0.000	0.122	0.122
07:48	0.000	0.000	0.000	0.000	0.121	0.121
07:54	0.000	0.000	0.000	0.000	0.121	0.121
08:00	0.000	0.000	0.000	0.000	0.121	0.121
08:06	0.000	0.000	0.000	0.000	0.120	0.120
08:12	0.000	0.000	0.000	0.000	0.120	0.120
08:18	0.000	0.000	0.000	0.000	0.119	0.119
08:24	0.000	0.000	0.000	0.000	0.119	0.119
08:30	0.000	0.000	0.000	0.000	0.119	0.119
08:36	0.000	0.000	0.000	0.000	0.118	0.118
08:42	0.000	0.000	0.000	0.000	0.118	0.118
08:48	0.000	0.000	0.000	0.000	0.118	0.118
08:54	0.000	0.000	0.000	0.000	0.117	0.117
09:00	0.000	0.000	0.000	0.000	0.117	0.117
09:06	0.000	0.000	0.000	0.000	0.116	0.116
09:12	0.000	0.000	0.000	0.000	0.116	0.116
09:18	0.000	0.000	0.000	0.000	0.116	0.116
09:24	0.000	0.000	0.000	0.000	0.115	0.115
09:30	0.000	0.000	0.000	0.000	0.115	0.115
09:36	0.000	0.000	0.000	0.000	0.114	0.114
09:42	0.000	0.000	0.000	0.000	0.114	0.114
09:48	0.000	0.000	0.000	0.000	0.114	0.114
09:54	0.000	0.000	0.000	0.000	0.113	0.113
10:00	0.000	0.000	0.000	0.000	0.113	0.113
10:06	0.000	0.000	0.000	0.000	0.113	0.113
10:12	0.000	0.000	0.000	0.000	0.112	0.112
10:18	0.000	0.000	0.000	0.000	0.112	0.112
10:24	0.000	0.000	0.000	0.000	0.111	0.111
10:30	0.000	0.000	0.000	0.000	0.111	0.111
10:36	0.000	0.000	0.000	0.000	0.111	0.111

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
10:42	0.000	0.000	0.000	0.000	0.110	0.110
10:48	0.000	0.000	0.000	0.000	0.110	0.110
10:54	0.000	0.000	0.000	0.000	0.110	0.110
11:00	0.000	0.000	0.000	0.000	0.109	0.109
11:06	0.000	0.000	0.000	0.000	0.109	0.109
11:12	0.000	0.000	0.000	0.000	0.109	0.109
11:18	0.000	0.000	0.000	0.000	0.108	0.108
11:24	0.000	0.000	0.000	0.000	0.108	0.108
11:30	0.000	0.000	0.000	0.000	0.108	0.108
11:36	0.000	0.000	0.000	0.000	0.107	0.107
11:42	0.000	0.000	0.000	0.000	0.107	0.107
11:48	0.000	0.000	0.000	0.000	0.106	0.106
11:54	0.000	0.000	0.000	0.000	0.106	0.106
12:00	0.000	0.000	0.000	0.000	0.106	0.106
12:06	0.000	0.000	0.000	0.000	0.105	0.105
12:12	0.000	0.000	0.000	0.000	0.105	0.105
12:18	0.000	0.000	0.000	0.000	0.105	0.105
12:24	0.000	0.000	0.000	0.000	0.104	0.104
12:30	0.000	0.000	0.000	0.000	0.104	0.104
12:36	0.000	0.000	0.000	0.000	0.104	0.104
12:42	0.000	0.000	0.000	0.000	0.103	0.103
12:48	0.000	0.000	0.000	0.000	0.103	0.103
12:54	0.000	0.000	0.000	0.000	0.103	0.103
13:00	0.000	0.000	0.000	0.000	0.102	0.102
13:06	0.000	0.000	0.000	0.000	0.102	0.102
13:12	0.000	0.000	0.000	0.000	0.102	0.102
13:18	0.000	0.000	0.000	0.000	0.101	0.101
13:24	0.000	0.000	0.000	0.000	0.101	0.101
13:30	0.000	0.000	0.000	0.000	0.101	0.101
13:36	0.000	0.000	0.000	0.000	0.100	0.100
13:42	0.000	0.000	0.000	0.000	0.100	0.100
13:48	0.000	0.000	0.000	0.000	0.100	0.100
13:54	0.000	0.000	0.000	0.000	0.099	0.099
14:00	0.000	0.000	0.000	0.000	0.099	0.099
14:06	0.000	0.000	0.000	0.000	0.099	0.099
14:12	0.000	0.000	0.000	0.000	0.098	0.098

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
14:18	0.000	0.000	0.000	0.000	0.098	0.098
14:24	0.000	0.000	0.000	0.000	0.098	0.098
14:30	0.000	0.000	0.000	0.000	0.097	0.097
14:36	0.000	0.000	0.000	0.000	0.097	0.097
14:42	0.000	0.000	0.000	0.000	0.097	0.097
14:48	0.000	0.000	0.000	0.000	0.096	0.096
14:54	0.000	0.000	0.000	0.000	0.096	0.096
15:00	0.000	0.000	0.000	0.000	0.096	0.096
15:06	0.000	0.000	0.000	0.000	0.095	0.095
15:12	0.000	0.000	0.000	0.000	0.095	0.095
15:18	0.000	0.000	0.000	0.000	0.095	0.095
15:24	0.000	0.000	0.000	0.000	0.095	0.095
15:30	0.000	0.000	0.000	0.000	0.094	0.094
15:36	0.000	0.000	0.000	0.000	0.094	0.094
15:42	0.000	0.000	0.000	0.000	0.094	0.094
15:48	0.000	0.000	0.000	0.000	0.093	0.093
15:54	0.000	0.000	0.000	0.000	0.093	0.093
16:00	0.000	0.000	0.000	0.000	0.093	0.093
16:06	0.000	0.000	0.000	0.000	0.092	0.092
16:12	0.000	0.000	0.000	0.000	0.092	0.092
16:18	0.000	0.000	0.000	0.000	0.092	0.092
16:24	0.000	0.000	0.000	0.000	0.091	0.091
16:30	0.000	0.000	0.000	0.000	0.091	0.091
16:36	0.000	0.000	0.000	0.000	0.091	0.091
16:42	0.000	0.000	0.000	0.000	0.091	0.091
16:48	0.000	0.000	0.000	0.000	0.090	0.090
16:54	0.000	0.000	0.000	0.000	0.090	0.090
17:00	0.000	0.000	0.000	0.000	0.090	0.090
17:06	0.000	0.000	0.000	0.000	0.089	0.089
17:12	0.000	0.000	0.000	0.000	0.089	0.089
17:18	0.000	0.000	0.000	0.000	0.089	0.089
17:24	0.000	0.000	0.000	0.000	0.089	0.089
17:30	0.000	0.000	0.000	0.000	0.088	0.088
17:36	0.000	0.000	0.000	0.000	0.088	0.088
17:42	0.000	0.000	0.000	0.000	0.088	0.088
17:48	0.000	0.000	0.000	0.000	0.087	0.087

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:54	0.000	0.000	0.000	0.000	0.087	0.087
18:00	0.000	0.000	0.000	0.000	0.087	0.087
18:06	0.000	0.000	0.000	0.000	0.087	0.087
18:12	0.000	0.000	0.000	0.000	0.086	0.086
18:18	0.000	0.000	0.000	0.000	0.086	0.086
18:24	0.000	0.000	0.000	0.000	0.086	0.086
18:30	0.000	0.000	0.000	0.000	0.085	0.085
18:36	0.000	0.000	0.000	0.000	0.085	0.085
18:42	0.000	0.000	0.000	0.000	0.085	0.085
18:48	0.000	0.000	0.000	0.000	0.085	0.085
18:54	0.000	0.000	0.000	0.000	0.084	0.084
19:00	0.000	0.000	0.000	0.000	0.084	0.084
19:06	0.000	0.000	0.000	0.000	0.084	0.084
19:12	0.000	0.000	0.000	0.000	0.083	0.083
19:18	0.000	0.000	0.000	0.000	0.083	0.083
19:24	0.000	0.000	0.000	0.000	0.083	0.083
19:30	0.000	0.000	0.000	0.000	0.083	0.083
19:36	0.000	0.000	0.000	0.000	0.082	0.082
19:42	0.000	0.000	0.000	0.000	0.082	0.082
19:48	0.000	0.000	0.000	0.000	0.082	0.082
19:54	0.000	0.000	0.000	0.000	0.082	0.082
20:00	0.000	0.000	0.000	0.000	0.081	0.081
20:06	0.000	0.000	0.000	0.000	0.081	0.081
20:12	0.000	0.000	0.000	0.000	0.081	0.081
20:18	0.000	0.000	0.000	0.000	0.080	0.080
20:24	0.000	0.000	0.000	0.000	0.080	0.080
20:30	0.000	0.000	0.000	0.000	0.080	0.080
20:36	0.000	0.000	0.000	0.000	0.080	0.080
20:42	0.000	0.000	0.000	0.000	0.079	0.079
20:48	0.000	0.000	0.000	0.000	0.079	0.079
20:54	0.000	0.000	0.000	0.000	0.079	0.079
21:00	0.000	0.000	0.000	0.000	0.079	0.079
21:06	0.000	0.000	0.000	0.000	0.078	0.078
21:12	0.000	0.000	0.000	0.000	0.078	0.078
21:18	0.000	0.000	0.000	0.000	0.078	0.078
21:24	0.000	0.000	0.000	0.000	0.078	0.078

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
21:30	0.000	0.000	0.000	0.000	0.077	0.077
21:36	0.000	0.000	0.000	0.000	0.077	0.077
21:42	0.000	0.000	0.000	0.000	0.077	0.077
21:48	0.000	0.000	0.000	0.000	0.077	0.077
21:54	0.000	0.000	0.000	0.000	0.076	0.076
22:00	0.000	0.000	0.000	0.000	0.076	0.076
22:06	0.000	0.000	0.000	0.000	0.076	0.076
22:12	0.000	0.000	0.000	0.000	0.076	0.076
22:18	0.000	0.000	0.000	0.000	0.075	0.075
22:24	0.000	0.000	0.000	0.000	0.075	0.075
22:30	0.000	0.000	0.000	0.000	0.075	0.075
22:36	0.000	0.000	0.000	0.000	0.075	0.075
22:42	0.000	0.000	0.000	0.000	0.074	0.074
22:48	0.000	0.000	0.000	0.000	0.074	0.074
22:54	0.000	0.000	0.000	0.000	0.074	0.074
23:00	0.000	0.000	0.000	0.000	0.074	0.074
23:06	0.000	0.000	0.000	0.000	0.073	0.073
23:12	0.000	0.000	0.000	0.000	0.073	0.073
23:18	0.000	0.000	0.000	0.000	0.073	0.073
23:24	0.000	0.000	0.000	0.000	0.073	0.073
23:30	0.000	0.000	0.000	0.000	0.072	0.072
23:36	0.000	0.000	0.000	0.000	0.072	0.072
23:42	0.000	0.000	0.000	0.000	0.072	0.072
23:48	0.000	0.000	0.000	0.000	0.072	0.072
23:54	0.000	0.000	0.000	0.000	0.071	0.071
24:00	0.000	0.000	0.000	0.000	0.071	0.071
24:06	0.000	0.000	0.000	0.000	0.071	0.071
24:12	0.000	0.000	0.000	0.000	0.071	0.071
24:18	0.000	0.000	0.000	0.000	0.071	0.071
24:24	0.000	0.000	0.000	0.000	0.070	0.070
24:30	0.000	0.000	0.000	0.000	0.070	0.070
24:36	0.000	0.000	0.000	0.000	0.070	0.070
24:42	0.000	0.000	0.000	0.000	0.070	0.070
24:48	0.000	0.000	0.000	0.000	0.069	0.069
24:54	0.000	0.000	0.000	0.000	0.069	0.069
25:00	0.000	0.000	0.000	0.000	0.069	0.069

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
25:06	0.000	0.000	0.000	0.000	0.069	0.069
25:12	0.000	0.000	0.000	0.000	0.068	0.068
25:18	0.000	0.000	0.000	0.000	0.068	0.068
25:24	0.000	0.000	0.000	0.000	0.068	0.068
25:30	0.000	0.000	0.000	0.000	0.068	0.068
25:36	0.000	0.000	0.000	0.000	0.068	0.068
25:42	0.000	0.000	0.000	0.000	0.067	0.067
25:48	0.000	0.000	0.000	0.000	0.067	0.067
25:54	0.000	0.000	0.000	0.000	0.067	0.067
26:00	0.000	0.000	0.000	0.000	0.067	0.067
26:06	0.000	0.000	0.000	0.000	0.066	0.066
26:12	0.000	0.000	0.000	0.000	0.066	0.066
26:18	0.000	0.000	0.000	0.000	0.066	0.066
26:24	0.000	0.000	0.000	0.000	0.066	0.066
26:30	0.000	0.000	0.000	0.000	0.066	0.066
26:36	0.000	0.000	0.000	0.000	0.065	0.065
26:42	0.000	0.000	0.000	0.000	0.065	0.065
26:48	0.000	0.000	0.000	0.000	0.065	0.065
26:54	0.000	0.000	0.000	0.000	0.065	0.065
27:00	0.000	0.000	0.000	0.000	0.065	0.065
27:06	0.000	0.000	0.000	0.000	0.064	0.064
27:12	0.000	0.000	0.000	0.000	0.064	0.064
27:18	0.000	0.000	0.000	0.000	0.064	0.064
27:24	0.000	0.000	0.000	0.000	0.064	0.064
27:30	0.000	0.000	0.000	0.000	0.063	0.063
27:36	0.000	0.000	0.000	0.000	0.063	0.063
27:42	0.000	0.000	0.000	0.000	0.063	0.063
27:48	0.000	0.000	0.000	0.000	0.063	0.063
27:54	0.000	0.000	0.000	0.000	0.063	0.063
28:00	0.000	0.000	0.000	0.000	0.062	0.062
28:06	0.000	0.000	0.000	0.000	0.062	0.062
28:12	0.000	0.000	0.000	0.000	0.062	0.062
28:18	0.000	0.000	0.000	0.000	0.062	0.062
28:24	0.000	0.000	0.000	0.000	0.062	0.062
28:30	0.000	0.000	0.000	0.000	0.061	0.061
28:36	0.000	0.000	0.000	0.000	0.061	0.061

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
28:42	0.000	0.000	0.000	0.000	0.061	0.061
28:48	0.000	0.000	0.000	0.000	0.061	0.061
28:54	0.000	0.000	0.000	0.000	0.061	0.061
29:00	0.000	0.000	0.000	0.000	0.060	0.060
29:06	0.000	0.000	0.000	0.000	0.060	0.060
29:12	0.000	0.000	0.000	0.000	0.060	0.060
29:18	0.000	0.000	0.000	0.000	0.060	0.060
29:24	0.000	0.000	0.000	0.000	0.060	0.060
29:30	0.000	0.000	0.000	0.000	0.059	0.059
29:36	0.000	0.000	0.000	0.000	0.059	0.059
29:42	0.000	0.000	0.000	0.000	0.059	0.059
29:48	0.000	0.000	0.000	0.000	0.059	0.059
29:54	0.000	0.000	0.000	0.000	0.059	0.059
30:00	0.000	0.000	0.000	0.000	0.058	0.058
30:06	0.000	0.000	0.000	0.000	0.058	0.058
30:12	0.000	0.000	0.000	0.000	0.058	0.058
30:18	0.000	0.000	0.000	0.000	0.058	0.058
30:24	0.000	0.000	0.000	0.000	0.058	0.058
30:30	0.000	0.000	0.000	0.000	0.058	0.058
30:36	0.000	0.000	0.000	0.000	0.057	0.057
30:42	0.000	0.000	0.000	0.000	0.057	0.057
30:48	0.000	0.000	0.000	0.000	0.057	0.057
30:54	0.000	0.000	0.000	0.000	0.057	0.057
31:00	0.000	0.000	0.000	0.000	0.057	0.057
31:06	0.000	0.000	0.000	0.000	0.056	0.056
31:12	0.000	0.000	0.000	0.000	0.056	0.056
31:18	0.000	0.000	0.000	0.000	0.056	0.056
31:24	0.000	0.000	0.000	0.000	0.056	0.056
31:30	0.000	0.000	0.000	0.000	0.056	0.056
31:36	0.000	0.000	0.000	0.000	0.055	0.055
31:42	0.000	0.000	0.000	0.000	0.055	0.055
31:48	0.000	0.000	0.000	0.000	0.055	0.055
31:54	0.000	0.000	0.000	0.000	0.055	0.055
32:00	0.000	0.000	0.000	0.000	0.055	0.055
32:06	0.000	0.000	0.000	0.000	0.055	0.055
32:12	0.000	0.000	0.000	0.000	0.054	0.054

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
32:18	0.000	0.000	0.000	0.000	0.054	0.054
32:24	0.000	0.000	0.000	0.000	0.054	0.054
32:30	0.000	0.000	0.000	0.000	0.054	0.054
32:36	0.000	0.000	0.000	0.000	0.054	0.054
32:42	0.000	0.000	0.000	0.000	0.053	0.053
32:48	0.000	0.000	0.000	0.000	0.053	0.053
32:54	0.000	0.000	0.000	0.000	0.053	0.053
33:00	0.000	0.000	0.000	0.000	0.053	0.053
33:06	0.000	0.000	0.000	0.000	0.053	0.053
33:12	0.000	0.000	0.000	0.000	0.053	0.053
33:18	0.000	0.000	0.000	0.000	0.052	0.052
33:24	0.000	0.000	0.000	0.000	0.052	0.052
33:30	0.000	0.000	0.000	0.000	0.052	0.052
33:36	0.000	0.000	0.000	0.000	0.052	0.052
33:42	0.000	0.000	0.000	0.000	0.052	0.052
33:48	0.000	0.000	0.000	0.000	0.052	0.052
33:54	0.000	0.000	0.000	0.000	0.051	0.051
34:00	0.000	0.000	0.000	0.000	0.051	0.051
34:06	0.000	0.000	0.000	0.000	0.051	0.051
34:12	0.000	0.000	0.000	0.000	0.051	0.051
34:18	0.000	0.000	0.000	0.000	0.051	0.051
34:24	0.000	0.000	0.000	0.000	0.051	0.051
34:30	0.000	0.000	0.000	0.000	0.050	0.050
34:36	0.000	0.000	0.000	0.000	0.050	0.050
34:42	0.000	0.000	0.000	0.000	0.050	0.050
34:48	0.000	0.000	0.000	0.000	0.050	0.050
34:54	0.000	0.000	0.000	0.000	0.050	0.050
35:00	0.000	0.000	0.000	0.000	0.050	0.050
35:06	0.000	0.000	0.000	0.000	0.049	0.049
35:12	0.000	0.000	0.000	0.000	0.049	0.049
35:18	0.000	0.000	0.000	0.000	0.049	0.049
35:24	0.000	0.000	0.000	0.000	0.049	0.049
35:30	0.000	0.000	0.000	0.000	0.049	0.049
35:36	0.000	0.000	0.000	0.000	0.049	0.049
35:42	0.000	0.000	0.000	0.000	0.048	0.048
35:48	0.000	0.000	0.000	0.000	0.048	0.048

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:54	0.000	0.000	0.000	0.000	0.048	0.048
36:00	0.000	0.000	0.000	0.000	0.048	0.048
36:06	0.000	0.000	0.000	0.000	0.048	0.048
36:12	0.000	0.000	0.000	0.000	0.048	0.048
36:18	0.000	0.000	0.000	0.000	0.048	0.048
36:24	0.000	0.000	0.000	0.000	0.047	0.047
36:30	0.000	0.000	0.000	0.000	0.047	0.047
36:36	0.000	0.000	0.000	0.000	0.047	0.047
36:42	0.000	0.000	0.000	0.000	0.047	0.047
36:48	0.000	0.000	0.000	0.000	0.047	0.047
36:54	0.000	0.000	0.000	0.000	0.047	0.047
37:00	0.000	0.000	0.000	0.000	0.046	0.046
37:06	0.000	0.000	0.000	0.000	0.046	0.046
37:12	0.000	0.000	0.000	0.000	0.046	0.046
37:18	0.000	0.000	0.000	0.000	0.046	0.046
37:24	0.000	0.000	0.000	0.000	0.046	0.046
37:30	0.000	0.000	0.000	0.000	0.046	0.046
37:36	0.000	0.000	0.000	0.000	0.046	0.046
37:42	0.000	0.000	0.000	0.000	0.045	0.045
37:48	0.000	0.000	0.000	0.000	0.045	0.045
37:54	0.000	0.000	0.000	0.000	0.045	0.045
38:00	0.000	0.000	0.000	0.000	0.045	0.045
38:06	0.000	0.000	0.000	0.000	0.045	0.045
38:12	0.000	0.000	0.000	0.000	0.045	0.045
38:18	0.000	0.000	0.000	0.000	0.044	0.044
38:24	0.000	0.000	0.000	0.000	0.044	0.044
38:30	0.000	0.000	0.000	0.000	0.044	0.044
38:36	0.000	0.000	0.000	0.000	0.044	0.044
38:42	0.000	0.000	0.000	0.000	0.044	0.044
38:48	0.000	0.000	0.000	0.000	0.044	0.044
38:54	0.000	0.000	0.000	0.000	0.044	0.044
39:00	0.000	0.000	0.000	0.000	0.043	0.043
39:06	0.000	0.000	0.000	0.000	0.043	0.043
39:12	0.000	0.000	0.000	0.000	0.043	0.043
39:18	0.000	0.000	0.000	0.000	0.043	0.043
39:24	0.000	0.000	0.000	0.000	0.043	0.043

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
39:30	0.000	0.000	0.000	0.000	0.043	0.043
39:36	0.000	0.000	0.000	0.000	0.043	0.043
39:42	0.000	0.000	0.000	0.000	0.042	0.042
39:48	0.000	0.000	0.000	0.000	0.042	0.042
39:54	0.000	0.000	0.000	0.000	0.042	0.042
40:00	0.000	0.000	0.000	0.000	0.042	0.042
40:06	0.000	0.000	0.000	0.000	0.042	0.042
40:12	0.000	0.000	0.000	0.000	0.042	0.042
40:18	0.000	0.000	0.000	0.000	0.042	0.042
40:24	0.000	0.000	0.000	0.000	0.042	0.042
40:30	0.000	0.000	0.000	0.000	0.041	0.041
40:36	0.000	0.000	0.000	0.000	0.041	0.041
40:42	0.000	0.000	0.000	0.000	0.041	0.041
40:48	0.000	0.000	0.000	0.000	0.041	0.041
40:54	0.000	0.000	0.000	0.000	0.041	0.041
41:00	0.000	0.000	0.000	0.000	0.041	0.041
41:06	0.000	0.000	0.000	0.000	0.041	0.041
41:12	0.000	0.000	0.000	0.000	0.040	0.040
41:18	0.000	0.000	0.000	0.000	0.040	0.040
41:24	0.000	0.000	0.000	0.000	0.040	0.040
41:30	0.000	0.000	0.000	0.000	0.040	0.040
41:36	0.000	0.000	0.000	0.000	0.040	0.040
41:42	0.000	0.000	0.000	0.000	0.040	0.040
41:48	0.000	0.000	0.000	0.000	0.040	0.040
41:54	0.000	0.000	0.000	0.000	0.040	0.040
42:00	0.000	0.000	0.000	0.000	0.039	0.039
42:06	0.000	0.000	0.000	0.000	0.039	0.039
42:12	0.000	0.000	0.000	0.000	0.039	0.039
42:18	0.000	0.000	0.000	0.000	0.039	0.039
42:24	0.000	0.000	0.000	0.000	0.039	0.039
42:30	0.000	0.000	0.000	0.000	0.039	0.039
42:36	0.000	0.000	0.000	0.000	0.039	0.039
42:42	0.000	0.000	0.000	0.000	0.038	0.038
42:48	0.000	0.000	0.000	0.000	0.038	0.038
42:54	0.000	0.000	0.000	0.000	0.038	0.038
43:00	0.000	0.000	0.000	0.000	0.038	0.038

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
43:06	0.000	0.000	0.000	0.000	0.038	0.038
43:12	0.000	0.000	0.000	0.000	0.038	0.038
43:18	0.000	0.000	0.000	0.000	0.038	0.038
43:24	0.000	0.000	0.000	0.000	0.038	0.038
43:30	0.000	0.000	0.000	0.000	0.037	0.037
43:36	0.000	0.000	0.000	0.000	0.037	0.037
43:42	0.000	0.000	0.000	0.000	0.037	0.037
43:48	0.000	0.000	0.000	0.000	0.037	0.037
43:54	0.000	0.000	0.000	0.000	0.037	0.037
44:00	0.000	0.000	0.000	0.000	0.037	0.037
44:06	0.000	0.000	0.000	0.000	0.037	0.037
44:12	0.000	0.000	0.000	0.000	0.037	0.037
44:18	0.000	0.000	0.000	0.000	0.037	0.037
44:24	0.000	0.000	0.000	0.000	0.036	0.036
44:30	0.000	0.000	0.000	0.000	0.036	0.036
44:36	0.000	0.000	0.000	0.000	0.036	0.036
44:42	0.000	0.000	0.000	0.000	0.036	0.036
44:48	0.000	0.000	0.000	0.000	0.036	0.036
44:54	0.000	0.000	0.000	0.000	0.036	0.036
45:00	0.000	0.000	0.000	0.000	0.036	0.036
45:06	0.000	0.000	0.000	0.000	0.036	0.036
45:12	0.000	0.000	0.000	0.000	0.035	0.035
45:18	0.000	0.000	0.000	0.000	0.035	0.035
45:24	0.000	0.000	0.000	0.000	0.035	0.035
45:30	0.000	0.000	0.000	0.000	0.035	0.035
45:36	0.000	0.000	0.000	0.000	0.035	0.035
45:42	0.000	0.000	0.000	0.000	0.035	0.035
45:48	0.000	0.000	0.000	0.000	0.035	0.035
45:54	0.000	0.000	0.000	0.000	0.035	0.035
46:00	0.000	0.000	0.000	0.000	0.035	0.035
46:06	0.000	0.000	0.000	0.000	0.034	0.034
46:12	0.000	0.000	0.000	0.000	0.034	0.034
46:18	0.000	0.000	0.000	0.000	0.034	0.034
46:24	0.000	0.000	0.000	0.000	0.034	0.034
46:30	0.000	0.000	0.000	0.000	0.034	0.034
46:36	0.000	0.000	0.000	0.000	0.034	0.034

Time (hh:mm)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
46:42	0.000	0.000	0.000	0.000	0.034	0.034
46:48	0.000	0.000	0.000	0.000	0.034	0.034
46:54	0.000	0.000	0.000	0.000	0.034	0.034
47:00	0.000	0.000	0.000	0.000	0.033	0.033
47:06	0.000	0.000	0.000	0.000	0.033	0.033
47:12	0.000	0.000	0.000	0.000	0.033	0.033
47:18	0.000	0.000	0.000	0.000	0.033	0.033
47:24	0.000	0.000	0.000	0.000	0.033	0.033
47:30	0.000	0.000	0.000	0.000	0.033	0.033
47:36	0.000	0.000	0.000	0.000	0.033	0.033
47:42	0.000	0.000	0.000	0.000	0.033	0.033
47:48	0.000	0.000	0.000	0.000	0.033	0.033
47:54	0.000	0.000	0.000	0.000	0.032	0.032
48:00	0.000	0.000	0.000	0.000	0.032	0.032
48:06	0.000	0.000	0.000	0.000	0.032	0.032
48:12	0.000	0.000	0.000	0.000	0.032	0.032
48:18	0.000	0.000	0.000	0.000	0.032	0.032
48:24	0.000	0.000	0.000	0.000	0.032	0.032
48:30	0.000	0.000	0.000	0.000	0.032	0.032
48:36	0.000	0.000	0.000	0.000	0.032	0.032
48:42	0.000	0.000	0.000	0.000	0.032	0.032
48:48	0.000	0.000	0.000	0.000	0.031	0.031
48:54	0.000	0.000	0.000	0.000	0.031	0.031
49:00	0.000	0.000	0.000	0.000	0.031	0.031
49:06	0.000	0.000	0.000	0.000	0.031	0.031
49:12	0.000	0.000	0.000	0.000	0.031	0.031

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km²)	1.05	No
ALTBAR	159	No
ASPBAR	222	No
ASPVAR	0.62	No
BFIHOST	0.62	No
DPLBAR (km)	1.05	No
DPSBAR (mkm-¹)	82.4	No
FARL	1	No
LDP	2.28	No
PROPWET (mm)	0.57	No
RMED1H	10.8	No
RMED1D	34.6	No
RMED2D	46.1	No
SAAR (mm)	825	No
SAAR4170 (mm)	840	No
SPRHOST	18.51	No
Urbext2000	0	No
Urbext1990	0	No
URBCONC	0	No
URBLOC	0	No
Urban Area (km²)	0	No
DDF parameter C	-0.03	No
DDF parameter D1	0.37	No
DDF parameter D2	0.4	No
DDF parameter D3	0.29	No
DDF parameter E	0.3	No
DDF parameter F	2.38	No
DDF parameter C (1km grid value)	-0.03	No
DDF parameter D1 (1km grid value)	0.37	No
DDF parameter D2 (1km grid value)	0.42	No
DDF parameter D3 (1km grid value)	0.29	No
DDF parameter E (1km grid value)	0.3	No
DDF parameter F (1km grid value)	2.36	No

Appendix E3

Baseline model configuration

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X     X
X     X  X        X            X   X    X    X    X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Oak Mills 120815
Project File : OakMills120815.prj
Run Date and Time: 05/01/2016 15:54:40

Project in SI units

PLAN DATA

Plan Title: Plan 11
Plan File : C:\Users\SMF\Documents\Oak Mills Model final\Baseline\OakMills120815.p11

Geometry Title: baseline final georef 31122015
Geometry File : C:\Users\SMF\Documents\Oak Mills Model final\Baseline\OakMills120815.g01

Flow Title : Flow 300915
Flow File : C:\Users\SMF\Documents\Oak Mills Model final\Baseline\OakMills120815.f10

Plan Summary Information:
Number of: Cross Sections = 45 Multiple Openings = 0
Culverts = 6 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Flow 300915
Flow File : C:\Users\SMF\Documents\Oak Mills Model final\Baseline\OakMills120815.f10

Flow Data (m3/s)

River	Reach	RS	PF 1	PF 2	PF 3
Cockleshaw Beck	1	3	1.01	1.76	.74
High Royds Beck	1	7	4.12	5.08	3.68
Hunsworth Beck	1	17	6.92	8.52	6.17
Hunsworth Beck	2	14.5	8.01	9.87	7.14
Hunsworth Beck	3	8.7	12.13	14.95	10.82
Hunsworth Beck	4	5	13.14	16.71	11.56
Toad Holes Beck	0.5	5	1.09	1.35	.97

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Cockleshaw Beck	1	PF 1	Known WS = 114.9	
Cockleshaw Beck	1	PF 2	Known WS = 115.1	
Cockleshaw Beck	1	PF 3	Known WS = 114.8	
High Royds Beck	1	PF 1	Known WS = 119.55	
High Royds Beck	1	PF 2	Known WS = 119.6	
High Royds Beck	1	PF 3	Known WS = 119.5	
Hunsworth Beck	1	PF 1	Known WS = 113.6	
Hunsworth Beck	1	PF 2	Known WS = 113.7	
Hunsworth Beck	1	PF 3	Known WS = 113.5	
Hunsworth Beck	4	PF 1	Known WS = 89.6	
Hunsworth Beck	4	PF 2	Known WS = 89.7	
Hunsworth Beck	4	PF 3	Known WS = 89.5	
Toad Holes Beck	0.5	PF 1	Known WS = 114.4	
Toad Holes Beck	0.5	PF 2	Known WS = 114.5	
Toad Holes Beck	0.5	PF 3	Known WS = 114.25	

GEOMETRY DATA

Geometry Title: baseline final georef 31122015

Geometry File : C:\Users\SMF\Documents\Oak Mills Model final\Baseline\OakMills120815.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Cockleshaw Beck	1		3
High Royds Beck	1		Junction 2
Hunsworth Beck	1		Junction 1
Hunsworth Beck	2	Junction 1	Junction 2
Hunsworth Beck	3	Junction 2	3
Hunsworth Beck	4	3	
Toad Holes Beck	0.5		Junction 1

JUNCTION INFORMATION

Name: Junction 1
Description:
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length Angle
Hunsworth Beck	1	to Hunsworth Beck	2	0 0
Toad Holes Beck	0.5	to Hunsworth Beck	2	0 0

Name: Junction 2
Description:
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length Angle
Hunsworth Beck	2	to Hunsworth Beck	3	0 0
High Royds Beck	1	to Hunsworth Beck	3	0 0

Name: 3
Description:
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length Angle
Hunsworth Beck	3	to Hunsworth Beck	4	120 0
Cockleshaw Beck	1	to Hunsworth Beck	4	0 0

CROSS SECTION

RIVER: Cockleshaw Beck
REACH: 1 RS: 3

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	115.37	10	115.39	20	115.33	20.5	114.5	21.5	114.5
22	115.93	32	116.02	42	115.77	52	117.26		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	20	.035	22	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
20	22	200	200	200 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	115.13	Element	Left OB	Channel Right OB
Vel Head (m)	0.23	Wt. n-Val.		0.035
W.S. Elev (m)	114.90	Reach Len. (m)	200.00	200.00 200.00
Crit W.S. (m)	114.94	Flow Area (m2)		0.48
E.G. Slope (m/m)	0.034599	Area (m2)		0.48
Q Total (m3/s)	1.01	Flow (m3/s)		1.01
Top Width (m)	1.38	Top Width (m)		1.38
Vel Total (m/s)	2.12	Avg. Vel. (m/s)		2.12
Max Chl Dpth (m)	0.40	Hydr. Depth (m)		0.35
Conv. Total (m3/s)	5.4	Conv. (m3/s)		5.4
Length Wtd. (m)	200.00	Wetted Per. (m)		1.89
Min Ch El (m)	114.50	Shear (N/m2)		85.48
Alpha	1.00	Stream Power (N/m s)	2489.65	0.00 0.00
Frctn Loss (m)		Cum Volume (1000 m3)		0.18
C & E Loss (m)		Cum SA (1000 m2)		0.55

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	115.37	Element	Left OB	Channel Right OB
Vel Head (m)	0.27	Wt. n-Val.		0.035
W.S. Elev (m)	115.10	Reach Len. (m)	200.00	200.00 200.00
Crit W.S. (m)	115.11	Flow Area (m2)		0.77
E.G. Slope (m/m)	0.027921	Area (m2)		0.77
Q Total (m3/s)	1.76	Flow (m3/s)		1.76

Top Width (m)	1.57	Top Width (m)			1.57
Vel Total (m/s)	2.28	Avg. Vel. (m/s)			2.28
Max Chl Dpth (m)	0.60	Hydr. Depth (m)			0.49
Conv. Total (m3/s)	10.5	Conv. (m3/s)			10.5
Length Wtd. (m)	200.00	Wetted Per. (m)			2.34
Min Ch El (m)	114.50	Shear (N/m2)			90.42
Alpha	1.00	Stream Power (N/m s)	2489.65		0.00
0.00					
Frctn Loss (m)		Cum Volume (1000 m3)			0.25
C & E Loss (m)		Cum SA (1000 m2)			0.59

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	115.04	Element	Left OB		Channel
Right OB					
Vel Head (m)	0.24	Wt. n-Val.			0.035
W.S. Elev (m)	114.80	Reach Len. (m)	200.00		200.00
200.00					
Crit W.S. (m)	114.86	Flow Area (m2)			0.34
E.G. Slope (m/m)	0.047086	Area (m2)			0.34
Q Total (m3/s)	0.74	Flow (m3/s)			0.74
Top Width (m)	1.29	Top Width (m)			1.29
Vel Total (m/s)	2.16	Avg. Vel. (m/s)			2.16
Max Chl Dpth (m)	0.30	Hydr. Depth (m)			0.27
Conv. Total (m3/s)	3.4	Conv. (m3/s)			3.4
Length Wtd. (m)	200.00	Wetted Per. (m)			1.67
Min Ch El (m)	114.50	Shear (N/m2)			94.89
Alpha	1.00	Stream Power (N/m s)	2489.65		0.00
0.00					
Frctn Loss (m)		Cum Volume (1000 m3)			0.17
C & E Loss (m)		Cum SA (1000 m2)			0.54

CROSS SECTION

RIVER: Cockleshaw Beck
REACH: 1 RS: 2

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.37	10	105.39	20	105.33	20.5	104.5	21.5	104.5
22	105.93	32	106.02	42	105.77	52	107.26		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	20	.035	22	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
20	22	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	105.22	Element	Left OB		Channel
Right OB					
Vel Head (m)	0.40	Wt. n-Val.			0.035
W.S. Elev (m)	104.81	Reach Len. (m)	200.00		200.00
200.00					
Crit W.S. (m)	104.94	Flow Area (m2)			0.36
E.G. Slope (m/m)	0.076512	Area (m2)			0.36
Q Total (m3/s)	1.01	Flow (m3/s)			1.01
Top Width (m)	1.30	Top Width (m)			1.30
Vel Total (m/s)	2.81	Avg. Vel. (m/s)			2.81
Max Chl Dpth (m)	0.31	Hydr. Depth (m)			0.28
Conv. Total (m3/s)	3.7	Conv. (m3/s)			3.7
Length Wtd. (m)	200.00	Wetted Per. (m)			1.70
Min Ch El (m)	104.50	Shear (N/m2)			158.99
Alpha	1.00	Stream Power (N/m s)	2489.65		0.00
0.00					
Frctn Loss (m)	9.90	Cum Volume (1000 m3)			0.10
C & E Loss (m)	0.02	Cum SA (1000 m2)			0.28

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	105.60	Element	Left OB		Channel
Right OB					
Vel Head (m)	0.70	Wt. n-Val.			0.035
W.S. Elev (m)	104.90	Reach Len. (m)	200.00		200.00
200.00					
Crit W.S. (m)	105.11	Flow Area (m2)			0.48
E.G. Slope (m/m)	0.105161	Area (m2)			0.48

Q Total (m3/s)	1.76	Flow (m3/s)		1.76	
Top Width (m)	1.38	Top Width (m)		1.38	
Vel Total (m/s)	3.70	Avg. Vel. (m/s)		3.70	
Max Chl Dpth (m)	0.40	Hydr. Depth (m)		0.34	
Conv. Total (m3/s)	5.4	Conv. (m3/s)		5.4	
Length Wtd. (m)	200.00	Wetted Per. (m)		1.89	
Min Ch El (m)	104.50	Shear (N/m2)		259.75	
Alpha	1.00	Stream Power (N/m s)	2489.65	0.00	
0.00					
Frctn Loss (m)	9.73	Cum Volume (1000 m3)		0.12	
C & E Loss (m)	0.04	Cum SA (1000 m2)		0.29	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	105.05	Element	Left OB	Channel	
Right OB					
Vel Head (m)	0.26	Wt. n-Val.		0.035	
W.S. Elev (m)	104.79	Reach Len. (m)	200.00	200.00	
200.00					
Crit W.S. (m)	104.86	Flow Area (m2)		0.33	
E.G. Slope (m/m)	0.053059	Area (m2)		0.33	
Q Total (m3/s)	0.74	Flow (m3/s)		0.74	
Top Width (m)	1.28	Top Width (m)		1.28	
Vel Total (m/s)	2.25	Avg. Vel. (m/s)		2.25	
Max Chl Dpth (m)	0.29	Hydr. Depth (m)		0.26	
Conv. Total (m3/s)	3.2	Conv. (m3/s)		3.2	
Length Wtd. (m)	200.00	Wetted Per. (m)		1.64	
Min Ch El (m)	104.50	Shear (N/m2)		104.08	
Alpha	1.00	Stream Power (N/m s)	2489.65	0.00	
0.00					
Frctn Loss (m)	9.99	Cum Volume (1000 m3)		0.10	
C & E Loss (m)	0.00	Cum SA (1000 m2)		0.28	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: Cockleshaw Beck
REACH: 1 RS: 1

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	95.37	10	95.39	20	95.33	20.5	94.5	21.5	94.5
22	95.93	32	96.02	42	95.77	52	97.26		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	20	.035	22	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
20	22	0	0	0	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	95.14	Element	Left OB	Channel	
Right OB					
Vel Head (m)	0.13	Wt. n-Val.		0.035	
W.S. Elev (m)	95.00	Reach Len. (m)	0.00	0.00	
0.00					
Crit W.S. (m)	94.94	Flow Area (m2)		0.63	
E.G. Slope (m/m)	0.016319	Area (m2)		0.63	
Q Total (m3/s)	1.01	Flow (m3/s)		1.01	
Top Width (m)	1.48	Top Width (m)		1.48	
Vel Total (m/s)	1.62	Avg. Vel. (m/s)		1.62	
Max Chl Dpth (m)	0.50	Hydr. Depth (m)		0.42	
Conv. Total (m3/s)	7.9	Conv. (m3/s)		7.9	
Length Wtd. (m)	0.00	Wetted Per. (m)		2.12	
Min Ch El (m)	94.50	Shear (N/m2)		47.13	
Alpha	1.00	Stream Power (N/m s)	2489.65	0.00	
0.00					
Frctn Loss (m)	0.00	Cum Volume (1000 m3)			
C & E Loss (m)	0.00	Cum SA (1000 m2)			

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	95.37	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.28	Wt. n-Val.		0.035
W.S. Elev (m)	95.09	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)	95.11	Flow Area (m2)		0.76
E.G. Slope (m/m)	0.029584	Area (m2)		0.76
Q Total (m3/s)	1.76	Flow (m3/s)		1.76
Top Width (m)	1.56	Top Width (m)		1.56
Vel Total (m/s)	2.33	Avg. Vel. (m/s)		2.33
Max Chl Dpth (m)	0.59	Hydr. Depth (m)		0.48
Conv. Total (m3/s)	10.2	Conv. (m3/s)		10.2
Length Wtd. (m)	0.00	Wetted Per. (m)		2.31
Min Ch El (m)	94.50	Shear (N/m2)		94.73
Alpha	1.00	Stream Power (N/m s)	2489.65	0.00
0.00				
Frctn Loss (m)	10.11	Cum Volume (1000 m3)		
C & E Loss (m)	0.13	Cum SA (1000 m2)		

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	95.11	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.06	Wt. n-Val.		0.035
W.S. Elev (m)	95.05	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)	94.86	Flow Area (m2)		0.70
E.G. Slope (m/m)	0.006422	Area (m2)		0.70
Q Total (m3/s)	0.74	Flow (m3/s)		0.74
Top Width (m)	1.53	Top Width (m)		1.53
Vel Total (m/s)	1.06	Avg. Vel. (m/s)		1.06
Max Chl Dpth (m)	0.55	Hydr. Depth (m)		0.46
Conv. Total (m3/s)	9.2	Conv. (m3/s)		9.2
Length Wtd. (m)	0.00	Wetted Per. (m)		2.23
Min Ch El (m)	94.50	Shear (N/m2)		19.74

Alpha	1.00	Stream Power (N/m s)	2489.65	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.01	Cum SA (1000 m2)		

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: High Royds Beck
REACH: 1 RS: 7

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	130	20	125	40	120	40.5	119.25	42.5	119.25
43	120	83	125	153	130				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	40	.035	43	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
40	43	250	250	250	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	121.54	Element	Left OB	Channel
Right OB				
Vel Head (m)	1.99	Wt. n-Val.		0.035
W.S. Elev (m)	119.55	Reach Len. (m)	250.00	250.00
250.00				
Crit W.S. (m)	119.94	Flow Area (m2)		0.66
E.G. Slope (m/m)	0.315829	Area (m2)		0.66
Q Total (m3/s)	4.12	Flow (m3/s)		4.12
Top Width (m)	2.40	Top Width (m)		2.40
Vel Total (m/s)	6.24	Avg. Vel. (m/s)		6.24
Max Chl Dpth (m)	0.30	Hydr. Depth (m)		0.27
Conv. Total (m3/s)	7.3	Conv. (m3/s)		7.3
Length Wtd. (m)	250.00	Wetted Per. (m)		2.72
Min Ch El (m)	119.25	Shear (N/m2)		751.06
Alpha	1.00	Stream Power (N/m s)	7325.32	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.48	1.95
0.52				
C & E Loss (m)		Cum SA (1000 m2)	3.74	2.75
4.69				

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	121.75	Element	Left OB	Channel
Right OB				
Vel Head (m)	2.15	Wt. n-Val.		0.035
W.S. Elev (m)	119.60	Reach Len. (m)	250.00	250.00
250.00				
Crit W.S. (m)	120.04	Flow Area (m2)		0.78
E.G. Slope (m/m)	0.289397	Area (m2)		0.78
Q Total (m3/s)	5.08	Flow (m3/s)		5.08
Top Width (m)	2.47	Top Width (m)		2.47
Vel Total (m/s)	6.50	Avg. Vel. (m/s)		6.50
Max Chl Dpth (m)	0.35	Hydr. Depth (m)		0.32
Conv. Total (m3/s)	9.4	Conv. (m3/s)		9.4
Length Wtd. (m)	250.00	Wetted Per. (m)		2.84
Min Ch El (m)	119.25	Shear (N/m2)		780.60
Alpha	1.00	Stream Power (N/m s)	7325.32	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.73	2.02
0.69				
C & E Loss (m)		Cum SA (1000 m2)	4.53	2.76
4.71				

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	121.85	Element	Left OB	Channel
Right OB				
Vel Head (m)	2.35	Wt. n-Val.		0.035
W.S. Elev (m)	119.50	Reach Len. (m)	250.00	250.00
250.00				
Crit W.S. (m)	119.90	Flow Area (m2)		0.54
E.G. Slope (m/m)	0.458385	Area (m2)		0.54
Q Total (m3/s)	3.68	Flow (m3/s)		3.68
Top Width (m)	2.33	Top Width (m)		2.33
Vel Total (m/s)	6.80	Avg. Vel. (m/s)		6.80
Max Chl Dpth (m)	0.25	Hydr. Depth (m)		0.23
Conv. Total (m3/s)	5.4	Conv. (m3/s)		5.4
Length Wtd. (m)	250.00	Wetted Per. (m)		2.60
Min Ch El (m)	119.25	Shear (N/m2)		935.97
Alpha	1.00	Stream Power (N/m s)	7325.32	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.38	1.83

0.41				
C & E Loss (m)		Cum SA (1000 m2)	3.27	2.74
3.89				

CROSS SECTION

RIVER: High Royds Beck
REACH: 1 RS: 6

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	120	10	115	20	110	25	108	25.5	107.25
27.5	107.25	28	108	33	110	43	115	53	120

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	25	.035	28	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
25	28	400	400	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	108.42	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.10	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (m)	108.32	Reach Len. (m)	400.00	400.00
400.00				
Crit W.S. (m)	107.94	Flow Area (m2)	0.13	2.83
0.13				
E.G. Slope (m/m)	0.003644	Area (m2)	0.13	2.83
0.13				
Q Total (m3/s)	4.12	Flow (m3/s)	0.06	4.00
0.06				
Top Width (m)	4.59	Top Width (m)	0.79	3.00
0.79				
Vel Total (m/s)	1.34	Avg. Vel. (m/s)	0.48	1.42
0.48				
Max Chl Dpth (m)	1.07	Hydr. Depth (m)	0.16	0.94
0.16				
Conv. Total (m3/s)	68.3	Conv. (m3/s)	1.0	66.3
1.0				
Length Wtd. (m)	400.00	Wetted Per. (m)	0.85	3.80
0.85				
Min Ch El (m)	107.25	Shear (N/m2)	5.26	26.55
5.26				
Alpha	1.09	Stream Power (N/m s)	2537.53	0.00
0.00				
Frctn Loss (m)	2.23	Cum Volume (1000 m3)	0.47	1.51
0.50				
C & E Loss (m)	0.00	Cum SA (1000 m2)	3.64	2.07
4.60				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the

need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	108.53	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.12	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (m)	108.41	Reach Len. (m)	400.00	400.00
400.00				
Crit W.S. (m)	108.04	Flow Area (m2)	0.21	3.12
0.21				
E.G. Slope (m/m)	0.003823	Area (m2)	0.21	3.12
0.21				
Q Total (m3/s)	5.08	Flow (m3/s)	0.13	4.83
0.13				
Top Width (m)	5.07	Top Width (m)	1.04	3.00
1.04				
Vel Total (m/s)	1.43	Avg. Vel. (m/s)	0.59	1.55
0.59				
Max Chl Dpth (m)	1.16	Hydr. Depth (m)	0.21	1.04
0.21				
Conv. Total (m3/s)	82.2	Conv. (m3/s)	2.0	78.1
2.0				
Length Wtd. (m)	400.00	Wetted Per. (m)	1.12	3.80
1.12				
Min Ch El (m)	107.25	Shear (N/m2)	7.21	30.74
7.21				
Alpha	1.12	Stream Power (N/m s)	2537.53	0.00
0.00				
Frctn Loss (m)	2.29	Cum Volume (1000 m3)	0.71	1.53
0.66				
C & E Loss (m)	0.00	Cum SA (1000 m2)	4.40	2.07
4.58				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	108.36	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.09	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (m)	108.27	Reach Len. (m)	400.00	400.00
400.00				
Crit W.S. (m)	107.90	Flow Area (m2)	0.09	2.68
0.09				
E.G. Slope (m/m)	0.003551	Area (m2)	0.09	2.68
0.09				
Q Total (m3/s)	3.68	Flow (m3/s)	0.04	3.60
0.04				
Top Width (m)	4.33	Top Width (m)	0.67	3.00
0.67				
Vel Total (m/s)	1.29	Avg. Vel. (m/s)	0.42	1.35
0.42				

Max Chl Dpth (m)	1.02	Hydr. Depth (m)	0.13	0.89
0.13				
Conv. Total (m3/s)	61.8	Conv. (m3/s)	0.6	60.5
0.6				
Length Wtd. (m)	400.00	Wetted Per. (m)	0.72	3.80
0.72				
Min Ch El (m)	107.25	Shear (N/m2)	4.31	24.50
4.31				
Alpha	1.07	Stream Power (N/m s)	2537.53	0.00
0.00				
Frctn Loss (m)	2.20	Cum Volume (1000 m3)	0.37	1.43
0.40				
C & E Loss (m)	0.00	Cum SA (1000 m2)	3.19	2.07
3.80				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: High Royds Beck
REACH: 1 RS: 5

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	115	40	110	75	106.5	95	105.75	95.5	105.43
97.5	105.43	98	105.77	110	110	218	112		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	95	.035	98	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
95	98	150	150	150	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	106.19	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.14	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (m)	106.05	Reach Len. (m)	150.00	150.00
150.00				
Crit W.S. (m)	106.05	Flow Area (m2)	1.20	1.69
0.11				
E.G. Slope (m/m)	0.009538	Area (m2)	1.20	1.69
0.11				
Q Total (m3/s)	4.12	Flow (m3/s)	0.94	3.10
0.08				
Top Width (m)	11.79	Top Width (m)	8.00	3.00
0.79				
Vel Total (m/s)	1.37	Avg. Vel. (m/s)	0.79	1.83
0.72				
Max Chl Dpth (m)	0.62	Hydr. Depth (m)	0.15	0.56
0.14				

Conv. Total (m3/s)	42.2	Conv. (m3/s)	9.7	31.7	0.8
Length Wtd. (m)	150.00	Wetted Per. (m)	8.00	3.20	0.84
Min Ch El (m)	105.43	Shear (N/m2)	14.01	49.56	12.35
Alpha	1.41	Stream Power (N/m s)	10437.38	0.00	0.00
Frctn Loss (m)	1.45	Cum Volume (1000 m3)	0.20	0.61	0.45
C & E Loss (m)	0.00	Cum SA (1000 m2)	1.88	0.87	4.28

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	106.24	Element	Left OB	Channel	Right OB
Vel Head (m)	0.14	Wt. n-Val.	0.035	0.035	0.035
W.S. Elev (m)	106.10	Reach Len. (m)	150.00	150.00	150.00
Crit W.S. (m)	106.10	Flow Area (m2)	1.63	1.84	0.15
E.G. Slope (m/m)	0.009463	Area (m2)	1.63	1.84	0.15
Q Total (m3/s)	5.08	Flow (m3/s)	1.41	3.55	0.12
Top Width (m)	13.25	Top Width (m)	9.31	3.00	0.93
Vel Total (m/s)	1.40	Avg. Vel. (m/s)	0.87	1.92	0.80
Max Chl Dpth (m)	0.67	Hydr. Depth (m)	0.17	0.61	0.16
Conv. Total (m3/s)	52.2	Conv. (m3/s)	14.5	36.4	1.3
Length Wtd. (m)	150.00	Wetted Per. (m)	9.32	3.20	0.99
Min Ch El (m)	105.43	Shear (N/m2)	16.19	53.46	14.41
Alpha	1.43	Stream Power (N/m s)	10437.38	0.00	0.00
Frctn Loss (m)	1.38	Cum Volume (1000 m3)	0.34	0.54	0.59
C & E Loss (m)	0.00	Cum SA (1000 m2)	2.33	0.87	4.19

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the

need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	106.16	Element	Left OB	Channel	Right OB
Vel Head (m)	0.13	Wt. n-Val.	0.035	0.035	0.035
W.S. Elev (m)	106.02	Reach Len. (m)	150.00	150.00	150.00
Crit W.S. (m)	106.02	Flow Area (m2)	1.00	1.62	0.09
E.G. Slope (m/m)	0.009628	Area (m2)	1.00	1.62	0.09
Q Total (m3/s)	3.68	Flow (m3/s)	0.74	2.87	0.06
Top Width (m)	11.02	Top Width (m)	7.30	3.00	0.72
Vel Total (m/s)	1.36	Avg. Vel. (m/s)	0.74	1.78	0.68
Max Chl Dpth (m)	0.59	Hydr. Depth (m)	0.14	0.54	0.13
Conv. Total (m3/s)	37.5	Conv. (m3/s)	7.6	29.3	0.6
Length Wtd. (m)	150.00	Wetted Per. (m)	7.31	3.20	0.76
Min Ch El (m)	105.43	Shear (N/m2)	12.91	47.71	11.30
Alpha	1.40	Stream Power (N/m s)	10437.38	0.00	0.00
Frctn Loss (m)	1.53	Cum Volume (1000 m3)	0.15	0.57	0.36
C & E Loss (m)	0.01	Cum SA (1000 m2)	1.60	0.87	3.53

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: High Royds Beck
REACH: 1 RS: 4

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	106.61	10	104.57	20	104	20.5	103.15	21.5	103.15	22	104	32	105.29

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	20	.035	22	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
20	22	140	140	140	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	104.44	Element	Left OB	Channel	Right OB
Vel Head (m)	0.25	Wt. n-Val.	0.035	0.035	0.035
W.S. Elev (m)	104.19	Reach Len. (m)	140.00	140.00	140.00
Crit W.S. (m)	104.25	Flow Area (m2)	0.31	1.65	0.14
E.G. Slope (m/m)	0.014271	Area (m2)	0.31	1.65	0.14
Q Total (m3/s)	4.12	Flow (m3/s)	0.22	3.81	0.10
Top Width (m)	6.75	Top Width (m)	3.30	2.00	1.46
Vel Total (m/s)	1.96	Avg. Vel. (m/s)	0.70	2.31	0.70
Max Chl Dpth (m)	1.04	Hydr. Depth (m)	0.09	0.83	0.09
Conv. Total (m3/s)	34.5	Conv. (m3/s)	1.8	31.9	0.8
Length Wtd. (m)	140.00	Wetted Per. (m)	3.30	2.97	1.47
Min Ch El (m)	103.15	Shear (N/m2)	13.13	77.72	13.04
Alpha	1.28	Stream Power (N/m s)	1532.09	0.00	0.00
Frctn Loss (m)	1.73	Cum Volume (1000 m3)	0.09	0.36	0.44
C & E Loss (m)	0.01	Cum SA (1000 m2)	1.03	0.50	4.11

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	104.52	Element	Left OB	Channel	Right OB
Vel Head (m)	0.26	Wt. n-Val.	0.035	0.035	0.035
W.S. Elev (m)	104.26	Reach Len. (m)	140.00	140.00	140.00
Crit W.S. (m)	104.33	Flow Area (m2)	0.59	1.79	0.26
E.G. Slope (m/m)	0.014027	Area (m2)	0.59	1.79	0.26
Q Total (m3/s)	5.08	Flow (m3/s)	0.51	4.34	0.23
Top Width (m)	8.58	Top Width (m)	4.56	2.00	2.02
Vel Total (m/s)	1.92	Avg. Vel. (m/s)	0.87	2.42	0.86
Max Chl Dpth (m)	1.11	Hydr. Depth (m)	0.13	0.90	0.13
Conv. Total (m3/s)	42.9	Conv. (m3/s)	4.3	36.6	1.9
Length Wtd. (m)	140.00	Wetted Per. (m)	4.57	2.97	2.03
Min Ch El (m)	103.15	Shear (N/m2)	17.86	83.07	17.74
Alpha	1.39	Stream Power (N/m s)	1532.09	0.00	0.00
Frctn Loss (m)	1.71	Cum Volume (1000 m3)	0.17	0.26	0.56
C & E Loss (m)	0.01	Cum SA (1000 m2)	1.29	0.50	3.97

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	104.39	Element	Left OB	Channel	Right OB
Vel Head (m)	0.25	Wt. n-Val.	0.035	0.035	0.035
W.S. Elev (m)	104.15	Reach Len. (m)	140.00	140.00	140.00
Crit W.S. (m)	104.20	Flow Area (m2)	0.19	1.57	0.08
E.G. Slope (m/m)	0.014470	Area (m2)	0.19	1.57	0.08
Q Total (m3/s)	3.68	Flow (m3/s)	0.11	3.52	0.05
Top Width (m)	5.71	Top Width (m)	2.57	2.00	1.14
Vel Total (m/s)	2.00	Avg. Vel. (m/s)	0.60	2.24	0.60
Max Chl Dpth (m)	1.00	Hydr. Depth (m)	0.07	0.78	0.07
Conv. Total (m3/s)	30.6	Conv. (m3/s)	0.9	29.2	0.4
Length Wtd. (m)	140.00	Wetted Per. (m)	2.57	2.97	1.14
Min Ch El (m)	103.15	Shear (N/m2)	10.38	74.85	10.31
Alpha	1.21	Stream Power (N/m s)	1532.09	0.00	0.00
Frctn Loss (m)	1.75	Cum Volume (1000 m3)	0.06	0.33	0.35
C & E Loss (m)	0.01	Cum SA (1000 m2)	0.86	0.50	3.39

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: High Royds Beck
REACH: 1 RS: 3

INPUT
Description:

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	107.43	10	104.39	20	102.18	30	101.87	35	100.48
45	100.25	45.5	100	47.5	100	48	100.38	58	100.44
68	100.29	78	100.07	88	100.74	98	102.07	103	105.46

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	45	.035	48	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
45	48	25	25	25	.1	.3

Right Levee Station= 48 Elevation= 100.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	100.48	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.04	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	100.44	Reach Len. (m)	25.00	25.00
25.00				
Crit W.S. (m)	100.39	Flow Area (m2)	0.77	1.16
4.62				
E.G. Slope (m/m)	0.007601	Area (m2)	0.77	1.16
4.62				
Q Total (m3/s)	4.12	Flow (m3/s)	0.28	1.47
2.37				
Top Width (m)	46.33	Top Width (m)	8.20	3.00
35.13				
Vel Total (m/s)	0.63	Avg. Vel. (m/s)	0.36	1.27
0.51				
Max Chl Dpth (m)	0.44	Hydr. Depth (m)	0.09	0.39
0.13				
Conv. Total (m3/s)	47.3	Conv. (m3/s)	3.2	16.9
27.2				
Length Wtd. (m)	25.00	Wetted Per. (m)	8.20	3.19
35.15				
Min Ch El (m)	100.00	Shear (N/m2)	7.03	27.09
9.80				
Alpha	1.86	Stream Power (N/m s)	4931.43	0.00
2298.13				
Frctn Loss (m)		Cum Volume (1000 m3)	0.02	0.16
0.10				
C & E Loss (m)		Cum SA (1000 m2)	0.23	0.15
1.55				

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	100.49	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.07	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	100.42	Reach Len. (m)	25.00	25.00
25.00				
Crit W.S. (m)	100.42	Flow Area (m2)	0.62	1.10
3.99				
E.G. Slope (m/m)	0.015365	Area (m2)	0.62	1.10
3.99				
Q Total (m3/s)	5.08	Flow (m3/s)	0.30	1.92

2.87				
Top Width (m)	40.70	Top Width (m)	7.36	3.00
30.34				
Vel Total (m/s)	0.89	Avg. Vel. (m/s)	0.48	1.74
0.72				
Max Chl Dpth (m)	0.42	Hydr. Depth (m)	0.08	0.37
0.13				
Conv. Total (m3/s)	41.0	Conv. (m3/s)	2.4	15.5
23.1				
Length Wtd. (m)	25.00	Wetted Per. (m)	7.36	3.19
30.36				
Min Ch El (m)	100.00	Shear (N/m2)	12.75	52.02
19.79				
Alpha	1.83	Stream Power (N/m s)	4931.43	0.00
2298.13				
Frctn Loss (m)		Cum Volume (1000 m3)	0.09	0.06
0.26				
C & E Loss (m)		Cum SA (1000 m2)	0.46	0.15
1.70				

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	100.45	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.05	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	100.41	Reach Len. (m)	25.00	25.00
25.00				
Crit W.S. (m)	100.38	Flow Area (m2)	0.52	1.06
3.59				
E.G. Slope (m/m)	0.009933	Area (m2)	0.52	1.06
3.59				
Q Total (m3/s)	3.68	Flow (m3/s)	0.19	1.45
2.04				
Top Width (m)	36.63	Top Width (m)	6.75	3.00
26.88				
Vel Total (m/s)	0.71	Avg. Vel. (m/s)	0.36	1.37
0.57				
Max Chl Dpth (m)	0.41	Hydr. Depth (m)	0.08	0.35
0.13				
Conv. Total (m3/s)	36.9	Conv. (m3/s)	1.9	14.5
20.5				
Length Wtd. (m)	25.00	Wetted Per. (m)	6.75	3.19
26.89				
Min Ch El (m)	100.00	Shear (N/m2)	7.56	32.35
12.99				
Alpha	1.81	Stream Power (N/m s)	4931.43	0.00
2298.13				
Frctn Loss (m)		Cum Volume (1000 m3)	0.01	0.15
0.09				
C & E Loss (m)		Cum SA (1000 m2)	0.20	0.15
1.43				

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CULVERT

RIVER: High Royds Beck

REACH: 1 RS: 2.5

INPUT
Description:
Distance from Upstream XS = 1
Deck/Roadway Width = 19
Weir Coefficient = 1.4
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
30	100.6	100	50	100.6	100

Upstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	107.43	10	104.39	20	102.18	30	101.87	35	100.48
45	100.25	45.5	100	47.5	100	48	100.38	58	100.44
68	100.29	78	100.07	88	100.74	98	102.07	103	105.46

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	45	.035	48	.05

Bank Sta: Left Right Coeff Contr. Expan.
45 48 .1 .3
Right Levee Station= 48 Elevation= 100.38

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
20	100.6	99.7	45	100.6	99.7

Downstream Bridge Cross Section Data
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	102.2	10	100.82	30	100.47	40	100.27	40.5	99.78
42.5	99.78	43	99.98	63	100.12	73	100.12	83	100.48

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	40	.035	43	.06

Bank Sta: Left Right Coeff Contr. Expan.
40 43 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Arch	.55	1.6

FHWA Chart # 41- Arch; Corrugated metal
FHWA Scale # 1 - 90 Degree headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
1	19	.02	.035	0		.5	1

Upstream Elevation = 100
Centerline Station = 46.5
Downstream Elevation = 99.78
Centerline Station = 41.5

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.65	Culv Full Len (m)	
# Barrels	1	Culv Vel US (m/s)	1.19
Q Barrel (m3/s)	0.65	Culv Vel DS (m/s)	1.02
E.G. US. (m)	100.48	Culv Inv El Up (m)	100.00
W.S. US. (m)	100.44	Culv Inv El Dn (m)	99.78
E.G. DS (m)	100.29	Culv Frctn Ls (m)	0.15
W.S. DS (m)	100.24	Culv Exit Loss (m)	0.00
Delta EG (m)	0.19	Culv Entr Loss (m)	0.04
Delta WS (m)	0.20	Q Weir (m3/s)	3.47
E.G. IC (m)	100.46	Weir Sta Lft (m)	50.00
E.G. OC (m)	100.48	Weir Sta Rgt (m)	83.92
Culvert Control	Outlet	Weir Submerg	0.13
Culv WS Inlet (m)	100.37	Weir Max Depth (m)	0.40
Culv WS Outlet (m)	100.24	Weir Avg Depth (m)	0.16
Culv Nml Depth (m)	0.34	Weir Flow Area (m2)	5.47
Culv Crt Depth (m)	0.26	Min El Weir Flow (m)	100.38

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.60	Culv Full Len (m)	
# Barrels	1	Culv Vel US (m/s)	0.86
Q Barrel (m3/s)	0.60	Culv Vel DS (m/s)	0.87
E.G. US. (m)	100.49	Culv Inv El Up (m)	100.00
W.S. US. (m)	100.42	Culv Inv El Dn (m)	99.78
E.G. DS (m)	100.35	Culv Frctn Ls (m)	0.23
W.S. DS (m)	100.32	Culv Exit Loss (m)	0.01
Delta EG (m)	0.14	Culv Entr Loss (m)	0.03
Delta WS (m)	0.10	Q Weir (m3/s)	
E.G. IC (m)		Weir Sta Lft (m)	50.00
E.G. OC (m)		Weir Sta Rgt (m)	84.46
Culvert Control	Outlet	Weir Submerg	0.29
Culv WS Inlet (m)	100.55	Weir Max Depth (m)	0.43
Culv WS Outlet (m)	100.32	Weir Avg Depth (m)	0.19
Culv Nml Depth (m)	0.32	Weir Flow Area (m2)	6.69
Culv Crt Depth (m)	0.55	Min El Weir Flow (m)	100.38

Warning: During supercritical calculations, the culvert inlet is submerged and the energy in the cross section upstream of the culvert is above the road. This indicates that there may be flow over the road. Since the program cannot calculate weir flow when there is supercritical flow through the culvert, the program sets the culvert inlet to critical depth and continues on. If the program is in supercritical only mode, try running it in mixed mode.
Note: During the supercritical calculations a hydraulic jump occurred at the inlet of (going into) the culvert.

CULVERT OUTPUT Profile #PF 3 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.61	Culv Full Len (m)	
# Barrels	1	Culv Vel US (m/s)	1.17
Q Barrel (m3/s)	0.61	Culv Vel DS (m/s)	0.97
E.G. US. (m)	100.45	Culv Inv El Up (m)	100.00
W.S. US. (m)	100.41	Culv Inv El Dn (m)	99.78
E.G. DS (m)	100.27	Culv Frctn Ls (m)	0.15
W.S. DS (m)	100.22	Culv Exit Loss (m)	0.00
Delta EG (m)	0.18	Culv Entr Loss (m)	0.03
Delta WS (m)	0.19	Q Weir (m3/s)	3.07
E.G. IC (m)	100.45	Weir Sta Lft (m)	50.00
E.G. OC (m)	100.45	Weir Sta Rgt (m)	83.69
Culvert Control	Outlet	Weir Submerg	0.08
Culv WS Inlet (m)	100.35	Weir Max Depth (m)	0.38
Culv WS Outlet (m)	100.23	Weir Avg Depth (m)	0.15

Culv Nml Depth (m)	0.33	Weir Flow Area (m2)	4.94
Culv Crt Depth (m)	0.24	Min El Weir Flow (m)	100.38

CROSS SECTION

RIVER: High Royds Beck
REACH: 1 RS: 2

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	102.2	10	100.82	30	100.47	40	100.27	40.5	99.78
42.5	99.78	43	99.98	63	100.12	73	100.12	83	100.48

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	40	.035	43	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
40	43	25	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	100.29	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.05	Wt. n-Val.		0.035
0.060				
W.S. Elev (m)	100.24	Reach Len. (m)	25.00	25.00
25.00				
Crit W.S. (m)		Flow Area (m2)		1.20
5.13				
E.G. Slope (m/m)	0.009420	Area (m2)		1.20
5.13				
Q Total (m3/s)	4.12	Flow (m3/s)		1.74
2.38				
Top Width (m)	36.24	Top Width (m)		2.97
33.27				
Vel Total (m/s)	0.65	Avg. Vel. (m/s)		1.45
0.46				
Max Chl Dpth (m)	0.46	Hydr. Depth (m)		0.40
0.15				
Conv. Total (m3/s)	42.4	Conv. (m3/s)		17.9
24.6				
Length Wtd. (m)	25.00	Wetted Per. (m)		3.19
33.27				
Min Ch El (m)	99.78	Shear (N/m2)		34.77
14.23				
Alpha	2.37	Stream Power (N/m s)	3973.87	0.00
0.00				
Frctn Loss (m)	0.24	Cum Volume (1000 m3)	0.02	0.03
0.10				
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.13	0.07
0.69				

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	100.35	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.03	Wt. n-Val.	0.060	0.035
0.060				

W.S. Elev (m)	100.32	Reach Len. (m)	25.00	25.00
25.00				
Crit W.S. (m)		Flow Area (m2)	0.07	1.46
8.07				
E.G. Slope (m/m)	0.004645	Area (m2)	0.07	1.46
8.07				
Q Total (m3/s)	5.08	Flow (m3/s)	0.01	1.67
3.41				
Top Width (m)	41.31	Top Width (m)	2.66	3.00
35.65				
Vel Total (m/s)	0.53	Avg. Vel. (m/s)	0.10	1.14
0.42				
Max Chl Dpth (m)	0.54	Hydr. Depth (m)	0.03	0.49
0.23				
Conv. Total (m3/s)	74.5	Conv. (m3/s)	0.1	24.5
50.0				
Length Wtd. (m)	25.00	Wetted Per. (m)	2.66	3.24
35.65				
Min Ch El (m)	99.78	Shear (N/m2)	1.21	20.50
10.31				
Alpha	1.96	Stream Power (N/m s)	3973.87	0.00
0.00				
Frctn Loss (m)	0.03	Cum Volume (1000 m3)	0.09	0.05
0.26				
C & E Loss (m)	0.01	Cum SA (1000 m2)	0.33	0.07
0.88				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	100.27	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.06	Wt. n-Val.		0.035
0.060				
W.S. Elev (m)	100.22	Reach Len. (m)	25.00	25.00
25.00				
Crit W.S. (m)	100.21	Flow Area (m2)		1.14
4.39				
E.G. Slope (m/m)	0.010683	Area (m2)		1.14
4.39				
Q Total (m3/s)	3.68	Flow (m3/s)		1.69
1.99				
Top Width (m)	35.59	Top Width (m)		2.94
32.65				
Vel Total (m/s)	0.67	Avg. Vel. (m/s)		1.49
0.45				
Max Chl Dpth (m)	0.44	Hydr. Depth (m)		0.39
0.13				
Conv. Total (m3/s)	35.6	Conv. (m3/s)		16.4
19.2				
Length Wtd. (m)	25.00	Wetted Per. (m)		3.16
32.65				
Min Ch El (m)	99.78	Shear (N/m2)		37.64
14.09				
Alpha	2.56	Stream Power (N/m s)	3973.87	0.00
0.00				
Frctn Loss (m)	0.24	Cum Volume (1000 m3)	0.01	0.03
0.09				
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.12	0.07
0.68				

CROSS SECTION

RIVER: High Royds Beck
REACH: 1 RS: 1

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	102.5	20	100.33	45	99.73	45.5	99.45	47.5	99.45
48	99.73	68	99.91	88	100.46				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	45	.035	48	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
45	48	20	20	20	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	100.05	Element	Left OB	Channel Right OB
Vel Head (m)	0.08	Wt. n-Val.	0.060	0.035 0.060
W.S. Elev (m)	99.97	Reach Len. (m)	0.00	0.00 0.00
Crit W.S. (m)	99.97	Flow Area (m2)	1.20	1.42 3.07
E.G. Slope (m/m)	0.009428	Area (m2)	1.20	1.42 3.07
Q Total (m3/s)	4.12	Flow (m3/s)	0.47	2.32 1.33
Top Width (m)	35.19	Top Width (m)	10.01	3.00 22.19
Vel Total (m/s)	0.72	Avg. Vel. (m/s)	0.39	1.63 0.43
Max Chl Dpth (m)	0.52	Hydr. Depth (m)	0.12	0.47 0.14
Conv. Total (m3/s)	42.4	Conv. (m3/s)	4.9	23.9 13.7
Length Wtd. (m)	0.00	Wetted Per. (m)	10.01	3.15 22.19
Min Ch El (m)	99.45	Shear (N/m2)	11.10	41.74 12.79
Alpha	3.01	Stream Power (N/m s)	4213.25	0.00 0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.02	Cum SA (1000 m2)		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	100.31	Element	Left OB	Channel Right OB
Vel Head (m)	0.01	Wt. n-Val.	0.060	0.035 0.060
W.S. Elev (m)	100.31	Reach Len. (m)	0.00	0.00 0.00
Crit W.S. (m)	100.00	Flow Area (m2)	6.97	2.44 12.66
E.G. Slope (m/m)	0.000545	Area (m2)	6.97	2.44 12.66
Q Total (m3/s)	5.08	Flow (m3/s)	1.19	1.37 2.52
Top Width (m)	61.60	Top Width (m)	24.10	3.00 34.50
Vel Total (m/s)	0.23	Avg. Vel. (m/s)	0.17	0.56 0.20
Max Chl Dpth (m)	0.86	Hydr. Depth (m)	0.29	0.81 0.37
Conv. Total (m3/s)	217.6	Conv. (m3/s)	50.8	58.7 108.1
Length Wtd. (m)	0.00	Wetted Per. (m)	24.11	3.15 34.50
Min Ch El (m)	99.45	Shear (N/m2)	1.55	4.14 1.96
Alpha	2.11	Stream Power (N/m s)	4213.25	0.00 0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.00	Cum SA (1000 m2)		

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	100.03	Element	Left OB	Channel Right OB
Vel Head (m)	0.07	Wt. n-Val.	0.060	0.035 0.060
W.S. Elev (m)	99.96	Reach Len. (m)	0.00	0.00 0.00
Crit W.S. (m)	99.96	Flow Area (m2)	1.11	1.39 2.86
E.G. Slope (m/m)	0.008558	Area (m2)	1.11	1.39 2.86
Q Total (m3/s)	3.68	Flow (m3/s)	0.41	2.14 1.14
Top Width (m)	34.46	Top Width (m)	9.62	3.00 21.84
Vel Total (m/s)	0.69	Avg. Vel. (m/s)	0.37	1.53 0.40
Max Chl Dpth (m)	0.51	Hydr. Depth (m)	0.12	0.46 0.13
Conv. Total (m3/s)	39.8	Conv. (m3/s)	4.4	23.1 12.3
Length Wtd. (m)	0.00	Wetted Per. (m)	9.62	3.15 21.85
Min Ch El (m)	99.45	Shear (N/m2)	9.68	37.13 10.99
Alpha	3.04	Stream Power (N/m s)	4213.25	0.00 0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		

C & E Loss (m)	0.02	Cum SA (1000 m2)	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 1 RS: 17

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	115	70	114	70.5	113	73.5	113	74	114
124	125								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	70	.035	74	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
70	74	120	120	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	114.22	Element	Left OB	Channel
Vel Head (m)	0.62	Wt. n-Val.		0.035
W.S. Elev (m)	113.60	Reach Len. (m)	120.00	120.00
Crit W.S. (m)	113.78	Flow Area (m2)		1.98
E.G. Slope (m/m)	0.042658	Area (m2)		1.98
Q Total (m3/s)	6.92	Flow (m3/s)		6.92
Top Width (m)	3.60	Top Width (m)		3.60
Vel Total (m/s)	3.50	Avg. Vel. (m/s)		3.50
Max Chl Dpth (m)	0.60	Hydr. Depth (m)		0.55
Conv. Total (m3/s)	33.5	Conv. (m3/s)		33.5
Length Wtd. (m)	120.00	Wetted Per. (m)		4.34
Min Ch El (m)	113.00	Shear (N/m2)		190.74
Alpha	1.00	Stream Power (N/m s)	5936.85	0.00
Frctn Loss (m)		Cum Volume (1000 m3)	6.27	15.32
C & E Loss (m)		Cum SA (1000 m2)	10.67	1.44

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	114.37	Element	Left OB	Channel
Vel Head (m)	0.67	Wt. n-Val.		0.035
W.S. Elev (m)	113.70	Reach Len. (m)	120.00	120.00
Crit W.S. (m)	113.89	Flow Area (m2)		2.34
E.G. Slope (m/m)	0.039339	Area (m2)		2.34
Q Total (m3/s)	8.52	Flow (m3/s)		8.52
Top Width (m)	3.70	Top Width (m)		3.70
Vel Total (m/s)	3.63	Avg. Vel. (m/s)		3.63
Max Chl Dpth (m)	0.70	Hydr. Depth (m)		0.63
Conv. Total (m3/s)	43.0	Conv. (m3/s)		43.0
Length Wtd. (m)	120.00	Wetted Per. (m)		4.56
Min Ch El (m)	113.00	Shear (N/m2)		198.12
Alpha	1.00	Stream Power (N/m s)	5936.85	0.00
Frctn Loss (m)		Cum Volume (1000 m3)	6.71	15.63
C & E Loss (m)		Cum SA (1000 m2)	10.84	1.44

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	114.23	Element	Left OB	Channel
Vel Head (m)	0.73	Wt. n-Val.		0.035
W.S. Elev (m)	113.50	Reach Len. (m)	120.00	120.00
Crit W.S. (m)	113.72	Flow Area (m2)		1.62
E.G. Slope (m/m)	0.061062	Area (m2)		1.62
Q Total (m3/s)	6.17	Flow (m3/s)		6.17
Top Width (m)	3.50	Top Width (m)		3.50
Vel Total (m/s)	3.80	Avg. Vel. (m/s)		3.80
Max Chl Dpth (m)	0.50	Hydr. Depth (m)		0.46
Conv. Total (m3/s)	25.0	Conv. (m3/s)		25.0
Length Wtd. (m)	120.00	Wetted Per. (m)		4.12

Min Ch El (m)	113.00	Shear (N/m2)			236.25
Alpha	1.00	Stream Power (N/m s)	5936.85		0.00
Frctn Loss (m)		Cum Volume (1000 m3)	6.08		15.05
C & E Loss (m)		Cum SA (1000 m2)	10.59		1.43

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 1 RS: 16

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	115	70	110	90	109	90.5	108	93.5	108
94	109	104	110	114	115	144	120	184	125

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	90	.035	94	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
90	94	140	140	140 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	110.06	Element	Left OB	Channel
Vel Head (m)	0.01	Wt. n-Val.	0.050	0.035
W.S. Elev (m)	110.05	Reach Len. (m)	140.00	140.00
Crit W.S. (m)	108.78	Flow Area (m2)	11.01	7.70
E.G. Slope (m/m)	0.000190	Area (m2)	11.01	7.70
Q Total (m3/s)	6.92	Flow (m3/s)	1.99	3.92
Top Width (m)	34.80	Top Width (m)	20.70	4.00
Vel Total (m/s)	0.29	Avg. Vel. (m/s)	0.18	0.51
Max Chl Dpth (m)	2.05	Hydr. Depth (m)	0.53	1.92
Conv. Total (m3/s)	501.9	Conv. (m3/s)	144.5	284.4
Length Wtd. (m)	140.00	Wetted Per. (m)	20.72	5.24
Min Ch El (m)	108.00	Shear (N/m2)	0.99	2.74
Alpha	1.97	Stream Power (N/m s)	8809.54	0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	5.61	14.74
C & E Loss (m)	0.00	Cum SA (1000 m2)	9.42	0.98

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	110.09	Element	Left OB	Channel
Vel Head (m)	0.01	Wt. n-Val.	0.050	0.035
W.S. Elev (m)	110.08	Reach Len. (m)	140.00	140.00
Crit W.S. (m)	108.89	Flow Area (m2)	11.70	7.83
E.G. Slope (m/m)	0.000258	Area (m2)	11.70	7.83
Q Total (m3/s)	8.52	Flow (m3/s)	2.53	4.70
Top Width (m)	35.32	Top Width (m)	21.16	4.00
Vel Total (m/s)	0.34	Avg. Vel. (m/s)	0.22	0.60
Max Chl Dpth (m)	2.08	Hydr. Depth (m)	0.55	1.96
Conv. Total (m3/s)	530.2	Conv. (m3/s)	157.5	292.5
Length Wtd. (m)	140.00	Wetted Per. (m)	21.19	5.24
Min Ch El (m)	108.00	Shear (N/m2)	1.40	3.79
Alpha	1.95	Stream Power (N/m s)	8809.54	0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	6.01	15.02
C & E Loss (m)	0.00	Cum SA (1000 m2)	9.57	0.98

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	110.04	Element	Left OB	Channel
Vel Head (m)	0.01	Wt. n-Val.	0.050	0.035
W.S. Elev (m)	110.04	Reach Len. (m)	140.00	140.00
Crit W.S. (m)	108.72	Flow Area (m2)	10.71	7.64
E.G. Slope (m/m)	0.000159	Area (m2)	10.71	7.64
Q Total (m3/s)	6.17	Flow (m3/s)	1.75	3.54
Top Width (m)	34.57	Top Width (m)	20.50	4.00
Vel Total (m/s)	0.26	Avg. Vel. (m/s)	0.16	0.46
Max Chl Dpth (m)	2.04	Hydr. Depth (m)	0.52	1.91

0.53				
Conv. Total (m3/s)	489.8	Conv. (m3/s)	138.9	280.9
70.0				
Length Wtd. (m)	140.00	Wetted Per. (m)	20.52	5.24
10.13				
Min Ch El (m)	108.00	Shear (N/m2)	0.81	2.27
0.82				
Alpha	1.98	Stream Power (N/m s)	8809.54	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	5.44	14.50
4.01				
C & E Loss (m)	0.00	Cum SA (1000 m2)	9.36	0.98
6.19				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 1 RS: 15

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	114	80	110	120	107	120.5	106	123.5	106
124	107	154	110	179	115	209	120		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	120	.035	124	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
120	124	105	105	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	110.05	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.05	Reach Len. (m)	105.00	105.00
105.00				
Crit W.S. (m)	106.78	Flow Area (m2)	62.19	15.72
46.62				
E.G. Slope (m/m)	0.000003	Area (m2)	62.19	15.72
46.62				
Q Total (m3/s)	6.92	Flow (m3/s)	2.97	1.70
2.25				
Top Width (m)	75.35	Top Width (m)	41.08	4.00
30.27				
Vel Total (m/s)	0.06	Avg. Vel. (m/s)	0.05	0.11
0.05				
Max Chl Dpth (m)	4.05	Hydr. Depth (m)	1.51	3.93
1.54				
Conv. Total (m3/s)	3810.3	Conv. (m3/s)	1636.7	934.2
1239.5				
Length Wtd. (m)	105.00	Wetted Per. (m)	41.19	5.24
30.42				

Min Ch El (m)	106.00	Shear (N/m2)	0.05	0.10
0.05				
Alpha	1.49	Stream Power (N/m s)	10006.48	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.48	13.10
0.52				
C & E Loss (m)		Cum SA (1000 m2)	5.10	0.42
3.37				

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	110.09	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.09	Reach Len. (m)	105.00	105.00
105.00				
Crit W.S. (m)	106.89	Flow Area (m2)	63.61	15.85
47.67				
E.G. Slope (m/m)	0.000005	Area (m2)	63.61	15.85
47.67				
Q Total (m3/s)	8.52	Flow (m3/s)	3.66	2.07
2.79				
Top Width (m)	76.21	Top Width (m)	41.77	4.00
30.44				
Vel Total (m/s)	0.07	Avg. Vel. (m/s)	0.06	0.13
0.06				
Max Chl Dpth (m)	4.09	Hydr. Depth (m)	1.52	3.96
1.57				
Conv. Total (m3/s)	3909.7	Conv. (m3/s)	1680.8	947.9
1281.0				
Length Wtd. (m)	105.00	Wetted Per. (m)	41.88	5.24
30.60				
Min Ch El (m)	106.00	Shear (N/m2)	0.07	0.14
0.07				
Alpha	1.48	Stream Power (N/m s)	10006.48	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.73	13.37
0.69				
C & E Loss (m)		Cum SA (1000 m2)	5.16	0.42
3.39				

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	110.04	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.04	Reach Len. (m)	105.00	105.00
105.00				
Crit W.S. (m)	106.72	Flow Area (m2)	61.57	15.65
46.17				
E.G. Slope (m/m)	0.000003	Area (m2)	61.57	15.65
46.17				
Q Total (m3/s)	6.17	Flow (m3/s)	2.65	1.52
2.00				
Top Width (m)	74.97	Top Width (m)	40.78	4.00
30.19				
Vel Total (m/s)	0.05	Avg. Vel. (m/s)	0.04	0.10
0.04				
Max Chl Dpth (m)	4.04	Hydr. Depth (m)	1.51	3.91
1.53				

Conv. Total (m3/s)	3767.3	Conv. (m3/s)	1617.6	928.3
1221.4				
Length Wtd. (m)	105.00	Wetted Per. (m)	40.89	5.24
30.35				
Min Ch El (m)	106.00	Shear (N/m2)	0.04	0.08
0.04				
Alpha	1.49	Stream Power (N/m s)	10006.48	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.38	12.87
0.41				
C & E Loss (m)		Cum SA (1000 m2)	5.07	0.42
3.37				

CULVERT

RIVER: Hunsworth Beck
REACH: 1 RS: 14.9

INPUT
Description:
Distance from Upstream XS = 2
Deck/Roadway Width = 100
Weir Coefficient = 1.4
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
50	108	200	108
	106		106

Upstream Bridge Cross Section Data
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	114	80	110	120	107	120.5	106	123.5	106
124	107	154	110	179	115	209	120		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	120	.035	124	.05

Bank Sta: Left Right Coeff Contr. Expan.
120 124 .1 .3

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
50	107	200	107
	105.25		105.25

Downstream Bridge Cross Section Data
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	113.25	80	109.25	120	106.25	120.5	105.25	123.5	105.25
124	106.25	154	109.25	179	114.25	209	119.25		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	120	.035	124	.05

Bank Sta: Left Right Coeff Contr. Expan.
120 124 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =

Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Arch	1	2

FHWA Chart # 41- Arch; Corrugated metal
FHWA Scale # 1 - 90 Degree headwall
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
2	100	.015	.045	0	.5	1

Upstream Elevation = 106
Centerline Station = 122
Downstream Elevation = 105.25
Centerline Station = 122

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.08	Culv Full Len (m)	100.00
# Barrels	1	Culv Vel US (m/s)	0.05
Q Barrel (m3/s)	0.08	Culv Vel DS (m/s)	0.05
E.G. US. (m)	110.05	Culv Inv El Up (m)	106.00
W.S. US. (m)	110.05	Culv Inv El Dn (m)	105.25
E.G. DS (m)	110.05	Culv Frctn Ls (m)	0.00
W.S. DS (m)	110.05	Culv Exit Loss (m)	0.00
Delta EG (m)	0.00	Culv Entr Loss (m)	0.00
Delta WS (m)	0.00	Q Weir (m3/s)	6.84
E.G. IC (m)	109.10	Weir Sta Lft (m)	78.92
E.G. OC (m)	110.05	Weir Sta Rgt (m)	154.27
Culvert Control	Outlet	Weir Submerg	1.00
Culv WS Inlet (m)	107.00	Weir Max Depth (m)	2.05
Culv WS Outlet (m)	106.25	Weir Avg Depth (m)	1.40
Culv Nml Depth (m)		Weir Flow Area (m2)	105.36
Culv Crt Depth (m)	0.05	Min El Weir Flow (m)	108.00

Warning: During subcritical analysis, while trying to calculate culvert and weir flow, the program could not get a balance of
energy within the specified tolerance and number of trials. The program used the solution with the minimum error.
Warning: The weir over culvert is submerged.
Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.24	Culv Full Len (m)	100.00
# Barrels	1	Culv Vel US (m/s)	0.16
Q Barrel (m3/s)	0.24	Culv Vel DS (m/s)	0.16
E.G. US. (m)	110.09	Culv Inv El Up (m)	106.00
W.S. US. (m)	110.09	Culv Inv El Dn (m)	105.25
E.G. DS (m)	110.08	Culv Frctn Ls (m)	0.01
W.S. DS (m)	110.08	Culv Exit Loss (m)	0.00
Delta EG (m)	0.01	Culv Entr Loss (m)	0.00
Delta WS (m)	0.01	Q Weir (m3/s)	8.28
E.G. IC (m)	110.08	Weir Sta Lft (m)	78.43
E.G. OC (m)	110.09	Weir Sta Rgt (m)	154.39
Culvert Control	Outlet	Weir Submerg	1.00
Culv WS Inlet (m)	107.00	Weir Max Depth (m)	2.08
Culv WS Outlet (m)	106.25	Weir Avg Depth (m)	1.41
Culv Nml Depth (m)		Weir Flow Area (m2)	107.20
Culv Crt Depth (m)	0.11	Min El Weir Flow (m)	108.00

Warning: The weir over culvert is submerged.

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.

CULVERT OUTPUT Profile #PF 3 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.08	Culv Full Len (m)	100.00
# Barrels	1	Culv Vel US (m/s)	0.05
Q Barrel (m3/s)	0.08	Culv Vel DS (m/s)	0.05
E.G. US. (m)	110.04	Culv Inv El Up (m)	106.00
W.S. US. (m)	110.04	Culv Inv El Dn (m)	105.25
E.G. DS (m)	110.04	Culv Frctn Ls (m)	0.00
W.S. DS (m)	110.04	Culv Exit Loss (m)	0.00
Delta EG (m)	0.00	Culv Entr Loss (m)	0.00
Delta WS (m)	0.00	Q Weir (m3/s)	6.09
E.G. IC (m)	108.60	Weir Sta Lft (m)	79.23
E.G. OC (m)	110.04	Weir Sta Rgt (m)	154.19
Culvert Control	Outlet	Weir Submerg	1.00
Culv WS Inlet (m)	107.00	Weir Max Depth (m)	2.04
Culv WS Outlet (m)	106.25	Weir Avg Depth (m)	1.39
Culv Nml Depth (m)		Weir Flow Area (m2)	104.21
Culv Crt Depth (m)	0.05	Min El Weir Flow (m)	108.00

Warning: During subcritical analysis, while trying to calculate culvert and weir flow, the program could not get a balance of energy within the specified tolerance and number of trials. The program used the solution with the minimum error.
Warning: The weir over culvert is submerged.
Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 1 RS: 14.8

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	113.25	80	109.25	120	106.25	120.5	105.25	123.5	105.25
124	106.25	154	109.25	179	114.25	209	119.25		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	120	.035	124	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
120	124	0	0	0 .1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	110.05	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.05	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)		Flow Area (m2)	98.56	18.71
70.70				
E.G. Slope (m/m)	0.000001	Area (m2)	98.56	18.71
70.70				
Q Total (m3/s)	6.92	Flow (m3/s)	3.10	1.35

2.48				
Top Width (m)	94.07	Top Width (m)	56.06	4.00
34.01				
Vel Total (m/s)	0.04	Avg. Vel. (m/s)	0.03	0.07
0.04				
Max Chl Dpth (m)	4.80	Hydr. Depth (m)	1.76	4.68
2.08				
Conv. Total (m3/s)	6409.5	Conv. (m3/s)	2867.2	1249.6
2292.7				
Length Wtd. (m)	0.00	Wetted Per. (m)	56.19	5.24
34.24				
Min Ch El (m)	105.25	Shear (N/m2)	0.02	0.04
0.02				
Alpha	1.40	Stream Power (N/m s)	10006.48	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.00	Cum SA (1000 m2)		

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	110.08	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.08	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)		Flow Area (m2)	99.92	18.81
71.52				
E.G. Slope (m/m)	0.000002	Area (m2)	99.92	18.81
71.52				
Q Total (m3/s)	8.52	Flow (m3/s)	3.82	1.65
3.05				
Top Width (m)	94.68	Top Width (m)	56.54	4.00
34.14				
Vel Total (m/s)	0.04	Avg. Vel. (m/s)	0.04	0.09
0.04				
Max Chl Dpth (m)	4.83	Hydr. Depth (m)	1.77	4.70
2.10				
Conv. Total (m3/s)	6508.8	Conv. (m3/s)	2916.7	1260.4
2331.7				
Length Wtd. (m)	0.00	Wetted Per. (m)	56.67	5.24
34.37				
Min Ch El (m)	105.25	Shear (N/m2)	0.03	0.06
0.03				
Alpha	1.39	Stream Power (N/m s)	10006.48	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.00	Cum SA (1000 m2)		

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	110.04	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.04	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)		Flow Area (m2)	97.72	18.65

70.18					
E.G. Slope (m/m)	0.000001	Area (m2)		97.72	18.65
70.18					
Q Total (m3/s)	6.17	Flow (m3/s)		2.76	1.21
2.20					
Top Width (m)	93.69	Top Width (m)		55.75	4.00
33.94					
Vel Total (m/s)	0.03	Avg. Vel. (m/s)		0.03	0.06
0.03					
Max Chl Dpth (m)	4.79	Hydr. Depth (m)		1.75	4.66
2.07					
Conv. Total (m3/s)	6347.5	Conv. (m3/s)		2836.4	1242.9
2268.3					
Length Wtd. (m)	0.00	Wetted Per. (m)		55.89	5.24
34.17					
Min Ch El (m)	105.25	Shear (N/m2)		0.02	0.03
0.02					
Alpha	1.40	Stream Power (N/m s)		10006.48	0.00
0.00					
Frctn Loss (m)	0.00	Cum Volume (1000 m3)			
C & E Loss (m)	0.00	Cum SA (1000 m2)			

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 2 RS: 14.5

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	111.75	100	106.75	100.5	105.25	103.5	105.25	104	106.75
144	111.75	204	116.75						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	100	.035	104	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
100	104	105	105	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	110.05	Element		Left OB	Channel
Right OB					
Vel Head (m)	0.00	Wt. n-Val.		0.050	0.035
0.050					
W.S. Elev (m)	110.05	Reach Len. (m)		105.00	105.00
105.00					
Crit W.S. (m)	106.12	Flow Area (m2)		109.09	18.46
43.63					
E.G. Slope (m/m)	0.000002	Area (m2)		109.09	18.46
43.63					
Q Total (m3/s)	8.01	Flow (m3/s)		4.56	1.64
1.81					
Top Width (m)	96.48	Top Width (m)		66.06	4.00
26.42					
Vel Total (m/s)	0.05	Avg. Vel. (m/s)		0.04	0.09
0.04					
Max Chl Dpth (m)	4.80	Hydr. Depth (m)		1.65	4.62
1.65					

Conv. Total (m3/s)	5354.7	Conv. (m3/s)		3045.6	1096.1
1213.0					
Length Wtd. (m)	105.00	Wetted Per. (m)		66.14	6.16
26.63					
Min Ch El (m)	105.25	Shear (N/m2)		0.04	0.07
0.04					
Alpha	1.37	Stream Power (N/m s)		9767.08	0.00
0.00					
Frctn Loss (m)		Cum Volume (1000 m3)		15.50	21.10
2.52					
C & E Loss (m)		Cum SA (1000 m2)		24.49	1.62
5.86					

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	110.08	Element		Left OB	Channel
Right OB					
Vel Head (m)	0.00	Wt. n-Val.		0.050	0.035
0.050					
W.S. Elev (m)	110.08	Reach Len. (m)		105.00	105.00
105.00					
Crit W.S. (m)	106.24	Flow Area (m2)		110.68	18.56
44.27					
E.G. Slope (m/m)	0.000003	Area (m2)		110.68	18.56
44.27					
Q Total (m3/s)	9.87	Flow (m3/s)		5.63	2.00
2.24					
Top Width (m)	97.15	Top Width (m)		66.54	4.00
26.62					
Vel Total (m/s)	0.06	Avg. Vel. (m/s)		0.05	0.11
0.05					
Max Chl Dpth (m)	4.83	Hydr. Depth (m)		1.66	4.64
1.66					
Conv. Total (m3/s)	5447.6	Conv. (m3/s)		3105.2	1105.7
1236.7					
Length Wtd. (m)	105.00	Wetted Per. (m)		66.62	6.16
26.82					
Min Ch El (m)	105.25	Shear (N/m2)		0.05	0.10
0.05					
Alpha	1.37	Stream Power (N/m s)		9767.08	0.00
0.00					
Frctn Loss (m)		Cum Volume (1000 m3)		16.53	21.94
2.56					
C & E Loss (m)		Cum SA (1000 m2)		26.64	1.64
5.92					

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	110.04	Element		Left OB	Channel
Right OB					
Vel Head (m)	0.00	Wt. n-Val.		0.050	0.035
0.050					
W.S. Elev (m)	110.04	Reach Len. (m)		105.00	105.00
105.00					
Crit W.S. (m)	106.06	Flow Area (m2)		108.08	18.40
43.23					
E.G. Slope (m/m)	0.000002	Area (m2)		108.08	18.40
43.23					
Q Total (m3/s)	7.14	Flow (m3/s)		4.06	1.47
1.62					
Top Width (m)	96.05	Top Width (m)		65.75	4.00
26.30					

Vel Total (m/s)	0.04	Avg. Vel. (m/s)	0.04	0.08	0.04
Max Chl Dpth (m)	4.79	Hydr. Depth (m)	1.64	4.60	1.64
Conv. Total (m3/s)	5296.7	Conv. (m3/s)	3008.4	1090.1	1198.2
Length Wtd. (m)	105.00	Wetted Per. (m)	65.84	6.16	26.51
Min Ch El (m)	105.25	Shear (N/m2)	0.03	0.05	0.03
Alpha	1.37	Stream Power (N/m s)	9767.08	0.00	0.00
Frctn Loss (m)		Cum Volume (1000 m3)	15.33	20.69	2.51
C & E Loss (m)		Cum SA (1000 m2)	24.28	1.61	5.84

CULVERT

RIVER: Hunsworth Beck
REACH: 2 RS: 14.2

INPUT
Description:
Distance from Upstream XS = 2
Deck/Roadway Width = 100
Weir Coefficient = 1.4
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	107	103.5	150	107	103.5

Upstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	111.75	100	106.75	100.5	105.25	103.5	105.25	104	106.75
144	111.75	204	116.75						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	100	.035	104	.05

Bank Sta: Left Right Coeff Contr. Expan.
100 104 .1 .3

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	106	103.5	150	106	103.5

Downstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	110.5	100	105.5	100.5	104	103.5	104	104	105.5
144	110.5	204	115.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	100	.035	104	.05

Bank Sta: Left Right Coeff Contr. Expan.
100 104 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Arch	1	2

FHWA Chart # 41- Arch; Corrugated metal
FHWA Scale # 1 - 90 Degree headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	2	100	.015	.045	0	.5	1

Upstream Elevation = 105.25
Centerline Station = 102
Downstream Elevation = 104
Centerline Station = 102

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.16	Culv Full Len (m)	100.00
# Barrels	1	Culv Vel US (m/s)	0.10
Q Barrel (m3/s)	0.16	Culv Vel DS (m/s)	0.10
E.G. US. (m)	110.05	Culv Inv El Up (m)	105.25
W.S. US. (m)	110.05	Culv Inv El Dn (m)	104.00
E.G. DS (m)	110.05	Culv Frctn Ls (m)	0.00
W.S. DS (m)	110.05	Culv Exit Loss (m)	0.00
Delta EG (m)	0.00	Culv Entr Loss (m)	0.00
Delta WS (m)	0.00	Q Weir (m3/s)	7.85
E.G. IC (m)	109.17	Weir Sta Lft (m)	34.02
E.G. OC (m)	110.05	Weir Sta Rgt (m)	130.39
Culvert Control	Outlet	Weir Submerg	1.00
Culv WS Inlet (m)	106.25	Weir Max Depth (m)	3.05
Culv WS Outlet (m)	105.00	Weir Avg Depth (m)	1.70
Culv Nml Depth (m)		Weir Flow Area (m2)	163.67
Culv Crt Depth (m)	0.09	Min El Weir Flow (m)	107.00

Warning: During subcritical analysis, while trying to calculate culvert and weir flow, the program could not get a balance of
energy within the specified tolerance and number of trials. The program used the solution with the minimum error.
Warning: The weir over culvert is submerged.
Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.23	Culv Full Len (m)	100.00
# Barrels	1	Culv Vel US (m/s)	0.15
Q Barrel (m3/s)	0.23	Culv Vel DS (m/s)	0.15
E.G. US. (m)	110.08	Culv Inv El Up (m)	105.25
W.S. US. (m)	110.08	Culv Inv El Dn (m)	104.00
E.G. DS (m)	110.07	Culv Frctn Ls (m)	0.01
W.S. DS (m)	110.07	Culv Exit Loss (m)	0.00
Delta EG (m)	0.01	Culv Entr Loss (m)	0.00
Delta WS (m)	0.01	Q Weir (m3/s)	9.64
E.G. IC (m)	110.07	Weir Sta Lft (m)	33.65
E.G. OC (m)	110.08	Weir Sta Rgt (m)	130.54
Culvert Control	Outlet	Weir Submerg	1.00
Culv WS Inlet (m)	106.25	Weir Max Depth (m)	3.07
Culv WS Outlet (m)	105.00	Weir Avg Depth (m)	1.71
Culv Nml Depth (m)		Weir Flow Area (m2)	165.47

Culv Crt Depth (m)	0.11	Min El Weir Flow (m)	107.00

Warning: The weir over culvert is submerged.
Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.

CULVERT OUTPUT Profile #PF 3 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.00	Culv Full Len (m)	100.00
# Barrels	1	Culv Vel US (m/s)	0.00
Q Barrel (m3/s)	0.00	Culv Vel DS (m/s)	0.00
E.G. US. (m)	110.04	Culv Inv El Up (m)	105.25
W.S. US. (m)	110.04	Culv Inv El Dn (m)	104.00
E.G. DS (m)	110.04	Culv Frctn Ls (m)	0.00
W.S. DS (m)	110.04	Culv Exit Loss (m)	0.00
Delta EG (m)	0.00	Culv Entr Loss (m)	0.00
Delta WS (m)	0.00	Q Weir (m3/s)	7.14
E.G. IC (m)	108.50	Weir Sta Lft (m)	34.23
E.G. OC (m)	110.04	Weir Sta Rgt (m)	130.31
Culvert Control	Outlet	Weir Submerg	1.00
Culv WS Inlet (m)	106.25	Weir Max Depth (m)	3.04
Culv WS Outlet (m)	105.00	Weir Avg Depth (m)	1.69
Culv Nml Depth (m)		Weir Flow Area (m2)	162.66
Culv Crt Depth (m)	0.01	Min El Weir Flow (m)	107.00

Warning: The weir over culvert is submerged.
Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
Warning: During the culvert outlet control computations, the program could not balance the culvert/weir flow. The reported outlet energy grade answer may not be valid.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 2 RS: 14

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	110.5	100	105.5	100.5	104	103.5	104	104	105.5
144	110.5	204	115.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	100	.035	104	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
100	104	40	40	40 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	110.05	Element	Left OB	Channel
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
W.S. Elev (m)	110.05	Reach Len. (m)	40.00	40.00
Crit W.S. (m)		Flow Area (m2)	206.85	23.44
E.G. Slope (m/m)	0.000000	Area (m2)	206.85	23.44
Q Total (m3/s)	8.01	Flow (m3/s)	4.92	1.12
Top Width (m)	131.35	Top Width (m)	90.96	4.00
Vel Total (m/s)	0.03	Avg. Vel. (m/s)	0.02	0.05
Max Chl Dpth (m)	6.05	Hydr. Depth (m)	2.27	5.86
Conv. Total (m3/s)	11627.0	Conv. (m3/s)	7148.1	1632.1
Length Wtd. (m)	40.00	Wetted Per. (m)	91.08	6.16
Min Ch El (m)	104.00	Shear (N/m2)	0.01	0.02
Alpha	1.24	Stream Power (N/m s)	9767.08	0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	15.50	3.90
C & E Loss (m)	0.00	Cum SA (1000 m2)	16.25	1.20

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	110.07	Element	Left OB	Channel
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
W.S. Elev (m)	110.07	Reach Len. (m)	40.00	40.00
Crit W.S. (m)		Flow Area (m2)	208.54	23.52
E.G. Slope (m/m)	0.000001	Area (m2)	208.54	23.52
Q Total (m3/s)	9.87	Flow (m3/s)	6.07	1.38
Top Width (m)	131.87	Top Width (m)	91.33	4.00
Vel Total (m/s)	0.03	Avg. Vel. (m/s)	0.03	0.06
Max Chl Dpth (m)	6.07	Hydr. Depth (m)	2.28	5.88
Conv. Total (m3/s)	11744.6	Conv. (m3/s)	7226.0	1640.7
Length Wtd. (m)	40.00	Wetted Per. (m)	91.45	6.16
Min Ch El (m)	104.00	Shear (N/m2)	0.02	0.03
Alpha	1.23	Stream Power (N/m s)	9767.08	0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	16.53	4.55
C & E Loss (m)	0.00	Cum SA (1000 m2)	18.35	1.22

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	110.04	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.04	Reach Len. (m)	40.00	40.00
40.00				
Crit W.S. (m)		Flow Area (m2)	205.91	23.40
82.36				
E.G. Slope (m/m)	0.000000	Area (m2)	205.91	23.40
82.36				
Q Total (m3/s)	7.14	Flow (m3/s)	4.39	1.00
1.75				
Top Width (m)	131.06	Top Width (m)	90.75	4.00
36.30				
Vel Total (m/s)	0.02	Avg. Vel. (m/s)	0.02	0.04
0.02				
Max Chl Dpth (m)	6.04	Hydr. Depth (m)	2.27	5.85
2.27				
Conv. Total (m3/s)	11561.6	Conv. (m3/s)	7104.7	1627.3
2829.6				
Length Wtd. (m)	40.00	Wetted Per. (m)	90.87	6.16
36.58				
Min Ch El (m)	104.00	Shear (N/m2)	0.01	0.01
0.01				
Alpha	1.24	Stream Power (N/m s)	9767.08	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	15.33	3.60
2.51				
C & E Loss (m)	0.00	Cum SA (1000 m2)	16.06	1.19
2.56				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 2 RS: 13

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	114.37	20	113.44	40	111.91	60	110.57	80	108.85
100	107.37	120	106.47	140	108.23	160	104.44	180	103.5
210	105	210.5	104	213.5	104	214	107	220	106.51
240	111.88	260	114.72						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	210	.035	214	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
210	214	150	150	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	110.05	Element	Left OB	Channel

Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.05	Reach Len. (m)	150.00	150.00
150.00				
Crit W.S. (m)	104.00	Flow Area (m2)	533.41	23.19
43.07				
E.G. Slope (m/m)	0.000000	Area (m2)	533.41	23.19
43.07				
Q Total (m3/s)	8.01	Flow (m3/s)	7.19	0.41
0.41				
Top Width (m)	167.11	Top Width (m)	143.93	4.00
19.18				
Vel Total (m/s)	0.01	Avg. Vel. (m/s)	0.01	0.02
0.01				
Max Chl Dpth (m)	6.55	Hydr. Depth (m)	3.71	5.80
2.25				
Conv. Total (m3/s)	28379.0	Conv. (m3/s)	25475.2	1450.9
1452.9				
Length Wtd. (m)	150.00	Wetted Per. (m)	144.55	7.16
19.66				
Min Ch El (m)	104.00	Shear (N/m2)	0.00	0.00
0.00				
Alpha	1.03	Stream Power (N/m s)	12448.24	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.70	2.97
0.01				
C & E Loss (m)		Cum SA (1000 m2)	11.55	1.04
1.45				

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	110.07	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.07	Reach Len. (m)	150.00	150.00
150.00				
Crit W.S. (m)	104.05	Flow Area (m2)	536.08	23.27
43.43				
E.G. Slope (m/m)	0.000000	Area (m2)	536.08	23.27
43.43				
Q Total (m3/s)	9.87	Flow (m3/s)	8.86	0.50
0.51				
Top Width (m)	167.40	Top Width (m)	144.15	4.00
19.25				
Vel Total (m/s)	0.02	Avg. Vel. (m/s)	0.02	0.02
0.01				
Max Chl Dpth (m)	6.57	Hydr. Depth (m)	3.72	5.82
2.26				
Conv. Total (m3/s)	28590.6	Conv. (m3/s)	25662.5	1458.6
1469.4				
Length Wtd. (m)	150.00	Wetted Per. (m)	144.77	7.16
19.74				
Min Ch El (m)	104.00	Shear (N/m2)	0.00	0.00
0.00				
Alpha	1.03	Stream Power (N/m s)	12448.24	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	1.63	3.62
0.02				
C & E Loss (m)		Cum SA (1000 m2)	13.64	1.06
1.49				

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	110.04	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	110.04	Reach Len. (m)	150.00	150.00
150.00				
Crit W.S. (m)	103.97	Flow Area (m2)	531.92	23.15
42.87				
E.G. Slope (m/m)	0.000000	Area (m2)	531.92	23.15
42.87				
Q Total (m3/s)	7.14	Flow (m3/s)	6.41	0.37
0.36				
Top Width (m)	166.95	Top Width (m)	143.81	4.00
19.14				
Vel Total (m/s)	0.01	Avg. Vel. (m/s)	0.01	0.02
0.01				
Max Chl Dpth (m)	6.54	Hydr. Depth (m)	3.70	5.79
2.24				
Conv. Total (m3/s)	28261.1	Conv. (m3/s)	25370.8	1446.6
1443.7				
Length Wtd. (m)	150.00	Wetted Per. (m)	144.43	7.16
19.62				
Min Ch El (m)	104.00	Shear (N/m2)	0.00	0.00
0.00				
Alpha	1.03	Stream Power (N/m s)	12448.24	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	0.57	2.67
0.00				
C & E Loss (m)		Cum SA (1000 m2)	11.37	1.03
1.45				

CULVERT

RIVER: Hunsworth Beck
REACH: 2 RS: 12.5

INPUT
Description:
Distance from Upstream XS = 2
Deck/Roadway Width = 140
Weir Coefficient = 1.4
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
68	110	102	300	110	102

Upstream Bridge Cross Section Data
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	114.37	20	113.44	40	111.91	60	110.57	80	108.85
100	107.37	120	106.47	140	108.23	160	104.44	180	103.5
210	105	210.5	104	213.5	104	214	107	220	106.51
240	111.88	260	114.72						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	210	.035	214	.05

Bank Sta: Left Right Coeff Contr. Expan.
210 214 .1 .3

Downstream Deck/Roadway Coordinates

num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	110	100	225	110	100

Downstream Bridge Cross Section Data
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	103.62	10	102.21	20	101.5	30	100.96	40	102.52		
50	102.5	50.5	101.5	53.5	101.5	54	102.5	60	103.25		
70	106.2	80	107.28	90	107.75	100	110.51				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	50	.035	54	.035

Bank Sta: Left Right Coeff Contr. Expan.
50 54 .1 .3
Left Levee Station= 50 Elevation= 102.5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Arch	1	2

FHWA Chart # 41- Arch; Corrugated metal
FHWA Scale # 1 - 90 Degree headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
1	2	140	.015	.045	0	.5	1

Upstream Elevation = 104
Centerline Station = 212
Downstream Elevation = 101.5
Centerline Station = 52

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (m3/s)	5.44	Culv Full Len (m)	138.25
# Barrels	1	Culv Vel US (m/s)	3.47
Q Barrel (m3/s)	5.44	Culv Vel DS (m/s)	3.71
E.G. US. (m)	110.05	Culv Inv El Up (m)	104.00
W.S. US. (m)	110.05	Culv Inv El Dn (m)	101.50
E.G. DS (m)	102.74	Culv Frctn Ls (m)	6.69
W.S. DS (m)	102.35	Culv Exit Loss (m)	0.32
Delta EG (m)	7.31	Culv Entr Loss (m)	0.31
Delta WS (m)	7.70	Q Weir (m3/s)	2.52
E.G. IC (m)	107.91	Weir Sta Lft (m)	66.07
E.G. OC (m)	110.05	Weir Sta Rgt (m)	233.18
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (m)	105.00	Weir Max Depth (m)	0.17
Culv WS Outlet (m)	102.35	Weir Avg Depth (m)	0.05
Culv Nml Depth (m)	1.00	Weir Flow Area (m2)	8.14
Culv Crt Depth (m)	0.85	Min El Weir Flow (m)	110.00

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height

of the culvert.

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

Q Culv Group (m3/s)	5.44	Culv Full Len (m)	139.55
# Barrels	1	Culv Vel US (m/s)	3.46
Q Barrel (m3/s)	5.44	Culv Vel DS (m/s)	3.48
E.G. US. (m)	110.07	Culv Inv El Up (m)	104.00
W.S. US. (m)	110.07	Culv Inv El Dn (m)	101.50
E.G. DS (m)	102.90	Culv Frctn Ls (m)	6.67
W.S. DS (m)	102.48	Culv Exit Loss (m)	0.19
Delta EG (m)	7.16	Culv Entr Loss (m)	0.31
Delta WS (m)	7.59	Q Weir (m3/s)	4.43
E.G. IC (m)	109.59	Weir Sta Lft (m)	65.81
E.G. OC (m)	110.07	Weir Sta Rgt (m)	233.26
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (m)	105.00	Weir Max Depth (m)	0.19
Culv WS Outlet (m)	102.48	Weir Avg Depth (m)	0.07
Culv Nml Depth (m)	1.00	Weir Flow Area (m2)	11.87
Culv Crt Depth (m)	0.85	Min El Weir Flow (m)	110.00

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height
of the culvert.

CULVERT OUTPUT Profile #PF 3 Culv Group: Culvert #1

Q Culv Group (m3/s)	5.44	Culv Full Len (m)	138.25
# Barrels	1	Culv Vel US (m/s)	3.46
Q Barrel (m3/s)	5.44	Culv Vel DS (m/s)	3.71
E.G. US. (m)	110.04	Culv Inv El Up (m)	104.00
W.S. US. (m)	110.04	Culv Inv El Dn (m)	101.50
E.G. DS (m)	102.65	Culv Frctn Ls (m)	6.68
W.S. DS (m)	102.30	Culv Exit Loss (m)	0.40
Delta EG (m)	7.39	Culv Entr Loss (m)	0.31
Delta WS (m)	7.74	Q Weir (m3/s)	1.77
E.G. IC (m)	107.25	Weir Sta Lft (m)	66.19
E.G. OC (m)	110.04	Weir Sta Rgt (m)	233.14
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (m)	105.00	Weir Max Depth (m)	0.16
Culv WS Outlet (m)	102.35	Weir Avg Depth (m)	0.04
Culv Nml Depth (m)	1.00	Weir Flow Area (m2)	6.40
Culv Crt Depth (m)	0.85	Min El Weir Flow (m)	110.00

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height
of the culvert.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 2 RS: 12

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	103.62	10	102.21	20	101.5	30	100.96	40	102.52
50	102.5	50.5	101.5	53.5	101.5	54	102.5	60	103.25

70	106.2	80	107.28	90	107.75	100	110.51		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	50	.035	54	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
50	54	40	40	.1	.3

Left Levee Station= 50 Elevation= 102.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	102.74	Element	Left OB	Channel	Right OB
Vel Head (m)	0.38	Wt. n-Val.		0.035	
W.S. Elev (m)	102.35	Reach Len. (m)	40.00	40.00	40.00
Crit W.S. (m)	102.35	Flow Area (m2)		2.91	
E.G. Slope (m/m)	0.018507	Area (m2)		2.91	
Q Total (m3/s)	8.01	Flow (m3/s)		8.01	
Top Width (m)	3.85	Top Width (m)		3.85	
Vel Total (m/s)	2.75	Avg. Vel. (m/s)		2.75	
Max Chl Dpth (m)	1.39	Hydr. Depth (m)		0.76	
Conv. Total (m3/s)	58.9	Conv. (m3/s)		58.9	
Length Wtd. (m)	40.00	Wetted Per. (m)		4.90	
Min Ch El (m)	101.50	Shear (N/m2)		107.90	
Alpha	1.00	Stream Power (N/m s)	4787.79	2393.89	0.00
Frctn Loss (m)	0.73	Cum Volume (1000 m3)	0.70	0.39	0.01
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.76	0.45	0.02

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	102.90	Element	Left OB	Channel	Right OB
Vel Head (m)	0.43	Wt. n-Val.		0.035	

W.S. Elev (m)	102.48	Reach Len. (m)	40.00	40.00
40.00				
Crit W.S. (m)	102.48	Flow Area (m2)		3.40
E.G. Slope (m/m)	0.018051	Area (m2)		3.40
Q Total (m3/s)	9.87	Flow (m3/s)		9.87
Top Width (m)	3.98	Top Width (m)		3.98
Vel Total (m/s)	2.90	Avg. Vel. (m/s)		2.90
Max Chl Dpth (m)	1.52	Hydr. Depth (m)		0.86
Conv. Total (m3/s)	73.5	Conv. (m3/s)		73.5
Length Wtd. (m)	40.00	Wetted Per. (m)		5.18
Min Ch El (m)	101.50	Shear (N/m2)		116.25
Alpha	1.00	Stream Power (N/m s)	4787.79	2393.89
0.00				
Frctn Loss (m)	0.72	Cum Volume (1000 m3)	1.63	0.51
0.02				
C & E Loss (m)	0.00	Cum SA (1000 m2)	2.83	0.46
0.04				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	102.65	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.35	Wt. n-Val.		0.035
W.S. Elev (m)	102.30	Reach Len. (m)	40.00	40.00
40.00				
Crit W.S. (m)	102.30	Flow Area (m2)		2.71
E.G. Slope (m/m)	0.018233	Area (m2)		2.71
Q Total (m3/s)	7.14	Flow (m3/s)		7.14
Top Width (m)	3.80	Top Width (m)		3.80
Vel Total (m/s)	2.64	Avg. Vel. (m/s)		2.64
Max Chl Dpth (m)	1.34	Hydr. Depth (m)		0.71
Conv. Total (m3/s)	52.9	Conv. (m3/s)		52.9
Length Wtd. (m)	40.00	Wetted Per. (m)		4.78

Min Ch El (m)	101.50	Shear (N/m2)		101.18
Alpha	1.00	Stream Power (N/m s)	4787.79	2393.89
0.00				
Frctn Loss (m)	0.73	Cum Volume (1000 m3)	0.57	0.34
0.00				
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.58	0.44
0.01				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 2 RS: 11

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	100.48	10	100.37	20	100.53	30	100.19	40	100.5
40.5	99.5	43.5	99.5	44	100.5	50	100.72	60	104.55
70	107.15	80	107.94						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	40	.035	44	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
40	44	60	60	60	.1 .3

Left Levee Station= 40 Elevation= 100.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	101.21	Element	Left OB	Channel
Right OB				
Vel Head (m)	1.20	Wt. n-Val.		0.035
W.S. Elev (m)	100.01	Reach Len. (m)	60.00	60.00
60.00				
Crit W.S. (m)	100.35	Flow Area (m2)		1.65
E.G. Slope (m/m)	0.098779	Area (m2)		1.65
Q Total (m3/s)	8.01	Flow (m3/s)		8.01
Top Width (m)	3.51	Top Width (m)		3.51
Vel Total (m/s)	4.86	Avg. Vel. (m/s)		4.86
Max Chl Dpth (m)	0.51	Hydr. Depth (m)		0.47

Conv. Total (m3/s)	25.5	Conv. (m3/s)		25.5
Length Wtd. (m)	60.00	Wetted Per. (m)		4.13
Min Ch El (m)	99.50	Shear (N/m2)		386.09
Alpha	1.00	Stream Power (N/m s)	3830.23	1915.12
0.00				
Frctn Loss (m)	1.44	Cum Volume (1000 m3)	0.70	0.30
0.01				
C & E Loss (m)	0.08	Cum SA (1000 m2)	0.76	0.30
0.02				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	101.42	Element	Left OB	Channel
Right OB				
Vel Head (m)	1.33	Wt. n-Val.		0.035
W.S. Elev (m)	100.09	Reach Len. (m)	60.00	60.00
60.00				
Crit W.S. (m)	100.48	Flow Area (m2)		1.93
E.G. Slope (m/m)	0.093626	Area (m2)		1.93
Q Total (m3/s)	9.87	Flow (m3/s)		9.87
Top Width (m)	3.59	Top Width (m)		3.59
Vel Total (m/s)	5.12	Avg. Vel. (m/s)		5.12
Max Chl Dpth (m)	0.59	Hydr. Depth (m)		0.54
Conv. Total (m3/s)	32.3	Conv. (m3/s)		32.3
Length Wtd. (m)	60.00	Wetted Per. (m)		4.31
Min Ch El (m)	99.50	Shear (N/m2)		410.98
Alpha	1.00	Stream Power (N/m s)	3830.23	1915.12
0.00				
Frctn Loss (m)	1.39	Cum Volume (1000 m3)	1.63	0.40
0.02				
C & E Loss (m)	0.09	Cum SA (1000 m2)	2.83	0.31
0.04				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream

conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	101.12	Element	Left OB	Channel
Right OB				
Vel Head (m)	1.16	Wt. n-Val.		0.035
W.S. Elev (m)	99.96	Reach Len. (m)	60.00	60.00
60.00				
Crit W.S. (m)	100.30	Flow Area (m2)		1.50
E.G. Slope (m/m)	0.104251	Area (m2)		1.50
Q Total (m3/s)	7.14	Flow (m3/s)		7.14
Top Width (m)	3.46	Top Width (m)		3.46
Vel Total (m/s)	4.76	Avg. Vel. (m/s)		4.76
Max Chl Dpth (m)	0.46	Hydr. Depth (m)		0.43
Conv. Total (m3/s)	22.1	Conv. (m3/s)		22.1
Length Wtd. (m)	60.00	Wetted Per. (m)		4.04
Min Ch El (m)	99.50	Shear (N/m2)		379.49
Alpha	1.00	Stream Power (N/m s)	3830.23	1915.12
0.00				
Frctn Loss (m)	1.45	Cum Volume (1000 m3)	0.57	0.26
0.00				
C & E Loss (m)	0.08	Cum SA (1000 m2)	0.58	0.30
0.01				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 2 RS: 10

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	100.94	10	100.68	20	100.45	30	100.02	40	99.96
50	100.14	60	99.86	70	99.99	80	98.6	83.5	98.6
84	100	90	103.46	100	104.11	110	104.98		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	80	.035	84	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
80	84	20	20	20	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.88	Element	Left OB	Channel Right OB
Vel Head (m)	0.03	Wt. n-Val.	0.035	0.035
W.S. Elev (m)	99.85	Reach Len. (m)	20.00	20.00 20.00
Crit W.S. (m)	99.25	Flow Area (m2)	5.62	4.66
E.G. Slope (m/m)	0.001055	Area (m2)	5.62	4.66
Q Total (m3/s)	8.01	Flow (m3/s)	3.79	4.22
Top Width (m)	12.94	Top Width (m)	9.00	3.95
Vel Total (m/s)	0.78	Avg. Vel. (m/s)	0.67	0.91
Max Chl Dpth (m)	1.25	Hydr. Depth (m)	0.63	1.18
Conv. Total (m3/s)	246.6	Conv. (m3/s)	116.7	129.8
Length Wtd. (m)	20.00	Wetted Per. (m)	9.08	4.83
Min Ch El (m)	98.60	Shear (N/m2)	6.41	9.98
Alpha	1.07	Stream Power (N/m s)	5266.56	0.00 0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	0.53	0.11 0.01
C & E Loss (m)	0.01	Cum SA (1000 m2)	0.49	0.08 0.02

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	100.32	Element	Left OB	Channel Right OB
Vel Head (m)	0.01	Wt. n-Val.	0.035	0.035 0.035
W.S. Elev (m)	100.31	Reach Len. (m)	20.00	20.00 20.00
Crit W.S. (m)	99.33	Flow Area (m2)	23.85	6.49 0.08
E.G. Slope (m/m)	0.000268	Area (m2)	23.85	6.49 0.08

Q Total (m3/s)	9.87	Flow (m3/s)	6.25	3.61 0.01
Top Width (m)	61.27	Top Width (m)	56.73	4.00 0.54
Vel Total (m/s)	0.32	Avg. Vel. (m/s)	0.26	0.56 0.12
Max Chl Dpth (m)	1.71	Hydr. Depth (m)	0.42	1.62 0.15
Conv. Total (m3/s)	603.4	Conv. (m3/s)	381.8	220.9 0.6
Length Wtd. (m)	20.00	Wetted Per. (m)	56.84	4.99 0.62
Min Ch El (m)	98.60	Shear (N/m2)	1.10	3.41 0.35
Alpha	1.49	Stream Power (N/m s)	5266.56	0.00 0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	0.92	0.15 0.02
C & E Loss (m)	0.00	Cum SA (1000 m2)	1.13	0.08 0.03

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.70	Element	Left OB	Channel Right OB
Vel Head (m)	0.04	Wt. n-Val.	0.035	0.035 0.035
W.S. Elev (m)	99.66	Reach Len. (m)	20.00	20.00 20.00
Crit W.S. (m)	99.21	Flow Area (m2)	4.02	3.90
E.G. Slope (m/m)	0.001686	Area (m2)	4.02	3.90
Q Total (m3/s)	7.14	Flow (m3/s)	3.06	4.08
Top Width (m)	11.48	Top Width (m)	7.60	3.88
Vel Total (m/s)	0.90	Avg. Vel. (m/s)	0.76	1.05
Max Chl Dpth (m)	1.06	Hydr. Depth (m)	0.53	1.01
Conv. Total (m3/s)	173.9	Conv. (m3/s)	74.5	99.4
Length Wtd. (m)	20.00	Wetted Per. (m)	7.67	4.62
Min Ch El (m)	98.60	Shear (N/m2)	8.65	13.94
Alpha	1.08	Stream Power (N/m s)	5266.56	0.00 0.00
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	0.45	0.09 0.00
C & E Loss (m)	0.01	Cum SA (1000 m2)	0.35	0.08 0.01

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 2 RS: 9

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.6	10	102.5	20	101.16	30	100.5	40	99.83
50	99.84	60	100.38	70	97.27	90	98.9	90.5	98.2
93.5	98.2	94	98.9	100	102.65	110	103.94	120	106.44
130	108.44								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	90	.035	94	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
90	94	10	10	10	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.87	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (m)	99.87	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)		Flow Area (m2)	47.01	6.34
0.76				
E.G. Slope (m/m)	0.000015	Area (m2)	47.01	6.34
0.76				
Q Total (m3/s)	8.01	Flow (m3/s)	7.11	0.85
0.05				
Top Width (m)	45.13	Top Width (m)	39.57	4.00
1.55				
Vel Total (m/s)	0.15	Avg. Vel. (m/s)	0.15	0.13
0.06				
Max Chl Dpth (m)	2.60	Hydr. Depth (m)	1.19	1.58
0.49				
Conv. Total (m3/s)	2068.4	Conv. (m3/s)	1836.1	220.3
11.9				
Length Wtd. (m)	0.00	Wetted Per. (m)	40.04	4.72
1.83				
Min Ch El (m)	98.20	Shear (N/m2)	0.17	0.20
0.06				
Alpha	1.02	Stream Power (N/m s)	6224.12	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.00	Cum SA (1000 m2)		

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	100.31	Element	Left OB	Channel

Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (m)	100.31	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)		Flow Area (m2)	68.10	8.11
1.60				
E.G. Slope (m/m)	0.000010	Area (m2)	68.10	8.11
1.60				
Q Total (m3/s)	9.87	Flow (m3/s)	8.73	1.04
0.10				
Top Width (m)	62.05	Top Width (m)	55.79	4.00
2.26				
Vel Total (m/s)	0.13	Avg. Vel. (m/s)	0.13	0.13
0.06				
Max Chl Dpth (m)	3.04	Hydr. Depth (m)	1.22	2.03
0.71				
Conv. Total (m3/s)	3145.6	Conv. (m3/s)	2781.0	332.1
32.5				
Length Wtd. (m)	0.00	Wetted Per. (m)	56.35	4.72
2.67				
Min Ch El (m)	98.20	Shear (N/m2)	0.12	0.17
0.06				
Alpha	1.01	Stream Power (N/m s)	6224.12	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.00	Cum SA (1000 m2)		

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.69	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (m)	99.69	Reach Len. (m)	0.00	0.00
0.00				
Crit W.S. (m)		Flow Area (m2)	41.40	5.59
0.49				
E.G. Slope (m/m)	0.000017	Area (m2)	41.40	5.59
0.49				
Q Total (m3/s)	7.14	Flow (m3/s)	6.37	0.75
0.03				
Top Width (m)	33.03	Top Width (m)	27.77	4.00
1.26				
Vel Total (m/s)	0.15	Avg. Vel. (m/s)	0.15	0.13
0.06				
Max Chl Dpth (m)	2.42	Hydr. Depth (m)	1.49	1.40
0.39				
Conv. Total (m3/s)	1713.7	Conv. (m3/s)	1527.9	179.0
6.8				
Length Wtd. (m)	0.00	Wetted Per. (m)	28.20	4.72
1.48				
Min Ch El (m)	98.20	Shear (N/m2)	0.25	0.20
0.06				
Alpha	1.02	Stream Power (N/m s)	6224.12	0.00
0.00				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		
C & E Loss (m)	0.00	Cum SA (1000 m2)		

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 8.7

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	100.62	10	100.16	20	100.45	30	100.67	40	100.66
50	98.5	50.5	98	60.5	98	61	98.5	70	99.98
80	101.47	90	102.46	100	103.15				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	50	.035	61	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
50	61	10	10	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.87	Element	Left OB	Channel Right OB
Vel Head (m)	0.01	Wt. n-Val.	0.050	0.035 0.035
W.S. Elev (m)	99.86	Reach Len. (m)	10.00	10.00 10.00
Crit W.S. (m)	98.52	Flow Area (m2)	4.29	20.23 5.63
E.G. Slope (m/m)	0.000137	Area (m2)	4.29	20.23 5.63
Q Total (m3/s)	12.13	Flow (m3/s)	0.77	9.92 1.45
Top Width (m)	25.58	Top Width (m)	6.30	11.00 8.28
Vel Total (m/s)	0.40	Avg. Vel. (m/s)	0.18	0.49 0.26
Max Chl Dpth (m)	1.86	Hydr. Depth (m)	0.68	1.84 0.68
Conv. Total (m3/s)	1035.0	Conv. (m3/s)	65.4	846.2 123.5
Length Wtd. (m)	10.00	Wetted Per. (m)	6.45	11.41 8.39
Min Ch El (m)	98.00	Shear (N/m2)	0.90	2.39 0.90
Alpha	1.28	Stream Power (N/m s)	4787.79	0.00 0.00
Frctn Loss (m)		Cum Volume (1000 m3)	1.76	2.50 0.66
C & E Loss (m)		Cum SA (1000 m2)	6.92	1.99 3.61

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	100.31	Element	Left OB	Channel Right OB
Vel Head (m)	0.01	Wt. n-Val.	0.050	0.035 0.035
W.S. Elev (m)	100.31	Reach Len. (m)	10.00	10.00 10.00

Crit W.S. (m)	98.60	Flow Area (m2)	8.15	25.11 9.95
E.G. Slope (m/m)	0.000086	Area (m2)	8.15	25.11 9.95
Q Total (m3/s)	14.95	Flow (m3/s)	1.30	11.23 2.41
Top Width (m)	38.74	Top Width (m)	16.56	11.00 11.19
Vel Total (m/s)	0.35	Avg. Vel. (m/s)	0.16	0.45 0.24
Max Chl Dpth (m)	2.31	Hydr. Depth (m)	0.49	2.28 0.89
Conv. Total (m3/s)	1615.4	Conv. (m3/s)	141.0	1213.9 260.6
Length Wtd. (m)	10.00	Wetted Per. (m)	16.76	11.41 11.33
Min Ch El (m)	98.00	Shear (N/m2)	0.41	1.85 0.74
Alpha	1.35	Stream Power (N/m s)	4787.79	0.00 0.00
Frctn Loss (m)		Cum Volume (1000 m3)	2.13	2.72 1.64
C & E Loss (m)		Cum SA (1000 m2)	8.03	2.00 8.08

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.69	Element	Left OB	Channel Right OB
Vel Head (m)	0.01	Wt. n-Val.	0.050	0.035 0.035
W.S. Elev (m)	99.67	Reach Len. (m)	10.00	10.00 10.00
Crit W.S. (m)	98.48	Flow Area (m2)	3.19	18.17 4.19
E.G. Slope (m/m)	0.000168	Area (m2)	3.19	18.17 4.19
Q Total (m3/s)	10.82	Flow (m3/s)	0.57	9.17 1.08
Top Width (m)	23.58	Top Width (m)	5.44	11.00 7.14
Vel Total (m/s)	0.42	Avg. Vel. (m/s)	0.18	0.50 0.26
Max Chl Dpth (m)	1.67	Hydr. Depth (m)	0.59	1.65 0.59
Conv. Total (m3/s)	835.2	Conv. (m3/s)	44.1	707.8 83.3
Length Wtd. (m)	10.00	Wetted Per. (m)	5.56	11.41 7.24
Min Ch El (m)	98.00	Shear (N/m2)	0.94	2.62 0.95
Alpha	1.25	Stream Power (N/m s)	4787.79	0.00 0.00
Frctn Loss (m)		Cum Volume (1000 m3)	1.63	2.39 0.46
C & E Loss (m)		Cum SA (1000 m2)	6.62	1.99 2.78

CULVERT

RIVER: Hunsworth Beck

REACH: 3 RS: 8.5

INPUT
Description: Cliff Hollings Lane Bridge
Distance from Upstream XS = 2
Deck/Roadway Width = 6
Weir Coefficient = 1.4
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
40	100.45	97.8	223	100.45	97.8

Upstream Bridge Cross Section Data
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	100.62	10	100.16	20	100.45	30	100.67	40	100.66
50	98.5	50.5	98	60.5	98	61	98.5	70	99.98
80	101.47	90	102.46	100	103.15				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	50	.035	61	.035

Bank Sta: Left Right Coeff Contr. Expan.
50 61 .1 .3

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
4.1	100.45	97.66	35	100.45	97.66

Downstream Bridge Cross Section Data
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.61	0	100.37	4.13	100.41	4.43	100.41	4.43	97.8
12.93	97.8	13.52	99.2	16.96	101	22	101.35	32	101.64
42	102.82	52	103.97	62	104.75	72	105.67		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	4.43	.035	13.52	.03

Bank Sta: Left Right Coeff Contr. Expan.
4.43 13.52 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 2

Culvert Name Shape Rise Span
Culvert #1 Arch 1.2 2.8
FHWA Chart # 41- Arch; Corrugated metal
FHWA Scale # 1 - 90 Degree headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss
Coef Exit Loss Coef
2 6 .015 .035 0 .5
1
Upstream Elevation = 98
Centerline Station = 52.375
Downstream Elevation = 97.8
Centerline Station = 6.808

Culvert Name Shape Rise Span
Culvert #2 Arch 1.2 2.8
FHWA Chart # 41- Arch; Corrugated metal
FHWA Scale # 1 - 90 Degree headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss
Coef Exit Loss Coef
2 6 .015 .035 0 .5
1
Upstream Elevation = 98
Centerline Station = 56.125
Downstream Elevation = 97.8
Centerline Station = 10.555

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (m3/s)	6.07	Culv Full Len (m)	6.00
# Barrels	1	Culv Vel US (m/s)	2.30
Q Barrel (m3/s)	6.07	Culv Vel DS (m/s)	2.30
E.G. US. (m)	99.87	Culv Inv El Up (m)	98.00
W.S. US. (m)	99.86	Culv Inv El Dn (m)	97.80
E.G. DS (m)	99.44	Culv Frctn Ls (m)	0.07
W.S. DS (m)	99.40	Culv Exit Loss (m)	0.23
Delta EG (m)	0.43	Culv Entr Loss (m)	0.13
Delta WS (m)	0.46	Q Weir (m3/s)	
E.G. IC (m)	99.42	Weir Sta Lft (m)	
E.G. OC (m)	99.87	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	99.20	Weir Max Depth (m)	
Culv WS Outlet (m)	99.00	Weir Avg Depth (m)	
Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	0.77	Min El Weir Flow (m)	100.37

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

Q Culv Group (m3/s)	7.48	Culv Full Len (m)	6.00
# Barrels	1	Culv Vel US (m/s)	2.83
Q Barrel (m3/s)	7.48	Culv Vel DS (m/s)	2.83
E.G. US. (m)	100.31	Culv Inv El Up (m)	98.00
W.S. US. (m)	100.31	Culv Inv El Dn (m)	97.80
E.G. DS (m)	99.64	Culv Frctn Ls (m)	0.10
W.S. DS (m)	99.60	Culv Exit Loss (m)	0.36
Delta EG (m)	0.67	Culv Entr Loss (m)	0.20
Delta WS (m)	0.71	Q Weir (m3/s)	
E.G. IC (m)	99.81	Weir Sta Lft (m)	
E.G. OC (m)	100.31	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	99.20	Weir Max Depth (m)	
Culv WS Outlet (m)	99.00	Weir Avg Depth (m)	
Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	0.88	Min El Weir Flow (m)	100.37

CULVERT OUTPUT Profile #PF 3 Culv Group: Culvert #1

Q Culv Group (m3/s)	5.41	Culv Full Len (m)	6.00
# Barrels	1	Culv Vel US (m/s)	2.05
Q Barrel (m3/s)	5.41	Culv Vel DS (m/s)	2.05
E.G. US. (m)	99.69	Culv Inv El Up (m)	98.00
W.S. US. (m)	99.67	Culv Inv El Dn (m)	97.80
E.G. DS (m)	99.35	Culv Frctn Ls (m)	0.05
W.S. DS (m)	99.31	Culv Exit Loss (m)	0.18
Delta EG (m)	0.34	Culv Entr Loss (m)	0.11
Delta WS (m)	0.36	Q Weir (m3/s)	
E.G. IC (m)	99.23	Weir Sta Lft (m)	
E.G. OC (m)	99.69	Weir Sta Rgt (m)	

Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	99.20	Weir Max Depth (m)	
Culv WS Outlet (m)	99.00	Weir Avg Depth (m)	
Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	0.72	Min El Weir Flow (m)	100.37

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #2

Q Culv Group (m3/s)	6.07	Culv Full Len (m)	6.00
# Barrels	1	Culv Vel US (m/s)	2.30
Q Barrel (m3/s)	6.07	Culv Vel DS (m/s)	2.30
E.G. US. (m)	99.87	Culv Inv El Up (m)	98.00
W.S. US. (m)	99.86	Culv Inv El Dn (m)	97.80
E.G. DS (m)	99.44	Culv Frctn Ls (m)	0.07
W.S. DS (m)	99.40	Culv Exit Loss (m)	0.23
Delta EG (m)	0.43	Culv Entr Loss (m)	0.13
Delta WS (m)	0.46	Q Weir (m3/s)	
E.G. IC (m)	99.42	Weir Sta Lft (m)	
E.G. OC (m)	99.87	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	99.20	Weir Max Depth (m)	
Culv WS Outlet (m)	99.00	Weir Avg Depth (m)	
Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	0.77	Min El Weir Flow (m)	100.37

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #2

Q Culv Group (m3/s)	7.48	Culv Full Len (m)	6.00
# Barrels	1	Culv Vel US (m/s)	2.83
Q Barrel (m3/s)	7.48	Culv Vel DS (m/s)	2.83
E.G. US. (m)	100.31	Culv Inv El Up (m)	98.00
W.S. US. (m)	100.31	Culv Inv El Dn (m)	97.80
E.G. DS (m)	99.64	Culv Frctn Ls (m)	0.10
W.S. DS (m)	99.60	Culv Exit Loss (m)	0.36
Delta EG (m)	0.67	Culv Entr Loss (m)	0.20
Delta WS (m)	0.71	Q Weir (m3/s)	
E.G. IC (m)	99.81	Weir Sta Lft (m)	
E.G. OC (m)	100.31	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	99.20	Weir Max Depth (m)	
Culv WS Outlet (m)	99.00	Weir Avg Depth (m)	
Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	0.88	Min El Weir Flow (m)	100.37

CULVERT OUTPUT Profile #PF 3 Culv Group: Culvert #2

Q Culv Group (m3/s)	5.41	Culv Full Len (m)	6.00
# Barrels	1	Culv Vel US (m/s)	2.05
Q Barrel (m3/s)	5.41	Culv Vel DS (m/s)	2.05
E.G. US. (m)	99.69	Culv Inv El Up (m)	98.00
W.S. US. (m)	99.67	Culv Inv El Dn (m)	97.80
E.G. DS (m)	99.35	Culv Frctn Ls (m)	0.05
W.S. DS (m)	99.31	Culv Exit Loss (m)	0.18
Delta EG (m)	0.34	Culv Entr Loss (m)	0.11
Delta WS (m)	0.36	Q Weir (m3/s)	
E.G. IC (m)	99.23	Weir Sta Lft (m)	
E.G. OC (m)	99.69	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	99.20	Weir Max Depth (m)	
Culv WS Outlet (m)	99.00	Weir Avg Depth (m)	
Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	0.72	Min El Weir Flow (m)	100.37

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 8

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.61	0	100.37	4.13	100.41	4.43	100.41	4.43	97.8
12.93	97.8	13.52	99.2	16.96	101	22	101.35	32	101.64
42	102.82	52	103.97	62	104.75	72	105.67		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	4.43	.035	13.52	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4.43	13.52	16	16	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.44	Element	Left OB	Channel	Right OB
Vel Head (m)	0.04	Wt. n-Val.		0.035	0.030
W.S. Elev (m)	99.40	Reach Len. (m)	16.00	16.00	16.00
Crit W.S. (m)		Flow Area (m2)		14.15	0.04
E.G. Slope (m/m)	0.000692	Area (m2)		14.15	0.04
Q Total (m3/s)	12.13	Flow (m3/s)		12.12	0.01
Top Width (m)	9.48	Top Width (m)		9.09	0.39
Vel Total (m/s)	0.86	Avg. Vel. (m/s)		0.86	0.18
Max Chl Dpth (m)	1.60	Hydr. Depth (m)		1.56	0.10
Conv. Total (m3/s)	461.1	Conv. (m3/s)		460.9	0.3
Length Wtd. (m)	16.00	Wetted Per. (m)		11.62	0.44
Min Ch El (m)	97.80	Shear (N/m2)		8.26	0.61
Alpha	1.00	Stream Power (N/m s)	3447.20	0.00	0.00
Frctn Loss (m)	0.03	Cum Volume (1000 m3)	1.76	2.40	0.66
C & E Loss (m)	0.02	Cum SA (1000 m2)	6.89	1.89	3.57

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	99.64	Element	Left OB	Channel	Right OB

Vel Head (m)	0.04	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	99.60	Reach Len. (m)	16.00	16.00
16.00				
Crit W.S. (m)		Flow Area (m2)		15.95
0.15				
E.G. Slope (m/m)	0.000718	Area (m2)		15.95
0.15				
Q Total (m3/s)	14.95	Flow (m3/s)		14.91
0.04				
Top Width (m)	9.85	Top Width (m)		9.09
0.76				
Vel Total (m/s)	0.93	Avg. Vel. (m/s)		0.93
0.28				
Max Chl Dpth (m)	1.80	Hydr. Depth (m)		1.75
0.20				
Conv. Total (m3/s)	558.1	Conv. (m3/s)		556.5
1.6				
Length Wtd. (m)	16.00	Wetted Per. (m)		11.82
0.86				
Min Ch El (m)	97.80	Shear (N/m2)		9.50
1.25				
Alpha	1.01	Stream Power (N/m s)	3447.20	0.00
0.00				
Frctn Loss (m)	0.03	Cum Volume (1000 m3)	2.13	2.60
1.64				
C & E Loss (m)	0.03	Cum SA (1000 m2)	7.95	1.90
8.02				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.35	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.03	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	99.31	Reach Len. (m)	16.00	16.00
16.00				
Crit W.S. (m)		Flow Area (m2)		13.33
0.01				
E.G. Slope (m/m)	0.000665	Area (m2)		13.33
0.01				
Q Total (m3/s)	10.82	Flow (m3/s)		10.82
0.00				
Top Width (m)	9.30	Top Width (m)		9.09
0.21				
Vel Total (m/s)	0.81	Avg. Vel. (m/s)		0.81
0.12				
Max Chl Dpth (m)	1.51	Hydr. Depth (m)		1.47
0.06				
Conv. Total (m3/s)	419.6	Conv. (m3/s)		419.6
0.1				
Length Wtd. (m)	16.00	Wetted Per. (m)		11.53
0.24				
Min Ch El (m)	97.80	Shear (N/m2)		7.54
0.32				
Alpha	1.00	Stream Power (N/m s)	3447.20	0.00
0.00				
Frctn Loss (m)	0.02	Cum Volume (1000 m3)	1.63	2.29
0.46				

C & E Loss (m)	0.02	Cum SA (1000 m2)	6.60	1.88
2.74				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.12

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.61	0	100.31	3.54	100.31	9.44	100.4	10.62	100.37
10.92	100.37	10.92	97.74	14.46	97.74	15.05	99	25	100.4
35	101.18	45	101.83	55	103.08	65	103.83	75	104.67
85	105.57								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	10.92	.035	15.05	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10.92	15.05	10	10	10	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.39	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.26	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	99.14	Reach Len. (m)	10.00	10.00
10.00				
Crit W.S. (m)		Flow Area (m2)		5.39
0.06				
E.G. Slope (m/m)	0.007640	Area (m2)		5.39
0.06				
Q Total (m3/s)	12.13	Flow (m3/s)		12.10
0.03				
Top Width (m)	5.09	Top Width (m)		4.13
0.96				
Vel Total (m/s)	2.22	Avg. Vel. (m/s)		2.24
0.48				
Max Chl Dpth (m)	1.40	Hydr. Depth (m)		1.31
0.07				
Conv. Total (m3/s)	138.8	Conv. (m3/s)		138.4
0.4				
Length Wtd. (m)	10.00	Wetted Per. (m)		6.33
0.97				
Min Ch El (m)	97.74	Shear (N/m2)		63.84
5.01				
Alpha	1.02	Stream Power (N/m s)	4069.61	0.00
0.00				
Frctn Loss (m)	0.04	Cum Volume (1000 m3)	1.76	2.24
0.66				
C & E Loss (m)	0.06	Cum SA (1000 m2)	6.89	1.79
3.56				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	99.59	Element	Left OB	Channel	Right OB
Vel Head (m)	0.29	Wt. n-Val.		0.035	0.030
W.S. Elev (m)	99.30	Reach Len. (m)	10.00	10.00	10.00
Crit W.S. (m)		Flow Area (m2)		6.06	0.31
E.G. Slope (m/m)	0.007879	Area (m2)		6.06	0.31
Q Total (m3/s)	14.95	Flow (m3/s)		14.69	0.26
Top Width (m)	6.25	Top Width (m)		4.13	2.12
Vel Total (m/s)	2.34	Avg. Vel. (m/s)		2.42	0.83
Max Chl Dpth (m)	1.56	Hydr. Depth (m)		1.47	0.15
Conv. Total (m3/s)	168.4	Conv. (m3/s)		165.5	2.9
Length Wtd. (m)	10.00	Wetted Per. (m)		6.49	2.14
Min Ch El (m)	97.74	Shear (N/m2)		72.17	11.39
Alpha	1.05	Stream Power (N/m s)	4069.61	0.00	0.00
Frctn Loss (m)	0.03	Cum Volume (1000 m3)	2.13	2.42	1.64
C & E Loss (m)	0.07	Cum SA (1000 m2)	7.95	1.79	8.00

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.30	Element	Left OB	Channel	Right OB
Vel Head (m)	0.22	Wt. n-Val.		0.035	0.030
W.S. Elev (m)	99.08	Reach Len. (m)	10.00	10.00	10.00
Crit W.S. (m)		Flow Area (m2)		5.15	0.02
E.G. Slope (m/m)	0.007012	Area (m2)		5.15	0.02
Q Total (m3/s)	10.82	Flow (m3/s)		10.81	0.01
Top Width (m)	4.68	Top Width (m)		4.13	0.55
Vel Total (m/s)	2.09	Avg. Vel. (m/s)		2.10	0.32
Max Chl Dpth (m)	1.34	Hydr. Depth (m)		1.25	0.04
Conv. Total (m3/s)	129.2	Conv. (m3/s)		129.1	0.1
Length Wtd. (m)	10.00	Wetted Per. (m)		6.27	0.55
Min Ch El (m)	97.74	Shear (N/m2)		56.51	2.63
Alpha	1.01	Stream Power (N/m s)	4069.61	0.00	0.00
Frctn Loss (m)	0.04	Cum Volume (1000 m3)	1.63	2.15	0.46
C & E Loss (m)	0.04	Cum SA (1000 m2)	6.60	1.78	2.73

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.11

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.61	0	99.35	7.08	99.41	9.44	99.48	15.34	99.48
15.34	97.68	18.88	97.68	19.47	98.8	25	98.67	35	99.29
45	99.7	55	100.83	65	101.46	75	102.68	85	103.41
95	103.95	105	104.76	115	105.84				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	15.34	.035	19.47	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
15.34	19.47	13	13	13	.1 .3

Left Levee Station= 15.34 Elevation= 99.48

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.30	Element	Left OB	Channel	Right OB
Vel Head (m)	0.07	Wt. n-Val.		0.035	0.030
W.S. Elev (m)	99.23	Reach Len. (m)	13.00	13.00	13.00
Crit W.S. (m)	98.91	Flow Area (m2)		6.06	5.24
E.G. Slope (m/m)	0.002239	Area (m2)		6.06	5.24
Q Total (m3/s)	12.13	Flow (m3/s)		7.95	4.18
Top Width (m)	18.66	Top Width (m)		4.13	14.53
Vel Total (m/s)	1.07	Avg. Vel. (m/s)		1.31	0.80
Max Chl Dpth (m)	1.55	Hydr. Depth (m)		1.47	0.36
Conv. Total (m3/s)	256.3	Conv. (m3/s)		167.9	

88.4				
Length Wtd. (m)	13.00	Wetted Per. (m)		6.35
14.55				
Min Ch El (m)	97.68	Shear (N/m2)		20.95
7.91				
Alpha	1.17	Stream Power (N/m s)	5505.96	734.45
0.00				
Frctn Loss (m)	0.05	Cum Volume (1000 m3)	1.76	2.18
0.64				
C & E Loss (m)	0.02	Cum SA (1000 m2)	6.89	1.74
3.48				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	99.49	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.05	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	99.44	Reach Len. (m)	13.00	13.00
13.00				
Crit W.S. (m)	99.01	Flow Area (m2)		6.93
8.72				
E.G. Slope (m/m)	0.001571	Area (m2)		6.93
8.72				
Q Total (m3/s)	14.95	Flow (m3/s)		8.13
6.82				
Top Width (m)	23.24	Top Width (m)		4.13
19.11				
Vel Total (m/s)	0.96	Avg. Vel. (m/s)		1.17
0.78				
Max Chl Dpth (m)	1.76	Hydr. Depth (m)		1.68
0.46				
Conv. Total (m3/s)	377.2	Conv. (m3/s)		205.2
172.0				
Length Wtd. (m)	13.00	Wetted Per. (m)		6.56
19.14				
Min Ch El (m)	97.68	Shear (N/m2)		16.26
7.02				
Alpha	1.13	Stream Power (N/m s)	5505.96	734.45
0.00				
Frctn Loss (m)	0.04	Cum Volume (1000 m3)	2.13	2.36
1.60				
C & E Loss (m)	0.02	Cum SA (1000 m2)	7.95	1.75
7.89				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.22	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.08	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	99.14	Reach Len. (m)	13.00	13.00
13.00				
Crit W.S. (m)	98.64	Flow Area (m2)		5.71
4.05				
E.G. Slope (m/m)	0.002541	Area (m2)		5.71
4.05				
Q Total (m3/s)	10.82	Flow (m3/s)		7.72
3.10				
Top Width (m)	17.27	Top Width (m)		4.13
13.14				
Vel Total (m/s)	1.11	Avg. Vel. (m/s)		1.35
0.77				
Max Chl Dpth (m)	1.46	Hydr. Depth (m)		1.38
0.31				
Conv. Total (m3/s)	214.6	Conv. (m3/s)		153.2
61.4				
Length Wtd. (m)	13.00	Wetted Per. (m)		6.27
13.16				
Min Ch El (m)	97.68	Shear (N/m2)		22.69
7.66				
Alpha	1.20	Stream Power (N/m s)	5505.96	734.45
0.00				
Frctn Loss (m)	0.05	Cum Volume (1000 m3)	1.63	2.09
0.44				
C & E Loss (m)	0.01	Cum SA (1000 m2)	6.60	1.74
2.67				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.10

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.61	0	99.96	5.9	98.92	14.75	98.84	16.52	99.24
23.6	99.12	26.55	99.18	30.68	99.25	31.27	99.27	31.57	99.27
31.57	97.62	35.11	97.62	35.74	98.7	40	99.15	50	99.25
60	99.66	70	100.65	80	102.02	90	103.13	100	103.74
110	104.12	120	105.02	130	105.82				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	31.57	.035	35.74	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
31.57 35.74 8 10 12 .1 .3
Left Levee Station= 31.57 Elevation= 99.27

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.23	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.24	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	98.99	Reach Len. (m)	8.00	10.00
12.00				
Crit W.S. (m)	98.65	Flow Area (m2)		5.38
0.40				
E.G. Slope (m/m)	0.007096	Area (m2)		5.38
0.40				
Q Total (m3/s)	12.13	Flow (m3/s)		11.82
0.31				
Top Width (m)	6.93	Top Width (m)		4.17
2.76				
Vel Total (m/s)	2.10	Avg. Vel. (m/s)		2.20
0.77				
Max Chl Dpth (m)	1.37	Hydr. Depth (m)		1.29
0.15				
Conv. Total (m3/s)	144.0	Conv. (m3/s)		140.3
3.7				
Length Wtd. (m)	10.03	Wetted Per. (m)		6.16
2.77				
Min Ch El (m)	97.62	Shear (N/m2)		60.73
10.08				
Alpha	1.07	Stream Power (N/m s)	6224.12	1511.50
0.00				
Frctn Loss (m)	0.04	Cum Volume (1000 m3)	1.76	2.11
0.60				
C & E Loss (m)	0.01	Cum SA (1000 m2)	6.89	1.69
3.37				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	99.43	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.25	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	99.18	Reach Len. (m)	8.00	10.00
12.00				
Crit W.S. (m)	98.84	Flow Area (m2)		6.18
1.15				
E.G. Slope (m/m)	0.006596	Area (m2)		6.18
1.15				
Q Total (m3/s)	14.95	Flow (m3/s)		14.06
0.89				
Top Width (m)	11.70	Top Width (m)		4.17
7.53				
Vel Total (m/s)	2.04	Avg. Vel. (m/s)		2.28
0.77				
Max Chl Dpth (m)	1.56	Hydr. Depth (m)		1.48
0.15				
Conv. Total (m3/s)	184.1	Conv. (m3/s)		173.1
10.9				
Length Wtd. (m)	10.09	Wetted Per. (m)		6.35
7.55				
Min Ch El (m)	97.62	Shear (N/m2)		62.88
9.86				
Alpha	1.18	Stream Power (N/m s)	6224.12	1511.50
0.00				

Frctn Loss (m)	0.04	Cum Volume (1000 m3)	2.13	2.27
1.53				
C & E Loss (m)	0.01	Cum SA (1000 m2)	7.95	1.70
7.72				

Warning: Multiple water surfaces were found that could balance the energy equation. The program selected the water surface
whose main channel velocity head was the closest to the previously computed cross section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.15	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.21	Wt. n-Val.		0.035
0.030				
W.S. Elev (m)	98.94	Reach Len. (m)	8.00	10.00
12.00				
Crit W.S. (m)	98.58	Flow Area (m2)		5.16
0.27				
E.G. Slope (m/m)	0.006512	Area (m2)		5.16
0.27				
Q Total (m3/s)	10.82	Flow (m3/s)		10.64
0.18				
Top Width (m)	6.44	Top Width (m)		4.17
2.27				
Vel Total (m/s)	1.99	Avg. Vel. (m/s)		2.06
0.65				
Max Chl Dpth (m)	1.32	Hydr. Depth (m)		1.24
0.12				
Conv. Total (m3/s)	134.1	Conv. (m3/s)		131.9
2.2				
Length Wtd. (m)	10.02	Wetted Per. (m)		6.11
2.29				
Min Ch El (m)	97.62	Shear (N/m2)		53.97
7.62				
Alpha	1.06	Stream Power (N/m s)	6224.12	1511.50
0.00				
Frctn Loss (m)	0.03	Cum Volume (1000 m3)	1.63	2.02
0.41				
C & E Loss (m)	0.00	Cum SA (1000 m2)	6.60	1.68
2.57				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.09

INPUT
Description:
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	111.11	10	110.88	20	110.07	30	109.24	40	107.44
50	105.41	60	103.52	80	102.13	82.95	101.17	89.44	99.76
93.57	99.72	95.93	99.28	99.47	99.96	101.83	99.02	105.37	98.86
112.45	98.8	115.99	98.89	126.02	99.03	128.38	99.29	128.68	99.29
128.68	97.56	132.22	97.56	132.51	98.82	137.23	98.82	140	98.94
150	99.09	160	99.29	170	99.24	180	99.27	190	99.99
200	101.91	210	102.89	220	103.22	230	103.18		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	128.68	.017	132.51	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
128.68	132.51	15	18	21 .1 .3

Left Levee Station= 128.68 Elevation= 99.29

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.18	Element	Left OB	Channel Right OB
Vel Head (m)	0.33	Wt. n-Val.		0.017 0.050
W.S. Elev (m)	98.85	Reach Len. (m)	15.00	18.00 21.00
Crit W.S. (m)	98.61	Flow Area (m2)		4.77 0.17
E.G. Slope (m/m)	0.002596	Area (m2)		4.77 0.17
Q Total (m3/s)	12.13	Flow (m3/s)		12.11 0.02
Top Width (m)	9.33	Top Width (m)		3.83 5.50
Vel Total (m/s)	2.45	Avg. Vel. (m/s)		2.54 0.10
Max Chl Dpth (m)	1.29	Hydr. Depth (m)		1.25 0.03
Conv. Total (m3/s)	238.1	Conv. (m3/s)		237.7 0.3
Length Wtd. (m)	18.00	Wetted Per. (m)		6.13 5.50
Min Ch El (m)	97.56	Shear (N/m2)		19.84 0.80
Alpha	1.07	Stream Power (N/m s)	11011.91	6160.92 0.00
Frctn Loss (m)	0.04	Cum Volume (1000 m3)	1.76	2.06 0.60
C & E Loss (m)	0.00	Cum SA (1000 m2)	6.89	1.65 3.32

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	99.39	Element	Left OB	Channel Right OB
Vel Head (m)	0.34	Wt. n-Val.		0.017 0.050
W.S. Elev (m)	99.05	Reach Len. (m)	15.00	18.00 21.00
Crit W.S. (m)	98.76	Flow Area (m2)		5.51 1.90

E.G. Slope (m/m)	0.002396	Area (m2)		5.51 1.90
Q Total (m3/s)	14.95	Flow (m3/s)		14.47 0.48
Top Width (m)	18.39	Top Width (m)		3.83 14.56
Vel Total (m/s)	2.02	Avg. Vel. (m/s)		2.63 0.25
Max Chl Dpth (m)	1.49	Hydr. Depth (m)		1.44 0.13
Conv. Total (m3/s)	305.4	Conv. (m3/s)		295.7 9.8
Length Wtd. (m)	18.13	Wetted Per. (m)		6.32 14.56
Min Ch El (m)	97.56	Shear (N/m2)		20.48 3.07
Alpha	1.64	Stream Power (N/m s)	11011.91	6160.92 0.00
Frctn Loss (m)	0.03	Cum Volume (1000 m3)	2.13	2.21 1.51
C & E Loss (m)	0.04	Cum SA (1000 m2)	7.95	1.66 7.59

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.11	Element	Left OB	Channel Right OB
Vel Head (m)	0.26	Wt. n-Val.		0.017 0.050
W.S. Elev (m)	98.85	Reach Len. (m)	15.00	18.00 21.00
Crit W.S. (m)	98.53	Flow Area (m2)		4.77 0.17
E.G. Slope (m/m)	0.002067	Area (m2)		4.77 0.17
Q Total (m3/s)	10.82	Flow (m3/s)		10.80 0.02
Top Width (m)	9.33	Top Width (m)		3.83 5.50
Vel Total (m/s)	2.19	Avg. Vel. (m/s)		2.26 0.09
Max Chl Dpth (m)	1.29	Hydr. Depth (m)		1.25 0.03
Conv. Total (m3/s)	238.0	Conv. (m3/s)		237.6 0.3
Length Wtd. (m)	18.00	Wetted Per. (m)		6.13 5.50
Min Ch El (m)	97.56	Shear (N/m2)		15.79 0.63
Alpha	1.07	Stream Power (N/m s)	11011.91	6160.92 0.00
Frctn Loss (m)	0.03	Cum Volume (1000 m3)	1.63	1.97 0.41
C & E Loss (m)	0.00	Cum SA (1000 m2)	6.60	1.64 2.52

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.08

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-5	111.09	5	111.59	15	110.79	25	109.46	35	107.49
45	105.56	55	103.9	75	102.13	81.49	99.86	89.75	99.56
93.29	99.32	95.65	99.39	98.6	99.82	100.96	99.01	105.09	98.89
116.89	98.98	122.79	99.1	123.09	99.1	123.09	97.5	126.63	97.5
126.92	99.02	132.82	98.75	145	99.06	155	99.14	165	99.11
175	99	185	98.9	195	99.05	205	100.05	215	100.68

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-5	.05	123.09	.015	126.92	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
123.09 126.92 20 20 20 .1 .3
Left Levee Station= 123.09 Elevation= 99.1
Right Levee Station= 126.92 Elevation= 99.02

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	99.14	Element	Left OB	Channel
Vel Head (m)	0.32	Wt. n-Val.		0.015
W.S. Elev (m)	98.82	Reach Len. (m)	2.00	2.00
Crit W.S. (m)	98.55	Flow Area (m2)		4.83
E.G. Slope (m/m)	0.001980	Area (m2)		4.83
Q Total (m3/s)	12.13	Flow (m3/s)		12.13
Top Width (m)	3.79	Top Width (m)		3.79
Vel Total (m/s)	2.51	Avg. Vel. (m/s)		2.51
Max Chl Dpth (m)	1.32	Hydr. Depth (m)		1.27
Conv. Total (m3/s)	272.6	Conv. (m3/s)		272.6
Length Wtd. (m)	2.00	Wetted Per. (m)		6.20
Min Ch El (m)	97.50	Shear (N/m2)		15.13
Alpha	1.00	Stream Power (N/m s)	10293.75	5893.29
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	1.76	1.97
C & E Loss (m)	0.00	Cum SA (1000 m2)	6.89	1.58

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	99.32	Element	Left OB	Channel
Vel Head (m)	0.22	Wt. n-Val.	0.050	0.015
W.S. Elev (m)	99.10	Reach Len. (m)	2.00	2.00
Crit W.S. (m)	98.71	Flow Area (m2)	2.94	5.91
E.G. Slope (m/m)	0.001299	Area (m2)	2.94	5.91
Q Total (m3/s)	14.95	Flow (m3/s)	0.55	13.07
Top Width (m)	78.94	Top Width (m)	22.39	3.83
Vel Total (m/s)	0.95	Avg. Vel. (m/s)	0.19	2.21
Max Chl Dpth (m)	1.60	Hydr. Depth (m)	0.13	1.54
Conv. Total (m3/s)	414.8	Conv. (m3/s)	15.1	362.6
Length Wtd. (m)	2.00	Wetted Per. (m)	22.41	6.69
Min Ch El (m)	97.50	Shear (N/m2)	1.67	11.26
Alpha	4.79	Stream Power (N/m s)	10293.75	5893.29
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	2.10	2.11
C & E Loss (m)	0.03	Cum SA (1000 m2)	7.78	1.59

Warning: Multiple water surfaces were found that could balance the energy equation. The program selected the water surface whose main channel velocity head was the closest to the previously computed cross section.
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	99.08	Element	Left OB	Channel
Vel Head (m)	0.25	Wt. n-Val.		0.015
W.S. Elev (m)	98.83	Reach Len. (m)	2.00	2.00
Crit W.S. (m)	98.48	Flow Area (m2)		4.87
E.G. Slope (m/m)	0.001539	Area (m2)		4.87
Q Total (m3/s)	10.82	Flow (m3/s)		10.82
Top Width (m)	3.79	Top Width (m)		3.79
Vel Total (m/s)	2.22	Avg. Vel. (m/s)		2.22
Max Chl Dpth (m)	1.33	Hydr. Depth (m)		1.28
Conv. Total (m3/s)	275.8	Conv. (m3/s)		275.8
Length Wtd. (m)	2.00	Wetted Per. (m)		6.22
Min Ch El (m)	97.50	Shear (N/m2)		11.82

Alpha	1.00	Stream Power (N/m s)	10293.75	5893.29
6076.66				
Frctn Loss (m)	0.00	Cum Volume (1000 m3)	1.63	1.89
0.41				
C & E Loss (m)	0.00	Cum SA (1000 m2)	6.60	1.58
2.46				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Hunsworth Beck
REACH: 3 RS: 7.075

INPUT
Description:
Distance from Upstream XS = 2
Deck/Roadway Width = 13
Weir Coefficient = 1.4
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
123.09	99.09	98.91	126.92	99.09	98.91

Upstream Bridge Cross Section Data
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-5	111.09	5	111.59	15	110.79	25	109.46	35	107.49
45	105.56	55	103.9	75	102.13	81.49	99.86	89.75	99.56
93.29	99.32	95.65	99.39	98.6	99.82	100.96	99.01	105.09	98.89
116.89	98.98	122.79	99.1	123.09	99.1	123.09	97.5	126.63	97.5
126.92	99.02	132.82	98.75	145	99.06	155	99.14	165	99.11
175	99	185	98.9	195	99.05	205	100.05	215	100.68

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-5	.05	123.09	.015	126.92	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
123.09	126.92	.1	.3

Left Levee Station= 123.09 Elevation= 99.1
Right Levee Station= 126.92 Elevation= 99.02

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
51.89	99.07	98.89	56.61	99.07	98.89

Downstream Bridge Cross Section Data
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	107.79	5	105.68	15	104.53	24.75	99.44	28.88	99.38
34.19	99.23	40.09	99.23	45.99	99.17	48.35	98.97	51.89	98.89
52.48	97.49	56.02	97.49	56.61	99.04	62.51	98.9	71.36	98.72
80.21	98.66	85.52	98.75	93.78	98.93	105	98.89	115	98.8
125	98.69	135	98.66	145	98.67	155	99.49	165	100.27

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	51.89	.035	56.61	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
51.89	56.61	.1	.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Momentum Cd = 1
Selected Low Flow Methods = Energy

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd = .8
Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

E.G. US. (m)	99.14	Element	Inside BR US
Inside BR DS			
W.S. US. (m)	98.82	E.G. Elev (m)	99.14
99.02			
Q Total (m3/s)	12.13	W.S. Elev (m)	98.81
98.99			
Q Bridge (m3/s)	12.13	Crit W.S. (m)	98.55
98.51			
Q Weir (m3/s)		Max Chl Dpth (m)	1.31
1.50			
Weir Sta Lft (m)		Vel Total (m/s)	2.52
0.48			
Weir Sta Rgt (m)		Flow Area (m2)	4.80
25.33			
Weir Submerg		Froude # Chl	0.72
0.17			
Weir Max Depth (m)		Specif Force (m3)	6.23
7.67			
Min El Weir Flow (m)	99.02	Hydr Depth (m)	1.27
0.27			
Min El Prs (m)	98.91	W.P. Total (m)	6.19
105.58			
Delta EG (m)	0.16	Conv. Total (m3/s)	270.7
244.2			
Delta WS (m)	0.04	Top Width (m)	3.79
94.23			
BR Open Area (m2)	5.18	Frctn Loss (m)	0.03
0.02			
BR Open Vel (m/s)	2.52	C & E Loss (m)	0.09
0.02			
Coef of Q		Shear Total (N/m2)	15.30
5.80			
Br Sel Method	Energy only	Power Total (N/m s)	-239.39
0.00			

Warning: The sluice gate calculations did not converge during pressure/weir flow calculations.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum
answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used
for pressure flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #PF 2

E.G. US. (m)	99.32	Element	Inside BR US
Inside BR DS			
W.S. US. (m)	99.10	E.G. Elev (m)	99.28
99.06			
Q Total (m3/s)	14.95	W.S. Elev (m)	99.18
99.04			
Q Bridge (m3/s)	10.01	Crit W.S. (m)	99.18
98.89			
Q Weir (m3/s)		Max Chl Dpth (m)	1.68
1.55			
Weir Sta Lft (m)		Vel Total (m/s)	0.68
0.51			
Weir Sta Rgt (m)		Flow Area (m2)	21.92
29.39			
Weir Submerg		Froude # Chl	0.36
0.17			
Weir Max Depth (m)		Specif Force (m3)	8.79
9.01			
Min El Weir Flow (m)	99.02	Hydr Depth (m)	0.23
0.30			
Min El Prs (m)	98.91	W.P. Total (m)	106.10
108.44			
Delta EG (m)	0.28	Conv. Total (m3/s)	301.2
291.4			
Delta WS (m)	0.11	Top Width (m)	95.77
97.04			
BR Open Area (m2)	5.18	Frctn Loss (m)	0.03
0.07			
BR Open Vel (m/s)	1.93	C & E Loss (m)	0.03
0.04			
Coef of Q		Shear Total (N/m2)	4.99
7.00			
Br Sel Method	Energy only	Power Total (N/m s)	-239.39
0.00			

Warning: The energy upstream of the bridge computed by the orifice equation was below critical depth. The pressure solution
has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum
answer has been disregarded.
Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was

used for pressure flow.
Note: Pressure/weir flow was attempted because the energy, low flow method was high enough. However, the
pressure/weir flow answer was below the low chord. Therefore, the pressure/weir answer is not valid.
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

BRIDGE OUTPUT Profile #PF 3

E.G. US. (m)	99.08	Element	Inside BR US
Inside BR DS			
W.S. US. (m)	98.83	E.G. Elev (m)	99.08
98.98			
Q Total (m3/s)	10.82	W.S. Elev (m)	98.82
98.96			
Q Bridge (m3/s)	10.82	Crit W.S. (m)	98.48
98.44			
Q Weir (m3/s)		Max Chl Dpth (m)	1.32
1.47			
Weir Sta Lft (m)		Vel Total (m/s)	2.23
0.50			
Weir Sta Rgt (m)		Flow Area (m2)	4.85
21.81			
Weir Submerg		Froude # Chl	0.63
0.19			
Weir Max Depth (m)		Specif Force (m3)	5.63
6.76			
Min El Weir Flow (m)	99.02	Hydr Depth (m)	1.28
0.24			
Min El Prs (m)	98.91	W.P. Total (m)	6.21
102.57			
Delta EG (m)	0.14	Conv. Total (m3/s)	274.4
207.2			
Delta WS (m)	0.16	Top Width (m)	3.79
91.27			
BR Open Area (m2)	5.18	Frctn Loss (m)	0.03
0.02			
BR Open Vel (m/s)	2.23	C & E Loss (m)	0.07
0.02			
Coef of Q		Shear Total (N/m2)	11.91
5.68			
Br Sel Method	Energy only	Power Total (N/m s)	-239.39
0.00			

Warning: The sluice gate calculations did not converge during pressure/weir flow calculations.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum
answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used

for pressure flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.07

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	107.79	5	105.68	15	104.53	24.75	99.44	28.88	99.38
34.19	99.23	40.09	99.23	45.99	99.17	48.35	98.97	51.89	98.89
52.48	97.49	56.02	97.49	56.61	99.04	62.51	98.9	71.36	98.72
80.21	98.66	85.52	98.75	93.78	98.93	105	98.89	115	98.8
125	98.69	135	98.66	145	98.67	155	99.49	165	100.27

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	51.89	.035	56.61	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
51.89	56.61	33	33	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	98.98	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.20	Wt. n-Val.		0.035
0.050				
W.S. Elev (m)	98.78	Reach Len. (m)	33.00	33.00
33.00				
Crit W.S. (m)	98.51	Flow Area (m2)		5.23
3.95				
E.G. Slope (m/m)	0.006817	Area (m2)		5.23
3.95				
Q Total (m3/s)	12.13	Flow (m3/s)		10.89
1.24				
Top Width (m)	52.59	Top Width (m)		4.57
48.01				
Vel Total (m/s)	1.32	Avg. Vel. (m/s)		2.08
0.31				
Max Chl Dpth (m)	1.29	Hydr. Depth (m)		1.14
0.08				
Conv. Total (m3/s)	146.9	Conv. (m3/s)		131.9
15.0				
Length Wtd. (m)	33.00	Wetted Per. (m)		6.32
48.02				
Min Ch El (m)	97.49	Shear (N/m2)		55.37
5.49				
Alpha	2.23	Stream Power (N/m s)	7899.86	0.00
0.00				
Frctn Loss (m)	0.22	Cum Volume (1000 m3)	1.76	1.87
0.41				

C & E Loss (m)	0.00	Cum SA (1000 m2)	6.86	1.54
2.32				

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	99.04	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.06	Wt. n-Val.	0.050	0.035
0.050				
W.S. Elev (m)	98.99	Reach Len. (m)	33.00	33.00
33.00				
Crit W.S. (m)	98.90	Flow Area (m2)	0.20	6.19
18.67				
E.G. Slope (m/m)	0.002483	Area (m2)	0.20	6.19
18.67				
Q Total (m3/s)	14.95	Flow (m3/s)	0.03	8.40
6.52				
Top Width (m)	98.43	Top Width (m)	3.73	4.70
89.99				
Vel Total (m/s)	0.60	Avg. Vel. (m/s)	0.14	1.36
0.35				
Max Chl Dpth (m)	1.50	Hydr. Depth (m)	0.05	1.32
0.21				
Conv. Total (m3/s)	300.0	Conv. (m3/s)	0.6	168.6
130.8				
Length Wtd. (m)	33.00	Wetted Per. (m)	3.73	6.66
90.01				
Min Ch El (m)	97.49	Shear (N/m2)	1.31	22.65
5.05				
Alpha	3.06	Stream Power (N/m s)	7899.86	0.00
0.00				
Frctn Loss (m)	0.17	Cum Volume (1000 m3)	2.06	1.99
1.07				
C & E Loss (m)	0.04	Cum SA (1000 m2)	7.54	1.55
5.25				

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	98.94	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.27	Wt. n-Val.		0.035
0.050				
W.S. Elev (m)	98.67	Reach Len. (m)	33.00	33.00
33.00				
Crit W.S. (m)	98.43	Flow Area (m2)		4.74
0.09				
E.G. Slope (m/m)	0.008906	Area (m2)		4.74
0.09				
Q Total (m3/s)	10.82	Flow (m3/s)		10.81
0.01				
Top Width (m)	20.17	Top Width (m)		4.49
15.69				
Vel Total (m/s)	2.24	Avg. Vel. (m/s)		2.28

0.06					
Max Chl Dpth (m)	1.18	Hydr. Depth (m)			1.06
0.01					
Conv. Total (m3/s)	114.7	Conv. (m3/s)			114.6
0.1					
Length Wtd. (m)	33.00	Wetted Per. (m)			6.08
15.69					
Min Ch El (m)	97.49	Shear (N/m2)			68.02
0.48					
Alpha	1.04	Stream Power (N/m s)	7899.86		0.00
0.00					
Frctn Loss (m)	0.25	Cum Volume (1000 m3)	1.63		1.78
0.27					
C & E Loss (m)	0.02	Cum SA (1000 m2)	6.57		1.53
1.63					

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.05

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	112.63	10	111.93	20	110.98	30	109.43	40	107.29
50	105.82	60	99.8	70	99.67	80	99.12	81.18	98
81.77	97.24	85.31	97.24	85.9	98	88.26	98.87	97.7	98.37
102.42	98.34	105.96	98.28	109.5	98.39	112.45	98.12	117.76	98.18
123.07	98.21	127.5	98.23	131.63	99.36	135.17	98.27	145	98.74
155	98.7	165	98.54	175	98.42	185	98.6	195	98.98
205	99.93	215	100.64						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	81.18	.04	85.9	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
81.18 85.9 30 25 20 .1 .3
Right Levee Station= 88.26 Elevation= 98.87

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	98.76	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.21	Wt. n-Val.	0.050	0.040
0.050				
W.S. Elev (m)	98.55	Reach Len. (m)	30.00	25.00
20.00				
Crit W.S. (m)	98.22	Flow Area (m2)	0.16	5.74
0.41				
E.G. Slope (m/m)	0.006302	Area (m2)	0.16	5.74
0.41				
Q Total (m3/s)	12.13	Flow (m3/s)	0.09	11.78
0.27				
Top Width (m)	6.80	Top Width (m)	0.58	4.72
1.50				
Vel Total (m/s)	1.92	Avg. Vel. (m/s)	0.54	2.05
0.64				
Max Chl Dpth (m)	1.31	Hydr. Depth (m)	0.28	1.22
0.28				

Conv. Total (m3/s)	152.8	Conv. (m3/s)		1.1	148.4
3.4					
Length Wtd. (m)	24.96	Wetted Per. (m)		0.80	5.46
1.59					
Min Ch El (m)	97.24	Shear (N/m2)		12.36	64.94
15.99					
Alpha	1.11	Stream Power (N/m s)	10293.75		0.00
4225.70					
Frctn Loss (m)	0.26	Cum Volume (1000 m3)		1.76	1.68
0.34					
C & E Loss (m)	0.02	Cum SA (1000 m2)		6.85	1.38
1.51					

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	98.83	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.46	Wt. n-Val.	0.050	0.040
0.050				
W.S. Elev (m)	98.37	Reach Len. (m)	30.00	25.00
20.00				
Crit W.S. (m)	98.37	Flow Area (m2)	0.07	4.86
0.18				
E.G. Slope (m/m)	0.017218	Area (m2)	0.07	4.86
0.18				
Q Total (m3/s)	14.95	Flow (m3/s)	0.05	14.76
0.15				
Top Width (m)	6.10	Top Width (m)	0.38	4.72
0.99				
Vel Total (m/s)	2.92	Avg. Vel. (m/s)	0.68	3.03
0.81				
Max Chl Dpth (m)	1.13	Hydr. Depth (m)	0.18	1.03
0.18				
Conv. Total (m3/s)	113.9	Conv. (m3/s)	0.4	112.5
1.1				
Length Wtd. (m)	24.53	Wetted Per. (m)	0.53	5.46
1.06				
Min Ch El (m)	97.24	Shear (N/m2)	22.36	150.25
28.93				
Alpha	1.06	Stream Power (N/m s)	10293.75	0.00
4225.70				
Frctn Loss (m)	0.22	Cum Volume (1000 m3)	2.06	1.81
0.76				
C & E Loss (m)	0.10	Cum SA (1000 m2)	7.47	1.39
3.75				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current

and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	98.67	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.19	Wt. n-Val.	0.050	0.040
0.050				
W.S. Elev (m)	98.48	Reach Len. (m)	30.00	25.00
20.00				
Crit W.S. (m)	98.15	Flow Area (m2)	0.12	5.39
0.31				
E.G. Slope (m/m)	0.006296	Area (m2)	0.12	5.39
0.31				
Q Total (m3/s)	10.82	Flow (m3/s)	0.06	10.58
0.18				
Top Width (m)	6.51	Top Width (m)	0.50	4.72
1.29				
Vel Total (m/s)	1.86	Avg. Vel. (m/s)	0.49	1.96
0.58				
Max Chl Dpth (m)	1.24	Hydr. Depth (m)	0.24	1.14
0.24				
Conv. Total (m3/s)	136.4	Conv. (m3/s)	0.7	133.4
2.3				
Length Wtd. (m)	24.97	Wetted Per. (m)	0.69	5.46
1.38				
Min Ch El (m)	97.24	Shear (N/m2)	10.66	60.86
13.79				
Alpha	1.09	Stream Power (N/m s)	10293.75	0.00
4225.70				
Frctn Loss (m)	0.27	Cum Volume (1000 m3)	1.63	1.61
0.26				
C & E Loss (m)	0.02	Cum SA (1000 m2)	6.56	1.38
1.35				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.04

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	109.42	10	108.24	20	106.72	30	105.98	40	105.09
50	99.32	60	98.5	70	98.6	80	98	80.5	97.03
84.04	97.03	84.63	98	85.81	98.1	93.19	98.2	99.09	98.07
107.35	98.18	114.43	98.2	118.56	98.2	120.33	98.13	122.1	98.14

130	98.62	140	98.59	150	98.47	160	98.21	170	98.17
180	98.55	190	99.3	200	100.18				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	80	.04	84.63	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
80	84.63	35	40	46	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	98.48	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.43	Wt. n-Val.	0.035	0.040
0.050				
W.S. Elev (m)	98.04	Reach Len. (m)	35.00	40.00
46.00				
Crit W.S. (m)	98.04	Flow Area (m2)	0.02	4.16
0.01				
E.G. Slope (m/m)	0.021006	Area (m2)	0.02	4.16
0.01				
Q Total (m3/s)	12.13	Flow (m3/s)	0.00	12.12
0.00				
Top Width (m)	5.85	Top Width (m)	0.71	4.63
0.50				
Vel Total (m/s)	2.90	Avg. Vel. (m/s)	0.32	2.91
0.22				
Max Chl Dpth (m)	1.01	Hydr. Depth (m)	0.02	0.90
0.02				
Conv. Total (m3/s)	83.7	Conv. (m3/s)	0.0	83.6
0.0				
Length Wtd. (m)	40.06	Wetted Per. (m)	0.71	5.77
0.51				
Min Ch El (m)	97.03	Shear (N/m2)	4.39	148.60
4.38				
Alpha	1.01	Stream Power (N/m s)	9575.58	0.00
0.00				
Frctn Loss (m)	0.29	Cum Volume (1000 m3)	1.76	1.56
0.33				
C & E Loss (m)	0.09	Cum SA (1000 m2)	6.83	1.27
1.49				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	98.47	Element	Left OB	Channel

Right OB				
Vel Head (m)	0.17	Wt. n-Val.	0.035	0.040
0.050				
W.S. Elev (m)	98.30	Reach Len. (m)	35.00	40.00
46.00				
Crit W.S. (m)	98.34	Flow Area (m2)	0.74	5.34
7.14				
E.G. Slope (m/m)	0.007770	Area (m2)	0.74	5.34
7.14				
Q Total (m3/s)	14.95	Flow (m3/s)	0.53	11.19
3.23				
Top Width (m)	66.46	Top Width (m)	4.97	4.63
56.86				
Vel Total (m/s)	1.13	Avg. Vel. (m/s)	0.71	2.09
0.45				
Max Chl Dpth (m)	1.27	Hydr. Depth (m)	0.15	1.15
0.13				
Conv. Total (m3/s)	169.6	Conv. (m3/s)	6.0	127.0
36.7				
Length Wtd. (m)	40.80	Wetted Per. (m)	4.98	5.77
56.87				
Min Ch El (m)	97.03	Shear (N/m2)	11.35	70.61
9.57				
Alpha	2.62	Stream Power (N/m s)	9575.58	0.00
0.00				
Frctn Loss (m)	0.27	Cum Volume (1000 m3)	2.05	1.68
0.68				
C & E Loss (m)	0.09	Cum SA (1000 m2)	7.39	1.27
3.17				

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	98.38	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.42	Wt. n-Val.		0.040
W.S. Elev (m)	97.96	Reach Len. (m)	35.00	40.00
46.00				
Crit W.S. (m)	97.96	Flow Area (m2)		3.79
E.G. Slope (m/m)	0.022410	Area (m2)		3.79
Q Total (m3/s)	10.82	Flow (m3/s)		10.82
Top Width (m)	4.59	Top Width (m)		4.59
Vel Total (m/s)	2.86	Avg. Vel. (m/s)		2.86
Max Chl Dpth (m)	0.93	Hydr. Depth (m)		0.83
Conv. Total (m3/s)	72.3	Conv. (m3/s)		72.3
Length Wtd. (m)	40.07	Wetted Per. (m)		5.68

Min Ch El (m)	97.03	Shear (N/m2)		146.56
Alpha	1.00	Stream Power (N/m s)	9575.58	0.00
0.00				
Frctn Loss (m)	0.29	Cum Volume (1000 m3)	1.63	1.50
0.26				
C & E Loss (m)	0.09	Cum SA (1000 m2)	6.55	1.26
1.33				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.03

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	107.16	10	106.22	20	105.71	30	104.51	40	99.17
50	97.13	60	98.29	65	97	65.5	96.64	69.04	96.64
69.63	96.81	73.76	98.06	76.71	98.54	86.74	97.9	89.1	97.9
95	97.82	106.8	97.87	116.83	97.78	122.73	97.78	126.86	97.71
140	98.49	150	98.41	160	98.25	170	98.05	180	99.97
190	98.3	200	98.85	210	99.86				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	65	.04	69.63	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
65 69.63 53 50 46 .1 .3
Left Levee Station= 60 Elevation= 98.29
Right Levee Station= 76.71 Elevation= 98.54

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	97.99	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.12	Wt. n-Val.	0.035	0.040
0.050				
W.S. Elev (m)	97.87	Reach Len. (m)	53.00	50.00
46.00				
Crit W.S. (m)	97.53	Flow Area (m2)	1.46	5.55
1.85				
E.G. Slope (m/m)	0.003672	Area (m2)	1.46	5.55

1.85					
Q Total (m3/s)	12.13	Flow (m3/s)	1.42	9.29	
1.42					
Top Width (m)	11.49	Top Width (m)	3.36	4.63	
3.50					
Vel Total (m/s)	1.37	Avg. Vel. (m/s)	0.97	1.67	
0.77					
Max Chl Dpth (m)	1.23	Hydr. Depth (m)	0.43	1.20	
0.53					
Conv. Total (m3/s)	200.2	Conv. (m3/s)	23.4	153.3	
23.5					
Length Wtd. (m)	50.15	Wetted Per. (m)	3.47	4.77	
3.65					
Min Ch El (m)	96.64	Shear (N/m2)	15.13	41.87	
18.23					
Alpha	1.24	Stream Power (N/m s)	10054.35	2872.67	
3672.71					
Frctn Loss (m)	0.26	Cum Volume (1000 m3)	1.73	1.37	
0.29					
C & E Loss (m)	0.01	Cum SA (1000 m2)	6.76	1.08	
1.40					

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	98.12	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.14	Wt. n-Val.	0.035	0.040
0.050				
W.S. Elev (m)	97.98	Reach Len. (m)	53.00	50.00
46.00				
Crit W.S. (m)	97.64	Flow Area (m2)	1.85	6.05
2.25				
E.G. Slope (m/m)	0.003879	Area (m2)	1.85	6.05
2.25				
Q Total (m3/s)	14.95	Flow (m3/s)	2.00	11.05
1.90				
Top Width (m)	12.28	Top Width (m)	3.79	4.63
3.86				
Vel Total (m/s)	1.47	Avg. Vel. (m/s)	1.08	1.82
0.84				
Max Chl Dpth (m)	1.34	Hydr. Depth (m)	0.49	1.31
0.58				
Conv. Total (m3/s)	240.1	Conv. (m3/s)	32.1	177.4
30.6				
Length Wtd. (m)	50.23	Wetted Per. (m)	3.91	4.77
4.03				
Min Ch El (m)	96.64	Shear (N/m2)	18.00	48.26
21.25				
Alpha	1.25	Stream Power (N/m s)	10054.35	2872.67
3672.71				
Frctn Loss (m)	0.26	Cum Volume (1000 m3)	2.00	1.46
0.47				
C & E Loss (m)	0.01	Cum SA (1000 m2)	7.24	1.09
1.77				

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	97.92	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.11	Wt. n-Val.	0.035	0.040
0.050				
W.S. Elev (m)	97.81	Reach Len. (m)	53.00	50.00
46.00				
Crit W.S. (m)	97.47	Flow Area (m2)	1.26	5.27
1.64				
E.G. Slope (m/m)	0.003613	Area (m2)	1.26	5.27
1.64				
Q Total (m3/s)	10.82	Flow (m3/s)	1.16	8.45
1.21				
Top Width (m)	11.06	Top Width (m)	3.13	4.63
3.30				
Vel Total (m/s)	1.32	Avg. Vel. (m/s)	0.92	1.61
0.73				
Max Chl Dpth (m)	1.17	Hydr. Depth (m)	0.40	1.14
0.50				
Conv. Total (m3/s)	180.0	Conv. (m3/s)	19.3	140.6
20.1				
Length Wtd. (m)	50.10	Wetted Per. (m)	3.23	4.77
3.44				
Min Ch El (m)	96.64	Shear (N/m2)	13.85	39.11
16.91				
Alpha	1.23	Stream Power (N/m s)	10054.35	2872.67
3672.71				
Frctn Loss (m)	0.27	Cum Volume (1000 m3)	1.60	1.32
0.22				
C & E Loss (m)	0.01	Cum SA (1000 m2)	6.50	1.08
1.26				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7.02

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	106.77	10	103.46	20	97.51	30	97.37	40	96.58
50	98.01	62	97	62.5	96.31	66.04	96.31	66.63	97.59
69.58	97.59	73.71	98.84	79.61	97.73	82.56	97.7	87.28	97.76
92.59	97.87	103.21	98.01	113.83	98.16	119.73	98.18	130	98.23
140	98.07	150	97.74	160	97.72	170	98.2	180	99.23
190	99.82	200	100.37						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0 .035 62 .04 66.63 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
62 66.63 112 100 95 .1 .3

Left Levee Station= 50 Elevation= 98.01

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	97.71	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.20	Wt. n-Val.	0.035	0.040
W.S. Elev (m)	97.52	Reach Len. (m)	112.00	100.00
95.00				
Crit W.S. (m)	97.37	Flow Area (m2)	1.58	5.03
E.G. Slope (m/m)	0.008234	Area (m2)	1.58	5.03
Q Total (m3/s)	12.13	Flow (m3/s)	1.65	10.48
Top Width (m)	10.72	Top Width (m)	6.12	4.60
Vel Total (m/s)	1.84	Avg. Vel. (m/s)	1.05	2.08
Max Chl Dpth (m)	1.21	Hydr. Depth (m)	0.26	1.09
Conv. Total (m3/s)	133.7	Conv. (m3/s)	18.2	115.5
Length Wtd. (m)	104.37	Wetted Per. (m)	6.14	5.72
Min Ch El (m)	96.31	Shear (N/m2)	20.73	71.03
Alpha	1.16	Stream Power (N/m s)	9575.58	2393.89
0.00				
Frctn Loss (m)	0.54	Cum Volume (1000 m3)	1.65	1.10
0.25				
C & E Loss (m)	0.05	Cum SA (1000 m2)	6.51	0.85
1.32				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	97.85	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.20	Wt. n-Val.	0.035	0.040
0.050				
W.S. Elev (m)	97.65	Reach Len. (m)	112.00	100.00
95.00				
Crit W.S. (m)	97.50	Flow Area (m2)	2.52	5.66
0.19				
E.G. Slope (m/m)	0.007415	Area (m2)	2.52	5.66
0.19				
Q Total (m3/s)	14.95	Flow (m3/s)	2.92	11.98

0.05				
Top Width (m)	15.51	Top Width (m)	7.73	4.63
3.15				
Vel Total (m/s)	1.79	Avg. Vel. (m/s)	1.16	2.12
0.26				
Max Chl Dpth (m)	1.34	Hydr. Depth (m)	0.33	1.22
0.06				
Conv. Total (m3/s)	173.6	Conv. (m3/s)	34.0	139.1
0.6				
Length Wtd. (m)	104.72	Wetted Per. (m)	7.76	5.80
3.16				
Min Ch El (m)	96.31	Shear (N/m2)	23.59	70.92
4.27				
Alpha	1.21	Stream Power (N/m s)	9575.58	2393.89
0.00				
Frctn Loss (m)	0.66	Cum Volume (1000 m3)	1.88	1.16
0.41				
C & E Loss (m)	0.04	Cum SA (1000 m2)	6.93	0.86
1.61				

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	97.64	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.20	Wt. n-Val.	0.035	0.040
W.S. Elev (m)	97.44	Reach Len. (m)	112.00	100.00
95.00				
Crit W.S. (m)	97.30	Flow Area (m2)	1.17	4.71
E.G. Slope (m/m)	0.008614	Area (m2)	1.17	4.71
Q Total (m3/s)	10.82	Flow (m3/s)	1.14	9.68
Top Width (m)	9.84	Top Width (m)	5.28	4.56
Vel Total (m/s)	1.84	Avg. Vel. (m/s)	0.97	2.06
Max Chl Dpth (m)	1.13	Hydr. Depth (m)	0.22	1.03
Conv. Total (m3/s)	116.6	Conv. (m3/s)	12.3	104.3
Length Wtd. (m)	104.19	Wetted Per. (m)	5.30	5.64
Min Ch El (m)	96.31	Shear (N/m2)	18.71	70.49
Alpha	1.15	Stream Power (N/m s)	9575.58	2393.89
0.00				
Frctn Loss (m)	0.48	Cum Volume (1000 m3)	1.54	1.07
0.18				
C & E Loss (m)	0.05	Cum SA (1000 m2)	6.28	0.85
1.18				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 7

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	109.95	10	108.5	20	106.51	30	104.55	40	101.28
50	96.42	60	96.97	70	96.6	80	97.08	100	97
100.5	96.05	104.04	96.05	104.63	97.68	105.22	97.68	111.12	97.44
117.02	97.55	124.1	97.23	135	96.51	145	96.76	155	96.65
165	96.53	175	97.08	185	96.76	195	97.23	205	97.88
215	99.27	225	99.97	235	100.49				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	100	.04	104.63	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
100	104.63	100	100	.1	.3

Left Levee Station= 80 Elevation= 97.08
Right Levee Station= 104.63 Elevation= 97.68

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	97.12	Element	Left OB	Channel
Vel Head (m)	0.04	Wt. n-Val.	0.030	0.040
W.S. Elev (m)	97.08	Reach Len. (m)	100.00	100.00
Crit W.S. (m)	97.08	Flow Area (m2)	10.45	4.12
E.G. Slope (m/m)	0.003572	Area (m2)	10.45	4.12
Q Total (m3/s)	12.13	Flow (m3/s)	7.19	4.94
Top Width (m)	55.77	Top Width (m)	51.36	4.41
Vel Total (m/s)	0.83	Avg. Vel. (m/s)	0.69	1.20
Max Chl Dpth (m)	1.03	Hydr. Depth (m)	0.20	0.93
Conv. Total (m3/s)	203.0	Conv. (m3/s)	120.2	82.7
Length Wtd. (m)	100.00	Wetted Per. (m)	51.54	5.71
Min Ch El (m)	96.05	Shear (N/m2)	7.10	25.25
Alpha	1.25	Stream Power (N/m s)	11251.29	3830.23
Frctn Loss (m)	0.40	Cum Volume (1000 m3)	0.98	0.64
C & E Loss (m)	0.00	Cum SA (1000 m2)	3.29	0.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	97.15	Element	Left OB	Channel
Vel Head (m)	0.07	Wt. n-Val.	0.030	0.040
W.S. Elev (m)	97.08	Reach Len. (m)	100.00	100.00
Crit W.S. (m)	97.08	Flow Area (m2)	10.45	4.12
E.G. Slope (m/m)	0.005426	Area (m2)	10.45	4.12
Q Total (m3/s)	14.95	Flow (m3/s)	8.86	6.09
Top Width (m)	55.77	Top Width (m)	51.36	4.41
Vel Total (m/s)	1.03	Avg. Vel. (m/s)	0.85	1.48
Max Chl Dpth (m)	1.03	Hydr. Depth (m)	0.20	0.93
Conv. Total (m3/s)	202.9	Conv. (m3/s)	120.2	82.7
Length Wtd. (m)	100.00	Wetted Per. (m)	51.54	5.71
Min Ch El (m)	96.05	Shear (N/m2)	10.79	38.36
Alpha	1.25	Stream Power (N/m s)	11251.29	3830.23
Frctn Loss (m)	0.45	Cum Volume (1000 m3)	1.16	0.68
C & E Loss (m)	0.01	Cum SA (1000 m2)	3.62	0.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	97.12	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.04	Wt. n-Val.	0.030	0.040
W.S. Elev (m)	97.08	Reach Len. (m)	100.00	100.00
100.00				
Crit W.S. (m)	97.08	Flow Area (m2)	10.45	4.12
E.G. Slope (m/m)	0.002842	Area (m2)	10.45	4.12
Q Total (m3/s)	10.82	Flow (m3/s)	6.41	4.41
Top Width (m)	55.77	Top Width (m)	51.36	4.41
Vel Total (m/s)	0.74	Avg. Vel. (m/s)	0.61	1.07
Max Chl Dpth (m)	1.03	Hydr. Depth (m)	0.20	0.93
Conv. Total (m3/s)	203.0	Conv. (m3/s)	120.2	82.7
Length Wtd. (m)	100.00	Wetted Per. (m)	51.54	5.71
Min Ch El (m)	96.05	Shear (N/m2)	5.65	20.09
Alpha	1.25	Stream Power (N/m s)	11251.29	3830.23
5009.46				
Frctn Loss (m)	0.35	Cum Volume (1000 m3)	0.89	0.63
0.18				
C & E Loss (m)	0.00	Cum SA (1000 m2)	3.11	0.40
1.18				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 3 RS: 6

INPUT
Description:
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	108.15	10	107.63	20	107.55	30	107.24	40	106.91
50	106.63	60	106.44	70	106.45	80	106.22	90	105.87
100	104.31	110	100.21	120	97.65	130	95.51	140	95.62
150	95.76	160	95.85	170	95.55	180	96	180.5	95
183.5	95	184	96	200	95.41	210	95.57	220	95.6
230	95.93	240	96.23	250	96.15	260	96.47	270	97.55
280	97.95	290	98.79	300	99.88	310	100.5		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.03	180	.035	184	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
180	184	150	150	150	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	96.18	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.56	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	95.62	Reach Len. (m)	120.00	120.00
120.00				
Crit W.S. (m)	95.74	Flow Area (m2)	0.71	2.05
2.25				
E.G. Slope (m/m)	0.051970	Area (m2)	0.71	2.05
2.25				
Q Total (m3/s)	12.13	Flow (m3/s)	0.75	8.05
3.33				
Top Width (m)	44.33	Top Width (m)	14.40	3.62
26.30				
Vel Total (m/s)	2.42	Avg. Vel. (m/s)	1.04	3.93
1.48				
Max Chl Dpth (m)	0.62	Hydr. Depth (m)	0.05	0.57
0.09				
Conv. Total (m3/s)	53.2	Conv. (m3/s)	3.3	35.3
14.6				
Length Wtd. (m)		Wetted Per. (m)	14.42	4.39
26.31				
Min Ch El (m)	95.00	Shear (N/m2)	25.26	238.43
43.67				
Alpha	1.87	Stream Power (N/m s)	14842.14	0.00
0.00				
Frctn Loss (m)	0.90	Cum Volume (1000 m3)	0.42	0.34
0.14				
C & E Loss (m)	0.05	Cum SA (1000 m2)		

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	96.01	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.34	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	95.67	Reach Len. (m)	120.00	120.00
120.00				
Crit W.S. (m)	95.76	Flow Area (m2)	1.61	2.24
3.66				
E.G. Slope (m/m)	0.034552	Area (m2)	1.61	2.24
3.66				
Q Total (m3/s)	14.95	Flow (m3/s)	1.82	7.45

5.68				
Top Width (m)	53.95	Top Width (m)	21.07	3.67
29.21				
Vel Total (m/s)	1.99	Avg. Vel. (m/s)	1.13	3.33
1.55				
Max Chl Dpth (m)	0.67	Hydr. Depth (m)	0.08	0.61
0.13				
Conv. Total (m3/s)	80.4	Conv. (m3/s)	9.8	40.1
30.5				
Length Wtd. (m)	120.00	Wetted Per. (m)	21.09	4.50
29.22				
Min Ch El (m)	95.00	Shear (N/m2)	25.91	168.43
42.44				
Alpha	1.67	Stream Power (N/m s)	14842.14	0.00
0.00				
Frctn Loss (m)	1.11	Cum Volume (1000 m3)	0.55	0.36
0.22				
C & E Loss (m)	0.03	Cum SA (1000 m2)		

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	96.28	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.69	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	95.60	Reach Len. (m)	120.00	120.00
120.00				
Crit W.S. (m)	95.73	Flow Area (m2)	0.41	1.96
1.64				
E.G. Slope (m/m)	0.060714	Area (m2)	0.41	1.96
1.64				
Q Total (m3/s)	10.82	Flow (m3/s)	0.39	8.16
2.26				
Top Width (m)	37.99	Top Width (m)	10.74	3.60
23.65				
Vel Total (m/s)	2.70	Avg. Vel. (m/s)	0.96	4.16
1.38				
Max Chl Dpth (m)	0.60	Hydr. Depth (m)	0.04	0.55
0.07				
Conv. Total (m3/s)	43.9	Conv. (m3/s)	1.6	33.1
9.2				
Length Wtd. (m)	120.00	Wetted Per. (m)	10.75	4.33
23.66				
Min Ch El (m)	95.00	Shear (N/m2)	22.70	270.00
41.18				
Alpha	1.85	Stream Power (N/m s)	14842.14	0.00
0.00				
Frctn Loss (m)	0.77	Cum Volume (1000 m3)	0.35	0.32
0.10				
C & E Loss (m)	0.07	Cum SA (1000 m2)		

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 4 RS: 5

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105.39	20	103.48	40	101.13	60	98.28	80	95.57
100	95.34	120	95.37	140	94.61	160	95	160.5	94
163.5	94	164	95	180	96.87	200	97.56	220	97.93
240	99.28	260	100.71	280	101.71	300	102.81	320	103.82

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	160	.035	164	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
160	164	130	130	130	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	95.13	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.12	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	95.01	Reach Len. (m)	130.00	130.00
130.00				
Crit W.S. (m)	95.01	Flow Area (m2)	6.26	3.55
0.00				
E.G. Slope (m/m)	0.007602	Area (m2)	6.26	3.55
0.00				
Q Total (m3/s)	13.14	Flow (m3/s)	6.32	6.82
0.00				
Top Width (m)	34.68	Top Width (m)	30.57	4.00
0.10				
Vel Total (m/s)	1.34	Avg. Vel. (m/s)	1.01	1.92
0.09				
Max Chl Dpth (m)	1.01	Hydr. Depth (m)	0.20	0.89
0.01				
Conv. Total (m3/s)	150.7	Conv. (m3/s)	72.5	78.2
0.0				
Length Wtd. (m)	130.00	Wetted Per. (m)	30.59	5.24
0.10				
Min Ch El (m)	94.00	Shear (N/m2)	15.26	50.51
0.44				
Alpha	1.34	Stream Power (N/m s)	15320.92	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)	1.73	2.65
2.67				

C & E Loss (m) 8.26		Cum SA (1000 m2)	7.67	2.43

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During supercritical flow calculations a junction was encountered. During standard step calculations the program used
the stream with the greatest momentum to balance the energy equation.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	95.20	Element	Left OB	Channel
Right OB				
Vel Head (m) 0.030	0.14	Wt. n-Val.	0.030	0.035
W.S. Elev (m) 130.00	95.06	Reach Len. (m)	130.00	130.00
Crit W.S. (m) 0.01	95.05	Flow Area (m2)	7.63	3.72
E.G. Slope (m/m) 0.01	0.008331	Area (m2)	7.63	3.72
Q Total (m3/s) 0.00	16.71	Flow (m3/s)	8.97	7.73
Top Width (m) 0.48	36.20	Top Width (m)	31.73	4.00
Vel Total (m/s) 0.28	1.47	Avg. Vel. (m/s)	1.18	2.08
Max Chl Dpth (m) 0.03	1.06	Hydr. Depth (m)	0.24	0.93
Conv. Total (m3/s) 0.0	183.1	Conv. (m3/s)	98.3	84.7
Length Wtd. (m) 0.48	130.00	Wetted Per. (m)	31.74	5.24
Min Ch El (m) 2.26	94.00	Shear (N/m2)	19.64	58.09
Alpha 0.00	1.27	Stream Power (N/m s)	15320.92	0.00
Frctn Loss (m) 3.52	1.39	Cum Volume (1000 m3)	2.30	2.86
C & E Loss (m) 9.73	0.00	Cum SA (1000 m2)	8.54	2.44

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	95.10	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.12	Wt. n-Val.	0.030	0.035
W.S. Elev (m) 130.00	94.98	Reach Len. (m)	130.00	130.00
Crit W.S. (m)	94.98	Flow Area (m2)	5.35	3.43
E.G. Slope (m/m)	0.007653	Area (m2)	5.35	3.43
Q Total (m3/s)	11.56	Flow (m3/s)	5.07	6.49
Top Width (m)	32.79	Top Width (m)	28.80	3.98
Vel Total (m/s)	1.32	Avg. Vel. (m/s)	0.95	1.89
Max Chl Dpth (m)	0.98	Hydr. Depth (m)	0.19	0.86
Conv. Total (m3/s)	132.1	Conv. (m3/s)	58.0	74.1
Length Wtd. (m)	130.00	Wetted Per. (m)	28.82	5.19
Min Ch El (m)	94.00	Shear (N/m2)	13.93	49.49
Alpha 0.00	1.39	Stream Power (N/m s)	15320.92	0.00
Frctn Loss (m) 2.26	1.37	Cum Volume (1000 m3)	1.49	2.53
C & E Loss (m) 7.45	0.00	Cum SA (1000 m2)	7.14	2.43

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 4 RS: 4

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	107.4	20	101.21	40	93.3	60	92.94	70	94
70.5	93	73.5	93	74	94	80	97.16	100	96.5
120	95.07	140	96.12	160	96.13	180	97.66	200	99.15
220	100.83	240	102.21	260	103.14	280	104.11	300	105.44
320	104.87	340	105.15						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	70	.035	74	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
70	74	150	150	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	93.55	Element	Left OB	Channel Right OB
Vel Head (m)	0.19	Wt. n-Val.	0.030	0.035
W.S. Elev (m)	93.36	Reach Len. (m)	150.00	150.00 150.00
Crit W.S. (m)	93.40	Flow Area (m2)	5.71	1.16
E.G. Slope (m/m)	0.022453	Area (m2)	5.71	1.16
Q Total (m3/s)	13.14	Flow (m3/s)	10.91	2.23
Top Width (m)	27.52	Top Width (m)	24.15	3.36
Vel Total (m/s)	1.91	Avg. Vel. (m/s)	1.91	1.93
Max Chl Dpth (m)	0.42	Hydr. Depth (m)	0.24	0.34
Conv. Total (m3/s)	87.7	Conv. (m3/s)	72.8	14.9
Length Wtd. (m)	150.00	Wetted Per. (m)	24.19	3.81
Min Ch El (m)	93.00	Shear (N/m2)	52.02	66.74
Alpha	1.00	Stream Power (N/m s)	16278.48	0.00 0.00
Frctn Loss (m)	1.58	Cum Volume (1000 m3)	0.95	2.34 2.67
C & E Loss (m)	0.01	Cum SA (1000 m2)	4.12	1.95 8.25

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	93.62	Element	Left OB	Channel Right OB
Vel Head (m)	0.19	Wt. n-Val.	0.030	0.035
W.S. Elev (m)	93.42	Reach Len. (m)	150.00	150.00 150.00
Crit W.S. (m)	93.45	Flow Area (m2)	7.19	1.36
E.G. Slope (m/m)	0.018229	Area (m2)	7.19	1.36
Q Total (m3/s)	16.71	Flow (m3/s)	14.13	2.58
Top Width (m)	28.30	Top Width (m)	24.87	3.42
Vel Total (m/s)	1.95	Avg. Vel. (m/s)	1.97	1.90

Max Chl Dpth (m)	0.48	Hydr. Depth (m)	0.29	0.40
Conv. Total (m3/s)	123.8	Conv. (m3/s)	104.7	19.1
Length Wtd. (m)	150.00	Wetted Per. (m)	24.93	3.95
Min Ch El (m)	93.00	Shear (N/m2)	51.58	61.60
Alpha	1.00	Stream Power (N/m s)	16278.48	0.00 0.00
Frctn Loss (m)	1.57	Cum Volume (1000 m3)	1.33	2.53 3.52
C & E Loss (m)	0.01	Cum SA (1000 m2)	4.86	1.96 9.70

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	93.51	Element	Left OB	Channel Right OB
Vel Head (m)	0.17	Wt. n-Val.	0.030	0.035
W.S. Elev (m)	93.34	Reach Len. (m)	150.00	150.00 150.00
Crit W.S. (m)	93.37	Flow Area (m2)	5.26	1.09
E.G. Slope (m/m)	0.022310	Area (m2)	5.26	1.09
Q Total (m3/s)	11.56	Flow (m3/s)	9.52	2.04
Top Width (m)	27.27	Top Width (m)	23.92	3.34
Vel Total (m/s)	1.82	Avg. Vel. (m/s)	1.81	1.87
Max Chl Dpth (m)	0.40	Hydr. Depth (m)	0.22	0.33
Conv. Total (m3/s)	77.4	Conv. (m3/s)	63.7	13.7
Length Wtd. (m)	150.00	Wetted Per. (m)	23.96	3.77
Min Ch El (m)	93.00	Shear (N/m2)	48.00	63.35
Alpha	1.00	Stream Power (N/m s)	16278.48	0.00 0.00
Frctn Loss (m)	1.59	Cum Volume (1000 m3)	0.80	2.24 2.26
C & E Loss (m)	0.00	Cum SA (1000 m2)	3.72	1.95 7.45

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 4 RS: 3

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	110	20	100	40	95	60	92	60.5	91
63.5	91	64	92	224	95	294	100	295	104

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	60	.035	64	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
60	64	150	150	150	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	92.78	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.02	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	92.76	Reach Len. (m)	150.00	150.00
150.00				
Crit W.S. (m)	92.34	Flow Area (m2)	1.93	6.54
15.44				
E.G. Slope (m/m)	0.000637	Area (m2)	1.93	6.54
15.44				
Q Total (m3/s)	13.14	Flow (m3/s)	0.85	5.48
6.82				
Top Width (m)	49.65	Top Width (m)	5.07	4.00
40.58				
Vel Total (m/s)	0.55	Avg. Vel. (m/s)	0.44	0.84
0.44				
Max Chl Dpth (m)	1.76	Hydr. Depth (m)	0.38	1.64
0.38				
Conv. Total (m3/s)	520.6	Conv. (m3/s)	33.5	216.9
270.1				
Length Wtd. (m)	150.00	Wetted Per. (m)	5.13	5.24
40.58				
Min Ch El (m)	91.00	Shear (N/m2)	2.35	7.81
2.38				
Alpha	1.34	Stream Power (N/m s)	14123.98	0.00
0.00				
Frctn Loss (m)	0.22	Cum Volume (1000 m3)	0.38	1.76
1.51				
C & E Loss (m)	0.02	Cum SA (1000 m2)	1.92	1.40
5.21				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	92.87	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.02	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	92.85	Reach Len. (m)	150.00	150.00
150.00				
Crit W.S. (m)	92.44	Flow Area (m2)	2.42	6.91
19.39				
E.G. Slope (m/m)	0.000662	Area (m2)	2.42	6.91
19.39				
Q Total (m3/s)	16.71	Flow (m3/s)	1.17	6.12
9.42				
Top Width (m)	55.17	Top Width (m)	5.69	4.00
45.48				
Vel Total (m/s)	0.58	Avg. Vel. (m/s)	0.48	0.88
0.49				
Max Chl Dpth (m)	1.85	Hydr. Depth (m)	0.43	1.73
0.43				
Conv. Total (m3/s)	649.3	Conv. (m3/s)	45.4	237.6
366.2				
Length Wtd. (m)	150.00	Wetted Per. (m)	5.75	5.24
45.49				
Min Ch El (m)	91.00	Shear (N/m2)	2.74	8.57
2.77				
Alpha	1.29	Stream Power (N/m s)	14123.98	0.00
0.00				
Frctn Loss (m)	0.22	Cum Volume (1000 m3)	0.61	1.91
2.07				
C & E Loss (m)	0.02	Cum SA (1000 m2)	2.57	1.40
6.29				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	92.73	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.02	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	92.71	Reach Len. (m)	150.00	150.00
150.00				
Crit W.S. (m)	92.28	Flow Area (m2)	1.69	6.35
13.52				
E.G. Slope (m/m)	0.000630	Area (m2)	1.69	6.35
13.52				
Q Total (m3/s)	11.56	Flow (m3/s)	0.70	5.18
5.68				
Top Width (m)	46.72	Top Width (m)	4.75	4.00
37.97				
Vel Total (m/s)	0.54	Avg. Vel. (m/s)	0.42	0.82
0.42				
Max Chl Dpth (m)	1.71	Hydr. Depth (m)	0.36	1.59
0.36				
Conv. Total (m3/s)	460.6	Conv. (m3/s)	28.1	206.2
226.3				
Length Wtd. (m)	150.00	Wetted Per. (m)	4.80	5.24
37.98				
Min Ch El (m)	91.00	Shear (N/m2)	2.17	7.49

2.20				
Alpha	1.37	Stream Power (N/m s)	14123.98	0.00
0.00				
Frctn Loss (m)	0.22	Cum Volume (1000 m3)	0.28	1.68
1.25				
C & E Loss (m)	0.02	Cum SA (1000 m2)	1.57	1.40
4.60				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 4 RS: 2

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105	20	100	40	95	100	92	100.5	91
103.5	91	104	92	204	95	244	100	245	104

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	100	.035	104	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
100	104	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	92.54	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.20	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	92.34	Reach Len. (m)	200.00	200.00
200.00				
Crit W.S. (m)	92.34	Flow Area (m2)	1.17	4.87
1.95				
E.G. Slope (m/m)	0.006392	Area (m2)	1.17	4.87
1.95				
Q Total (m3/s)	13.14	Flow (m3/s)	0.96	10.59
1.60				
Top Width (m)	22.22	Top Width (m)	6.83	4.00
11.39				
Vel Total (m/s)	1.65	Avg. Vel. (m/s)	0.82	2.18
0.82				
Max Chl Dpth (m)	1.34	Hydr. Depth (m)	0.17	1.22
0.17				
Conv. Total (m3/s)	164.3	Conv. (m3/s)	12.0	132.4
20.0				
Length Wtd. (m)	200.00	Wetted Per. (m)	6.84	5.24
11.39				
Min Ch El (m)	91.00	Shear (N/m2)	10.69	58.26
10.70				
Alpha	1.45	Stream Power (N/m s)	11730.08	0.00
0.00				

Frctn Loss (m)	1.42	Cum Volume (1000 m3)	0.15	0.91
0.21				
C & E Loss (m)	0.01	Cum SA (1000 m2)	1.03	0.80
1.31				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	92.63	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.19	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	92.44	Reach Len. (m)	200.00	200.00
200.00				
Crit W.S. (m)	92.44	Flow Area (m2)	1.95	5.27
3.26				
E.G. Slope (m/m)	0.006062	Area (m2)	1.95	5.27
3.26				
Q Total (m3/s)	16.71	Flow (m3/s)	1.85	11.77
3.09				
Top Width (m)	27.58	Top Width (m)	8.84	4.00
14.73				
Vel Total (m/s)	1.59	Avg. Vel. (m/s)	0.95	2.23
0.95				
Max Chl Dpth (m)	1.44	Hydr. Depth (m)	0.22	1.32
0.22				
Conv. Total (m3/s)	214.6	Conv. (m3/s)	23.8	151.1
39.7				
Length Wtd. (m)	200.00	Wetted Per. (m)	8.85	5.24
14.74				
Min Ch El (m)	91.00	Shear (N/m2)	13.12	59.82
13.13				
Alpha	1.49	Stream Power (N/m s)	11730.08	0.00
0.00				
Frctn Loss (m)	1.31	Cum Volume (1000 m3)	0.28	1.00
0.37				
C & E Loss (m)	0.01	Cum SA (1000 m2)	1.48	0.80
1.77				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	92.49	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.21	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	92.28	Reach Len. (m)	200.00	200.00
200.00				
Crit W.S. (m)	92.28	Flow Area (m2)	0.79	4.62
1.32				
E.G. Slope (m/m)	0.006765	Area (m2)	0.79	4.62
1.32				
Q Total (m3/s)	11.56	Flow (m3/s)	0.58	10.00
0.97				
Top Width (m)	18.98	Top Width (m)	5.62	4.00
9.36				
Vel Total (m/s)	1.72	Avg. Vel. (m/s)	0.74	2.16
0.74				
Max Chl Dpth (m)	1.28	Hydr. Depth (m)	0.14	1.16
0.14				
Conv. Total (m3/s)	140.5	Conv. (m3/s)	7.1	121.6
11.8				
Length Wtd. (m)	200.00	Wetted Per. (m)	5.63	5.24
9.37				
Min Ch El (m)	91.00	Shear (N/m2)	9.31	58.59
9.31				
Alpha	1.40	Stream Power (N/m s)	11730.08	0.00
0.00				
Frctn Loss (m)	1.59	Cum Volume (1000 m3)	0.09	0.86
0.14				
C & E Loss (m)	0.01	Cum SA (1000 m2)	0.79	0.80
1.05				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: Hunsworth Beck
REACH: 4 RS: 1

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	105	20	100	30	95	130	90	130.5	89
133.5	89	134	90	184	95	284	98	285	104

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	130	.035	134	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
130	134	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	90.63	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.46	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	90.17	Reach Len. (m)		
Crit W.S. (m)	90.33	Flow Area (m2)	0.30	4.20
0.15				
E.G. Slope (m/m)	0.015257	Area (m2)	0.30	4.20
0.15				
Q Total (m3/s)	13.14	Flow (m3/s)	0.24	12.77
0.12				
Top Width (m)	9.22	Top Width (m)	3.48	4.00
1.74				
Vel Total (m/s)	2.83	Avg. Vel. (m/s)	0.81	3.04
0.81				
Max Chl Dpth (m)	1.17	Hydr. Depth (m)	0.09	1.05
0.09				
Conv. Total (m3/s)	106.4	Conv. (m3/s)	2.0	103.4
1.0				
Length Wtd. (m)		Wetted Per. (m)	3.48	5.24
1.75				
Min Ch El (m)	89.00	Shear (N/m2)	12.99	119.89
12.94				
Alpha	1.13	Stream Power (N/m s)	13645.19	0.00
0.00				
Frctn Loss (m)	1.88	Cum Volume (1000 m3)		
C & E Loss (m)	0.03	Cum SA (1000 m2)		

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	90.79	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.50	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	90.30	Reach Len. (m)		
Crit W.S. (m)	90.47	Flow Area (m2)	0.88	4.68
0.44				
E.G. Slope (m/m)	0.014992	Area (m2)	0.88	4.68
0.44				
Q Total (m3/s)	16.71	Flow (m3/s)	1.00	15.21
0.50				
Top Width (m)	12.88	Top Width (m)	5.92	4.00
2.96				
Vel Total (m/s)	2.79	Avg. Vel. (m/s)	1.14	3.25
1.14				
Max Chl Dpth (m)	1.30	Hydr. Depth (m)	0.15	1.17
0.15				
Conv. Total (m3/s)	136.5	Conv. (m3/s)	8.2	124.2
4.1				

Length Wtd. (m)		Wetted Per. (m)	5.93	5.24
2.97				
Min Ch El (m)	89.00	Shear (N/m2)	21.73	131.51
21.65				
Alpha	1.25	Stream Power (N/m s)	13645.19	0.00
0.00				
Frctn Loss (m)	1.81	Cum Volume (1000 m3)		
C & E Loss (m)	0.03	Cum SA (1000 m2)		

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	90.54	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.42	Wt. n-Val.	0.030	0.035
0.030				
W.S. Elev (m)	90.11	Reach Len. (m)		
Crit W.S. (m)	90.23	Flow Area (m2)	0.13	3.95
0.06				
E.G. Slope (m/m)	0.014930	Area (m2)	0.13	3.95
0.06				
Q Total (m3/s)	11.56	Flow (m3/s)	0.08	11.44
0.04				
Top Width (m)	7.40	Top Width (m)	2.27	4.00
1.13				
Vel Total (m/s)	2.79	Avg. Vel. (m/s)	0.60	2.89
0.60				
Max Chl Dpth (m)	1.11	Hydr. Depth (m)	0.06	0.99
0.06				
Conv. Total (m3/s)	94.6	Conv. (m3/s)	0.6	93.7
0.3				
Length Wtd. (m)		Wetted Per. (m)	2.27	5.24
1.14				
Min Ch El (m)	89.00	Shear (N/m2)	8.29	110.54
8.26				
Alpha	1.07	Stream Power (N/m s)	13645.19	0.00
0.00				
Frctn Loss (m)	1.93	Cum Volume (1000 m3)		
C & E Loss (m)	0.02	Cum SA (1000 m2)		

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: Toad Holes Beck
REACH: 0.5 RS: 5

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	120	35	115	75	114.5	75.5	114	76.5	114
77	114.5	97	115	147	120				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	75	.035	77	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
75	77	70	70	70	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	114.65	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.06	Wt. n-Val.	0.060	0.035
0.060				
W.S. Elev (m)	114.59	Reach Len. (m)	70.00	70.00
70.00				
Crit W.S. (m)	114.42	Flow Area (m2)	0.31	0.93
0.16				
E.G. Slope (m/m)	0.005314	Area (m2)	0.31	0.93
0.16				
Q Total (m3/s)	1.09	Flow (m3/s)	0.05	1.02
0.02				
Top Width (m)	12.59	Top Width (m)	7.06	2.00
3.53				
Vel Total (m/s)	0.78	Avg. Vel. (m/s)	0.15	1.10
0.15				
Max Chl Dpth (m)	0.59	Hydr. Depth (m)	0.04	0.46
0.04				
Conv. Total (m3/s)	15.0	Conv. (m3/s)	0.6	14.0
0.3				
Length Wtd. (m)	70.00	Wetted Per. (m)	7.06	2.41
3.53				
Min Ch El (m)	114.00	Shear (N/m2)	2.30	20.00
2.30				
Alpha	1.85	Stream Power (N/m s)	7038.04	0.00
0.00				
Frctn Loss (m)	0.53	Cum Volume (1000 m3)	0.06	0.26
0.19				
C & E Loss (m)	0.00	Cum SA (1000 m2)	0.43	0.49
0.76				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	114.70	Element	Left OB	Channel

Right OB				
Vel Head (m)	0.04	Wt. n-Val.	0.060	0.035
0.060				
W.S. Elev (m)	114.65	Reach Len. (m)	70.00	70.00
70.00				
Crit W.S. (m)	114.48	Flow Area (m2)	0.95	1.06
0.47				
E.G. Slope (m/m)	0.003872	Area (m2)	0.95	1.06
0.47				
Q Total (m3/s)	1.35	Flow (m3/s)	0.18	1.08
0.09				
Top Width (m)	20.44	Top Width (m)	12.30	2.00
6.15				
Vel Total (m/s)	0.55	Avg. Vel. (m/s)	0.19	1.03
0.19				
Max Chl Dpth (m)	0.65	Hydr. Depth (m)	0.08	0.53
0.08				
Conv. Total (m3/s)	21.7	Conv. (m3/s)	2.8	17.4
1.4				
Length Wtd. (m)	70.00	Wetted Per. (m)	12.30	2.41
6.15				
Min Ch El (m)	114.00	Shear (N/m2)	2.92	16.63
2.92				
Alpha	2.86	Stream Power (N/m s)	7038.04	0.00
0.00				
Frctn Loss (m)	0.52	Cum Volume (1000 m3)	0.09	0.27
0.21				
C & E Loss (m)	0.01	Cum SA (1000 m2)	6.34	0.50
0.86				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	114.74	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.49	Wt. n-Val.		0.035
W.S. Elev (m)	114.25	Reach Len. (m)	70.00	70.00
70.00				
Crit W.S. (m)	114.40	Flow Area (m2)		0.31
E.G. Slope (m/m)	0.113625	Area (m2)		0.31
Q Total (m3/s)	0.97	Flow (m3/s)		0.97
Top Width (m)	1.50	Top Width (m)		1.50
Vel Total (m/s)	3.10	Avg. Vel. (m/s)		3.10
Max Chl Dpth (m)	0.25	Hydr. Depth (m)		0.21
Conv. Total (m3/s)	2.9	Conv. (m3/s)		2.9
Length Wtd. (m)	70.00	Wetted Per. (m)		1.71
Min Ch El (m)	114.00	Shear (N/m2)		203.94
Alpha	1.00	Stream Power (N/m s)	7038.04	0.00
0.00				

Frctn Loss (m)		Cum Volume (1000 m3)	0.05	0.23
0.18				
C & E Loss (m)		Cum SA (1000 m2)	0.19	0.47
0.63				

CROSS SECTION

RIVER: Toad Holes Beck
REACH: 0.5 RS: 4

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	120	30	115	80	114	80.5	113.5	81.5	113.5
82	114	102	115	132	120	232	125		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	80	.035	82	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
80	82	80	80	80	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	114.11	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.10	Wt. n-Val.	0.060	0.035
0.000				
W.S. Elev (m)	114.01	Reach Len. (m)	80.00	80.00
80.00				
Crit W.S. (m)	113.92	Flow Area (m2)	0.00	0.76
0.00				
E.G. Slope (m/m)	0.011585	Area (m2)	0.00	0.76
0.00				
Q Total (m3/s)	1.09	Flow (m3/s)	0.00	1.09
0.00				
Top Width (m)	2.47	Top Width (m)	0.33	2.00
0.13				
Vel Total (m/s)	1.42	Avg. Vel. (m/s)	0.04	1.43
0.04				
Max Chl Dpth (m)	0.51	Hydr. Depth (m)	0.00	0.38
0.00				
Conv. Total (m3/s)	10.1	Conv. (m3/s)	0.0	10.1
0.0				
Length Wtd. (m)	80.00	Wetted Per. (m)	0.33	2.41
0.13				
Min Ch El (m)	113.50	Shear (N/m2)	0.38	35.93
Alpha	1.00	Stream Power (N/m s)	11107.67	0.00
0.00				
Frctn Loss (m)	0.02	Cum Volume (1000 m3)	0.05	0.20
0.18				
C & E Loss (m)	0.03	Cum SA (1000 m2)	0.17	0.35
0.63				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	114.16	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.17	Wt. n-Val.		0.035
W.S. Elev (m)	113.99	Reach Len. (m)	80.00	80.00
80.00				
Crit W.S. (m)	113.98	Flow Area (m2)		0.74
E.G. Slope (m/m)	0.019633	Area (m2)		0.74
Q Total (m3/s)	1.35	Flow (m3/s)		1.35
Top Width (m)	1.99	Top Width (m)		1.99
Vel Total (m/s)	1.83	Avg. Vel. (m/s)		1.83
Max Chl Dpth (m)	0.49	Hydr. Depth (m)		0.37
Conv. Total (m3/s)	9.6	Conv. (m3/s)		9.6
Length Wtd. (m)	80.00	Wetted Per. (m)		2.40
Min Ch El (m)	113.50	Shear (N/m2)		59.33
Alpha	1.00	Stream Power (N/m s)	11107.67	0.00
0.00				
Frctn Loss (m)	0.02	Cum Volume (1000 m3)	0.06	0.21
0.20				
C & E Loss (m)	0.05	Cum SA (1000 m2)	5.91	0.36
0.64				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	114.09	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.08	Wt. n-Val.	0.060	0.035
0.060				
W.S. Elev (m)	114.01	Reach Len. (m)	80.00	80.00
80.00				
Crit W.S. (m)	113.90	Flow Area (m2)	0.00	0.77
0.00				
E.G. Slope (m/m)	0.008886	Area (m2)	0.00	0.77
0.00				
Q Total (m3/s)	0.97	Flow (m3/s)	0.00	0.97
0.00				
Top Width (m)	2.72	Top Width (m)	0.52	2.00
0.21				
Vel Total (m/s)	1.25	Avg. Vel. (m/s)	0.05	1.26
0.05				
Max Chl Dpth (m)	0.51	Hydr. Depth (m)	0.01	0.39
0.01				
Conv. Total (m3/s)	10.3	Conv. (m3/s)	0.0	10.3
0.0				
Length Wtd. (m)	80.00	Wetted Per. (m)	0.52	2.41
0.21				
Min Ch El (m)	113.50	Shear (N/m2)	0.45	27.82

0.45				
Alpha	1.01	Stream Power (N/m s)	11107.67	0.00
0.00				
Frctn Loss (m)	0.01	Cum Volume (1000 m3)	0.05	0.19
0.18				
C & E Loss (m)	0.02	Cum SA (1000 m2)	0.18	0.35
0.63				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: Toad Holes Beck
REACH: 0.5 RS: 3

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	120.1	55	115.1	60	113.1	60.5	112.6	61.5	112.6
62	113.1	82	115.1	112	120.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	60	.035	62	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
60	62	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	114.06	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.00	Wt. n-Val.	0.060	0.035
0.060				
W.S. Elev (m)	114.06	Reach Len. (m)	50.00	50.00
50.00				
Crit W.S. (m)	113.02	Flow Area (m2)	1.15	2.67
4.62				
E.G. Slope (m/m)	0.000061	Area (m2)	1.15	2.67
4.62				
Q Total (m3/s)	1.09	Flow (m3/s)	0.09	0.64
0.37				
Top Width (m)	14.01	Top Width (m)	2.40	2.00
9.61				
Vel Total (m/s)	0.13	Avg. Vel. (m/s)	0.08	0.24
0.08				
Max Chl Dpth (m)	1.46	Hydr. Depth (m)	0.48	1.34
0.48				
Conv. Total (m3/s)	140.0	Conv. (m3/s)	11.2	81.7
47.1				
Length Wtd. (m)	50.00	Wetted Per. (m)	2.59	2.41
9.66				
Min Ch El (m)	112.60	Shear (N/m2)	0.27	0.66
0.28				
Alpha	2.14	Stream Power (N/m s)	5362.32	0.00
0.00				
Frctn Loss (m)		Cum Volume (1000 m3)		0.06

C & E Loss (m) 0.24		Cum SA (1000 m2)	0.06	0.19

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	114.09	Element	Left OB	Channel
Right OB				
Vel Head (m) 0.060	0.00	Wt. n-Val.	0.060	0.035
W.S. Elev (m) 50.00	114.09	Reach Len. (m)	50.00	50.00
Crit W.S. (m) 4.88	113.08	Flow Area (m2)	1.22	2.73
E.G. Slope (m/m) 4.88	0.000084	Area (m2)	1.22	2.73
Q Total (m3/s) 0.46	1.35	Flow (m3/s)	0.11	0.77
Top Width (m) 9.88	14.35	Top Width (m)	2.47	2.00
Vel Total (m/s) 0.10	0.15	Avg. Vel. (m/s)	0.09	0.28
Max Chl Dpth (m) 0.49	1.49	Hydr. Depth (m)	0.49	1.36
Conv. Total (m3/s) 50.6	147.1	Conv. (m3/s)	12.1	84.4
Length Wtd. (m) 9.93	50.00	Wetted Per. (m)	2.66	2.41
Min Ch El (m) 0.41	112.60	Shear (N/m2)	0.38	0.93
Alpha 0.00	2.14	Stream Power (N/m s)	5362.32	0.00
Frctn Loss (m) 0.00		Cum Volume (1000 m3)	0.01	0.07
C & E Loss (m) 0.25		Cum SA (1000 m2)	5.81	0.20

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	114.05	Element	Left OB	Channel
Right OB				
Vel Head (m) 0.060	0.00	Wt. n-Val.	0.060	0.035
W.S. Elev (m) 50.00	114.05	Reach Len. (m)	50.00	50.00
Crit W.S. (m) 4.53	113.00	Flow Area (m2)	1.13	2.65
E.G. Slope (m/m) 4.53	0.000050	Area (m2)	1.13	2.65
Q Total (m3/s) 0.32	0.97	Flow (m3/s)	0.08	0.57
Top Width (m) 9.52	13.90	Top Width (m)	2.38	2.00
Vel Total (m/s) 0.07	0.12	Avg. Vel. (m/s)	0.07	0.21
Max Chl Dpth (m) 0.48	1.45	Hydr. Depth (m)	0.48	1.33
Conv. Total (m3/s) 45.9	137.6	Conv. (m3/s)	11.0	80.8
Length Wtd. (m) 9.57	50.00	Wetted Per. (m)	2.56	2.41
Min Ch El (m) 0.23	112.60	Shear (N/m2)	0.22	0.54

Alpha 0.00	2.14	Stream Power (N/m s)	5362.32	0.00
Frctn Loss (m)		Cum Volume (1000 m3)		0.06
C & E Loss (m) 0.24		Cum SA (1000 m2)	0.06	0.19

CULVERT

RIVER: Toad Holes Beck
REACH: 0.5 RS: 2.5

INPUT
Description:
Distance from Upstream XS = 2
Deck/Roadway Width = 10
Weir Coefficient = 1.4
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
50	114	112	149	114	112

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	120.1	55	115.1	60	113.1	60.5	112.6	61.5	112.6
62	113.1	82	115.1	112	120.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	60	.035	62	.06

Bank Sta: Left	Right	Coeff Contr.	Expan.
60	62	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
50	114	112	149	114	112

Downstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
30	120	55	115	60	113	60.5	112.5	61.5	112.5
62	113	80	115	207	120				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
30	.06	60	.035	62	.06

Bank Sta: Left	Right	Coeff Contr.	Expan.
60	62	.1	.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	.6	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	2	10	.015	.015	0	.3	1

Upstream Elevation = 112.6
Centerline Station = 61
Downstream Elevation = 112.5
Centerline Station = 61

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.81	Culv Full Len (m)	
# Barrels	1	Culv Vel US (m/s)	2.85
Q Barrel (m3/s)	0.81	Culv Vel DS (m/s)	3.56
E.G. US. (m)	114.06	Culv Inv El Up (m)	112.60
W.S. US. (m)	114.06	Culv Inv El Dn (m)	112.50
E.G. DS (m)	113.09	Culv Frctn Ls (m)	0.34
W.S. DS (m)	112.95	Culv Exit Loss (m)	0.50
Delta EG (m)	0.97	Culv Entr Loss (m)	0.12
Delta WS (m)	1.11	Q Weir (m3/s)	0.30
E.G. IC (m)	114.06	Weir Sta Lft (m)	57.59
E.G. OC (m)	113.85	Weir Sta Rgt (m)	71.63
Culvert Control	Inlet	Weir Submerg	0.00
Culv WS Inlet (m)	113.20	Weir Max Depth (m)	0.06
Culv WS Outlet (m)	112.95	Weir Avg Depth (m)	0.06
Culv Nml Depth (m)	0.60	Weir Flow Area (m2)	0.86
Culv Crt Depth (m)	0.56	Min El Weir Flow (m)	114.00

Warning: The flow through the culvert is supercritical. However, since there is flow over the road (weir flow), the program cannot
determine if the downstream cross section should be subcritical or supercritical. The program used the downstream
subcritical answer, even though it may not be valid.
Warning: During the supercritical analysis, the program could not converge on a supercritical answer in the downstream cross
section. The program used the solution with the least error.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height
of the culvert.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.82	Culv Full Len (m)	
# Barrels	1	Culv Vel US (m/s)	2.89
Q Barrel (m3/s)	0.82	Culv Vel DS (m/s)	3.61
E.G. US. (m)	114.09	Culv Inv El Up (m)	112.60
W.S. US. (m)	114.09	Culv Inv El Dn (m)	112.50
E.G. DS (m)	113.16	Culv Frctn Ls (m)	0.35
W.S. DS (m)	112.98	Culv Exit Loss (m)	0.45
Delta EG (m)	0.93	Culv Entr Loss (m)	0.13
Delta WS (m)	1.11	Q Weir (m3/s)	0.53
E.G. IC (m)	114.09	Weir Sta Lft (m)	57.52
E.G. OC (m)	113.88	Weir Sta Rgt (m)	71.92
Culvert Control	Inlet	Weir Submerg	0.00
Culv WS Inlet (m)	113.20	Weir Max Depth (m)	0.09
Culv WS Outlet (m)	112.95	Weir Avg Depth (m)	0.09
Culv Nml Depth (m)	0.60	Weir Flow Area (m2)	1.27
Culv Crt Depth (m)	0.56	Min El Weir Flow (m)	114.00

Warning: The flow through the culvert is supercritical. However, since there is flow over the road (weir flow), the program cannot
determine if the downstream cross section should be subcritical or

supercritical. The program used the downstream
subcritical answer, even though it may not be valid.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height
of the culvert.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 3 Culv Group: Culvert #1

Q Culv Group (m3/s)	0.80	Culv Full Len (m)	
# Barrels	1	Culv Vel US (m/s)	2.84
Q Barrel (m3/s)	0.80	Culv Vel DS (m/s)	3.55
E.G. US. (m)	114.05	Culv Inv El Up (m)	112.60
W.S. US. (m)	114.05	Culv Inv El Dn (m)	112.50
E.G. DS (m)	113.06	Culv Frctn Ls (m)	0.34
W.S. DS (m)	112.92	Culv Exit Loss (m)	0.53
Delta EG (m)	1.00	Culv Entr Loss (m)	0.12
Delta WS (m)	1.13	Q Weir (m3/s)	0.17
E.G. IC (m)	114.05	Weir Sta Lft (m)	57.64
E.G. OC (m)	113.84	Weir Sta Rgt (m)	71.43
Culvert Control	Inlet	Weir Submerg	0.00
Culv WS Inlet (m)	113.20	Weir Max Depth (m)	0.04
Culv WS Outlet (m)	112.95	Weir Avg Depth (m)	0.04
Culv Nml Depth (m)	0.60	Weir Flow Area (m2)	0.58
Culv Crt Depth (m)	0.56	Min El Weir Flow (m)	114.00

Warning: The flow through the culvert is supercritical. However, since there is flow over the road (weir flow), the program cannot
determine if the downstream cross section should be subcritical or supercritical. The program used the downstream
subcritical answer, even though it may not be valid.
Warning: During the supercritical analysis, the program could not converge on a supercritical answer in the downstream cross
section. The program used the solution with the least error.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height
of the culvert.
Note: The flow in the culvert is entirely supercritical.

CROSS SECTION

RIVER: Toad Holes Beck
REACH: 0.5 RS: 2

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
30	120	55	115	60	113	60.5	112.5	61.5	112.5
62	113	80	115	207	120				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
30	.06	60	.035	62	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
60	62	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	113.09	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.14	Wt. n-Val.		0.035

W.S. Elev (m)	112.95	Reach Len. (m)	50.00	50.00
50.00				
Crit W.S. (m)	112.92	Flow Area (m2)		0.65
E.G. Slope (m/m)	0.018171	Area (m2)		0.65
Q Total (m3/s)	1.09	Flow (m3/s)		1.09
Top Width (m)	1.90	Top Width (m)		1.90
Vel Total (m/s)	1.67	Avg. Vel. (m/s)		1.67
Max Chl Dpth (m)	0.45	Hydr. Depth (m)		0.34
Conv. Total (m3/s)	8.1	Conv. (m3/s)		8.1
Length Wtd. (m)	50.00	Wetted Per. (m)		2.27
Min Ch El (m)	112.50	Shear (N/m2)		51.09
Alpha	1.00	Stream Power (N/m s)	9910.72	0.00
0.00				
Frctn Loss (m)	1.00	Cum Volume (1000 m3)		0.03
C & E Loss (m)	0.00	Cum SA (1000 m2)		0.09

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	113.16	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.18	Wt. n-Val.		0.035
W.S. Elev (m)	112.98	Reach Len. (m)	50.00	50.00
50.00				
Crit W.S. (m)	112.98	Flow Area (m2)		0.71
E.G. Slope (m/m)	0.021819	Area (m2)		0.71
Q Total (m3/s)	1.35	Flow (m3/s)		1.35
Top Width (m)	1.96	Top Width (m)		1.96
Vel Total (m/s)	1.90	Avg. Vel. (m/s)		1.90
Max Chl Dpth (m)	0.48	Hydr. Depth (m)		0.36
Conv. Total (m3/s)	9.1	Conv. (m3/s)		9.1
Length Wtd. (m)	50.00	Wetted Per. (m)		2.36
Min Ch El (m)	112.50	Shear (N/m2)		64.52
Alpha	1.00	Stream Power (N/m s)	9910.72	0.00
0.00				
Frctn Loss (m)	0.42	Cum Volume (1000 m3)	0.01	0.04
0.00				
C & E Loss (m)	0.05	Cum SA (1000 m2)	5.75	0.10
0.00				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	113.06	Element	Left OB	Channel
Right OB				
Vel Head (m)	0.13	Wt. n-Val.		0.035
W.S. Elev (m)	112.92	Reach Len. (m)	50.00	50.00
50.00				
Crit W.S. (m)	112.90	Flow Area (m2)		0.60
E.G. Slope (m/m)	0.017868	Area (m2)		0.60
Q Total (m3/s)	0.97	Flow (m3/s)		0.97
Top Width (m)	1.85	Top Width (m)		1.85
Vel Total (m/s)	1.61	Avg. Vel. (m/s)		1.61
Max Chl Dpth (m)	0.42	Hydr. Depth (m)		0.33
Conv. Total (m3/s)	7.3	Conv. (m3/s)		7.3
Length Wtd. (m)	50.00	Wetted Per. (m)		2.20
Min Ch El (m)	112.50	Shear (N/m2)		48.02
Alpha	1.00	Stream Power (N/m s)	9910.72	0.00
0.00				
Frctn Loss (m)	1.00	Cum Volume (1000 m3)		0.03
C & E Loss (m)	0.00	Cum SA (1000 m2)		0.09

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Toad Holes Beck
REACH: 0.5 RS: 1

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
      0     120       0     112      80     112     230     112   230.5   111.5
  231.5   111.5     232     112     250     113

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06     230    .035     232     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.
Expan.
          230     232              120     120     120             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1


  E.G. Elev (m)           112.09    Element                 Left OB    Channel
Right OB
  Vel Head (m)              0.16    Wt. n-Val.                          0.035

  W.S. Elev (m)           111.93    Reach Len. (m)             0.00       0.00
   0.00
  Crit W.S. (m)           111.93    Flow Area (m2)                      0.61

  E.G. Slope (m/m)      0.022066    Area (m2)                           0.61

  Q Total (m3/s)            1.09    Flow (m3/s)                         1.09

  Top Width (m)             1.85    Top Width (m)                       1.85

  Vel Total (m/s)           1.80    Avg. Vel. (m/s)                     1.80

  Max Chl Dpth (m)          0.43    Hydr. Depth (m)                     0.33

  Conv. Total (m3/s)         7.3    Conv. (m3/s)                         7.3

  Length Wtd. (m)           0.00    Wetted Per. (m)                     2.20

  Min Ch El (m)           111.50    Shear (N/m2)                       59.58

  Alpha                     1.00    Stream Power (N/m s)  11969.47       0.00
   0.00
  Frctn Loss (m)            0.00    Cum Volume (1000 m3)

  C & E Loss (m)            0.05    Cum SA (1000 m2)



Warning: The energy equation could not be balanced within the specified number
of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may
indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current
and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was
set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that
there is not a valid subcritical answer.  The program
         defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #PF 2


  E.G. Elev (m)           112.16    Element                 Left OB    Channel
Right OB
  Vel Head (m)              0.16    Wt. n-Val.               0.060      0.035
  0.000
```



```
  W.S. Elev (m)           112.00    Reach Len. (m)             0.00       0.00
   0.00
  Crit W.S. (m)           112.03    Flow Area (m2)             0.39       0.75
   0.00
  E.G. Slope (m/m)      0.018267    Area (m2)                  0.39       0.75
   0.00
  Q Total (m3/s)            1.35    Flow (m3/s)                0.01       1.34
   0.00
  Top Width (m)           232.03    Top Width (m)            230.00       2.00
   0.03
  Vel Total (m/s)           1.19    Avg. Vel. (m/s)            0.03       1.78
   0.02
  Max Chl Dpth (m)          0.50    Hydr. Depth (m)            0.00       0.38
   0.00
  Conv. Total (m3/s)        10.0    Conv. (m3/s)                0.1        9.9
    0.0
  Length Wtd. (m)           0.00    Wetted Per. (m)          230.00       2.41
   0.03
  Min Ch El (m)           111.50    Shear (N/m2)               0.30      55.89

  Alpha                     2.22    Stream Power (N/m s)  11969.47       0.00
   0.00
  Frctn Loss (m)            1.00    Cum Volume (1000 m3)

  C & E Loss (m)            0.01    Cum SA (1000 m2)



Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current
and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 3


  E.G. Elev (m)           112.05    Element                 Left OB    Channel
Right OB
  Vel Head (m)              0.16    Wt. n-Val.                          0.035

  W.S. Elev (m)           111.90    Reach Len. (m)             0.00       0.00
   0.00
  Crit W.S. (m)           111.90    Flow Area (m2)                      0.55

  E.G. Slope (m/m)      0.022494    Area (m2)                           0.55

  Q Total (m3/s)            0.97    Flow (m3/s)                         0.97

  Top Width (m)             1.79    Top Width (m)                       1.79

  Vel Total (m/s)           1.75    Avg. Vel. (m/s)                     1.75

  Max Chl Dpth (m)          0.40    Hydr. Depth (m)                     0.31

  Conv. Total (m3/s)         6.5    Conv. (m3/s)                         6.5

  Length Wtd. (m)           0.00    Wetted Per. (m)                     2.12

  Min Ch El (m)           111.50    Shear (N/m2)                       57.60

  Alpha                     1.00    Stream Power (N/m s)  11969.47       0.00
   0.00
  Frctn Loss (m)            0.00    Cum Volume (1000 m3)

  C & E Loss (m)            0.05    Cum SA (1000 m2)
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

SUMMARY OF MANNING'S N VALUES

River:Cockleshaw Beck

Reach	River Sta.	n1	n2	n3
1	3	.03	.035	.03
1	2	.03	.035	.03
1	1	.03	.035	.03

River:High Royds Beck

Reach	River Sta.	n1	n2	n3
1	7	.035	.035	.035
1	6	.035	.035	.035
1	5	.035	.035	.035
1	4	.035	.035	.035
1	3	.05	.035	.05
1	2.5	Culvert		
1	2	.06	.035	.06
1	1	.06	.035	.06

River:Hunsworth Beck

Reach	River Sta.	n1	n2	n3
1	17	.05	.035	.05
1	16	.05	.035	.05
1	15	.05	.035	.05
1	14.9	Culvert		
1	14.8	.05	.035	.05
2	14.5	.05	.035	.05
2	14.2	Culvert		
2	14	.05	.035	.05
2	13	.05	.035	.05
2	12.5	Culvert		
2	12	.035	.035	.035
2	11	.035	.035	.035
2	10	.035	.035	.035
2	9	.035	.035	.035
3	8.7	.05	.035	.035
3	8.5	Culvert		
3	8	.05	.035	.03
3	7.12	.05	.035	.03
3	7.11	.05	.035	.03
3	7.10	.05	.035	.03
3	7.09	.05	.017	.05
3	7.08	.05	.015	.05

3	7.075	Bridge		
3	7.07	.05	.035	.05
3	7.05	.05	.04	.05
3	7.04	.035	.04	.05
3	7.03	.035	.04	.05
3	7.02	.035	.04	.05
3	7	.03	.04	.05
3	6	.03	.035	.03
4	5	.03	.035	.03
4	4	.03	.035	.03
4	3	.03	.035	.03
4	2	.03	.035	.03
4	1	.03	.035	.03

River:Toad Holes Beck

Reach	River Sta.	n1	n2	n3
0.5	5	.06	.035	.06
0.5	4	.06	.035	.06
0.5	3	.06	.035	.06
0.5	2.5	Culvert		
0.5	2	.06	.035	.06
0.5	1	.06	.035	.06

SUMMARY OF REACH LENGTHS

River: Cockleshaw Beck

Reach	River Sta.	Left	Channel	Right
1	3	200	200	200
1	2	200	200	200
1	1	0	0	0

River: High Royds Beck

Reach	River Sta.	Left	Channel	Right
1	7	250	250	250
1	6	400	400	400
1	5	150	150	150
1	4	140	140	140
1	3	25	25	25
1	2.5	Culvert		
1	2	25	25	25
1	1	20	20	20

River: Hunsworth Beck

Reach	River Sta.	Left	Channel	Right
1	17	120	120	120
1	16	140	140	140
1	15	105	105	105
1	14.9	Culvert		
1	14.8	0	0	0
2	14.5	105	105	105
2	14.2	Culvert		
2	14	40	40	40
2	13	150	150	150
2	12.5	Culvert		

2	12	40	40	40
2	11	60	60	60
2	10	20	20	20
2	9	10	10	10
3	8.7	10	10	10
3	8.5	Culvert		
3	8	16	16	16
3	7.12	10	10	10
3	7.11	13	13	13
3	7.10	8	10	12
3	7.09	15	18	21
3	7.08	20	20	20
3	7.075	Bridge		
3	7.07	33	33	33
3	7.05	30	25	20
3	7.04	35	40	46
3	7.03	53	50	46
3	7.02	112	100	95
3	7	100	100	100
3	6	150	150	150
4	5	130	130	130
4	4	150	150	150
4	3	150	150	150
4	2	200	200	200
4	1	0	0	0

River: Toad Holes Beck

Reach	River Sta.	Left	Channel	Right
0.5	5	70	70	70
0.5	4	80	80	80
0.5	3	50	50	50
0.5	2.5	Culvert		
0.5	2	50	50	50
0.5	1	120	120	120

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Cockleshaw Beck

Reach	River Sta.	Contr.	Expan.
1	3	.1	.3
1	2	.1	.3
1	1	.1	.3

River: High Royds Beck

Reach	River Sta.	Contr.	Expan.
1	7	.1	.3
1	6	.1	.3
1	5	.1	.3
1	4	.1	.3
1	3	.1	.3
1	2.5	Culvert	
1	2	.1	.3
1	1	.1	.3

River: Hunsworth Beck

Reach	River Sta.	Contr.	Expan.
1	17	.1	.3
1	16	.1	.3
1	15	.1	.3
1	14.9	Culvert	
1	14.8	.1	.3
2	14.5	.1	.3
2	14.2	Culvert	
2	14	.1	.3
2	13	.1	.3
2	12.5	Culvert	
2	12	.1	.3
2	11	.1	.3
2	10	.1	.3
2	9	.1	.3
3	8.7	.1	.3
3	8.5	Culvert	
3	8	.1	.3
3	7.12	.1	.3
3	7.11	.1	.3
3	7.10	.1	.3
3	7.09	.1	.3
3	7.08	.1	.3
3	7.075	Bridge	
3	7.07	.1	.3
3	7.05	.1	.3
3	7.04	.1	.3
3	7.03	.1	.3
3	7.02	.1	.3
3	7	.1	.3
3	6	.1	.3
4	5	.1	.3
4	4	.1	.3
4	3	.1	.3
4	2	.1	.3
4	1	.1	.3

River: Toad Holes Beck

Reach	River Sta.	Contr.	Expan.
0.5	5	.1	.3
0.5	4	.1	.3
0.5	3	.1	.3
0.5	2.5	Culvert	
0.5	2	.1	.3
0.5	1	.1	.3

Profile Output Table - Standard Table 1

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Toad Holes Beck	0.5	5	PF 1	1.09	114.00	114.59	114.42	114.65	0.005314	1.10	1.39	12.59	0.52
Toad Holes Beck	0.5	5	PF 2	1.35	114.00								

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114.65      114.48      114.70      0.003872       1.03        2.48       20.44
        0.45
Toad Holes Beck   0.5           5                PF 3          0.97      114.00
114.25      114.40      114.74      0.113625       3.10        0.31        1.50
        2.17



Toad Holes Beck   0.5           4                PF 1          1.09      113.50
114.01      113.92      114.11      0.011585       1.43        0.77        2.47
        0.74
Toad Holes Beck   0.5           4                PF 2          1.35      113.50
113.99      113.98      114.16      0.019633       1.83        0.74        1.99
        0.96
Toad Holes Beck   0.5           4                PF 3          0.97      113.50
114.01      113.90      114.09      0.008886       1.26        0.77        2.72
        0.65



Toad Holes Beck   0.5           3                PF 1          1.09      112.60
114.06      113.02      114.06      0.000061       0.24        8.45       14.01
        0.07
Toad Holes Beck   0.5           3                PF 2          1.35      112.60
114.09      113.08      114.09      0.000084       0.28        8.82       14.35
        0.08
Toad Holes Beck   0.5           3                PF 3          0.97      112.60
114.05      113.00      114.05      0.000050       0.21        8.32       13.90
        0.06



Toad Holes Beck   0.5           2.5                        Culvert



Toad Holes Beck   0.5           2                PF 1          1.09      112.50
112.95      112.92      113.09      0.018171       1.67        0.65        1.90
        0.91
Toad Holes Beck   0.5           2                PF 2          1.35      112.50
112.98      112.98      113.16      0.021819       1.90        0.71        1.96
        1.01
Toad Holes Beck   0.5           2                PF 3          0.97      112.50
112.92      112.90      113.06      0.017868       1.61        0.60        1.85
        0.90



Toad Holes Beck   0.5           1                PF 1          1.09      111.50
111.93      111.93      112.09      0.022066       1.80        0.61        1.85
        1.00
Toad Holes Beck   0.5           1                PF 2          1.35      111.50
112.00      112.03      112.16      0.018267       1.78        1.14      232.03
        0.92
Toad Holes Beck   0.5           1                PF 3          0.97      111.50
111.90      111.90      112.05      0.022494       1.75        0.55        1.79
        1.01



Hunsworth Beck    1             17               PF 1          6.92      113.00
113.60      113.78      114.22      0.042658       3.50        1.98        3.60
        1.50
Hunsworth Beck    1             17               PF 2          8.52      113.00
113.70      113.89      114.37      0.039339       3.63        2.34        3.70
        1.46
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Hunsworth Beck    1             17               PF 3          6.17      113.00
113.50      113.72      114.23      0.061062       3.80        1.62        3.50
        1.78



Hunsworth Beck    1             16               PF 1          6.92      108.00
110.05      108.78      110.06      0.000190       0.51       24.21       34.80
        0.12
Hunsworth Beck    1             16               PF 2          8.52      108.00
110.08      108.89      110.09      0.000258       0.60       25.36       35.32
        0.14
Hunsworth Beck    1             16               PF 3          6.17      108.00
110.04      108.72      110.04      0.000159       0.46       23.71       34.57
        0.11



Hunsworth Beck    1             15               PF 1          6.92      106.00
110.05      106.78      110.05      0.000003       0.11      124.52       75.35
        0.02
Hunsworth Beck    1             15               PF 2          8.52      106.00
110.09      106.89      110.09      0.000005       0.13      127.12       76.21
        0.02
Hunsworth Beck    1             15               PF 3          6.17      106.00
110.04      106.72      110.04      0.000003       0.10      123.39       74.97
        0.02



Hunsworth Beck    1             14.9                       Culvert



Hunsworth Beck    1             14.8             PF 1          6.92      105.25
110.05                110.05      0.000001       0.07      187.98       94.07
        0.01
Hunsworth Beck    1             14.8             PF 2          8.52      105.25
110.08                110.08      0.000002       0.09      190.25       94.68
        0.01
Hunsworth Beck    1             14.8             PF 3          6.17      105.25
110.04                110.04      0.000001       0.06      186.55       93.69
        0.01



Hunsworth Beck    2             14.5             PF 1          8.01      105.25
110.05      106.12      110.05      0.000002       0.09      171.18       96.48
        0.01
Hunsworth Beck    2             14.5             PF 2          9.87      105.25
110.08      106.24      110.08      0.000003       0.11      173.52       97.15
        0.02
Hunsworth Beck    2             14.5             PF 3          7.14      105.25
110.04      106.06      110.04      0.000002       0.08      169.72       96.05
        0.01



Hunsworth Beck    2             14.2                       Culvert



Hunsworth Beck    2             14               PF 1          8.01      104.00
110.05                110.05      0.000000       0.05      313.03      131.35
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        0.01
Hunsworth Beck    2             14            PF 2         9.87       104.00
110.07                  110.07      0.000001       0.06       315.47       131.87
        0.01
Hunsworth Beck    2             14            PF 3         7.14       104.00
110.04                  110.04      0.000000       0.04       311.67       131.06
        0.01



Hunsworth Beck    2             13            PF 1         8.01       104.00
110.05      104.00      110.05      0.000000       0.02       599.68       167.11
        0.00
Hunsworth Beck    2             13            PF 2         9.87       104.00
110.07      104.05      110.07      0.000000       0.02       602.78       167.40
        0.00
Hunsworth Beck    2             13            PF 3         7.14       104.00
110.04      103.97      110.04      0.000000       0.02       597.95       166.95
        0.00



Hunsworth Beck    2             12.5                    Culvert



Hunsworth Beck    2             12            PF 1         8.01       101.50
102.35      102.35      102.74      0.018507       2.75         2.91         3.85
        1.01
Hunsworth Beck    2             12            PF 2         9.87       101.50
102.48      102.48      102.90      0.018051       2.90         3.40         3.98
        1.00
Hunsworth Beck    2             12            PF 3         7.14       101.50
102.30      102.30      102.65      0.018233       2.64         2.71         3.80
        1.00



Hunsworth Beck    2             11            PF 1         8.01        99.50
100.01      100.35      101.21      0.098779       4.86         1.65         3.51
        2.27
Hunsworth Beck    2             11            PF 2         9.87        99.50
100.09      100.48      101.42      0.093626       5.12         1.93         3.59
        2.23
Hunsworth Beck    2             11            PF 3         7.14        99.50
 99.96      100.30      101.12      0.104251       4.76         1.50         3.46
        2.31



Hunsworth Beck    2             10            PF 1         8.01        98.60
 99.85       99.25       99.88      0.001055       0.91        10.28        12.94
        0.27
Hunsworth Beck    2             10            PF 2         9.87        98.60
100.31       99.33      100.32      0.000268       0.56        30.42        61.27
        0.14
Hunsworth Beck    2             10            PF 3         7.14        98.60
 99.66       99.21       99.70      0.001686       1.05         7.91        11.48
        0.33



Hunsworth Beck    2             9             PF 1         8.01        98.20
 99.87                   99.87      0.000015       0.13        54.10        45.13
        0.03
Hunsworth Beck    2             9             PF 2         9.87        98.20
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100.31                  100.31      0.000010       0.13        77.80        62.05
        0.03
Hunsworth Beck    2             9             PF 3         7.14        98.20
 99.69                   99.69      0.000017       0.13        47.49        33.03
        0.04



Hunsworth Beck    3             8.7           PF 1        12.13        98.00
 99.86       98.52       99.87      0.000137       0.49        30.15        25.58
        0.12
Hunsworth Beck    3             8.7           PF 2        14.95        98.00
100.31       98.60      100.31      0.000086       0.45        43.21        38.74
        0.09
Hunsworth Beck    3             8.7           PF 3        10.82        98.00
 99.67       98.48       99.69      0.000168       0.50        25.56        23.58
        0.13



Hunsworth Beck    3             8.5                     Culvert



Hunsworth Beck    3             8             PF 1        12.13        97.80
 99.40                   99.44      0.000692       0.86        14.19         9.48
        0.22
Hunsworth Beck    3             8             PF 2        14.95        97.80
 99.60                   99.64      0.000718       0.93        16.10         9.85
        0.23
Hunsworth Beck    3             8             PF 3        10.82        97.80
 99.31                   99.35      0.000665       0.81        13.34         9.30
        0.21



Hunsworth Beck    3             7.12          PF 1        12.13        97.74
 99.14                   99.39      0.007640       2.24         5.46         5.09
        0.63
Hunsworth Beck    3             7.12          PF 2        14.95        97.74
 99.30                   99.59      0.007879       2.42         6.38         6.25
        0.64
Hunsworth Beck    3             7.12          PF 3        10.82        97.74
 99.08                   99.30      0.007012       2.10         5.17         4.68
        0.60



Hunsworth Beck    3             7.11          PF 1        12.13        97.68
 99.23       98.91       99.30      0.002239       1.31        11.30        18.66
        0.35
Hunsworth Beck    3             7.11          PF 2        14.95        97.68
 99.44       99.01       99.49      0.001571       1.17        15.64        23.24
        0.29
Hunsworth Beck    3             7.11          PF 3        10.82        97.68
 99.14       98.64       99.22      0.002541       1.35         9.75        17.27
        0.37



Hunsworth Beck    3             7.10          PF 1        12.13        97.62
 98.99       98.65       99.23      0.007096       2.20         5.78         6.93
        0.62
Hunsworth Beck    3             7.10          PF 2        14.95        97.62
 99.18       98.84       99.43      0.006596       2.28         7.33        11.70
        0.60
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Hunsworth Beck    3            7.10          PF 3        10.82       97.62
 98.94       98.58       99.15     0.006512       2.06        5.44        6.44
        0.59


Hunsworth Beck    3            7.09          PF 1        12.13       97.56
 98.85       98.61       99.18     0.002596       2.54        4.95        9.33
        0.73
Hunsworth Beck    3            7.09          PF 2        14.95       97.56
 99.05       98.76       99.39     0.002396       2.63        7.41       18.39
        0.70
Hunsworth Beck    3            7.09          PF 3        10.82       97.56
 98.85       98.53       99.11     0.002067       2.26        4.94        9.33
        0.65


Hunsworth Beck    3            7.08          PF 1        12.13       97.50
 98.82       98.55       99.14     0.001980       2.51        4.83        3.79
        0.71
Hunsworth Beck    3            7.08          PF 2        14.95       97.50
 99.10       98.71       99.32     0.001299       2.21       15.81       78.94
        0.57
Hunsworth Beck    3            7.08          PF 3        10.82       97.50
 98.83       98.48       99.08     0.001539       2.22        4.87        3.79
        0.63


Hunsworth Beck    3            7.075                     Bridge




Hunsworth Beck    3            7.07          PF 1        12.13       97.49
 98.78       98.51       98.98     0.006817       2.08        9.18       52.59
        0.62
Hunsworth Beck    3            7.07          PF 2        14.95       97.49
 98.99       98.90       99.04     0.002483       1.36       25.06       98.43
        0.38
Hunsworth Beck    3            7.07          PF 3        10.82       97.49
 98.67       98.43       98.94     0.008906       2.28        4.82       20.17
        0.71


Hunsworth Beck    3            7.05          PF 1        12.13       97.24
 98.55       98.22       98.76     0.006302       2.05        6.31        6.80
        0.59
Hunsworth Beck    3            7.05          PF 2        14.95       97.24
 98.37       98.37       98.83     0.017218       3.03        5.11        6.10
        0.95
Hunsworth Beck    3            7.05          PF 3        10.82       97.24
 98.48       98.15       98.67     0.006296       1.96        5.81        6.51
        0.59


Hunsworth Beck    3            7.04          PF 1        12.13       97.03
 98.04       98.04       98.48     0.021006       2.91        4.19        5.85
        0.98
Hunsworth Beck    3            7.04          PF 2        14.95       97.03
 98.30       98.34       98.47     0.007770       2.09       13.23       66.46
        0.62
Hunsworth Beck    3            7.04          PF 3        10.82       97.03
 97.96       97.96       98.38     0.022410       2.86        3.79        4.59
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        1.00


Hunsworth Beck    3            7.03          PF 1        12.13       96.64
 97.87       97.53       97.99     0.003672       1.67        8.85       11.49
        0.49
Hunsworth Beck    3            7.03          PF 2        14.95       96.64
 97.98       97.64       98.12     0.003879       1.82       10.16       12.28
        0.51
Hunsworth Beck    3            7.03          PF 3        10.82       96.64
 97.81       97.47       97.92     0.003613       1.61        8.17       11.06
        0.48


Hunsworth Beck    3            7.02          PF 1        12.13       96.31
 97.52       97.37       97.71     0.008234       2.08        6.61       10.72
        0.64
Hunsworth Beck    3            7.02          PF 2        14.95       96.31
 97.65       97.50       97.85     0.007415       2.12        8.36       15.51
        0.61
Hunsworth Beck    3            7.02          PF 3        10.82       96.31
 97.44       97.30       97.64     0.008614       2.06        5.88        9.84
        0.65


Hunsworth Beck    3            7             PF 1        12.13       96.05
 97.08       97.08       97.12     0.003572       1.20       14.57       55.77
        0.40
Hunsworth Beck    3            7             PF 2        14.95       96.05
 97.08       97.08       97.15     0.005426       1.48       14.57       55.77
        0.49
Hunsworth Beck    3            7             PF 3        10.82       96.05
 97.08       97.08       97.12     0.002842       1.07       14.57       55.77
        0.35


Hunsworth Beck    3            6             PF 1        12.13       95.00
 95.62       95.74       96.18     0.051970       3.93        5.02       44.33
        1.66
Hunsworth Beck    3            6             PF 2        14.95       95.00
 95.67       95.76       96.01     0.034552       3.33        7.51       53.95
        1.36
Hunsworth Beck    3            6             PF 3        10.82       95.00
 95.60       95.73       96.28     0.060714       4.16        4.01       37.99
        1.79


Hunsworth Beck    4            5             PF 1        13.14       94.00
 95.01       95.01       95.13     0.007602       1.92        9.81       34.68
        0.65
Hunsworth Beck    4            5             PF 2        16.71       94.00
 95.06       95.05       95.20     0.008331       2.08       11.36       36.20
        0.69
Hunsworth Beck    4            5             PF 3        11.56       94.00
 94.98       94.98       95.10     0.007653       1.89        8.77       32.79
        0.65


Hunsworth Beck    4            4             PF 1        13.14       93.00
 93.36       93.40       93.55     0.022453       1.93        6.87       27.52
        1.05
Hunsworth Beck    4            4             PF 2        16.71       93.00
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93.42	93.45	93.62	0.018229	1.90	8.55	28.30		
0.96								
Hunsworth Beck	4		4		PF 3	11.56	93.00	
93.34	93.37	93.51	0.022310	1.87	6.35	27.27		
1.04								
Hunsworth Beck	4		3		PF 1	13.14	91.00	
92.76	92.34	92.78	0.000637	0.84	23.91	49.65		
0.21								
Hunsworth Beck	4		3		PF 2	16.71	91.00	
92.85	92.44	92.87	0.000662	0.88	28.73	55.17		
0.21								
Hunsworth Beck	4		3		PF 3	11.56	91.00	
92.71	92.28	92.73	0.000630	0.82	21.55	46.72		
0.21								
Hunsworth Beck	4		2		PF 1	13.14	91.00	
92.34	92.34	92.54	0.006392	2.18	7.98	22.22		
0.63								
Hunsworth Beck	4		2		PF 2	16.71	91.00	
92.44	92.44	92.63	0.006062	2.23	10.48	27.58		
0.62								
Hunsworth Beck	4		2		PF 3	11.56	91.00	
92.28	92.28	92.49	0.006765	2.16	6.73	18.98		
0.64								
Hunsworth Beck	4		1		PF 1	13.14	89.00	
90.17	90.33	90.63	0.015257	3.04	4.65	9.22		
0.95								
Hunsworth Beck	4		1		PF 2	16.71	89.00	
90.30	90.47	90.79	0.014992	3.25	6.00	12.88		
0.96								
Hunsworth Beck	4		1		PF 3	11.56	89.00	
90.11	90.23	90.54	0.014930	2.89	4.15	7.40		
0.93								
High Royds Beck	1		7		PF 1	4.12	119.25	
119.55	119.94	121.54	0.315829	6.24	0.66	2.40		
3.80								
High Royds Beck	1		7		PF 2	5.08	119.25	
119.60	120.04	121.75	0.289397	6.50	0.78	2.47		
3.69								
High Royds Beck	1		7		PF 3	3.68	119.25	
119.50	119.90	121.85	0.458385	6.80	0.54	2.33		
4.50								
High Royds Beck	1		6		PF 1	4.12	107.25	
108.32	107.94	108.42	0.003644	1.42	3.08	4.59		
0.47								
High Royds Beck	1		6		PF 2	5.08	107.25	
108.41	108.04	108.53	0.003823	1.55	3.55	5.07		
0.48								
High Royds Beck	1		6		PF 3	3.68	107.25	
108.27	107.90	108.36	0.003551	1.35	2.85	4.33		
0.46								

High Royds Beck	1		5		PF 1	4.12	105.43	
106.05	106.05	106.19	0.009538	1.83	3.00	11.79		
0.78								
High Royds Beck	1		5		PF 2	5.08	105.43	
106.10	106.10	106.24	0.009463	1.92	3.62	13.25		
0.78								
High Royds Beck	1		5		PF 3	3.68	105.43	
106.02	106.02	106.16	0.009628	1.78	2.71	11.02		
0.77								
High Royds Beck	1		4		PF 1	4.12	103.15	
104.19	104.25	104.44	0.014271	2.31	2.10	6.75		
0.81								
High Royds Beck	1		4		PF 2	5.08	103.15	
104.26	104.33	104.52	0.014027	2.42	2.65	8.58		
0.81								
High Royds Beck	1		4		PF 3	3.68	103.15	
104.15	104.20	104.39	0.014470	2.24	1.84	5.71		
0.81								
High Royds Beck	1		3		PF 1	4.12	100.00	
100.44	100.39	100.48	0.007601	1.27	6.55	46.33		
0.65								
High Royds Beck	1		3		PF 2	5.08	100.00	
100.42	100.42	100.49	0.015365	1.74	5.71	40.70		
0.92								
High Royds Beck	1		3		PF 3	3.68	100.00	
100.41	100.38	100.45	0.009933	1.37	5.17	36.63		
0.73								
High Royds Beck	1		2.5			Culvert		
High Royds Beck	1		2		PF 1	4.12	99.78	
100.24		100.29	0.009420	1.45	6.33	36.24		
0.73								
High Royds Beck	1		2		PF 2	5.08	99.78	
100.32		100.35	0.004645	1.14	9.60	41.31		
0.52								
High Royds Beck	1		2		PF 3	3.68	99.78	
100.22	100.21	100.27	0.010683	1.49	5.53	35.59		
0.77								
High Royds Beck	1		1		PF 1	4.12	99.45	
99.97	99.97	100.05	0.009428	1.63	5.69	35.19		
0.76								
High Royds Beck	1		1		PF 2	5.08	99.45	
100.31	100.00	100.31	0.000545	0.56	22.07	61.60		
0.20								
High Royds Beck	1		1		PF 3	3.68	99.45	
99.96	99.96	100.03	0.008558	1.53	5.36	34.46		
0.72								
Cockleshaw Beck	1		3		PF 1	1.01	114.50	
114.90	114.94	115.13	0.034599	2.12	0.48	1.38		

	1.15							
Cockleshaw Beck	1		3		PF 2	1.76	114.50	
115.10	115.11	115.37	0.027921		2.28	0.77	1.57	
	1.04							
Cockleshaw Beck	1		3		PF 3	0.74	114.50	
114.80	114.86	115.04	0.047086		2.16	0.34	1.29	
	1.33							
Cockleshaw Beck	1		2		PF 1	1.01	104.50	
104.81	104.94	105.22	0.076512		2.81	0.36	1.30	
	1.70							
Cockleshaw Beck	1		2		PF 2	1.76	104.50	
104.90	105.11	105.60	0.105161		3.70	0.48	1.38	
	2.01							
Cockleshaw Beck	1		2		PF 3	0.74	104.50	
104.79	104.86	105.05	0.053059		2.25	0.33	1.28	
	1.42							
Cockleshaw Beck	1		1		PF 1	1.01	94.50	
95.00	94.94	95.14	0.016319		1.62	0.63	1.48	
	0.79							
Cockleshaw Beck	1		1		PF 2	1.76	94.50	
95.09	95.11	95.37	0.029584		2.33	0.76	1.56	
	1.07							
Cockleshaw Beck	1		1		PF 3	0.74	94.50	
95.05	94.86	95.11	0.006422		1.06	0.70	1.53	
	0.50							

Profile Output Table - Standard Table 2

River	Reach	River Sta	Profile	E.G. Elev	W.S. Elev
Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
					(m)	(m)
(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
Toad Holes Beck	0.5	5		PF 1	114.65	114.59
0.06	0.53	0.00	0.05	1.02	0.02	12.59
Toad Holes Beck	0.5	5		PF 2	114.70	114.65
0.04	0.52	0.01	0.18	1.08	0.09	20.44
Toad Holes Beck	0.5	5		PF 3	114.74	114.25
0.49				0.97		1.50
Toad Holes Beck	0.5	4		PF 1	114.11	114.01
0.10	0.02	0.03	0.00	1.09	0.00	2.47
Toad Holes Beck	0.5	4		PF 2	114.16	113.99
0.17	0.02	0.05		1.35		1.99
Toad Holes Beck	0.5	4		PF 3	114.09	114.01
0.08	0.01	0.02	0.00	0.97	0.00	2.72
Toad Holes Beck	0.5	3		PF 1	114.06	114.06
0.00			0.09	0.64	0.37	14.01
Toad Holes Beck	0.5	3		PF 2	114.09	114.09
0.00			0.11	0.77	0.46	14.35
Toad Holes Beck	0.5	3		PF 3	114.05	114.05
0.00			0.08	0.57	0.32	13.90

Toad Holes Beck	0.5	2.5				Culvert		
Toad Holes Beck	0.5	2		PF 1		113.09	112.95	
0.14	1.00	0.00		1.09			1.90	
Toad Holes Beck	0.5	2		PF 2		113.16	112.98	
0.18	0.42	0.05		1.35			1.96	
Toad Holes Beck	0.5	2		PF 3		113.06	112.92	
0.13	1.00	0.00		0.97			1.85	
Toad Holes Beck	0.5	1		PF 1		112.09	111.93	
0.16	0.00	0.05		1.09			1.85	
Toad Holes Beck	0.5	1		PF 2		112.16	112.00	
0.16	1.00	0.01	0.01	1.34		0.00	232.03	
Toad Holes Beck	0.5	1		PF 3		112.05	111.90	
0.16	0.00	0.05		0.97			1.79	
Hunsworth Beck	1	17		PF 1		114.22	113.60	
0.62				6.92			3.60	
Hunsworth Beck	1	17		PF 2		114.37	113.70	
0.67				8.52			3.70	
Hunsworth Beck	1	17		PF 3		114.23	113.50	
0.73				6.17			3.50	
Hunsworth Beck	1	16		PF 1		110.06	110.05	
0.01	0.00	0.00	1.99	3.92		1.01	34.80	
Hunsworth Beck	1	16		PF 2		110.09	110.08	
0.01	0.00	0.00	2.53	4.70		1.29	35.32	
Hunsworth Beck	1	16		PF 3		110.04	110.04	
0.01	0.00	0.00	1.75	3.54		0.88	34.57	
Hunsworth Beck	1	15		PF 1		110.05	110.05	
0.00			2.97	1.70		2.25	75.35	
Hunsworth Beck	1	15		PF 2		110.09	110.09	
0.00			3.66	2.07		2.79	76.21	
Hunsworth Beck	1	15		PF 3		110.04	110.04	
0.00			2.65	1.52		2.00	74.97	
Hunsworth Beck	1	14.9				Culvert		
Hunsworth Beck	1	14.8		PF 1		110.05	110.05	
0.00	0.00	0.00	3.10	1.35		2.48	94.07	
Hunsworth Beck	1	14.8		PF 2		110.08	110.08	
0.00	0.00	0.00	3.82	1.65		3.05	94.68	
Hunsworth Beck	1	14.8		PF 3		110.04	110.04	
0.00	0.00	0.00	2.76	1.21		2.20	93.69	
Hunsworth Beck	2	14.5		PF 1		110.05	110.05	
0.00			4.56	1.64		1.81	96.48	
Hunsworth Beck	2	14.5		PF 2		110.08	110.08	
0.00			5.63	2.00		2.24	97.15	
Hunsworth Beck	2	14.5		PF 3		110.04	110.04	
0.00			4.06	1.47		1.62	96.05	
Hunsworth Beck	2	14.2				Culvert		

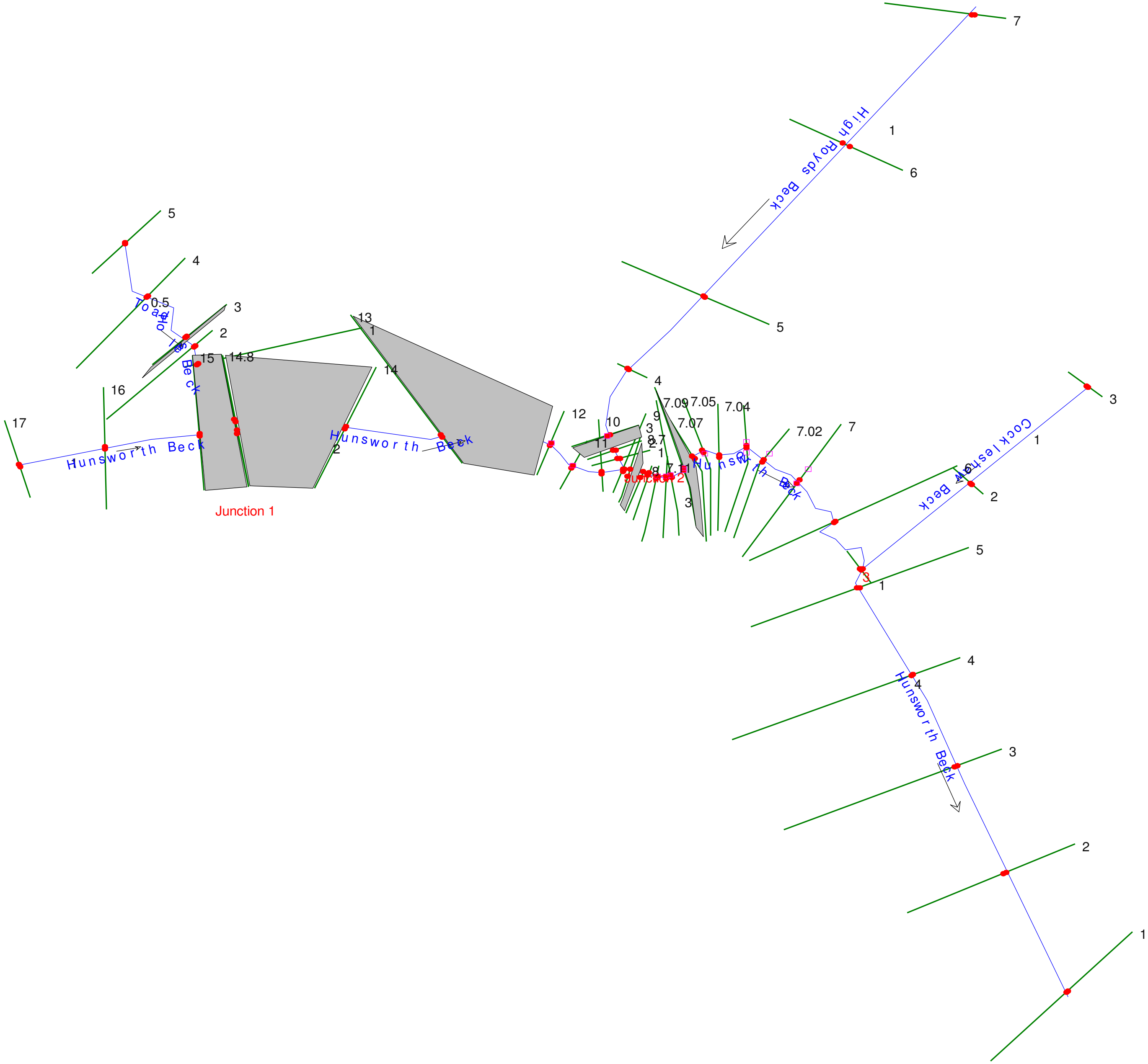
Hunsworth Beck	2	14		PF 1	110.05	110.05	
0.00	0.00	0.00	4.92	1.12	1.96	131.35	
Hunsworth Beck	2	14		PF 2	110.07	110.07	
0.00	0.00	0.00	6.07	1.38	2.42	131.87	
Hunsworth Beck	2	14		PF 3	110.04	110.04	
0.00	0.00	0.00	4.39	1.00	1.75	131.06	
Hunsworth Beck	2	13		PF 1	110.05	110.05	
0.00			7.19	0.41	0.41	167.11	
Hunsworth Beck	2	13		PF 2	110.07	110.07	
0.00			8.86	0.50	0.51	167.40	
Hunsworth Beck	2	13		PF 3	110.04	110.04	
0.00			6.41	0.37	0.36	166.95	
Hunsworth Beck	2	12.5			Culvert		
Hunsworth Beck	2	12		PF 1	102.74	102.35	
0.38	0.73	0.00		8.01		3.85	
Hunsworth Beck	2	12		PF 2	102.90	102.48	
0.43	0.72	0.00		9.87		3.98	
Hunsworth Beck	2	12		PF 3	102.65	102.30	
0.35	0.73	0.00		7.14		3.80	
Hunsworth Beck	2	11		PF 1	101.21	100.01	
1.20	1.44	0.08		8.01		3.51	
Hunsworth Beck	2	11		PF 2	101.42	100.09	
1.33	1.39	0.09		9.87		3.59	
Hunsworth Beck	2	11		PF 3	101.12	99.96	
1.16	1.45	0.08		7.14		3.46	
Hunsworth Beck	2	10		PF 1	99.88	99.85	
0.03	0.00	0.01	3.79	4.22		12.94	
Hunsworth Beck	2	10		PF 2	100.32	100.31	
0.01	0.00	0.00	6.25	3.61	0.01	61.27	
Hunsworth Beck	2	10		PF 3	99.70	99.66	
0.04	0.00	0.01	3.06	4.08		11.48	
Hunsworth Beck	2	9		PF 1	99.87	99.87	
0.00	0.00	0.00	7.11	0.85	0.05	45.13	
Hunsworth Beck	2	9		PF 2	100.31	100.31	
0.00	0.00	0.00	8.73	1.04	0.10	62.05	
Hunsworth Beck	2	9		PF 3	99.69	99.69	
0.00	0.00	0.00	6.37	0.75	0.03	33.03	
Hunsworth Beck	3	8.7		PF 1	99.87	99.86	
0.01			0.77	9.92	1.45	25.58	
Hunsworth Beck	3	8.7		PF 2	100.31	100.31	
0.01			1.30	11.23	2.41	38.74	
Hunsworth Beck	3	8.7		PF 3	99.69	99.67	
0.01			0.57	9.17	1.08	23.58	
Hunsworth Beck	3	8.5			Culvert		
Hunsworth Beck	3	8		PF 1	99.44	99.40	
0.04	0.03	0.02		12.12	0.01	9.48	
Hunsworth Beck	3	8		PF 2	99.64	99.60	
0.04	0.03	0.03		14.91	0.04	9.85	

Hunsworth Beck	3	8		PF 3	99.35	99.31	
0.03	0.02	0.02		10.82	0.00	9.30	
Hunsworth Beck	3	7.12		PF 1	99.39	99.14	
0.26	0.04	0.06		12.10	0.03	5.09	
Hunsworth Beck	3	7.12		PF 2	99.59	99.30	
0.29	0.03	0.07		14.69	0.26	6.25	
Hunsworth Beck	3	7.12		PF 3	99.30	99.08	
0.22	0.04	0.04		10.81	0.01	4.68	
Hunsworth Beck	3	7.11		PF 1	99.30	99.23	
0.07	0.05	0.02		7.95	4.18	18.66	
Hunsworth Beck	3	7.11		PF 2	99.49	99.44	
0.05	0.04	0.02		8.13	6.82	23.24	
Hunsworth Beck	3	7.11		PF 3	99.22	99.14	
0.08	0.05	0.01		7.72	3.10	17.27	
Hunsworth Beck	3	7.10		PF 1	99.23	98.99	
0.24	0.04	0.01		11.82	0.31	6.93	
Hunsworth Beck	3	7.10		PF 2	99.43	99.18	
0.25	0.04	0.01		14.06	0.89	11.70	
Hunsworth Beck	3	7.10		PF 3	99.15	98.94	
0.21	0.03	0.00		10.64	0.18	6.44	
Hunsworth Beck	3	7.09		PF 1	99.18	98.85	
0.33	0.04	0.00		12.11	0.02	9.33	
Hunsworth Beck	3	7.09		PF 2	99.39	99.05	
0.34	0.03	0.04		14.47	0.48	18.39	
Hunsworth Beck	3	7.09		PF 3	99.11	98.85	
0.26	0.03	0.00		10.80	0.02	9.33	
Hunsworth Beck	3	7.08		PF 1	99.14	98.82	
0.32	0.00	0.00		12.13		3.79	
Hunsworth Beck	3	7.08		PF 2	99.32	99.10	
0.22	0.00	0.03	0.55	13.07	1.33	78.94	
Hunsworth Beck	3	7.08		PF 3	99.08	98.83	
0.25	0.00	0.00		10.82		3.79	
Hunsworth Beck	3	7.075			Bridge		
Hunsworth Beck	3	7.07		PF 1	98.98	98.78	
0.20	0.22	0.00		10.89	1.24	52.59	
Hunsworth Beck	3	7.07		PF 2	99.04	98.99	
0.06	0.17	0.04	0.03	8.40	6.52	98.43	
Hunsworth Beck	3	7.07		PF 3	98.94	98.67	
0.27	0.25	0.02		10.81	0.01	20.17	
Hunsworth Beck	3	7.05		PF 1	98.76	98.55	
0.21	0.26	0.02	0.09	11.78	0.27	6.80	
Hunsworth Beck	3	7.05		PF 2	98.83	98.37	
0.46	0.22	0.10	0.05	14.76	0.15	6.10	
Hunsworth Beck	3	7.05		PF 3	98.67	98.48	
0.19	0.27	0.02	0.06	10.58	0.18	6.51	
Hunsworth Beck	3	7.04		PF 1	98.48	98.04	
0.43	0.29	0.09	0.00	12.12	0.00	5.85	
Hunsworth Beck	3	7.04		PF 2	98.47	98.30	
0.17	0.27	0.09	0.53	11.19	3.23	66.46	

Hunsworth Beck	3	7.04		PF 3	98.38	97.96	
0.42	0.29	0.09		10.82		4.59	
Hunsworth Beck	3	7.03		PF 1	97.99	97.87	
0.12	0.26	0.01	1.42	9.29	1.42	11.49	
Hunsworth Beck	3	7.03		PF 2	98.12	97.98	
0.14	0.26	0.01	2.00	11.05	1.90	12.28	
Hunsworth Beck	3	7.03		PF 3	97.92	97.81	
0.11	0.27	0.01	1.16	8.45	1.21	11.06	
Hunsworth Beck	3	7.02		PF 1	97.71	97.52	
0.20	0.54	0.05	1.65	10.48		10.72	
Hunsworth Beck	3	7.02		PF 2	97.85	97.65	
0.20	0.66	0.04	2.92	11.98	0.05	15.51	
Hunsworth Beck	3	7.02		PF 3	97.64	97.44	
0.20	0.48	0.05	1.14	9.68		9.84	
Hunsworth Beck	3	7		PF 1	97.12	97.08	
0.04	0.40	0.00	7.19	4.94		55.77	
Hunsworth Beck	3	7		PF 2	97.15	97.08	
0.07	0.45	0.01	8.86	6.09		55.77	
Hunsworth Beck	3	7		PF 3	97.12	97.08	
0.04	0.35	0.00	6.41	4.41		55.77	
Hunsworth Beck	3	6		PF 1	96.18	95.62	
0.56	0.90	0.05	0.75	8.05	3.33	44.33	
Hunsworth Beck	3	6		PF 2	96.01	95.67	
0.34	1.11	0.03	1.82	7.45	5.68	53.95	
Hunsworth Beck	3	6		PF 3	96.28	95.60	
0.69	0.77	0.07	0.39	8.16	2.26	37.99	
Hunsworth Beck	4	5		PF 1	95.13	95.01	
0.12			6.32	6.82	0.00	34.68	
Hunsworth Beck	4	5		PF 2	95.20	95.06	
0.14	1.39	0.00	8.97	7.73	0.00	36.20	
Hunsworth Beck	4	5		PF 3	95.10	94.98	
0.12	1.37	0.00	5.07	6.49		32.79	
Hunsworth Beck	4	4		PF 1	93.55	93.36	
0.19	1.58	0.01	10.91	2.23		27.52	
Hunsworth Beck	4	4		PF 2	93.62	93.42	
0.19	1.57	0.01	14.13	2.58		28.30	
Hunsworth Beck	4	4		PF 3	93.51	93.34	
0.17	1.59	0.00	9.52	2.04		27.27	
Hunsworth Beck	4	3		PF 1	92.78	92.76	
0.02	0.22	0.02	0.85	5.48	6.82	49.65	
Hunsworth Beck	4	3		PF 2	92.87	92.85	
0.02	0.22	0.02	1.17	6.12	9.42	55.17	
Hunsworth Beck	4	3		PF 3	92.73	92.71	
0.02	0.22	0.02	0.70	5.18	5.68	46.72	
Hunsworth Beck	4	2		PF 1	92.54	92.34	
0.20	1.42	0.01	0.96	10.59	1.60	22.22	
Hunsworth Beck	4	2		PF 2	92.63	92.44	
0.19	1.31	0.01	1.85	11.77	3.09	27.58	
Hunsworth Beck	4	2		PF 3	92.49	92.28	
0.21	1.59	0.01	0.58	10.00	0.97	18.98	

Hunsworth Beck	4	1		PF 1	90.63	90.17	
0.46	1.88	0.03	0.24	12.77	0.12	9.22	
Hunsworth Beck	4	1		PF 2	90.79	90.30	
0.50	1.81	0.03	1.00	15.21	0.50	12.88	
Hunsworth Beck	4	1		PF 3	90.54	90.11	
0.42	1.93	0.02	0.08	11.44	0.04	7.40	
High Royds Beck	1	7		PF 1	121.54	119.55	
1.99				4.12		2.40	
High Royds Beck	1	7		PF 2	121.75	119.60	
2.15				5.08		2.47	
High Royds Beck	1	7		PF 3	121.85	119.50	
2.35				3.68		2.33	
High Royds Beck	1	6		PF 1	108.42	108.32	
0.10	2.23	0.00	0.06	4.00	0.06	4.59	
High Royds Beck	1	6		PF 2	108.53	108.41	
0.12	2.29	0.00	0.13	4.83	0.13	5.07	
High Royds Beck	1	6		PF 3	108.36	108.27	
0.09	2.20	0.00	0.04	3.60	0.04	4.33	
High Royds Beck	1	5		PF 1	106.19	106.05	
0.14	1.45	0.00	0.94	3.10	0.08	11.79	
High Royds Beck	1	5		PF 2	106.24	106.10	
0.14	1.38	0.00	1.41	3.55	0.12	13.25	
High Royds Beck	1	5		PF 3	106.16	106.02	
0.13	1.53	0.01	0.74	2.87	0.06	11.02	
High Royds Beck	1	4		PF 1	104.44	104.19	
0.25	1.73	0.01	0.22	3.81	0.10	6.75	
High Royds Beck	1	4		PF 2	104.52	104.26	
0.26	1.71	0.01	0.51	4.34	0.23	8.58	
High Royds Beck	1	4		PF 3	104.39	104.15	
0.25	1.75	0.01	0.11	3.52	0.05	5.71	
High Royds Beck	1	3		PF 1	100.48	100.44	
0.04			0.28	1.47	2.37	46.33	
High Royds Beck	1	3		PF 2	100.49	100.42	
0.07			0.30	1.92	2.87	40.70	
High Royds Beck	1	3		PF 3	100.45	100.41	
0.05			0.19	1.45	2.04	36.63	
High Royds Beck	1	2.5			Culvert		
High Royds Beck	1	2		PF 1	100.29	100.24	
0.05	0.24	0.00		1.74	2.38	36.24	
High Royds Beck	1	2		PF 2	100.35	100.32	
0.03	0.03	0.01	0.01	1.67	3.41	41.31	
High Royds Beck	1	2		PF 3	100.27	100.22	
0.06	0.24	0.00		1.69	1.99	35.59	
High Royds Beck	1	1		PF 1	100.05	99.97	
0.08	0.00	0.02	0.47	2.32	1.33	35.19	
High Royds Beck	1	1		PF 2	100.31	100.31	
0.01	0.00	0.00	1.19	1.37	2.52	61.60	
High Royds Beck	1	1		PF 3	100.03	99.96	
0.07	0.00	0.02	0.41	2.14	1.14	34.46	

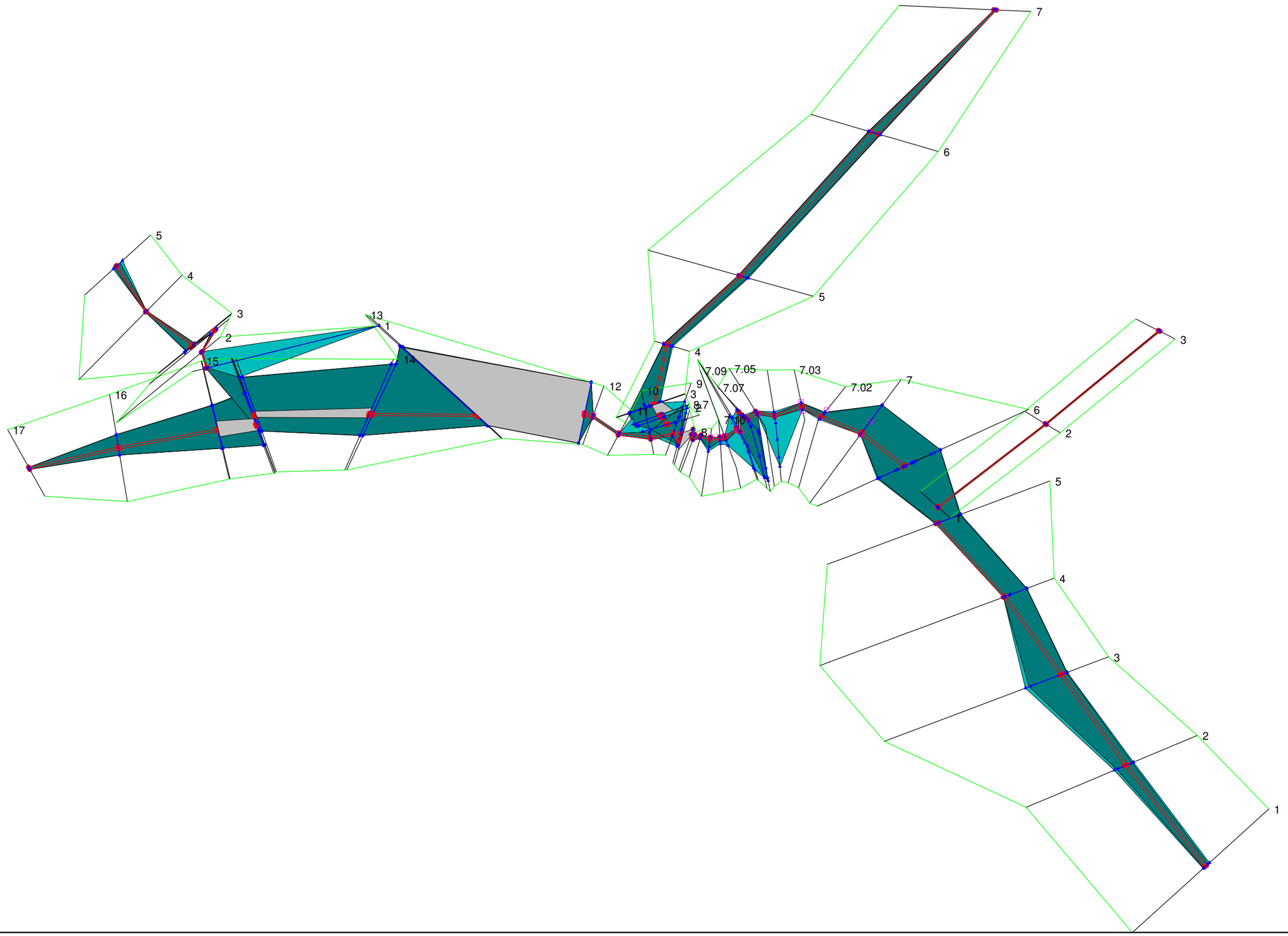
Cockleshaw Beck	1		3	PF 1	115.13	114.90
0.23				1.01		1.38
Cockleshaw Beck	1		3	PF 2	115.37	115.10
0.27				1.76		1.57
Cockleshaw Beck	1		3	PF 3	115.04	114.80
0.24				0.74		1.29
Cockleshaw Beck	1		2	PF 1	105.22	104.81
0.40	9.90	0.02		1.01		1.30
Cockleshaw Beck	1		2	PF 2	105.60	104.90
0.70	9.73	0.04		1.76		1.38
Cockleshaw Beck	1		2	PF 3	105.05	104.79
0.26	9.99	0.00		0.74		1.28
Cockleshaw Beck	1		1	PF 1	95.14	95.00
0.13	0.00	0.00		1.01		1.48
Cockleshaw Beck	1		1	PF 2	95.37	95.09
0.28	10.11	0.13		1.76		1.56
Cockleshaw Beck	1		1	PF 3	95.11	95.05
0.06	0.00	0.01		0.74		1.53


High Royds Beck
Hunsworth Beck
Hunsworth Beck
Hunsworth Beck
Hunsworth Beck
Junction 1
Junction 2
7.09
7.05
7.04
7.07
7.02
7.11
14.8
0.5
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

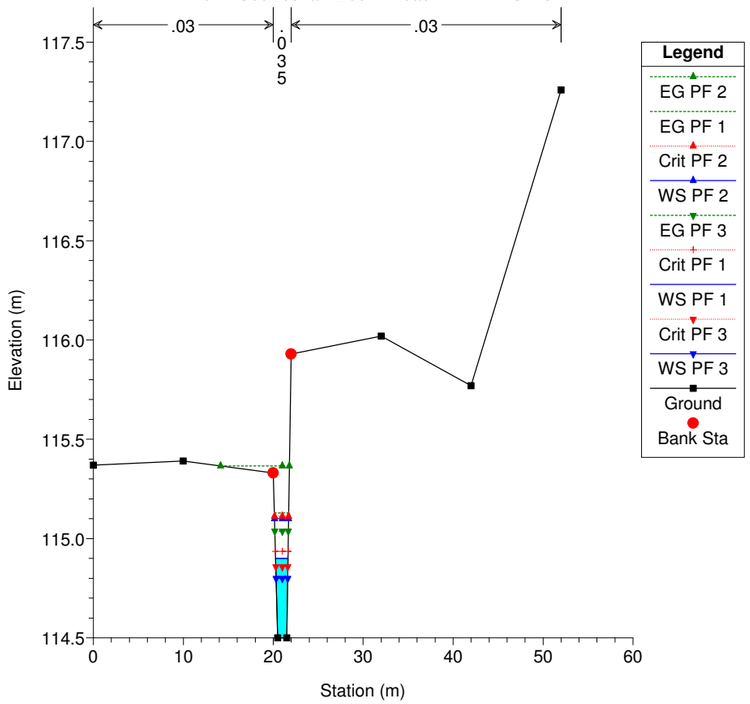
Appendix E4

Baseline model results

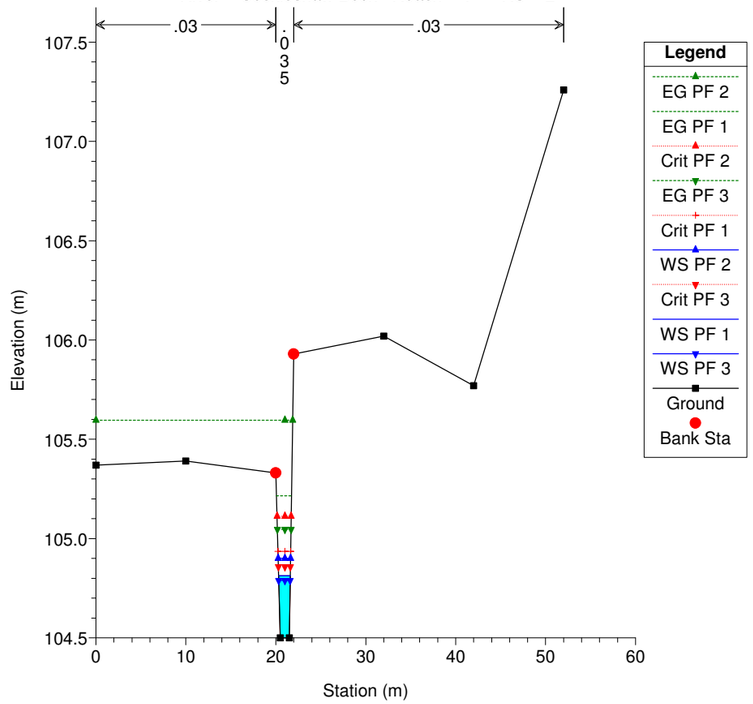
Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016



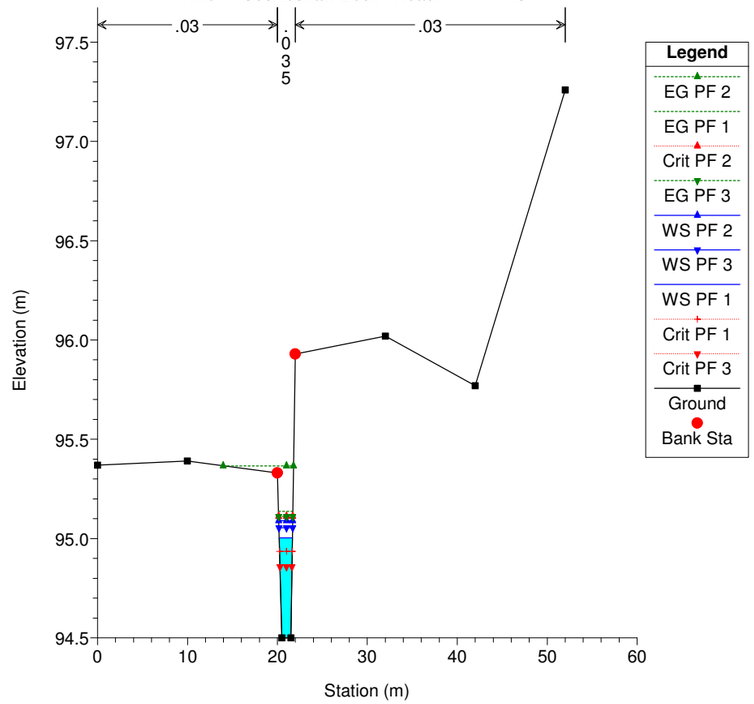
Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Cockleshaw Beck Reach = 1 RS = 3



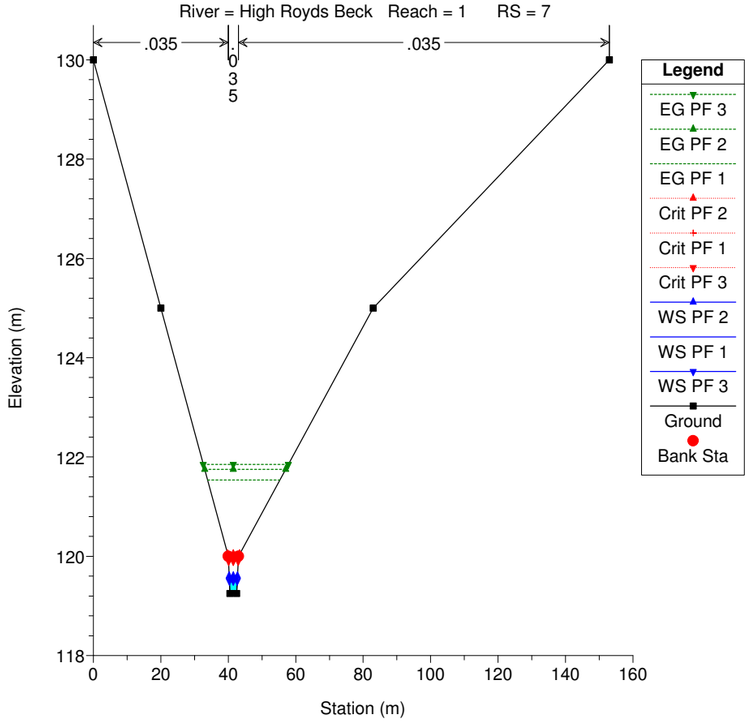
Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Cockleshaw Beck Reach = 1 RS = 2



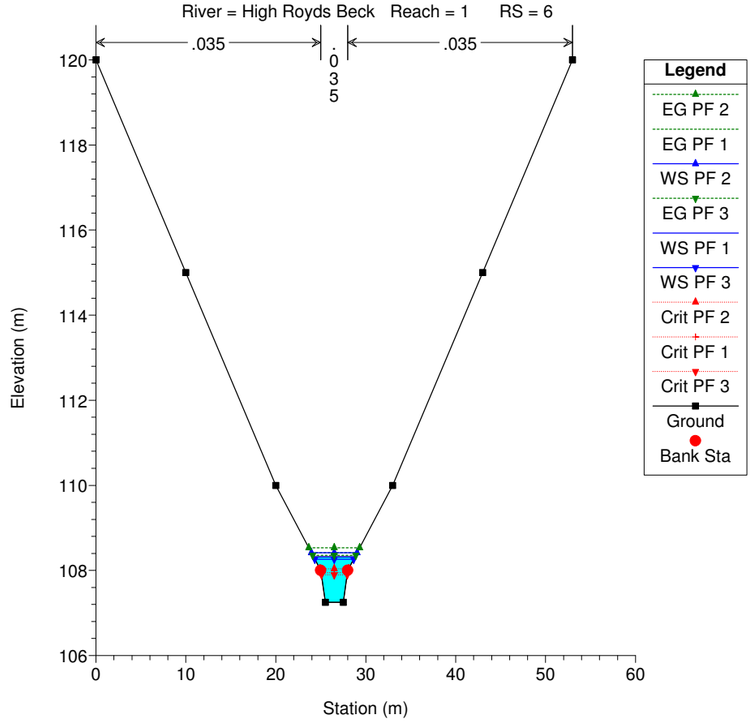
Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Cockleshaw Beck Reach = 1 RS = 1



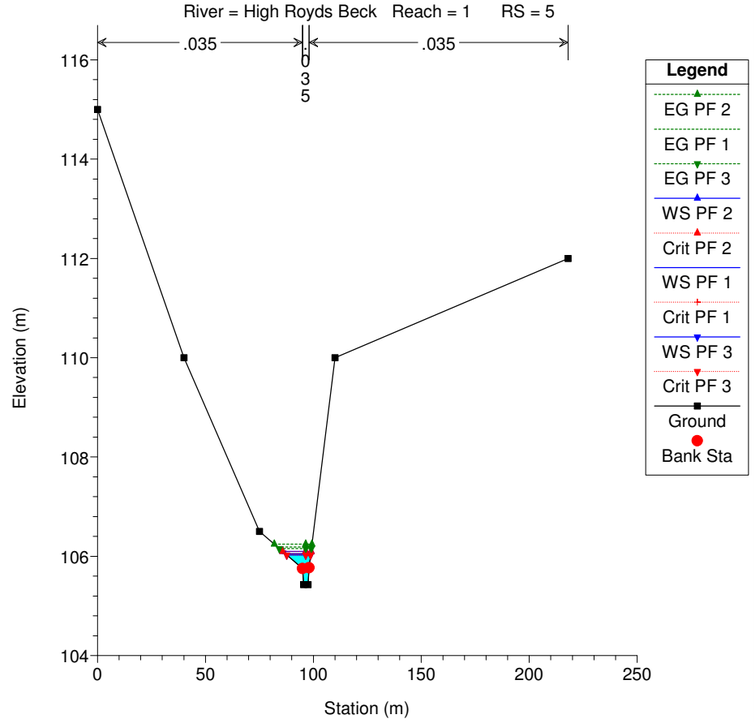
Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 7

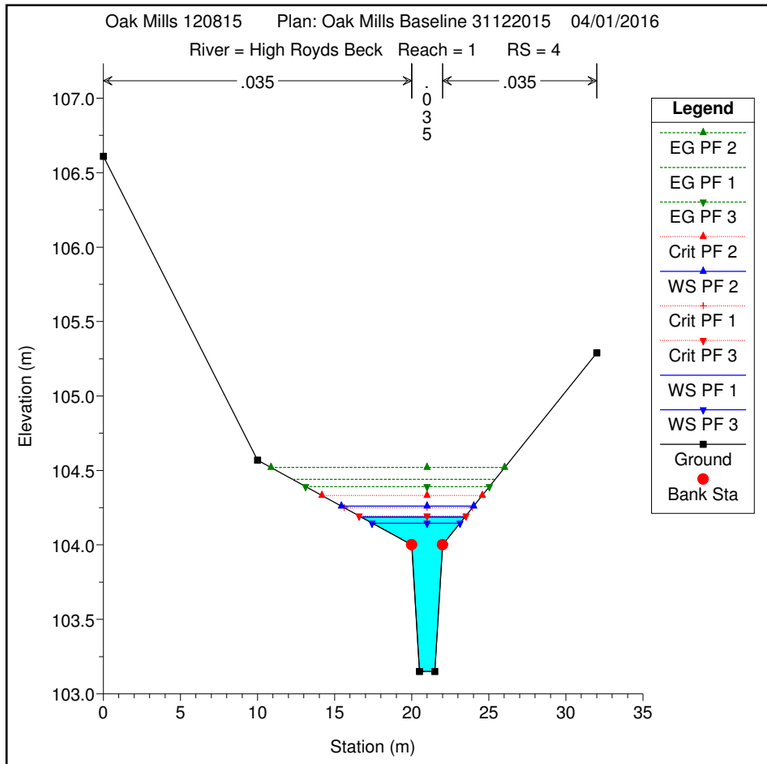


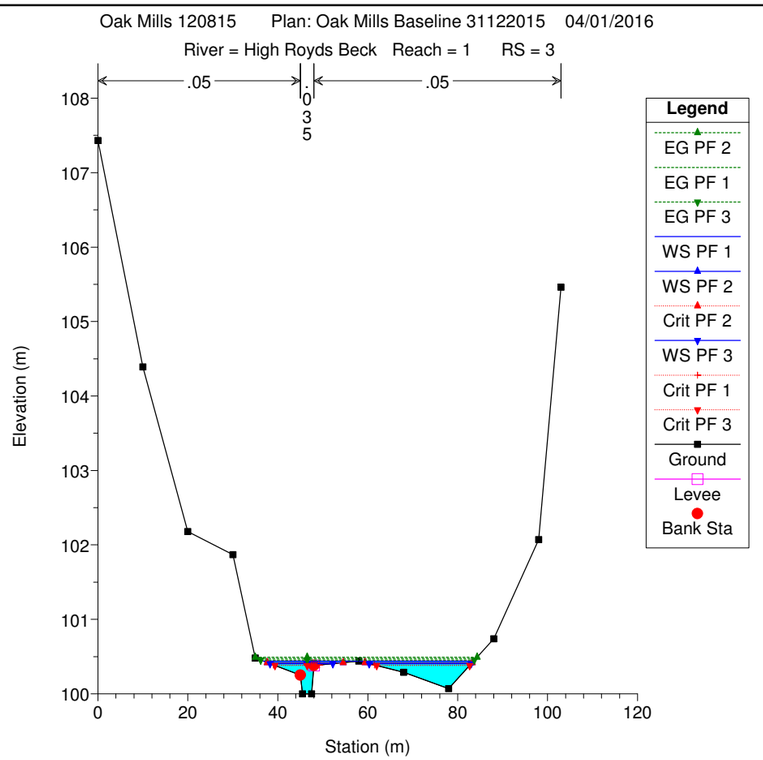
Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 6

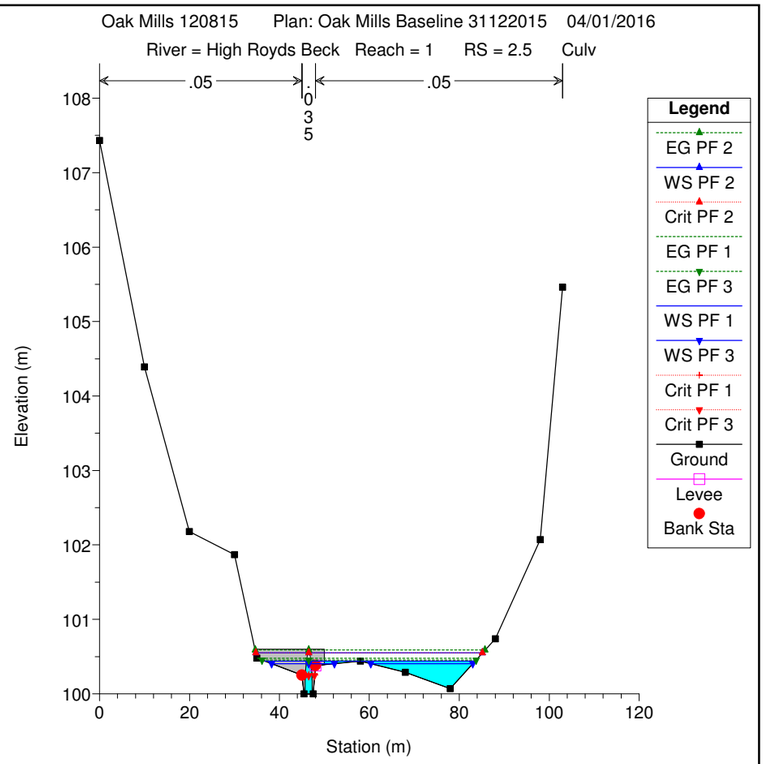


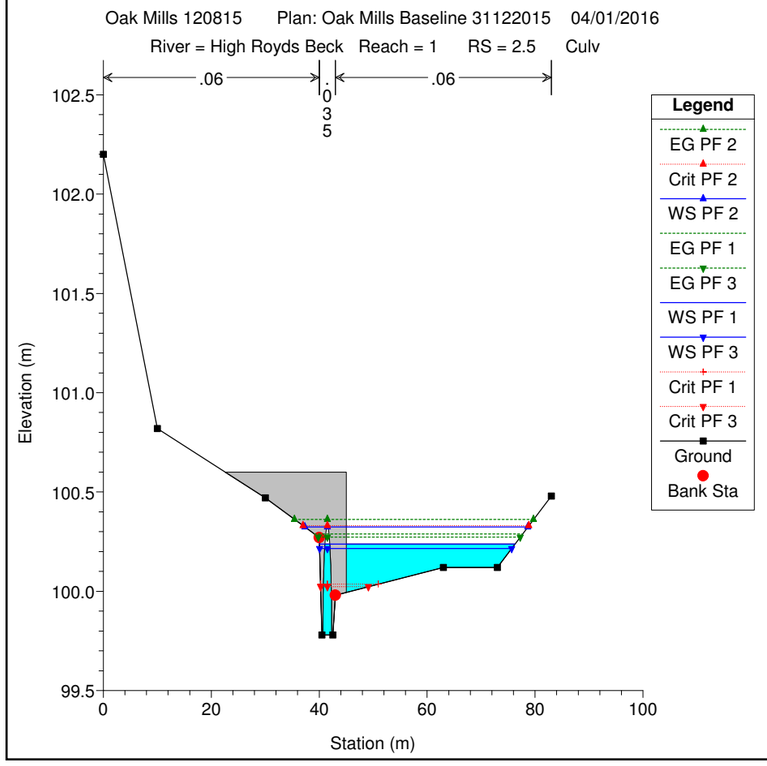
Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 5

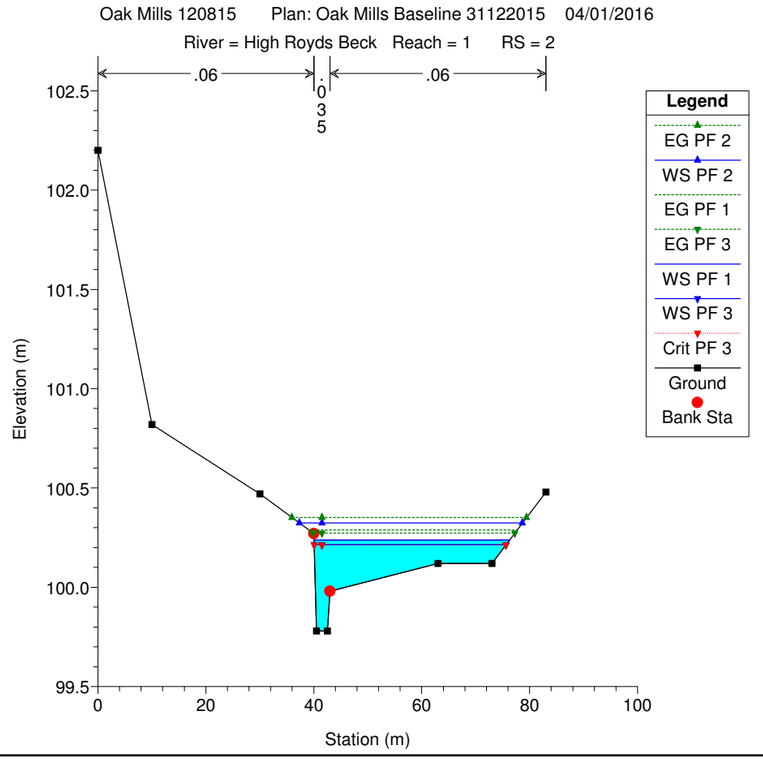


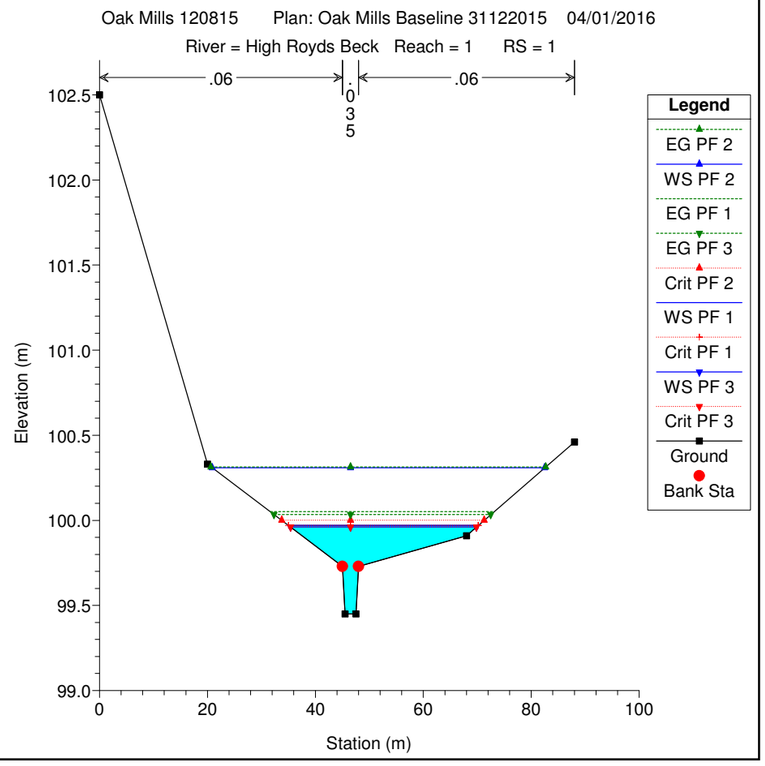

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 4
.035
.035
0
3
5
Legend
EG PF 2
EG PF 1
EG PF 3
Crit PF 2
WS PF 2
Crit PF 1
Crit PF 3
WS PF 1
WS PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

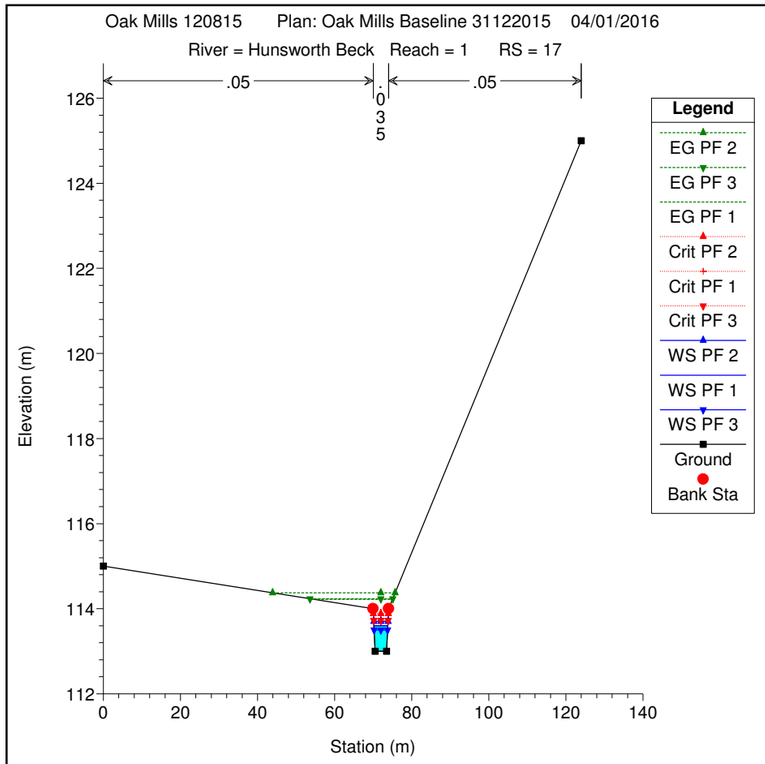

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 3
.05
.05
0
3
5
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 1
WS PF 2
Crit PF 2
WS PF 3
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

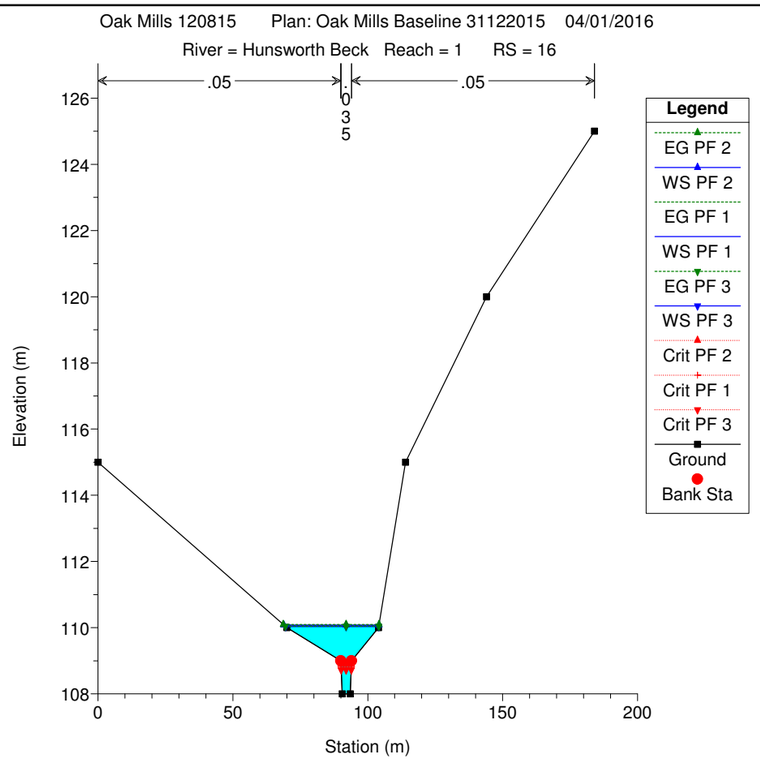

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 2.5 Culv
.05
.05
0
3
5
Legend
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
EG PF 3
WS PF 1
WS PF 3
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

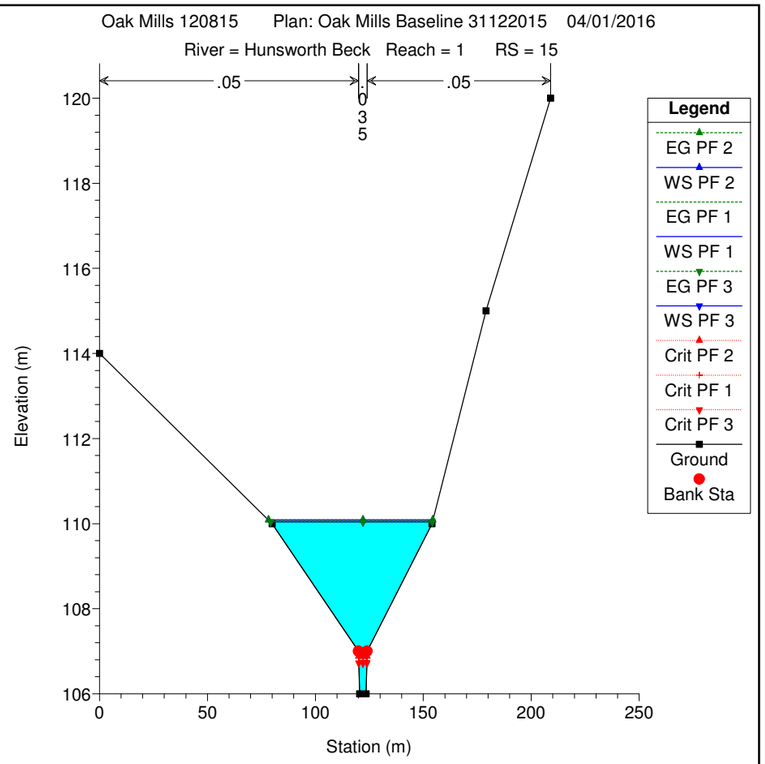

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 2.5 Culv
.06
.06
0
3
5
Legend
EG PF 2
Crit PF 2
WS PF 2
EG PF 1
EG PF 3
WS PF 1
WS PF 3
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

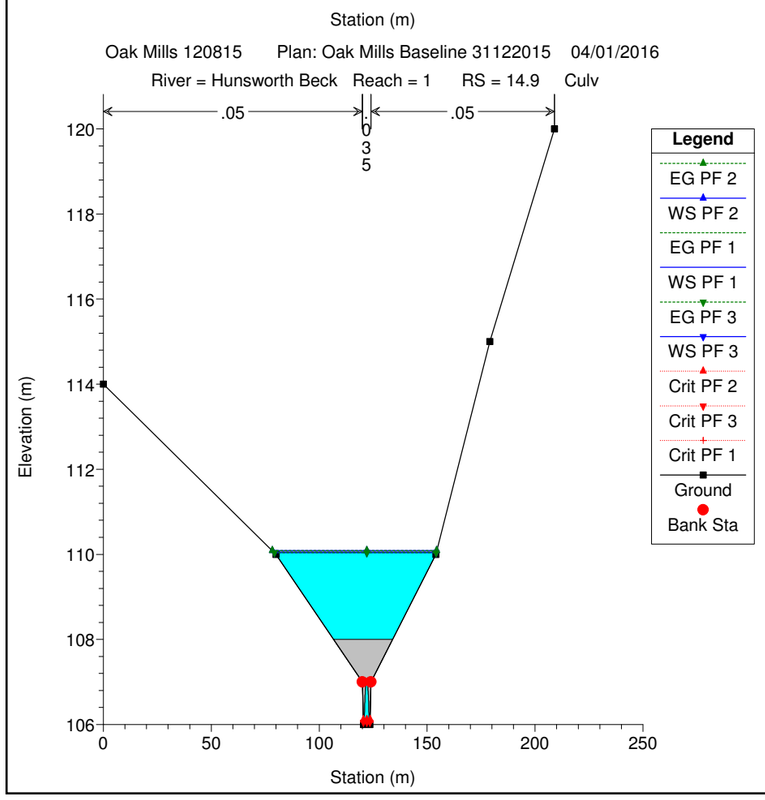

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 2
.06
.06
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
EG PF 3
WS PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

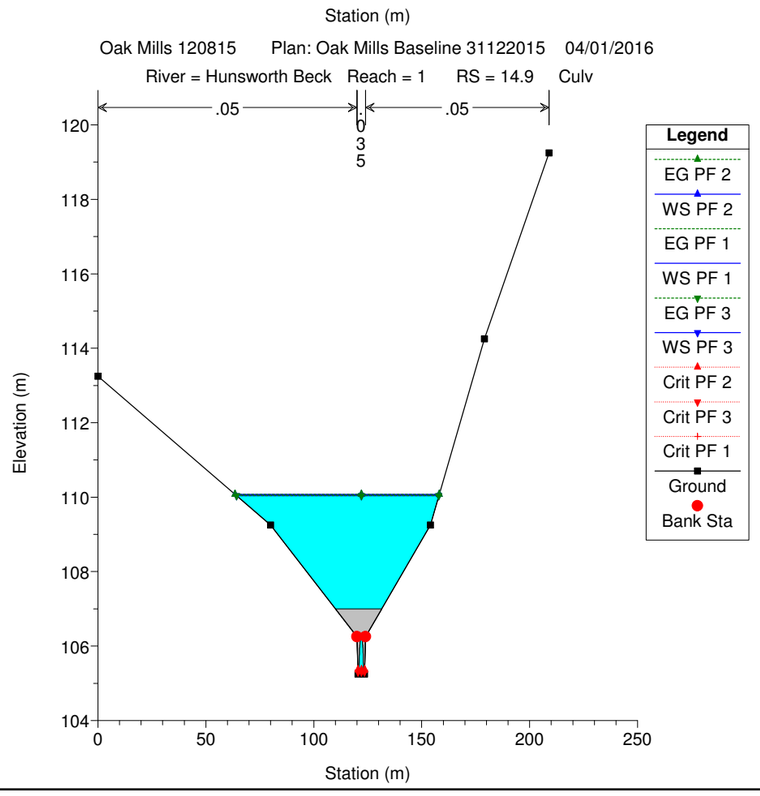

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = High Royds Beck Reach = 1 RS = 1
.06
.06
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
EG PF 3
Crit PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

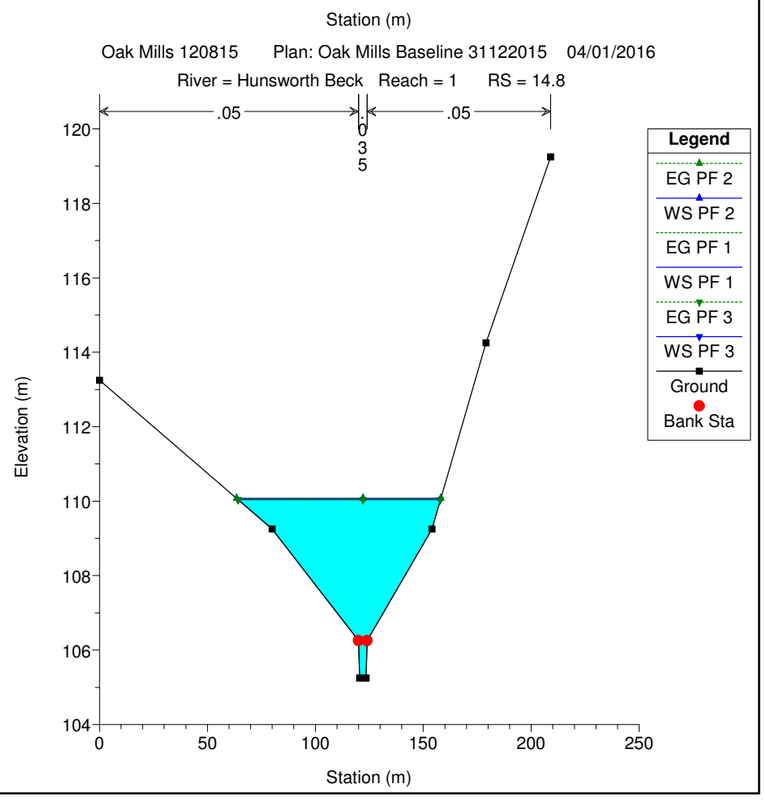

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 1 RS = 17
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 3
EG PF 1
Crit PF 2
Crit PF 1
Crit PF 3
WS PF 2
WS PF 1
WS PF 3
Ground
Bank Sta

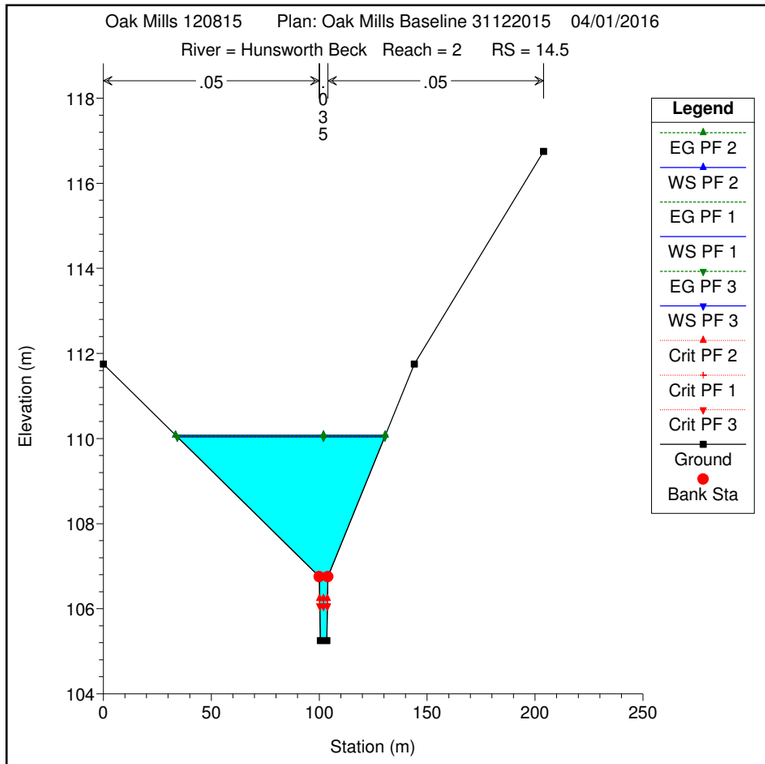

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 1 RS = 16
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

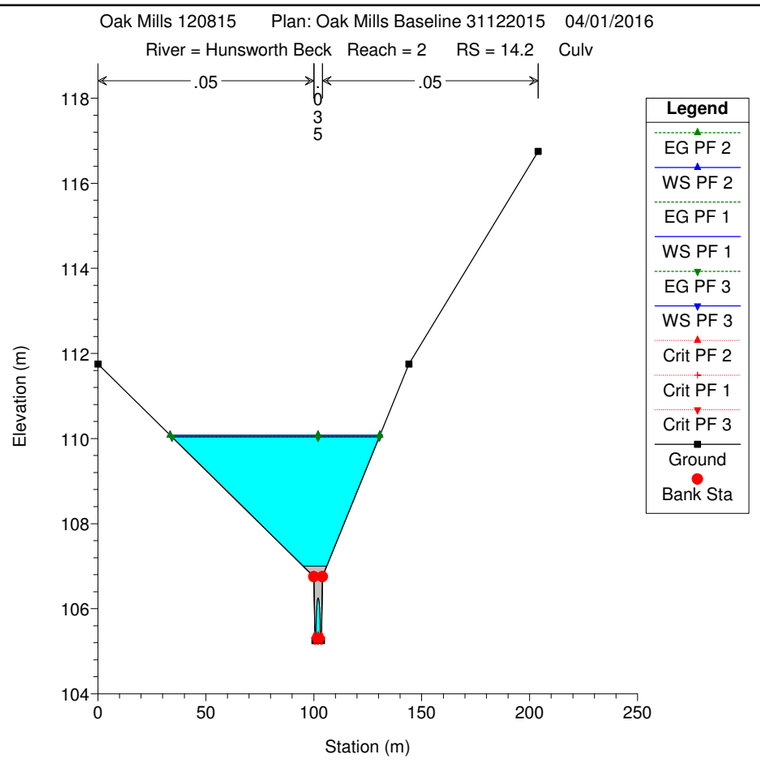

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 1 RS = 15
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

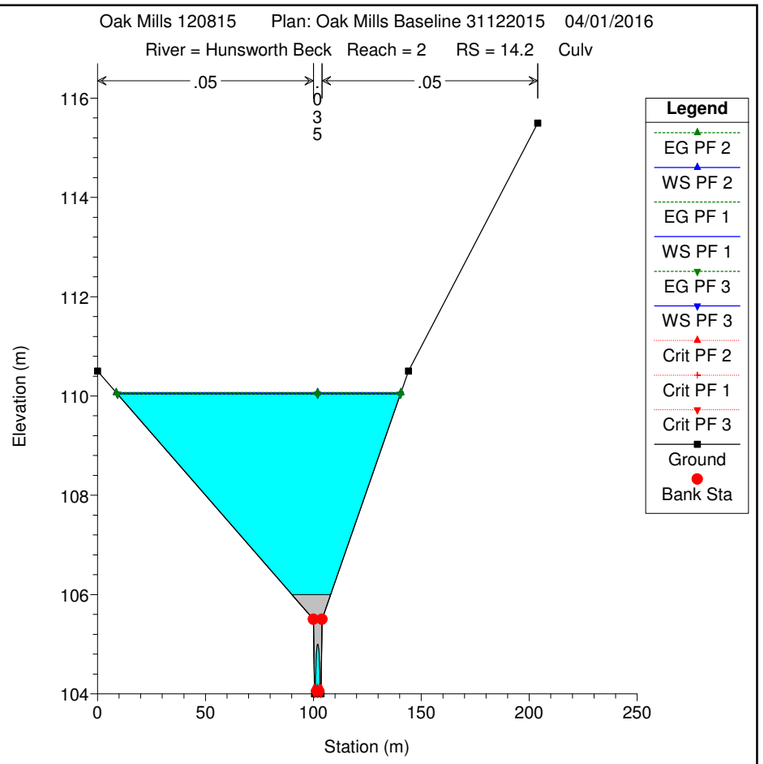

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 1 RS = 14.9 Culv
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 3
Crit PF 1
Ground
Bank Sta

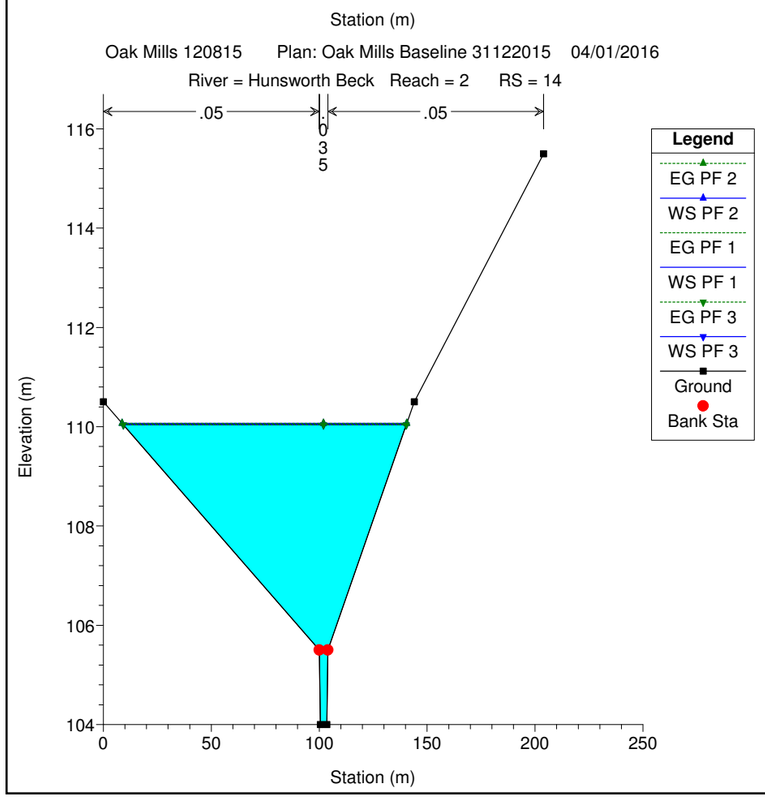

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 1 RS = 14.9 Culv
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 3
Crit PF 1
Ground
Bank Sta

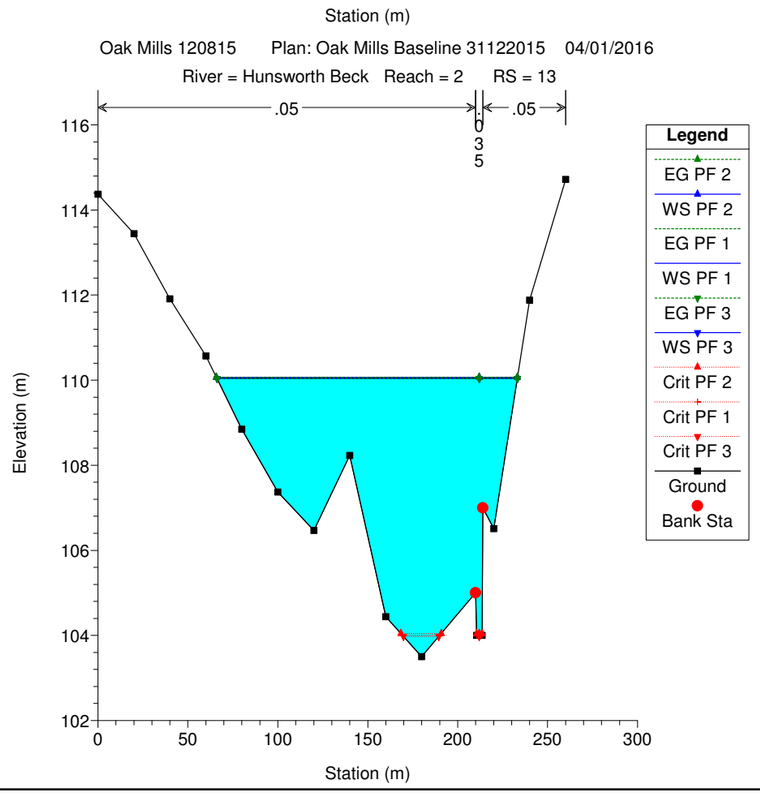

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 1 RS = 14.8
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Ground
Bank Sta

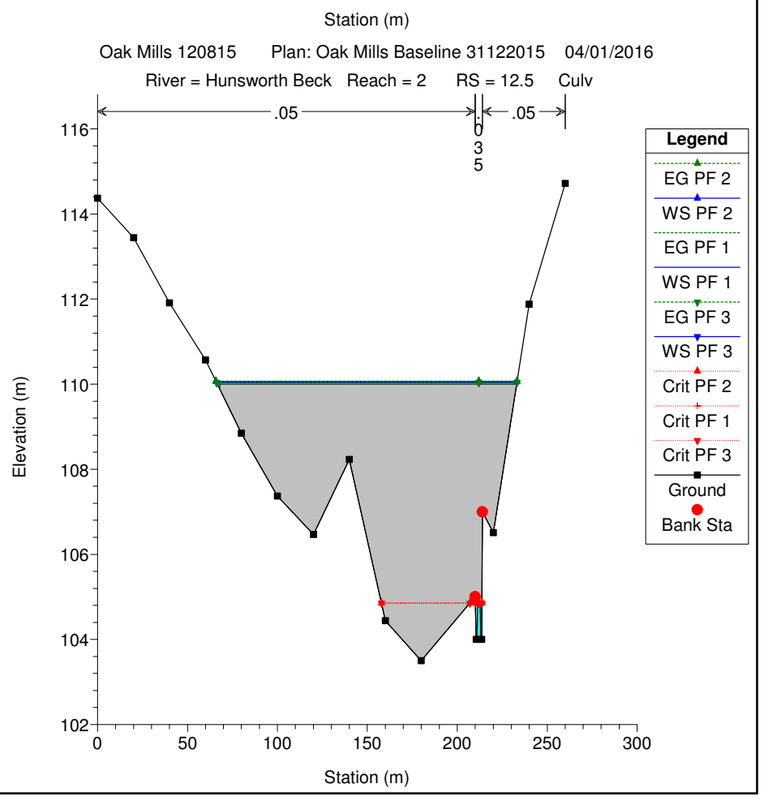

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 14.5
.05
.05
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

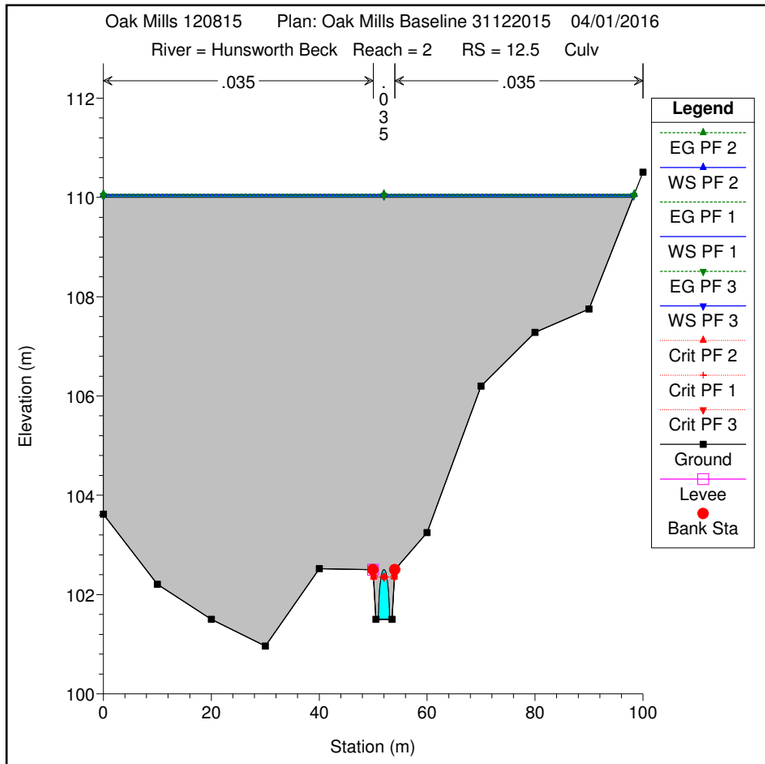

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 14.2 Culv
.05
.05
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

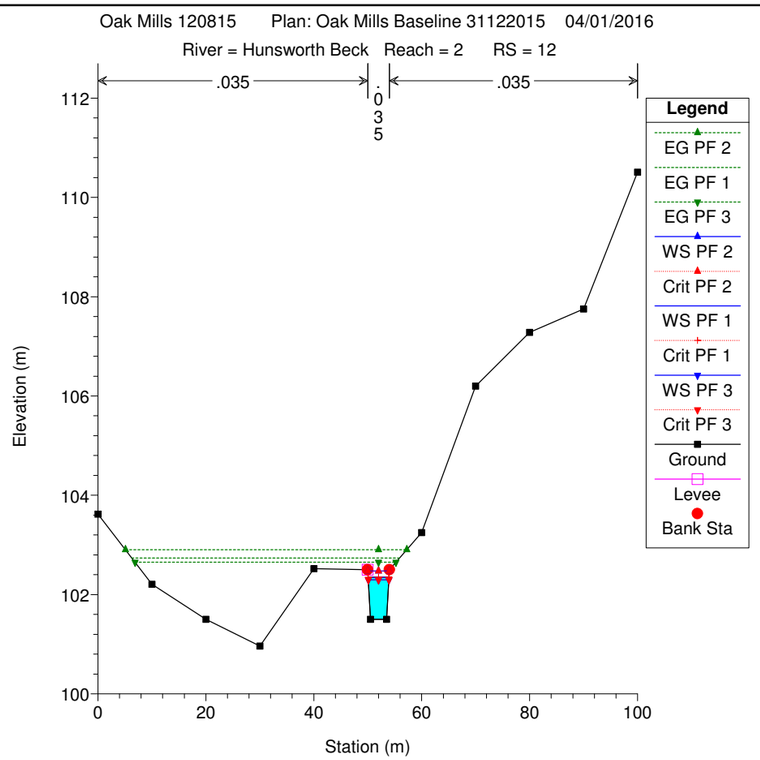

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 14.2 Culv
.05
.05
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

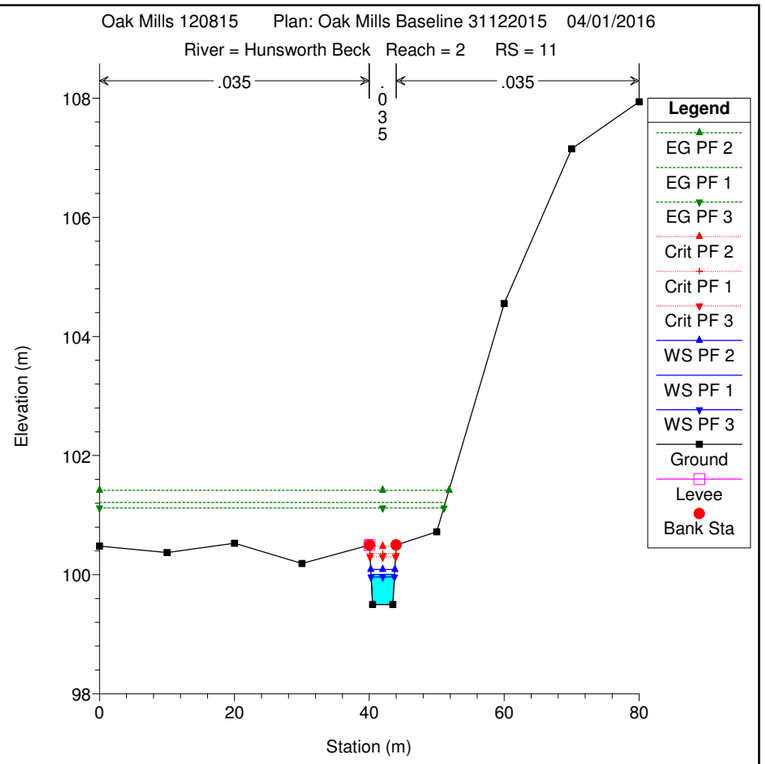

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 14
.05
.05
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Ground
Bank Sta

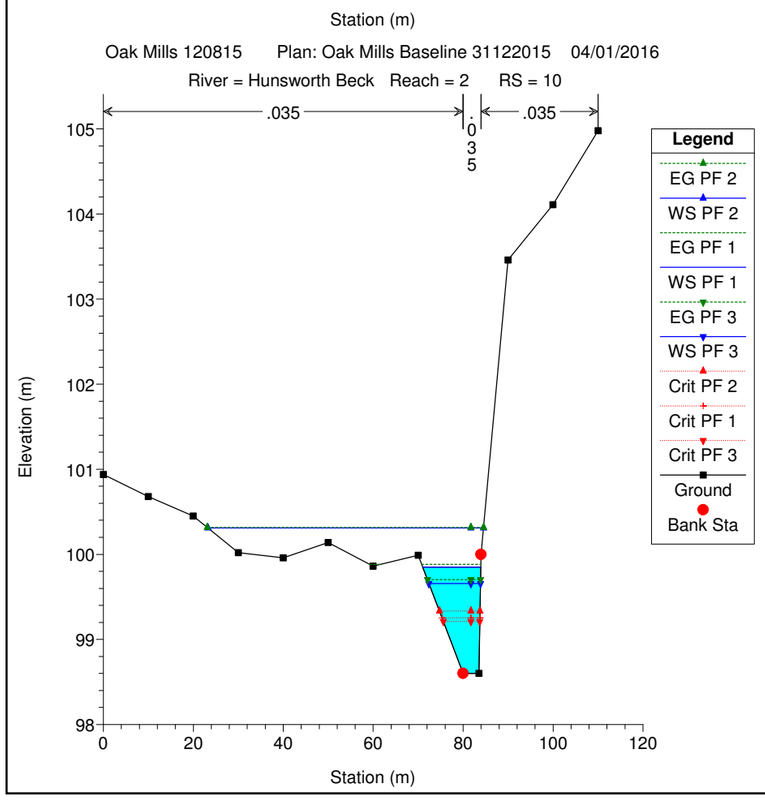

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 13
.05
.05
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

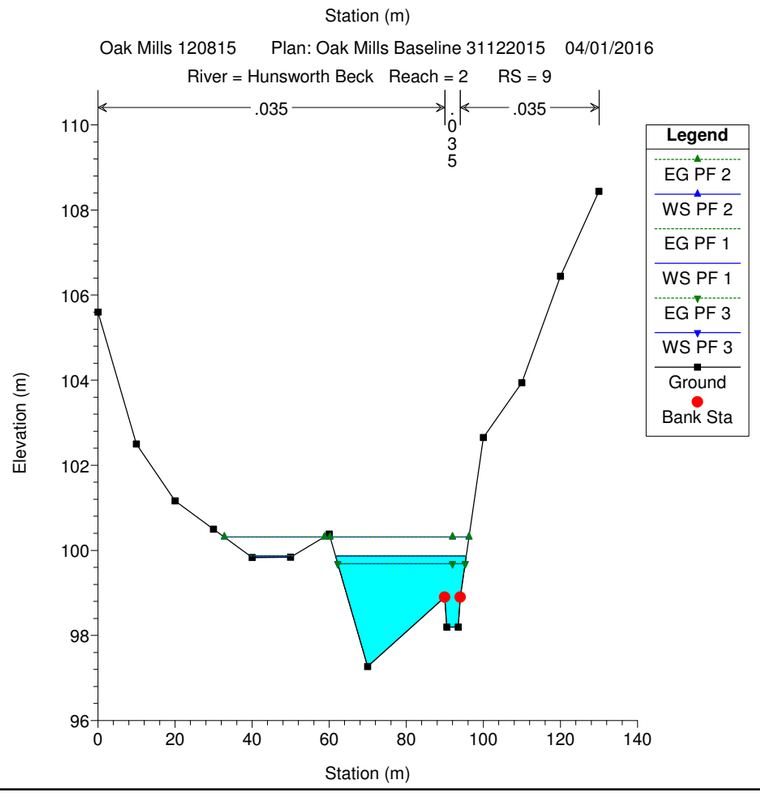

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 12.5 Culv
.05
.05
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

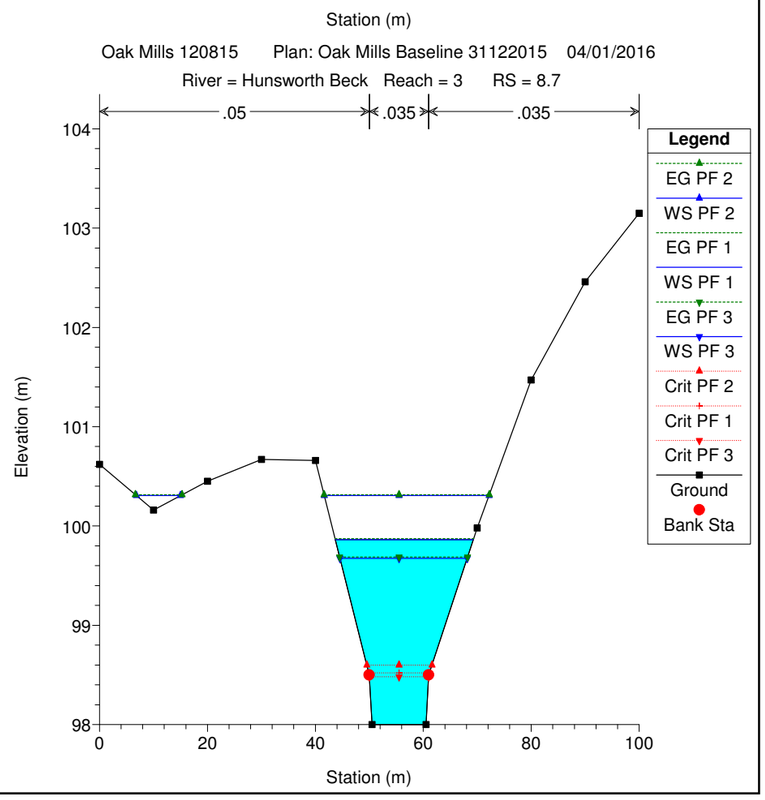

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 12.5 Culv
.035
.035
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

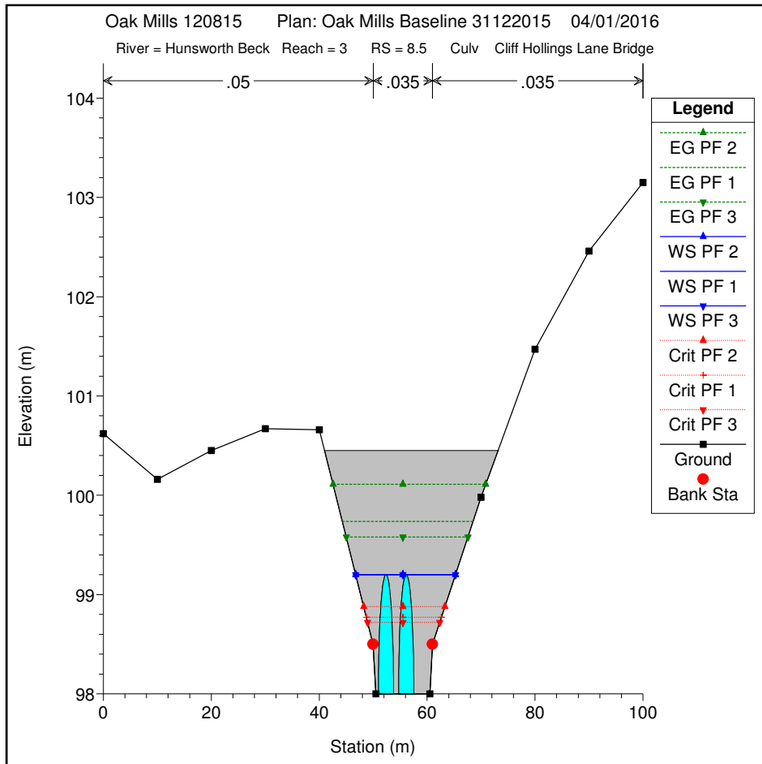

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 12
.035
.035
.035
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

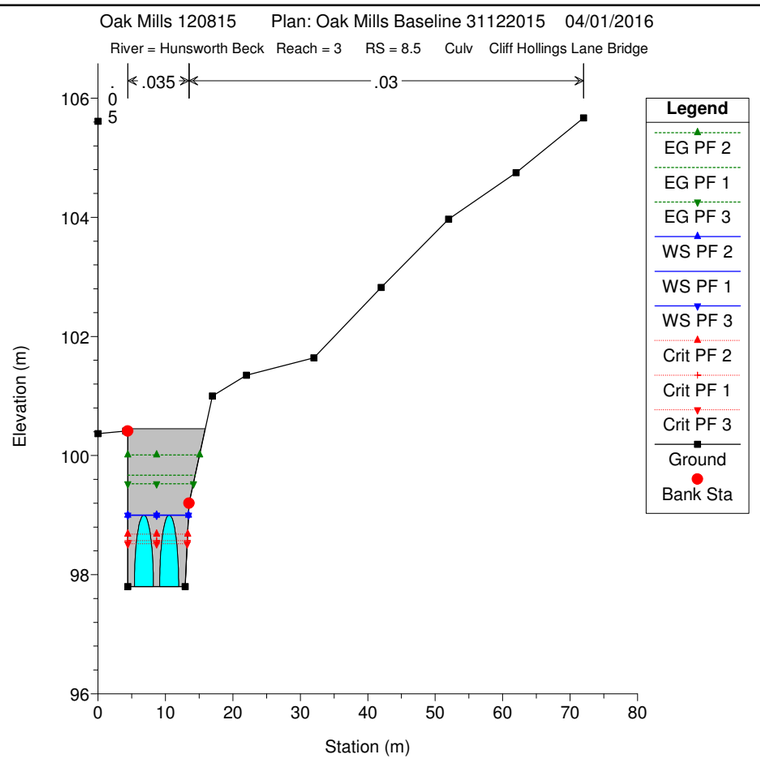

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 11
.035
.035
.035
Legend
EG PF 2
EG PF 1
EG PF 3
Crit PF 2
Crit PF 1
Crit PF 3
WS PF 2
WS PF 1
WS PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

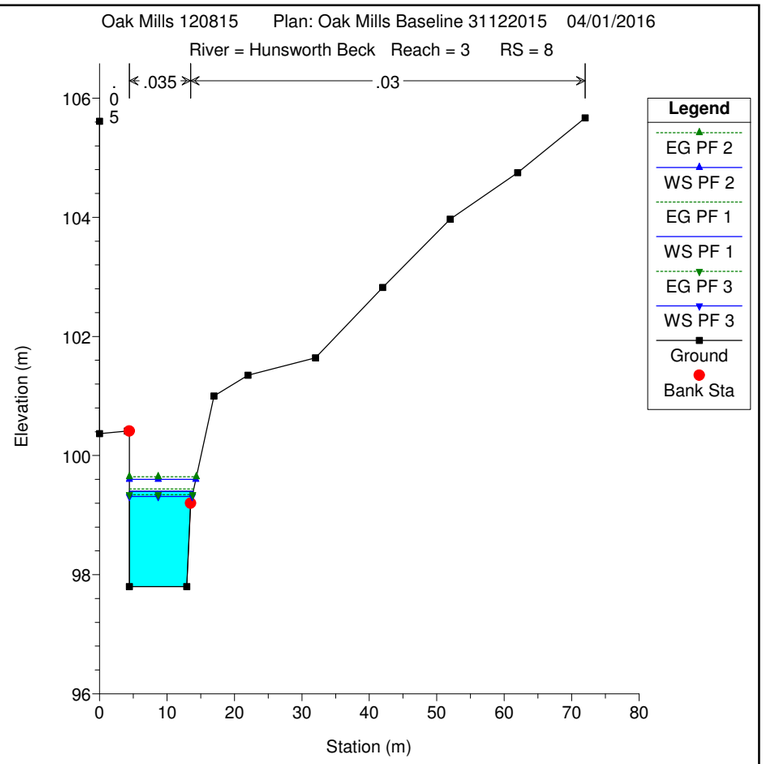

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 10
.035
.035
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

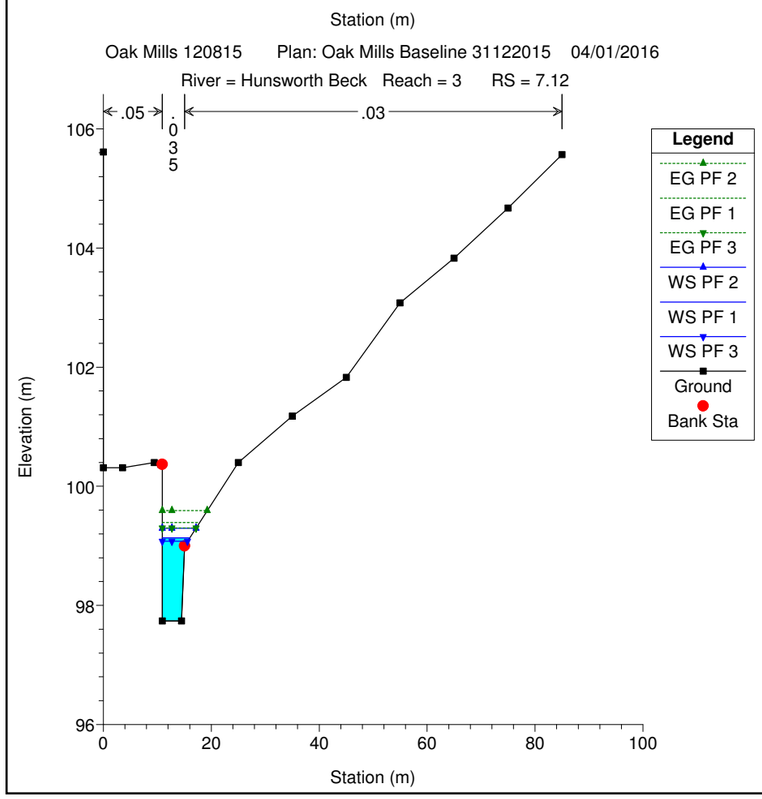

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 2 RS = 9
.035
.035
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

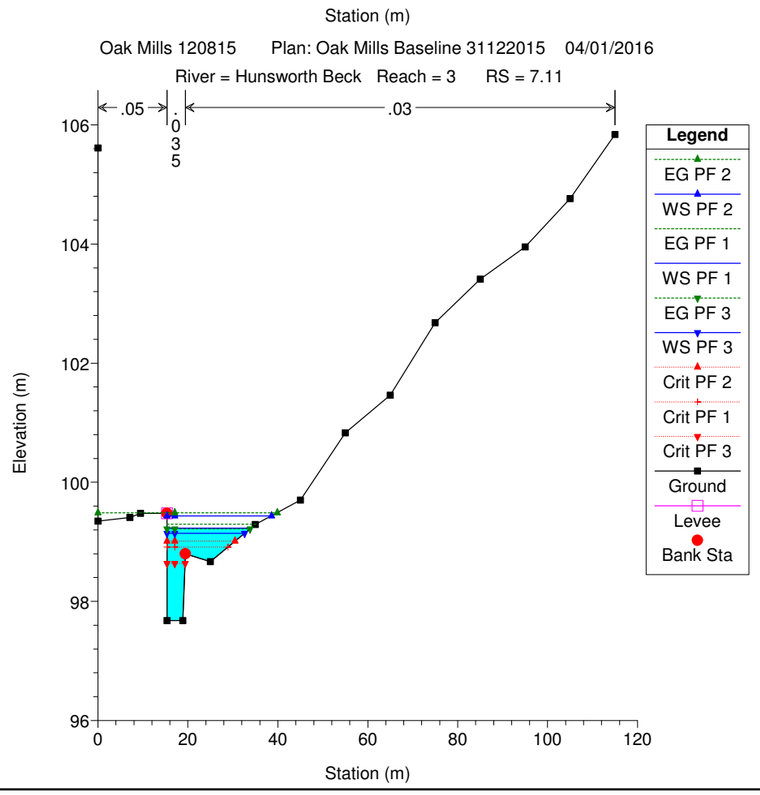

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 8.7
.05
.035
.035
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

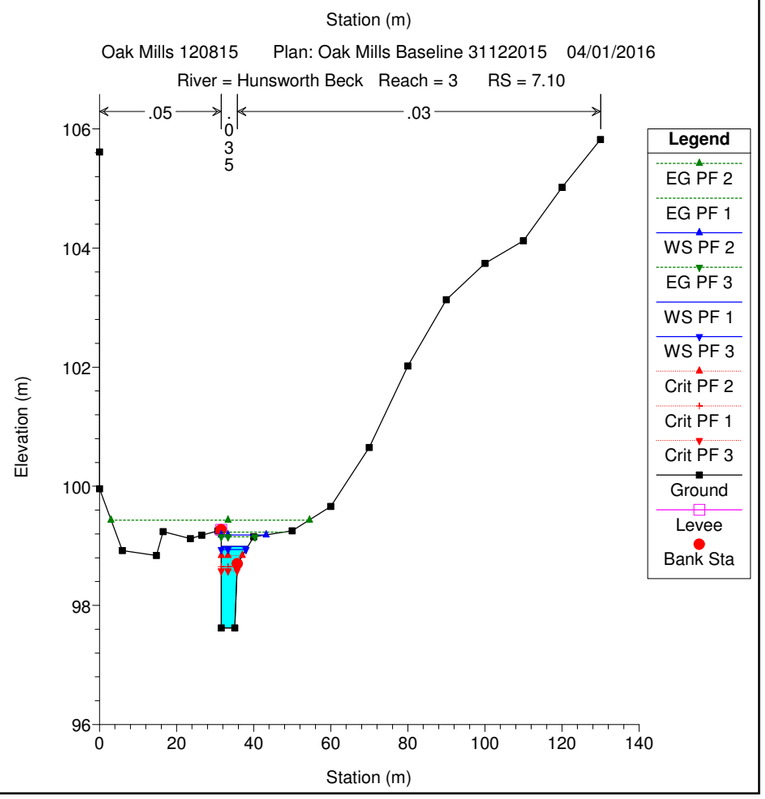

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 8.5 Culv Cliff Hollings Lane Bridge
.05
.035
.035
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

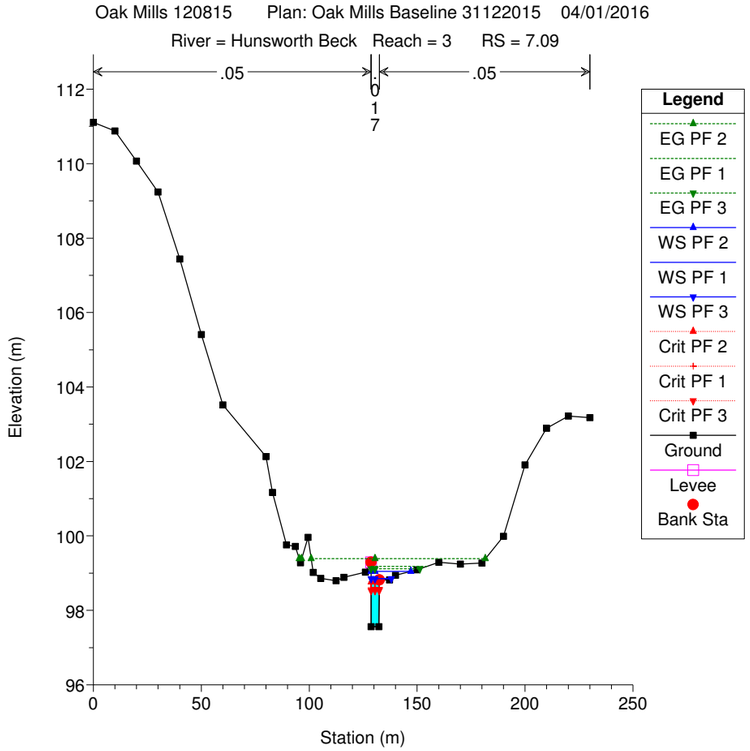

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 8.5 Culv Cliff Hollings Lane Bridge
.05
.035
.03
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

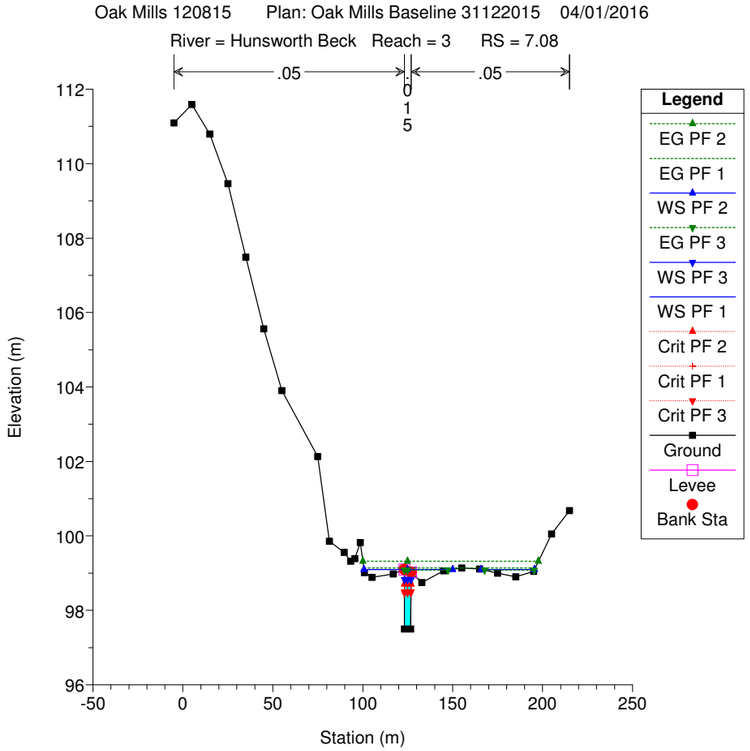

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 8
.05
.035
.03
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Ground
Bank Sta

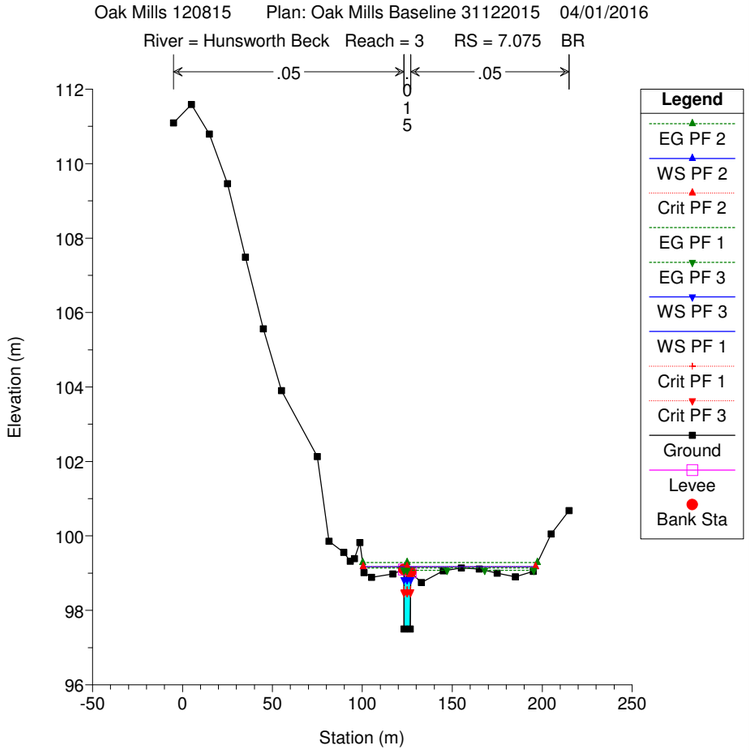

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.12
.05
.035
.03
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Ground
Bank Sta

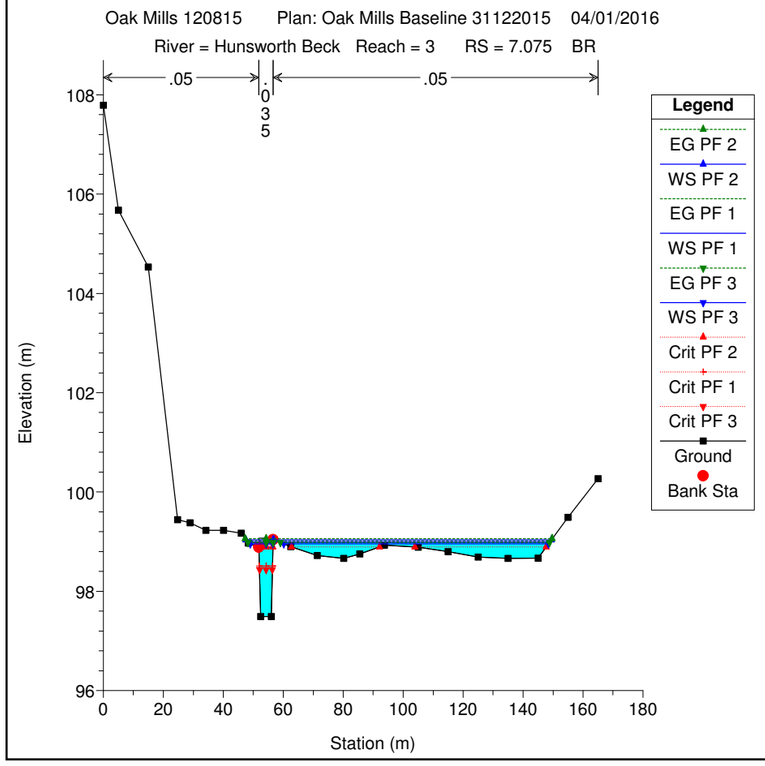

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.11
.05
.035
.03
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta

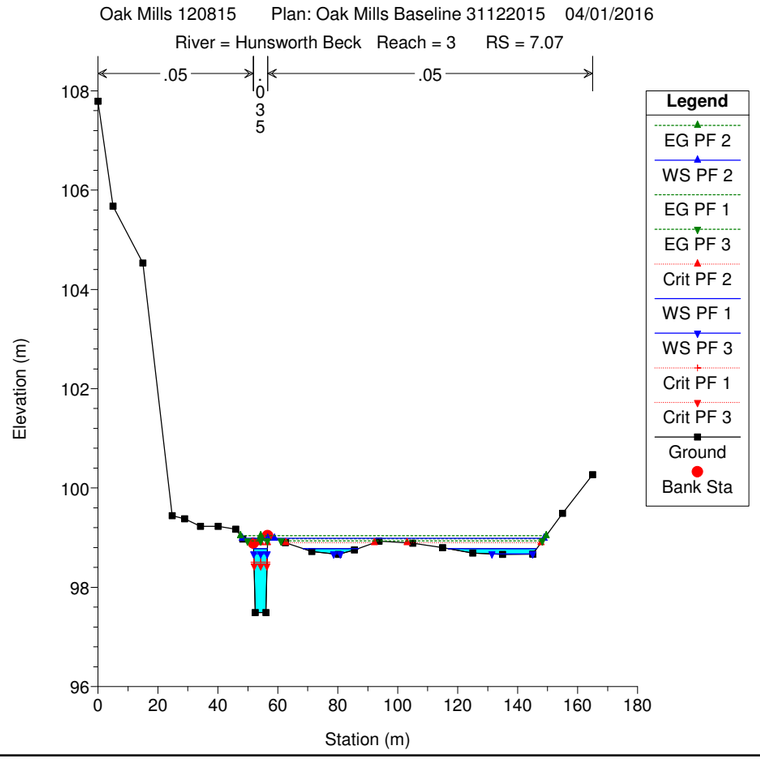

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.10
.05
.035
.03
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta

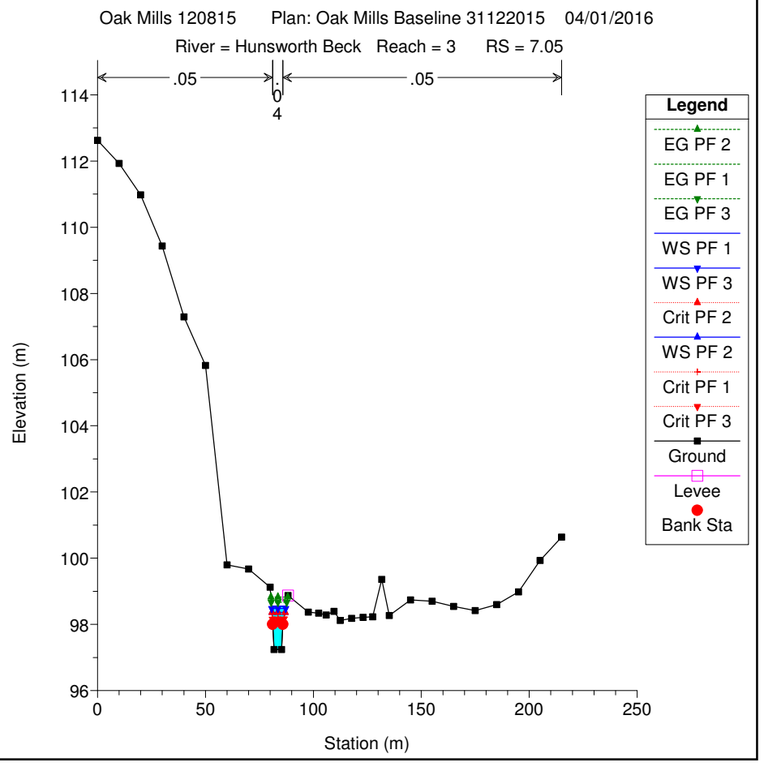

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.09
.05
.05
0
1
7
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

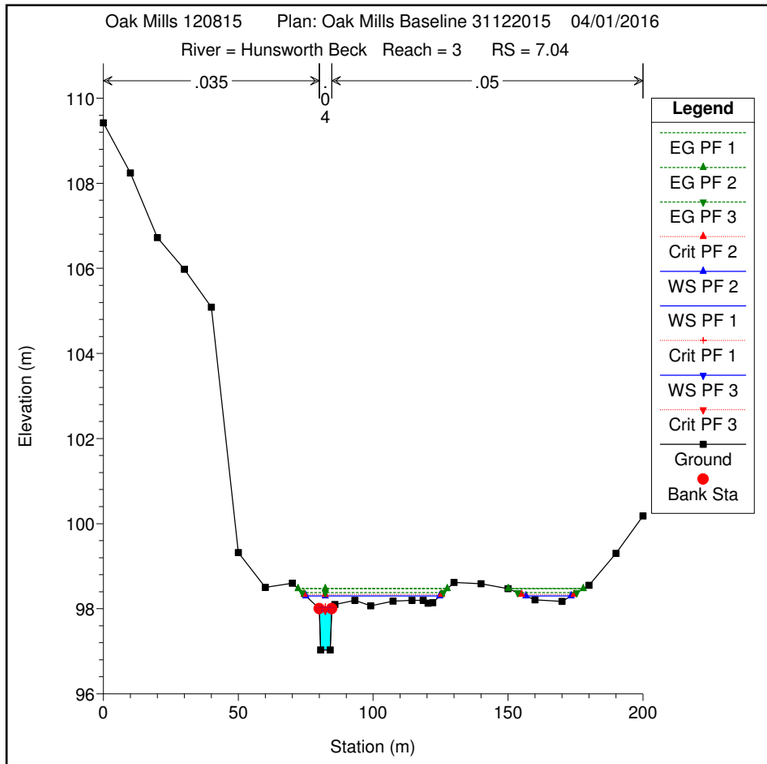

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.08
.05
.05
0
1
5
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 3
WS PF 1
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

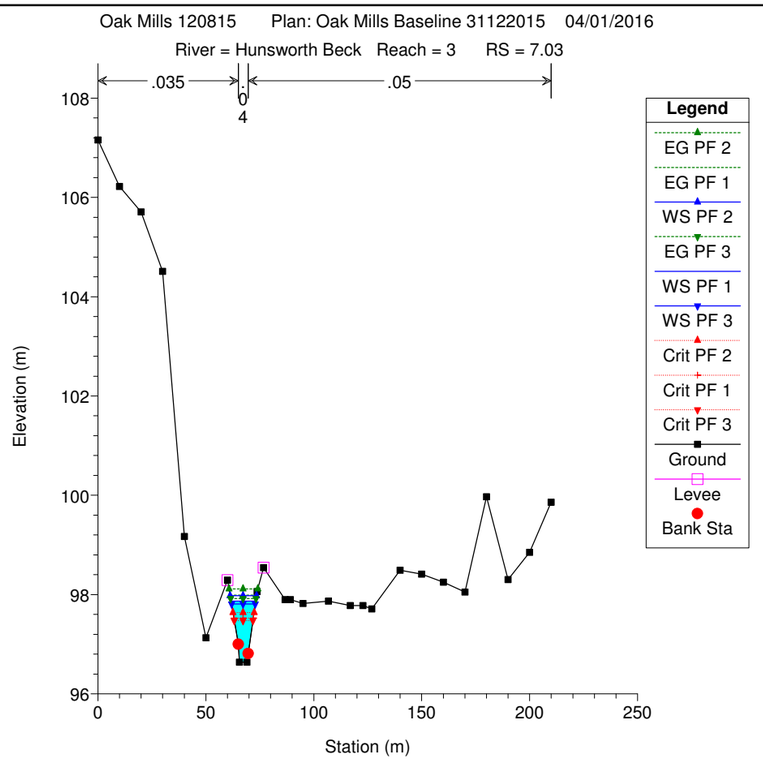

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.075 BR
.05
.05
0
1
5
Legend
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
EG PF 3
WS PF 3
WS PF 1
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

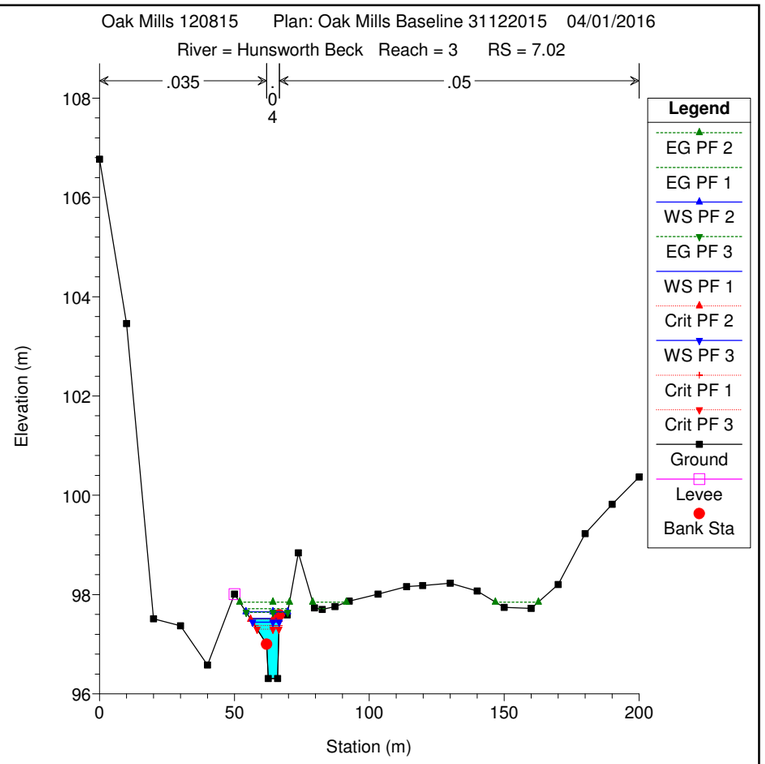

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.075 BR
.05
.05
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

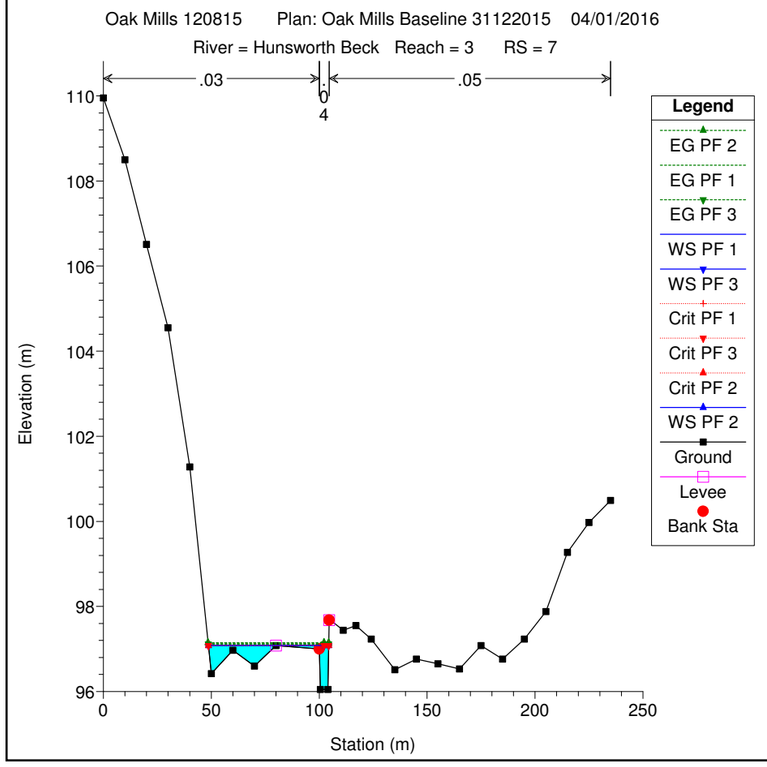

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.07
.05
.05
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
EG PF 3
Crit PF 2
WS PF 1
WS PF 3
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

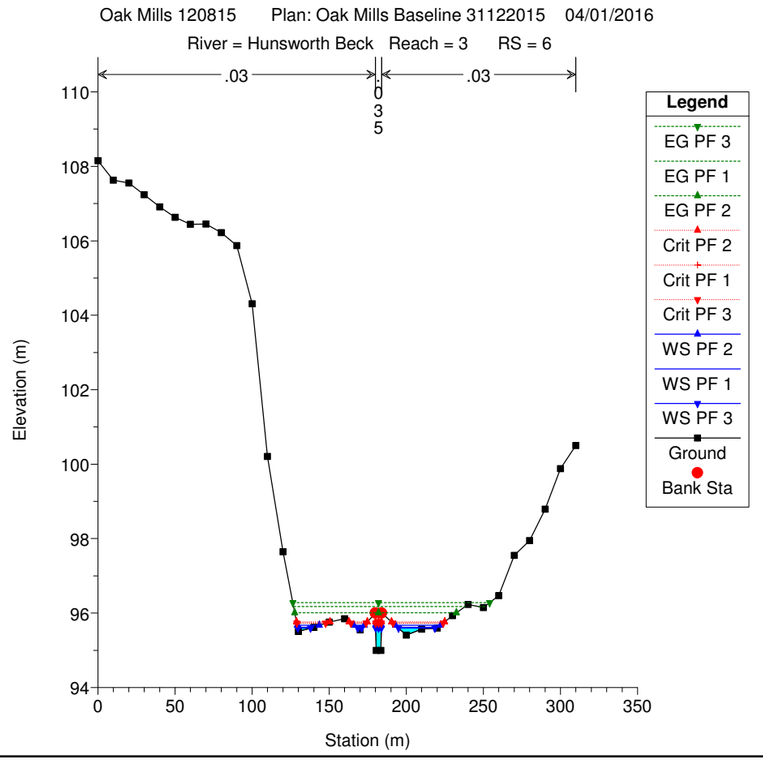

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.05
.05
.05
0
4
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
WS PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

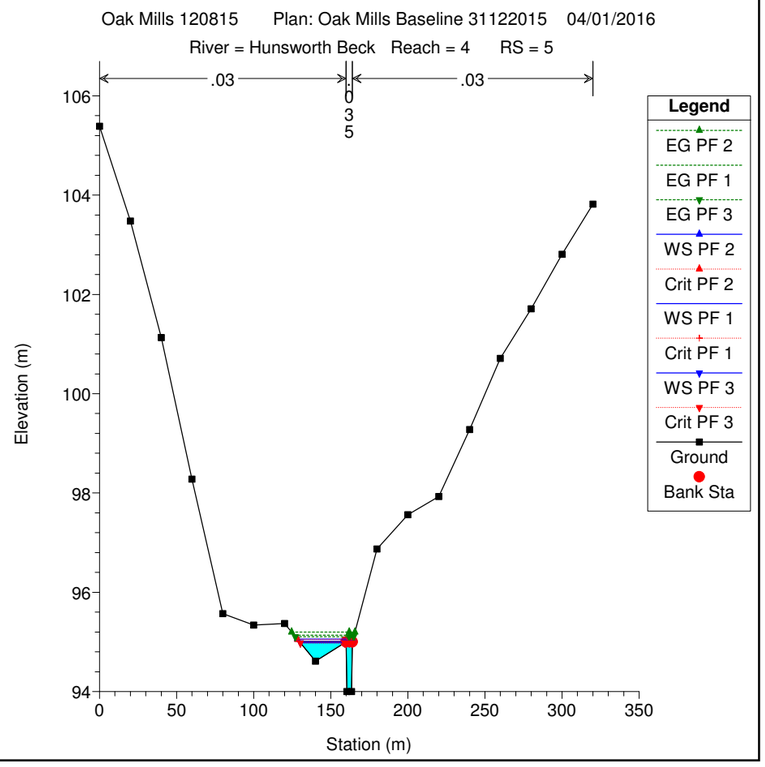

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.04
.035
.05
Legend
EG PF 1
EG PF 2
EG PF 3
Crit PF 2
WS PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

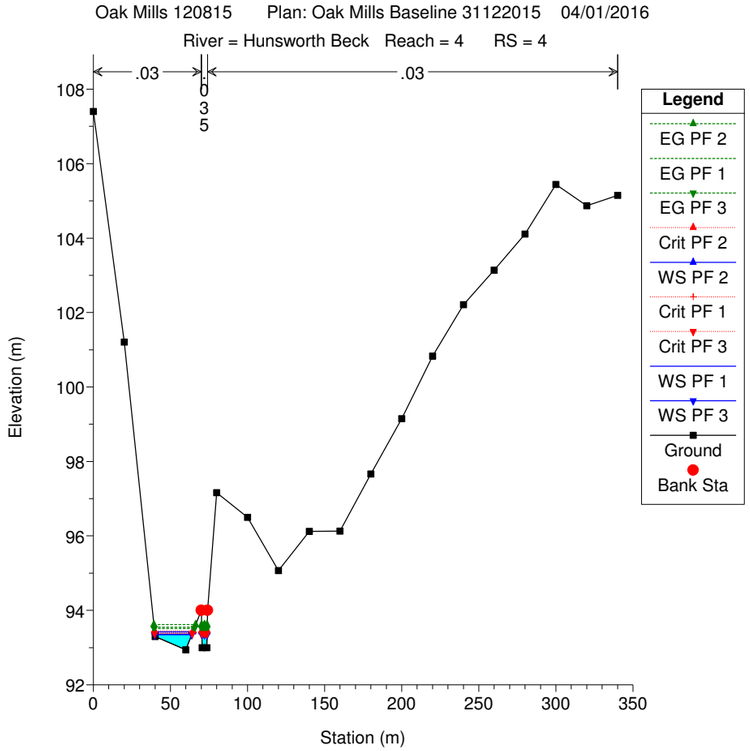

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.03
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

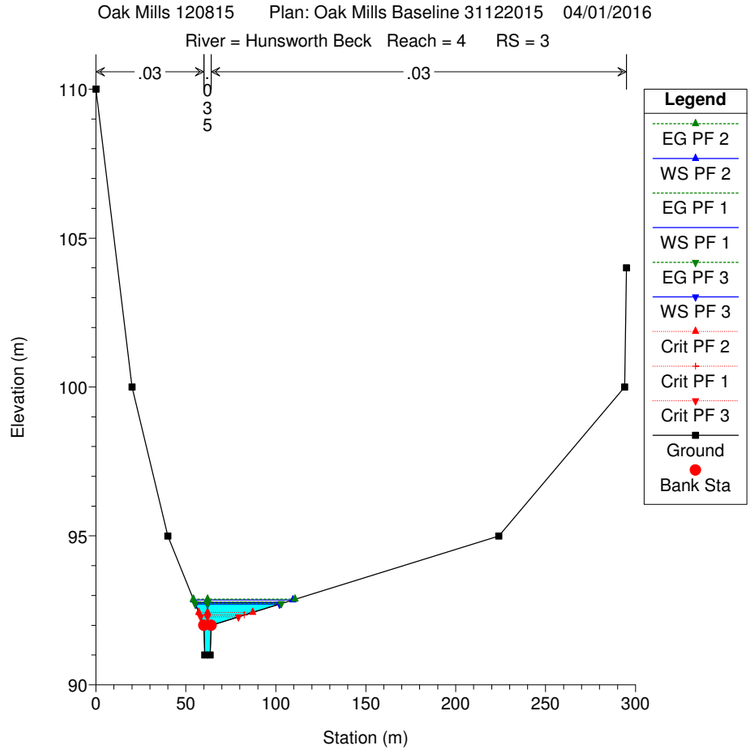

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7.02
.035
.05
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
Crit PF 2
WS PF 3
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

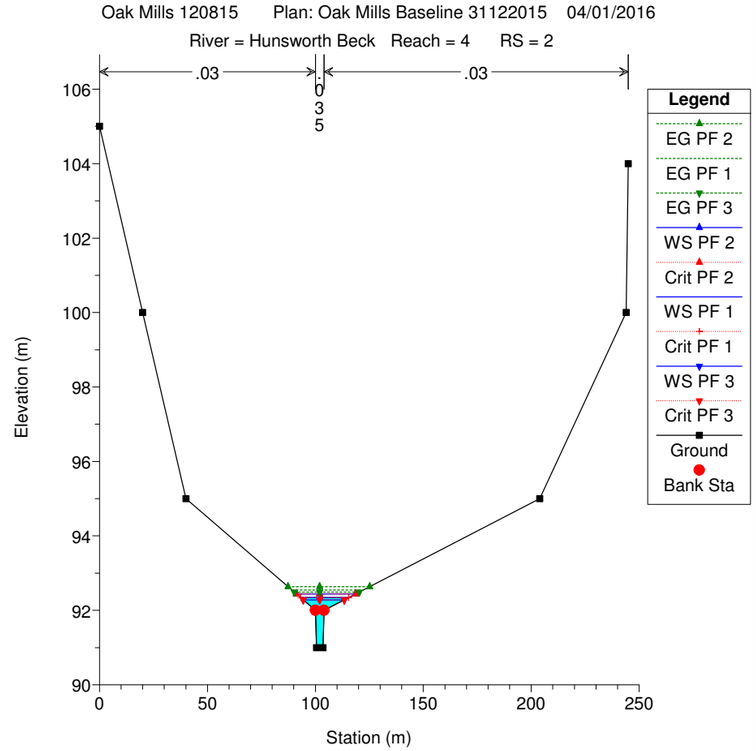

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 7
.03
.05
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 1
WS PF 3
Crit PF 1
Crit PF 3
Crit PF 2
WS PF 2
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

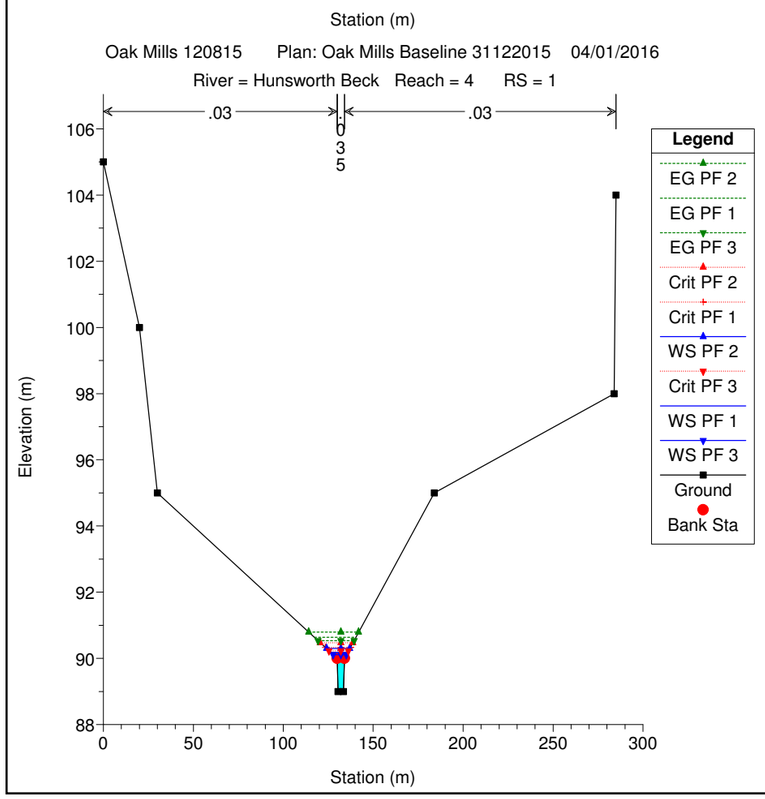

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 3 RS = 6
.03
.03
Legend
EG PF 3
EG PF 1
EG PF 2
Crit PF 2
Crit PF 1
Crit PF 3
WS PF 2
WS PF 1
WS PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

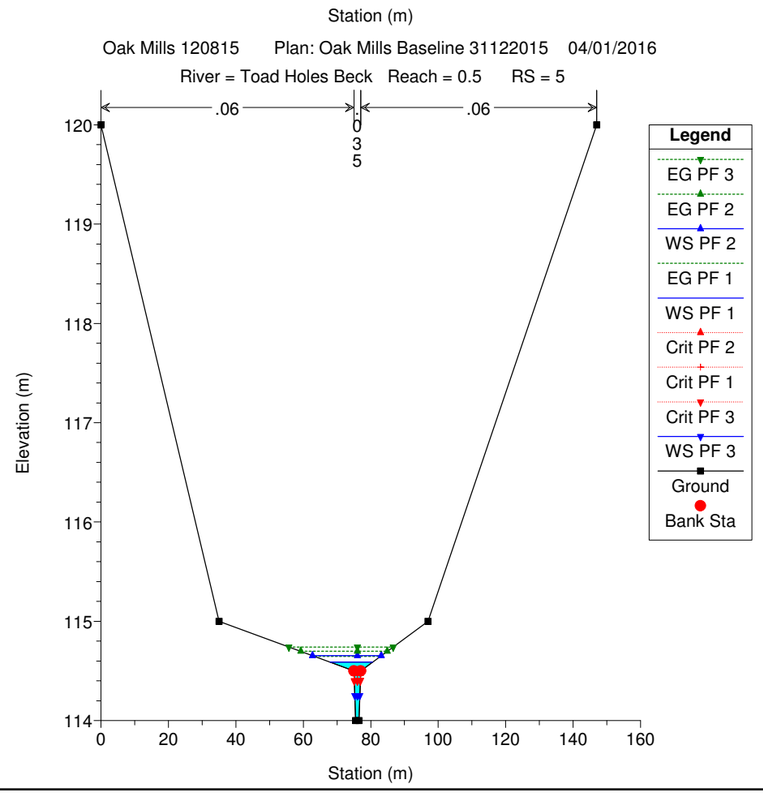

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 4 RS = 5
.03
.03
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

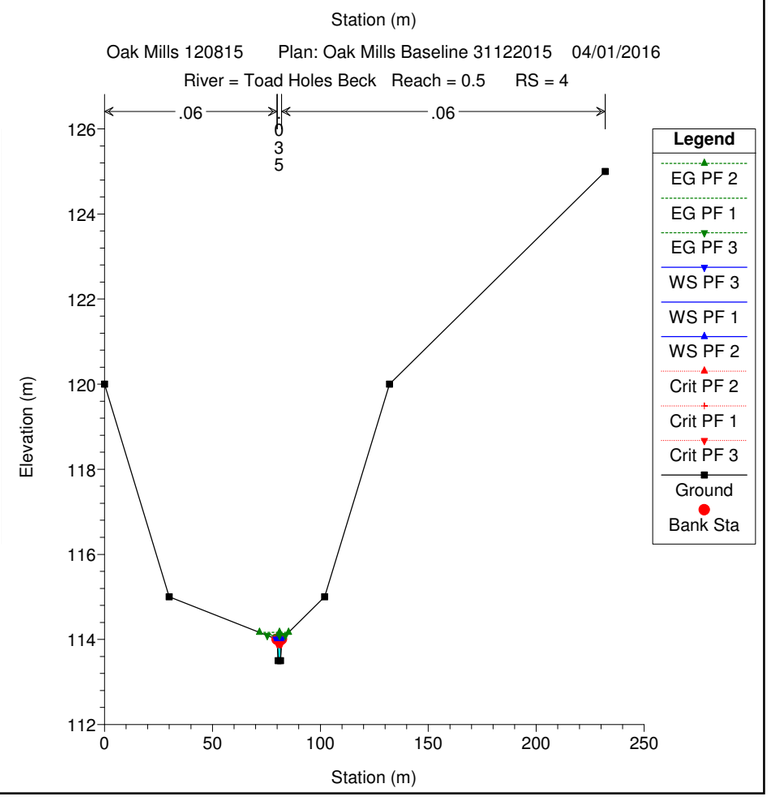

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 4 RS = 4
.03
.03
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
Crit PF 2
WS PF 2
Crit PF 1
Crit PF 3
WS PF 1
WS PF 3
Ground
Bank Sta

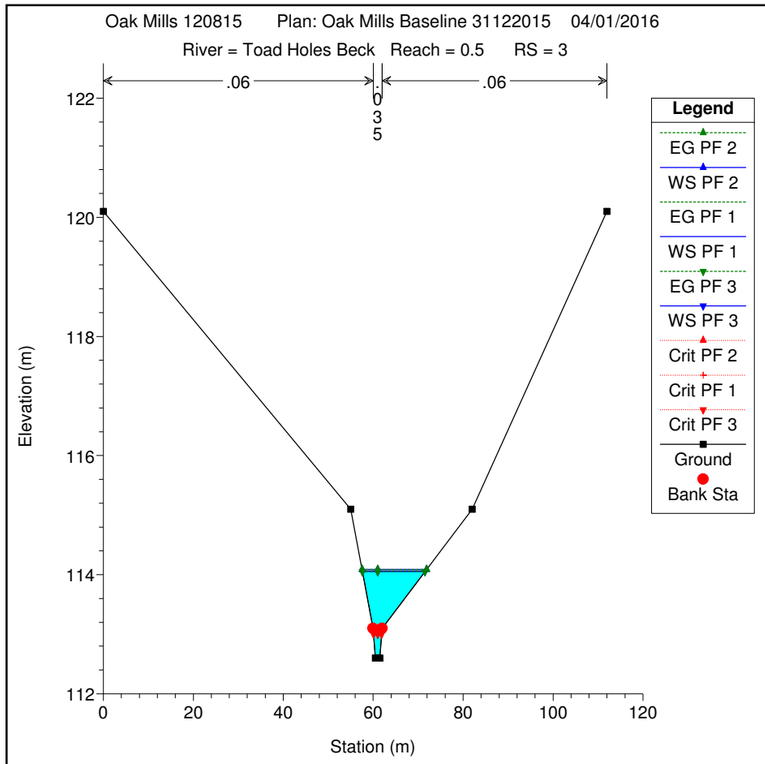

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 4 RS = 3
.03
.03
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

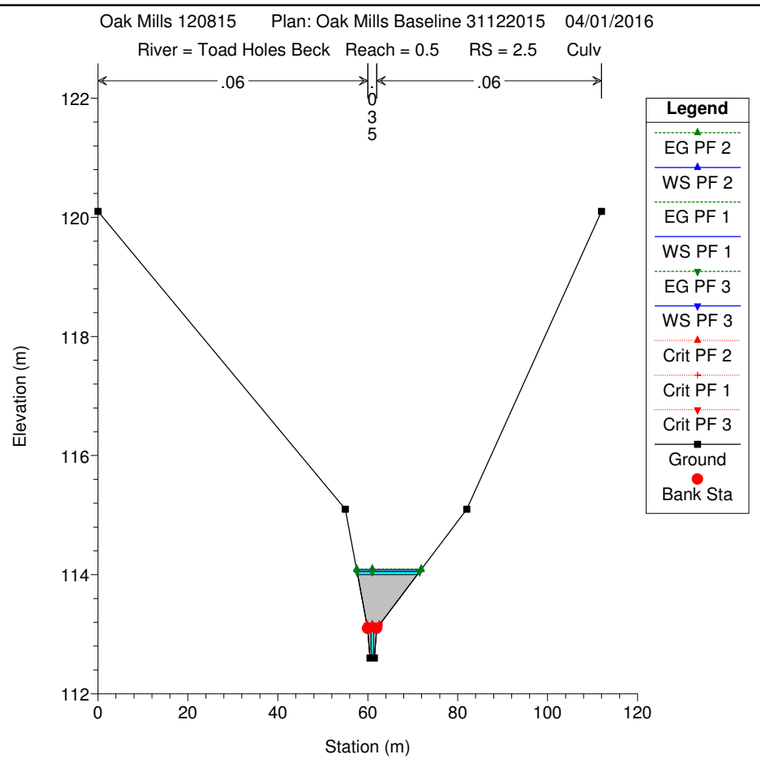

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 4 RS = 2
.03
.03
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta

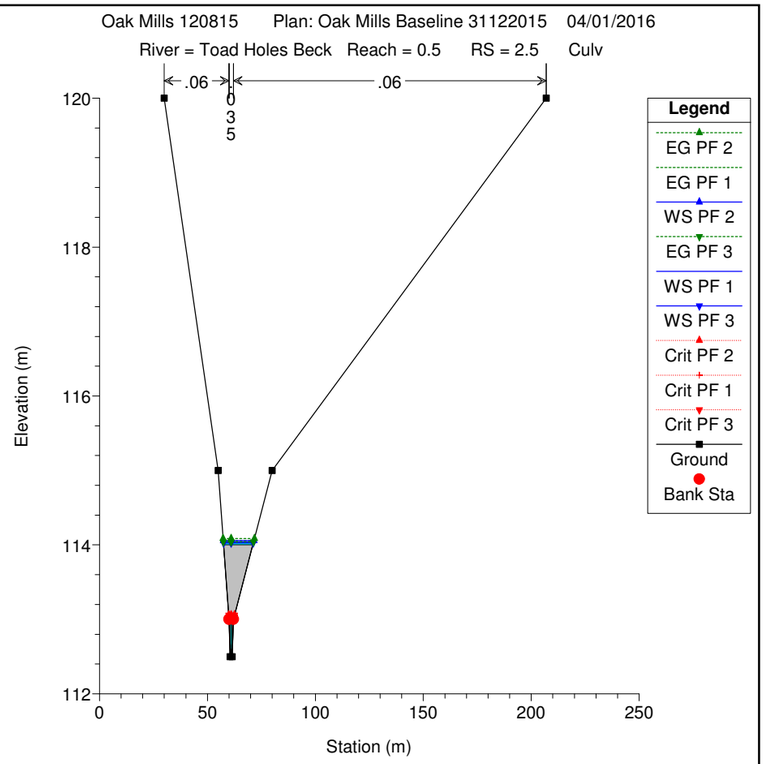

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Hunsworth Beck Reach = 4 RS = 1
.03
.03
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
Crit PF 2
Crit PF 1
WS PF 2
Crit PF 3
WS PF 1
WS PF 3
Ground
Bank Sta

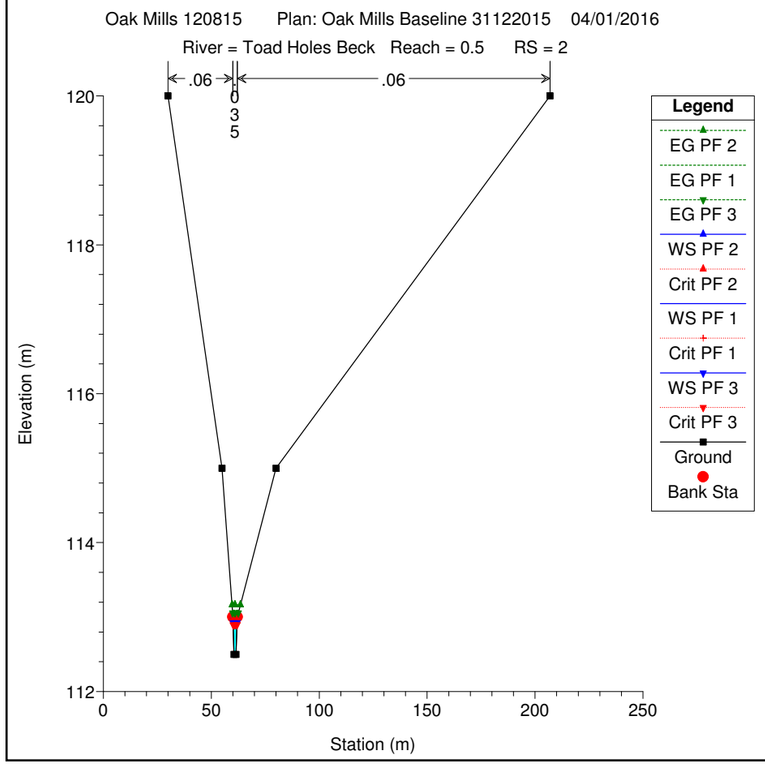

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Toad Holes Beck Reach = 0.5 RS = 5
.06
.06
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 3
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Crit PF 2
Crit PF 1
Crit PF 3
WS PF 3
Ground
Bank Sta

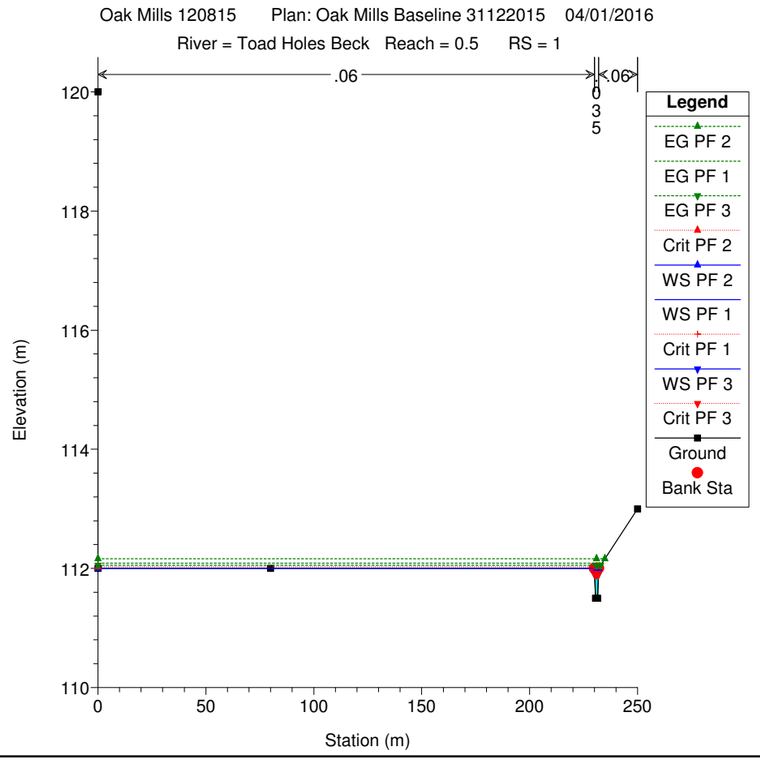

Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Toad Holes Beck Reach = 0.5 RS = 4
.06
.06
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 3
WS PF 1
WS PF 2
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta


Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Toad Holes Beck Reach = 0.5 RS = 3
.06
.06
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)


Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Toad Holes Beck Reach = 0.5 RS = 2.5 Culv
.06
.06
0
3
5
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)


Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Toad Holes Beck Reach = 0.5 RS = 2.5 Culv
.06
.06
0
3
5
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)


Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Toad Holes Beck Reach = 0.5 RS = 2
.06
.06
0
3
5
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)


Oak Mills 120815 Plan: Oak Mills Baseline 31122015 04/01/2016
River = Toad Holes Beck Reach = 0.5 RS = 1
.06
.06
0
3
5
Legend
EG PF 2
EG PF 1
EG PF 3
Crit PF 2
WS PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta
Elevation (m)
Station (m)

HEC-RAS Plan: Base311215

River	Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
				(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
Toad Holes Beck	0.5	5	PF 1	114.65	114.59	0.06	0.53	0.00	0.05	1.02	0.02	12.59
Toad Holes Beck	0.5	5	PF 2	114.70	114.65	0.04	0.52	0.01	0.18	1.08	0.09	20.44
Toad Holes Beck	0.5	5	PF 3	114.74	114.25	0.49				0.97		1.50
Toad Holes Beck	0.5	4	PF 1	114.11	114.01	0.10	0.02	0.03	0.00	1.09	0.00	2.47
Toad Holes Beck	0.5	4	PF 2	114.16	113.99	0.17	0.02	0.05		1.35		1.99
Toad Holes Beck	0.5	4	PF 3	114.09	114.01	0.08	0.01	0.02	0.00	0.97	0.00	2.72
Toad Holes Beck	0.5	3	PF 1	114.06	114.06	0.00			0.09	0.64	0.37	14.01
Toad Holes Beck	0.5	3	PF 2	114.09	114.09	0.00			0.11	0.77	0.46	14.35
Toad Holes Beck	0.5	3	PF 3	114.05	114.05	0.00			0.08	0.57	0.32	13.90
Toad Holes Beck	0.5	2.5		Culvert								
Toad Holes Beck	0.5	2	PF 1	113.09	112.95	0.14	1.00	0.00		1.09		1.90
Toad Holes Beck	0.5	2	PF 2	113.16	112.98	0.18	0.42	0.05		1.35		1.96
Toad Holes Beck	0.5	2	PF 3	113.06	112.92	0.13	1.00	0.00		0.97		1.85
Toad Holes Beck	0.5	1	PF 1	112.09	111.93	0.16	0.00	0.05		1.09		1.85
Toad Holes Beck	0.5	1	PF 2	112.16	112.00	0.16	1.00	0.01	0.01	1.34	0.00	232.03
Toad Holes Beck	0.5	1	PF 3	112.05	111.90	0.16	0.00	0.05		0.97		1.79
Hunsworth Beck	1	17	PF 1	114.22	113.60	0.62				6.92		3.60
Hunsworth Beck	1	17	PF 2	114.37	113.70	0.67				8.52		3.70
Hunsworth Beck	1	17	PF 3	114.23	113.50	0.73				6.17		3.50
Hunsworth Beck	1	16	PF 1	110.06	110.05	0.01	0.00	0.00	1.99	3.92	1.01	34.80
Hunsworth Beck	1	16	PF 2	110.09	110.08	0.01	0.00	0.00	2.53	4.70	1.29	35.32
Hunsworth Beck	1	16	PF 3	110.04	110.04	0.01	0.00	0.00	1.75	3.54	0.88	34.57
Hunsworth Beck	1	15	PF 1	110.05	110.05	0.00			2.97	1.70	2.25	75.35
Hunsworth Beck	1	15	PF 2	110.09	110.09	0.00			3.66	2.07	2.79	76.21
Hunsworth Beck	1	15	PF 3	110.04	110.04	0.00			2.65	1.52	2.00	74.97
Hunsworth Beck	1	14.9		Culvert								
Hunsworth Beck	1	14.8	PF 1	110.05	110.05	0.00	0.00	0.00	3.10	1.35	2.48	94.07
Hunsworth Beck	1	14.8	PF 2	110.08	110.08	0.00	0.00	0.00	3.82	1.65	3.05	94.68
Hunsworth Beck	1	14.8	PF 3	110.04	110.04	0.00	0.00	0.00	2.76	1.21	2.20	93.69
Hunsworth Beck	2	14.5	PF 1	110.05	110.05	0.00			4.56	1.64	1.81	96.48
Hunsworth Beck	2	14.5	PF 2	110.08	110.08	0.00			5.63	2.00	2.24	97.15
Hunsworth Beck	2	14.5	PF 3	110.04	110.04	0.00			4.06	1.47	1.62	96.05
Hunsworth Beck	2	14.2		Culvert								
Hunsworth Beck	2	14	PF 1	110.05	110.05	0.00	0.00	0.00	4.92	1.12	1.96	131.35
Hunsworth Beck	2	14	PF 2	110.07	110.07	0.00	0.00	0.00	6.07	1.38	2.42	131.87
Hunsworth Beck	2	14	PF 3	110.04	110.04	0.00	0.00	0.00	4.39	1.00	1.75	131.06
Hunsworth Beck	2	13	PF 1	110.05	110.05	0.00			7.19	0.41	0.41	167.11
Hunsworth Beck	2	13	PF 2	110.07	110.07	0.00			8.86	0.50	0.51	167.40
Hunsworth Beck	2	13	PF 3	110.04	110.04	0.00			6.41	0.37	0.36	166.95
Hunsworth Beck	2	12.5		Culvert								
Hunsworth Beck	2	12	PF 1	102.74	102.35	0.38	0.73	0.00		8.01		3.85
Hunsworth Beck	2	12	PF 2	102.90	102.48	0.43	0.72	0.00		9.87		3.98
Hunsworth Beck	2	12	PF 3	102.65	102.30	0.35	0.73	0.00		7.14		3.80
Hunsworth Beck	2	11	PF 1	101.21	100.01	1.20	1.44	0.08		8.01		3.51
Hunsworth Beck	2	11	PF 2	101.42	100.09	1.33	1.39	0.09		9.87		3.59
Hunsworth Beck	2	11	PF 3	101.12	99.96	1.16	1.45	0.08		7.14		3.46
Hunsworth Beck	2	10	PF 1	99.88	99.85	0.03	0.00	0.01	3.79	4.22		12.94
Hunsworth Beck	2	10	PF 2	100.32	100.31	0.01	0.00	0.00	6.25	3.61	0.01	61.27
Hunsworth Beck	2	10	PF 3	99.70	99.66	0.04	0.00	0.01	3.06	4.08		11.48
Hunsworth Beck	2	9	PF 1	99.87	99.87	0.00	0.00	0.00	7.11	0.85	0.05	45.13
Hunsworth Beck	2	9	PF 2	100.31	100.31	0.00	0.00	0.00	8.73	1.04	0.10	62.05
Hunsworth Beck	2	9	PF 3	99.69	99.69	0.00	0.00	0.00	6.37	0.75	0.03	33.03
Hunsworth Beck	3	8.7	PF 1	99.87	99.86	0.01			0.77	9.92	1.45	25.58
Hunsworth Beck	3	8.7	PF 2	100.31	100.31	0.01			1.30	11.23	2.41	38.74
Hunsworth Beck	3	8.7	PF 3	99.69	99.67	0.01			0.57	9.17	1.08	23.58
Hunsworth Beck	3	8.5		Culvert								
Hunsworth Beck	3	8	PF 1	99.44	99.40	0.04	0.03	0.02		12.12	0.01	9.48
Hunsworth Beck	3	8	PF 2	99.64	99.60	0.04	0.03	0.03		14.91	0.04	9.85
Hunsworth Beck	3	8	PF 3	99.35	99.31	0.03	0.02	0.02		10.82	0.00	9.30
Hunsworth Beck	3	7.12	PF 1	99.39	99.14	0.26	0.04	0.06		12.10	0.03	5.09
Hunsworth Beck	3	7.12	PF 2	99.59	99.30	0.29	0.03	0.07		14.69	0.26	6.25
Hunsworth Beck	3	7.12	PF 3	99.30	99.08	0.22	0.04	0.04		10.81	0.01	4.68
Hunsworth Beck	3	7.11	PF 1	99.30	99.23	0.07	0.05	0.02		7.95	4.18	18.66
Hunsworth Beck	3	7.11	PF 2	99.49	99.44	0.05	0.04	0.02		8.13	6.82	23.24
Hunsworth Beck	3	7.11	PF 3	99.22	99.14	0.08	0.05	0.01		7.72	3.10	17.27

HEC-RAS Plan: Base311215 (Continued)

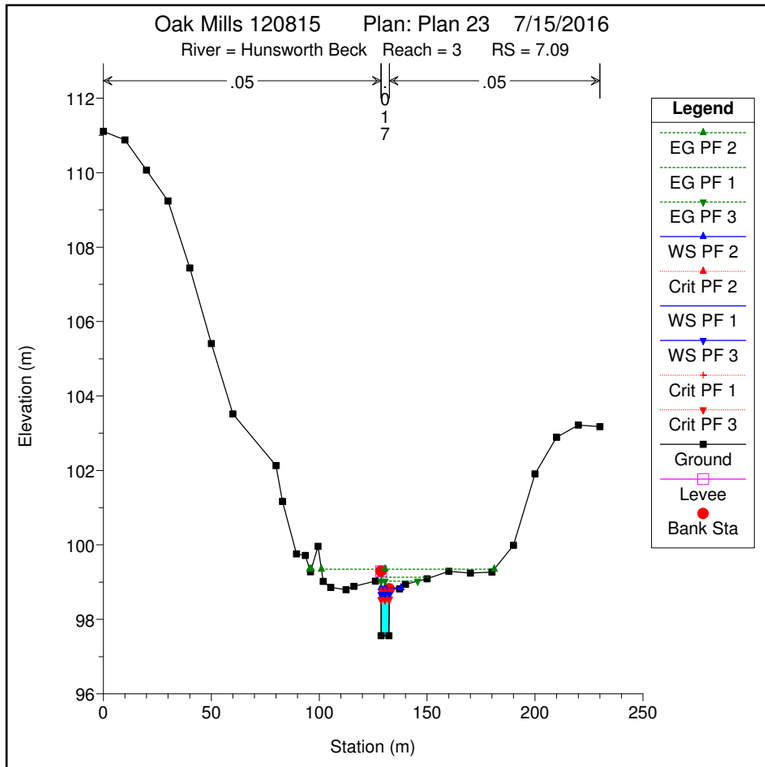
River	Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
				(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
Hunsworth Beck	3	7.10	PF 1	99.23	98.99	0.24	0.04	0.01		11.82	0.31	6.93
Hunsworth Beck	3	7.10	PF 2	99.43	99.18	0.25	0.04	0.01		14.06	0.89	11.70
Hunsworth Beck	3	7.10	PF 3	99.15	98.94	0.21	0.03	0.00		10.64	0.18	6.44
Hunsworth Beck	3	7.09	PF 1	99.18	98.85	0.33	0.04	0.00		12.11	0.02	9.33
Hunsworth Beck	3	7.09	PF 2	99.39	99.05	0.34	0.03	0.04		14.47	0.48	18.39
Hunsworth Beck	3	7.09	PF 3	99.11	98.85	0.26	0.03	0.00		10.80	0.02	9.33
Hunsworth Beck	3	7.08	PF 1	99.14	98.82	0.32	0.00	0.00		12.13		3.79
Hunsworth Beck	3	7.08	PF 2	99.32	99.10	0.22	0.00	0.03	0.55	13.07	1.33	78.94
Hunsworth Beck	3	7.08	PF 3	99.08	98.83	0.25	0.00	0.00		10.82		3.79
Hunsworth Beck	3	7.075		Bridge								
Hunsworth Beck	3	7.07	PF 1	98.98	98.78	0.20	0.22	0.00		10.89	1.24	52.59
Hunsworth Beck	3	7.07	PF 2	99.04	98.99	0.06	0.17	0.04	0.03	8.40	6.52	98.43
Hunsworth Beck	3	7.07	PF 3	98.94	98.67	0.27	0.25	0.02		10.81	0.01	20.17
Hunsworth Beck	3	7.05	PF 1	98.76	98.55	0.21	0.26	0.02	0.09	11.78	0.27	6.80
Hunsworth Beck	3	7.05	PF 2	98.83	98.37	0.46	0.22	0.10	0.05	14.76	0.15	6.10
Hunsworth Beck	3	7.05	PF 3	98.67	98.48	0.19	0.27	0.02	0.06	10.58	0.18	6.51
Hunsworth Beck	3	7.04	PF 1	98.48	98.04	0.43	0.29	0.09	0.00	12.12	0.00	5.85
Hunsworth Beck	3	7.04	PF 2	98.47	98.30	0.17	0.27	0.09	0.53	11.19	3.23	66.46
Hunsworth Beck	3	7.04	PF 3	98.38	97.96	0.42	0.29	0.09		10.82		4.59
Hunsworth Beck	3	7.03	PF 1	97.99	97.87	0.12	0.26	0.01	1.42	9.29	1.42	11.49
Hunsworth Beck	3	7.03	PF 2	98.12	97.98	0.14	0.26	0.01	2.00	11.05	1.90	12.28
Hunsworth Beck	3	7.03	PF 3	97.92	97.81	0.11	0.27	0.01	1.16	8.45	1.21	11.06
Hunsworth Beck	3	7.02	PF 1	97.71	97.52	0.20	0.54	0.05	1.65	10.48		10.72
Hunsworth Beck	3	7.02	PF 2	97.85	97.65	0.20	0.66	0.04	2.92	11.98	0.05	15.51
Hunsworth Beck	3	7.02	PF 3	97.64	97.44	0.20	0.48	0.05	1.14	9.68		9.84
Hunsworth Beck	3	7	PF 1	97.12	97.08	0.04	0.40	0.00	7.19	4.94		55.77
Hunsworth Beck	3	7	PF 2	97.15	97.08	0.07	0.45	0.01	8.86	6.09		55.77
Hunsworth Beck	3	7	PF 3	97.12	97.08	0.04	0.35	0.00	6.41	4.41		55.77
Hunsworth Beck	3	6	PF 1	96.18	95.62	0.56	0.90	0.05	0.75	8.05	3.33	44.33
Hunsworth Beck	3	6	PF 2	96.01	95.67	0.34	1.11	0.03	1.82	7.45	5.68	53.95
Hunsworth Beck	3	6	PF 3	96.28	95.60	0.69	0.77	0.07	0.39	8.16	2.26	37.99
Hunsworth Beck	4	5	PF 1	95.13	95.01	0.12			6.32	6.82	0.00	34.68
Hunsworth Beck	4	5	PF 2	95.20	95.06	0.14	1.39	0.00	8.97	7.73	0.00	36.20
Hunsworth Beck	4	5	PF 3	95.10	94.98	0.12	1.37	0.00	5.07	6.49		32.79
Hunsworth Beck	4	4	PF 1	93.55	93.36	0.19	1.58	0.01	10.91	2.23		27.52
Hunsworth Beck	4	4	PF 2	93.62	93.42	0.19	1.57	0.01	14.13	2.58		28.30
Hunsworth Beck	4	4	PF 3	93.51	93.34	0.17	1.59	0.00	9.52	2.04		27.27
Hunsworth Beck	4	3	PF 1	92.78	92.76	0.02	0.22	0.02	0.85	5.48	6.82	49.65
Hunsworth Beck	4	3	PF 2	92.87	92.85	0.02	0.22	0.02	1.17	6.12	9.42	55.17
Hunsworth Beck	4	3	PF 3	92.73	92.71	0.02	0.22	0.02	0.70	5.18	5.68	46.72
Hunsworth Beck	4	2	PF 1	92.54	92.34	0.20	1.42	0.01	0.96	10.59	1.60	22.22
Hunsworth Beck	4	2	PF 2	92.63	92.44	0.19	1.31	0.01	1.85	11.77	3.09	27.58
Hunsworth Beck	4	2	PF 3	92.49	92.28	0.21	1.59	0.01	0.58	10.00	0.97	18.98
Hunsworth Beck	4	1	PF 1	90.63	90.17	0.46	1.88	0.03	0.24	12.77	0.12	9.22
Hunsworth Beck	4	1	PF 2	90.79	90.30	0.50	1.81	0.03	1.00	15.21	0.50	12.88
Hunsworth Beck	4	1	PF 3	90.54	90.11	0.42	1.93	0.02	0.08	11.44	0.04	7.40
High Royds Beck	1	7	PF 1	121.54	119.55	1.99				4.12		2.40
High Royds Beck	1	7	PF 2	121.75	119.60	2.15				5.08		2.47
High Royds Beck	1	7	PF 3	121.85	119.50	2.35				3.68		2.33
High Royds Beck	1	6	PF 1	108.42	108.32	0.10	2.23	0.00	0.06	4.00	0.06	4.59
High Royds Beck	1	6	PF 2	108.53	108.41	0.12	2.29	0.00	0.13	4.83	0.13	5.07
High Royds Beck	1	6	PF 3	108.36	108.27	0.09	2.20	0.00	0.04	3.60	0.04	4.33
High Royds Beck	1	5	PF 1	106.19	106.05	0.14	1.45	0.00	0.94	3.10	0.08	11.79
High Royds Beck	1	5	PF 2	106.24	106.10	0.14	1.38	0.00	1.41	3.55	0.12	13.25
High Royds Beck	1	5	PF 3	106.16	106.02	0.13	1.53	0.01	0.74	2.87	0.06	11.02
High Royds Beck	1	4	PF 1	104.44	104.19	0.25	1.73	0.01	0.22	3.81	0.10	6.75
High Royds Beck	1	4	PF 2	104.52	104.26	0.26	1.71	0.01	0.51	4.34	0.23	8.58
High Royds Beck	1	4	PF 3	104.39	104.15	0.25	1.75	0.01	0.11	3.52	0.05	5.71
High Royds Beck	1	3	PF 1	100.48	100.44	0.04			0.28	1.47	2.37	46.33
High Royds Beck	1	3	PF 2	100.49	100.42	0.07			0.30	1.92	2.87	40.70
High Royds Beck	1	3	PF 3	100.45	100.41	0.05			0.19	1.45	2.04	36.63
High Royds Beck	1	2.5		Culvert								
High Royds Beck	1	2	PF 1	100.29	100.24	0.05	0.24	0.00		1.74	2.38	36.24
High Royds Beck	1	2	PF 2	100.35	100.32	0.03	0.03	0.01	0.01	1.67	3.41	41.31
High Royds Beck	1	2	PF 3	100.27	100.22	0.06	0.24	0.00		1.69	1.99	35.59
High Royds Beck	1	1	PF 1	100.05	99.97	0.08	0.00	0.02	0.47	2.32	1.33	35.19
High Royds Beck	1	1	PF 2	100.31	100.31	0.01	0.00	0.00	1.19	1.37	2.52	61.60

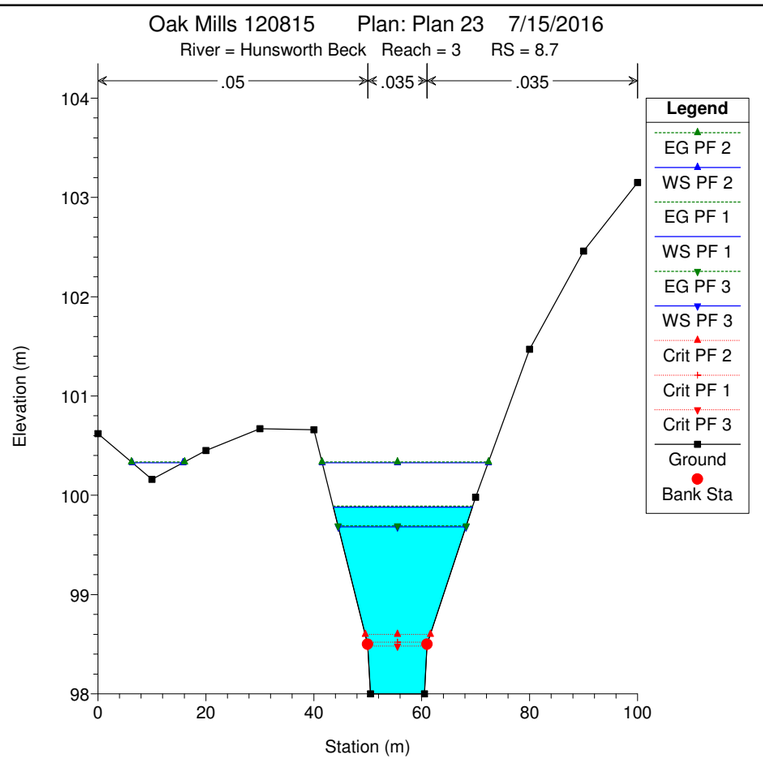
HEC-RAS Plan: Base311215 (Continued)

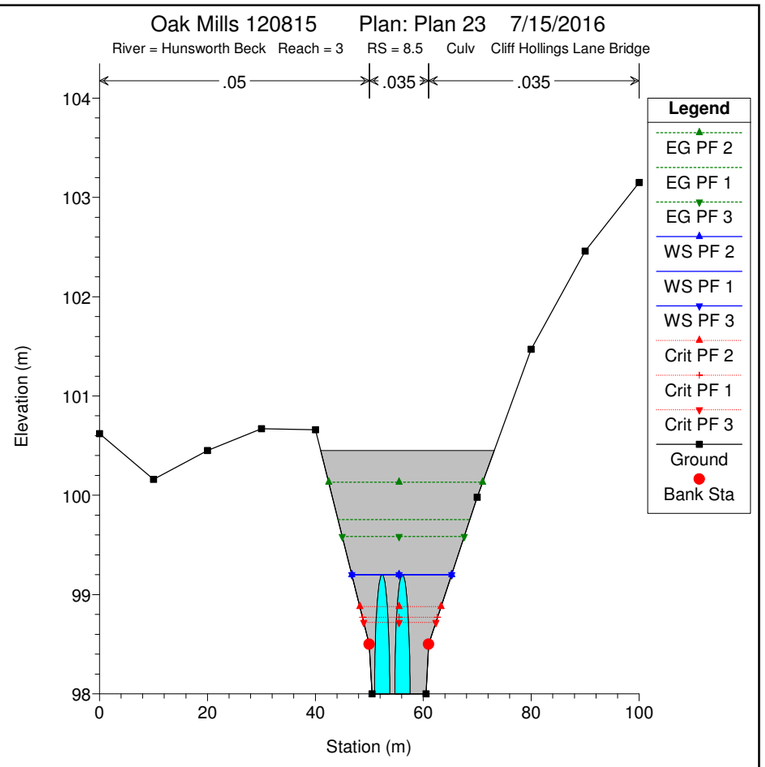
River	Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
				(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)
High Royds Beck	1	1	PF 3	100.03	99.96	0.07	0.00	0.02	0.41	2.14	1.14	34.46
Cockleshaw Beck	1	3	PF 1	115.13	114.90	0.23				1.01		1.38
Cockleshaw Beck	1	3	PF 2	115.37	115.10	0.27				1.76		1.57
Cockleshaw Beck	1	3	PF 3	115.04	114.80	0.24				0.74		1.29
Cockleshaw Beck	1	2	PF 1	105.22	104.81	0.40	9.90	0.02		1.01		1.30
Cockleshaw Beck	1	2	PF 2	105.60	104.90	0.70	9.73	0.04		1.76		1.38
Cockleshaw Beck	1	2	PF 3	105.05	104.79	0.26	9.99	0.00		0.74		1.28
Cockleshaw Beck	1	1	PF 1	95.14	95.00	0.13	0.00	0.00		1.01		1.48
Cockleshaw Beck	1	1	PF 2	95.37	95.09	0.28	10.11	0.13		1.76		1.56
Cockleshaw Beck	1	1	PF 3	95.11	95.05	0.06	0.00	0.01		0.74		1.53

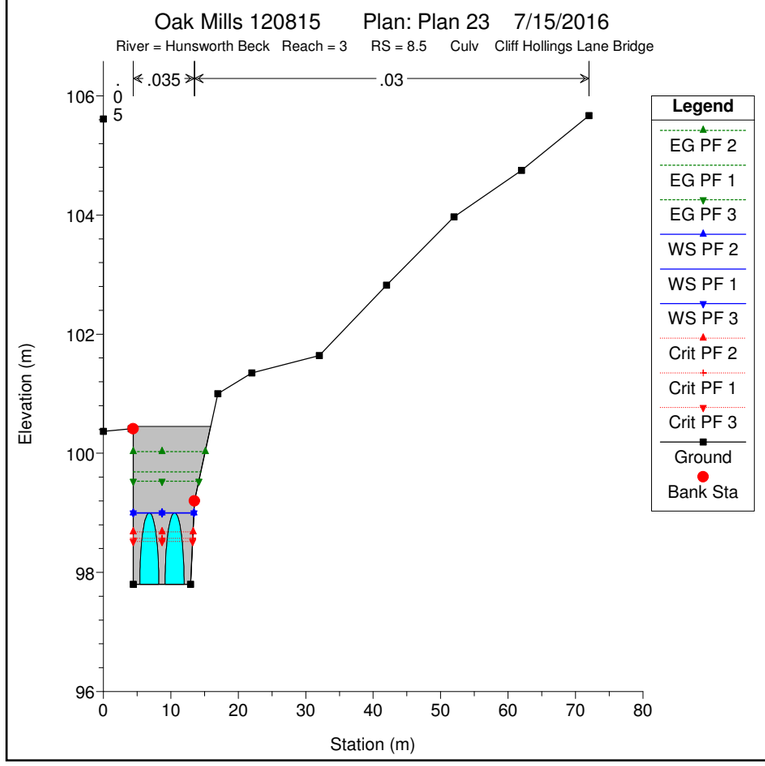
Appendix E4/1

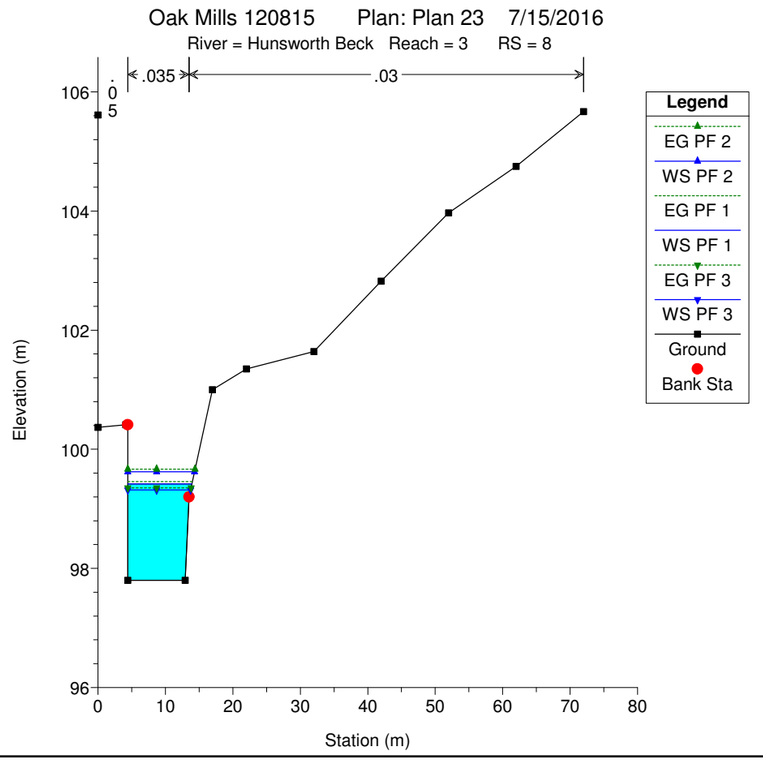
Post development model results

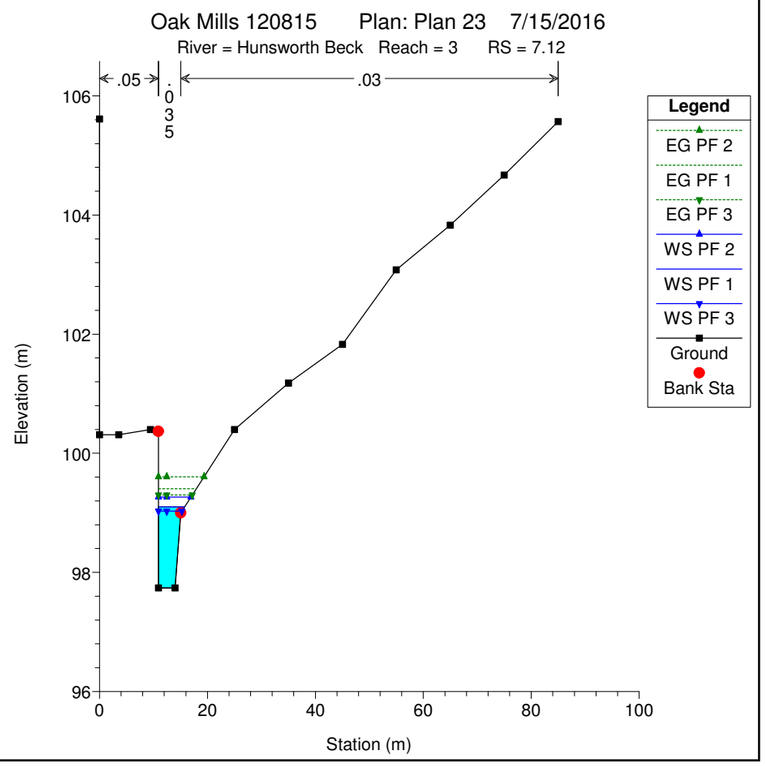

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.09
.05
.05
0
1
7
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
Crit PF 2
WS PF 1
WS PF 3
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta

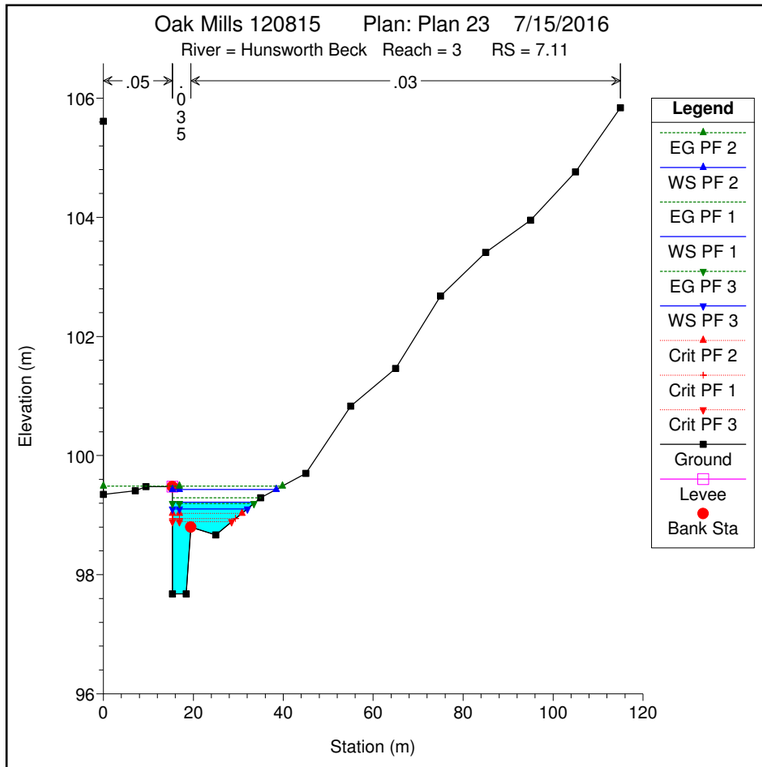

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 8.7
.05
.035
.035
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

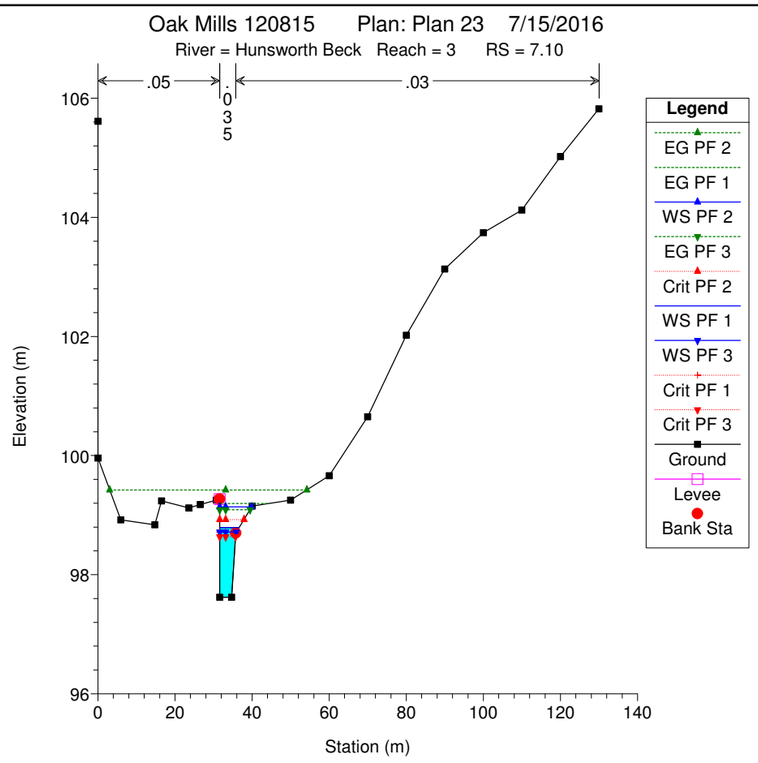

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 8.5 Culv Cliff Hollings Lane Bridge
.05
.035
.035
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

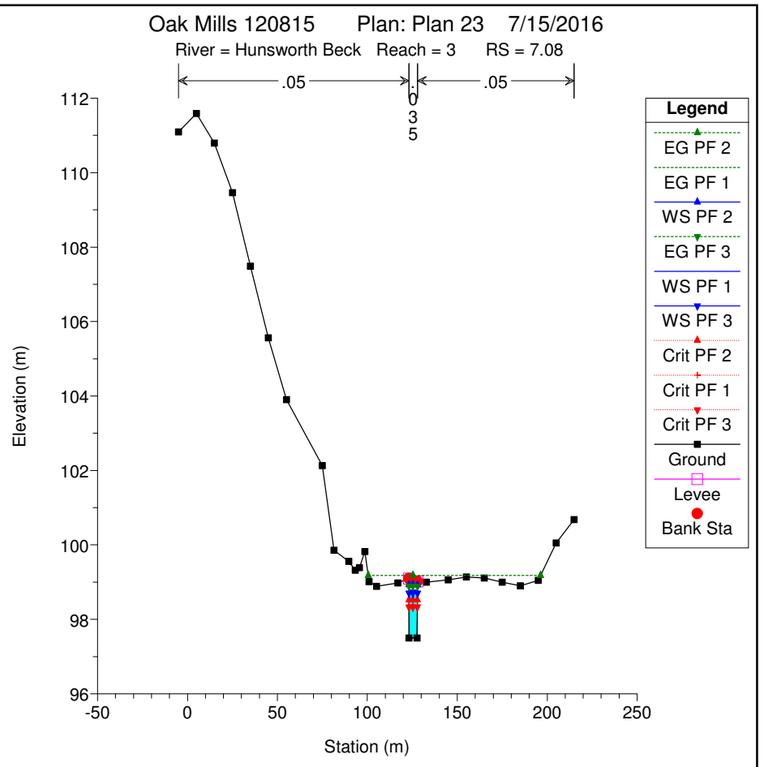

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 8.5 Culv Cliff Hollings Lane Bridge
.035
.03
0
5
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Bank Sta

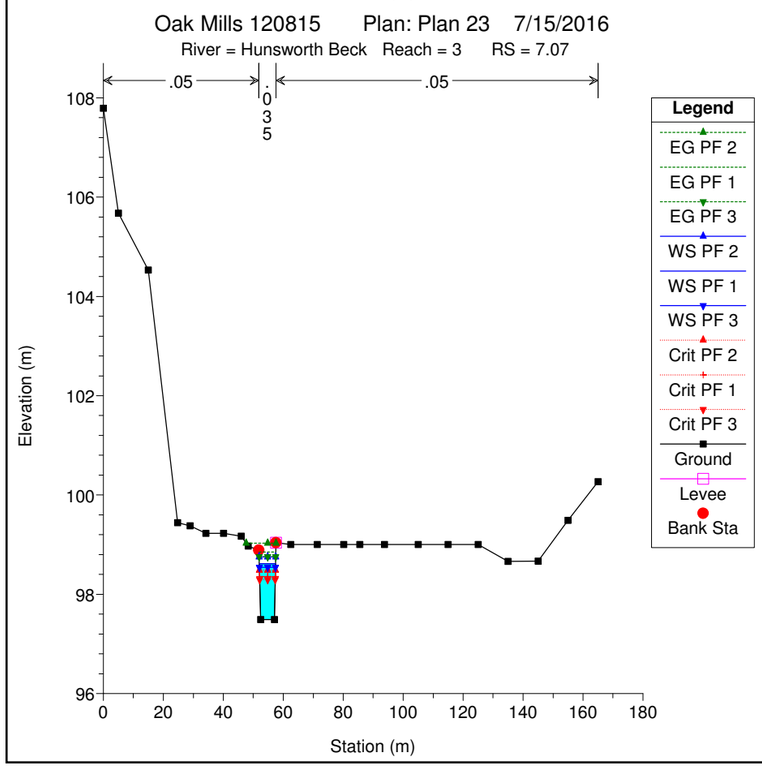

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 8
.035
.03
0
5
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Ground
Bank Sta

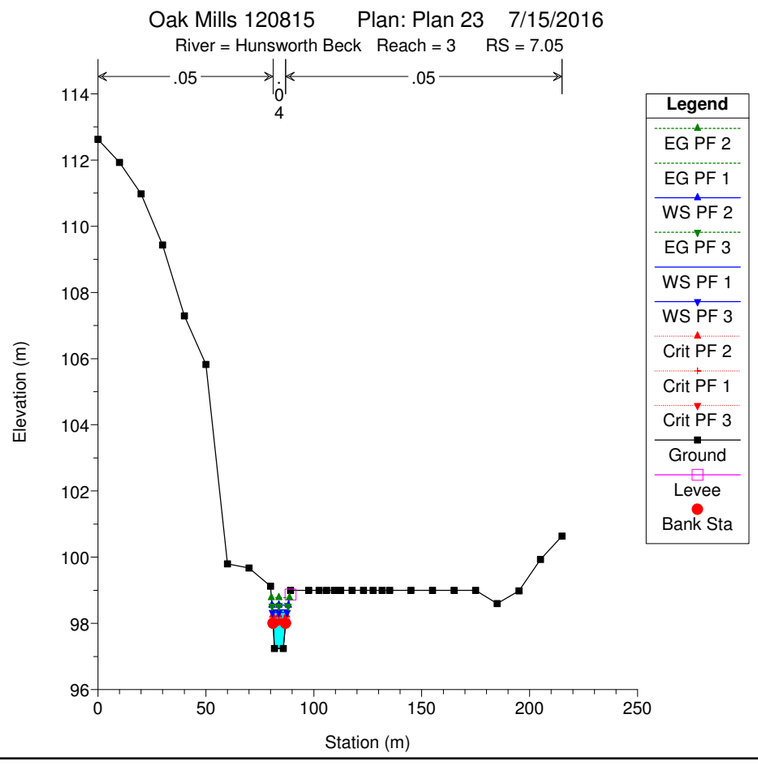

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.12
.05
.03
0
3
5
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Ground
Bank Sta

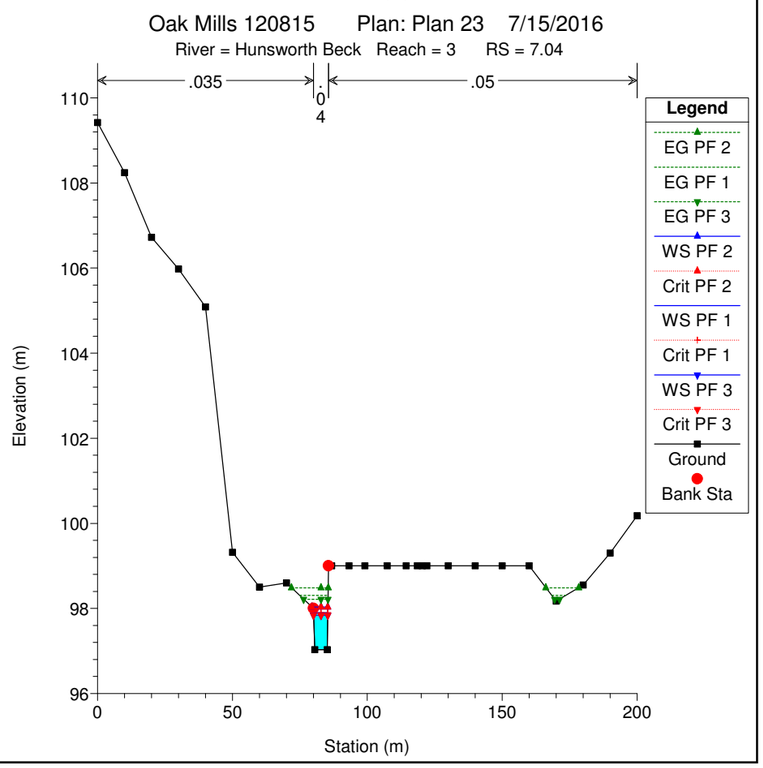

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.11
.05
.03
Elevation (m)
Station (m)
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
EG PF 3
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta

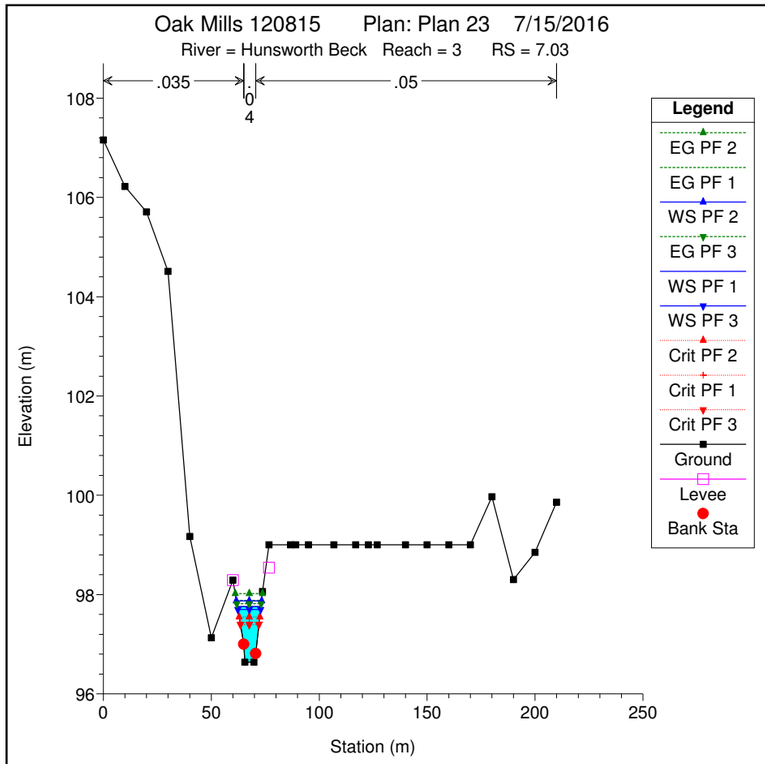

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.10
.05
.03
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
Crit PF 2
WS PF 1
WS PF 3
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta

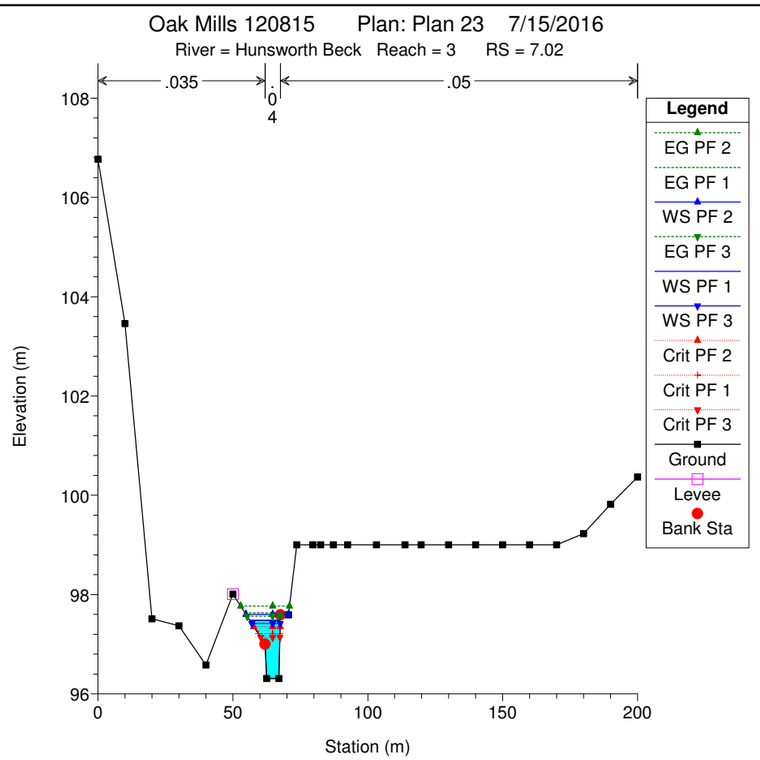

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.08
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta

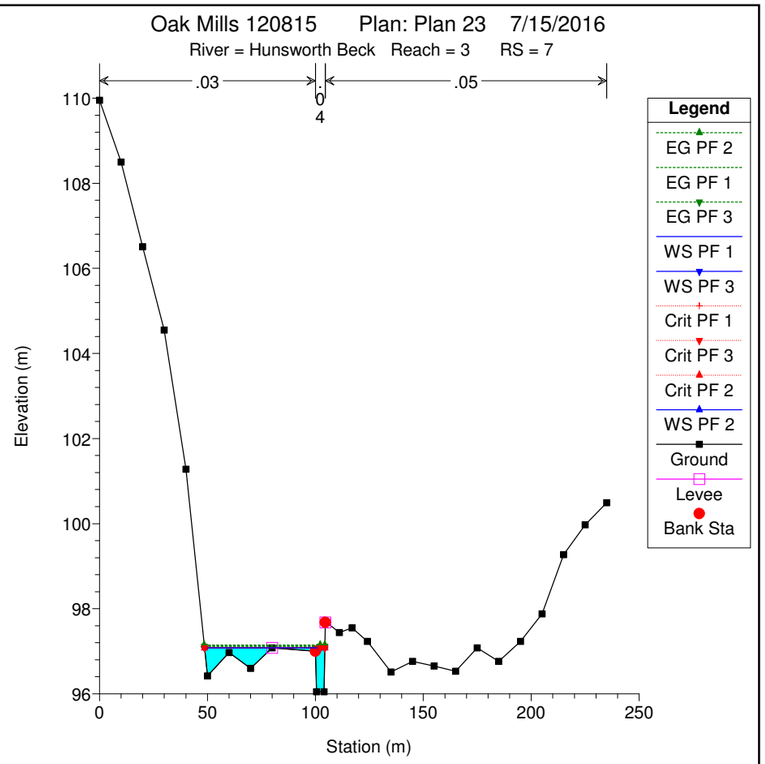

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.07
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta

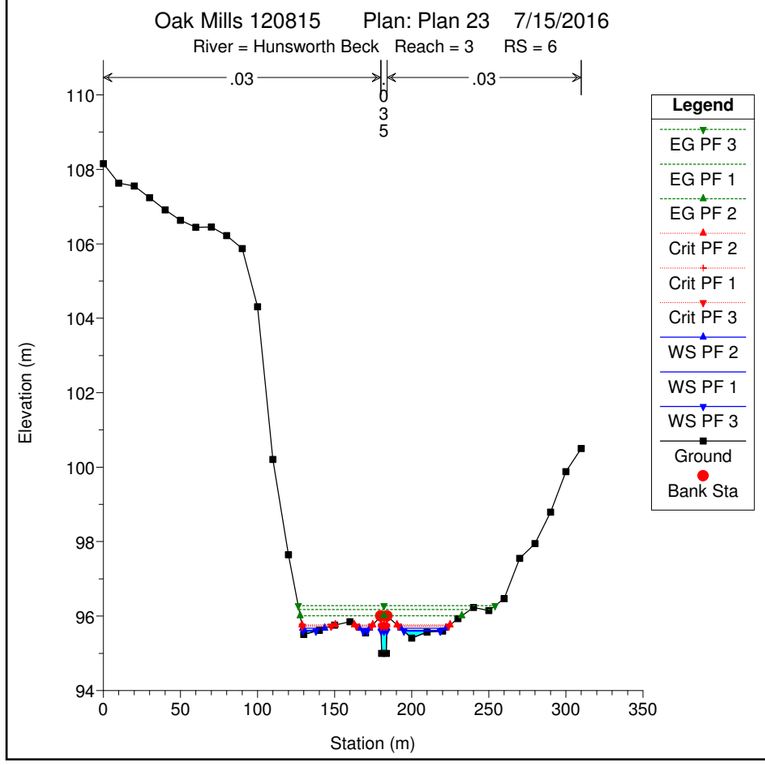

Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.05
.05
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta


Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.04
.035
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
WS PF 3
Crit PF 3
Ground
Bank Sta


Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.03
.035
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta


Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7.02
.035
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
WS PF 2
EG PF 3
WS PF 1
WS PF 3
Crit PF 2
Crit PF 1
Crit PF 3
Ground
Levee
Bank Sta


Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 7
.03
.05
Elevation (m)
Station (m)
Legend
EG PF 2
EG PF 1
EG PF 3
WS PF 1
WS PF 3
Crit PF 1
Crit PF 3
Crit PF 2
WS PF 2
Ground
Levee
Bank Sta


Oak Mills 120815 Plan: Plan 23 7/15/2016
River = Hunsworth Beck Reach = 3 RS = 6
.03
.03
Elevation (m)
Station (m)
Legend
EG PF 3
EG PF 1
EG PF 2
Crit PF 2
Crit PF 1
Crit PF 3
WS PF 2
WS PF 1
WS PF 3
Ground
Bank Sta

HEC-RAS Plan: Plan 23

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Toad Holes Beck	0.5	5	PF 1	1.09	114.00	114.59	114.42	114.65	0.005314	1.10	1.39	12.59	0.52
Toad Holes Beck	0.5	5	PF 2	1.35	114.00	114.65	114.48	114.70	0.003872	1.03	2.48	20.44	0.45
Toad Holes Beck	0.5	5	PF 3	0.97	114.00	114.25	114.40	114.74	0.113625	3.10	0.31	1.50	2.17
Toad Holes Beck	0.5	4	PF 1	1.09	113.50	114.01	113.92	114.11	0.011585	1.43	0.77	2.47	0.74
Toad Holes Beck	0.5	4	PF 2	1.35	113.50	113.99	113.98	114.16	0.019633	1.83	0.74	1.99	0.96
Toad Holes Beck	0.5	4	PF 3	0.97	113.50	114.01	113.90	114.09	0.008886	1.26	0.77	2.72	0.65
Toad Holes Beck	0.5	3	PF 1	1.09	112.60	114.06	113.02	114.06	0.000061	0.24	8.45	14.01	0.07
Toad Holes Beck	0.5	3	PF 2	1.35	112.60	114.09	113.08	114.09	0.000084	0.28	8.82	14.35	0.08
Toad Holes Beck	0.5	3	PF 3	0.97	112.60	114.05	113.00	114.05	0.000050	0.21	8.32	13.90	0.06
Toad Holes Beck	0.5	2.5		Culvert									
Toad Holes Beck	0.5	2	PF 1	1.09	112.50	112.95	112.92	113.09	0.018171	1.67	0.65	1.90	0.91
Toad Holes Beck	0.5	2	PF 2	1.35	112.50	112.98	112.98	113.16	0.021819	1.90	0.71	1.96	1.01
Toad Holes Beck	0.5	2	PF 3	0.97	112.50	112.92	112.90	113.06	0.017868	1.61	0.60	1.85	0.90
Toad Holes Beck	0.5	1	PF 1	1.09	111.50	111.93	111.93	112.09	0.022066	1.80	0.61	1.85	1.00
Toad Holes Beck	0.5	1	PF 2	1.35	111.50	112.00	112.03	112.16	0.018267	1.78	1.14	232.03	0.92
Toad Holes Beck	0.5	1	PF 3	0.97	111.50	111.90	111.90	112.05	0.022494	1.75	0.55	1.79	1.01
Hunsworth Beck	1	17	PF 1	6.92	113.00	113.60	113.78	114.22	0.042658	3.50	1.98	3.60	1.50
Hunsworth Beck	1	17	PF 2	8.52	113.00	113.70	113.89	114.37	0.039339	3.63	2.34	3.70	1.46
Hunsworth Beck	1	17	PF 3	6.17	113.00	113.50	113.72	114.23	0.061062	3.80	1.62	3.50	1.78
Hunsworth Beck	1	16	PF 1	6.92	108.00	110.05	108.78	110.06	0.000190	0.51	24.21	34.80	0.12
Hunsworth Beck	1	16	PF 2	8.52	108.00	110.08	108.89	110.09	0.000258	0.60	25.36	35.32	0.14
Hunsworth Beck	1	16	PF 3	6.17	108.00	110.04	108.72	110.04	0.000159	0.46	23.71	34.57	0.11
Hunsworth Beck	1	15	PF 1	6.92	106.00	110.05	106.78	110.05	0.000003	0.11	124.52	75.35	0.02
Hunsworth Beck	1	15	PF 2	8.52	106.00	110.09	106.89	110.09	0.000005	0.13	127.12	76.21	0.02
Hunsworth Beck	1	15	PF 3	6.17	106.00	110.04	106.72	110.04	0.000003	0.10	123.39	74.97	0.02
Hunsworth Beck	1	14.9		Culvert									
Hunsworth Beck	1	14.8	PF 1	6.92	105.25	110.05		110.05	0.000001	0.07	187.98	94.07	0.01
Hunsworth Beck	1	14.8	PF 2	8.52	105.25	110.08		110.08	0.000002	0.09	190.25	94.68	0.01
Hunsworth Beck	1	14.8	PF 3	6.17	105.25	110.04		110.04	0.000001	0.06	186.55	93.69	0.01
Hunsworth Beck	2	14.5	PF 1	8.01	105.25	110.05	106.12	110.05	0.000002	0.09	171.18	96.48	0.01
Hunsworth Beck	2	14.5	PF 2	9.87	105.25	110.08	106.24	110.08	0.000003	0.11	173.52	97.15	0.02
Hunsworth Beck	2	14.5	PF 3	7.14	105.25	110.04	106.06	110.04	0.000002	0.08	169.72	96.05	0.01
Hunsworth Beck	2	14.2		Culvert									
Hunsworth Beck	2	14	PF 1	8.01	104.00	110.05		110.05	0.000000	0.05	313.03	131.35	0.01
Hunsworth Beck	2	14	PF 2	9.87	104.00	110.07		110.07	0.000001	0.06	315.47	131.87	0.01
Hunsworth Beck	2	14	PF 3	7.14	104.00	110.04		110.04	0.000000	0.04	311.67	131.06	0.01
Hunsworth Beck	2	13	PF 1	8.01	104.00	110.05	104.00	110.05	0.000000	0.02	599.68	167.11	0.00
Hunsworth Beck	2	13	PF 2	9.87	104.00	110.07	104.05	110.07	0.000000	0.02	602.78	167.40	0.00
Hunsworth Beck	2	13	PF 3	7.14	104.00	110.04	103.97	110.04	0.000000	0.02	597.95	166.95	0.00
Hunsworth Beck	2	12.5		Culvert									
Hunsworth Beck	2	12	PF 1	8.01	101.50	102.35	102.35	102.74	0.018507	2.75	2.91	3.85	1.01
Hunsworth Beck	2	12	PF 2	9.87	101.50	102.48	102.48	102.90	0.018051	2.90	3.40	3.98	1.00
Hunsworth Beck	2	12	PF 3	7.14	101.50	102.30	102.30	102.65	0.018233	2.64	2.71	3.80	1.00
Hunsworth Beck	2	11	PF 1	8.01	99.50	100.01	100.35	101.21	0.098779	4.86	1.65	3.51	2.27
Hunsworth Beck	2	11	PF 2	9.87	99.50	100.09	100.48	101.42	0.093626	5.12	1.93	3.59	2.23
Hunsworth Beck	2	11	PF 3	7.14	99.50	99.96	100.30	101.12	0.104251	4.76	1.50	3.46	2.31
Hunsworth Beck	2	10	PF 1	8.01	98.60	99.87	99.25	99.90	0.000991	0.88	10.53	14.14	0.26
Hunsworth Beck	2	10	PF 2	9.87	98.60	100.33	99.33	100.34	0.000238	0.53	31.75	61.81	0.13
Hunsworth Beck	2	10	PF 3	7.14	98.60	99.66	99.21	99.71	0.001638	1.04	8.00	11.54	0.33
Hunsworth Beck	2	9	PF 1	8.01	98.20	99.89		99.89	0.000014	0.13	54.92	45.82	0.03
Hunsworth Beck	2	9	PF 2	9.87	98.20	100.34		100.34	0.000009	0.13	79.12	62.86	0.03
Hunsworth Beck	2	9	PF 3	7.14	98.20	99.69		99.69	0.000017	0.13	47.71	33.06	0.04
Hunsworth Beck	3	8.7	PF 1	12.13	98.00	99.88	98.52	99.89	0.000132	0.48	30.62	25.78	0.11
Hunsworth Beck	3	8.7	PF 2	14.95	98.00	100.33	98.60	100.34	0.000082	0.44	44.05	40.19	0.09
Hunsworth Beck	3	8.7	PF 3	10.82	98.00	99.68	98.48	99.69	0.000165	0.50	25.72	23.65	0.12
Hunsworth Beck	3	8.5		Culvert									
Hunsworth Beck	3	8	PF 1	12.13	97.80	99.42		99.46	0.000667	0.85	14.36	9.51	0.22
Hunsworth Beck	3	8	PF 2	14.95	97.80	99.62		99.66	0.000691	0.92	16.31	9.90	0.22
Hunsworth Beck	3	8	PF 3	10.82	97.80	99.32		99.35	0.000655	0.81	13.41	9.32	0.21
Hunsworth Beck	3	7.12	PF 1	12.13	97.74	99.10		99.40	0.009523	2.44	5.01	4.85	0.71
Hunsworth Beck	3	7.12	PF 2	14.95	97.74	99.26		99.61	0.009573	2.61	5.89	6.01	0.71
Hunsworth Beck	3	7.12	PF 3	10.82	97.74	99.03		99.30	0.009183	2.31	4.68	4.34	0.69
Hunsworth Beck	3	7.11	PF 1	12.13	97.68	99.22	98.94	99.29	0.002508	1.37	10.84	18.47	0.37
Hunsworth Beck	3	7.11	PF 2	14.95	97.68	99.43	99.03	99.49	0.001672	1.20	15.29	23.13	0.30
Hunsworth Beck	3	7.11	PF 3	10.82	97.68	99.10	98.89	99.20	0.003232	1.49	8.87	16.67	0.42
Hunsworth Beck	3	7.10	PF 1	12.13	97.62	98.79	98.71	99.19	0.014496	2.82	4.33	5.01	0.89
Hunsworth Beck	3	7.10	PF 2	14.95	97.62	99.14	98.93	99.42	0.007865	2.43	6.67	8.33	0.66
Hunsworth Beck	3	7.10	PF 3	10.82	97.62	98.72	98.64	99.09	0.014566	2.71	3.99	4.31	0.89

HEC-RAS Plan: Plan 23 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Hunsworth Beck	3	7.09	PF 1	12.13	97.56	98.73	98.61	99.13	0.003514	2.82	4.31	3.81	0.85
Hunsworth Beck	3	7.09	PF 2	14.95	97.56	98.85	98.76	99.35	0.003969	3.13	4.91	9.20	0.90
Hunsworth Beck	3	7.09	PF 3	10.82	97.56	98.66	98.53	99.02	0.003292	2.66	4.06	3.80	0.82
Hunsworth Beck	3	7.08	PF 1	12.13	97.50	98.78	98.39	98.99	0.006357	2.02	5.99	4.79	0.58
Hunsworth Beck	3	7.08	PF 2	14.95	97.50	98.93	98.52	99.18	0.007050	2.23	6.69	4.81	0.61
Hunsworth Beck	3	7.08	PF 3	10.82	97.50	98.71	98.33	98.89	0.006027	1.92	5.64	4.78	0.56
Hunsworth Beck	3	7.07	PF 1	12.13	97.49	98.61	98.36	98.85	0.007512	2.15	5.65	5.46	0.67
Hunsworth Beck	3	7.07	PF 2	14.95	97.49	98.75	98.48	99.03	0.007920	2.33	6.41	5.56	0.69
Hunsworth Beck	3	7.07	PF 3	10.82	97.49	98.54	98.30	98.76	0.007318	2.05	5.27	5.40	0.66
Hunsworth Beck	3	7.05	PF 1	12.13	97.24	98.41	98.12	98.60	0.006642	1.98	6.35	7.11	0.61
Hunsworth Beck	3	7.05	PF 2	14.95	97.24	98.55	98.25	98.78	0.006433	2.12	7.42	7.61	0.62
Hunsworth Beck	3	7.05	PF 3	10.82	97.24	98.33	98.06	98.52	0.006761	1.90	5.83	6.86	0.61
Hunsworth Beck	3	7.04	PF 1	12.13	97.03	97.90	97.90	98.31	0.022243	2.83	4.28	5.28	1.00
Hunsworth Beck	3	7.04	PF 2	14.95	97.03	98.03	98.03	98.49	0.021393	3.00	5.00	5.86	0.99
Hunsworth Beck	3	7.04	PF 3	10.82	97.03	97.84	97.83	98.22	0.022400	2.73	3.96	5.23	1.00
Hunsworth Beck	3	7.03	PF 1	12.13	96.64	97.76	97.44	97.89	0.004106	1.67	8.38	10.95	0.51
Hunsworth Beck	3	7.03	PF 2	14.95	96.64	97.87	97.55	98.02	0.004207	1.81	9.68	11.68	0.53
Hunsworth Beck	3	7.03	PF 3	10.82	96.64	97.70	97.39	97.82	0.004087	1.60	7.72	10.56	0.50
Hunsworth Beck	3	7.02	PF 1	12.13	96.31	97.48	97.21	97.63	0.006068	1.82	7.39	11.26	0.56
Hunsworth Beck	3	7.02	PF 2	14.95	96.31	97.60	97.36	97.77	0.005909	1.91	8.92	15.76	0.56
Hunsworth Beck	3	7.02	PF 3	10.82	96.31	97.42	97.14	97.57	0.006062	1.76	6.72	10.50	0.56
Hunsworth Beck	3	7	PF 1	12.13	96.05	97.08	97.08	97.12	0.003572	1.20	14.57	55.77	0.40
Hunsworth Beck	3	7	PF 2	14.95	96.05	97.08	97.08	97.15	0.005426	1.48	14.57	55.77	0.49
Hunsworth Beck	3	7	PF 3	10.82	96.05	97.08	97.08	97.12	0.002842	1.07	14.57	55.77	0.35
Hunsworth Beck	3	6	PF 1	12.13	95.00	95.62	95.74	96.18	0.051970	3.93	5.02	44.33	1.66
Hunsworth Beck	3	6	PF 2	14.95	95.00	95.67	95.76	96.01	0.034552	3.33	7.51	53.95	1.36
Hunsworth Beck	3	6	PF 3	10.82	95.00	95.60	95.73	96.28	0.060714	4.16	4.01	37.99	1.79
Hunsworth Beck	4	5	PF 1	13.14	94.00	95.01	95.01	95.13	0.007602	1.92	9.81	34.68	0.65
Hunsworth Beck	4	5	PF 2	16.71	94.00	95.06	95.05	95.20	0.008331	2.08	11.36	36.20	0.69
Hunsworth Beck	4	5	PF 3	11.56	94.00	94.98	94.98	95.10	0.007653	1.89	8.77	32.79	0.65
Hunsworth Beck	4	4	PF 1	13.14	93.00	93.36	93.40	93.55	0.022453	1.93	6.87	27.52	1.05
Hunsworth Beck	4	4	PF 2	16.71	93.00	93.42	93.45	93.62	0.018229	1.90	8.55	28.30	0.96
Hunsworth Beck	4	4	PF 3	11.56	93.00	93.34	93.37	93.51	0.022310	1.87	6.35	27.27	1.04
Hunsworth Beck	4	3	PF 1	13.14	91.00	92.76	92.34	92.78	0.000637	0.84	23.91	49.65	0.21
Hunsworth Beck	4	3	PF 2	16.71	91.00	92.85	92.44	92.87	0.000662	0.88	28.73	55.17	0.21
Hunsworth Beck	4	3	PF 3	11.56	91.00	92.71	92.28	92.73	0.000630	0.82	21.55	46.72	0.21
Hunsworth Beck	4	2	PF 1	13.14	91.00	92.34	92.34	92.54	0.006392	2.18	7.98	22.22	0.63
Hunsworth Beck	4	2	PF 2	16.71	91.00	92.44	92.44	92.63	0.006062	2.23	10.48	27.58	0.62
Hunsworth Beck	4	2	PF 3	11.56	91.00	92.28	92.28	92.49	0.006765	2.16	6.73	18.98	0.64
Hunsworth Beck	4	1	PF 1	13.14	89.00	90.17	90.33	90.63	0.015257	3.04	4.65	9.22	0.95
Hunsworth Beck	4	1	PF 2	16.71	89.00	90.30	90.47	90.79	0.014992	3.25	6.00	12.88	0.96
Hunsworth Beck	4	1	PF 3	11.56	89.00	90.11	90.23	90.54	0.014930	2.89	4.15	7.40	0.93
High Royds Beck	1	7	PF 1	4.12	119.25	119.55	119.94	121.54	0.315829	6.24	0.66	2.40	3.80
High Royds Beck	1	7	PF 2	5.08	119.25	119.60	120.04	121.75	0.289397	6.50	0.78	2.47	3.69
High Royds Beck	1	7	PF 3	3.68	119.25	119.50	119.90	121.85	0.458385	6.80	0.54	2.33	4.50
High Royds Beck	1	6	PF 1	4.12	107.25	108.32	107.94	108.42	0.003644	1.42	3.08	4.59	0.47
High Royds Beck	1	6	PF 2	5.08	107.25	108.41	108.04	108.53	0.003823	1.55	3.55	5.07	0.48
High Royds Beck	1	6	PF 3	3.68	107.25	108.27	107.90	108.36	0.003551	1.35	2.85	4.33	0.46
High Royds Beck	1	5	PF 1	4.12	105.43	106.05	106.05	106.19	0.009538	1.83	3.00	11.79	0.78
High Royds Beck	1	5	PF 2	5.08	105.43	106.10	106.10	106.24	0.009463	1.92	3.62	13.25	0.78
High Royds Beck	1	5	PF 3	3.68	105.43	106.02	106.02	106.16	0.009628	1.78	2.71	11.02	0.77
High Royds Beck	1	4	PF 1	4.12	103.15	104.19	104.25	104.44	0.014271	2.31	2.10	6.75	0.81
High Royds Beck	1	4	PF 2	5.08	103.15	104.26	104.33	104.52	0.014027	2.42	2.65	8.58	0.81
High Royds Beck	1	4	PF 3	3.68	103.15	104.15	104.20	104.39	0.014470	2.24	1.84	5.71	0.81
High Royds Beck	1	3	PF 1	4.12	100.00	100.44	100.39	100.48	0.007601	1.27	6.55	46.33	0.65
High Royds Beck	1	3	PF 2	5.08	100.00	100.44	100.42	100.50	0.012017	1.61	6.84	47.05	0.82
High Royds Beck	1	3	PF 3	3.68	100.00	100.41	100.38	100.45	0.009933	1.37	5.17	36.63	0.73
High Royds Beck	1	2.5		Culvert									
High Royds Beck	1	2	PF 1	4.12	99.78	100.24		100.29	0.009420	1.45	6.33	36.24	0.73
High Royds Beck	1	2	PF 2	5.08	99.78	100.34		100.37	0.003705	1.05	10.45	42.87	0.47
High Royds Beck	1	2	PF 3	3.68	99.78	100.22	100.21	100.27	0.010683	1.49	5.53	35.59	0.77
High Royds Beck	1	1	PF 1	4.12	99.45	99.97	99.97	100.05	0.009428	1.63	5.69	35.19	0.76
High Royds Beck	1	1	PF 2	5.08	99.45	100.33		100.34	0.000467	0.53	23.44	63.30	0.19
High Royds Beck	1	1	PF 3	3.68	99.45	99.96	99.96	100.03	0.008558	1.53	5.36	34.46	0.72
Cockleshaw Beck	1	3	PF 1	1.01	114.50	114.90	114.94	115.13	0.034599	2.12	0.48	1.38	1.15
Cockleshaw Beck	1	3	PF 2	1.76	114.50	115.10	115.11	115.37	0.027921	2.28	0.77	1.57	1.04
Cockleshaw Beck	1	3	PF 3	0.74	114.50	114.80	114.86	115.04	0.047086	2.16	0.34	1.29	1.33
Cockleshaw Beck	1	2	PF 1	1.01	104.50	104.81	104.94	105.22	0.076512	2.81	0.36	1.30	1.70
Cockleshaw Beck	1	2	PF 2	1.76	104.50	104.90	105.11	105.60	0.105161	3.70	0.48	1.38	2.01
Cockleshaw Beck	1	2	PF 3	0.74	104.50	104.79	104.86	105.05	0.053059	2.25	0.33	1.28	1.42

HEC-RAS Plan: Plan 23 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Cockleshaw Beck	1	1	PF 1	1.01	94.50	95.00	94.94	95.14	0.016319	1.62	0.63	1.48	0.79
Cockleshaw Beck	1	1	PF 2	1.76	94.50	95.09	95.11	95.37	0.029584	2.33	0.76	1.56	1.07
Cockleshaw Beck	1	1	PF 3	0.74	94.50	95.05	94.86	95.11	0.006422	1.06	0.70	1.53	0.50