





Huu-ay-aht First Nations

huu ay aht

ANCIENT SPIRIT, MODERN MIND

Alluvial Channel and Floodplain Mapping Estimate Project

Prepared by

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31 March 2019

Alluvial Channel and Floodplain Mapping Estimate Project
Huu-ay-aht Traditional Territory

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Introduction

This project proposes to develop mapping and analysis techniques that approximate the alluvial channel and floodplains for the Huu-ay-aht First Nations (HFN) directly managed lands. The lack of this data prevents appropriate representation of riparian management areas in strategic, tactical and operational planning and represents a limited understanding of riparian management risk throughout HFN lands. Once completed, this data will allow for improved riparian area management through identification of floodplains and potential risk associated with existing riparian management standards, ability to adjust riparian management areas to account for specific alluvial features, and aligning operational riparian management with sustainable timber supply analysis and site specific riparian management area assumptions. Completion of this project will satisfy the fulfillment of an information gap noted in the Watershed Framework and the Watershed Renewal Fund.

Methodology

Source Data

The majority of the data used for this analysis was provided by Meridian Forest Services Ltd. (MFS) (Table 1). Freshwater Atlas streams were downloaded from the BC Geographic Warehouse (BCGW) and the Timber Harvesting Land Base (THLB) was compiled by Forest Ecosystem Solutions (FESL) as part of previous projects for Huu-ay-aht First Nations.

Table 1: Data used for floodplain mapping project

Dataset	Source	Vintage (if known)
1m resolution LiDAR DEM	MFS	June 2015
Classified streams	MFS	2017
Freshwater Atlas streams	BCGW	2018
Waterbodies (lakes, etc.)	MFS	2017
Roads	MFS	2017
Culvert locations	MFS	2018
20cm resolution orthophotos	MFS	2015
Timber Harvesting Land Base (WFP MP#4)	FESL	2003
Recent depletions (1996 to 2018)	MFS	2018

LiDAR Stream Network

The LiDAR DEM used for this project is extremely detailed. It was noted that stream data provided by HFN and the Provincial streams in the Freshwater Atlas were captured at different resolutions and did not match the LiDAR DEM. Figure 1 shows an example of this.

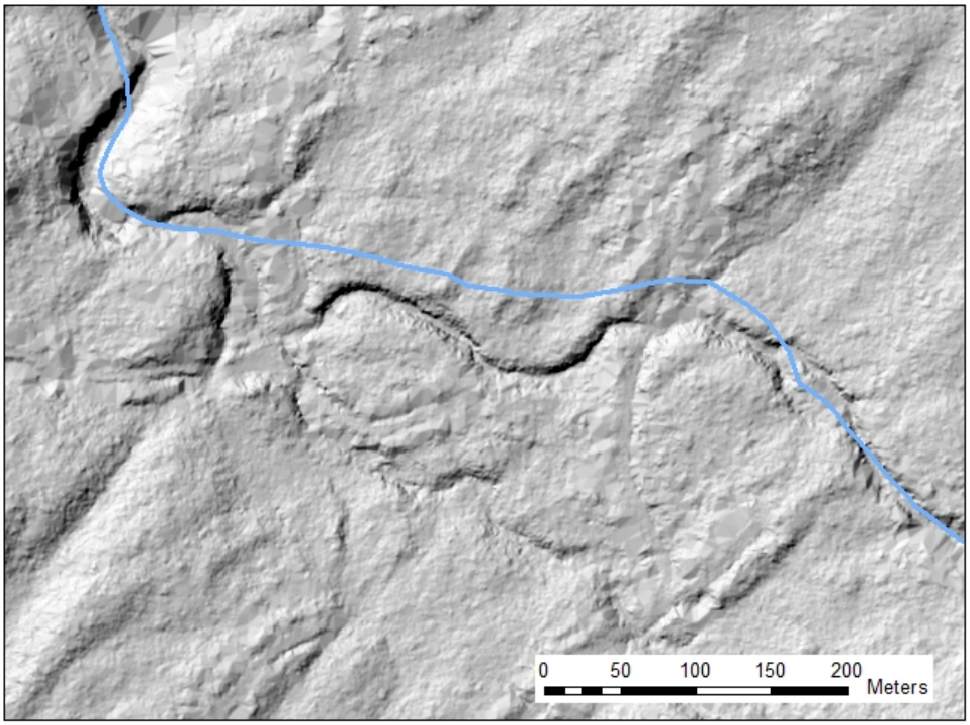


Figure 1: Example of a stream offset from the LiDAR

For consistency between the stream and LiDAR data, the ArcGIS FLOWACCUMULATION function was used to generate a stream network based on the LiDAR DEM. The following issues were identified while generating the LiDAR stream network:

1. Streams crossing roads

Due to the level of detail in the LiDAR, roads form a barrier to the streams, as shown in Figure 2. To resolve this, culvert locations were provided by MFS, and additional stream-road crossings were identified manually. At each culvert site, a line was run through the road, buffered by 2m each side, and given the elevation of the lowest point below the road. The LiDAR DEM was updated with these “ditches”, and then the FLOWACCUMULATION function re-run. The resulting streams are shown in Figure 3.

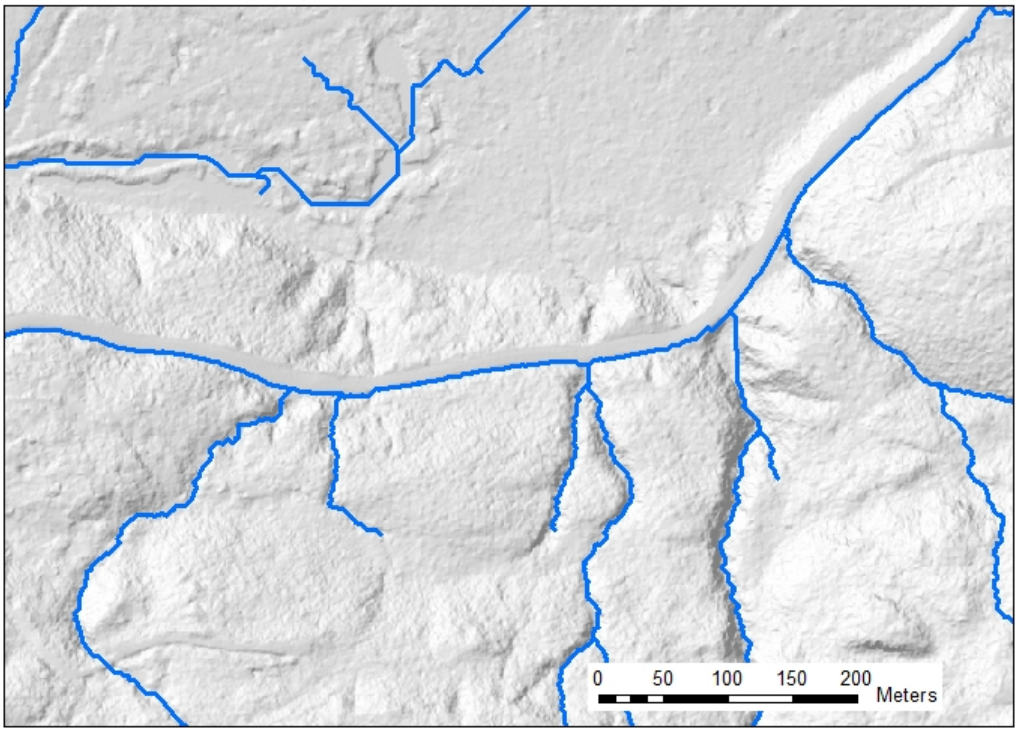


Figure 2: Streams blocked by roads

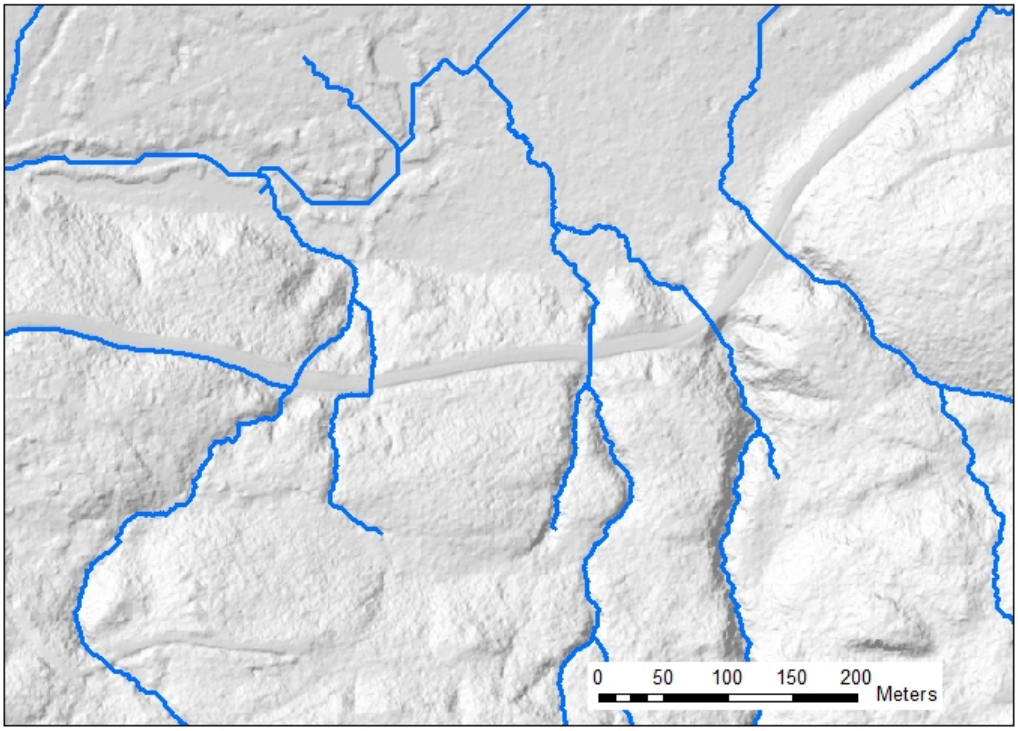


Figure 3 Same streams after adding culverts

2. Lakes

Where streams cross through lakes, the LiDAR stream network created numerous parallel lines. These were cleaned up by using a skeletonizer utility, originally made for BC MSRM, to make a clean network. Figure 4 shows the results of this process on Sarita Lake.

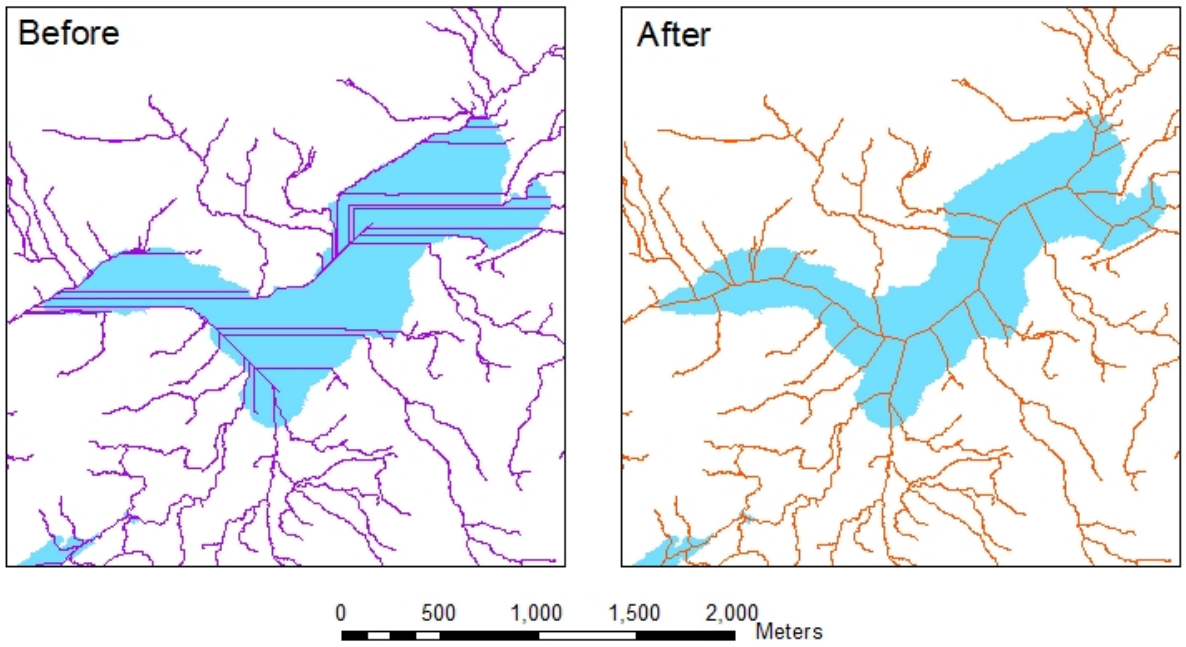


Figure 4: Skeletonizer process

3. Stream Cleanup

Once the streams were generated in raster, they were converted to vector format to make a network. However, some manual clean-up was required as shown in Figure 5. The first example is of a “diamond”, and the second of a “lattice”.

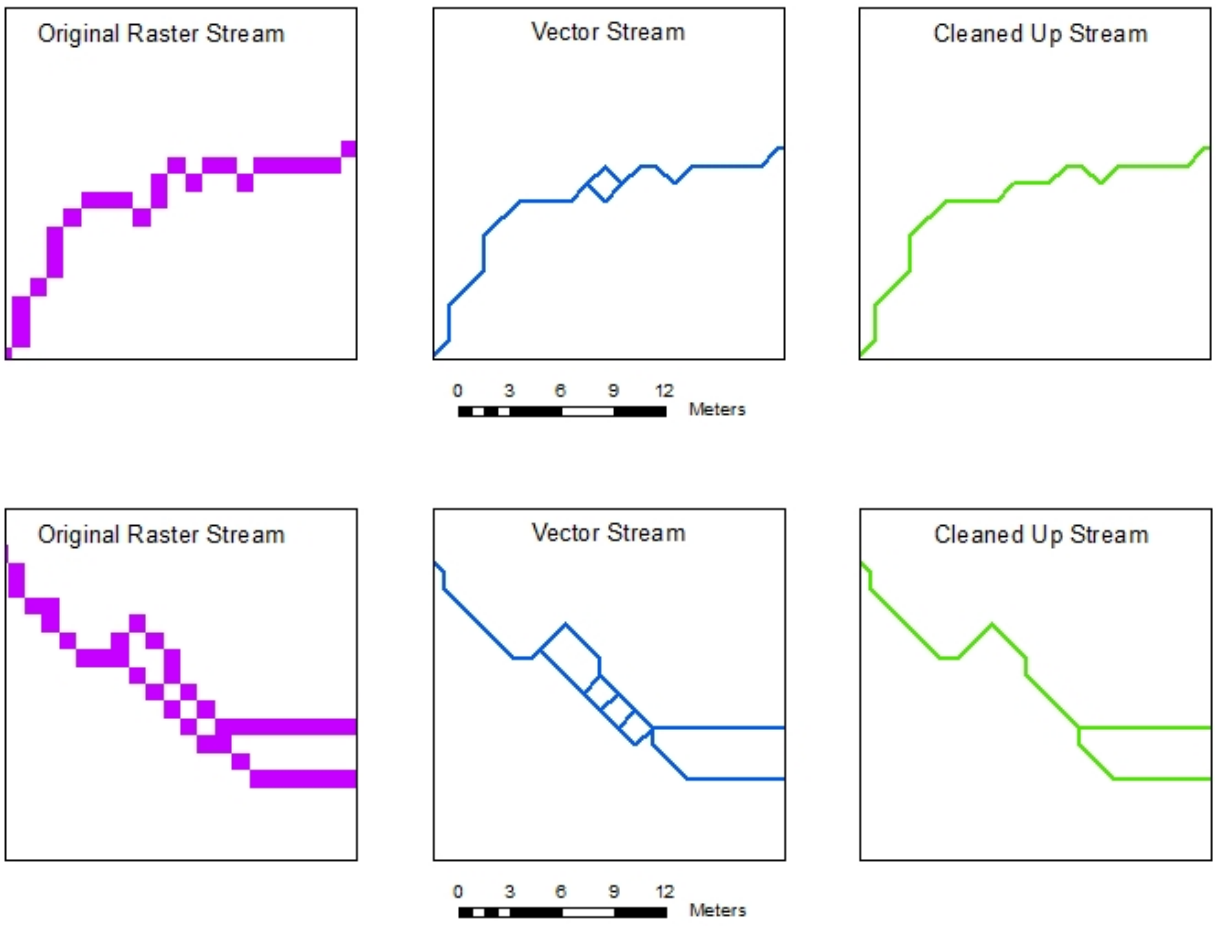


Figure 5: Stream clean-up examples

Once all the clean-up was completed, stream names and classes were assigned based on the HFN classified streams dataset. The LiDAR stream dataset was used to define floodplains. For more information on the stream network process, see Appendix 1: LiDAR Stream Network Methodology.

Cross Sections

For this analysis, only the anadromous sections of streams were used. A list and map of these streams was provided by Marc Gaboury, and from this information the streams were identified in the LiDAR stream network. The streams used are shown in Figure 6 and listed in Table 2. For each of these streams, cross-sections were generated perpendicular to the stream flow at that point. The cross-sections extended out until they reached a maximum elevation above the stream, or for a maximum distance on each side, whichever came first.

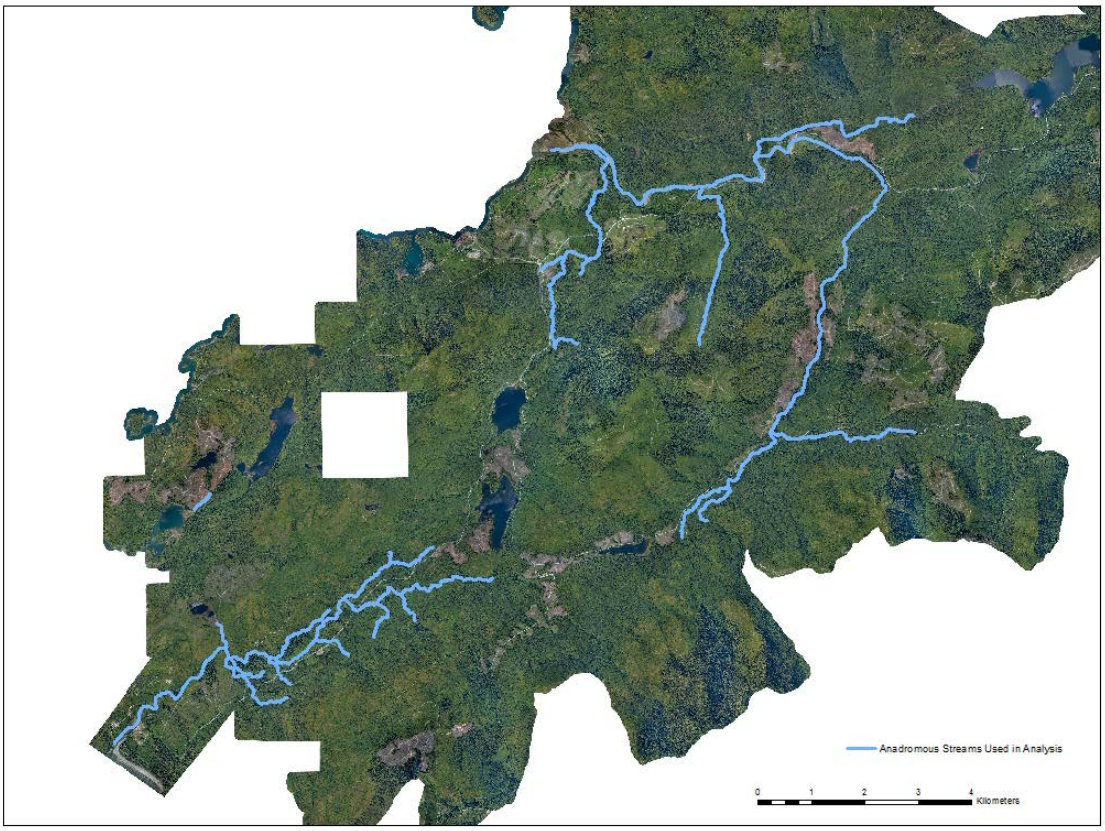


Figure 6: Anadromous sections of streams used in floodplain mapping project

Table 2: Anadromous sections of streams

Stream Name	Length (km)
Sarita	10.2
South Sarita	13.7
Sabrina	3.7
Sabrina 1	1.3
Hunter	4.4
Frederick	6.6
Fred1	0.4
Fred2	0.6
Fred3	0.6
Pachena	9.8
Rousseau	4.1
F-Trib	0.9
E-Trib	1.1

Stream Name	Length (km)
Pach1	1.8
Pach2	0.3
D-Trib	0.9
U-Trib	0.9
C-Trib	0.7
Shaky Bill's 1	1.0
Shaky Bill's 2	2.2
Sugsaw	0.5

Initially, the cross-sections were spaced 50m apart, with a maximum elevation of 10m above the stream or a maximum distance of 1.5km. After reviewing the results, the decision was made to space the cross-sections 25m apart in most locations, but on steeper gradients to space them 5m apart. The maximum elevation above the stream was reduced to 5m, and the maximum distance from the stream to 1km on each side. These parameters were then used in the final version.

As shown in Figure 7, where streams meander, the cross-section lines crossed each other and formed a confusing web. However, where streams ran more or less straight, the cross-section lines were more parallel and easier to follow.

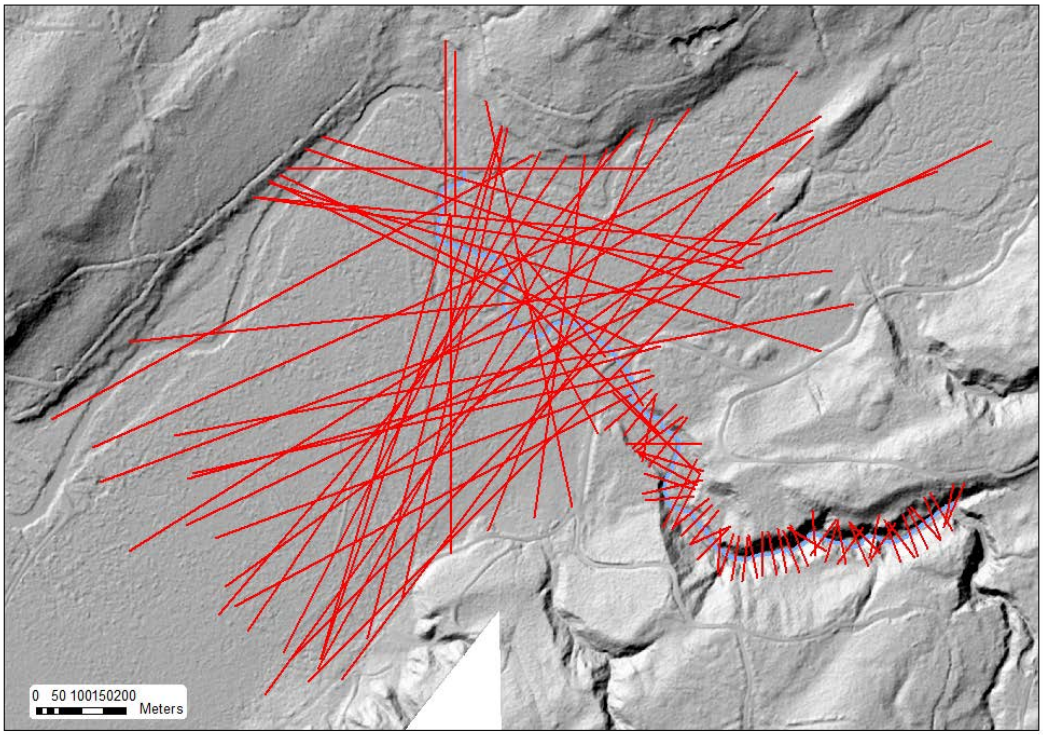


Figure 7: Example cross-sections, Shaky Bill's 2 Creek

Using different water depths, the ArcGIS TOPOGRID command was used to generate a water surface, using the cross-section lines as input. For each cross-section, the water surface elevation at the point it crossed the stream was provided. Note: LiDAR does not penetrate water so LiDAR elevations for the wetted surface of the stream are water surface elevations on the date the LiDAR was taken (June 2015). The cross-section line was then treated as a "contour" line at the new trial floodplain elevation. TOPOGRID interpolates a surface based on the input elevations. The streams were assessed separately.

In a situation like in Figure 7, where the cross-sections are intersecting each other multiple times, the TOPOGRID function does not work well. To resolve this, all cross-sections that re-crossed the stream were cut off halfway between the two stream crossings. Also, the TOPOGRID output was reviewed manually, and some cross-sections were either removed or cut off.

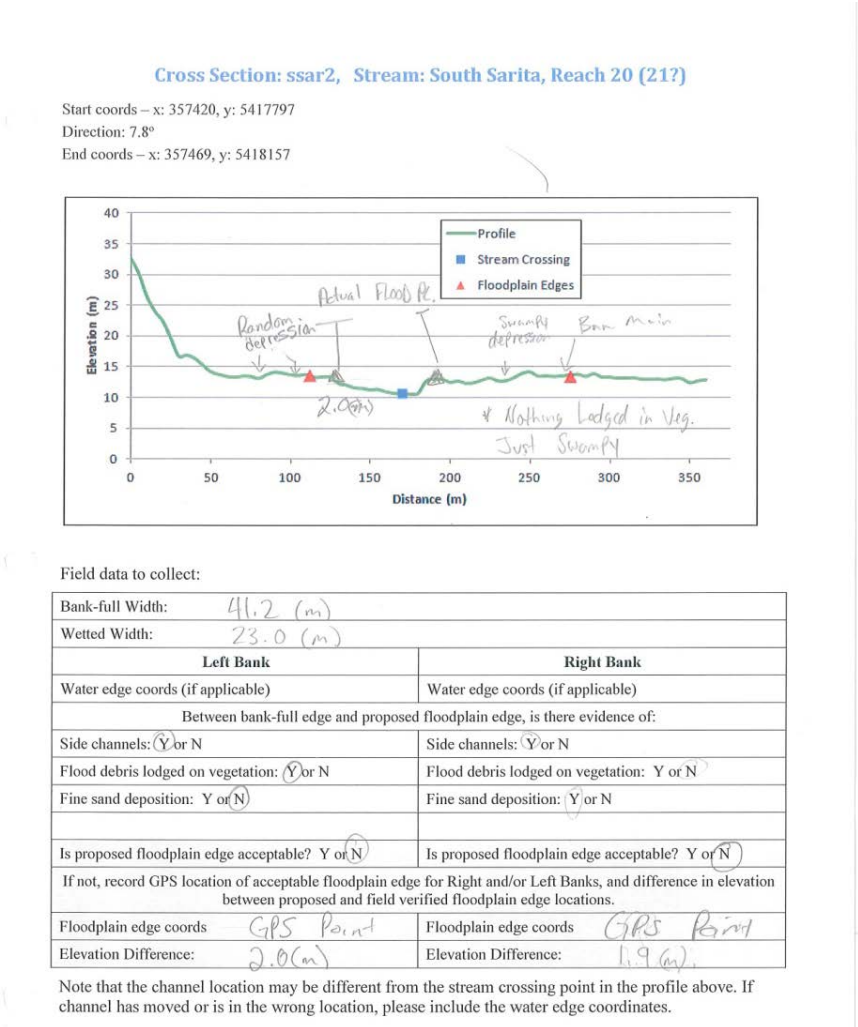
The water surfaces generated by TOPOGRID were compared to the LiDAR DEM surface. Wherever the water was above the ground level was tagged as floodplain for that water depth. This method of defining a floodplain was based on http://desktop.arcgis.com/en/arcmap/10.3/manage-data/las-dataset/floodplain-modeling-using-lidar-in-arcgis.htm.

Based on a hydrological analysis of the Sarita River Water Survey of Canada (WSC) gauge station (08HB014), floodplain water depth for the Sarita River WSC gauge site was determined for a 5yr return period flood (mean daily discharge of ~385m^3/s) (Appendix 2: Hydrologic Rationale). A 5yr return period flood at the Sarita WSC gauge equated to a flood level that was similar to the flood prone width for a moderately entrenched stream, as defined by Rosgen (1996). Floodplain water depths were then estimated for the other ungauged streams in the Sarita and Pachena River watersheds by calculating water depths above the LiDAR water surface elevation using estimates of flood prone width and a determination of channel entrenchment at the various LiDAR cross sections. For each watercourse the appropriate floodplain water depth (i.e., 1.0 to 4.0m) was added to the LiDAR water surface elevation (June 2015) to determine the upland floodplain limits of the potential 5yr return period flood elevation on the LiDAR cross section.

Field verification

In the spring of 2018, one floodplain surface was generated and mapped for each stream. The depths used were 3m for Sarita, South Sarita, Sabrina, and Pachena, 2.5m for Hunter and Rousseau, and 2m for all other streams.

A subset of cross-sections on Sarita, South Sarita, Sabrina, Frederick, Pachena, Rousseau, E-Trib, and Shaky Bill's 2 were flagged for field verification. A total of 70 cross-sections were field sampled between August and October 2018 by Meridian Forest Services Ltd. For each cross-section, the field crew noted the location of the stream, the left and right banks, and the left and right active floodplain edges. Also noted was the distance between the centre of the stream and the floodplain edge, and the depth. Figure 8 shows an example of the cards filled in by the field crews, and Table 3 shows the compiled field work results. A full set of field cards is provided in Appendix 3: Field Cards.



Cross Section: ssar2, Stream: South Sarita, Reach 20 (21?)

Start coords – x: 357420, y: 5417797
Direction: 7.8°
End coords – x: 357469, y: 5418157

Field data to collect:

Bank-full Width: 41.2 (m)	
Wetted Width: 23.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference: 2.0(m)	Elevation Difference: 1.9 (m).

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Figure 8: Example field card

Table 3: Field work results

Creek	xsect id	Reach	Field checked	Flooding Evidence[1]	Floodplain edge ok	Model depth (m)	Field depth (m)	Wetted width (m)	Bank-full width (m)
E-Trib	e1	E1	Y	B	Y	2		4.8	5.3
	e2	E1	Y	L	Y			6	6.6
	e3	E1	Y	R	Y			2.9	3.8
	e4	E1							
	e5	E1	Y	B	N		1.54	1.7	3.5
	e6	E1							

Creek	xsect id	Reach	Field checked	Flooding Evidence[1]	Floodplain edge ok	Model depth (m)	Field depth (m)	Wetted width (m)	Bank-full width (m)
	e7	E1	Y	R	N		1.5	2.7	2.7
	e8	E1							
	e9	E1							
	e10	E1	Y	L	N		1.8	2.1	3.3
Shaky Bill's 2	sb1	S1				2			
	sb2	S1							
	sb3	S1							
	sb4	S1	Y	B	N		1.83	8.2	8.5
	sb5	S2	Y	B	Y			5.9	7.2
	sb6	S2	Y	L	Y			8.9	9.3
	sb7	S2	Y	R	Y			10.7	10.9
	sb8	S2	Y	N	Y			7.5	7.9
	sb9	S2							
Pachena	pach1	P1				3			
	pach2	P1							
	pach3	P1	Y	N	N		1.5	33.5	38.4
	pach4	P2	Y	L	N		2	20	21.2
	pach5	P2	Y	B	N		2.01	19.9	21.1
	pach6	P2	Y	R	N		2.67	22.3	25
	pach7	P2	Y	L	N		2.84	11.7	17
	pach8	P2	Y	L	Y			17.3	18.9
	pach9	P2	Y	B	N		2.24	7.4	18.3
	pach10	P2	Y	B	N		1.96	13.7	18.1
	pach11	P2	Y	B	?			7.9	8.4
	pach12	P3/P4							
	pach13	P3/P4							
	pach14	P3/P4	Y	B	N		2.87	13	13.9
	pach15	P3/P4	Y	B	Y			9	10.1
	pach16	P3/P4	Y	B	N		2.08	7.8	24.8
	pach17	P5							
	pach18	P6	Y	L	N		2	4.7	5.5
	pach19	P6	Y	L	N		1.9	4.2	4.9
	pach20	P6	Y	R	Y			7.9	8.4
	pach21	P6	Y	R	N		1.5	4.5	5.9
	pach22	P6	Y	N	N		1.5	5.5	8.5

Creek	xsect id	Reach	Field checked	Flooding Evidence[1]	Floodplain edge ok	Model depth (m)	Field depth (m)	Wetted width (m)	Bank-full width (m)
	pach23	P7	Y	N	N		1.5	5	12
	pach24	P7	Y	L	Y			5.6	7.9
Sarita	sar1	1				3			
	sar2	1							
	sar3	1	Y	B	N		3.05	52.3	66.1
	sar4	1	Y	L	N		3.27	48.6	49.4
	sar5	1	Y	R	N		3.16	39.8	43.5
	sar6	1	Y	R	N		2.8	25.8	29.3
	sar7	2	Y	R	N		2.1	46.5	47.8
	sar8	2	Y	N	N		2.6	45.6	46.2
	sar9	2	Y	N	N		2.4	56.8	62
	sar10	3	Y	B	Y			35	74.2
	sar11	4	Y	N	Y			23.8	25.6
	sar12	4							
	sar13	4							
Frederick	fred1	13				2			
	fred2	13	Y	B	Y			5.2	12.6
	fred3	14	Y	B	Y			10.2	12.5
	fred4	15	Y	B	Y			10.9	11.3
	fred5	15	Y	R	Y			14.2	15.8
	fred6	16							
	fred7	16							
	fred8	16/17	Y	R	Y			3.9	10.8
	fred9	17	Y	B	Y			7	10.4
	fred10	17	Y	L	Y			5.8	11.6
	fred11	17	Y	B	Y			6.8	10.1
Rousseau	rous1	R1	Y	B	N	2.5	2.2	25.4	36.4
	rous2	R1	Y	R	N		1.5	15.2	18.2
	rous3	R1	Y	B	N		1.8	14.5	30.2
	rous4	R1	Y	B	Y			14.5	15.5
	rous5	R1	Y	B	Y			6.8	8.5
	rous6	R1	Y	B	N		3.88	19.2	29.4
	rous7	R1	Y	B	N		3.41	13.6	17.3
	rous8	R1	Y	R	N		3.79	18	28.9
	rous9	R1	Y	R	Y			6.8	12.9

Creek	xsect id	Reach	Field checked	Flooding Evidence[1]	Floodplain edge ok	Model depth (m)	Field depth (m)	Wetted width (m)	Bank-full width (m)
	rous10	R1	Y	R	Y			15.1	29
	rous11	R1	Y	R	Y			6.9	21.9
	rous12	R2	Y	L	Y			12	17.4
Sabrina	sab1	34	Y	N	N	3	2.2	14.4	16.5
	sab2	34	Y	R	N		2.1	12.5	15.6
	sab3	34	Y	N	N		2.3	11.5	16.4
	sab4	35	Y	N	Y			8.3	14.5
	sab5	35	Y	R	Y			10.6	13.9
	sab6	35	Y	L	Y			5.5	17
South Sarita	ssar1	20	Y	L	Y	3		14.1	37.7
	ssar2	20/21	Y	B	N		1.9	23	41.2
	ssar3	22	Y	R	Y			21.8	22.5
	ssar4	22	Y	L	Y			28.3	32.5
	ssar5	22	Y	L	Y			14.2	24.3
	ssar6	24							
	ssar7	28							
	ssar8	29							

[1]Flooding evidence codes: R = right bank, L = left bank, B = both banks, N = none

Field depths shown as red text were estimated based on GPS location and LiDAR elevation, not measured in the field.

Flood surfaces

For the final version of the floodplain model, a range of potential floodwater depths was used for each stream. The depths were chosen by Marc Gaboury, based on the size and channel type of the stream, and the field observations. Further information on the methodology can be found in Appendix 2. The different depths were 0.5m apart, and a minimum of 4 different depths were run per stream. So for example, Frederick was run 4 times, with water depths 1.5m, 2m, 2.5m, and 3m. The minimum and maximum depths used for each stream are shown in Table 4.

Table 4: Floodwater depths used in floodplain modelling

Stream Name	Minimum Depth (m)	Maximum Depth (m)
Sarita	2	4
South Sarita	2	4
Sabrina	2	4
Sabrina 1	1	2.5
Hunter	1	2.5
Frederick	1.5	3
Fred1	1	2.5
Fred2	1	2.5
Fred3	1	2.5
Pachena	1	3.5
Rousseau	2	3.5
F-Trib	1	2.5
E-Trib	1	2.5
Pach1	1	2.5
Pach2	1	2.5
D-Trib	1	2.5
U-Trib	1	2.5
C-Trib	1	2.5
Shaky Bill's 1	1	2.5
Shaky Bill's 2	1	3
Sugsaw	1	2.5

Once each floodplain was generated, the output was edited by removing all isolated polygons not attached to the main river as shown in Figure 9. The orange isolated polygons were all removed, leaving only the blue in the cleaned up version.

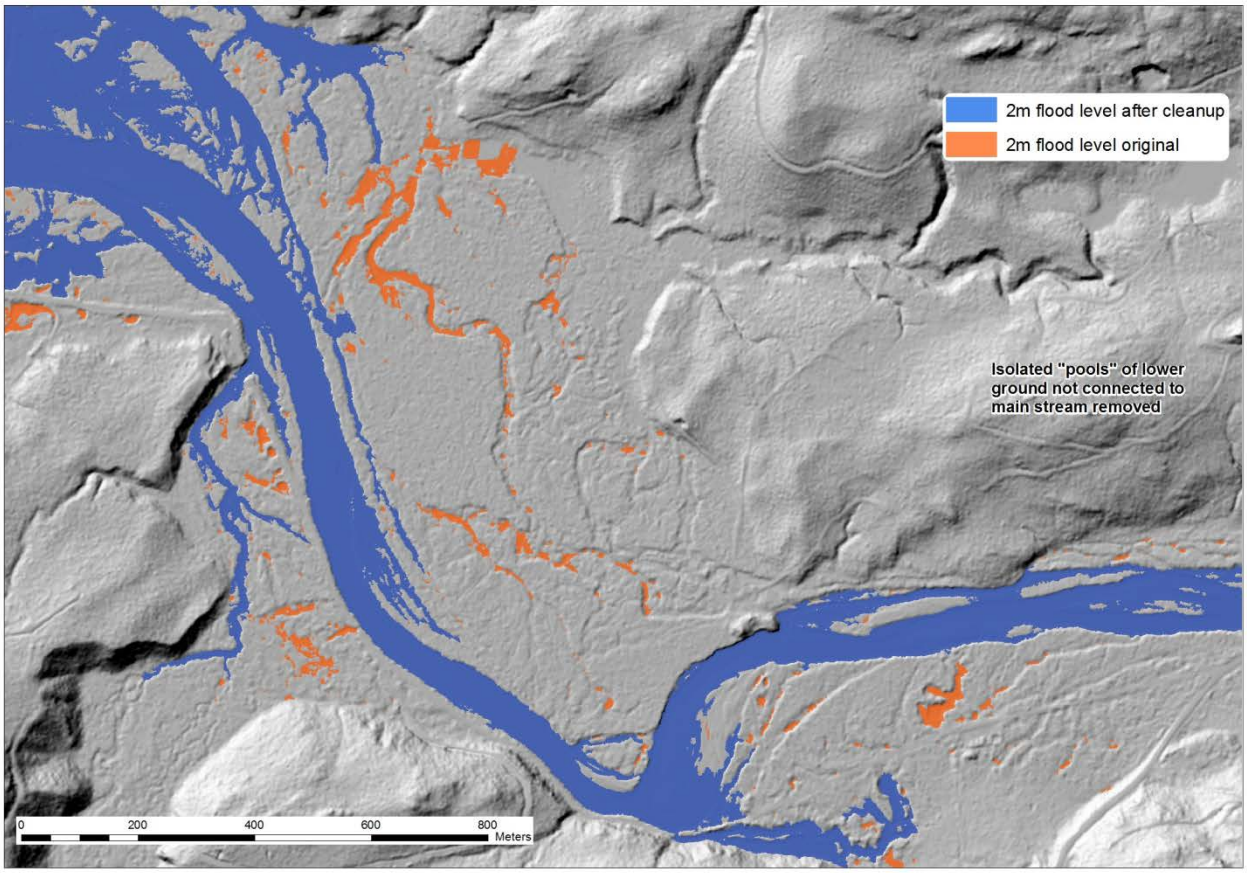


Figure 9: Example of floodplain cleanup

After clean-up, the floodplains were mapped and sent to Marc Gaboury and Bob Bocking for review (Figure 10).

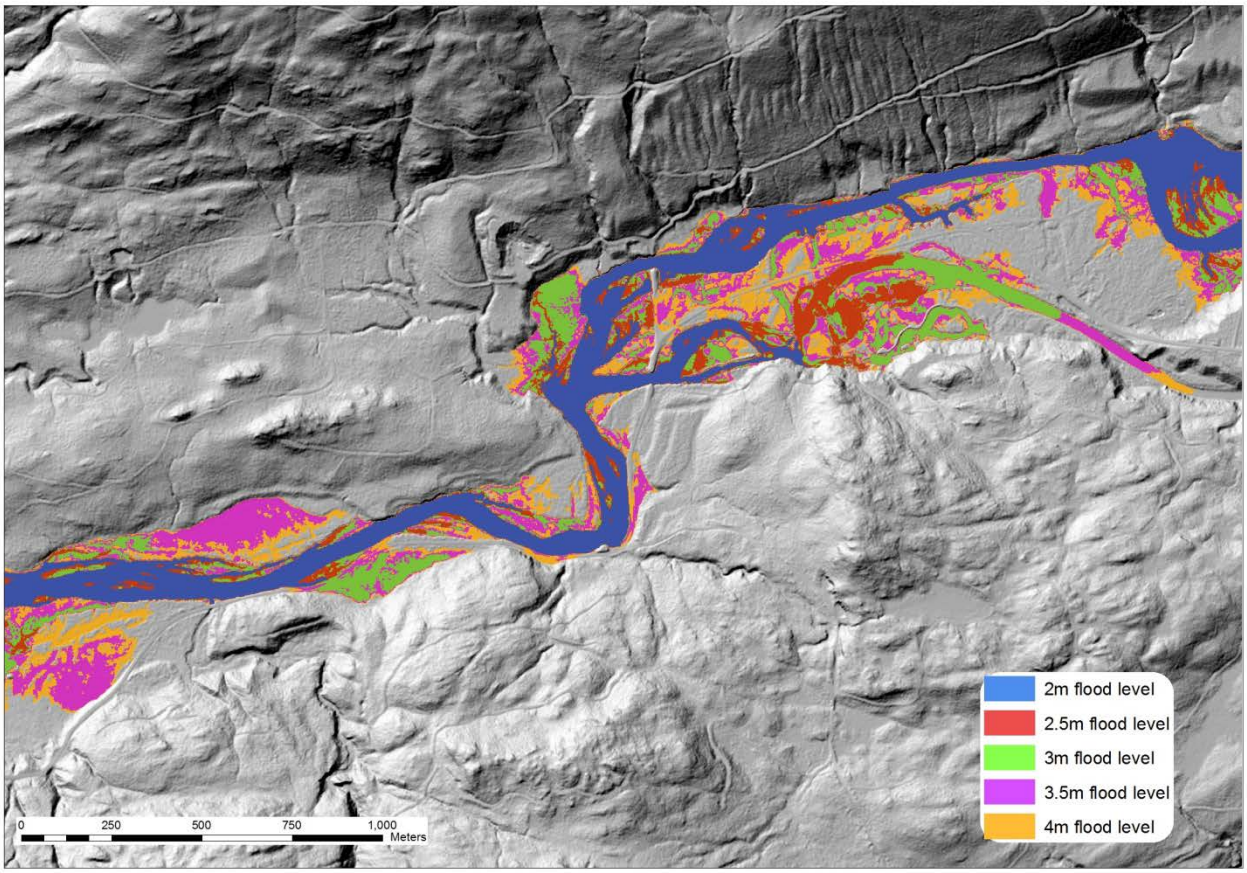


Figure 10: Sarita River floodplains at different depths

Effective Operational and Enhanced Floodplains

Based on local knowledge and expert opinion, two floodplains were defined – effective operational and enhanced. The effective operational floodplain is estimated to represent the approximate 5-year floodplain level. The enhanced floodplain reflects a more conservative floodplain for additional riparian protection where desired.

Some of the longer streams were divided into 2 or more reaches, and for each stream or reach a flood depth was chosen for the enhanced level, then the effective operational level was set at 0.5m lower. In some places, the floodplain edge was manually defined, and alluvial fans where tributaries join the main stream were also manually added to the floodplains. The floodplain edges were simplified from the original model output – the furthest outside edge was used.

Figure 11 shows the effective operational floodplain for the Sarita estuary and lower Frederick. The 3.5m flood level was used as the basis for Sarita (purple on map), and the 1.5m level for Frederick (blue on map), but there were some changes. The darker purple delineates where the Sarita and Frederick flood levels overlap. The orange hatched area shows the effective operational floodplain. Streams whose floodplains

entirely overlapped with larger rivers (e.g. Shaky Bill's 1) were removed. E-Trib was also removed from further analysis due to its small size and because its exact location is unclear.

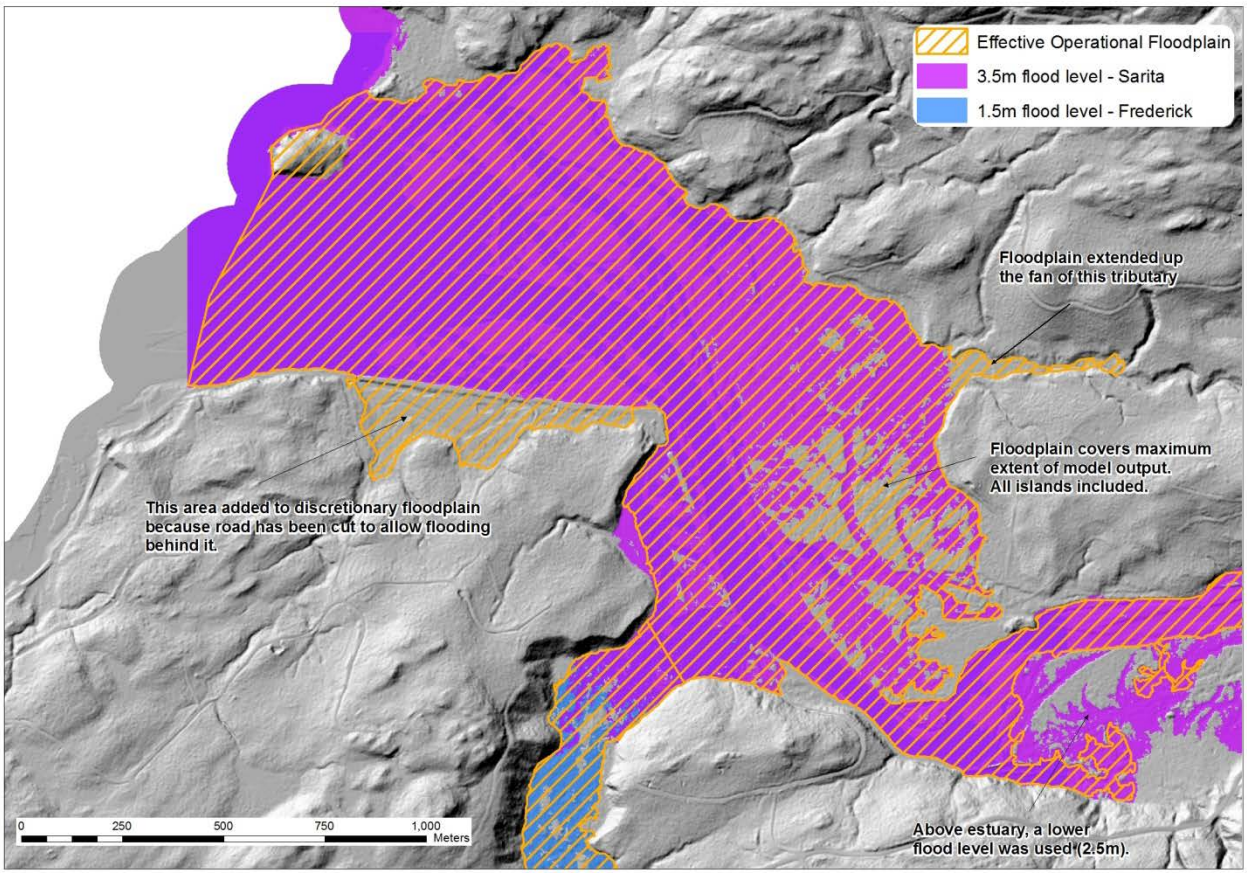


Figure 11: Effective operational floodplain for Sarita estuary

Table 5 shows the depths used for each stream for the enhanced and effective operational floodplains. Each stream was also assigned a riparian class, based on the data received from MFS. Changes from the source data are indicated in the "notes" field.

Table 5: Enhanced and effective operational depths, and stream classes

Stream	Enhanced floodplain depth (m)	Effective operational floodplain depth (m)	Stream Class	Notes
Sarita Estuary	4	3.5	S1	Changed from S2
Sarita	3	2.5	S1	Changed from S2
South Sarita (lower)	2.5	2	S1	Changed from S2
South Sarita	2.5	2	S2	
Sabrina	2.5	2	S2	
Sabrina 1	2.5	2	S2	
Hunter (lower)	2	1.5	S2	

Stream	Enhanced floodplain depth (m)	Effective operational floodplain depth (m)	Stream Class	Notes
Hunter	2	1.5	S4	Changed from S5
Frederick	2	1.5	S2	
Fred1	n/a	n/a	n/a	Completely within Frederick floodplain
Fred2	2	1.5	S4	
Fred3	manual	manual	S3	
Pachena below Rousseau confluence	3	2.5	S1	Changed from S2
Pachena between Rousseau and Pach2	2.5	2	S2	
Pachena above Pach2	1.5	1	S3	
Rousseau	3	2.5	S1	
F-Trib	2	1.5	S2	
E-Trib	n/a	n/a	n/a	Too small, remove
Pach1	n/a	n/a	n/a	Completely within Pachena floodplain
Pach2	1.5	1	S3	
D-Trib	2	1.5	S4	
U-Trib	2	1.5	S3	
Shaky Bill's 1	n/a	n/a	n/a	Completely within Pachena floodplain
Shaky Bill's 2 (above Bamfield Main)	2	1.5	S3	Changed from S6
C-Trib	1.5	1	S4	
Sugsaw	2.5	2	S2	

The total area of the floodplains is shown in Table 6. Note that all tributaries are connected, so the Sarita watershed includes South Sarita, Sabrina, Sabrina1, Hunter, Frederick, Fred2, and Fred3, and the Pachena watershed includes Rousseau, Pach2, F-Trib, D-Trib, U-Trib, C-Trib, and Shaky Bill's 2.

Table 6: Floodplain area by watershed

Watershed	Effective operational floodplain area (ha)	Enhanced floodplain area (ha)
Sarita	392	444
Pachena	227	259
Sugsaw	0.8	0.9
Total	**619**	**704**

Figure 12 shows the difference between the effective operational and enhanced floodplains for the lower part of the Sarita River.

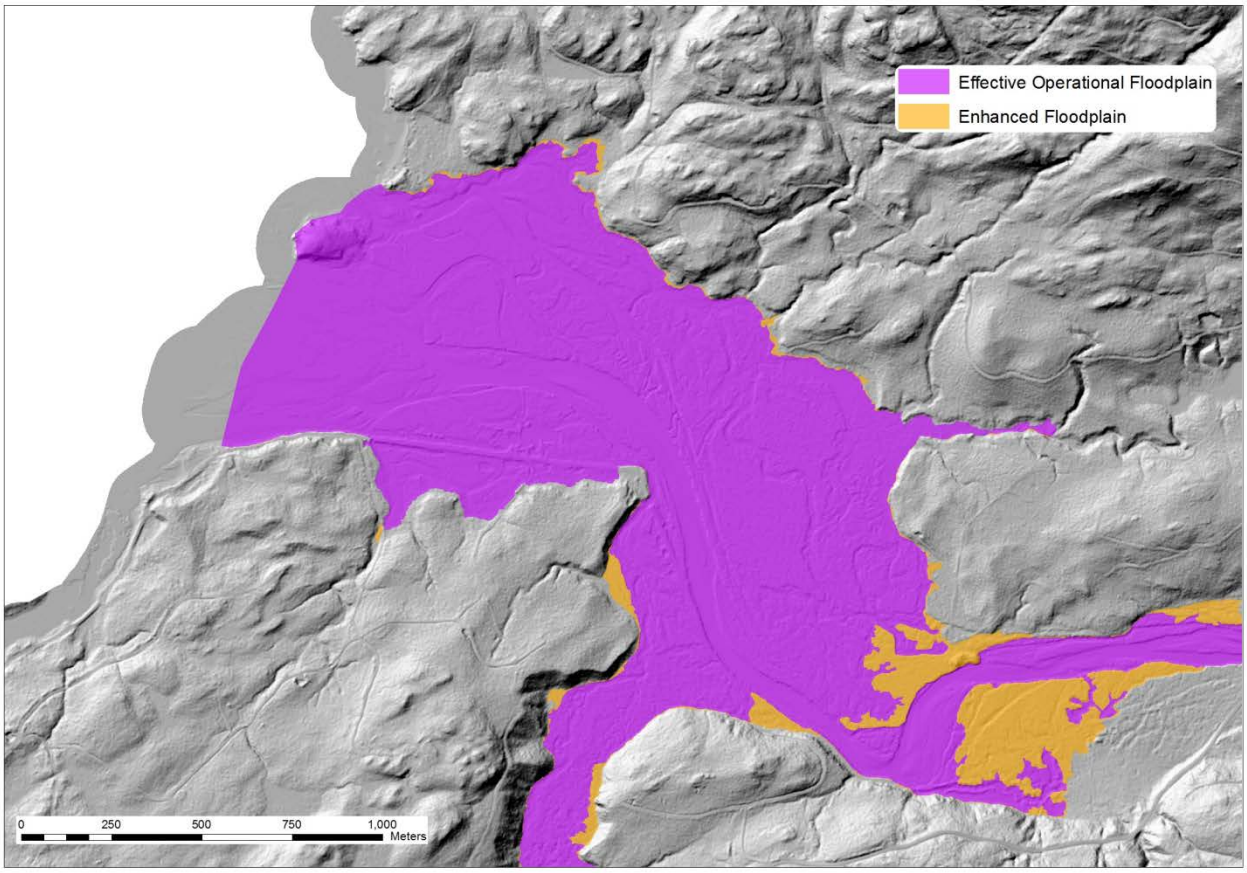


Figure 12: Effective operational and enhanced floodplains, lower Sarita

Riparian Buffers

Once the effective operational and enhanced floodplains were finalised, each was buffered as per FRPA guidelines, based on the stream class in the HFN Streams dataset provided by MFS. Riparian reserve (RRZ) and management zone (RMZ) buffers were applied separately. Note that the full RMZ width was applied, but only a portion of the total retention is required in this zone. Table 7 shows the buffer widths for each class.

Table 7: Riparian buffer widths

Stream Class	RRZ (m)	RMZ (m)
S1	50	20
S2	30	20
S3	20	20
S4	0	30

The floodplains and buffers were overlaid with the Timber Harvesting Land Base (THLB) and recent cutblocks, and the results summarized. Table 8 shows the total area, THLB, Non-harvesting land base (NHLB), excluded land base (EXLB), and no data areas for the effective operational floodplain and riparian buffers. Table 9 shows the same information for the enhanced floodplain and riparian buffers. 'No data' areas are private land parcels and Indian Reserve areas that have no forest cover information and were excluded from the last timber supply review. Figure 13 shows the land base netdown combined with the enhanced floodplain and buffers for part of the Sarita River. The black line shows the boundary between the land base netdown and no data areas. Overall, 19% of the effective operational and 20% of the enhanced riparian area is THLB.

Table 8: Riparian areas netdown – effective operational floodplain

	Area (ha)	THLB (ha)	NHLB (ha)	EXLB (ha)	No data (ha)	Percent THLB
Floodplain	619	59	196	33	332	10%
RRZ	410	91	179	6	134	22%
RMZ	211	84	67	2	58	40%
Total	**1,240**	**234**	**442**	**41**	**524**	**19%**

Table 9: Riparian areas netdown – enhanced floodplain

	Area (ha)	THLB (ha)	NHLB (ha)	EXLB (ha)	No data (ha)	Percent THLB
Floodplain	704	77	223	34	370	11%
RRZ	393	101	166	6	121	26%
RMZ	206	85	64	2	55	41%
Total	**1,304**	**263**	**453**	**41**	**546**	**20%**

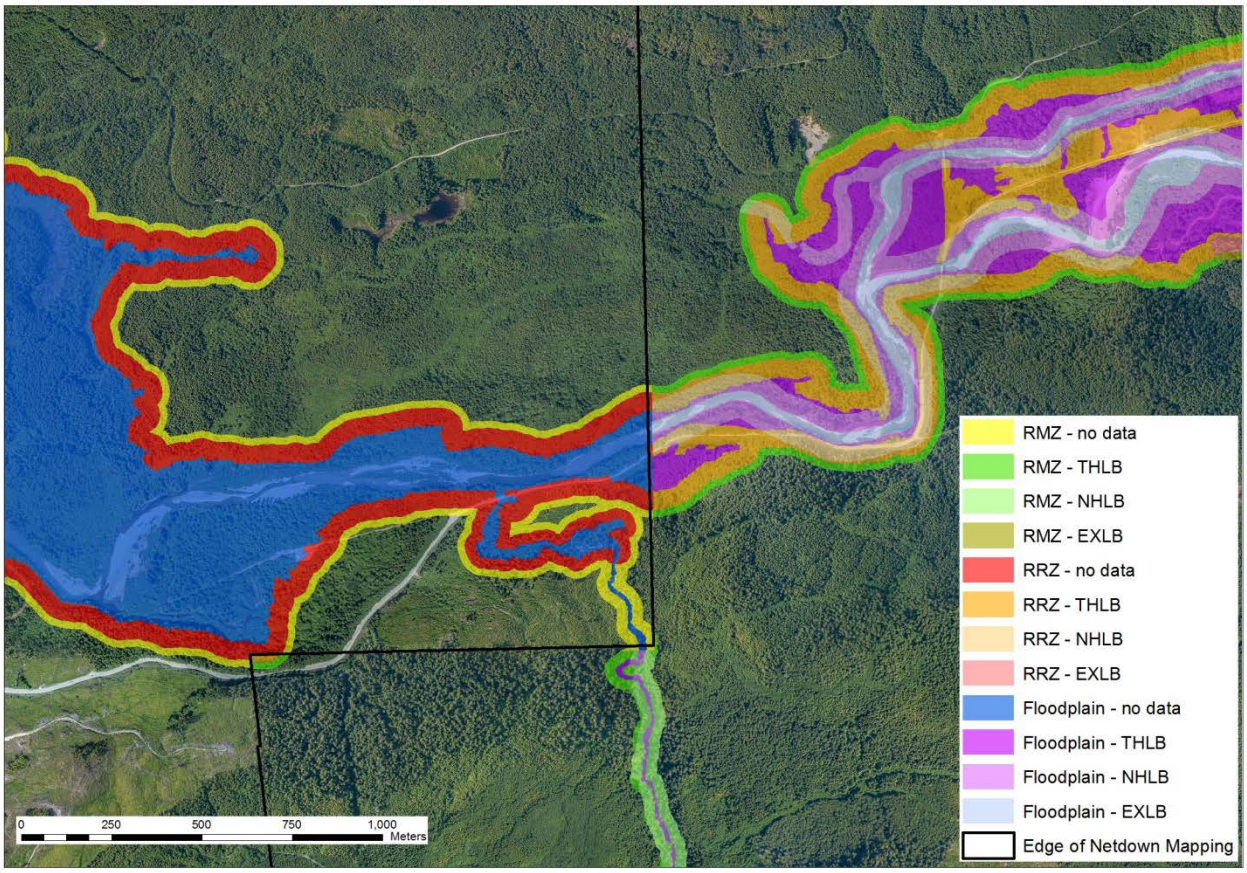


Figure 13: Enhanced floodplain and buffers overlaid with land base netdown

Previous harvest (between 1996 and 2018) has occurred on 86 ha of the effective operational riparian area (20 ha of THLB), and 97 ha of the enhanced riparian area (26 ha of THLB).

Figure 14 and Figure 15 show the age class breakdown of the THLB in the effective operational and enhanced riparian areas. The majority of the THLB is between age 1 and 80 (age class 1 to 4), with about 10% older than 250 (age class 9).

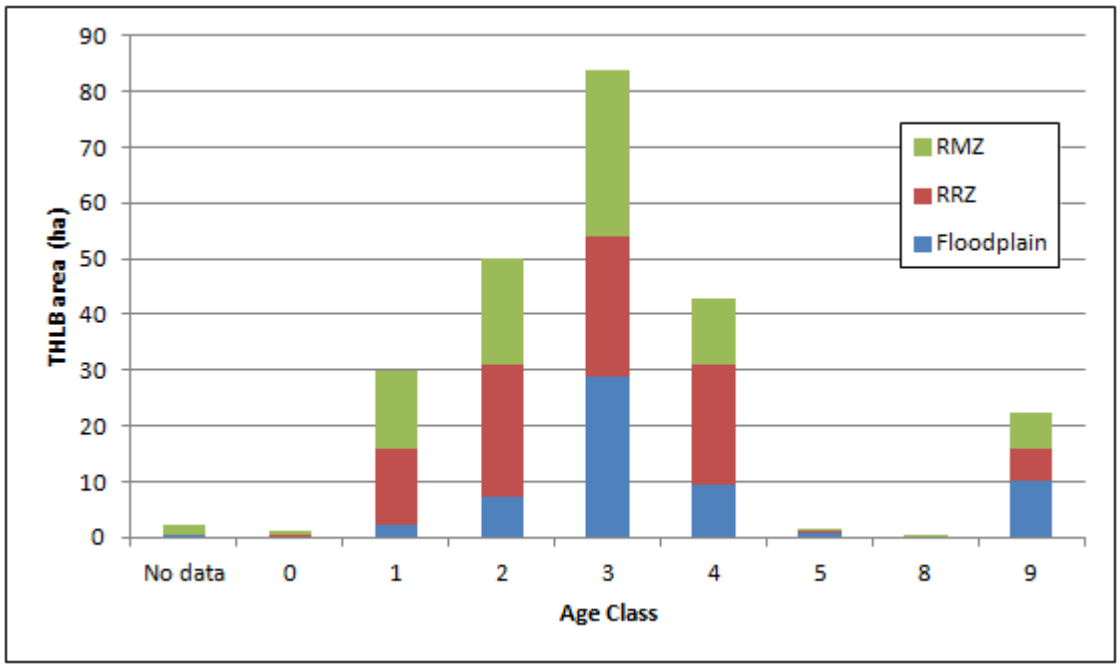


Figure 14: Age class breakdown in the THLB, effective operational riparian area

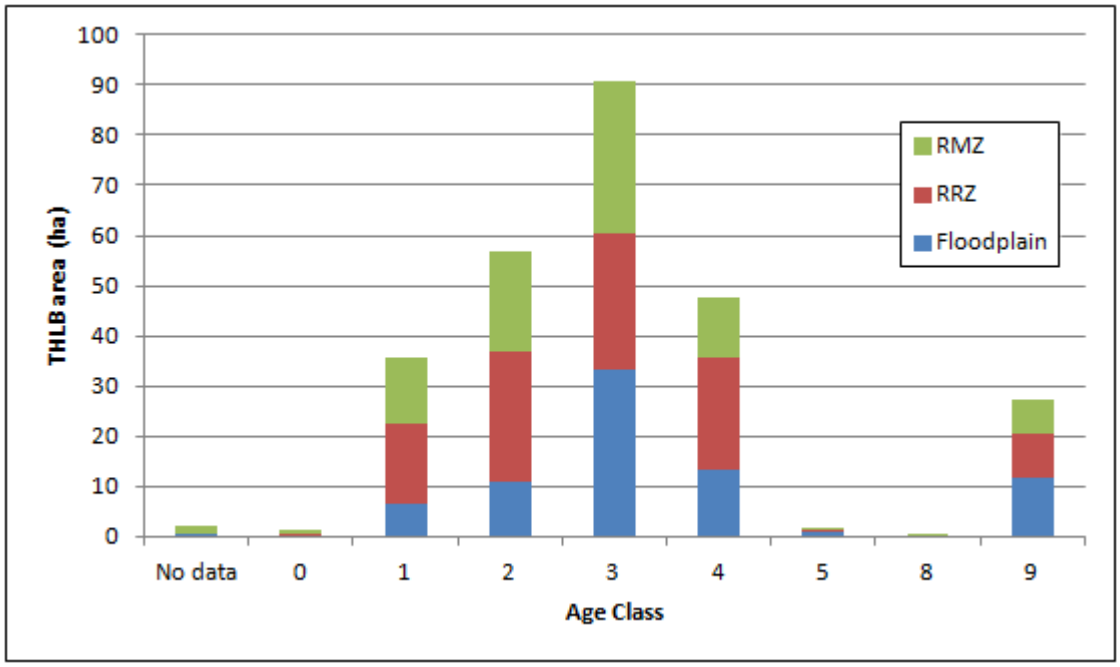


Figure 15: Age class breakdown in the THLB, enhanced riparian area

REFERENCES

Forest Planning and Practices Regulation – Forest and Range Practices Act. Part 4 – Practice Requirements, Division 3 – Riparian Areas.

Rosgen, D.L. 1996. Applied river morphology: Pagosa Springs, Colo., Wildland Hydrology [variously paged].

Terra Remote Sensing Inc. 2016. Project Report: Huu-ay-aht First Nation Aerial Survey, Bamfield, BC, Canada.

Appendix 1: LiDAR Stream Network Methodology

HFN LiDAR Stream Network Methodology

In the process of mapping floodplains, shortcomings were discovered with the existing stream data for the study area. Streams were missing, or offset from the LiDAR DEM location, either due to changes since the stream data was captured, or because of the scale the data was captured. It was decided to generate a stream network that matched the LiDAR DEM data, since the LiDAR DEM is the most detailed and accurate data available. The new stream network was generated by modeling the flow and accumulation of water over the LiDAR DEM surface.

Processing Steps

1. Fill Sinks

In order to generate a stream network, there must not be any "sinks" in the DEM. A sink occurs when all the surrounding cells are higher, and leads to breaks in modeling water flowing across the surface.

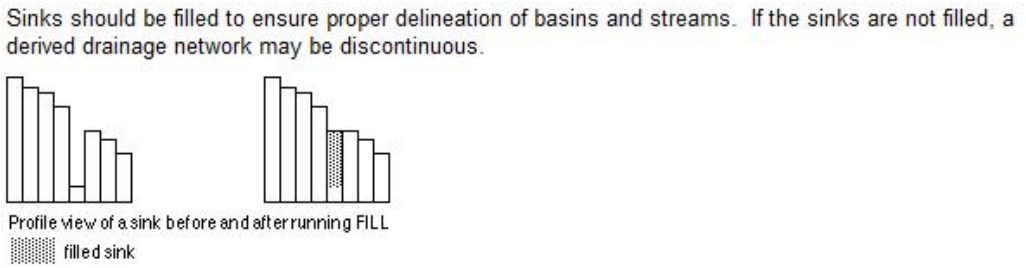


Figure 1: Illustration of Sinks from Arc/Info Help

2. Run Flowaccumulation Command

The ArcGIS Spatial Analyst command "FLOWACCUMULATION" pours virtual water over the landscape and sees where it flows. Each cell in the output receives the value of the number of upstream cells that flow into it. Figure 2 shows how the output looks, and two different options for defining streams.

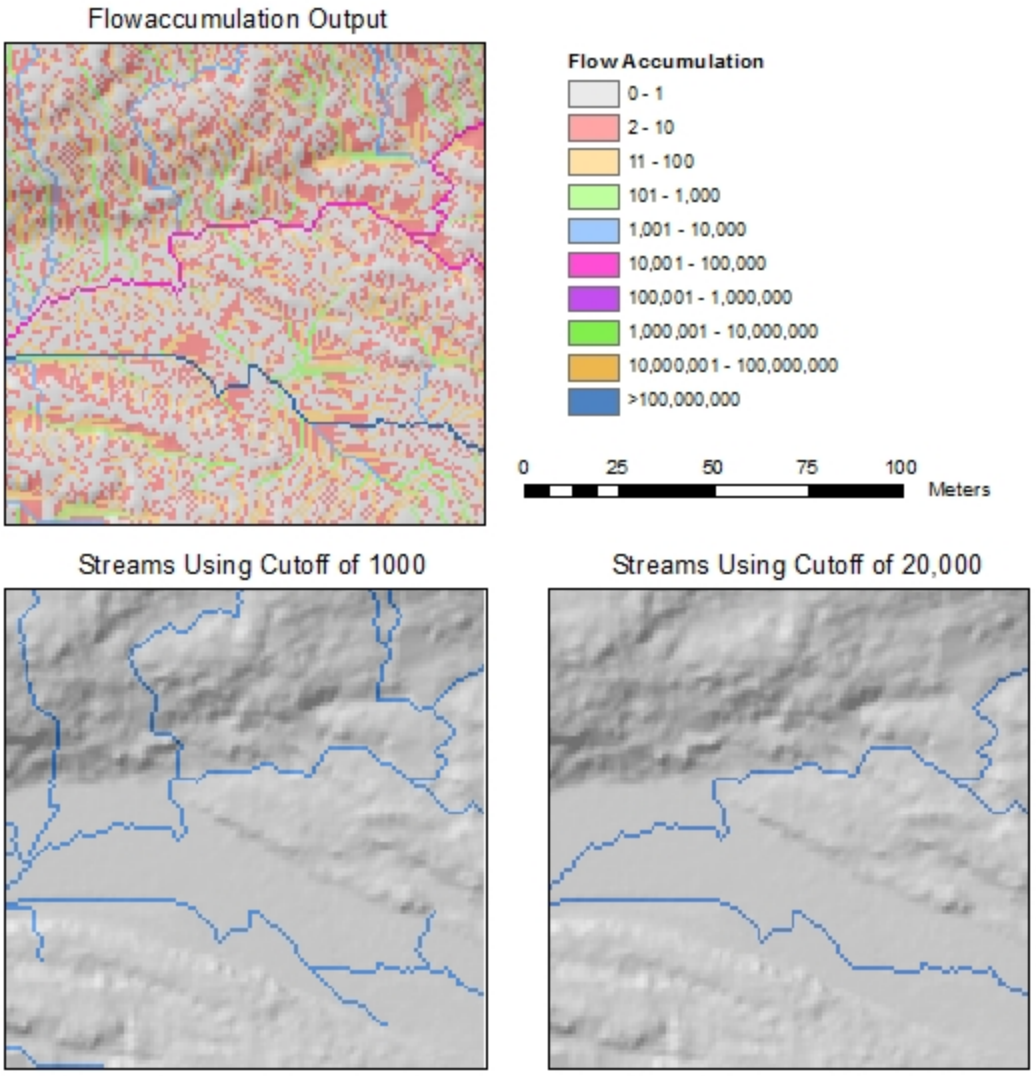


Figure 2: Flowaccumulation Output and Classification of Streams

3. Classify Flowaccumulation output to make streams

The output from Flowaccumulation has values ranging from 0 to several hundred million. To identify streams, a cut-off of 20,000 was used. This appeared to give a reasonable output without including too many tiny creeks. Using this cut-off ended up with approximately 1,450 km of streams within the study area.

Initial review of the LiDAR streams showed that the roads were causing a problem. Due to the high level of detail in the LiDAR DEM, many streams were running along beside the road and unable to cross (Figure 3). To resolve this, we located likely culvert sites along the roads.

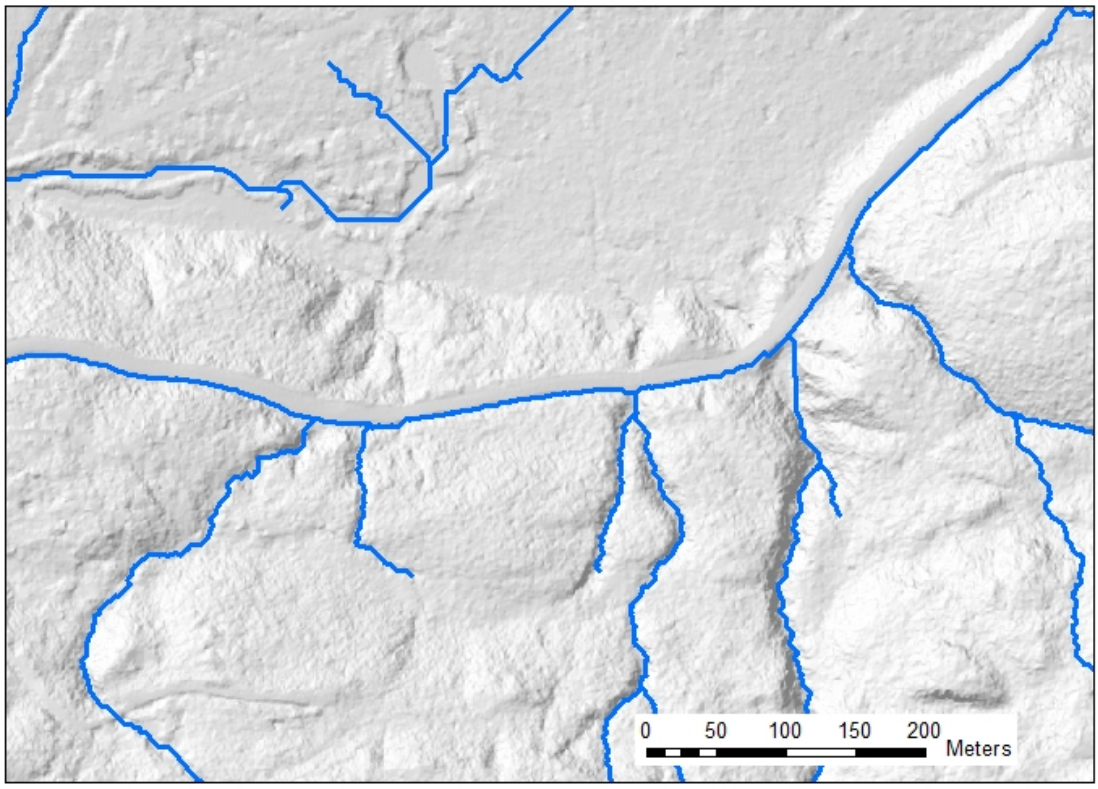


Figure 3: Example of Streams Blocked by Road

4. Cut ditches across roads

At each culvert site, a line was run through the road, buffered by 2m each side, and given the elevation of the lowest point below the road. The LiDAR DEM was updated with these "ditches", and then steps 1, 2, and 3 were re-run. Figure 4 shows the same streams after this process.

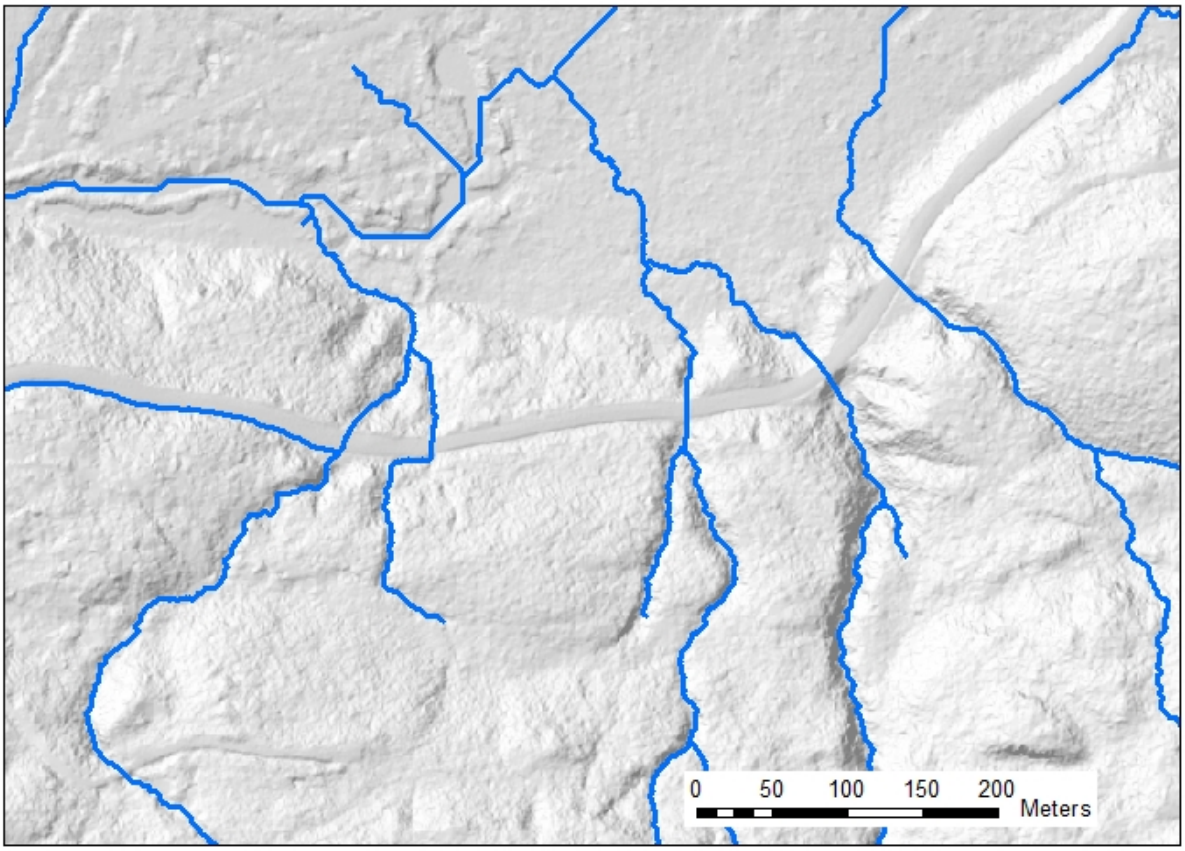


Figure 4: New Streams After Cutting Ditches

5. Clean-up streams

The streams derived from the Flowaccumulation command are a 1 m^2 raster. To make a useable stream network, the streams were converted to vector, then cleaned up to remove small glitches. There were several thousand short line segments (less than 4m long), many of them were "diamonds" in the middle of the stream, like the one shown in Figure 5.

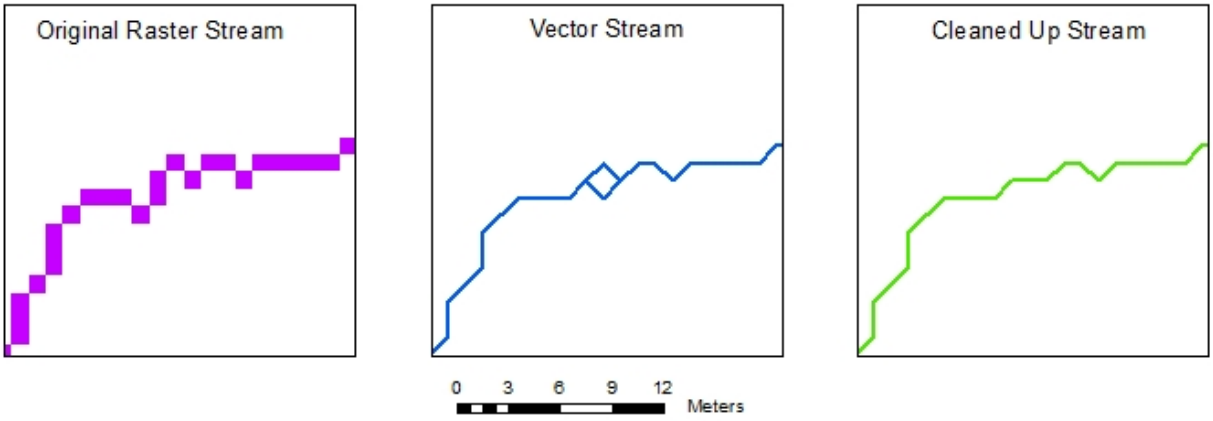


Figure 5: Example of stream clean-up

Another common issue where two streams join is the “lattice”, like this one shown in Figure 6.

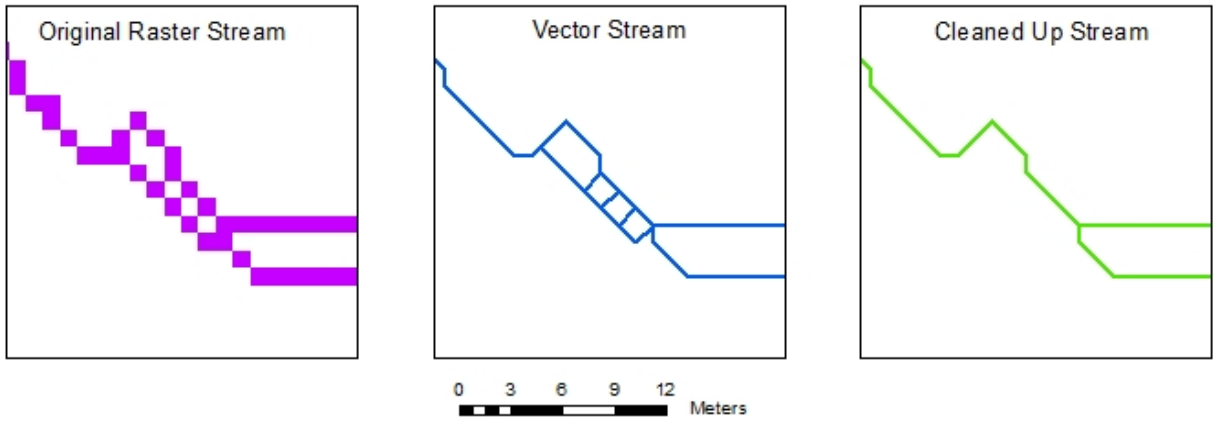


Figure 6: Another stream clean-up example

6. Check stream direction and fill gaps

Once all the cleanup was completed, checks were done to ensure that the stream network was fully connected (no gaps), and that all the stream lines pointed downstream. The stream direction is important for doing network analysis.

There is a hole in the LiDAR DEM and orthophoto data due to a private land parcel. The HFN streams provided by Meridian continue through this area, but because there is no data, the LiDAR streams stop at the edge. Using the HFN streams, the gap was digitized and matched as well as possible between the two datasets. Figure 7 shows how the HFN streams were used to fill in the gap.

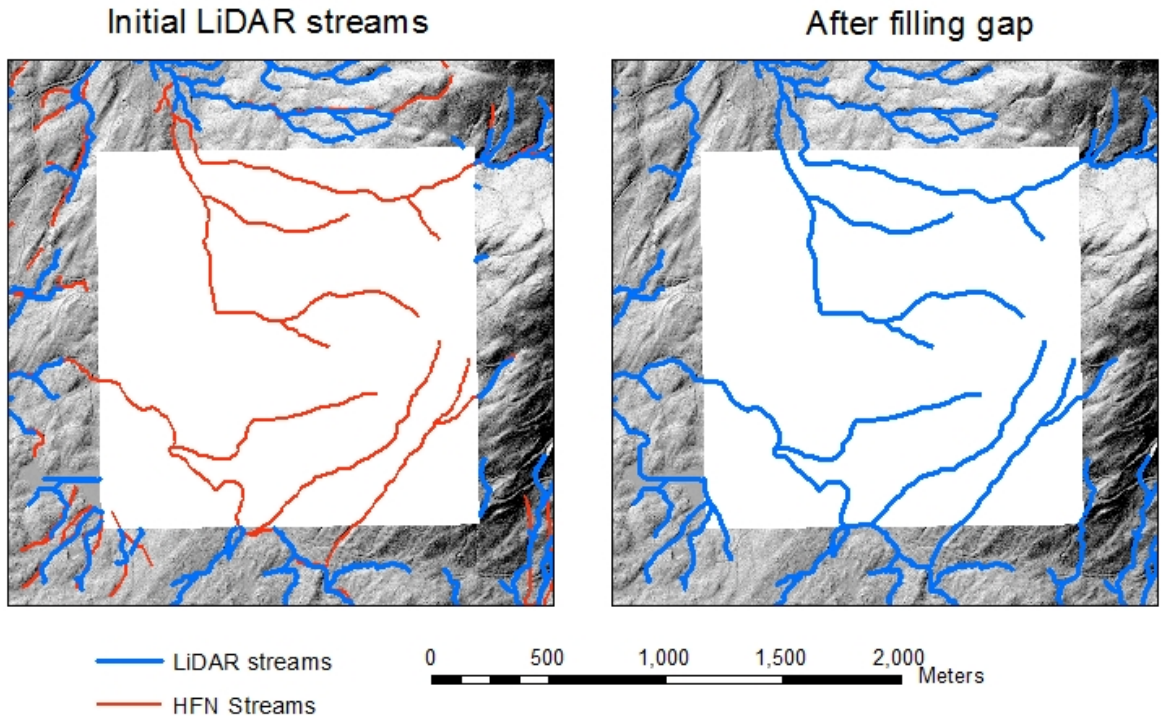


Figure 7: Filling in Private Land Gap

7. Add stream names where known

Once the streams layer was complete, the next step was to manually name the streams and rivers where possible. To do this, the stream names provided by Marc Gaboury were used, as well as the Freshwater Atlas and NTS 1:50,000 topographic maps. Where there was a conflict between the name provided by Marc and one of the other sources, Marc's name was used.

8. Add lakes from HFN Waterbodies layer

There are 22 lakes of various sizes within the study area boundary. The lakes were provided by Meridian as part of the HFN Waterbodies dataset, and the lake boundaries appear to have been digitized based on the orthophotos. The lake shores do not always match the LiDAR DEM. The Flowaccumulation function does not account for lakes, and the output can include several tributaries running parallel through the middle of the lake, or a stream running close to the shoreline.

To clean this up, a Skeletonizer utility (initially made for BC MSRM) was used. The inputs for this are the lake polygons, and points on the edge of each lake where the streams enter and leave it. All the stream segments within the lakes were deleted, and replaced with the skeletonizer output. Figure 8 shows Sarita Lake before and after this process.

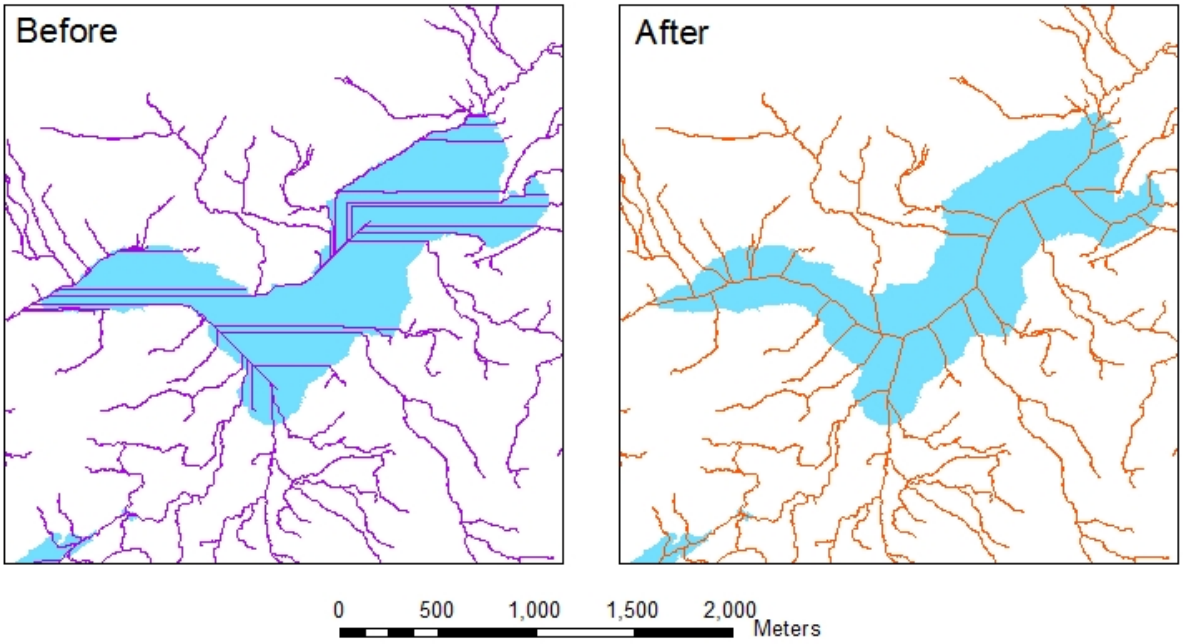


Figure 8: Example of Streams within Lake Before and After Skeletonizer

9. Add stream classification from HFN Streams

The final step was to manually assign the stream classes (S1 through S6) from the HFN Streams dataset to the LiDAR streams. This could not be automated because two datasets do not always have the streams in the same location. There are many new streams in the LiDAR stream layer that do not exist in the HFN Streams, these were left as unclassified.

A number of issues were noted when assigning the stream classes. Some of the rivers are classified as S2 from the source to the mouth – this seems unlikely. The Sarita River is S2 all the way along, but probably at least the lower part should be S1. Hunter Creek is classified as non-fish (mostly S5), but Marc Gaboury's data says it is a salmon-bearing stream. There are many cases where a fish-bearing stream flows into a non-fish stream (eg S3 above S6), or a larger stream flows into a smaller one (eg S1 above S2, or S5 above S6), which does not make sense. A field has been added to the output data indicating where this has happened so that the classification of these streams can be checked.

Limitations of LiDAR Stream Data

Although the LiDAR DEM is very detailed and is the most accurate elevation data available, there are still limitations to its use for stream networks. The first and most obvious issue is that the LiDAR DEM does not cover the entire watershed. Along the edges of the study area, this can lead to streams flowing the wrong way, gaps in streams, or incorrect calculations of stream order and magnitude. Figure 9 shows the extent of the LiDAR coverage, and the full Sarita Watershed (from Freshwater Atlas), including all tributaries. Since the LiDAR DEM does not cover the entire watershed, the LiDAR streams cannot be used to calculate stream order or magnitude.

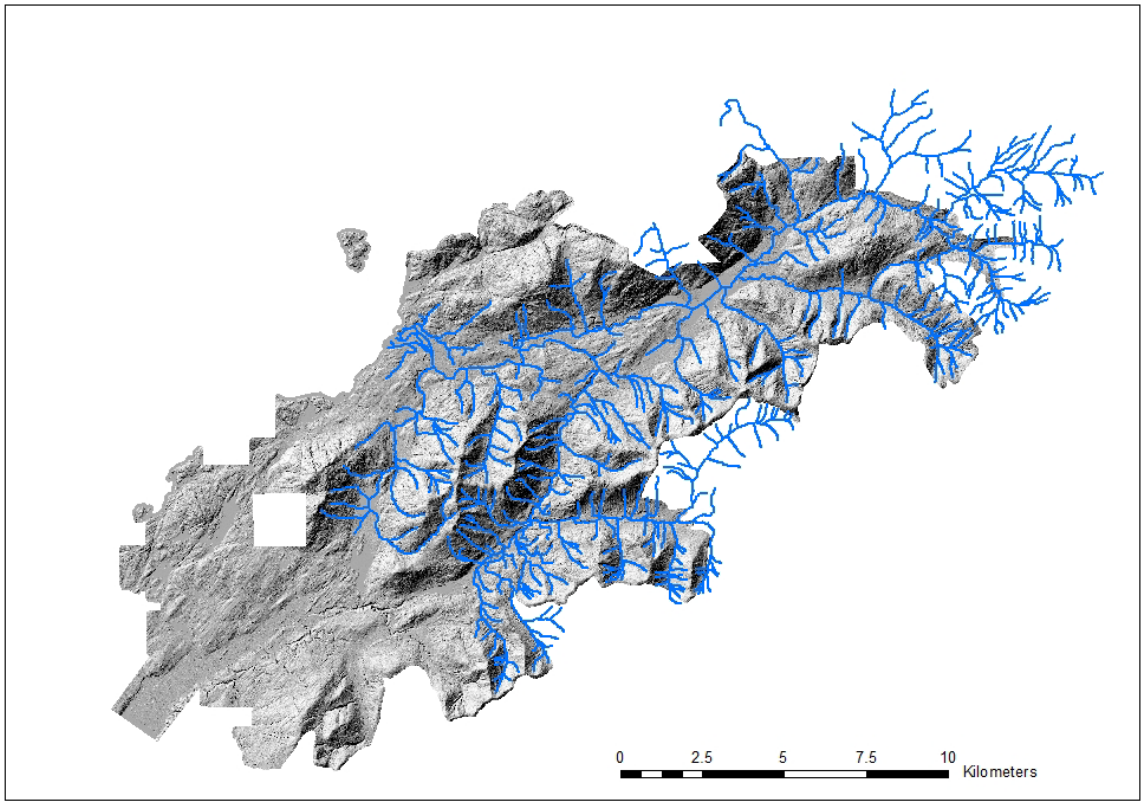


Figure 9: Comparison of LiDAR DEM Extent and Sarita Watershed

Figure 10 shows an example of edge issues. The arrow points to the corner of a lake that is cut off by the LiDAR boundary. Because of this, the Flowaccumulation function cannot determine where the lake outflow is, and the streams flowing into the lake end at that corner. Based on the Freshwater Atlas, the lake outflow is at the south-east corner, but without LiDAR DEM data for the entire area around the lake, Flowaccumulation does not find this. Note that this lake was manually cleaned up when the streams in lakes were skeletonized, and now the outflow matches the Freshwater Atlas.

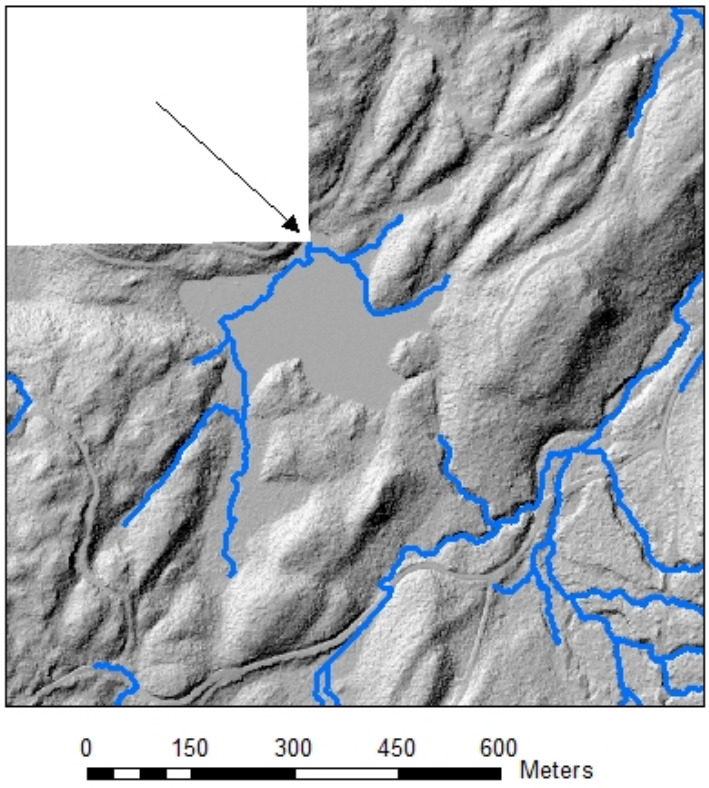


Figure 10: Edge Issues

Another issue, which may or may not be a concern, is that when converting from raster to vector, it is possible to get a zigzag pattern along a stream. Where these were found, they were smoothed out, but there will still be a number of zigzag sections. Figure 11 shows a short zigzag example, each zigzag is approximately 1.5m long.

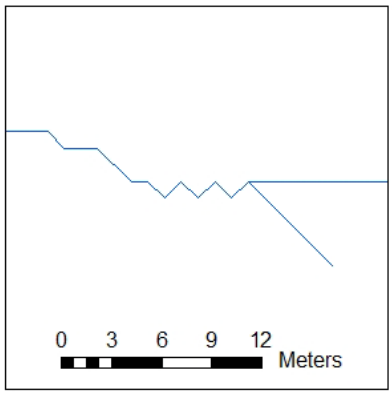


Figure 11: Example of Zigzag Stream

Even after cutting ditches through the roads, there are still some locations where streams are shown flowing along the side of the road. These may be cases where there was no clear culvert location (ie no evidence of a stream or gully below the road), or the culvert may have been

missed. In other cases, the culvert location may have been clearly seen on the LiDAR DEM, but the Flowaccumulation function found that the water concentrated beside the road, instead of in the gully above the culvert. An example of this is shown in Figure 12. The red dot is the culvert location, and it seemed that the stream would flow down the gully above the culvert. However, the Flowaccumulation output showed the water collecting beside the road.

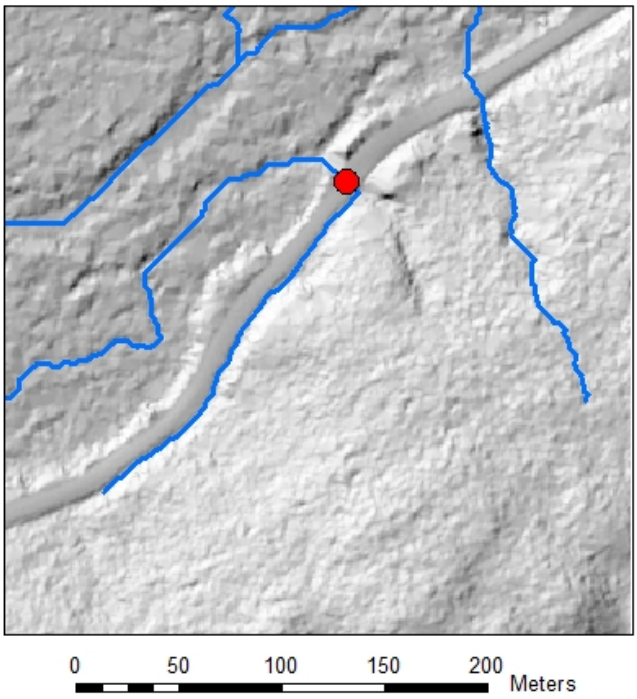


Figure 12: Example of stream flowing along road

Attributes in Final Stream Dataset

The final stream dataset is called “LiDAR_Streams_final_5April2018.shp”, and contains the following fields:

- Watershed: This is the name of the major watershed the stream is part of (Sarita, Pachena, Sugsaw, Carnation). Streams outside these major watersheds have no value in this field.
- Riv_Name: Stream name where known, see step 7 of the methodology
- Lk_Name: Lake name where known, from the HFN_Waterbodies layer
- Stream_Cla: Stream class (S1 to S6) taken from HFN_Streams layer, see step 9 of methodology
- Chk_class: Indicates that stream class needs to be verified, as there is a larger class upstream (see step 9).

Appendix 2: Hydrologic Rationale

Hydrologic Rationale

Flood frequencies for the Water Survey of Canada (WSC) hydrometric gauge station Sarita River near Bamfield 08HB014 were based on analyses by Chapman Geoscience Ltd. (1999[1].

Table 1. Flood frequencies for WSC Station 08HB014 based on Chapman Geoscience Ltd. (1999data.

Return Period Flood (yr)	Flood Frequency	Discharge (m^3/s)
2	0.5	270
10	0.1	480
25	0.04	576
50	0.02	660
100	0.01	750

The following Figure 1 shows plots of flood frequency versus discharge at the gauge station using data in Table 1.

[1] Chapman Geoscience. 1999. Guide to peak flow estimation for ungauged watersheds in the Vancouver Island region. Prepared for BC Ministry of Environment, Lands and Parks., Nanaimo, BC.

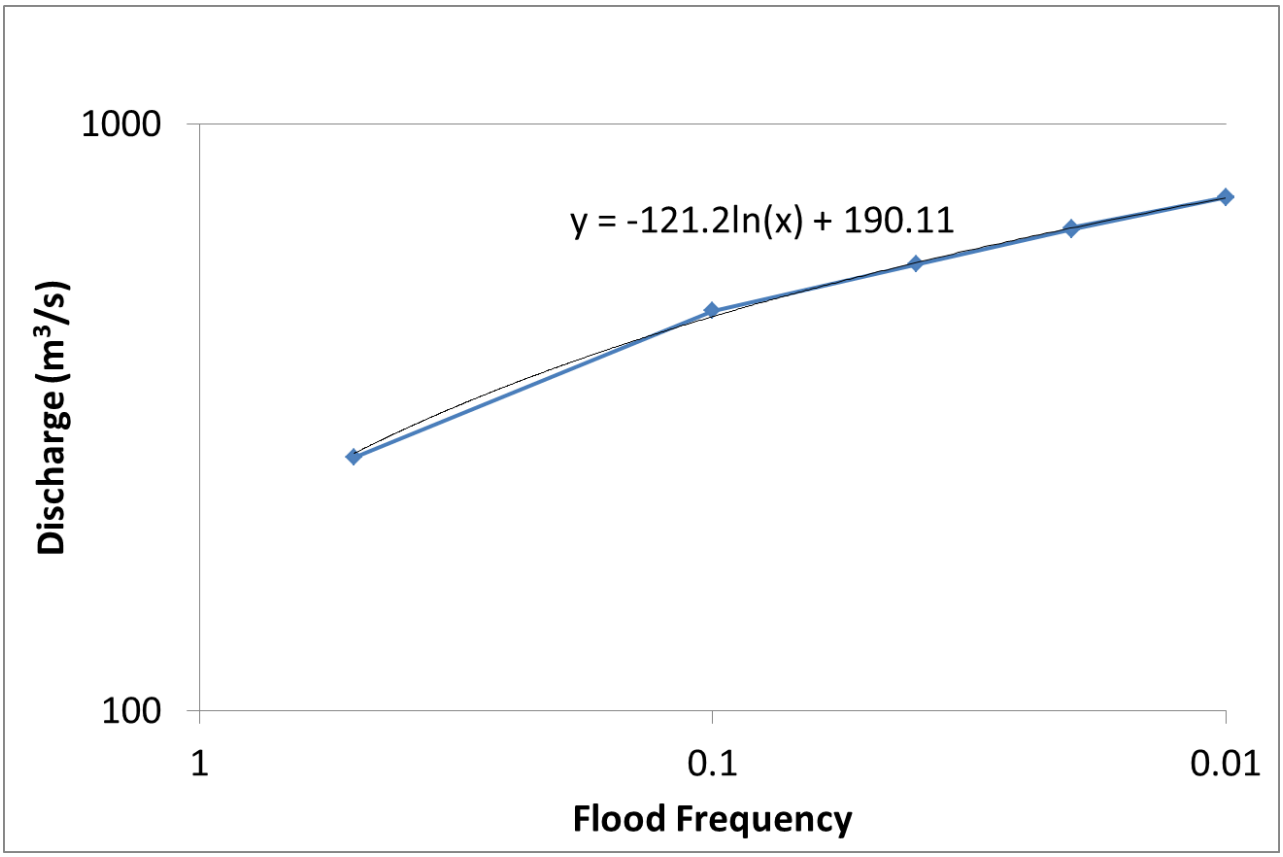


Figure 1. Relationships between flood frequency and discharge for WSC Station 08HB014.

A relationship was plotted between stage elevation and mean daily discharge for WSC Station 08HB014 for the period January 1, 2011 to December 31, 2017 (Figure 2).

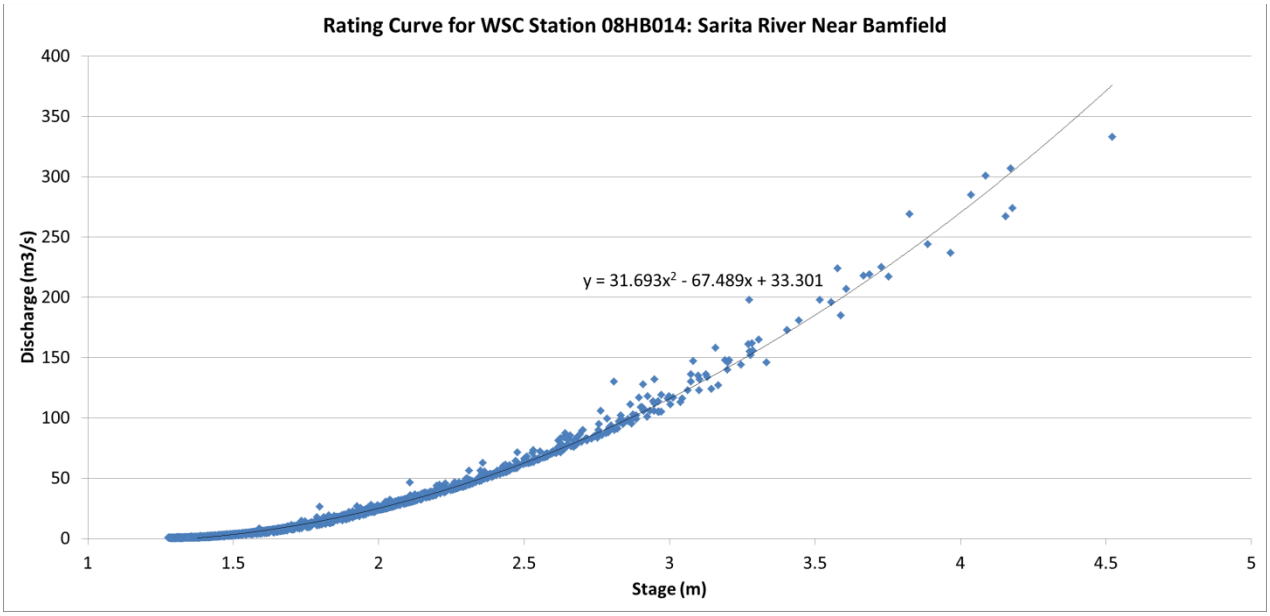


Figure 2. Plot of stage versus mean daily discharge for WSC Station 08HB014: Sarita River near Bamfield, January 1, 2011 to December 31, 2017.

Using the equation in Figure 1, additional return period discharges were estimated (Table 2). Also, stage elevations at various flood discharges were estimated using the equation from Figure 2 (Table 2).

Table 2. Calculated flood discharges using equations in Figure 1 and water stage at gauge using equation in Figure 2.

Return Period Flood (yr)	Flood Frequency	Discharge (m^3/s)	Sarita River Gauge Station (m)		
			Water Stage at Gauge	Mean Water Stage at Gauge (June 17-23, 2015)	Net Increase in Water Level at Specified Flood Frequency
100.0	0.01	748.27	5.93	1.32	4.61
50.0	0.02	664.26	5.65	1.32	4.33
33.3	0.03	615.11	5.48	1.32	4.16
25.0	0.04	580.25	5.36	1.32	4.04
20.0	0.05	553.20	5.25	1.32	3.93
16.7	0.06	531.11	5.17	1.32	3.85
14.3	0.07	512.42	5.10	1.32	3.78
12.5	0.08	496.24	5.03	1.32	3.71
11.1	0.09	481.96	4.98	1.32	3.66
10.0	0.1	469.19	4.92	1.32	3.60
5.0	0.2	385.18	4.56	1.32	3.24
3.0	0.3	336.04	4.33	1.32	3.01
2.5	0.4	301.17	4.16	1.32	2.84
2.0	0.5	274.13	4.02	1.32	2.70
1.7	0.6	252.03	3.90	1.32	2.58
1.4	0.7	233.35	3.79	1.32	2.47
1.3	0.8	217.16	3.70	1.32	2.38
1.1	0.9	202.89	3.61	1.32	2.29
1.0	1	190.12	3.53	1.32	2.21

From Table 2, a mean daily flood discharge with a return period of 5 yr was estimated at ~385 m^3/s. Stage elevation at a 5 yr mean daily flow of ~385 m^3/s was estimated at 4.56 m.

LiDAR imagery was flown June 17-23, 2015. As LiDAR does not penetrate the water surface, it was assumed that the elevation of the stream channel shown on the LiDAR cross sections would be the mean water level over these dates (Table 3). Therefore, the amount of water level increase above the mean June elevation of 1.319 m at a ~5 yr mean annual flow would be equal to: 4.56-1.32 m or 3.24 m.

Table 3. LiDAR Imagery for HFN Territory from June 17-23, 2015.

Date	Water Level (m)	Discharge (m^3/s)
17-Jun	1.323	0.673
18-Jun	1.322	0.660
19-Jun	1.322	0.654
20-Jun	1.320	0.635
21-Jun	1.318	0.617
22-Jun	1.316	0.597
23-Jun	1.314	0.583
mean	1.319	0.631

Note: Water level at WSC Gauge is based on an Assumed Datum

The LiDAR cross section (#440) at the WSC gauge station is shown in Figure 2. Note: Elevations for LiDAR are Geodetic.

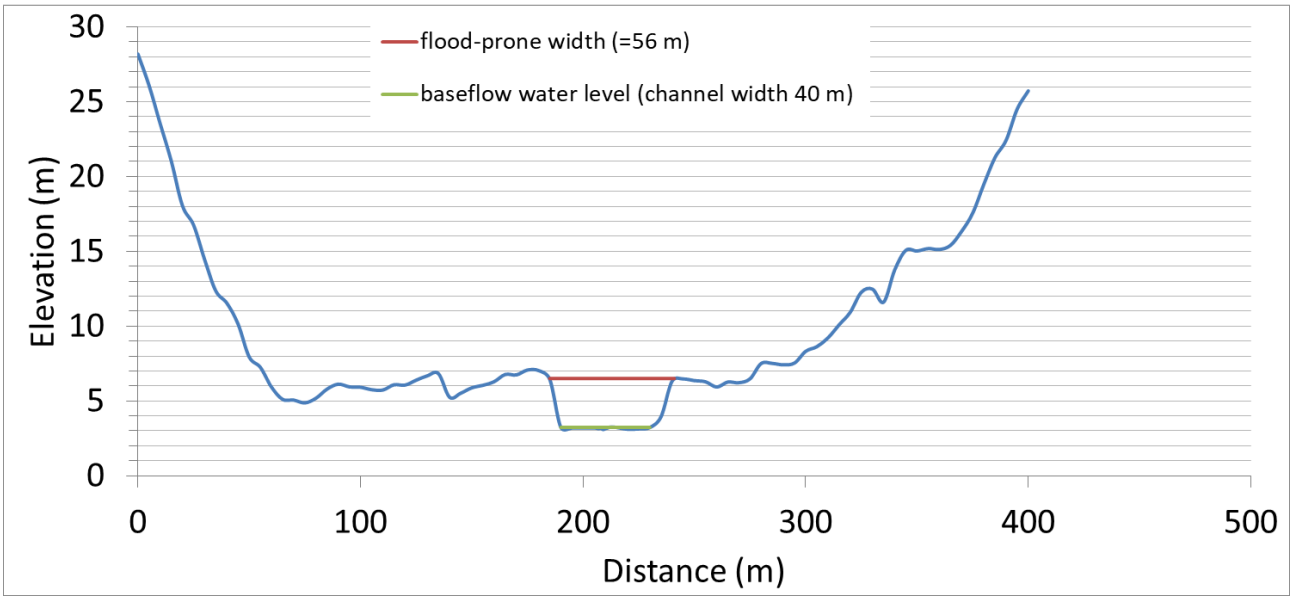


Figure 3. LiDAR cross section at WSC Gauge 08HB014: Sarita River near Bamfield.

The bankfull channel width was estimated at 40 m at a water level of ~3.23 m. At the gauge station, the 4 m high banks suggest a moderately entrenched channel. Using the equation:

Entrenchment Ratio = Flood-prone Width / Bankfull Width

and assuming a moderately entrenched channel with an Entrenchment Ratio of 1.4, flood-prone width would equal 1.4 x 40 m or 56 m. At a channel width of 56 m, the water surface elevation would be ~6.50 m. The water level at the flood-prone width would be 3.27 m above the June 17-23, 2015 water level when the LiDAR imagery was taken. This elevation increase of

3.27 m is quite similar to the estimated water level increase of 3.24 m above the June 2015 water level that was estimated for a 5 yr return period flood (Table 2).

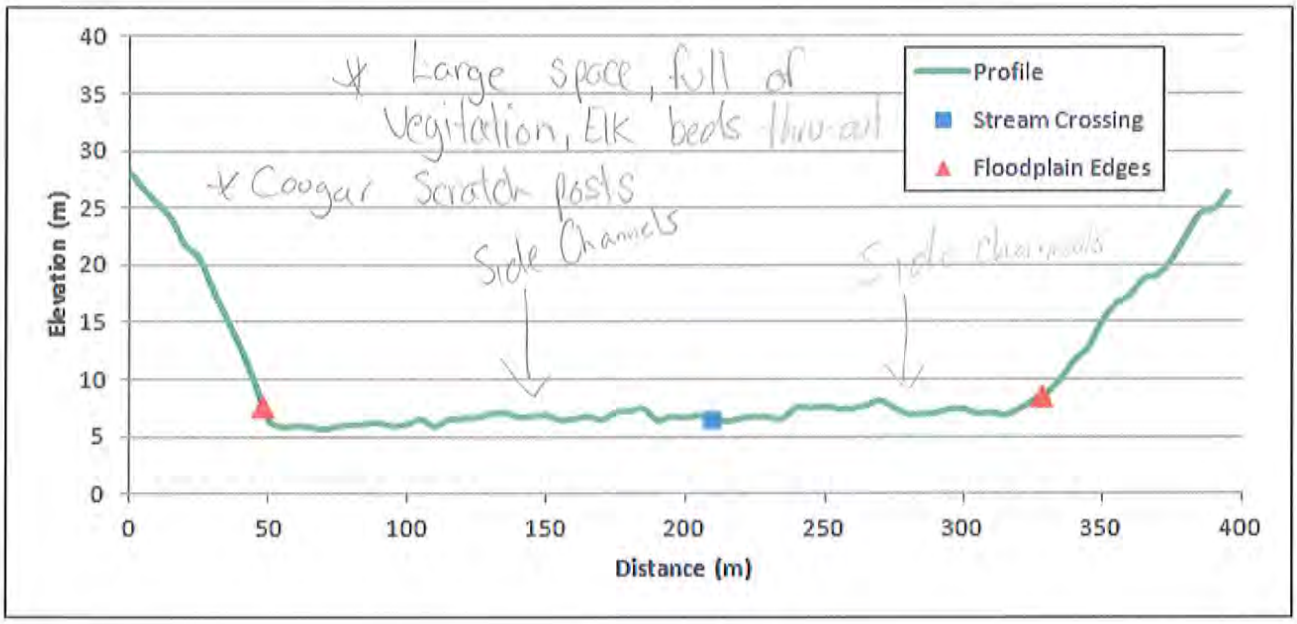
Appendix 3: Field Cards

Cross Section: fred3, Stream: Frederick, Reach 14

Start coords – x: 352975, y: 5416640

Direction: 96.8°

End coords – x: 353371, y: 5416593



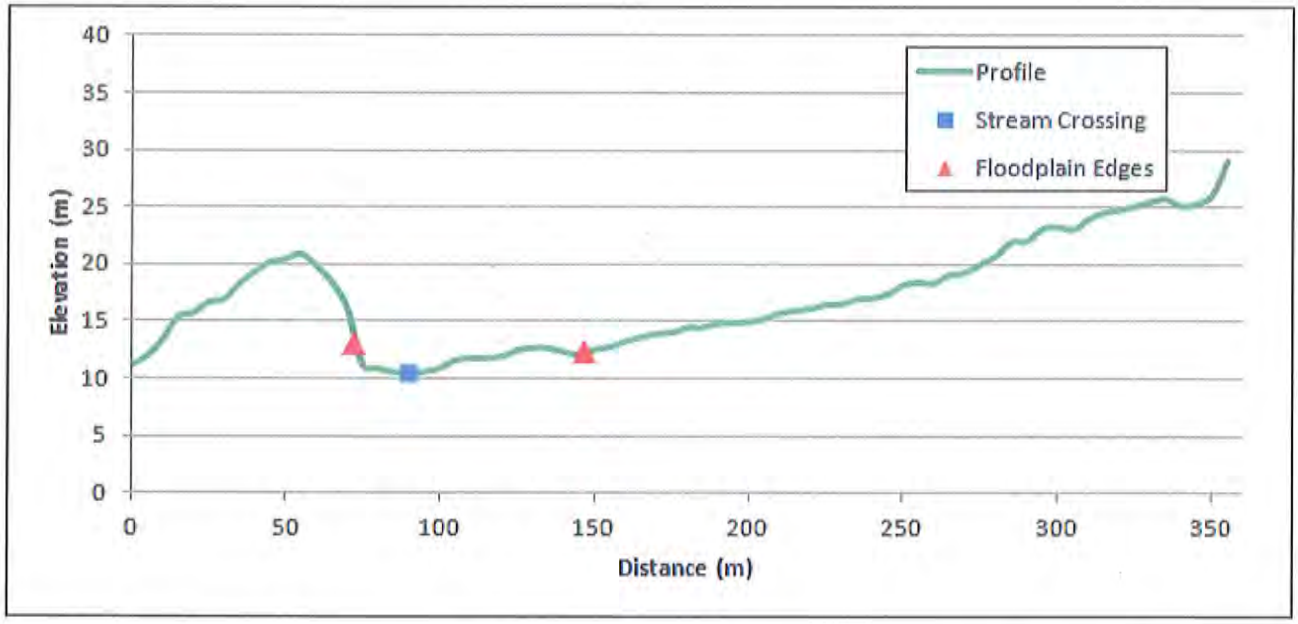
Field data to collect:

Bank-full Width: 12.5 (m)	
Wetted Width: 10.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Points	Floodplain edge coords GPS Points
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: fred5, Stream: Frederick, Reach 15

Start coords – x: 353009, y: 5416037
Direction: 137.6°
End coords – x: 353251, y: 5415771



Field data to collect:

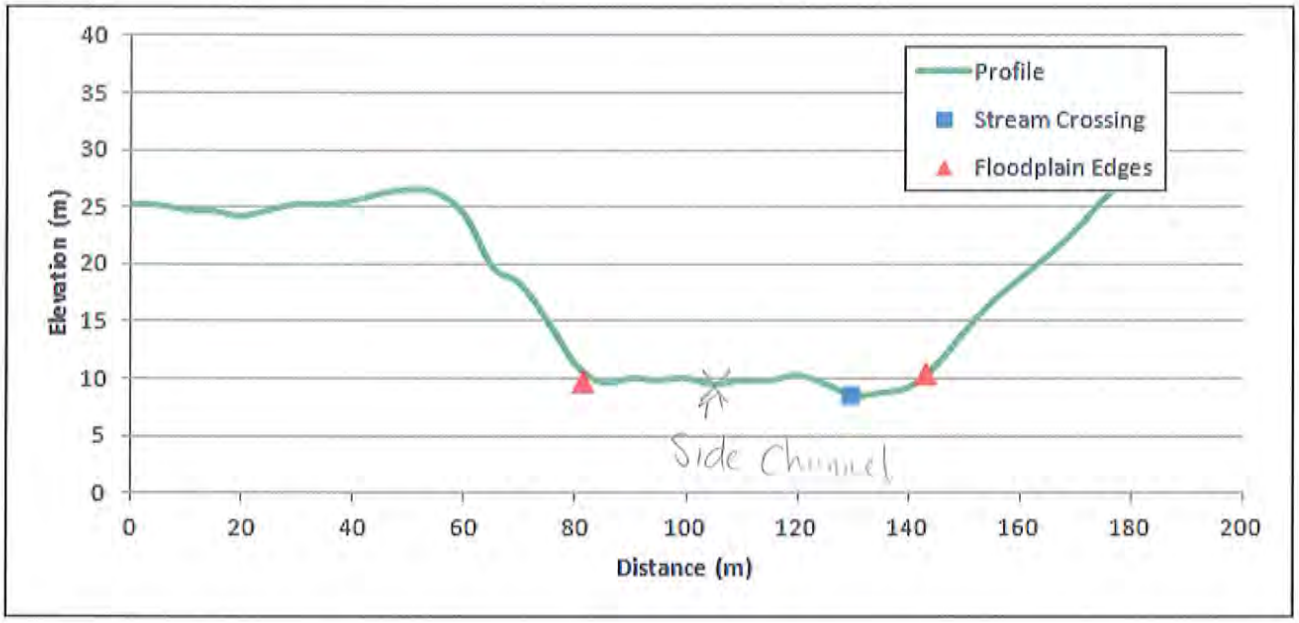
Bank-full Width:	15.8
Wetted Width:	14.2

Left Bank	Right Bank
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point.
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: fred4, Stream: Frederick, Reach 15

Start coords – x: 353140, y: 5416229
Direction: 92.3°
End coords – x: 353330, y: 5416221



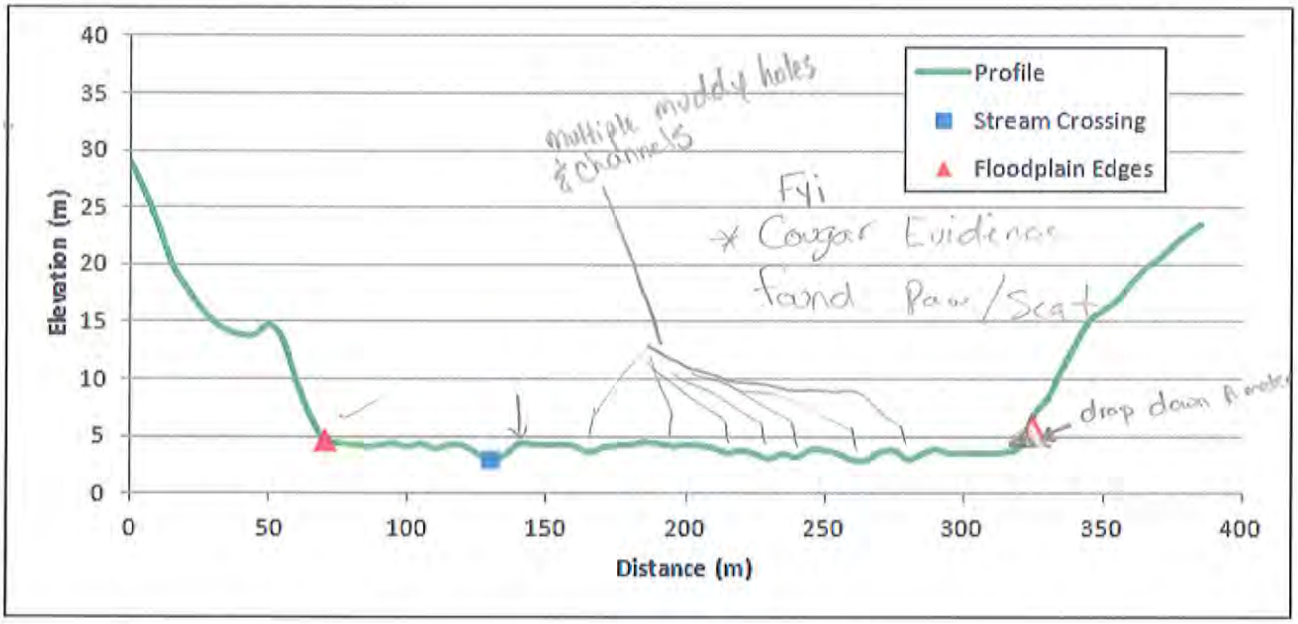
Field data to collect:

Bank-full Width: 11.3 m	
Wetted Width: 10.9 m	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: fred2, Stream: Frederick, Reach 13

Start coords – x: 353052, y: 5417103
Direction:92.3°
End coords – x: 353441, y: 5417087



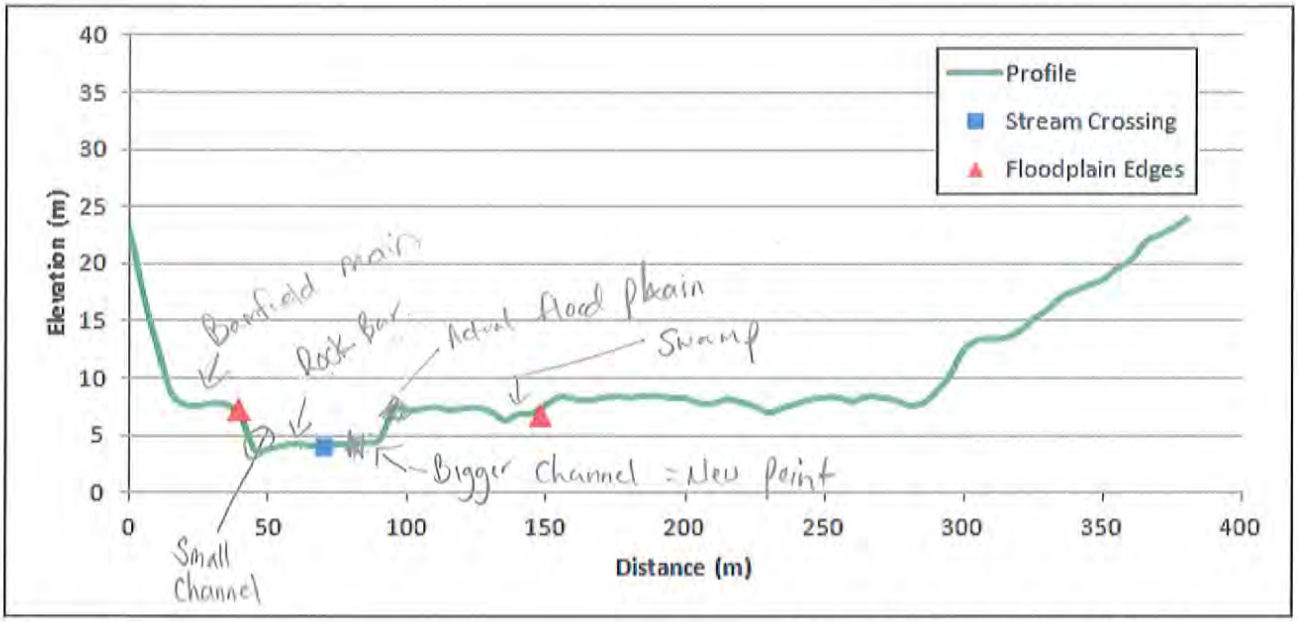
Field data to collect:

Bank-full Width: 12.6 (m)	
Wetted Width: 5.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
	mudd
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS	Floodplain edge coords GPS
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar9, Stream: Sarita, Reach 2

Start coords – x: 356160, y: 5417251
Direction: 352.1°
End coords – x: 356108, y: 5417628



Small Channel = 12 (m)
main Channel = 116.8 (m)
Rock Bar = 30 (m)

Field data to collect:

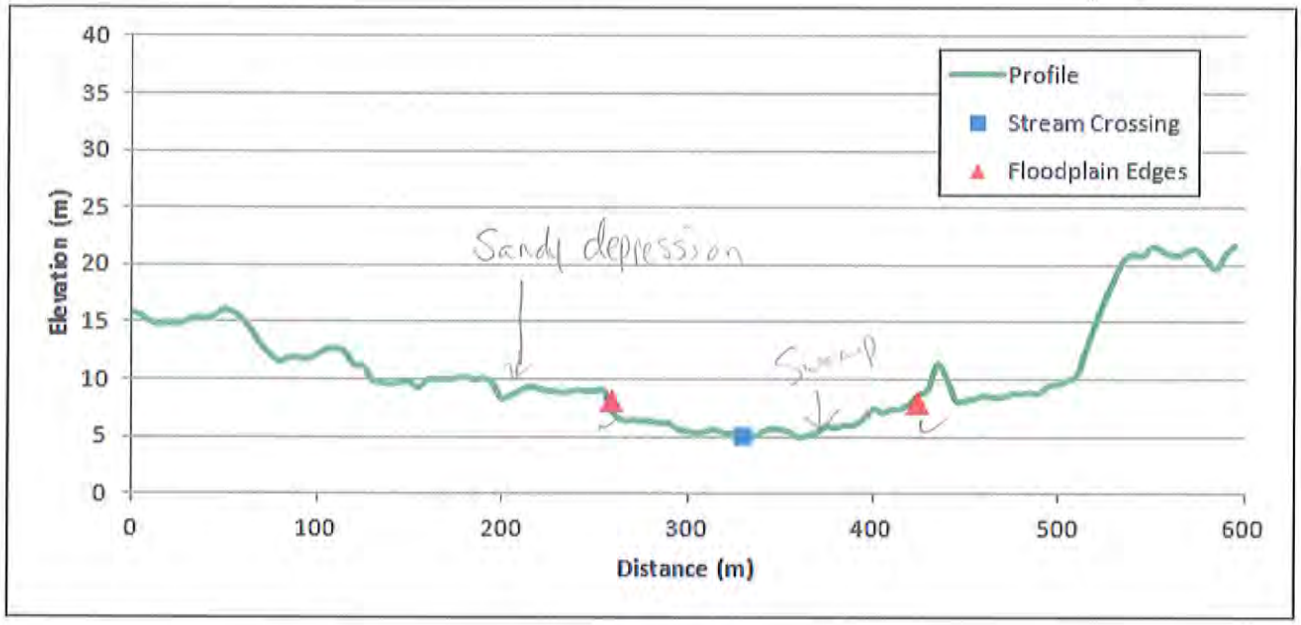
Bank-full Width: 62 (m)	
Wetted Width: 56.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords GPS Point
Elevation Difference:	Elevation Difference: 2.42 (m) bm @ 44%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

bm from wetted line to exposed roots
Nothing showing water evidence flowing through Brush or Sand deposits

Cross Section: sar10, Stream: Sarita, Reach 3

Start coords – x: 356537, y: 5417683
Direction: 278.3°
End coords – x: 355944, y: 5417770



Field data to collect:

Bank-full Width: 74.2 (m)	
Wetted Width: 35.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords
Elevation Difference:	Elevation Difference:

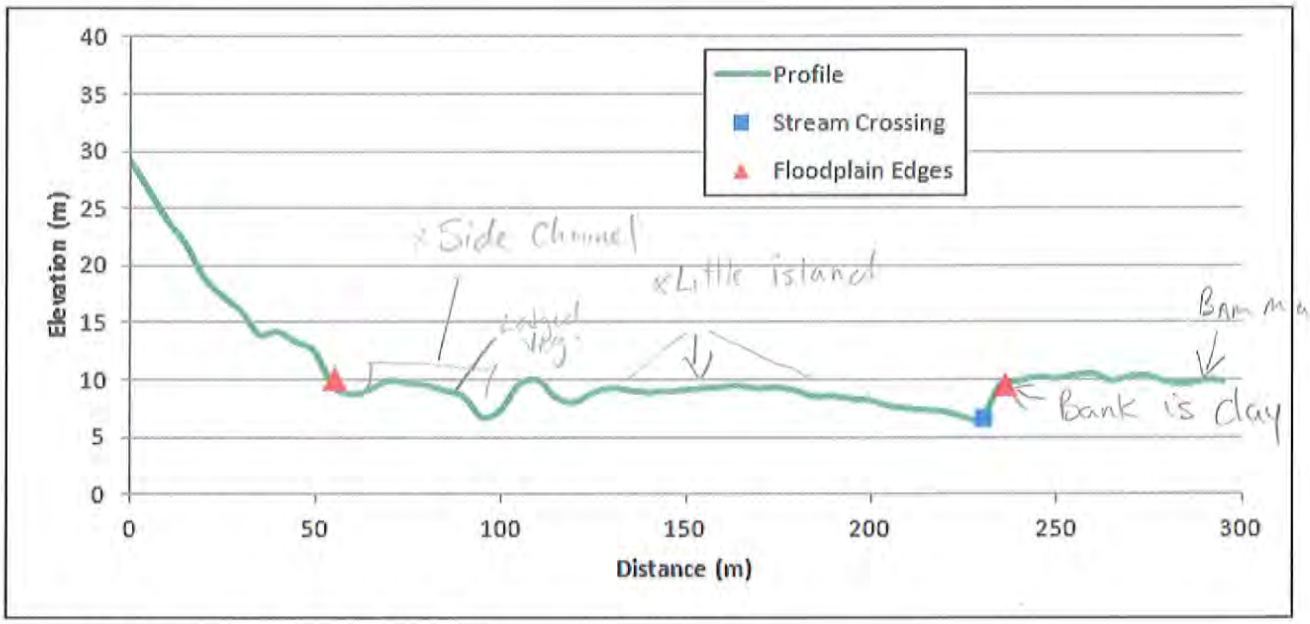
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: ssar1, Stream: South Sarita, Reach 20

Start coords – x: 356651, y: 5417693

Direction: 354.2°

End coords – x: 356620, y: 5417989



Active channel has changed to left side

Field data to collect:

Bank-full Width: 37.7 (m)	
Wetted Width: 14.1 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference:	Elevation Difference:

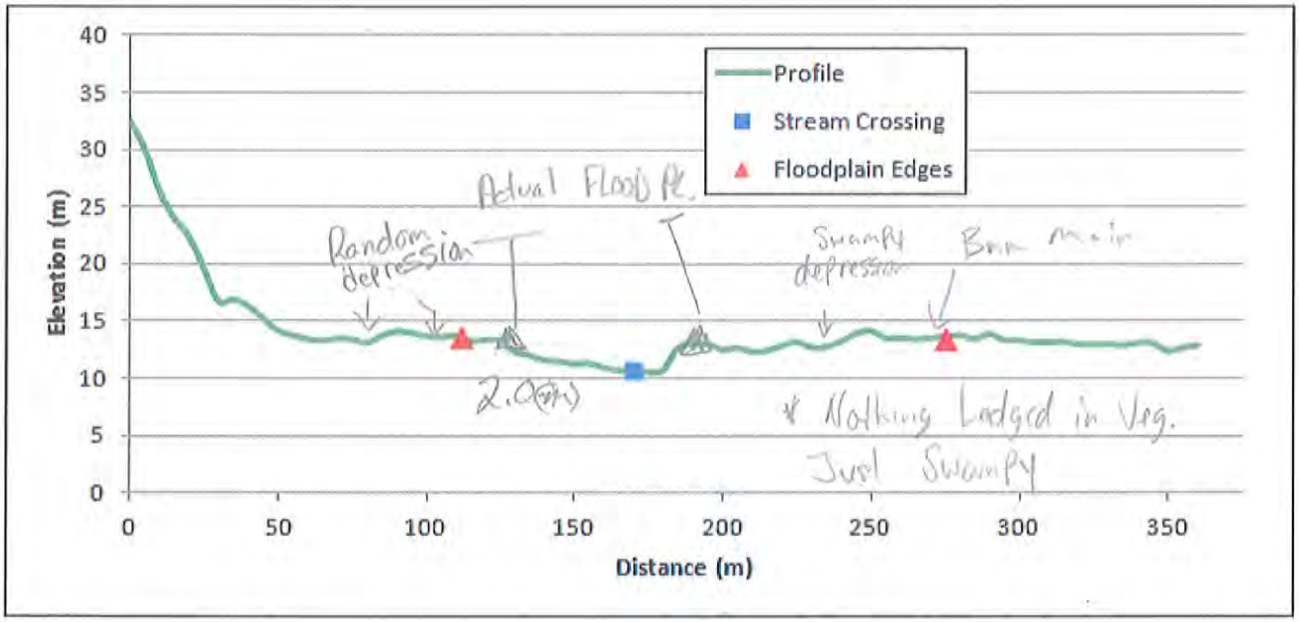
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: ssar2, Stream: South Sarita, Reach 20 (21?)

Start coords – x: 357420, y: 5417797

Direction: 7.8°

End coords – x: 357469, y: 5418157



Field data to collect:

Bank-full Width: 41.2 (m)	
Wetted Width: 23.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference: 2.0(m)	Elevation Difference: 1.9 (m)

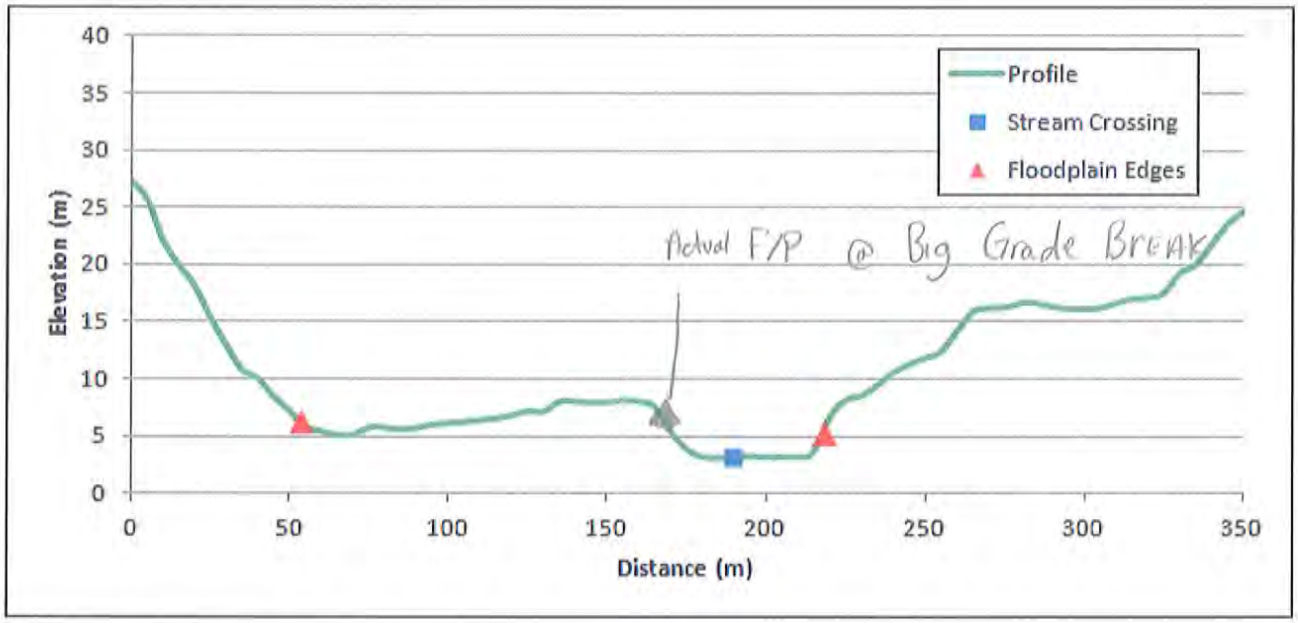
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar8, Stream: Sarita, Reach 2

Start coords – x: 355794, y: 5417210

Direction: 341.5°

End coords – x: 355683, y: 5417542



Field data to collect:

Bank-full Width: 46.2 (M)	
Wetted Width: 45.6 (M)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords
Elevation Difference: -2.6 + (m)	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

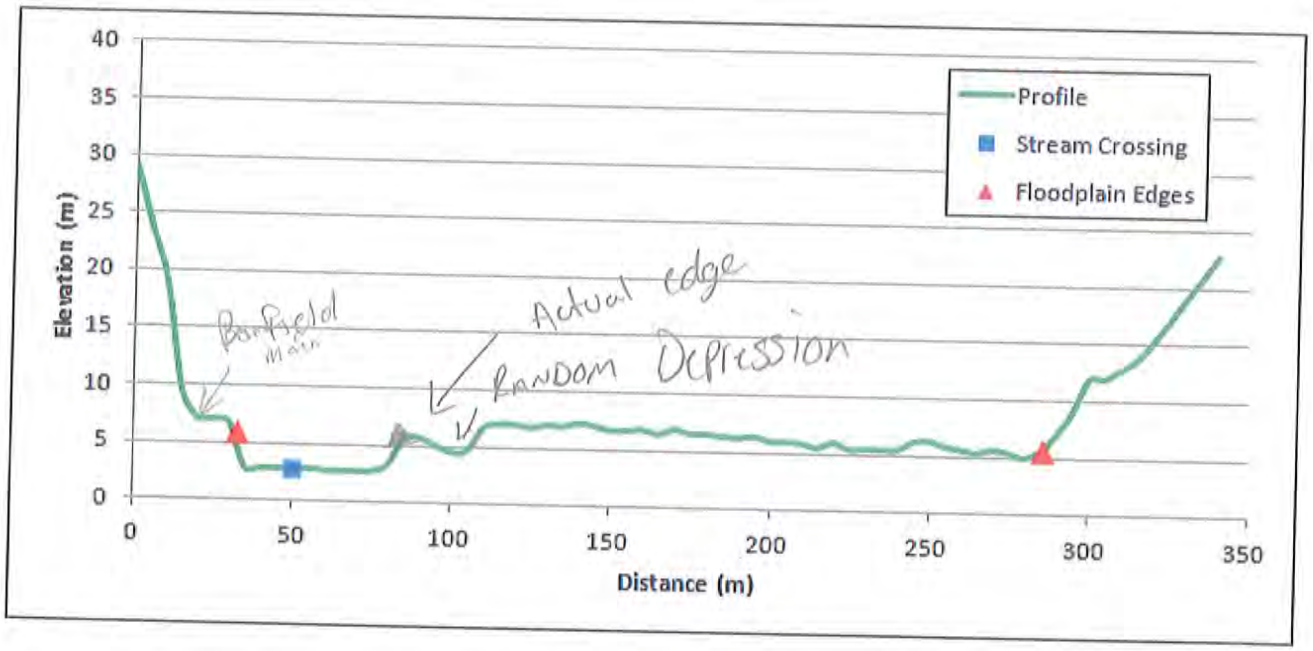
* ELEVATION Diff. ON Road SIDE WAS TAKEN @ OUTER Extremities @ Bottom of Massive Grade Break

Cross Section: sar7, Stream: Sarita, Reach 2

Start coords – x: 355392, y: 5417197

Direction: 350.0°

End coords – x: 355333, y: 5417532



Field data to collect:

Bank-full Width: 47.8 (m)	
Wetted Width: 46.5 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference:	Elevation Difference: 2.08 (m)

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

14m from middle of River @ 15x

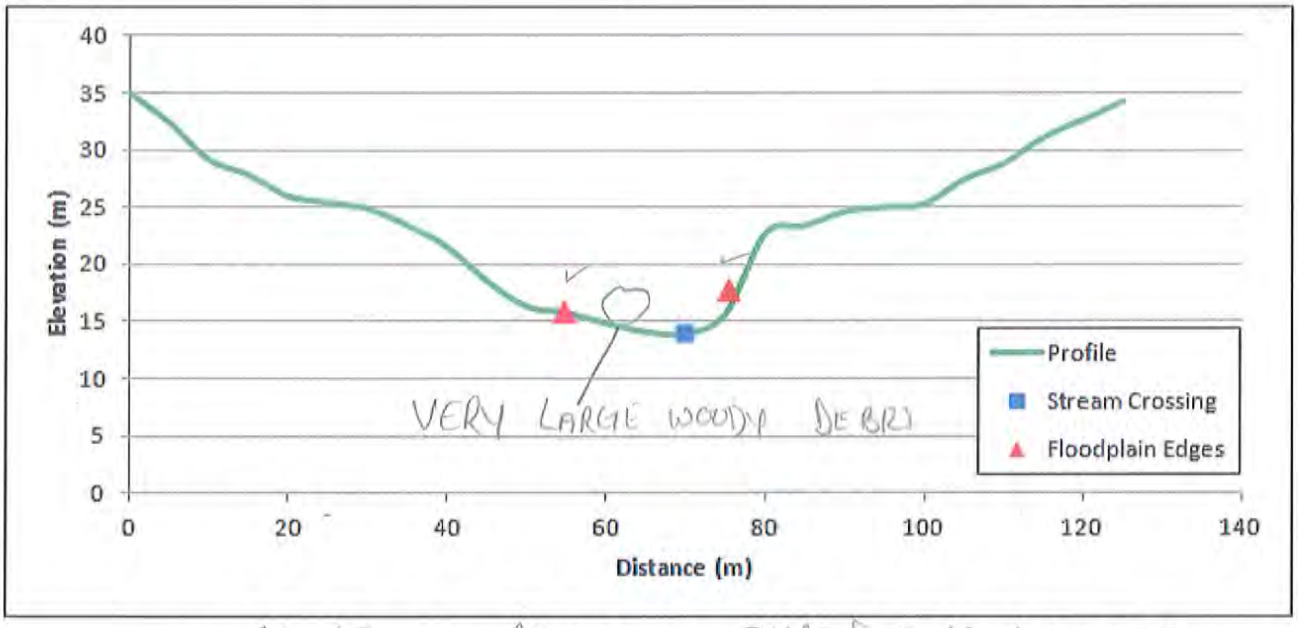
Cross Section: sb8, Stream: Shaky Bill's 2, Reach S2

Start coords – x: 346465, y: 5407920

Direction: 68.3°

End coords – x: 346585, y: 5407968

LARGE POOL



* GPS / Trimble Accuracy or SHAPE FILE IS INCORRECT FOR X-Section Point

Field data to collect:

Bank-full Width: 7.9 (m)	
Wetted Width: 7.5 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

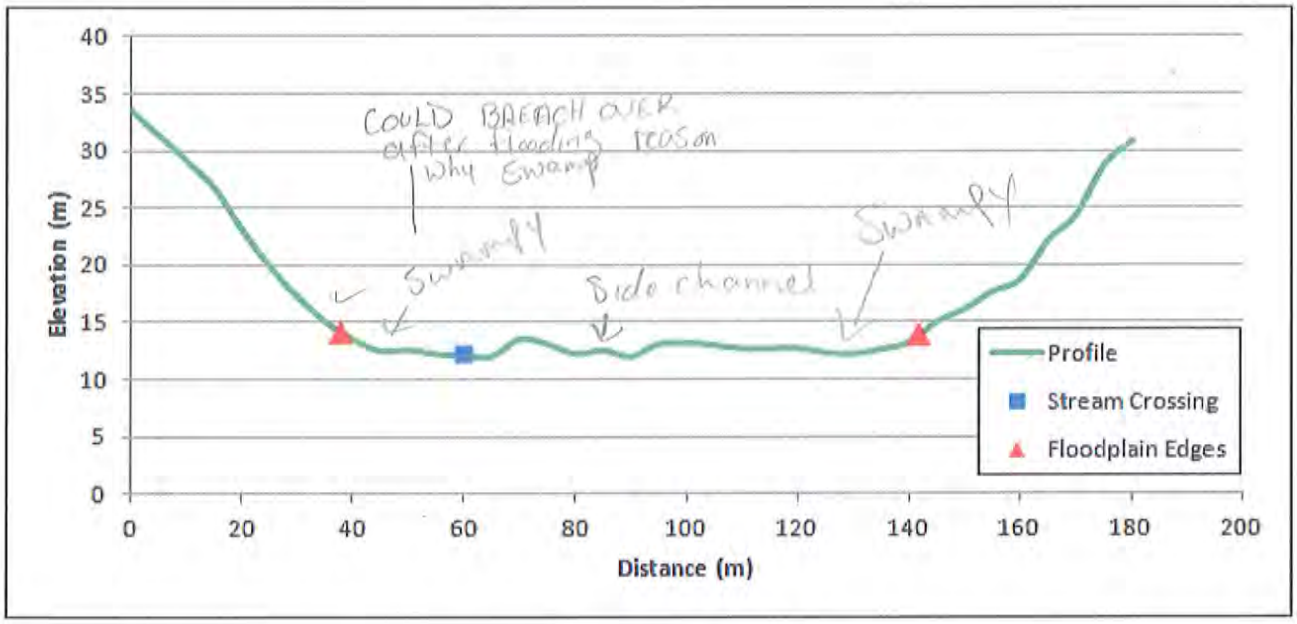
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sb7, Stream: Shaky Bill's 2, Reach S2

Start coords – x: 346443, y: 5407953

Direction: 28.6°

End coords – x: 346529, y: 5408112



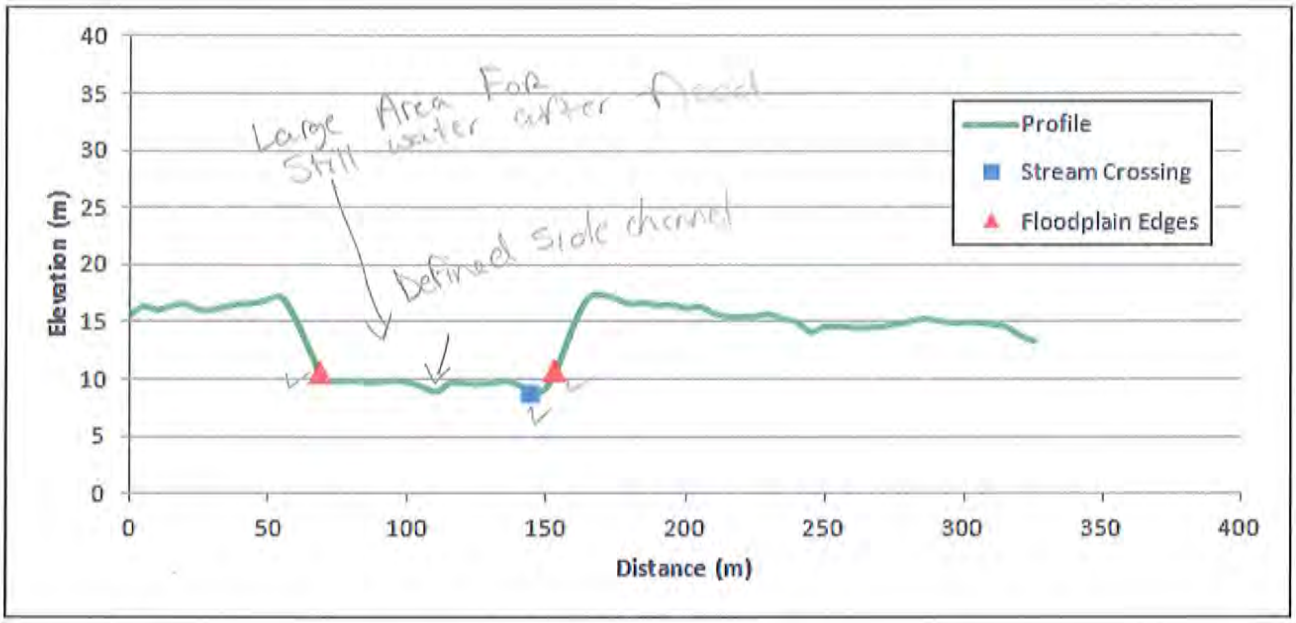
Field data to collect:

Bank-full Width: 10.9 (m)	
Wetted Width: 16.7 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sb6, Stream: Shaky Bill's 2, Reach S2

Start coords – x: 346321, y: 5408107
Direction: 55.8°
End coords – x: 346593, y: 5408291



Field data to collect:

Bank-full Width: 9.3 (m)	
Wetted Width: 8.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point.	Floodplain edge coords GPS Point
Elevation Difference:	Elevation Difference:

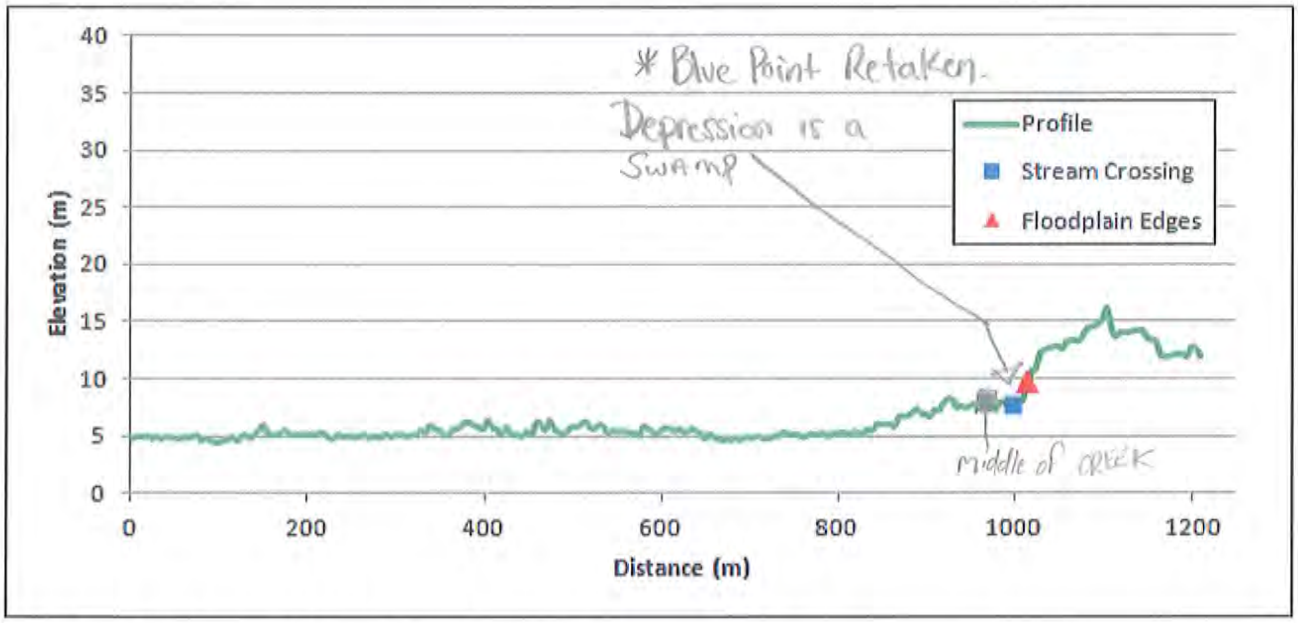
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sb5, Stream: Shaky Bill's 2, Reach S2

Start coords – x: 345379, y: 5408132

Direction: 79.5°

End coords – x: 346573, y: 5408353



Location of left edge of floodplain is unknown

LEFT IS HARD to JUDGE, debri all through BRUSH But can tell water stands through out area when flooding. Bridge and CULVERT take care of

Field data to collect: water that reaches the road.

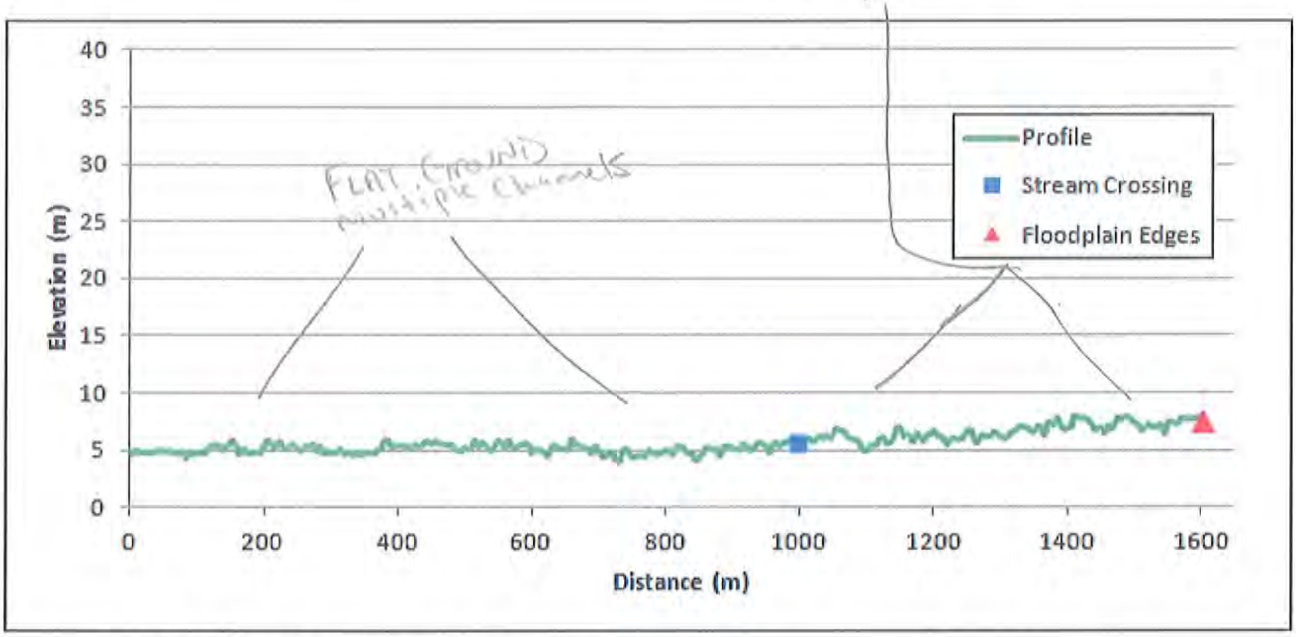
Bank-full Width: 7.2 (m)	
Wetted Width: 5.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sb4, Stream: Shaky Bill's 2, Reach S1

Start coords – x: 345360, y: 5408015
Direction: 66.7°
End coords – x: 346838, y: 5408650

GROUND HAS A LOT OF FLAT SPOTS TO FLOOD LOTS OF Vegitation



Location of left edge of floodplain is unknown

Field data to collect:

Bank-full Width: 8.5 (m)	
Wetted Width: 8.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

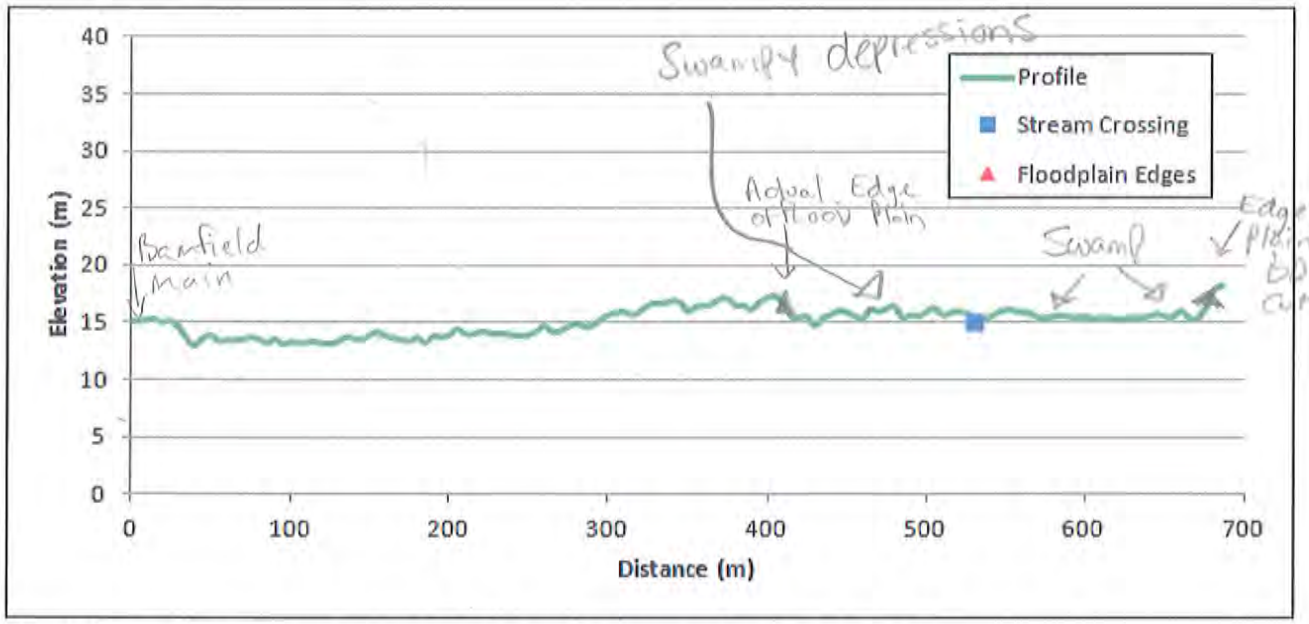
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous1, Stream: Rousseau, Reach R1

Start coords – x: 348096, y: 5409200

Direction: 28.7°

End coords – x: 348425, y: 5409801



Floodplain edges unknown, some overlap with Pachena floodplain here

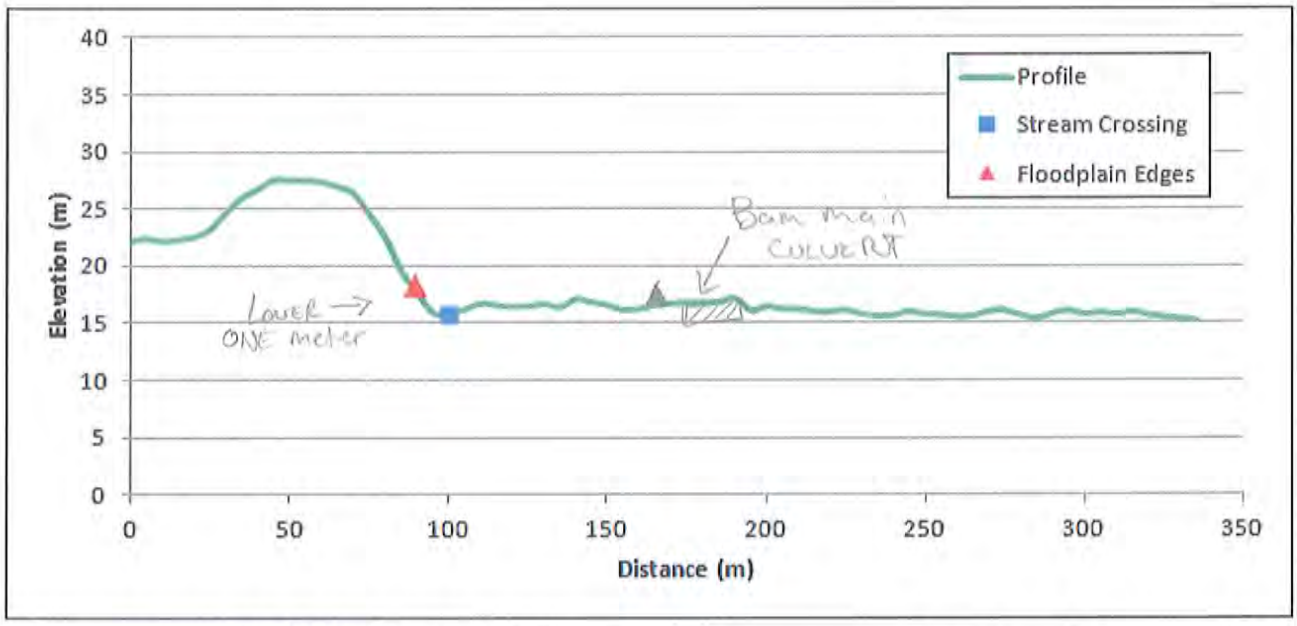
Field data to collect:

Bank-full Width: 36.4 (m)	
Wetted Width: 25.4 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords TPAD Point	Floodplain edge coords TPAD Point
Elevation Difference: 2.5(m) 80% @ 12%	Elevation Difference: 2.2(m)

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous2, Stream: Rousseau, Reach R1

Start coords – x: 348526, y: 5409484
Direction: 338.5°
End coords – x: 348404, y: 5409796



Location of right side floodplain edge is unknown

FLOOD PLAIN RIGHT WOULD END @ BAM MAIN CULVERT TAKES CARE of EXCESS WATER

Field data to collect:

Bank-full Width: 18.2 (m)	
Wetted Width: 15.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords TPAD POINT
Elevation Difference:	Elevation Difference: 1.5 m

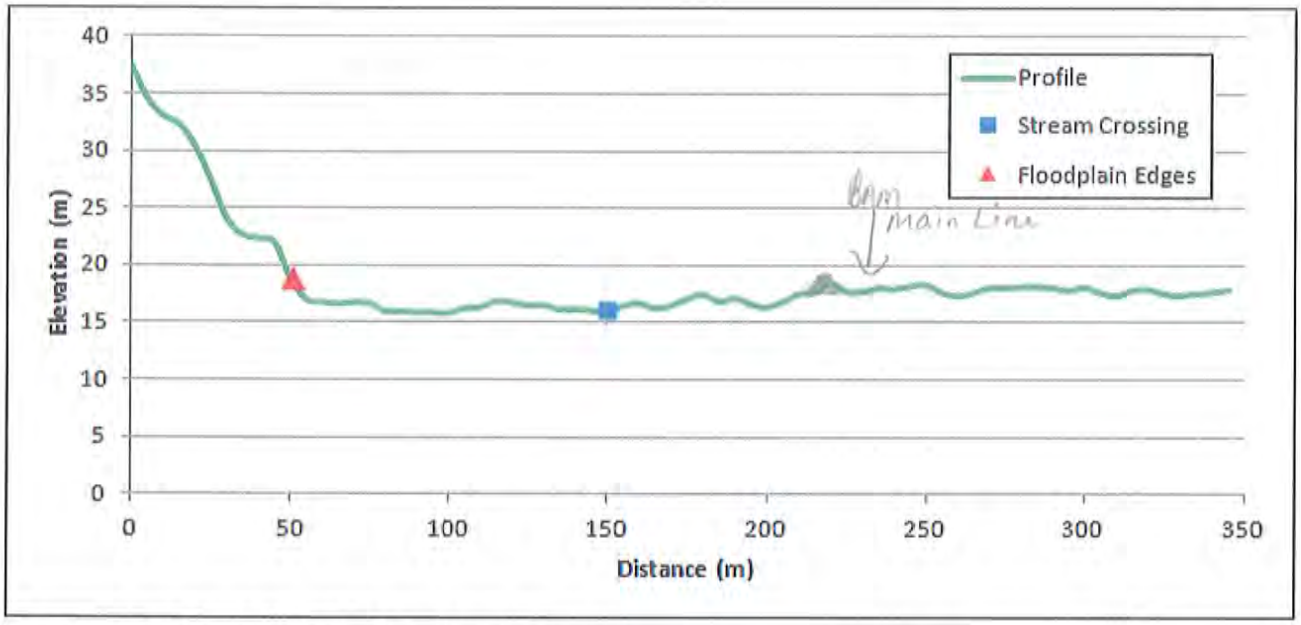
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous3, Stream: Rousseau, Reach R1

Start coords – x: 348634, y: 5409494

Direction: 330.5°

End coords – x: 348463, y: 5409795



Location of right side floodplain edge is unknown

Field data to collect:

Bank-full Width: 30.2 (M)	
Wetted Width: 14.5 (M)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords IPAD Point
Elevation Difference:	Elevation Difference: 1.8m @ Bam main Line Ditch

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

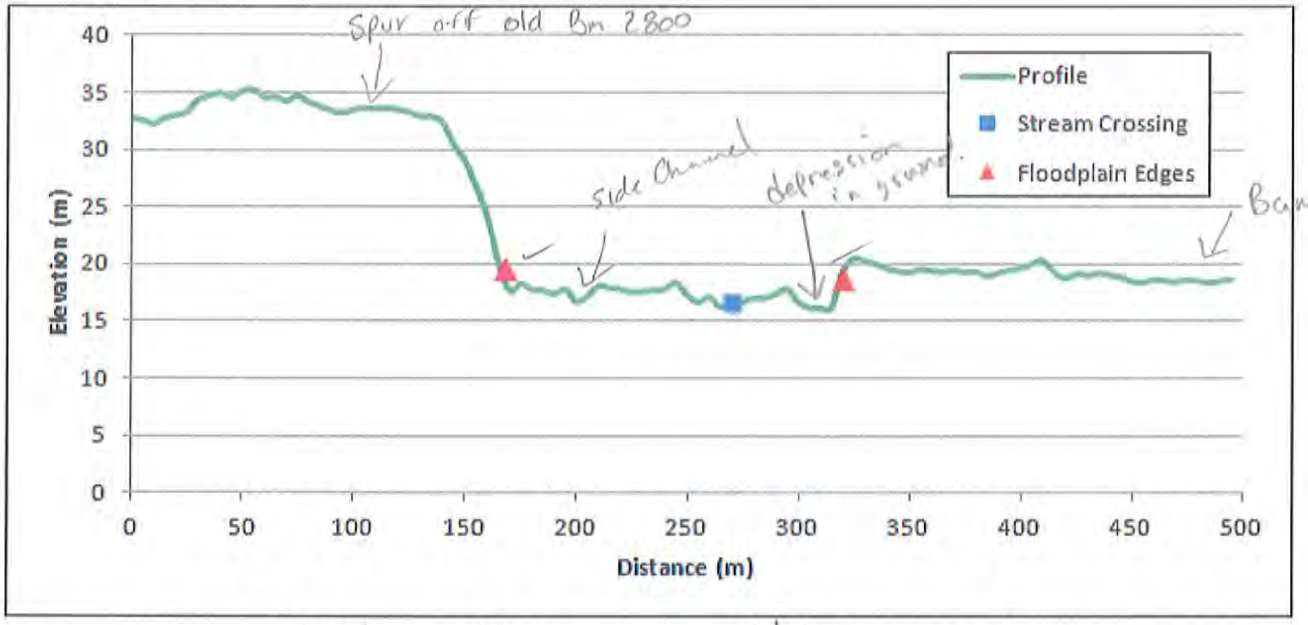
Cross Section: rous4, Stream: Rousseau, Reach R1

Start coords – x: 348825, y: 5409441

Direction: 327.4°

End coords – x: 348556, y: 5409862

NOTE: this is the same as the previous rous8



Field map / Point are off!, but correct on Graph.

Field data to collect:

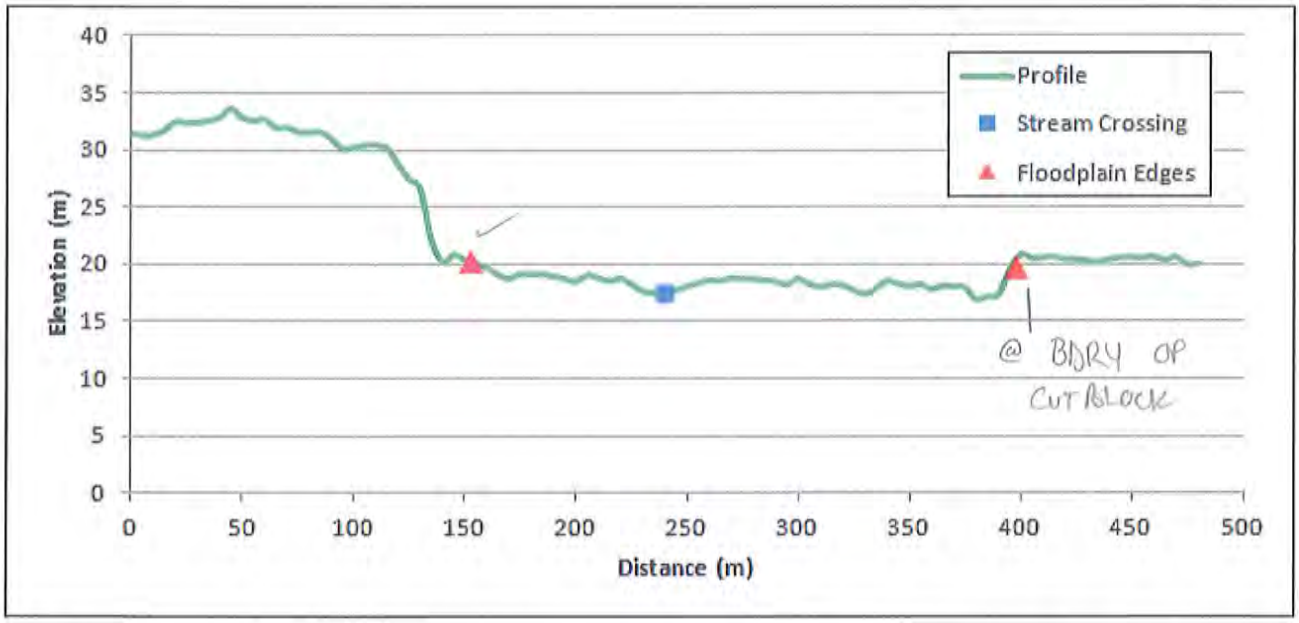
Bank-full Width: 15.5 (M)	
Wetted Width: 14.5 (M)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

GPS Point off IPAD TRUE CENTER !

Cross Section: rous5, Stream: Rousseau, Reach R1

Start coords – x: 348993, y: 5409509
Direction: 315.6°
End coords – x: 348654, y: 5409854



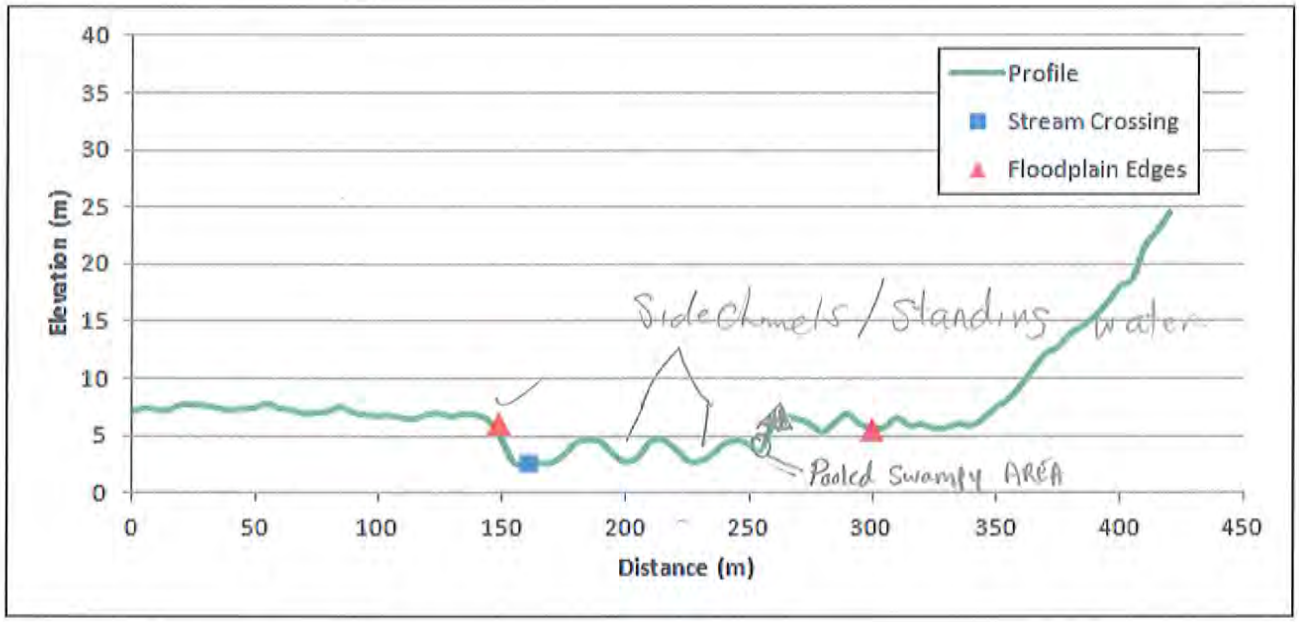
Field data to collect:

Bank-full Width: 8.5 (m)	
Wetted Width: 6.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar6, Stream: Sarita, Reach 1

Start coords – x: 355024, y: 5417064
Direction: 7.4°
End coords – x: 355078, y: 5417481



Field data to collect:

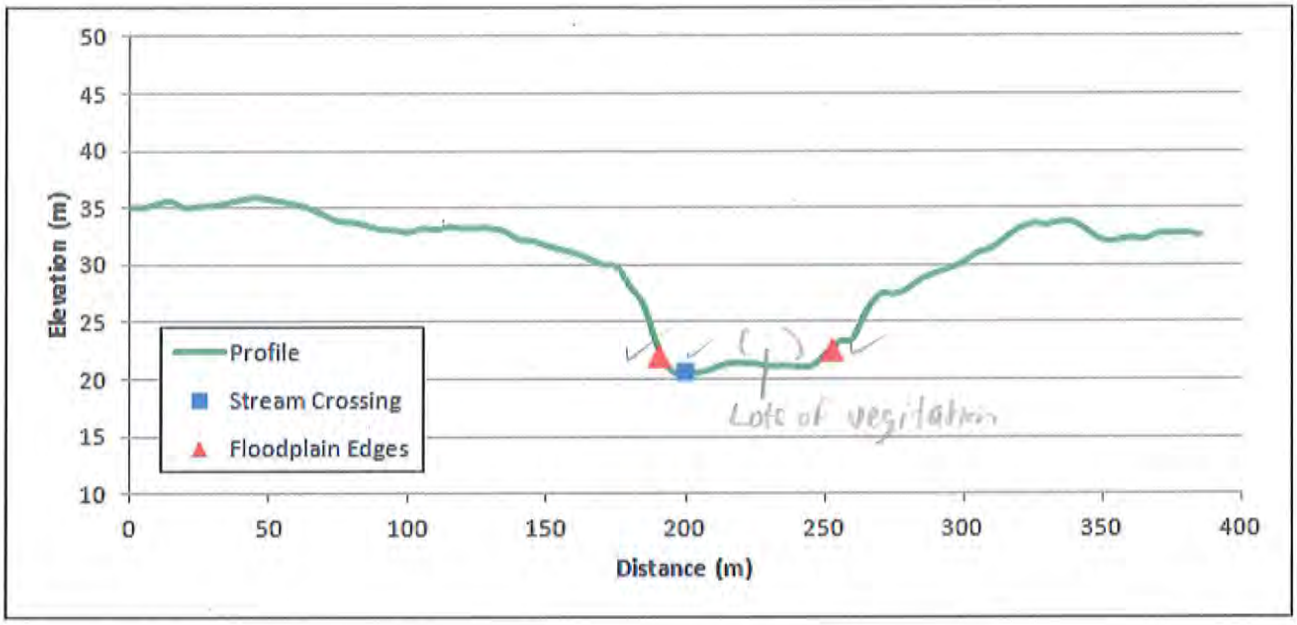
Bank-full Width: 29.3 (m)	
Wetted Width: 25.8	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference: 2.8 m 60+ m @ 20%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Took Center of creek Point more in the middle.
Mapd RIGHT Bank FLOOD PLAIN IN more
No Evidence of water flowing through area.

Cross Section: e1, Stream: E-Trib, Reach E1

Start coords – x: 348799, y: 5409488
Direction: 59.0°
End coords – x: 349133, y: 5409689



Field data to collect:

Bank-full Width: 5.3 (m)	
Wetted Width: 4.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

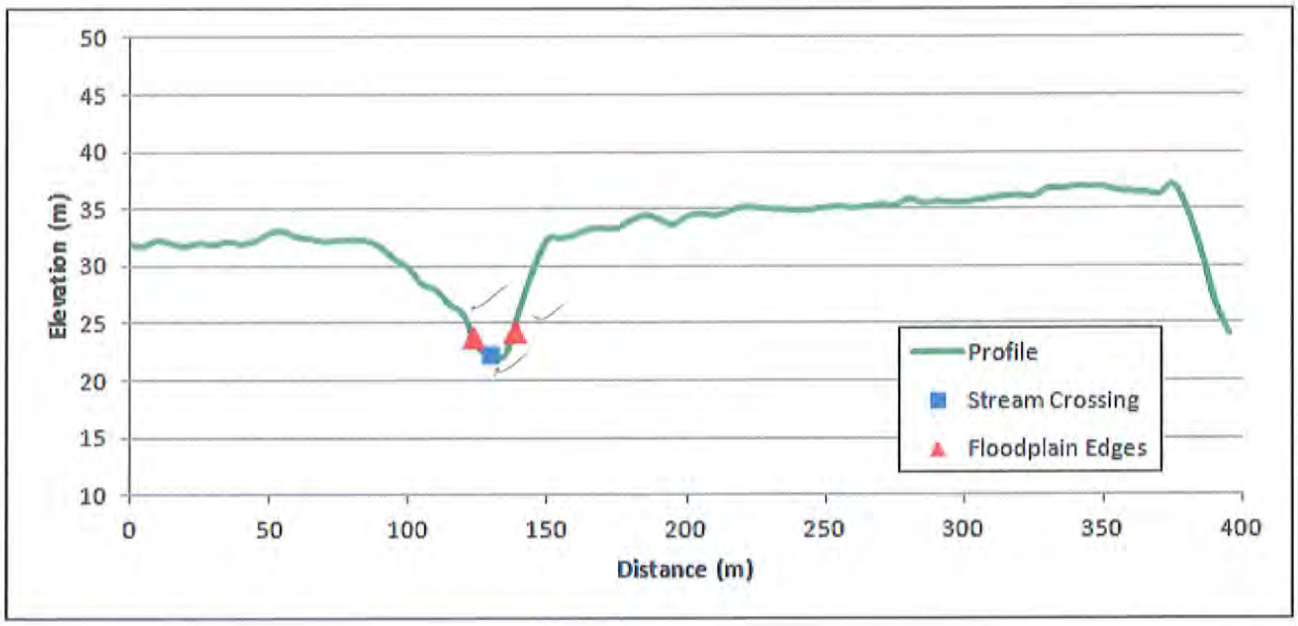
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: e2, Stream: E-Trib, Reach E1

Start coords – x: 348898, y: 5409489

Direction: 74.5°

End coords – x: 349283, y: 5409596



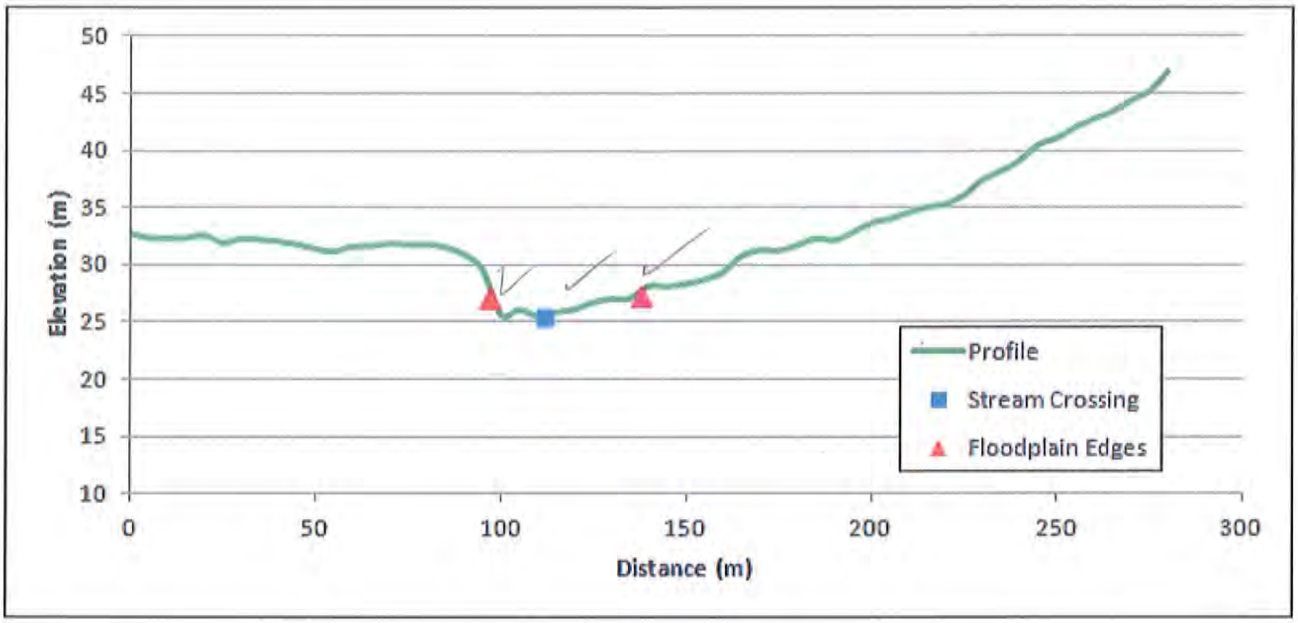
Field data to collect:

Bank-full Width: 6.6 (m)	
Wetted Width: 6.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords IPAD POINT
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: e3, Stream: E-Trib, Reach E1

Start coords – x: 348935, y: 5409527
Direction: 168.9°
End coords – x: 348989, y: 5409250



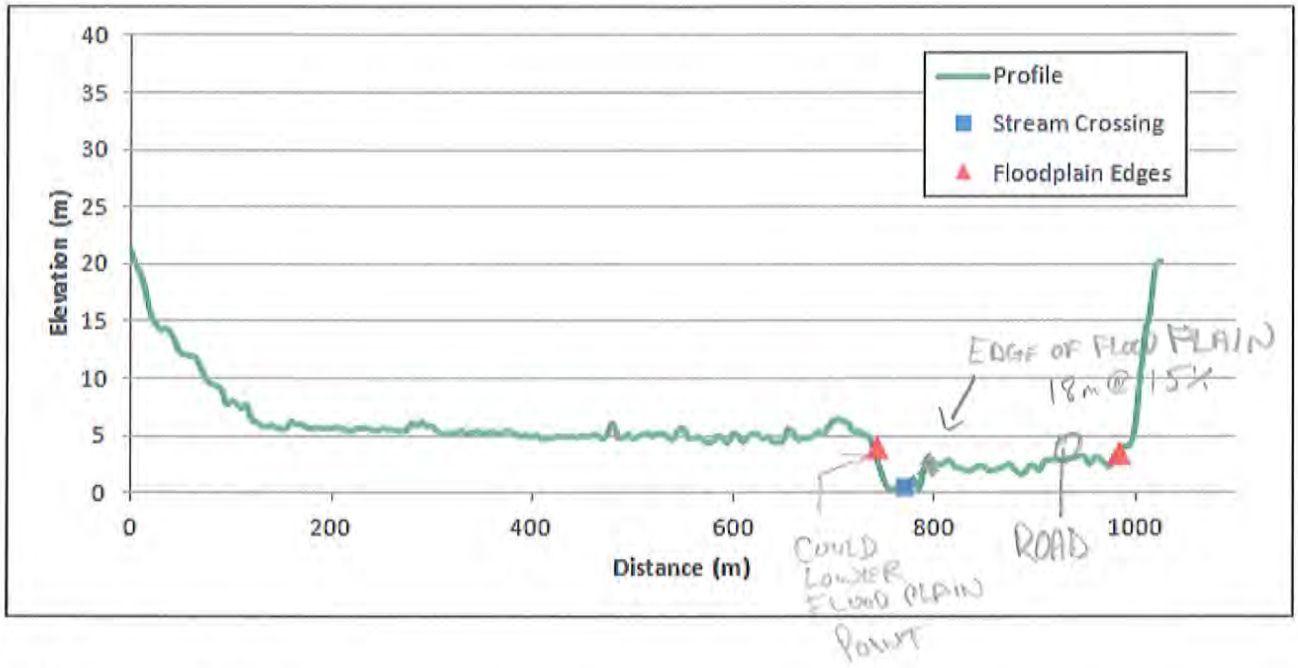
Field data to collect:

Bank-full Width: 3.8 (m)	
Wetted Width: 2.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach3, Stream: Pachena, Reach P1

Start coords – x: 345577, y: 5407530
Direction: 317.4°
End coords – x: 344880, y: 5408288



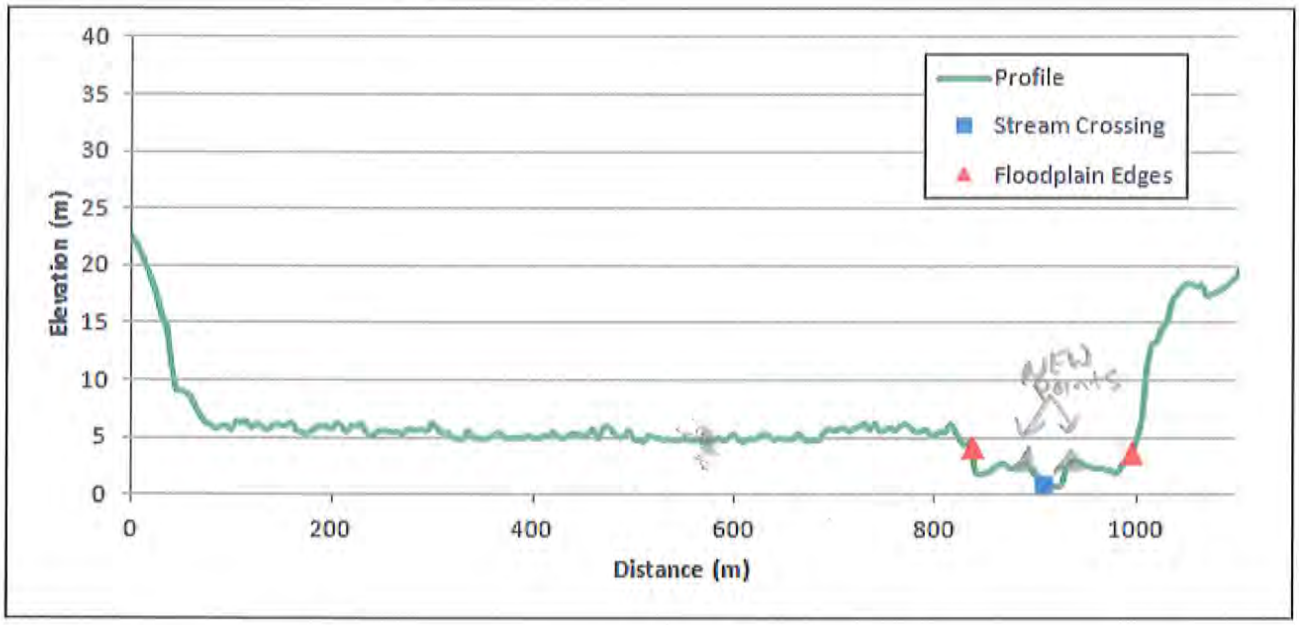
Field data to collect: -

Bank-full Width: 34.8(m)	
Wetted Width: 33.5 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords IPAD POINT
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach4, Stream: Pachena, Reach P2

Start coords – x: 345995, y: 5407908
Direction: 292.4°
End coords – x: 344970, y: 5408330



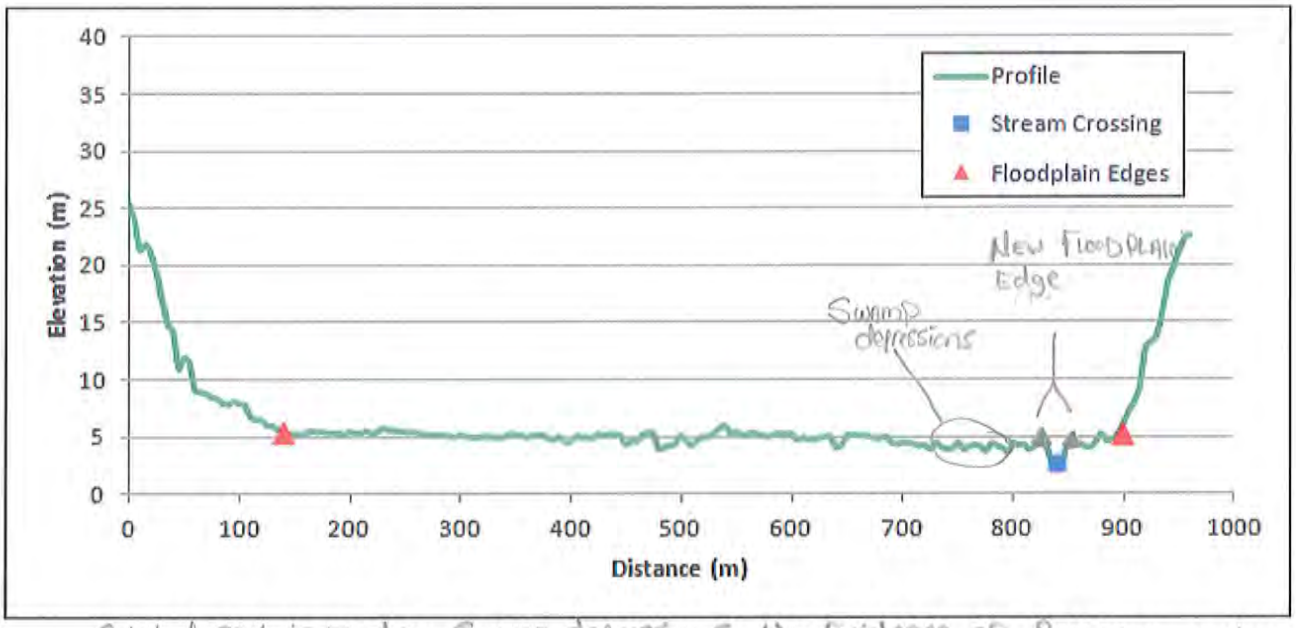
Field data to collect:

Bank-full Width: 21.2	
Wetted Width: 20.0 m	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD	Floodplain edge coords IPAD
Elevation Difference: 2.01 (m) 14m @ 17%	Elevation Difference: 2.99 (m) 16m @ 19%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach9, Stream: Pachena, Reach P2

Start coords – x: 346067, y: 5407910
Direction: 12.3°
End coords – x: 346273, y: 5408849



Circled Spot is random Swamp depressions. No Evidence of Running water Coming through AREA.

Field data to collect:

Bank-full Width: 18.3 (m)	
Wetted Width: 7.4 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
BANK is all SAND	BANK IS ALL SAND
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINTS	Floodplain edge coords IPAD Points
Elevation Difference: 2.75 (m) 14m @20%	Elevation Difference: 2.24 m 12m @ 19%

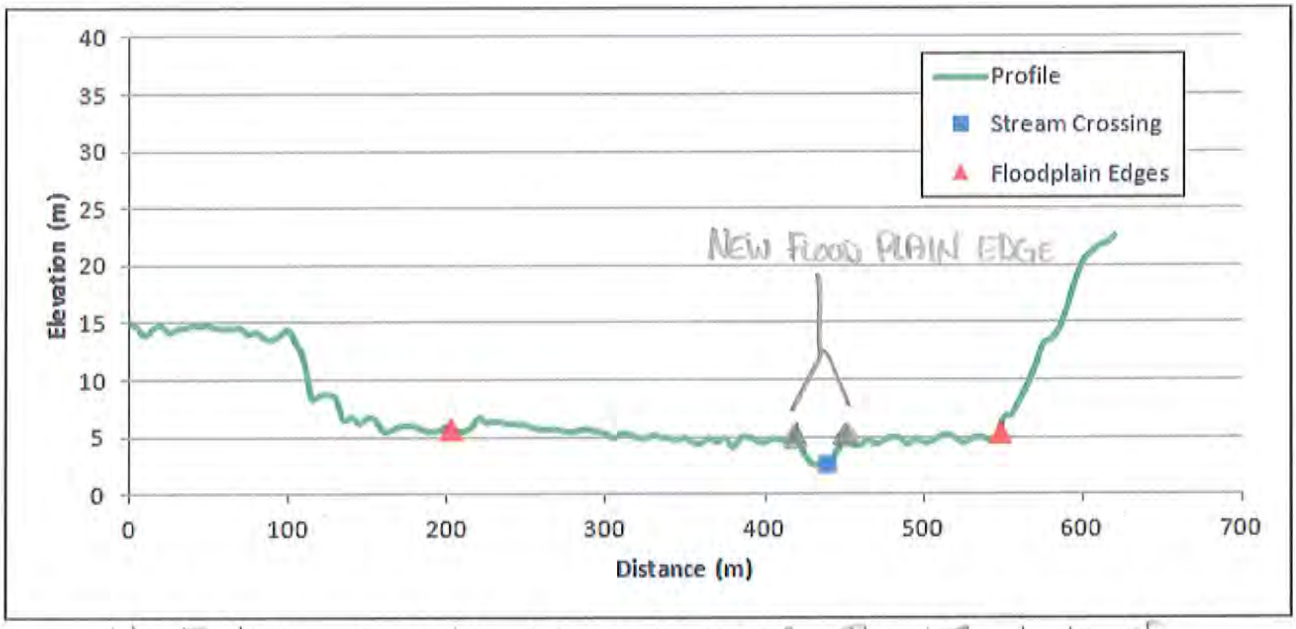
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach10, Stream: Pachena, Reach P2

Start coords – x: 346470, y: 5408270

Direction: 340.2°

End coords – x: 346260, y: 5408854



No Evidence of water FLOWING OVER BANKS. Lots of LARGE DEBRI FALLEN INTO CREEK.

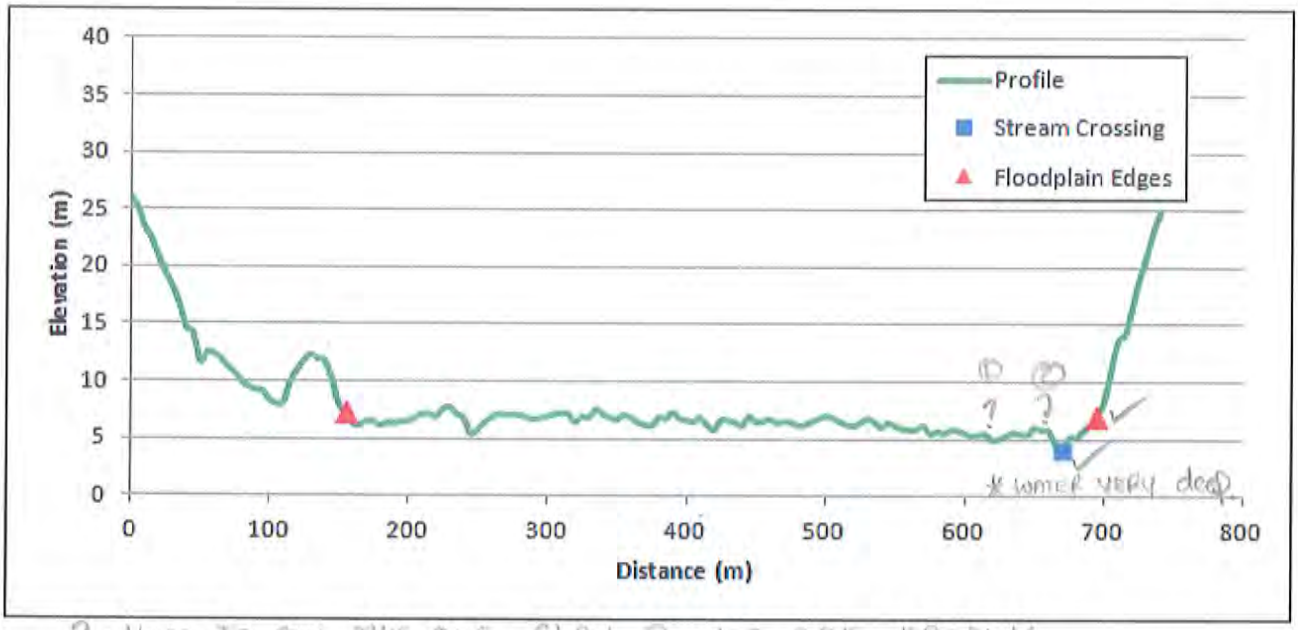
Field data to collect:

Bank-full Width: 18.1 (m)	
Wetted Width: 13.7 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
BANK SAND & CLAY	BANK SAND & CLAY
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords IPAD POINT
Elevation Difference: 1.96 (m) 10m @ 20%	Elevation Difference: 2.15 (m) 10m @ 22%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach11, Stream: Pachena, Reach P2

Start coords – x: 346700, y: 5408224
Direction: 344.0°
End coords – x: 346497, y: 5408936



? : HARD TO CALL THIS ONE, CLAY BANKS ARE ERODING. Lots of side channels. Possibly just showing debri @ Question mark 2

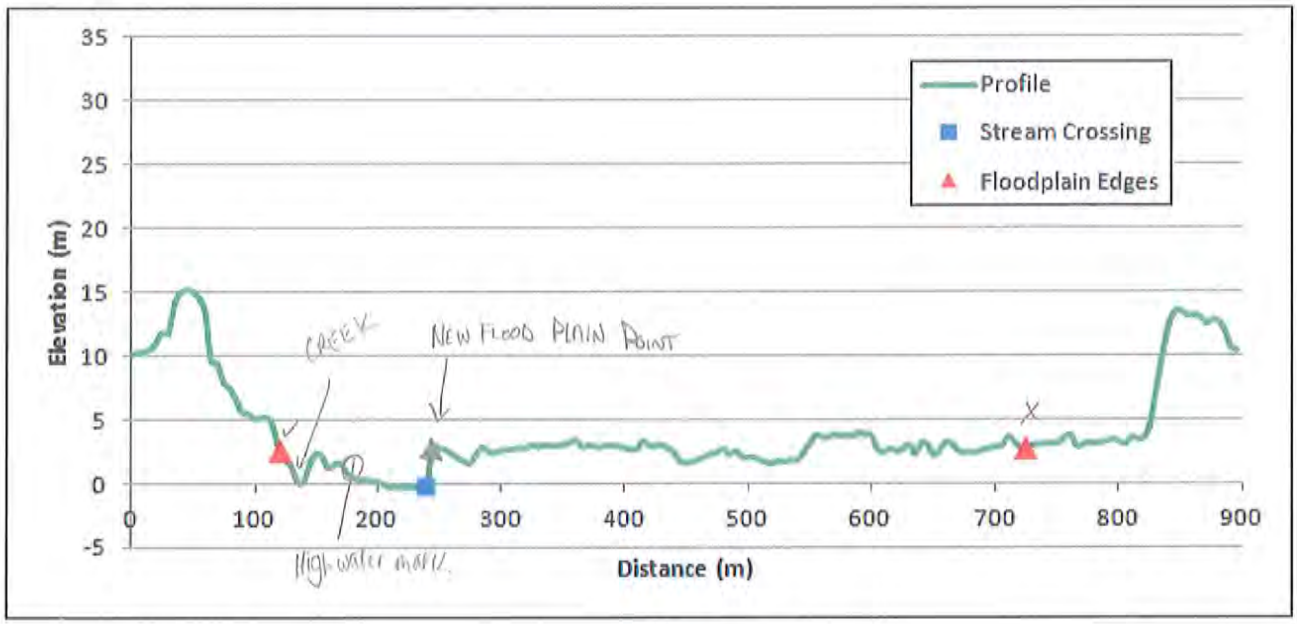
Field data to collect:

Bank-full Width: 8.4 (m)	
Wetted Width: 7.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar3, Stream: Sarita, Reach 1

Start coords – x: 353307, y: 5417756
Direction: 86.3°
End coords – x: 354204, y: 5417813



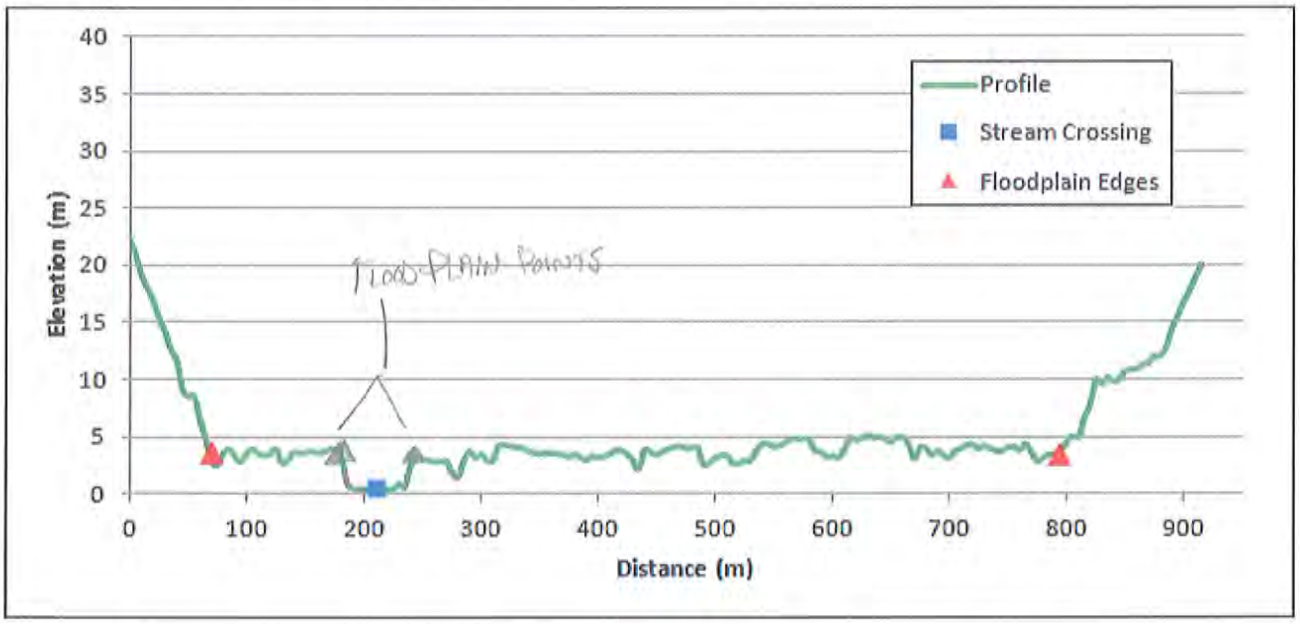
Field data to collect:

Bank-full Width: 66.1 (m)	
Wetted Width: 52.3 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords IPAD POINT
Elevation Difference:	Elevation Difference: 3.05 (m) 22 m @ 14%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar4, Stream: Sarita, Reach 1

Start coords – x: 353522, y: 5417105
Direction: 56.3°
End coords – x: 354287, y: 5417615



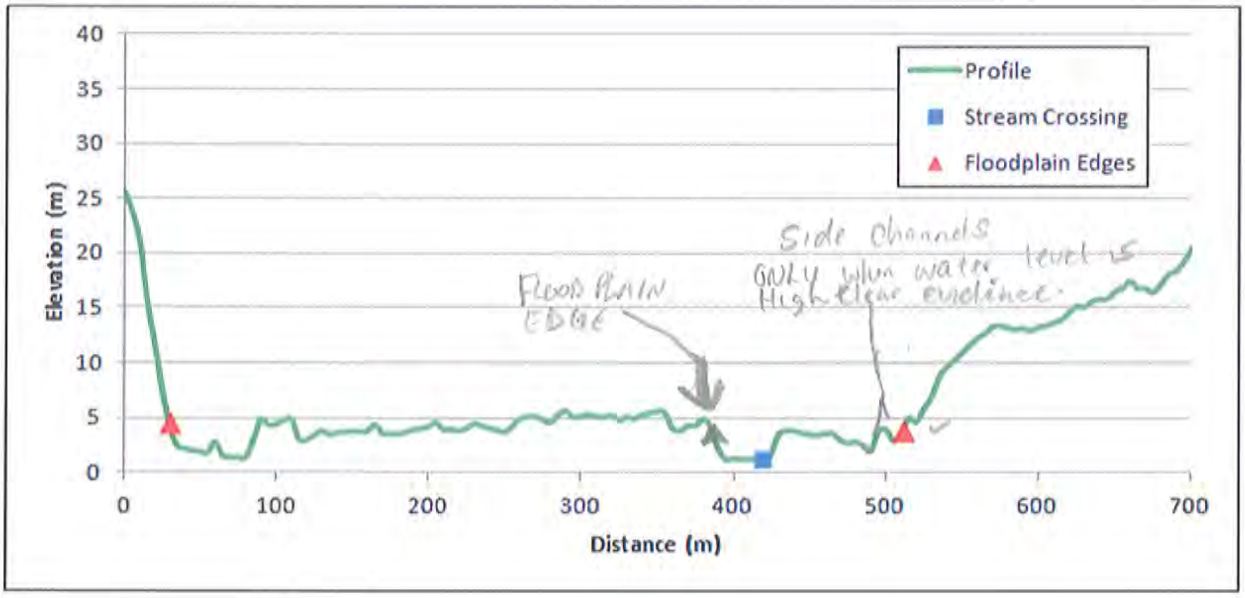
Field data to collect:

Bank-full Width: 49.4 (m)	
Wetted Width: 48.6 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or N
Fine sand deposition: (Y) or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD Point	Floodplain edge coords IPAD Point
Elevation Difference: 3.47(m) 22m@16%	Elevation Difference: 3.26(m) 22m@15%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar5, Stream: Sarita, Reach 1

Start coords – x: 354409, y: 5416801
Direction: 7.0°
End coords – x: 354495, y: 5417507



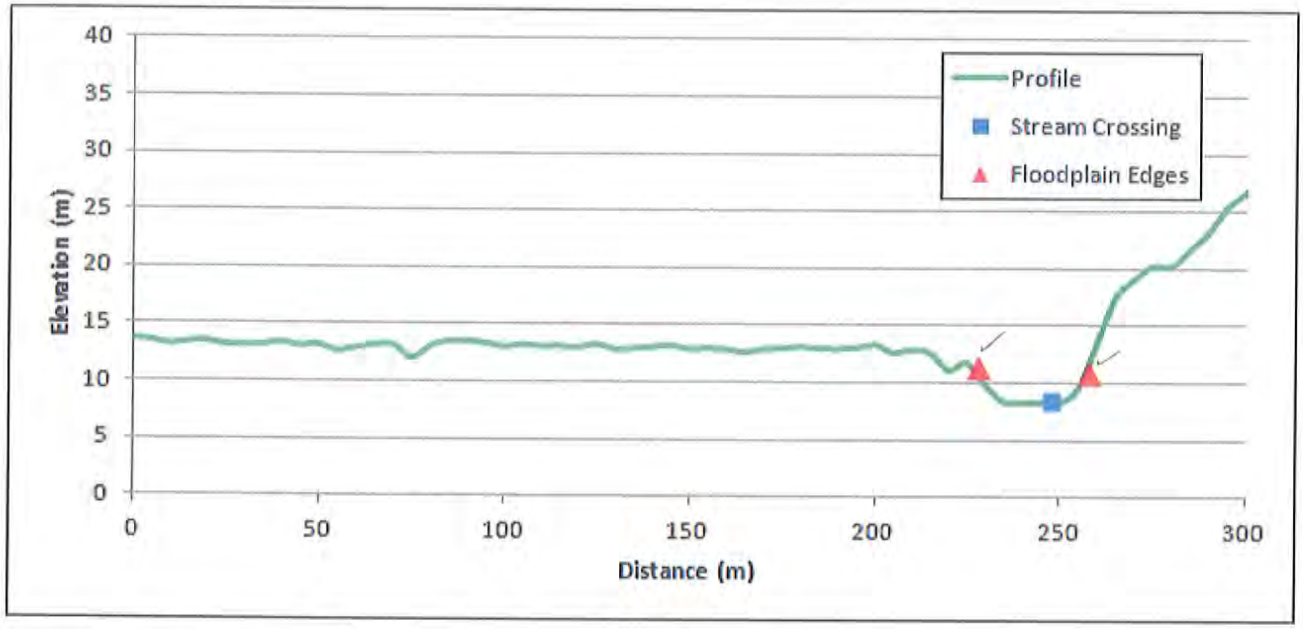
Field data to collect:

Bank-full Width: 43.5 (m)	
Wetted Width: 39.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 3.16 m 20m @ 16%	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar11, Stream: Sarita, Reach 4

Start coords – x: 357497, y: 5418072
Direction: 359.8°
End coords – x: 357496, y: 5418380



Good

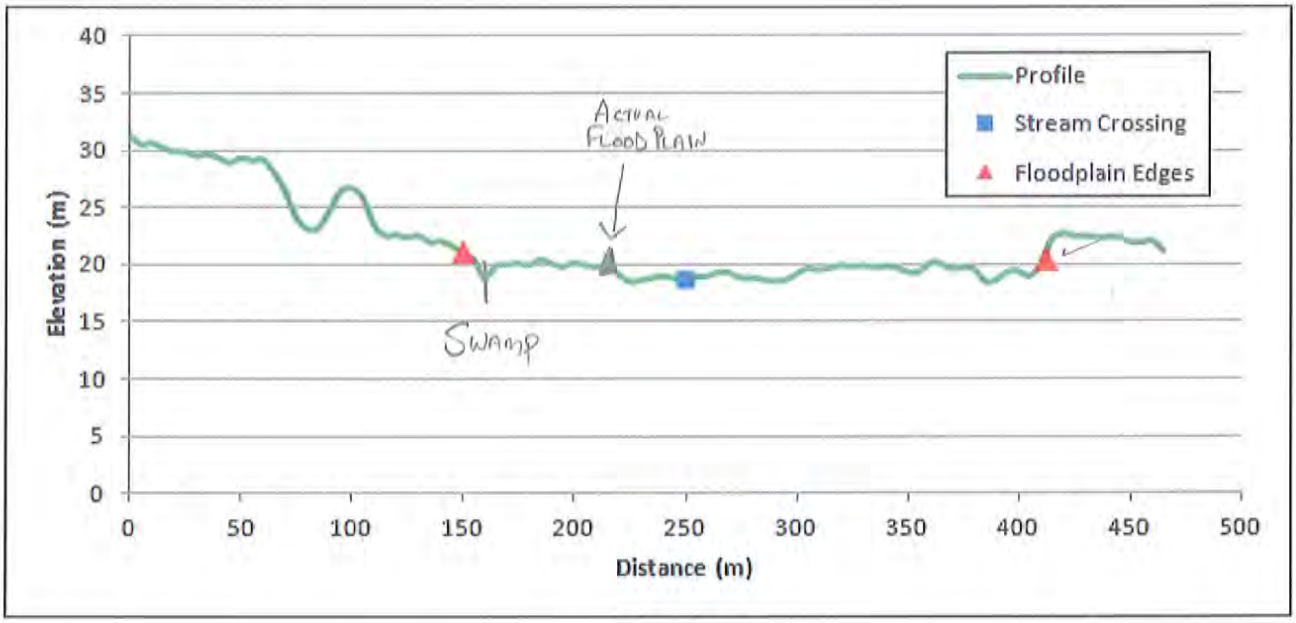
Field data to collect:

Bank-full Width: 25.6 (m)	
Wetted Width: 23.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous6, Stream: Rousseau, Reach R1

Start coords – x: 349071, y: 5409605
Direction: 325.9°
End coords – x: 348808, y: 5409995



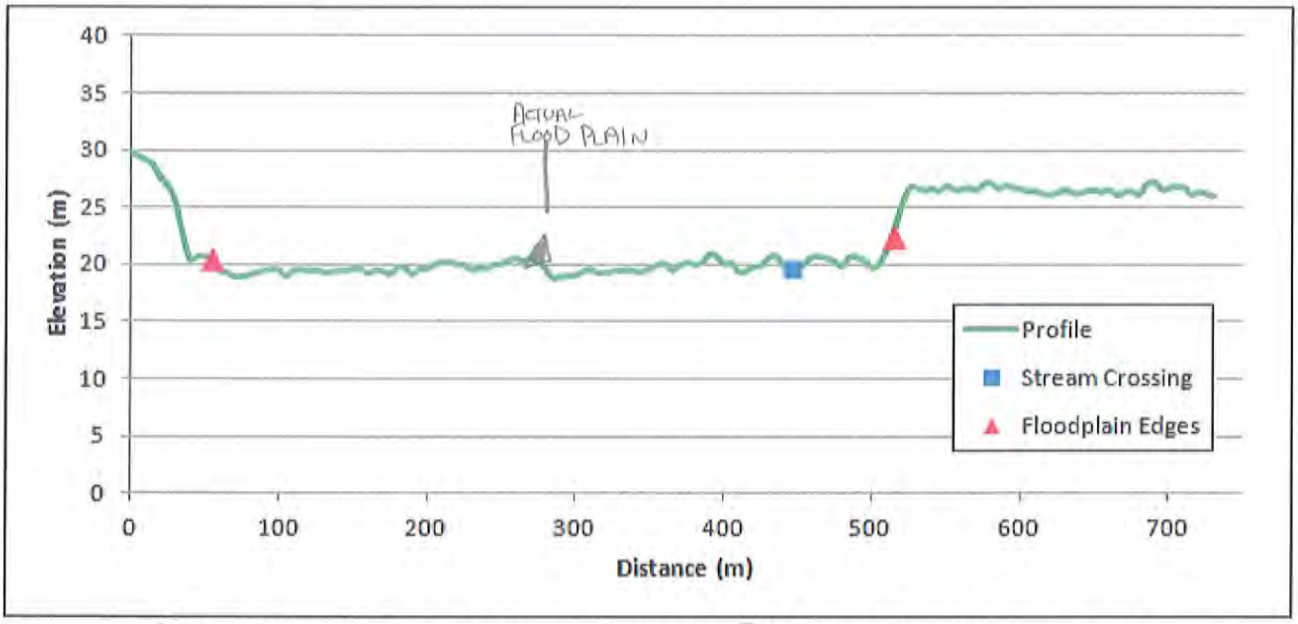
Field data to collect:

Bank-full Width: 29.4 (m)	
Wetted Width: 19.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 3.88 (m) 20m @ 14%	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous7, Stream: Rousseau, Reach R1

Start coords – x: 348862, y: 5409573
Direction: 34.2°
End coords – x: 349284, y: 5410195



LEFT SIDE HAS A LARGE GRADE BREAK TO DETERMINE THE FLOOD PLAIN.

Field data to collect:

Bank-full Width: 17.3 (m)	
Wetted Width: 13.6 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords I PAD POINT	Floodplain edge coords
Elevation Difference: 3.41 (m) 38m @ 10%	Elevation Difference:

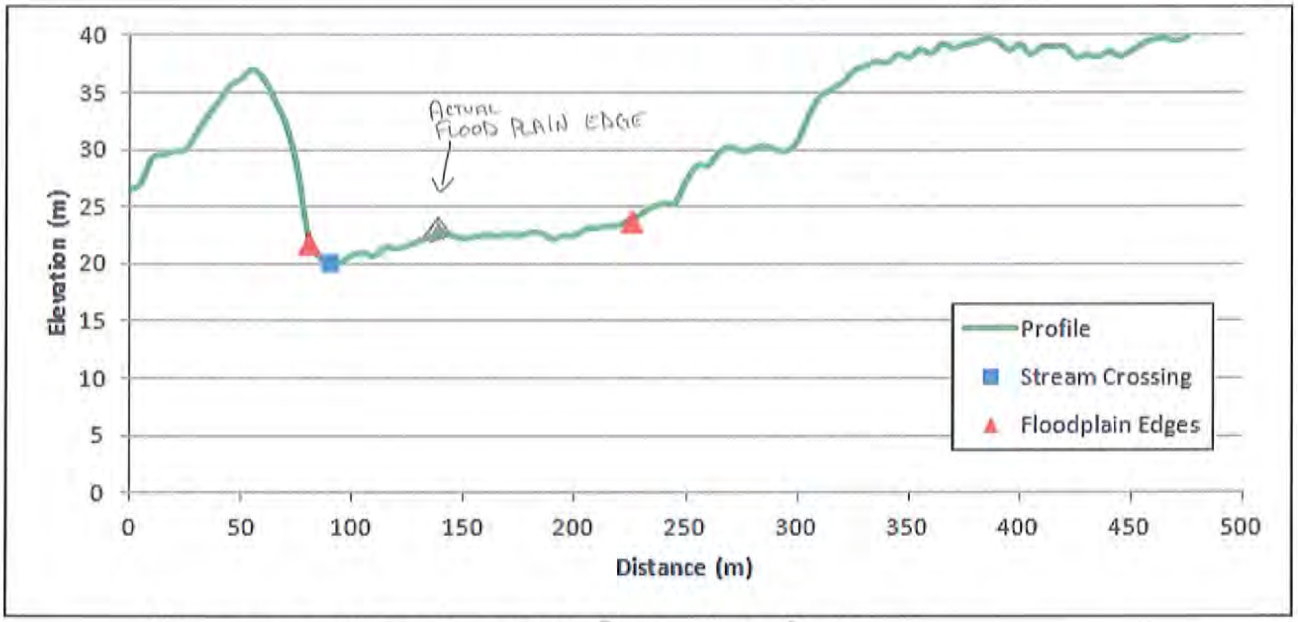
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous8, Stream: Rousseau, Reach R1

Start coords – x: 349149, y: 5409788

Direction: 47.2°

End coords – x: 349501, y: 5410113



NO EVIDENCE OF WATER PAST NEW POINT.

Field data to collect:

Bank-full Width: 28.9 (m)	
Wetted Width: 18.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords IPAD POINT
Elevation Difference:	Elevation Difference: 3.79 (m) 38m @ 10%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

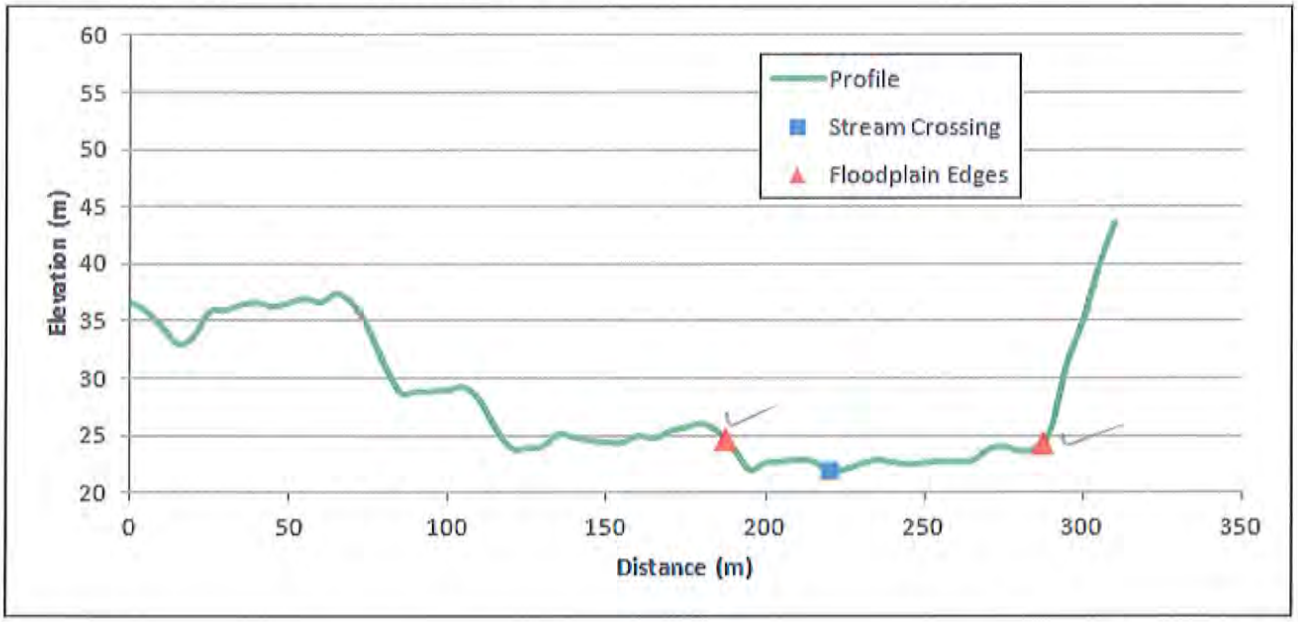
Cross Section: rous9, Stream: Rousseau, Reach R1

Start coords – x: 349404, y: 5409694

Direction: 9.8°

End coords – x: 349457, y: 5410000

NOTE: this is the same as the previous rous6



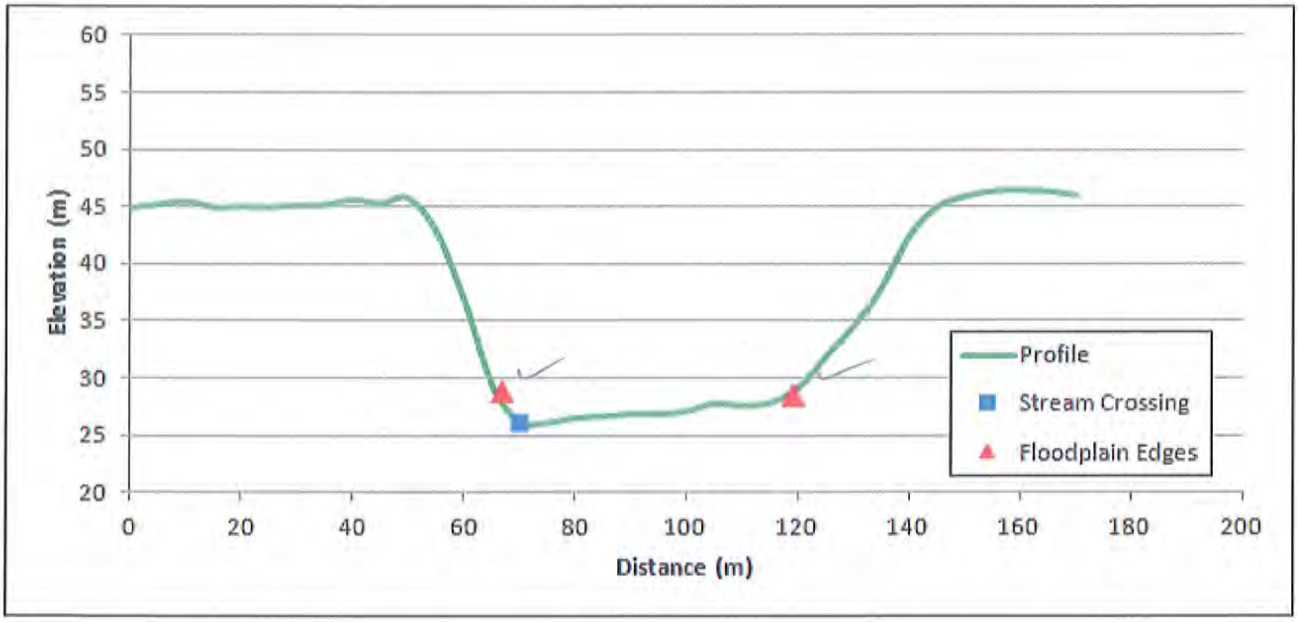
Field data to collect:

Bank-full Width: 12.9 (m)	
Wetted Width: 6.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous10, Stream: Rousseau, Reach R1

Start coords – x: 349803, y: 5409807
Direction: 348.3°
End coords – x: 349769, y: 5409974



Field data to collect:

Bank-full Width: 29.0 (m)	
Wetted Width: 15.1 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

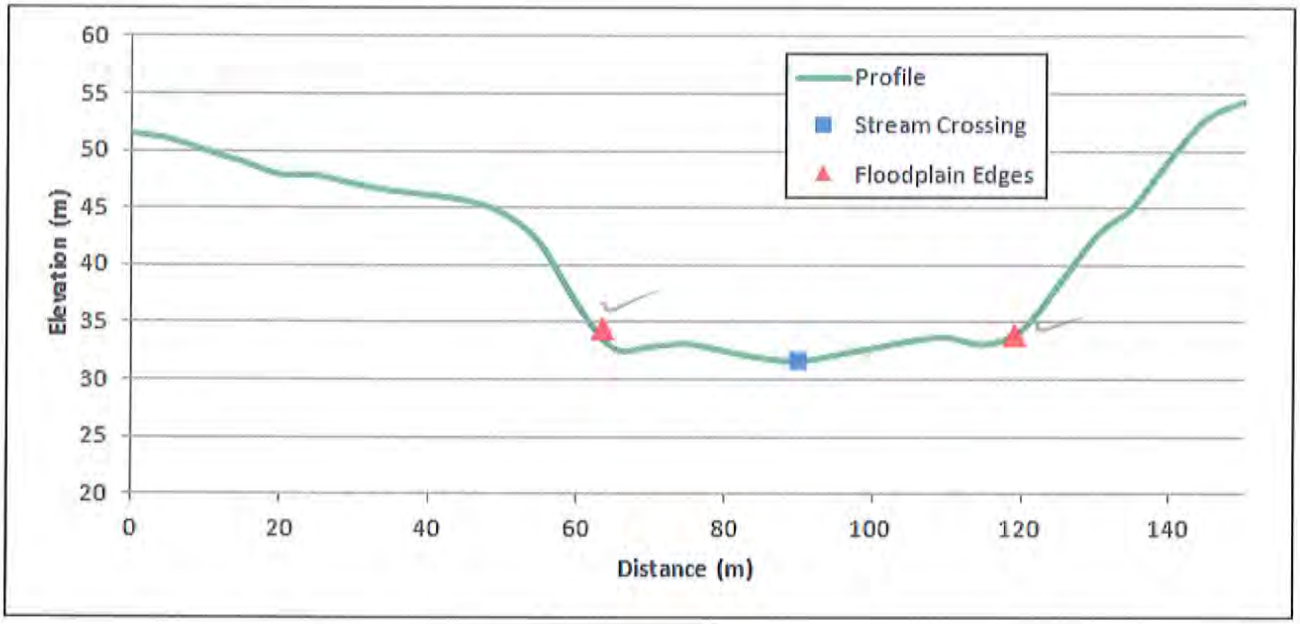
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous11, Stream: Rousseau, Reach R1

Start coords – x: 350118, y: 5409979

Direction: 330.2°

End coords – x: 350043, y: 5410109



Field data to collect:

Bank-full Width: 21.9 (m)	
Wetted Width: 6.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

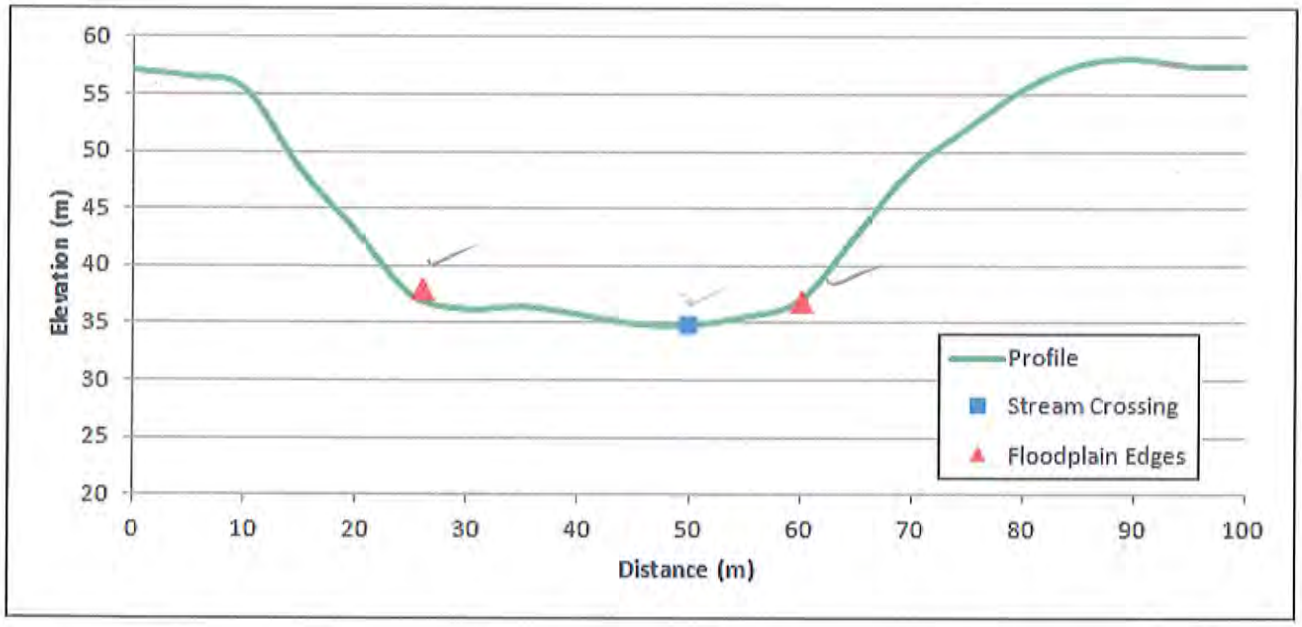
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: rous12, Stream: Rousseau, Reach R2

Start coords – x: 350307, y: 5410076

Direction: 22.5°

End coords – x: 350345, y: 5410168



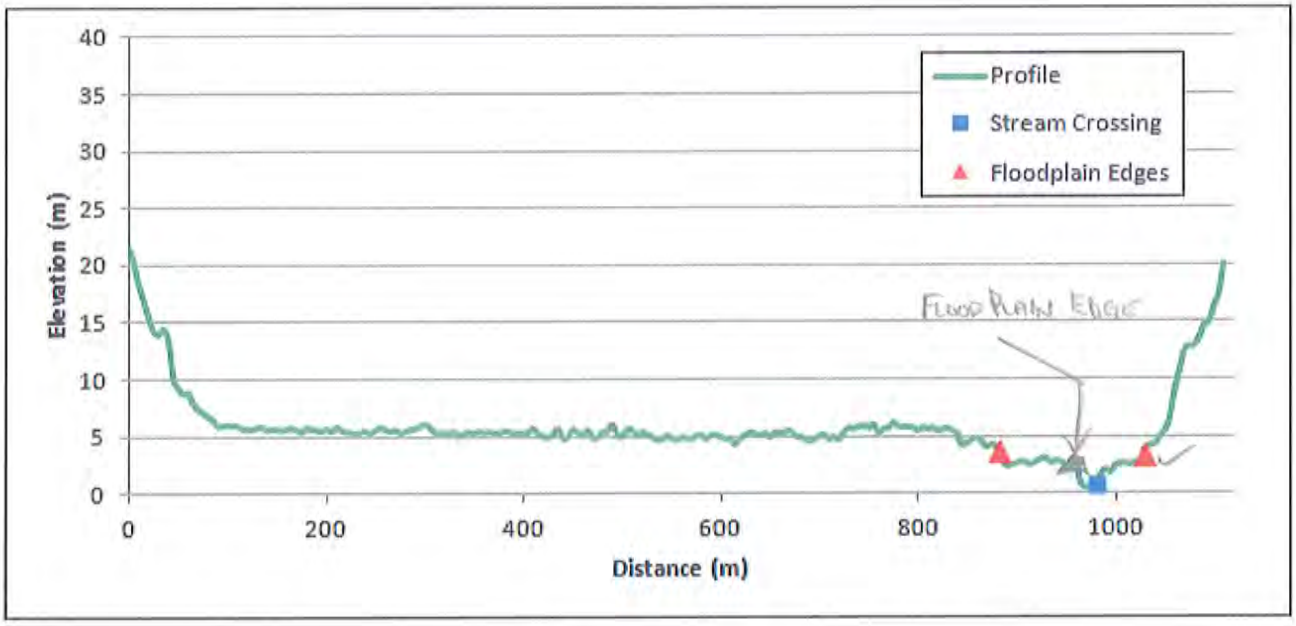
Field data to collect:

Bank-full Width: 17.4 (M)	
Wetted Width: 12.0 (M)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach5, Stream: Pachena, Reach P2

Start coords – x: 345409, y: 5407446
Direction: 354.8°
End coords – x: 345309, y: 5408553



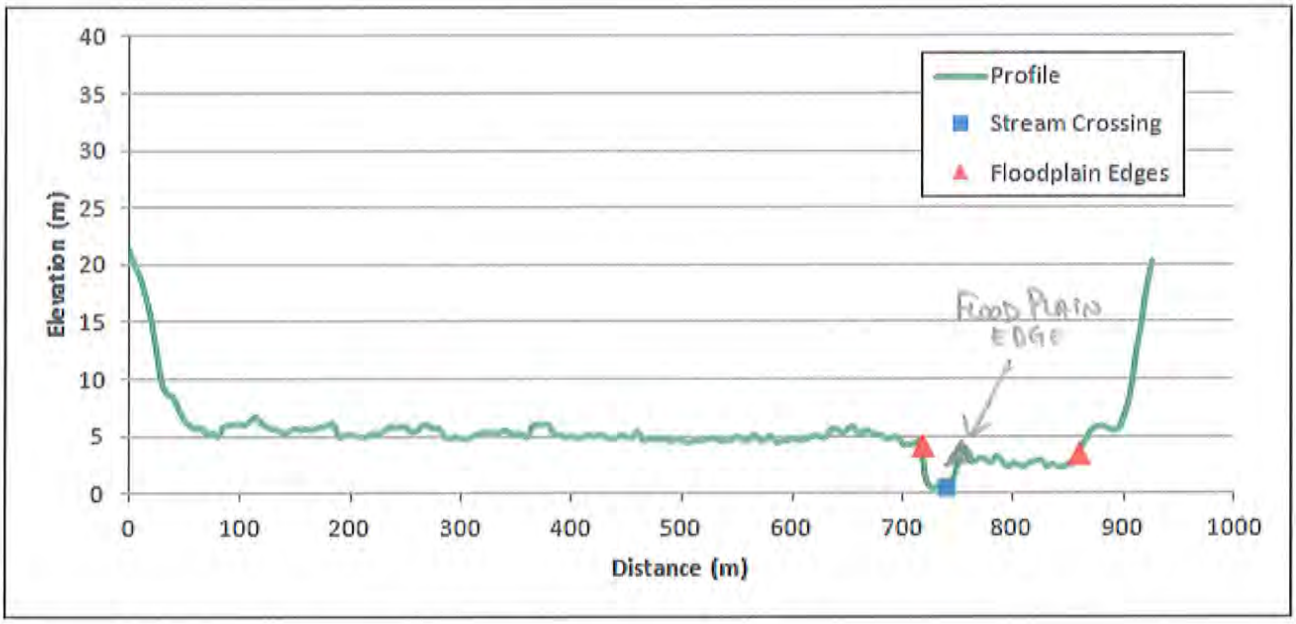
Field data to collect:

Bank-full Width: 21.1 (m)	
Wetted Width: 19.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 2.61 (m) 14-e17	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach6, Stream: Pachena, Reach P2

Start coords – x: 345961, y: 5407899
Direction: 317.4°
End coords – x: 345332, y: 5408583



Field data to collect:

Bank-full Width: 25 (m)	
Wetted Width: 22.3 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords IPAD POINT
Elevation Difference:	Elevation Difference: 2.67 (m) 18m @ 15%

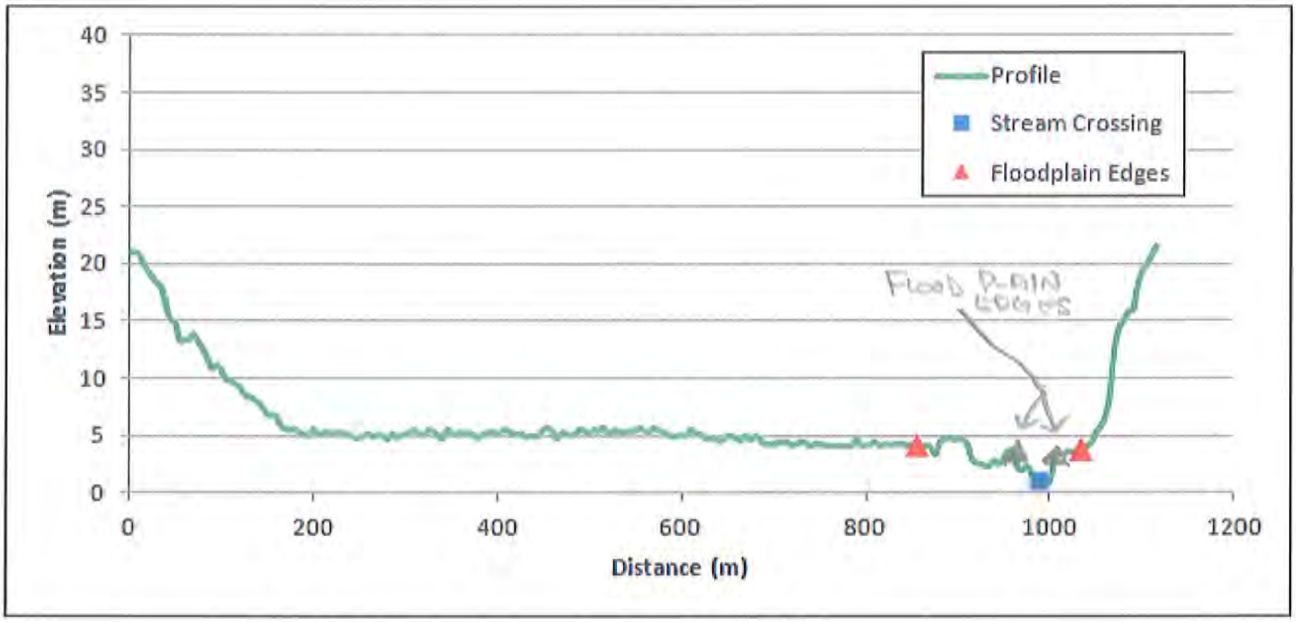
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach7, Stream: Pachena, Reach P2

Start coords – x: 346213, y: 5407918

Direction: 317.4°

End coords – x: 345455, y: 5408742



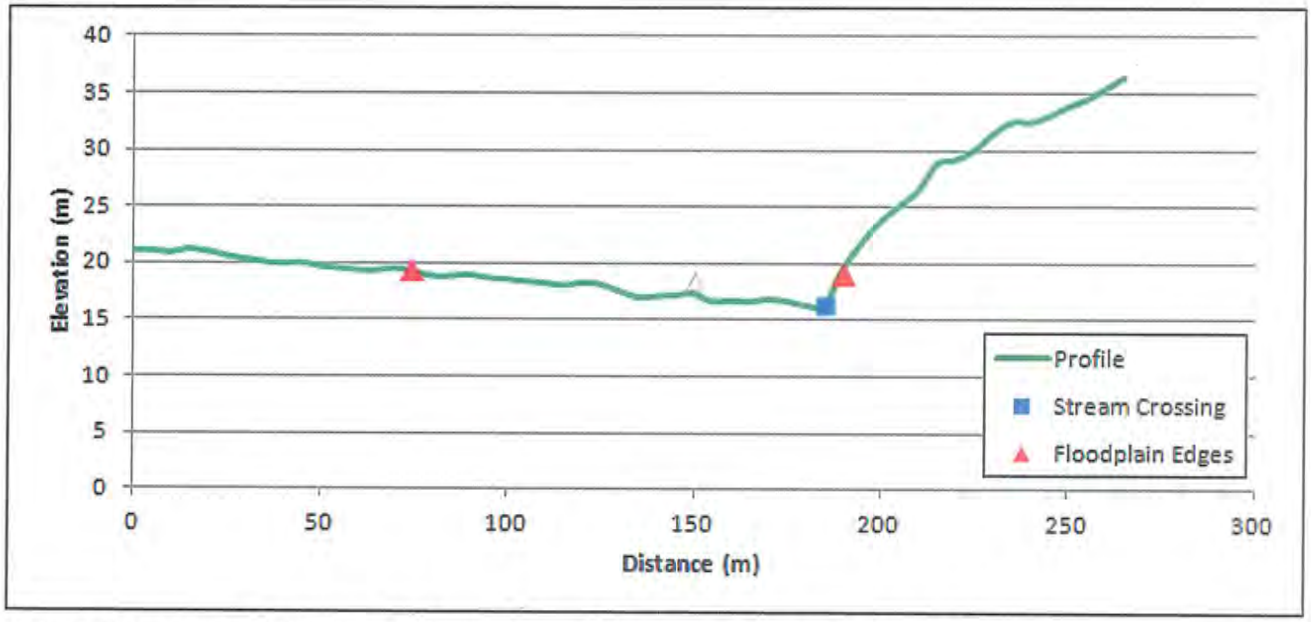
Field data to collect:

Bank-full Width: 17 (m)	
Wetted Width: 11.7 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords IPAD POINT
Elevation Difference: 2.84 (m) 26m @ 11%	Elevation Difference: 2.84 (m) 8m @ 38%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach19, Stream: Pachena, Reach P6

Start coords – x: 348701, y: 5409898
Direction: 330.5°
End coords – x: 348570, y: 5410128



Above Rousseau Confluence, Pachena active floodplain is probably much smaller

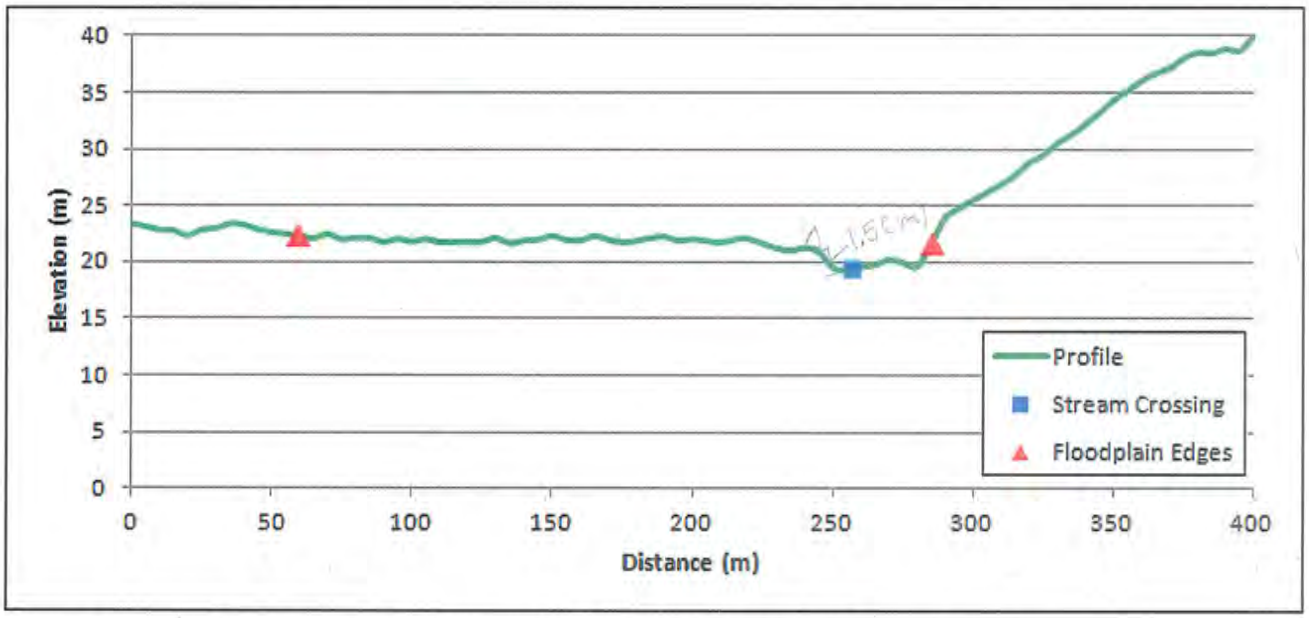
Field data to collect:

Bank-full Width: 4.9 (m)	
Wetted Width: 4.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords
Elevation Difference: 1.9 (m) above crossing	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach21, Stream: Pachena, Reach P6

Start coords – x: 348954, y: 5410090
Direction: 2.3°
End coords – x: 348971, y: 5410496



Above Rousseau Confluence, Pachena active floodplain is probably much smaller

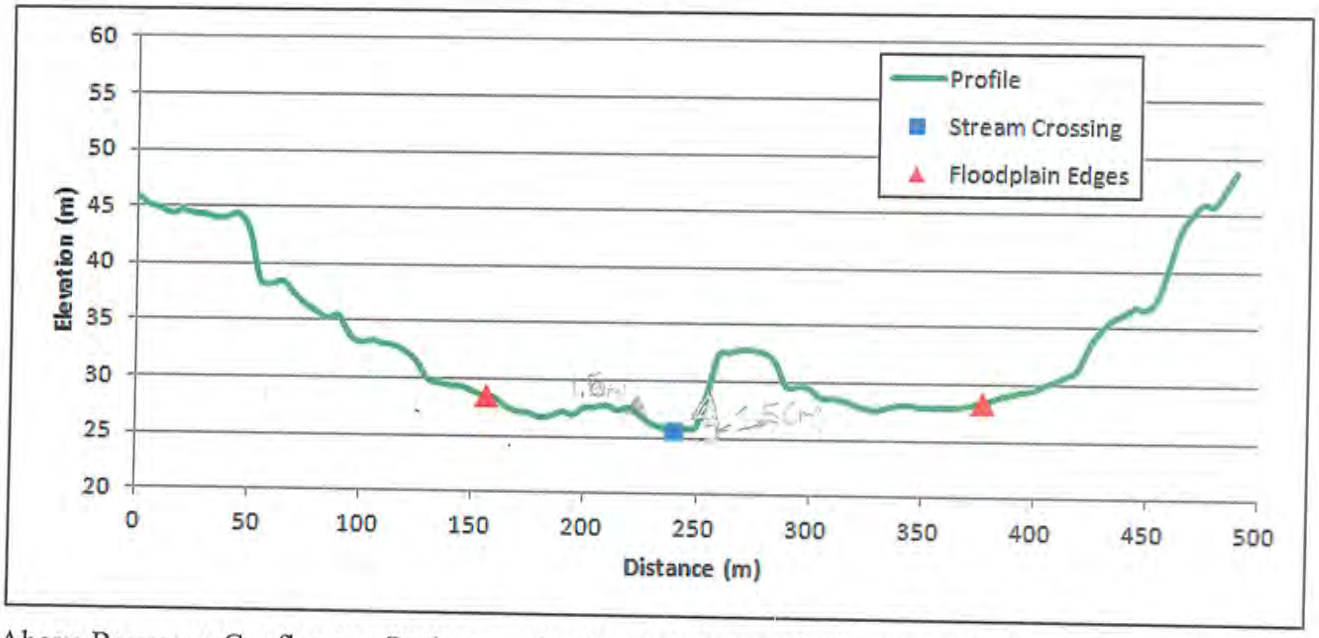
Field data to collect:

Bank-full Width: 5m? (m)	
Wetted Width: 4.5 cm	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference: 1.5 (m)	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach23, Stream: Pachena, Reach P7

Start coords – x: 349547, y: 5410146
Direction: 342.2°
End coords – x: 349397, y: 5410614



Above Rousseau Confluence, Pachena active floodplain is probably much smaller

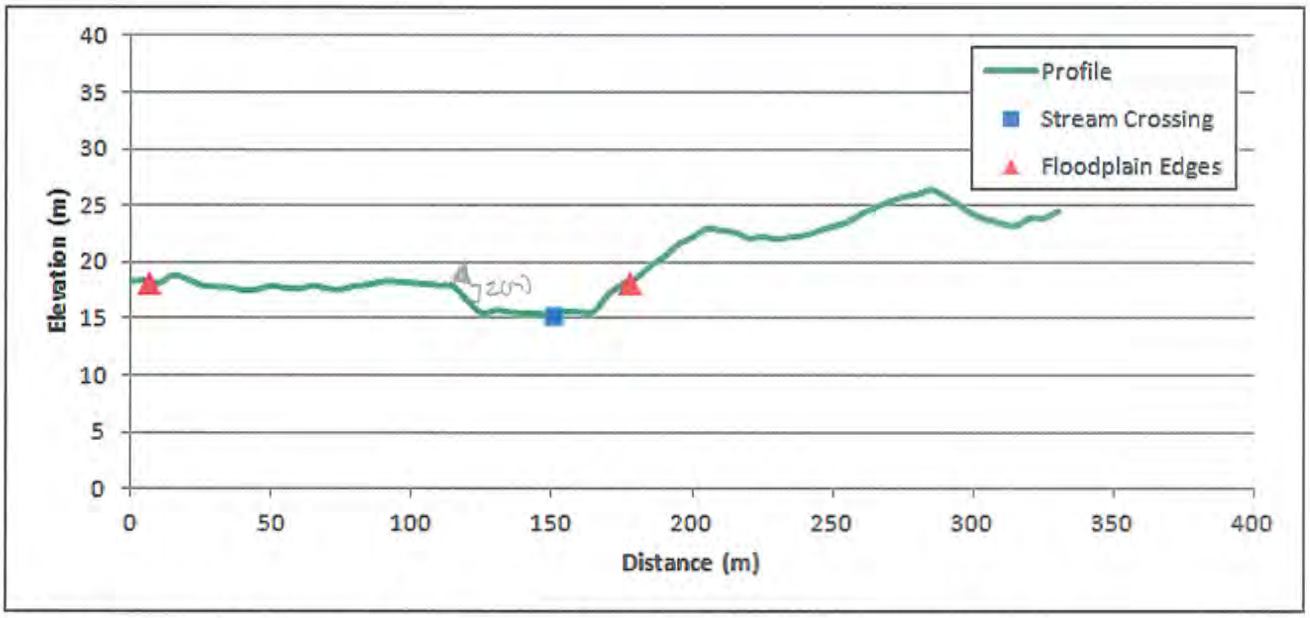
Field data to collect:

Bank-full Width: 12 m	
Wetted Width: 5 Cms	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference: 1.5 Cm) from stream	Elevation Difference: 1.5(m) floodplain difference

Note that the channel location may be different from the stream crossing point in the profile above. If the stream channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach18, Stream: Pachena, Reach P6

Start coords – x: 348526, y: 5409707
Direction: 335.3°
End coords – x: 348388, y: 5410007



Above Rousseau Confluence, Pachena active floodplain is probably much smaller

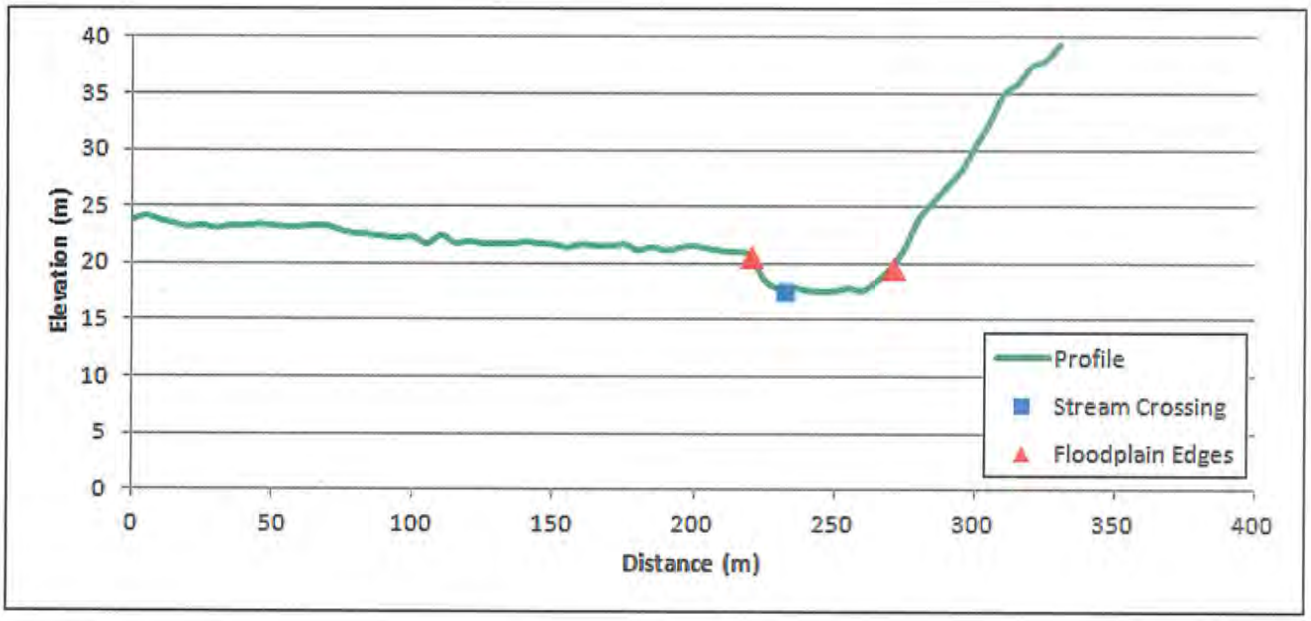
Field data to collect:

Bank-full Width: 5.5 (m)	
Wetted Width: 4.7 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords
Elevation Difference: 2(m) from stream	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach20, Stream: Pachena, Reach P6

Start coords – x: 349015, y: 5410104
Direction: 290.2°
End coords – x: 348703, y: 5410219



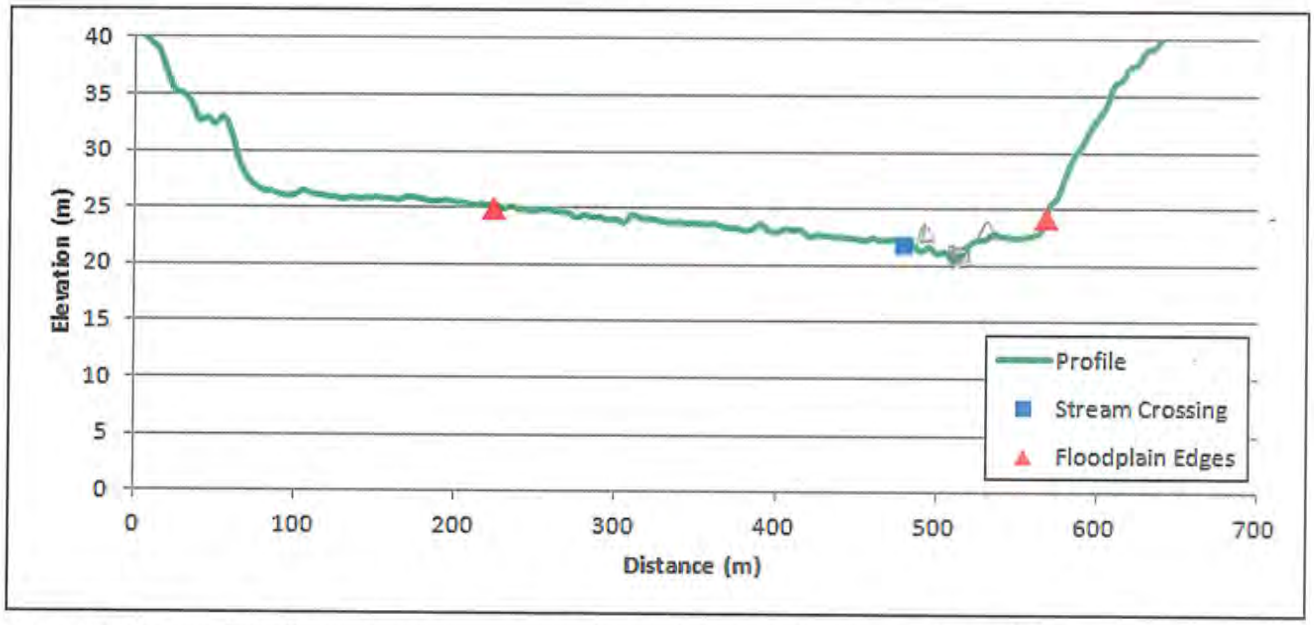
Field data to collect:

Bank-full Width: 8.4 (m)	
Wetted Width: 7.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach22, Stream: Pachena, Reach P7

Start coords – x: 349551, y: 5410222
Direction: 294.9°
End coords – x: 348962, y: 5410495



Above Rousseau Confluence, Pachena active floodplain is probably much smaller

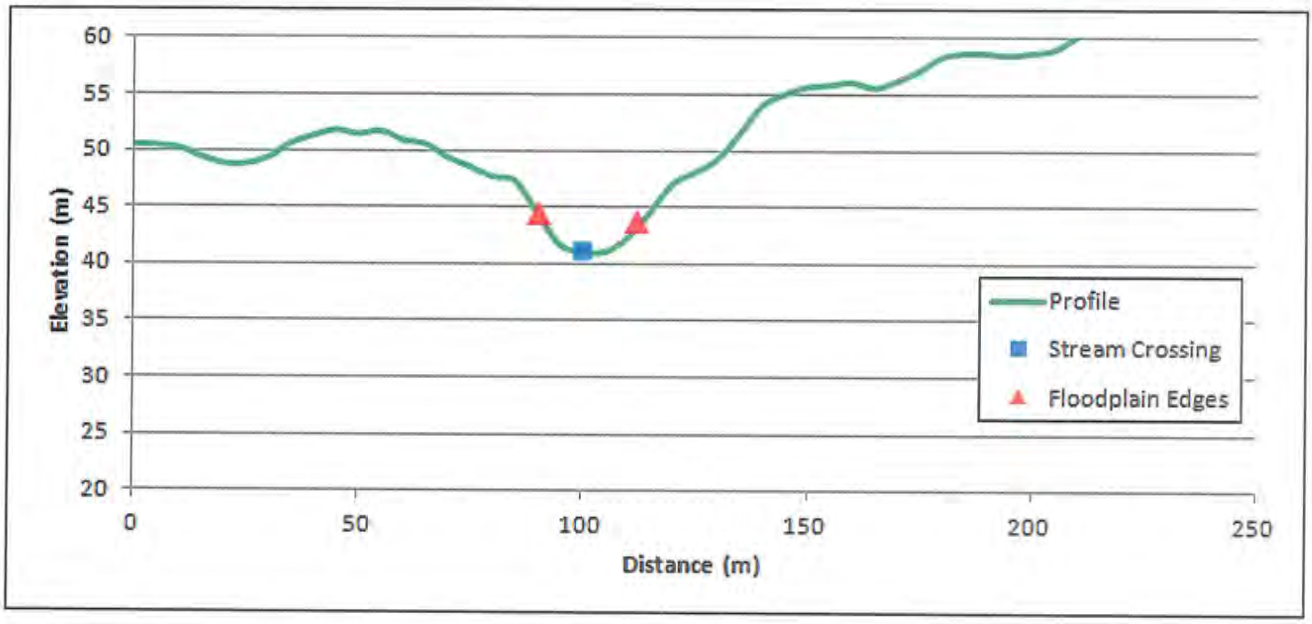
Field data to collect:

Bank-full Width: 8.5	
Wetted Width: 5.5	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS Point	Floodplain edge coords GPS Point
Elevation Difference: 1.5(m) from stream	Elevation Difference: 1.5(m) from stream crossing

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach24, Stream: Pachena, Reach P7

Start coords – x: 349907, y: 5410583
Direction: 339.7°
End coords – x: 349831, y: 5410790



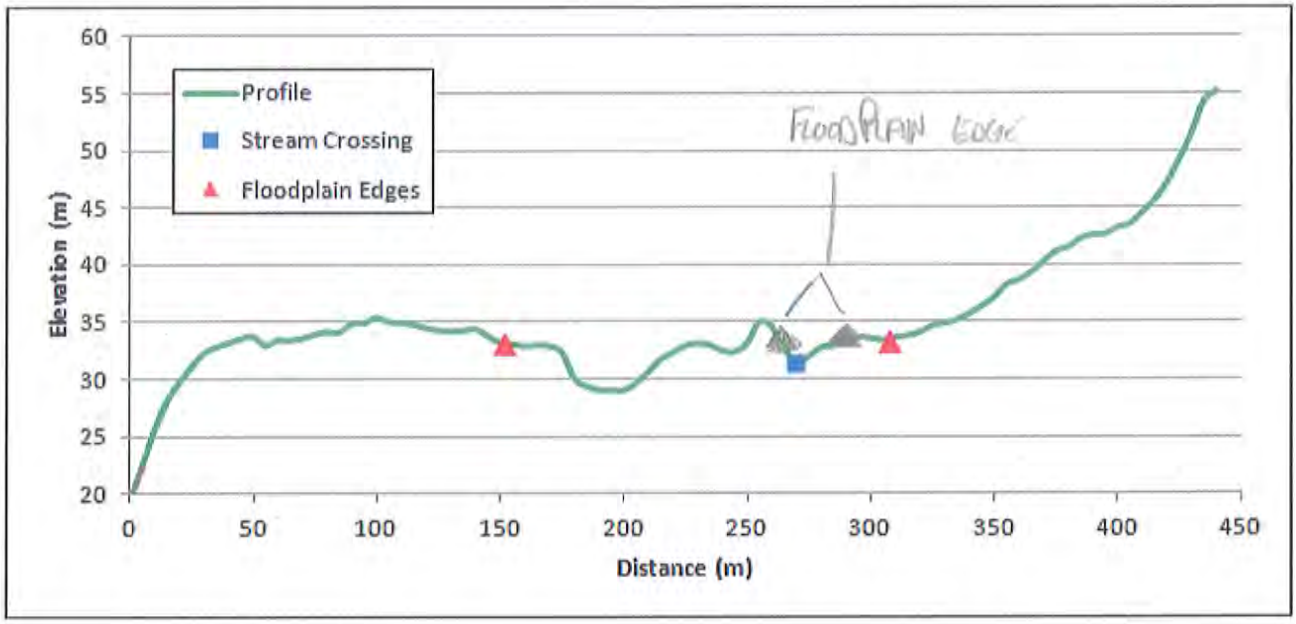
Field data to collect:

Bank-full Width: 7 (m)	
Wetted Width: 5.6 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: e5, Stream: E-Trib, Reach E1

Start coords – x: 348746, y: 5409587
Direction: 163.5°
End coords – x: 348871, y: 5409165



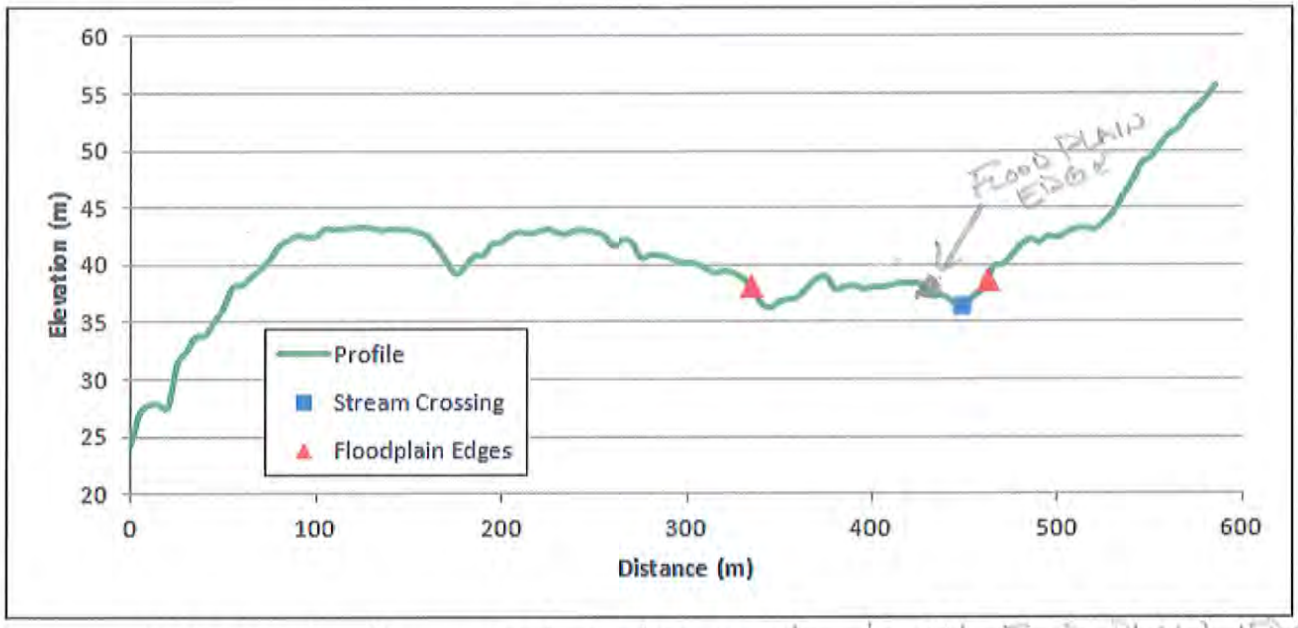
Field data to collect:

Bank-full Width: 3.5 (m)	
Wetted Width: 1.7 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords IPAD POINT
Elevation Difference: 1.54 (m) 6m @ 26%	Elevation Difference: 8 m @ 20%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: e7, Stream: E-Trib, Reach E1

Start coords – x: 348344, y: 5409269
Direction: 97.7°
End coords – x: 348928, y: 5409191



measured from high water mark to get Flood PLAIN EDGE

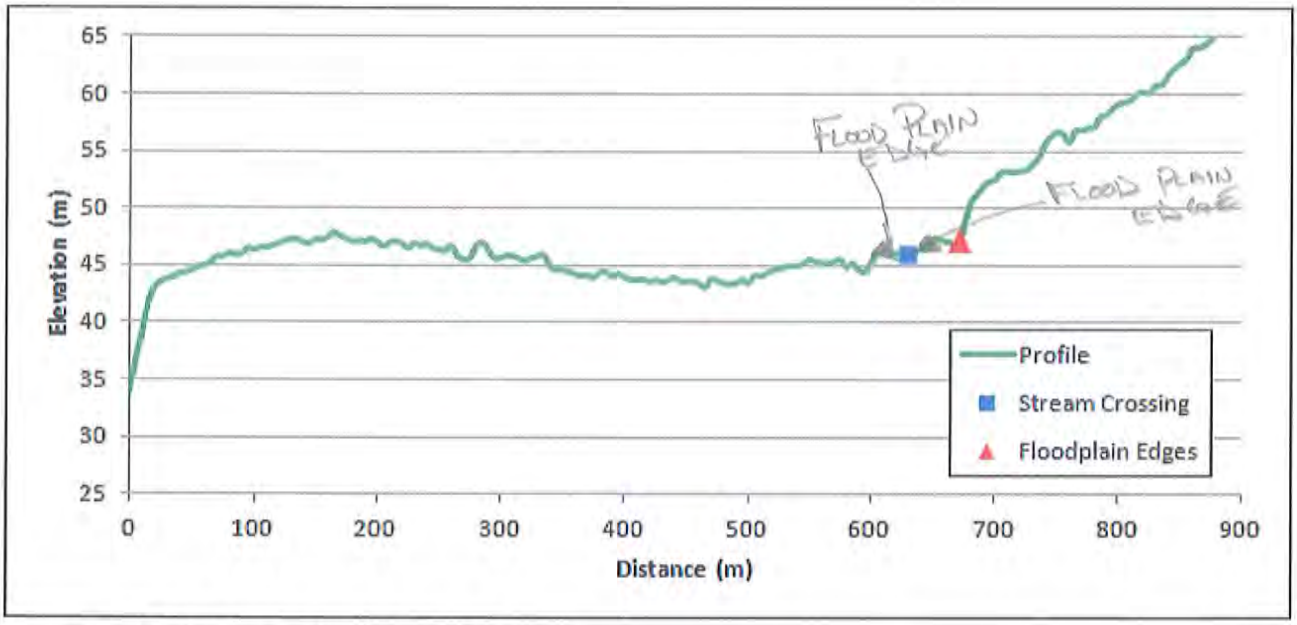
Field data to collect:

Bank-full Width: 2.7 m	
Wetted Width: 2.7 m	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 1.50	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: e10, Stream: E-Trib, Reach E1

Start coords – x: 348143, y: 5408849
Direction: 70.0°
End coords – x: 348969, y: 5409149



Location of left edge of floodplain is unknown.

Field data to collect:

Bank-full Width: 3.3 (m)	
Wetted Width: 2.1 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords IPAD POINT
Elevation Difference: 2.13 (m) 12m @ 18%	Elevation Difference: 1.8 m

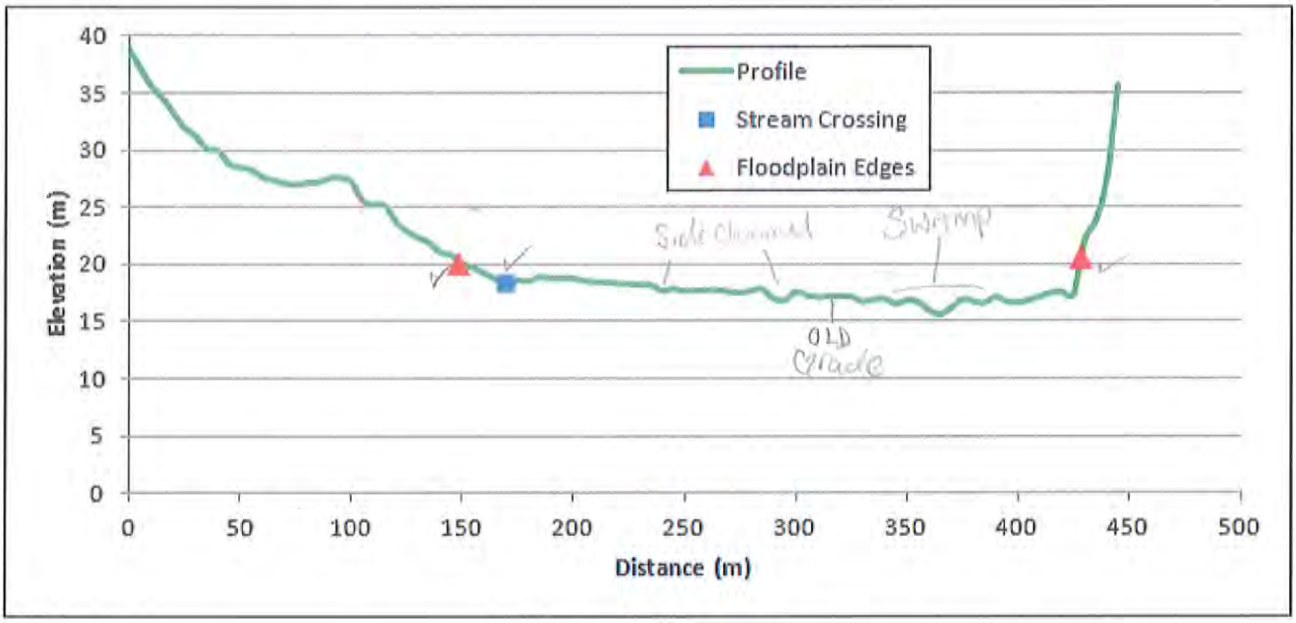
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

ON OLD Gravel road

ON old grade BANK

Cross Section: fred8, Stream: Frederick, Reach 16 (17?)

Start coords – x: 352197, y: 5415617
Direction: 99.5°
End coords – x: 352640, y: 5415543



Field data to collect:

Bank-full Width: 10.8 (m)	
Wetted Width: 3.9 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

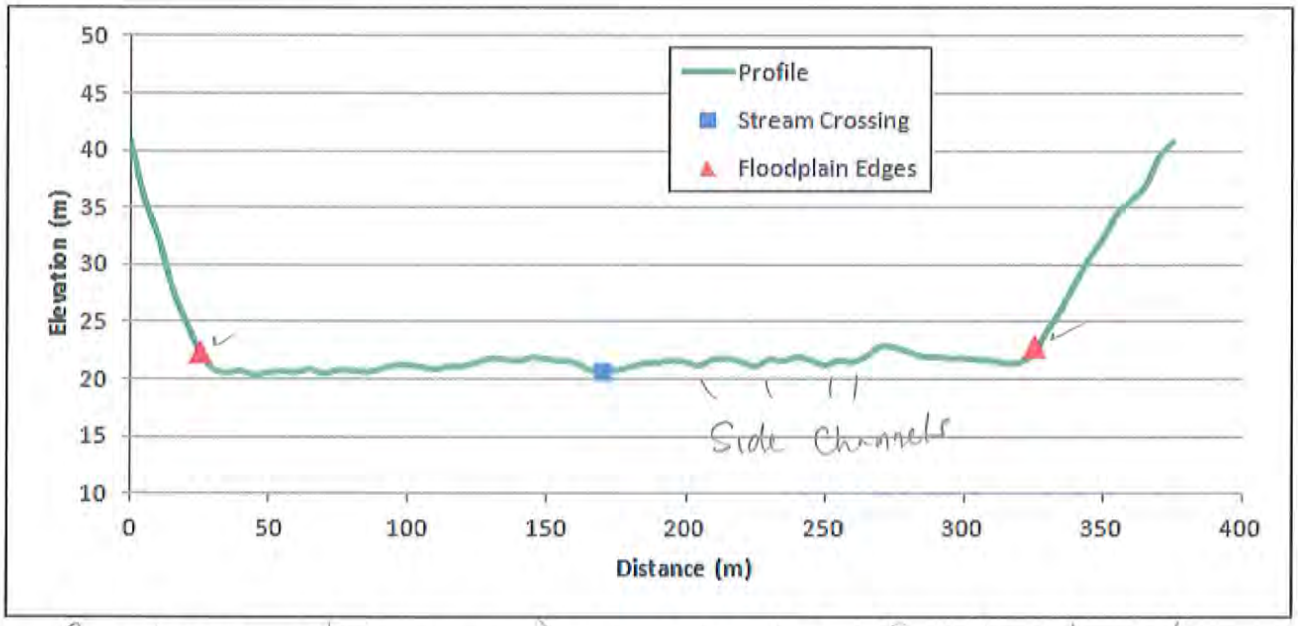
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: fred9, Stream: Frederick, Reach 17

Start coords – x: 352141, y: 5415258

Direction: 87.6°

End coords – x: 352520, y: 5415274



Ground was alot more flat and alot of side channels spread out.

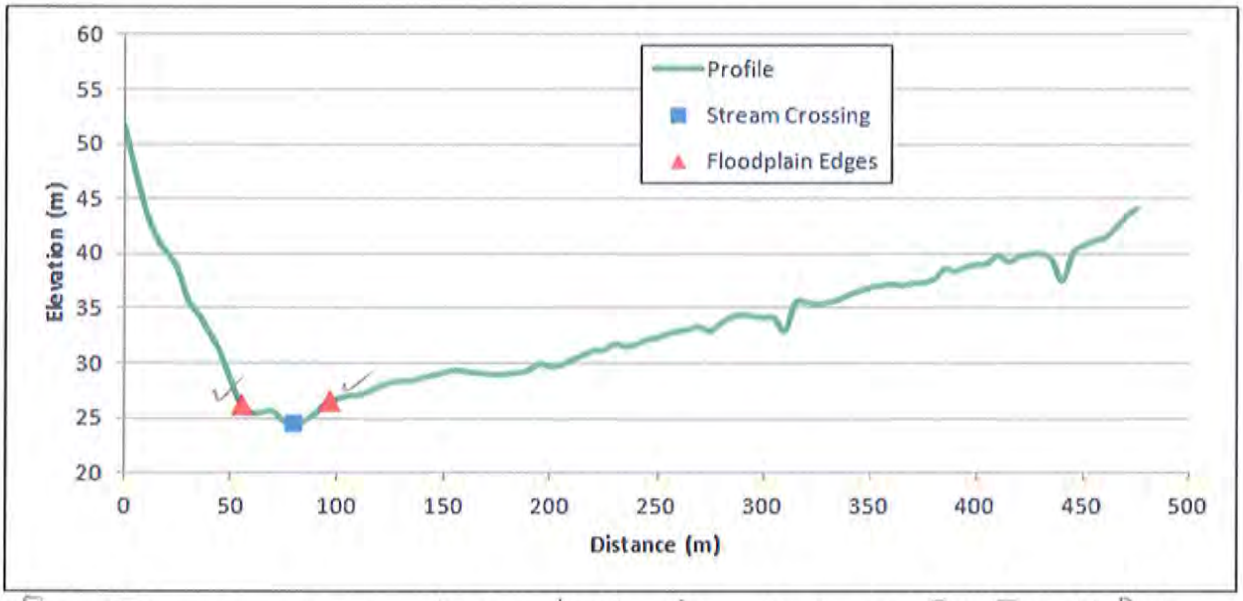
Field data to collect:

Bank-full Width: 10.4 (m)	
Wetted Width: 7.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: fred10, Stream: Frederick, Reach 17

Start coords – x: 352250, y: 5414802
Direction: 79.1°
End coords – x: 352721, y: 5414893



FISH SPAWNING POOL (COHO & TROUT) 10 to 15 BIG FISH IN POOL

Field data to collect:

Bank-full Width: 11.6 (m)	
Wetted Width: 5.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

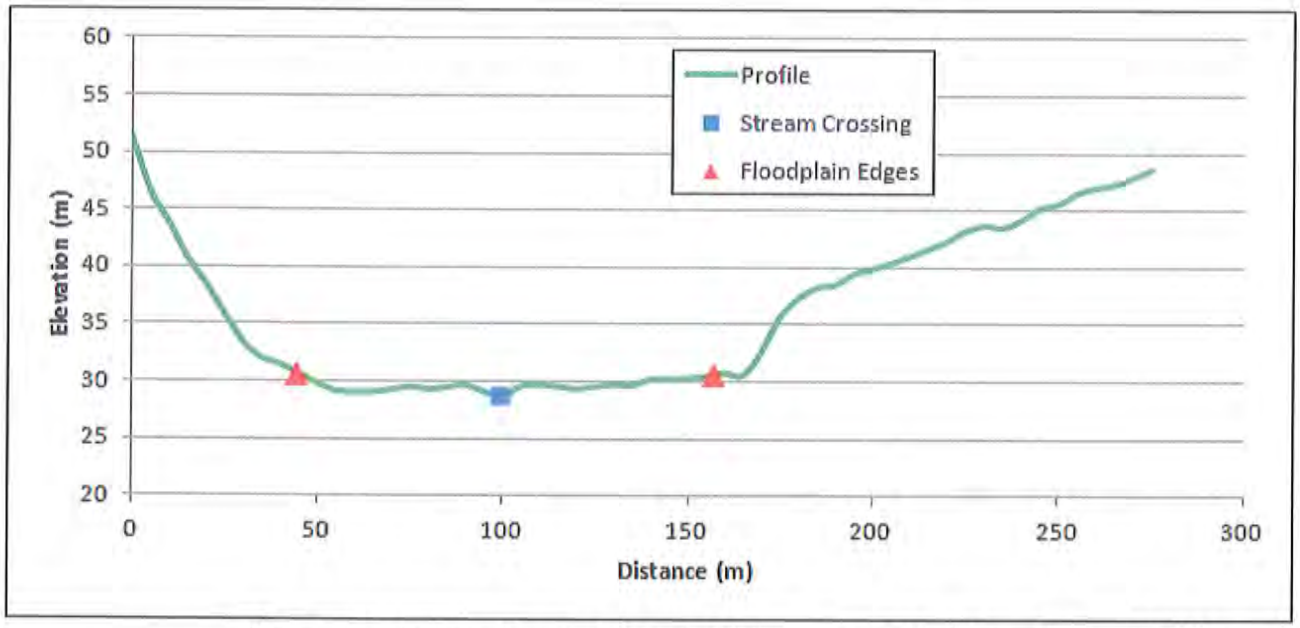
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: fred11, Stream: Frederick, Reach 17

Start coords – x: 352249, y: 5414438

Direction: 104.7°

End coords – x: 352519, y: 5414368



Easy Evidence where Flood plain is at the toe of the Slopes.

Field data to collect:

Bank-full Width: 10.1 (m)	
Wetted Width: 6.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

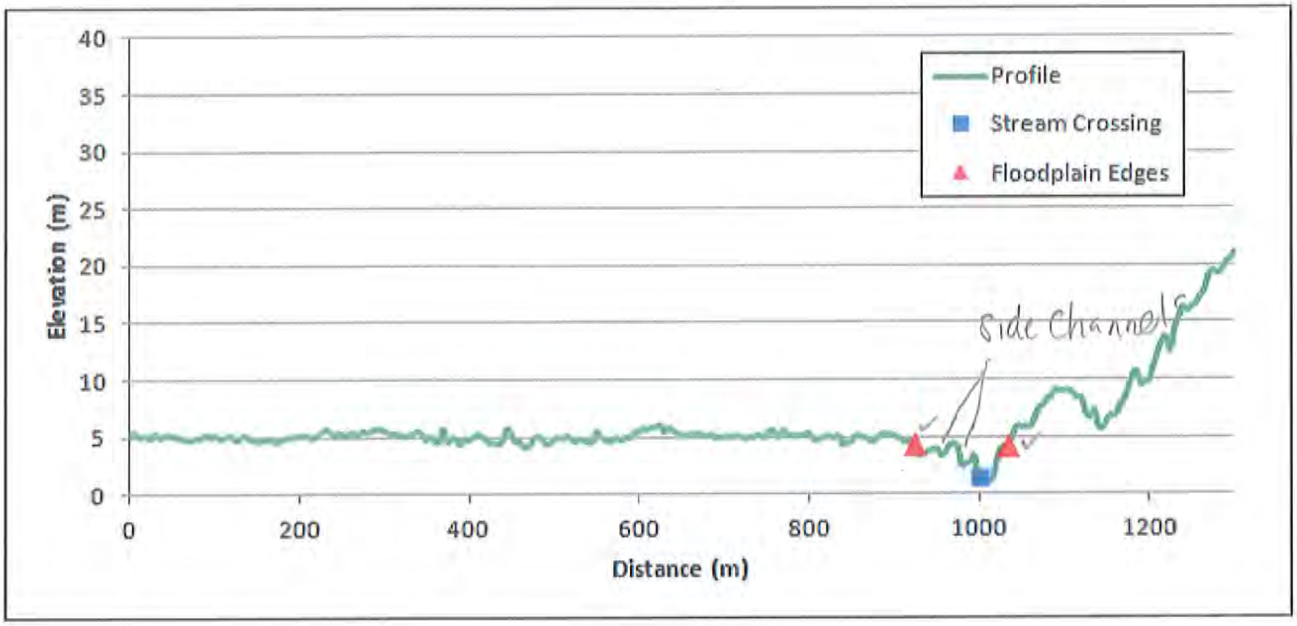
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach8, Stream: Pachena, Reach P2

Start coords – x: 345646, y: 5407992

Direction: 14.9°

End coords – x: 345981, y: 5409250



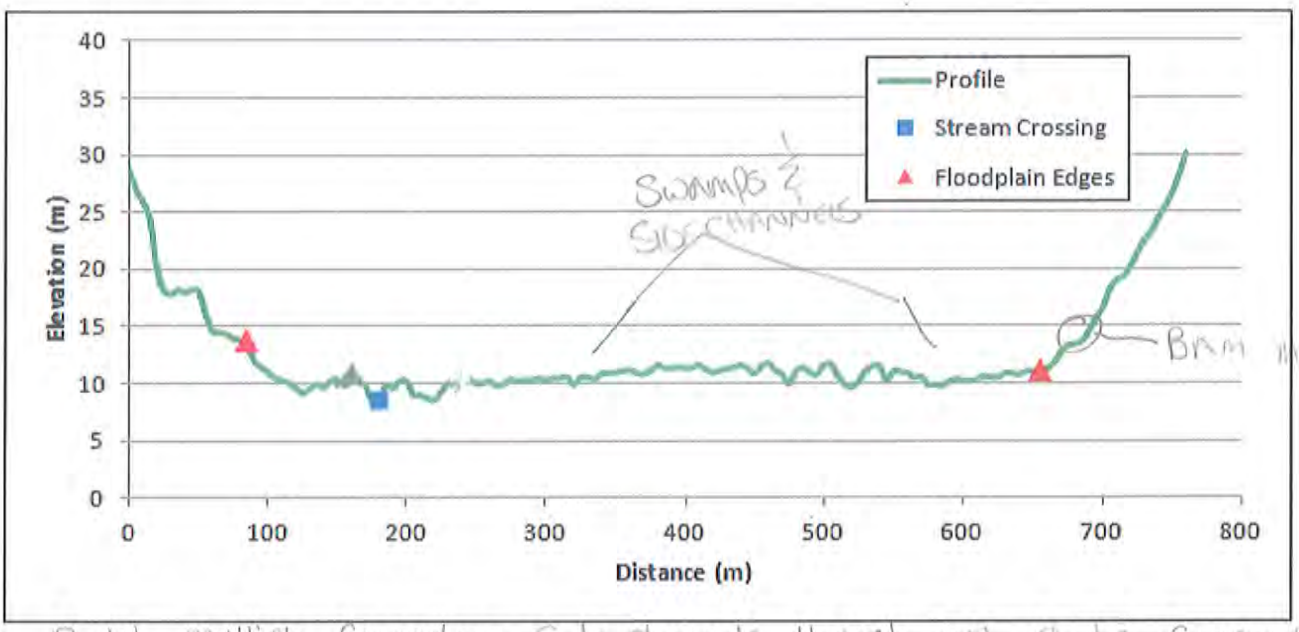
Field data to collect:

Bank-full Width: 18.9 (m)	
Wetted Width: 17.3 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach14, Stream: Pachena, Reach P4 (P3?)

Start coords – x: 347635, y: 5408761
Direction: 321.6°
End coords – x: 347163, y: 5409356



Right - multiple connecting side channels through out flats. Swamps also. Hard to judge where main junction for main creek.

Field data to collect:

Bank-full Width: 13.9 (m)	
Wetted Width: 13.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords - PAIS Point
Elevation Difference:	Elevation Difference: 2.87(m) 10m @ 30%

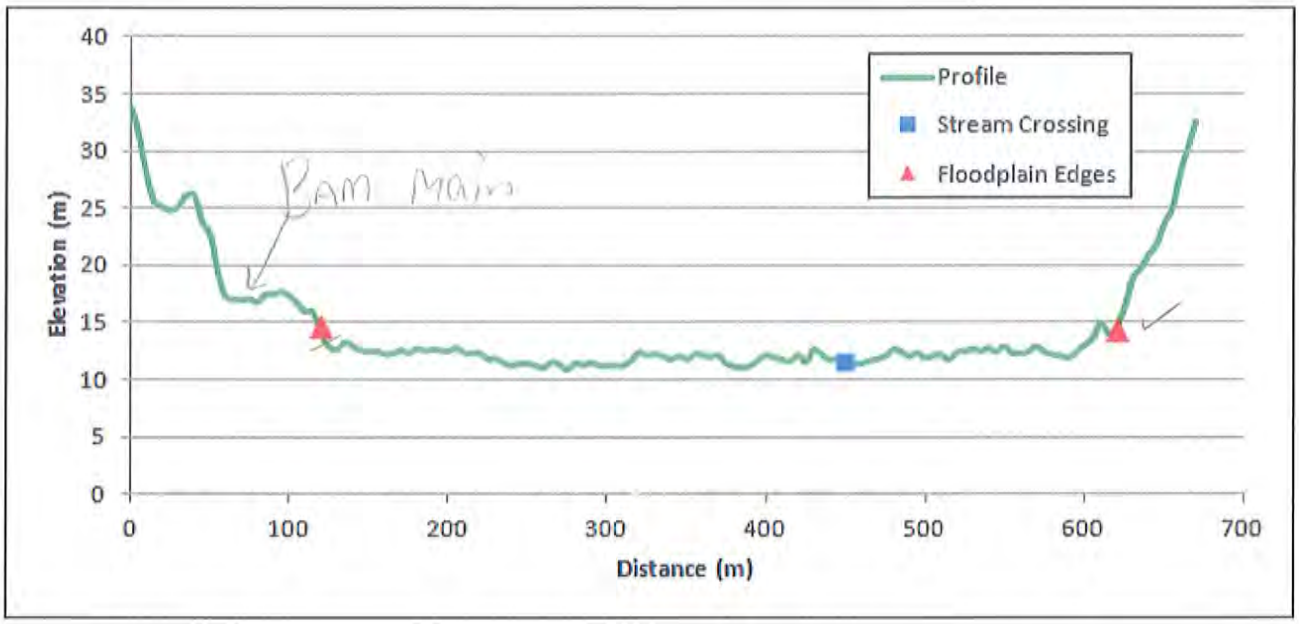
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach15, Stream: Pachena, Reach P4 (P3?)

Start coords – x: 347819, y: 5408827

Direction: 344.3°

End coords – x: 347637, y: 5409473



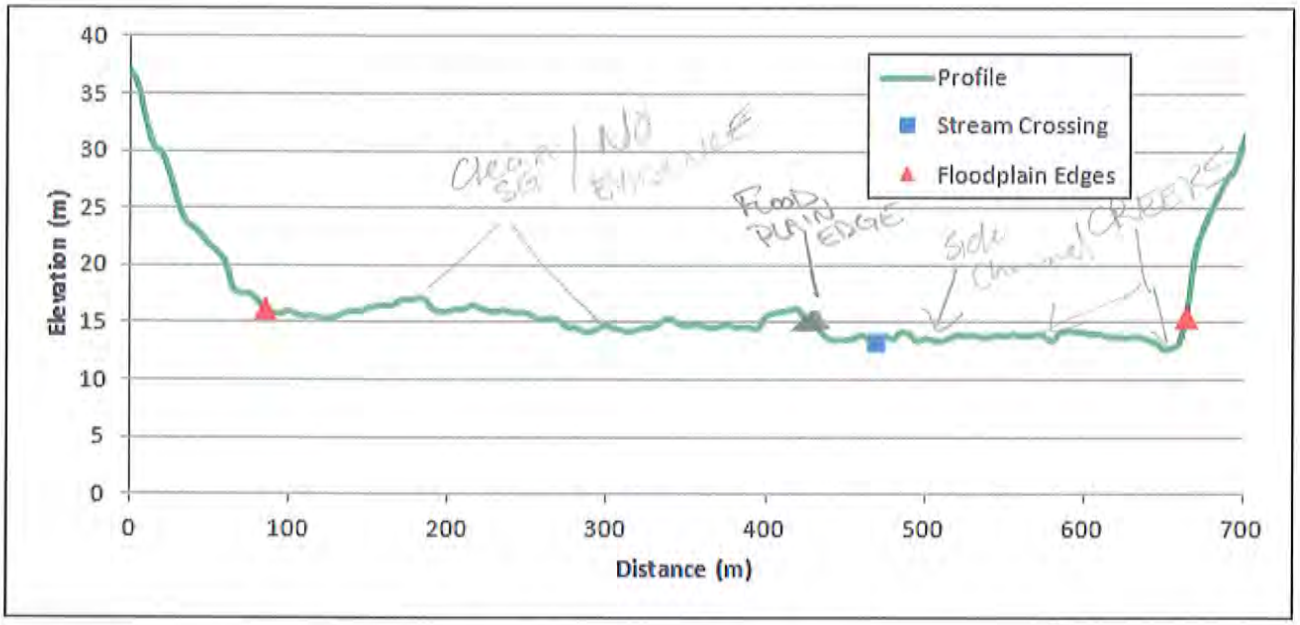
Field data to collect:

Bank-full Width: 10.1 (m)	
Wetted Width: 9.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: pach16, Stream: Pachena, Reach P4 (P3?)

Start coords – x: 348497, y: 5409326
Direction: 291.6°
End coords – x: 347838, y: 5409588



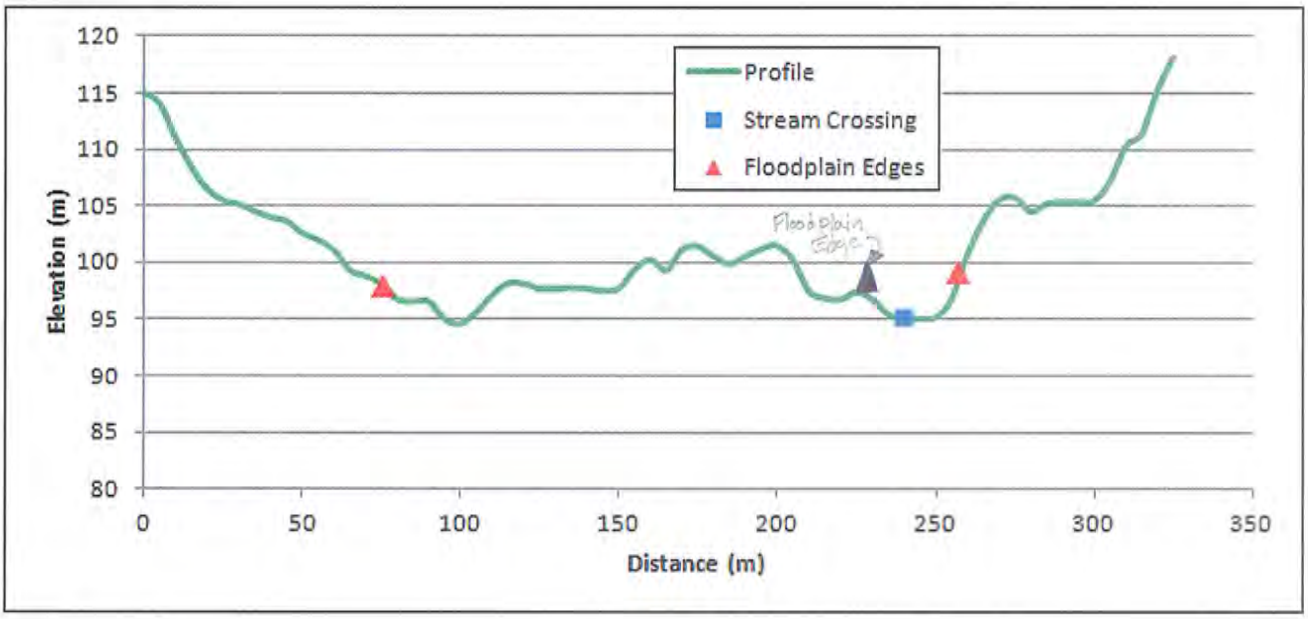
Field data to collect:

Bank-full Width: 20.8 (m)	
Wetted Width: 7.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 2.08 14m @ 15%	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sab1, Stream: Sabrina, Reach 34

Start coords – x: 356194, y: 5412566
Direction: 126.6°
End coords – x: 356459, y: 5412369



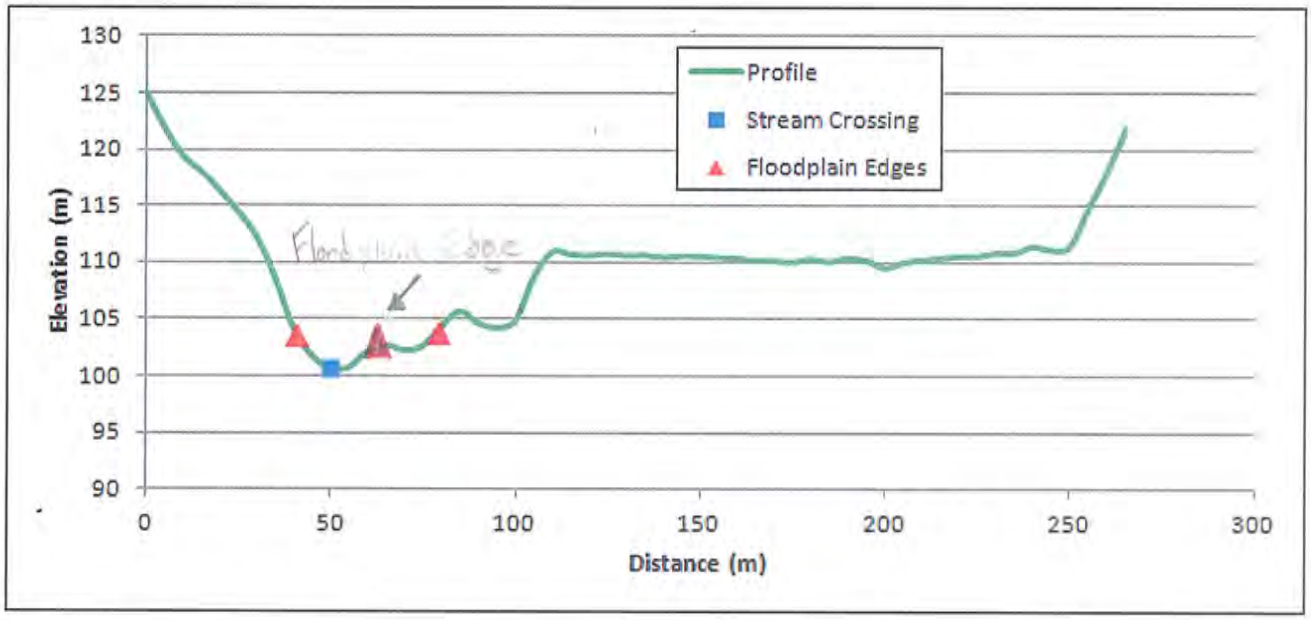
Field data to collect:

Bank-full Width: 16.5 (m)	
Wetted Width: 14.4 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords GPS point taken for	Floodplain edge coords GPS Point
Elevation Difference: this difference	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sab2, Stream: Sabrina, Reach 34

Start coords – x: 355881, y: 5412220
Direction: 127.1°
End coords – x: 356096, y: 5412057



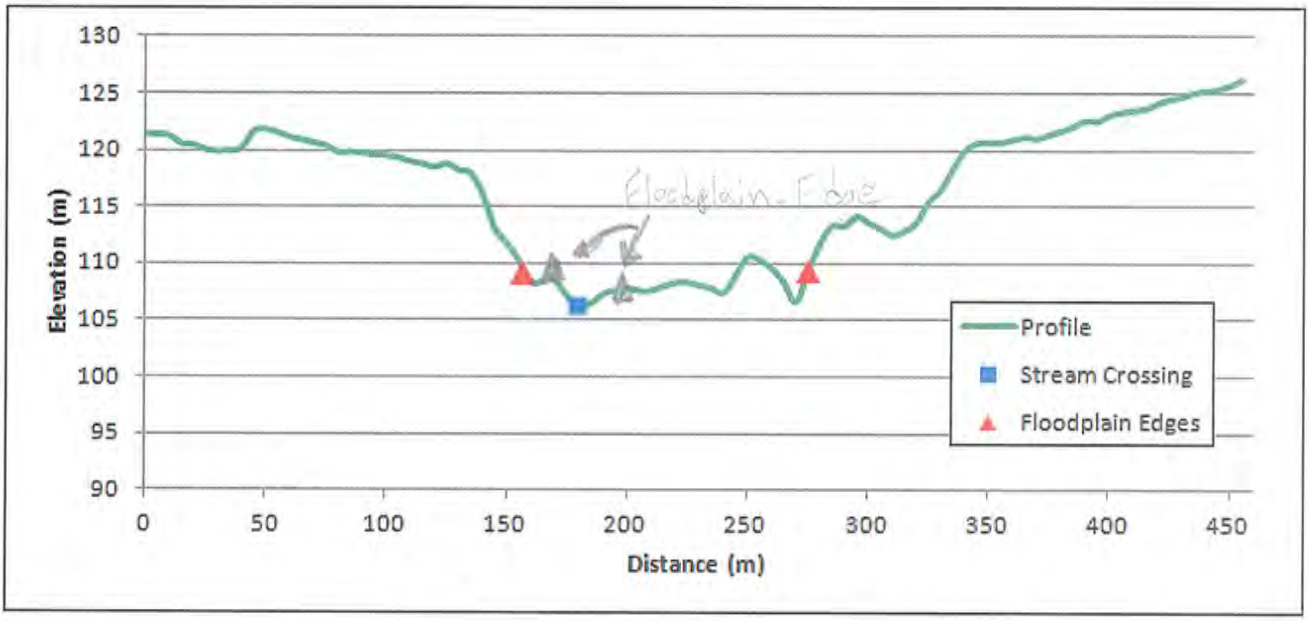
Field data to collect:

Bank-full Width: 15.6 (m)	
Wetted Width: 12.5 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference: 0.89

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sab3, Stream: Sabrina, Reach 34

Start coords – x: 355306, y: 5411746
Direction: 102.0°
End coords – x: 355755, y: 5411650



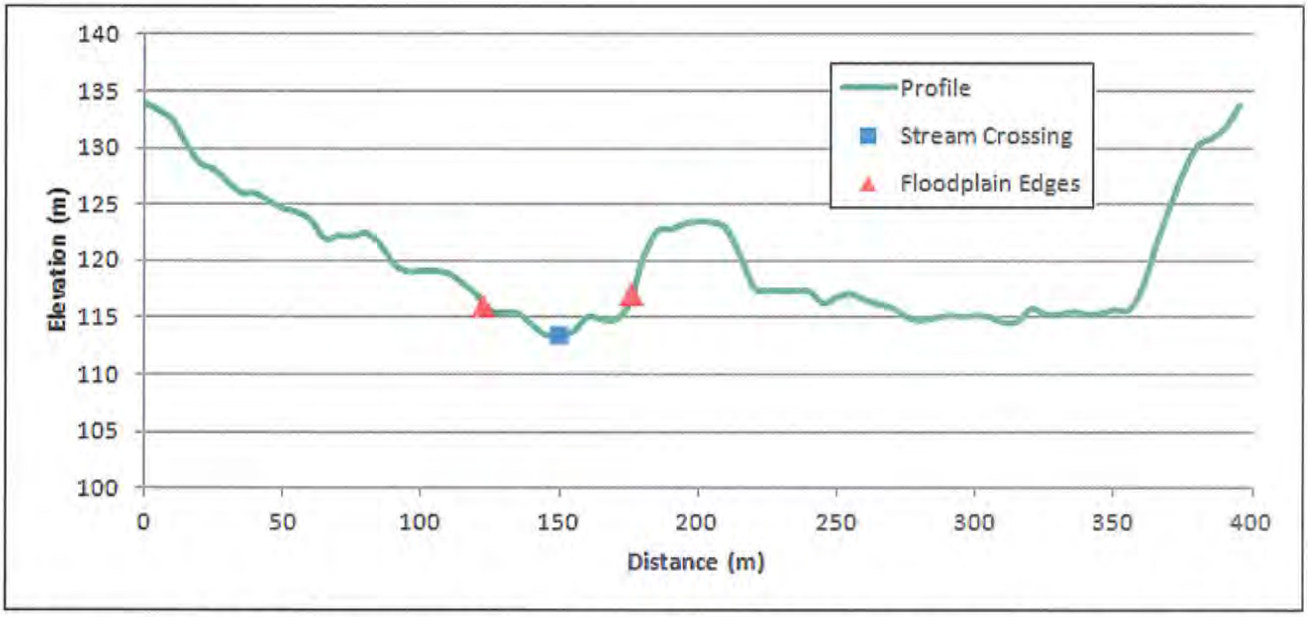
Field data to collect:

Bank-full Width: 16.2 m	
Wetted Width: 11.5 m	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords GPS point was used
Elevation Difference: 0.3 - 0.5 (m)	Elevation Difference: for the difference

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sab4, Stream: Sabrina, Reach 35

Start coords – x: 354984, y: 5411568
Direction: 137.4°
End coords – x: 355254, y: 5411274



Flat area on right side is a tributary. There is a possibility that the Sabrina flood plain may extend to this area.

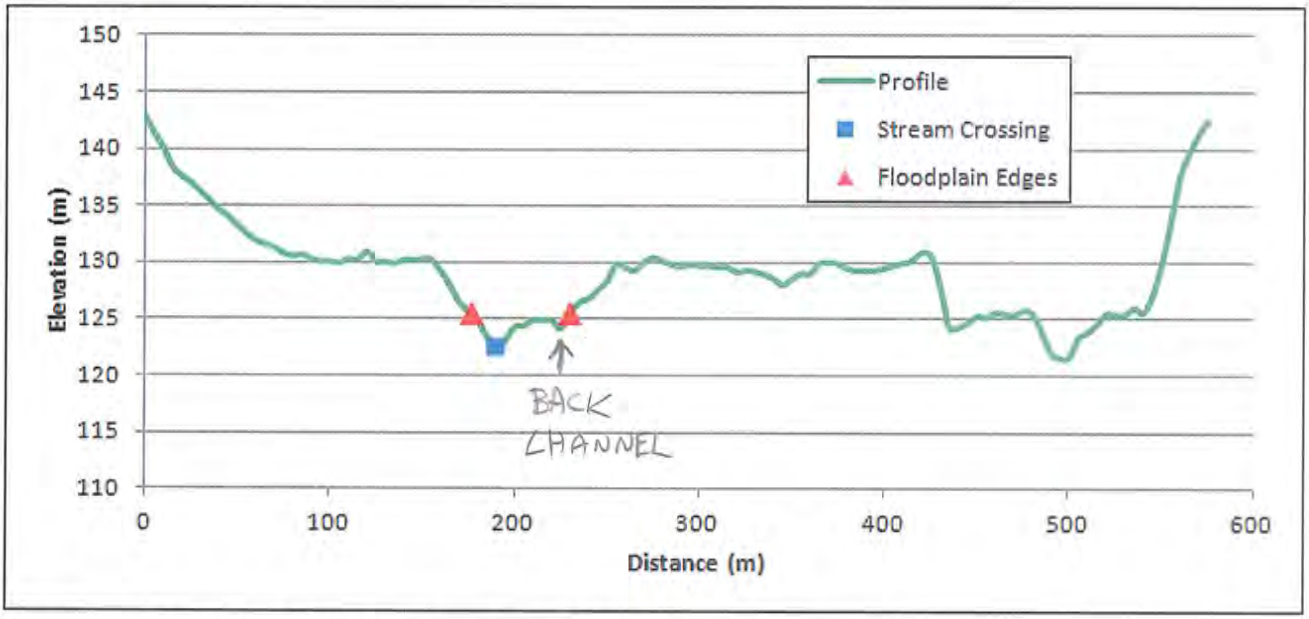
Field data to collect:

Bank-full Width: 14.5m	
Wetted Width: 8.3m	
Left Bank	**Right Bank**
Water edge coords (if applicable) MINIMAL WATER	Water edge coords (if applicable) MINIMAL WATER
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords N/A	Floodplain edge coords N/A
Elevation Difference: N/A	Elevation Difference: N/A

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sab5, Stream: Sabrina, Reach 35

Start coords – x: 354428, y: 5411035
Direction: 86.4°
End coords – x: 355006, y: 5411071



Note tributary on right side, same creek seen in sab4

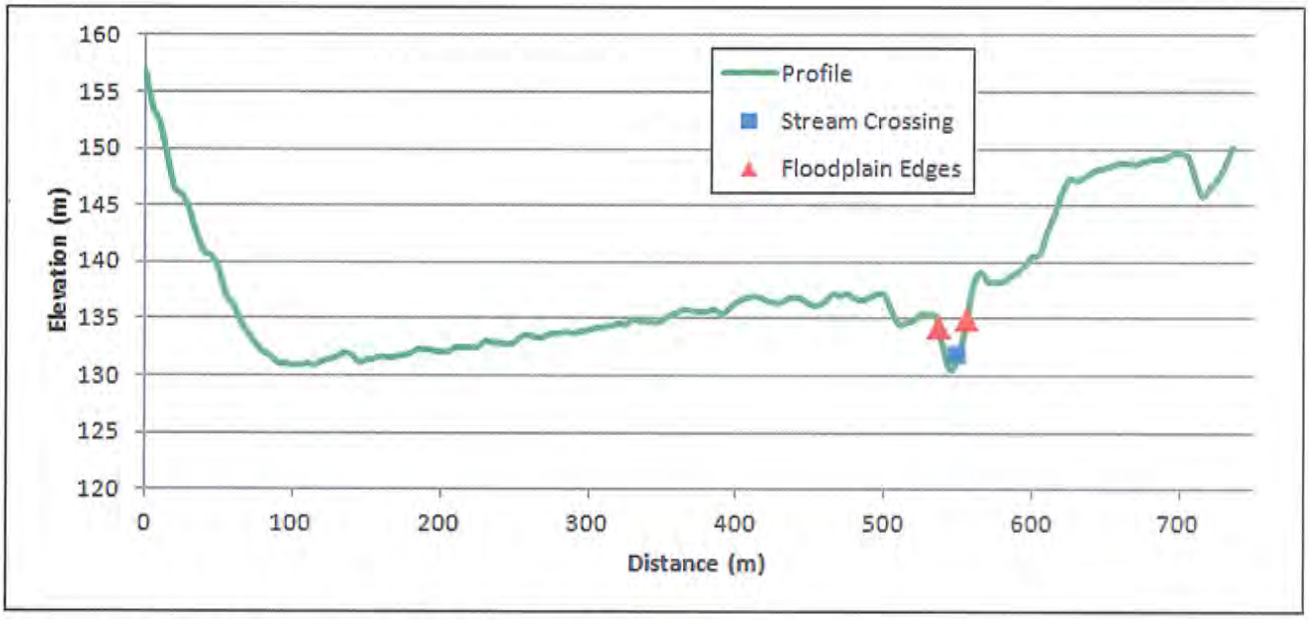
Field data to collect:

Bank-full Width: 13.9m	
Wetted Width: 10.6m	
Left Bank	**Right Bank**
Water edge coords (if applicable) MINIMAL WATER	Water edge coords (if applicable) MINIMAL WATER
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N BACK CHANNEL
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords N/A	Floodplain edge coords N/A
Elevation Difference: N/A	Elevation Difference: N/A

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sab6, Stream: Sabrina, Reach 35

Start coords – x: 354032, y: 5410834
Direction: 99.1°
End coords – x: 354762, y: 5410718



Low area at left side may be part of the floodplain

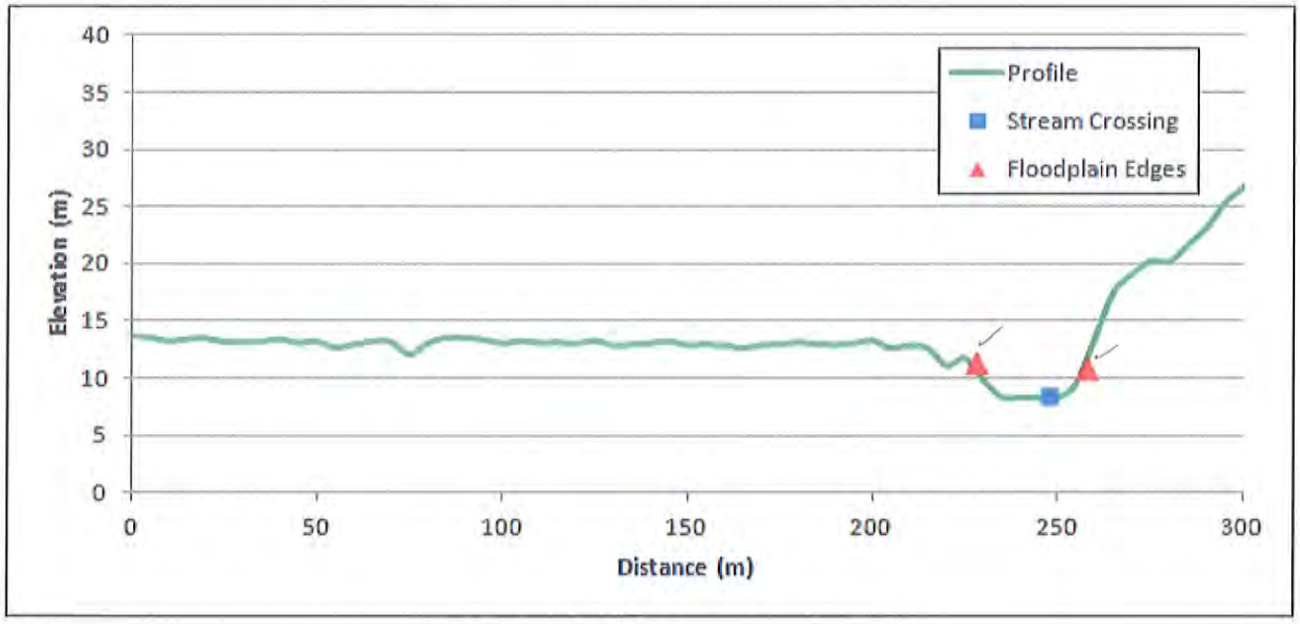
Field data to collect:

Bank-full Width: 17.0 m	
Wetted Width: 5.5m	
Left Bank	**Right Bank**
Water edge coords (if applicable) NO WATER PRESENT	Water edge coords (if applicable) NO WATER PRESENT
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: Y or (N)	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords N/A	Floodplain edge coords N/A
Elevation Difference: N/A	Elevation Difference: N/A

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar11, Stream: Sarita, Reach 4

Start coords – x: 357497, y: 5418072
Direction: 359.8°
End coords – x: 357496, y: 5418380



GOOD

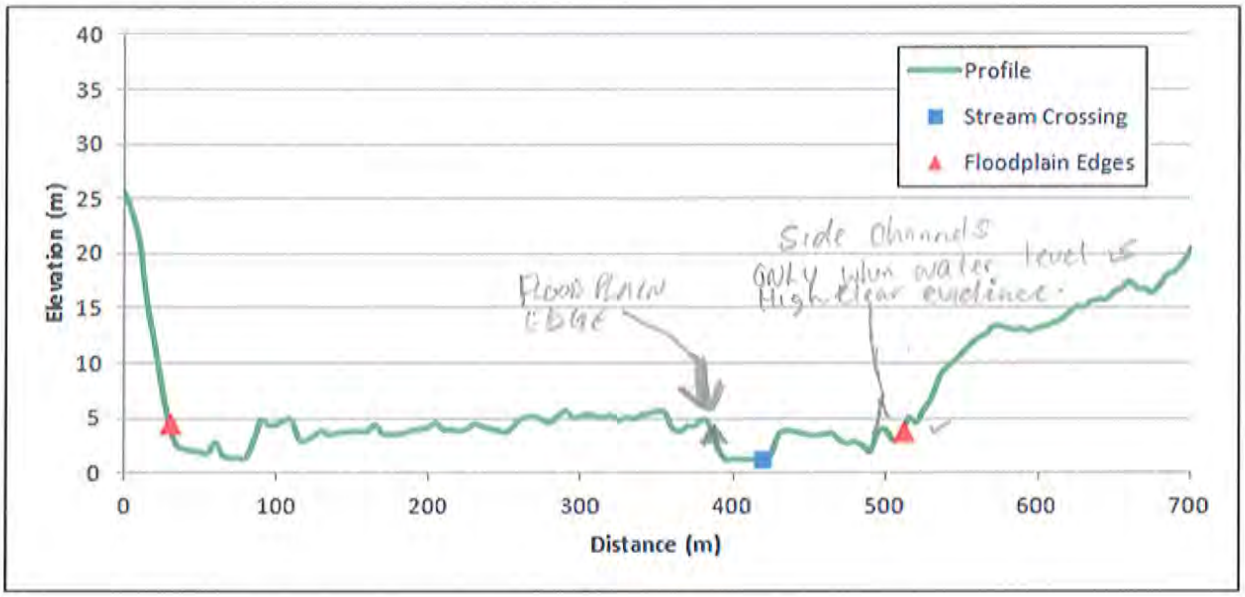
Field data to collect:

Bank-full Width: 25.6 (m)	
Wetted Width: 23.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar5, Stream: Sarita, Reach 1

Start coords – x: 354409, y: 5416801
Direction: 7.0°
End coords – x: 354495, y: 5417507



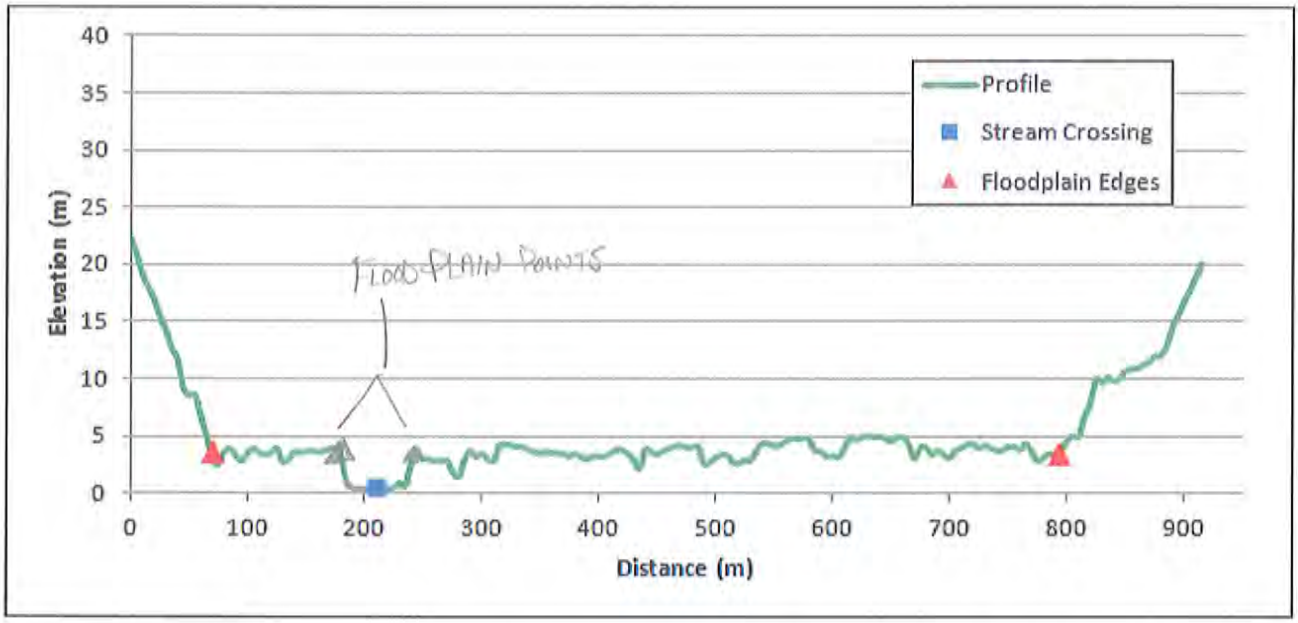
Field data to collect:

Bank-full Width: 43.5 (m)	
Wetted Width: 39.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: (Y) or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: Y or (N)	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 3.16 m 20m @ 16%	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar4, Stream: Sarita, Reach 1

Start coords – x: 353522, y: 5417105
Direction: 56.3°
End coords – x: 354287, y: 5417615



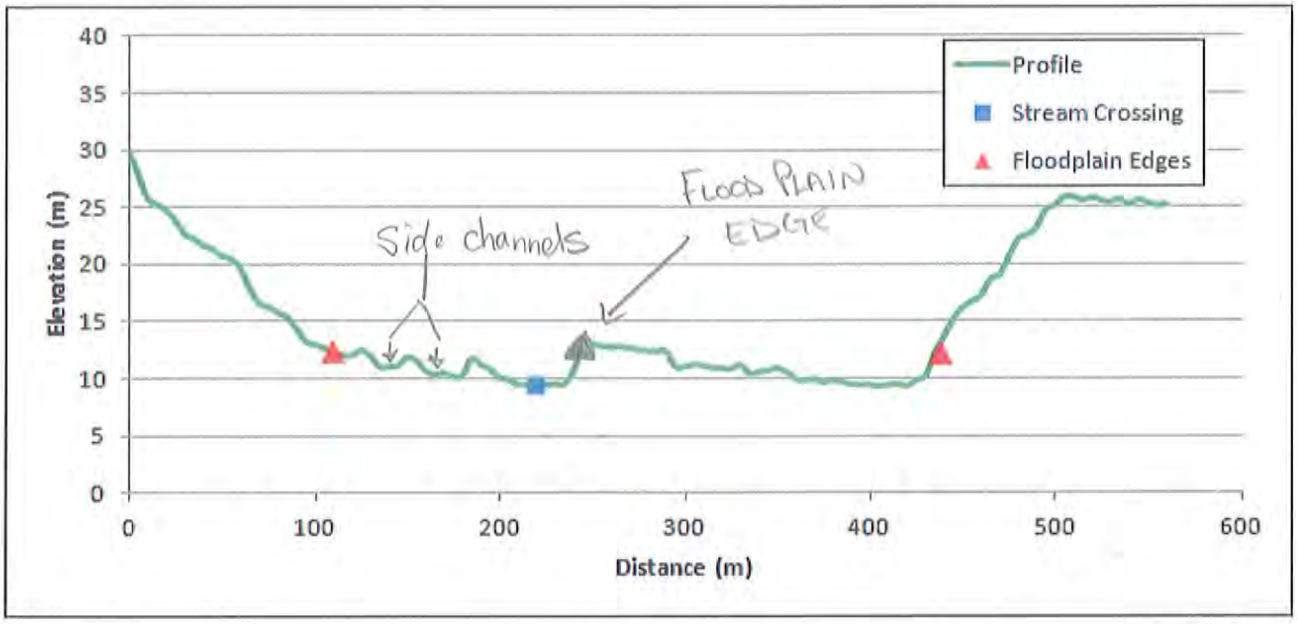
Field data to collect:

Bank-full Width: 49.4 (m)	
Wetted Width: 48.6 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or N
Fine sand deposition: (Y) or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD Point 1	Floodplain edge coords IPAD Point
Elevation Difference: 3.47(m) 22m @ 16%	Elevation Difference: 3.26(m) 22m @ 15%

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar12, Stream: Sarita, Reach 4

Start coords – x: 358303, y: 5417979
Direction: 325.2°
End coords – x: 357983, y: 5418438



Field data to collect:

Bank-full Width: 39.4 (m)	
Wetted Width: 28.3 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords IPAD POINT
Elevation Difference:	Elevation Difference: 4.36 (m) 18m @ 25%

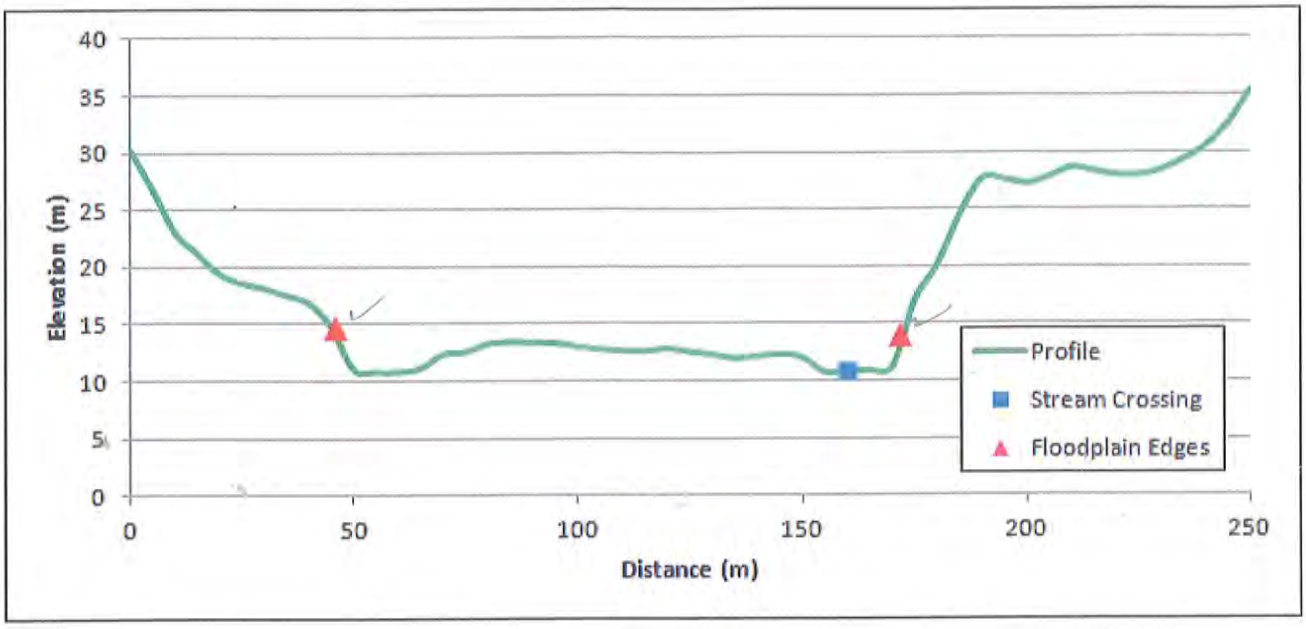
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sar13, Stream: Sarita, Reach 4

Start coords – x: 358686, y: 5418220

Direction: 356.4°

End coords – x: 358670, y: 5418470



Field data to collect:

Bank-full Width: 20.5 (m)	
Wetted Width: 17.4 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

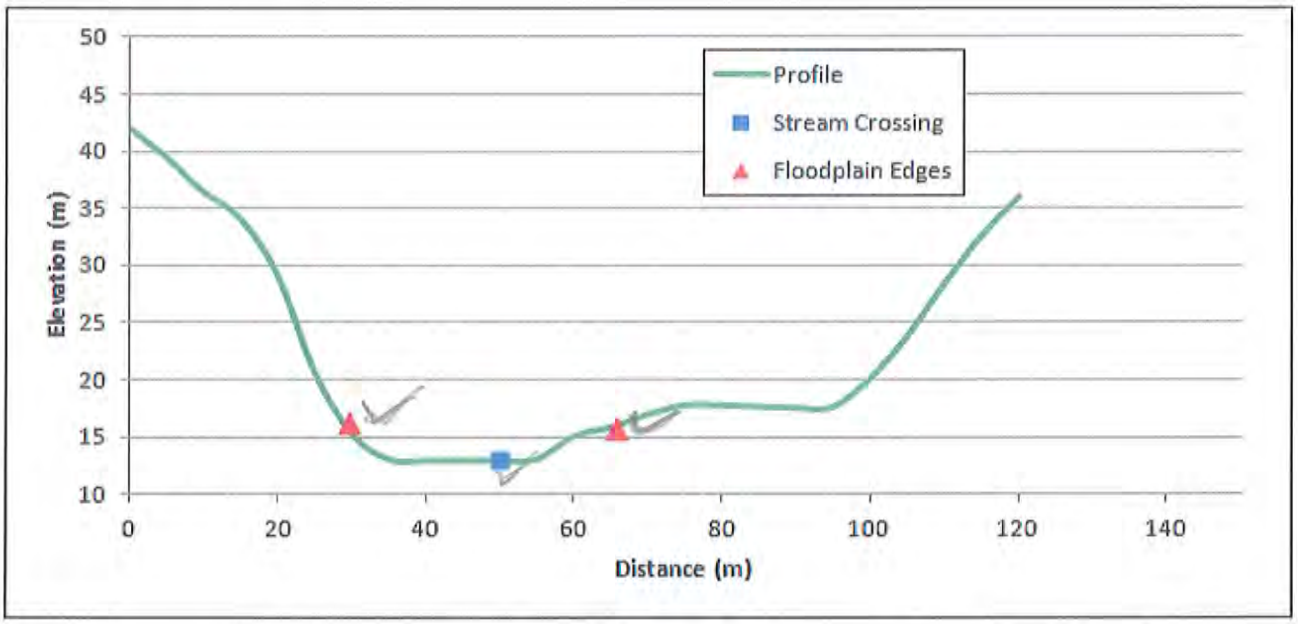
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: ssar3, Stream: South Sarita, Reach 22

Start coords – x: 357991, y: 5417614

Direction: 4.9°

End coords – x: 358001, y: 5417734



Field data to collect:

Bank-full Width: 22.5 (m)	
Wetted Width: 21.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

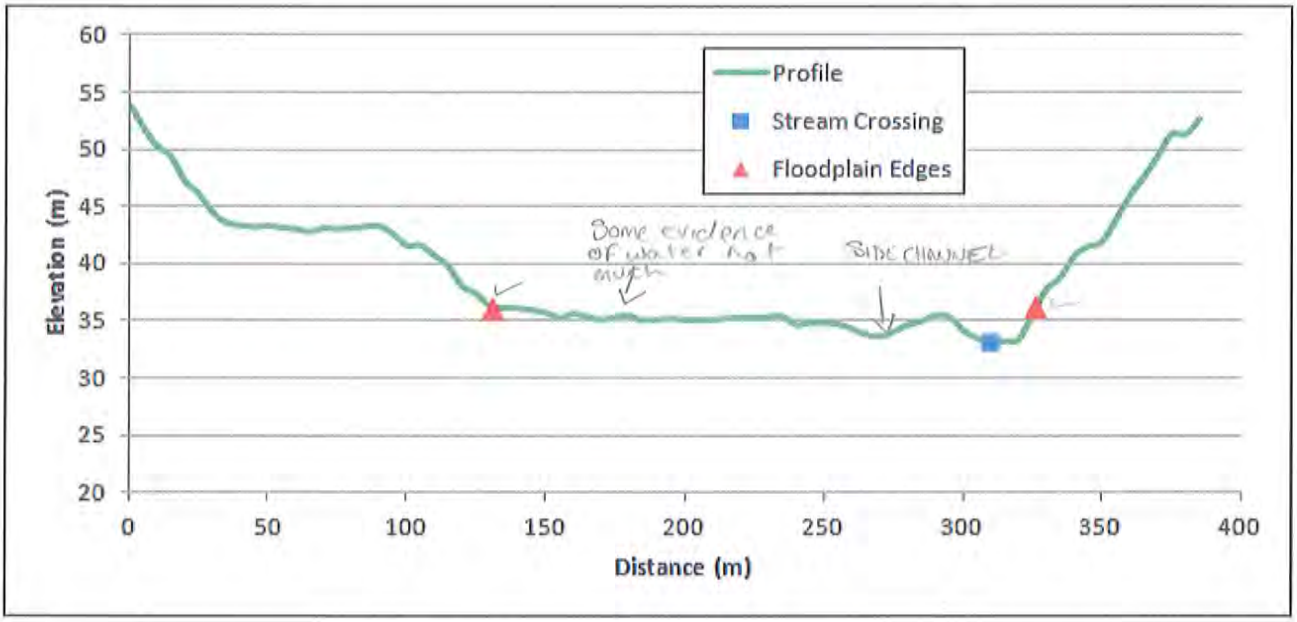
Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: ssar4, Stream: South Sarita, Reach 22

Start coords – x: 357535, y: 5415815

Direction: 114.0°

End coords – x: 357891, y: 5415656



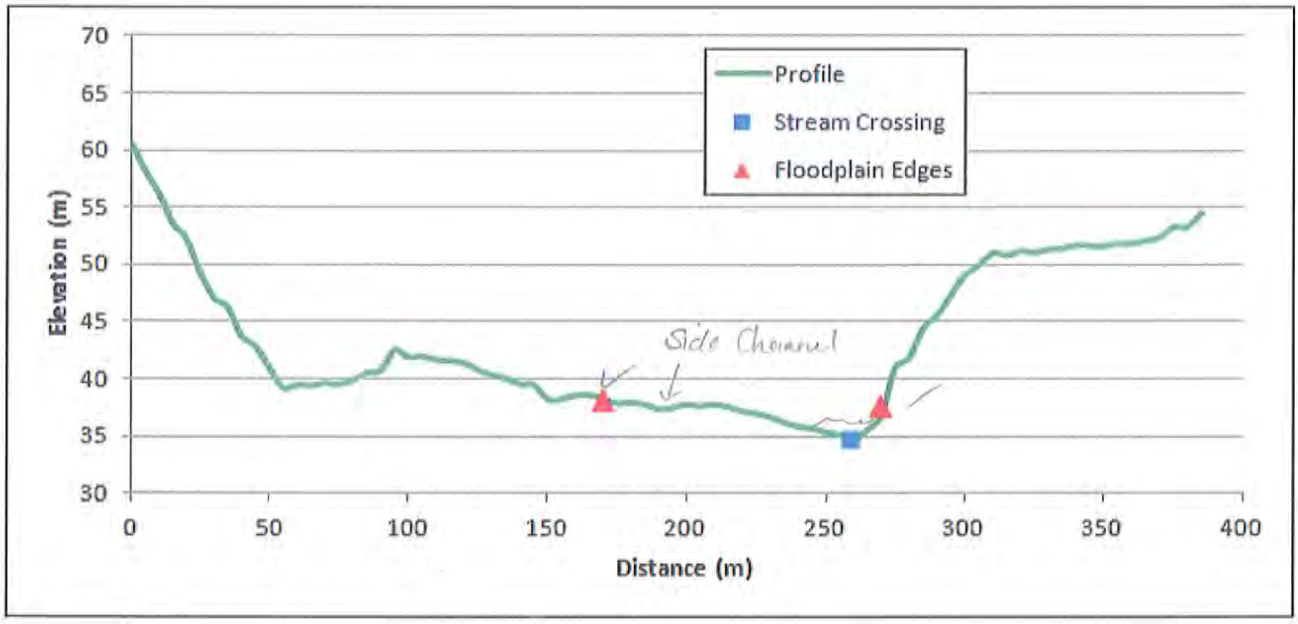
Field data to collect:

Bank-full Width: 32.5 (m)	
Wetted Width: 28.3 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: ssar5, Stream: South Sarita, Reach 22

Start coords – x: 357380, y: 5415517
Direction: 97.4°
End coords – x: 357766, y: 5415467



Field data to collect:

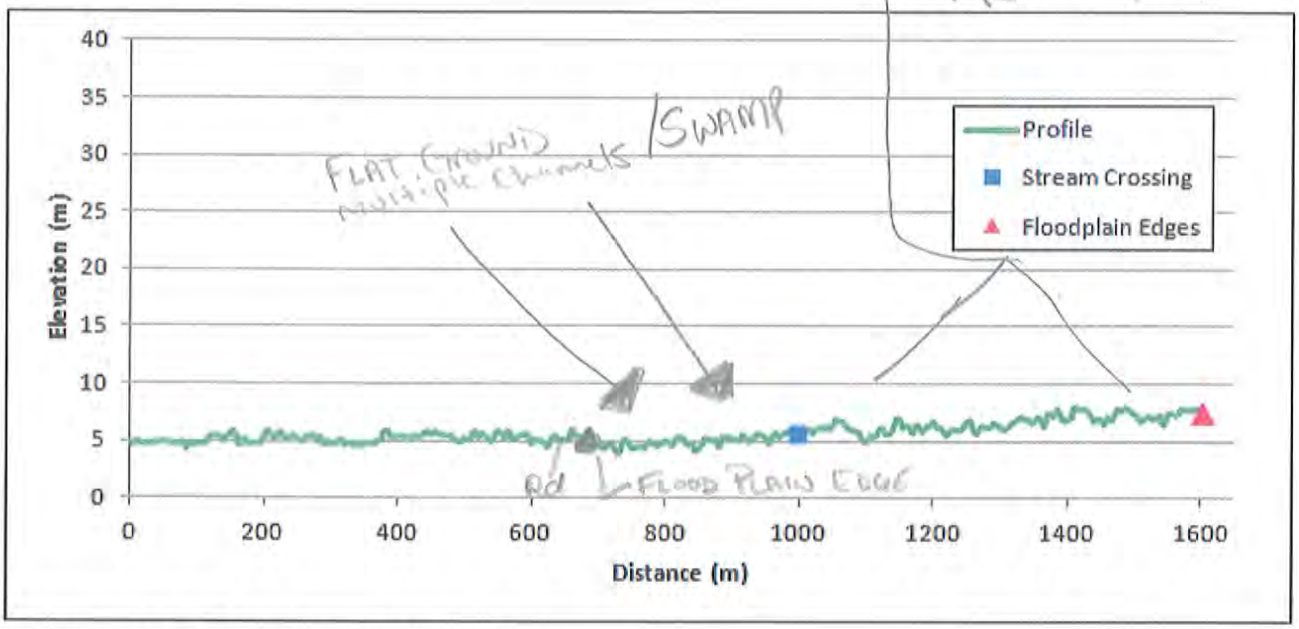
Bank-full Width: 24.3 (m)	
Wetted Width: 14.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: Y or (N)
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords
Elevation Difference:	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

Cross Section: sb4, Stream: Shaky Bill's 2, Reach S1

Start coords – x: 345360, y: 5408015
Direction: 66.7°
End coords – x: 346838, y: 5408650

GROUND HAS A LOT OF FLAT SPOTS TO FLOOD
LOTS of Vegitation
*RUNS Passed creek twice



Location of left edge of floodplain is unknown

Field data to collect:

Bank-full Width: 8.5 (m)	
Wetted Width: 8.2 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: (Y) or N
Flood debris lodged on vegetation: (Y) or N	Flood debris lodged on vegetation: (Y) or N
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? (Y) or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 1.83 (m)	Elevation Difference:

Note that the channel location may be different from the stream crossing point in the profile above. If channel has moved or is in the wrong location, please include the water edge coordinates.

MN Gaboury Associates Ltd.
2459 Holyrood Drive
Nanaimo, BC V9S 4K7

3 November 2018

Chris Niziolomski
Claire Tweeddale
sent via email

Dear Chris and Claire:

Re: Field Re-examination of Floodplain Edge Designations

Matt Neuwirth of Meridian Forest Services Ltd. (MFS) and I re-examined four cross sections to assess floodplain edge designations that were determined previously by the MFS crew.

In the lower Sarita River, cross sections at Sar 3, 4 and 5 were re-examined. Claire had indicated that:

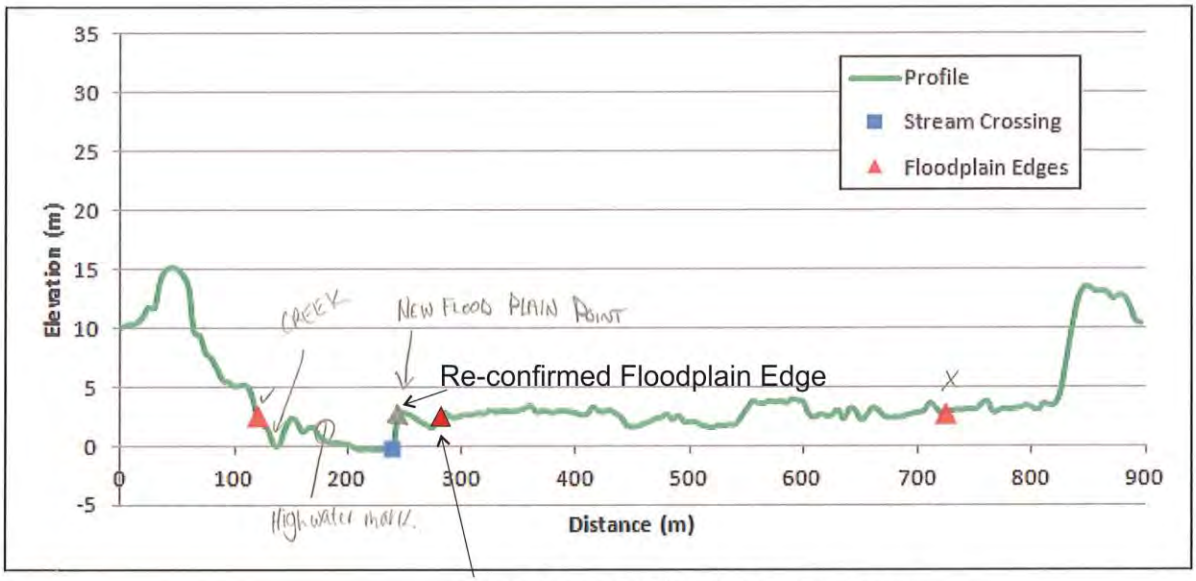
> *For the lower Sarita, the locations of the edge of the floodplain as mapped by the GPS points (and as drawn on the field cards) are inconsistent with the depths provided. If the depths are correct, the floodplain edge should be hundreds of metres further away from the stream. If the point locations are correct, the depths should be much less.*

We only re-examined the right bank floodplain edges at Sar 3 and Sar 4. The location for the right bank floodplain edge at Sar 3, as identified by the MFS crew is acceptable, and appears to be ~3.0 m higher than river baseflow water level (Figure 1). There is a flood channel that parallels the river at Sar 3 (Photo 1). We walked the length of this overflow channel upstream to Sar 4 and the channel did not show evidence of flood debris accumulations, and appeared to be inundated infrequently at probably >5 yr return period flows. (Note: if desired, it would be possible to estimate water levels through the cross section at our target 5 yr flow by using local channel morphology data and Manning's equation). However, placing the right bank floodplain edge to the right of the overflow channel would provide a more conservative floodplain edge for the right bank. We may want to discuss this further to determine if selecting a more conservative floodplain edge would be a more prudent approach to achieve our long term stream protection objective.

We re-confirmed the right bank floodplain edge at Sar 4 as identified by the MFS crew. It appeared to be ~3.3 m higher than river baseflow water level (Figure 2Figure 1).

Cross Section: sar3, Stream: Sarita, Reach 1

Start coords – x: 353307, y: 5417756
Direction: 86.3°
End coords – x: 354204, y: 5417813



144 31-OCT-18 11:54:05AM along floodplain channel near 10 U 353599 5417676

Field data to collect:

Bank-full Width: 66.1 (m)	
Wetted Width: 52.3 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: (Y) or N	Side channels: Y or (N)
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or (N)
Fine sand deposition: (Y) or N	Fine sand deposition: (Y) or N
Is proposed floodplain edge acceptable? (Y) or N	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords IPAD POINT
Elevation Difference:	Elevation Difference: 3.05 (m) 22m @ 14%

Figure 1. Cross section Sar 3, Sarita River, Reach 1.

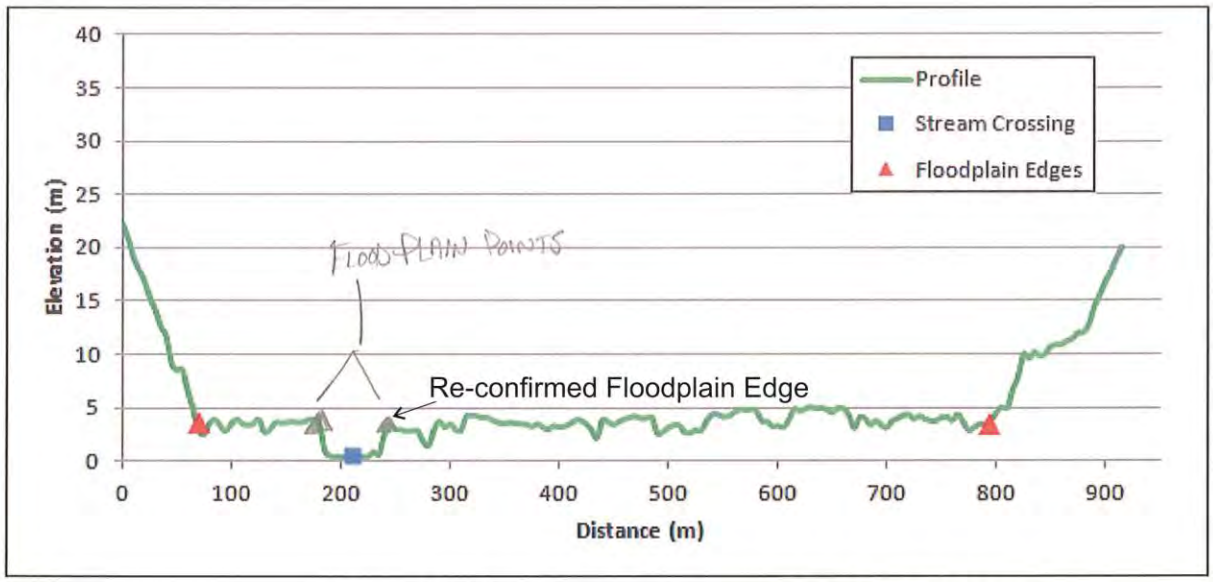


Photo 1. Flood channel on right bank of Sarita River between Sar 3 and Sar 4 cross sections.

We only examined the left bank floodplain edge at Sar 5. The location for the left bank floodplain edge at Sar 5, as identified by the MFS crew, is acceptable and appears to be ~3.2 m higher than river baseflow water level (Figure 3). Similar to the right bank at Sar 3, there is a flood channel that parallels the river at Sar 5. We walked along a section of this overflow channel downstream to the IR#1 access road and found that the channel did not show evidence of flood debris accumulations, and appeared to be inundated infrequently at probably >5 yr return period flows. However, placing the left bank floodplain edge to the left of the overflow channel would provide a more conservative floodplain edge.

Cross Section: sar4, Stream: Sarita, Reach 1

Start coords – x: 353522, y: 5417105
Direction: 56.3°
End coords – x: 354287, y: 5417615



146 31-OCT-18 12:17:05PM 10 U 353724 5417236 at
Re-confirmed Floodplain Edge

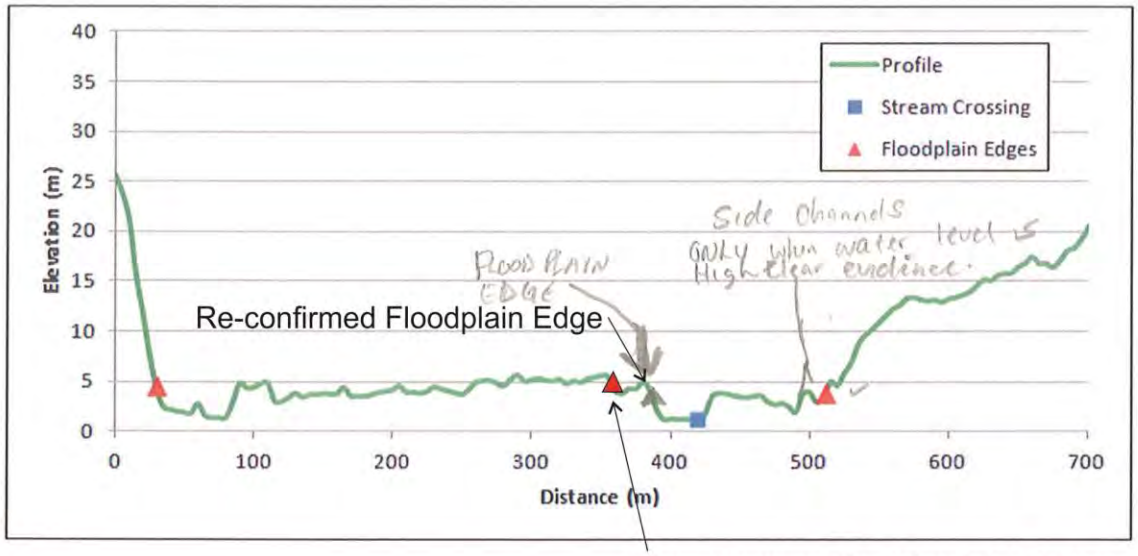
Field data to collect:

Bank-full Width: 49.4 (m)	
Wetted Width: 48.6 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or (N)	Side channels: Y or N
Flood debris lodged on vegetation: Y or (N)	Flood debris lodged on vegetation: Y or N
Fine sand deposition: (Y) or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or (N)	Is proposed floodplain edge acceptable? Y or (N)
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD Point	Floodplain edge coords IPAD Point
Elevation Difference: 3.47(m) 22m@16%	Elevation Difference: 3.26(m) 22m@15%

Figure 2. Cross section Sar 4, Sarita River, Reach 1.

Cross Section: sar5, Stream: Sarita, Reach 1

Start coords – x: 354409, y: 5416801
Direction: 7.0°
End coords – x: 354495, y: 5417507



143 31-OCT-18 10:26:58AM 10 U 354438 5417155

Field data to collect:

Bank-full Width: 43.5 (m)	
Wetted Width: 39.8 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords IPAD POINT	Floodplain edge coords
Elevation Difference: 3.16 m 20m @ 16%	Elevation Difference:

Figure 3. Cross section Sar 5, Sarita River, Reach 1.

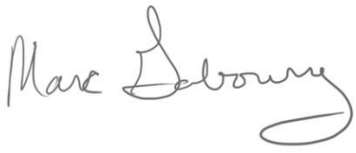
In the lower Pachena River, we re-examined cross section Pach 14. Claire had indicated that:

> *For pach14, the GPS point for the floodplain edge does not make sense. The stream crossing may be right, the location of the Pachena river in that area is unclear, but please verify where the floodplain edges are (on both sides) if you can. For pach14, it seems that the field crew read the xsection graph backwards. They've marked Bamfield Main on the right side, but it is actually on the left. The field point in the middle of the stream is on the creek we've called Pachena1 - far towards the right side, and the floodplain edge point is to the right of that. It's unclear from the LiDAR where the Pachena River actually flows, so their point may be in the right location, however, there's no mention in the field card that our mapped creek is in the wrong place, and they said they moved the left bank floodplain edge.*

There are two prominent distributaries, P3 and P4, of the Pachena River within this cross section. Flows are more predominant in P4 but P3 on the north side also carries water once it starts to rain (i.e., under relatively low discharges in Pachena River). It was evident that the MFS crew had mislabelled the location of Bamfield Main. We were able to only re-examine and confirm the left bank floodplain edge location which appeared to be ~3.2 m higher than river baseflow water level (Figure 4). To check the right bank floodplain would have taken the better part of ~5 hours as flows were too high to cross the river and it would have meant a significant hike on the north side of the river through overgrown logging roads/bush. I believe the floodplain edge that the MFS crew identified on the right bank is likely acceptable.

Please contact me if you wish to discuss any of my comments in greater detail.

Yours truly,

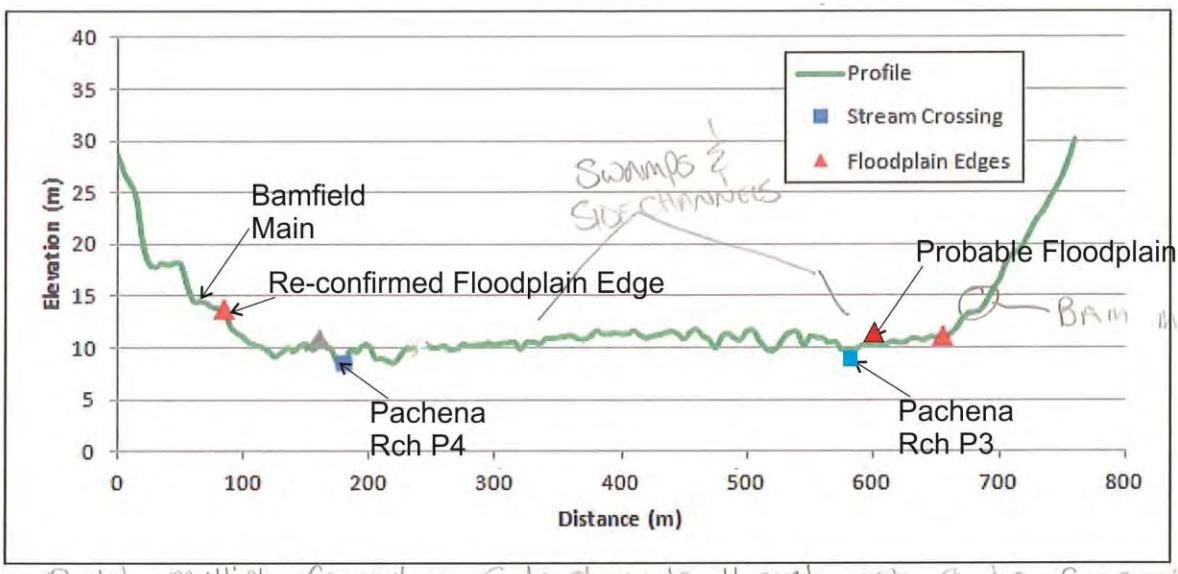


Marc Gaboury
Senior Fish Biologist

cc. Matt Neuwirth, Meridian Forest Services Ltd.

Cross Section: pach14, Stream: Pachena, Reach P4 (P3?)

Start coords – x: 347635, y: 5408761
Direction: 321.6°
End coords – x: 347163, y: 5409356



Right - multiple connecting side channels through out flats, swamps also. Hard to judge where main junction for main creek.

Field data to collect:

Bank-full Width: 13.9 (m)	
Wetted Width: 13.0 (m)	
Left Bank	**Right Bank**
Water edge coords (if applicable)	Water edge coords (if applicable)
Between bank-full edge and proposed floodplain edge, is there evidence of:	
Side channels: Y or N	Side channels: Y or N
Flood debris lodged on vegetation: Y or N	Flood debris lodged on vegetation: Y or N
Fine sand deposition: Y or N	Fine sand deposition: Y or N
Is proposed floodplain edge acceptable? Y or N	Is proposed floodplain edge acceptable? Y or N
If not, record GPS location of acceptable floodplain edge for Right and/or Left Banks, and difference in elevation between proposed and field verified floodplain edge locations.	
Floodplain edge coords	Floodplain edge coords + PAIS Point
Elevation Difference:	Elevation Difference: 2.87(m) 10m@30°,

Figure 4. Cross section Pach 14, Pachena River, Reach P3 & P4.