APPENDIX A

SUMMARY OF BACKGROUND DATA

No.	Background Item	Currently Available	Source	Notes
01. Climate Data				
	A. Environment Canada Climate Normals Data			
	B. IDF Curves			
	C. Provincial Climate Data			
	i. NLENCL0004 (Mud Lake Weather Station)	Y	WRMD	From Churchill River Flood Study 2010 - 2017 Data
	ii. NLENCL0006 (Muskrat Falls Weather Station)	Y	WRMD	From Churchill River Flood Study 2014 - 2017 Data
	iii. Raw Hourly Data - Cache River	Y	WRMD	From Churchill River Flood Study 2016 - 2017 Data
	iv. Raw Hourly Data - Churchill Falls	Y	WRMD	From Churchill River Flood Study 2016 - 2017 Data
	v. Raw Hourly Data - Grad Lake	Y	WRMD	From Churchill River Flood Study 2016 - 2017 Data
	vi. Raw Hourly Data - Kenamu River	Y	WRMD	From Churchill River Flood Study 2016 - 2017 Data
	vii. Raw Hourly Data - Moose Head Lake	Y	WRMD	From Churchill River Flood Study 2016 - 2017 Data
	viii. Raw Hourly Data - Paradise River	Y	WRMD	From Churchill River Flood Study 2016 - 2017 Data
	ix. Station Coordinates	Y	WRMD	From Churchill River Flood Study 2016 - 2017 Data
	x. Metchin River near TLH (NLENCL0009)	N	WRMD	No data online on WRMD website
	xi. Mud Lake (NLENCL0004)	Y	WRMD	Hourly, Daily and Monthly Summaries currently available for live window. WRMD to provide historical
	xii. Muskrat Falls (NLENCL0006)	Y	WRMD	Hourly, Daily and Monthly Summaries currently available for live window. WRMD to provide historical
	xiii. TLH between Churchill Falls and Lab City (NLENCL0008)	N	WRMD	No data online on WRMD website
	xiv. NLENCL0004 - Churchill River at Mud Lake	Y	WRMD	2010 - 2018 Hourly Air Temperature
	xv. NLENCL0006 - Churchill River at Muskrat Falls	Y	WRMD	2014 - 2018 Hourly Air Temperature
	xvi. NLENCL0008 - Churchill River at TLH	Y	WRMD	2017 - 2018 Hourly Air Temperature
	xvii. NLENCL0009 - Metchin River	Y	WRMD	2017 - 2018 Hourly Air Temperature
	xviii. 03OD001 - Churchill River near Churchill Falls	Y	WRMD	2008 - 2016 Hourly Water Temperature
	xix. 03OE011 - Pinus River	Y	WRMD	2007 - 2018 Hourly Water Temperature
	xx. NF03OD0013 - Below Metchin River	Y	WRMD	2008 - 2017 Hourly Water Temperature
	xxi. NF03OE0054 - Churchill River at English Point	Y	WRMD	2011 - 2018 Hourly Water Temperature
	xxii. NF03OE0054 - Churchill River at English Point (Secondary)	Y	WRMD	2017 - 2018 Hourly Water Temperature (Secondary)
	D. Snow Measurements			
	i. Churchill Falls Snow Surveys 2017	Y	WRMD	From Churchill River Flood Study
	ii. Lower Churchill River Snow Surveys 2017	Y	WRMD	From Churchill River Flood Study
	E. Assessments from Flood Review Study			
	i. Climate Data	Y	KGS	2016 - 2017 Precip, snow and temperature data for HVGB, Churchill Falls, Schefferville, Wabush
	ii. Degree Days Chart	Y	KGS	Comparison of 2017 Degree Days to Historical normals for Muskrat Falls and HVGB
	iii. Snow Data	Y	KGS	Comparison of 2017 Snow Depth to Historical normals for HVGB
	iv. Sorted Climate Data - Churchill Falls	Y	KGS	Sorted historical rainfall - 1968-2017
	v. Sorted Climate Data - Goose Bay	Y	KGS	Sorted historical temperature, precip and rain, 1941 - 2017
	F. Canadian Precipitation Analysis Data			
	i. Precipitation data (Canada) 2011-2018(September)	Y	EC	Gridded daily precipitation data over Canada
	ii. Lower Churchill extraction 2011-2018(September)	Y	EC	CaPA data extracted over the Lower Churchill River basin
02. Hydraulic Data				
	A. Stage-Storage Information			
	i. Muskrat Falls Reservoir Storage-Area Curve	Y	Nalcor	From Churchill River Flood Study
	B. Churchill River Hydraulic Model Calibration Data	Y	Nalcor	From Churchill River Flood Study
03. Hydrologic Data				
	A. Hydrometric Data			

No.	Background Item	Currently Available	Source	Notes
	i. Churchill Falls Plant Flow	Y	Nalcor	From Churchill River Flood Study, 2010 - 2017 Flow
	ii. Melville Lake Buoy Data	Y	WRMD	NLEN WQ0002 2015 - 2017
	iii. Muskrat Falls Spillway Flow	Y	Nalcor	From Churchill River Flood Study, Operational levels 2016 - 2017, Surveyed levels 2017
	iv. WSC Data - 2016-2017 Data			
	a. 03OE001 Rating Curve	Y	WSC	From Churchill River Flood Study
	b. 03OE001 2016 Water Levels	Y	WSC	From Churchill River Flood Study
	c. 03OE011 2016 Flow	Y	WSC	From Churchill River Flood Study
	d. 03OE011 2016 Water Levels	Y	WSC	From Churchill River Flood Study
	e. 03OE012 2016 Water Levels	Y	WSC	From Churchill River Flood Study
	f. 03OE012 2017 Water Levels to June	Y	WSC	From Churchill River Flood Study
	g. 03OE013 2016 Water Levels	Y	WSC	From Churchill River Flood Study
	h. 03OE013 2017 Water Level to June	Y	WSC	From Churchill River Flood Study
	i. 03OE014 2016 Water Levels	Y	WSC	From Churchill River Flood Study
	j. 03OE014 2017 Water Levels to June	Y	WSC	From Churchill River Flood Study
	k. 03OE015 2016 Water Levels	Y	WSC	From Churchill River Flood Study
	l. 03OE015 2017 Water Levels	Y	WSC	From Churchill River Flood Study
	m. 03PC001 2016 Water Levels	Y	WSC	From Churchill River Flood Study
	n. 03PC001 2017 Water Levels to June	Y	WSC	From Churchill River Flood Study
	v. WSC Data - Historical			
	a. 03OD005 Daily Flow	Y	WSC	From Churchill River Flood Study
	b. 03OD007 Daily Flow	Y	WSC	From Churchill River Flood Study
	c. 03OD009 Daily Flow	Y	WSC	From Churchill River Flood Study
	d. 03OE001 Daily Flow	Y	WSC	From Churchill River Flood Study
	e. 03OE001 Daily Level	Y	WSC	From Churchill River Flood Study
	f. 03OE003 Daily Flow	Y	WSC	From Churchill River Flood Study
	g. 03OE005 Daily Level	Y	WSC	From Churchill River Flood Study
	h. 03OE011 Daily Flod	Y	WSC	From Churchill River Flood Study
	i. 03OE012 Daily Level	Y	WSC	From Churchill River Flood Study
	j. 03OE013 Daily Level	Y	WSC	From Churchill River Flood Study
	k. 03OE014 Daily Level	Y	WSC	From Churchill River Flood Study
	l. 03PC001 Daily Level	Y	WSC	From Churchill River Flood Study
	vi. Data from WRMD Website			
	a. Churchill River 6.15 kms below Lower Muskrat Falls (03OE014)	Y	WRMD / WSC	Daily Level 2008 - 2016, hourly 2017 - 2018. Gap Jan 1 - Jan 25 2017
	b. Churchill River above Grizzle Rapids (03OE013)	Y	WRMD / WSC	Daily Level 2009 - 2016, hourly 2017 - 2018. Gap Jan 1 - Jan 25 2017
	c. Churchill River above Upper Muskrat Falls (03OE001)	Y	WRMD / WSC	Daily Flow 1948 - 2015, Daily Level 2011 - 2015
	d. Churchill River at English Point (03PC001 NF03OE0054)	Y	WRMD / WSC	Daily Level 2010 - 2016, hourly 2017 - 2018. Gap Jan 1 - Jan 25 2017
	e. Churchill River at Happy Valley (03OE016)	Y	WRMD	7 Day RT data, 31 day daily, monthly summaries to Oct 2017. Historical available from WRMD
	f. Churchill River at Mid Pool (03OE015)	Y	WRMD / WSC	Hourly Water Level 2017 - 2018
	g. Churchill River below Churchill Falls Tailrace (03OD010)	Y	WRMD	7 Day RT data, 31 day daily, monthly summaries to Oct 2017. Historical available from WRMD
	h. Churchill River below Metchin River (NF03OD0013 03OD009)	Y	WRMD / WSC	Flow 2009 - 2014, WL 2011 - 2014, 7 Day RT data, 31 day daily, monthly summaries to Sept 2017. Historical available from WRMD
	i. Lake Melville East of Little River (NF03QA0047 03PD001)	Y	WRMD WSC	2010 and 2013 WL, RT available
	j. Mud Lake Outlet Tributary at Mud Lake (03OE017)	N	WRMD	No data online on WRMD website
	k. Pinus River (03OE011)	Y	WRMD WSC	1998 - 2016 Daily, 2017 - 2018 Hourly Flow. 2011 - 2016 WL

No.	Background Item	Currently Available	Source	Notes
	L_03OE016	Y	WRMD	Churchill River at Happy Valley - Goose Bay Oct. 15, 2017 to Oct. 17, 2018
	L_03OE017	Y	WRMD	Mud Lake at Mud Lake Oct. 14, 2017 to Oct. 17, 2018
	L_03OE018	Y	WRMD	Churchill River at End of Mud Lake Road Jun. 25, 2018 to Oct. 17, 2018
	L_03OE019	Y	WRMD	Churchill River below Traverspine River Jun. 25, 2018 to Oct. 17, 2018
	vii. New Gauge Locations	Y	WRMD	Provided by M. Murphy July 30, 2018
	viii. Tidal Information			
	Tidal comparison to hydrometrics	Y	WRMD	Provided by A. Khan Aug. 2, 2018
	ix. WSC Data - Hourly Flow Data			
	03OD008_20170920-20181017 DAILY MEAN_QQp	Y	WSC	Churchill River above Churchill Falls Tailrace - Daily Q Sept 2017 to Oct 17, 2018
	03OD009_20180701-20181017 DAILY MEAN_QQp	Y	WSC	Churchill River below Metchin River - Daily Q July 2018 to Oct 17, 2018
	03OE001_20160101-20161104 DAILY MEAN_QQp	Y	WSC	Churchill River above Upper Muskrat Falls - Daily Q Jan 2016 to Nov 2016
	03OE011_20180101-20181017 DAILY MEAN_QQp	Y	WSC	Pinus River - Daily Q Jan 1 2018 to Oct 17, 2018
	B. KGS Group Analyses			
	i. Churchill River above Upper Muskrat Falls Flows	Y	KGS	Sorted Historical flows & Assessments of WSC data
04. Land Use & Soil Data				
	i. Landcover/landuse historical 2010 map	Y	NRCAN	A historical landcover/landuse map for the UTM zone 20 tile
05. Nalcor Data				
	A. Historical Reservoir Levels	Y	Nalcor	1976 - 2018
	B. Historic Spills	Y	Nalcor	1976 - 2018
	C. Historic Inflows 1976 - 2014	Y	Nalcor	1976 - 2014
	D. Hydromet Stations	Y	Nalcor	Locations not included
	E. Regional Map	Y	Nalcor	Provided Aug. 28
	F. Regional Map Ossokmanuan	Y	Nalcor	Provided Aug. 28
	G. Regional Map Smallwood	Y	Nalcor	Provided Aug. 28
	H. Seasonal Operating Rules B4S8_1	Y	Nalcor	Provided Aug. 28
	I. Smallwood Reservoir Simplified	Y	Nalcor	Provided Aug. 28
	J. Spillway & Dike Locations	Y	Nalcor	Provided Aug. 28
	K. Hatch Muskrat Falls Inflow Forecasting Model Report	Y	Nalcor	Provided Sept. 4
	L. Muskrat Falls - Hydrometric Data	Y	Nalcor	2017 - 2018
	M. Muskrat Falls Cleared Reservoir Area	Y	Nalcor	Provided Oct. 16, 2018
	N. Churchill Falls Hourly Plant Flows 2017-2018	Y	Nalcor	Provided Oct. 19, 2018, hourly flows from Jan 1, 2017 to Oct 17, 2018
	O. Nalcor LiDAR Data	Y	Nalcor	Provided Oct. 19, 2018; 1m contour drawings, ground return LiDAR, Mud Lake LiDAR
06. Observations				
	A. Historic Freeze Up Dates			
	i. 2009 - 2016 Freeze Up Dates	Y	WRMD	From Churchill River Flood Study
	ii. Mud Lake Freeze Up Observations (2009)	Y	WRMD	From Churchill River Flood Study
	B. Ice Observation Reports			
	i. Ice Observation Program 2009-2010	Y	WRMD	From Churchill River Flood Study
	ii. Ice Observation Program 2010 - 2011	Y	WRMD	From Churchill River Flood Study
	iii. Ice Observation Program 2011 - 2012	Y	WRMD	From Churchill River Flood Study
	iv. Ice Observation Program 2012 - 2013	Y	WRMD	From Churchill River Flood Study
	v. Ice Observation Program 2013 - 2014	Y	WRMD	From Churchill River Flood Study
	vi. Ice Observation Program 2014 - 2015	Y	WRMD	From Churchill River Flood Study
	vii. Ice Observation Program 2015 - 2016	Y	WRMD	From Churchill River Flood Study

No.	Background Item	Currently Available	Source	Notes
	C. Ice Observation Reports 1981 - 1992			
	i. 1981-82	Y	WRMD	From Churchill River Flood Study
	ii. 1982-83	Y	WRMD	From Churchill River Flood Study
	iii. 1983-84	Y	WRMD	From Churchill River Flood Study
	iv. 1984-1985	Y	WRMD	From Churchill River Flood Study
	v. 1985-86	Y	WRMD	From Churchill River Flood Study
	vi. 1986-87	Y	WRMD	From Churchill River Flood Study
	vii. 1987-88	Y	WRMD	From Churchill River Flood Study
	viii. 1988-89	Y	WRMD	From Churchill River Flood Study
	ix. 1990-91	Y	WRMD	From Churchill River Flood Study
	x. 1991-92	Y	WRMD	From Churchill River Flood Study
	D. Historic Review of Ice Jams	Y	WRMD	From Churchill River Flood Study
	E. Mud Lake Crossing Dates	Y	WRMD	From Churchill River Flood Study
	F. Simulated Ice Thickness	Y	WRMD	From Churchill River Flood Study
	G. 2006 Flood Record	Y	WRMD	Provided by WRMD July 27, 2018
07. Presentations				
	A. Muskrat Falls Presentation	Y	WRMD	From Churchill River Flood Study
	B. Mud Lake Presentation Version 2	Y	WRMD	From Churchill River Flood Study
	C. Mud Lake Weather Station Camera - May 2017	Y	WRMD	From Churchill River Flood Study
	D. Robert Wray May 2017 Discussion Slides	Y	R. Wray	From Churchill River Flood Study
	E. Robert Wray September 2017 Discussion Slides	Y	R. Wray	From Churchill River Flood Study
08. Remote Sensing Data				
	A. 2011 - 2012 Ice Front Images	Y	WRMD	From Churchill River Flood Study
	B. 2012 Ice Cover	Y	WRMD	From Churchill River Flood Study
	C. 2013-2014 C-Core Sat Imagery	Y	WRMD	From Churchill River Flood Study
	D. 2014-2015 C-Core Sat Imarger	Y	WRMD	From Churchill River Flood Study
	E. 2015-2016 C-Core Sat Imagery	Y	WRMD	From Churchill River Flood Study
	F. 2016-2016 C-Core Sat Imagery	Y	WRMD	From Churchill River Flood Study
	G. Surface Temperatures	Y	WRMD	From Churchill River Flood Study
	H. Figures_Modis Images	Y	WRMD	From Churchill River Flood Study
09. Reports				
	A. TCH Bridge Reports			
	i. Blackrock Bridge	Y	WRMD	From Churchill River Flood Study
	B. EIS	Y	WRMD	From Churchill River Flood Study
	C. Flood Zone Maps	Y	WRMD	From Churchill River Flood Study
	D. Ice Study Reports			
	i. LPC Ice Formation Environmental Effects Monitoring Plan	Y	WRMD	From Churchill River Flood Study
	ii. Effects of the LCP on the Mud Lake Winter Crossing	Y	WRMD	From Churchill River Flood Study
	iii. Effects of Ice Progression during Construction of Muskrat Falls	Y	WRMD	From Churchill River Flood Study
	iv. Ice Dynamics Report Update 2008 Hatch	Y	WRMD	From Churchill River Flood Study
	v. Mud Lake Freezeup Observations	Y	WRMD	From Churchill River Flood Study
	vi. Hydraulic Modelling and Studies - 2010 MF Ice Study	Y	WRMD	From Churchill River Flood Study
	vii. LCP Ice Dynamics on the Lower Churchill River	Y	WRMD	From Churchill River Flood Study
	viii. Log Boom for Ice Control During Impoundment	Y	WRMD	From Churchill River Flood Study

No.	Background Item	Currently Available	Source	Notes
	ix. MF Feasibility Ice Studies	Y	WRMD	From Churchill River Flood Study
	x. Muskrat Falls Ice Study 2013 Update	Y	WRMD	From Churchill River Flood Study
	xi. Muskrat Falls Headpond Freezeup Program 2016	Y	WRMD	From Churchill River Flood Study
	xii. Lower Churchill River Ice Observations and Studies	Y	WRMD	From Churchill River Flood Study
	xiii. Review of Ice Study Work 2012	Y	WRMD	From Churchill River Flood Study
	E. Information Requests	Y	WRMD	From Churchill River Flood Study
	F. Sediment Reports			
	i. Final Scour Study - Hatch 2007	Y	WRMD	From Churchill River Flood Study
	ii. Scour Study SGC Acres July 2006	Y	WRMD	From Churchill River Flood Study
	G. Forecasting			
	i. Stochastic Modelling Approach for Operational Real-Time Ice Jam Flood Forec	Y	KEL	Provided by Karl
	ii. Exploring new approaches to modelling stage exceedance probabilities and p	Y	KEL	Provided by Karl
	H. Climate Reports			
	i. Projected Impacts of Climate Change for the Province of Newfoundland and L	Y	WRMD	Provided by WRMD July 19, 2018
	ii. 2014 NL RFFA - Report	Y	WRMD	Accessed online
	iii. 2014 NL RFFA - Users Guide	Y	WRMD	Accessed online
	iv. 2016 NL RFFA	Y	WRMD	Accessed online
	v. Past and Future Sea Level Change in NL	Y	WRMD	Accessed online
	vi. 2015 Intensity-Duration-Frequency Curve Update for Newfoundland and Lab	Y	WRMD	Accessed online
	I. Flood Risk Mapping			
	i. Application of Remote Sensing (Digital Terrain Models) in Flood Risk Assessme	Y	WRMD	Provided by WRMD July 24, 2018
	ii. Flood Risk Assessment Guidance for New Development - Phase 2	Y	WRMD	Provided by WRMD July 24, 2018
	J. Dam Break Studies			
	i. Churchill Falls Dam Break	Y	Nalcor	Provided by Nalcor Aug. 15, 2018
	ii. Dam Break Analysis for Muskrat Falls Construction	Y	Nalcor	Provided by Nalcor Aug. 15, 2018
	iii. Muskrat Falls Hydraulic Modelling and Studies 2010 Update Report	Y	Nalcor	Provided by Nalcor Aug. 15, 2018
10. Site Photos				
	A. KGS Group Photos			
	i. July 26, 2017 - DSB	Y	KGS	From Churchill River Flood Study
	ii. July 26, 2017 - KEL	Y	KGS	From Churchill River Flood Study
	iii. July 27, 2017 - DSB	Y	KGS	From Churchill River Flood Study
	iv. September 7, 2017 - DSB	Y	KGS	From Churchill River Flood Study
	v. September 7, 2017 - KEL	Y	KGS	From Churchill River Flood Study
	B. Government of Newfoundland and Labrador Photos			
	i. Grizzle Rapids Cam	Y	WRMD	From Churchill River Flood Study
	ii. Helicopter Photos	Y	WRMD	From Churchill River Flood Study
	iii. Helicopter Photos Pt 2	Y	WRMD	From Churchill River Flood Study
	iv. Helicopter Photos	Y	WRMD	From Churchill River Flood Study
	v. Mud Lake Cam	Y	WRMD	From Churchill River Flood Study
	vi. Pictures from WRMD	Y	WRMD	From Churchill River Flood Study
	C. Photos from Residents			
	i. Photos from Ingried Felsberg Croeker	Y	Local Residents	From Churchill River Flood Study
	ii. Photos from Vyann Kerby	Y	Local Residents	From Churchill River Flood Study
	iii. Photos from Melissa Best	Y	Local Residents	From Churchill River Flood Study

No.	Background Item	Currently Available	Source	Notes
11. Structure Drawings				
	A. TLH Bridge	Y	WRMD	From Churchill River Flood Study
12. Topographic & Bathymetric Data				
	A. Churchill River Coordinate Info	Y	WRMD	From Churchill River Flood Study
	B. Cross Sections and Location Maps	Y	WRMD	From Churchill River Flood Study
	C. GIS Shapefiles	Y	WRMD	From Churchill River Flood Study
	D. LiDAR Mosaic	Y	WRMD	From Churchill River Flood Study
	E. Muskrat Falls Bathymetry August 2017	Y	Nalcor	From Churchill River Flood Study
	F. Mud Lake DTM	Y	WRMD	From Churchill River Flood Study
	G. Raster	Y	WRMD	From Churchill River Flood Study
13. Maps				
	A. General Basin Map	Y	WRMD	From Churchill River Flood Study
	B. Watershed Climate Stations	Y	WRMD	From Churchill River Flood Study
	C. Waterhsed Gauge Locations	Y	WRMD	From Churchill River Flood Study
	D. Watershed Snow Station Locations	Y	WRMD	From Churchill River Flood Study
14. WRMD Flood Inventory				
	A. Fall 2014 Flood Inventory	Y	WRMD	Provided in Kickoff Meeting
	B. Fall 2014 Flood Inventory Attachments	Y	WRMD	Provided in Kickoff Meeting - Detailed tickets for floods

APPENDIX B

CHURCHILL RIVER FLOOD EVENT INVENTORY

Start Year	Season	Region	Community Name	Water Bodies	Type of Event	Description	Source
2006	Fall	Labrador	Mud Lake	Mud Lake	Ice Jam	Ice jam. Bad Weather caused ice build-up in Churchill River flooding in village of Mud Lake. Local school closed and two houses' basements were flooded. Churchill River raised several feet.	Email, Notes, Environment Canada
2012	Spring	Labrador	Mud Lake	Churchill River	Ice Jam	Water levels rising because the ice Is not letting go along with the water. River flooded its banks. Some homes full of water.	The Labradorian, CBC
1978	Spring	Labrador	Happy Valley - Goose Bay	Churchill River	Ice Jam	In late May of 1978, the river banks along the Churchill River experienced flooding conditions which lasted several days due ice build-up and spring run-off. An area along the Birch Island Road was completely underwater and had washed away, while the Communications Branch of the MOT experienced 14 to 15 inches of water inside of the transmitter building and was only accessible by canoe. Several boats were swept away by the flood. Water levels had not yet dropped and the extent of damage was undetermined on the date that the article was printed. The erosion of the river bank was expected to be extensive because of the unusually high water levels.	The Labradorian
1983	Spring	Labrador	Mud Lake	Churchill River Goose River	Ice Jam	In early May of 1983, flooding conditions were observed at Goose River which required massive blasting of the ice jam to prevent damage to the Goose River Bridge and erosion of the road. Emergency measures meetings were held by the Happy Valley-Goose Bay town council and various agencies to put in place a contingency plan which included a means of helping residents of Mud Lake if flood conditions threatened their homes. Flooding conditions were believed to be higher than ever seen before the river ice breaks up. In Mud Lake, four houses were evacuated due to the increased water levels. The first house evacuated experiences similar problems just about every year. The other three houses had been evacuated for the first time since they were built about 5 or 6 years prior. A Disaster Operations Committee in Happy Valley-Goose Bay maintained a close watch on the water levels in the event that Mud Lake required assistance.	The Labradorian
1998	Spring	Labrador	Happy Valley - Goose Bay	Churchill River	Ice Jam	In Mid-May of 1998, a convenience store located on Hamilton Road expressed concern of becoming submerged by the rising water levels of the Churchill River on a Thursday. Several nearby houses had basements that were flooded. By that Monday, ice blockages down river had increased water level to the front steps of the business and flooded the business owner's garage in a few feet of water. Children in the area were riding their bicycles in two feet of water. One man stated "I haven't seen the water as high as this in 15 years". The Emergency Measures Organization local representative said there was nothing that could be done to clear the blockage, referring to the use of explosives.	The Labradorian
2000	Spring	Labrador	Mud Lake Road	Churchill River	Ice Jam	During late April of 2000, high winds caused a build-up of ice on the Churchill River at Mud Lake and toward the mouth of the Churchill River, which in turn caused flooding of the Mud Lake Road when the water levels increased by five feet. Mud Lake Road resident Eugene Mesher stated flooding like this was unusual for the time of year (i.e. April). Residents of Mud Lake expressed concern over the possibility of flooding in the basements of their homes. There was a fear that flooding in the spring would completely wash away the already flooded section of Mud Lake Road. Once wind speeds subsided the water level receded several inches but was still several feet above normal at the time of the media coverage. The CBC reporter stated people were concerned because "historically, this area does flood in the spring time".	The Labradorian
2001	Spring	Labrador	Mud Lake	Churchill River	Ice Jam	On May 13th, 2001 Mud Lake resident, Jordan Hope, had flooding in his basement that rose to a depth of 44 inches of water. Mr. Hope stated "That was the highest it rose since 1985". Mr. Hope's house and two other houses next to his regularly flood. The ice jams at the mouth of the Churchill River and once the ice moves, the water level drops off. The water level stayed high until May 22nd when the levels eventually began to drop back down.	The Labradorian
2017	Spring	Labrador	Mud Lake, Mud Lake Road	Churchill River	Ice Jam	As reported by the hydrometric station at English Point, water levels started increasing in the Churchill River on May 11th, 2017 Water levels began rising in Mud Lake on May 16th, 2017. The water rose to levels deemed unsafe on the early hours of May 17th, 2017 and the evacuation of residents from Mud Lake to Happy Valley-Goose Bay was initiated. Extensive flooding was also reported in the Mud Lake Road region north of Happy Valley – Goose Bay on the western side of the Churchill River. Damage to properties in both areas was significant.	Independent Review of Flooding at Mud Lake

APPENDIX C

SUMMARY OF CULVERT DETAILS

Culvert ID	Site Name	Culvert Diameter (m)	Culvert Length (m)	Upstream Invert (m)	Downstream Invert (m)	Top of Road (m)	Date Surveryed	Water Course	Upstream Invert Northing (m)	Upstream Invert Easting (m)	Downstream Invert Northing (m)	Downstream Invert Easting (m)
S1-S1-A	S1-S1	1.26	16.0	1.48	0.90	4.71	05/08/2018	OC	5913781.8	376878.4	5913787.3	376893.4
S1-S1-B	S1-S1	1.19	16.8	1.43	1.01	4.71	05/08/2018	OC	5913779.3	376879.3	5913785.8	376894.8
S1-S1-C	S1-S1	1.62	22.4	0.93	1.25	4.71	05/08/2018	OC	5913757.6	376886.1	5913777.1	376897.1
S1-S1-D	S1-S1	1.62	22.5	1.03	0.61	4.71	05/08/2018	OC	5913755.2	376887.2	5913774.9	376897.9
S2-S1-A	S2-S1	1.04	19.2	3.81	3.15	6.98	04/08/2018	LC1	5912984.1	377146.9	5912990.9	377164.8
S2-S1-B	S2-S1	0.80	12.8	2.16	1.62	4.72	04/08/2018	LC1	5912992.5	377170.5	5912998.9	377181.6
S3-S1-A	S3-S1	0.82	11.6	6.75	6.78	8.65	07/08/2018	LC2	5912201.4	377675.1	5912208.4	377684.3
S3-S2-A	S3-S2	0.61	9.5	6.20	5.62	7.20	20/05/2020	LC2	5912224.2	377709.0	5912226.3	377718.2
S3-S2-B	S3-S2	0.61	9.6	6.22	5.53	7.20	20/05/2020	LC2	5912224.9	377708.8	5912226.8	377718.2
S3-S3-A	S3-S3	0.65	22.6	9.42	9.13	10.52	06/08/2018	LC2	5911880.6	377965.2	5911897.8	377979.9
S4-S1-A	S4-S1	0.81	25.2	7.75	7.41	9.85	06/08/2018	LC3	5911694.7	378430.1	5911719.7	378433.2
S4-S4-A	S4-S4	1.19		3.68		5.06	21/05/2020	LC3	5911769.7	378590.6		
S4-S5-A	S4-S5	0.76	23.9	6.88	6.45	9.91	21/05/2020	LC3	5911676.3	378721.7	5911698.8	378713.8
S4-S6-A	S4-S6	0.92	8.3	15.00	14.83	16.74	20/05/2020	LC3	5911480.6	378052.9	5911485.8	378059.3
S4-S7-A	S4-S7	0.85	10.0	10.86	10.51	12.41	20/05/2020	LC3	5911633.3	378368.0	5911635.5	378377.7
S5-S3-A	S5-S3	1.46	34.9	8.89	8.24	10.80	06/08/2018	LC4	5911734.4	379226.7	5911768.3	379218.6
S5-S3-B	S5-S3	1.61	35.3	9.08	8.27	10.80	06/08/2018	LC4	5911734.6	379229.4	5911768.9	379221.0
S5-S4-A	S5-S4	1.22	13.7	6.52	6.11	8.23	20/05/2020	LC4	5911804.2	379315.8	5911816.3	379309.5
S6-S3-A	S6-S3	0.94	15.1	24.87	24.79	26.06	06/08/2018	LC5	5909423.3	380132.1	5909434.6	380142.1
S6-S3-B	S6-S3	1.06	15.0	24.70	24.65	26.06	06/08/2018	LC5	5909421.7	380133.9	5909432.9	380144.0
S6-S4-A	S6-S4	1.20	99.6	35.21	35.23	39.31	05/08/2018	LC5	5909260.8	379420.9	5909304.7	379510.4
S6-S4-B	S6-S4	1.20	99.8	35.34	35.13	39.31	05/08/2018	LC5	5909262.3	379420.0	5909306.9	379509.2
S6-S5-A	S6-S5	1.24	16.9	22.57	22.07	23.65	29/05/2020	LC5	5909720.7	380515.8	5909735.5	380524.1
S6-S5-B	S6-S5	1.62	16.9	22.14	22.03	23.65	29/05/2020	LC5	5909719.6	380517.8	5909734.3	380526.1
S7-S3-A	S7-S3	0.61	15.4	15.69	15.92	17.08	05/08/2018	LC5	5909332.5	382945.6	5909347.8	382947.1
S7-S4-A	S7-S4	0.28	14.0	16.08	15.91	16.64	05/08/2018	LC5	5908882.7	382960.2	5908888.1	382973.1
S8-S6-A	S8-S6	0.91	18.4	6.95	6.56	9.02	16/08/2018	LC7	5909138.7	387192.9	5909120.4	387194.1
S8-S6-B	S8-S6	0.78	6.0	6.40	6.63	7.11	16/08/2018	LC7	5909112.9	387191.8	5909106.9	387191.9
S8-S8-A	S8-S8	1.00	12.2	7.63	7.63	9.02	10/08/2018	LC7	5910987.4	389014.7	5910986.8	389026.9
S8-S8-B	S8-S8	0.79	10.3	7.74	7.93	9.02	10/08/2018	LC7	5910984.0	389016.4	5910982.9	389026.7

APPENDIX D

SITE PHOTOS

APPENDIX D

CHANNEL BANK PHOTOS

Aug. 22/18 - North Riverbank
(Station -0+062)

Aug. 22/18 - South Riverbank
(Station 0+217)

Aug. 22/18 - South Riverbank
(Station -0+792)

Aug. 22/18 - Sandbar/South Riverbank
(Station -0+442)

Aug. 22/18 - North Riverbank
(Station -0+329)

Aug. 22/18 - North Riverbank
(Station -0+750)

Aug. 22/18 - South Riverbank Willows Low Ground could not access (Station -0+247)

Aug. 22/18 - South Riverbank (Station -1+619)

Aug. 22/18 - North Riverbank (Station -2+099)

Aug. 22/18 - South Riverbank (Station -1+844)

Aug. 22/18 - South Riverbank (Station 0+577)

Aug 22. 22/18 - North shore, facing east (Station 0+278)

Aug. 24/18 - North Riverbank
(Station 0+641)

Aug. 24/18 - South Riverbank
(Station 0+921)

Aug. 24/18 - South Riverbank
(Station 1+359)

Aug. 24/18 – Island, Northside
(Station 1+371)

Aug. 24/18 - North Riverbank
(Station 0+560)

Aug. 24/18 - North Riverbank
(Station 1+799)

Aug. 24/18 – Island, Northside
(Station 0+457)

Aug. 24/18 – Island, Northside
(Station 2+127)

Aug. 24/18 - North Riverbank
(Station 2+246)

Aug. 24/18 - North Riverbank
(Station 0+281)

Aug. 24/18 - Island, Northside
(Station 0+277)

Aug. 24/18 - North Riverbank
(Station 3+166)

Aug. 24/18 – Island, Northside
(Station 3+632)

Aug. 24/18 - North Riverbank
(Station 3+632)

Aug. 24/18 – North Riverbank
(Station 4+092)

Aug. 24/18 – Island, Northside
(Station 4+092)

Aug. 24/18 – North Riverbank
(Station 4+554)

Aug. 24/18 – Island, Northside
(Station 4+554)

Aug. 28/18 – North Riverbank (Station 4+753)

Aug. 28/18 – Sandbar before South Riverbank (Station 5+478)

Aug. 28/18 – North Riverbank (Station 4+439)

Aug. 28/18 – South Riverbank (Station 4+730)

Aug. 28/18 – North Riverbank (Station 4+016)

Aug. 28/18 – South Riverbank (Station 4+235)

Aug. 28/18 – Facing North islands
(Station 2+761)

Aug. 28/18 – South Riverbank
(Station 2+750)

Aug. 28/18 – South Riverbank
(Station 2+294)

Aug. 28/18 – Facing north islands
(Station 2+294)

Aug. 30/18 – North Riverbank (Station 5+205)

Aug. 30/18 – South Riverbank (Station 5+417)

Aug. 30/18 – South Riverbank (Station 6+813)

Aug. 30/18 – Facing north towards South side of island (Station 6+937)

Aug. 30/18 – Facing south towards North side of island (Station 6+988)

Aug. 30/18 – North Riverbank (Station 7+267)

Aug. 30/18 – North Riverbank (Station 7+792)

Aug. 30/18 - Facing south towards North side of island (Station 7+413)

Aug. 30/18 – South Riverbank (Station 7+340)

Aug. 30/18 – South Riverbank (Station 7+909)

Aug. 30/18 – North Riverbank (Station 8+286)

Aug. 30/18 – North Riverbank (Station 8+733)

Aug. 30/18 – South Riverbank (Station 8+453)

Aug. 30/18 – South Riverbank (Station 8+991)

Aug. 30/18 – North Riverbank (Station 9+164)

Aug. 30/18 – North Riverbank (Station 9+647)

Aug. 30/18 - Facing South towards North side of island (Station 9+665)

Aug. 30/18 - Facing North towards South side of island (Station 9+665)

Aug. 30/18 – South Riverbank
(Station 9+539)

Aug. 30/18 – South Riverbank
(Station 9+989)

Aug. 30/18 – North Riverbank
(Station 10+173)

Aug. 31/18 – Sandbar and North Riverbank (Station 10+629)

Aug. 31/18 – South Riverbank (Station 10+555)

Aug. 31/18 – Along the North Riverbank (Station 11+080)

Aug. 31/18 – Sandbar and North Riverbank (Station 11+103)

Aug. 31/18 – South Riverbank (Station 11+091)

Aug. 31/18 – South Riverbank (Station 11+613)

Aug. 31/18 – North Riverbank
(Station 11+579)

Aug. 31/18 – South Riverbank
(Station 12+148)

Aug. 31/18 – Sandbar and North Riverbank
(Station 12+114)

Aug. 31/18 – Sandbar and North Riverbank
(Station 12+081)

Aug. 31/18 – North Riverbank
(Station 12+609)

Aug. 31/18 – South Riverbank
(Station 12+623)

Aug. 31/18 – South Riverbank
(Station 13+056)

Aug. 31/18 – North Riverbank
(Station 13+089)

Aug. 31/18 – North Riverbank
(Station 13+575)

Aug. 31/18 – South Riverbank
(Station 13+632)

Aug. 31/18 – South Riverbank
(Station 14+106)

Sept. 4/18 – North Riverbank
(Station 14+709)

Sept. 4/18 – North Riverbank
(Station 14+952)

Sept. 4/18 – Facing SE along sandbar
(Station 15+220)

Sept. 4/18 – North Riverbank
(Station 15+105)

Sept. 4/18 – North Riverbank
(Station 15+640)

Sept. 4/18 – North Riverbank
(Station 16+123)

Sept. 4/18 – North Riverbank
(Station 16+628)

Sept. 5/18 – South Riverbank
(Station 14+577)

Sept. 5/18 – South Riverbank
(Station 15+126)

Sept. 5/18 – Sandbar and North Riverbank
(Station 15+120)

Sept. 5/18 – South Riverbank
(Station 15+607)

Sept. 5/18 – North Riverbank
(Station 17+141)

Sept. 5/18 – South Riverbank
(Station 17+120)

Sept. 5/18 – Sandbar and North Riverbank (Station 17+129)

Sept. 5/18 – South Riverbank (Station 17+587)

Sept. 5/18 – South side of sandbar (Station 17+627)

Sept. 5/18 – North side of sandbar (Station 17+638)

Sept. 5/18 – North Riverbank (Station 17+654)

Sept. 5/18 – North Riverbank (Station 18+152)

Sept. 5/18 – South Riverbank
(Station 18+092)

Sept. 5/18 – South Riverbank
(Station 18+567)

Sept. 5/18 – North side of sandbar
(Station 18+611)

Sept. 5/18 – North Riverbank
(Station 18+656)

Sept. 7/18 – South Riverbank
(Station 19+079)

Sept. 7/18 – South side of sandbar
(Station 19+154)

Sept. 7/18 – North Riverbank
(Station 19+174)

Sept. 7/18 – North Riverbank
(Station 19+628)

Sept. 7/18 – South side of sandbar
(Station 19+625)

Sept. 7/18 – South Riverbank
(Station 19+603)

Sept. 7/18 – South Riverbank
(Station 20+201)

Sept. 7/18 – South side of sandbar
(Station 20+124)

Sept. 7/18 – North side of sandbar
(Station 20+141)

Sept. 7/18 – North Riverbank
(Station 20+092)

Sept. 7/18 – North Riverbank
(Station 20+587)

Sept. 7/18 – South Riverbank
(Station 20+662)

Sept. 7/18 – South Riverbank
(Station 21+242)

Sept. 7/18 – North Riverbank
(Station 21+041)

Sept. 7/18 – South Riverbank
(Station 21+711)

Sept. 7/18 – North Riverbank
(Station 21+518)

Sept. 7/18 – North Riverbank
(Station 22+063)

Sept. 7/18 – South Riverbank
(Station 22+190)

Sept. 7/18 – North Riverbank
(Station 22+570)

Sept. 7/18 – North side of sandbar
(Station 22+643)

Sept. 7/18 – South side of sandbar
(Station 22+666)

Sept. 7/18 – South Riverbank
(Station 22+700)

Sept. 7/18 – South Riverbank
(Station 23+204)

Sept. 7/18 – North Riverbank
(Station 22+988)

Sept. 7/18 – North Riverbank
(Station 23+642)

Sept. 7/18 – South Riverbank
(Station 23+659)

Sept. 7/18 – South Riverbank
(Station 24+058)

Sept. 7/18 – North Riverbank
(Station 24+101)

Sept. 10/18 – South Riverbank
(Station 24+208)

Sept. 10/18 – North Riverbank
(Station 24+211)

Sept. 10/18 – North Riverbank
(Station 25+229)

Sept. 10/18 – South Riverbank
(Station 25+156)

Sept. 10/18 – South Riverbank
(Station 26+178)

Sept. 10/18 – South side of sandbar
(Station 26+190)

Sept. 10/18 – North Riverbank
(Station 26+062)

Sept. 10/18 – North Riverbank
(Station 27+186)

Sept. 10/18 – South Riverbank
(Station 27+227)

Sept. 10/18 – South Riverbank
(Station 28+220)

Sept. 10/18 – North Riverbank
(Station 28+170)

Sept. 10/18 – North Riverbank
(Station 29+227)

Sept. 10/18 – South Riverbank
(Station 29+136)

Sept. 10/18 – South Riverbank
(Station 30+147)

Sept. 10/18 – North Riverbank
(Station 30+228)

Sept. 10/18 – South Riverbank
(Station 31+183)

Sept. 10/18 – South Riverbank
(Station 32+164)

Sept. 10/18 – North Riverbank
(Station 32+192)

Sept. 11/18 – North Riverbank
(Station 17+141)

Sept. 11/18 – North side of sandbar
(Station 17+140)

Sept. 11/18 – South Riverbank
(Station 17+108)

Sept. 11/18 – South Riverbank
(Station 17+596)

Sept. 11/18 – South side of sandbar
(Station 17+624)

Sept. 11/18 – North side of sandbar
(Station 17+609)

Sept. 11/18 – North Riverbank
(Station 17+675)

Sept. 11/18 – North Riverbank
(Station 18+186)

Sept. 11/18 – South side of island and North Riverbank (background)
(Station 33+205)

Sept. 11/18 – North side of island
(Station 33+205)

Sept. 11/18 – South side of island
(Station 33+166)

Sept. 11/18 – South Riverbank
(Station 33+185)

Sept. 11/18 – South Riverbank
(Station 34+160)

Sept. 11/18 – North Riverbank
(Station 34+178)

Sept. 11/18 – North Riverbank
(Station 35+120)

Sept. 11/18 – South Riverbank
(Station 35+204)

Sept. 12/18 – South Riverbank
(Station 36+205)

Sept. 12/18 – North Riverbank
(Station 36+176)

Sept. 12/18 – North Riverbank
(Station 37+171)

Sept. 12/18 – South Riverbank
(Station 37+197)

Sept. 12/18 – South Riverbank
(Station 38+234)

Sept. 12/18 – North Riverbank
(Station 38+128)

Sept. 12/18 – North Riverbank
(Station 39+505)

Sept. 12/18 – South Riverbank
(Station 39+119)

Sept. 12/18 – South Riverbank
(Station 40+080)

Sept. 12/18 – North Riverbank
(Station 40+547)

Sept. 12/18 – North Riverbank
(Station 41+362)

Sept. 12/18 – North side of island
(Station 41+247)

Sept. 12/18 – South side of island
(Station 41+178)

Sept. 12/18 – South Riverbank
(Station 40+938)

Sept. 12/18 – South Riverbank
(Station 42+283)

Sept. 12/18 – North Riverbank
(Station 42+121)

The following photos are of the channel furthest West that connects to Mud Lake starting from the north end of the channel.

Sept. 13/18 – North side of channel (Photo #12)

Sept. 13/18 – South side of channel (Photo #13)

Sept. 13/18 – West side of channel (Photo #11)

Sept. 13/18 – East side of channel (Photo #10)

Sept. 13/18 – West side of channel at bridge (Photo #3)

Sept. 13/18 – East side of channel at bridge (Photo #1)

Sept. 13/18 – West side of channel at bridge
(Photo #2)

Sept. 13/18 – North side of channel
(Photo #5)

Sept. 13/18 – North side of channel
(Photo #9)

Mud Lake Bridge
(Photo #6)

Sept. 13/18 – South side of channel
(Photo #7)

Sept. 13/18 – North side of channel
(Photo #8)

The following photos are of the channel furthest East that connects to Mud Lake and Churchill River starting from the north end of the channel.

Sept. 14/18 – West side of channel
(Photo #1)

Sept. 14/18 – East side of channel
(Photo #2)

Sept. 14/18 – East side of channel
(Photo #3)

Sept. 14/18 – West side of channel
(Photo #4)

Sept. 14/18 – West side of channel
(Photo #5)

Sept. 14/18 – East side of channel
(Photo #6)

Sept. 14/18 – East side of channel
(Photo #7)

Sept. 14/18 – West side of channel
(Photo #8)

Sept. 14/18 – West side of channel
(Photo #9)

Sept. 14/18 – East side of channel
(Photo #10)

Sept. 14/18 – East side of channel
(Photo #11)

Sept. 14/18 – West side of channel
(Photo #12)

APPENDIX D

CULVERT PHOTOS

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	1	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S1-S1-A		Date Surveyed:	2018/08/04	
No. of Culverts:	4		Watercourse:	Otter Creek	
Culvert Diameter:	1.26	m	MTM Zone:	4	
Culvert Length:	16.00	m	U/S Invert Northing:	5913781.8	m
U/S Invert:	1.48	m	U/S Invert Easting:	376878.4	m
D/S Invert:	0.90	m	D/S Invert Northing:	5913787.3	m
Top of Road:	4.71	m	D/S Invert Easting:	376893.4	m

Notes: This data is from the location of the two most northern culverts at this site.

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	2	of	25
Date:	2020/06/26	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S1-S1-B		Date Surveyed:	2018/08/04	
No. of Culverts:	4		Watercourse:	Otter Creek	
Culvert Diameter:	1.62	m	MTM Zone:	4	
Culvert Length:	22.43	m	U/S Invert Northing:	5913757.6	m
U/S Invert:	0.93	m	U/S Invert Easting:	376886.1	m
D/S Invert:	1.25	m	D/S Invert Northing:	5913777.1	m
Top of Road:	4.71	m	D/S Invert Easting:	376897.1	m

Notes: S1-S1-B and S1-S1-C are parallel to each other

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	3	of	25
Date:	2020/06/26	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S1-S1-C		Date Surveyed:	2018/08/04	
No. of Culverts:	4		Watercourse:	Otter Creek	
Culvert Diameter:	1.62	m	MTM Zone:	4	
Culvert Length:	22.45	m	U/S Invert Northing:	5913755.2	m
U/S Invert:	1.03	m	U/S Invert Easting:	376887.2	m
D/S Invert:	0.61	m	D/S Invert Northing:	5913774.9	m
Top of Road:	4.71	m	D/S Invert Easting:	376897.9	m

Notes: S1-S1-B and S1-S1-C are parallel to each other

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	4	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S2-S1-A		Date Surveyed:	2018/08/04	
No. of Culverts:	2		Watercourse:	LC1	
Culvert Diameter:	1.04	m	MTM Zone:	4	
Culvert Length:	19.17	m	U/S Invert Northing:	5912984.1	m
U/S Invert:	3.81	m	U/S Invert Easting:	377146.9	m
D/S Invert:	3.15	m	D/S Invert Northing:	5912990.9	m
Top of Road:	6.98	m	D/S Invert Easting:	377164.8	m

Notes: Westmost culvert at this site

Culvert Photos

Looking Downstream

Culvert Outlet

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	5	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S2-S1-B		Date Surveyed:	2018/08/04	
No. of Culverts:	2		Watercourse:	LC1	
Culvert Diameter:	0.80	m	MTM Zone:	4	
Culvert Length:	12.80	m	U/S Invert Northing:	5912992.5	m
U/S Invert:	2.16	m	U/S Invert Easting:	377170.5	m
D/S Invert:	1.62	m	D/S Invert Northing:	5912998.9	m
Top of Road:	4.72	m	D/S Invert Easting:	377181.6	m

Notes: Eastmost culvert at this site

Culvert Photos

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	6	of	25
Date:	2020/06/24	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S3-S1		Date Surveyed:	2018/08/07	
No. of Culverts:	1		Watercourse:	LC2	
Culvert Diameter:	0.82	m	MTM Zone:	4	
Culvert Length:	11.59	m	U/S Invert Northing:	5912201.4	m
U/S Invert:	6.75	m	U/S Invert Easting:	377675.1	m
D/S Invert:	6.78	m	D/S Invert Northing:	5912208.4	m
Top of Road:	8.65	m	D/S Invert Easting:	377684.3	m

Notes:

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	7	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S3-S2		Date Surveyed:	2020/05/20	
No. of Culverts:	2		Watercourse:	LC2	
Culvert Diameter:	0.61	m	MTM Zone:	4	
Culvert Length:	9.48	m	U/S Invert Northing:	5912224.2	m
U/S Invert:	6.20	m	U/S Invert Easting:	377709.0	m
D/S Invert:	5.62	m	D/S Invert Northing:	5912226.3	m
Top of Road:	7.20	m	D/S Invert Easting:	377718.2	m

Notes:

Culvert Photos

Culvert Inlet

Looking Upstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	8	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S3-S3		Date Surveyed:	2018/08/06	
No. of Culverts:	1		Watercourse:	LC2	
Culvert Diameter:	0.65	m	MTM Zone:	4	
Culvert Length:	22.63	m	U/S Invert Northing:	5911880.6	m
U/S Invert:	9.42	m	U/S Invert Easting:	377965.2	m
D/S Invert:	9.13	m	D/S Invert Northing:	5911897.8	m
Top of Road:	10.52	m	D/S Invert Easting:	377979.9	m

Notes:

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	9	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S4-S1		Date Surveyed:	2018/08/06	
No. of Culverts:	1		Watercourse:	LC3	
Culvert Diameter:	0.81	m	MTM Zone:	4	
Culvert Length:	25.25	m	U/S Invert Northing:	5911694.7	m
U/S Invert:	7.75	m	U/S Invert Easting:	378430.1	m
D/S Invert:	7.41	m	D/S Invert Northing:	5911719.7	m
Top of Road:	9.85	m	D/S Invert Easting:	378433.2	m

Notes:

Culvert Photos

Culvert Inlet

Culvert Outlet

KGS GROUP
CONSULTING ENGINEERS

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	10	of	25
Date:	2020/06/26	By:	JDW
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S4-S4		Date Surveyed:	2020/05/21	
No. of Culverts:	1		Watercourse:	LC3	
Culvert Diameter:	1.19	m	MTM Zone:	4	
Culvert Length:		m	U/S Invert Northing:	5911769.7	m
U/S Invert:	3.68	m	U/S Invert Easting:	378590.6	m
D/S Invert:		m	D/S Invert Northing:		m
Top of Road:	5.06	m	D/S Invert Easting:		m

Notes: only one side of culvert surveyed

Culvert Photos

Culvert Photo 1

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	11	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S4-S5		Date Surveyed:	2020/05/21	
No. of Culverts:	1		Watercourse:	LC3	
Culvert Diameter:	0.76	m	MTM Zone:	4	
Culvert Length:	23.88	m	U/S Invert Northing:	5911676.3	m
U/S Invert:	6.88	m	U/S Invert Easting:	378721.7	m
D/S Invert:	6.45	m	D/S Invert Northing:	5911698.8	m
Top of Road:	9.91	m	D/S Invert Easting:	378713.8	m

Notes:

Culvert Photos

Culvert Photo 1

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	12	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S4-S6		Date Surveyed:	2020/05/20	
No. of Culverts:	1		Watercourse:	LC3	
Culvert Diameter:	0.92	m	MTM Zone:	4	
Culvert Length:	8.31	m	U/S Invert Northing:	5911480.6	m
U/S Invert:	15.00	m	U/S Invert Easting:	378052.9	m
D/S Invert:	14.83	m	D/S Invert Northing:	5911485.8	m
Top of Road:	16.74	m	D/S Invert Easting:	378059.3	m

Notes:

Culvert Photos

Culvert Photo 1

Culvert Photo 2

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	13	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S4-S7		Date Surveyed:	2020/05/20	
No. of Culverts:	1		Watercourse:	LC3	
Culvert Diameter:	0.85	m	MTM Zone:	4	
Culvert Length:	10.03	m	U/S Invert Northing:	5911633.3	m
U/S Invert:	10.86	m	U/S Invert Easting:	378368.0	m
D/S Invert:	10.51	m	D/S Invert Northing:	5911635.5	m
Top of Road:	12.41	m	D/S Invert Easting:	378377.7	m

Notes:

Culvert Photos

Culvert Photo 1

Culvert Photo 2

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	14	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S5-S3		Date Surveyed:	2018/08/06	
No. of Culverts:	2		Watercourse:	LC4	
Culvert Diameter:	1.46	m	MTM Zone:	4	
Culvert Length:	34.87	m	U/S Invert Northing:	5911734.4	m
U/S Invert:	8.89	m	U/S Invert Easting:	379226.7	m
D/S Invert:	8.24	m	D/S Invert Northing:	5911768.3	m
Top of Road:	10.80	m	D/S Invert Easting:	379218.6	m

Notes:

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	15	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S5-S4		Date Surveyed:	2020/05/20	
No. of Culverts:	1		Watercourse:	LC4	
Culvert Diameter:	1.22	m	MTM Zone:	4	
Culvert Length:	13.72	m	U/S Invert Northing:	5911804.2	m
U/S Invert:	6.52	m	U/S Invert Easting:	379315.8	m
D/S Invert:	6.11	m	D/S Invert Northing:	5911816.3	m
Top of Road:	8.23	m	D/S Invert Easting:	379309.5	m

Notes:

Culvert Photos

Culvert Photo 1

Culvert Photo 2

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	16	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S6-S3		Date Surveyed:	2018/08/06	
No. of Culverts:	2		Watercourse:	LC5	
Culvert Diameter:	0.94	m	MTM Zone:	4	
Culvert Length:	15.10	m	U/S Invert Northing:	5909423.3	m
U/S Invert:	24.87	m	U/S Invert Easting:	380132.1	m
D/S Invert:	24.79	m	D/S Invert Northing:	5909434.6	m
Top of Road:	26.06	m	D/S Invert Easting:	380142.1	m

Notes:

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	17	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S6-S4		Date Surveyed:	2018/08/05	
No. of Culverts:	2		Watercourse:	LC5	
Culvert Diameter:	1.20	m	MTM Zone:	4	
Culvert Length:	99.78	m	U/S Invert Northing:	5909262.3	m
U/S Invert:	35.34	m	U/S Invert Easting:	379420.0	m
D/S Invert:	35.13	m	D/S Invert Northing:	5909306.9	m
Top of Road:	39.31	m	D/S Invert Easting:	379509.2	m

Notes:

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	18	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S6-S5-A		Date Surveyed:	2020/05/29	
No. of Culverts:	2		Watercourse:	LC5	
Culvert Diameter:	1.24	m	MTM Zone:	4	
Culvert Length:	16.91	m	U/S Invert Northing:	5909720.7	m
U/S Invert:	22.57	m	U/S Invert Easting:	380515.8	m
D/S Invert:	22.07	m	D/S Invert Northing:	5909735.5	m
Top of Road:	23.65	m	D/S Invert Easting:	380524.1	m

Notes:

Culvert Photos (none at this location)

Culvert Description

Culvert Properties

Site Name:	S6-S5-B		Date Surveyed:	29/5/2020	
No. of Culverts:	2		Watercourse:	LC5	
Culvert Diameter:	1.62	m	MTM Zone:	4	
Culvert Length:	16.88	m	U/S Invert Northing:	5909719.6	m
U/S Invert:	22.14	m	U/S Invert Easting:	380517.8	m
D/S Invert:	22.03	m	D/S Invert Northing:	5909734.3	m
Top of Road:	23.65	m	D/S Invert Easting:	380526.1	m

Notes:

Culvert Photos (none at this location)

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	20	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S7-S3		Date Surveyed:	2018/08/05	
No. of Culverts:	1		Watercourse:	LC5	
Culvert Diameter:	0.61	m	MTM Zone:	4	
Culvert Length:	15.39	m	U/S Invert Northing:	5909332.5	m
U/S Invert:	15.69	m	U/S Invert Easting:	382945.6	m
D/S Invert:	15.92	m	D/S Invert Northing:	5909347.8	m
Top of Road:	17.08	m	D/S Invert Easting:	382947.1	m

Notes:

Culvert Photos

Culvert Inlet

Culvert Outlet

Looking Upstream

Looking Downstream

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	21	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S7-S4		Date Surveyed:	2018/08/05	
No. of Culverts:	1		Watercourse:	LC5	
Culvert Diameter:	0.28	m	MTM Zone:	4	
Culvert Length:	14.00	m	U/S Invert Northing:	5908882.7	m
U/S Invert:	16.08	m	U/S Invert Easting:	382960.2	m
D/S Invert:	15.91	m	D/S Invert Northing:	5908888.1	m
Top of Road:	16.64	m	D/S Invert Easting:	382973.1	m

Notes:

Culvert Photos

Looking Downstream

Culvert Outlet

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	22	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S8-S6-A		Date Surveyed:	2018/08/16	
No. of Culverts:	2		Watercourse:	LC7	
Culvert Diameter:	0.91	m	MTM Zone:	4	
Culvert Length:	18.35	m	U/S Invert Northing:	5909138.7	m
U/S Invert:	6.95	m	U/S Invert Easting:	387192.9	m
D/S Invert:	6.56	m	D/S Invert Northing:	5909120.4	m
Top of Road:	9.02	m	D/S Invert Easting:	387194.1	m

Notes:

Culvert Photos

Looking Downstream

Culvert Inlet

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	23	of	25
Date:	2020/06/25	By:	ERB
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S8-S6-B		Date Surveyed:	2018/08/16	
No. of Culverts:	2		Watercourse:	LC7	
Culvert Diameter:	0.78	m	MTM Zone:	4	
Culvert Length:	6.00	m	U/S Invert Northing:	5909112.9	m
U/S Invert:	6.40	m	U/S Invert Easting:	387191.8	m
D/S Invert:	6.63	m	D/S Invert Northing:	5909106.9	m
Top of Road:	7.11	m	D/S Invert Easting:	387191.9	m

Notes:

Culvert Photos

Culvert Outlet

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	24	of	25
Date:	2020/06/26	By:	JDW
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S8-S8A		Date Surveyed:	2018/08/10	
No. of Culverts:	2		Watercourse:	LC7	
Culvert Diameter:	1.00	m	MTM Zone:	4	
Culvert Length:	12.24	m	U/S Invert Northing:	5910987.4	m
U/S Invert:	7.63	m	U/S Invert Easting:	389014.7	m
D/S Invert:	7.63	m	D/S Invert Northing:	5910986.8	m
Top of Road:	9.02	m	D/S Invert Easting:	389026.9	m

Notes:

Culvert Photos (none at this location)

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	25	of	25
Date:	2020/06/26	By:	JDW
Checked:	2020/06/26	By:	JDW

Culvert Description

Culvert Properties

Site Name:	S8-S8B		Date Surveyed:	2018/08/10	
No. of Culverts:	2		Watercourse:	LC7	
Culvert Diameter:	0.79	m	MTM Zone:	4	
Culvert Length:	10.33	m	U/S Invert Northing:	5910984.0	m
U/S Invert:	7.93	m	U/S Invert Easting:	389016.4	m
D/S Invert:	7.74	m	D/S Invert Northing:	5910982.9	m
Top of Road:	9.02	m	D/S Invert Easting:	389026.7	m

Notes:

Culvert Photos (none at this location)

APPENDIX D

BRIDGE PHOTOS

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	1	of	2
Date:	06/29/20	By:	JDW
Checked:		By:	

Bridge Description

Bridge Properties

Bridge Location:	Trans-Labrador Bridge		Date Surveyed:	09/12/18	
No. of Spans:	3		Watercourse:	Churchill River	
Structure Type:	steel		MTM Zone:	4	
Channel Invert:	-11.07	m	Northing:	5903856.8	m
Top of Road:	10.95	m	Easting	371802.5	m

Notes:

Bridge Photos

Bridge Photo 1

Bridge Photo 2

Client:	Government of N.L.		
File No:			
Project:	18-3217-001		
Ref. Dwg:			
Sheet:	2	of	2
Date:	06/29/20	By:	JDW
Checked:		By:	

Bridge Description

Bridge Properties

Bridge Location:	Mud Lake Bridge		Date Surveyed:	09/14/18	
No. of Spans:	1		Watercourse:	Mud Lake Channel	
Structure Type:	steel		MTM Zone:	4	
Channel Invert:	-2.23	m	Northing:	5908621.8	m
Top of Road:	2.91	m	Easting	393637.0	m

Notes:

Bridge Photos

Bridge Photo 1 - Facing East

Bridge Photo 2 - Facing West

Bridge Photo 3 - North Side of Bridge

Bridge Photo 4 - Facing South East

APPENDIX E

LIDAR FLIGHT REPORT

Flight Report

Project # 1734
Happy Valley Goose Bay
KGS Group

Prepared by:

ATLIS Geomatics Inc.
Winnipeg, Manitoba
Calgary Alberta

December 10, 2019
Revised: January 5, 2020

Contents

1.0 PROJECT SUMMARY

An aerial survey for in the area of Happy Valley Goose Bay was conducted to develop a high density topographic dataset using Light Detection and Ranging (LiDAR) technology for use by KGS Group to develop accurate elevation models of the project area.

1.1 PROJECT TEAM

The aerial survey was piloted by Michael Malaba, flying a Cessna 206 owned and operated by Terrasaurus Aviation. Matt Brigley was the sensor operator using the Leica Flight & Sensor Control Management System equipped with a Honeywell Laserref V micro IRS SM inertial measurement unit, a Leica ALS70 airborne laser scanner, and a Leica RCD30 80MP RGBN camera.

1.2 PROJECT AREA

This project is 556.18km^2 and covers Happy Valley Goose Bay along with the surrounding area that incorporates the river valley for the Churchill River. The location of this project proved to be a very difficult location for aerial survey. Rain and low cloud was a consistent issue for this project so we had to make the most of the few weather windows we were presented with.

Appendix A shows the proposed Area of Interest (AOI) for the project along with the actual coverage area achieved by the aerial survey.

1.3 COORDINATE SYSTEM

Table 1 shows the coordinate system that was used for all survey activities on this project and for which all results are reported unless otherwise stated.

Reference System	NAD83CSRS
Epoch	2010.0
Coordinate System	MTMz4
Geoid	CGVD2013
Units	Metric (m)

Table 1: Project Coordinate System

2.0 ACQUISTION

2.1 FLIGHT PLAN

Flight lines were planned such that there would be sufficient pulse density, overlap and pulse footprint. The flight lines were flown at average 1300m Above Ground Level (AGL) producing a Nominal Point Spacing (NPS) of 0.6m along and 0.5m across the flight line metres for each flight line and a nominal overlap of 30% between adjacent flight lines. Appendix A shows the planned flight lines along with the project area.

2.2 FLIGHT PARAMETERS

The project flight plan was based on the project specifications and site characteristics. Considerations taken into account when planning the aerial survey included: required project accuracies, level of development, amount and types of vegetation, project schedule and flight regulations. *Table 2* summarizes the flight parameters used for this project.

Flying Height (AGL)	1300m
Nominal Ground Speed	105kn
Field of View	40°
Measurement Rate	424kHz
Scan Rate	53Hz
Nominal Cross Track Spacing	0.6m
Nominal Along Track Spacing	0.5m
Nominal Side Overlap	30%

Table 2: Flight Parameters

Using the flight parameters listed in *Table 2* produced a nominal swath width of 946m and an average pulse density of 8.3 points per square metre.

2.3 AERIAL SURVEY MISSION

The aerial survey for the Happy Valley Goose Bay project was conducted over 3 days, September 11th to September 13th, 2019 and flown out of Happy Valley Goose Bay airport. There were 6 flights over the 3 days and the flight lines were flown in accordance with the proposed 2019 flight plan with no changes made. Weather was a factor on this project, effort was taken to reduce the amount of cloud shadow and fly with good sun angle but there were times we had to fly with below optimal conditions.

The Leica ALS70-HP airborne LiDAR sensor used for this project was configured to register unlimited returns and operate in Multiple Pulses in Air (MPiA) mode using a pulse rate of 424 kHz, a scan rate of 53Hz at 100% laser power.

2.4 GNSS-IMU POSITIONING

ATLIS utilizes a NovAtel ANT-A72GOLA-TW Dual frequency GNSS antenna paired to a IPAS-CUS6 control unit logging at 1Hz to collect GNSS data during flight operations. The airborne gnss data was post processed and corrected using static base station data provided by KGS Group.

ATLIS utilizes a Honeywell LASEREF V micro Inertial Reference System to perform tightly-coupled GNSS-IMU trajectory processing.

Table 3 summarizes the average GNSS statistics observed during the aerial survey. Detailed graphs of the PDOP values experienced during the aerial survey are shown in *Appendix B* , Graphs of the number of satellites tracked during the aerial survey are shown in *Appendix C* .

Maximum PDOP	1.7
Minimum Number of SVs	15
Correction Data Frequency	1Hz

Table 3: GNSS Flight Statistics

2.5 NAVIGATION PROCESSING

The airborne GNSS and INS data was processed using Waypoint Inertial Explorer tightly-coupled processing. Lever arm offsets and boresight calibration parameters were imported from a calibration performed in September 2019 by Eric Gareau of Atlis Geomatics.

The airborne GNSS data was combined with ground-based static GNSS data collected during the mission to provide differential corrections for the airborne unit.

The GNSS-IMU data was processed using tight coupling and forward/reverse processing with smoothing. Pre and post mission static alignments were performed and used by Inertial Explorer to initialize the IMU.

Appendix D shows the combined solution separation graphs; the graphs demonstrates that the trajectory of the aerial survey was successfully processed.

3.0 QUALITY CONTROL

3.1 SENSOR CALIBRATION

ATLIS performs a calibration of our LiDAR and imaging sensors on two or three occasions during our production season. The LiDAR sensor was last calibrated on May 12th, 2019 by Michael Kettridge, and value can be seen below in Table 4.

	Receiver A	Receiver B
Roll	0.008995626	0.008944651
Pitch	-0.002488473	-0.002157135
Heading	-0.002227413	-0.002244497

Table 4: System Calibration Values

3.2 POST-FLIGHT

The flight logs were reviewed by the operations manager and the data files were checked for coverage of the project area during file conversion. No issues were found with the flight logs or data coverage. Review of the trajectory data found that a proper orbit was executed over the base station as planned.

3.3 FLIGHT DATA PROCESSING

Flight lines were inspected against the flight plans and for any IMU gaps, no significant deviation or gaps were found in the final flight line datasets. Checks on the base line distances found that the longest baseline distance was approximately 25km. Reviews of the line-to-line overlap were acceptable and no range gate errors were found.

3.4 LIDAR CALIBRATION

The LiDAR data was tested for line-to-line correlation to determine if any misalignments were present in the trajectory data. No significate misalignment was found, and the final dz comparison between flight lines is below in *Table 6*.

Flightline	Points	Maqnitude	Dz
0	9954278	0.0463	0.0098
1	5320700	0.061	-0.0272
2	965358	0.0861	0.0474
3	7899604	0.029	-0.002
4	2595593	0.0631	-0.0272
5	3286497	0.0538	0.0138
6	1700723	0.0893	-0.0539
7	5787729	0.0613	0.0337
9	8674979	0.0334	-0.0159
10	3371140	0.0539	-0.0001
11	3374421	0.0976	0.026
12	7178630	0.0488	0.0049

13	6703068	0.0519	-0.0319
14	3775037	0.0492	0.0046
15	6081578	0.0456	-0.0249
16	3607842	0.045	0.0241
17	2494581	0.1	-0.0689
18	6979491	0.0431	0.0031
19	4291664	0.0926	0.0339
20	7164078	0.0441	0.0288
22	9901341	0.0467	-0.0095
23	4712343	0.0768	-0.016
25	1381687	0.0303	-0.0093
26	6838414	0.0378	0.0071
28	7761639	0.0279	-0.0065
30	4530066	0.0502	0.0148
31	1523072	0.0323	0.0131
33	5777079	0.0623	0.021
34	3148574	0.0608	-0.0152
35	2936737	0.0674	-0.0032
36	2127490	0.0782	0.0445
Average		0.048	0.001

Table 6: Calibration Results

3.5 GROUND CONTROL VALIDATION

One hundred and forty non-vegetation survey points collected during the ground control survey were compared against the LiDAR data. Elevations were interpolated from the DEM at the horizontal locations of the control points and compared to the elevations of the control points. The results of this comparison are summarized in *Table* 7 and the full table of ground control check residuals are presented in *Appendix E*.

Average Vertical Error	-0.001m
Standard Deviation	0.044m
Minimum Error	-0.12m
Maximum Error	0.13m
RMSE	0.044m

Table 7: Ground Control Check Summary

3.6 LIDAR CLASSIFICATION

A macro was first used to automatically classify the ground points in the model. The results of the macro were then manually checked throughout the project to ensure a classification accuracy of 95% was met or exceeded.

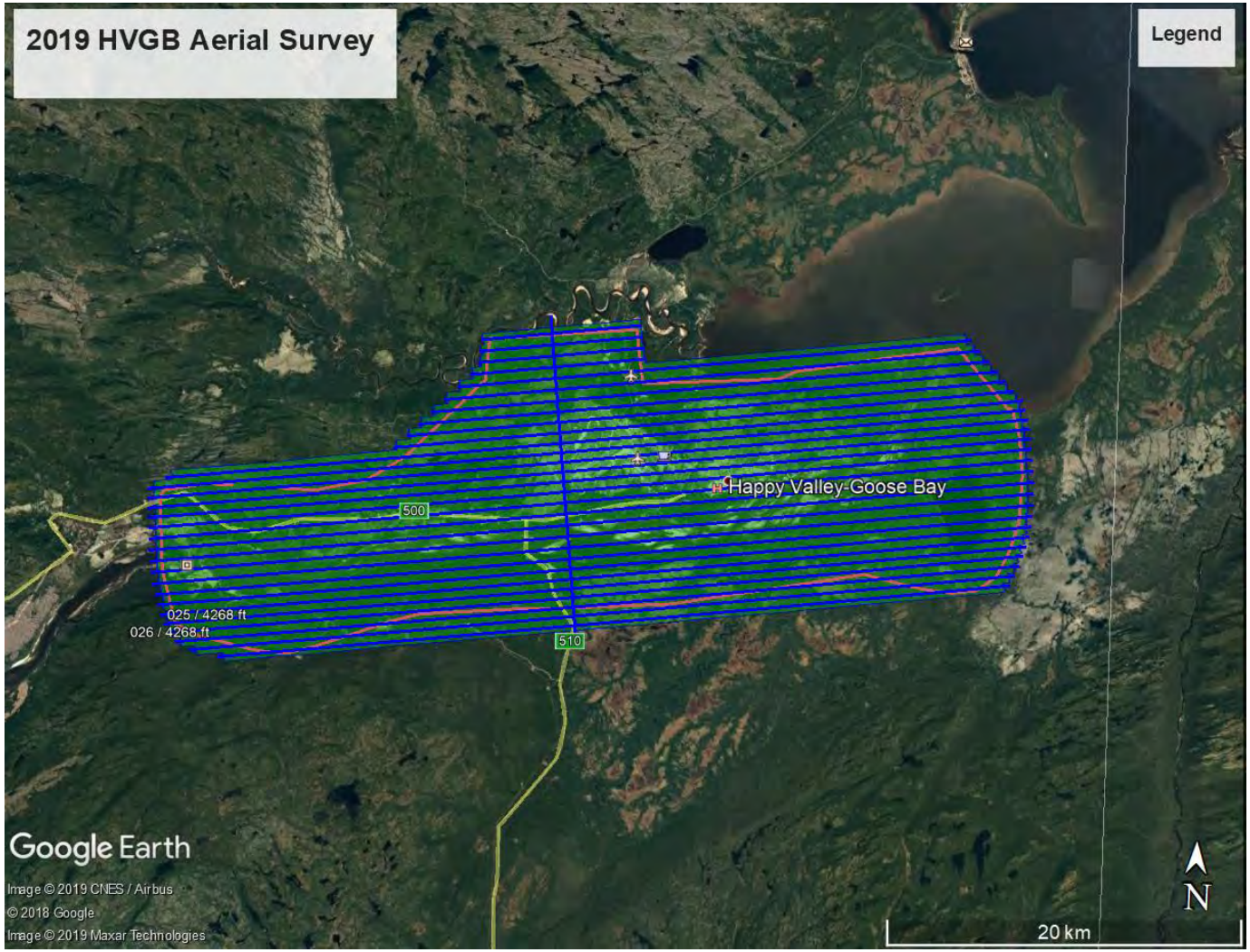
3.7 ORTHO PHOTO PRODUCTION

To generate the ortho photo Atlis utilized Trimble Inpho Suite. The first step of the process was to complete the aerial triangulation utilizing Match AT. At this stage all the flights were combined into one project and the surveyed photo targets were used to confirm the accuracy of the imagery. Once the residuals were refined to a level of acceptance Ortho Master was used to rectify the images and generate the ortho plates. Once the orthos were complete Ortho Vista was used to generate the mosaic, apply the colour balancing and make any seam line edits to improve the quality of the final ortho product.

3.8 FINAL QUALITY CONTROL

ATLIS inspected the data to ensure that it loads to the correct geographic extent, thus verifying the projection definitions. The gridded data was overlaid on the tile index to verify area coverage and ensure that no files were corrupted. Classification of the LAS dataset was verified and that there were no corrupt or empty files.

APPENDIX A – PROJECT AREA AND FLIGHT PLAN



APPENDIX B- PDOP GRAPHS

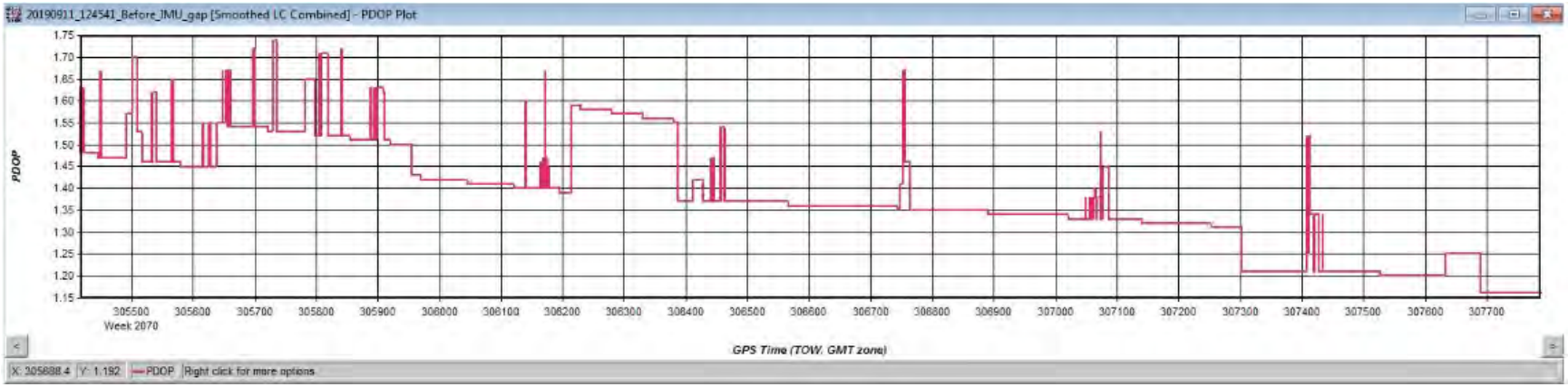


Figure 1: PDOP Graphs 20190911 Flight1

Figure 2: PDOP Graphs 20190911 Flight2

Figure 2: PDOP Graphs 20190912 Flight3

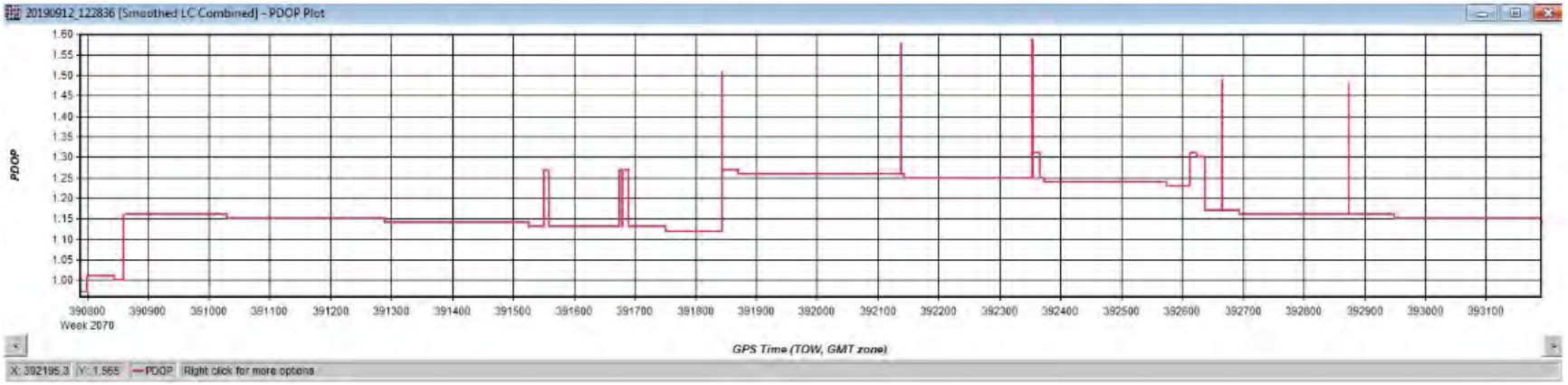


Figure 2: PDOP Graphs 20190912 Flight3

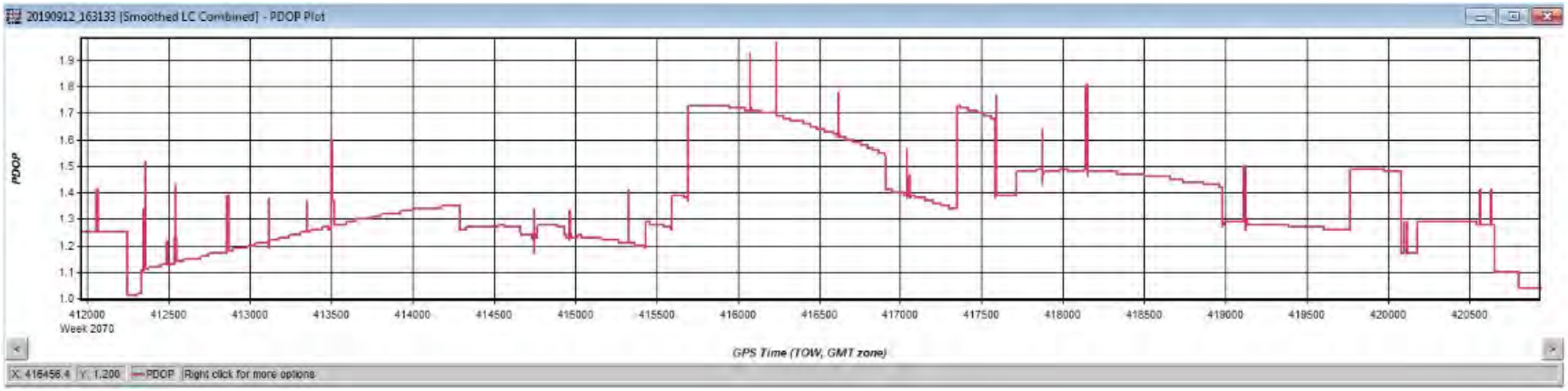


Figure 2: PDOP Graphs 20190912 Flight4

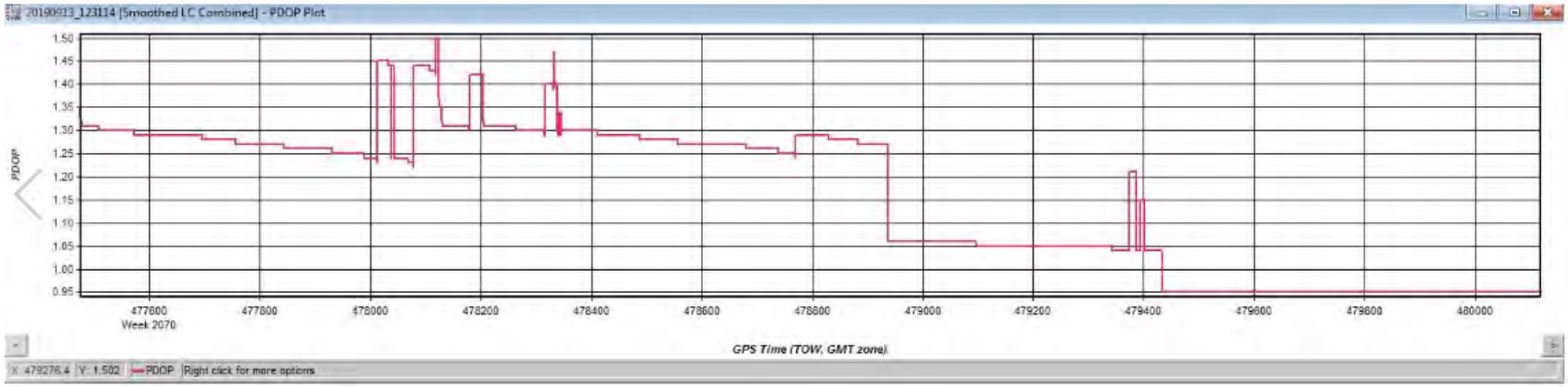


Figure 2: PDOP Graphs 20190913 Flight5

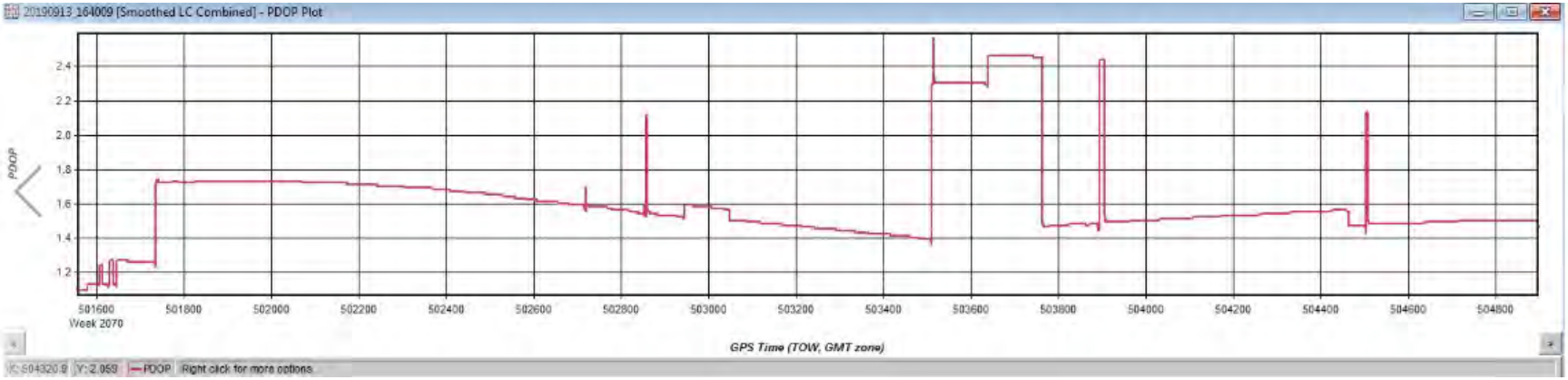


Figure 2: PDOP Graphs 20190913 Flight6

APPENDIX C– SV GRAPHS

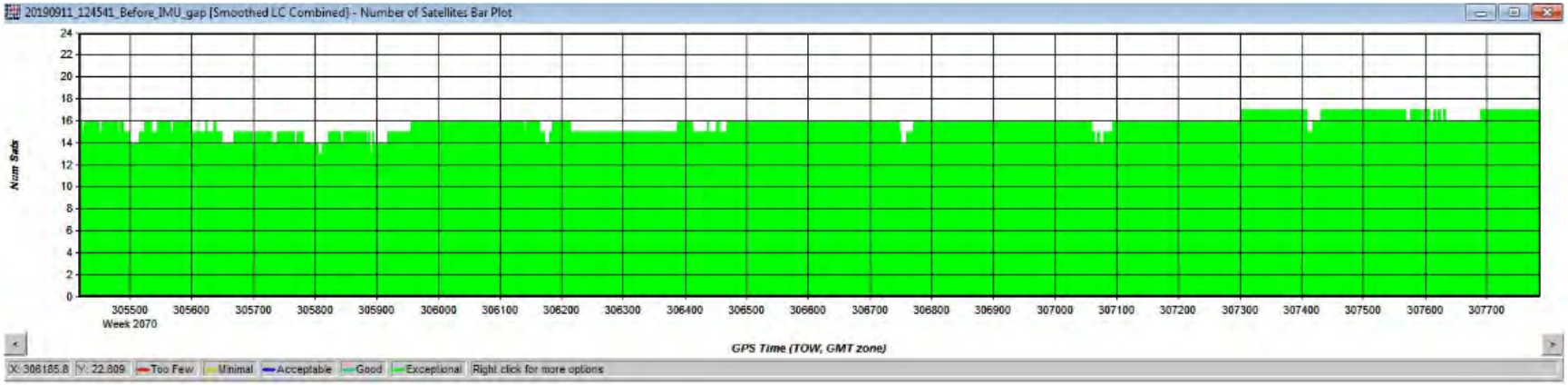


Figure 2: Number of SV Graph 20190911 Flight1

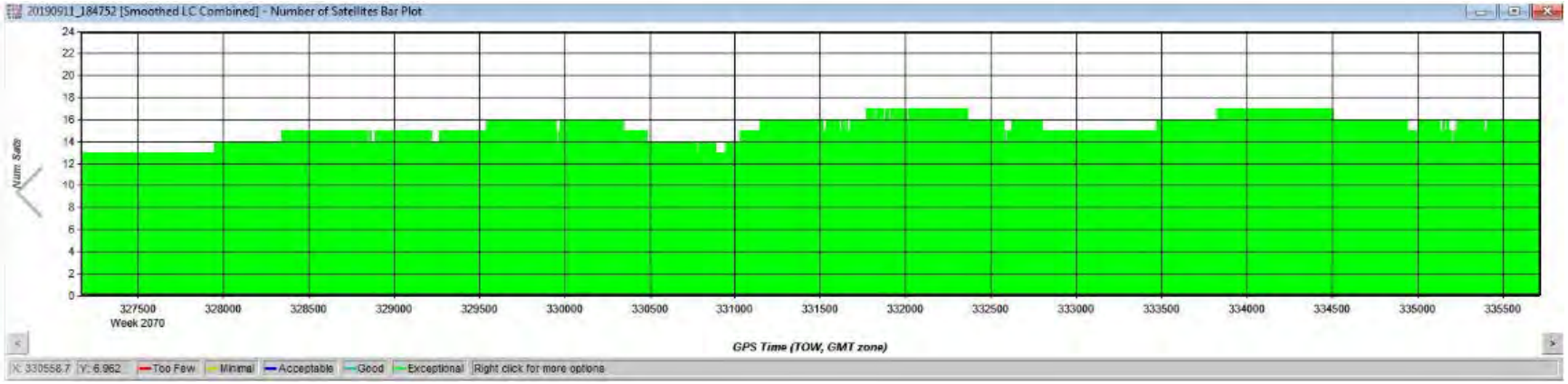


Figure 2: Number of SV Graph 20190911 Flight2

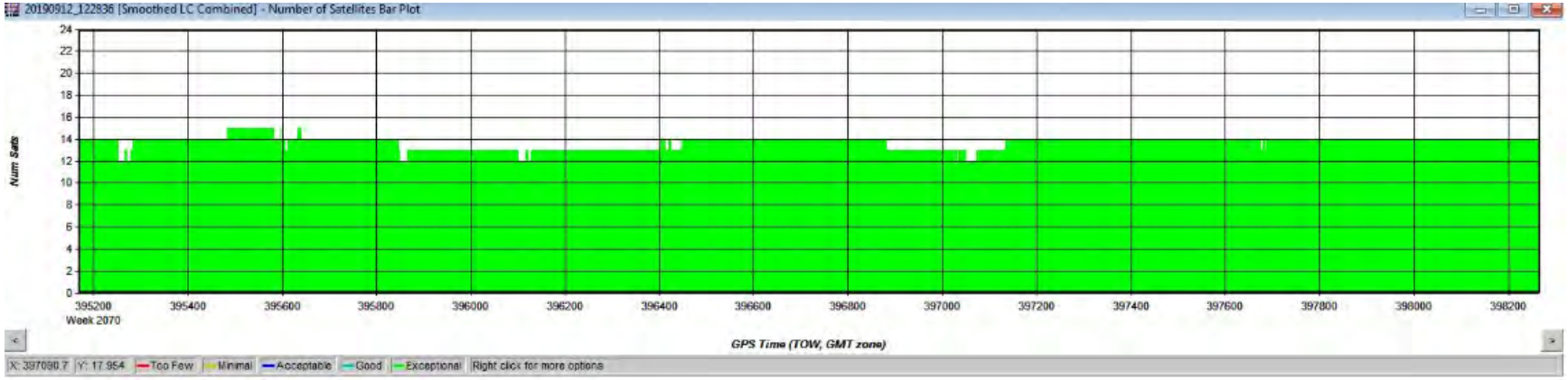


Figure 2: Number of SV Graph 20190912 Flight3

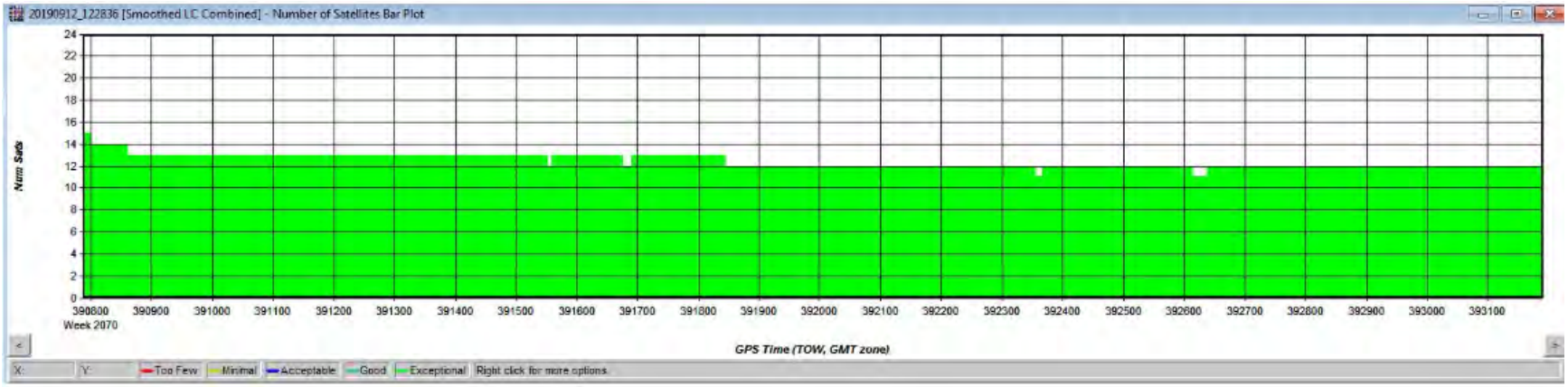


Figure 2: Number of SV Graph 20190912 Flight3

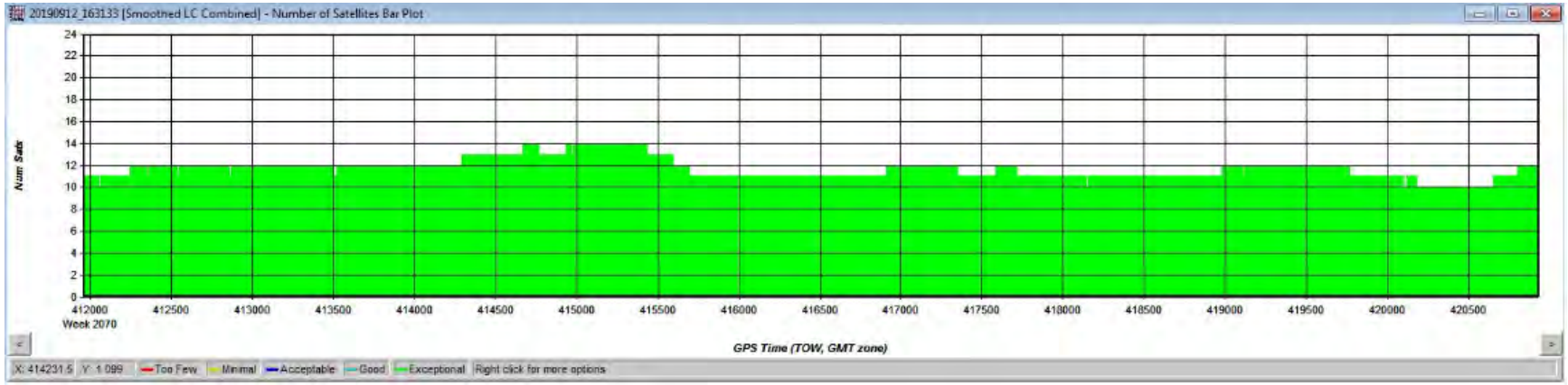


Figure 2: Number of SV Graph 20190912 Flight4

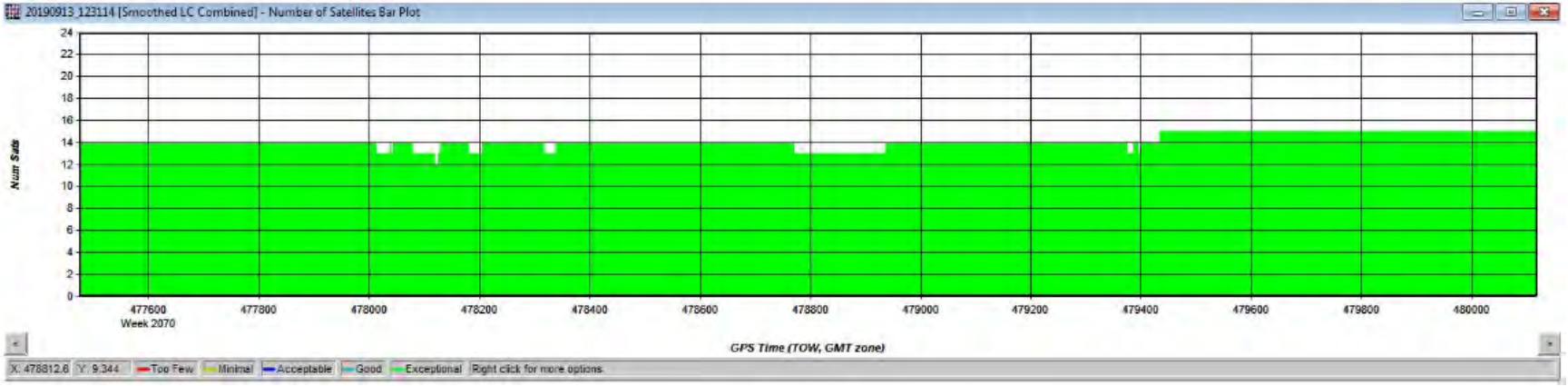


Figure 2: Number of SV Graph 20190913 Flight5

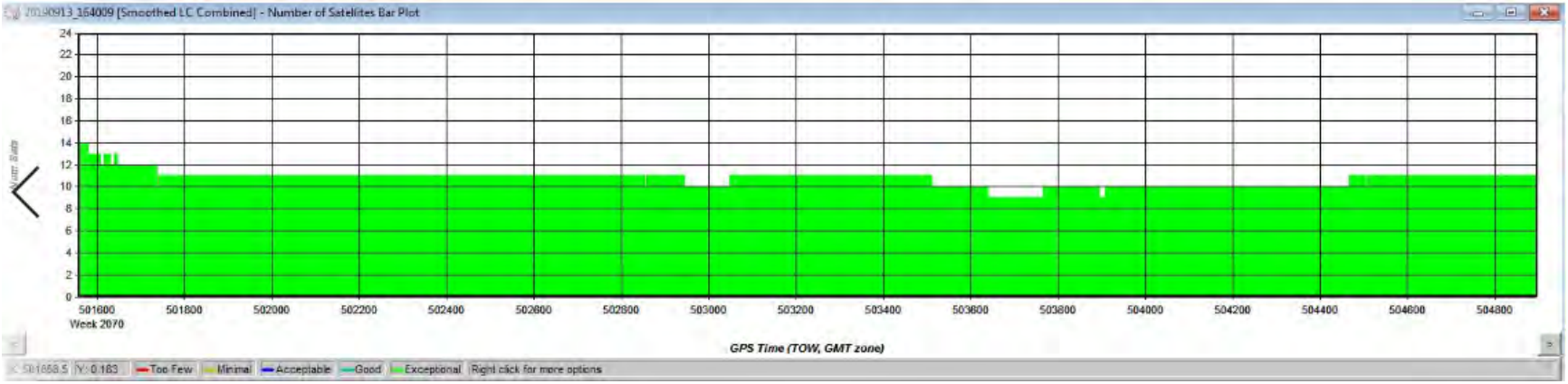


Figure 2: Number of SV Graph 20190913 Flight6

APPENDIX D– COMBINED SOLUTION SEPARATION GRAPHS

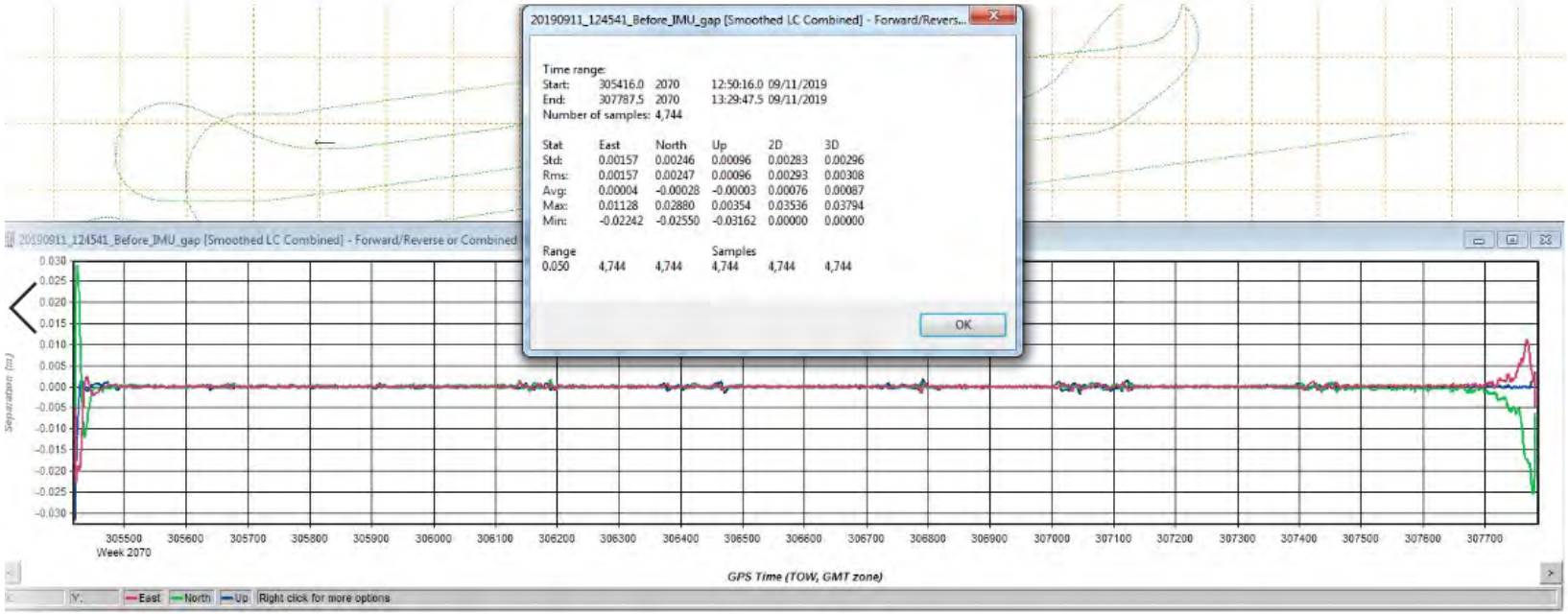


Figure 3: Combined Solution Separation Graph 20190911 Flight1

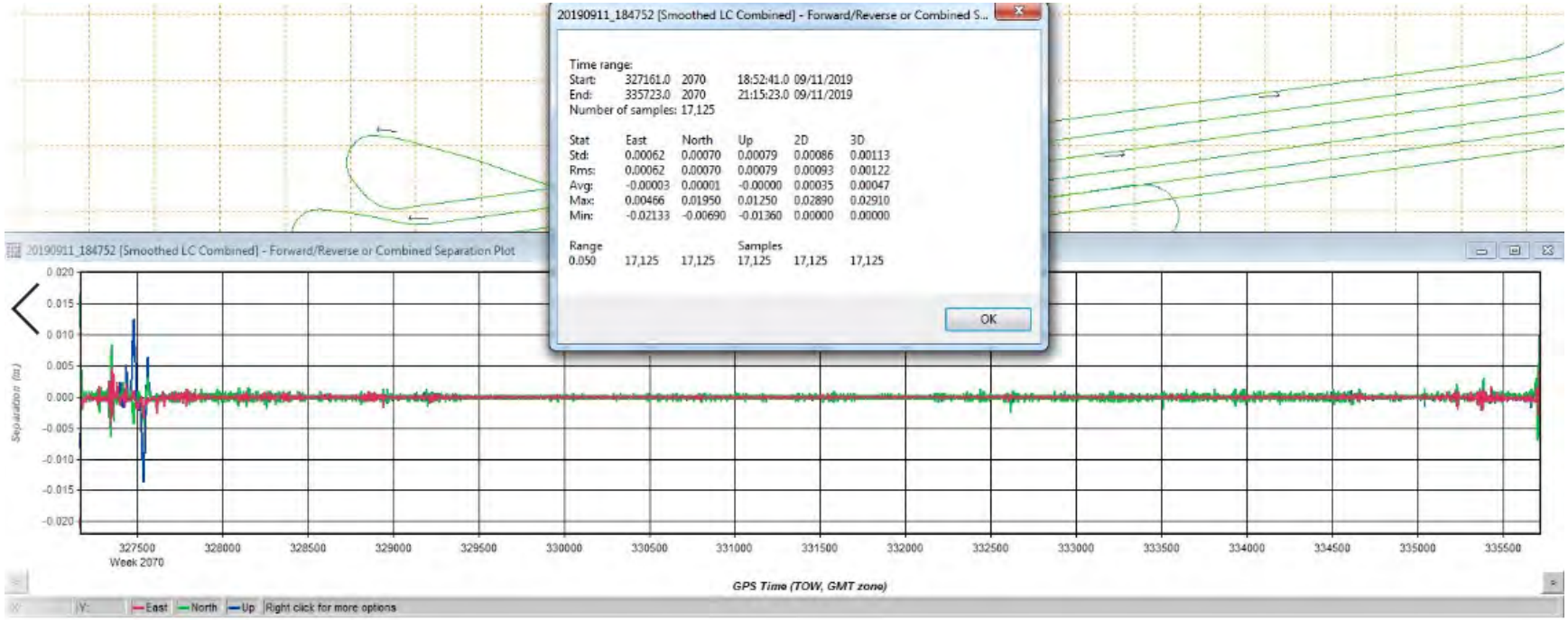


Figure 3: Combined Solution Separation Graph 20190911 Flight2

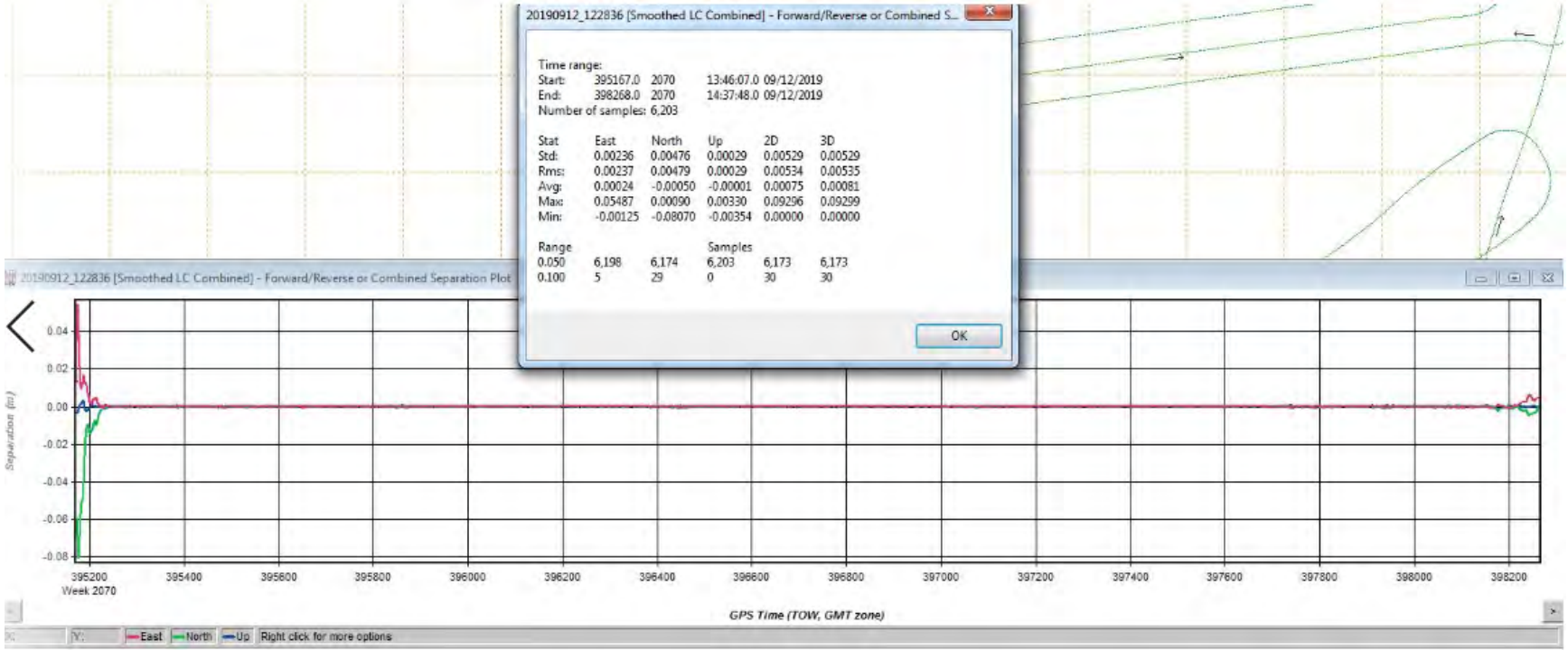


Figure 3: Combined Solution Separation Graph 20190912 Flight3

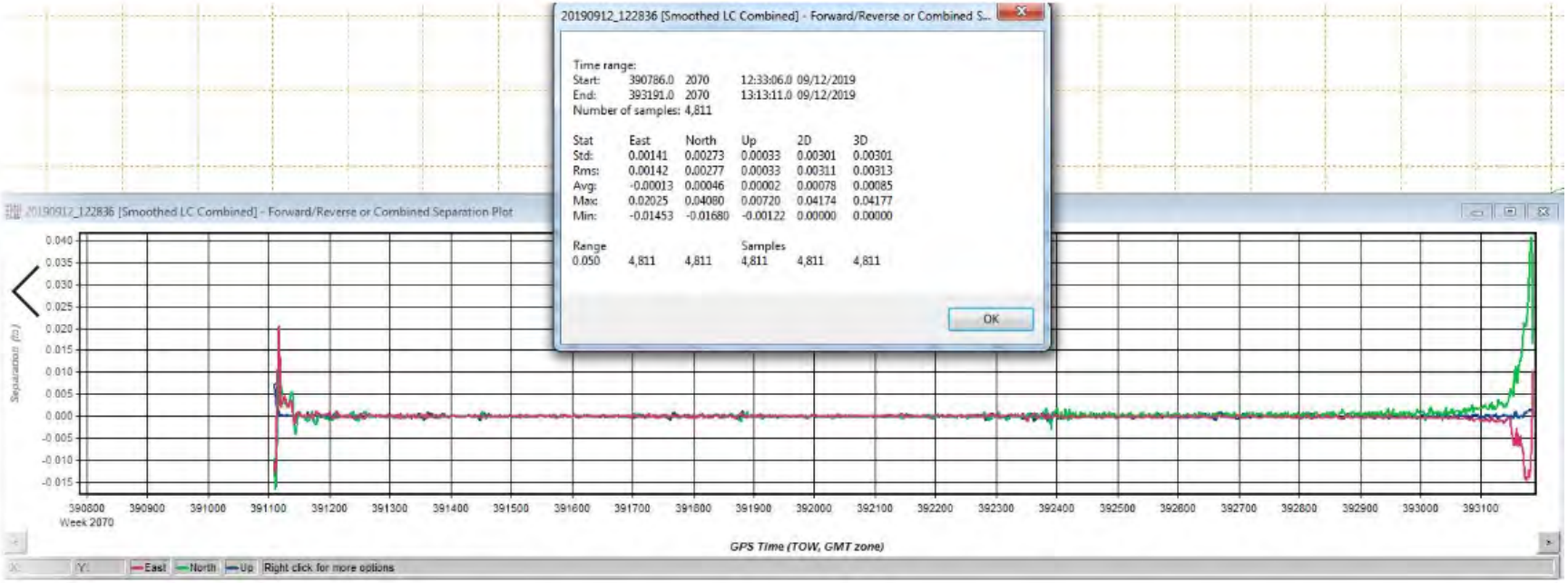


Figure 3: Combined Solution Separation Graph 20190912 Flight3

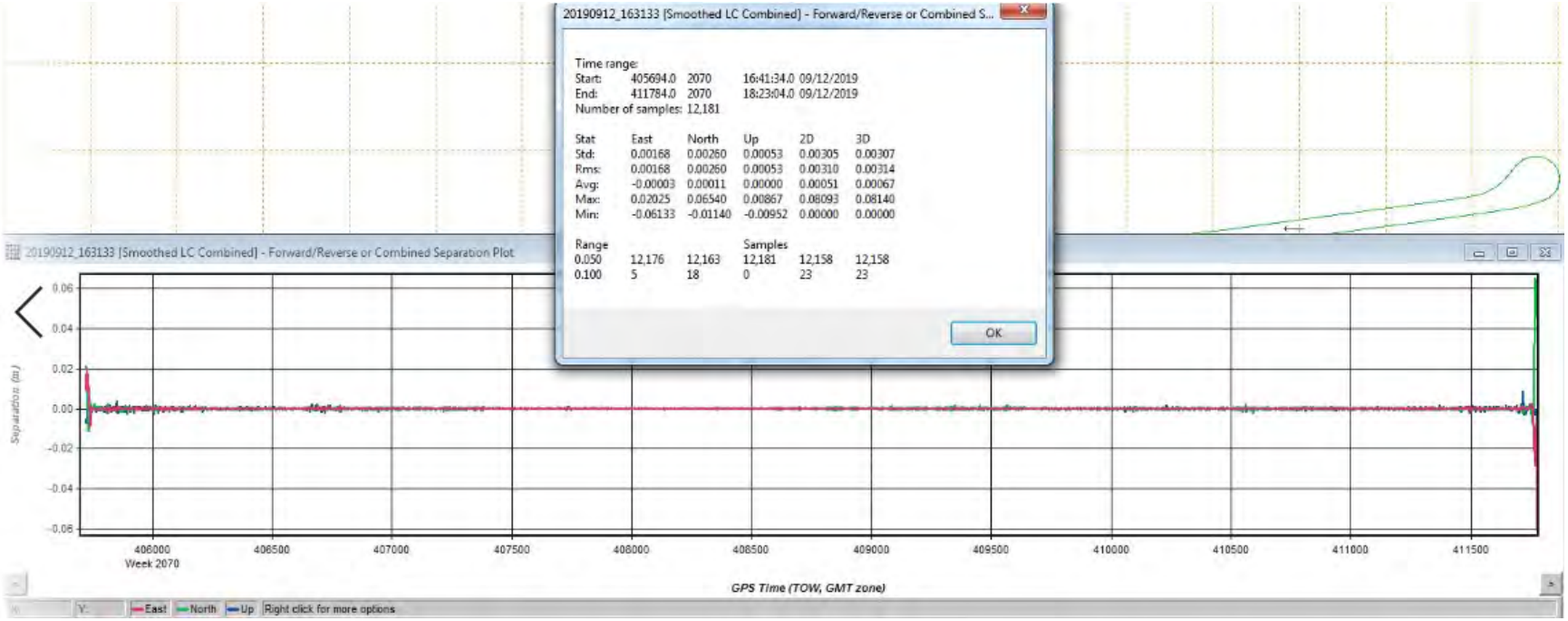


Figure 3: Combined Solution Separation Graph 20190912 Flight4

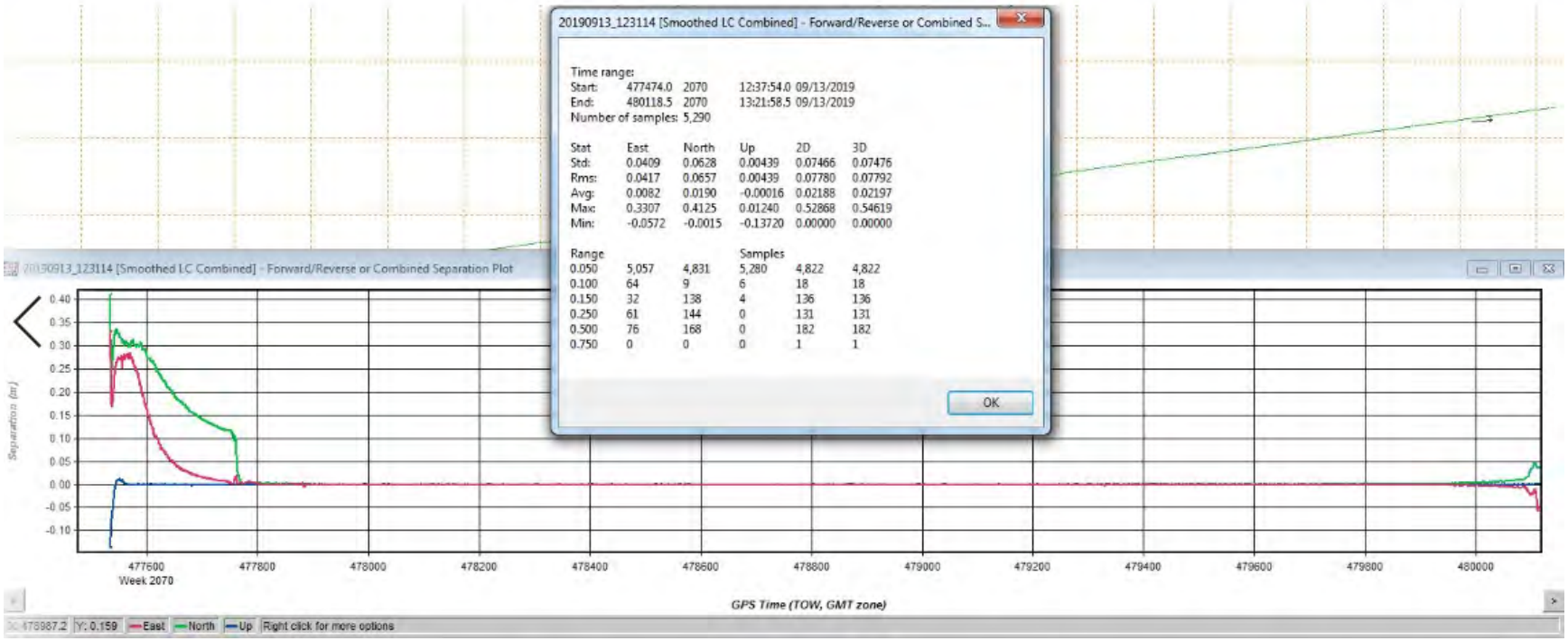


Figure 3: Combined Solution Separation Graph 20190913 Flight5

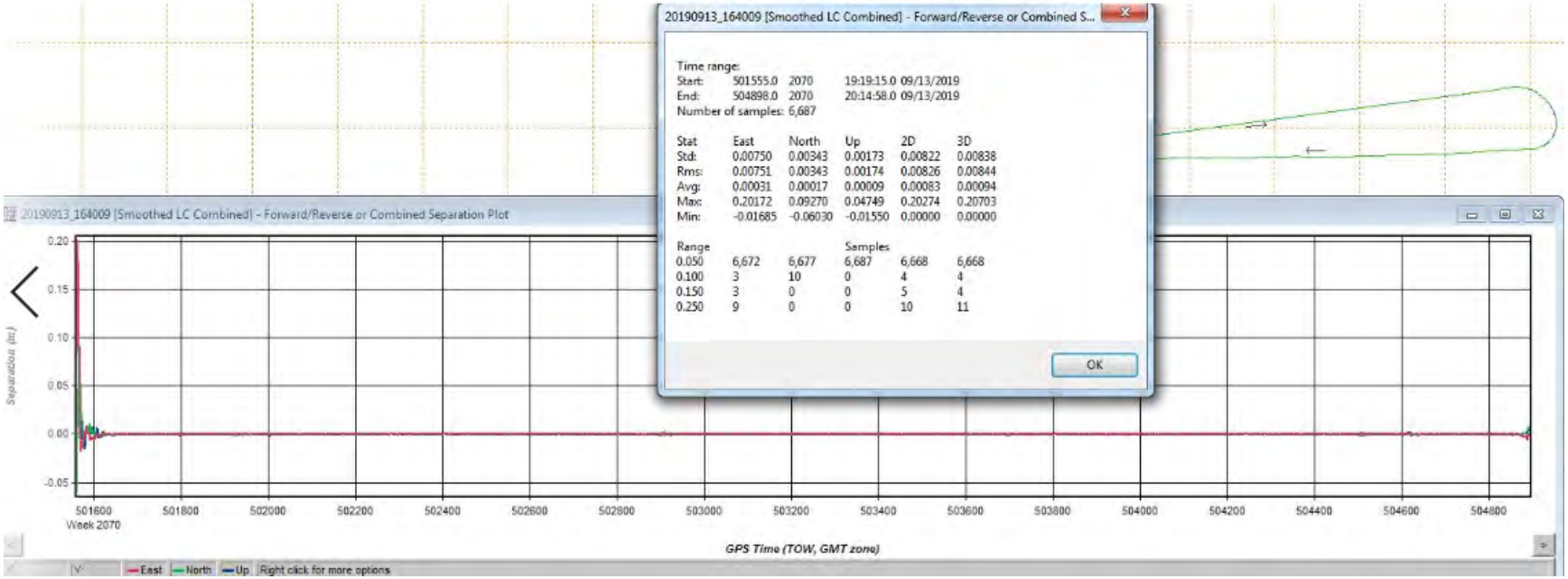


Figure 3: Combined Solution Separation Graph 20190913 Flight6

APPENDIX E– GROUND CONTROL CHECK RESIDUALS

NUMBER	EASTING	NORTHING	SURVEY Z	LASER Z	DZ
AUG15-32	379068.1	5908991	40.319	40.45	0.131
AUG15-34	379055.9	5908977	40.192	40.31	0.118
AUG15-35	379054.9	5908974	40.233	40.32	0.087
AUG15-19	378686.6	5910083	41.616	41.7	0.084
AUG15-17	378681.6	5910071	42.019	42.1	0.081
AUG15-28	378630.8	5910443	40.002	40.08	0.078
AUG15-33	379061.9	5908984	40.255	40.33	0.075
AUG15-29	379039.1	5908991	40.238	40.31	0.072
AUG15-22	378620.5	5910448	40.151	40.22	0.069
AUG15-30	379041.7	5908992	40.224	40.29	0.066
AUG15-23	378619.2	5910446	40.219	40.28	0.061
AUG15-21	378620.6	5910451	40.01	40.07	0.06
AUG15-40	378197	5910075	44.98	45.04	0.06
AUG23-48	382615.7	5909323	17.185	17.24	0.055
AUG15-39	378207.8	5910047	44.867	44.92	0.053
AUG23-35	382887.9	5909419	16.99	17.04	0.05
AUG15-81	380102.4	5908901	38.74	38.79	0.05
AUG23-41	382437.9	5909241	17.373	17.42	0.047
AUG15-20	378685.6	5910086	41.554	41.6	0.046
AUG15-18	378680.6	5910069	42.165	42.21	0.045
AUG15-27	378629.3	5910443	40.065	40.11	0.045
AUG23-30	382879.4	5909418	16.957	17	0.043
AUG23-58	382125.6	5908923	18.087	18.13	0.043
AUG15-37	378201.3	5910046	44.838	44.88	0.042
AUG15-15	378692.1	5910081	41.648	41.69	0.042
AUG15-36	378200.3	5910044	44.882	44.92	0.038
AUG15-78	380100.1	5908883	39.253	39.29	0.037
AUG23-52	382105.2	5908945	18.093	18.13	0.037
AUG23-31	382880.3	5909421	16.994	17.03	0.036
AUG23-46	382612.6	5909320	17.225	17.26	0.035
AUG23-44	382621.6	5909316	17.278	17.31	0.032
AUG23-36	382429.9	5909236	17.349	17.38	0.031
AUG15-76	380096.2	5908901	38.761	38.79	0.029
AUG15-79	380105.7	5908886	39.202	39.23	0.028
AUG23-54	382110.7	5908936	17.992	18.02	0.028
AUG23-12	382334.3	5907602	17.153	17.18	0.027
AUG23-43	382618	5909323	17.224	17.25	0.026

AUG15-24	378615.1	5910441	40.775	40.8	0.025
AUG23-49	382102.3	5908932	18.006	18.03	0.024
AUG23-45	382616.3	5909314	17.278	17.3	0.022
AUG15-85	380747.1	5908713	33.959	33.98	0.021
AUG23-6	382323.6	5907588	17.039	17.06	0.021
AUG23-39	382433	5909247	17.46	17.48	0.02
AUG15-14	378694.9	5910082	41.592	41.61	0.018
AUG23-13	382344.8	5907594	16.673	16.69	0.017
AUG23-42	382618	5909326	17.183	17.2	0.017
AUG15-38	378209.5	5910045	44.813	44.83	0.017
AUG15-26	378627.7	5910442	40.125	40.14	0.015
AUG15-77	380097.8	5908894	38.945	38.96	0.015
AUG15-80	380104	5908894	38.947	38.96	0.013
AUG23-67	382191.2	5908819	17.408	17.42	0.012
AUG23-17	382332.5	5907613	17.481	17.49	0.009
AUG23-8	382342.5	5907590	16.681	16.69	0.009
AUG23-10	382325.8	5907598	17.262	17.27	0.008
AUG23-32	382879.4	5909428	17.094	17.1	0.006
AUG23-59	382122.1	5908931	18.014	18.02	0.006
AUG23-9	382331.7	5907599	17.064	17.07	0.006
AUG15-25	378620.7	5910436	40.885	40.89	0.005
AUG23-61	382180.5	5908814	17.386	17.39	0.004
AUG15-82	380102.9	5908905	38.647	38.65	0.003
AUG23-14	382343.4	5907604	16.697	16.7	0.003
AUG15-56	377523.8	5908047	41.028	41.03	0.002
AUG23-38	382427.7	5909244	17.438	17.44	0.002
AUG14-61	384303.2	5908712	20.198	20.2	0.002
AUG23-5	382323.3	5907588	17.059	17.06	0.001
AUG23-11	382322.4	5907594	17.31	17.31	0
AUG23-47	382610.2	5909322	17.181	17.18	-0.001
AUG15-75	380094.4	5908903	38.702	38.7	-0.002
AUG23-55	382113.8	5908930	17.992	17.99	-0.002
AUG23-34	382886.3	5909422	17.023	17.02	-0.003
AUG15-83	380757	5908706	33.824	33.82	-0.004
AUG15-84	380755	5908708	33.815	33.81	-0.005
AUG23-60	382122.7	5908934	18.005	18	-0.005
AUG23-50	382102.8	5908935	18.026	18.02	-0.006
AUG14-50	385218.3	5908729	19.747	19.74	-0.007
AUG23-37	382430.2	5909239	17.398	17.39	-0.008
AUG23-40	382435.6	5909242	17.398	17.39	-0.008

AUG14-55	385191.4	5908691	19.228	19.22	-0.008
AUG23-56	382116.6	5908928	18.039	18.03	-0.009
AUG23-15	382341.7	5907615	16.83	16.82	-0.01
AUG14-47	385216.9	5908713	19.57	19.56	-0.01
AUG14-44	385212.2	5908697	19.201	19.19	-0.011
AUG23-33	382885.5	5909429	17.131	17.12	-0.011
AUG23-62	382180.7	5908817	17.481	17.47	-0.011
AUG14-46	385219.7	5908699	19.183	19.17	-0.013
AUG23-7	382333.8	5907589	16.833	16.82	-0.013
AUG15-88	380748.7	5908719	33.934	33.92	-0.014
AUG14-57	385197.3	5908692	19.225	19.21	-0.015
AUG14-54	385192.2	5908693	19.296	19.28	-0.016
AUG15-68	380776.1	5908302	33.806	33.79	-0.016
AUG15-71	380772.8	5908295	33.807	33.79	-0.017
AUG14-58	384303.7	5908721	20.229	20.21	-0.019
AUG15-47	376638.8	5907390	42.099	42.08	-0.019
AUG23-57	382120.2	5908920	18.109	18.09	-0.019
AUG15-90	380761.7	5908714	33.639	33.62	-0.019
AUG14-43	385211.5	5908695	19.2	19.18	-0.02
AUG23-51	382099.4	5908943	18.1	18.08	-0.02
AUG14-64	384274	5908721	22.391	22.37	-0.021
AUG23-63	382176.9	5908826	17.722	17.7	-0.022
AUG23-65	382183.3	5908829	17.702	17.68	-0.022
AUG23-53	382108.6	5908937	18.013	17.99	-0.023
AUG23-64	382180.2	5908827	17.723	17.7	-0.023
AUG14-45	385221.3	5908697	19.145	19.12	-0.025
AUG15-49	376618.1	5907394	41.605	41.58	-0.025
AUG14-51	385186.2	5908724	19.885	19.86	-0.025
AUG14-53	385188	5908715	19.796	19.77	-0.026
AUG14-71	384472.4	5909016	19.987	19.96	-0.027
AUG15-42	376632.4	5907396	41.677	41.65	-0.027
AUG15-16	378686.5	5910067	42.098	42.07	-0.028
AUG15-51	376611.2	5907393	41.629	41.6	-0.029
AUG15-50	376611.8	5907393	41.64	41.61	-0.03
AUG15-69	380792.4	5908294	34.032	34	-0.032
AUG15-66	377556.1	5908164	41.075	41.04	-0.035
AUG14-65	384274.5	5908715	22.326	22.29	-0.036
AUG14-62	384290.8	5908714	21.142	21.1	-0.042
AUG15-43	376633.1	5907395	41.753	41.71	-0.043
AUG15-87	380740.4	5908723	34.124	34.08	-0.044

AUG15-61	377596.3	5908127	41.065	41.02	-0.045
AUG15-41	378203.6	5910076	44.977	44.93	-0.047
AUG15-89	380758	5908714	33.727	33.68	-0.047
AUG15-73	380782.7	5908299	33.877	33.83	-0.047
AUG23-16	382334.7	5907614	17.449	17.4	-0.049
AUG15-74	380779.3	5908292	33.9	33.85	-0.05
AUG14-70	384478.4	5909016	19.971	19.92	-0.051
AUG15-67	380773.9	5908305	33.772	33.72	-0.052
AUG23-66	382186.1	5908830	17.672	17.62	-0.052
AUG15-53	376611.5	5907384	42.433	42.38	-0.053
AUG14-56	385195.8	5908694	19.288	19.23	-0.058
AUG15-45	376632.6	5907387	42.268	42.21	-0.058
AUG14-59	384300.6	5908719	20.449	20.39	-0.059
AUG15-48	376639.2	5907397	41.71	41.65	-0.06
AUG15-52	376611.8	5907392	41.711	41.65	-0.061
AUG15-86	380737.9	5908718	34.134	34.07	-0.064
AUG15-44	376632.4	5907384	42.468	42.4	-0.068
AUG14-60	384300.2	5908713	20.439	20.37	-0.069
AUG15-72	380769.2	5908296	33.792	33.72	-0.072
AUG15-70	380789.1	5908287	34.045	33.96	-0.085
AUG14-63	384291.1	5908720	21.158	21.07	-0.088
AUG14-49	385220.2	5908719	19.699	19.6	-0.099
AUG14-52	385191.5	5908716	19.823	19.71	-0.113
AUG15-46	376638.3	5907382	42.581	42.46	-0.121

APPENDIX F

RFFA FREQUENCY CURVES

FIGURE 2: Annual Flood Frequency Curve
02AX003 Little Mecatina River above Lac Fourmont

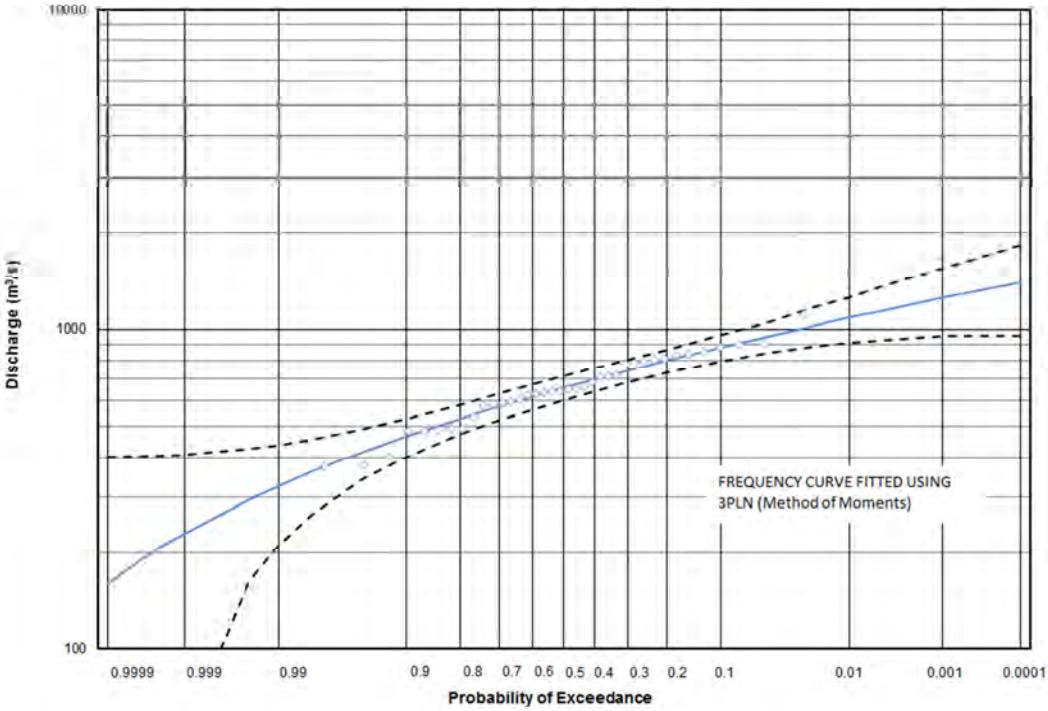


FIGURE 3: Annual Flood Frequency Curve
02XA004 Riviere Joir near Provincial Boundary

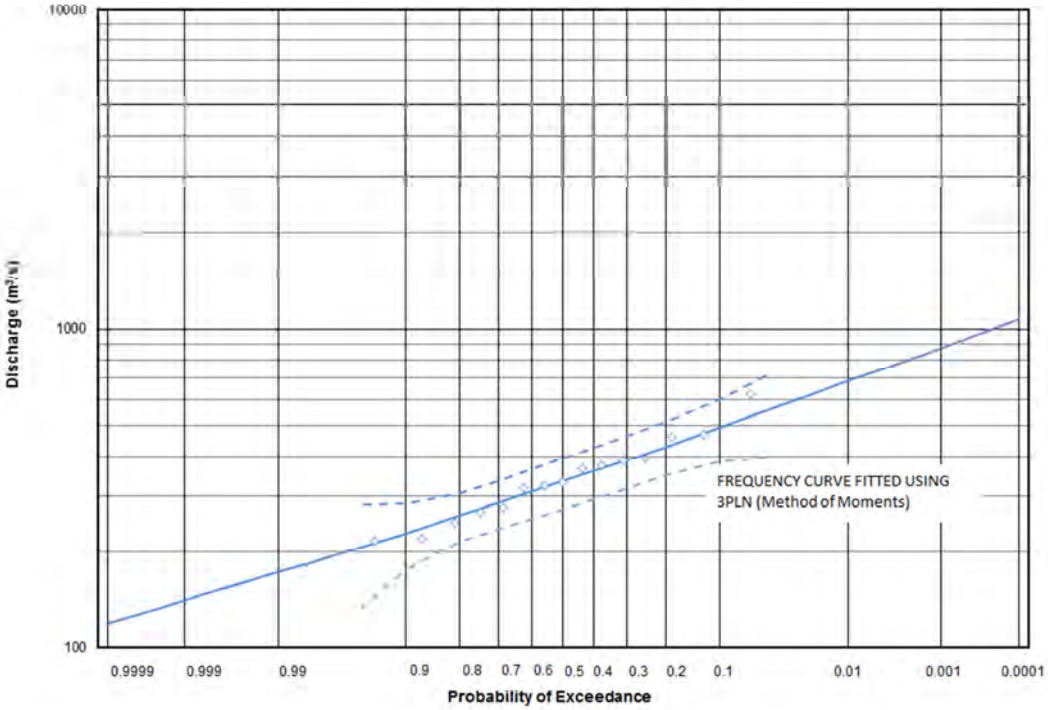


FIGURE 4: Annual Flood Frequency Curve
03NE001 Reid Brook at outlet of Reid Pond

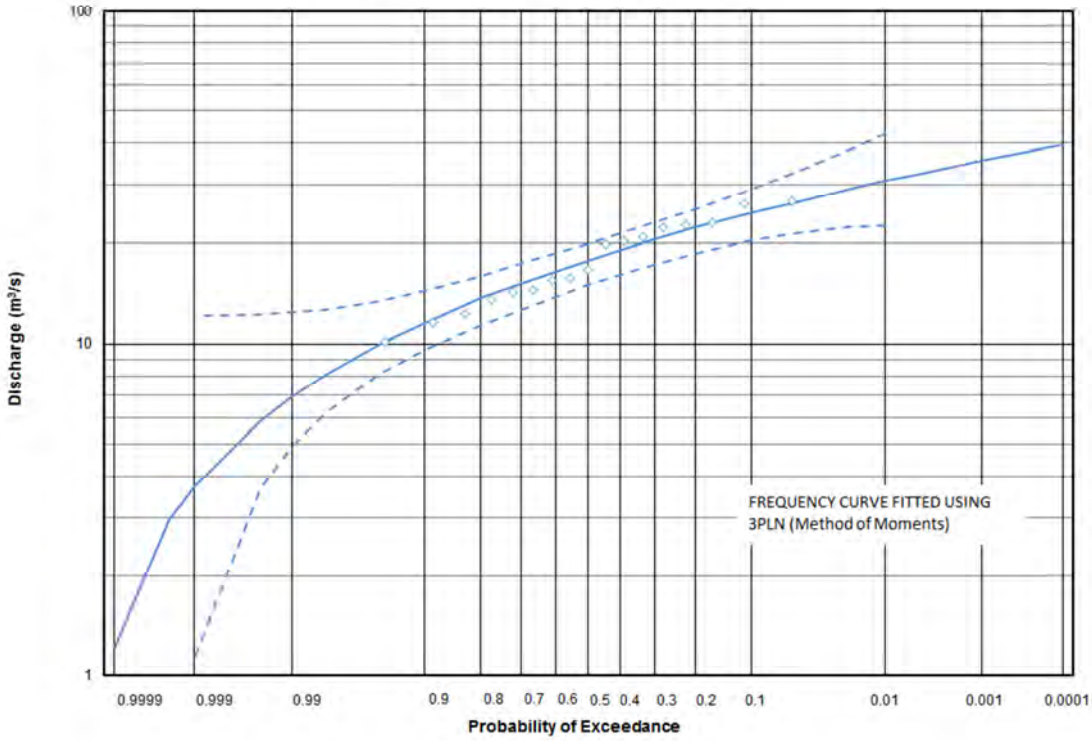


FIGURE 5: Annual Flood Frequency Curve
03NF001 Ugjoktok River below Harp Lake

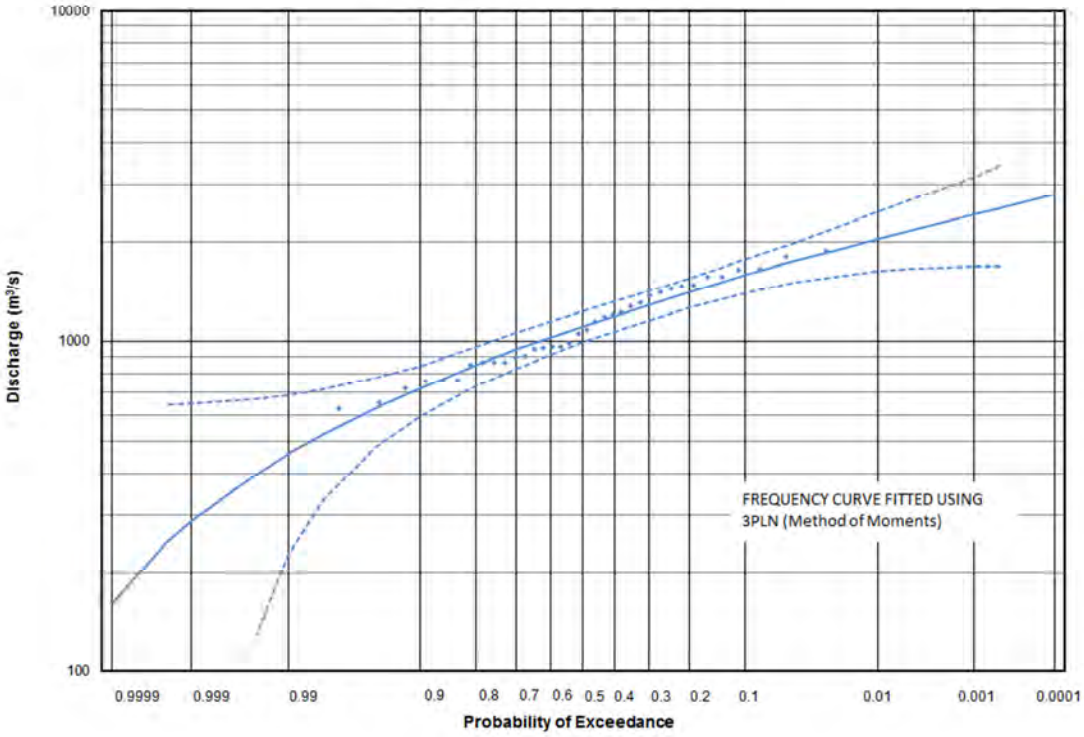


FIGURE 7: Annual Flood Frequency Curve
03OC003 Atikonak River above Panchia Lake

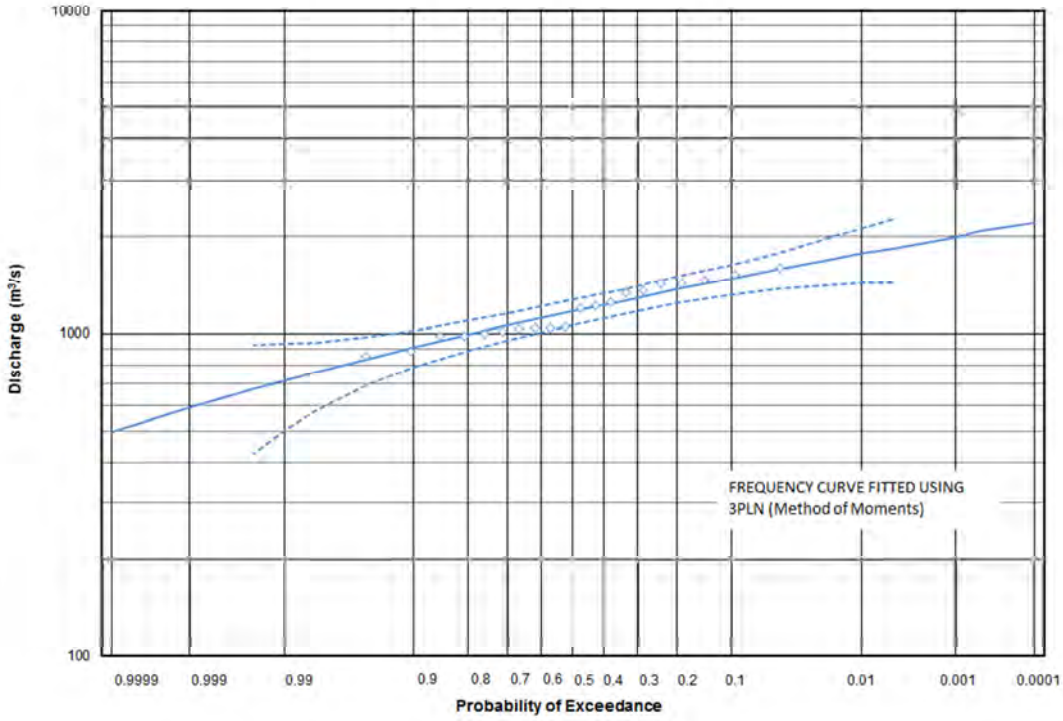


FIGURE 8: Annual Flood Frequency Curve
03OD007 East Metchin River

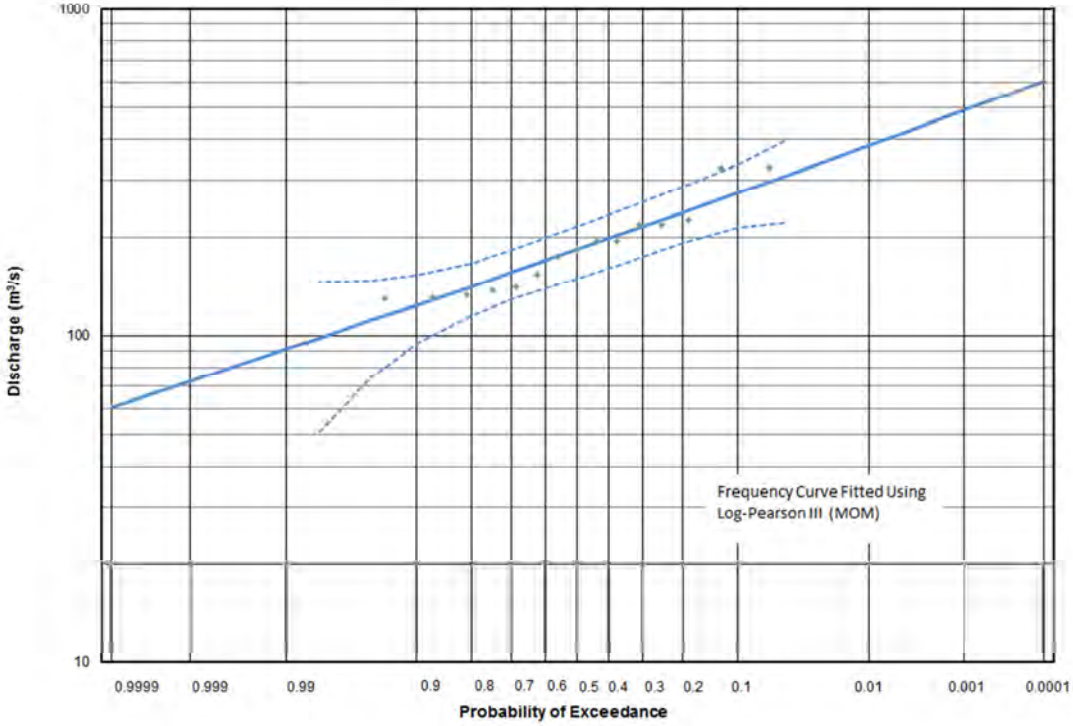


FIGURE 9: Annual Flood Frequency Curve
03OE003 Minipi R below Minipi Lake

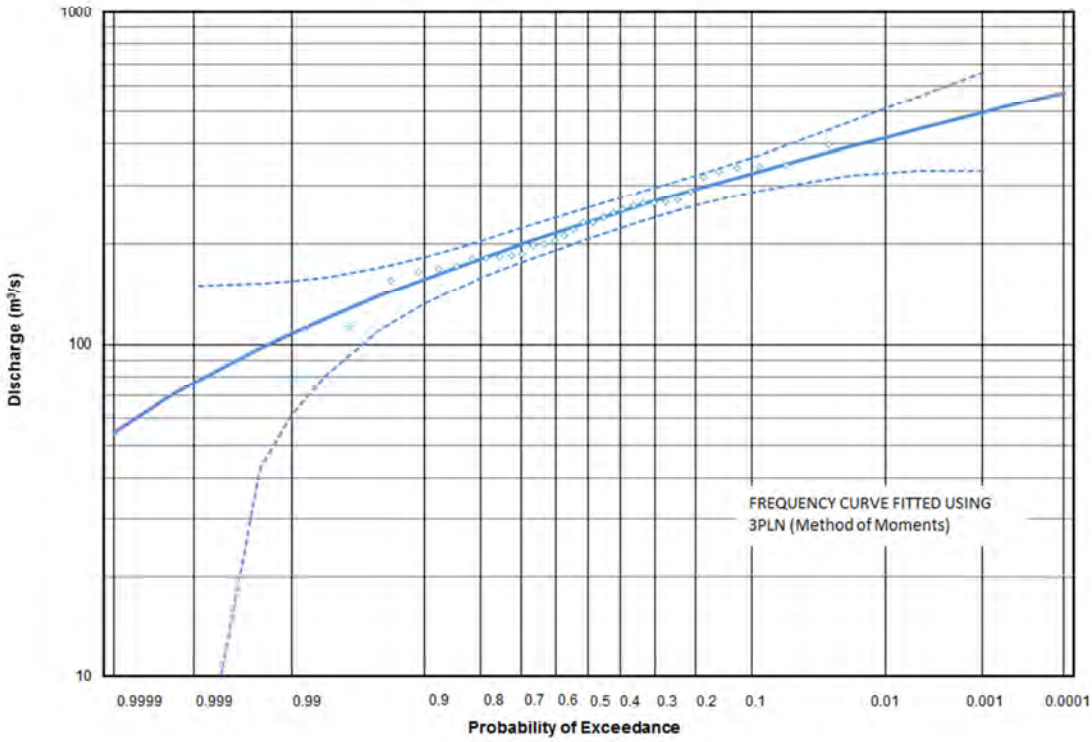


FIGURE 10: Annual Flood Frequency Curve
03OE010 Big Pond Brook below Big Pond

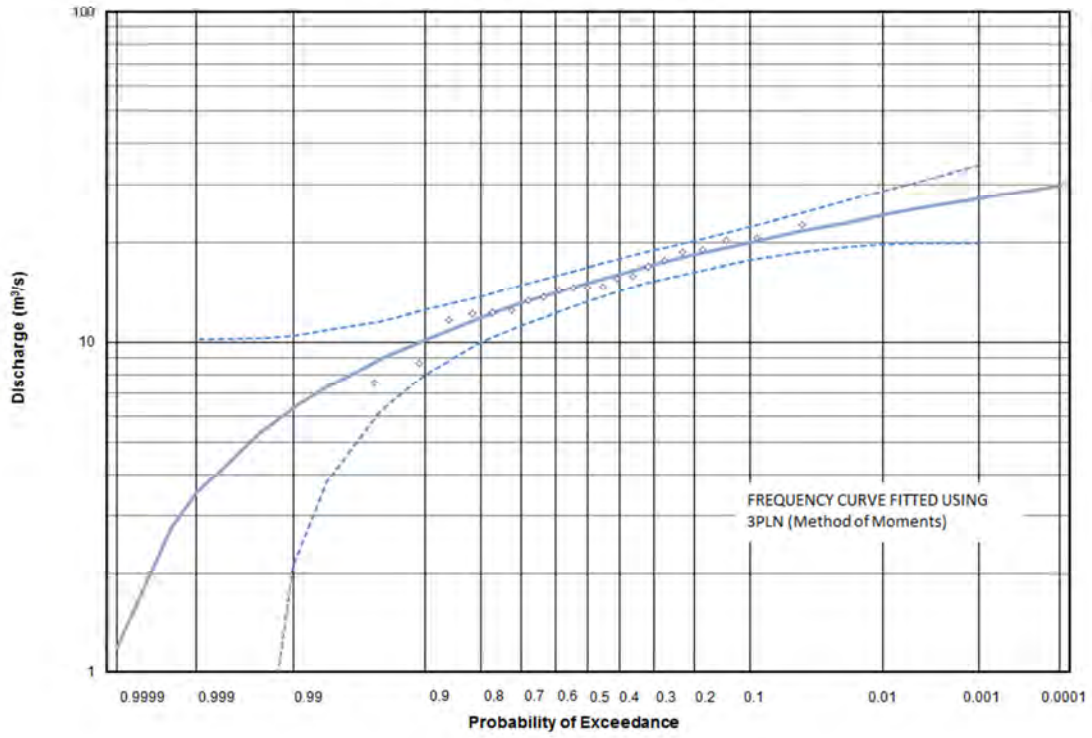


FIGURE 11: Annual Flood Frequency Curve
03OC011 - Pinus River

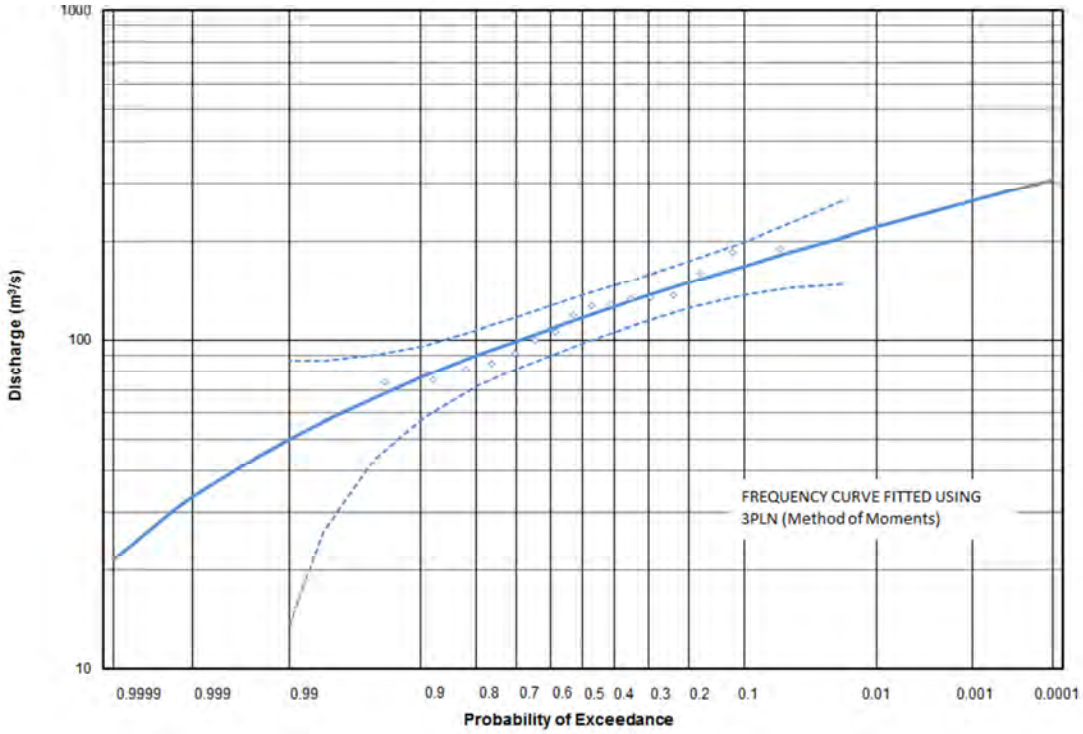


FIGURE 12: Annual Flood Frequency Curve
03PB002 Nasaupi River below Naskaupi Lake

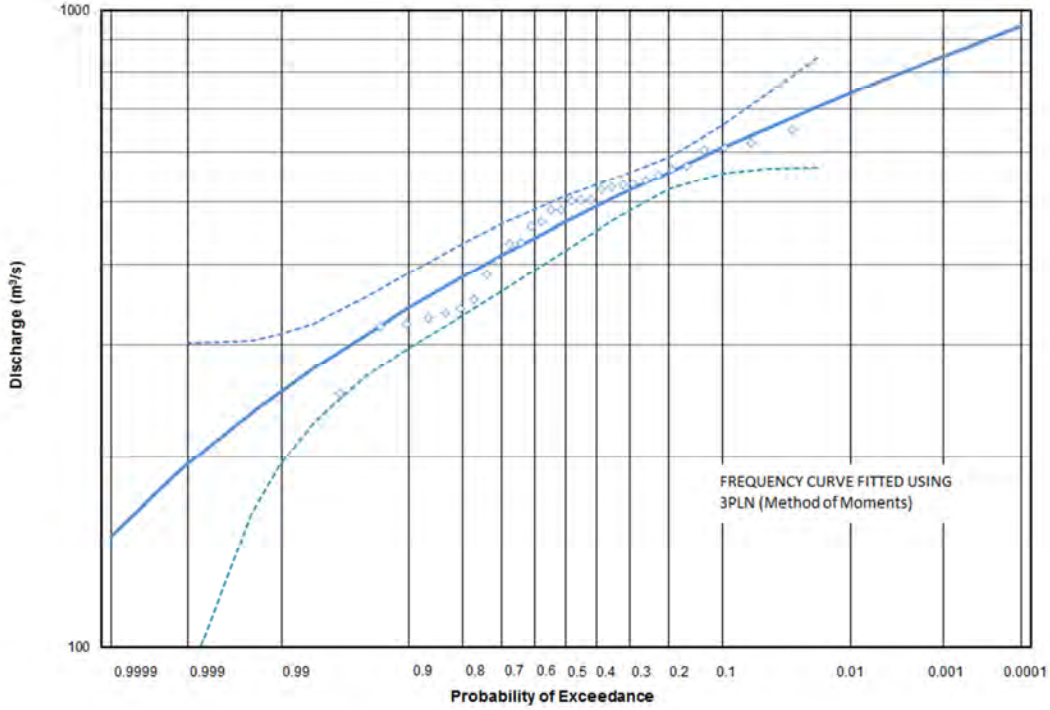
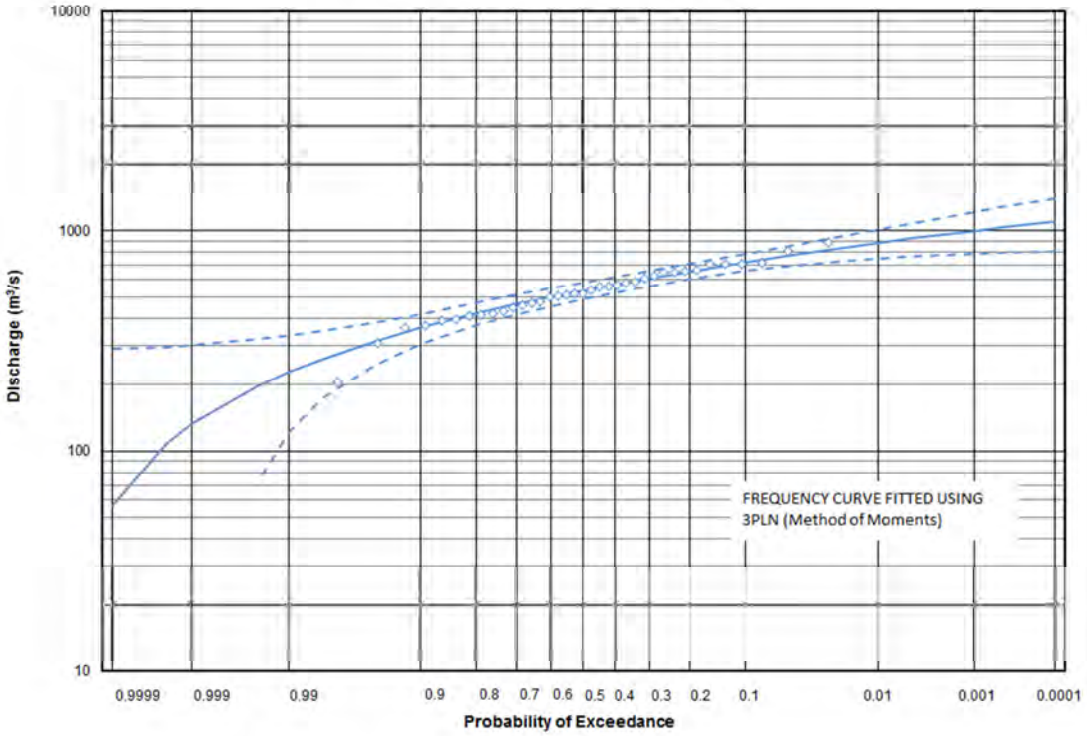
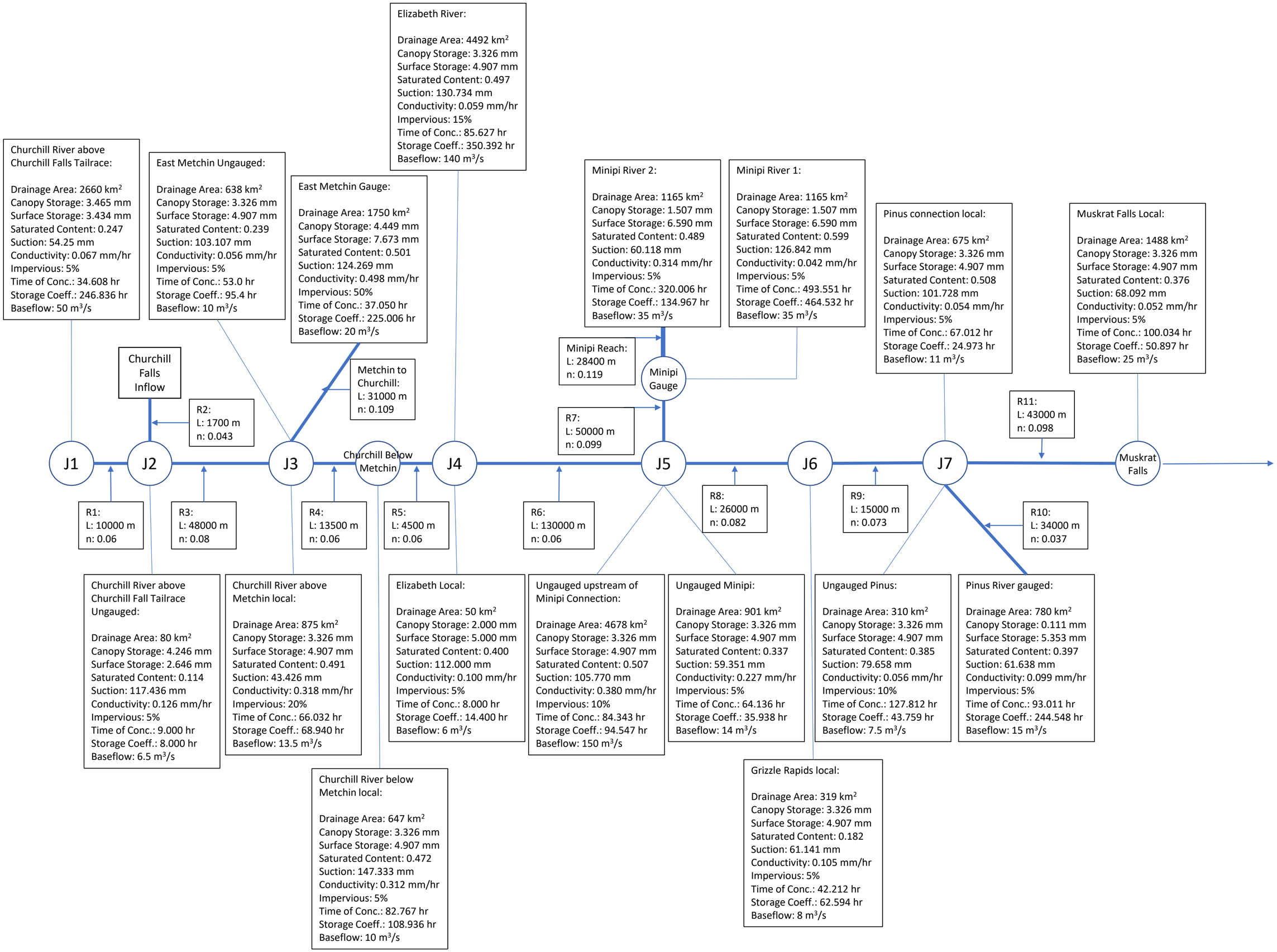


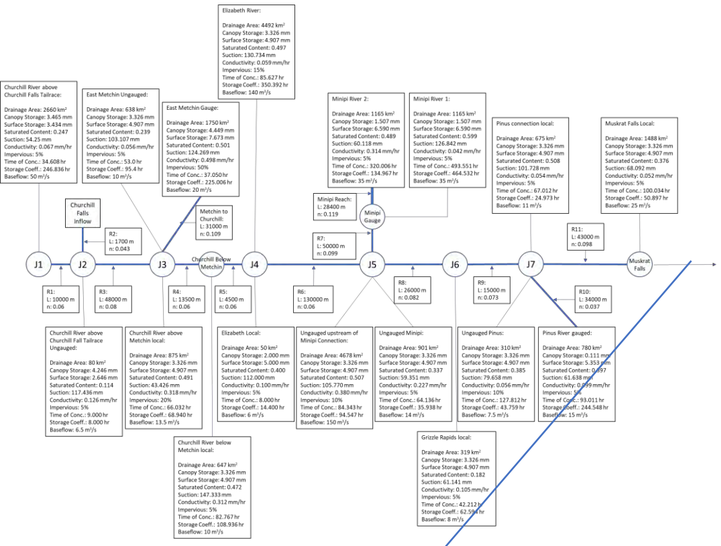
FIGURE 13: Annual Flood Frequency Curve
03QC002 Alexis River near Port Hope Simpson



APPENDIX G

HEC-HMS MODEL SCHEMATIC


Churchill River above Churchill Falls Tailrace:
Drainage Area: 2660 km²
Canopy Storage: 3.465 mm
Surface Storage: 3.434 mm
Saturated Content: 0.247
Suction: 54.25 mm
Conductivity: 0.067 mm/hr
Impervious: 5%
Time of Conc.: 34.608 hr
Storage Coeff.: 246.836 hr
Baseflow: 50 m³/s
East Metchin Ungauged:
Drainage Area: 638 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.239
Suction: 103.107 mm
Conductivity: 0.056 mm/hr
Impervious: 5%
Time of Conc.: 53.0 hr
Storage Coeff.: 95.4 hr
Baseflow: 10 m³/s
East Metchin Gauge:
Drainage Area: 1750 km²
Canopy Storage: 4.449 mm
Surface Storage: 7.673 mm
Saturated Content: 0.501
Suction: 124.269 mm
Conductivity: 0.498 mm/hr
Impervious: 50%
Time of Conc.: 37.050 hr
Storage Coeff.: 225.006 hr
Baseflow: 20 m³/s
Elizabeth River:
Drainage Area: 4492 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.497
Suction: 130.734 mm
Conductivity: 0.059 mm/hr
Impervious: 15%
Time of Conc.: 85.627 hr
Storage Coeff.: 350.392 hr
Baseflow: 140 m³/s
Minipi River 2:
Drainage Area: 1165 km²
Canopy Storage: 1.507 mm
Surface Storage: 6.590 mm
Saturated Content: 0.489
Suction: 60.118 mm
Conductivity: 0.314 mm/hr
Impervious: 5%
Time of Conc.: 320.006 hr
Storage Coeff.: 134.967 hr
Baseflow: 35 m³/s
Minipi River 1:
Drainage Area: 1165 km²
Canopy Storage: 1.507 mm
Surface Storage: 6.590 mm
Saturated Content: 0.599
Suction: 126.842 mm
Conductivity: 0.042 mm/hr
Impervious: 5%
Time of Conc.: 493.551 hr
Storage Coeff.: 464.532 hr
Baseflow: 35 m³/s
Pinus connection local:
Drainage Area: 675 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.508
Suction: 101.728 mm
Conductivity: 0.054 mm/hr
Impervious: 5%
Time of Conc.: 67.012 hr
Storage Coeff.: 24.973 hr
Baseflow: 11 m³/s
Muskrat Falls Local:
Drainage Area: 1488 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.376
Suction: 68.092 mm
Conductivity: 0.052 mm/hr
Impervious: 5%
Time of Conc.: 100.034 hr
Storage Coeff.: 50.897 hr
Baseflow: 25 m³/s
Churchill Falls Inflow
R2: L: 1700 m n: 0.043
Metchin to Churchill: L: 31000 m n: 0.109
Minipi Reach: L: 28400 m n: 0.119
Minipi Gauge
R7: L: 50000 m n: 0.099
R11: L: 43000 m n: 0.098
J1
J2
J3
Churchill Below Metchin
J4
J5
J6
J7
Muskrat Falls
R1: L: 10000 m n: 0.06
R3: L: 48000 m n: 0.08
R4: L: 13500 m n: 0.06
R5: L: 4500 m n: 0.06
R6: L: 130000 m n: 0.06
R8: L: 26000 m n: 0.082
R9: L: 15000 m n: 0.073
R10: L: 34000 m n: 0.037
Churchill River above Churchill Fall Tailrace Ungauged:
Drainage Area: 80 km²
Canopy Storage: 4.246 mm
Surface Storage: 2.646 mm
Saturated Content: 0.114
Suction: 117.436 mm
Conductivity: 0.126 mm/hr
Impervious: 5%
Time of Conc.: 9.000 hr
Storage Coeff.: 8.000 hr
Baseflow: 6.5 m³/s
Churchill River above Metchin local:
Drainage Area: 875 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.491
Suction: 43.426 mm
Conductivity: 0.318 mm/hr
Impervious: 20%
Time of Conc.: 66.032 hr
Storage Coeff.: 68.940 hr
Baseflow: 13.5 m³/s
Elizabeth Local:
Drainage Area: 50 km²
Canopy Storage: 2.000 mm
Surface Storage: 5.000 mm
Saturated Content: 0.400
Suction: 112.000 mm
Conductivity: 0.100 mm/hr
Impervious: 5%
Time of Conc.: 8.000 hr
Storage Coeff.: 14.400 hr
Baseflow: 6 m³/s
Ungauged upstream of Minipi Connection:
Drainage Area: 4678 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.507
Suction: 105.770 mm
Conductivity: 0.380 mm/hr
Impervious: 10%
Time of Conc.: 84.343 hr
Storage Coeff.: 94.547 hr
Baseflow: 150 m³/s
Ungauged Minipi:
Drainage Area: 901 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.337
Suction: 59.351 mm
Conductivity: 0.227 mm/hr
Impervious: 5%
Time of Conc.: 64.136 hr
Storage Coeff.: 35.938 hr
Baseflow: 14 m³/s
Ungauged Pinus:
Drainage Area: 310 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.385
Suction: 79.658 mm
Conductivity: 0.056 mm/hr
Impervious: 10%
Time of Conc.: 127.812 hr
Storage Coeff.: 43.759 hr
Baseflow: 7.5 m³/s
Pinus River gauged:
Drainage Area: 780 km²
Canopy Storage: 0.111 mm
Surface Storage: 5.353 mm
Saturated Content: 0.397
Suction: 61.638 mm
Conductivity: 0.099 mm/hr
Impervious: 5%
Time of Conc.: 93.011 hr
Storage Coeff.: 244.548 hr
Baseflow: 15 m³/s
Churchill River below Metchin local:
Drainage Area: 647 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.472
Suction: 147.333 mm
Conductivity: 0.312 mm/hr
Impervious: 5%
Time of Conc.: 82.767 hr
Storage Coeff.: 108.936 hr
Baseflow: 10 m³/s
Grizzle Rapids local:
Drainage Area: 319 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.182
Suction: 61.141 mm
Conductivity: 0.105 mm/hr
Impervious: 5%
Time of Conc.: 42.212 hr
Storage Coeff.: 62.594 hr
Baseflow: 8 m³/s



Outlet Local:

Drainage Area: 277 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.4
Suction: 75.0 mm
Conductivity: 0.06 mm/hr
Impervious: 5%
Time of Conc.: 38.0 hr
Storage Coeff.: 40.0 hr
Baseflow: 7.5 m³/s

R12:

L: 3300 m
n: 0.06

R13:

L: 4700 m
n: 0.06

R14:

L: 10400 m
n: 0.06

R15:

L: 7100 m
n: 0.06

R16:

L: 9300 m
n: 0.06

R17:

L: 8500 m
n: 0.06

Muskrat Falls — J8 — J9 — J10 — J11 — J12 — Outlet

Lateral Inflow 1:

Drainage Area: 212 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.4
Suction: 75.0 mm
Conductivity: 0.06 mm/hr
Impervious: 8%
Time of Conc.: 35.0 hr
Storage Coeff.: 50.0 hr
Baseflow: 7.5 m³/s

Lateral Inflow 2:

Drainage Area: 50 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.4
Suction: 75.0 mm
Conductivity: 0.06 mm/hr
Impervious: 5%
Time of Conc.: 8.0 hr
Storage Coeff.: 8.0 hr
Baseflow: 25.0 m³/s

Lateral Inflow 3:

Drainage Area: 78 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.4
Suction: 75.0 mm
Conductivity: 0.06 mm/hr
Impervious: 5%
Time of Conc.: 9.0 hr
Storage Coeff.: 10.0 hr
Baseflow: 6.25 m³/s

Lateral Inflow 4:

Drainage Area: 57 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.4
Suction: 75.0 mm
Conductivity: 0.06 mm/hr
Impervious: 5%
Time of Conc.: 8.0 hr
Storage Coeff.: 8.0 hr
Baseflow: 6.5 m³/s

Lateral Inflow 5:

Drainage Area: 1015 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.4
Suction: 75.0 mm
Conductivity: 0.06 mm/hr
Impervious: 5%
Time of Conc.: 48.0 hr
Storage Coeff.: 50.0 hr
Baseflow: 16.0 m³/s

Mud Lake:

Drainage Area: 117 km²
Canopy Storage: 3.326 mm
Surface Storage: 4.907 mm
Saturated Content: 0.4
Suction: 75.0 mm
Conductivity: 0.06 mm/hr
Impervious: 5%
Time of Conc.: 300.0 hr
Storage Coeff.: 400.4 hr
Baseflow: 6.5 m³/s

APPENDIX H

PRECIPITATION DATA

Goose A – Maximum Annual Precipitation (mm)

Year	5 min	10 min	15 min	30 min	1 hour	2 hour	6 hour	12 hour	24 hour
1961	2.3	4.1	4.1	7.1	8.4	12.7	22.9	37.6	57.4
1962	4.1	5.1	6.3	6.9	6.9	9.9	20.6	33.0	37.8
1963	11.2	20.1	24.6	33.3	35.6	39.1	61.2	67.8	75.2
1966	5.8	11.2	11.4	11.4	11.4	14.2	26.7	44.2	59.9
1967	5.6	8.9	9.1	13.5	15.7	17.3	18.3	24.4	36.8
1968	2.5	3.6	4.3	5.3	8.1	13.5	24.4	31.7	44.7
1969	2.8	5.3	7.6	8.6	15.5	16.3	28.4	37.3	38.1
1970	4.1	6.6	8.9	11.7	15.7	24.4	30.2	36.8	46.2
1971	5.3	7.1	7.9	8.1	8.1	9.4	20.6	29.7	31.7
1972	5.1	7.4	9.1	10.4	14.0	14.2	20.1	31.0	39.6
1973	6.3	9.9	12.4	15.0	19.3	31.7	38.9	40.9	41.1
1974	3.0	4.6	5.1	6.9	10.7	11.2	22.1	33.3	43.9
1975	4.1	5.1	6.1	7.9	9.1	11.7	13.7	18.0	18.8
1976	3.3	3.6	5.6	8.6	10.7	14.2	30.2	44.2	50.3
1977	3.8	4.1	4.1	4.8	6.6	8.1	19.3	27.2	31.2
1978	3.0	3.6	4.6	5.6	8.4	12.1	21.3	26.0	33.8
1979	3.9	4.7	4.7	4.7	8.0	10.6	24.0	30.2	36.3
1980	1.9	3.3	5.2	6.8	8.1	10.6	26.3	33.6	44.3
1981	2.2	4.0	4.8	6.5	10.6	19.4	44.6	60.0	68.0
1982	1.4	1.7	2.5	4.7	8.8	13.9	20.9	22.5	22.8
1983	3.7	7.3	7.3	8.8	10.5	13.0	26.0	32.4	43.6
1984	3.2	4.3	4.9	5.9	8.1	11.1	21.4	24.2	29.5
1985	4.5	5.2	5.4	7.0	8.3	15.3	28.8	40.3	47.3
1986	5.6	9.0	9.8	10.5	11.2	12.5	24.7	32.9	40.9
1987	5.5	6.6	6.8	7.9	11.8	18.2	21.0	31.7	36.4
1988	2.6	3.6	4.0	5.5	7.2	14.3	24.8	28.9	30.8
1989	6.2	6.6	6.6	6.6	7.4	12.6	22.7	35.3	56.6
1990	4.5	7.1	8.3	9.6	9.8	10.8	18.4	23.4	27.2
1991	4.4	8.0	10.4	16.8	17.4	17.4	26.3	37.8	43.2
1992	2.5	3.2	4.0	6.7	8.8	11.1	18.2	25.2	33.1
1993	2.8	4.3	5.0	6.3	10.8	11.9	15.1	24.9	34.1
1994	3.1	4.2	4.7	6.2	12.2	15.1	26.8	34.4	39.8
1995	4.6	5.2	6.3	7.9	13.0	16.9	20.0	22.2	29.8
1996	3.9	5.4	7.4	11.6	15.9	21.5	25.3	34.8	51.1
1997	3.7	5.3	6.2	7.3	10.0	13.3	26.7	39.7	55.1
1998	5.4	10.5	11.9	15.7	15.9	15.9	17.8	25.3	34.3
1999	8.2	11.9	15.8	15.8	18.5	22.3	28.0	43.8	72.2
2000	3.5	4.1	5.7	6.3	8.2	12.2	24.0	29.5	32.2
2001	7.1	7.3	8.7	13.0	13.6	13.6	26.9	35.0	50.6
2002	5.1	6.3	7.1	7.3	8.5	16.1	28.2	41.3	52.5
2003	2.8	4.4	5.4	8.8	9.6	11.2	19.1	22.7	32.9
2004	4.4	7.3	9.9	13.3	14.3	15.9	38.8	40.4	47.7
2005	1.9	2.4	3.2	5.4	9.6	15.6	28.6	31.6	40.6
2006	6.9	10.8	15.0	20.3	20.3	20.3	20.5	26.6	37.1
2007	2.6	4.8	5.4	9.2	11.4	13.4	24.5	30.5	41.9
2008	3.8	6.3	8.2	10.9	16.2	23.1	29.2	45.7	61.6
2009	5.1	7.5	11.3	15.8	17.4	17.6		40.4	58.4
2010	8.3	12.3	13.0	13.8	14.4	15.6	21.4	33.5	41.2
2011	5.1	6.1	6.7	7.6	9.0	15.0	22.6	22.6	31.0
2012	2.1	3.1	4.2	4.8	6.0	8.1	18.8	29.2	39.2
2013	3.1	3.7	3.7	4.2	7.2	10.9	24.1	35.8	39.6

Churchill Falls A – Maximum Annual Precipitation (mm)

Year	5 min	10 min	15 min	30 min	1 hour	2 hour	6 hour	12 hour	24 hour
1969	6.6	7.9	8.4	8.4	9.7	16.0	33.8	44.4	49.3
1970	3.0	6.1	7.1	9.1	10.2	12.2	21.6	27.9	29.5
1971	3.0	4.6	5.8	7.1	8.9	10.2	13.5	20.6	28.2
1972	4.8	5.6	5.8	6.6	10.7	17.5	26.4	31.0	32.8
1973	4.6	8.4	10.7	12.2	13.7	14.0	21.8	30.7	35.1
1974	3.8	5.6	5.8	6.1	7.1	9.7	12.7	18.8	29.5
1975	4.3	5.1	5.3	6.1	9.1	16.5	35.8	53.3	59.9
1976	5.1	7.4	8.1	9.4	11.2	11.7	19.6	30.7	38.1
1978	3.7	5.3	5.8	5.8	8.2	12.4	21.9	38.4	48.7
1979	5.9	6.1	7.3	10.2	11.8	16.5	29.0	33.7	36.8
1980	2.9	5.2	7.9	13.3	16.0	18.7	20.0	25.6	29.7
1981	5.8	7.7	10.1	14.3	14.4	16.1	16.9	25.4	39.4
1982	3.4	3.6	5.1	8.6	14.3	18.4	20.4	24.2	38.6
1983	3.7	3.7	3.7	6.7	8.6	10.3	18.3	20.7	22.7
1984	4.9	6.2	8.1	10.3	11.0	13.7	23.7	32.4	43.6
1985	4.4	4.8	5.1	7.5	8.1	11.5	14.2	22.3	30.9
1986	8.3	11.7	13.5	14.7	15.0	15.2	23.9	28.2	48.5
1987	9.6	15.7	18.4	20.2	20.2	21.2	26.0	27.6	33.1
1988	3.7	3.9	4.8	6.8	7.5	9.7	15.3	24.2	34.6
1989	6.3	8.0	12.0	16.0	17.2	17.4	18.4	24.7	29.3
1990	8.6	10.1	10.6	13.3	13.3	13.3	16.5	26.1	36.3
1991	2.1	3.6	5.1	7.4	9.8	16.4	29.8	34.8	34.8
1992	2.0	2.5	3.3	3.8	5.1	8.9	16.6	20.1	25.5
1994								29.0	36.0
1995							41.0	45.0	66.0
1996							35.0	35.0	38.0
1997							24.0	34.0	41.0
1998							22.0	26.0	29.0
1999							28.0	31.0	35.0
2000							13.0	19.0	29.0
2001							20.0	35.0	36.6
2002							15.0	28.0	30.0
2003							25.0	29.0	36.0
2005							29.0	38.0	40.0
2006							25.0	41.0	48.0
2007							17.0	30.0	37.0
2008							13.0	22.0	33.0
2009							13.0	21.0	31.0
2011							28.0	38.0	50.0
2012							19.0	32.0	38.8
2013								33.0	43.5

Wabush A – Maximum Annual Precipitation (mm)

Year	5 min	10 min	15 min	30 min	1 hour	2 hour	6 hour	12 hour	24 hour
1974	6.6	10.4	13.5	21.1	26.2	28.4	32.0	32.0	35.3
1975	4.6	5.8	6.1	6.9	8.1	11.9	20.8	24.6	34.3
1976	2.8	3.8	5.1	9.7	12.2	16.5	21.8	25.9	35.6
1977	2.5	3.6	4.3	6.1	10.2	16.5	18.8	37.1	38.1
1978	8.1	11.1	11.8	15.9	21.2	24.6	26.6	31.6	41.9
1979	2.7	4.2	5.8	8.8	10.8	17.2	25.5	34.3	39.4
1980	4.2	7.6	10.6	16.4	21.2	27.8	32.6	42.2	43.2
1981	3.9	4.9	6.0	11.6	17.5	21.2	27.3	38.6	62.0
1982	4.8	4.8	5.2	10.2	11.2	12.8	19.9	34.8	46.6
1983					13.3	17.7	20.0	22.9	26.2
1984	7.7	14.5	18.3	20.0	24.9	25.2	29.4	35.6	43.3
1985	3.2	5.3	7.2	10.6	11.7	12.4	17.2	24.8	24.8
1986	4.0	4.9	5.3	6.2	6.4	11.9	18.4	23.7	33.0
1987	2.2	3.7	4.5	5.6	9.0	10.4	16.5	24.0	33.0
1988	4.7	5.7	6.0	6.7	8.9	12.5	17.7	23.2	29.2
1989	3.9	6.8	7.3	10.0	14.5	17.4	21.0	27.7	34.2
1990					7.7	11.8	25.4	38.3	59.1
1991	2.8	4.0	5.5	9.1	10.5	20.2	36.6	45.6	46.2
1992									
1993	10.4	12.8	15.3	20.3	25.3	25.9	26.7	26.9	33.9
1994	2.9	4.1	4.8	6.0	6.6	7.1	9.2	14.5	19.7
1995	3.0	5.2	6.2	6.8	8.7	12.7	12.9	17.6	27.6
1996	7.6	7.6	7.6	8.6	8.6	9.6	17.3	23.2	27.4
1997	3.2	4.3	5.3	7.7	9.2	10.3	19.8	34.7	41.1
1998	1.2	2.1	2.7	4.1	6.5	8.2	13.7	21.2	25.5
1999									
2000	8.1	10.7	11.1	11.1	11.1	11.1	17.0	25.0	31.4
2001	4.0	4.8	5.8	6.7	6.7	7.7	15.4	19.8	26.6
2002	4.5	6.7	9.8	16.7	17.6	17.9	28.6	30.2	31.2
2003							29.0	37.0	38.0
2004							15.0	24.0	32.0
2005							20.0	28.0	30.6
2006							19.0	29.0	34.0
2007							19.0	21.0	36.0
2008							22.0	26.0	43.0
2009							33.0	53.0	66.0
2010							31.0	40.0	44.0
2011							23.0	28.0	33.0
2012									

Schefferville A – Maximum Annual Precipitation (mm)

Year	5 min	10 min	15 min	30 min	1 hour	2 hour	6 hour	12 hour	24 hour
1965	3.6	4.1	4.1	4.3	8.4	13.2	17.8	23.6	24.9
1966	2.8	4.1	4.6	7.1	10.2	17.3	29.5	30.5	30.5
1967	4.8	8.1	8.6	9.1	10.9	15.2	35.1	43.2	47.2
1969	3.6	5.3	6.1	6.3	8.4	10.4	11.7	17.3	22.1
1972	4.1	5.3	5.8	7.1	8.6	11.2	20.1	22.6	25.9
1973	6.6	10.2	12.4	14.5	14.5	16.5	20.6	20.6	21.3
1974	2.3	3.6	4.8	5.1	6.1	8.6	16.8	24.1	39.1
1975	11.4	12.4	14.0	17.8	22.1	22.6	27.7	34.0	40.1
1976	6.1	8.6	8.9	10.4	10.4	10.4	17.3	29.2	42.2
1978	2.6	3.5	4.4	5.8	9.8	10.5	20.0	23.2	32.8
1979	8.6	9.0	9.0	9.0	9.8	15.0	22.5	23.7	30.7
1980	5.4	8.9	11.2	13.7	17.9	22.2	28.5	42.5	56.6
1981				7.9	9.8	10.1	18.3	29.7	37.9
1982	2.8	4.4	4.4	5.4	9.9	12.7	18.1	22.1	29.4
1983	5.1	6.8	7.3	8.9	12.9	16.6	26.4	33.1	38.8
1984	5.6	7.3	7.8	8.2	8.2	11.0	23.8	26.4	31.5
1985	1.3	2.0	2.4	2.6	4.0	6.6	13.1	18.7	20.7
1986	2.5	3.0	3.8	4.8	9.1	13.1	21.8	25.5	35.1
1987	3.5	5.3	5.5	5.5	8.6	13.5	30.1	45.5	47.7
1988	2.0	3.2	3.3	5.5	7.8	11.1	20.2	26.1	50.1
1989	2.9	5.5	8.0	12.4	17.2	17.7	32.2	47.8	59.1
1990	1.3	2.4	3.7	7.1	13.0	21.2	33.9	53.3	83.4
1991	1.9	2.9	4.1	6.0	9.1	16.3	27.8	33.8	37.0
1992	3.7	5.8	7.1	8.9	9.7	14.7	27.5	37.9	56.2

APPENDIX I

UPDATED IDF CURVE DATA

Goose A – Updated IDF Curve (Historical)

Duration (Minutes)	Return Period (Years)							
	2	5	10	20	50	100	200	500
5	48.968	70.821	85.311	99.371	117.457	131.307	144.827	163.490
10	33.063	48.859	59.294	69.272	82.357	92.004	101.954	115.144
15	26.121	38.613	46.866	54.719	65.101	72.638	80.579	90.953
30	17.357	25.318	30.568	35.539	42.170	46.900	51.987	58.551
60	11.485	16.353	19.550	22.570	26.619	29.479	32.573	36.563
120	7.583	10.479	12.373	14.161	16.566	18.257	20.081	22.449
360	3.920	5.137	5.932	6.686	7.706	8.422	9.183	10.193
720	2.583	3.269	3.720	4.151	4.736	5.148	5.580	6.164
1440	1.702	2.079	2.330	2.574	2.907	3.143	3.386	3.722

Churchill Falls A – Updated IDF Curve (Historical)

Duration (Minutes)	Return Period (Years)							
	2	5	10	20	50	100	200	500
5	54.960	78.471	94.424	109.341	128.691	143.765	158.113	178.070
10	35.325	49.726	59.310	68.422	80.116	88.999	98.092	110.108
15	27.270	37.989	45.075	51.836	60.477	66.997	73.811	82.688
30	17.517	23.921	28.130	32.146	37.252	41.094	45.166	50.425
60	11.250	15.038	17.526	19.890	22.883	25.147	27.539	30.640
120	7.225	9.446	10.910	12.292	14.038	15.370	16.761	18.584
360	3.581	4.517	5.143	5.726	6.462	7.036	7.617	8.399
720	2.299	2.836	3.200	3.535	3.960	4.296	4.629	5.087
1440	1.477	1.780	1.990	2.183	2.426	2.623	2.812	3.080

Wabush A – Updated IDF Curve (Historical)

Duration (Minutes)	Return Period (Years)							
	2	5	10	20	50	100	200	500
5	50.059	74.122	90.092	105.381	125.166	140.019	155.289	175.269
10	35.144	51.900	63.020	73.666	87.442	97.785	108.417	122.330
15	28.079	41.522	50.444	58.985	70.038	78.335	86.866	98.028
30	19.394	28.213	34.066	39.669	46.920	52.363	57.959	65.282
60	11.803	17.213	20.804	24.241	28.689	32.029	35.462	39.954
120	7.387	10.178	12.031	13.804	16.099	17.821	19.592	21.910
360	3.523	4.473	5.103	5.706	6.487	7.073	7.676	8.465
720	2.354	2.965	3.370	3.758	4.259	4.636	5.024	5.530
1440	1.466	1.839	2.087	2.325	2.632	2.862	3.099	3.409

Schefferville A – Updated IDF Curve (Historical)

Duration (Minutes)	Return Period (Years)							
	2	5	10	20	50	100	200	500
5	42.295	67.851	82.811	97.121	115.766	129.698	143.202	161.248
10	30.012	43.996	53.214	62.065	73.571	82.140	90.441	101.556
15	23.589	34.147	41.085	47.763	56.434	62.880	69.122	77.491
30	15.628	22.142	26.401	30.523	35.865	39.823	43.655	48.805
60	10.354	14.357	16.966	19.506	22.793	25.220	27.571	30.738
120	6.860	9.309	10.902	12.465	14.485	15.973	17.413	19.359
360	3.572	4.685	5.409	6.130	7.061	7.744	8.405	9.304
720	2.366	3.038	3.476	3.918	4.488	4.904	5.308	5.860
1440	1.568	1.970	2.234	2.503	2.852	3.106	3.353	3.690

APPENDIX J

CLIMATE CHANGE AFFECTED IDF CURVE DATA

Goose A – Climate Change IDF Curve

Duration (Minutes)	Return Period (Years)					
	2	5	10	25	50	100
5	66.439	92.666	109.576	131.813	148.992	164.935
10	43.960	60.888	71.849	86.081	96.655	107.074
15	34.372	47.321	55.710	66.554	74.505	82.504
30	22.474	30.562	35.794	42.530	47.411	52.422
60	14.649	19.649	22.874	27.020	30.016	33.119
120	9.533	12.603	14.578	17.116	18.954	20.863
360	4.819	6.221	7.120	8.278	9.125	10.002
720	3.132	3.983	4.527	5.231	5.750	6.285
1440	2.035	2.549	2.877	3.305	3.622	3.948

Churchill Falls A – Climate Change IDF Curve

Duration (Minutes)	Return Period (Years)					
	2	5	10	25	50	100
5	74.835	102.942	116.793	134.397	148.009	162.057
10	47.487	65.160	73.829	84.909	93.264	101.863
15	36.307	49.627	56.129	64.456	70.688	77.088
30	22.893	31.012	34.933	39.965	43.710	47.540
60	14.412	19.314	21.653	24.657	26.894	29.171
120	9.065	12.009	13.394	15.175	16.506	17.854
360	4.345	5.646	6.243	7.014	7.596	8.181
720	2.731	3.506	3.855	4.307	4.652	4.996
1440	1.717	2.176	2.380	2.645	2.848	3.051

Wabush A – Climate Change IDF Curve

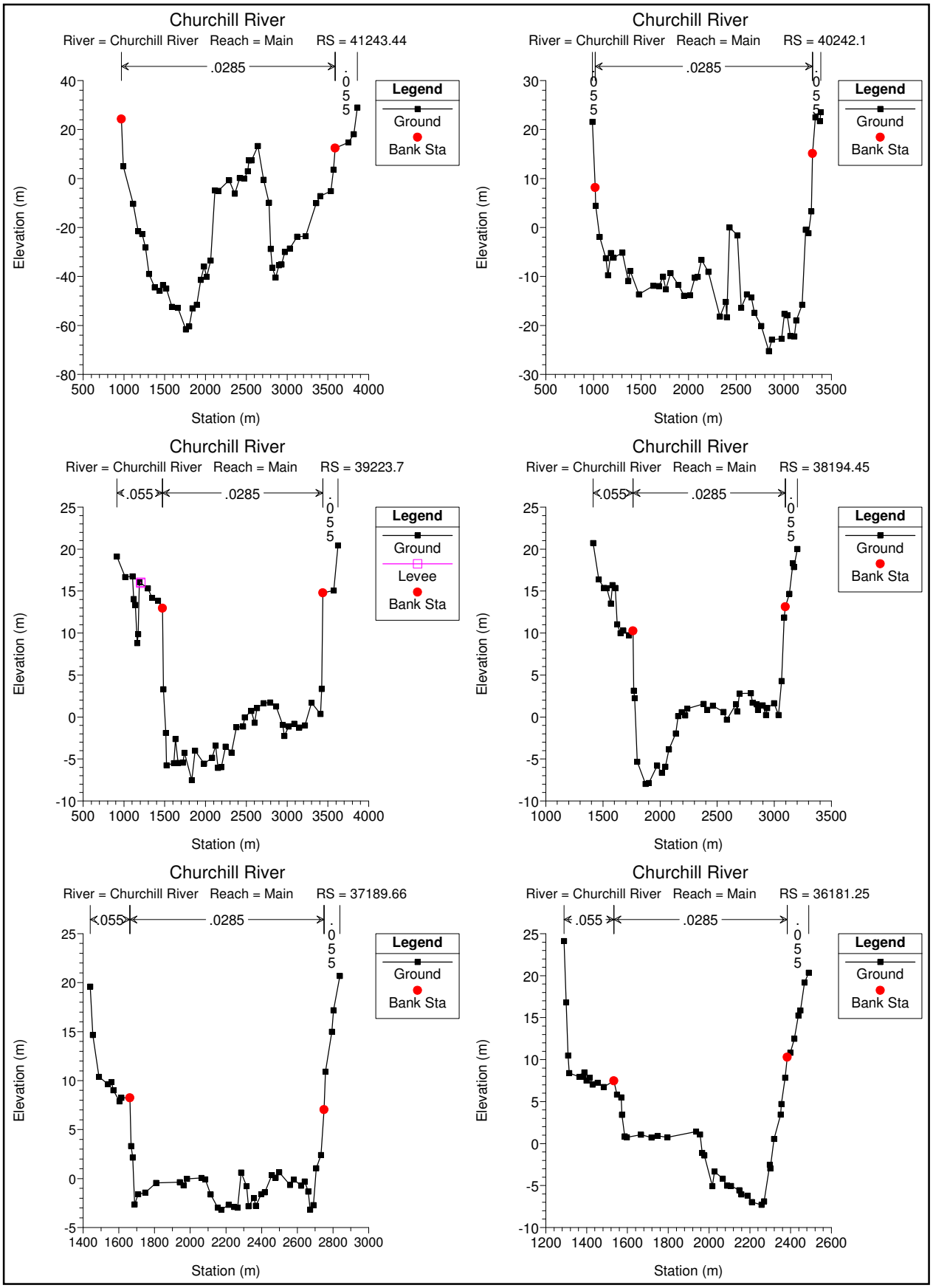
Duration (Minutes)	Return Period (Years)					
	2	5	10	25	50	100
5	67.030	92.399	108.543	129.569	145.336	159.843
10	46.763	64.630	76.375	91.078	102.454	113.245
15	36.947	50.959	60.285	71.781	80.792	89.435
30	23.996	32.815	38.749	45.954	51.680	57.215
60	15.235	20.563	24.154	28.495	31.963	35.306
120	9.554	12.694	14.802	17.356	19.399	21.347
360	4.507	5.825	6.699	7.774	8.630	9.425
720	2.796	3.548	4.043	4.661	5.150	5.595
1440	1.733	2.159	2.437	2.789	3.067	3.315

Schefferville A – Climate Change IDF Curve

Duration (Minutes)	Return Period (Years)					
	2	5	10	25	50	100
5	59.884	85.781	102.969	124.636	141.066	157.173
10	39.132	55.315	66.039	79.538	89.774	99.817
15	30.509	42.793	50.927	61.160	68.919	76.535
30	19.935	27.595	32.659	39.030	43.860	48.606
60	13.026	17.794	20.944	24.908	27.912	30.868
120	8.511	11.474	13.431	15.895	17.763	19.604
360	4.335	5.724	6.642	7.800	8.678	9.546
720	2.833	3.691	4.259	4.978	5.523	6.062
1440	1.851	2.380	2.731	3.177	3.515	3.850

APPENDIX K

FORECASTING MODEL CROSS SECTIONS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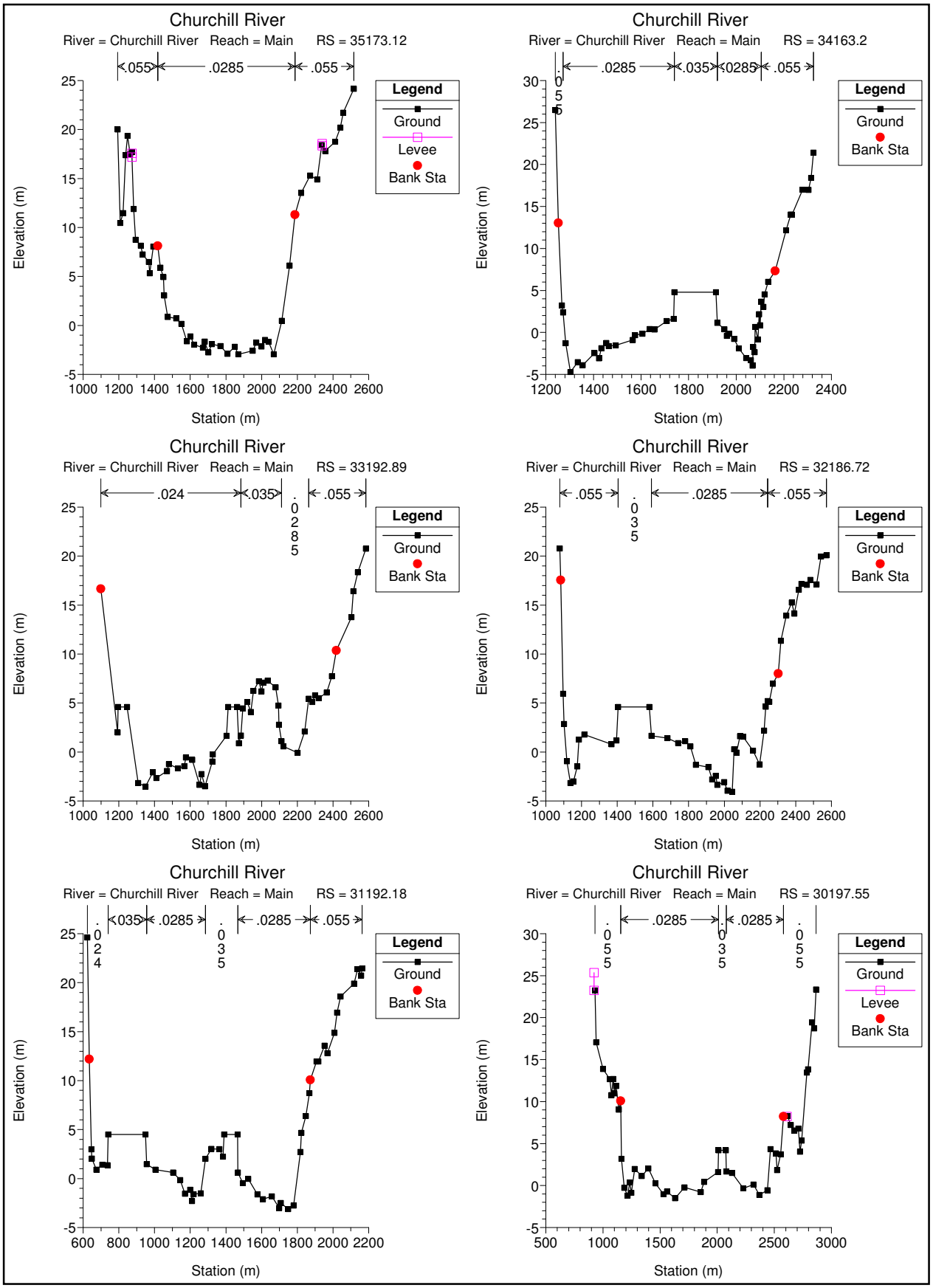
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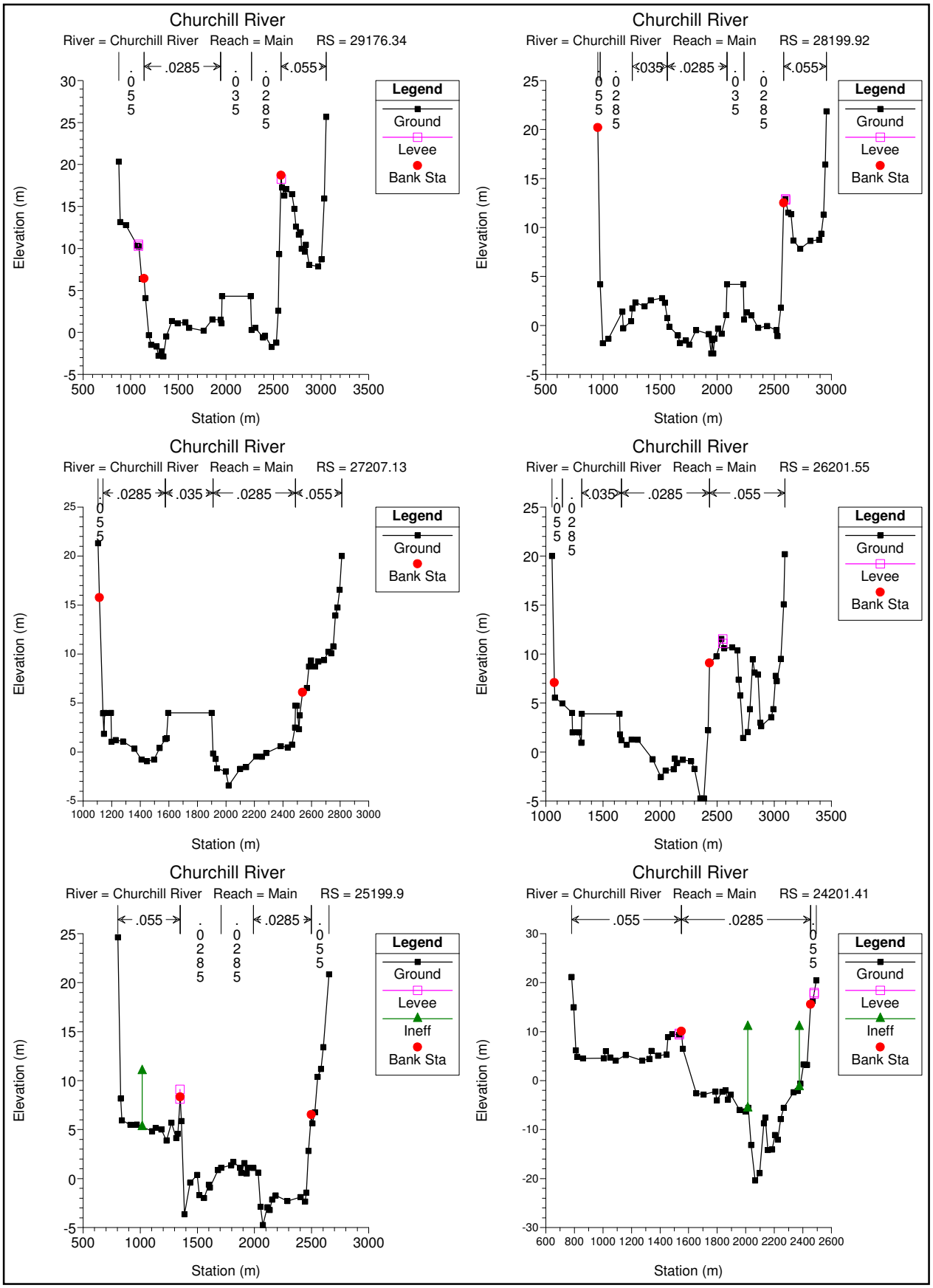
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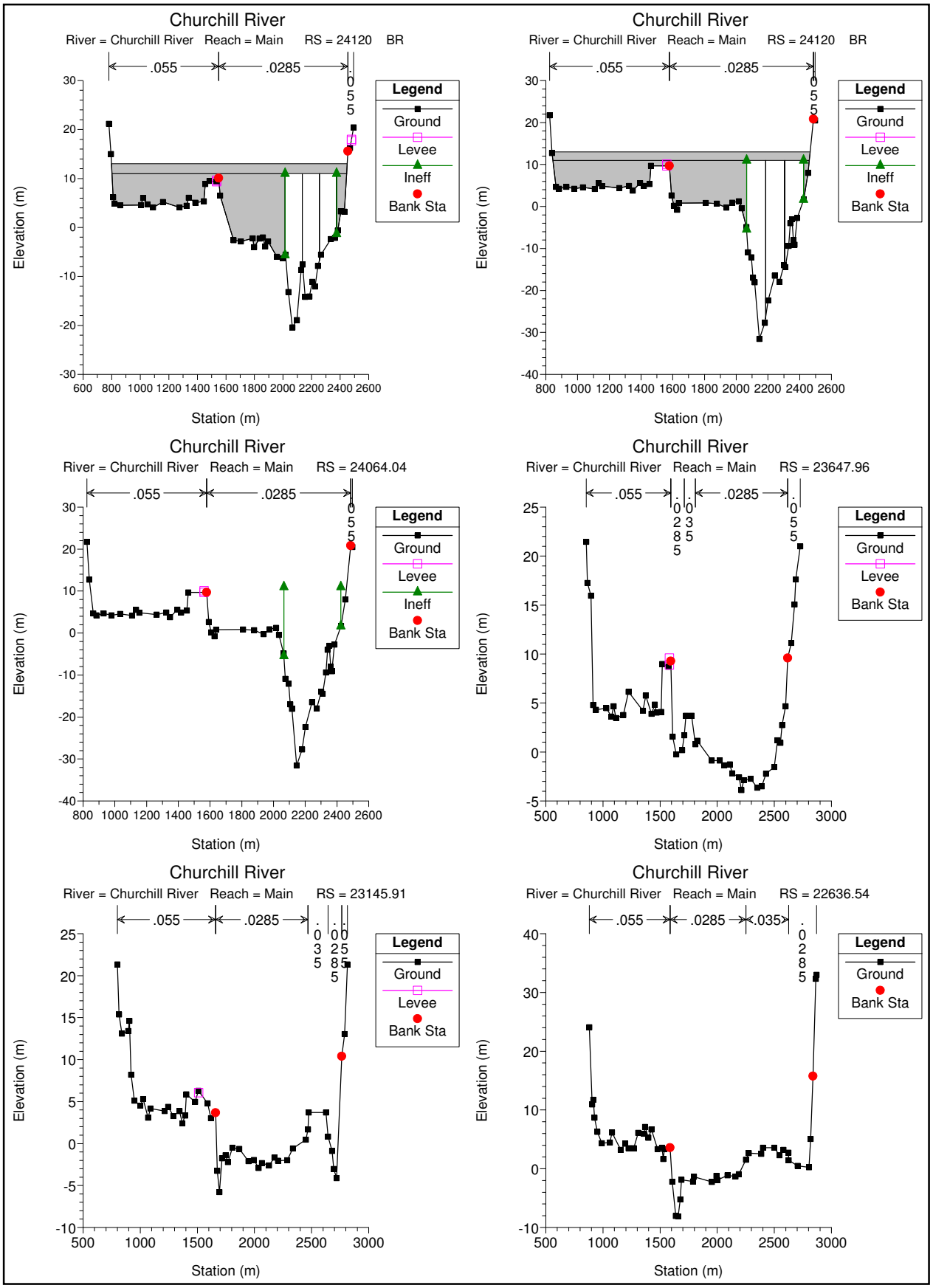
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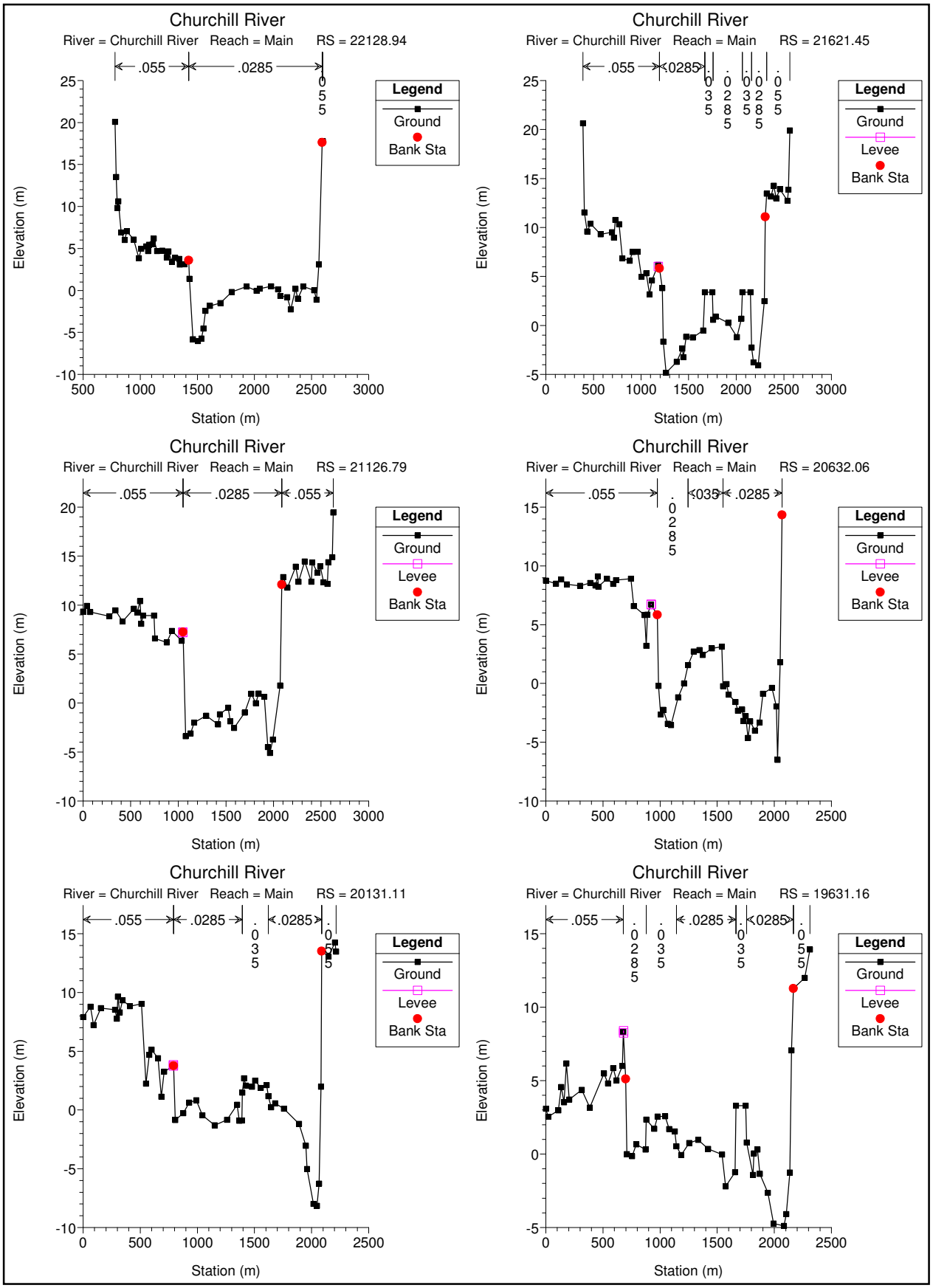
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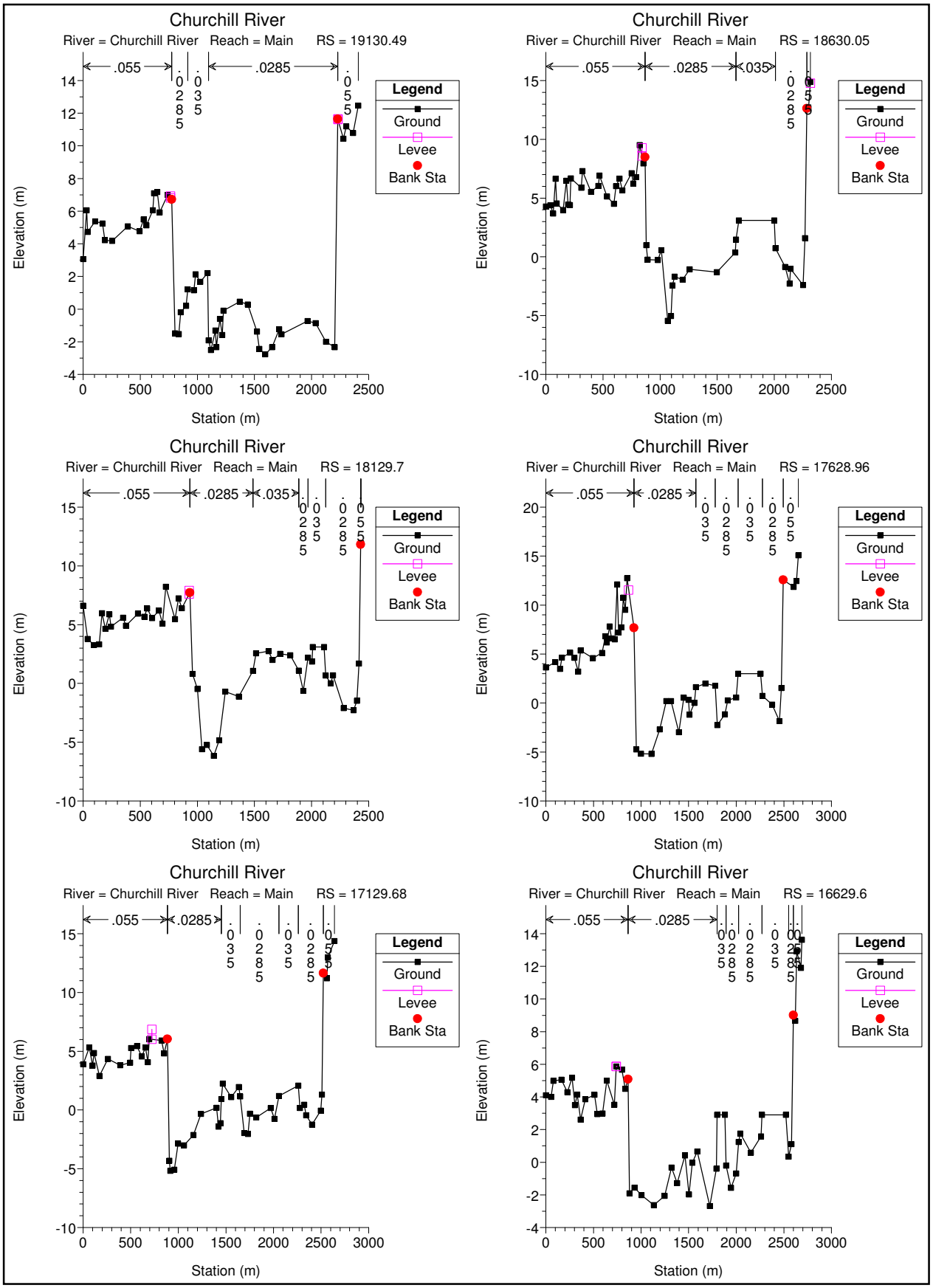
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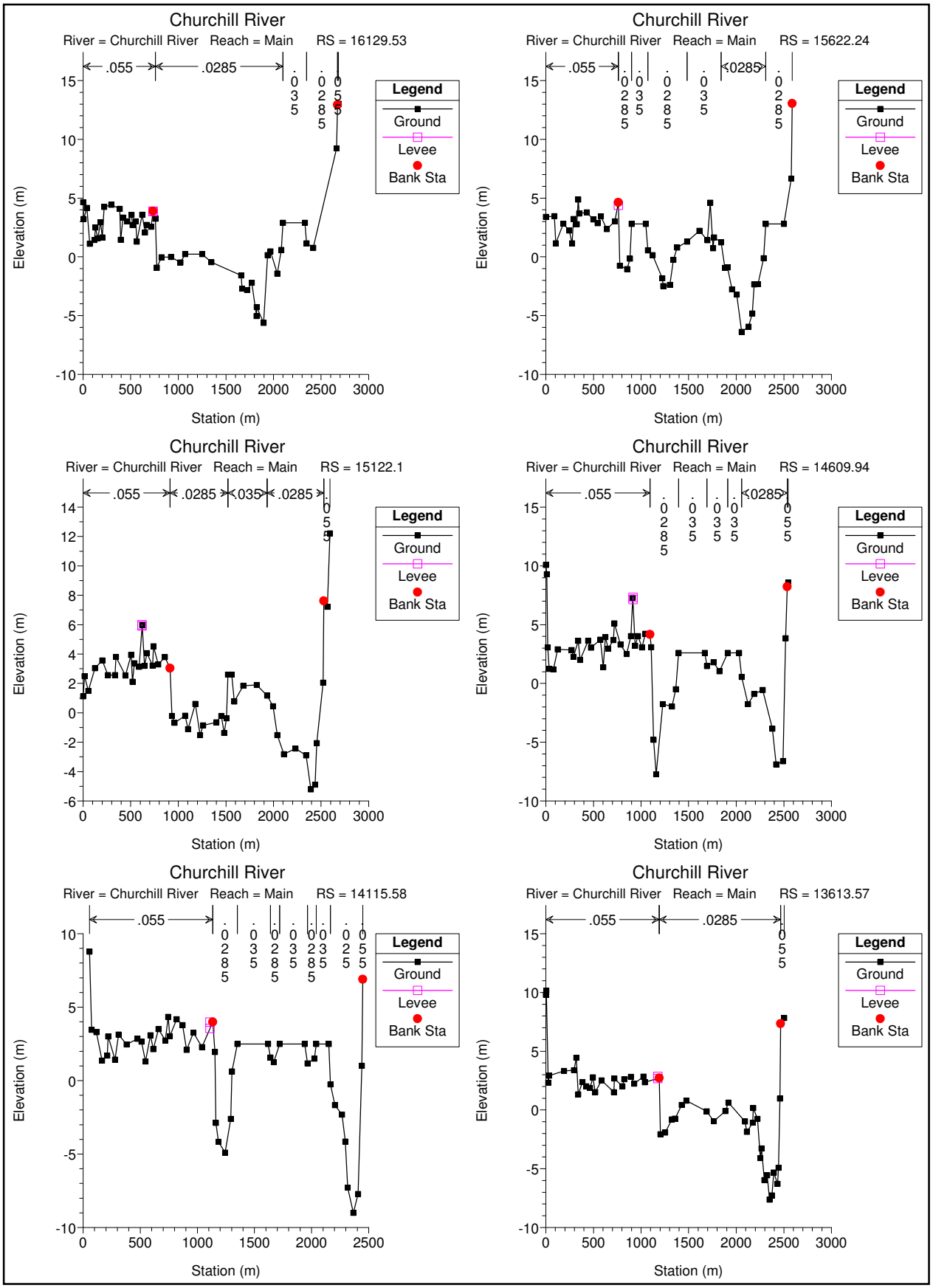
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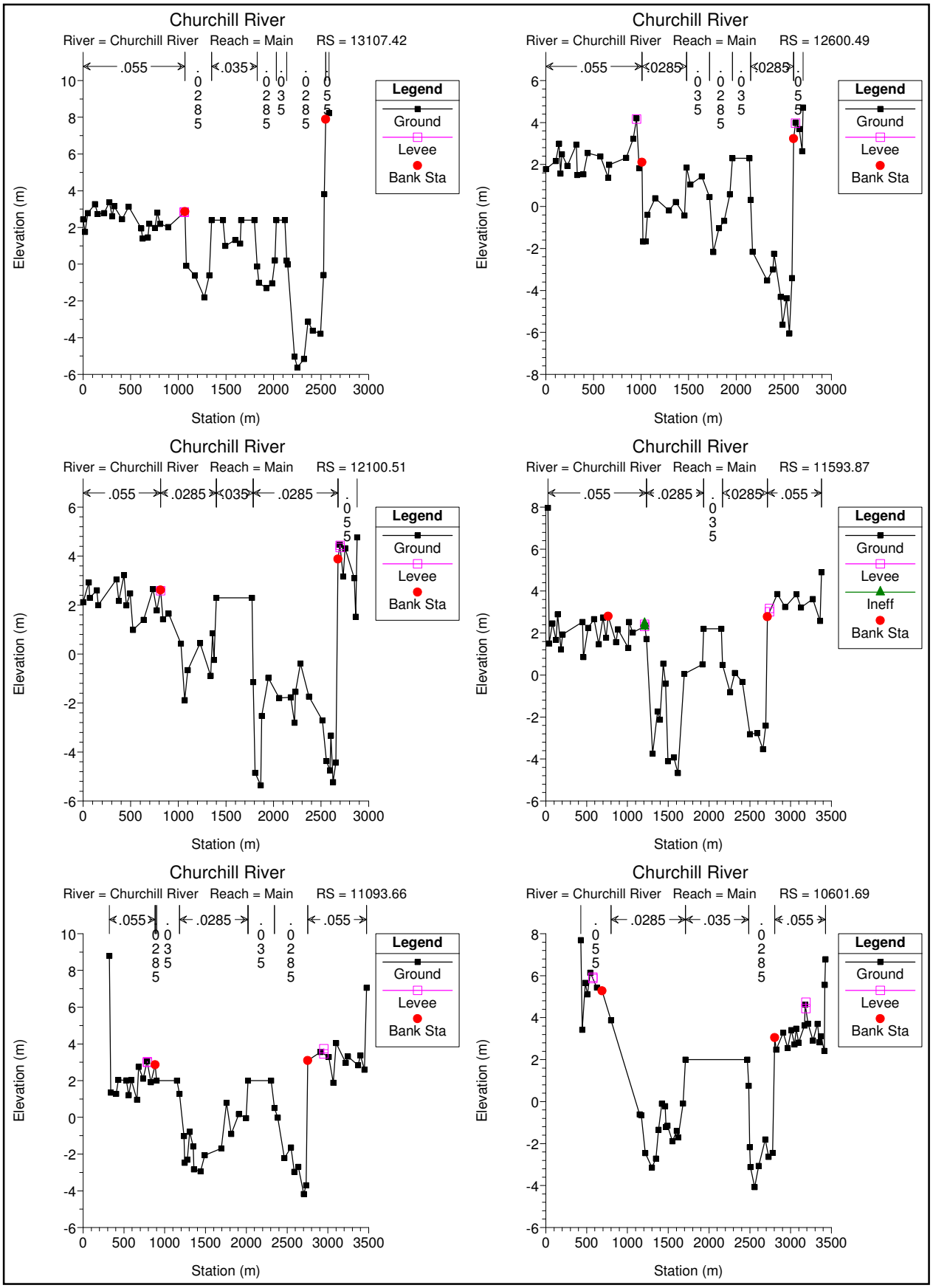
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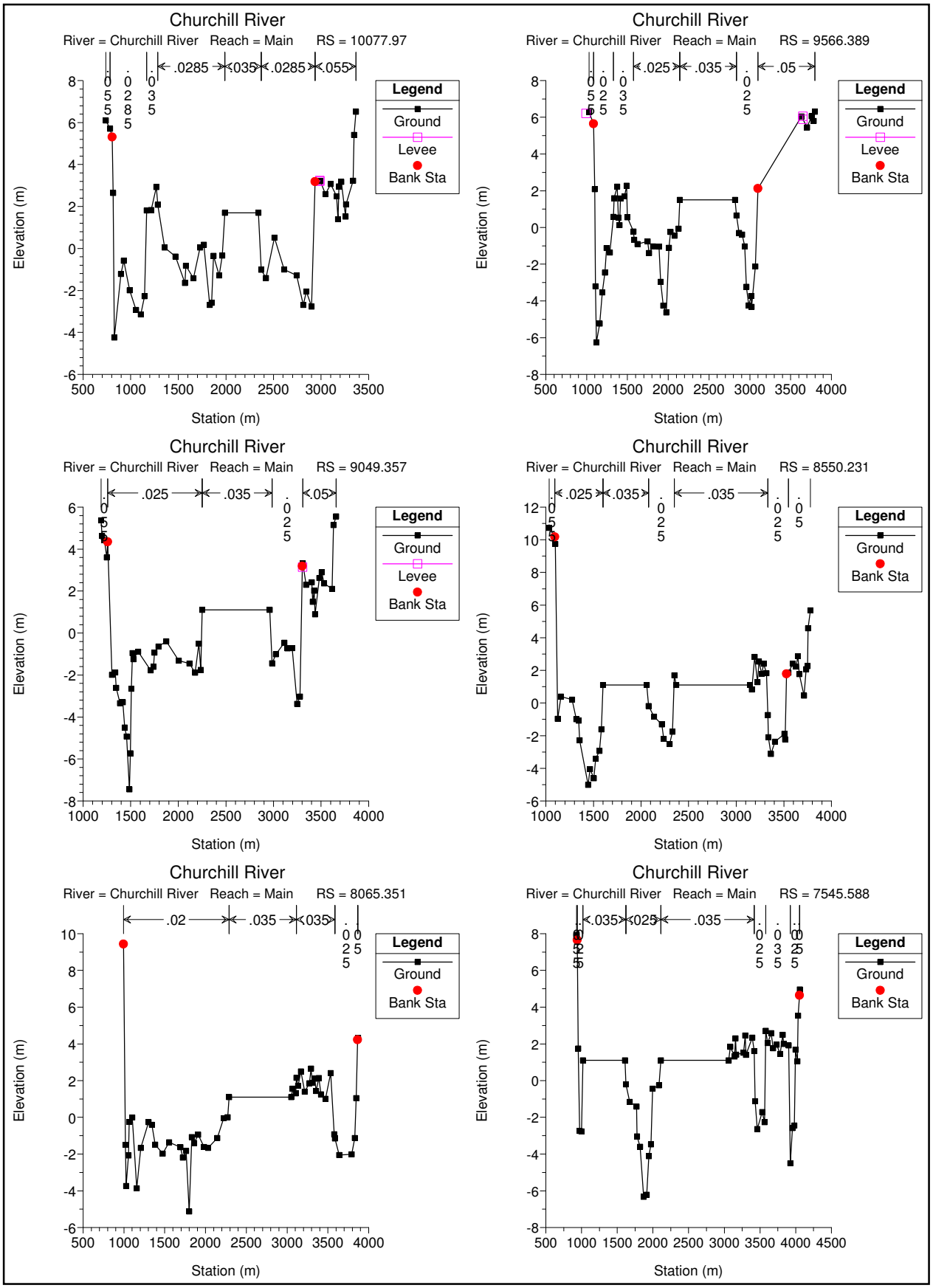
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Levee
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.035
.025
.05
Legend
Ground
Bank Sta
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Station (m)
Churchill River
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Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Churchill River Reach = Main RS = 7545.588
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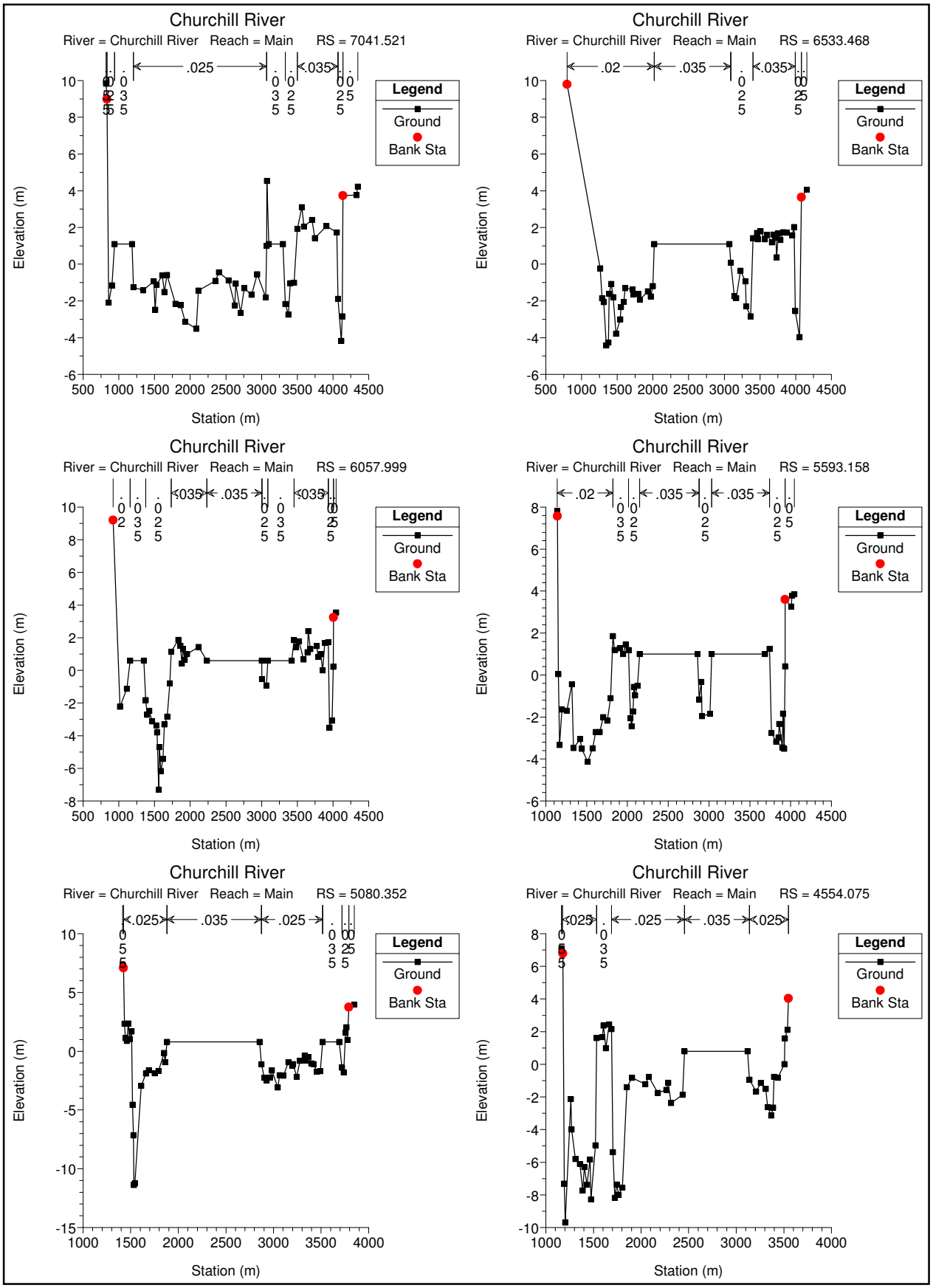
Ground
Bank Sta
Elevation (m)
Station (m)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River = Churchill River Reach = Main RS = 6057.999
Churchill River
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Churchill River
River = Churchill River Reach = Main RS = 5080.352
Churchill River
River = Churchill River Reach = Main RS = 4554.075
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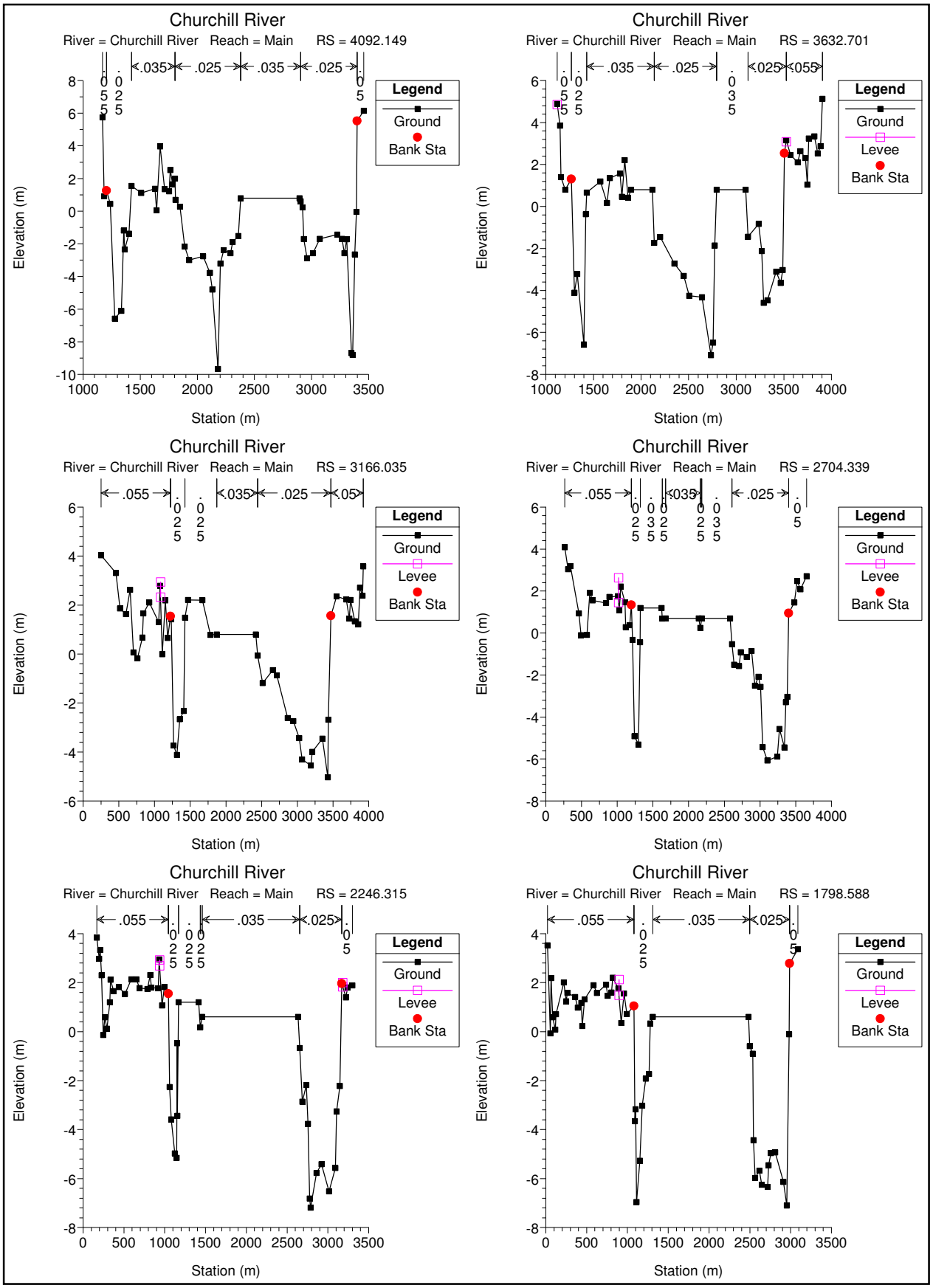
Station (m)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Legend
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Bank Sta
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Churchill River
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Legend
Ground
Levee
Bank Sta
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Churchill River
River = Churchill River Reach = Main RS = 2704.339
Legend
Ground
Levee
Bank Sta
Elevation (m)
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Churchill River
River = Churchill River Reach = Main RS = 2246.315
Legend
Ground
Levee
Bank Sta
Elevation (m)
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River = Churchill River Reach = Main RS = 1798.588
Legend
Ground
Levee
Bank Sta
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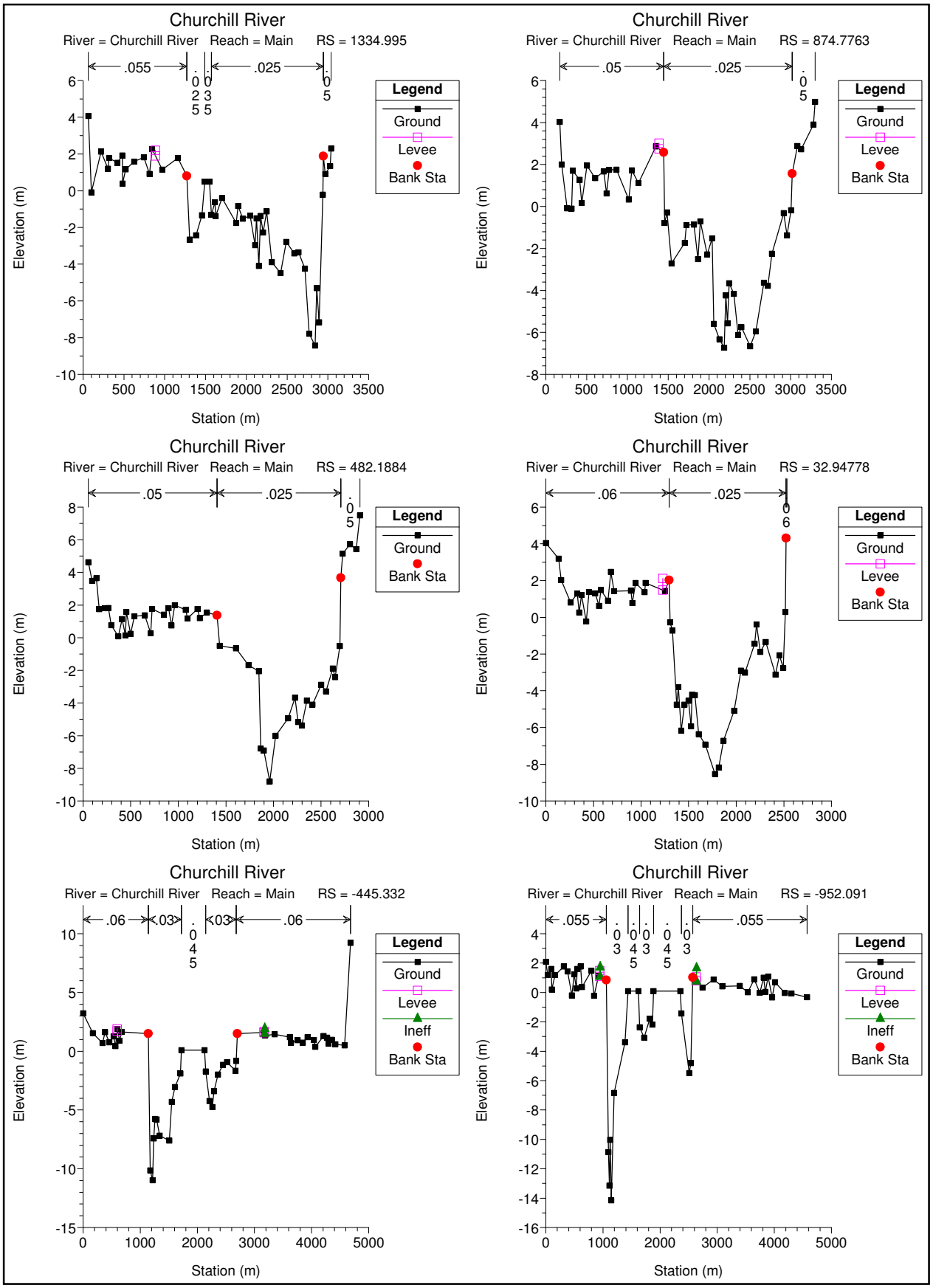
Station (m)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Churchill River
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Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Churchill River Reach = Main RS = -445.332
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.03
.06
Legend
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
Churchill River
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Legend
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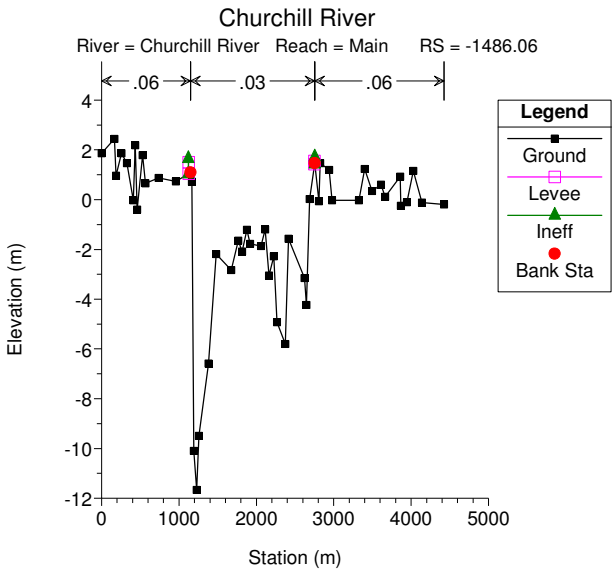
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)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Levee
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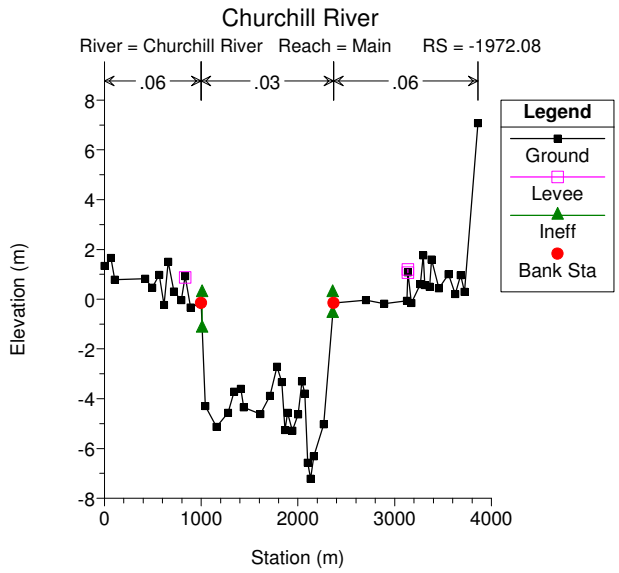
Station (m)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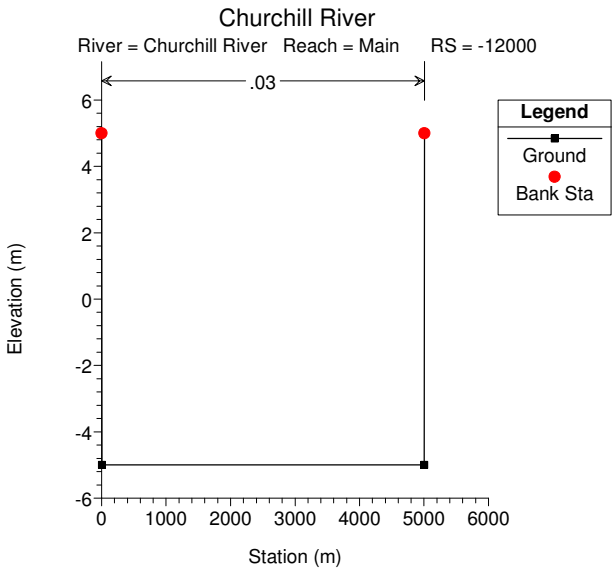
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)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River = Churchill River Reach = Main RS = -12000
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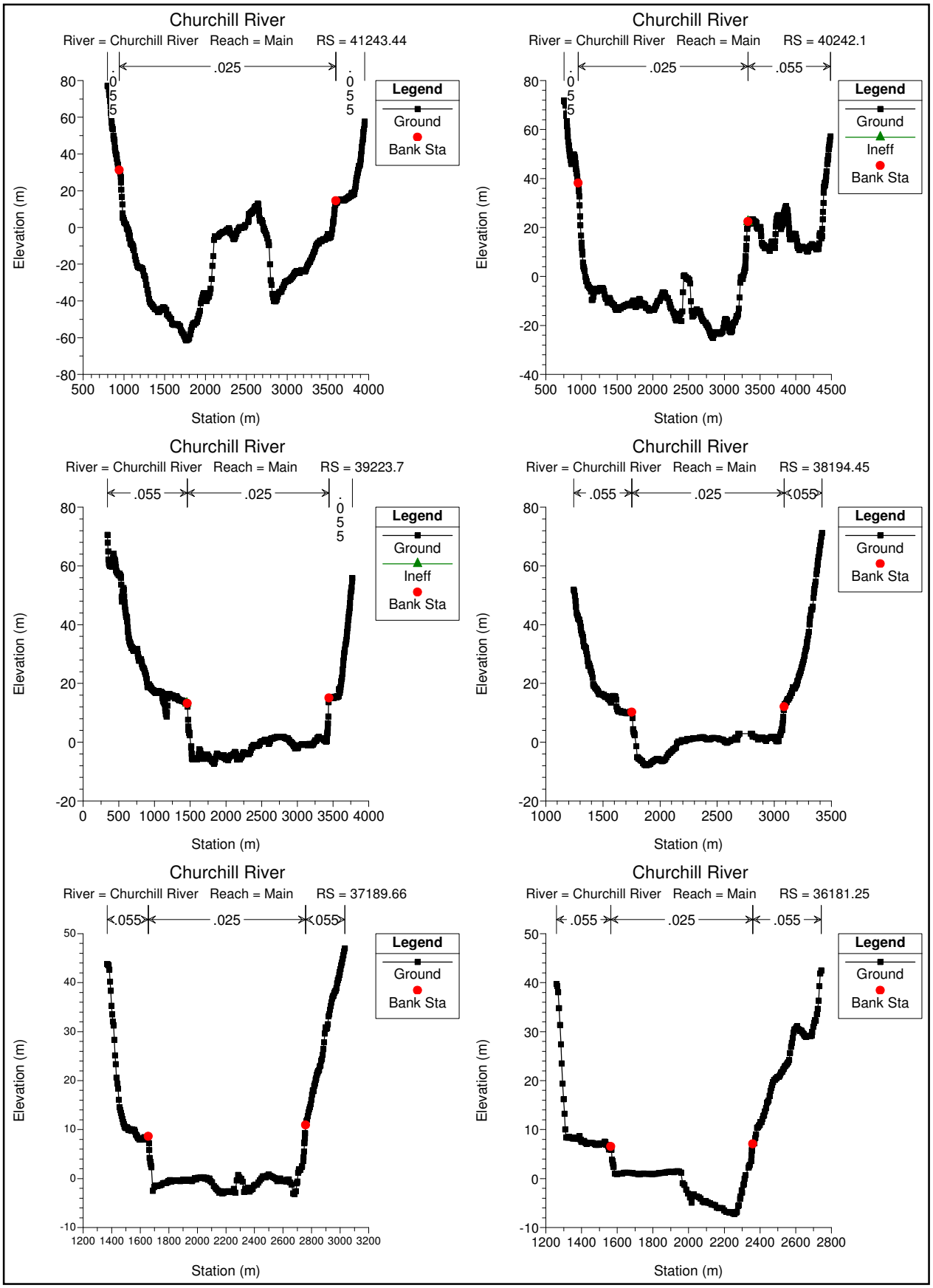
Ground
Bank Sta
Elevation (m)
Station (m)

APPENDIX L

FLOOD RISK MAPPING MODEL CROSS SECTIONS

APPENDIX L

CHURCHILL RIVER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Bank Sta
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Churchill River
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Legend
Ground
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Bank Sta
Elevation (m)
Station (m)
Churchill River
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Churchill River
River = Churchill River Reach = Main RS = 37189.66
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Bank Sta
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Churchill River
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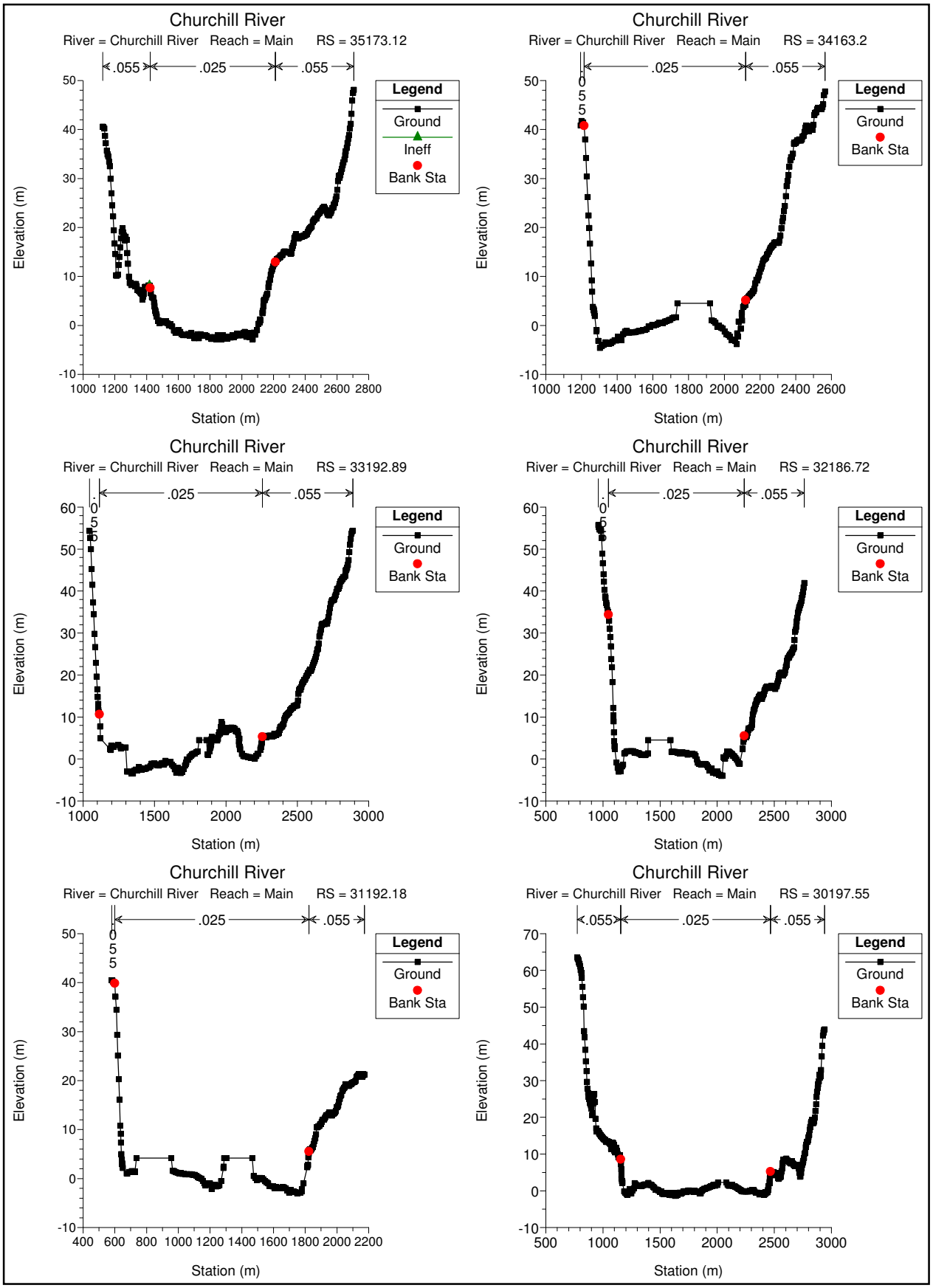
Station (m)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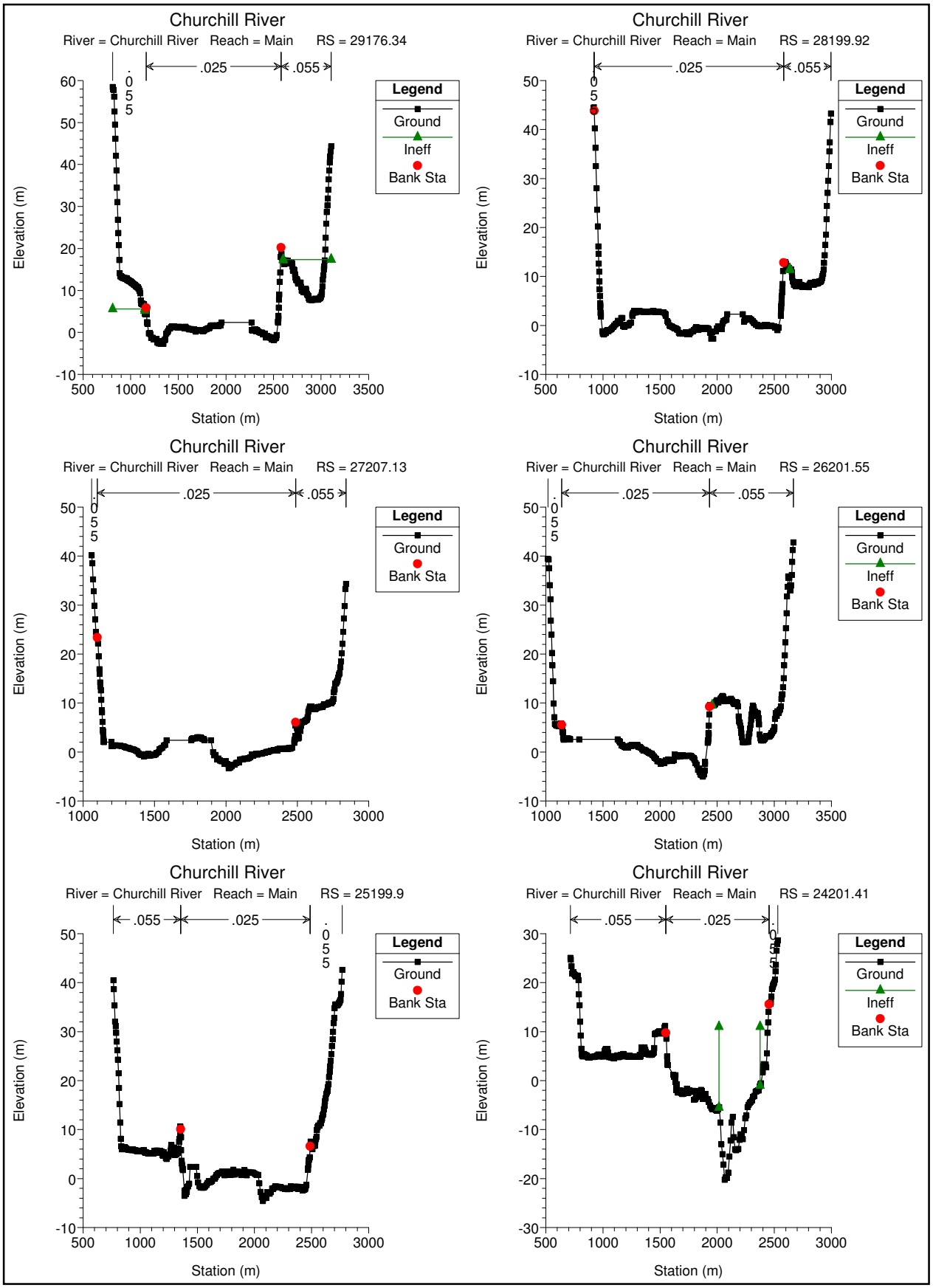
Elevation (m)
Station (m)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Ground
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Bank Sta
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Bank Sta
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.025
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Legend
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Bank Sta
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Churchill River
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Bank Sta
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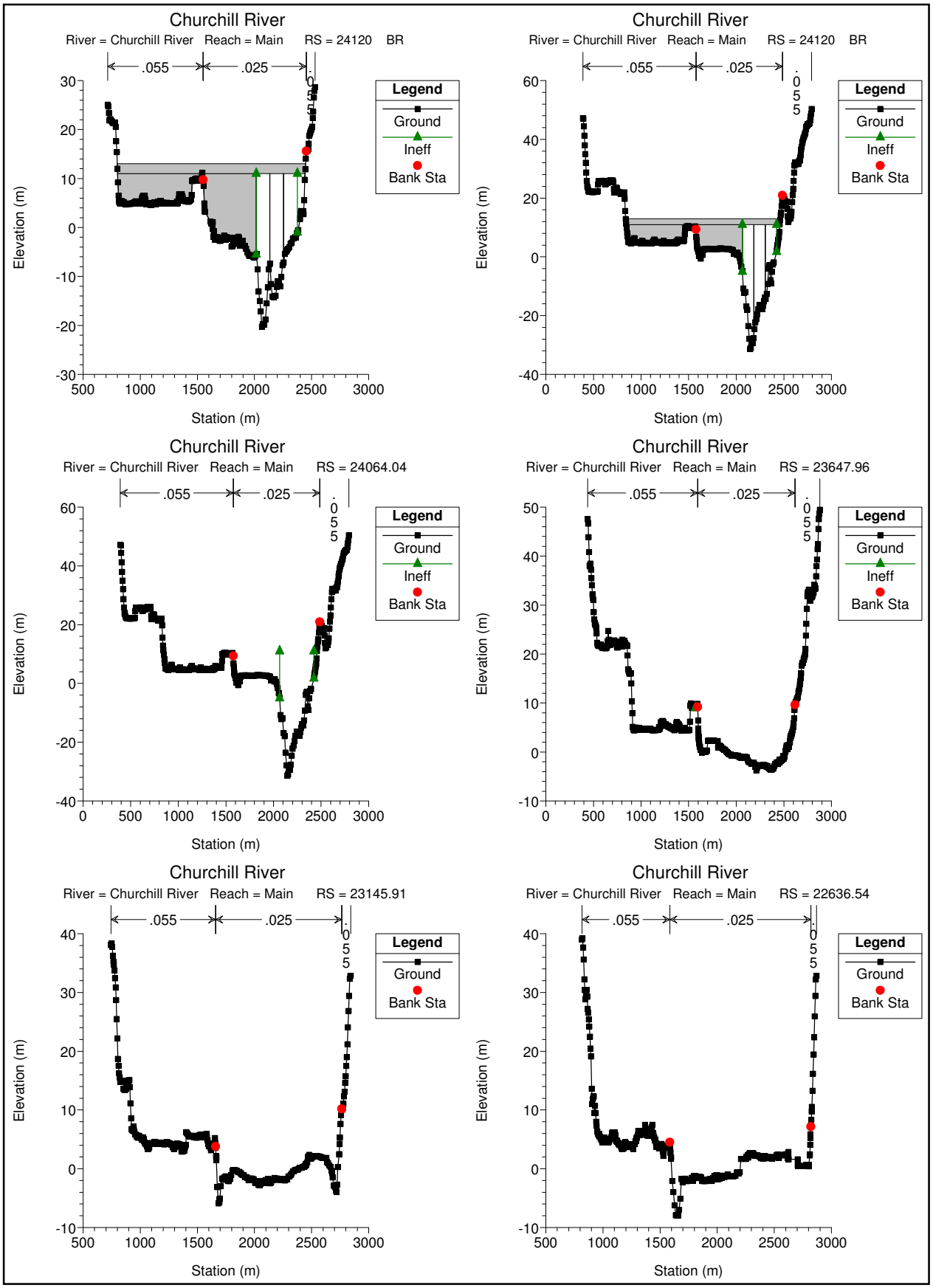
Station (m)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Legend
Ground
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Bank Sta
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.025
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Legend
Ground
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Bank Sta
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.025
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Legend
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Bank Sta
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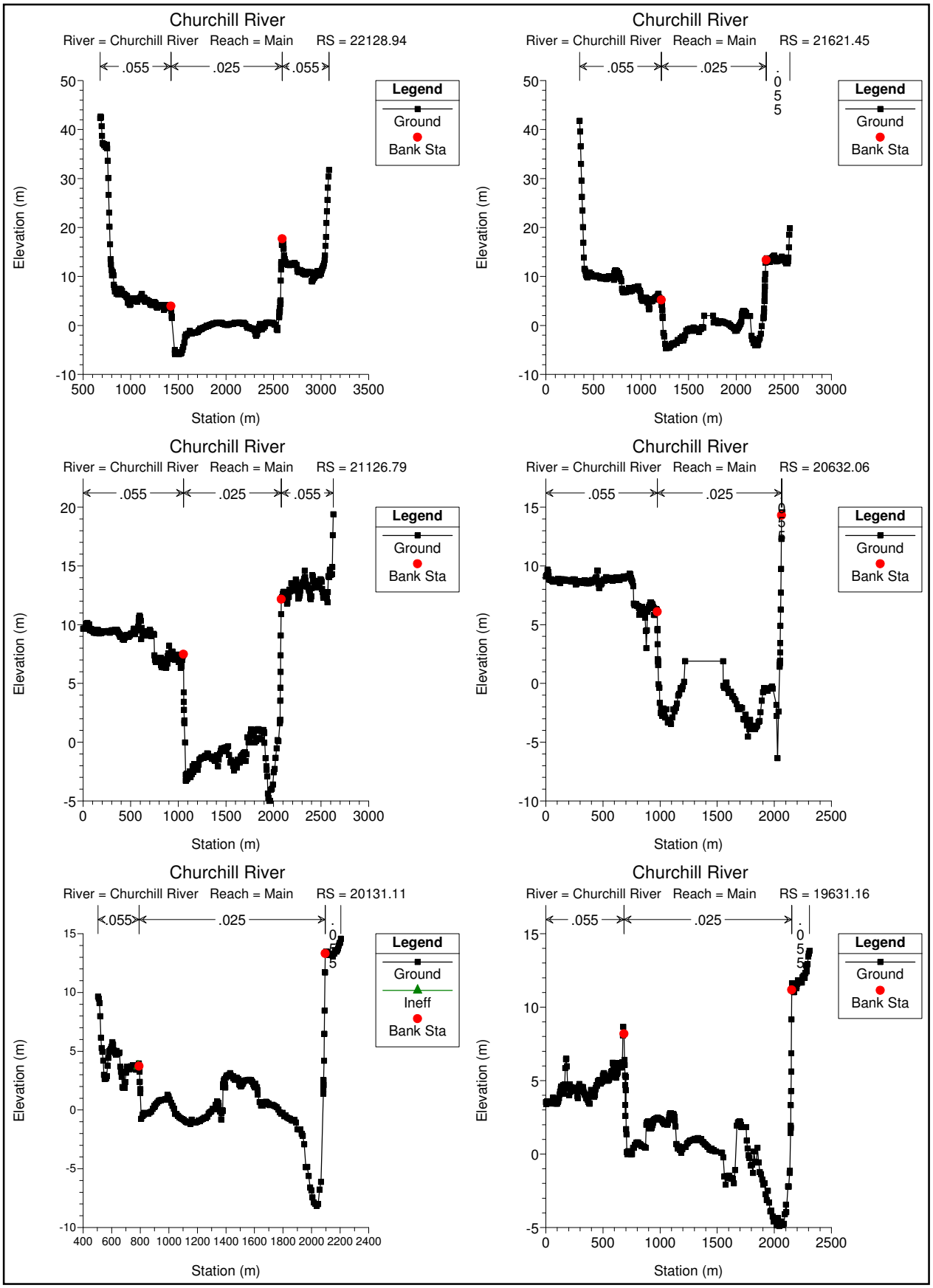
Station (m)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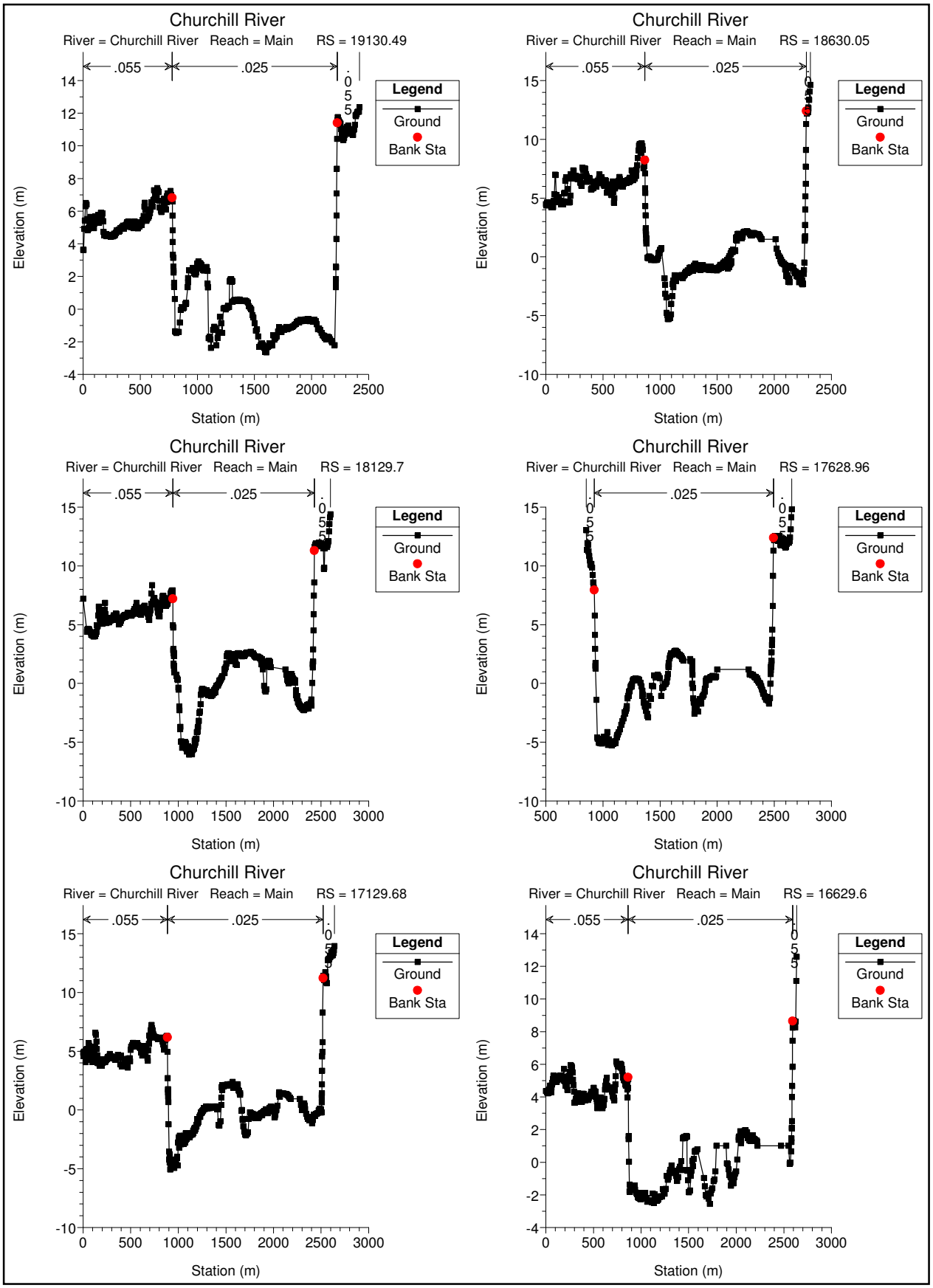
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Bank Sta
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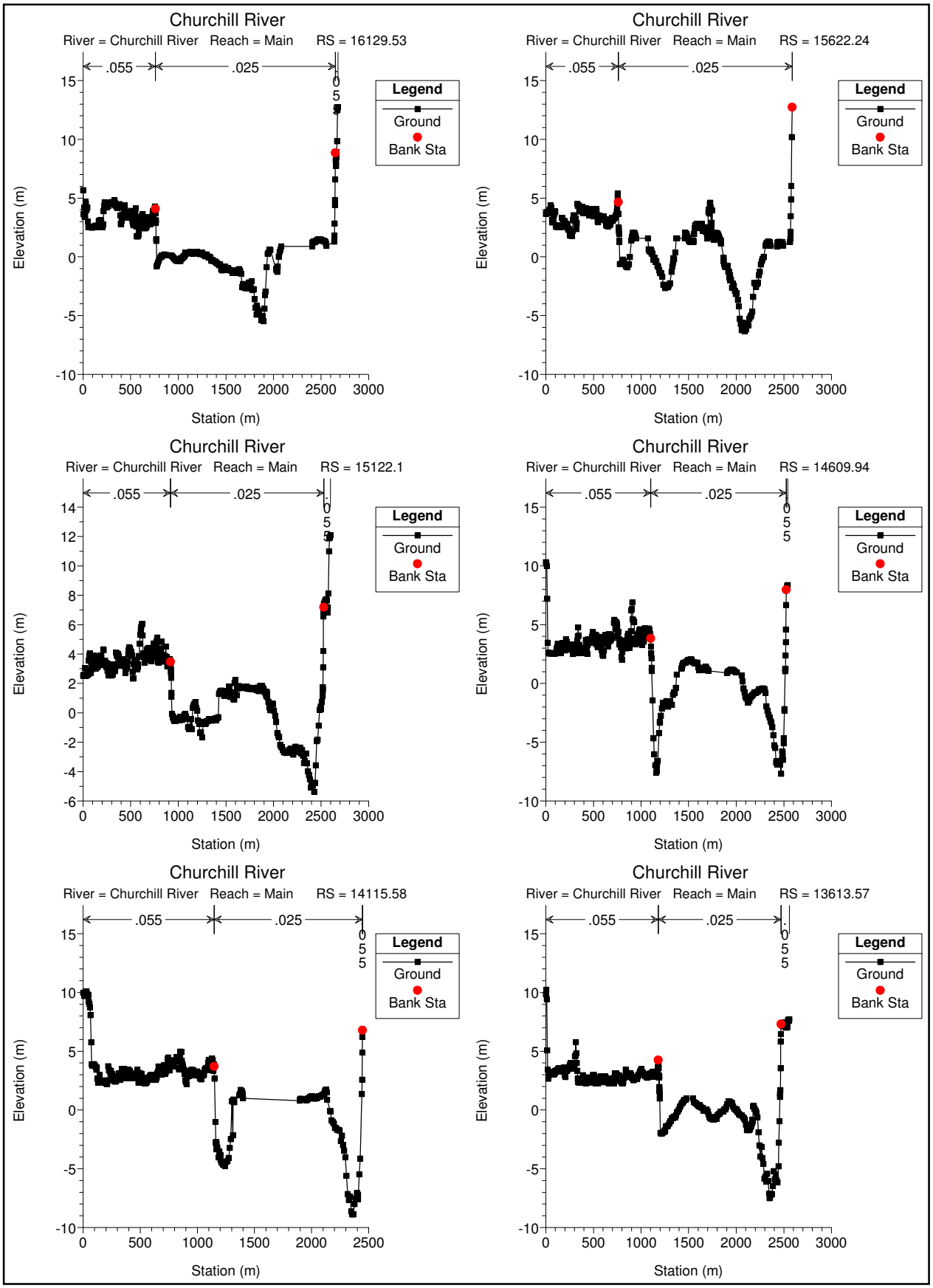
Station (m)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Bank Sta
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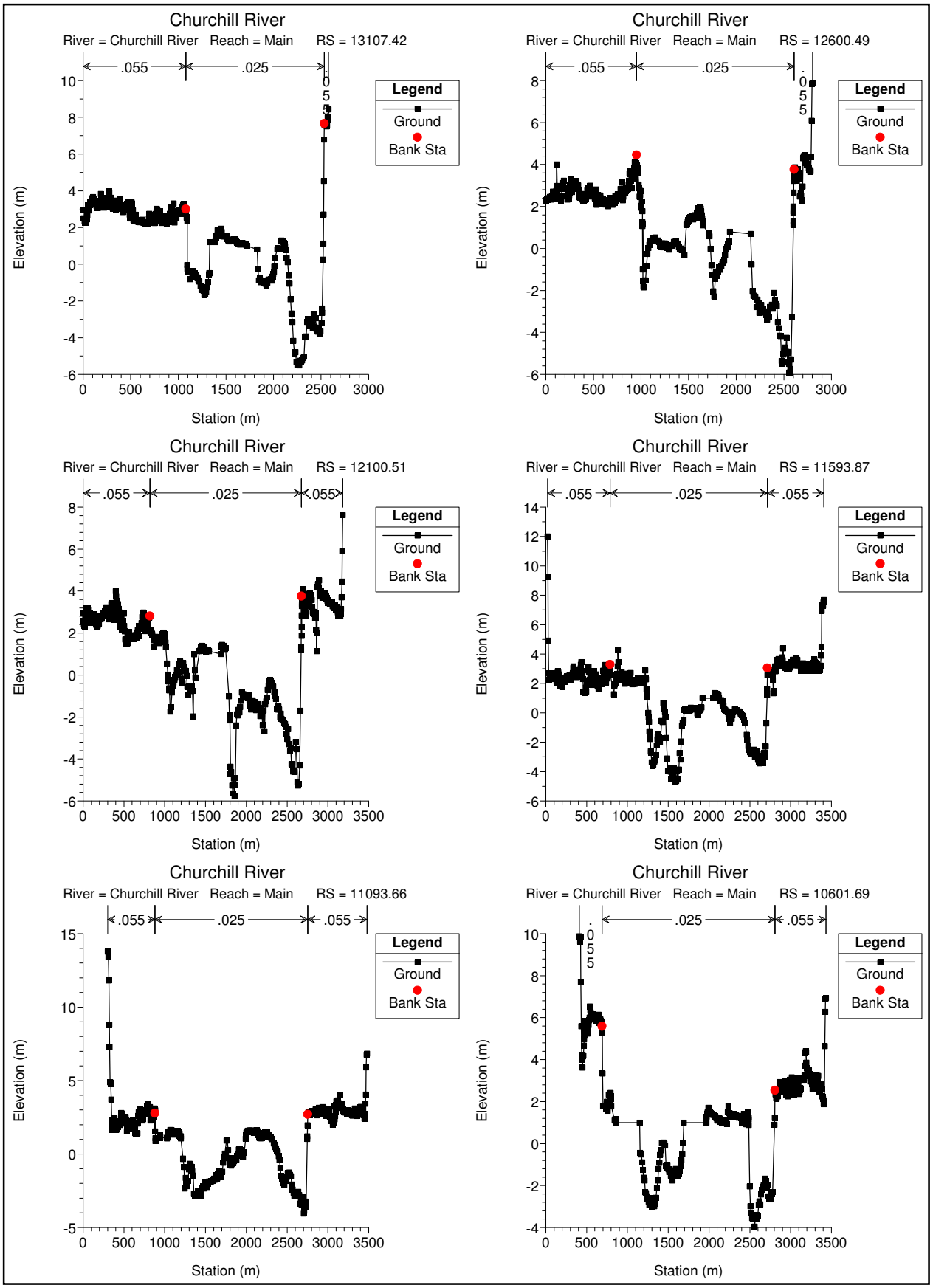
Station (m)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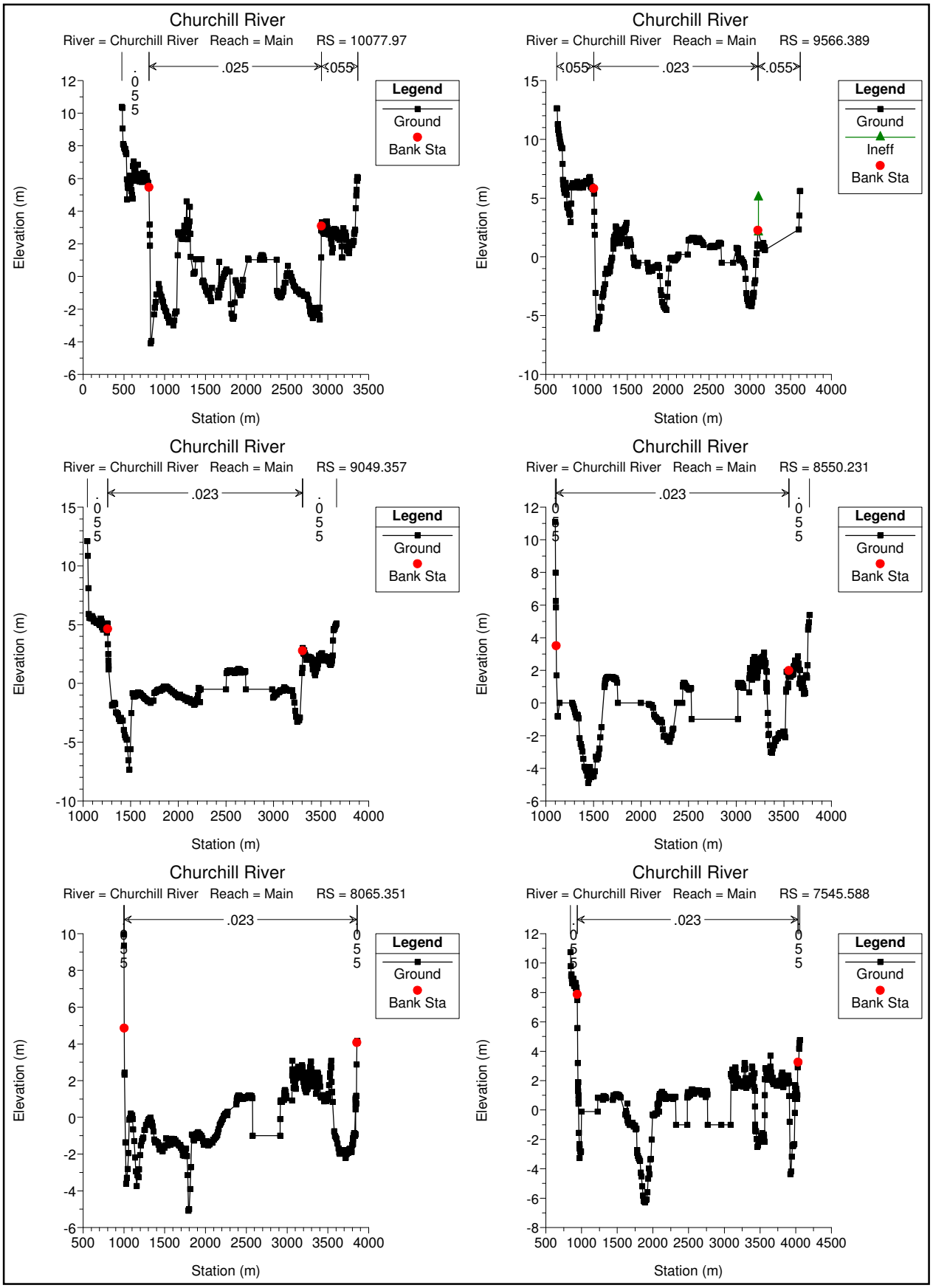
Station (m)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Legend
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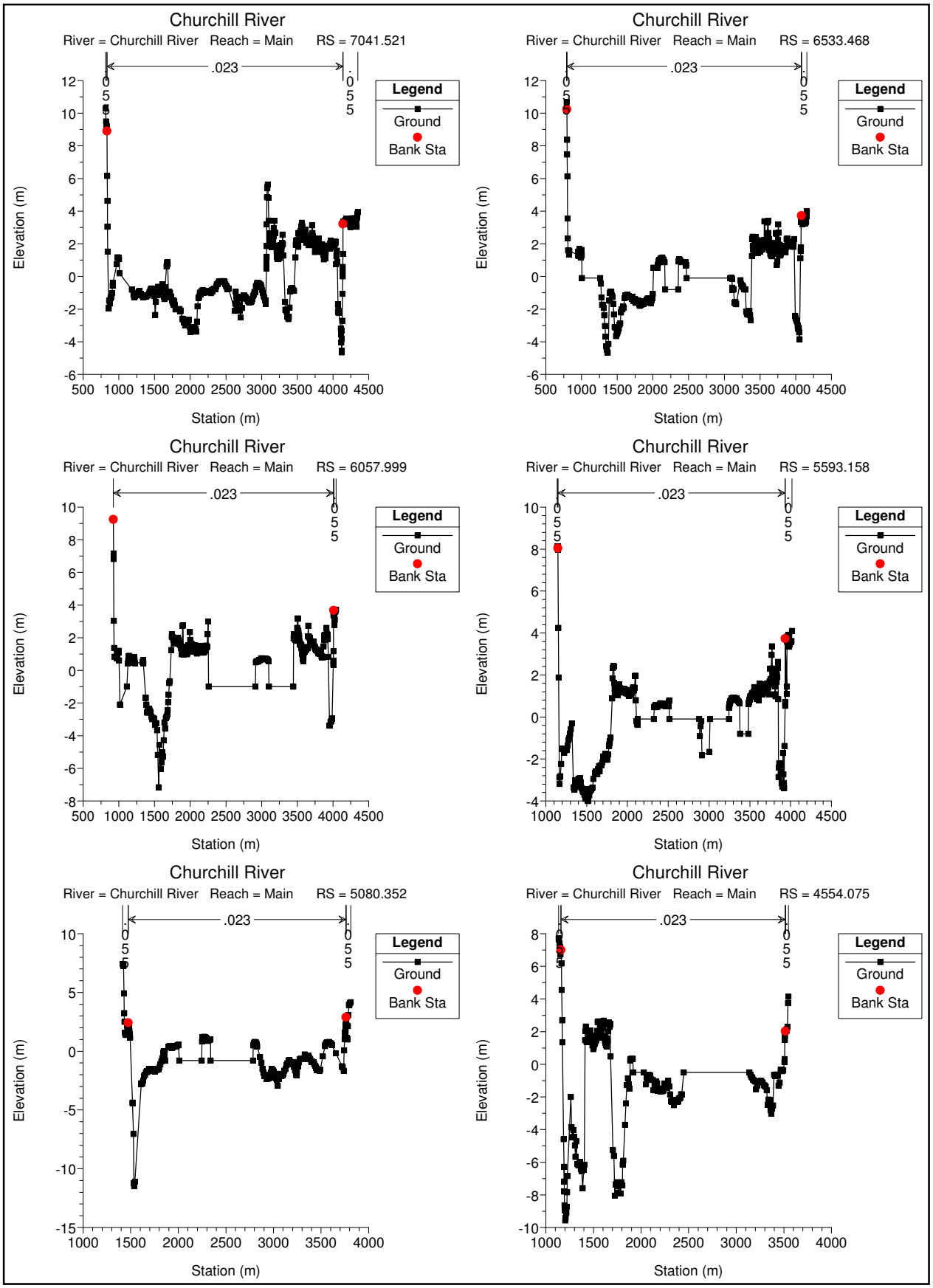
Station (m)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Bank Sta
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River = Churchill River Reach = Main RS = 5593.158
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Bank Sta
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Legend
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Bank Sta
Elevation (m)
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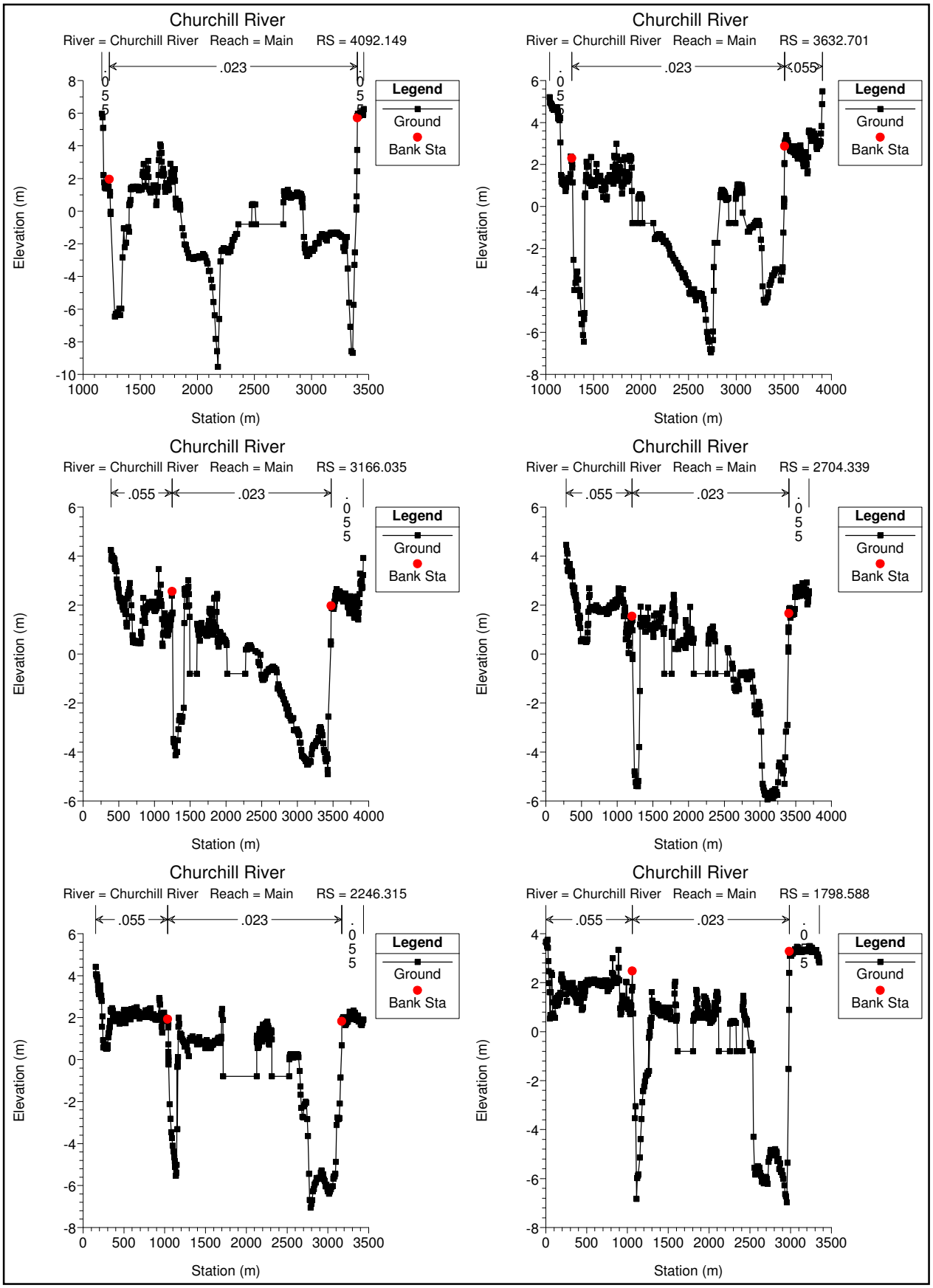
Station (m)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Legend
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Churchill River
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Legend
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Bank Sta
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Station (m)
Churchill River
River = Churchill River Reach = Main RS = 3166.035
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Churchill River
River = Churchill River Reach = Main RS = 2704.339
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Legend
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Station (m)
Churchill River
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.023
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Legend
Ground
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Station (m)
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Legend
Ground
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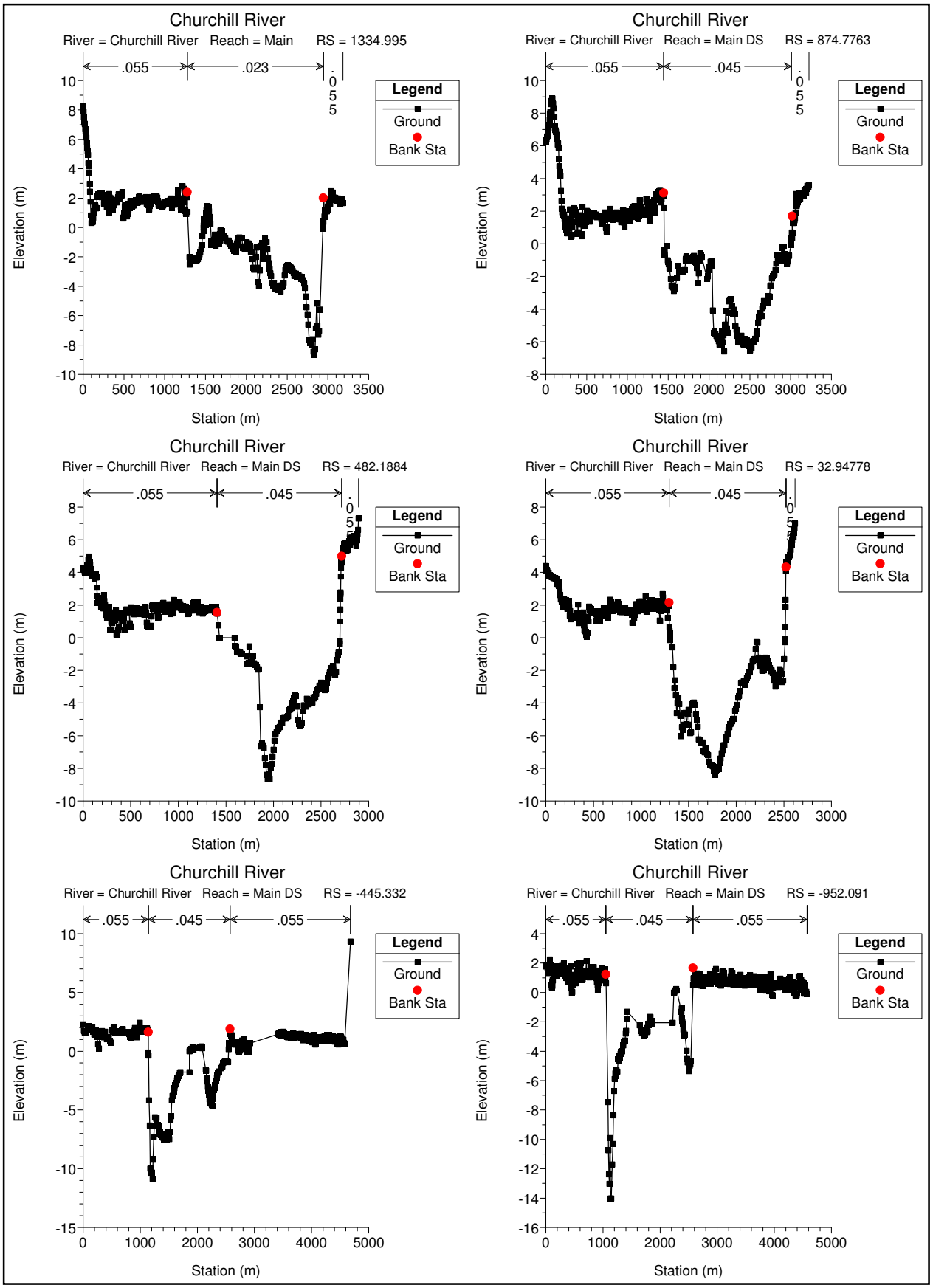
Station (m)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Legend
Ground
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Legend
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River = Churchill River Reach = Main DS RS = 482.1884
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Legend
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Elevation (m)
Station (m)
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River = Churchill River Reach = Main DS RS = 32.94778
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Legend
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Bank Sta
Elevation (m)
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River = Churchill River Reach = Main DS RS = -445.332
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.045
.055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
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Legend
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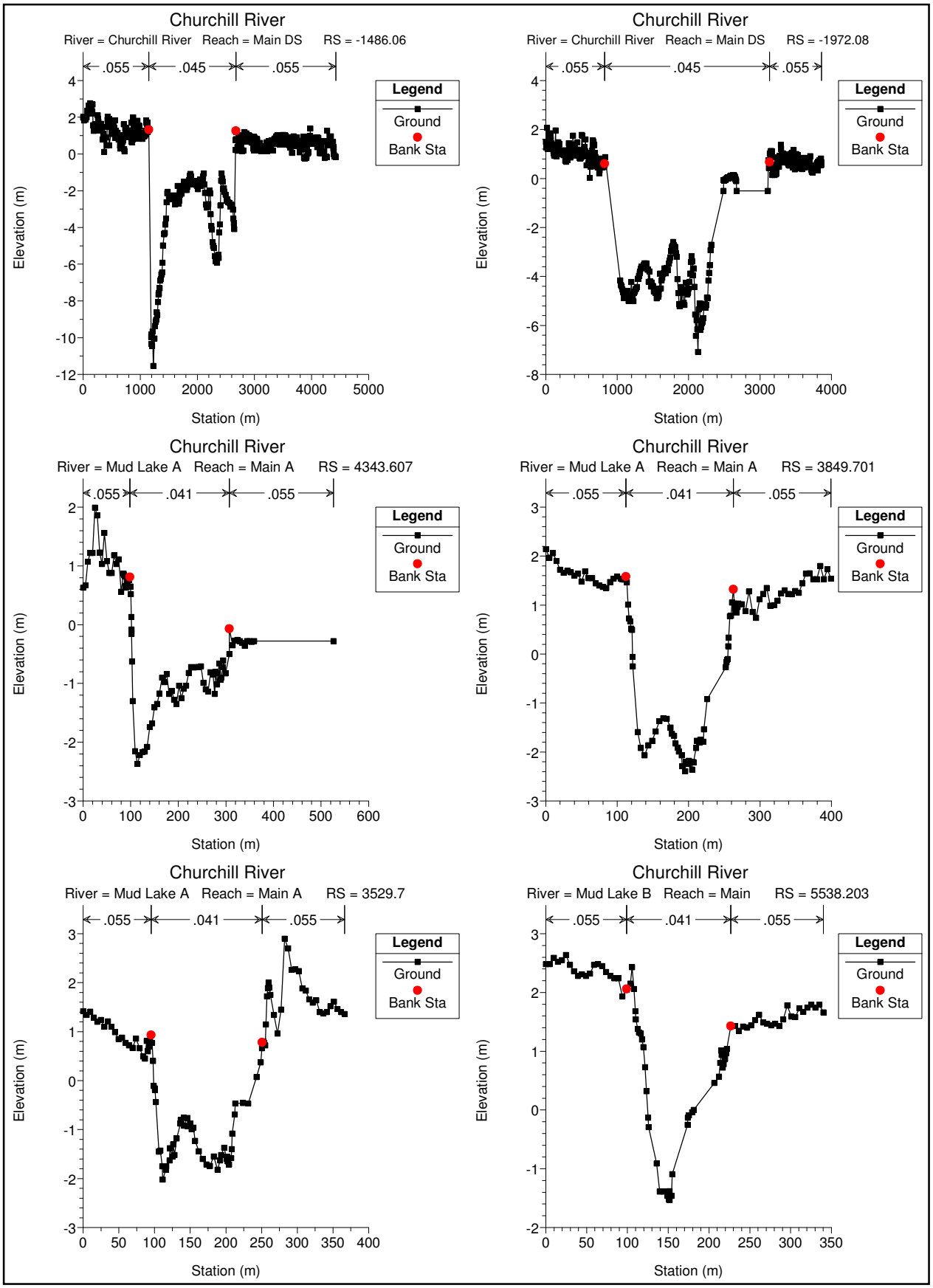
Station (m)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Station (m)
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Bank Sta
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Station (m)
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Legend
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Elevation (m)
Station (m)
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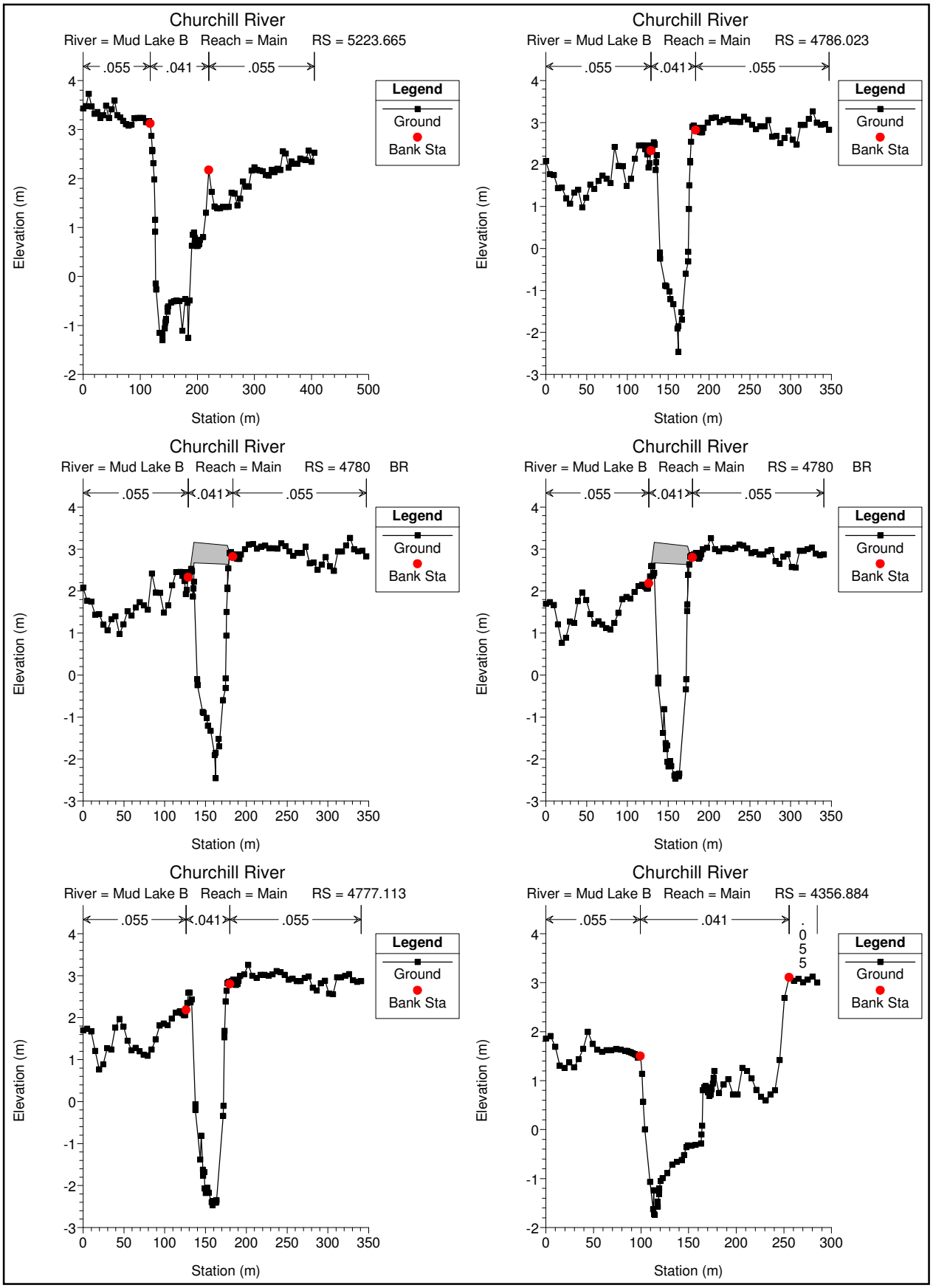
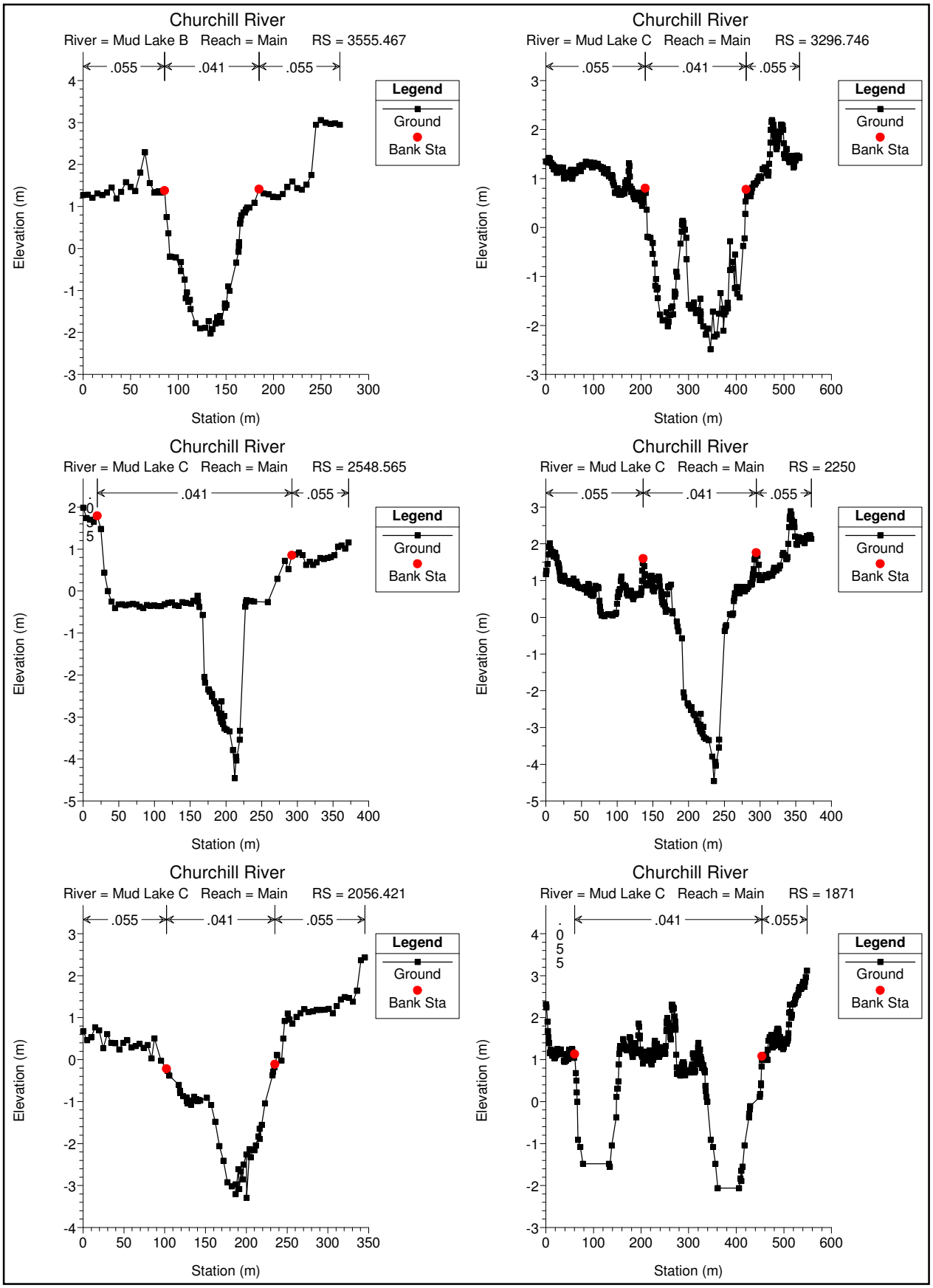
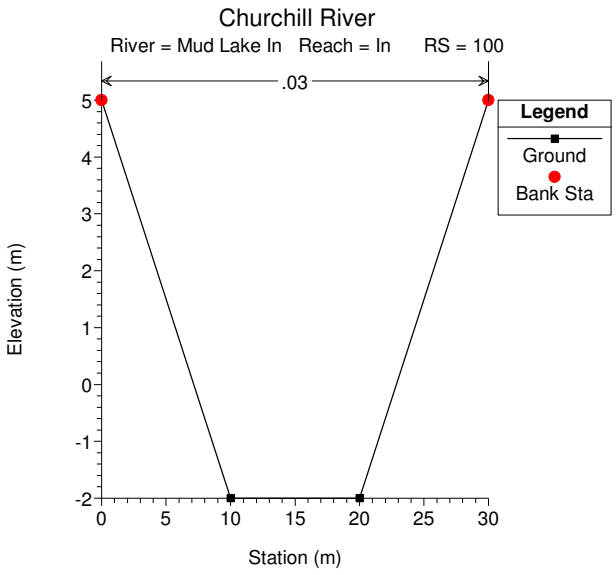
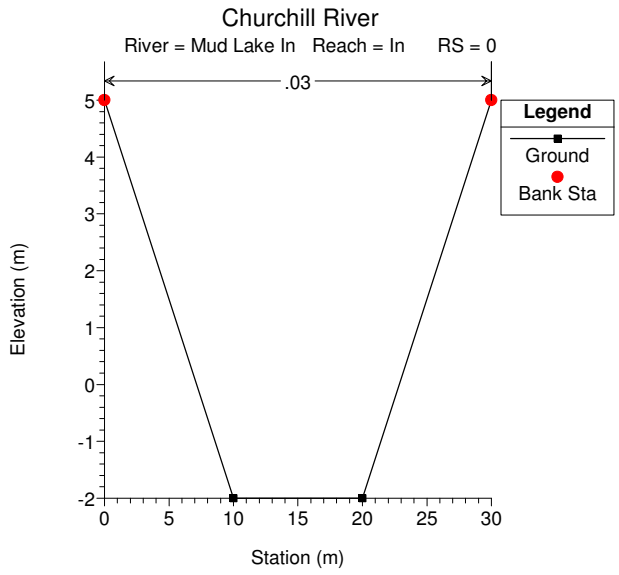
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake B Reach = Main RS = 5538.203
.055 .041 .055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


Churchill River
River = Mud Lake B Reach = Main RS = 5223.665
.055 .041 .055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake B Reach = Main RS = 4786.023
.055 .041 .055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake B Reach = Main RS = 4780 BR
.055 .041 .055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake B Reach = Main RS = 4780 BR
.055 .041 .055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake B Reach = Main RS = 4777.113
.055 .041 .055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake B Reach = Main RS = 4356.884
.055 .041 .055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

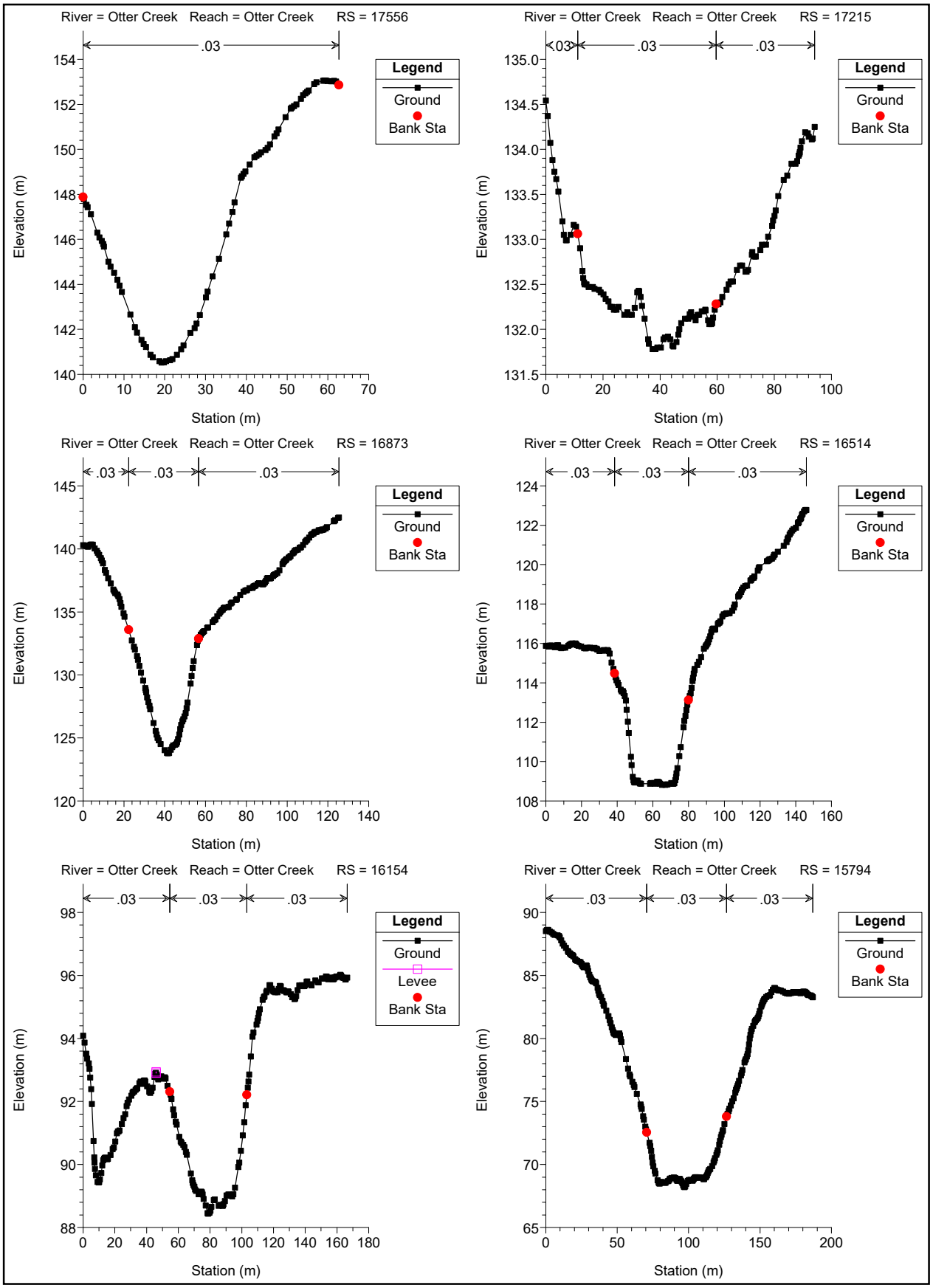

Churchill River
River = Mud Lake B Reach = Main RS = 3555.467
.055
.041
.055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake C Reach = Main RS = 3296.746
.055
.041
.055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake C Reach = Main RS = 2548.565
.055
.041
.055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake C Reach = Main RS = 2250
.055
.041
.055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake C Reach = Main RS = 2056.421
.055
.041
.055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
Churchill River
River = Mud Lake C Reach = Main RS = 1871
.055
.041
.055
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

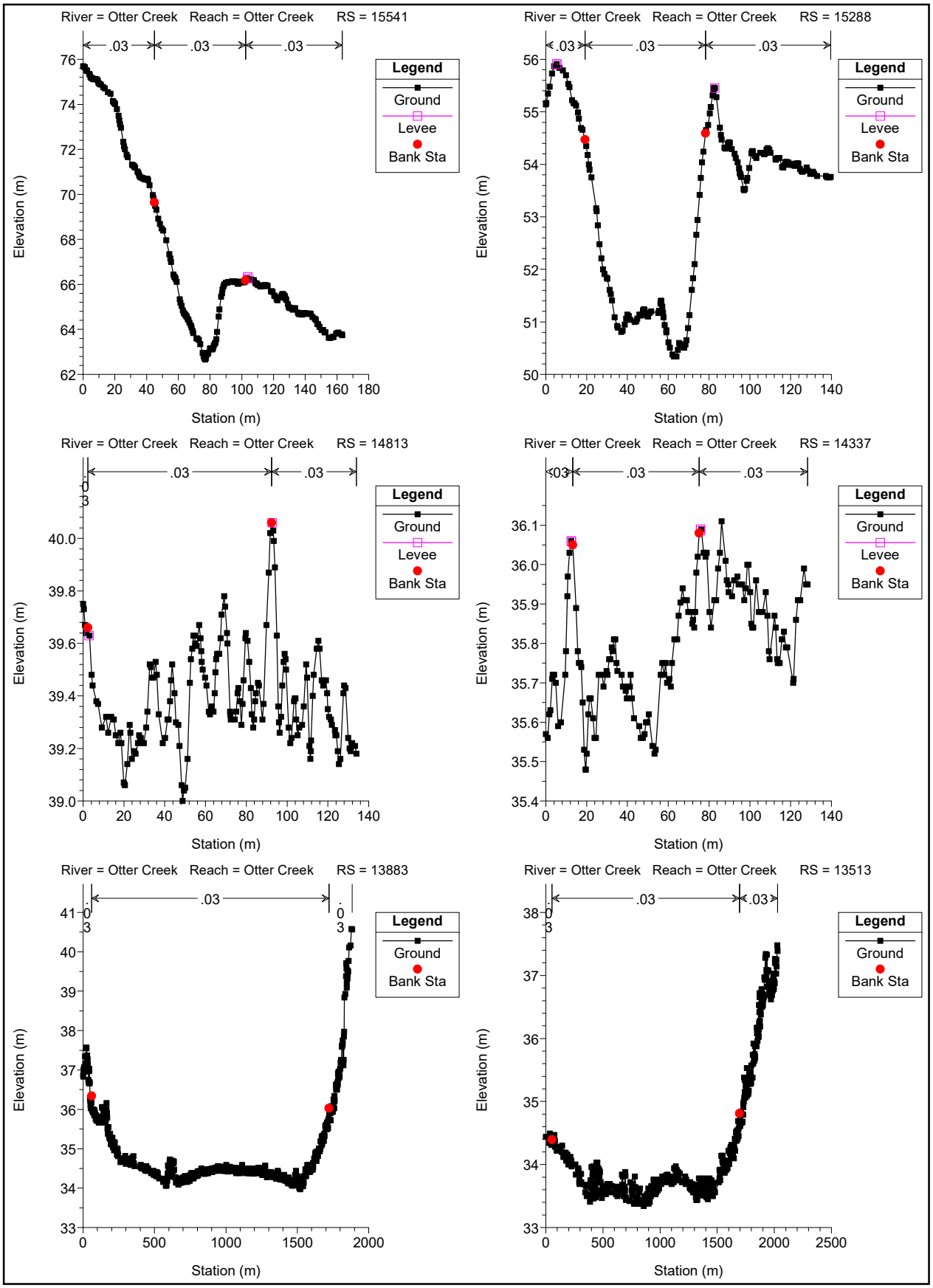

Churchill River
River = Mud Lake In Reach = In RS = 100
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
5
4
3
2
1
0
-1
-2
0
5
10
15
20
25
30

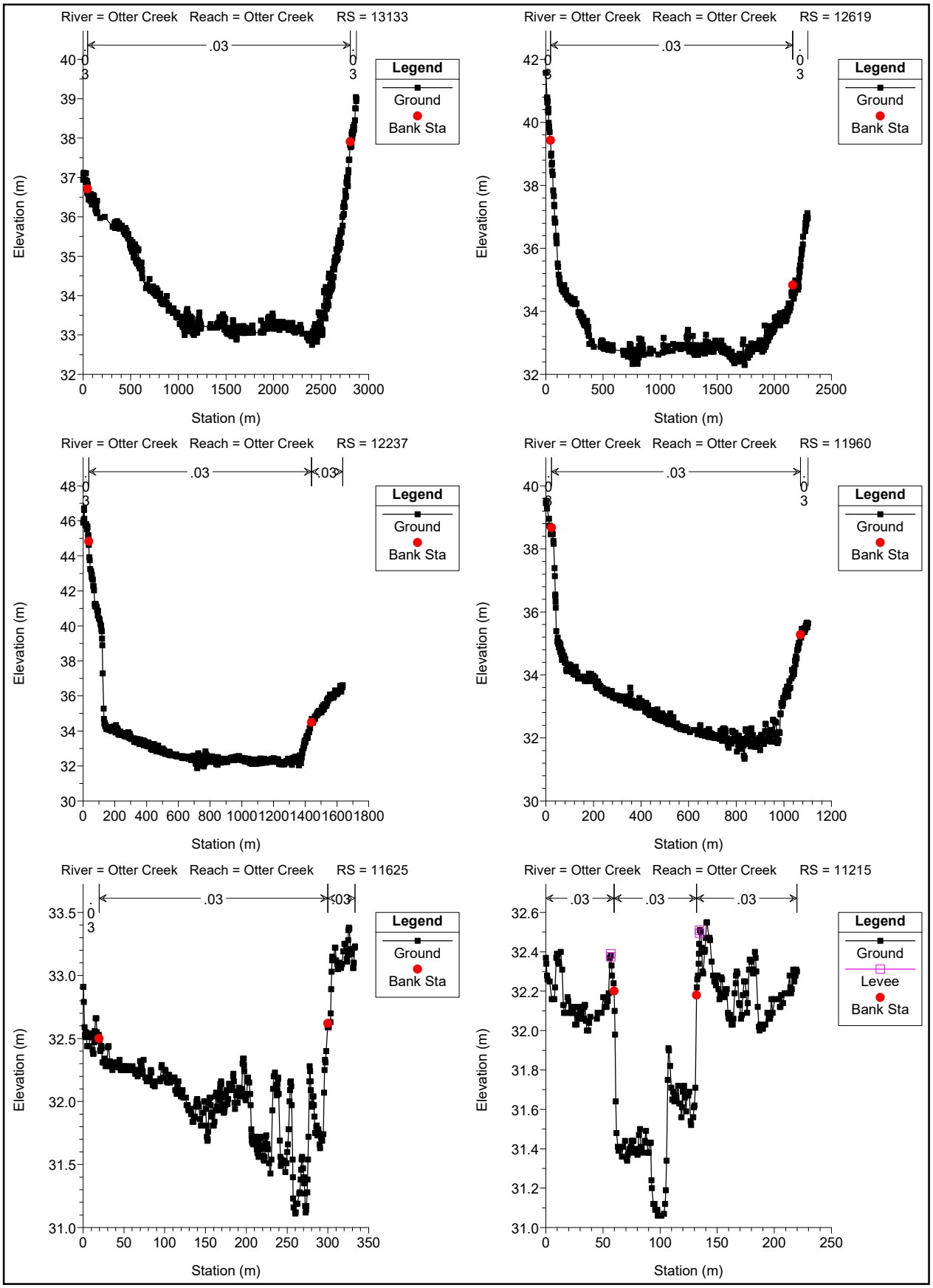

Churchill River
River = Mud Lake In Reach = In RS = 0
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
5
4
3
2
1
0
-1
-2
0
5
10
15
20
25
30

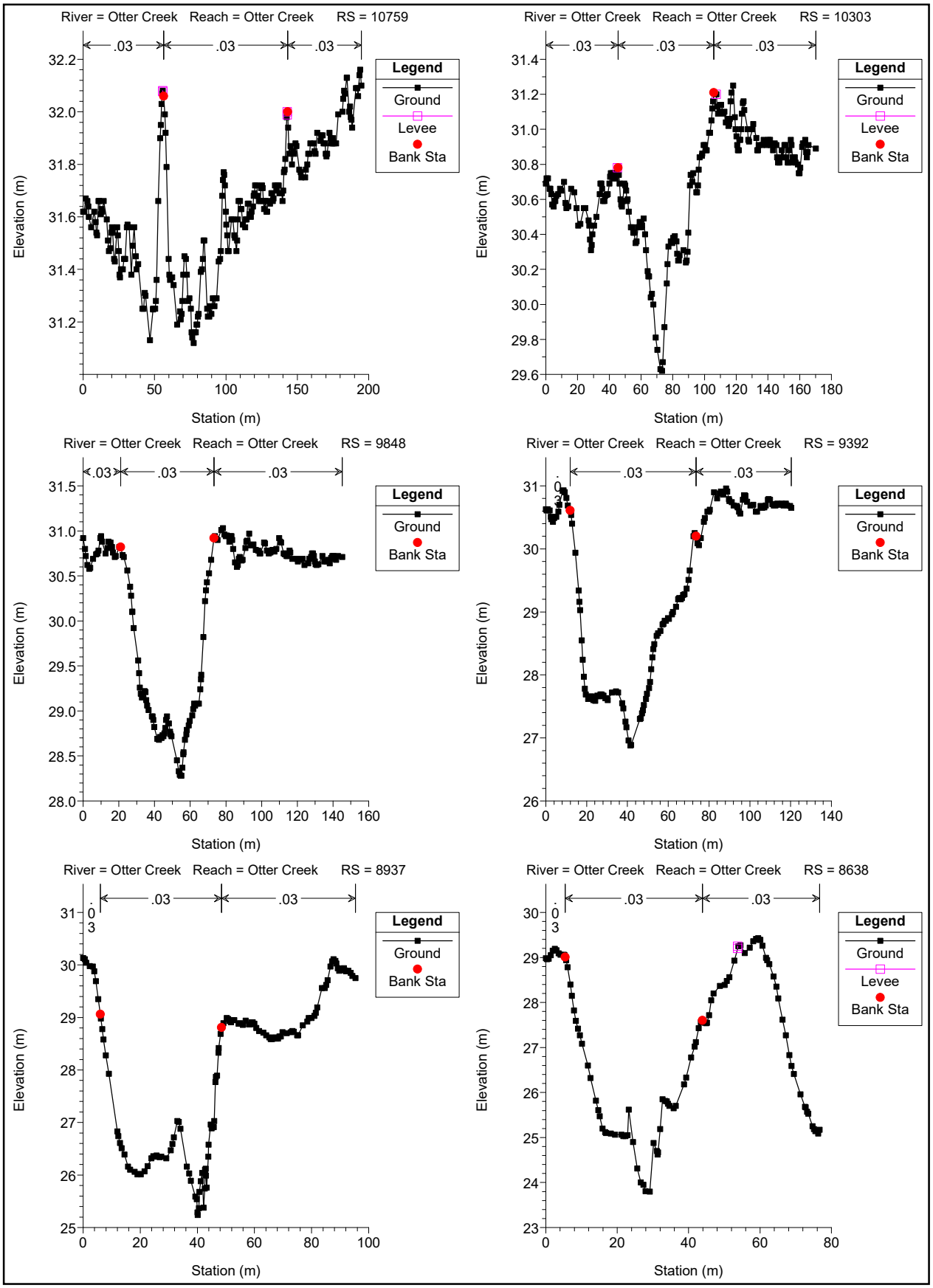
APPENDIX L

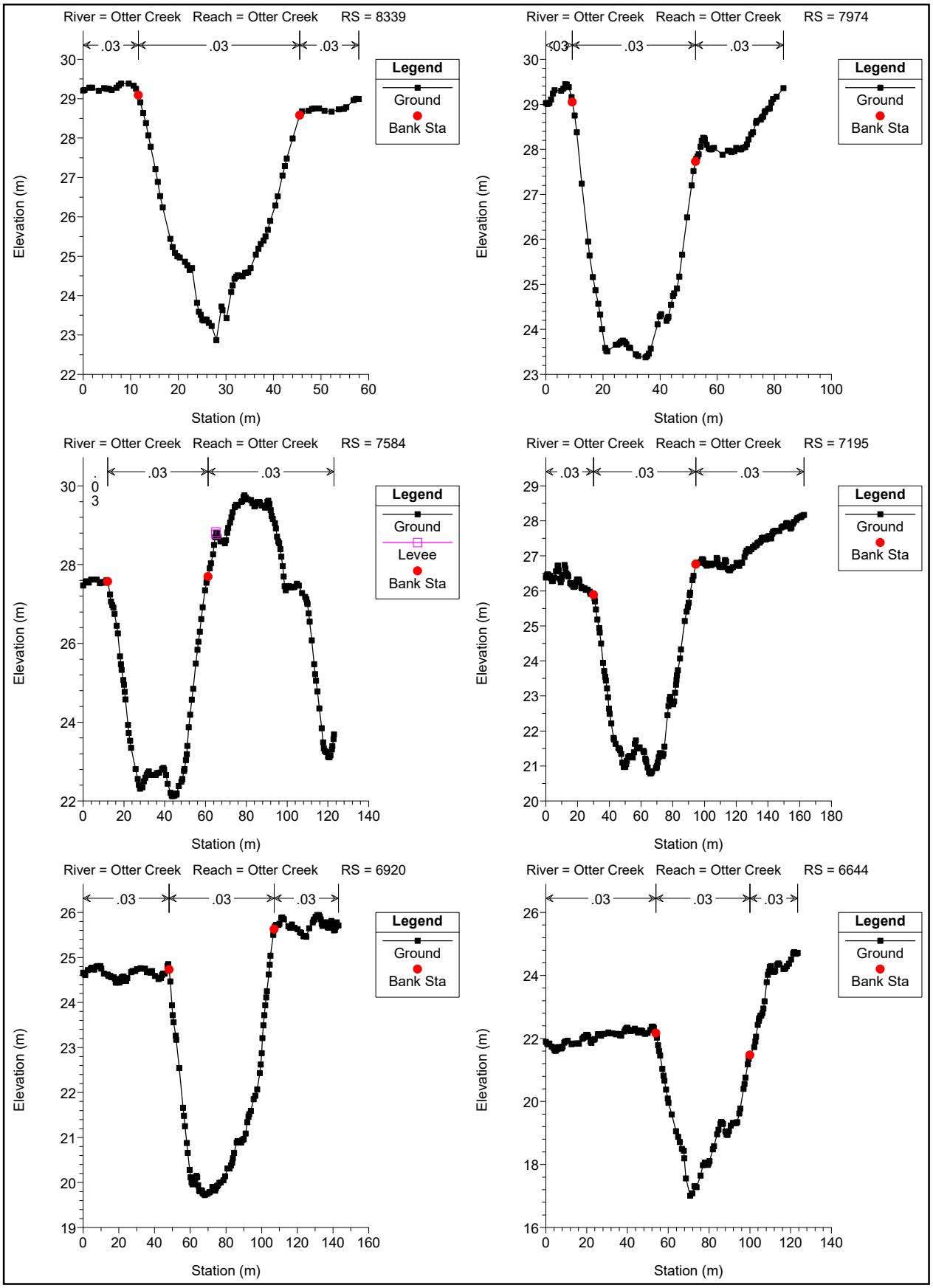
OTTER CREEK

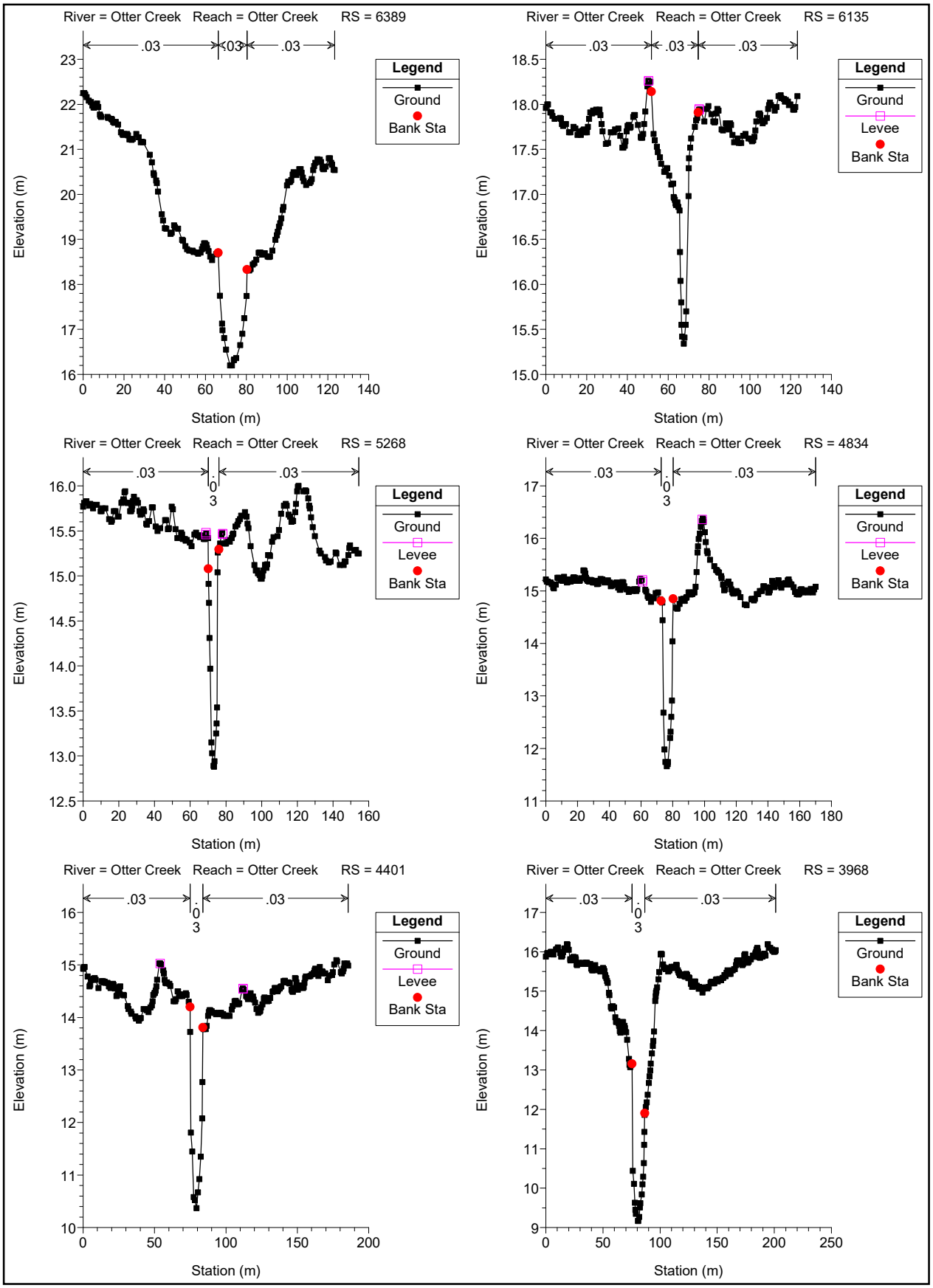

River = Otter Creek Reach = Otter Creek RS = 17556
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 17215
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 16873
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 16514
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 16154
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 15794
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

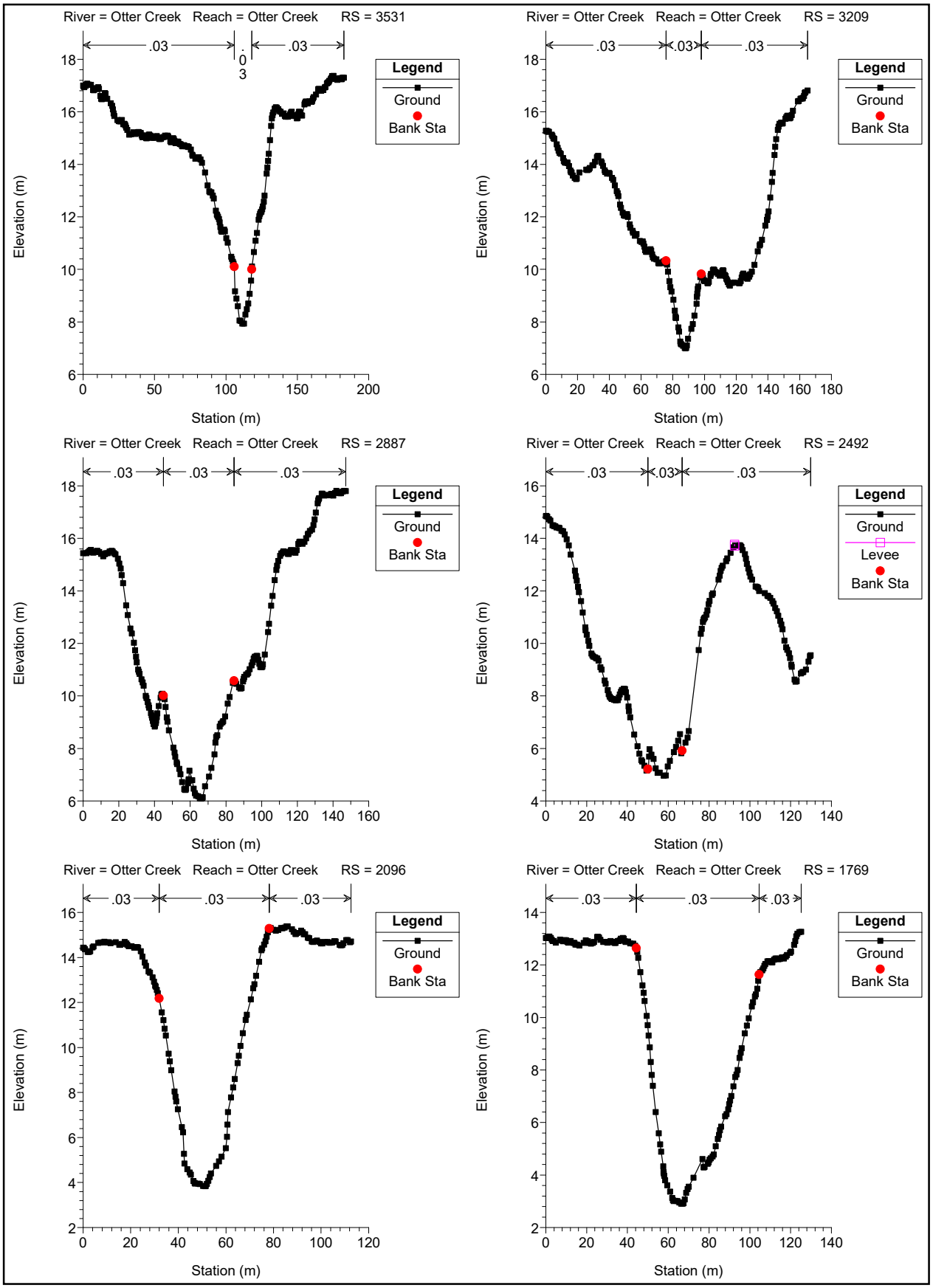

River = Otter Creek Reach = Otter Creek RS = 15541
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 15288
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 14813
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 14337
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 13883
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 13513
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

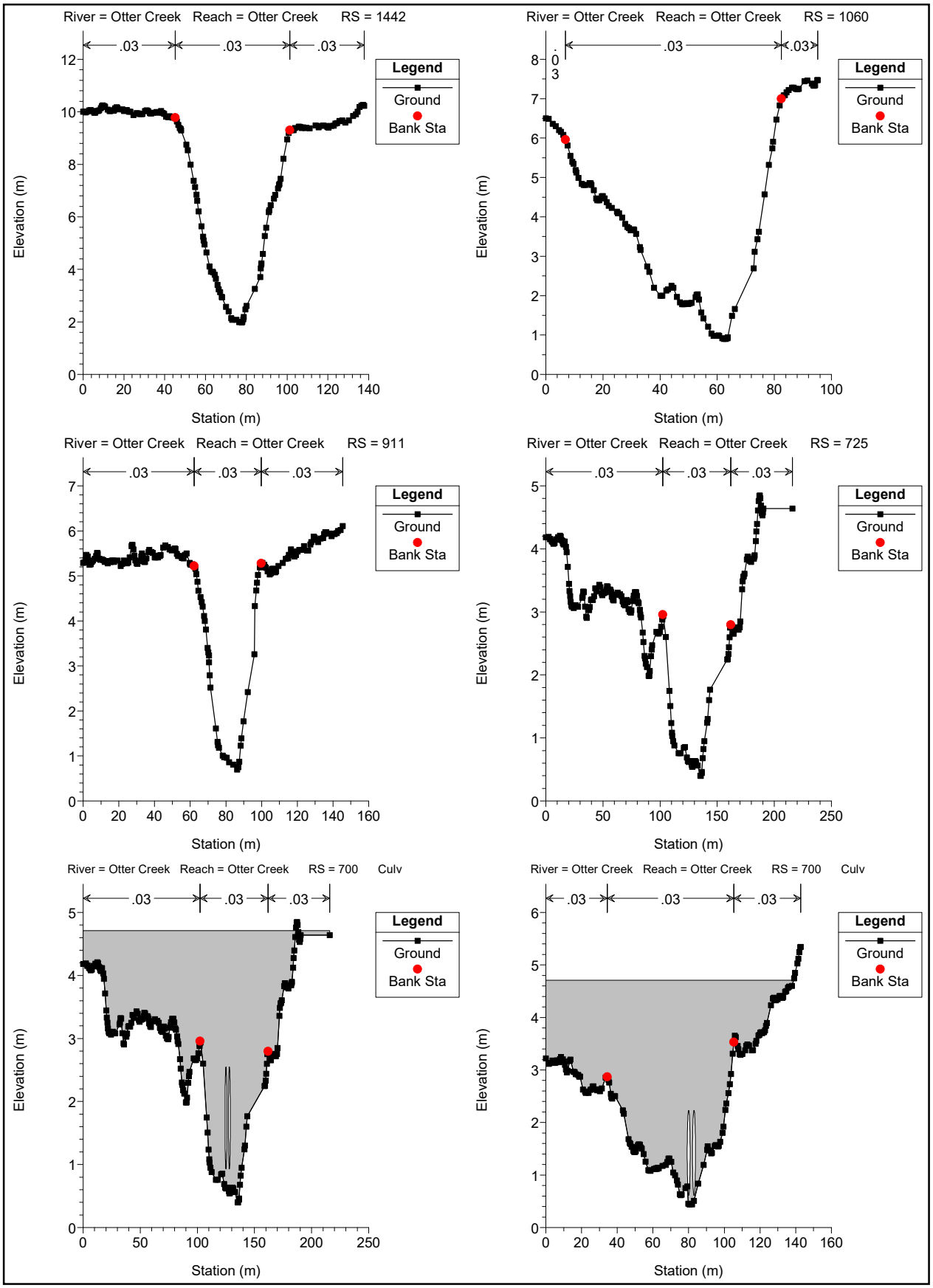

River = Otter Creek Reach = Otter Creek RS = 13133
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 12619
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 12237
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 11960
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 11625
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 11215
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

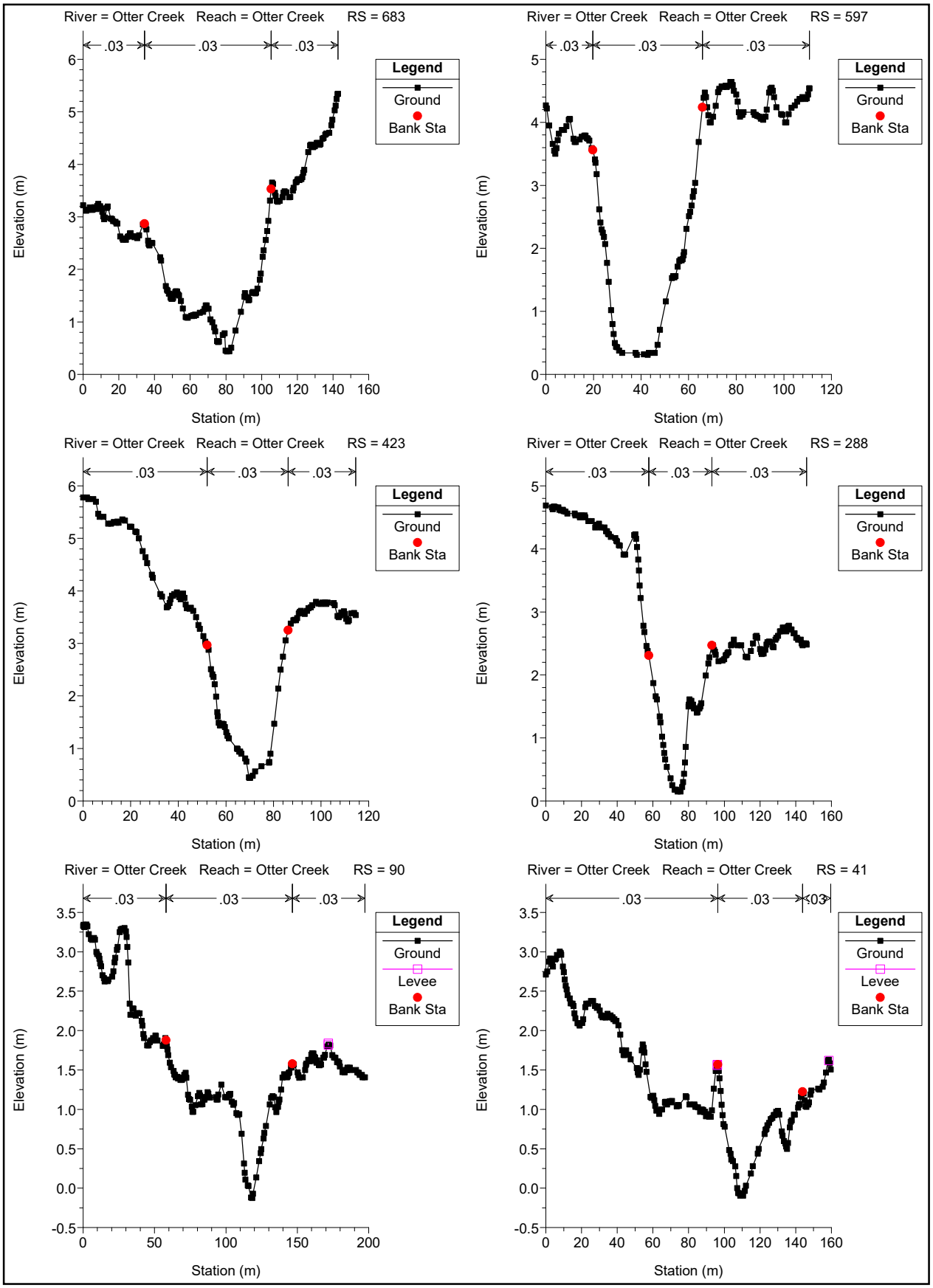

River = Otter Creek Reach = Otter Creek RS = 10759
River = Otter Creek Reach = Otter Creek RS = 10303
River = Otter Creek Reach = Otter Creek RS = 9848
River = Otter Creek Reach = Otter Creek RS = 9392
River = Otter Creek Reach = Otter Creek RS = 8937
River = Otter Creek Reach = Otter Creek RS = 8638
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

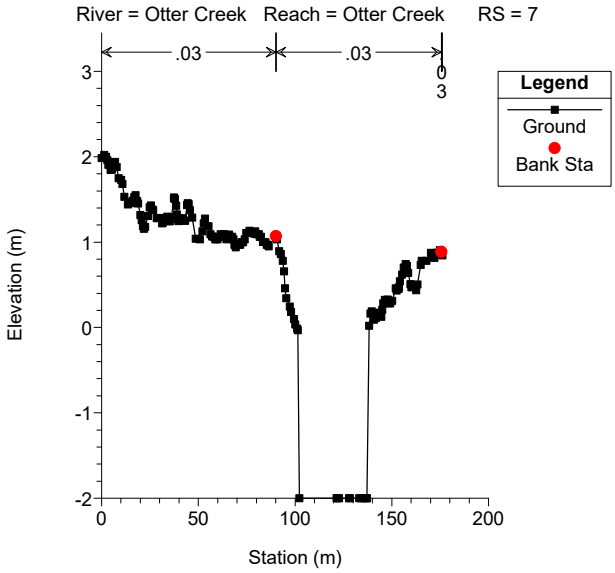

River = Otter Creek Reach = Otter Creek RS = 8339
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 7974
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 7584
.03 .03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 7195
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 6920
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 6644
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Otter Creek Reach = Otter Creek RS = 6389
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 6135
.03 .03 .03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 5268
.03 .03 .03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 4834
.03 .03 .03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 4401
.03 .03 .03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 3968
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Otter Creek Reach = Otter Creek RS = 3531
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 3209
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 2887
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 2492
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 2096
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 1769
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

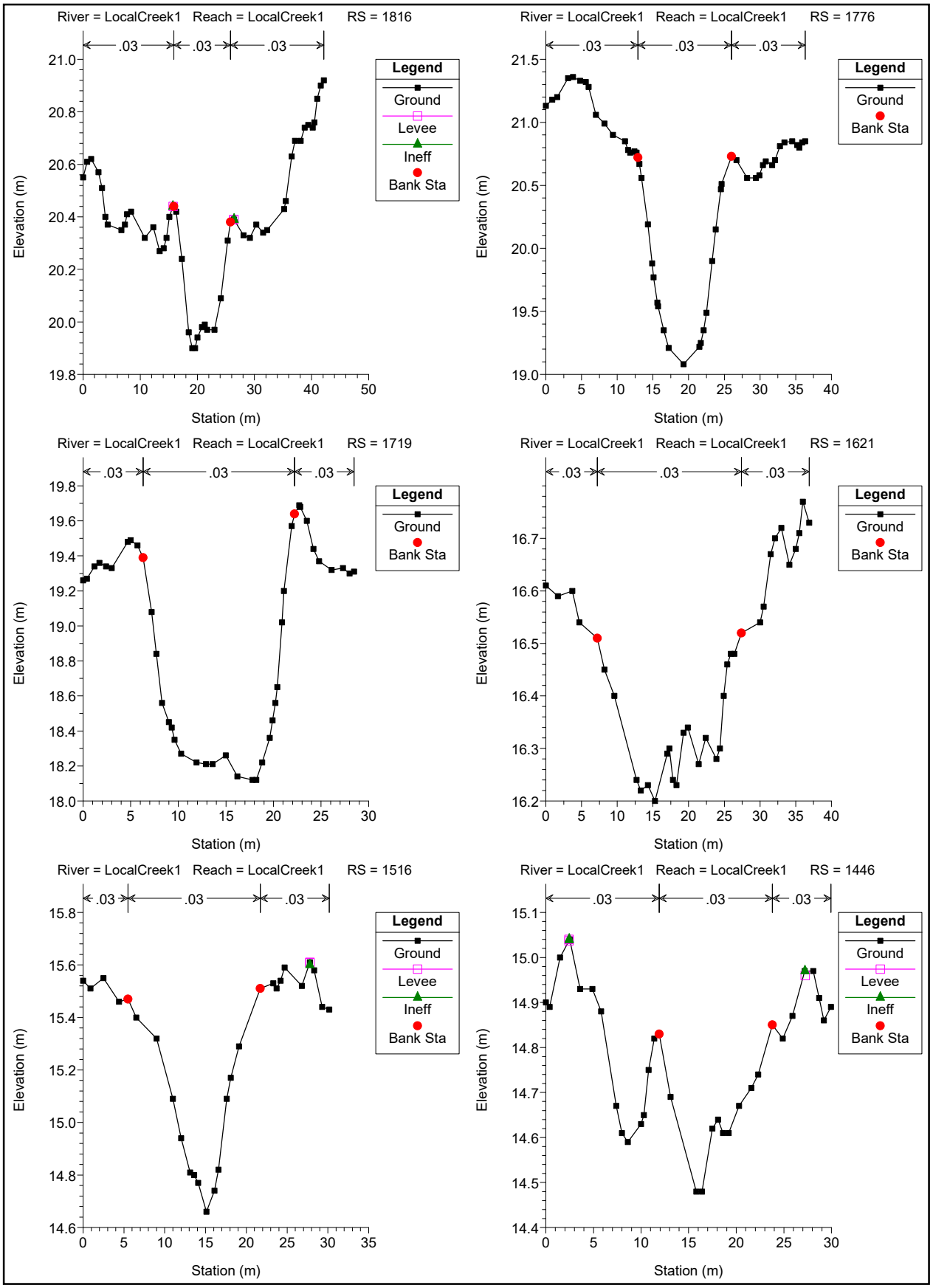

River = Otter Creek Reach = Otter Creek RS = 1442
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 1060
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 911
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 725
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 700 Culv
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 700 Culv
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

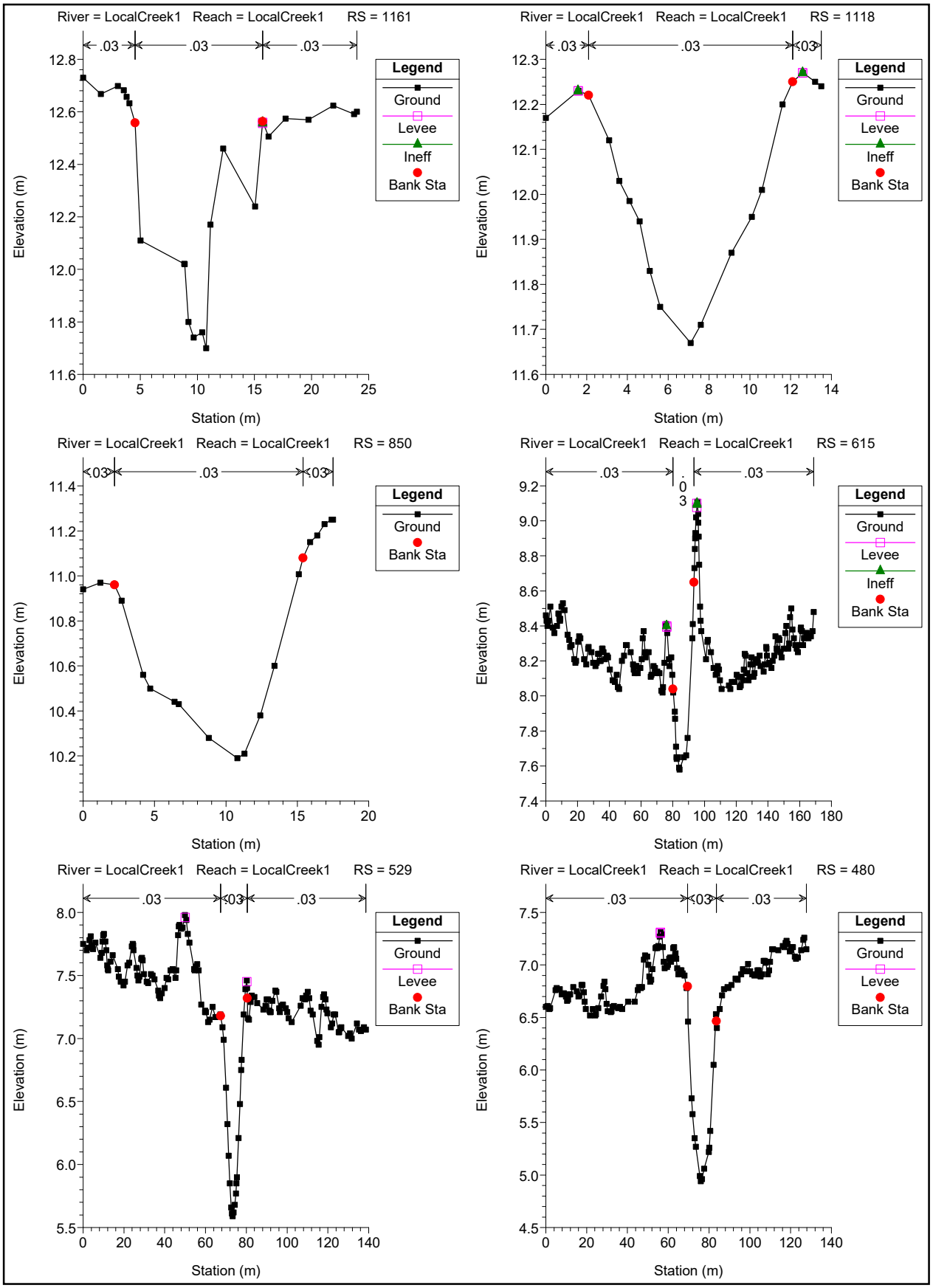

River = Otter Creek Reach = Otter Creek RS = 683
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 597
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 423
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 288
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 90
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Otter Creek Reach = Otter Creek RS = 41
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

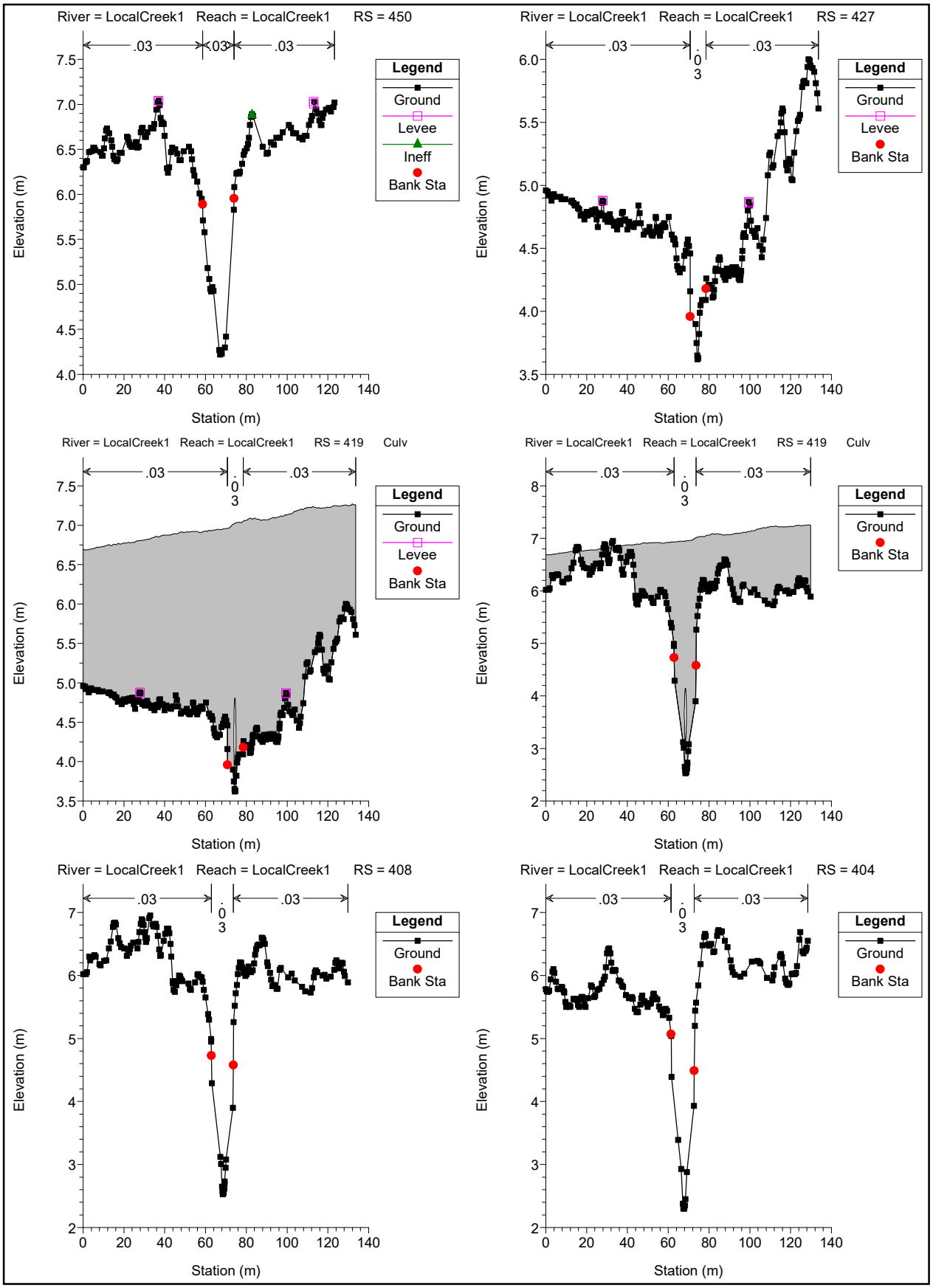

River = Otter Creek Reach = Otter Creek RS = 7
.03
.03
0
3
Legend
Ground
Bank Sta
Elevation (m)
3
2
1
0
-1
-2
0
50
100
150
200
Station (m)

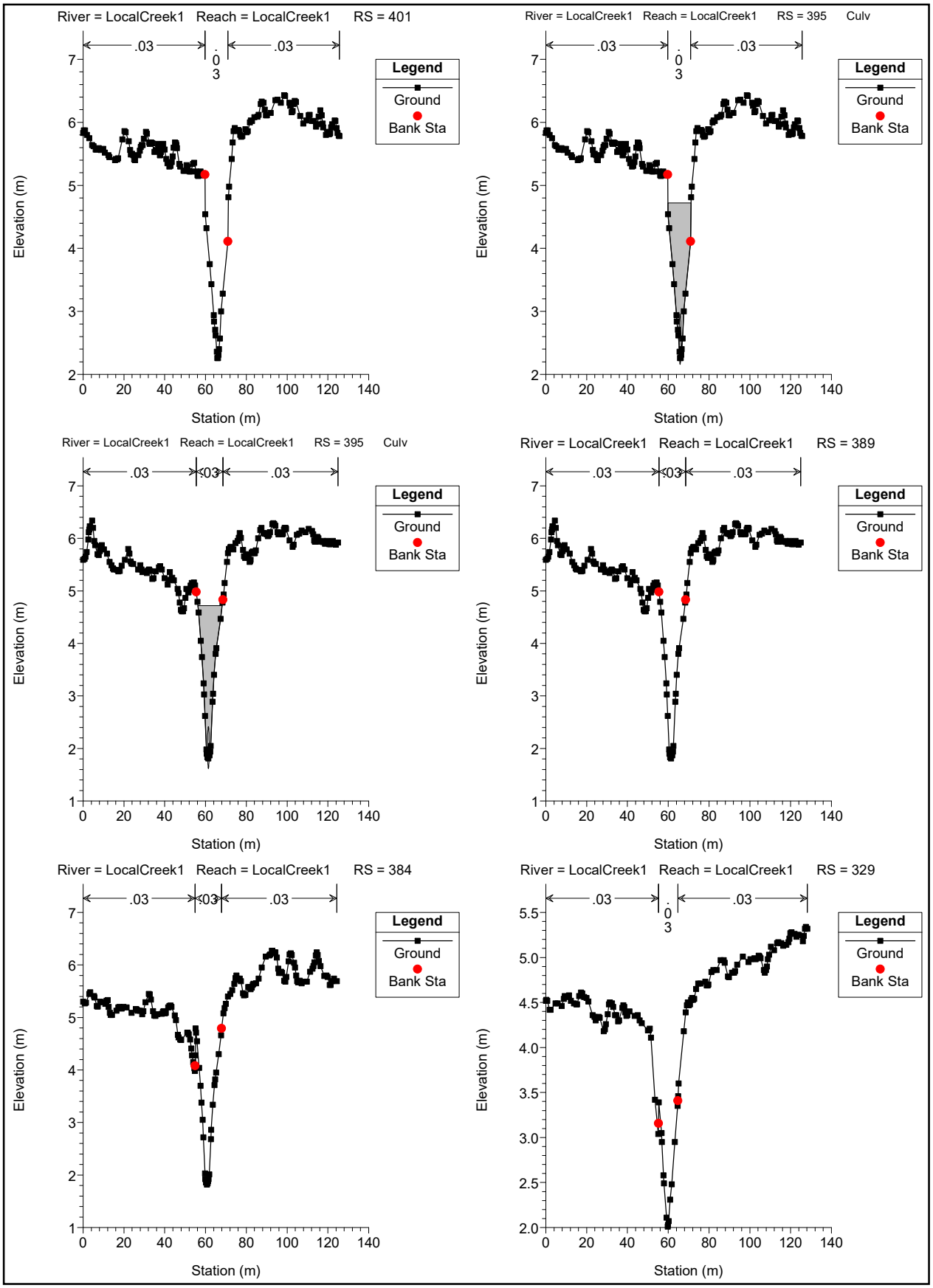
APPENDIX L

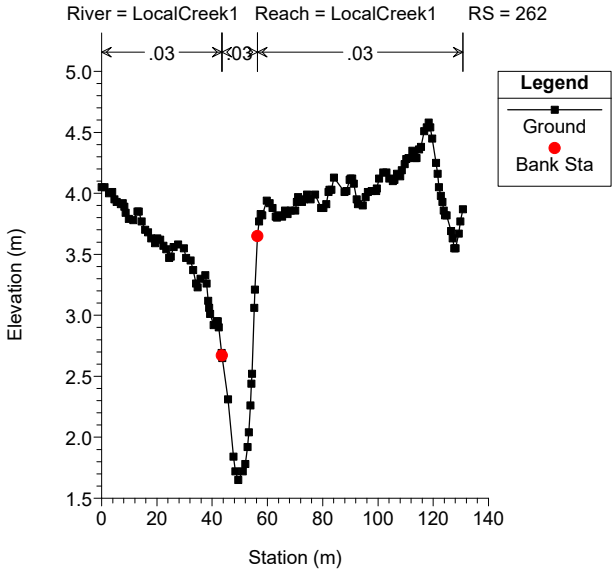
LOCAL CREEK 1

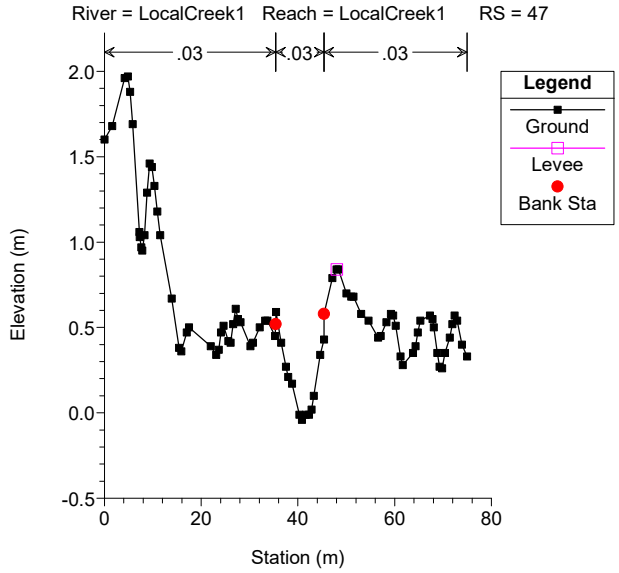

River = LocalCreek1 Reach = LocalCreek1 RS = 1816
River = LocalCreek1 Reach = LocalCreek1 RS = 1776
River = LocalCreek1 Reach = LocalCreek1 RS = 1719
River = LocalCreek1 Reach = LocalCreek1 RS = 1621
River = LocalCreek1 Reach = LocalCreek1 RS = 1516
River = LocalCreek1 Reach = LocalCreek1 RS = 1446
.03
Legend
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)

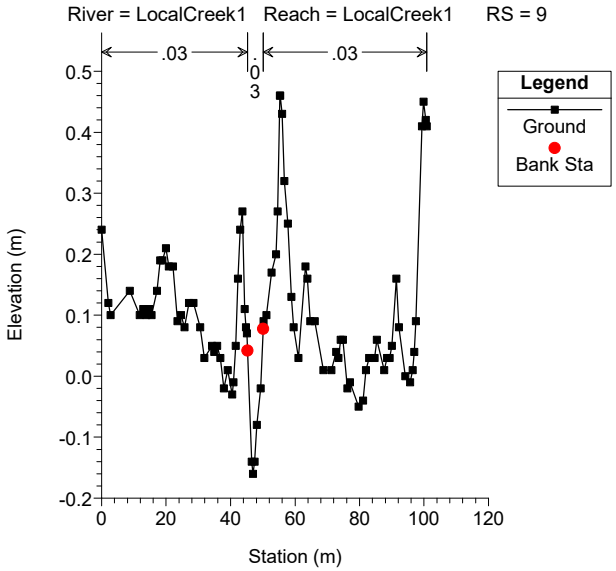

River = LocalCreek1 Reach = LocalCreek1 RS = 1161
.03
.03
.03
Legend
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 1118
.03
.03
.03
Legend
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 850
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 615
.03
.03
.03
Legend
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 529
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 480
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


River = LocalCreek1 Reach = LocalCreek1 RS = 450
.03
.03
.03
Legend
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 427
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 419 Culv
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 419 Culv
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 408
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = LocalCreek1 Reach = LocalCreek1 RS = 404
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = LocalCreek1 Reach = LocalCreek1 RS = 401
River = LocalCreek1 Reach = LocalCreek1 RS = 395 Culv
River = LocalCreek1 Reach = LocalCreek1 RS = 395 Culv
River = LocalCreek1 Reach = LocalCreek1 RS = 389
River = LocalCreek1 Reach = LocalCreek1 RS = 384
River = LocalCreek1 Reach = LocalCreek1 RS = 329
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

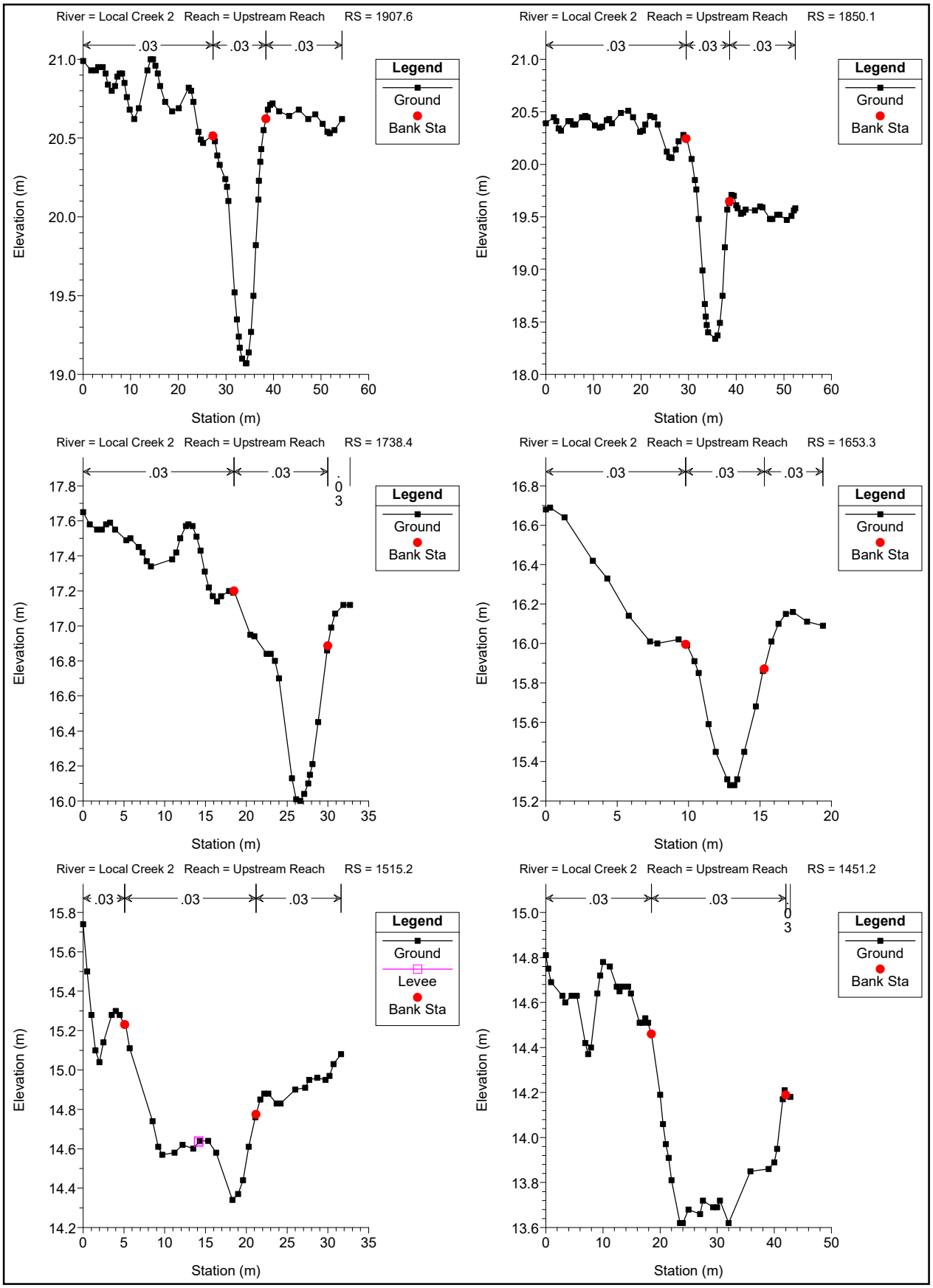

River = LocalCreek1 Reach = LocalCreek1 RS = 262
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

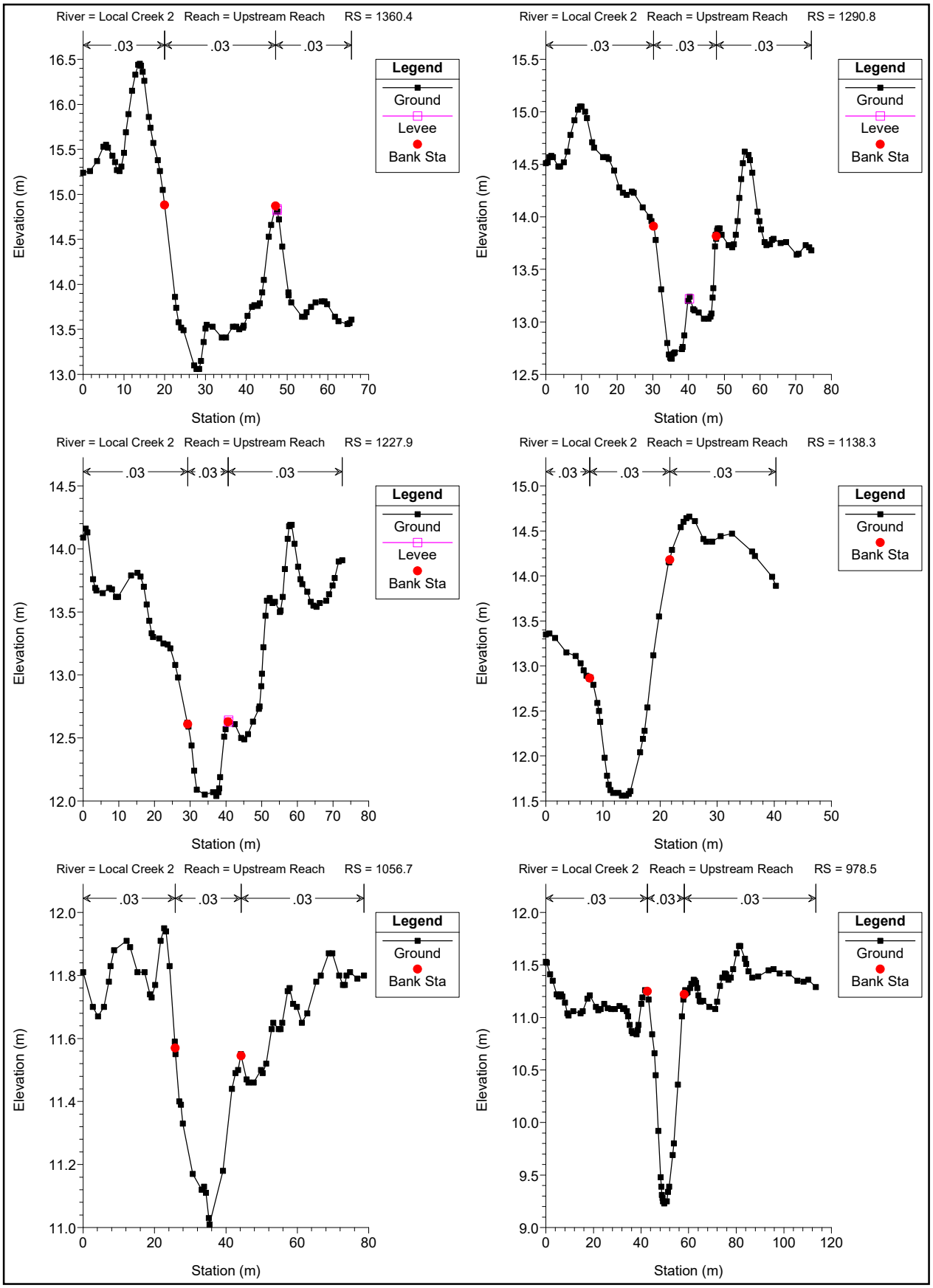

River = LocalCreek1 Reach = LocalCreek1 RS = 47
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


River = LocalCreek1 Reach = LocalCreek1 RS = 9
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

APPENDIX L

LOCAL CREEK 2


River = Local Creek 2 Reach = Upstream Reach RS = 1907.6
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Upstream Reach RS = 1850.1
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Upstream Reach RS = 1738.4
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Upstream Reach RS = 1653.3
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Upstream Reach RS = 1515.2
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Upstream Reach RS = 1451.2
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 2 Reach = Upstream Reach RS = 1360.4
River = Local Creek 2 Reach = Upstream Reach RS = 1290.8
River = Local Creek 2 Reach = Upstream Reach RS = 1227.9
River = Local Creek 2 Reach = Upstream Reach RS = 1138.3
River = Local Creek 2 Reach = Upstream Reach RS = 1056.7
River = Local Creek 2 Reach = Upstream Reach RS = 978.5
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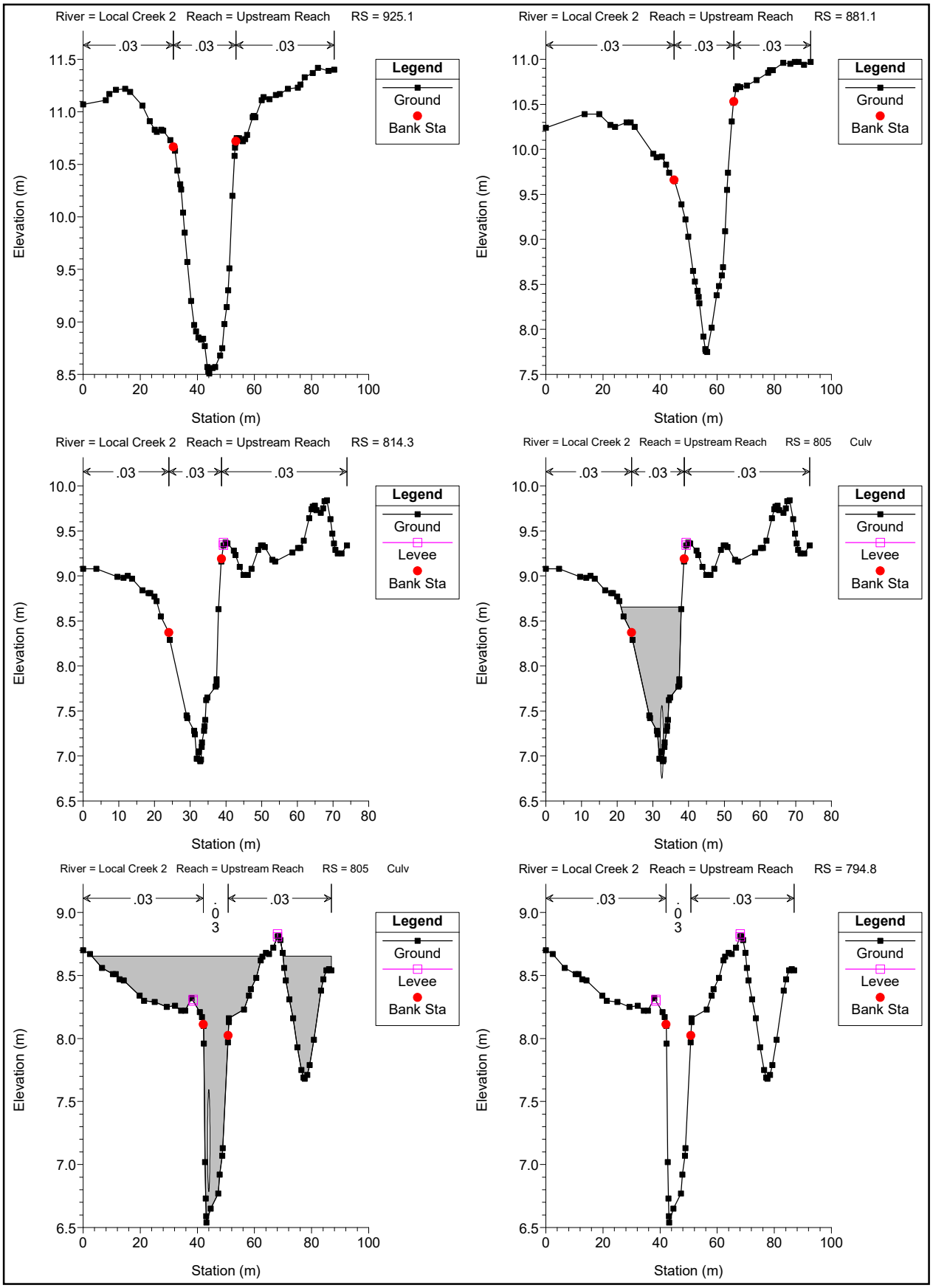
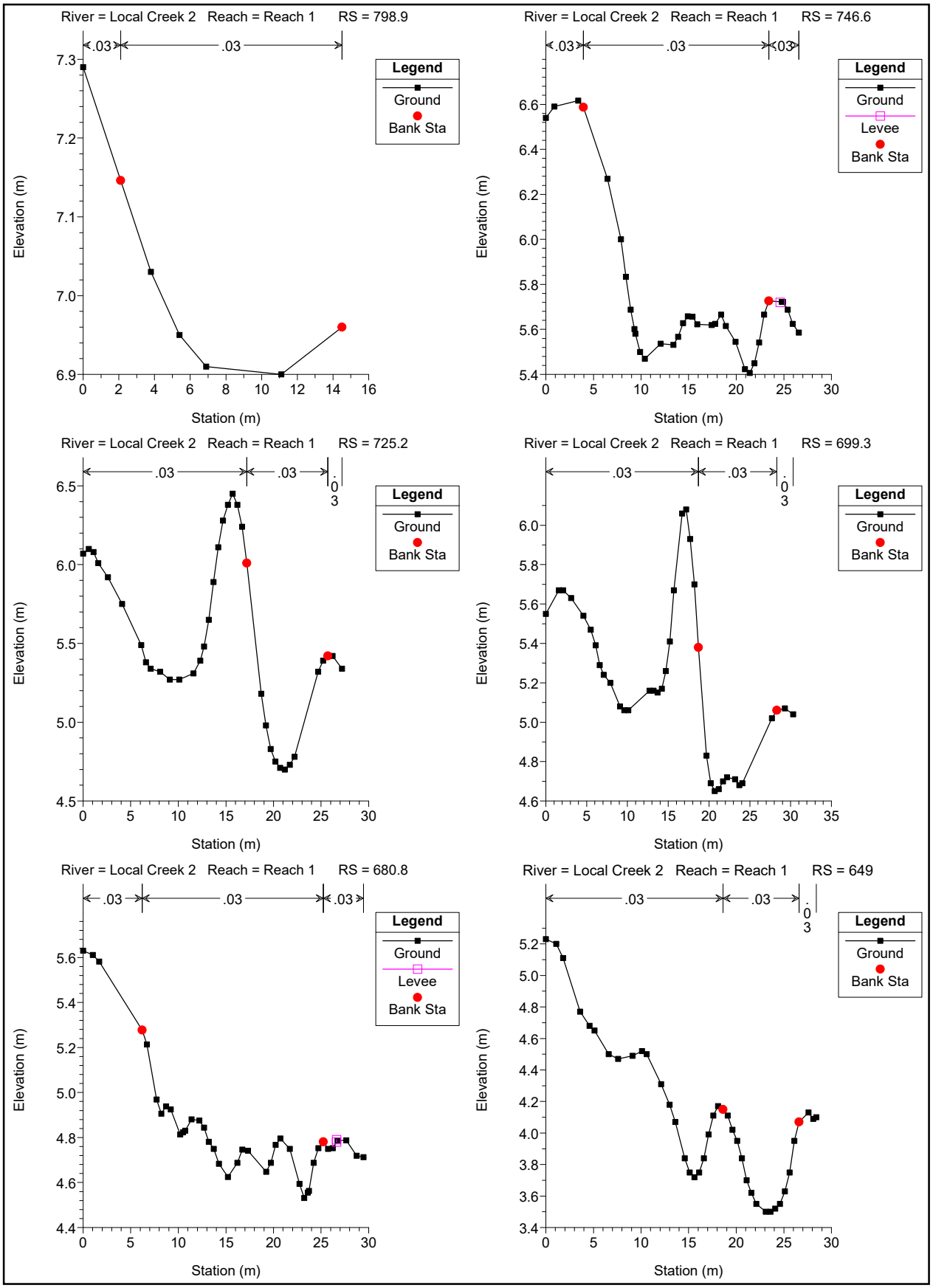
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 2 Reach = Upstream Reach RS = 925.1
River = Local Creek 2 Reach = Upstream Reach RS = 881.1
River = Local Creek 2 Reach = Upstream Reach RS = 814.3
River = Local Creek 2 Reach = Upstream Reach RS = 805 Culv
River = Local Creek 2 Reach = Upstream Reach RS = 805 Culv
River = Local Creek 2 Reach = Upstream Reach RS = 794.8
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 2 Reach = Reach 1 RS = 798.9
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Reach 1 RS = 746.6
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Reach 1 RS = 725.2
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Reach 1 RS = 699.3
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Reach 1 RS = 680.8
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 2 Reach = Reach 1 RS = 649
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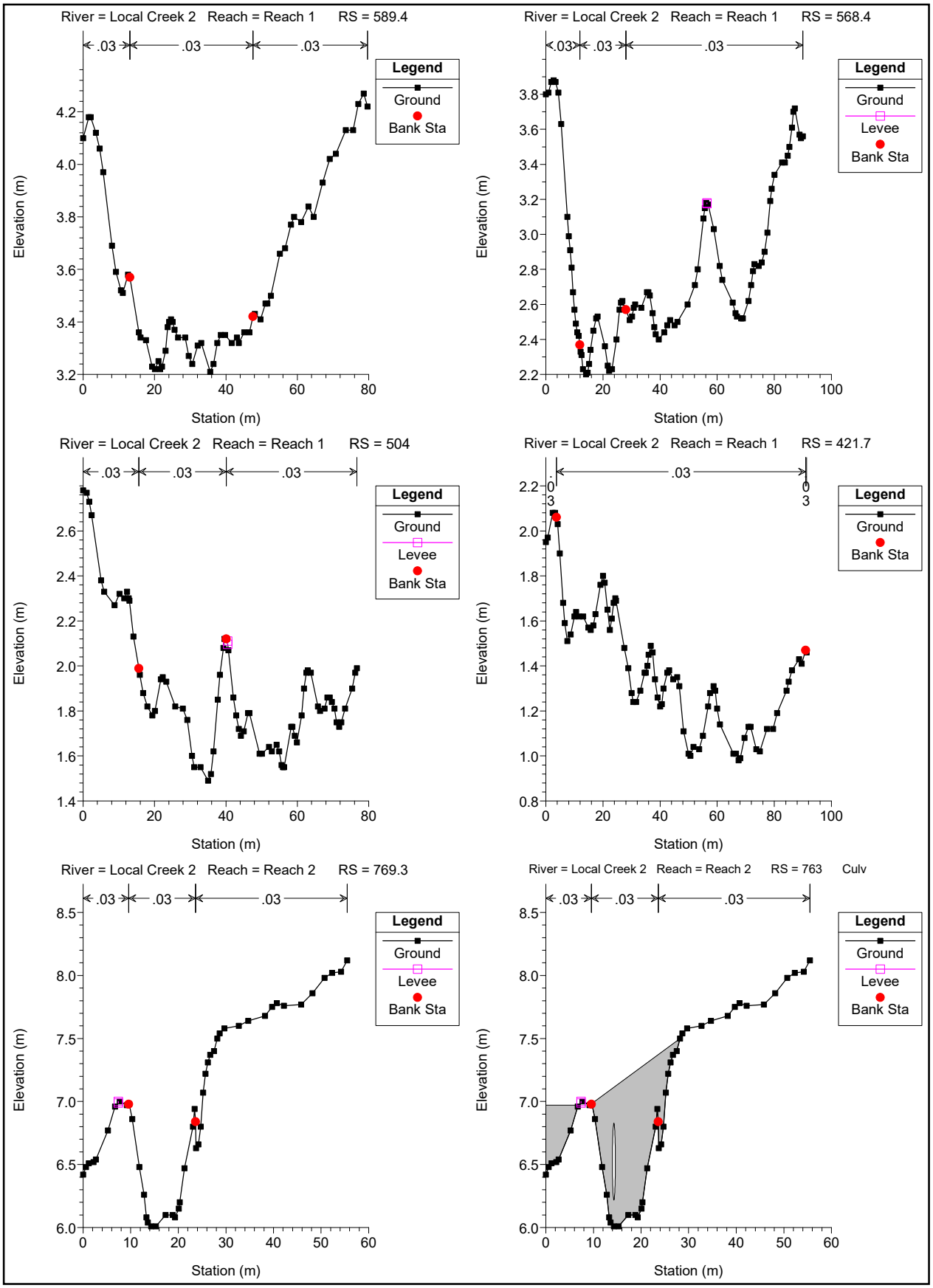
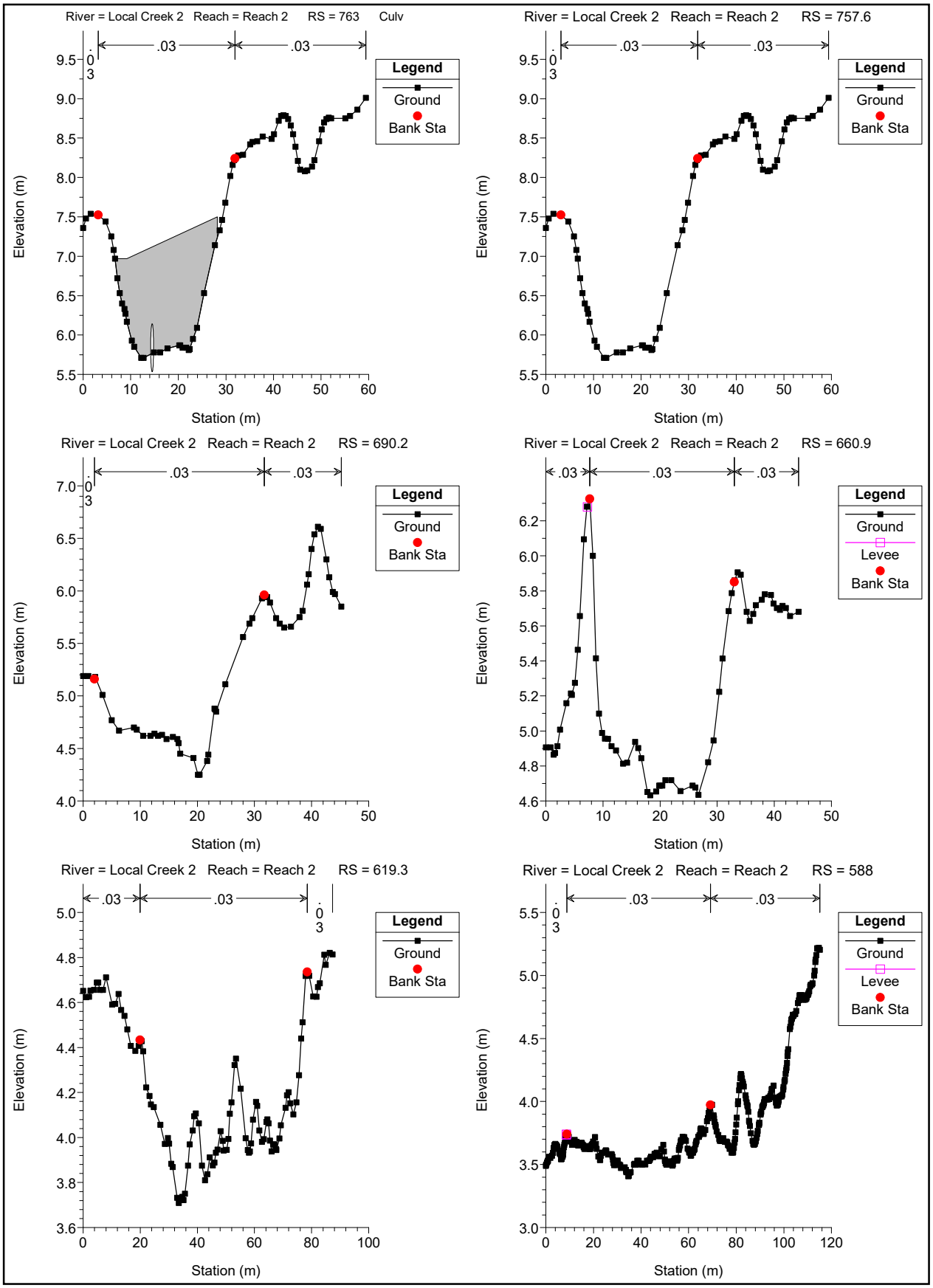
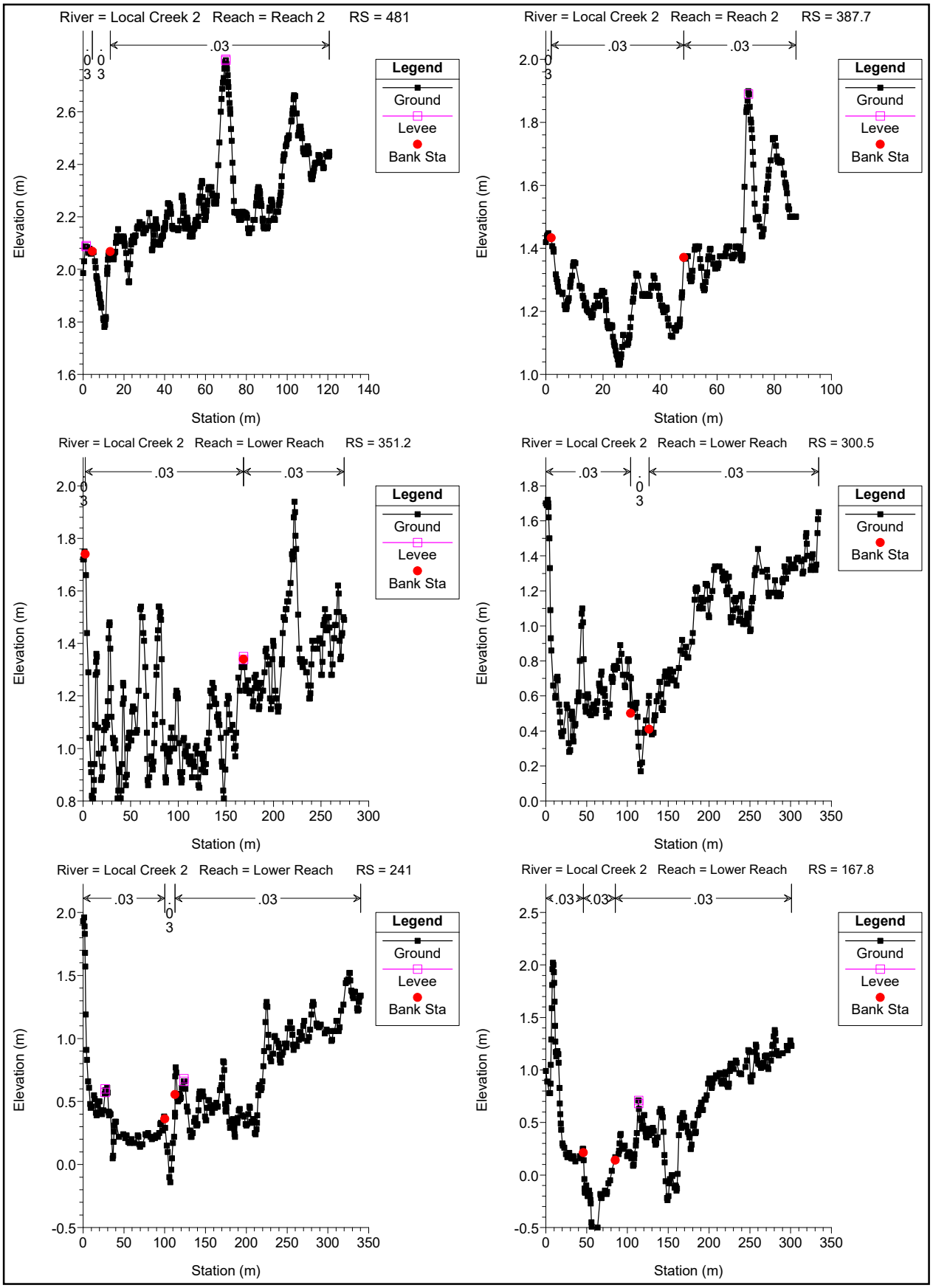
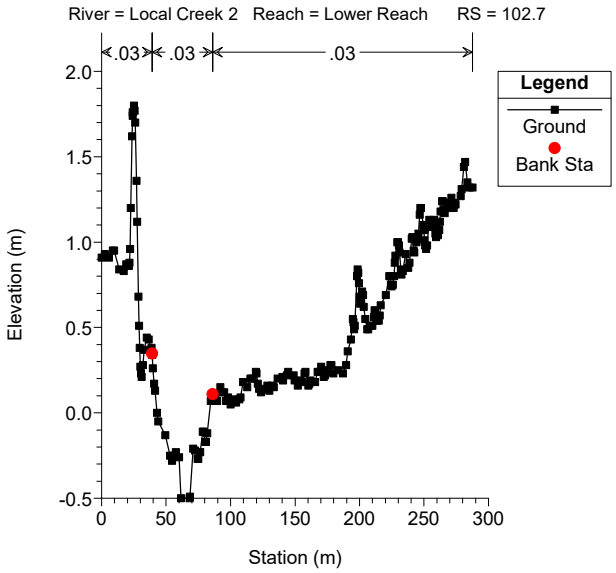
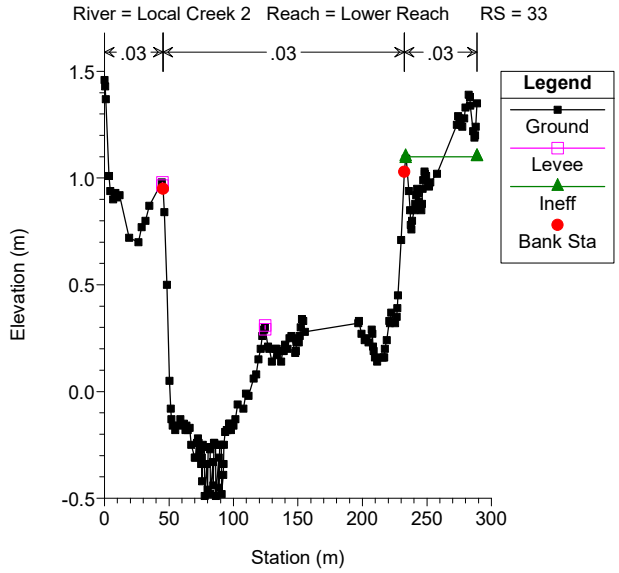
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 2 Reach = Reach 1 RS = 589.4
River = Local Creek 2 Reach = Reach 1 RS = 568.4
River = Local Creek 2 Reach = Reach 1 RS = 504
River = Local Creek 2 Reach = Reach 1 RS = 421.7
River = Local Creek 2 Reach = Reach 2 RS = 769.3
River = Local Creek 2 Reach = Reach 2 RS = 763 Culv
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 2 Reach = Reach 2 RS = 763 Culv
River = Local Creek 2 Reach = Reach 2 RS = 757.6
River = Local Creek 2 Reach = Reach 2 RS = 690.2
River = Local Creek 2 Reach = Reach 2 RS = 660.9
River = Local Creek 2 Reach = Reach 2 RS = 619.3
River = Local Creek 2 Reach = Reach 2 RS = 588
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

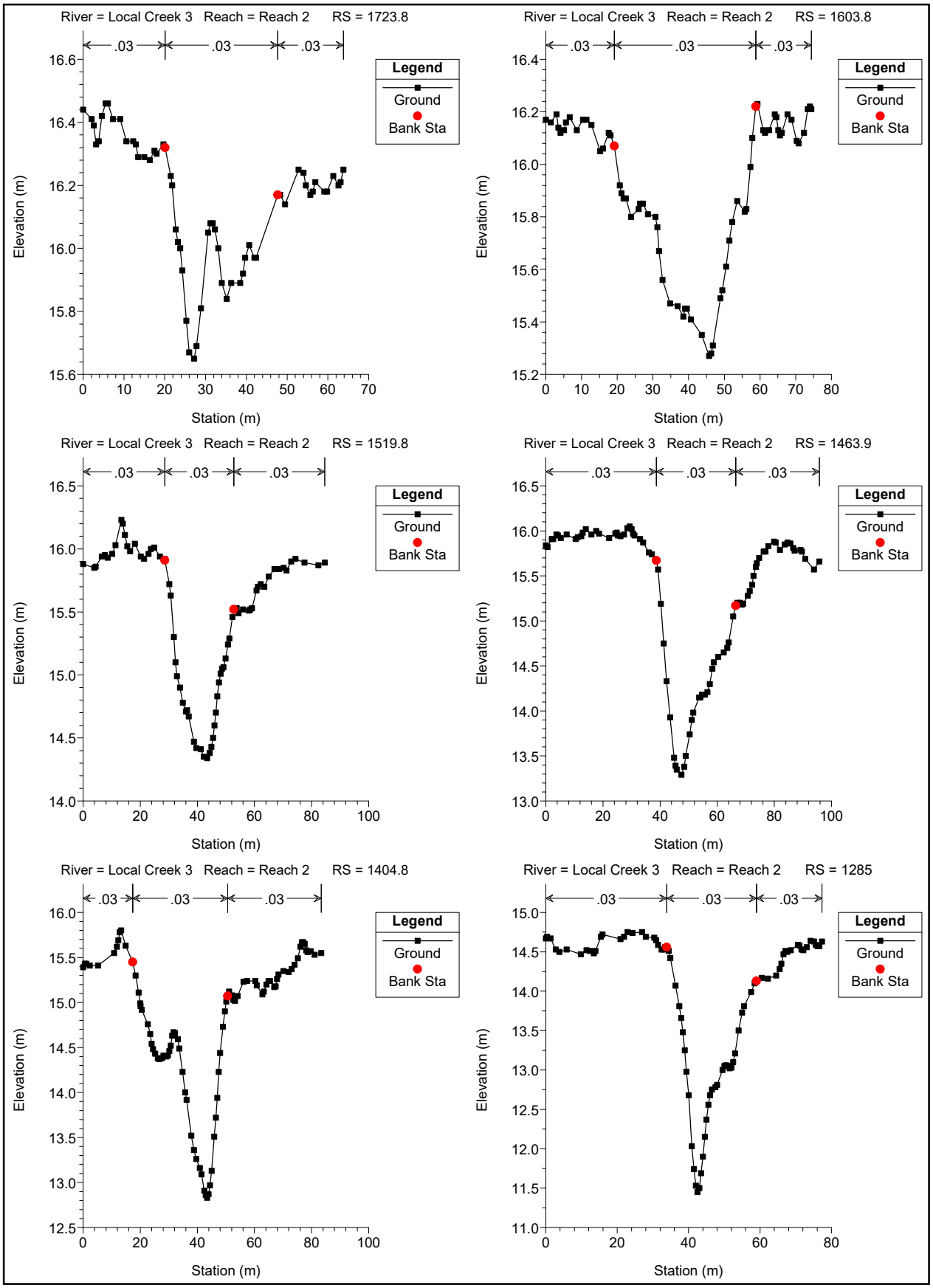

River = Local Creek 2 Reach = Reach 2 RS = 481
River = Local Creek 2 Reach = Reach 2 RS = 387.7
River = Local Creek 2 Reach = Lower Reach RS = 351.2
River = Local Creek 2 Reach = Lower Reach RS = 300.5
River = Local Creek 2 Reach = Lower Reach RS = 241
River = Local Creek 2 Reach = Lower Reach RS = 167.8
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

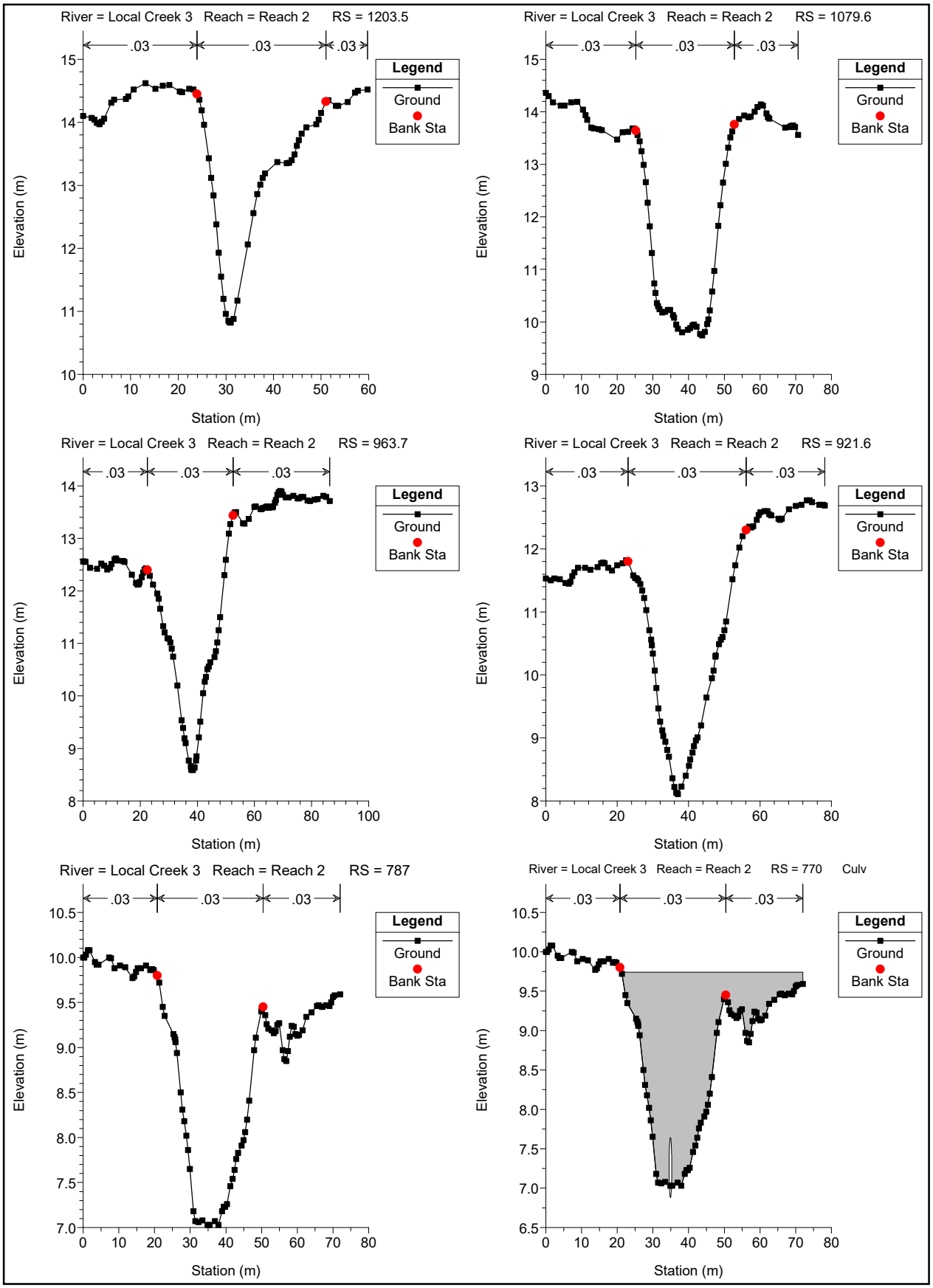

River = Local Creek 2 Reach = Lower Reach RS = 102.7
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
2.0
1.5
1.0
0.5
0.0
-0.5
0
50
100
150
200
250
300

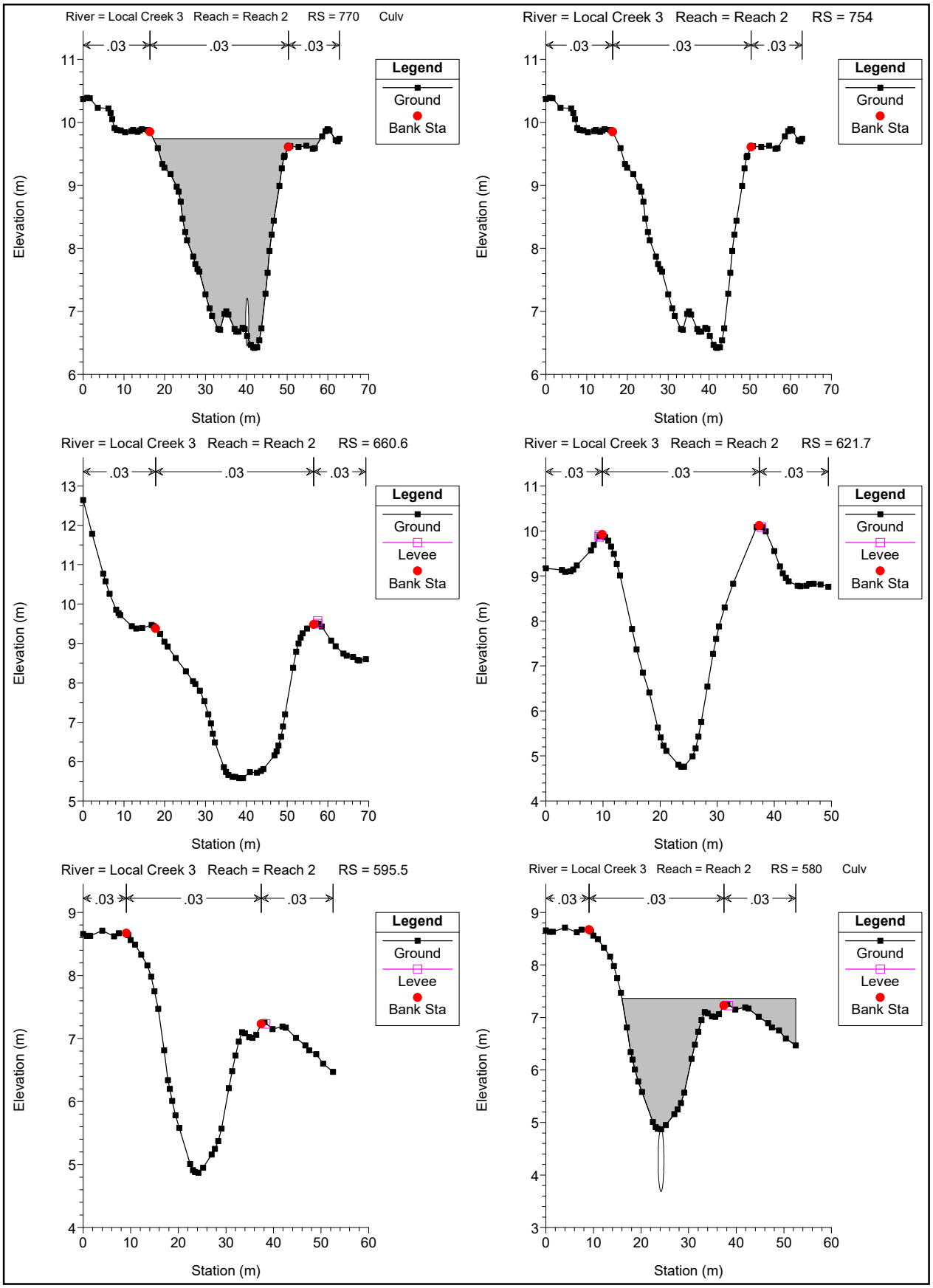

River = Local Creek 2 Reach = Lower Reach RS = 33
.03
.03
.03
Legend
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
1.5
1.0
0.5
0.0
-0.5
0
50
100
150
200
250
300

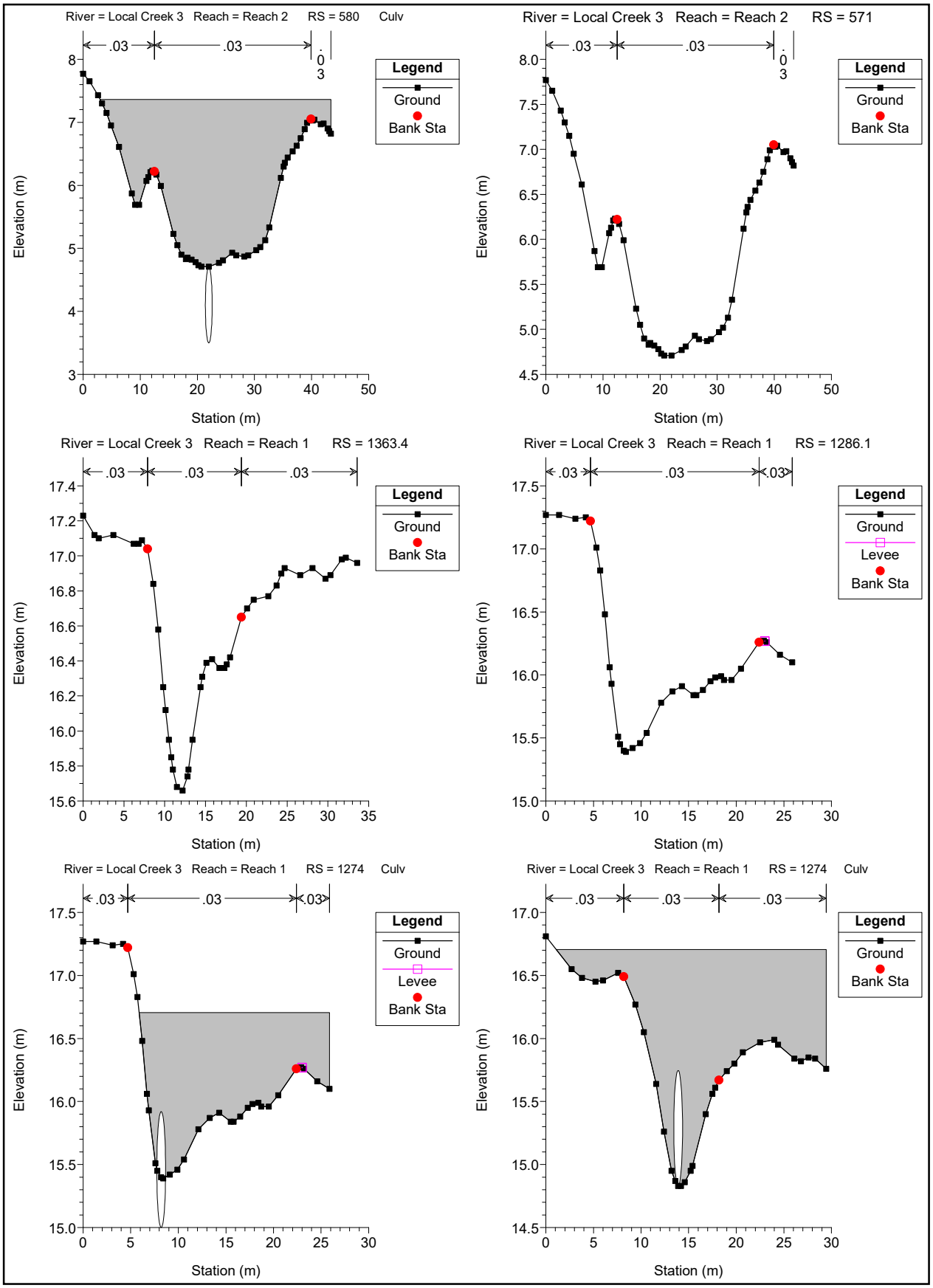
APPENDIX L

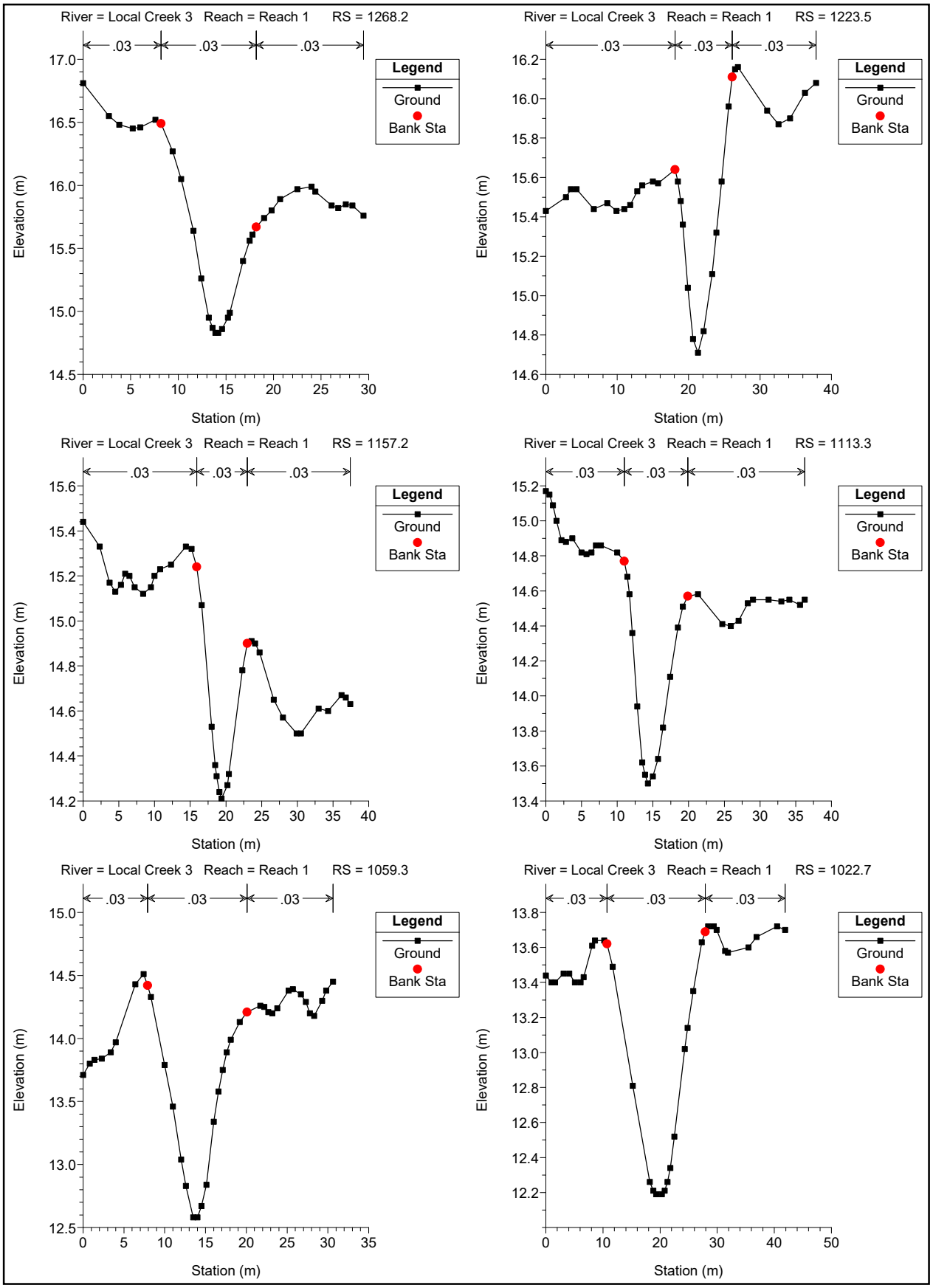
LOCAL CREEK 3

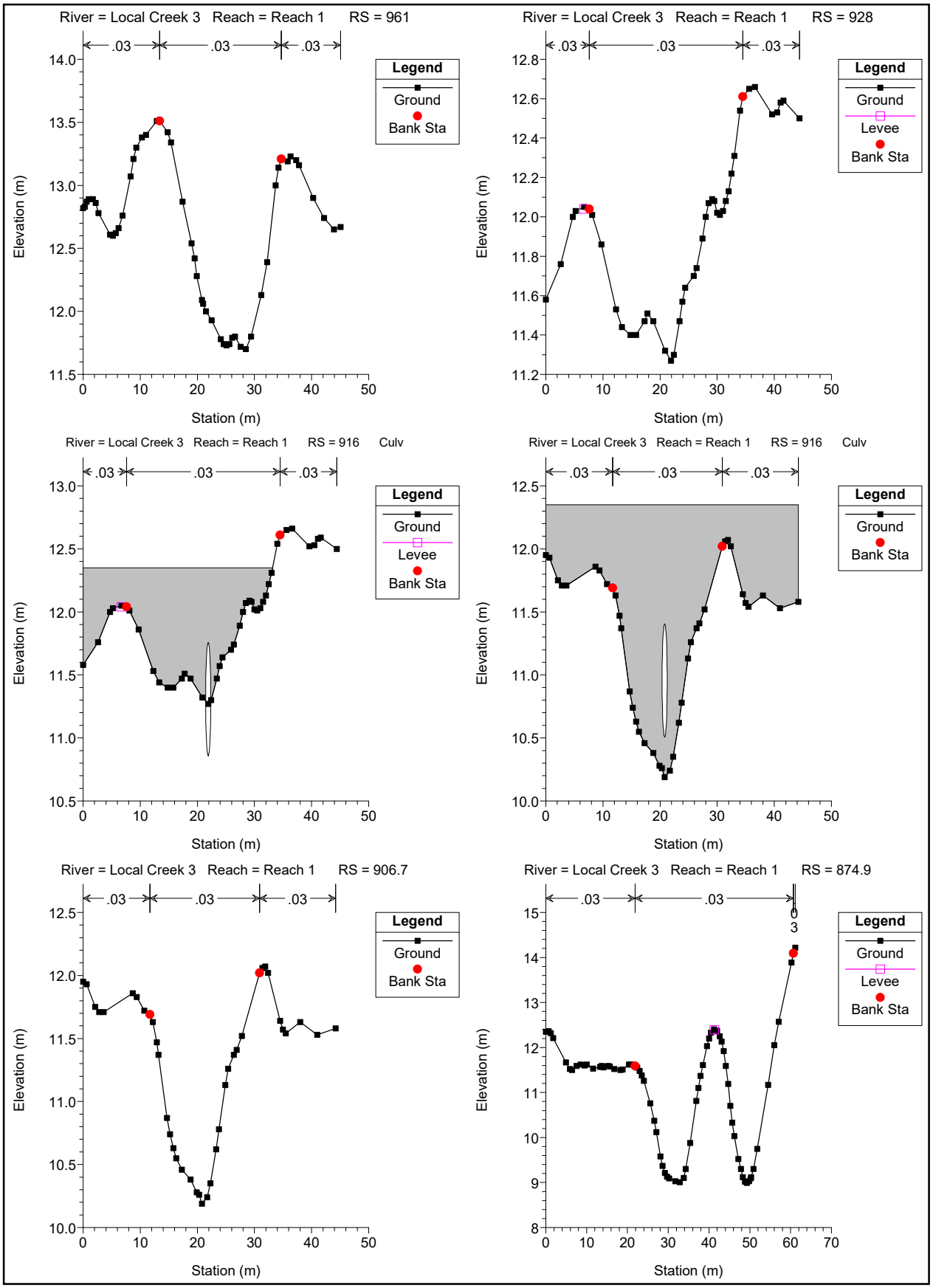

River = Local Creek 3 Reach = Reach 2 RS = 1723.8
River = Local Creek 3 Reach = Reach 2 RS = 1603.8
River = Local Creek 3 Reach = Reach 2 RS = 1519.8
River = Local Creek 3 Reach = Reach 2 RS = 1463.9
River = Local Creek 3 Reach = Reach 2 RS = 1404.8
River = Local Creek 3 Reach = Reach 2 RS = 1285
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

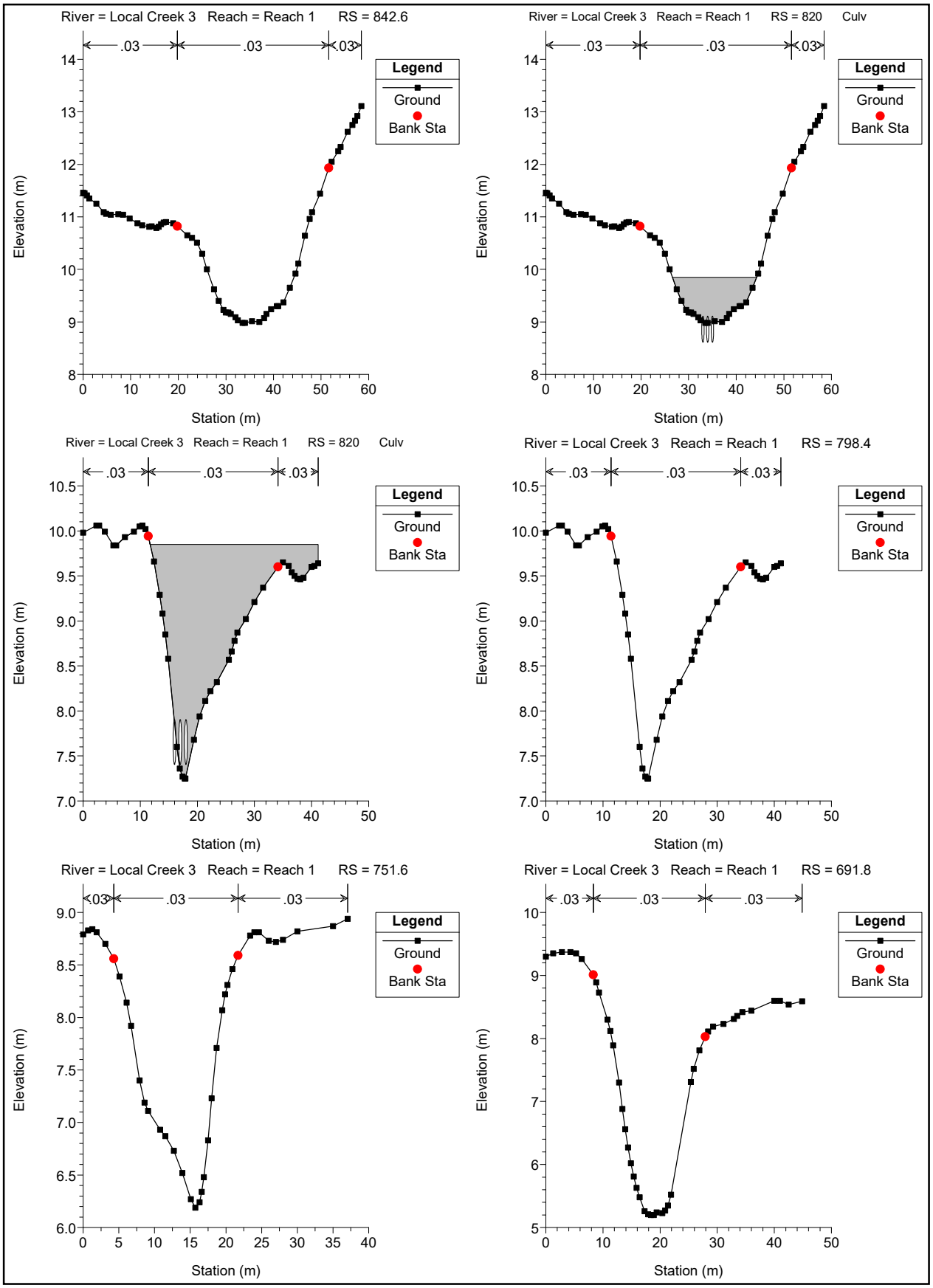

River = Local Creek 3 Reach = Reach 2 RS = 1203.5
River = Local Creek 3 Reach = Reach 2 RS = 1079.6
River = Local Creek 3 Reach = Reach 2 RS = 963.7
River = Local Creek 3 Reach = Reach 2 RS = 921.6
River = Local Creek 3 Reach = Reach 2 RS = 787
River = Local Creek 3 Reach = Reach 2 RS = 770 Culv
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

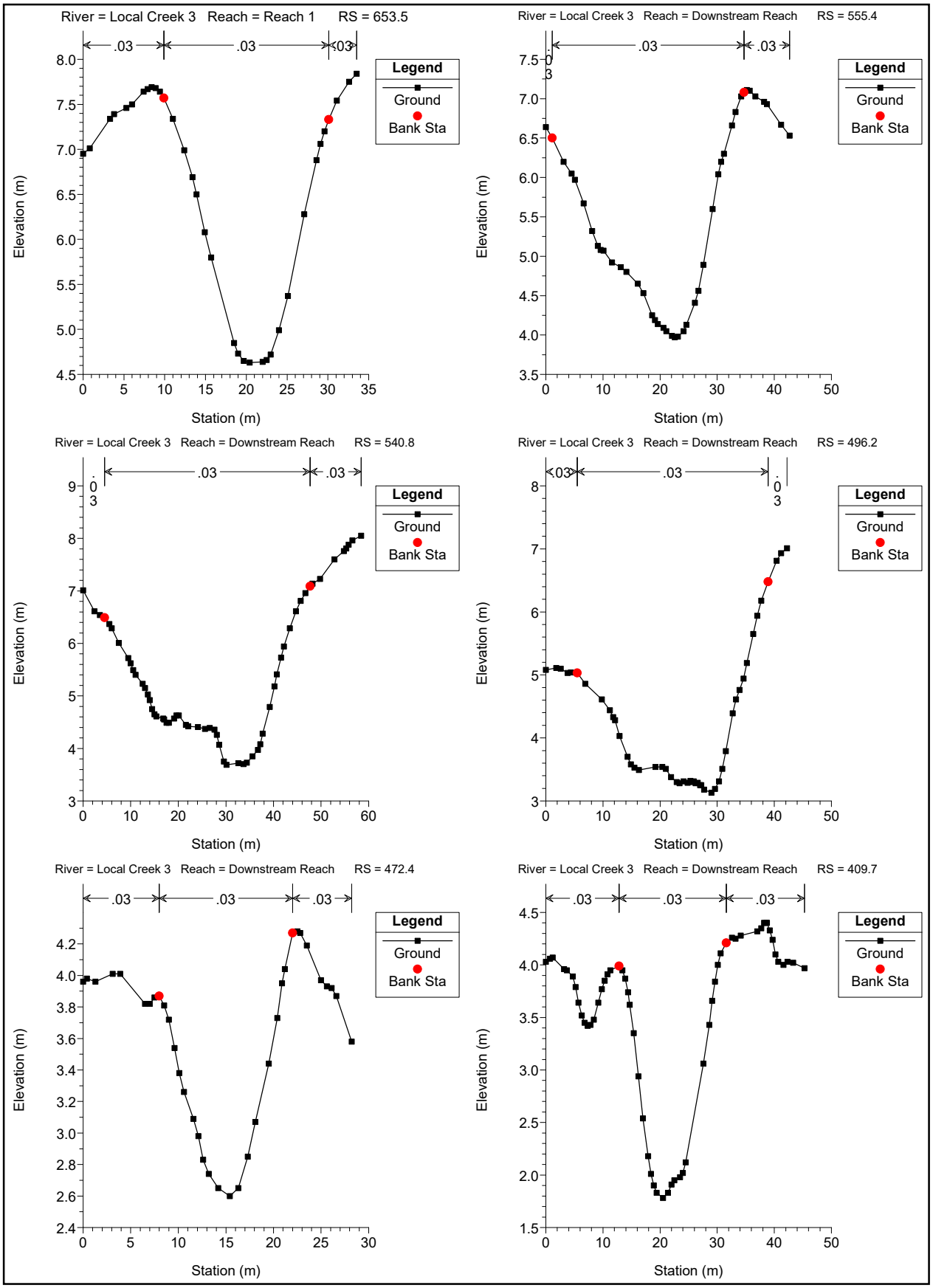

River = Local Creek 3 Reach = Reach 2 RS = 770 Culv
River = Local Creek 3 Reach = Reach 2 RS = 754
River = Local Creek 3 Reach = Reach 2 RS = 660.6
River = Local Creek 3 Reach = Reach 2 RS = 621.7
River = Local Creek 3 Reach = Reach 2 RS = 595.5
River = Local Creek 3 Reach = Reach 2 RS = 580 Culv
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

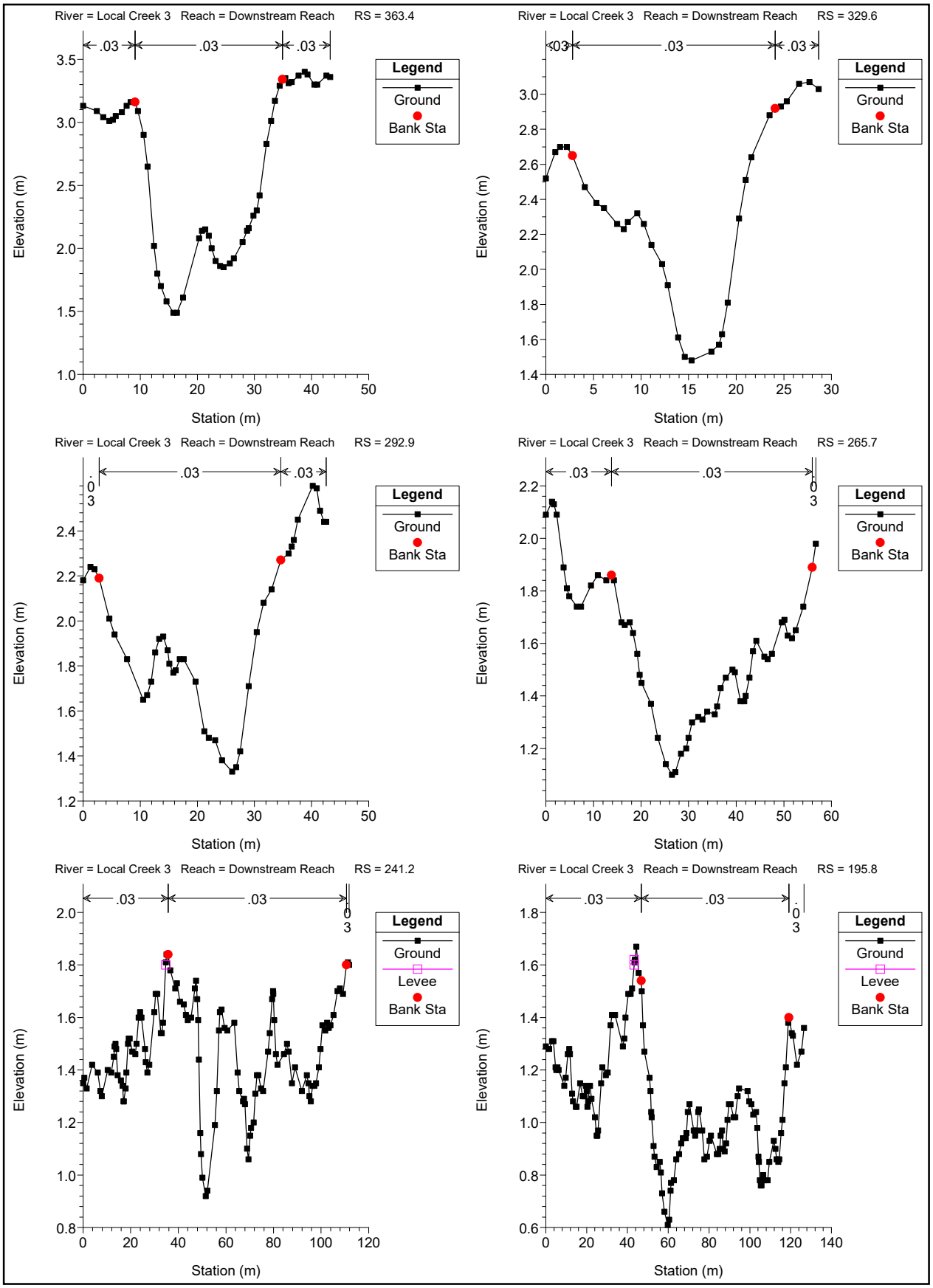

River = Local Creek 3 Reach = Reach 2 RS = 580 Culv
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Reach 2 RS = 571
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Reach 1 RS = 1363.4
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Reach 1 RS = 1286.1
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Reach 1 RS = 1274 Culv
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Reach 1 RS = 1274 Culv
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

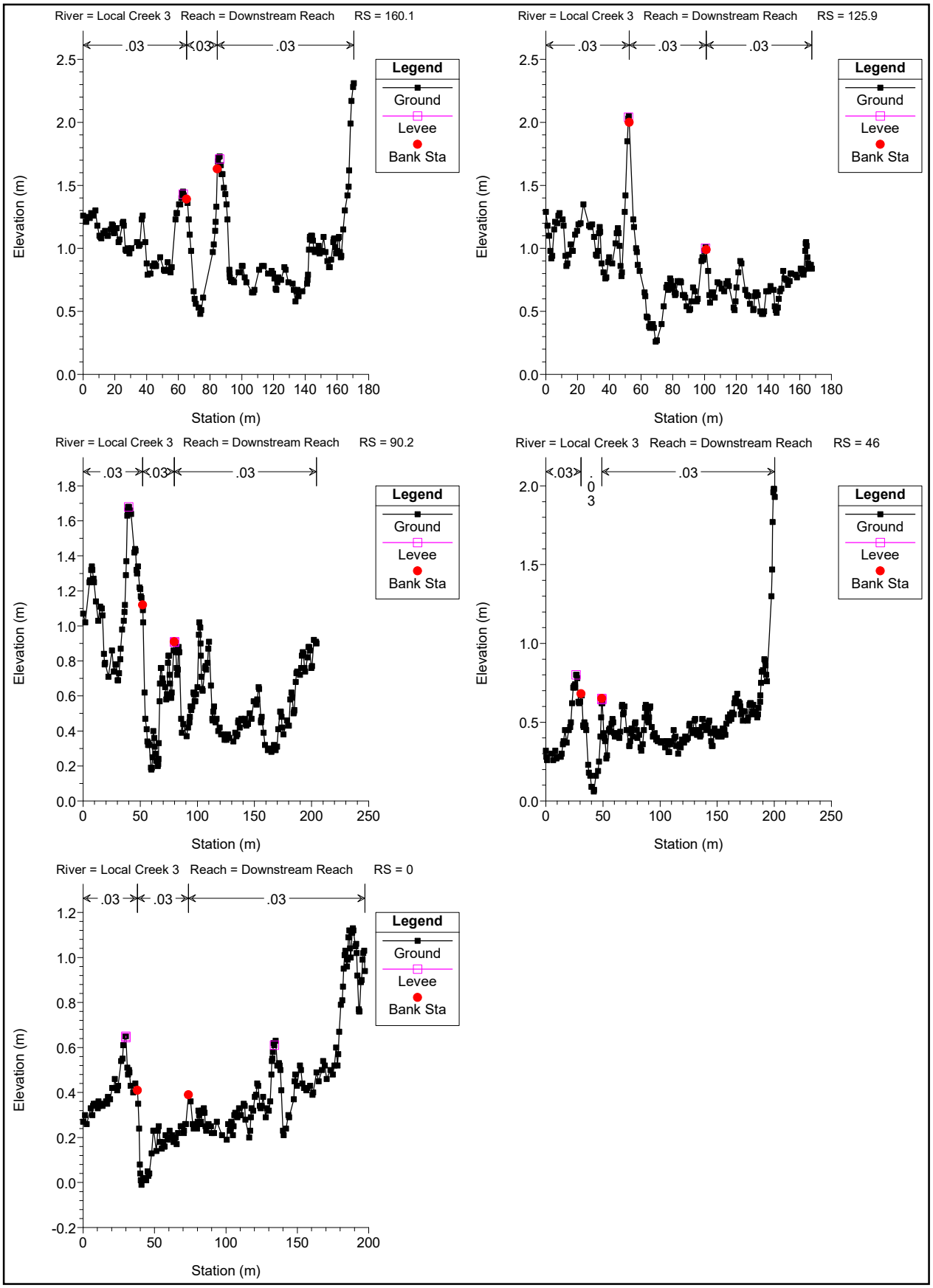

River = Local Creek 3 Reach = Reach 1 RS = 1268.2
River = Local Creek 3 Reach = Reach 1 RS = 1223.5
River = Local Creek 3 Reach = Reach 1 RS = 1157.2
River = Local Creek 3 Reach = Reach 1 RS = 1113.3
River = Local Creek 3 Reach = Reach 1 RS = 1059.3
River = Local Creek 3 Reach = Reach 1 RS = 1022.7
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 3 Reach = Reach 1 RS = 961
River = Local Creek 3 Reach = Reach 1 RS = 928
River = Local Creek 3 Reach = Reach 1 RS = 916 Culv
River = Local Creek 3 Reach = Reach 1 RS = 916 Culv
River = Local Creek 3 Reach = Reach 1 RS = 906.7
River = Local Creek 3 Reach = Reach 1 RS = 874.9
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 3 Reach = Reach 1 RS = 842.6
River = Local Creek 3 Reach = Reach 1 RS = 820 Culv
River = Local Creek 3 Reach = Reach 1 RS = 820 Culv
River = Local Creek 3 Reach = Reach 1 RS = 798.4
River = Local Creek 3 Reach = Reach 1 RS = 751.6
River = Local Creek 3 Reach = Reach 1 RS = 691.8
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

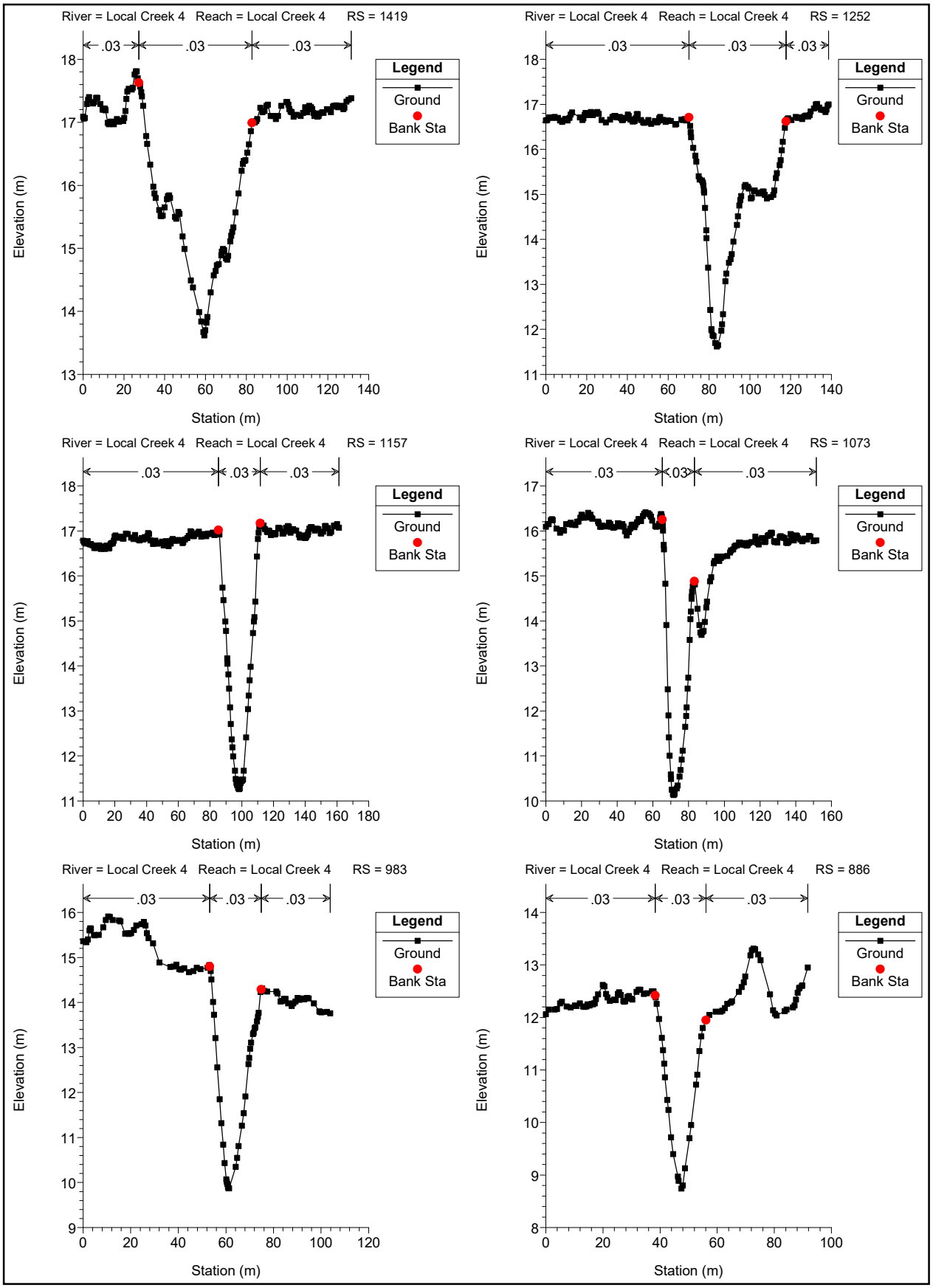

River = Local Creek 3 Reach = Reach 1 RS = 653.5
River = Local Creek 3 Reach = Downstream Reach RS = 555.4
River = Local Creek 3 Reach = Downstream Reach RS = 540.8
River = Local Creek 3 Reach = Downstream Reach RS = 496.2
River = Local Creek 3 Reach = Downstream Reach RS = 472.4
River = Local Creek 3 Reach = Downstream Reach RS = 409.7
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

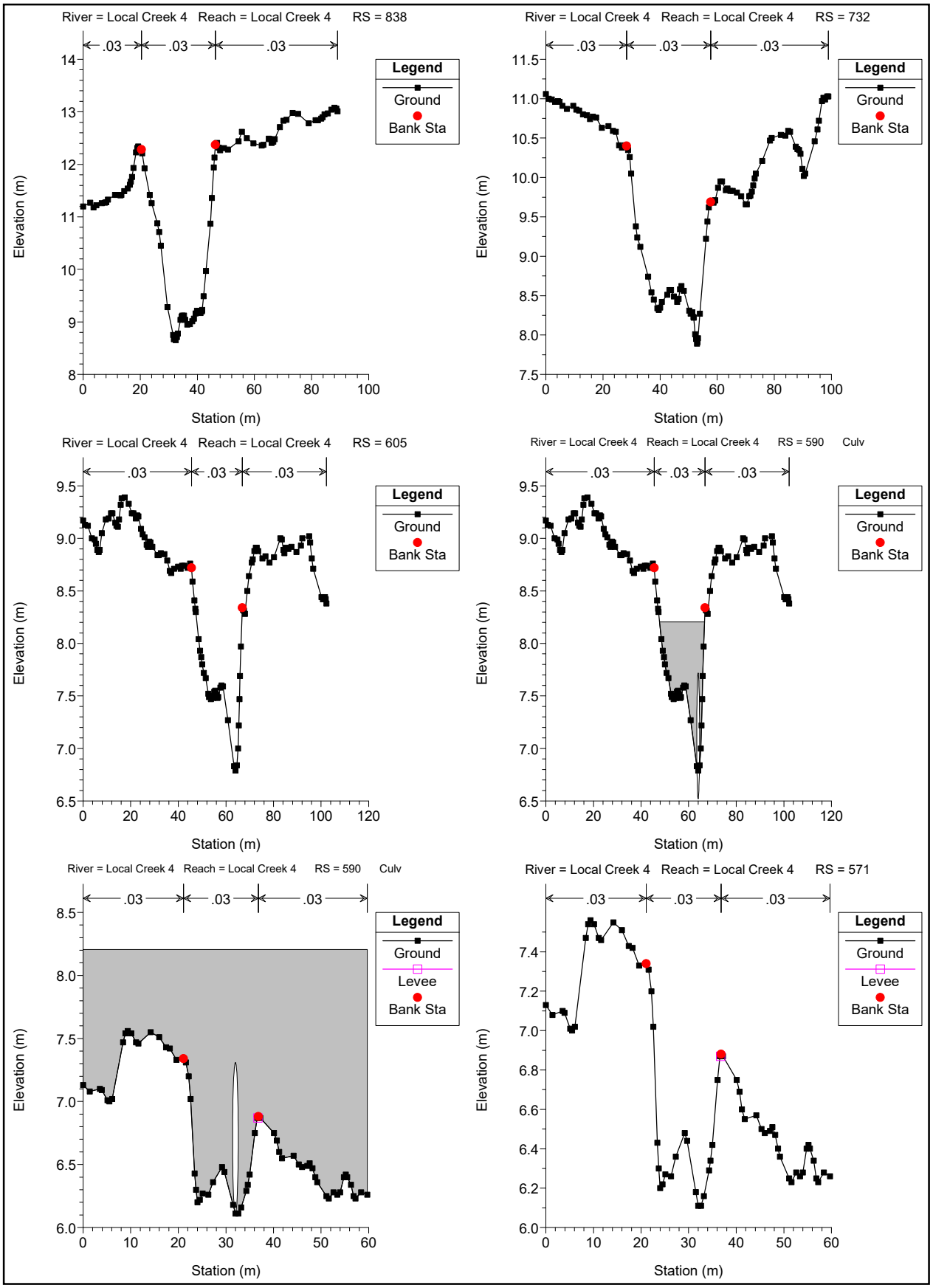

River = Local Creek 3 Reach = Downstream Reach RS = 363.4
River = Local Creek 3 Reach = Downstream Reach RS = 329.6
River = Local Creek 3 Reach = Downstream Reach RS = 292.9
River = Local Creek 3 Reach = Downstream Reach RS = 265.7
River = Local Creek 3 Reach = Downstream Reach RS = 241.2
River = Local Creek 3 Reach = Downstream Reach RS = 195.8
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

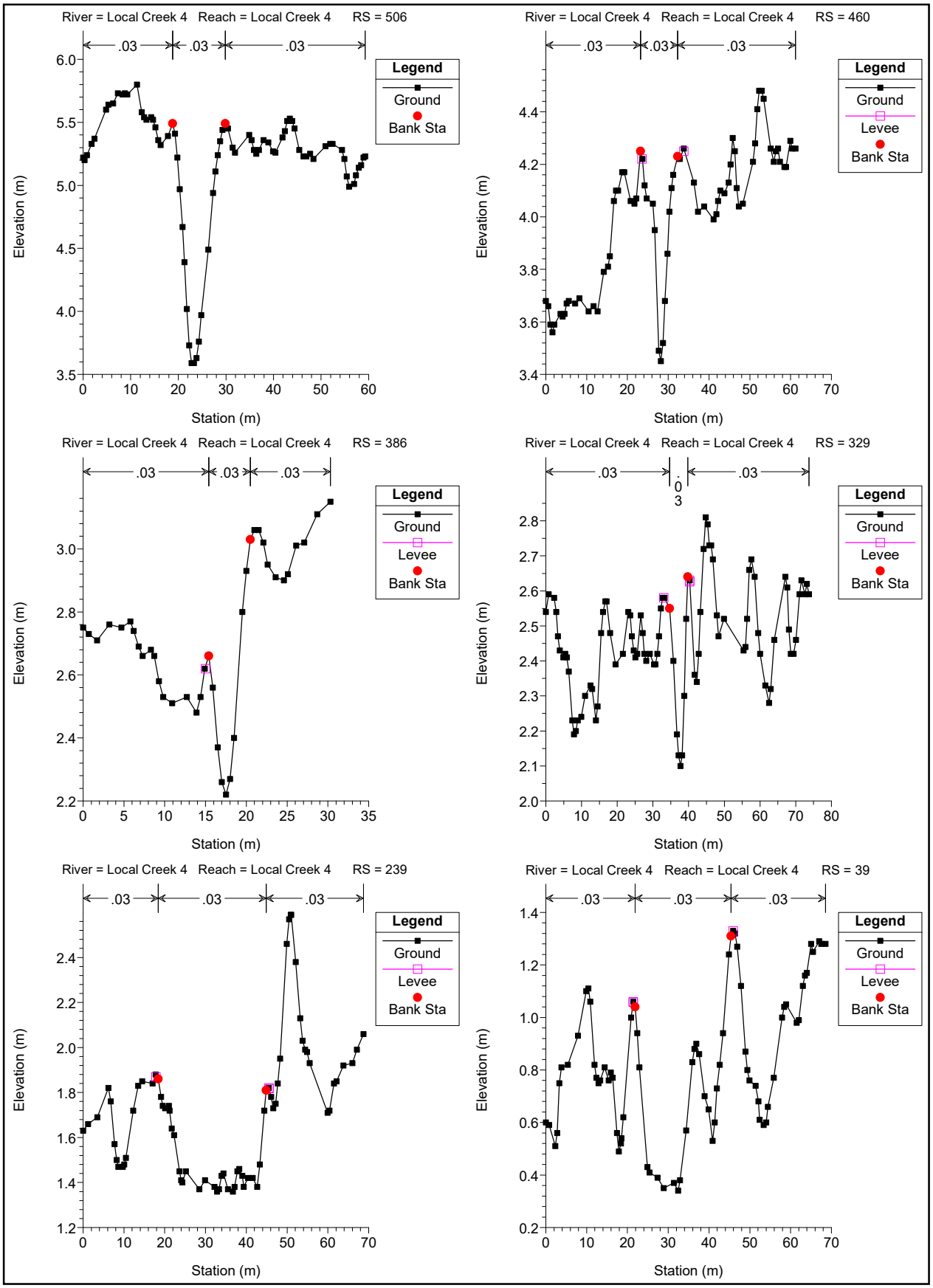

River = Local Creek 3 Reach = Downstream Reach RS = 160.1
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Downstream Reach RS = 125.9
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Downstream Reach RS = 90.2
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Downstream Reach RS = 46
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 3 Reach = Downstream Reach RS = 0
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

APPENDIX L

LOCAL CREEK 4

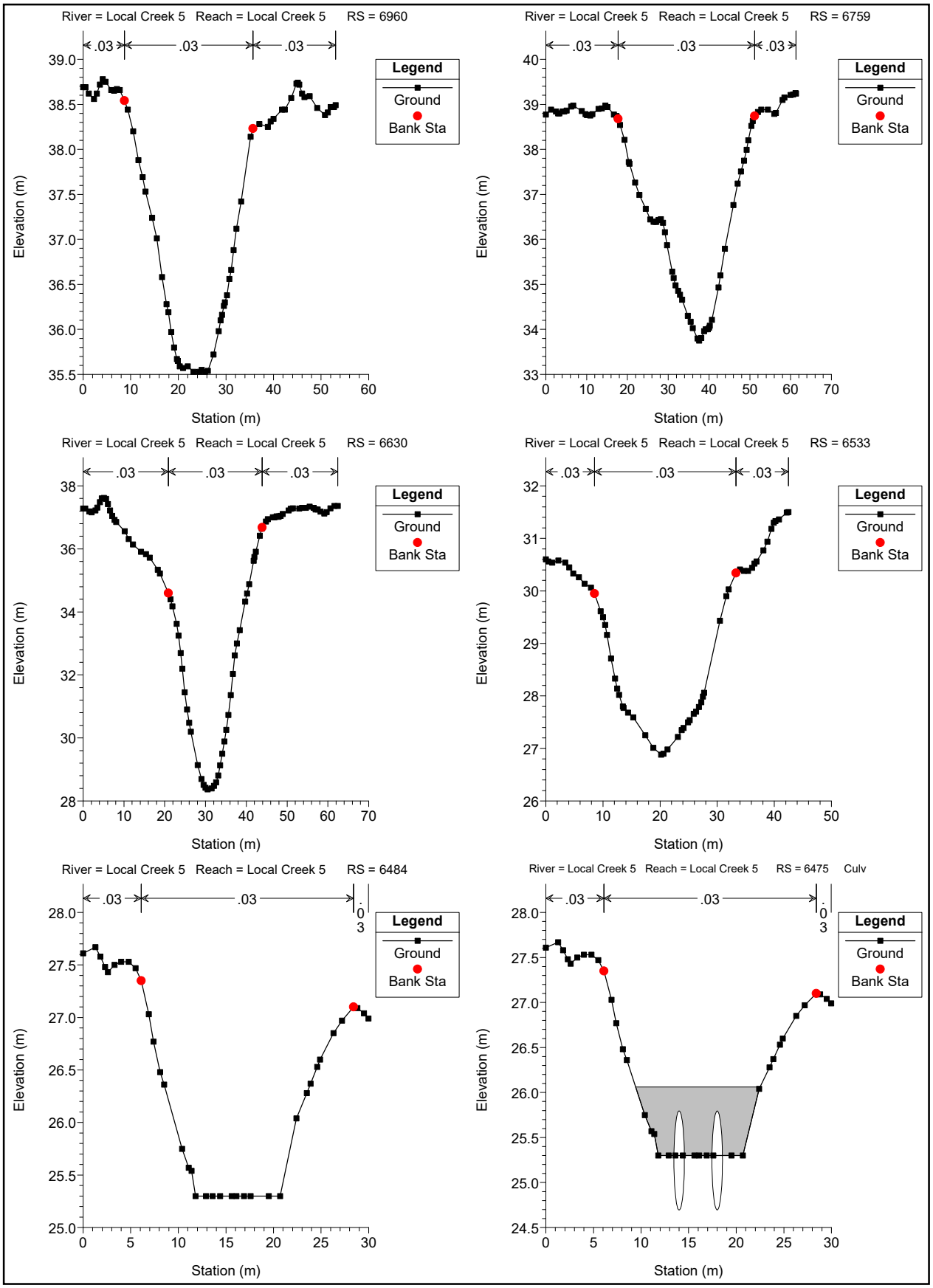

River = Local Creek 4 Reach = Local Creek 4 RS = 1419
River = Local Creek 4 Reach = Local Creek 4 RS = 1252
River = Local Creek 4 Reach = Local Creek 4 RS = 1157
River = Local Creek 4 Reach = Local Creek 4 RS = 1073
River = Local Creek 4 Reach = Local Creek 4 RS = 983
River = Local Creek 4 Reach = Local Creek 4 RS = 886
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

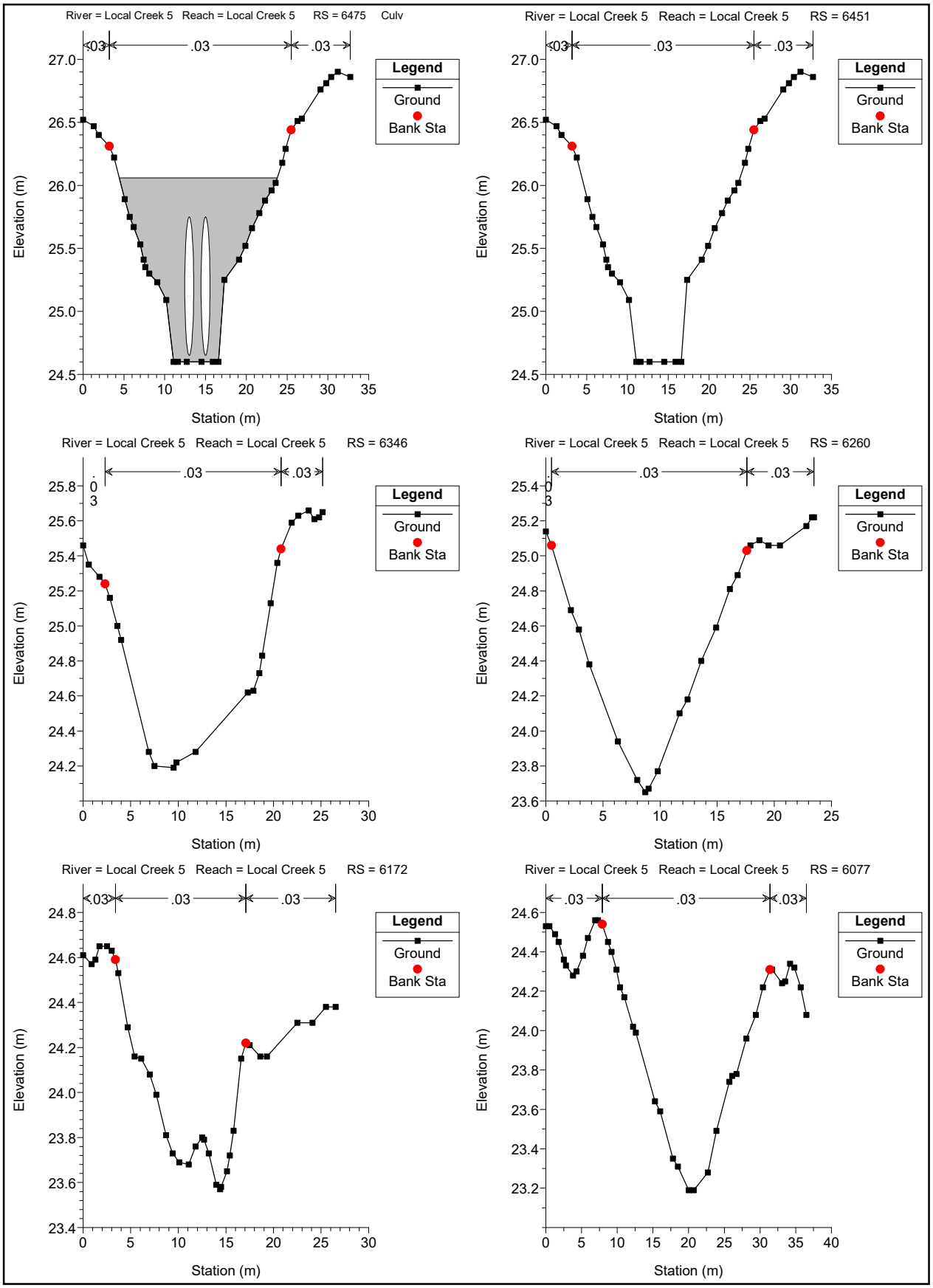

River = Local Creek 4 Reach = Local Creek 4 RS = 838
River = Local Creek 4 Reach = Local Creek 4 RS = 732
River = Local Creek 4 Reach = Local Creek 4 RS = 605
River = Local Creek 4 Reach = Local Creek 4 RS = 590 Culv
River = Local Creek 4 Reach = Local Creek 4 RS = 590 Culv
River = Local Creek 4 Reach = Local Creek 4 RS = 571
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

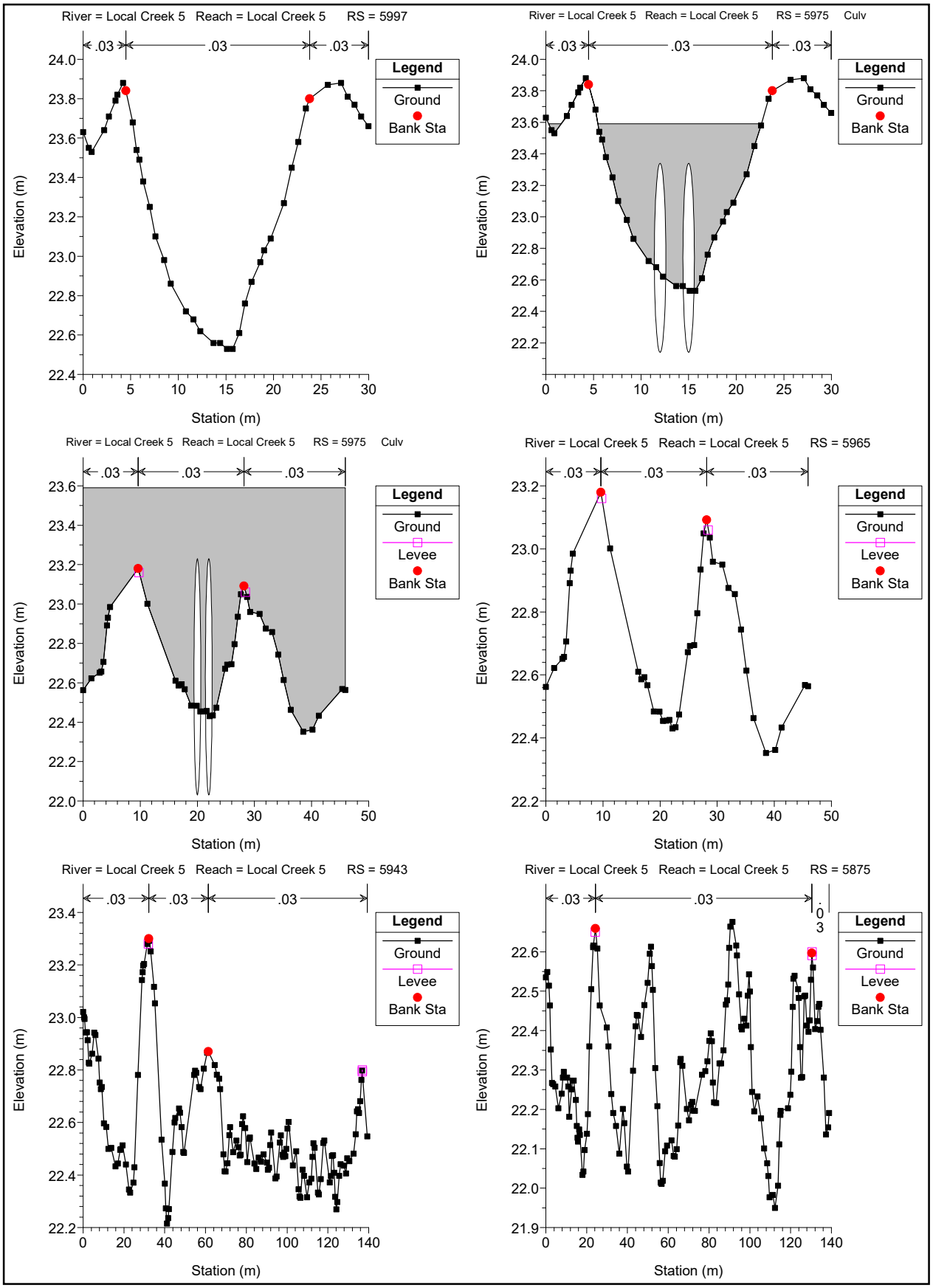

River = Local Creek 4 Reach = Local Creek 4 RS = 506
River = Local Creek 4 Reach = Local Creek 4 RS = 460
River = Local Creek 4 Reach = Local Creek 4 RS = 386
River = Local Creek 4 Reach = Local Creek 4 RS = 329
River = Local Creek 4 Reach = Local Creek 4 RS = 239
River = Local Creek 4 Reach = Local Creek 4 RS = 39
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

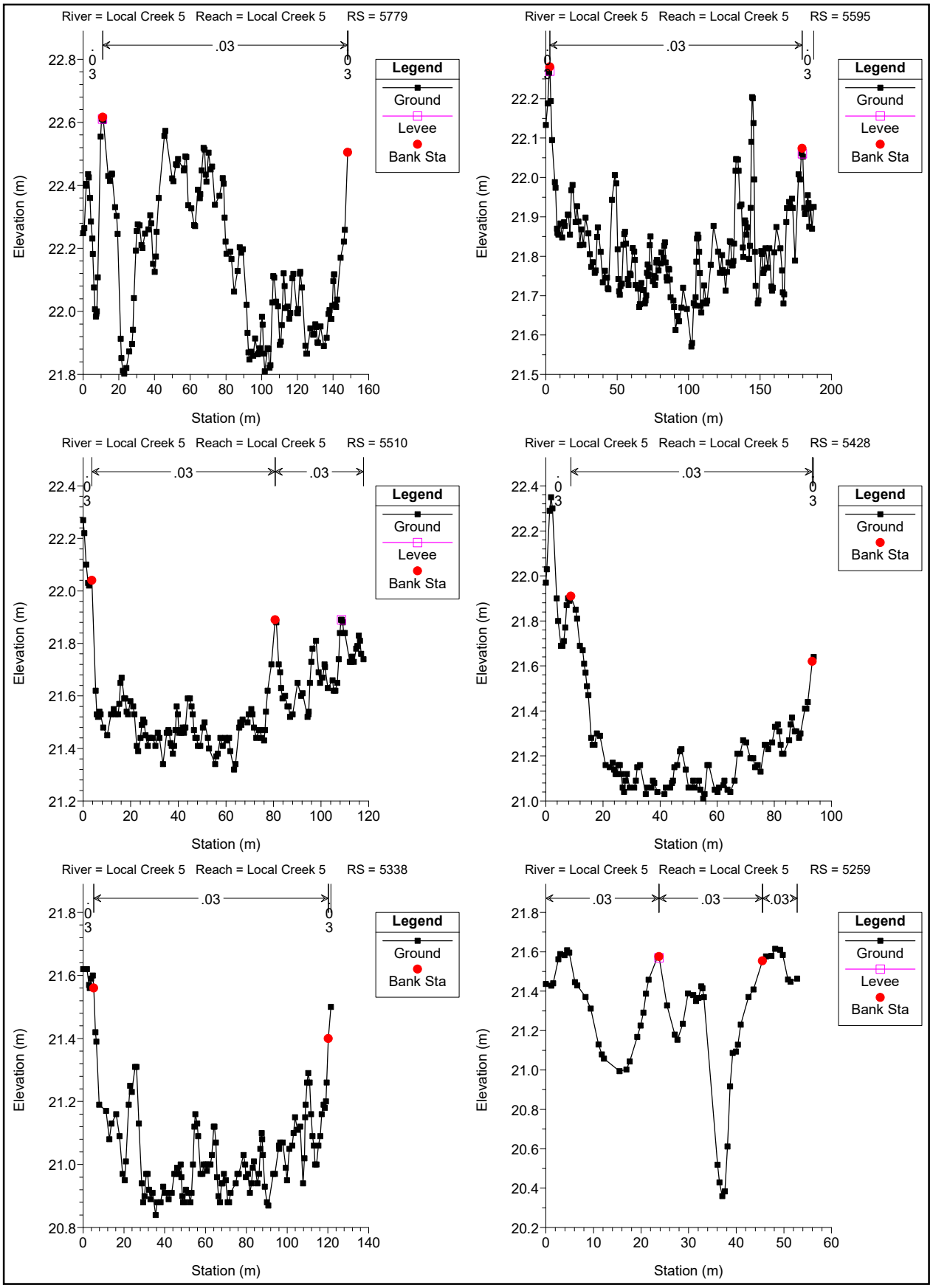
APPENDIX L

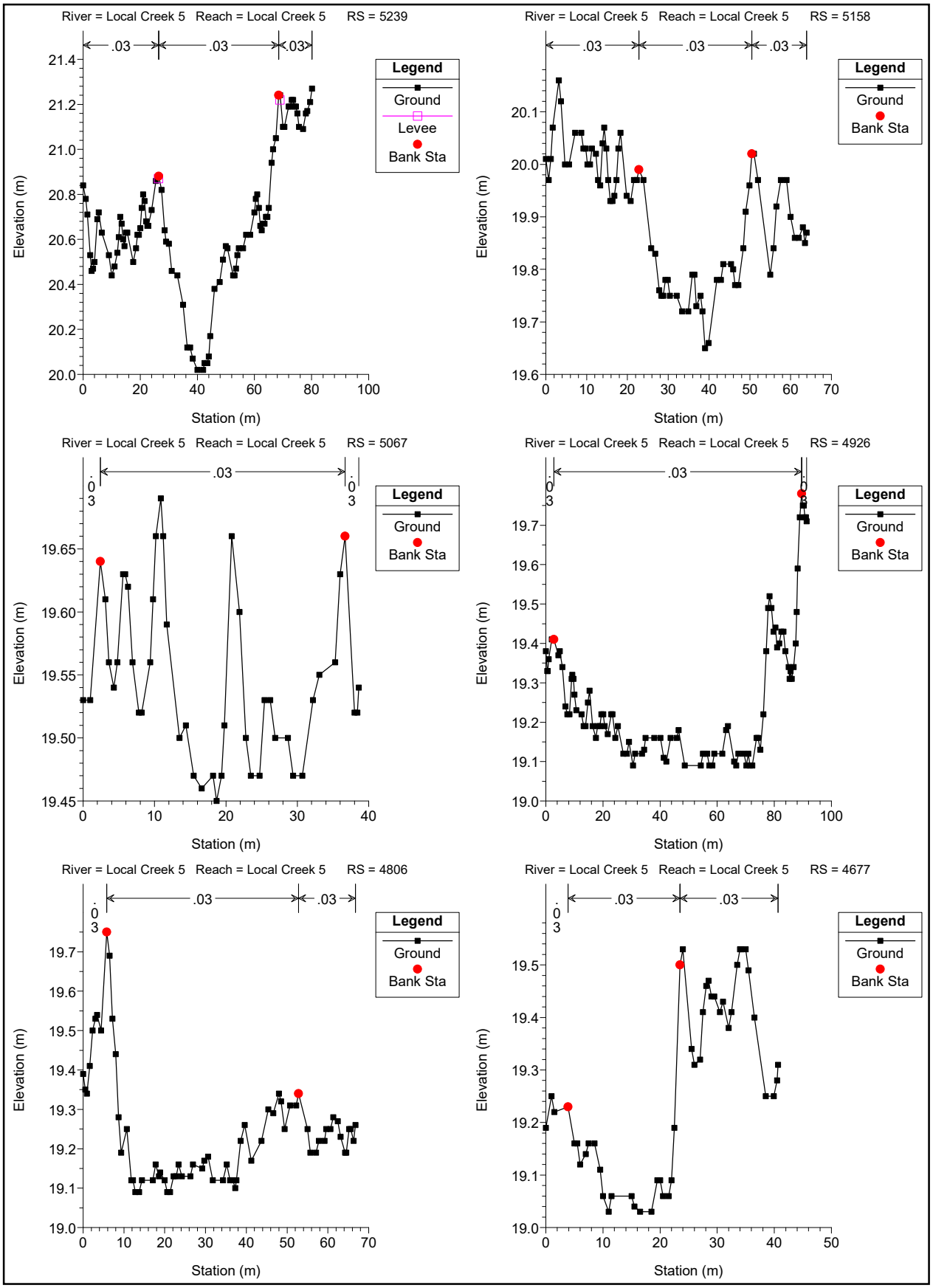
LOCAL CREEK 5

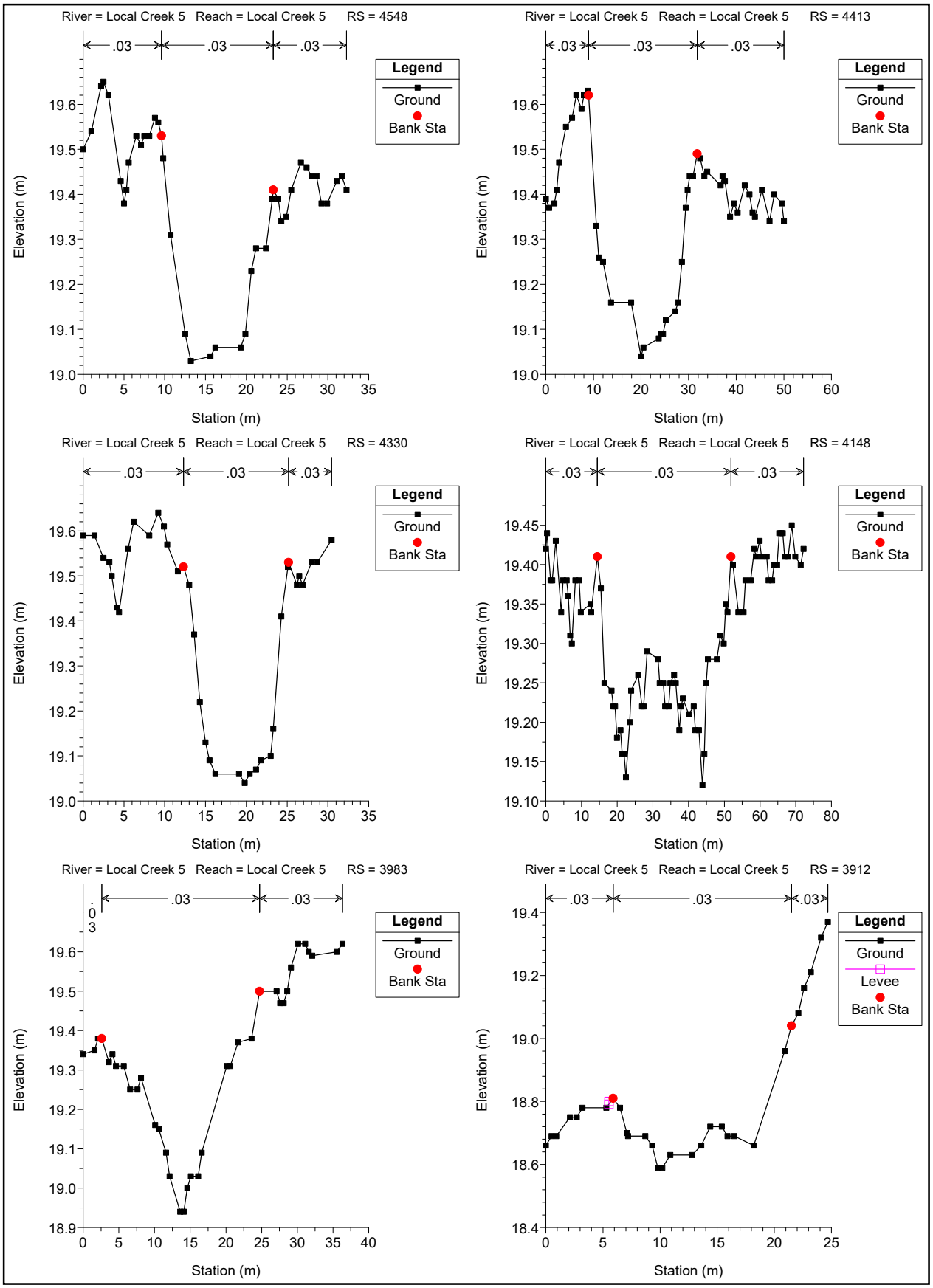

River = Local Creek 5 Reach = Local Creek 5 RS = 6960
River = Local Creek 5 Reach = Local Creek 5 RS = 6759
River = Local Creek 5 Reach = Local Creek 5 RS = 6630
River = Local Creek 5 Reach = Local Creek 5 RS = 6533
River = Local Creek 5 Reach = Local Creek 5 RS = 6484
River = Local Creek 5 Reach = Local Creek 5 RS = 6475 Culv
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

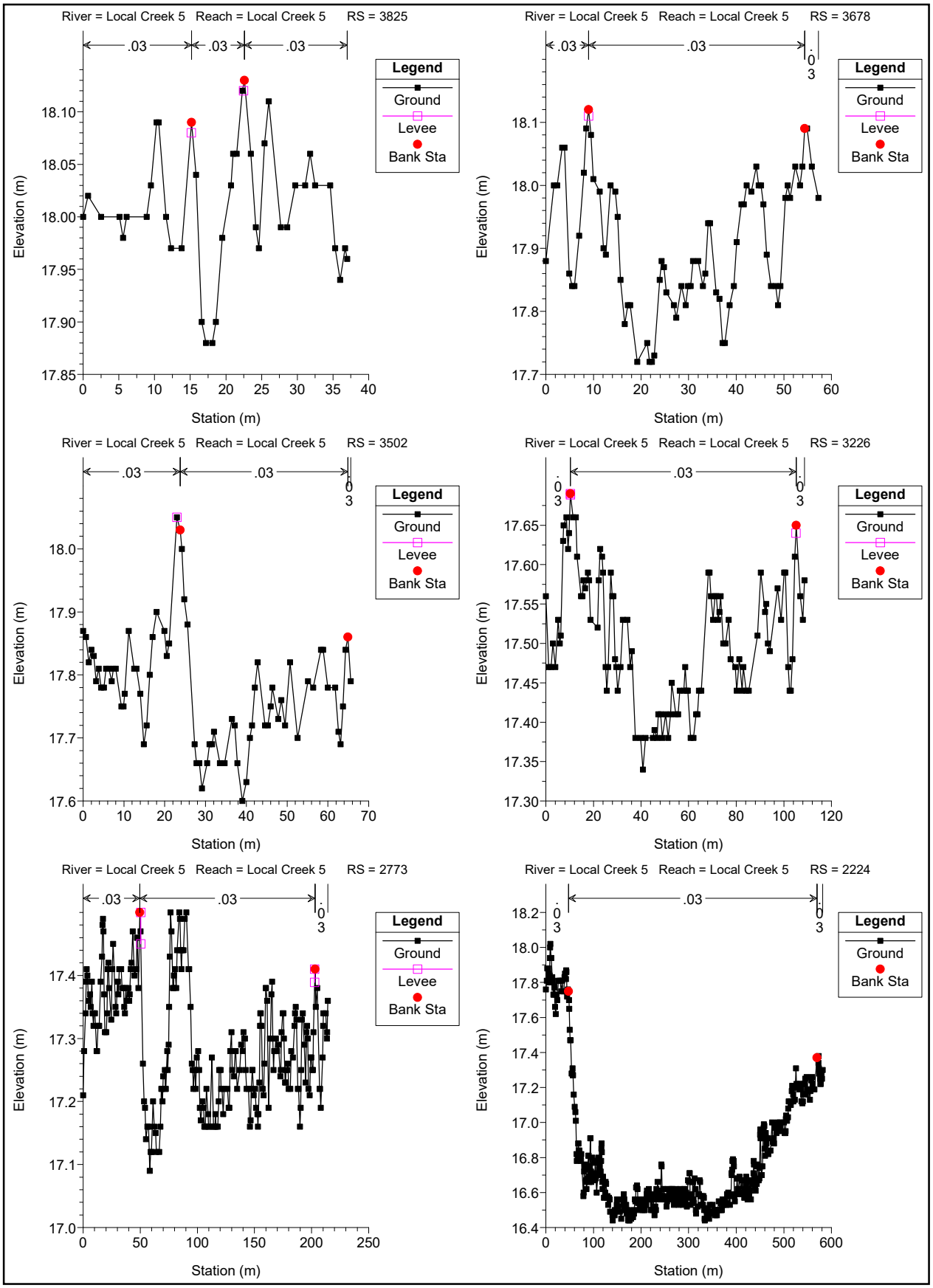

River = Local Creek 5 Reach = Local Creek 5 RS = 6475 Culv
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 6451
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 6346
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 6260
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 6172
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 6077
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

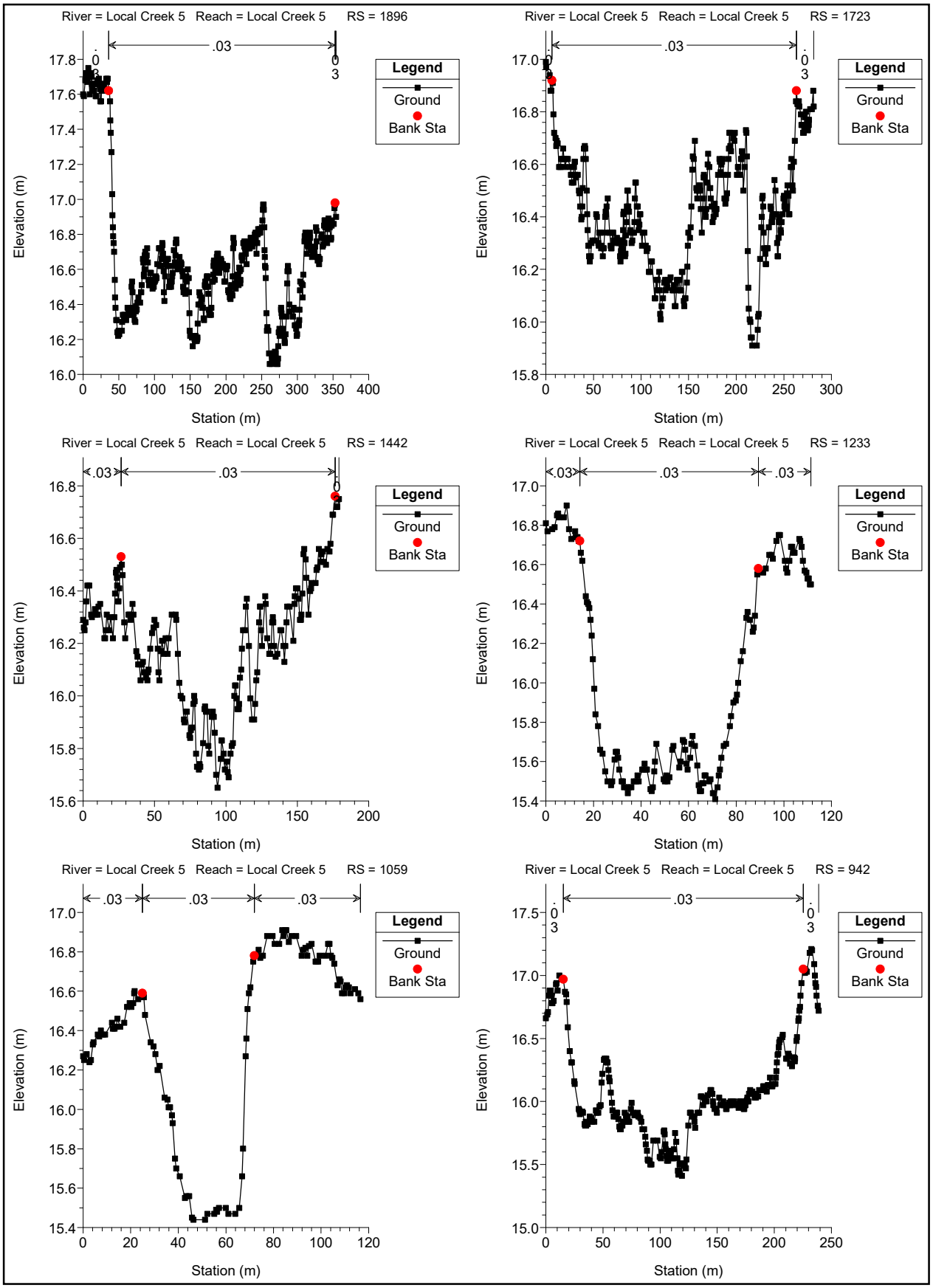

River = Local Creek 5 Reach = Local Creek 5 RS = 5997
River = Local Creek 5 Reach = Local Creek 5 RS = 5975 Culv
River = Local Creek 5 Reach = Local Creek 5 RS = 5975 Culv
River = Local Creek 5 Reach = Local Creek 5 RS = 5965
River = Local Creek 5 Reach = Local Creek 5 RS = 5943
River = Local Creek 5 Reach = Local Creek 5 RS = 5875
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

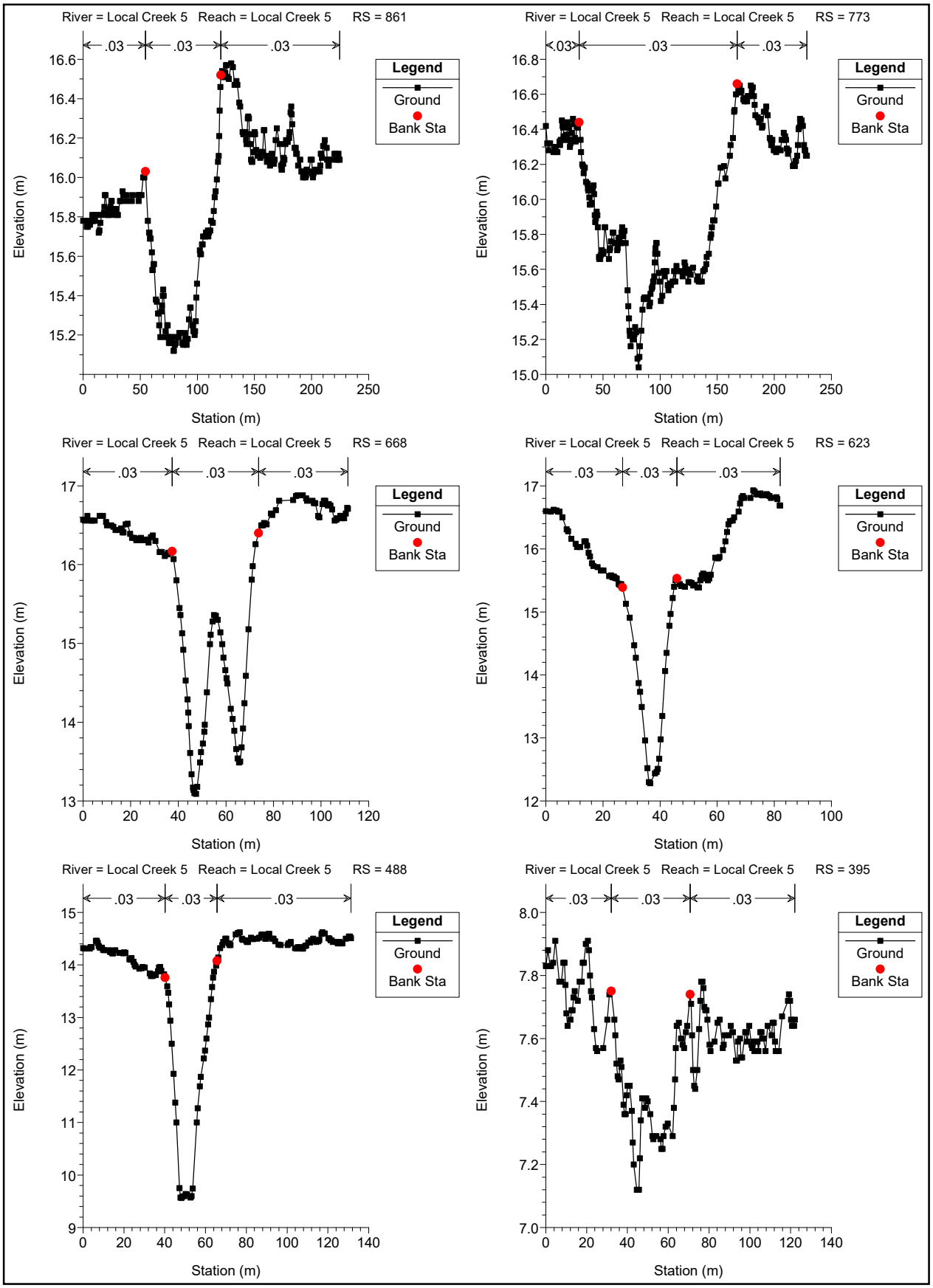

River = Local Creek 5 Reach = Local Creek 5 RS = 5779
River = Local Creek 5 Reach = Local Creek 5 RS = 5595
River = Local Creek 5 Reach = Local Creek 5 RS = 5510
River = Local Creek 5 Reach = Local Creek 5 RS = 5428
River = Local Creek 5 Reach = Local Creek 5 RS = 5338
River = Local Creek 5 Reach = Local Creek 5 RS = 5259
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

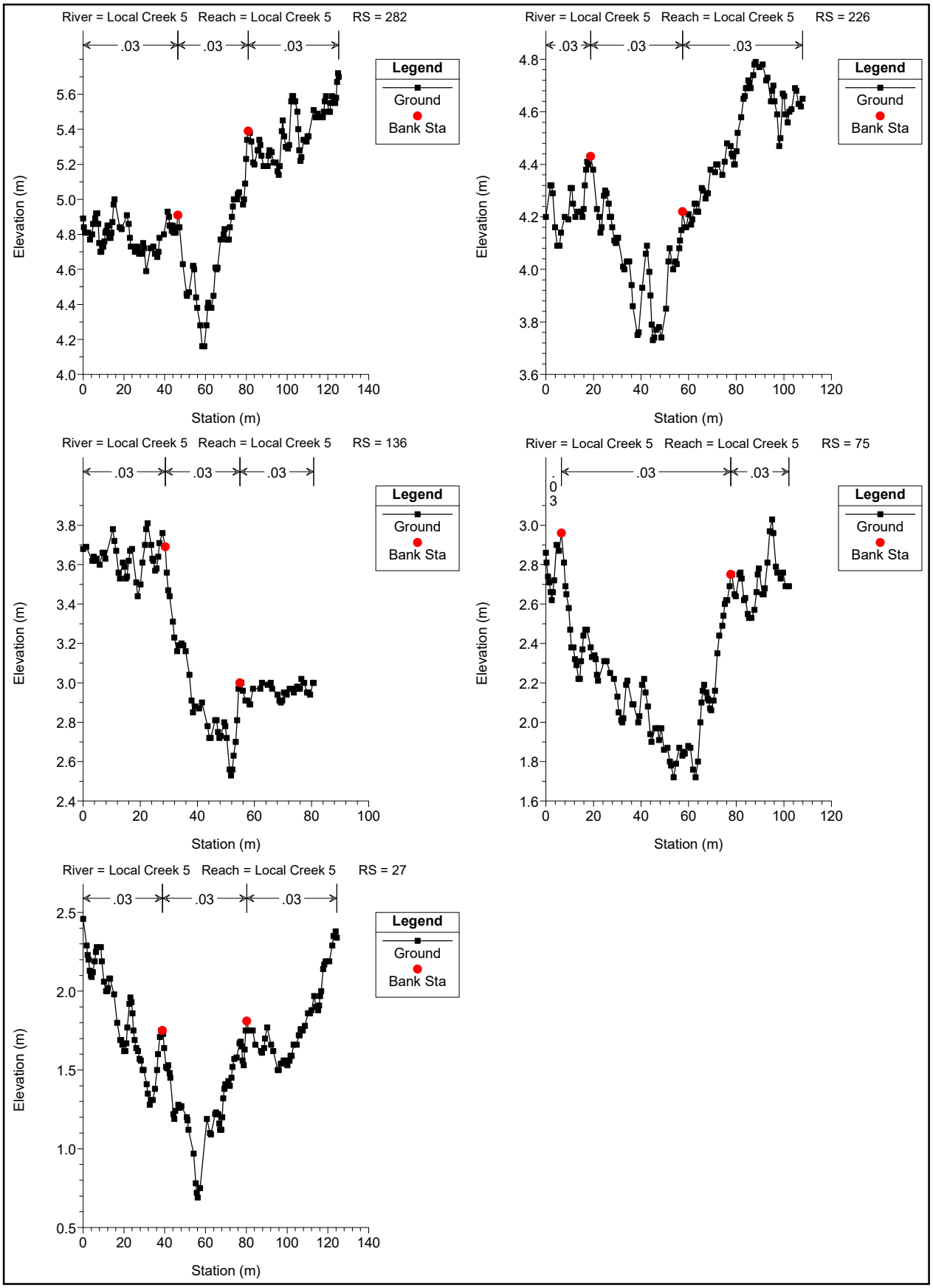

River = Local Creek 5 Reach = Local Creek 5 RS = 5239
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 5158
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 5067
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 4926
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 4806
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 4677
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 5 Reach = Local Creek 5 RS = 4548
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 4413
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 4330
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 4148
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 3983
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 3912
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 5 Reach = Local Creek 5 RS = 3825
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 3678
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 3502
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 3226
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 2773
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 2224
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

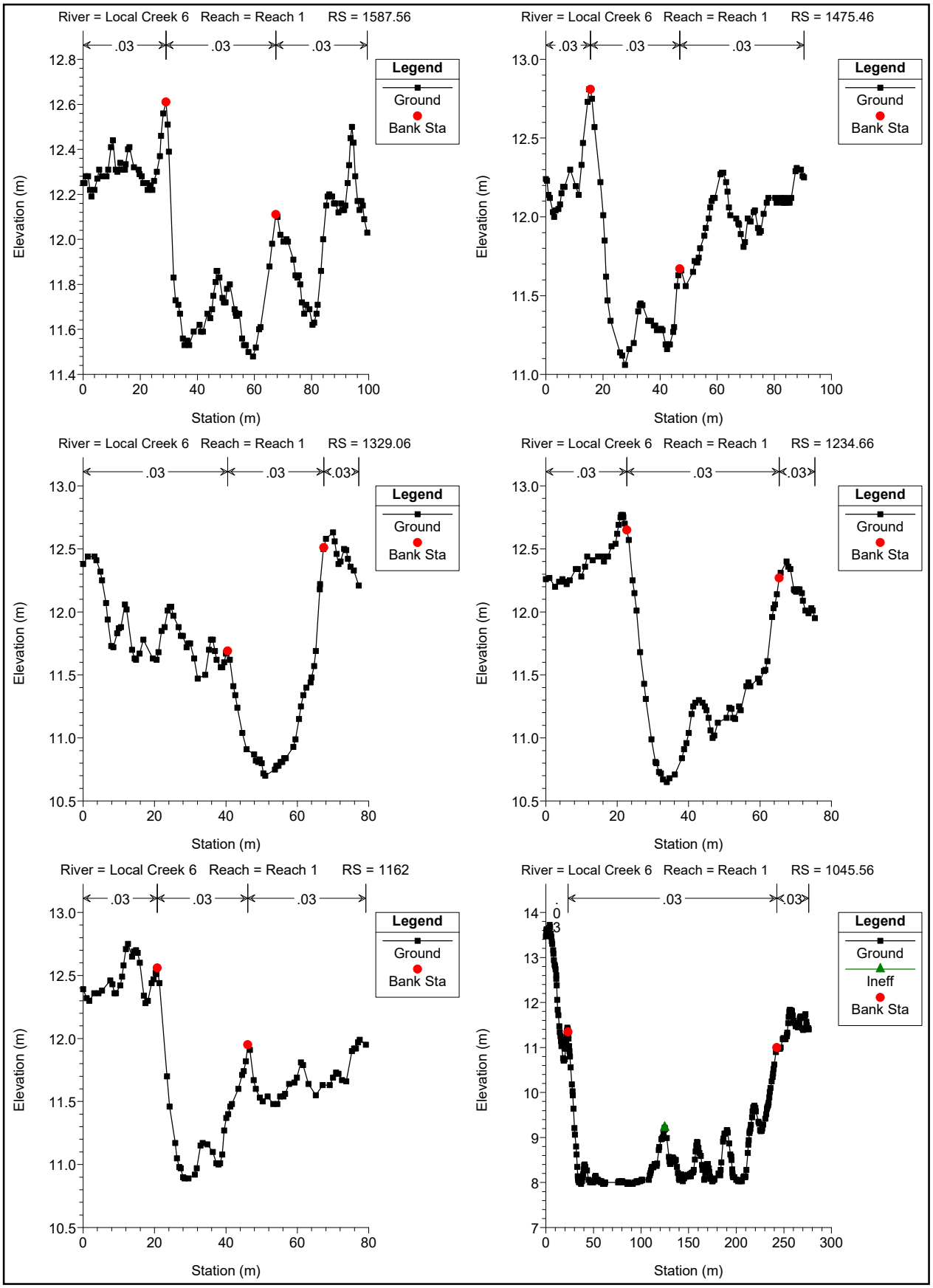

River = Local Creek 5 Reach = Local Creek 5 RS = 1896
River = Local Creek 5 Reach = Local Creek 5 RS = 1723
River = Local Creek 5 Reach = Local Creek 5 RS = 1442
River = Local Creek 5 Reach = Local Creek 5 RS = 1233
River = Local Creek 5 Reach = Local Creek 5 RS = 1059
River = Local Creek 5 Reach = Local Creek 5 RS = 942
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
.03

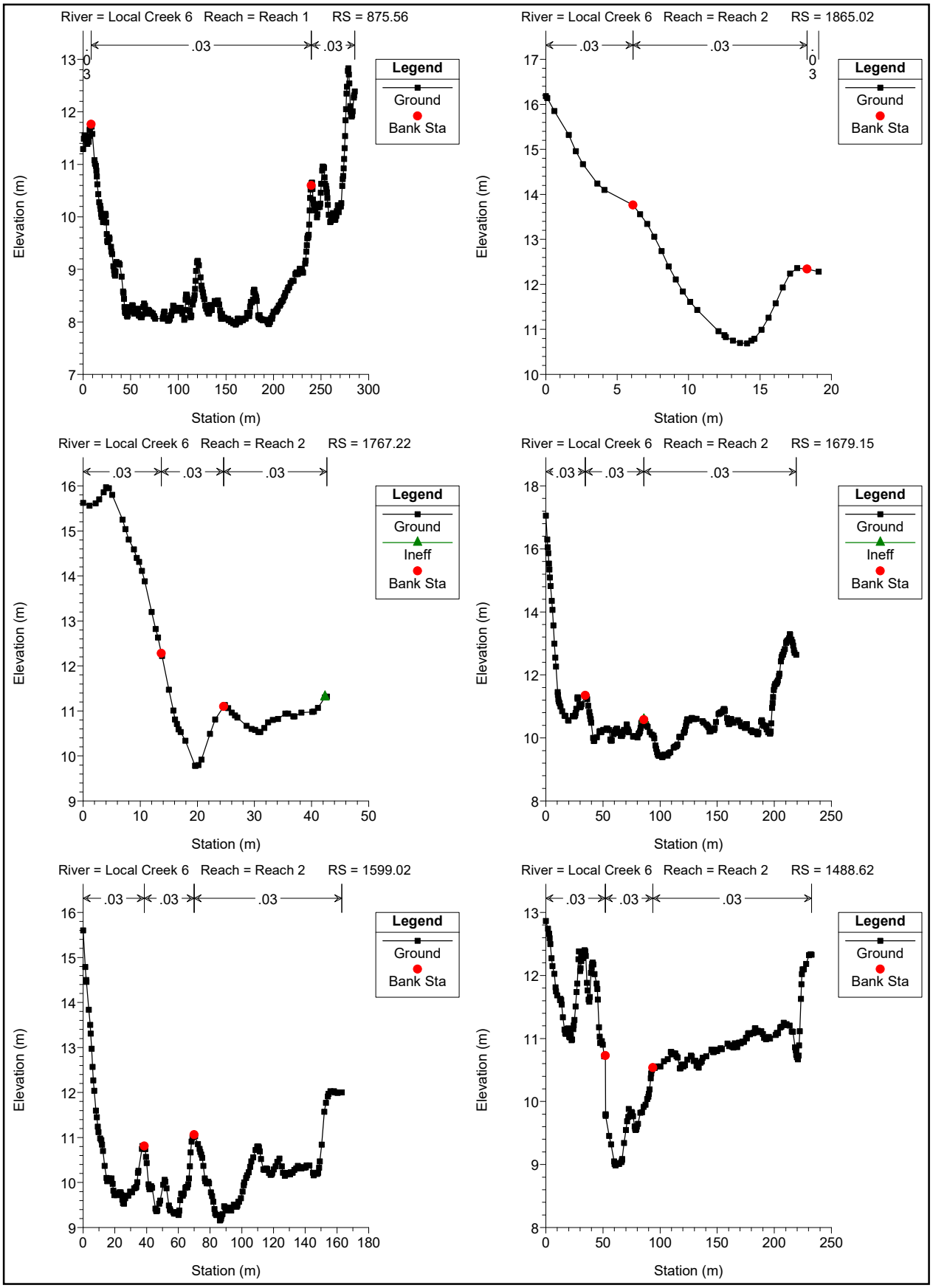

River = Local Creek 5 Reach = Local Creek 5 RS = 861
River = Local Creek 5 Reach = Local Creek 5 RS = 773
River = Local Creek 5 Reach = Local Creek 5 RS = 668
River = Local Creek 5 Reach = Local Creek 5 RS = 623
River = Local Creek 5 Reach = Local Creek 5 RS = 488
River = Local Creek 5 Reach = Local Creek 5 RS = 395
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

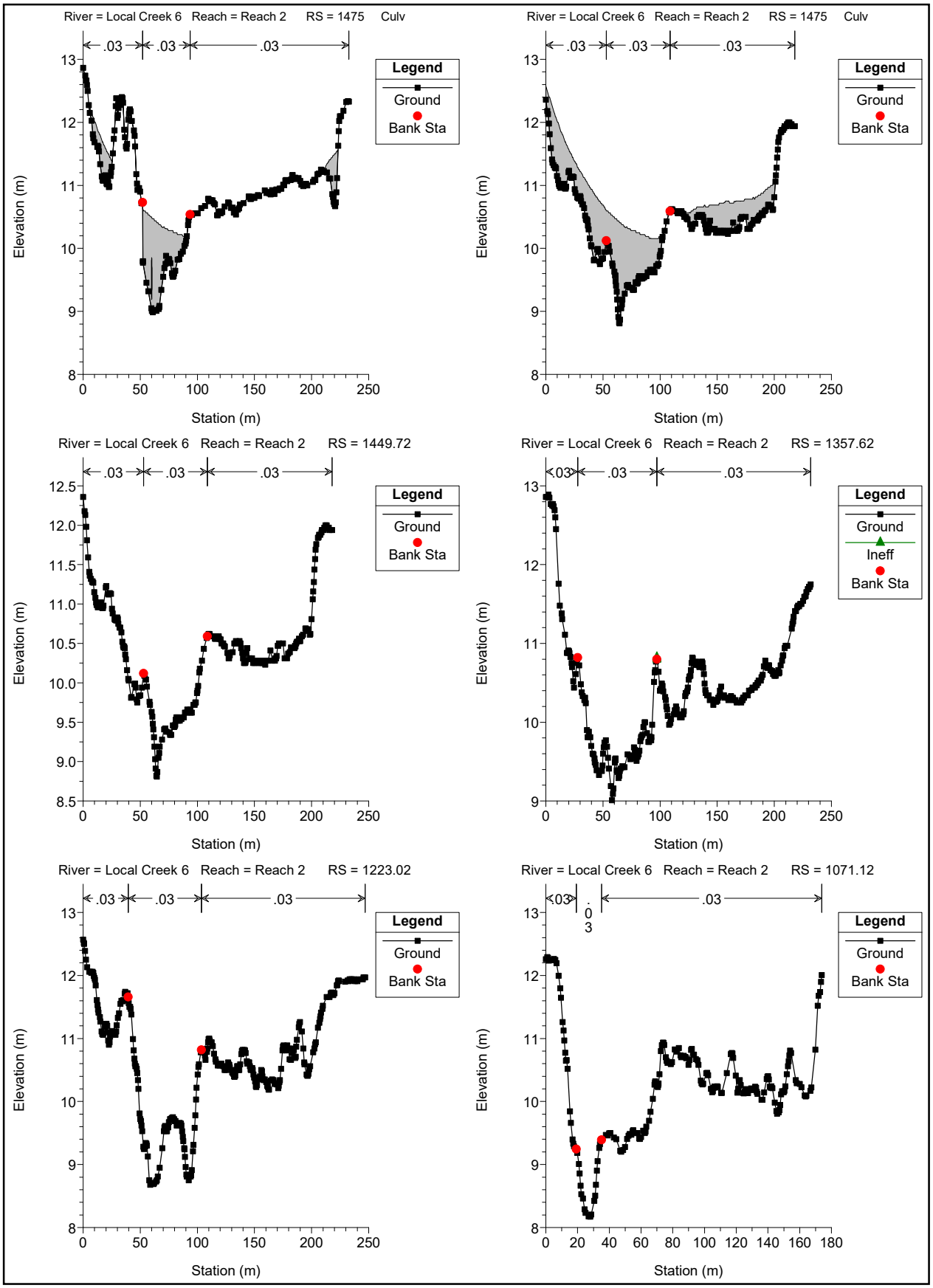

River = Local Creek 5 Reach = Local Creek 5 RS = 282
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 226
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 136
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 75
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 5 Reach = Local Creek 5 RS = 27
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

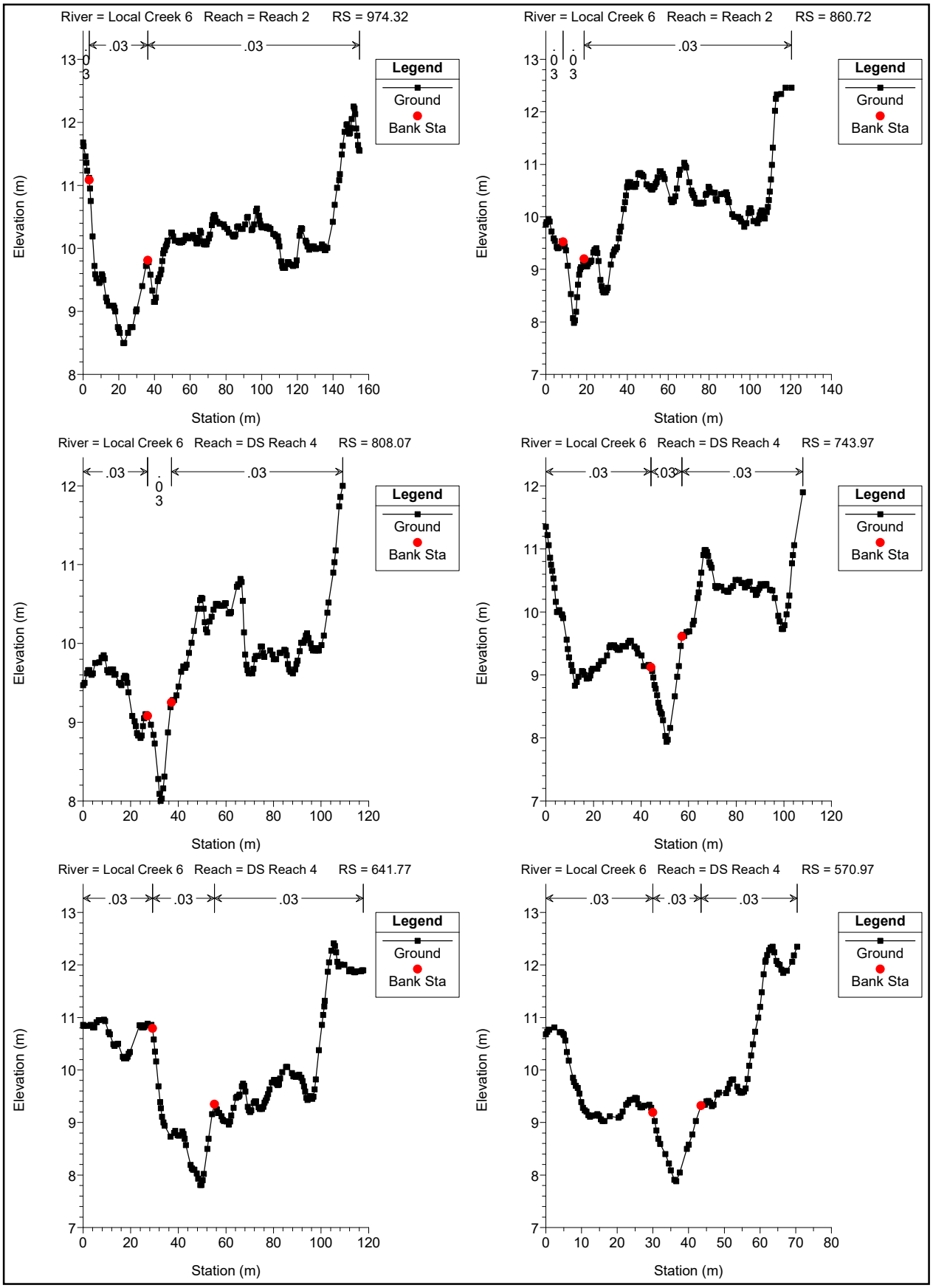
APPENDIX L

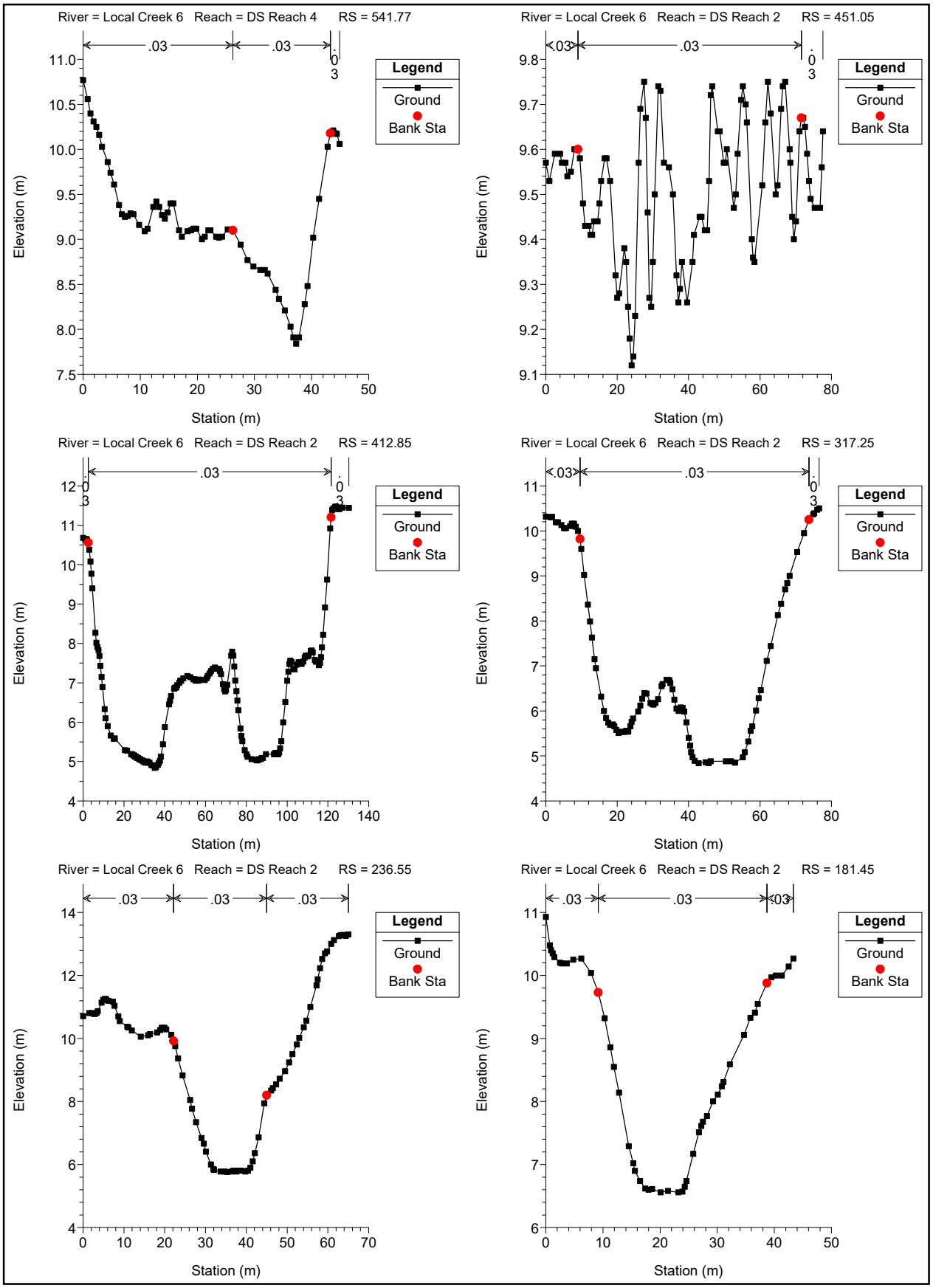
LOCAL CREEK 6

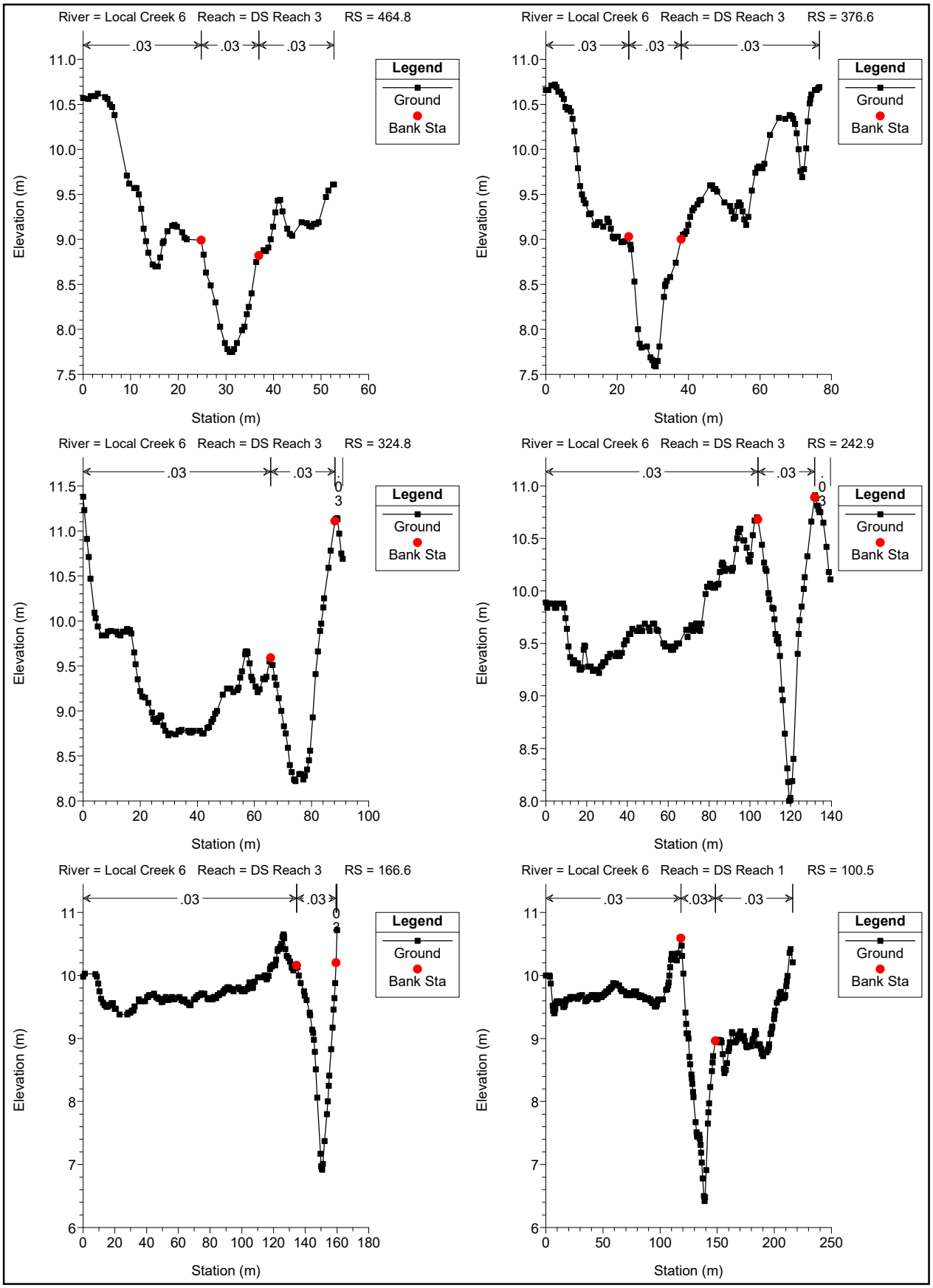

River = Local Creek 6 Reach = Reach 1 RS = 1587.56
River = Local Creek 6 Reach = Reach 1 RS = 1475.46
River = Local Creek 6 Reach = Reach 1 RS = 1329.06
River = Local Creek 6 Reach = Reach 1 RS = 1234.66
River = Local Creek 6 Reach = Reach 1 RS = 1162
River = Local Creek 6 Reach = Reach 1 RS = 1045.56
.03
Legend
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)

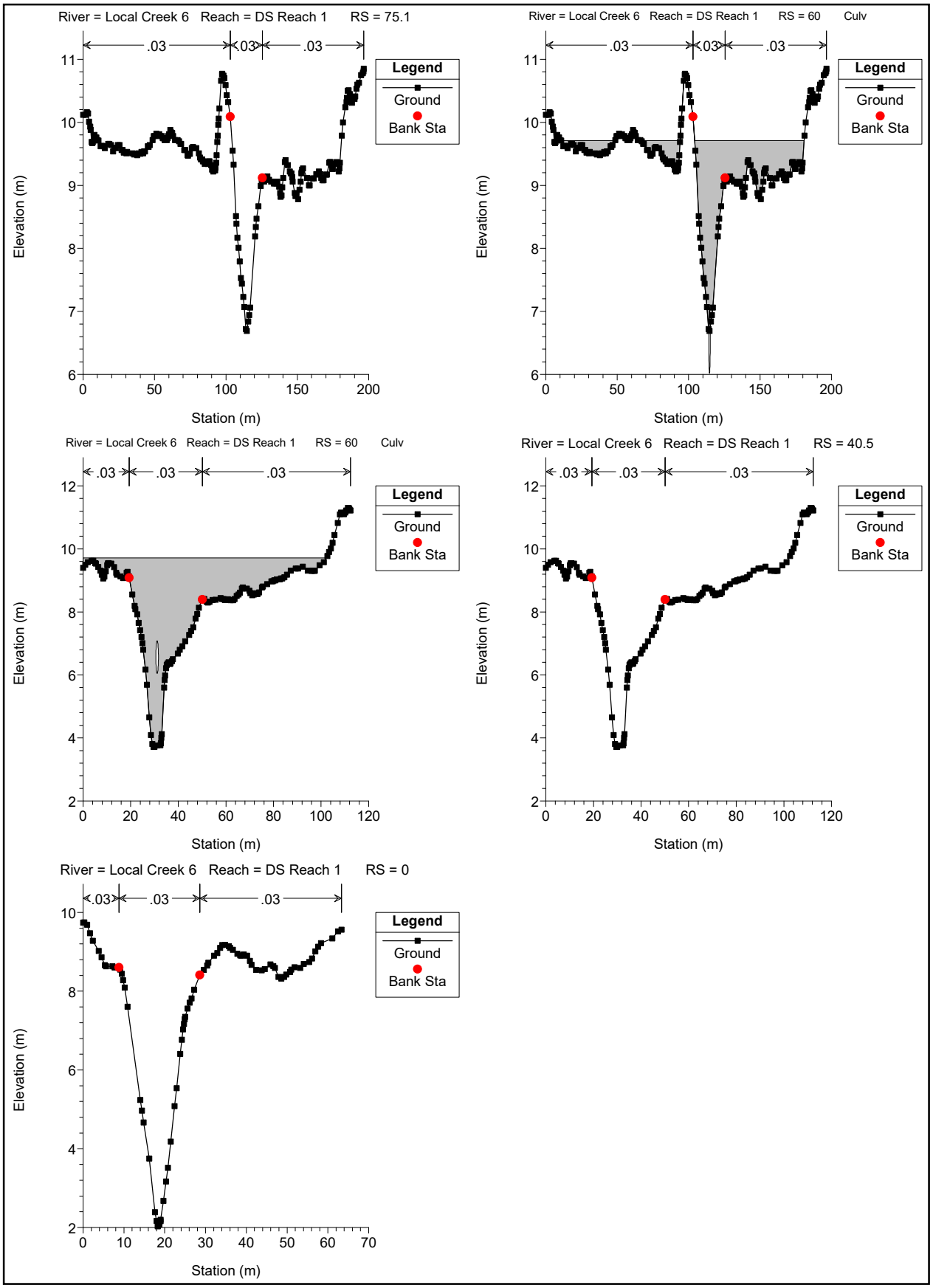

River = Local Creek 6 Reach = Reach 1 RS = 875.56
River = Local Creek 6 Reach = Reach 2 RS = 1865.02
River = Local Creek 6 Reach = Reach 2 RS = 1767.22
River = Local Creek 6 Reach = Reach 2 RS = 1679.15
River = Local Creek 6 Reach = Reach 2 RS = 1599.02
River = Local Creek 6 Reach = Reach 2 RS = 1488.62
.03
Legend
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 6 Reach = Reach 2 RS = 1475 Culv
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 6 Reach = Reach 2 RS = 1475 Culv
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 6 Reach = Reach 2 RS = 1449.72
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 6 Reach = Reach 2 RS = 1357.62
.03 .03 .03
Legend
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 6 Reach = Reach 2 RS = 1223.02
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 6 Reach = Reach 2 RS = 1071.12
.03 .03 .03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 6 Reach = Reach 2 RS = 974.32
River = Local Creek 6 Reach = Reach 2 RS = 860.72
River = Local Creek 6 Reach = DS Reach 4 RS = 808.07
River = Local Creek 6 Reach = DS Reach 4 RS = 743.97
River = Local Creek 6 Reach = DS Reach 4 RS = 641.77
River = Local Creek 6 Reach = DS Reach 4 RS = 570.97
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

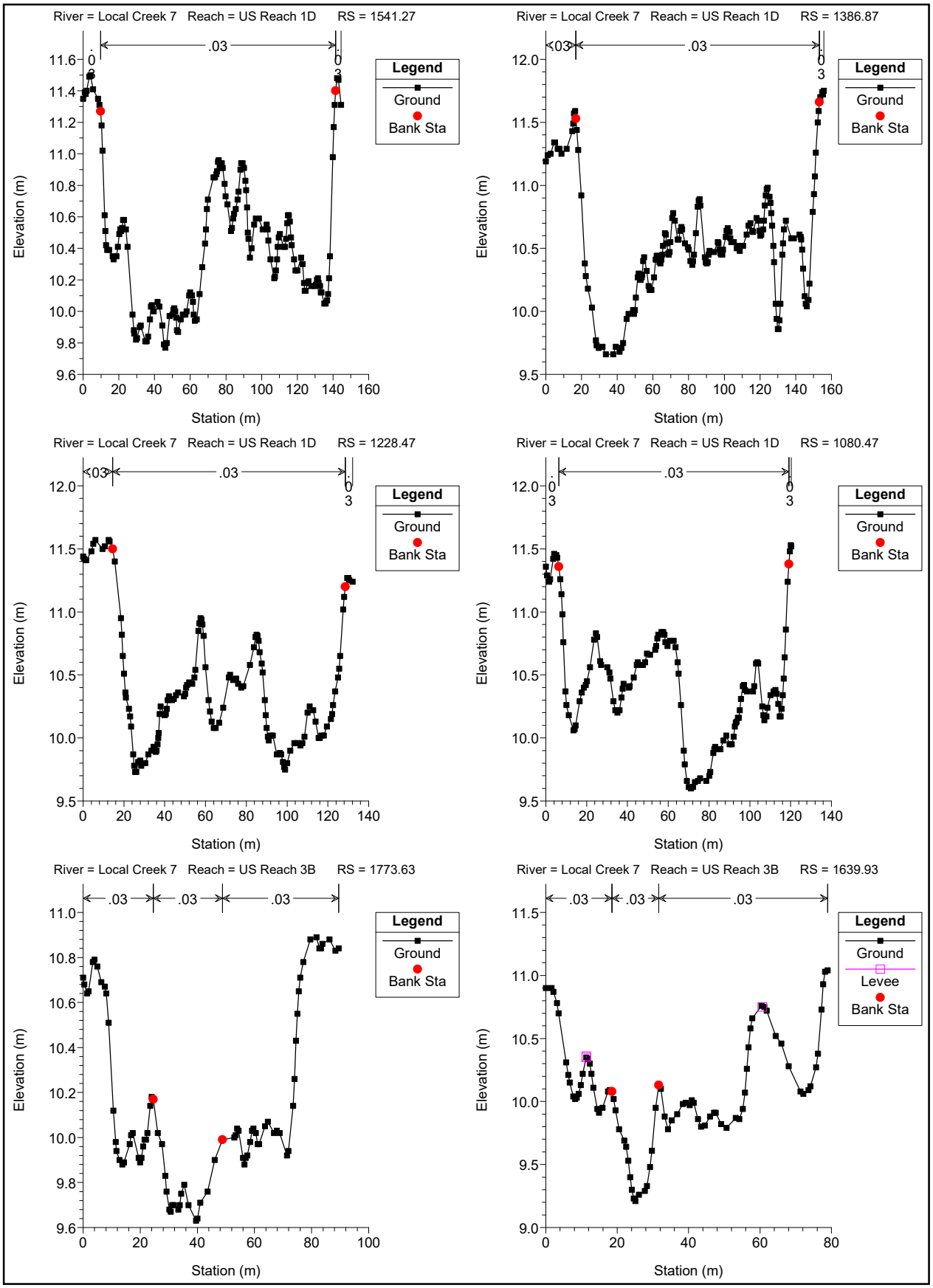

River = Local Creek 6 Reach = DS Reach 4 RS = 541.77
River = Local Creek 6 Reach = DS Reach 2 RS = 451.05
River = Local Creek 6 Reach = DS Reach 2 RS = 412.85
River = Local Creek 6 Reach = DS Reach 2 RS = 317.25
River = Local Creek 6 Reach = DS Reach 2 RS = 236.55
River = Local Creek 6 Reach = DS Reach 2 RS = 181.45
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

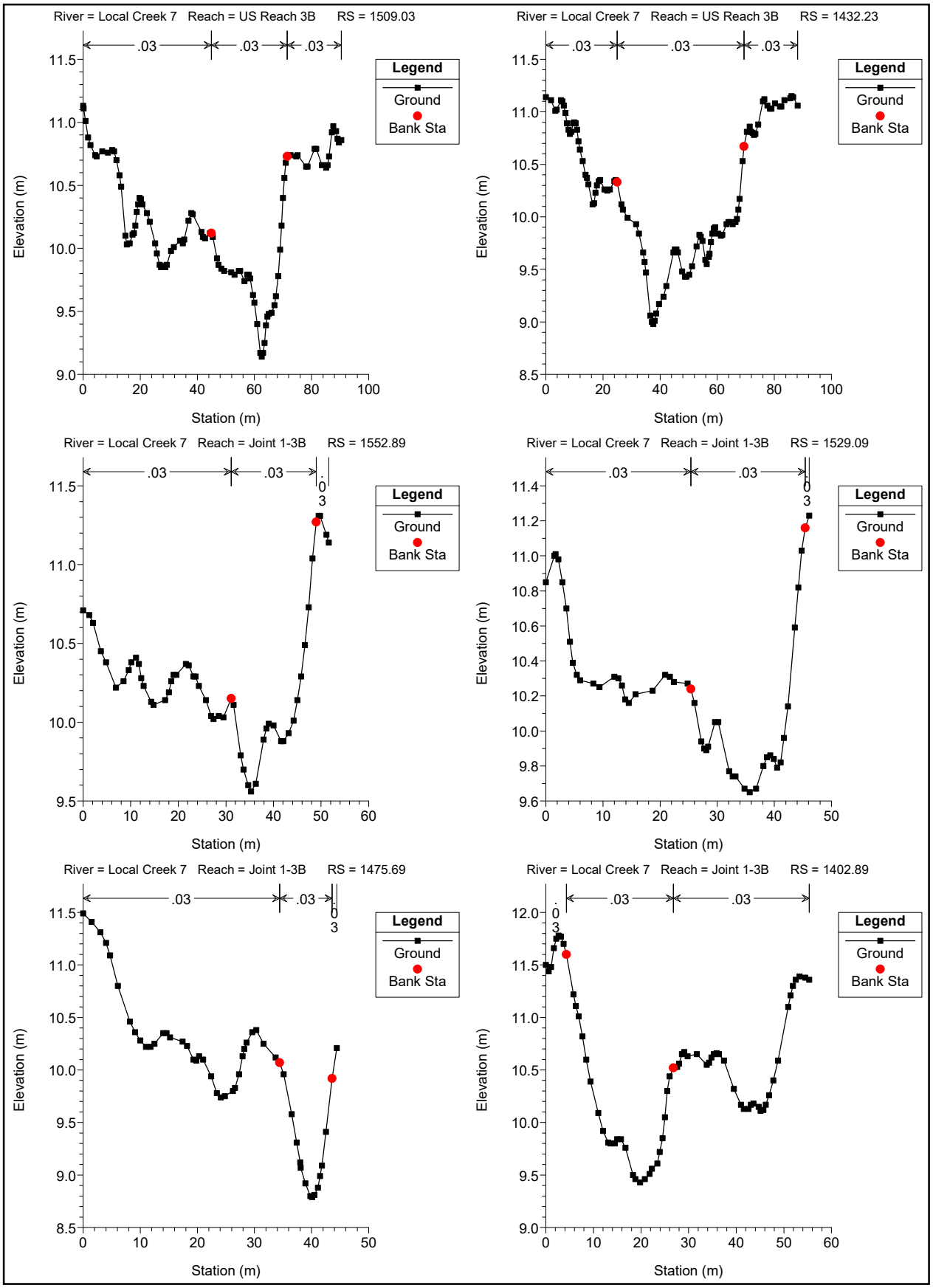

River = Local Creek 6 Reach = DS Reach 3 RS = 464.8
River = Local Creek 6 Reach = DS Reach 3 RS = 376.6
River = Local Creek 6 Reach = DS Reach 3 RS = 324.8
River = Local Creek 6 Reach = DS Reach 3 RS = 242.9
River = Local Creek 6 Reach = DS Reach 3 RS = 166.6
River = Local Creek 6 Reach = DS Reach 1 RS = 100.5
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

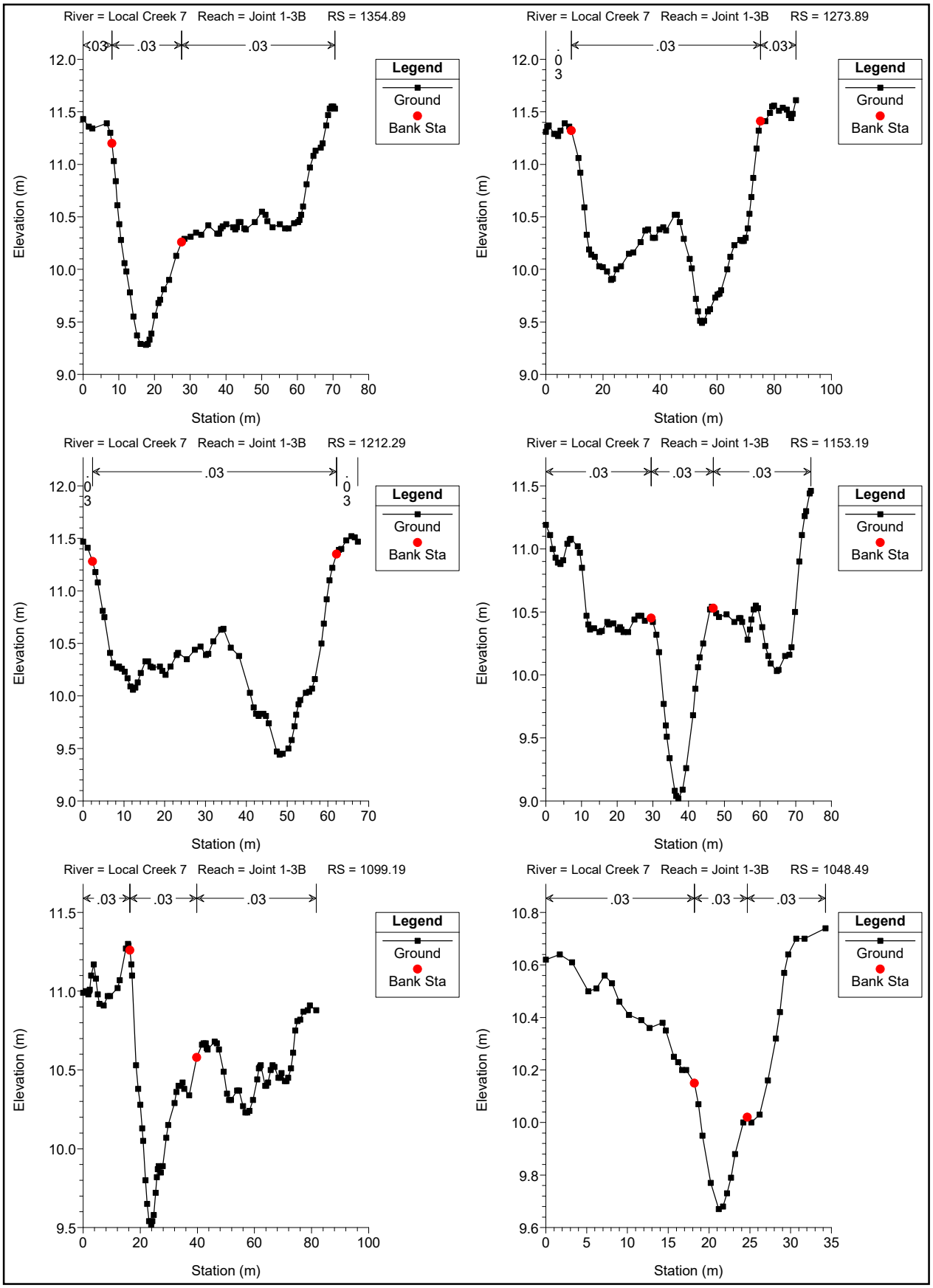

River = Local Creek 6 Reach = DS Reach 1 RS = 75.1
River = Local Creek 6 Reach = DS Reach 1 RS = 60 Culv
River = Local Creek 6 Reach = DS Reach 1 RS = 60 Culv
River = Local Creek 6 Reach = DS Reach 1 RS = 40.5
River = Local Creek 6 Reach = DS Reach 1 RS = 0
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

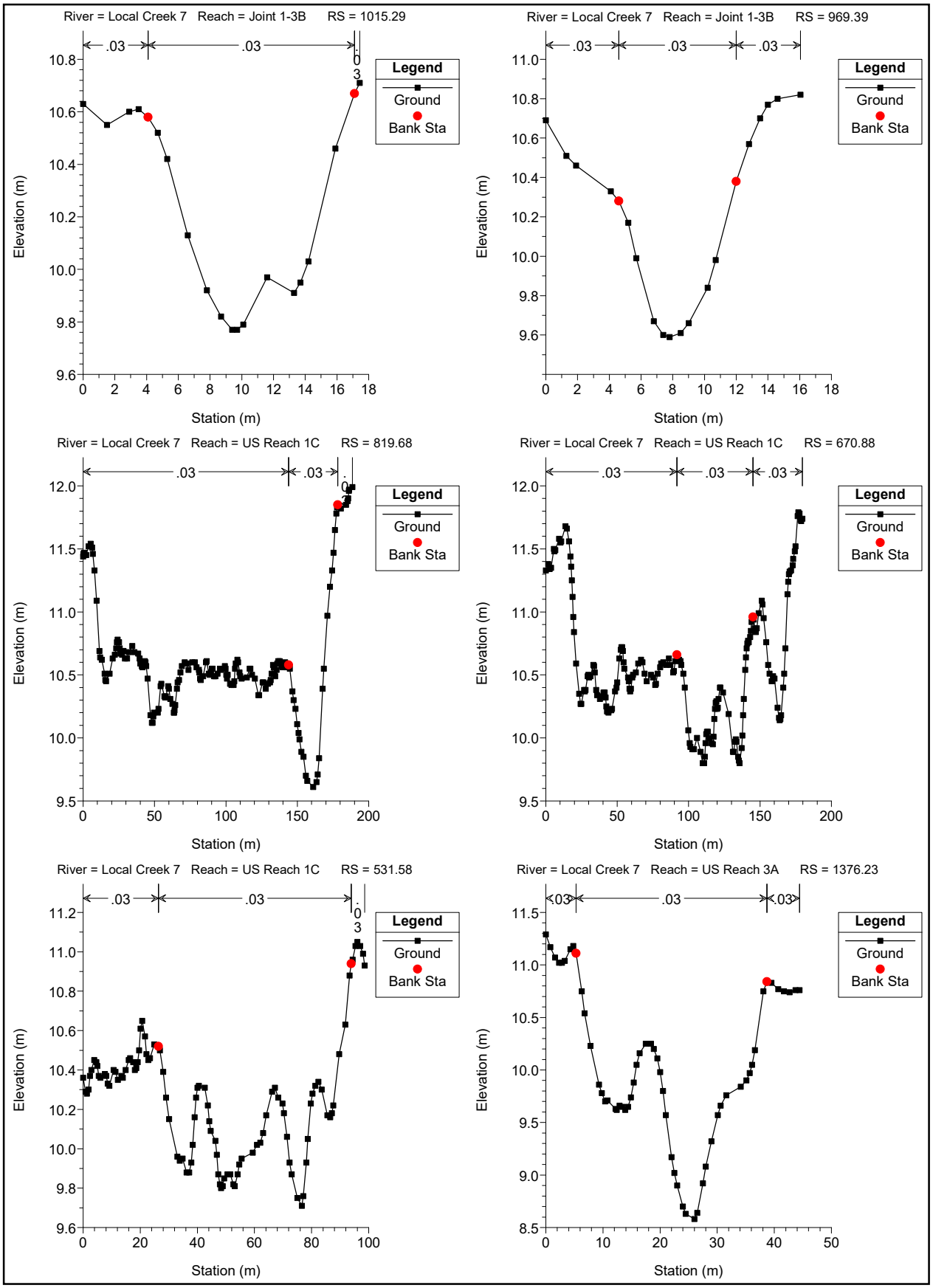
APPENDIX L

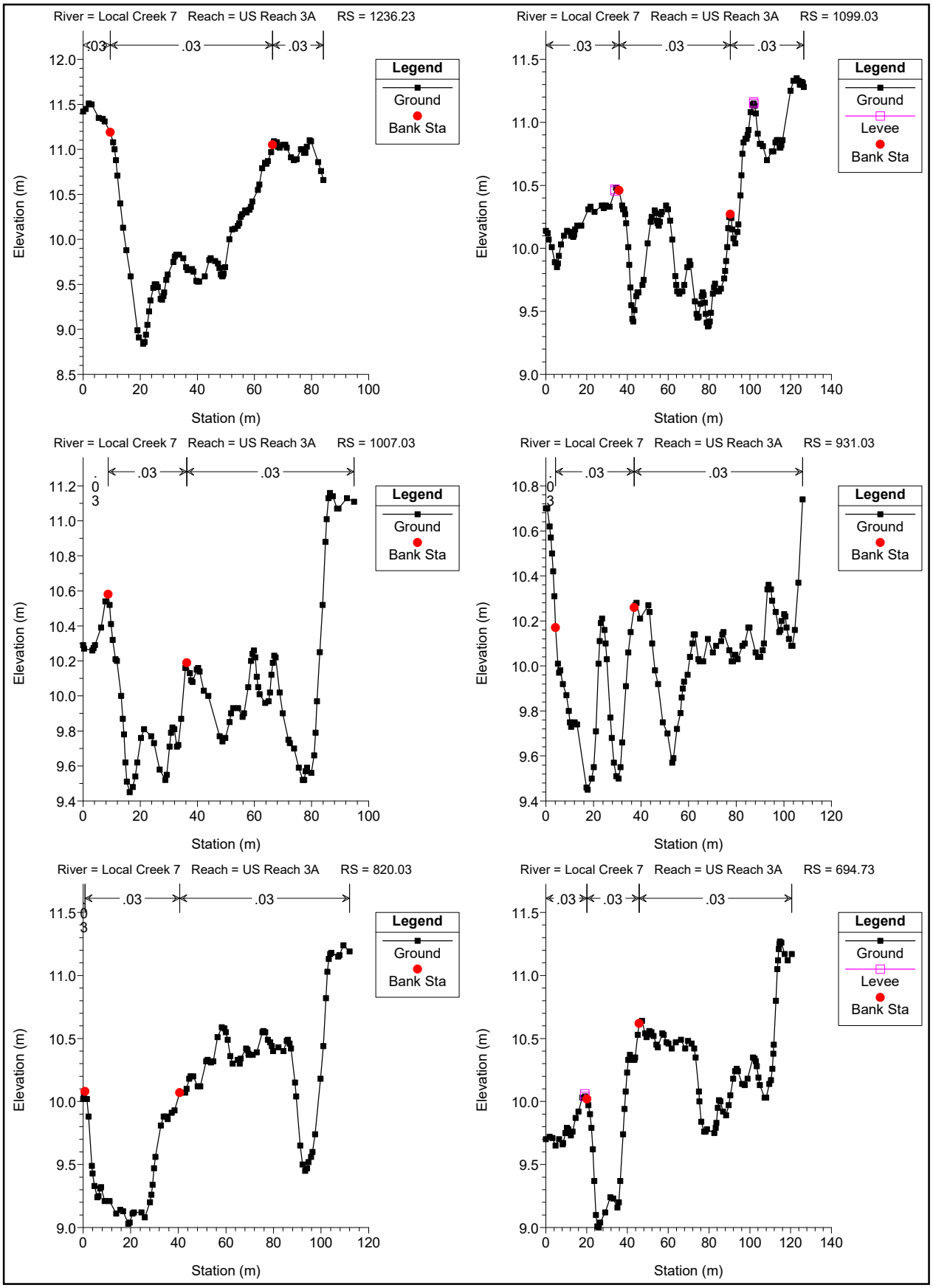
LOCAL CREEK 7

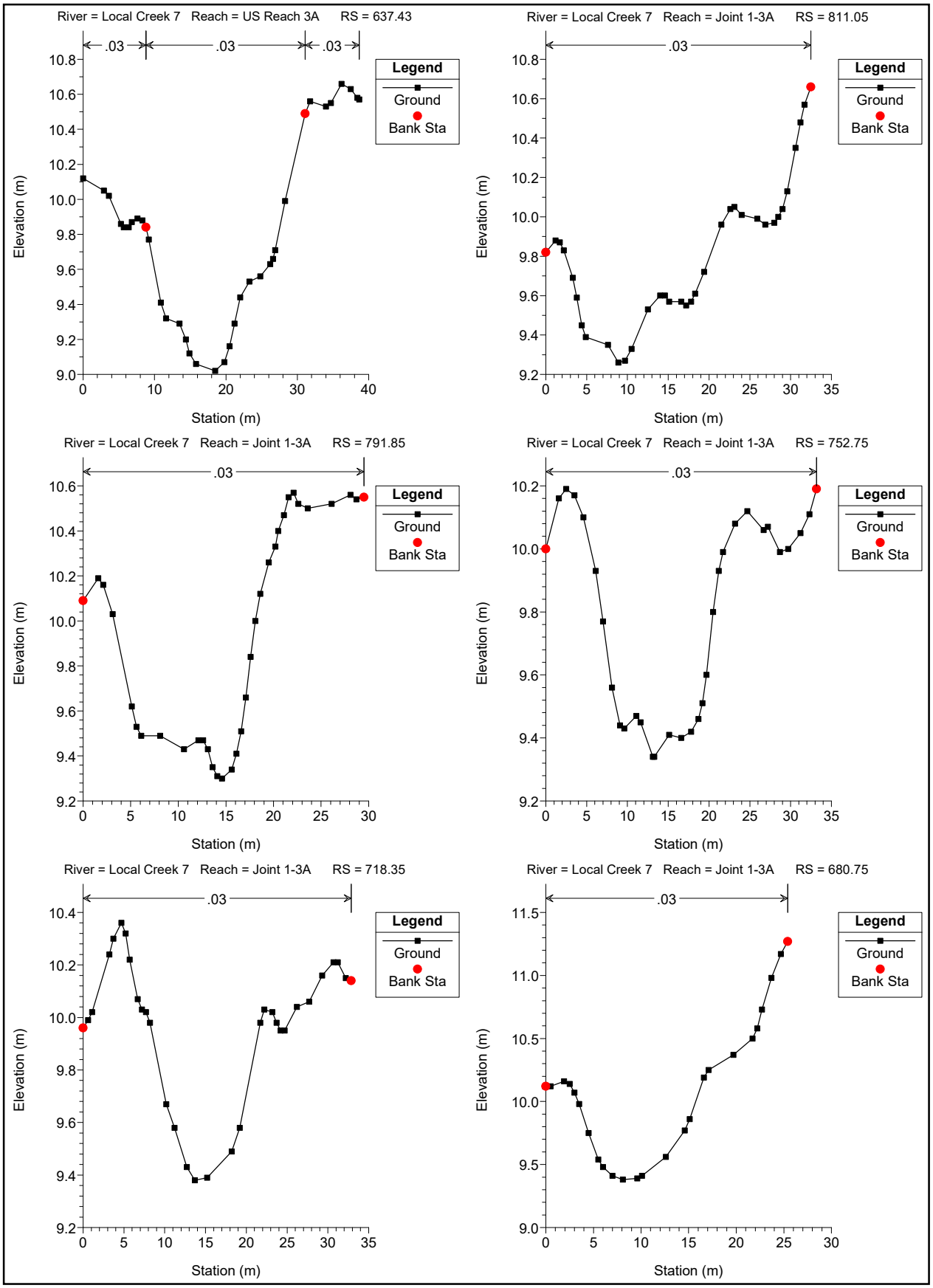

River = Local Creek 7 Reach = US Reach 1D RS = 1541.27
River = Local Creek 7 Reach = US Reach 1D RS = 1386.87
River = Local Creek 7 Reach = US Reach 1D RS = 1228.47
River = Local Creek 7 Reach = US Reach 1D RS = 1080.47
River = Local Creek 7 Reach = US Reach 3B RS = 1773.63
River = Local Creek 7 Reach = US Reach 3B RS = 1639.93
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

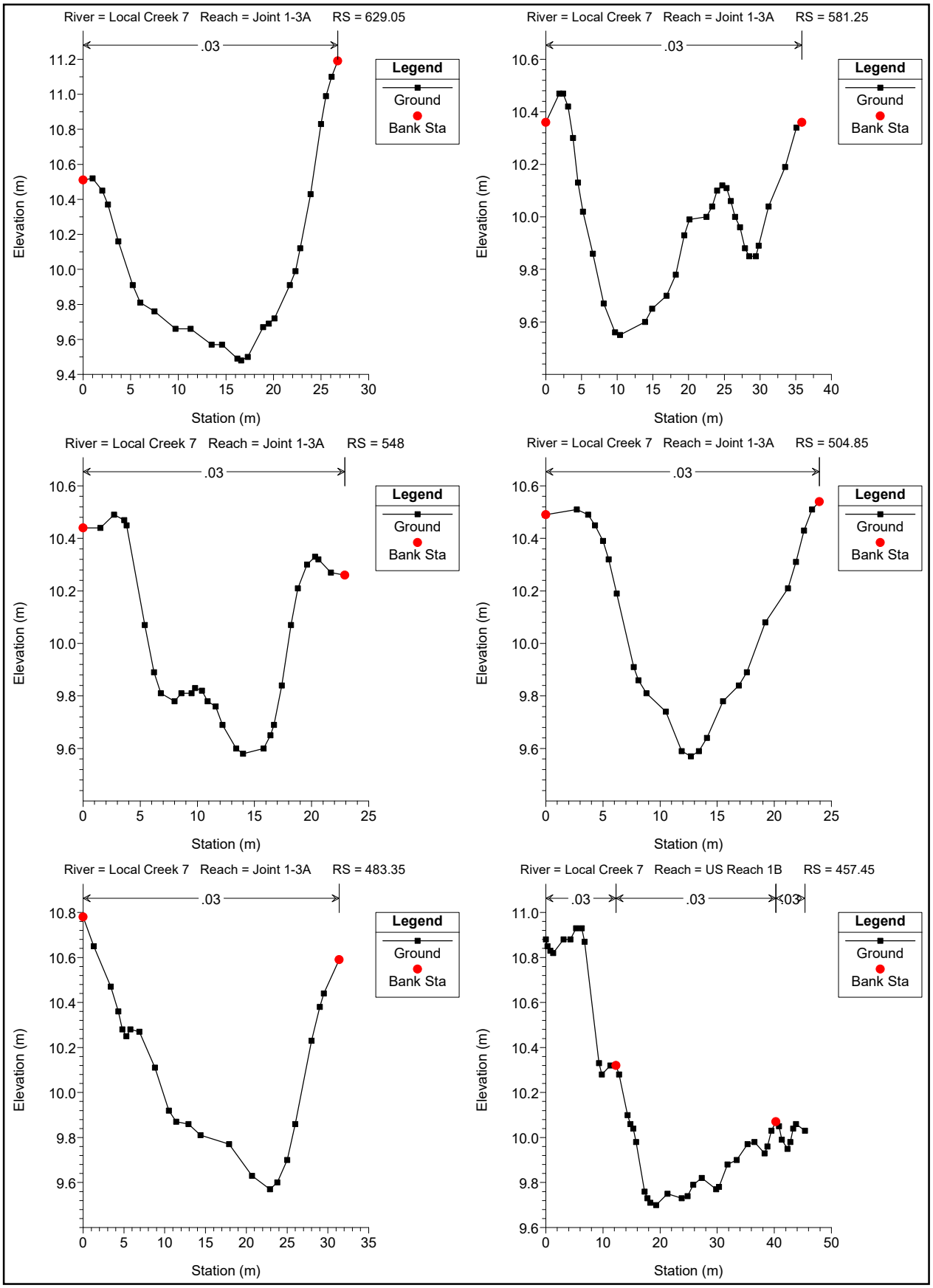

River = Local Creek 7 Reach = US Reach 3B RS = 1509.03
River = Local Creek 7 Reach = US Reach 3B RS = 1432.23
River = Local Creek 7 Reach = Joint 1-3B RS = 1552.89
River = Local Creek 7 Reach = Joint 1-3B RS = 1529.09
River = Local Creek 7 Reach = Joint 1-3B RS = 1475.69
River = Local Creek 7 Reach = Joint 1-3B RS = 1402.89
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

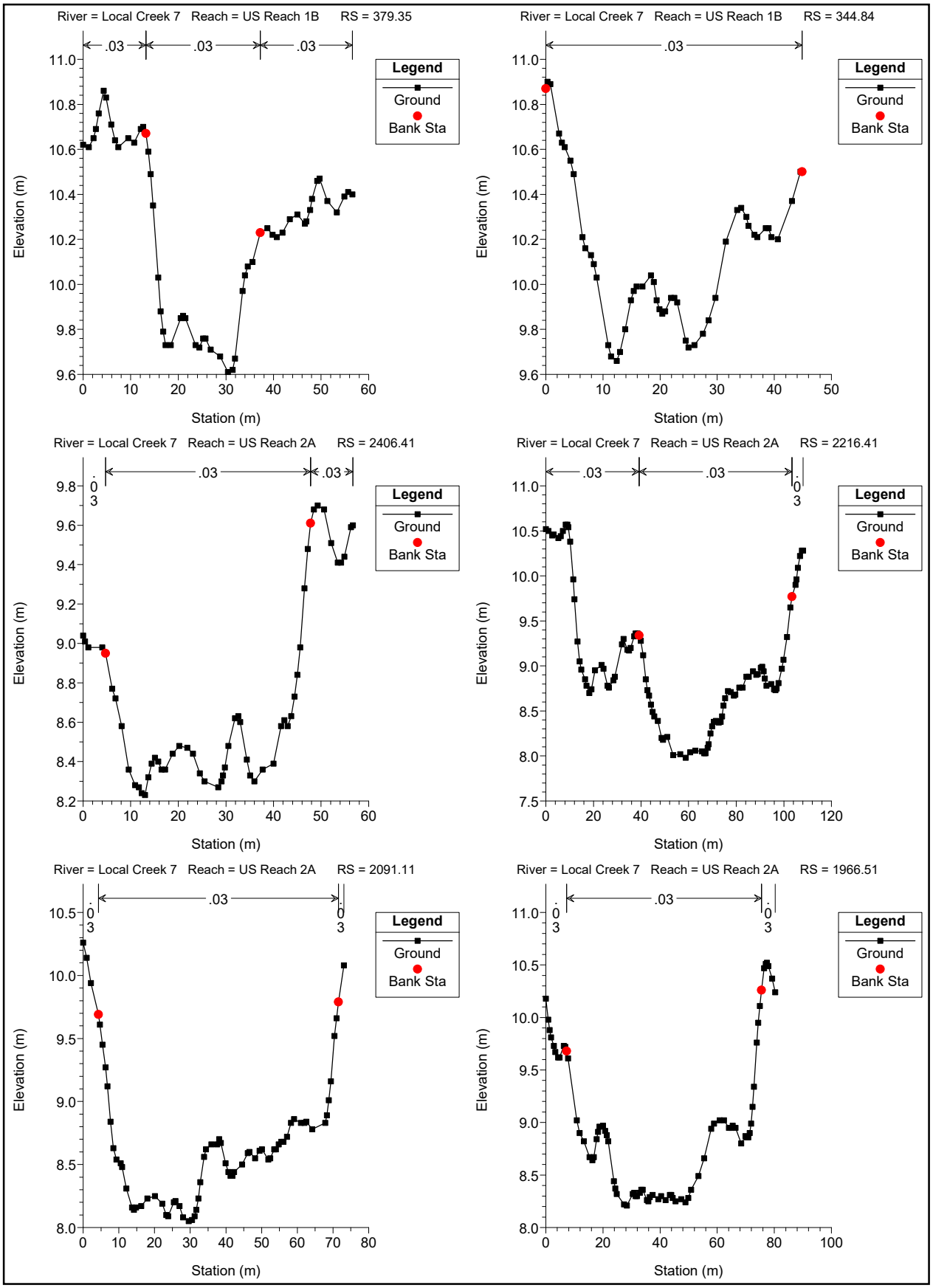

River = Local Creek 7 Reach = Joint 1-3B RS = 1354.89
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3B RS = 1273.89
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3B RS = 1212.29
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3B RS = 1153.19
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3B RS = 1099.19
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3B RS = 1048.49
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

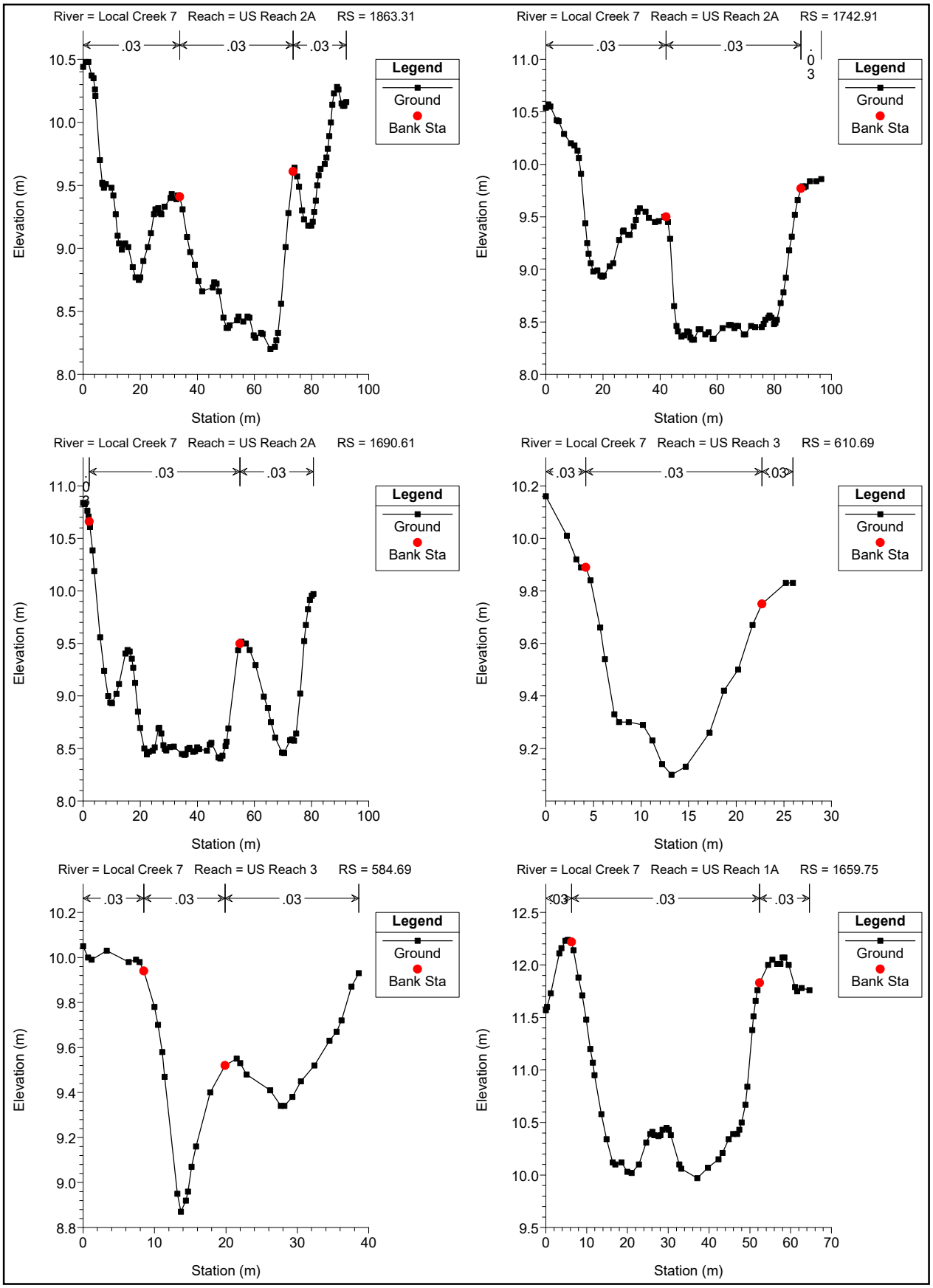

River = Local Creek 7 Reach = Joint 1-3B RS = 1015.29
River = Local Creek 7 Reach = Joint 1-3B RS = 969.39
River = Local Creek 7 Reach = US Reach 1C RS = 819.68
River = Local Creek 7 Reach = US Reach 1C RS = 670.88
River = Local Creek 7 Reach = US Reach 1C RS = 531.58
River = Local Creek 7 Reach = US Reach 3A RS = 1376.23
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

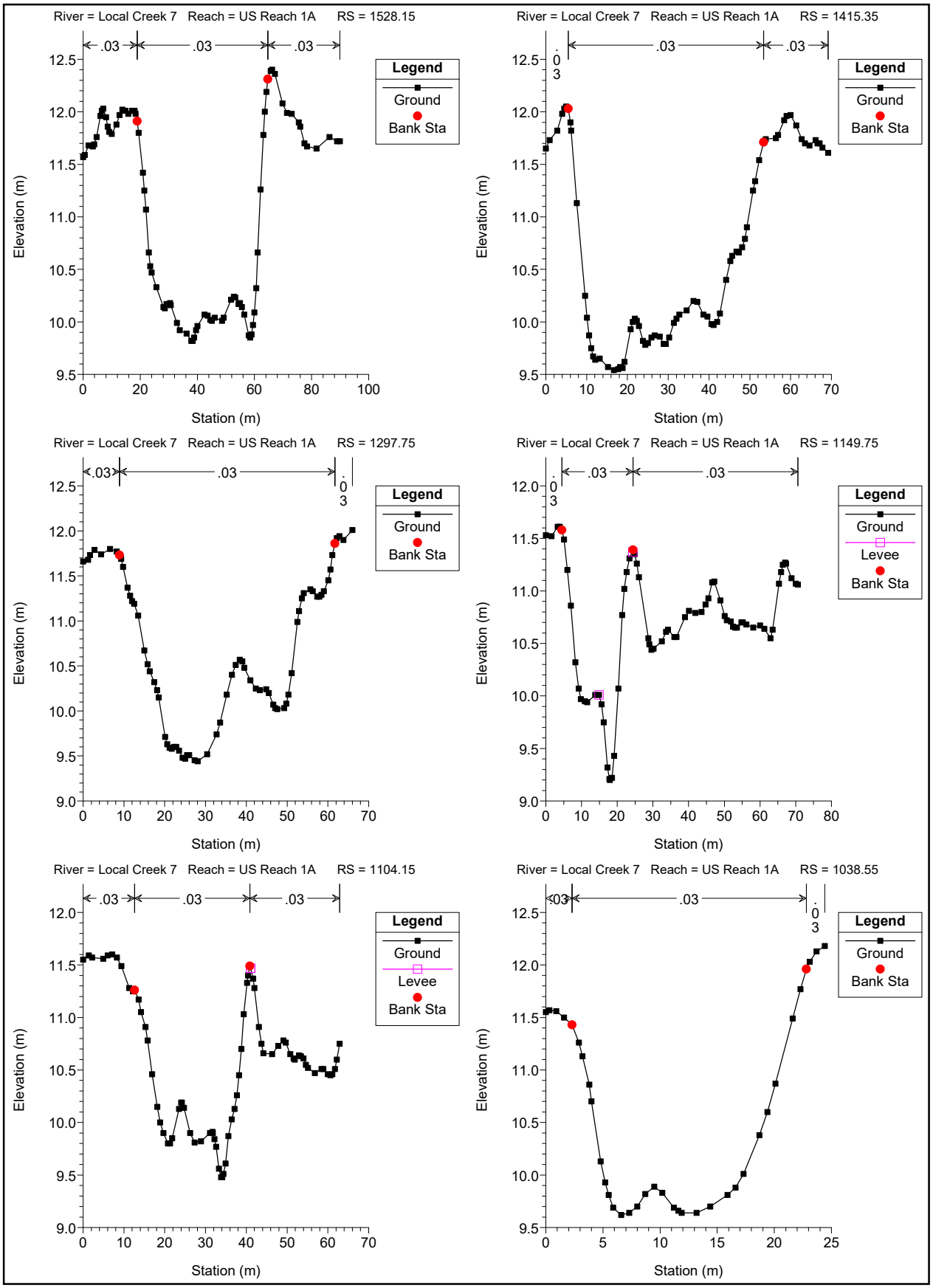

River = Local Creek 7 Reach = US Reach 3A RS = 1236.23
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 3A RS = 1099.03
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 3A RS = 1007.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 3A RS = 931.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 3A RS = 820.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 3A RS = 694.73
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

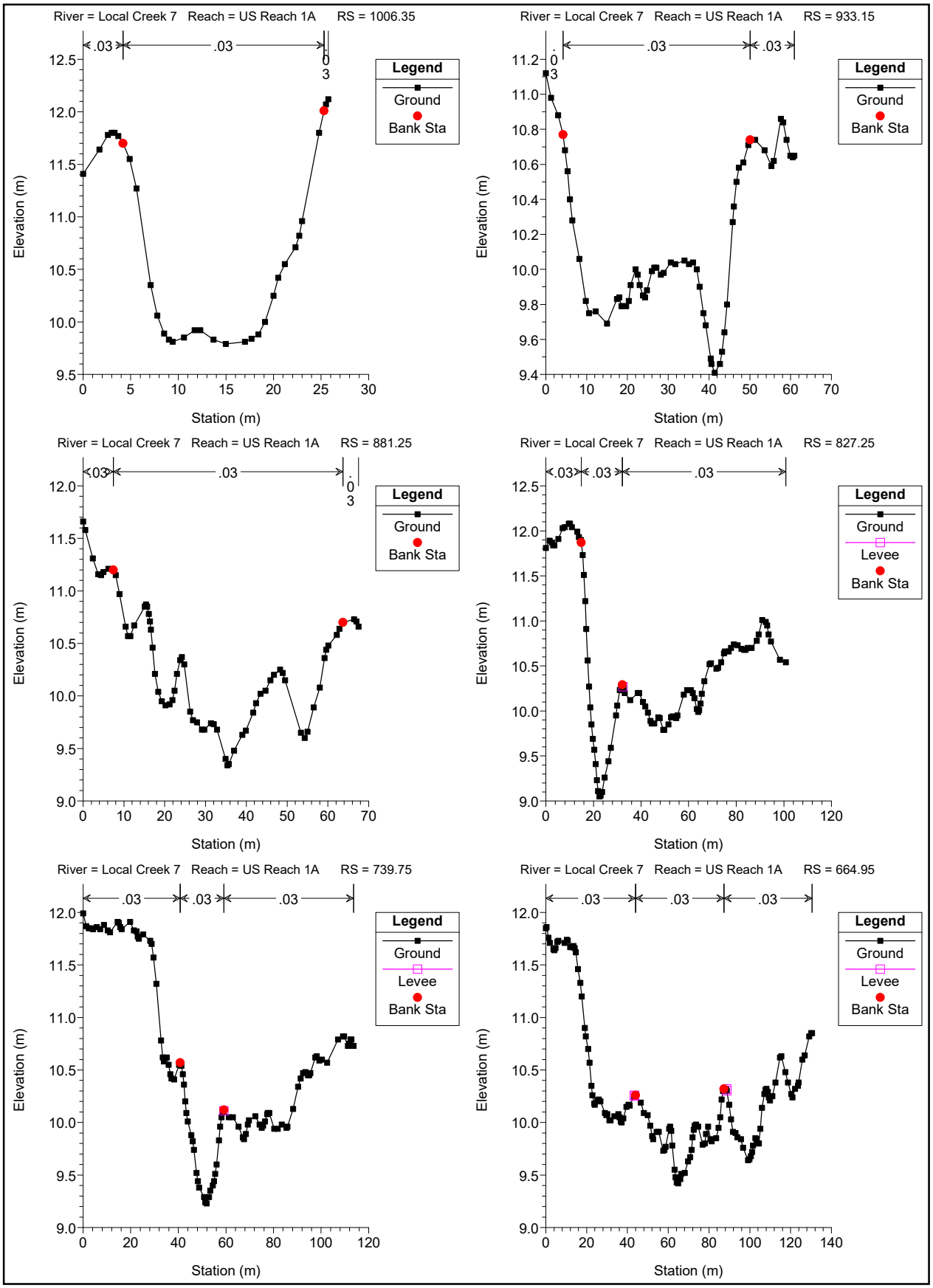

River = Local Creek 7 Reach = US Reach 3A RS = 637.43
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3A RS = 811.05
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3A RS = 791.85
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3A RS = 752.75
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3A RS = 718.35
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = Joint 1-3A RS = 680.75
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

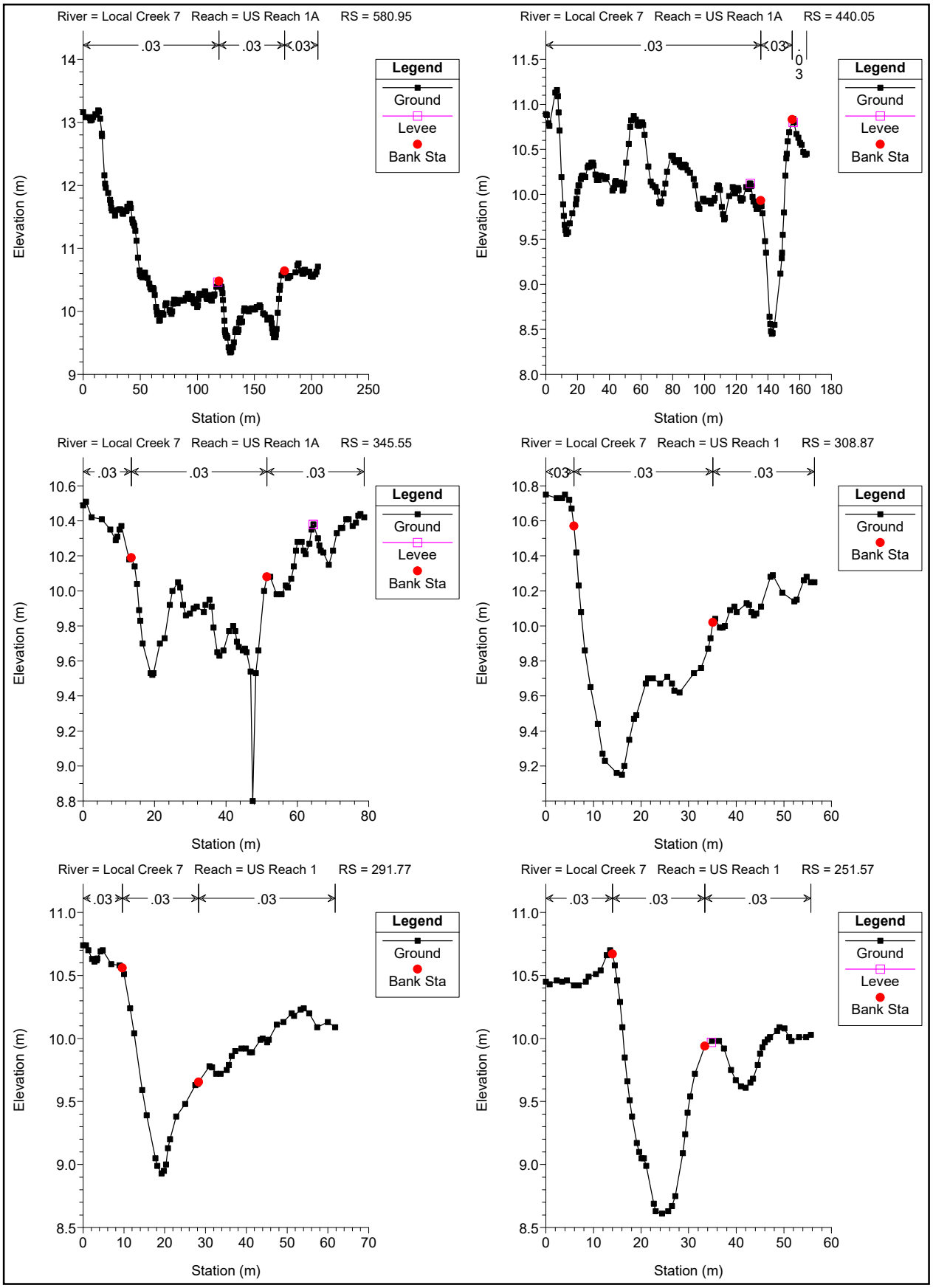

River = Local Creek 7 Reach = Joint 1-3A RS = 629.05
River = Local Creek 7 Reach = Joint 1-3A RS = 581.25
River = Local Creek 7 Reach = Joint 1-3A RS = 548
River = Local Creek 7 Reach = Joint 1-3A RS = 504.85
River = Local Creek 7 Reach = Joint 1-3A RS = 483.35
River = Local Creek 7 Reach = US Reach 1B RS = 457.45
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

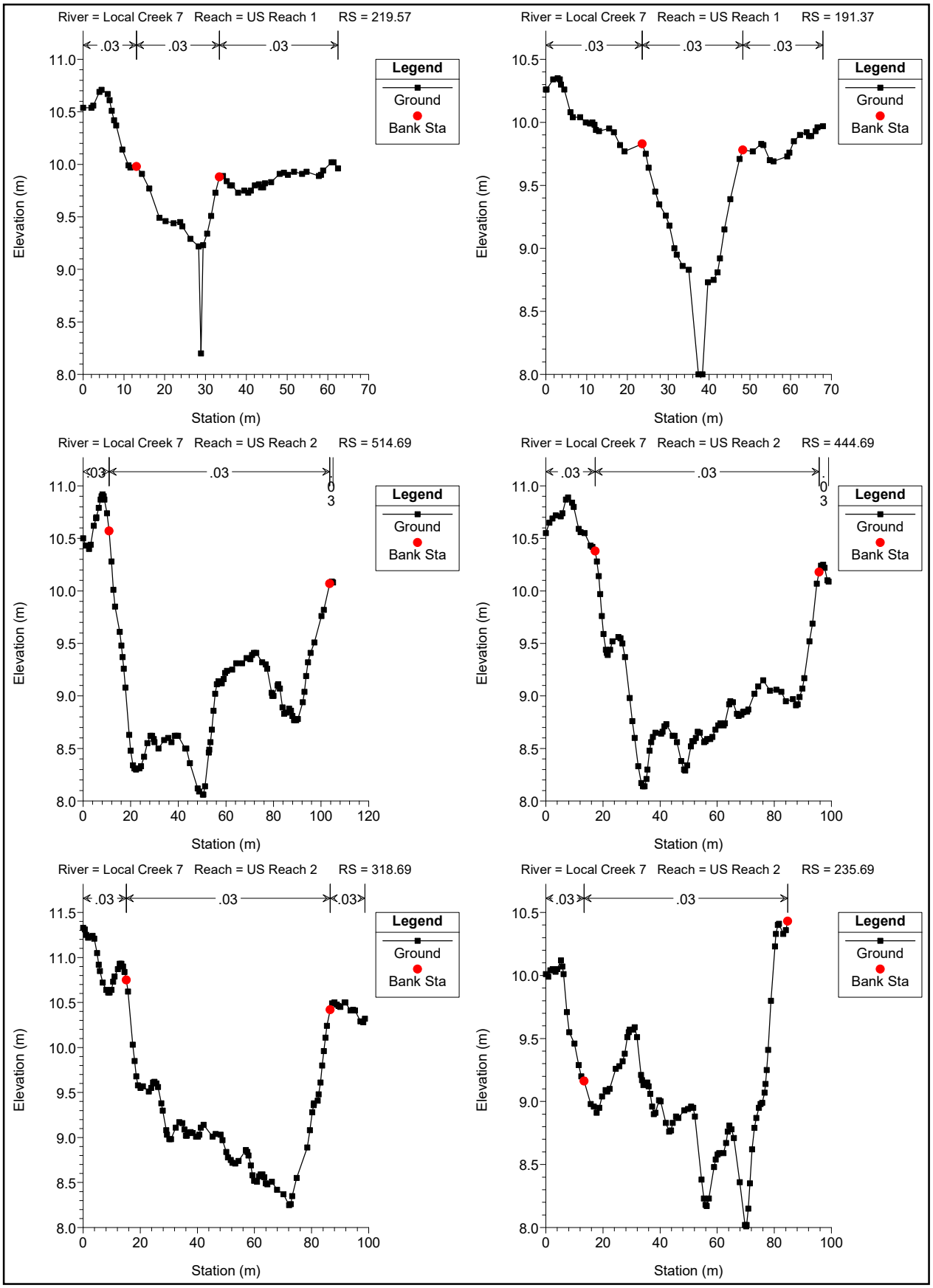

River = Local Creek 7 Reach = US Reach 1B RS = 379.35
River = Local Creek 7 Reach = US Reach 1B RS = 344.84
River = Local Creek 7 Reach = US Reach 2A RS = 2406.41
River = Local Creek 7 Reach = US Reach 2A RS = 2216.41
River = Local Creek 7 Reach = US Reach 2A RS = 2091.11
River = Local Creek 7 Reach = US Reach 2A RS = 1966.51
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 7 Reach = US Reach 2A RS = 1863.31
River = Local Creek 7 Reach = US Reach 2A RS = 1742.91
River = Local Creek 7 Reach = US Reach 2A RS = 1690.61
River = Local Creek 7 Reach = US Reach 3 RS = 610.69
River = Local Creek 7 Reach = US Reach 3 RS = 584.69
River = Local Creek 7 Reach = US Reach 1A RS = 1659.75
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 7 Reach = US Reach 1A RS = 1528.15
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 1A RS = 1415.35
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 1A RS = 1297.75
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 1A RS = 1149.75
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 1A RS = 1104.15
.03
.03
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = US Reach 1A RS = 1038.55
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)


River = Local Creek 7 Reach = US Reach 1A RS = 1006.35
River = Local Creek 7 Reach = US Reach 1A RS = 933.15
River = Local Creek 7 Reach = US Reach 1A RS = 881.25
River = Local Creek 7 Reach = US Reach 1A RS = 827.25
River = Local Creek 7 Reach = US Reach 1A RS = 739.75
River = Local Creek 7 Reach = US Reach 1A RS = 664.95
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
.03


River = Local Creek 7 Reach = US Reach 1A RS = 580.95
River = Local Creek 7 Reach = US Reach 1A RS = 440.05
River = Local Creek 7 Reach = US Reach 1A RS = 345.55
River = Local Creek 7 Reach = US Reach 1 RS = 308.87
River = Local Creek 7 Reach = US Reach 1 RS = 291.77
River = Local Creek 7 Reach = US Reach 1 RS = 251.57
.03
Legend
Ground
Levee
Bank Sta
Elevation (m)
Station (m)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River = Local Creek 7 Reach = US Reach 2 RS = 318.69
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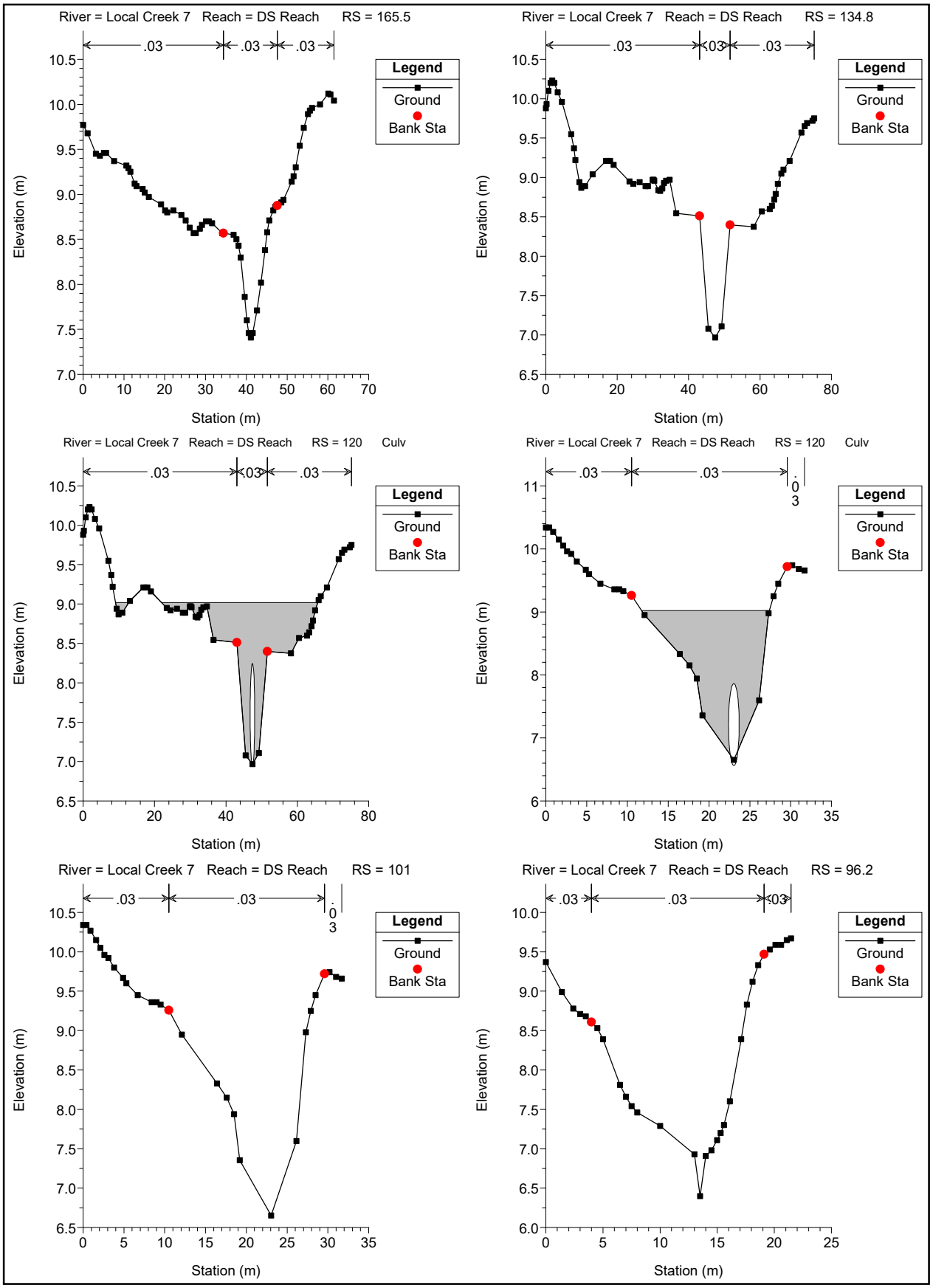
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)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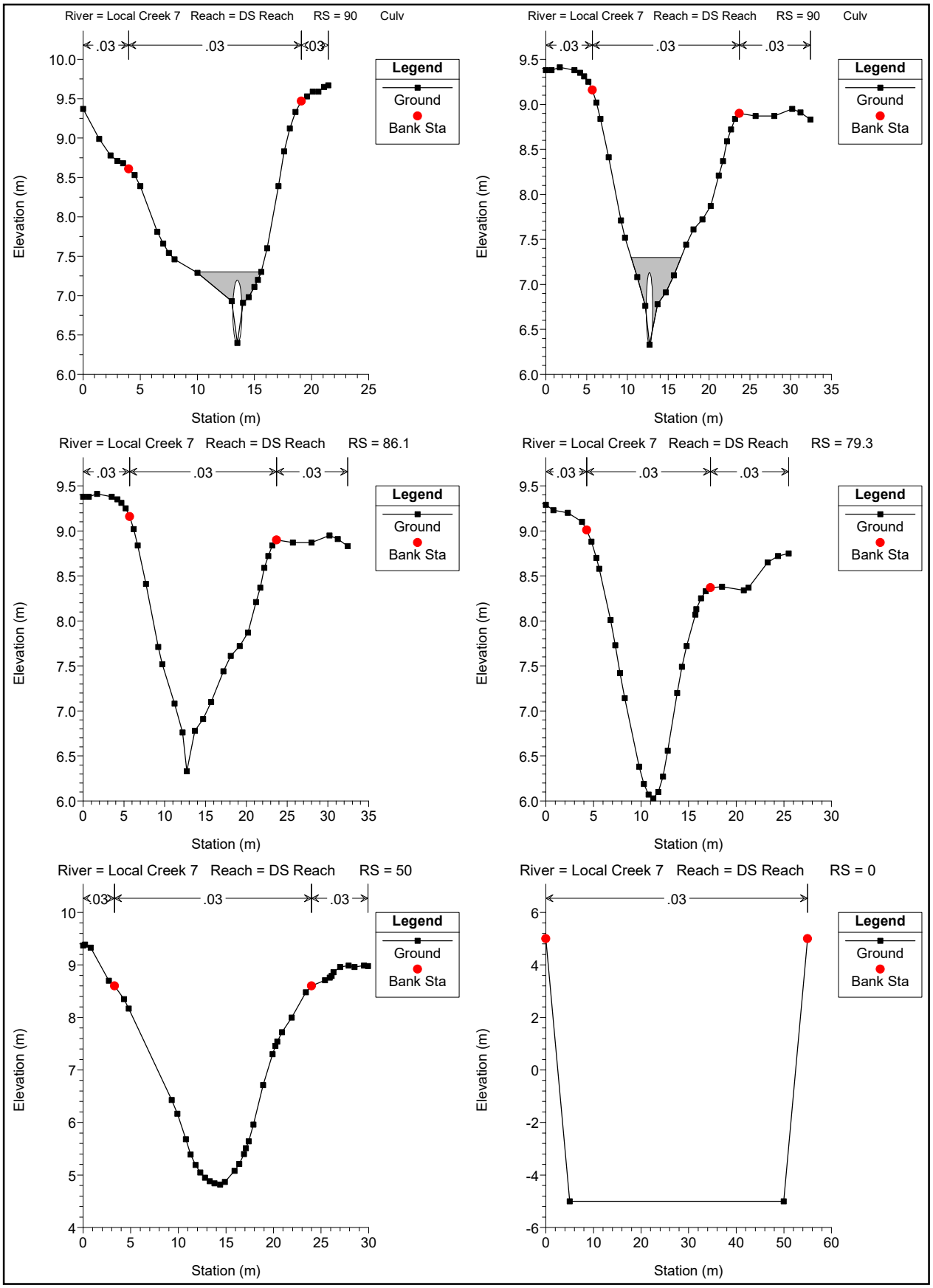
River = Local Creek 7 Reach = DS Reach RS = 120 Culv
River = Local Creek 7 Reach = DS Reach RS = 101
River = Local Creek 7 Reach = DS Reach RS = 96.2
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)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.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = DS Reach RS = 90 Culv
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = DS Reach RS = 86.1
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = DS Reach RS = 79.3
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = DS Reach RS = 50
.03
.03
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)
River = Local Creek 7 Reach = DS Reach RS = 0
.03
Legend
Ground
Bank Sta
Elevation (m)
Station (m)

APPENDIX M

CREEK FLOWS AND WATER LEVELS

APPENDIX M

OTTER CREEK

HEC-RAS Plan: Otter Creek River: Otter Creek Reach: Otter Creek Profile: CC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Otter Creek	17556	CC - 20	0.89	140.52	140.77	140.77	140.84	0.017366	1.18	0.75	5.35	1.01
Otter Creek	17215	CC - 20	0.89	131.78	131.93	131.93	131.98	0.019776	0.93	0.96	10.76	1.00
Otter Creek	16873	CC - 20	0.89	123.78	124.09	124.09	124.19	0.016132	1.38	0.65	3.41	1.01
Otter Creek	16514	CC - 20	0.89	108.81	108.94	108.94	108.97	0.022360	0.78	1.14	18.37	1.00
Otter Creek	16154	CC - 20	0.89	88.44	88.73	88.73	88.79	0.018239	1.03	0.87	7.89	0.99
Otter Creek	15794	CC - 20	0.89	68.20	68.57	68.57	68.64	0.017987	1.15	0.77	5.83	1.01
Otter Creek	15541	CC - 20	0.89	62.66	62.99	62.99	63.08	0.016273	1.34	0.67	3.70	1.01
Otter Creek	15288	CC - 20	0.89	50.34	50.58	50.58	50.63	0.018029	1.03	0.86	7.75	0.99
Otter Creek	14813	CC - 20	0.89	39.00	39.22	39.22	39.26	0.020133	0.93	0.95	10.80	1.00
Otter Creek	14337	CC - 20	0.89	35.48	35.73	35.64	35.74	0.001350	0.25	3.54	38.09	0.26
Otter Creek	13883	CC - 20	0.89	33.97	34.09	34.09	34.11	0.025747	0.66	1.35	31.07	1.01
Otter Creek	13513	CC - 20	0.89	33.34	33.47		33.47	0.000465	0.10	8.90	171.34	0.14
Otter Creek	13133	CC - 20	0.89	32.75	32.90	32.90	32.91	0.030099	0.61	1.45	42.01	1.05
Otter Creek	12619	CC - 20	0.89	32.30	32.60		32.60	0.000046	0.05	18.35	183.59	0.05
Otter Creek	12237	CC - 20	4.43	31.87	32.21		32.23	0.013063	0.57	7.71	131.58	0.76
Otter Creek	11960	CC - 20	4.43	31.34	32.06		32.06	0.000188	0.14	32.51	199.11	0.11
Otter Creek	11625	CC - 20	8.31	31.11	31.97		31.98	0.000279	0.25	33.19	109.47	0.15
Otter Creek	11215	CC - 20	8.31	31.06	31.87	31.47	31.88	0.000213	0.28	30.02	69.51	0.13
Otter Creek	10759	CC - 20	8.31	31.12	31.62	31.47	31.64	0.002507	0.65	12.86	53.26	0.42
Otter Creek	10303	CC - 20	8.31	29.62	30.51	30.27	30.53	0.002382	0.73	11.37	37.61	0.42
Otter Creek	9848	CC - 20	8.31	28.28	29.04		29.10	0.004391	1.02	8.13	25.71	0.58
Otter Creek	9392	CC - 20	8.31	26.88	27.87	27.58	27.89	0.001740	0.71	11.74	32.13	0.37
Otter Creek	8937	CC - 20	10.84	25.24	26.47		26.54	0.005078	1.16	9.31	25.31	0.61
Otter Creek	8638	CC - 20	10.84	23.80	25.28	24.89	25.35	0.003163	1.22	8.87	15.67	0.52
Otter Creek	8339	CC - 20	10.84	22.87	24.75		24.80	0.001205	0.97	11.16	13.36	0.34
Otter Creek	7974	CC - 20	10.84	23.38	24.12		24.18	0.002496	1.06	10.18	19.73	0.47
Otter Creek	7584	CC - 20	10.84	22.12	22.94	22.80	23.00	0.003798	1.10	9.86	24.90	0.56
Otter Creek	7195	CC - 20	13.46	20.78	21.67		21.72	0.002922	1.02	13.22	30.80	0.50
Otter Creek	6920	CC - 20	13.46	19.72	20.34	20.28	20.47	0.008010	1.55	8.66	22.91	0.81
Otter Creek	6644	CC - 20	13.46	17.01	18.14		18.33	0.007470	1.93	6.98	12.34	0.82
Otter Creek	6389	CC - 20	13.46	16.20	17.83		17.87	0.000674	0.91	14.84	13.22	0.27
Otter Creek	6135	CC - 20	13.46	15.34	17.50	16.79	17.58	0.002496	1.22	11.02	15.95	0.47
Otter Creek	5268	CC - 20	13.46	12.88	14.81	14.26	15.01	0.003515	1.97	6.82	4.86	0.53
Otter Creek	4834	CC - 20	13.46	11.66	13.35	12.92	13.53	0.003308	1.90	7.08	5.74	0.55
Otter Creek	4401	CC - 20	13.46	10.37	11.92	11.56	12.08	0.003358	1.77	7.60	7.80	0.57
Otter Creek	3968	CC - 20	13.46	9.17	10.56		10.69	0.003033	1.61	8.37	9.63	0.55
Otter Creek	3531	CC - 20	13.46	7.93	9.24		9.36	0.003050	1.56	8.65	10.67	0.55
Otter Creek	3209	CC - 20	13.46	7.00	8.25		8.37	0.003094	1.49	9.02	12.13	0.55
Otter Creek	2887	CC - 20	13.46	6.09	7.11		7.21	0.004170	1.43	9.41	16.83	0.61
Otter Creek	2492	CC - 20	13.46	4.96	6.11	5.74	6.16	0.001793	1.05	13.09	20.86	0.41
Otter Creek	2096	CC - 20	16.80	3.84	4.99		5.12	0.003761	1.60	10.49	14.83	0.61
Otter Creek	1769	CC - 20	16.80	2.91	4.73		4.76	0.000458	0.69	24.43	25.20	0.22
Otter Creek	1442	CC - 20	16.80	1.98	4.71		4.71	0.000057	0.35	47.69	27.98	0.09
Otter Creek	1060	CC - 20	16.80	0.90	4.70		4.71	0.000006	0.13	127.68	60.22	0.03
Otter Creek	911	CC - 20	16.80	0.70	4.70		4.70	0.000011	0.20	83.84	32.56	0.04
Otter Creek	725	CC - 20	16.80	0.40	4.70	1.03	4.70	0.000001	0.06	380.22	213.57	0.01
Otter Creek	700		Culvert									
Otter Creek	683	CC - 20	16.80	0.43	1.80		1.81	0.000401	0.49	34.06	53.27	0.20
Otter Creek	597	CC - 20	16.80	0.31	1.78		1.79	0.000216	0.51	32.75	30.22	0.16
Otter Creek	423	CC - 20	16.80	0.44	1.66		1.71	0.001267	0.95	17.66	24.33	0.36
Otter Creek	288	CC - 20	16.80	0.15	1.46		1.52	0.001538	1.11	15.07	18.78	0.40
Otter Creek	280		Lat Struct									
Otter Creek	90	CC - 20	16.80	-0.12	1.05	0.70	1.12	0.002848	1.13	14.88	29.26	0.51
Otter Creek	41	CC - 20	16.80	-0.09	0.67	0.67	0.85	0.012382	1.88	8.95	24.75	1.00
Otter Creek	7	CC - 20	16.80	-2.00	0.22	-1.71	0.22	0.000020	0.21	80.94	47.65	0.05

HEC-RAS Plan: Otter Creek River: Otter Creek Reach: Otter Creek Profile: CC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Otter Creek	17556	CC - 100	1.84	140.52	140.86	140.86	140.96	0.015457	1.42	1.29	6.39	1.01
Otter Creek	17215	CC - 100	1.84	131.78	131.99	131.99	132.06	0.017588	1.18	1.56	11.35	1.01
Otter Creek	16873	CC - 100	1.84	123.78	124.22	124.22	124.35	0.014465	1.63	1.13	4.25	1.01
Otter Creek	16514	CC - 100	1.84	108.81	108.98	108.98	109.02	0.020482	0.96	1.92	21.40	1.02
Otter Creek	16154	CC - 100	1.84	88.44	88.81	88.81	88.88	0.016446	1.19	1.55	10.43	0.99
Otter Creek	15794	CC - 100	1.84	68.20	68.66	68.66	68.73	0.017304	1.18	1.55	10.92	1.00
Otter Creek	15541	CC - 100	1.84	62.66	63.12	63.12	63.23	0.014852	1.47	1.25	5.68	1.00
Otter Creek	15288	CC - 100	1.84	50.34	50.65	50.65	50.73	0.016416	1.27	1.45	8.96	1.00
Otter Creek	14813	CC - 100	1.84	39.00	39.27	39.27	39.32	0.020440	0.93	1.98	22.88	1.01
Otter Creek	14337	CC - 100	1.84	35.48	35.79	35.68	35.79	0.001398	0.32	5.82	45.48	0.28
Otter Creek	13883	CC - 100	1.84	33.97	34.12	34.12	34.14	0.023769	0.71	2.61	51.21	1.00
Otter Creek	13513	CC - 100	1.84	33.34	33.50		33.51	0.000466	0.12	14.85	207.66	0.15
Otter Creek	13133	CC - 100	1.84	32.75	32.92	32.92	32.94	0.028000	0.72	2.54	54.36	1.07
Otter Creek	12619	CC - 100	1.84	32.30	32.65		32.65	0.000090	0.07	27.73	286.99	0.07
Otter Creek	12237	CC - 100	9.18	31.87	32.30		32.31	0.002700	0.34	27.05	311.45	0.37
Otter Creek	11960	CC - 100	9.18	31.34	32.25		32.25	0.000073	0.11	83.74	350.42	0.07
Otter Creek	11625	CC - 100	17.27	31.11	32.19		32.19	0.000278	0.26	65.47	199.10	0.15
Otter Creek	11215	CC - 100	17.27	31.06	32.07	31.57	32.08	0.000263	0.39	44.19	71.54	0.16
Otter Creek	10759	CC - 100	17.27	31.12	31.78	31.59	31.81	0.002340	0.71	24.29	82.71	0.42
Otter Creek	10303	CC - 100	17.27	29.62	30.70	30.48	30.74	0.002348	0.89	19.34	46.84	0.44
Otter Creek	9848	CC - 100	17.27	28.28	29.24		29.32	0.004324	1.22	14.13	33.77	0.60
Otter Creek	9392	CC - 100	17.27	26.88	28.07		28.12	0.001744	0.94	18.46	33.25	0.40
Otter Creek	8937	CC - 100	22.22	25.24	26.69		26.80	0.004799	1.45	15.27	28.59	0.64
Otter Creek	8638	CC - 100	22.22	23.80	25.73	25.30	25.82	0.002361	1.34	16.61	20.40	0.47
Otter Creek	8339	CC - 100	22.22	22.87	25.16		25.24	0.001589	1.26	17.57	17.66	0.40
Otter Creek	7974	CC - 100	22.22	23.38	24.44		24.52	0.002511	1.30	17.12	24.68	0.50
Otter Creek	7584	CC - 100	22.22	22.12	23.13	22.98	23.24	0.004430	1.50	14.79	26.24	0.64
Otter Creek	7195	CC - 100	27.44	20.78	21.95		22.02	0.002427	1.24	22.17	33.43	0.49
Otter Creek	6920	CC - 100	27.44	19.72	20.49	20.49	20.75	0.011458	2.23	12.29	24.64	1.01
Otter Creek	6644	CC - 100	27.44	17.01	18.67		18.85	0.004004	1.87	14.67	16.99	0.64
Otter Creek	6389	CC - 100	27.44	16.20	18.30		18.38	0.000962	1.30	21.10	13.84	0.34
Otter Creek	6135	CC - 100	27.44	15.34	17.84	17.47	17.97	0.003212	1.56	17.56	21.67	0.55
Otter Creek	5268	CC - 100	27.44	12.88	15.49	14.90	15.62	0.002308	1.86	23.65	74.51	0.45
Otter Creek	4834	CC - 100	27.44	11.66	14.04	13.44	14.35	0.003797	2.45	11.22	6.16	0.58
Otter Creek	4401	CC - 100	27.44	10.37	12.47	12.03	12.73	0.003595	2.28	12.04	8.25	0.60
Otter Creek	3968	CC - 100	27.44	9.17	11.05		11.27	0.003141	2.07	13.24	10.02	0.58
Otter Creek	3531	CC - 100	27.44	7.93	9.70		9.90	0.003100	1.98	13.86	11.71	0.58
Otter Creek	3209	CC - 100	27.44	7.00	8.65	8.32	8.84	0.003492	1.93	14.18	14.06	0.62
Otter Creek	2887	CC - 100	27.44	6.09	7.43		7.59	0.004233	1.79	15.35	19.90	0.65
Otter Creek	2492	CC - 100	27.44	4.96	6.50	6.03	6.58	0.001644	1.28	22.47	26.08	0.41
Otter Creek	2096	CC - 100	34.10	3.84	5.43		5.62	0.003493	1.95	17.51	17.18	0.62
Otter Creek	1769	CC - 100	34.10	2.91	4.90		4.98	0.001152	1.18	28.80	26.22	0.36
Otter Creek	1442	CC - 100	34.10	1.98	4.81		4.83	0.000198	0.67	50.58	28.47	0.16
Otter Creek	1060	CC - 100	34.10	0.90	4.80		4.81	0.000021	0.26	133.70	61.03	0.06
Otter Creek	911	CC - 100	34.10	0.70	4.79		4.80	0.000041	0.39	86.88	33.05	0.08
Otter Creek	725	CC - 100	34.10	0.40	4.80	1.23	4.80	0.000002	0.11	400.67	214.67	0.02
Otter Creek	700		Culvert									
Otter Creek	683	CC - 100	34.10	0.43	2.26		2.28	0.000286	0.57	59.63	58.02	0.18
Otter Creek	597	CC - 100	34.10	0.31	2.23		2.25	0.000309	0.72	47.65	34.81	0.20
Otter Creek	423	CC - 100	34.10	0.44	2.08		2.15	0.001238	1.21	28.07	26.17	0.37
Otter Creek	288	CC - 100	34.10	0.15	1.83		1.93	0.002186	1.40	24.38	28.24	0.48
Otter Creek	280		Lat Struct									
Otter Creek	90	CC - 100	34.10	-0.12	1.35	1.09	1.41	0.003031	1.10	31.03	66.70	0.51
Otter Creek	41	CC - 100	34.10	-0.09	0.92	0.92	1.14	0.011575	2.10	16.26	36.22	1.00
Otter Creek	7	CC - 100	34.10	-2.00	0.22	-1.54	0.23	0.000084	0.42	80.94	47.65	0.10

HEC-RAS Plan: Otter Creek River: Otter Creek Reach: Otter Creek Profile: CLC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Otter Creek	17556	CLC - 20	1.38	140.52	140.82	140.82	140.91	0.016289	1.33	1.04	5.92	1.01
Otter Creek	17215	CLC - 20	1.38	131.78	131.96	131.96	132.02	0.018645	1.08	1.28	11.09	1.01
Otter Creek	16873	CLC - 20	1.38	123.78	124.16	124.16	124.28	0.015103	1.53	0.90	3.88	1.01
Otter Creek	16514	CLC - 20	1.38	108.81	108.96	108.96	109.00	0.021492	0.89	1.55	19.99	1.02
Otter Creek	16154	CLC - 20	1.38	88.44	88.78	88.78	88.84	0.017192	1.12	1.23	9.33	0.99
Otter Creek	15794	CLC - 20	1.38	68.20	68.63	68.63	68.69	0.018056	1.10	1.25	10.10	1.00
Otter Creek	15541	CLC - 20	1.38	62.66	63.06	63.06	63.17	0.015043	1.46	0.95	4.37	1.00
Otter Creek	15288	CLC - 20	1.38	50.34	50.61	50.61	50.68	0.017772	1.17	1.17	8.60	1.01
Otter Creek	14813	CLC - 20	1.38	39.00	39.26	39.26	39.29	0.020029	0.86	1.60	20.40	0.98
Otter Creek	14337	CLC - 20	1.38	35.48	35.77	35.66	35.77	0.001368	0.29	4.84	43.48	0.27
Otter Creek	13883	CLC - 20	1.38	33.97	34.11	34.11	34.13	0.025025	0.69	2.00	42.28	1.01
Otter Creek	13513	CLC - 20	1.38	33.34	33.49		33.49	0.000478	0.12	11.92	188.23	0.15
Otter Creek	13133	CLC - 20	1.38	32.75	32.91	32.91	32.93	0.024245	0.64	2.17	50.73	0.98
Otter Creek	12619	CLC - 20	1.38	32.30	32.64		32.64	0.000055	0.05	26.43	271.84	0.05
Otter Creek	12237	CLC - 20	6.89	31.87	32.25		32.26	0.008445	0.51	13.40	194.60	0.63
Otter Creek	11960	CLC - 20	6.89	31.34	32.17		32.17	0.000101	0.12	58.45	279.26	0.08
Otter Creek	11625	CLC - 20	12.89	31.11	32.10		32.10	0.000280	0.26	49.83	157.02	0.15
Otter Creek	11215	CLC - 20	12.89	31.06	31.99	31.52	32.00	0.000232	0.34	38.43	71.07	0.15
Otter Creek	10759	CLC - 20	12.89	31.12	31.72	31.54	31.75	0.002578	0.66	19.55	80.15	0.43
Otter Creek	10303	CLC - 20	12.89	29.62	30.62	30.41	30.65	0.002244	0.82	15.69	41.62	0.43
Otter Creek	9848	CLC - 20	12.89	28.28	29.14		29.21	0.004731	1.17	10.99	29.88	0.62
Otter Creek	9392	CLC - 20	12.89	26.88	27.99		28.03	0.001623	0.82	15.74	32.85	0.38
Otter Creek	8937	CLC - 20	16.65	25.24	26.57		26.67	0.005620	1.39	11.96	26.90	0.67
Otter Creek	8638	CLC - 20	16.65	23.80	25.53	25.19	25.61	0.002417	1.28	12.98	17.22	0.47
Otter Creek	8339	CLC - 20	16.65	22.87	24.99		25.06	0.001441	1.13	14.73	16.22	0.38
Otter Creek	7974	CLC - 20	16.65	23.38	24.32		24.39	0.002419	1.17	14.27	23.49	0.48
Otter Creek	7584	CLC - 20	16.65	22.12	23.03	22.90	23.12	0.004551	1.36	12.21	25.56	0.63
Otter Creek	7195	CLC - 20	20.59	20.78	21.84	21.59	21.90	0.002403	1.11	18.58	32.83	0.47
Otter Creek	6920	CLC - 20	20.59	19.72	20.40	20.40	20.62	0.012113	2.05	10.02	23.77	1.01
Otter Creek	6644	CLC - 20	20.59	17.01	18.44		18.62	0.004620	1.87	11.00	14.11	0.68
Otter Creek	6389	CLC - 20	20.59	16.20	18.13		18.19	0.000770	1.10	18.78	13.61	0.30
Otter Creek	6135	CLC - 20	20.59	15.34	17.81	17.31	17.89	0.002007	1.22	16.86	21.12	0.44
Otter Creek	5268	CLC - 20	20.59	12.88	15.31	14.61	15.56	0.003724	2.20	9.38	6.33	0.56
Otter Creek	4834	CLC - 20	20.59	11.66	13.73	13.20	13.98	0.003569	2.21	9.32	5.97	0.56
Otter Creek	4401	CLC - 20	20.59	10.37	12.22	11.83	12.44	0.003505	2.06	9.99	8.13	0.59
Otter Creek	3968	CLC - 20	20.59	9.17	10.83		11.00	0.003084	1.87	11.02	9.93	0.57
Otter Creek	3531	CLC - 20	20.59	7.93	9.50		9.66	0.003065	1.79	11.49	11.33	0.57
Otter Creek	3209	CLC - 20	20.59	7.00	8.47	8.16	8.63	0.003332	1.75	11.78	13.16	0.59
Otter Creek	2887	CLC - 20	20.59	6.09	7.29		7.42	0.004177	1.63	12.64	18.62	0.63
Otter Creek	2492	CLC - 20	20.59	4.96	6.32	5.91	6.39	0.001724	1.19	17.96	23.93	0.41
Otter Creek	2096	CLC - 20	25.60	3.84	5.23		5.39	0.003590	1.80	14.23	16.16	0.61
Otter Creek	1769	CLC - 20	25.60	2.91	4.84		4.88	0.000787	0.95	27.05	25.89	0.30
Otter Creek	1442	CLC - 20	25.60	1.98	4.78		4.79	0.000117	0.51	49.75	28.33	0.12
Otter Creek	1060	CLC - 20	25.60	0.90	4.78		4.78	0.000012	0.19	132.04	60.81	0.04
Otter Creek	911	CLC - 20	25.60	0.70	4.77		4.78	0.000024	0.30	86.10	32.92	0.06
Otter Creek	725	CLC - 20	25.60	0.40	4.77	1.14	4.77	0.000001	0.08	395.27	214.36	0.01
Otter Creek	700		Culvert									
Otter Creek	683	CLC - 20	25.60	0.43	2.08		2.09	0.000291	0.52	49.23	55.89	0.18
Otter Creek	597	CLC - 20	25.60	0.31	2.05		2.07	0.000259	0.61	41.63	33.44	0.18
Otter Creek	423	CLC - 20	25.60	0.44	1.93		1.98	0.001102	1.06	24.19	25.45	0.35
Otter Creek	288	CLC - 20	25.60	0.15	1.72		1.79	0.001805	1.20	21.31	26.86	0.43
Otter Creek	280		Lat Struct									
Otter Creek	90	CLC - 20	25.60	-0.12	1.26	0.88	1.31	0.003378	1.03	24.83	63.73	0.53
Otter Creek	41	CLC - 20	25.60	-0.09	0.80	0.80	1.02	0.011938	2.03	12.59	30.02	1.00
Otter Creek	7	CLC - 20	25.60	-2.00	0.92	-1.62	0.92	0.000023	0.20	126.09	84.62	0.05

HEC-RAS Plan: Otter Creek River: Otter Creek Reach: Otter Creek Profile: CLC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Otter Creek	17556	CLC - 100	2.37	140.52	140.90	140.90	141.02	0.014877	1.52	1.55	6.72	1.01
Otter Creek	17215	CLC - 100	2.37	131.78	132.01	132.01	132.10	0.016649	1.27	1.87	11.70	1.01
Otter Creek	16873	CLC - 100	2.37	123.78	124.27	124.27	124.42	0.013963	1.73	1.37	4.61	1.01
Otter Creek	16514	CLC - 100	2.37	108.81	108.99	108.99	109.05	0.019355	1.03	2.30	21.80	1.02
Otter Creek	16154	CLC - 100	2.37	88.44	88.84	88.84	88.92	0.015974	1.26	1.89	11.50	0.99
Otter Creek	15794	CLC - 100	2.37	68.20	68.69	68.69	68.77	0.017059	1.26	1.88	11.96	1.01
Otter Creek	15541	CLC - 100	2.37	62.66	63.18	63.18	63.29	0.015025	1.47	1.61	7.38	1.00
Otter Creek	15288	CLC - 100	2.37	50.34	50.68	50.68	50.77	0.015801	1.37	1.73	9.24	1.01
Otter Creek	14813	CLC - 100	2.37	39.00	39.30	39.30	39.34	0.019182	0.92	2.56	28.48	0.98
Otter Creek	14337	CLC - 100	2.37	35.48	35.81	35.70	35.81	0.001451	0.35	6.78	46.90	0.29
Otter Creek	13883	CLC - 100	2.37	33.97	34.13	34.13	34.16	0.020953	0.69	3.44	63.72	0.95
Otter Creek	13513	CLC - 100	2.37	33.34	33.52		33.52	0.000519	0.14	17.36	227.66	0.16
Otter Creek	13133	CLC - 100	2.37	32.75	32.94	32.93	32.96	0.013806	0.59	3.99	67.52	0.78
Otter Creek	12619	CLC - 100	2.37	32.30	32.63		32.63	0.000198	0.10	23.16	226.96	0.10
Otter Creek	12237	CLC - 100	11.85	31.87	32.36		32.36	0.001036	0.24	48.77	451.82	0.24
Otter Creek	11960	CLC - 100	11.85	31.34	32.32		32.32	0.000055	0.11	112.00	398.52	0.06
Otter Creek	11625	CLC - 100	22.26	31.11	32.27		32.28	0.000264	0.27	83.76	242.30	0.14
Otter Creek	11215	CLC - 100	22.26	31.06	32.15	31.62	32.16	0.000296	0.45	49.81	72.04	0.17
Otter Creek	10759	CLC - 100	22.26	31.12	31.84	31.65	31.87	0.002174	0.77	29.04	83.59	0.42
Otter Creek	10303	CLC - 100	22.26	29.62	30.77	30.54	30.82	0.002439	0.97	23.01	50.87	0.46
Otter Creek	9848	CLC - 100	22.26	28.28	29.32		29.41	0.004035	1.32	16.93	34.40	0.60
Otter Creek	9392	CLC - 100	22.26	26.88	28.16		28.22	0.001824	1.04	21.31	33.64	0.42
Otter Creek	8937	CLC - 100	28.60	25.24	26.81		26.93	0.004293	1.52	18.76	30.12	0.62
Otter Creek	8638	CLC - 100	28.60	23.80	25.91	25.42	26.01	0.002284	1.38	20.66	23.67	0.47
Otter Creek	8339	CLC - 100	28.60	22.87	25.32		25.42	0.001720	1.40	20.43	18.75	0.43
Otter Creek	7974	CLC - 100	28.60	23.38	24.55		24.65	0.002595	1.43	19.94	25.34	0.52
Otter Creek	7584	CLC - 100	28.60	22.12	23.23	23.06	23.37	0.004308	1.63	17.53	26.88	0.65
Otter Creek	7195	CLC - 100	35.29	20.78	22.06		22.15	0.002455	1.36	25.89	34.04	0.50
Otter Creek	6920	CLC - 100	35.29	19.72	20.59	20.59	20.89	0.010936	2.41	14.66	25.35	1.01
Otter Creek	6644	CLC - 100	35.29	17.01	18.89		19.07	0.003477	1.90	18.59	18.97	0.61
Otter Creek	6389	CLC - 100	35.29	16.20	18.48		18.59	0.001107	1.49	24.05	17.72	0.37
Otter Creek	6135	CLC - 100	35.29	15.34	17.82	17.63	18.04	0.005649	2.06	17.13	21.29	0.73
Otter Creek	5268	CLC - 100	35.29	12.88	15.67	15.53	15.74	0.001487	1.59	38.89	102.32	0.36
Otter Creek	4834	CLC - 100	35.29	11.66	14.36	13.69	14.72	0.004014	2.67	13.23	6.43	0.59
Otter Creek	4401	CLC - 100	35.29	10.37	12.73	12.23	13.04	0.003684	2.49	14.19	8.38	0.61
Otter Creek	3968	CLC - 100	35.29	9.17	11.28		11.54	0.003205	2.27	15.57	10.19	0.59
Otter Creek	3531	CLC - 100	35.29	7.93	9.90		10.14	0.003175	2.17	16.26	12.00	0.60
Otter Creek	3209	CLC - 100	35.29	7.00	8.82	8.48	9.05	0.003642	2.13	16.59	14.64	0.64
Otter Creek	2887	CLC - 100	35.29	6.09	7.56		7.76	0.004325	1.95	18.08	20.87	0.67
Otter Creek	2492	CLC - 100	35.29	4.96	6.68	6.15	6.77	0.001551	1.37	27.12	27.18	0.41
Otter Creek	2096	CLC - 100	43.80	3.84	5.62		5.84	0.003431	2.10	20.82	17.81	0.62
Otter Creek	1769	CLC - 100	43.80	2.91	5.00		5.10	0.001485	1.40	31.24	26.65	0.41
Otter Creek	1442	CLC - 100	43.80	1.98	4.85		4.89	0.000304	0.85	51.83	28.67	0.20
Otter Creek	1060	CLC - 100	43.80	0.90	4.84		4.85	0.000035	0.32	136.23	63.68	0.07
Otter Creek	911	CLC - 100	43.80	0.70	4.83		4.84	0.000066	0.50	88.03	33.23	0.10
Otter Creek	725	CLC - 100	43.80	0.40	4.84	1.33	4.84	0.000003	0.14	408.72	215.24	0.02
Otter Creek	700		Culvert									
Otter Creek	683	CLC - 100	43.80	0.43	2.45		2.47	0.000292	0.62	70.81	62.06	0.18
Otter Creek	597	CLC - 100	43.80	0.31	2.41		2.44	0.000359	0.81	54.06	36.66	0.21
Otter Creek	423	CLC - 100	43.80	0.44	2.23		2.32	0.001361	1.36	32.11	26.98	0.40
Otter Creek	288	CLC - 100	43.80	0.15	1.95		2.08	0.002457	1.57	27.90	29.66	0.52
Otter Creek	280		Lat Struct									
Otter Creek	90	CLC - 100	43.80	-0.12	1.46	1.23	1.53	0.002976	1.12	39.24	84.90	0.51
Otter Creek	41	CLC - 100	43.80	-0.09	1.02	1.02	1.25	0.011319	2.16	20.30	42.62	1.00
Otter Creek	7	CLC - 100	43.80	-2.00	0.92	-1.46	0.93	0.000066	0.35	126.09	84.62	0.09

APPENDIX M

LOCAL CREEK 1

HEC-RAS Plan: Local Creek 1 River: LocalCreek1 Reach: LocalCreek1 Profile: CC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LocalCreek1	1816	CC - 20	1.20	19.90	20.13	20.13	20.21	0.017017	1.22	0.98	6.56	1.01
LocalCreek1	1776	CC - 20	1.20	19.08	19.34	19.34	19.43	0.016500	1.29	0.93	5.54	1.01
LocalCreek1	1719	CC - 20	1.20	18.12	18.32	18.32	18.38	0.018012	1.07	1.12	9.58	1.00
LocalCreek1	1621	CC - 20	1.20	16.20	16.37	16.37	16.41	0.019789	0.93	1.29	14.48	1.00
LocalCreek1	1516	CC - 20	1.20	14.66	15.11	14.97	15.13	0.002467	0.67	1.79	6.89	0.42
LocalCreek1	1446	CC - 20	1.20	14.48	14.71	14.71	14.76	0.017861	1.00	1.24	12.36	0.98
LocalCreek1	1161	CC - 20	1.20	11.70	12.22	12.13	12.25	0.003753	0.77	1.56	6.44	0.50
LocalCreek1	1118	CC - 20	1.20	11.67	12.05	11.96	12.08	0.004222	0.77	1.56	7.36	0.53
LocalCreek1	850	CC - 20	1.20	10.19	10.50	10.46	10.54	0.008211	0.89	1.34	8.29	0.71
LocalCreek1	615	CC - 20	1.20	7.58	7.78	7.78	7.85	0.017162	1.15	1.04	7.63	1.00
LocalCreek1	529	CC - 20	1.20	5.59	5.94	5.93	6.04	0.012924	1.38	0.87	3.85	0.93
LocalCreek1	480	CC - 20	1.20	4.94	5.24	5.24	5.31	0.016407	1.23	0.97	6.26	1.00
LocalCreek1	450	CC - 20	1.20	4.22	4.84	4.50	4.84	0.000567	0.43	2.79	6.84	0.22
LocalCreek1	427	CC - 20	1.20	3.62	4.84	4.05	4.84	0.000005	0.07	25.92	71.06	0.02
LocalCreek1	419		Culvert									
LocalCreek1	408	CC - 20	1.20	2.53	3.22		3.26	0.003231	0.91	1.32	3.63	0.48
LocalCreek1	404	CC - 20	1.20	2.30	3.23		3.25	0.000701	0.51	2.36	4.97	0.24
LocalCreek1	401	CC - 20	1.20	2.26	3.23	2.73	3.24	0.000500	0.46	2.60	4.92	0.20
LocalCreek1	395		Culvert									
LocalCreek1	389	CC - 20	1.20	1.81	2.66		2.68	0.000706	0.57	2.10	3.49	0.24
LocalCreek1	384	CC - 20	1.20	1.82	2.65		2.67	0.000732	0.57	2.09	3.59	0.24
LocalCreek1	329	CC - 20	1.20	2.01	2.45	2.44	2.56	0.013695	1.45	0.83	3.52	0.96
LocalCreek1	262	CC - 20	1.20	1.65	2.00	1.91	2.04	0.004704	0.85	1.40	6.10	0.57
LocalCreek1	47	CC - 20	1.20	-0.04	0.22	0.22	0.30	0.016648	1.25	0.96	6.08	1.01
LocalCreek1	9	CC - 20	1.20	-0.16	0.22	0.05	0.22	0.000076	0.12	13.96	93.00	0.08

HEC-RAS Plan: Local Creek 1 River: LocalCreek1 Reach: LocalCreek1 Profile: CC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LocalCreek1	1816	CC - 100	2.50	19.90	20.23	20.23	20.34	0.014608	1.48	1.69	7.54	1.00
LocalCreek1	1776	CC - 100	2.50	19.08	19.46	19.46	19.58	0.014277	1.57	1.59	6.34	1.00
LocalCreek1	1719	CC - 100	2.50	18.12	18.40	18.40	18.49	0.016121	1.35	1.86	10.32	1.01
LocalCreek1	1621	CC - 100	2.50	16.20	16.42	16.42	16.49	0.017726	1.16	2.16	16.15	1.01
LocalCreek1	1516	CC - 100	2.50	14.66	15.25	15.08	15.28	0.003178	0.87	2.88	9.10	0.49
LocalCreek1	1446	CC - 100	2.50	14.48	14.78	14.78	14.85	0.016605	1.21	2.13	14.98	1.00
LocalCreek1	1161	CC - 100	2.50	11.70	12.37	12.23	12.41	0.004300	0.94	2.67	9.03	0.55
LocalCreek1	1118	CC - 100	2.50	11.67	12.19	12.07	12.23	0.004077	0.93	2.68	9.14	0.55
LocalCreek1	850	CC - 100	2.50	10.19	10.59	10.55	10.66	0.009068	1.18	2.12	9.30	0.79
LocalCreek1	615	CC - 100	2.50	7.58	7.87	7.87	7.97	0.014941	1.43	1.75	8.38	1.00
LocalCreek1	529	CC - 100	2.50	5.59	6.07	6.07	6.23	0.013481	1.75	1.43	4.56	1.00
LocalCreek1	480	CC - 100	2.50	4.94	5.88	5.34	5.89	0.000247	0.38	6.65	10.73	0.15
LocalCreek1	450	CC - 100	2.50	4.22	5.88	4.63	5.89	0.000025	0.16	15.41	15.34	0.05
LocalCreek1	427	CC - 100	2.50	3.62	5.89	4.17	5.89	0.000000	0.02	151.08	130.00	0.01
LocalCreek1	419		Culvert									
LocalCreek1	408	CC - 100	2.50	2.53	4.80		4.80	0.000020	0.17	14.74	10.79	0.05
LocalCreek1	404	CC - 100	2.50	2.30	4.80		4.80	0.000014	0.15	16.72	11.34	0.04
LocalCreek1	401	CC - 100	2.50	2.26	4.80	2.91	4.80	0.000014	0.15	16.52	11.38	0.04
LocalCreek1	395		Culvert									
LocalCreek1	389	CC - 100	2.50	1.81	2.89		2.93	0.001174	0.84	2.98	3.98	0.31
LocalCreek1	384	CC - 100	2.50	1.82	2.89		2.92	0.001186	0.84	2.99	4.10	0.31
LocalCreek1	329	CC - 100	2.50	2.01	2.59	2.59	2.76	0.013955	1.79	1.40	4.39	1.01
LocalCreek1	262	CC - 100	2.50	1.65	2.13	2.03	2.19	0.005140	1.11	2.26	7.06	0.63
LocalCreek1	47	CC - 100	2.50	-0.04	0.33	0.33	0.44	0.014557	1.48	1.69	7.48	1.00
LocalCreek1	9	CC - 100	2.50	-0.16	0.22	0.09	0.22	0.000331	0.26	13.96	93.00	0.16

HEC-RAS Plan: Local Creek 1 River: LocalCreek1 Reach: LocalCreek1 Profile: CLC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LocalCreek1	1816	CLC - 20	1.90	19.90	20.19	20.19	20.29	0.015458	1.38	1.38	7.12	1.00
LocalCreek1	1776	CLC - 20	1.90	19.08	19.41	19.41	19.52	0.015324	1.47	1.29	6.00	1.01
LocalCreek1	1719	CLC - 20	1.90	18.12	18.37	18.37	18.44	0.017055	1.24	1.54	10.09	1.01
LocalCreek1	1621	CLC - 20	1.90	16.20	16.40	16.40	16.46	0.018708	1.08	1.76	15.25	1.01
LocalCreek1	1516	CLC - 20	1.90	14.66	15.19	15.03	15.22	0.002868	0.79	2.42	8.18	0.46
LocalCreek1	1446	CLC - 20	1.90	14.48	14.75	14.75	14.81	0.017592	1.13	1.72	13.89	1.00
LocalCreek1	1161	CLC - 20	1.90	11.70	12.31	12.18	12.35	0.004142	0.88	2.17	7.86	0.53
LocalCreek1	1118	CLC - 20	1.90	11.67	12.13	12.03	12.17	0.004139	0.88	2.17	8.25	0.55
LocalCreek1	850	CLC - 20	1.90	10.19	10.56	10.52	10.61	0.008705	1.06	1.79	8.96	0.76
LocalCreek1	615	CLC - 20	1.90	7.58	7.83	7.83	7.92	0.015771	1.32	1.44	8.06	1.00
LocalCreek1	529	CLC - 20	1.90	5.59	6.01	6.01	6.15	0.014128	1.64	1.16	4.23	1.00
LocalCreek1	480	CLC - 20	1.90	4.94	5.29	5.29	5.40	0.015950	1.41	1.34	6.85	1.02
LocalCreek1	450	CLC - 20	1.90	4.22	5.22	4.57	5.22	0.000176	0.30	6.40	11.36	0.13
LocalCreek1	427	CLC - 20	1.90	3.62	5.22	4.12	5.22	0.000001	0.04	69.70	115.09	0.01
LocalCreek1	419		Culvert									
LocalCreek1	408	CLC - 20	1.90	2.53	4.26		4.26	0.000052	0.21	9.07	10.31	0.07
LocalCreek1	404	CLC - 20	1.90	2.30	4.26		4.26	0.000031	0.18	10.76	10.65	0.06
LocalCreek1	401	CLC - 20	1.90	2.26	4.26	2.84	4.26	0.000031	0.18	10.60	10.38	0.06
LocalCreek1	395		Culvert									
LocalCreek1	389	CLC - 20	1.90	1.81	2.80		2.82	0.000983	0.73	2.60	3.77	0.28
LocalCreek1	384	CLC - 20	1.90	1.82	2.79		2.82	0.001002	0.73	2.60	3.89	0.29
LocalCreek1	329	CLC - 20	1.90	2.01	2.63	2.53	2.70	0.006061	1.23	1.55	4.57	0.67
LocalCreek1	262	CLC - 20	1.90	1.65	1.98	1.98	2.09	0.015071	1.47	1.29	5.94	1.01
LocalCreek1	47	CLC - 20	1.90	-0.04	0.92	0.29	0.92	0.000010	0.09	29.14	62.72	0.03
LocalCreek1	9	CLC - 20	1.90	-0.16	0.92	0.07	0.92	0.000001	0.03	83.62	100.80	0.01

HEC-RAS Plan: Local Creek 1 River: LocalCreek1 Reach: LocalCreek1 Profile: CLC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
LocalCreek1	1816	CLC - 100	3.20	19.90	20.28	20.28	20.40	0.014173	1.58	2.03	8.01	1.00
LocalCreek1	1776	CLC - 100	3.20	19.08	19.50	19.50	19.65	0.013884	1.69	1.90	6.66	1.01
LocalCreek1	1719	CLC - 100	3.20	18.12	18.43	18.43	18.54	0.015276	1.44	2.22	10.64	1.01
LocalCreek1	1621	CLC - 100	3.20	16.20	16.45	16.45	16.53	0.017038	1.24	2.59	17.10	1.01
LocalCreek1	1516	CLC - 100	3.20	14.66	15.30	15.13	15.35	0.003446	0.94	3.39	10.04	0.52
LocalCreek1	1446	CLC - 100	3.20	14.48	14.81	14.81	14.89	0.016119	1.29	2.56	16.05	1.00
LocalCreek1	1161	CLC - 100	3.20	11.70	12.42	12.28	12.47	0.004416	1.00	3.21	10.15	0.57
LocalCreek1	1118	CLC - 100	3.20	11.67	12.25	12.11	12.30	0.004001	0.99	3.30	12.06	0.55
LocalCreek1	850	CLC - 100	3.20	10.19	10.63	10.59	10.71	0.009436	1.30	2.46	9.62	0.82
LocalCreek1	615	CLC - 100	3.20	7.58	7.91	7.91	8.03	0.014156	1.52	2.10	8.81	0.99
LocalCreek1	529	CLC - 100	3.20	5.59	6.65	6.14	6.68	0.000721	0.66	4.86	7.32	0.26
LocalCreek1	480	CLC - 100	3.20	4.94	6.66	5.38	6.67	0.000029	0.19	16.81	16.33	0.06
LocalCreek1	450	CLC - 100	3.20	4.22	6.66	4.68	6.66	0.000005	0.11	35.48	57.40	0.03
LocalCreek1	427	CLC - 100	3.20	3.62	6.66	4.21	6.66	0.000000	0.02	254.96	133.60	0.00
LocalCreek1	419		Culvert									
LocalCreek1	408	CLC - 100	3.20	2.53	4.88		4.88	0.000027	0.20	15.66	10.86	0.05
LocalCreek1	404	CLC - 100	3.20	2.30	4.88		4.88	0.000019	0.18	17.68	11.40	0.05
LocalCreek1	401	CLC - 100	3.20	2.26	4.88	2.99	4.88	0.000019	0.18	17.49	11.58	0.05
LocalCreek1	395		Culvert									
LocalCreek1	389	CLC - 100	3.20	1.81	2.98		3.03	0.001452	0.96	3.32	4.23	0.35
LocalCreek1	384	CLC - 100	3.20	1.82	2.97		3.02	0.001451	0.96	3.34	4.31	0.35
LocalCreek1	329	CLC - 100	3.20	2.01	2.75	2.66	2.86	0.006955	1.49	2.14	5.22	0.74
LocalCreek1	262	CLC - 100	3.20	1.65	2.08	2.08	2.22	0.013871	1.68	1.90	6.70	1.01
LocalCreek1	47	CLC - 100	3.20	-0.04	0.92	0.38	0.92	0.000029	0.14	29.13	62.72	0.05
LocalCreek1	9	CLC - 100	3.20	-0.16	0.92	0.10	0.92	0.000002	0.04	83.62	100.80	0.01

APPENDIX M

LOCAL CREEK 2

HEC-RAS Plan: Local Creek 2 Profile: CC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Upstream Reach	1907.6	CC - 20	0.70	19.07	19.35	19.33	19.42	0.010786	1.14	0.62	3.20	0.83
Upstream Reach	1850.1	CC - 20	0.70	18.34	18.57	18.57	18.66	0.016696	1.30	0.54	3.19	1.01
Upstream Reach	1738.4	CC - 20	0.70	16.00	16.27	16.26	16.35	0.015647	1.30	0.54	3.06	0.98
Upstream Reach	1653.3	CC - 20	0.70	15.28	15.68	15.58	15.72	0.004221	0.82	0.85	3.55	0.53
Upstream Reach	1515.2	CC - 20	0.70	14.34	14.59	14.59	14.66	0.017458	1.20	0.59	4.10	1.01
Upstream Reach	1451.2	CC - 20	0.70	13.62	13.80	13.75	13.81	0.003890	0.48	1.45	12.91	0.46
Upstream Reach	1360.4	CC - 20	0.70	13.06	13.42	13.31	13.44	0.004237	0.67	1.05	6.06	0.51
Upstream Reach	1290.8	CC - 20	0.70	12.65	12.85	12.85	12.91	0.017378	1.11	0.63	4.88	0.99
Upstream Reach	1227.9	CC - 20	0.70	12.04	12.22	12.17	12.24	0.005307	0.66	1.05	7.31	0.56
Upstream Reach	1138.3	CC - 20	0.70	11.56	11.82		11.84	0.003820	0.70	1.00	5.01	0.50
Upstream Reach	1056.7	CC - 20	0.70	11.01	11.20	11.20	11.24	0.020077	0.91	0.77	9.20	1.00
Upstream Reach	978.5	CC - 20	0.70	9.23	9.46	9.45	9.53	0.014830	1.17	0.60	3.86	0.94
Upstream Reach	925.1	CC - 20	0.70	8.51	8.72	8.71	8.77	0.013340	0.97	0.72	5.61	0.87
Upstream Reach	881.1	CC - 20	0.70	7.75	8.03	8.03	8.11	0.016879	1.28	0.55	3.35	1.01
Upstream Reach	814.3	CC - 20	0.70	6.94	7.61	7.27	7.62	0.000410	0.32	2.18	6.39	0.18
Upstream Reach	805		Culvert									
Upstream Reach	794.8	CC - 20	0.70	6.54	7.03	6.80	7.04	0.000745	0.40	1.75	5.75	0.23
Reach 1	798.9	CC - 20	0.01	6.90	6.91		6.92	0.021335	0.21	0.05	5.21	0.71
Reach 1	746.6	CC - 20	0.01	5.41	5.44	5.44	5.45	0.038355	0.48	0.02	1.04	1.08
Reach 1	725.2	CC - 20	0.01	4.70	4.76		4.76	0.001792	0.15	0.07	1.82	0.26
Reach 1	699.3	CC - 20	0.01	4.65	4.70		4.70	0.002679	0.15	0.07	2.58	0.30
Reach 1	680.8	CC - 20	0.01	4.53	4.57	4.57	4.59	0.028512	0.47	0.02	0.89	0.96
Reach 1	649	CC - 20	0.01	3.50	3.55	3.53	3.55	0.001710	0.13	0.07	2.46	0.25
Reach 1	589.4	CC - 20	0.01	3.21	3.23	3.23	3.24	0.076488	0.38	0.03	3.16	1.33
Reach 1	568.4	CC - 20	0.01	2.20	2.24	2.23	2.24	0.005445	0.17	0.06	3.26	0.40
Reach 1	504	CC - 20	0.01	1.49	1.52	1.52	1.53	0.033387	0.37	0.03	1.83	0.96
Reach 1	421.7	CC - 20	0.01	0.98	1.11		1.11	0.000002	0.01	1.24	19.98	0.01
Reach 2	769.3	CC - 20	0.70	6.01	7.03	6.17	7.03	0.000005	0.06	13.17	25.13	0.02
Reach 2	763		Culvert									
Reach 2	757.6	CC - 20	0.70	5.71	5.87	5.87	5.91	0.021502	0.83	0.85	12.11	1.00
Reach 2	690.2	CC - 20	0.70	4.25	4.81		4.81	0.000156	0.16	4.37	18.12	0.10
Reach 2	660.9	CC - 20	0.70	4.63	4.76	4.76	4.80	0.022065	0.88	0.80	10.64	1.03
Reach 2	619.3	CC - 20	0.70	3.71	3.92		3.94	0.007171	0.61	1.15	11.49	0.61
Reach 2	588	CC - 20	0.70	3.41	3.55	3.55	3.57	0.022737	0.67	1.04	21.13	0.97
Reach 2	481	CC - 20	0.70	1.78	2.02	1.99	2.05	0.009138	0.83	0.87	7.66	0.73
Reach 2	387.7	CC - 20	0.70	1.03	1.21	1.19	1.23	0.008447	0.52	1.34	18.95	0.63
Lower Reach	351.2	CC - 20	0.70	0.81	0.93	0.91	0.94	0.007241	0.40	1.77	33.76	0.55
Lower Reach	300.5	CC - 20	0.70	0.17	0.35	0.35	0.40	0.017101	0.95	0.78	9.39	0.95
Lower Reach	241	CC - 20	0.70	-0.14	0.22	0.08	0.22	0.001031	0.33	2.75	39.76	0.25
Lower Reach	167.8	CC - 20	0.70	-0.50	0.22	-0.40	0.22	0.000005	0.04	18.13	74.97	0.02
Lower Reach	102.7	CC - 20	0.70	-0.50	0.22		0.22	0.000003	0.03	24.90	119.40	0.02
Lower Reach	33	CC - 20	0.70	-0.49	0.22	-0.33	0.22	0.000002	0.03	27.90	72.02	0.01

HEC-RAS Plan: Local Creek 2 Profile: CC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Upstream Reach	1907.6	CC - 100	1.70	19.07	19.49	19.47	19.61	0.012111	1.55	1.10	3.90	0.93
Upstream Reach	1850.1	CC - 100	1.70	18.34	18.71	18.71	18.85	0.014427	1.66	1.02	3.69	1.01
Upstream Reach	1738.4	CC - 100	1.70	16.00	16.43	16.41	16.55	0.011862	1.52	1.12	3.99	0.92
Upstream Reach	1653.3	CC - 100	1.70	15.28	15.85	15.73	15.91	0.004959	1.12	1.52	4.46	0.61
Upstream Reach	1515.2	CC - 100	1.70	14.34	14.68	14.68	14.75	0.017455	1.12	1.52	11.87	0.99
Upstream Reach	1451.2	CC - 100	1.70	13.62	13.90		13.92	0.003022	0.55	3.08	18.60	0.43
Upstream Reach	1360.4	CC - 100	1.70	13.06	13.57	13.46	13.59	0.004418	0.65	2.60	16.13	0.52
Upstream Reach	1290.8	CC - 100	1.70	12.65	12.95	12.95	13.06	0.015282	1.45	1.17	5.57	1.01
Upstream Reach	1227.9	CC - 100	1.70	12.04	12.35	12.26	12.38	0.003941	0.83	2.06	8.23	0.53
Upstream Reach	1138.3	CC - 100	1.70	11.56	11.95		12.00	0.004642	0.99	1.71	5.79	0.58
Upstream Reach	1056.7	CC - 100	1.70	11.01	11.27	11.27	11.34	0.017919	1.16	1.47	11.06	1.02
Upstream Reach	978.5	CC - 100	1.70	9.23	9.58	9.58	9.69	0.013851	1.49	1.14	4.79	0.97
Upstream Reach	925.1	CC - 100	1.70	8.51	8.81	8.81	8.90	0.015649	1.36	1.25	6.64	1.00
Upstream Reach	881.1	CC - 100	1.70	7.75	8.69		8.70	0.000297	0.34	4.98	10.68	0.16
Upstream Reach	814.3	CC - 100	1.70	6.94	8.69	7.43	8.69	0.000011	0.11	15.71	17.20	0.03
Upstream Reach	805		Culvert									
Upstream Reach	794.8	CC - 100	1.70	6.54	7.12	6.91	7.15	0.001903	0.73	2.33	6.22	0.38
Reach 1	798.9	CC - 100	0.01	6.90	6.91		6.92	0.021335	0.21	0.05	5.21	0.71
Reach 1	746.6	CC - 100	0.01	5.41	5.44	5.44	5.45	0.038355	0.48	0.02	1.04	1.08
Reach 1	725.2	CC - 100	0.01	4.70	4.76		4.76	0.001792	0.15	0.07	1.82	0.26
Reach 1	699.3	CC - 100	0.01	4.65	4.70		4.70	0.002679	0.15	0.07	2.58	0.30
Reach 1	680.8	CC - 100	0.01	4.53	4.57	4.57	4.59	0.028512	0.47	0.02	0.89	0.96
Reach 1	649	CC - 100	0.01	3.50	3.55	3.53	3.55	0.001710	0.13	0.07	2.46	0.25
Reach 1	589.4	CC - 100	0.01	3.21	3.23	3.23	3.24	0.076488	0.38	0.03	3.16	1.33
Reach 1	568.4	CC - 100	0.01	2.20	2.24	2.23	2.24	0.005445	0.17	0.06	3.26	0.40
Reach 1	504	CC - 100	0.01	1.49	1.52	1.52	1.53	0.033387	0.37	0.03	1.83	0.96
Reach 1	421.7	CC - 100	0.01	0.98	1.17		1.17	0.000000	0.00	2.96	28.58	0.00
Reach 2	769.3	CC - 100	1.70	6.01	7.14	6.25	7.14	0.000018	0.12	15.92	25.44	0.04
Reach 2	763		Culvert									
Reach 2	757.6	CC - 100	1.70	5.71	5.93	5.93	5.99	0.018536	1.11	1.54	12.76	1.02
Reach 2	690.2	CC - 100	1.70	4.25	4.91		4.92	0.000307	0.27	6.27	19.65	0.15
Reach 2	660.9	CC - 100	1.70	4.63	4.82	4.82	4.88	0.017402	1.09	1.56	12.60	0.99
Reach 2	619.3	CC - 100	1.70	3.71	4.00		4.02	0.009857	0.70	2.43	24.95	0.72
Reach 2	588	CC - 100	1.70	3.41	3.60	3.59	3.62	0.016860	0.73	2.32	34.15	0.89
Reach 2	481	CC - 100	1.70	1.78	2.10	2.10	2.15	0.011465	1.04	1.90	20.29	0.84
Reach 2	387.7	CC - 100	1.70	1.03	1.29	1.24	1.30	0.004632	0.47	3.64	39.46	0.49
Lower Reach	351.2	CC - 100	1.70	0.81	0.95	0.95	0.98	0.023712	0.74	2.30	41.97	1.01
Lower Reach	300.5	CC - 100	1.70	0.17	0.49		0.50	0.002632	0.51	4.03	38.65	0.40
Lower Reach	241	CC - 100	1.70	-0.14	0.20	0.20	0.24	0.008492	0.93	2.24	31.19	0.73
Lower Reach	167.8	CC - 100	1.70	-0.50	0.22	-0.33	0.22	0.000029	0.10	18.27	75.19	0.05
Lower Reach	102.7	CC - 100	1.70	-0.50	0.22		0.22	0.000017	0.08	24.99	119.83	0.04
Lower Reach	33	CC - 100	1.70	-0.49	0.22	-0.25	0.22	0.000012	0.06	27.90	72.02	0.03

HEC-RAS Plan: Local Creek 2 Profile: CLC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Upstream Reach	1907.6	CLC - 20	1.20	19.07	19.43	19.41	19.53	0.011694	1.38	0.87	3.58	0.89
Upstream Reach	1850.1	CLC - 20	1.20	18.34	18.65	18.65	18.76	0.015161	1.51	0.80	3.47	1.01
Upstream Reach	1738.4	CLC - 20	1.20	16.00	16.36	16.35	16.46	0.013431	1.44	0.83	3.56	0.95
Upstream Reach	1653.3	CLC - 20	1.20	15.28	15.78	15.66	15.83	0.004554	0.98	1.22	4.08	0.57
Upstream Reach	1515.2	CLC - 20	1.20	14.34	14.66	14.66	14.71	0.018327	0.99	1.21	11.58	0.98
Upstream Reach	1451.2	CLC - 20	1.20	13.62	13.87		13.88	0.003121	0.50	2.42	17.58	0.43
Upstream Reach	1360.4	CLC - 20	1.20	13.06	13.52	13.38	13.54	0.004579	0.64	1.86	12.11	0.52
Upstream Reach	1290.8	CLC - 20	1.20	12.65	12.91	12.91	12.99	0.016135	1.31	0.92	5.27	1.00
Upstream Reach	1227.9	CLC - 20	1.20	12.04	12.29	12.22	12.32	0.004363	0.76	1.59	7.82	0.54
Upstream Reach	1138.3	CLC - 20	1.20	11.56	11.89		11.93	0.004239	0.86	1.39	5.45	0.55
Upstream Reach	1056.7	CLC - 20	1.20	11.01	11.24	11.24	11.29	0.019086	1.06	1.13	10.20	1.02
Upstream Reach	978.5	CLC - 20	1.20	9.23	9.52	9.52	9.62	0.015717	1.40	0.86	4.33	1.01
Upstream Reach	925.1	CLC - 20	1.20	8.51	8.78	8.76	8.84	0.013116	1.15	1.04	6.25	0.90
Upstream Reach	881.1	CLC - 20	1.20	7.75	8.11	8.11	8.21	0.015619	1.44	0.83	4.01	1.01
Upstream Reach	814.3	CLC - 20	1.20	6.94	8.07	7.37	8.08	0.000063	0.18	6.81	12.03	0.07
Upstream Reach	805		Culvert									
Upstream Reach	794.8	CLC - 20	1.20	6.54	7.07	6.86	7.09	0.001450	0.59	2.02	6.03	0.33
Reach 1	798.9	CLC - 20	0.01	6.90	6.91		6.92	0.021335	0.21	0.05	5.21	0.71
Reach 1	746.6	CLC - 20	0.01	5.41	5.44	5.44	5.45	0.038355	0.48	0.02	1.04	1.08
Reach 1	725.2	CLC - 20	0.01	4.70	4.76		4.76	0.001792	0.15	0.07	1.82	0.26
Reach 1	699.3	CLC - 20	0.01	4.65	4.70		4.70	0.002679	0.15	0.07	2.58	0.30
Reach 1	680.8	CLC - 20	0.01	4.53	4.57	4.57	4.59	0.028512	0.47	0.02	0.89	0.96
Reach 1	649	CLC - 20	0.01	3.50	3.55	3.53	3.55	0.001710	0.13	0.07	2.46	0.25
Reach 1	589.4	CLC - 20	0.01	3.21	3.23	3.23	3.24	0.076488	0.38	0.03	3.16	1.33
Reach 1	568.4	CLC - 20	0.01	2.20	2.24	2.23	2.24	0.005445	0.17	0.06	3.26	0.40
Reach 1	504	CLC - 20	0.01	1.49	1.52	1.52	1.53	0.033387	0.37	0.03	1.83	0.96
Reach 1	421.7	CLC - 20	0.01	0.98	1.15		1.15	0.000000	0.00	2.36	27.39	0.00
Reach 2	769.3	CLC - 20	1.20	6.01	7.09	6.21	7.09	0.000012	0.09	14.49	25.25	0.03
Reach 2	763		Culvert									
Reach 2	757.6	CLC - 20	1.20	5.71	5.90	5.90	5.95	0.020093	1.00	1.21	12.45	1.02
Reach 2	690.2	CLC - 20	1.20	4.25	4.87		4.87	0.000240	0.22	5.39	18.93	0.13
Reach 2	660.9	CLC - 20	1.20	4.63	4.79	4.79	4.84	0.019251	1.03	1.17	11.15	1.01
Reach 2	619.3	CLC - 20	1.20	3.71	3.96		3.98	0.011048	0.74	1.62	16.55	0.76
Reach 2	588	CLC - 20	1.20	3.41	3.58	3.57	3.60	0.013372	0.62	1.94	30.00	0.78
Reach 2	481	CLC - 20	1.20	1.78	2.05	2.05	2.11	0.014487	1.08	1.18	11.21	0.92
Reach 2	387.7	CLC - 20	1.20	1.03	1.27	1.22	1.28	0.004666	0.43	2.80	34.70	0.48
Lower Reach	351.2	CLC - 20	1.20	0.81	0.93	0.93	0.96	0.022713	0.70	1.72	33.21	0.98
Lower Reach	300.5	CLC - 20	1.20	0.17	0.92		0.92	0.000002	0.03	53.28	169.73	0.01
Lower Reach	241	CLC - 20	1.20	-0.14	0.92	0.14	0.92	0.000000	0.01	119.97	229.71	0.00
Lower Reach	167.8	CLC - 20	1.20	-0.50	0.92	-0.36	0.92	0.000000	0.01	130.19	203.84	0.00
Lower Reach	102.7	CLC - 20	1.20	-0.50	0.92		0.92	0.000000	0.01	148.27	221.89	0.00
Lower Reach	33	CLC - 20	1.20	-0.49	0.92	-0.29	0.92	0.000000	0.01	150.38	194.60	0.00

HEC-RAS Plan: Local Creek 2 Profile: CLC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Upstream Reach	1907.6	CLC - 100	2.10	19.07	19.53	19.52	19.67	0.012390	1.66	1.26	4.08	0.95
Upstream Reach	1850.1	CLC - 100	2.10	18.34	18.76	18.76	18.91	0.014004	1.76	1.19	3.84	1.01
Upstream Reach	1738.4	CLC - 100	2.10	16.00	16.48	16.46	16.61	0.011040	1.57	1.33	4.28	0.90
Upstream Reach	1653.3	CLC - 100	2.10	15.28	15.90	15.78	15.97	0.005234	1.20	1.75	4.94	0.64
Upstream Reach	1515.2	CLC - 100	2.10	14.34	14.70	14.70	14.77	0.017031	1.20	1.75	12.08	1.00
Upstream Reach	1451.2	CLC - 100	2.10	13.62	13.93		13.95	0.003091	0.60	3.50	18.95	0.45
Upstream Reach	1360.4	CLC - 100	2.10	13.06	13.59	13.50	13.62	0.004270	0.70	3.01	16.50	0.52
Upstream Reach	1290.8	CLC - 100	2.10	12.65	12.99	12.99	13.11	0.014694	1.53	1.37	5.79	1.01
Upstream Reach	1227.9	CLC - 100	2.10	12.04	12.39	12.28	12.43	0.003657	0.87	2.43	8.54	0.52
Upstream Reach	1138.3	CLC - 100	2.10	11.56	11.99		12.05	0.004913	1.08	1.94	6.02	0.61
Upstream Reach	1056.7	CLC - 100	2.10	11.01	11.29	11.29	11.37	0.017267	1.22	1.72	11.66	1.02
Upstream Reach	978.5	CLC - 100	2.10	9.23	9.62	9.62	9.75	0.013716	1.58	1.33	5.07	0.99
Upstream Reach	925.1	CLC - 100	2.10	8.51	8.85	8.85	8.94	0.016125	1.34	1.56	8.68	1.01
Upstream Reach	881.1	CLC - 100	2.10	7.75	8.72		8.73	0.000378	0.40	5.30	10.86	0.18
Upstream Reach	814.3	CLC - 100	2.10	6.94	8.72	7.47	8.72	0.000015	0.13	16.23	17.47	0.04
Upstream Reach	805		Culvert									
Upstream Reach	794.8	CLC - 100	2.10	6.54	7.15	6.95	7.19	0.002282	0.83	2.52	6.31	0.42
Reach 1	798.9	CLC - 100	0.01	6.90	6.91		6.92	0.021335	0.21	0.05	5.21	0.71
Reach 1	746.6	CLC - 100	0.01	5.41	5.44	5.44	5.45	0.038355	0.48	0.02	1.04	1.08
Reach 1	725.2	CLC - 100	0.01	4.70	4.76		4.76	0.001792	0.15	0.07	1.82	0.26
Reach 1	699.3	CLC - 100	0.01	4.65	4.70		4.70	0.002679	0.15	0.07	2.58	0.30
Reach 1	680.8	CLC - 100	0.01	4.53	4.57	4.57	4.59	0.028512	0.47	0.02	0.89	0.96
Reach 1	649	CLC - 100	0.01	3.50	3.55	3.53	3.55	0.001710	0.13	0.07	2.46	0.25
Reach 1	589.4	CLC - 100	0.01	3.21	3.23	3.23	3.24	0.076488	0.38	0.03	3.16	1.33
Reach 1	568.4	CLC - 100	0.01	2.20	2.24	2.23	2.24	0.005445	0.17	0.06	3.26	0.40
Reach 1	504	CLC - 100	0.01	1.49	1.52	1.52	1.53	0.033387	0.37	0.03	1.83	0.96
Reach 1	421.7	CLC - 100	0.01	0.98	1.19		1.19	0.000000	0.00	3.33	29.29	0.00
Reach 2	769.3	CLC - 100	2.10	6.01	7.18	6.28	7.18	0.000023	0.14	16.84	25.56	0.05
Reach 2	763		Culvert									
Reach 2	757.6	CLC - 100	2.10	5.71	5.95	5.95	6.02	0.017484	1.18	1.79	12.95	1.01
Reach 2	690.2	CLC - 100	2.10	4.25	4.94		4.95	0.000354	0.31	6.87	20.04	0.17
Reach 2	660.9	CLC - 100	2.10	4.63	4.84	4.84	4.91	0.017284	1.15	1.82	13.43	1.00
Reach 2	619.3	CLC - 100	2.10	3.71	4.02		4.04	0.009405	0.72	2.91	27.54	0.71
Reach 2	588	CLC - 100	2.10	3.41	3.60	3.60	3.64	0.018815	0.81	2.59	35.37	0.95
Reach 2	481	CLC - 100	2.10	1.78	2.12	2.12	2.17	0.010459	1.08	2.36	24.57	0.82
Reach 2	387.7	CLC - 100	2.10	1.03	1.31	1.26	1.32	0.004863	0.51	4.16	42.55	0.51
Lower Reach	351.2	CLC - 100	2.10	0.81	0.96	0.96	0.99	0.021991	0.75	2.79	46.64	0.99
Lower Reach	300.5	CLC - 100	2.10	0.17	0.92		0.92	0.000006	0.05	53.29	169.74	0.02
Lower Reach	241	CLC - 100	2.10	-0.14	0.92	0.22	0.92	0.000001	0.02	119.98	229.72	0.01
Lower Reach	167.8	CLC - 100	2.10	-0.50	0.92	-0.31	0.92	0.000000	0.02	130.20	203.84	0.01
Lower Reach	102.7	CLC - 100	2.10	-0.50	0.92		0.92	0.000000	0.02	148.27	221.89	0.01
Lower Reach	33	CLC - 100	2.10	-0.49	0.92	-0.24	0.92	0.000000	0.01	150.38	194.60	0.00

APPENDIX M

LOCAL CREEK 3

HEC-RAS Plan: Local Creek 3 Profile: CC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 2	1723.8	CC - 20	1.70	15.65	16.07	15.95	16.08	0.002684	0.51	3.36	21.05	0.41
Reach 2	1603.8	CC - 20	1.70	15.27	15.55	15.51	15.58	0.007508	0.76	2.24	16.69	0.66
Reach 2	1519.8	CC - 20	1.70	14.34	14.58	14.58	14.67	0.016543	1.28	1.33	8.16	1.01
Reach 2	1463.9	CC - 20	1.70	13.29	13.73		13.78	0.004262	0.94	1.81	6.26	0.56
Reach 2	1404.8	CC - 20	1.70	12.83	13.23	13.23	13.34	0.015216	1.48	1.15	5.27	1.01
Reach 2	1285	CC - 20	1.70	11.45	12.07		12.15	0.005981	1.29	1.32	3.50	0.67
Reach 2	1203.5	CC - 20	1.70	10.82	11.28	11.28	11.43	0.014326	1.73	0.98	3.27	1.01
Reach 2	1079.6	CC - 20	1.70	9.74	10.06	10.01	10.10	0.006860	0.92	1.85	9.53	0.67
Reach 2	963.7	CC - 20	1.70	8.59	9.04		9.15	0.009917	1.43	1.19	4.05	0.84
Reach 2	921.6	CC - 20	1.70	8.11	9.08		9.09	0.000234	0.32	5.25	10.17	0.14
Reach 2	787	CC - 20	1.70	7.03	9.09	7.24	9.09	0.000002	0.05	32.38	24.79	0.01
Reach 2	770		Culvert									
Reach 2	754	CC - 20	1.70	6.42	6.84	6.78	6.88	0.007313	0.94	1.81	9.37	0.69
Reach 2	660.6	CC - 20	1.70	5.58	5.82	5.82	5.89	0.016634	1.20	1.42	9.63	1.00
Reach 2	621.7	CC - 20	1.70	4.76	5.38	5.13	5.41	0.001325	0.65	2.61	6.44	0.33
Reach 2	595.5	CC - 20	1.70	4.87	5.21	5.21	5.32	0.014904	1.42	1.19	5.73	0.99
Reach 2	580		Culvert									
Reach 2	571	CC - 20	1.70	4.71	4.94	4.94	5.00	0.018597	1.11	1.54	12.81	1.02
Reach 1	1363.4	CC - 20	0.50	15.66	16.03	15.89	16.05	0.002377	0.62	0.81	3.36	0.40
Reach 1	1286.1	CC - 20	0.50	15.39	15.59	15.59	15.65	0.017536	1.12	0.45	3.43	0.99
Reach 1	1274		Culvert									
Reach 1	1268.2	CC - 20	0.50	14.83	15.20		15.22	0.002165	0.59	0.85	3.56	0.38
Reach 1	1223.5	CC - 20	0.50	14.71	15.05		15.08	0.004854	0.79	0.64	3.15	0.56
Reach 1	1157.2	CC - 20	0.50	14.21	14.45	14.45	14.53	0.017093	1.22	0.41	2.71	1.00
Reach 1	1113.3	CC - 20	0.50	13.50	13.73	13.73	13.80	0.015826	1.17	0.43	2.82	0.96
Reach 1	1059.3	CC - 20	0.50	12.58	12.83	12.83	12.92	0.017154	1.26	0.40	2.49	1.01
Reach 1	1022.7	CC - 20	0.50	12.19	12.41		12.43	0.004855	0.68	0.74	4.67	0.54
Reach 1	961	CC - 20	0.50	11.70	11.84	11.84	11.89	0.020554	0.93	0.54	6.24	1.01
Reach 1	928	CC - 20	0.50	11.27	11.49	11.46	11.50	0.007241	0.57	0.88	9.92	0.60
Reach 1	916		Culvert									
Reach 1	906.7	CC - 20	0.50	10.19	10.40	10.40	10.46	0.018736	1.06	0.47	4.15	1.01
Reach 1	874.9	CC - 20	0.50	8.99	9.28	9.17	9.29	0.001926	0.49	1.03	5.31	0.35
Reach 1	842.6	CC - 20	0.50	8.98	9.10	9.10	9.14	0.020399	0.92	0.54	6.35	1.01
Reach 1	820		Culvert									
Reach 1	798.4	CC - 20	0.50	7.25	7.52	7.52	7.60	0.016813	1.29	0.39	2.27	1.00
Reach 1	751.6	CC - 20	0.50	6.19	6.45	6.45	6.53	0.017290	1.25	0.40	2.57	1.01
Reach 1	691.8	CC - 20	0.50	5.20	5.35	5.35	5.40	0.019004	1.04	0.48	4.47	1.01
Reach 1	653.5	CC - 20	0.50	4.63	4.80		4.83	0.009715	0.84	0.59	4.57	0.74
Downstream Reach	555.4	CC - 20	2.20	3.97	4.31	4.31	4.41	0.015205	1.45	1.52	7.23	1.01
Downstream Reach	540.8	CC - 20	2.20	3.69	4.00	3.96	4.07	0.009196	1.19	1.84	8.01	0.80
Downstream Reach	496.2	CC - 20	2.20	3.13	3.45	3.45	3.54	0.015906	1.33	1.66	9.32	1.00
Downstream Reach	472.4	CC - 20	2.20	2.60	2.97	2.97	3.10	0.014419	1.57	1.40	5.62	1.01
Downstream Reach	409.7	CC - 20	2.20	1.78	2.18		2.26	0.008596	1.25	1.77	6.82	0.78
Downstream Reach	363.4	CC - 20	2.20	1.49	2.06		2.08	0.001941	0.60	3.64	13.66	0.37
Downstream Reach	329.6	CC - 20	2.20	1.48	1.94		1.99	0.003733	0.97	2.27	6.78	0.54
Downstream Reach	292.9	CC - 20	2.20	1.33	1.63	1.63	1.73	0.016308	1.41	1.57	8.22	1.03
Downstream Reach	265.7	CC - 20	2.20	1.10	1.48		1.49	0.003448	0.60	3.65	21.34	0.47
Downstream Reach	241.2	CC - 20	2.20	0.92	1.24	1.24	1.33	0.016391	1.27	1.73	10.57	1.00
Downstream Reach	195.8	CC - 20	2.20	0.61	1.00	0.90	1.00	0.001716	0.36	6.05	44.73	0.32
Downstream Reach	160.1	CC - 20	2.20	0.48	0.80	0.78	0.87	0.011717	1.18	1.86	9.85	0.87
Downstream Reach	125.9	CC - 20	2.20	0.26	0.67	0.55	0.68	0.002751	0.53	4.13	24.51	0.41
Downstream Reach	90.2	CC - 20	2.20	0.18	0.57	0.45	0.59	0.002547	0.67	3.28	12.96	0.43
Downstream Reach	46	CC - 20	2.20	0.06	0.46	0.32	0.49	0.002110	0.63	3.47	12.97	0.39
Downstream Reach	0	CC - 20	2.20	-0.01	0.23	0.23	0.27	0.016927	0.86	2.70	39.15	0.92

HEC-RAS Plan: Local Creek 3 Profile: CC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 2	1723.8	CC - 100	3.90	15.65	16.18		16.20	0.002694	0.65	6.02	29.10	0.43
Reach 2	1603.8	CC - 100	3.90	15.27	15.64	15.59	15.69	0.007469	1.01	3.88	18.75	0.71
Reach 2	1519.8	CC - 100	3.90	14.34	14.72	14.72	14.84	0.014249	1.54	2.54	10.52	1.00
Reach 2	1463.9	CC - 100	3.90	13.29	13.91		14.00	0.005126	1.28	3.05	7.63	0.65
Reach 2	1404.8	CC - 100	3.90	12.83	13.42	13.40	13.56	0.011173	1.65	2.36	7.24	0.92
Reach 2	1285	CC - 100	3.90	11.45	12.30		12.46	0.007707	1.77	2.20	4.30	0.79
Reach 2	1203.5	CC - 100	3.90	10.82	11.55	11.51	11.74	0.010017	1.92	2.03	4.35	0.90
Reach 2	1079.6	CC - 100	3.90	9.74	10.13	10.13	10.25	0.014327	1.57	2.49	10.05	1.00
Reach 2	963.7	CC - 100	3.90	8.59	9.82		9.84	0.000633	0.67	5.83	7.70	0.25
Reach 2	921.6	CC - 100	3.90	8.11	9.83		9.83	0.000068	0.27	14.70	14.96	0.09
Reach 2	787	CC - 100	3.90	7.03	9.83	7.35	9.83	0.000002	0.07	63.61	53.47	0.02
Reach 2	770		Culvert									
Reach 2	754	CC - 100	3.90	6.42	6.91	6.91	7.03	0.015102	1.54	2.53	10.77	1.02
Reach 2	660.6	CC - 100	3.90	5.58	6.20	5.93	6.23	0.001223	0.66	5.92	13.82	0.32
Reach 2	621.7	CC - 100	3.90	4.76	6.20	5.30	6.21	0.000189	0.43	9.05	9.31	0.14
Reach 2	595.5	CC - 100	3.90	4.87	6.19	5.37	6.20	0.000159	0.37	10.53	12.35	0.13
Reach 2	580		Culvert									
Reach 2	571	CC - 100	3.90	4.71	5.03	5.03	5.13	0.015695	1.39	2.80	14.54	1.01
Reach 1	1363.4	CC - 100	1.00	15.66	16.07		16.13	0.005973	1.04	0.96	3.60	0.65
Reach 1	1286.1	CC - 100	1.00	15.39	15.96	15.67	15.97	0.000914	0.38	2.66	11.45	0.25
Reach 1	1274		Culvert									
Reach 1	1268.2	CC - 100	1.00	14.83	15.33		15.36	0.002310	0.73	1.37	4.32	0.41
Reach 1	1223.5	CC - 100	1.00	14.71	15.13	15.06	15.19	0.006758	1.08	0.93	3.66	0.68
Reach 1	1157.2	CC - 100	1.00	14.21	14.57	14.57	14.64	0.010381	1.22	0.93	7.50	0.83
Reach 1	1113.3	CC - 100	1.00	13.50	13.82	13.82	13.93	0.015683	1.44	0.69	3.35	1.01
Reach 1	1059.3	CC - 100	1.00	12.58	12.93	12.93	13.05	0.015494	1.50	0.67	2.96	1.01
Reach 1	1022.7	CC - 100	1.00	12.19	12.49	12.42	12.53	0.005477	0.87	1.15	5.43	0.60
Reach 1	961	CC - 100	1.00	11.70	11.90	11.90	11.96	0.018104	1.12	0.89	7.09	1.01
Reach 1	928	CC - 100	1.00	11.27	11.84	11.50	11.84	0.000121	0.18	5.71	17.15	0.10
Reach 1	916		Culvert									
Reach 1	906.7	CC - 100	1.00	10.19	10.48	10.48	10.55	0.017460	1.22	0.82	5.63	1.02
Reach 1	874.9	CC - 100	1.00	8.99	9.35	9.23	9.38	0.002817	0.70	1.44	5.74	0.44
Reach 1	842.6	CC - 100	1.00	8.98	9.30	9.15	9.31	0.001378	0.42	2.38	11.97	0.30
Reach 1	820		Culvert									
Reach 1	798.4	CC - 100	1.00	7.25	7.63	7.63	7.74	0.015545	1.52	0.66	2.85	1.01
Reach 1	751.6	CC - 100	1.00	6.19	6.54	6.54	6.65	0.015737	1.45	0.69	3.25	1.01
Reach 1	691.8	CC - 100	1.00	5.20	5.42	5.42	5.50	0.016621	1.26	0.79	4.93	1.01
Reach 1	653.5	CC - 100	1.00	4.63	4.92		4.96	0.004489	0.82	1.22	5.46	0.55
Downstream Reach	555.4	CC - 100	5.00	3.97	4.47	4.47	4.63	0.013311	1.78	2.81	8.87	1.01
Downstream Reach	540.8	CC - 100	5.00	3.69	4.14	4.11	4.28	0.010592	1.65	3.02	8.92	0.91
Downstream Reach	496.2	CC - 100	5.00	3.13	3.59	3.59	3.70	0.015796	1.47	3.40	16.21	1.03
Downstream Reach	472.4	CC - 100	5.00	2.60	3.16	3.16	3.35	0.012874	1.90	2.63	7.29	1.01
Downstream Reach	409.7	CC - 100	5.00	1.78	2.34	2.31	2.49	0.010346	1.74	2.88	7.71	0.91
Downstream Reach	363.4	CC - 100	5.00	1.49	2.29		2.31	0.001432	0.68	7.34	18.26	0.34
Downstream Reach	329.6	CC - 100	5.00	1.48	2.12		2.22	0.005489	1.38	3.64	8.59	0.68
Downstream Reach	292.9	CC - 100	5.00	1.33	1.79	1.79	1.90	0.015209	1.46	3.42	16.02	1.01
Downstream Reach	265.7	CC - 100	5.00	1.10	1.60		1.63	0.003559	0.75	6.68	28.86	0.50
Downstream Reach	241.2	CC - 100	5.00	0.92	1.39	1.39	1.46	0.016822	1.18	4.25	29.70	0.99
Downstream Reach	195.8	CC - 100	5.00	0.61	1.14	0.97	1.14	0.000967	0.36	13.73	65.75	0.25
Downstream Reach	160.1	CC - 100	5.00	0.48	0.92	0.92	1.04	0.013800	1.57	3.18	12.42	0.99
Downstream Reach	125.9	CC - 100	5.00	0.26	0.83	0.66	0.85	0.001476	0.51	9.79	38.81	0.32
Downstream Reach	90.2	CC - 100	5.00	0.18	0.74	0.56	0.77	0.002945	0.78	6.43	22.63	0.47
Downstream Reach	46	CC - 100	5.00	0.06	0.58	0.44	0.63	0.003650	0.94	5.32	16.63	0.53
Downstream Reach	0	CC - 100	5.00	-0.01	0.29	0.29	0.33	0.013604	0.98	5.76	63.20	0.88

HEC-RAS Plan: Local Creek 3 Profile: CLC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 2	1723.8	CLC - 20	2.90	15.65	16.13		16.15	0.002672	0.59	4.92	24.50	0.42
Reach 2	1603.8	CLC - 20	2.90	15.27	15.60		15.64	0.007532	0.91	3.19	18.04	0.69
Reach 2	1519.8	CLC - 20	2.90	14.34	14.66	14.66	14.77	0.015108	1.47	1.98	9.20	1.01
Reach 2	1463.9	CLC - 20	2.90	13.29	13.84		13.91	0.005039	1.17	2.48	7.02	0.63
Reach 2	1404.8	CLC - 20	2.90	12.83	13.36	13.33	13.47	0.011166	1.51	1.92	6.73	0.90
Reach 2	1285	CLC - 20	2.90	11.45	12.18		12.32	0.008350	1.69	1.72	3.87	0.81
Reach 2	1203.5	CLC - 20	2.90	10.82	11.48	11.42	11.62	0.008908	1.70	1.71	4.05	0.83
Reach 2	1079.6	CLC - 20	2.90	9.74	10.08	10.08	10.18	0.015461	1.45	2.00	9.64	1.01
Reach 2	963.7	CLC - 20	2.90	8.59	9.79		9.80	0.000391	0.52	5.60	7.58	0.19
Reach 2	921.6	CLC - 20	2.90	8.11	9.79		9.79	0.000041	0.20	14.21	14.74	0.07
Reach 2	787	CLC - 20	2.90	7.03	9.79	7.30	9.79	0.000001	0.05	61.84	52.08	0.01
Reach 2	770		Culvert									
Reach 2	754	CLC - 20	2.90	6.42	6.91	6.86	6.98	0.007816	1.12	2.59	10.88	0.73
Reach 2	660.6	CLC - 20	2.90	5.58	5.89	5.89	5.99	0.015143	1.40	2.07	10.39	1.00
Reach 2	621.7	CLC - 20	2.90	4.76	5.64	5.24	5.67	0.000822	0.66	4.42	7.45	0.27
Reach 2	595.5	CLC - 20	2.90	4.87	5.62	5.31	5.64	0.001167	0.68	4.28	9.16	0.32
Reach 2	580		Culvert									
Reach 2	571	CLC - 20	2.90	4.71	5.00	5.00	5.08	0.016671	1.28	2.26	13.92	1.01
Reach 1	1363.4	CLC - 20	0.80	15.66	16.02		16.07	0.006961	1.04	0.77	3.29	0.68
Reach 1	1286.1	CLC - 20	0.80	15.39	15.83	15.64	15.84	0.001509	0.53	1.52	5.70	0.33
Reach 1	1274		Culvert									
Reach 1	1268.2	CLC - 20	0.80	14.83	15.28		15.31	0.002268	0.68	1.18	4.06	0.40
Reach 1	1223.5	CLC - 20	0.80	14.71	15.11		15.15	0.005604	0.94	0.85	3.55	0.62
Reach 1	1157.2	CLC - 20	0.80	14.21	14.52	14.52	14.61	0.013207	1.27	0.66	5.04	0.92
Reach 1	1113.3	CLC - 20	0.80	13.50	13.79	13.79	13.88	0.016181	1.36	0.59	3.14	1.01
Reach 1	1059.3	CLC - 20	0.80	12.58	12.90	12.90	13.00	0.015734	1.41	0.57	2.80	1.00
Reach 1	1022.7	CLC - 20	0.80	12.19	12.46	12.39	12.49	0.005246	0.80	1.00	5.16	0.58
Reach 1	961	CLC - 20	0.80	11.70	11.88	11.88	11.94	0.018836	1.06	0.76	6.78	1.01
Reach 1	928	CLC - 20	0.80	11.27	11.71	11.49	11.71	0.000292	0.22	3.64	15.11	0.14
Reach 1	916		Culvert									
Reach 1	906.7	CLC - 20	0.80	10.19	10.45	10.45	10.52	0.017660	1.15	0.70	5.23	1.01
Reach 1	874.9	CLC - 20	0.80	8.99	9.32	9.21	9.34	0.002796	0.64	1.24	5.54	0.43
Reach 1	842.6	CLC - 20	0.80	8.98	9.18	9.13	9.21	0.006523	0.69	1.16	8.91	0.61
Reach 1	820		Culvert									
Reach 1	798.4	CLC - 20	0.80	7.25	7.59	7.59	7.69	0.015985	1.44	0.55	2.65	1.01
Reach 1	751.6	CLC - 20	0.80	6.19	6.51	6.51	6.61	0.016116	1.38	0.58	3.00	1.01
Reach 1	691.8	CLC - 20	0.80	5.20	5.39	5.39	5.46	0.017305	1.19	0.67	4.76	1.01
Reach 1	653.5	CLC - 20	0.80	4.63	4.87		4.91	0.006457	0.86	0.93	5.10	0.64
Downstream Reach	555.4	CLC - 20	3.70	3.97	4.40	4.40	4.54	0.014018	1.65	2.24	8.23	1.01
Downstream Reach	540.8	CLC - 20	3.70	3.69	4.09		4.19	0.009451	1.44	2.58	8.67	0.84
Downstream Reach	496.2	CLC - 20	3.70	3.13	3.55	3.55	3.64	0.016758	1.35	2.75	15.69	1.03
Downstream Reach	472.4	CLC - 20	3.70	2.60	3.08	3.08	3.25	0.013430	1.78	2.08	6.52	1.01
Downstream Reach	409.7	CLC - 20	3.70	1.78	2.28		2.40	0.009197	1.52	2.44	7.37	0.84
Downstream Reach	363.4	CLC - 20	3.70	1.49	2.20		2.22	0.001645	0.65	5.73	17.19	0.36
Downstream Reach	329.6	CLC - 20	3.70	1.48	2.05		2.12	0.004664	1.21	3.05	7.69	0.62
Downstream Reach	292.9	CLC - 20	3.70	1.33	1.73	1.73	1.84	0.015164	1.45	2.55	12.02	1.01
Downstream Reach	265.7	CLC - 20	3.70	1.10	1.55		1.58	0.003276	0.68	5.44	25.47	0.47
Downstream Reach	241.2	CLC - 20	3.70	0.92	1.34	1.34	1.42	0.016595	1.25	2.95	18.60	1.00
Downstream Reach	195.8	CLC - 20	3.70	0.61	1.08	0.94	1.08	0.001279	0.37	10.05	58.42	0.28
Downstream Reach	160.1	CLC - 20	3.70	0.48	0.90	0.86	0.98	0.009595	1.27	2.91	11.95	0.82
Downstream Reach	125.9	CLC - 20	3.70	0.26	0.92	0.61	0.92	0.000325	0.28	13.19	41.22	0.16
Downstream Reach	90.2	CLC - 20	3.70	0.18	0.92	0.51	0.92	0.000013	0.07	57.89	149.88	0.03
Downstream Reach	46	CLC - 20	3.70	0.06	0.92	0.39	0.92	0.000004	0.05	90.63	194.69	0.02
Downstream Reach	0	CLC - 20	3.70	-0.01	0.92	0.27	0.92	0.000002	0.04	105.90	185.37	0.02

HEC-RAS Plan: Local Creek 3 Profile: CLC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 2	1723.8	CLC - 100	5.10	15.65	16.22		16.24	0.002682	0.72	7.37	37.85	0.44
Reach 2	1603.8	CLC - 100	5.10	15.27	15.68		15.74	0.007317	1.10	4.65	19.46	0.72
Reach 2	1519.8	CLC - 100	5.10	14.34	14.77	14.77	14.91	0.013929	1.63	3.13	11.72	1.01
Reach 2	1463.9	CLC - 100	5.10	13.29	14.00		14.09	0.005275	1.38	3.70	8.48	0.67
Reach 2	1404.8	CLC - 100	5.10	12.83	13.49	13.47	13.65	0.010979	1.77	2.87	7.78	0.93
Reach 2	1285	CLC - 100	5.10	11.45	12.42		12.59	0.007232	1.85	2.75	4.76	0.78
Reach 2	1203.5	CLC - 100	5.10	10.82	11.63	11.61	11.86	0.011189	2.15	2.37	4.63	0.96
Reach 2	1079.6	CLC - 100	5.10	9.74	10.18	10.18	10.32	0.013403	1.65	3.10	11.01	0.99
Reach 2	963.7	CLC - 100	5.10	8.59	9.85		9.88	0.000978	0.84	6.05	7.82	0.31
Reach 2	921.6	CLC - 100	5.10	8.11	9.86		9.86	0.000106	0.34	15.19	15.18	0.11
Reach 2	787	CLC - 100	5.10	7.03	9.86	7.40	9.86	0.000003	0.09	65.41	55.00	0.02
Reach 2	770		Culvert									
Reach 2	754	CLC - 100	5.10	6.42	7.03		7.11	0.007119	1.26	4.03	13.16	0.73
Reach 2	660.6	CLC - 100	5.10	5.58	7.07	5.98	7.07	0.000053	0.25	20.09	18.25	0.08
Reach 2	621.7	CLC - 100	5.10	4.76	7.07	5.38	7.07	0.000045	0.28	18.52	12.48	0.07
Reach 2	595.5	CLC - 100	5.10	4.87	7.07	5.44	7.07	0.000035	0.22	23.23	18.98	0.06
Reach 2	580		Culvert									
Reach 2	571	CLC - 100	5.10	4.71	5.07	5.07	5.19	0.014886	1.50	3.39	15.03	1.01
Reach 1	1363.4	CLC - 100	1.30	15.66	16.16		16.21	0.004408	1.00	1.30	4.10	0.57
Reach 1	1286.1	CLC - 100	1.30	15.39	16.15	15.71	16.15	0.000233	0.25	5.19	14.78	0.13
Reach 1	1274		Culvert									
Reach 1	1268.2	CLC - 100	1.30	14.83	15.39		15.42	0.002402	0.80	1.63	4.64	0.43
Reach 1	1223.5	CLC - 100	1.30	14.71	15.18	15.11	15.25	0.007118	1.18	1.10	3.89	0.71
Reach 1	1157.2	CLC - 100	1.30	14.21	14.60	14.60	14.68	0.010591	1.29	1.19	8.96	0.85
Reach 1	1113.3	CLC - 100	1.30	13.50	13.87	13.87	13.99	0.015091	1.53	0.85	3.59	1.01
Reach 1	1059.3	CLC - 100	1.30	12.58	12.98	12.98	13.11	0.014541	1.58	0.82	3.20	1.00
Reach 1	1022.7	CLC - 100	1.30	12.19	12.45	12.45	12.55	0.015855	1.37	0.95	5.08	1.01
Reach 1	961	CLC - 100	1.30	11.70	12.01		12.04	0.003976	0.71	1.82	9.16	0.51
Reach 1	928	CLC - 100	1.30	11.27	12.02	11.52	12.03	0.000055	0.14	9.22	21.19	0.07
Reach 1	916		Culvert									
Reach 1	906.7	CLC - 100	1.30	10.19	10.51	10.51	10.59	0.016740	1.29	1.01	6.10	1.01
Reach 1	874.9	CLC - 100	1.30	8.99	9.57	9.27	9.58	0.000652	0.47	2.79	6.69	0.23
Reach 1	842.6	CLC - 100	1.30	8.98	9.57	9.18	9.57	0.000142	0.21	6.08	15.28	0.11
Reach 1	820		Culvert									
Reach 1	798.4	CLC - 100	1.30	7.25	7.68	7.68	7.81	0.014960	1.61	0.81	3.10	1.01
Reach 1	751.6	CLC - 100	1.30	6.19	6.59	6.59	6.71	0.015231	1.54	0.85	3.60	1.01
Reach 1	691.8	CLC - 100	1.30	5.20	5.45	5.45	5.54	0.015780	1.35	0.96	5.16	1.00
Reach 1	653.5	CLC - 100	1.30	4.63	4.98		5.02	0.003609	0.83	1.58	5.88	0.51
Downstream Reach	555.4	CLC - 100	6.50	3.97	4.53	4.53	4.72	0.012671	1.89	3.44	9.52	1.01
Downstream Reach	540.8	CLC - 100	6.50	3.69	4.18	4.18	4.37	0.012704	1.92	3.38	9.13	1.01
Downstream Reach	496.2	CLC - 100	6.50	3.13	3.64	3.63	3.76	0.013044	1.53	4.25	16.58	0.96
Downstream Reach	472.4	CLC - 100	6.50	2.60	3.24	3.24	3.45	0.012416	2.00	3.25	8.06	1.01
Downstream Reach	409.7	CLC - 100	6.50	1.78	2.39	2.38	2.59	0.011816	1.98	3.29	8.01	0.99
Downstream Reach	363.4	CLC - 100	6.50	1.49	2.37		2.40	0.001309	0.73	8.95	18.92	0.34
Downstream Reach	329.6	CLC - 100	6.50	1.48	2.18	2.07	2.31	0.006313	1.55	4.20	9.23	0.73
Downstream Reach	292.9	CLC - 100	6.50	1.33	1.84	1.84	1.96	0.015551	1.50	4.34	19.93	1.03
Downstream Reach	265.7	CLC - 100	6.50	1.10	1.64		1.67	0.003863	0.82	7.97	32.20	0.52
Downstream Reach	241.2	CLC - 100	6.50	0.92	1.42	1.42	1.50	0.016416	1.25	5.19	32.49	1.00
Downstream Reach	195.8	CLC - 100	6.50	0.61	1.19	0.99	1.20	0.000756	0.37	17.45	67.23	0.23
Downstream Reach	160.1	CLC - 100	6.50	0.48	0.97	0.97	1.11	0.013341	1.67	3.90	13.60	1.00
Downstream Reach	125.9	CLC - 100	6.50	0.26	0.92	0.71	0.93	0.001022	0.50	13.09	41.07	0.28
Downstream Reach	90.2	CLC - 100	6.50	0.18	0.92	0.62	0.92	0.000040	0.11	58.00	149.89	0.06
Downstream Reach	46	CLC - 100	6.50	0.06	0.92	0.51	0.92	0.000013	0.09	90.68	194.69	0.03
Downstream Reach	0	CLC - 100	6.50	-0.01	0.92	0.31	0.92	0.000007	0.07	105.90	185.37	0.03

APPENDIX M

LOCAL CREEK 4

HEC-RAS Plan: Local Creek 4 River: Local Creek 4 Reach: Local Creek 4 Profile: CC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 4	1419	CC - 20	0.60	13.62	13.90	13.90	13.98	0.017475	1.21	0.50	3.39	1.01
Local Creek 4	1252	CC - 20	0.60	11.62	12.00	11.87	12.01	0.002141	0.56	1.08	4.88	0.38
Local Creek 4	1157	CC - 20	0.60	11.26	11.49	11.49	11.55	0.018851	1.10	0.55	4.62	1.02
Local Creek 4	1073	CC - 20	0.60	10.13	10.53		10.54	0.001426	0.50	1.21	4.79	0.31
Local Creek 4	983	CC - 20	0.60	9.87	10.14	10.14	10.23	0.017098	1.27	0.47	2.93	1.01
Local Creek 4	886	CC - 20	0.60	8.74	9.18		9.21	0.002587	0.67	0.89	3.45	0.42
Local Creek 4	838	CC - 20	0.60	8.65	9.04		9.06	0.003689	0.58	1.03	6.57	0.47
Local Creek 4	732	CC - 20	0.60	7.89	8.23	8.23	8.33	0.016547	1.41	0.43	2.14	1.01
Local Creek 4	605	CC - 20	0.60	6.79	7.13	7.04	7.16	0.004732	0.79	0.76	3.64	0.55
Local Creek 4	590		Culvert									
Local Creek 4	571	CC - 20	0.60	6.11	6.31	6.31	6.36	0.020338	0.96	0.63	6.92	1.01
Local Creek 4	506	CC - 20	0.60	3.59	4.03		4.05	0.001910	0.63	0.95	3.20	0.37
Local Creek 4	460	CC - 20	0.60	3.45	3.75	3.75	3.85	0.016407	1.37	0.44	2.32	1.00
Local Creek 4	386	CC - 20	0.60	2.22	2.63	2.50	2.64	0.001489	0.50	1.48	9.64	0.32
Local Creek 4	329	CC - 20	0.60	2.10	2.35	2.35	2.43	0.016624	1.25	0.48	2.99	1.00
Local Creek 4	239	CC - 20	0.60	1.36	1.50	1.45	1.50	0.002238	0.32	1.86	20.18	0.34
Local Creek 4	39	CC - 20	0.60	0.34	0.46	0.46	0.50	0.020059	0.87	0.69	8.76	0.99

HEC-RAS Plan: Local Creek 4 River: Local Creek 4 Reach: Local Creek 4 Profile: CC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 4	1419	CC - 100	1.30	13.62	14.01	14.01	14.11	0.015455	1.40	0.93	4.64	1.00
Local Creek 4	1252	CC - 100	1.30	11.62	12.13	11.97	12.15	0.002417	0.75	1.73	5.40	0.42
Local Creek 4	1157	CC - 100	1.30	11.26	11.57	11.57	11.67	0.016082	1.37	0.95	5.07	1.01
Local Creek 4	1073	CC - 100	1.30	10.13	10.69		10.71	0.001528	0.64	2.02	5.62	0.34
Local Creek 4	983	CC - 100	1.30	9.87	10.26	10.26	10.38	0.015362	1.51	0.86	3.80	1.01
Local Creek 4	886	CC - 100	1.30	8.74	9.31		9.36	0.003759	0.94	1.39	4.28	0.53
Local Creek 4	838	CC - 100	1.30	8.65	9.15		9.17	0.003603	0.68	1.90	9.34	0.49
Local Creek 4	732	CC - 100	1.30	7.89	8.39	8.39	8.47	0.016245	1.24	1.04	6.41	0.98
Local Creek 4	605	CC - 100	1.30	6.79	7.50	7.16	7.51	0.001145	0.49	2.64	8.88	0.29
Local Creek 4	590		Culvert									
Local Creek 4	571	CC - 100	1.30	6.11	6.38	6.38	6.44	0.017434	1.14	1.14	8.65	1.00
Local Creek 4	506	CC - 100	1.30	3.59	4.21		4.24	0.002209	0.82	1.59	3.95	0.41
Local Creek 4	460	CC - 100	1.30	3.45	3.89	3.89	4.02	0.014757	1.61	0.81	3.07	1.00
Local Creek 4	386	CC - 100	1.30	2.22	2.75	2.62	2.76	0.001253	0.55	2.95	16.15	0.31
Local Creek 4	329	CC - 100	1.30	2.10	2.47	2.47	2.58	0.014801	1.47	0.88	3.94	0.99
Local Creek 4	239	CC - 100	1.30	1.36	1.55	1.48	1.56	0.002278	0.43	2.99	20.88	0.37
Local Creek 4	39	CC - 100	1.30	0.34	0.51	0.51	0.57	0.017625	1.10	1.18	9.47	1.00

HEC-RAS Plan: Local Creek 4 River: Local Creek 4 Reach: Local Creek 4 Profile: CLC - 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 4	1419	CLC - 20	1.00	13.62	13.97	13.97	14.06	0.016374	1.34	0.75	4.16	1.01
Local Creek 4	1252	CLC - 20	1.00	11.62	12.08	11.93	12.10	0.002317	0.68	1.47	5.20	0.41
Local Creek 4	1157	CLC - 20	1.00	11.26	11.54	11.54	11.62	0.016937	1.27	0.79	4.90	1.01
Local Creek 4	1073	CLC - 20	1.00	10.13	10.63		10.64	0.001482	0.59	1.70	5.30	0.33
Local Creek 4	983	CLC - 20	1.00	9.87	10.22	10.22	10.32	0.015911	1.42	0.70	3.47	1.01
Local Creek 4	886	CLC - 20	1.00	8.74	9.26		9.30	0.003325	0.84	1.19	3.97	0.49
Local Creek 4	838	CLC - 20	1.00	8.65	9.11		9.13	0.003514	0.64	1.55	8.24	0.47
Local Creek 4	732	CLC - 20	1.00	7.89	8.35	8.35	8.43	0.017221	1.24	0.81	5.18	1.00
Local Creek 4	605	CLC - 20	1.00	6.79	7.36	7.11	7.37	0.001289	0.56	1.78	5.30	0.31
Local Creek 4	590		Culvert									
Local Creek 4	571	CLC - 20	1.00	6.11	6.35	6.35	6.41	0.018175	1.07	0.93	7.94	1.00
Local Creek 4	506	CLC - 20	1.00	3.59	4.14		4.17	0.002095	0.75	1.34	3.67	0.40
Local Creek 4	460	CLC - 20	1.00	3.45	3.84	3.84	3.96	0.015393	1.53	0.65	2.79	1.01
Local Creek 4	386	CLC - 20	1.00	2.22	2.70	2.57	2.71	0.001544	0.56	2.23	12.55	0.33
Local Creek 4	329	CLC - 20	1.00	2.10	2.49	2.42	2.54	0.006882	1.03	0.97	4.13	0.68
Local Creek 4	239	CLC - 20	1.00	1.36	1.47	1.47	1.50	0.023150	0.80	1.25	19.77	1.02
Local Creek 4	39	CLC - 20	1.00	0.34	0.92	0.49	0.92	0.000070	0.14	7.25	20.79	0.07

HEC-RAS Plan: Local Creek 4 River: Local Creek 4 Reach: Local Creek 4 Profile: CLC - 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 4	1419	CLC - 100	1.70	13.62	14.05	14.05	14.16	0.015246	1.49	1.14	5.15	1.01
Local Creek 4	1252	CLC - 100	1.70	11.62	12.18	12.01	12.22	0.002508	0.83	2.04	5.60	0.44
Local Creek 4	1157	CLC - 100	1.70	11.26	11.61	11.61	11.72	0.015354	1.48	1.15	5.28	1.01
Local Creek 4	1073	CLC - 100	1.70	10.13	10.75		10.78	0.001574	0.71	2.40	5.89	0.35
Local Creek 4	983	CLC - 100	1.70	9.87	10.31	10.31	10.44	0.014843	1.60	1.06	4.18	1.01
Local Creek 4	886	CLC - 100	1.70	8.74	9.36		9.42	0.004263	1.05	1.62	4.62	0.57
Local Creek 4	838	CLC - 100	1.70	8.65	9.20		9.22	0.003604	0.72	2.36	10.76	0.49
Local Creek 4	732	CLC - 100	1.70	7.89	8.43	8.43	8.51	0.016584	1.28	1.32	7.89	1.00
Local Creek 4	605	CLC - 100	1.70	6.79	7.68	7.21	7.68	0.000485	0.35	4.87	14.49	0.19
Local Creek 4	590		Culvert									
Local Creek 4	571	CLC - 100	1.70	6.11	6.41	6.41	6.48	0.016652	1.20	1.42	9.56	0.99
Local Creek 4	506	CLC - 100	1.70	3.59	4.28		4.33	0.002329	0.90	1.90	4.27	0.43
Local Creek 4	460	CLC - 100	1.70	3.45	3.95	3.95	4.10	0.014289	1.71	1.00	3.38	1.00
Local Creek 4	386	CLC - 100	1.70	2.22	2.80	2.64	2.81	0.001256	0.60	3.88	19.50	0.31
Local Creek 4	329	CLC - 100	1.70	2.10	2.57	2.52	2.65	0.008092	1.26	1.36	6.01	0.76
Local Creek 4	239	CLC - 100	1.70	1.36	1.49	1.49	1.54	0.020779	0.95	1.78	20.13	1.02
Local Creek 4	39	CLC - 100	1.70	0.34	0.92	0.54	0.92	0.000203	0.23	7.25	20.79	0.13

APPENDIX M

LOCAL CREEK 5

HEC-RAS Plan: Local Creek 5 Locations: User Defined Profile: CC - 20

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 5	Local Creek 5	6960	CC - 20	2.30	35.53	35.87		35.91	0.004794	0.95	2.43	9.17	0.59
Local Creek 5	Local Creek 5	6759	CC - 20	2.30	33.75	34.22	34.22	34.36	0.014566	1.61	1.43	5.53	1.01
Local Creek 5	Local Creek 5	6630	CC - 20	2.30	28.37	28.81	28.81	28.96	0.013889	1.75	1.32	4.31	1.01
Local Creek 5	Local Creek 5	6533	CC - 20	2.30	26.88	27.29	27.29	27.41	0.014654	1.53	1.50	6.38	1.01
Local Creek 5	Local Creek 5	6484	CC - 20	2.30	25.30	25.61	25.49	25.64	0.002933	0.77	2.97	10.47	0.46
Local Creek 5	Local Creek 5	6475		Culvert									
Local Creek 5	Local Creek 5	6451	CC - 20	2.30	24.60	25.00		25.04	0.003318	0.95	2.42	6.66	0.50
Local Creek 5	Local Creek 5	6346	CC - 20	2.30	24.19	24.56		24.61	0.005442	0.92	2.49	10.75	0.61
Local Creek 5	Local Creek 5	6260	CC - 20	2.30	23.65	24.29		24.32	0.002158	0.76	3.03	8.71	0.41
Local Creek 5	Local Creek 5	6172	CC - 20	2.30	23.57	24.08		24.11	0.002723	0.79	2.91	9.39	0.45
Local Creek 5	Local Creek 5	6077	CC - 20	2.30	23.19	23.53	23.52	23.63	0.012279	1.34	1.71	7.79	0.91
Local Creek 5	Local Creek 5	5997	CC - 20	2.30	22.53	22.93	22.85	22.98	0.005414	0.97	2.37	9.47	0.62
Local Creek 5	Local Creek 5	5975		Culvert									
Local Creek 5	Local Creek 5	5965	CC - 20	2.30	22.43	22.71	22.71	22.79	0.016030	1.26	1.83	11.19	0.99
Local Creek 5	Local Creek 5	5943	CC - 20	2.30	22.22	22.51	22.48	22.52	0.004418	0.58	4.98	58.40	0.50
Local Creek 5	Local Creek 5	5875	CC - 20	2.30	21.95	22.24	22.17	22.25	0.003743	0.45	5.07	48.22	0.45
Local Creek 5	Local Creek 5	5779	CC - 20	2.30	21.80	22.08	21.97	22.09	0.000956	0.28	8.14	56.58	0.24
Local Creek 5	Local Creek 5	5595	CC - 20	2.30	21.57	21.81	21.76	21.82	0.002583	0.31	7.51	97.55	0.35
Local Creek 5	Local Creek 5	5510	CC - 20	2.30	21.32	21.54	21.49	21.55	0.003864	0.42	5.55	63.70	0.44
Local Creek 5	Local Creek 5	5428	CC - 20	2.30	21.01	21.19		21.21	0.004498	0.47	4.85	49.57	0.48
Local Creek 5	Local Creek 5	5338	CC - 20	2.30	20.84	21.14		21.14	0.000261	0.16	14.71	93.72	0.13
Local Creek 5	Local Creek 5	5259	CC - 20	2.30	20.36	20.90	20.90	21.06	0.013766	1.81	1.27	3.86	1.01
Local Creek 5	Local Creek 5	5239	CC - 20	2.30	20.02	20.26	20.26	20.35	0.015913	1.32	1.74	9.79	1.00
Local Creek 5	Local Creek 5	5158	CC - 20	2.30	19.65	19.96	19.86	19.97	0.001717	0.44	5.59	39.43	0.33
Local Creek 5	Local Creek 5	5067	CC - 20	2.30	19.45	19.62		19.65	0.010642	0.74	3.19	33.29	0.75
Local Creek 5	Local Creek 5	4926	CC - 20	2.30	19.09	19.63		19.63	0.000010	0.06	38.05	88.43	0.03
Local Creek 5	Local Creek 5	4806	CC - 20	2.30	19.09	19.63		19.63	0.000022	0.09	26.51	65.13	0.04
Local Creek 5	Local Creek 5	4677	CC - 20	2.30	19.03	19.63		19.63	0.000060	0.17	15.74	40.64	0.07
Local Creek 5	Local Creek 5	4548	CC - 20	2.30	19.03	19.61		19.61	0.000246	0.31	8.73	30.90	0.15
Local Creek 5	Local Creek 5	4413	CC - 20	2.30	19.04	19.59		19.59	0.000136	0.21	12.84	46.62	0.11
Local Creek 5	Local Creek 5	4330	CC - 20	2.30	19.04	19.56		19.57	0.000687	0.46	5.34	22.26	0.24
Local Creek 5	Local Creek 5	4148	CC - 20	2.30	19.12	19.49		19.49	0.000251	0.21	12.71	72.19	0.13
Local Creek 5	Local Creek 5	3983	CC - 20	2.30	18.94	19.36	19.27	19.39	0.004163	0.68	3.38	20.41	0.52
Local Creek 5	Local Creek 5	3912	CC - 20	2.30	18.59	18.82	18.82	18.87	0.015015	1.08	2.28	19.63	0.93
Local Creek 5	Local Creek 5	3825	CC - 20	2.30	17.88	18.19	18.11	18.19	0.001154	0.39	6.50	36.97	0.28
Local Creek 5	Local Creek 5	3678	CC - 20	2.30	17.72	18.08	17.91	18.08	0.000543	0.26	8.87	46.86	0.19
Local Creek 5	Local Creek 5	3502	CC - 20	2.30	17.60	17.84	17.80	17.85	0.005762	0.57	4.04	37.99	0.56
Local Creek 5	Local Creek 5	3226	CC - 20	2.30	17.34	17.64	17.49	17.64	0.000281	0.16	14.28	92.22	0.13
Local Creek 5	Local Creek 5	2773	CC - 20	2.30	17.09	17.26	17.24	17.27	0.008965	0.46	4.97	88.48	0.62
Local Creek 5	Local Creek 5	2224	CC - 20	2.30	16.44	16.61		16.61	0.000445	0.12	18.87	261.29	0.14
Local Creek 5	Local Creek 5	1896	CC - 20	4.00	16.06	16.45		16.46	0.000511	0.23	17.59	105.92	0.18
Local Creek 5	Local Creek 5	1723	CC - 20	4.00	15.91	16.36		16.36	0.000584	0.23	17.38	113.65	0.19
Local Creek 5	Local Creek 5	1442	CC - 20	4.00	15.65	16.00		16.02	0.003735	0.59	6.79	43.51	0.48
Local Creek 5	Local Creek 5	1233	CC - 20	4.00	15.41	15.94		15.94	0.000132	0.19	21.03	59.82	0.10
Local Creek 5	Local Creek 5	1059	CC - 20	4.00	15.44	15.89		15.90	0.000445	0.36	11.01	29.61	0.19
Local Creek 5	Local Creek 5	942	CC - 20	4.00	15.41	15.67	15.67	15.74	0.018831	1.13	3.53	28.52	1.03
Local Creek 5	Local Creek 5	861	CC - 20	4.00	15.12	15.61		15.62	0.000312	0.28	14.14	42.34	0.16
Local Creek 5	Local Creek 5	773	CC - 20	4.00	15.04	15.44	15.44	15.52	0.017350	1.26	3.18	20.73	1.02
Local Creek 5	Local Creek 5	668	CC - 20	4.00	13.09	13.71	13.71	13.86	0.014043	1.72	2.33	7.86	1.01
Local Creek 5	Local Creek 5	623	CC - 20	4.00	12.28	12.87	12.87	13.07	0.012985	1.98	2.02	5.12	1.01
Local Creek 5	Local Creek 5	488	CC - 20	4.00	9.56	9.95	9.95	10.11	0.013582	1.78	2.25	7.06	1.01
Local Creek 5	Local Creek 5	395	CC - 20	4.00	7.12	7.45	7.45	7.52	0.018367	1.17	3.41	26.30	1.03
Local Creek 5	Local Creek 5	282	CC - 20	4.00	4.16	4.63	4.59	4.70	0.009647	1.13	3.55	18.25	0.80
Local Creek 5	Local Creek 5	226	CC - 20	4.00	3.73	4.08	4.05	4.13	0.010615	1.01	3.94	24.47	0.81
Local Creek 5	Local Creek 5	136	CC - 20	4.00	2.53	2.96	2.96	3.04	0.014059	1.27	3.33	26.76	0.95
Local Creek 5	Local Creek 5	75	CC - 20	4.00	1.72	2.01	2.01	2.08	0.016923	1.20	3.32	22.69	1.00
Local Creek 5	Local Creek 5	27	CC - 20	4.00	0.69	1.21	1.21	1.30	0.015723	1.33	3.00	16.53	1.00

HEC-RAS Plan: Local Creek 5 Locations: User Defined Profile: CC - 100

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 5	Local Creek 5	6960	CC - 100	4.90	35.53	36.03		36.11	0.004901	1.23	3.99	10.32	0.63
Local Creek 5	Local Creek 5	6759	CC - 100	4.90	33.75	34.40	34.40	34.59	0.012808	1.94	2.53	6.74	1.01
Local Creek 5	Local Creek 5	6630	CC - 100	4.90	28.37	29.02	29.02	29.25	0.012430	2.13	2.30	5.07	1.01
Local Creek 5	Local Creek 5	6533	CC - 100	4.90	26.88	27.46	27.46	27.62	0.013367	1.79	2.73	8.51	1.01
Local Creek 5	Local Creek 5	6484	CC - 100	4.90	25.30	26.14	25.61	26.15	0.000431	0.53	9.29	13.65	0.20
Local Creek 5	Local Creek 5	6475		Culvert									
Local Creek 5	Local Creek 5	6451	CC - 100	4.90	24.60	25.16		25.26	0.004880	1.37	3.58	7.59	0.64
Local Creek 5	Local Creek 5	6346	CC - 100	4.90	24.19	24.75		24.80	0.003706	1.01	4.86	13.80	0.54
Local Creek 5	Local Creek 5	6260	CC - 100	4.90	23.65	24.49		24.54	0.002471	0.98	5.02	10.96	0.46
Local Creek 5	Local Creek 5	6172	CC - 100	4.90	23.57	24.27	24.07	24.31	0.002703	0.95	5.38	16.83	0.47
Local Creek 5	Local Creek 5	6077	CC - 100	4.90	23.19	23.67	23.67	23.81	0.013767	1.70	2.89	10.06	1.01
Local Creek 5	Local Creek 5	5997	CC - 100	4.90	22.53	23.58	22.99	23.59	0.000301	0.44	11.29	18.20	0.17
Local Creek 5	Local Creek 5	5975		Culvert									
Local Creek 5	Local Creek 5	5965	CC - 100	4.90	22.43	22.82	22.82	22.94	0.014258	1.54	3.18	13.14	1.00
Local Creek 5	Local Creek 5	5943	CC - 100	4.90	22.22	22.56	22.52	22.58	0.004944	0.64	8.37	70.62	0.54
Local Creek 5	Local Creek 5	5875	CC - 100	4.90	21.95	22.33	22.24	22.34	0.002674	0.50	9.86	63.52	0.40
Local Creek 5	Local Creek 5	5779	CC - 100	4.90	21.80	22.15	22.02	22.16	0.001417	0.40	12.27	68.11	0.30
Local Creek 5	Local Creek 5	5595	CC - 100	4.90	21.57	21.89	21.79	21.89	0.001447	0.30	16.32	141.35	0.28
Local Creek 5	Local Creek 5	5510	CC - 100	4.90	21.32	21.54	21.54	21.58	0.019934	0.93	5.27	61.76	1.00
Local Creek 5	Local Creek 5	5428	CC - 100	4.90	21.01	21.39		21.39	0.000510	0.28	17.32	75.02	0.19
Local Creek 5	Local Creek 5	5338	CC - 100	4.90	20.84	21.38		21.38	0.000054	0.12	40.05	113.48	0.07
Local Creek 5	Local Creek 5	5259	CC - 100	4.90	20.36	21.15	21.15	21.34	0.012721	1.94	2.53	6.56	1.00
Local Creek 5	Local Creek 5	5239	CC - 100	4.90	20.02	20.44	20.39	20.52	0.009530	1.26	3.89	16.15	0.82
Local Creek 5	Local Creek 5	5158	CC - 100	4.90	19.65	20.00		20.02	0.004154	0.75	7.21	47.92	0.53
Local Creek 5	Local Creek 5	5067	CC - 100	4.90	19.45	19.79		19.80	0.001535	0.52	9.57	38.60	0.33
Local Creek 5	Local Creek 5	4926	CC - 100	4.90	19.09	19.79		19.79	0.000016	0.09	52.13	91.28	0.04
Local Creek 5	Local Creek 5	4806	CC - 100	4.90	19.09	19.79		19.79	0.000035	0.14	36.81	66.76	0.06
Local Creek 5	Local Creek 5	4677	CC - 100	4.90	19.03	19.78		19.78	0.000098	0.25	21.93	40.64	0.10
Local Creek 5	Local Creek 5	4548	CC - 100	4.90	19.03	19.75		19.76	0.000343	0.44	13.28	32.27	0.18
Local Creek 5	Local Creek 5	4413	CC - 100	4.90	19.04	19.72		19.72	0.000180	0.29	19.51	50.02	0.13
Local Creek 5	Local Creek 5	4330	CC - 100	4.90	19.04	19.67		19.69	0.001042	0.67	8.58	30.45	0.30
Local Creek 5	Local Creek 5	4148	CC - 100	4.90	19.12	19.60		19.61	0.000240	0.26	20.99	72.19	0.14
Local Creek 5	Local Creek 5	3983	CC - 100	4.90	18.94	19.46	19.38	19.50	0.004355	0.87	5.73	24.35	0.56
Local Creek 5	Local Creek 5	3912	CC - 100	4.90	18.59	18.89	18.89	18.98	0.014317	1.37	3.76	20.29	0.97
Local Creek 5	Local Creek 5	3825	CC - 100	4.90	17.88	18.28	18.13	18.29	0.001263	0.52	9.99	36.97	0.31
Local Creek 5	Local Creek 5	3678	CC - 100	4.90	17.72	18.16	17.97	18.17	0.000596	0.35	14.72	57.25	0.21
Local Creek 5	Local Creek 5	3502	CC - 100	4.90	17.60	17.90	17.85	17.93	0.005161	0.73	6.75	40.46	0.57
Local Creek 5	Local Creek 5	3226	CC - 100	4.90	17.34	17.72	17.53	17.72	0.000281	0.21	23.95	108.69	0.14
Local Creek 5	Local Creek 5	2773	CC - 100	4.90	17.09	17.27	17.27	17.31	0.020880	0.78	6.32	97.72	0.97
Local Creek 5	Local Creek 5	2224	CC - 100	4.90	16.44	16.69		16.69	0.000196	0.12	41.76	330.90	0.11
Local Creek 5	Local Creek 5	1896	CC - 100	8.80	16.06	16.57		16.57	0.000567	0.27	32.75	165.85	0.19
Local Creek 5	Local Creek 5	1723	CC - 100	8.80	15.91	16.47		16.47	0.000599	0.28	31.84	161.11	0.20
Local Creek 5	Local Creek 5	1442	CC - 100	8.80	15.65	16.19		16.21	0.001668	0.51	17.20	74.51	0.34
Local Creek 5	Local Creek 5	1233	CC - 100	8.80	15.41	16.12		16.12	0.000162	0.27	32.26	62.30	0.12
Local Creek 5	Local Creek 5	1059	CC - 100	8.80	15.44	16.06		16.07	0.000718	0.55	16.04	33.21	0.25
Local Creek 5	Local Creek 5	942	CC - 100	8.80	15.41	15.86		15.89	0.005425	0.81	10.86	57.13	0.59
Local Creek 5	Local Creek 5	861	CC - 100	8.80	15.12	15.78		15.79	0.000494	0.39	22.42	63.64	0.20
Local Creek 5	Local Creek 5	773	CC - 100	8.80	15.04	15.58	15.58	15.65	0.016124	1.19	7.38	49.27	0.98
Local Creek 5	Local Creek 5	668	CC - 100	8.80	13.09	13.93	13.93	14.14	0.012484	2.02	4.35	10.46	1.00
Local Creek 5	Local Creek 5	623	CC - 100	8.80	12.28	13.15	13.15	13.45	0.011545	2.42	3.64	6.18	1.01
Local Creek 5	Local Creek 5	488	CC - 100	8.80	9.56	10.17	10.17	10.43	0.011835	2.25	3.92	7.69	1.01
Local Creek 5	Local Creek 5	395	CC - 100	8.80	7.12	7.55	7.55	7.65	0.014316	1.41	6.36	33.63	0.98
Local Creek 5	Local Creek 5	282	CC - 100	8.80	4.16	4.76	4.76	4.86	0.008574	1.40	6.98	36.33	0.81
Local Creek 5	Local Creek 5	226	CC - 100	8.80	3.73	4.16	4.16	4.26	0.013902	1.39	6.44	33.67	0.97
Local Creek 5	Local Creek 5	136	CC - 100	8.80	2.53	3.06	3.06	3.15	0.010130	1.41	7.52	43.80	0.86
Local Creek 5	Local Creek 5	75	CC - 100	8.80	1.72	2.12	2.12	2.22	0.015864	1.39	6.32	33.03	1.02
Local Creek 5	Local Creek 5	27	CC - 100	8.80	0.69	1.33	1.33	1.45	0.014892	1.52	5.86	27.94	1.01

HEC-RAS Plan: Local Creek 5 Locations: User Defined Profile: CLC - 20

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 5	Local Creek 5	6960	CLC - 20	3.70	35.53	35.96		36.03	0.004854	1.11	3.32	9.90	0.61
Local Creek 5	Local Creek 5	6759	CLC - 20	3.70	33.75	34.33	34.33	34.50	0.013534	1.81	2.04	6.28	1.01
Local Creek 5	Local Creek 5	6630	CLC - 20	3.70	28.37	28.93	28.93	29.13	0.012893	1.98	1.87	4.75	1.01
Local Creek 5	Local Creek 5	6533	CLC - 20	3.70	26.88	27.39	27.39	27.54	0.013865	1.70	2.18	7.59	1.01
Local Creek 5	Local Creek 5	6484	CLC - 20	3.70	25.30	25.96	25.56	25.98	0.000547	0.52	7.05	12.49	0.22
Local Creek 5	Local Creek 5	6475		Culvert									
Local Creek 5	Local Creek 5	6451	CLC - 20	3.70	24.60	25.09		25.17	0.004111	1.20	3.08	6.97	0.58
Local Creek 5	Local Creek 5	6346	CLC - 20	3.70	24.19	24.67		24.72	0.004313	0.96	3.84	13.06	0.57
Local Creek 5	Local Creek 5	6260	CLC - 20	3.70	23.65	24.42		24.46	0.002245	0.88	4.22	10.11	0.43
Local Creek 5	Local Creek 5	6172	CLC - 20	3.70	23.57	24.20	24.01	24.24	0.002719	0.87	4.30	14.32	0.46
Local Creek 5	Local Creek 5	6077	CLC - 20	3.70	23.19	23.60	23.60	23.74	0.014172	1.60	2.31	8.93	1.01
Local Creek 5	Local Creek 5	5997	CLC - 20	3.70	22.53	23.34	22.93	23.36	0.000554	0.49	7.50	14.94	0.22
Local Creek 5	Local Creek 5	5975		Culvert									
Local Creek 5	Local Creek 5	5965	CLC - 20	3.70	22.43	22.78	22.78	22.88	0.014968	1.43	2.58	12.34	1.00
Local Creek 5	Local Creek 5	5943	CLC - 20	3.70	22.22	22.54	22.50	22.56	0.005116	0.63	6.78	67.05	0.55
Local Creek 5	Local Creek 5	5875	CLC - 20	3.70	21.95	22.30	22.21	22.31	0.002820	0.47	7.86	57.11	0.41
Local Creek 5	Local Creek 5	5779	CLC - 20	3.70	21.80	22.12	22.00	22.13	0.001307	0.36	10.40	64.69	0.28
Local Creek 5	Local Creek 5	5595	CLC - 20	3.70	21.57	21.86	21.78	21.86	0.001572	0.29	12.89	127.14	0.29
Local Creek 5	Local Creek 5	5510	CLC - 20	3.70	21.32	21.53	21.52	21.56	0.014519	0.78	4.74	56.54	0.85
Local Creek 5	Local Creek 5	5428	CLC - 20	3.70	21.01	21.29		21.30	0.001280	0.35	10.63	67.30	0.28
Local Creek 5	Local Creek 5	5338	CLC - 20	3.70	20.84	21.28		21.28	0.000089	0.13	28.81	110.03	0.08
Local Creek 5	Local Creek 5	5259	CLC - 20	3.70	20.36	21.04	21.04	21.23	0.012862	1.97	1.88	4.78	1.00
Local Creek 5	Local Creek 5	5239	CLC - 20	3.70	20.02	20.37	20.34	20.45	0.010254	1.30	2.84	11.76	0.85
Local Creek 5	Local Creek 5	5158	CLC - 20	3.70	19.65	19.98		20.00	0.003350	0.64	6.29	44.74	0.47
Local Creek 5	Local Creek 5	5067	CLC - 20	3.70	19.45	19.72		19.74	0.002394	0.53	7.07	38.60	0.39
Local Creek 5	Local Creek 5	4926	CLC - 20	3.70	19.09	19.73		19.73	0.000014	0.08	46.36	89.64	0.04
Local Creek 5	Local Creek 5	4806	CLC - 20	3.70	19.09	19.72		19.72	0.000029	0.12	32.61	66.30	0.05
Local Creek 5	Local Creek 5	4677	CLC - 20	3.70	19.03	19.72		19.72	0.000081	0.22	19.43	40.64	0.09
Local Creek 5	Local Creek 5	4548	CLC - 20	3.70	19.03	19.69		19.70	0.000303	0.38	11.44	32.27	0.17
Local Creek 5	Local Creek 5	4413	CLC - 20	3.70	19.04	19.67		19.67	0.000162	0.25	16.80	50.02	0.12
Local Creek 5	Local Creek 5	4330	CLC - 20	3.70	19.04	19.62		19.64	0.000924	0.59	7.14	29.75	0.28
Local Creek 5	Local Creek 5	4148	CLC - 20	3.70	19.12	19.56		19.56	0.000236	0.24	17.67	72.19	0.13
Local Creek 5	Local Creek 5	3983	CLC - 20	3.70	18.94	19.42	19.33	19.45	0.004345	0.79	4.78	23.99	0.54
Local Creek 5	Local Creek 5	3912	CLC - 20	3.70	18.59	18.86	18.86	18.94	0.014719	1.26	3.12	20.01	0.96
Local Creek 5	Local Creek 5	3825	CLC - 20	3.70	17.88	18.24	18.12	18.25	0.001254	0.47	8.45	36.97	0.30
Local Creek 5	Local Creek 5	3678	CLC - 20	3.70	17.72	18.13	17.94	18.13	0.000531	0.30	12.83	57.25	0.19
Local Creek 5	Local Creek 5	3502	CLC - 20	3.70	17.60	17.85	17.83	17.88	0.009547	0.79	4.68	39.42	0.73
Local Creek 5	Local Creek 5	3226	CLC - 20	3.70	17.34	17.70	17.51	17.70	0.000204	0.17	22.25	108.69	0.12
Local Creek 5	Local Creek 5	2773	CLC - 20	3.70	17.09	17.26	17.26	17.29	0.022729	0.74	5.01	88.69	0.99
Local Creek 5	Local Creek 5	2224	CLC - 20	3.70	16.44	16.65		16.65	0.000272	0.12	30.74	300.09	0.12
Local Creek 5	Local Creek 5	1896	CLC - 20	6.50	16.06	16.52		16.52	0.000542	0.25	25.55	135.80	0.19
Local Creek 5	Local Creek 5	1723	CLC - 20	6.50	15.91	16.42		16.42	0.000624	0.26	24.74	139.28	0.20
Local Creek 5	Local Creek 5	1442	CLC - 20	6.50	15.65	16.11		16.12	0.002162	0.55	11.81	55.61	0.38
Local Creek 5	Local Creek 5	1233	CLC - 20	6.50	15.41	16.04		16.04	0.000154	0.24	27.06	61.09	0.12
Local Creek 5	Local Creek 5	1059	CLC - 20	6.50	15.44	15.98		15.99	0.000606	0.48	13.61	30.52	0.23
Local Creek 5	Local Creek 5	942	CLC - 20	6.50	15.41	15.77		15.82	0.007319	0.92	7.06	38.38	0.69
Local Creek 5	Local Creek 5	861	CLC - 20	6.50	15.12	15.71		15.72	0.000403	0.35	18.72	49.98	0.18
Local Creek 5	Local Creek 5	773	CLC - 20	6.50	15.04	15.52	15.52	15.61	0.015642	1.30	4.99	28.56	0.99
Local Creek 5	Local Creek 5	668	CLC - 20	6.50	13.09	13.84	13.84	14.02	0.012864	1.89	3.45	9.44	1.00
Local Creek 5	Local Creek 5	623	CLC - 20	6.50	12.28	13.03	13.03	13.28	0.012082	2.25	2.89	5.72	1.01
Local Creek 5	Local Creek 5	488	CLC - 20	6.50	9.56	10.07	10.07	10.29	0.012472	2.06	3.16	7.41	1.01
Local Creek 5	Local Creek 5	395	CLC - 20	6.50	7.12	7.51	7.51	7.60	0.015653	1.31	5.01	29.93	1.00
Local Creek 5	Local Creek 5	282	CLC - 20	6.50	4.16	4.72	4.68	4.80	0.007825	1.24	5.52	29.91	0.76
Local Creek 5	Local Creek 5	226	CLC - 20	6.50	3.73	4.12	4.12	4.20	0.015495	1.32	4.93	28.69	0.99
Local Creek 5	Local Creek 5	136	CLC - 20	6.50	2.53	3.03	3.03	3.10	0.008837	1.24	6.31	43.52	0.79
Local Creek 5	Local Creek 5	75	CLC - 20	6.50	1.72	2.07	2.07	2.16	0.016333	1.33	4.89	27.96	1.02
Local Creek 5	Local Creek 5	27	CLC - 20	6.50	0.69	1.29	1.29	1.39	0.015446	1.37	4.75	25.20	1.00

HEC-RAS Plan: Local Creek 5 Locations: User Defined Profile: CLC - 100

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Local Creek 5	Local Creek 5	6960	CLC - 100	6.60	35.53	36.11		36.21	0.004904	1.36	4.86	10.84	0.65
Local Creek 5	Local Creek 5	6759	CLC - 100	6.60	33.75	34.49	34.49	34.72	0.012352	2.09	3.16	7.28	1.01
Local Creek 5	Local Creek 5	6630	CLC - 100	6.60	28.37	29.13	29.13	29.39	0.011931	2.29	2.88	5.46	1.01
Local Creek 5	Local Creek 5	6533	CLC - 100	6.60	26.88	27.54	27.54	27.73	0.012873	1.90	3.47	9.61	1.01
Local Creek 5	Local Creek 5	6484	CLC - 100	6.60	25.30	26.25	25.67	26.27	0.000506	0.61	10.85	14.50	0.22
Local Creek 5	Local Creek 5	6475		Culvert									
Local Creek 5	Local Creek 5	6451	CLC - 100	6.60	24.60	25.24		25.37	0.005871	1.57	4.21	8.38	0.71
Local Creek 5	Local Creek 5	6346	CLC - 100	6.60	24.19	24.84		24.90	0.003285	1.07	6.15	14.48	0.53
Local Creek 5	Local Creek 5	6260	CLC - 100	6.60	23.65	24.58		24.64	0.002751	1.10	6.02	11.95	0.49
Local Creek 5	Local Creek 5	6172	CLC - 100	6.60	23.57	24.35	24.15	24.40	0.002691	1.05	6.82	20.38	0.48
Local Creek 5	Local Creek 5	6077	CLC - 100	6.60	23.19	23.73	23.73	23.90	0.013403	1.82	3.62	11.09	1.02
Local Creek 5	Local Creek 5	5997	CLC - 100	6.60	22.53	23.70	23.06	23.71	0.000328	0.49	13.65	21.27	0.18
Local Creek 5	Local Creek 5	5975		Culvert									
Local Creek 5	Local Creek 5	5965	CLC - 100	6.60	22.43	22.88	22.88	23.02	0.013536	1.66	3.97	14.10	1.00
Local Creek 5	Local Creek 5	5943	CLC - 100	6.60	22.22	22.59	22.54	22.61	0.004859	0.66	10.32	73.96	0.54
Local Creek 5	Local Creek 5	5875	CLC - 100	6.60	21.95	22.37	22.26	22.38	0.002541	0.54	12.23	67.02	0.40
Local Creek 5	Local Creek 5	5779	CLC - 100	6.60	21.80	22.18	22.05	22.19	0.001555	0.45	14.54	71.49	0.32
Local Creek 5	Local Creek 5	5595	CLC - 100	6.60	21.57	21.91	21.81	21.92	0.001454	0.33	19.89	148.96	0.29
Local Creek 5	Local Creek 5	5510	CLC - 100	6.60	21.32	21.56	21.56	21.61	0.018530	0.99	6.71	68.40	0.99
Local Creek 5	Local Creek 5	5428	CLC - 100	6.60	21.01	21.48		21.48	0.000304	0.27	24.46	77.26	0.15
Local Creek 5	Local Creek 5	5338	CLC - 100	6.60	20.84	21.47		21.47	0.000044	0.13	51.04	115.39	0.06
Local Creek 5	Local Creek 5	5259	CLC - 100	6.60	20.36	21.28	21.28	21.44	0.013324	1.81	3.65	11.06	1.00
Local Creek 5	Local Creek 5	5239	CLC - 100	6.60	20.02	20.50	20.47	20.59	0.010989	1.35	4.89	20.29	0.88
Local Creek 5	Local Creek 5	5158	CLC - 100	6.60	19.65	20.03		20.06	0.004093	0.82	9.06	56.46	0.54
Local Creek 5	Local Creek 5	5067	CLC - 100	6.60	19.45	19.87		19.88	0.001134	0.53	12.56	38.60	0.30
Local Creek 5	Local Creek 5	4926	CLC - 100	6.60	19.09	19.87		19.87	0.000020	0.11	59.12	91.28	0.04
Local Creek 5	Local Creek 5	4806	CLC - 100	6.60	19.09	19.86		19.86	0.000042	0.16	41.88	66.76	0.06
Local Creek 5	Local Creek 5	4677	CLC - 100	6.60	19.03	19.85		19.86	0.000118	0.30	24.92	40.64	0.11
Local Creek 5	Local Creek 5	4548	CLC - 100	6.60	19.03	19.82		19.83	0.000392	0.50	15.48	32.27	0.20
Local Creek 5	Local Creek 5	4413	CLC - 100	6.60	19.04	19.79		19.79	0.000202	0.33	22.76	50.02	0.14
Local Creek 5	Local Creek 5	4330	CLC - 100	6.60	19.04	19.73		19.76	0.001152	0.76	10.34	30.45	0.33
Local Creek 5	Local Creek 5	4148	CLC - 100	6.60	19.12	19.66		19.67	0.000245	0.29	25.09	72.19	0.14
Local Creek 5	Local Creek 5	3983	CLC - 100	6.60	18.94	19.51	19.42	19.56	0.004366	0.97	6.98	28.68	0.57
Local Creek 5	Local Creek 5	3912	CLC - 100	6.60	18.59	18.93	18.93	19.04	0.014026	1.51	4.57	20.65	0.99
Local Creek 5	Local Creek 5	3825	CLC - 100	6.60	17.88	18.33	18.16	18.35	0.001304	0.59	11.85	36.97	0.32
Local Creek 5	Local Creek 5	3678	CLC - 100	6.60	17.72	18.21	18.00	18.22	0.000625	0.39	17.41	57.25	0.22
Local Creek 5	Local Creek 5	3502	CLC - 100	6.60	17.60	17.94	17.88	17.98	0.004562	0.79	8.42	40.97	0.55
Local Creek 5	Local Creek 5	3226	CLC - 100	6.60	17.34	17.76	17.55	17.76	0.000298	0.24	28.17	108.69	0.15
Local Creek 5	Local Creek 5	2773	CLC - 100	6.60	17.09	17.29	17.29	17.33	0.020842	0.83	7.92	109.86	0.99
Local Creek 5	Local Creek 5	2224	CLC - 100	6.60	16.44	16.72		16.72	0.000171	0.12	52.95	346.56	0.10
Local Creek 5	Local Creek 5	1896	CLC - 100	11.40	16.06	16.61		16.61	0.000562	0.28	40.07	184.97	0.20
Local Creek 5	Local Creek 5	1723	CLC - 100	11.40	15.91	16.51		16.51	0.000567	0.29	39.36	178.18	0.20
Local Creek 5	Local Creek 5	1442	CLC - 100	11.40	15.65	16.27		16.28	0.001336	0.48	24.09	104.11	0.31
Local Creek 5	Local Creek 5	1233	CLC - 100	11.40	15.41	16.20		16.20	0.000176	0.31	37.03	63.64	0.13
Local Creek 5	Local Creek 5	1059	CLC - 100	11.40	15.44	16.12		16.14	0.000818	0.62	18.31	34.55	0.27
Local Creek 5	Local Creek 5	942	CLC - 100	11.40	15.41	15.92		15.95	0.005223	0.74	15.40	90.19	0.57
Local Creek 5	Local Creek 5	861	CLC - 100	11.40	15.12	15.83		15.84	0.000566	0.45	25.98	81.34	0.22
Local Creek 5	Local Creek 5	773	CLC - 100	11.40	15.04	15.62	15.61	15.69	0.015510	1.17	9.76	65.24	0.96
Local Creek 5	Local Creek 5	668	CLC - 100	11.40	13.09	14.02	14.02	14.25	0.012054	2.15	5.31	11.35	1.00
Local Creek 5	Local Creek 5	623	CLC - 100	11.40	12.28	13.28	13.28	13.61	0.011144	2.58	4.42	6.63	1.01
Local Creek 5	Local Creek 5	488	CLC - 100	11.40	9.56	10.27	10.27	10.57	0.011385	2.42	4.71	7.97	1.01
Local Creek 5	Local Creek 5	395	CLC - 100	11.40	7.12	7.61	7.61	7.70	0.010314	1.33	9.42	65.94	0.85
Local Creek 5	Local Creek 5	282	CLC - 100	11.40	4.16	4.81	4.81	4.91	0.009407	1.43	9.06	50.23	0.84
Local Creek 5	Local Creek 5	226	CLC - 100	11.40	3.73	4.21	4.21	4.31	0.012181	1.42	8.35	44.76	0.92
Local Creek 5	Local Creek 5	136	CLC - 100	11.40	2.53	3.10	3.10	3.19	0.009876	1.49	9.11	44.19	0.86
Local Creek 5	Local Creek 5	75	CLC - 100	11.40	1.72	2.16	2.16	2.27	0.015312	1.46	7.83	37.22	1.01
Local Creek 5	Local Creek 5	27	CLC - 100	11.40	0.69	1.39	1.39	1.51	0.012769	1.58	7.37	30.00	0.97

APPENDIX M

LOCAL CREEK 6

HEC-RAS Plan: Local Creek 6 Profile: CC 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 1	1587.56	CC 20	3.50	11.48	11.81		11.82	0.003413	0.60	6.05	37.83	0.46
Reach 1	1475.46	CC 20	3.50	11.06	11.52		11.53	0.002060	0.59	5.93	24.29	0.38
Reach 1	1329.06	CC 20	3.50	10.70	11.43		11.44	0.000292	0.34	10.17	21.55	0.16
Reach 1	1234.66	CC 20	3.50	10.65	11.40		11.41	0.000410	0.34	10.27	28.52	0.18
Reach 1	1162	CC 20	3.50	10.89	11.23	11.23	11.31	0.012284	1.26	2.78	13.93	0.90
Reach 1	1045.56	CC 20	3.50	7.97	9.75	8.08	9.75	0.000000	0.01	279.42	205.07	0.00
Reach 1	875.56	CC 20	3.50	7.95	9.75		9.75	0.000000	0.01	289.84	212.51	0.00
Reach 2	1865.02	CC 20	1.20	10.69	11.05	11.05	11.17	0.015203	1.52	0.79	3.39	1.01
Reach 2	1767.22	CC 20	1.20	9.78	10.34	10.19	10.39	0.003707	0.94	1.28	3.91	0.52
Reach 2	1679.15	CC 20	1.20	9.90	10.31	10.10	10.31	0.000306	0.18	6.77	90.54	0.14
Reach 2	1599.02	CC 20	1.20	9.28	10.31		10.31	0.000001	0.03	48.11	97.18	0.01
Reach 2	1488.62	CC 20	1.20	8.98	10.31	9.16	10.31	0.000002	0.04	29.37	39.15	0.02
Reach 2	1475		Culvert									
Reach 2	1449.72	CC 20	1.20	8.81	9.76		9.76	0.000041	0.10	12.43	40.71	0.06
Reach 2	1357.62	CC 20	1.20	9.01	9.75	9.39	9.75	0.000055	0.10	11.66	43.07	0.06
Reach 2	1223.02	CC 20	1.20	8.68	9.75		9.75	0.000006	0.05	23.87	48.23	0.02
Reach 2	1071.12	CC 20	1.20	8.17	9.75		9.75	0.000002	0.05	28.51	49.87	0.02
Reach 2	974.32	CC 20	1.20	8.50	9.75		9.75	0.000005	0.06	21.90	42.79	0.02
Reach 2	860.72	CC 20	1.20	7.98	9.75		9.75	0.000004	0.06	22.59	33.81	0.02
DS Reach 4	808.07	CC 20	4.70	8.00	9.74		9.75	0.000071	0.29	21.43	46.02	0.09
DS Reach 4	743.97	CC 20	4.70	7.94	9.74		9.74	0.000027	0.19	33.04	53.75	0.06
DS Reach 4	641.77	CC 20	4.70	7.81	9.74		9.74	0.000017	0.15	37.69	53.69	0.04
DS Reach 4	570.97	CC 20	4.70	7.88	9.74		9.74	0.000029	0.20	29.71	46.49	0.06
DS Reach 4	541.77	CC 20	4.70	7.84	9.74		9.74	0.000028	0.19	29.53	37.24	0.06
DS Reach 2	451.05	CC 20	0.01	9.12	9.73		9.73	0.000000	0.00	17.01	74.58	0.00
DS Reach 2	412.85	CC 20	0.01	4.84	9.73		9.73	0.000000	0.00	384.69	115.67	0.00
DS Reach 2	317.25	CC 20	0.01	4.84	9.73		9.73	0.000000	0.00	211.58	61.58	0.00
DS Reach 2	236.55	CC 20	0.01	5.76	9.73		9.73	0.000000	0.00	72.70	29.46	0.00
DS Reach 2	181.45	CC 20	0.01	6.56	9.73		9.73	0.000000	0.00	55.32	28.78	0.00
DS Reach 3	464.8	CC 20	4.70	7.75	9.74		9.74	0.000014	0.17	37.10	43.60	0.04
DS Reach 3	376.6	CC 20	4.70	7.59	9.74		9.74	0.000014	0.16	37.31	50.11	0.04
DS Reach 3	324.8	CC 20	4.70	8.22	9.74		9.74	0.000012	0.11	48.47	64.97	0.04
DS Reach 3	242.9	CC 20	4.70	8.00	9.73		9.73	0.000084	0.26	26.83	79.34	0.09
DS Reach 3	166.6	CC 20	4.70	6.92	9.73		9.73	0.000023	0.18	34.52	96.89	0.05
DS Reach 1	100.5	CC 20	4.70	6.42	9.73		9.73	0.000002	0.06	98.04	168.24	0.02
DS Reach 1	75.1	CC 20	4.70	6.69	9.73	7.36	9.73	0.000003	0.08	83.31	148.95	0.02
DS Reach 1	60		Culvert									
DS Reach 1	40.5	CC 20	4.70	3.72	4.28	4.28	4.50	0.012640	2.11	2.23	4.93	1.00
DS Reach 1	0	CC 20	4.70	2.03	3.02	3.02	3.33	0.013780	2.46	1.91	3.17	1.01

HEC-RAS Plan: Local Creek 6 Profile: CC 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 1	1587.56	CC 100	7.70	11.48	11.92		11.95	0.002815	0.73	10.97	44.58	0.45
Reach 1	1475.46	CC 100	7.70	11.06	11.74		11.76	0.001132	0.65	12.24	32.66	0.31
Reach 1	1329.06	CC 100	7.70	10.70	11.65		11.66	0.000435	0.51	15.74	33.57	0.20
Reach 1	1234.66	CC 100	7.70	10.65	11.60		11.62	0.000496	0.45	16.96	35.32	0.21
Reach 1	1162	CC 100	7.70	10.89	11.35	11.35	11.50	0.013738	1.72	4.47	15.14	1.01
Reach 1	1045.56	CC 100	7.70	7.97	9.85	8.12	9.85	0.000000	0.03	300.93	206.05	0.01
Reach 1	875.56	CC 100	7.70	7.95	9.85		9.85	0.000000	0.02	312.10	213.02	0.01
Reach 2	1865.02	CC 100	2.60	10.69	11.31		11.41	0.006492	1.40	1.85	4.70	0.71
Reach 2	1767.22	CC 100	2.60	9.78	10.38	10.37	10.55	0.012651	1.79	1.45	4.20	0.97
Reach 2	1679.15	CC 100	2.60	9.90	10.41	10.16	10.41	0.000313	0.24	10.96	107.35	0.15
Reach 2	1599.02	CC 100	2.60	9.28	10.41		10.41	0.000003	0.05	58.87	112.52	0.02
Reach 2	1488.62	CC 100	2.60	8.98	10.41	9.25	10.41	0.000007	0.08	33.35	39.80	0.03
Reach 2	1475		Culvert									
Reach 2	1449.72	CC 100	2.60	8.81	9.87		9.87	0.000070	0.15	17.46	48.72	0.08
Reach 2	1357.62	CC 100	2.60	9.01	9.86	9.46	9.86	0.000096	0.15	16.92	52.10	0.09
Reach 2	1223.02	CC 100	2.60	8.68	9.86		9.86	0.000014	0.09	29.15	49.03	0.04
Reach 2	1071.12	CC 100	2.60	8.17	9.86		9.86	0.000007	0.10	33.98	52.84	0.03
Reach 2	974.32	CC 100	2.60	8.50	9.86		9.86	0.000015	0.10	26.81	47.60	0.04
Reach 2	860.72	CC 100	2.60	7.98	9.85		9.86	0.000012	0.12	26.26	36.22	0.04
DS Reach 4	808.07	CC 100	10.30	8.00	9.84		9.85	0.000219	0.55	26.30	56.71	0.16
DS Reach 4	743.97	CC 100	10.30	7.94	9.84		9.84	0.000087	0.35	38.21	56.58	0.10
DS Reach 4	641.77	CC 100	10.30	7.81	9.83		9.83	0.000060	0.29	42.62	57.31	0.08
DS Reach 4	570.97	CC 100	10.30	7.88	9.82		9.83	0.000101	0.40	33.65	48.77	0.11
DS Reach 4	541.77	CC 100	10.30	7.84	9.82		9.83	0.000100	0.37	32.56	37.79	0.11
DS Reach 2	451.05	CC 100	2.28	9.12	9.80		9.80	0.000047	0.10	22.68	77.59	0.06
DS Reach 2	412.85	CC 100	2.28	4.84	9.80		9.80	0.000000	0.01	393.23	115.86	0.00
DS Reach 2	317.25	CC 100	2.28	4.84	9.80		9.80	0.000000	0.01	216.14	62.02	0.00
DS Reach 2	236.55	CC 100	2.28	5.76	9.80		9.80	0.000000	0.03	74.89	29.89	0.01
DS Reach 2	181.45	CC 100	2.28	6.56	9.80		9.80	0.000001	0.04	57.46	29.44	0.01
DS Reach 3	464.8	CC 100	8.03	7.75	9.82		9.82	0.000032	0.26	40.64	43.92	0.06
DS Reach 3	376.6	CC 100	8.03	7.59	9.82		9.82	0.000032	0.25	41.36	53.21	0.06
DS Reach 3	324.8	CC 100	8.03	8.22	9.81		9.82	0.000026	0.17	53.62	65.62	0.05
DS Reach 3	242.9	CC 100	8.03	8.00	9.81		9.81	0.000146	0.35	32.91	81.31	0.12
DS Reach 3	166.6	CC 100	8.03	6.92	9.80		9.81	0.000051	0.26	42.02	112.29	0.08
DS Reach 1	100.5	CC 100	10.30	6.42	9.80		9.80	0.000007	0.13	111.00	183.32	0.03
DS Reach 1	75.1	CC 100	10.30	6.69	9.80	7.64	9.80	0.000011	0.16	94.54	160.65	0.04
DS Reach 1	60		Culvert									
DS Reach 1	40.5	CC 100	10.30	3.72	4.60	4.60	4.95	0.011588	2.65	3.89	5.52	1.01
DS Reach 1	0	CC 100	10.30	2.03	3.47	3.47	3.89	0.012547	2.89	3.57	4.24	1.01

HEC-RAS Plan: Local Creek 6 Profile: CLC 20

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 1	1587.56	CLC 20	5.60	11.48	11.86		11.89	0.003505	0.70	8.33	42.65	0.49
Reach 1	1475.46	CLC 20	5.60	11.06	11.64		11.66	0.001365	0.62	9.21	29.10	0.33
Reach 1	1329.06	CLC 20	5.60	10.70	11.55		11.56	0.000374	0.43	13.04	26.10	0.19
Reach 1	1234.66	CLC 20	5.60	10.65	11.52		11.52	0.000484	0.40	13.87	33.78	0.20
Reach 1	1162	CLC 20	5.60	10.89	11.29	11.29	11.41	0.014043	1.56	3.60	14.47	1.00
Reach 1	1045.56	CLC 20	5.60	7.97	9.81	8.10	9.81	0.000000	0.02	291.52	205.66	0.01
Reach 1	875.56	CLC 20	5.60	7.95	9.81		9.81	0.000000	0.02	302.37	212.80	0.00
Reach 2	1865.02	CLC 20	1.90	10.69	11.18	11.14	11.29	0.009940	1.50	1.27	4.04	0.85
Reach 2	1767.22	CLC 20	1.90	9.78	10.37	10.29	10.47	0.007167	1.34	1.42	4.14	0.73
Reach 2	1679.15	CLC 20	1.90	9.90	10.37	10.14	10.37	0.000291	0.21	9.19	98.80	0.14
Reach 2	1599.02	CLC 20	1.90	9.28	10.37		10.37	0.000002	0.04	54.21	108.11	0.01
Reach 2	1488.62	CLC 20	1.90	8.98	10.37	9.21	10.37	0.000004	0.06	31.69	39.51	0.02
Reach 2	1475		Culvert									
Reach 2	1449.72	CLC 20	1.90	8.81	9.82		9.82	0.000056	0.13	15.11	44.37	0.07
Reach 2	1357.62	CLC 20	1.90	9.01	9.81	9.44	9.81	0.000077	0.13	14.48	48.00	0.08
Reach 2	1223.02	CLC 20	1.90	8.68	9.81		9.81	0.000010	0.07	26.81	48.78	0.03
Reach 2	1071.12	CLC 20	1.90	8.17	9.81		9.81	0.000004	0.08	31.53	50.56	0.02
Reach 2	974.32	CLC 20	1.90	8.50	9.81		9.81	0.000010	0.08	24.60	46.89	0.03
Reach 2	860.72	CLC 20	1.90	7.98	9.81		9.81	0.000008	0.09	24.62	34.45	0.03
DS Reach 4	808.07	CLC 20	7.50	8.00	9.80		9.81	0.000140	0.43	24.11	50.33	0.13
DS Reach 4	743.97	CLC 20	7.50	7.94	9.80		9.80	0.000054	0.27	35.98	55.55	0.08
DS Reach 4	641.77	CLC 20	7.50	7.81	9.79		9.80	0.000035	0.22	40.52	55.69	0.06
DS Reach 4	570.97	CLC 20	7.50	7.88	9.79		9.79	0.000061	0.30	32.03	47.65	0.09
DS Reach 4	541.77	CLC 20	7.50	7.84	9.79		9.79	0.000059	0.28	31.33	37.57	0.08
DS Reach 2	451.05	CLC 20	0.01	9.12	9.77		9.77	0.000000	0.00	20.08	77.59	0.00
DS Reach 2	412.85	CLC 20	0.01	4.84	9.77		9.77	0.000000	0.00	389.30	115.77	0.00
DS Reach 2	317.25	CLC 20	0.01	4.84	9.77		9.77	0.000000	0.00	214.04	61.82	0.00
DS Reach 2	236.55	CLC 20	0.01	5.76	9.77		9.77	0.000000	0.00	73.88	29.68	0.00
DS Reach 2	181.45	CLC 20	0.01	6.56	9.77		9.77	0.000000	0.00	56.47	29.14	0.00
DS Reach 3	464.8	CLC 20	7.50	7.75	9.78		9.79	0.000031	0.25	39.17	43.79	0.06
DS Reach 3	376.6	CLC 20	7.50	7.59	9.78		9.78	0.000031	0.24	39.63	51.15	0.06
DS Reach 3	324.8	CLC 20	7.50	8.22	9.78		9.78	0.000026	0.17	51.44	65.35	0.05
DS Reach 3	242.9	CLC 20	7.50	8.00	9.77		9.78	0.000160	0.37	30.17	80.43	0.13
DS Reach 3	166.6	CLC 20	7.50	6.92	9.77		9.77	0.000051	0.26	38.36	102.82	0.08
DS Reach 1	100.5	CLC 20	7.50	6.42	9.77		9.77	0.000004	0.10	104.92	178.25	0.02
DS Reach 1	75.1	CLC 20	7.50	6.69	9.77	7.52	9.77	0.000007	0.12	89.28	154.83	0.03
DS Reach 1	60		Culvert									
DS Reach 1	40.5	CLC 20	7.50	3.72	4.45	4.45	4.75	0.011827	2.41	3.11	5.25	1.00
DS Reach 1	0	CLC 20	7.50	2.03	3.27	3.27	3.64	0.012894	2.70	2.78	3.75	1.00

HEC-RAS Plan: Local Creek 6 Profile: CLC 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 1	1587.56	CLC 100	10.00	11.48	11.99		12.01	0.002299	0.75	13.92	47.22	0.42
Reach 1	1475.46	CLC 100	10.00	11.06	11.83		11.85	0.001030	0.69	15.07	34.27	0.31
Reach 1	1329.06	CLC 100	10.00	10.70	11.73		11.75	0.000476	0.57	18.88	41.47	0.22
Reach 1	1234.66	CLC 100	10.00	10.65	11.69		11.70	0.000506	0.50	19.88	36.00	0.22
Reach 1	1162	CLC 100	10.00	10.89	11.41	11.41	11.58	0.012723	1.82	5.50	16.28	1.00
Reach 1	1045.56	CLC 100	10.00	7.97	9.89	8.15	9.89	0.000001	0.03	308.97	206.38	0.01
Reach 1	875.56	CLC 100	10.00	7.95	9.89		9.89	0.000001	0.03	320.40	213.18	0.01
Reach 2	1865.02	CLC 100	3.40	10.69	11.39		11.51	0.006452	1.51	2.26	5.09	0.72
Reach 2	1767.22	CLC 100	3.40	9.78	10.46	10.46	10.64	0.012781	1.91	1.78	4.70	0.99
Reach 2	1679.15	CLC 100	3.40	9.90	10.44	10.19	10.45	0.000348	0.27	12.59	112.76	0.16
Reach 2	1599.02	CLC 100	3.40	9.28	10.45		10.45	0.000005	0.06	63.14	114.50	0.02
Reach 2	1488.62	CLC 100	3.40	8.98	10.44	9.28	10.45	0.000011	0.10	34.84	40.08	0.03
Reach 2	1475		Culvert									
Reach 2	1449.72	CLC 100	3.40	8.81	9.91		9.92	0.000086	0.18	19.69	51.93	0.09
Reach 2	1357.62	CLC 100	3.40	9.01	9.90	9.49	9.91	0.000113	0.18	19.20	53.93	0.09
Reach 2	1223.02	CLC 100	3.40	8.68	9.90		9.90	0.000020	0.11	31.19	49.24	0.04
Reach 2	1071.12	CLC 100	3.40	8.17	9.90		9.90	0.000010	0.12	36.17	53.79	0.03
Reach 2	974.32	CLC 100	3.40	8.50	9.90		9.90	0.000020	0.13	28.75	48.20	0.05
Reach 2	860.72	CLC 100	3.40	7.98	9.89		9.90	0.000017	0.14	27.74	38.33	0.04
DS Reach 4	808.07	CLC 100	13.40	8.00	9.87		9.89	0.000334	0.69	28.19	60.45	0.20
DS Reach 4	743.97	CLC 100	13.40	7.94	9.87		9.87	0.000130	0.44	39.95	57.31	0.12
DS Reach 4	641.77	CLC 100	13.40	7.81	9.86		9.86	0.000092	0.36	44.17	57.88	0.10
DS Reach 4	570.97	CLC 100	13.40	7.88	9.84		9.85	0.000157	0.50	34.74	48.91	0.14
DS Reach 4	541.77	CLC 100	13.40	7.84	9.84		9.85	0.000158	0.47	33.35	37.93	0.14
DS Reach 2	451.05	CLC 100	4.92	9.12	9.82		9.83	0.000175	0.21	24.32	77.59	0.12
DS Reach 2	412.85	CLC 100	4.92	4.84	9.83		9.83	0.000000	0.01	395.81	115.91	0.00
DS Reach 2	317.25	CLC 100	4.92	4.84	9.83		9.83	0.000000	0.02	217.52	62.16	0.00
DS Reach 2	236.55	CLC 100	4.92	5.76	9.83		9.83	0.000001	0.07	75.55	30.01	0.01
DS Reach 2	181.45	CLC 100	4.92	6.56	9.83		9.83	0.000003	0.08	58.11	29.64	0.02
DS Reach 3	464.8	CLC 100	8.49	7.75	9.84		9.84	0.000034	0.26	41.61	44.00	0.07
DS Reach 3	376.6	CLC 100	8.49	7.59	9.84		9.84	0.000034	0.26	42.54	53.58	0.07
DS Reach 3	324.8	CLC 100	8.49	8.22	9.84		9.84	0.000027	0.18	55.06	65.80	0.05
DS Reach 3	242.9	CLC 100	8.49	8.00	9.83		9.83	0.000142	0.35	34.71	81.88	0.12
DS Reach 3	166.6	CLC 100	8.49	6.92	9.82		9.83	0.000053	0.27	44.53	115.97	0.08
DS Reach 1	100.5	CLC 100	13.40	6.42	9.82		9.83	0.000011	0.16	114.96	185.53	0.04
DS Reach 1	75.1	CLC 100	13.40	6.69	9.82	7.75	9.83	0.000018	0.21	97.98	164.14	0.05
DS Reach 1	60		Culvert									
DS Reach 1	40.5	CLC 100	13.40	3.72	4.74	4.74	5.15	0.011301	2.85	4.70	5.76	1.01
DS Reach 1	0	CLC 100	13.40	2.03	3.65	3.65	4.13	0.012242	3.06	4.38	4.64	1.01

APPENDIX M

LOCAL CREEK 7

HEC-RAS Plan: LC7 CC20 Profile: 23SEP2008 0000

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
US Reach 1D	1541.27	23SEP2008 0000	0.40	9.77	10.05		10.05	0.000161	0.10	3.94	33.40	0.09
US Reach 1D	1386.87	23SEP2008 0000	0.40	9.66	10.04		10.04	0.000024	0.06	6.40	26.71	0.04
US Reach 1D	1228.47	23SEP2008 0000	0.40	9.73	10.02		10.02	0.000126	0.10	4.16	31.76	0.08
US Reach 1D	1080.47	23SEP2008 0000	0.40	9.60	10.00		10.00	0.000041	0.08	5.16	23.63	0.05
US Reach 3B	1773.63	23SEP2008 0000	0.40	9.63	9.83		9.84	0.000659	0.21	1.93	16.18	0.19
US Reach 3B	1639.93	23SEP2008 0000	0.40	9.21	9.81		9.81	0.000044	0.11	3.64	13.87	0.06
US Reach 3B	1509.03	23SEP2008 0000	0.40	9.14	9.80		9.81	0.000079	0.11	3.51	14.62	0.07
US Reach 3B	1432.23	23SEP2008 0000	0.40	8.98	9.80		9.80	0.000009	0.05	8.19	24.34	0.03
Joint 1-3B	1552.89	23SEP2008 0000	-0.18	9.56	9.80		9.81	0.000879	-0.27	0.64	4.36	0.23
Joint 1-3B	1529.09	23SEP2008 0000	-0.18	9.65	9.82		9.83	0.001091	-0.23	0.76	7.71	0.24
Joint 1-3B	1475.69	23SEP2008 0000	-0.18	8.79	9.84		9.84	0.000002	-0.04	5.21	11.44	0.01
Joint 1-3B	1402.89	23SEP2008 0000	-0.18	9.43	9.84		9.84	0.000043	-0.08	2.27	10.70	0.05
Joint 1-3B	1354.89	23SEP2008 0000	-0.18	9.28	9.84		9.84	0.000011	-0.05	3.40	10.24	0.03
Joint 1-3B	1273.89	23SEP2008 0000	-0.18	9.49	9.84		9.84	0.000075	-0.09	1.87	9.89	0.07
Joint 1-3B	1212.29	23SEP2008 0000	-0.18	9.44	9.84		9.84	0.000056	-0.09	2.05	10.07	0.06
Joint 1-3B	1153.19	23SEP2008 0000	-0.18	9.02	9.84		9.84	0.000003	-0.04	4.58	8.98	0.02
Joint 1-3B	1099.19	23SEP2008 0000	-0.18	9.52	9.85		9.85	0.000273	-0.19	0.91	4.30	0.13
Joint 1-3B	1048.49	23SEP2008 0000	-0.18	9.67	9.89		9.89	0.001707	-0.36	0.50	3.72	0.31
Joint 1-3B	1015.29	23SEP2008 0000	-0.18	9.77	9.96		9.96	0.003188	-0.36	0.49	5.73	0.40
Joint 1-3B	969.39	23SEP2008 0000	-0.18	9.59	9.99		9.99	0.000094	-0.13	1.34	5.05	0.08
US Reach 1C	819.68	23SEP2008 0000	0.22	9.61	9.99		9.99	0.000019	0.06	3.76	14.35	0.04
US Reach 1C	670.88	23SEP2008 0000	0.22	9.80	9.98		9.98	0.000723	0.16	1.42	19.23	0.19
US Reach 1C	531.58	23SEP2008 0000	0.23	9.71	9.90		9.90	0.001765	0.24	0.96	13.93	0.29
US Reach 3A	1376.23	23SEP2008 0000	0.58	8.58	9.80		9.80	0.000011	0.07	8.54	17.90	0.03
US Reach 3A	1236.23	23SEP2008 0000	0.58	8.84	9.80		9.80	0.000016	0.06	9.70	32.06	0.03
US Reach 3A	1099.03	23SEP2008 0000	0.58	9.38	9.80		9.80	0.000116	0.11	5.10	28.78	0.09
US Reach 3A	1007.03	23SEP2008 0000	0.58	9.45	9.76		9.76	0.000357	0.18	3.33	24.31	0.15
US Reach 3A	931.03	23SEP2008 0000	0.58	9.45	9.67		9.68	0.001988	0.38	1.60	14.15	0.34
US Reach 3A	820.03	23SEP2008 0000	0.58	9.03	9.45		9.45	0.000031	0.08	7.26	26.05	0.05
US Reach 3A	694.73	23SEP2008 0000	0.58	9.00	9.44		9.45	0.000117	0.15	3.74	13.26	0.09
US Reach 3A	637.43	23SEP2008 0000	0.58	9.02	9.43		9.43	0.000225	0.20	2.86	11.14	0.13
Joint 1-3A	811.05	23SEP2008 0000	-0.26	9.26	9.39		9.42	0.018417	-0.69	0.37	6.25	0.90
Joint 1-3A	791.85	23SEP2008 0000	-0.26	9.30	9.56		9.56	0.000474	-0.18	1.41	11.35	0.16
Joint 1-3A	752.75	23SEP2008 0000	-0.26	9.34	9.58		9.58	0.000253	-0.15	1.72	11.56	0.12
Joint 1-3A	718.35	23SEP2008 0000	-0.26	9.38	9.59		9.59	0.000684	-0.23	1.11	8.14	0.20
Joint 1-3A	680.75	23SEP2008 0000	-0.26	9.38	9.61		9.61	0.000497	-0.21	1.20	7.86	0.17
Joint 1-3A	629.05	23SEP2008 0000	-0.26	9.48	9.66		9.67	0.002985	-0.34	0.75	9.22	0.38
Joint 1-3A	581.25	23SEP2008 0000	-0.26	9.55	9.73		9.73	0.001019	-0.24	1.05	9.68	0.23
Joint 1-3A	548	23SEP2008 0000	-0.26	9.58	9.77		9.78	0.001689	-0.35	0.74	5.79	0.31
Joint 1-3A	504.85	23SEP2008 0000	-0.26	9.57	9.82		9.83	0.000972	-0.26	0.98	7.83	0.23
Joint 1-3A	483.35	23SEP2008 0000	-0.26	9.57	9.84		9.84	0.000352	-0.16	1.60	12.30	0.14
US Reach 1B	457.45	23SEP2008 0000	-0.03	9.70	9.84		9.84	0.000020	-0.03	1.12	14.40	0.03
US Reach 1B	379.35	23SEP2008 0000	-0.03	9.61	9.84		9.84	0.000006	-0.02	1.69	14.87	0.02
US Reach 1B	344.84	23SEP2008 0000	0.03	9.66	9.73		9.73	0.007591	0.29	0.11	3.42	0.52
US Reach 2A	2406.41	23SEP2008 0000	0.10	8.23	8.72		8.72	0.000000	0.01	11.17	37.45	0.01
US Reach 2A	2216.41	23SEP2008 0000	0.10	7.98	8.72		8.72	0.000000	0.01	16.86	37.45	0.00
US Reach 2A	2091.11	23SEP2008 0000	0.10	8.05	8.72		8.72	0.000000	0.01	15.53	48.81	0.00
US Reach 2A	1966.51	23SEP2008 0000	0.10	8.21	8.72		8.72	0.000000	0.01	12.97	35.92	0.00
US Reach 2A	1863.31	23SEP2008 0000	0.10	8.20	8.72		8.72	0.000001	0.01	7.74	28.00	0.01
US Reach 2A	1742.91	23SEP2008 0000	0.10	8.33	8.72		8.72	0.000000	0.01	10.48	37.80	0.01
US Reach 2A	1690.61	23SEP2008 0000	0.10	8.40	8.72		8.72	0.000001	0.01	7.88	39.82	0.01
US Reach 3	610.69	23SEP2008 0000	0.83	9.10	9.39		9.40	0.001942	0.44	1.89	11.54	0.35
US Reach 3	584.69	23SEP2008 0000	0.83	8.87	9.19	9.18	9.27	0.015275	1.29	0.65	3.65	0.97
US Reach 1A	1659.75	23SEP2008 0000	0.70	9.97	10.23		10.23	0.000625	0.23	2.99	20.06	0.19
US Reach 1A	1528.15	23SEP2008 0000	0.70	9.82	10.11		10.11	0.000696	0.23	3.06	23.03	0.20
US Reach 1A	1415.35	23SEP2008 0000	0.70	9.54	10.08		10.09	0.000051	0.10	7.22	27.67	0.06
US Reach 1A	1297.75	23SEP2008 0000	0.70	9.44	10.08		10.08	0.000028	0.09	7.51	19.19	0.05
US Reach 1A	1149.75	23SEP2008 0000	0.70	9.20	10.07		10.07	0.000256	0.22	3.12	11.07	0.14
US Reach 1A	1104.15	23SEP2008 0000	0.70	9.48	10.06		10.06	0.000267	0.20	3.52	15.76	0.13
US Reach 1A	1038.55	23SEP2008 0000	0.70	9.62	10.03		10.04	0.000191	0.20	3.53	12.40	0.12
US Reach 1A	1006.35	23SEP2008 0000	0.70	9.79	10.00		10.01	0.002385	0.44	1.57	11.00	0.38
US Reach 1A	933.15	23SEP2008 0000	0.70	9.41	9.86		9.86	0.000691	0.25	2.80	18.31	0.20
US Reach 1A	881.25	23SEP2008 0000	0.70	9.34	9.83		9.83	0.000337	0.20	3.54	19.25	0.15
US Reach 1A	827.25	23SEP2008 0000	0.70	9.05	9.82		9.82	0.000081	0.17	4.10	9.40	0.08
US Reach 1A	739.75	23SEP2008 0000	0.70	9.23	9.81		9.81	0.000096	0.17	4.12	10.88	0.09
US Reach 1A	664.95	23SEP2008 0000	0.70	9.42	9.79		9.79	0.000716	0.30	2.32	11.68	0.22
US Reach 1A	580.95	23SEP2008 0000	0.70	9.35	9.72		9.73	0.000768	0.27	2.56	15.80	0.22
US Reach 1A	440.05	23SEP2008 0000	0.70	8.45	9.71		9.71	0.000007	0.07	9.63	12.86	0.03
US Reach 1A	345.55	23SEP2008 0000	0.70	8.80	9.61		9.64	0.008093	0.82	0.85	5.33	0.65
US Reach 1	308.87	23SEP2008 0000	0.73	9.15	9.43		9.45	0.002253	0.52	1.39	7.26	0.38
US Reach 1	291.77	23SEP2008 0000	0.73	8.93	9.42		9.42	0.000688	0.35	2.08	8.14	0.22
US Reach 1	251.57	23SEP2008 0000	0.73	8.61	9.41		9.41	0.000030	0.12	6.17	11.84	0.05
US Reach 1	219.57	23SEP2008 0000	0.73	8.20	8.97	9.02	9.24	0.045578	2.29	0.32	0.83	1.18
US Reach 1	191.37	23SEP2008 0000	0.73	8.00	8.30	8.30	8.40	0.016274	1.45	0.50	2.38	1.01
US Reach 2	514.69	23SEP2008 0000	0.93	8.06	8.71		8.71	0.000048	0.10	9.61	35.13	0.06
US Reach 2	444.69	23SEP2008 0000	0.93	8.14	8.70		8.70	0.000278	0.18	5.18	28.06	0.13
US Reach 2	318.69	23SEP2008 0000	0.93	8.25	8.62		8.63	0.001189	0.34	2.71	16.52	0.27
US Reach 2	235.69	23SEP2008 0000	0.93	8.01	8.37		8.40	0.005481	0.75	1.24	7.35	0.58
DS Reach	165.5	23SEP2008 0000	1.66	7.41	8.06		8.10	0.002967	0.94	1.77	4.56	0.48
DS Reach	134.8	23SEP2008 0000	1.66	6.97	8.04		8.05	0.000138	0.31	5.34	7.06	0.11
DS Reach	120		Culvert									
DS Reach	101	23SEP2008 0000	1.66	6.65	7.46		7.48	0.001022	0.59	2.81	6.61	0.29
DS Reach	96.2	23SEP2008 0000	1.66	6.40	7.45		7.47	0.001795	0.65	2.56	7.70	0.36

HEC-RAS Plan: LC7 CC20 Profile: 23SEP2008 0000 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
DS Reach	90		Culvert									
DS Reach	86.1	23SEP2008 0000	1.66	6.33	6.96	7.02	7.18	0.030614	2.10	0.79	3.38	1.38
DS Reach	79.3	23SEP2008 0000	1.66	6.03	7.00		7.01	0.000632	0.56	2.94	4.90	0.23
DS Reach	50	23SEP2008 0000	1.66	4.82	5.06	5.20	5.57	0.115728	3.16	0.52	3.52	2.62
DS Reach	0	23SEP2008 0000	1.66	-5.00	2.20	-4.95	2.20	0.000000	0.00	349.92	52.20	0.00

HEC-RAS Plan: LC7 CC100 Profile: 23SEP2008 0000

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
US Reach 1D	1541.27	23SEP2008 0000	0.90	9.77	10.14		10.15	0.000119	0.11	7.87	44.54	0.09
US Reach 1D	1386.87	23SEP2008 0000	0.90	9.66	10.13		10.13	0.000044	0.10	9.26	31.60	0.06
US Reach 1D	1228.47	23SEP2008 0000	0.90	9.73	10.11		10.11	0.000128	0.12	7.54	42.21	0.09
US Reach 1D	1080.47	23SEP2008 0000	0.90	9.60	10.08		10.08	0.000084	0.13	7.10	26.59	0.08
US Reach 3B	1773.63	23SEP2008 0000	0.90	9.63	9.95		9.95	0.000400	0.23	4.19	29.28	0.16
US Reach 3B	1639.93	23SEP2008 0000	0.90	9.21	9.92		9.92	0.000087	0.18	5.98	28.68	0.09
US Reach 3B	1509.03	23SEP2008 0000	0.90	9.14	9.91		9.91	0.000143	0.16	5.72	25.13	0.10
US Reach 3B	1432.23	23SEP2008 0000	0.90	8.98	9.90		9.90	0.000024	0.08	10.98	31.02	0.04
Joint 1-3B	1552.89	23SEP2008 0000	-0.36	9.56	9.90		9.91	0.000924	-0.31	1.15	6.76	0.24
Joint 1-3B	1529.09	23SEP2008 0000	-0.36	9.65	9.92		9.92	0.000516	-0.21	1.69	11.51	0.18
Joint 1-3B	1475.69	23SEP2008 0000	-0.36	8.79	9.93		9.93	0.000006	-0.06	6.34	13.05	0.02
Joint 1-3B	1402.89	23SEP2008 0000	-0.36	9.43	9.93		9.93	0.000058	-0.10	3.40	12.75	0.06
Joint 1-3B	1354.89	23SEP2008 0000	-0.36	9.28	9.93		9.93	0.000022	-0.08	4.45	12.02	0.04
Joint 1-3B	1273.89	23SEP2008 0000	-0.36	9.49	9.93		9.93	0.000100	-0.12	2.90	12.95	0.08
Joint 1-3B	1212.29	23SEP2008 0000	-0.36	9.44	9.94		9.94	0.000070	-0.12	3.09	11.50	0.07
Joint 1-3B	1153.19	23SEP2008 0000	-0.36	9.02	9.94		9.94	0.000008	-0.06	5.49	9.65	0.03
Joint 1-3B	1099.19	23SEP2008 0000	-0.36	9.52	9.94		9.95	0.000400	-0.24	1.49	6.91	0.16
Joint 1-3B	1048.49	23SEP2008 0000	-0.36	9.67	9.98		9.99	0.001432	-0.40	0.89	4.94	0.30
Joint 1-3B	1015.29	23SEP2008 0000	-0.36	9.77	10.03		10.04	0.001847	-0.38	0.95	7.01	0.33
Joint 1-3B	969.39	23SEP2008 0000	-0.36	9.59	10.06		10.06	0.000195	-0.21	1.69	5.45	0.12
US Reach 1C	819.68	23SEP2008 0000	0.54	9.61	10.06		10.06	0.000058	0.11	4.74	15.64	0.07
US Reach 1C	670.88	23SEP2008 0000	0.54	9.80	10.04		10.04	0.000637	0.20	2.78	24.71	0.19
US Reach 1C	531.58	23SEP2008 0000	0.54	9.71	9.95		9.96	0.001685	0.29	1.90	19.85	0.30
US Reach 3A	1376.23	23SEP2008 0000	1.26	8.58	9.90		9.90	0.000034	0.12	10.52	21.24	0.05
US Reach 3A	1236.23	23SEP2008 0000	1.26	8.84	9.90		9.90	0.000032	0.10	13.05	35.68	0.05
US Reach 3A	1099.03	23SEP2008 0000	1.26	9.38	9.89		9.89	0.000150	0.16	7.97	33.08	0.10
US Reach 3A	1007.03	23SEP2008 0000	1.26	9.45	9.85		9.85	0.000374	0.20	6.12	35.84	0.15
US Reach 3A	931.03	23SEP2008 0000	1.26	9.45	9.75		9.76	0.002384	0.45	2.95	23.13	0.38
US Reach 3A	820.03	23SEP2008 0000	1.26	9.03	9.58		9.59	0.000042	0.12	11.09	31.79	0.06
US Reach 3A	694.73	23SEP2008 0000	1.26	9.00	9.57		9.57	0.000170	0.23	5.46	14.04	0.12
US Reach 3A	637.43	23SEP2008 0000	1.26	9.02	9.55		9.55	0.000366	0.29	4.33	14.06	0.17
Joint 1-3A	811.05	23SEP2008 0000	-0.42	9.26	9.52		9.53	0.001094	-0.32	1.30	8.30	0.26
Joint 1-3A	791.85	23SEP2008 0000	-0.42	9.30	9.55		9.55	0.001903	-0.34	1.25	11.21	0.32
Joint 1-3A	752.75	23SEP2008 0000	-0.42	9.34	9.59		9.59	0.000509	-0.22	1.88	11.71	0.18
Joint 1-3A	718.35	23SEP2008 0000	-0.42	9.38	9.61		9.62	0.001150	-0.32	1.30	8.53	0.26
Joint 1-3A	680.75	23SEP2008 0000	-0.42	9.38	9.64		9.64	0.000726	-0.28	1.48	8.35	0.21
Joint 1-3A	629.05	23SEP2008 0000	-0.42	9.48	9.70		9.71	0.002508	-0.37	1.14	10.97	0.36
Joint 1-3A	581.25	23SEP2008 0000	-0.42	9.55	9.77		9.77	0.001004	-0.28	1.48	10.69	0.24
Joint 1-3A	548	23SEP2008 0000	-0.42	9.58	9.82		9.82	0.002534	-0.39	1.08	9.65	0.37
Joint 1-3A	504.85	23SEP2008 0000	-0.42	9.57	9.87		9.88	0.000934	-0.29	1.43	9.37	0.24
Joint 1-3A	483.35	23SEP2008 0000	-0.42	9.57	9.89		9.89	0.000357	-0.18	2.32	15.12	0.15
US Reach 1B	457.45	23SEP2008 0000	0.13	9.70	9.89		9.89	0.000069	0.07	1.89	16.15	0.06
US Reach 1B	379.35	23SEP2008 0000	0.13	9.61	9.89		9.89	0.000032	0.05	2.44	16.77	0.04
US Reach 1B	344.84	23SEP2008 0000	0.13	9.66	9.88		9.88	0.000184	0.10	1.22	11.09	0.10
US Reach 2A	2406.41	23SEP2008 0000	0.20	8.23	8.85		8.85	0.000000	0.01	16.47	39.60	0.01
US Reach 2A	2216.41	23SEP2008 0000	0.20	7.98	8.85		8.85	0.000000	0.01	23.29	54.88	0.00
US Reach 2A	2091.11	23SEP2008 0000	0.20	8.05	8.85		8.85	0.000000	0.01	22.66	59.64	0.00
US Reach 2A	1966.51	23SEP2008 0000	0.20	8.21	8.85		8.85	0.000000	0.01	18.26	42.62	0.01
US Reach 2A	1863.31	23SEP2008 0000	0.20	8.20	8.85		8.85	0.000001	0.02	12.07	34.38	0.01
US Reach 2A	1742.91	23SEP2008 0000	0.20	8.33	8.85		8.85	0.000001	0.01	15.75	39.16	0.01
US Reach 2A	1690.61	23SEP2008 0000	0.20	8.40	8.85		8.85	0.000001	0.02	13.55	42.75	0.01
US Reach 3	610.69	23SEP2008 0000	1.67	9.10	9.52		9.53	0.001298	0.48	3.52	14.08	0.30
US Reach 3	584.69	23SEP2008 0000	1.67	8.87	9.30	9.30	9.41	0.015036	1.50	1.12	4.94	1.01
US Reach 1A	1659.75	23SEP2008 0000	1.50	9.97	10.33		10.33	0.000604	0.30	5.08	23.44	0.20
US Reach 1A	1528.15	23SEP2008 0000	1.50	9.82	10.24		10.24	0.000396	0.23	6.64	33.28	0.16
US Reach 1A	1415.35	23SEP2008 0000	1.50	9.54	10.22		10.22	0.000067	0.13	11.39	33.68	0.07
US Reach 1A	1297.75	23SEP2008 0000	1.50	9.44	10.21		10.21	0.000055	0.15	10.21	22.21	0.07
US Reach 1A	1149.75	23SEP2008 0000	1.50	9.20	10.19		10.19	0.000382	0.34	4.47	11.70	0.17
US Reach 1A	1104.15	23SEP2008 0000	1.50	9.48	10.17		10.17	0.000347	0.27	5.49	18.62	0.16
US Reach 1A	1038.55	23SEP2008 0000	1.50	9.62	10.14		10.14	0.000327	0.31	4.85	12.99	0.16
US Reach 1A	1006.35	23SEP2008 0000	1.50	9.79	10.09		10.11	0.002131	0.57	2.64	11.69	0.38
US Reach 1A	933.15	23SEP2008 0000	1.50	9.41	10.02		10.02	0.000384	0.23	6.41	29.78	0.16
US Reach 1A	881.25	23SEP2008 0000	1.50	9.34	9.99		9.99	0.000232	0.21	7.18	27.01	0.13
US Reach 1A	827.25	23SEP2008 0000	1.50	9.05	9.98		9.98	0.000149	0.26	5.70	10.77	0.12
US Reach 1A	739.75	23SEP2008 0000	1.50	9.23	9.97		9.97	0.000166	0.25	5.95	13.12	0.12
US Reach 1A	664.95	23SEP2008 0000	1.50	9.42	9.95		9.95	0.000615	0.27	5.60	30.21	0.20
US Reach 1A	580.95	23SEP2008 0000	1.50	9.35	9.91		9.91	0.000391	0.25	6.08	26.41	0.16
US Reach 1A	440.05	23SEP2008 0000	1.50	8.45	9.90		9.90	0.000018	0.12	12.32	17.59	0.04
US Reach 1A	345.55	23SEP2008 0000	1.50	8.80	9.89		9.89	0.000607	0.29	5.26	24.91	0.20
US Reach 1	308.87	23SEP2008 0000	1.63	9.15	9.87		9.88	0.000151	0.19	8.43	25.98	0.11
US Reach 1	291.77	23SEP2008 0000	1.63	8.93	9.87		9.87	0.000083	0.20	8.96	23.43	0.09
US Reach 1	251.57	23SEP2008 0000	1.63	8.61	9.87		9.87	0.000022	0.13	12.49	16.19	0.05
US Reach 1	219.57	23SEP2008 0000	1.63	8.20	9.14	9.38	9.74	0.080035	3.45	0.47	1.01	1.61
US Reach 1	191.37	23SEP2008 0000	1.63	8.00	8.74		8.77	0.002194	0.80	2.02	5.15	0.41
US Reach 2	514.69	23SEP2008 0000	1.88	8.06	8.85		8.85	0.000058	0.13	14.72	41.35	0.07
US Reach 2	444.69	23SEP2008 0000	1.88	8.14	8.84		8.84	0.000195	0.19	9.68	35.84	0.12
US Reach 2	318.69	23SEP2008 0000	1.88	8.25	8.80		8.80	0.000540	0.31	6.14	24.71	0.20
US Reach 2	235.69	23SEP2008 0000	1.88	8.01	8.76		8.77	0.000376	0.30	6.17	18.88	0.17
DS Reach	165.5	23SEP2008 0000	3.51	7.41	8.72		8.74	0.000523	0.52	7.34	20.81	0.22
DS Reach	134.8	23SEP2008 0000	3.51	6.97	8.72		8.72	0.000059	0.28	15.31	28.25	0.08
DS Reach	120		Culvert									
DS Reach	101	23SEP2008 0000	3.51	6.65	7.64		7.68	0.001510	0.85	4.10	7.33	0.36
DS Reach	96.2	23SEP2008 0000	3.51	6.40	7.63		7.67	0.001999	0.85	4.14	9.04	0.40

HEC-RAS Plan: LC7 CC100 Profile: 23SEP2008 0000 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
DS Reach	90		Culvert									
DS Reach	86.1	23SEP2008 0000	3.51	6.33	7.12	7.20	7.42	0.028017	2.42	1.45	4.73	1.40
DS Reach	79.3	23SEP2008 0000	3.51	6.03	7.22		7.26	0.001110	0.85	4.15	5.69	0.32
DS Reach	50	23SEP2008 0000	3.51	4.82	5.13	5.35	6.08	0.147551	4.31	0.81	4.10	3.09
DS Reach	0	23SEP2008 0000	3.51	-5.00	2.40	-4.91	2.40	0.000000	0.01	360.38	52.40	0.00

HEC-RAS Plan: LC7 CLC20 Profile: 23SEP2008 0000

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
US Reach 1D	1541.27	23SEP2008 0000	0.65	9.77	10.10		10.10	0.000133	0.11	6.00	39.98	0.09
US Reach 1D	1386.87	23SEP2008 0000	0.65	9.66	10.09		10.09	0.000036	0.08	7.93	29.90	0.05
US Reach 1D	1228.47	23SEP2008 0000	0.65	9.73	10.07		10.07	0.000124	0.11	5.93	36.79	0.09
US Reach 1D	1080.47	23SEP2008 0000	0.65	9.60	10.04		10.04	0.000065	0.10	6.20	25.26	0.07
US Reach 3B	1773.63	23SEP2008 0000	0.65	9.63	9.90		9.90	0.000469	0.22	2.99	20.16	0.17
US Reach 3B	1639.93	23SEP2008 0000	0.65	9.21	9.87		9.87	0.000070	0.15	4.75	22.86	0.08
US Reach 3B	1509.03	23SEP2008 0000	0.65	9.14	9.86		9.86	0.000135	0.14	4.62	23.04	0.10
US Reach 3B	1432.23	23SEP2008 0000	0.65	8.98	9.86		9.86	0.000017	0.07	9.67	28.39	0.04
Joint 1-3B	1552.89	23SEP2008 0000	-0.27	9.56	9.86		9.86	0.000781	-0.30	0.90	4.94	0.22
Joint 1-3B	1529.09	23SEP2008 0000	-0.27	9.65	9.88		9.88	0.000684	-0.22	1.24	9.99	0.20
Joint 1-3B	1475.69	23SEP2008 0000	-0.27	8.79	9.89		9.89	0.000004	-0.05	5.83	12.35	0.02
Joint 1-3B	1402.89	23SEP2008 0000	-0.27	9.43	9.89		9.89	0.000054	-0.09	2.90	12.28	0.06
Joint 1-3B	1354.89	23SEP2008 0000	-0.27	9.28	9.89		9.89	0.000017	-0.07	3.97	11.38	0.04
Joint 1-3B	1273.89	23SEP2008 0000	-0.27	9.49	9.89		9.89	0.000082	-0.11	2.42	10.71	0.07
Joint 1-3B	1212.29	23SEP2008 0000	-0.27	9.44	9.90		9.90	0.000064	-0.10	2.62	10.91	0.07
Joint 1-3B	1153.19	23SEP2008 0000	-0.27	9.02	9.90		9.90	0.000006	-0.05	5.09	9.34	0.02
Joint 1-3B	1099.19	23SEP2008 0000	-0.27	9.52	9.90		9.90	0.000425	-0.22	1.21	6.50	0.16
Joint 1-3B	1048.49	23SEP2008 0000	-0.27	9.67	9.94		9.95	0.001549	-0.38	0.71	4.44	0.31
Joint 1-3B	1015.29	23SEP2008 0000	-0.27	9.77	10.00		10.00	0.002341	-0.37	0.73	6.63	0.36
Joint 1-3B	969.39	23SEP2008 0000	-0.27	9.59	10.03		10.03	0.000149	-0.18	1.53	5.27	0.10
US Reach 1C	819.68	23SEP2008 0000	0.38	9.61	10.03		10.03	0.000038	0.09	4.29	15.09	0.05
US Reach 1C	670.88	23SEP2008 0000	0.38	9.80	10.01		10.01	0.000690	0.18	2.13	23.04	0.19
US Reach 1C	531.58	23SEP2008 0000	0.38	9.71	9.92		9.92	0.002016	0.29	1.33	15.69	0.32
US Reach 3A	1376.23	23SEP2008 0000	0.92	8.58	9.86		9.86	0.000023	0.10	9.61	20.09	0.04
US Reach 3A	1236.23	23SEP2008 0000	0.92	8.84	9.86		9.86	0.000026	0.08	11.55	35.27	0.04
US Reach 3A	1099.03	23SEP2008 0000	0.92	9.38	9.85		9.85	0.000134	0.14	6.67	30.93	0.09
US Reach 3A	1007.03	23SEP2008 0000	0.92	9.45	9.81		9.81	0.000400	0.19	4.77	32.39	0.16
US Reach 3A	931.03	23SEP2008 0000	0.92	9.45	9.72		9.73	0.001964	0.43	2.29	17.21	0.35
US Reach 3A	820.03	23SEP2008 0000	0.92	9.03	9.52		9.52	0.000040	0.10	9.11	29.16	0.06
US Reach 3A	694.73	23SEP2008 0000	0.92	9.00	9.51		9.51	0.000157	0.20	4.58	13.64	0.11
US Reach 3A	637.43	23SEP2008 0000	0.92	9.02	9.49		9.49	0.000323	0.26	3.52	12.14	0.16
Joint 1-3A	811.05	23SEP2008 0000	-0.27	9.26	9.45		9.46	0.002036	-0.34	0.80	7.37	0.33
Joint 1-3A	791.85	23SEP2008 0000	-0.27	9.30	9.50		9.51	0.003532	-0.35	0.78	10.65	0.41
Joint 1-3A	752.75	23SEP2008 0000	-0.27	9.34	9.56		9.56	0.000431	-0.18	1.51	11.35	0.16
Joint 1-3A	718.35	23SEP2008 0000	-0.27	9.38	9.58		9.58	0.000999	-0.27	1.01	7.92	0.24
Joint 1-3A	680.75	23SEP2008 0000	-0.27	9.38	9.60		9.60	0.000617	-0.23	1.16	7.79	0.19
Joint 1-3A	629.05	23SEP2008 0000	-0.27	9.48	9.67		9.67	0.003063	-0.35	0.77	9.30	0.39
Joint 1-3A	581.25	23SEP2008 0000	-0.27	9.55	9.73		9.73	0.001024	-0.25	1.09	9.78	0.24
Joint 1-3A	548	23SEP2008 0000	-0.27	9.58	9.77		9.78	0.001756	-0.35	0.76	5.96	0.32
Joint 1-3A	504.85	23SEP2008 0000	-0.27	9.57	9.83		9.83	0.000969	-0.26	1.03	8.05	0.23
Joint 1-3A	483.35	23SEP2008 0000	-0.27	9.57	9.84		9.85	0.000348	-0.16	1.67	12.51	0.14
US Reach 1B	457.45	23SEP2008 0000	0.11	9.70	9.84		9.84	0.000215	0.09	1.20	14.52	0.10
US Reach 1B	379.35	23SEP2008 0000	0.11	9.61	9.83		9.83	0.000075	0.07	1.61	14.62	0.06
US Reach 1B	344.84	23SEP2008 0000	0.11	9.66	9.76		9.77	0.010903	0.44	0.24	5.24	0.66
US Reach 2A	2406.41	23SEP2008 0000	0.10	8.23	8.76		8.76	0.000000	0.01	12.93	38.36	0.00
US Reach 2A	2216.41	23SEP2008 0000	0.11	7.98	8.76		8.76	0.000000	0.01	18.74	44.01	0.00
US Reach 2A	2091.11	23SEP2008 0000	0.11	8.05	8.76		8.76	0.000000	0.01	17.82	49.52	0.00
US Reach 2A	1966.51	23SEP2008 0000	0.11	8.21	8.76		8.76	0.000000	0.01	14.69	37.49	0.00
US Reach 2A	1863.31	23SEP2008 0000	0.10	8.20	8.76		8.76	0.000001	0.01	9.12	30.84	0.01
US Reach 2A	1742.91	23SEP2008 0000	0.09	8.33	8.76		8.76	0.000000	0.01	12.28	38.37	0.00
US Reach 2A	1690.61	23SEP2008 0000	0.08	8.40	8.76		8.76	0.000000	0.01	9.80	40.88	0.01
US Reach 3	610.69	23SEP2008 0000	1.19	9.10	9.45		9.47	0.001492	0.45	2.64	12.75	0.32
US Reach 3	584.69	23SEP2008 0000	1.19	8.87	9.24	9.24	9.34	0.015619	1.41	0.85	4.25	1.01
US Reach 1A	1659.75	23SEP2008 0000	1.10	9.97	10.28		10.29	0.000608	0.27	4.10	21.88	0.20
US Reach 1A	1528.15	23SEP2008 0000	1.10	9.82	10.18		10.18	0.000516	0.23	4.87	29.80	0.18
US Reach 1A	1415.35	23SEP2008 0000	1.10	9.54	10.16		10.16	0.000060	0.12	9.46	31.24	0.07
US Reach 1A	1297.75	23SEP2008 0000	1.10	9.44	10.15		10.15	0.000042	0.12	8.98	20.83	0.06
US Reach 1A	1149.75	23SEP2008 0000	1.10	9.20	10.13		10.14	0.000321	0.28	3.87	11.43	0.16
US Reach 1A	1104.15	23SEP2008 0000	1.10	9.48	10.12		10.12	0.000308	0.24	4.59	17.31	0.15
US Reach 1A	1038.55	23SEP2008 0000	1.10	9.62	10.09		10.10	0.000260	0.26	4.27	12.74	0.14
US Reach 1A	1006.35	23SEP2008 0000	1.10	9.79	10.05		10.06	0.002077	0.50	2.19	11.44	0.37
US Reach 1A	933.15	23SEP2008 0000	1.10	9.41	9.94		9.95	0.000426	0.24	4.62	22.53	0.17
US Reach 1A	881.25	23SEP2008 0000	1.10	9.34	9.91		9.91	0.000271	0.21	5.19	21.47	0.14
US Reach 1A	827.25	23SEP2008 0000	1.10	9.05	9.90		9.90	0.000125	0.23	4.87	10.12	0.10
US Reach 1A	739.75	23SEP2008 0000	1.10	9.23	9.89		9.89	0.000143	0.22	4.98	11.91	0.11
US Reach 1A	664.95	23SEP2008 0000	1.10	9.42	9.86		9.87	0.000982	0.32	3.45	20.27	0.25
US Reach 1A	580.95	23SEP2008 0000	1.10	9.35	9.80		9.80	0.000570	0.29	3.79	17.10	0.20
US Reach 1A	440.05	23SEP2008 0000	1.09	8.45	9.79		9.79	0.000014	0.10	10.61	13.44	0.04
US Reach 1A	345.55	23SEP2008 0000	1.09	8.80	9.70		9.72	0.006715	0.66	1.66	13.47	0.60
US Reach 1	308.87	23SEP2008 0000	1.20	9.15	9.57		9.58	0.001238	0.47	2.53	9.86	0.30
US Reach 1	291.77	23SEP2008 0000	1.23	8.93	9.56		9.56	0.000570	0.35	3.47	11.58	0.21
US Reach 1	251.57	23SEP2008 0000	1.33	8.61	9.55		9.55	0.000050	0.17	7.89	12.91	0.07
US Reach 1	219.57	23SEP2008 0000	1.38	8.20	9.36	9.35	9.45	0.018010	1.31	1.06	5.45	0.95
US Reach 1	191.37	23SEP2008 0000	1.37	8.00	8.46		8.56	0.010130	1.45	0.95	3.14	0.84
US Reach 2	514.69	23SEP2008 0000	1.27	8.06	8.76		8.76	0.000053	0.11	11.28	35.48	0.06
US Reach 2	444.69	23SEP2008 0000	1.27	8.14	8.75		8.75	0.000278	0.19	6.62	32.44	0.14
US Reach 2	318.69	23SEP2008 0000	1.29	8.25	8.64		8.65	0.001746	0.44	2.95	16.75	0.33
US Reach 2	235.69	23SEP2008 0000	1.25	8.01	8.50		8.51	0.001819	0.53	2.34	9.99	0.35
DS Reach	165.5	23SEP2008 0000	2.62	7.41	8.37		8.40	0.001213	0.76	3.47	6.28	0.32
DS Reach	134.8	23SEP2008 0000	2.56	6.97	8.37		8.38	0.000112	0.32	7.88	8.82	0.11
DS Reach	120		Culvert									
DS Reach	101	23SEP2008 0000	2.56	6.65	7.56		7.58	0.001307	0.73	3.48	7.05	0.33
DS Reach	96.2	23SEP2008 0000	2.55	6.40	7.55		7.58	0.001960	0.76	3.37	8.53	0.39

HEC-RAS Plan: LC7 CLC20 Profile: 23SEP2008 0000 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
DS Reach	90		Culvert									
DS Reach	86.1	23SEP2008 0000	2.55	6.33	7.10	7.12	7.28	0.017986	1.89	1.35	4.56	1.11
DS Reach	79.3	23SEP2008 0000	2.55	6.03	7.16		7.18	0.000748	0.67	3.80	5.47	0.26
DS Reach	50	23SEP2008 0000	2.54	4.82	5.09	5.28	5.87	0.146424	3.90	0.65	3.79	3.01
DS Reach	0	23SEP2008 0000	2.54	-5.00	2.20	-4.93	2.20	0.000000	0.01	349.92	52.20	0.00

HEC-RAS Plan: LC7-CLC100 Profile: 23SEP2008 0000

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
US Reach 1D	1541.27	23SEP2008 0000	1.15	9.77	10.18		10.18	0.000120	0.12	9.65	51.50	0.09
US Reach 1D	1386.87	23SEP2008 0000	1.15	9.66	10.17		10.17	0.000051	0.11	10.44	32.96	0.06
US Reach 1D	1228.47	23SEP2008 0000	1.15	9.73	10.14		10.15	0.000128	0.13	9.02	45.82	0.09
US Reach 1D	1080.47	23SEP2008 0000	1.15	9.60	10.11		10.11	0.000102	0.14	7.95	28.19	0.09
US Reach 3B	1773.63	23SEP2008 0000	1.15	9.63	9.98		9.99	0.000365	0.23	5.46	36.90	0.16
US Reach 3B	1639.93	23SEP2008 0000	1.15	9.21	9.96		9.96	0.000100	0.19	7.13	31.91	0.09
US Reach 3B	1509.03	23SEP2008 0000	1.15	9.14	9.94		9.94	0.000153	0.18	6.62	26.44	0.11
US Reach 3B	1432.23	23SEP2008 0000	1.15	8.98	9.94		9.94	0.000032	0.10	12.07	33.19	0.05
Joint 1-3B	1552.89	23SEP2008 0000	-0.44	9.56	9.94		9.94	0.000962	-0.31	1.41	8.43	0.24
Joint 1-3B	1529.09	23SEP2008 0000	-0.44	9.65	9.95		9.96	0.000432	-0.21	2.09	12.47	0.16
Joint 1-3B	1475.69	23SEP2008 0000	-0.44	8.79	9.96		9.96	0.000007	-0.07	6.78	13.70	0.03
Joint 1-3B	1402.89	23SEP2008 0000	-0.44	9.43	9.96		9.96	0.000061	-0.11	3.82	13.02	0.07
Joint 1-3B	1354.89	23SEP2008 0000	-0.44	9.28	9.96		9.96	0.000026	-0.09	4.85	12.46	0.05
Joint 1-3B	1273.89	23SEP2008 0000	-0.44	9.49	9.97		9.97	0.000107	-0.13	3.36	14.49	0.09
Joint 1-3B	1212.29	23SEP2008 0000	-0.44	9.44	9.97		9.97	0.000076	-0.13	3.49	12.19	0.07
Joint 1-3B	1153.19	23SEP2008 0000	-0.44	9.02	9.97		9.98	0.000011	-0.08	5.82	9.90	0.03
Joint 1-3B	1099.19	23SEP2008 0000	-0.44	9.52	9.98		9.98	0.000390	-0.25	1.74	7.25	0.16
Joint 1-3B	1048.49	23SEP2008 0000	-0.44	9.67	10.01		10.02	0.001410	-0.41	1.06	6.24	0.30
Joint 1-3B	1015.29	23SEP2008 0000	-0.44	9.77	10.06		10.06	0.001555	-0.38	1.15	7.28	0.31
Joint 1-3B	969.39	23SEP2008 0000	-0.44	9.59	10.09		10.09	0.000232	-0.24	1.84	5.61	0.13
US Reach 1C	819.68	23SEP2008 0000	0.71	9.61	10.09		10.09	0.000078	0.14	5.17	16.10	0.08
US Reach 1C	670.88	23SEP2008 0000	0.71	9.80	10.06		10.07	0.000611	0.21	3.39	26.29	0.19
US Reach 1C	531.58	23SEP2008 0000	0.70	9.71	9.98		9.98	0.001634	0.29	2.40	23.84	0.29
US Reach 3A	1376.23	23SEP2008 0000	1.59	8.58	9.94		9.94	0.000045	0.14	11.24	21.85	0.06
US Reach 3A	1236.23	23SEP2008 0000	1.59	8.84	9.93		9.93	0.000039	0.11	14.22	35.98	0.06
US Reach 3A	1099.03	23SEP2008 0000	1.59	9.38	9.92		9.92	0.000167	0.18	9.00	34.14	0.11
US Reach 3A	1007.03	23SEP2008 0000	1.59	9.45	9.88		9.88	0.000371	0.22	7.20	37.47	0.16
US Reach 3A	931.03	23SEP2008 0000	1.59	9.45	9.78		9.79	0.002139	0.47	3.61	24.78	0.36
US Reach 3A	820.03	23SEP2008 0000	1.59	9.03	9.63		9.63	0.000048	0.13	12.48	33.07	0.06
US Reach 3A	694.73	23SEP2008 0000	1.59	9.00	9.61		9.61	0.000201	0.26	6.02	14.28	0.13
US Reach 3A	637.43	23SEP2008 0000	1.59	9.02	9.59		9.59	0.000441	0.33	4.87	15.27	0.18
Joint 1-3A	811.05	23SEP2008 0000	-0.49	9.26	9.55		9.56	0.000897	-0.31	1.59	9.25	0.24
Joint 1-3A	791.85	23SEP2008 0000	-0.49	9.30	9.57		9.58	0.001282	-0.32	1.56	11.46	0.27
Joint 1-3A	752.75	23SEP2008 0000	-0.49	9.34	9.61		9.61	0.000488	-0.23	2.12	11.91	0.18
Joint 1-3A	718.35	23SEP2008 0000	-0.49	9.38	9.63		9.64	0.001120	-0.34	1.47	8.87	0.26
Joint 1-3A	680.75	23SEP2008 0000	-0.49	9.38	9.66		9.66	0.000742	-0.30	1.64	8.62	0.22
Joint 1-3A	629.05	23SEP2008 0000	-0.49	9.48	9.72		9.73	0.002155	-0.37	1.35	11.74	0.34
Joint 1-3A	581.25	23SEP2008 0000	-0.49	9.55	9.78		9.79	0.001019	-0.30	1.65	11.03	0.25
Joint 1-3A	548	23SEP2008 0000	-0.49	9.58	9.83		9.84	0.002457	-0.39	1.25	10.73	0.37
Joint 1-3A	504.85	23SEP2008 0000	-0.49	9.57	9.89		9.90	0.000933	-0.31	1.61	9.77	0.24
Joint 1-3A	483.35	23SEP2008 0000	-0.49	9.57	9.91		9.91	0.000344	-0.19	2.59	15.54	0.15
US Reach 1B	457.45	23SEP2008 0000	0.21	9.70	9.91		9.91	0.000134	0.10	2.19	17.30	0.09
US Reach 1B	379.35	23SEP2008 0000	0.22	9.61	9.90		9.90	0.000072	0.08	2.67	16.88	0.07
US Reach 1B	344.84	23SEP2008 0000	0.22	9.66	9.89		9.89	0.000481	0.17	1.30	11.63	0.16
US Reach 2A	2406.41	23SEP2008 0000	0.20	8.23	9.08		9.08	0.000000	0.01	26.03	45.89	0.00
US Reach 2A	2216.41	23SEP2008 0000	0.20	7.98	9.08		9.08	0.000000	0.01	38.38	75.42	0.00
US Reach 2A	2091.11	23SEP2008 0000	0.20	8.05	9.08		9.08	0.000000	0.01	36.41	62.13	0.00
US Reach 2A	1966.51	23SEP2008 0000	0.20	8.21	9.08		9.08	0.000000	0.01	30.27	61.66	0.00
US Reach 2A	1863.31	23SEP2008 0000	0.20	8.20	9.08		9.08	0.000000	0.01	20.94	45.64	0.00
US Reach 2A	1742.91	23SEP2008 0000	0.20	8.33	9.08		9.08	0.000000	0.01	25.44	48.95	0.00
US Reach 2A	1690.61	23SEP2008 0000	0.20	8.40	9.08		9.08	0.000000	0.01	24.08	51.75	0.00
US Reach 3	610.69	23SEP2008 0000	2.08	9.10	9.55		9.57	0.001366	0.52	4.00	14.53	0.32
US Reach 3	584.69	23SEP2008 0000	2.08	8.87	9.37	9.34	9.47	0.010377	1.37	1.55	7.80	0.86
US Reach 1A	1659.75	23SEP2008 0000	1.90	9.97	10.36		10.37	0.000620	0.32	5.97	25.05	0.21
US Reach 1A	1528.15	23SEP2008 0000	1.90	9.82	10.29		10.29	0.000312	0.23	8.32	34.34	0.15
US Reach 1A	1415.35	23SEP2008 0000	1.90	9.54	10.27		10.27	0.000068	0.14	13.13	34.04	0.07
US Reach 1A	1297.75	23SEP2008 0000	1.90	9.44	10.26		10.26	0.000076	0.17	11.43	26.23	0.08
US Reach 1A	1149.75	23SEP2008 0000	1.90	9.20	10.23		10.24	0.000433	0.38	5.00	11.93	0.19
US Reach 1A	1104.15	23SEP2008 0000	1.90	9.48	10.22		10.22	0.000367	0.30	6.35	19.57	0.17
US Reach 1A	1038.55	23SEP2008 0000	1.90	9.62	10.18		10.18	0.000379	0.35	5.38	13.20	0.18
US Reach 1A	1006.35	23SEP2008 0000	1.90	9.79	10.12		10.14	0.002166	0.62	3.05	11.90	0.39
US Reach 1A	933.15	23SEP2008 0000	1.90	9.41	10.05		10.06	0.000451	0.25	7.67	36.91	0.17
US Reach 1A	881.25	23SEP2008 0000	1.90	9.34	10.03		10.03	0.000260	0.23	8.21	28.90	0.14
US Reach 1A	827.25	23SEP2008 0000	1.90	9.05	10.01		10.02	0.000199	0.31	6.08	11.02	0.13
US Reach 1A	739.75	23SEP2008 0000	1.90	9.23	10.00		10.00	0.000226	0.30	6.35	13.67	0.14
US Reach 1A	664.95	23SEP2008 0000	1.90	9.42	9.97		9.98	0.000692	0.29	6.45	32.96	0.21
US Reach 1A	580.95	23SEP2008 0000	1.90	9.35	9.93		9.93	0.000504	0.29	6.57	27.23	0.19
US Reach 1A	440.05	23SEP2008 0000	1.90	8.45	9.91		9.91	0.000027	0.15	12.56	18.28	0.05
US Reach 1A	345.55	23SEP2008 0000	1.90	8.80	9.89		9.90	0.000921	0.35	5.43	25.92	0.24
US Reach 1	308.87	23SEP2008 0000	2.12	9.15	9.87		9.88	0.000258	0.25	8.41	25.98	0.14
US Reach 1	291.77	23SEP2008 0000	2.12	8.93	9.87		9.87	0.000142	0.26	8.91	23.37	0.11
US Reach 1	251.57	23SEP2008 0000	2.12	8.61	9.87		9.87	0.000038	0.17	12.44	16.16	0.06
US Reach 1	219.57	23SEP2008 0000	2.12	8.20	9.34	9.45	9.60	0.056543	2.26	0.94	4.95	1.65
US Reach 1	191.37	23SEP2008 0000	2.12	8.00	9.05		9.06	0.000585	0.43	4.91	12.18	0.22
US Reach 2	514.69	23SEP2008 0000	2.28	8.06	9.08		9.08	0.000019	0.09	25.18	51.19	0.04
US Reach 2	444.69	23SEP2008 0000	2.28	8.14	9.07		9.07	0.000046	0.11	20.22	56.98	0.06
US Reach 2	318.69	23SEP2008 0000	2.28	8.25	9.07		9.07	0.000099	0.16	14.36	43.24	0.09
US Reach 2	235.69	23SEP2008 0000	2.28	8.01	9.06		9.06	0.000082	0.15	15.54	45.32	0.08
DS Reach	165.5	23SEP2008 0000	4.40	7.41	9.05		9.05	0.000129	0.32	16.66	35.42	0.11
DS Reach	134.8	23SEP2008 0000	4.40	6.97	9.05		9.05	0.000028	0.23	27.06	48.90	0.06
DS Reach	120		Culvert									
DS Reach	101	23SEP2008 0000	4.40	6.65	7.71		7.75	0.001696	0.96	4.58	7.46	0.39
DS Reach	96.2	23SEP2008 0000	4.40	6.40	7.70		7.74	0.002081	0.92	4.76	9.37	0.41

HEC-RAS Plan: LC7-CLC100 Profile: 23SEP2008 0000 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
DS Reach	90		Culvert									
DS Reach	86.1	23SEP2008 0000	4.40	6.33	7.26	7.27	7.47	0.015015	2.03	2.17	5.79	1.06
DS Reach	79.3	23SEP2008 0000	4.40	6.03	7.35		7.39	0.001132	0.90	4.87	6.12	0.32
DS Reach	50	23SEP2008 0000	4.40	4.82	5.17	5.42	6.24	0.145748	4.59	0.96	4.35	3.13
DS Reach	0	23SEP2008 0000	4.40	-5.00	2.40	-4.90	2.40	0.000000	0.01	360.38	52.40	0.00

APPENDIX N

CHURCHILL RIVER OPEN WATER MODEL SENSITIVITY ANALYSIS WATER LEVELS

River	Reach	River Station (m)	Initial Water Level (m)	Roughness Sensitivity Analysis Water Level (m)					
				-30%	-20%	-10%	+10%	+20%	+30%
Churchill River	Main	41243.4	6.13	5.27	5.57	5.86	6.39	6.63	6.87
Churchill River	Main	40242.1	6.13	5.27	5.57	5.86	6.39	6.63	6.87
Churchill River	Main	39223.7	6.12	5.26	5.56	5.85	6.38	6.62	6.86
Churchill River	Main	38194.5	6.07	5.22	5.52	5.80	6.33	6.58	6.82
Churchill River	Main	37189.7	6.03	5.17	5.47	5.76	6.28	6.53	6.77
Churchill River	Main	36181.3	5.95	5.10	5.40	5.68	6.20	6.45	6.68
Churchill River	Main	35173.1	5.85	5.01	5.31	5.59	6.10	6.34	6.57
Churchill River	Main	34163.2	5.72	4.89	5.19	5.46	5.97	6.20	6.43
Churchill River	Main	33192.9	5.59	4.79	5.07	5.34	5.84	6.07	6.29
Churchill River	Main	32186.7	5.46	4.67	4.95	5.21	5.70	5.92	6.14
Churchill River	Main	31192.2	5.28	4.48	4.76	5.03	5.52	5.74	5.96
Churchill River	Main	30197.6	5.17	4.39	4.66	4.92	5.40	5.62	5.83
Churchill River	Main	29176.3	5.06	4.29	4.56	4.82	5.29	5.51	5.72
Churchill River	Main	28199.9	4.98	4.22	4.49	4.74	5.21	5.43	5.63
Churchill River	Main	27207.1	4.86	4.10	4.37	4.62	5.09	5.31	5.52
Churchill River	Main	26201.6	4.71	3.94	4.22	4.47	4.94	5.15	5.36
Churchill River	Main	25199.9	4.59	3.85	4.11	4.36	4.81	5.03	5.23
Churchill River	Main	24201.4	4.51	3.80	4.05	4.28	4.72	4.93	5.12
Churchill River	Main	24120.0							
Churchill River	Main	24064.0	4.54	3.84	4.09	4.32	4.76	4.96	5.15
Churchill River	Main	23648.0	4.46	3.73	3.99	4.23	4.68	4.89	5.08
Churchill River	Main	23145.9	4.41	3.70	3.95	4.19	4.63	4.83	5.03
Churchill River	Main	22636.5	4.35	3.63	3.89	4.13	4.57	4.77	4.96
Churchill River	Main	22128.9	4.3	3.59	3.84	4.08	4.51	4.71	4.90
Churchill River	Main	21621.5	4.22	3.52	3.77	4.00	4.43	4.63	4.82
Churchill River	Main	21126.8	4.17	3.48	3.73	3.96	4.38	4.57	4.75
Churchill River	Main	20632.1	4.1	3.41	3.65	3.88	4.30	4.49	4.67
Churchill River	Main	20131.1	4.04	3.36	3.60	3.83	4.24	4.43	4.61
Churchill River	Main	19631.2	3.97	3.31	3.55	3.77	4.17	4.36	4.54
Churchill River	Main	19130.5	3.92	3.26	3.50	3.72	4.11	4.30	4.47
Churchill River	Main	18630.1	3.85	3.20	3.43	3.65	4.05	4.23	4.40
Churchill River	Main	18129.7	3.78	3.14	3.37	3.58	3.98	4.16	4.33
Churchill River	Main	17629.0	3.73	3.09	3.32	3.53	3.92	4.10	4.26
Churchill River	Main	17129.7	3.68	3.05	3.27	3.48	3.86	4.04	4.20
Churchill River	Main	16629.6	3.62	3.00	3.22	3.43	3.81	3.98	4.14
Churchill River	Main	16129.5	3.58	2.96	3.18	3.39	3.76	3.93	4.09
Churchill River	Main	15622.2	3.51	2.89	3.11	3.32	3.69	3.86	4.03
Churchill River	Main	15122.1	3.44	2.83	3.05	3.25	3.62	3.79	3.95
Churchill River	Main	14609.9	3.36	2.76	2.98	3.18	3.55	3.71	3.87
Churchill River	Main	14115.6	3.27	2.67	2.88	3.08	3.45	3.62	3.78
Churchill River	Main	13613.6	3.2	2.61	2.82	3.02	3.38	3.54	3.70
Churchill River	Main	13107.4	3.12	2.54	2.75	2.94	3.30	3.46	3.61
Churchill River	Main	12600.5	3.05	2.48	2.69	2.88	3.22	3.38	3.54
Churchill River	Main	12100.5	3	2.44	2.64	2.83	3.17	3.33	3.48
Churchill River	Main	11593.9	2.92	2.35	2.55	2.74	3.09	3.25	3.40
Churchill River	Main	11093.7	2.84	2.28	2.48	2.67	3.01	3.16	3.31
Churchill River	Main	10601.7	2.73	2.17	2.37	2.56	2.91	3.06	3.21

River	Reach	River Station (m)	Initial Water Level (m)	Roughness Sensitivity Analysis Water Level (m)					
				-30%	-20%	-10%	+10%	+20%	+30%
Churchill River	Main	10078.0	2.64	2.08	2.28	2.47	2.81	2.97	3.12
Churchill River	Main	9566.4	2.55	1.99	2.19	2.38	2.72	2.87	3.02
Churchill River	Main	9049.4	2.48	1.94	2.13	2.32	2.65	2.80	2.95
Churchill River	Main	8550.2	2.43	1.89	2.08	2.27	2.60	2.75	2.89
Churchill River	Main	8065.4	2.38	1.85	2.04	2.22	2.54	2.69	2.84
Churchill River	Main	7545.6	2.3	1.76	1.95	2.13	2.46	2.61	2.76
Churchill River	Main	7041.5	2.24	1.72	1.90	2.08	2.41	2.55	2.70
Churchill River	Main	6533.5	2.17	1.64	1.83	2.01	2.34	2.49	2.63
Churchill River	Main	6058.0	2.09	1.56	1.75	1.93	2.26	2.41	2.56
Churchill River	Main	5593.2	2	1.46	1.66	1.84	2.17	2.32	2.47
Churchill River	Main	5080.4	1.92	1.39	1.58	1.76	2.09	2.24	2.39
Churchill River	Main	4554.1	1.87	1.35	1.53	1.71	2.04	2.19	2.33
Churchill River	Main	4092.1	1.81	1.29	1.47	1.64	1.97	2.12	2.26
Churchill River	Main	4000.0							
Churchill River	Main	3632.7	1.76	1.25	1.43	1.60	1.92	2.07	2.21
Churchill River	Main	3166.0	1.69	1.18	1.36	1.53	1.85	2.00	2.14
Churchill River	Main	2704.3	1.61	1.11	1.29	1.46	1.77	1.92	2.07
Churchill River	Main	2246.3	1.53	1.04	1.21	1.37	1.68	1.83	1.98
Churchill River	Main	1798.6	1.43	0.96	1.12	1.28	1.59	1.74	1.88
Churchill River	Main	1335.0	1.37	0.92	1.08	1.23	1.53	1.67	1.81
Churchill River	Main DS	874.8	1.37	0.92	1.08	1.23	1.53	1.67	1.81
Churchill River	Main DS	482.2	1.19	0.78	0.92	1.06	1.33	1.46	1.60
Churchill River	Main DS	32.9	1.03	0.68	0.79	0.91	1.15	1.27	1.38
Churchill River	Main DS	-445.3	0.94	0.62	0.72	0.83	1.06	1.17	1.28
Churchill River	Main DS	-952.1	0.7	0.47	0.54	0.62	0.79	0.87	0.96
Churchill River	Main DS	-1486.1	0.44	0.32	0.35	0.39	0.48	0.53	0.58
Churchill River	Main DS	-1972.1	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Mud Lake A	Main A	4343.6	1.54	0.98	1.18	1.37	1.71	1.87	2.03
Mud Lake A	Main A	3849.7	1.5	0.97	1.16	1.34	1.67	1.83	1.98
Mud Lake A	Main A	3529.7	1.47	0.95	1.14	1.31	1.64	1.79	1.94
Mud Lake B	Main	5538.2	1.54	0.98	1.18	1.37	1.71	1.87	2.03
Mud Lake B	Main	5223.7	1.53	0.97	1.17	1.36	1.70	1.86	2.01
Mud Lake B	Main	4786.0	1.5	0.97	1.16	1.34	1.67	1.83	1.98
Mud Lake B	Main	4780.0							
Mud Lake B	Main	4777.1	1.5	0.97	1.16	1.34	1.67	1.83	1.98
Mud Lake B	Main	4356.9	1.49	0.96	1.15	1.33	1.66	1.81	1.97
Mud Lake B	Main	3555.5	1.47	0.95	1.14	1.31	1.64	1.79	1.94
Mud Lake C	Main	3296.7	1.47	0.95	1.14	1.31	1.64	1.79	1.94
Mud Lake C	Main	2548.6	1.46	0.95	1.13	1.31	1.63	1.78	1.93
Mud Lake C	Main	2250.0	1.42	0.93	1.10	1.26	1.58	1.72	1.87
Mud Lake C	Main	2056.4	1.39	0.93	1.08	1.24	1.55	1.69	1.84
Mud Lake C	Main	1871.0	1.37	0.92	1.08	1.23	1.53	1.67	1.81
Mud Lake In	In	100.0	1.56	1.00	1.20	1.39	1.73	1.89	2.05
Mud Lake In	In	0.0	1.54	0.98	1.18	1.37	1.71	1.87	2.03

River	Reach	Station (m)	Water Level (m)	Flow Sensitivity Analysis Water Level (m)					
				-30%	-20%	-10%	+10%	+20%	+30%
Churchill River	Main	41243.4	6.13	5.20	5.53	5.84	6.41	6.67	6.93
Churchill River	Main	40242.1	6.13	5.20	5.53	5.84	6.41	6.67	6.93
Churchill River	Main	39223.7	6.12	5.19	5.52	5.83	6.39	6.66	6.91
Churchill River	Main	38194.5	6.07	5.16	5.48	5.79	6.35	6.61	6.86
Churchill River	Main	37189.7	6.03	5.12	5.44	5.74	6.30	6.55	6.80
Churchill River	Main	36181.3	5.95	5.07	5.38	5.67	6.21	6.46	6.70
Churchill River	Main	35173.1	5.85	4.99	5.30	5.58	6.10	6.34	6.58
Churchill River	Main	34163.2	5.72	4.89	5.18	5.46	5.97	6.20	6.43
Churchill River	Main	33192.9	5.59	4.78	5.07	5.34	5.84	6.07	6.30
Churchill River	Main	32186.7	5.46	4.66	4.94	5.21	5.70	5.93	6.16
Churchill River	Main	31192.2	5.28	4.48	4.76	5.03	5.52	5.75	5.97
Churchill River	Main	30197.6	5.17	4.36	4.64	4.91	5.41	5.64	5.86
Churchill River	Main	29176.3	5.06	4.26	4.54	4.81	5.30	5.53	5.75
Churchill River	Main	28199.9	4.98	4.18	4.46	4.73	5.22	5.45	5.67
Churchill River	Main	27207.1	4.86	4.07	4.35	4.61	5.10	5.33	5.54
Churchill River	Main	26201.6	4.71	3.92	4.20	4.46	4.95	5.17	5.38
Churchill River	Main	25199.9	4.59	3.81	4.09	4.35	4.82	5.04	5.25
Churchill River	Main	24201.4	4.51	3.76	4.03	4.27	4.73	4.93	5.13
Churchill River	Main	24120.0							
Churchill River	Main	24064.0	4.54	3.78	4.05	4.31	4.77	4.98	5.19
Churchill River	Main	23648.0	4.46	3.71	3.98	4.23	4.68	4.89	5.10
Churchill River	Main	23145.9	4.41	3.67	3.94	4.18	4.63	4.84	5.04
Churchill River	Main	22636.5	4.35	3.61	3.88	4.12	4.57	4.78	4.97
Churchill River	Main	22128.9	4.30	3.57	3.83	4.07	4.51	4.72	4.91
Churchill River	Main	21621.5	4.22	3.51	3.76	4.00	4.43	4.63	4.82
Churchill River	Main	21126.8	4.17	3.46	3.72	3.95	4.38	4.57	4.76
Churchill River	Main	20632.1	4.10	3.40	3.65	3.88	4.30	4.49	4.68
Churchill River	Main	20131.1	4.04	3.35	3.60	3.82	4.24	4.43	4.61
Churchill River	Main	19631.2	3.97	3.29	3.54	3.76	4.18	4.36	4.55
Churchill River	Main	19130.5	3.92	3.24	3.49	3.71	4.12	4.31	4.49
Churchill River	Main	18630.1	3.85	3.18	3.42	3.65	4.05	4.23	4.41
Churchill River	Main	18129.7	3.78	3.12	3.36	3.58	3.98	4.16	4.34
Churchill River	Main	17629.0	3.73	3.07	3.31	3.53	3.92	4.11	4.28
Churchill River	Main	17129.7	3.68	3.02	3.26	3.47	3.87	4.05	4.22
Churchill River	Main	16629.6	3.62	2.97	3.21	3.42	3.81	3.99	4.16
Churchill River	Main	16129.5	3.58	2.93	3.16	3.38	3.77	3.95	4.12
Churchill River	Main	15622.2	3.51	2.87	3.10	3.31	3.70	3.87	4.04
Churchill River	Main	15122.1	3.44	2.81	3.04	3.25	3.63	3.80	3.97
Churchill River	Main	14609.9	3.36	2.75	2.97	3.18	3.55	3.72	3.88
Churchill River	Main	14115.6	3.27	2.67	2.88	3.09	3.45	3.62	3.78
Churchill River	Main	13613.6	3.20	2.61	2.82	3.02	3.38	3.54	3.70
Churchill River	Main	13107.4	3.12	2.54	2.75	2.94	3.30	3.46	3.61
Churchill River	Main	12600.5	3.05	2.47	2.68	2.88	3.23	3.39	3.54
Churchill River	Main	12100.5	3.00	2.43	2.63	2.82	3.17	3.33	3.48
Churchill River	Main	11593.9	2.92	2.35	2.55	2.74	3.09	3.24	3.40
Churchill River	Main	11093.7	2.84	2.28	2.48	2.67	3.01	3.16	3.31
Churchill River	Main	10601.7	2.73	2.18	2.38	2.56	2.90	3.06	3.21

River	Reach	Station (m)	Water Level (m)	Flow Sensitivity Analysis Water Level (m)					
				-30%	-20%	-10%	+10%	+20%	+30%
Churchill River	Main	10078.0	2.64	2.08	2.29	2.47	2.81	2.96	3.11
Churchill River	Main	9566.4	2.55	2.00	2.20	2.38	2.71	2.87	3.01
Churchill River	Main	9049.4	2.48	1.94	2.14	2.32	2.65	2.80	2.94
Churchill River	Main	8550.2	2.43	1.89	2.09	2.27	2.59	2.74	2.89
Churchill River	Main	8065.4	2.38	1.84	2.04	2.22	2.54	2.69	2.84
Churchill River	Main	7545.6	2.30	1.76	1.95	2.13	2.46	2.61	2.76
Churchill River	Main	7041.5	2.24	1.71	1.90	2.08	2.41	2.56	2.70
Churchill River	Main	6533.5	2.17	1.65	1.84	2.01	2.34	2.49	2.63
Churchill River	Main	6058.0	2.09	1.57	1.76	1.93	2.26	2.41	2.56
Churchill River	Main	5593.2	2.00	1.48	1.66	1.84	2.17	2.32	2.47
Churchill River	Main	5080.4	1.92	1.40	1.58	1.76	2.09	2.24	2.39
Churchill River	Main	4554.1	1.87	1.35	1.53	1.71	2.04	2.19	2.34
Churchill River	Main	4092.1	1.81	1.30	1.48	1.65	1.97	2.12	2.26
Churchill River	Main	4000.0							
Churchill River	Main	3632.7	1.76	1.26	1.43	1.60	1.92	2.06	2.21
Churchill River	Main	3166.0	1.69	1.20	1.37	1.54	1.85	1.99	2.13
Churchill River	Main	2704.3	1.61	1.13	1.30	1.46	1.77	1.92	2.06
Churchill River	Main	2246.3	1.53	1.06	1.22	1.38	1.68	1.82	1.97
Churchill River	Main	1798.6	1.43	0.99	1.14	1.29	1.58	1.73	1.87
Churchill River	Main	1335.0	1.37	0.94	1.09	1.23	1.52	1.67	1.81
Churchill River	Main DS	874.8	1.37	0.94	1.09	1.23	1.52	1.67	1.81
Churchill River	Main DS	482.2	1.19	0.82	0.94	1.07	1.32	1.45	1.57
Churchill River	Main DS	32.9	1.03	0.71	0.81	0.92	1.14	1.25	1.36
Churchill River	Main DS	-445.3	0.94	0.65	0.75	0.84	1.05	1.15	1.26
Churchill River	Main DS	-952.1	0.70	0.49	0.56	0.63	0.78	0.86	0.94
Churchill River	Main DS	-1486.1	0.44	0.34	0.37	0.40	0.48	0.52	0.56
Churchill River	Main DS	-1972.1	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Mud Lake A	Main A	4343.6	1.54	1.04	1.22	1.38	1.70	1.85	2.00
Mud Lake A	Main A	3849.7	1.50	1.02	1.19	1.35	1.66	1.81	1.96
Mud Lake A	Main A	3529.7	1.47	1.00	1.17	1.33	1.63	1.78	1.93
Mud Lake B	Main	5538.2	1.54	1.04	1.22	1.38	1.70	1.85	2.00
Mud Lake B	Main	5223.7	1.53	1.04	1.21	1.37	1.69	1.84	1.99
Mud Lake B	Main	4786.0	1.50	1.03	1.20	1.35	1.66	1.81	1.96
Mud Lake B	Main	4780.0							
Mud Lake B	Main	4777.1	1.50	1.03	1.20	1.36	1.66	1.81	1.96
Mud Lake B	Main	4356.9	1.49	1.02	1.19	1.34	1.65	1.80	1.95
Mud Lake B	Main	3555.5	1.47	1.00	1.17	1.33	1.63	1.78	1.93
Mud Lake C	Main	3296.7	1.47	1.00	1.17	1.33	1.63	1.78	1.93
Mud Lake C	Main	2548.6	1.46	1.00	1.16	1.32	1.62	1.77	1.91
Mud Lake C	Main	2250.0	1.42	0.97	1.12	1.27	1.57	1.71	1.86
Mud Lake C	Main	2056.4	1.39	0.95	1.10	1.25	1.54	1.68	1.82
Mud Lake C	Main	1871.0	1.37	0.94	1.09	1.23	1.52	1.67	1.81
Mud Lake In	In	100.0	1.56	1.08	1.25	1.41	1.72	1.87	2.02
Mud Lake In	In	0.0	1.54	1.04	1.22	1.38	1.70	1.85	2.00

APPENDIX O

CHURCHILL RIVER ICE-AFFECTED MODEL SENSITIVITY ANALYSIS WATER LEVELS

Station (m)	Initial Water Level (m)	Ice Porosity Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
41243.4	4.37	4.37	4.36	4.37	4.37	4.40	4.41
40242.1	4.36	4.35	4.34	4.35	4.36	4.39	4.40
39223.7	4.35	4.35	4.34	4.35	4.36	4.39	4.40
38194.5	4.33	4.33	4.32	4.33	4.33	4.37	4.37
37189.7	4.30	4.29	4.28	4.29	4.30	4.33	4.34
36181.3	4.25	4.25	4.24	4.24	4.25	4.28	4.28
35173.1	4.19	4.19	4.18	4.18	4.19	4.22	4.22
34163.2	4.12	4.13	4.12	4.12	4.12	4.15	4.16
33192.9	4.03	4.05	4.03	4.04	4.04	4.06	4.06
32186.7	3.92	3.95	3.92	3.92	3.92	3.94	3.95
31192.2	3.82	3.85	3.83	3.82	3.82	3.83	3.84
30197.6	3.73	3.77	3.74	3.73	3.72	3.74	3.74
29176.3	3.60	3.66	3.63	3.61	3.60	3.61	3.61
28199.9	3.49	3.57	3.53	3.51	3.49	3.49	3.49
27207.1	3.39	3.49	3.43	3.41	3.38	3.39	3.38
26201.6	3.24	3.37	3.30	3.27	3.23	3.23	3.21
25199.9	3.13	3.28	3.20	3.16	3.11	3.10	3.09
24201.4	3.10	3.26	3.18	3.13	3.08	3.08	3.06
24064.0	3.11	3.26	3.18	3.14	3.09	3.08	3.06
23648.0	3.10	3.26	3.17	3.13	3.08	3.07	3.05
23145.9	3.04	3.20	3.11	3.07	3.02	3.01	2.99
22636.5	3.04	3.21	3.12	3.07	3.02	3.01	2.98
22128.9	2.98	3.15	3.06	3.02	2.96	2.95	2.93
21621.5	2.98	3.16	3.07	3.02	2.96	2.94	2.92
21126.8	2.94	3.12	3.02	2.97	2.91	2.90	2.87
20632.1	2.94	3.13	3.03	2.98	2.91	2.89	2.87
20131.1	2.88	3.08	2.98	2.92	2.86	2.84	2.81
19631.2	2.89	3.09	2.99	2.93	2.86	2.83	2.81
19130.5	2.83	3.04	2.93	2.87	2.80	2.78	2.75
18630.1	2.84	3.05	2.94	2.88	2.81	2.78	2.75
18129.7	2.78	3.00	2.89	2.83	2.75	2.73	2.70
17629.0	2.78	3.02	2.90	2.83	2.75	2.72	2.69
17129.7	2.72	2.96	2.84	2.77	2.69	2.66	2.63
16629.6	2.72	2.97	2.85	2.77	2.69	2.65	2.61
16129.5	2.66	2.92	2.79	2.71	2.62	2.59	2.55
15622.2	2.66	2.93	2.79	2.72	2.62	2.58	2.54
15122.1	2.61	2.88	2.75	2.67	2.57	2.53	2.49
14609.9	2.60	2.89	2.75	2.66	2.56	2.52	2.47
14115.6	2.56	2.85	2.70	2.62	2.52	2.47	2.42
13613.6	2.55	2.85	2.70	2.61	2.50	2.45	2.41
13107.4	2.51	2.82	2.67	2.58	2.47	2.42	2.37
12600.5	2.51	2.82	2.66	2.57	2.46	2.41	2.35
12100.5	2.49	2.81	2.65	2.56	2.44	2.39	2.33
11593.9	2.48	2.80	2.64	2.55	2.43	2.37	2.32

Station (m)	Initial Water Level (m)	Ice Porosity Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
11093.7	2.47	2.79	2.63	2.54	2.41	2.36	2.31
10601.7	2.46	2.79	2.62	2.53	2.40	2.35	2.29
10078.0	2.44	2.78	2.61	2.52	2.39	2.33	2.28
9566.4	2.41	2.75	2.58	2.48	2.36	2.30	2.24
9049.4	2.43	2.78	2.60	2.50	2.37	2.31	2.24
8550.2	2.37	2.72	2.55	2.45	2.32	2.26	2.20
8065.4	2.39	2.75	2.57	2.47	2.33	2.26	2.20
7545.6	2.34	2.70	2.52	2.42	2.28	2.22	2.16
7041.5	2.37	2.75	2.56	2.45	2.31	2.24	2.17
6533.5	2.32	2.69	2.51	2.40	2.26	2.19	2.13
6058.0	2.34	2.73	2.53	2.42	2.28	2.20	2.13
5593.2	2.31	2.70	2.51	2.40	2.25	2.18	2.11
5080.4	2.30	2.70	2.50	2.39	2.24	2.17	2.09
4554.1	2.27	2.67	2.47	2.36	2.21	2.13	2.06
4092.1	2.28	2.68	2.48	2.37	2.22	2.14	2.07
3632.7	2.29	2.70	2.50	2.38	2.23	2.15	2.07
3166.0	2.25	2.66	2.45	2.34	2.19	2.11	2.04
2704.3	2.25	2.65	2.45	2.34	2.19	2.11	2.03
2246.3	2.26	2.66	2.46	2.35	2.20	2.12	2.04
1798.6	2.23	2.61	2.41	2.31	2.17	2.10	2.02
1335.0	2.18	2.56	2.36	2.26	2.13	2.06	1.99
874.8	2.17	2.57	2.35	2.25	2.12	2.06	1.99
482.2	2.12	2.52	2.29	2.20	2.08	2.01	1.94
32.9	2.06	2.47	2.23	2.14	2.02	1.96	1.89
-445.3	1.92	2.34	2.07	1.99	1.88	1.83	1.76
-952.1	1.77	2.25	1.92	1.84	1.73	1.67	1.60
-1486.1	1.07	1.48	1.18	1.12	1.05	1.01	0.94

Station (m)	Initial Water Level (m)	Ice Pan Thickness Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
41243.4	4.37	4.35	4.36	4.36	4.37	4.37	4.38
40242.1	4.36	4.34	4.34	4.35	4.36	4.36	4.37
39223.7	4.35	4.34	4.34	4.35	4.36	4.36	4.36
38194.5	4.33	4.31	4.32	4.33	4.33	4.34	4.34
37189.7	4.30	4.28	4.28	4.29	4.30	4.30	4.31
36181.3	4.25	4.23	4.23	4.24	4.25	4.25	4.26
35173.1	4.19	4.17	4.17	4.18	4.19	4.19	4.20
34163.2	4.12	4.10	4.11	4.12	4.12	4.13	4.13
33192.9	4.03	4.02	4.02	4.03	4.04	4.04	4.05
32186.7	3.92	3.90	3.91	3.92	3.92	3.93	3.93
31192.2	3.82	3.80	3.80	3.81	3.82	3.82	3.83
30197.6	3.73	3.71	3.71	3.72	3.73	3.73	3.74
29176.3	3.60	3.58	3.59	3.60	3.61	3.61	3.62
28199.9	3.49	3.47	3.48	3.49	3.50	3.50	3.51
27207.1	3.39	3.37	3.38	3.39	3.40	3.40	3.41
26201.6	3.24	3.22	3.23	3.24	3.25	3.25	3.26
25199.9	3.13	3.10	3.11	3.12	3.13	3.13	3.15
24201.4	3.10	3.08	3.09	3.10	3.11	3.11	3.12
24064.0	3.11	3.08	3.09	3.10	3.11	3.11	3.13
23648.0	3.10	3.07	3.08	3.09	3.10	3.10	3.12
23145.9	3.04	3.01	3.02	3.03	3.04	3.04	3.06
22636.5	3.04	3.02	3.03	3.03	3.05	3.05	3.06
22128.9	2.98	2.96	2.97	2.98	2.99	2.99	3.01
21621.5	2.98	2.96	2.97	2.98	2.99	2.99	3.00
21126.8	2.94	2.91	2.92	2.93	2.94	2.94	2.96
20632.1	2.94	2.91	2.92	2.93	2.94	2.94	2.96
20131.1	2.88	2.85	2.87	2.88	2.89	2.89	2.91
19631.2	2.89	2.86	2.87	2.88	2.89	2.89	2.91
19130.5	2.83	2.80	2.81	2.82	2.84	2.84	2.85
18630.1	2.84	2.81	2.82	2.83	2.84	2.84	2.86
18129.7	2.78	2.75	2.76	2.77	2.79	2.79	2.81
17629.0	2.78	2.75	2.77	2.78	2.79	2.79	2.81
17129.7	2.72	2.69	2.71	2.72	2.73	2.73	2.75
16629.6	2.72	2.69	2.70	2.71	2.73	2.73	2.75
16129.5	2.66	2.63	2.64	2.65	2.67	2.67	2.69
15622.2	2.66	2.63	2.64	2.65	2.66	2.67	2.69
15122.1	2.61	2.58	2.59	2.60	2.62	2.62	2.64
14609.9	2.60	2.57	2.58	2.60	2.61	2.61	2.63
14115.6	2.56	2.52	2.54	2.55	2.56	2.56	2.59
13613.6	2.55	2.52	2.53	2.54	2.55	2.56	2.58
13107.4	2.51	2.48	2.49	2.51	2.52	2.52	2.54
12600.5	2.51	2.47	2.49	2.50	2.51	2.51	2.54
12100.5	2.49	2.45	2.47	2.48	2.49	2.49	2.52
11593.9	2.48	2.44	2.46	2.47	2.48	2.48	2.51

Station (m)	Initial Water Level (m)	Ice Pan Thickness Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
11093.7	2.47	2.43	2.45	2.46	2.47	2.47	2.50
10601.7	2.46	2.42	2.44	2.45	2.46	2.46	2.49
10078.0	2.44	2.41	2.43	2.44	2.45	2.45	2.48
9566.4	2.41	2.37	2.39	2.40	2.41	2.42	2.44
9049.4	2.43	2.39	2.41	2.42	2.43	2.43	2.46
8550.2	2.37	2.33	2.35	2.36	2.37	2.38	2.40
8065.4	2.39	2.35	2.37	2.38	2.39	2.39	2.42
7545.6	2.34	2.30	2.32	2.33	2.34	2.35	2.38
7041.5	2.37	2.33	2.35	2.36	2.37	2.37	2.40
6533.5	2.32	2.28	2.30	2.31	2.32	2.32	2.35
6058.0	2.34	2.30	2.32	2.33	2.34	2.34	2.37
5593.2	2.31	2.27	2.29	2.30	2.31	2.31	2.35
5080.4	2.30	2.27	2.28	2.30	2.30	2.31	2.34
4554.1	2.27	2.23	2.25	2.26	2.27	2.27	2.31
4092.1	2.28	2.24	2.26	2.27	2.28	2.28	2.32
3632.7	2.29	2.25	2.27	2.28	2.29	2.29	2.32
3166.0	2.25	2.21	2.23	2.24	2.25	2.26	2.29
2704.3	2.25	2.21	2.23	2.24	2.25	2.26	2.29
2246.3	2.26	2.22	2.24	2.26	2.27	2.27	2.31
1798.6	2.23	2.18	2.20	2.22	2.23	2.23	2.27
1335.0	2.18	2.14	2.16	2.18	2.18	2.18	2.22
874.8	2.17	2.14	2.16	2.17	2.17	2.17	2.20
482.2	2.12	2.09	2.11	2.12	2.12	2.12	2.15
32.9	2.06	2.04	2.05	2.07	2.06	2.06	2.09
-445.3	1.92	1.89	1.91	1.92	1.92	1.92	1.95
-952.1	1.77	1.75	1.76	1.77	1.76	1.77	1.80
-1486.1	1.07	1.06	1.07	1.07	1.07	1.07	1.10

Station (m)	Initial Water Level (m)	Volume of Ice Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
41243.4	4.37	4.42	4.41	4.38	4.36	4.36	4.36
40242.1	4.36	4.41	4.40	4.37	4.35	4.34	4.35
39223.7	4.35	4.41	4.40	4.36	4.35	4.34	4.34
38194.5	4.33	4.38	4.37	4.34	4.33	4.32	4.32
37189.7	4.30	4.35	4.34	4.31	4.29	4.29	4.29
36181.3	4.25	4.29	4.28	4.26	4.24	4.24	4.24
35173.1	4.19	4.23	4.22	4.19	4.18	4.18	4.18
34163.2	4.12	4.16	4.16	4.13	4.12	4.11	4.12
33192.9	4.03	4.07	4.07	4.04	4.03	4.03	4.04
32186.7	3.92	3.95	3.95	3.93	3.92	3.92	3.93
31192.2	3.82	3.84	3.84	3.82	3.82	3.82	3.83
30197.6	3.73	3.74	3.74	3.73	3.73	3.74	3.75
29176.3	3.60	3.61	3.61	3.60	3.61	3.62	3.64
28199.9	3.49	3.49	3.49	3.49	3.50	3.52	3.54
27207.1	3.39	3.37	3.38	3.39	3.40	3.42	3.45
26201.6	3.24	3.20	3.22	3.23	3.26	3.29	3.32
25199.9	3.13	3.07	3.10	3.11	3.15	3.18	3.22
24201.4	3.10	3.04	3.07	3.09	3.12	3.16	3.19
24064.0	3.11	3.04	3.07	3.09	3.13	3.16	3.20
23648.0	3.10	3.03	3.06	3.08	3.12	3.15	3.19
23145.9	3.04	2.98	3.00	3.02	3.06	3.09	3.13
22636.5	3.04	2.96	3.00	3.02	3.07	3.10	3.14
22128.9	2.98	2.91	2.94	2.96	3.01	3.04	3.09
21621.5	2.98	2.90	2.93	2.96	3.01	3.05	3.09
21126.8	2.94	2.86	2.89	2.91	2.96	3.00	3.04
20632.1	2.94	2.85	2.88	2.92	2.97	3.01	3.05
20131.1	2.88	2.79	2.83	2.86	2.91	2.95	3.00
19631.2	2.89	2.78	2.82	2.86	2.92	2.96	3.01
19130.5	2.83	2.73	2.77	2.80	2.86	2.91	2.95
18630.1	2.84	2.72	2.77	2.81	2.87	2.92	2.97
18129.7	2.78	2.67	2.72	2.75	2.82	2.86	2.91
17629.0	2.78	2.65	2.71	2.75	2.82	2.87	2.92
17129.7	2.72	2.60	2.65	2.69	2.76	2.81	2.87
16629.6	2.72	2.58	2.63	2.69	2.76	2.82	2.87
16129.5	2.66	2.52	2.57	2.62	2.70	2.76	2.81
15622.2	2.66	2.50	2.56	2.62	2.70	2.76	2.82
15122.1	2.61	2.45	2.52	2.57	2.66	2.72	2.78
14609.9	2.60	2.43	2.50	2.56	2.65	2.71	2.78
14115.6	2.56	2.38	2.45	2.51	2.61	2.67	2.73
13613.6	2.55	2.36	2.43	2.50	2.60	2.67	2.73
13107.4	2.51	2.32	2.40	2.47	2.57	2.63	2.70
12600.5	2.51	2.31	2.38	2.46	2.56	2.63	2.70
12100.5	2.49	2.28	2.36	2.44	2.54	2.61	2.68
11593.9	2.48	2.27	2.35	2.43	2.53	2.61	2.67

Station (m)	Initial Water Level (m)	Volume of Ice Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
11093.7	2.47	2.25	2.34	2.41	2.52	2.59	2.66
10601.7	2.46	2.24	2.32	2.40	2.51	2.59	2.66
10078.0	2.44	2.22	2.31	2.39	2.50	2.58	2.65
9566.4	2.41	2.19	2.28	2.36	2.47	2.55	2.62
9049.4	2.43	2.19	2.28	2.37	2.49	2.57	2.64
8550.2	2.37	2.14	2.23	2.31	2.43	2.51	2.58
8065.4	2.39	2.14	2.24	2.33	2.45	2.53	2.61
7545.6	2.34	2.10	2.19	2.28	2.41	2.49	2.56
7041.5	2.37	2.11	2.21	2.31	2.44	2.52	2.60
6533.5	2.32	2.06	2.16	2.26	2.39	2.47	2.54
6058.0	2.34	2.07	2.17	2.27	2.41	2.49	2.57
5593.2	2.31	2.04	2.15	2.24	2.38	2.47	2.54
5080.4	2.30	2.02	2.13	2.24	2.38	2.46	2.54
4554.1	2.27	1.99	2.10	2.20	2.34	2.43	2.51
4092.1	2.28	1.99	2.11	2.21	2.35	2.44	2.52
3632.7	2.29	2.00	2.11	2.22	2.37	2.46	2.54
3166.0	2.25	1.96	2.08	2.18	2.33	2.42	2.49
2704.3	2.25	1.96	2.07	2.18	2.33	2.41	2.49
2246.3	2.26	1.97	2.09	2.20	2.34	2.42	2.49
1798.6	2.23	1.95	2.06	2.17	2.30	2.37	2.44
1335.0	2.18	1.92	2.03	2.13	2.24	2.32	2.39
874.8	2.17	1.92	2.02	2.12	2.24	2.32	2.38
482.2	2.12	1.88	1.98	2.08	2.19	2.26	2.33
32.9	2.06	1.82	1.93	2.02	2.13	2.20	2.26
-445.3	1.92	1.71	1.80	1.88	1.97	2.04	2.10
-952.1	1.77	1.54	1.64	1.73	1.82	1.89	1.94
-1486.1	1.07	0.91	0.97	1.05	1.11	1.16	1.19

Station (m)	Initial Water Level (m)	Bed Roughness Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
41243.4	4.37	3.62	3.84	4.07	4.58	4.77	4.97
40242.1	4.36	3.60	3.83	4.05	4.57	4.76	4.96
39223.7	4.35	3.60	3.82	4.05	4.56	4.76	4.95
38194.5	4.33	3.57	3.80	4.03	4.54	4.73	4.93
37189.7	4.30	3.54	3.77	3.99	4.51	4.70	4.89
36181.3	4.25	3.49	3.72	3.95	4.45	4.64	4.84
35173.1	4.19	3.45	3.67	3.89	4.39	4.57	4.77
34163.2	4.12	3.40	3.62	3.83	4.32	4.50	4.69
33192.9	4.03	3.33	3.54	3.75	4.23	4.40	4.58
32186.7	3.92	3.24	3.44	3.64	4.11	4.27	4.45
31192.2	3.82	3.16	3.35	3.55	4.00	4.16	4.33
30197.6	3.73	3.09	3.27	3.46	3.90	4.06	4.23
29176.3	3.60	2.97	3.15	3.34	3.77	3.93	4.10
28199.9	3.49	2.87	3.05	3.23	3.66	3.82	3.98
27207.1	3.39	2.77	2.95	3.13	3.56	3.71	3.87
26201.6	3.24	2.64	2.81	2.98	3.40	3.55	3.71
25199.9	3.13	2.55	2.71	2.88	3.28	3.42	3.58
24201.4	3.10	2.54	2.69	2.85	3.25	3.39	3.54
24064.0	3.11	2.55	2.70	2.86	3.25	3.39	3.54
23648.0	3.10	2.54	2.69	2.85	3.24	3.38	3.53
23145.9	3.04	2.48	2.63	2.79	3.18	3.32	3.46
22636.5	3.04	2.50	2.65	2.80	3.18	3.32	3.46
22128.9	2.98	2.44	2.59	2.74	3.12	3.25	3.40
21621.5	2.98	2.46	2.60	2.75	3.12	3.25	3.39
21126.8	2.94	2.41	2.55	2.70	3.07	3.20	3.33
20632.1	2.94	2.43	2.57	2.71	3.07	3.19	3.32
20131.1	2.88	2.38	2.51	2.65	3.01	3.13	3.26
19631.2	2.89	2.40	2.52	2.66	3.01	3.13	3.25
19130.5	2.83	2.35	2.47	2.60	2.95	3.07	3.19
18630.1	2.84	2.37	2.49	2.62	2.95	3.07	3.19
18129.7	2.78	2.32	2.43	2.56	2.89	3.01	3.13
17629.0	2.78	2.33	2.44	2.57	2.89	3.00	3.12
17129.7	2.72	2.28	2.38	2.51	2.83	2.94	3.05
16629.6	2.72	2.29	2.39	2.52	2.82	2.93	3.04
16129.5	2.66	2.24	2.33	2.45	2.76	2.86	2.97
15622.2	2.66	2.25	2.35	2.46	2.75	2.85	2.96
15122.1	2.61	2.21	2.30	2.41	2.70	2.80	2.90
14609.9	2.60	2.22	2.30	2.41	2.69	2.78	2.88
14115.6	2.56	2.18	2.26	2.36	2.64	2.73	2.83
13613.6	2.55	2.19	2.26	2.36	2.63	2.72	2.81
13107.4	2.51	2.16	2.23	2.33	2.59	2.67	2.76
12600.5	2.51	2.16	2.23	2.32	2.58	2.66	2.75
12100.5	2.49	2.15	2.21	2.30	2.55	2.64	2.72
11593.9	2.48	2.15	2.21	2.30	2.54	2.62	2.71

Station (m)	Initial Water Level (m)	Bed Roughness Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
11093.7	2.47	2.14	2.20	2.29	2.53	2.61	2.69
10601.7	2.46	2.14	2.19	2.28	2.52	2.59	2.67
10078.0	2.44	2.14	2.19	2.27	2.50	2.57	2.65
9566.4	2.41	2.10	2.15	2.24	2.47	2.54	2.61
9049.4	2.43	2.14	2.18	2.26	2.48	2.55	2.62
8550.2	2.37	2.08	2.12	2.20	2.42	2.49	2.56
8065.4	2.39	2.11	2.15	2.23	2.43	2.50	2.57
7545.6	2.34	2.06	2.10	2.17	2.39	2.45	2.51
7041.5	2.37	2.11	2.15	2.21	2.41	2.47	2.54
6533.5	2.32	2.06	2.09	2.15	2.36	2.41	2.48
6058.0	2.34	2.09	2.13	2.18	2.37	2.43	2.49
5593.2	2.31	2.07	2.10	2.15	2.34	2.40	2.45
5080.4	2.30	2.07	2.10	2.15	2.33	2.38	2.44
4554.1	2.27	2.03	2.06	2.11	2.30	2.35	2.40
4092.1	2.28	2.05	2.08	2.13	2.31	2.35	2.41
3632.7	2.29	2.07	2.10	2.14	2.32	2.36	2.41
3166.0	2.25	2.03	2.06	2.10	2.28	2.32	2.37
2704.3	2.25	2.04	2.07	2.10	2.28	2.31	2.36
2246.3	2.26	2.07	2.09	2.13	2.29	2.33	2.37
1798.6	2.23	2.03	2.06	2.09	2.24	2.28	2.33
1335.0	2.18	1.99	2.01	2.04	2.19	2.23	2.27
874.8	2.17	2.00	2.02	2.04	2.18	2.22	2.26
482.2	2.12	1.96	1.99	1.99	2.14	2.17	2.21
32.9	2.06	1.93	1.96	1.94	2.08	2.11	2.15
-445.3	1.92	1.81	1.83	1.80	1.94	1.96	2.00
-952.1	1.77	1.76	1.78	1.68	1.79	1.79	1.82
-1486.1	1.07	1.12	1.13	1.02	1.09	1.07	1.09

Station (m)	Initial Water Level (m)	Flow Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
41243.4	4.37	3.81	4.01	4.18	4.60	4.83	5.02
40242.1	4.36	3.81	4.01	4.17	4.58	4.82	5.00
39223.7	4.35	3.80	4.00	4.17	4.58	4.82	5.00
38194.5	4.33	3.79	3.98	4.15	4.56	4.79	4.97
37189.7	4.30	3.76	3.95	4.12	4.52	4.75	4.93
36181.3	4.25	3.71	3.91	4.07	4.46	4.69	4.87
35173.1	4.19	3.67	3.85	4.01	4.40	4.63	4.80
34163.2	4.12	3.61	3.80	3.95	4.33	4.55	4.73
33192.9	4.03	3.53	3.71	3.87	4.24	4.46	4.63
32186.7	3.92	3.42	3.60	3.76	4.13	4.34	4.51
31192.2	3.82	3.32	3.50	3.65	4.02	4.23	4.41
30197.6	3.73	3.22	3.40	3.56	3.93	4.14	4.32
29176.3	3.60	3.09	3.27	3.43	3.81	4.02	4.20
28199.9	3.49	2.95	3.15	3.32	3.70	3.92	4.11
27207.1	3.39	2.83	3.03	3.21	3.61	3.82	4.01
26201.6	3.24	2.66	2.87	3.06	3.46	3.68	3.87
25199.9	3.13	2.53	2.75	2.94	3.35	3.57	3.77
24201.4	3.10	2.50	2.72	2.91	3.32	3.54	3.74
24064.0	3.11	2.50	2.72	2.92	3.33	3.55	3.74
23648.0	3.10	2.48	2.71	2.91	3.32	3.54	3.73
23145.9	3.04	2.45	2.66	2.85	3.26	3.47	3.67
22636.5	3.04	2.43	2.65	2.85	3.26	3.47	3.67
22128.9	2.98	2.39	2.61	2.80	3.20	3.42	3.61
21621.5	2.98	2.37	2.60	2.79	3.20	3.41	3.61
21126.8	2.94	2.35	2.56	2.75	3.15	3.36	3.56
20632.1	2.94	2.33	2.55	2.75	3.15	3.36	3.56
20131.1	2.88	2.29	2.51	2.70	3.10	3.31	3.50
19631.2	2.89	2.27	2.49	2.69	3.10	3.31	3.51
19130.5	2.83	2.23	2.45	2.64	3.04	3.26	3.45
18630.1	2.84	2.21	2.44	2.64	3.05	3.26	3.46
18129.7	2.78	2.18	2.40	2.59	3.00	3.21	3.40
17629.0	2.78	2.15	2.38	2.59	3.00	3.21	3.41
17129.7	2.72	2.11	2.33	2.53	2.94	3.15	3.35
16629.6	2.72	2.07	2.31	2.52	2.94	3.15	3.35
16129.5	2.66	2.03	2.26	2.47	2.88	3.09	3.29
15622.2	2.66	2.00	2.24	2.46	2.88	3.09	3.30
15122.1	2.61	1.97	2.20	2.41	2.83	3.04	3.25
14609.9	2.60	1.94	2.18	2.40	2.82	3.03	3.24
14115.6	2.56	1.90	2.14	2.36	2.78	2.98	3.20
13613.6	2.55	1.87	2.12	2.35	2.77	2.97	3.19
13107.4	2.51	1.84	2.09	2.31	2.73	2.94	3.16
12600.5	2.51	1.83	2.08	2.30	2.72	2.93	3.15
12100.5	2.49	1.81	2.06	2.28	2.70	2.91	3.13
11593.9	2.48	1.80	2.05	2.27	2.69	2.90	3.13

Station (m)	Initial Water Level (m)	Flow Sensitivity Analysis Water Level (m)					
		-30%	-20%	-10%	+10%	+20%	+30%
11093.7	2.47	1.78	2.03	2.26	2.68	2.89	3.11
10601.7	2.46	1.77	2.02	2.25	2.67	2.87	3.11
10078.0	2.44	1.75	2.01	2.24	2.66	2.86	3.10
9566.4	2.41	1.73	1.98	2.21	2.63	2.83	3.06
9049.4	2.43	1.72	1.98	2.22	2.64	2.84	3.08
8550.2	2.37	1.69	1.94	2.17	2.59	2.79	3.02
8065.4	2.39	1.68	1.94	2.18	2.60	2.81	3.05
7545.6	2.34	1.65	1.91	2.14	2.56	2.76	3.00
7041.5	2.37	1.64	1.91	2.16	2.59	2.79	3.04
6533.5	2.32	1.62	1.88	2.11	2.53	2.74	2.98
6058.0	2.34	1.61	1.88	2.13	2.55	2.76	3.01
5593.2	2.31	1.59	1.86	2.10	2.53	2.73	2.98
5080.4	2.30	1.58	1.85	2.09	2.52	2.72	2.98
4554.1	2.27	1.56	1.82	2.06	2.48	2.69	2.94
4092.1	2.28	1.56	1.82	2.07	2.49	2.70	2.95
3632.7	2.29	1.55	1.82	2.07	2.50	2.70	2.97
3166.0	2.25	1.54	1.80	2.04	2.47	2.67	2.93
2704.3	2.25	1.53	1.80	2.04	2.47	2.66	2.93
2246.3	2.26	1.52	1.80	2.05	2.48	2.68	2.95
1798.6	2.23	1.49	1.77	2.01	2.44	2.64	2.92
1335.0	2.18	1.45	1.73	1.97	2.39	2.59	2.88
874.8	2.17	1.42	1.70	1.96	2.38	2.58	2.88
482.2	2.12	1.37	1.65	1.91	2.33	2.53	2.84
32.9	2.06	1.30	1.59	1.85	2.28	2.46	2.79
-445.3	1.92	1.18	1.46	1.71	2.13	2.29	2.65
-952.1	1.77	0.98	1.27	1.55	1.96	2.07	2.51
-1486.1	1.07	0.51	0.70	0.91	1.19	1.23	1.62

Station (m)	Initial Water Level (m)	Lake Melville Level Sensitivity Analysis Water Level (m)					
		-0.75 m	-0.50 m	-0.25 m	+0.25 m	+0.50 m	+0.75 m
41243.4	4.37	4.06	4.08	4.10	4.47	4.54	4.61
40242.1	4.36	4.03	4.06	4.07	4.46	4.53	4.61
39223.7	4.35	4.03	4.06	4.07	4.46	4.53	4.60
38194.5	4.33	4.01	4.04	4.05	4.43	4.50	4.58
37189.7	4.30	3.98	4.00	4.02	4.40	4.47	4.54
36181.3	4.25	3.93	3.95	3.97	4.35	4.42	4.49
35173.1	4.19	3.87	3.89	3.91	4.29	4.35	4.43
34163.2	4.12	3.81	3.83	3.85	4.22	4.29	4.36
33192.9	4.03	3.72	3.75	3.77	4.13	4.20	4.27
32186.7	3.92	3.61	3.63	3.66	4.02	4.08	4.15
31192.2	3.82	3.50	3.53	3.55	3.91	3.97	4.04
30197.6	3.73	3.41	3.44	3.47	3.82	3.88	3.95
29176.3	3.60	3.28	3.31	3.34	3.70	3.76	3.83
28199.9	3.49	3.17	3.20	3.24	3.58	3.65	3.72
27207.1	3.39	3.06	3.10	3.14	3.48	3.55	3.62
26201.6	3.24	2.91	2.95	3.00	3.33	3.40	3.47
25199.9	3.13	2.79	2.84	2.89	3.21	3.29	3.35
24201.4	3.10	2.76	2.81	2.87	3.19	3.26	3.32
24064.0	3.11	2.78	2.82	2.88	3.19	3.26	3.32
23648.0	3.10	2.77	2.82	2.88	3.18	3.24	3.31
23145.9	3.04	2.68	2.73	2.79	3.13	3.20	3.27
22636.5	3.04	2.72	2.77	2.83	3.12	3.18	3.25
22128.9	2.98	2.64	2.69	2.75	3.07	3.14	3.21
21621.5	2.98	2.66	2.71	2.77	3.06	3.13	3.19
21126.8	2.94	2.59	2.64	2.71	3.02	3.09	3.16
20632.1	2.94	2.62	2.67	2.74	3.01	3.08	3.14
20131.1	2.88	2.54	2.59	2.66	2.96	3.04	3.10
19631.2	2.89	2.57	2.62	2.69	2.96	3.02	3.08
19130.5	2.83	2.49	2.54	2.61	2.91	2.98	3.05
18630.1	2.84	2.52	2.57	2.65	2.91	2.97	3.03
18129.7	2.78	2.44	2.49	2.57	2.86	2.93	3.00
17629.0	2.78	2.47	2.52	2.60	2.85	2.92	2.98
17129.7	2.72	2.38	2.44	2.51	2.80	2.87	2.94
16629.6	2.72	2.41	2.46	2.54	2.79	2.85	2.91
16129.5	2.66	2.32	2.37	2.46	2.74	2.81	2.87
15622.2	2.66	2.35	2.40	2.49	2.73	2.79	2.85
15122.1	2.61	2.27	2.33	2.42	2.68	2.76	2.82
14609.9	2.60	2.28	2.34	2.43	2.67	2.74	2.79
14115.6	2.56	2.22	2.28	2.37	2.63	2.70	2.76
13613.6	2.55	2.23	2.29	2.39	2.61	2.68	2.74
13107.4	2.51	2.18	2.24	2.34	2.58	2.65	2.71
12600.5	2.51	2.19	2.25	2.34	2.57	2.64	2.70
12100.5	2.49	2.16	2.22	2.32	2.55	2.62	2.68
11593.9	2.48	2.16	2.22	2.31	2.54	2.61	2.67

Station (m)	Initial Water Level (m)	Lake Melville Level Sensitivity Analysis Water Level (m)					
		-0.75 m	-0.50 m	-0.25 m	+0.25 m	+0.50 m	+0.75 m
11093.7	2.47	2.14	2.21	2.30	2.53	2.60	2.65
10601.7	2.46	2.14	2.20	2.30	2.51	2.58	2.64
10078.0	2.44	2.13	2.19	2.29	2.50	2.57	2.62
9566.4	2.41	2.08	2.14	2.24	2.47	2.55	2.61
9049.4	2.43	2.13	2.19	2.29	2.48	2.54	2.59
8550.2	2.37	2.03	2.10	2.20	2.43	2.51	2.57
8065.4	2.39	2.08	2.15	2.25	2.44	2.51	2.56
7545.6	2.34	2.00	2.07	2.17	2.40	2.48	2.54
7041.5	2.37	2.08	2.14	2.25	2.42	2.48	2.53
6533.5	2.32	1.98	2.05	2.16	2.38	2.45	2.51
6058.0	2.34	2.04	2.10	2.21	2.39	2.45	2.51
5593.2	2.31	2.00	2.06	2.17	2.36	2.43	2.49
5080.4	2.30	2.00	2.06	2.17	2.35	2.42	2.48
4554.1	2.27	1.94	2.01	2.12	2.33	2.40	2.46
4092.1	2.28	1.97	2.04	2.15	2.33	2.40	2.46
3632.7	2.29	2.00	2.06	2.17	2.33	2.40	2.45
3166.0	2.25	1.93	2.00	2.11	2.31	2.38	2.44
2704.3	2.25	1.94	2.00	2.12	2.30	2.37	2.43
2246.3	2.26	1.98	2.04	2.16	2.31	2.37	2.42
1798.6	2.23	1.92	1.99	2.10	2.27	2.34	2.39
1335.0	2.18	1.85	1.92	2.04	2.23	2.30	2.36
874.8	2.17	1.87	1.95	2.07	2.21	2.28	2.33
482.2	2.12	1.83	1.91	2.03	2.16	2.23	2.27
32.9	2.06	1.80	1.88	2.00	2.10	2.15	2.19
-445.3	1.92	1.65	1.73	1.86	1.96	2.02	2.04
-952.1	1.77	1.63	1.71	1.84	1.76	1.80	1.79
-1486.1	1.07	0.84	0.96	1.12	1.11	1.20	1.26