



Appendix A

Drawdown Test Summaries



Drawdown Tests Conducted in 2016

Lift Station	Pump / Fill	Start (Time)	Stop (Time)	Start	Stop	Time	Rate
				m		s	L/s
Building 1	P2	11:11:00 AM	11:13:00 AM	2.3	1.35	120	55.96
	F	11:13:00 AM	11:21:00 AM	1.35	2.3	480	13.99
	P1	11:21:00 AM	11:23:00 AM	2.3	1.35	120	55.96
	F	11:23:00 AM	11:31:00 AM	1.35	2.3	480	13.99
	P1+P2	11:31:00 AM	11:32:00 AM	2.3	1.35	60	111.92
	F	11:32:00 AM	11:40:00 AM	1.35	2.3	480	13.99
	P1	11:41:00 AM	11:43:00 AM	2.3	1.35	120	55.96
	F	11:43:00 AM	11:51:00 AM	1.35	2.3	480	13.99
	P1+P2	11:51:00 AM	11:52:00 AM	2.3	1.35	60	111.92
Building 3	P1	12:14:00 PM	12:15:00 PM	2.40	2.00	60	47.12
	F	12:15:00 PM	12:20:00 PM	2.00	2.41	300	9.66
	P2	12:20:00 PM	12:21:00 PM	2.41	2.00	60	48.30
	F	12:21:00 PM	12:26:00 PM	2.00	2.41	300	9.66
	P1	12:26:00 PM	12:27:00 PM	2.40	2.00	60	47.12
	F	12:27:00 PM	12:32:00 PM	2.00	2.40	300	9.42
	P1+P2	12:32:00 PM	12:33:00 PM	2.40	1.96	60	51.84
	F	12:33:00 PM	12:38:30 PM	2.00	2.40	300	9.42
	P1+P2	12:38:00 PM	12:39:00 PM	2.40	1.96	60	51.84
Building 4	F	-	-	1.75	2.41	489.33	36.82
	P1	-	-	2.4	1.4	212.32	128.58
	P3	-	-	2.4	1.4	195.91	139.35
	F	-	-	1.4	2.55	892.78	35.17
	P1+P2	-	-	1.86	1.52	45.55	203.78
	P2+P3	-	-	2.55	1.4	167.05	187.94
	F	-	-	1.4	2.4	856.45	31.88
	P3+P1	-	-	2.12	1.96	17.51	249.46
	F	-	-	1.71	2.24	438	33.03
	P2	-	-	2.24	1.37	161	147.52
	P2	-	-	2.24	1.37	168	141.38
	F	-	-	1.35	1.67	268	32.60
	F	-	-	1.67	1.92	195	35.00
Building 8	F	10:19:00 AM	10:35:00 AM	1.7	2.05	960	8.18
	P1	10:35:00 AM	10:36:08 AM	2.05	1.63	68	138.51
	F	10:36:08 AM	10:52:00 AM	1.63	2.05	952	9.89
	P2	10:52:00 AM	10:53:13 AM	2.05	1.63	73	129.02
	F	10:53:13 AM	11:09:30 AM	1.63	2.05	977	9.64
	P1+P2	11:10:08 AM	11:10:53 AM	2.05	1.63	45	209.30
Building 9	F	11:15:00 AM	11:17:48 AM	1.7	2.21	168	104.73
	P3	11:17:48 AM	11:29:55 AM	2.21	1.69	727	24.68
	F	11:29:55 AM	11:31:40 AM	1.69	2.2	105	167.57
	P1	11:31:40 AM	11:41:55 AM	2.2	1.7	615	28.05
	F	11:41:55 AM	11:44:14 AM	1.7	2.21	139	126.58
	P2	11:44:14 AM	11:55:20 AM	2.21	1.68	666	27.45
	F	11:55:20 AM	11:57:53 AM	1.68	2.2	153	117.25
	P2+P3	11:57:53 AM	11:59:30 AM	2.2	1.7	97	177.84
	F	11:59:30 AM	12:01:34 PM	1.7	2.2	124	139.11
	P1+P2	12:01:34 PM	12:03:45 PM	2.2	1.68	131	136.95
	F	12:03:45 PM	12:05:50 PM	1.68	2.2	125	143.52

Drawdown Tests Conducted on April 18, 2018

Lift Station	Pump / Fill	Start (Time)	Stop (Time)	Start	Stop	Time	Rate
				m		s	L/s
Building 1	P1	-	-	2.3	1.22	100	76.34
	F	-	-	1.22	2.31	605	12.74
	P2	-	-	2.31	1.2	89	88.16
	F	-	-	1.2	2.31	629	12.47
	P1+P2	-	-	2.3	1.2	69	112.69
	F	-	-	1.2	2.3	630	12.34
	P1+P2	-	-	2.3	1.14	70	117.14
Building 3	P2	-	-	2.45	1.92	48	78.05
	F	-	-	1.92	2.46	291	13.12
	P1	-	-	2.46	1.98	45	75.40
	F	-	-	1.98	2.45	185	17.96
	P2	-	-	2.45	1.92	41	91.37
	F	-	-	1.92	2.44	235	15.64
	P1	-	-	2.44	1.97	47	70.69
	F	-	-	1.97	2.44	209	15.90
	P1+P2	-	-	2.44	1.90	38	100.45
	F	-	-	1.90	2.30	240	11.78
	P1+P2	-	-	2.43	1.90	42	89.20



Appendix B

MIKE URBAN Model Files
(Provided on Flash Drive)





Appendix C

Sanitary Sewer Flow Monitoring Reports



**Final Report for
City of Cold Lake**

Attn: Mr. Azam Khan, P. Eng., M. Eng.

Cold Lake, Alberta
Sanitary Sewer Flow Monitoring
June - October 2015



Prepared and submitted by:

SFE Global
10743 178th Street
Edmonton, Alberta T5S 1J6
Phone (780) 461-0171 Fax (780) 443-4613
Toll Free: 1-877-293-0173



November 25, 2015

Mr. Azam Khan, P. Eng., M. Eng.
Cold Lake City Hall
5513 - 48 Avenue
Cold Lake, AB T9M 1A1

FINAL REPORT: CITY OF COLD LAKE
Sanitary Sewer Flow Monitoring
June - October 2015

Dear Mr. Khan,

Please find enclosed SFE's Final Report for the above mentioned project. If you have any questions, comments or concerns, please do not hesitate to contact us at your earliest convenience.

Thank you for having SFE conduct this work on your behalf. We are appreciative of the opportunity to work with you and your team on this project. We look forward to working together again in the near future.

Sincerely,
SFE Global

Nick Schellenberg
General Manager - Prairies
(780) 461-0171
Nick.Schellenberg@sfeglobal.com
www.sfeglobal.com

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1. Introduction

This report provides details of the sanitary sewer flow monitoring project conducted in Cold Lake, Alberta. SFE Global was retained by the City of Cold Lake, under the direction of Mr. Azam Khan, P.Eng., M.Eng.. Mr. Nick Schellenberg represented SFE Global as Project Manager during this project.

As requested, SFE installed eight (8) sanitary sewer flow monitors and two (2) rain gauges to collect data for an anticipated five month duration. The stations were installed by May 12th, 2015 and collected data until removal on November 2nd, 2015. The monitoring stations are as follows:

Site #	Location	Meter Utilized
A15-124-01	Highway 28 @ 10 Street	ISCO 2150 Area Velocity Flow Meter
A15-124-02	Cold Lake Beach	ISCO 2150 Area Velocity Flow Meter
A15-124-03	East Ditch of 28 Street	ISCO 2150 Area Velocity Flow Meter
A15-124-04	49 Street @ 50 Avenue	ISCO 2150 Area Velocity Flow Meter
A15-124-05	5112 54 Avenue	ISCO 2150 Area Velocity Flow Meter
A15-124-06	5600 49 Street	ISCO 2150 Area Velocity Flow Meter
A15-124-07A	47 Street, N. of Tailgate Crt	ISCO 2150 Area Velocity Flow Meter
A15-124-07B	NE of 47 Street, In Field	ISCO 2150 Area Velocity Flow Meter
A15-124-08	5104 52 Street	ISCO 2150 Area Velocity Flow Meter
A15-124-RG01	720 10 th St- Firehall	Detectronic – PMAC 6385
A15-124-RG02	Lift Station Roof	Detectronic - PMAC 6385

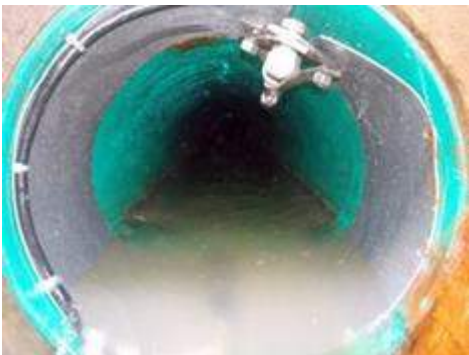
2. Flow Monitoring Stations

Prior to installing flow monitoring stations, SFE performs detailed site assessments of each potential site to determine the acceptability of SFE's Custom Compound Weir. Factors such as pipe size, channel condition, site location, site access, and flow hydraulics were all considered and documented while performing site assessments. See Appendix #1 of this report for site assessment details.

SFE installed the flow monitoring station in accordance with the approved site assessment documentation. The meter was calibrated and set to log data at 5 minute intervals. SFE obtained and recorded corresponding meter and field readings during site installation and site removal on the field maintenance sheet. These readings provided an indication of the accuracy and operation of the meter. See Appendix #2 of this report for the field report sheets detailing site inspection information, calibrations, and depth verifications.

**Site A15-124-01 / Highway 28 @ 10 Street**

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 450mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.

**Site A15-124-02 / Cold Lake Beach**

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 375mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.

**Site A15-124-03 / East Ditch of 28 Street**

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 400mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.

**Site A15-124-04 / 49 Street @ 50 Avenue**

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 525mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.



Site A15-124-05 / 5112 54 Avenue

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 375mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.



Site A15-124-06 / 5600 49 Street

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 375mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.



Site A15-124-07A / 47 Street, N. of Tailgate Ctr

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 375mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.



Site A15-124-07B / NE of 47 Street, In Field

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 200mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.



Site A15-124-08 / 5104 52 Street

SFE installed an ISCO 2150 Area Velocity flow meter within the manhole to monitor flow from the 200mm diameter pipe. Flow was calculated using the continuity equation $Q=VA$ by the flow meter's internal computer. Flow monitoring results were obtained for the complete monitoring duration. All equipment has been removed from the site.

3. QA/QC and Safety Statement

SFE confirms that all flow monitoring stations were installed according to SFE's QA/QC methodology and protocol, and standard industry practice. All flow monitoring equipment and weir material has been removed from the site locations.

SFE has a comprehensive Company Safety Manual and can be reviewed upon request.

Confined space entry procedures and general site/traffic safety was adhered to during site installation and site maintenance. SFE utilizes an approved rescue system, a 2800 CFM air induction device and four-gas air quality monitors. All of our staff members are thoroughly trained and certified in confined space entry procedures. Certificates are available upon request.

A thorough traffic control plan was established and used by SFE Global crews where required.

4. SFE Standard Data Processing Procedures

SFE Data Analysts have reviewed the final dataset and applied some of our standard data edits where necessary. When any data edits are performed, we always provide the full raw dataset for reference.

Raw Data Review

- Analyzing individual site hydraulics and scatter plots
- Reviewing installation site books, calibrations and photos
- Reviewing maintenance trips and verification against meter data
- Making note of any equipment level adjustments and reflecting this upon the dataset
- Noting and reporting on any data loss and the reason associated with it

Data Edits and Processing

SFE performs and notes any data processing or manipulation on the Data Processing QA/QC Sheet. The raw dataset is provided to the client, as well as the processed dataset. Processed data is identified in the file name by the suffix P, after the site name. Our goal is to achieve zero data edits on every project. However, due to the nature of open channel flow monitoring, sensor ragging, and some measure of equipment malfunction it is infrequent, but inevitable. We attempt to use the least amount of data editing to achieve the project objective.

Standard Processing Operations - ISCO Meter Algorithm

Due to the chance of ragging of sensors and velocity loss at low flow, the manufacturer has built a velocity replacement algorithm into their flow calculations. This algorithm checks the velocity data for zero or error values. It then look back for the last known good velocity, and replaces the erroneous data with that value. This significantly cleans the low flow portion of the data, and very seldom changes the peak flows, where most analysis takes place. Although we override this function to process and provide the true raw data from the instrument, we will periodically re-process with it, for sites with significant velocity drop out at low flows.

Fixed Value Level Adjust

If maintenance operations identify level drift of sensor error in subsequent trips, our field technicians will adjust the meter level to the current measured value. Data processing for level adjustments will offset the data from the last known good value, to the point of the level adjustment. If the level error is due to gradual sensor drift, we have a progressive level adjustment that will correct all data from the start of drifting to the point of level adjustment.

Manning's Flow Replacement

If a site has a high incidence of velocity loss due to ragging, our software can perform a Manning's Equation Flow Calculation. Although we do not use measured slope and roughness for this substitution, we adjust the slope and roughness values to produce a level based flow calculation, that matches as closely as possible, periods of good area velocity data. For periods of peak flow, rain events or surcharge conditions, the raw AV data can be referenced for calculation. Generally higher flow rates as seen during rain events will clear the debris blocking the velocity, and allow true AV data to be collected for these events.

Known Velocity Replacement

If a site has a period of lost velocity during normal flow, without any rain events, we will perform a velocity copy/paste of the equivalent number of days, from the nearest point of good velocity, without rain events. This is generally done only for short intervals, where replacing an entire data set with Manning's would not be a valid alternative.

Data Summaries are included in this report in Appendix #3.

5. Appendices

- Appendix #1 Includes technical information on Area Velocity Flow Meters
- Appendix #2 Includes all site assessment sheets, site photos, and field set-up reports
- Appendix #3 Includes site maintenance sheet and data summary

Report End
November 2015

SFE Global
Project A15-124

Appendix 1

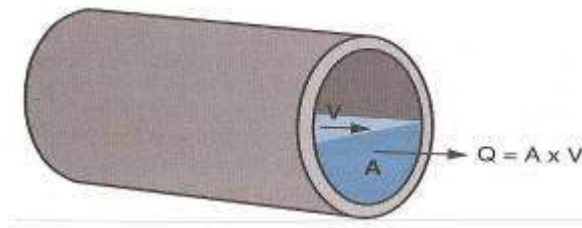
Area Velocity Flow Meters – Technical Information

Area Velocity Meter - Calibration & Verification of Monitor Sensors

Pipe Conduit Measurements

The measurement and condition of all sites were recorded during meter installation.

General Site Installation



Meter velocity was field calibrated according to the manufacturer's methodology and data was verified utilizing SFE Standard Protocol as outlined below.

Depth Verification

Depth verification was conducted at site and all data included on the field report. Five depth measurements from the meter and corresponding water depth are obtained simultaneously at sequential time intervals and recorded on the field worksheet. The lowest and highest measurements are discarded. The remaining three (3) measurements must be within 2.0 cm of each other. The averaged monitor reading must be within 5 % of the averaged field measurement to be acceptable.

Velocity Verification

Depth and velocity profiles were performed utilizing a Marsh McBirney Flow Mate point velocity meter. This instrument uses the Faraday principle to measure water velocity flowing over three electrodes. This allows an accurate velocity to be measured in a small area of the total flow.

SFE standard procedure is to use the 2-D method to determine average velocity. Numerous measurements are taken from the invert to water surface at the left, center and right thirds of the pipe. These measurements are averaged with the inclusion of readings taken from the upper left and right corner of flow.

SFE's alternate procedure when the pipe diameter is small or flow is sufficient is to use the .9-Vmax method. Point velocity readings are taken throughout the cross section of flow. The highest repeatable Velocity obtained is multiplied by 0.9 to determine average velocity. This average velocity is then correlated to the average velocity reading from the meter and must be within 10 %.

Appendix 2

Monitoring Station Site Books



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 1
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-01

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date:	11-May-15	2-Nov-15
Meter Make & Model:	ISCO 2150	
Meter I.D. - #1 and #2	207K01073	N/A
Wireless I.D # / Cell #:	211F00537	N/A
Level / Velocity Type:	Submerged	AV Sensor
Sensor Mounting:	Scissor Band	
Primary Device:	Area Velocity	
Logging Rate / Call out:	5 minute	24hr

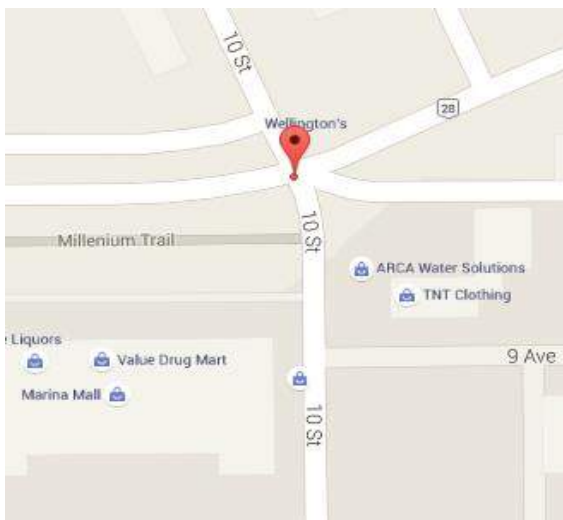
Site Location Information

Client Manhole #: N/A
Address (Location): Intersection Hwy28 & 10 Street
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.46424 W110.17315
Landmarks: In front of Median
Traffic Control Req's: High - Early/Late Entry
Additional Information:

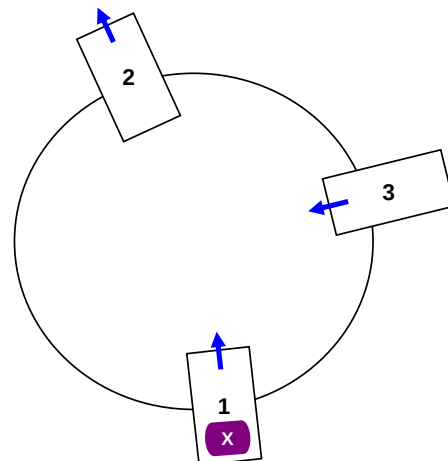
Site Profile

Manhole Depth (mm): 5720 Rungs? Y
Overall Site Condition: Excellent
Pipe Size #1 450 #2 900
(mm): #3 450 #4
Location of Sensor (which pipe?): X = 450
Overall Pipe Condition: Good
Additional Information: X in South Lead, 1.5m above invert

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 1
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-01

General Area



Birdseye View



Downhole Install



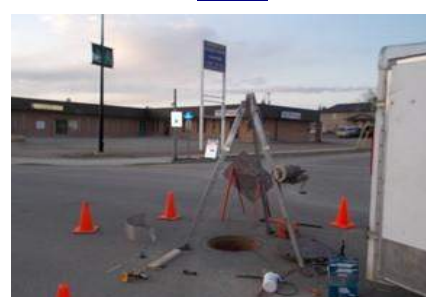
Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



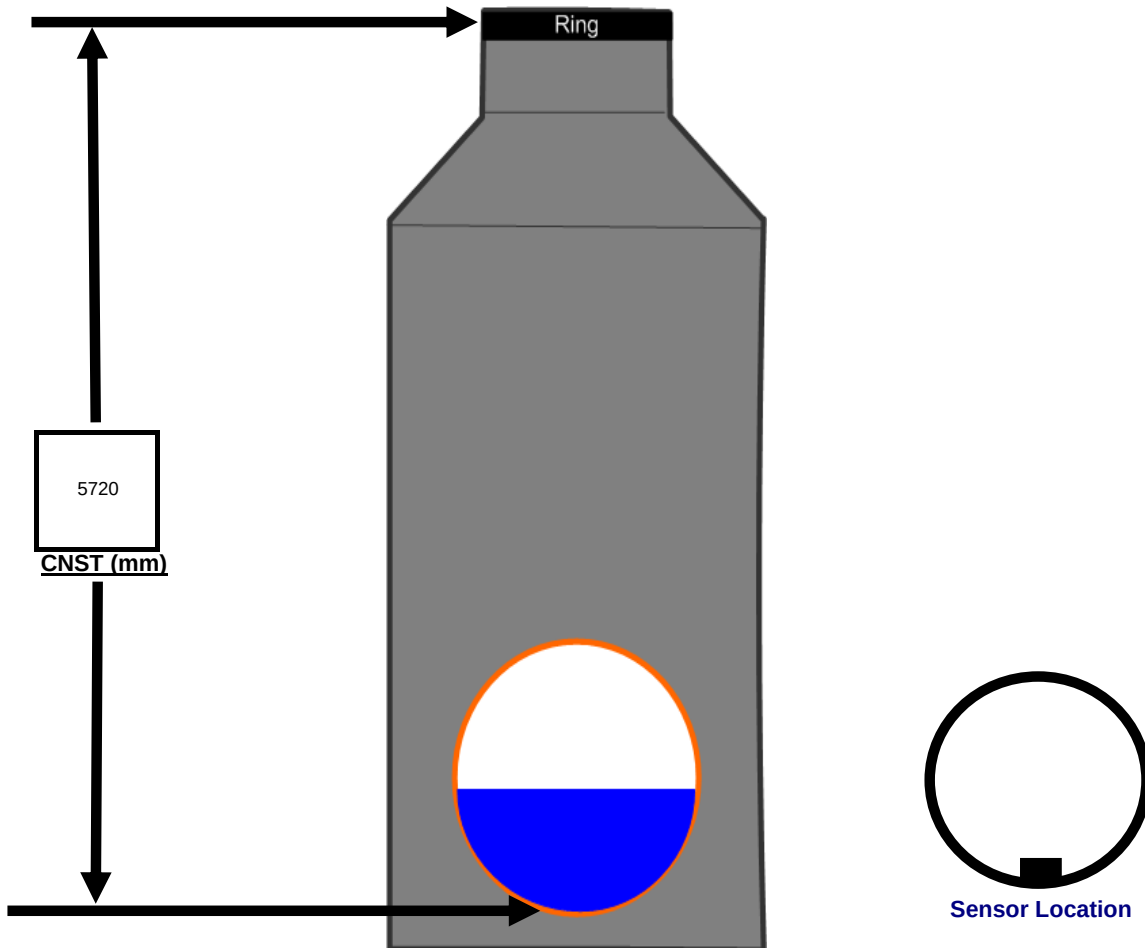
CLIENT FLOW MONITORING #: FM# 1
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-01
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	12-May-15	6:00	36	11.0	LA:
1	12-May-15	6:01	36	35.2	
2	12-May-15	6:06	32	31.6	
3	12-May-15	6:11	34	34.3	
Average			34	33.7	

- * Three Continuous Measurements Within 20 mm.
- * Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 1
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-01
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	450	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Vmax			1.954		
Average all readings		1.95			

0.9 Vmax Method

If depth is less than 4", use Max measured velocity x 0.9
Use above 2-D method as preferred method when possible

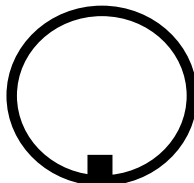
Max	N/A	Max * 0.9	#VALUE!
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Velocity Profile Summary

Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
1.95	1.926		32	12-May-15	6:10

Meter Location and Orientation

Sensor Location



Section View

Comments:



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 2
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-02

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date:	11-May-15	2-Nov-15
Meter Make & Model:	ISCO 2150	
Meter I.D. - #1 and #2	206A02419	N/A
Wireless I.D # / Cell #:	211E00968	N/A
Level / Velocity Type:	Submerged	AV Sensor
Sensor Mounting:	Scissor Band	
Primary Device:	Area Velocity	
Logging Rate / Call out:	5 minute	24hr

Site Location Information

Client Manhole #: N/A
Address (Location): Cold Lake Beach
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.47203 W110.18778
Landmarks: Near newly built splash park
Traffic Control Req's: Low - on Greenspace
Additional Information:

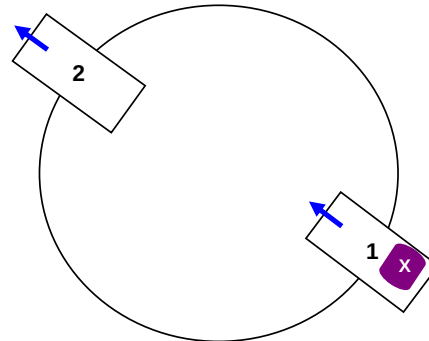
Site Profile

Manhole Depth (mm): 2470 Rungs? Y
Overall Site Condition: Excellent
Pipe Size #1 375 #2 375
(mm): #3 #4
Location of Sensor (which pipe?): x = 375
Overall Pipe Condition: Excellent
Additional Information:

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 2
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-02

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: FM# 2
NAME: ISL - Cold Lake TFM

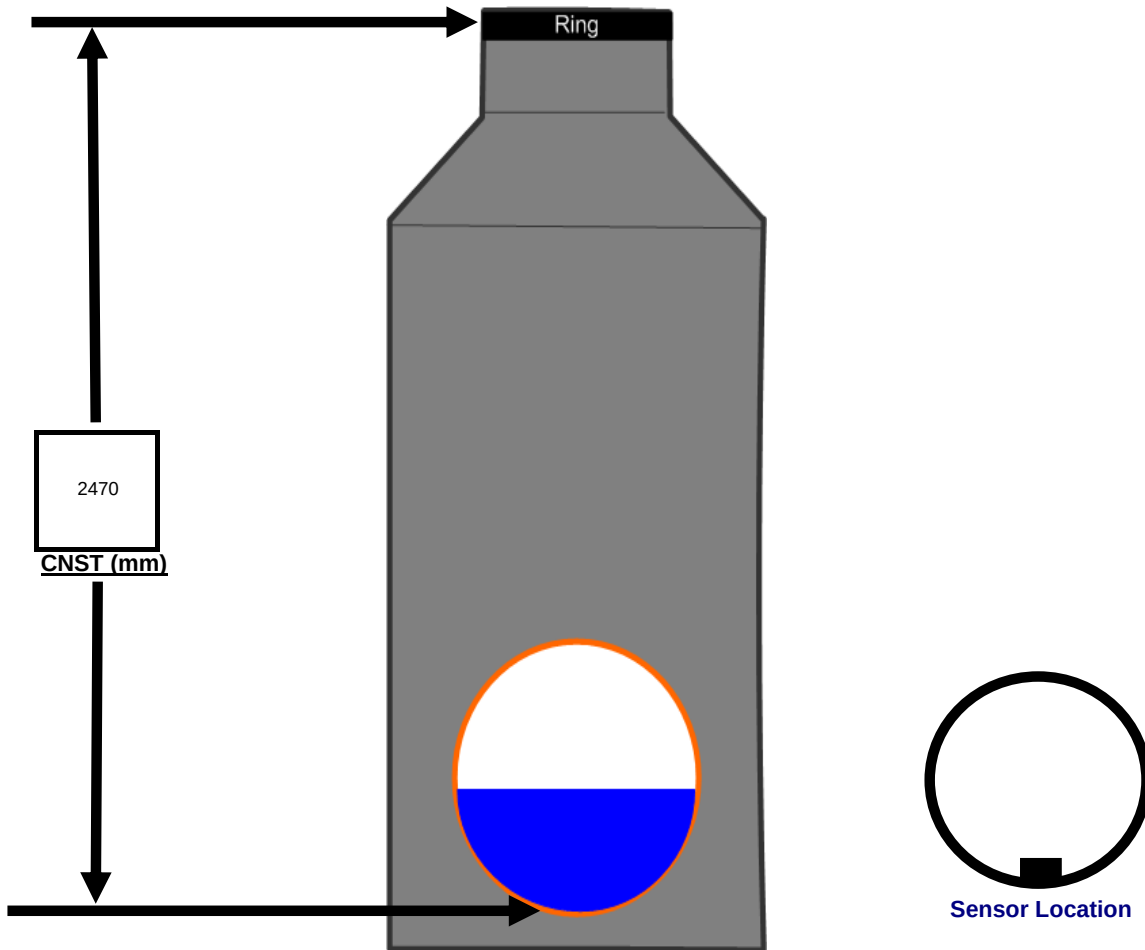
SFE PROJECT #: A15-124
SFE SITE #: A15-124-02
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	11-May-15	13:16	80	-108.0	LA:
1	11-May-15	13:17	80	79.8	
2	11-May-15	13:22	80	79.8	
3	11-May-15	13:30	90	90.8	
Average			83	83.5	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 2
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-02
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	375	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface		0.428	0.518	0.485	
Invert			0.512		
Average all readings		0.49			

0.9 Vmax Method

If depth is less than 4", use Max measured velocity x 0.9
Use above 2-D method as preferred method when possible

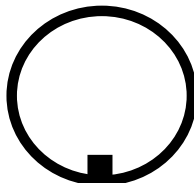
Max	N/A	Max * 0.9	#VALUE!
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Velocity Profile Summary

Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.49	0.512		82	11-May-15	13:25

Meter Location and Orientation

Sensor Location



Section View

Comments:



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 3
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-03

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date: 11-May-15 | 2-Nov-15
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2: 204M01524 | N/A
Wireless I.D # / Cell #: 211E00961 | N/A
Level / Velocity Type: Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | 24hr

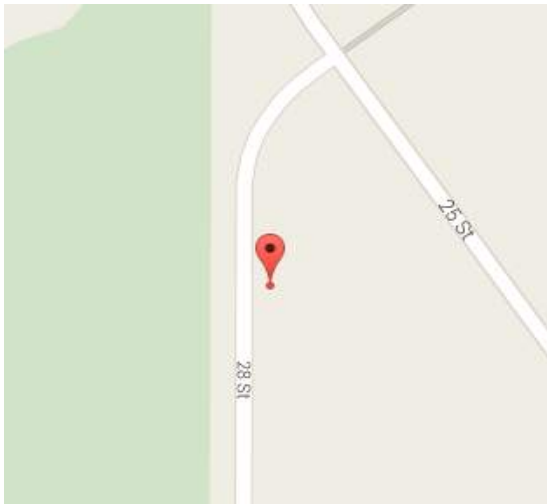
Site Location Information

Client Manhole #: N/A
Address (Location): East ditch of 28 Street
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.46538 W110.20740
Landmarks: Post and Collar painted Orange
Traffic Control Req's: Low - Park on shoulder
Additional Information: Swampy Area -

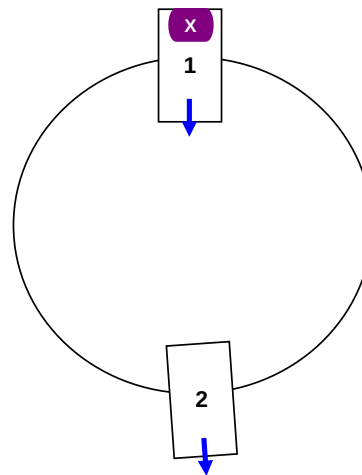
Site Profile

Manhole Depth (mm): 5290 Rungs? Y
Overall Site Condition: Excellent
Pipe Size #1 400 #2 400
(mm): #3 400 #4 400
Location of Sensor (which pipe?): X = 400
Overall Pipe Condition: Excellent
Additional Information:

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 3
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-03

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



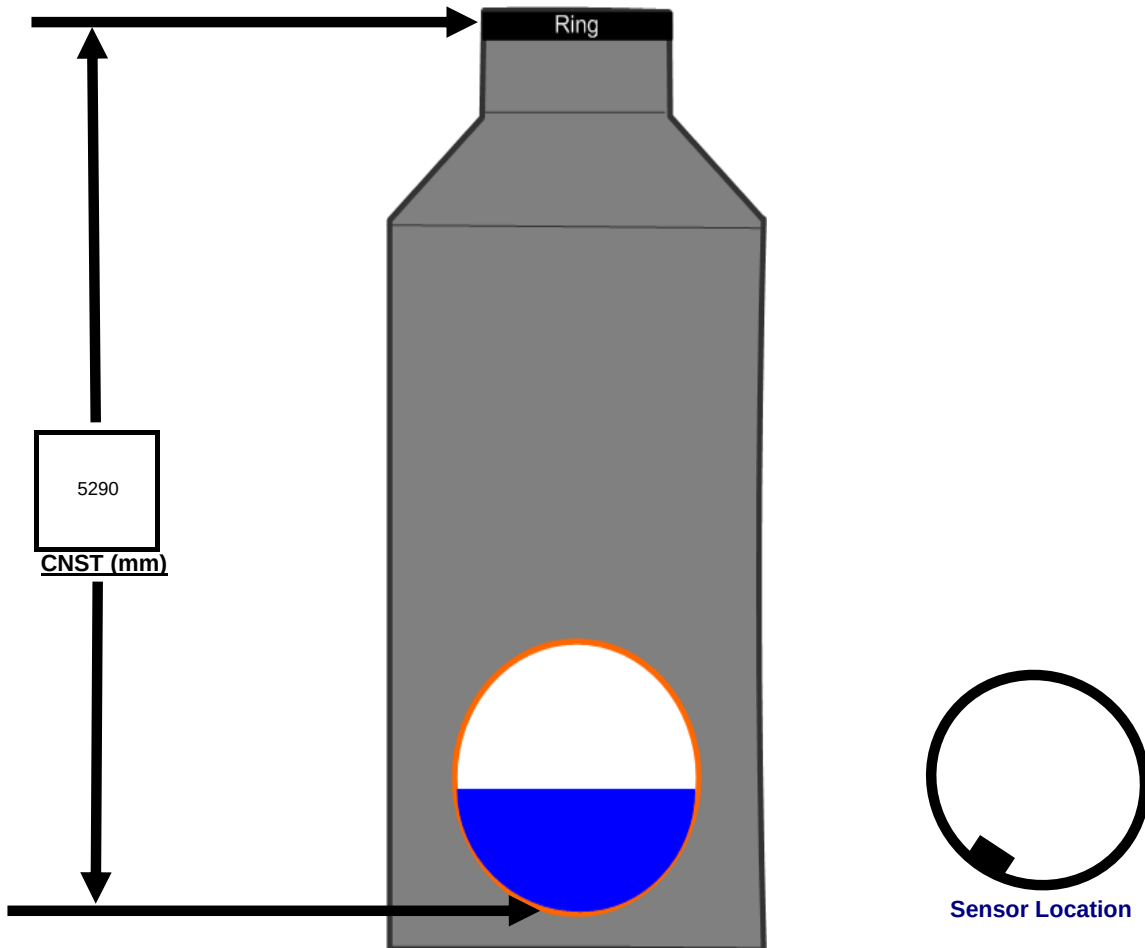
CLIENT FLOW MONITORING #: FM# 3
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-03
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	11-May-15	16:59	194	127.1	LA: Sensor Offset 90mm, 40mm Silt
1	11-May-15	16:00	194	193.6	
2	11-May-15	16:05	200	200.0	
3	11-May-15	16:10	200	198.0	
Average			198	197.2	

- * Three Continuous Measurements Within 20 mm.
- * Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 3
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-03
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	400	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface	0.063	0.095	0.096	0.104	0.051
100		0.082	0.048	0.063	
Invert			0.028		
Average all readings		0.07			

0.9 Vmax Method

If depth is less than 4", use Max measured velocity x 0.9
Use above 2-D method as preferred method when possible

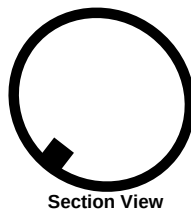
Max	N/A	Max * 0.9	#VALUE!
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Velocity Profile Summary

Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.07	0.11		200	11-May-15	16:05

Meter Location and Orientation

Sensor Location



Comments:

Sensor Offset @ 7:00 Position.
90mm Offset - PM
40mm Silt



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 4
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-04

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date: 28-May-15 | 2-Nov-15
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2: 207F00797 | N/A
Wireless I.D # / Cell #: 214E03118 | N/A
Level / Velocity Type: Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | 24hr

Site Location Information

Client Manhole #: N/A
Address (Location): Intersection of 49 St & 50 Ave
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.41364 W110.20402
Landmarks: North of Intersection
Traffic Control Req's: High - Partial Lane Closure
Additional Information:

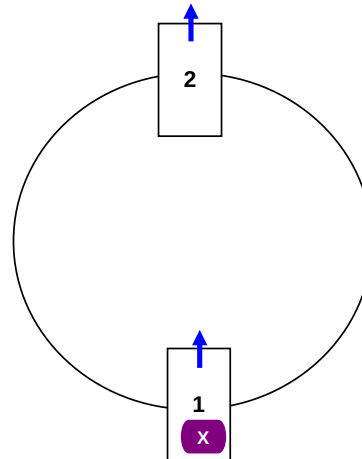
Site Profile

Manhole Depth (mm): 6200 Rungs? Y
Overall Site Condition: Good
Pipe Size #1 525 #2 525
(mm): #3 #4
Location of Sensor (which pipe?): X = 525
Overall Pipe Condition: Good
Additional Information:

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 4
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-04

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: FM# 4
NAME: ISL - Cold Lake TFM

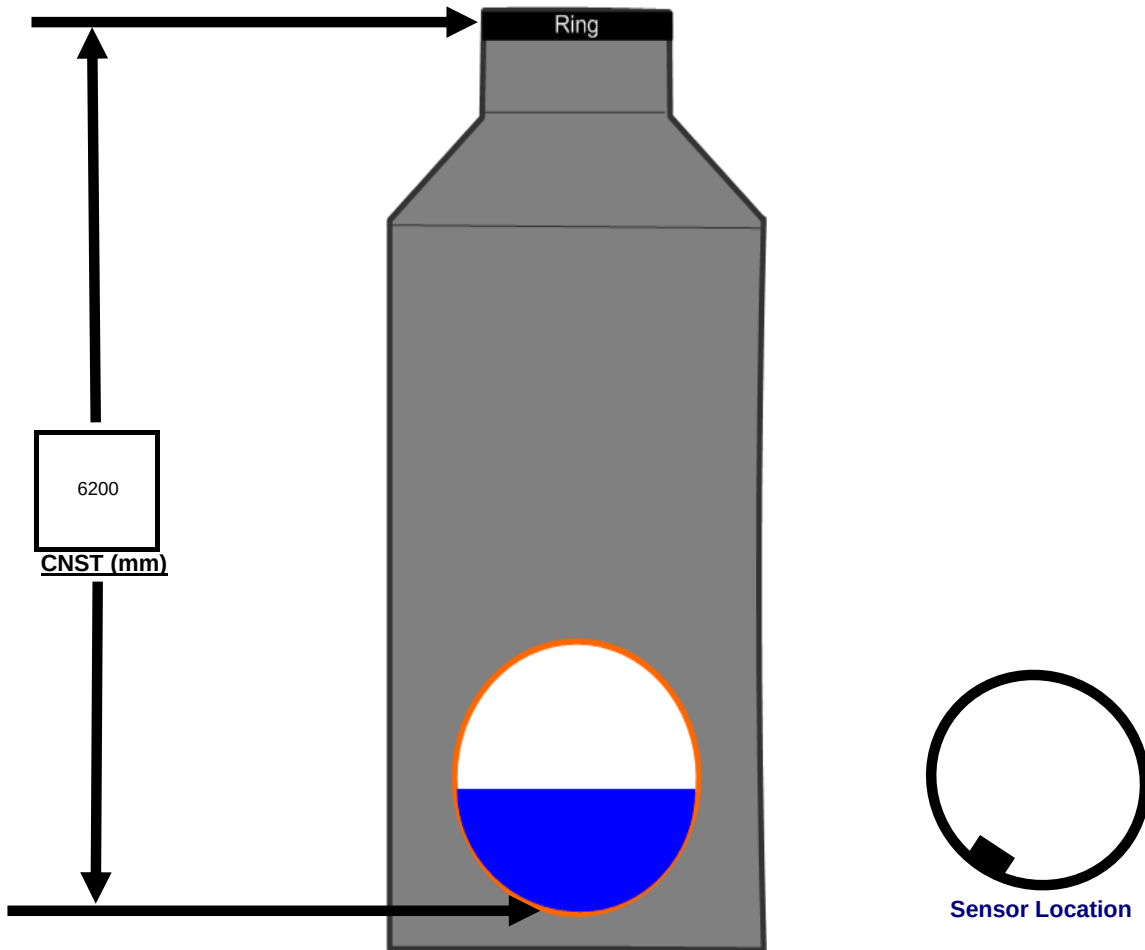
SFE PROJECT #: A15-124
SFE SITE #: A15-124-04
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	28-May-15	17:50	82	49.0	LA: Sensor Offset 58mm
1	28-May-15	17:55	82	83.0	
2	28-May-15	18:00	82	83.0	
3	28-May-15	18:08	78	77.0	
Average			81	81.0	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 4
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-04
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	525	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

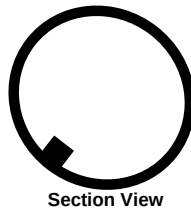
2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Vmax			0.28		
Average all readings		0.28			

0.9 Vmax Method					
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible					
Max	0.28	Max * 0.9	0.252		

Velocity Profile Summary					
Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.25	0.257		82	28-May-15	18:04

Meter Location and Orientation

Sensor Location



Comments:

Sensor Offset @ 7:00 Position.
58mm Offset - PM



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 5
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-05

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date: 12-May-15 | 5-Nov-15
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2: 207K01072 | N/A
Wireless I.D # / Cell #: 214E03112 | N/A
Level / Velocity Type: Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | 24hr

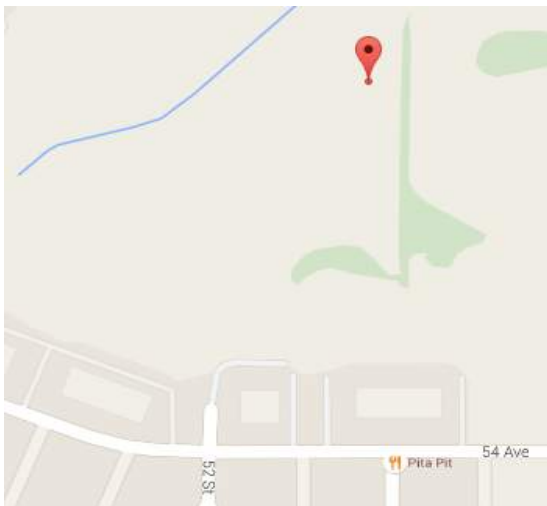
Site Location Information

Client Manhole #: N/A
Address (Location): 5112 54 Avenue
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.41975 | W110.20757
Landmarks: In Greenspace behind address
Traffic Control Req's: N/A - Off Road - Hard to Find
Additional Information:

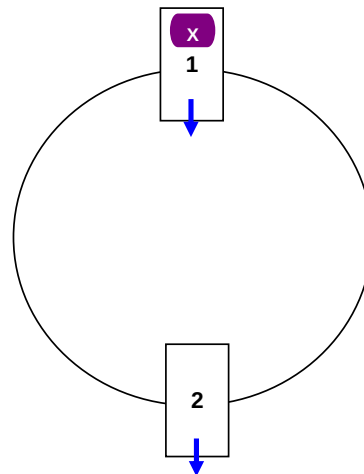
Site Profile

Manhole Depth (mm): 5000 | Rungs? Y
Overall Site Condition: Good
Pipe Size #1: 375 | #2: 375
(mm): #3: | #4:
Location of Sensor (which pipe?): X = 375
Overall Pipe Condition: Poor
Additional Information: Major Infiltration

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 5
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-05

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



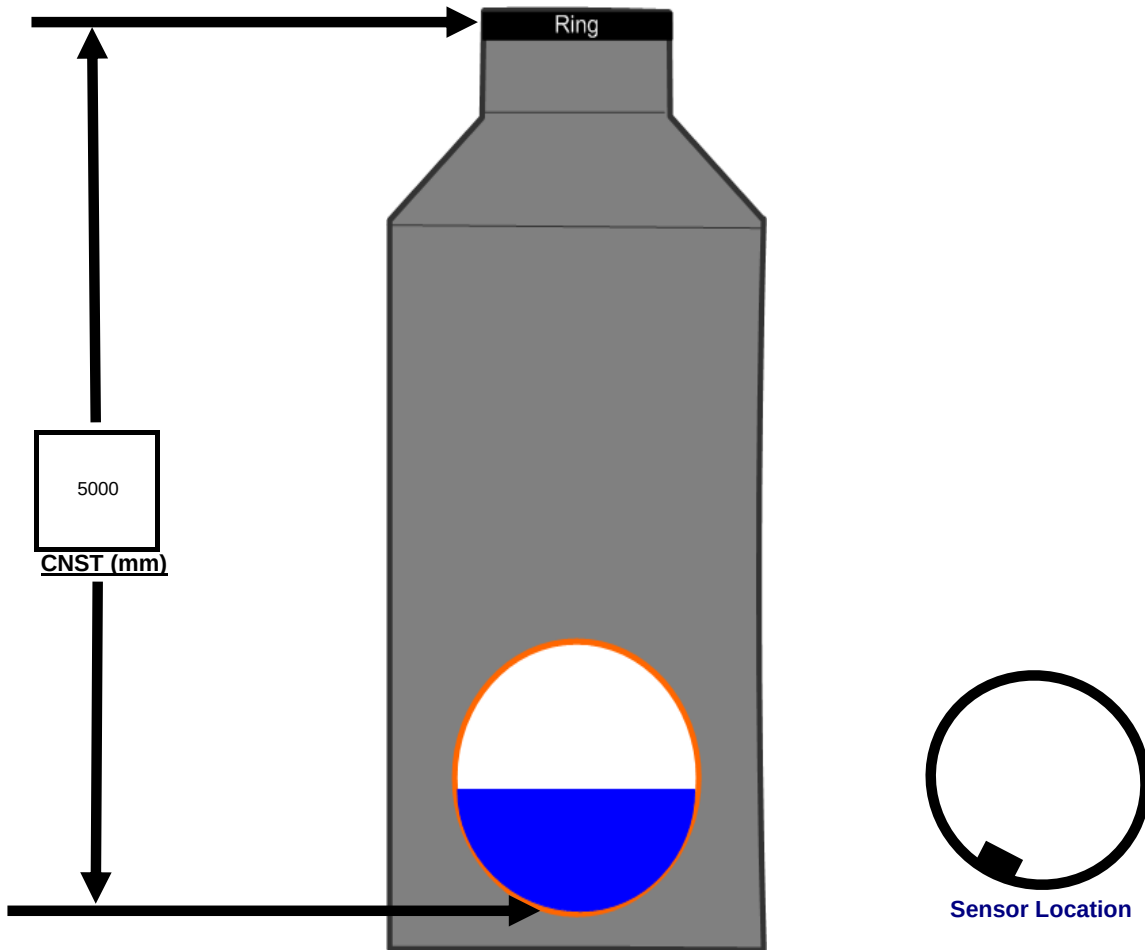
CLIENT FLOW MONITORING #: FM# 5
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-05
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	12-May-15	21:44	142	117.5	LA: Sensor Offset 32mm, Silt 10mm.
1	12-May-15	21:45	142	142.1	
2	12-May-15	21:50	140	141.2	
3	12-May-15	21:55	146	147.7	
Average			143	143.7	

- * Three Continuous Measurements Within 20 mm.
- * Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 5
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-05
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	375	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

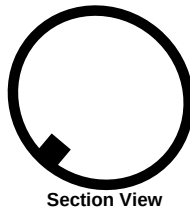
2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface	0.33	0.444	0.47	0.45	0.39
70		0.171	0.417	0.265	
Invert			0.128		
Average all readings		0.34			

0.9 Vmax Method				
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible				
Max	N/A	Max * 0.9	#VALUE!	

Velocity Profile Summary					
Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.34	0.487		144	12-May-15	21:52

Meter Location and Orientation

Sensor Location



Comments:

Sensor Offset @ 7:00 Position.
32mm Offset - PM
10mm Silt



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 6
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-06

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date: 13-May-15 | 3-Nov-15
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2: 208D00245 | N/A
Wireless I.D # / Cell #: 211E0311 | N/A
Level / Velocity Type: Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | 24hr

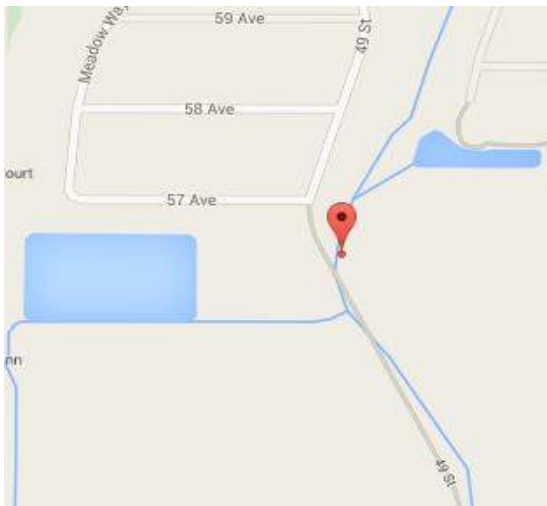
Site Location Information

Client Manhole #: N/A
Address (Location): 5600 49 Street
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.42407 W110.20228
Landmarks: First MH on Gravel Road
Traffic Control Req's: Low - Construction Zone
Additional Information:

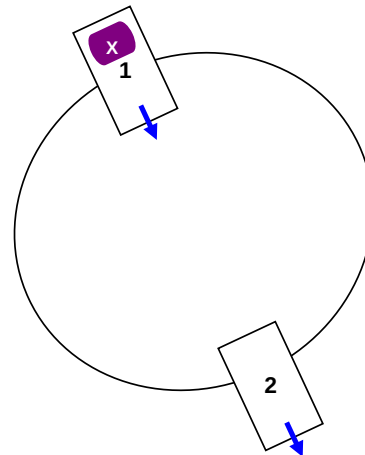
Site Profile

Manhole Depth (mm): 4000 Rungs? Y
Overall Site Condition: Excellent
Pipe Size #1 375 #2 375
(mm): #3 #4
Location of Sensor (which pipe?): X = 375
Overall Pipe Condition: Excellent
Additional Information:

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 6
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-06

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: FM# 6
NAME: ISL - Cold Lake TFM

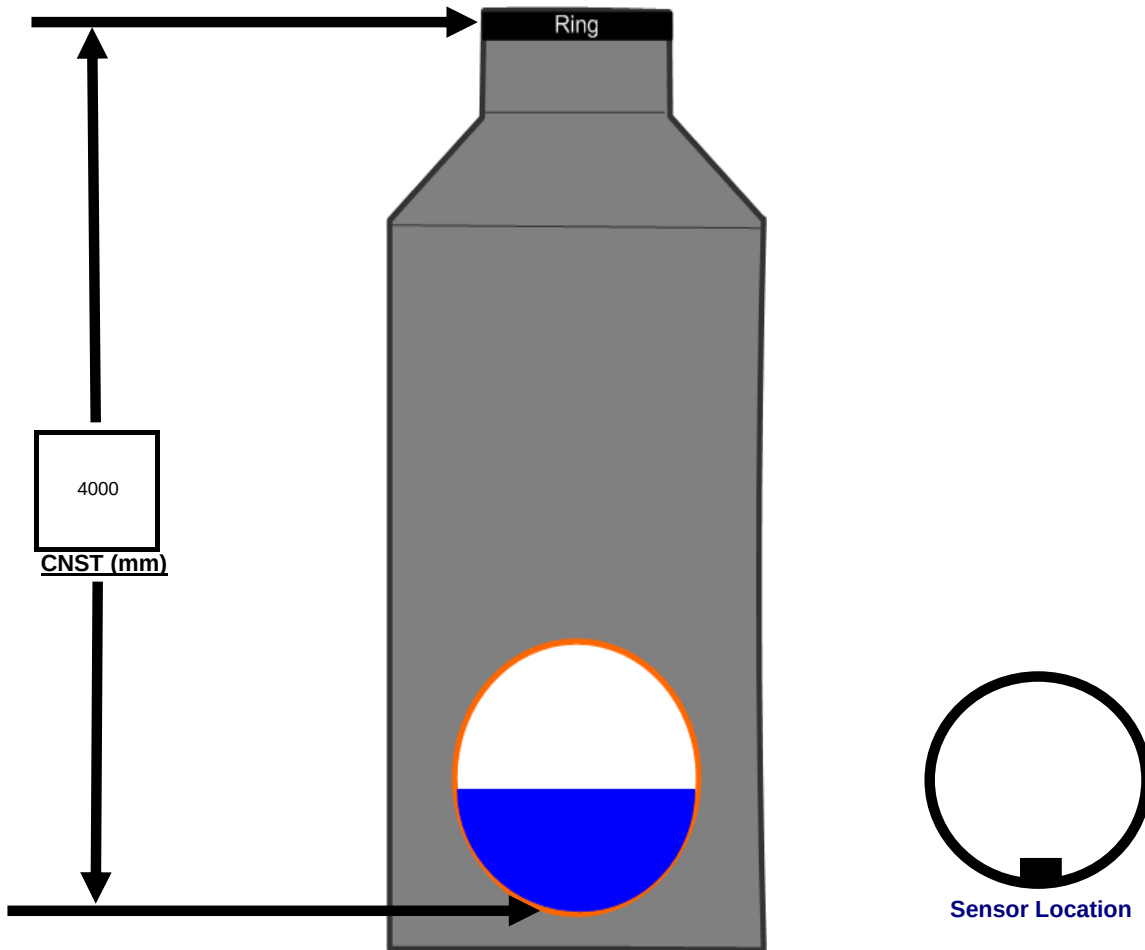
SFE PROJECT #: A15-124
SFE SITE #: A15-124-06
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	13-May-15	8:58	82	36.0	LA:
1	13-May-15	9:11	44	44.0	
2	13-May-15	9:16	40	40.4	
3	13-May-15	9:21	42	42.2	
Average			42	42.2	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 6
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-06
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	375	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

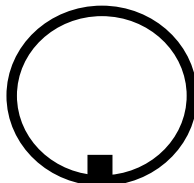
2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface		0.26		0.271	
Invert			0.244		
Average all readings		0.26			

0.9 Vmax Method				
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible				
Max	N/A	Max * 0.9	#VALUE!	

Velocity Profile Summary					
Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.26	0.266		9:08	13-May-15	9:08

Meter Location and Orientation

Sensor Location



Section View

Comments:



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 7A
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-07A

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date: 12-May-15 | 3-Nov-15
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2: 207E02357 | N/A
Wireless I.D # / Cell #: 214E03115 | N/A
Level / Velocity Type: Submerged | AV Sensor
Sensor Mounting: Compression Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | 24hr

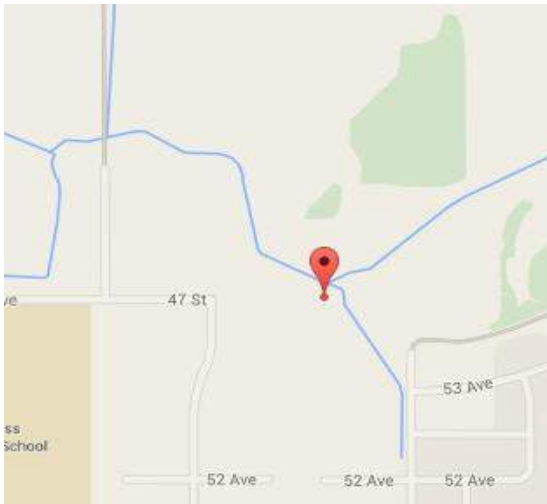
Site Location Information

Client Manhole #: N/A
Address (Location): 47 Street, N of Tailgate Crt
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.41778 W110.19702
Landmarks: Near Construction site on Left
Traffic Control Req's: N/A - Off Road
Additional Information:

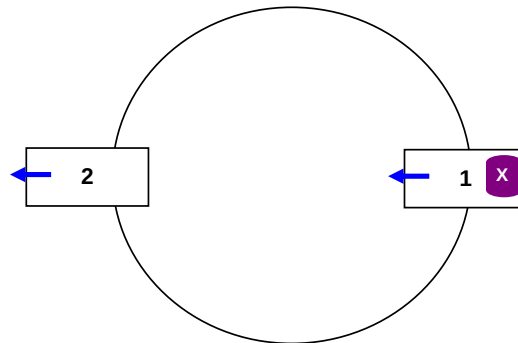
Site Profile

Manhole Depth (mm): 4880 Rungs? Y
Overall Site Condition: Good
Pipe Size #1 375 #2 375
(mm): #3 #4
Location of Sensor (which pipe?): x = 375
Overall Pipe Condition: Excellent
Additional Information:

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 7A
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-07A

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: FM# 7A
NAME: ISL - Cold Lake TFM

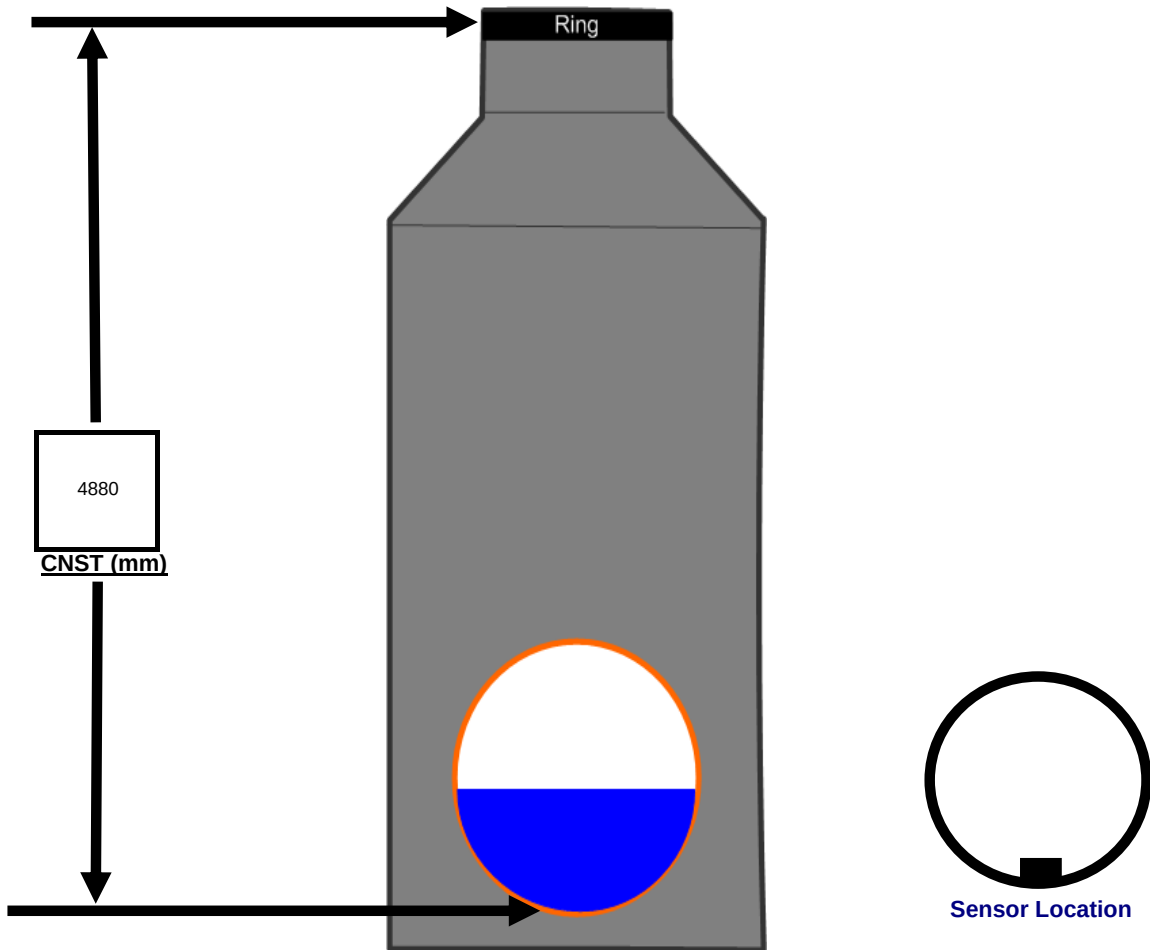
SFE PROJECT #: A15-124
SFE SITE #: A15-124-07A
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	12-May-15	15:56	46	72.6	LA:
1	12-May-15	15:56	46	46.2	
2	12-May-15	16:01	52	48.9	
3	12-May-15	16:06	50	49.2	
Average			49	48.1	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 7A
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-07A
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	375	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Vmax			0.443		
Average all readings		0.44			

0.9 Vmax Method

If depth is less than 4", use Max measured velocity x 0.9
Use above 2-D method as preferred method when possible

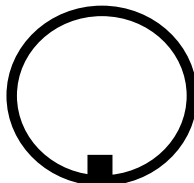
Max	N/A	Max * 0.9	#VALUE!
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Velocity Profile Summary

Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.44	0.462		50	12-May-15	16:06

Meter Location and Orientation

Sensor Location



Section View

Comments:



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 7B
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-07B

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date: 12-May-15 | 3-Nov-15
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2: 206F01467 | N/A
Wireless I.D # / Cell #: 214E03117 | N/A
Level / Velocity Type: Submerged | AV Sensor
Sensor Mounting: Compression Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | 24hr

Site Location Information

Client Manhole #: N/A
Address (Location): NE of 47 Street, In field
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.41762 | W110.19868
Landmarks: Near Blue Construction Fence
Traffic Control Req's: Low - Construction Zone
Additional Information:

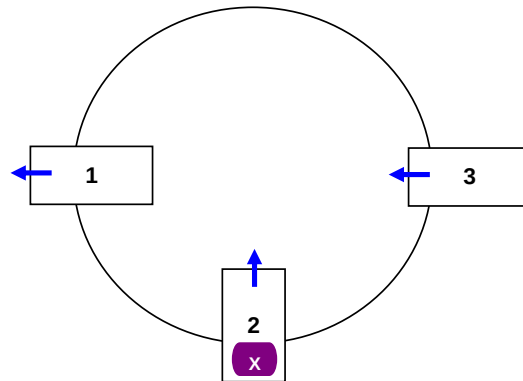
Site Profile

Manhole Depth (mm): 5300 | Rungs? Y
Overall Site Condition: Excellent
Pipe Size #1: 250 | #2: 200
(mm): #3: 375 | #4:
Location of Sensor (which pipe?): x = 200
Overall Pipe Condition: Excellent
Additional Information:

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 7B
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-07B

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



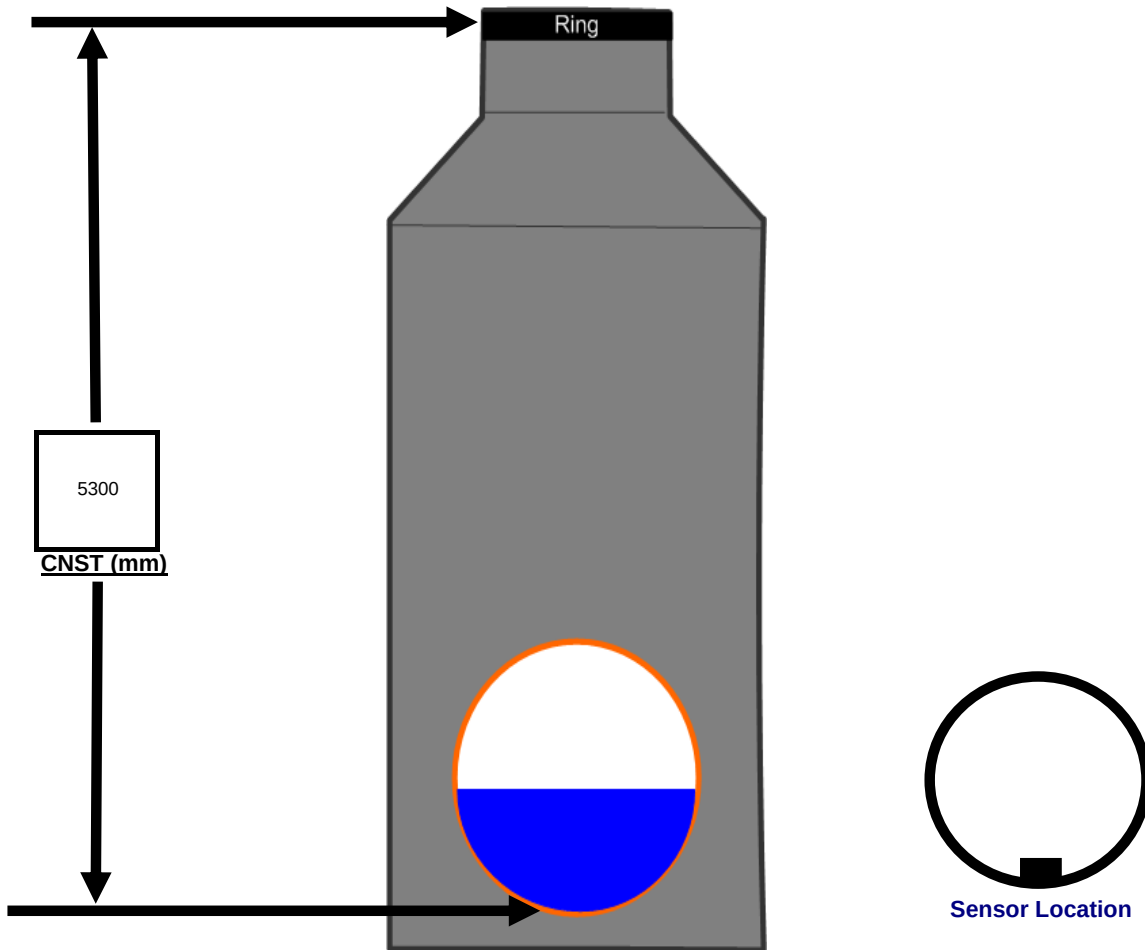
CLIENT FLOW MONITORING #: FM# 7B
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-07B
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	12-May-15	14:35	52	47.6	LA:
1	12-May-15	14:35	52	51.8	
2	12-May-15	14:40	100	102.3	(Technician Backing up Flow)
3	12-May-15	14:45	104	106.2	
Average			85	86.8	

- * Three Continuous Measurements Within 20 mm.
- * Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 7B
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-07B
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	200	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface	0.14	0.18	0.21	0.193	0.138
Invert			0.193		
Average all readings		0.18			

0.9 Vmax Method

If depth is less than 4", use Max measured velocity x 0.9
Use above 2-D method as preferred method when possible

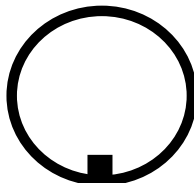
Max	N/A	Max * 0.9	#VALUE!
-----	-----	-----------	---------

Velocity Profile Summary

Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.18	0.177		100	12-May-15	14:50

Meter Location and Orientation

Sensor Location



Section View

Comments:



Site Assessment Sheet



CLIENT FLOW MONITORING #: FM# 8
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-08

Project Specific Information

Client Name: ISL Engineering and Land Services
End User Name: City of Cold Lake
Project Name: ISL - Cold Lake TFM
Client Contact: Geoffrey Schulmeister 403-254-0544
Field Contact: Azam Khan (xt.7932) 780-594-4494
SFE PM Contact: Inderpaul Lakhian 780-691-2422
Site Maintenance: Monthly

Site Equipment

Install / Removal Date: 12-May-15 | 2-Nov-15
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2: 207E02353 | N/A
Wireless I.D # / Cell #: 214E03118 | N/A
Level / Velocity Type: Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | 24hr

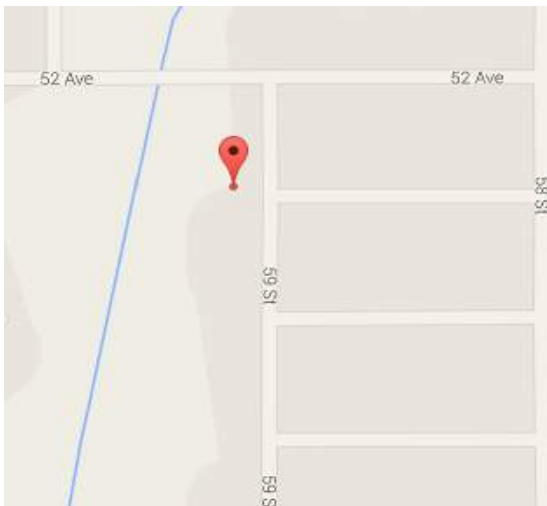
Site Location Information

Client Manhole #: N/A
Address (Location): 5104 52 Street
City, Province: Cold Lake, Alberta
GPS (Lat - Long): N54.41515 W110.22509
Landmarks: In gravel drive of Lift Station
Traffic Control Req's: N/A
Additional Information:

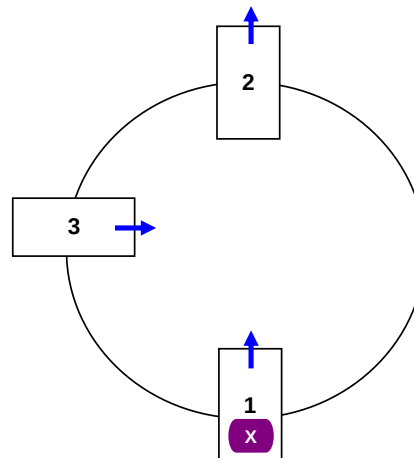
Site Profile

Manhole Depth (mm): 6800 Rungs? Y
Overall Site Condition: OK
Pipe Size #1 200 #2 200
(mm): #3 #4
Location of Sensor (which pipe?): x = 200
Overall Pipe Condition: Good
Additional Information:

Map of Area



Manhole Layout





Site Pictures



CLIENT FLOW MONITORING #: FM# 8
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-08

General Area



Birdseye View



Downhole Install



Meter Closeup



Misc 1



Misc 2





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: FM# 8
NAME: ISL - Cold Lake TFM

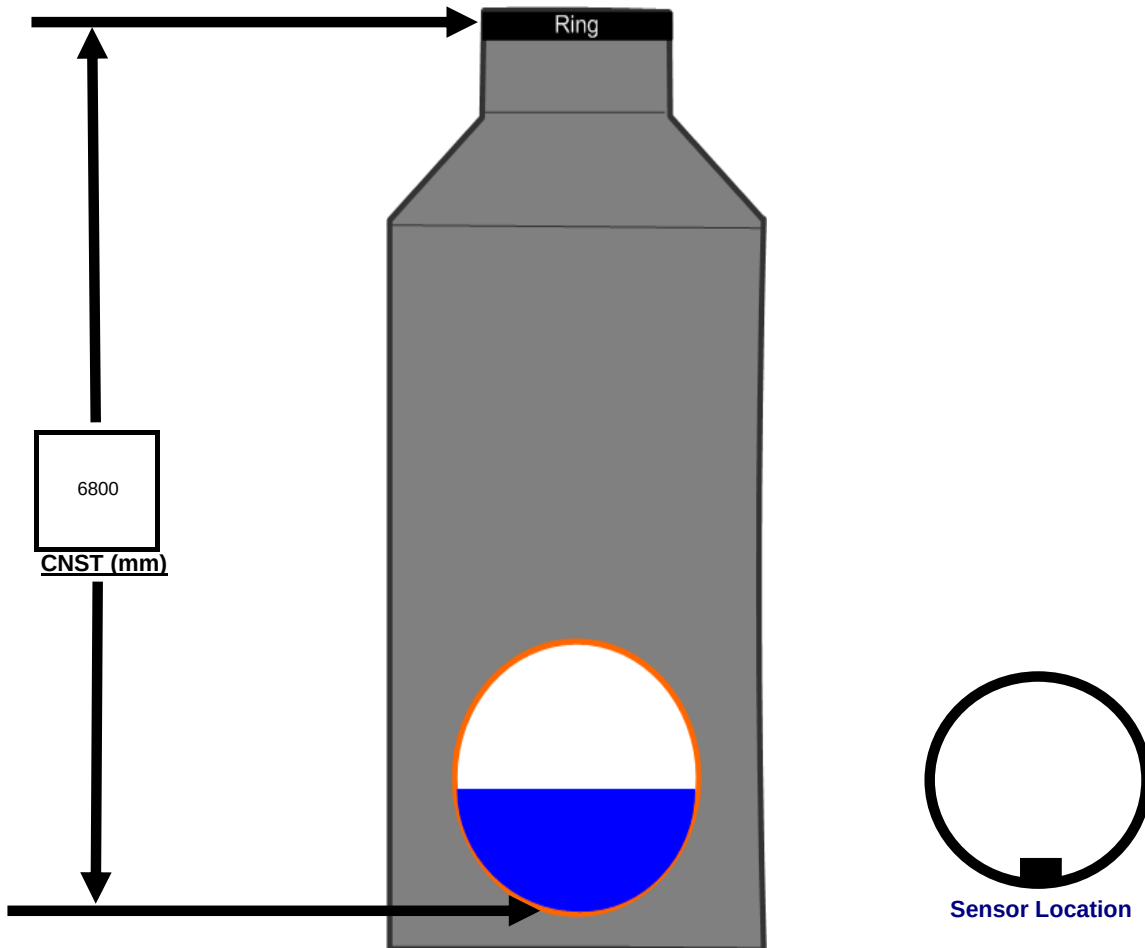
SFE PROJECT #: A15-124
SFE SITE #: A15-124-08
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	11-May-15	19:25	68	57.6	LA:
1	11-May-15	19:25	68	68.1	
2	11-May-15	19:30	68	69.5	
3	11-May-15	19:35	74	74.0	
Average			70	70.5	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: FM# 8
NAME: ISL - Cold Lake TFM

SFE PROJECT #: A15-124
SFE SITE #: A15-124-08
Technician 1: Inder Lakhian
Technician 2: Jake Fushtey

Pipe Diameter (mm):	200	PV Meter	HACH FH950
Weather - Raining?	Clear	AV Meter:	ISCO 2150

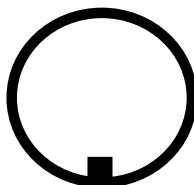
2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface		0.341	0.948	0.487	
Invert			0.24		
Average all readings	0.50				

0.9 Vmax Method			
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible			
Max	N/A	Max * 0.9	#VALUE!

Velocity Profile Summary					
Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.50	0.791		74	12-May-15	19:36

Meter Location and Orientation

Sensor Location



Section View

Comments:

Appendix 3

Maintenance Record and Data Summary

Data Processing QA/QC Document

Project Name:	ISL Cold Lake	Data Span:	May 2015
SFE Project #	A15-124	Reviewed By:	K. McMillan
Client Name:	ISL Engineering	Date Reviewed:	25-Oct-15
Client Contact:	Rafal Jadinsky	Date Ok'd	October 25, 2015
Project Term:	Four months	Ok'd By:	K. McMillan
Start/End Date:	12-May-15		

Data Processing Notes

Site #	Manhole #	Pipe Size (mm)	Primary Device	Install Date	Removal Date	Processing Notes
1		450	AV			5/11 to 5:28 - Adjust install level +82 mm, Rebuild flow data with Manning's for velocity dropout, 09/07 to Removal, use AV data.
2		375	AV			No edits.
3		400	AV			Apply Manning's to all flow data. Install to 29JUL use AV data. 11MAY to 27MAY - Add 25mm to level. 18JUN to 30JUN reduce level due to silting of sensor. 9JUN to 18JUN - Incremental level adjust -15mm to correct for sensor drift.
4		525	AV			No edits.
5		375	AV			2OCT to 2NOV - Multiply level by .25 to correct ranging issues caused by silt over sensor. Incremental level adjust to correct for associated drift.
6		375	AV			No edits.
7a		375	AV			No edits.
7b		200	AV			Apply Mannings to flow data 2MAY to 2JUL, and 20AUG to 3NOV to fill lost velocity from silting. 27MAY to 01JUL adjust level caused by silt.
8		200	AV			Data OK to 25AUG. Level malfunction from silt after. 31AUG to 3NOV multiply level by .3 to correct ranging issues. 11SEP to 19 SEP incremental adjust for drift - 167mm, 11SEP to 22SEP IA for drift -90mm, 30OCT to 1NOV IA for drift of -247mm.
RG1						No edits.
RG2						No edits.

FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-01
ADDRESS:	Hwy 28 & 10 Street
GPS:	N54.46424 W110.17315
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

CONSTANTS			
D1 (mm):		D1-lip to x-bar	
TOM (mm)	5720	Raw Weir L - lip to water	
METER #	207K01073	DATE:	11-May-15
METER #	211F00537	DATE:	11-May-15
METER #		DATE:	

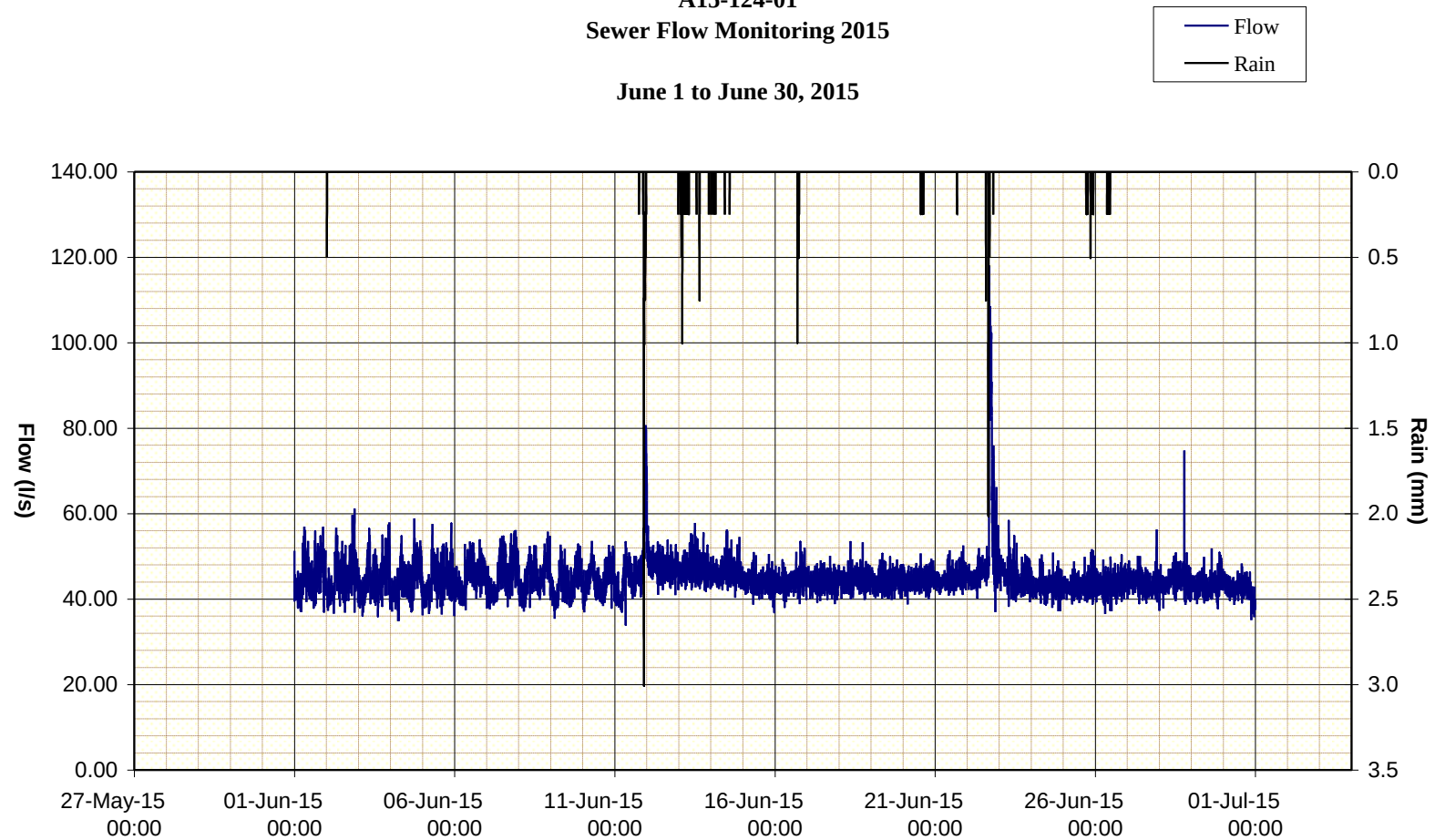
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:

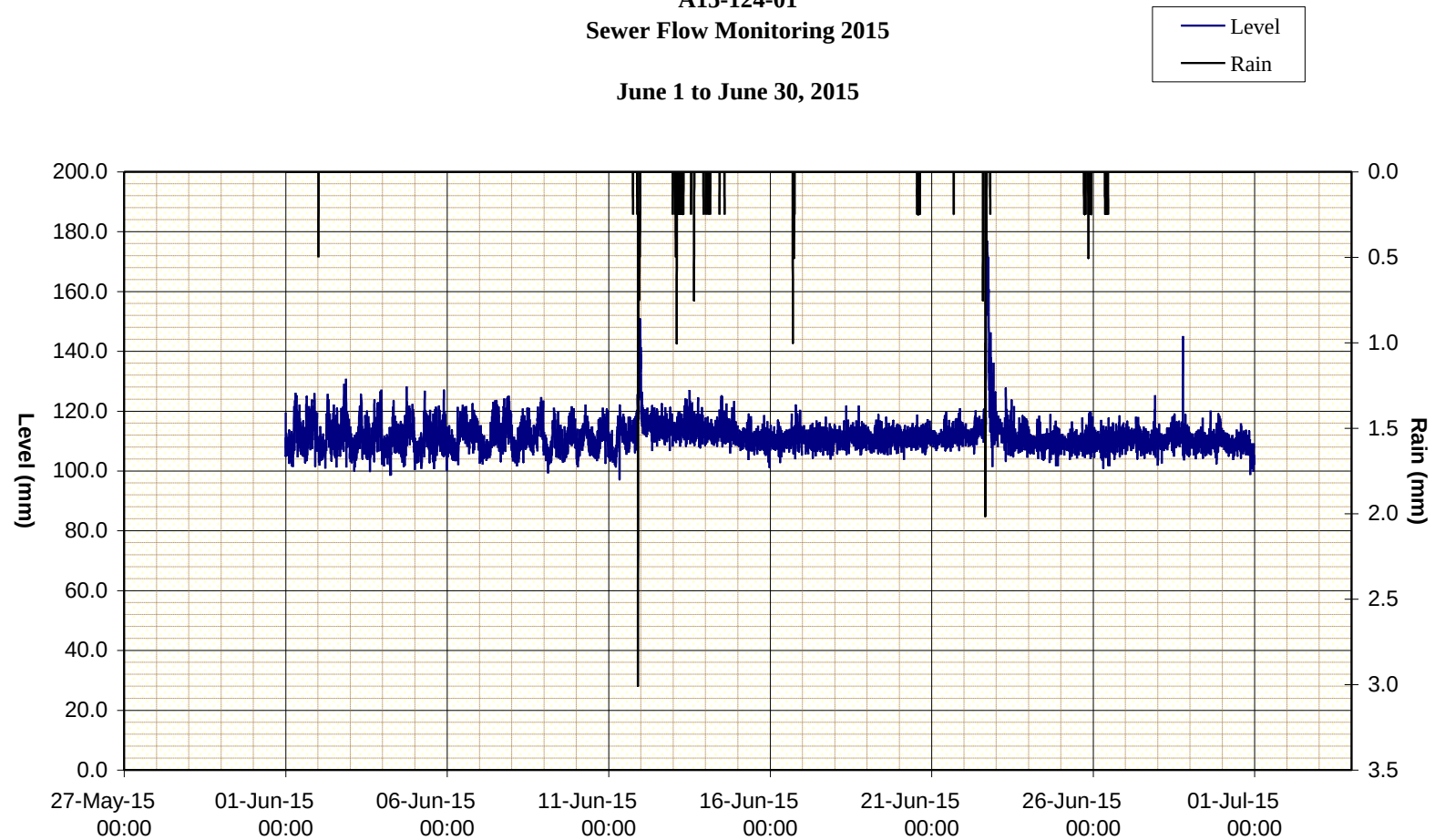
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



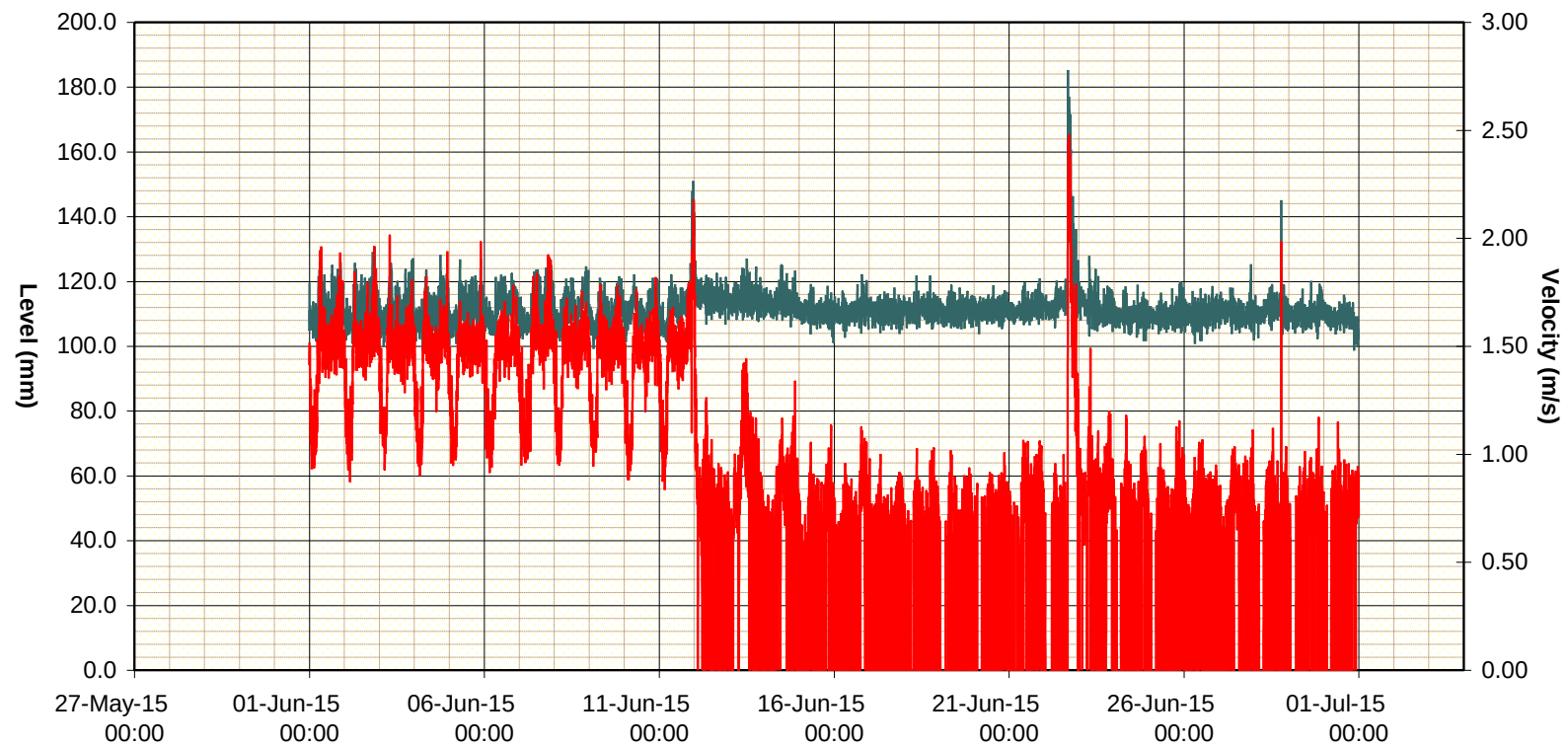
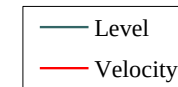
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



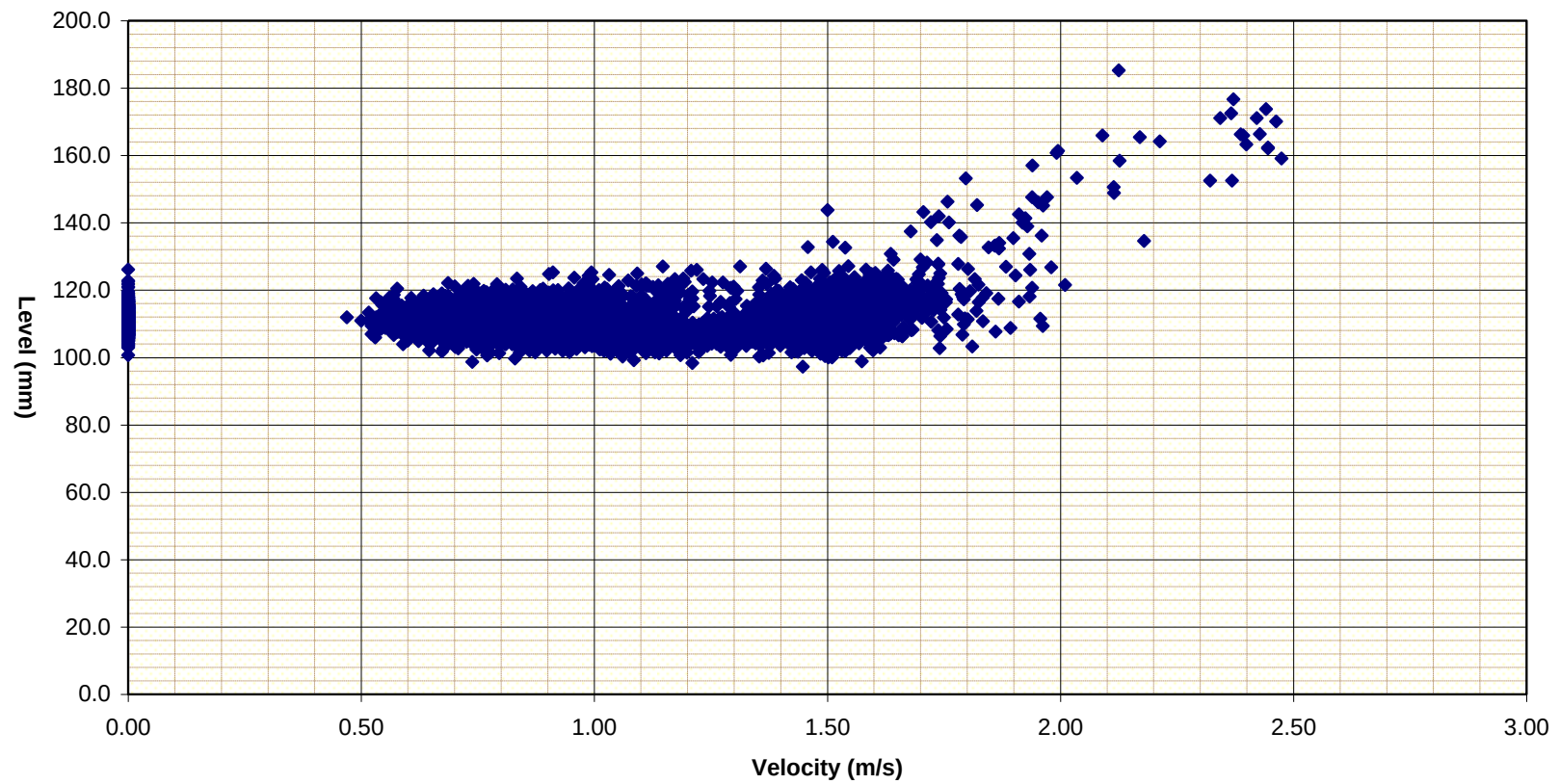
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta

A15-124-01

Sewer Flow Monitoring 2015

June 1 to June 30, 2015

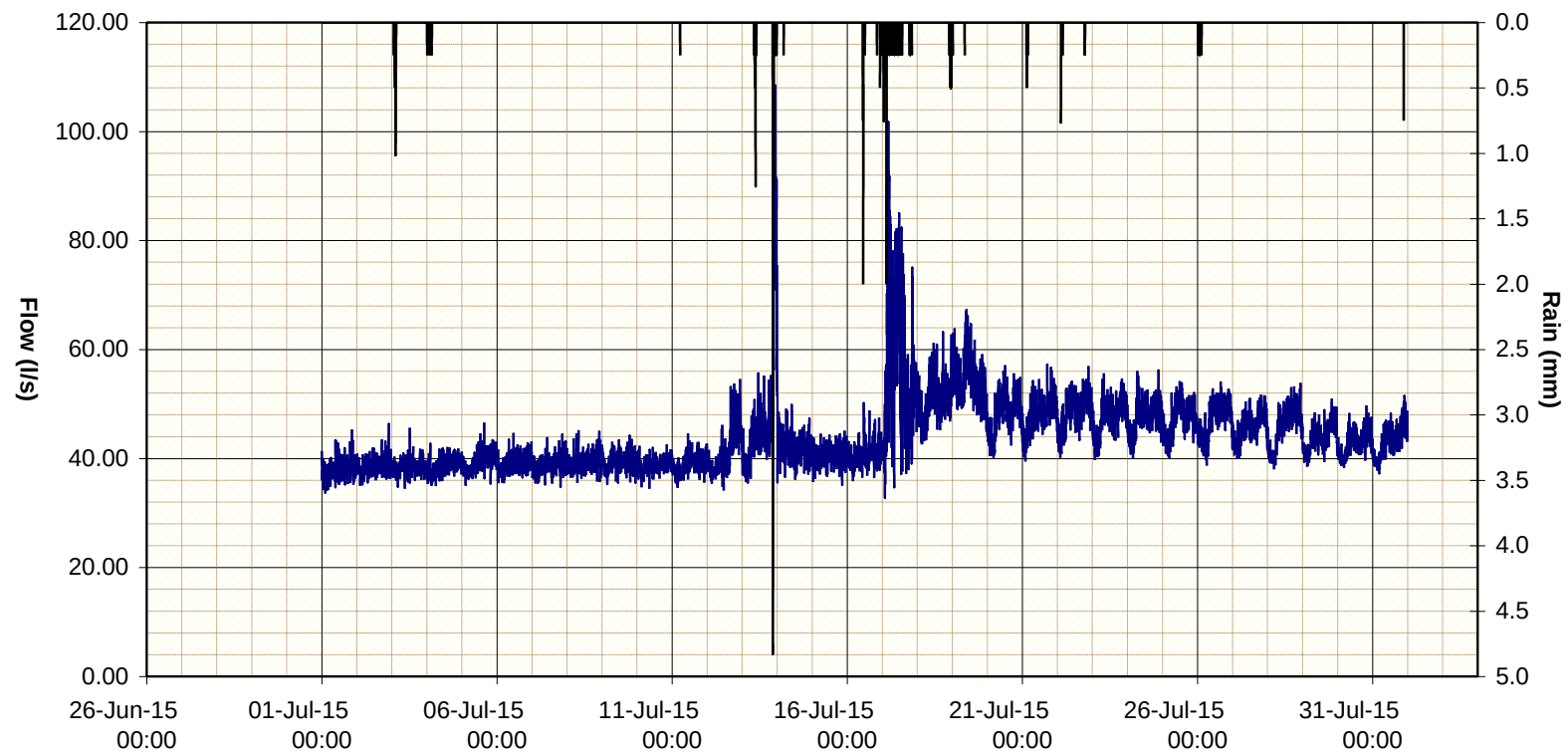
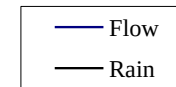
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	45.28	36.95	56.98	3912.27	0.0
02-Jun-15	44.83	36.57	61.19	3873.47	0.5
03-Jun-15	44.72	36.02	57.93	3863.55	0.0
04-Jun-15	44.10	34.83	58.88	3810.37	0.0
05-Jun-15	44.04	36.04	57.64	3804.93	0.0
06-Jun-15	45.00	37.42	53.62	3888.19	0.0
07-Jun-15	45.19	37.55	56.16	3904.50	0.0
08-Jun-15	44.82	37.10	55.76	3872.20	0.0
09-Jun-15	43.82	35.41	52.75	3785.97	0.0
10-Jun-15	44.41	36.88	53.59	3836.72	0.0
11-Jun-15	46.31	34.05	80.30	4001.48	16.5
12-Jun-15	48.21	40.95	71.14	4165.08	0.3
13-Jun-15	47.35	41.92	57.85	4091.27	10.8
14-Jun-15	46.56	40.32	56.28	4022.45	1.5
15-Jun-15	43.88	36.96	50.75	3791.20	0.0
16-Jun-15	44.19	38.19	53.24	3818.21	3.5
17-Jun-15	44.11	38.81	50.14	3810.72	0.0
18-Jun-15	44.49	39.82	53.31	3843.94	0.0
19-Jun-15	44.21	39.84	50.56	3819.65	0.0
20-Jun-15	44.46	38.75	50.69	3841.63	3.0
21-Jun-15	44.76	40.84	52.56	3866.89	0.5
22-Jun-15	51.96	36.97	118.09	4489.32	8.5
23-Jun-15	45.26	38.49	57.86	3910.46	0.0
24-Jun-15	43.12	37.13	50.85	3725.32	0.0
25-Jun-15	43.32	38.75	51.67	3743.09	4.0
26-Jun-15	43.42	36.51	50.18	3751.53	1.5
27-Jun-15	43.86	39.05	56.30	3789.75	0.0
28-Jun-15	44.39	37.30	74.81	3834.98	0.0
29-Jun-15	43.53	37.95	51.87	3761.11	0.0
30-Jun-15	42.24	35.07	48.31	3649.87	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
116280.117	34.048	118.085	50.5

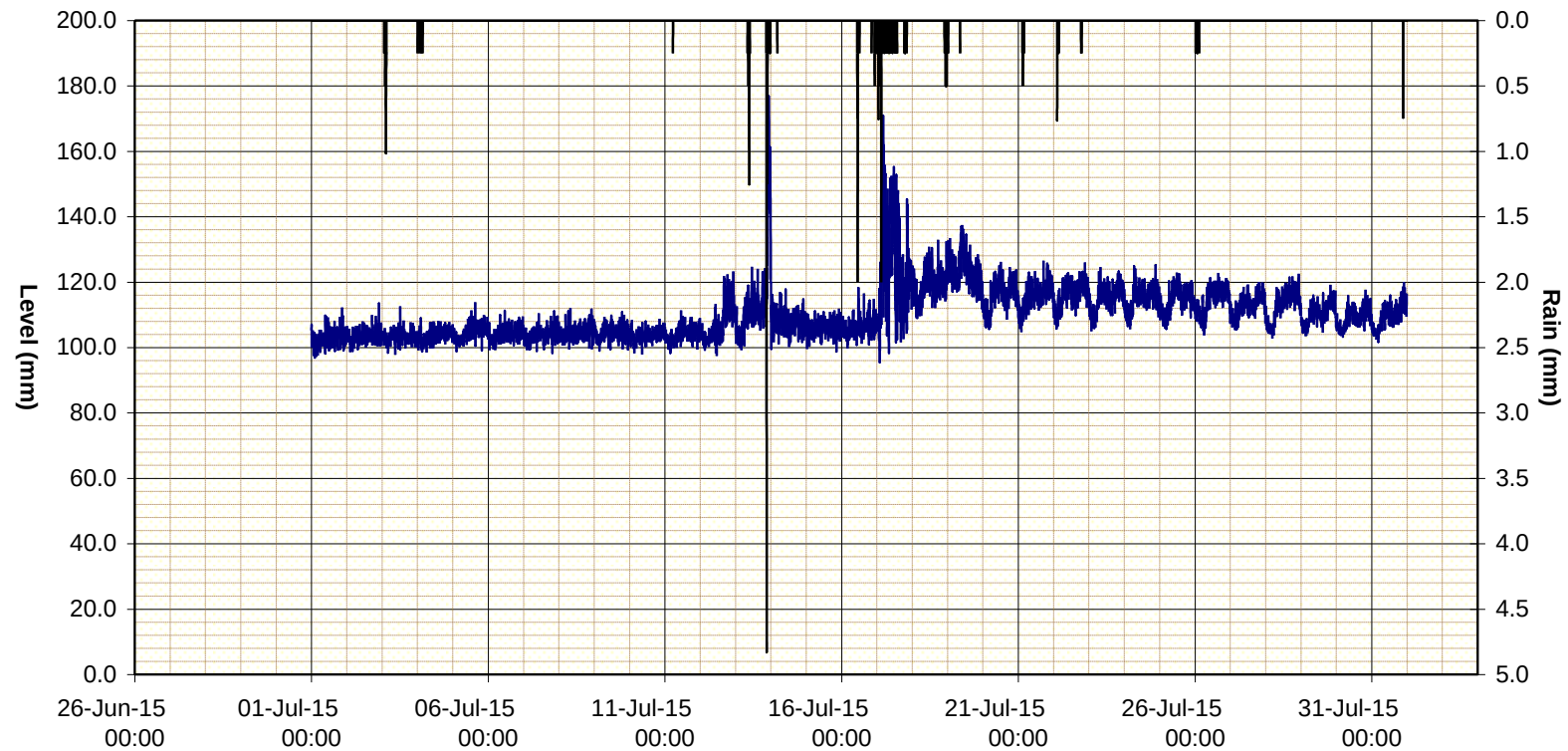
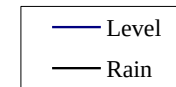
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



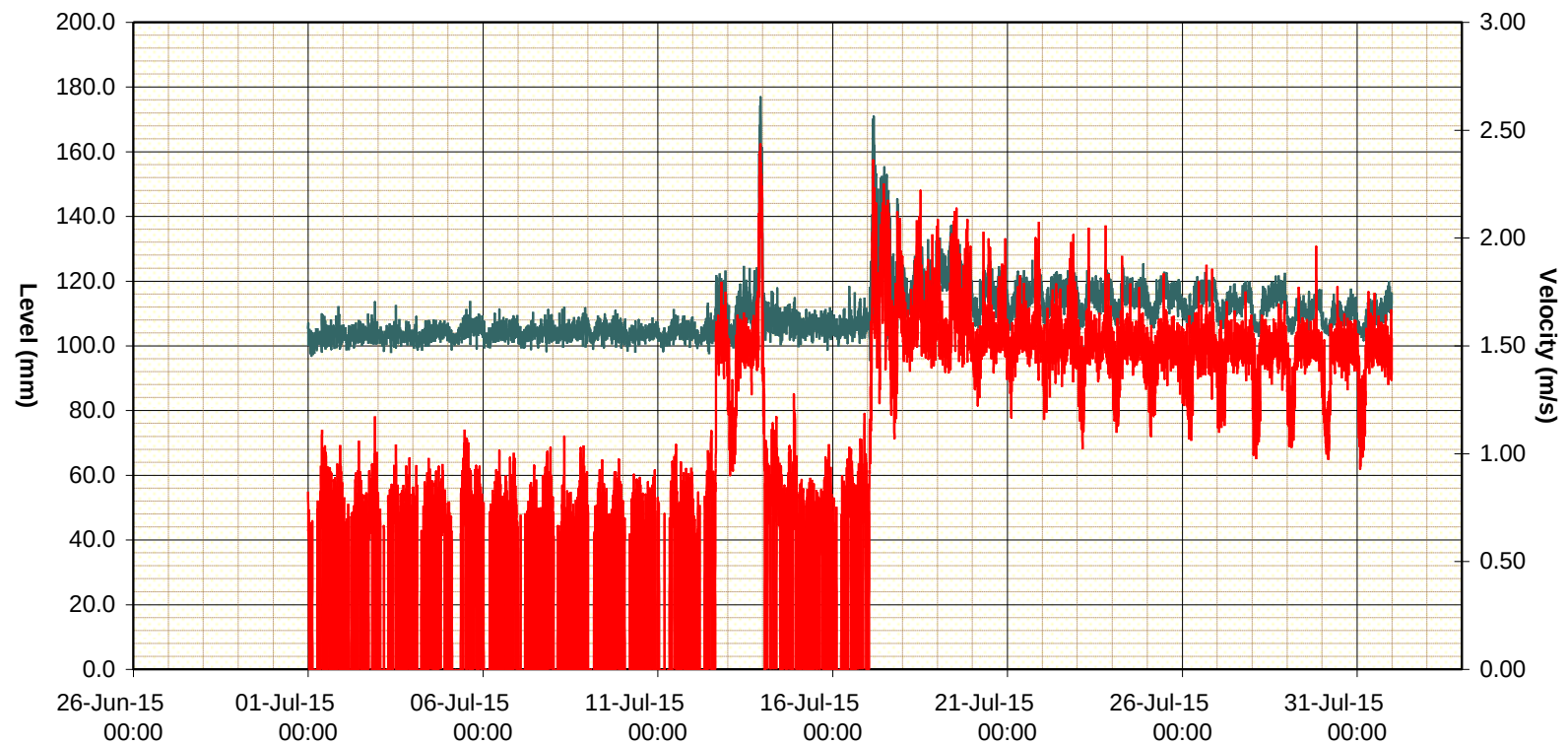
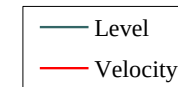
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



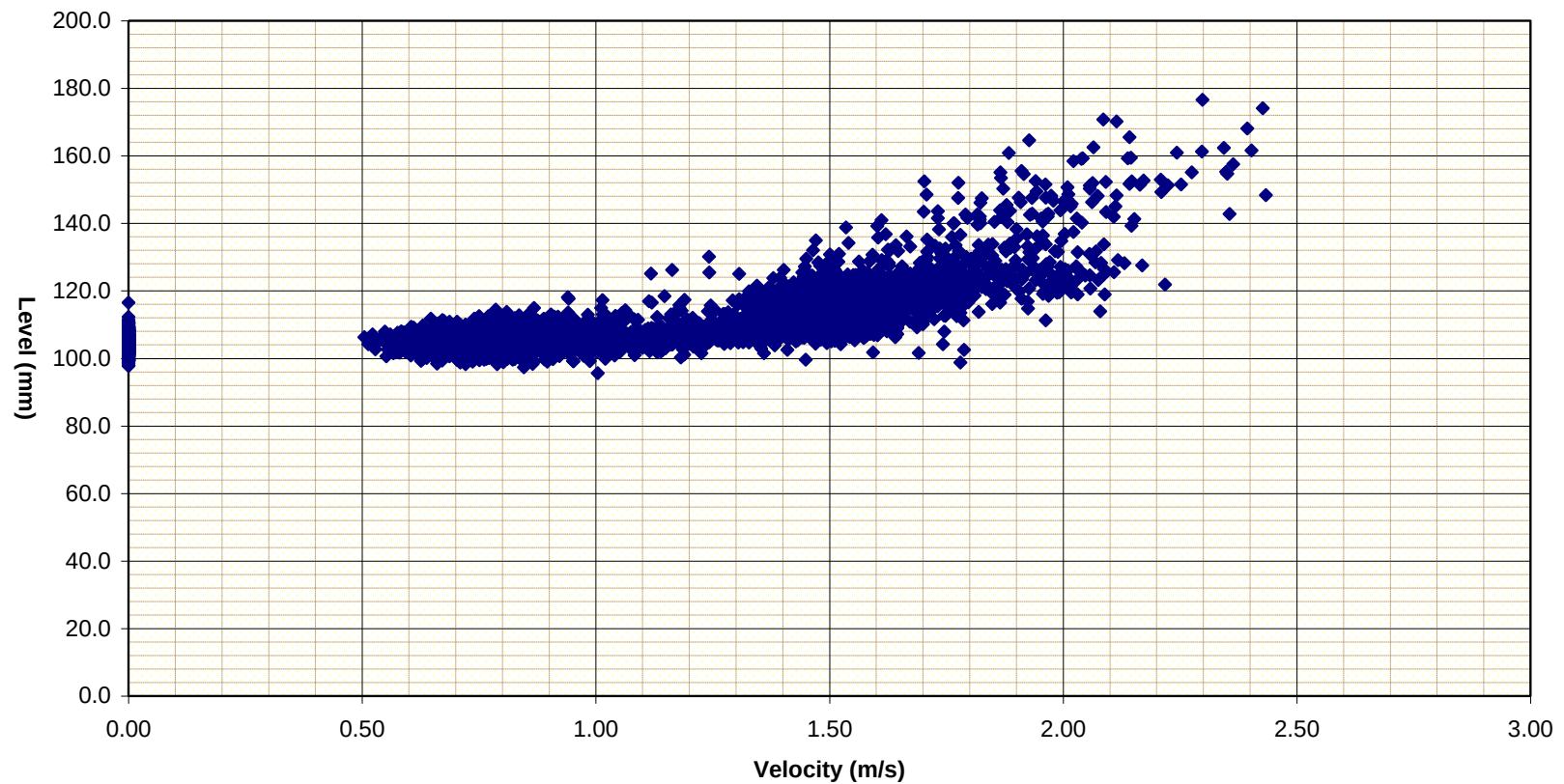
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta

A15-124-01

Sewer Flow Monitoring 2015

July 1 to July 31, 2015

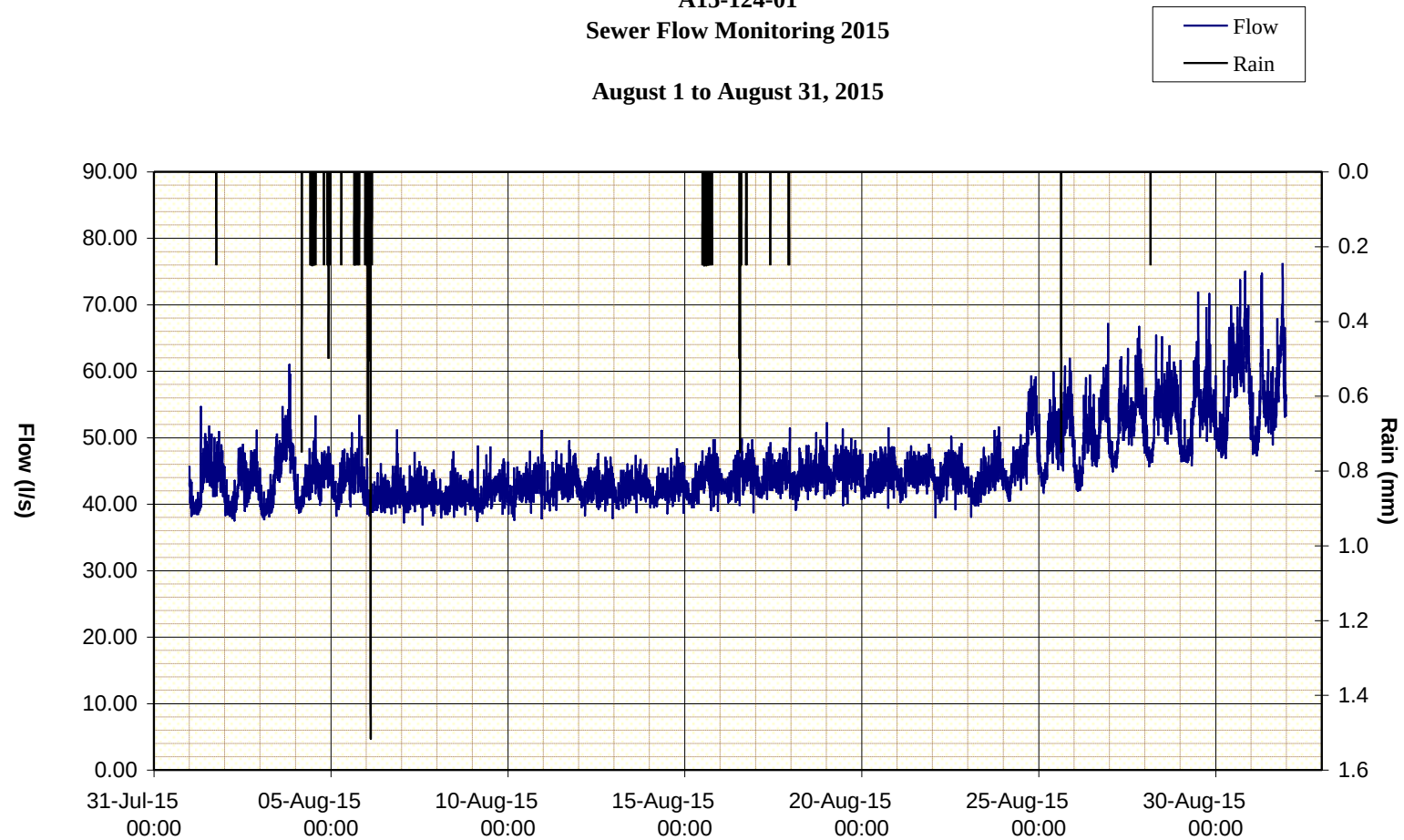
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	38.07	33.83	45.32	3289.44	0.0
02-Jul-15	38.60	34.96	46.28	3335.21	0.0
03-Jul-15	38.43	34.43	45.61	3320.25	6.3
04-Jul-15	38.66	34.90	42.66	3339.84	1.0
05-Jul-15	39.32	35.22	46.61	3397.47	0.0
06-Jul-15	39.12	35.43	44.45	3379.61	0.0
07-Jul-15	38.91	34.84	44.34	3362.07	0.0
08-Jul-15	39.38	35.52	45.21	3402.00	0.0
09-Jul-15	39.26	35.34	44.12	3392.12	0.0
10-Jul-15	38.69	34.46	42.58	3342.68	0.0
11-Jul-15	38.96	34.89	44.59	3366.50	0.3
12-Jul-15	41.48	34.15	54.55	3583.89	0.0
13-Jul-15	47.83	35.42	108.18	4132.32	22.5
14-Jul-15	42.19	35.73	52.66	3645.38	0.3
15-Jul-15	40.53	35.19	45.07	3501.50	0.0
16-Jul-15	40.66	35.83	50.12	3513.23	7.8
17-Jul-15	57.60	32.88	101.69	4976.49	22.3
18-Jul-15	50.78	42.59	63.16	4387.74	4.8
19-Jul-15	54.43	44.87	67.39	4703.06	0.8
20-Jul-15	48.02	40.29	57.11	4149.24	0.0
21-Jul-15	47.95	39.46	57.42	4142.51	3.0
22-Jul-15	48.33	40.34	56.95	4175.45	3.3
23-Jul-15	47.54	39.70	55.66	4107.41	0.0
24-Jul-15	47.32	40.11	56.03	4088.08	0.0
25-Jul-15	47.05	40.37	54.20	4064.82	0.0
26-Jul-15	47.17	38.72	54.12	4075.42	2.5
27-Jul-15	45.66	39.89	51.76	3944.96	0.0
28-Jul-15	45.92	38.03	53.89	3967.84	0.0
29-Jul-15	43.88	38.51	51.00	3790.92	0.0
30-Jul-15	42.84	38.49	49.73	3701.65	0.0
31-Jul-15	43.12	37.32	51.32	3725.88	1.5

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
117304.971	32.880	108.183	76.0

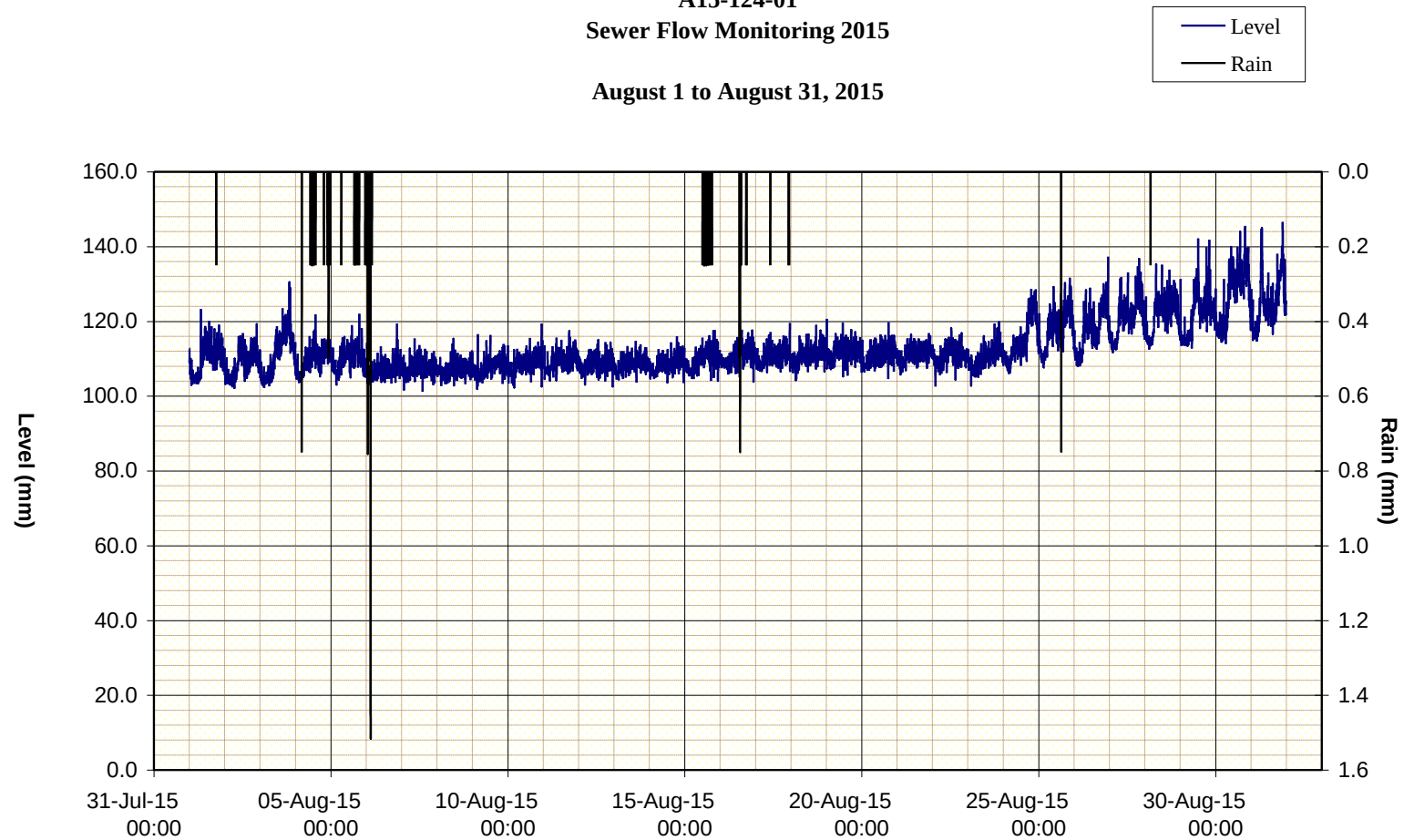
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



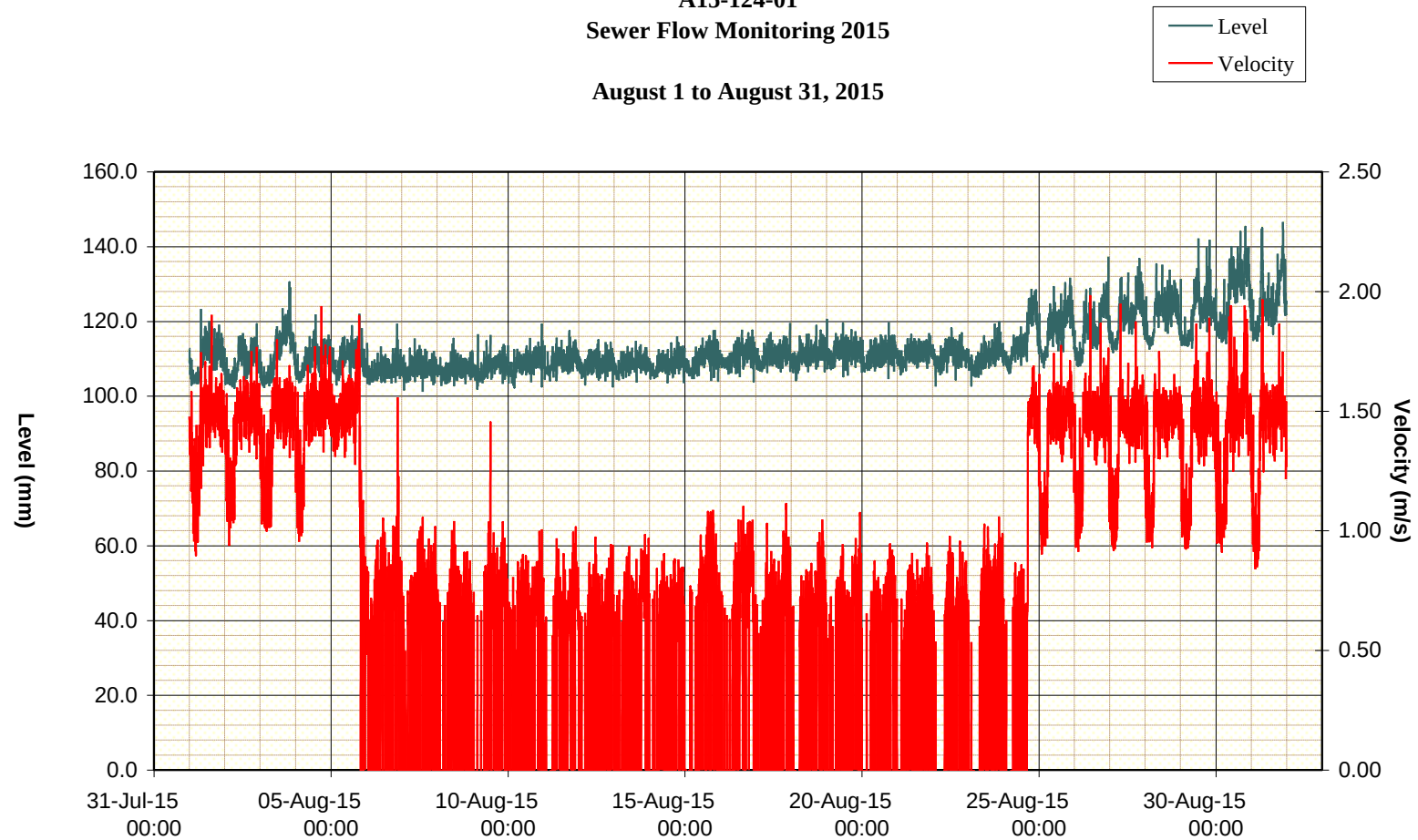
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



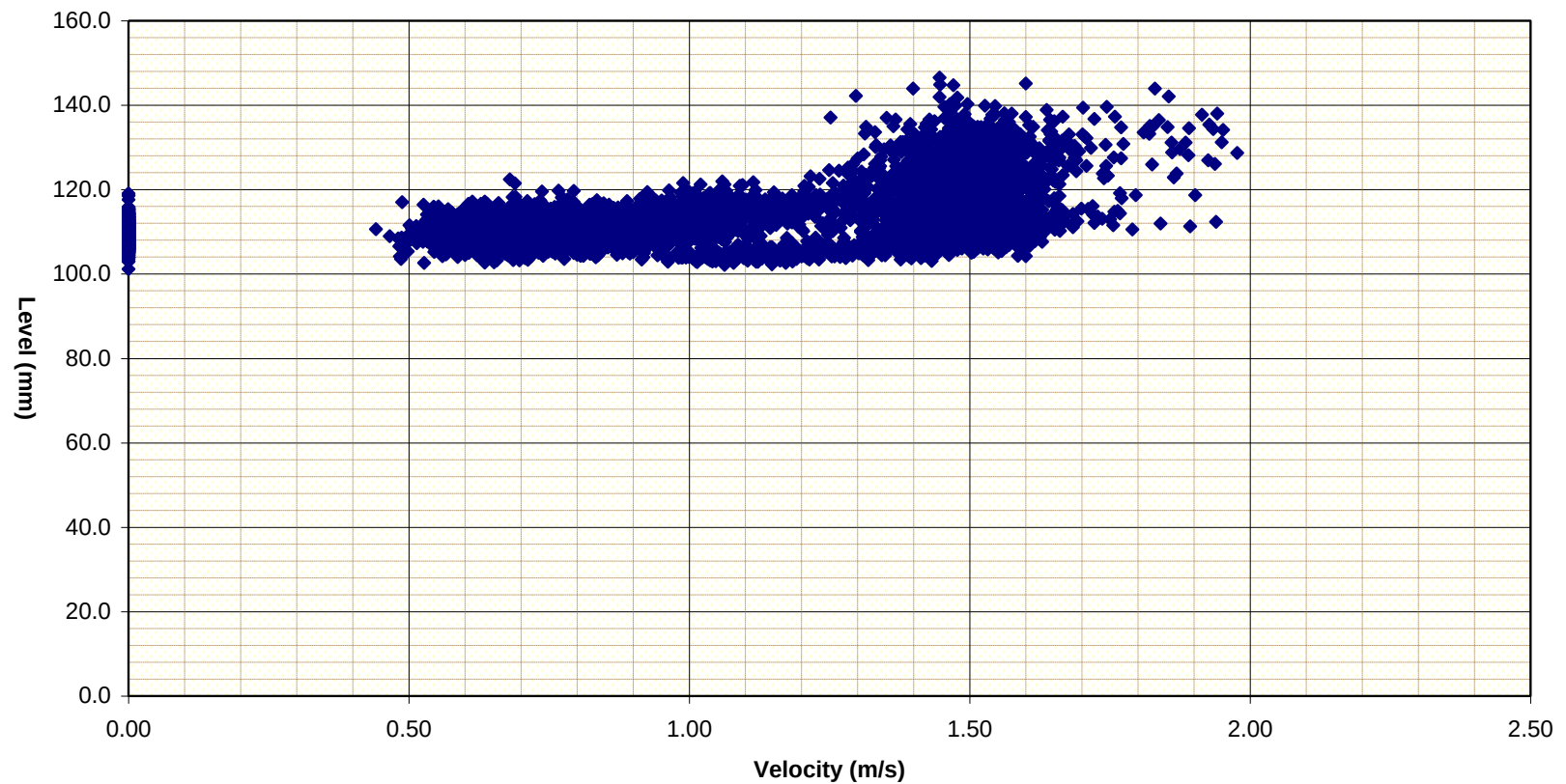
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



Cold Lake, Alberta

A15-124-01

Sewer Flow Monitoring 2015

August 1 to August 31, 2015

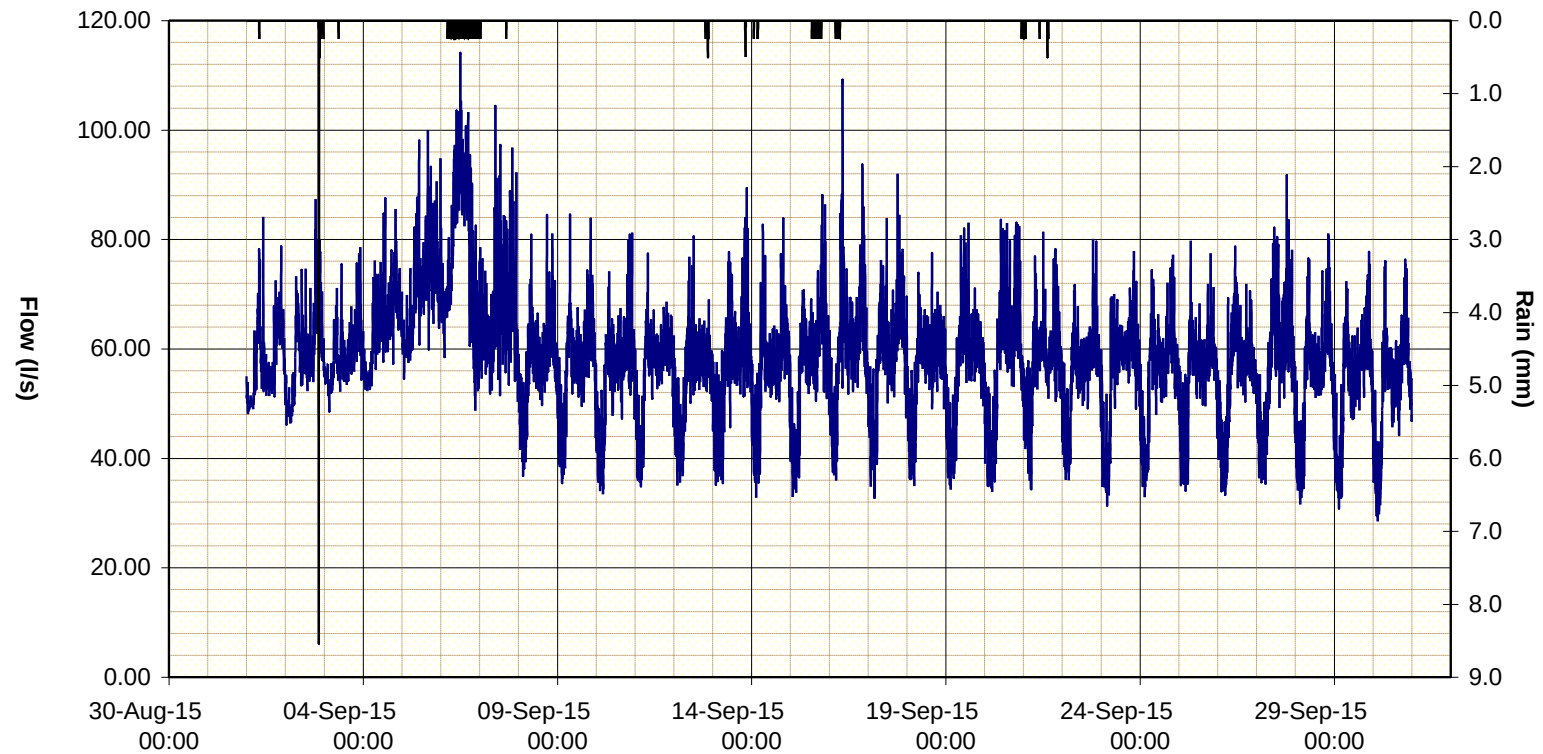
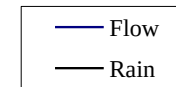
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-15	43.54	38.26	54.57	3761.61	0.3
02-Aug-15	42.58	37.67	51.02	3679.34	0.0
03-Aug-15	44.74	37.58	60.80	3865.35	0.0
04-Aug-15	43.59	38.57	53.34	3766.40	8.5
05-Aug-15	43.59	38.28	53.43	3766.20	2.3
06-Aug-15	41.49	38.19	51.24	3585.13	12.0
07-Aug-15	41.56	36.83	47.88	3590.39	0.0
08-Aug-15	41.33	38.00	47.79	3570.90	0.0
09-Aug-15	41.74	37.48	48.82	3606.29	0.0
10-Aug-15	42.38	37.71	50.94	3661.82	0.0
11-Aug-15	42.97	39.12	49.36	3712.35	0.0
12-Aug-15	42.46	38.00	47.45	3668.57	0.0
13-Aug-15	42.42	38.67	47.40	3664.90	0.0
14-Aug-15	42.44	38.58	48.40	3666.98	0.0
15-Aug-15	43.29	38.98	49.80	3740.57	7.8
16-Aug-15	44.09	38.86	49.87	3809.18	4.5
17-Aug-15	44.08	40.79	51.34	3808.69	0.8
18-Aug-15	44.29	39.19	50.68	3826.88	0.0
19-Aug-15	44.88	40.03	52.31	3877.40	0.0
20-Aug-15	44.42	39.34	51.54	3837.81	0.0
21-Aug-15	44.50	40.33	49.06	3844.63	0.0
22-Aug-15	44.29	37.90	50.15	3826.67	0.0
23-Aug-15	43.95	38.12	51.70	3797.28	0.0
24-Aug-15	47.67	40.37	59.33	4118.28	0.0
25-Aug-15	49.97	41.65	62.00	4317.73	0.8
26-Aug-15	49.78	41.98	67.25	4301.23	0.0
27-Aug-15	52.75	44.96	66.64	4557.32	0.0
28-Aug-15	53.05	45.71	65.34	4583.87	0.3
29-Aug-15	53.27	45.70	71.95	4602.25	0.0
30-Aug-15	57.51	46.97	74.83	4969.01	0.0
31-Aug-15	56.11	47.18	76.25	4847.89	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
122232.925	36.827	76.253	37.0

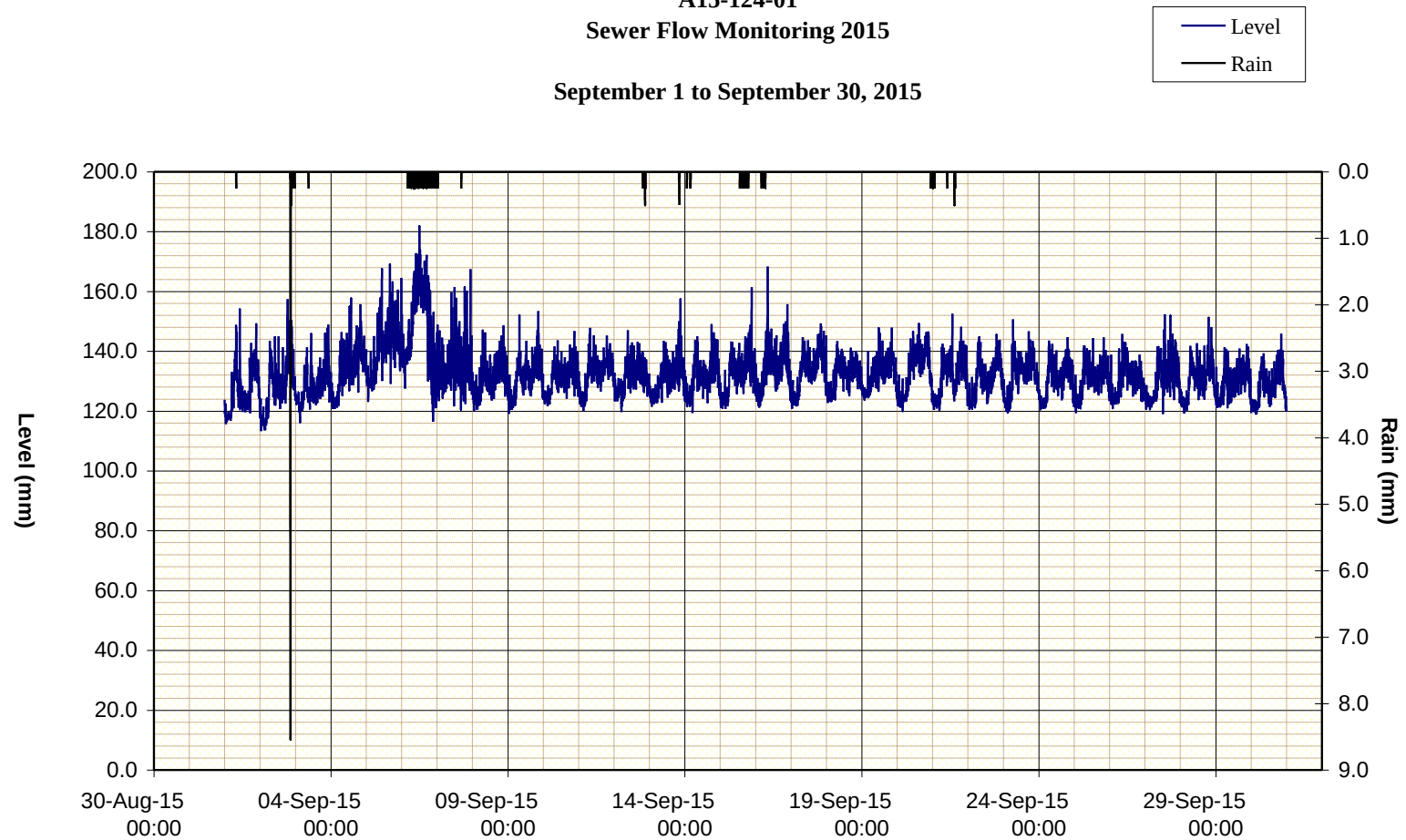
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



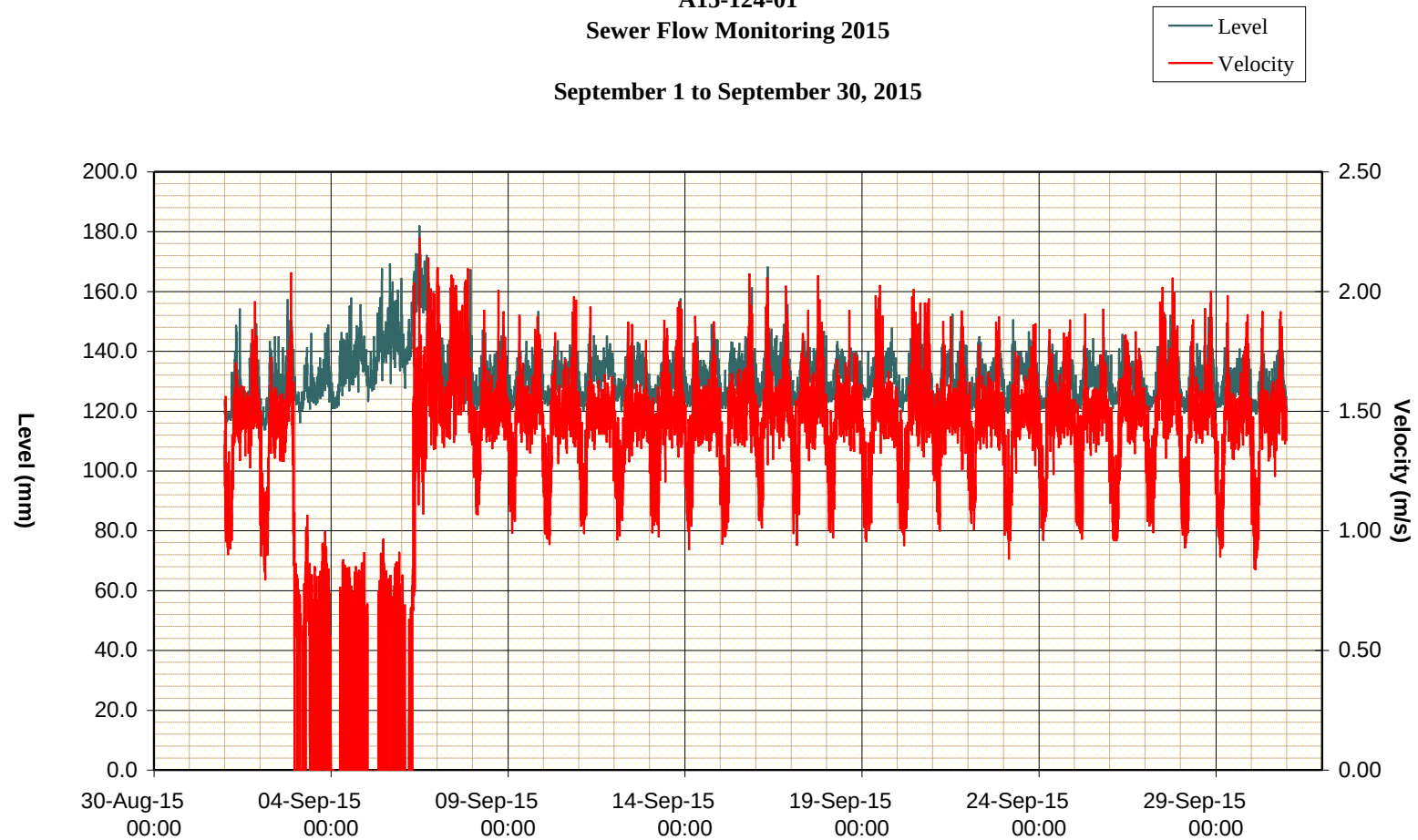
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



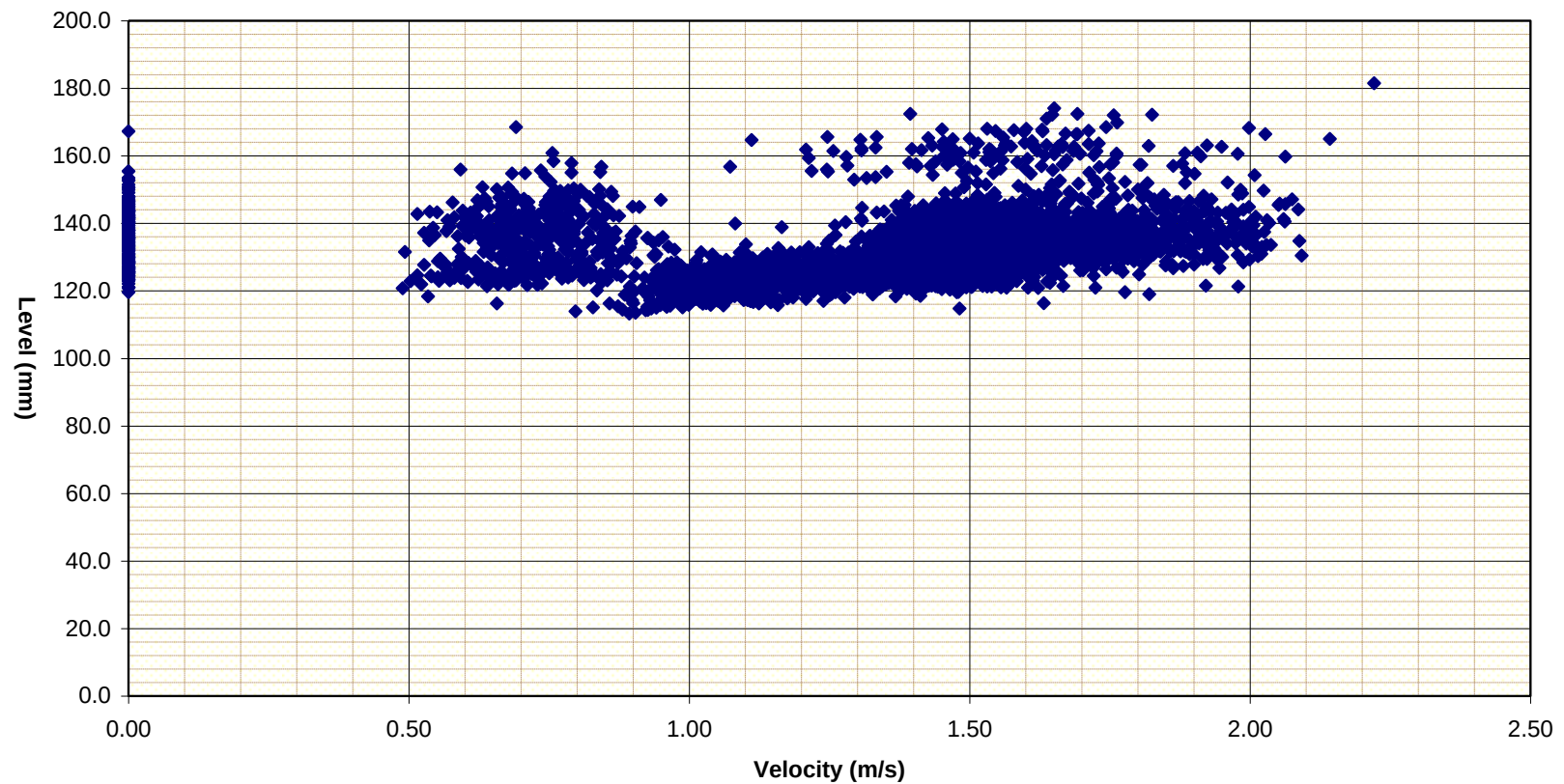
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015

September 1 to September 30, 2015



Cold Lake, Alberta

A15-124-01

Sewer Flow Monitoring 2015

September 1 to September 30, 2015

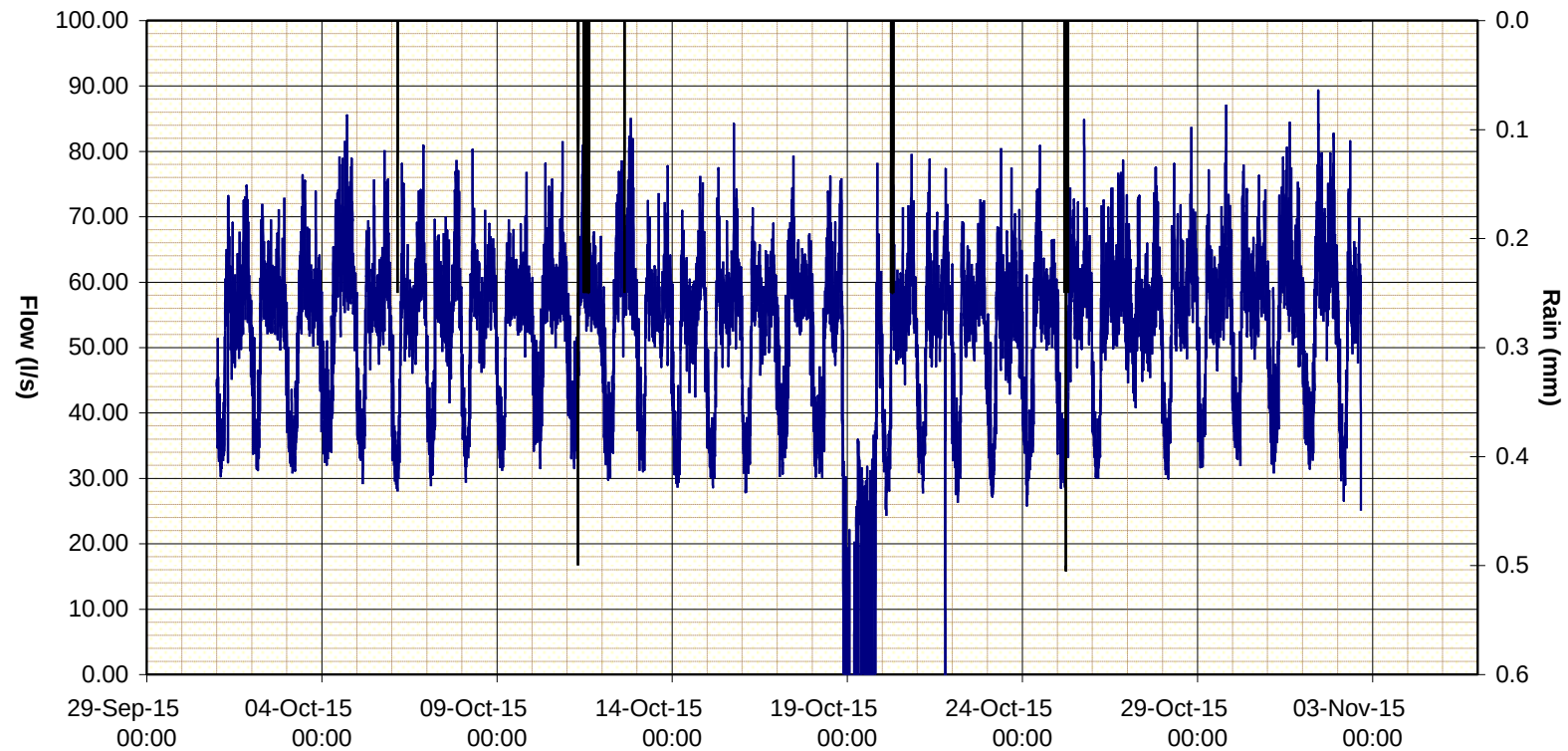
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	57.67	48.05	84.10	4982.28	0.3
02-Sep-15	59.08	46.19	87.35	5104.22	19.3
03-Sep-15	58.60	48.64	78.58	5062.77	0.3
04-Sep-15	64.39	52.29	87.36	5563.21	0.0
05-Sep-15	70.69	54.76	99.22	6107.96	0.0
06-Sep-15	78.83	48.70	113.78	6810.91	21.8
07-Sep-15	67.28	50.29	104.36	5812.82	0.5
08-Sep-15	57.22	36.87	84.46	4943.93	0.0
09-Sep-15	56.51	35.49	84.20	4882.61	0.0
10-Sep-15	55.04	33.44	81.26	4755.61	0.0
11-Sep-15	55.94	35.06	77.05	4833.42	0.0
12-Sep-15	54.48	35.01	80.27	4707.32	3.0
13-Sep-15	56.12	35.45	89.34	4848.96	1.5
14-Sep-15	55.71	32.77	83.77	4813.49	0.8
15-Sep-15	56.78	32.94	87.47	4905.83	3.0
16-Sep-15	60.32	35.92	108.45	5211.33	1.8
17-Sep-15	58.09	32.68	92.01	5018.75	0.0
18-Sep-15	56.22	34.90	77.34	4857.65	0.0
19-Sep-15	56.44	34.28	83.05	4876.09	0.0
20-Sep-15	57.18	33.85	83.42	4940.13	1.5
21-Sep-15	56.86	34.33	81.42	4912.96	3.3
22-Sep-15	55.45	35.99	79.80	4790.69	0.0
23-Sep-15	55.65	31.43	77.89	4807.75	0.0
24-Sep-15	55.23	32.90	77.22	4772.04	0.0
25-Sep-15	55.01	34.19	79.76	4753.20	0.0
26-Sep-15	54.59	33.37	78.59	4716.64	0.0
27-Sep-15	57.21	35.67	91.68	4942.88	0.0
28-Sep-15	54.51	31.55	81.09	4709.40	0.0
29-Sep-15	53.91	30.90	77.53	4658.18	0.0
30-Sep-15	52.57	28.46	76.17	4541.92	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
150644.939	28.460	113.783	56.8

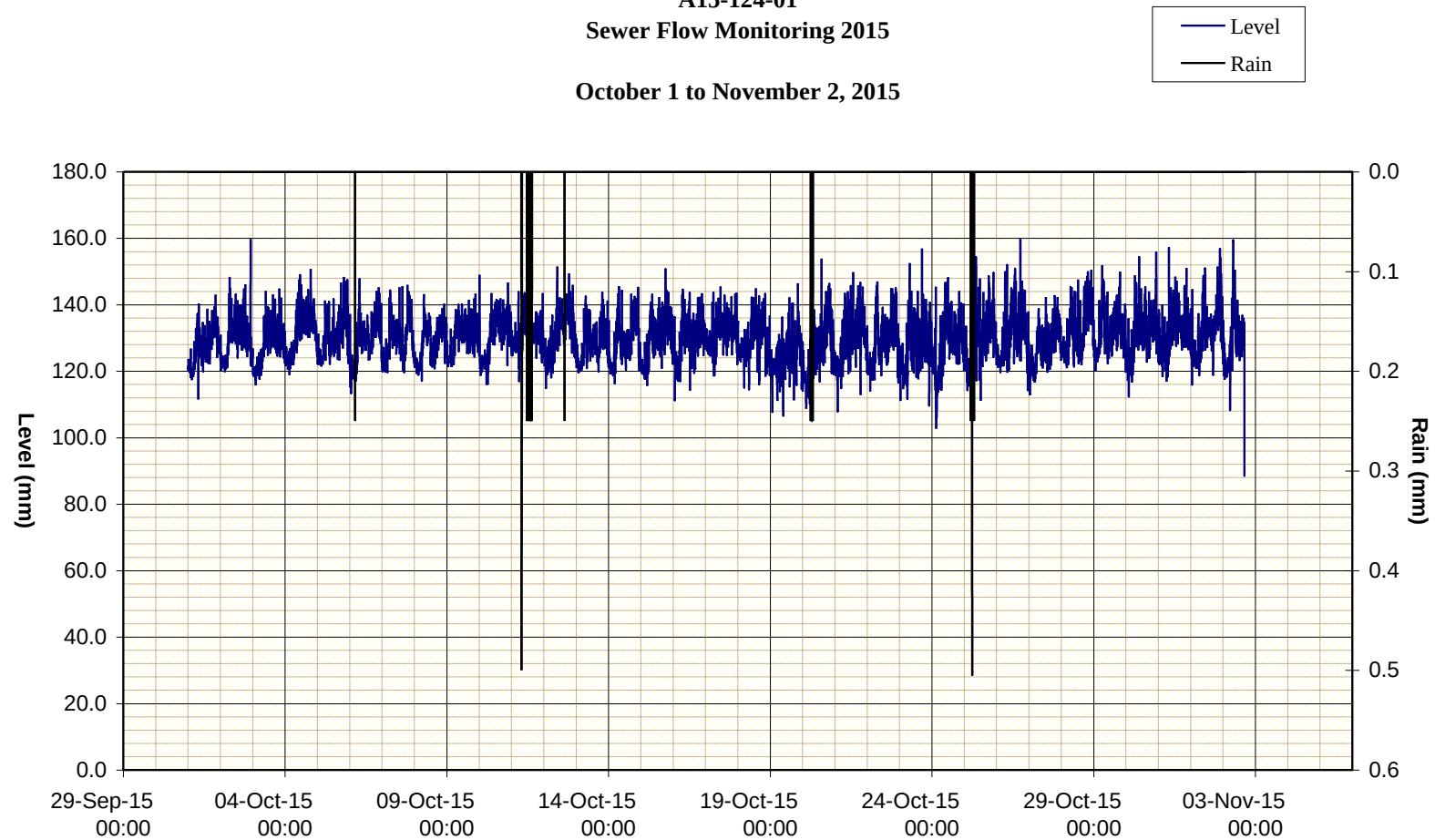
**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**

— Flow
— Rain

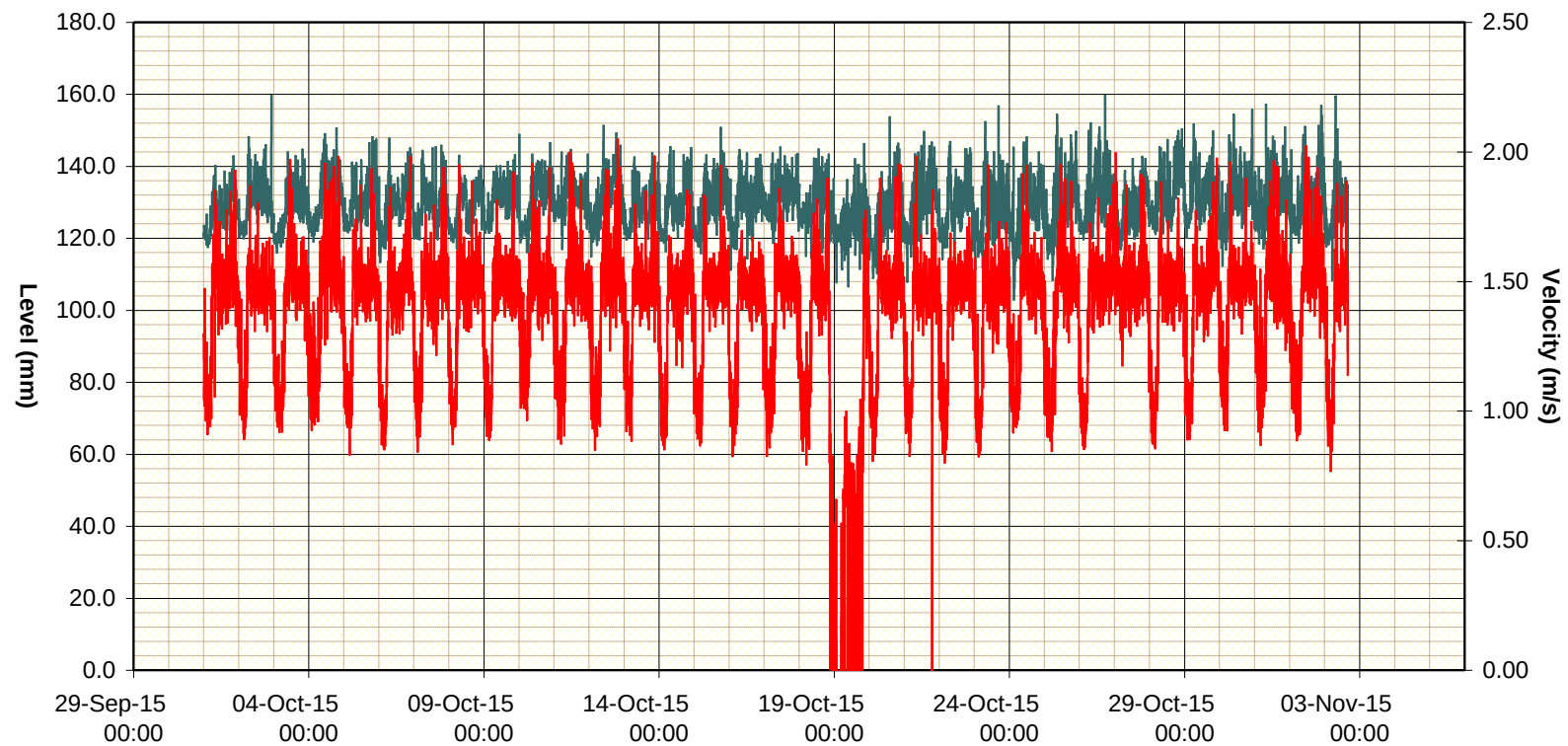
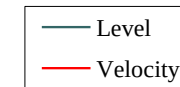


**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015**

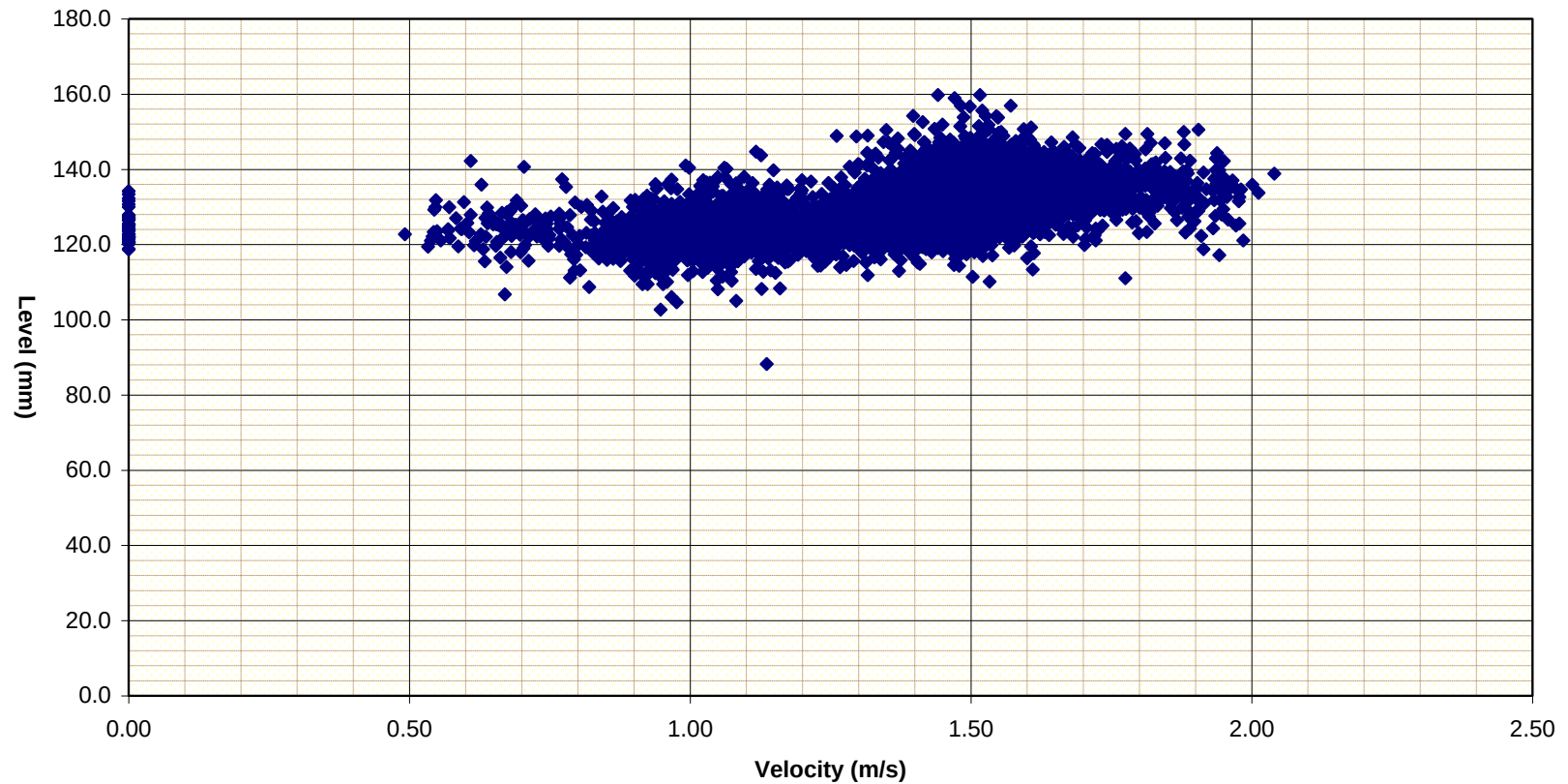
October 1 to November 2, 2015



**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-01
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



Cold Lake, Alberta

A15-124-01

Sewer Flow Monitoring 2015

October 1 to November 2, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Oct-15	52.48	30.44	74.51	4534.22	0.0
02-Oct-15	53.33	31.38	72.89	4607.65	0.0
03-Oct-15	51.58	30.74	76.25	4456.67	0.0
04-Oct-15	55.42	32.34	85.32	4788.15	0.0
05-Oct-15	53.62	29.10	80.19	4632.69	0.0
06-Oct-15	52.61	27.99	80.40	4545.51	0.3
07-Oct-15	53.73	28.80	78.65	4641.95	0.0
08-Oct-15	52.88	29.33	80.09	4569.01	0.0
09-Oct-15	53.51	31.15	76.82	4622.85	0.0
10-Oct-15	54.72	31.63	81.54	4728.08	0.0
11-Oct-15	54.04	31.57	81.02	4669.28	4.0
12-Oct-15	55.38	29.82	85.09	4784.62	0.3
13-Oct-15	52.77	31.14	77.45	4559.30	0.0
14-Oct-15	52.42	28.57	76.22	4528.68	0.0
15-Oct-15	53.05	28.70	84.07	4583.81	0.0
16-Oct-15	52.32	27.90	71.06	4520.66	0.0
17-Oct-15	53.28	30.23	79.32	4603.26	0.0
18-Oct-15	46.87	-13.99	76.15	4049.63	0.0
19-Oct-15	17.13	-19.73	78.23	1479.95	0.0
20-Oct-15	51.59	24.28	79.59	4457.01	2.3
21-Oct-15	52.24	0.00	78.54	4513.21	0.0
22-Oct-15	52.05	26.28	72.65	4497.17	0.0
23-Oct-15	51.38	27.27	80.48	4439.51	0.0
24-Oct-15	51.61	25.90	80.79	4459.16	0.0
25-Oct-15	52.05	28.46	84.56	4496.91	2.3
26-Oct-15	53.80	29.91	78.59	4648.58	0.0
27-Oct-15	55.94	38.72	77.42	4833.05	0.0
28-Oct-15	54.34	29.97	83.74	4695.13	0.0
29-Oct-15	54.78	31.61	87.14	4733.13	0.0
30-Oct-15	55.17	31.85	77.95	4766.88	0.0
31-Oct-15	55.42	30.76	84.32	4788.44	0.0
01-Nov-15	55.71	31.49	88.80	4813.12	0.0
02-Nov-15	50.18	25.02	81.38	4335.44	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
148382.682	-19.730	88.800	9.0



FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-02
ADDRESS:	Cold Lake Beach
GPS:	N54.47203 W110.18778
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

CONSTANTS		
D1 (mm):		D1-lip to x-bar
TOM (mm)	2470	Raw Weir L - lip to water
METER #	206A02419	DATE:
METER #	211E00968	DATE:
METER #		DATE:

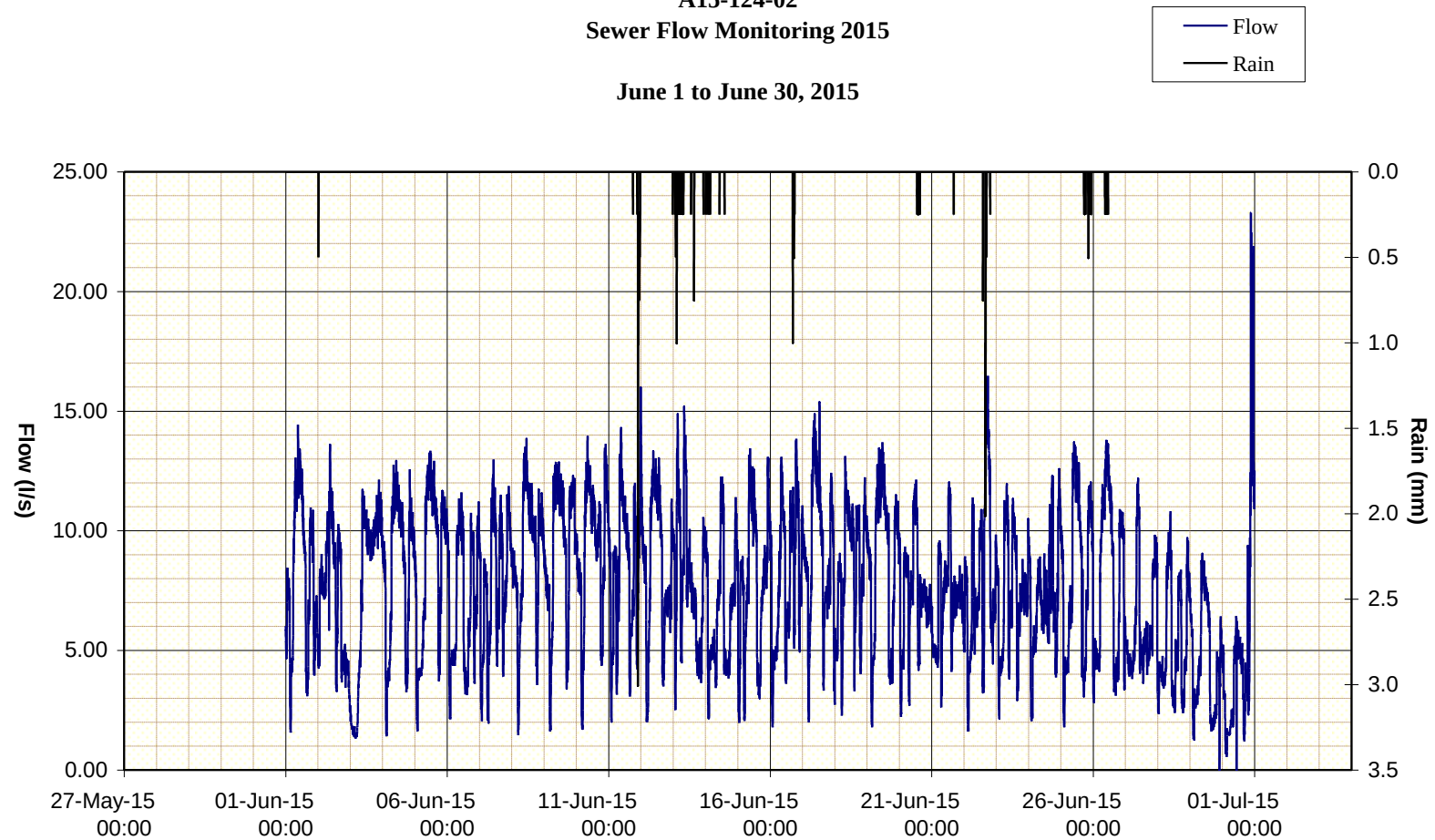
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:

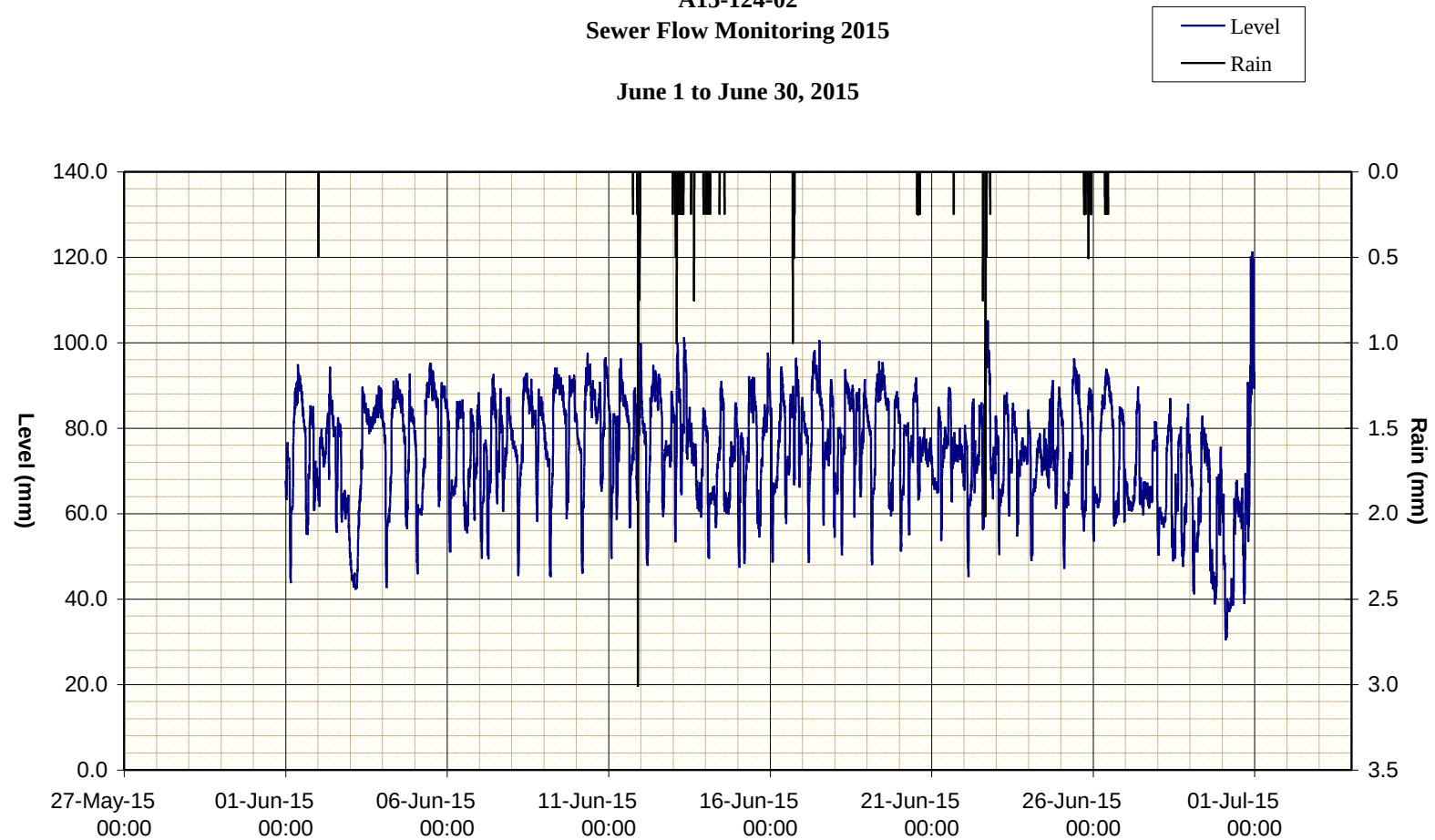
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



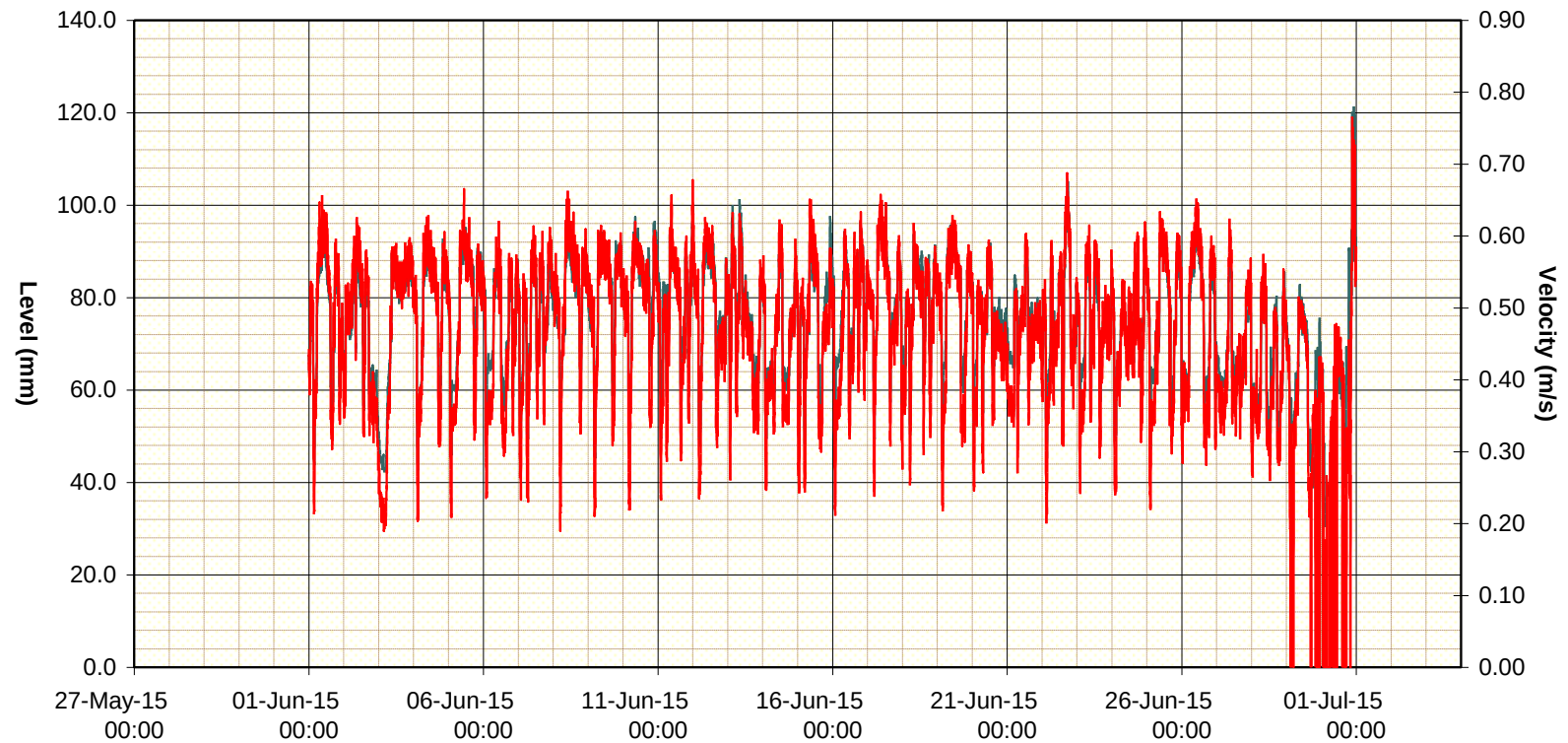
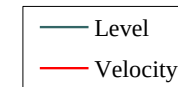
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



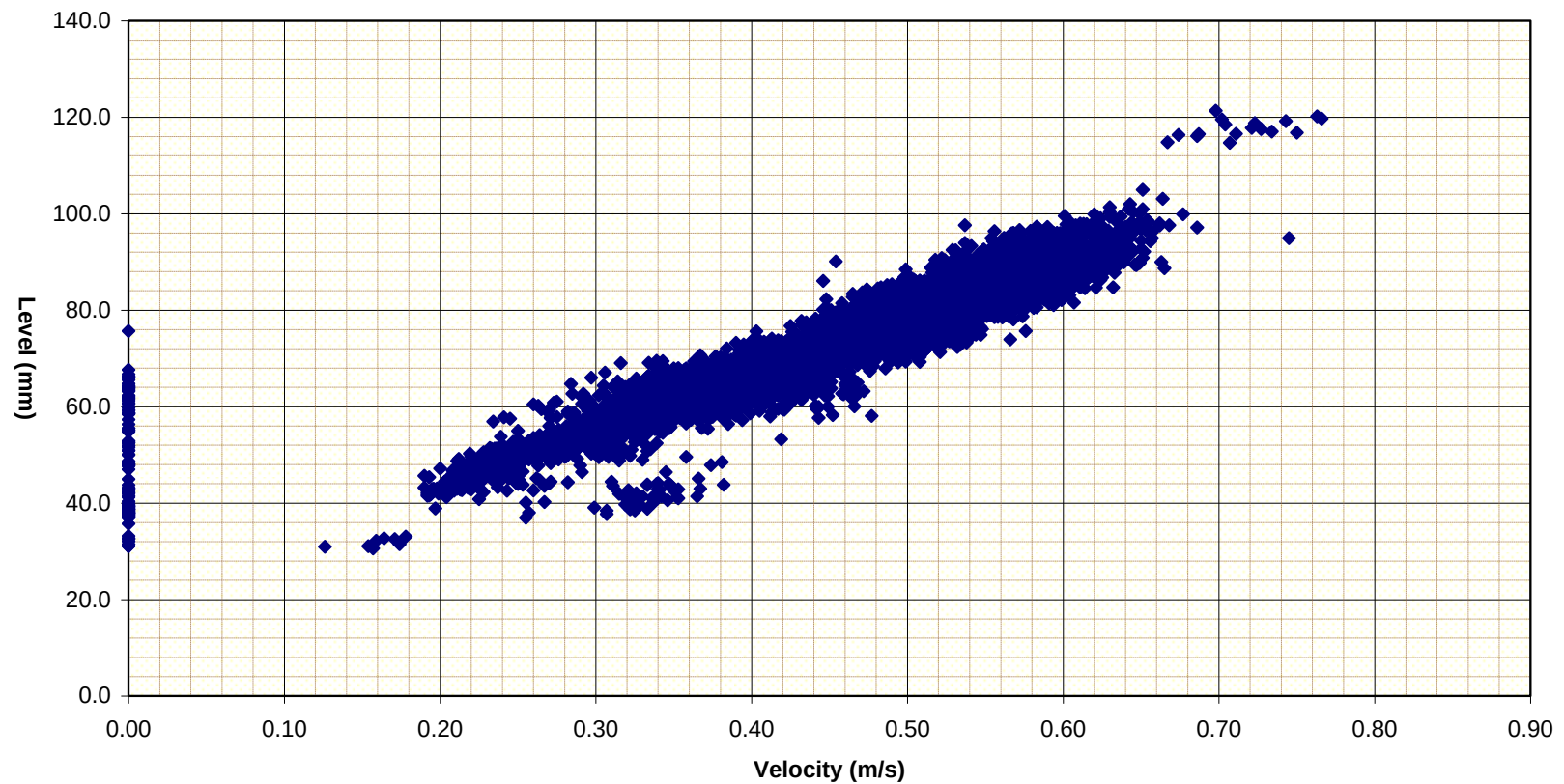
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
June 1 to June 30, 2015

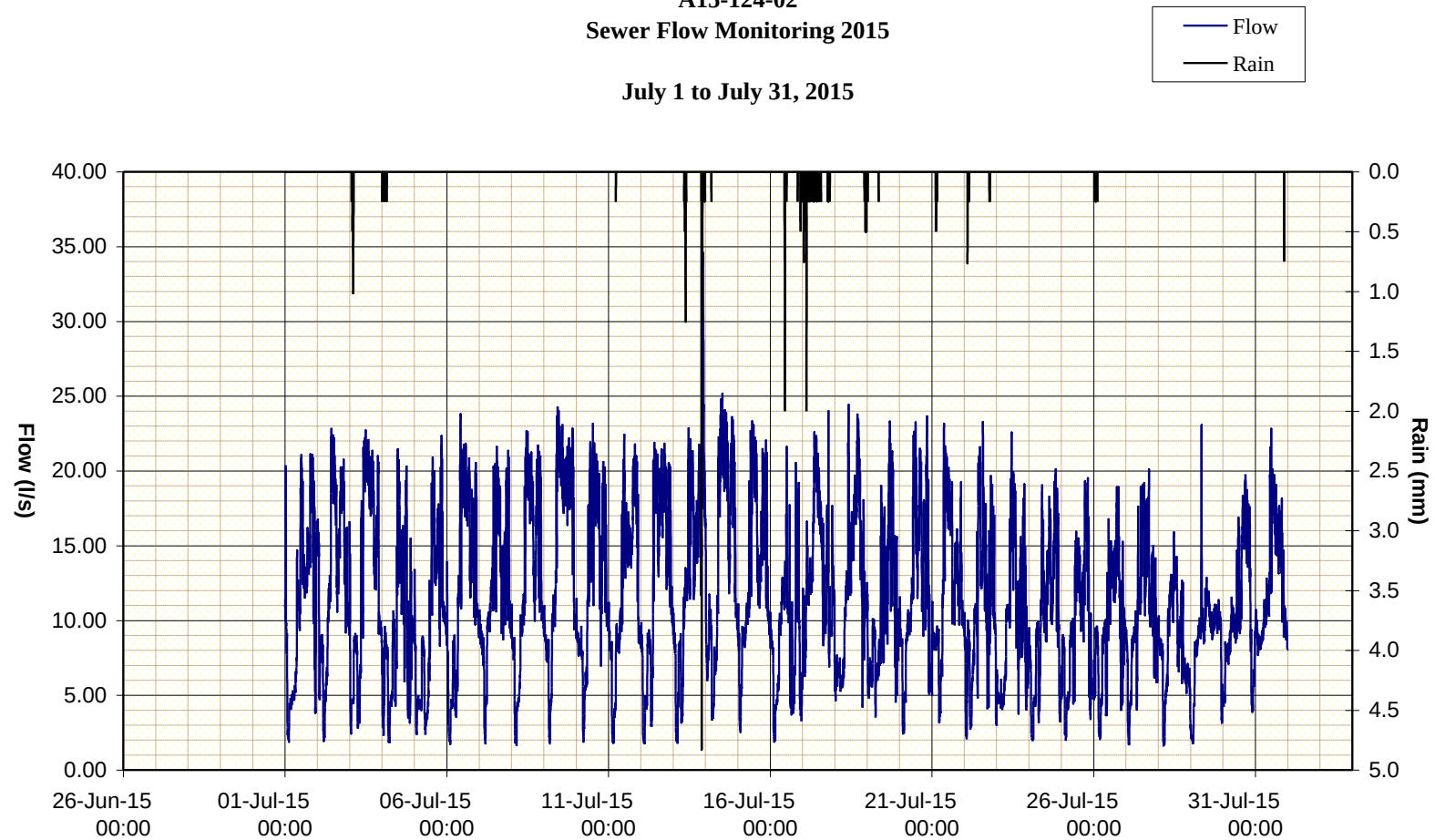
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jun-15	8.15	1.57	14.44	704.04	0.0
02-Jun-15	7.23	2.39	13.59	624.31	0.5
03-Jun-15	7.45	1.31	12.13	643.67	0.0
04-Jun-15	8.49	1.41	12.88	733.94	0.0
05-Jun-15	8.68	1.62	13.35	749.52	0.0
06-Jun-15	7.01	2.12	11.61	605.93	0.0
07-Jun-15	7.80	1.99	12.98	674.14	0.0
08-Jun-15	9.11	1.46	13.82	787.14	0.0
09-Jun-15	9.26	1.61	12.88	800.50	0.0
10-Jun-15	9.35	1.73	13.96	808.24	0.0
11-Jun-15	8.45	2.03	15.97	730.39	16.5
12-Jun-15	8.71	2.00	15.12	752.32	0.3
13-Jun-15	8.06	2.51	15.17	696.15	10.8
14-Jun-15	6.67	2.16	12.27	576.33	1.5
15-Jun-15	7.90	1.97	13.44	682.40	0.0
16-Jun-15	8.07	1.78	13.84	697.36	3.5
17-Jun-15	9.14	1.98	15.33	789.88	0.0
18-Jun-15	8.44	2.28	13.13	729.31	0.0
19-Jun-15	8.84	1.79	13.70	763.37	0.0
20-Jun-15	7.33	2.22	12.13	633.10	3.0
21-Jun-15	7.08	2.62	12.02	612.06	0.5
22-Jun-15	8.00	1.61	16.47	691.07	8.5
23-Jun-15	7.35	2.17	11.91	634.81	0.0
24-Jun-15	7.15	2.04	12.53	617.88	0.0
25-Jun-15	8.19	1.78	13.69	707.73	4.0
26-Jun-15	8.09	2.84	13.79	698.73	1.5
27-Jun-15	6.07	3.26	12.18	524.03	0.0
28-Jun-15	5.36	2.33	10.81	463.50	0.0
29-Jun-15	4.60	-3.62	9.02	397.47	0.0
30-Jun-15	5.21	-5.74	23.29	450.45	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
19979.755	-5.736	23.290	50.5

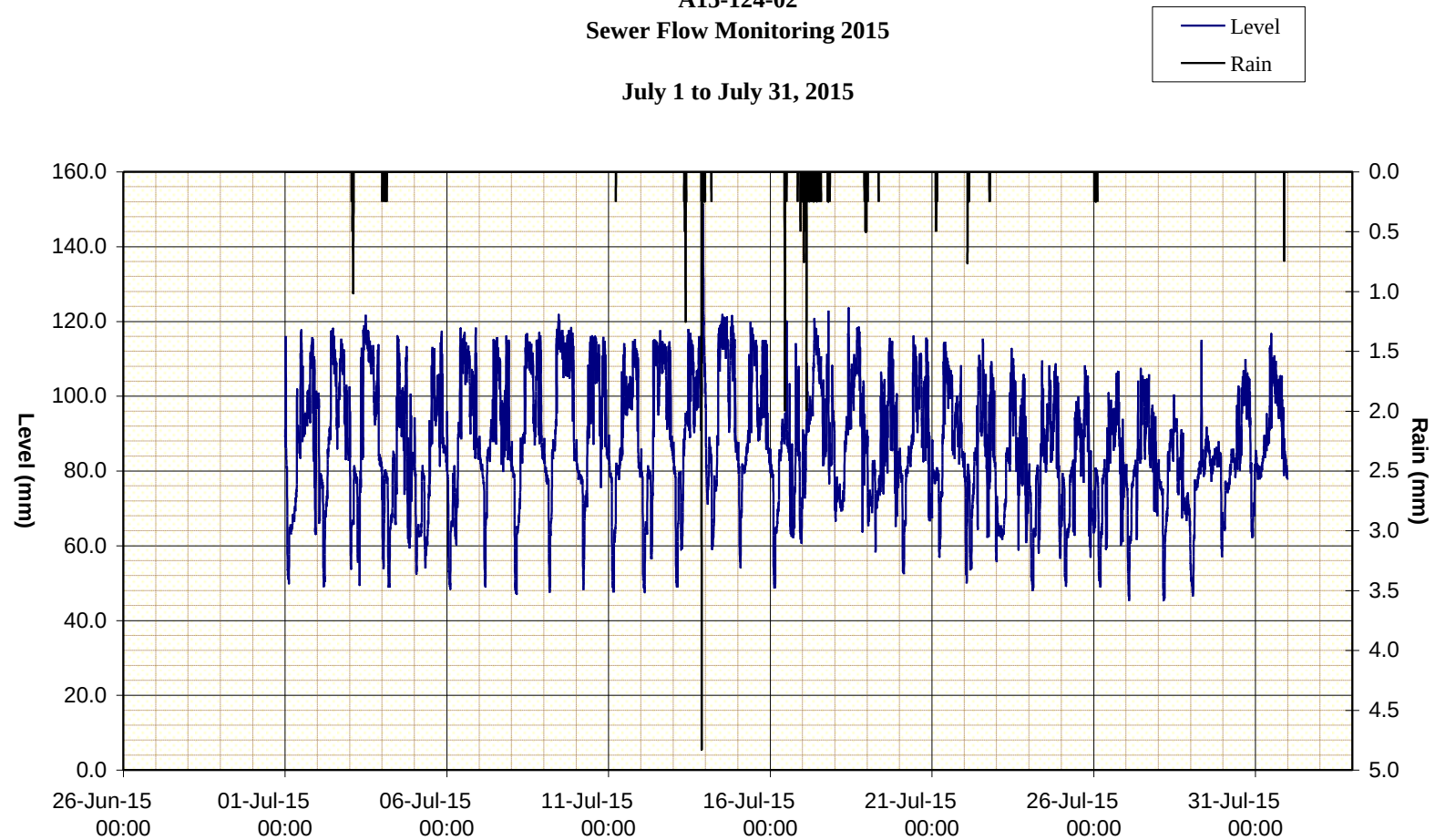
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



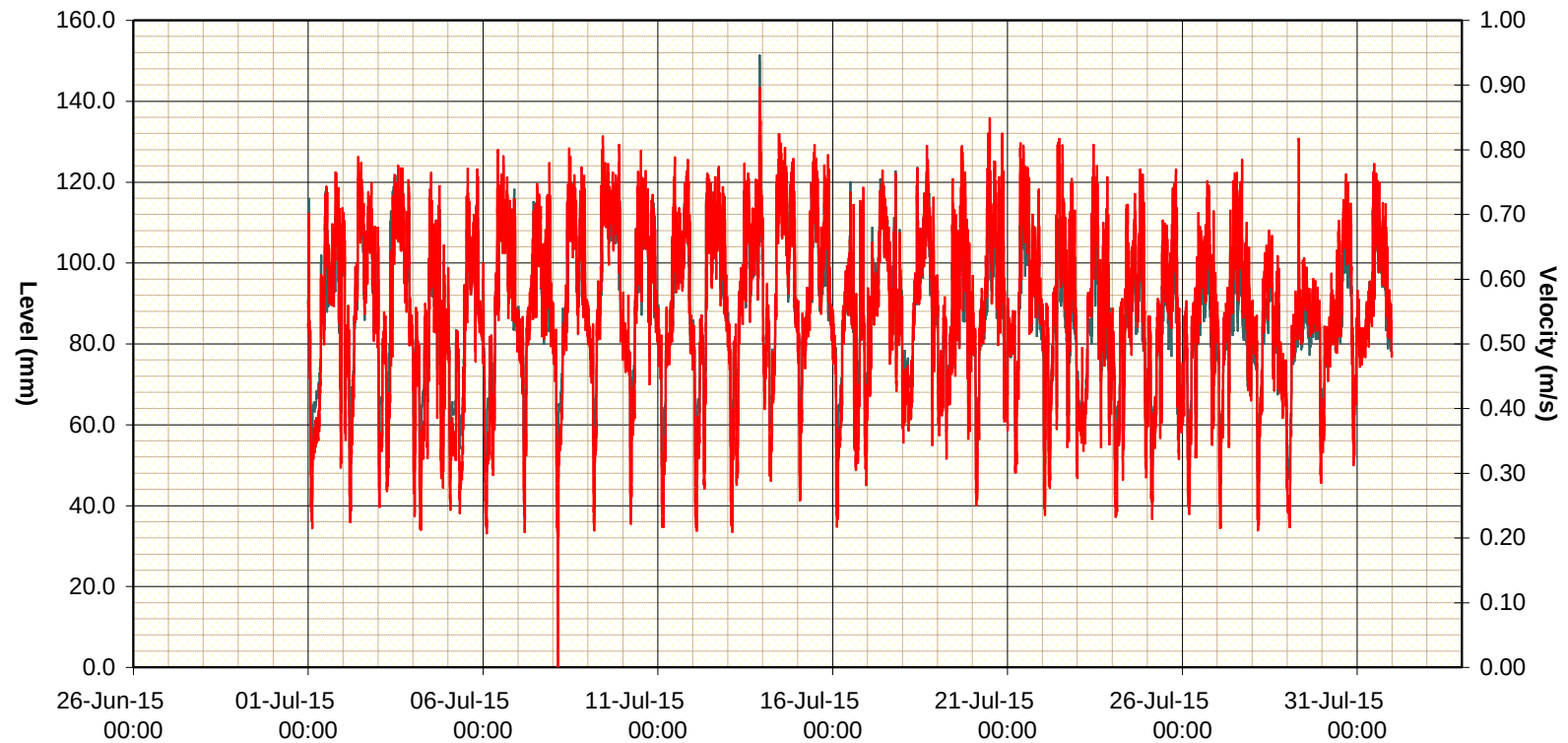
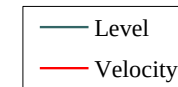
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



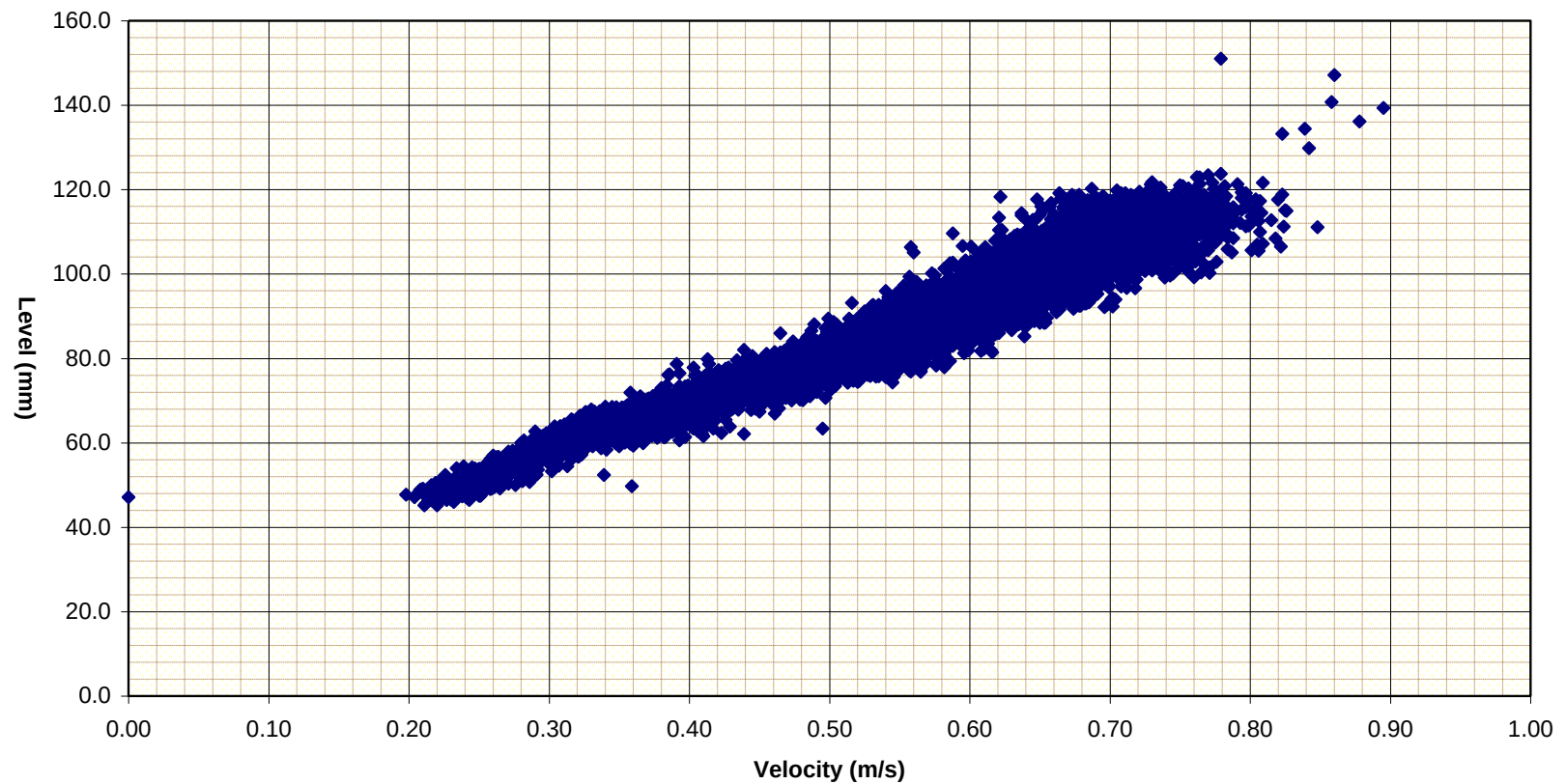
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta

A15-124-02

Sewer Flow Monitoring 2015

July 1 to July 31, 2015

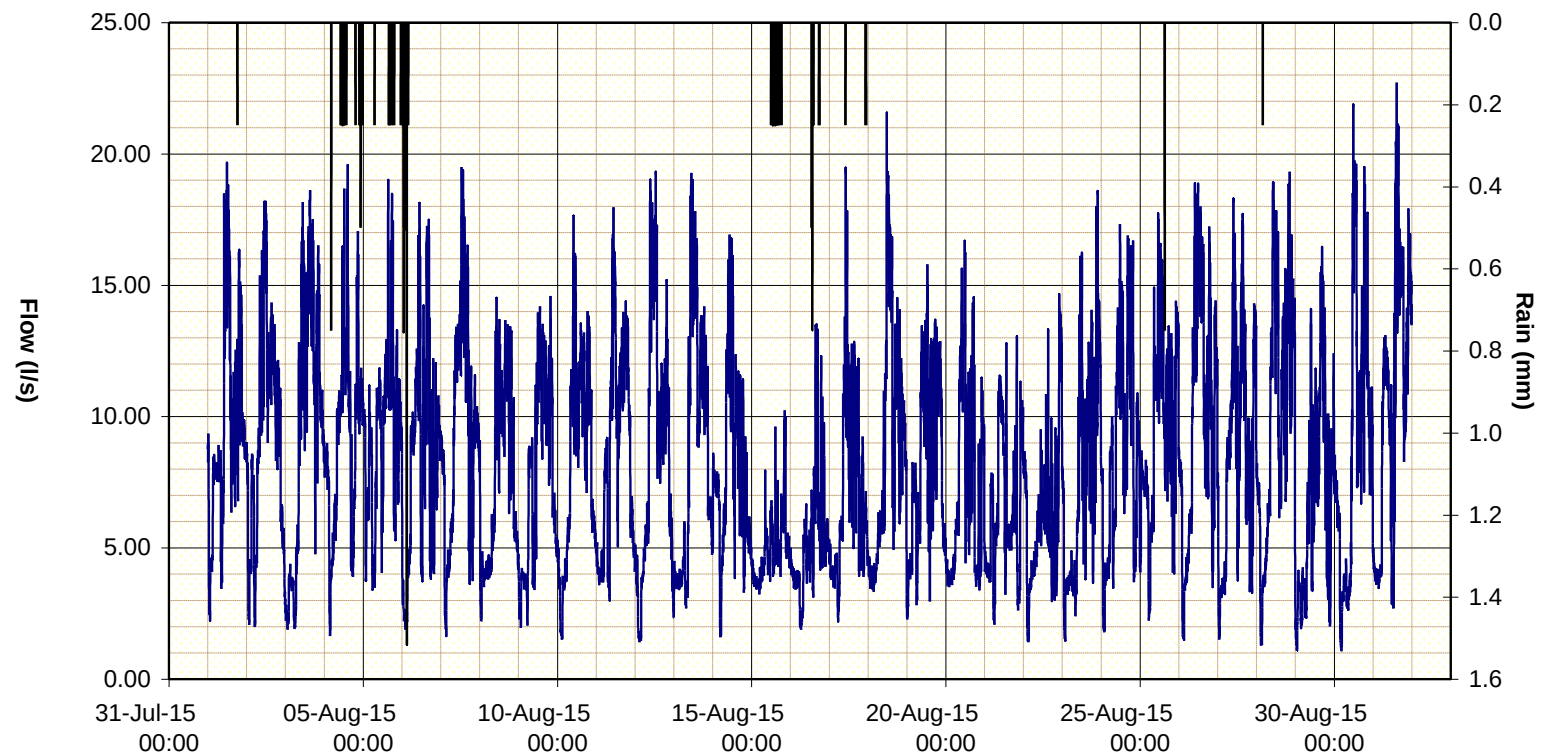
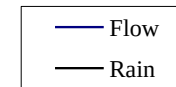
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	11.18	1.89	21.12	965.78	0.0
02-Jul-15	12.99	1.90	22.88	1122.60	0.0
03-Jul-15	12.88	2.44	22.69	1112.88	6.3
04-Jul-15	9.36	1.81	21.26	808.48	1.0
05-Jul-15	9.83	2.35	22.32	849.70	0.0
06-Jul-15	12.24	1.75	23.64	1057.46	0.0
07-Jul-15	12.04	1.79	21.68	1040.00	0.0
08-Jul-15	12.62	1.62	22.65	1090.60	0.0
09-Jul-15	14.65	1.75	24.30	1265.54	0.0
10-Jul-15	12.93	1.83	23.12	1117.34	0.0
11-Jul-15	12.05	1.76	22.37	1040.85	0.3
12-Jul-15	12.71	1.73	21.94	1098.34	0.0
13-Jul-15	13.39	1.76	34.57	1156.90	22.5
14-Jul-15	14.48	3.30	25.11	1251.25	0.3
15-Jul-15	13.37	2.56	23.24	1154.90	0.0
16-Jul-15	8.39	1.83	21.46	724.89	7.8
17-Jul-15	13.45	5.45	24.05	1161.77	22.3
18-Jul-15	12.42	4.31	24.38	1073.05	4.8
19-Jul-15	10.71	3.51	23.21	925.18	0.8
20-Jul-15	12.27	2.38	23.72	1059.95	0.0
21-Jul-15	12.31	3.16	23.07	1063.94	3.0
22-Jul-15	10.70	2.06	23.21	924.32	3.3
23-Jul-15	10.00	2.97	22.48	864.38	0.0
24-Jul-15	10.06	1.93	20.07	868.82	0.0
25-Jul-15	9.49	1.95	19.40	819.86	0.0
26-Jul-15	9.76	2.08	18.98	843.41	2.5
27-Jul-15	10.60	1.66	20.08	916.07	0.0
28-Jul-15	8.46	1.59	15.88	730.64	0.0
29-Jul-15	8.86	1.72	23.06	765.39	0.0
30-Jul-15	10.76	3.83	19.77	929.50	0.0
31-Jul-15	12.51	7.70	22.79	1081.15	1.5

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
30884.939	1.592	34.569	76.0

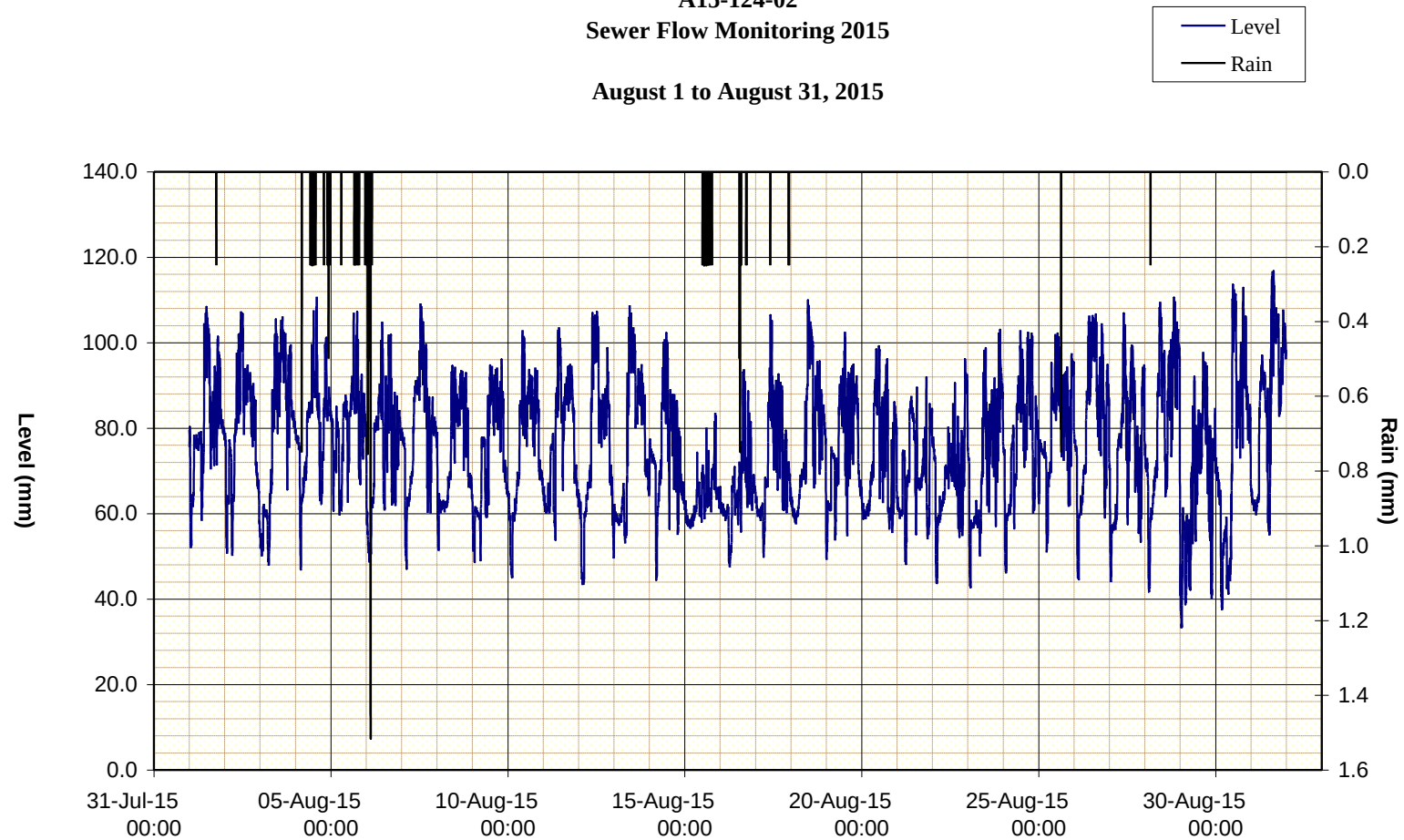
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



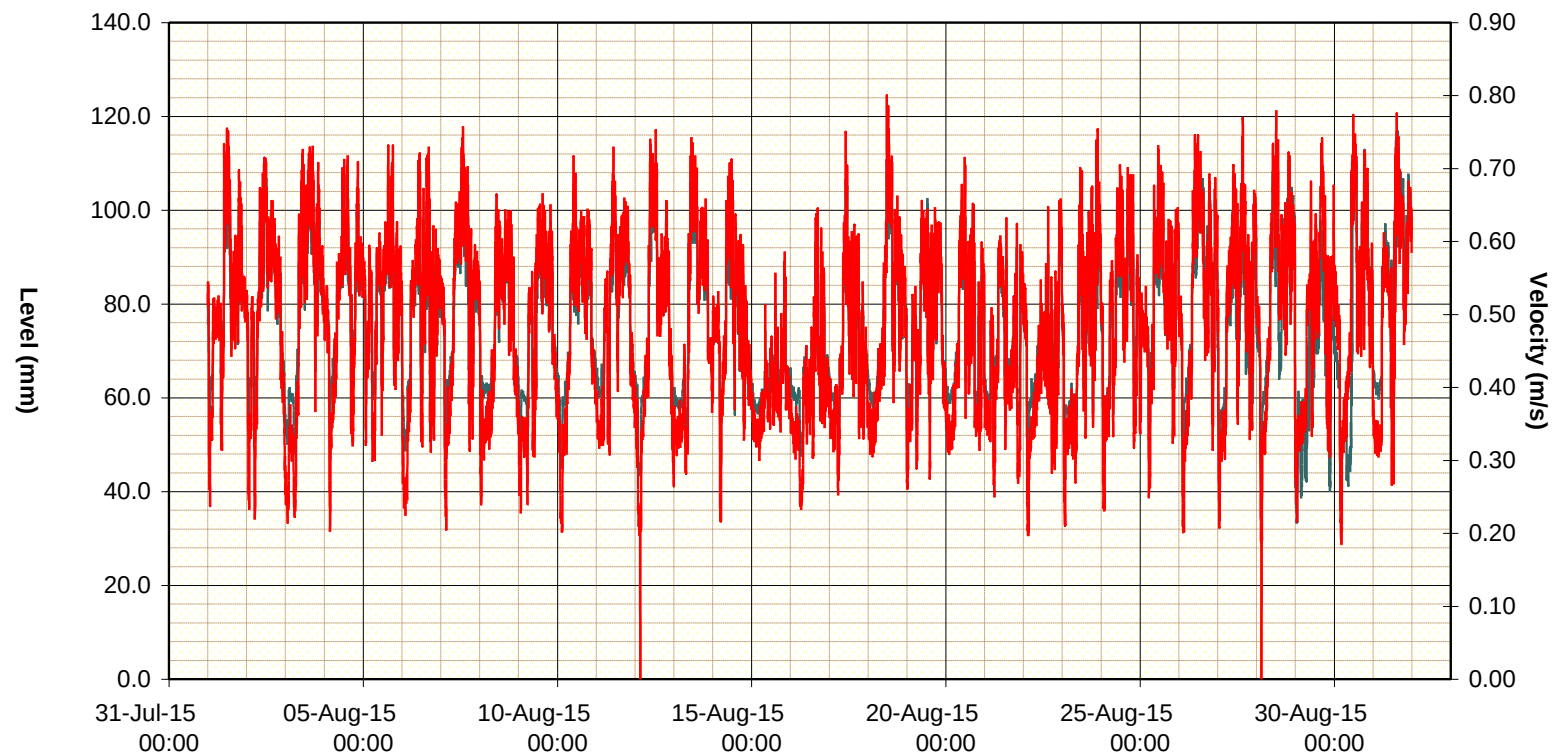
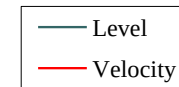
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015

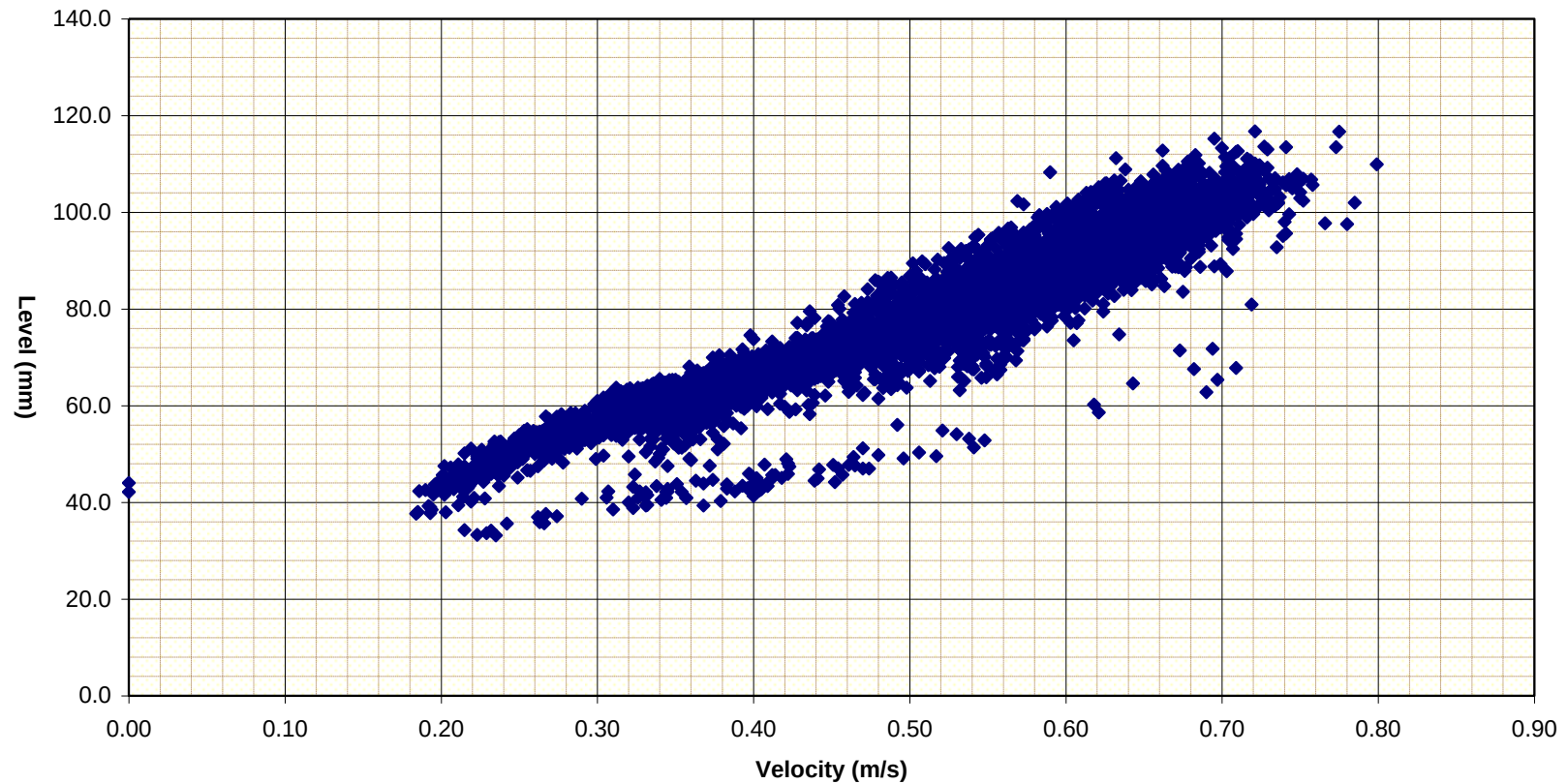


**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
August 1 to August 31, 2015**



Cold Lake, Alberta

A15-124-02

Sewer Flow Monitoring 2015

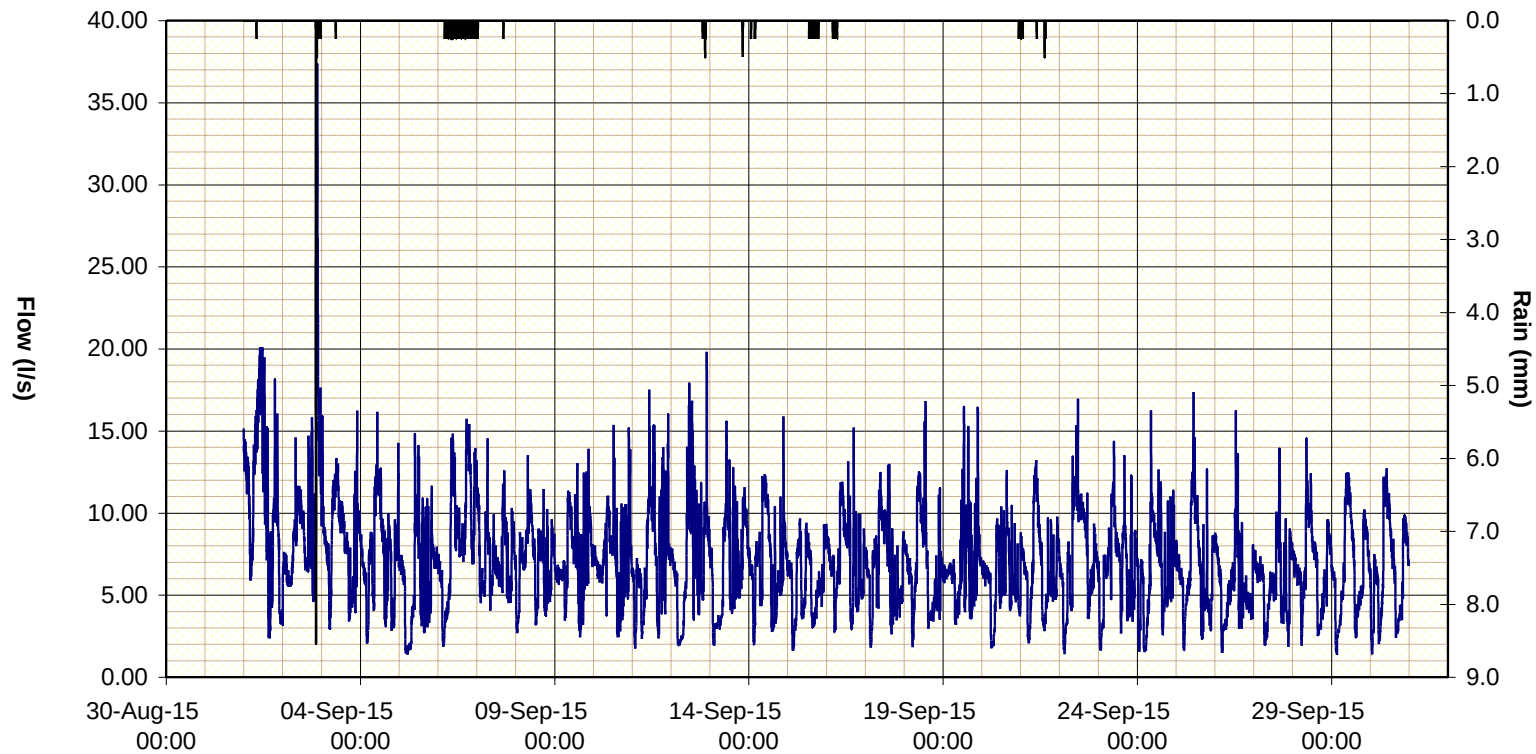
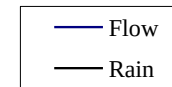
August 1 to August 31, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-15	9.66	2.24	19.53	834.53	0.3
02-Aug-15	9.11	1.99	18.17	787.14	0.0
03-Aug-15	9.57	1.89	18.62	826.89	0.0
04-Aug-15	9.03	1.64	19.56	780.34	8.5
05-Aug-15	9.09	3.42	18.98	785.60	2.3
06-Aug-15	8.30	1.88	18.13	717.30	12.0
07-Aug-15	9.66	1.66	19.50	834.55	0.0
08-Aug-15	7.70	2.20	14.46	664.94	0.0
09-Aug-15	7.80	1.95	14.54	673.87	0.0
10-Aug-15	8.27	1.51	17.62	714.46	0.0
11-Aug-15	8.77	3.02	17.92	757.93	0.0
12-Aug-15	8.53	1.41	19.21	736.81	0.0
13-Aug-15	8.62	2.69	19.27	745.01	0.0
14-Aug-15	8.19	1.60	16.93	707.62	0.0
15-Aug-15	4.93	3.23	10.24	425.85	7.8
16-Aug-15	5.31	1.88	13.50	459.11	4.5
17-Aug-15	7.19	2.21	19.24	621.33	0.8
18-Aug-15	8.79	3.22	21.57	759.66	0.0
19-Aug-15	8.18	2.28	15.79	707.05	0.0
20-Aug-15	7.31	3.38	16.69	631.37	0.0
21-Aug-15	6.37	2.08	12.99	550.10	0.0
22-Aug-15	6.00	1.41	14.65	518.56	0.0
23-Aug-15	7.64	1.49	18.45	660.14	0.0
24-Aug-15	8.72	1.79	17.32	753.23	0.0
25-Aug-15	9.41	2.23	17.73	812.97	0.8
26-Aug-15	9.85	1.51	18.87	851.11	0.0
27-Aug-15	8.73	1.51	18.15	754.11	0.0
28-Aug-15	10.00	1.28	19.32	864.29	0.3
29-Aug-15	6.78	1.08	16.45	586.17	0.0
30-Aug-15	8.87	1.07	21.79	766.75	0.0
31-Aug-15	10.39	2.70	22.72	897.41	0.0

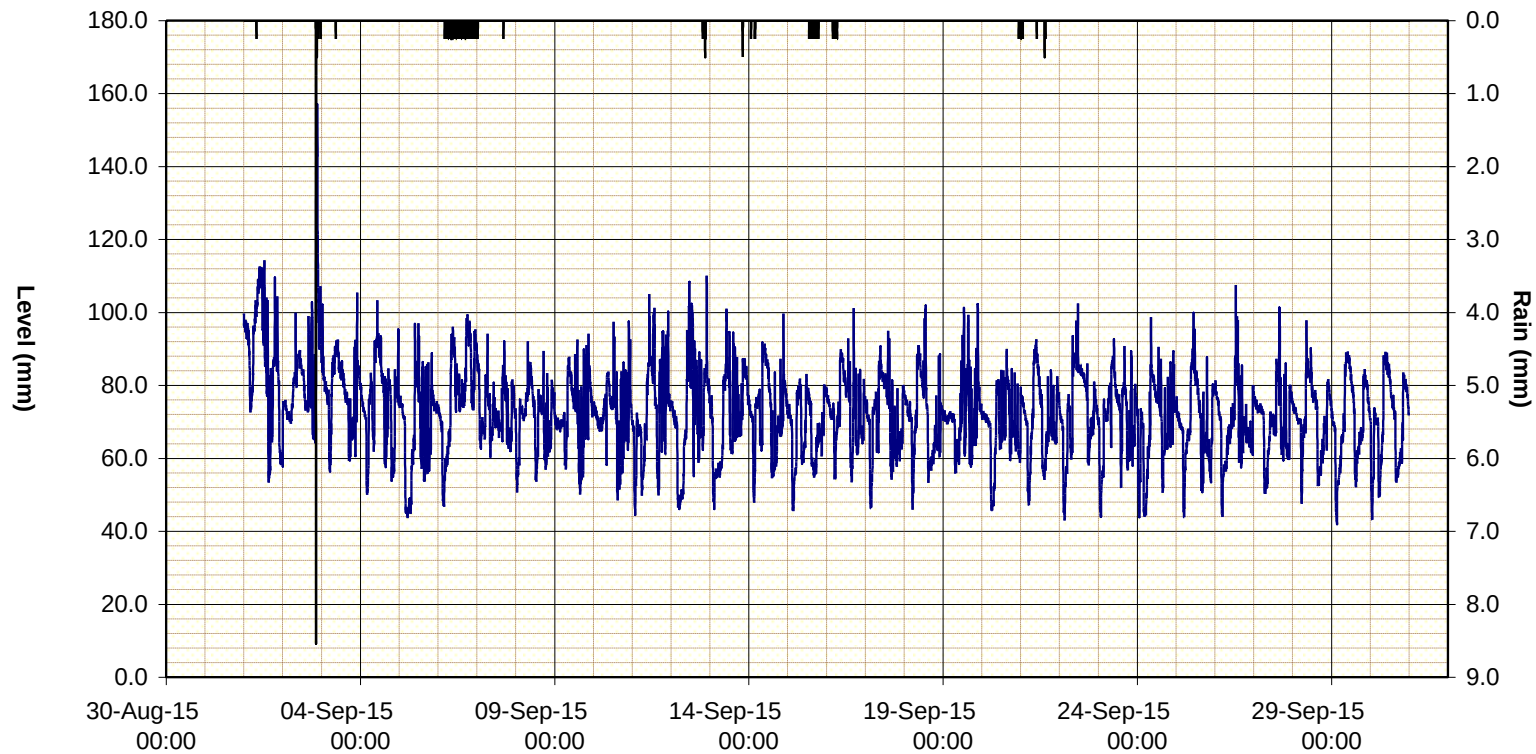
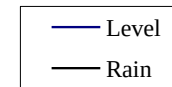
Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
22186.205	1.067	22.720	37.0

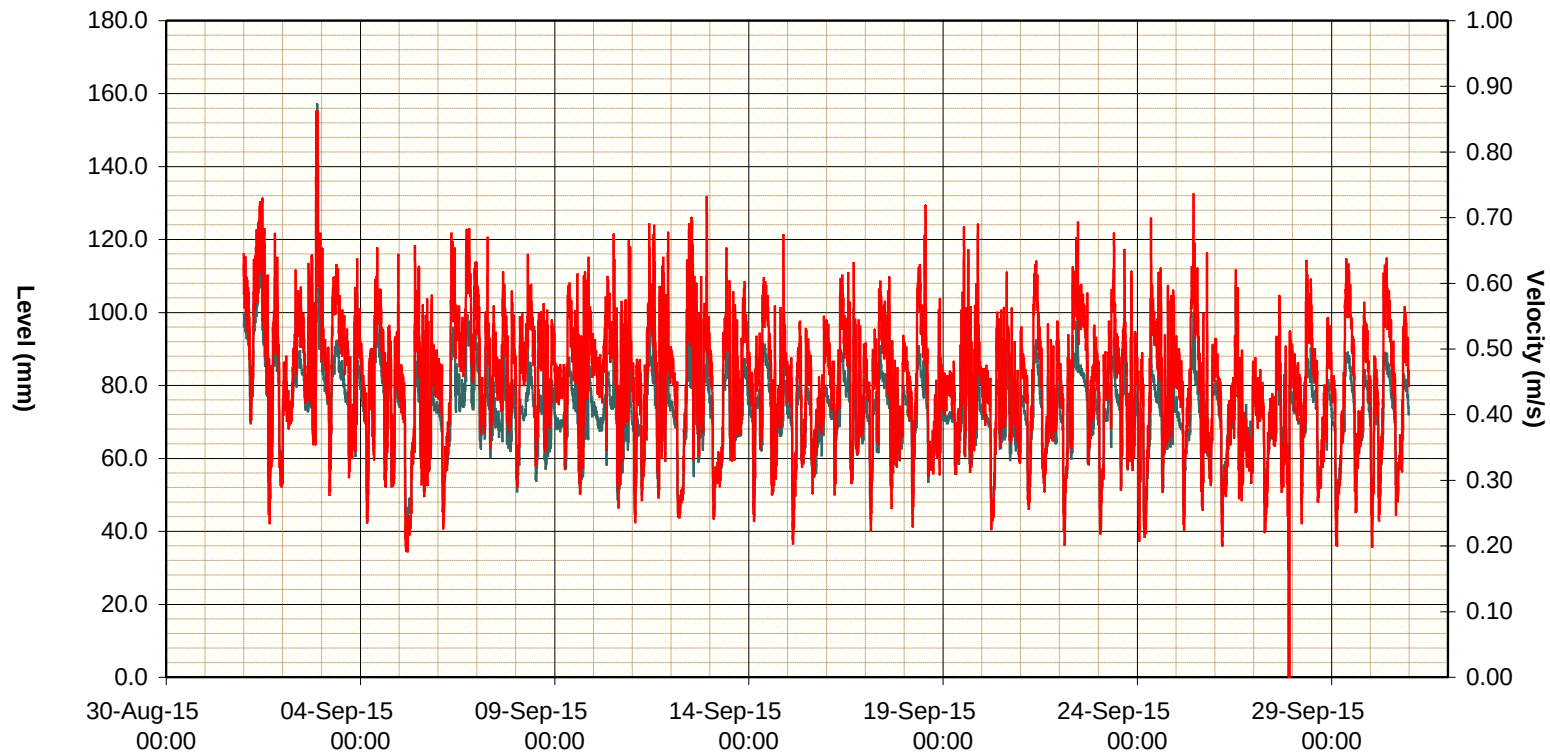
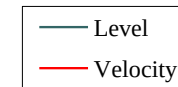
Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
September 1 to September 30, 2015



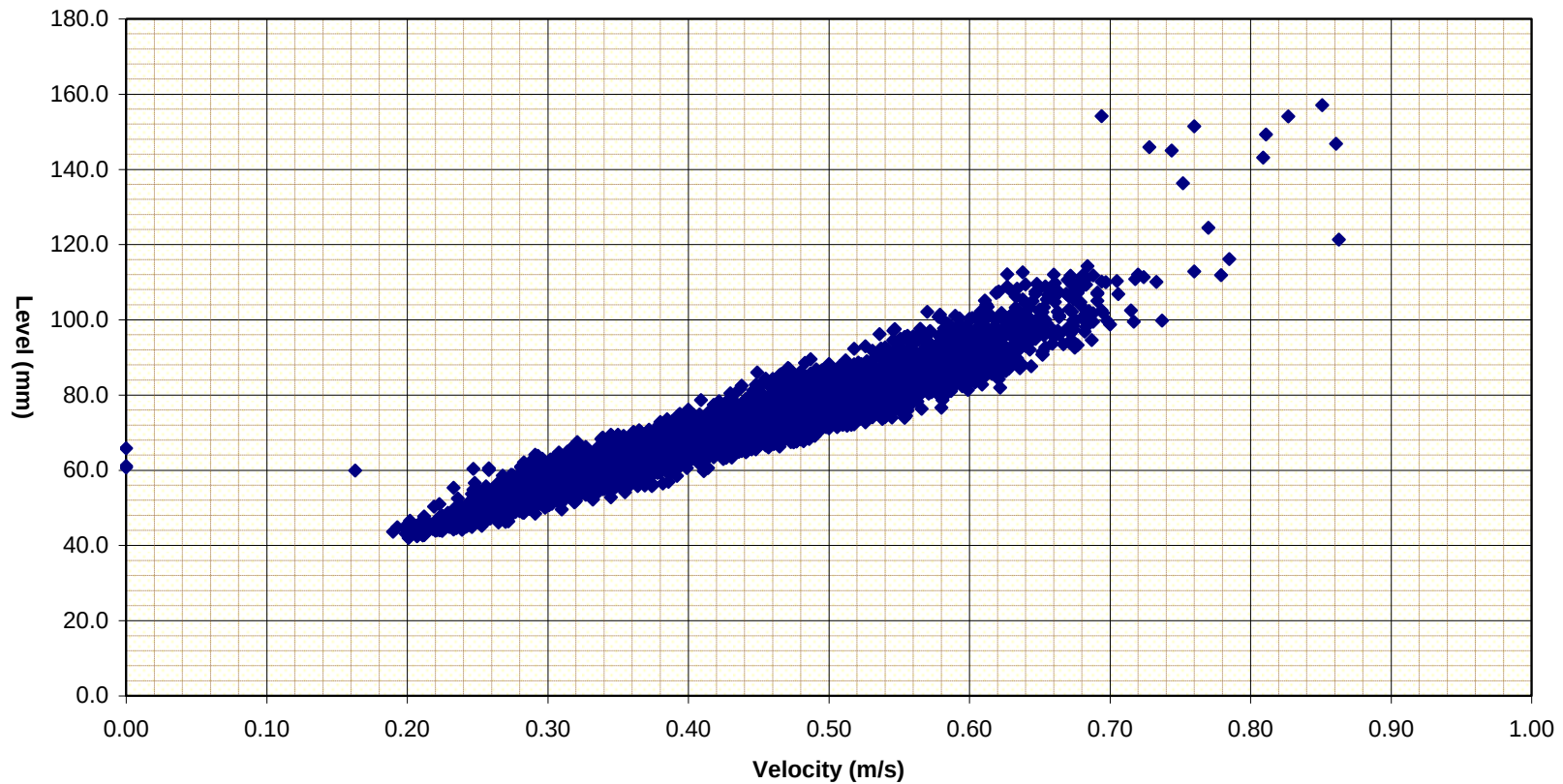
Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
September 1 to September 30, 2015



**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
September 1 to September 30, 2015**



**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
September 1 to September 30, 2015**



Cold Lake, Alberta

A15-124-02

Sewer Flow Monitoring 2015

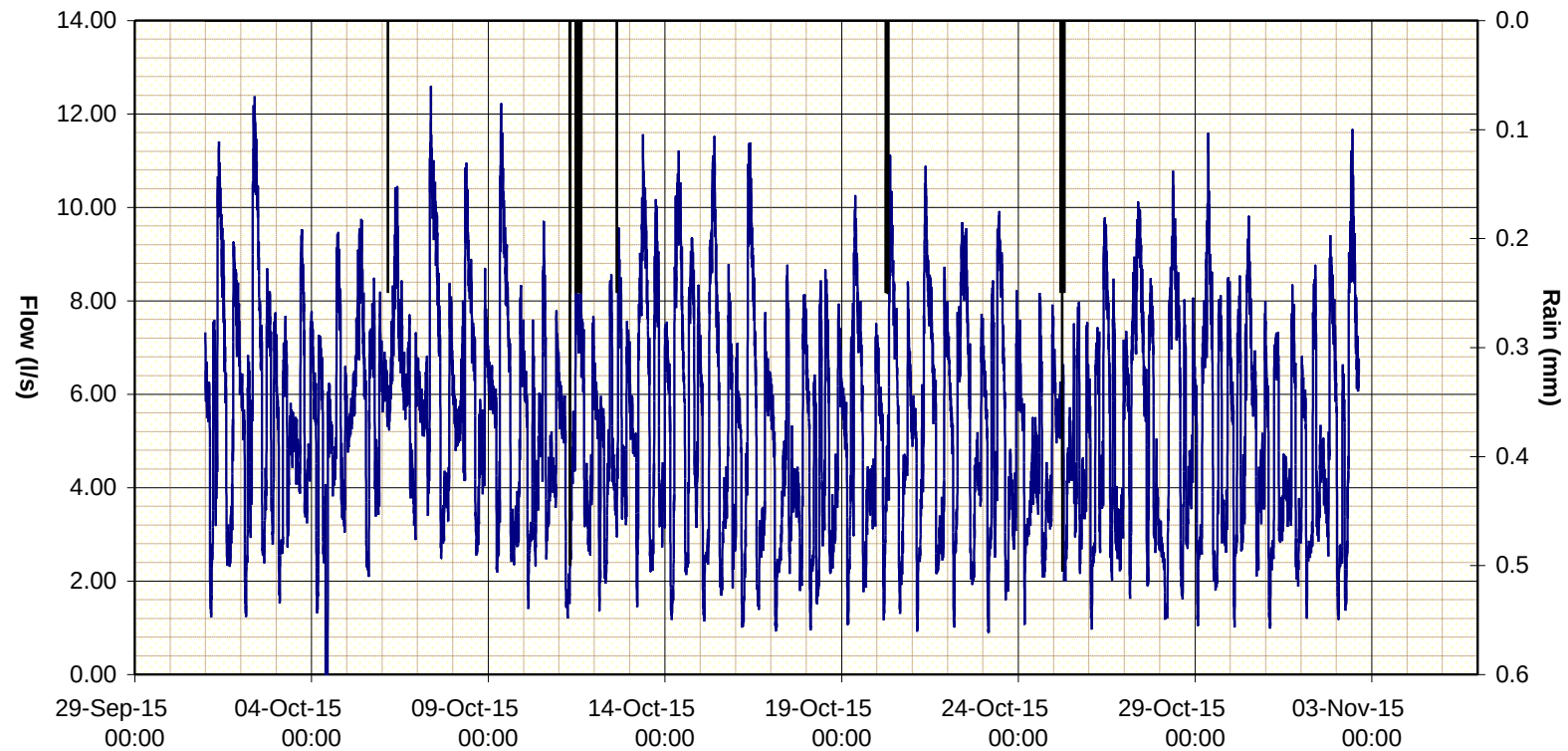
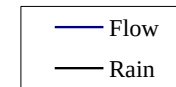
September 1 to September 30, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	10.66	2.36	19.94	921.01	0.3
02-Sep-15	9.77	3.21	37.31	843.87	19.3
03-Sep-15	8.37	2.92	16.24	722.97	0.3
04-Sep-15	7.39	2.05	16.17	638.22	0.0
05-Sep-15	5.78	1.36	14.77	499.13	0.0
06-Sep-15	8.64	1.85	15.73	746.53	21.8
07-Sep-15	7.21	4.05	14.56	623.35	0.5
08-Sep-15	6.98	2.68	13.53	603.35	0.0
09-Sep-15	7.13	2.43	13.91	616.07	0.0
10-Sep-15	7.14	2.44	15.37	616.55	0.0
11-Sep-15	7.36	1.74	17.51	636.19	0.0
12-Sep-15	7.40	1.93	19.82	639.19	3.0
13-Sep-15	6.63	1.91	15.45	572.78	1.5
14-Sep-15	6.95	1.95	15.88	600.56	0.8
15-Sep-15	5.74	1.59	9.67	496.13	3.0
16-Sep-15	7.11	2.74	15.20	614.41	1.8
17-Sep-15	6.47	1.80	12.94	559.18	0.0
18-Sep-15	6.73	1.83	16.83	581.61	0.0
19-Sep-15	6.78	3.20	16.42	585.40	0.0
20-Sep-15	5.84	1.75	12.55	504.98	1.5
21-Sep-15	6.62	2.06	13.23	571.57	3.3
22-Sep-15	7.44	1.40	16.97	642.43	0.0
23-Sep-15	6.79	1.61	14.32	586.67	0.0
24-Sep-15	6.20	1.53	16.26	535.27	0.0
25-Sep-15	6.50	1.62	17.38	561.89	0.0
26-Sep-15	5.49	1.48	16.25	474.15	0.0
27-Sep-15	5.77	1.85	13.96	498.33	0.0
28-Sep-15	6.69	1.91	14.52	578.33	0.0
29-Sep-15	6.54	1.36	12.47	565.26	0.0
30-Sep-15	6.46	1.41	12.65	558.05	0.0

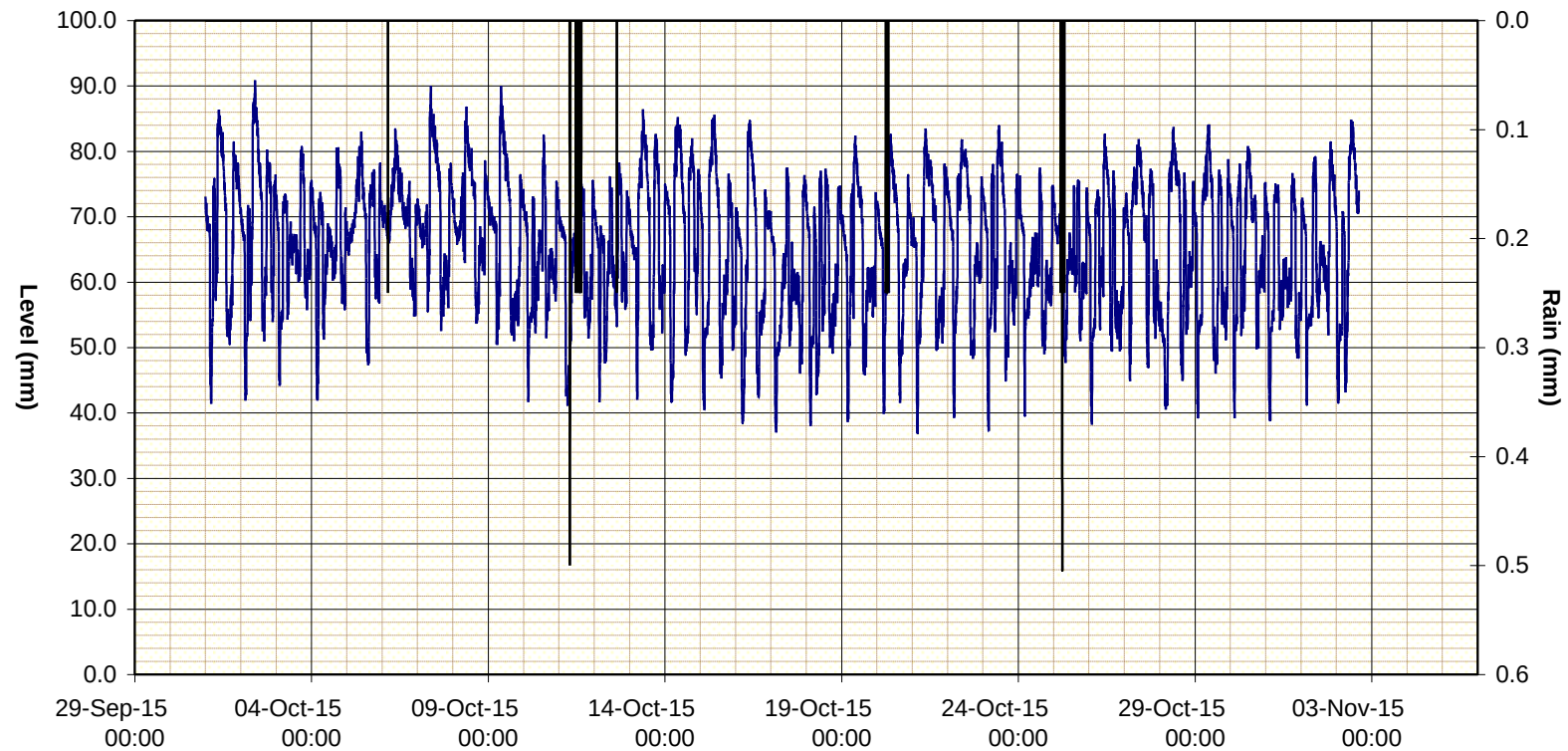
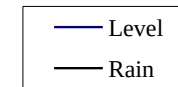
Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
18193.416	1.361	37.306	56.8

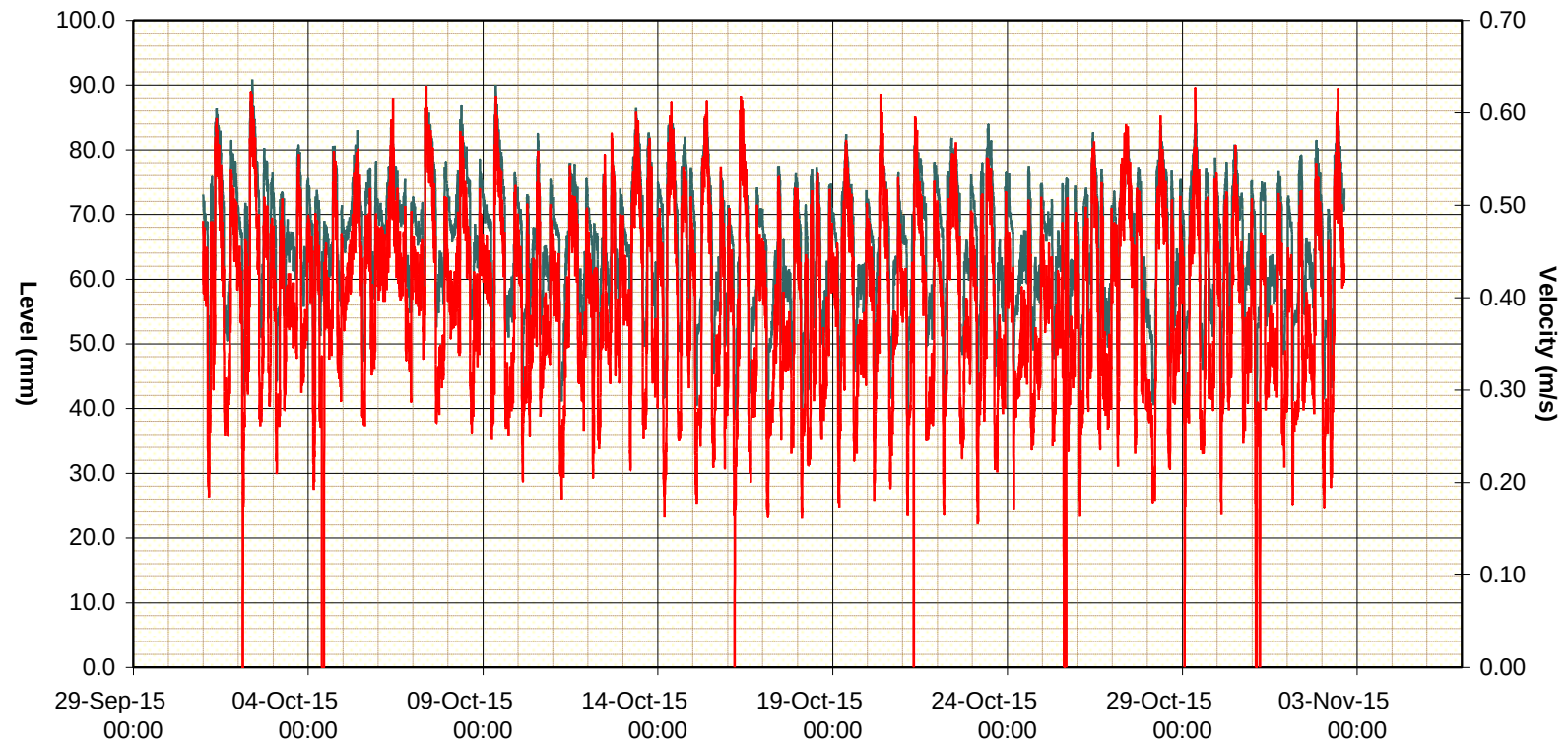
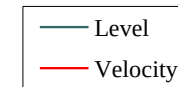
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



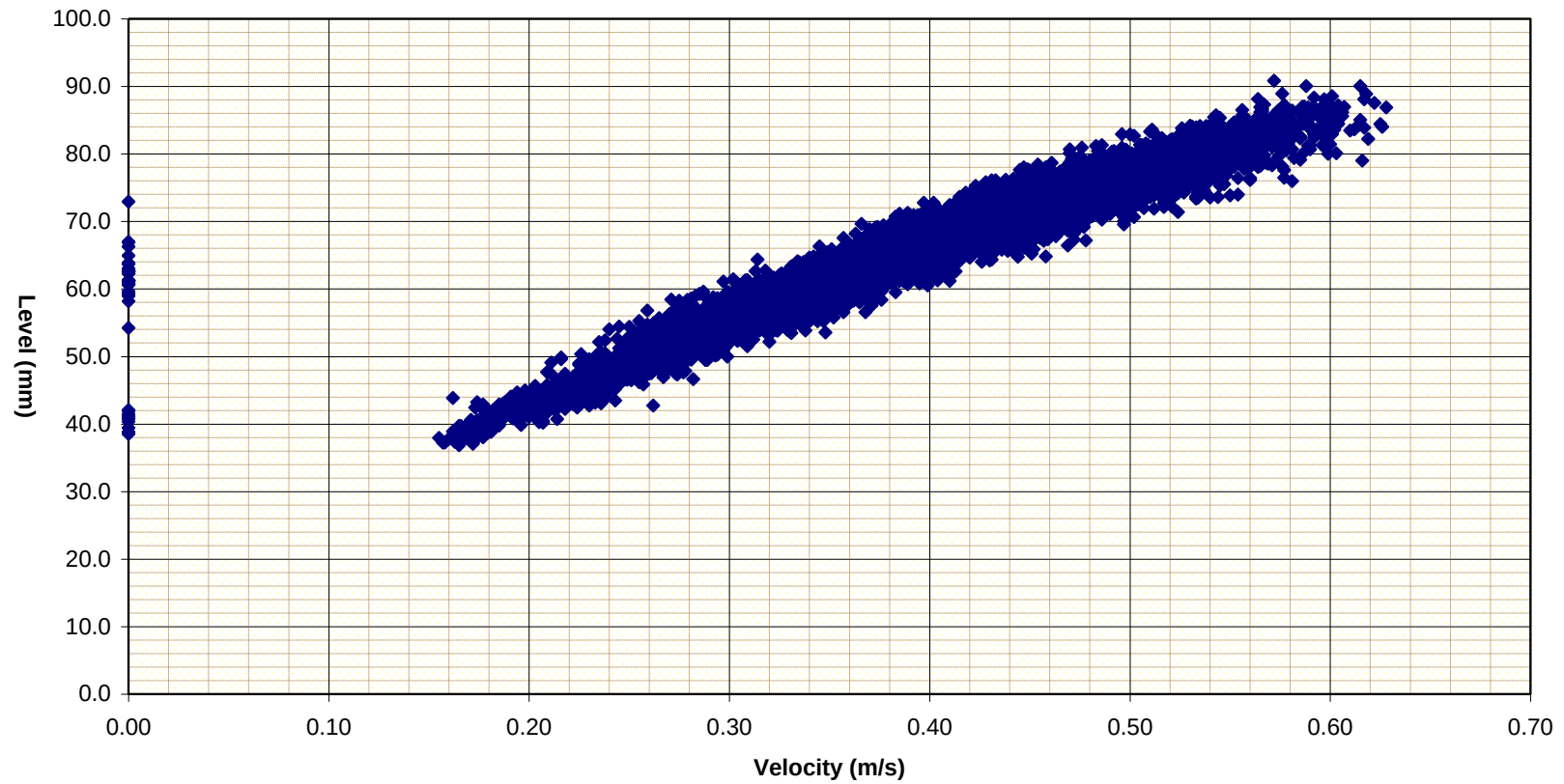
**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-02
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



Cold Lake, Alberta

A15-124-02

Sewer Flow Monitoring 2015

October 1 to November 2, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Oct-15	6.13	1.22	11.41	529.35	0.0
02-Oct-15	6.18	1.23	12.38	533.98	0.0
03-Oct-15	5.14	1.52	9.53	443.96	0.0
04-Oct-15	4.78	-4.62	9.43	413.28	0.0
05-Oct-15	6.06	2.13	9.75	523.49	0.0
06-Oct-15	6.42	2.93	10.43	554.28	0.3
07-Oct-15	6.40	2.49	12.54	552.89	0.0
08-Oct-15	6.13	2.55	10.93	529.49	0.0
09-Oct-15	5.92	2.18	12.21	511.82	0.0
10-Oct-15	4.84	1.40	9.71	418.55	0.0
11-Oct-15	4.97	1.20	8.93	429.43	4.0
12-Oct-15	5.11	1.38	9.54	441.24	0.3
13-Oct-15	6.04	1.44	11.56	522.27	0.0
14-Oct-15	6.30	1.17	11.18	544.41	0.0
15-Oct-15	5.28	1.13	11.50	456.59	0.0
16-Oct-15	5.26	1.03	11.39	454.40	0.0
17-Oct-15	4.19	0.93	8.74	362.26	0.0
18-Oct-15	4.50	0.94	8.65	388.72	0.0
19-Oct-15	5.13	1.07	10.24	442.91	0.0
20-Oct-15	5.46	1.16	11.10	471.58	2.3
21-Oct-15	5.37	0.93	10.86	463.64	0.0
22-Oct-15	5.53	1.04	9.69	478.16	0.0
23-Oct-15	5.13	0.89	9.89	443.39	0.0
24-Oct-15	4.34	1.07	8.17	374.59	0.0
25-Oct-15	4.76	2.00	7.94	411.53	2.3
26-Oct-15	4.84	0.96	9.75	418.37	0.0
27-Oct-15	6.19	1.62	10.10	534.50	0.0
28-Oct-15	5.12	1.17	10.78	442.58	0.0
29-Oct-15	5.34	1.06	11.57	461.22	0.0
30-Oct-15	5.27	1.01	9.80	455.31	0.0
31-Oct-15	4.35	0.98	8.32	375.83	0.0
01-Nov-15	5.01	1.20	9.41	432.88	0.0
02-Nov-15	5.61	1.19	11.64	484.55	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
15301.462	-4.618	12.537	9.0



FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-03
ADDRESS:	Hwy 28 & 10 Street
GPS:	N54.46538 W110.20740
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

CONSTANTS			
D1 (mm):		D1-lip to x-bar	
TOM (mm)	5290	Raw Weir L - lip to water	
METER #	204M01524	DATE:	11-May-15
METER #	211E00961	DATE:	11-May-15
METER #		DATE:	

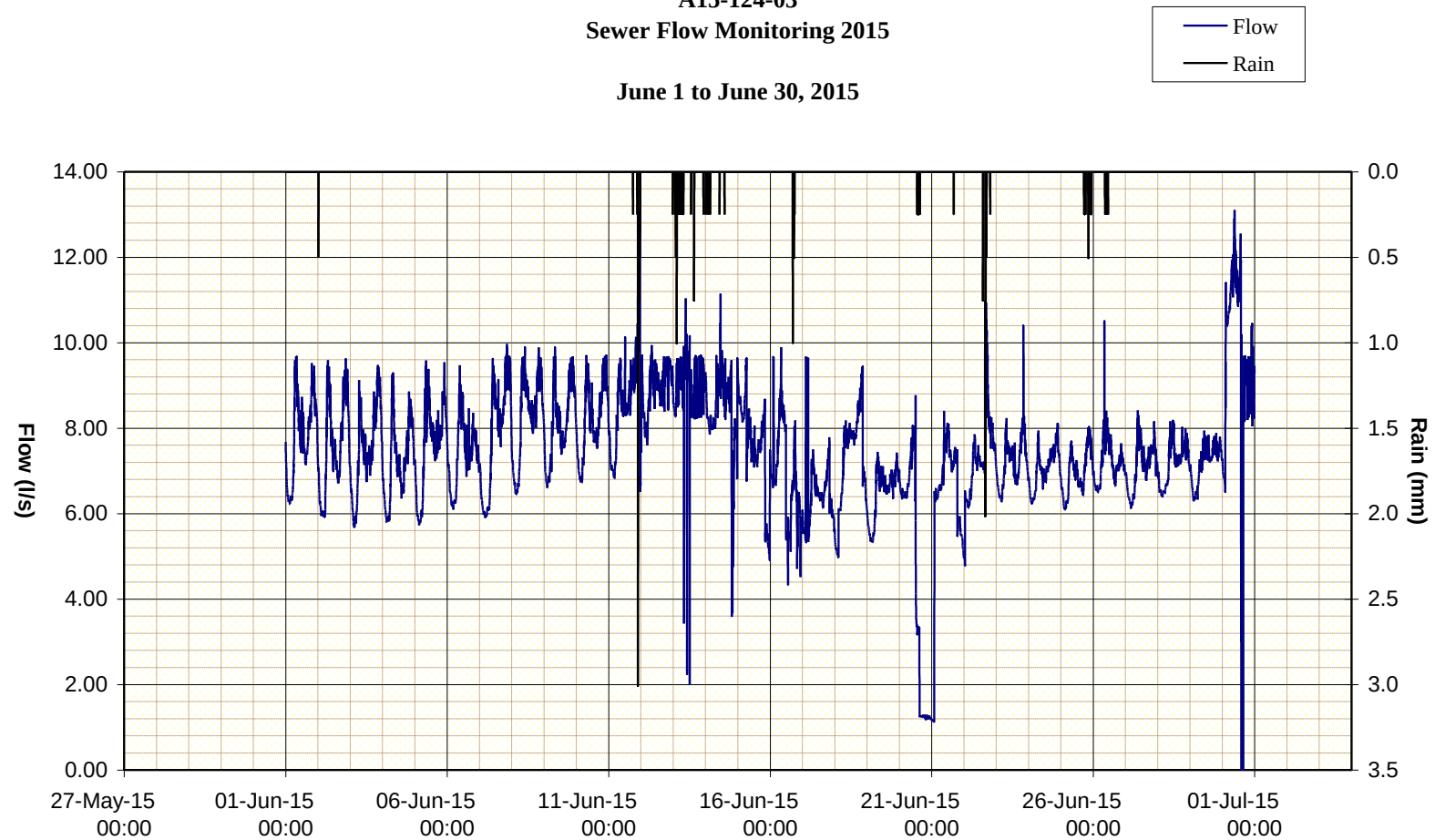
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:
30-Jun-15	Sensor Silted over on arrival - Increased offset to 80mm, Performed Level Adjust.

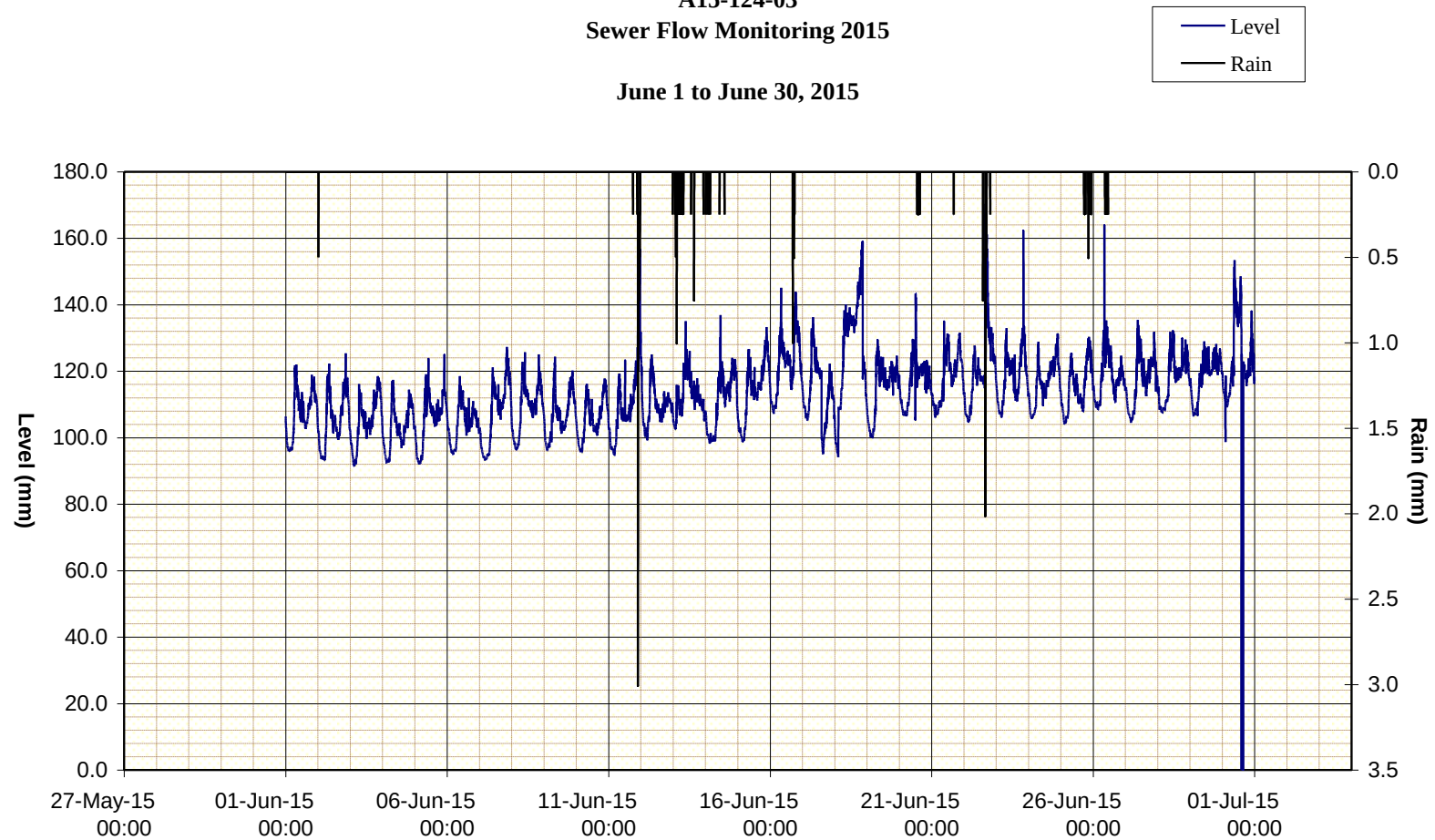
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



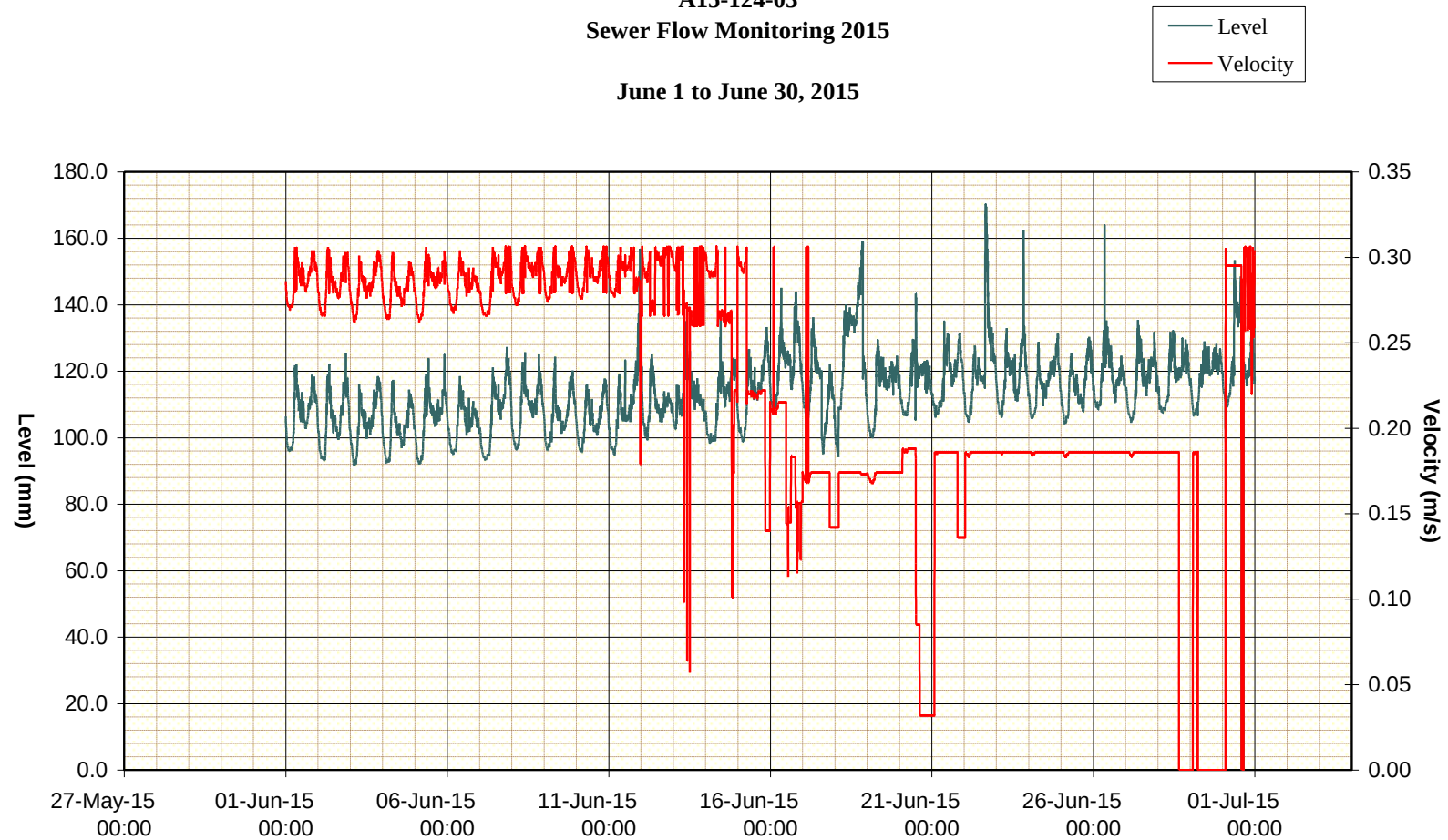
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



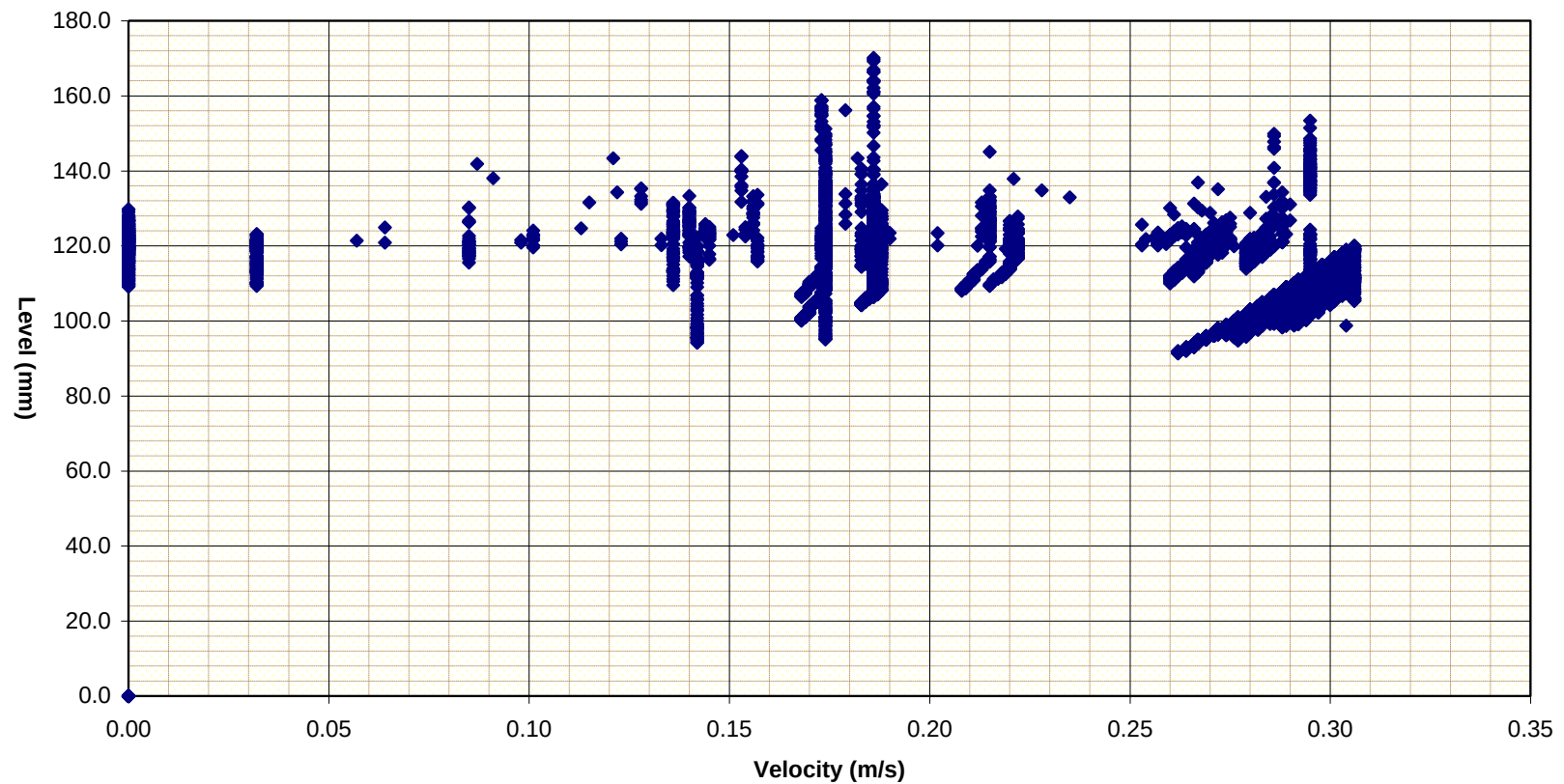
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta

A15-124-03

Sewer Flow Monitoring 2015

June 1 to June 30, 2015

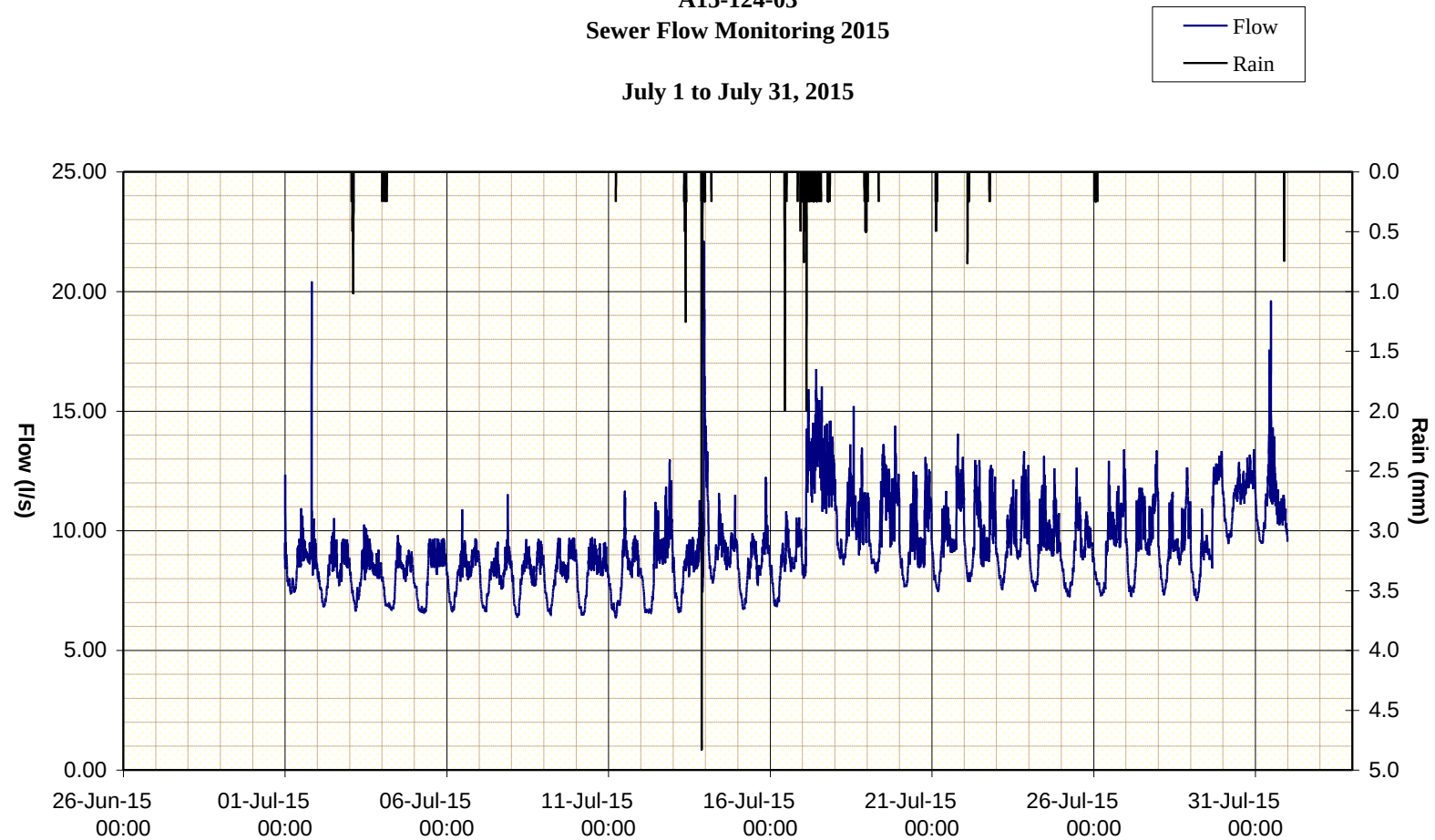
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	7.84	6.23	9.68	677.10	0.0
02-Jun-15	7.57	5.91	9.61	653.62	0.5
03-Jun-15	7.51	5.67	9.48	649.00	0.0
04-Jun-15	7.22	5.79	9.31	624.06	0.0
05-Jun-15	7.59	5.73	9.58	655.50	0.0
06-Jun-15	7.39	6.10	9.48	638.29	0.0
07-Jun-15	7.82	5.91	9.97	675.62	0.0
08-Jun-15	8.23	6.45	9.89	711.48	0.0
09-Jun-15	8.11	6.60	9.88	700.55	0.0
10-Jun-15	8.19	6.73	9.69	707.68	0.0
11-Jun-15	8.61	6.51	13.04	743.85	16.5
12-Jun-15	8.94	7.47	9.95	772.29	0.3
13-Jun-15	8.90	2.03	11.04	769.09	10.8
14-Jun-15	8.37	3.58	11.15	722.80	1.5
15-Jun-15	7.59	4.92	9.63	655.63	0.0
16-Jun-15	6.89	4.32	9.90	595.64	3.5
17-Jun-15	6.52	5.34	9.68	563.71	0.0
18-Jun-15	7.29	4.97	9.44	629.96	0.0
19-Jun-15	6.49	5.34	7.45	560.36	0.0
20-Jun-15	4.38	1.17	8.77	378.11	3.0
21-Jun-15	6.28	1.13	8.37	542.46	0.5
22-Jun-15	7.37	4.79	10.98	637.12	8.5
23-Jun-15	7.19	6.29	10.38	620.90	0.0
24-Jun-15	7.05	6.22	8.12	609.46	0.0
25-Jun-15	6.96	6.09	8.05	601.19	4.0
26-Jun-15	7.19	6.50	10.50	621.14	1.5
27-Jun-15	7.09	6.11	8.42	612.77	0.0
28-Jun-15	7.17	6.40	8.17	619.44	0.0
29-Jun-15	7.19	6.31	7.95	621.16	0.0
30-Jun-15	9.47	0.00	13.10	818.29	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
19388.271	0.000	13.104	50.5

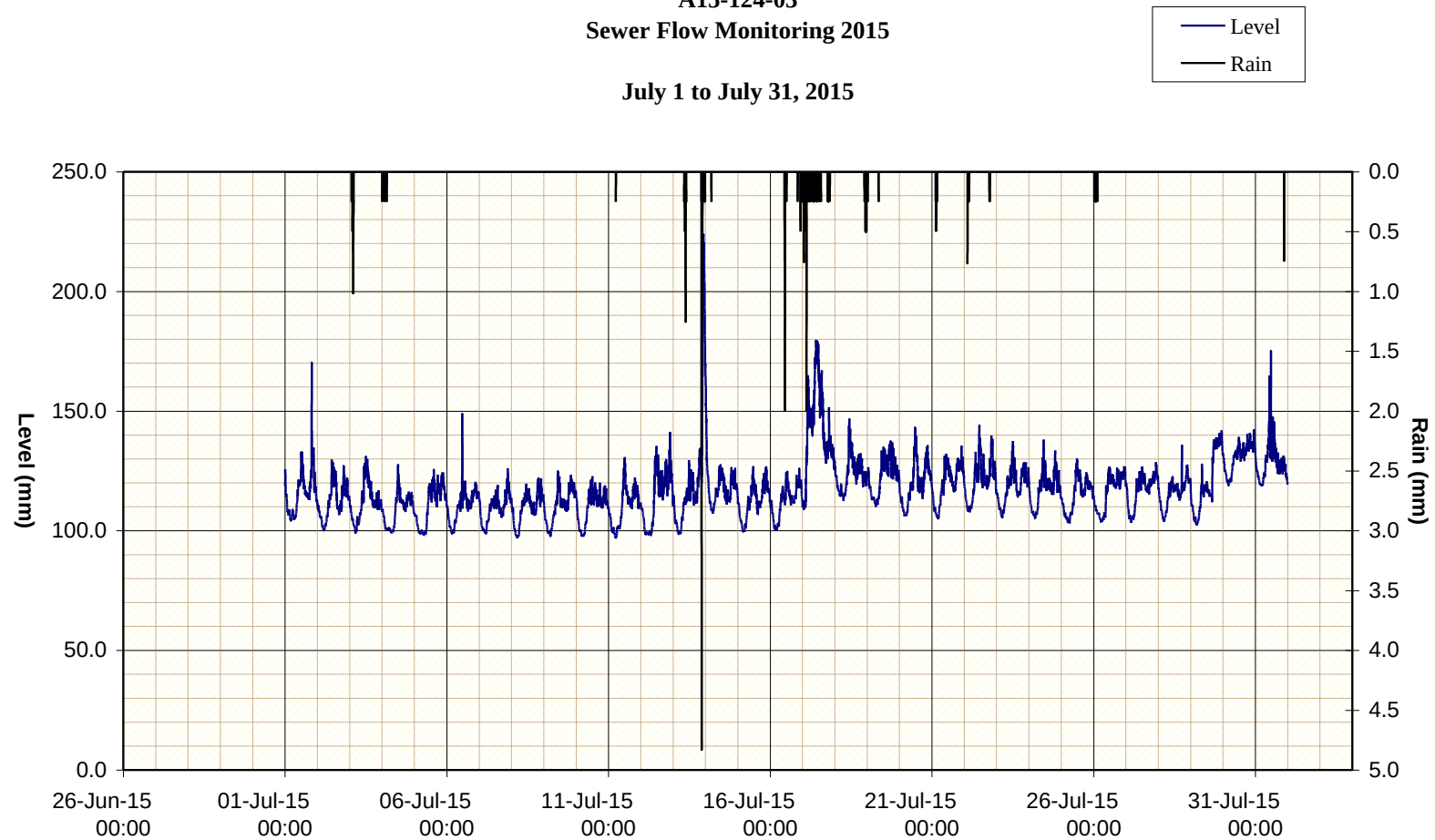
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



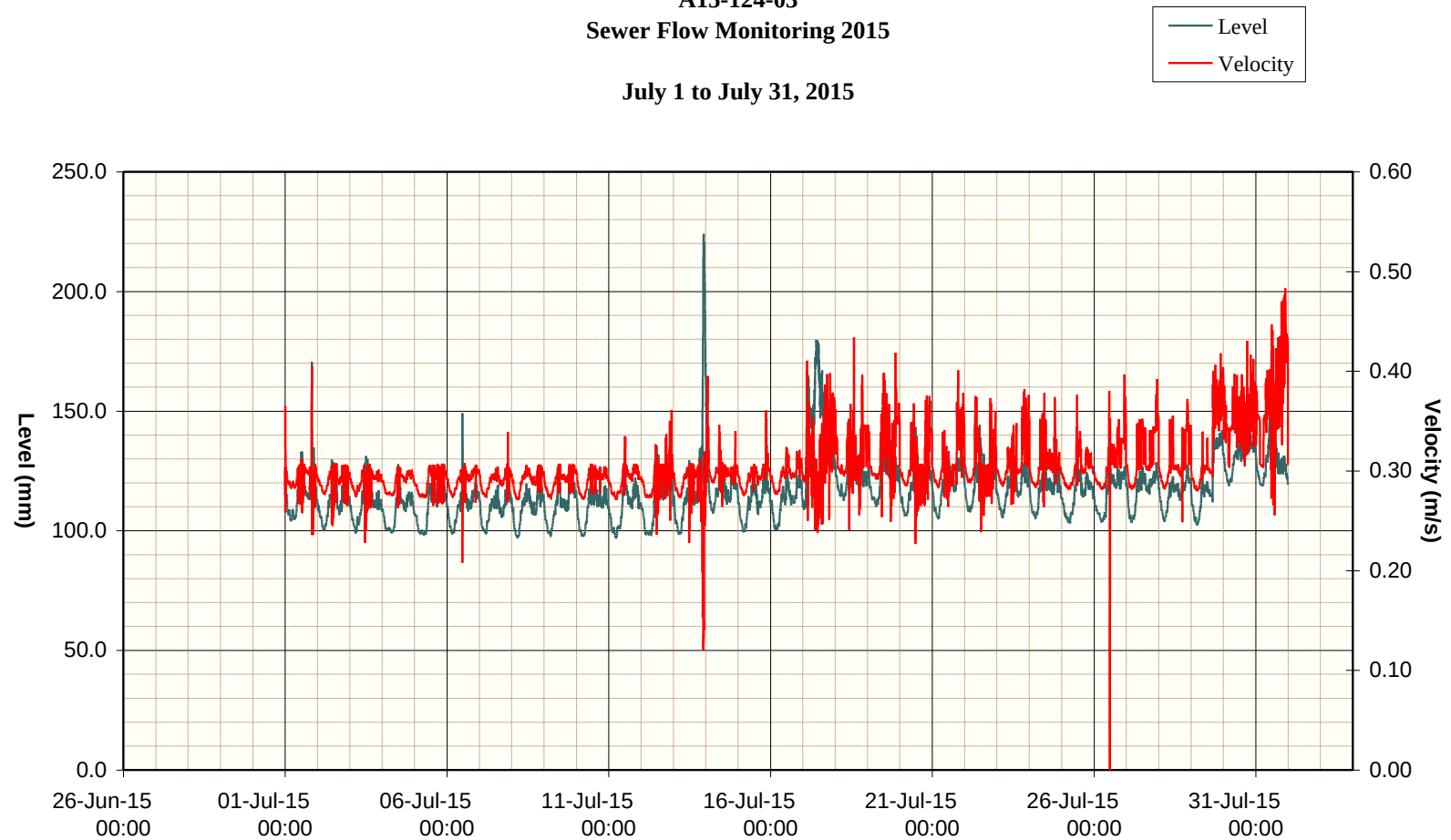
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



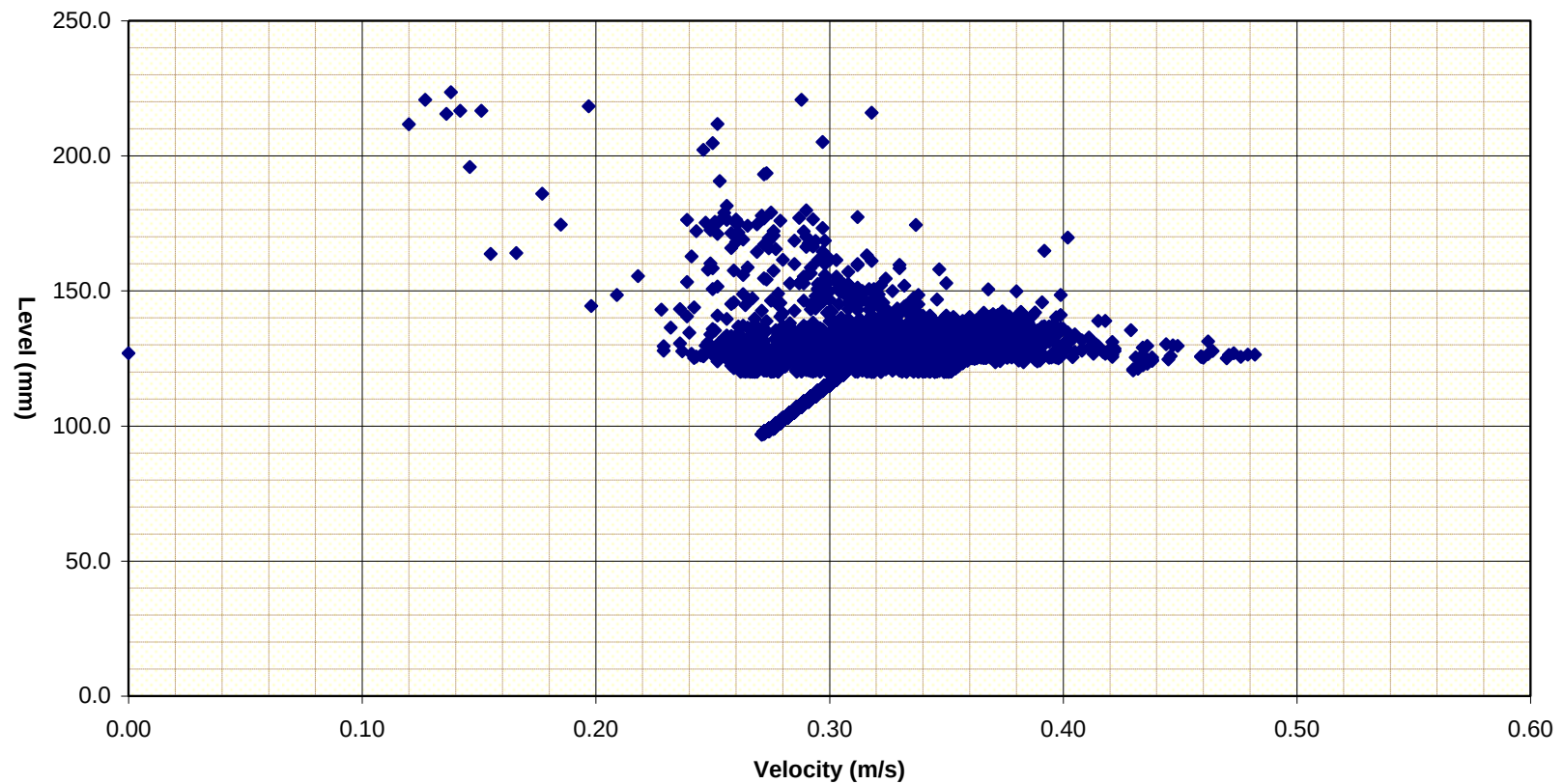
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta

A15-124-03

Sewer Flow Monitoring 2015

July 1 to July 31, 2015

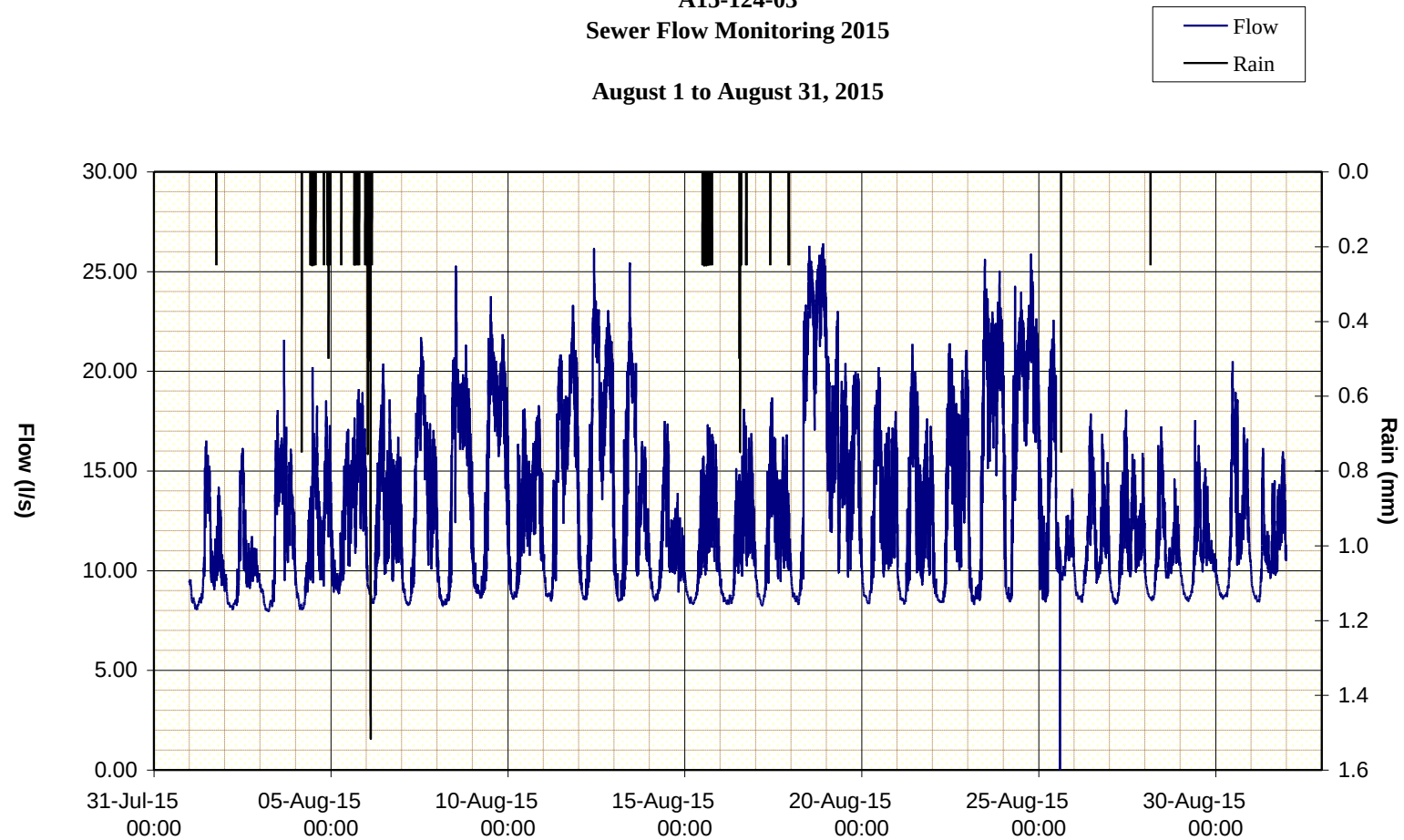
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	8.77	7.36	20.42	757.40	0.0
02-Jul-15	8.33	6.82	10.53	719.31	0.0
03-Jul-15	8.22	6.63	10.27	709.82	6.3
04-Jul-15	7.96	6.69	9.76	687.66	1.0
05-Jul-15	8.16	6.56	9.68	705.10	0.0
06-Jul-15	8.24	6.59	10.90	711.59	0.0
07-Jul-15	8.08	6.60	11.52	697.88	0.0
08-Jul-15	8.16	6.36	9.66	704.75	0.0
09-Jul-15	8.22	6.46	9.67	709.98	0.0
10-Jul-15	8.19	6.46	9.69	708.01	0.0
11-Jul-15	8.16	6.35	11.62	704.79	0.3
12-Jul-15	8.61	6.54	12.91	744.26	0.0
13-Jul-15	8.84	6.56	22.02	763.98	22.5
14-Jul-15	9.45	7.80	14.39	816.55	0.3
15-Jul-15	8.53	6.72	12.16	737.31	0.0
16-Jul-15	8.60	6.81	10.81	743.39	7.8
17-Jul-15	12.57	7.99	16.76	1086.28	22.3
18-Jul-15	10.42	8.56	15.21	900.09	4.8
19-Jul-15	10.57	8.24	14.35	912.91	0.8
20-Jul-15	9.57	7.65	13.04	827.28	0.0
21-Jul-15	9.80	7.44	14.06	846.69	3.0
22-Jul-15	9.74	7.85	12.96	841.85	3.3
23-Jul-15	9.65	7.53	13.28	833.69	0.0
24-Jul-15	9.43	7.45	13.07	814.36	0.0
25-Jul-15	9.01	7.23	12.64	778.45	0.0
26-Jul-15	9.41	7.27	13.33	812.88	2.5
27-Jul-15	9.74	7.25	13.31	841.86	0.0
28-Jul-15	9.34	7.30	12.64	806.68	0.0
29-Jul-15	9.77	7.07	13.33	844.20	0.0
30-Jul-15	11.45	9.46	13.41	989.01	0.0
31-Jul-15	11.03	9.46	19.44	952.77	1.5

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
24710.775	6.346	22.020	76.0

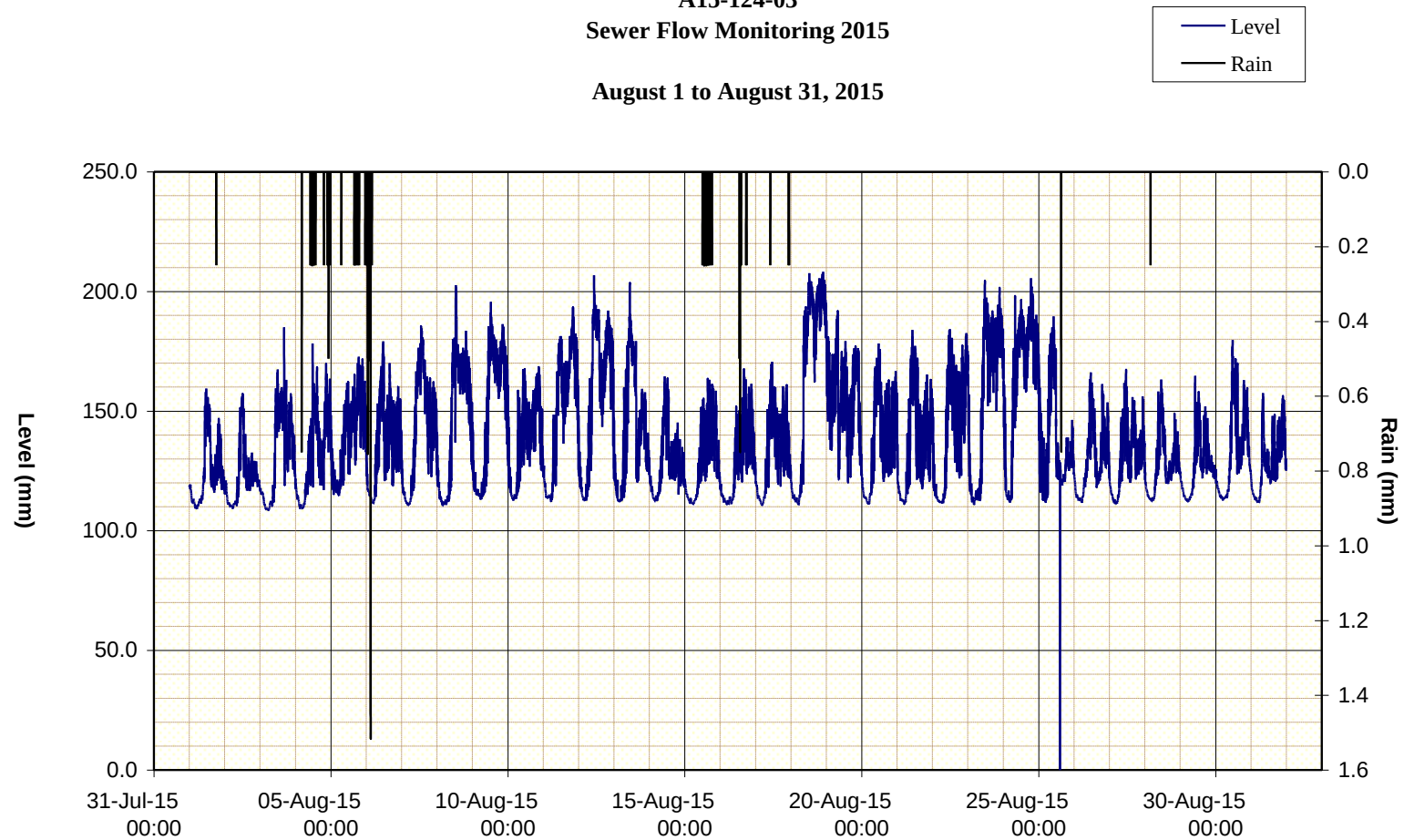
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



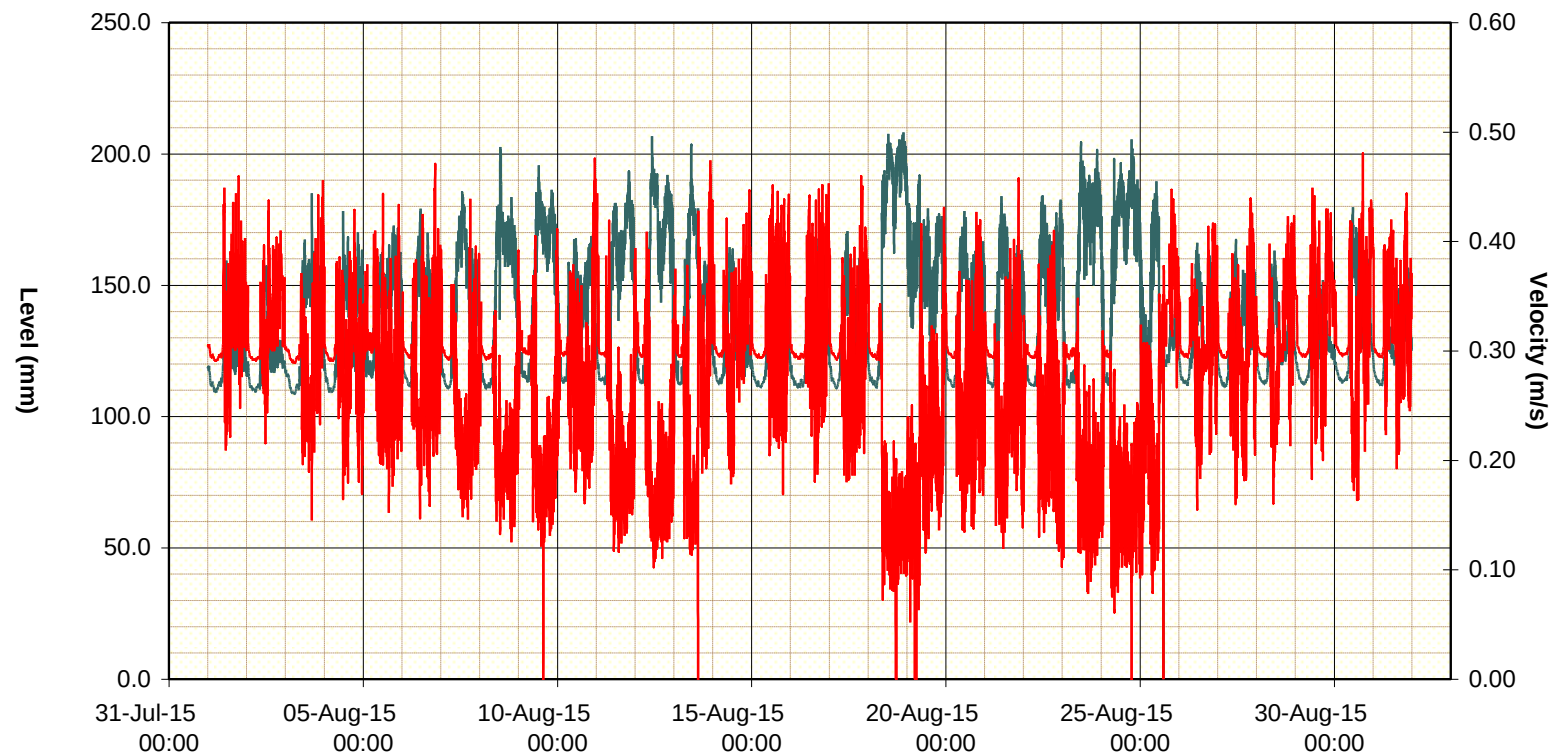
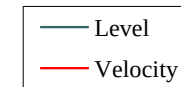
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



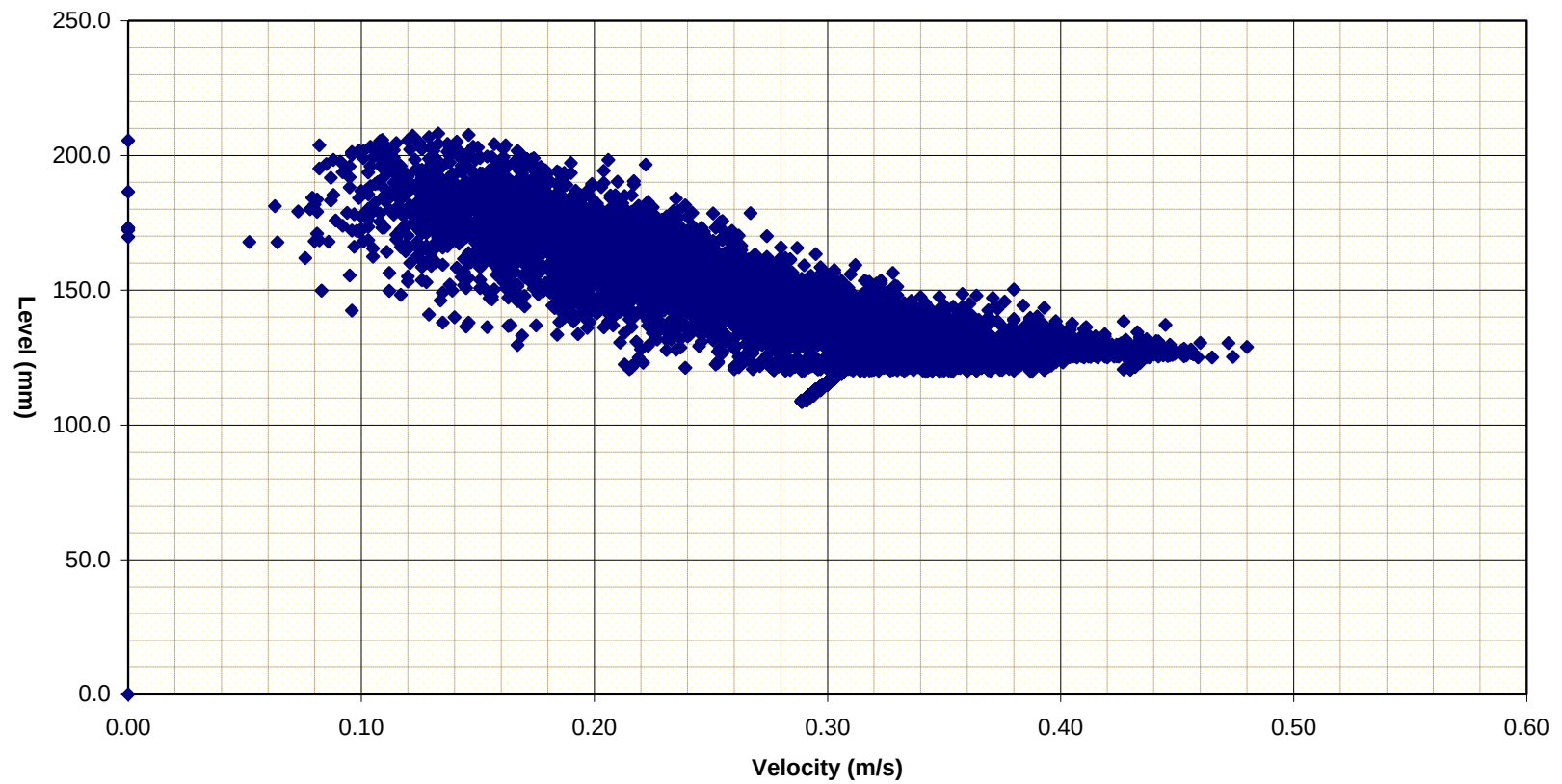
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



Cold Lake, Alberta

A15-124-03

Sewer Flow Monitoring 2015

August 1 to August 31, 2015

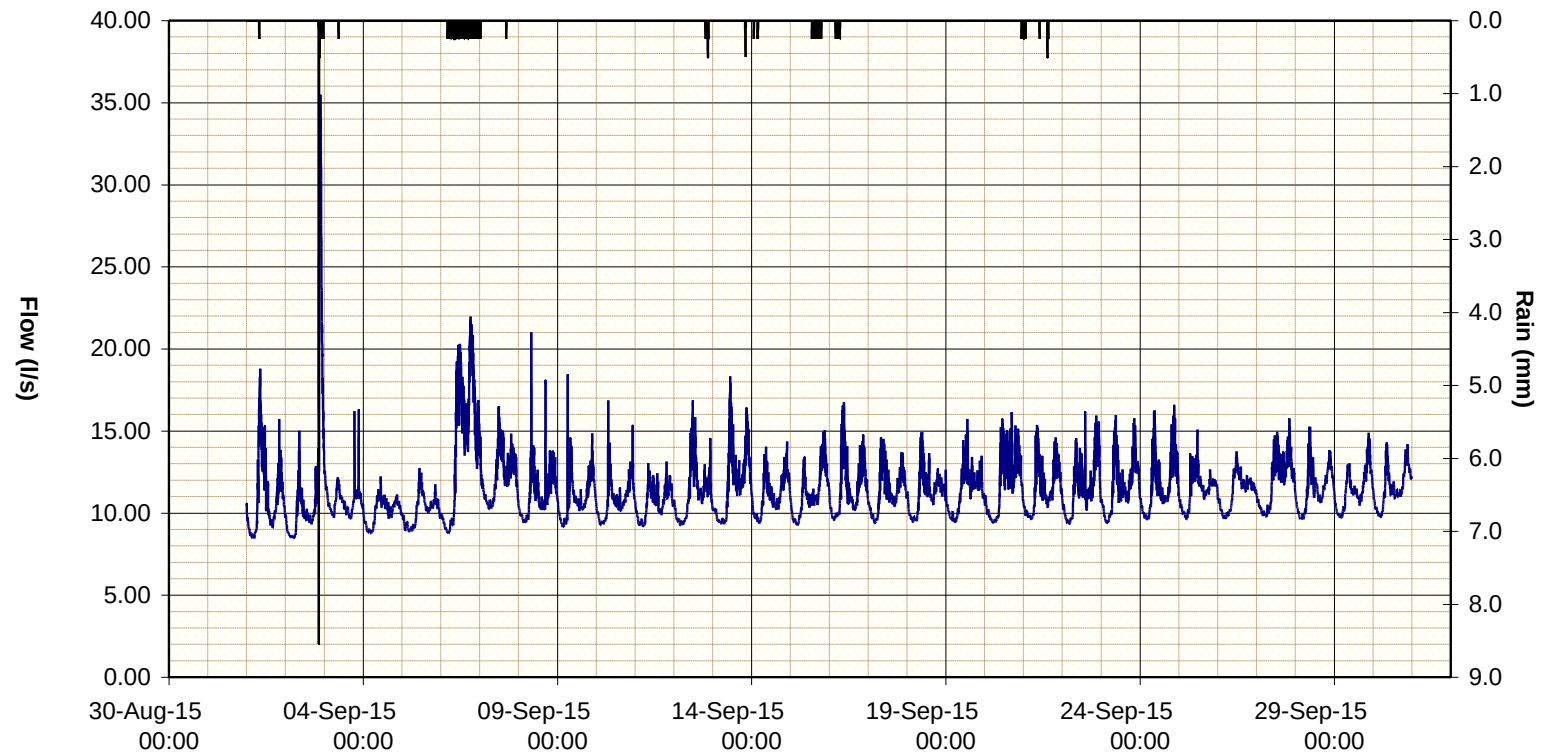
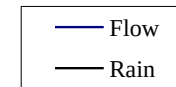
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-15	10.36	8.04	16.52	895.28	0.3
02-Aug-15	10.02	8.03	16.08	865.73	0.0
03-Aug-15	11.67	7.95	21.57	1008.52	0.0
04-Aug-15	11.67	8.04	20.21	1008.29	8.5
05-Aug-15	13.05	8.83	19.10	1127.93	2.3
06-Aug-15	12.50	8.35	20.38	1079.86	12.0
07-Aug-15	13.48	8.25	21.65	1164.55	0.0
08-Aug-15	14.21	8.22	25.23	1227.96	0.0
09-Aug-15	14.88	8.60	23.76	1285.70	0.0
10-Aug-15	12.61	8.54	18.23	1089.11	0.0
11-Aug-15	14.93	8.45	23.29	1290.38	0.0
12-Aug-15	16.10	8.51	26.11	1390.95	0.0
13-Aug-15	13.46	8.46	25.33	1162.70	0.0
14-Aug-15	11.03	8.48	17.50	953.28	0.0
15-Aug-15	10.96	8.32	17.21	947.05	7.8
16-Aug-15	11.11	8.30	18.05	960.13	4.5
17-Aug-15	11.76	8.22	18.68	1016.33	0.8
18-Aug-15	18.03	8.28	26.40	1557.64	0.0
19-Aug-15	16.03	9.73	22.95	1385.06	0.0
20-Aug-15	12.56	8.33	20.20	1084.79	0.0
21-Aug-15	12.41	8.32	21.36	1072.36	0.0
22-Aug-15	13.38	8.40	21.33	1155.60	0.0
23-Aug-15	16.19	8.28	25.58	1398.77	0.0
24-Aug-15	17.51	8.41	25.84	1512.65	0.0
25-Aug-15	12.39	0.00	22.52	1070.21	0.8
26-Aug-15	11.20	8.40	17.82	967.84	0.0
27-Aug-15	11.42	8.32	18.00	986.64	0.0
28-Aug-15	10.87	8.49	17.24	939.59	0.3
29-Aug-15	10.71	8.46	17.54	925.04	0.0
30-Aug-15	11.80	8.59	20.50	1019.88	0.0
31-Aug-15	11.02	8.41	16.15	952.00	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
34501.800	0.000	26.400	37.0

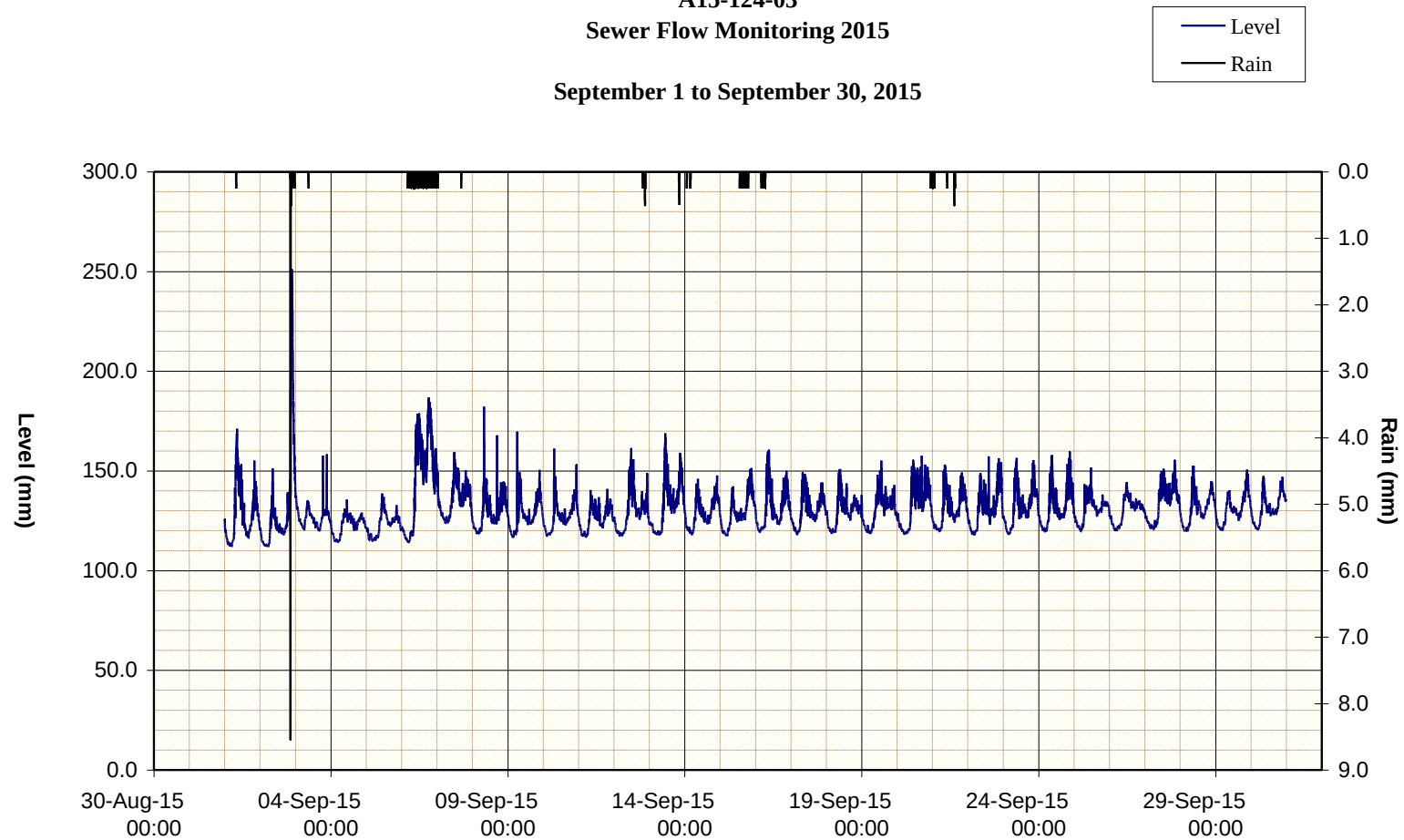
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



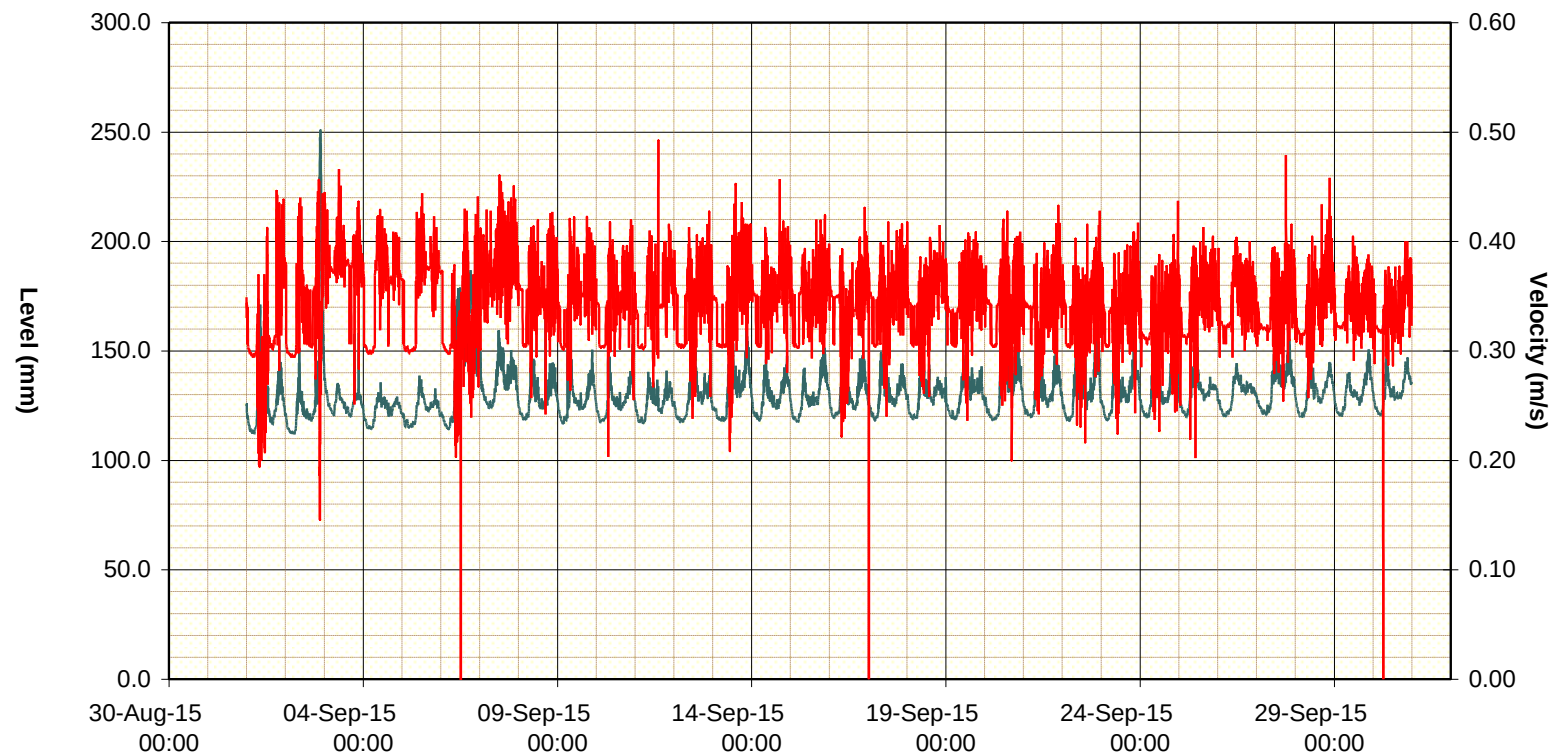
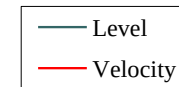
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



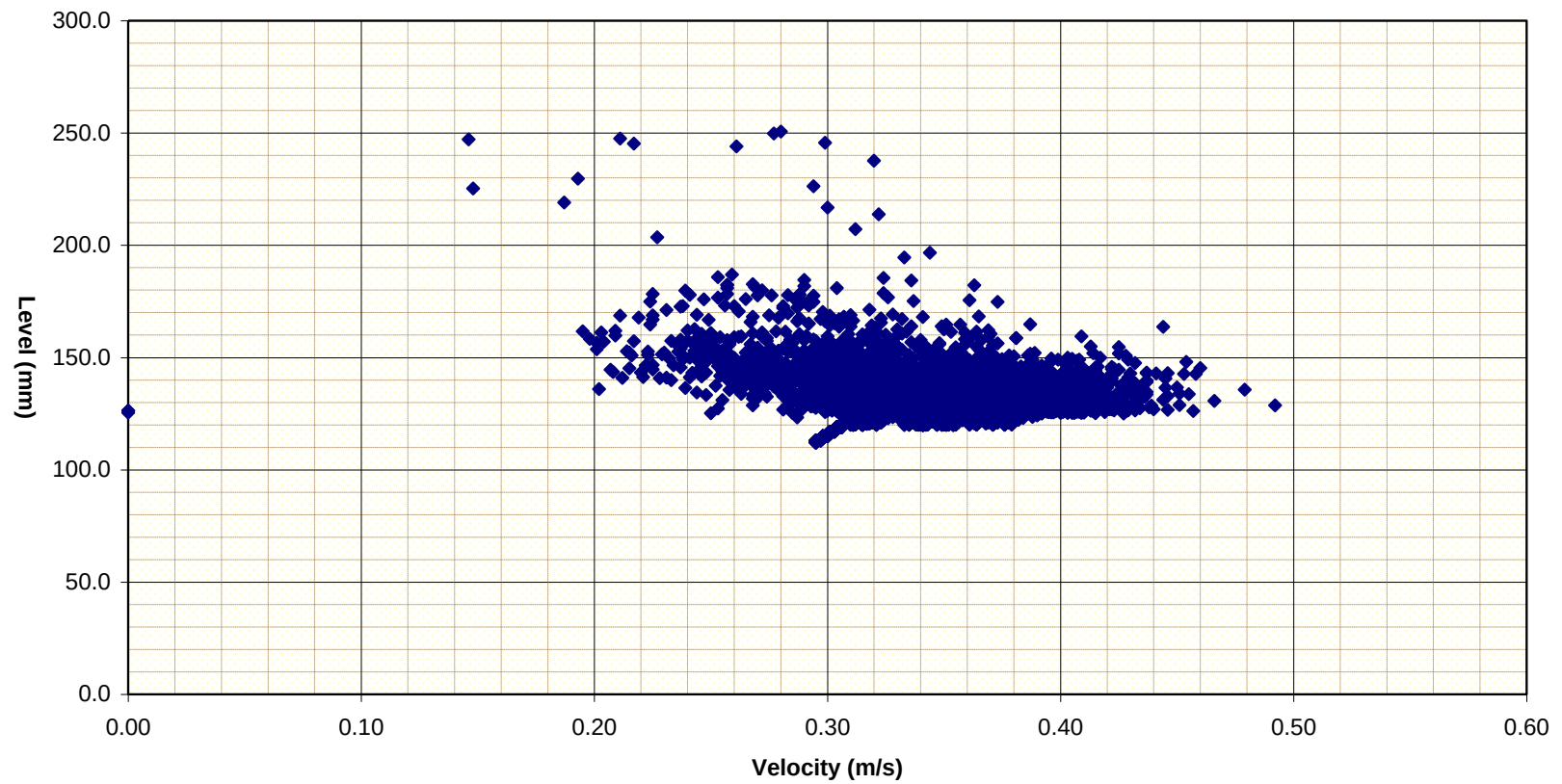
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



Cold Lake, Alberta

A15-124-03

Sewer Flow Monitoring 2015

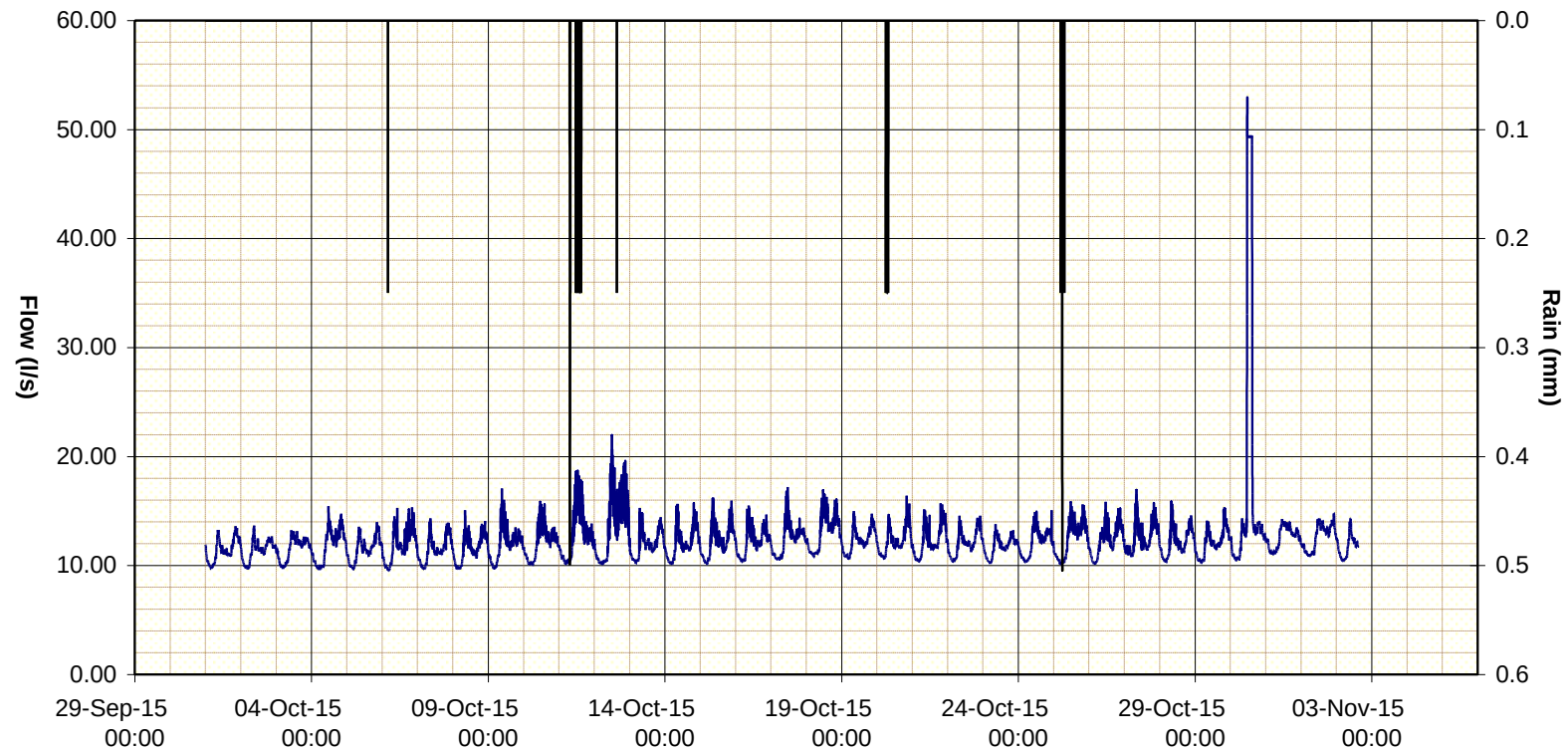
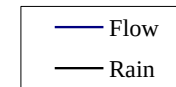
September 1 to September 30, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	10.96	8.46	18.80	947.01	0.3
02-Sep-15	11.68	8.48	35.41	1009.08	19.3
03-Sep-15	10.79	9.65	16.23	931.88	0.3
04-Sep-15	10.12	8.75	12.23	874.19	0.0
05-Sep-15	10.16	8.87	12.74	877.83	0.0
06-Sep-15	14.11	8.77	21.97	1219.49	21.8
07-Sep-15	12.24	10.22	16.53	1057.28	0.5
08-Sep-15	11.14	9.43	21.02	962.56	0.0
09-Sep-15	10.91	9.16	18.37	942.69	0.0
10-Sep-15	10.78	9.27	16.86	931.54	0.0
11-Sep-15	10.64	9.15	13.14	919.04	0.0
12-Sep-15	11.18	9.22	16.81	966.20	3.0
13-Sep-15	11.75	9.32	18.34	1015.08	1.5
14-Sep-15	11.07	9.36	14.35	956.46	0.8
15-Sep-15	11.13	9.30	15.04	961.58	3.0
16-Sep-15	11.44	9.53	16.75	988.45	1.8
17-Sep-15	11.24	9.38	14.55	970.95	0.0
18-Sep-15	11.19	9.44	14.94	966.41	0.0
19-Sep-15	11.28	9.43	15.73	974.91	0.0
20-Sep-15	11.73	9.41	16.00	1013.66	1.5
21-Sep-15	11.41	9.58	15.36	985.64	3.3
22-Sep-15	11.48	9.33	16.13	991.54	0.0
23-Sep-15	11.58	9.35	15.97	1000.28	0.0
24-Sep-15	11.59	9.62	16.52	1001.78	0.0
25-Sep-15	11.37	9.61	15.09	982.66	0.0
26-Sep-15	11.30	9.65	13.76	976.52	0.0
27-Sep-15	11.85	9.75	15.70	1023.58	0.0
28-Sep-15	11.45	9.63	15.27	989.46	0.0
29-Sep-15	11.43	9.71	14.89	987.68	0.0
30-Sep-15	11.50	9.73	14.31	993.86	0.0

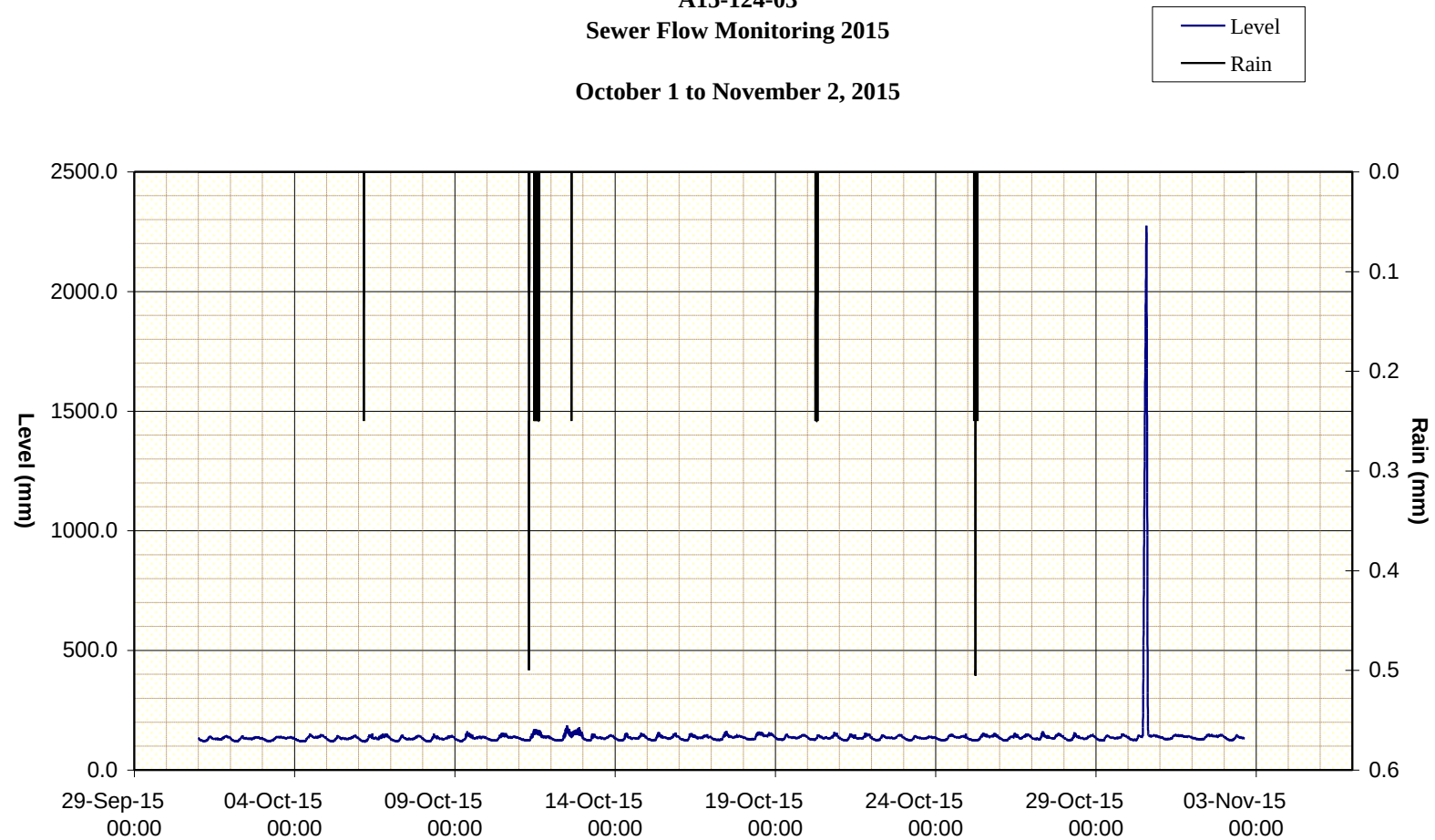
Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
29419.284	8.460	35.410	56.8

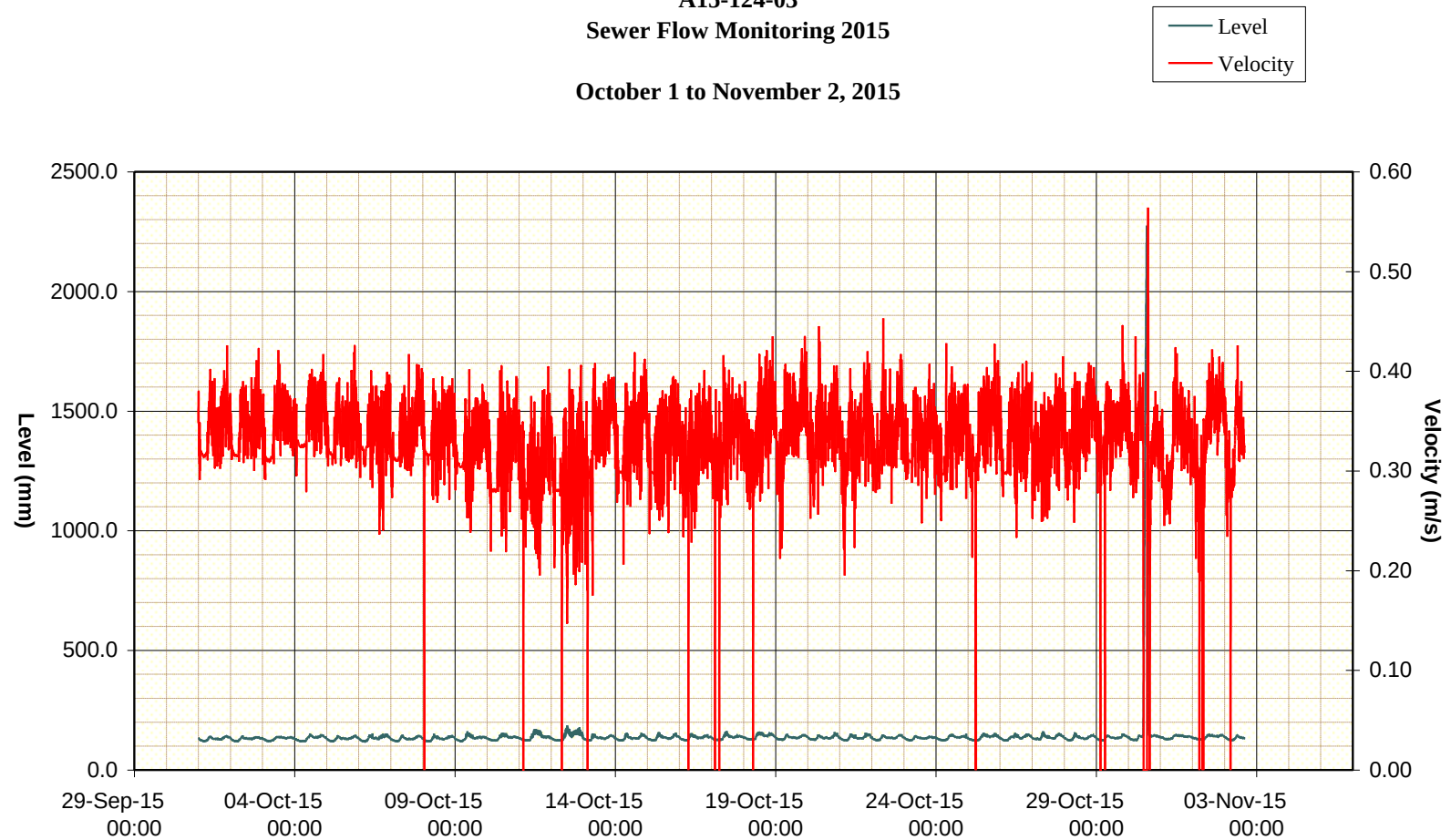
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



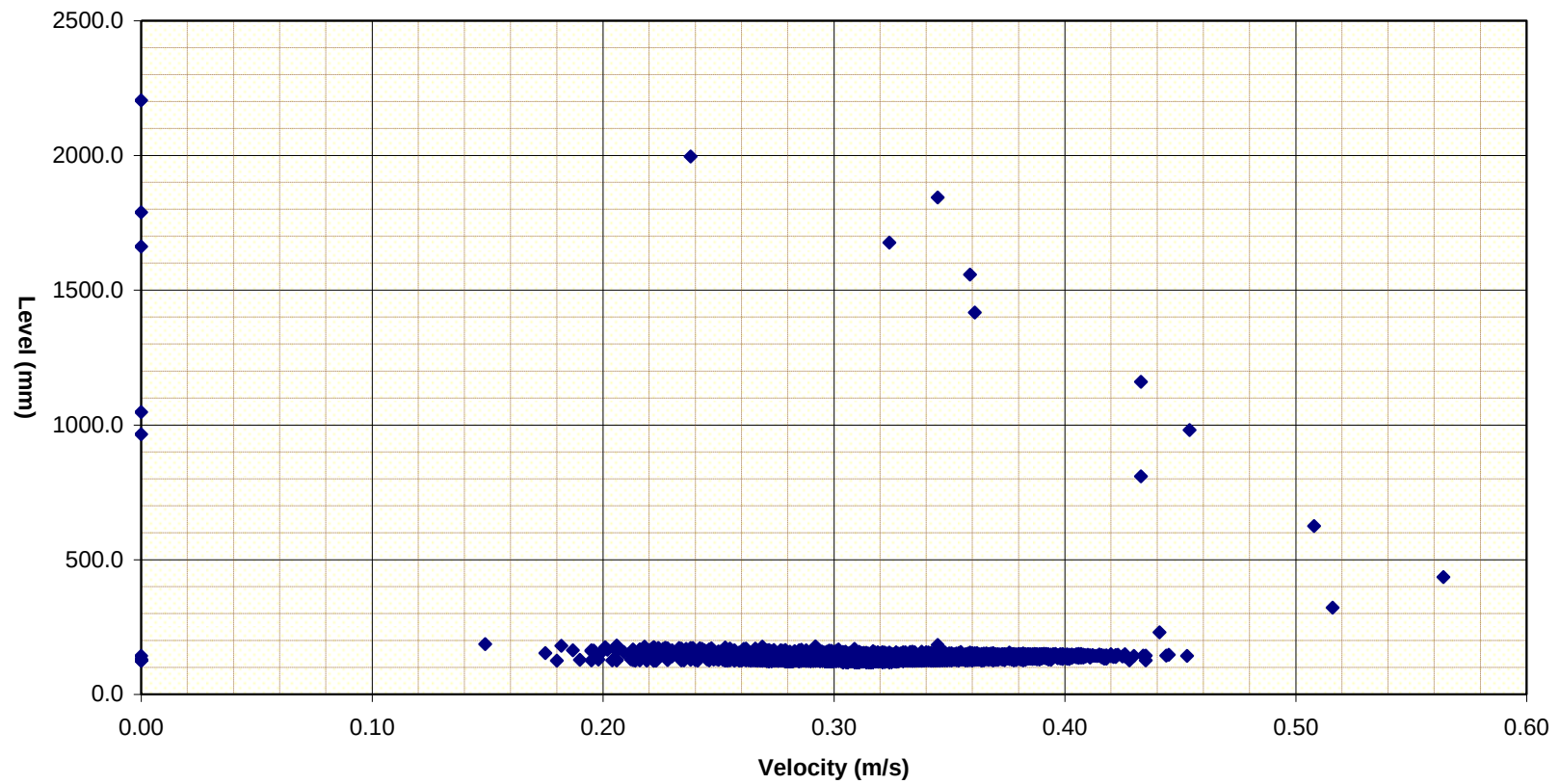
**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-03
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



Cold Lake, Alberta

A15-124-03

Sewer Flow Monitoring 2015

October 1 to November 2, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Oct-15	11.40	9.70	13.60	985.10	0.0
02-Oct-15	11.38	9.72	13.65	983.53	0.0
03-Oct-15	11.52	9.69	13.22	995.37	0.0
04-Oct-15	11.81	9.67	15.43	1020.39	0.0
05-Oct-15	11.52	9.66	13.98	995.13	0.0
06-Oct-15	11.80	9.50	15.32	1019.76	0.3
07-Oct-15	11.48	9.67	14.33	992.21	0.0
08-Oct-15	11.54	9.64	15.07	996.77	0.0
09-Oct-15	11.92	9.73	17.06	1029.50	0.0
10-Oct-15	12.04	10.05	15.80	1040.45	0.0
11-Oct-15	12.76	10.11	18.65	1102.80	4.0
12-Oct-15	13.59	10.11	21.84	1174.47	0.3
13-Oct-15	11.98	10.19	15.27	1035.29	0.0
14-Oct-15	12.05	10.12	15.69	1040.84	0.0
15-Oct-15	12.20	10.12	16.24	1054.04	0.0
16-Oct-15	12.20	10.32	15.50	1054.14	0.0
17-Oct-15	12.33	10.53	17.20	1065.34	0.0
18-Oct-15	13.04	10.78	16.86	1126.32	0.0
19-Oct-15	12.31	10.60	14.99	1063.58	0.0
20-Oct-15	12.26	10.57	16.39	1059.68	2.3
21-Oct-15	12.21	10.33	15.70	1054.63	0.0
22-Oct-15	12.08	10.32	14.57	1043.63	0.0
23-Oct-15	11.77	10.18	13.79	1016.58	0.0
24-Oct-15	12.08	10.30	15.07	1044.10	0.0
25-Oct-15	12.36	10.11	15.77	1067.76	2.3
26-Oct-15	12.25	10.09	15.83	1058.63	0.0
27-Oct-15	12.56	10.79	16.91	1084.89	0.0
28-Oct-15	12.14	10.29	15.91	1049.12	0.0
29-Oct-15	12.09	10.25	15.32	1044.30	0.0
30-Oct-15	18.05	10.48	52.93	1559.24	0.0
31-Oct-15	12.60	11.00	14.27	1088.72	0.0
01-Nov-15	12.60	10.85	14.78	1088.23	0.0
02-Nov-15	11.74	10.39	14.30	1014.29	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
35048.814	9.500	52.930	9.0



FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-04
ADDRESS:	4715 49 Street
GPS:	N54.41188 W110.20382
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

CONSTANTS			
D1 (mm):		D1-lip to x-bar	
TOM (mm)	6200	Raw Weir L - lip to water	
METER #	207F00797	DATE:	28-May-15
METER #	214E03118	DATE:	28-May-15
METER #		DATE:	

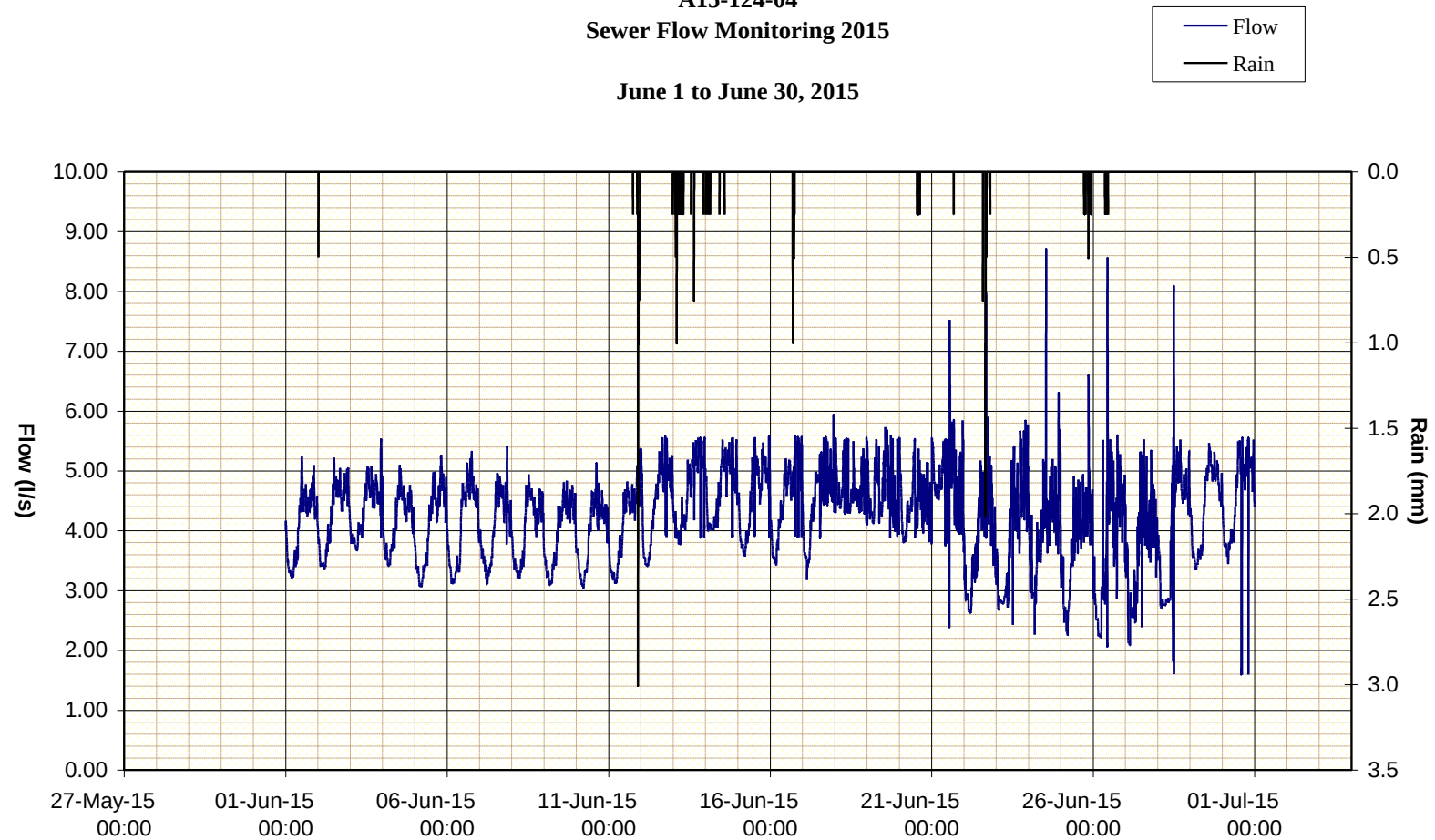
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:

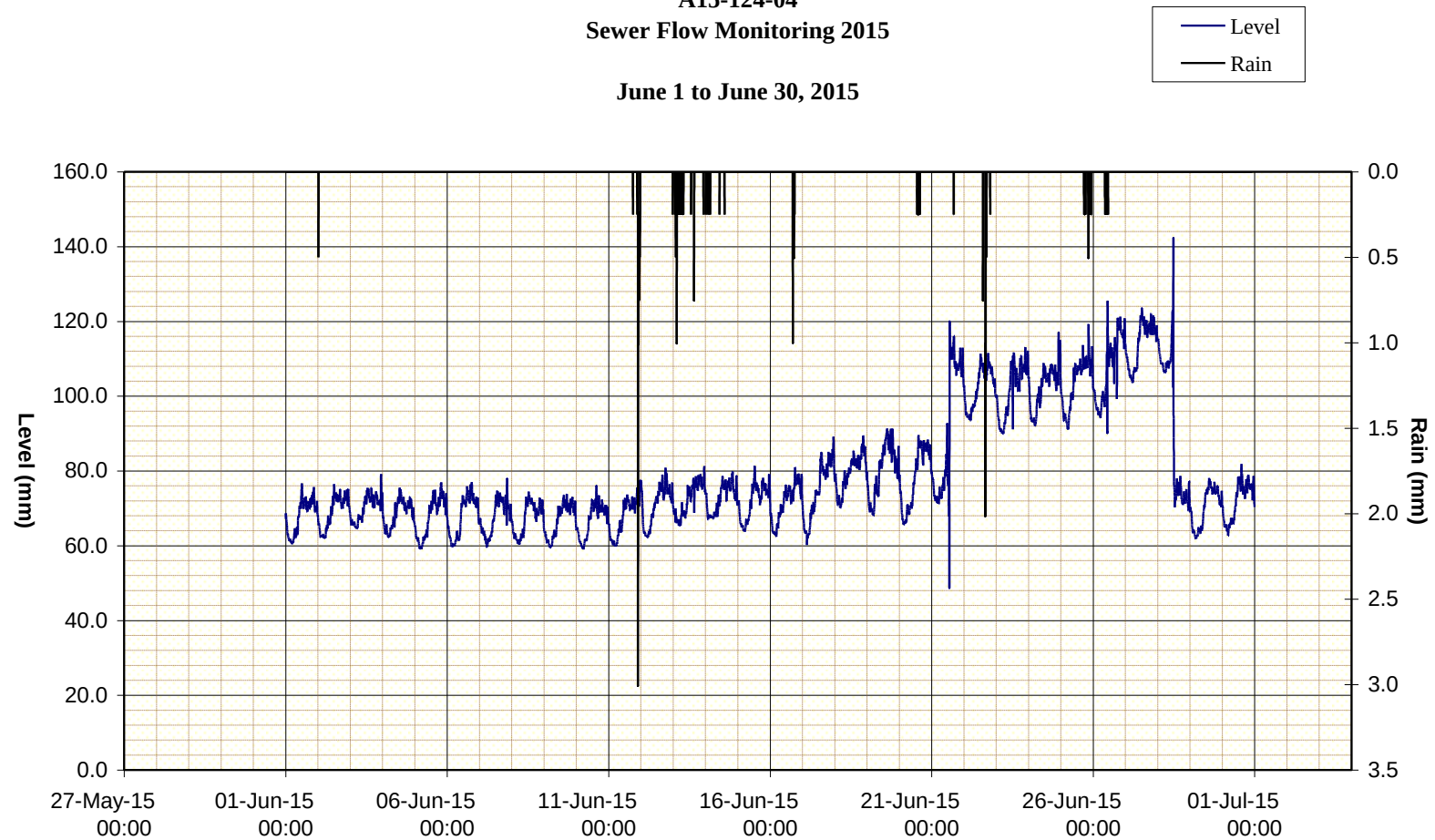
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



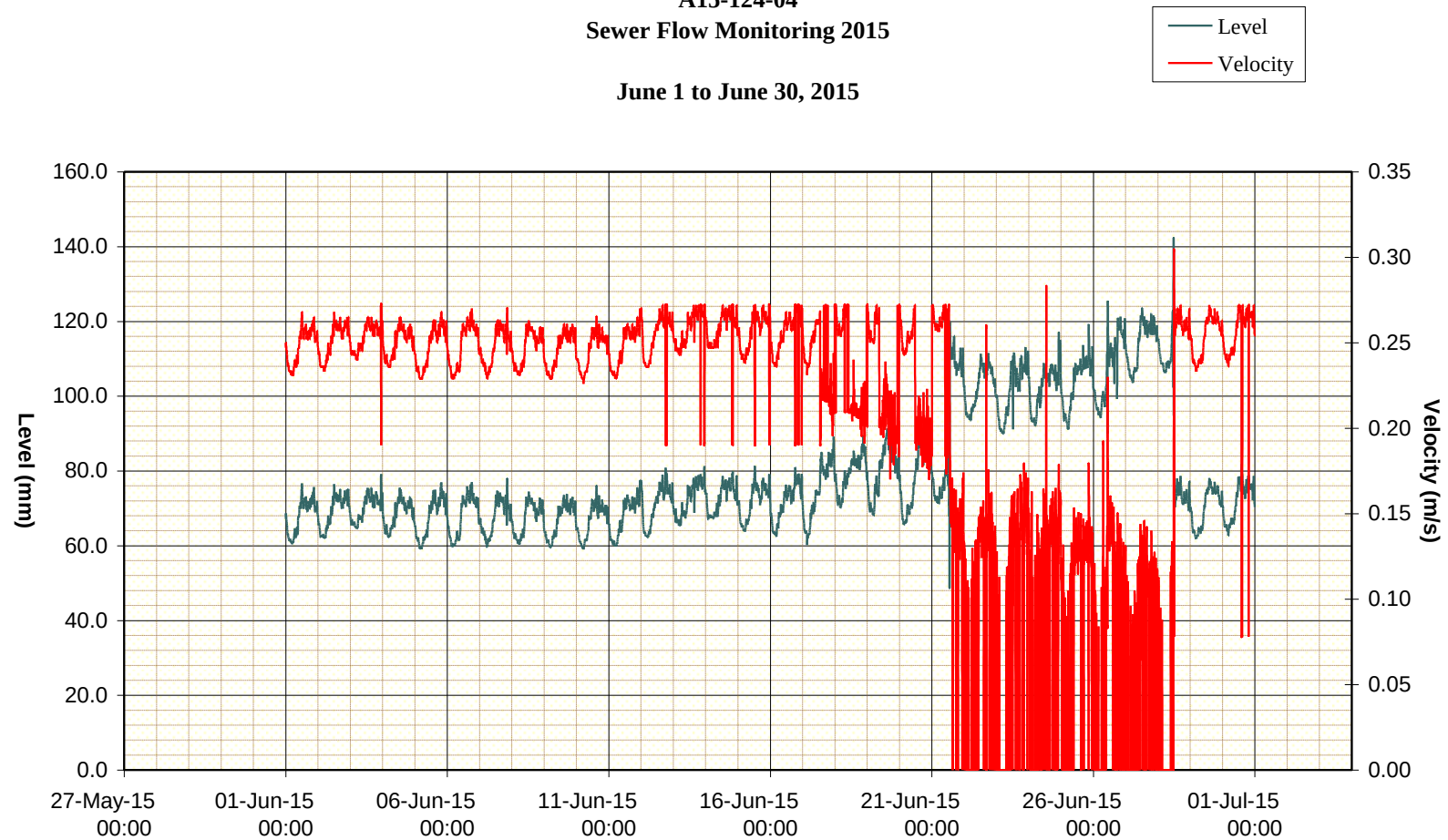
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



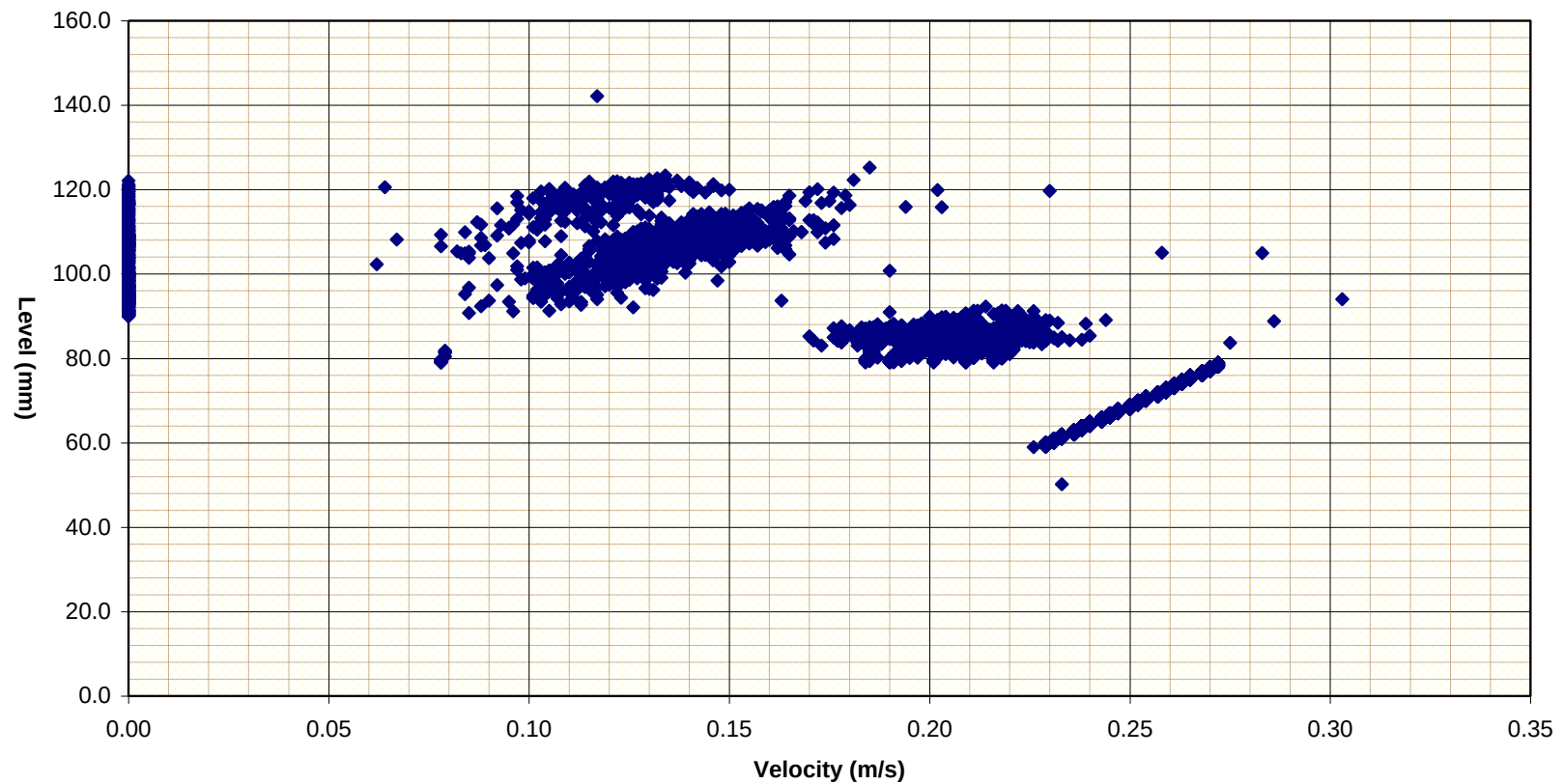
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta

A15-124-04

Sewer Flow Monitoring 2015

June 1 to June 30, 2015

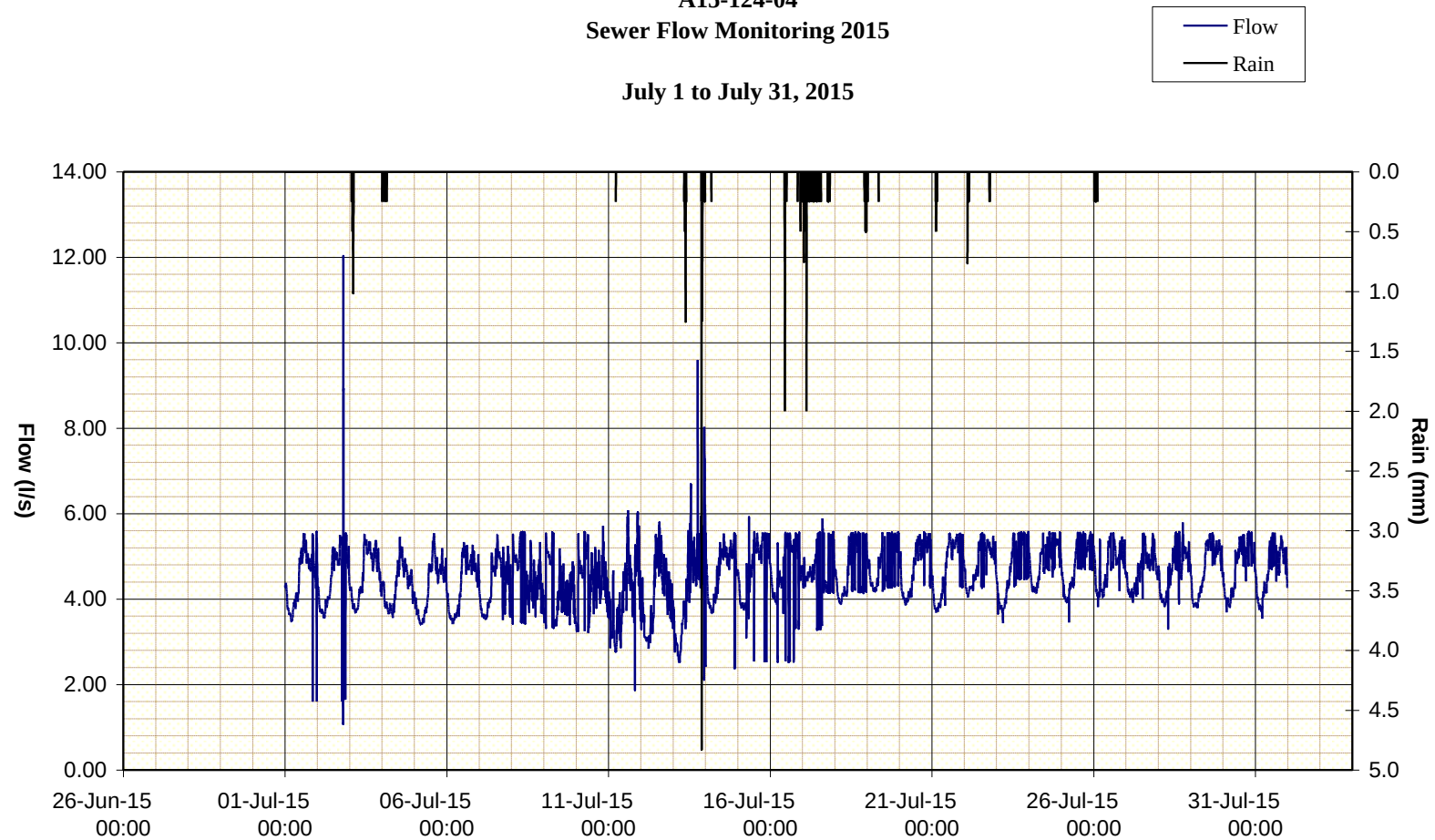
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	4.11	3.21	5.24	355.00	0.0
02-Jun-15	4.23	3.35	5.22	365.75	0.5
03-Jun-15	4.36	3.67	5.49	376.37	0.0
04-Jun-15	4.16	3.41	5.08	359.26	0.0
05-Jun-15	4.06	3.06	5.27	350.70	0.0
06-Jun-15	4.10	3.11	5.32	354.33	0.0
07-Jun-15	4.06	3.10	5.39	351.16	0.0
08-Jun-15	4.02	3.19	4.94	347.46	0.0
09-Jun-15	3.96	3.09	4.84	342.32	0.0
10-Jun-15	3.94	3.02	5.12	340.83	0.0
11-Jun-15	4.08	3.11	5.37	352.14	16.5
12-Jun-15	4.47	3.40	5.56	385.98	0.3
13-Jun-15	4.66	3.76	5.55	402.81	10.8
14-Jun-15	4.67	3.89	5.56	403.23	1.5
15-Jun-15	4.57	3.57	5.55	394.47	0.0
16-Jun-15	4.52	3.42	5.56	390.52	3.5
17-Jun-15	4.47	3.18	5.93	386.57	0.0
18-Jun-15	4.74	4.12	5.55	409.75	0.0
19-Jun-15	4.68	3.88	5.73	404.09	0.0
20-Jun-15	4.43	3.79	5.56	382.34	3.0
21-Jun-15	4.82	2.46	7.52	416.39	0.5
22-Jun-15	3.85	2.62	7.96	332.69	8.5
23-Jun-15	3.93	2.43	5.83	339.41	0.0
24-Jun-15	4.03	2.26	8.70	347.96	0.0
25-Jun-15	3.76	2.26	6.59	325.18	4.0
26-Jun-15	3.81	2.13	8.55	329.17	1.5
27-Jun-15	3.69	2.09	5.53	318.50	0.0
28-Jun-15	4.00	1.62	7.97	345.51	0.0
29-Jun-15	4.39	3.34	5.47	379.34	0.0
30-Jun-15	4.48	1.60	5.55	387.03	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
10976.225	1.598	8.700	50.5

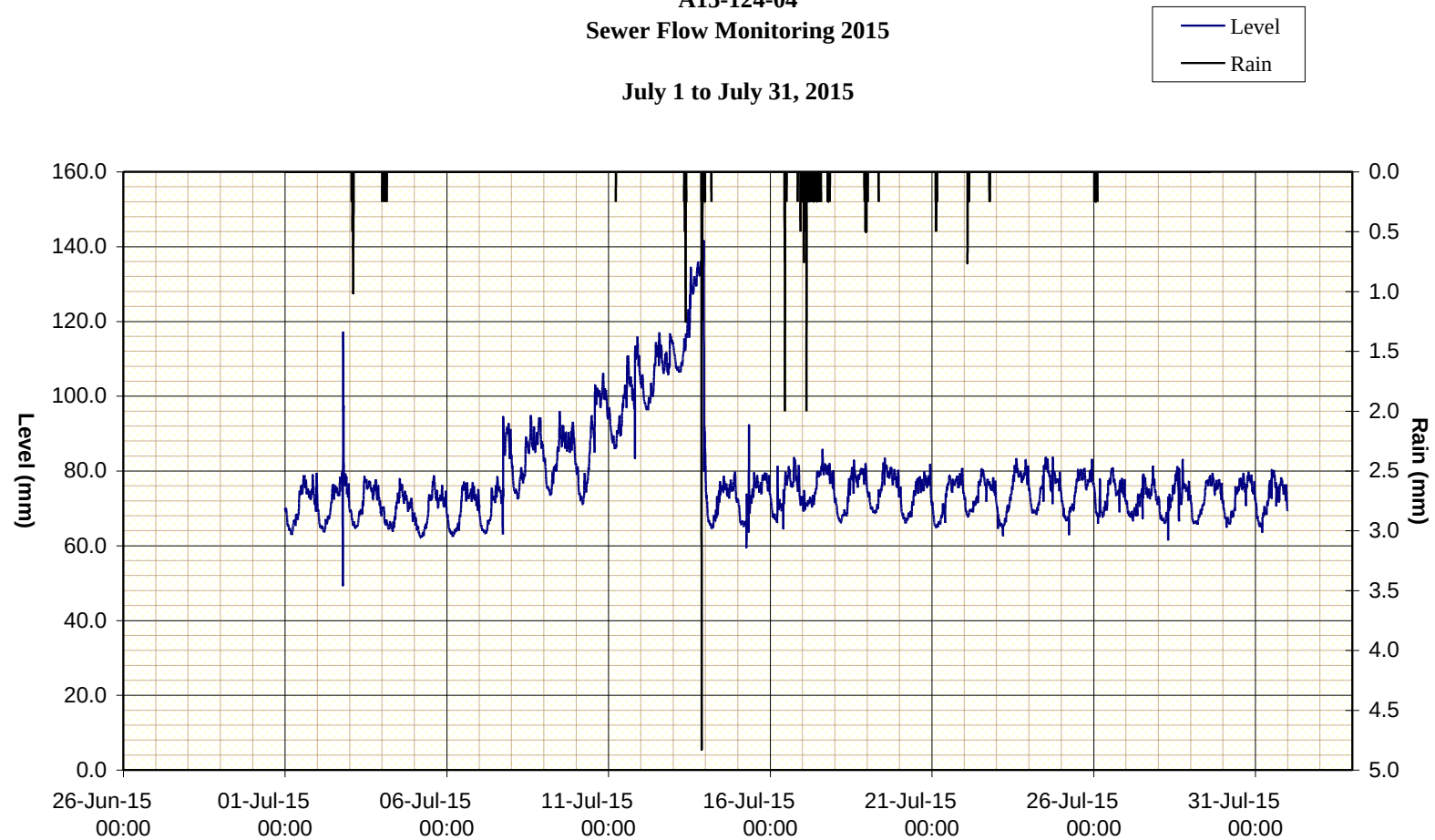
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



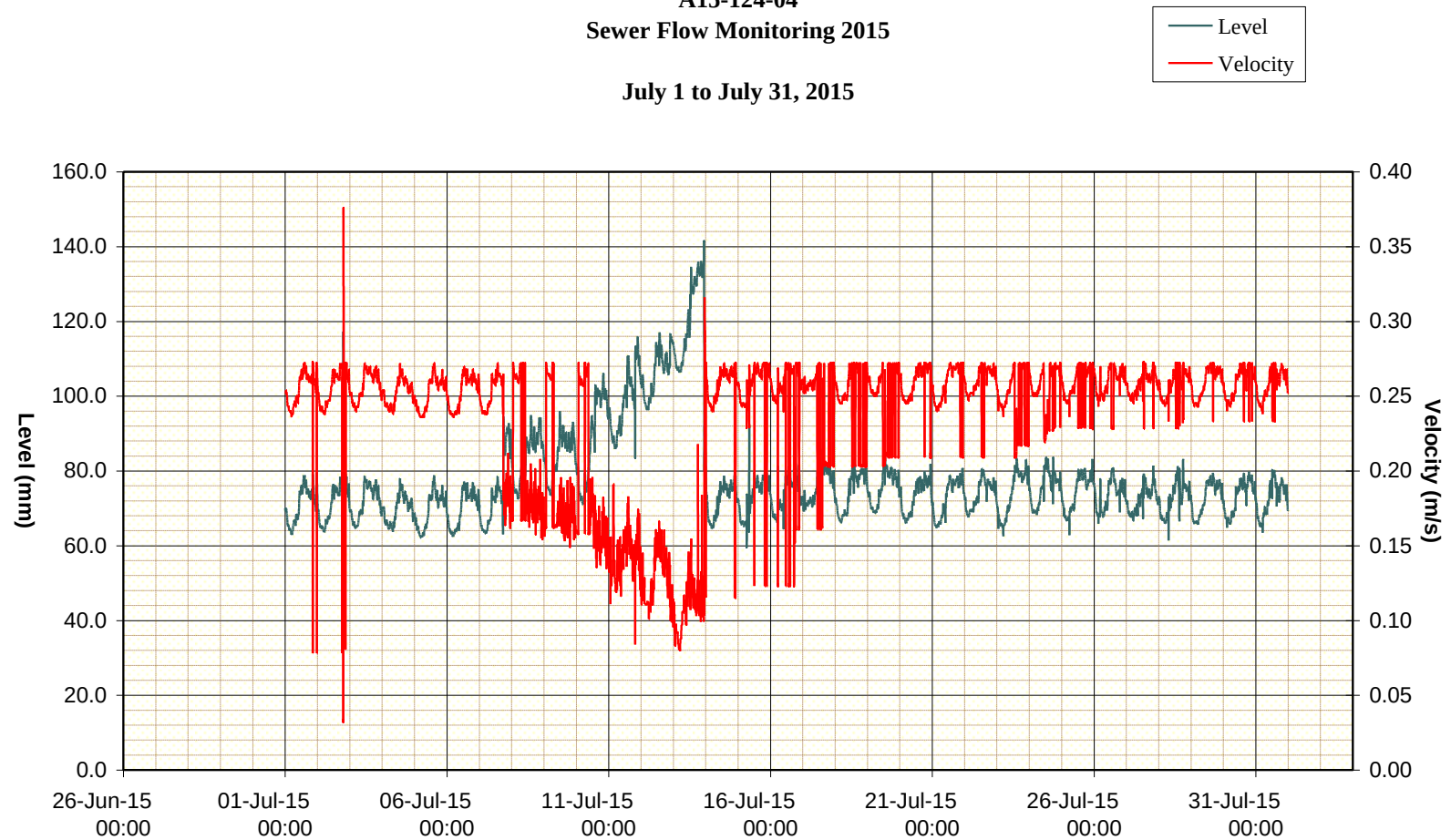
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



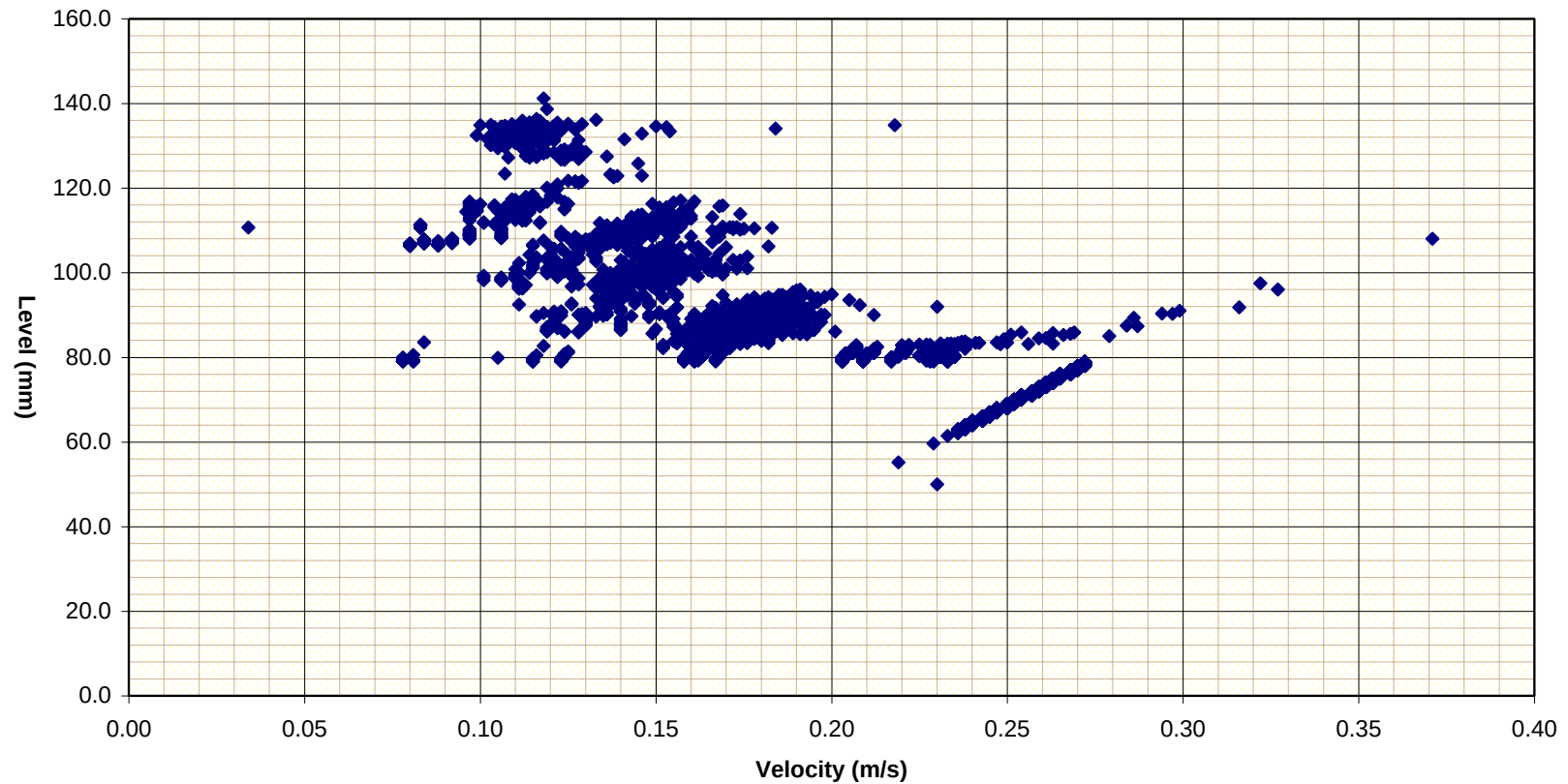
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015
July 1 to July 31, 2015

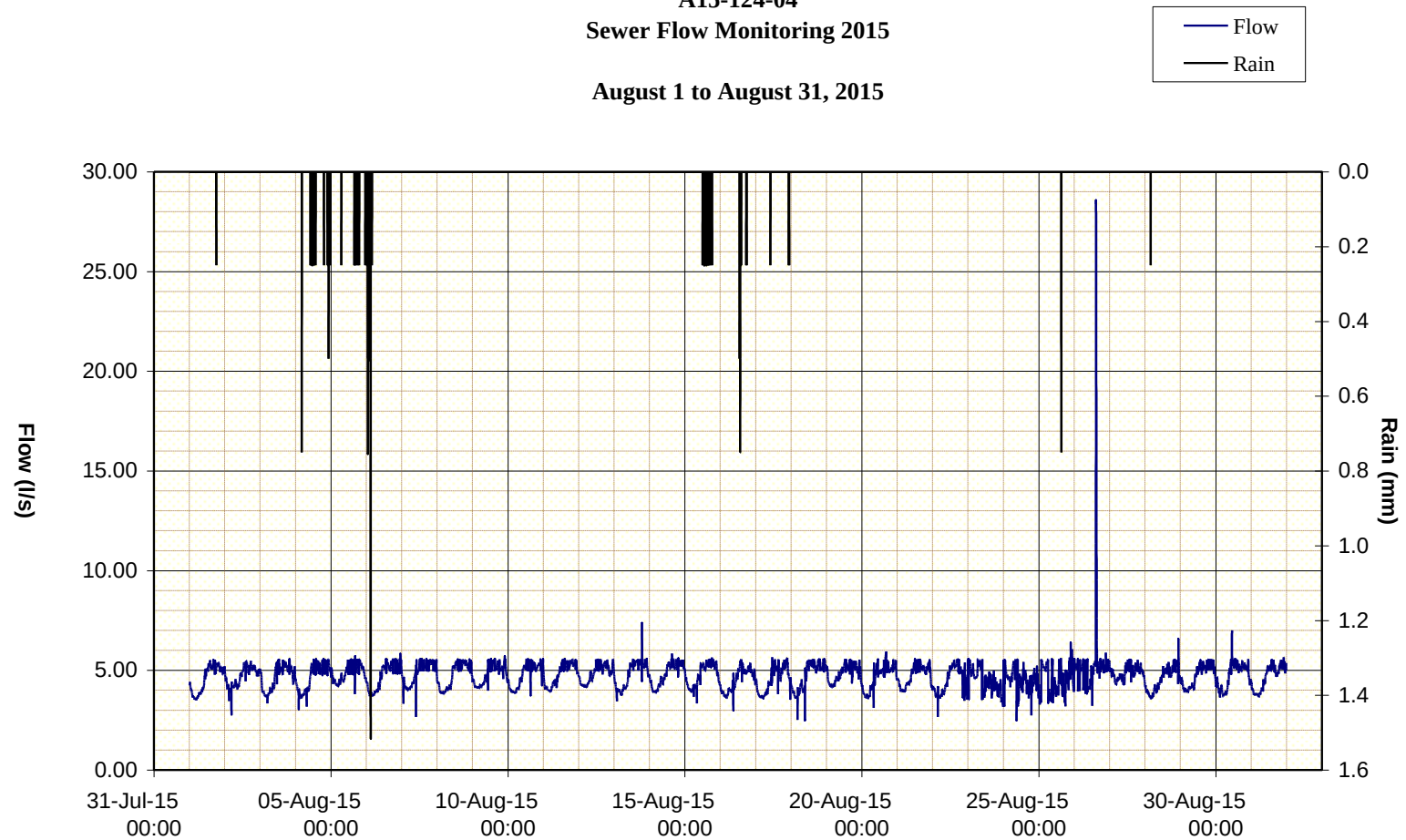
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	4.45	1.60	5.55	384.19	0.0
02-Jul-15	4.48	1.12	11.91	386.77	0.0
03-Jul-15	4.57	3.67	5.52	394.85	6.3
04-Jul-15	4.32	3.56	5.46	373.17	1.0
05-Jul-15	4.30	3.40	5.54	371.82	0.0
06-Jul-15	4.36	3.43	5.33	376.53	0.0
07-Jul-15	4.34	3.51	5.51	374.64	0.0
08-Jul-15	4.51	3.42	5.56	389.97	0.0
09-Jul-15	4.22	3.33	5.56	364.28	0.0
10-Jul-15	4.47	3.23	5.71	385.99	0.0
11-Jul-15	4.06	1.88	6.08	351.01	0.3
12-Jul-15	4.07	2.84	5.78	351.28	0.0
13-Jul-15	4.26	2.19	9.59	367.95	22.5
14-Jul-15	4.59	2.36	5.54	396.39	0.3
15-Jul-15	4.67	2.53	5.86	403.15	0.0
16-Jul-15	4.49	2.53	5.55	388.30	7.8
17-Jul-15	4.54	3.29	5.89	392.58	22.3
18-Jul-15	4.61	3.88	5.56	398.67	4.8
19-Jul-15	4.70	4.17	5.56	406.23	0.8
20-Jul-15	4.74	3.87	5.55	409.94	0.0
21-Jul-15	4.69	3.68	5.55	405.19	3.0
22-Jul-15	4.77	4.04	5.54	411.80	3.3
23-Jul-15	4.56	3.43	5.56	394.13	0.0
24-Jul-15	4.85	4.13	5.56	418.92	0.0
25-Jul-15	4.77	3.46	5.56	412.06	0.0
26-Jul-15	4.76	3.82	5.54	411.15	2.5
27-Jul-15	4.66	3.92	5.56	403.04	0.0
28-Jul-15	4.67	3.31	5.79	403.12	0.0
29-Jul-15	4.71	3.79	5.55	407.29	0.0
30-Jul-15	4.73	3.69	5.56	408.79	0.0
31-Jul-15	4.66	3.54	5.56	402.78	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
12145.970	1.119	11.912	74.5

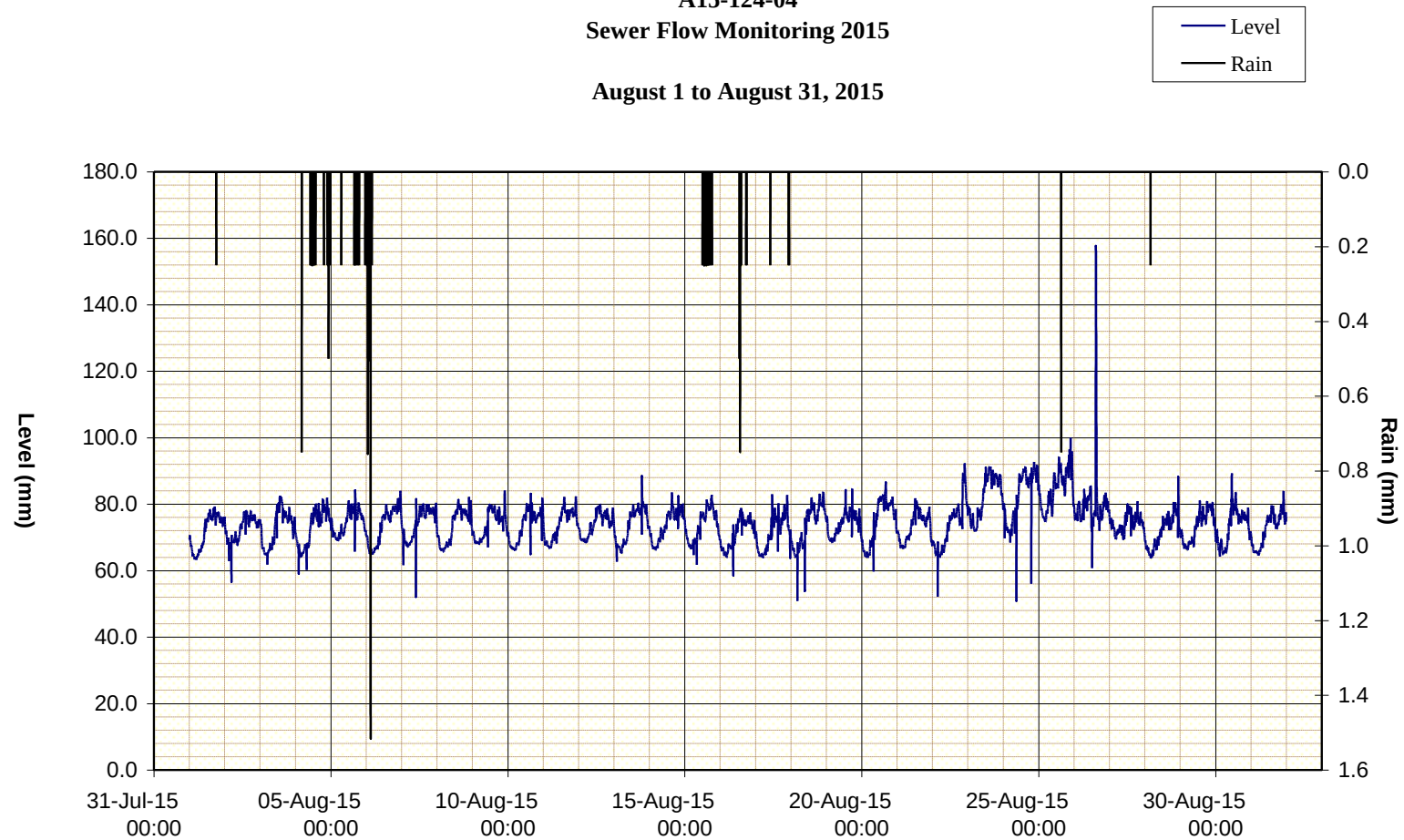
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015

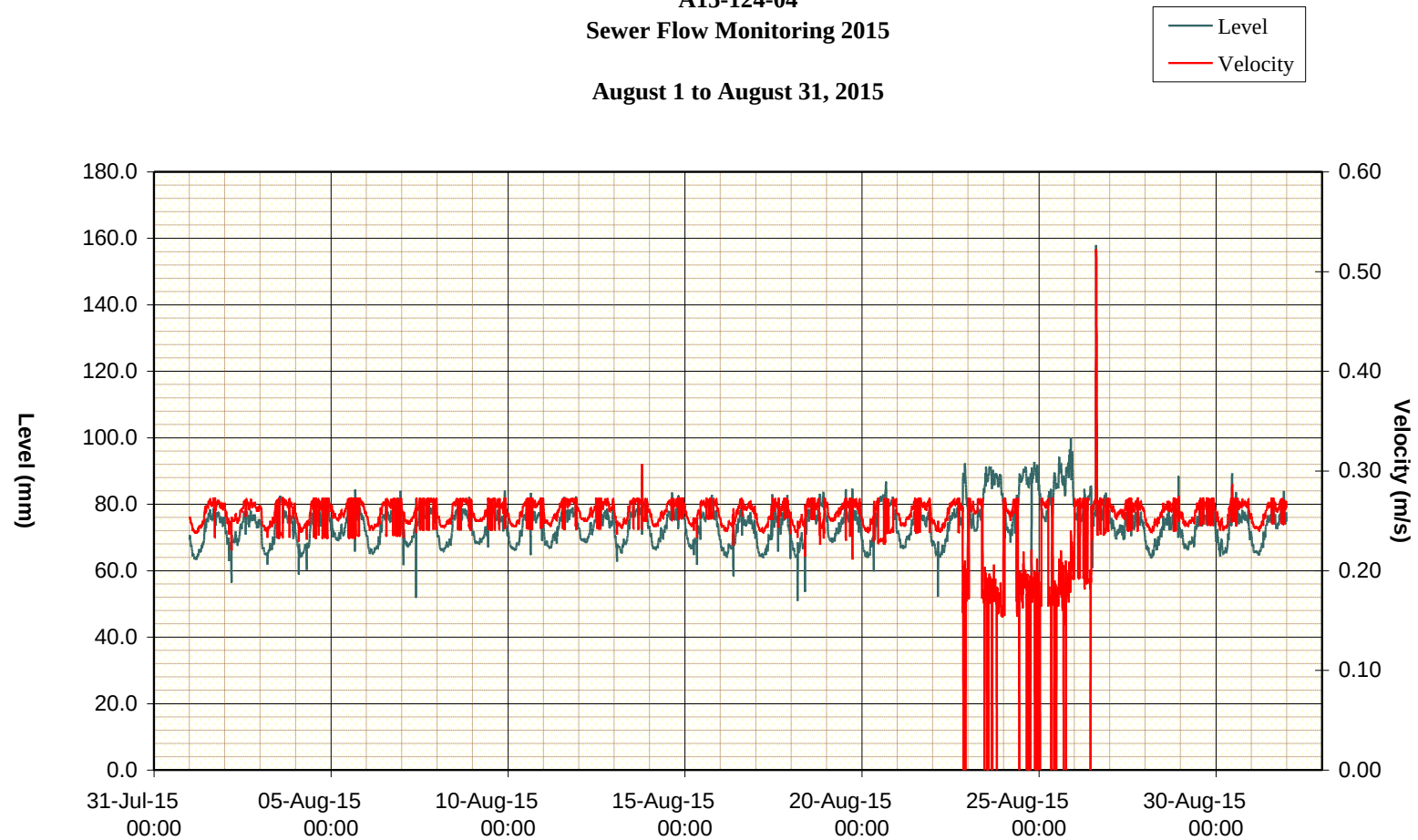


**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

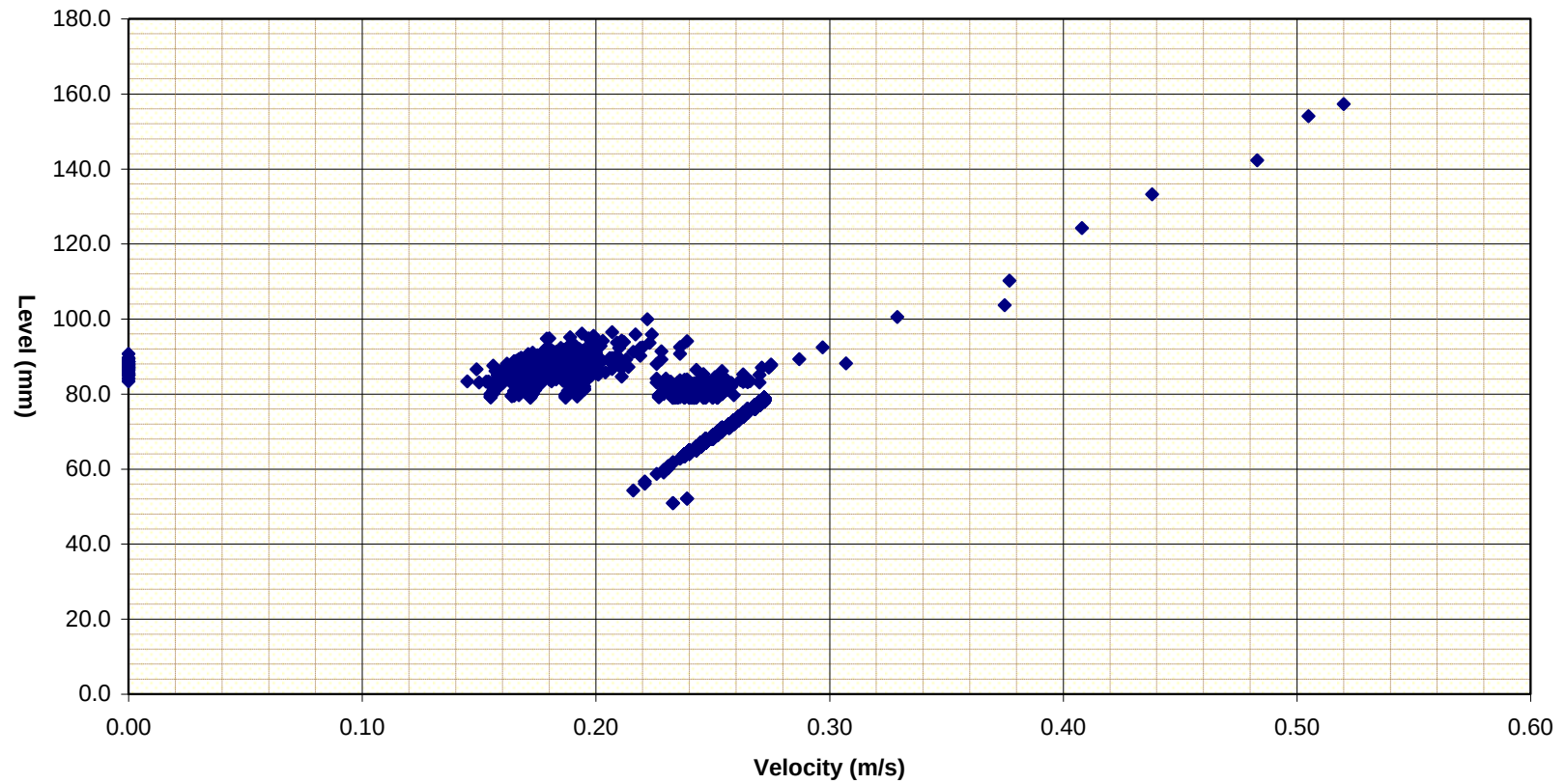
August 1 to August 31, 2015



**Cold Lake, Alberta
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Sewer Flow Monitoring 2015
August 1 to August 31, 2015**



**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015
August 1 to August 31, 2015**



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Sewer Flow Monitoring 2015

August 1 to August 31, 2015

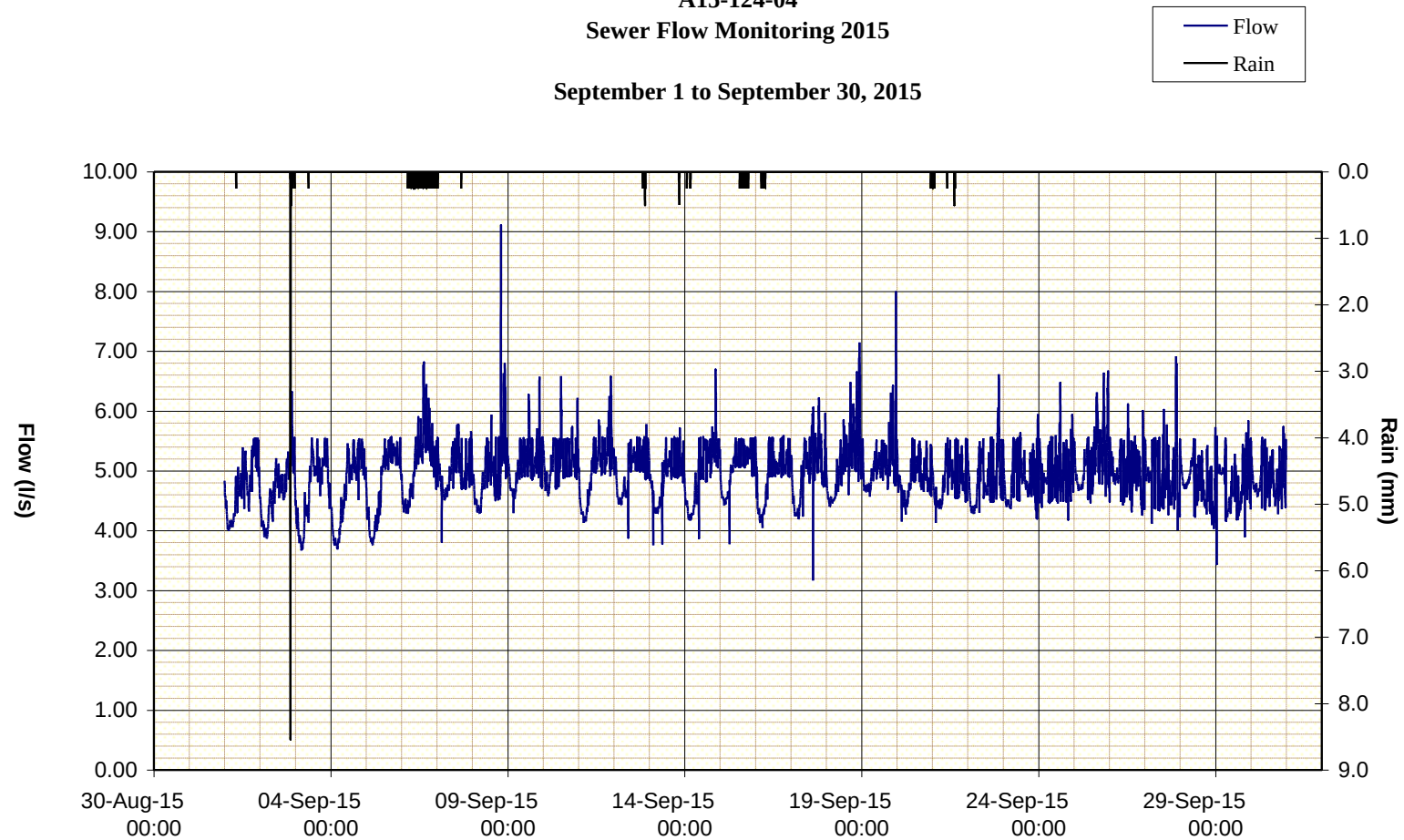
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-15	4.58	3.53	5.51	395.61	0.3
02-Aug-15	4.70	2.79	5.48	406.39	0.0
03-Aug-15	4.64	3.34	5.56	400.73	0.0
04-Aug-15	4.67	3.06	5.56	403.26	8.5
05-Aug-15	4.86	3.80	5.69	419.83	2.3
06-Aug-15	4.70	3.70	5.81	406.37	12.0
07-Aug-15	4.84	2.67	5.56	417.84	0.0
08-Aug-15	4.74	3.79	5.55	409.59	0.0
09-Aug-15	4.79	3.99	5.69	413.66	0.0
10-Aug-15	4.75	3.77	5.56	410.55	0.0
11-Aug-15	4.80	3.92	5.56	415.00	0.0
12-Aug-15	4.84	4.13	5.56	418.45	0.0
13-Aug-15	4.79	3.45	7.36	413.62	0.0
14-Aug-15	4.80	3.88	5.85	414.47	0.0
15-Aug-15	4.78	3.34	5.64	413.20	7.8
16-Aug-15	4.52	3.00	5.55	390.77	4.5
17-Aug-15	4.55	3.57	5.66	392.93	0.8
18-Aug-15	4.71	2.51	5.59	406.97	0.0
19-Aug-15	4.86	4.14	5.56	420.21	0.0
20-Aug-15	4.65	3.11	5.95	401.50	0.0
21-Aug-15	4.73	3.91	5.56	408.82	0.0
22-Aug-15	4.47	2.67	5.56	386.20	0.0
23-Aug-15	4.48	3.17	5.56	386.96	0.0
24-Aug-15	4.53	2.51	5.56	391.32	0.0
25-Aug-15	4.53	3.20	6.37	391.11	0.8
26-Aug-15	5.26	3.23	28.38	454.84	0.0
27-Aug-15	4.87	4.26	5.54	420.63	0.0
28-Aug-15	4.53	3.56	6.55	391.48	0.3
29-Aug-15	4.72	3.89	5.56	407.55	0.0
30-Aug-15	4.75	3.64	7.00	410.15	0.0
31-Aug-15	4.64	3.67	5.65	401.32	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
12621.343	2.510	28.379	37.0

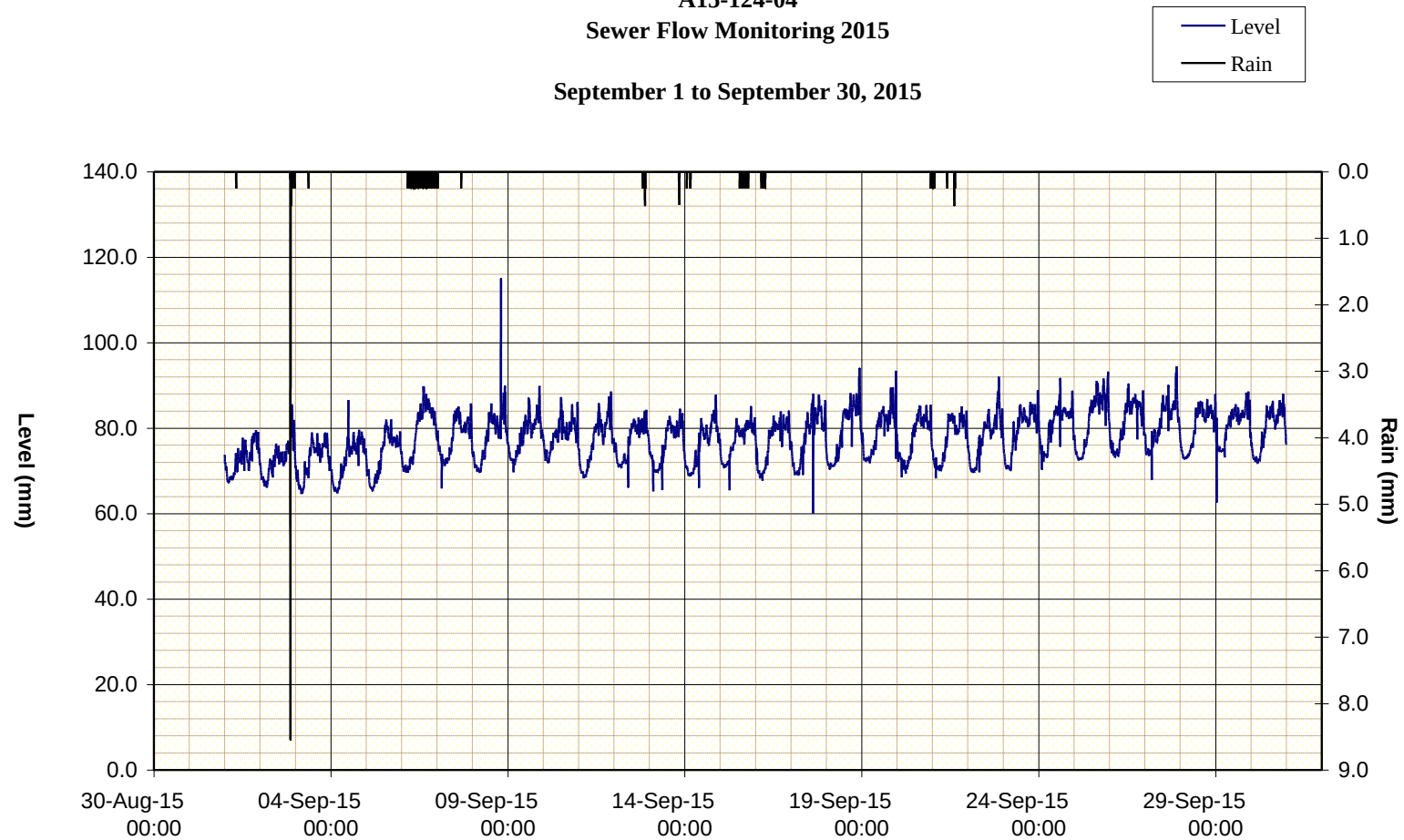
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



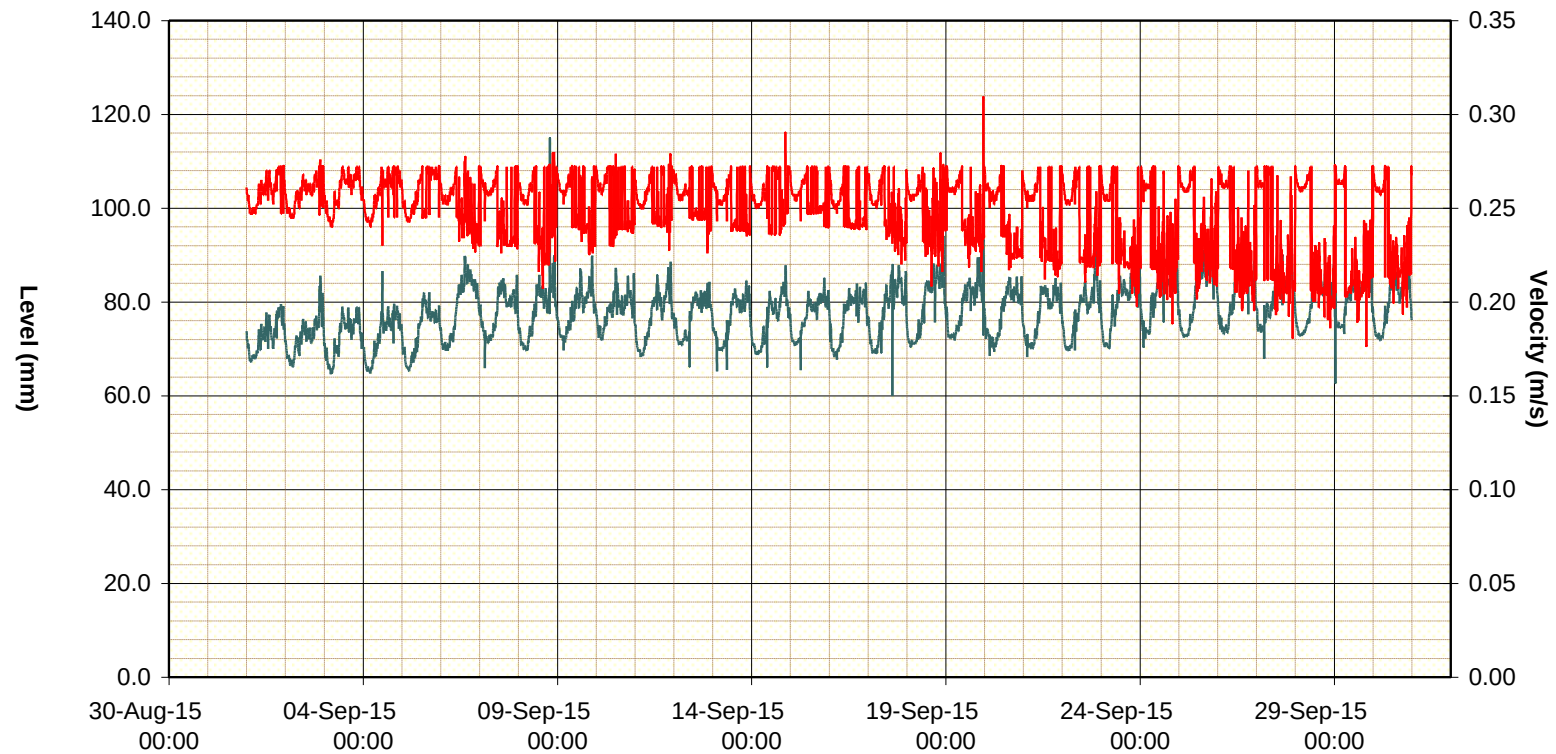
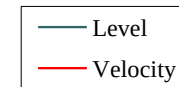
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



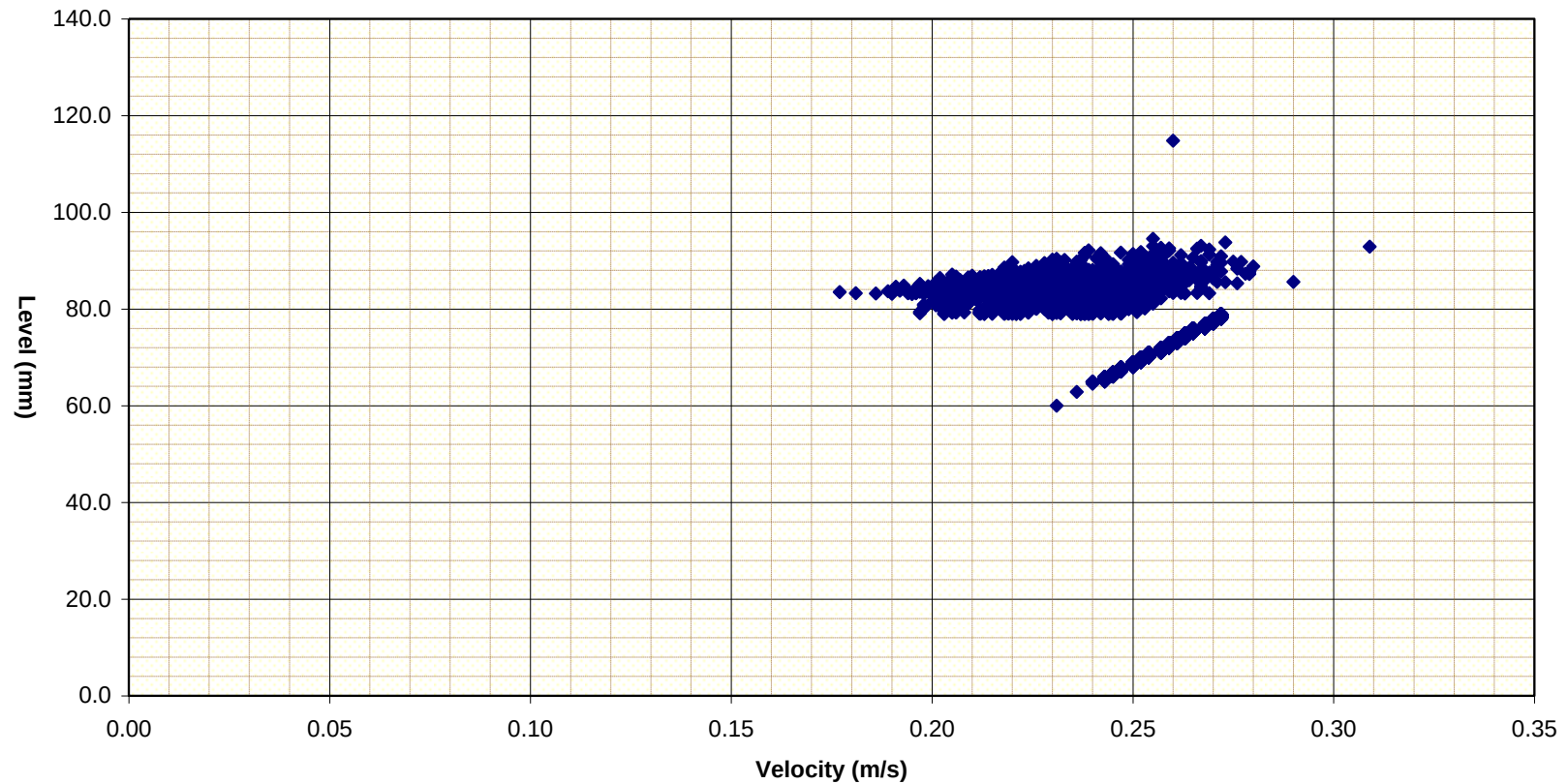
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



Cold Lake, Alberta

A15-124-04

Sewer Flow Monitoring 2015

September 1 to September 30, 2015

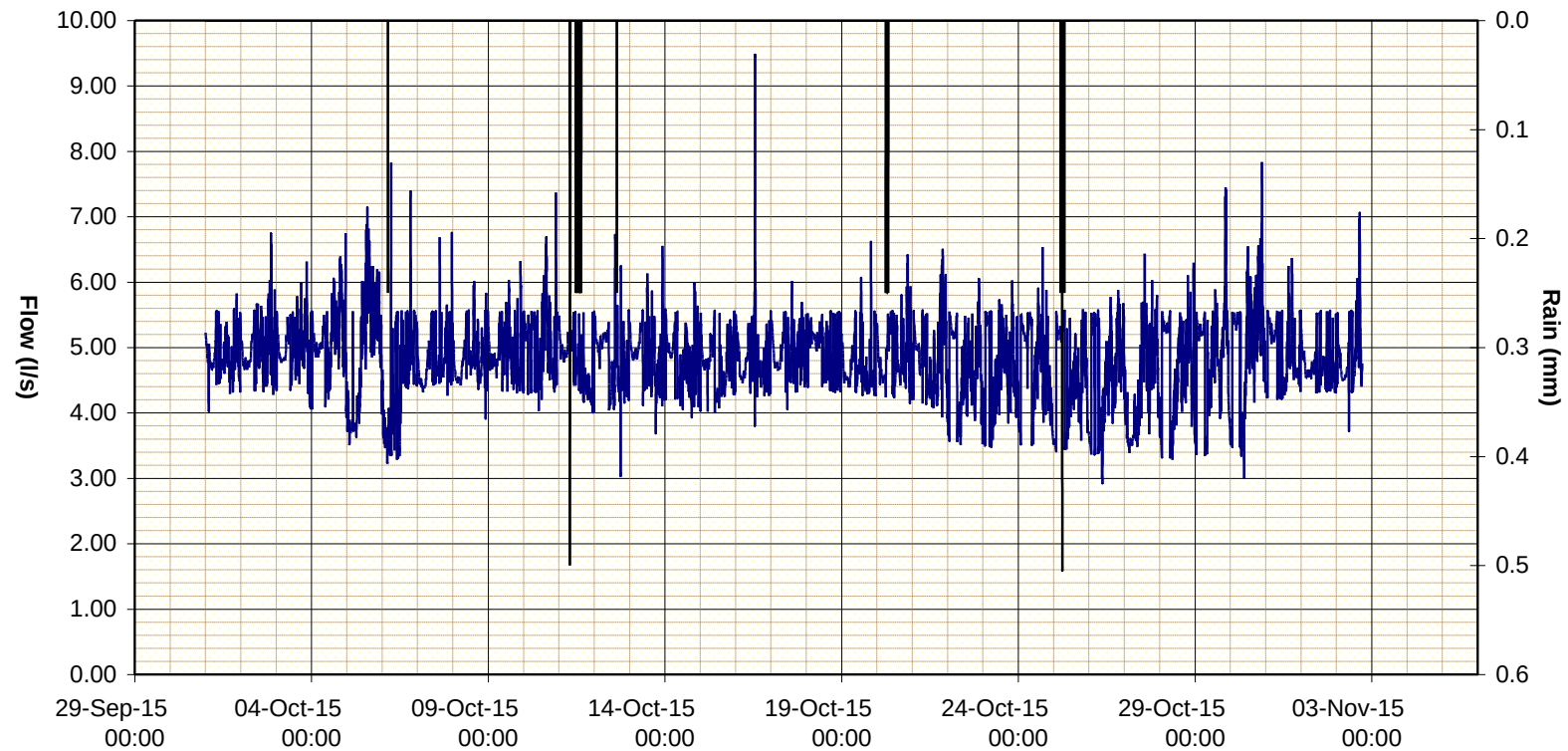
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	4.73	4.00	5.56	408.59	0.3
02-Sep-15	4.69	3.87	6.31	404.85	19.3
03-Sep-15	4.68	3.67	5.56	404.47	0.3
04-Sep-15	4.70	3.69	5.54	406.21	0.0
05-Sep-15	4.77	3.76	5.56	411.98	0.0
06-Sep-15	5.13	4.28	6.81	442.92	21.8
07-Sep-15	4.98	3.81	5.77	430.15	0.5
08-Sep-15	4.98	4.29	9.10	430.42	0.0
09-Sep-15	5.10	4.29	6.58	440.40	0.0
10-Sep-15	5.17	4.58	6.59	447.05	0.0
11-Sep-15	4.99	4.13	6.56	431.11	0.0
12-Sep-15	5.00	3.89	5.78	432.37	3.0
13-Sep-15	4.90	3.76	5.71	422.99	1.5
14-Sep-15	4.95	3.88	6.67	427.68	0.8
15-Sep-15	5.06	3.78	5.56	437.40	3.0
16-Sep-15	4.93	4.05	5.60	425.96	1.8
17-Sep-15	4.99	3.17	6.21	430.98	0.0
18-Sep-15	5.12	4.41	7.15	442.74	0.0
19-Sep-15	5.09	4.57	7.99	439.51	0.0
20-Sep-15	4.87	4.15	5.54	420.58	1.5
21-Sep-15	4.82	4.13	5.55	416.15	3.3
22-Sep-15	4.87	4.28	6.62	420.75	0.0
23-Sep-15	4.87	4.21	5.95	420.59	0.0
24-Sep-15	4.96	4.19	6.47	428.93	0.0
25-Sep-15	5.17	4.48	6.66	446.84	0.0
26-Sep-15	4.99	4.25	6.08	431.30	0.0
27-Sep-15	4.92	4.00	6.92	425.15	0.0
28-Sep-15	4.79	4.03	5.73	413.71	0.0
29-Sep-15	4.77	3.46	5.83	412.05	0.0
30-Sep-15	4.86	4.28	5.73	419.63	0.0

Statistics

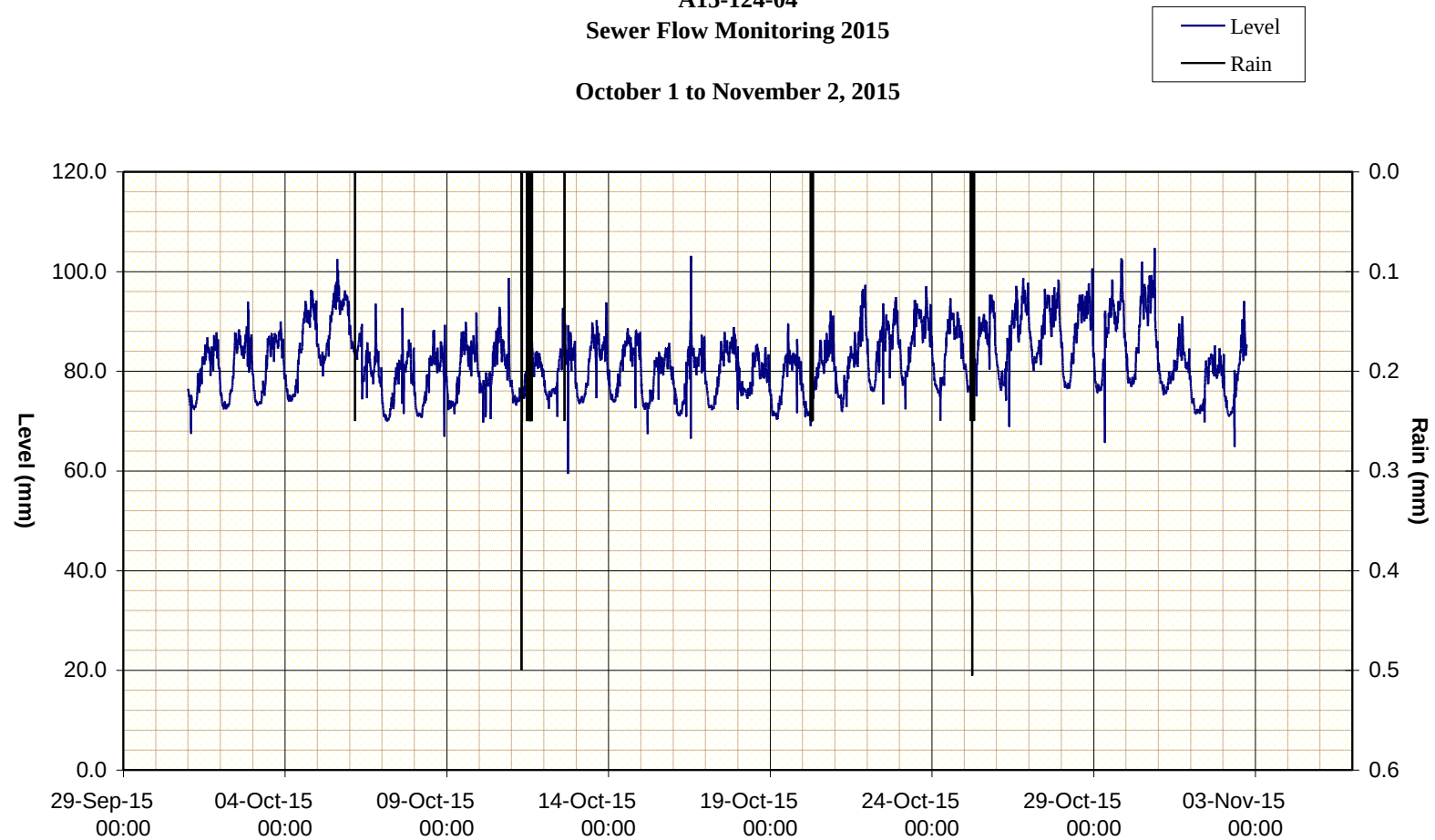
Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
12773.447	3.166	9.099	56.8

**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**

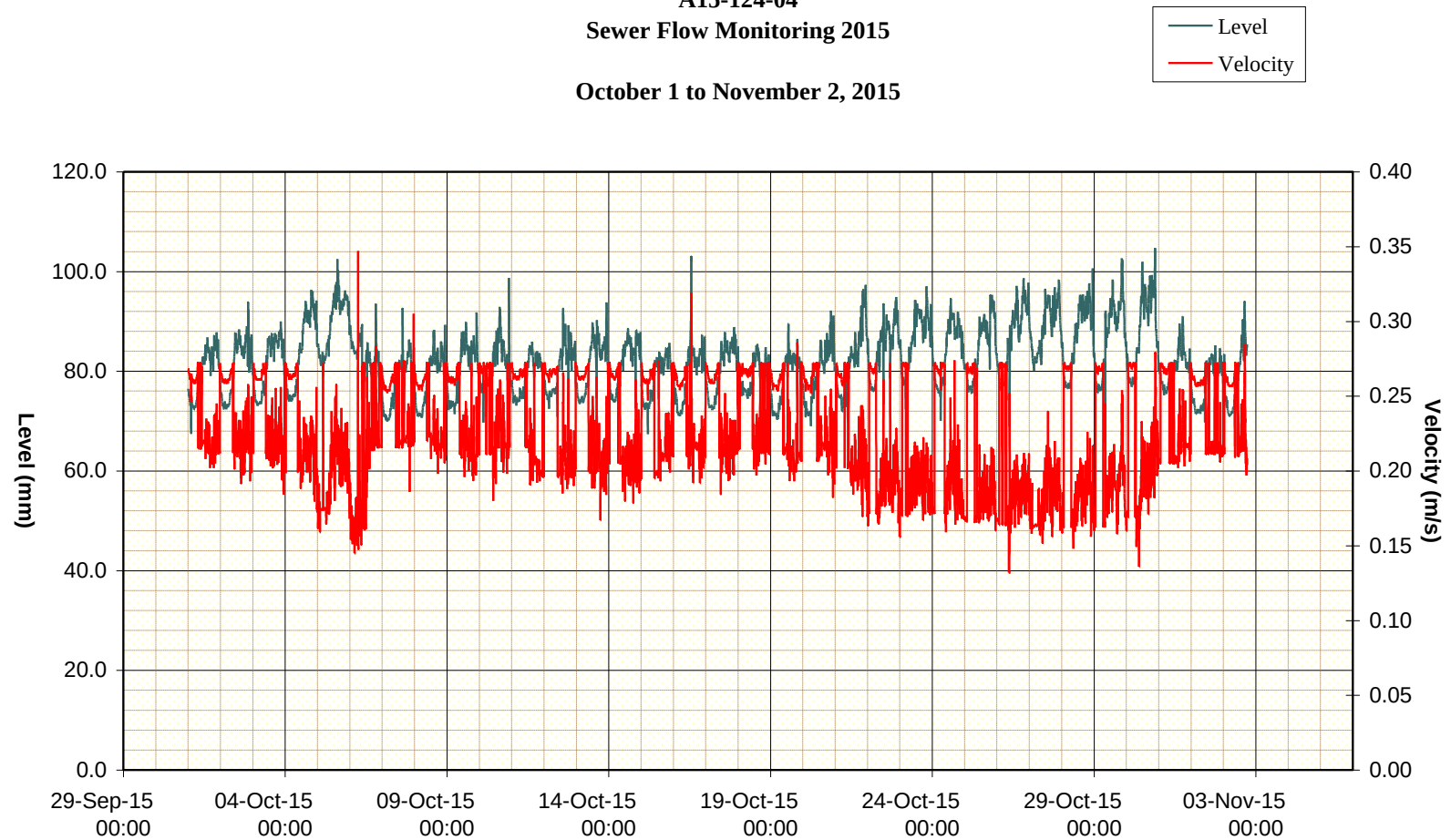
— Flow
— Rain



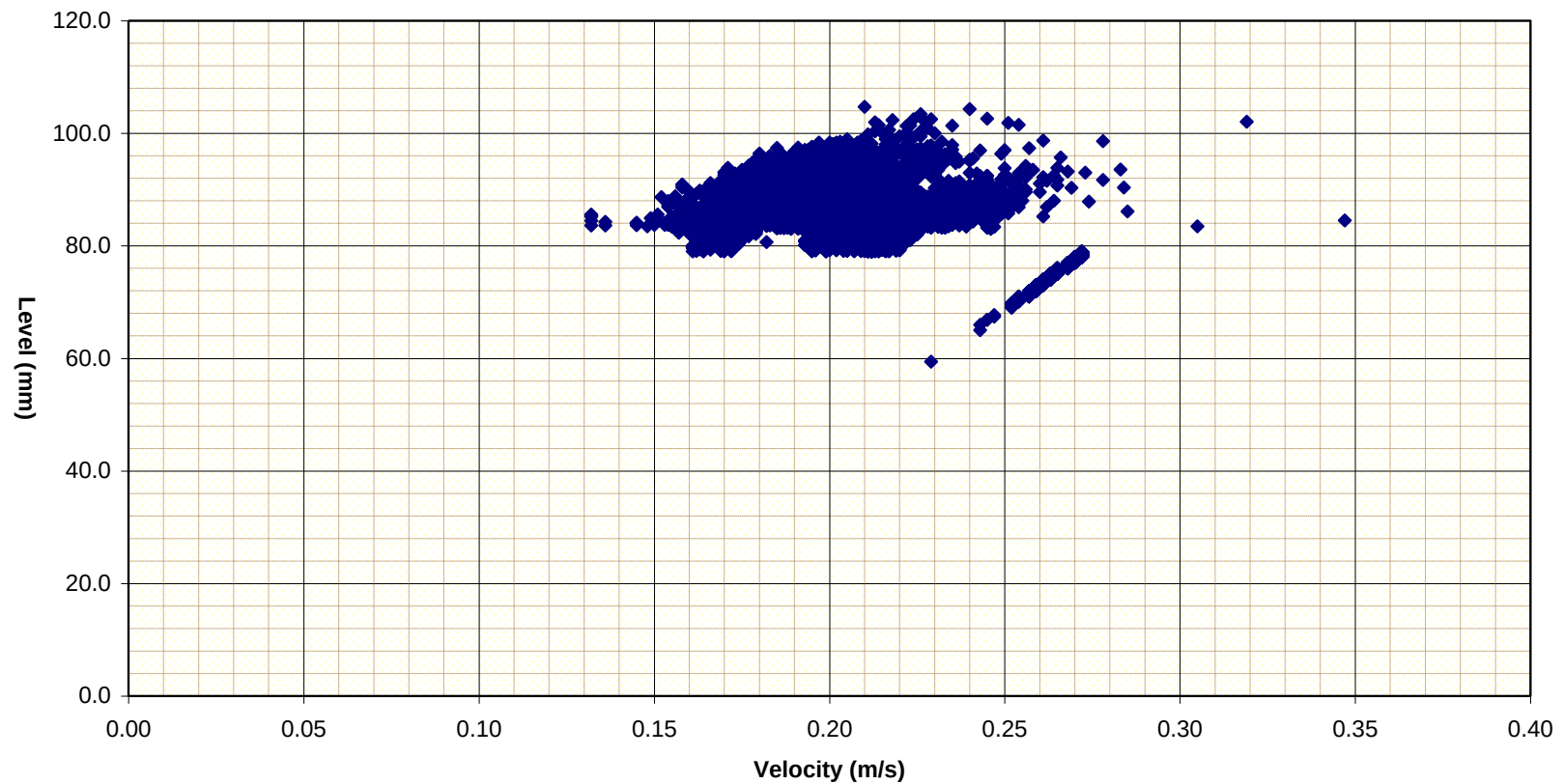
**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-04
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



Cold Lake, Alberta

A15-124-04

Sewer Flow Monitoring 2015

October 1 to November 2, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Oct-15	4.88	4.04	5.83	421.25	0.0
02-Oct-15	4.98	4.28	6.73	429.99	0.0
03-Oct-15	4.98	4.07	6.32	430.50	0.0
04-Oct-15	5.13	3.94	6.75	442.93	0.0
05-Oct-15	4.91	3.51	7.10	423.93	0.0
06-Oct-15	4.49	3.22	7.82	388.25	0.3
07-Oct-15	4.81	4.27	6.75	415.96	0.0
08-Oct-15	4.85	3.94	6.00	419.01	0.0
09-Oct-15	4.91	4.32	6.32	424.30	0.0
10-Oct-15	5.08	4.03	7.37	438.49	0.0
11-Oct-15	4.74	4.01	5.54	409.96	4.0
12-Oct-15	4.85	3.09	6.72	419.10	0.3
13-Oct-15	4.89	3.69	6.55	422.87	0.0
14-Oct-15	4.84	3.94	5.95	417.95	0.0
15-Oct-15	4.70	4.00	5.56	406.09	0.0
16-Oct-15	4.84	3.93	9.43	418.24	0.0
17-Oct-15	4.90	4.07	6.02	423.54	0.0
18-Oct-15	4.96	4.33	5.55	428.54	0.0
19-Oct-15	4.71	4.27	6.61	407.14	0.0
20-Oct-15	4.89	4.18	6.40	422.60	2.3
21-Oct-15	4.88	3.93	6.49	421.26	0.0
22-Oct-15	4.64	3.51	6.04	401.09	0.0
23-Oct-15	4.65	3.48	6.03	401.64	0.0
24-Oct-15	4.71	3.52	6.53	407.26	0.0
25-Oct-15	4.51	3.42	5.59	390.03	2.3
26-Oct-15	4.56	2.93	5.88	393.75	0.0
27-Oct-15	4.41	3.38	6.43	380.77	0.0
28-Oct-15	4.70	3.28	6.30	405.99	0.0
29-Oct-15	4.85	3.36	7.45	418.73	0.0
30-Oct-15	5.06	3.01	7.84	437.59	0.0
31-Oct-15	4.95	4.21	6.35	427.88	0.0
01-Nov-15	4.71	4.30	5.56	407.14	0.0
02-Nov-15	4.91	3.74	7.06	424.45	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
13728.202	2.927	9.432	9.0



FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-05
ADDRESS:	5112 54 Avenue
GPS:	N54.41975 W110.20757
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

CONSTANTS			
D1 (mm):		D1-lip to x-bar	
TOM (mm)	5000	Raw Weir L - lip to water	
METER #	207K01072	DATE:	12-May-15
METER #	214E03112	DATE:	12-May-15
METER #		DATE:	

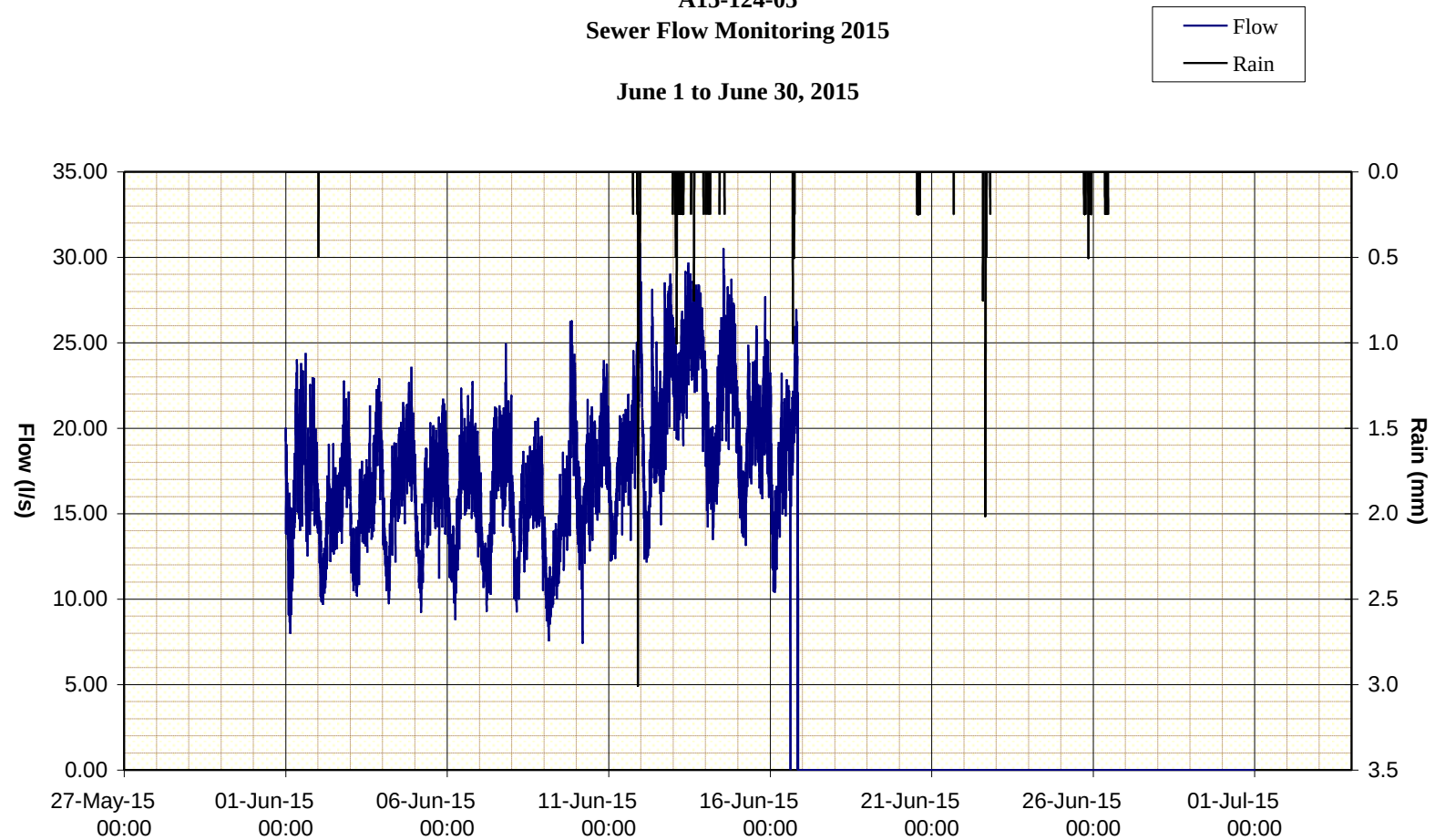
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:

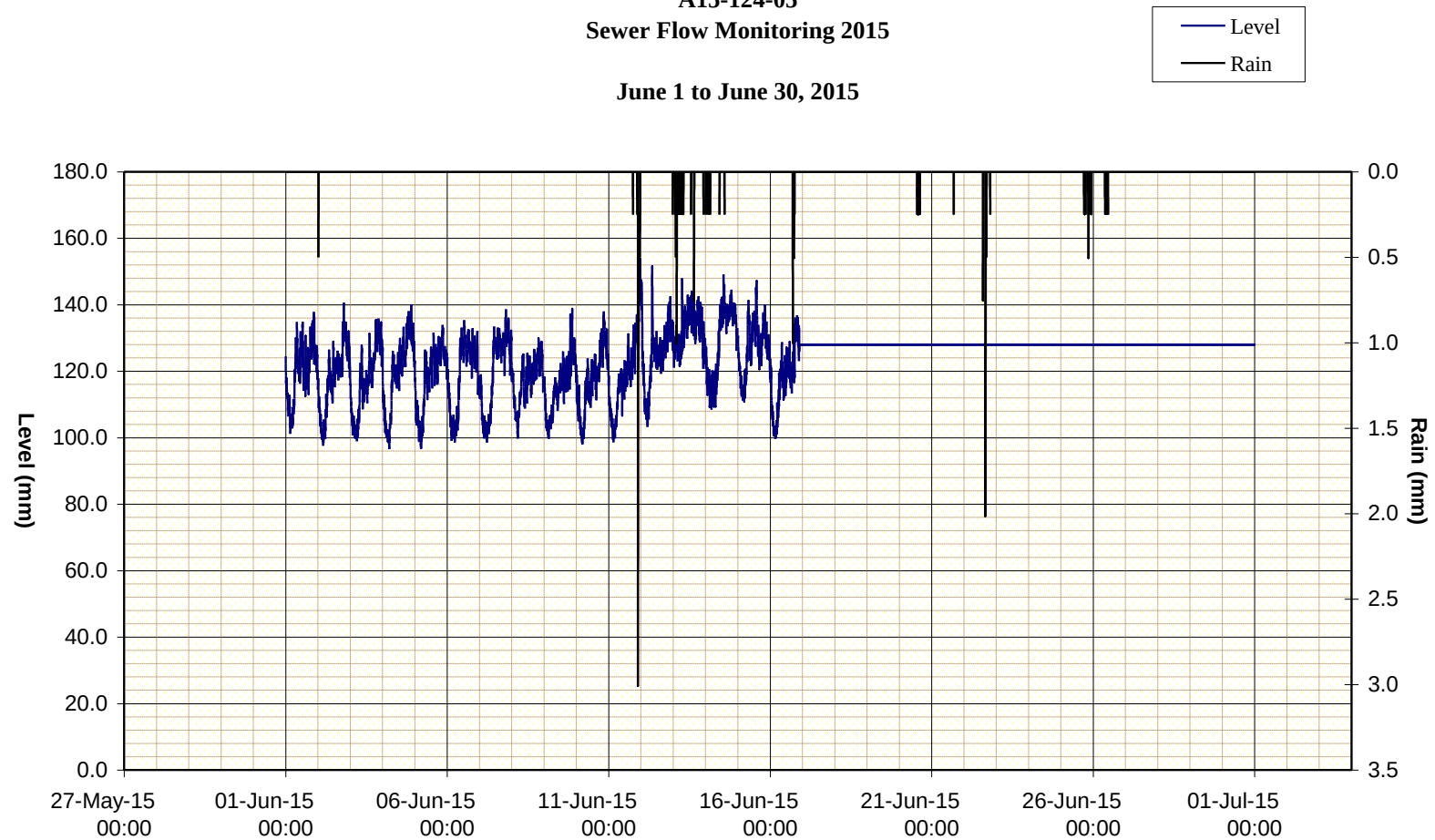
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



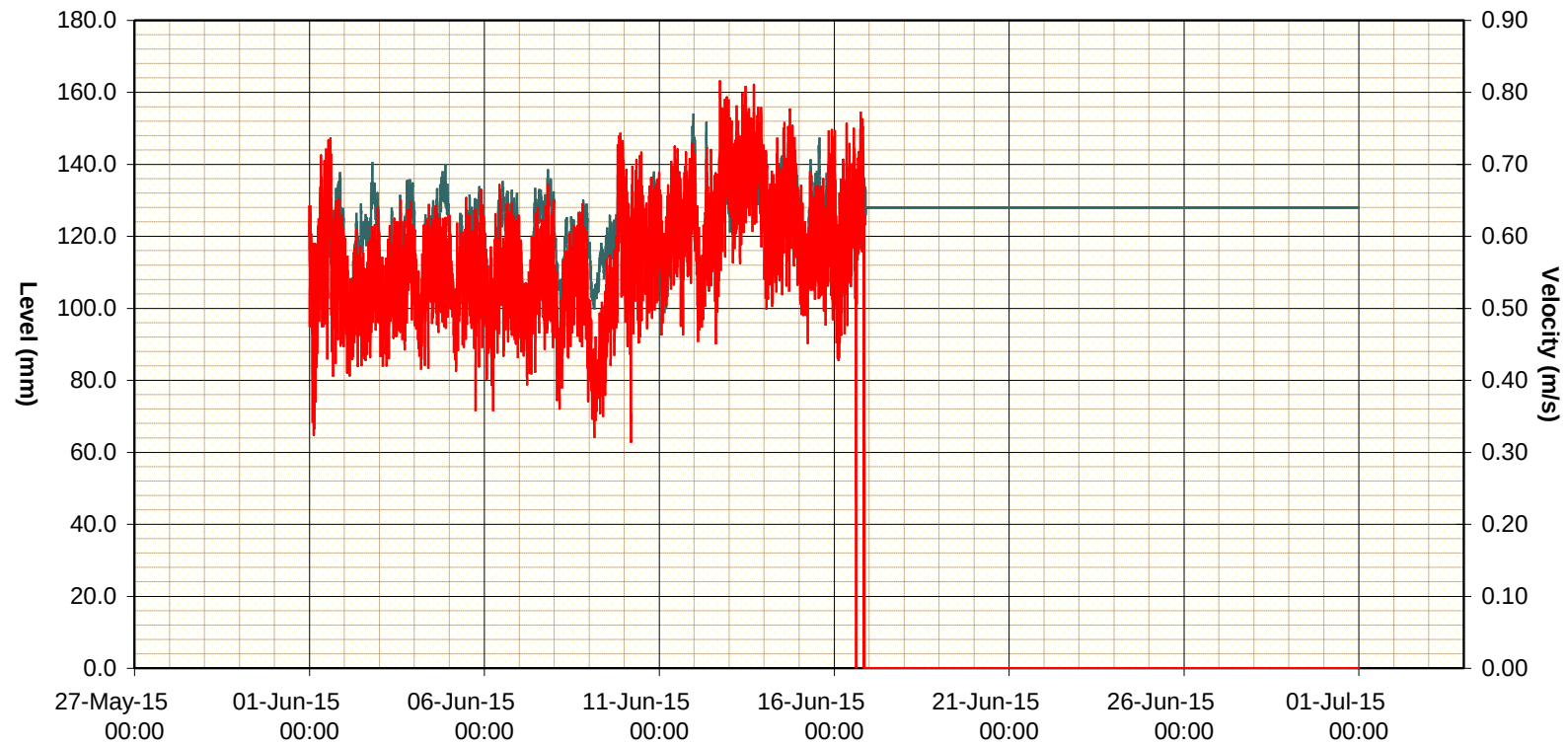
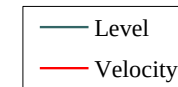
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



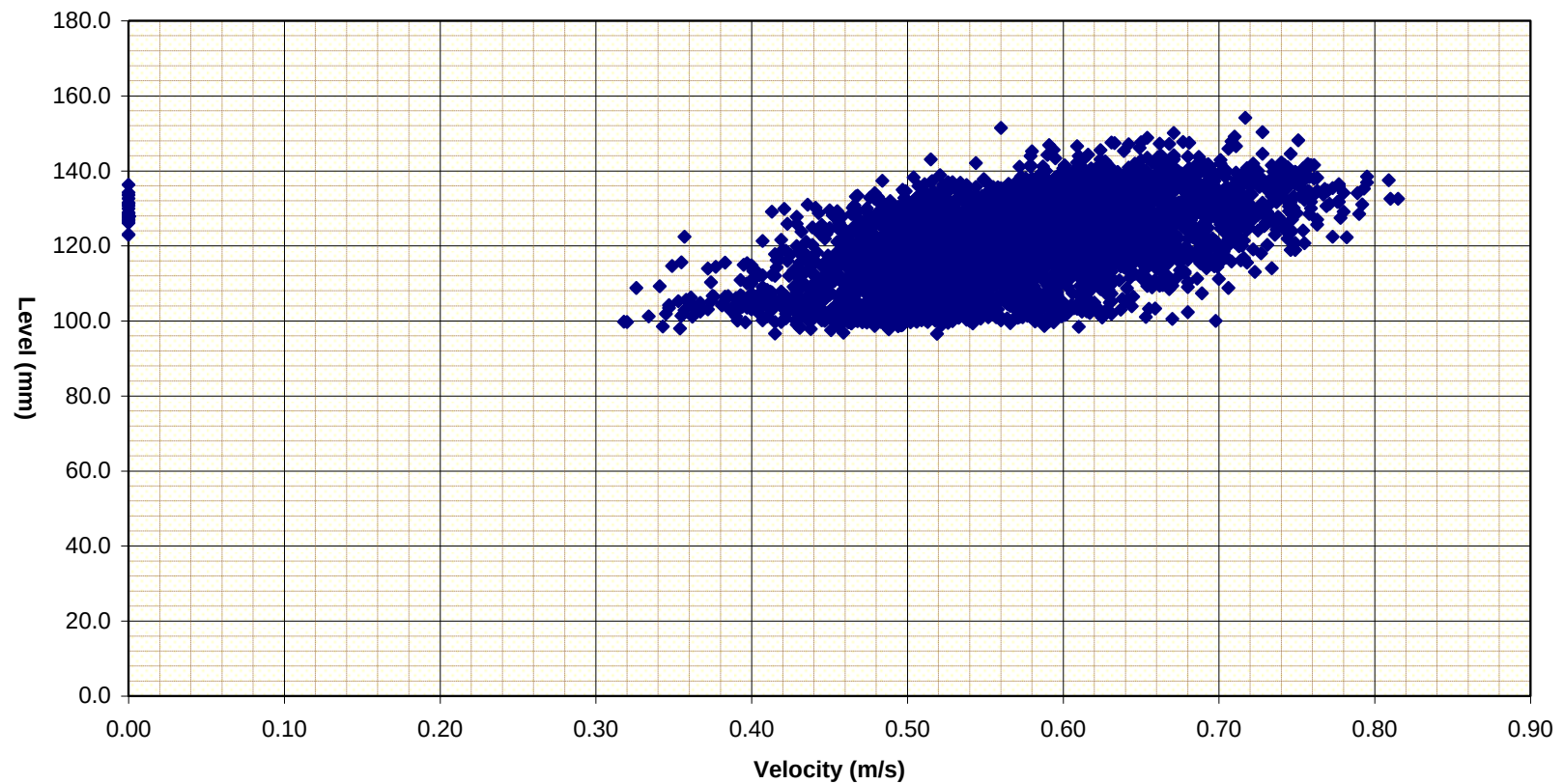
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta

A15-124-05

Sewer Flow Monitoring 2015

June 1 to June 30, 2015

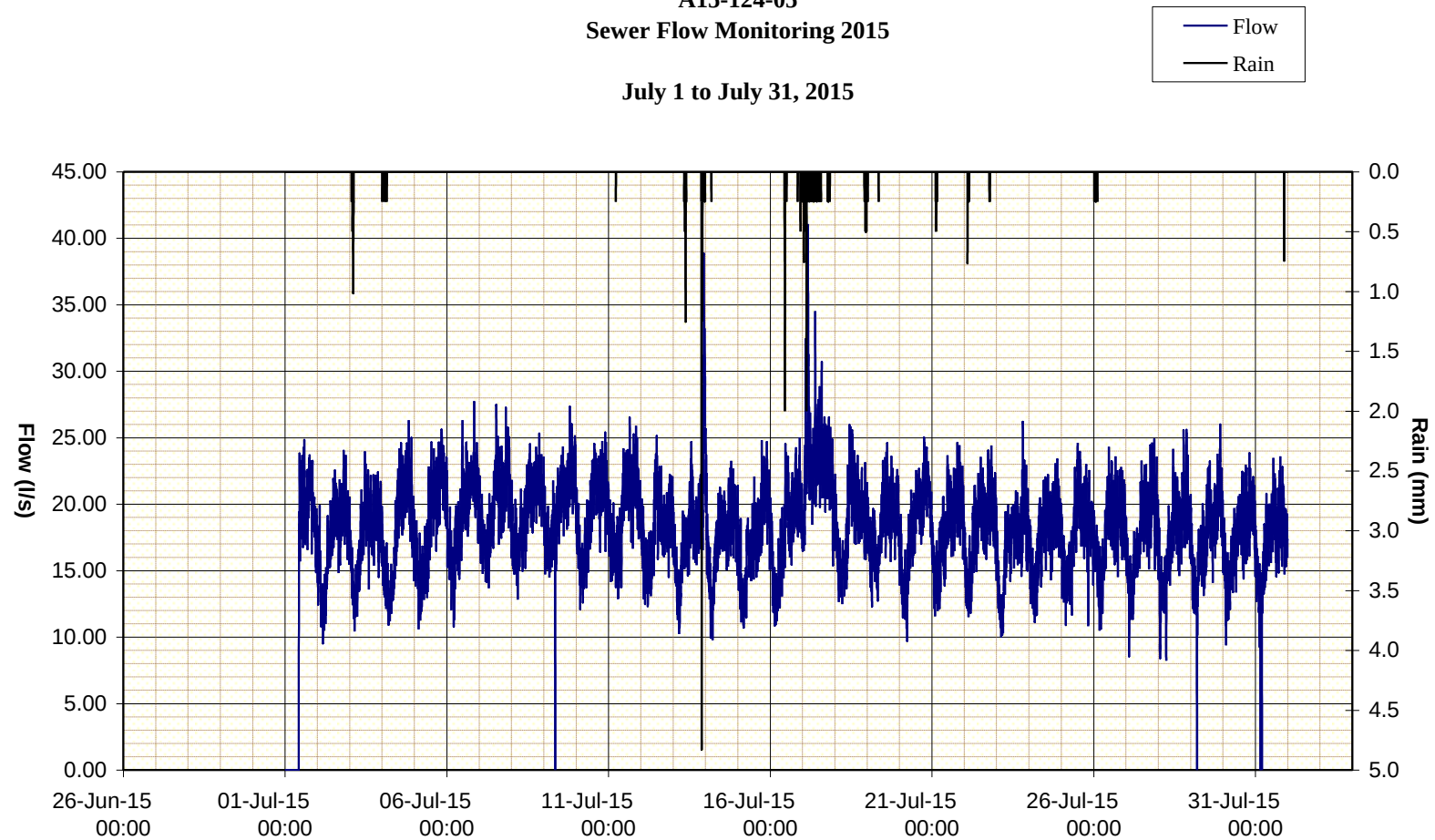
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	17.13	8.04	24.39	1479.99	0.0
02-Jun-15	15.31	9.66	22.70	1322.72	0.5
03-Jun-15	15.76	10.25	22.85	1361.51	0.0
04-Jun-15	16.55	9.77	23.59	1429.96	0.0
05-Jun-15	16.09	9.34	21.73	1390.35	0.0
06-Jun-15	16.06	8.78	22.49	1387.88	0.0
07-Jun-15	16.21	9.33	24.91	1400.15	0.0
08-Jun-15	15.13	9.29	20.55	1307.23	0.0
09-Jun-15	14.66	7.53	26.19	1266.95	0.0
10-Jun-15	17.38	7.50	23.98	1501.85	0.0
11-Jun-15	18.46	12.29	30.68	1594.68	16.5
12-Jun-15	20.26	12.14	29.03	1750.55	0.3
13-Jun-15	24.37	18.68	29.69	2105.36	10.8
14-Jun-15	21.24	13.47	30.45	1835.41	1.5
15-Jun-15	19.50	13.19	27.66	1684.76	0.0
16-Jun-15	15.50	0.00	26.90	1339.24	3.5
17-Jun-15	0.00	0.00	0.00	0.00	0.0
18-Jun-15	0.00	0.00	0.00	0.00	0.0
19-Jun-15	0.00	0.00	0.00	0.00	0.0
20-Jun-15	0.00	0.00	0.00	0.00	3.0
21-Jun-15	0.00	0.00	0.00	0.00	0.5
22-Jun-15	0.00	0.00	0.00	0.00	8.5
23-Jun-15	0.00	0.00	0.00	0.00	0.0
24-Jun-15	0.00	0.00	0.00	0.00	0.0
25-Jun-15	0.00	0.00	0.00	0.00	4.0
26-Jun-15	0.00	0.00	0.00	0.00	1.5
27-Jun-15	0.00	0.00	0.00	0.00	0.0
28-Jun-15	0.00	0.00	0.00	0.00	0.0
29-Jun-15	0.00	0.00	0.00	0.00	0.0
30-Jun-15	0.00	0.00	0.00	0.00	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
24158.580	0.000	30.680	50.5

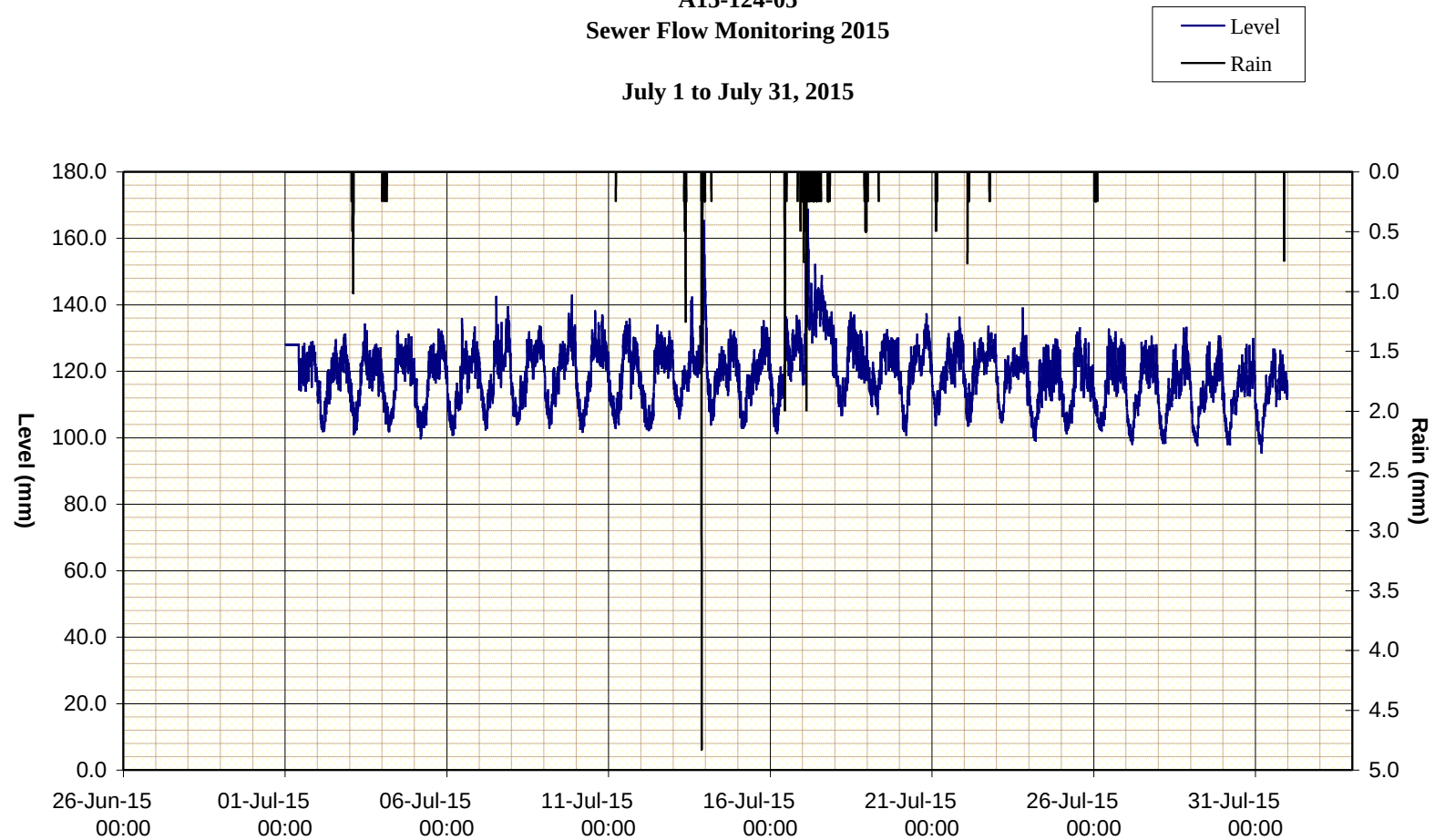
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



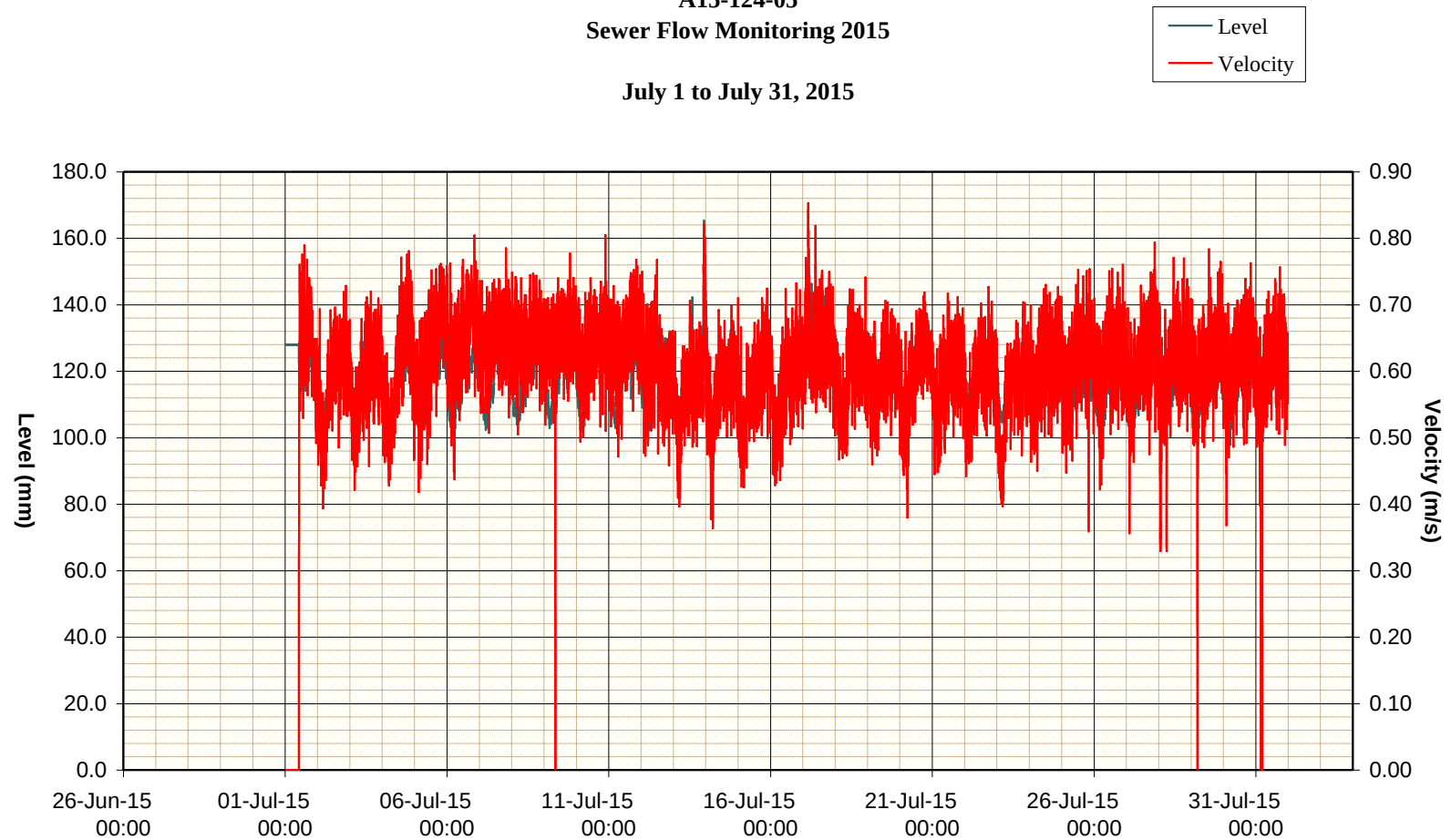
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



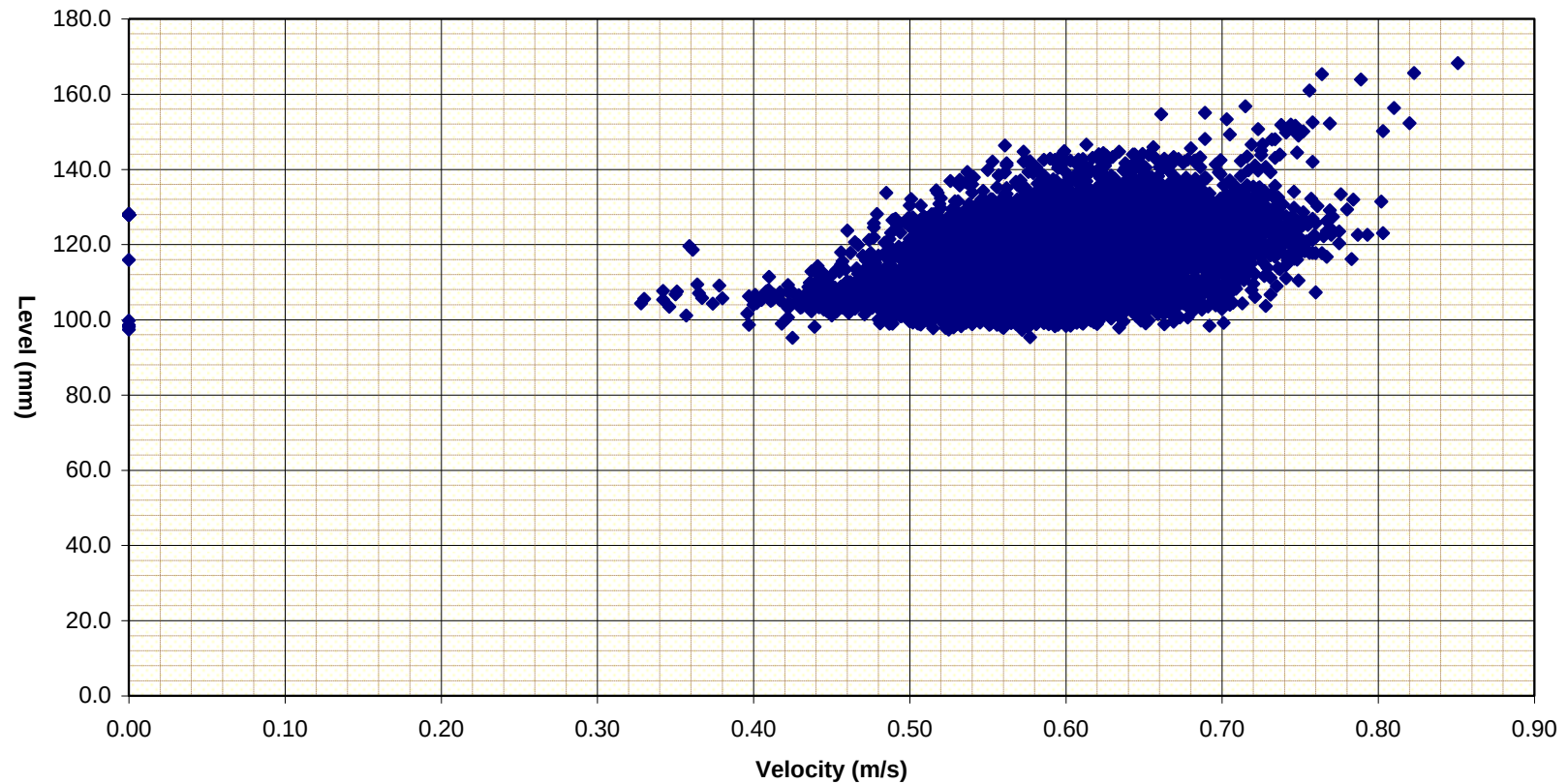
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta

A15-124-05

Sewer Flow Monitoring 2015

July 1 to July 31, 2015

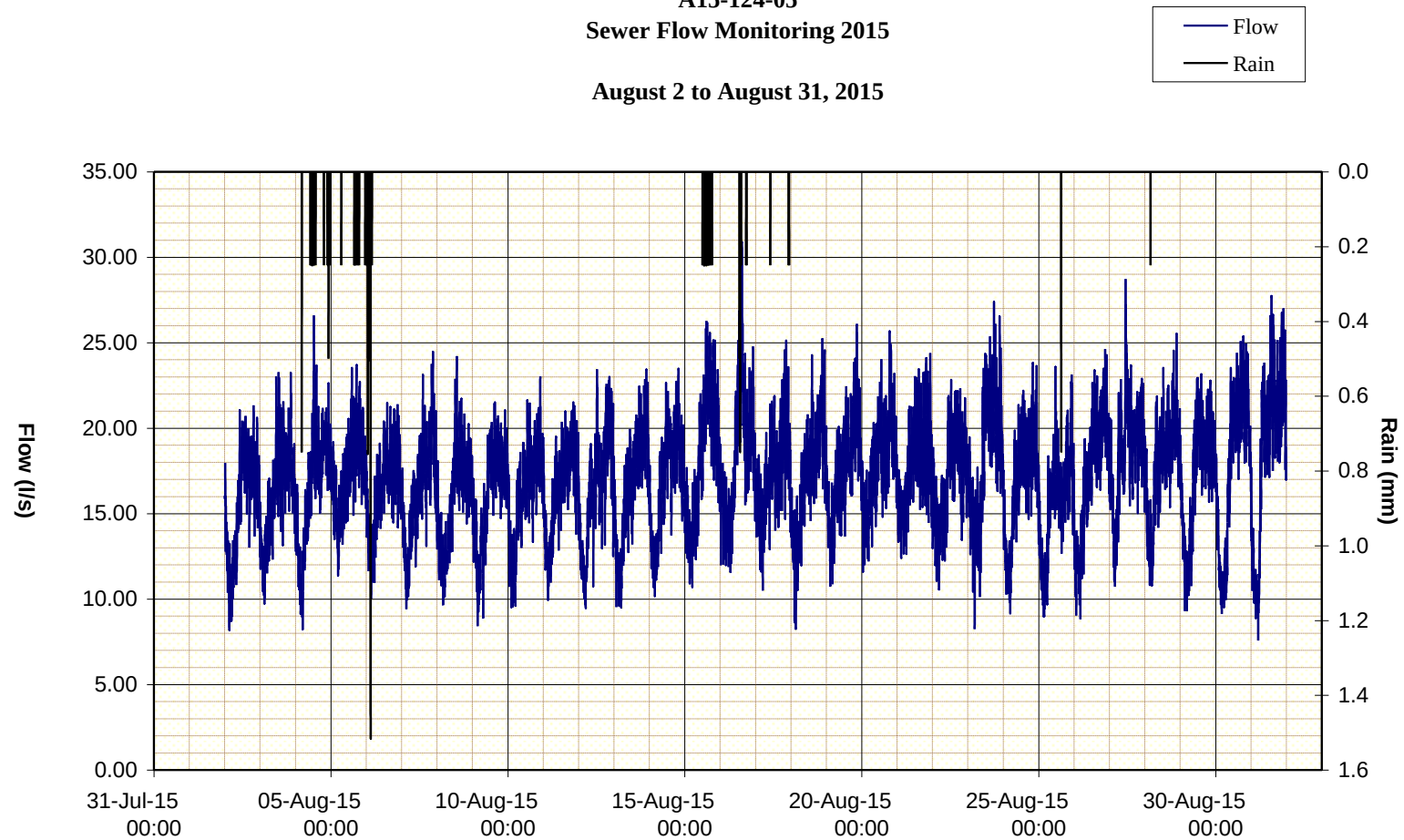
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	11.28	0.00	24.70	974.41	0.0
02-Jul-15	17.22	9.58	24.00	1487.71	0.0
03-Jul-15	17.53	10.42	23.86	1514.97	6.3
04-Jul-15	17.92	11.02	26.32	1548.56	1.0
05-Jul-15	18.70	10.58	25.53	1615.61	0.0
06-Jul-15	19.23	10.81	27.68	1661.04	0.0
07-Jul-15	19.87	13.67	27.35	1716.83	0.0
08-Jul-15	19.51	12.81	25.26	1685.28	0.0
09-Jul-15	19.81	0.00	27.32	1711.61	0.0
10-Jul-15	19.30	12.12	25.33	1667.18	0.0
11-Jul-15	19.38	12.85	26.42	1674.69	0.3
12-Jul-15	18.03	12.34	25.06	1557.46	0.0
13-Jul-15	18.21	10.22	38.71	1573.13	22.5
14-Jul-15	17.54	9.76	25.56	1515.35	0.3
15-Jul-15	17.35	10.80	24.81	1498.96	0.0
16-Jul-15	17.86	10.91	25.02	1542.77	7.8
17-Jul-15	22.99	15.50	40.83	1986.75	22.3
18-Jul-15	18.72	12.47	25.87	1616.98	4.8
19-Jul-15	18.51	12.33	24.54	1598.96	0.8
20-Jul-15	18.22	9.72	25.00	1573.84	0.0
21-Jul-15	18.02	11.56	24.59	1557.29	3.0
22-Jul-15	18.07	11.50	24.41	1561.45	3.3
23-Jul-15	16.94	10.09	26.06	1463.22	0.0
24-Jul-15	17.56	11.21	23.29	1517.42	0.0
25-Jul-15	17.80	10.83	24.62	1537.89	0.0
26-Jul-15	17.94	10.49	24.32	1549.96	2.5
27-Jul-15	17.87	8.56	24.87	1543.86	0.0
28-Jul-15	17.47	8.23	25.57	1509.58	0.0
29-Jul-15	17.50	0.00	25.96	1512.16	0.0
30-Jul-15	17.46	9.38	23.78	1508.50	0.0
31-Jul-15	17.00	0.00	23.60	1469.01	1.5

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
48452.391	0.000	40.830	76.0

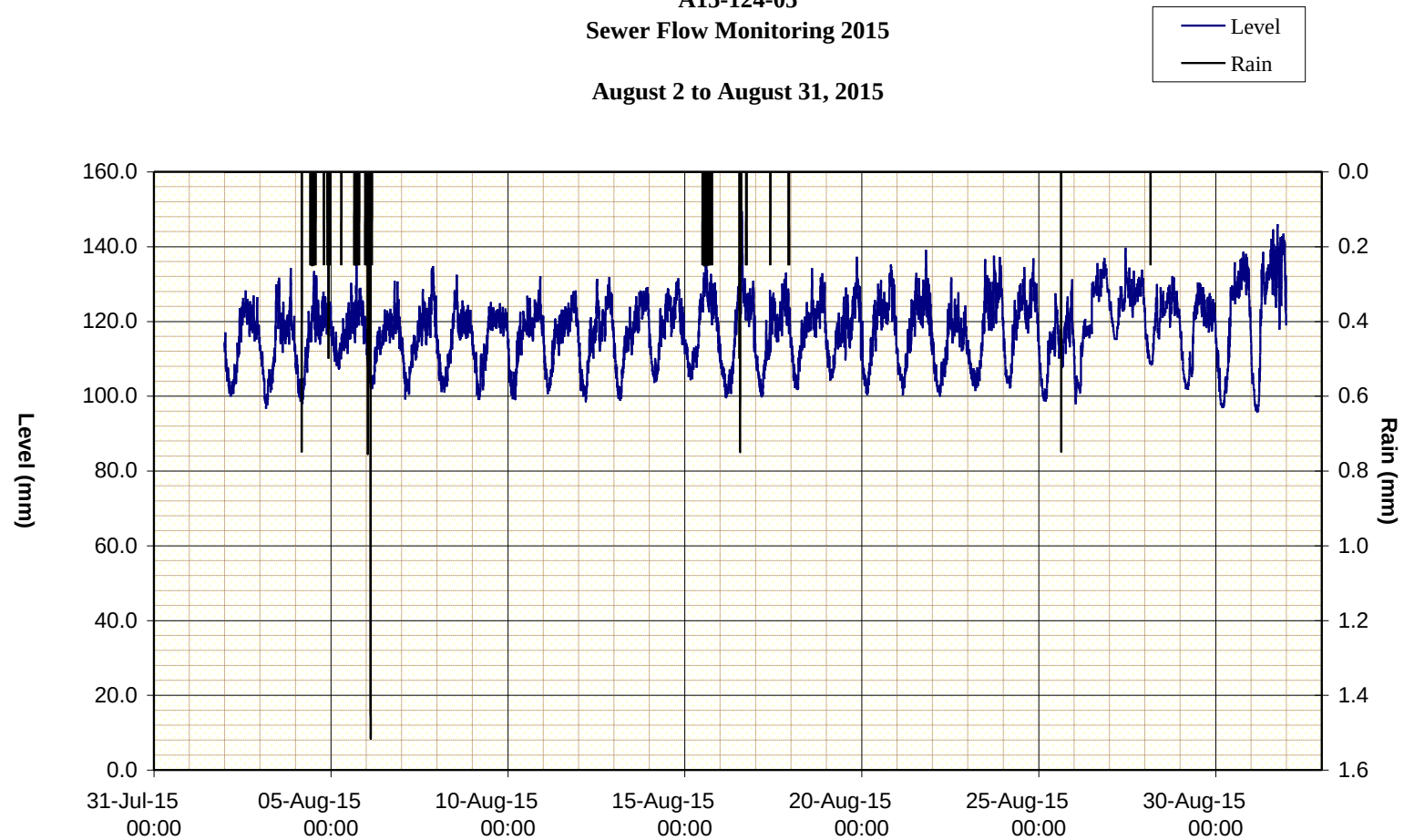
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

August 2 to August 31, 2015



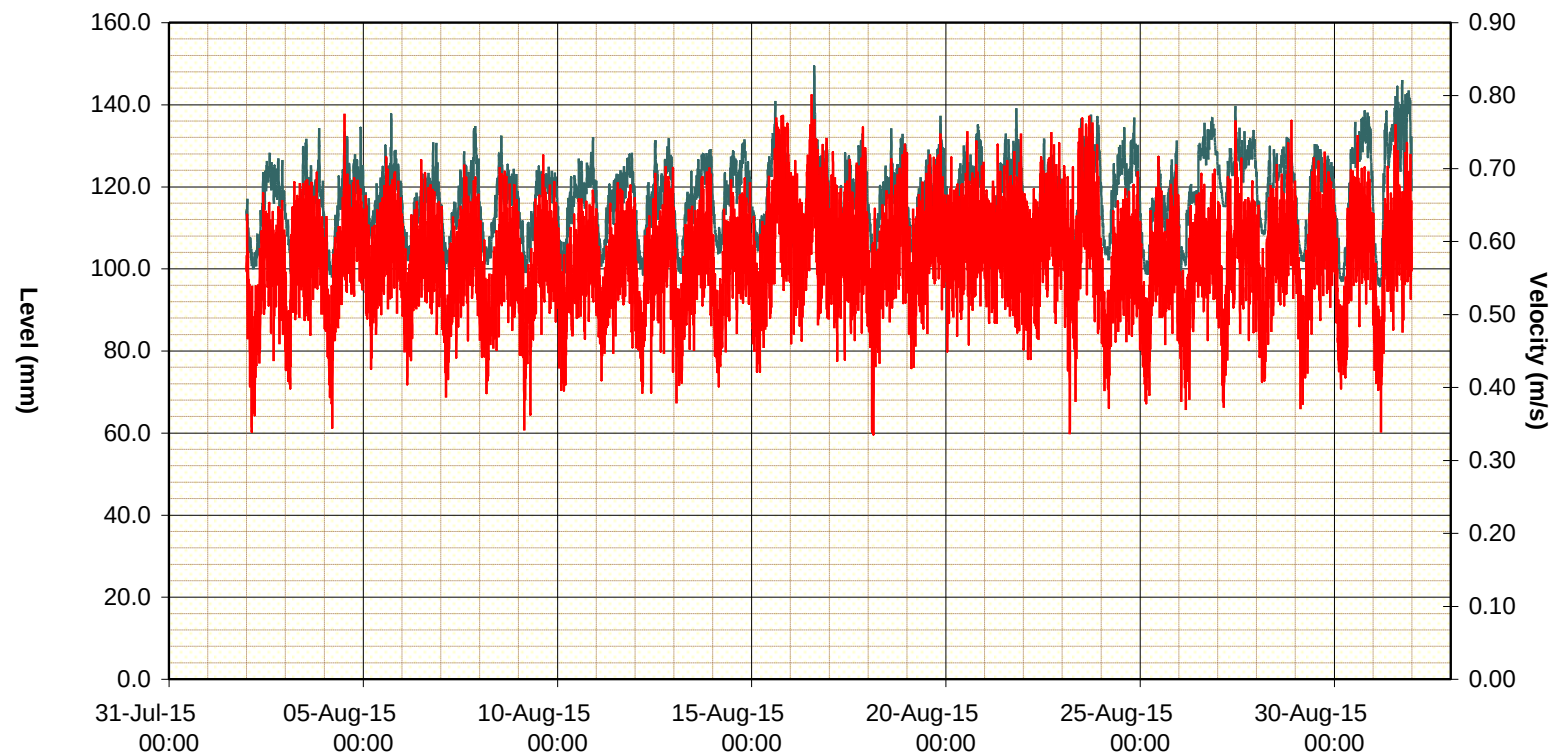
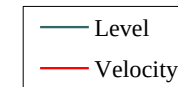
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

August 2 to August 31, 2015



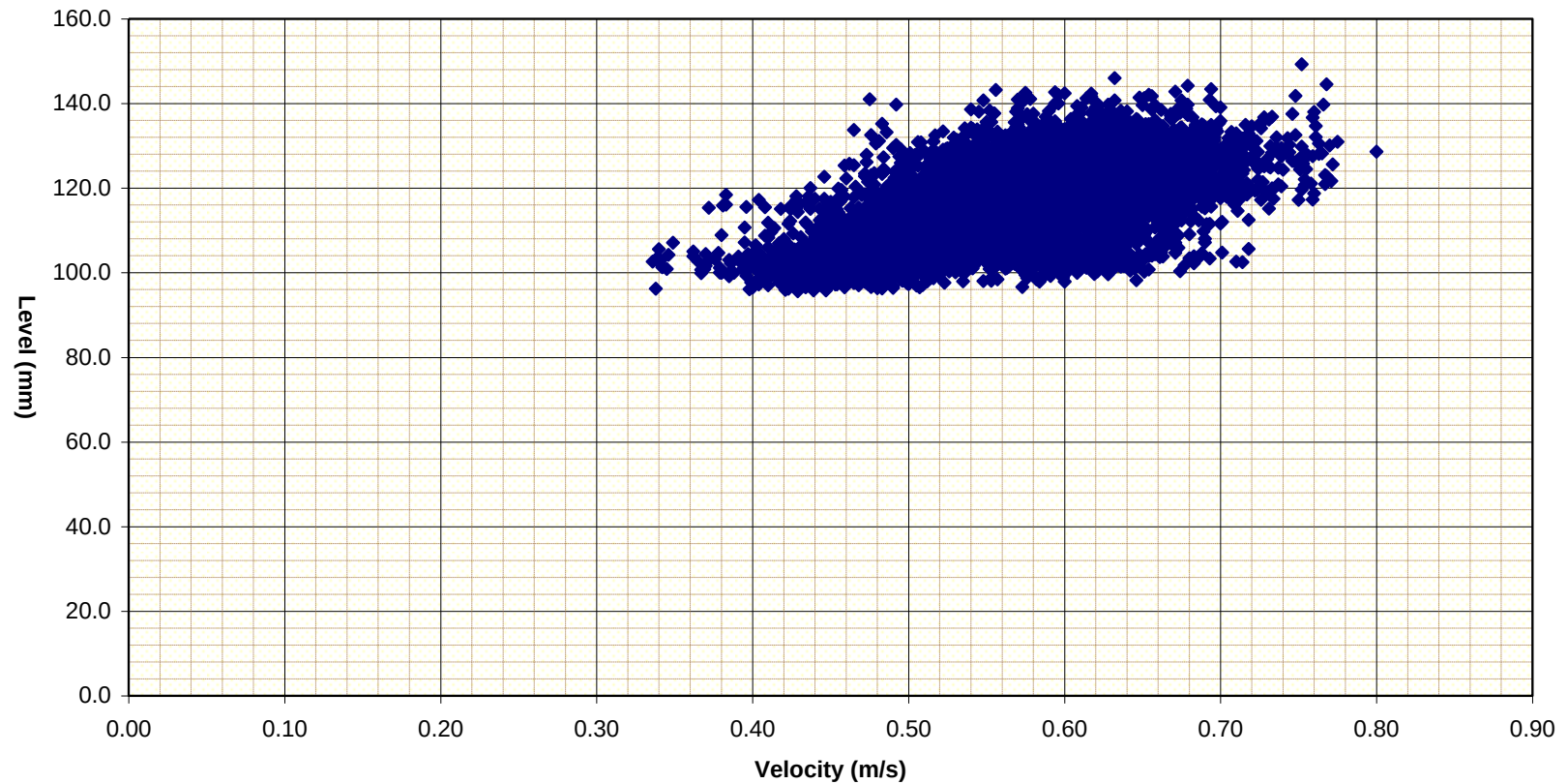
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

August 2 to August 31, 2015



**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

August 2 to August 31, 2015



Cold Lake, Alberta

A15-124-05

Sewer Flow Monitoring 2015

August 2 to August 31, 2015

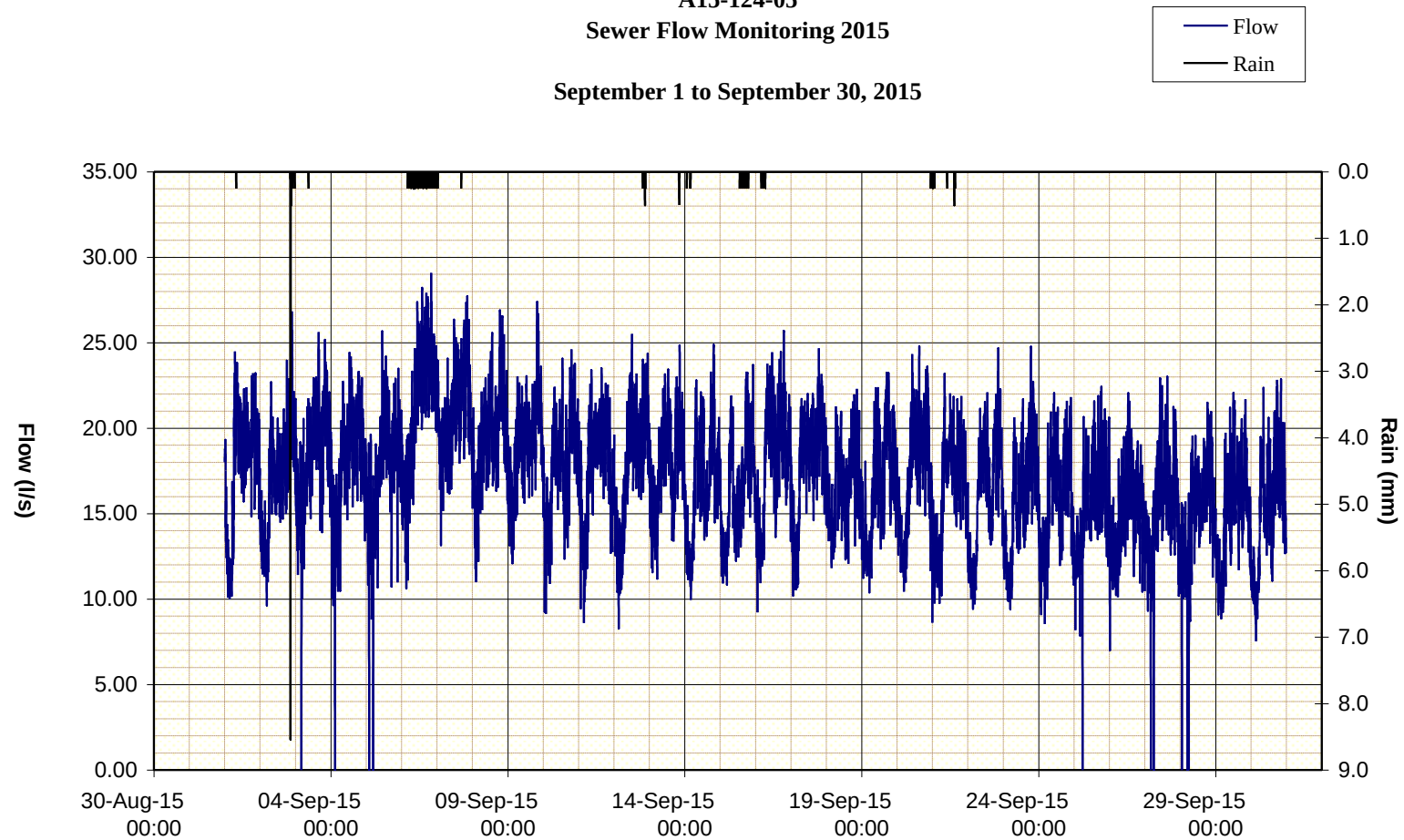
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
02-Aug-15	15.57	8.25	21.34	1345.38	0.0
03-Aug-15	16.20	9.77	23.28	1399.38	0.0
04-Aug-15	16.43	8.25	26.60	1419.93	8.5
05-Aug-15	17.46	11.41	23.64	1508.57	2.3
06-Aug-15	16.32	10.11	21.40	1410.45	12.0
07-Aug-15	16.32	9.41	24.45	1409.76	0.0
08-Aug-15	15.93	9.64	24.14	1376.56	0.0
09-Aug-15	16.02	8.41	21.47	1384.45	0.0
10-Aug-15	16.11	9.52	23.03	1391.48	0.0
11-Aug-15	16.56	9.97	21.49	1431.07	0.0
12-Aug-15	16.31	9.50	23.45	1408.82	0.0
13-Aug-15	16.54	9.52	23.39	1429.03	0.0
14-Aug-15	16.90	10.22	23.37	1460.41	0.0
15-Aug-15	18.14	10.77	26.27	1567.41	7.8
16-Aug-15	18.45	11.61	30.82	1594.27	4.5
17-Aug-15	17.28	10.49	25.10	1492.73	0.8
18-Aug-15	17.06	8.36	25.16	1473.89	0.0
19-Aug-15	17.89	10.83	26.10	1546.00	0.0
20-Aug-15	17.97	11.65	25.56	1552.46	0.0
21-Aug-15	17.96	12.43	24.40	1551.35	0.0
22-Aug-15	17.14	10.60	22.81	1481.16	0.0
23-Aug-15	18.20	8.24	27.38	1572.73	0.0
24-Aug-15	16.78	9.17	23.72	1449.85	0.0
25-Aug-15	15.66	8.96	23.57	1352.87	0.8
26-Aug-15	17.38	8.82	24.62	1502.02	0.0
27-Aug-15	18.61	10.73	28.72	1607.87	0.0
28-Aug-15	17.78	10.83	25.51	1536.18	0.3
29-Aug-15	17.09	9.29	23.12	1476.39	0.0
30-Aug-15	17.64	9.13	25.27	1523.85	0.0
31-Aug-15	18.65	7.58	27.61	1611.67	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
44267.967	7.580	30.820	36.8

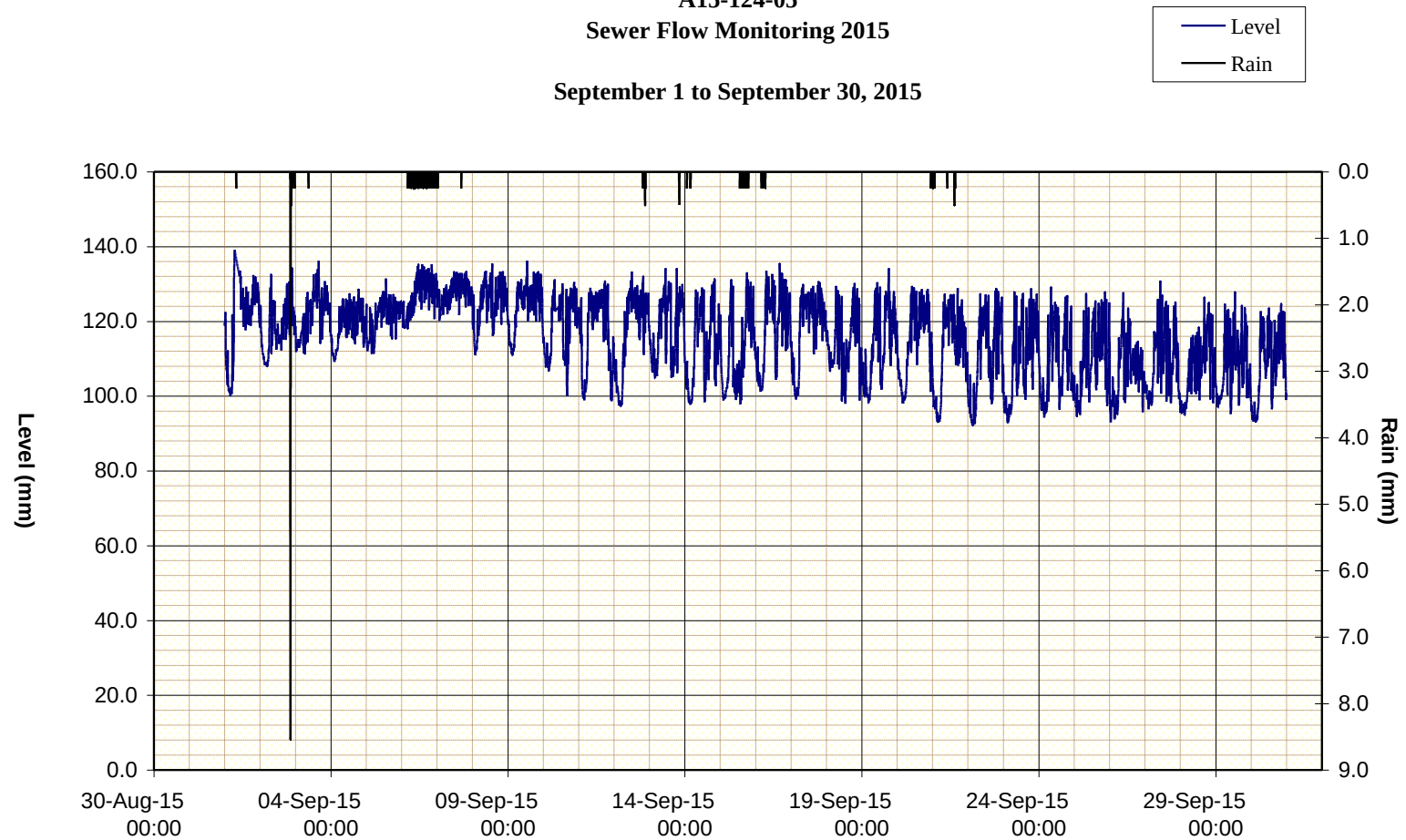
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



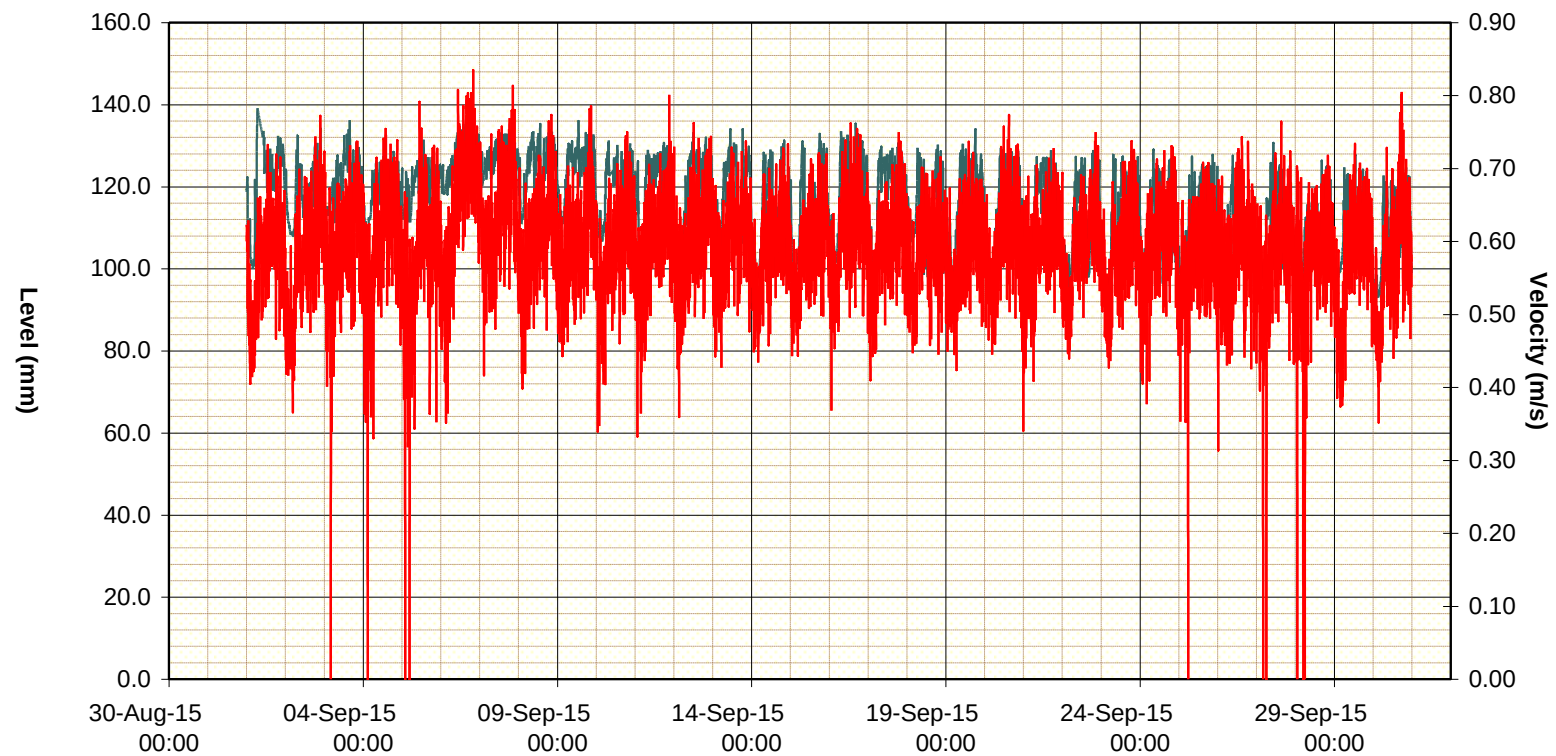
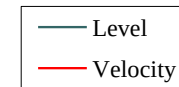
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



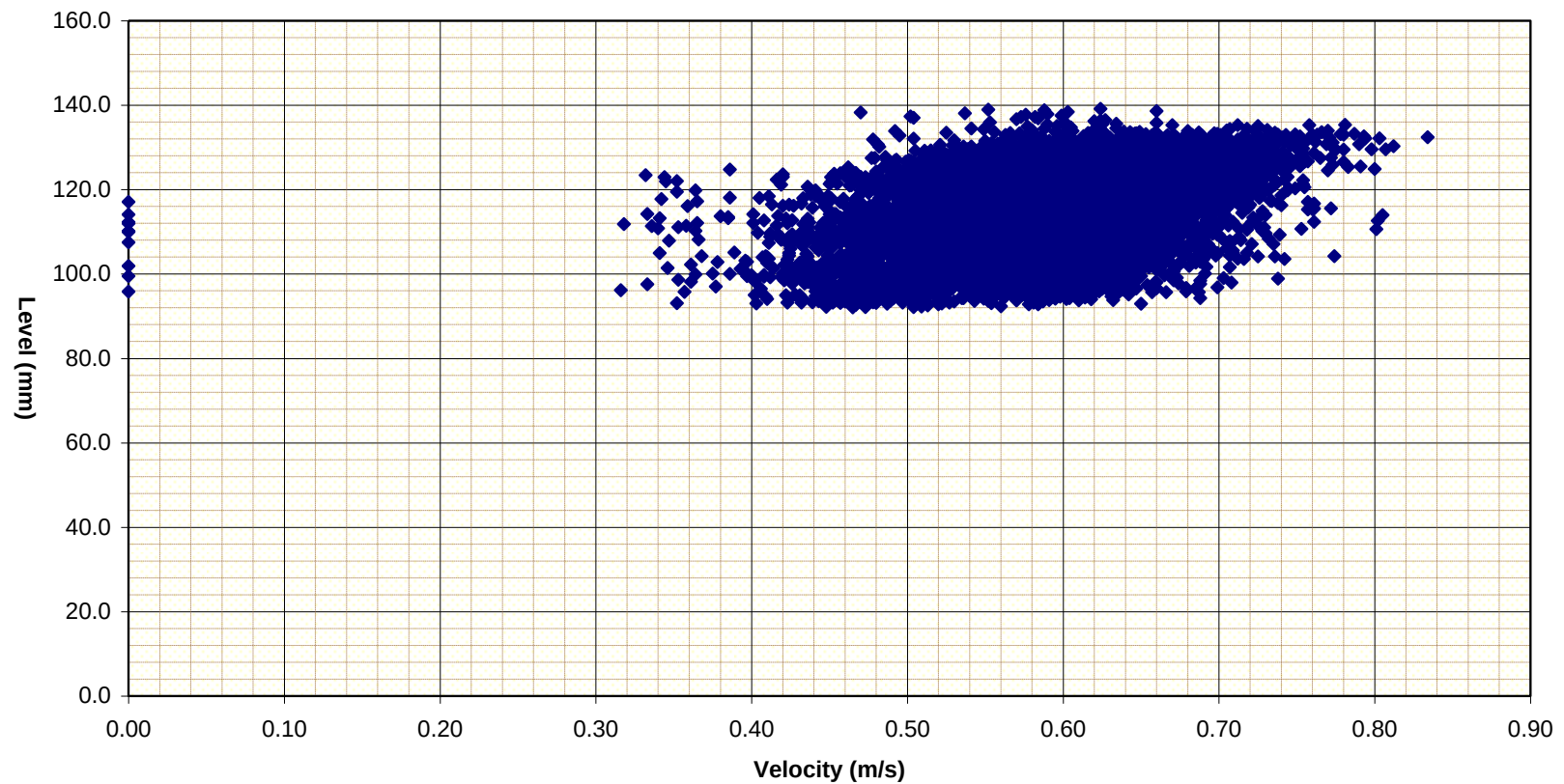
**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



Cold Lake, Alberta

A15-124-05

Sewer Flow Monitoring 2015

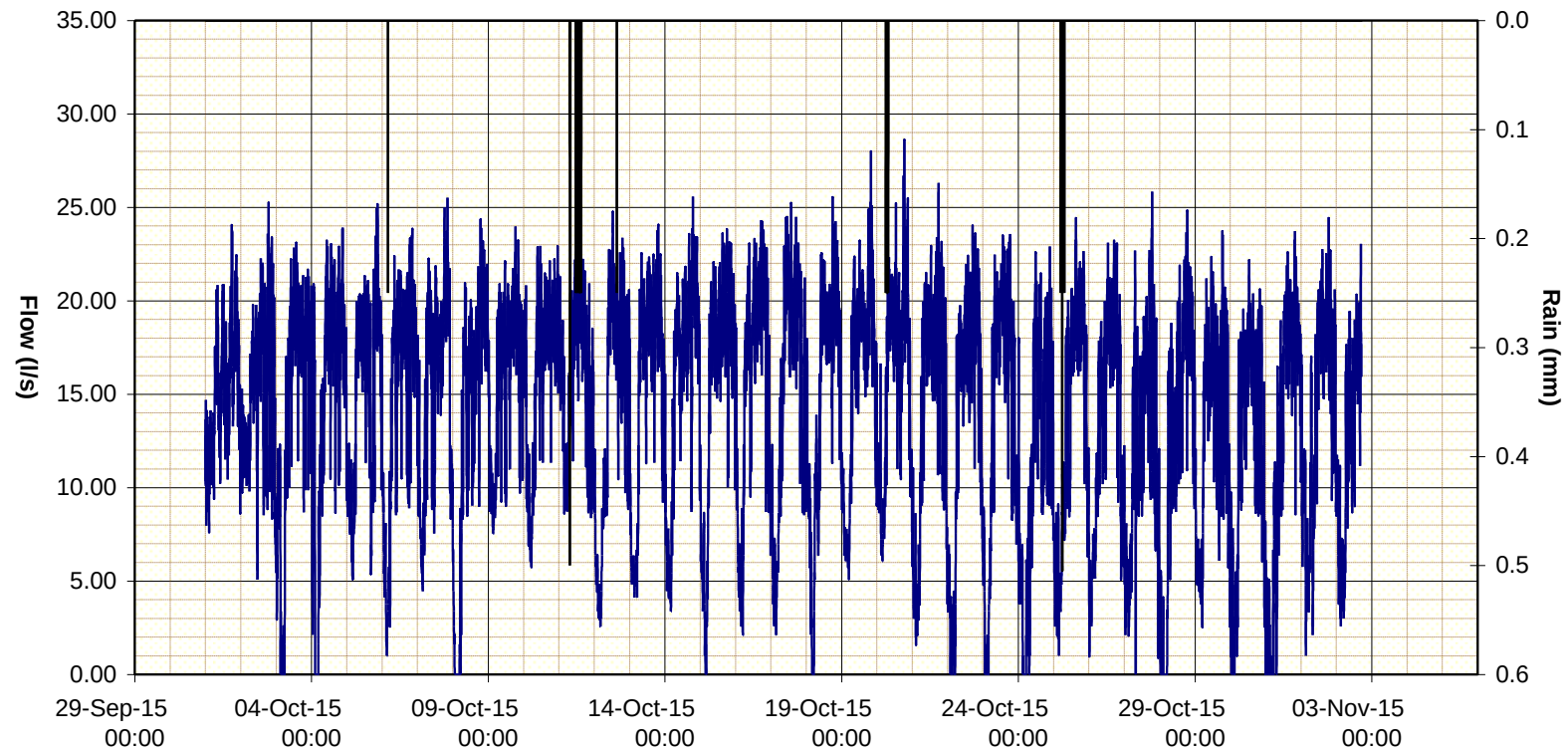
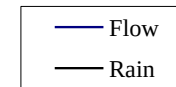
September 1 to September 30, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	17.96	9.98	24.48	1551.59	0.3
02-Sep-15	17.11	9.65	26.84	1477.98	19.3
03-Sep-15	18.57	0.00	25.62	1604.70	0.3
04-Sep-15	17.79	0.00	24.39	1537.40	0.0
05-Sep-15	17.64	0.00	25.64	1524.05	0.0
06-Sep-15	21.22	10.65	29.08	1833.08	21.8
07-Sep-15	21.00	13.26	27.67	1814.78	0.5
08-Sep-15	19.35	11.11	26.78	1671.57	0.0
09-Sep-15	19.08	12.13	27.35	1648.15	0.0
10-Sep-15	17.77	9.13	24.61	1535.30	0.0
11-Sep-15	17.65	8.60	23.46	1525.19	0.0
12-Sep-15	17.84	8.31	25.52	1541.71	3.0
13-Sep-15	17.84	11.21	24.72	1541.28	1.5
14-Sep-15	16.71	9.96	24.70	1443.47	0.8
15-Sep-15	16.48	10.87	23.63	1424.16	3.0
16-Sep-15	17.99	9.23	25.59	1554.05	1.8
17-Sep-15	17.85	10.22	24.67	1542.41	0.0
18-Sep-15	16.76	11.81	22.30	1447.82	0.0
19-Sep-15	16.62	10.40	23.29	1435.58	0.0
20-Sep-15	17.15	10.44	24.70	1481.36	1.5
21-Sep-15	16.48	8.62	23.16	1423.50	3.3
22-Sep-15	16.13	9.45	24.65	1393.80	0.0
23-Sep-15	15.81	9.42	24.66	1365.89	0.0
24-Sep-15	15.77	8.54	21.96	1362.88	0.0
25-Sep-15	15.56	0.00	22.23	1344.17	0.0
26-Sep-15	15.15	7.07	22.04	1308.53	0.0
27-Sep-15	15.34	0.00	22.97	1325.53	0.0
28-Sep-15	15.06	0.00	21.44	1301.29	0.0
29-Sep-15	15.08	8.88	22.05	1302.52	0.0
30-Sep-15	15.20	7.53	22.83	1312.92	0.0

Statistics

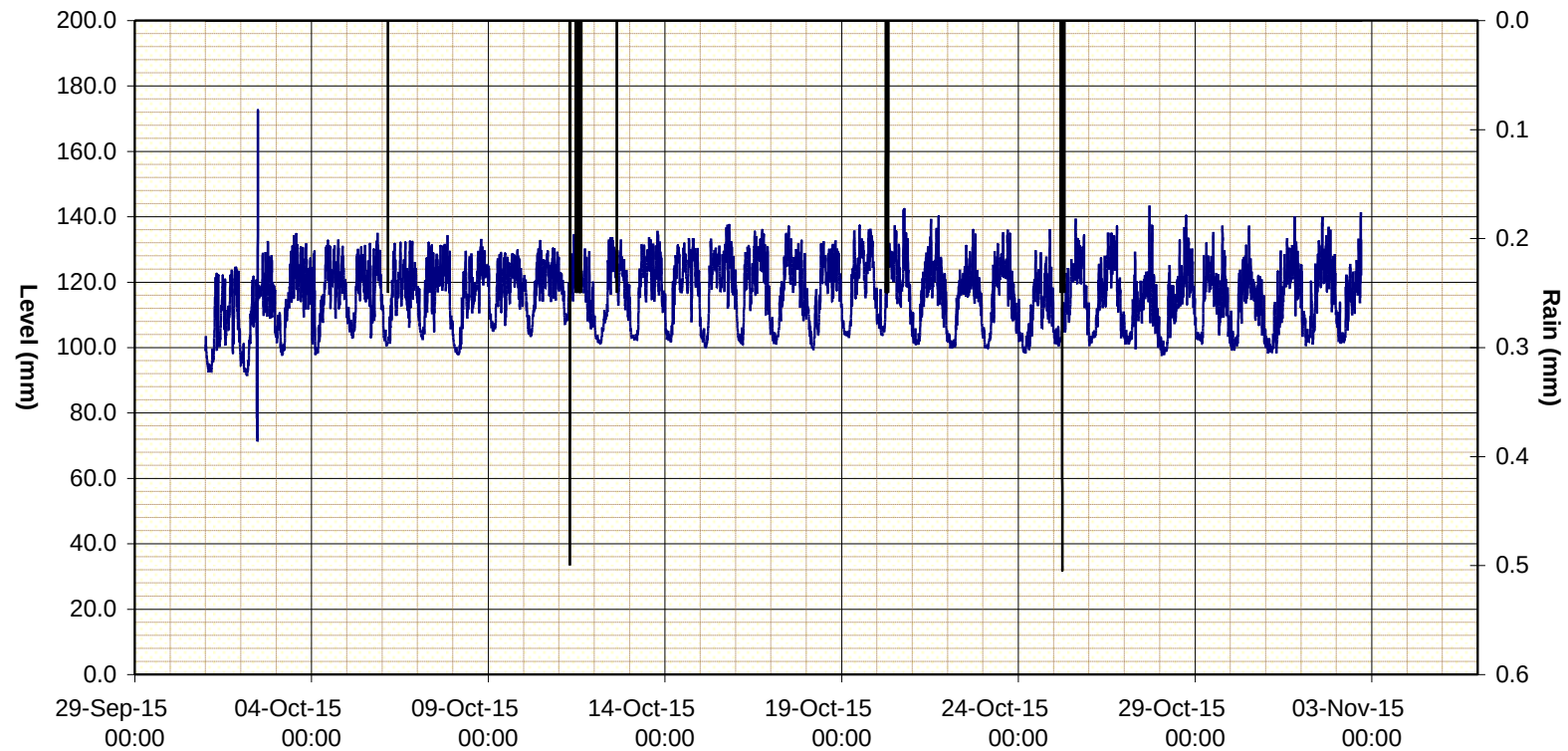
Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
44576.634	0.000	29.080	56.8

Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015
October 1 to November 2, 2015

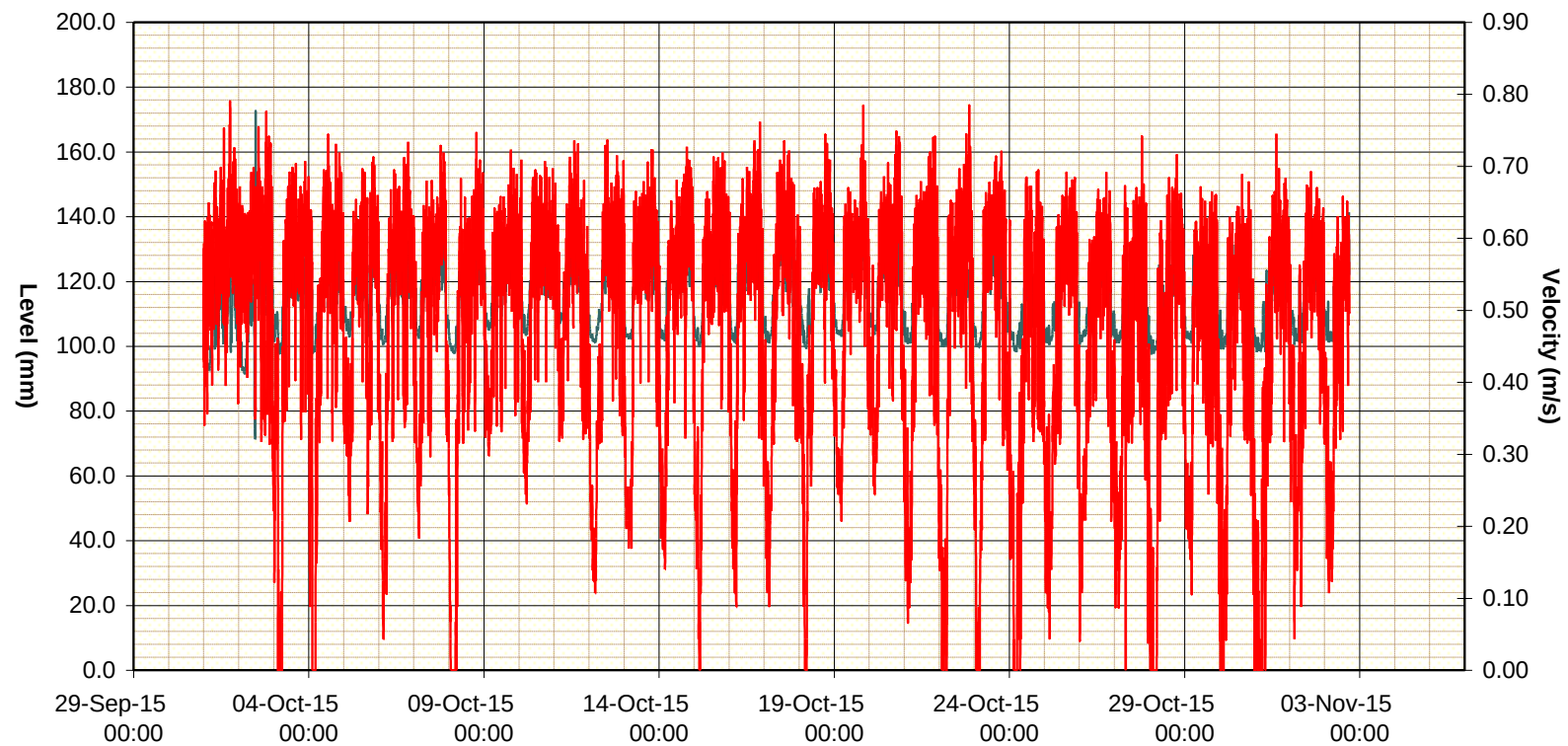
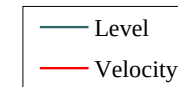


**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**

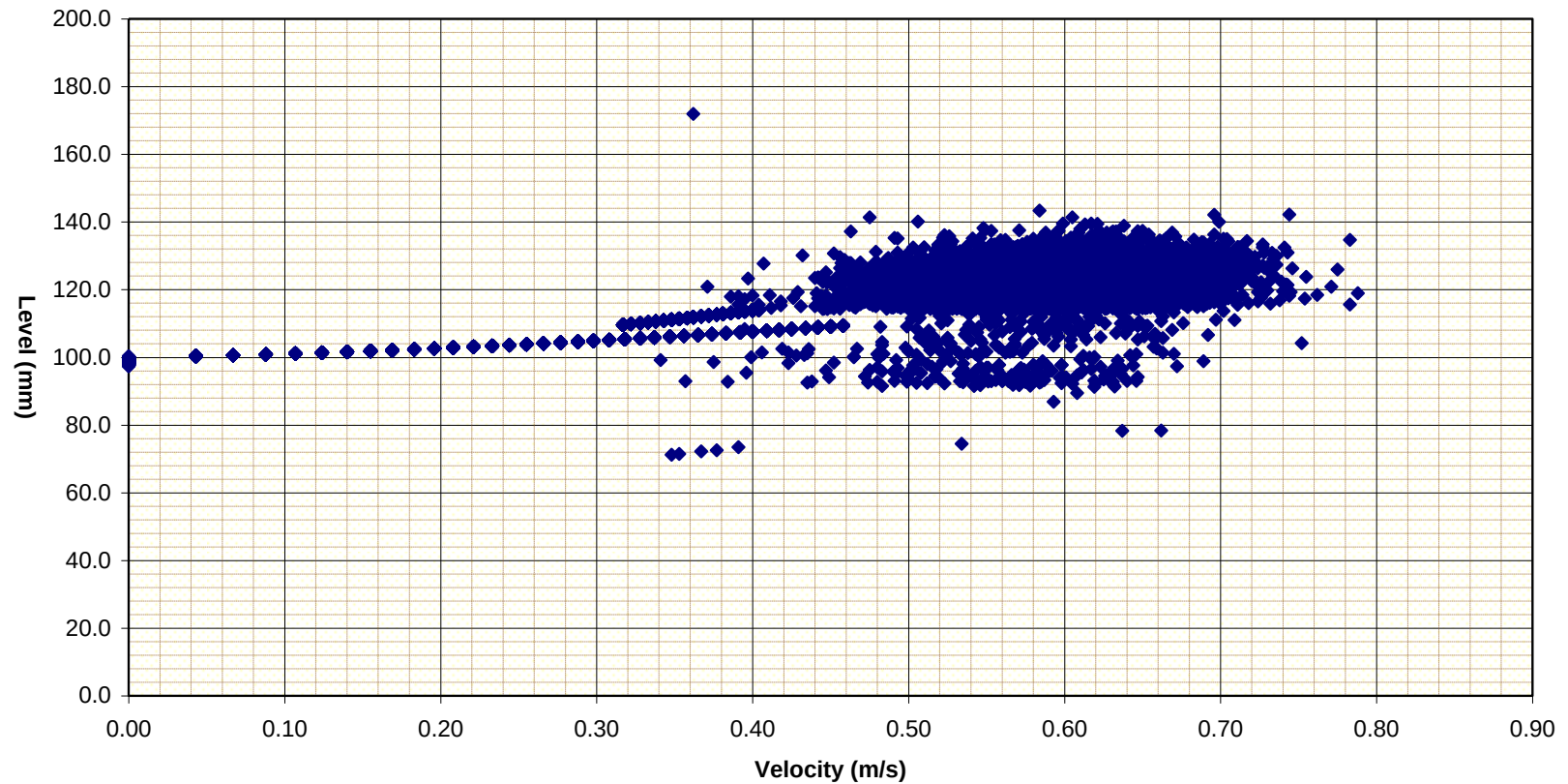
— Level
— Rain



**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



**Cold Lake, Alberta
A15-124-05
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



Cold Lake, Alberta

A15-124-05

Sewer Flow Monitoring 2015

October 1 to November 2, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Oct-15	15.09	7.62	24.01	1304.06	0.0
02-Oct-15	15.00	5.08	25.23	1295.85	0.0
03-Oct-15	14.00	0.00	23.09	1209.89	0.0
04-Oct-15	14.46	0.00	23.91	1249.15	0.0
05-Oct-15	15.10	5.12	25.13	1304.29	0.0
06-Oct-15	14.34	1.01	23.78	1238.80	0.3
07-Oct-15	15.24	4.46	25.51	1316.44	0.0
08-Oct-15	13.09	0.00	24.38	1130.88	0.0
09-Oct-15	15.95	7.54	23.98	1378.22	0.0
10-Oct-15	16.05	5.77	22.93	1386.72	0.0
11-Oct-15	15.83	8.37	25.01	1367.48	4.0
12-Oct-15	13.83	2.56	24.71	1195.33	0.3
13-Oct-15	15.21	4.11	24.02	1314.51	0.0
14-Oct-15	15.54	3.38	25.58	1342.65	0.0
15-Oct-15	15.33	0.00	23.82	1324.61	0.0
16-Oct-15	15.44	2.11	24.32	1333.91	0.0
17-Oct-15	14.79	2.11	25.16	1278.21	0.0
18-Oct-15	14.47	0.00	25.49	1250.36	0.0
19-Oct-15	15.60	5.13	27.94	1347.90	0.0
20-Oct-15	15.89	6.07	28.59	1372.76	2.3
21-Oct-15	13.89	1.61	26.31	1199.82	0.0
22-Oct-15	13.55	0.00	24.01	1170.86	0.0
23-Oct-15	13.74	0.00	23.57	1186.85	0.0
24-Oct-15	10.84	0.00	22.91	936.96	0.0
25-Oct-15	13.03	1.01	24.40	1125.72	2.3
26-Oct-15	13.55	1.01	23.19	1170.74	0.0
27-Oct-15	11.73	0.00	25.84	1013.40	0.0
28-Oct-15	12.08	0.00	24.73	1043.78	0.0
29-Oct-15	13.04	2.56	23.70	1126.45	0.0
30-Oct-15	11.99	0.00	22.15	1035.69	0.0
31-Oct-15	12.01	0.00	23.73	1037.68	0.0
01-Nov-15	13.81	1.01	24.41	1193.02	0.0
02-Nov-15	11.70	2.57	23.05	1010.49	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
40193.465	0.000	28.590	9.0



FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-06
ADDRESS:	5600 49 Street
GPS:	N54.42407 W110.20228
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

CONSTANTS			
D1 (mm):		D1-lip to x-bar	
TOM (mm)	4000	Raw Weir L - lip to water	
METER #	208D00245	DATE:	12-May-15
METER #	211E0311	DATE:	12-May-15
METER #	215C01509	DATE:	27-May-15

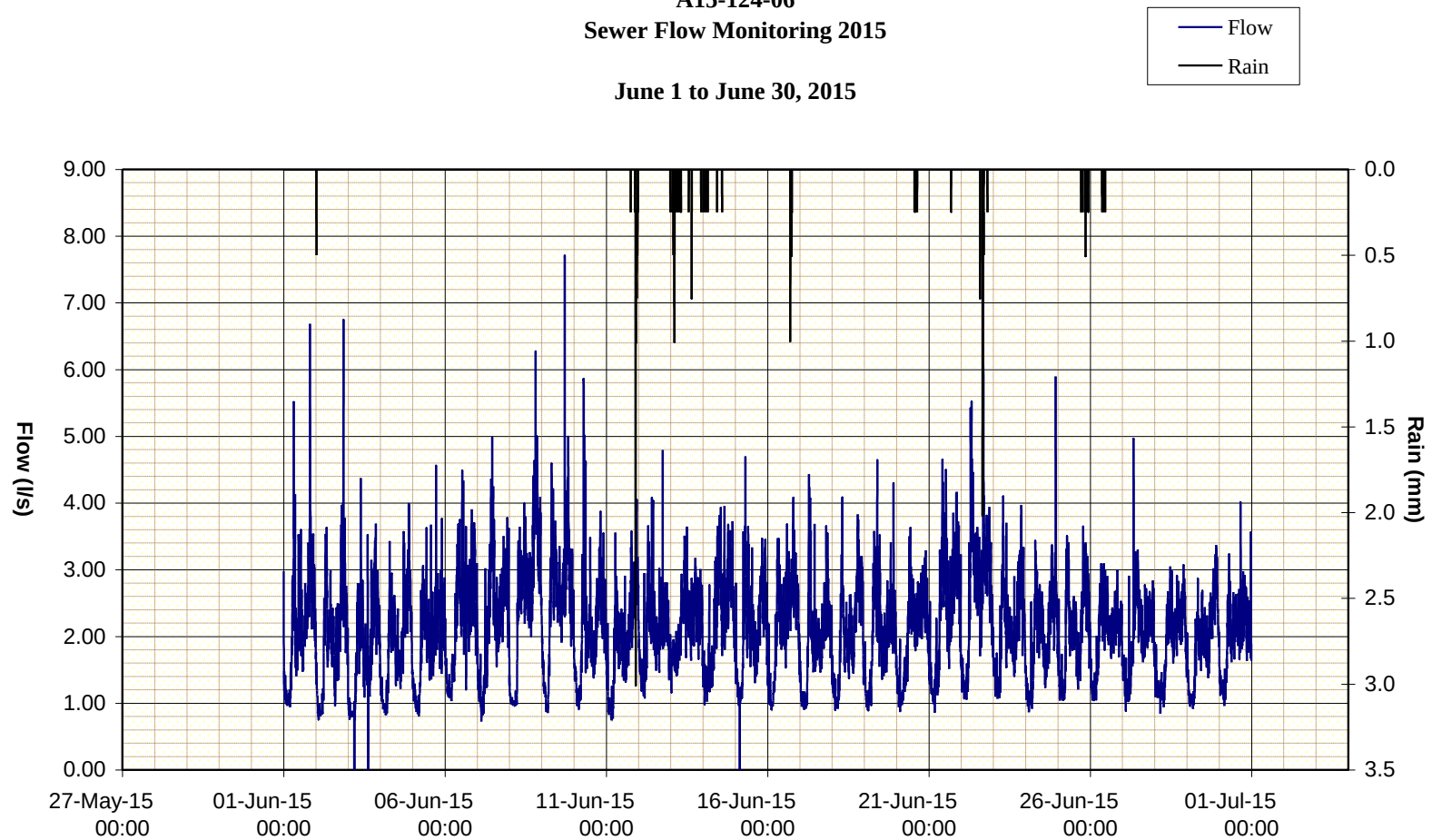
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:
30-Jun-15	Construction site - Barrel is going to be shortened and road is going to be paved - Lowered our meter to next section of MH Barrel.
2-Oct-15	MH Barrel looks as though it has been flushed/surcharged - Meter is wet, Cell Module is DOA. Removed Cell and Shortened to 1 Battery box

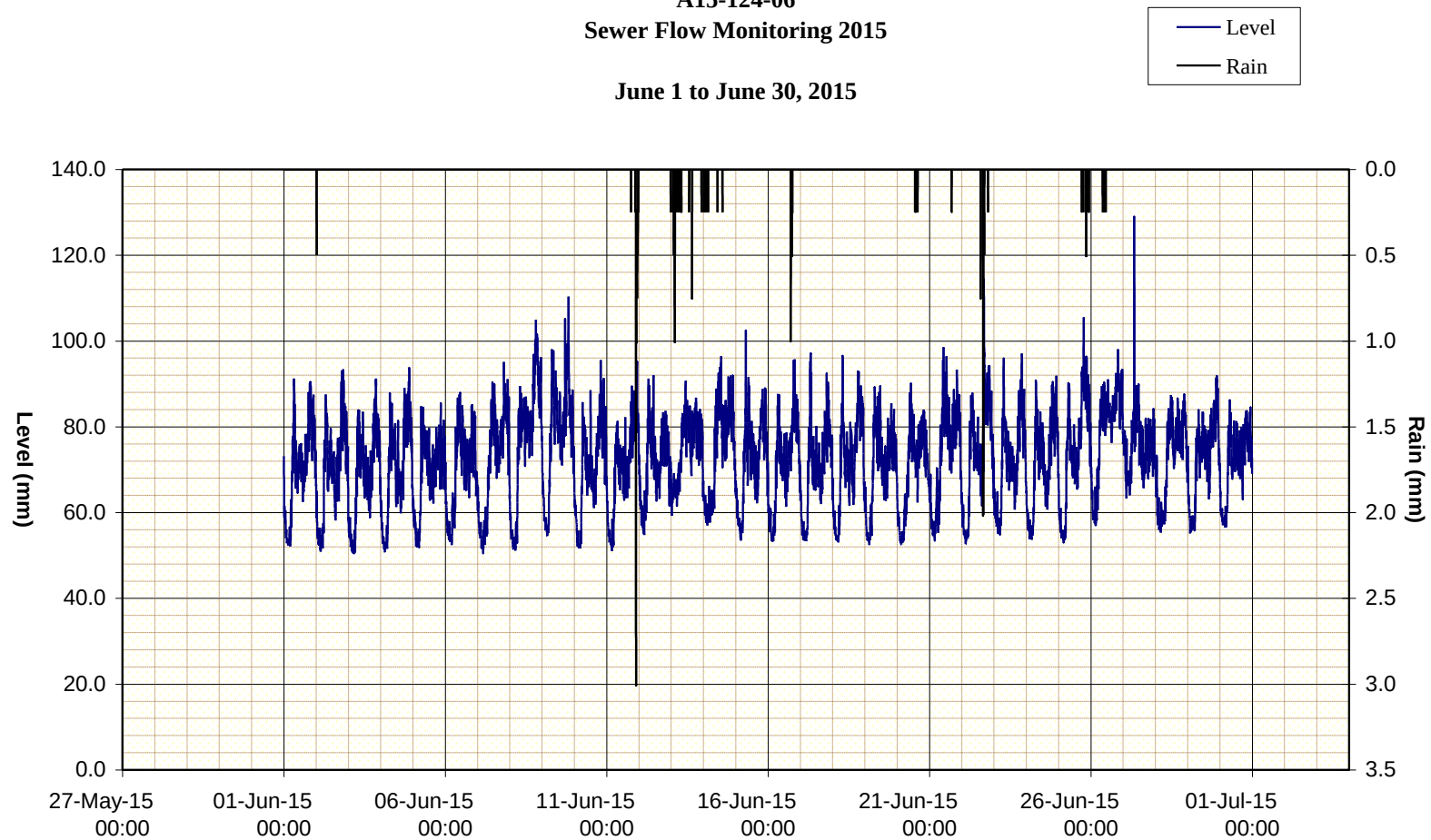
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



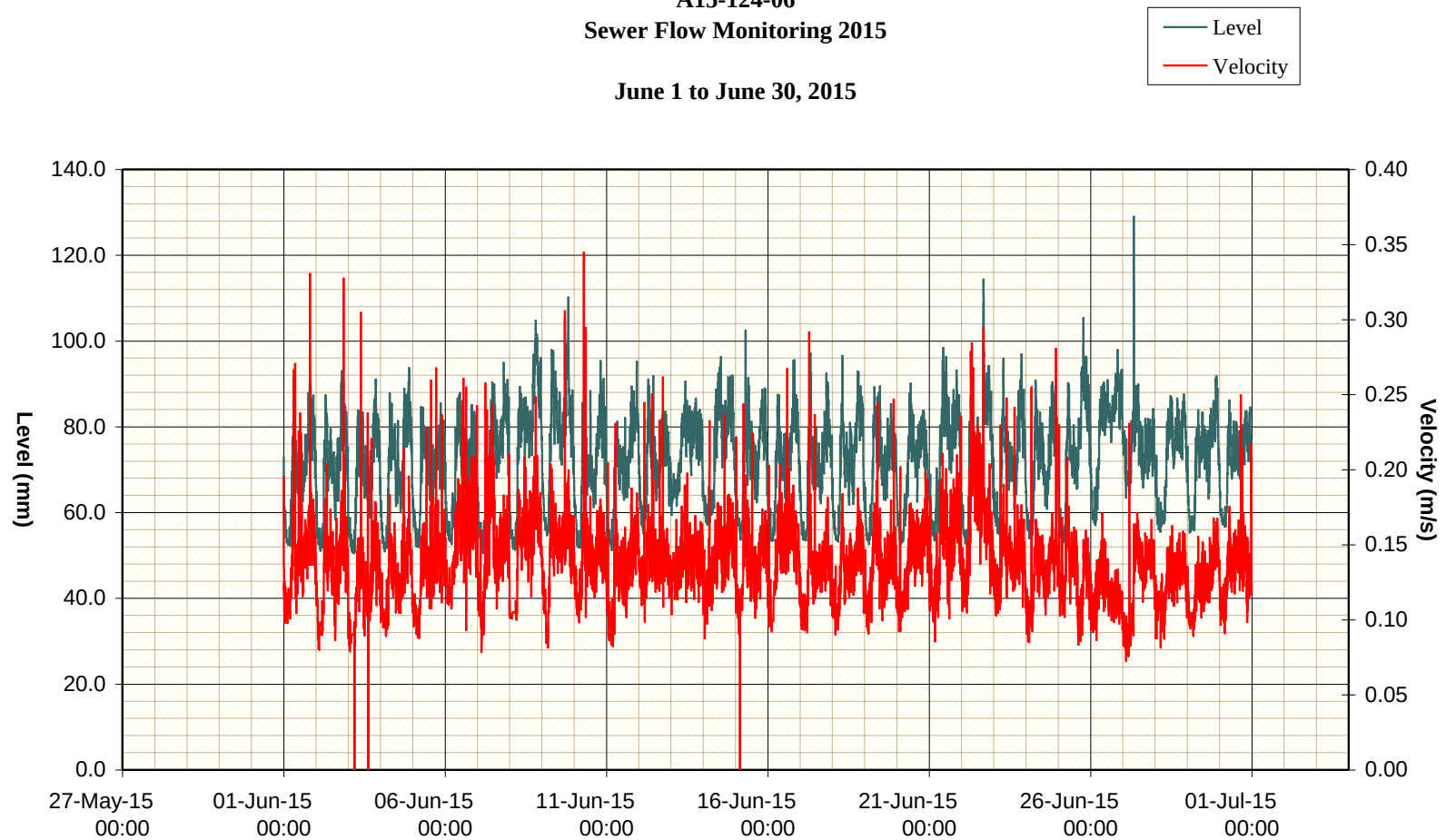
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



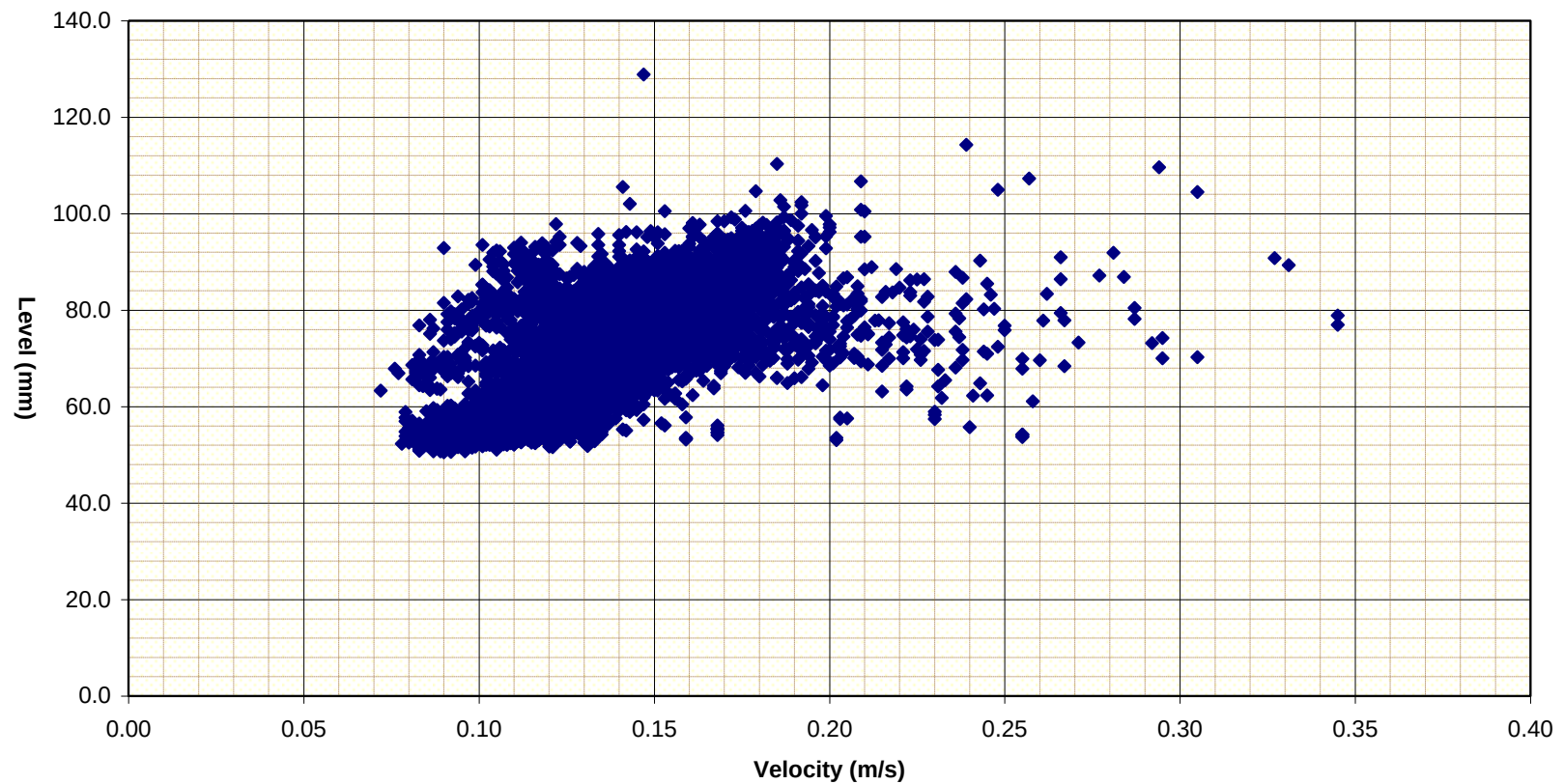
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta

A15-124-06

Sewer Flow Monitoring 2015

June 1 to June 30, 2015

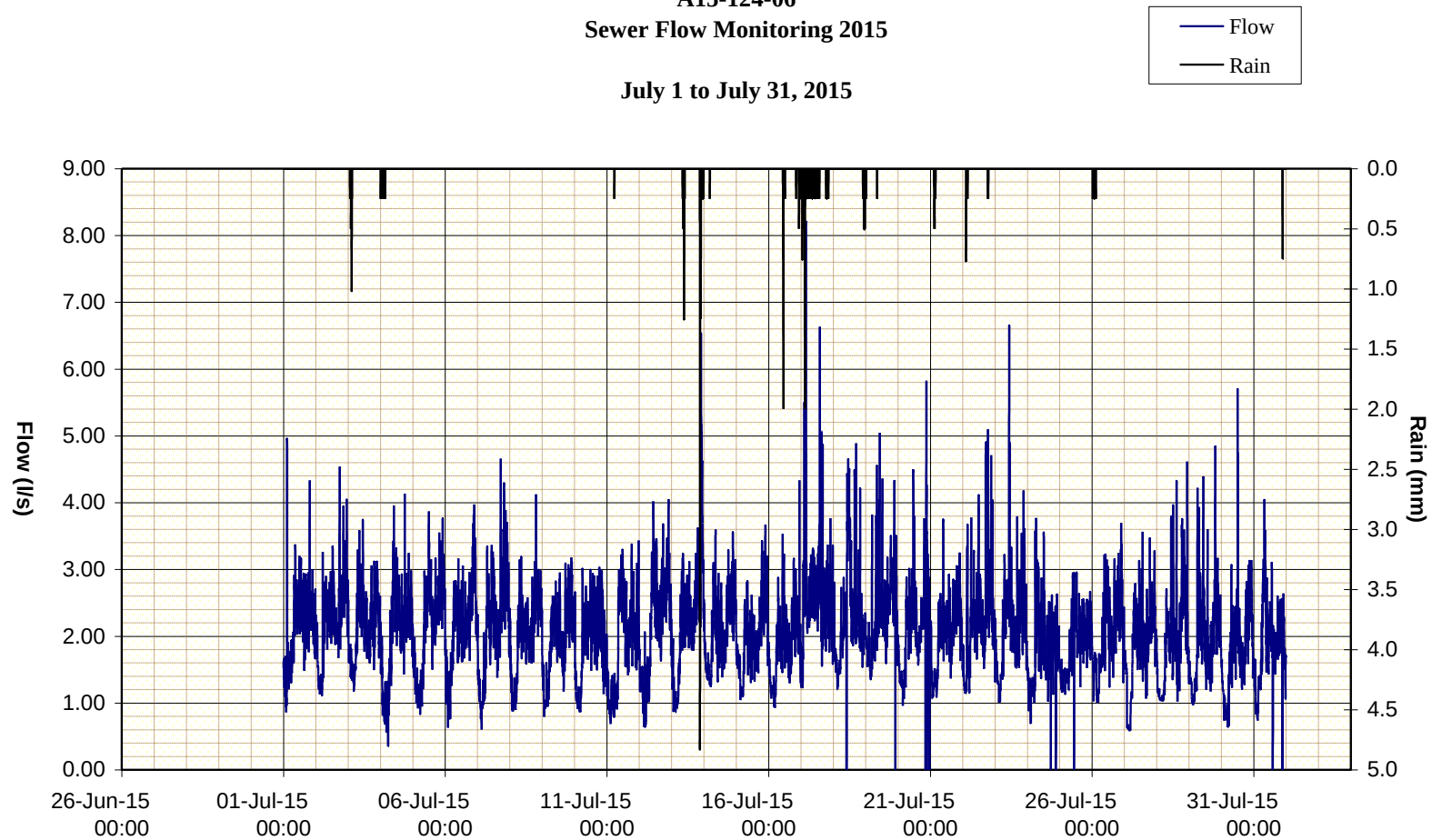
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	2.15	0.94	6.68	185.62	0.0
02-Jun-15	1.95	0.75	6.74	168.08	0.5
03-Jun-15	1.73	-1.69	4.37	149.82	0.0
04-Jun-15	1.89	0.82	4.00	163.38	0.0
05-Jun-15	1.87	0.82	4.55	161.74	0.0
06-Jun-15	2.23	1.03	4.48	192.40	0.0
07-Jun-15	2.22	0.73	4.97	191.73	0.0
08-Jun-15	2.60	0.95	6.27	224.36	0.0
09-Jun-15	2.49	0.85	7.67	215.57	0.0
10-Jun-15	2.08	0.90	5.84	179.82	0.0
11-Jun-15	1.94	0.74	4.05	167.64	16.5
12-Jun-15	2.07	1.09	4.80	178.58	0.3
13-Jun-15	2.20	1.17	3.63	189.82	10.8
14-Jun-15	2.26	0.98	3.96	195.65	1.5
15-Jun-15	2.09	-1.14	4.68	180.42	0.0
16-Jun-15	2.20	0.90	4.07	189.74	3.5
17-Jun-15	1.94	0.90	4.43	167.41	0.0
18-Jun-15	2.01	0.90	4.08	173.87	0.0
19-Jun-15	1.98	0.90	4.64	171.02	0.0
20-Jun-15	2.06	0.90	3.62	177.93	3.0
21-Jun-15	2.34	0.87	4.63	202.01	0.5
22-Jun-15	2.69	1.07	7.92	232.41	8.5
23-Jun-15	2.09	1.07	4.08	180.65	0.0
24-Jun-15	1.99	0.86	5.90	172.33	0.0
25-Jun-15	2.06	1.04	3.64	178.26	4.0
26-Jun-15	2.03	1.03	3.10	175.56	1.5
27-Jun-15	2.01	0.89	4.95	174.00	0.0
28-Jun-15	1.89	0.85	3.06	163.19	0.0
29-Jun-15	1.94	0.92	3.37	167.41	0.0
30-Jun-15	2.00	0.96	4.00	172.53	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
5442.925	-1.686	7.916	50.5

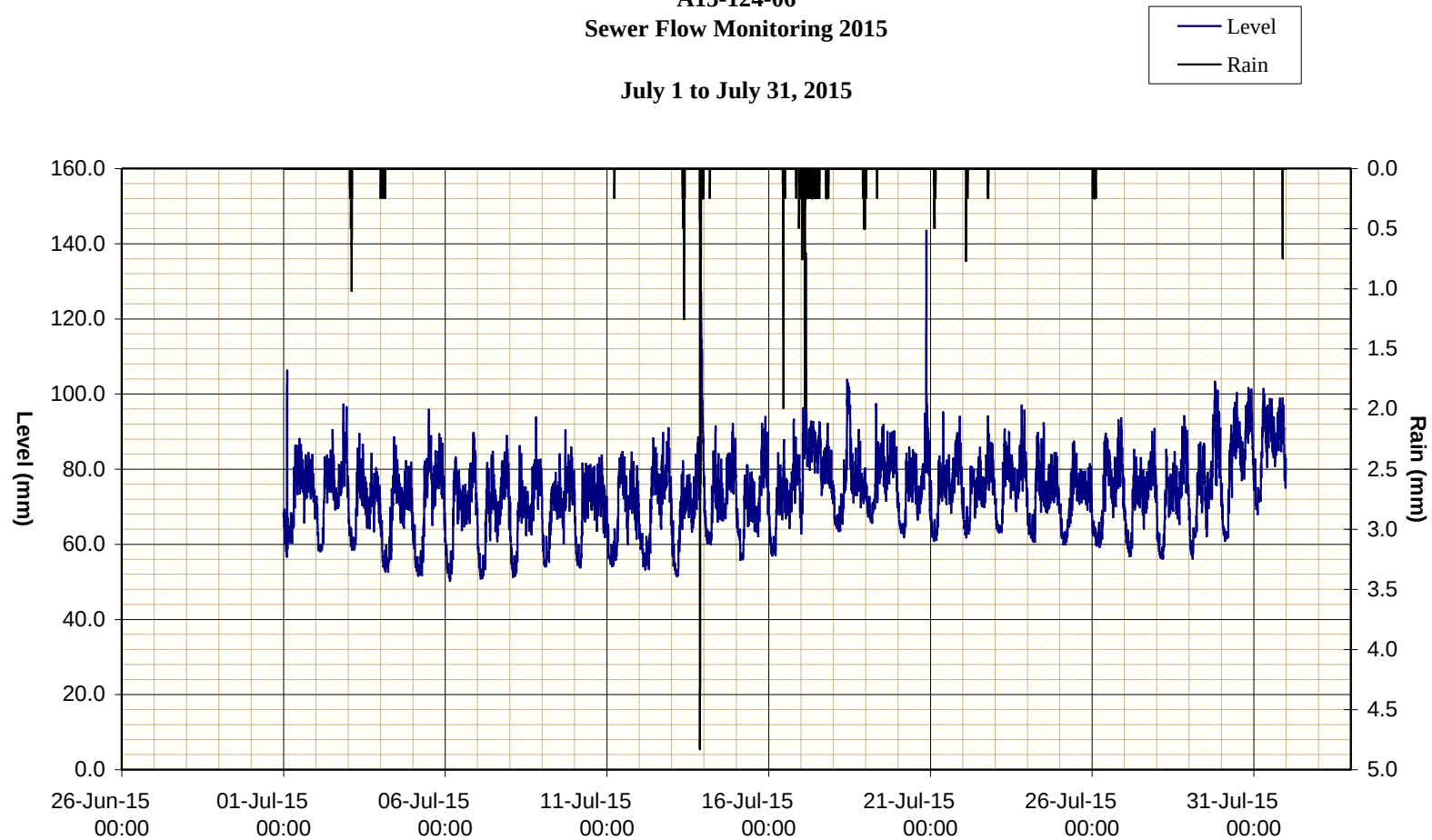
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



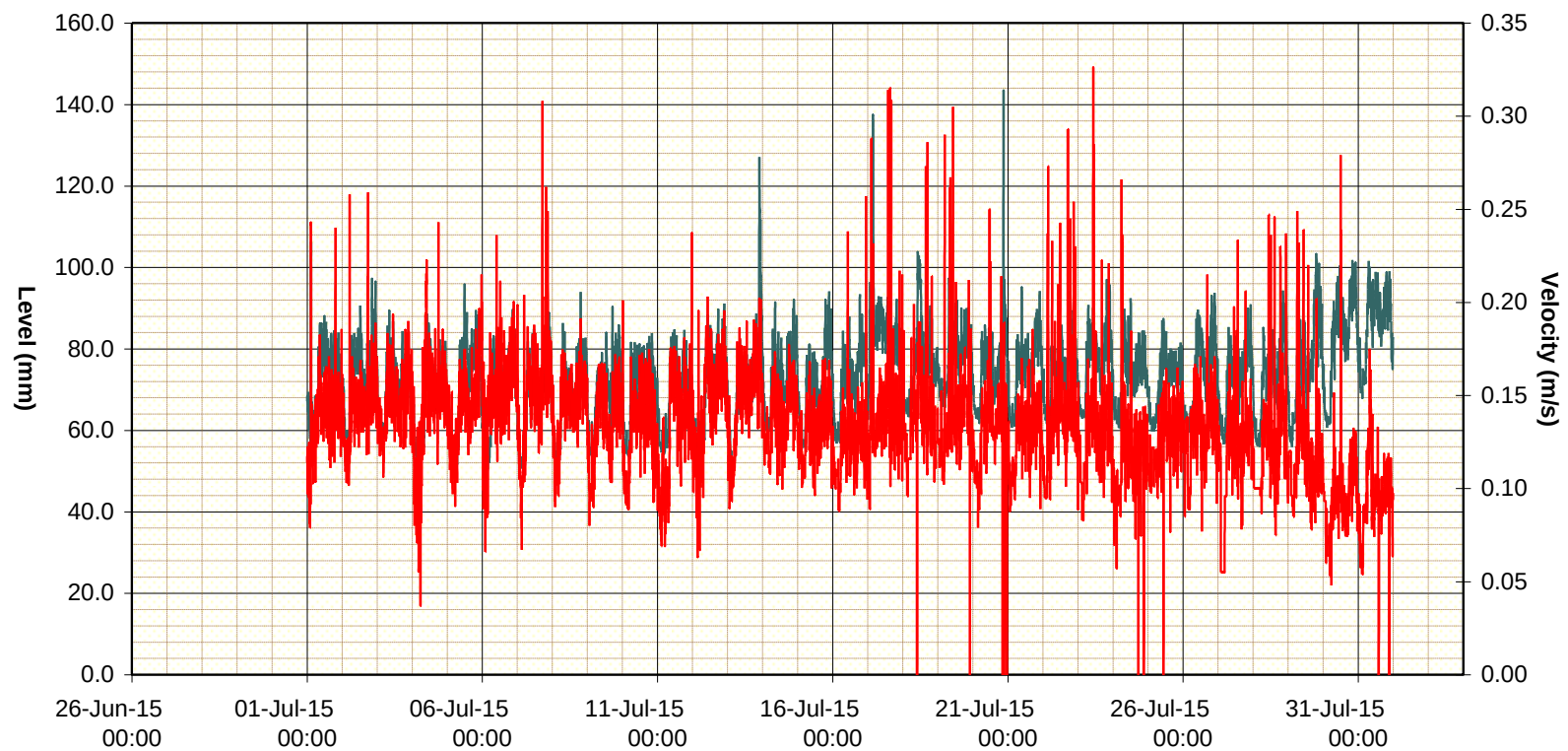
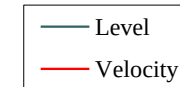
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



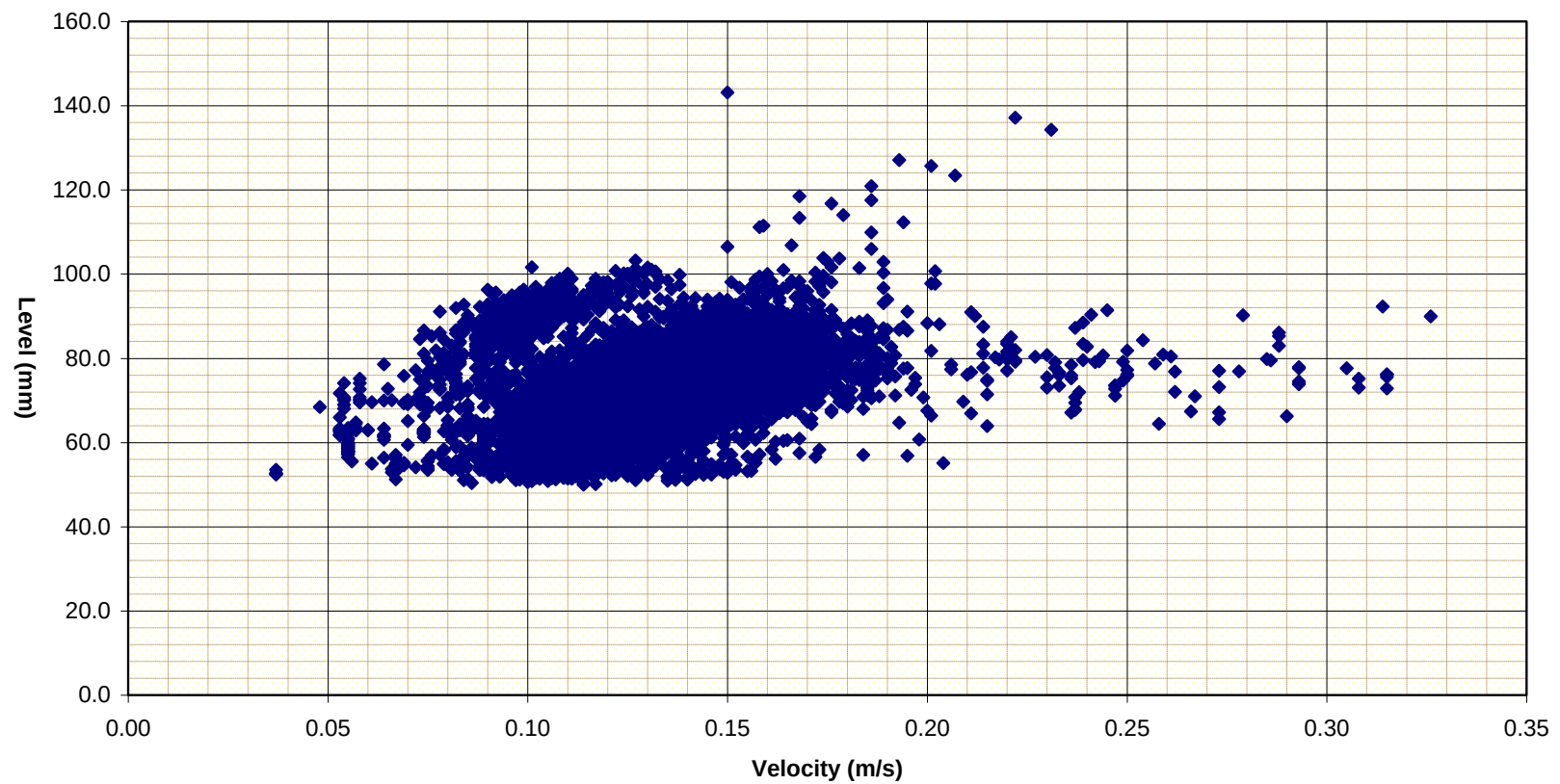
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
July 1 to July 31, 2015

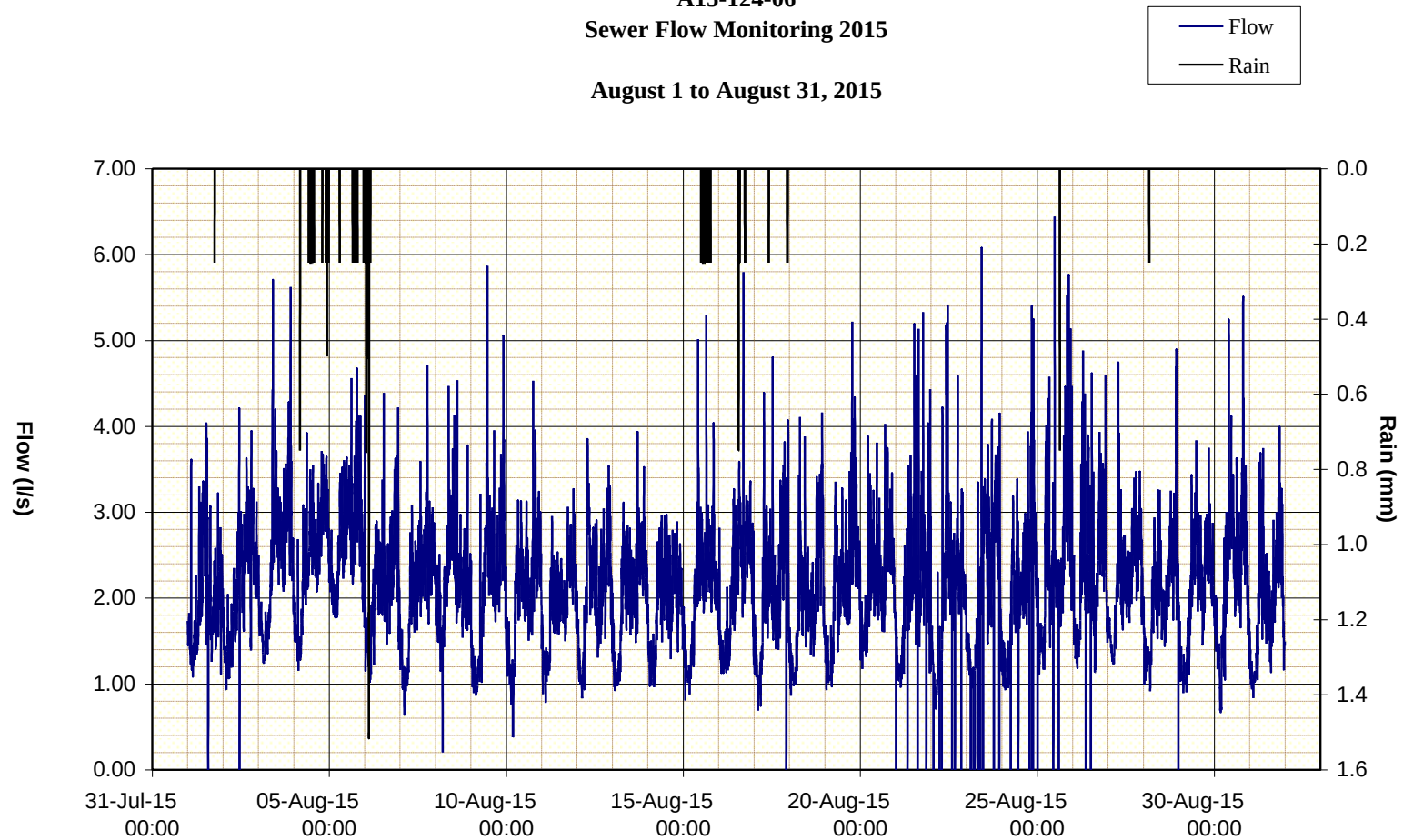
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-15	2.15	0.86	4.94	185.56	0.0
02-Jul-15	2.24	1.12	4.54	193.57	0.0
03-Jul-15	2.14	1.19	3.74	185.26	6.3
04-Jul-15	2.01	0.35	4.14	173.33	1.0
05-Jul-15	2.12	0.84	3.87	183.31	0.0
06-Jul-15	2.15	0.63	3.97	185.72	0.0
07-Jul-15	2.15	0.60	4.66	185.65	0.0
08-Jul-15	2.04	0.88	4.10	175.96	0.0
09-Jul-15	1.95	0.79	3.18	168.48	0.0
10-Jul-15	1.92	0.87	3.04	165.69	0.0
11-Jul-15	1.86	0.69	3.43	161.14	0.3
12-Jul-15	2.15	0.64	4.05	185.88	0.0
13-Jul-15	2.26	0.86	6.52	194.85	22.5
14-Jul-15	2.12	1.24	3.58	183.04	0.3
15-Jul-15	1.96	1.05	3.67	169.04	0.0
16-Jul-15	1.87	0.94	4.33	161.36	7.8
17-Jul-15	2.66	1.22	8.20	230.20	22.3
18-Jul-15	2.21	-3.03	4.89	191.29	4.8
19-Jul-15	2.33	-2.59	5.05	201.74	0.8
20-Jul-15	2.10	-3.04	5.80	181.58	0.0
21-Jul-15	2.05	1.07	3.71	177.09	3.0
22-Jul-15	2.19	1.14	5.10	189.22	3.3
23-Jul-15	2.09	1.01	6.65	180.43	0.0
24-Jul-15	1.79	-2.35	3.77	154.23	0.0
25-Jul-15	1.86	-2.58	2.94	160.92	0.0
26-Jul-15	2.04	1.00	3.70	176.11	2.5
27-Jul-15	1.82	0.58	3.56	157.54	0.0
28-Jul-15	1.91	1.02	4.61	164.76	0.0
29-Jul-15	1.91	0.96	4.83	165.28	0.0
30-Jul-15	1.78	0.63	5.71	153.97	0.0
31-Jul-15	1.82	-2.91	4.03	157.68	1.5

Statistics

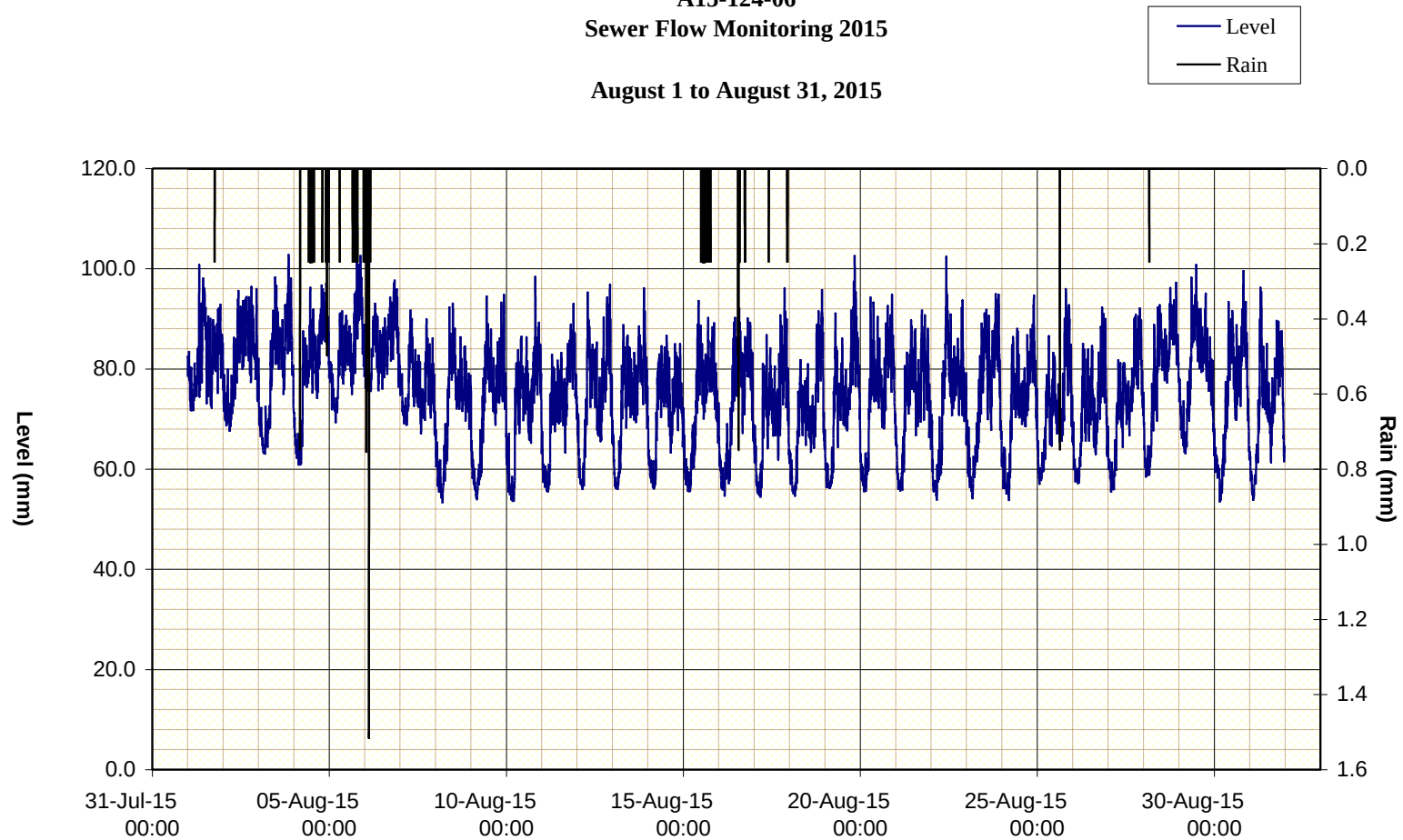
Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
5499.861	-3.035	8.203	76.0

**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015

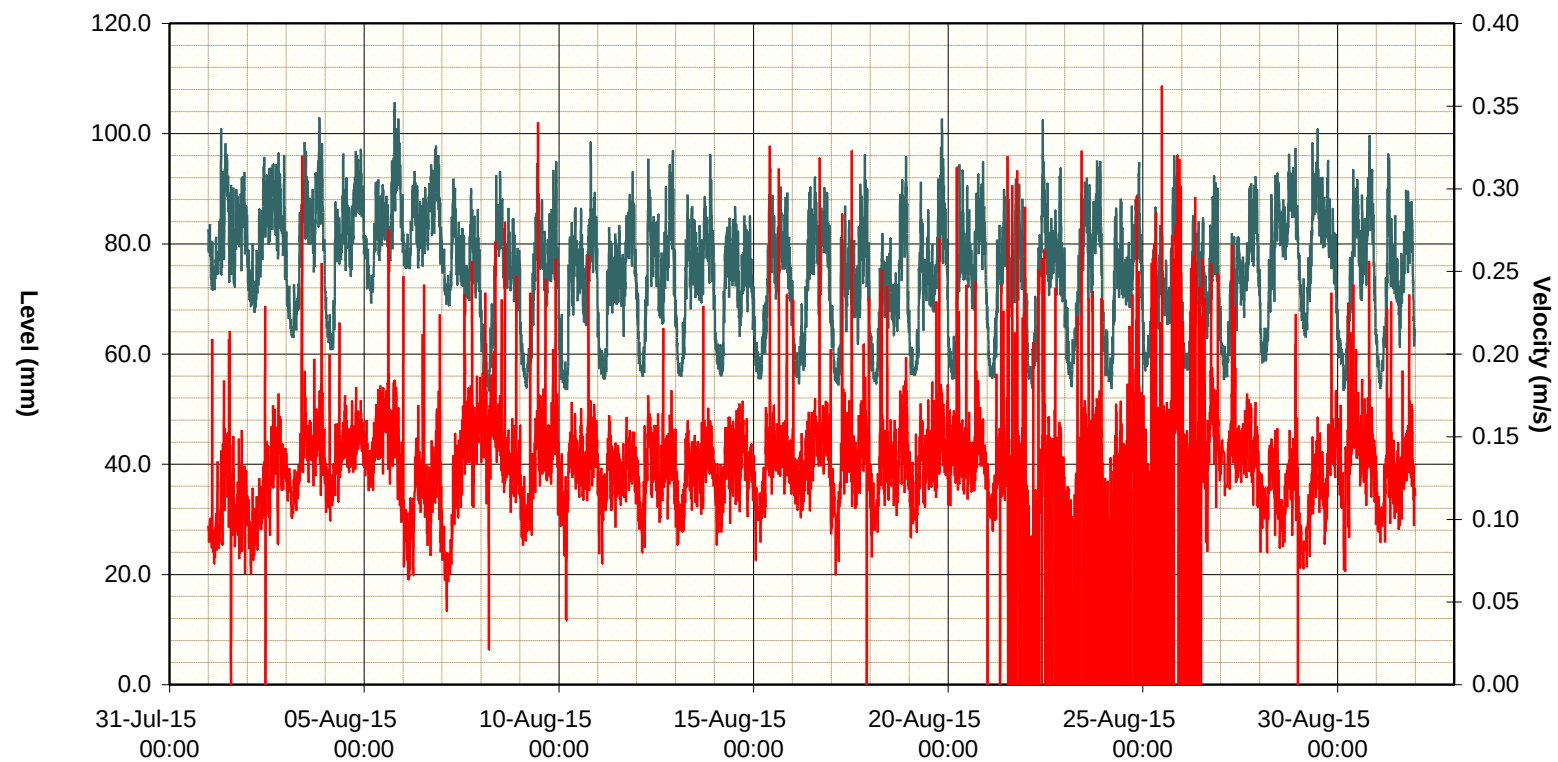


**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
August 1 to August 31, 2015**

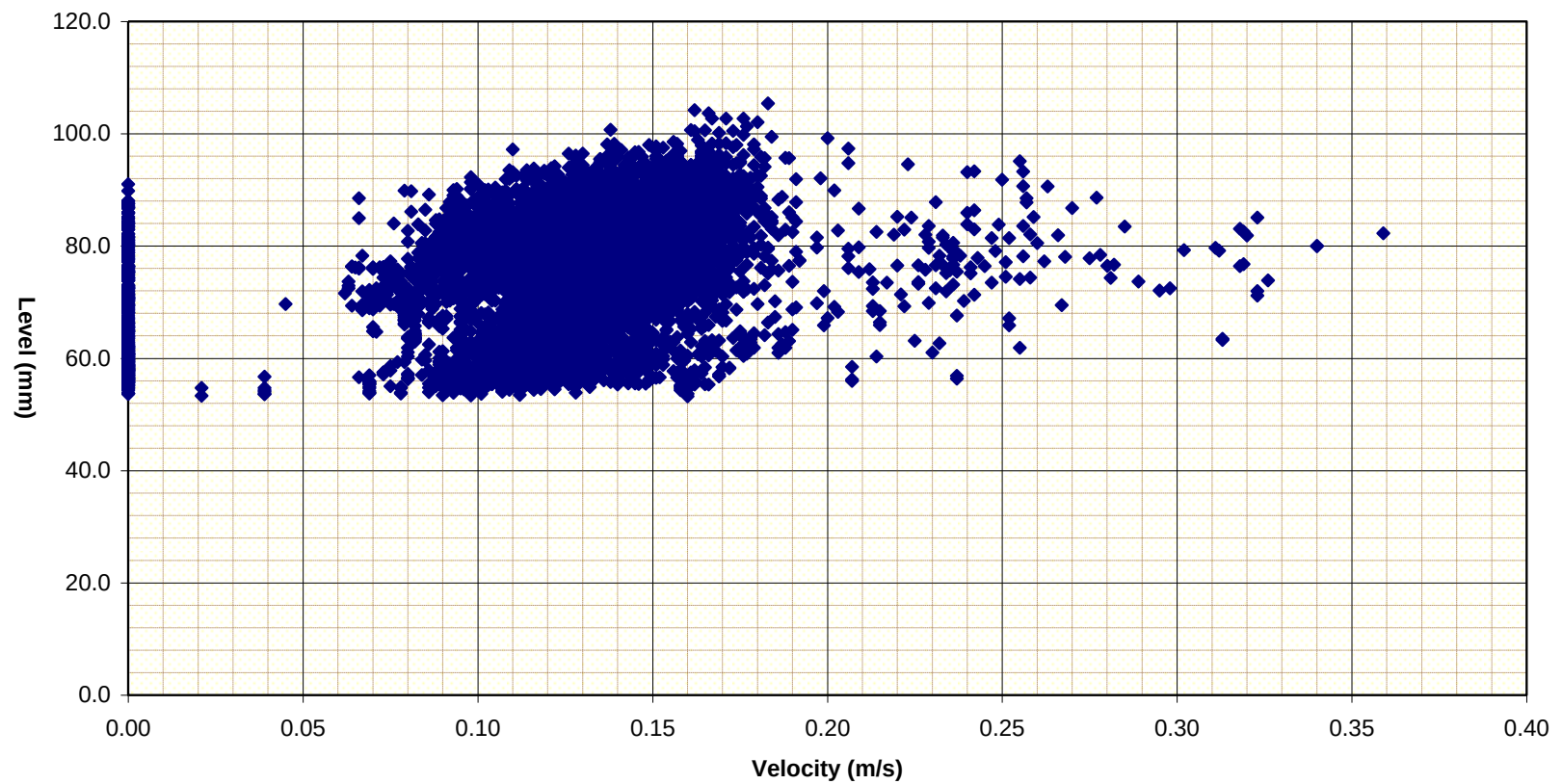


**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
August 1 to August 31, 2015**

— Level
— Velocity



**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
August 1 to August 31, 2015**



Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
August 1 to August 31, 2015

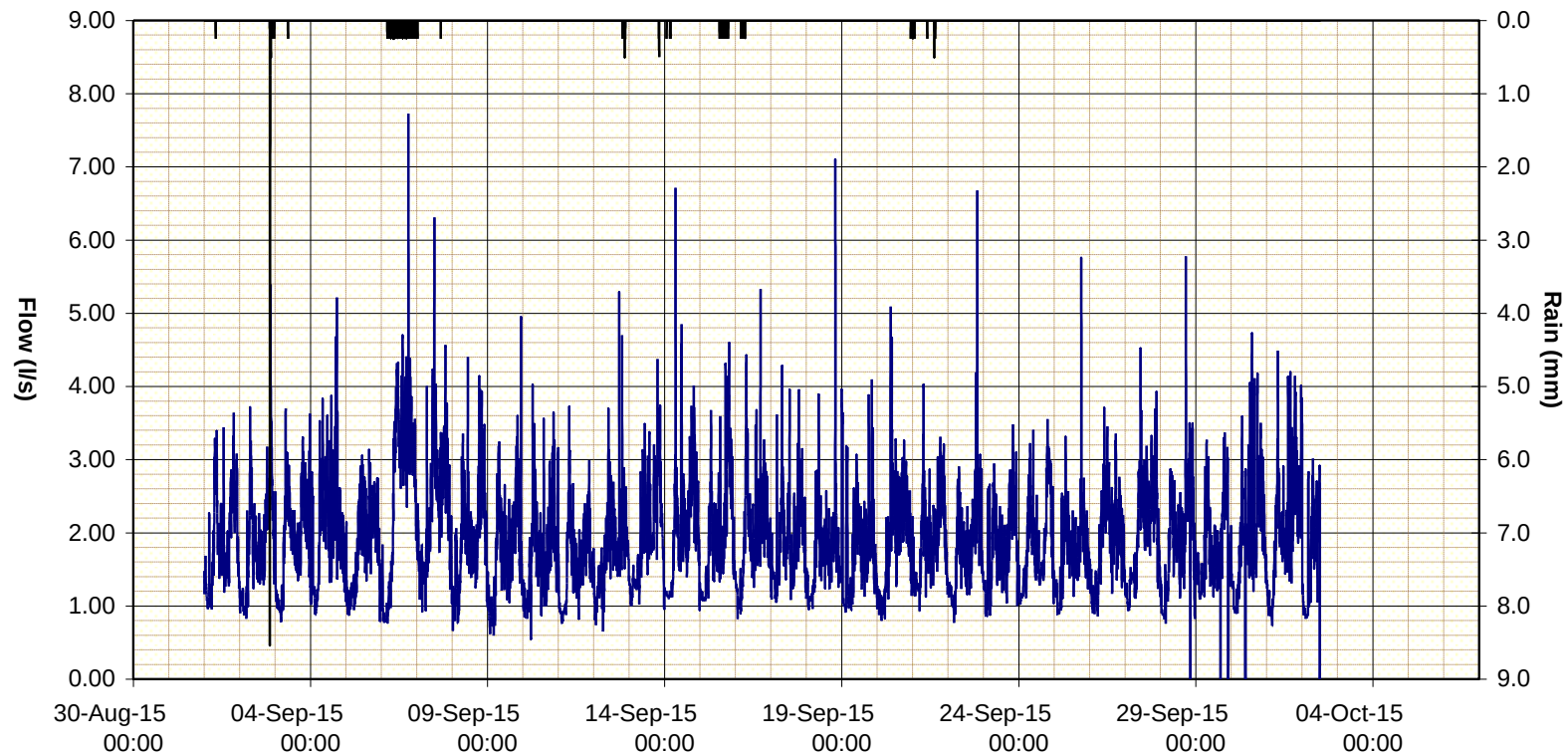
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-15	1.92	-1.55	4.03	166.18	0.3
02-Aug-15	2.11	-1.91	4.21	182.45	0.0
03-Aug-15	2.45	1.24	5.70	211.48	0.0
04-Aug-15	2.45	1.15	3.92	211.68	8.5
05-Aug-15	2.71	1.67	4.65	233.71	2.3
06-Aug-15	2.13	1.03	4.39	184.33	12.0
07-Aug-15	2.07	0.64	4.70	178.75	0.0
08-Aug-15	2.20	0.20	4.54	189.72	0.0
09-Aug-15	2.09	0.86	5.87	180.68	0.0
10-Aug-15	2.02	0.38	4.53	174.42	0.0
11-Aug-15	1.93	0.78	3.27	167.00	0.0
12-Aug-15	2.06	0.83	3.84	177.69	0.0
13-Aug-15	2.02	0.93	3.93	174.66	0.0
14-Aug-15	1.97	0.96	2.96	170.56	0.0
15-Aug-15	2.03	0.81	5.29	175.46	7.8
16-Aug-15	2.15	1.13	5.80	185.63	4.5
17-Aug-15	2.02	-1.94	4.79	174.80	0.8
18-Aug-15	2.01	0.86	4.16	173.80	0.0
19-Aug-15	2.15	0.93	5.22	185.92	0.0
20-Aug-15	2.23	1.18	4.03	192.59	0.0
21-Aug-15	1.99	-2.30	5.33	171.96	0.0
22-Aug-15	1.95	-2.46	5.42	168.52	0.0
23-Aug-15	1.79	-2.98	6.08	154.70	0.0
24-Aug-15	1.97	-3.05	5.24	169.80	0.0
25-Aug-15	2.31	-2.99	6.44	199.54	0.8
26-Aug-15	2.22	-1.95	4.88	192.20	0.0
27-Aug-15	2.18	1.23	4.74	188.35	0.0
28-Aug-15	2.01	-2.11	4.87	174.07	0.3
29-Aug-15	2.06	0.90	3.84	178.19	0.0
30-Aug-15	2.24	0.67	5.50	193.57	0.0
31-Aug-15	1.94	0.84	3.99	167.55	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
5649.935	-3.046	6.443	37.0

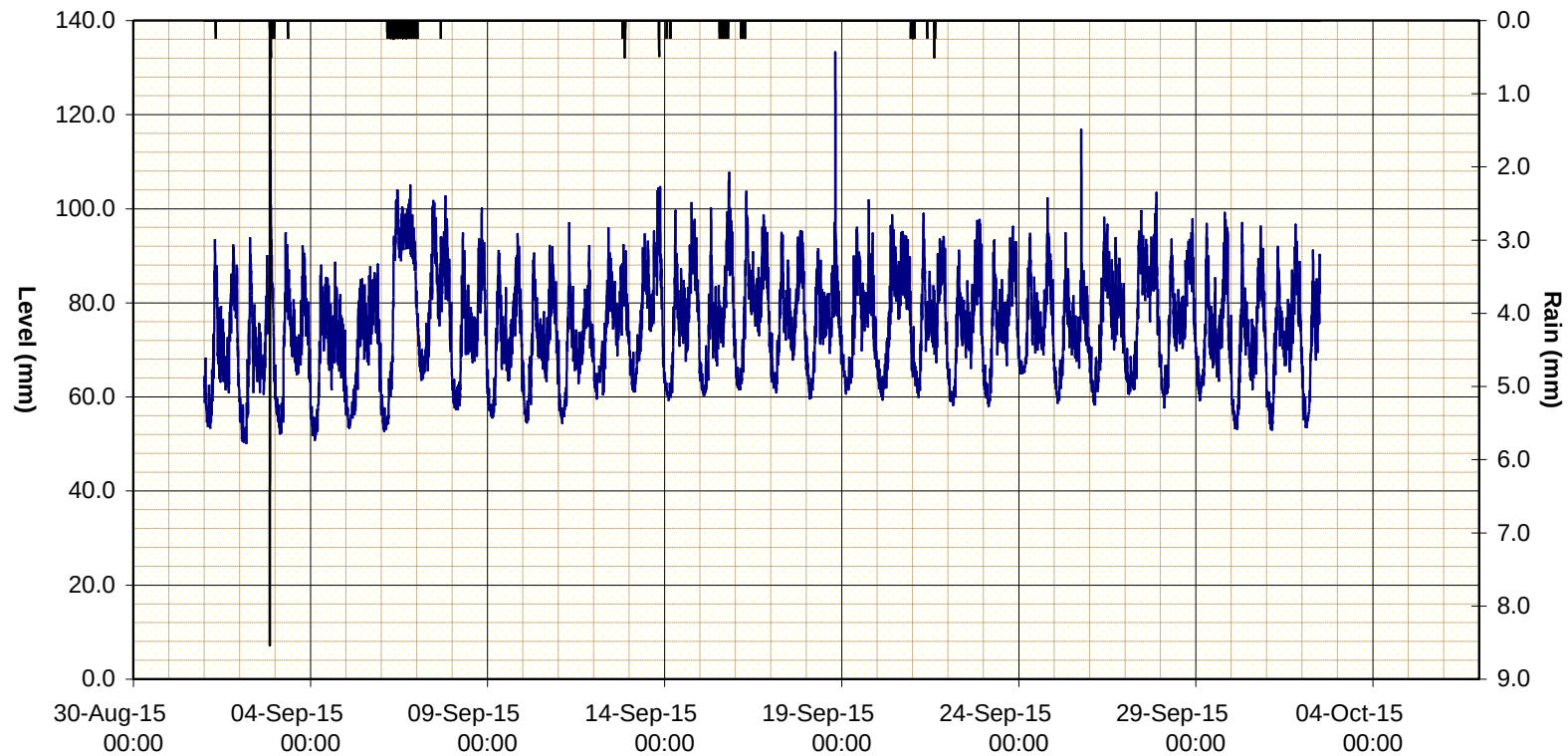
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
September 1 to October 2, 2015**

— Flow
— Rain



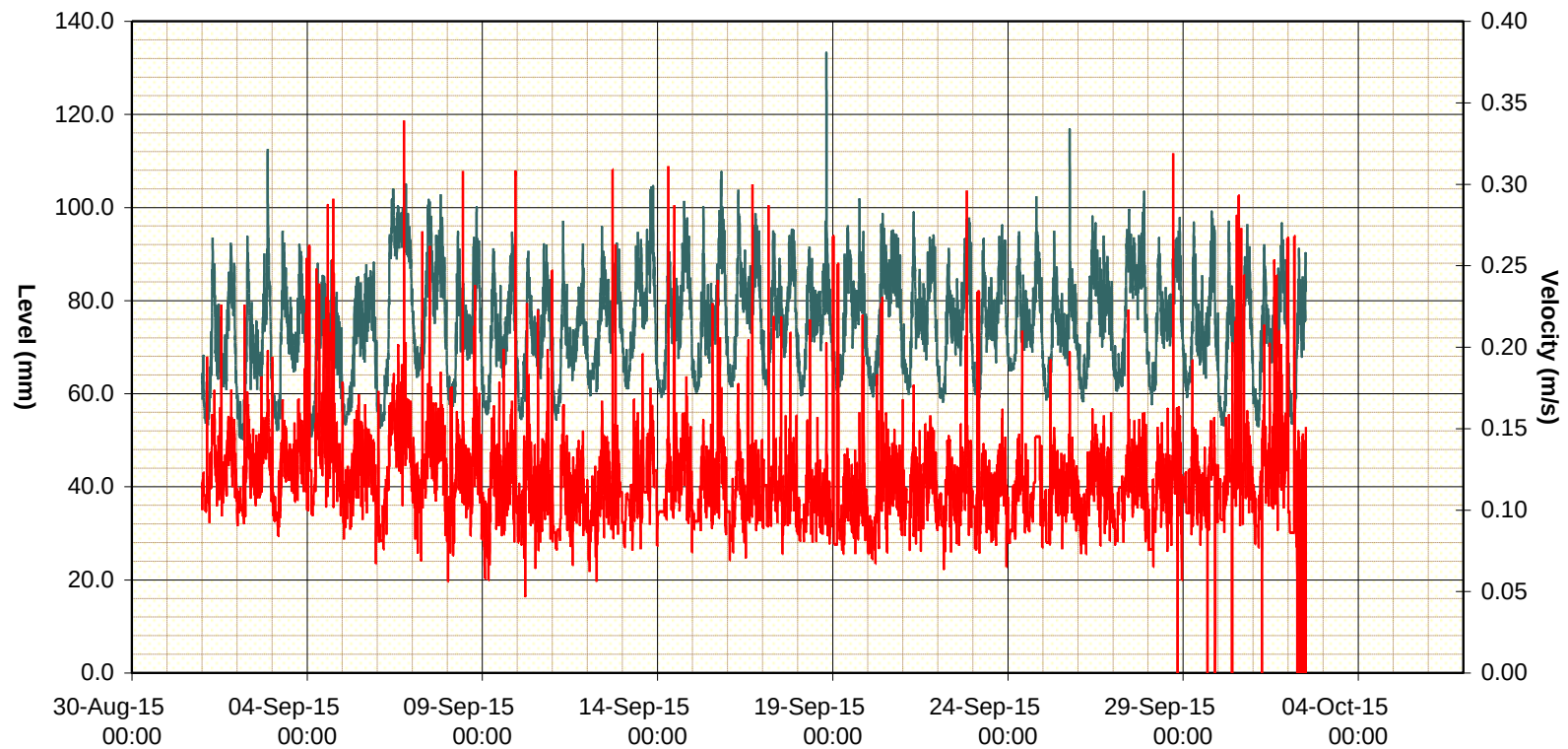
**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
September 1 to October 2, 2015**

— Level
— Rain

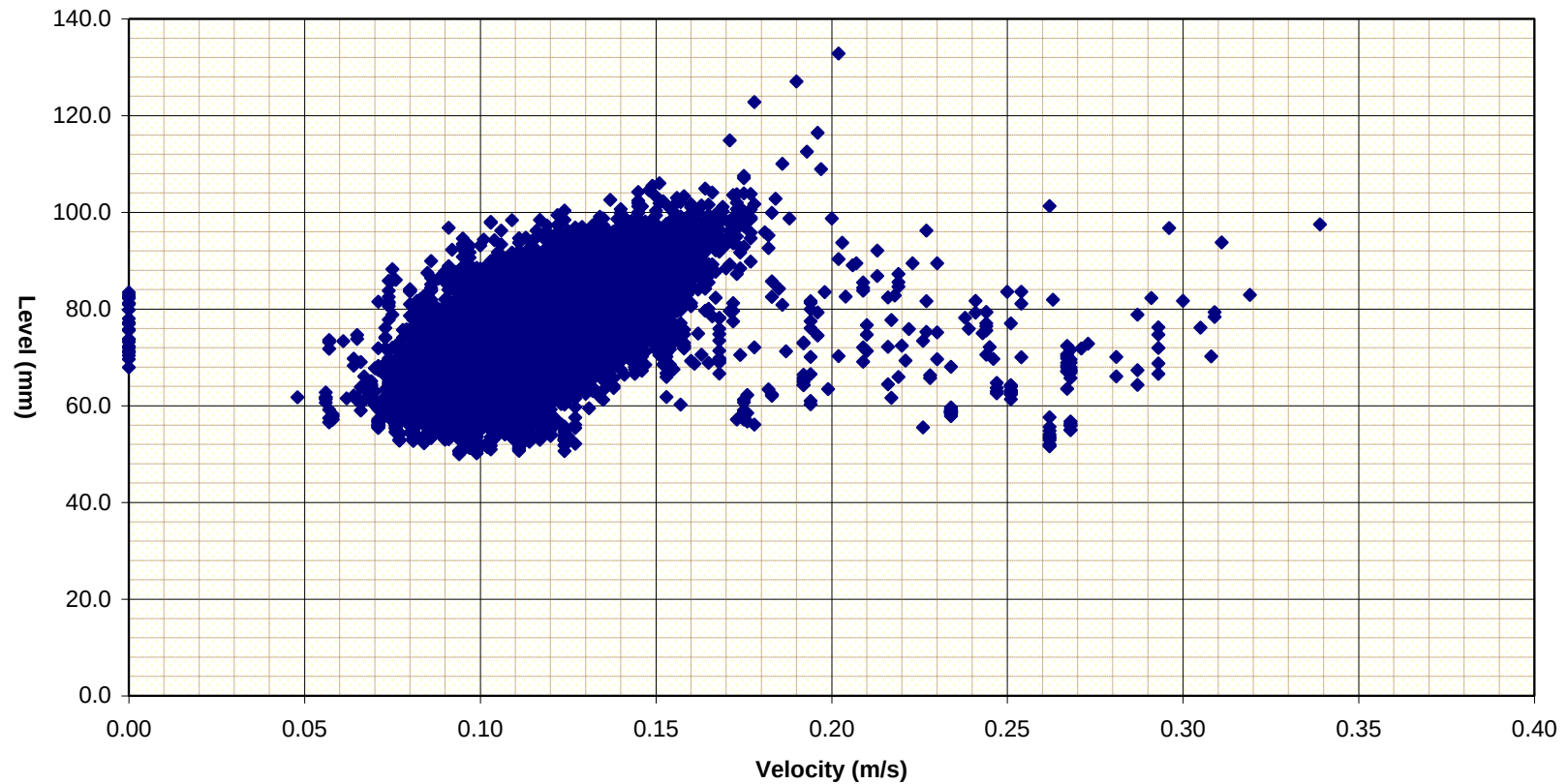


**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
September 1 to October 2, 2015**

— Level
— Velocity



**Cold Lake, Alberta
A15-124-06
Sewer Flow Monitoring 2015
September 1 to October 2, 2015**



Cold Lake, Alberta

A15-124-06

Sewer Flow Monitoring 2015

September 1 to October 2, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	1.87	0.95	3.64	161.91	0.3
02-Sep-15	1.87	0.82	5.39	161.54	19.3
03-Sep-15	1.90	0.78	3.70	164.33	0.3
04-Sep-15	2.01	0.88	5.22	173.47	0.0
05-Sep-15	1.80	0.78	3.13	155.81	0.0
06-Sep-15	2.59	0.76	7.73	223.57	21.8
07-Sep-15	2.31	0.93	6.31	199.46	0.5
08-Sep-15	1.93	0.66	4.40	166.69	0.0
09-Sep-15	1.73	0.59	4.91	149.06	0.0
10-Sep-15	1.72	0.57	4.02	148.65	0.0
11-Sep-15	1.60	0.76	3.72	138.34	0.0
12-Sep-15	1.82	0.65	5.27	156.86	3.0
13-Sep-15	1.99	0.95	4.37	172.07	1.5
14-Sep-15	2.01	0.95	6.71	173.46	0.8
15-Sep-15	1.96	1.07	4.59	169.07	3.0
16-Sep-15	1.96	0.82	5.33	169.75	1.8
17-Sep-15	1.89	1.04	4.27	163.34	0.0
18-Sep-15	1.75	0.96	7.06	150.87	0.0
19-Sep-15	1.81	0.91	4.10	156.55	0.0
20-Sep-15	1.88	0.80	5.09	162.36	1.5
21-Sep-15	1.90	0.93	3.98	163.98	3.3
22-Sep-15	1.82	0.77	6.68	157.06	0.0
23-Sep-15	1.86	0.86	3.48	161.12	0.0
24-Sep-15	1.84	1.02	3.55	158.91	0.0
25-Sep-15	1.74	0.88	5.74	150.74	0.0
26-Sep-15	1.87	0.86	3.69	161.43	0.0
27-Sep-15	2.02	0.93	4.52	174.31	0.0
28-Sep-15	1.86	-1.82	5.78	161.09	0.0
29-Sep-15	1.77	-2.14	3.37	152.67	0.0
30-Sep-15	1.93	-1.80	4.71	166.73	0.0
01-Oct-15	2.02	0.73	4.49	174.47	0.0
02-Oct-15	1.60	-2.73	3.64	138.20	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
5237.851	-2.733	7.727	56.8



FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-07A
ADDRESS:	47 Street, North of Tailgate Crt
GPS:	N54.41778 W110.19702
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

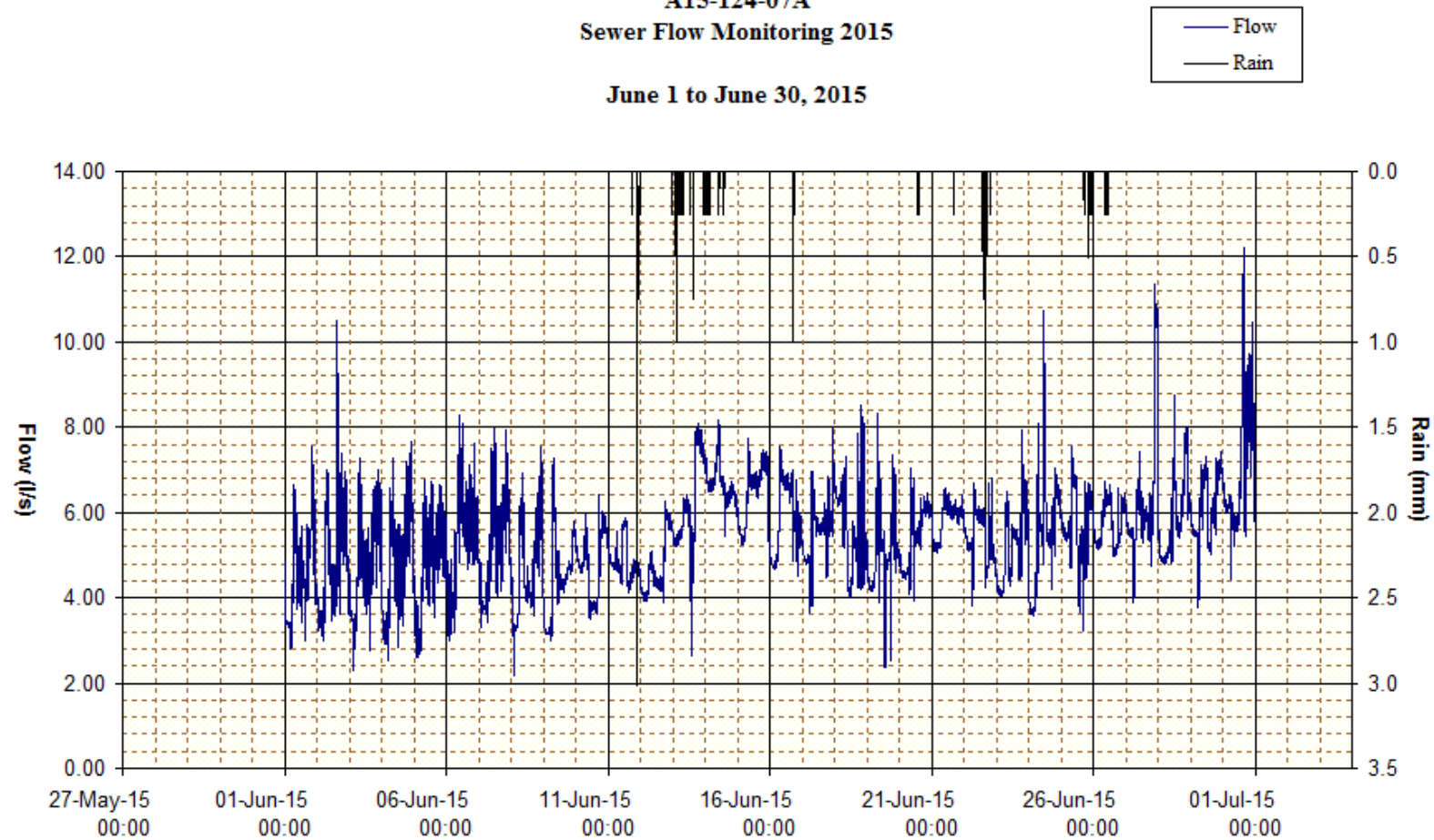
CONSTANTS			
D1 (mm):	D1-lip to x-bar		
TOM (mm)	4880	Raw Weir L - lip to water	
METER #	207E02357	DATE:	12-May-15
METER #	214E03115	DATE:	12-May-15
METER #		DATE:	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible][illegible]

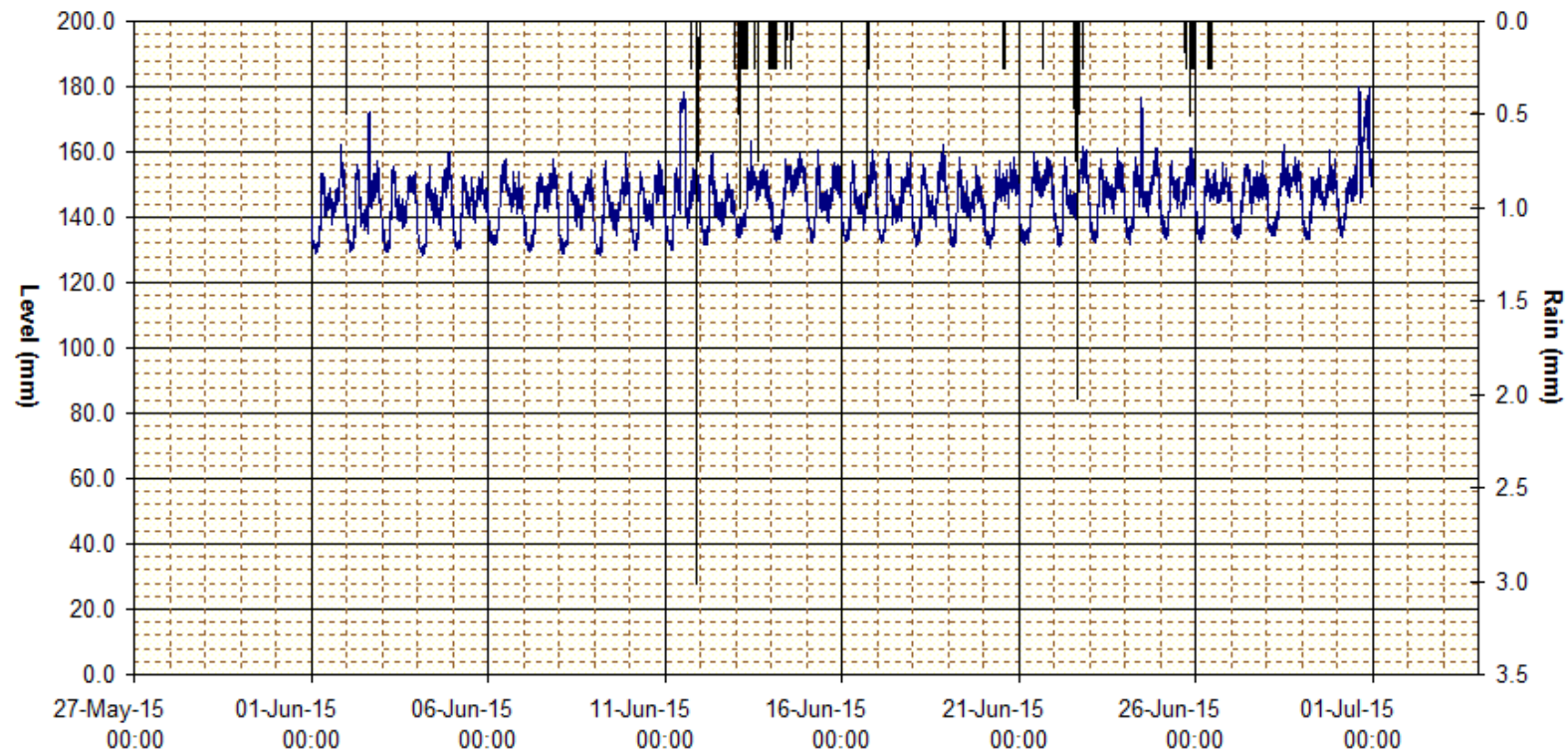
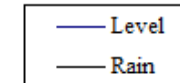
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



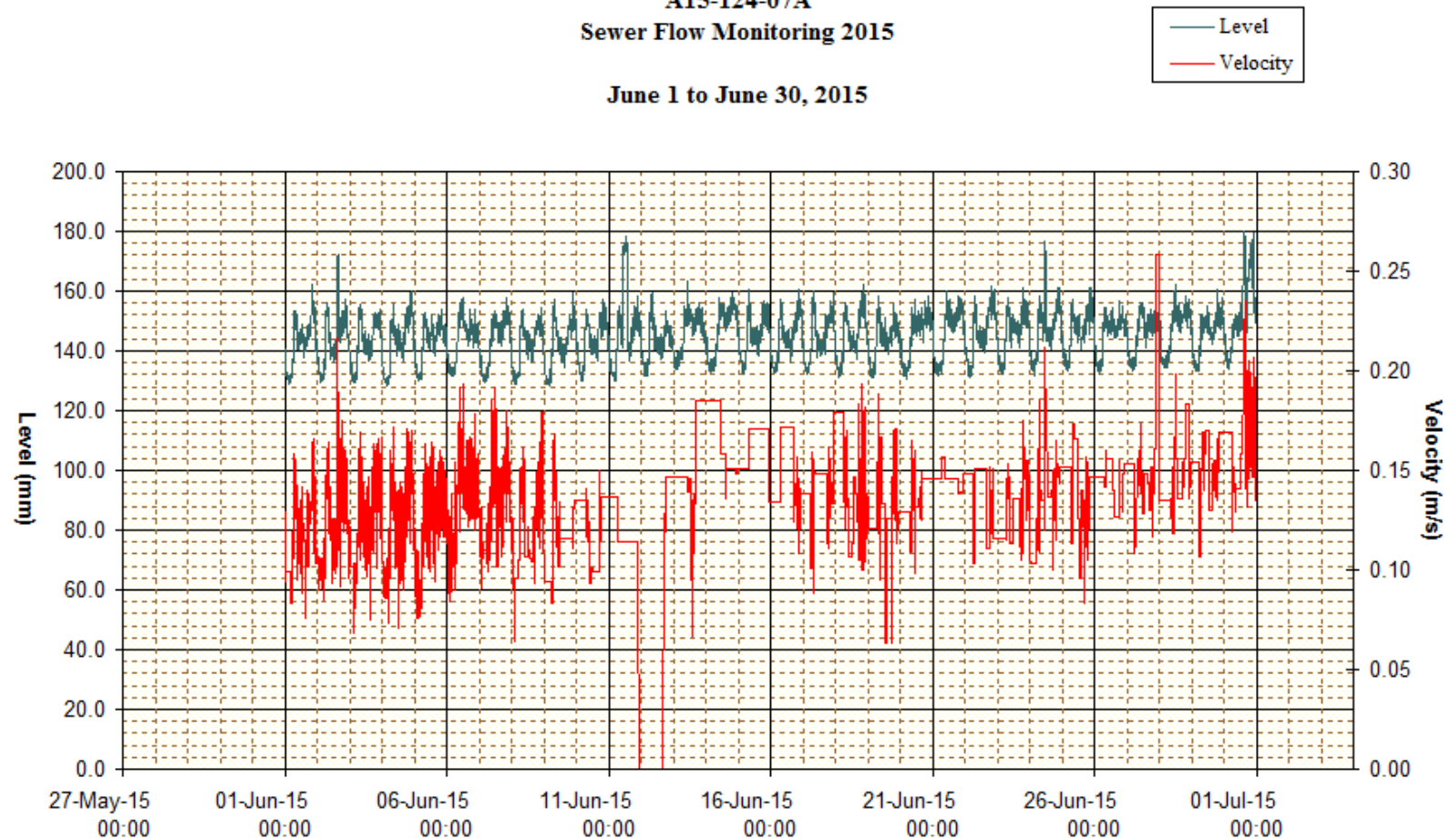
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



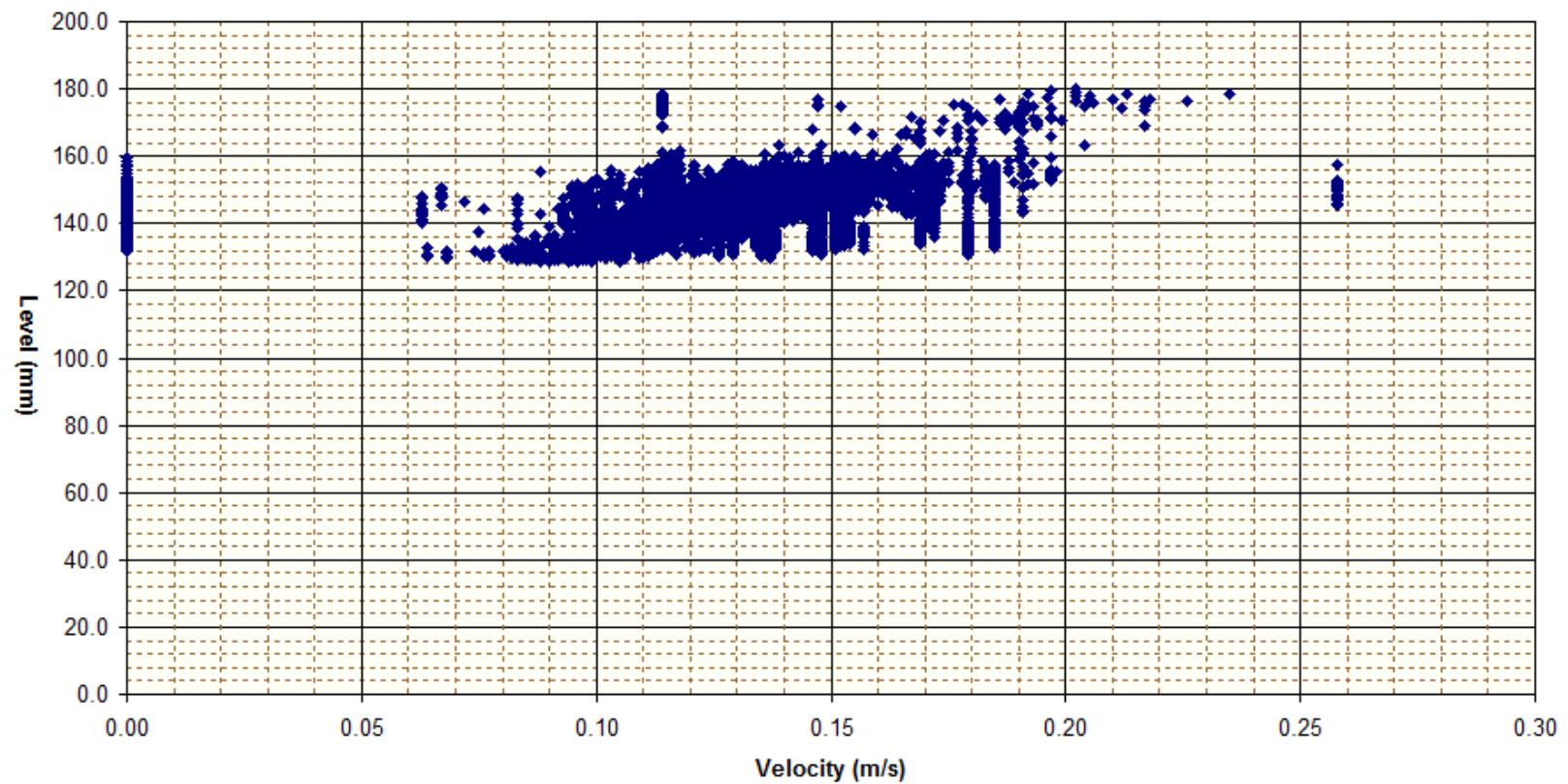
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015
June 1 to June 30, 2015

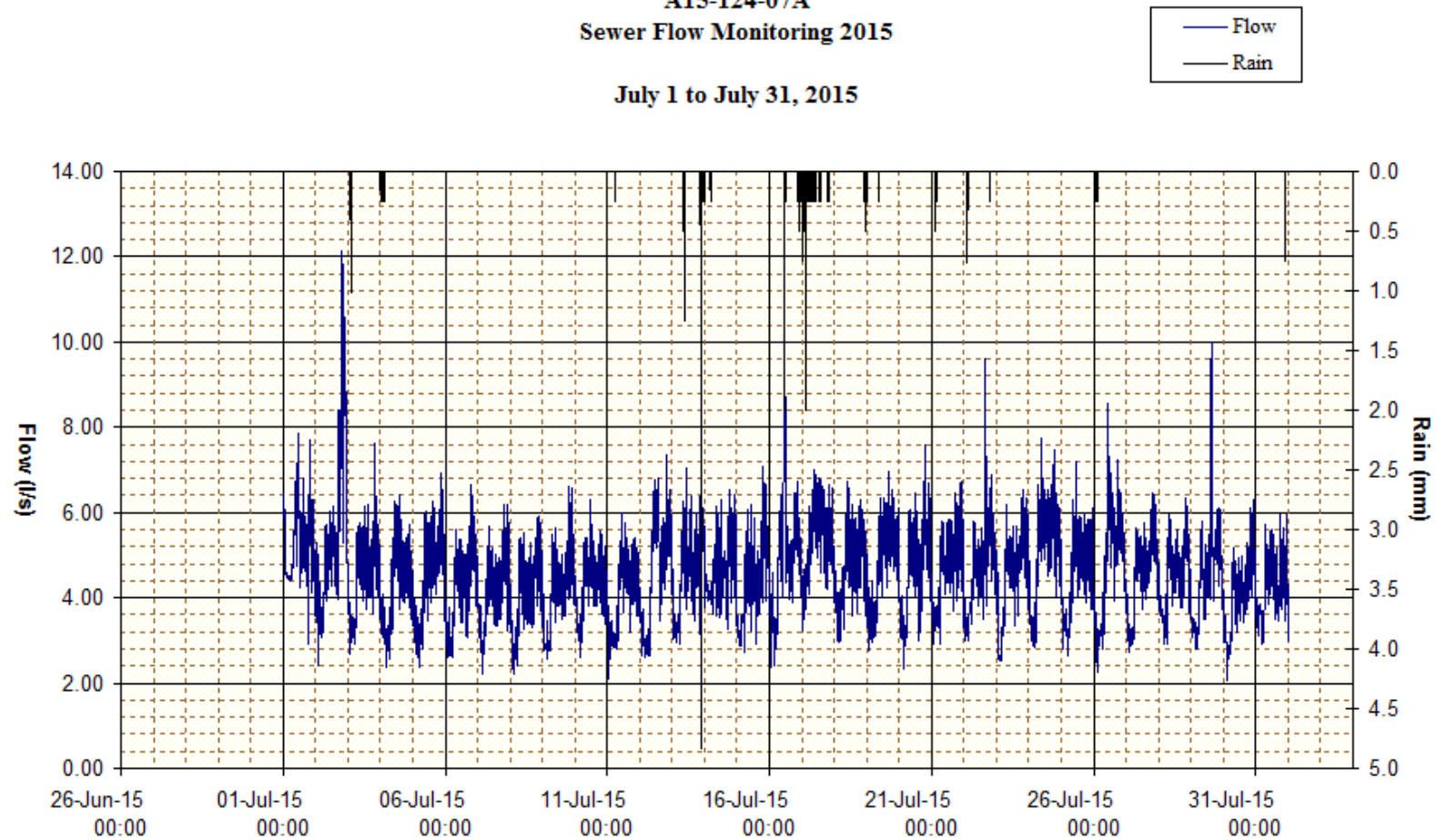
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	4.61	2.81	7.51	398.30	0.0
02-Jun-15	4.96	3.00	10.51	428.77	0.5
03-Jun-15	4.76	2.30	7.28	411.56	0.0
04-Jun-15	4.79	2.56	7.64	413.93	0.0
05-Jun-15	4.88	2.60	6.76	421.28	0.0
06-Jun-15	5.28	2.99	8.27	456.07	0.0
07-Jun-15	5.21	3.32	8.03	449.92	0.0
08-Jun-15	4.67	2.17	7.54	403.06	0.0
09-Jun-15	4.43	2.98	7.26	383.10	0.0
10-Jun-15	4.74	3.50	6.32	409.74	0.0
11-Jun-15	4.85	4.13	5.88	418.66	16.5
12-Jun-15	4.71	3.90	6.26	406.85	0.3
13-Jun-15	6.06	2.65	8.08	523.93	10.8
14-Jun-15	6.70	5.44	8.17	578.57	1.5
15-Jun-15	6.40	5.16	7.74	553.28	0.0
16-Jun-15	5.90	4.52	7.54	510.16	3.5
17-Jun-15	5.54	3.64	8.00	478.39	0.0
18-Jun-15	5.73	4.02	8.53	495.42	0.0
19-Jun-15	4.99	2.37	8.32	430.96	0.0
20-Jun-15	5.50	3.91	7.04	474.84	3.0
21-Jun-15	5.83	5.06	6.58	504.02	0.5
22-Jun-15	5.39	3.80	6.80	465.40	8.5
23-Jun-15	5.15	4.05	7.95	444.95	0.0
24-Jun-15	5.55	3.57	10.69	479.25	0.0
25-Jun-15	5.62	3.21	7.53	485.37	4.0
26-Jun-15	5.76	4.98	6.73	497.63	1.5
27-Jun-15	6.25	3.88	11.33	540.05	0.0
28-Jun-15	5.88	4.80	8.74	507.78	0.0
29-Jun-15	6.05	3.78	7.44	522.43	0.0
30-Jun-15	6.87	4.43	12.21	593.69	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
14087.400	2.167	12.206	50.5

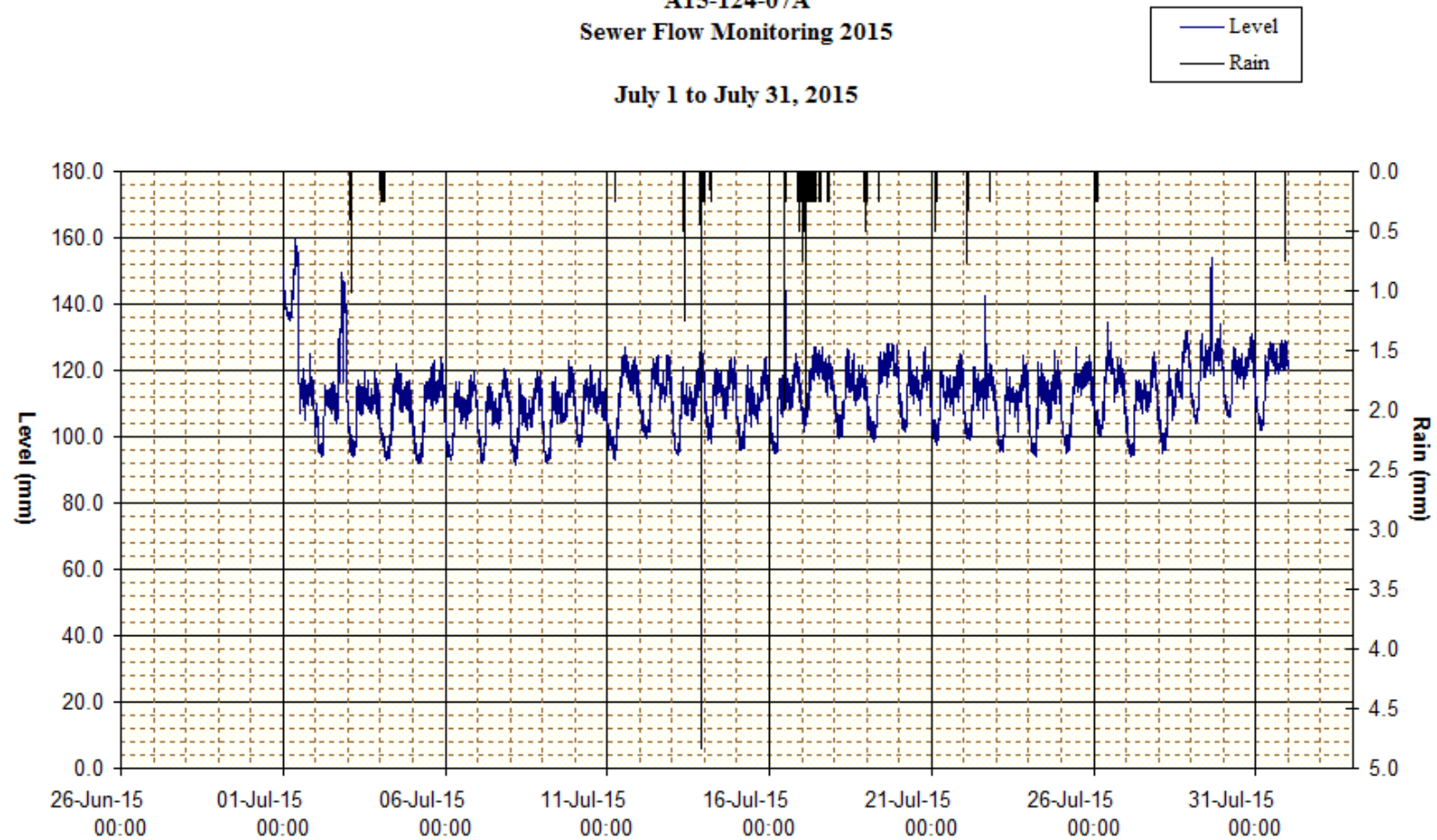
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



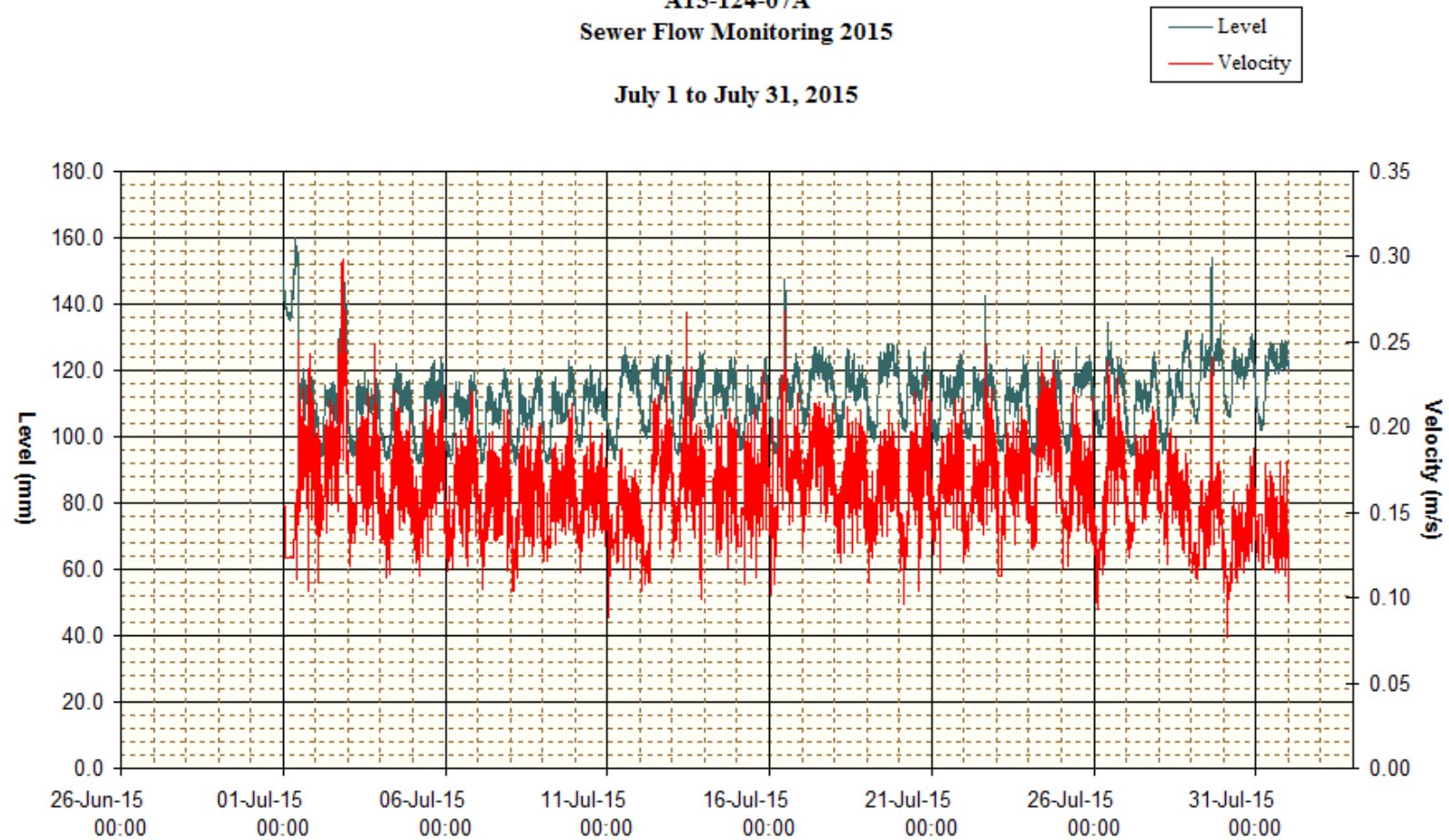
Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015

July 1 to July 31, 2015



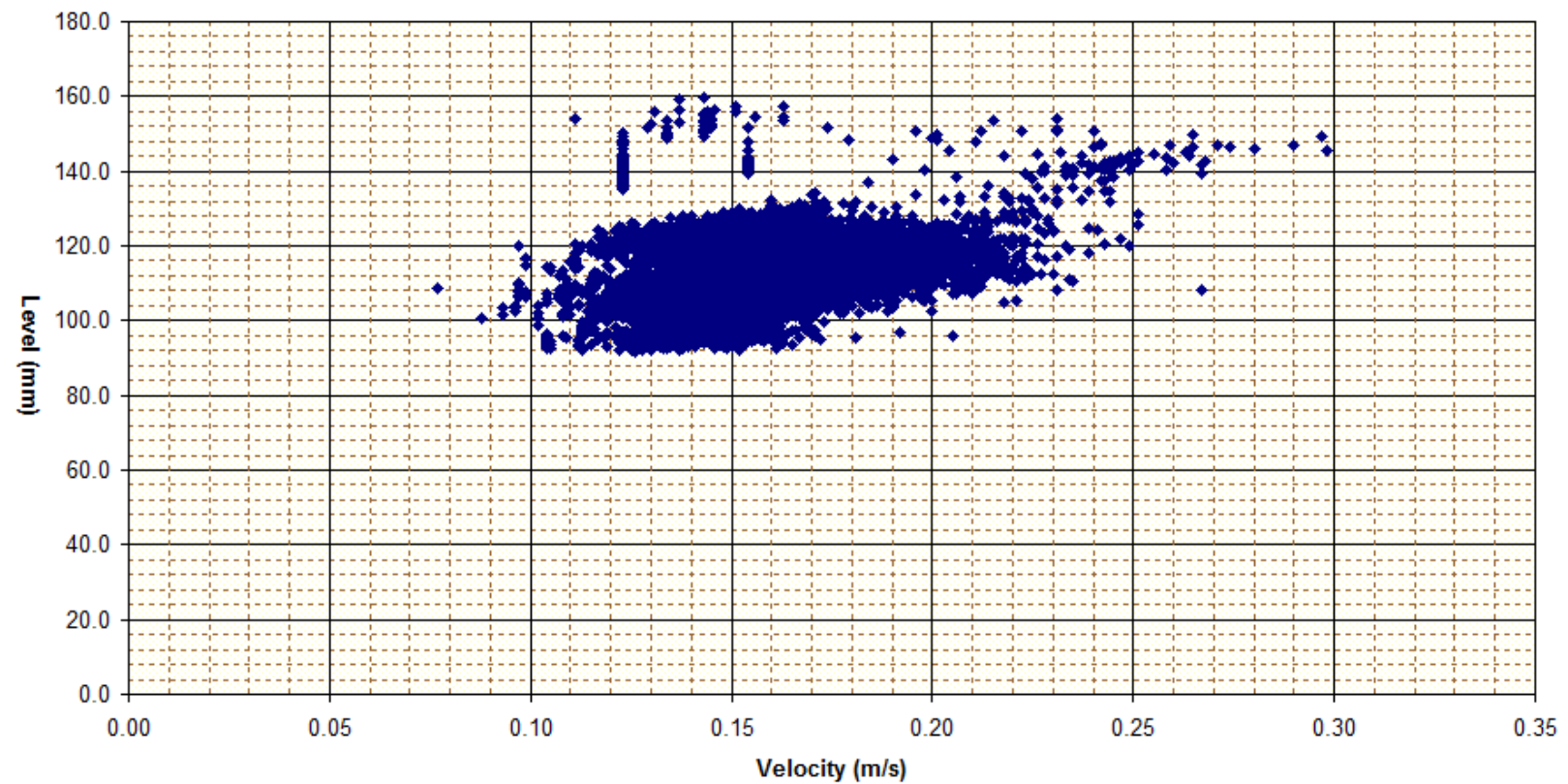
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015

July 1 to July 31, 2015



Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015
July 1 to July 31, 2015

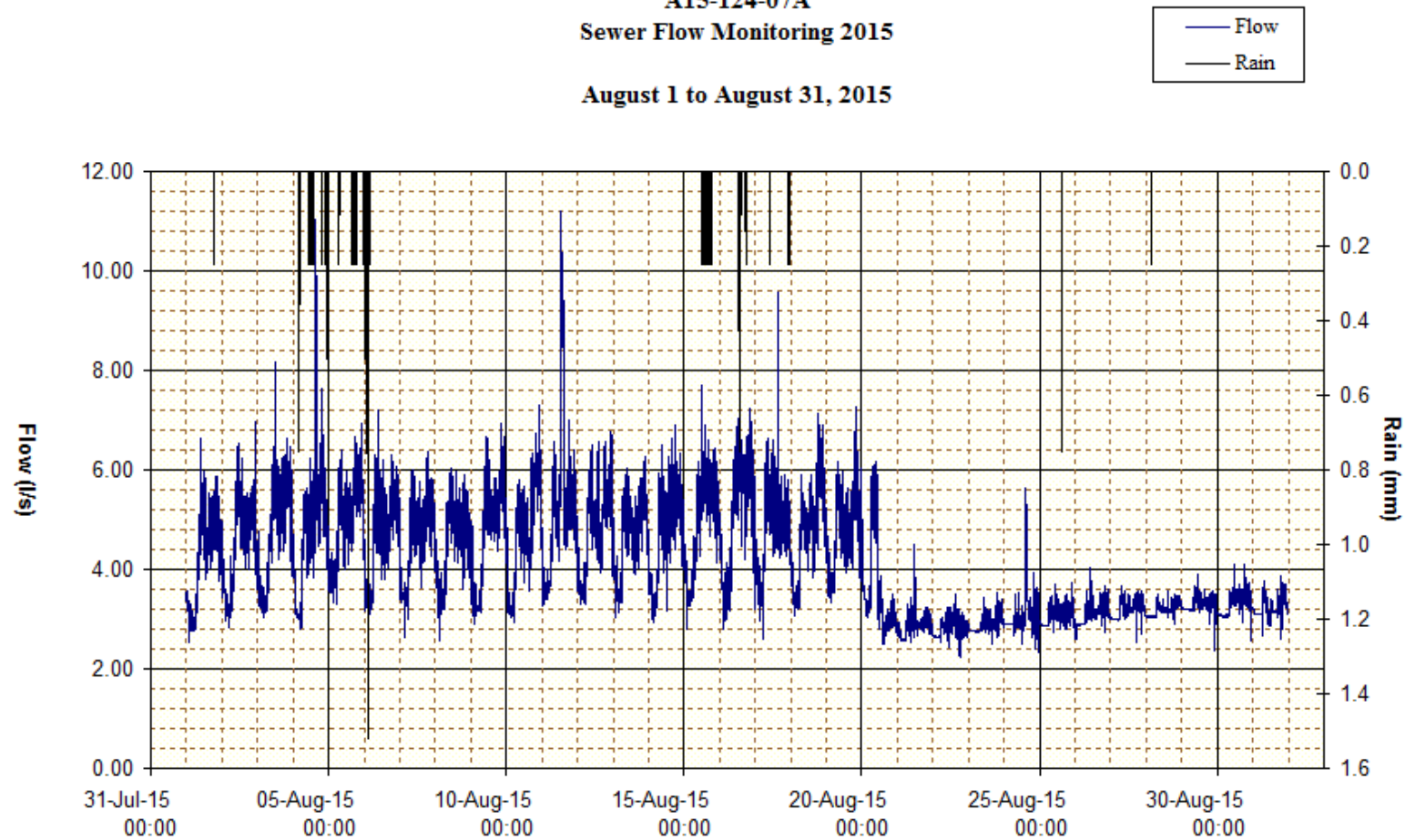
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	5.25	2.95	7.86	453.62	0.0
02-Jul-15	5.57	2.43	12.15	481.37	0.0
03-Jul-15	4.50	2.69	7.62	389.01	6.3
04-Jul-15	4.33	2.38	6.40	373.82	1.0
05-Jul-15	4.46	2.39	6.87	385.36	0.0
06-Jul-15	4.22	2.60	6.65	364.49	0.0
07-Jul-15	4.17	2.22	6.18	359.94	0.0
08-Jul-15	4.05	2.21	5.91	349.67	0.0
09-Jul-15	4.23	2.56	6.62	365.57	0.0
10-Jul-15	4.24	2.62	6.30	365.98	0.0
11-Jul-15	4.10	2.11	5.99	354.57	0.3
12-Jul-15	4.62	2.61	7.36	398.95	0.0
13-Jul-15	4.50	2.84	7.04	388.95	22.5
14-Jul-15	4.63	3.25	6.55	400.20	0.3
15-Jul-15	4.41	2.71	7.07	380.92	0.0
16-Jul-15	4.94	2.36	10.02	426.56	7.8
17-Jul-15	5.36	3.24	7.02	463.18	22.3
18-Jul-15	4.75	2.96	6.73	410.04	4.8
19-Jul-15	4.78	2.76	6.95	413.16	0.8
20-Jul-15	4.63	2.35	7.53	400.12	0.0
21-Jul-15	4.67	2.90	6.69	403.89	3.0
22-Jul-15	4.78	3.00	9.60	413.21	3.3
23-Jul-15	4.54	2.51	6.53	392.22	0.0
24-Jul-15	5.09	2.83	7.70	439.42	0.0
25-Jul-15	4.51	2.66	7.20	389.59	0.0
26-Jul-15	4.77	2.25	8.55	412.10	2.5
27-Jul-15	4.60	2.72	6.47	397.47	0.0
28-Jul-15	4.50	2.91	6.32	389.21	0.0
29-Jul-15	4.56	2.80	9.96	394.38	0.0
30-Jul-15	4.06	2.06	6.31	351.09	0.0
31-Jul-15	4.23	2.93	5.94	365.70	1.5

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
12273.772	2.059	12.147	76.0

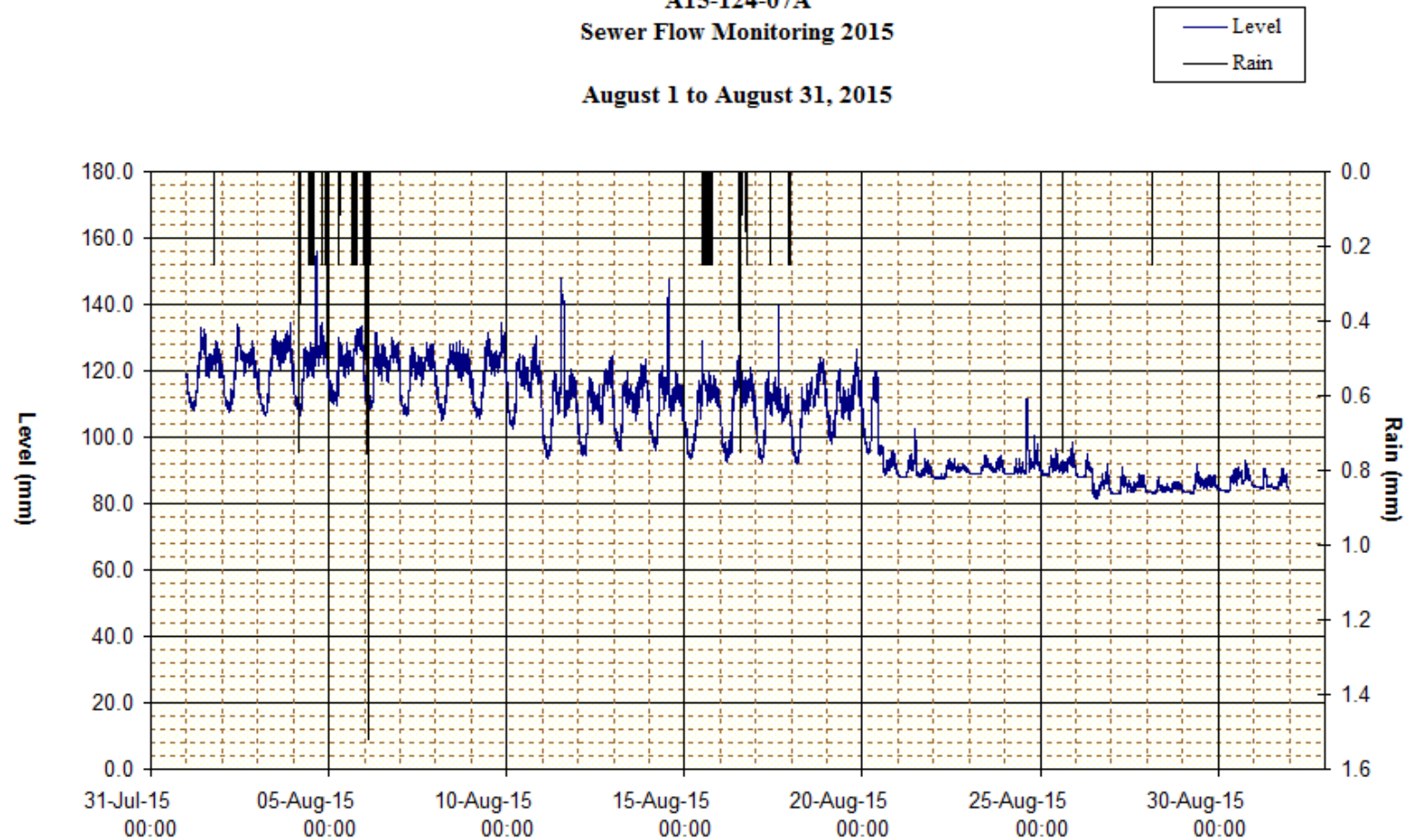
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



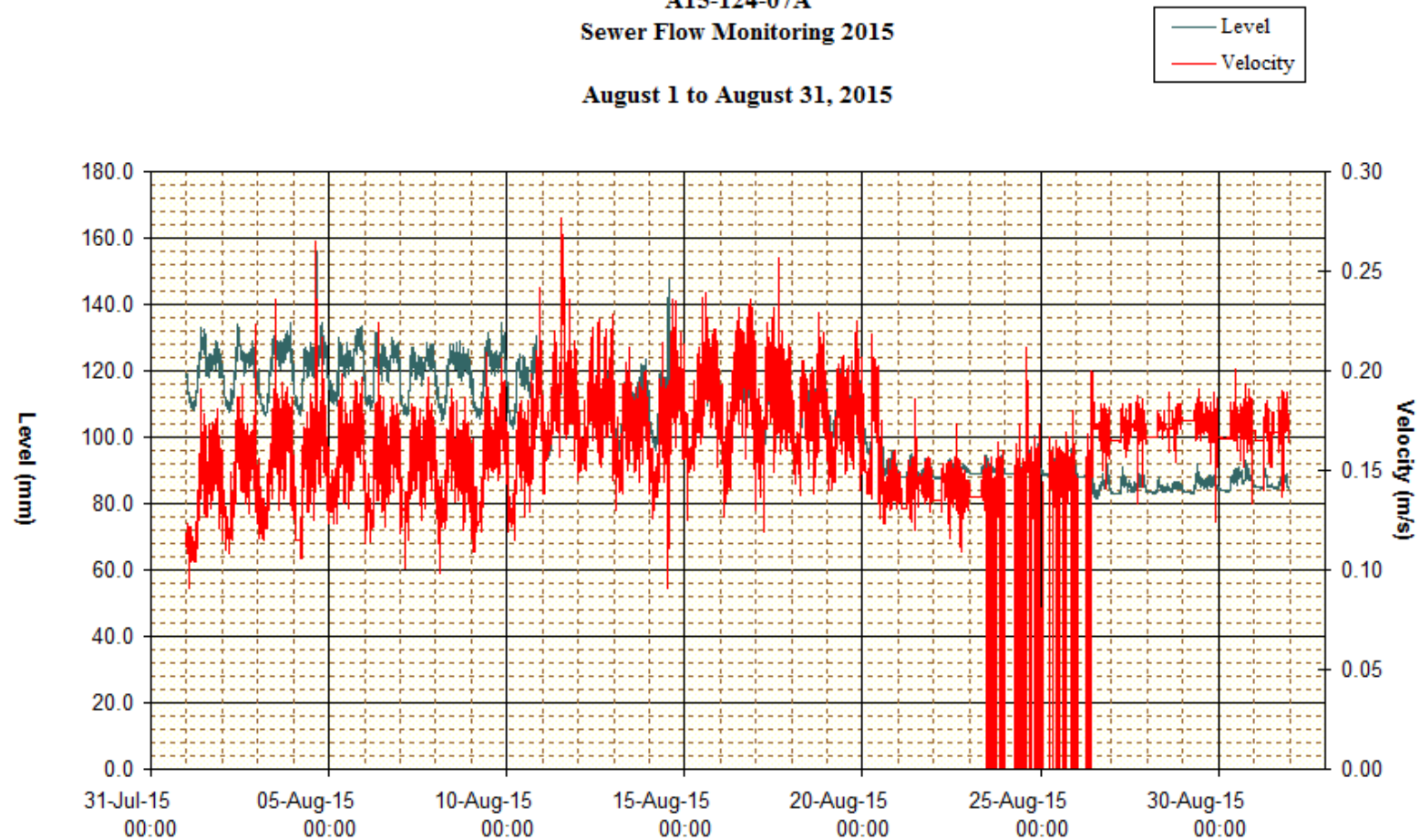
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



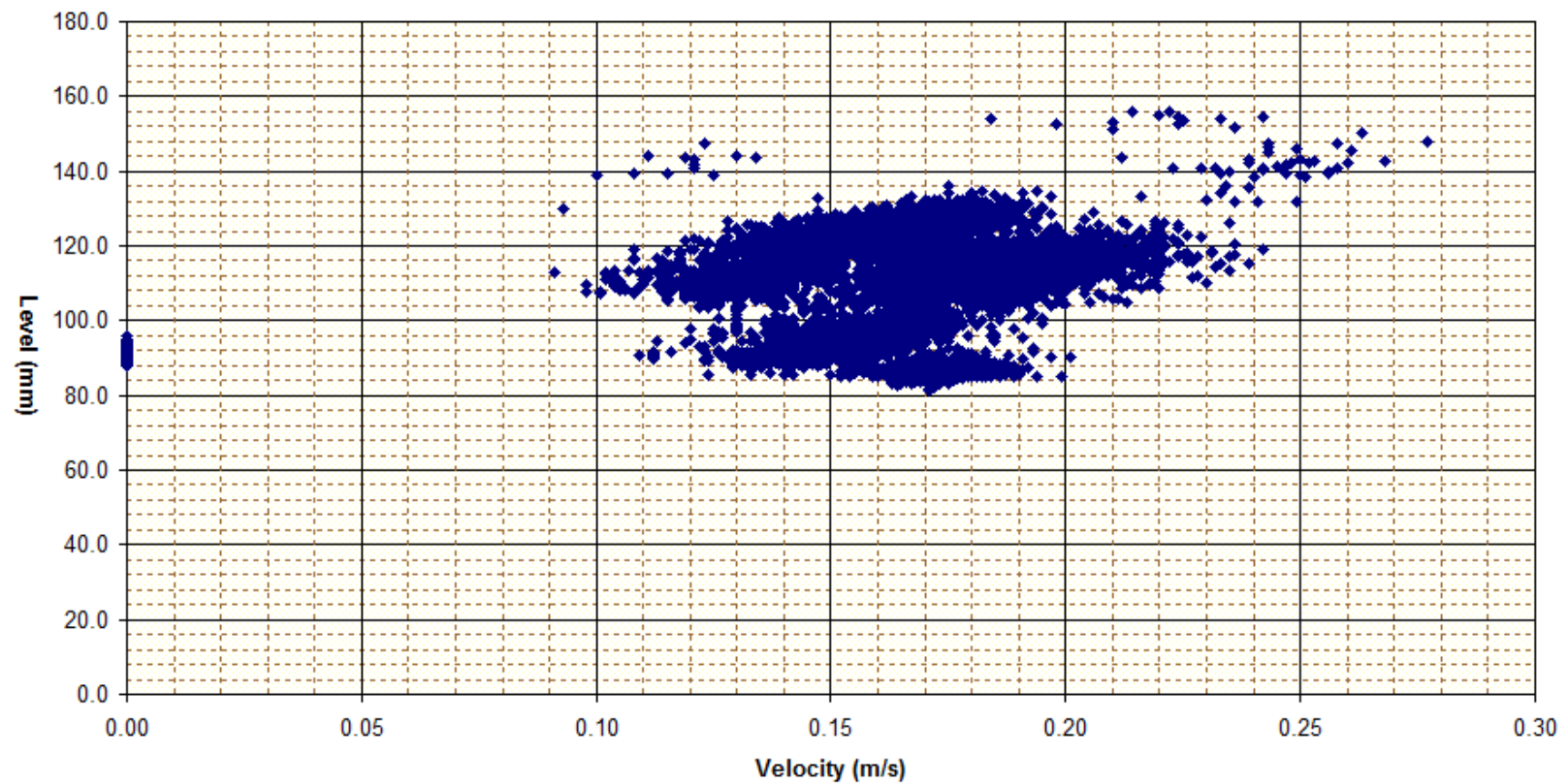
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



Cold Lake, Alberta

A15-124-07A

Sewer Flow Monitoring 2015

August 1 to August 31, 2015

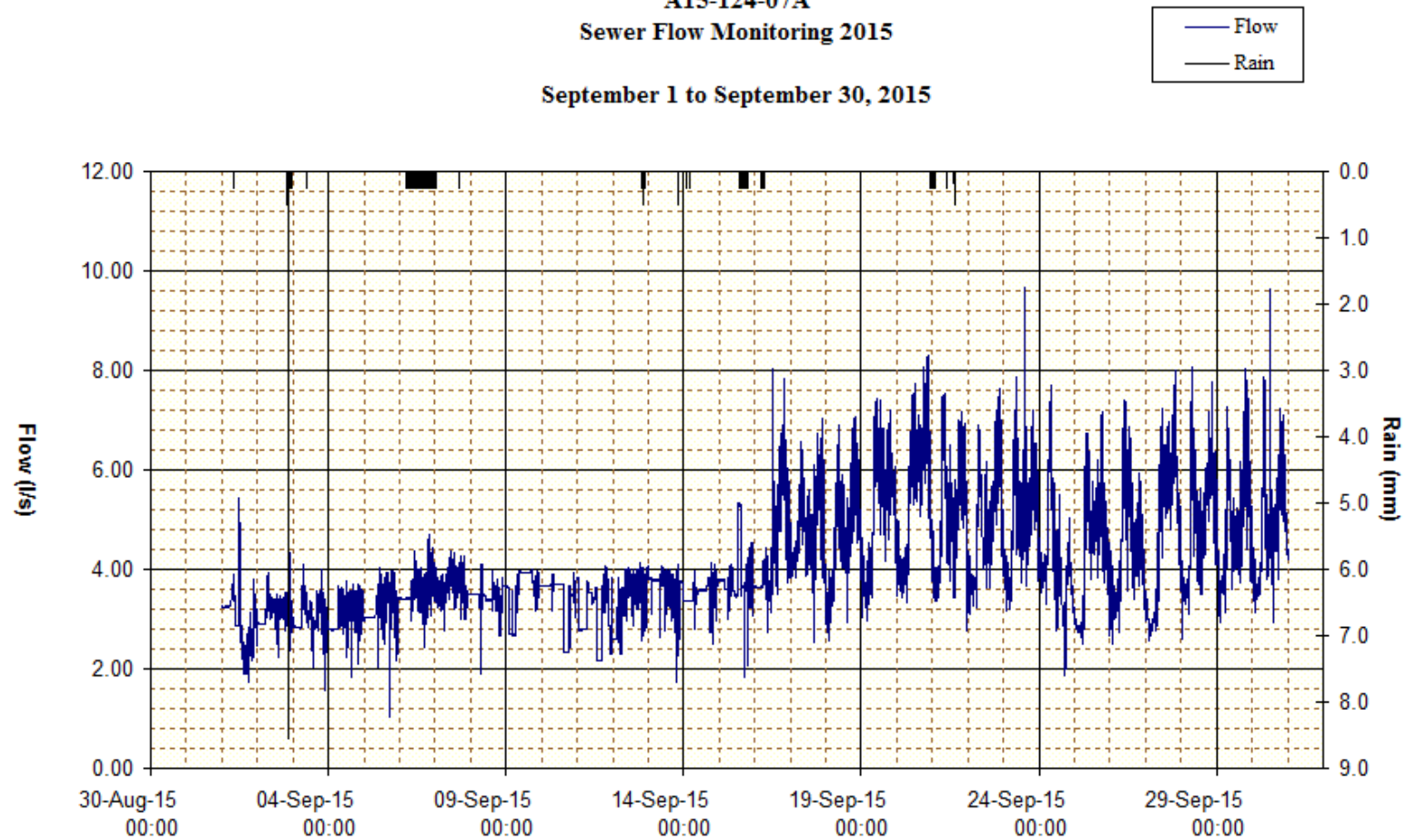
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-15	4.25	2.55	6.63	366.83	0.3
02-Aug-15	4.53	2.82	6.96	391.21	0.0
03-Aug-15	4.79	3.04	8.18	413.98	0.0
04-Aug-15	4.89	2.80	10.90	422.46	8.5
05-Aug-15	4.97	3.30	6.94	429.03	2.3
06-Aug-15	4.69	3.12	7.19	404.99	12.0
07-Aug-15	4.58	2.63	6.35	395.68	0.0
08-Aug-15	4.50	2.55	6.05	389.17	0.0
09-Aug-15	4.73	2.89	6.95	408.50	0.0
10-Aug-15	4.70	2.93	7.29	406.13	0.0
11-Aug-15	5.34	3.26	11.22	461.29	0.0
12-Aug-15	4.77	3.31	6.78	412.38	0.0
13-Aug-15	4.66	3.03	6.25	403.01	0.0
14-Aug-15	4.73	2.94	6.91	408.97	0.0
15-Aug-15	4.96	2.82	7.66	428.68	7.8
16-Aug-15	5.08	2.80	7.24	438.58	4.5
17-Aug-15	4.93	2.59	9.58	426.22	0.8
18-Aug-15	4.82	3.06	7.15	416.16	0.0
19-Aug-15	4.84	3.32	7.27	418.11	0.0
20-Aug-15	3.59	2.48	6.16	309.89	0.0
21-Aug-15	2.89	2.54	4.51	249.63	0.0
22-Aug-15	2.83	2.24	3.51	244.54	0.0
23-Aug-15	2.89	2.51	3.54	249.82	0.0
24-Aug-15	3.12	2.34	5.64	269.43	0.0
25-Aug-15	3.07	2.60	3.73	265.27	0.8
26-Aug-15	3.11	2.58	4.03	268.86	0.0
27-Aug-15	3.20	2.52	3.65	276.57	0.0
28-Aug-15	3.18	2.91	3.55	275.15	0.3
29-Aug-15	3.29	2.35	3.88	283.93	0.0
30-Aug-15	3.31	2.57	4.10	285.82	0.0
31-Aug-15	3.24	2.61	3.86	280.31	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
11100.611	2.240	11.216	37.0

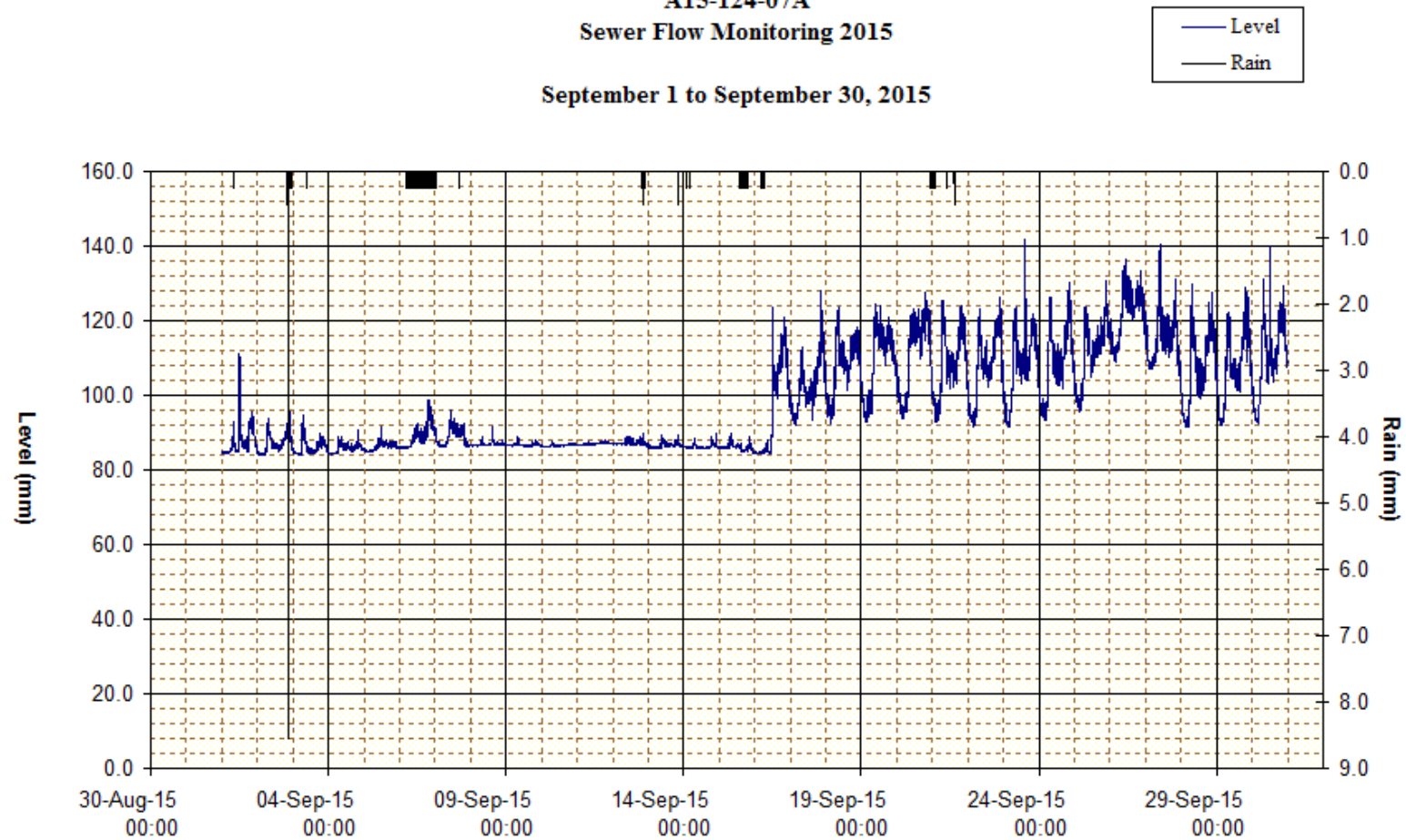
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



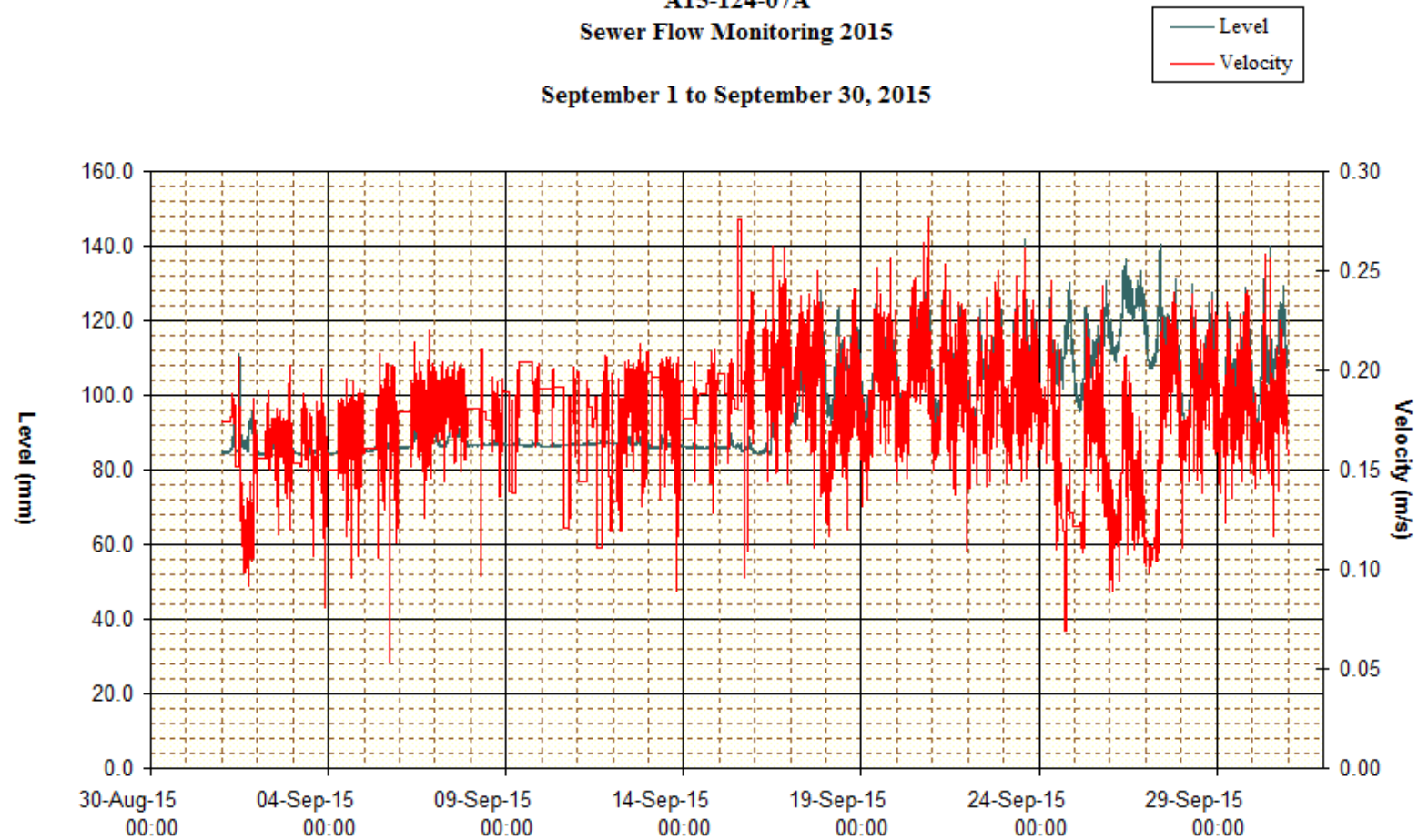
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



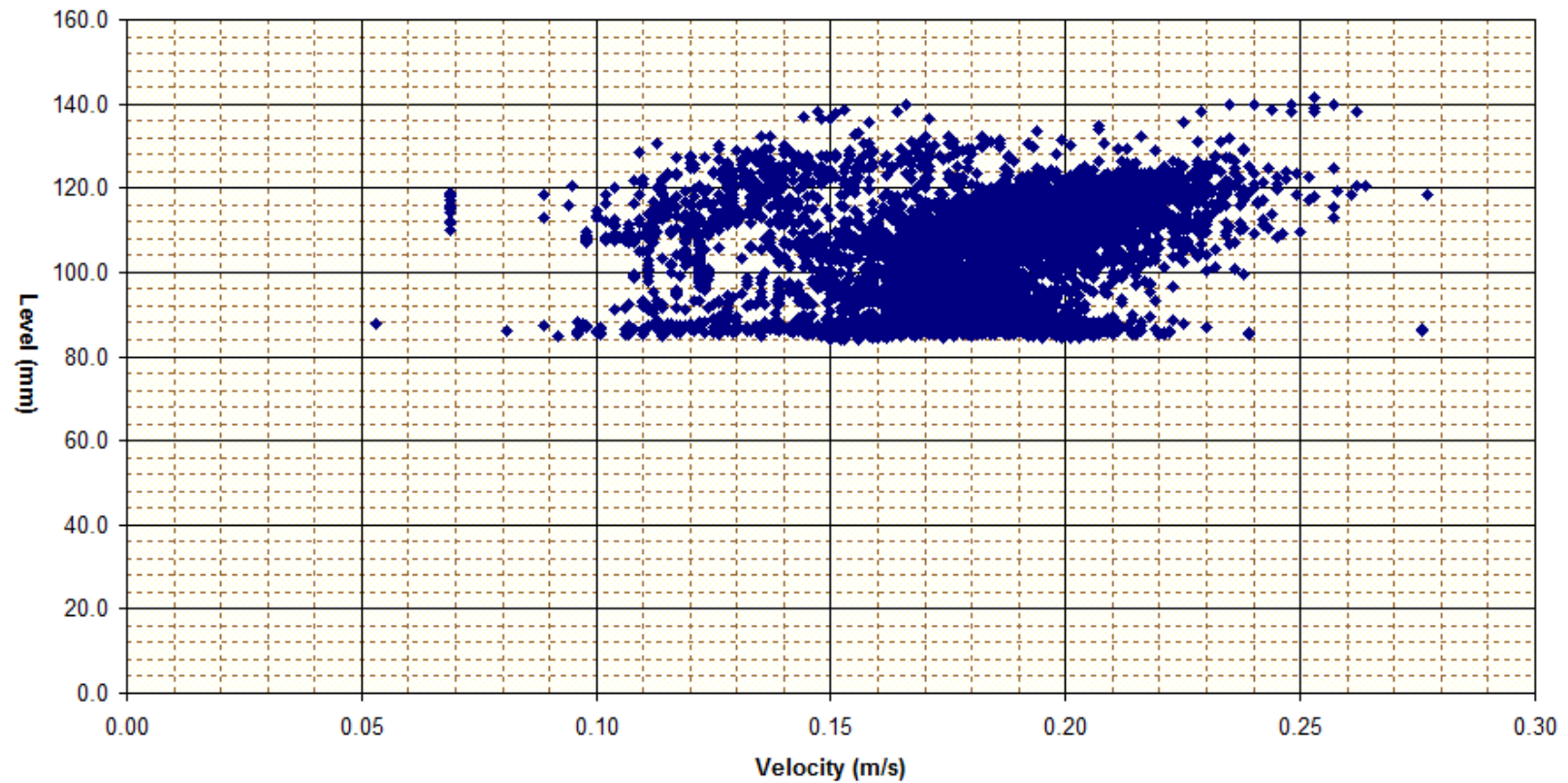
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



Cold Lake, Alberta

A15-124-07A

Sewer Flow Monitoring 2015

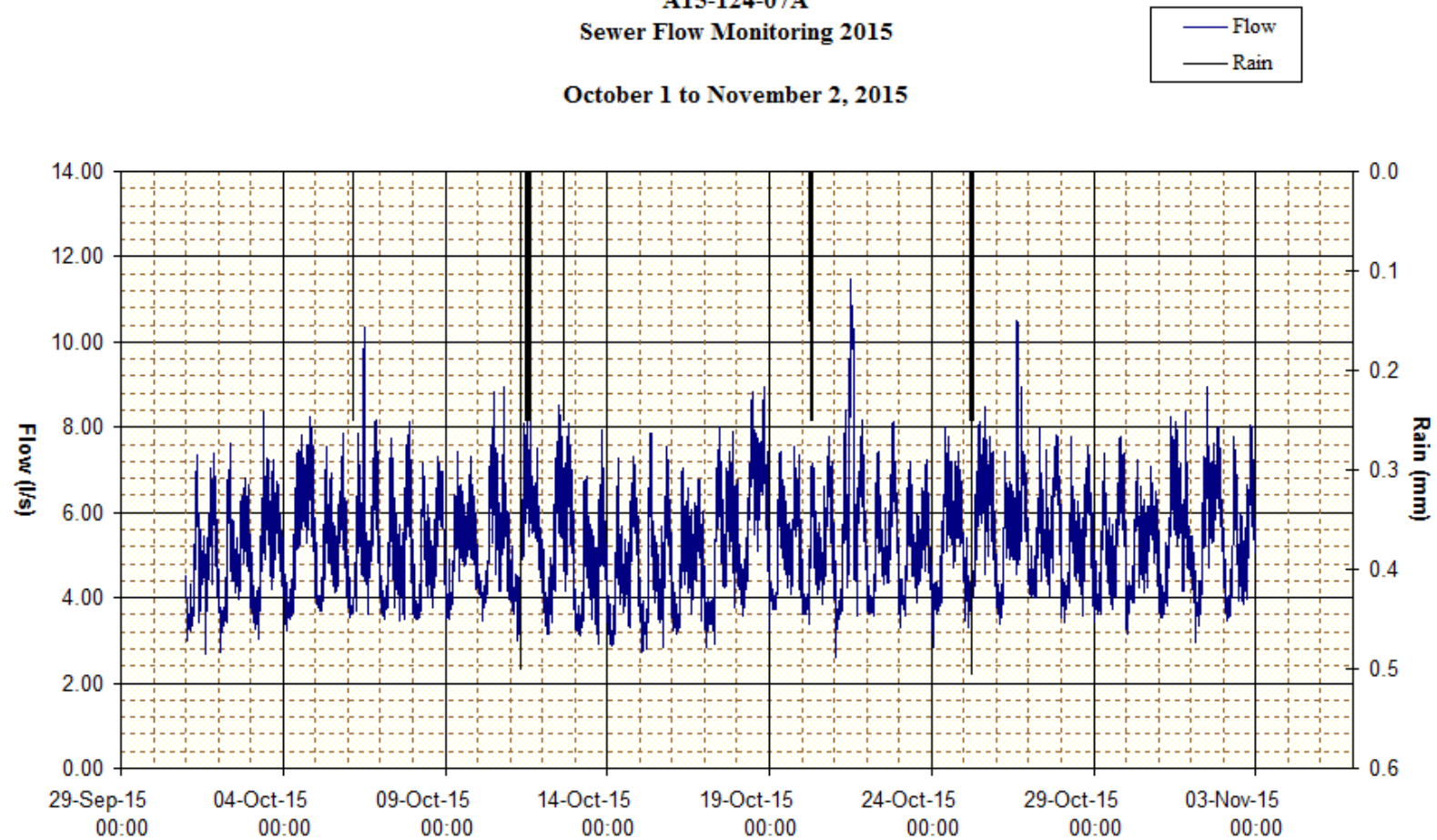
September 1 to September 30, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	2.97	1.72	5.44	256.79	0.3
02-Sep-15	3.16	2.24	4.31	273.28	19.3
03-Sep-15	3.05	1.56	4.12	263.64	0.3
04-Sep-15	3.10	1.83	3.76	267.83	0.0
05-Sep-15	3.20	1.04	4.02	276.41	0.0
06-Sep-15	3.62	2.45	4.70	312.37	21.8
07-Sep-15	3.67	2.76	4.38	317.23	0.5
08-Sep-15	3.48	1.91	4.11	301.04	0.0
09-Sep-15	3.60	2.66	4.00	310.97	0.0
10-Sep-15	3.46	2.33	3.92	298.61	0.0
11-Sep-15	3.06	2.16	4.05	264.09	0.0
12-Sep-15	3.39	2.31	4.14	292.89	3.0
13-Sep-15	3.65	1.73	4.08	315.64	1.5
14-Sep-15	3.52	2.49	4.13	303.97	0.8
15-Sep-15	3.78	1.82	5.34	326.63	3.0
16-Sep-15	4.60	2.73	8.02	397.69	1.8
17-Sep-15	4.82	2.54	7.02	416.20	0.0
18-Sep-15	4.66	2.57	7.06	402.56	0.0
19-Sep-15	5.15	2.98	7.42	444.81	0.0
20-Sep-15	5.50	3.34	8.30	475.26	1.5
21-Sep-15	5.09	2.76	7.53	439.67	3.3
22-Sep-15	4.98	3.11	7.60	430.15	0.0
23-Sep-15	5.17	3.18	9.67	446.78	0.0
24-Sep-15	4.18	1.85	7.70	361.26	0.0
25-Sep-15	4.36	2.50	7.12	376.61	0.0
26-Sep-15	4.49	2.50	7.40	388.29	0.0
27-Sep-15	4.80	2.55	8.01	415.12	0.0
28-Sep-15	4.93	2.61	8.04	425.68	0.0
29-Sep-15	4.89	2.95	8.00	422.37	0.0
30-Sep-15	4.98	2.92	9.65	430.23	0.0

Statistics

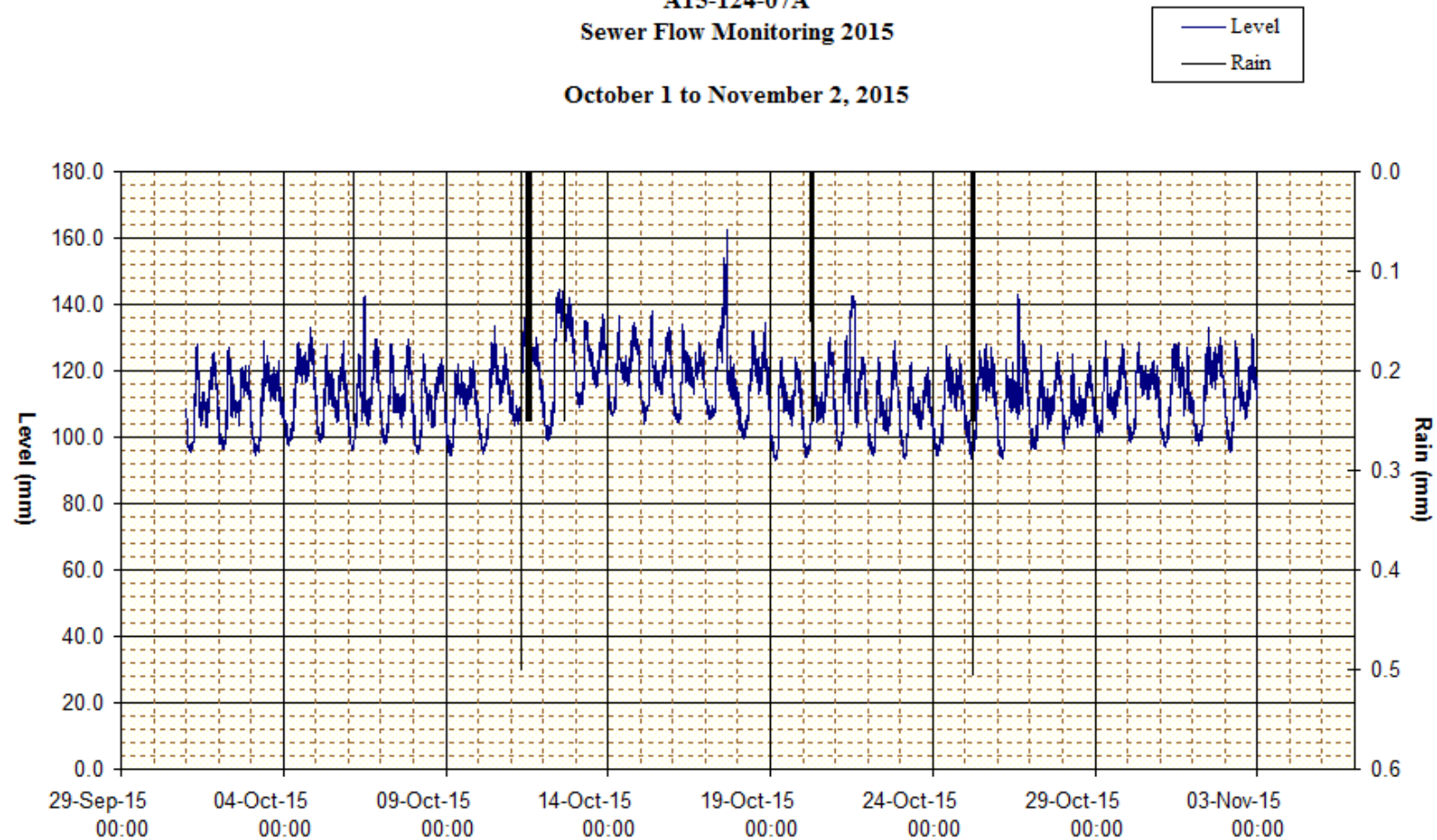
Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
10654.060	1.042	9.666	56.8

**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



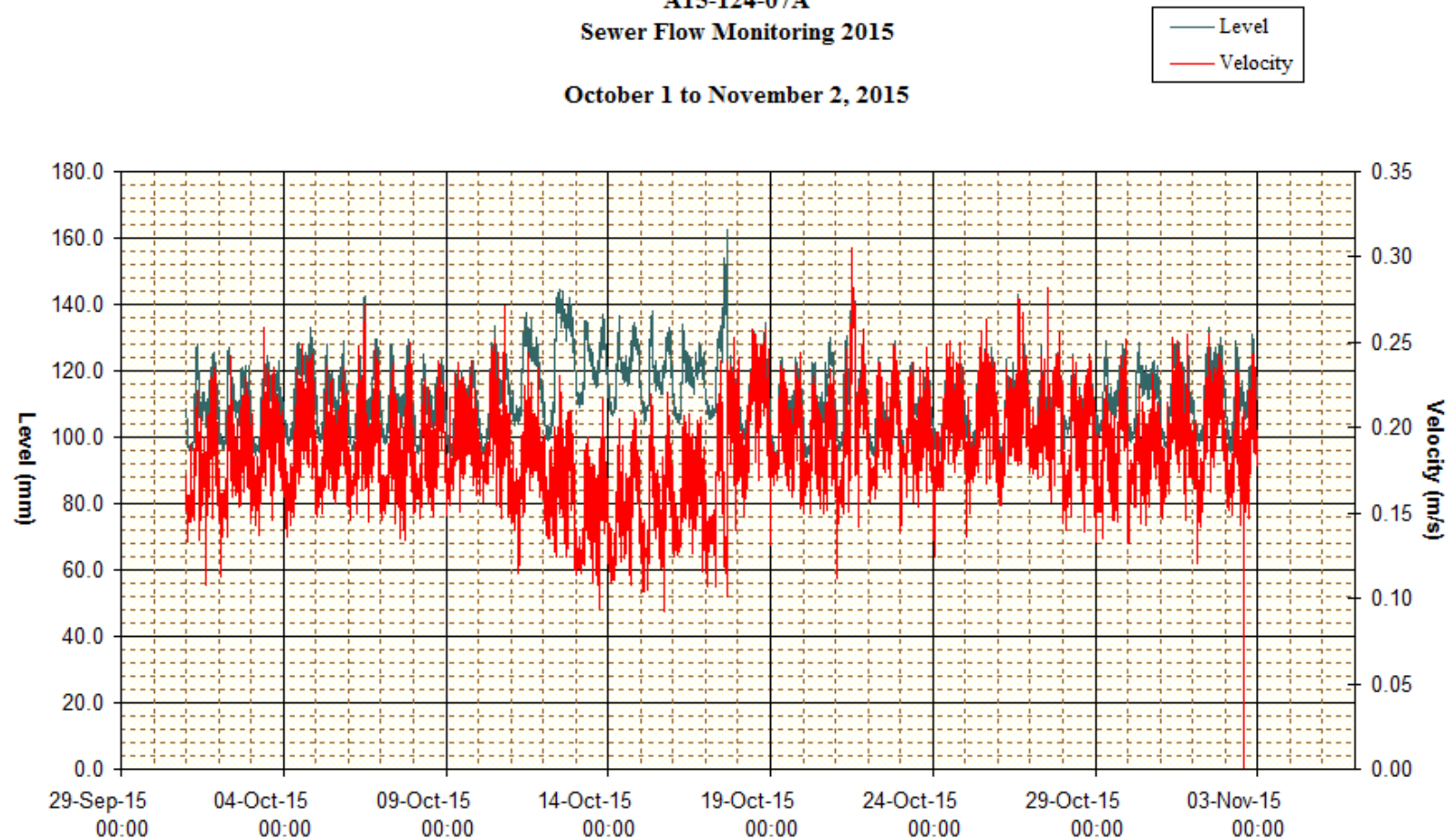
**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

October 1 to November 2, 2015

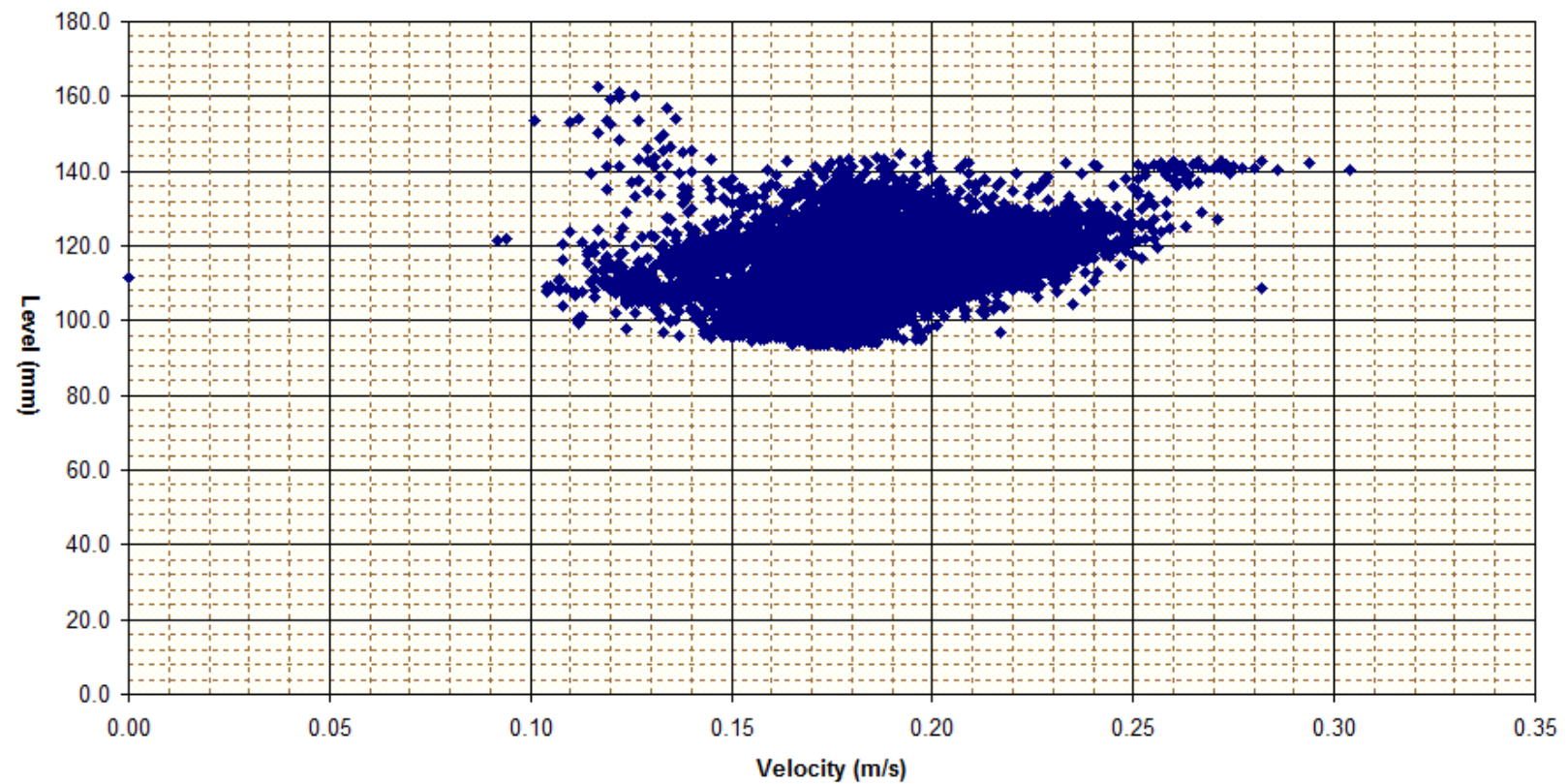


**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015**

October 1 to November 2, 2015



**Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



Cold Lake, Alberta
A15-124-07A
Sewer Flow Monitoring 2015
October 1 to November 2, 2015

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Oct-15	4.77	2.70	7.38	411.83	0.0
02-Oct-15	4.91	2.72	7.62	424.45	0.0
03-Oct-15	5.15	3.05	8.33	444.94	0.0
04-Oct-15	5.51	3.22	8.20	475.77	0.0
05-Oct-15	5.17	3.68	7.87	446.98	0.0
06-Oct-15	5.37	3.53	10.34	464.04	0.3
07-Oct-15	5.09	3.48	8.14	440.17	0.0
08-Oct-15	5.08	3.50	7.33	439.19	0.0
09-Oct-15	5.30	3.50	7.39	458.29	0.0
10-Oct-15	5.44	3.46	8.96	469.69	0.0
11-Oct-15	5.45	2.99	8.14	470.97	4.0
12-Oct-15	5.43	3.16	8.48	468.81	0.3
13-Oct-15	4.72	2.92	7.94	407.47	0.0
14-Oct-15	4.75	2.89	7.30	410.60	0.0
15-Oct-15	4.70	2.73	7.84	406.09	0.0
16-Oct-15	4.86	3.16	7.03	419.67	0.0
17-Oct-15	5.16	2.83	8.00	445.88	0.0
18-Oct-15	6.06	3.22	8.95	523.70	0.0
19-Oct-15	5.25	3.71	7.53	453.82	0.0
20-Oct-15	5.19	3.38	7.78	448.05	2.3
21-Oct-15	5.83	2.60	11.47	504.12	0.0
22-Oct-15	5.28	3.59	8.12	456.49	0.0
23-Oct-15	5.12	3.32	7.25	442.19	0.0
24-Oct-15	5.36	2.83	7.99	463.46	0.0
25-Oct-15	5.58	3.31	8.48	482.35	2.3
26-Oct-15	5.71	3.39	10.50	493.69	0.0
27-Oct-15	5.48	4.01	7.96	473.52	0.0
28-Oct-15	5.26	3.40	7.77	454.06	0.0
29-Oct-15	5.25	3.51	7.78	454.02	0.0
30-Oct-15	5.18	3.17	7.24	447.47	0.0
31-Oct-15	5.50	3.55	8.38	475.06	0.0
01-Nov-15	5.69	2.95	8.94	491.67	0.0
02-Nov-15	5.21	3.45	8.06	450.11	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
15018.604	2.604	11.474	9.0



FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-07B
ADDRESS:	NE of 47 Street, In Field
GPS:	N54.41762 W110.19868
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

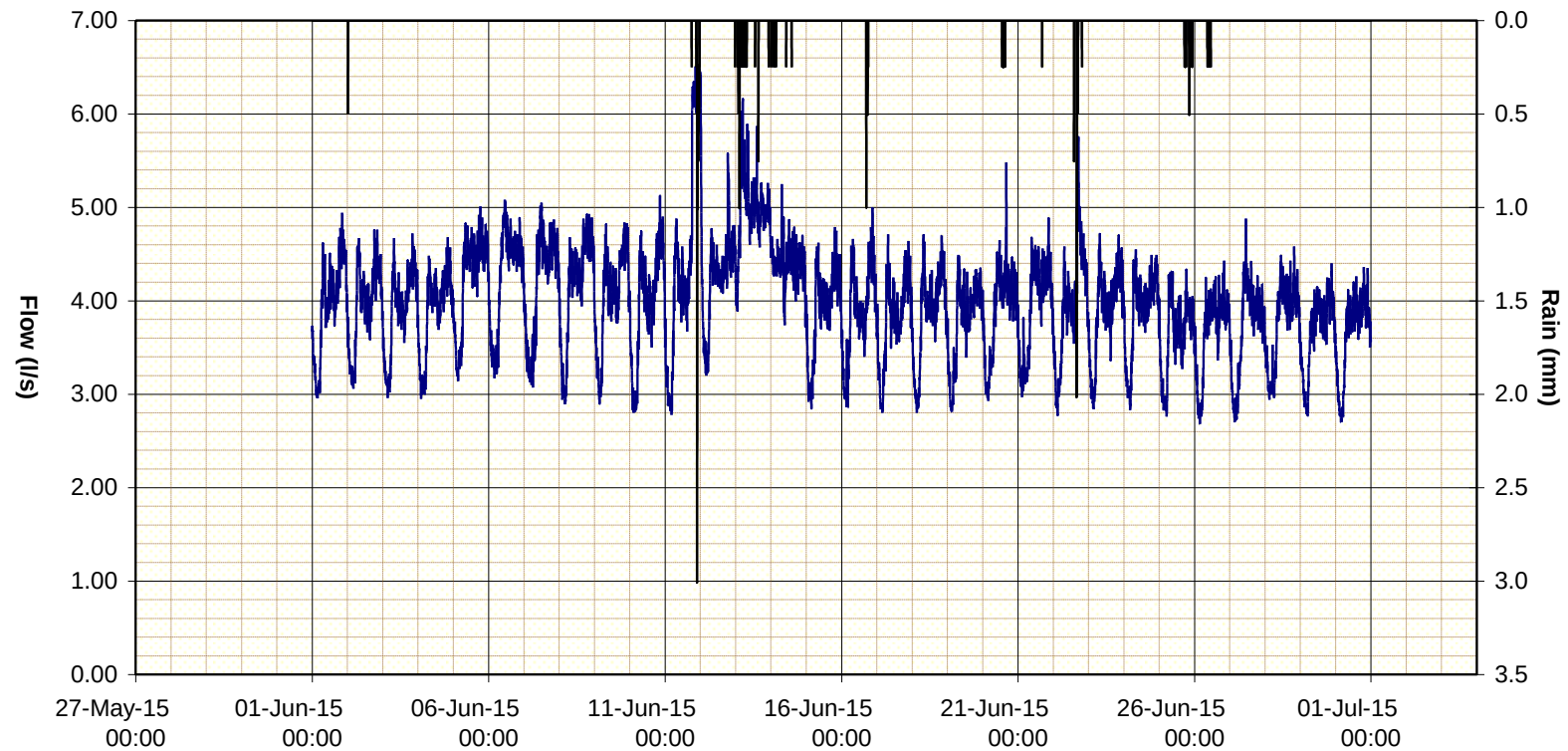
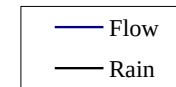
CONSTANTS			
D1 (mm):		D1-lip to x-bar	
TOM (mm)	5300	Raw Weir L - lip to water	
METER #	206F01467	DATE:	12-May-15
METER #	214E03117	DATE:	12-May-15
METER #		DATE:	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible][illegible]

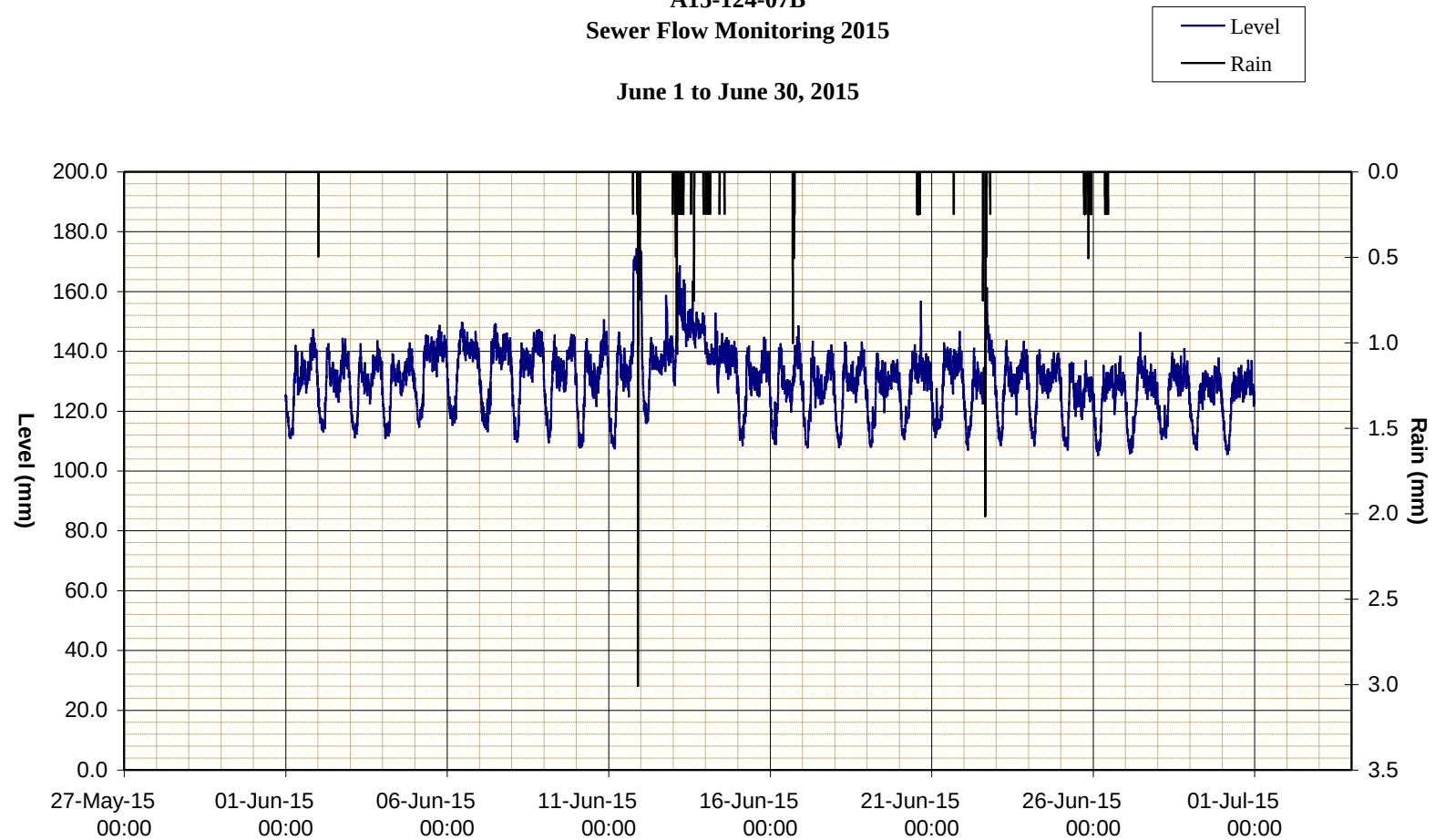
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



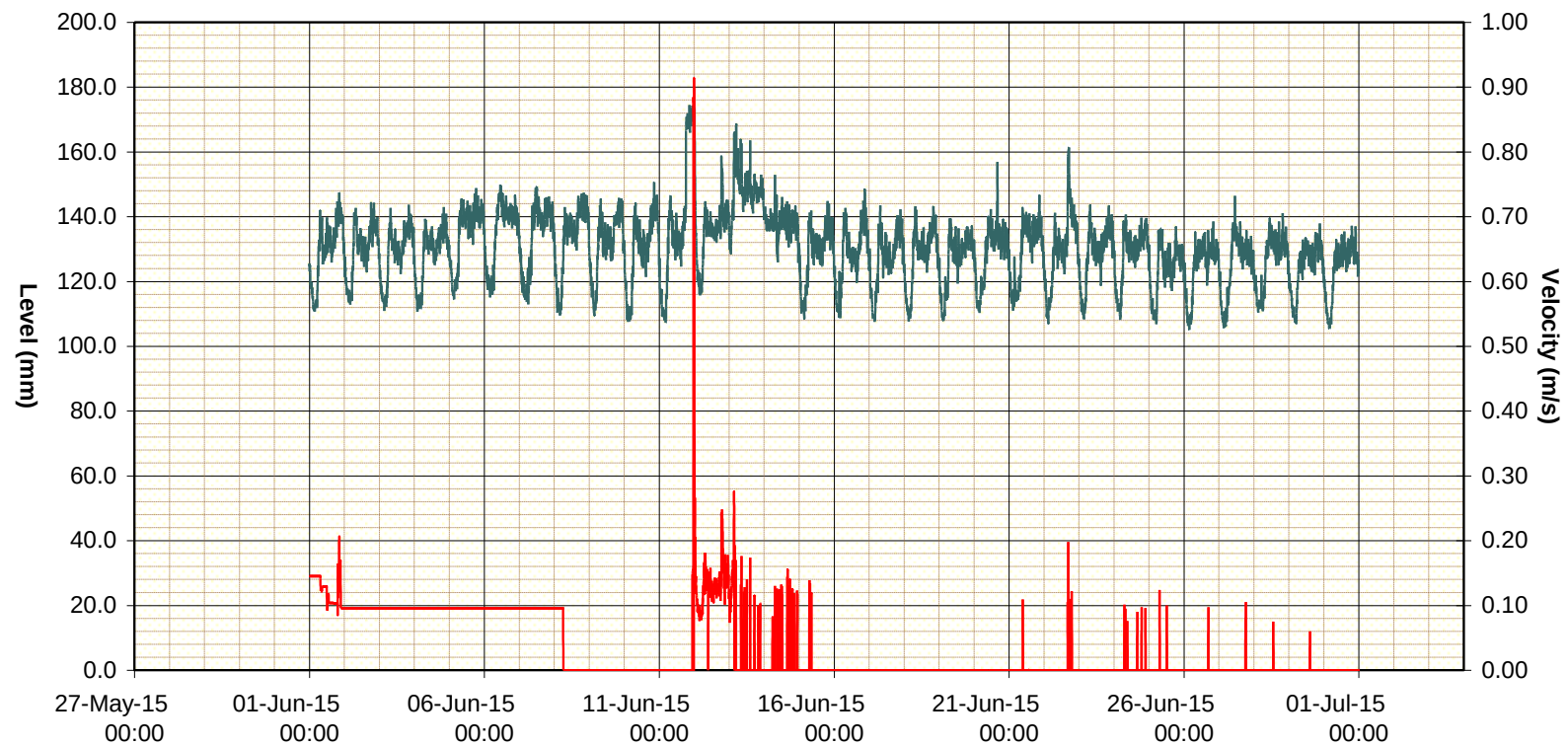
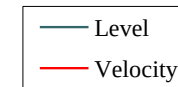
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



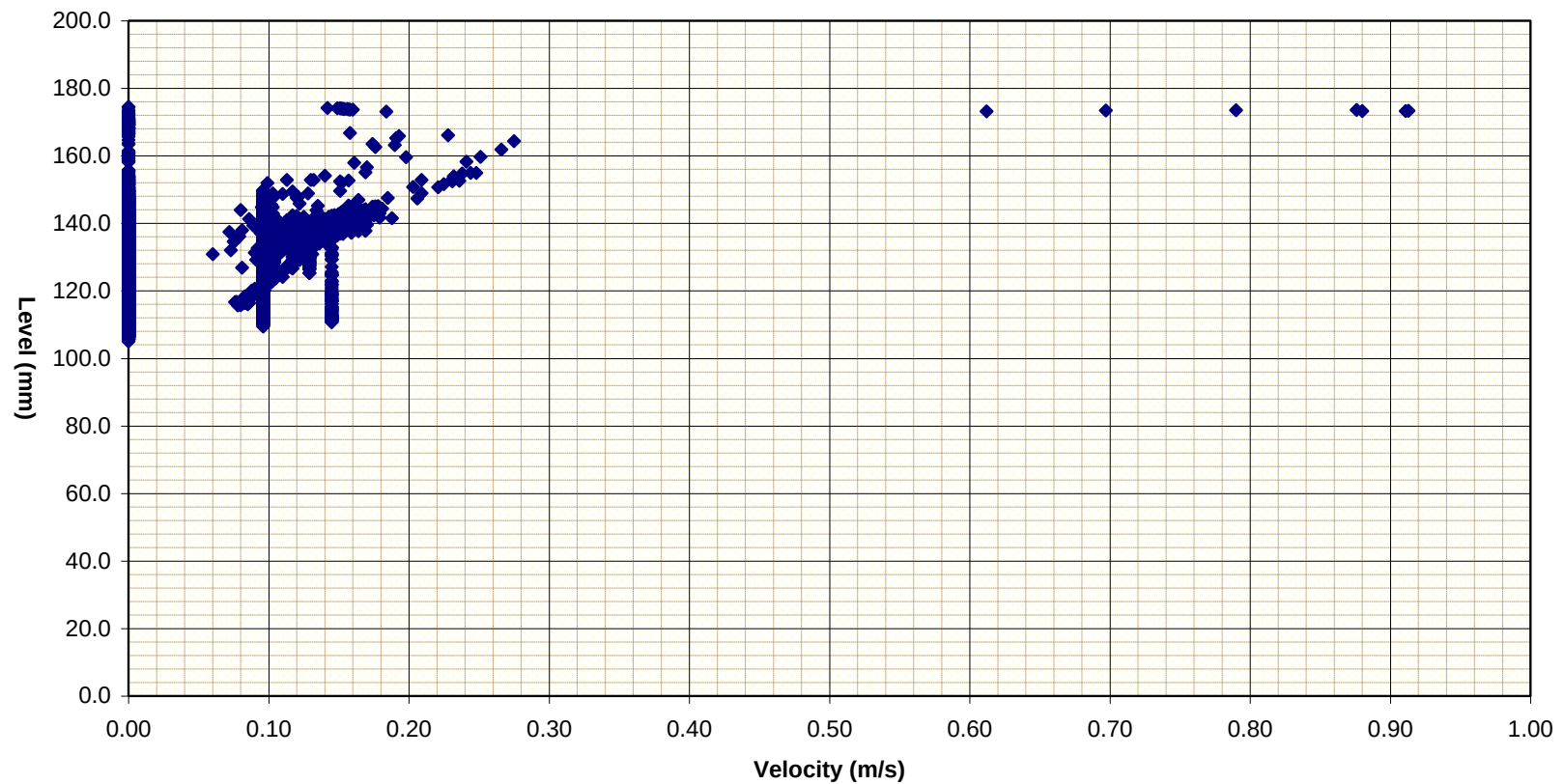
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta

A15-124-07B

Sewer Flow Monitoring 2015

June 1 to June 30, 2015

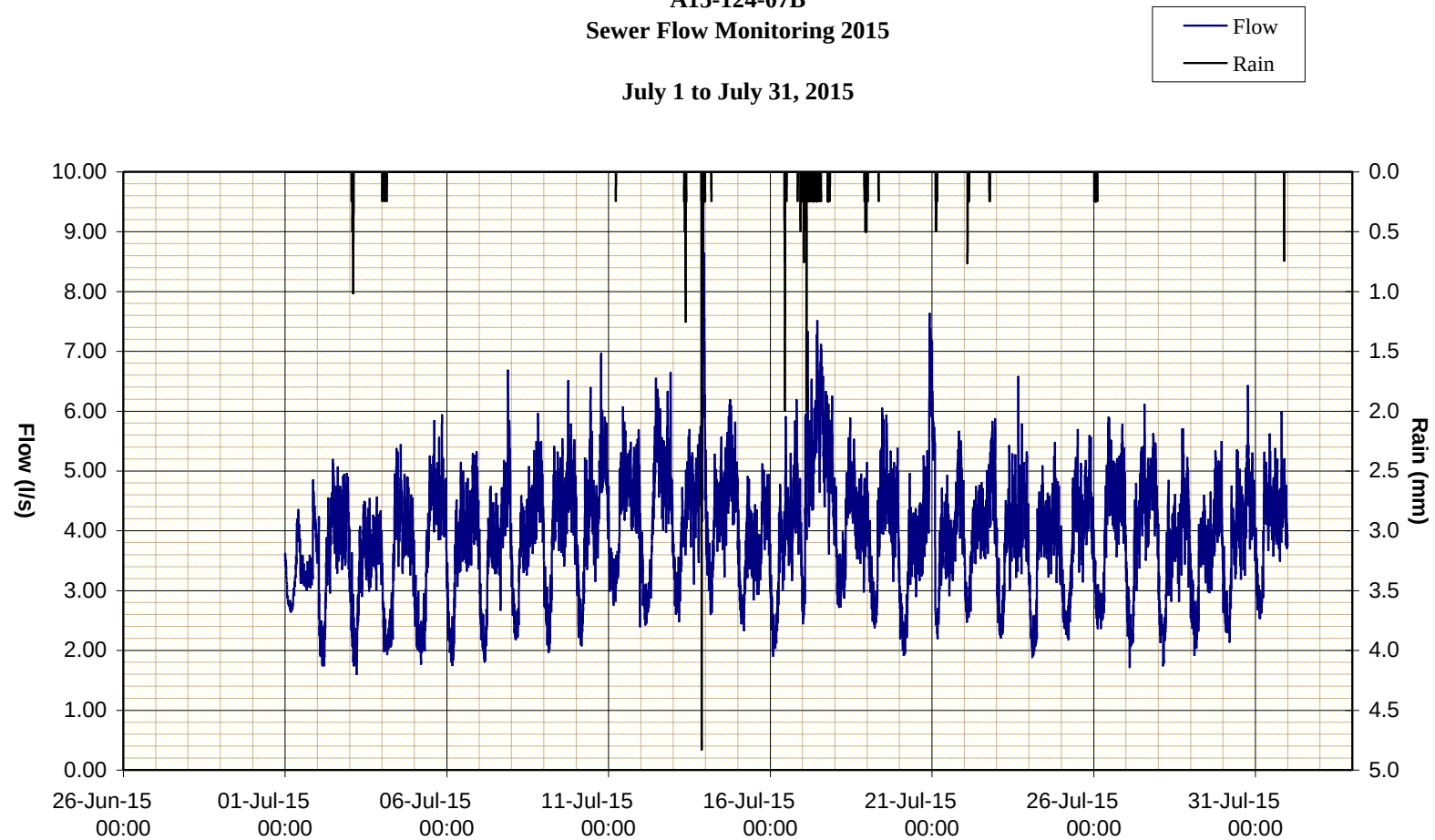
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	3.96	2.96	4.94	341.81	0.0
02-Jun-15	3.96	3.06	4.76	342.11	0.5
03-Jun-15	3.89	2.96	4.72	336.34	0.0
04-Jun-15	3.89	2.95	4.68	335.99	0.0
05-Jun-15	4.23	3.14	5.01	365.16	0.0
06-Jun-15	4.26	3.17	5.08	367.99	0.0
07-Jun-15	4.17	3.07	5.05	360.11	0.0
08-Jun-15	4.15	2.89	4.93	358.67	0.0
09-Jun-15	4.04	2.90	4.84	349.00	0.0
10-Jun-15	3.97	2.80	5.12	343.43	0.0
11-Jun-15	4.45	2.78	6.51	384.83	16.5
12-Jun-15	4.29	3.20	6.44	370.42	0.3
13-Jun-15	4.98	3.90	6.15	430.62	10.8
14-Jun-15	4.38	3.73	5.25	378.71	1.5
15-Jun-15	3.91	2.85	4.79	337.56	0.0
16-Jun-15	3.87	2.86	4.98	334.36	3.5
17-Jun-15	3.81	2.80	4.71	329.16	0.0
18-Jun-15	3.84	2.80	4.70	331.52	0.0
19-Jun-15	3.78	2.81	4.49	326.97	0.0
20-Jun-15	3.88	2.93	5.48	334.85	3.0
21-Jun-15	3.92	2.97	4.88	338.79	0.5
22-Jun-15	3.97	2.78	5.75	342.68	8.5
23-Jun-15	3.88	2.84	4.71	335.33	0.0
24-Jun-15	3.87	2.83	4.55	333.97	0.0
25-Jun-15	3.64	2.76	4.32	314.69	4.0
26-Jun-15	3.67	2.68	4.43	316.90	1.5
27-Jun-15	3.68	2.70	4.88	317.97	0.0
28-Jun-15	3.76	2.94	4.58	324.44	0.0
29-Jun-15	3.67	2.77	4.40	316.71	0.0
30-Jun-15	3.63	2.70	4.36	313.94	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
10315.017	2.680	6.510	50.5

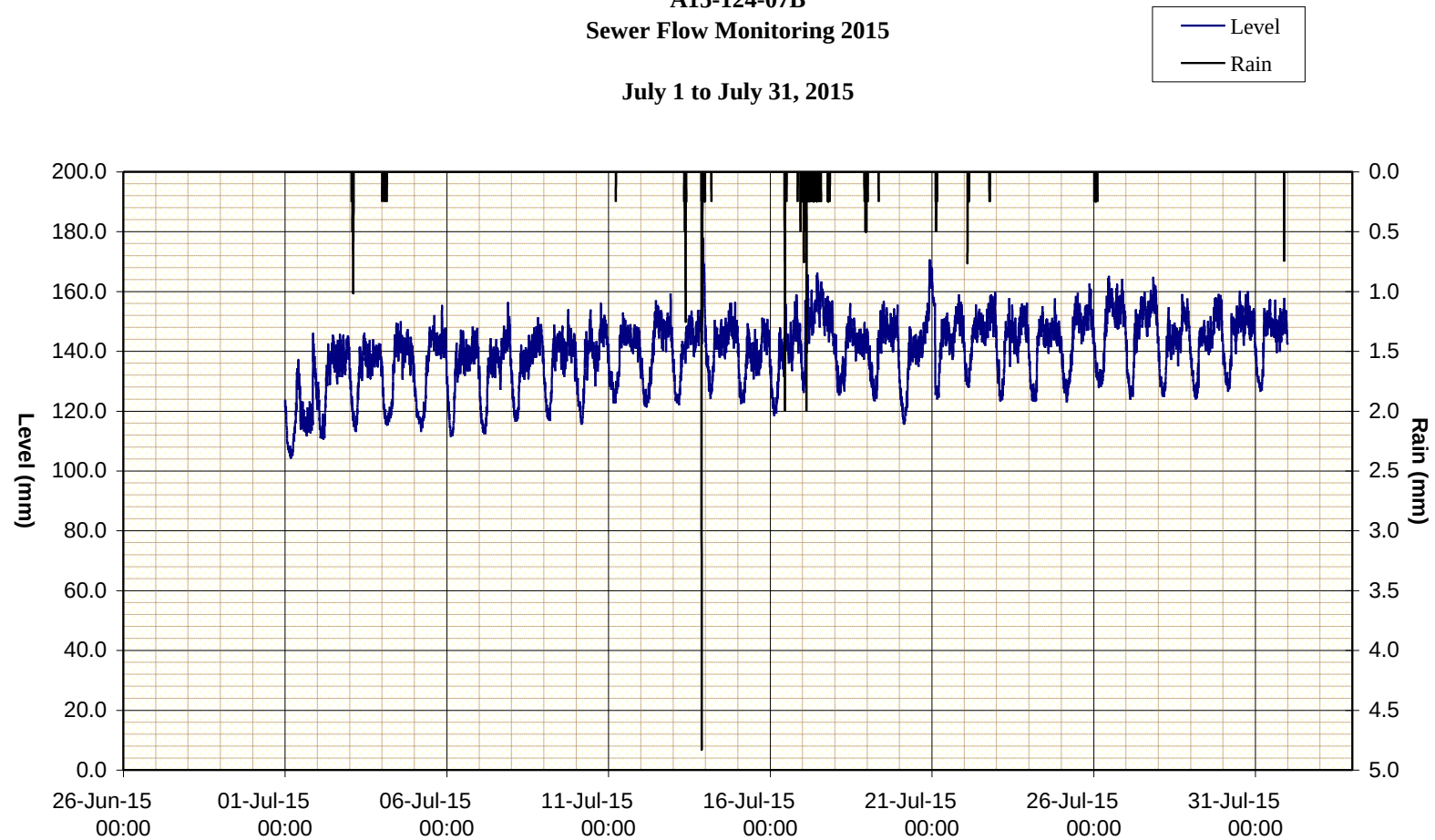
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



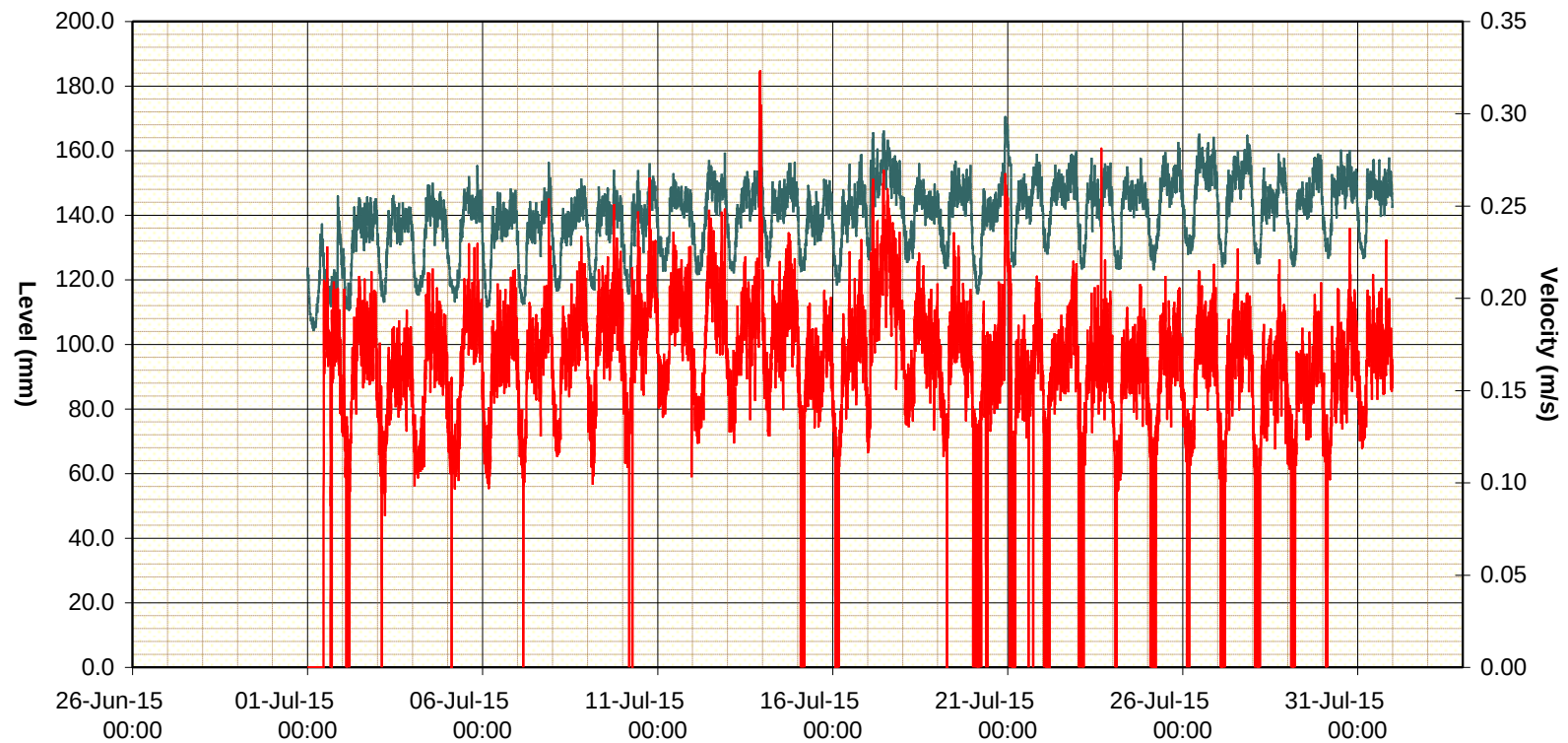
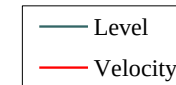
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



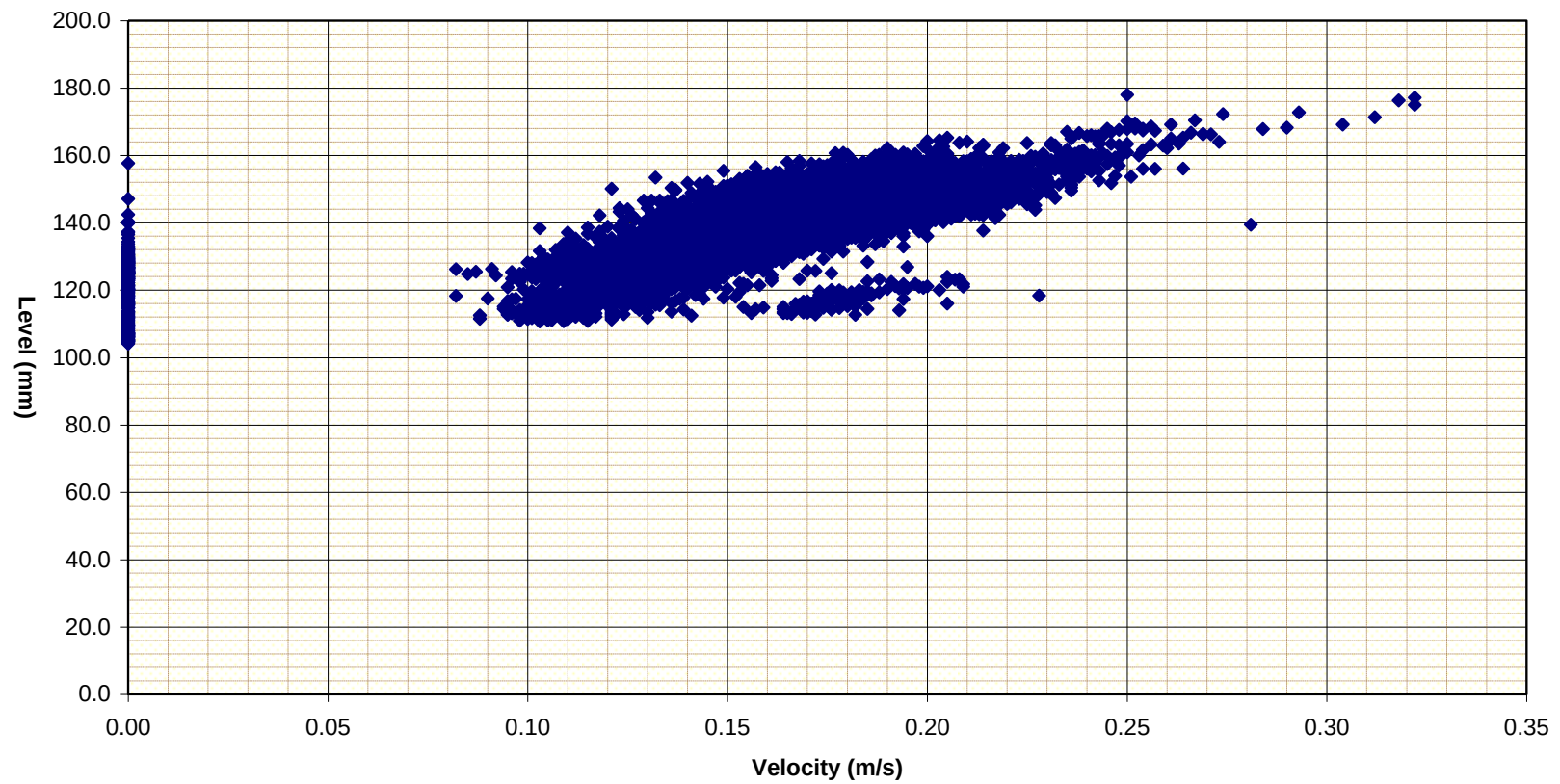
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta

A15-124-07B

Sewer Flow Monitoring 2015

July 1 to July 31, 2015

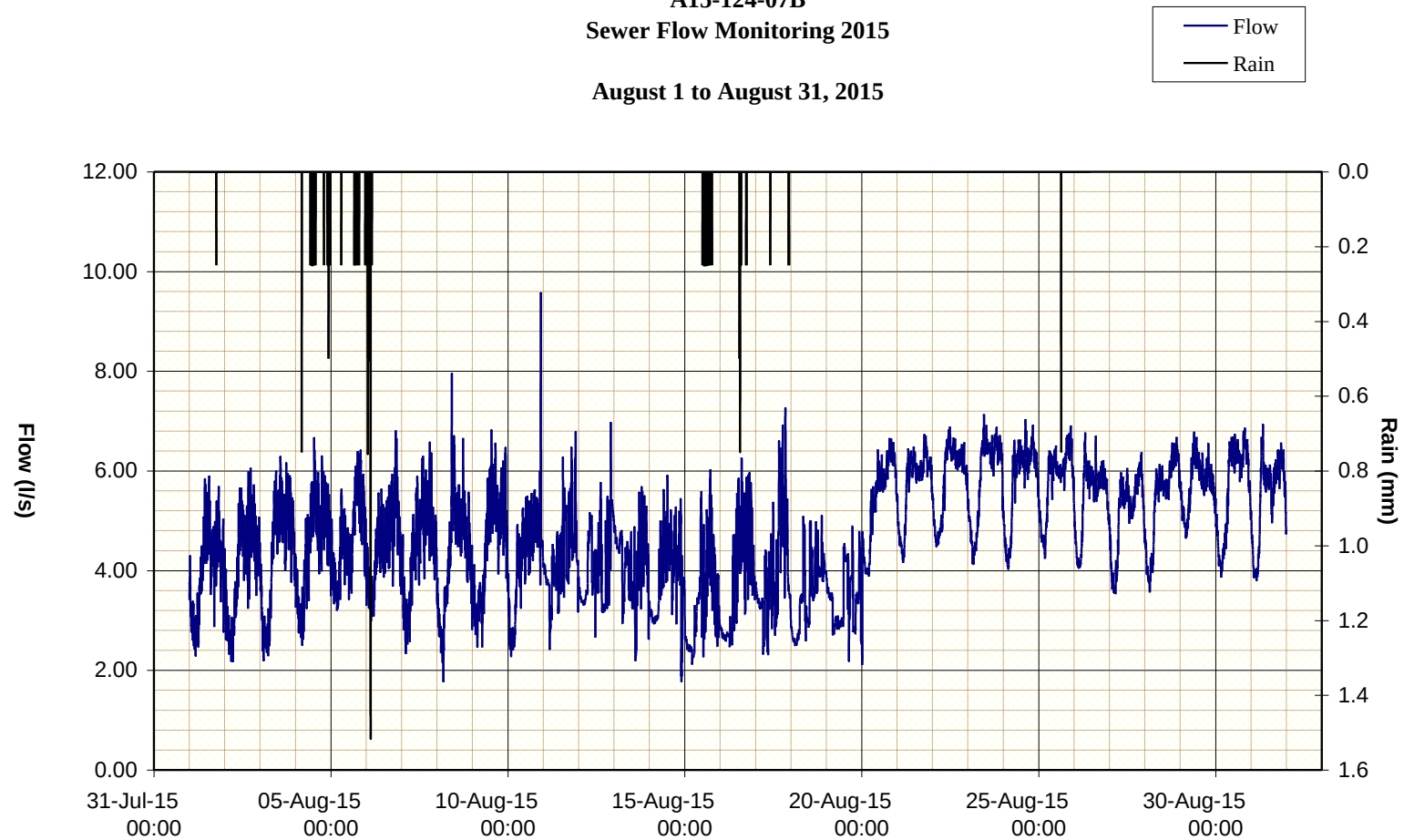
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	3.36	2.63	4.84	290.56	0.0
02-Jul-15	3.65	1.74	5.20	315.24	0.0
03-Jul-15	3.33	1.59	4.55	287.70	6.3
04-Jul-15	3.54	1.94	5.45	305.95	1.0
05-Jul-15	3.68	1.78	5.92	318.12	0.0
06-Jul-15	3.67	1.77	5.31	316.92	0.0
07-Jul-15	3.69	1.82	6.67	318.39	0.0
08-Jul-15	3.87	2.17	5.95	334.58	0.0
09-Jul-15	4.10	1.96	6.50	354.27	0.0
10-Jul-15	4.20	2.07	6.94	362.89	0.0
11-Jul-15	4.27	2.39	6.08	368.62	0.3
12-Jul-15	4.33	2.44	6.62	374.32	0.0
13-Jul-15	4.42	2.49	9.49	381.75	22.5
14-Jul-15	4.38	2.61	6.16	378.47	0.3
15-Jul-15	3.73	2.34	5.12	322.68	0.0
16-Jul-15	3.73	1.90	6.16	321.99	7.8
17-Jul-15	5.22	2.44	7.52	450.63	22.3
18-Jul-15	4.07	2.71	5.88	351.70	4.8
19-Jul-15	4.02	2.37	6.04	347.24	0.8
20-Jul-15	3.84	1.91	7.61	331.74	0.0
21-Jul-15	4.03	2.20	7.14	347.95	3.0
22-Jul-15	4.05	2.46	5.85	350.12	3.3
23-Jul-15	3.85	2.20	6.57	332.27	0.0
24-Jul-15	3.67	1.88	5.46	317.33	0.0
25-Jul-15	3.84	2.18	5.70	331.99	0.0
26-Jul-15	4.03	2.36	5.87	348.25	2.5
27-Jul-15	3.96	1.71	6.10	341.96	0.0
28-Jul-15	3.64	1.75	5.71	314.51	0.0
29-Jul-15	3.63	1.91	5.50	313.87	0.0
30-Jul-15	3.90	2.15	6.42	336.55	0.0
31-Jul-15	4.08	2.54	5.94	352.32	1.5

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
10520.860	1.589	9.489	76.0

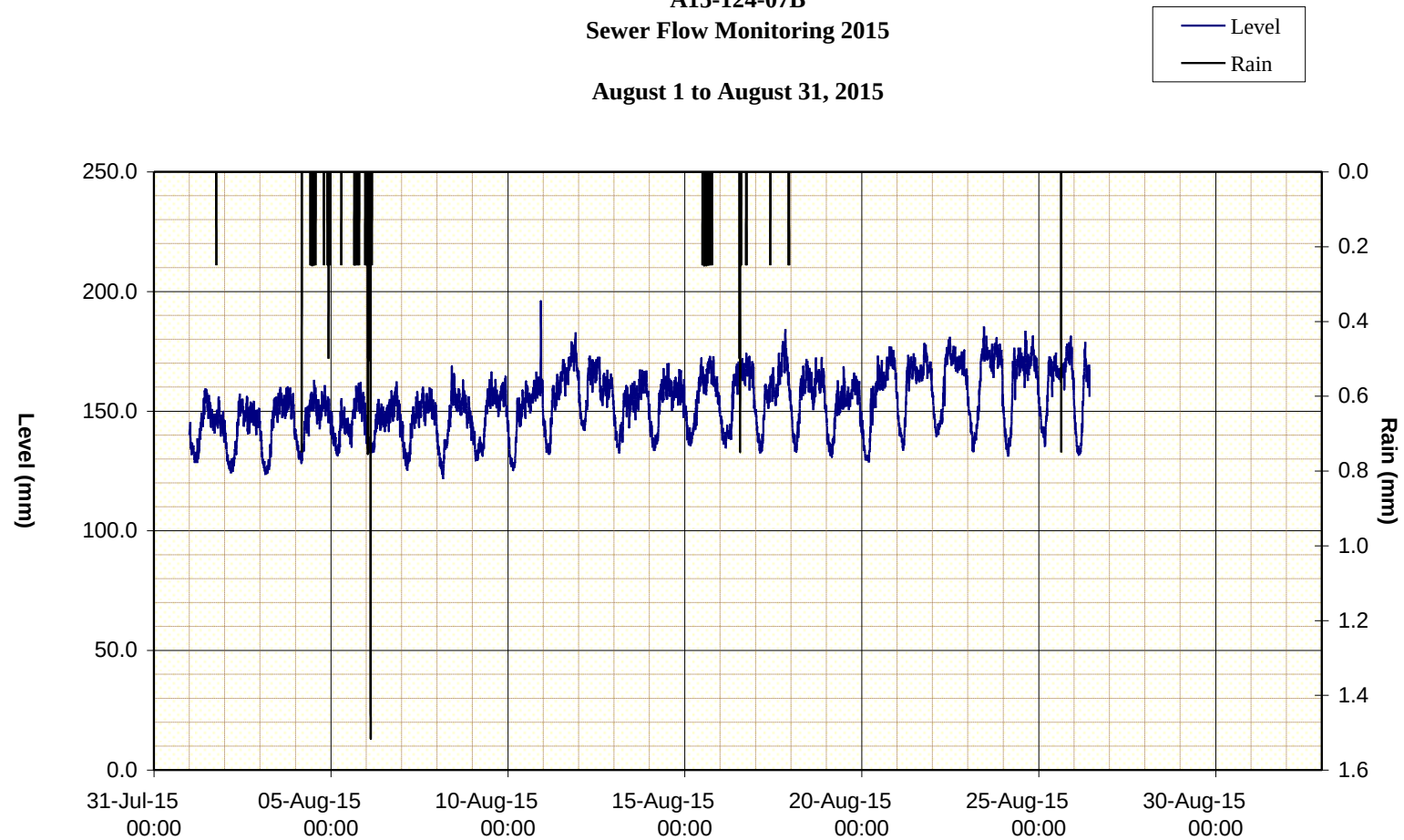
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



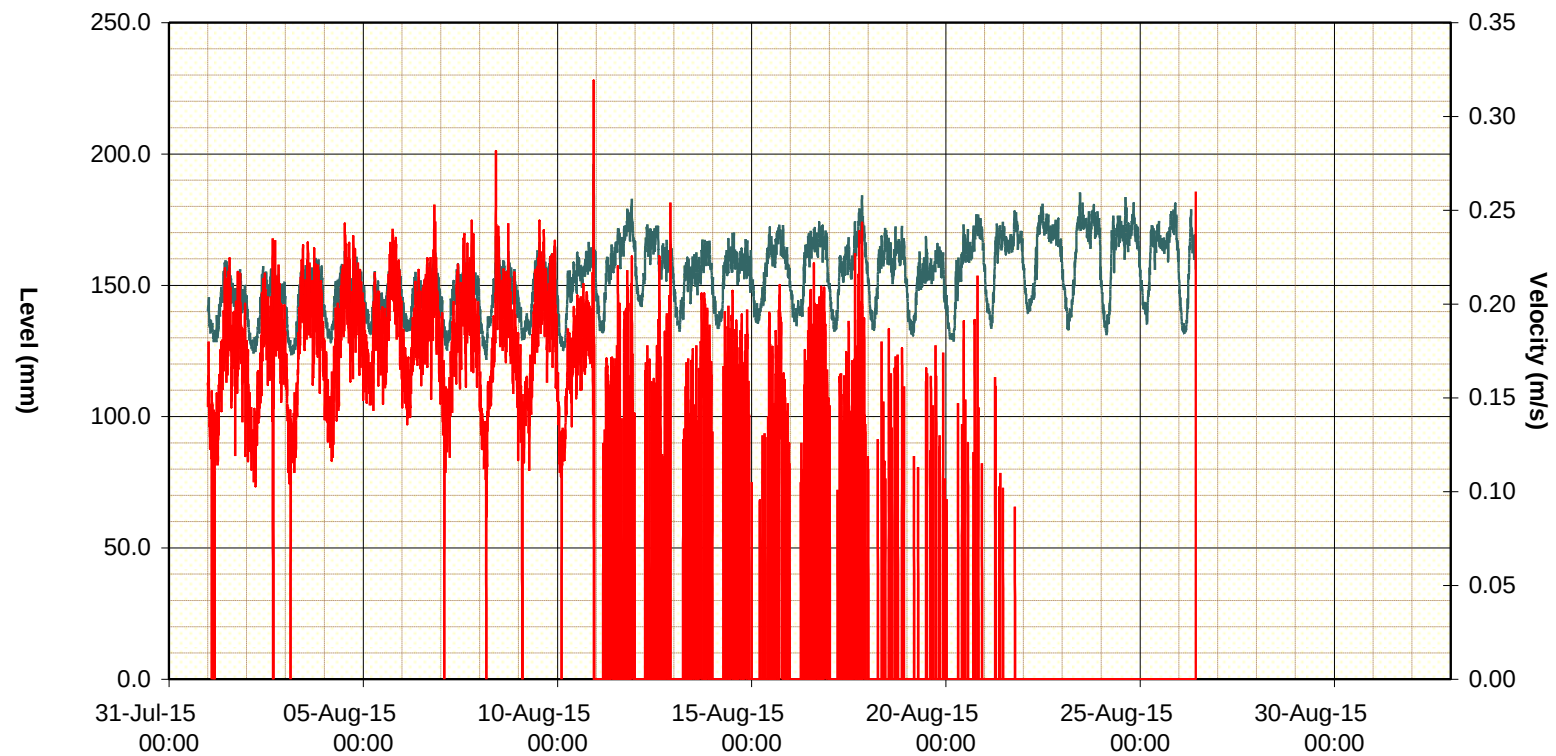
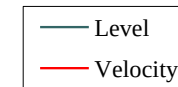
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



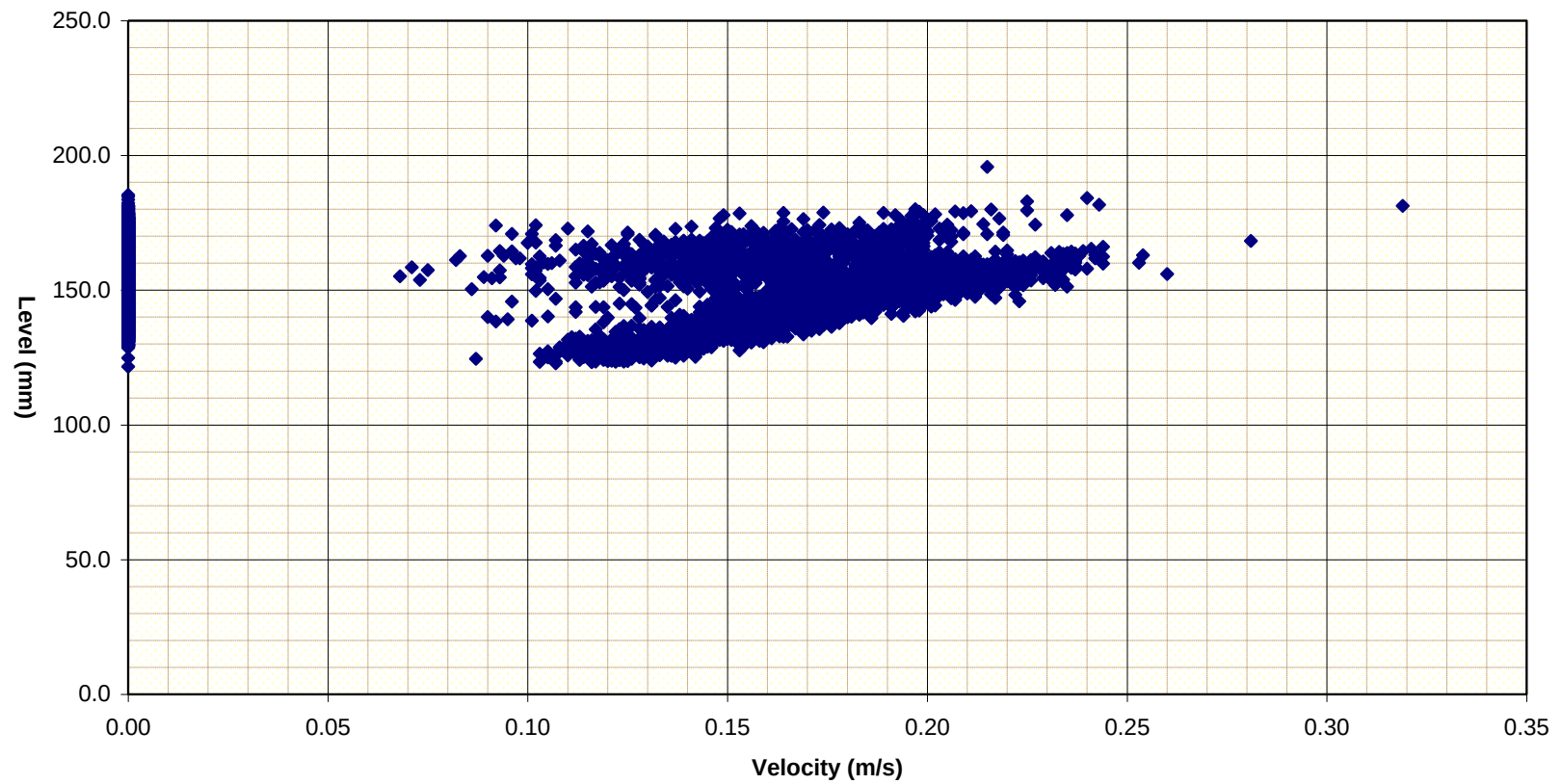
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



Cold Lake, Alberta

A15-124-07B

Sewer Flow Monitoring 2015

August 1 to August 31, 2015

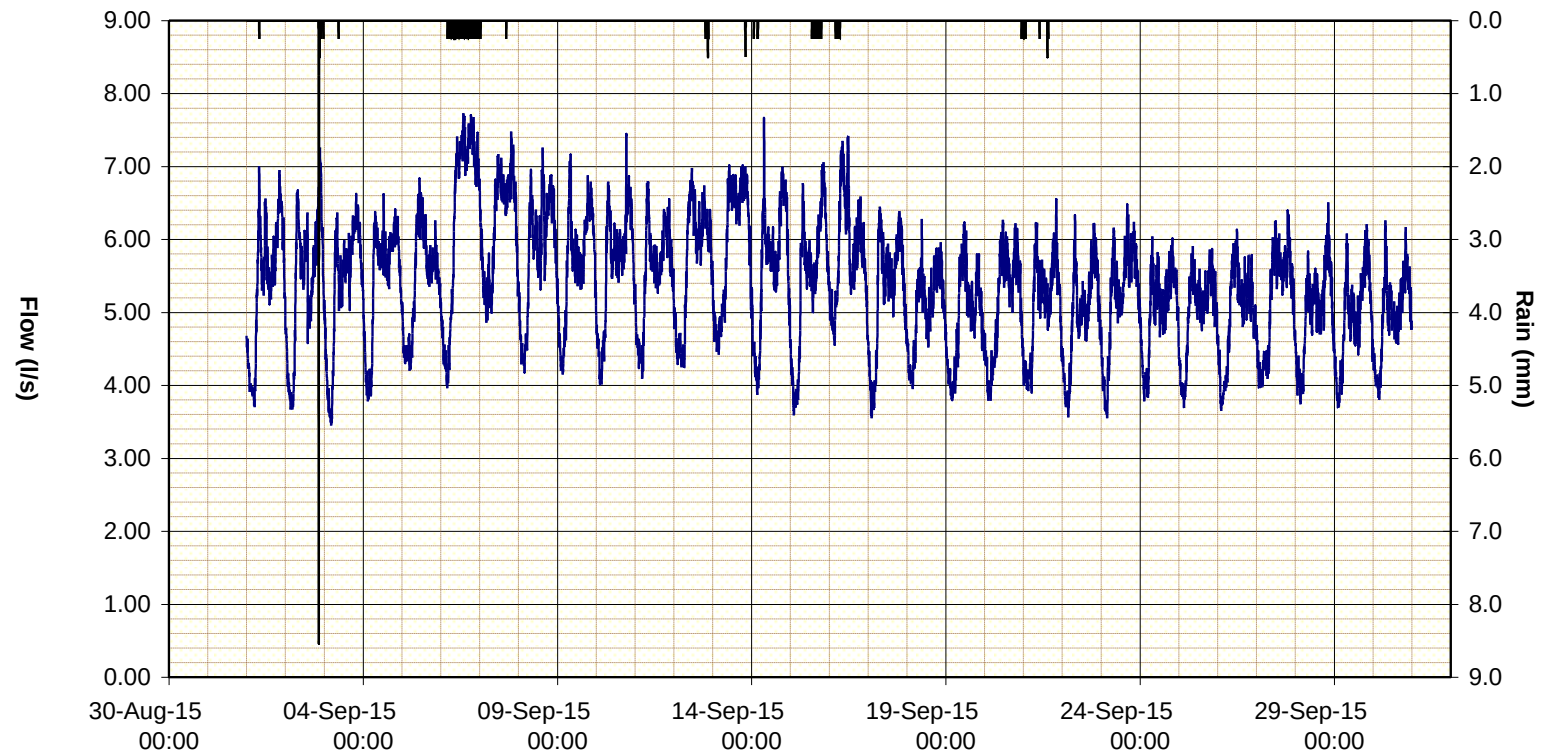
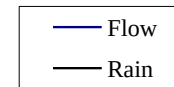
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-15	4.00	2.30	5.87	345.82	0.3
02-Aug-15	4.06	2.16	6.07	350.71	0.0
03-Aug-15	4.36	2.21	6.25	376.85	0.0
04-Aug-15	4.48	2.51	6.64	387.06	8.5
05-Aug-15	4.59	3.19	6.40	396.93	2.3
06-Aug-15	4.54	3.00	6.81	392.05	12.0
07-Aug-15	4.44	2.33	6.56	383.46	0.0
08-Aug-15	4.31	1.79	7.94	372.13	0.0
09-Aug-15	4.52	2.46	6.80	390.17	0.0
10-Aug-15	4.27	2.29	9.55	368.96	0.0
11-Aug-15	4.30	2.46	6.76	371.09	0.0
12-Aug-15	4.09	2.66	6.96	353.51	0.0
13-Aug-15	4.12	2.19	5.66	355.61	0.0
14-Aug-15	3.85	1.79	5.87	332.86	0.0
15-Aug-15	3.39	2.14	5.99	292.67	7.8
16-Aug-15	3.88	2.47	6.26	334.85	4.5
17-Aug-15	4.01	2.33	7.27	346.30	0.8
18-Aug-15	3.53	2.49	5.08	304.92	0.0
19-Aug-15	3.42	2.19	4.89	295.07	0.0
20-Aug-15	5.41	2.11	6.66	467.41	0.0
21-Aug-15	5.73	4.15	6.72	494.91	0.0
22-Aug-15	5.82	4.47	6.89	503.05	0.0
23-Aug-15	5.84	4.12	7.14	504.90	0.0
24-Aug-15	5.78	4.02	7.04	499.75	0.0
25-Aug-15	5.80	4.24	6.89	501.50	0.8
26-Aug-15	5.48	4.04	6.77	473.11	0.0
27-Aug-15	5.15	3.54	6.38	444.59	0.0
28-Aug-15	5.44	3.56	6.68	469.86	0.0
29-Aug-15	5.73	4.64	6.79	494.91	0.0
30-Aug-15	5.64	3.86	6.87	487.55	0.0
31-Aug-15	5.49	3.81	6.92	474.37	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
12566.915	1.789	9.552	36.8

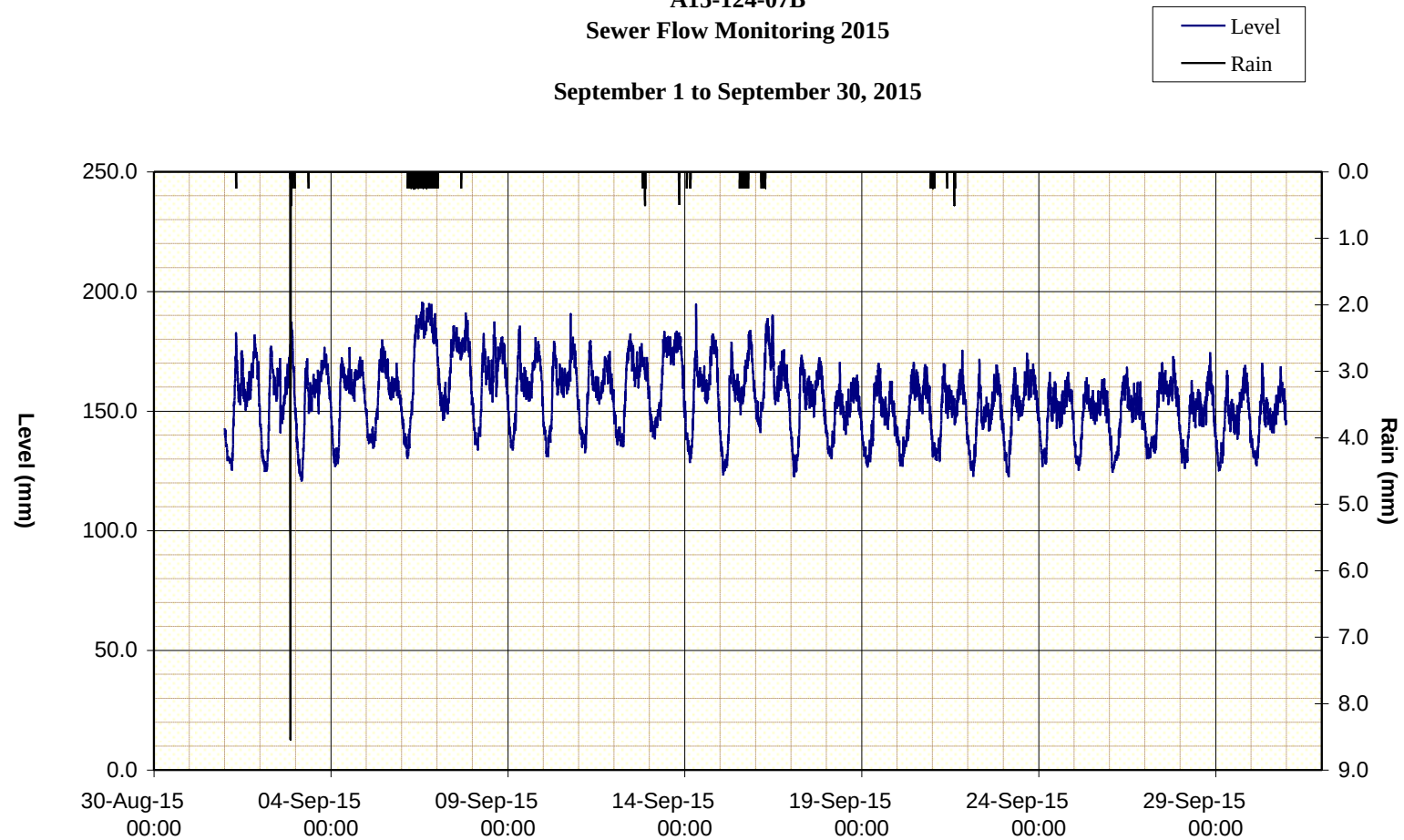
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



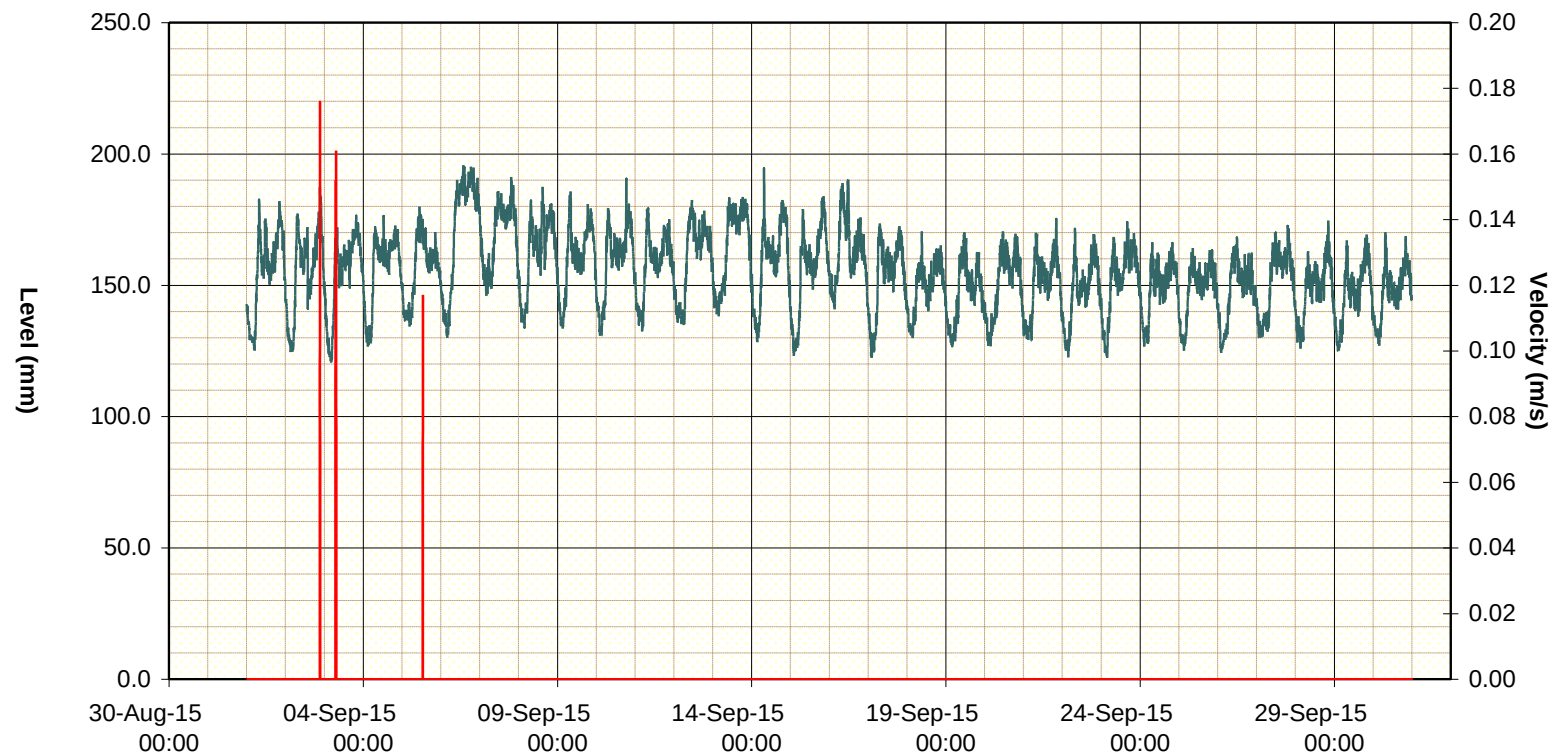
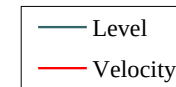
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



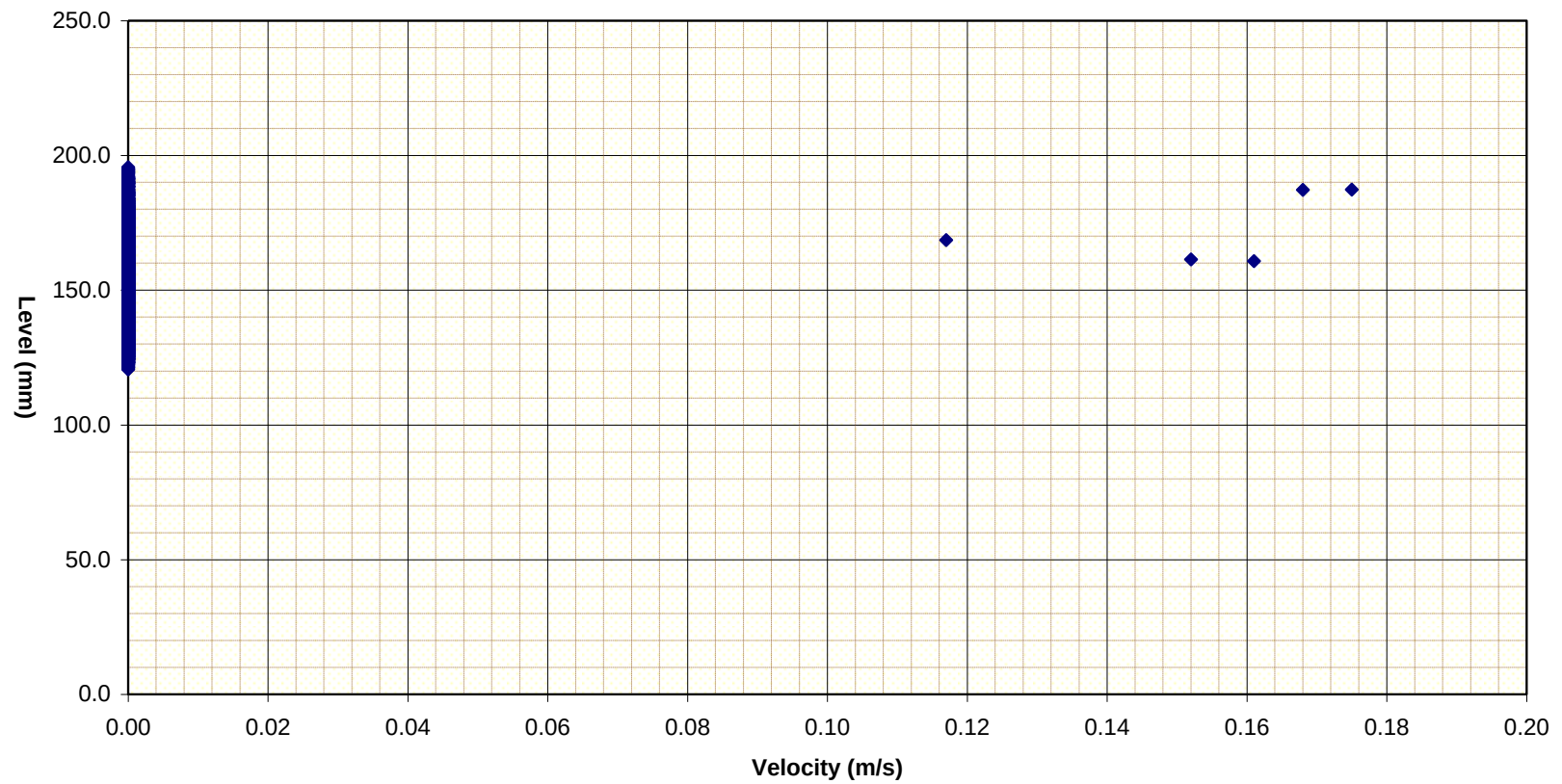
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



Cold Lake, Alberta

A15-124-07B

Sewer Flow Monitoring 2015

September 1 to September 30, 2015

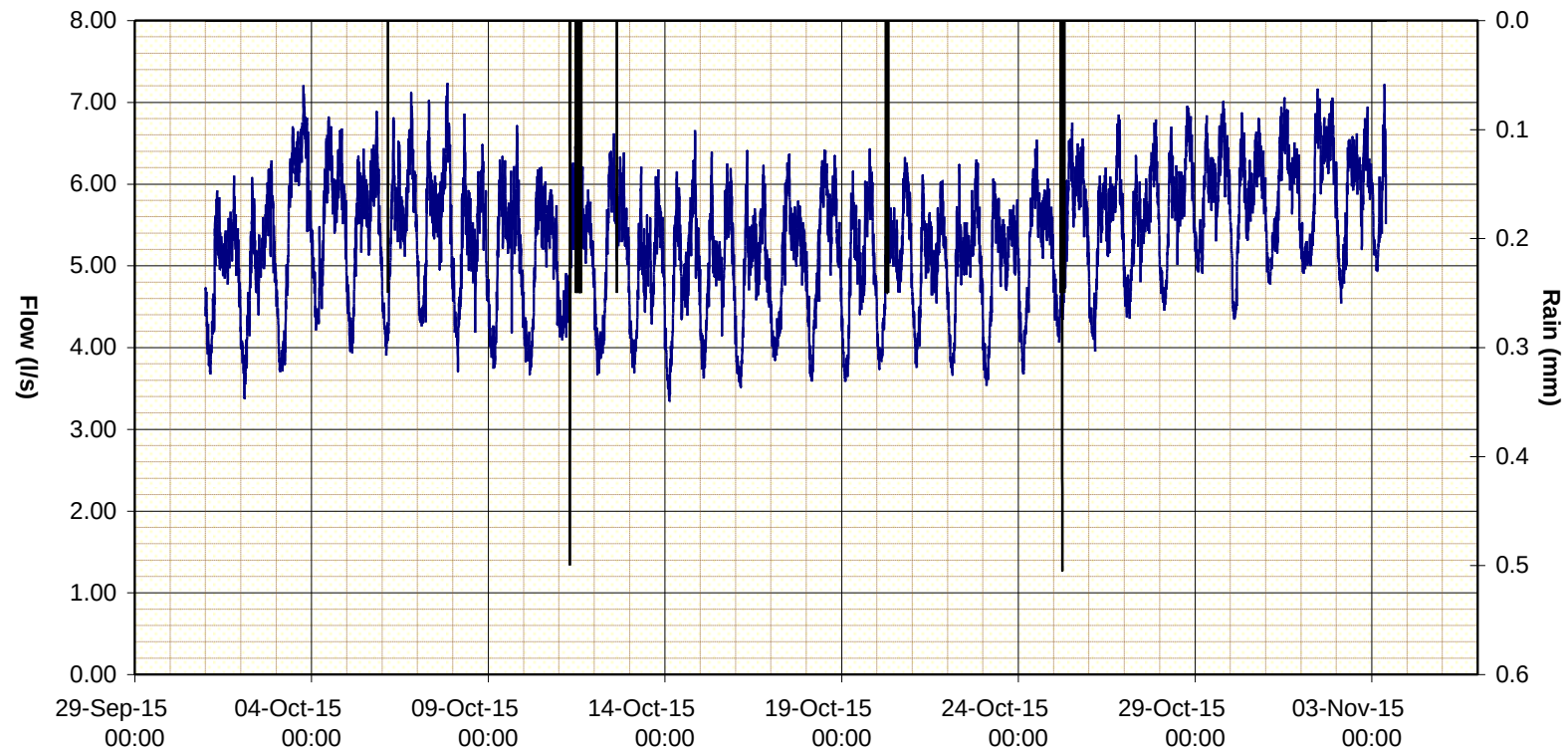
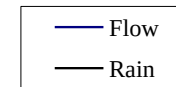
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	5.42	3.70	6.98	468.30	0.3
02-Sep-15	5.41	3.67	7.26	467.03	19.3
03-Sep-15	5.34	3.45	6.62	461.72	0.3
04-Sep-15	5.44	3.78	6.60	469.79	0.0
05-Sep-15	5.45	4.20	6.83	470.53	0.0
06-Sep-15	6.32	3.96	7.73	546.26	21.8
07-Sep-15	6.20	4.86	7.48	535.94	0.5
08-Sep-15	5.82	4.18	7.26	502.71	0.0
09-Sep-15	5.69	4.15	7.16	491.38	0.0
10-Sep-15	5.63	4.01	7.41	486.39	0.0
11-Sep-15	5.55	4.09	6.80	479.35	0.0
12-Sep-15	5.69	4.24	6.98	491.47	3.0
13-Sep-15	5.95	4.42	7.01	513.69	1.5
14-Sep-15	5.61	3.87	7.66	484.51	0.8
15-Sep-15	5.44	3.59	7.06	470.35	3.0
16-Sep-15	5.82	4.56	7.42	503.15	1.8
17-Sep-15	5.26	3.55	6.45	454.83	0.0
18-Sep-15	5.05	3.95	6.28	436.12	0.0
19-Sep-15	4.91	3.80	6.23	423.99	0.0
20-Sep-15	5.11	3.79	6.27	441.65	1.5
21-Sep-15	5.10	3.90	6.54	440.81	3.3
22-Sep-15	4.95	3.56	6.33	427.86	0.0
23-Sep-15	5.19	3.55	6.47	448.54	0.0
24-Sep-15	5.03	3.78	6.04	434.54	0.0
25-Sep-15	4.99	3.69	5.91	430.76	0.0
26-Sep-15	4.96	3.65	6.13	428.38	0.0
27-Sep-15	5.13	3.96	6.39	443.48	0.0
28-Sep-15	4.99	3.74	6.51	431.01	0.0
29-Sep-15	4.92	3.69	6.21	424.95	0.0
30-Sep-15	4.95	3.80	6.26	428.04	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
13937.505	3.450	7.730	56.8

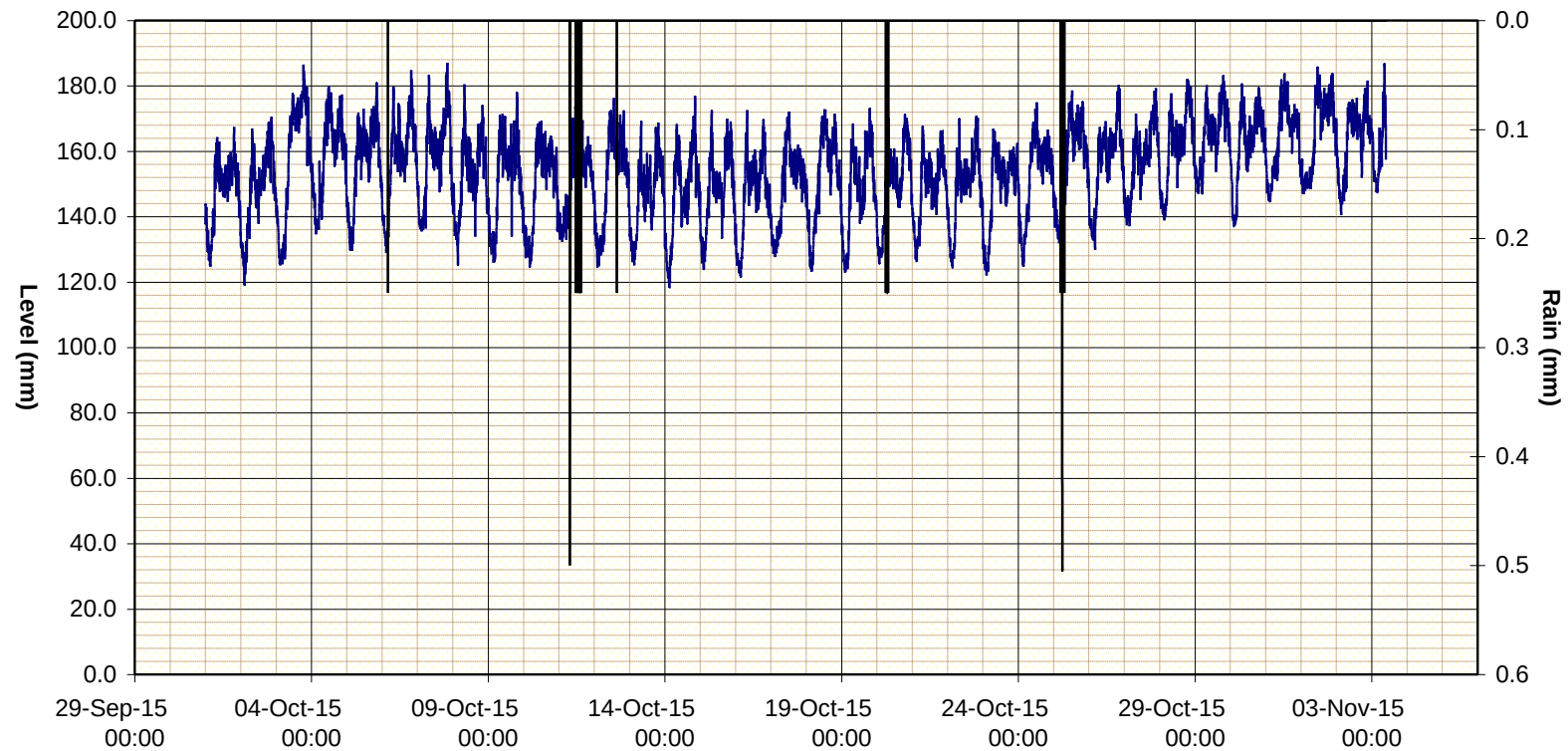
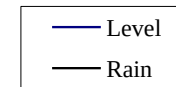
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

October 1 to November 3, 2015



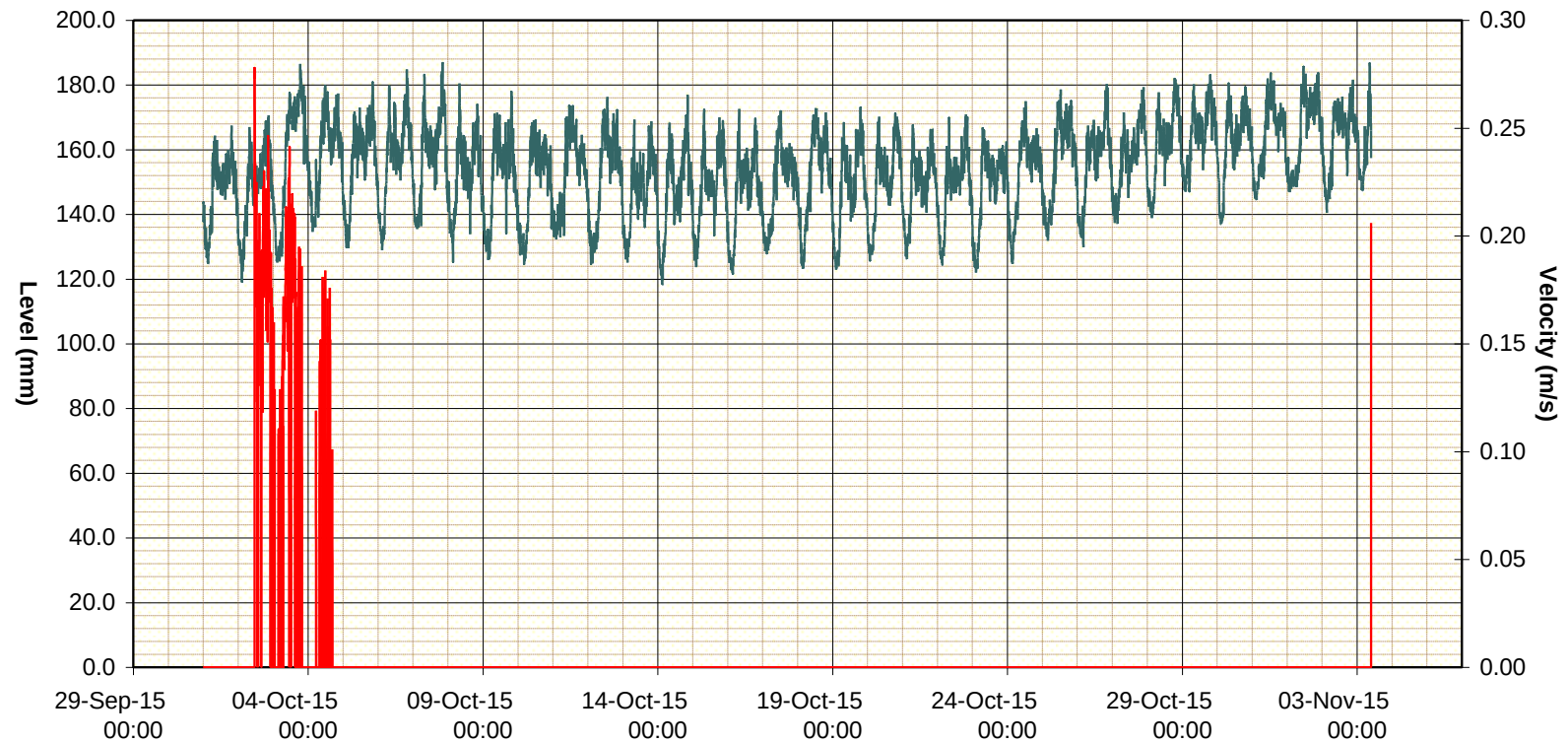
**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015**

October 1 to November 3, 2015

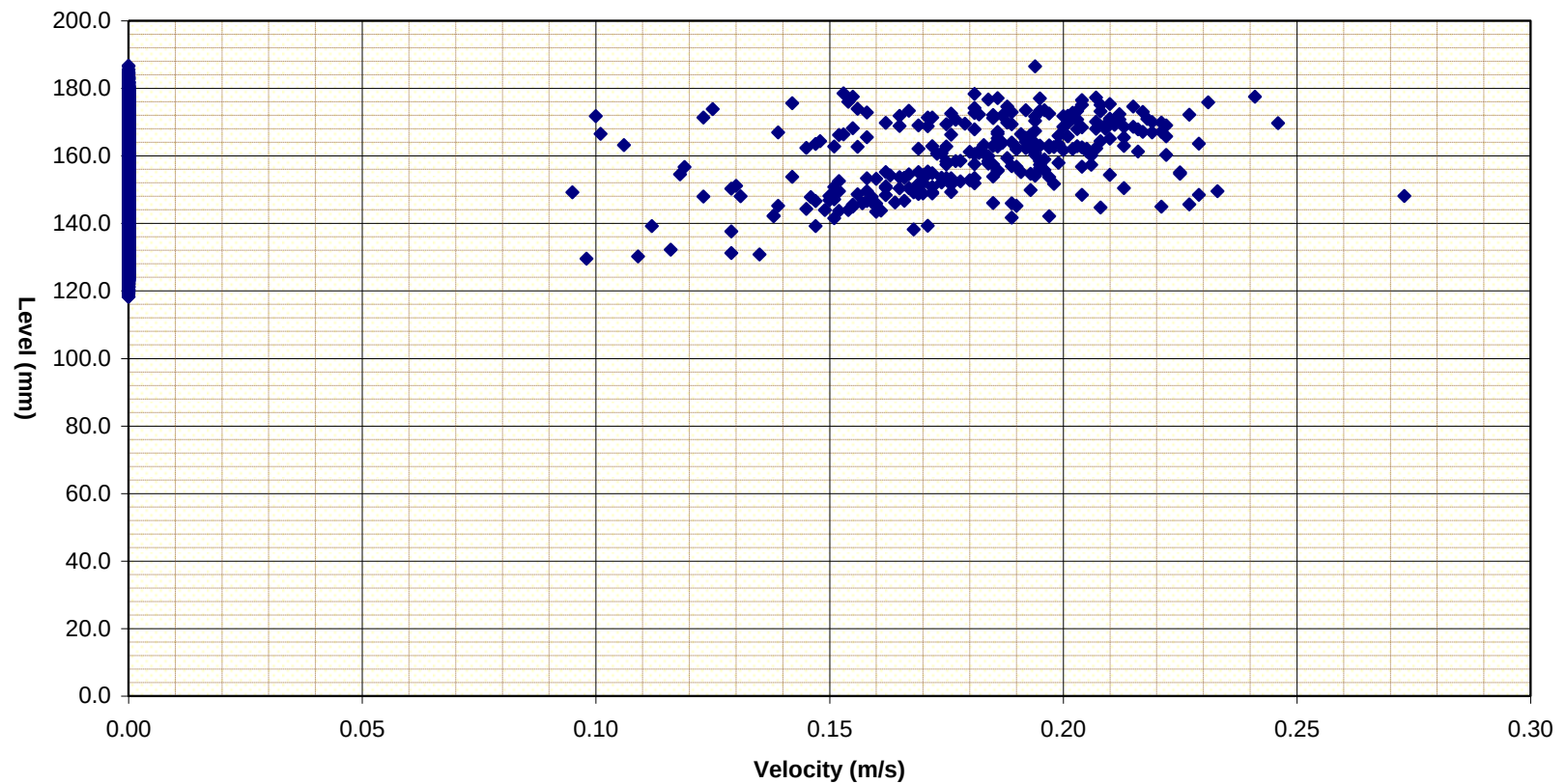


**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015
October 1 to November 3, 2015**

— Level
— Velocity



**Cold Lake, Alberta
A15-124-07B
Sewer Flow Monitoring 2015
October 1 to November 3, 2015**



Cold Lake, Alberta

A15-124-07B

Sewer Flow Monitoring 2015

October 1 to November 3, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Oct-15	4.96	3.67	6.10	428.40	0.0
02-Oct-15	4.98	3.39	6.29	430.64	0.0
03-Oct-15	5.54	3.70	7.21	478.91	0.0
04-Oct-15	5.57	4.21	6.81	481.59	0.0
05-Oct-15	5.47	3.93	6.87	472.56	0.0
06-Oct-15	5.53	3.90	7.11	477.71	0.3
07-Oct-15	5.60	4.26	7.22	484.04	0.0
08-Oct-15	5.24	3.72	6.86	452.54	0.0
09-Oct-15	5.18	3.74	6.70	447.23	0.0
10-Oct-15	5.05	3.68	6.20	436.02	0.0
11-Oct-15	5.24	4.09	6.45	452.79	4.0
12-Oct-15	5.16	3.68	6.62	445.74	0.3
13-Oct-15	4.93	3.70	6.21	425.75	0.0
14-Oct-15	4.92	3.34	6.66	424.75	0.0
15-Oct-15	4.99	3.62	6.37	430.93	0.0
16-Oct-15	4.90	3.52	6.40	423.19	0.0
17-Oct-15	5.05	3.85	6.37	436.49	0.0
18-Oct-15	5.18	3.59	6.42	447.31	0.0
19-Oct-15	5.00	3.58	6.41	431.80	0.0
20-Oct-15	5.11	3.74	6.31	441.31	2.3
21-Oct-15	5.02	3.75	6.10	433.34	0.0
22-Oct-15	5.01	3.67	6.30	433.12	0.0
23-Oct-15	5.01	3.53	6.05	433.27	0.0
24-Oct-15	5.22	3.67	6.54	451.21	0.0
25-Oct-15	5.45	4.06	6.75	471.04	2.3
26-Oct-15	5.44	3.95	6.85	470.15	0.0
27-Oct-15	5.54	4.35	6.79	478.24	0.0
28-Oct-15	5.76	4.45	6.94	497.28	0.0
29-Oct-15	5.95	4.92	7.00	513.71	0.0
30-Oct-15	5.76	4.35	6.86	497.61	0.0
31-Oct-15	5.88	4.77	7.04	508.07	0.0
01-Nov-15	5.99	4.90	7.15	517.40	0.0
02-Nov-15	5.87	4.54	6.93	507.47	0.0
03-Nov-15	5.65	4.93	7.21	488.37	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
15649.962	3.340	7.220	9.0

FIELD MAINTENANCE RECORD



PROJ. #:	A15-124
SFE SITE #:	A15-124-08
ADDRESS:	5104 52 Street
GPS:	N54.41515 W110.22509
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

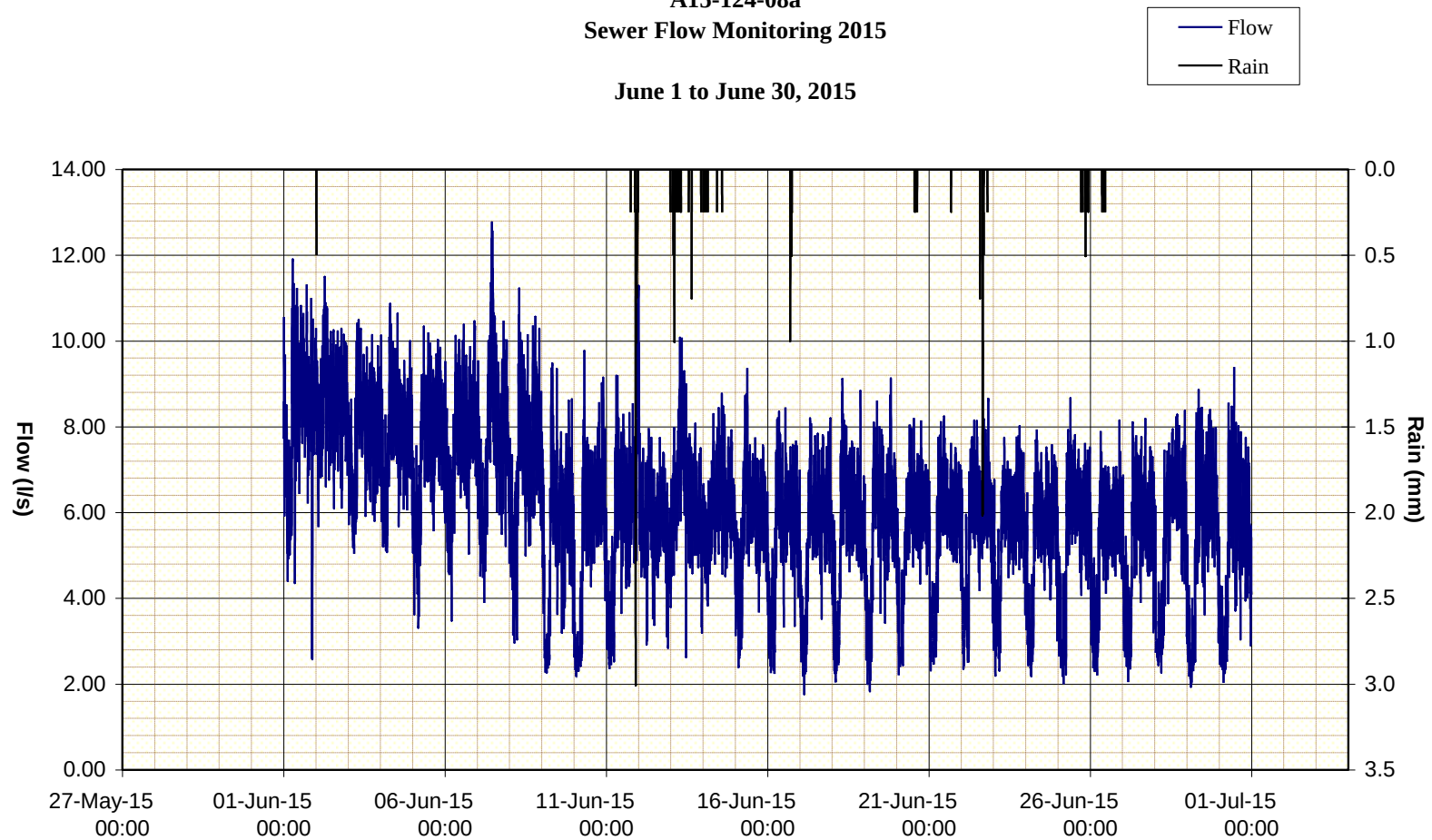
CONSTANTS			
D1 (mm):	D1-lip to x-bar		
TOM (mm)	6800	Raw Weir L - lip to water	
METER #	207E02353	DATE:	12-May-15
METER #	214E03118	DATE:	12-May-15
METER #		DATE:	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible][illegible]

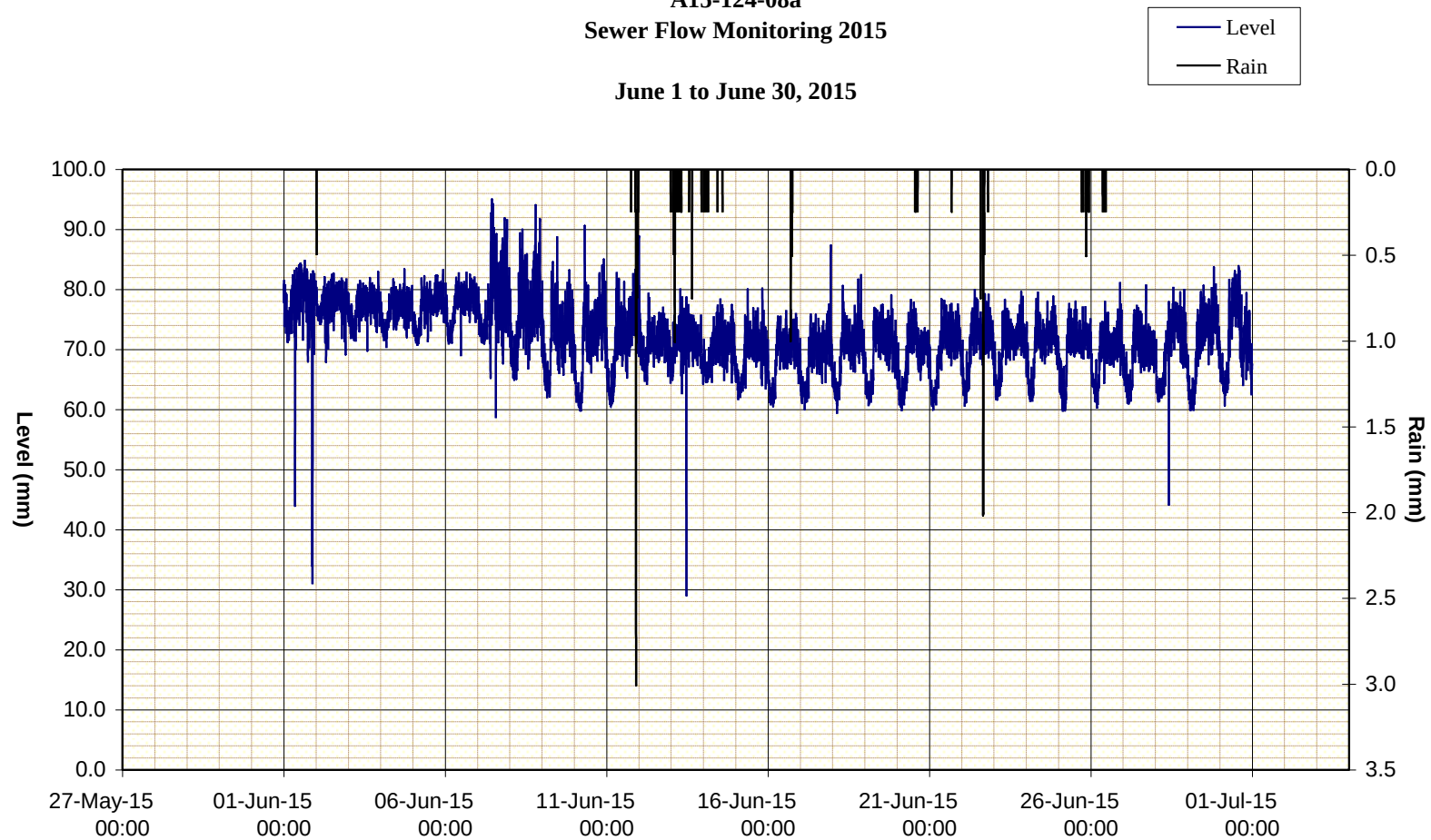
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



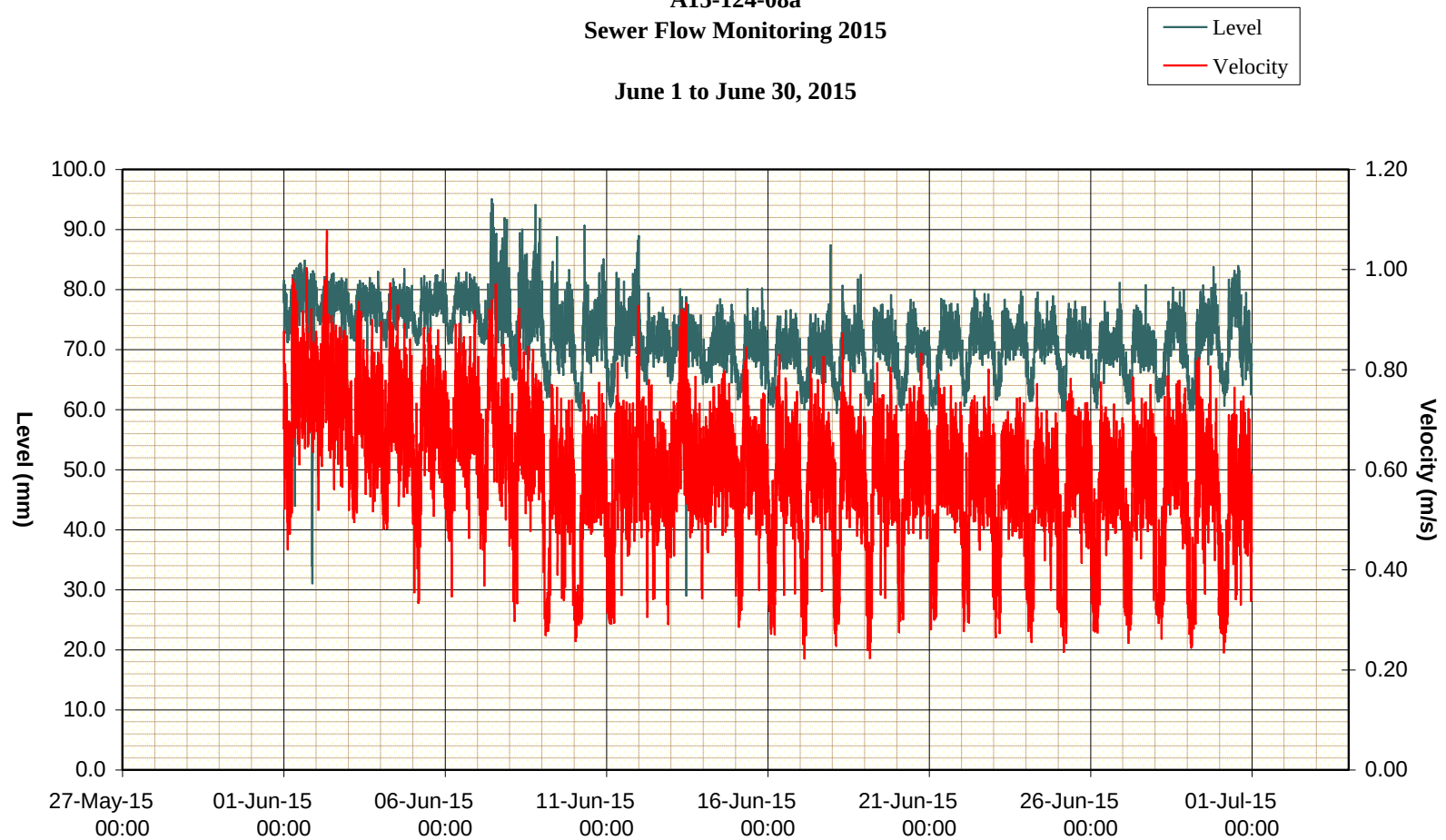
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



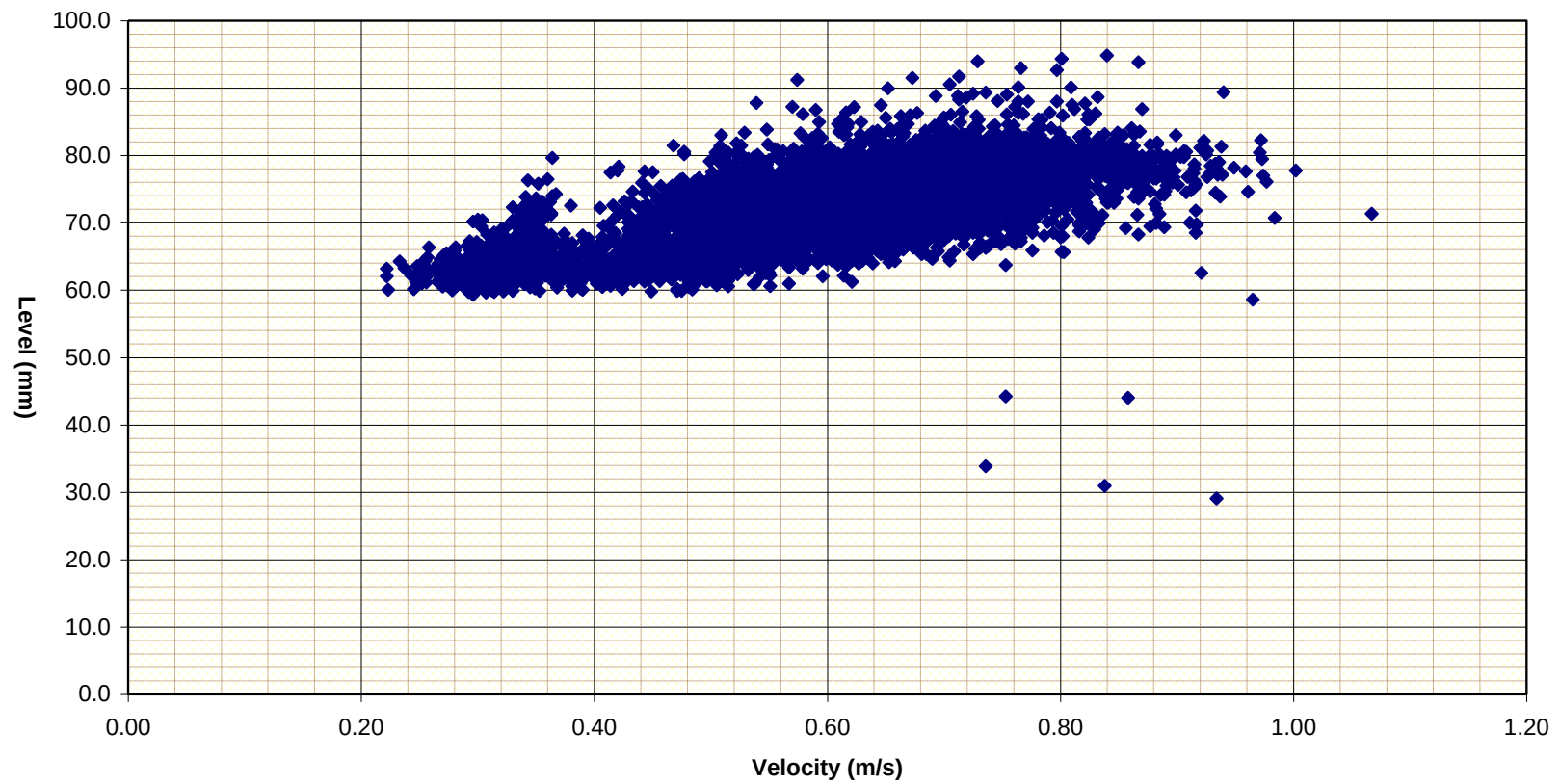
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

June 1 to June 30, 2015



Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015
June 1 to June 30, 2015

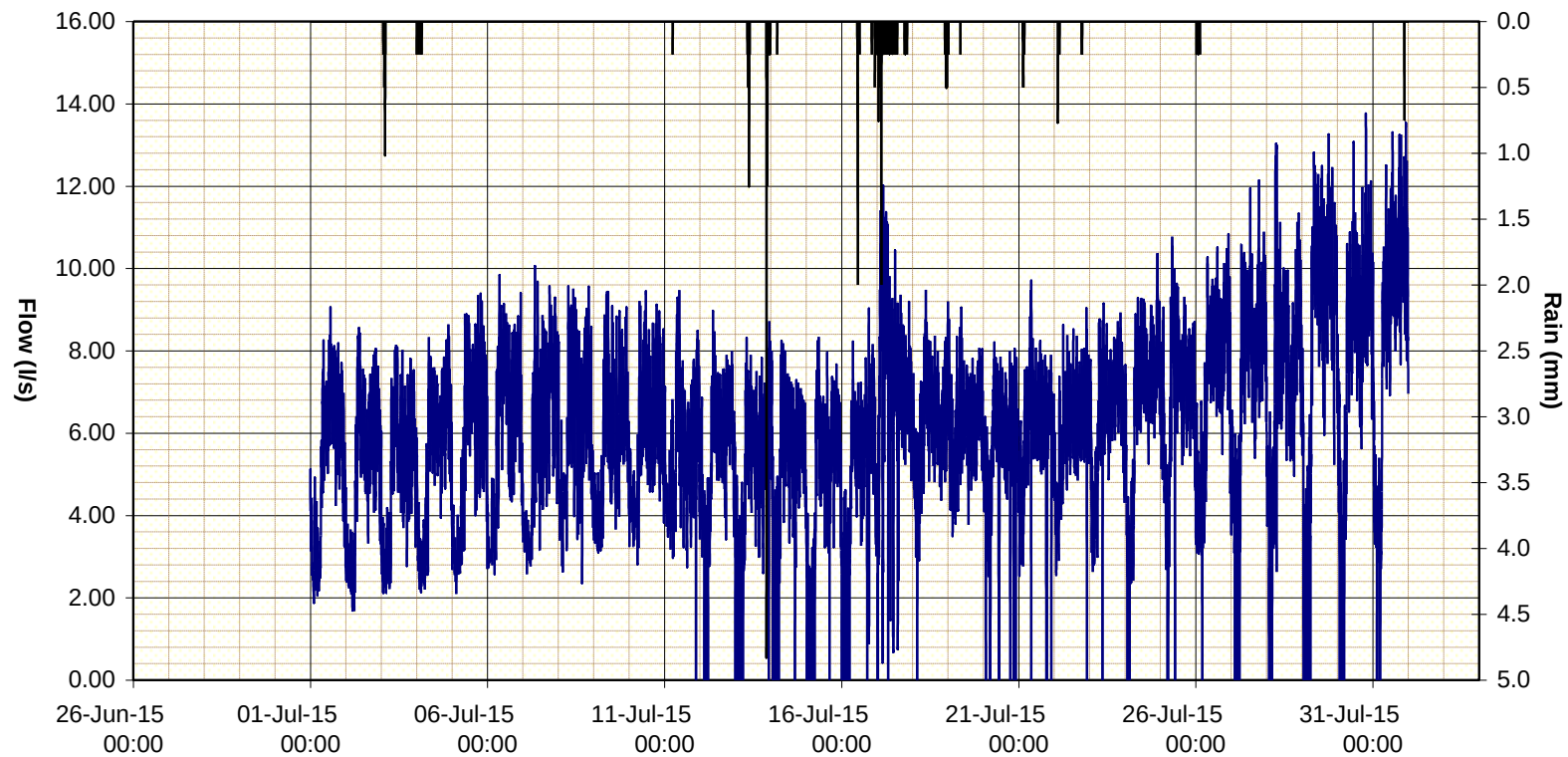
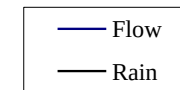
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-15	8.28	2.59	11.85	715.36	0.0
02-Jun-15	8.57	5.66	11.47	740.88	0.5
03-Jun-15	7.85	5.04	10.45	678.44	0.0
04-Jun-15	7.81	5.11	10.86	674.93	0.0
05-Jun-15	7.45	3.36	10.31	643.70	0.0
06-Jun-15	7.63	3.49	10.42	658.94	0.0
07-Jun-15	7.70	3.89	12.76	665.20	0.0
08-Jun-15	7.14	2.97	11.22	617.29	0.0
09-Jun-15	5.54	2.29	9.41	478.90	0.0
10-Jun-15	5.45	2.17	9.74	471.19	0.0
11-Jun-15	5.78	2.35	11.00	498.98	16.5
12-Jun-15	5.76	2.91	11.18	497.59	0.3
13-Jun-15	6.46	2.64	10.08	558.56	10.8
14-Jun-15	6.11	3.88	8.76	528.21	1.5
15-Jun-15	5.73	2.44	9.37	495.47	0.0
16-Jun-15	5.48	2.24	8.45	473.48	3.5
17-Jun-15	5.43	1.77	8.19	468.85	0.0
18-Jun-15	5.52	2.04	9.10	477.23	0.0
19-Jun-15	5.57	1.84	9.12	481.08	0.0
20-Jun-15	5.49	2.21	8.20	474.22	3.0
21-Jun-15	5.50	2.32	8.22	475.48	0.5
22-Jun-15	5.60	2.36	8.58	483.65	8.5
23-Jun-15	5.52	2.22	7.93	477.02	0.0
24-Jun-15	5.33	2.19	7.94	460.30	0.0
25-Jun-15	5.47	2.02	8.65	472.99	4.0
26-Jun-15	5.29	2.20	8.13	456.74	1.5
27-Jun-15	5.24	2.05	8.18	452.65	0.0
28-Jun-15	5.47	2.30	8.37	472.22	0.0
29-Jun-15	5.34	1.94	8.77	461.66	0.0
30-Jun-15	5.20	2.03	9.39	449.06	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
15960.264	1.770	12.760	50.5

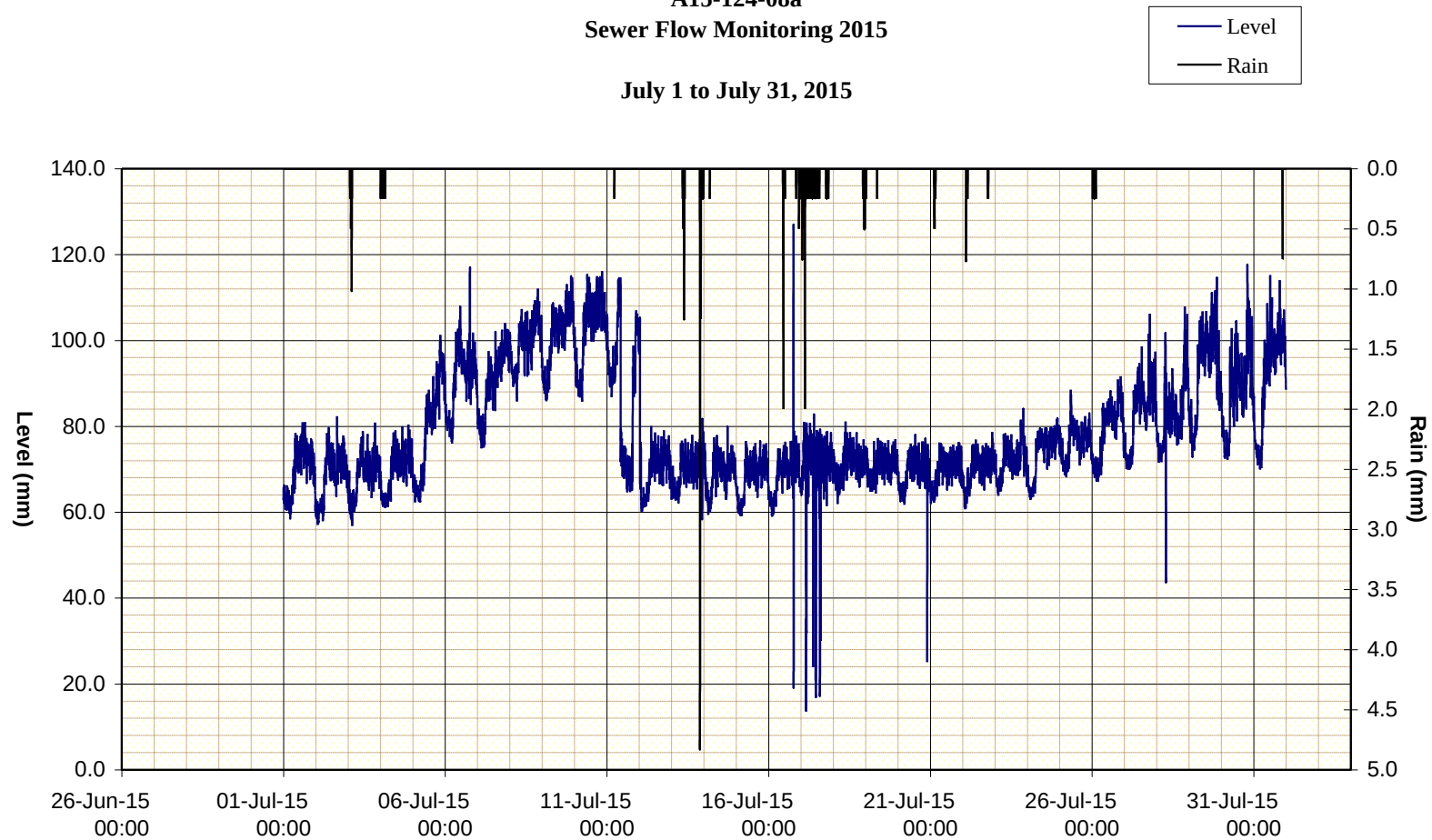
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



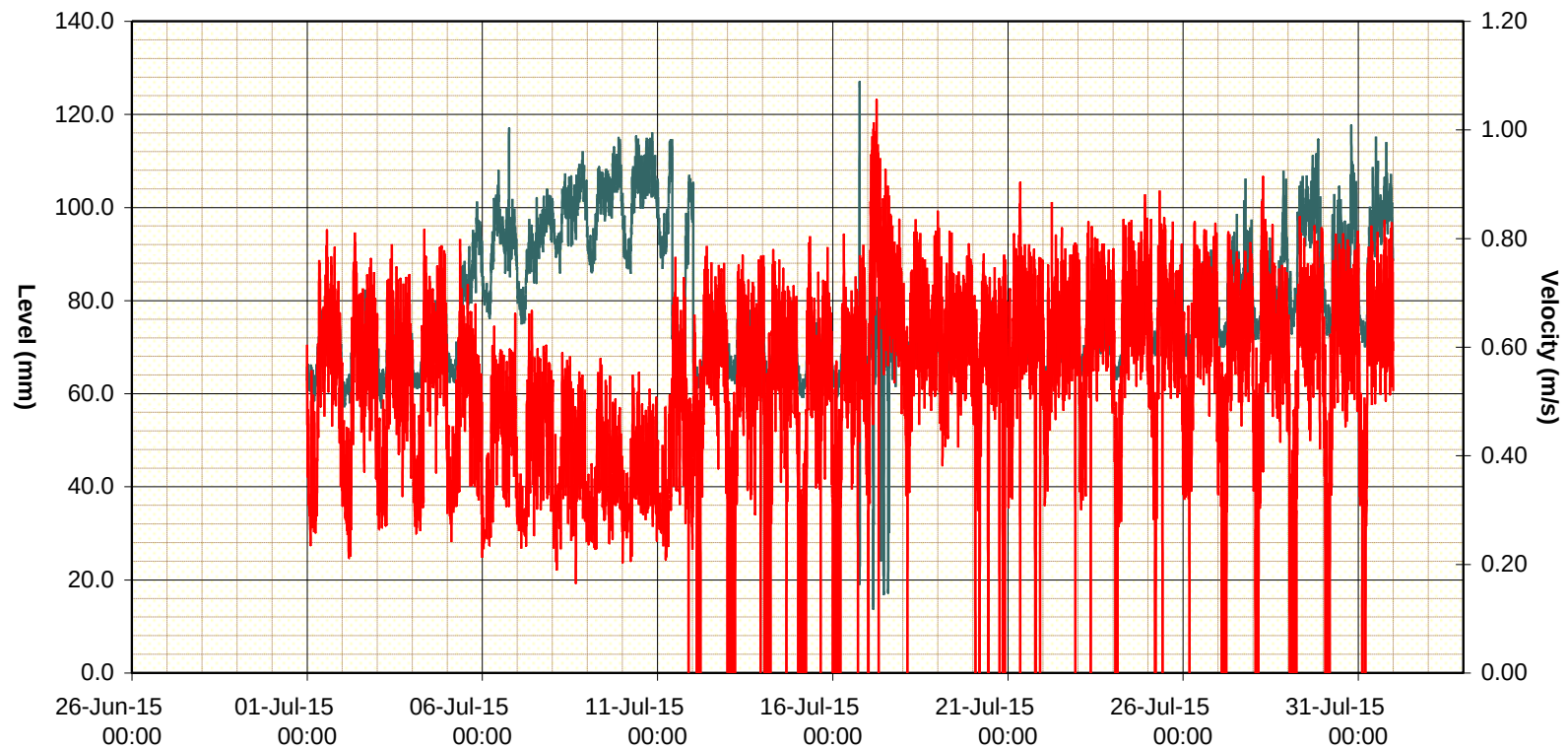
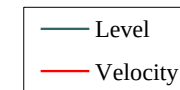
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



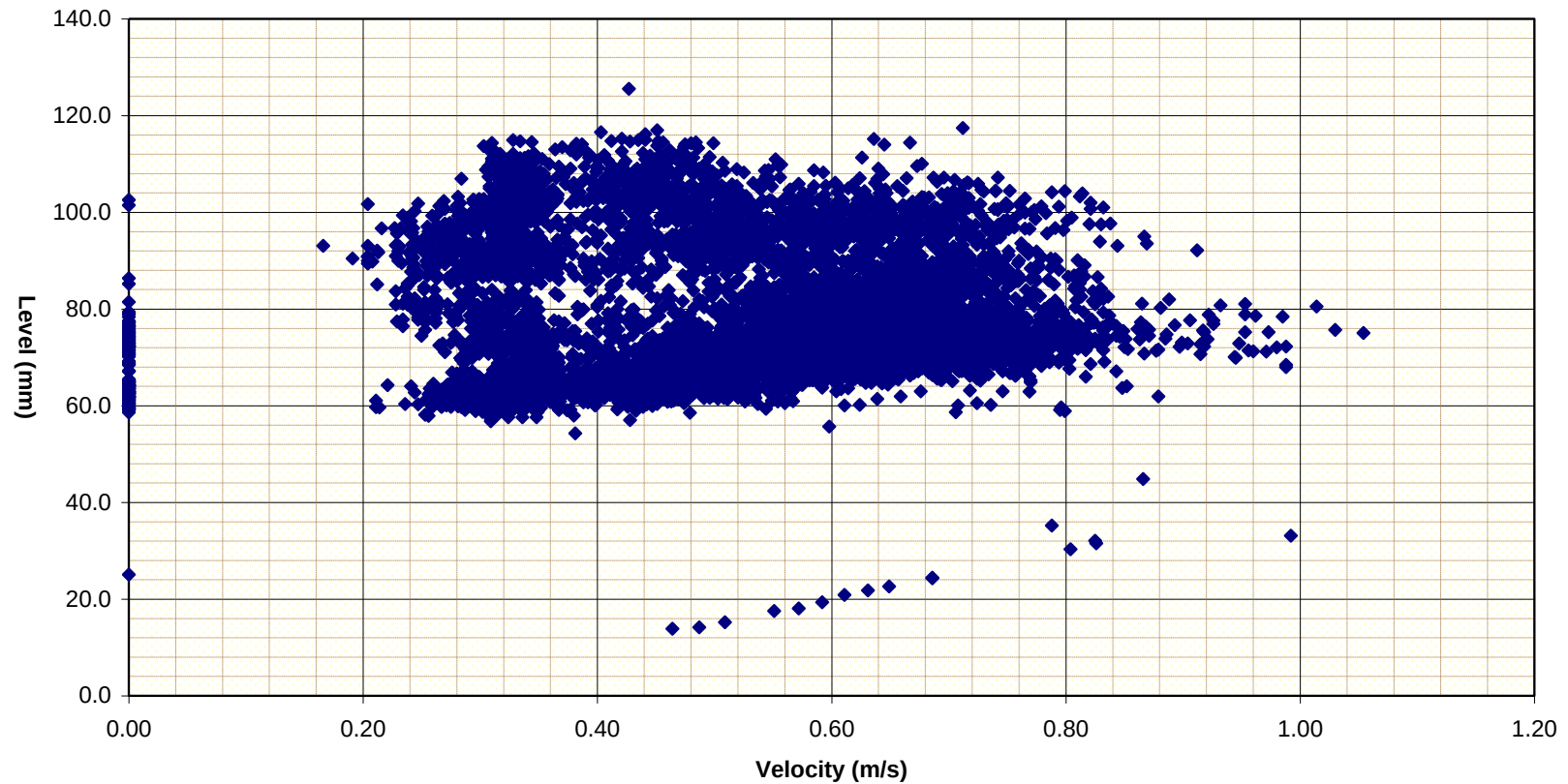
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

July 1 to July 31, 2015



Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015
July 1 to July 31, 2015

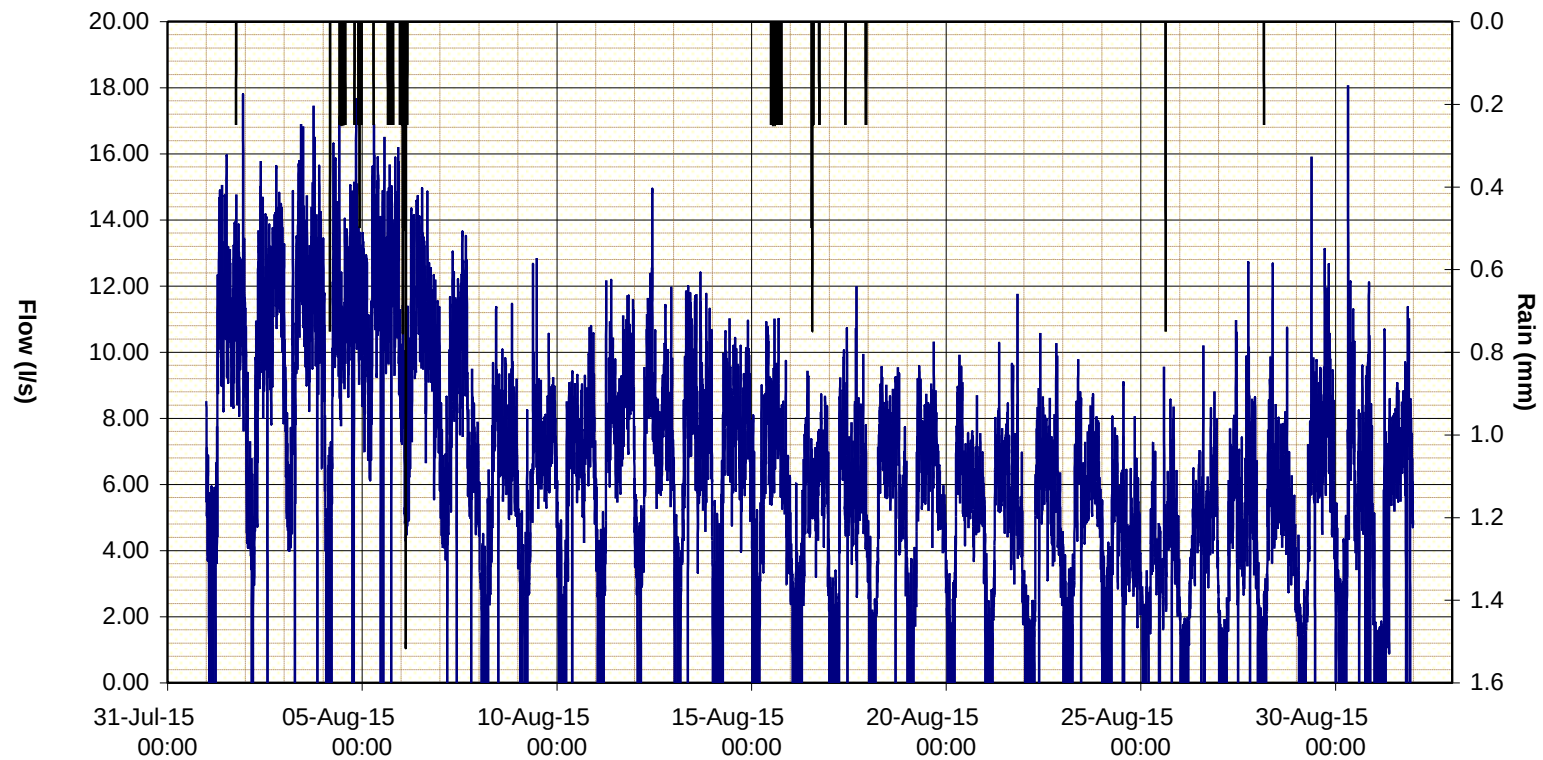
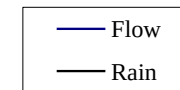
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-15	5.28	1.88	8.99	455.97	0.0
02-Jul-15	5.10	1.66	8.53	441.06	0.0
03-Jul-15	5.04	2.11	8.15	435.03	6.3
04-Jul-15	5.34	2.14	8.64	461.20	1.0
05-Jul-15	5.62	2.09	9.35	485.80	0.0
06-Jul-15	6.01	2.58	9.82	519.51	0.0
07-Jul-15	5.86	2.57	10.04	506.30	0.0
08-Jul-15	5.97	2.37	9.54	515.42	0.0
09-Jul-15	5.65	3.11	9.42	488.00	0.0
10-Jul-15	5.86	2.85	9.35	506.15	0.0
11-Jul-15	5.50	0.00	9.47	475.06	0.3
12-Jul-15	5.44	0.00	8.93	470.10	0.0
13-Jul-15	5.04	0.00	8.72	435.12	22.5
14-Jul-15	5.16	0.00	8.21	446.16	0.3
15-Jul-15	4.74	0.00	8.34	409.35	0.0
16-Jul-15	4.79	0.00	8.86	413.44	7.8
17-Jul-15	7.17	0.00	12.01	619.18	22.3
18-Jul-15	6.14	0.00	9.48	530.36	4.8
19-Jul-15	6.29	3.50	9.20	543.25	0.8
20-Jul-15	5.59	-6.00	8.20	482.55	0.0
21-Jul-15	6.14	0.00	9.50	530.63	3.0
22-Jul-15	6.06	0.00	9.03	523.40	3.3
23-Jul-15	6.32	0.00	9.12	545.85	0.0
24-Jul-15	6.54	0.00	10.37	565.38	0.0
25-Jul-15	6.79	0.00	10.77	586.57	0.0
26-Jul-15	7.11	0.00	10.78	614.59	2.5
27-Jul-15	7.33	0.00	12.13	633.11	0.0
28-Jul-15	7.28	0.00	13.01	629.36	0.0
29-Jul-15	8.13	0.00	13.23	702.80	0.0
30-Jul-15	7.88	0.00	13.65	680.93	0.0
31-Jul-15	8.41	0.00	13.42	726.87	1.5

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
16378.473	-6.000	13.650	76.0

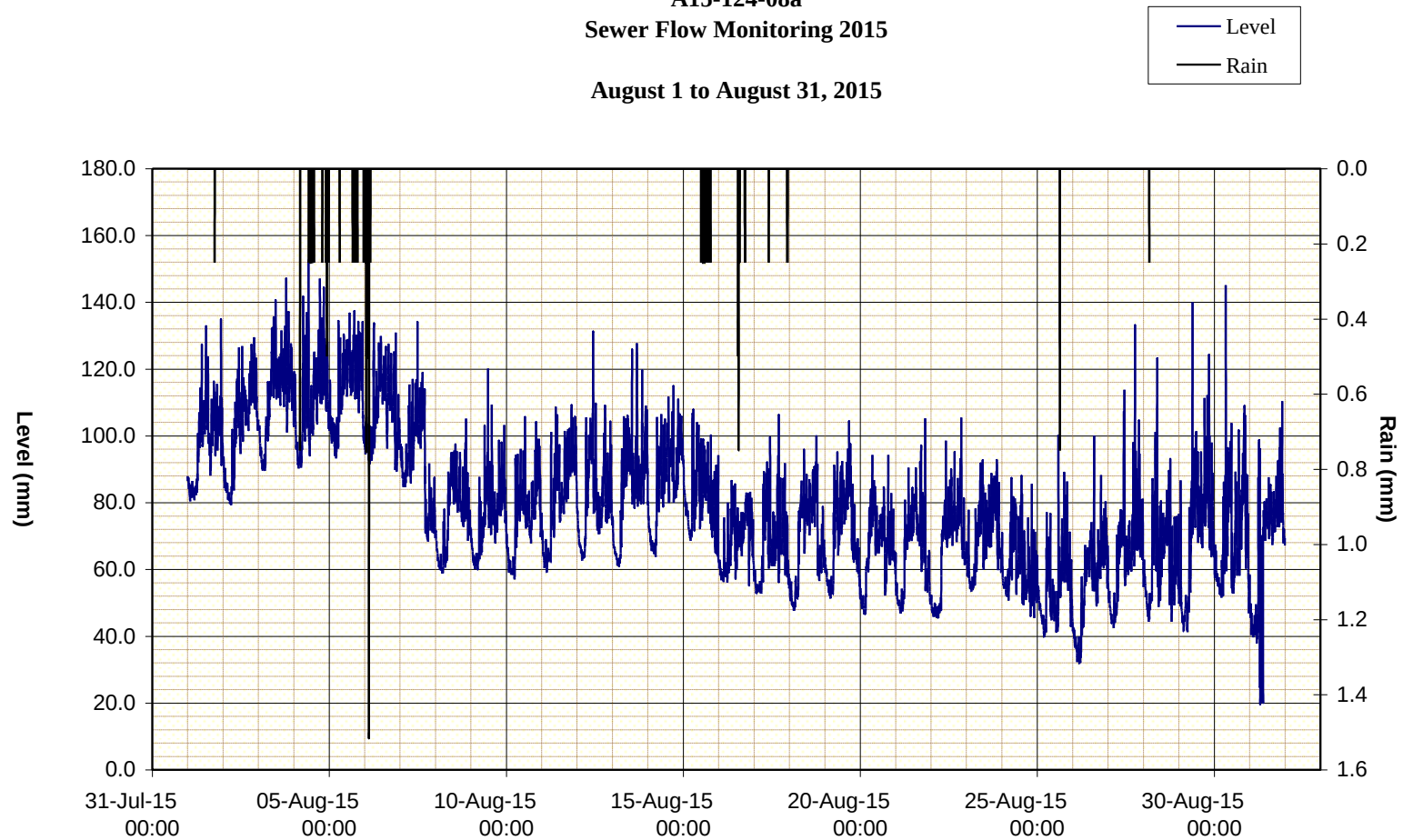
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



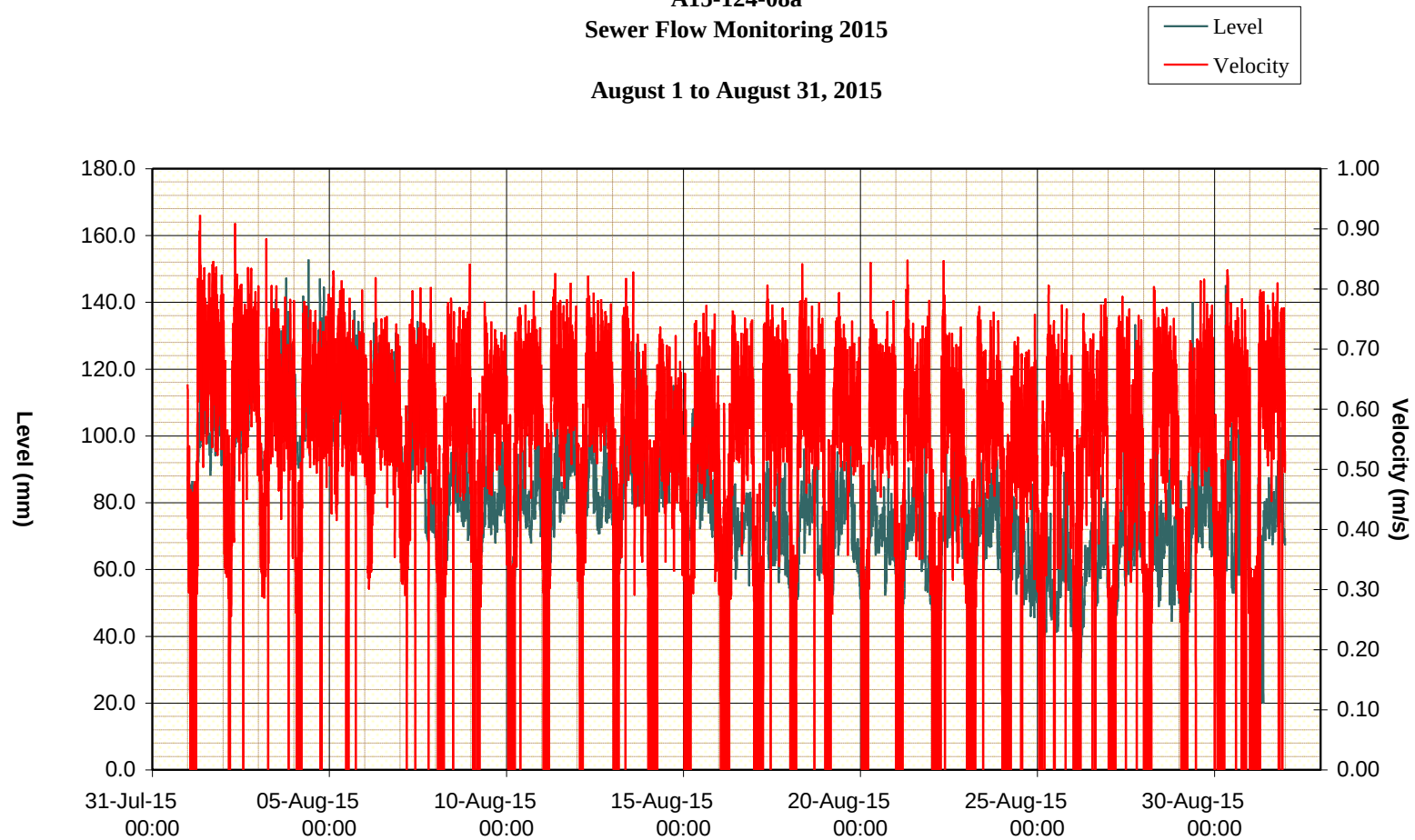
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



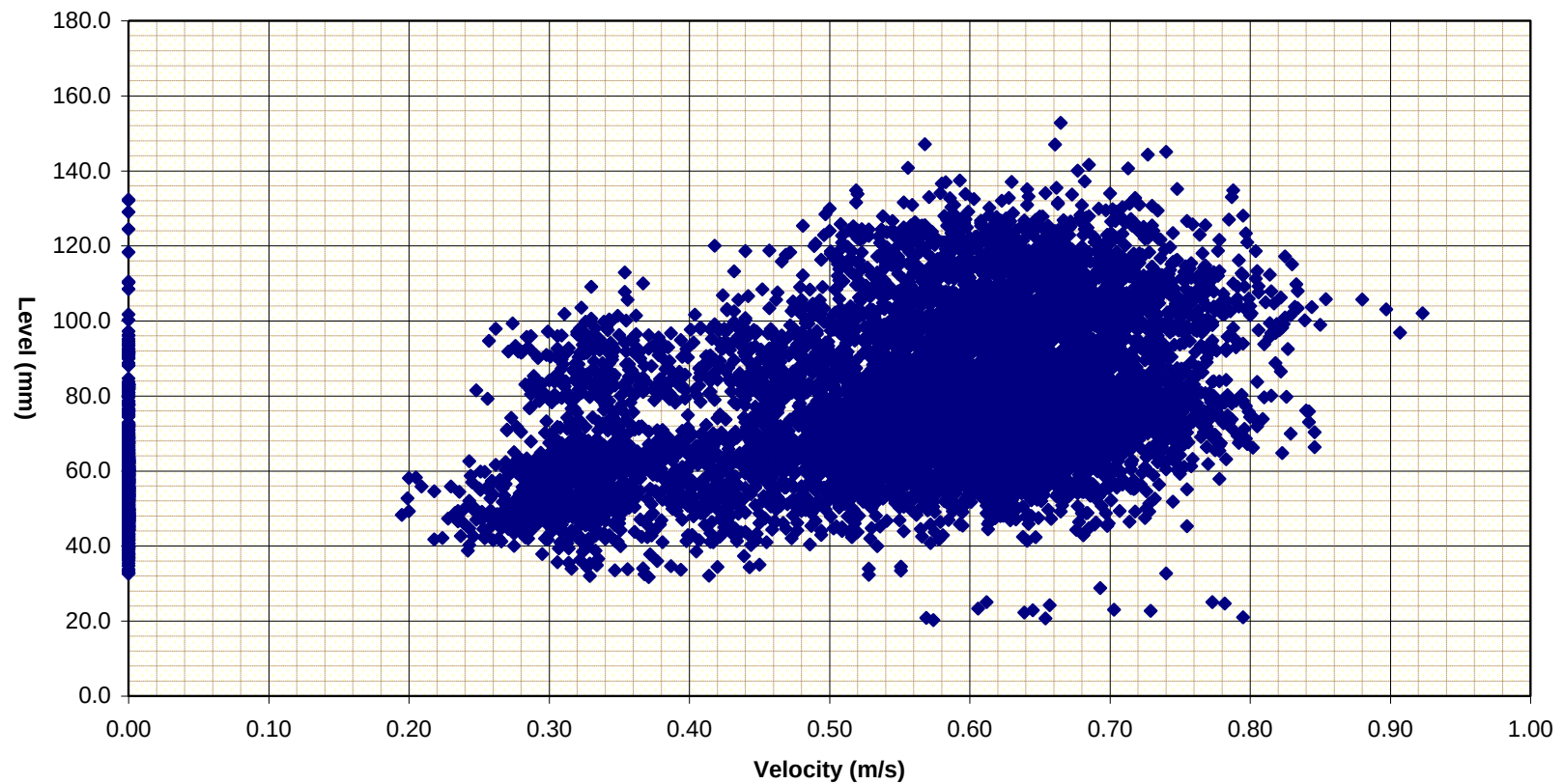
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

August 1 to August 31, 2015



Cold Lake, Alberta

A15-124-08a

Sewer Flow Monitoring 2015

August 1 to August 31, 2015

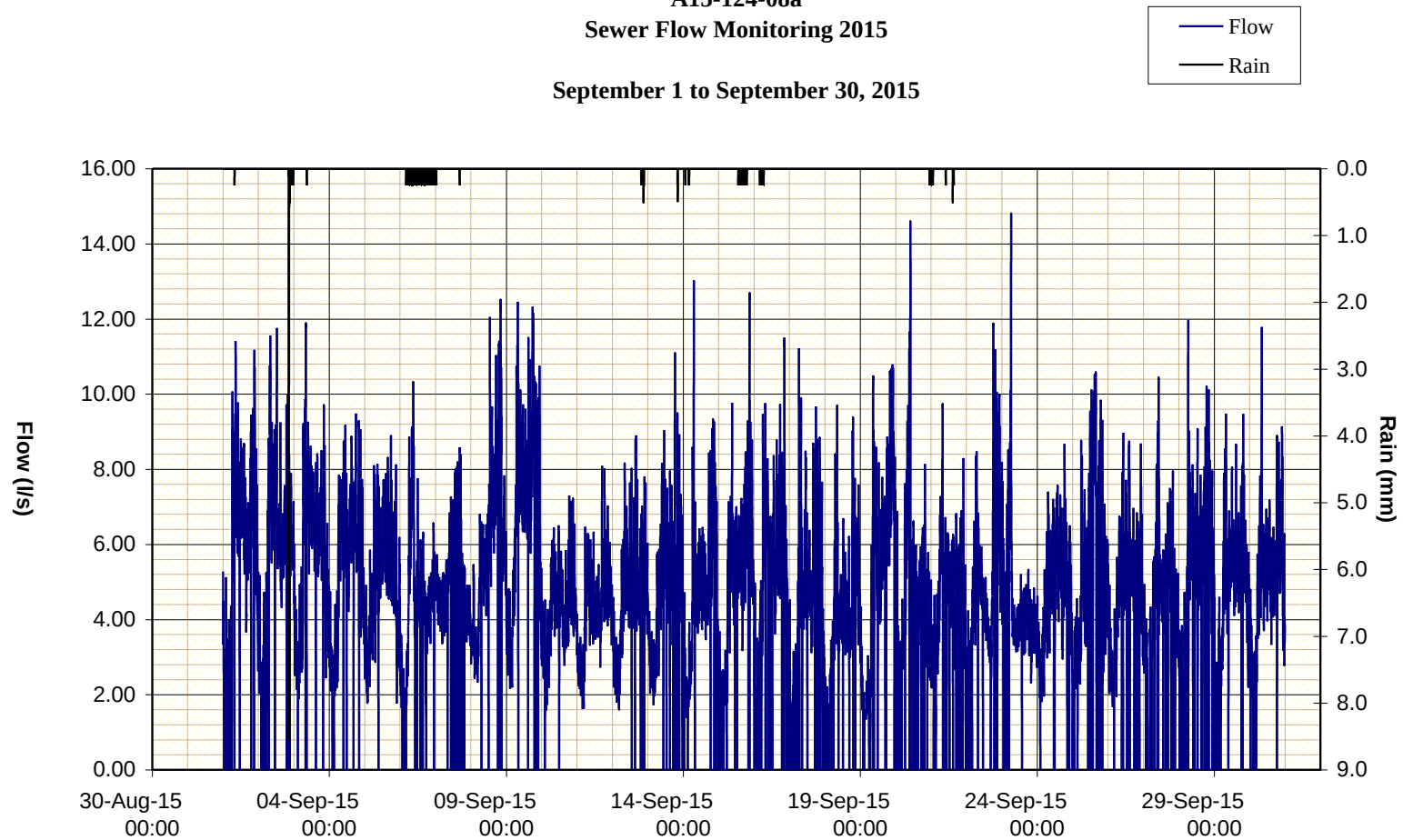
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-15	9.16	0.00	17.76	791.45	0.3
02-Aug-15	9.96	0.00	15.78	860.63	0.0
03-Aug-15	10.60	0.00	17.45	915.48	0.0
04-Aug-15	10.00	0.00	17.64	864.06	8.5
05-Aug-15	11.48	0.00	16.88	991.64	2.3
06-Aug-15	10.05	4.36	14.95	867.92	12.0
07-Aug-15	8.02	0.00	13.51	693.05	0.0
08-Aug-15	6.01	0.00	11.43	518.98	0.0
09-Aug-15	5.85	0.00	12.85	505.63	0.0
10-Aug-15	6.14	0.00	10.77	530.84	0.0
11-Aug-15	6.99	0.00	12.17	604.03	0.0
12-Aug-15	7.11	0.00	14.81	614.36	0.0
13-Aug-15	6.92	0.00	12.40	598.19	0.0
14-Aug-15	6.41	0.00	11.02	554.04	0.0
15-Aug-15	5.93	0.00	11.01	512.66	7.8
16-Aug-15	4.84	0.00	9.44	418.39	4.5
17-Aug-15	4.86	0.00	11.99	419.73	0.8
18-Aug-15	5.45	0.00	9.54	471.05	0.0
19-Aug-15	5.45	0.00	10.32	470.76	0.0
20-Aug-15	5.01	0.00	9.92	432.59	0.0
21-Aug-15	4.82	0.00	11.76	416.19	0.0
22-Aug-15	4.65	0.00	10.58	402.16	0.0
23-Aug-15	4.81	0.00	9.79	415.65	0.0
24-Aug-15	3.97	0.00	8.99	343.38	0.0
25-Aug-15	3.63	0.00	9.56	314.04	0.8
26-Aug-15	3.88	0.00	10.20	335.11	0.0
27-Aug-15	4.40	0.00	12.67	380.51	0.0
28-Aug-15	4.46	0.00	12.58	385.05	0.3
29-Aug-15	5.50	0.00	15.91	475.01	0.0
30-Aug-15	5.28	0.00	18.07	455.92	0.0
31-Aug-15	5.19	0.00	11.35	448.72	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
17007.189	0.000	18.070	37.0

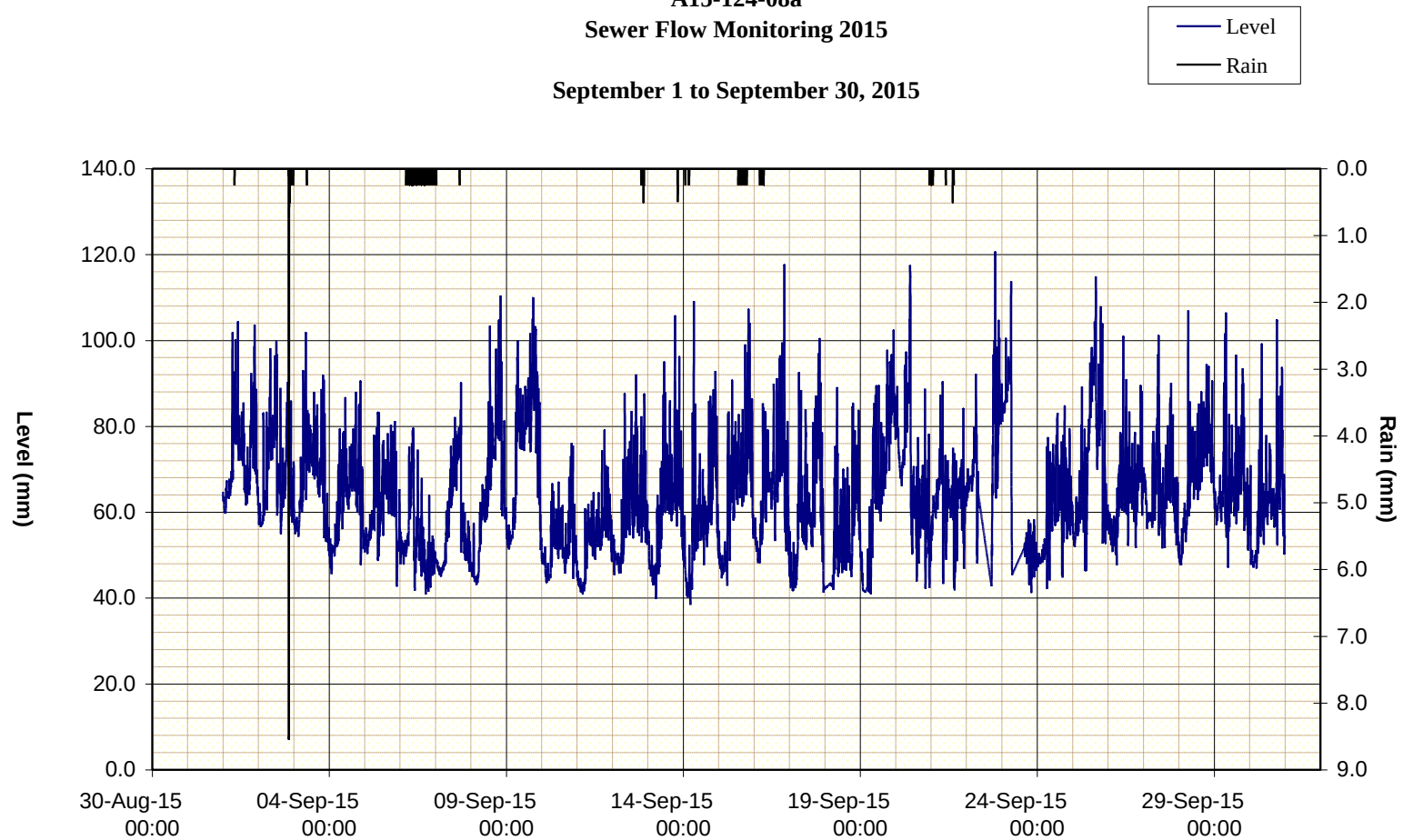
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



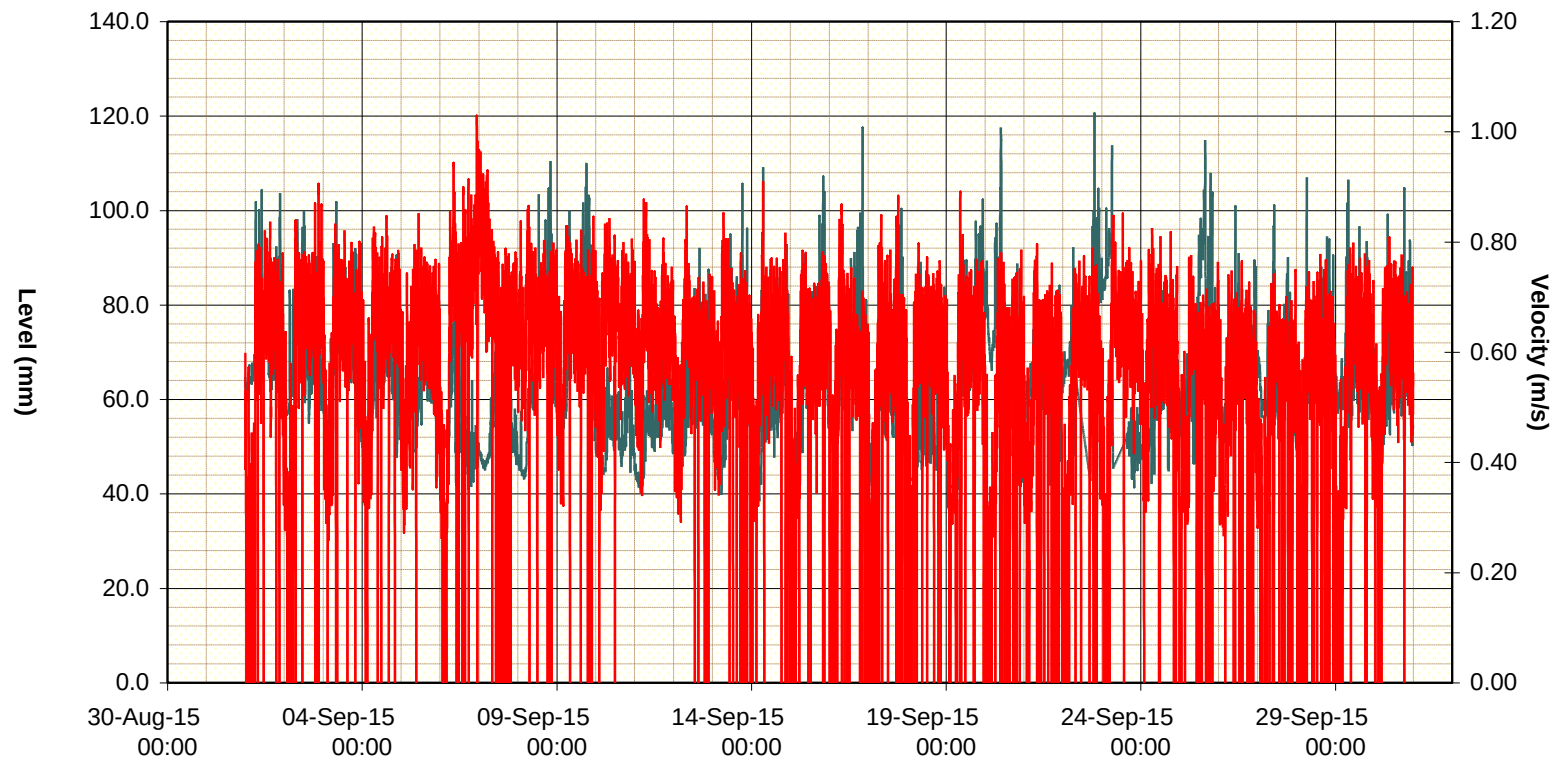
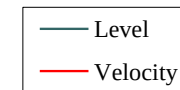
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



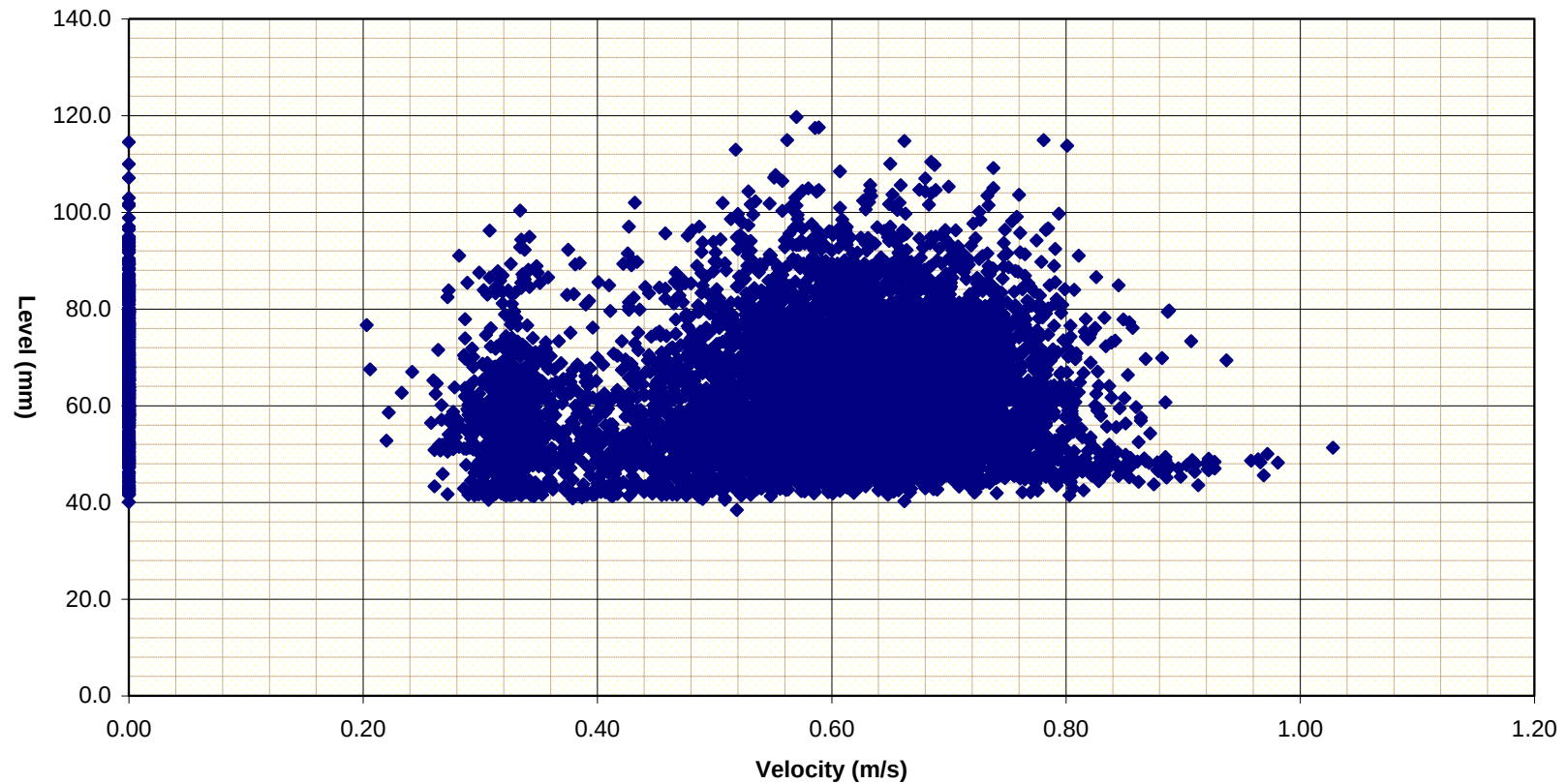
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015**

September 1 to September 30, 2015



Cold Lake, Alberta

A15-124-08a

Sewer Flow Monitoring 2015

September 1 to September 30, 2015

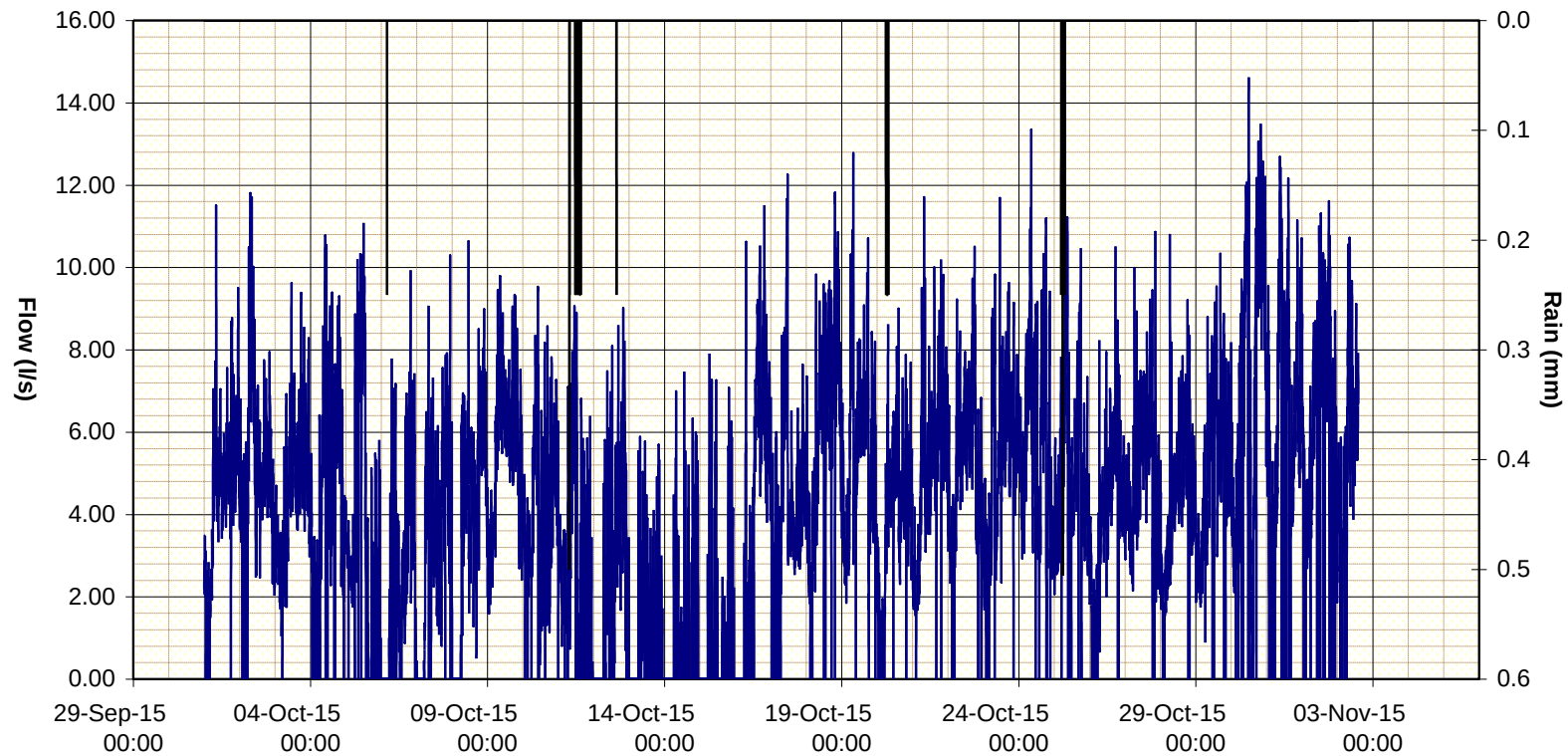
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-15	5.69	0.00	11.41	491.85	0.3
02-Sep-15	5.56	0.00	11.72	480.53	19.3
03-Sep-15	5.72	0.00	11.75	494.26	0.3
04-Sep-15	5.31	0.00	9.44	458.94	0.0
05-Sep-15	5.00	0.00	8.91	432.41	0.0
06-Sep-15	4.19	0.00	10.31	362.10	21.8
07-Sep-15	4.55	0.00	8.43	393.12	0.5
08-Sep-15	5.72	0.00	12.19	494.48	0.0
09-Sep-15	6.60	0.00	12.42	570.24	0.0
10-Sep-15	4.24	0.00	7.30	366.28	0.0
11-Sep-15	4.24	1.62	8.09	365.90	0.0
12-Sep-15	4.55	0.00	8.90	393.45	3.0
13-Sep-15	4.56	0.00	11.08	394.03	1.5
14-Sep-15	4.47	0.00	12.94	386.18	0.8
15-Sep-15	4.83	0.00	12.49	417.72	3.0
16-Sep-15	4.71	0.00	11.25	407.22	1.8
17-Sep-15	4.33	0.00	11.22	373.92	0.0
18-Sep-15	3.89	0.00	9.71	336.43	0.0
19-Sep-15	5.03	0.00	10.79	434.96	0.0
20-Sep-15	4.21	0.00	14.59	363.46	1.5
21-Sep-15	4.12	0.00	9.59	356.15	3.3
22-Sep-15	4.62	0.00	11.80	398.88	0.0
23-Sep-15	4.19	0.00	14.79	361.60	0.0
24-Sep-15	4.60	0.00	8.68	397.04	0.0
25-Sep-15	5.28	0.00	10.57	456.44	0.0
26-Sep-15	4.50	0.00	8.97	388.52	0.0
27-Sep-15	3.96	0.00	10.39	342.10	0.0
28-Sep-15	5.01	0.00	11.63	432.81	0.0
29-Sep-15	4.65	0.00	9.48	401.36	0.0
30-Sep-15	4.76	0.00	11.76	410.98	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
12363.369	0.000	14.790	56.8

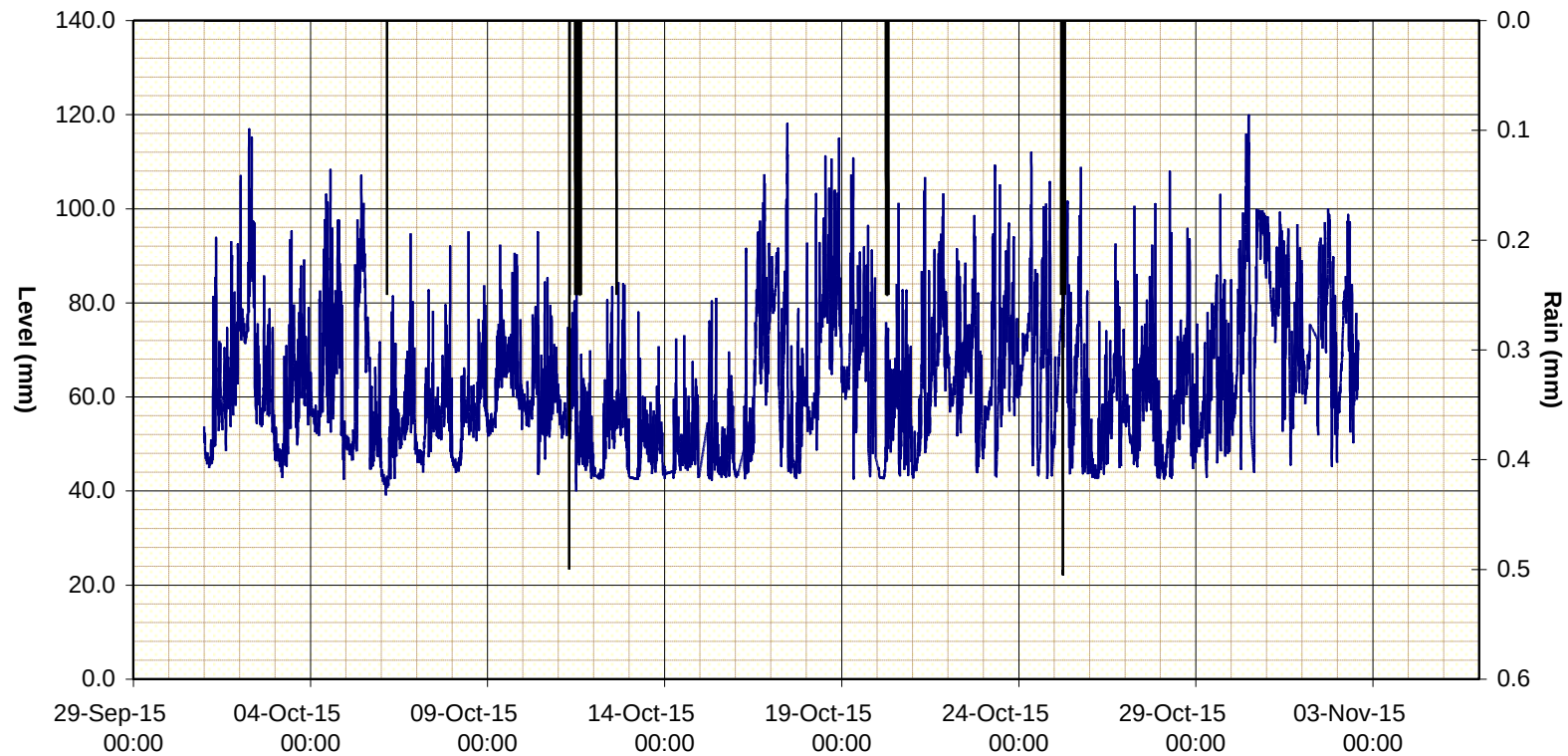
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**

— Flow
— Rain



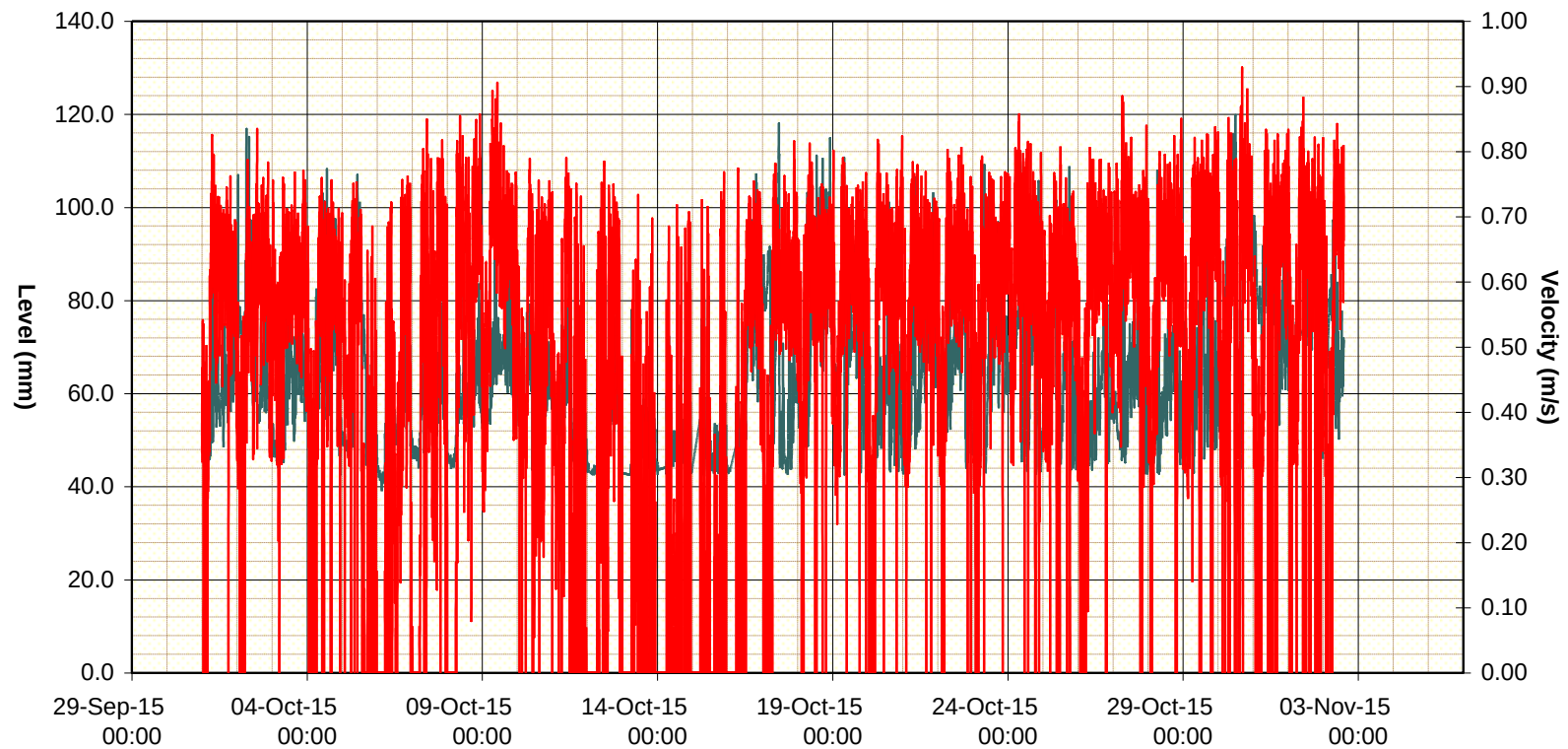
**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**

— Level
— Rain

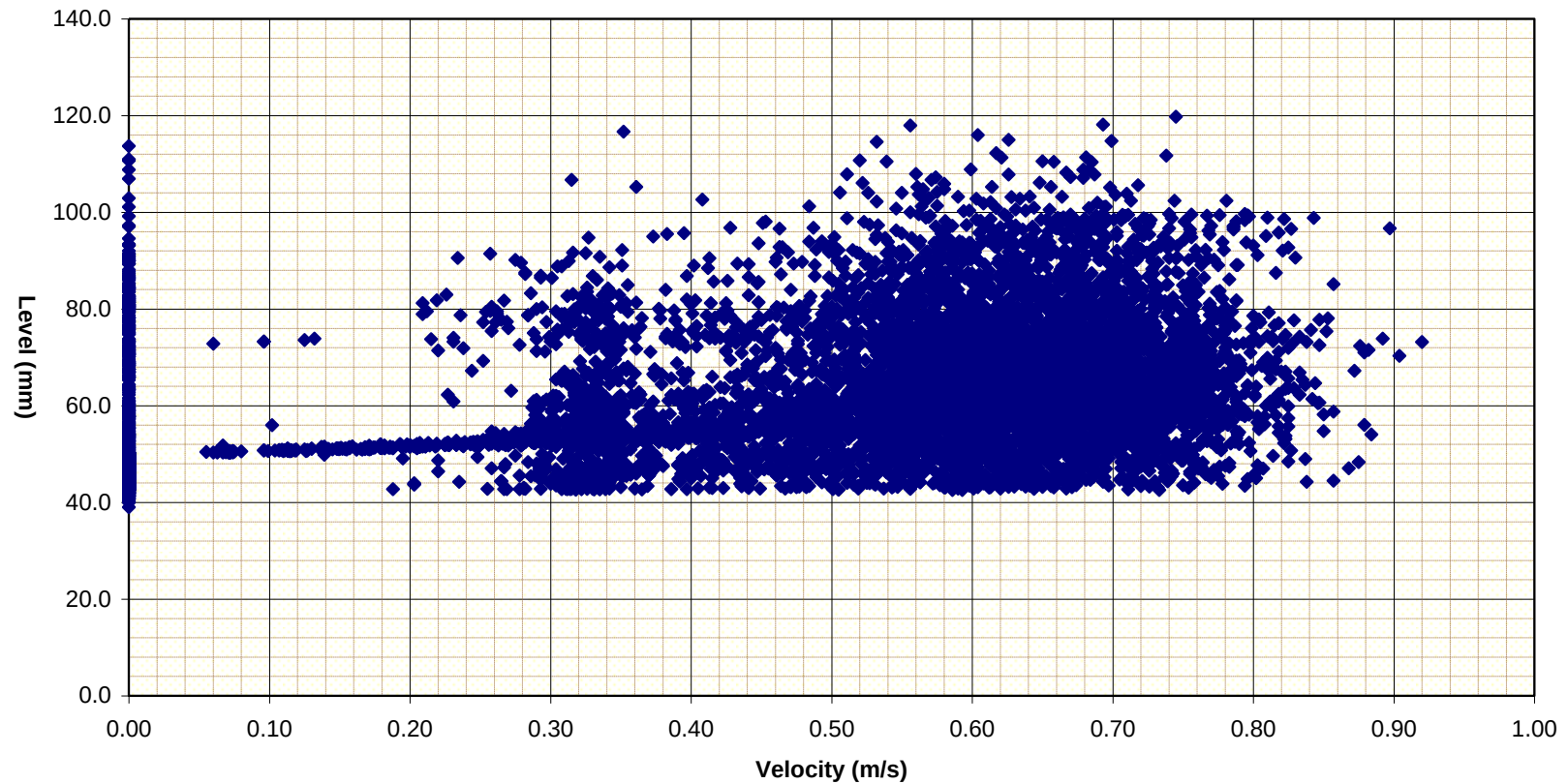


**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**

— Level
— Velocity



**Cold Lake, Alberta
A15-124-08a
Sewer Flow Monitoring 2015
October 1 to November 2, 2015**



Cold Lake, Alberta

A15-124-08a

Sewer Flow Monitoring 2015

October 1 to November 2, 2015

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Oct-15	4.50	0.00	11.50	388.49	0.0
02-Oct-15	5.08	0.00	11.79	439.23	0.0
03-Oct-15	4.45	0.00	9.61	384.72	0.0
04-Oct-15	4.51	0.00	10.74	389.33	0.0
05-Oct-15	3.35	0.00	11.08	289.28	0.0
06-Oct-15	2.10	0.00	9.93	181.20	0.3
07-Oct-15	2.98	0.00	10.27	257.68	0.0
08-Oct-15	3.58	0.00	10.63	309.72	0.0
09-Oct-15	5.58	1.60	9.76	482.02	0.0
10-Oct-15	3.94	0.00	9.41	340.00	0.0
11-Oct-15	2.32	0.00	9.04	200.77	4.0
12-Oct-15	2.31	0.00	8.99	199.80	0.3
13-Oct-15	0.83	0.00	5.76	71.71	0.0
14-Oct-15	0.71	0.00	7.47	61.35	0.0
15-Oct-15	0.55	0.00	7.91	47.66	0.0
16-Oct-15	3.47	0.00	11.51	300.23	0.0
17-Oct-15	4.08	0.00	12.24	352.92	0.0
18-Oct-15	6.03	0.00	11.53	521.28	0.0
19-Oct-15	5.38	0.00	12.65	464.66	0.0
20-Oct-15	3.87	0.00	8.99	334.71	2.3
21-Oct-15	5.09	0.00	11.70	439.58	0.0
22-Oct-15	5.16	0.00	10.49	445.46	0.0
23-Oct-15	5.20	0.00	11.67	449.38	0.0
24-Oct-15	5.74	0.00	13.33	495.55	0.0
25-Oct-15	4.99	0.00	11.21	430.89	2.3
26-Oct-15	4.01	0.00	10.51	346.52	0.0
27-Oct-15	4.86	0.00	10.85	419.87	0.0
28-Oct-15	4.37	0.00	10.81	377.40	0.0
29-Oct-15	4.96	0.00	10.32	428.34	0.0
30-Oct-15	7.07	0.00	14.62	610.83	0.0
31-Oct-15	5.85	0.00	12.68	505.05	0.0
01-Nov-15	6.19	0.00	11.60	534.49	0.0
02-Nov-15	5.24	0.00	10.67	452.63	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
11952.739	0.000	14.620	9.0



RAIN GAUGE MAINTENANCE RECORD

PROJ. #:	A15-124
SFE SITE #:	A15-124-RG01
ADDRESS:	720 10th St - Firehall
GPS:	N54.46497 W110.17200
Logger Type:	Detect - PMAC
Tip Amount:	0.25

LEGEND

DL - DOWNLOAD
CB - CHG BATTERY
CA - CALIBRATE
CF - CLEAN FUNNEL

[illegible]



RAIN GAUGE MAINTENANCE RECORD

PROJ. #:	A15-124
SFE SITE #:	A15-124-RG02
ADDRESS:	Lift Station Roof
GPS:	N54.418752 W110.19999
Logger Type:	Detect - PMAC 6385
Tip Amount:	0.25

LEGEND

DL - DOWNLOAD
CB - CHG BATTERY
CA - CALIBRATE
CF - CLEAN FUNNEL

[illegible]

Final Report for
City of Cold Lake

Attn: Mr. Azam Khan, P. Eng., M. Eng.

Cold Lake, Alberta
Sanitary Sewer Flow Monitoring 2016



Prepared and submitted by:

SFE Global

10707 181 Street

Edmonton, Alberta T5S 1J6

Phone (780) 461-0171 Fax (780) 443-4613

Toll Free: 1-877-293-0173



December 06, 2016

Mr. Azam Khan, P. Eng., M. Eng.
Cold Lake City Hall
5513 - 48 Avenue
Cold Lake, AB T9M 1A1

FINAL REPORT: CITY OF COLD LAKE
Sanitary Sewer Flow Monitoring 2016

Dear Mr. Khan,

Please find enclosed SFE's Final Report for the above mentioned project. If you have any questions, comments or concerns, please do not hesitate to contact us at your earliest convenience.

Thank you for having SFE conduct this work on your behalf. We are appreciative of the opportunity to work with you and your team on this project. We look forward to working together again in the near future.

Sincerely,
SFE Global

Nick Schellenberg
General Manager - Prairies
(780) 461-0171
Nick.Schellenberg@sfeglobal.com
www.sfeglobal.com

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<i>Maintenance Sheet & Data Summary</i>	

1. Introduction

This report provides details of the sanitary sewer flow monitoring project conducted in Cold Lake, Alberta. SFE Global was retained by the City of Cold Lake, under the direction of Mr. Azam Khan, P.Eng., M.Eng.. Mr. Nick Schellenberg represented SFE Global as Project Manager during this project.

As requested, SFE installed nine (9) sanitary sewer flow monitors and two (2) rain gauges to collect data for an anticipated five-month duration. The stations were installed by April 30th, 2016 and collected data until removal on October 11th, 2016. The monitoring stations are as follows:

Site #	Location	Meter Utilized
A15-124-01	10 St near 8 Ave	ISCO 2150 Area Velocity Flow Meter
A15-124-02	Cold Lake Beach – Off 1 Ave	ISCO 2150 Area Velocity Flow Meter
A15-124-03	East Ditch of 28 Street	ISCO 2150 Area Velocity Flow Meter
A15-124-04	43 Ave and 50 St	ISCO 2150 Area Velocity Flow Meter
A15-124-05	Off 54 Ave – In field	ISCO 2150 Area Velocity Flow Meter
A15-124-06	Dead end of 49 St	ISCO 2150 Area Velocity Flow Meter
A15-124-07A	54 Ave – Dirt Road (NE of 47 St)	ISCO 2150 Area Velocity Flow Meter
A15-124-07B	Lily St and 47 St	ISCO 2150 Area Velocity Flow Meter
A15-124-08	Off 52 Ave – In field	ISCO 2150 Area Velocity Flow Meter
A15-124-RG01	720 10 th St- Fire hall	Detectronic – PMAC 6385
A15-124-RG02	Lift Station Roof	Detectronic - PMAC 6385

2. Flow Monitoring Stations

Prior to installing flow monitoring stations, SFE performs detailed site assessments of each potential site to determine the acceptability of SFE's Custom Compound Weir. Factors such as pipe size, channel condition, site location, site access, and flow hydraulics were all considered and documented while performing site assessments. See Appendix #1 of this report for site assessment details.

SFE installed the flow monitoring station in accordance with the approved site assessment documentation. The meter was calibrated and set to log data at 5 minute intervals. SFE obtained and recorded corresponding meter and field readings during site installation and site removal on the field maintenance sheet. These readings provided an indication of the accuracy and operation of the meter. See Appendix #2 of this report for the field report sheets detailing site inspection information, calibrations, and depth verifications.

3. QA/QC and Safety Statement

SFE confirms that all flow monitoring stations were installed according to SFE's QA/QC methodology and protocol, and standard industry practice. All flow monitoring equipment and weir material has been removed from the site locations.

SFE has a comprehensive Company Safety Manual and can be reviewed upon request.

Confined space entry procedures and general site/traffic safety was adhered to during site installation and site maintenance. SFE utilizes an approved rescue system, a 2800 CFM air induction device and four-gas air quality monitors. All of our staff members are thoroughly trained and certified in confined space entry procedures. Certificates are available upon request.

A thorough traffic control plan was established and used by SFE Global crews where required.

4. SFE Standard Data Processing Procedures

SFE Data Analysts have reviewed the final dataset and applied some of our standard data edits where necessary. When any data edits are performed, we always provide the full raw dataset for reference.

Raw Data Review

- Analyzing individual site hydraulics and scatterplots
- Reviewing installation site books, calibrations and photos
- Reviewing maintenance trips and verification against meter data
- Making note of any equipment level adjustments and reflecting this upon the dataset
- Noting and reporting on any data loss and the reason associated with it

Data Edits and Processing

SFE performs and notes any data processing or manipulation on the Data Processing QA/QC Sheet. The raw dataset is provided to the client, as well as the processed dataset. Processed data is identified in the file name by the suffix P, after the site name. Our goal is to achieve zero data edits on every project. However, due to the nature of open channel flow monitoring, sensor ragging, and some measure of equipment malfunction it is infrequent, but inevitable. We attempt to use the least amount of data editing to achieve the project objective.

Standard Processing Operations - ISCO Meter Algorithm

Due to the chance of ragging of sensors and velocity loss at low flow, the manufacturer has built a velocity replacement algorithm into their flow calculations. This algorithm checks the velocity data for zero or error values. It then looks back for the last known good velocity, and replaces the erroneous data with that value. This significantly cleans the low flow portion of the data, and very seldom changes the peak flows, where most analysis takes place. Although we override this function to process and provide the true raw data from the instrument, we will periodically re-process with it, for sites with significant velocity drop out at low flows.

Fixed Value Level Adjust

If maintenance operations identify level drift of sensor error in subsequent trips, our field technicians will adjust the meter level to the current measured value. Data processing for level adjustments will offset the data from the last known good value, to the point of the level adjustment. If the level error is due to gradual sensor drift, we have a progressive level adjustment that will correct all data from the start of drifting to the point of level adjustment.

Manning's Flow Replacement

If a site has a high incidence of velocity loss due to ragging, our software can perform a Manning's Equation Flow Calculation. Although we do not use measured slope and roughness for this substitution, we adjust the slope and roughness values to produce a level based flow calculation, that matches as closely as possible, periods of good area velocity data. For periods of peak flow, rain events or surcharge conditions, the raw AV data can be referenced for calculation. Generally higher flow rates as seen during rain events will clear the debris blocking the velocity, and allow true AV data to be collected for these events.

Known Velocity Replacement

If a site has a period of lost velocity during normal flow, without any rain events, we will perform a velocity copy/paste of the equivalent number of days, from the nearest point of good velocity, without rain events. This is generally done only for short intervals, where replacing an entire data set with Manning's would not be a valid alternative.

5. Appendices

- Appendix #1 Includes technical information on Custom Compound Weirs
- Appendix #2 Includes all site assessment sheets, site photos, and field set-up reports
- Appendix #3 Includes site maintenance sheet and data summary

Appendix 1

SFE Custom Compound Weir – Technical Information

SFE Custom Compound Weir - A Technical Discussion

SFE's Custom Compound Weir (CCW) Technology was first developed in 1983. This system consists of the following two components:

- *A customized primary device (Custom Compound Weir or CCW), which provides a predictable relationship of "head" versus "flow"*
- *A water level sensor and data logger*

Testing & Awards

The relationship between "head" and "flow" for the primary device was initially established in a hydraulics lab in conjunction with the Canadian Center for Inland Waterways (CCIW) and published in a report prepared for a local utility. In subsequent years the monitoring techniques were further refined and additional laboratory work was carried out for the primary device. The work was recognized in 1988 by the Association of Consulting Engineers with an Award of Merit at their annual national engineering awards program.

Any level sensing device may be used to reliably measure flows including ultrasonic level indicators, pressure transducers and floats. The system was designed to make it economically feasible for even small utilities to be able to operate a network of stations for a long duration - the low operating costs & high accuracy/reliability prevailing over other measurement systems.

Self-Cleaning

The primary device has a rectangular notch, which then flares out into a "V" section and then a rectangular upper portion. The notch and "V" section have chamfered 1 ½ inch thick "lips" which make them self cleaning and result in a very high weir flow coefficient.



The self-cleaning properties of these weirs have been amply field proven over the past 20 years at approximately 2200 such stations. Each of our Custom Compound Weirs is custom designed by an open channel hydraulics specialist, for the manhole, chamber or channel configuration it is to be used in.

Low Flow Accuracy

For sewers up to 21 inches in diameter the notch is typically 4 inches wide and 5 ½ inches deep. This results in a flow rate of roughly 0.25 GPM for a head of 1 inch. Since a 2.5 psi pressure transducer or narrow beam ultrasonic indicator is usually capable of measuring water levels within $\pm \frac{1}{4}$ ", flow rates down to 0.25 GPM can readily be measured (a special unit has previously been designed to measure pre-treated wastewater flow rates down to 0.025 GPM).

No Sewer Backups

The lower notch magnifies the variation of the water level with small changes in flow rate (e.g. for the base flow regime). The overall primary device or "weir" normally has an opening greater than the pipe cross sectional area and capacities greater than that of the sewer in which they are placed.

Any Size, Any Shape

SFE has installed custom compound weirs in sewers from 6 inch to 12 foot as well as in varying sizes of pond outlets, creeks, WWTP's, etc. Custom designing the primary device for the manhole or channel in which it will be placed means that you have considerable control over the final flow regime. This has allowed many difficult hydraulic situations to be handled including bends, junctions, slopes over 10%, drop connections, and drops in the main pipe invert.

Velocity Measurements Not Required

One of the major advantages of SFE's Custom Compound Weir is that it only requires a depth sensor and logger; a velocity sensor is not used. Many of the problems associated with sewer flow monitoring are related to the velocity sensor and the need to measure average velocity. Velocity sensors are prone to fouling with subsequent "drifting" of the signal whereas pressure sensors will still accurately register variations in water level even if they have debris on them.

No "In the flow" Probes

The use of SFE's Custom Compound Weir further improves the performance of pressure sensors since they no longer represent an effective obstruction in the flow (they are installed behind the weir). They will always have a reasonable "head" on them as the weir lip elevation maintains a minimum depth of 4 inches behind the weir. As pressure transducers are much less accurate when depths approach zero; this situation becomes a problem for Area-Velocity A-V) type meters in small pipes where base flow rates are low.

Less Expensive

“Level only” monitors such as those used with our Custom Compound Weir are less expensive than A-V meters and need less power to operate. Flow profiling is needed for conventional A-V meters to ensure that the velocity sensed at a point or across a band of flow is properly transformed into average velocity across the pipe section. Since the Custom Compound Weir does not use velocity, profiling becomes redundant.

High Accuracy

Dye dilution and full-scale lab comparisons have been conducted and the results have been excellent. In most cases +/- 5% over the full range of flows is readily achievable.

Temporary or Permanent

The Custom Compound Weir’s (CCW’s) are normally located in the manhole chamber about 12 inches from the downstream end.

Material	Life Expectancy	Uses
Lumber/Lexan	1 week to several years	Short Term (E.g. I/I Study)
Plywood	Up to 2 years	Temporary
Pressure Treated Lumber	5 years	Semi-Permanent
Lexan and 316 Stainless	50 Years	Permanent

No Surcharges

Is there a possibility of sewer surcharges causing basement flooding because of the use of such primary devices or weirs? The question has been raised many times and was addressed on a project when the Custom Compound Weir was first designed. The purpose of that first project was to determine the cause of persistent sewer related basement flooding. The client was very concerned that the study procedures did not create more flooding since two Custom Compound Weir stations were just downstream of the area receiving the flooding. The design and placement of the Custom Compound Weirs addressed this as follows:

For manholes with a chamber larger than the pipe (i.e. 18 inch pipe in standard 42 inch manhole), the weir opening is greater than the pipe area. The flow over the weir is also at critical depth and therefore at a higher velocity than normally occurs in the pipe itself. As a result, the weir capacity is much greater than the pipe capacity in most installations.

A rating curve was provided for a demo weir that has the standard opening used in pipes up to 18 inches. The table below shows the flow capacity of this weir configuration at selected heads versus the full flow capacity of selected pipe sizes up to 18 inches at a 0.25 % grade. The comparison illustrates that the CCW capacity can be much greater than the pipe capacity.

<i>Flow Capacity of Standard Small Pipe Configuration at Selected Heads (Custom Compound Weir range)</i>		<i>Full Flow Capacity of Selected Pipes @ 0.25 % Grade (Pipe range)</i>	
Head (in.)	Flow (US GPM)	Pipe Diameter (in.)	Capacity (US GPM)
1	15.85	8	254
5.5	190	10	471
8	349	12	761
12.5	999	15	1388
20	2298	18	2267
24	3638		

Laboratory Tested

Hydraulic model testing conducted at the Canada Center for Inland Waters (CCIW), provided the opportunity of observing the pipe / weir / manhole performance as the flow rates in the system were increased to the point that it surcharged. As the system started to surcharge, the “control” shifted from the weir to the downstream pipe and there was essentially no drop in the water surface across the weir (under surcharge, the weir was not influencing the water levels upstream).

Custom Designs

Every Custom Compound Weir is custom designed with a rectangular low flow notch and chamfered lips to give it a high weir flow coefficient. This means that it passes a greater flow for a given head than normal sharp crested weirs. Custom designed means specific concerns are addressed at specific sites.

Appendix 2

Monitoring Station Site Book

CLIENT FLOW MONITORING #: 1
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-01

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2016
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

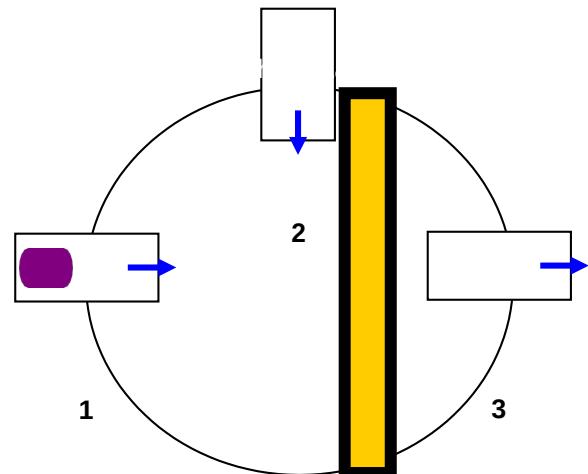
Install / Removal Date: 30-Apr-16 | 11-Oct-16
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2
Wireless I.D # / Cell #: 208D02252 | N/A
Level / VelocityType: 215E02563 | N/A
Submerged | N/A
Sensor Mounting: Compression
Primary Device: AV and Weir
Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: 1
Address (Location): 10 St, near 8 Ave
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4640 W-110.1731

Manhole Depth (mm): 3590 Rungs? Yes
Overall Site Condition: Fair
Pipe Size #1 350 #2 200
(mm): #3 450 #4 N/A

Landmarks: Near strip mall entrance
Traffic Control Reg's: Moderate - busy at rush hour
Additional Information: Middle of road

Location of Sensor (which pipe?): = 1
Overall Pipe Condition: Fair
Additional Information: 250mm SFE Weir



CLIENT FLOW MONITORING #: 1
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-01

Site View



Site View



Meter



Install



Weir Install



Downhole





Weir Install Sheet



CLIENT FLOW MONITORING #: 1
NAME: Cold Lake Flow Monitoring 2016

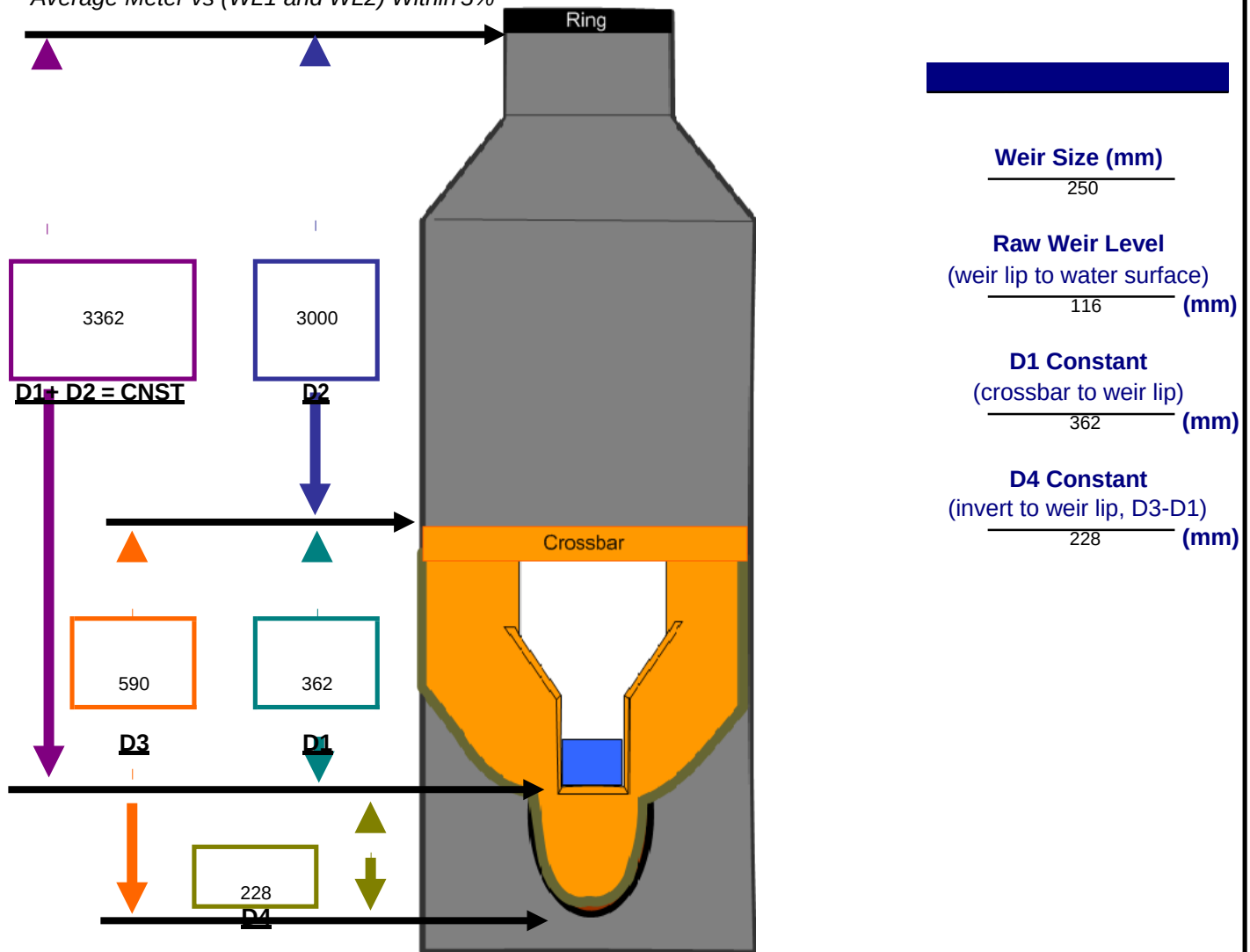
SFE PROJECT #: A15-124
SFE SITE #: A15-124-01
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	30-Apr-16	9:12	115.000	126.000	LA
1	30-Apr-16	9:14	115.000	115.000	
2	30-Apr-16	9:16	116.000	115.000	
3	30-Apr-16	9:18	116.000	116.000	
Average			115.667	115.333	

* Three Continuous Measurements Within 20 mm

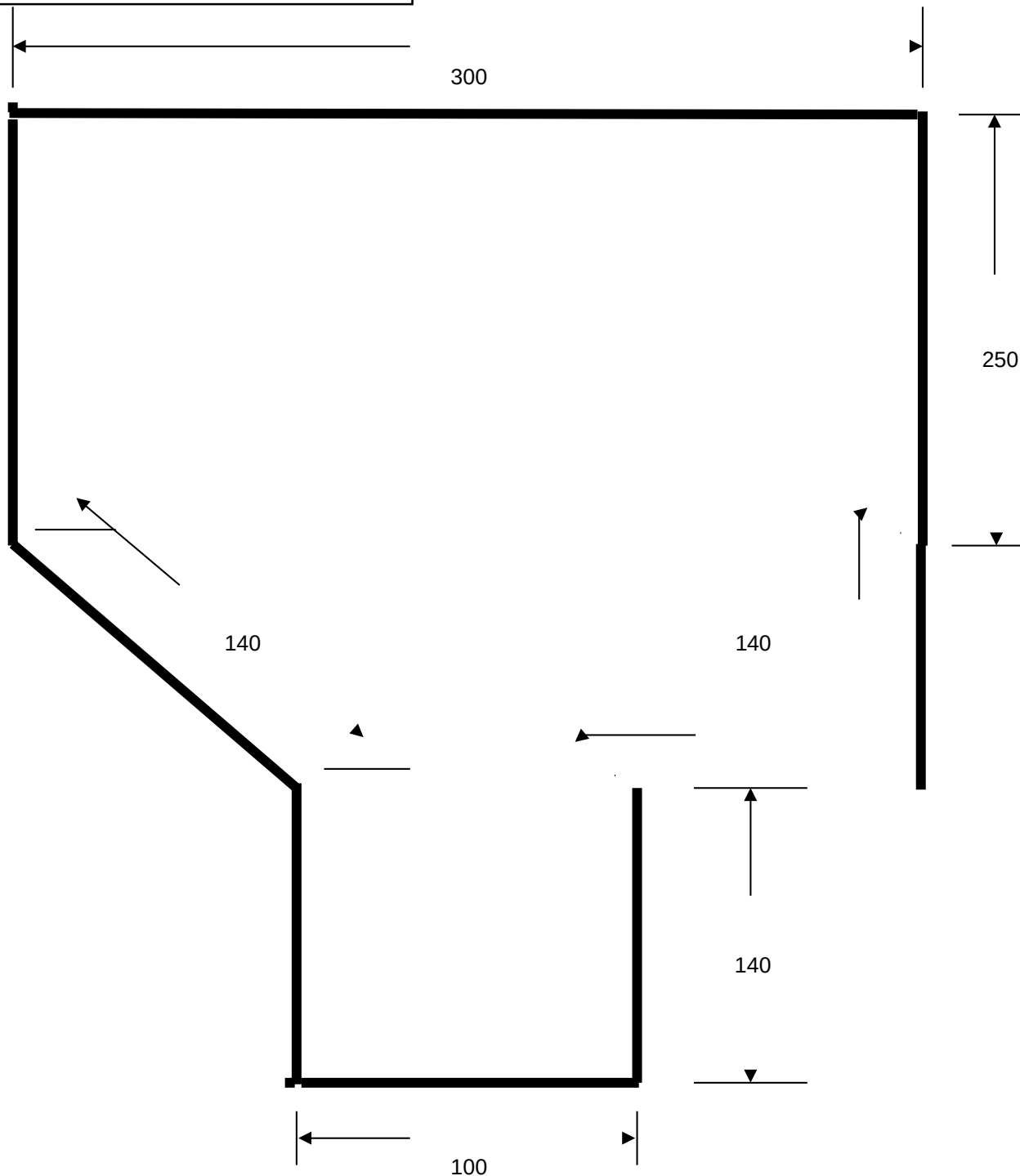
* Average Meter vs (WL1 and WL2) Within 5%



CLIENT FLOW MONITORING #: 1
 NAME: Cold Lake Flow Monitoring 2016
 Date / Time: 30-Apr-16 9:30

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-01
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) 250



CLIENT FLOW MONITORING #: 2
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-02

Project Specific Information	
Client Name:	<u>City of Cold Lake</u>
End User Name:	<u>City of Cold Lake</u>
Project Name:	<u>Flow Monitoring 2016</u>
Client Contact:	<u>Azam Khan 780-594-4494</u>
Field Contact:	<u>Azam Khan 780-594-4494</u>
SFE PM Contact:	<u>Nick Schellenberg 204-999-3547</u>
Site Maintenance:	<u>Bi-weekly</u>

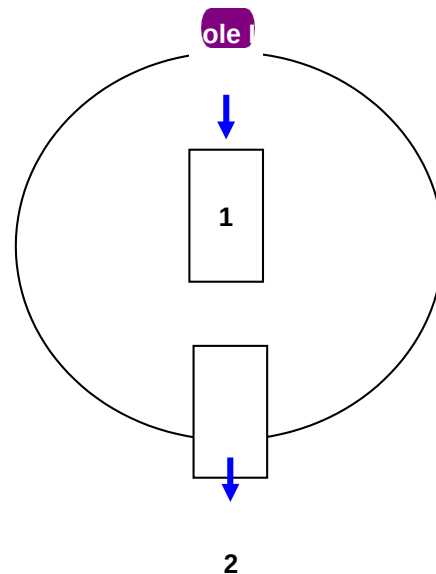
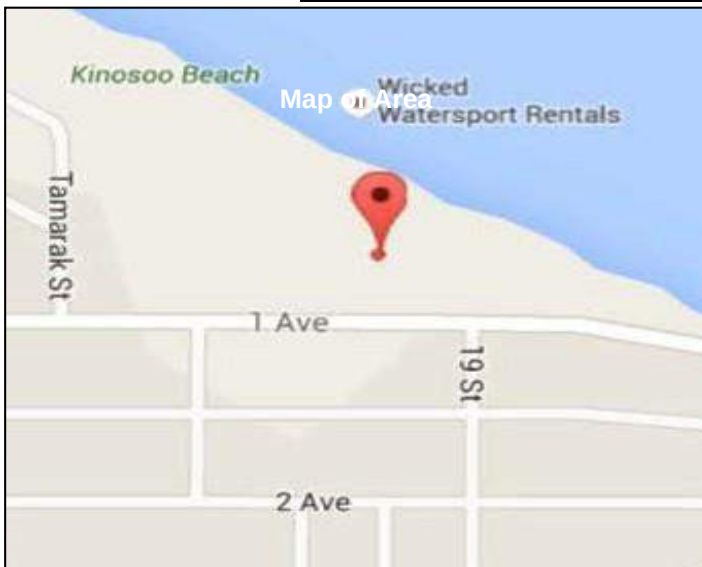
Site Equipment	
Install / Removal Date:	<u>29-Apr-16</u> | <u>11-Oct-16</u>
Meter Make & Model:	<u>ISCO 2150</u>
Meter I.D. - #1 and #2	
Wireless I.D # / Cell #:	<u>208D02245</u> | <u>N/A</u>
Level / VelocityType:	<u>N/A</u> | <u>N/A</u>
	<u>Submerged</u> | <u>AV Sensor</u>
Sensor Mounting:	<u>Scissor Band</u>
Primary Device:	<u>Area Velocity</u>
Logging Rate / Call out:	<u>5 minute</u> | <u>Twice Daily</u>

Client Manhole #: 2
Address (Location): Off 1st St - Water Park
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4719 W-110.1877

Manhole Depth (mm): 2506 Rungs? Yes
Overall Site Condition: Good
Pipe Size #1 375 #2 375
(mm): #3 N/A #4 N/A

Landmarks: Near Beach - Waterfront
Traffic Control Reg's: N/A
Additional Information: N/A

Location of Sensor (which pipe?): = 1
Overall Pipe Condition: Good
Additional Information: Possible Weir Adder



CLIENT FLOW MONITORING #: 2
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-02

Site View



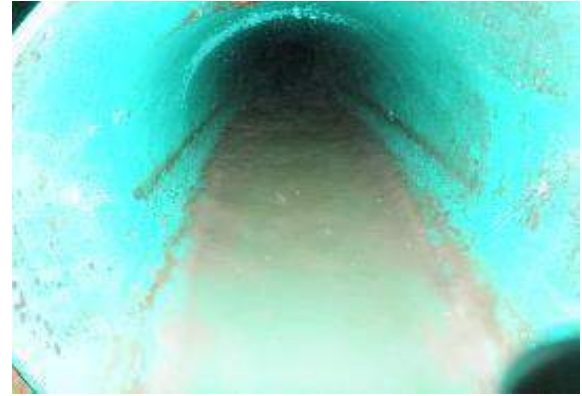
Site View



Meter



Upstream



Install



Downhole





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: 2
NAME: Cold Lake Flow Monitoring 2016

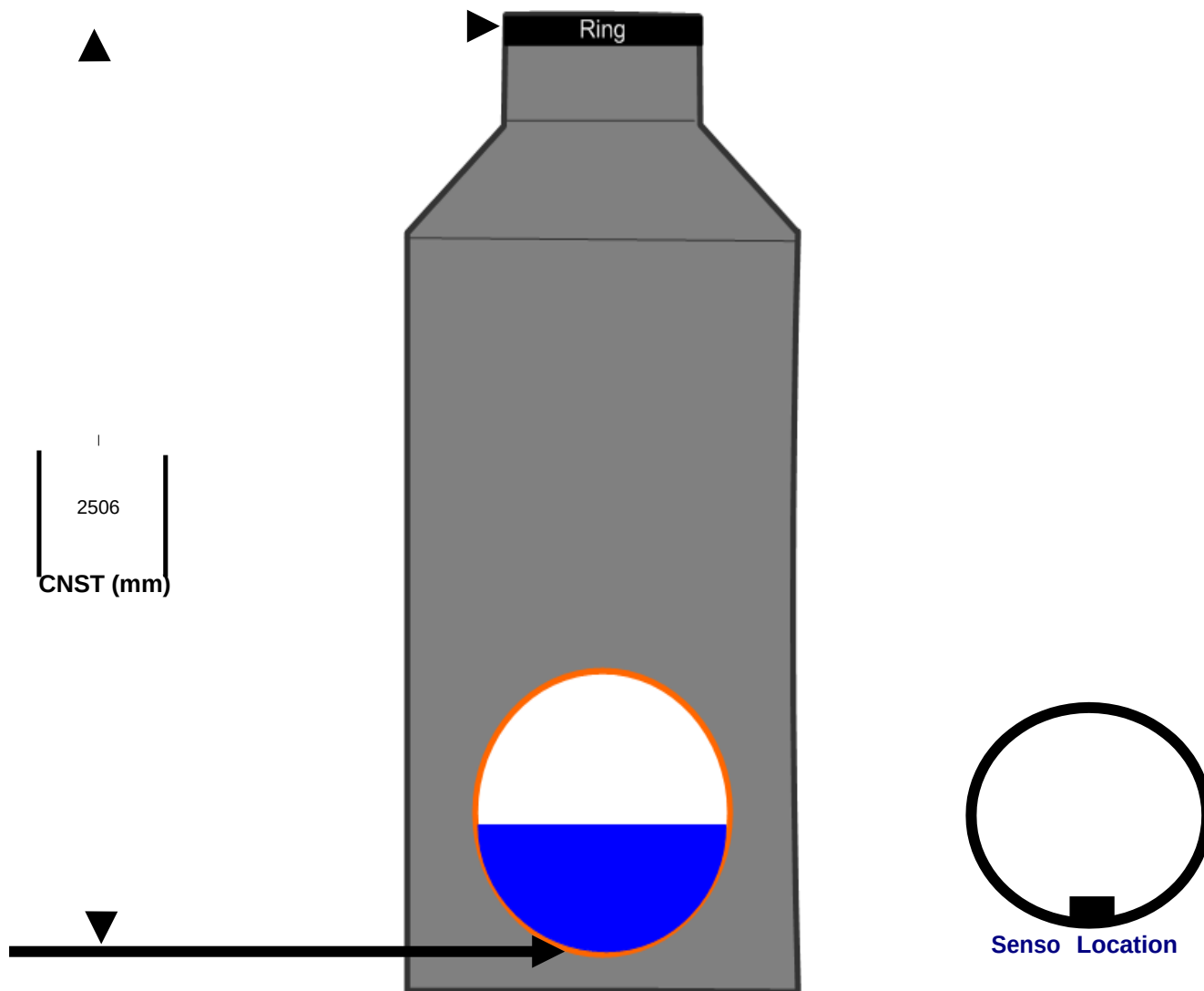
SFE PROJECT #: A15-124
SFE SITE #: A15-124-02
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	29-Apr-16	10:54	98	74	LA
1	29-Apr-16	10:56	98	97	
2	29-Apr-16	10:58	96	97	
3	29-Apr-16	11:00	98	99	
Average			97	98	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: 2
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-02
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

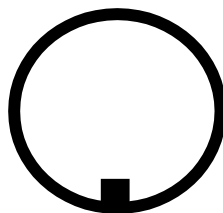
Pipe Diameter (mm):	375	PV Meter	Hach
Raining?	No	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface	0.46	0.52	0.59	0.58	0.49
50		0.54	0.57	0.57	
Average all readings		0.54			
0.9 Vmax Method					
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible					
Max	N/A	Max * 0.9	N/A		

Velocity Profile Summary					
Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.54	0.56	N/A	98	29-Apr-16	11:09

Meter Location and Orientation

Sensor Location



Section View

Comments:

N/A

CLIENT FLOW MONITORING #: 3
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-03

Project Specific Information

Client Name: City of Cold Lake
 End User Name: City of Cold Lake
 Project Name: Flow Monitoring 2016
 Client Contact: Azam Khan 780-594-4494
 Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
 Site Maintenance: Bi-weekly

Site Equipment

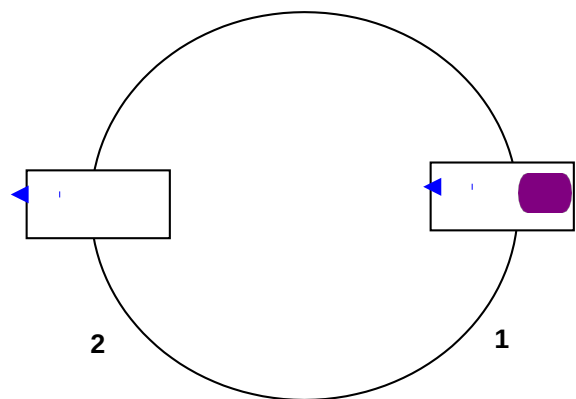
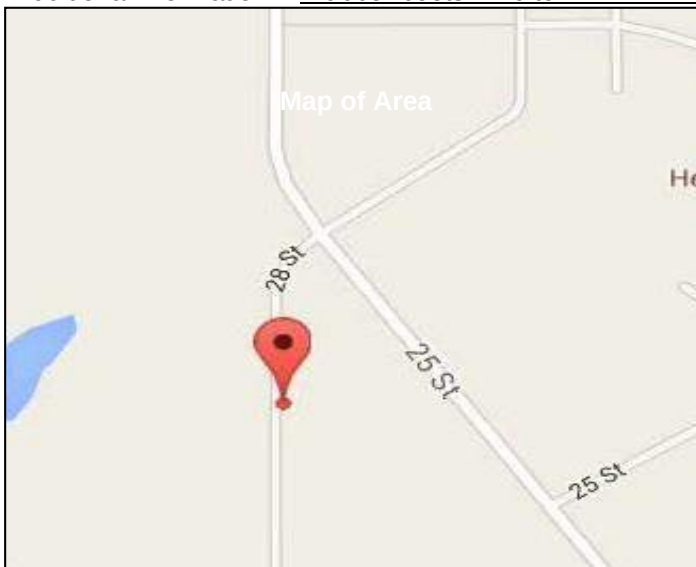
Install / Removal Date: 30-Apr-16 | 11-Oct-16
 Meter Make & Model: ISCO 2150
 Meter I.D. - #1 and #2
 Wireless I.D # / Cell #: 207K01076 | N/A
 Level / VelocityType: N/A | N/A
Submerged | AV Sensor
 Sensor Mounting: Scissor Band
 Primary Device: Area Velocity
 Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: 3
 Address (Location): Off 28 St in ditch
 City, Province: Cold Lake, AB
 GPS (Lat - Long): N54.4652 W-110.2073

Manhole Depth (mm): 5280 Rungs? Yes
 Overall Site Condition: Fair
 Pipe Size #1 425 #2 425
 (mm): #3 N/A #4 N/A

Landmarks: Green pole near manhole
 Traffic Control Req's: N/A
 Additional Information: Rubber boots - in ditch

Location of Sensor (which pipe?): = 1
 Overall Pipe Condition: Fair
 Additional Information: May need Weir adder



CLIENT FLOW MONITORING #: 3
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-03

Site View



Site View



Meter



Upstream



Install



Downhole





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: 3
NAME: Cold Lake Flow Monitoring 2016

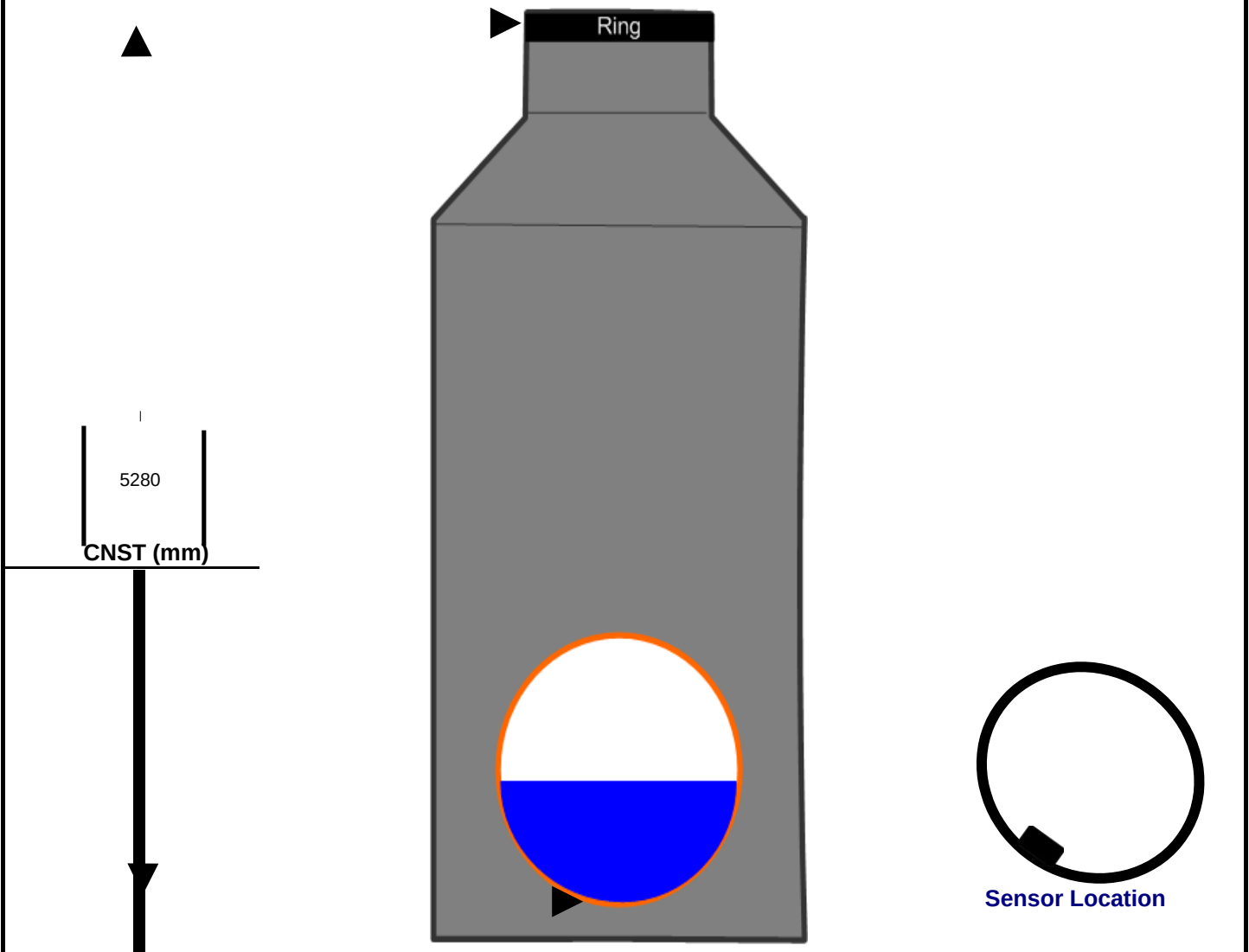
SFE PROJECT #: A15-124
SFE SITE #: A15-124-03
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	30-Apr-16	12:32	140	182	LA
1	30-Apr-16	12:34	140	139	
2	30-Apr-16	12:36	142	140	
3	30-Apr-16	12:38	142	142	
Average			141	140	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: 3
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-03
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

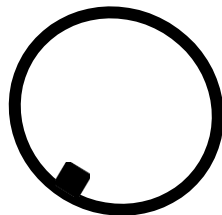
Pipe Diameter (mm):	425	PV Meter	Hach
Weather - Raining?	N/A	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface	0.22	0.26	0.31	0.29	0.24
100		0.28	0.3	0.31	
50			0.28		
Average all readings		0.28			
0.9 Vmax Method					
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible					
Max	N/A	Max * 0.9	N/A		

Velocity Profile Summary					
Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.28	0.3	N/A	141	30-Apr-16	12:49

Meter Location and Orientation

Sensor Location



Section View

Comments:

N/A

CLIENT FLOW MONITORING #: 4
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-04

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2016
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

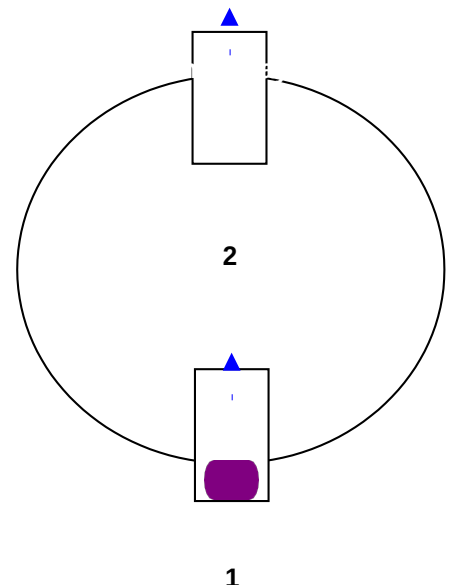
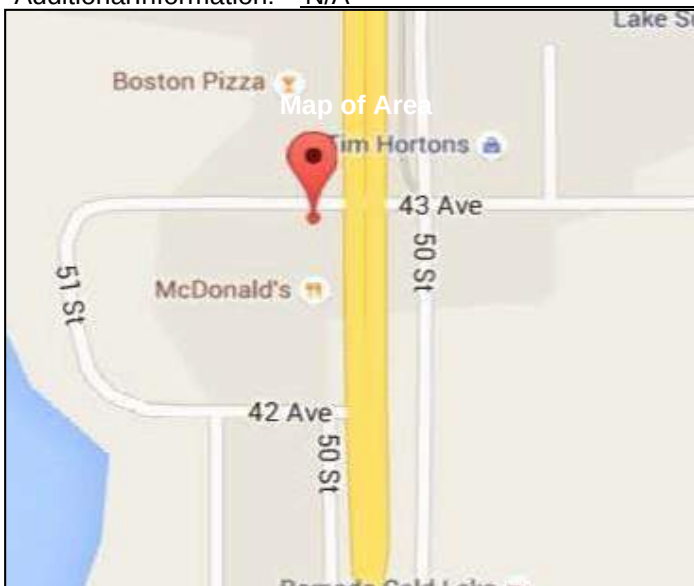
Install / Removal Date: 17-May-01 | 11-Oct-16
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2
Wireless I.D # / Cell #: A-2150-09 | N/A
Level / VelocityType: 215E02560 | N/A
Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: N/A
Address (Location): 43 Ave + 50 St
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4070 W-110.2058

Manhole Depth (mm): 6735 Rungs? Yes
Overall Site Condition: Poor
Pipe Size #1 450 #2 450
(mm): #3 N/A #4 N/A

Landmarks: In between Shell and McDonalds
Traffic Control Req's: Moderate
Additional Information: N/A

Location of Sensor (which pipe?): = 1
Overall Pipe Condition: Fair
Additional Information: Lots of debris upstream



CLIENT FLOW MONITORING #: 4
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-04

Site View



Site View



Meter



Upstream



Install



Downhole





Area Velocity Install Sheet



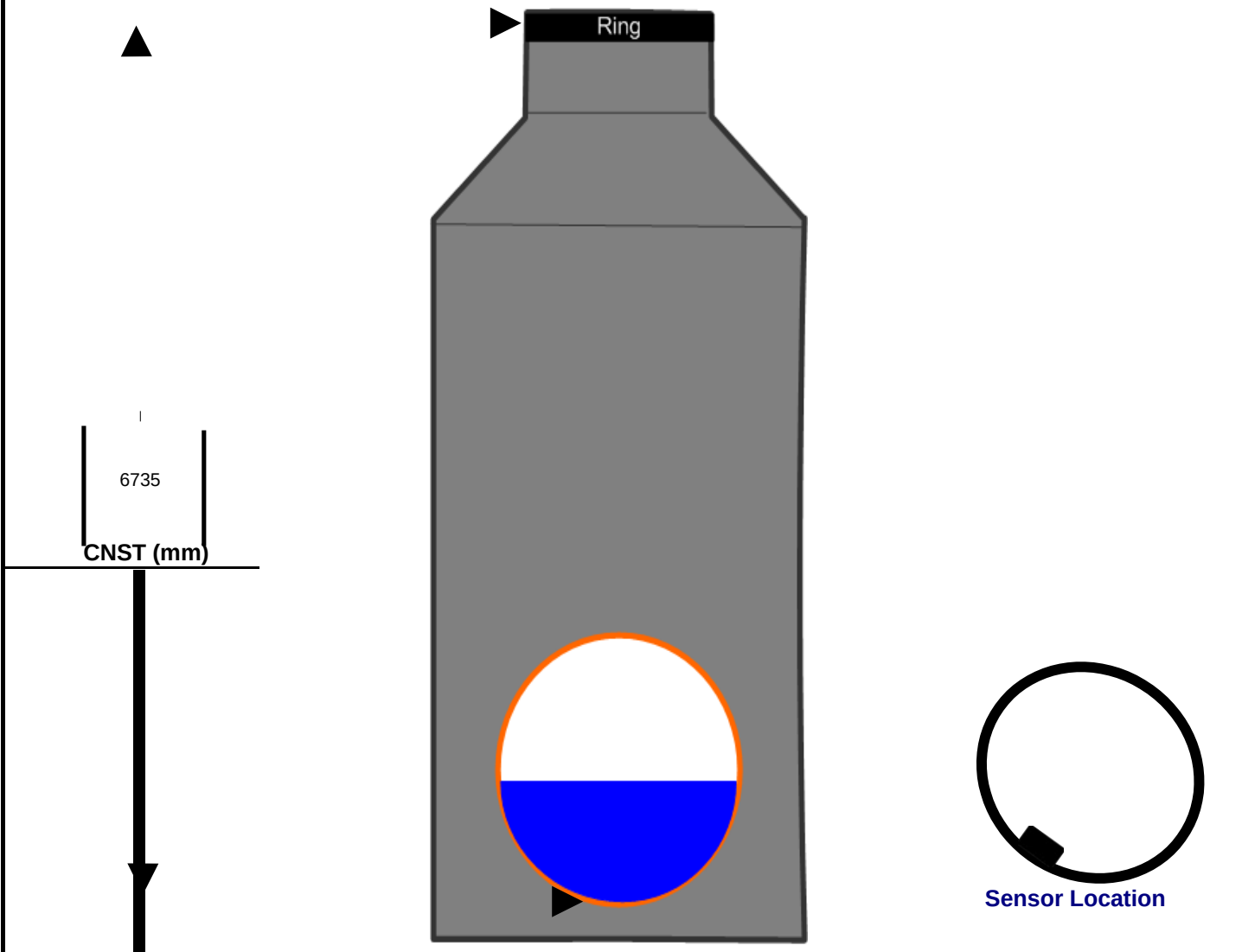
CLIENT FLOW MONITORING #: 4
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-04
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	17-May-16	11:19	62	95	LA
1	17-May-16	11:21	62	61	
2	17-May-16	11:23	62	62	
3	17-May-16	11:25	64	63	
Average			63	62	

* Three Continuous Measurements Within 20 mm.
* Average Meter vs (WL1 and WL2) Within 5%





SFE PROJECT #: A15-124
SFE SITE #: A15-124-04
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Pipe Diameter (mm):	450	PV Meter	Hach
Raining?	No	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Average all readings		#DIV/0!			

0.9 Vmax Method				
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible				
Max	0.32	Max * 0.9	0.28	

Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.28	0.29	N/A	60	17-May-16	11:29

Meter Location and Orientation

[illegible]

CLIENT FLOW MONITORING #: 5
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-05

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2016
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

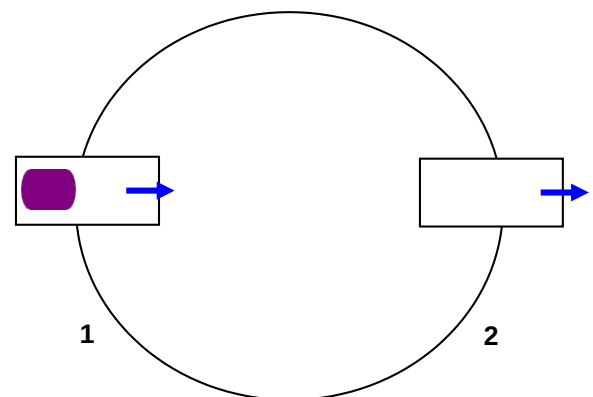
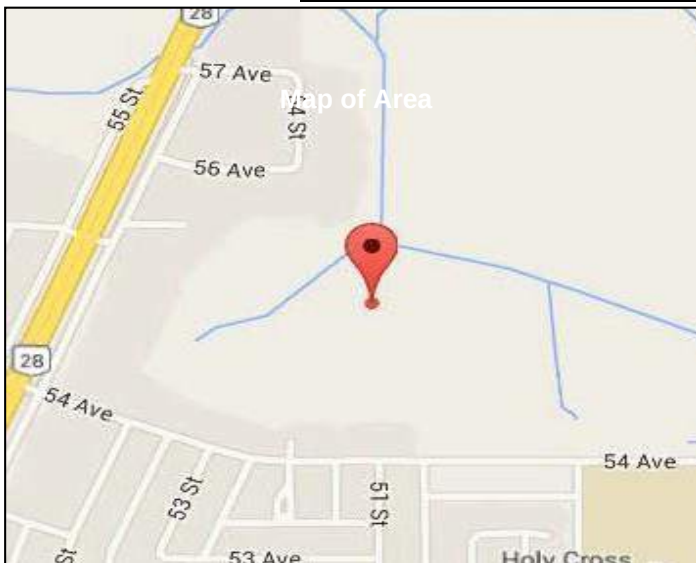
Install / Removal Date: 29-Apr-16 | 11-Oct-16
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2
Wireless I.D # / Cell #: 208D02259 | N/A
Level / VelocityType: 215E02558 | N/A
Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: 5
Address (Location): Off 54 Ave - In Field
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4197 W-110.2075

Manhole Depth (mm): 5112 Rungs? Yes
Overall Site Condition: Fair
Pipe Size #1 375 #2 375
(mm): #3 N/A #4 N/A

Landmarks: Behind Condos in field
Traffic Control Reg's: N/A
Additional Information: Raised manhole

Location of Sensor (which pipe?): = 1
Overall Pipe Condition: Fair
Additional Information: Possible weir Adder



CLIENT FLOW MONITORING #: 5
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-05

Site View



Site View



Meter



Upstream



Install



Downhole





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: 5
NAME: Cold Lake Flow Monitoring 2016

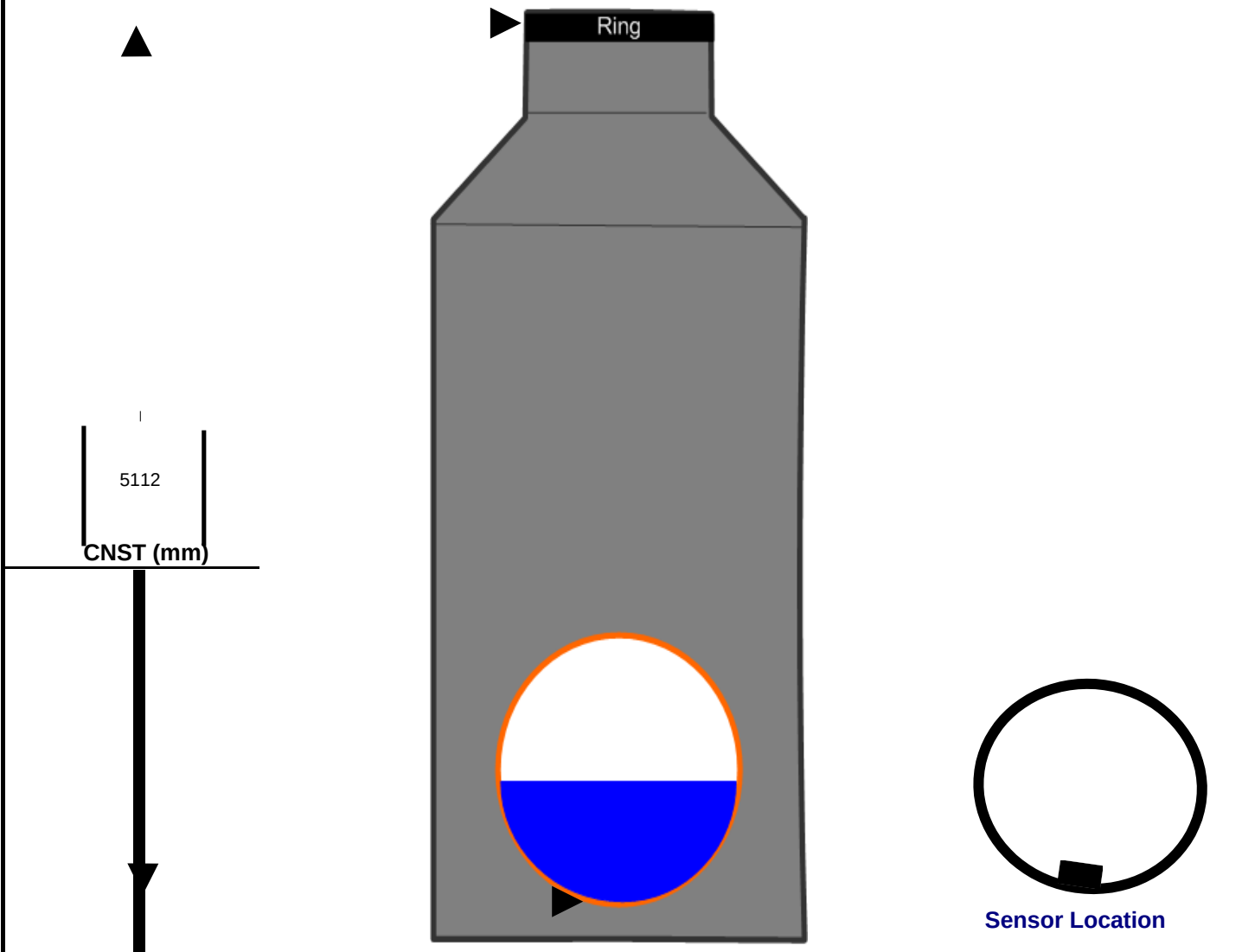
SFE PROJECT #: A15-124
SFE SITE #: A15-124-05
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	29-Apr-16	12:58	126	145	LA
1	29-Apr-16	13:00	126	136	LA
2	29-Apr-16	13:02	124	125	
3	29-Apr-16	13:04	126	127	
Average			125	129	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%





Velocity Profile Sheet



CLIENT FLOW MONITORING #: 5
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-05
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

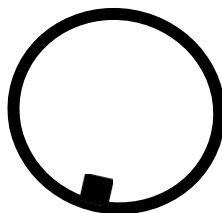
Pipe Diameter (mm):	375	PV Meter	Hach
Raining?	No	AV Meter:	ISCO 2150

2-D Method					
Depth from	Left	Left	Center	Right	Right
Invert (mm)	Corner				Corner
Surface	0.42	0.52	0.54	0.56	0.5
50		0.56	0.59	0.56	
Average all readings		0.53			
0.9 Vmax Method					
If depth is less than 4", use Max measured velocity x 0.9 Use above 2-D method as preferred method when possible					
Max	N/A	Max * 0.9	N/A		

Velocity Profile Summary					
Profile	Meter	Meter	Depth of	Date	Time
Average	Reading	Coeff.	Flow (mm)	(ddmmmyy)	(hh:mm)
m/s	m/s				
0.53	0.58		130	29-Apr-16	13:11

Meter Location and Orientation

Sensor Location



Section View

Comments:

CLIENT FLOW MONITORING #: 6
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-06

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2016
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

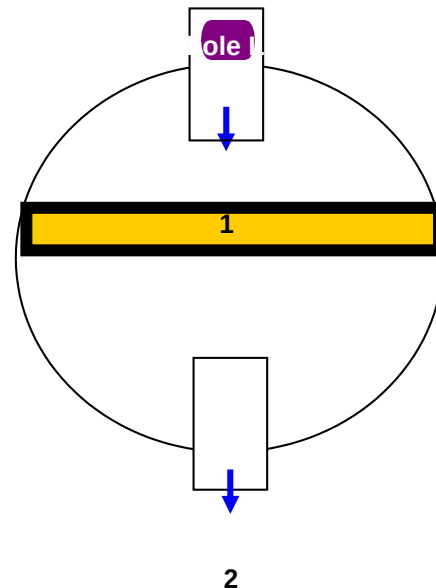
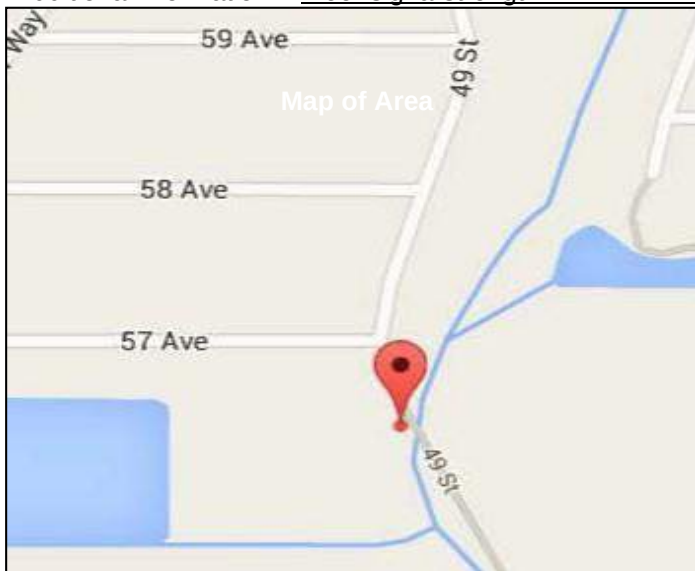
Install / Removal Date: 30-Apr-16 | 11-Oct-16
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2
Wireless I.D # / Cell #: 206M01407 | N/A
Level / Velocity Type: N/A | N/A
Submerged | N/A
Sensor Mounting: Compression
Primary Device: AV and Weir
Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: 6
Address (Location): End of 49 St - Dirt Rd
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4241 W-110.2025

Manhole Depth (mm): 3563 Rungs? Yes
Overall Site Condition: Fair
Pipe Size #1 375 #2 375
(mm): #3 N/A #4 N/A

Landmarks: Middle of dirt road
Traffic Control Req's: N/A
Additional Information: Poor signal strength

Location of Sensor (which pipe?): = 1
Overall Pipe Condition: Fair
Additional Information: Added SFE 250mm Weir



CLIENT FLOW MONITORING #: 6
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-06

Site View



Site View



Meter



Install



Weir Install



Downhole





Weir Install Sheet



CLIENT FLOW MONITORING #: 6
NAME: Cold Lake Flow Monitoring 2016

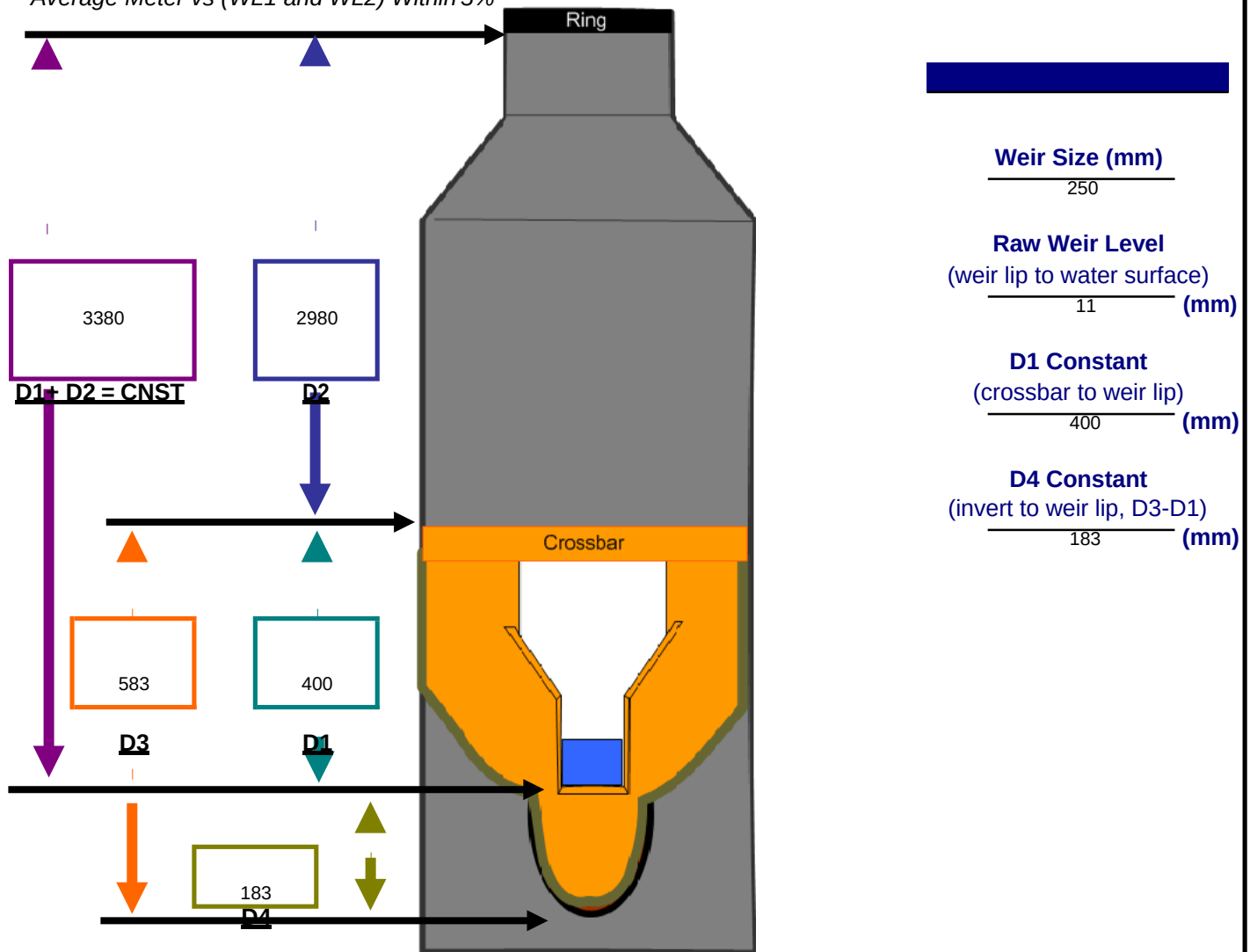
SFE PROJECT #: A15-124
SFE SITE #: A15-124-06
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	30-Apr-16	11:19	10.000	16.000	LA
1	30-Apr-16	11:21	10.000	11.000	
2	30-Apr-16	11:23	11.000	10.000	
3	30-Apr-16	11:25	10.000	10.000	
Average			10.333	10.333	

* Three Continuous Measurements Within 20 mm

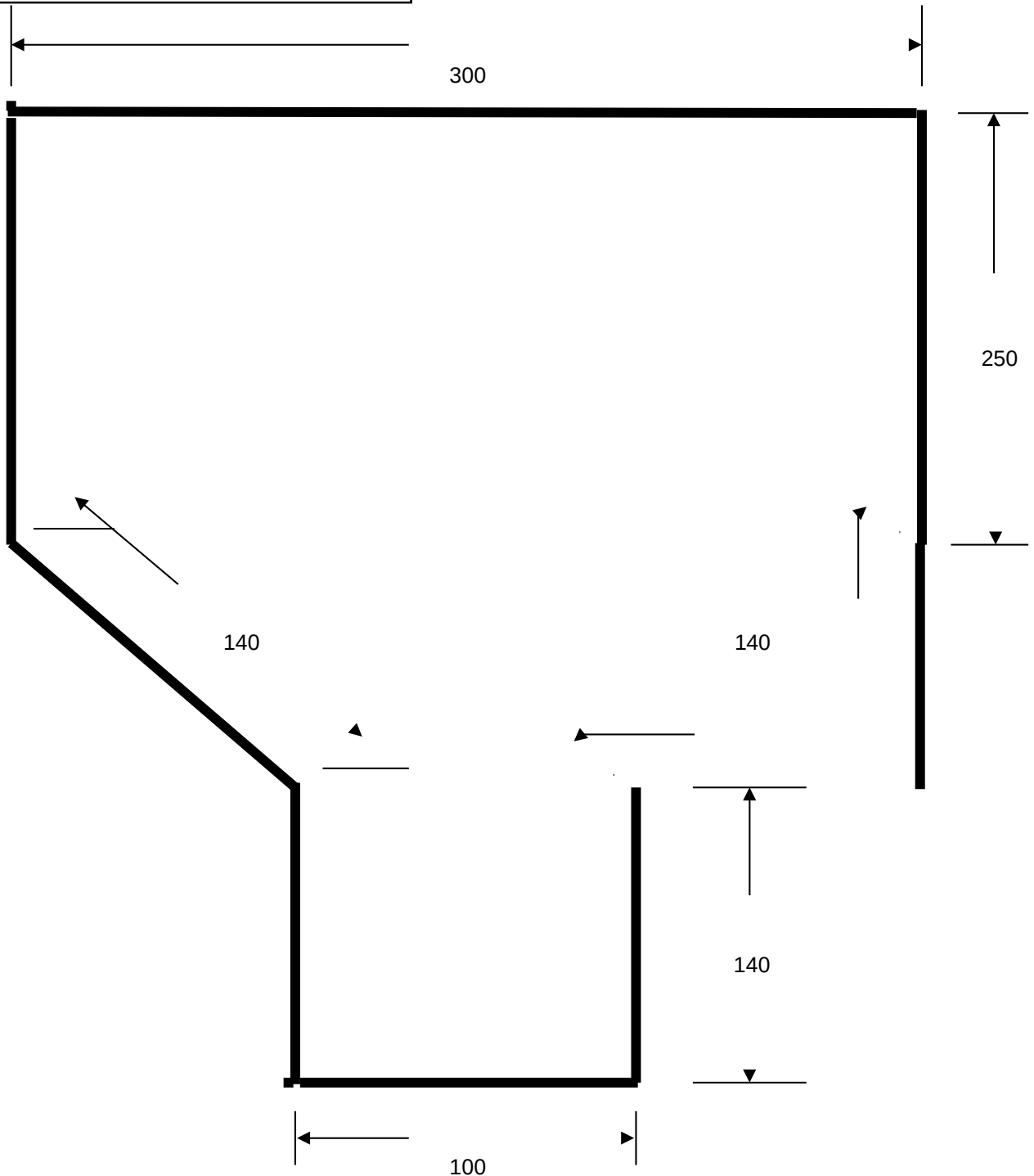
* Average Meter vs (WL1 and WL2) Within 5%



CLIENT FLOW MONITORING #: 6
 NAME: Cold Lake Flow Monitoring 2016
 Date / Time: 30-Apr-16 11:34

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-06
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) 250



CLIENT FLOW MONITORING #: 7A
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-7A

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2016
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

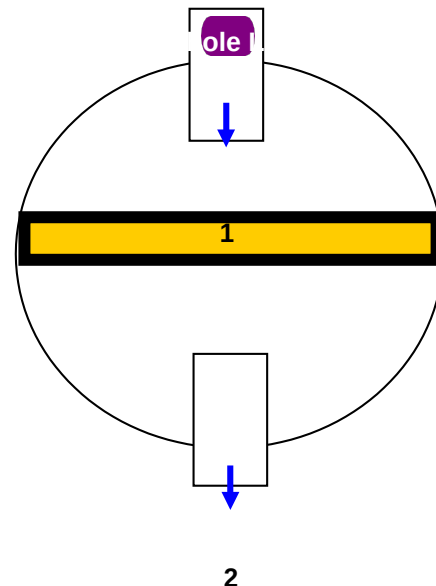
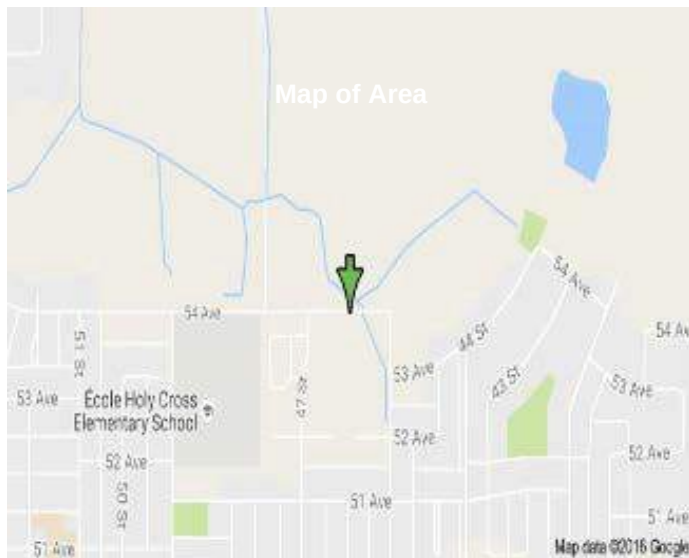
Install / Removal Date: 29-Apr-16 | 11-Oct-16
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2
Wireless I.D # / Cell #: 203C00518 | N/A
Level / VelocityType: N/A | N/A
Submerged | AV Sensor
Sensor Mounting: Scissor Band
Primary Device: Area Velocity
Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: 7A
Address (Location): N/A - Dirt Road
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4177 W-110.1972

Manhole Depth (mm): 4918 Rungs? Yes
Overall Site Condition: Fair
Pipe Size #1 375 #2 375
(mm): #3 N/A #4 N/A

Landmarks: Middle of dirt road
Traffic Control Req's: N/A - Dirt road
Additional Information: 2015 Location

Location of Sensor (which pipe?): = 1
Overall Pipe Condition: Good
Additional Information: Weir installed - 17May16



CLIENT FLOW MONITORING #: 7A
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-7A

Site View



Site View



Meter



Upstream



Install



Downhole



CLIENT FLOW MONITORING #: 7A
 NAME: Cold Lake Flow Monitoring 2016

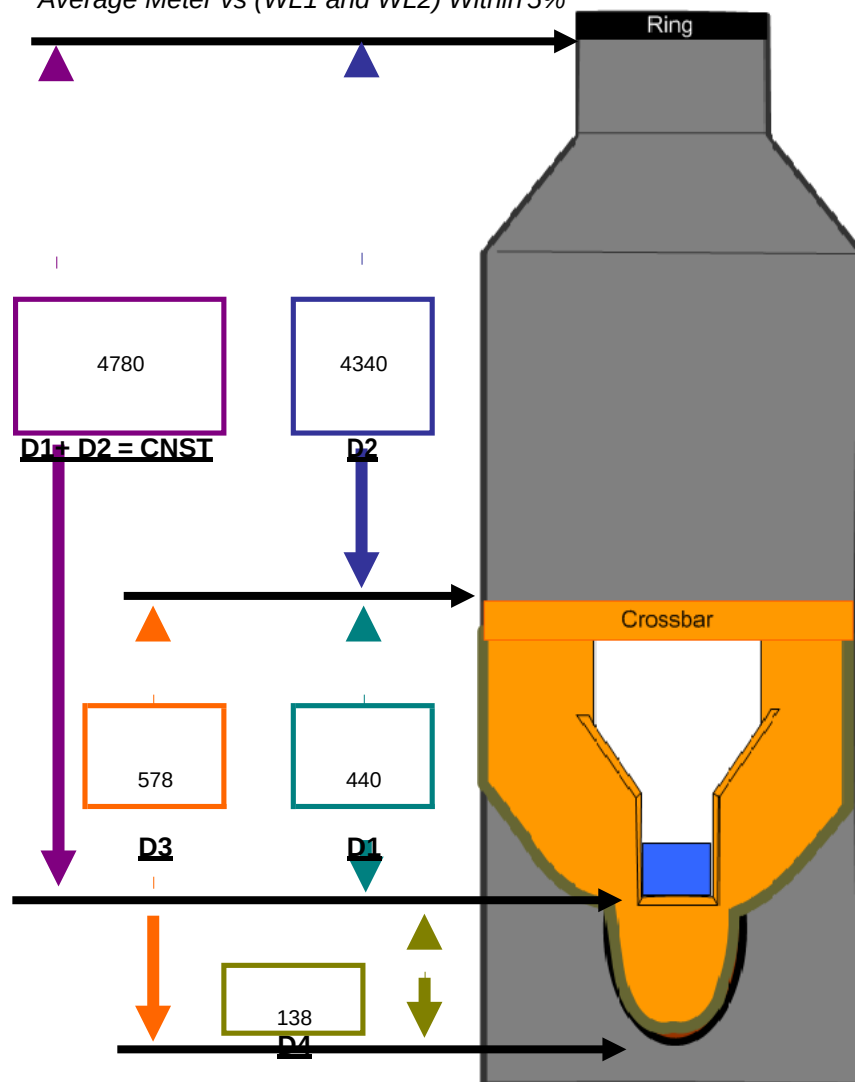
SFE PROJECT #: A15-124
 SFE SITE #: A15-124-7A
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	17-May-16	12:52	48.000	60.000	LA
1	17-May-16	15:53	48.000	49.000	
2	17-May-16	12:55	50.000	50.000	
3	17-May-16	12:57	52.000	52.000	
Average			50.000	50.333	

* Three Continuous Measurements Within 20 mm

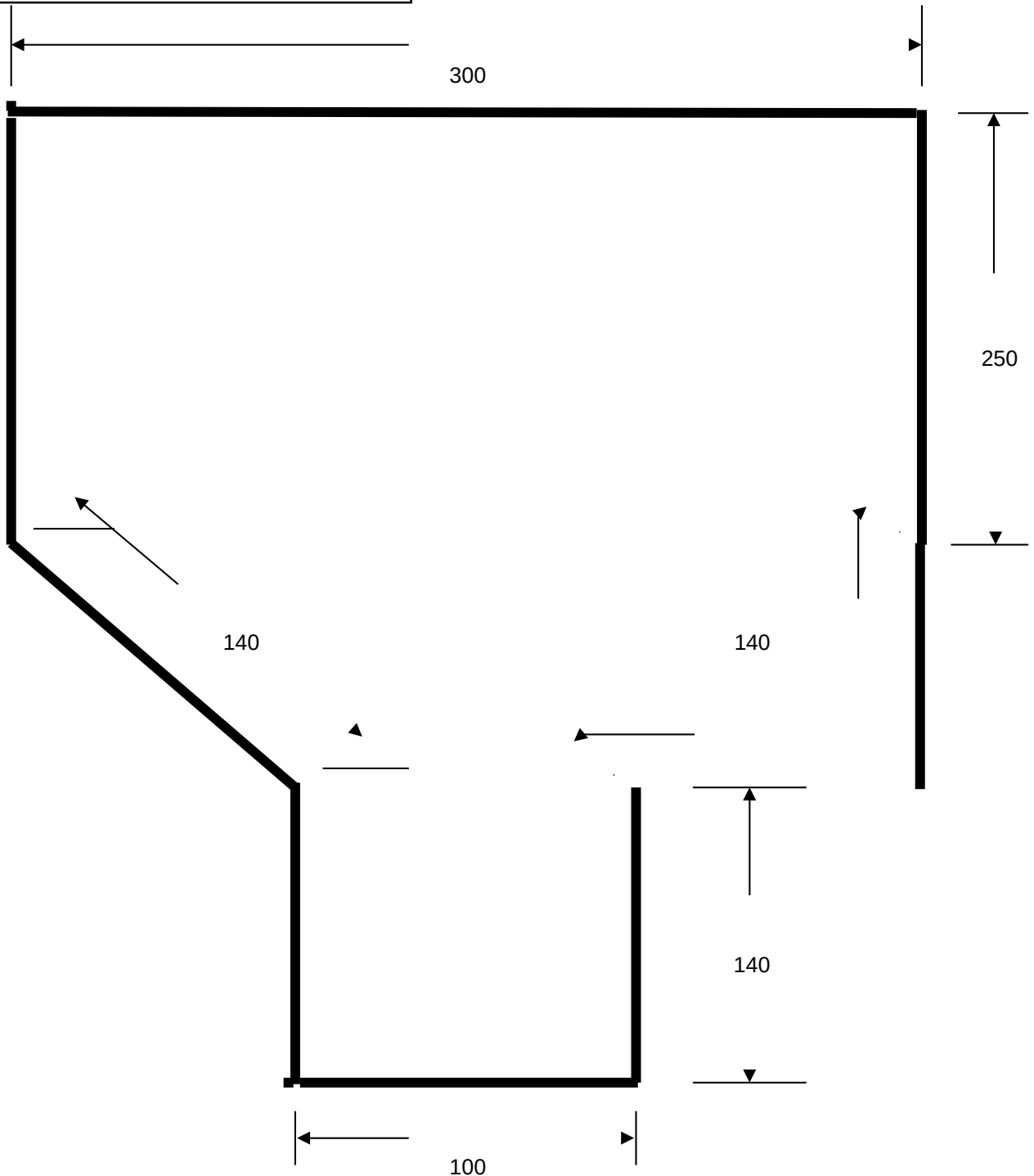
* Average Meter vs (WL1 and WL2) Within 5%



CLIENT FLOW MONITORING #: 7A
 NAME: Cold Lake Flow Monitoring 2016
 Date / Time: 17-May-16 12:59

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-7A
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) 250



CLIENT FLOW MONITORING #: 7B
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-7B

Project Specific Information

Client Name: City of Cold Lake
 End User Name: City of Cold Lake
 Project Name: Flow Monitoring 2016
 Client Contact: Azam Khan 780-594-4494
 Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
 Site Maintenance: Bi-weekly

Site Equipment

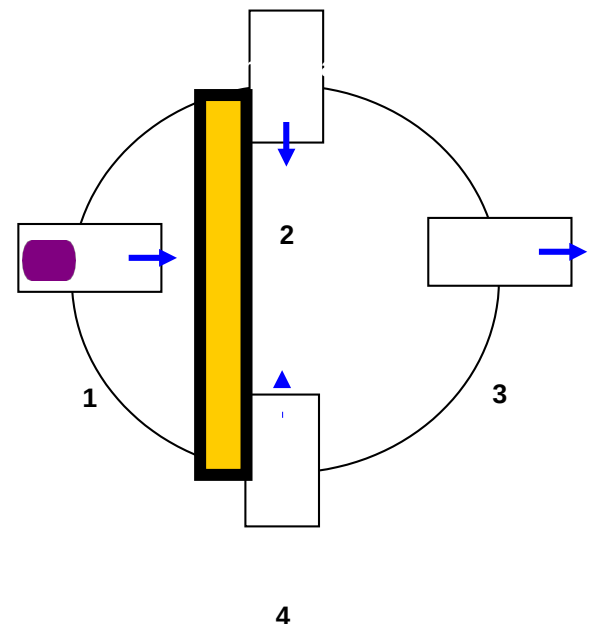
Install / Removal Date: 29-Apr-16 | 11-Oct-16
 Meter Make & Model: ISCO 2150
 Meter I.D. - #1 and #2
 Wireless I.D # / Cell #: 207KA01821 | N/A
 Level / VelocityType: N/A | N/A
Submerged | AV Sensor
 Sensor Mounting: Scissor Band
 Primary Device: Area Velocity
 Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: 7B
 Address (Location): 47 St and Lily St
 City, Province: Cold Lake, AB
 GPS (Lat - Long): N54.4159 W-110.1991

Manhole Depth (mm): 4568 Rungs? Yes
 Overall Site Condition: Fair
 Pipe Size #1 250 #2 225
 (mm): #3 250 #4 200

Landmarks: Near new development area
 Traffic Control Req's: Low
 Additional Information: Middle of intersection

Location of Sensor (which pipe?): = 1
 Overall Pipe Condition: Fair
 Additional Information: Weir Installed - 15Jun16



CLIENT FLOW MONITORING #: 7B
 NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-7B

Site View



Site View



Meter



Upstream



Install



Downhole



CLIENT FLOW MONITORING #: 7B
 NAME: Cold Lake Flow Monitoring 2016

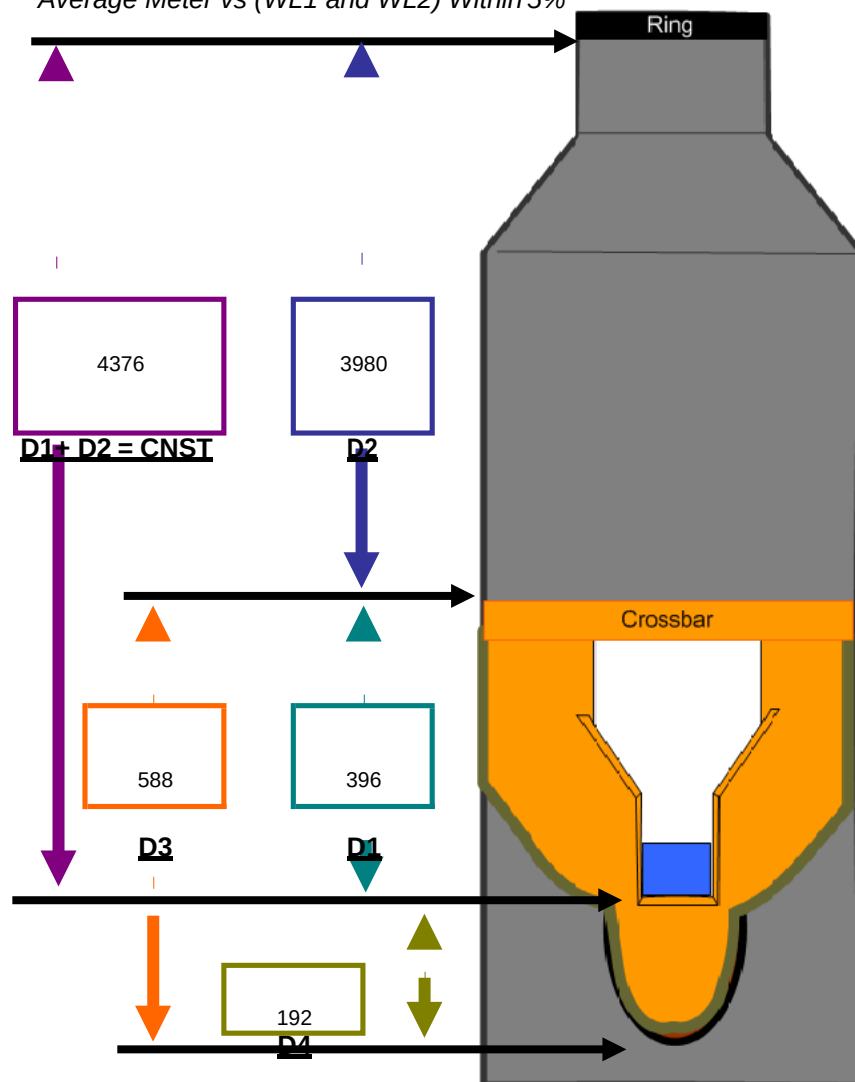
SFE PROJECT #: A15-124
 SFE SITE #: A15-124-7B
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	15-Jun-16	7:17	50.000	188.000	LA
1	15-Jun-16	7:19	52.000	53.000	
2	15-Jun-16	7:21	56.000	57.000	
3	15-Jun-16	7:23	58.000	57.000	
Average			55.333	55.667	

* Three Continuous Measurements Within 20 mm

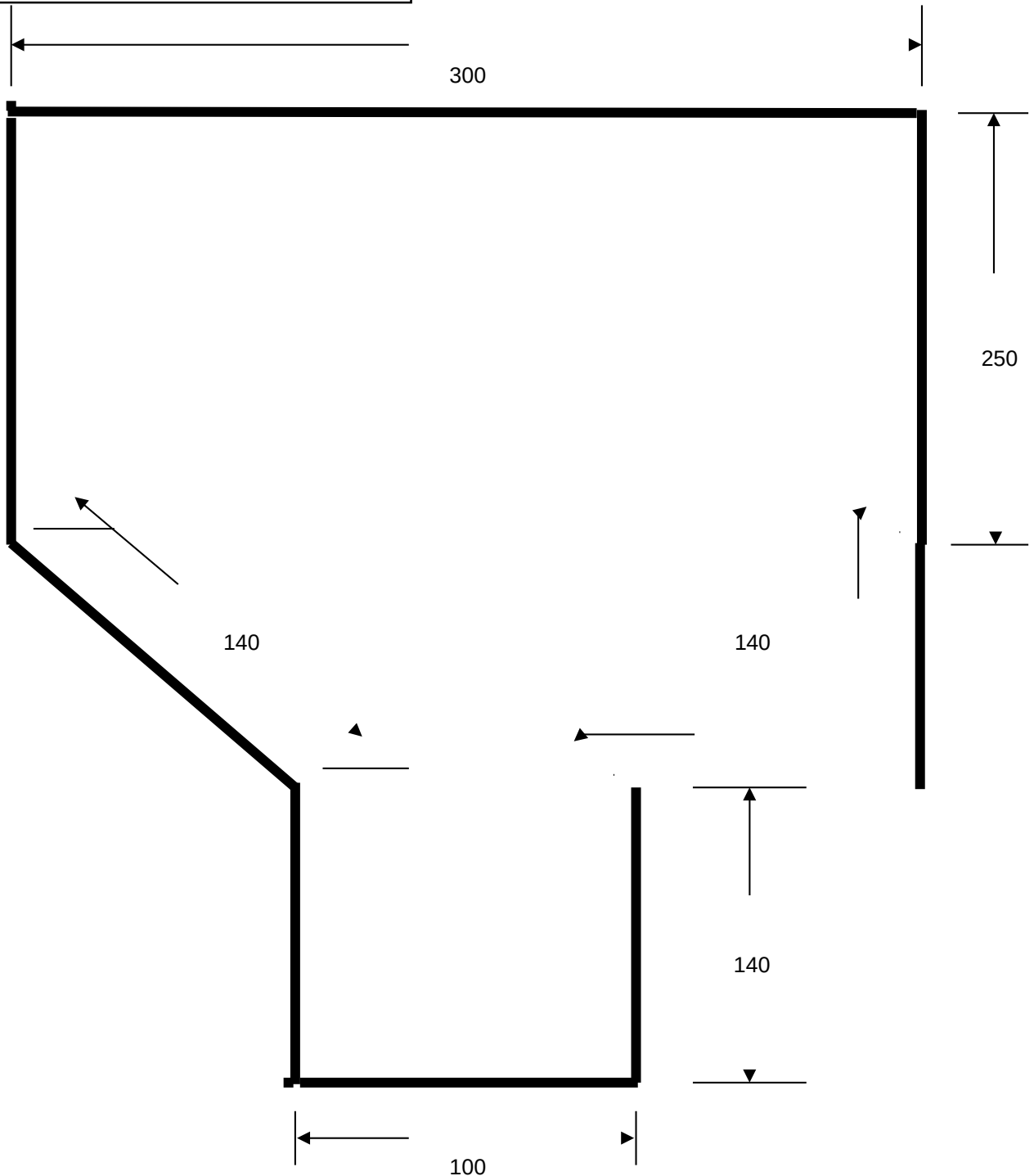
* Average Meter vs (WL1 and WL2) Within 5%



CLIENT FLOW MONITORING #: 7B
 NAME: Cold Lake Flow Monitoring 2016
 Date / Time: 15-Jun-16 7:29

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-7B
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) 250



CLIENT FLOW MONITORING #: 8
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-08

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2016
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494

SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

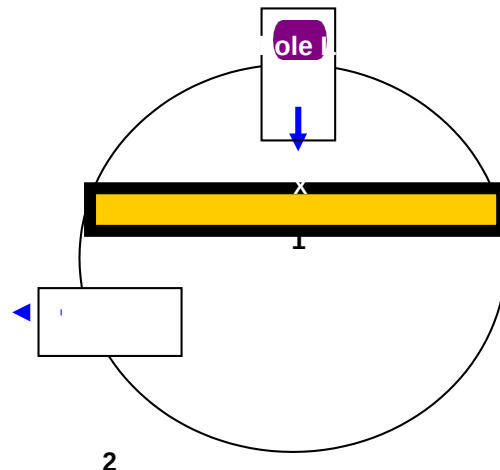
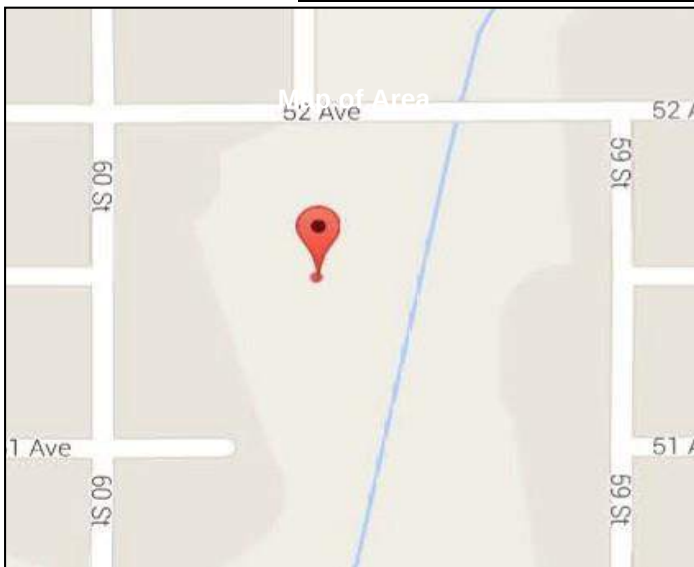
Install / Removal Date: 29-Apr-16 | 11-Oct-16
Meter Make & Model: ISCO 2150
Meter I.D. - #1 and #2
Wireless I.D # / Cell #: 206F01467 | N/A
Level / Velocity Type: 215E02557 | N/A
Submerged | N/A
Sensor Mounting: Compression
Primary Device: AV and Weir
Logging Rate / Call out: 5 minute | Twice Daily

Client Manhole #: 8
Address (Location): Off 52 Ave - In field
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4151 W-110.2264

Manhole Depth (mm): 7380 Rungs? Yes
Overall Site Condition: Fair
Pipe Size #1 200 #2 200
(mm): #3 N/A #4 N/A

Landmarks: In grass area
Traffic Control Reg's: N/A
Additional Information: N/A

Location of Sensor (which pipe?): = 1
Overall Pipe Condition: Fair
Additional Information: 250mm SFE Weir



CLIENT FLOW MONITORING #: 8
NAME: Cold Lake Flow Monitoring 2016

SFE PROJECT #: A15-124
SFE SITE #: A15-124-08

Site View



Site View



Meter



Install



Weir Install



Downhole



CLIENT FLOW MONITORING #: 8
 NAME: Cold Lake Flow Monitoring 2016

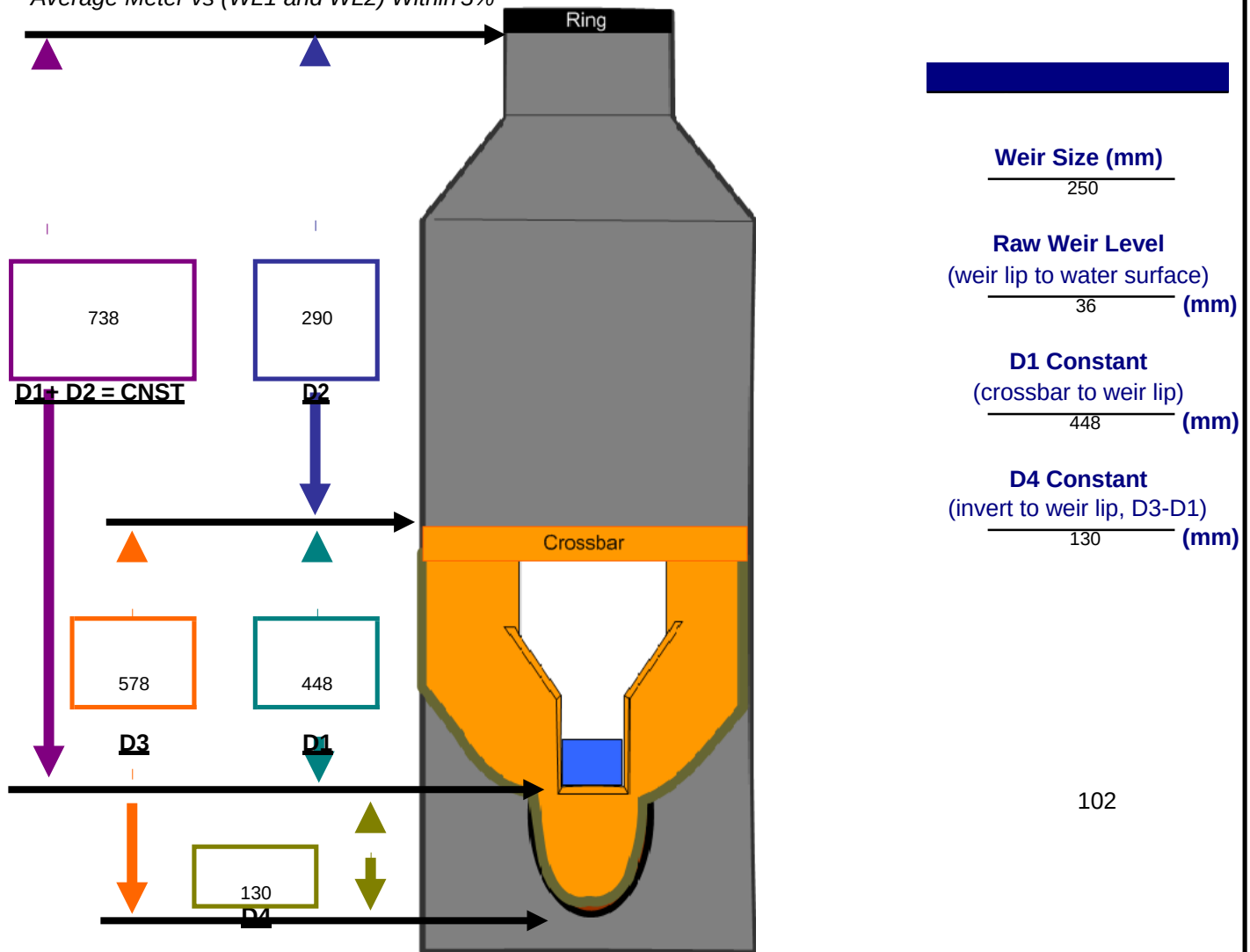
SFE PROJECT #: A15-124
 SFE SITE #: A15-124-08
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	29-Apr-16	19:02	36.000	49.000	LA
1	29-Apr-16	19:04	34.000	35.000	
2	29-Apr-16	19:06	36.000	36.000	
3	29-Apr-16	19:08	34.000	36.000	
Average			34.667	35.667	

* Three Continuous Measurements Within 20 mm

* Average Meter vs (WL1 and WL2) Within 5%

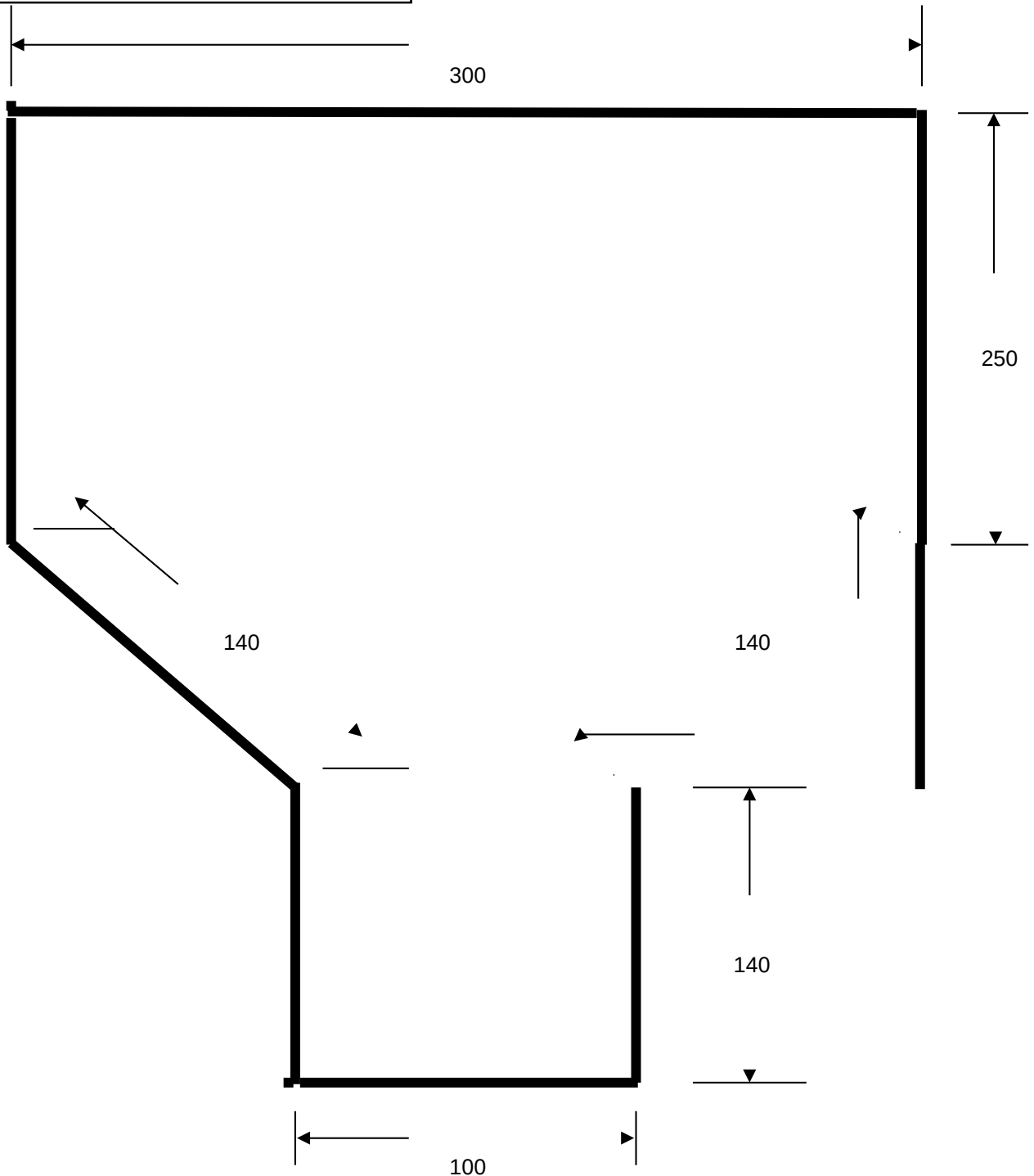


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CLIENT FLOW MONITORING #: 8
 NAME: Cold Lake Flow Monitoring 2016
 Date / Time: 29-Apr-16 19:16

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-08
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) 250



Appendix 3

Maintenance Sheet & Data Summary

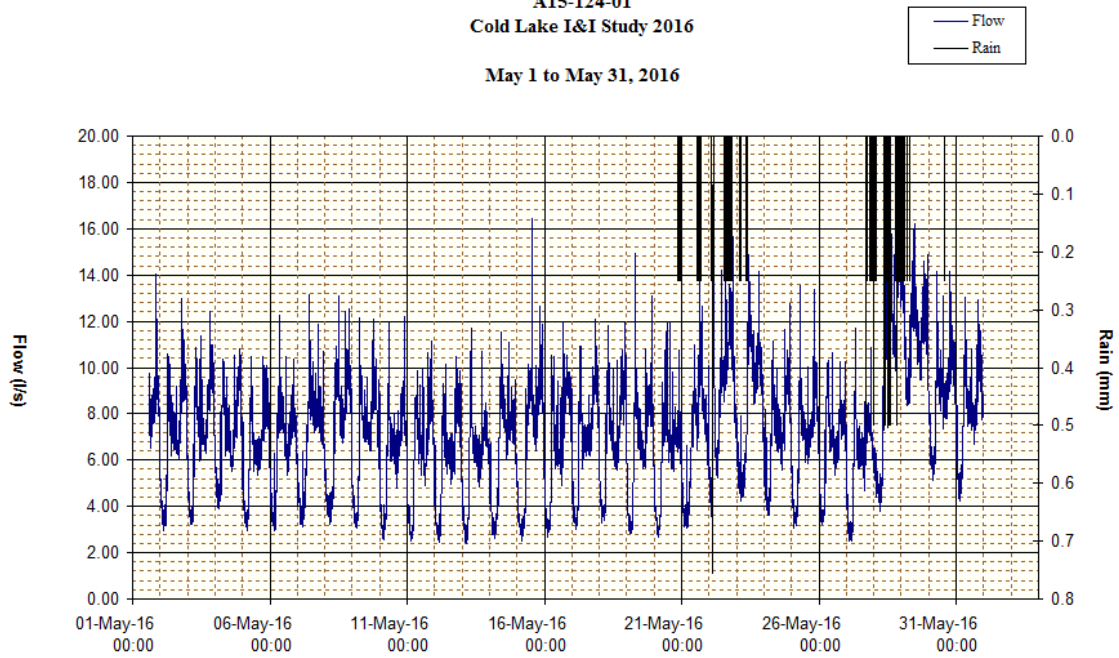


LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

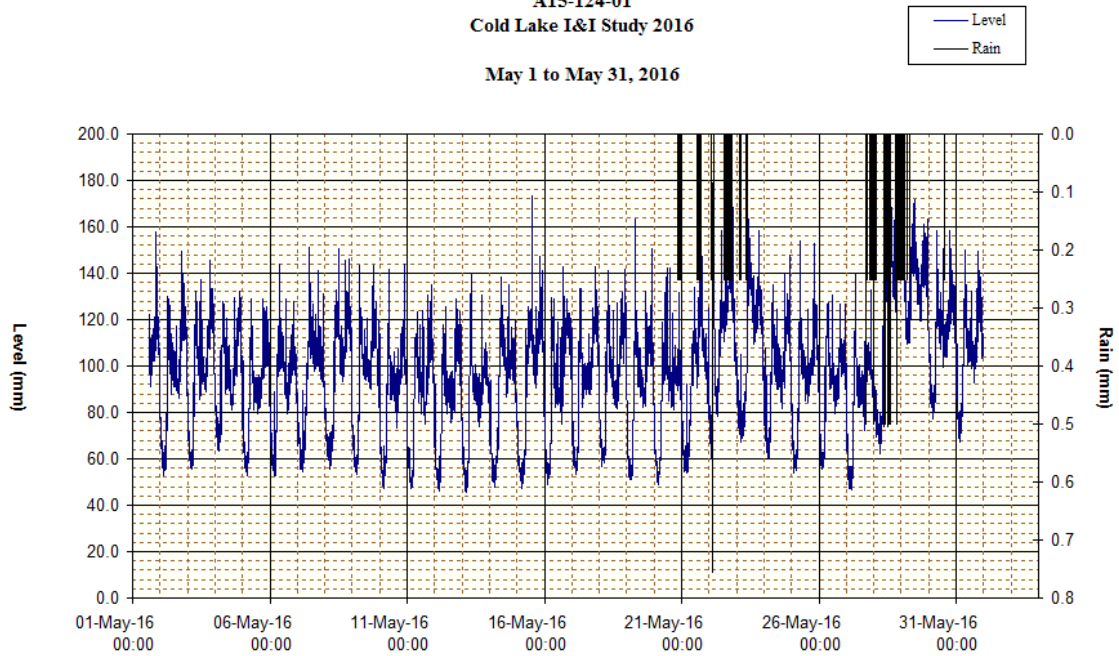
ISL Engineering Ltd.
A15-124-01
Cold Lake I&I Study 2016

May 1 to May 31, 2016



ISL Engineering Ltd.
A15-124-01
Cold Lake I&I Study 2016

May 1 to May 31, 2016



ISL Engineering Ltd.
A15-124-01
Cold Lake I&I Study 2016

May 1 to May 31, 2016

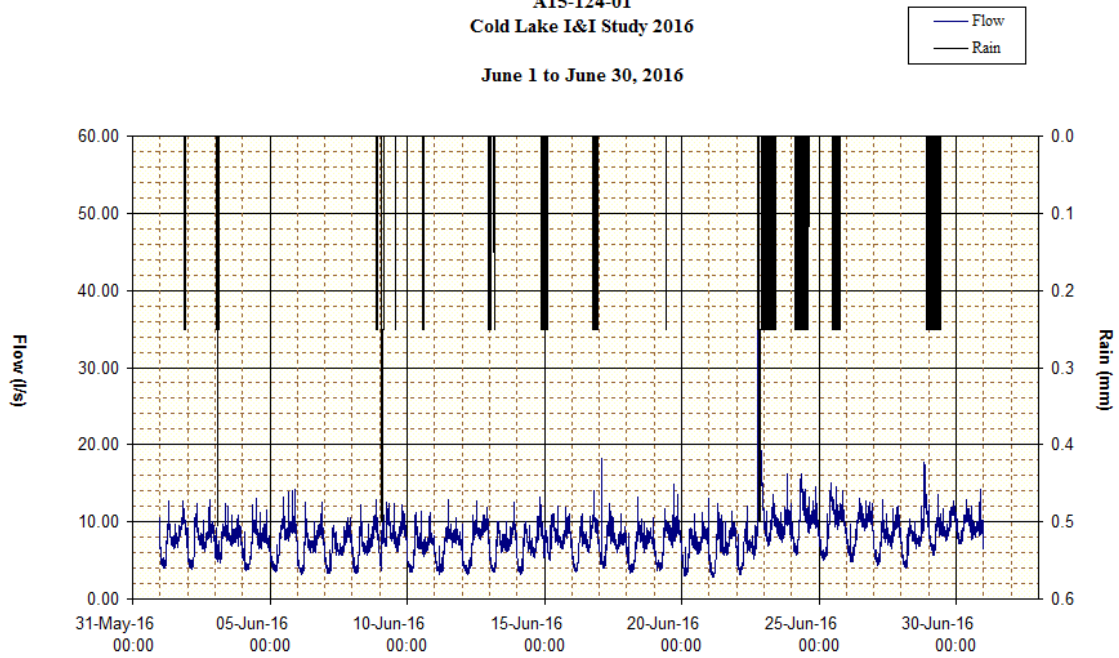
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-May-16	8.41	5.72	13.99	726.73	0.0
02-May-16	7.05	2.98	12.96	609.11	0.0
03-May-16	7.17	3.22	12.45	619.23	0.0
04-May-16	7.06	3.89	10.80	610.08	0.0
05-May-16	6.50	2.97	10.49	562.03	0.0
06-May-16	6.58	2.97	12.23	568.10	0.0
07-May-16	6.82	3.12	13.10	589.40	0.0
08-May-16	7.29	3.23	13.11	629.86	0.0
09-May-16	6.96	3.04	12.13	601.22	0.0
10-May-16	6.28	2.55	12.15	542.43	0.0
11-May-16	6.35	2.52	11.13	548.63	0.0
12-May-16	6.11	2.46	10.47	527.55	0.0
13-May-16	5.88	2.41	11.68	507.87	0.0
14-May-16	6.39	2.60	11.47	552.01	0.0
15-May-16	6.88	2.52	16.37	594.73	0.0
16-May-16	6.61	2.67	11.98	571.18	0.0
17-May-16	6.89	3.03	12.01	595.17	0.0
18-May-16	6.88	3.31	11.93	594.06	0.0
19-May-16	6.55	2.84	14.95	565.73	0.0
20-May-16	6.41	2.66	12.00	553.67	1.5
21-May-16	6.89	3.07	16.91	595.00	3.8
22-May-16	9.04	3.59	15.62	780.63	9.8
23-May-16	8.41	4.23	14.88	726.56	2.0
24-May-16	7.18	3.61	12.73	619.96	0.0
25-May-16	6.88	3.08	13.54	594.08	0.0
26-May-16	6.59	3.22	10.66	569.43	0.0
27-May-16	5.97	2.49	11.71	516.16	4.5
28-May-16	9.98	3.77	17.28	862.31	22.0
29-May-16	11.66	8.36	16.82	1007.45	3.0
30-May-16	8.82	5.14	14.16	761.96	0.5
31-May-16	7.92	4.21	13.04	684.44	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
19386.760	2.410	17.280	47.0

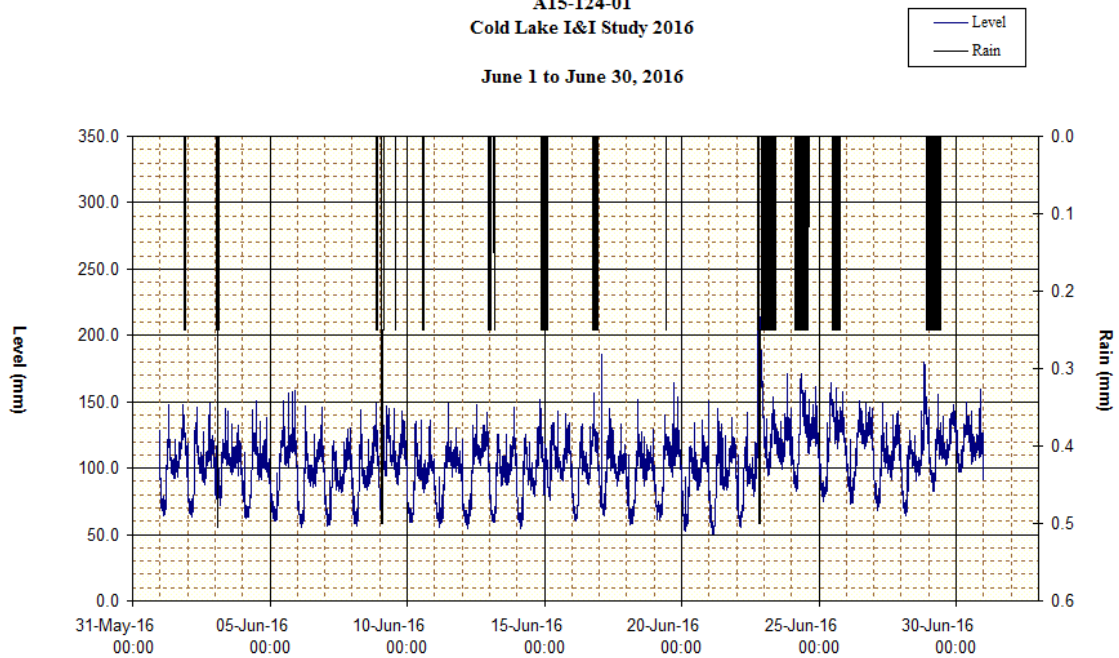
ISL Engineering Ltd.
A15-124-01
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
A15-124-01
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
A15-124-01
Cold Lake I&I Study 2016

June 1 to June 30, 2016

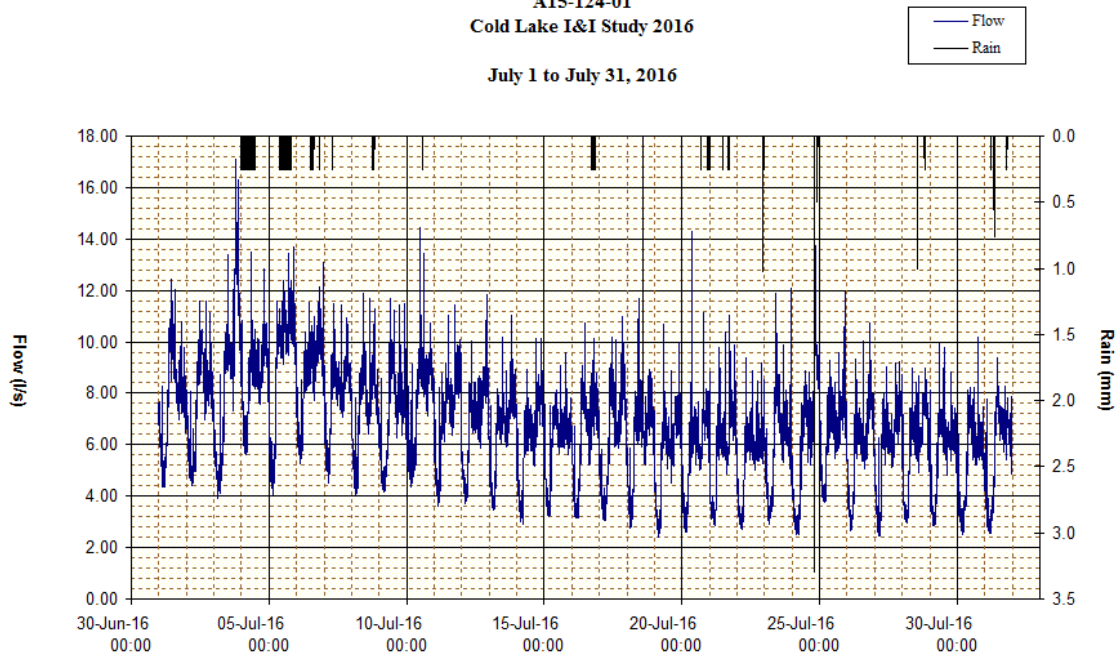
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jun-16	7.72	3.97	12.78	667.02	1.0
02-Jun-16	7.56	3.88	12.83	652.78	0.0
03-Jun-16	7.69	4.69	12.39	664.33	4.0
04-Jun-16	7.07	3.74	13.07	610.64	0.0
05-Jun-16	7.61	3.59	14.13	657.15	0.0
06-Jun-16	6.93	3.19	12.53	598.81	0.0
07-Jun-16	6.68	3.26	10.59	576.92	0.0
08-Jun-16	6.93	3.32	12.87	598.47	2.5
09-Jun-16	8.30	3.64	12.53	716.84	8.5
10-Jun-16	6.68	3.51	11.31	577.49	0.5
11-Jun-16	6.75	3.22	12.79	583.58	0.0
12-Jun-16	7.33	3.11	12.78	633.11	2.0
13-Jun-16	7.04	3.53	12.50	608.08	1.5
14-Jun-16	6.98	3.15	13.18	602.91	2.5
15-Jun-16	7.98	5.00	12.04	689.25	4.3
16-Jun-16	7.46	3.58	13.97	644.92	3.3
17-Jun-16	7.31	3.95	18.11	632.01	0.0
18-Jun-16	6.85	3.41	13.26	591.62	0.0
19-Jun-16	7.34	3.72	14.86	633.90	0.3
20-Jun-16	6.79	2.93	12.99	586.64	0.0
21-Jun-16	6.73	2.77	12.32	581.32	0.0
22-Jun-16	10.30	3.17	56.85	889.56	12.0
23-Jun-16	9.45	6.83	16.16	816.79	14.5
24-Jun-16	10.04	5.67	16.14	867.50	13.8
25-Jun-16	9.38	4.95	15.05	810.29	4.5
26-Jun-16	8.87	4.84	13.05	766.28	0.0
27-Jun-16	7.96	4.33	12.82	687.75	0.0
28-Jun-16	8.20	3.96	17.66	708.08	2.5
29-Jun-16	9.12	5.64	13.61	787.90	8.8
30-Jun-16	9.17	6.43	14.26	791.92	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
20233.851	2.770	56.850	86.3

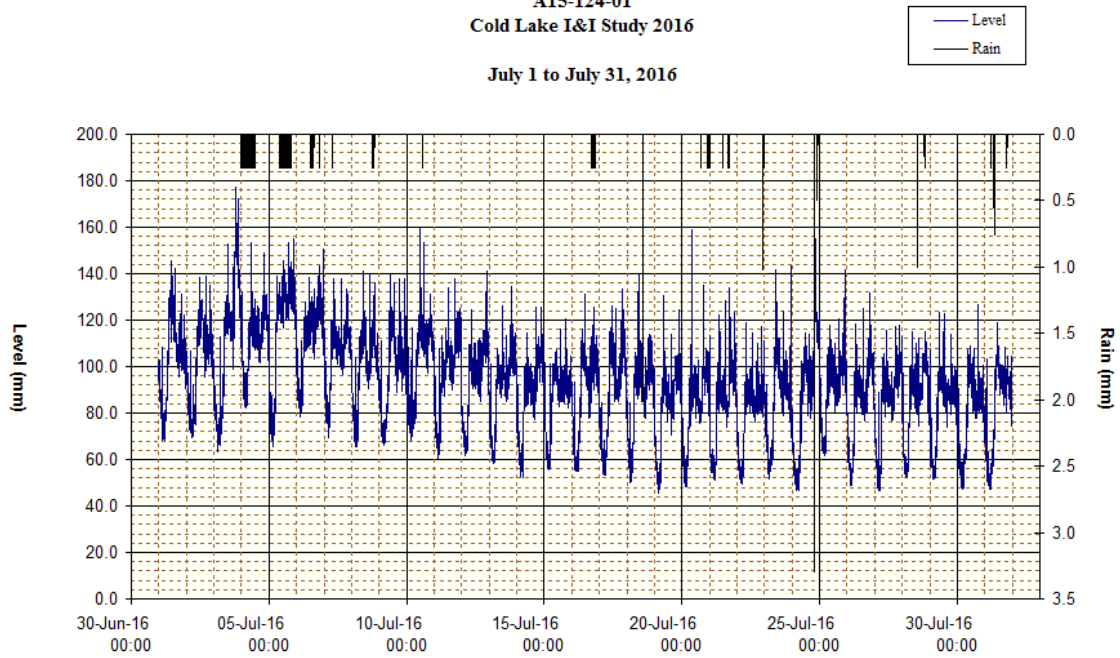
ISL Engineering Ltd.
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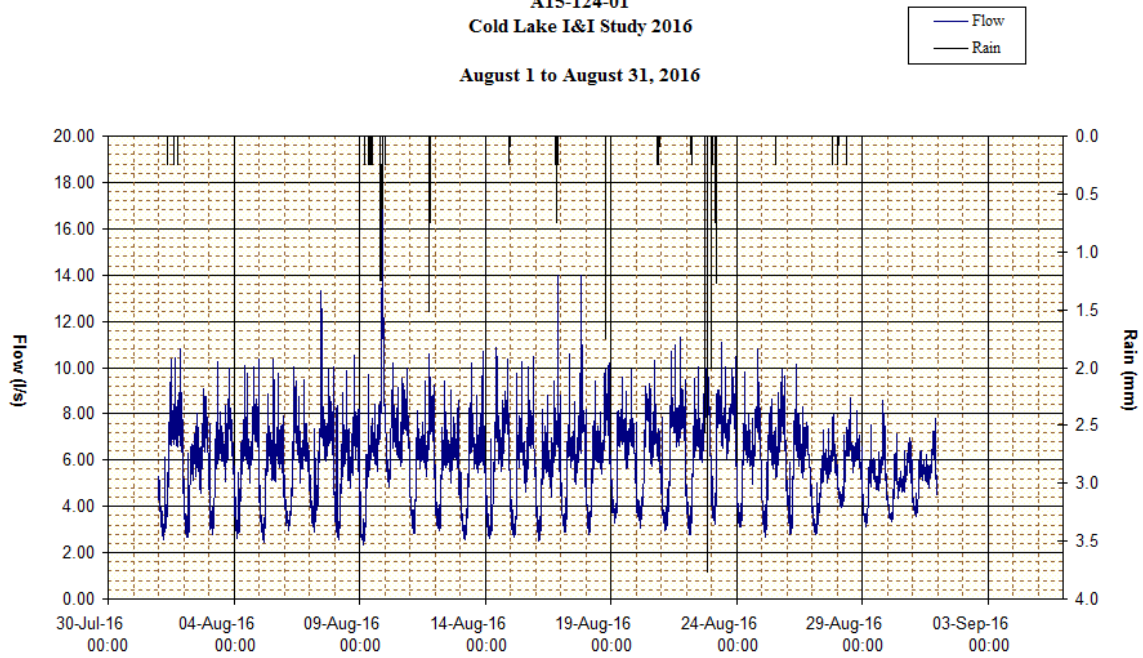
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	7.66	4.34	12.45	661.57	0.0
02-Jul-16	7.58	4.41	11.59	654.74	0.0
03-Jul-16	8.58	3.89	17.12	741.46	0.5
04-Jul-16	8.57	5.63	13.47	740.67	9.0
05-Jul-16	9.17	4.07	13.70	792.54	8.3
06-Jul-16	8.73	5.24	13.11	754.16	2.5
07-Jul-16	7.92	4.50	11.44	684.46	0.3
08-Jul-16	7.43	4.07	11.86	642.26	1.3
09-Jul-16	7.16	4.15	11.68	618.80	0.0
10-Jul-16	7.67	4.34	14.45	662.41	0.3
11-Jul-16	7.16	3.62	11.43	618.38	0.0
12-Jul-16	6.80	3.72	11.85	587.23	0.0
13-Jul-16	6.51	3.46	11.04	562.88	0.0
14-Jul-16	6.23	2.93	10.12	538.55	0.0
15-Jul-16	6.08	3.21	9.58	525.29	0.0
16-Jul-16	6.31	3.16	10.73	545.50	1.8
17-Jul-16	6.35	3.04	10.96	548.28	0.0
18-Jul-16	6.20	2.78	11.67	535.79	2.8
19-Jul-16	5.69	2.43	10.67	491.71	0.0
20-Jul-16	5.77	2.61	14.23	498.95	1.0
21-Jul-16	5.79	2.86	11.02	500.22	1.8
22-Jul-16	5.55	2.72	9.39	479.49	2.5
23-Jul-16	6.02	2.89	12.05	519.70	0.0
24-Jul-16	6.25	2.49	14.74	540.27	11.8
25-Jul-16	6.53	3.74	11.90	564.53	0.0
26-Jul-16	5.89	2.67	10.75	509.17	0.0
27-Jul-16	5.82	2.48	9.20	502.52	0.0
28-Jul-16	5.92	2.94	8.96	511.82	1.3
29-Jul-16	5.64	2.87	9.88	486.90	0.0
30-Jul-16	5.38	2.53	10.15	464.65	0.0
31-Jul-16	5.62	2.54	9.39	485.20	3.3

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
17970.075	2.430	17.120	48.0

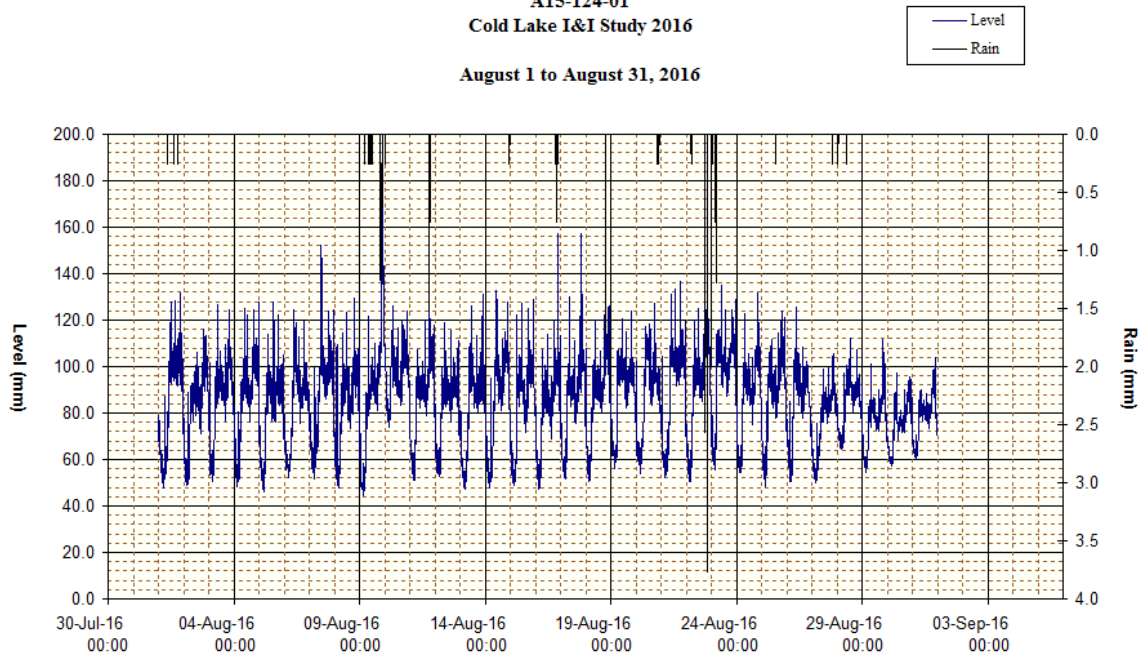
ISL Engineering Ltd.
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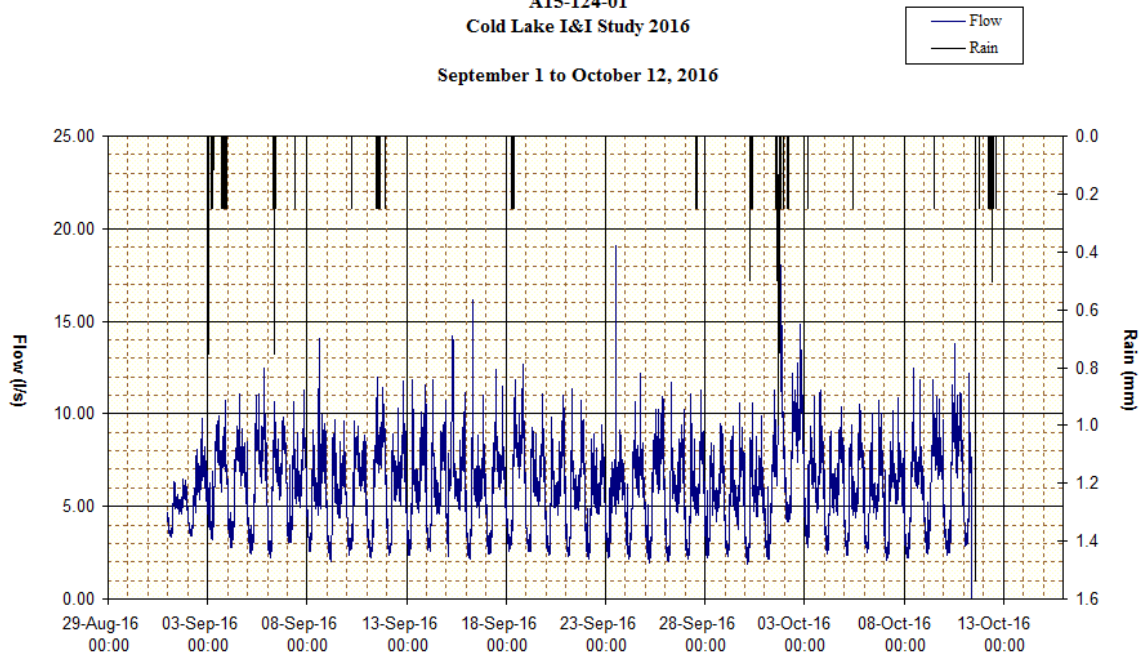
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	6.07	2.57	10.79	524.17	1.3
02-Aug-16	5.70	2.67	9.03	492.70	0.0
03-Aug-16	6.01	2.81	10.26	519.37	0.0
04-Aug-16	5.96	2.61	10.36	514.95	0.0
05-Aug-16	5.62	2.46	10.29	485.94	0.0
06-Aug-16	5.77	2.93	10.01	498.76	0.0
07-Aug-16	6.07	2.89	13.34	524.86	0.0
08-Aug-16	5.79	2.59	10.54	499.99	0.0
09-Aug-16	6.52	2.33	17.46	563.27	17.8
10-Aug-16	7.08	4.85	10.14	611.72	0.3
11-Aug-16	6.11	2.83	10.57	528.06	3.3
12-Aug-16	5.73	2.98	9.41	494.99	0.0
13-Aug-16	5.56	2.56	10.65	480.02	0.0
14-Aug-16	5.88	2.61	10.75	508.02	0.3
15-Aug-16	5.77	2.68	10.50	498.65	0.0
16-Aug-16	5.67	2.53	13.99	489.64	1.3
17-Aug-16	5.97	2.88	13.99	516.05	0.0
18-Aug-16	6.15	2.80	10.08	531.30	5.3
19-Aug-16	6.21	3.28	9.88	536.70	0.0
20-Aug-16	6.10	3.05	10.25	526.91	0.8
21-Aug-16	6.35	2.94	11.29	548.90	0.0
22-Aug-16	6.45	2.79	10.73	557.09	10.5
23-Aug-16	6.98	3.21	11.11	603.03	7.3
24-Aug-16	6.18	3.12	10.79	533.64	0.0
25-Aug-16	6.12	2.65	9.92	528.95	0.3
26-Aug-16	5.81	2.79	10.13	501.89	0.0
27-Aug-16	5.07	2.78	7.99	438.09	0.3
28-Aug-16	5.80	3.98	8.69	500.76	1.0
29-Aug-16	5.11	3.10	8.54	441.72	0.0
30-Aug-16	4.99	3.34	7.12	431.47	0.0
31-Aug-16	5.26	3.57	7.82	454.59	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
15886.173	2.330	17.460	49.3

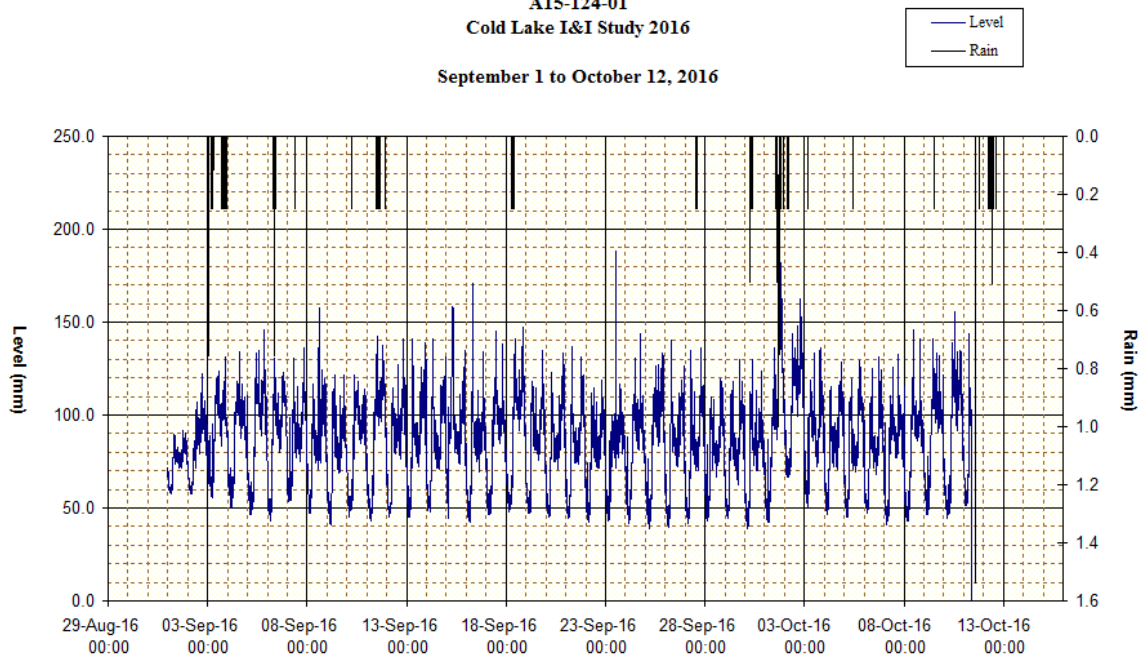
ISL Engineering Ltd.
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September 1 to October 12, 2016



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September 1 to October 12, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-16	4.94	3.37	6.49	426.94	0.0
02-Sep-16	5.73	3.38	9.78	495.47	0.0
03-Sep-16	6.59	3.23	10.71	569.12	10.5
04-Sep-16	6.14	2.76	11.05	530.54	0.0
05-Sep-16	6.40	2.47	12.49	553.17	0.0
06-Sep-16	6.38	2.22	10.64	551.46	5.8
07-Sep-16	6.07	3.06	11.18	524.50	0.3
08-Sep-16	6.12	2.56	14.01	528.44	0.0
09-Sep-16	5.40	2.05	9.67	466.49	0.0
10-Sep-16	5.82	2.36	9.61	502.91	0.3
11-Sep-16	6.34	2.22	12.01	548.06	2.0
12-Sep-16	5.96	2.40	11.80	514.89	0.0
13-Sep-16	5.94	2.38	11.84	513.15	0.0
14-Sep-16	5.89	2.59	11.84	508.46	0.0
15-Sep-16	6.69	2.33	14.18	578.17	0.0
16-Sep-16	5.69	2.16	16.13	491.75	0.0
17-Sep-16	6.01	2.47	12.40	519.28	0.0
18-Sep-16	6.67	2.59	12.66	576.29	3.0
19-Sep-16	5.97	2.55	11.07	515.63	0.0
20-Sep-16	5.72	2.37	10.98	494.53	0.0
21-Sep-16	5.74	2.33	11.33	495.97	0.0
22-Sep-16	5.43	2.18	9.39	469.29	0.0
23-Sep-16	5.49	2.21	19.00	474.08	0.0
24-Sep-16	5.69	2.13	12.17	492.01	0.0
25-Sep-16	5.94	1.93	10.94	513.13	0.0
26-Sep-16	5.61	1.99	11.73	484.40	0.0
27-Sep-16	5.61	2.14	11.29	484.95	0.8
28-Sep-16	5.45	2.25	9.46	471.26	0.0
29-Sep-16	5.46	2.31	10.57	471.50	0.0
30-Sep-16	5.25	1.91	10.59	453.35	3.3
01-Oct-16	7.60	2.16	21.10	656.51	17.3
02-Oct-16	8.01	4.18	14.82	691.74	0.5
03-Oct-16	6.39	2.78	11.25	551.70	0.3
04-Oct-16	5.92	2.47	10.40	511.25	0.0
05-Oct-16	5.80	2.40	10.52	501.07	0.3
06-Oct-16	5.52	2.54	10.73	477.00	0.0
07-Oct-16	5.61	2.06	10.84	485.06	0.0
08-Oct-16	5.85	2.20	12.47	505.63	0.0
09-Oct-16	6.37	2.46	11.87	550.23	0.3
10-Oct-16	6.60	2.35	13.79	570.32	0.0

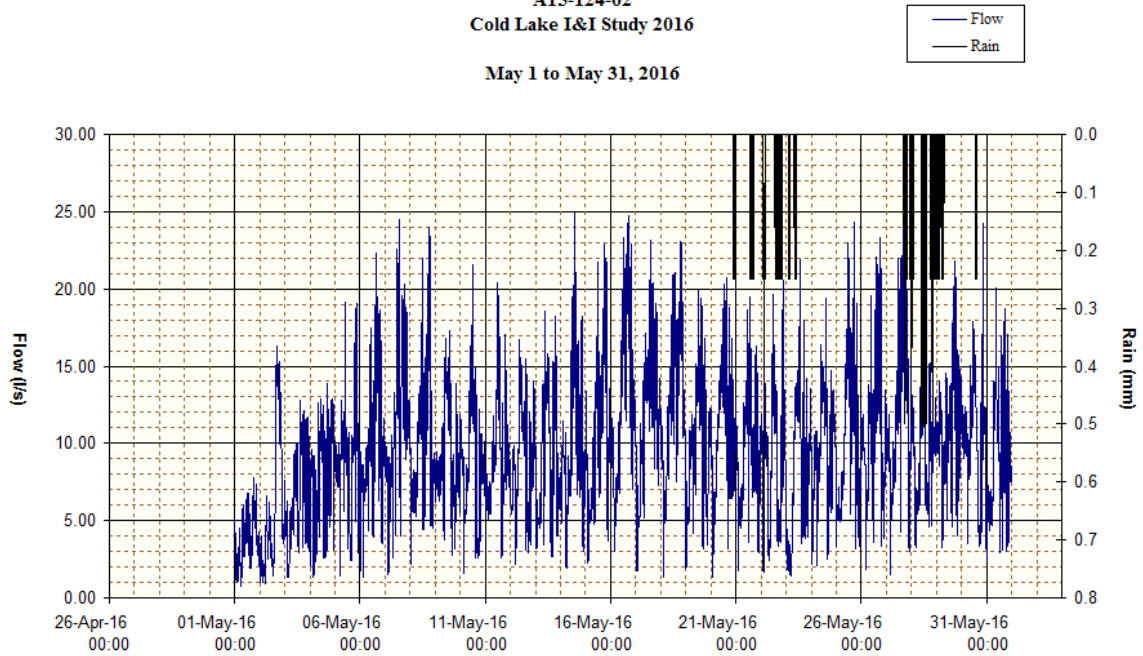
11-Oct-16	2.09	0.00	12.19	180.94	3.0
12-Oct-16	0.00	0.00	0.00	0.00	2.3

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
20900.637	0.000	21.100	49.5

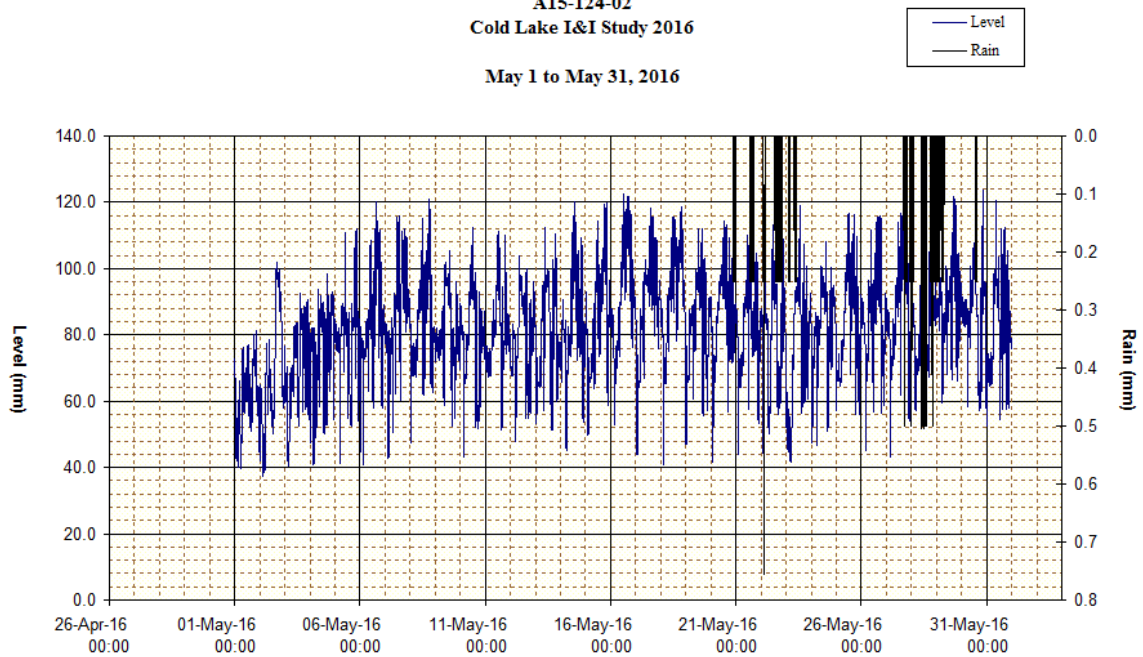
ISL Engineering Ltd.
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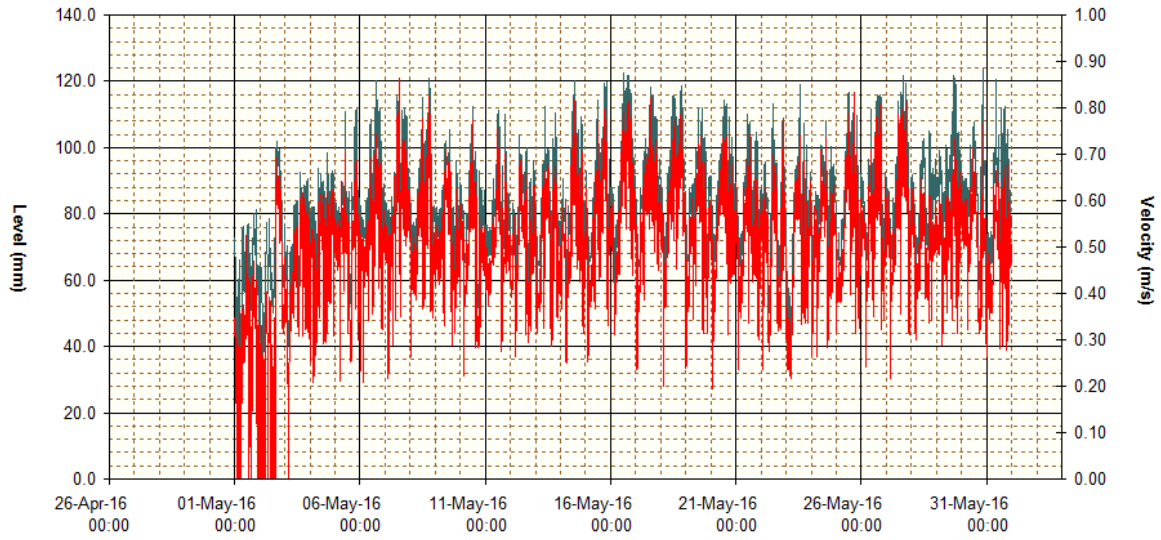
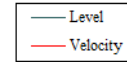
ISL Engineering Ltd.
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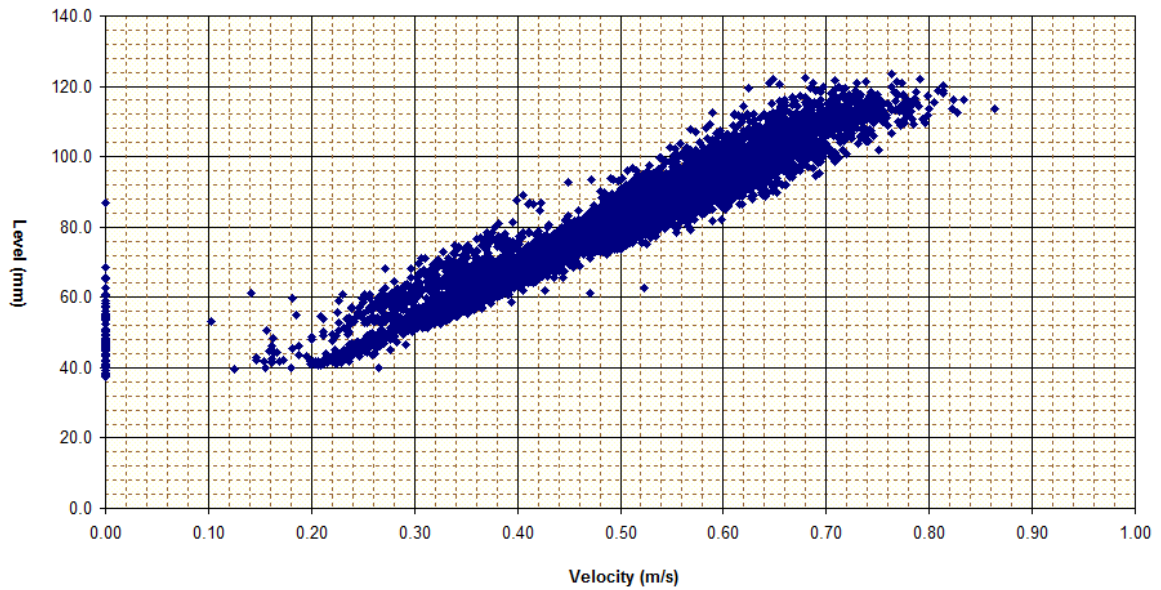
ISL Engineering Ltd.
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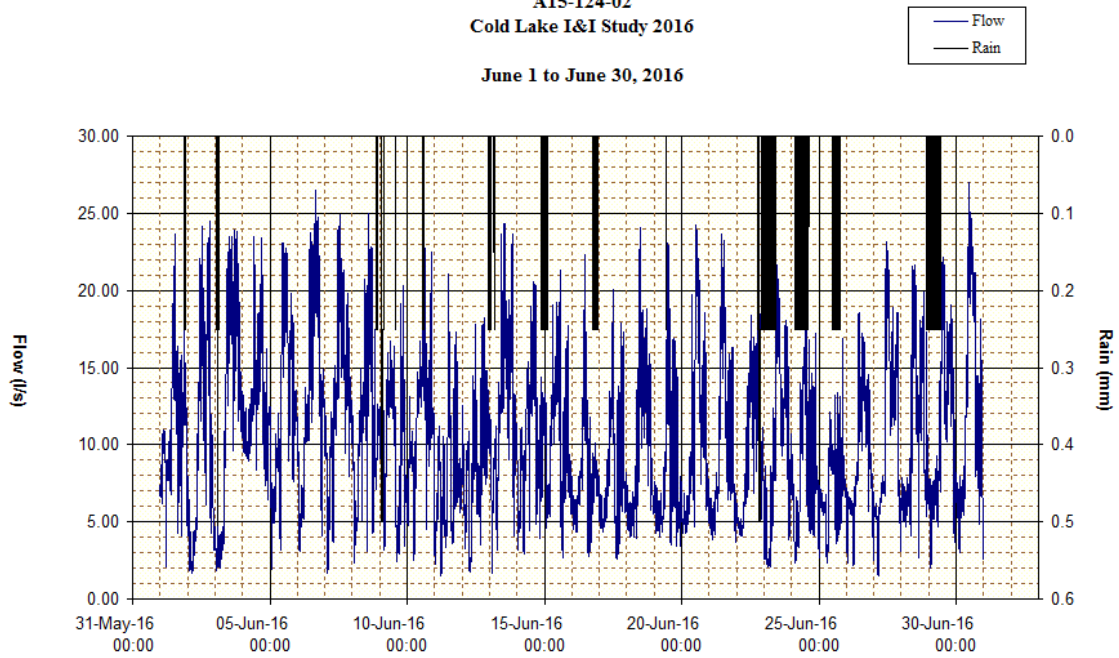
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-May-16	3.91	0.78	7.80	337.82	0.0
02-May-16	5.85	0.95	16.30	505.51	0.0
03-May-16	6.57	1.30	12.79	567.40	0.0
04-May-16	7.59	1.34	13.67	655.35	0.0
05-May-16	8.73	1.42	19.14	754.04	0.0
06-May-16	10.28	1.37	22.19	887.79	0.0
07-May-16	11.23	1.52	24.37	970.26	0.0
08-May-16	10.29	2.17	23.98	888.72	0.0
09-May-16	9.00	2.72	17.21	777.90	0.0
10-May-16	8.42	1.58	21.59	727.71	0.0
11-May-16	8.70	2.57	20.37	751.48	0.0
12-May-16	8.53	2.18	16.71	737.36	0.0
13-May-16	8.74	2.64	18.53	755.14	0.0
14-May-16	10.03	1.93	24.86	866.78	0.0
15-May-16	11.35	2.22	22.84	980.86	0.0
16-May-16	13.03	3.03	24.63	1125.43	0.0
17-May-16	11.88	1.72	23.18	1026.30	0.0
18-May-16	12.70	1.33	23.03	1097.15	0.0
19-May-16	9.52	1.91	20.01	822.76	0.0
20-May-16	10.78	1.38	20.76	931.11	1.5
21-May-16	9.15	1.72	19.44	790.99	3.8
22-May-16	8.56	1.73	20.59	739.88	9.8
23-May-16	8.16	1.45	21.80	705.02	2.0
24-May-16	9.36	2.12	19.37	808.92	0.0
25-May-16	10.57	3.33	24.34	913.61	0.0
26-May-16	10.91	1.81	23.23	942.45	0.0
27-May-16	11.57	1.53	24.49	1000.04	4.5
28-May-16	9.24	3.24	15.21	798.44	22.0
29-May-16	10.61	3.23	21.70	917.11	3.0
30-May-16	10.30	2.53	24.17	889.71	0.5
31-May-16	9.05	2.93	20.07	782.10	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
25455.149	0.783	24.860	47.0

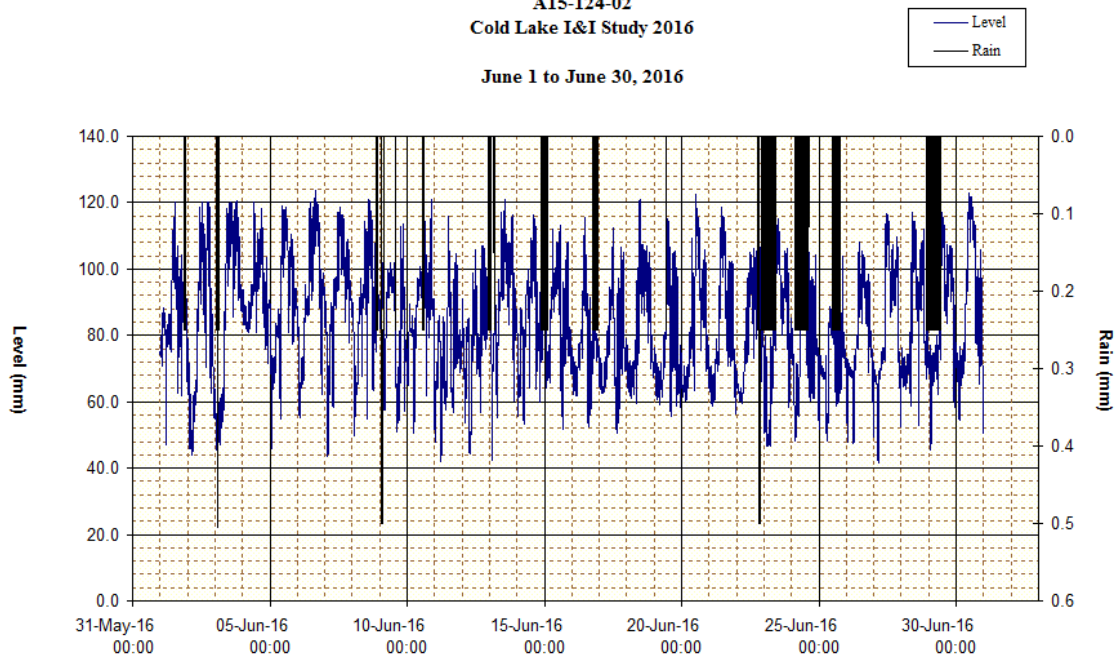
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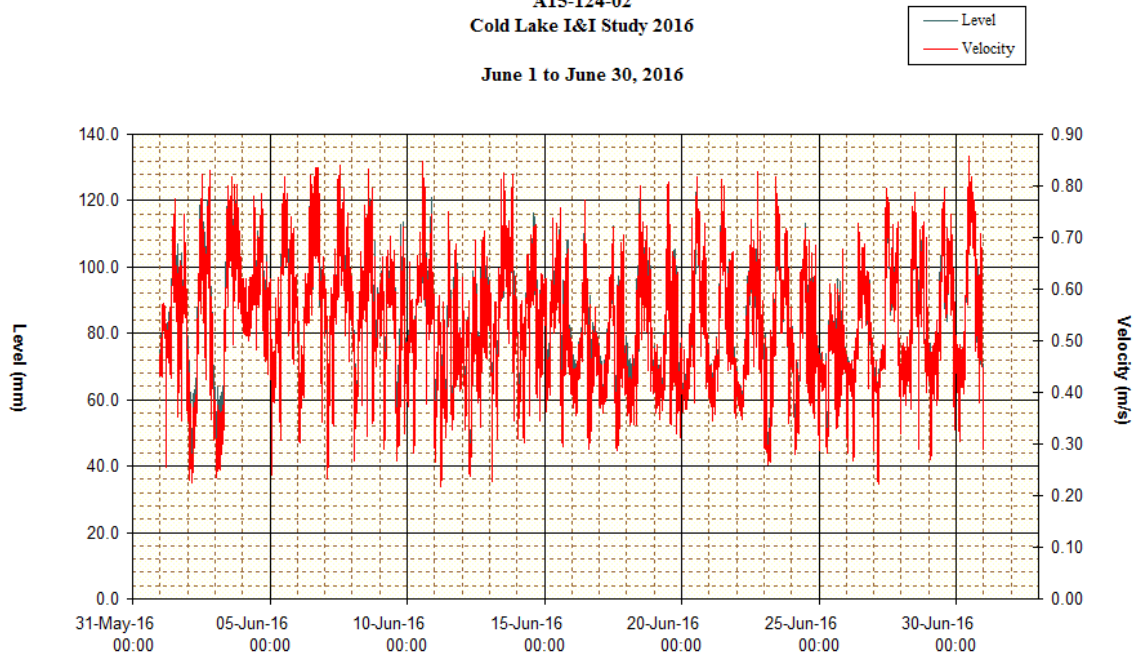
ISL Engineering Ltd.
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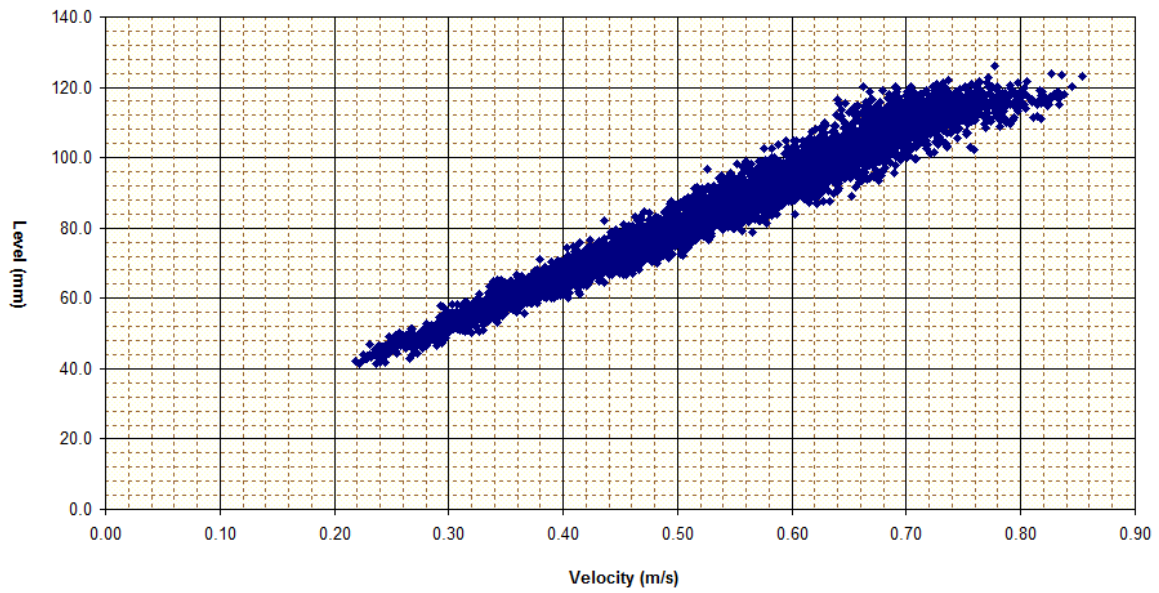
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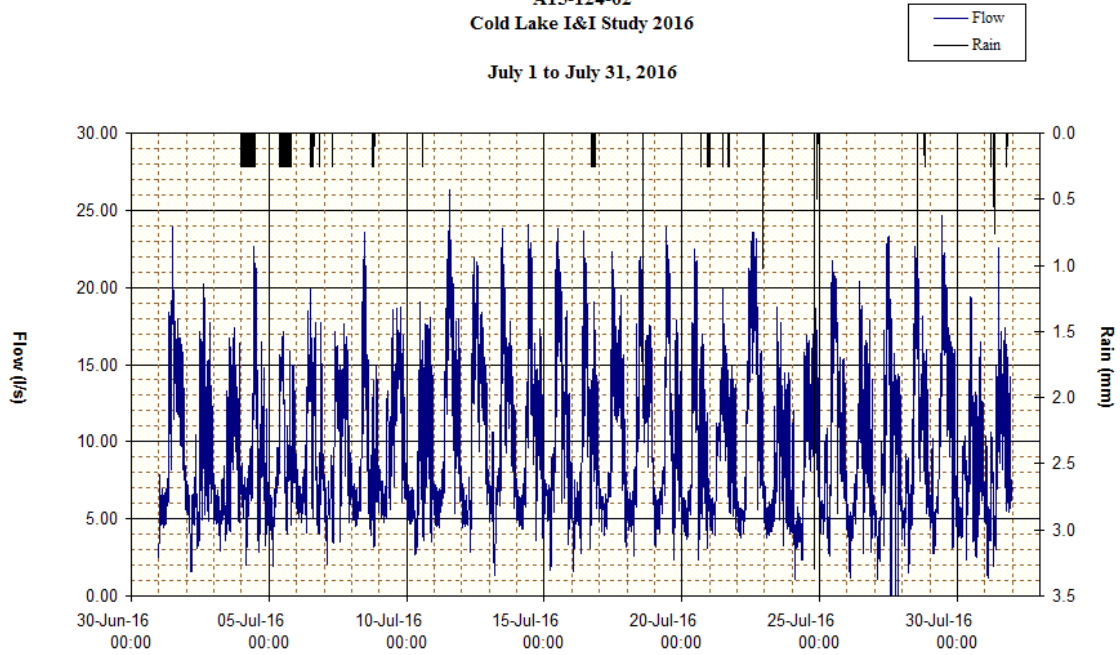
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Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-16	10.60	2.12	23.67	915.53	1.0
02-Jun-16	10.13	1.63	24.49	875.09	0.0
03-Jun-16	11.92	1.80	23.84	1030.12	4.0
04-Jun-16	12.98	6.47	23.52	1121.74	0.0
05-Jun-16	12.34	1.89	23.04	1066.16	0.0
06-Jun-16	13.52	3.12	26.49	1168.04	0.0
07-Jun-16	12.99	1.67	24.92	1122.68	0.0
08-Jun-16	11.56	2.33	25.01	998.54	2.5
09-Jun-16	10.00	2.43	20.33	863.74	8.5
10-Jun-16	12.02	2.51	25.79	1038.12	0.5
11-Jun-16	7.36	1.49	21.02	635.58	0.0
12-Jun-16	8.85	1.77	18.12	764.99	2.0
13-Jun-16	12.75	1.64	24.34	1101.50	1.5
14-Jun-16	10.15	2.90	20.49	877.36	2.5
15-Jun-16	10.15	2.70	21.20	877.34	4.3
16-Jun-16	7.73	2.74	22.15	668.09	3.3
17-Jun-16	8.15	2.58	20.08	703.90	0.0
18-Jun-16	10.03	3.93	24.06	866.48	0.0
19-Jun-16	8.15	3.47	23.09	704.16	0.3
20-Jun-16	10.71	4.22	24.22	924.93	0.0
21-Jun-16	10.10	3.64	23.54	872.65	0.0
22-Jun-16	9.29	3.61	26.32	802.95	12.0
23-Jun-16	9.96	2.08	22.44	860.44	14.5
24-Jun-16	9.02	2.35	20.14	779.43	13.8
25-Jun-16	7.01	2.35	16.84	605.38	4.5
26-Jun-16	9.11	2.16	18.55	787.28	0.0
27-Jun-16	10.62	1.48	23.15	917.32	0.0
28-Jun-16	10.81	2.83	21.62	933.72	2.5
29-Jun-16	11.11	2.04	22.12	959.76	8.8
30-Jun-16	12.12	2.58	26.90	1046.83	0.0

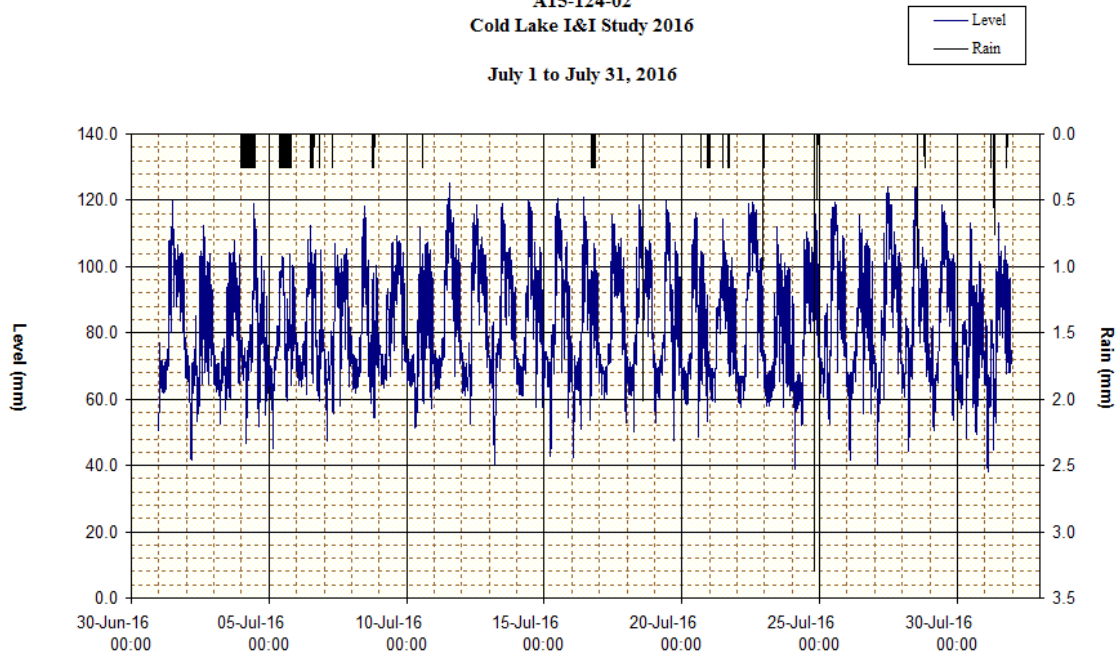
Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
26889.848	1.481	26.899	86.3

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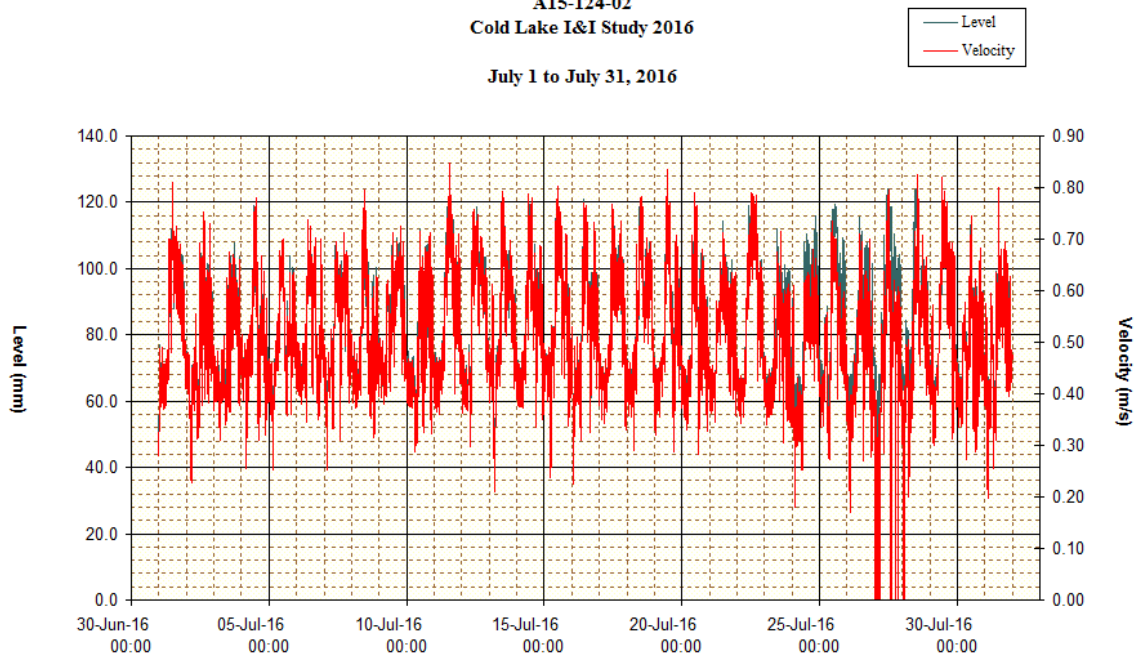


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Cold Lake I&I Study 2016
July 1 to July 31, 2016



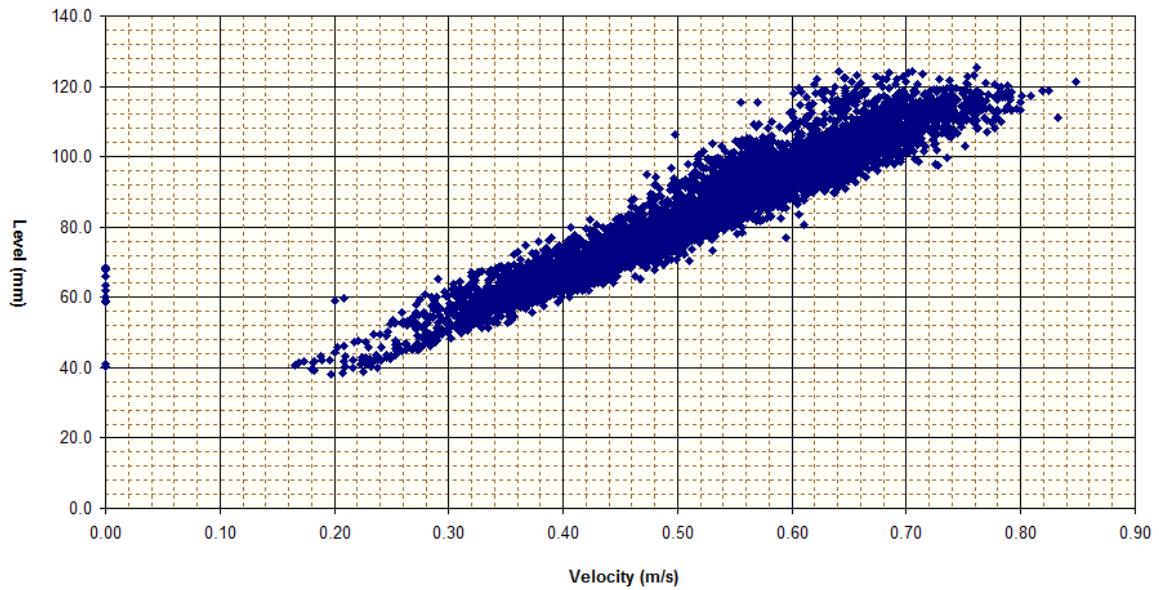
ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

July 1 to July 31, 2016



ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

July 1 to July 31, 2016



ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

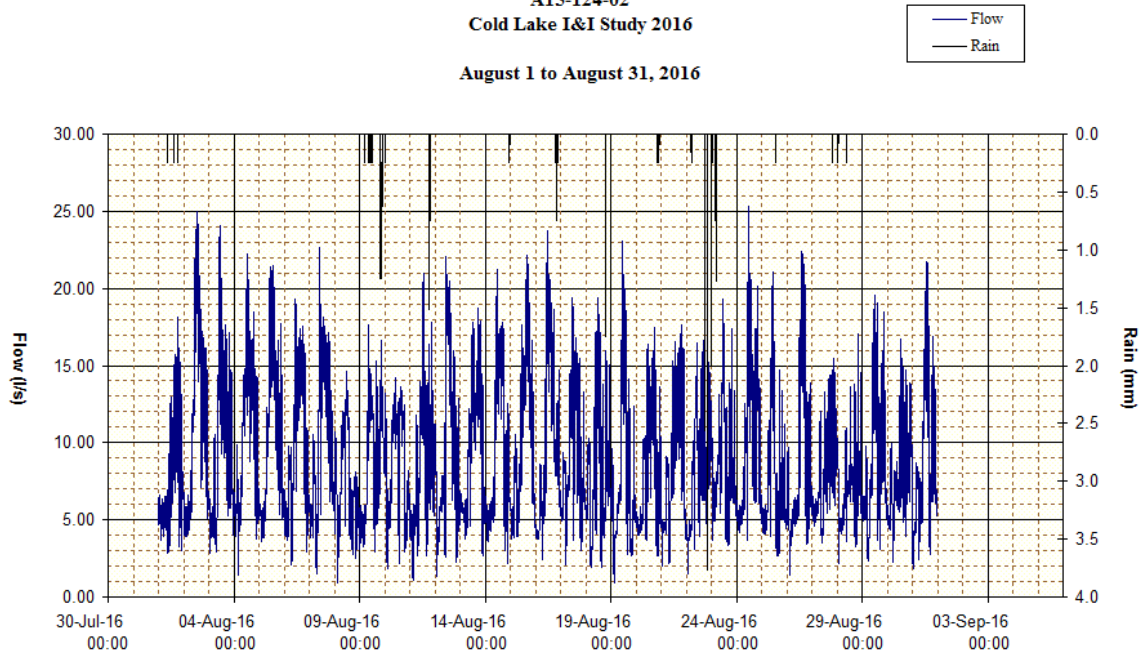
July 1 to July 31, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	10.91	2.50	23.93	942.96	0.0
02-Jul-16	8.32	1.55	20.12	718.42	0.0
03-Jul-16	8.41	2.92	17.35	726.68	0.5
04-Jul-16	8.39	2.01	22.48	725.25	9.0
05-Jul-16	8.60	1.92	17.09	742.98	8.3
06-Jul-16	8.93	4.01	19.90	771.35	2.5
07-Jul-16	9.44	2.06	17.55	815.99	0.3
08-Jul-16	8.50	3.14	23.52	734.28	1.3
09-Jul-16	10.55	4.75	18.68	911.79	0.0
10-Jul-16	8.43	2.64	19.01	728.08	0.3
11-Jul-16	11.72	4.46	26.23	1012.66	0.0
12-Jul-16	11.27	2.85	21.89	973.48	0.0
13-Jul-16	10.78	1.34	23.73	931.50	0.0
14-Jul-16	10.63	3.66	24.09	918.26	0.0
15-Jul-16	10.87	1.64	23.82	939.57	0.0
16-Jul-16	9.87	1.56	23.67	852.99	1.8
17-Jul-16	10.25	3.18	22.22	885.80	0.0
18-Jul-16	11.14	2.57	21.95	962.28	2.8
19-Jul-16	9.98	2.33	23.82	862.16	0.0
20-Jul-16	8.95	2.42	22.48	773.00	1.0
21-Jul-16	9.30	3.94	19.87	803.46	1.8
22-Jul-16	11.45	3.72	23.57	989.45	2.5
23-Jul-16	8.23	3.27	18.69	710.95	0.0
24-Jul-16	9.21	1.11	18.62	795.90	11.8
25-Jul-16	10.25	2.57	21.76	885.48	0.0
26-Jul-16	8.29	1.17	20.43	716.01	0.0
27-Jul-16	9.81	-19.25	23.24	848.00	0.0
28-Jul-16	10.24	1.47	24.74	884.46	1.3
29-Jul-16	10.99	2.78	24.57	949.38	0.0
30-Jul-16	7.91	2.31	19.37	683.82	0.0
31-Jul-16	8.90	1.16	22.52	768.64	3.3

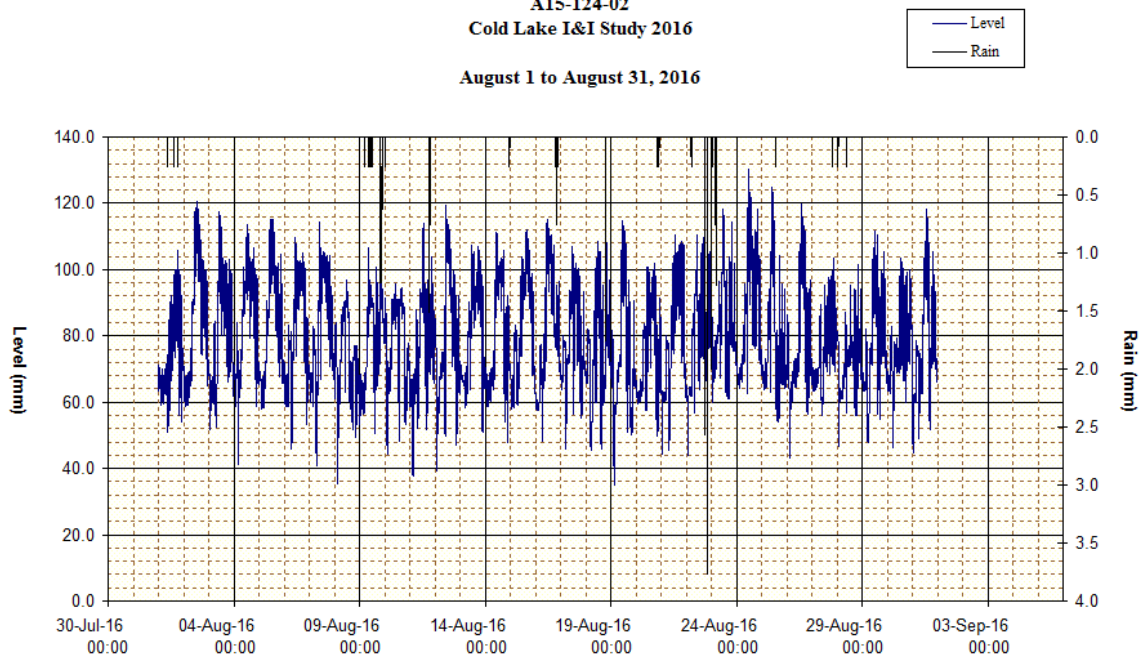
Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
25965.041	-19.247	26.231	48.0

ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016
August 1 to August 31, 2016

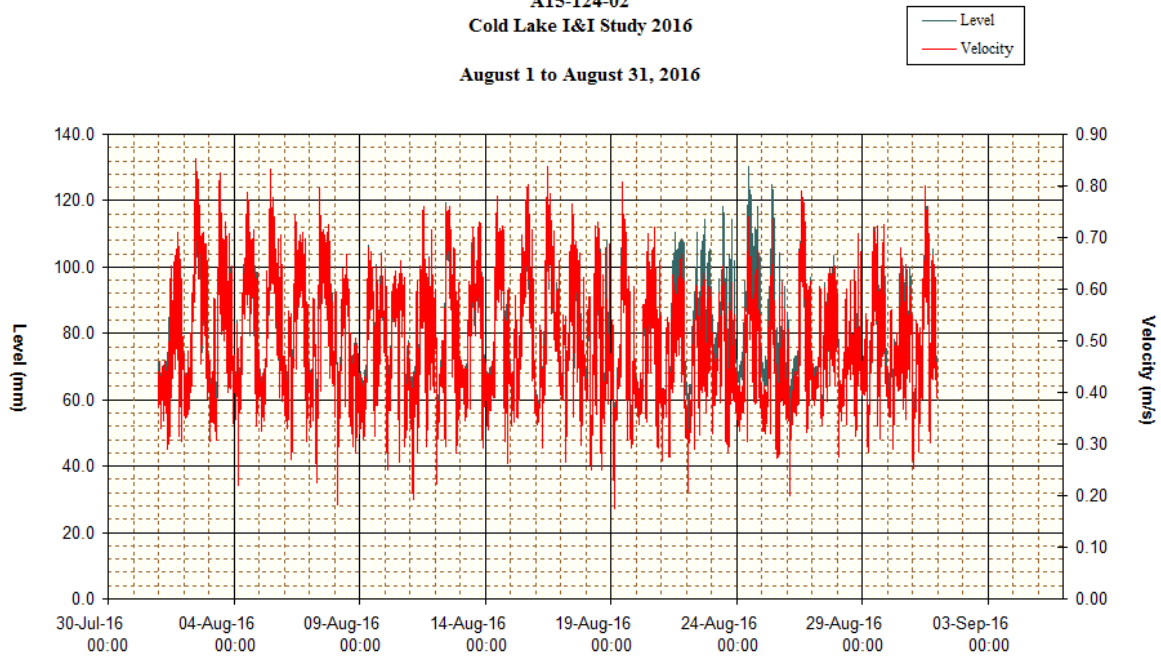


ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016
August 1 to August 31, 2016



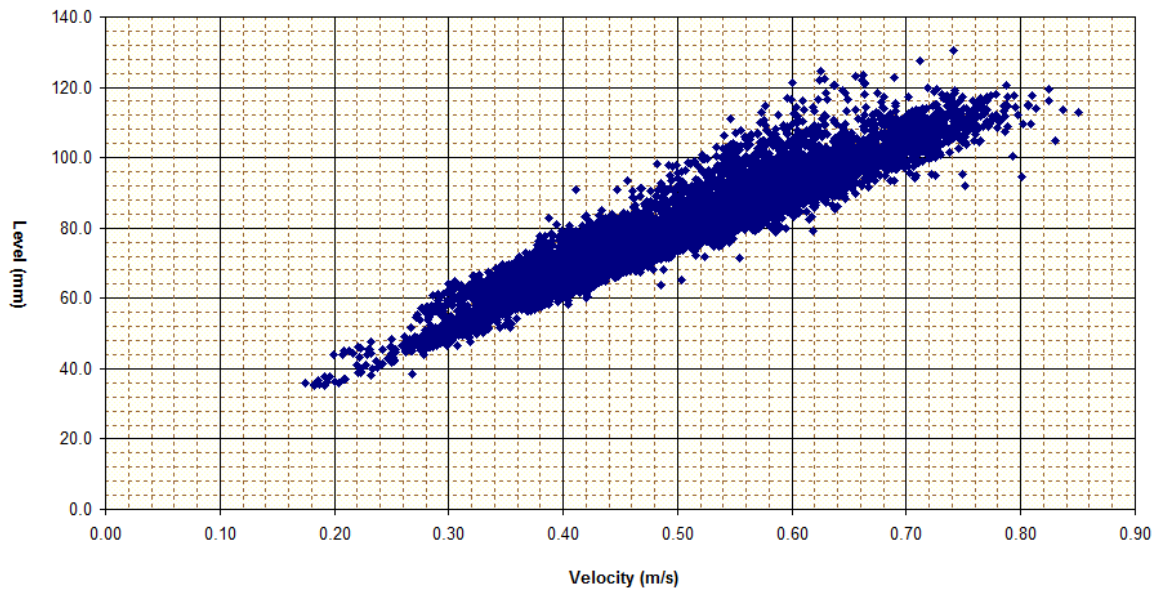
ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

August 1 to August 31, 2016



ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

August 1 to August 31, 2016



ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

August 1 to August 31, 2016

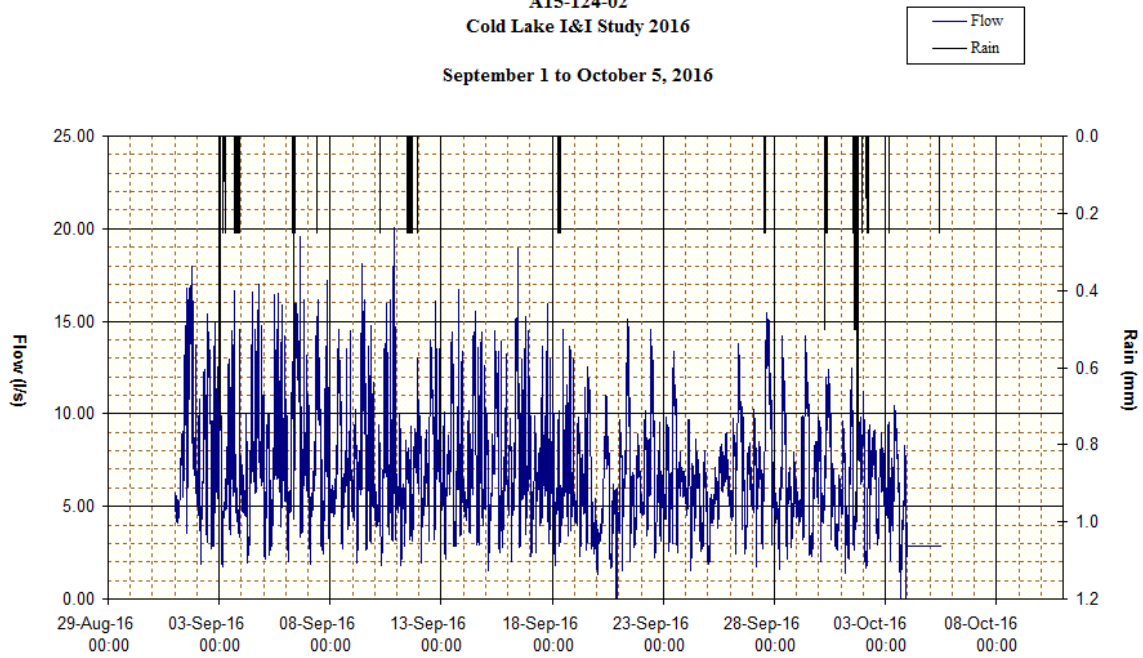
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	7.33	2.88	18.13	633.42	1.3
02-Aug-16	11.53	3.94	24.91	996.17	0.0
03-Aug-16	10.15	2.87	24.03	877.17	0.0
04-Aug-16	10.25	1.46	22.05	886.03	0.0
05-Aug-16	10.78	3.56	21.51	930.99	0.0
06-Aug-16	9.79	2.12	19.26	845.84	0.0
07-Aug-16	10.12	1.50	22.68	874.47	0.0
08-Aug-16	7.35	0.96	14.62	635.20	0.0
09-Aug-16	8.47	2.89	17.58	731.39	17.8
10-Aug-16	8.52	1.84	14.17	736.18	0.3
11-Aug-16	8.87	1.12	21.00	766.75	3.3
12-Aug-16	9.48	1.37	22.10	819.26	0.0
13-Aug-16	9.67	2.71	18.70	835.38	0.0
14-Aug-16	9.01	2.18	21.23	778.71	0.3
15-Aug-16	10.22	3.73	22.10	883.17	0.0
16-Aug-16	10.02	2.44	23.64	865.43	1.3
17-Aug-16	9.03	2.06	19.37	780.28	0.0
18-Aug-16	7.83	1.92	19.42	676.76	5.3
19-Aug-16	7.91	0.94	23.06	683.46	0.0
20-Aug-16	7.89	2.64	17.49	681.79	0.8
21-Aug-16	8.58	2.01	17.48	741.47	0.0
22-Aug-16	7.82	1.49	17.57	675.35	10.5
23-Aug-16	8.13	3.34	19.28	702.55	7.3
24-Aug-16	10.21	3.72	25.29	882.08	0.0
25-Aug-16	7.32	2.69	21.05	632.66	0.3
26-Aug-16	8.74	1.45	22.37	755.48	0.0
27-Aug-16	7.81	3.48	15.47	674.40	0.3
28-Aug-16	6.82	2.17	16.91	589.16	1.0
29-Aug-16	8.45	2.35	19.60	730.34	0.0
30-Aug-16	7.65	2.28	16.74	660.99	0.0
31-Aug-16	8.10	1.87	21.74	700.17	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
23662.510	0.939	25.290	49.3

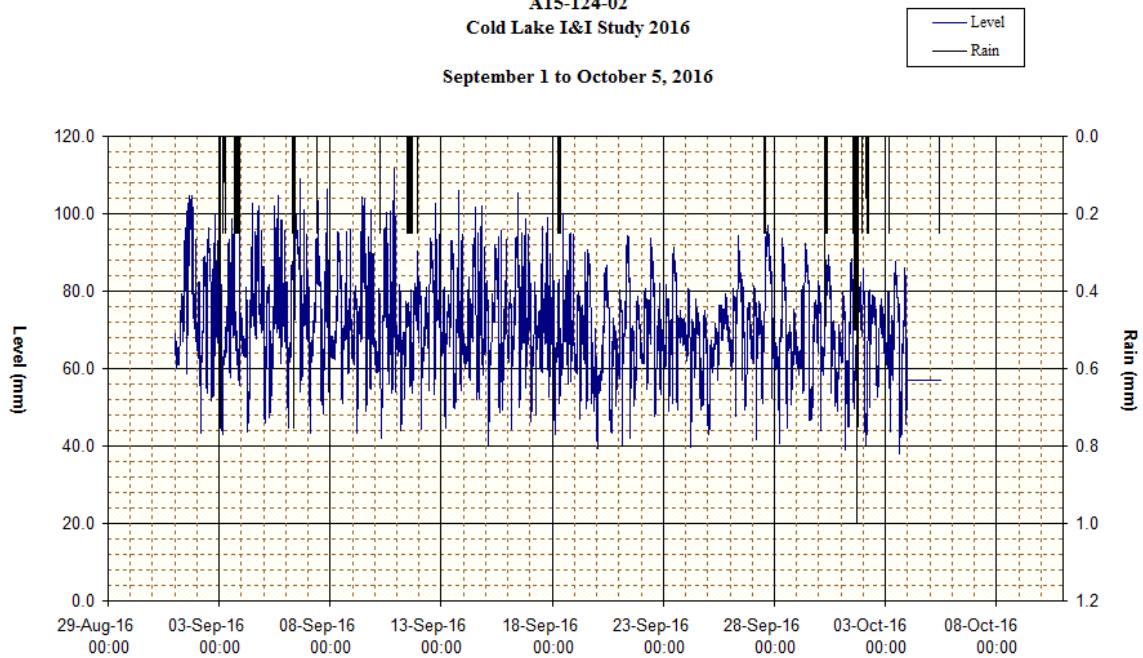
ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

September 1 to October 5, 2016



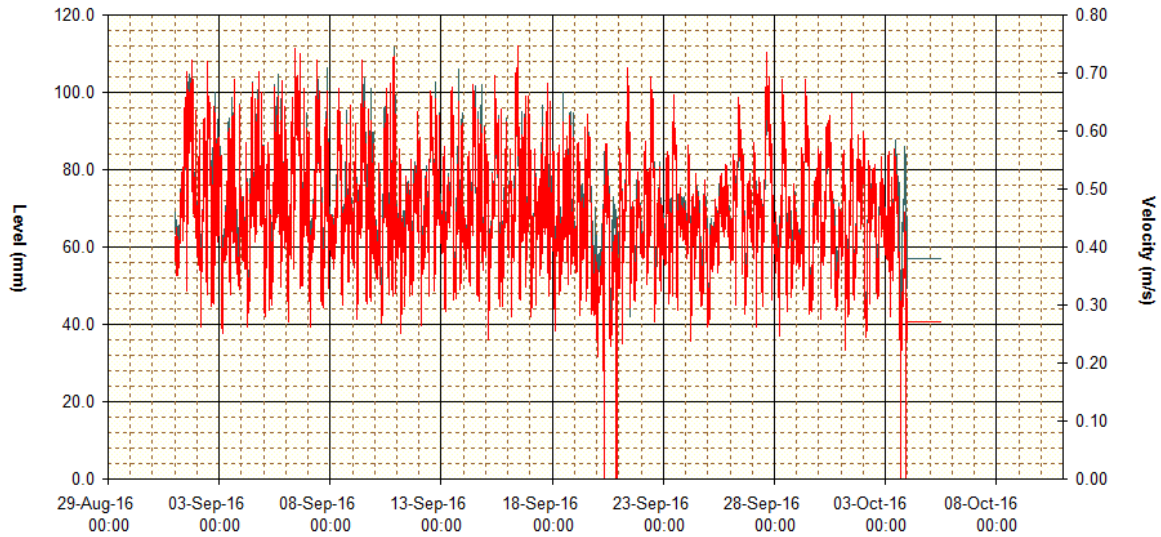
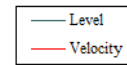
ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

September 1 to October 5, 2016



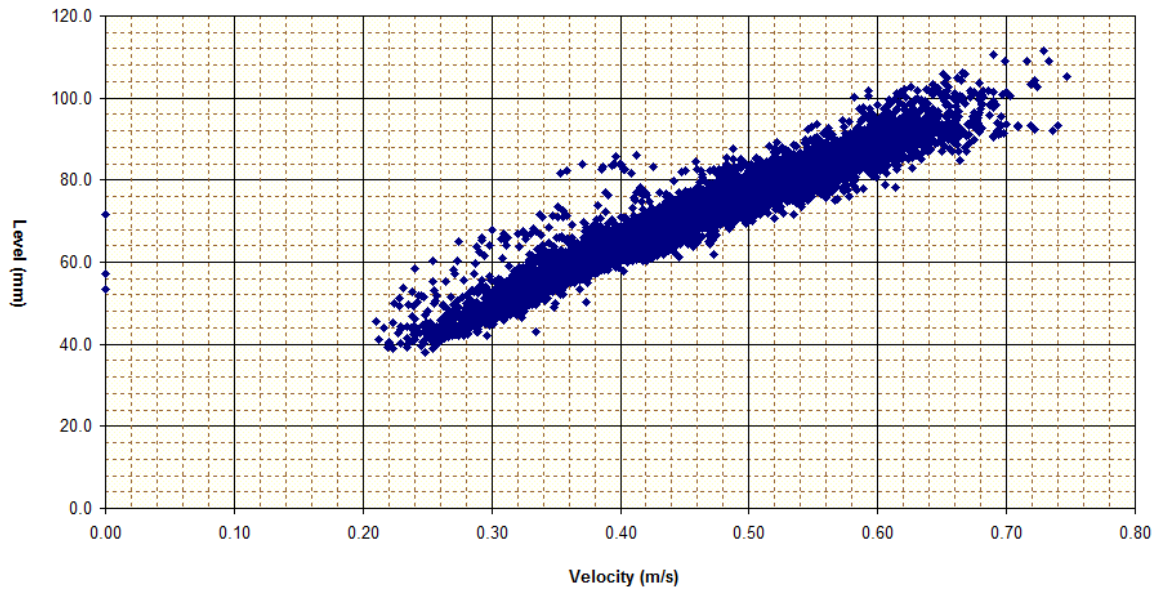
ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

September 1 to October 5, 2016



ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

September 1 to October 5, 2016



ISL Engineering Ltd.
A15-124-02
Cold Lake I&I Study 2016

September 1 to October 5, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Sep-16	8.93	3.63	17.82	771.56	0.0
02-Sep-16	7.34	1.86	15.40	634.27	0.0
03-Sep-16	6.41	1.77	16.60	554.03	10.5
04-Sep-16	7.52	1.95	16.88	649.49	0.0
05-Sep-16	7.10	2.15	16.50	613.68	0.0
06-Sep-16	8.61	2.01	19.59	743.70	5.8
07-Sep-16	7.39	1.86	17.15	638.21	0.3
08-Sep-16	6.99	2.73	14.56	604.28	0.0
09-Sep-16	7.28	1.95	18.08	628.74	0.0
10-Sep-16	6.73	1.84	20.07	581.51	0.3
11-Sep-16	6.18	1.82	12.90	533.74	2.0
12-Sep-16	7.55	1.94	15.87	652.70	0.0
13-Sep-16	7.19	2.15	16.69	621.03	0.0
14-Sep-16	7.24	2.95	15.51	625.26	0.0
15-Sep-16	7.13	1.56	14.42	616.22	0.0
16-Sep-16	7.73	2.05	18.97	667.62	0.0
17-Sep-16	6.35	2.27	15.79	548.43	0.0
18-Sep-16	6.34	1.78	14.40	547.42	3.0
19-Sep-16	6.31	2.29	12.56	545.08	0.0
20-Sep-16	4.72	-5.70	11.02	408.12	0.0
21-Sep-16	6.71	1.50	15.10	580.02	0.0
22-Sep-16	6.73	2.21	14.58	581.90	0.0
23-Sep-16	6.76	2.50	13.28	584.19	0.0
24-Sep-16	5.64	1.52	9.70	487.01	0.0
25-Sep-16	5.85	1.90	8.95	505.82	0.0
26-Sep-16	7.04	2.45	13.74	607.96	0.0
27-Sep-16	7.97	1.76	15.44	688.70	0.8
28-Sep-16	6.03	1.59	14.21	520.79	0.0
29-Sep-16	6.79	2.29	14.19	586.84	0.0
30-Sep-16	6.42	1.99	12.42	554.34	3.3
01-Oct-16	6.58	1.36	12.44	568.40	17.3
02-Oct-16	6.29	1.65	10.82	543.77	0.5
03-Oct-16	5.39	-2.14	10.47	466.04	0.3
04-Oct-16	2.88	2.88	2.88	248.92	0.0
05-Oct-16	2.88	2.88	2.88	248.92	0.3

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
19958.707	-5.697	20.071	44.0



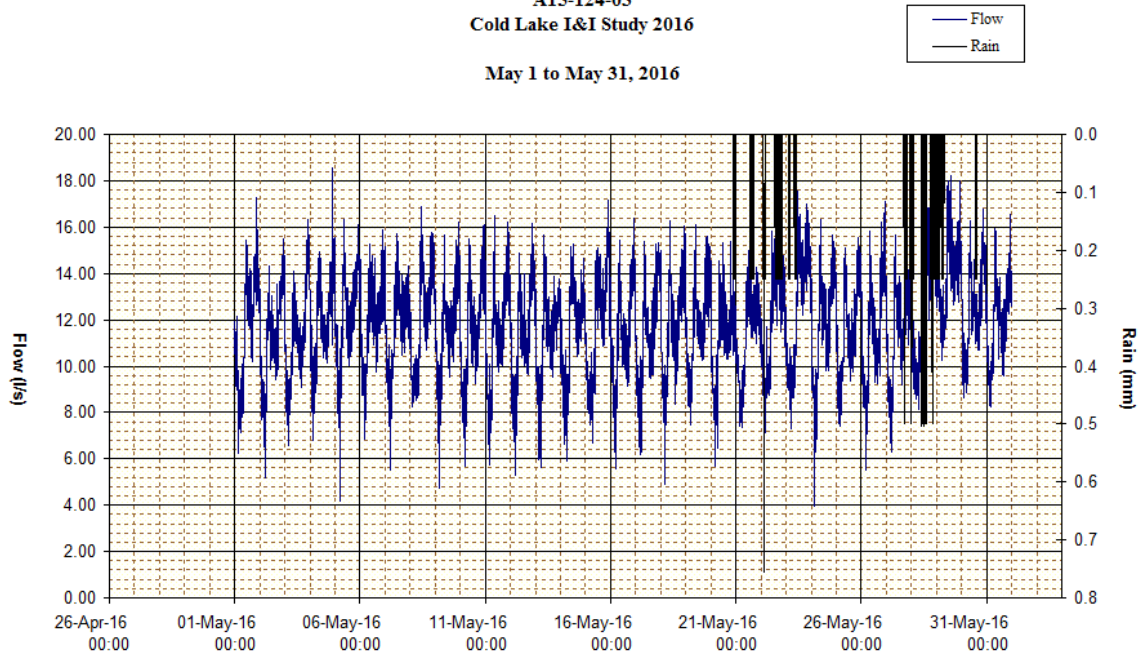
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:
30-Apr-16	Pipe size verified at 425mm. May need weir added after first data collection.
11-Oct-16	Sensor ragged.

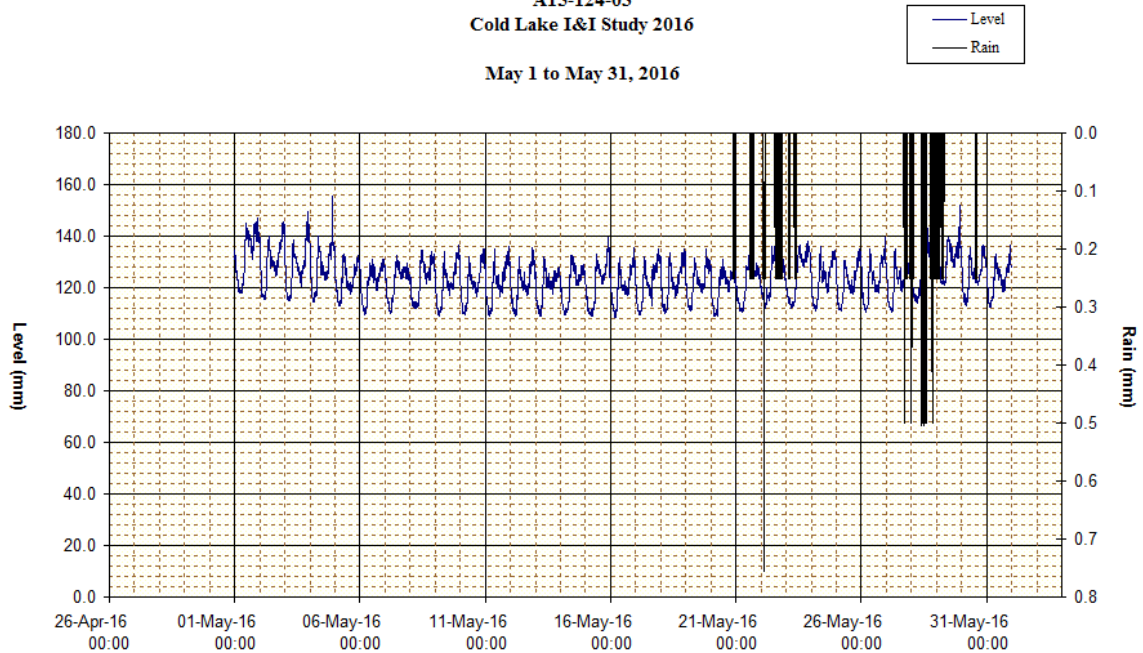
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

May 1 to May 31, 2016



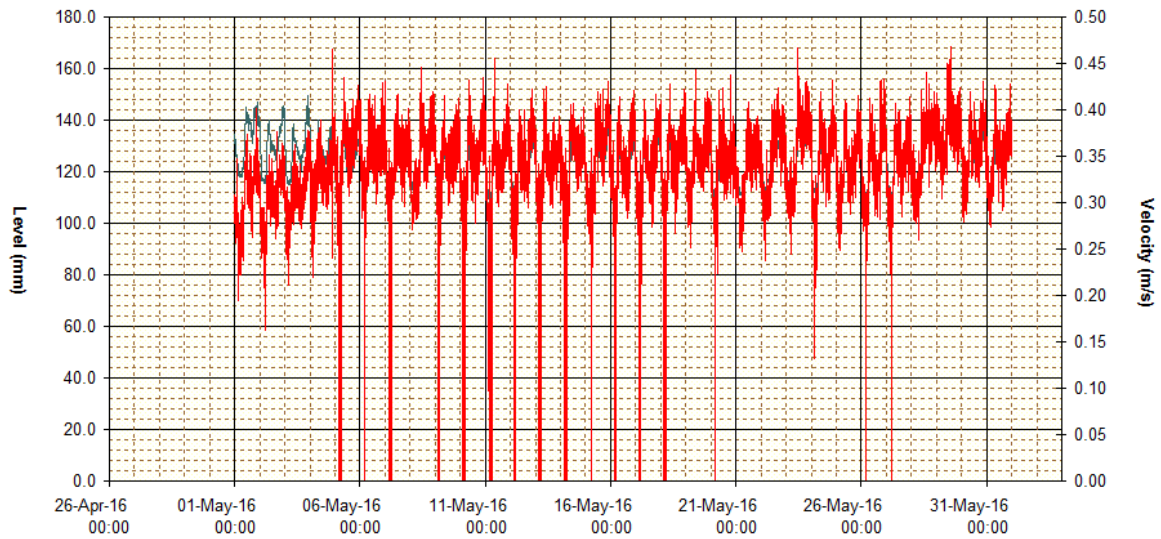
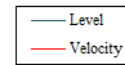
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

May 1 to May 31, 2016



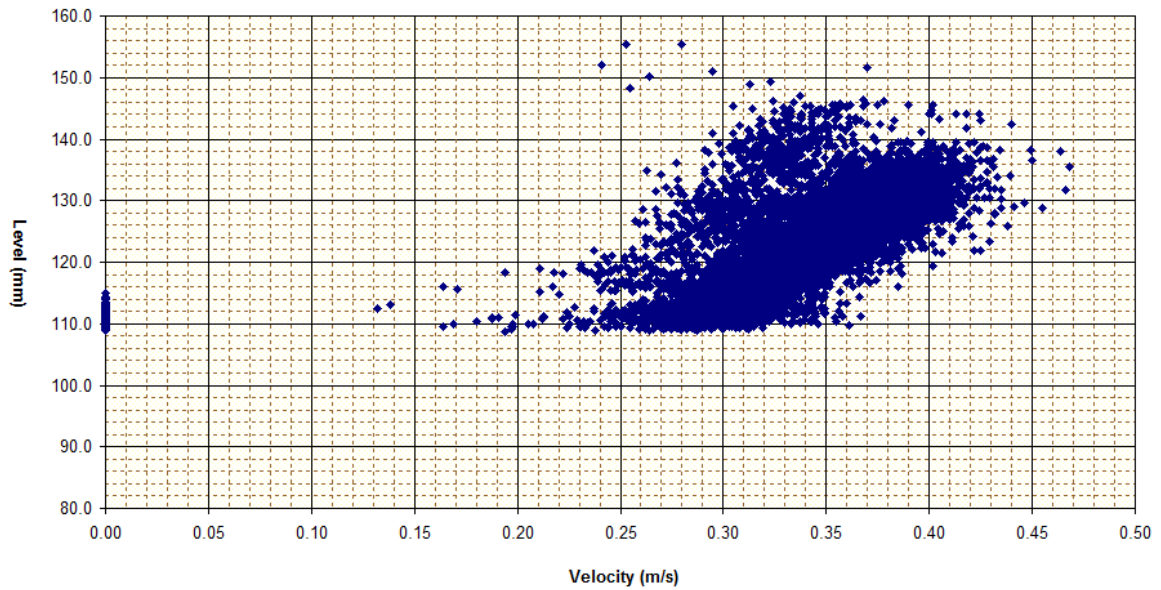
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

May 1 to May 31, 2016



ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

May 1 to May 31, 2016



ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

May 1 to May 31, 2016

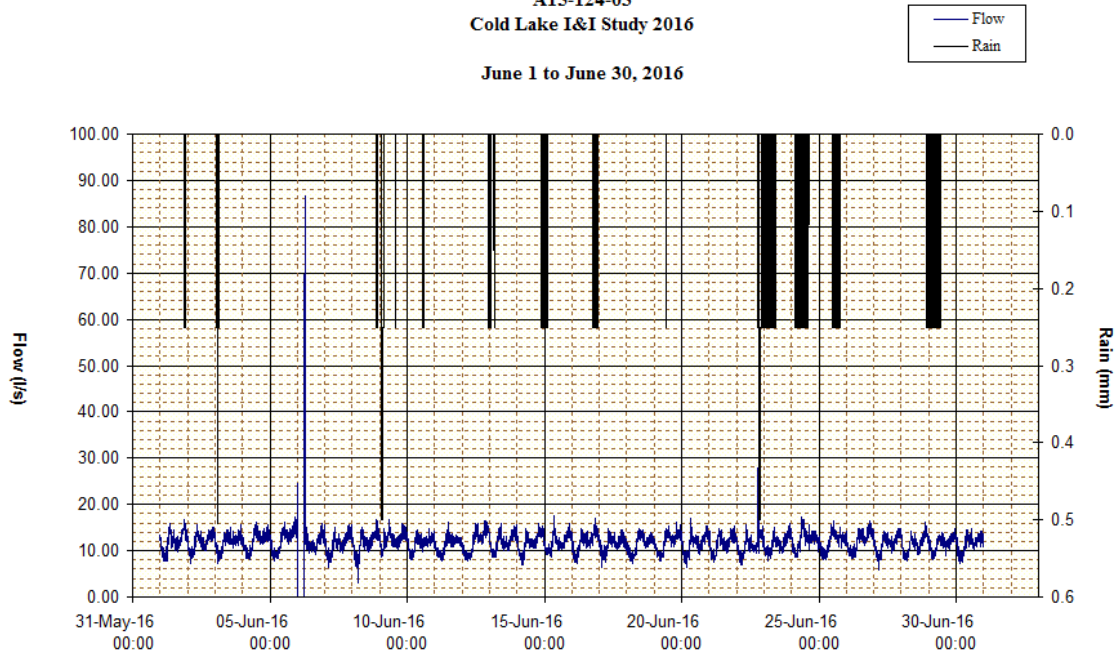
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-May-16	11.61	6.27	17.25	1002.76	0.0
02-May-16	11.16	5.16	15.46	964.28	0.0
03-May-16	11.25	6.55	16.33	971.67	0.0
04-May-16	11.78	6.79	18.53	1018.09	0.0
05-May-16	12.11	4.19	16.30	1046.31	0.0
06-May-16	11.88	6.83	15.86	1026.59	0.0
07-May-16	11.65	5.53	15.69	1006.23	0.0
08-May-16	11.99	8.22	16.86	1035.64	0.0
09-May-16	11.65	4.76	16.22	1006.24	0.0
10-May-16	11.47	5.70	16.11	990.76	0.0
11-May-16	11.50	5.75	16.51	993.39	0.0
12-May-16	11.39	5.28	16.14	984.43	0.0
13-May-16	11.20	5.64	15.68	967.78	0.0
14-May-16	11.34	5.90	15.25	980.07	0.0
15-May-16	11.68	6.69	17.13	1009.25	0.0
16-May-16	11.41	5.55	16.37	986.03	0.0
17-May-16	11.41	6.26	15.32	985.46	0.0
18-May-16	11.62	4.90	16.25	1004.24	0.0
19-May-16	11.76	7.49	16.03	1015.84	0.0
20-May-16	11.21	5.66	15.40	968.68	1.5
21-May-16	11.35	7.33	15.01	980.84	3.8
22-May-16	11.90	7.14	15.81	1028.30	9.8
23-May-16	12.46	7.32	17.47	1076.65	2.0
24-May-16	11.87	3.97	16.32	1025.73	0.0
25-May-16	11.53	7.38	15.46	996.59	0.0
26-May-16	11.63	5.56	17.12	1004.90	0.0
27-May-16	11.38	6.27	15.64	983.61	4.5
28-May-16	12.89	8.16	18.33	1113.66	22.0
29-May-16	14.06	10.24	18.20	1214.74	3.0
30-May-16	12.35	8.68	16.77	1067.09	0.5
31-May-16	12.11	8.25	16.52	1046.21	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
31502.048	3.967	18.527	47.0

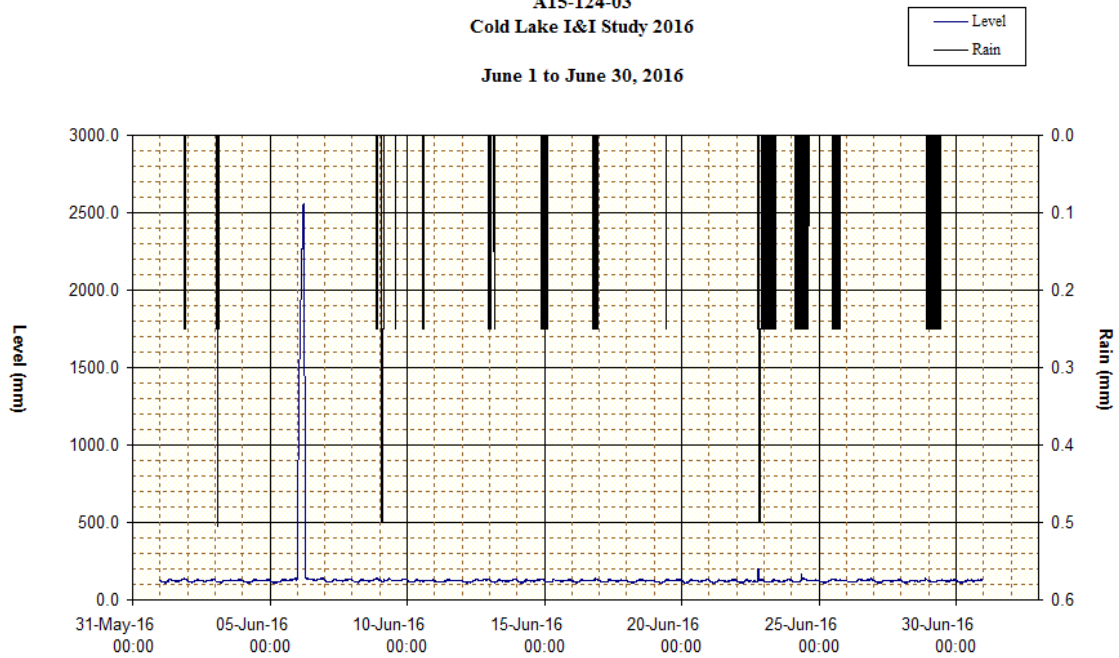
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

June 1 to June 30, 2016



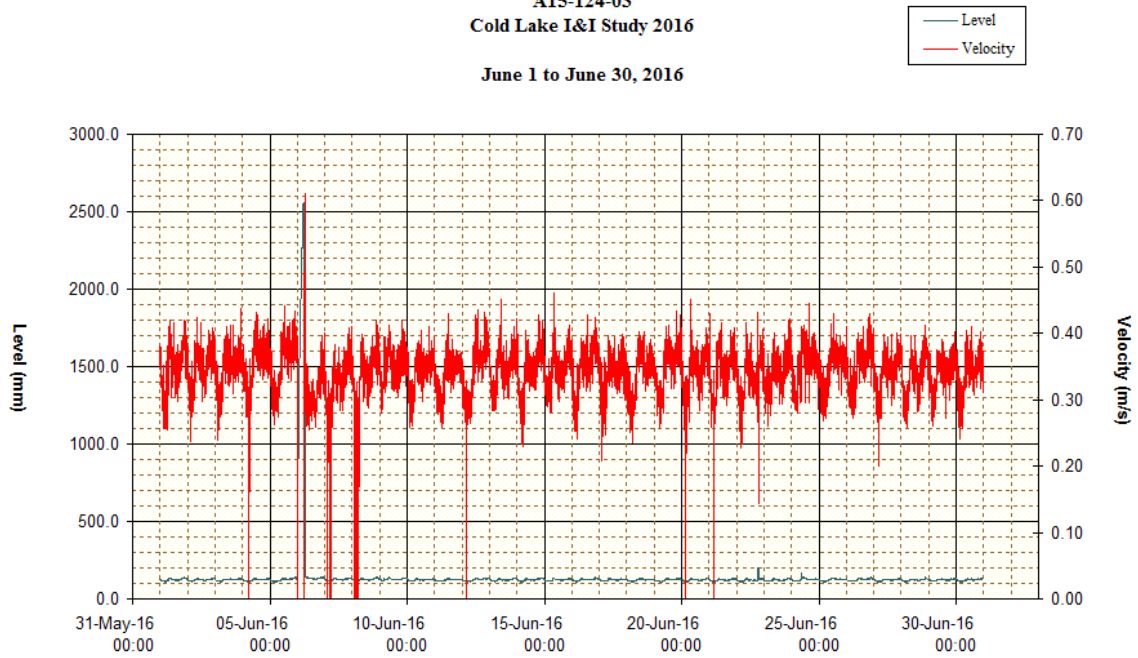
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

June 1 to June 30, 2016



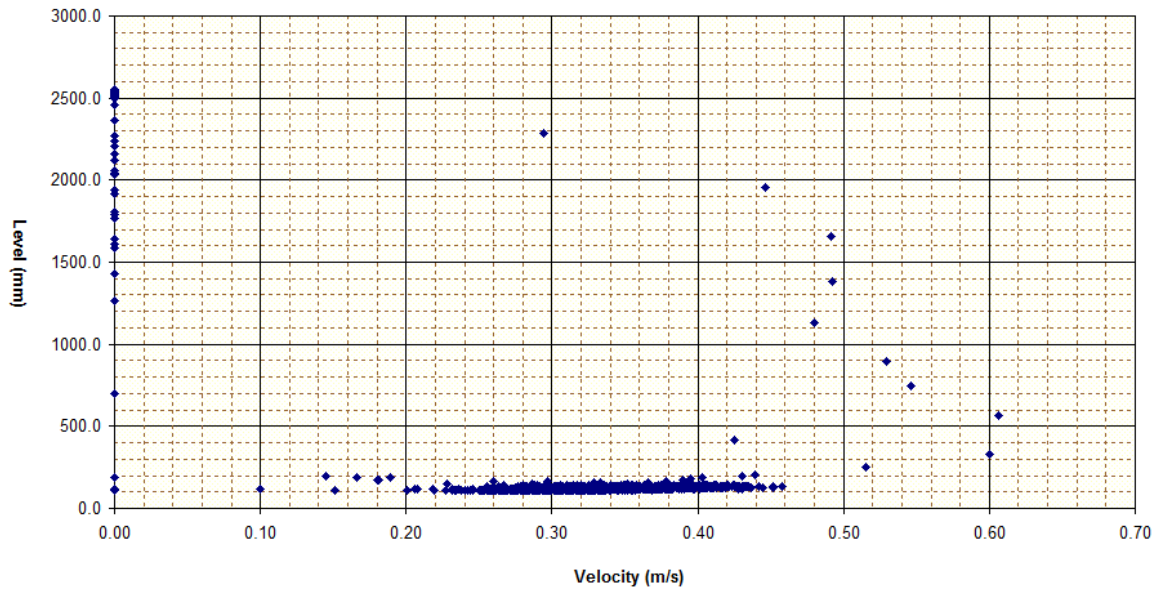
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

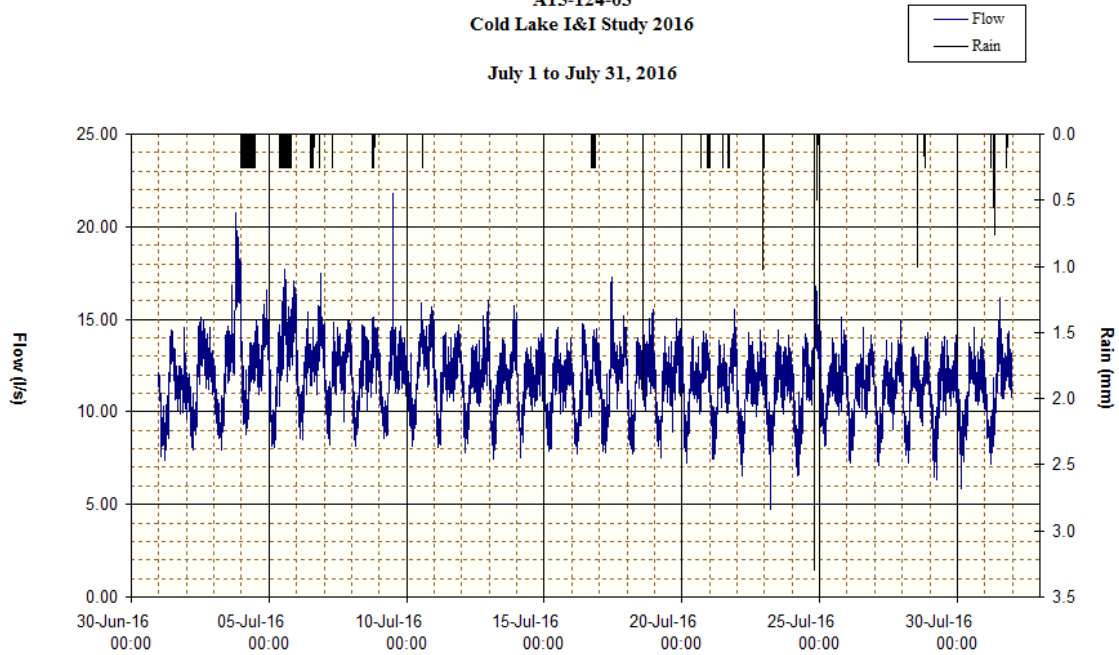
June 1 to June 30, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-16	11.93	7.67	16.69	1030.84	1.0
02-Jun-16	11.88	7.19	15.64	1026.30	0.0
03-Jun-16	11.81	7.34	15.68	1020.67	4.0
04-Jun-16	11.98	8.20	16.04	1035.43	0.0
05-Jun-16	12.26	-8.57	23.65	1058.96	0.0
06-Jun-16	7.68	-20.34	85.98	663.64	0.0
07-Jun-16	11.50	6.53	15.61	993.64	0.0
08-Jun-16	11.76	3.07	16.76	1016.08	2.5
09-Jun-16	12.55	8.72	16.83	1084.18	8.5
10-Jun-16	11.64	7.95	14.63	1005.78	0.5
11-Jun-16	11.39	7.92	16.21	984.50	0.0
12-Jun-16	11.90	7.89	16.55	1028.44	2.0
13-Jun-16	11.85	8.50	15.90	1023.46	1.5
14-Jun-16	11.71	6.95	16.01	1011.60	2.5
15-Jun-16	11.82	8.74	17.55	1021.36	4.3
16-Jun-16	11.79	7.22	16.86	1018.82	3.3
17-Jun-16	11.45	6.40	14.72	989.54	0.0
18-Jun-16	11.43	7.21	14.72	987.40	0.0
19-Jun-16	11.81	7.78	16.27	1020.70	0.3
20-Jun-16	11.55	6.43	16.94	998.18	0.0
21-Jun-16	11.50	7.47	15.28	993.64	0.0
22-Jun-16	11.34	6.84	27.52	979.98	12.0
23-Jun-16	11.56	7.86	15.83	998.73	14.5
24-Jun-16	12.26	8.62	17.25	1059.06	13.8
25-Jun-16	11.91	8.08	16.35	1029.20	4.5
26-Jun-16	12.05	8.43	16.52	1040.91	0.0
27-Jun-16	11.53	5.95	14.84	996.27	0.0
28-Jun-16	11.33	7.68	16.23	979.07	2.5
29-Jun-16	11.54	8.06	14.82	997.08	8.8
30-Jun-16	11.48	7.25	14.89	991.46	0.0

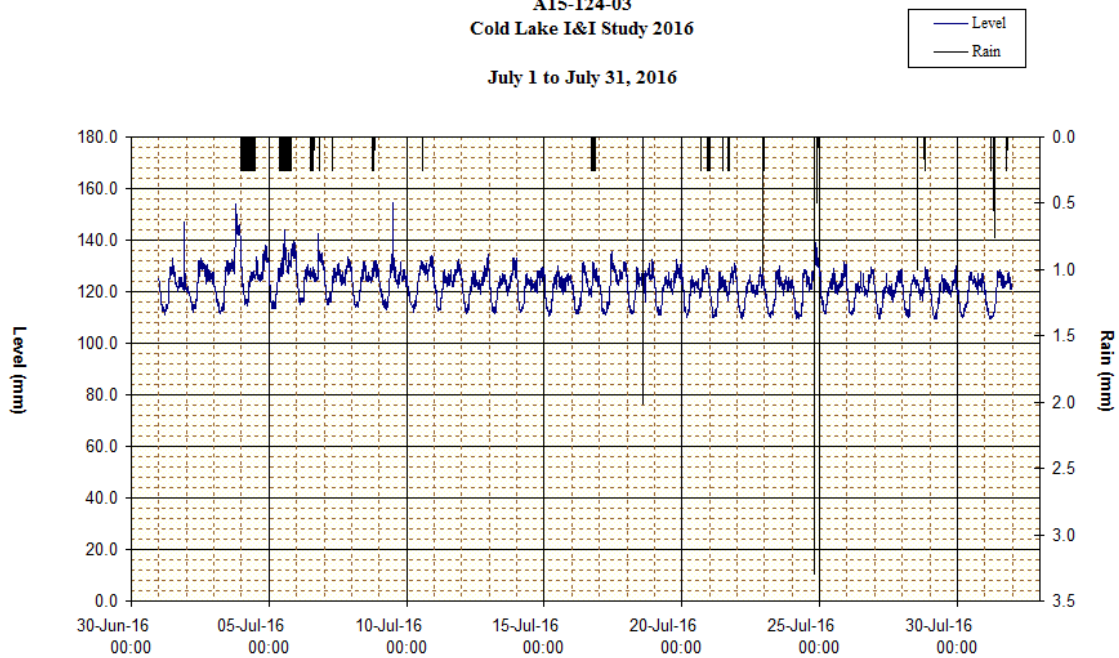
Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
30084.930	-20.342	85.979	86.3

ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016
July 1 to July 31, 2016

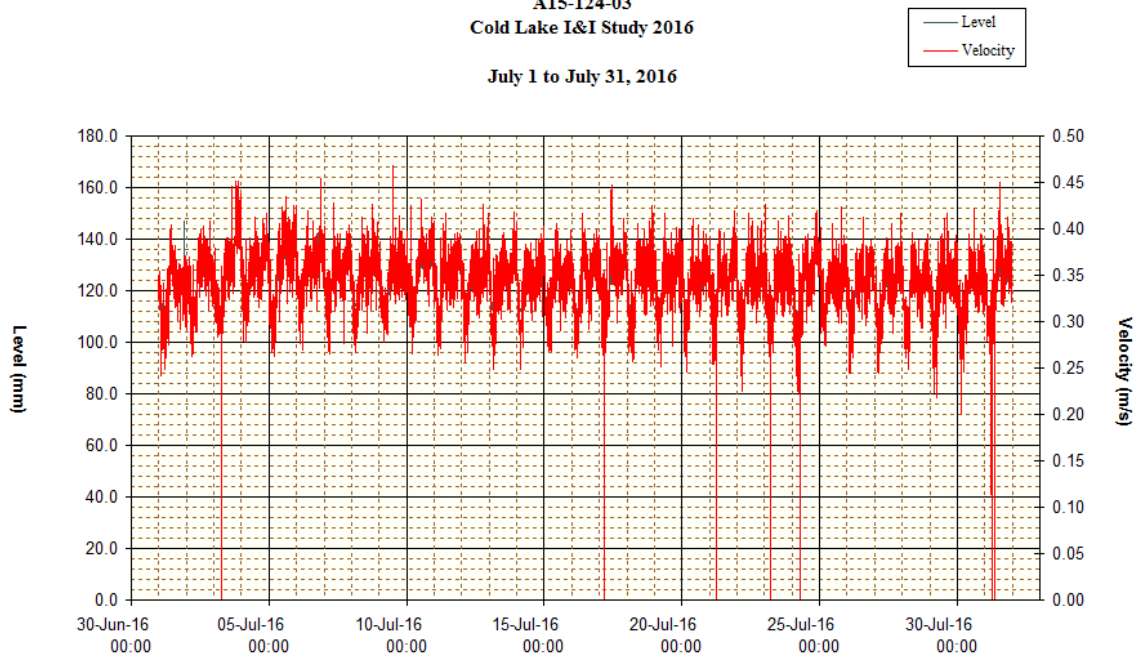


ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016
July 1 to July 31, 2016



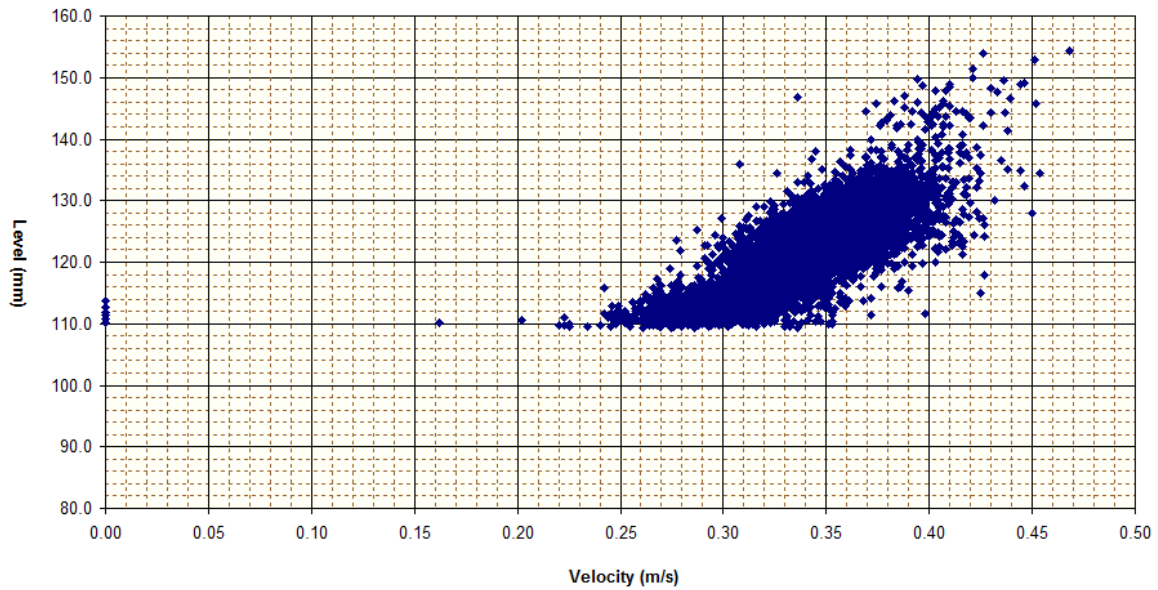
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

July 1 to July 31, 2016



ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

July 1 to July 31, 2016



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A15-124-03

Cold Lake I&I Study 2016

July 1 to July 31, 2016

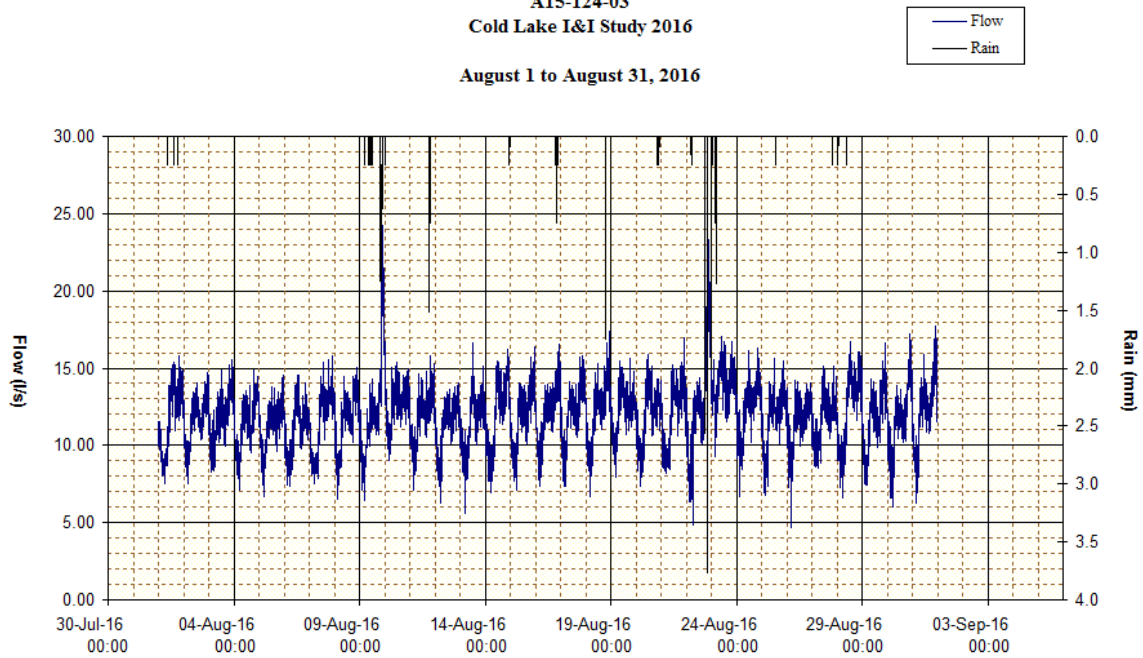
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	11.11	7.36	14.59	959.71	0.0
02-Jul-16	11.76	7.97	15.14	1016.24	0.0
03-Jul-16	12.83	8.04	20.74	1108.94	0.5
04-Jul-16	12.54	8.80	16.56	1083.35	9.0
05-Jul-16	12.90	8.08	17.69	1114.46	8.3
06-Jul-16	12.45	8.50	17.49	1075.36	2.5
07-Jul-16	12.21	8.32	14.96	1054.54	0.3
08-Jul-16	12.04	8.15	15.12	1039.93	1.3
09-Jul-16	11.99	8.57	21.81	1035.94	0.0
10-Jul-16	12.28	8.14	15.90	1060.62	0.3
11-Jul-16	11.88	8.11	14.72	1026.37	0.0
12-Jul-16	11.70	7.79	15.91	1011.20	0.0
13-Jul-16	11.63	7.46	15.72	1005.11	0.0
14-Jul-16	11.48	7.50	14.42	991.95	0.0
15-Jul-16	11.49	7.87	14.52	992.53	0.0
16-Jul-16	11.51	7.75	14.76	994.65	1.8
17-Jul-16	11.86	7.88	17.18	1025.01	0.0
18-Jul-16	11.69	7.71	15.50	1010.17	2.8
19-Jul-16	11.47	7.53	15.02	991.20	0.0
20-Jul-16	11.43	7.24	14.35	987.89	1.0
21-Jul-16	11.37	7.44	15.50	982.14	1.8
22-Jul-16	11.09	6.52	14.42	958.24	2.5
23-Jul-16	11.07	4.72	14.42	956.57	0.0
24-Jul-16	11.44	6.53	16.76	988.38	11.8
25-Jul-16	11.47	8.17	15.12	990.81	0.0
26-Jul-16	11.11	7.26	14.57	959.98	0.0
27-Jul-16	11.03	7.08	14.96	953.05	0.0
28-Jul-16	11.10	7.25	14.28	959.47	1.3
29-Jul-16	10.98	6.39	14.12	948.31	0.0
30-Jul-16	11.00	5.92	14.57	950.39	0.0
31-Jul-16	11.26	7.20	16.17	972.68	3.3

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
31205.196	4.721	21.805	48.0

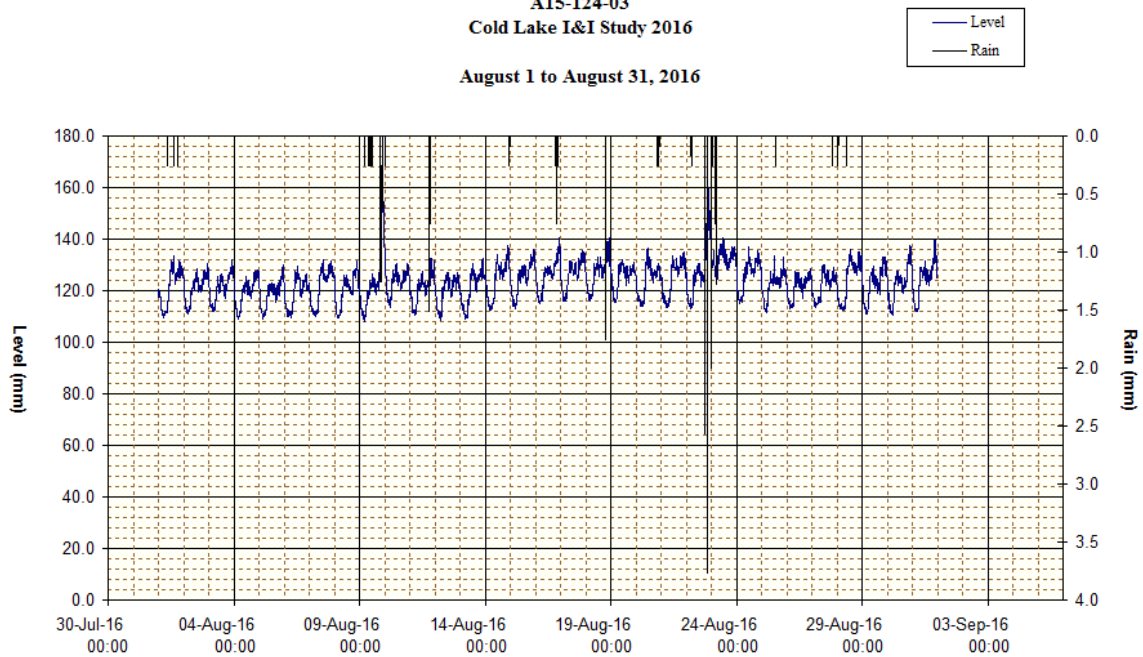
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

August 1 to August 31, 2016

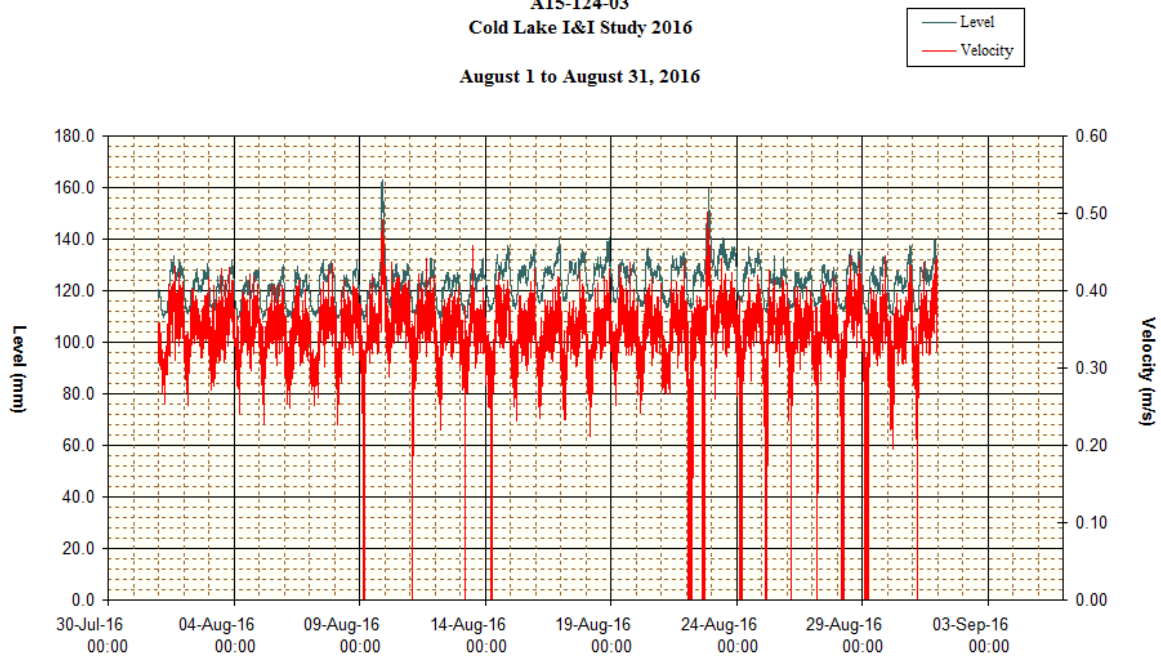


ISL Engineering Ltd.
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Cold Lake I&I Study 2016

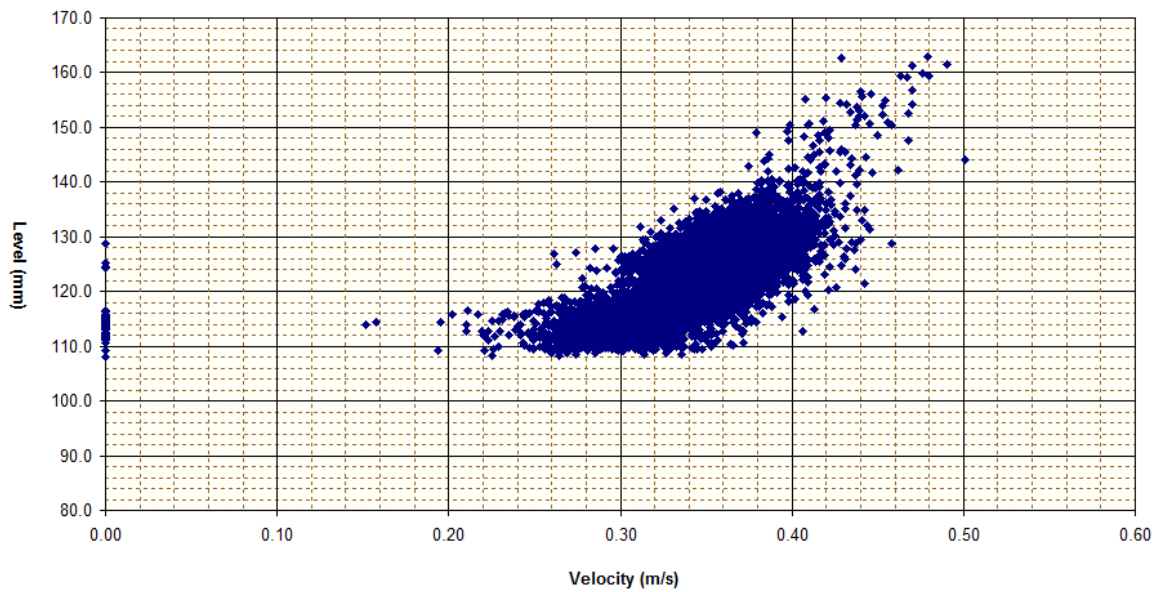
August 1 to August 31, 2016



ISL Engineering Ltd.
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Cold Lake I&I Study 2016
August 1 to August 31, 2016



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Cold Lake I&I Study 2016
August 1 to August 31, 2016



ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

August 1 to August 31, 2016

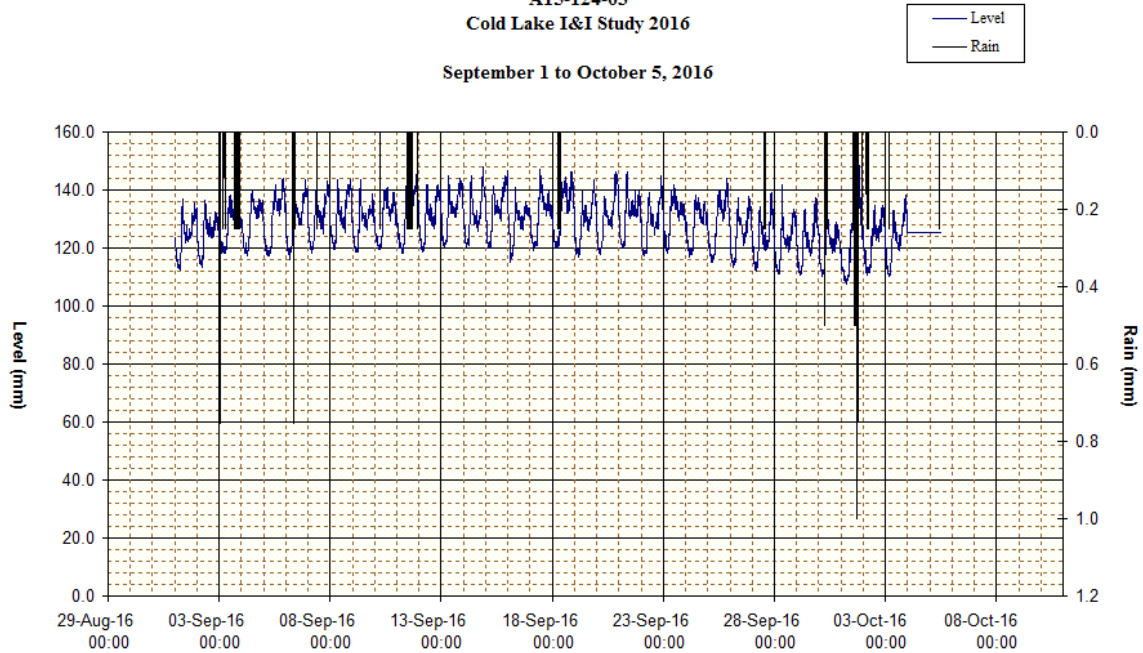
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	11.81	7.56	15.78	1020.52	1.3
02-Aug-16	11.61	7.51	14.69	1002.83	0.0
03-Aug-16	11.81	8.35	15.52	1020.50	0.0
04-Aug-16	11.36	7.12	14.84	981.29	0.0
05-Aug-16	11.19	6.66	14.58	966.81	0.0
06-Aug-16	11.04	7.34	14.57	954.06	0.0
07-Aug-16	11.53	7.52	15.82	996.34	0.0
08-Aug-16	11.50	6.56	15.08	993.53	0.0
09-Aug-16	12.26	6.40	24.26	1059.55	17.8
10-Aug-16	12.63	9.00	16.69	1091.58	0.3
11-Aug-16	11.74	7.21	15.78	1013.96	3.3
12-Aug-16	11.30	6.38	14.05	976.73	0.0
13-Aug-16	11.36	5.59	16.60	981.13	0.0
14-Aug-16	11.91	6.92	16.19	1029.00	0.3
15-Aug-16	11.85	7.14	16.35	1024.27	0.0
16-Aug-16	12.03	7.36	16.59	1039.33	1.3
17-Aug-16	12.04	7.32	15.80	1040.31	0.0
18-Aug-16	12.20	6.65	17.39	1054.02	5.3
19-Aug-16	12.25	7.94	15.63	1058.47	0.0
20-Aug-16	11.87	7.39	15.91	1025.66	0.8
21-Aug-16	11.98	8.22	16.95	1035.27	0.0
22-Aug-16	12.72	4.87	23.34	1098.71	10.5
23-Aug-16	13.98	9.26	17.08	1207.65	7.3
24-Aug-16	12.44	6.71	16.27	1074.82	0.0
25-Aug-16	11.82	6.77	15.66	1021.28	0.3
26-Aug-16	11.56	4.65	14.24	998.43	0.0
27-Aug-16	11.83	8.50	15.15	1022.17	0.3
28-Aug-16	12.36	6.60	16.70	1067.89	1.0
29-Aug-16	11.68	7.42	16.61	1009.43	0.0
30-Aug-16	11.64	5.99	17.24	1005.71	0.0
31-Aug-16	12.09	6.34	17.76	1044.67	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
31915.901	4.646	24.257	49.3

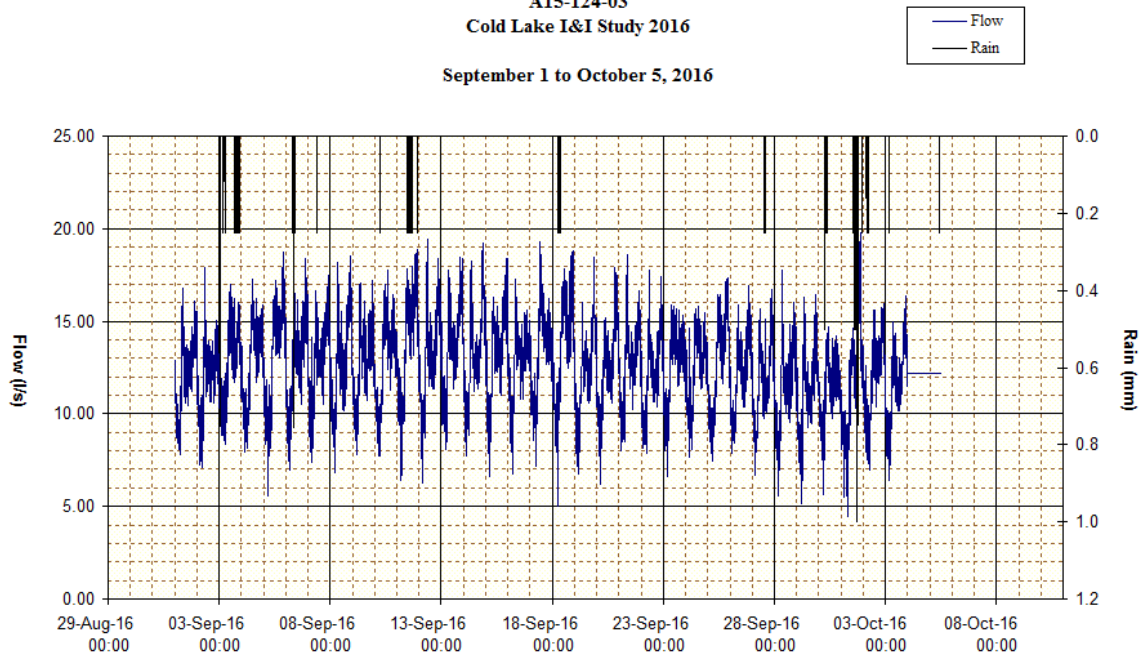
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

September 1 to October 5, 2016



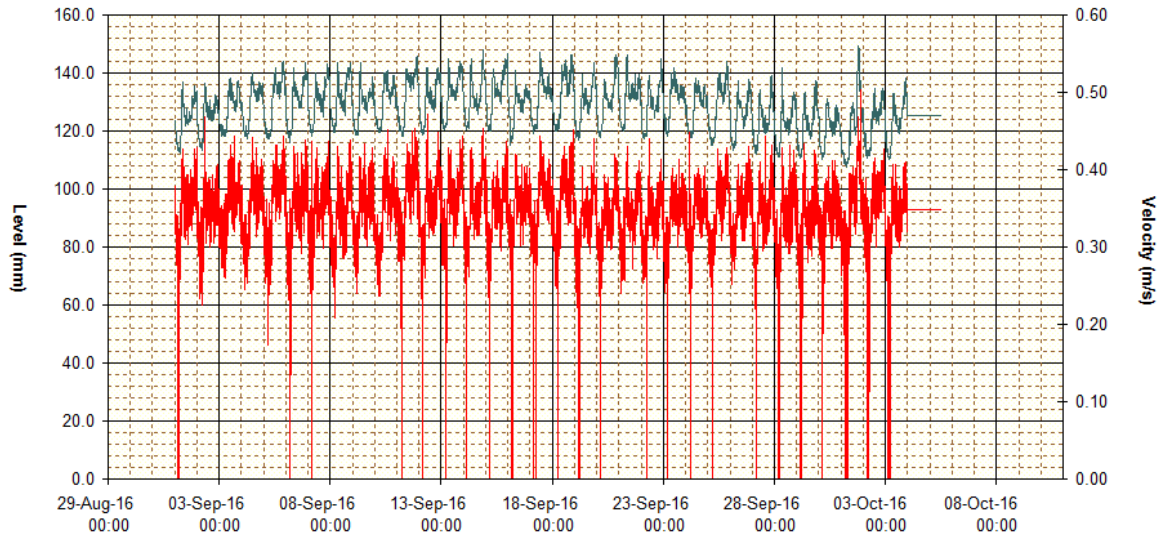
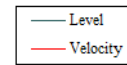
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

September 1 to October 5, 2016



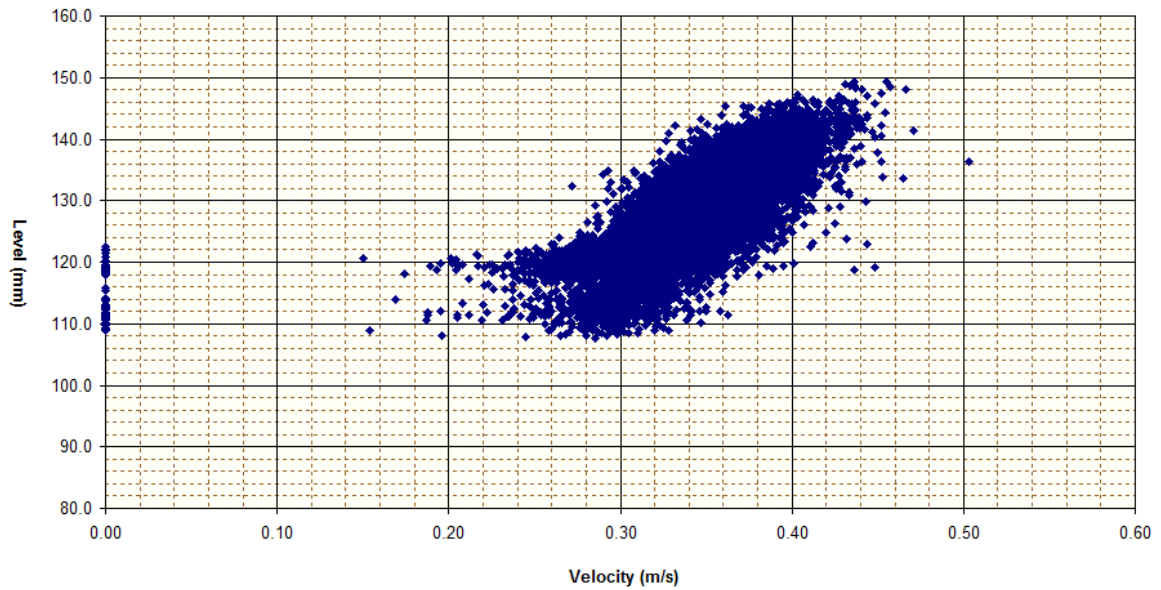
ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

September 1 to October 5, 2016



ISL Engineering Ltd.
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Cold Lake I&I Study 2016

September 1 to October 5, 2016



ISL Engineering Ltd.
A15-124-03
Cold Lake I&I Study 2016

September 1 to October 5, 2016

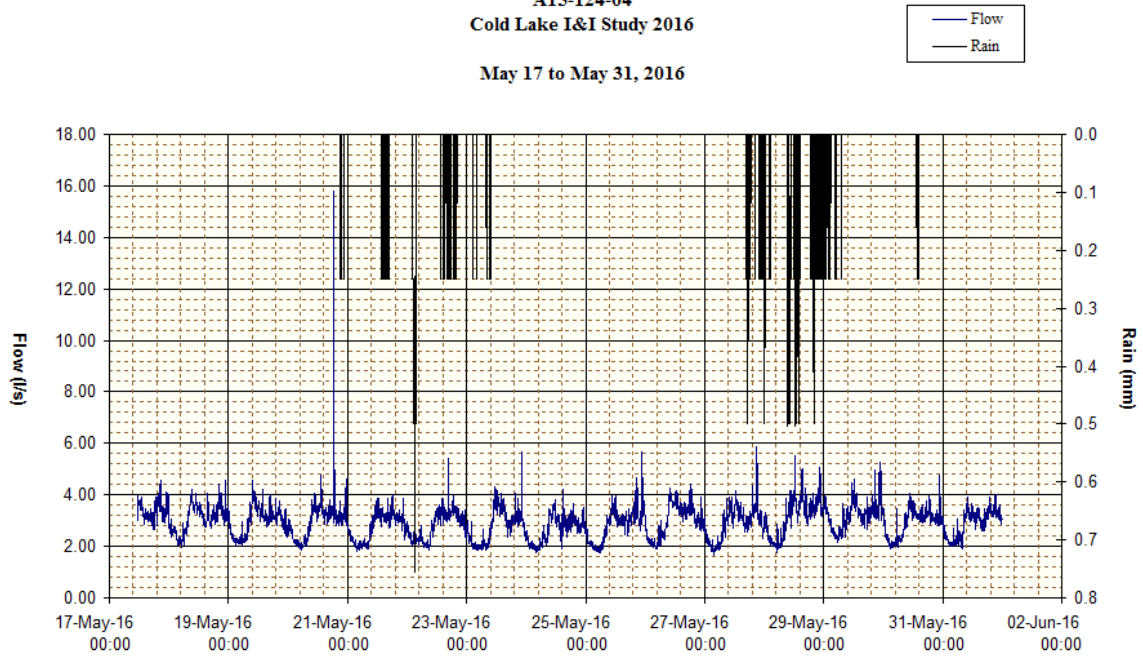
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Sep-16	12.15	7.78	16.76	1050.04	0.0
02-Sep-16	11.94	7.08	17.79	1031.26	0.0
03-Sep-16	12.60	8.39	16.98	1088.89	10.5
04-Sep-16	12.62	8.03	17.30	1090.17	0.0
05-Sep-16	13.10	5.60	18.71	1131.87	0.0
06-Sep-16	12.84	6.96	18.30	1109.46	5.8
07-Sep-16	12.88	7.38	17.48	1112.90	0.3
08-Sep-16	12.89	6.82	18.50	1113.80	0.0
09-Sep-16	12.62	7.79	17.23	1090.31	0.0
10-Sep-16	12.88	7.73	17.75	1112.74	0.3
11-Sep-16	13.71	6.39	18.84	1184.57	2.0
12-Sep-16	13.13	6.26	19.44	1134.50	0.0
13-Sep-16	13.55	8.06	18.47	1170.43	0.0
14-Sep-16	13.20	7.81	19.25	1140.90	0.0
15-Sep-16	13.37	6.63	18.40	1155.02	0.0
16-Sep-16	12.80	6.74	17.24	1106.33	0.0
17-Sep-16	13.27	7.21	19.31	1146.30	0.0
18-Sep-16	13.56	4.99	18.80	1171.73	3.0
19-Sep-16	12.26	6.76	18.46	1059.36	0.0
20-Sep-16	12.49	6.18	17.91	1079.19	0.0
21-Sep-16	12.72	8.04	18.62	1099.15	0.0
22-Sep-16	12.26	7.85	17.73	1059.62	0.0
23-Sep-16	12.52	6.61	15.90	1081.89	0.0
24-Sep-16	12.43	7.64	15.83	1074.05	0.0
25-Sep-16	12.74	7.49	17.33	1100.32	0.0
26-Sep-16	12.15	7.84	16.94	1049.57	0.0
27-Sep-16	11.68	6.67	16.73	1009.52	0.8
28-Sep-16	11.47	5.58	17.75	990.58	0.0
29-Sep-16	11.40	5.16	16.43	984.74	0.0
30-Sep-16	11.24	5.62	14.67	970.89	3.3
01-Oct-16	11.92	4.44	20.48	1029.47	17.3
02-Oct-16	11.96	7.02	15.97	1033.57	0.5
03-Oct-16	11.57	6.43	16.38	999.94	0.3
04-Oct-16	12.20	12.20	12.20	1054.43	0.0
05-Oct-16	12.20	12.20	12.20	1054.43	0.3

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
37871.922	4.435	20.481	44.0

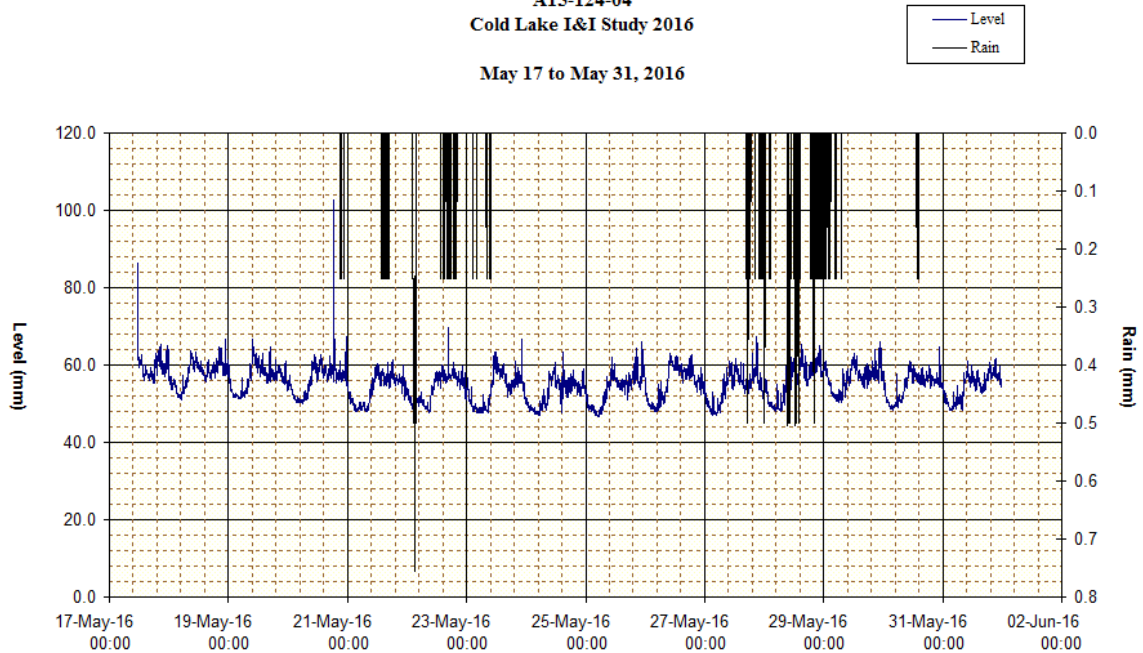
ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016

May 17 to May 31, 2016

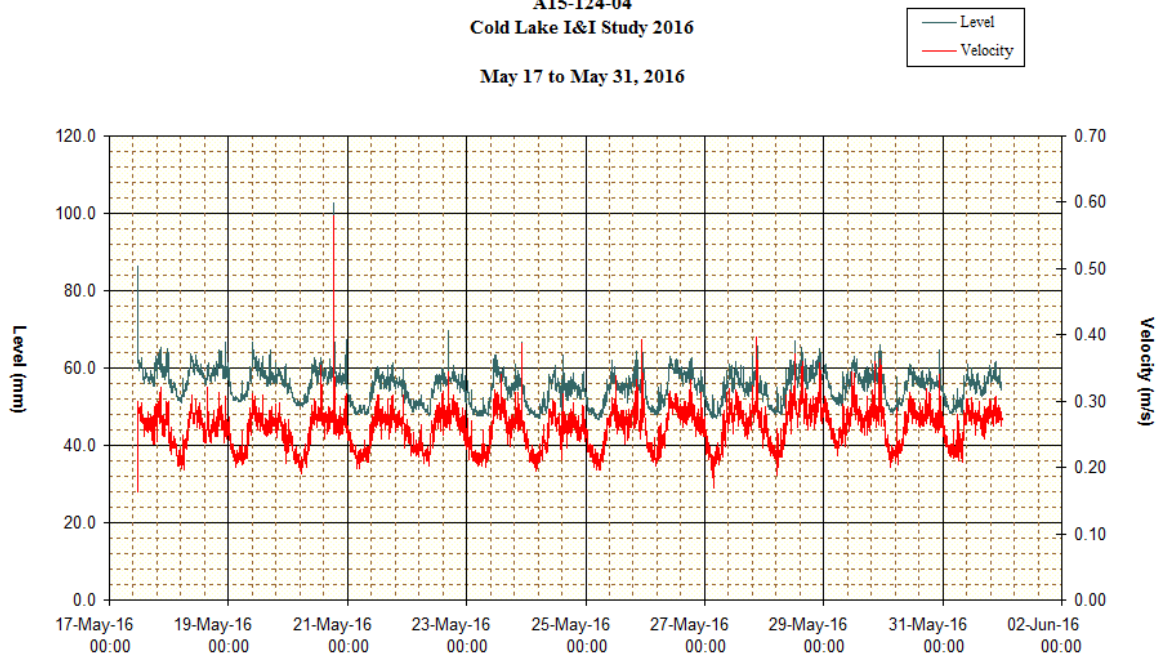


ISL Engineering Ltd.
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Cold Lake I&I Study 2016

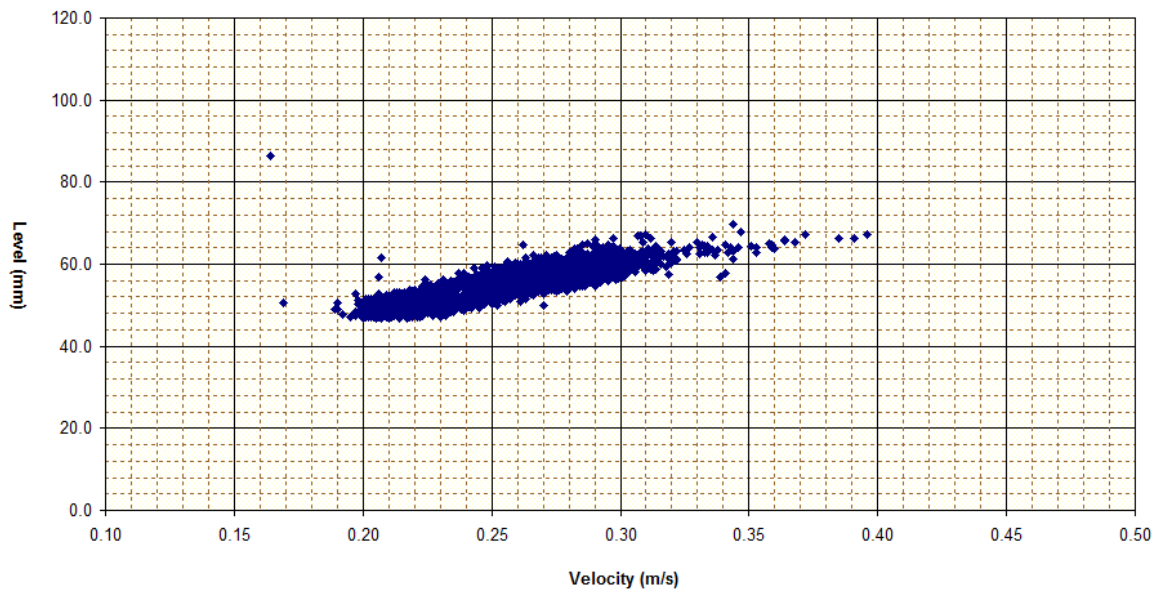
May 17 to May 31, 2016



ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016
May 17 to May 31, 2016



ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016
May 17 to May 31, 2016



ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016

May 17 to May 31, 2016

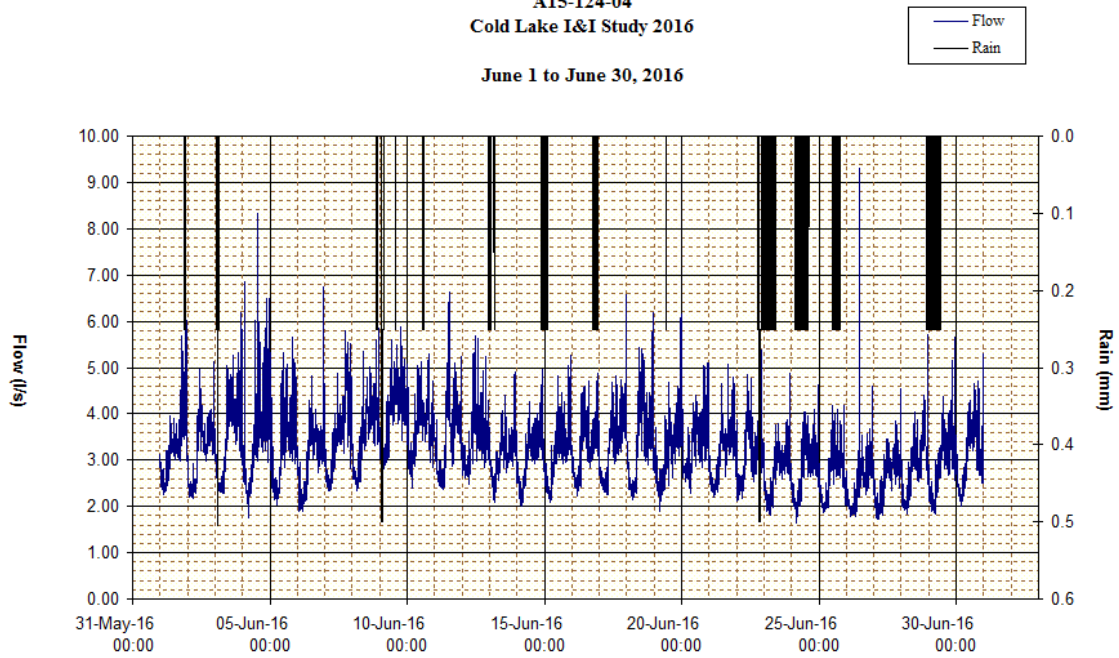
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
17-May-16	3.37	2.64	4.57	291.09	0.0
18-May-16	3.10	1.97	4.55	267.64	0.0
19-May-16	2.96	2.04	4.55	255.92	0.0
20-May-16	2.98	1.86	15.79	257.53	1.5
21-May-16	2.76	1.82	4.03	238.66	3.8
22-May-16	2.80	1.84	5.40	241.52	9.8
23-May-16	2.77	1.85	5.61	239.47	2.0
24-May-16	2.65	1.74	4.23	229.27	0.0
25-May-16	2.81	1.76	5.69	243.01	0.0
26-May-16	2.99	1.88	4.42	258.12	0.0
27-May-16	2.85	1.66	5.88	246.53	4.5
28-May-16	3.14	1.77	5.52	271.25	22.0
29-May-16	3.20	2.17	5.26	276.72	3.0
30-May-16	2.92	1.89	4.79	252.35	0.5
31-May-16	2.90	1.92	4.02	250.41	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
3819.504	1.663	15.790	47.0

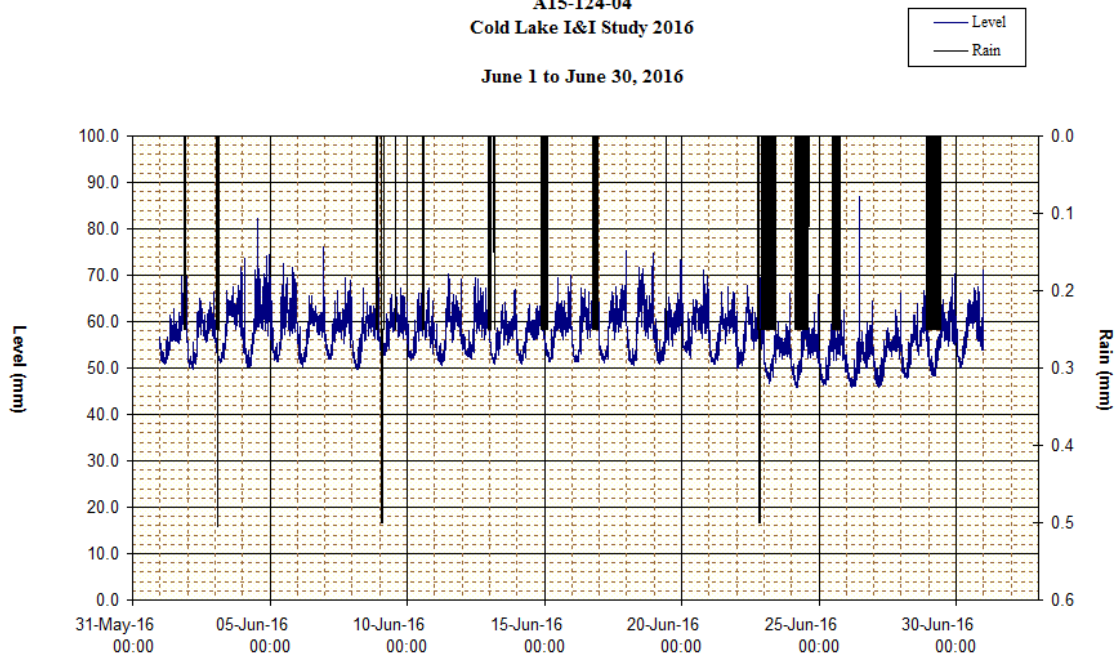
ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016

June 1 to June 30, 2016



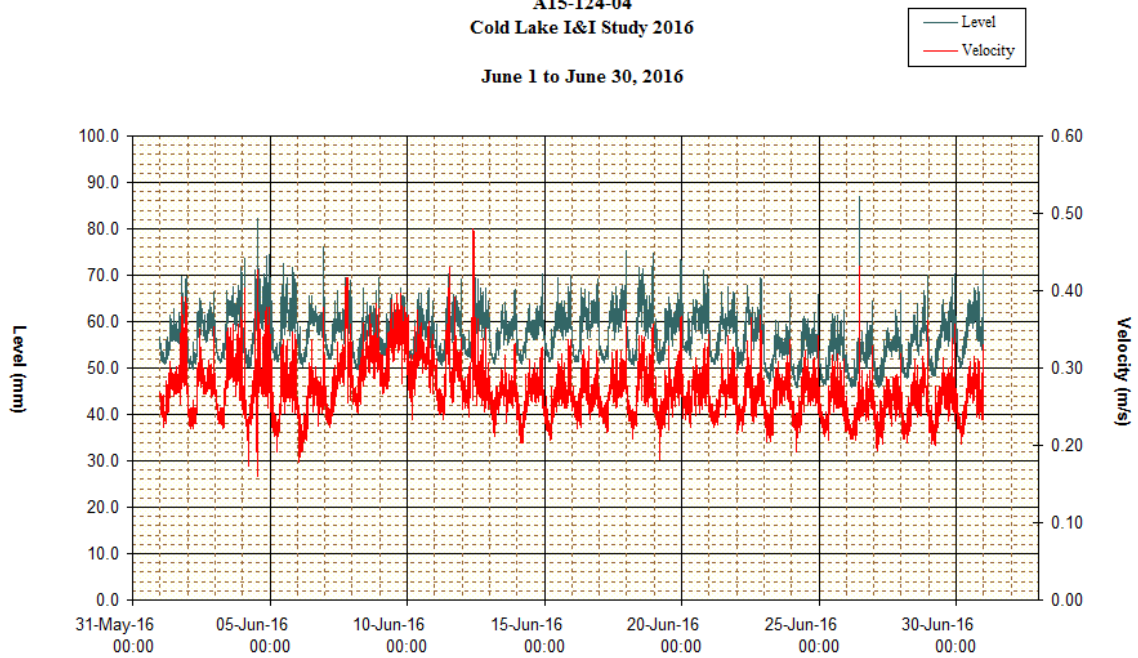
ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016

June 1 to June 30, 2016



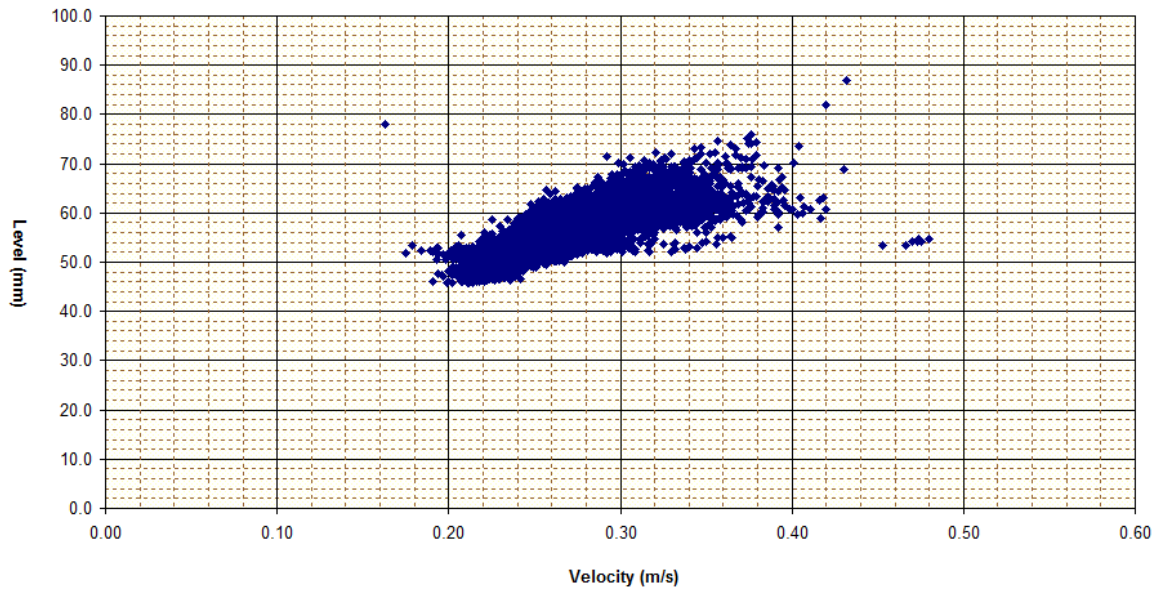
ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016

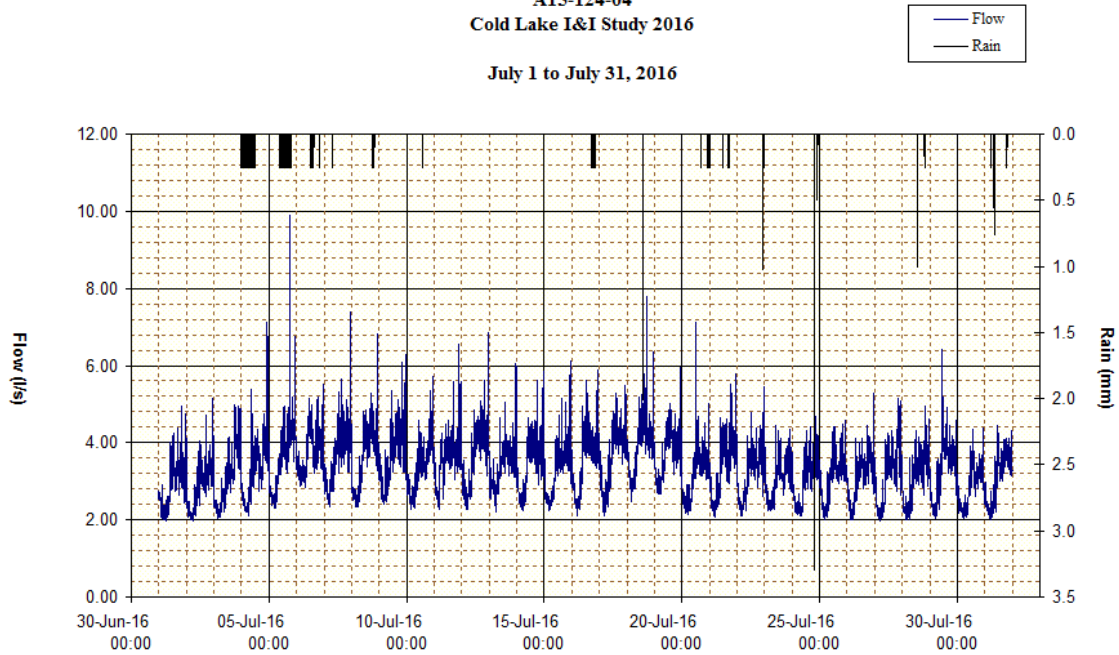
June 1 to June 30, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-16	3.30	2.27	6.07	284.88	1.0
02-Jun-16	3.19	2.17	5.09	275.49	0.0
03-Jun-16	3.49	2.28	6.19	301.35	4.0
04-Jun-16	3.54	1.79	8.30	305.57	0.0
05-Jun-16	3.31	2.02	5.60	285.56	0.0
06-Jun-16	3.05	1.89	6.66	263.77	0.0
07-Jun-16	3.53	2.33	5.77	305.15	0.0
08-Jun-16	3.59	2.33	5.86	310.09	2.5
09-Jun-16	4.00	2.73	5.86	345.88	8.5
10-Jun-16	3.70	2.39	5.30	319.54	0.5
11-Jun-16	3.58	2.36	6.62	309.56	0.0
12-Jun-16	3.47	2.47	5.64	299.90	2.0
13-Jun-16	3.12	2.10	4.90	269.90	1.5
14-Jun-16	3.10	2.02	4.97	267.58	2.5
15-Jun-16	3.12	2.09	5.23	269.68	4.3
16-Jun-16	3.27	2.23	4.86	282.69	3.3
17-Jun-16	3.36	2.25	6.54	290.64	0.0
18-Jun-16	3.40	2.14	6.18	293.88	0.0
19-Jun-16	3.17	1.90	6.14	273.48	0.3
20-Jun-16	3.36	2.29	5.09	290.32	0.0
21-Jun-16	3.14	2.21	5.06	271.59	0.0
22-Jun-16	3.17	2.12	5.70	273.88	12.0
23-Jun-16	2.77	1.82	4.87	239.27	14.5
24-Jun-16	2.83	1.64	4.64	244.73	13.8
25-Jun-16	2.70	1.86	4.18	233.03	4.5
26-Jun-16	2.53	1.78	9.31	218.41	0.0
27-Jun-16	2.59	1.72	4.52	224.03	0.0
28-Jun-16	2.87	1.85	5.71	247.87	2.5
29-Jun-16	2.96	1.83	5.66	255.38	8.8
30-Jun-16	3.10	2.00	5.26	268.07	0.0

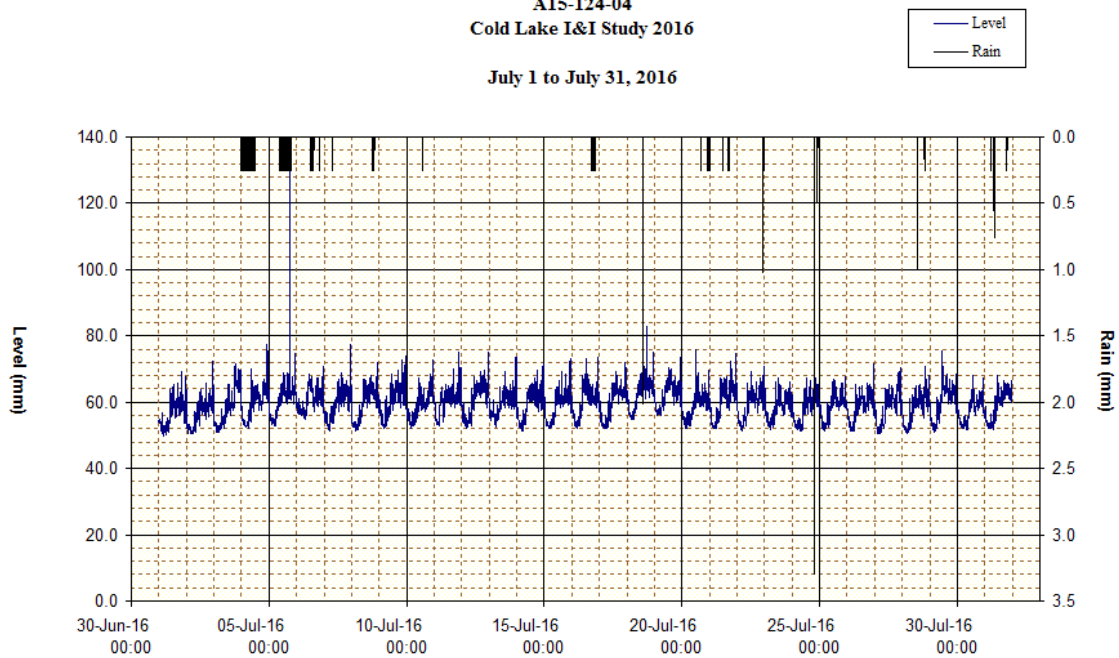
Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
8321.182	1.643	9.308	86.3

ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016
July 1 to July 31, 2016

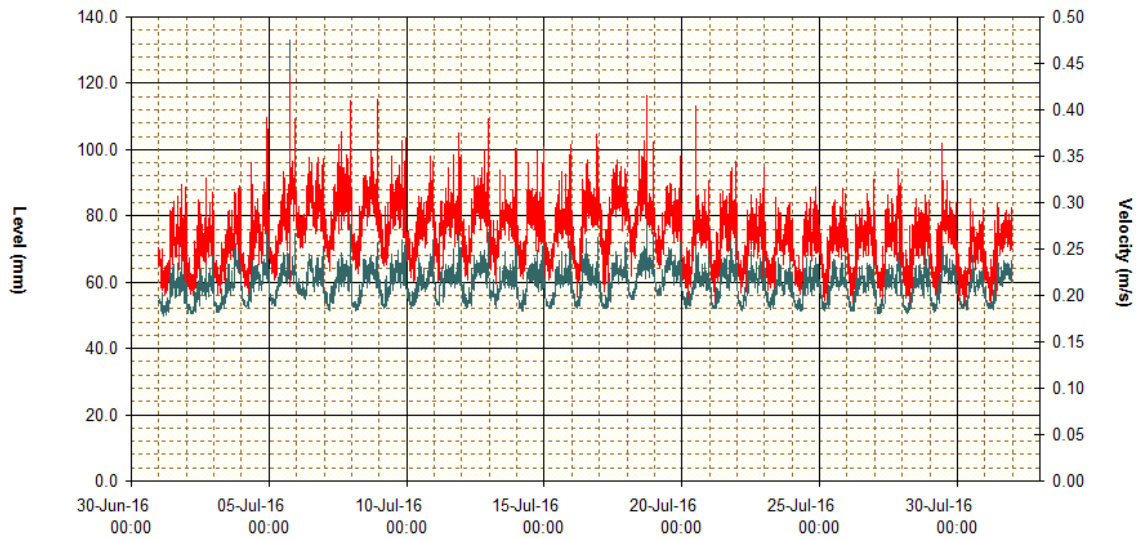
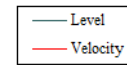


ISL Engineering Ltd.
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Cold Lake I&I Study 2016
July 1 to July 31, 2016



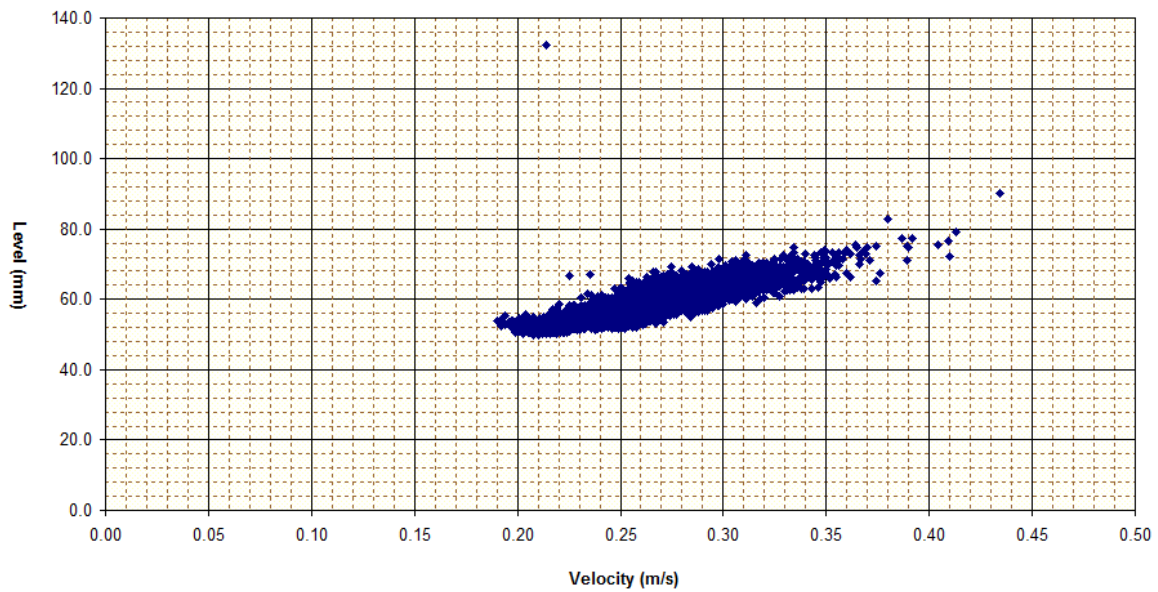
ISL Engineering Ltd.
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July 1 to July 31, 2016



ISL Engineering Ltd.
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July 1 to July 31, 2016



ISL Engineering Ltd.
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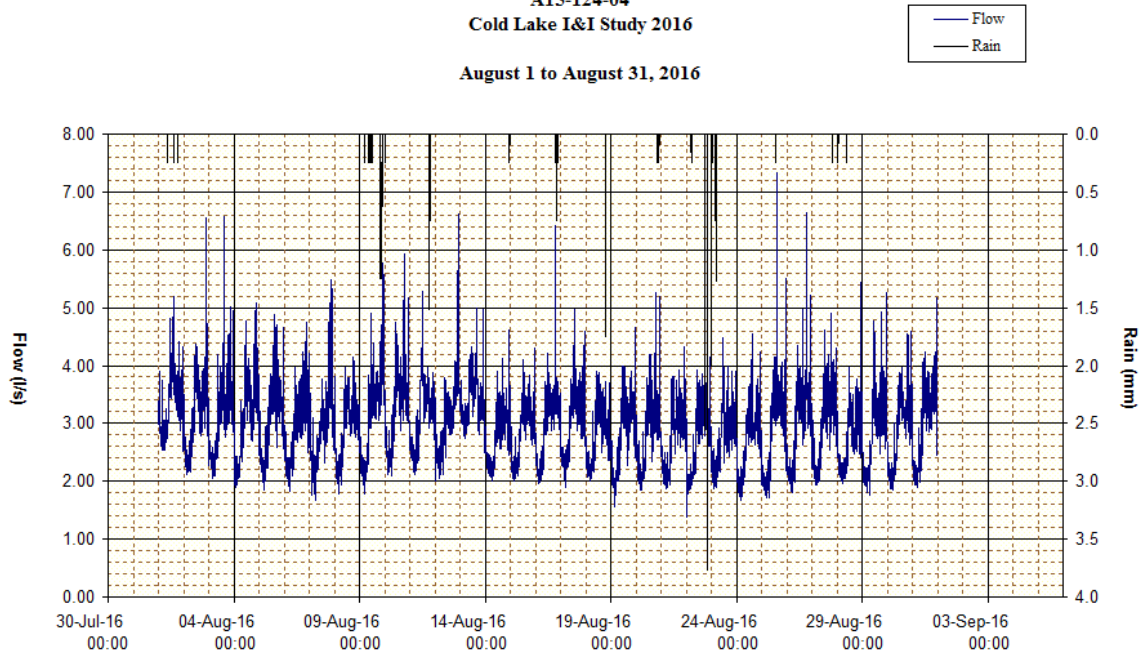
July 1 to July 31, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	2.87	1.98	4.96	248.19	0.0
02-Jul-16	2.87	1.98	5.15	247.65	0.0
03-Jul-16	3.07	2.03	4.99	264.93	0.5
04-Jul-16	3.30	2.11	7.13	285.09	9.0
05-Jul-16	3.60	2.30	9.83	310.62	8.3
06-Jul-16	3.77	2.84	5.47	326.15	2.5
07-Jul-16	3.59	2.35	7.36	309.98	0.3
08-Jul-16	3.57	2.33	6.74	308.83	1.3
09-Jul-16	3.60	2.41	6.26	310.95	0.0
10-Jul-16	3.36	2.28	5.72	290.74	0.3
11-Jul-16	3.56	2.26	6.53	307.76	0.0
12-Jul-16	3.62	2.28	6.81	312.94	0.0
13-Jul-16	3.42	2.20	6.05	295.29	0.0
14-Jul-16	3.38	2.23	5.82	292.38	0.0
15-Jul-16	3.32	2.24	6.07	287.07	0.0
16-Jul-16	3.56	2.10	5.87	307.23	1.8
17-Jul-16	3.63	2.11	5.46	313.61	0.0
18-Jul-16	3.91	2.48	7.80	337.50	2.8
19-Jul-16	3.68	2.67	5.94	317.54	0.0
20-Jul-16	3.19	2.13	7.13	275.81	1.0
21-Jul-16	3.37	2.06	5.78	291.34	1.8
22-Jul-16	3.16	2.10	5.41	273.42	2.5
23-Jul-16	3.07	2.23	4.43	265.24	0.0
24-Jul-16	3.05	2.10	4.65	263.41	11.8
25-Jul-16	3.10	2.02	4.58	267.78	0.0
26-Jul-16	3.09	2.00	5.29	266.63	0.0
27-Jul-16	3.11	1.96	5.15	268.50	0.0
28-Jul-16	3.05	1.99	4.96	263.40	1.3
29-Jul-16	3.29	2.05	6.41	284.57	0.0
30-Jul-16	2.84	2.04	4.37	245.65	0.0
31-Jul-16	3.09	2.02	4.42	267.11	3.3

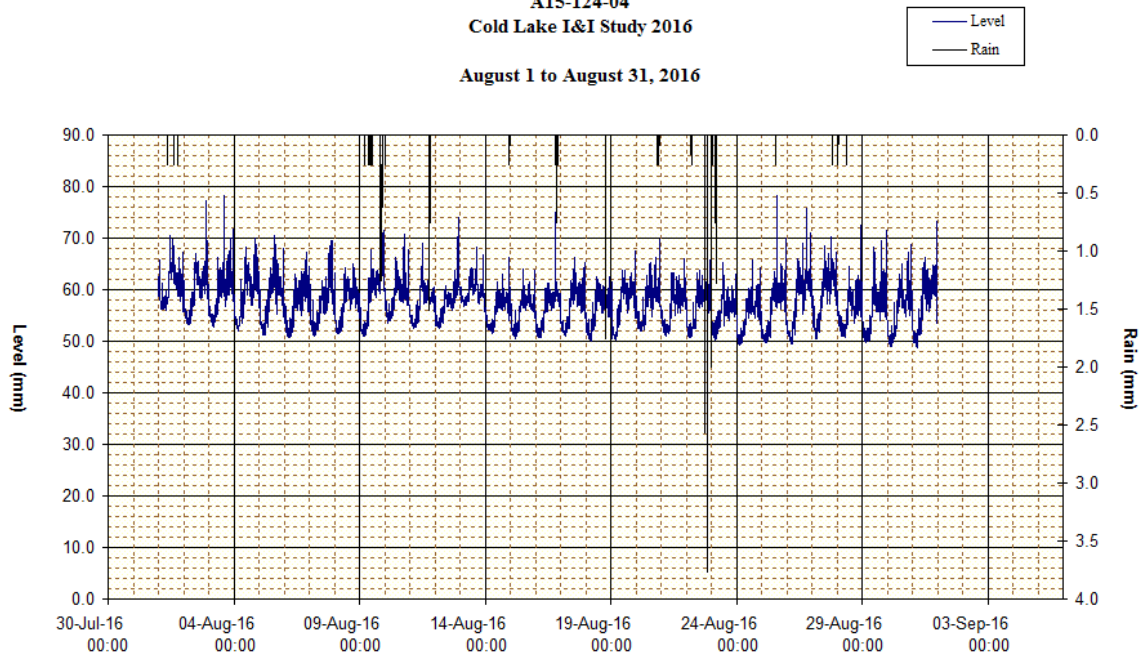
Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
8907.297	1.956	9.831	48.0

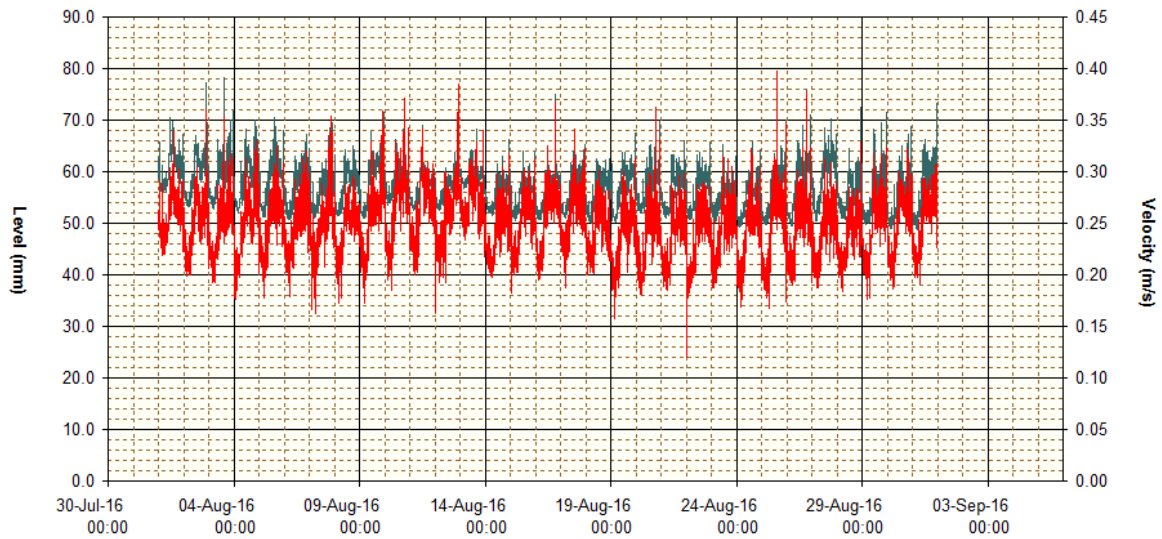
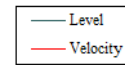
ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016
August 1 to August 31, 2016



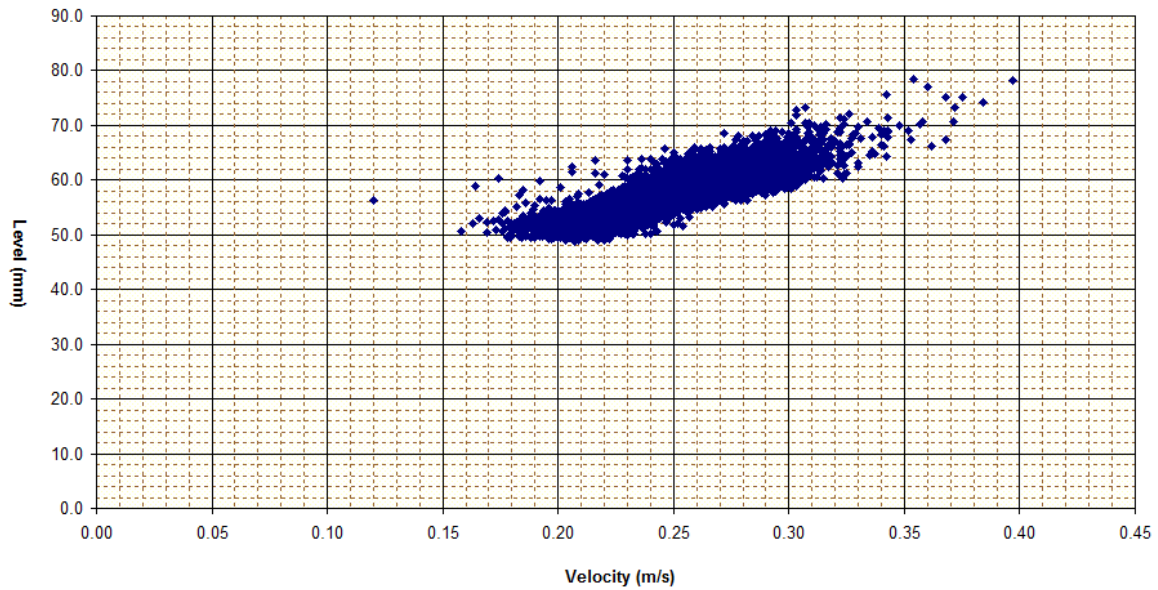
ISL Engineering Ltd.
A15-124-04
Cold Lake I&I Study 2016
August 1 to August 31, 2016



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A15-124-04
Cold Lake I&I Study 2016

August 1 to August 31, 2016

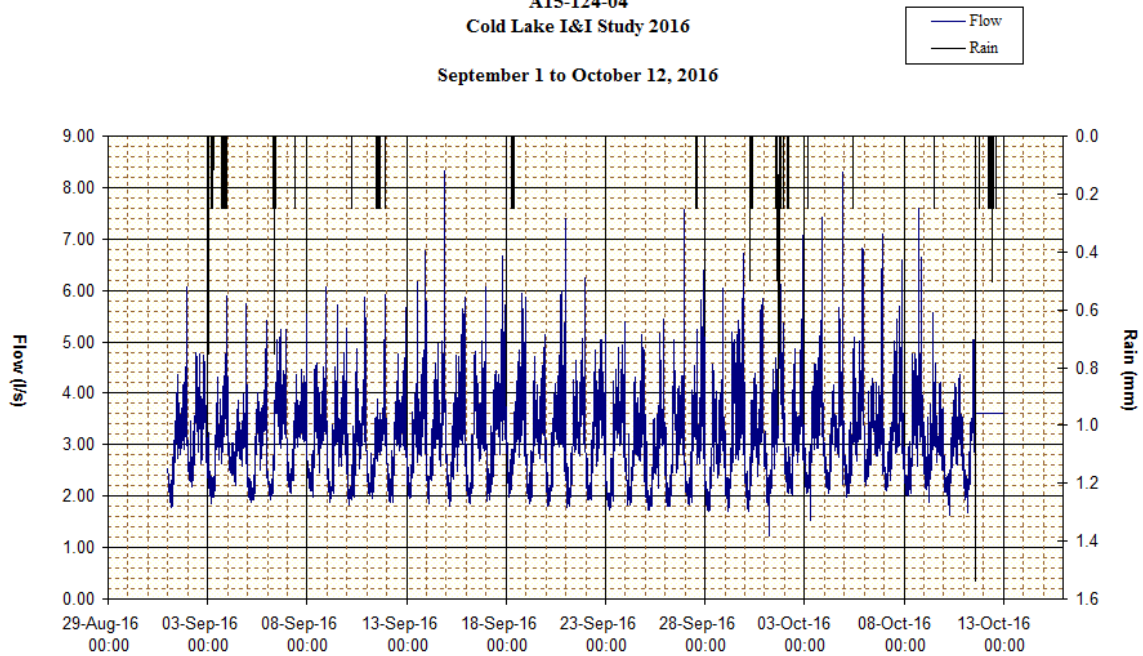
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	3.32	2.53	5.19	286.82	1.3
02-Aug-16	3.12	2.13	6.54	269.61	0.0
03-Aug-16	3.11	2.06	6.57	268.83	0.0
04-Aug-16	3.10	1.90	5.05	268.07	0.0
05-Aug-16	3.05	1.85	4.87	263.10	0.0
06-Aug-16	2.90	1.83	4.75	250.60	0.0
07-Aug-16	2.90	1.67	5.44	250.14	0.0
08-Aug-16	2.94	1.81	4.15	254.24	0.0
09-Aug-16	3.15	1.78	5.72	272.59	17.8
10-Aug-16	3.26	2.11	5.93	281.48	0.3
11-Aug-16	3.12	2.11	5.27	269.96	3.3
12-Aug-16	3.11	2.02	6.58	268.32	0.0
13-Aug-16	3.40	2.49	5.00	293.87	0.0
14-Aug-16	2.79	2.01	4.61	241.03	0.3
15-Aug-16	2.88	2.00	4.31	248.50	0.0
16-Aug-16	2.98	1.97	6.42	257.29	1.3
17-Aug-16	3.03	1.90	4.95	261.93	0.0
18-Aug-16	2.78	2.00	3.90	240.24	5.3
19-Aug-16	2.81	1.56	4.65	242.59	0.0
20-Aug-16	2.85	1.85	5.25	246.65	0.8
21-Aug-16	2.77	1.88	4.32	238.92	0.0
22-Aug-16	2.77	1.38	4.12	239.15	10.5
23-Aug-16	2.78	1.87	4.47	240.00	7.3
24-Aug-16	2.70	1.66	4.55	233.10	0.0
25-Aug-16	2.88	1.71	7.33	249.13	0.3
26-Aug-16	2.99	1.81	6.56	258.68	0.0
27-Aug-16	2.94	1.93	4.91	253.79	0.3
28-Aug-16	2.75	1.96	5.38	237.67	1.0
29-Aug-16	2.85	1.76	5.22	246.31	0.0
30-Aug-16	2.87	1.85	4.56	248.27	0.0
31-Aug-16	2.99	1.89	5.18	258.53	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
7939.423	1.383	7.334	49.3

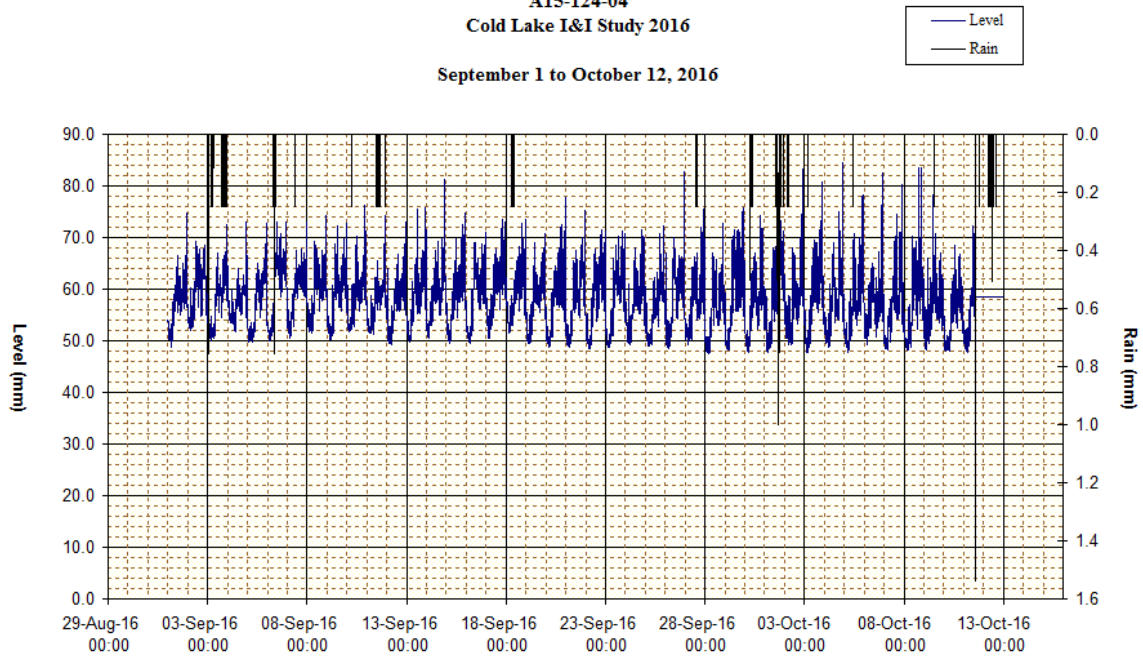
ISL Engineering Ltd.
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September 1 to October 12, 2016



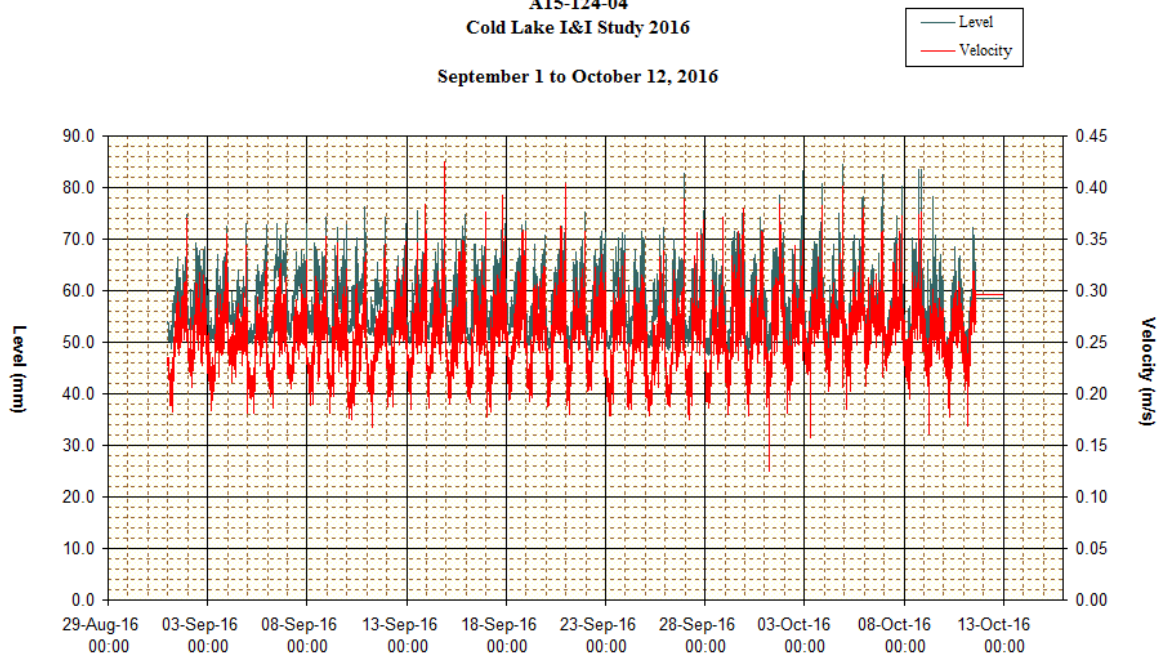
ISL Engineering Ltd.
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September 1 to October 12, 2016



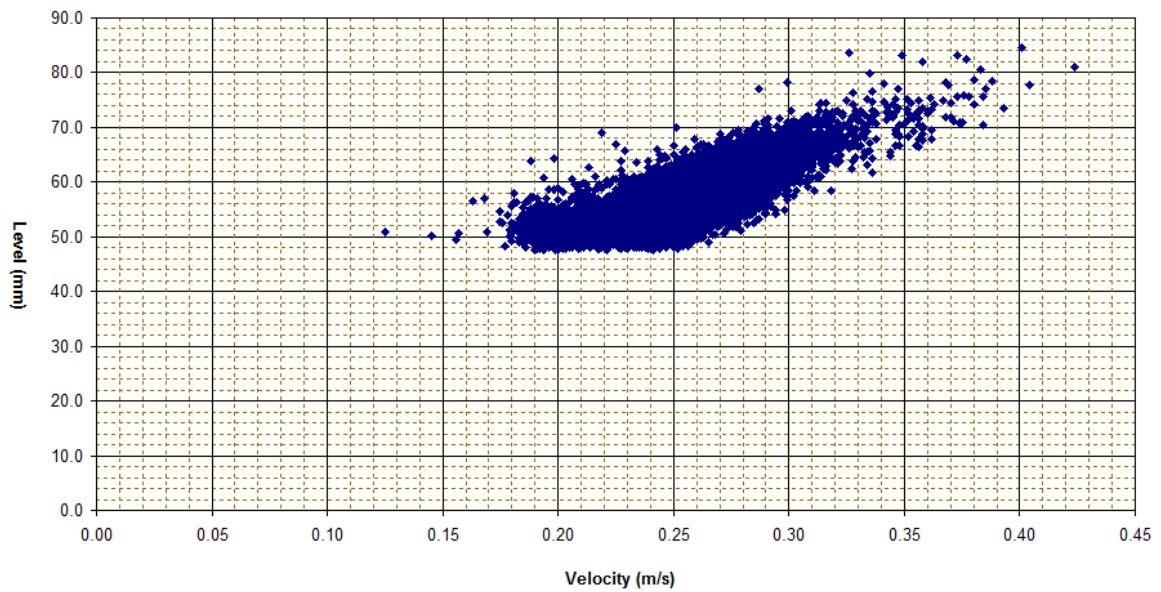
ISL Engineering Ltd.
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Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-16	3.03	1.78	6.04	261.42	0.0
02-Sep-16	3.19	2.18	4.79	275.47	0.0
03-Sep-16	3.01	1.86	5.89	260.09	10.5
04-Sep-16	3.02	2.19	5.72	261.33	0.0
05-Sep-16	2.90	1.89	5.40	250.44	0.0
06-Sep-16	3.26	1.94	5.24	282.00	5.8
07-Sep-16	3.13	2.06	5.51	270.02	0.3
08-Sep-16	3.18	1.98	6.07	275.14	0.0
09-Sep-16	3.07	1.88	5.67	265.46	0.0
10-Sep-16	2.99	1.83	5.87	258.59	0.3
11-Sep-16	2.90	1.97	5.93	250.84	2.0
12-Sep-16	3.10	1.89	5.63	267.83	0.0
13-Sep-16	3.16	1.95	6.77	272.68	0.0
14-Sep-16	3.23	1.85	8.26	278.89	0.0
15-Sep-16	3.14	1.81	5.81	271.68	0.0
16-Sep-16	3.17	1.85	5.99	274.15	0.0
17-Sep-16	3.30	1.91	6.67	285.51	0.0
18-Sep-16	3.25	1.99	5.93	280.65	3.0
19-Sep-16	3.07	1.86	5.15	265.30	0.0
20-Sep-16	3.13	1.81	7.40	270.02	0.0
21-Sep-16	3.10	1.79	6.20	267.74	0.0
22-Sep-16	3.13	1.93	5.14	270.18	0.0
23-Sep-16	3.03	1.72	5.38	261.54	0.0
24-Sep-16	3.00	1.84	5.13	258.82	0.0
25-Sep-16	2.78	1.73	5.41	240.15	0.0
26-Sep-16	3.00	1.79	7.54	259.42	0.0
27-Sep-16	3.04	1.83	6.38	262.29	0.8
28-Sep-16	2.87	1.71	6.00	248.11	0.0
29-Sep-16	3.23	1.70	6.65	279.24	0.0
30-Sep-16	3.01	1.70	5.82	260.12	3.3
01-Oct-16	3.33	1.24	7.09	287.31	17.3
02-Oct-16	3.08	2.02	7.07	266.16	0.5
03-Oct-16	3.28	1.54	7.42	283.20	0.3
04-Oct-16	3.17	2.06	8.30	273.52	0.0
05-Oct-16	3.25	1.97	6.80	280.76	0.3
06-Oct-16	3.16	2.21	7.08	273.36	0.0
07-Oct-16	3.24	2.11	6.58	279.67	0.0
08-Oct-16	3.16	2.01	7.54	273.30	0.0
09-Oct-16	2.99	1.89	5.53	258.60	0.3
10-Oct-16	2.84	1.63	4.37	245.32	0.0

11-Oct-16	3.15	1.68	5.04	272.08	3.0
12-Oct-16	3.60	3.60	3.60	311.21	2.3

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
11289.604	1.239	8.299	49.5



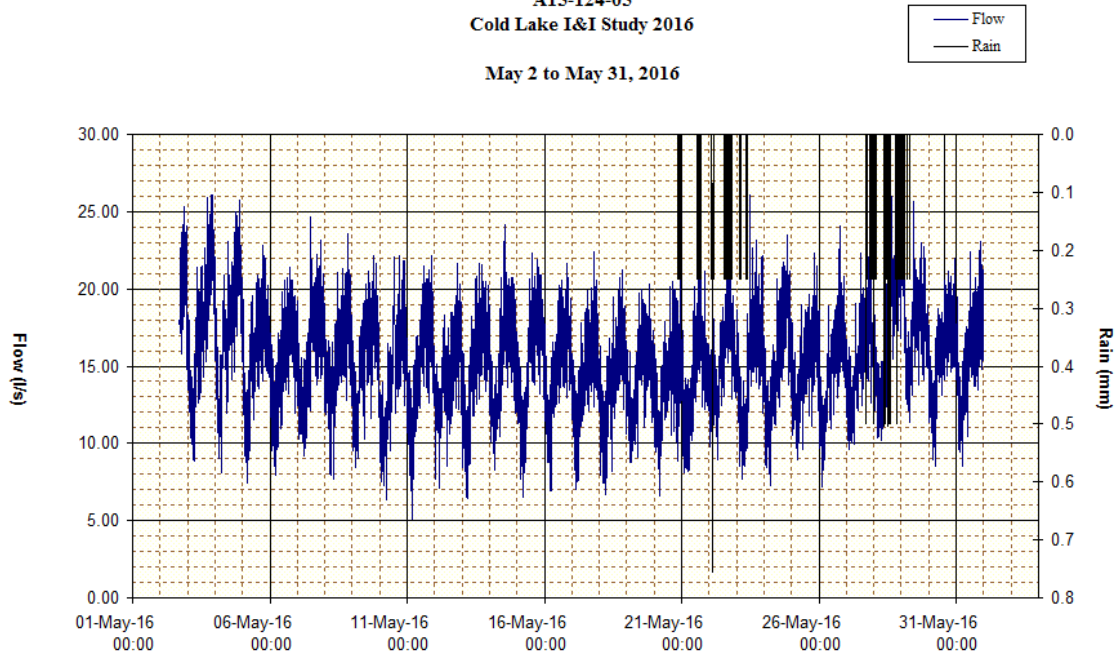
LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

DATE:	NOTES:
29-Apr-16	Slow flow. May need to add weir after first maintenance trip after review of data set.
19-Jul-16	No velocity Offset sensor to 5:00 and set zero level offset, did level adjust
18-Aug-16	Swapped sensor. Benching deteriorating and infiltration is worse than prior visits.

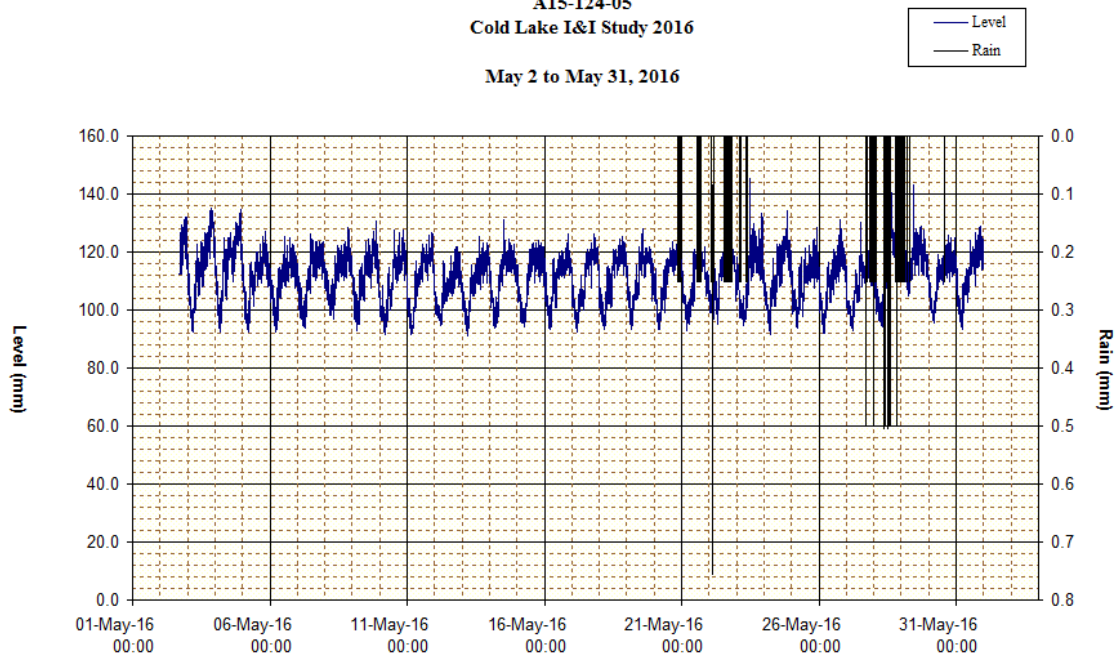
ISL Engineering Ltd.
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May 2 to May 31, 2016



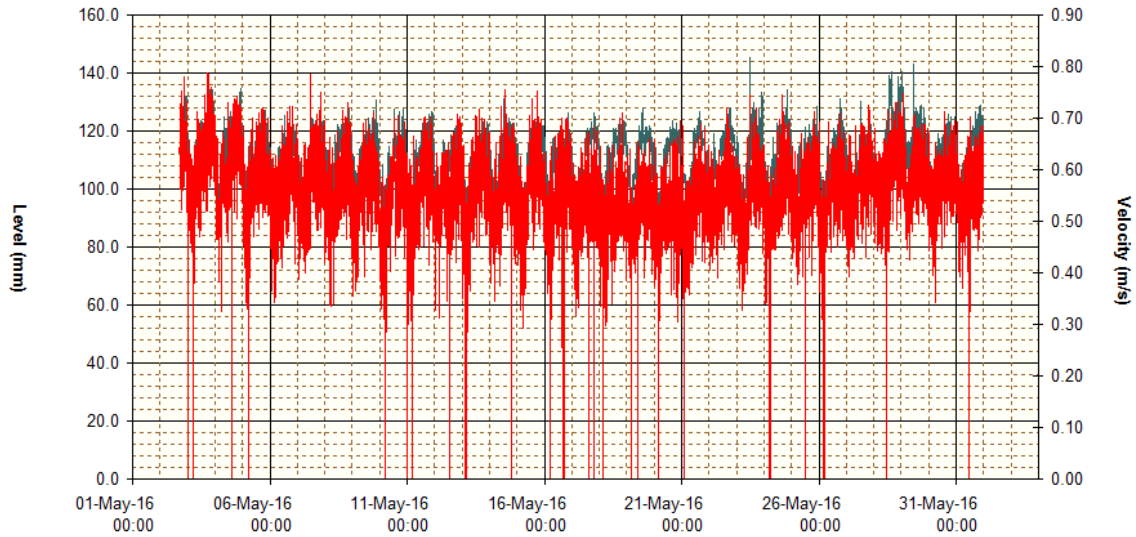
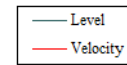
ISL Engineering Ltd.
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Cold Lake I&I Study 2016

May 2 to May 31, 2016



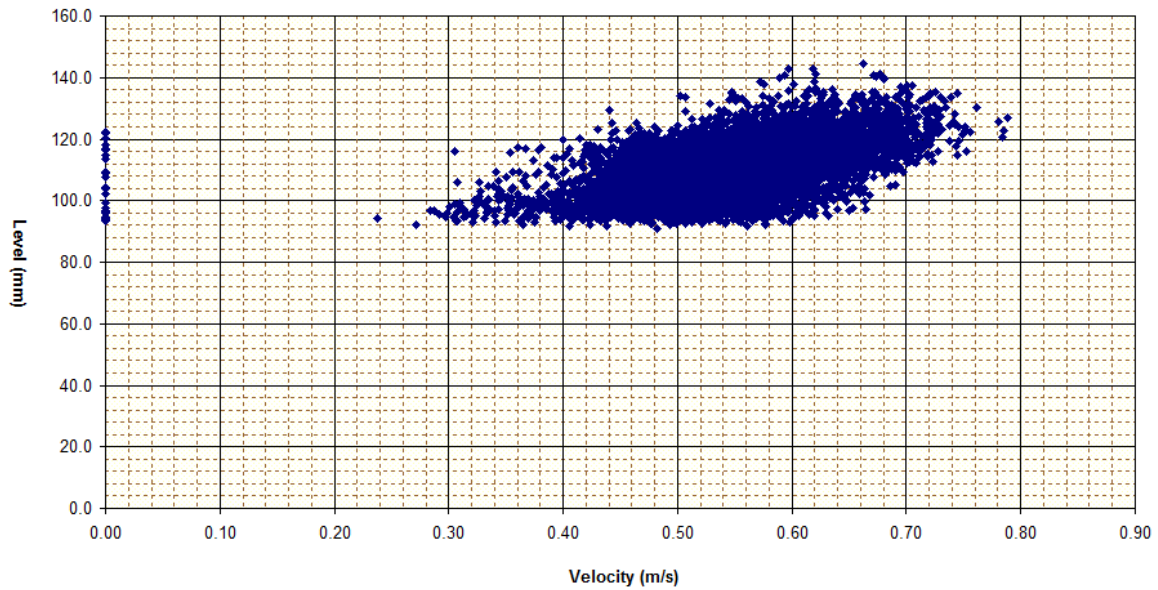
ISL Engineering Ltd.
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Cold Lake I&I Study 2016

May 2 to May 31, 2016



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Cold Lake I&I Study 2016

May 2 to May 31, 2016



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A15-124-05
Cold Lake I&I Study 2016

May 2 to May 31, 2016

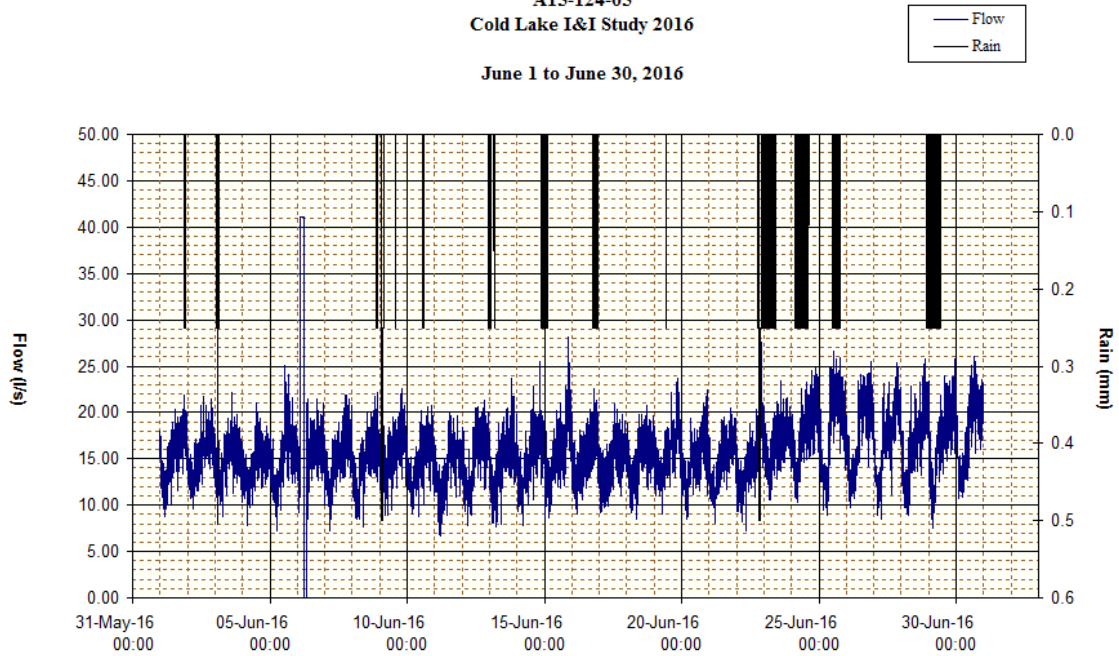
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
02-May-16	20.32	14.75	25.35	1755.96	0.0
03-May-16	17.71	8.88	26.10	1529.79	0.0
04-May-16	17.44	8.10	25.72	1507.16	0.0
05-May-16	15.84	7.45	22.73	1368.29	0.0
06-May-16	15.51	7.97	21.43	1340.01	0.0
07-May-16	15.78	9.18	24.68	1363.36	0.0
08-May-16	15.79	7.68	23.58	1364.42	0.0
09-May-16	15.55	8.45	22.11	1343.09	0.0
10-May-16	14.59	6.46	22.07	1260.97	0.0
11-May-16	14.96	5.16	22.17	1292.85	0.0
12-May-16	14.37	7.13	21.67	1241.47	0.0
13-May-16	14.96	6.40	21.67	1292.81	0.0
14-May-16	15.39	8.26	23.95	1329.91	0.0
15-May-16	15.31	6.49	22.30	1323.05	0.0
16-May-16	14.96	6.91	21.64	1292.13	0.0
17-May-16	14.63	7.10	22.27	1264.21	0.0
18-May-16	14.13	6.66	21.24	1220.81	0.0
19-May-16	14.48	8.78	20.20	1250.77	0.0
20-May-16	14.24	6.59	20.70	1230.72	1.5
21-May-16	14.41	8.10	21.83	1244.60	3.8
22-May-16	15.36	8.97	22.67	1327.25	9.8
23-May-16	15.46	7.71	26.04	1335.62	2.0
24-May-16	15.34	7.26	23.46	1325.32	0.0
25-May-16	15.00	8.90	22.20	1296.26	0.0
26-May-16	14.92	7.18	24.11	1289.21	0.0
27-May-16	15.37	9.58	22.33	1327.67	4.5
28-May-16	17.15	10.17	25.90	1481.43	22.0
29-May-16	17.92	11.48	26.58	1548.45	3.0
30-May-16	15.75	8.51	21.94	1361.22	0.5
31-May-16	15.63	8.54	23.06	1350.50	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
40459.283	5.162	26.580	47.0

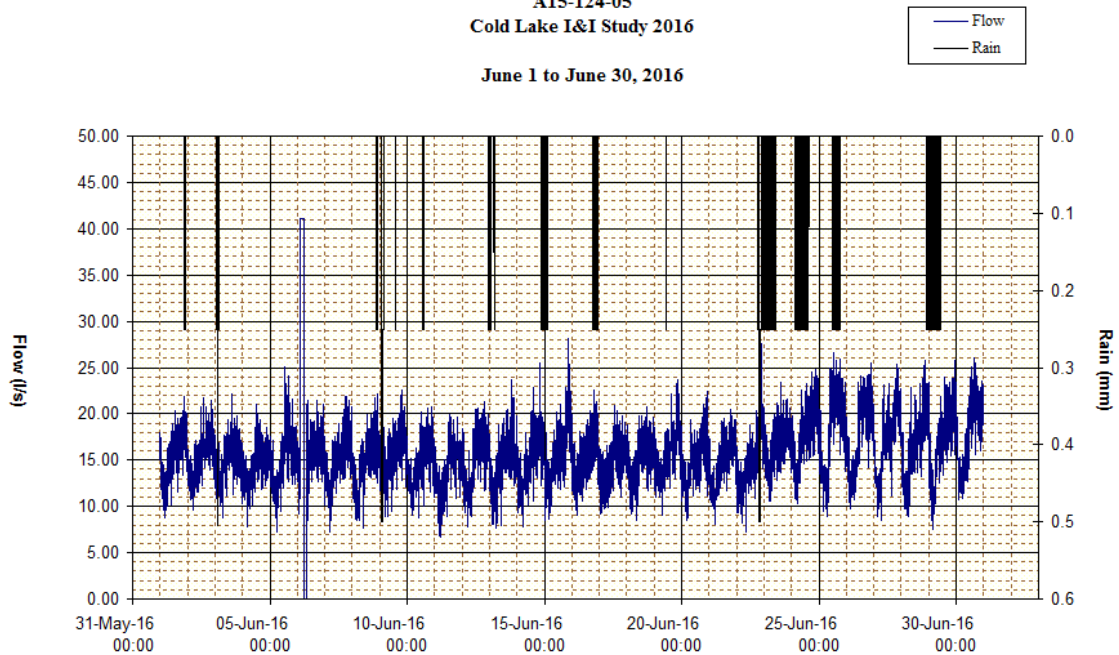
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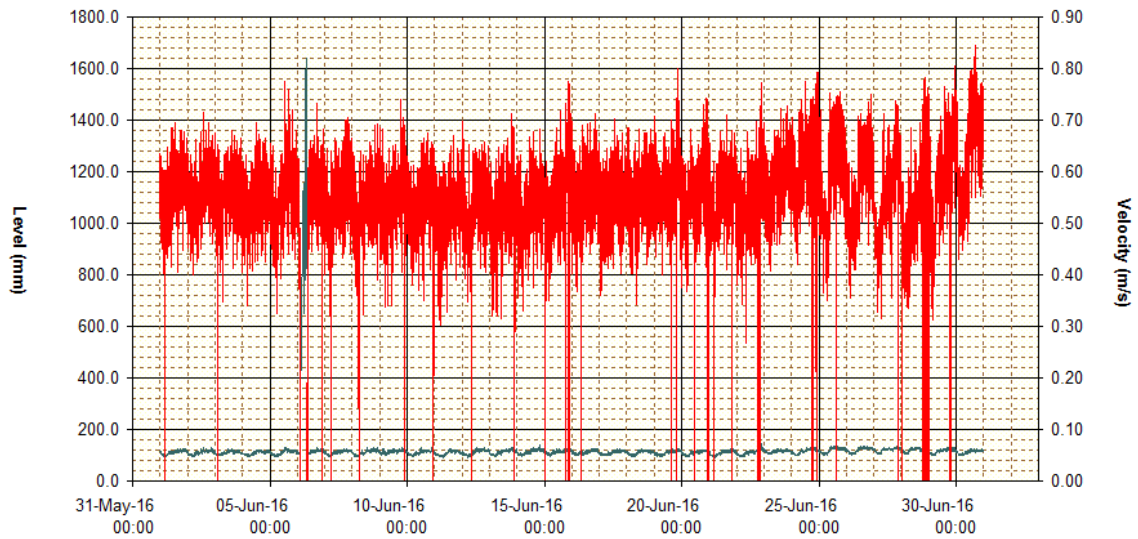
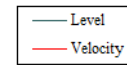
ISL Engineering Ltd.
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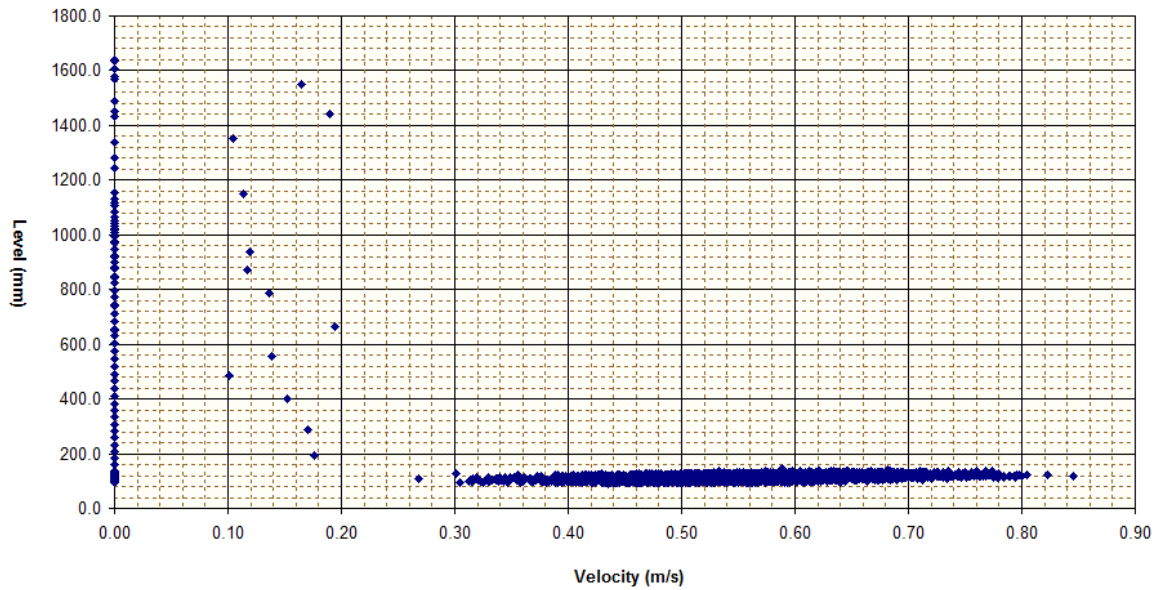
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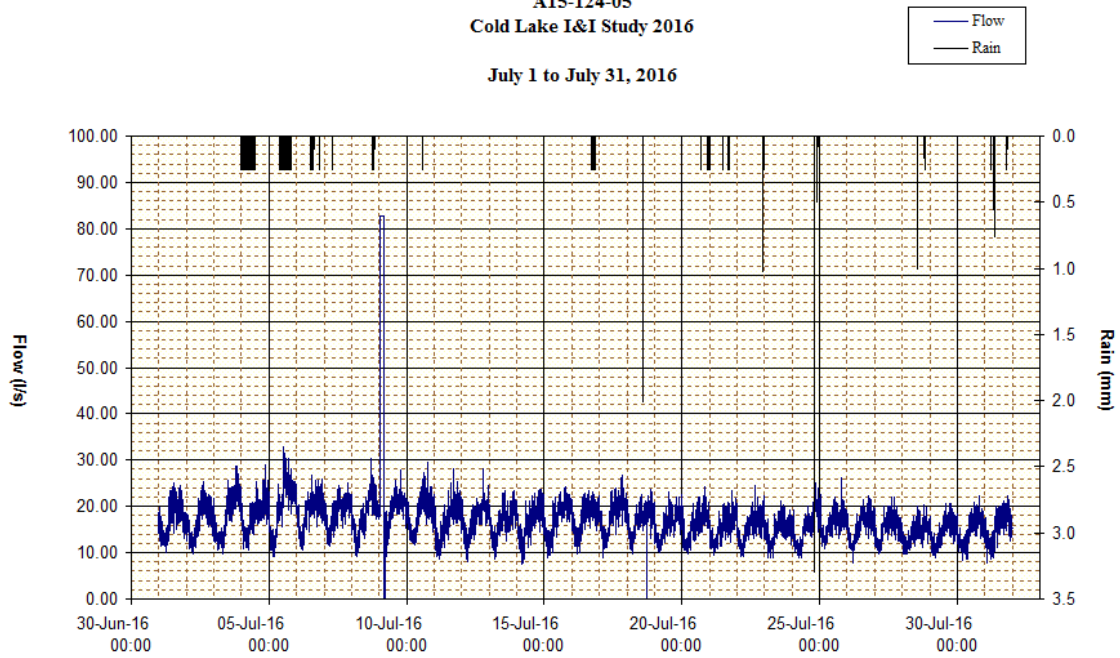
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-16	15.37	8.74	21.92	1327.84	1.0
02-Jun-16	15.32	9.58	21.67	1323.25	0.0
03-Jun-16	15.02	8.74	22.17	1297.32	4.0
04-Jun-16	14.62	7.85	21.09	1262.94	0.0
05-Jun-16	15.13	7.25	24.94	1307.31	0.0
06-Jun-16	18.06	-14.47	41.14	1560.58	0.0
07-Jun-16	14.96	7.39	21.91	1292.73	0.0
08-Jun-16	14.79	7.65	21.96	1277.85	2.5
09-Jun-16	15.79	8.88	22.59	1364.06	8.5
10-Jun-16	14.69	8.81	20.75	1269.32	0.5
11-Jun-16	13.93	6.70	19.86	1203.45	0.0
12-Jun-16	14.99	7.75	21.34	1294.84	2.0
13-Jun-16	14.80	7.63	23.62	1278.69	1.5
14-Jun-16	15.08	7.73	25.51	1303.10	2.5
15-Jun-16	15.99	8.56	28.15	1381.70	4.3
16-Jun-16	15.42	9.02	22.38	1331.87	3.3
17-Jun-16	14.97	9.22	20.72	1293.56	0.0
18-Jun-16	15.14	8.51	20.70	1308.44	0.0
19-Jun-16	15.38	9.12	23.73	1328.72	0.3
20-Jun-16	14.89	8.51	22.42	1286.54	0.0
21-Jun-16	14.64	8.06	20.48	1265.07	0.0
22-Jun-16	14.96	7.24	27.58	1292.24	12.0
23-Jun-16	16.50	10.59	23.38	1425.71	14.5
24-Jun-16	17.66	10.32	24.74	1525.42	13.8
25-Jun-16	18.14	8.98	26.64	1567.63	4.5
26-Jun-16	17.73	9.75	25.56	1532.28	0.0
27-Jun-16	17.26	8.52	25.18	1491.54	0.0
28-Jun-16	16.68	8.89	25.66	1440.82	2.5
29-Jun-16	17.18	7.47	25.81	1484.63	8.8
30-Jun-16	18.00	10.70	26.03	1555.10	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
40874.531	-14.471	41.143	86.3

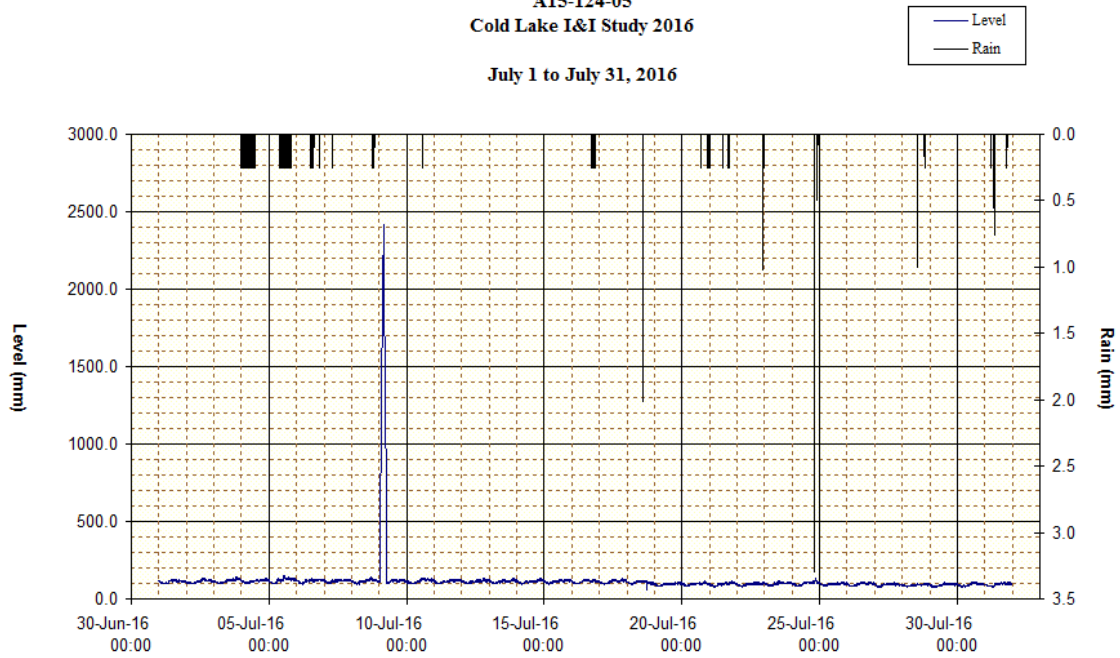
ISL Engineering Ltd.
A15-124-05
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July 1 to July 31, 2016



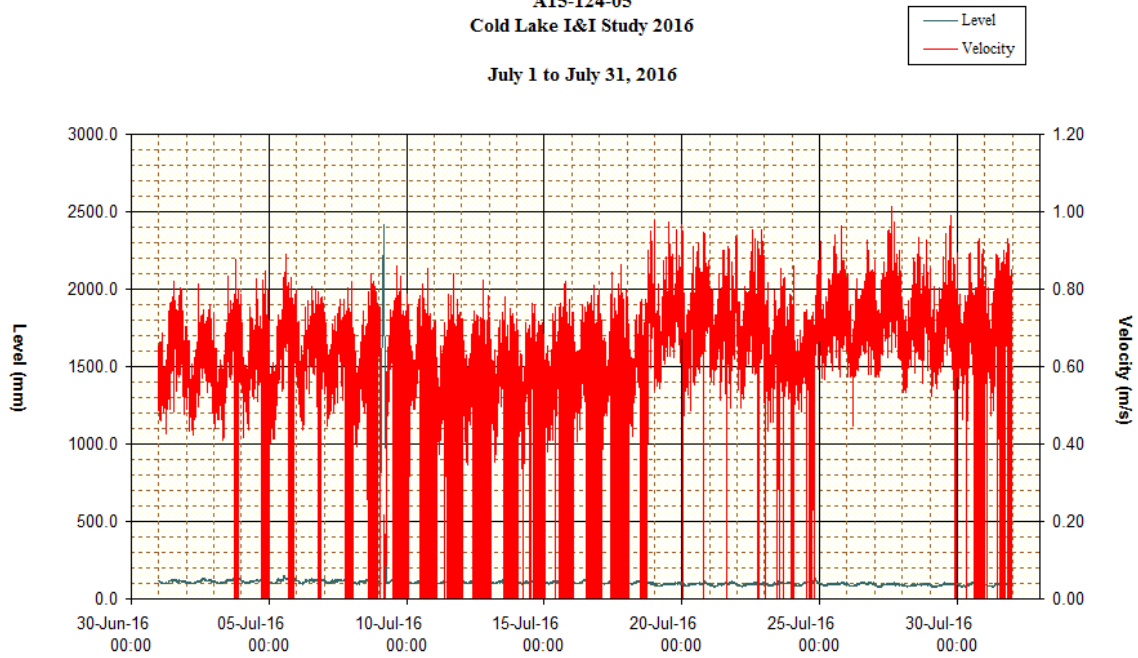
ISL Engineering Ltd.
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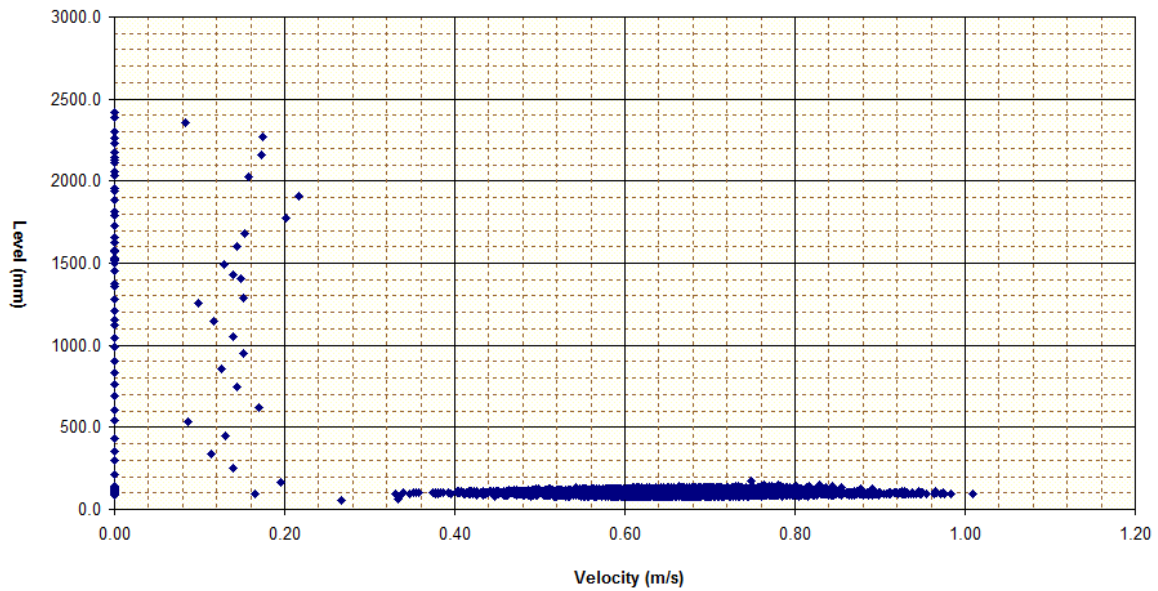
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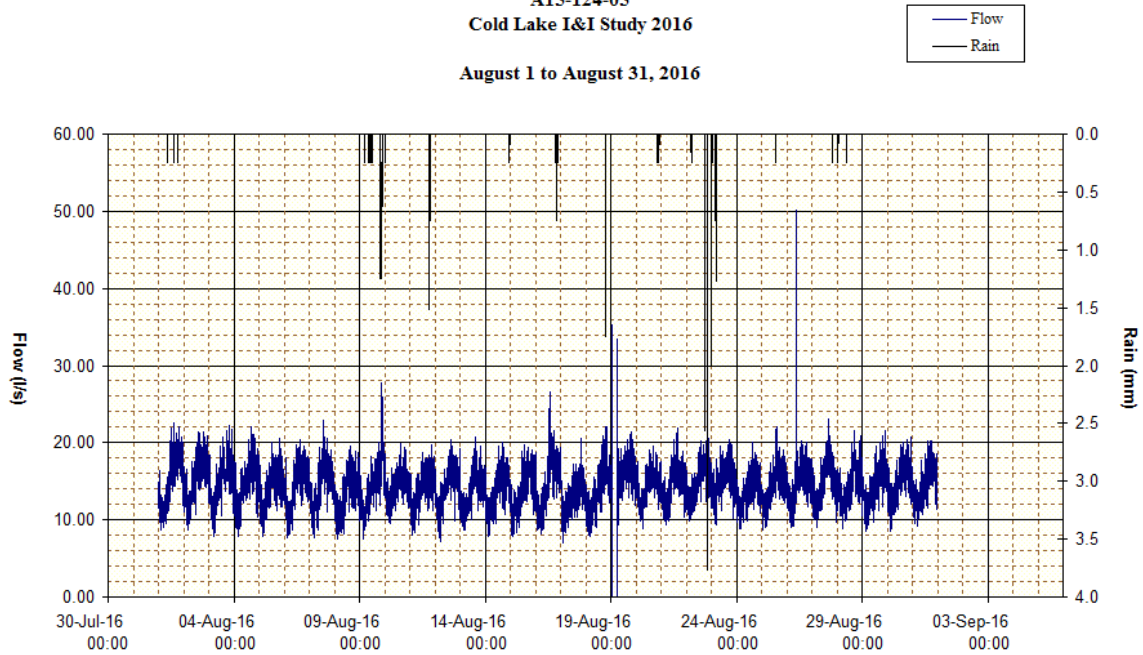
July 1 to July 31, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	17.20	10.05	25.10	1486.20	0.0
02-Jul-16	17.29	9.83	25.22	1494.24	0.0
03-Jul-16	18.26	9.71	28.81	1577.65	0.5
04-Jul-16	18.38	10.57	29.08	1588.32	9.0
05-Jul-16	20.12	9.32	32.92	1738.72	8.3
06-Jul-16	19.04	10.58	26.67	1645.04	2.5
07-Jul-16	18.63	11.46	25.07	1609.86	0.3
08-Jul-16	18.05	9.08	30.31	1559.87	1.3
09-Jul-16	26.94	-10.41	82.70	2327.21	0.0
10-Jul-16	18.55	11.61	29.48	1602.61	0.3
11-Jul-16	17.07	8.65	28.01	1474.59	0.0
12-Jul-16	17.18	7.98	28.16	1484.26	0.0
13-Jul-16	16.72	8.51	23.41	1444.43	0.0
14-Jul-16	16.62	7.49	23.78	1435.85	0.0
15-Jul-16	17.37	8.78	24.21	1501.04	0.0
16-Jul-16	17.70	9.62	23.49	1529.26	1.8
17-Jul-16	17.90	9.05	26.75	1546.42	0.0
18-Jul-16	16.40	0.00	23.75	1417.18	2.8
19-Jul-16	16.03	10.04	23.06	1385.31	0.0
20-Jul-16	15.81	9.84	24.36	1365.87	1.0
21-Jul-16	15.60	9.60	23.37	1347.80	1.8
22-Jul-16	15.44	9.09	24.39	1334.07	2.5
23-Jul-16	14.73	8.87	21.08	1273.06	0.0
24-Jul-16	15.27	8.93	25.19	1319.58	11.8
25-Jul-16	16.24	10.86	26.24	1403.22	0.0
26-Jul-16	15.74	7.68	22.19	1360.28	0.0
27-Jul-16	15.34	9.78	22.11	1325.38	0.0
28-Jul-16	14.12	9.74	20.29	1219.63	1.3
29-Jul-16	14.50	9.02	20.73	1253.02	0.0
30-Jul-16	14.73	8.35	22.25	1272.63	0.0
31-Jul-16	15.32	7.90	22.37	1323.88	3.3

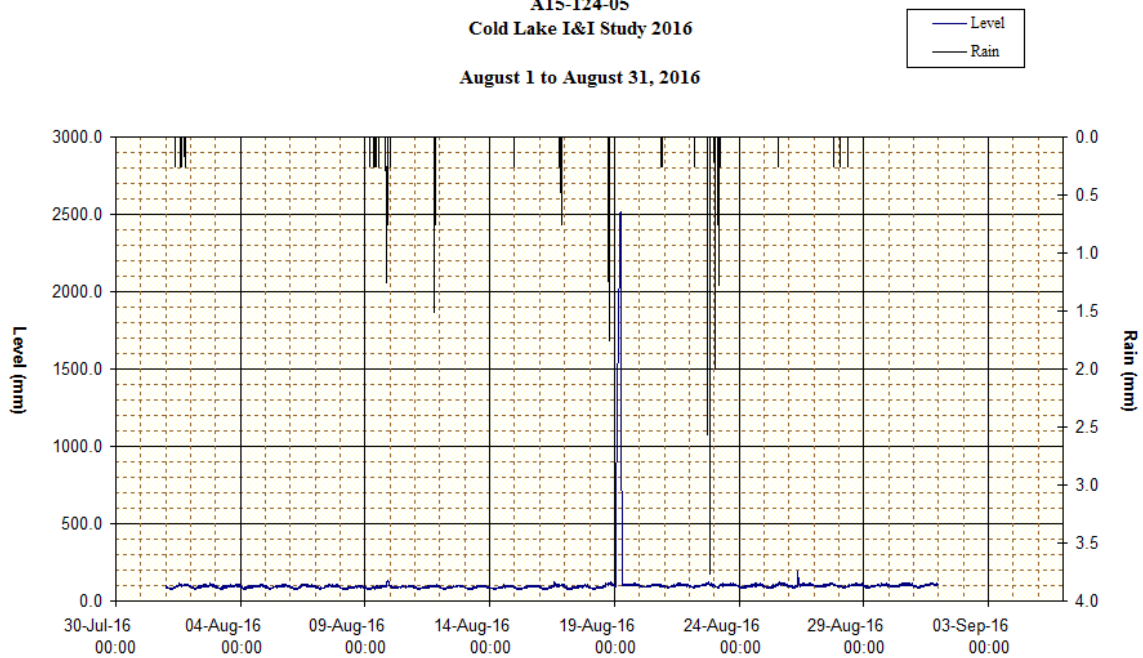
Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
45646.483	-10.405	82.702	48.0

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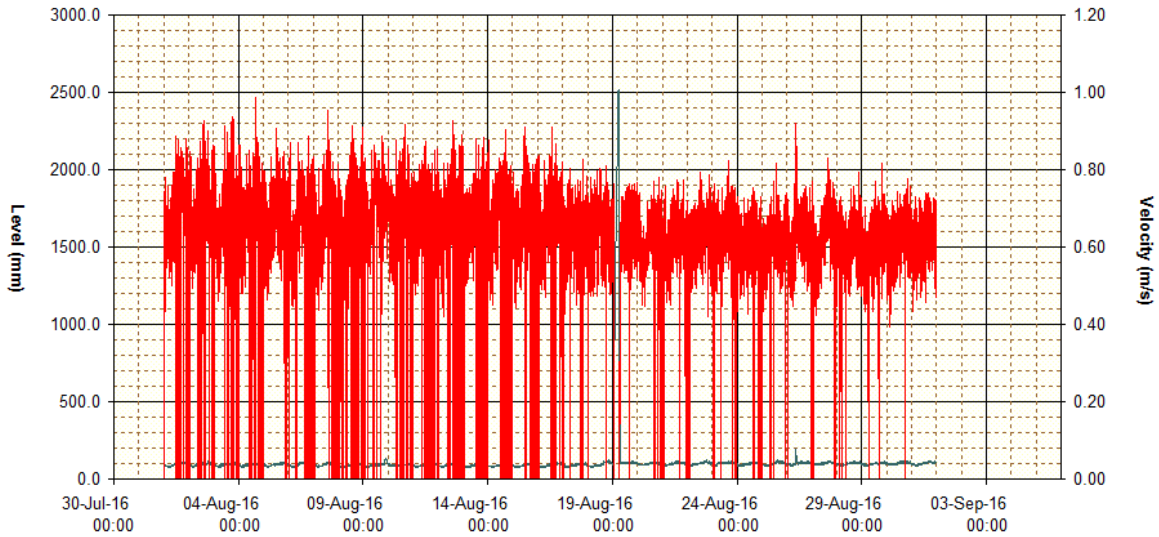
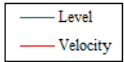


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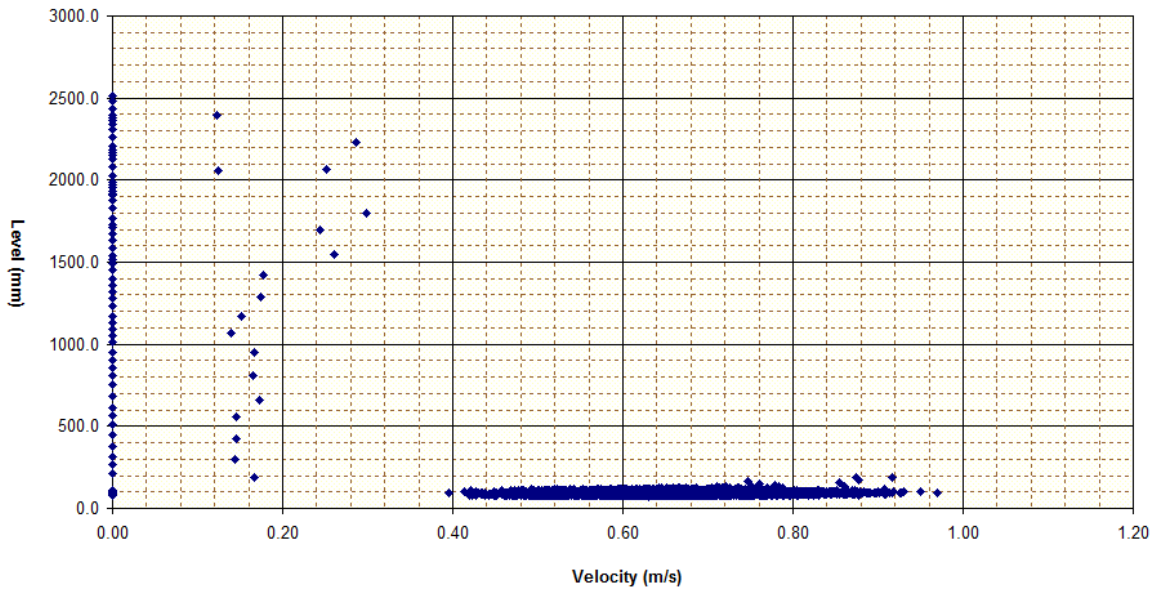
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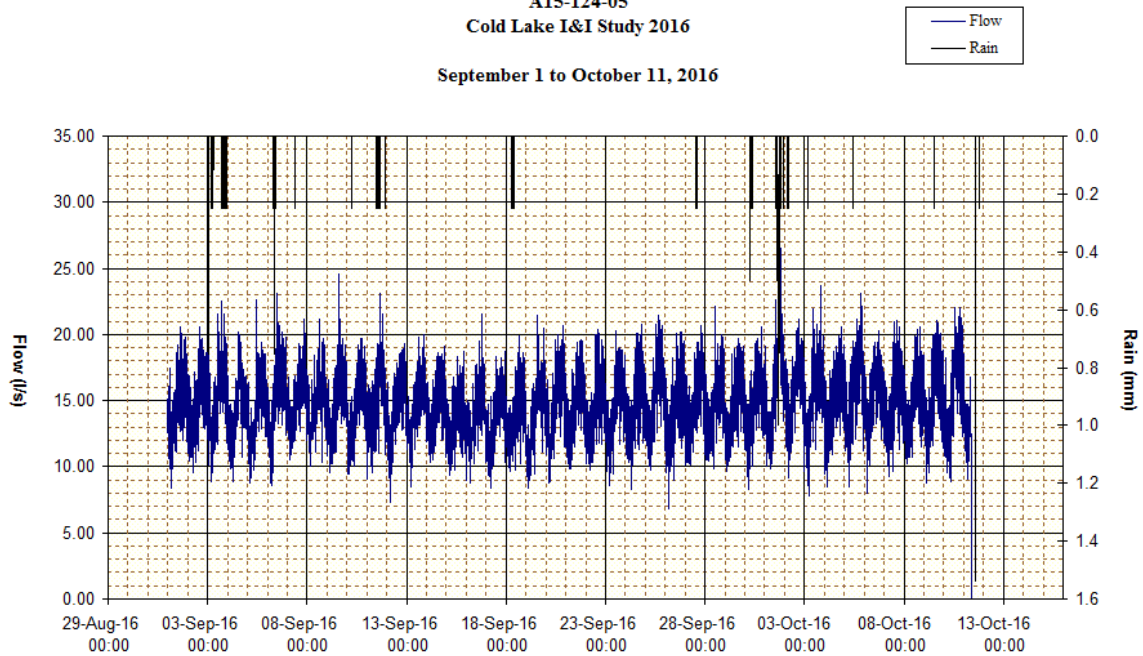
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	15.24	8.62	22.33	1317.12	1.3
02-Aug-16	15.49	8.65	21.46	1338.28	0.0
03-Aug-16	14.86	7.81	22.18	1284.30	0.0
04-Aug-16	14.74	7.83	22.06	1273.35	0.0
05-Aug-16	14.37	7.81	20.59	1241.64	0.0
06-Aug-16	14.49	7.73	20.38	1251.85	0.0
07-Aug-16	14.46	7.75	22.81	1249.74	0.0
08-Aug-16	13.37	7.56	19.52	1155.12	0.0
09-Aug-16	14.72	7.56	27.77	1271.58	17.8
10-Aug-16	14.31	9.57	19.92	1236.02	0.3
11-Aug-16	14.03	8.07	19.66	1212.20	3.3
12-Aug-16	14.34	7.17	20.43	1238.76	0.0
13-Aug-16	14.07	8.66	20.64	1215.38	0.0
14-Aug-16	13.74	7.90	20.06	1187.41	0.3
15-Aug-16	13.77	7.78	19.64	1189.49	0.0
16-Aug-16	14.74	8.23	26.57	1273.43	1.3
17-Aug-16	13.24	7.07	20.54	1143.54	0.0
18-Aug-16	13.70	7.87	22.08	1183.75	5.3
19-Aug-16	13.10	0.00	35.15	1131.73	0.0
20-Aug-16	14.48	8.89	19.49	1251.34	0.8
21-Aug-16	14.55	9.33	21.65	1257.14	0.0
22-Aug-16	14.90	9.90	22.26	1287.30	10.5
23-Aug-16	15.09	9.37	20.39	1303.41	7.3
24-Aug-16	13.76	8.88	19.98	1188.94	0.0
25-Aug-16	14.42	8.71	22.04	1246.21	0.3
26-Aug-16	15.31	9.07	49.92	1322.85	0.0
27-Aug-16	14.84	8.97	22.85	1281.75	0.3
28-Aug-16	14.43	8.86	21.48	1246.70	1.0
29-Aug-16	14.17	8.46	21.53	1224.65	0.0
30-Aug-16	14.91	8.49	20.76	1288.48	0.0
31-Aug-16	14.73	9.24	20.29	1272.65	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
38566.112	0.000	49.923	49.3

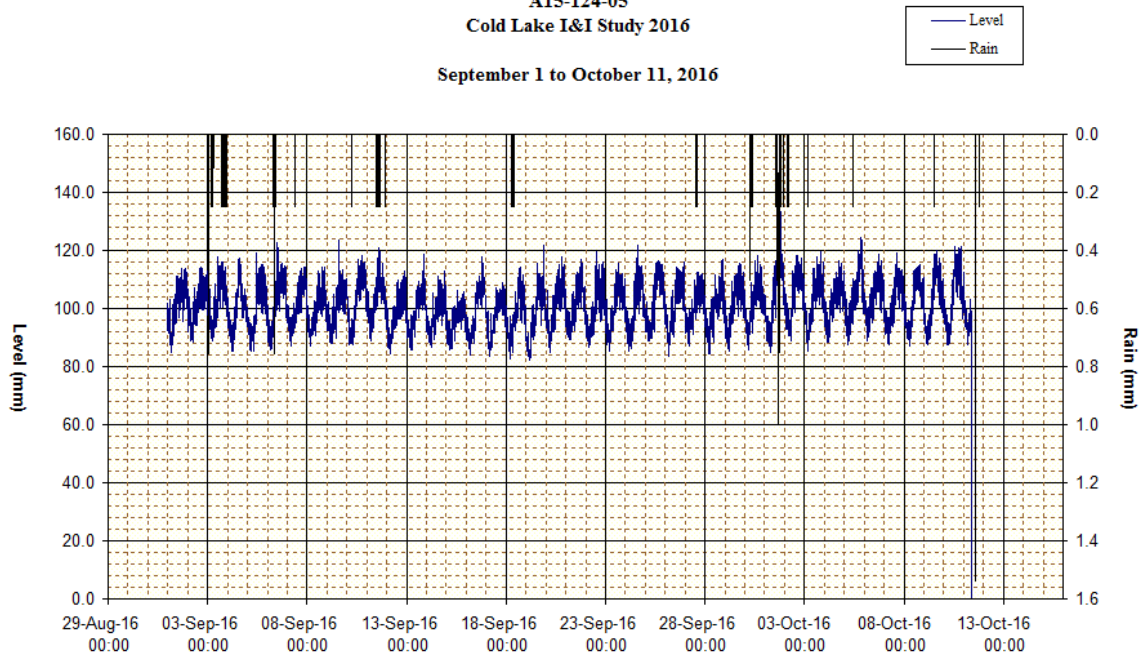
ISL Engineering Ltd.
A15-124-05
Cold Lake I&I Study 2016

September 1 to October 11, 2016



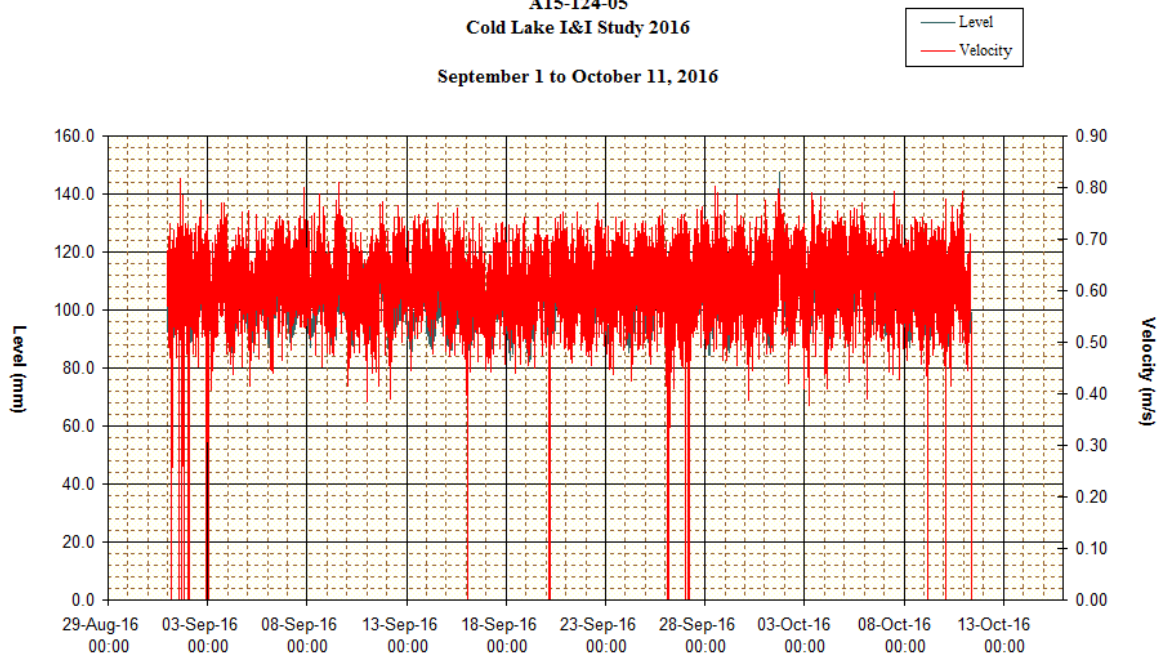
ISL Engineering Ltd.
A15-124-05
Cold Lake I&I Study 2016

September 1 to October 11, 2016



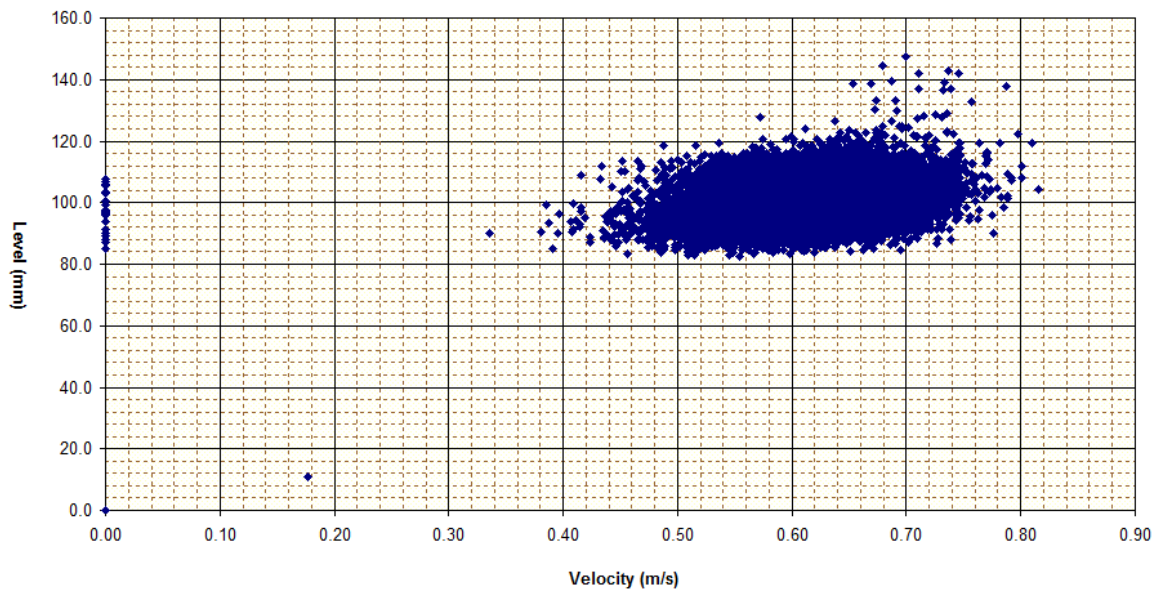
ISL Engineering Ltd.
A15-124-05
Cold Lake I&I Study 2016

September 1 to October 11, 2016



ISL Engineering Ltd.
A15-124-05
Cold Lake I&I Study 2016

September 1 to October 11, 2016



ISL Engineering Ltd.
A15-124-05
Cold Lake I&I Study 2016

September 1 to October 11, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-16	14.64	8.38	20.43	1265.07	0.0
02-Sep-16	14.77	9.60	20.60	1276.02	0.0
03-Sep-16	15.10	8.83	22.39	1304.88	10.5
04-Sep-16	14.33	8.88	20.15	1238.19	0.0
05-Sep-16	14.52	8.77	22.57	1254.44	0.0
06-Sep-16	15.37	8.62	23.13	1327.83	5.8
07-Sep-16	15.22	10.55	21.14	1314.82	0.3
08-Sep-16	14.98	10.05	21.11	1293.89	0.0
09-Sep-16	14.94	9.59	24.55	1291.03	0.0
10-Sep-16	14.43	9.04	19.72	1246.48	0.3
11-Sep-16	15.08	9.54	23.14	1303.01	2.0
12-Sep-16	14.42	7.33	19.27	1245.82	0.0
13-Sep-16	14.61	8.53	19.84	1262.47	0.0
14-Sep-16	14.52	10.35	19.15	1254.70	0.0
15-Sep-16	13.57	8.92	18.71	1172.16	0.0
16-Sep-16	13.93	8.79	21.42	1203.31	0.0
17-Sep-16	13.64	8.50	18.62	1178.86	0.0
18-Sep-16	14.08	9.62	19.86	1216.94	3.0
19-Sep-16	13.85	8.35	21.42	1196.43	0.0
20-Sep-16	14.82	8.73	20.54	1280.38	0.0
21-Sep-16	14.70	9.87	19.56	1270.23	0.0
22-Sep-16	14.59	9.80	20.42	1260.21	0.0
23-Sep-16	14.58	8.61	20.29	1259.36	0.0
24-Sep-16	14.59	8.27	20.73	1260.73	0.0
25-Sep-16	15.18	9.71	21.42	1311.24	0.0
26-Sep-16	14.43	6.84	20.22	1246.49	0.0
27-Sep-16	14.79	10.09	20.59	1278.14	0.8
28-Sep-16	14.64	9.88	22.09	1265.28	0.0
29-Sep-16	14.86	9.68	19.58	1283.84	0.0
30-Sep-16	14.61	8.31	20.62	1262.73	3.3
01-Oct-16	16.41	9.90	29.00	1417.80	17.3
02-Oct-16	15.76	9.21	21.03	1361.58	0.5
03-Oct-16	15.23	7.82	23.67	1316.19	0.3
04-Oct-16	15.24	8.51	20.47	1316.49	0.0
05-Oct-16	15.84	8.48	23.13	1368.45	0.3
06-Oct-16	15.39	8.05	20.16	1330.11	0.0
07-Oct-16	14.99	9.35	21.06	1295.12	0.0
08-Oct-16	15.04	10.25	20.59	1299.76	0.0
09-Oct-16	15.27	8.74	21.02	1319.61	0.3
10-Oct-16	15.45	8.86	22.07	1334.66	0.0

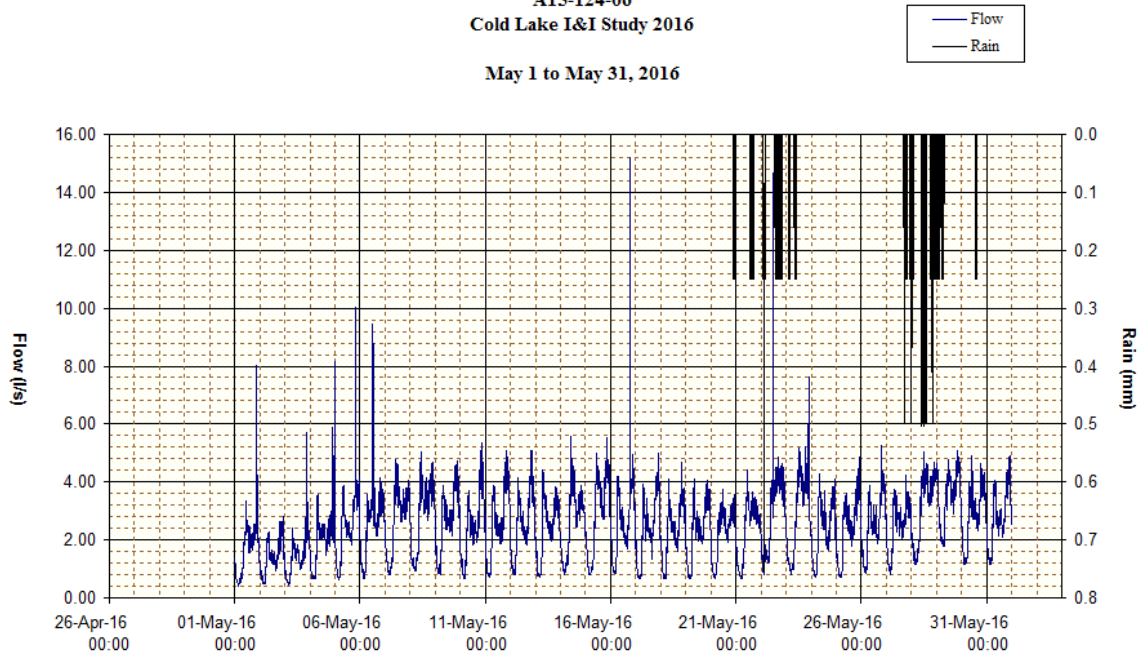
11-Oct-16	4.88	0.00	17.58	421.64	3.0
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Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
51606.409	0.000	28.998	47.3

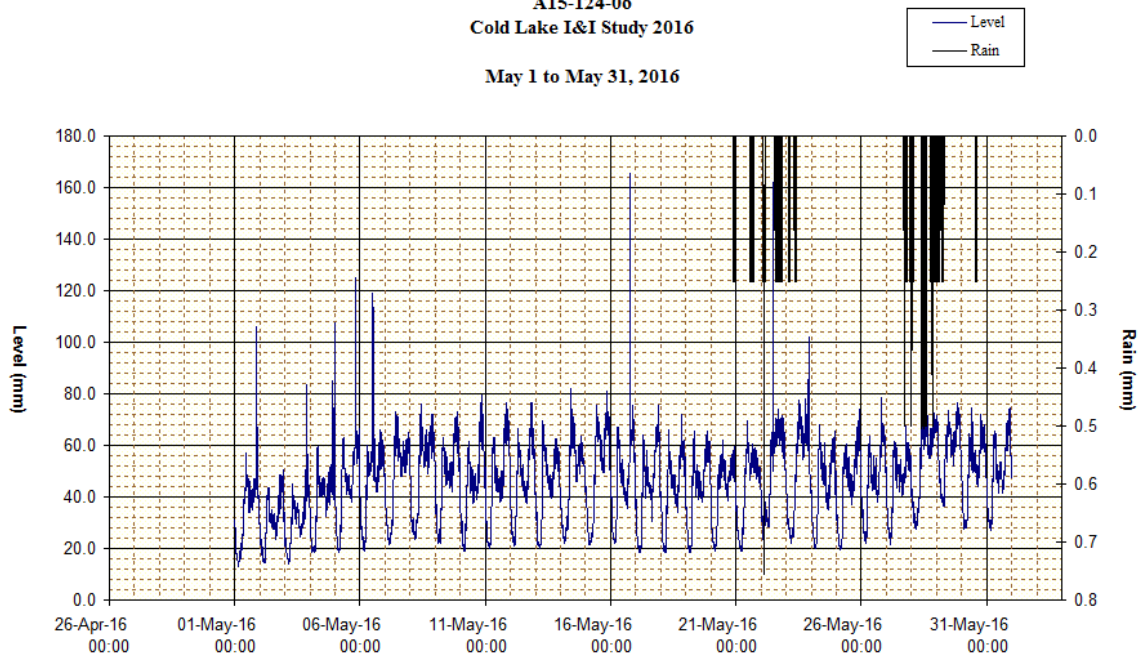
ISL Engineering Ltd.
A15-124-06
Cold Lake I&I Study 2016

May 1 to May 31, 2016



ISL Engineering Ltd.
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May 1 to May 31, 2016



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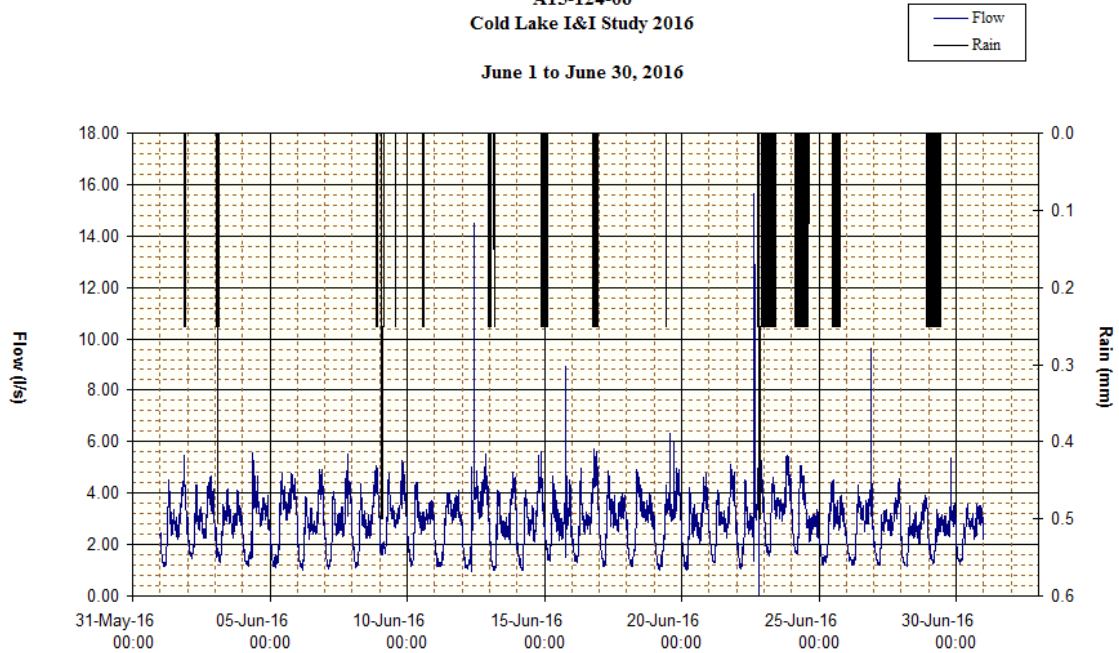
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-May-16	1.70	0.41	8.04	146.66	0.0
02-May-16	1.42	0.48	2.80	122.49	0.0
03-May-16	1.51	0.46	5.65	130.75	0.0
04-May-16	2.06	0.65	5.88	177.87	0.0
05-May-16	2.54	0.64	9.99	219.03	0.0
06-May-16	2.57	0.67	9.39	222.13	0.0
07-May-16	2.69	0.79	4.76	232.34	0.0
08-May-16	2.83	0.92	5.05	244.94	0.0
09-May-16	2.60	0.82	4.73	224.80	0.0
10-May-16	2.49	0.68	5.36	215.06	0.0
11-May-16	2.55	0.71	5.09	219.98	0.0
12-May-16	2.52	0.78	5.07	217.91	0.0
13-May-16	2.42	0.71	4.41	209.15	0.0
14-May-16	2.63	0.81	5.54	227.57	0.0
15-May-16	2.89	0.79	5.52	249.62	0.0
16-May-16	2.66	0.84	15.14	229.98	0.0
17-May-16	2.38	0.65	4.99	205.28	0.0
18-May-16	2.33	0.65	4.67	201.35	0.0
19-May-16	2.31	0.65	4.09	199.17	0.0
20-May-16	2.24	0.67	3.76	193.57	1.5
21-May-16	2.34	0.66	4.42	202.17	3.8
22-May-16	2.99	0.81	14.62	258.75	9.8
23-May-16	2.94	0.82	7.63	253.88	2.0
24-May-16	2.38	0.72	4.29	205.49	0.0
25-May-16	2.45	0.70	4.85	211.37	0.0
26-May-16	2.57	0.84	5.28	221.62	0.0
27-May-16	2.52	0.80	4.24	217.85	4.5
28-May-16	3.12	1.17	5.05	269.70	22.0
29-May-16	3.47	1.77	5.06	299.51	3.0
30-May-16	2.89	1.17	4.89	249.96	0.5
31-May-16	2.77	1.14	4.89	239.46	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
6719.388	0.410	15.140	47.0

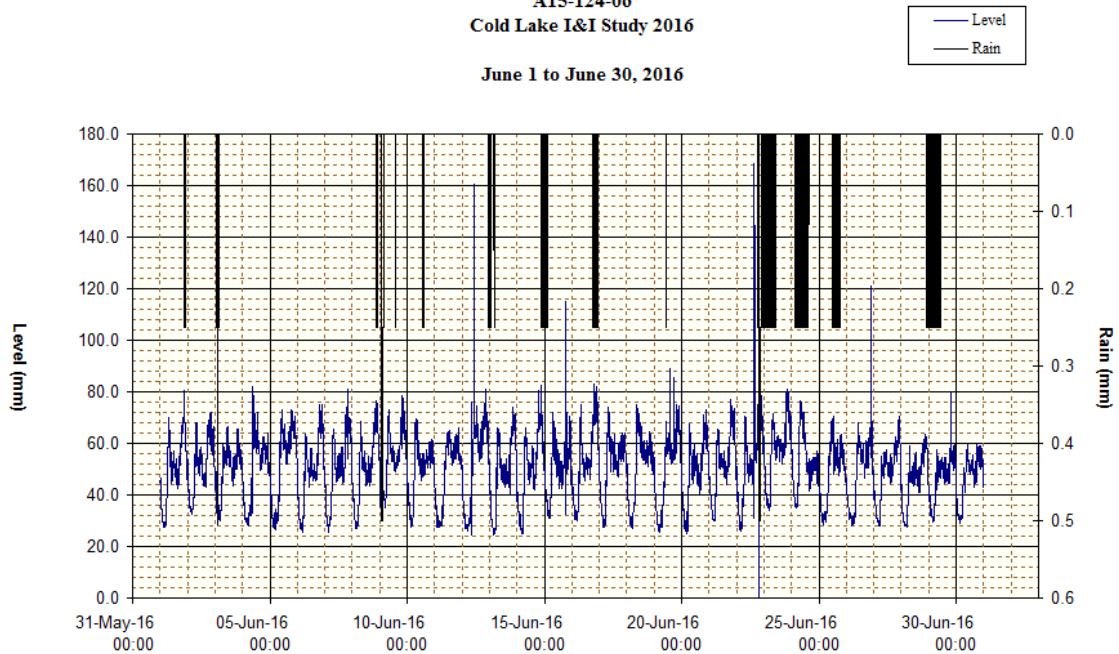
ISL Engineering Ltd.
A15-124-06
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
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June 1 to June 30, 2016



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June 1 to June 30, 2016

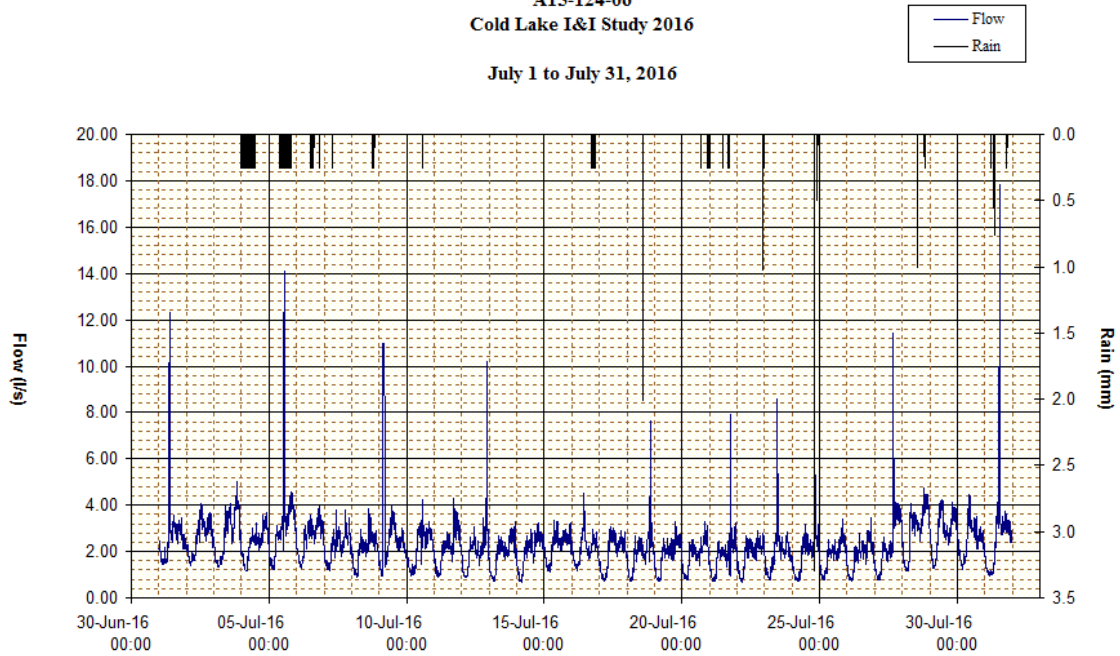
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jun-16	2.82	1.14	5.46	244.00	1.0
02-Jun-16	2.89	1.46	4.67	250.11	0.0
03-Jun-16	2.73	1.30	4.16	235.80	4.0
04-Jun-16	2.80	1.17	5.53	242.07	0.0
05-Jun-16	2.97	1.08	4.77	256.92	0.0
06-Jun-16	2.78	1.02	4.93	240.30	0.0
07-Jun-16	2.83	1.04	5.48	244.80	0.0
08-Jun-16	2.85	1.11	5.07	246.06	2.5
09-Jun-16	3.11	1.60	5.26	268.61	8.5
10-Jun-16	2.76	1.15	4.43	238.74	0.5
11-Jun-16	2.69	1.15	4.11	232.56	0.0
12-Jun-16	3.11	1.00	14.44	269.07	2.0
13-Jun-16	2.78	0.98	4.83	240.54	1.5
14-Jun-16	2.87	1.01	5.64	247.55	2.5
15-Jun-16	2.91	1.36	8.75	251.18	4.3
16-Jun-16	3.13	1.31	5.72	270.84	3.3
17-Jun-16	2.91	1.17	4.86	251.26	0.0
18-Jun-16	2.89	1.13	4.93	249.32	0.0
19-Jun-16	2.86	1.02	6.31	247.31	0.3
20-Jun-16	2.72	1.00	4.77	235.14	0.0
21-Jun-16	2.93	1.31	5.11	253.42	0.0
22-Jun-16	3.18	0.00	15.52	275.02	12.0
23-Jun-16	3.43	1.57	5.49	296.19	14.5
24-Jun-16	3.00	1.64	5.07	259.01	13.8
25-Jun-16	2.68	1.21	4.53	231.21	4.5
26-Jun-16	2.73	1.19	9.64	235.72	0.0
27-Jun-16	2.66	1.19	4.54	229.63	0.0
28-Jun-16	2.46	1.16	3.91	212.80	2.5
29-Jun-16	2.54	1.27	5.33	219.13	8.8
30-Jun-16	2.54	1.26	3.54	219.21	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
7393.503	0.000	15.520	86.3

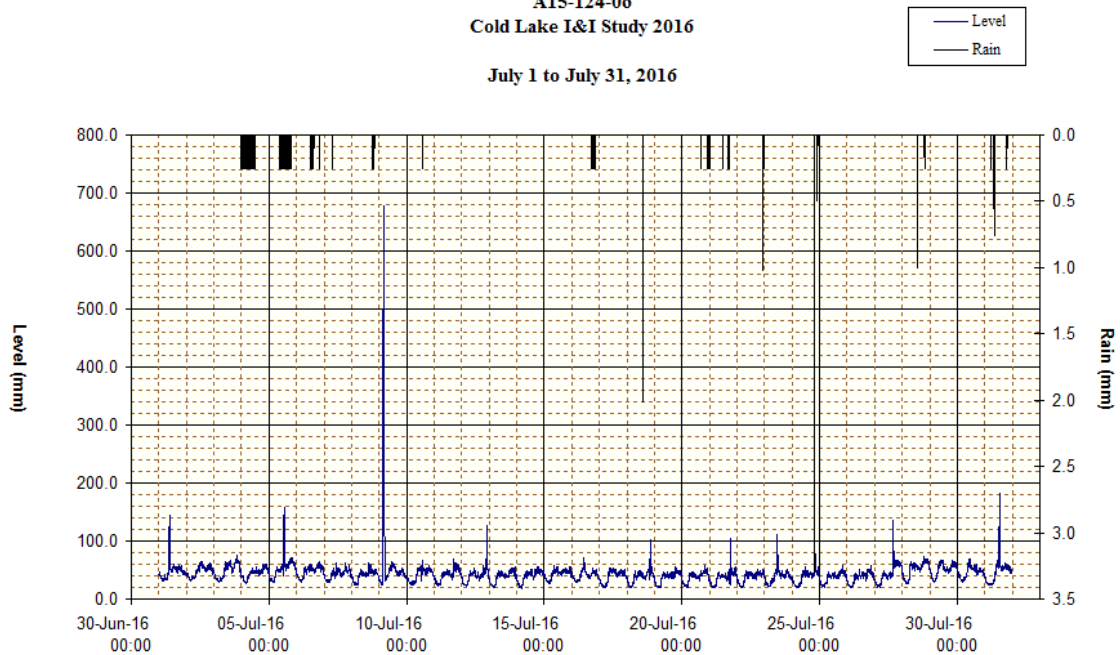
ISL Engineering Ltd.
A15-124-06
Cold Lake I&I Study 2016

July 1 to July 31, 2016



ISL Engineering Ltd.
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July 1 to July 31, 2016



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A15-124-06
Cold Lake I&I Study 2016

July 1 to July 31, 2016

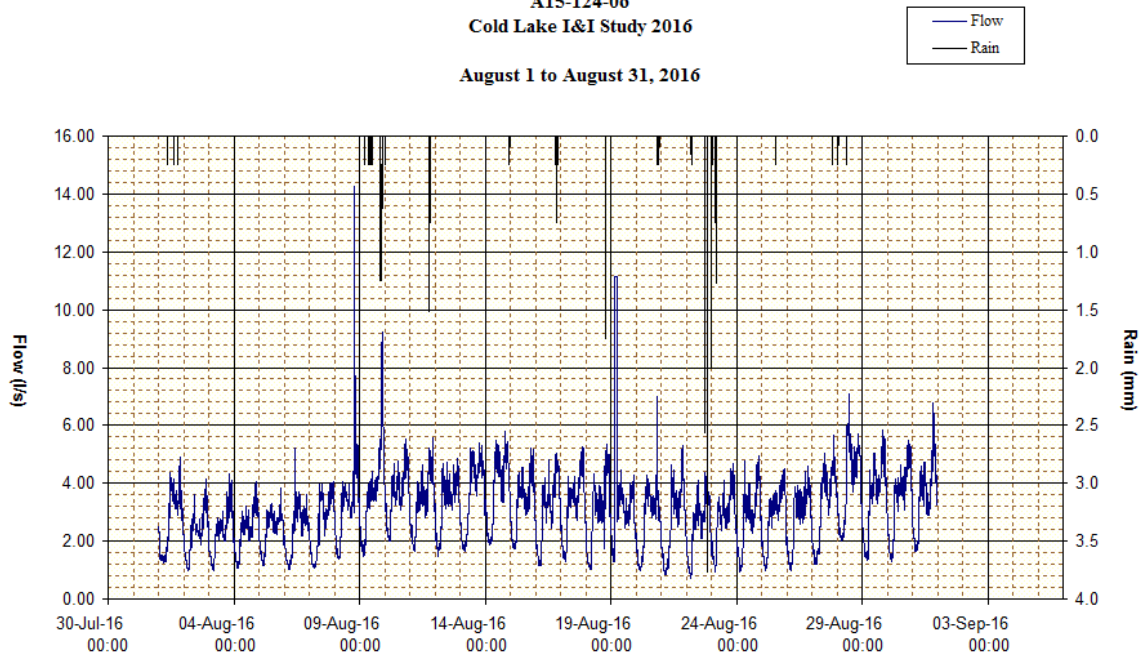
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jul-16	2.59	1.43	12.27	223.65	0.0
02-Jul-16	2.63	1.41	4.05	226.88	0.0
03-Jul-16	2.71	1.31	5.03	234.08	0.5
04-Jul-16	2.39	1.15	3.66	206.08	9.0
05-Jul-16	3.02	1.24	13.98	260.72	8.3
06-Jul-16	2.60	1.28	3.93	224.61	2.5
07-Jul-16	2.27	1.17	3.80	196.43	0.3
08-Jul-16	2.09	0.91	3.82	180.71	1.3
09-Jul-16	3.03	0.96	10.96	261.68	0.0
10-Jul-16	2.16	0.96	4.22	186.53	0.3
11-Jul-16	2.17	0.90	4.28	187.30	0.0
12-Jul-16	2.17	0.87	10.12	187.25	0.0
13-Jul-16	1.92	0.73	3.27	165.58	0.0
14-Jul-16	2.01	0.65	3.24	173.58	0.0
15-Jul-16	2.26	1.12	3.36	194.89	0.0
16-Jul-16	2.10	1.18	4.52	181.86	1.8
17-Jul-16	1.98	0.72	3.07	171.11	0.0
18-Jul-16	1.94	0.72	7.61	167.37	2.8
19-Jul-16	1.88	0.70	3.29	162.00	0.0
20-Jul-16	1.84	0.76	3.31	158.97	1.0
21-Jul-16	1.87	0.72	7.86	161.99	1.8
22-Jul-16	1.87	0.69	2.89	161.40	2.5
23-Jul-16	1.92	0.80	8.60	165.85	0.0
24-Jul-16	1.91	0.70	5.29	164.90	11.8
25-Jul-16	1.87	0.77	3.38	161.26	0.0
26-Jul-16	1.84	0.71	3.44	158.74	0.0
27-Jul-16	2.34	0.76	11.32	202.24	0.0
28-Jul-16	2.94	1.15	4.71	253.98	1.3
29-Jul-16	2.85	1.27	4.26	245.91	0.0
30-Jul-16	2.49	1.21	4.43	215.49	0.0
31-Jul-16	2.77	0.92	17.67	239.27	3.3

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
6082.296	0.650	17.670	48.0

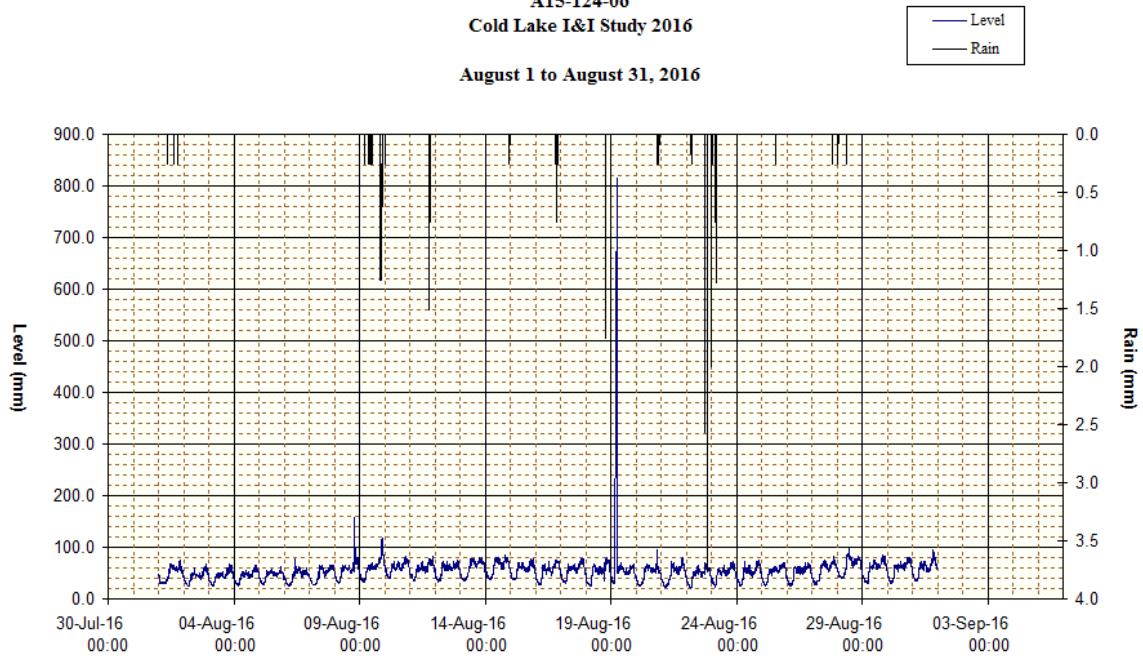
ISL Engineering Ltd.
A15-124-06
Cold Lake I&I Study 2016

August 1 to August 31, 2016



ISL Engineering Ltd.
A15-124-06
Cold Lake I&I Study 2016

August 1 to August 31, 2016



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A15-124-06
Cold Lake I&I Study 2016

August 1 to August 31, 2016

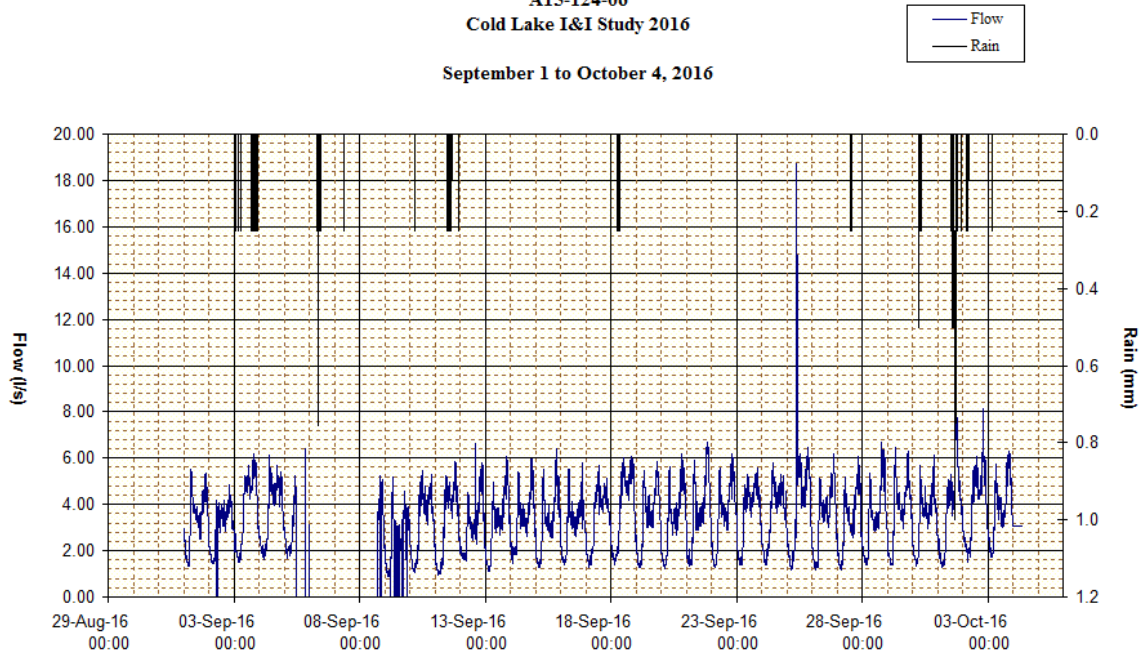
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	2.71	1.25	4.92	233.95	1.3
02-Aug-16	2.31	1.00	4.15	199.65	0.0
03-Aug-16	2.36	0.99	4.26	203.79	0.0
04-Aug-16	2.41	1.07	4.06	208.33	0.0
05-Aug-16	2.43	1.16	3.82	210.33	0.0
06-Aug-16	2.39	1.01	5.23	206.21	0.0
07-Aug-16	2.63	1.08	4.07	227.40	0.0
08-Aug-16	3.33	1.37	14.21	287.57	0.0
09-Aug-16	3.81	1.48	9.24	329.11	17.8
10-Aug-16	3.67	2.00	5.54	317.03	0.3
11-Aug-16	3.39	1.67	5.56	292.91	3.3
12-Aug-16	3.33	1.49	4.87	287.73	0.0
13-Aug-16	3.63	1.63	5.41	313.31	0.0
14-Aug-16	3.77	1.88	5.79	325.59	0.3
15-Aug-16	3.37	1.74	5.19	291.26	0.0
16-Aug-16	3.11	1.18	5.02	268.92	1.3
17-Aug-16	3.25	1.31	5.28	281.22	0.0
18-Aug-16	3.02	1.02	5.34	261.01	5.3
19-Aug-16	3.84	1.29	11.12	331.97	0.0
20-Aug-16	2.72	0.98	6.99	235.15	0.8
21-Aug-16	2.72	0.83	5.30	234.86	0.0
22-Aug-16	2.59	0.73	4.38	223.56	10.5
23-Aug-16	2.82	0.92	4.66	243.32	7.3
24-Aug-16	2.80	0.93	4.95	242.32	0.0
25-Aug-16	2.85	0.99	4.48	246.36	0.3
26-Aug-16	2.83	0.96	4.59	244.27	0.0
27-Aug-16	3.24	1.19	5.67	280.08	0.3
28-Aug-16	4.00	1.99	7.08	345.50	1.0
29-Aug-16	3.56	1.34	5.84	307.46	0.0
30-Aug-16	3.45	1.30	5.49	298.19	0.0
31-Aug-16	3.56	1.65	6.79	307.43	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
8285.775	0.730	14.210	49.3

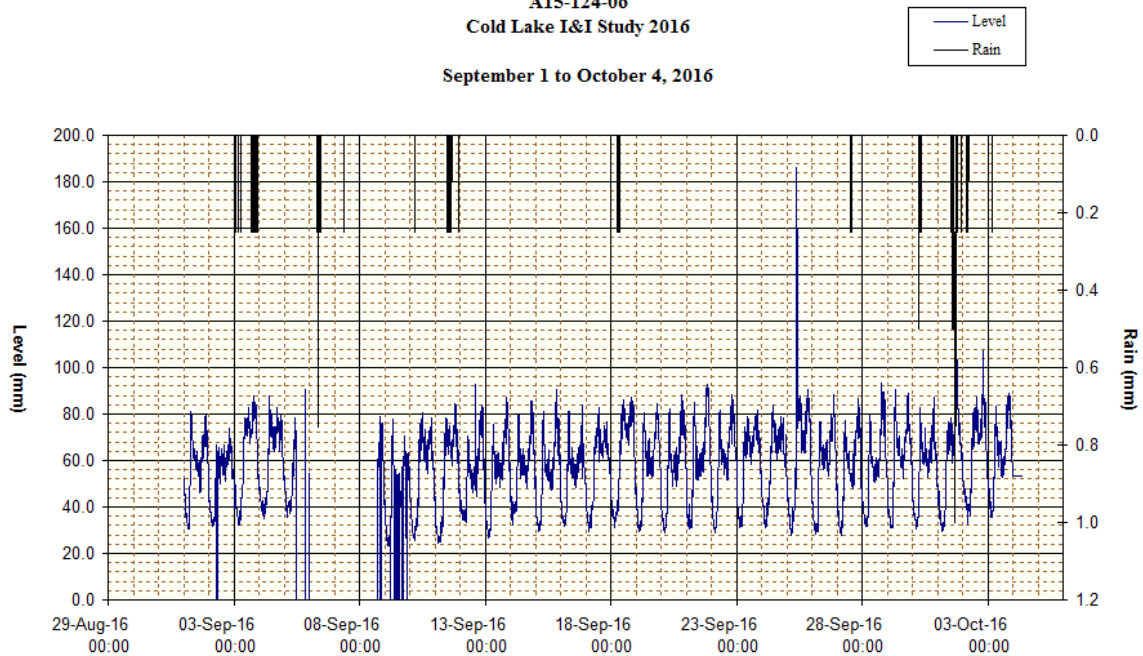
ISL Engineering Ltd.
A15-124-06
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September 1 to October 4, 2016



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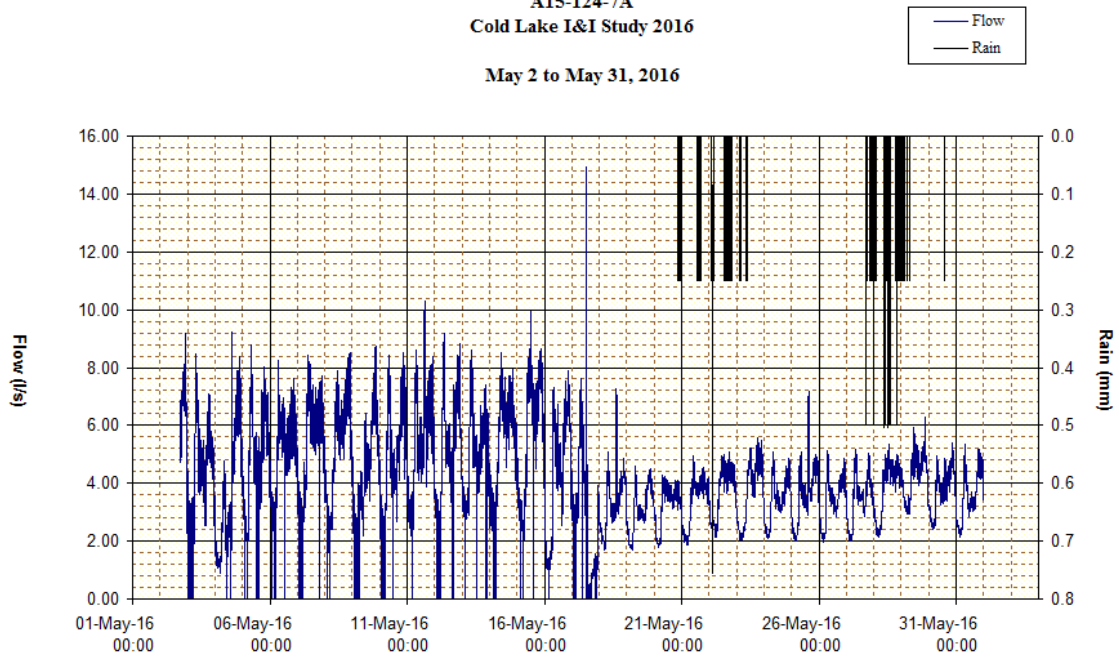
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Sep-16	3.36	1.33	5.49	290.33	0.0
02-Sep-16	2.97	0.00	4.83	256.46	0.0
03-Sep-16	3.78	1.48	6.20	327.02	10.5
04-Sep-16	3.72	1.63	6.15	321.49	0.0
05-Sep-16	1.35	0.00	6.42	116.66	0.0
06-Sep-16	0.00	0.00	0.00	0.00	5.8
07-Sep-16	0.00	0.00	0.00	0.00	0.3
08-Sep-16	0.81	0.00	5.26	69.73	0.0
09-Sep-16	2.24	0.00	5.19	193.19	0.0
10-Sep-16	3.20	1.04	5.46	276.18	0.3
11-Sep-16	3.25	0.97	5.86	280.88	2.0
12-Sep-16	3.17	1.54	6.58	273.47	0.0
13-Sep-16	3.25	1.10	6.10	280.73	0.0
14-Sep-16	3.36	1.46	5.94	290.69	0.0
15-Sep-16	3.23	1.27	6.43	279.22	0.0
16-Sep-16	3.16	1.40	5.78	273.03	0.0
17-Sep-16	3.42	1.27	5.68	295.40	0.0
18-Sep-16	3.83	1.38	6.10	331.07	3.0
19-Sep-16	3.42	1.27	5.83	295.31	0.0
20-Sep-16	3.44	1.23	6.21	297.41	0.0
21-Sep-16	3.62	1.35	6.66	312.79	0.0
22-Sep-16	3.59	1.26	6.21	310.46	0.0
23-Sep-16	3.67	1.38	5.58	316.85	0.0
24-Sep-16	3.57	1.39	5.81	308.56	0.0
25-Sep-16	3.93	1.18	18.69	339.17	0.0
26-Sep-16	3.46	1.19	6.20	299.22	0.0
27-Sep-16	3.32	1.18	6.08	287.22	0.8
28-Sep-16	3.51	1.41	6.70	303.23	0.0
29-Sep-16	3.68	1.37	6.45	317.74	0.0
30-Sep-16	3.45	1.34	6.11	298.37	3.3
01-Oct-16	3.82	1.27	8.44	330.33	17.3
02-Oct-16	4.02	1.51	8.12	346.93	0.5
03-Oct-16	3.75	1.70	6.28	324.30	0.3
04-Oct-16	3.04	3.04	3.04	262.66	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
9106.092	0.000	18.690	43.8

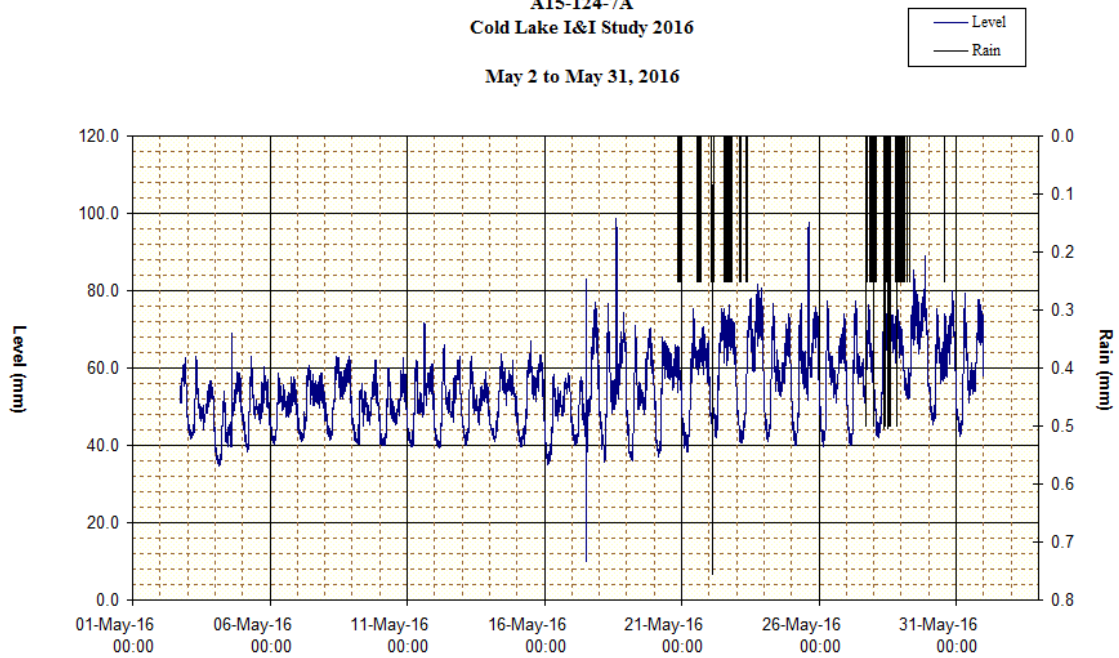
ISL Engineering Ltd.
A15-124-7A
Cold Lake I&I Study 2016

May 2 to May 31, 2016



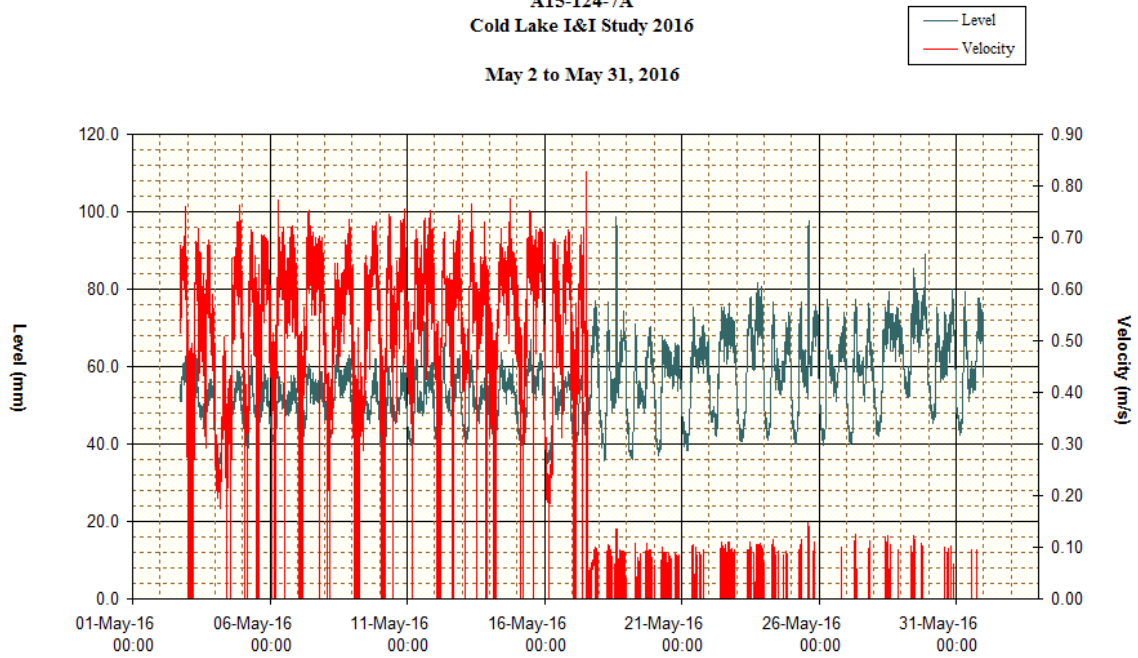
ISL Engineering Ltd.
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Cold Lake I&I Study 2016

May 2 to May 31, 2016



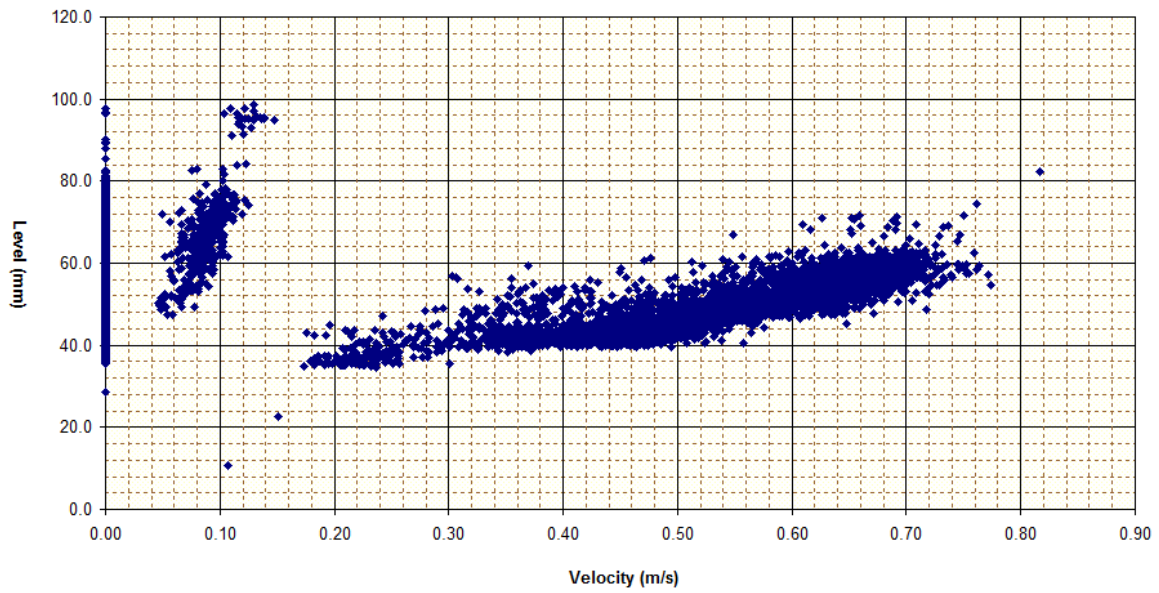
ISL Engineering Ltd.
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Cold Lake I&I Study 2016

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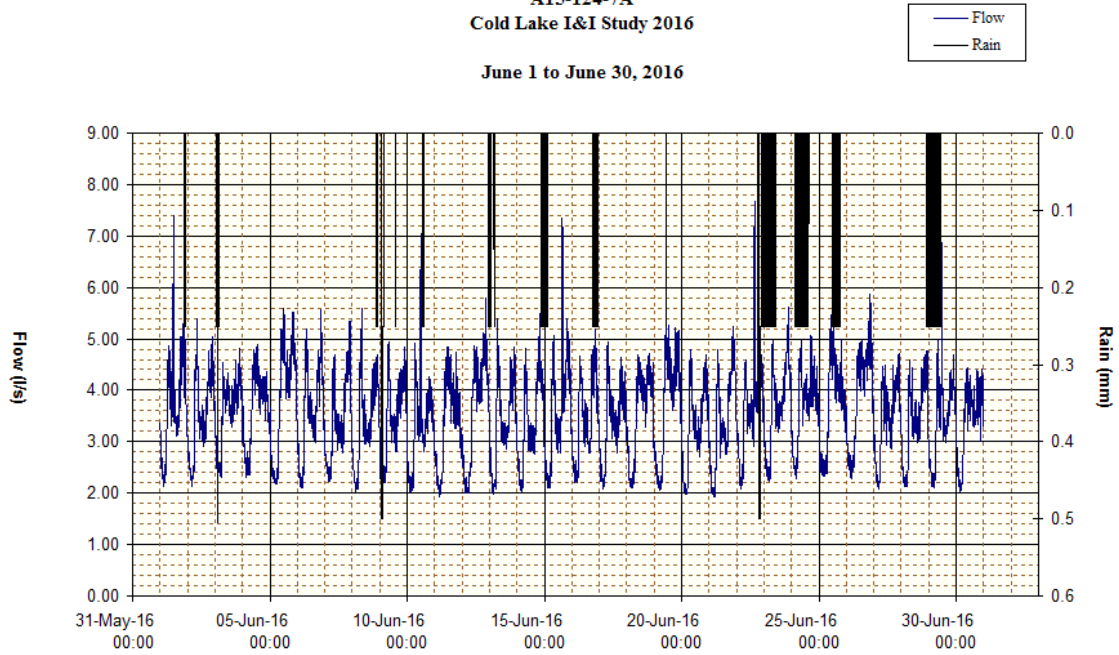
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
02-May-16	6.37	2.33	9.20	550.57	0.0
03-May-16	4.44	0.00	8.45	383.56	0.0
04-May-16	3.67	-0.47	9.23	317.28	0.0
05-May-16	4.76	0.00	8.79	411.28	0.0
06-May-16	5.04	0.00	8.22	435.32	0.0
07-May-16	5.29	0.00	8.43	456.99	0.0
08-May-16	5.20	0.00	8.48	449.71	0.0
09-May-16	4.39	0.00	8.75	379.16	0.0
10-May-16	4.88	0.00	8.52	421.21	0.0
11-May-16	5.47	0.00	10.30	472.50	0.0
12-May-16	4.97	-0.59	9.17	429.35	0.0
13-May-16	4.86	0.00	8.62	420.15	0.0
14-May-16	5.30	0.00	8.53	457.81	0.0
15-May-16	5.64	0.00	9.96	487.50	0.0
16-May-16	4.34	0.00	7.87	374.78	0.0
17-May-16	2.84	0.00	14.63	245.36	0.0
18-May-16	3.47	1.68	7.26	299.52	0.0
19-May-16	3.10	1.71	4.58	267.80	0.0
20-May-16	3.26	1.80	4.30	281.34	1.5
21-May-16	3.37	1.88	4.96	291.58	3.8
22-May-16	3.70	2.14	5.07	319.32	9.8
23-May-16	3.71	2.05	5.59	320.39	2.0
24-May-16	3.45	2.08	5.09	298.27	0.0
25-May-16	3.69	1.99	7.17	318.57	0.0
26-May-16	3.44	1.97	5.14	297.07	0.0
27-May-16	3.45	2.01	5.17	297.75	4.5
28-May-16	3.80	2.14	5.35	328.10	22.0
29-May-16	4.26	2.92	6.30	367.74	3.0
30-May-16	3.74	2.41	5.41	322.84	0.5
31-May-16	3.54	2.16	5.35	305.89	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
11008.693	-0.590	14.630	47.0

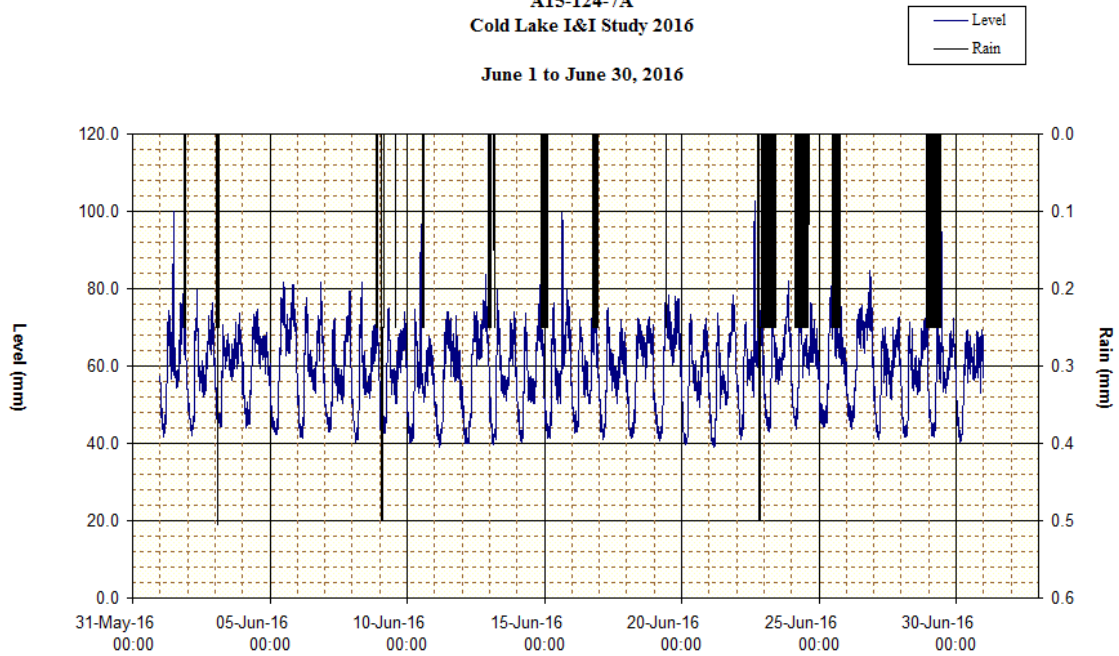
ISL Engineering Ltd.
A15-124-7A
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June 1 to June 30, 2016



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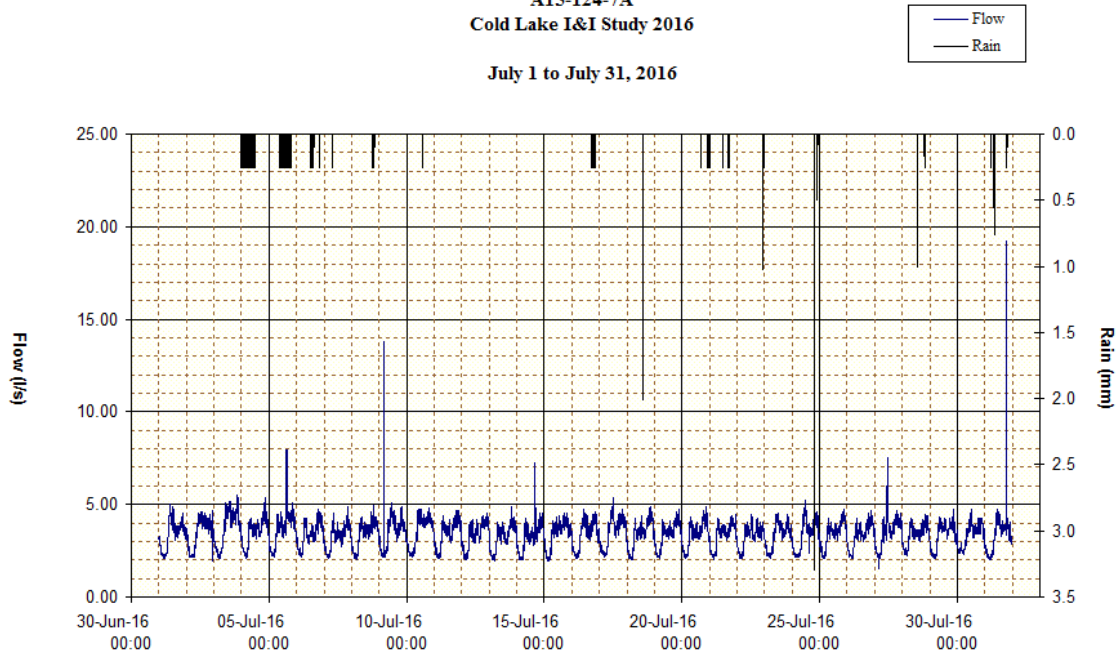
June 1 to June 30, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Jun-16	3.72	2.12	7.40	321.11	1.0
02-Jun-16	3.56	2.14	5.38	307.94	0.0
03-Jun-16	3.58	2.31	4.81	309.50	4.0
04-Jun-16	3.65	2.31	4.89	315.17	0.0
05-Jun-16	3.81	2.17	5.58	329.40	0.0
06-Jun-16	3.54	2.11	5.57	306.04	0.0
07-Jun-16	3.42	2.22	5.34	295.72	0.0
08-Jun-16	3.39	2.03	5.58	292.85	2.5
09-Jun-16	3.45	2.20	4.95	297.80	8.5
10-Jun-16	3.33	2.01	7.04	288.07	0.5
11-Jun-16	3.37	1.92	4.84	291.49	0.0
12-Jun-16	3.62	2.01	5.78	312.40	2.0
13-Jun-16	3.40	1.97	5.39	293.97	1.5
14-Jun-16	3.38	2.02	5.49	291.97	2.5
15-Jun-16	3.65	2.10	7.35	315.21	4.3
16-Jun-16	3.43	2.21	5.18	296.35	3.3
17-Jun-16	3.38	2.08	4.94	291.83	0.0
18-Jun-16	3.55	2.10	4.72	306.34	0.0
19-Jun-16	3.66	2.05	5.26	316.48	0.3
20-Jun-16	3.33	1.98	4.78	287.54	0.0
21-Jun-16	3.39	1.93	5.24	293.15	0.0
22-Jun-16	3.74	2.08	7.66	323.45	12.0
23-Jun-16	3.68	2.23	5.62	317.54	14.5
24-Jun-16	3.66	2.28	5.06	316.51	13.8
25-Jun-16	3.70	2.32	5.46	319.69	4.5
26-Jun-16	3.88	2.28	5.87	335.01	0.0
27-Jun-16	3.43	2.08	4.71	296.50	0.0
28-Jun-16	3.40	2.12	4.76	293.81	2.5
29-Jun-16	3.44	2.11	6.87	297.28	8.8
30-Jun-16	3.42	2.04	4.43	295.14	0.0

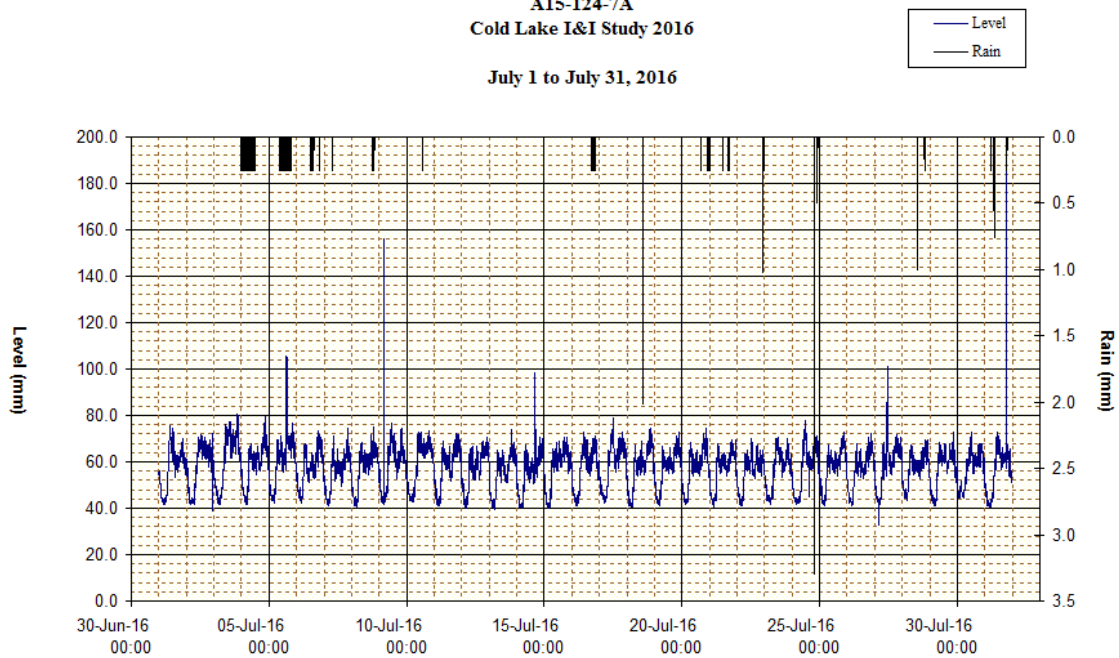
Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
9155.244	1.920	7.660	86.3

ISL Engineering Ltd.
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July 1 to July 31, 2016



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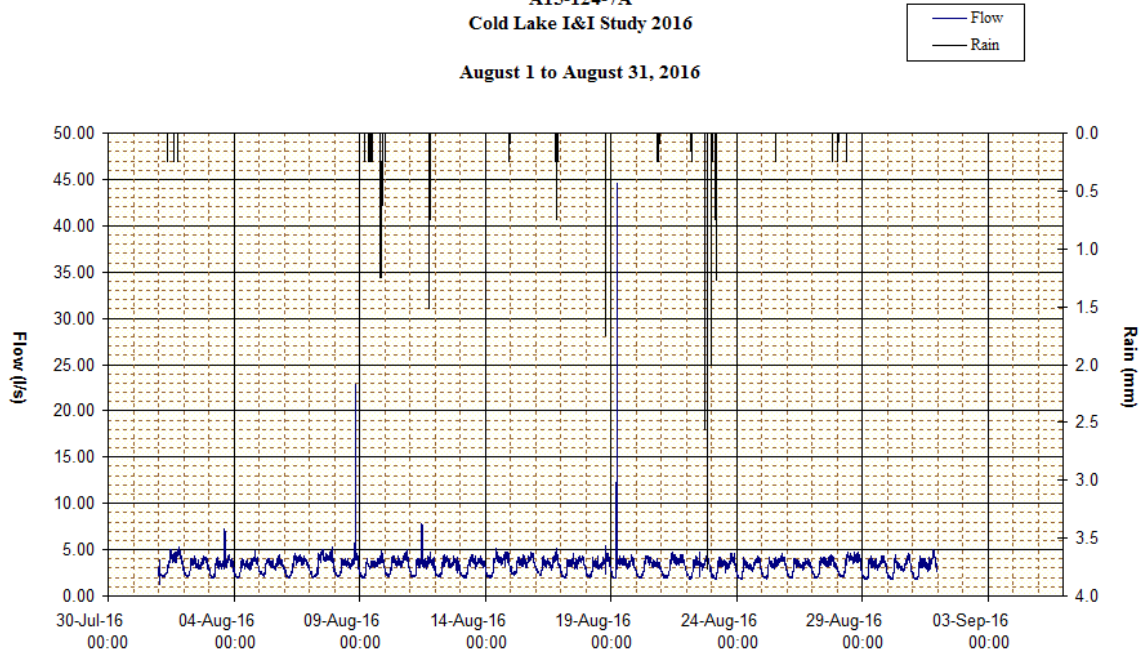
July 1 to July 31, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	3.39	2.10	4.99	293.26	0.0
02-Jul-16	3.43	1.92	4.68	296.72	0.0
03-Jul-16	3.73	2.10	5.47	322.23	0.5
04-Jul-16	3.51	2.11	5.35	303.65	9.0
05-Jul-16	3.81	2.18	7.95	329.06	8.3
06-Jul-16	3.36	2.16	4.76	289.92	2.5
07-Jul-16	3.28	2.07	4.88	283.08	0.3
08-Jul-16	3.42	2.04	4.96	295.25	1.3
09-Jul-16	3.61	2.14	13.75	312.33	0.0
10-Jul-16	3.52	2.19	4.78	304.53	0.3
11-Jul-16	3.42	2.08	4.70	295.52	0.0
12-Jul-16	3.32	2.01	4.53	287.24	0.0
13-Jul-16	3.26	1.97	4.84	282.04	0.0
14-Jul-16	3.36	2.01	7.25	290.71	0.0
15-Jul-16	3.38	1.98	4.53	292.45	0.0
16-Jul-16	3.38	2.08	4.71	291.63	1.8
17-Jul-16	3.54	2.16	5.33	305.64	0.0
18-Jul-16	3.41	2.04	4.88	294.32	2.8
19-Jul-16	3.36	2.09	4.73	290.54	0.0
20-Jul-16	3.38	2.12	4.89	292.36	1.0
21-Jul-16	3.35	2.05	4.45	289.64	1.8
22-Jul-16	3.27	2.07	4.48	282.10	2.5
23-Jul-16	3.33	2.12	4.54	287.40	0.0
24-Jul-16	3.40	2.14	5.22	293.78	11.8
25-Jul-16	3.40	2.08	4.72	293.41	0.0
26-Jul-16	3.31	2.07	4.68	285.89	0.0
27-Jul-16	3.56	1.50	7.54	307.48	0.0
28-Jul-16	3.35	2.26	4.44	289.84	1.3
29-Jul-16	3.33	2.07	4.72	287.44	0.0
30-Jul-16	3.35	2.33	4.72	289.49	0.0
31-Jul-16	3.47	2.05	19.21	299.86	3.3

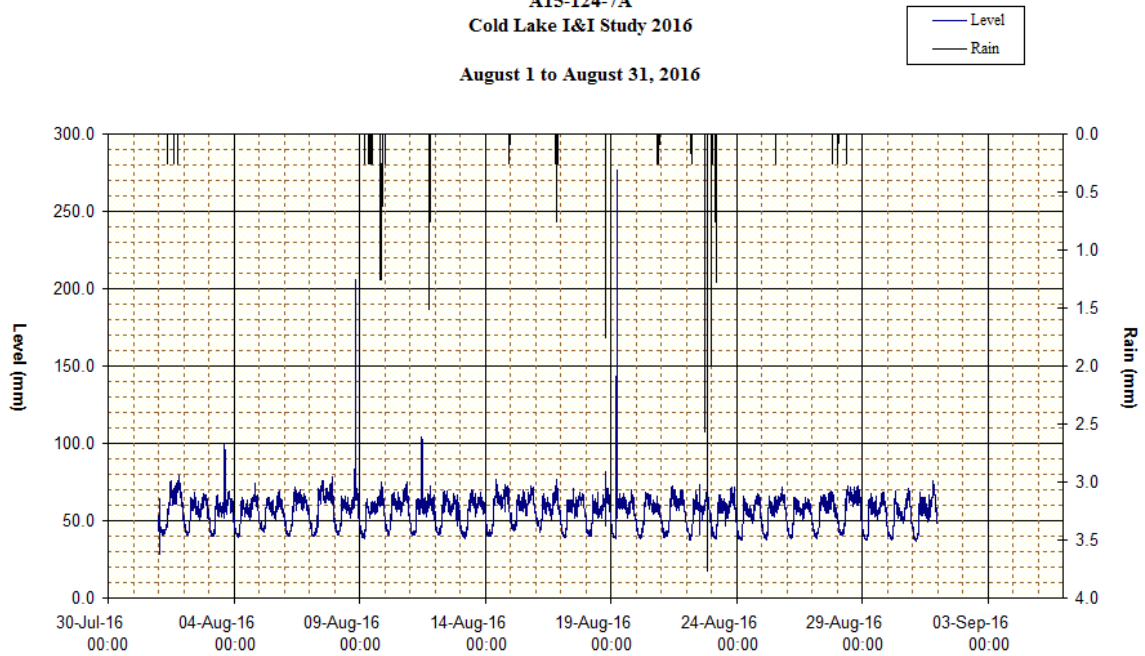
Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
9158.775	1.500	19.210	48.0

ISL Engineering Ltd.
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August 1 to August 31, 2016



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August 1 to August 31, 2016

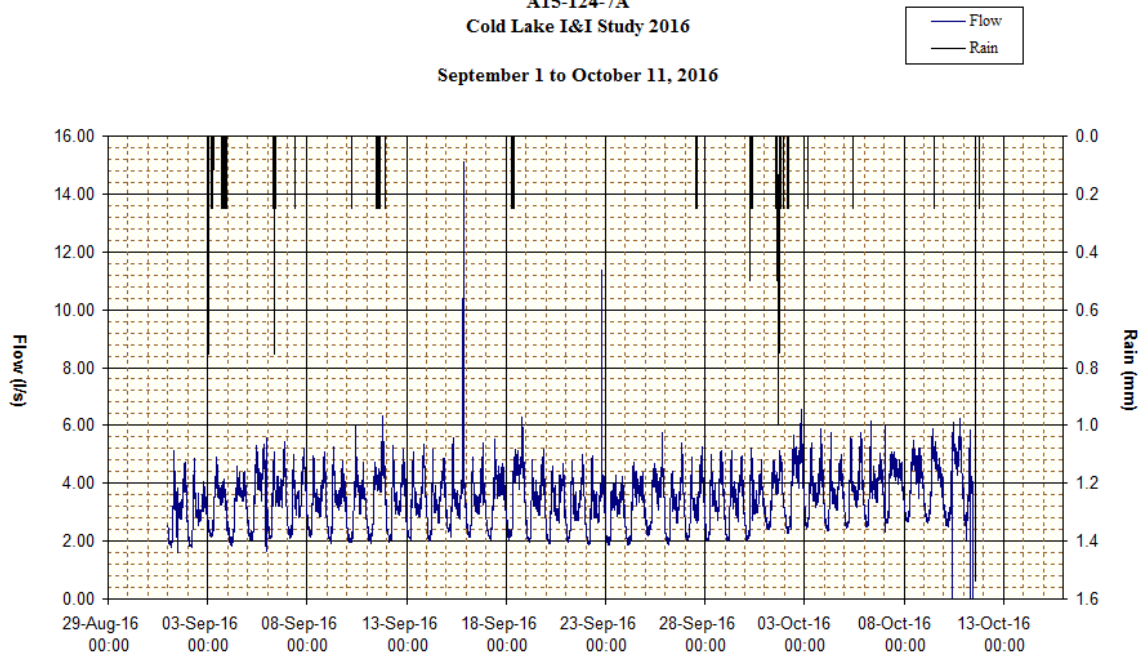
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	3.50	1.28	5.30	302.02	1.3
02-Aug-16	3.23	2.04	4.36	278.95	0.0
03-Aug-16	3.35	1.98	7.27	289.86	0.0
04-Aug-16	3.20	1.92	4.84	276.56	0.0
05-Aug-16	3.22	2.15	4.44	277.90	0.0
06-Aug-16	3.30	1.99	4.64	285.22	0.0
07-Aug-16	3.49	2.01	5.24	301.39	0.0
08-Aug-16	3.52	2.07	22.67	303.85	0.0
09-Aug-16	3.20	1.91	4.91	276.40	17.8
10-Aug-16	3.40	2.07	4.97	294.05	0.3
11-Aug-16	3.43	2.04	7.83	296.72	3.3
12-Aug-16	3.27	2.04	4.39	282.52	0.0
13-Aug-16	3.20	1.91	4.48	276.58	0.0
14-Aug-16	3.41	1.99	5.09	294.45	0.3
15-Aug-16	3.46	2.25	4.74	299.03	0.0
16-Aug-16	3.38	2.17	5.09	291.72	1.3
17-Aug-16	3.27	1.94	4.55	282.56	0.0
18-Aug-16	3.26	1.99	5.49	281.43	5.3
19-Aug-16	3.77	1.91	44.38	325.31	0.0
20-Aug-16	3.15	1.90	4.29	272.13	0.8
21-Aug-16	3.27	1.96	4.68	282.57	0.0
22-Aug-16	3.17	1.82	4.74	273.78	10.5
23-Aug-16	3.22	1.85	4.63	278.54	7.3
24-Aug-16	3.07	1.83	4.25	264.83	0.0
25-Aug-16	3.25	1.84	4.62	280.52	0.3
26-Aug-16	3.13	1.90	4.05	270.24	0.0
27-Aug-16	3.23	1.90	4.44	279.13	0.3
28-Aug-16	3.43	2.03	4.70	296.45	1.0
29-Aug-16	3.14	1.84	4.35	271.10	0.0
30-Aug-16	3.06	1.80	4.55	264.05	0.0
31-Aug-16	3.14	1.78	5.04	271.51	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
8821.335	1.280	44.380	49.3

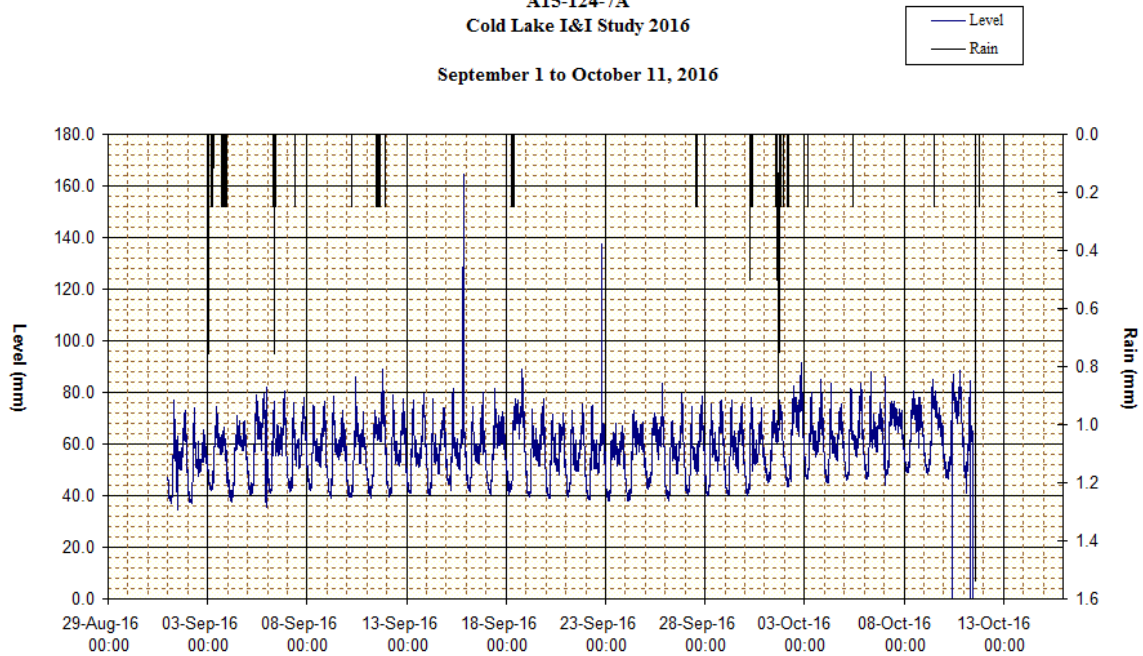
ISL Engineering Ltd.
A15-124-7A
Cold Lake I&I Study 2016

September 1 to October 11, 2016



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Cold Lake I&I Study 2016

September 1 to October 11, 2016



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September 1 to October 11, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-16	3.10	1.60	5.11	267.48	0.0
02-Sep-16	2.94	1.80	4.84	254.37	0.0
03-Sep-16	3.26	2.16	4.89	281.24	10.5
04-Sep-16	3.17	1.82	4.58	273.52	0.0
05-Sep-16	3.59	1.75	5.53	310.49	0.0
06-Sep-16	3.54	2.08	5.45	305.59	5.8
07-Sep-16	3.43	2.11	5.21	296.24	0.3
08-Sep-16	3.40	2.13	5.08	293.80	0.0
09-Sep-16	3.36	1.92	5.25	290.31	0.0
10-Sep-16	3.22	1.95	6.02	278.04	0.3
11-Sep-16	3.54	1.93	6.31	305.81	2.0
12-Sep-16	3.30	1.97	5.30	284.98	0.0
13-Sep-16	3.37	2.07	5.36	291.50	0.0
14-Sep-16	3.29	2.02	5.18	284.62	0.0
15-Sep-16	3.49	2.15	15.10	301.19	0.0
16-Sep-16	3.30	2.12	5.41	285.32	0.0
17-Sep-16	3.45	2.04	5.49	298.04	0.0
18-Sep-16	3.74	2.05	6.29	323.15	3.0
19-Sep-16	3.33	1.98	5.16	287.73	0.0
20-Sep-16	3.19	1.92	4.67	275.49	0.0
21-Sep-16	3.23	1.98	4.97	278.66	0.0
22-Sep-16	3.19	1.88	11.29	276.04	0.0
23-Sep-16	3.06	1.85	4.29	264.02	0.0
24-Sep-16	3.25	1.87	4.73	280.42	0.0
25-Sep-16	3.44	2.20	5.74	297.28	0.0
26-Sep-16	3.22	1.87	5.39	277.90	0.0
27-Sep-16	3.26	2.04	5.27	281.66	0.8
28-Sep-16	3.33	2.02	5.14	287.46	0.0
29-Sep-16	3.31	2.02	5.13	286.18	0.0
30-Sep-16	3.31	2.01	5.21	285.99	3.3
01-Oct-16	3.60	2.39	5.13	311.43	17.3
02-Oct-16	3.97	2.26	6.55	342.60	0.5
03-Oct-16	3.70	2.47	5.88	319.55	0.3
04-Oct-16	3.58	2.36	5.75	308.97	0.0
05-Oct-16	3.74	2.47	5.76	322.74	0.3
06-Oct-16	3.79	2.50	6.17	327.11	0.0
07-Oct-16	4.02	2.31	5.89	347.08	0.0
08-Oct-16	4.01	2.66	5.47	346.25	0.0
09-Oct-16	4.02	2.64	5.88	346.91	0.3
10-Oct-16	4.10	0.00	6.24	354.20	0.0

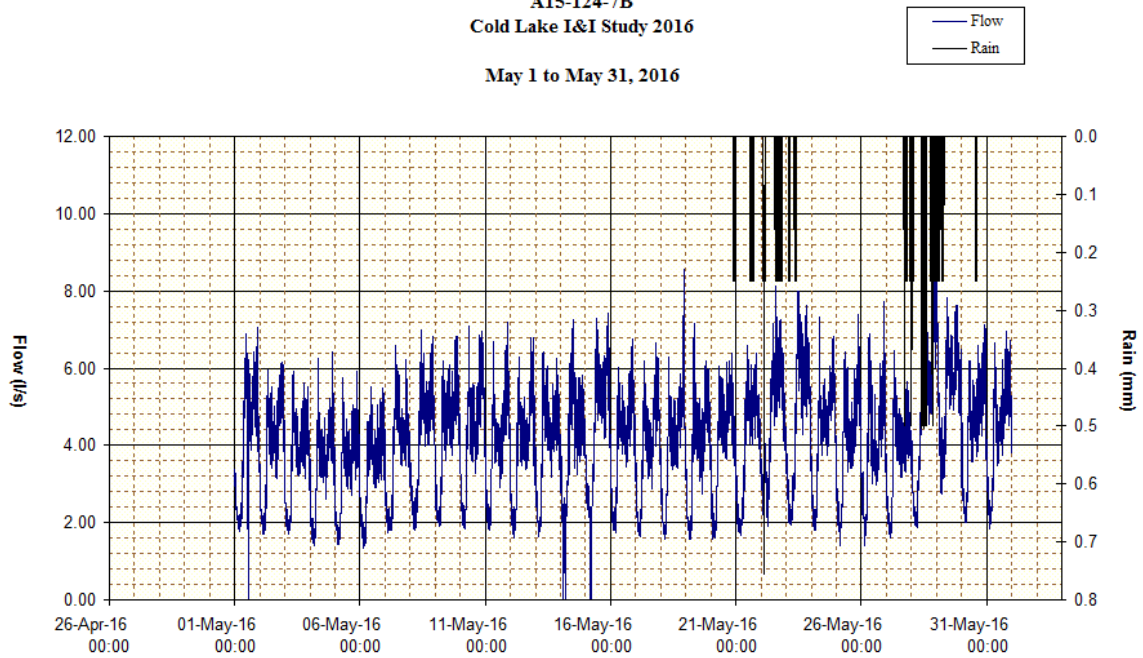
11-Oct-16	1.70	0.00	5.84	146.62	3.0
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Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
12077.970	0.000	15.100	47.3

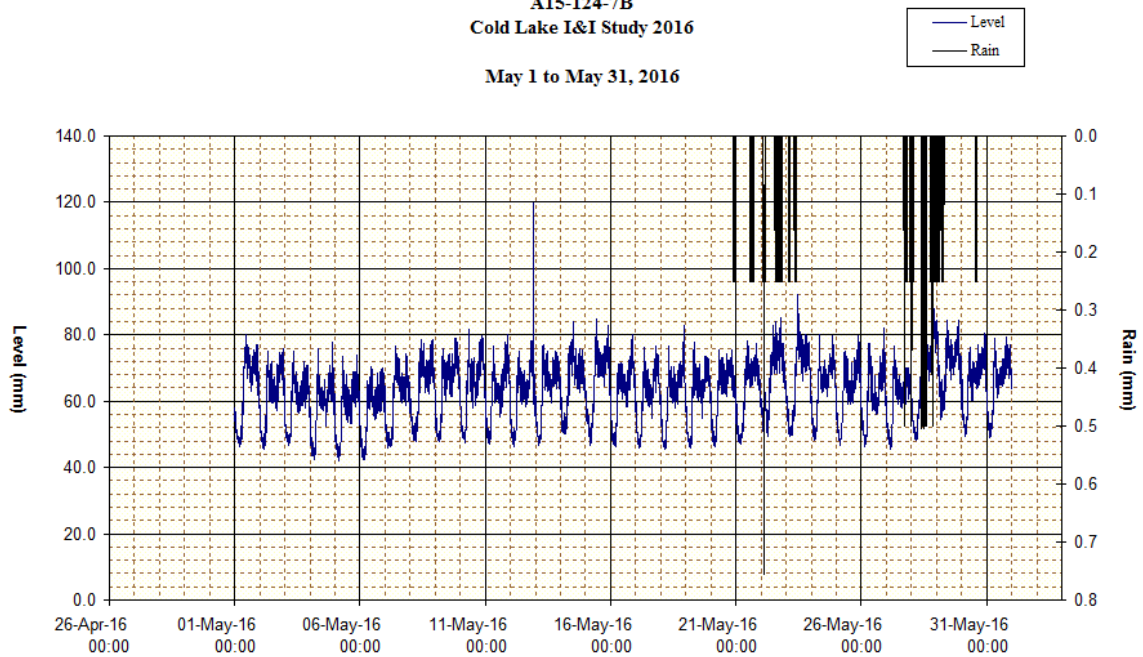
ISL Engineering Ltd.
A15-124-7B
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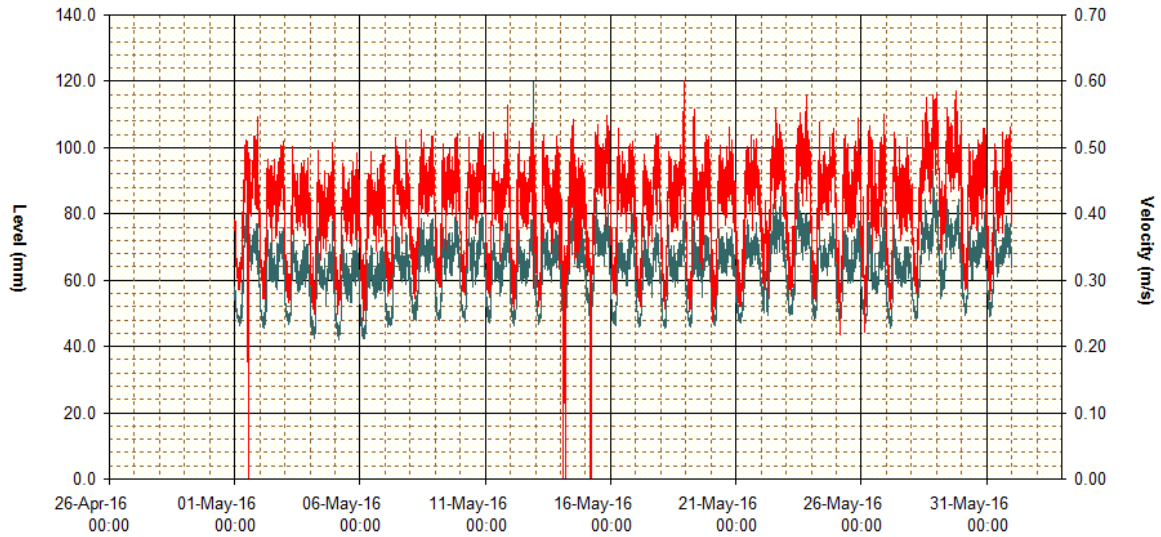
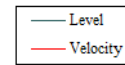
ISL Engineering Ltd.
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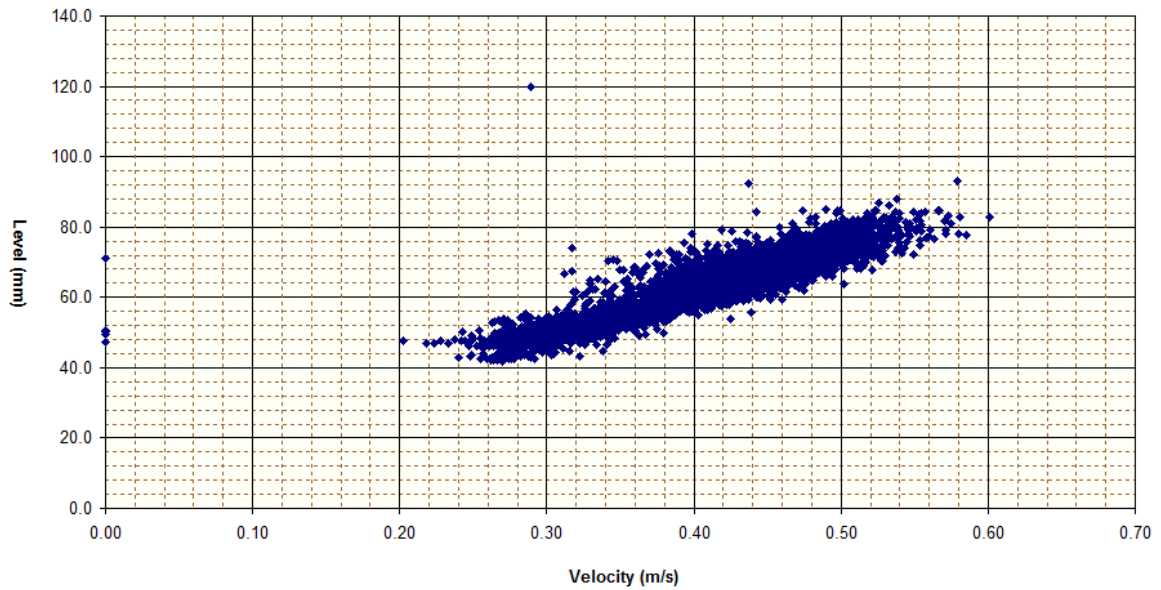
ISL Engineering Ltd.
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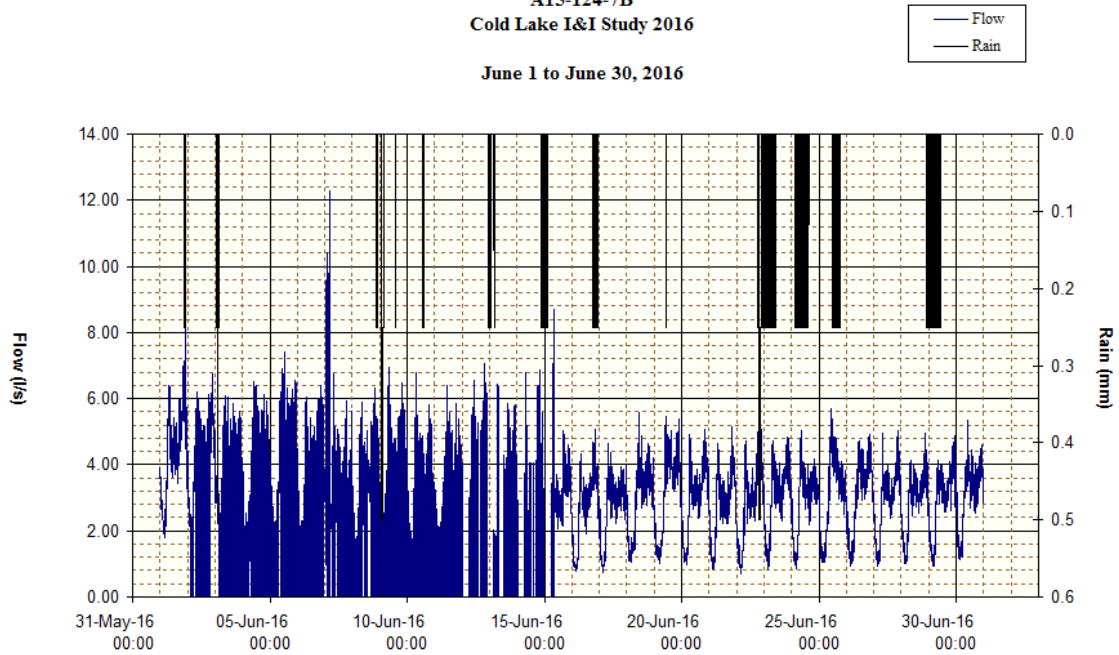
May 1 to May 31, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-May-16	4.22	0.00	7.05	364.49	0.0
02-May-16	3.88	1.70	6.16	335.66	0.0
03-May-16	3.66	1.70	5.90	316.17	0.0
04-May-16	3.48	1.40	6.39	300.65	0.0
05-May-16	3.44	1.44	5.92	296.81	0.0
06-May-16	3.43	1.34	5.52	295.97	0.0
07-May-16	3.80	1.74	6.54	328.73	0.0
08-May-16	4.17	1.82	6.98	360.54	0.0
09-May-16	4.34	1.90	6.83	374.90	0.0
10-May-16	4.22	1.85	7.06	364.81	0.0
11-May-16	4.01	1.80	7.18	346.72	0.0
12-May-16	4.02	1.61	6.78	347.68	0.0
13-May-16	4.06	1.65	6.41	351.15	0.0
14-May-16	4.12	0.00	7.22	356.29	0.0
15-May-16	4.48	0.00	7.42	386.97	0.0
16-May-16	4.06	1.75	6.75	350.52	0.0
17-May-16	3.90	1.65	6.66	336.88	0.0
18-May-16	3.92	1.57	8.55	338.47	0.0
19-May-16	3.96	1.58	7.16	341.85	0.0
20-May-16	4.03	1.56	6.37	348.38	1.5
21-May-16	3.99	1.68	6.59	344.89	3.8
22-May-16	4.64	1.90	8.09	400.77	9.8
23-May-16	4.73	1.94	7.99	408.45	2.0
24-May-16	4.28	1.82	7.28	369.85	0.0
25-May-16	4.07	1.40	7.35	352.01	0.0
26-May-16	3.93	1.41	7.73	339.84	0.0
27-May-16	3.81	1.60	6.46	329.51	4.5
28-May-16	4.94	1.87	9.64	427.01	22.0
29-May-16	5.42	2.75	8.24	468.11	3.0
30-May-16	4.47	1.99	7.11	386.23	0.5
31-May-16	4.41	1.84	6.92	381.05	0.0

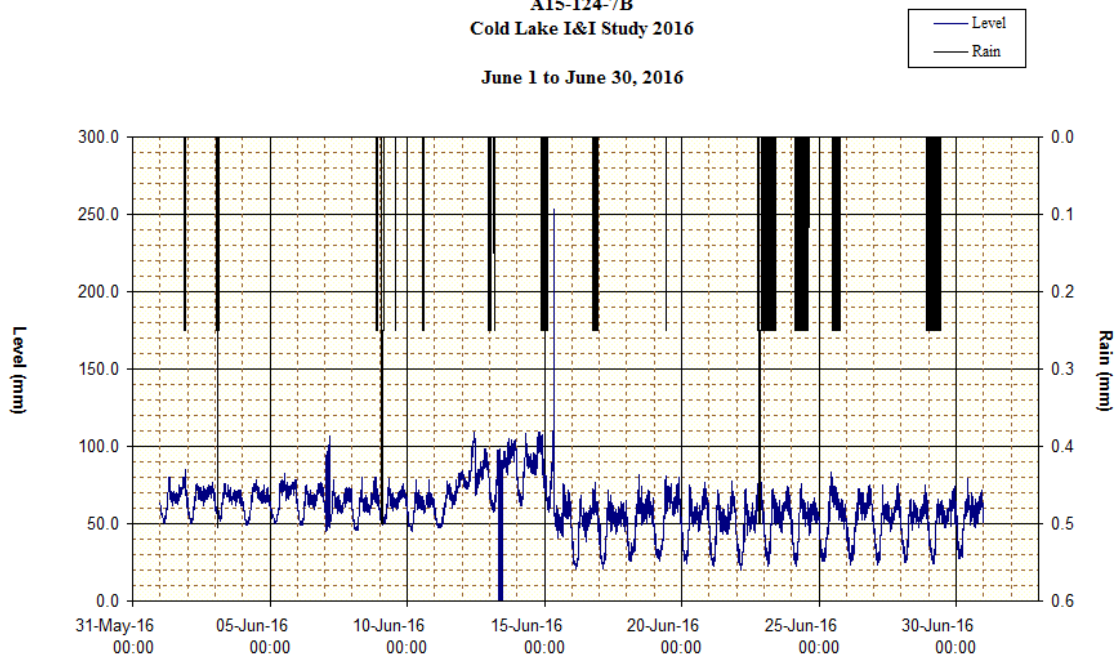
Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
11051.340	0.000	9.640	47.0

ISL Engineering Ltd.
A15-124-7B
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June 1 to June 30, 2016

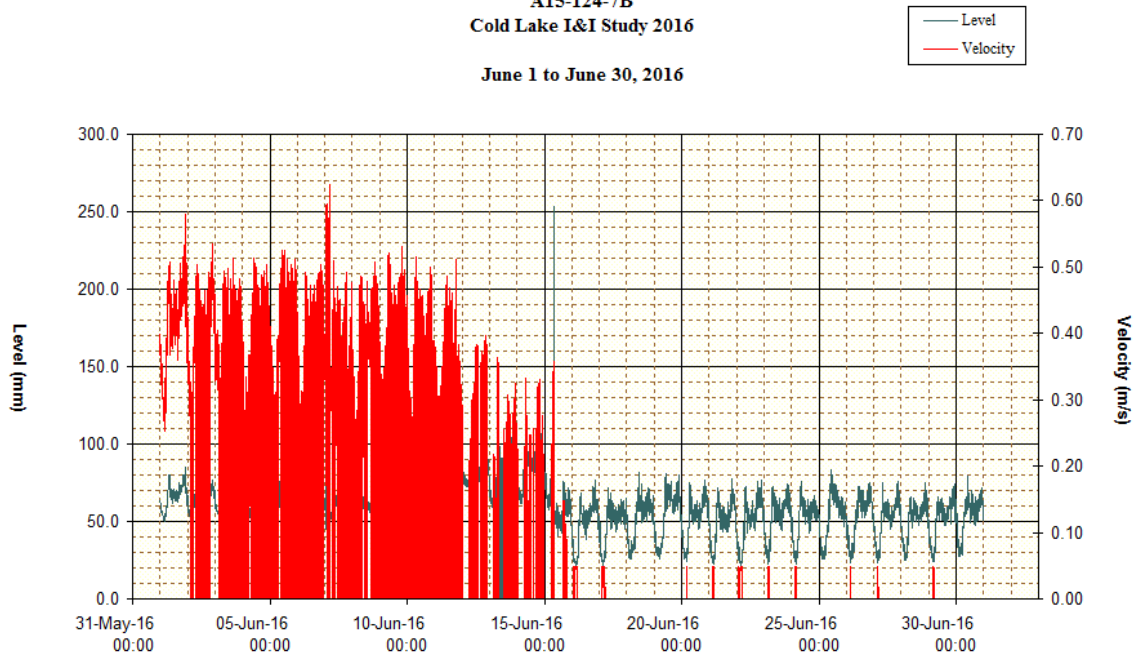


ISL Engineering Ltd.
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Cold Lake I&I Study 2016
June 1 to June 30, 2016



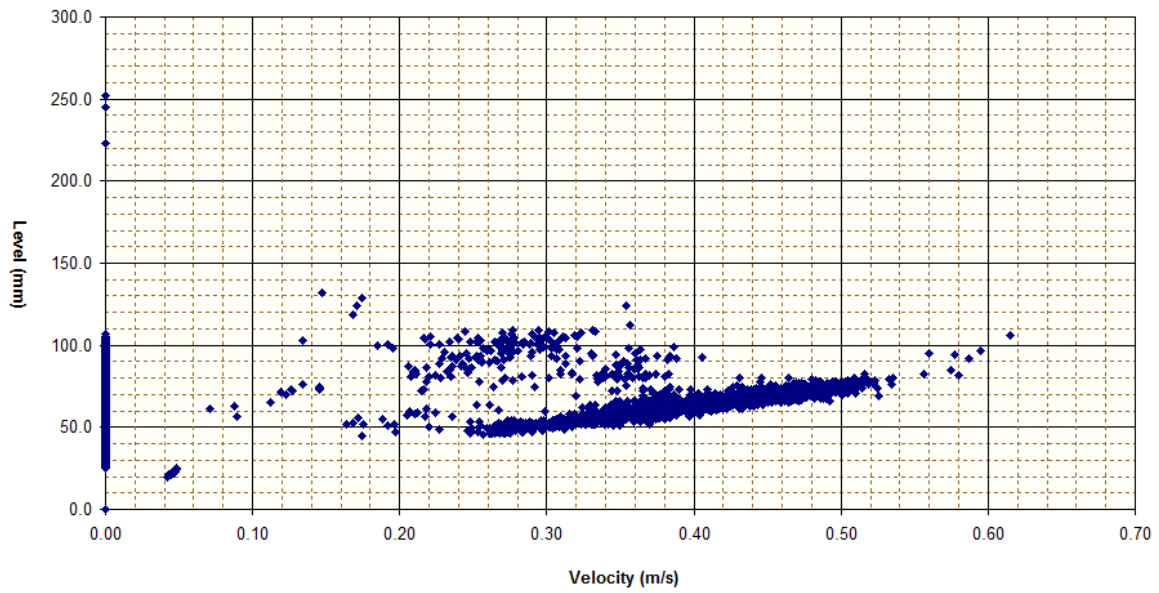
ISL Engineering Ltd.
A15-124-7B
Cold Lake I&I Study 2016

June 1 to June 30, 2016



ISL Engineering Ltd.
A15-124-7B
Cold Lake I&I Study 2016

June 1 to June 30, 2016



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A15-124-7B
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June 1 to June 30, 2016

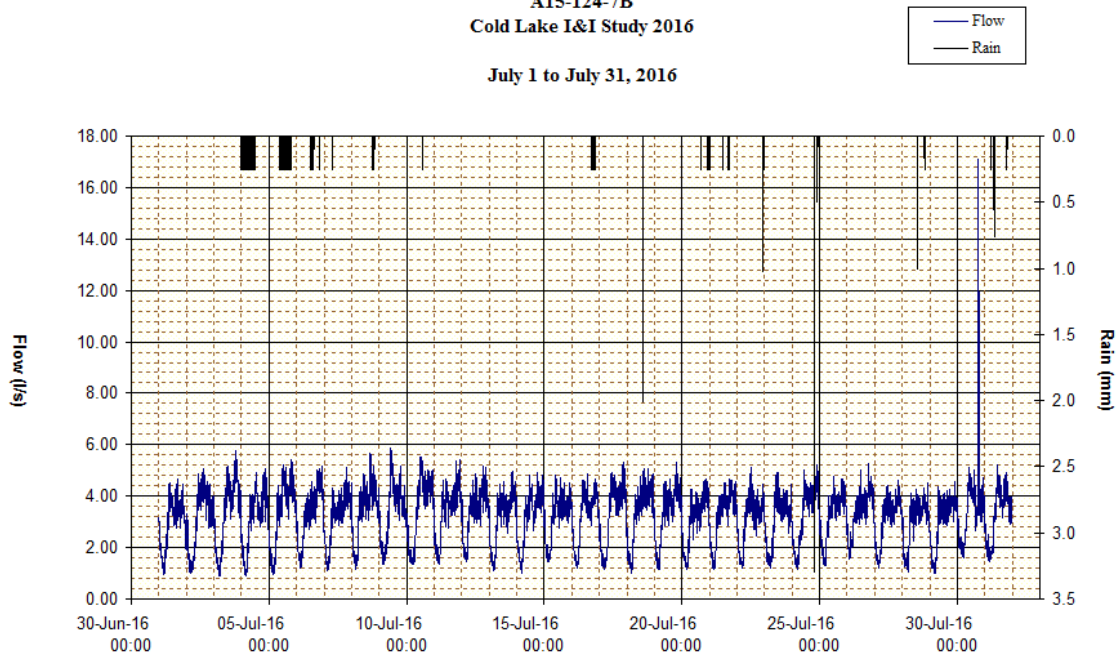
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jun-16	4.43	1.78	8.42	382.85	1.0
02-Jun-16	2.69	0.00	6.76	232.04	0.0
03-Jun-16	2.01	0.00	6.07	173.47	4.0
04-Jun-16	2.02	0.00	6.51	174.61	0.0
05-Jun-16	2.39	0.00	7.32	206.41	0.0
06-Jun-16	2.55	0.00	6.32	219.98	0.0
07-Jun-16	2.33	0.00	12.15	201.68	0.0
08-Jun-16	2.91	0.00	6.26	251.73	2.5
09-Jun-16	2.49	0.00	6.95	214.92	8.5
10-Jun-16	1.64	0.00	6.74	142.12	0.5
11-Jun-16	1.79	0.00	6.34	154.31	0.0
12-Jun-16	1.28	0.00	6.95	110.95	2.0
13-Jun-16	0.81	0.00	6.43	70.32	1.5
14-Jun-16	0.80	0.00	6.85	68.69	2.5
15-Jun-16	2.33	0.00	8.59	201.59	4.3
16-Jun-16	2.74	0.77	5.07	237.12	3.3
17-Jun-16	2.69	0.75	4.64	232.09	0.0
18-Jun-16	2.95	1.06	5.55	255.15	0.0
19-Jun-16	3.15	1.03	5.46	272.14	0.3
20-Jun-16	3.02	0.97	5.07	260.84	0.0
21-Jun-16	2.77	0.85	5.15	239.23	0.0
22-Jun-16	2.83	0.72	5.06	244.56	12.0
23-Jun-16	3.03	0.86	4.85	261.75	14.5
24-Jun-16	2.89	0.86	5.05	249.92	13.8
25-Jun-16	3.08	1.05	5.70	266.14	4.5
26-Jun-16	3.05	0.92	4.92	263.46	0.0
27-Jun-16	2.94	0.92	5.02	253.83	0.0
28-Jun-16	2.89	1.02	4.96	249.98	2.5
29-Jun-16	2.94	0.93	4.89	253.66	8.8
30-Jun-16	3.06	1.14	5.36	263.98	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
6609.498	0.000	12.150	86.3

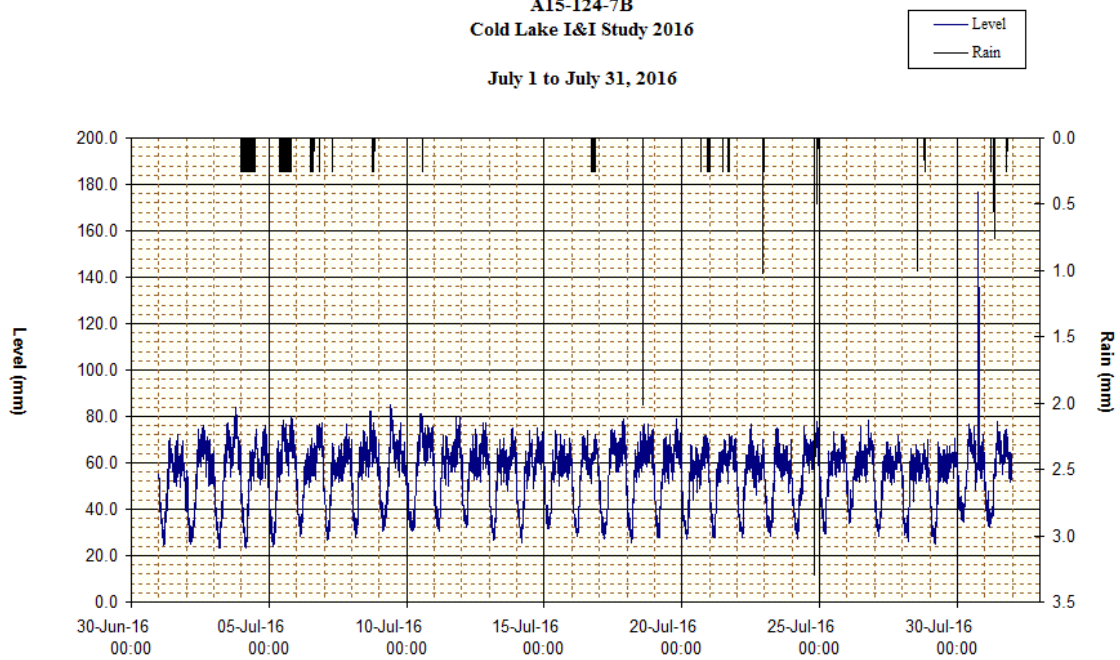
ISL Engineering Ltd.
A15-124-7B
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July 1 to July 31, 2016



ISL Engineering Ltd.
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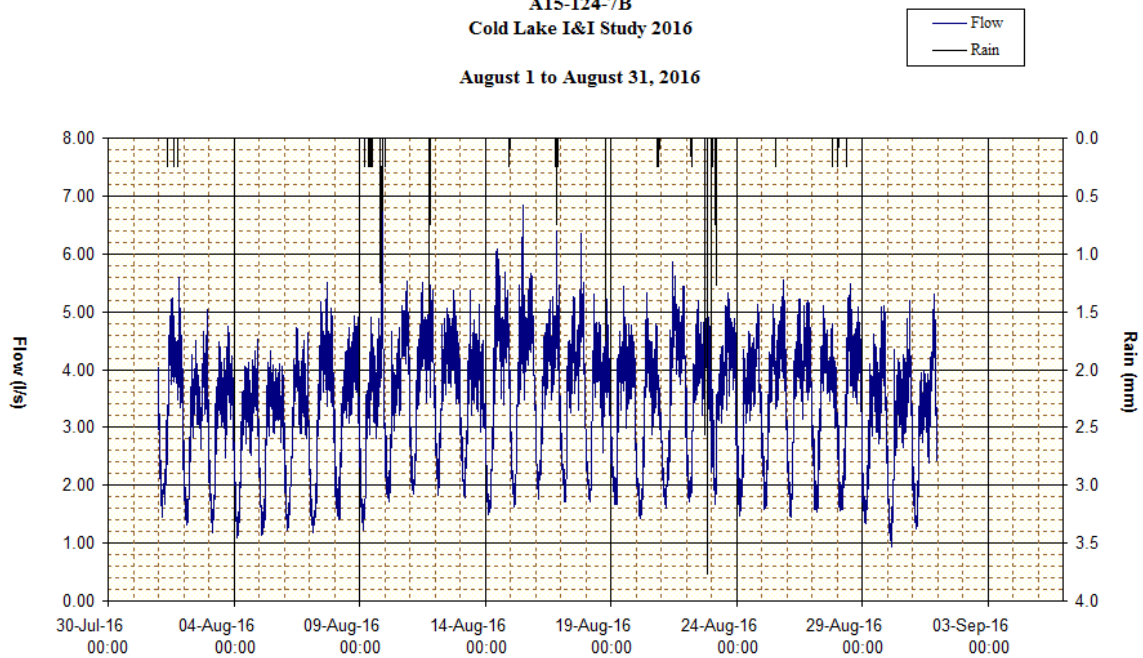
July 1 to July 31, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	2.95	0.97	4.66	255.03	0.0
02-Jul-16	3.10	1.00	5.04	268.01	0.0
03-Jul-16	3.32	0.90	5.79	286.65	0.5
04-Jul-16	3.13	0.89	5.04	270.77	9.0
05-Jul-16	3.38	0.95	5.43	292.14	8.3
06-Jul-16	3.28	1.21	5.16	283.32	2.5
07-Jul-16	3.17	1.10	5.11	274.27	0.3
08-Jul-16	3.42	1.16	5.65	295.22	1.3
09-Jul-16	3.39	1.36	5.88	293.21	0.0
10-Jul-16	3.46	1.34	5.52	298.69	0.3
11-Jul-16	3.37	1.34	5.41	290.77	0.0
12-Jul-16	3.37	1.44	5.16	290.96	0.0
13-Jul-16	3.14	1.09	4.95	271.18	0.0
14-Jul-16	3.18	1.02	4.93	275.09	0.0
15-Jul-16	3.18	1.43	4.82	274.80	0.0
16-Jul-16	3.19	1.20	4.84	275.26	1.8
17-Jul-16	3.32	1.14	5.33	286.79	0.0
18-Jul-16	3.32	1.02	5.08	286.99	2.8
19-Jul-16	3.30	1.15	5.29	284.95	0.0
20-Jul-16	3.07	1.13	4.64	265.07	1.0
21-Jul-16	3.21	1.16	4.68	277.55	1.8
22-Jul-16	3.05	1.18	5.09	263.95	2.5
23-Jul-16	3.06	1.20	4.93	264.47	0.0
24-Jul-16	3.24	1.15	5.19	280.11	11.8
25-Jul-16	3.21	1.29	4.77	277.35	0.0
26-Jul-16	3.33	1.56	5.27	287.62	0.0
27-Jul-16	3.04	1.19	4.62	262.30	0.0
28-Jul-16	3.00	1.06	4.49	259.00	1.3
29-Jul-16	3.02	1.01	4.55	261.30	0.0
30-Jul-16	3.44	1.61	17.11	297.17	0.0
31-Jul-16	3.24	1.45	5.22	279.89	3.3

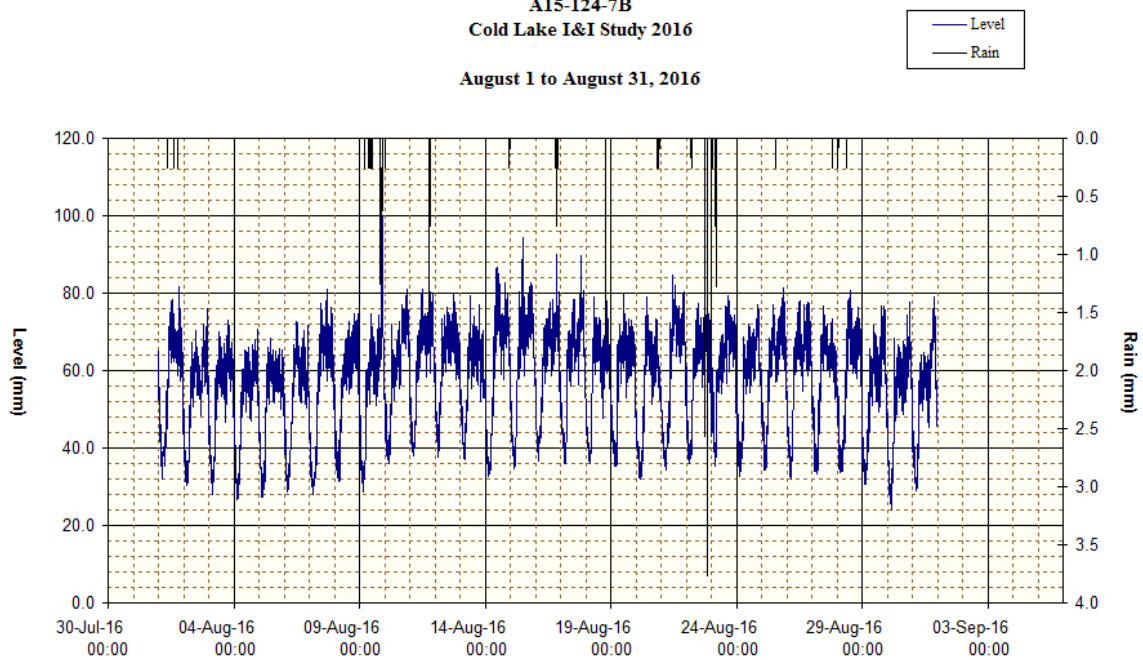
Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
8629.878	0.890	17.110	48.0

ISL Engineering Ltd.
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Cold Lake I&I Study 2016
August 1 to August 31, 2016



ISL Engineering Ltd.
A15-124-7B
Cold Lake I&I Study 2016
August 1 to August 31, 2016



ISL Engineering Ltd.
A15-124-7B
Cold Lake I&I Study 2016

August 1 to August 31, 2016

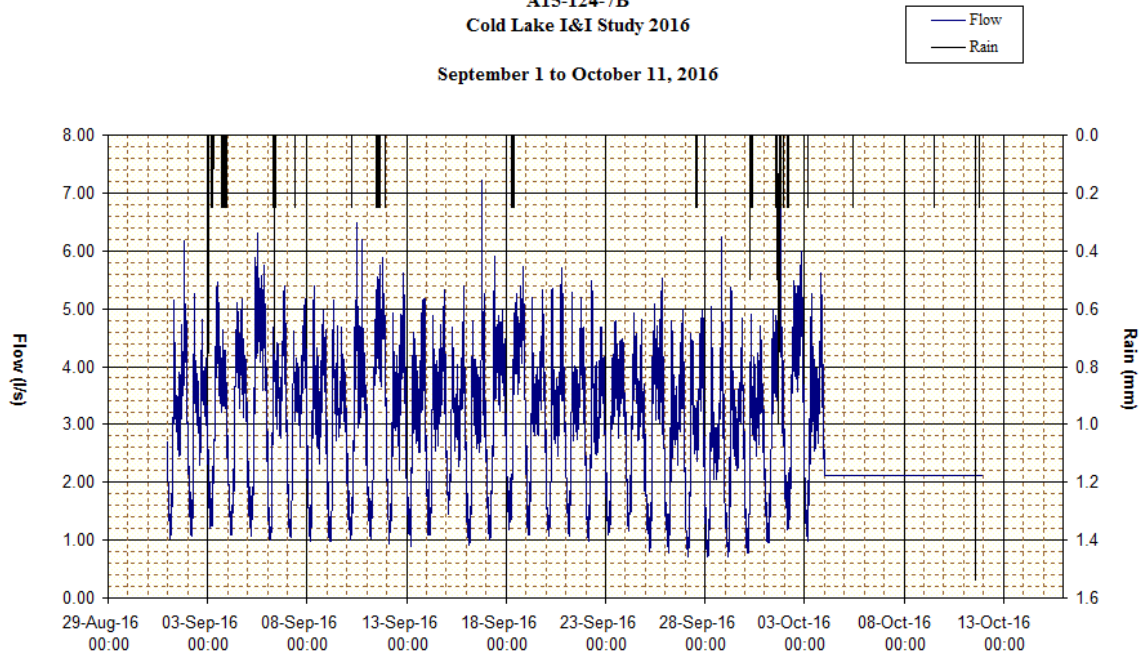
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Aug-16	3.41	1.45	5.59	294.53	1.3
02-Aug-16	3.12	1.32	5.03	269.82	0.0
03-Aug-16	3.07	1.18	4.75	265.14	0.0
04-Aug-16	2.90	1.09	4.53	250.62	0.0
05-Aug-16	2.95	1.14	4.32	254.49	0.0
06-Aug-16	3.03	1.22	4.73	262.15	0.0
07-Aug-16	3.30	1.19	5.51	285.53	0.0
08-Aug-16	3.29	1.40	4.92	284.58	0.0
09-Aug-16	3.43	1.23	7.36	296.58	17.8
10-Aug-16	3.59	1.72	5.52	310.22	0.3
11-Aug-16	3.82	1.85	5.50	329.79	3.3
12-Aug-16	3.85	1.83	5.37	332.62	0.0
13-Aug-16	3.46	1.79	5.34	298.69	0.0
14-Aug-16	3.76	1.50	6.07	325.01	0.3
15-Aug-16	3.85	1.63	6.84	332.91	0.0
16-Aug-16	3.77	1.77	6.40	325.90	1.3
17-Aug-16	3.78	1.71	6.35	326.81	0.0
18-Aug-16	3.54	1.71	5.31	306.19	5.3
19-Aug-16	3.50	1.67	5.42	302.09	0.0
20-Aug-16	3.25	1.43	5.32	281.19	0.8
21-Aug-16	3.70	1.61	5.86	319.40	0.0
22-Aug-16	3.60	1.72	5.17	310.76	10.5
23-Aug-16	3.67	1.67	5.33	317.39	7.3
24-Aug-16	3.46	1.48	5.12	298.73	0.0
25-Aug-16	3.64	1.59	5.54	314.71	0.3
26-Aug-16	3.54	1.45	5.22	305.74	0.0
27-Aug-16	3.41	1.54	5.11	294.23	0.3
28-Aug-16	3.46	1.55	5.46	298.79	1.0
29-Aug-16	3.21	1.34	5.11	276.95	0.0
30-Aug-16	3.02	0.93	5.19	260.93	0.0
31-Aug-16	3.11	1.24	5.31	268.96	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
9201.435	0.930	7.360	49.3

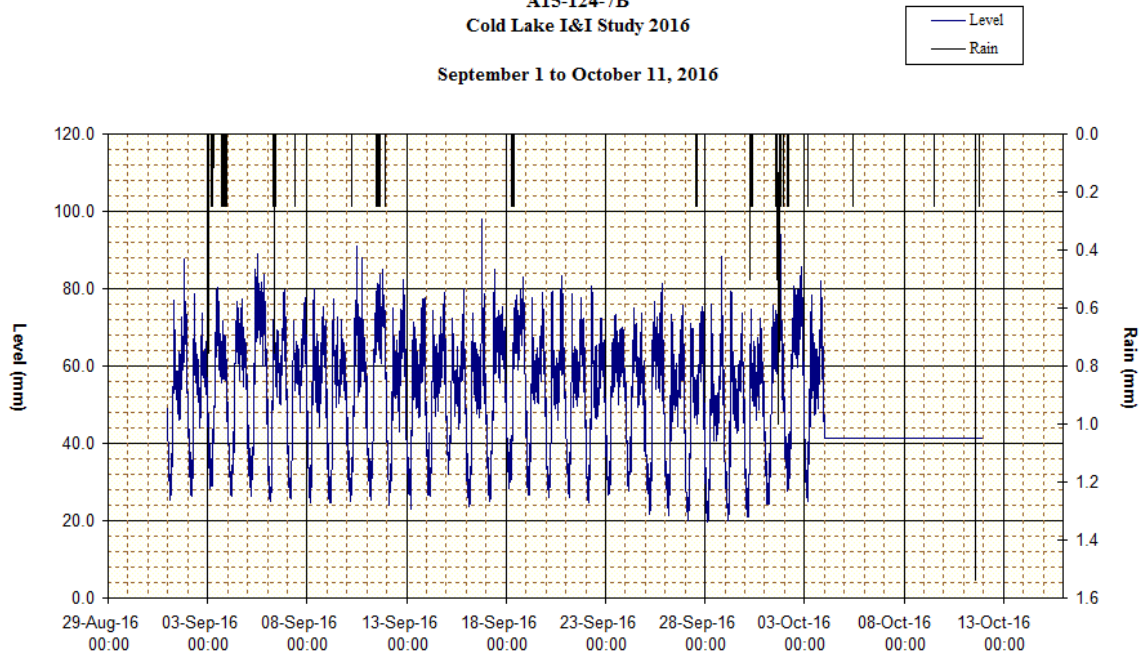
ISL Engineering Ltd.
A15-124-7B
Cold Lake I&I Study 2016

September 1 to October 11, 2016



ISL Engineering Ltd.
A15-124-7B
Cold Lake I&I Study 2016

September 1 to October 11, 2016



ISL Engineering Ltd.
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Cold Lake I&I Study 2016

September 1 to October 11, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-16	3.13	1.03	6.17	270.79	0.0
02-Sep-16	3.03	1.07	5.27	261.83	0.0
03-Sep-16	3.20	1.20	5.45	276.61	10.5
04-Sep-16	3.21	1.09	5.16	277.73	0.0
05-Sep-16	3.62	1.08	6.30	313.13	0.0
06-Sep-16	3.23	1.00	5.39	279.22	5.8
07-Sep-16	3.15	1.04	5.18	271.89	0.3
08-Sep-16	3.10	0.98	5.40	267.80	0.0
09-Sep-16	3.01	0.98	5.14	260.08	0.0
10-Sep-16	3.19	1.00	6.48	275.92	0.3
11-Sep-16	3.46	1.03	5.88	299.16	2.0
12-Sep-16	3.13	0.94	5.62	270.45	0.0
13-Sep-16	3.03	0.89	5.18	261.84	0.0
14-Sep-16	3.10	1.09	5.32	268.10	0.0
15-Sep-16	3.06	1.44	5.40	264.44	0.0
16-Sep-16	3.06	0.92	7.21	264.70	0.0
17-Sep-16	3.23	1.01	5.90	278.69	0.0
18-Sep-16	3.50	1.19	5.72	302.74	3.0
19-Sep-16	3.19	1.09	5.31	275.99	0.0
20-Sep-16	3.05	1.07	5.69	263.30	0.0
21-Sep-16	3.14	1.07	5.28	271.16	0.0
22-Sep-16	2.99	0.98	5.48	258.59	0.0
23-Sep-16	3.12	1.09	4.78	269.81	0.0
24-Sep-16	3.02	1.16	4.93	261.02	0.0
25-Sep-16	3.02	0.80	5.53	261.20	0.0
26-Sep-16	2.81	0.79	5.00	242.90	0.0
27-Sep-16	2.83	0.72	4.97	244.79	0.8
28-Sep-16	2.64	0.71	6.23	228.38	0.0
29-Sep-16	2.72	0.72	5.34	234.97	0.0
30-Sep-16	2.84	0.77	4.90	245.71	3.3
01-Oct-16	3.34	0.96	7.48	288.37	17.3
02-Oct-16	3.49	1.17	5.98	301.92	0.5
03-Oct-16	3.13	0.99	5.62	270.05	0.3
04-Oct-16	2.11	2.11	2.11	182.30	0.0
05-Oct-16	2.11	2.11	2.11	182.30	0.3
06-Oct-16	2.11	2.11	2.11	182.30	0.0
07-Oct-16	2.11	2.11	2.11	182.30	0.0
08-Oct-16	2.11	2.11	2.11	182.30	0.0
09-Oct-16	2.11	2.11	2.11	182.30	0.3
10-Oct-16	2.11	2.11	2.11	182.30	0.0

11-Oct-16	2.11	2.11	2.11	182.30	3.0
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Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
10341.687	0.710	7.480	47.3

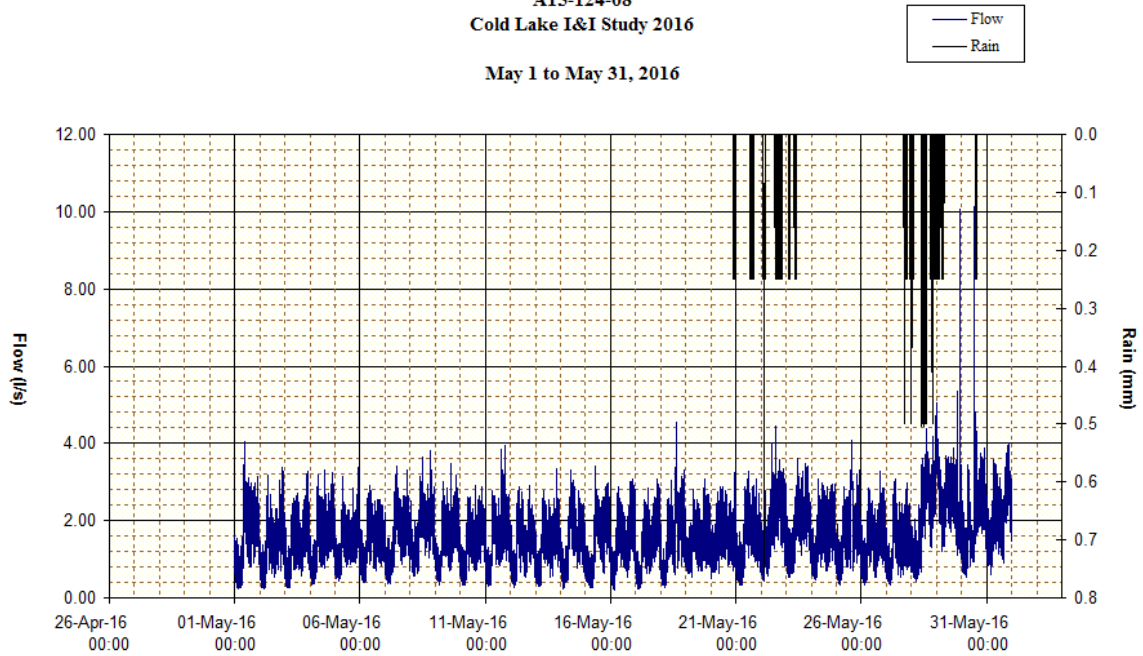


LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

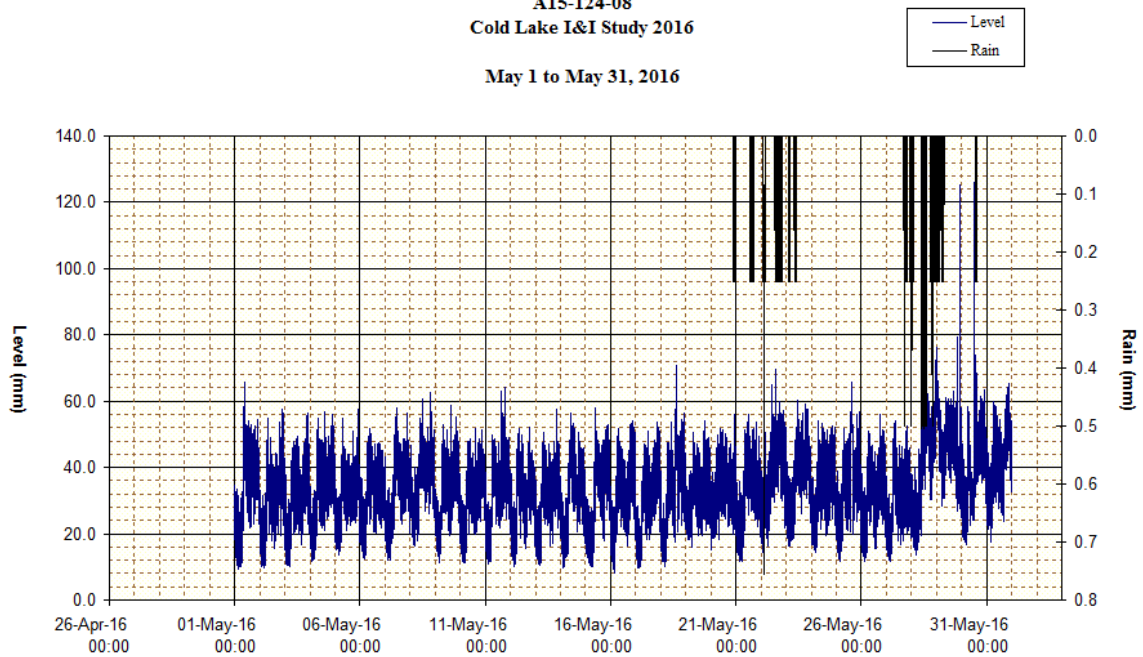
ISL Engineering Ltd.
A15-124-08
Cold Lake I&I Study 2016

May 1 to May 31, 2016



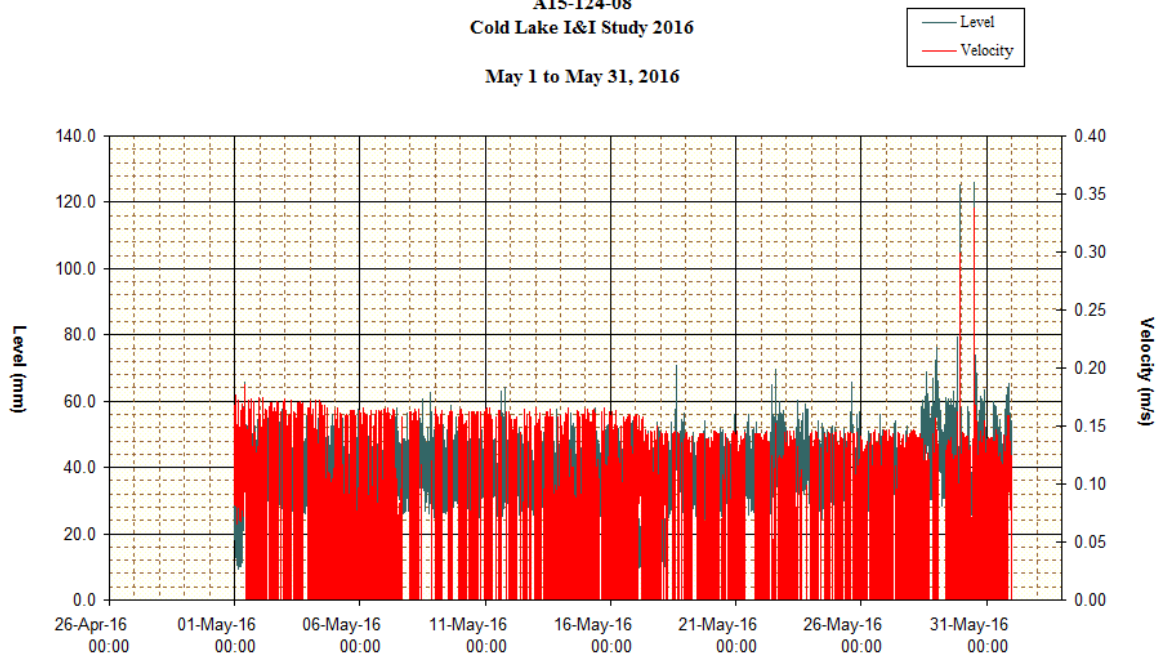
ISL Engineering Ltd.
A15-124-08
Cold Lake I&I Study 2016

May 1 to May 31, 2016



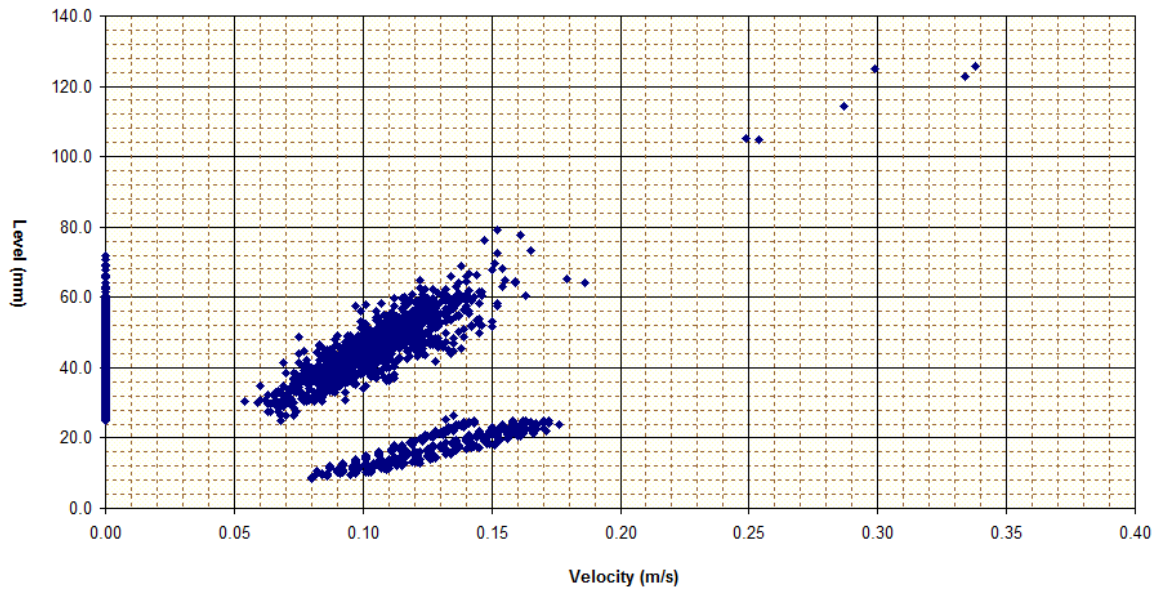
ISL Engineering Ltd.
A15-124-08
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May 1 to May 31, 2016



ISL Engineering Ltd.
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May 1 to May 31, 2016



ISL Engineering Ltd.
A15-124-08
Cold Lake I&I Study 2016

May 1 to May 31, 2016

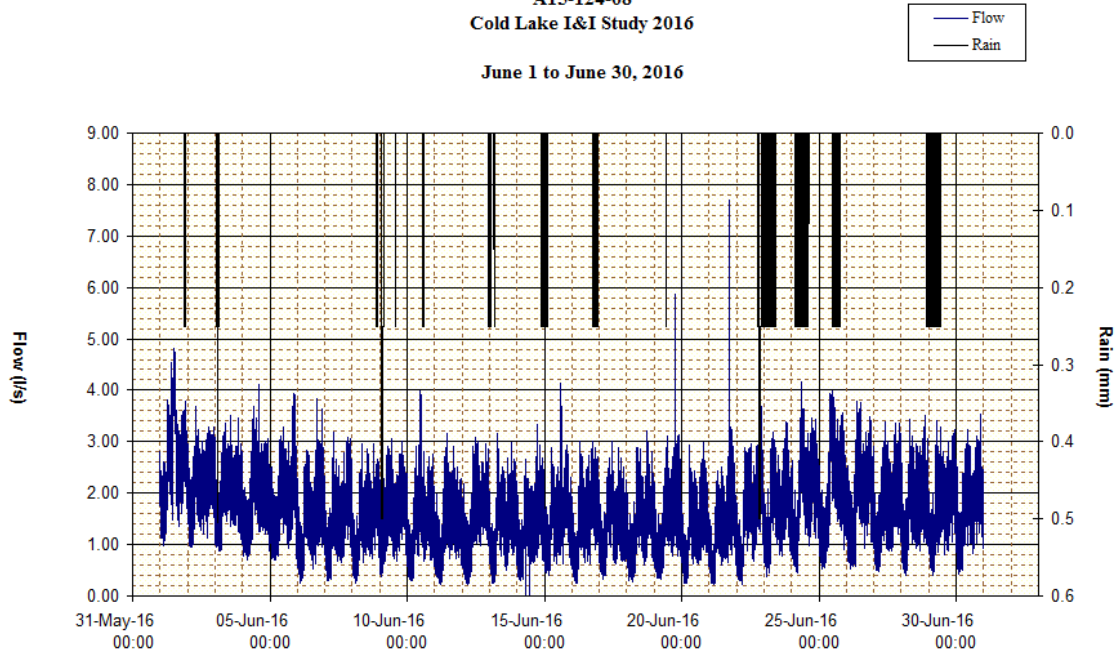
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-May-16	1.49	0.24	4.04	129.01	0.0
02-May-16	1.30	0.25	3.39	112.13	0.0
03-May-16	1.33	0.27	3.27	115.07	0.0
04-May-16	1.47	0.34	3.32	126.78	0.0
05-May-16	1.40	0.43	3.39	121.17	0.0
06-May-16	1.41	0.39	2.86	122.04	0.0
07-May-16	1.52	0.37	3.40	130.92	0.0
08-May-16	1.72	0.56	3.81	148.72	0.0
09-May-16	1.40	0.33	3.49	120.95	0.0
10-May-16	1.35	0.33	2.88	116.64	0.0
11-May-16	1.48	0.30	3.96	127.48	0.0
12-May-16	1.30	0.27	2.92	112.61	0.0
13-May-16	1.34	0.29	3.31	116.11	0.0
14-May-16	1.43	0.25	3.30	123.67	0.0
15-May-16	1.45	0.26	3.41	125.69	0.0
16-May-16	1.36	0.20	3.07	117.18	0.0
17-May-16	1.30	0.25	3.06	112.57	0.0
18-May-16	1.50	0.26	4.56	129.38	0.0
19-May-16	1.42	0.56	3.09	122.27	0.0
20-May-16	1.48	0.50	3.25	127.58	1.5
21-May-16	1.47	0.34	3.26	126.81	3.8
22-May-16	1.87	0.45	4.45	161.57	9.8
23-May-16	1.82	0.55	3.61	157.28	2.0
24-May-16	1.50	0.47	3.08	129.81	0.0
25-May-16	1.57	0.35	4.09	136.07	0.0
26-May-16	1.40	0.35	3.26	121.03	0.0
27-May-16	1.32	0.34	3.09	114.29	4.5
28-May-16	2.12	0.43	4.71	182.98	22.0
29-May-16	2.66	1.10	10.06	230.24	3.0
30-May-16	2.04	0.58	10.14	176.60	0.5
31-May-16	2.08	0.59	4.02	179.59	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
4174.209	0.200	10.140	47.0

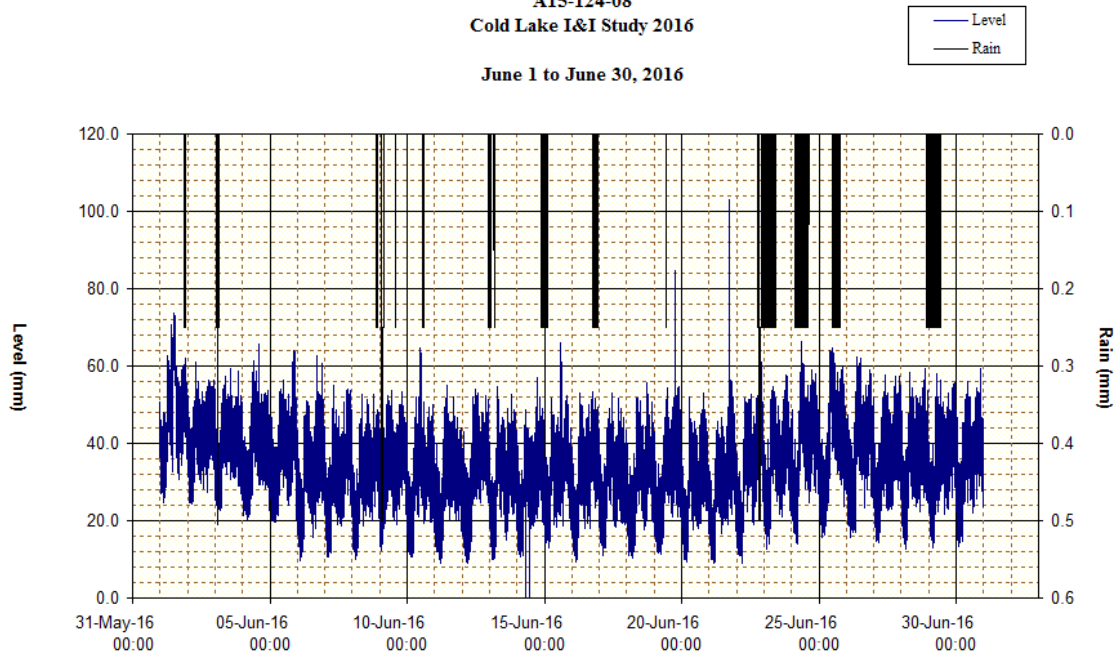
ISL Engineering Ltd.
A15-124-08
Cold Lake I&I Study 2016

June 1 to June 30, 2016



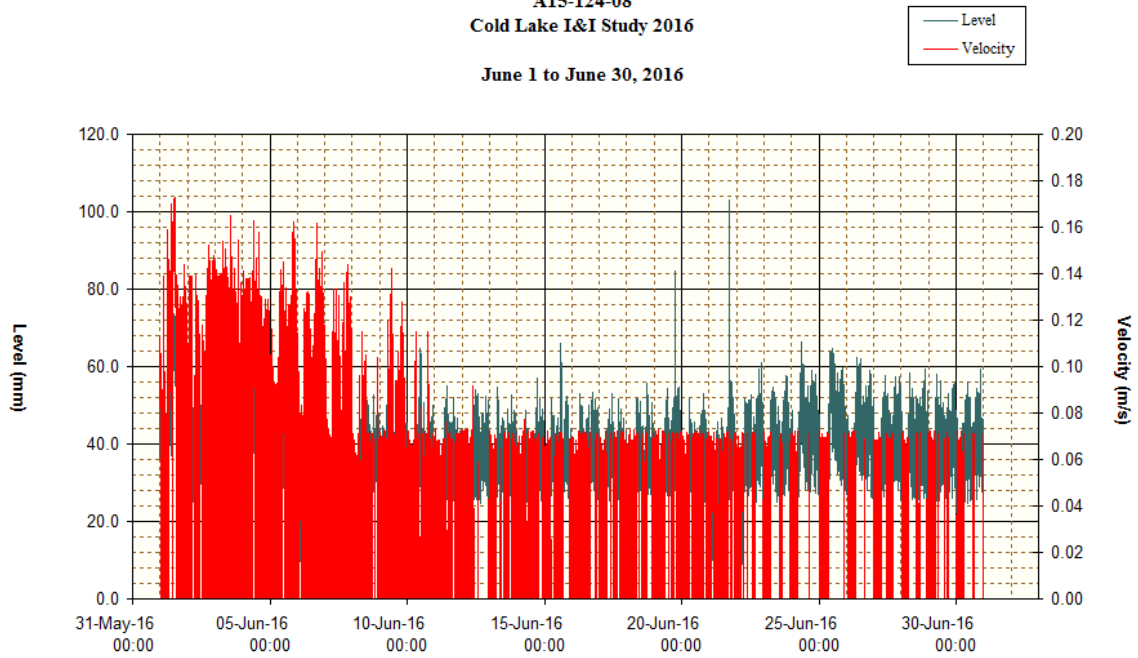
ISL Engineering Ltd.
A15-124-08
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June 1 to June 30, 2016



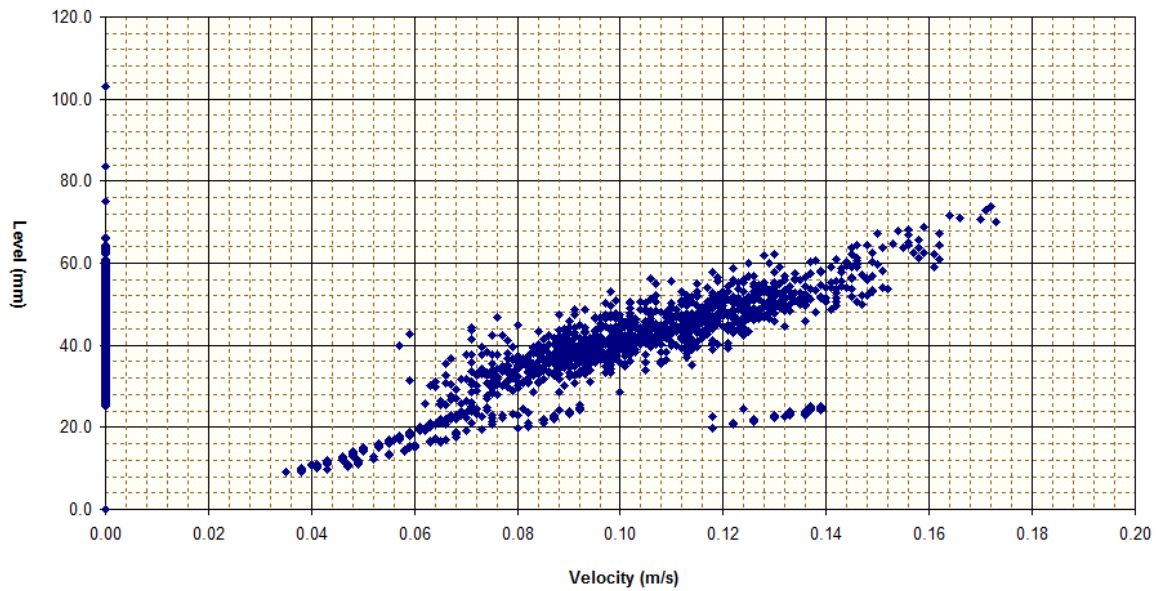
ISL Engineering Ltd.
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June 1 to June 30, 2016

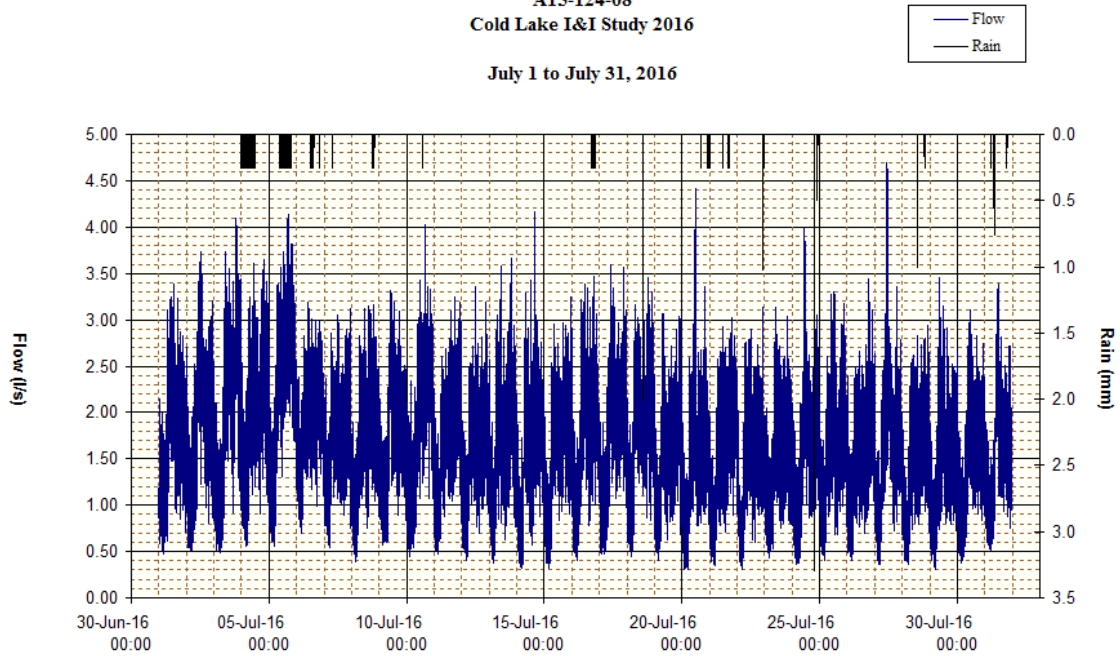
Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jun-16	2.49	0.99	4.82	215.23	1.0
02-Jun-16	2.07	0.95	3.65	178.86	0.0
03-Jun-16	1.98	0.87	3.52	171.08	4.0
04-Jun-16	1.84	0.71	4.10	159.27	0.0
05-Jun-16	1.73	0.71	3.92	149.44	0.0
06-Jun-16	1.47	0.25	3.80	127.03	0.0
07-Jun-16	1.41	0.29	3.18	121.64	0.0
08-Jun-16	1.38	0.26	2.97	118.94	2.5
09-Jun-16	1.55	0.38	3.06	134.08	8.5
10-Jun-16	1.40	0.29	3.99	120.65	0.5
11-Jun-16	1.30	0.23	3.15	112.36	0.0
12-Jun-16	1.46	0.23	3.08	126.09	2.0
13-Jun-16	1.34	0.26	3.15	115.73	1.5
14-Jun-16	1.27	0.00	3.30	109.92	2.5
15-Jun-16	1.51	0.40	4.13	130.20	4.3
16-Jun-16	1.42	0.24	3.02	122.96	3.3
17-Jun-16	1.33	0.32	2.98	114.86	0.0
18-Jun-16	1.33	0.27	3.17	114.49	0.0
19-Jun-16	1.43	0.32	5.76	123.34	0.3
20-Jun-16	1.26	0.24	2.97	109.14	0.0
21-Jun-16	1.29	0.22	7.70	111.84	0.0
22-Jun-16	1.51	0.23	3.69	130.48	12.0
23-Jun-16	1.61	0.38	3.36	139.53	14.5
24-Jun-16	1.91	0.46	4.15	165.08	13.8
25-Jun-16	1.99	0.56	3.99	171.51	4.5
26-Jun-16	1.91	0.52	3.77	164.98	0.0
27-Jun-16	1.69	0.48	3.37	145.78	0.0
28-Jun-16	1.70	0.39	3.52	146.49	2.5
29-Jun-16	1.63	0.41	3.38	140.48	8.8
30-Jun-16	1.62	0.42	3.53	139.98	0.0

Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
4131.456	0.000	7.700	86.3

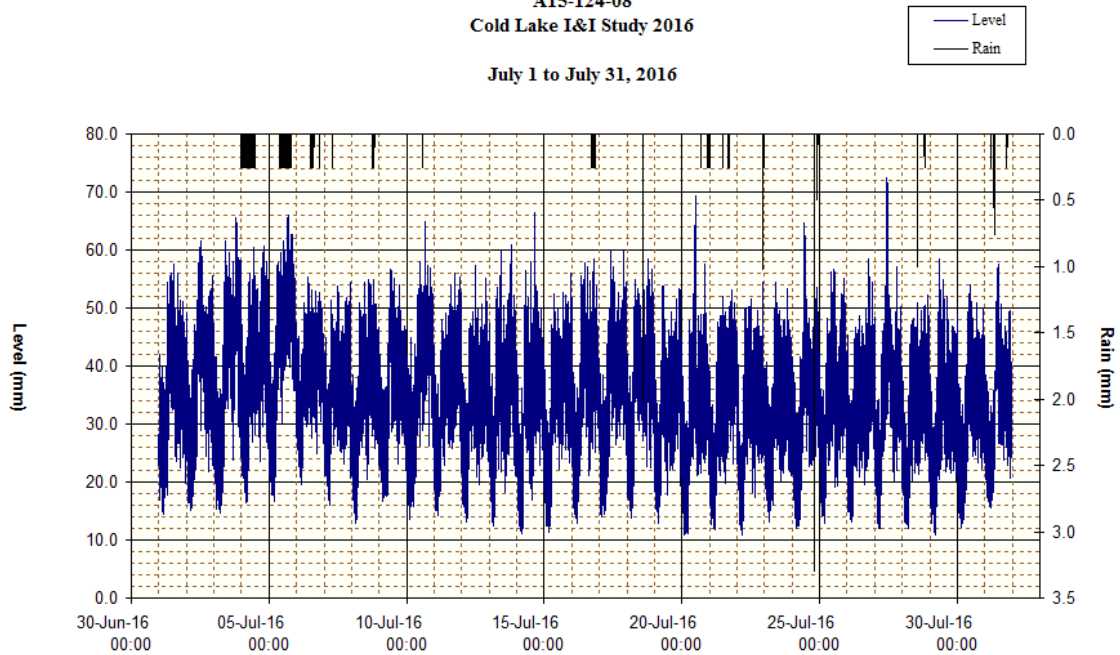
ISL Engineering Ltd.
A15-124-08
Cold Lake I&I Study 2016

July 1 to July 31, 2016



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Cold Lake I&I Study 2016

July 1 to July 31, 2016



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Cold Lake I&I Study 2016

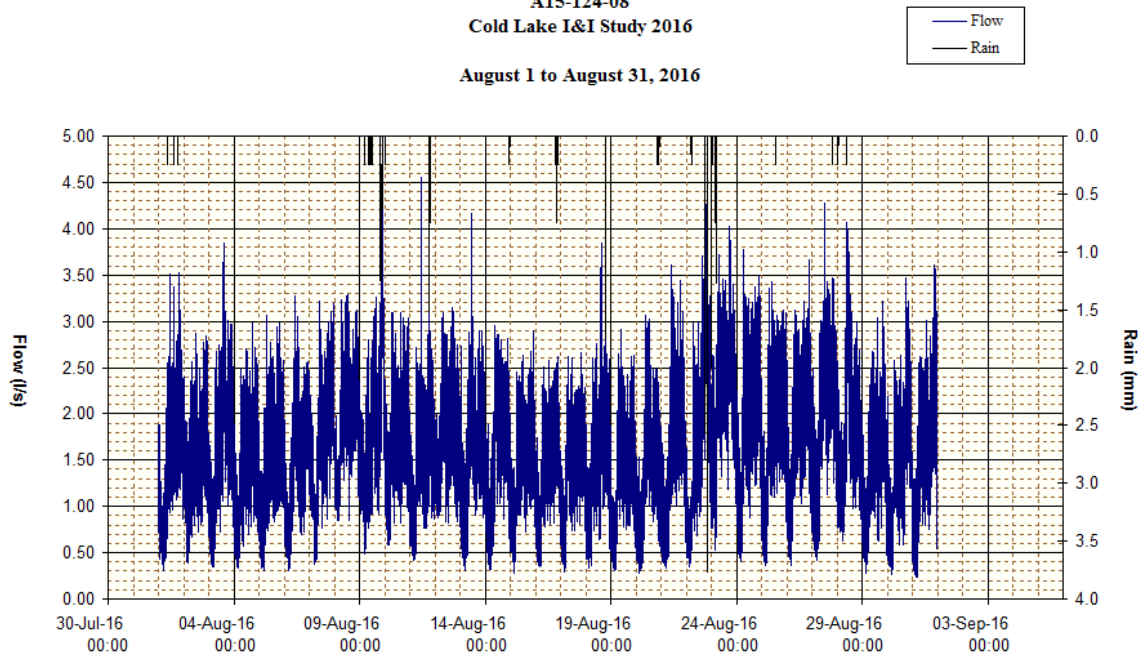
July 1 to July 31, 2016

Date	Avg Flow	Min Flow	Max Flow	Total Flow	Total Rain
	(l/s)	(l/s)	(l/s)	(m3d)	(mm)
01-Jul-16	1.58	0.47	3.38	136.76	0.0
02-Jul-16	1.73	0.50	3.73	149.36	0.0
03-Jul-16	1.93	0.49	4.08	166.77	0.5
04-Jul-16	1.87	0.56	3.65	161.52	9.0
05-Jul-16	2.23	0.57	4.13	193.03	8.3
06-Jul-16	1.84	0.71	3.19	159.00	2.5
07-Jul-16	1.66	0.54	3.10	143.11	0.3
08-Jul-16	1.64	0.41	3.16	141.91	1.3
09-Jul-16	1.66	0.57	3.29	143.37	0.0
10-Jul-16	1.83	0.44	4.02	158.12	0.3
11-Jul-16	1.64	0.47	3.20	142.10	0.0
12-Jul-16	1.55	0.41	3.31	134.30	0.0
13-Jul-16	1.58	0.38	3.66	136.62	0.0
14-Jul-16	1.56	0.32	4.17	134.60	0.0
15-Jul-16	1.56	0.32	3.23	134.97	0.0
16-Jul-16	1.65	0.40	3.47	142.69	1.8
17-Jul-16	1.70	0.47	3.60	146.61	0.0
18-Jul-16	1.72	0.44	3.45	148.23	2.8
19-Jul-16	1.48	0.41	3.06	128.15	0.0
20-Jul-16	1.44	0.31	4.42	124.80	1.0
21-Jul-16	1.54	0.35	3.02	132.81	1.8
22-Jul-16	1.37	0.31	3.13	118.76	2.5
23-Jul-16	1.42	0.43	3.13	123.04	0.0
24-Jul-16	1.50	0.36	3.95	129.50	11.8
25-Jul-16	1.52	0.41	3.27	131.17	0.0
26-Jul-16	1.41	0.41	3.43	121.70	0.0
27-Jul-16	1.61	0.36	4.68	139.25	0.0
28-Jul-16	1.36	0.36	2.94	117.51	1.3
29-Jul-16	1.35	0.30	3.42	116.96	0.0
30-Jul-16	1.40	0.37	3.09	121.18	0.0
31-Jul-16	1.45	0.52	3.39	125.33	3.3

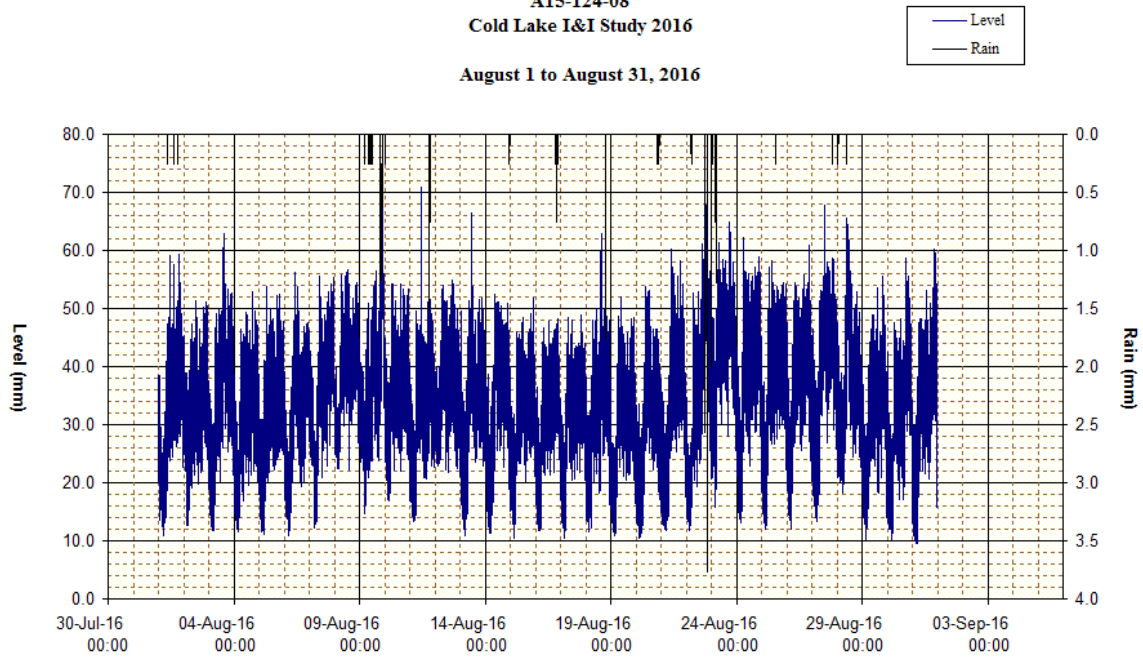
Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
4303.233	0.300	4.680	48.0

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August 1 to August 31, 2016



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August 1 to August 31, 2016



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A15-124-08
Cold Lake I&I Study 2016

August 1 to August 31, 2016

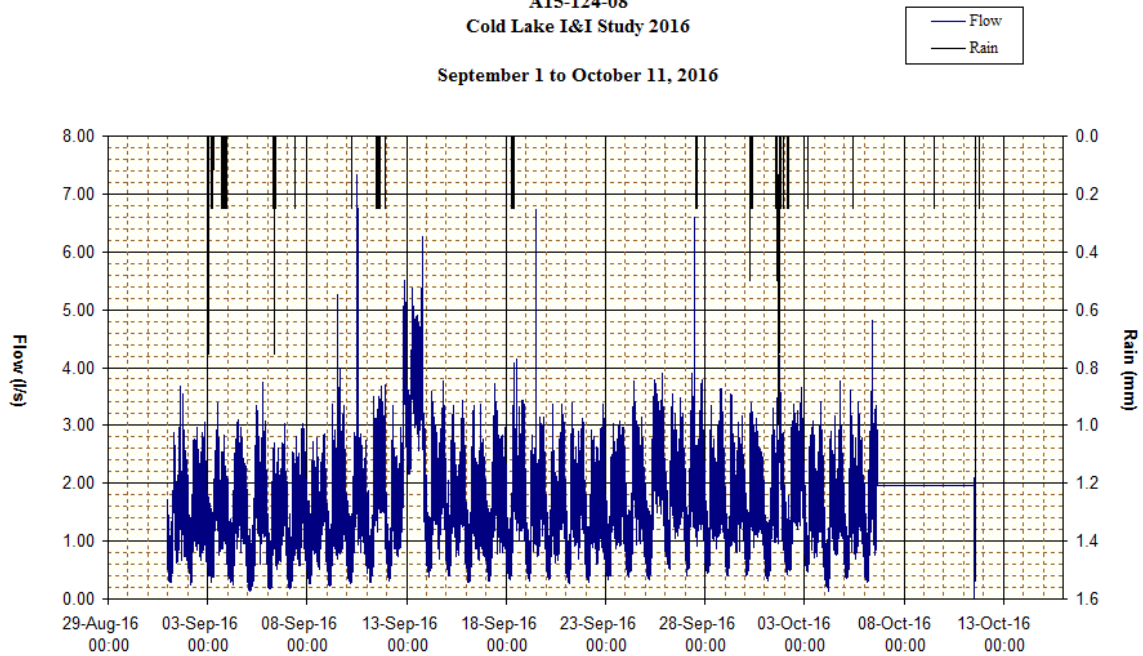
Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Aug-16	1.47	0.31	3.51	126.94	1.3
02-Aug-16	1.44	0.39	2.87	124.36	0.0
03-Aug-16	1.56	0.35	3.85	134.87	0.0
04-Aug-16	1.33	0.34	2.95	114.66	0.0
05-Aug-16	1.38	0.31	3.07	119.36	0.0
06-Aug-16	1.32	0.30	3.26	114.13	0.0
07-Aug-16	1.56	0.37	3.20	135.11	0.0
08-Aug-16	1.81	0.85	3.26	156.37	0.0
09-Aug-16	1.79	0.49	4.67	154.86	17.8
10-Aug-16	1.65	0.58	3.09	142.26	0.3
11-Aug-16	1.51	0.42	4.56	130.16	3.3
12-Aug-16	1.71	0.83	3.15	147.35	0.0
13-Aug-16	1.50	0.30	4.16	129.44	0.0
14-Aug-16	1.48	0.32	2.93	128.08	0.3
15-Aug-16	1.39	0.28	2.88	120.34	0.0
16-Aug-16	1.36	0.35	2.60	117.33	1.3
17-Aug-16	1.34	0.29	2.65	115.47	0.0
18-Aug-16	1.46	0.33	3.84	126.14	5.3
19-Aug-16	1.26	0.30	2.90	108.70	0.0
20-Aug-16	1.29	0.28	3.06	111.36	0.8
21-Aug-16	1.51	0.34	3.61	130.26	0.0
22-Aug-16	1.69	0.35	4.23	146.17	10.5
23-Aug-16	2.16	0.53	4.02	186.48	7.3
24-Aug-16	1.83	0.41	3.76	158.27	0.0
25-Aug-16	1.74	0.36	3.43	150.06	0.3
26-Aug-16	1.73	0.37	3.66	149.64	0.0
27-Aug-16	1.92	0.42	4.26	165.55	0.3
28-Aug-16	1.75	0.63	4.07	151.59	1.0
29-Aug-16	1.39	0.28	3.22	120.23	0.0
30-Aug-16	1.38	0.27	3.47	119.55	0.0
31-Aug-16	1.47	0.24	3.61	126.68	0.0

Statistics

Total Flow (m3)	Min Flow (l/s)	Max Flow (l/s)	Total Rain (mm)
4161.723	0.240	4.670	49.3

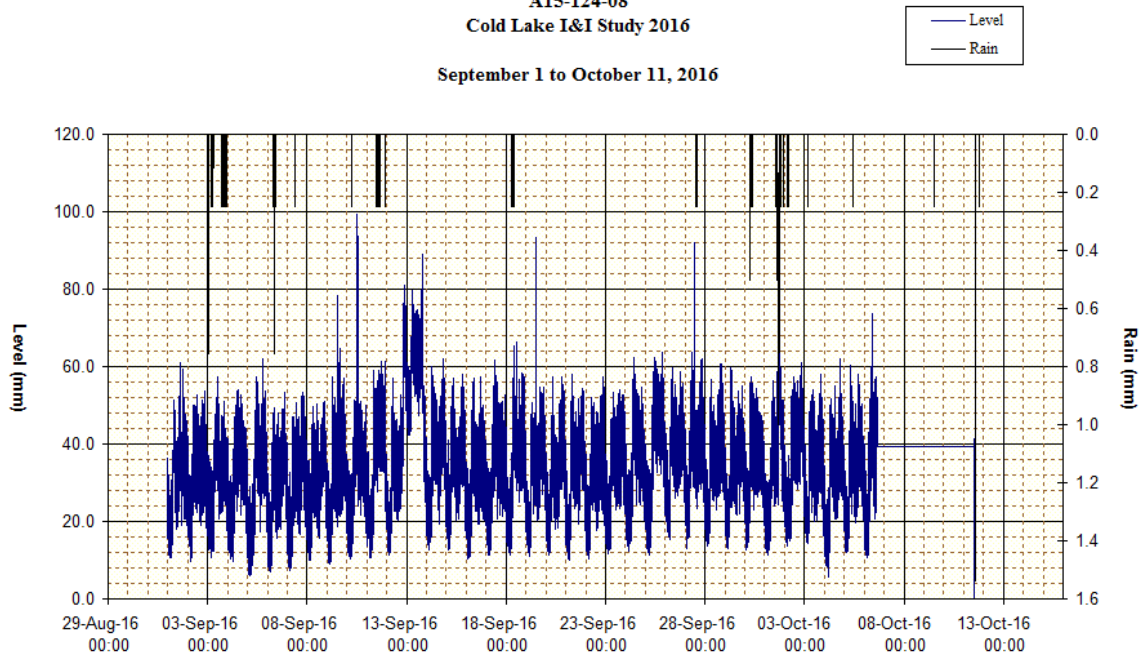
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September 1 to October 11, 2016



ISL Engineering Ltd.
A15-124-08
Cold Lake I&I Study 2016

September 1 to October 11, 2016



ISL Engineering Ltd.
A15-124-08
Cold Lake I&I Study 2016

September 1 to October 11, 2016

Date	Avg Flow (l/s)	Min Flow (l/s)	Max Flow (l/s)	Total Flow (m3d)	Total Rain (mm)
01-Sep-16	1.43	0.29	3.68	123.45	0.0
02-Sep-16	1.33	0.25	3.06	115.22	0.0
03-Sep-16	1.37	0.30	3.38	118.15	10.5
04-Sep-16	1.32	0.25	3.10	114.40	0.0
05-Sep-16	1.34	0.14	3.73	116.14	0.0
06-Sep-16	1.27	0.17	3.01	109.91	5.8
07-Sep-16	1.26	0.17	3.02	108.52	0.3
08-Sep-16	1.30	0.26	2.85	112.04	0.0
09-Sep-16	1.36	0.22	5.23	117.88	0.0
10-Sep-16	1.55	0.27	7.30	134.02	0.3
11-Sep-16	1.63	0.30	3.71	140.71	2.0
12-Sep-16	1.81	0.32	5.50	156.36	0.0
13-Sep-16	3.33	0.87	6.19	288.14	0.0
14-Sep-16	1.61	0.38	3.77	139.43	0.0
15-Sep-16	1.50	0.39	3.40	130.00	0.0
16-Sep-16	1.32	0.28	3.36	114.42	0.0
17-Sep-16	1.46	0.32	3.73	126.40	0.0
18-Sep-16	1.59	0.33	4.14	137.24	3.0
19-Sep-16	1.47	0.32	6.72	126.88	0.0
20-Sep-16	1.42	0.33	3.36	123.03	0.0
21-Sep-16	1.42	0.26	3.36	122.93	0.0
22-Sep-16	1.33	0.28	3.36	114.83	0.0
23-Sep-16	1.47	0.34	3.08	127.29	0.0
24-Sep-16	1.52	0.37	3.75	131.48	0.0
25-Sep-16	1.79	0.33	3.90	154.28	0.0
26-Sep-16	1.71	0.52	3.55	147.83	0.0
27-Sep-16	1.73	0.41	6.50	149.07	0.8
28-Sep-16	1.52	0.44	3.62	130.93	0.0
29-Sep-16	1.51	0.41	3.53	130.51	0.0
30-Sep-16	1.53	0.39	3.38	131.97	3.3
01-Oct-16	1.59	0.32	4.22	137.28	17.3
02-Oct-16	1.73	0.43	3.66	149.43	0.5
03-Oct-16	1.48	0.47	3.42	128.15	0.3
04-Oct-16	1.37	0.13	3.76	118.66	0.0
05-Oct-16	1.45	0.35	3.61	125.01	0.3
06-Oct-16	1.60	0.30	4.79	138.46	0.0
07-Oct-16	1.96	1.96	1.96	169.34	0.0
08-Oct-16	1.96	1.96	1.96	169.34	0.0
09-Oct-16	1.96	1.96	1.96	169.34	0.3
10-Oct-16	1.96	1.96	1.96	169.34	0.0

11-Oct-16	1.06	0.00	2.07	91.76	3.0
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Statistics

Total Flow	Min Flow	Max Flow	Total Rain
(m3)	(l/s)	(l/s)	(mm)
5559.552	0.000	7.300	47.3

Final Report for
City of Cold Lake

Attn: Mr. Azam Khan

City of Cold Lake, Alberta
2017 Sanitary Sewer Flow and Rainfall Monitoring



Prepared and submitted by:

SFE Global

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December 14, 2017

Mr. Azam Khan, P.Eng
General Manager
Infrastructure Services

5513 – 48 Ave
T9M 1A1
Cold Lake, Alberta

FINAL REPORT:
City of Cold Lake Sanitary Sewer Flow and Rainfall Monitoring

Dear Mr. Khan,

Please find enclosed SFE's Final Report for the above mentioned project. If you have any questions, comments or concerns, please do not hesitate to contact us at your earliest convenience.

Thank you for having SFE conduct this work on your behalf. We are appreciative of the opportunity to work with you and your team on this project. We look forward to working together again in the near future.

Sincerely,
SFE Global

Nick Schellenberg
General Manager
(780) 461-0171
Nick.Schellenberg@sfeglobal.com
www.sfeglobal.com

1. Introduction

This report provides details of the sanitary sewer flow monitoring project conducted in the City of Cold Lake, Alberta. SFE Global was retained under the direction of Mr. Azam Khan. Mr. Nick Schellenberg represented SFE Global as Project Manager during this project.

As requested, SFE installed nine (9) sanitary sewer flow monitors and two (2) rainfall gauge to collect data for an anticipated five-month duration. The stations were installed June 16th, 2016 and collected data until November 17th, 2016. The monitoring stations were as follows:

Site #	Location/GPS	Meter / Primary Device Utilized
A15-124A-01	10 St, near 8 Ave – N54.4640 W-110.1731	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-05	Off 54 Ave – N54.4197 W-110.2075	ISCO 2150 AV Flow Meter
A15-124A-06	49 St – N54.4241 W-110.2025	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-08	52 Ave – N54.4151 W-110.2263	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-09	1311 12 St – N54.4588 W-110.1760	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-10	502 16 Ave – N54.4569 W-110.1647	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-11	69 Ave, near 47 St – N54.4352 W-110.1995	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-12A	4712 62 Ave – N54.4284 W-110.2001	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-12B	Fontaine Dr and Labrador Dr – N54.4272 W-110.1984	ISCO 2150 AV Flow Meter w/ SFE Weir
A15-124A-RG01	North Fire Hall – N54.4648 W-110.1731	ISCO 2105G Rain Logger w/.25 mm Tipping Bucket Rain Gauge
A15-124A-RG02	Lift Station #9 – N54.4188 W-110.1999	ISCO 2105G Rain Logger w/.25 mm Tipping Bucket Rain Gauge

2. Flow Monitoring Stations

Prior to installing flow monitoring stations, SFE performs detailed site assessments of each potential site to determine the acceptability of SFE's Custom Compound Weir. Factors such as pipe size, channel condition, site location, site access, and flow hydraulics were all considered and documented while performing site assessments. See Appendix #2 of this report for site assessment details.

SFE installed the flow monitoring stations in accordance with the approved site assessment documentation. The meters were calibrated and set to log data at 5 minute intervals. SFE obtained and recorded corresponding meter and field readings during site installation and site removal on the field maintenance sheet. These readings provided an indication of the accuracy and operation of the meter. See Appendix #3 of this report for the field report sheets detailing site inspection information, calibrations, and depth verifications.

Due to poor hydraulic conditions, low flow, and small diameter pipes, SFE installed Custom Compound Weirs at all sites except location #5 which is reflected in the data. This device allows determination of low flow rates in sanitary sewers with acceptable accuracy. During surcharge events where the system and weirs are flooded, SFE uses a hybrid system to calculate accurate flows using AV data when acceptable, which is reflected in the final data set and the processing notes found in Appendix #3. Site 10 should be further investigated as, on initial inspection, the pipes appear to be eroding and/or possibly collapsed.

3. QA/QC and Safety Statement

SFE confirms that all flow monitoring stations were installed according to SFE's QA/QC methodology and protocol, and standard industry practice. All flow monitoring equipment and weir material has been removed from the site locations.

SFE has a comprehensive Company Safety Manual and can be reviewed upon request.

Confined space entry procedures and general site/traffic safety was adhered to during site installation and site maintenance. SFE utilizes an approved rescue system, a 2800 CFM air induction device and four-gas air quality monitors. All of our staff members are thoroughly trained and certified in confined space entry procedures. Certificates are available upon request.

A thorough traffic control plan was established and used by SFE Global crews where required.

4. Appendices

- Appendix #1 Includes Technical Information on Custom Compound Weirs
- Appendix #2 Includes Technical Information on Area Velocity Metering
- Appendix #3 Includes Site Maintenance Sheets, Processing Notes and Flow Data
- Appendix #4 Includes Site Setup Books

Report End
December 2017

SFE Global
Project A15-124A

SFE Custom Compound Weir – Technical Information

Appendix 1

SFE Custom Compound Weir - A Technical Discussion

SFE's Custom Compound Weir (CCW) Technology was first developed in 1983. This system consists of the following two components:

- *A customized primary device (Custom Compound Weir or CCW), which provides a predictable relationship of "head" versus "flow"*
- *A water level sensor and data logger*

Testing & Awards

The relationship between "head" and "flow" for the primary device was initially established in a hydraulics lab in conjunction with the Canadian Center for Inland Waterways (CCIW) and published in a report prepared for a local utility. In subsequent years the monitoring techniques were further refined and additional laboratory work was carried out for the primary device. The work was recognized in 1988 by the Association of Consulting Engineers with an Award of Merit at their annual national engineering awards program.

Any level sensing device may be used to reliably measure flows including ultrasonic level indicators, pressure transducers and floats. The system was designed to make it economically feasible for even small utilities to be able to operate a network of stations for a long duration - the low operating costs & high accuracy/reliability prevailing over other measurement systems.

Self-Cleaning

The primary device has a rectangular notch, which then flares out into a "V" section and then a rectangular upper portion. The notch and "V" section have chamfered 1 ½ inch thick "lips" which make them self cleaning and result in a very high weir flow coefficient.



The self-cleaning properties of these weirs have been amply field proven over the past 20 years at approximately 2200 such stations. Each of our Custom Compound Weirs is custom designed by an open channel hydraulics specialist, for the manhole, chamber or channel configuration it is to be used in.

Low Flow Accuracy

For sewers up to 21 inches in diameter the notch is typically 4 inches wide and 5 ½ inches deep. This results in a flow rate of roughly 0.25 GPM for a head of 1 inch. Since a 2.5 psi pressure transducer or narrow beam ultrasonic indicator is usually capable of measuring water levels within $\pm \frac{1}{4}$ ", flow rates down to 0.25 GPM can readily be measured (a special unit has previously been designed to measure pre-treated wastewater flow rates down to 0.025 GPM).

No Sewer Backups

The lower notch magnifies the variation of the water level with small changes in flow rate (e.g. for the base flow regime). The overall primary device or "weir" normally has an opening greater than the pipe cross sectional area and capacities greater than that of the sewer in which they are placed.

Any Size, Any Shape

SFE has installed custom compound weirs in sewers from 6 inch to 12 foot as well as in varying sizes of pond outlets, creeks, WWTP's, etc. Custom designing the primary device for the manhole or channel in which it will be placed means that you have considerable control over the final flow regime. This has allowed many difficult hydraulic situations to be handled including bends, junctions, slopes over 10%, drop connections, and drops in the main pipe invert.

Velocity Measurements Not Required

One of the major advantages of SFE's Custom Compound Weir is that it only requires a depth sensor and logger; a velocity sensor is not used. Many of the problems associated with sewer flow monitoring are related to the velocity sensor and the need to measure average velocity. Velocity sensors are prone to fouling with subsequent "drifting" of the signal whereas pressure sensors will still accurately register variations in water level even if they have debris on them.

No "In the flow" Probes

The use of SFE's Custom Compound Weir further improves the performance of pressure sensors since they no longer represent an effective obstruction in the flow (they are installed behind the weir). They will always have a reasonable "head" on them as the weir lip elevation maintains a minimum depth of 4 inches behind the weir. As pressure transducers are much less accurate when depths approach zero; this situation becomes a problem for Area-Velocity A-V) type meters in small pipes where base flow rates are low.

Less Expensive

“Level only” monitors such as those used with our Custom Compound Weir are less expensive than A-V meters and need less power to operate. Flow profiling is needed for conventional A-V meters to ensure that the velocity sensed at a point or across a band of flow is properly transformed into average velocity across the pipe section. Since the Custom Compound Weir does not use velocity, profiling becomes redundant.

High Accuracy

Dye dilution and full-scale lab comparisons have been conducted and the results have been excellent. In most cases +/- 5% over the full range of flows is readily achievable.

Temporary or Permanent

The Custom Compound Weir's (CCW's) are normally located in the manhole chamber about 12 inches from the downstream end.

Material	Life Expectancy	Uses
Lumber/Lexan	1 week to several years	Short Term (E.g. I/I Study)
Plywood	Up to 2 years	Temporary
Pressure Treated Lumber	5 years	Semi-Permanent
Lexan and 316 Stainless	50 Years	Permanent

No Surcharges

Is there a possibility of sewer surcharges causing basement flooding because of the use of such primary devices or weirs? The question has been raised many times and was addressed on a project when the Custom Compound Weir was first designed. The purpose of that first project was to determine the cause of persistent sewer related basement flooding. The client was very concerned that the study procedures did not create more flooding since two Custom Compound Weir stations were just downstream of the area receiving the flooding. The design and placement of the Custom Compound Weirs addressed this as follows:

Each CCW was located in a manhole, and not in the pipe, approximately 12 inches from the downstream end so that if the weir were to ever get blocked it could simply overflow safely. (This event has never occurred).

For manholes with a chamber larger than the pipe (i.e. 18 inch pipe in standard 42 inch manhole), the weir opening is greater than the pipe area. The flow over the weir is also at critical depth and therefore at a higher velocity than normally occurs in the pipe itself. As a result, the weir capacity is much greater than the pipe capacity in most installations.

A rating curve was provided for a demo weir that has the standard opening used in pipes up to 18 inches. The table below shows the flow capacity of this weir configuration at selected heads versus the full flow capacity of selected pipe sizes up to 18 inches at a 0.25 % grade. The comparison illustrates that the CCW capacity can be much greater than the pipe capacity.

<i>Flow Capacity of Standard Small Pipe Configuration at Selected Heads (Custom Compound Weir range)</i>		<i>Full Flow Capacity of Selected Pipes @ 0.25 % Grade (Pipe range)</i>	
Head (in.)	Flow (US GPM)	Pipe Diameter (in.)	Capacity (US GPM)
1	15.85	8	254
5.5	190	10	471
8	349	12	761
12.5	999	15	1388
20	2298	18	2267
24	3638		

Laboratory Tested

Hydraulic model testing conducted at the Canada Center for Inland Waters (CCIW), provided the opportunity of observing the pipe / weir / manhole performance as the flow rates in the system were increased to the point that it surcharged. As the system started to surcharge, the “control” shifted from the weir to the downstream pipe and there was essentially no drop in the water surface across the weir (under surcharge, the weir was not influencing the water levels upstream).

Custom Designs

Every Custom Compound Weir is custom designed with a rectangular low flow notch and chamfered lips to give it a high weir flow coefficient. This means that it passes a greater flow for a given head than normal sharp crested weirs. Custom designed means specific concerns are addressed at specific sites.

Appendix 2

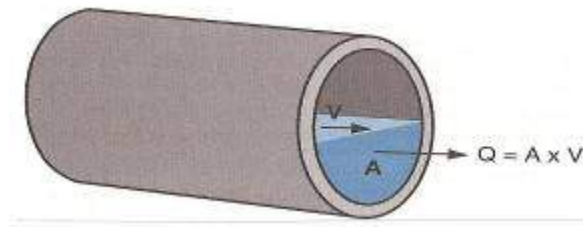
Area Velocity Metering – Technical Information

Area Velocity Meter - Calibration & Verification of Monitor Sensors

Pipe Conduit Measurements

The measurement and condition of all sites were recorded during meter installation.

General Site Installation



Meter velocity was field calibrated according to the manufacturer's methodology and data was verified utilizing SFE Standard Protocol as outlined below.

Depth Verification

Depth verification was conducted at site and all data included on the field report. Five depth measurements from the meter and corresponding water depth are obtained simultaneously at sequential time intervals and recorded on the field worksheet. The lowest and highest measurements are discarded. The remaining three (3) measurements must be within 2.0 cm of each other. The averaged monitor reading must be within 5 % of the averaged field measurement to be acceptable.

Velocity Verification

Depth and velocity profiles were performed utilizing a Marsh McBirney Flow Mate point velocity meter. This instrument uses the Faraday principle to measure water velocity flowing over three electrodes. This allows an accurate velocity to be measured in a small area of the total flow.

SFE standard procedure is to use the 2-D method to determine average velocity. Numerous measurements are taken from the invert to water surface at the left, center and right thirds of the pipe. These measurements are averaged with the inclusion of readings taken from the upper left and right corner of flow.

SFE's alternate procedure when the pipe diameter is small or flow is sufficient is to use the .9-Vmax method. Point velocity readings are taken throughout the cross section of flow. The highest repeatable Velocity obtained is multiplied by 0.9 to determine average velocity. This average velocity is then correlated to the average velocity reading from the meter and must be within 10 %.

Appendix 3

Maintenance Sheets

Processing Notes

Flow Data

PROJ. #:	A15-124
SFE SITE #:	A15-124-01
ADDRESS:	10 St near 8 Ave
GPS:	N54.4640 W-110.1731
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	SFE Weir 250mm

CONSTANTS	
D1 (mm): 362	D1-lip to x-bar
TOM (mm): 3590	Raw Weir L - lip to water
METER #	US - 207K01093

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

FIELD MAINTENANCE RECORD

PROJ. #:	A15-124
SFE SITE #:	A15-124-05
ADDRESS:	Off 54 Ave - In Field
GPS:	N54.4197 W-110.2075
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	AV

CONSTANTS		
D1 (mm):	N/A	D1-lip to x-bar
TOM (mm):	5112	Raw Weir L - lip to water
METER #	211M01092	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

PROJ. #:	A15-124
SFE SITE #:	A15-124-06
ADDRESS:	End of 49 St - Dirt Rd
GPS:	N54.4241 W-110.2025
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	SFE Weir 250mm

CONSTANTS	
D1 (mm):	400
TOM (mm):	3563
METER #	A-2150-38

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

FIELD MAINTENANCE RECORD

PROJ. #:	A15-124
SFE SITE #:	A15-124-08
ADDRESS:	Off 52 Ave - In Field
GPS:	N54.41518 W-110.22636
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	SFE Weir 250mm

CONSTANTS	
D1 (mm):	448
TOM (mm):	768
METER #	A-2150-21
METER #	207M02195

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

PROJ. #:	A15-124
SFE SITE #:	A15-124-09
ADDRESS:	1311 12 St
GPS:	N54.45882 W-110.17605
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	SFE Weir 250mm

CONSTANTS	
D1 (mm):	N/A
TOM (mm):	4070
METER #	207H01732

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

FIELD MAINTENANCE RECORD

PROJ. #:	A15-124
SFE SITE #:	A15-124-10
ADDRESS:	502 16 Ave
GPS:	N54.4569 W-110.1647
SENSOR TYPE:	SFE Weir 250mm
PRIMARY DEVICE:	AV

CONSTANTS		
D1 (mm):	N/A	D1-lip to x-bar
TOM (mm):	1970	Raw Weir L - lip to water
METER #	207K01073	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

PROJ. #:	A15-124
SFE SITE #:	A15-124-11
ADDRESS:	69 Ave. near 47 St
GPS:	N54.4352 W-110.1995
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	SFE Weir 250mm

CONSTANTS		
D1 (mm):	N/A	D1-lip to x-bar
TOM (mm):	4600	Raw Weir L - lip to water
METER #	211J00555	
METER #	207B02356	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

FIELD MAINTENANCE RECORD

PROJ. #:	A15-124
SFE SITE #:	A15-124-12A
ADDRESS:	4712 62 Ave
GPS:	N54.4284 -110.2001
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	SFE Weir 250mm

CONSTANTS		
D1 (mm):	N/A	D1-lip to x-bar
TOM (mm):	4140	Raw Weir L - lip to water
METER #	A-2150-63	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VIS - VISUAL
LA - LEVEL ADJUST	VP - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

PROJ. #:	A15-124
SFE SITE #:	A15-124-12B
ADDRESS:	Fontaine Dr + Labrador Dr
GPS:	N54.4272 -110.1984
SENSOR TYPE:	ISCO 2150
PRIMARY DEVICE:	SFE Weir 250mm

CONSTANTS		
D1 (mm):	N/A	D1-lip to x-bar
TOM (mm)	3990	Raw Weir L - lip to water
METER #	208D02248	

LEGEND	
DL - DOWNLOAD	PC - PROGRAM COMPLETE
CB - CHG BATTERY	PM - PROG. METER
V - VERIFY	VP - VISUAL
LA - LEVEL ADJUST	VIS - VELOCITY PROFILE
DO - DEPTH ONLY	CD - CHG DESICCANT

[illegible]

[illegible]



Data Processing QA/QC Document

Project Name:	ISL Cold Lake	Data Span:	N/A
SFE Project #	A15-124A	Reviewed By:	N/A
Client Name:	City of Cold Lake	Date Reviewed:	N/A
Client Contact:	Azam Khan	Date OK'd	N/A
Project Term:	Five Months	OK'd By:	N/A
Start/End Date:	16-Jun-17	17-Nov-17	

Installation and Project Setup

Site #	Manhole #	Pipe Size (mm)	Primary Device	Install Date	Removal Date	Install Notes
1		450	250 Weir	16-Jun-17	17-Nov-17	Install
5		375	AV	15-Jun-17	15-Nov-17	Install
6		375	250 Weir	15-Jun-17	16-Nov-17	Install
8		200	250 Weir	16-Jun-17	15-Nov-17	Install
9		200	250 Weir	15-Jun-17	17-Nov-17	Install
10		200	AV	16-Jun-17	16-Nov-17	Install
11		375	250 Weir	15-Jun-17	16-Nov-17	Install
12A		300	250 Weir	15-Jun-17	16-Nov-17	Install
12B		300	250 Weir	15-Jun-17	16-Nov-17	Install
RG01			.25mm	15-Jun-17	16-Nov-17	Install
RG02			.25 mm	15-Jun-17	16-Nov-17	Install



Data Processing QA/QC Document

Project Name:	ISL Cold Lake	Data Span:	June / July 2017
SFE Project #	A15-124A	Reviewed By:	K. McMillan
Client Name:	City of Cold Lake	Date Reviewed:	5-Dec-17
Client Contact:	Azam Khan	Date Ok'd	5-Dec-17
Project Term:	Five Months	Ok'd By:	K. McMillan
Start/End Date:	16-Jun-17	17-Nov-17	

Data Processing Notes

Site #	Manhole #	Pipe Size (mm)	Primary Device	Install Date	Removal Date	Processing Notes
1		450	250 Weir	16-Jun-17	17-Nov-17	Replace weir surcharge with AV data 21JUL17 10:30 to 13:30.
5		375	AV	15-Jun-17	15-Nov-17	
6		375	250 Weir	15-Jun-17	16-Nov-17	Replace weir surcharge with AV data 21JUL17 10:05 to 17:00.
8		200	250 Weir	16-Jun-17	15-Nov-17	
9		200	250 Weir	15-Jun-17	17-Nov-17	Replace weir surcharge with AV data 21JUL17 10:30 to 11:45.
10		200	250 Weir	16-Jun-17	16-Nov-17	Replace weir surcharge with AV data 21JUL17 10:30 to 13:10.
11		375	250 Weir	15-Jun-17	16-Nov-17	Replace weir surcharge with AV data 21JUL17 11:45 to 13:25.
12A		300	250 Weir	15-Jun-17	16-Nov-17	Replace weir surcharge with AV data 21JUL17 10:45 to 17:00.
12B		300	250 Weir	15-Jun-17	16-Nov-17	Replace weir surcharge with AV data 21JUL17 10:30 to 15:30.
RG01			.25mm	15-Jun-17	16-Nov-17	
RG02			.25 mm	15-Jun-17	16-Nov-17	



Data Processing QA/QC Document

Project Name:	ISL Cold Lake	Data Span:	Aug 2017
SFE Project #	A15-124A	Reviewed By:	K. McMillan
Client Name:	City of Cold Lake	Date Reviewed:	5-Dec-17
Client Contact:	Azam Khan	Date Ok'd	5-Dec-17
Project Term:	Five Months	Ok'd By:	K. McMillan
Start/End Date:	16-Jun-17 | 17-Nov-17		

Data Processing Notes

Site #	Manhole #	Pipe Size (mm)	Primary Device	Install Date	Removal Date	Processing Notes
1		450	250 Weir	16-Jun-17	17-Nov-17	Replace weir surcharge with AV data 7JUL17 10:30 to 13:30.
5		375	AV	15-Jun-17	15-Nov-17	
6		375	250 Weir	15-Jun-17	16-Nov-17	
8		200	250 Weir	16-Jun-17	15-Nov-17	Fix plugging 15JUL to 15AUG - cumulative.
9		200	250 Weir	15-Jun-17	17-Nov-17	Fix plug 28JUL to 14AUG
10		200	AV	16-Jun-17	16-Nov-17	
11		375	250 Weir	15-Jun-17	16-Nov-17	
12A		300	250 Weir	15-Jun-17	16-Nov-17	
12B		300	250 Weir	15-Jun-17	16-Nov-17	
RG01			.25mm	15-Jun-17	16-Nov-17	
RG02			.25 mm	15-Jun-17	16-Nov-17	



Data Processing QA/QC Document

Project Name:	ISL Cold Lake	Data Span:	Sept 2017
SFE Project #	A15-124A	Reviewed By:	K. McMillan
Client Name:	City of Cold Lake	Date Reviewed:	5-Dec-17
Client Contact:	Azam Khan	Date Ok'd	5-Dec-17
Project Term:	Five Months	Ok'd By:	K. McMillan
Start/End Date:	16-Jun-17 | 17-Nov-17		

Data Processing Notes

Site #	Manhole #	Pipe Size (mm)	Primary Device	Install Date	Removal Date	Processing Notes
1		450	250 Weir	16-Jun-17	17-Nov-17	Removed weir plugging 11SEP to 13 SEP
5		375	AV	15-Jun-17	15-Nov-17	
6		375	250 Weir	15-Jun-17	16-Nov-17	
8		200	250 Weir	16-Jun-17	15-Nov-17	
9		200	250 Weir	15-Jun-17	17-Nov-17	
10		200	AV	16-Jun-17	16-Nov-17	Replaced weir surcharge with AV 11SEP 18:00 to 18:35
11		375	250 Weir	15-Jun-17	16-Nov-17	
12A		300	250 Weir	15-Jun-17	16-Nov-17	
12B		300	250 Weir	15-Jun-17	16-Nov-17	Repair weir plugging 4SEP to 14SEP
RG01			.25mm	15-Jun-17	16-Nov-17	
RG02			.25 mm	15-Jun-17	16-Nov-17	



Data Processing QA/QC Document

Project Name:	ISL Cold Lake	Data Span:	Oct 2017
SFE Project #	A15-124A	Reviewed By:	K. McMillan
Client Name:	City of Cold Lake	Date Reviewed:	5-Dec-17
Client Contact:	Azam Khan	Date Ok'd	5-Dec-17
Project Term:	Five Months	Ok'd By:	K. McMillan
Start/End Date:	16-Jun-17	17-Nov-17	

Data Processing Notes

Site #	Manhole #	Pipe Size (mm)	Primary Device	Install Date	Removal Date	Processing Notes
1		450	250 Weir	16-Jun-17	17-Nov-17	Replace weir surcharge with AV data 7JUL17 10:30 to 13:30.
5		375	AV	15-Jun-17	15-Nov-17	
6		375	250 Weir	15-Jun-17	16-Nov-17	
8		200	250 Weir	16-Jun-17	15-Nov-17	Fix plugging 15SEP to 10OCT
9		200	250 Weir	15-Jun-17	17-Nov-17	
10		200	AV	16-Jun-17	16-Nov-17	
11		375	250 Weir	15-Jun-17	16-Nov-17	
12A		300	250 Weir	15-Jun-17	16-Nov-17	
12B		300	250 Weir	15-Jun-17	16-Nov-17	
RG01			.25mm	15-Jun-17	16-Nov-17	
RG02			.25 mm	15-Jun-17	16-Nov-17	



Data Processing QA/QC Document

Project Name:	ISL Cold Lake	Data Span:	Nov 2017
SFE Project #	A15-124A	Reviewed By:	K. McMillan
Client Name:	City of Cold Lake	Date Reviewed:	5-Dec-17
Client Contact:	Azam Khan	Date Ok'd	5-Dec-17
Project Term:	Five Months	Ok'd By:	K. McMillan
Start/End Date:	16-Jun-17	17-Nov-17	

Data Processing Notes

Site #	Manhole #	Pipe Size (mm)	Primary Device	Install Date	Removal Date	Processing Notes
1		450	250 Weir	16-Jun-17	17-Nov-17	Remove plugging 5NOV to 8NOV
5		375	AV	15-Jun-17	15-Nov-17	
6		375	250 Weir	15-Jun-17	16-Nov-17	
8		200	250 Weir	16-Jun-17	15-Nov-17	Fix plugging 1NOV to 15 NOV
9		200	250 Weir	15-Jun-17	17-Nov-17	
10		200	AV	16-Jun-17	16-Nov-17	
11		375	250 Weir	15-Jun-17	16-Nov-17	
12A		300	250 Weir	15-Jun-17	16-Nov-17	
12B		300	250 Weir	15-Jun-17	16-Nov-17	
RG01			.25mm	15-Jun-17	16-Nov-17	
RG02			.25 mm	15-Jun-17	16-Nov-17	



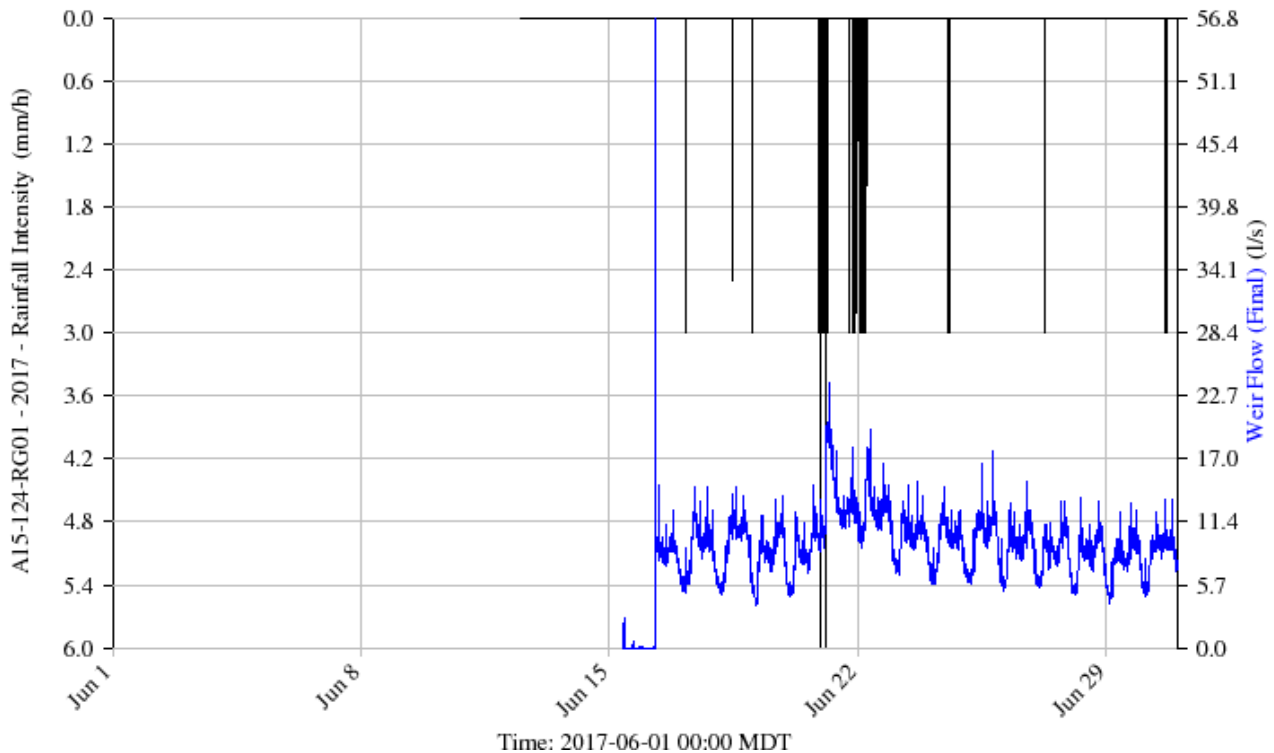
Monthly Report

A15-124 - Cold Lake TFM

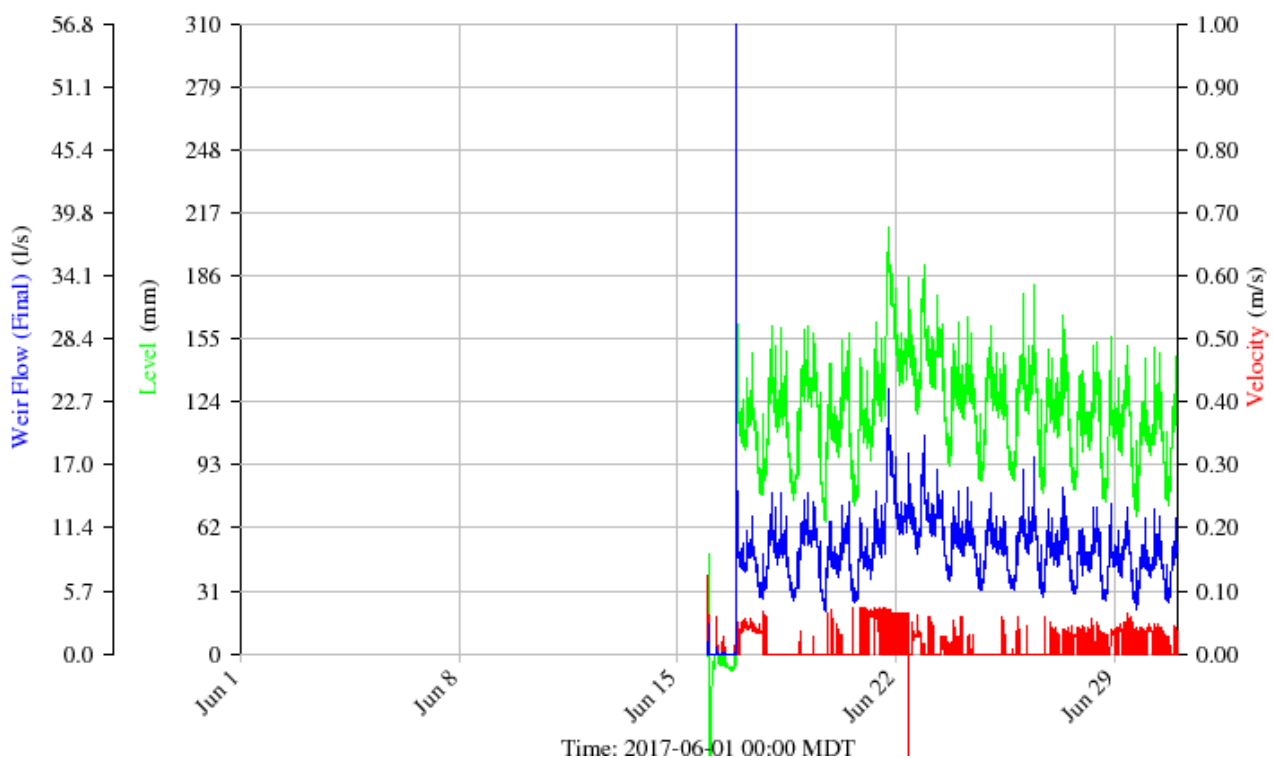
June 2017

A15-124-01

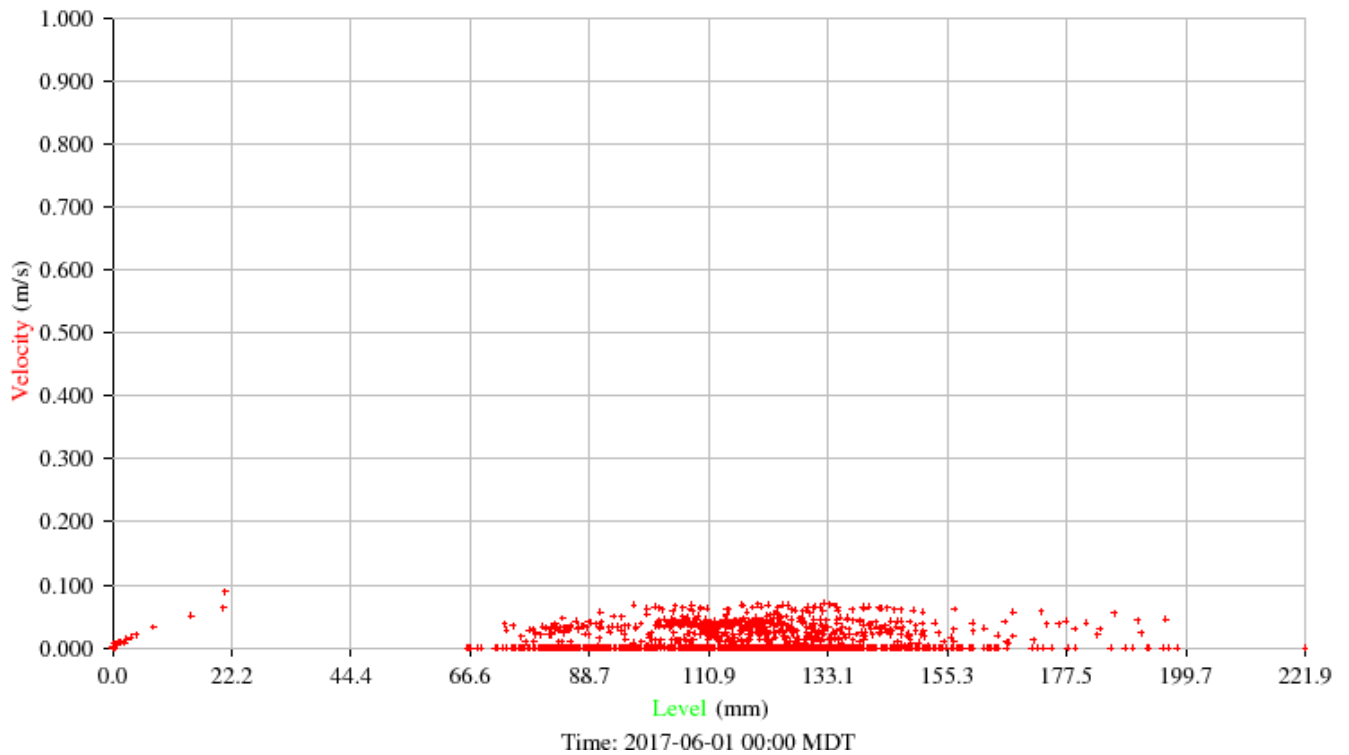
A15-124-01 – Flow with rain intensity



A15-124-01 – Level with velocity and flow



A15-124-01 – Level vs. velocity scatter plot

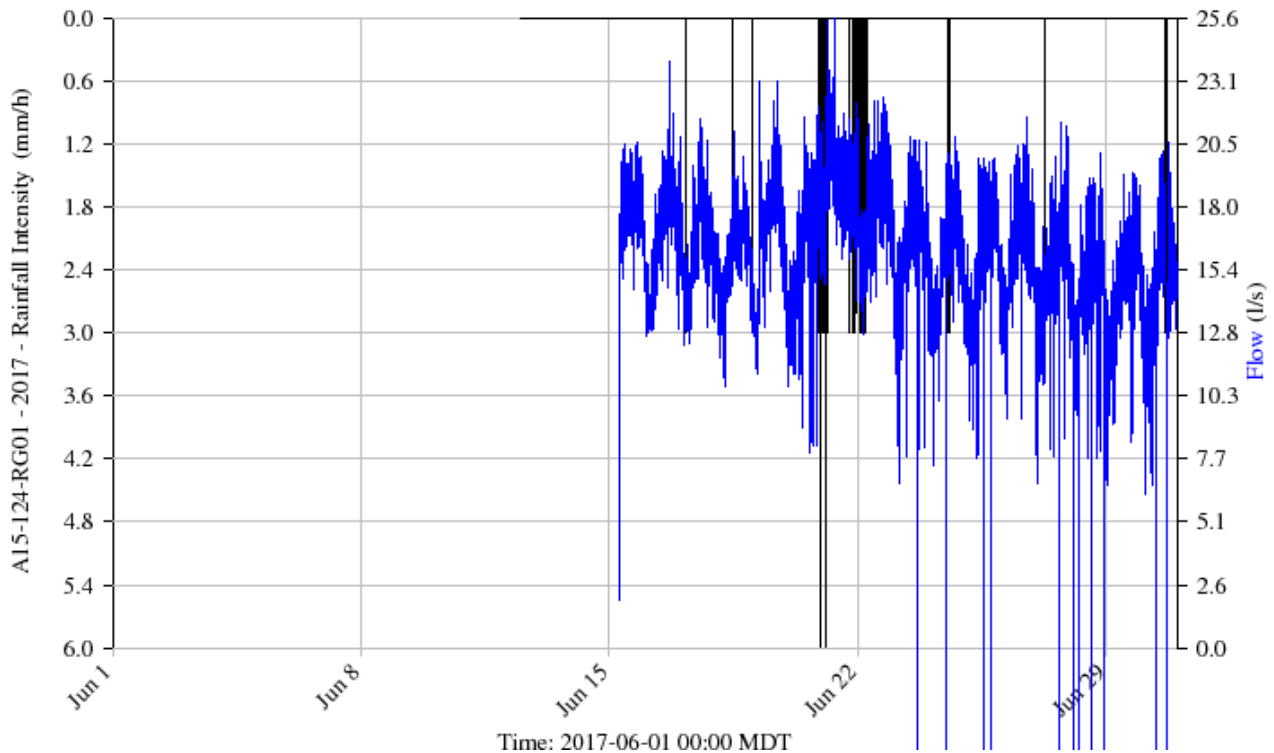


A15-124-01 – Summary report

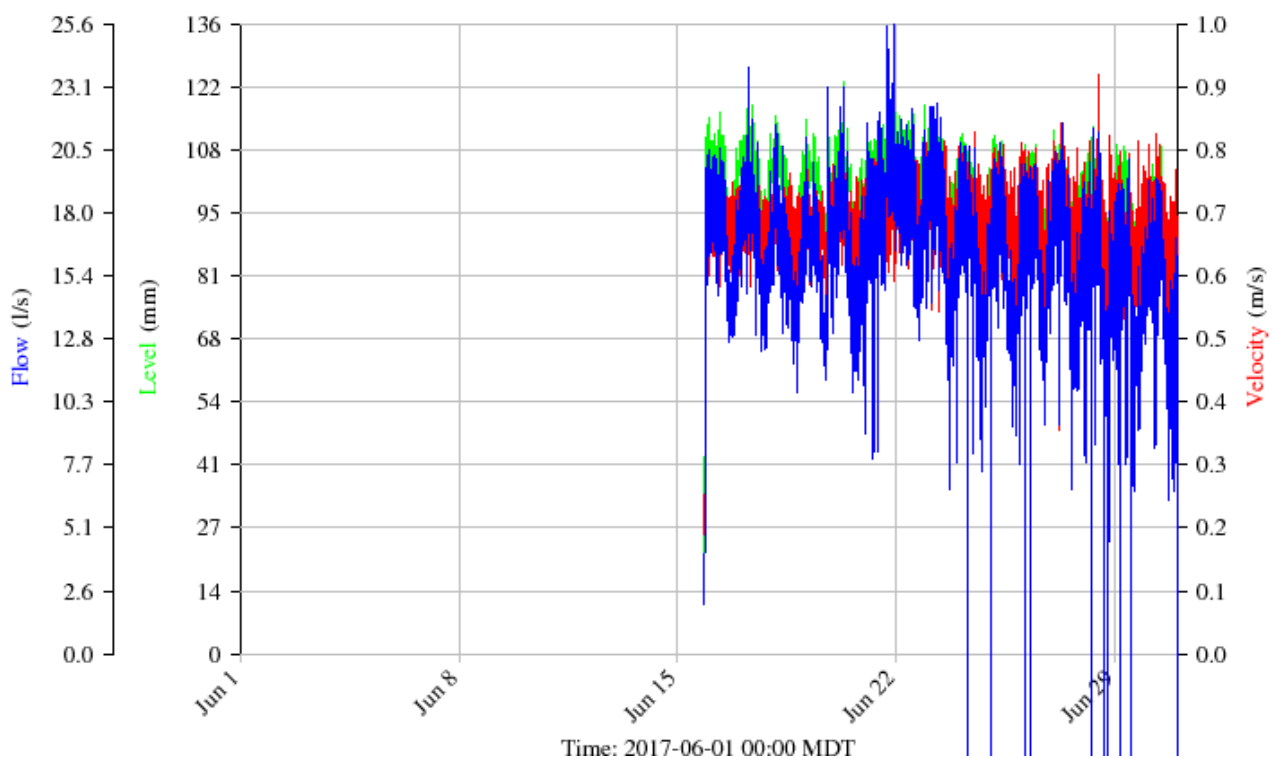
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	6.91	7.63	8.44	659.02	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	0.00	0.08	2.68	6.51	0.00
16	0.00	6.35	56.81	548.48	0.00
17	4.99	8.65	14.55	746.98	0.50
18	4.82	9.13	14.54	788.86	0.25
19	3.89	8.38	13.72	724.41	0.25
20	4.70	8.36	14.69	722.05	4.75
21	9.02	13.73	23.95	1,186.10	15.75
22	9.03	12.41	19.69	1,072.17	3.25
23	6.59	9.92	14.94	856.70	0.00
24	5.77	9.48	14.54	818.99	0.75
25	5.79	9.63	17.82	831.86	0.00
26	5.08	9.05	15.01	781.75	0.00
27	5.48	8.65	13.30	747.44	0.25
28	4.80	8.26	13.51	713.92	0.00
29	4.03	7.87	13.09	679.57	0.00
Mean	5.03	8.59	16.75	741.87	1.49
Minimum	0.00	0.08	2.68	6.51	0.00
Maximum	9.03	13.73	56.81	1,186.10	15.75
Total	n/a	n/a	n/a	12,611.85	26.75

A15-124-05

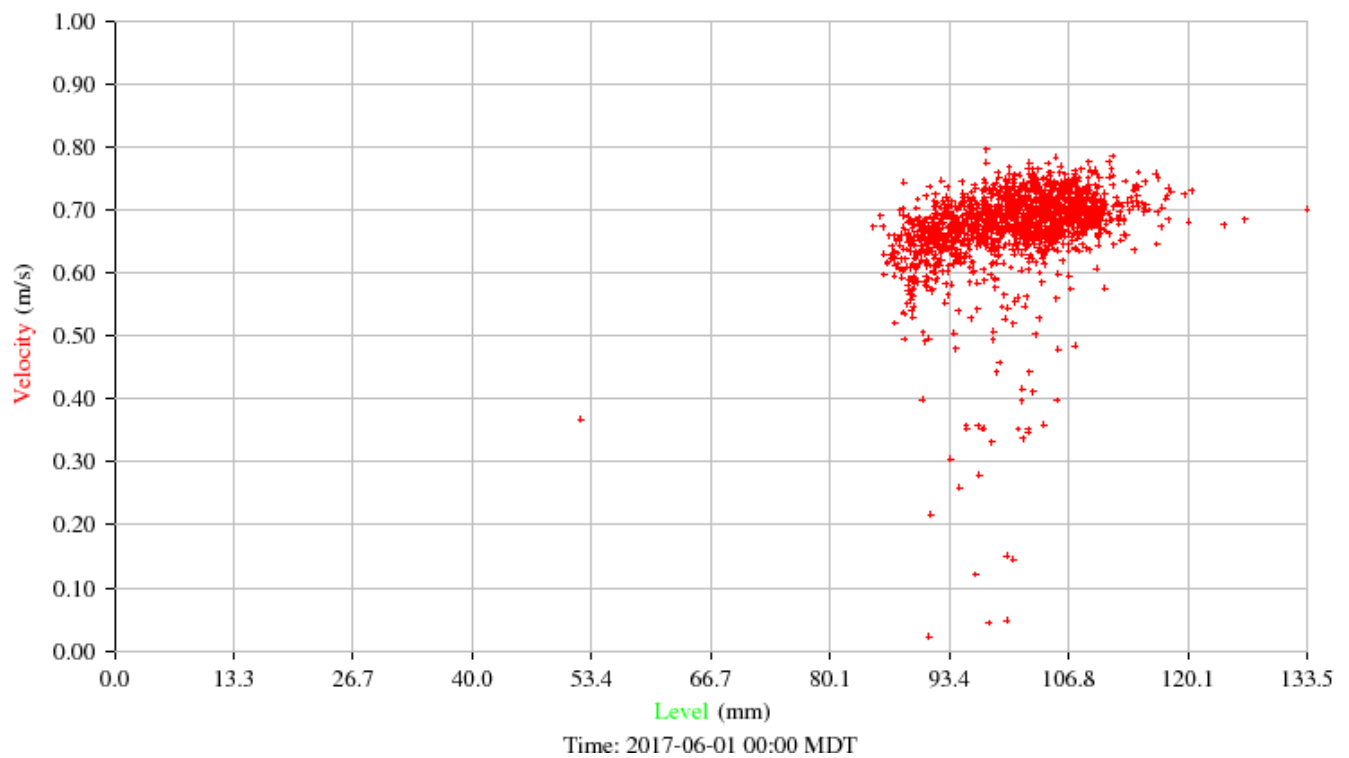
A15-124-05 – Flow with rain intensity



A15-124-05 – Level with velocity and flow



A15-124-05 – Level vs. velocity scatter plot

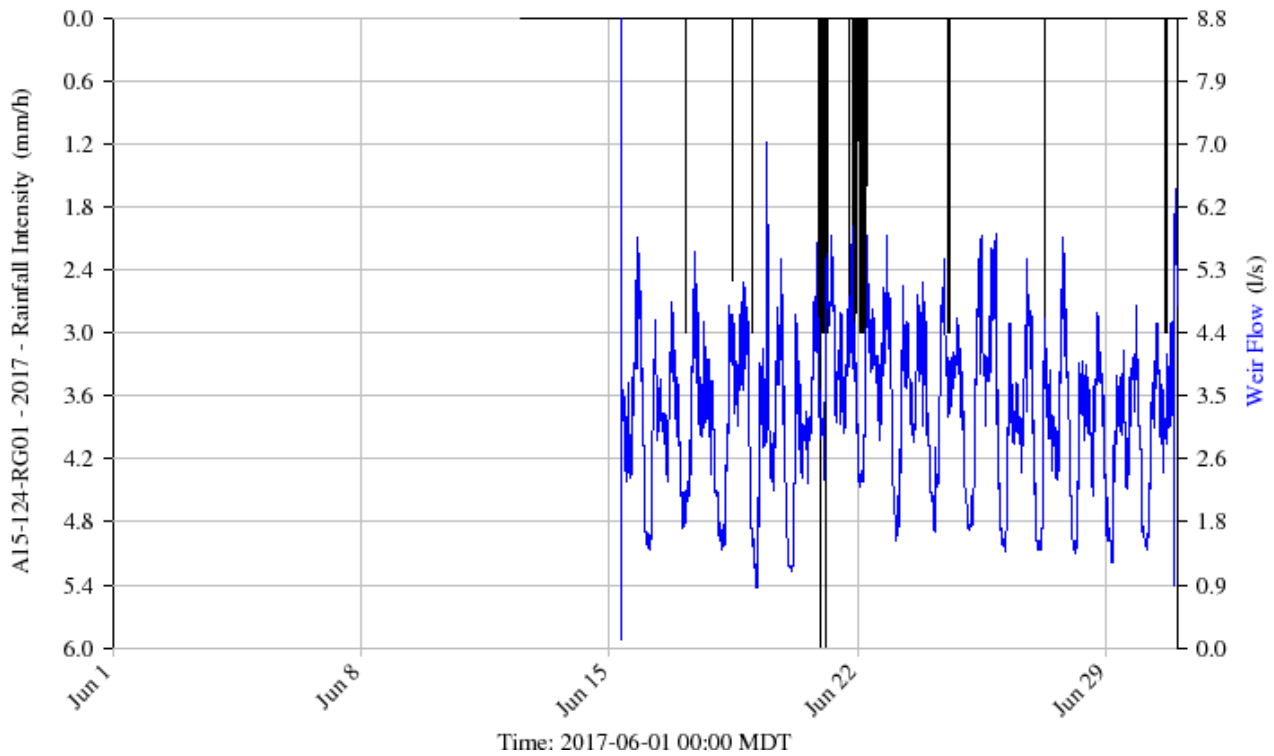


A15-124-05 – Summary report

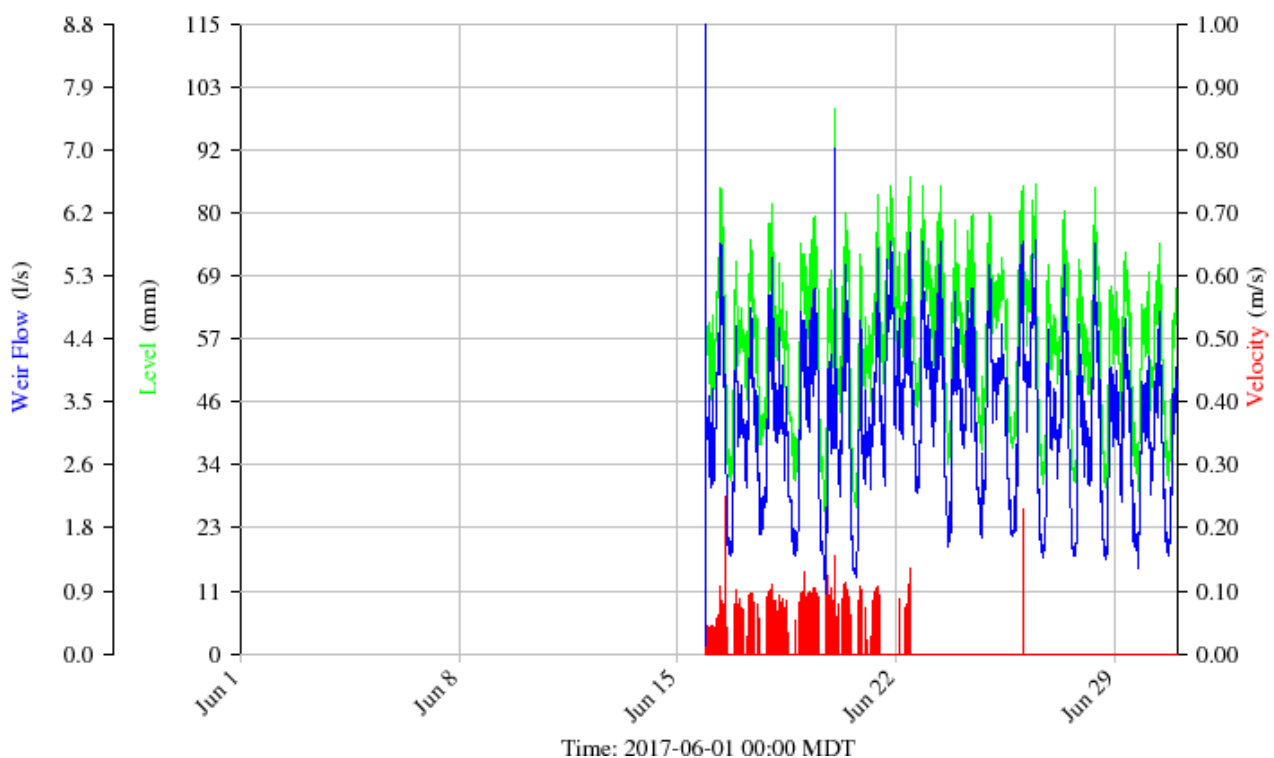
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	13.75	14.77	16.35	1,276.52	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	1.95	17.88	20.61	1,544.63	0.00
16	12.72	16.81	23.87	1,452.28	0.00
17	12.37	16.42	21.55	1,418.97	0.50
18	10.64	15.95	21.04	1,377.83	0.25
19	11.13	16.56	23.11	1,430.89	0.25
20	7.91	15.89	22.08	1,372.69	4.75
21	14.79	19.30	25.65	1,667.14	15.75
22	12.76	17.84	22.43	1,541.22	3.25
23	-6.42	15.88	20.78	1,372.34	0.00
24	-6.03	15.66	20.83	1,353.07	0.75
25	-5.68	15.66	19.95	1,352.80	0.00
26	9.30	16.19	21.65	1,398.83	0.00
27	-5.93	15.05	21.42	1,300.68	0.25
28	-6.46	14.29	20.16	1,234.40	0.00
29	6.64	14.39	19.38	1,243.58	0.00
Mean	4.55	16.04	21.26	1,386.21	1.49
Minimum	-6.46	14.21	16.35	1,227.64	0.00
Maximum	14.79	19.30	25.65	1,667.14	15.75
Total	n/a	n/a	n/a	23,565.52	26.75

A15-124-06

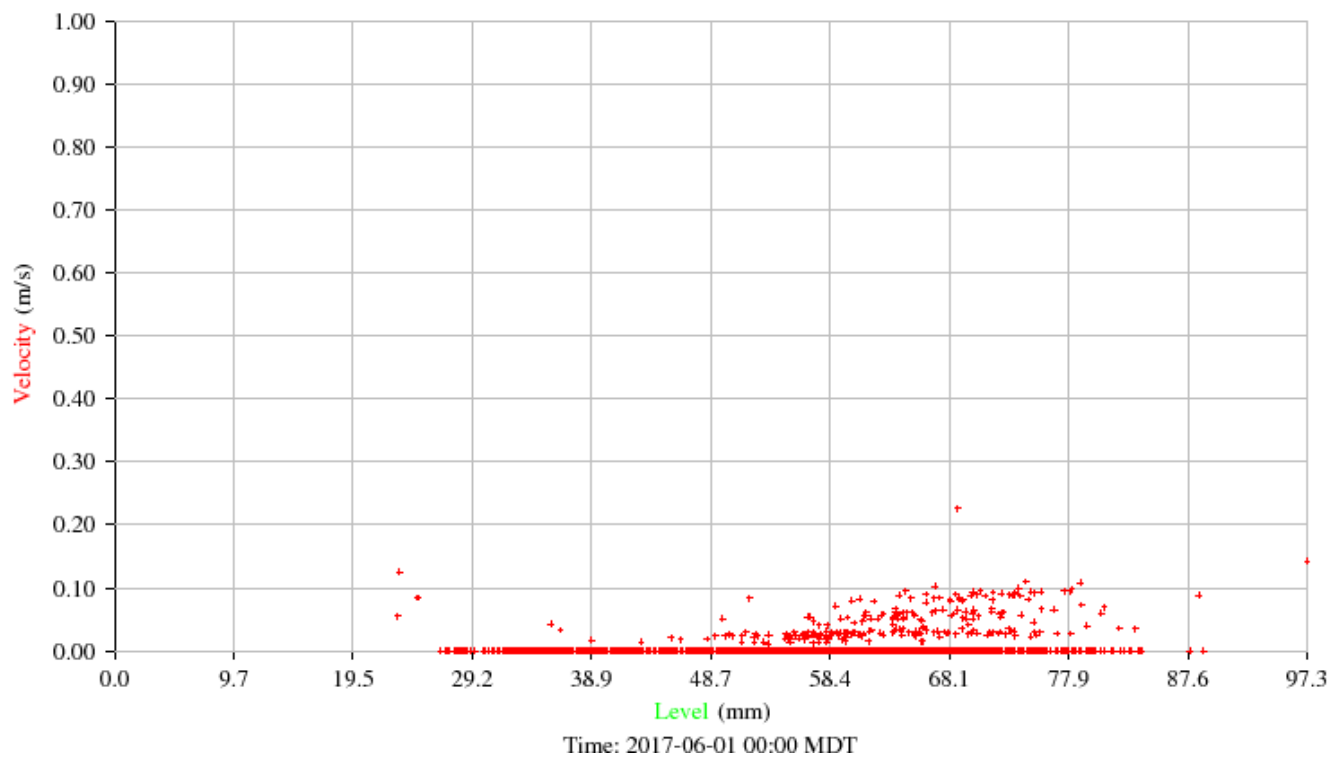
A15-124-06 – Flow with rain intensity



A15-124-06 – Level with velocity and flow



A15-124-06 – Level vs. velocity scatter plot

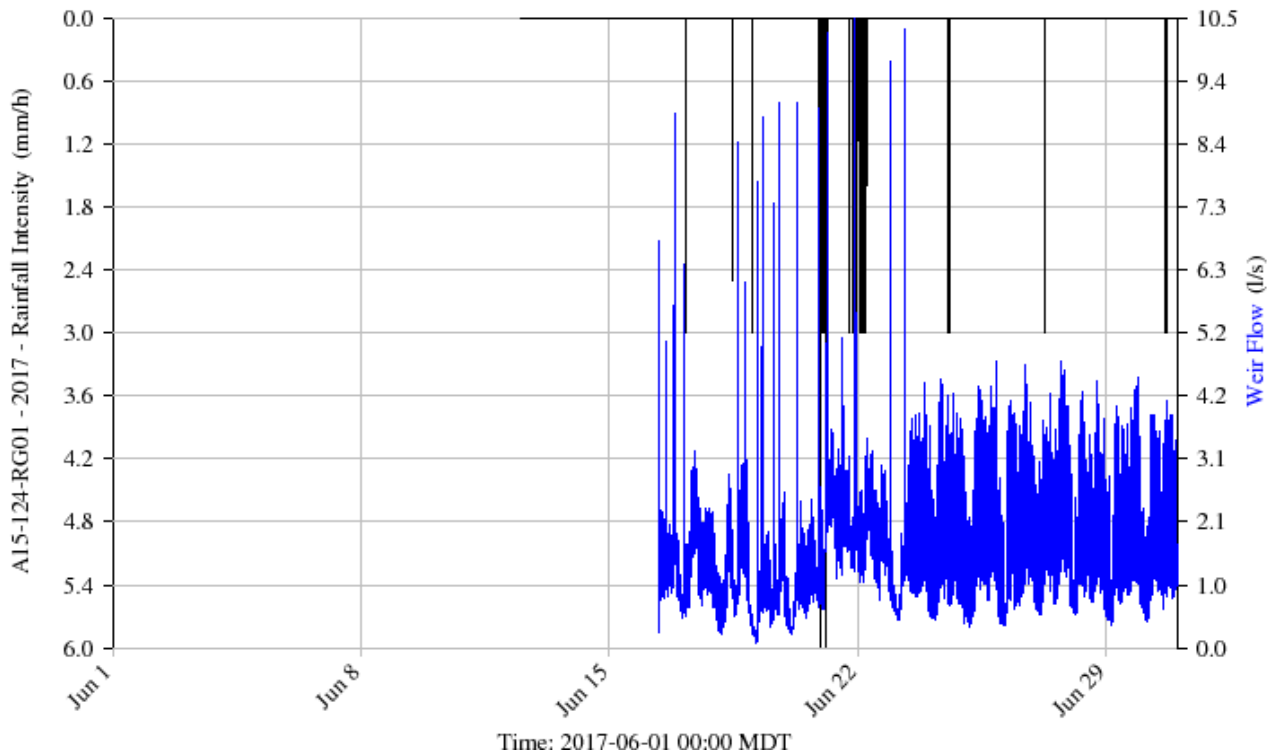


A15-124-06 – Summary report

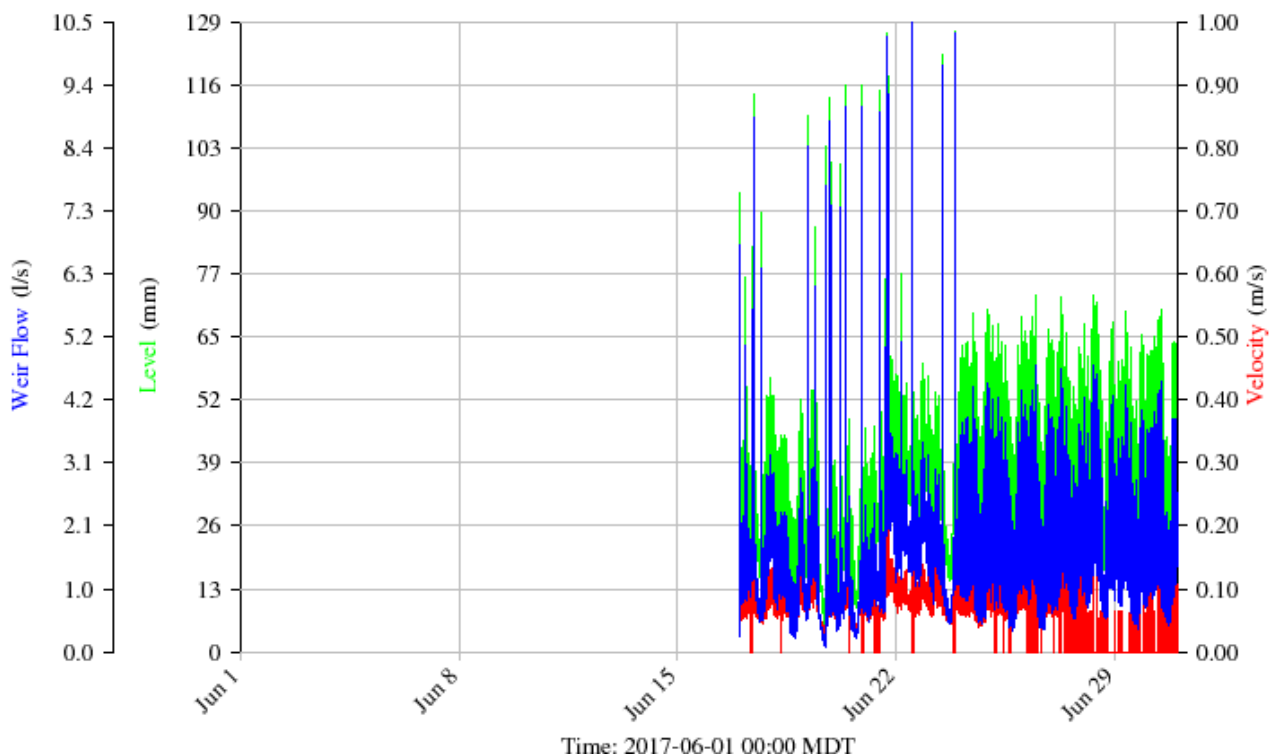
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	4.79	5.45	6.40	471.25	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	0.11	3.61	8.79	311.95	0.00
16	1.38	3.02	4.83	260.99	0.00
17	1.66	3.14	5.53	271.61	0.50
18	1.38	3.26	5.09	281.37	0.25
19	0.83	2.99	7.05	258.63	0.25
20	1.06	2.97	5.64	256.21	4.75
21	2.35	4.08	5.87	352.36	15.75
22	2.26	3.84	5.77	331.44	3.25
23	1.51	3.35	5.11	289.84	0.00
24	1.63	3.46	5.43	299.27	0.75
25	1.64	3.58	5.79	309.35	0.00
26	1.35	3.08	5.44	266.20	0.00
27	1.36	3.11	5.73	268.31	0.25
28	1.33	2.97	4.68	256.52	0.00
29	1.19	2.92	4.78	252.19	0.00
Mean	1.57	3.40	5.79	293.93	1.49
Minimum	0.11	2.92	4.68	252.19	0.00
Maximum	4.79	5.45	8.79	471.25	15.75
Total	n/a	n/a	n/a	4,996.85	26.75

A15-124-08

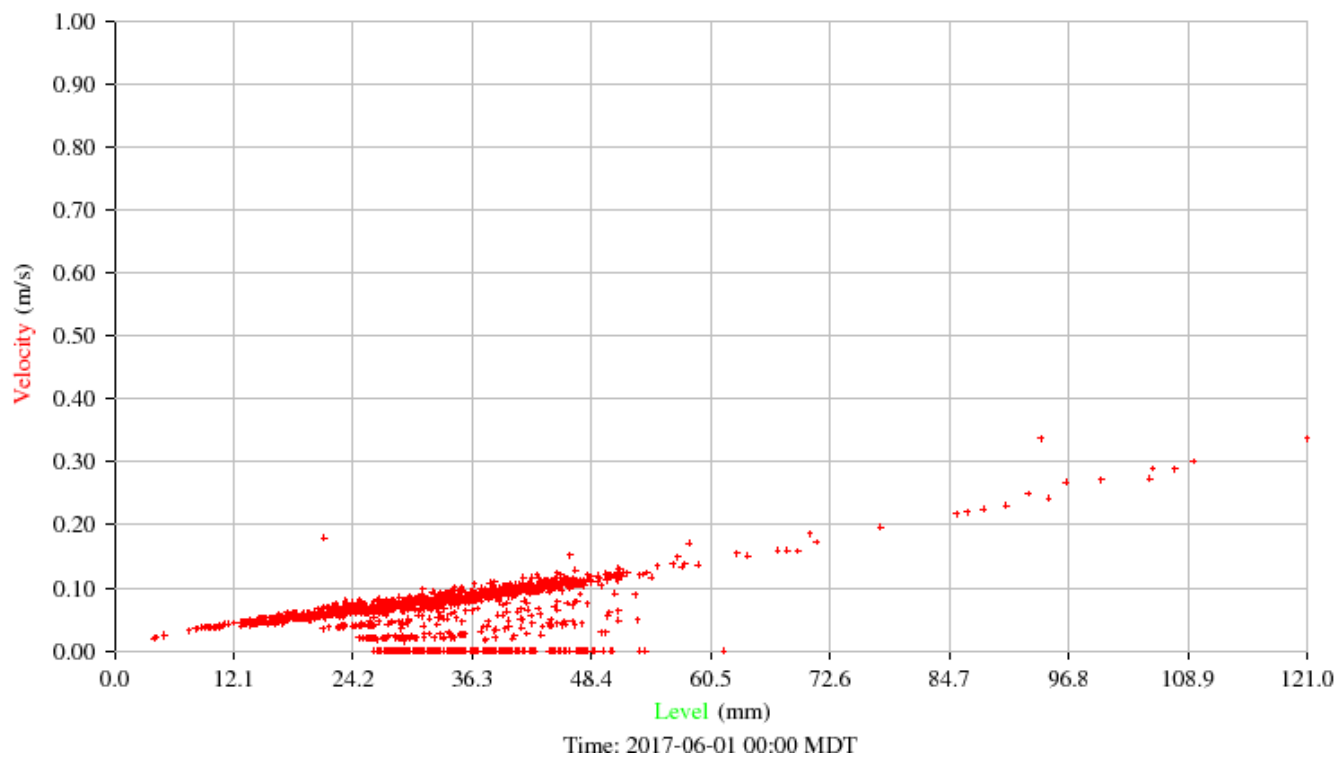
A15-124-08 – Flow with rain intensity



A15-124-08 – Level with velocity and flow



A15-124-08 – Level vs. velocity scatter plot

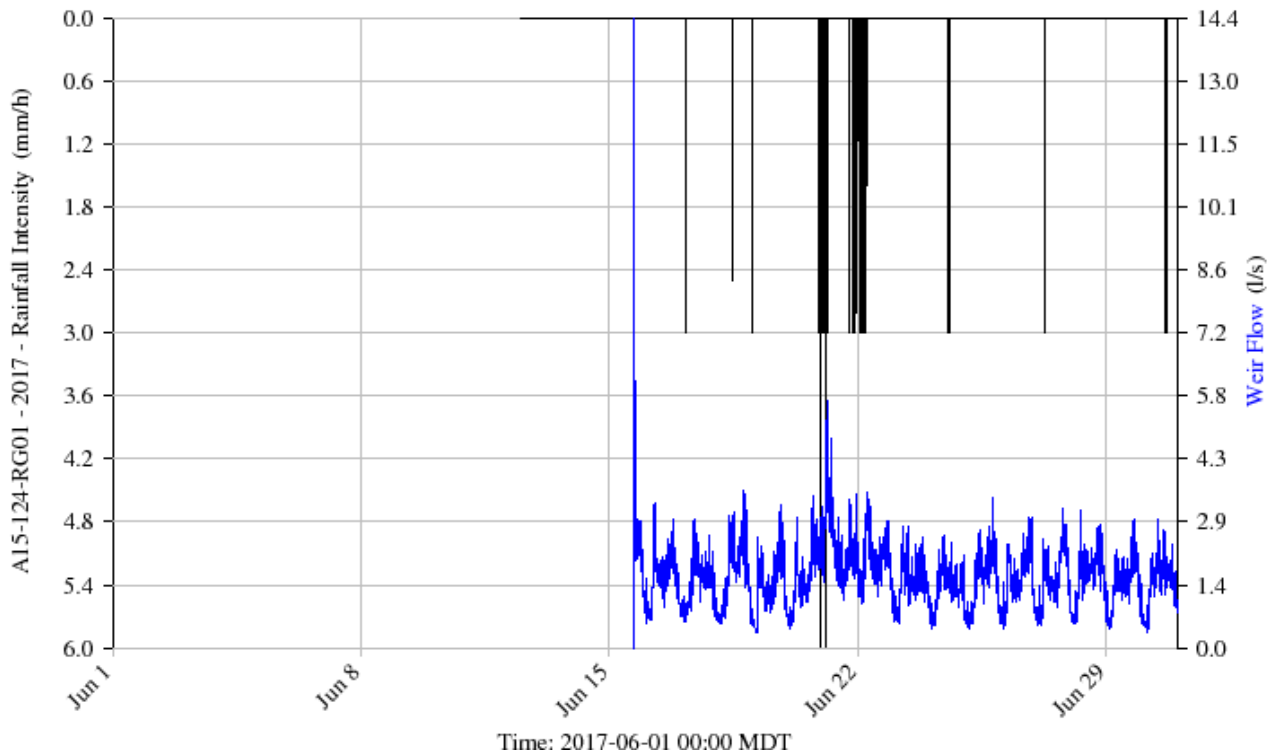


A15-124-08 – Summary report

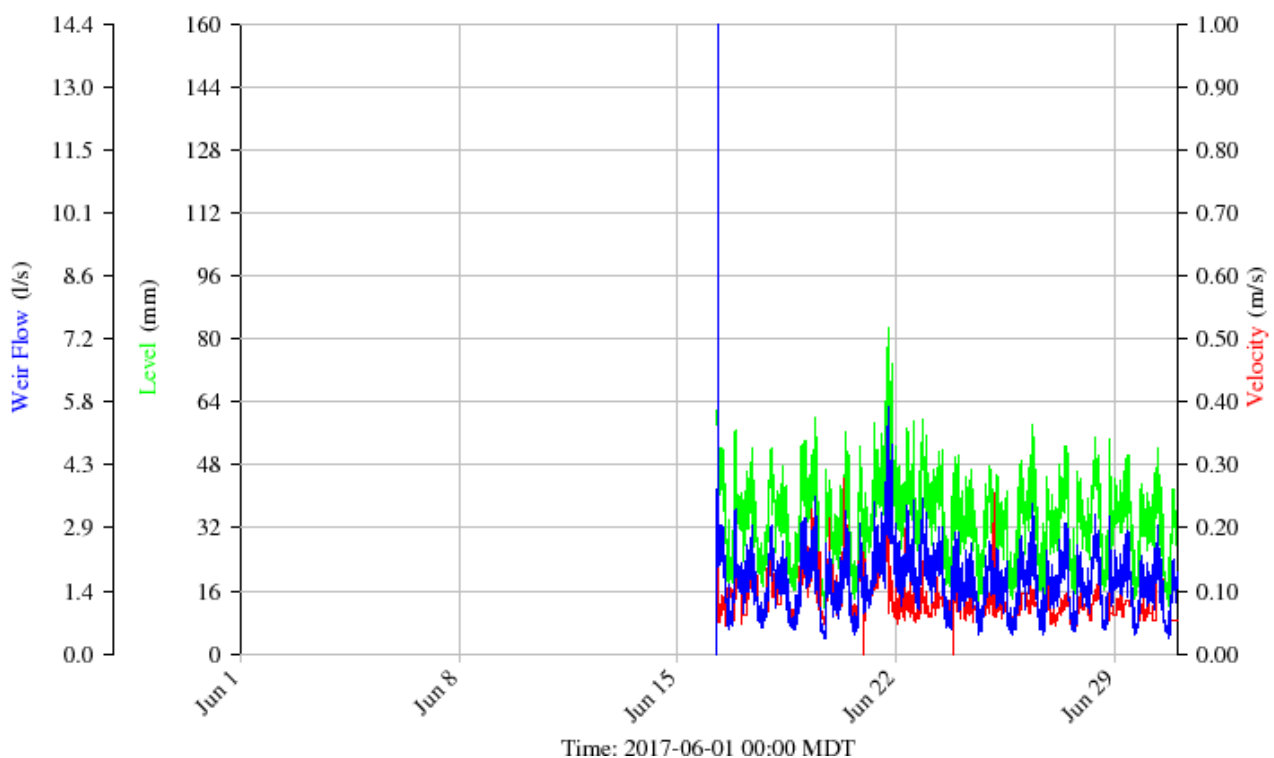
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.03	1.47	2.99	127.41	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	n/a	n/a	n/a	n/a	0.00
16	0.26	1.68	8.92	144.84	0.00
17	0.51	1.53	6.40	131.84	0.50
18	0.22	1.38	8.44	119.18	0.25
19	0.09	1.15	9.09	98.94	0.25
20	0.23	1.16	9.08	100.46	4.75
21	0.63	2.38	10.50	205.96	15.75
22	0.79	1.95	9.77	168.20	3.25
23	0.48	1.57	10.31	135.84	0.00
24	0.47	1.52	4.48	131.26	0.75
25	0.34	1.53	4.77	131.83	0.00
26	0.37	1.43	4.72	123.38	0.00
27	0.55	1.66	4.78	143.25	0.25
28	0.57	1.53	4.46	132.30	0.00
29	0.38	1.47	4.51	127.23	0.00
Mean	0.46	1.55	6.71	134.14	1.49
Minimum	0.09	1.15	2.99	98.94	0.00
Maximum	1.03	2.38	10.50	205.96	15.75
Total	n/a	n/a	n/a	2,146.30	26.75

A15-124-09

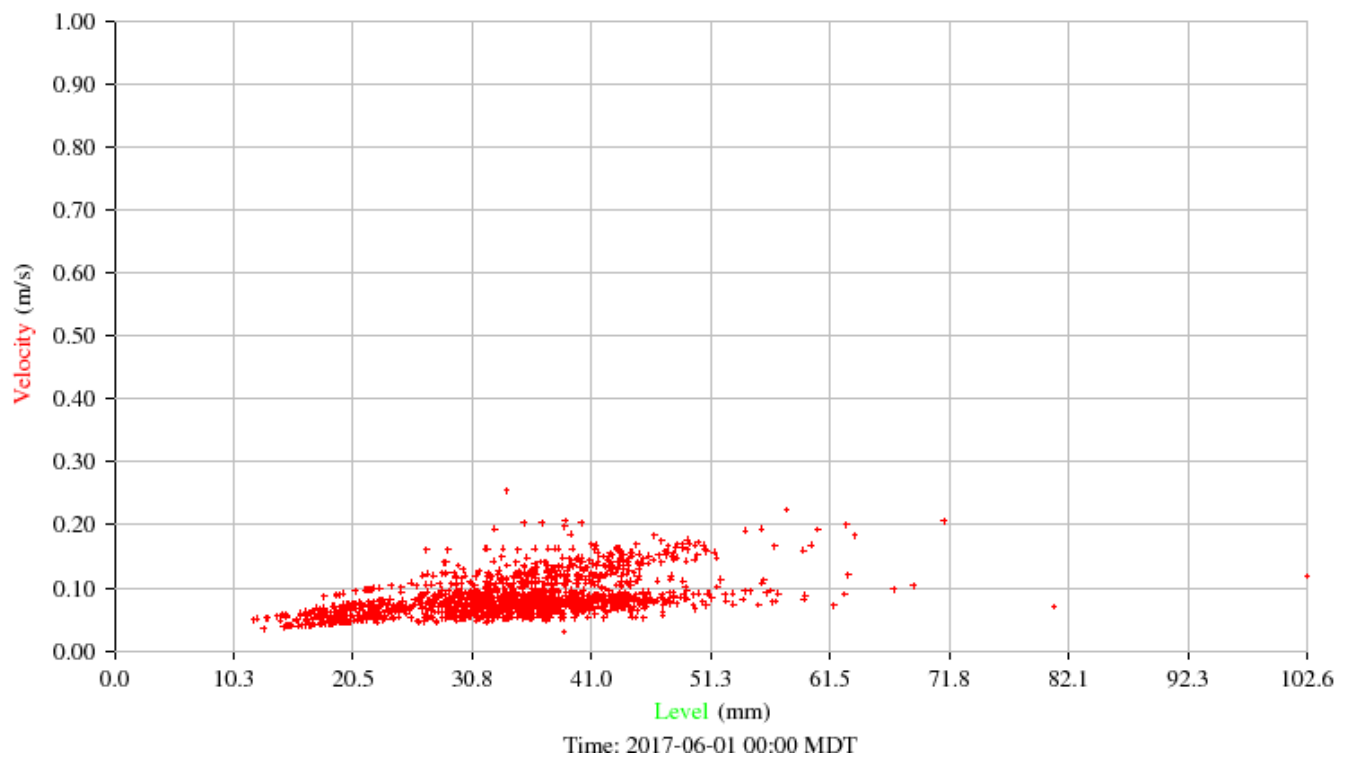
A15-124-09 – Flow with rain intensity



A15-124-09 – Level with velocity and flow



A15-124-09 – Level vs. velocity scatter plot

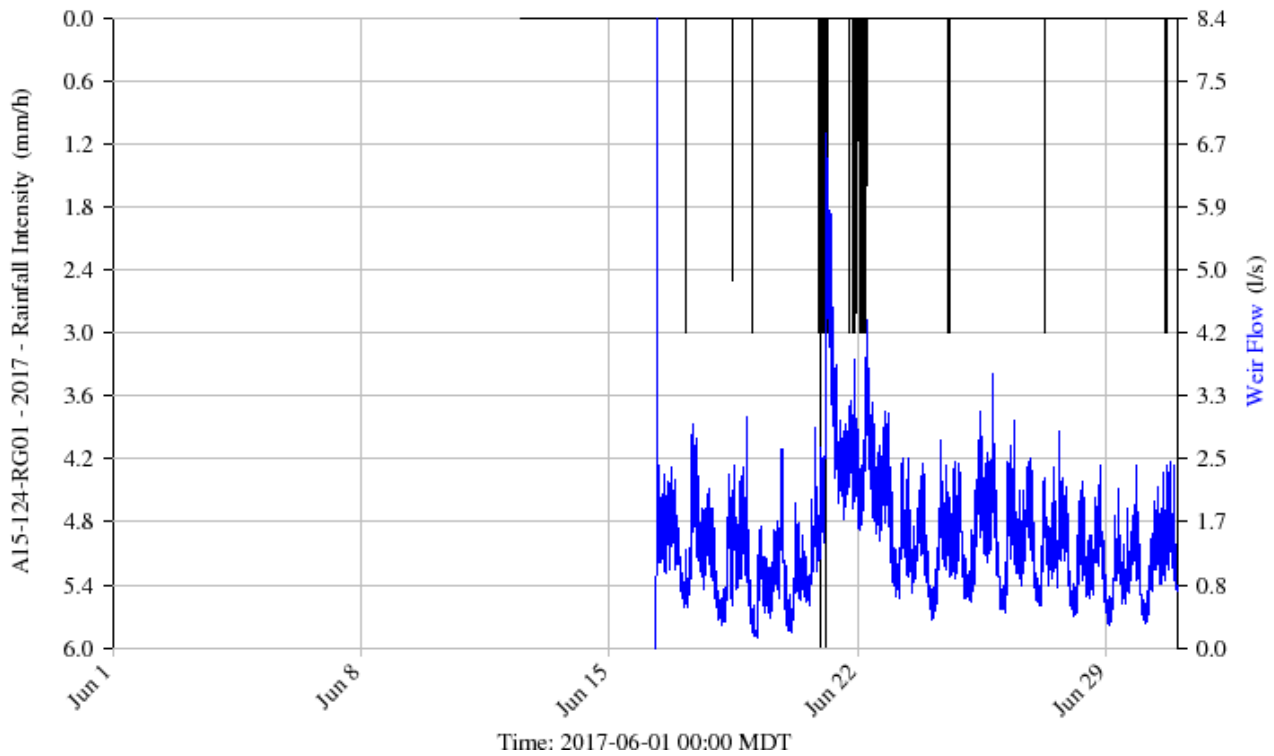


A15-124-09 – Summary report

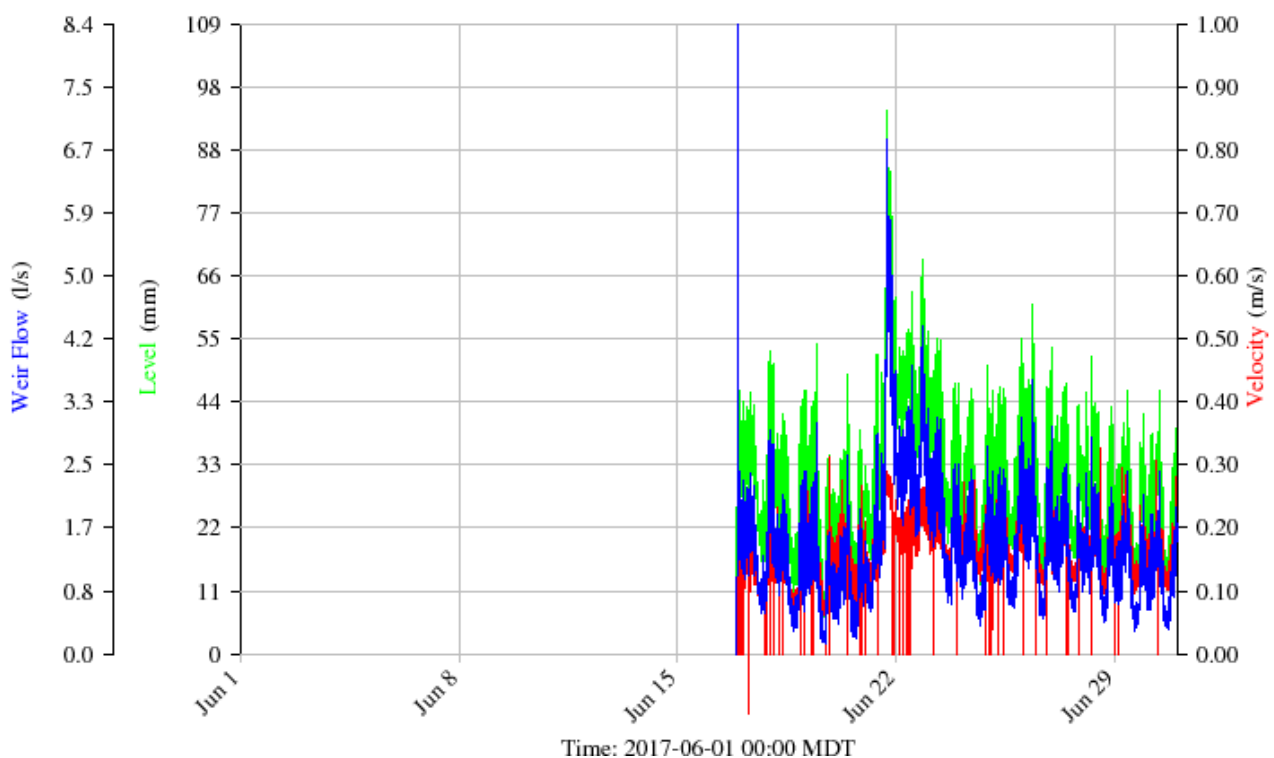
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.80	1.14	1.73	98.65	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	0.00	2.65	14.40	229.36	0.00
16	0.56	1.59	3.31	137.62	0.00
17	0.58	1.52	2.95	131.44	0.50
18	0.55	1.68	3.61	144.91	0.25
19	0.33	1.39	3.29	119.89	0.25
20	0.45	1.53	3.48	131.92	4.75
21	1.10	2.39	5.67	206.44	15.75
22	1.02	2.01	3.57	173.56	3.25
23	0.56	1.48	2.78	127.66	0.00
24	0.42	1.41	2.57	121.54	0.75
25	0.44	1.54	3.42	132.86	0.00
26	0.43	1.52	2.98	131.09	0.00
27	0.52	1.54	3.17	133.12	0.25
28	0.54	1.61	3.14	138.85	0.00
29	0.46	1.45	2.95	125.69	0.00
Mean	0.54	1.64	3.88	141.57	1.49
Minimum	0.00	1.14	1.73	98.65	0.00
Maximum	1.10	2.65	14.40	229.36	15.75
Total	n/a	n/a	n/a	2,406.70	26.75

A15-124-10

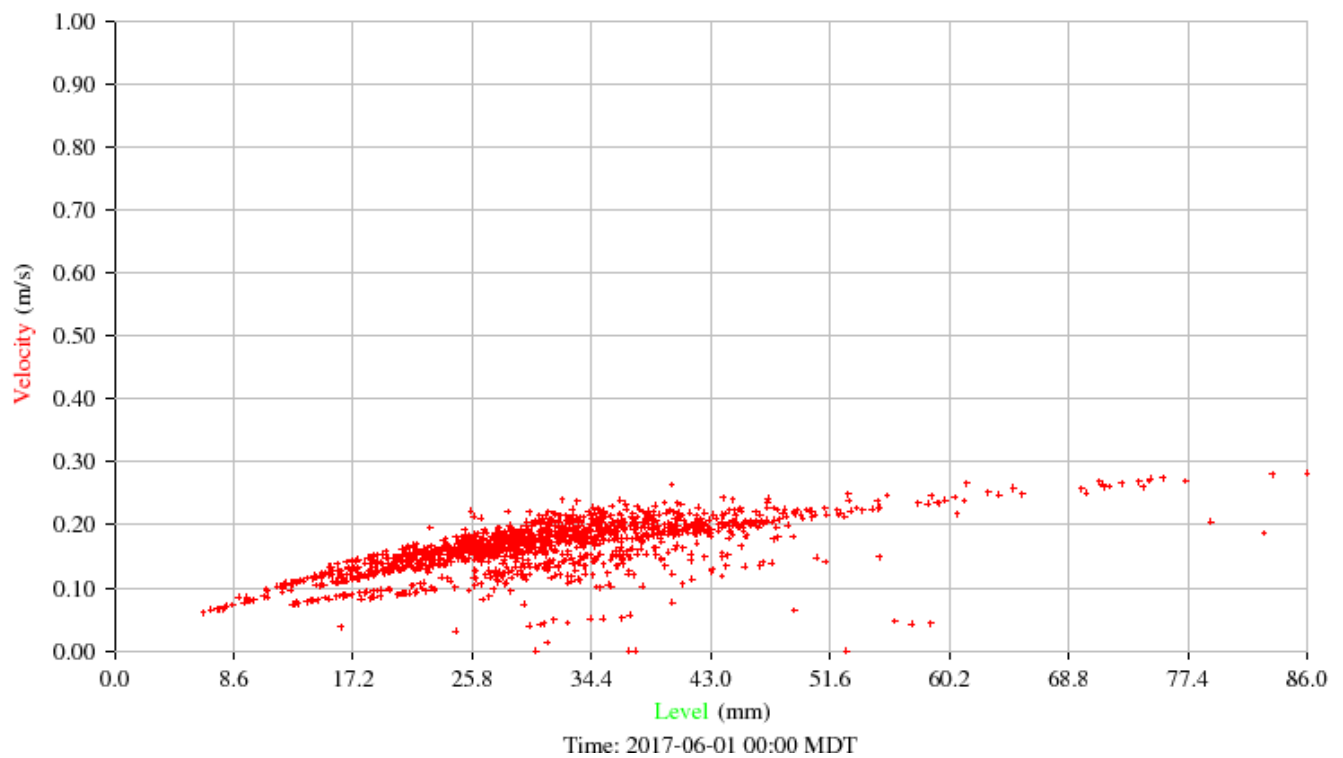
A15-124-10 – Flow with rain intensity



A15-124-10 – Level with velocity and flow



A15-124-10 – Level vs. velocity scatter plot

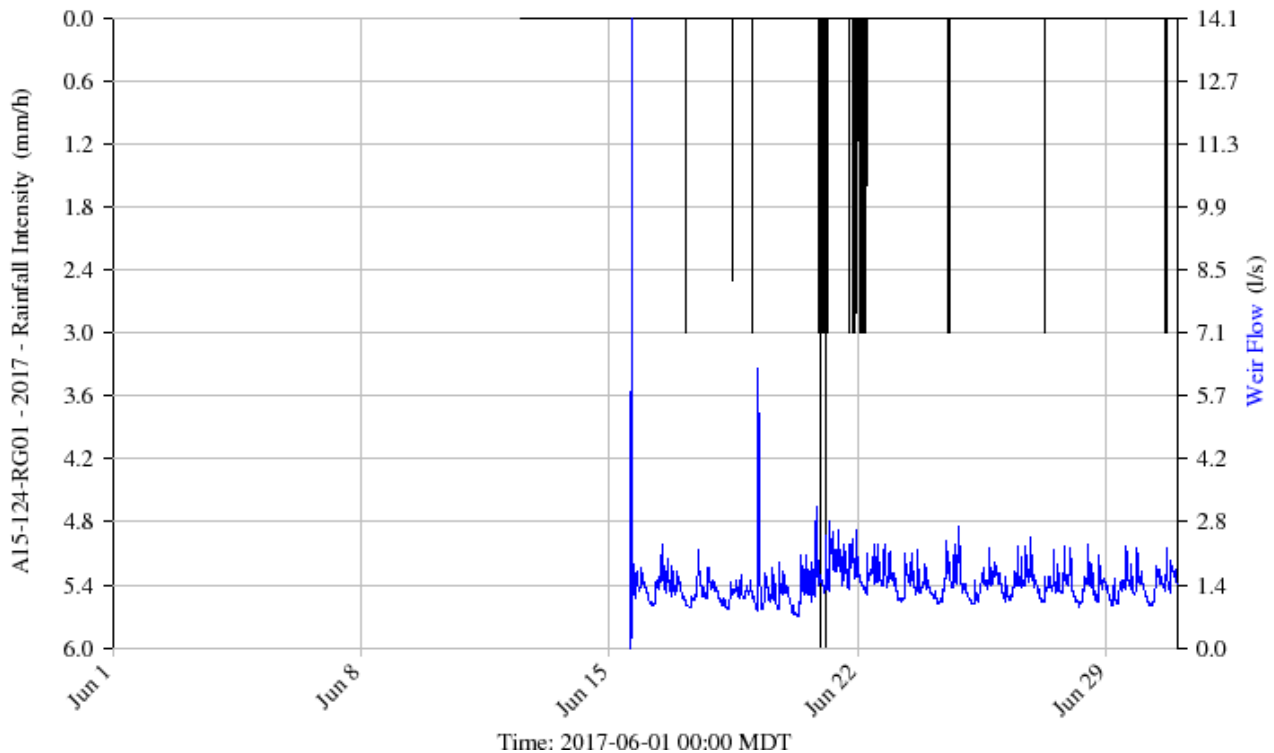


A15-124-10 – Summary report

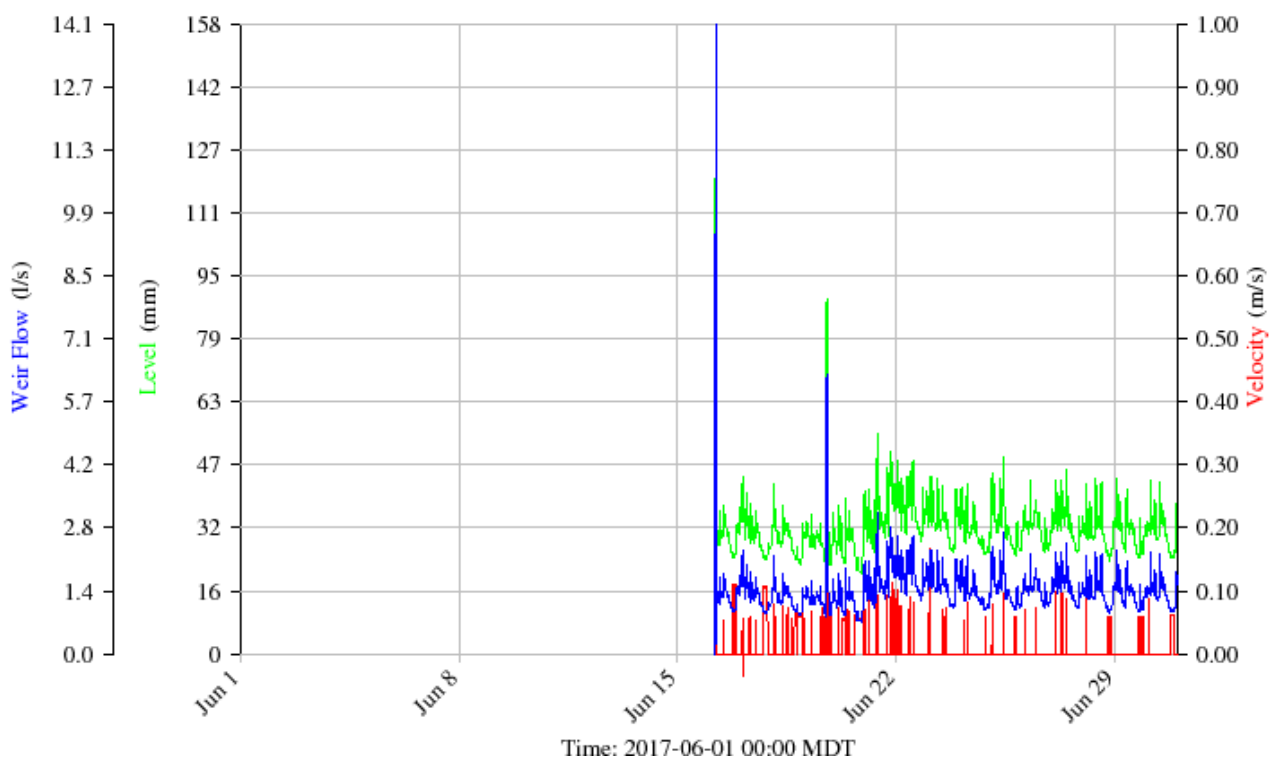
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.75	0.99	1.38	85.60	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	n/a	n/a	n/a	n/a	0.00
16	0.00	1.69	8.37	146.23	0.00
17	0.55	1.30	2.97	112.67	0.50
18	0.31	1.12	3.06	96.43	0.25
19	0.13	0.88	2.64	76.32	0.25
20	0.22	1.03	2.92	88.97	4.75
21	1.39	2.97	6.84	256.83	15.75
22	1.14	2.35	4.36	203.35	3.25
23	0.66	1.34	2.52	116.17	0.00
24	0.37	1.31	2.76	112.80	0.75
25	0.62	1.55	3.65	133.95	0.00
26	0.47	1.42	3.03	122.26	0.00
27	0.57	1.30	2.89	112.50	0.25
28	0.42	1.14	2.42	98.10	0.00
29	0.31	1.00	2.41	86.44	0.00
Mean	0.51	1.41	3.42	121.95	1.49
Minimum	0.00	0.88	1.38	76.32	0.00
Maximum	1.39	2.97	8.37	256.83	15.75
Total	n/a	n/a	n/a	1,951.19	26.75

A15-124-11

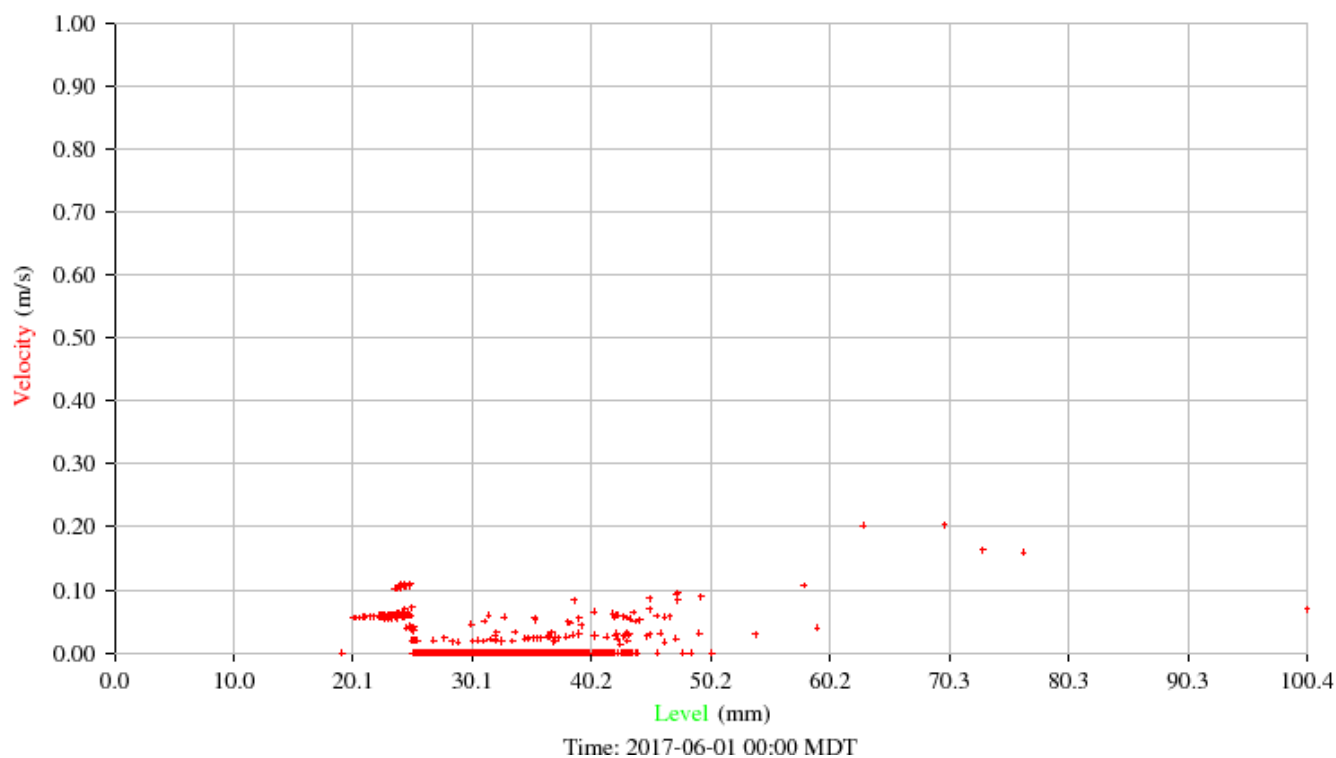
A15-124-11 – Flow with rain intensity



A15-124-11 – Level with velocity and flow



A15-124-11 – Level vs. velocity scatter plot

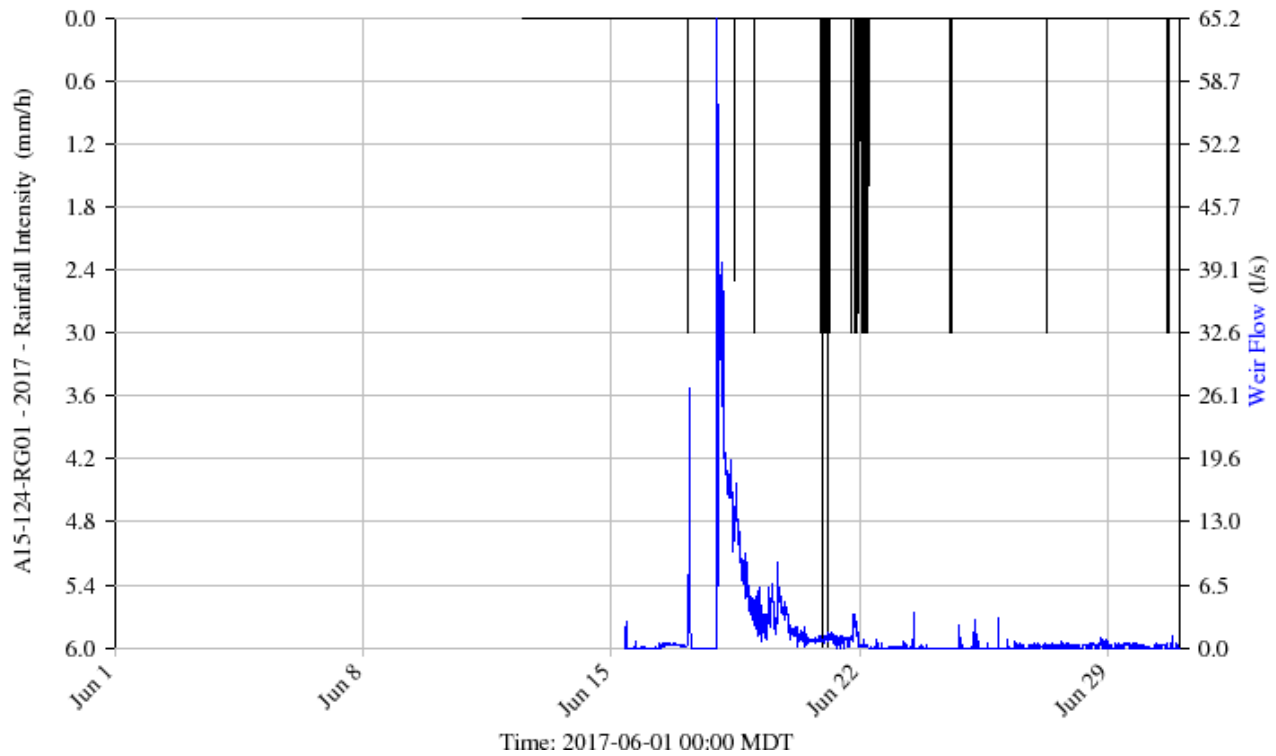


A15-124-11 – Summary report

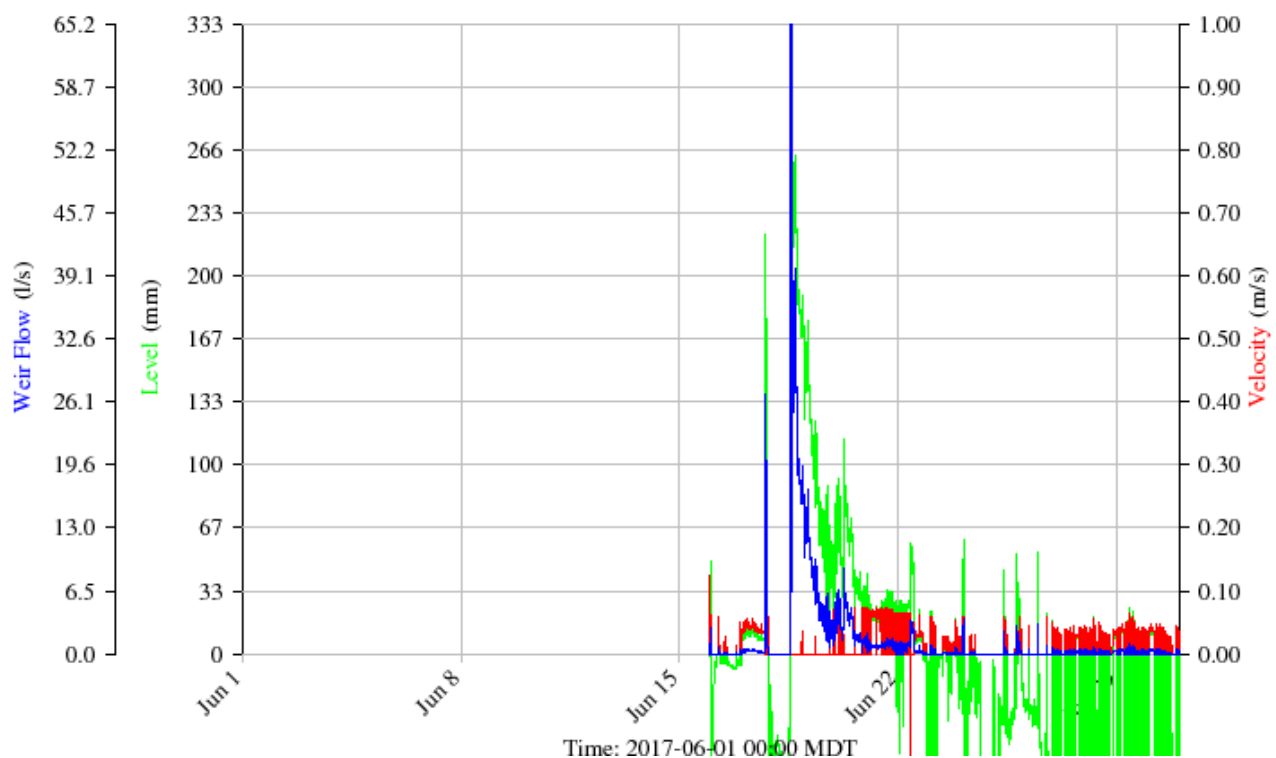
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.44	1.48	1.56	127.46	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	0.00	1.88	14.14	162.49	0.00
16	0.94	1.39	2.33	119.97	0.00
17	0.91	1.27	2.19	109.68	0.50
18	0.86	1.18	1.64	101.65	0.25
19	0.84	1.33	6.29	115.18	0.25
20	0.72	1.35	3.18	117.02	4.75
21	1.24	1.86	2.83	160.95	15.75
22	1.20	1.66	2.39	143.56	3.25
23	1.03	1.44	2.19	124.61	0.00
24	1.00	1.46	2.72	126.38	0.75
25	0.98	1.39	2.26	120.18	0.00
26	1.04	1.51	2.47	130.65	0.00
27	1.03	1.41	2.29	121.48	0.25
28	0.91	1.37	2.30	118.13	0.00
29	0.95	1.36	2.27	117.27	0.00
Mean	0.94	1.46	3.25	125.79	1.49
Minimum	0.00	1.18	1.56	101.65	0.00
Maximum	1.44	1.88	14.14	162.49	15.75
Total	n/a	n/a	n/a	2,138.49	26.75

A15-124-12A

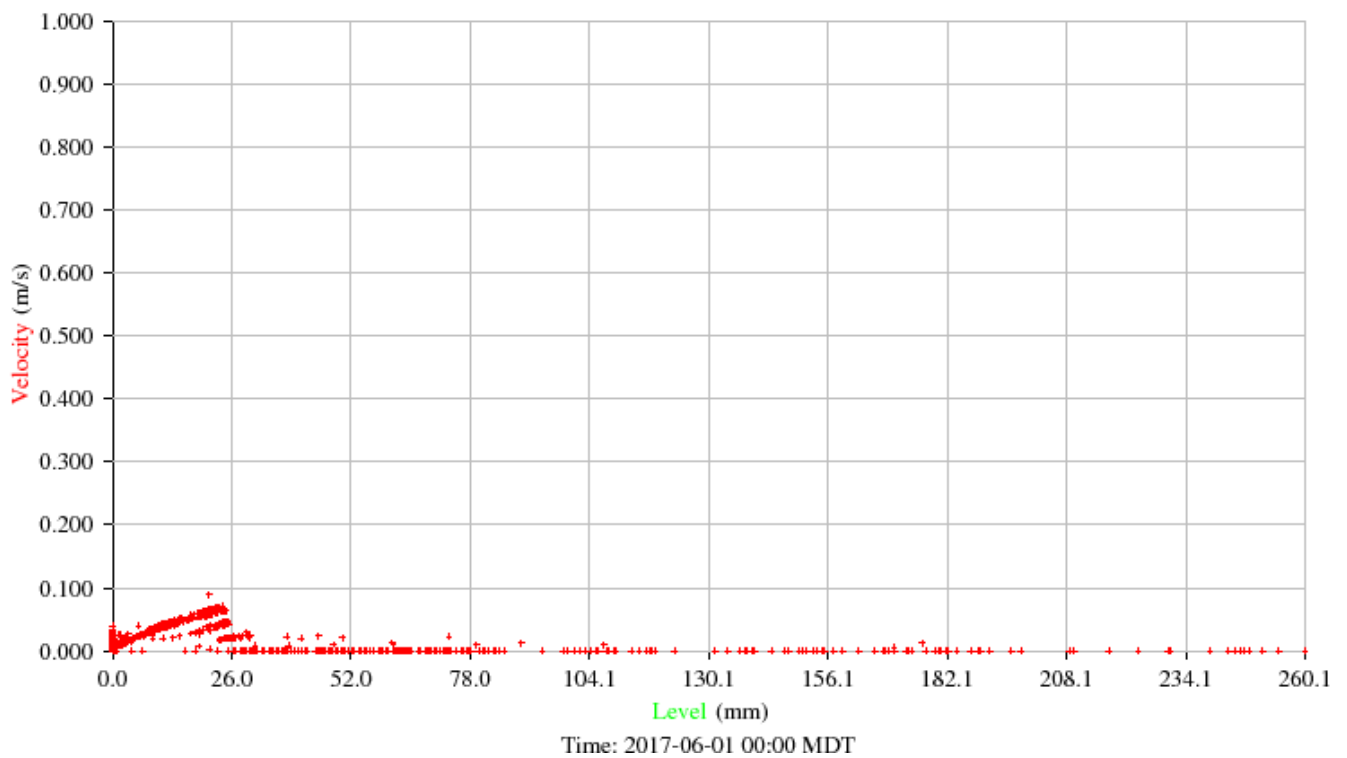
A15-124-12A – Flow with rain intensity



A15-124-12A – Level with velocity and flow



A15-124-12A – Level vs. velocity scatter plot

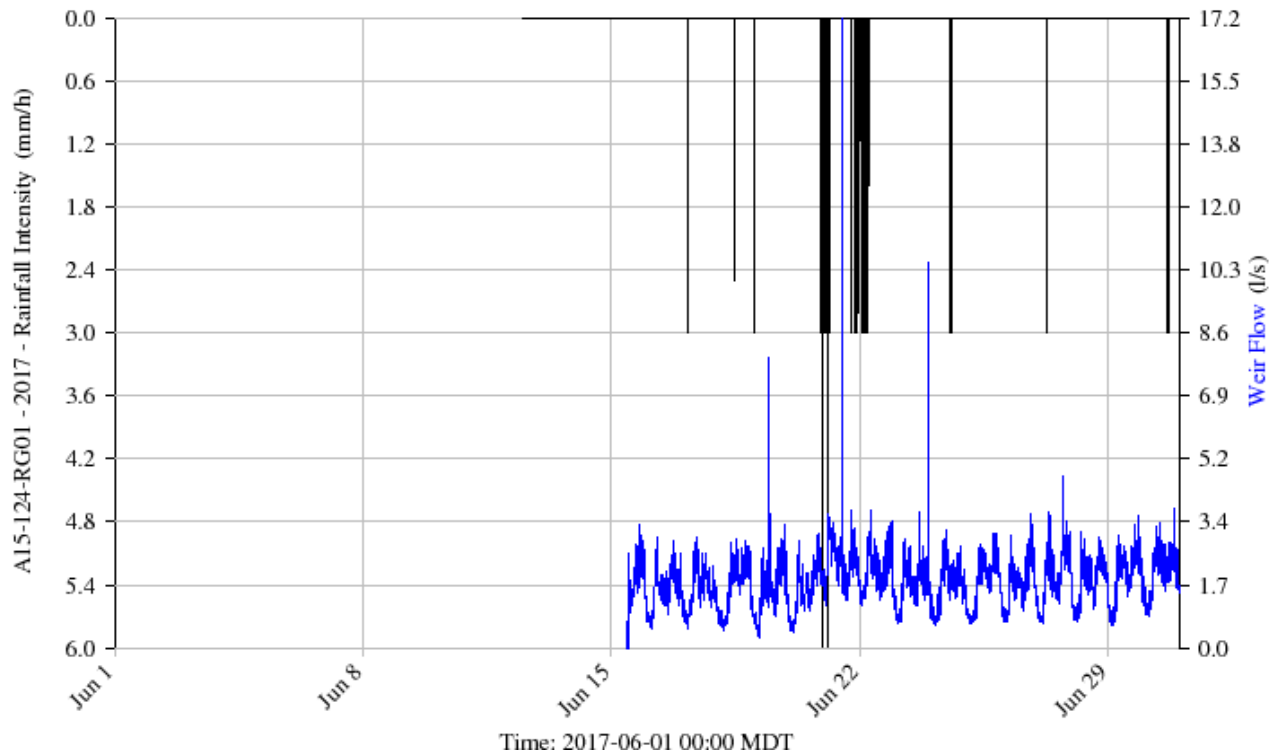


A15-124-12A – Summary report

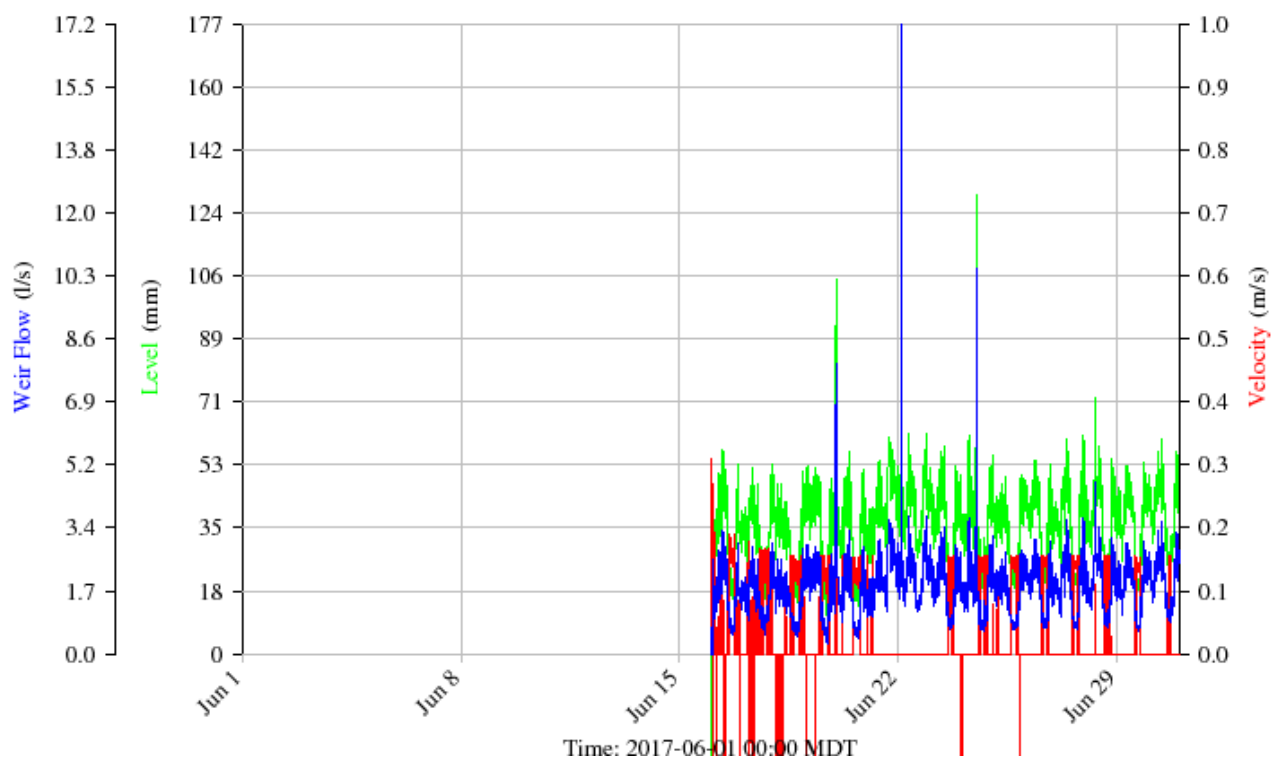
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.00	0.11	0.29	9.50	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	0.00	0.08	2.68	6.51	0.00
16	0.00	0.18	0.54	15.15	0.00
17	0.00	0.47	26.98	40.42	0.50
18	0.00	14.78	65.23	1,276.99	0.25
19	0.63	3.95	8.80	341.23	0.25
20	0.04	1.20	3.64	103.30	4.75
21	0.00	1.11	3.47	95.78	15.75
22	0.00	0.09	0.91	8.06	3.25
23	0.00	0.10	3.61	8.41	0.00
24	0.00	0.05	2.29	4.30	0.75
25	0.00	0.09	3.06	7.98	0.00
26	0.00	0.06	0.81	5.18	0.00
27	0.00	0.15	0.71	13.10	0.25
28	0.00	0.21	0.98	17.97	0.00
29	0.00	0.17	0.63	15.05	0.00
Mean	0.04	1.35	7.40	116.67	1.49
Minimum	0.00	0.05	0.29	4.30	0.00
Maximum	0.63	14.78	65.23	1,276.99	15.75
Total	n/a	n/a	n/a	1,983.38	26.75

A15-124-12B

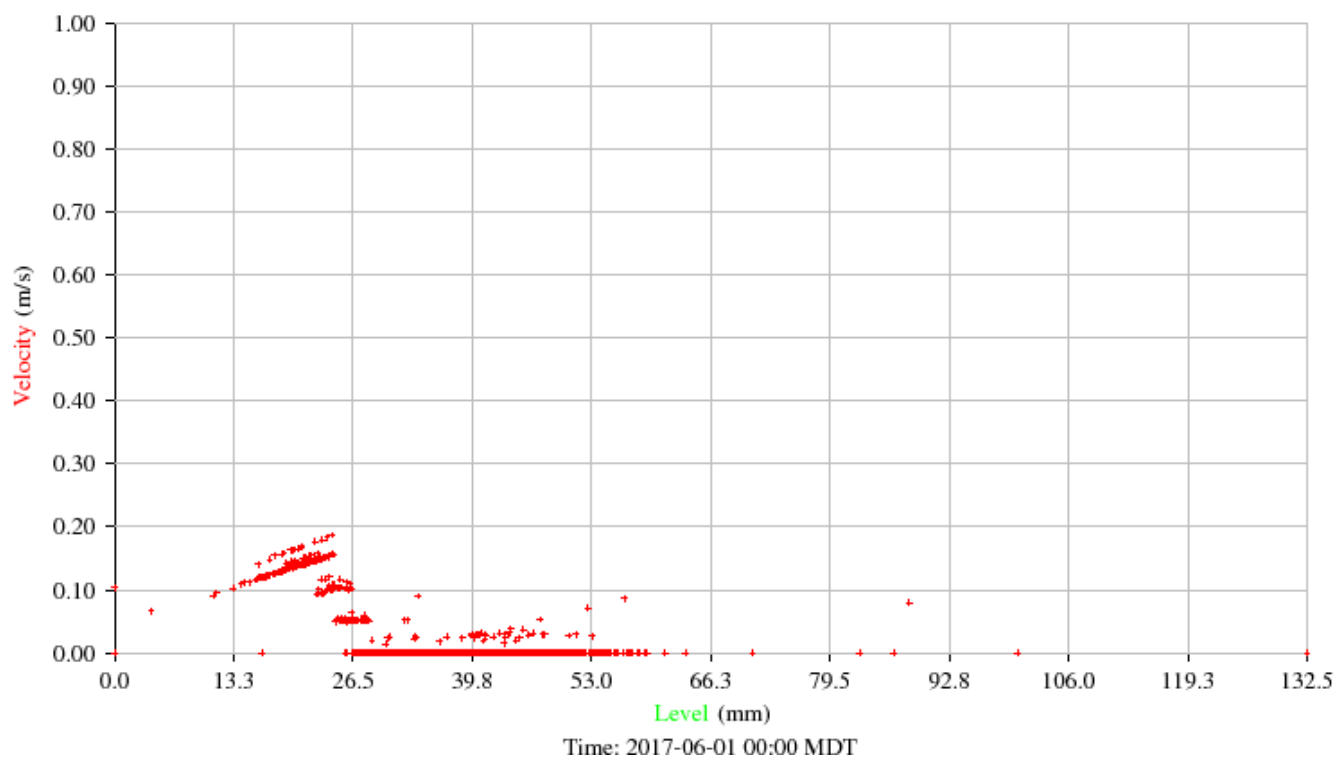
A15-124-12B – Flow with rain intensity



A15-124-12B – Level with velocity and flow



A15-124-12B – Level vs. velocity scatter plot



A15-124-12B – Summary report

	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.50	1.86	2.16	160.84	0.00
2	n/a	n/a	n/a	n/a	n/a
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a
8	n/a	n/a	n/a	n/a	n/a
9	n/a	n/a	n/a	n/a	n/a
10	n/a	n/a	n/a	n/a	n/a
11	n/a	n/a	n/a	n/a	n/a
12	n/a	n/a	n/a	n/a	0.00
13	n/a	n/a	n/a	n/a	n/a
14	n/a	n/a	n/a	n/a	n/a
15	0.00	1.85	3.38	160.23	0.00
16	0.52	1.58	3.03	136.54	0.00
17	0.52	1.57	3.04	135.93	0.50
18	0.49	1.65	3.00	142.21	0.25
19	0.28	1.68	7.95	145.48	0.25
20	0.44	1.56	3.12	134.96	4.75
21	1.17	2.48	17.21	213.93	15.75
22	1.14	2.10	3.77	181.84	3.25
23	0.67	1.82	10.51	157.24	0.00
24	0.61	1.67	3.23	144.04	0.75
25	0.65	1.78	3.12	154.21	0.00
26	0.71	1.76	3.65	151.88	0.00
27	0.69	1.92	4.68	165.99	0.25
28	0.70	1.86	3.18	160.74	0.00
29	0.63	1.93	3.63	167.11	0.00
Mean	0.68	1.83	4.85	158.15	1.49
Minimum	0.00	1.56	2.16	134.96	0.00
Maximum	1.50	2.48	17.21	213.93	15.75
Total	n/a	n/a	n/a	2,688.47	26.75



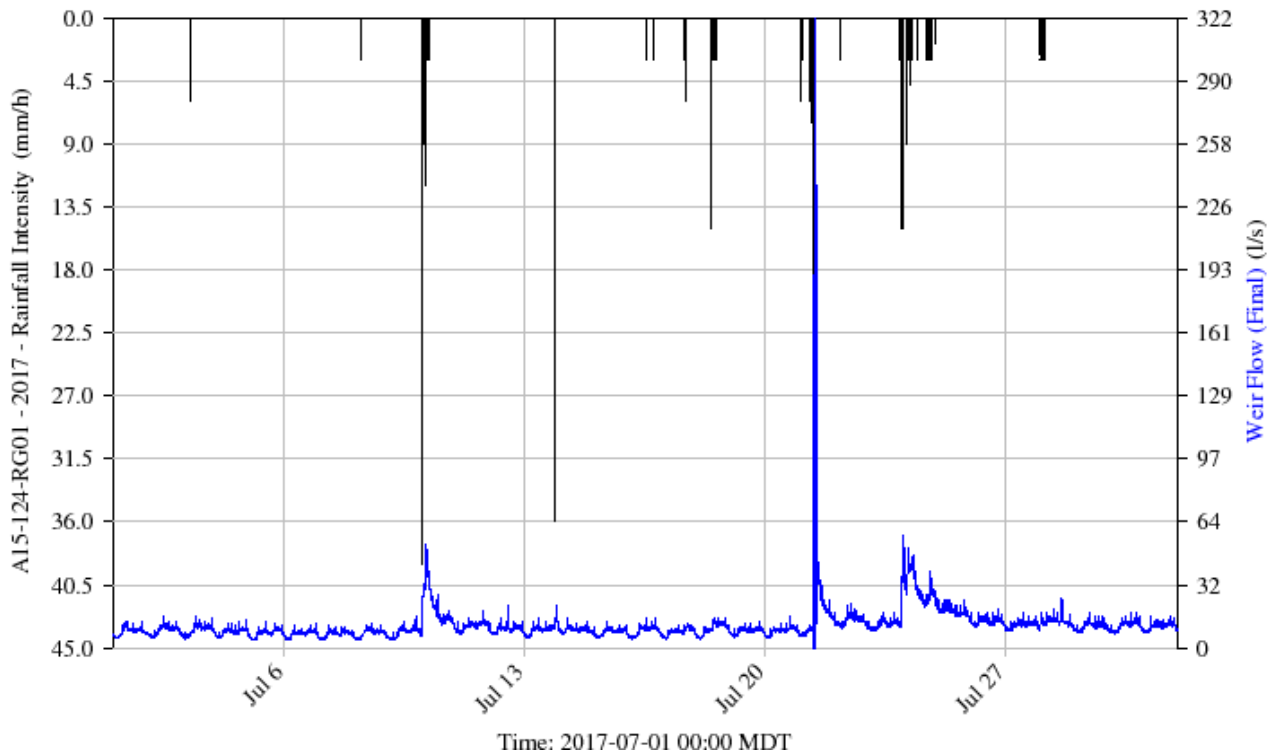
Monthly Report

A15-124 - Cold Lake TFM

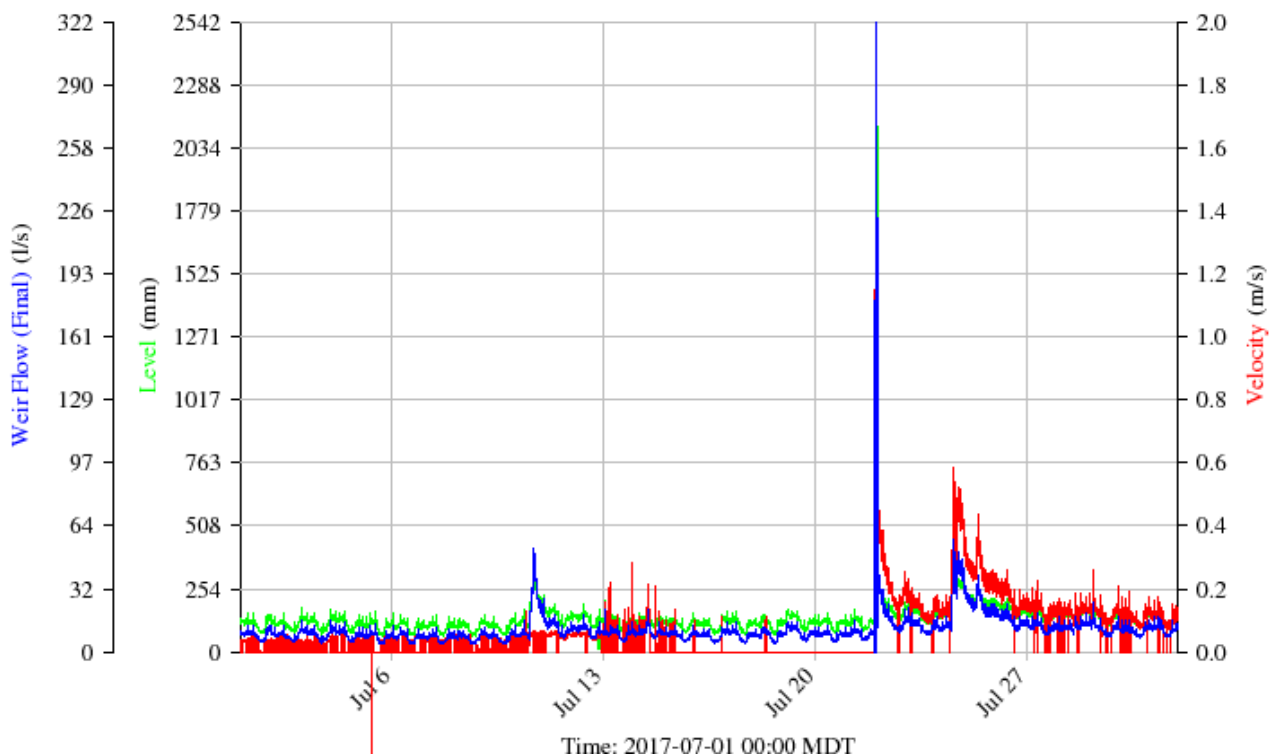
July 2017

A15-124-01

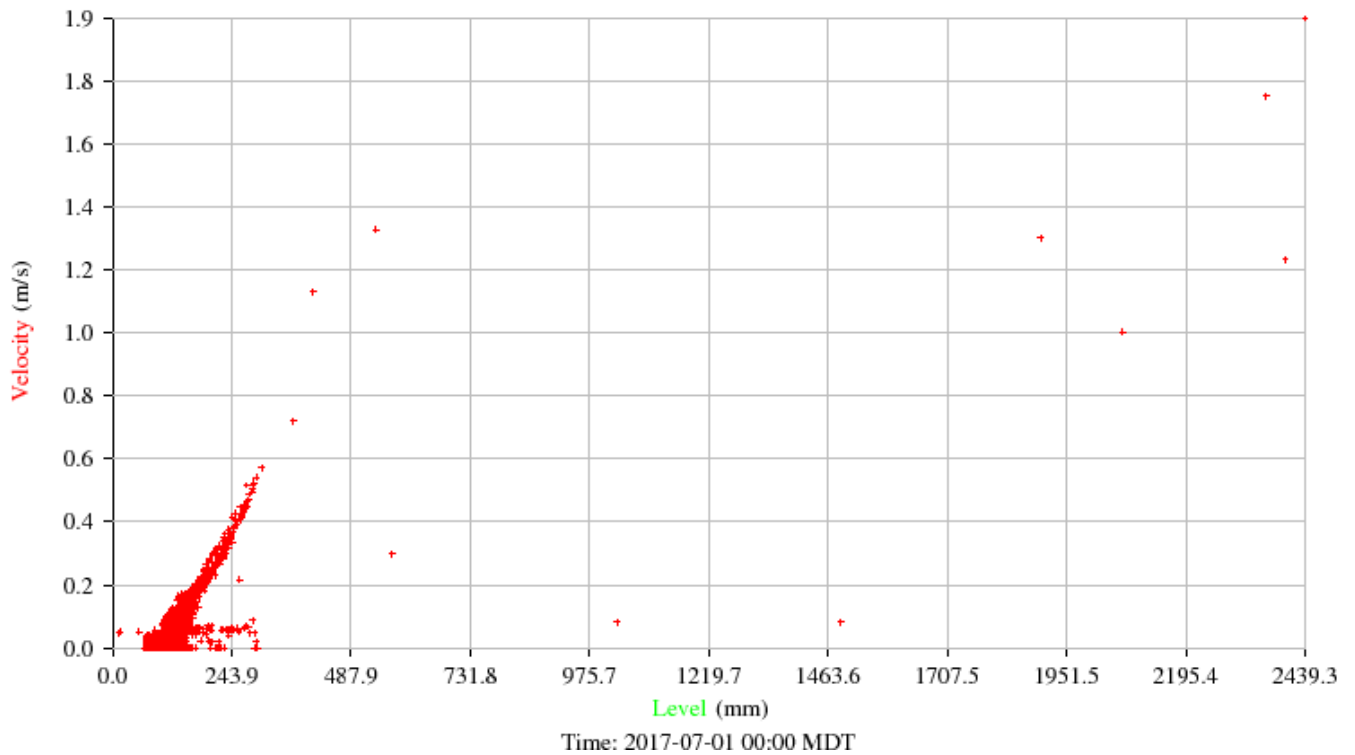
A15-124-01 – Flow with rain intensity



A15-124-01 – Level with velocity and flow



A15-124-01 – Level vs. velocity scatter plot

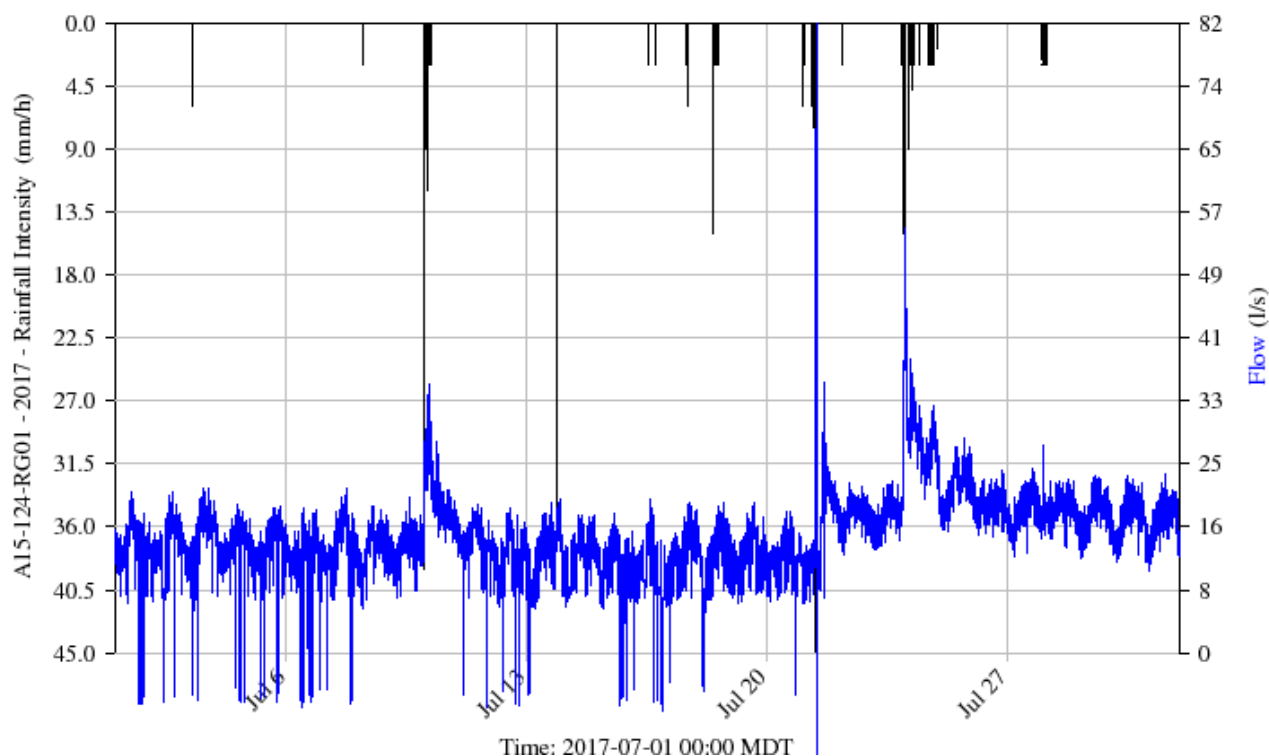


A15-124-01 – Summary report

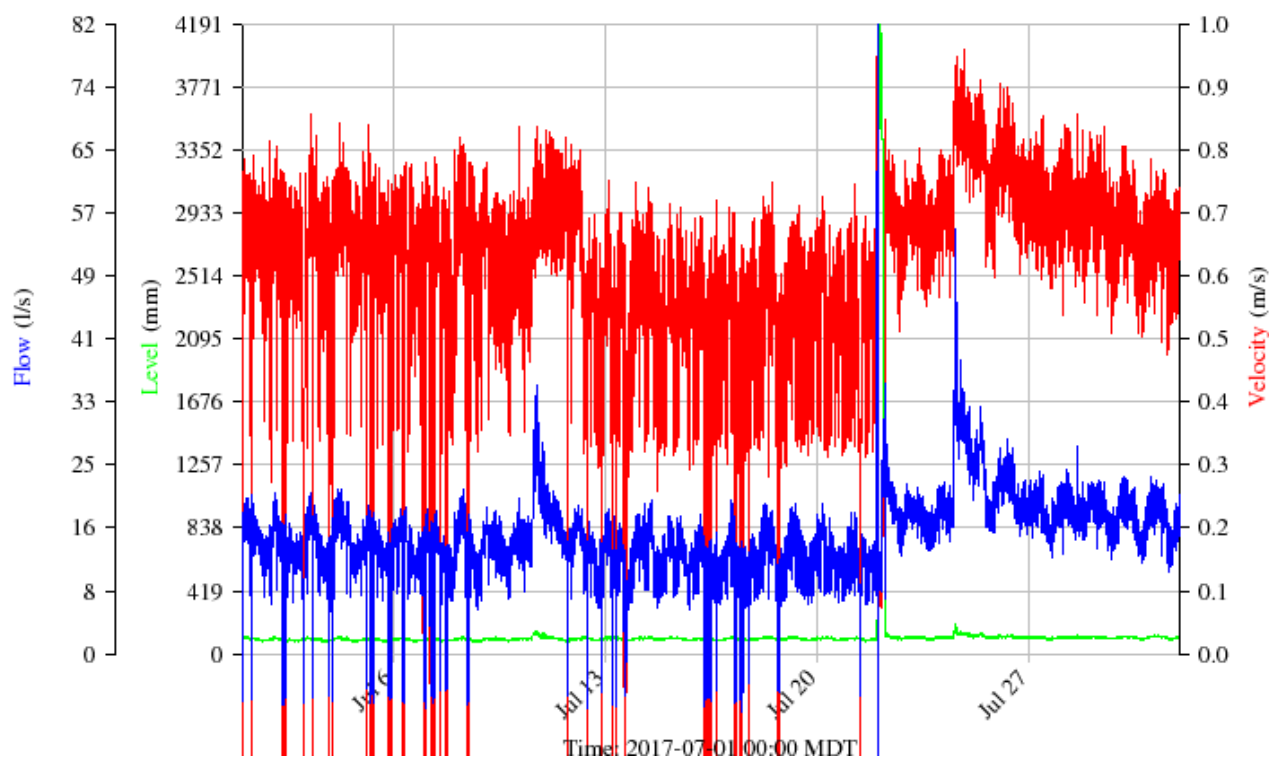
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	4.85	8.37	13.31	722.83	0.00
2	5.41	8.99	16.52	776.57	0.00
3	4.64	9.07	16.19	783.80	0.50
4	4.78	8.07	14.44	697.18	0.00
5	3.83	7.49	13.28	647.49	0.00
6	4.01	7.24	12.22	625.56	0.00
7	3.92	7.04	11.39	608.37	0.00
8	3.88	7.41	12.27	640.53	1.00
9	4.00	7.86	16.14	679.31	0.00
10	5.74	20.81	53.28	1,798.13	35.75
11	7.02	11.08	18.61	957.04	0.00
12	6.84	9.79	22.05	845.94	0.00
13	5.12	9.60	22.05	829.22	8.50
14	6.67	9.29	14.86	802.97	0.00
15	5.06	8.12	13.53	701.45	0.00
16	4.61	8.56	14.95	739.69	1.00
17	4.67	8.29	12.38	716.22	3.25
18	4.67	9.69	15.13	837.06	7.25
19	5.55	8.77	13.27	757.61	0.00
20	4.93	8.66	15.96	748.16	0.00
21	0.00	31.53	322.38	2,724.59	37.75
22	10.06	14.27	22.48	1,233.14	0.25
23	8.75	12.04	18.44	1,040.35	6.00
24	16.52	32.01	57.36	2,765.75	28.50
25	14.50	18.98	29.38	1,640.07	0.00
26	10.84	13.62	19.96	1,176.80	0.00
27	8.59	11.81	17.76	1,020.32	0.00
28	9.13	13.66	25.04	1,180.21	11.00
29	7.77	10.96	17.95	947.02	0.00
30	7.40	11.26	18.44	972.58	0.50
Mean	6.49	11.78	29.26	1,018.09	4.56
Minimum	0.00	7.04	11.39	608.37	0.00
Maximum	16.52	32.01	322.38	2,765.75	37.75
Total	n/a	n/a	n/a	31,560.82	141.25

A15-124-05

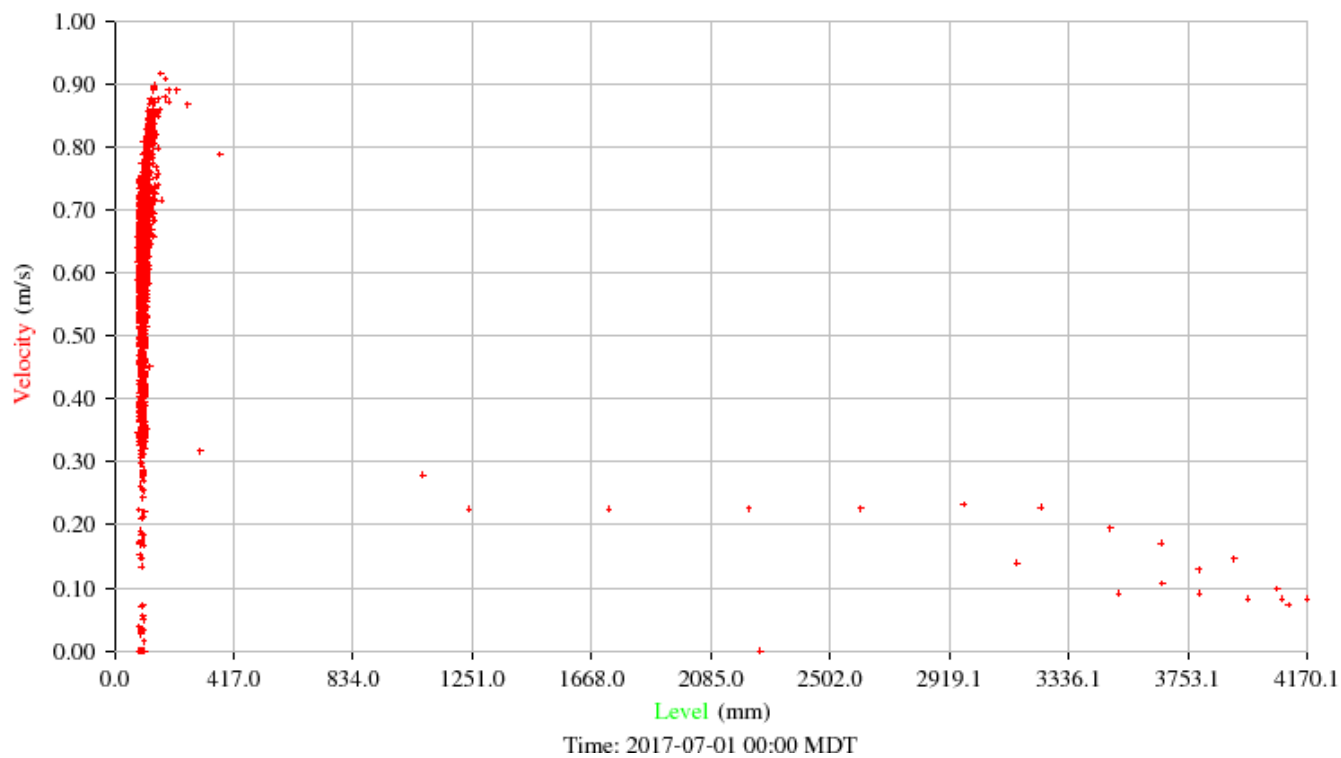
A15-124-05 – Flow with rain intensity



A15-124-05 – Level with velocity and flow



A15-124-05 – Level vs. velocity scatter plot

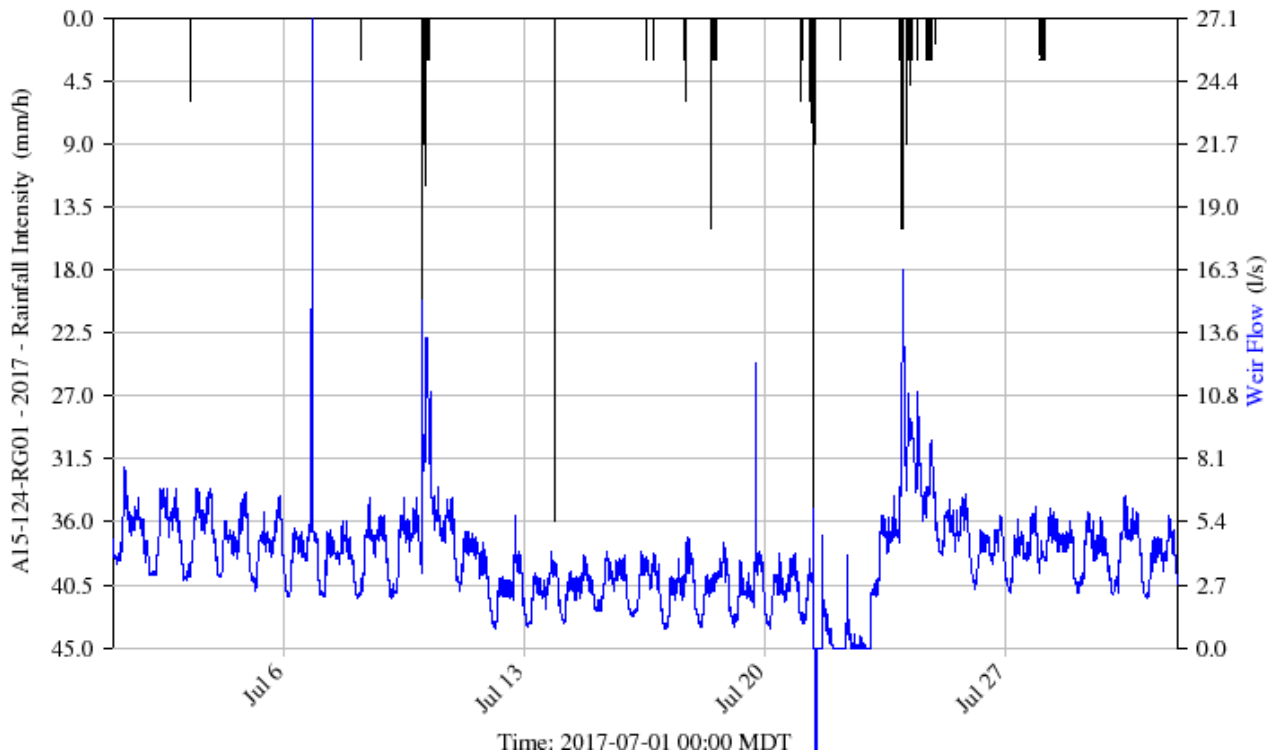


A15-124-05 – Summary report

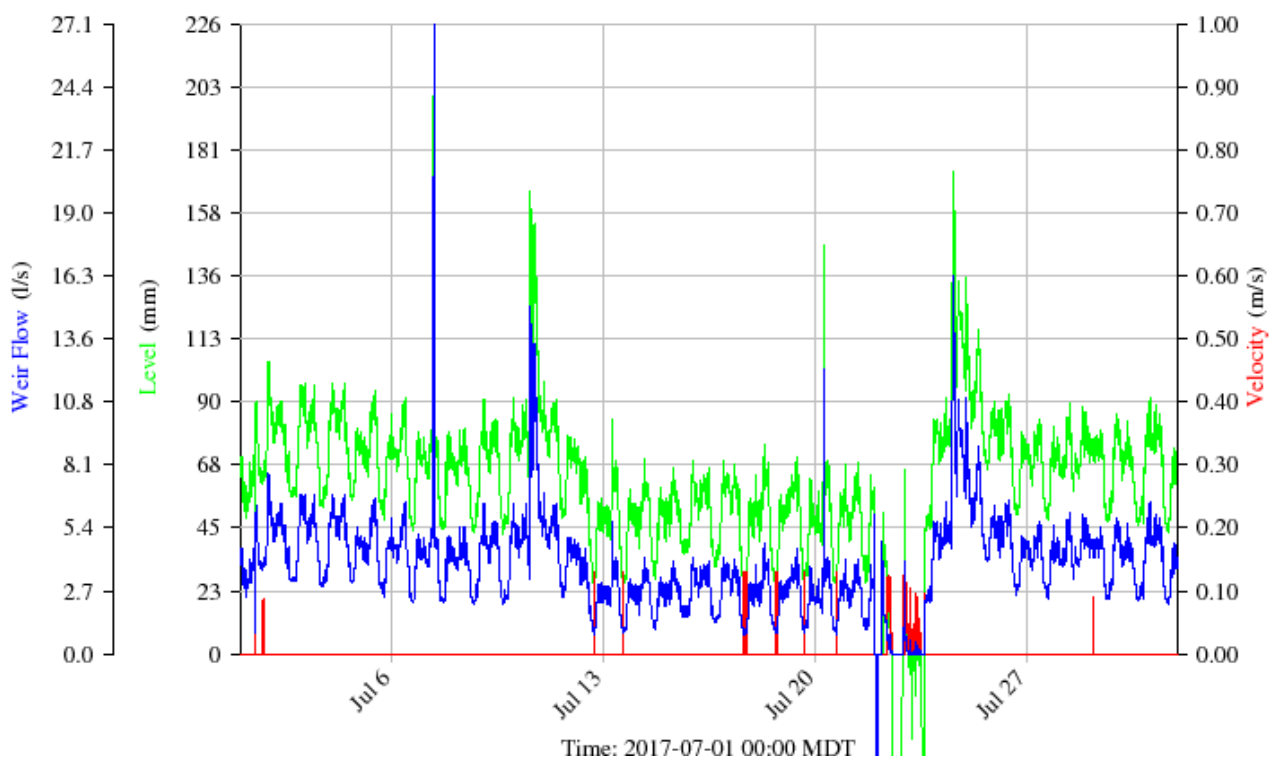
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	-6.65	13.74	20.92	1,186.90	0.00
2	-6.35	13.49	20.91	1,165.53	0.00
3	-6.13	14.49	21.32	1,251.93	0.50
4	-6.40	13.28	19.32	1,147.11	0.00
5	-6.38	12.75	19.04	1,101.56	0.00
6	-6.98	11.94	18.87	1,031.22	0.00
7	-6.50	12.79	21.26	1,105.03	0.00
8	5.68	13.58	19.03	1,173.24	1.00
9	7.08	13.62	20.23	1,176.37	0.00
10	11.38	20.27	34.91	1,751.62	35.75
11	-7.09	14.13	19.22	1,220.83	0.00
12	-6.91	11.48	18.81	992.27	0.00
13	-5.55	12.25	19.43	1,058.49	8.50
14	5.90	12.26	19.89	1,059.22	0.00
15	-6.91	11.24	18.02	970.78	0.00
16	-7.45	10.55	19.89	911.81	1.00
17	-6.42	12.36	19.41	1,067.67	3.25
18	-4.94	12.02	19.55	1,038.95	7.25
19	6.33	12.56	19.44	1,084.95	0.00
20	-5.39	11.74	18.42	1,014.74	0.00
21	-24.90	17.21	81.67	1,486.59	37.75
22	12.66	18.10	22.13	1,564.24	0.25
23	13.33	17.64	30.38	1,524.44	6.00
24	19.83	28.92	55.09	2,498.73	28.50
25	15.81	21.28	27.84	1,838.96	0.00
26	15.08	19.05	23.56	1,645.52	0.00
27	12.57	18.27	23.98	1,578.76	0.00
28	13.76	18.84	27.03	1,627.98	11.00
29	12.19	17.94	22.94	1,550.18	0.00
30	11.76	17.76	22.95	1,534.87	0.50
Mean	1.71	15.26	24.79	1,318.19	4.56
Minimum	-24.90	10.55	18.02	911.81	0.00
Maximum	19.83	28.92	81.67	2,498.73	37.75
Total	n/a	n/a	n/a	40,863.90	141.25

A15-124-06

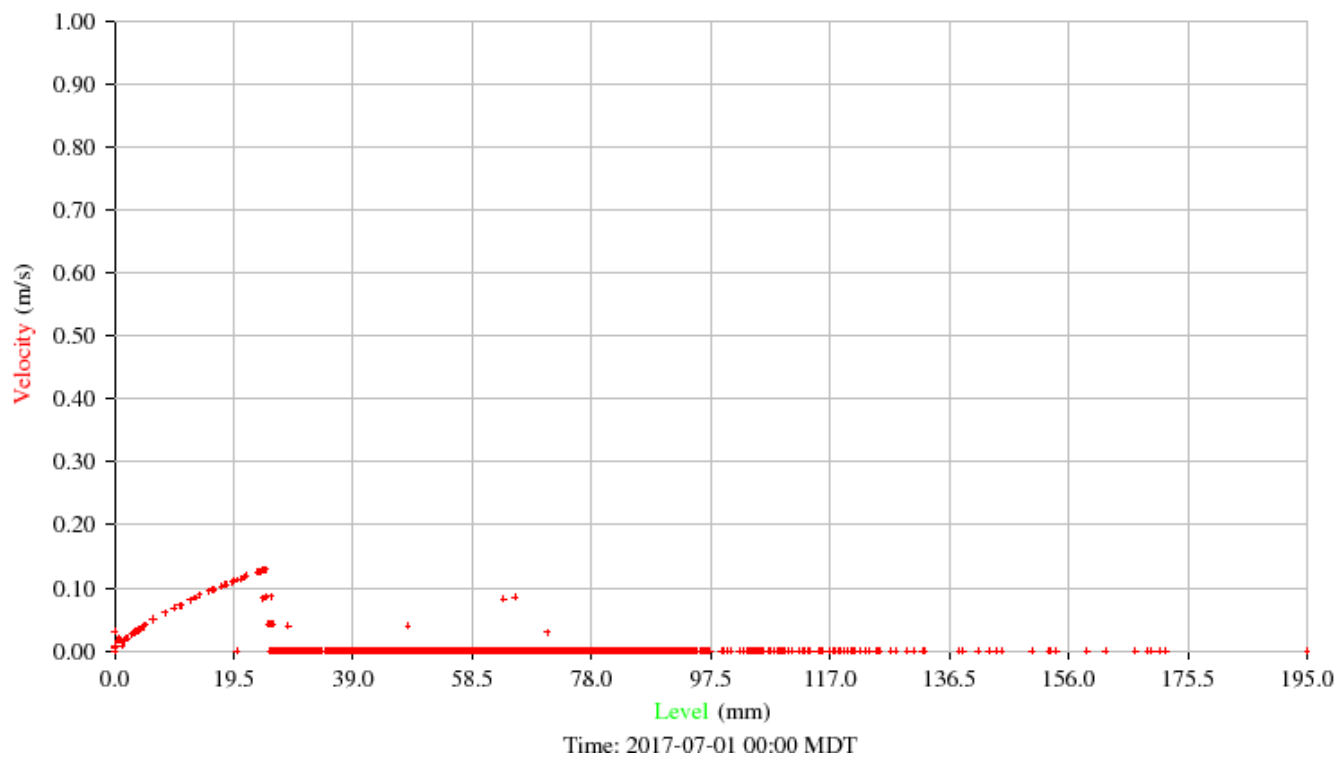
A15-124-06 – Flow with rain intensity



A15-124-06 – Level with velocity and flow



A15-124-06 – Level vs. velocity scatter plot

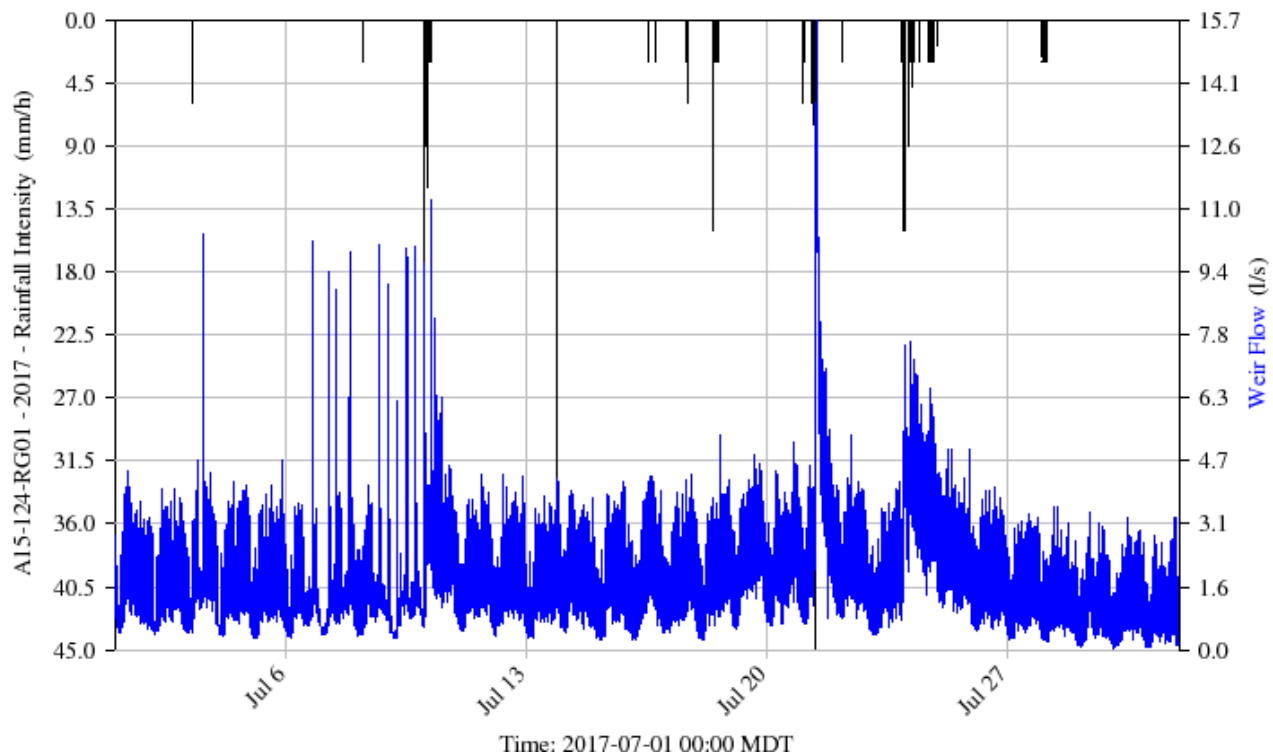


A15-124-06 – Summary report

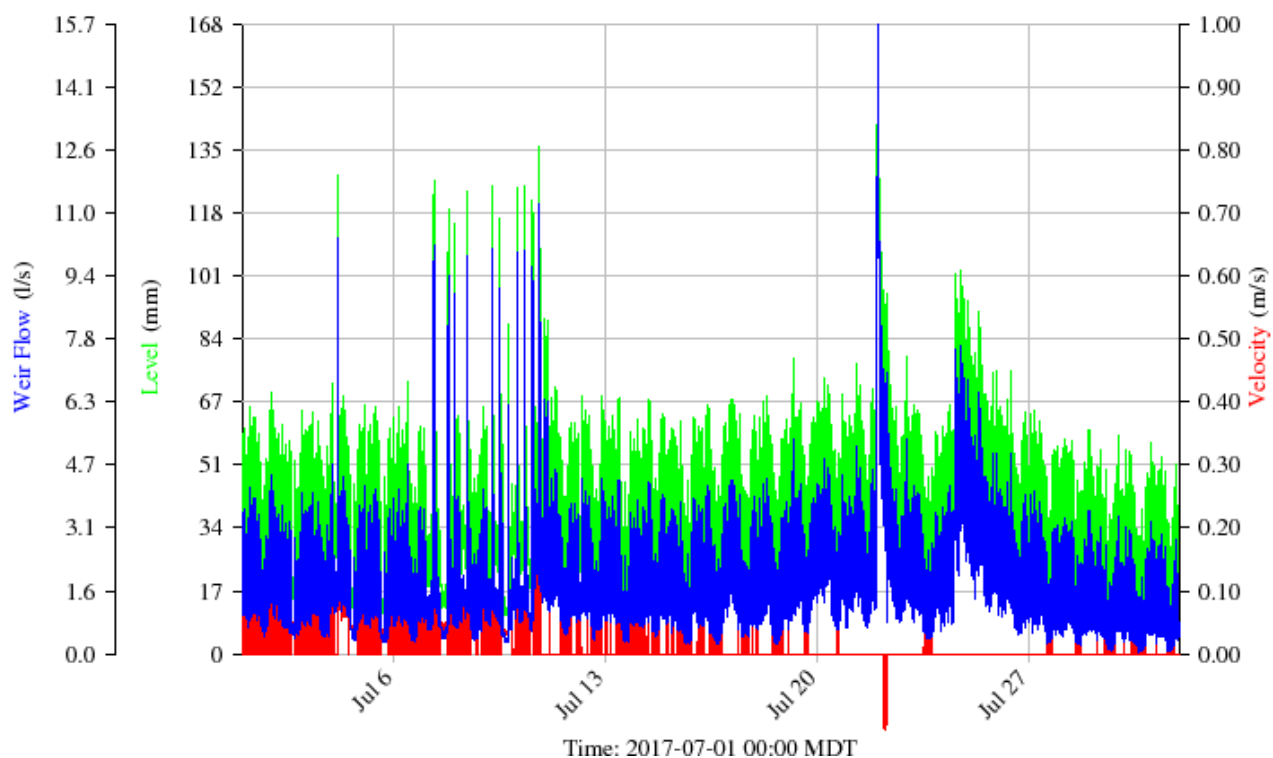
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	2.77	5.07	7.76	437.76	0.00
2	3.11	4.99	6.88	431.00	0.00
3	2.89	4.91	6.88	424.57	0.50
4	3.06	4.64	6.69	401.04	0.00
5	2.41	4.40	6.55	379.75	0.00
6	2.20	4.64	27.12	400.96	0.00
7	2.24	3.88	5.46	334.84	0.00
8	2.16	4.14	6.46	357.67	1.00
9	2.14	4.23	6.50	365.41	0.00
10	3.23	6.61	14.94	570.70	35.75
11	2.27	3.83	5.03	330.69	0.00
12	0.84	2.52	5.67	217.34	0.00
13	0.87	2.45	4.17	211.79	8.50
14	1.06	2.51	3.98	216.87	0.00
15	1.58	2.79	4.13	241.36	0.00
16	1.37	2.74	4.14	236.81	1.00
17	0.83	2.53	4.80	218.33	3.25
18	0.87	2.58	4.53	223.07	7.25
19	0.89	2.69	12.27	232.76	0.00
20	0.86	2.52	4.10	217.67	0.00
21	-39.14	1.05	5.97	90.80	37.75
22	0.00	0.19	3.97	16.59	0.25
23	0.00	3.90	7.01	336.76	6.00
24	5.46	8.34	16.26	720.69	28.50
25	3.96	5.22	6.61	450.73	0.00
26	2.49	4.22	5.71	364.42	0.00
27	2.39	4.12	6.06	356.15	0.00
28	3.22	4.63	6.01	400.23	11.00
29	2.38	4.10	5.84	353.88	0.00
30	2.30	4.25	6.52	367.55	0.50
Mean	0.74	3.82	7.22	330.23	4.56
Minimum	-39.14	0.19	3.97	16.59	0.00
Maximum	5.46	8.34	27.12	720.69	37.75
Total	n/a	n/a	n/a	10,237.10	141.25

A15-124-08

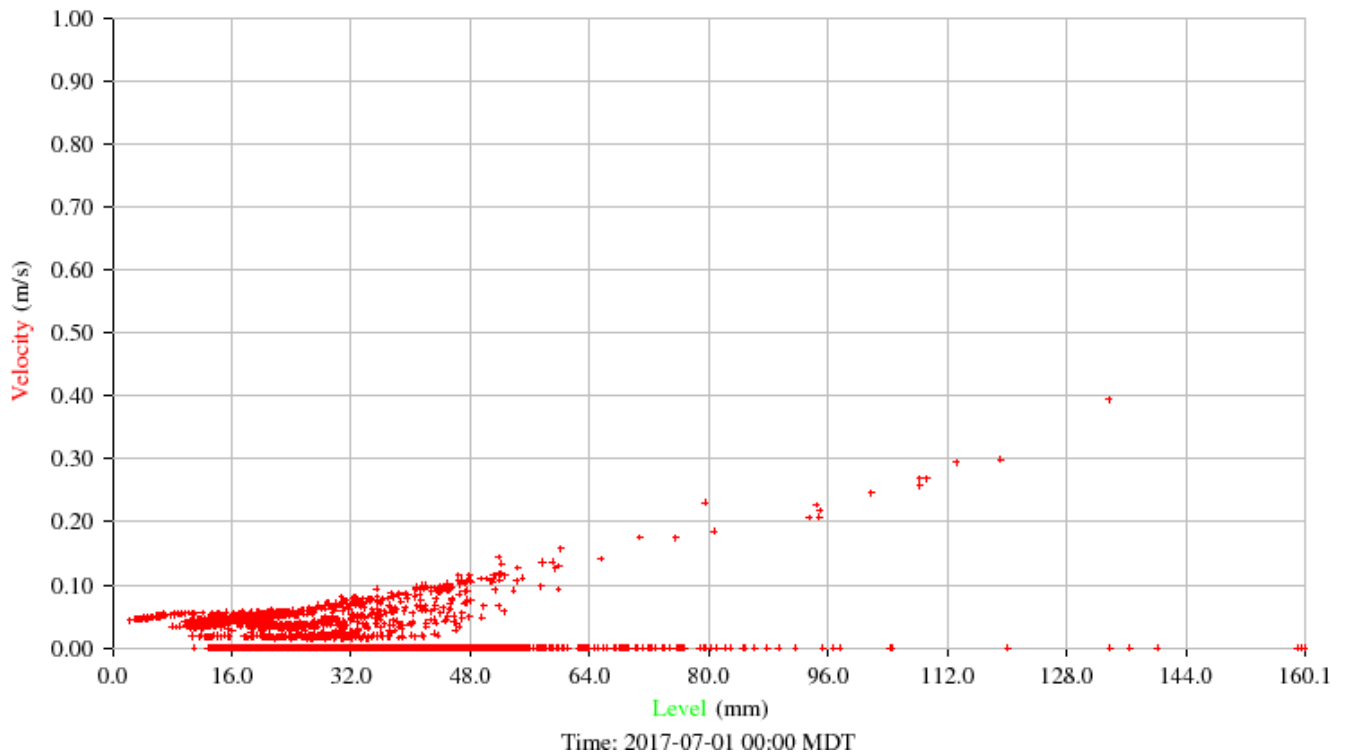
A15-124-08 – Flow with rain intensity



A15-124-08 – Level with velocity and flow



A15-124-08 – Level vs. velocity scatter plot

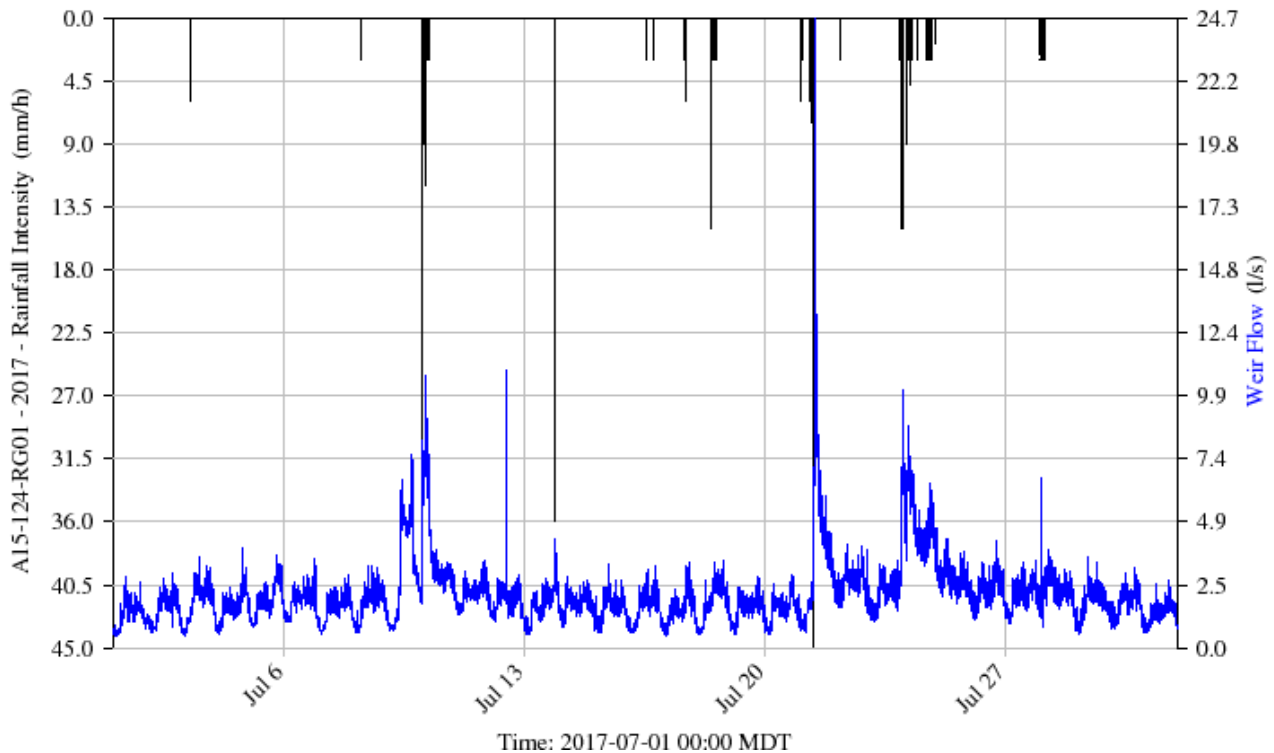


A15-124-08 – Summary report

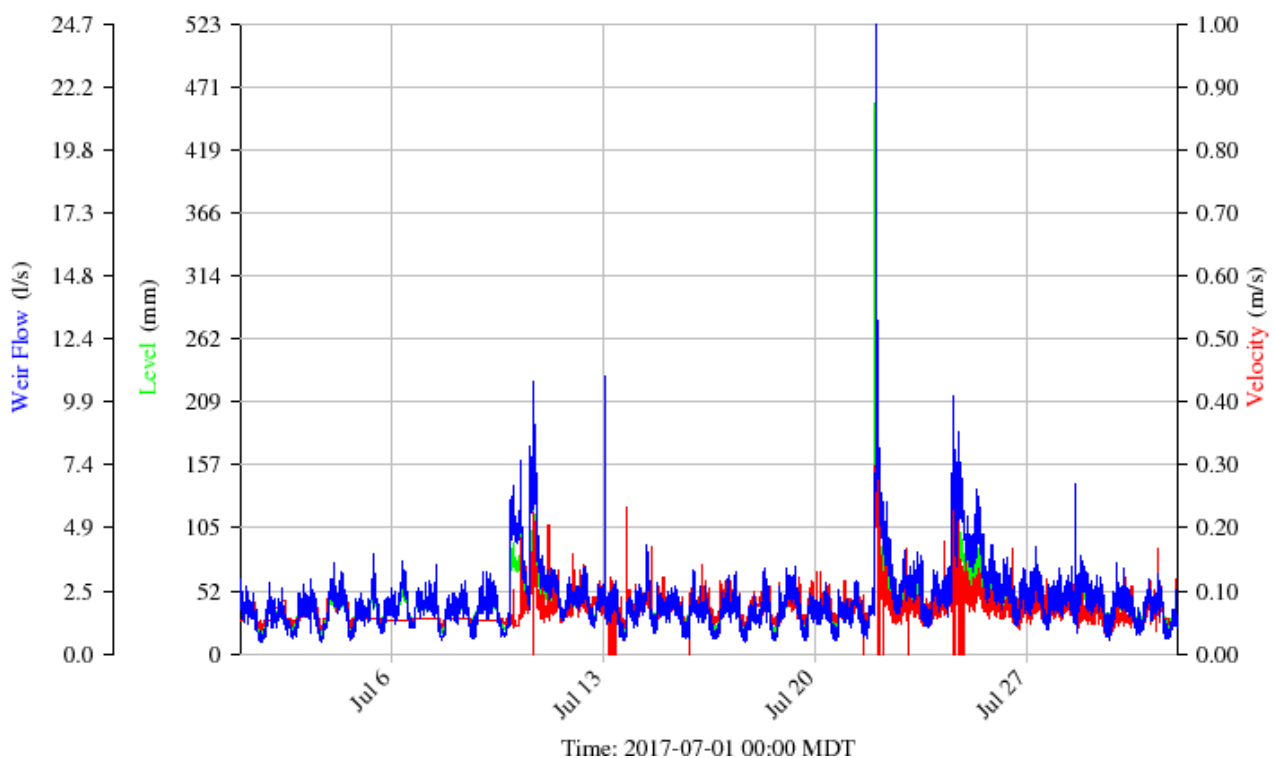
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.11	1.36	4.46	117.74	0.00
2	0.37	1.38	4.03	119.06	0.00
3	0.41	1.61	10.35	138.73	0.50
4	0.35	1.39	4.17	120.28	0.00
5	0.29	1.36	4.74	117.18	0.00
6	0.28	1.25	10.21	108.34	0.00
7	0.38	1.39	9.93	119.94	0.00
8	0.34	1.36	10.08	117.60	1.00
9	0.28	1.27	10.06	109.78	0.00
10	0.58	2.39	11.22	206.56	35.75
11	0.46	1.49	4.37	128.90	0.00
12	0.34	1.38	4.38	119.10	0.00
13	0.28	1.29	4.29	111.35	8.50
14	0.44	1.34	3.97	116.19	0.00
15	0.23	1.32	4.17	114.09	0.00
16	0.25	1.42	4.31	122.49	1.00
17	0.41	1.44	4.39	124.13	3.25
18	0.23	1.47	5.33	126.62	7.25
19	0.52	1.94	4.84	167.75	0.00
20	0.59	1.77	5.16	152.57	0.00
21	0.66	3.70	15.69	319.81	37.75
22	0.65	1.80	5.36	155.87	0.25
23	0.37	1.40	4.18	120.67	6.00
24	1.35	3.74	7.66	323.52	28.50
25	0.69	2.10	5.00	181.34	0.00
26	0.48	1.45	4.03	125.24	0.00
27	0.27	1.16	3.37	100.16	0.00
28	0.21	1.02	3.58	87.74	11.00
29	0.08	0.86	3.44	74.17	0.00
30	0.04	0.87	3.29	75.01	0.50
Mean	0.39	1.56	5.91	134.94	4.56
Minimum	0.04	0.71	3.29	61.09	0.00
Maximum	1.35	3.74	15.69	323.52	37.75
Total	n/a	n/a	n/a	4,183.01	141.25

A15-124-09

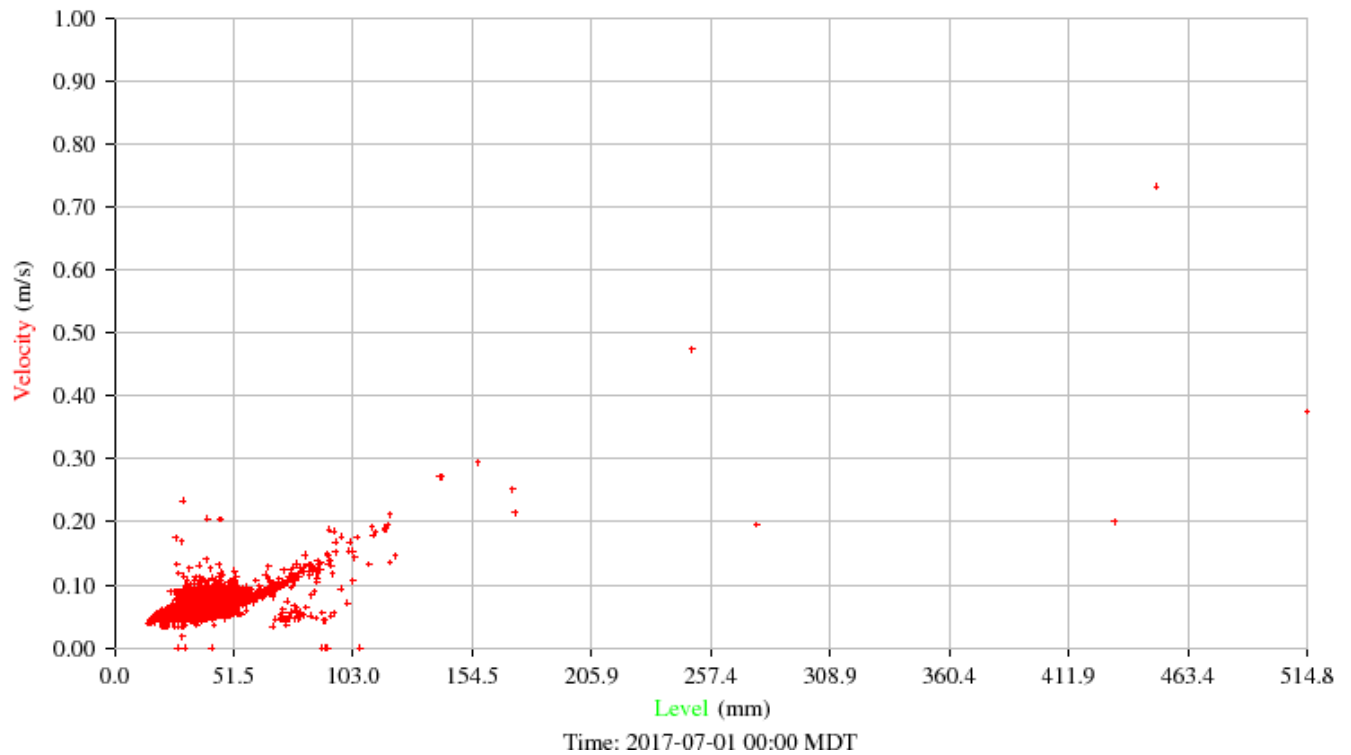
A15-124-09 – Flow with rain intensity



A15-124-09 – Level with velocity and flow



A15-124-09 – Level vs. velocity scatter plot

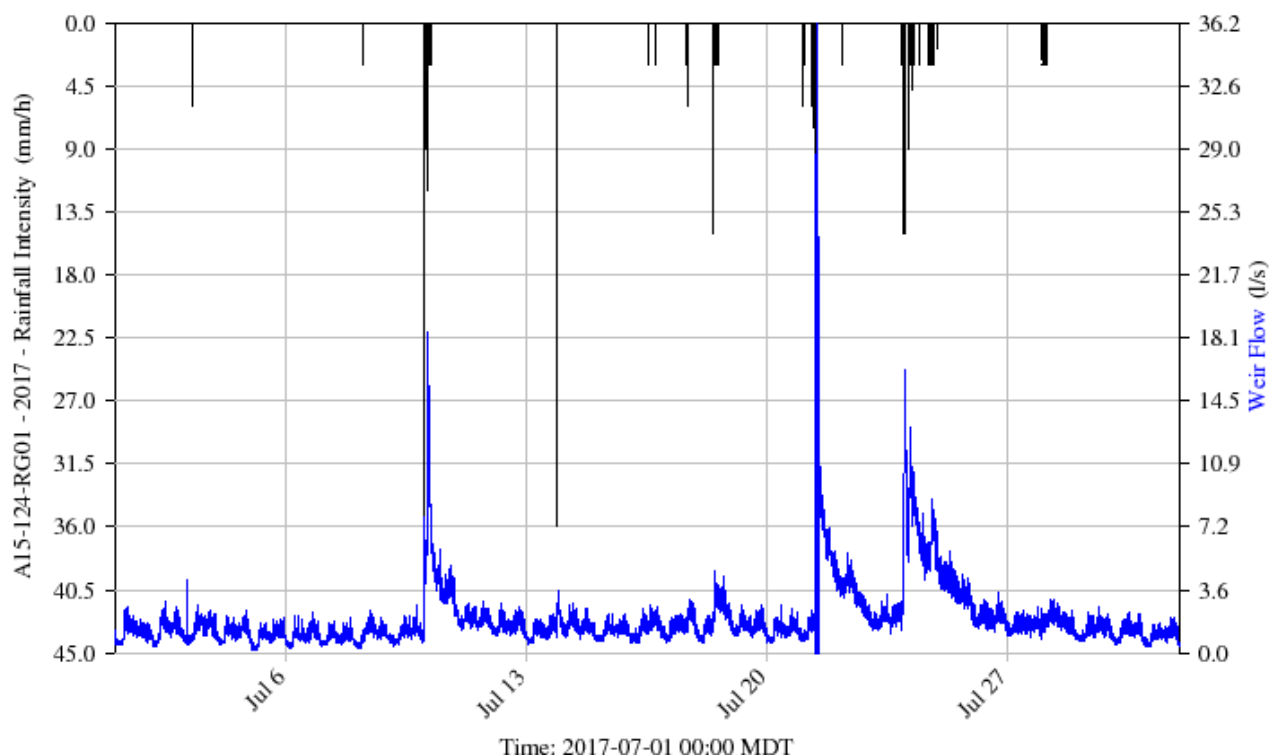


A15-124-09 – Summary report

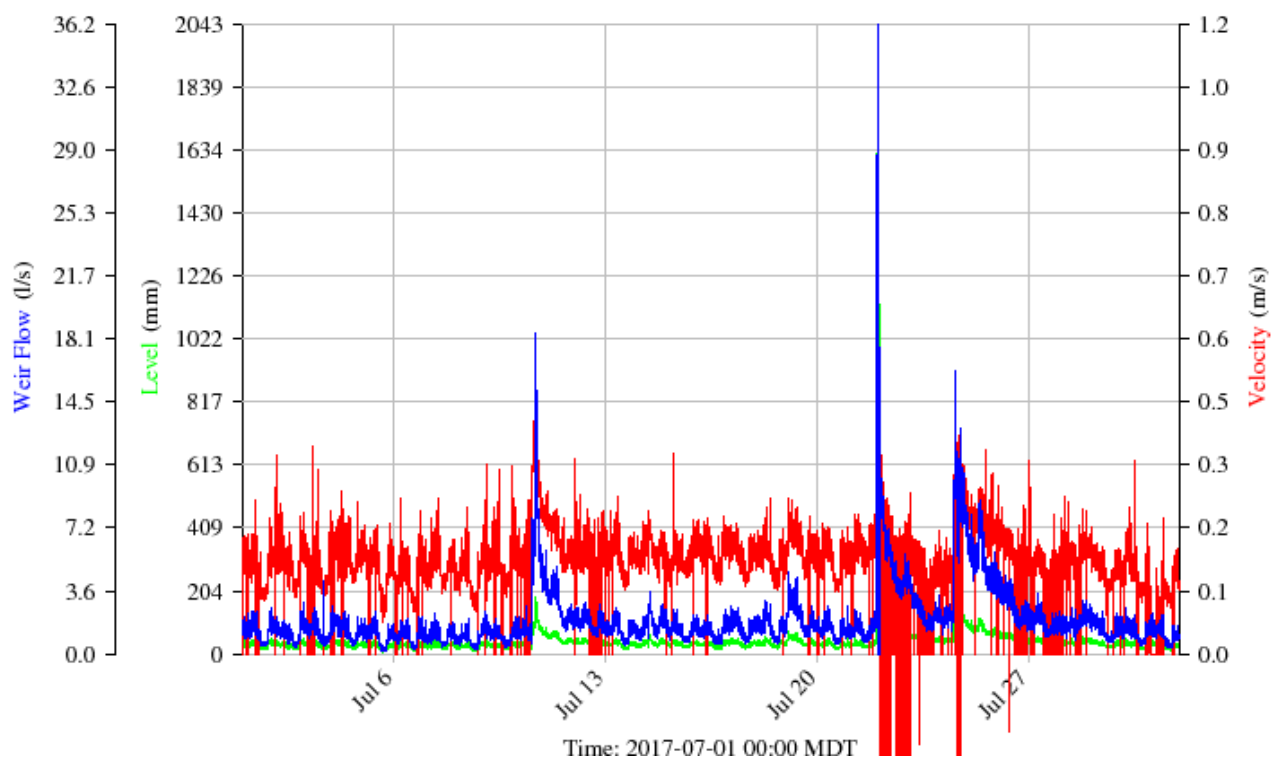
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.44	1.30	2.76	112.05	0.00
2	0.61	1.53	2.93	132.26	0.00
3	0.46	1.79	3.58	154.66	0.50
4	0.57	1.59	3.90	137.16	0.00
5	0.82	1.85	3.61	160.12	0.00
6	0.99	1.83	3.47	158.11	0.00
7	0.57	1.59	2.89	137.50	0.00
8	0.63	1.70	3.24	146.54	1.00
9	0.68	3.02	7.58	260.77	0.00
10	1.76	3.79	10.69	327.86	35.75
11	1.29	2.12	3.45	183.05	0.00
12	1.04	1.90	10.91	164.20	0.00
13	0.52	1.68	4.27	144.77	8.50
14	0.78	1.71	2.80	147.54	0.00
15	0.61	1.54	3.27	133.31	0.00
16	0.58	1.56	3.18	134.35	1.00
17	0.49	1.47	3.33	126.62	3.25
18	0.52	1.77	3.44	153.35	7.25
19	0.56	1.55	2.79	133.58	0.00
20	0.55	1.52	2.87	131.67	0.00
21	0.61	4.17	24.71	360.57	37.75
22	1.35	2.55	4.03	220.25	0.25
23	1.02	2.12	3.87	183.07	6.00
24	3.18	5.12	10.14	442.11	28.50
25	1.75	2.78	4.70	240.15	0.00
26	1.09	2.18	4.19	188.52	0.00
27	0.95	1.97	3.44	170.06	0.00
28	0.83	2.34	6.66	202.18	11.00
29	0.56	1.75	3.53	151.34	0.00
30	0.73	1.74	3.14	150.14	0.50
Mean	0.87	2.09	5.03	180.72	4.56
Minimum	0.44	1.30	2.67	112.05	0.00
Maximum	3.18	5.12	24.71	442.11	37.75
Total	n/a	n/a	n/a	5,602.32	141.25

A15-124-10

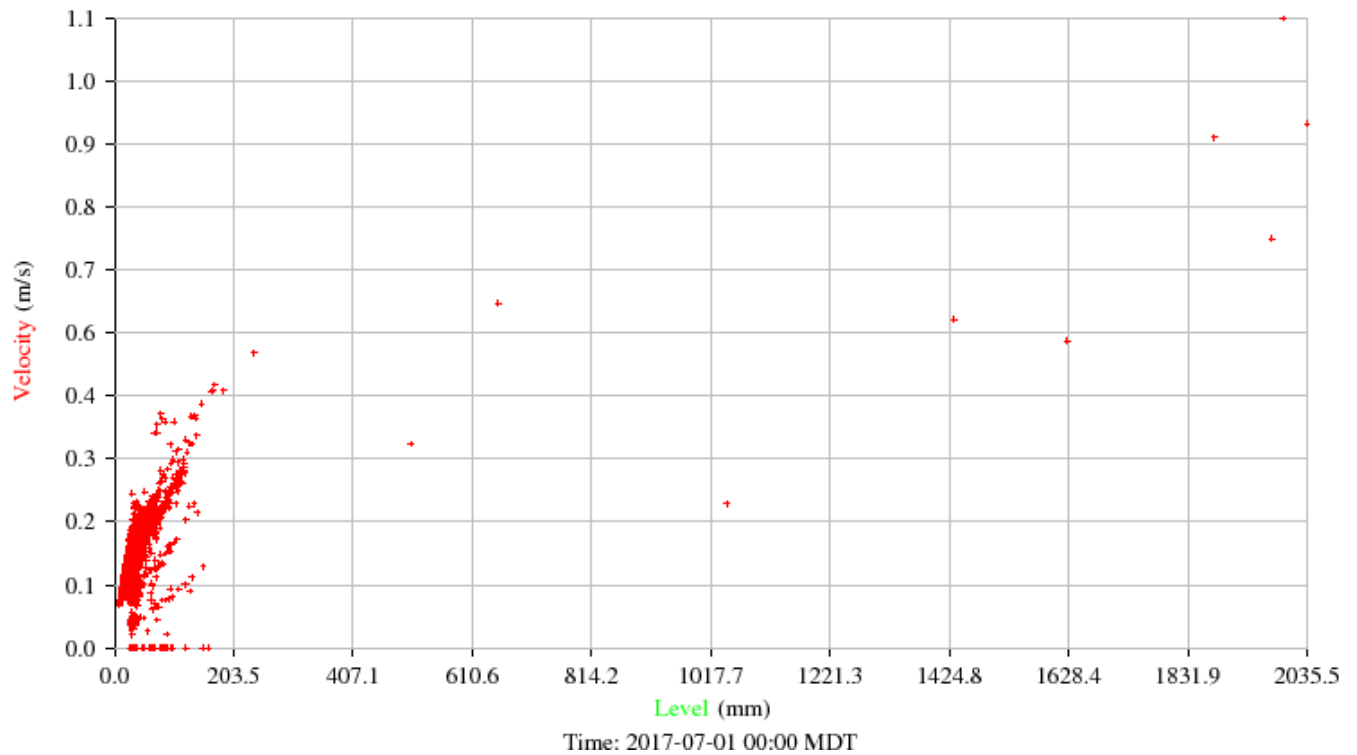
A15-124-10 – Flow with rain intensity



A15-124-10 – Level with velocity and flow



A15-124-10 – Level vs. velocity scatter plot

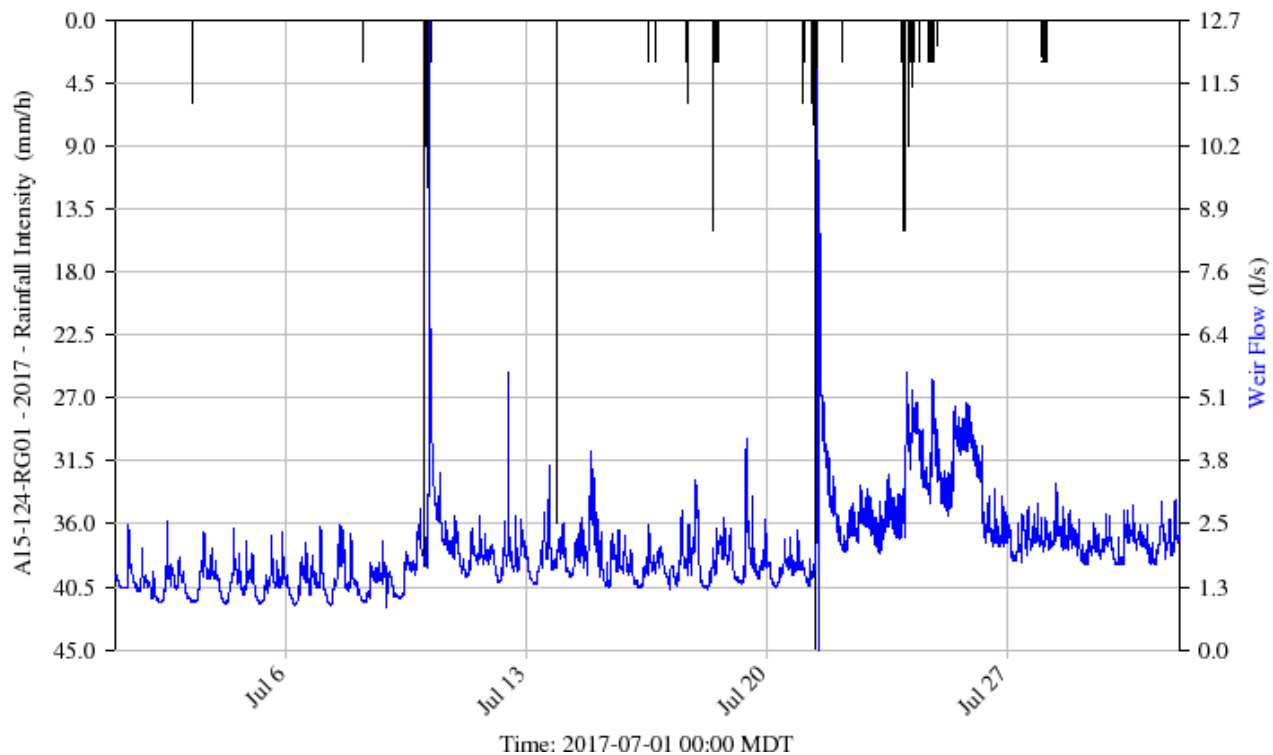


A15-124-10 – Summary report

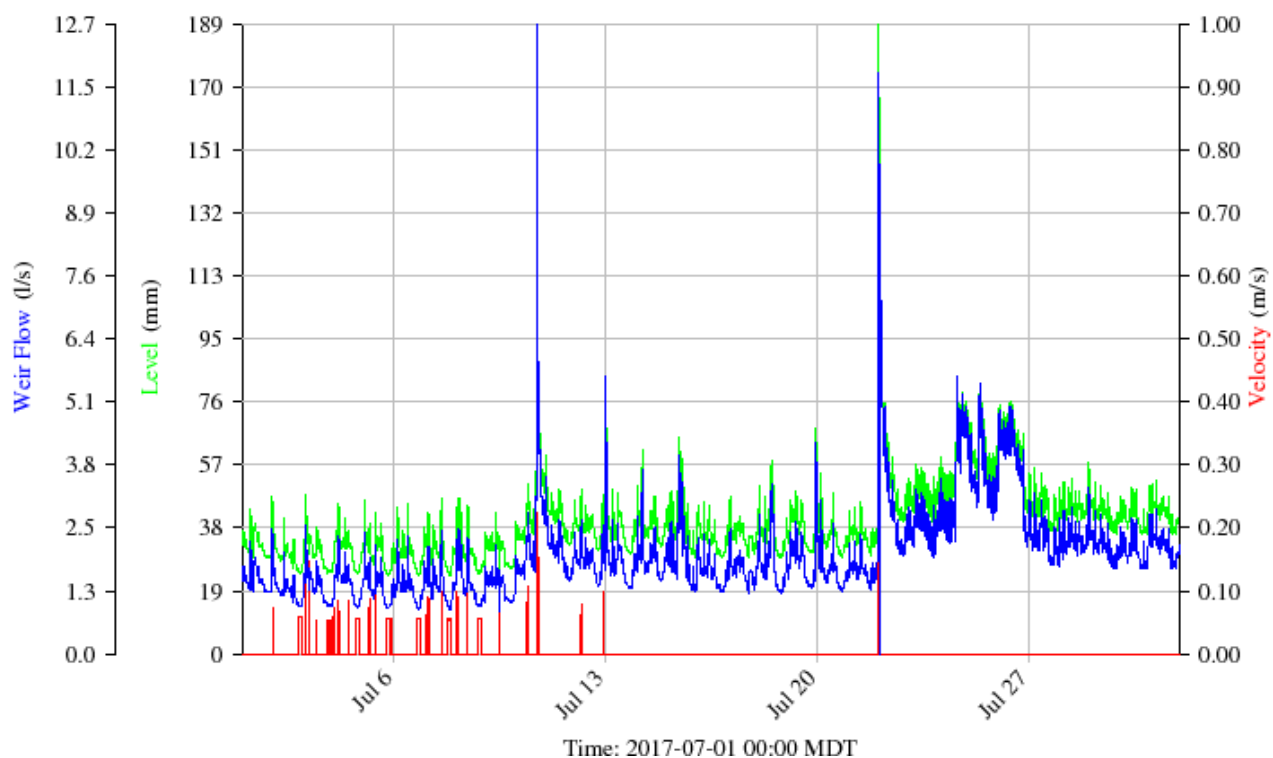
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.40	1.18	2.67	101.54	0.00
2	0.38	1.30	2.93	112.72	0.00
3	0.51	1.33	4.16	115.11	0.50
4	0.50	1.16	2.41	99.93	0.00
5	0.14	0.95	1.99	82.34	0.00
6	0.28	1.01	2.29	87.04	0.00
7	0.38	0.91	2.06	78.38	0.00
8	0.25	1.10	2.48	94.67	1.00
9	0.39	1.11	2.69	95.81	0.00
10	0.55	4.84	18.40	417.96	35.75
11	1.31	1.99	2.94	171.91	0.00
12	0.99	1.59	2.82	137.75	0.00
13	0.52	1.36	3.58	117.14	8.50
14	0.82	1.57	2.88	135.63	0.00
15	0.63	1.26	2.27	109.01	0.00
16	0.56	1.38	2.71	119.66	1.00
17	0.59	1.51	3.02	130.55	3.25
18	0.61	2.03	4.69	175.65	7.25
19	0.90	1.55	2.71	133.82	0.00
20	0.55	1.27	2.75	109.39	0.00
21	0.00	5.97	36.19	516.04	37.75
22	1.96	3.57	5.71	308.79	0.25
23	1.14	2.04	6.46	176.26	6.00
24	4.15	7.39	16.30	638.61	28.50
25	2.22	3.86	5.84	333.08	0.00
26	1.24	2.03	3.47	175.21	0.00
27	0.89	1.53	2.65	132.33	0.00
28	0.82	1.78	3.08	154.18	11.00
29	0.66	1.31	2.66	113.09	0.00
30	0.45	1.19	2.38	103.18	0.50
Mean	0.81	2.00	5.14	172.97	4.56
Minimum	0.00	0.91	1.99	78.38	0.00
Maximum	4.15	7.39	36.19	638.61	37.75
Total	n/a	n/a	n/a	5,362.10	141.25

A15-124-11

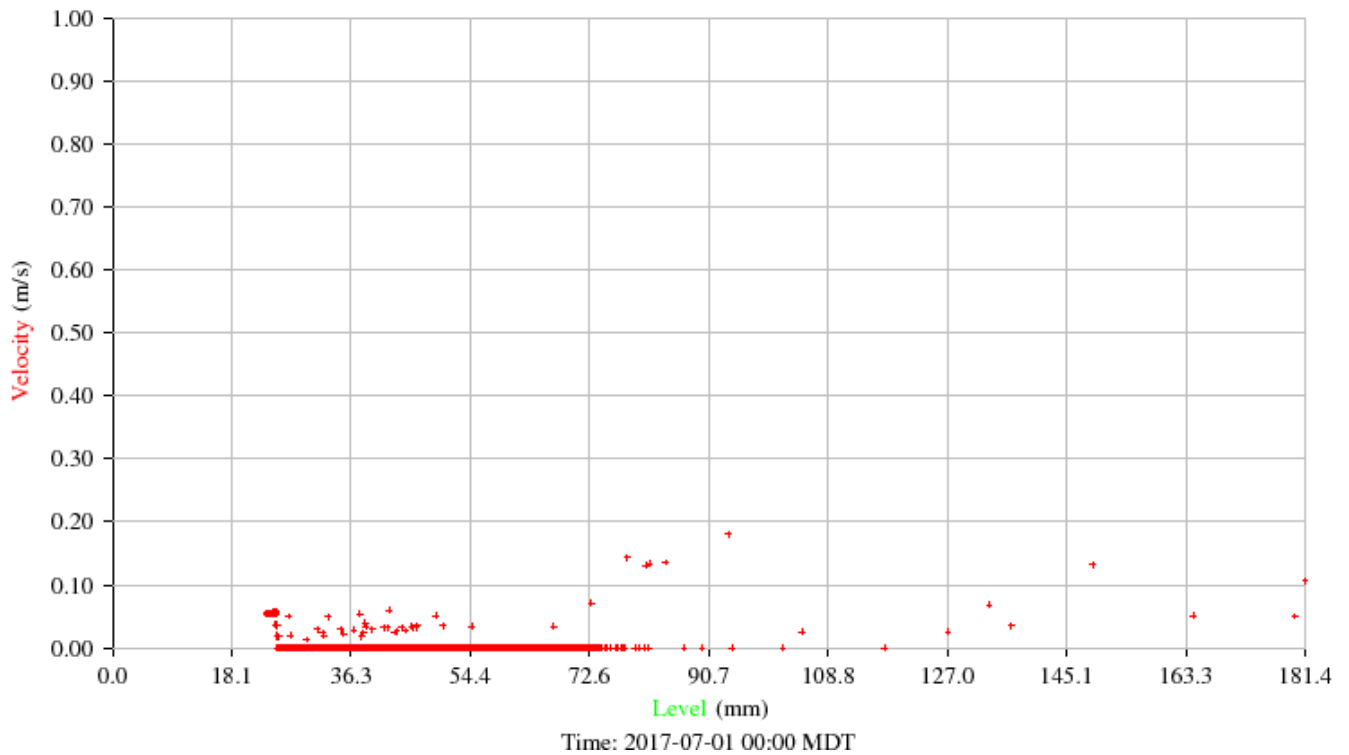
A15-124-11 – Flow with rain intensity



A15-124-11 – Level with velocity and flow



A15-124-11 – Level vs. velocity scatter plot

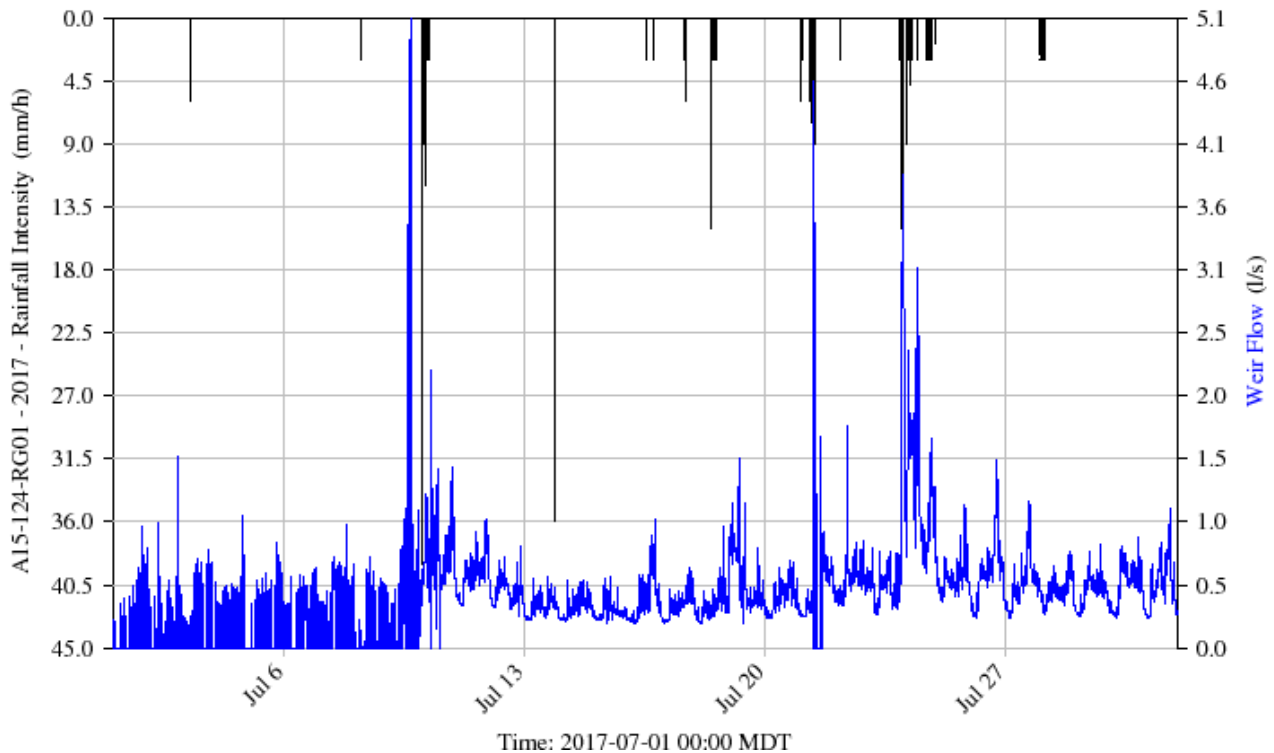


A15-124-11 – Summary report

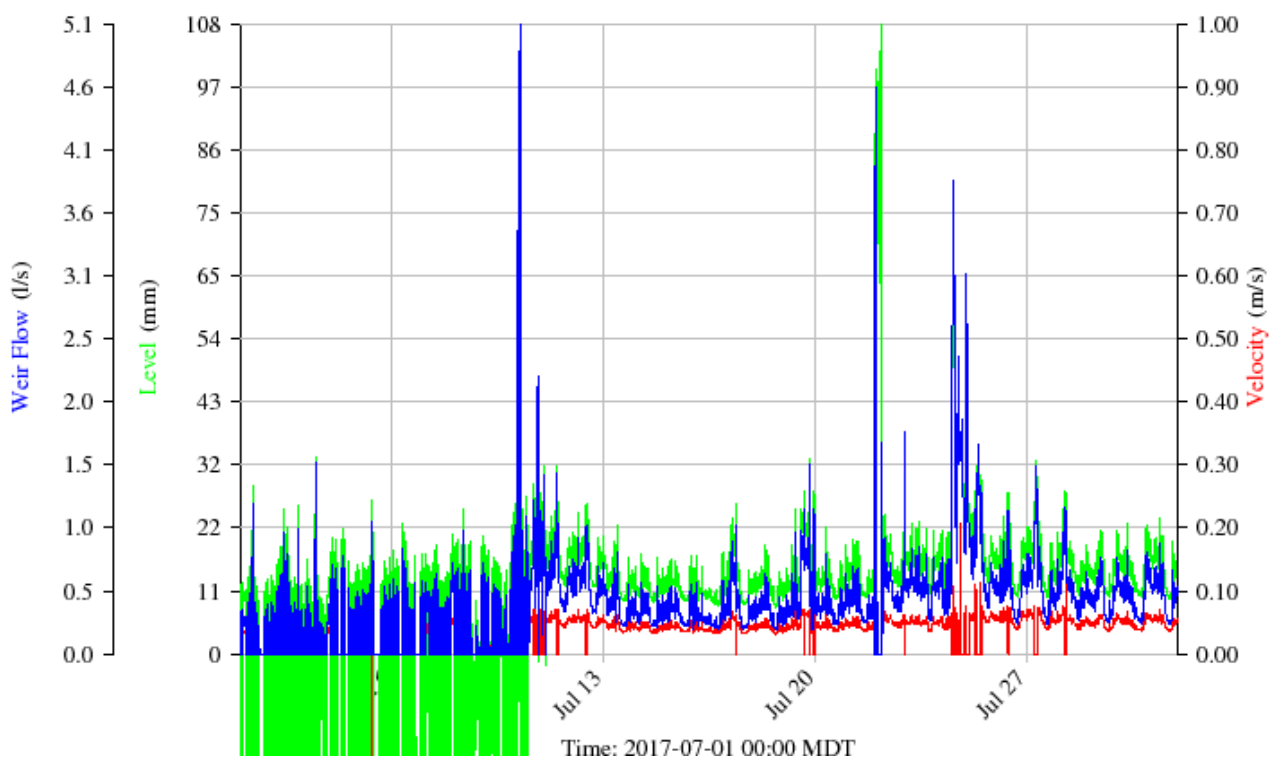
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.17	1.47	2.54	126.73	0.00
2	0.96	1.34	2.58	115.68	0.00
3	0.96	1.38	2.39	119.05	0.50
4	0.93	1.37	2.45	117.95	0.00
5	0.93	1.35	2.37	117.07	0.00
6	0.90	1.31	2.18	113.37	0.00
7	0.90	1.48	2.51	127.60	0.00
8	0.87	1.34	2.19	115.64	1.00
9	1.02	1.57	2.84	135.28	0.00
10	1.65	2.75	12.73	237.76	35.75
11	1.48	1.88	2.72	162.81	0.00
12	1.37	1.92	5.62	165.80	0.00
13	1.32	1.81	3.71	156.63	8.50
14	1.46	2.04	4.03	176.46	0.00
15	1.25	1.82	3.46	157.13	0.00
16	1.25	1.63	2.54	140.76	1.00
17	1.24	1.81	3.42	156.24	3.25
18	1.23	1.82	3.33	157.54	7.25
19	1.34	1.80	4.27	155.11	0.00
20	1.24	1.67	2.49	144.69	0.00
21	0.00	3.11	11.75	268.29	37.75
22	1.99	2.51	3.34	216.60	0.25
23	1.93	2.63	3.53	227.44	6.00
24	2.26	4.08	5.61	352.36	28.50
25	2.71	3.92	5.00	338.41	0.00
26	2.09	2.90	4.36	250.80	0.00
27	1.76	2.23	2.96	192.74	0.00
28	1.99	2.31	3.36	199.93	11.00
29	1.71	2.08	2.75	179.56	0.00
30	1.72	2.16	2.91	186.94	0.50
Mean	1.40	2.05	3.84	177.37	4.56
Minimum	0.00	1.31	2.18	113.37	0.00
Maximum	2.71	4.08	12.73	352.36	37.75
Total	n/a	n/a	n/a	5,498.47	141.25

A15-124-12A

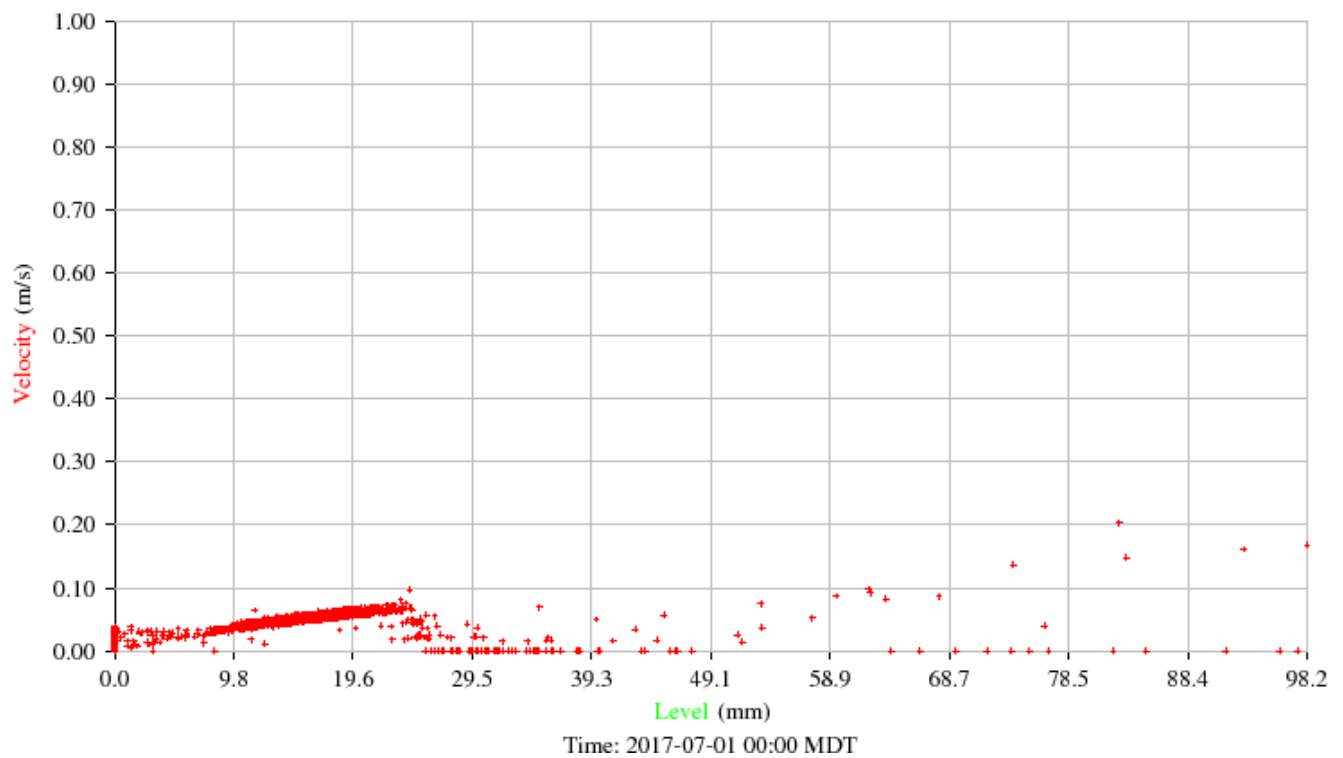
A15-124-12A – Flow with rain intensity



A15-124-12A – Level with velocity and flow



A15-124-12A – Level vs. velocity scatter plot

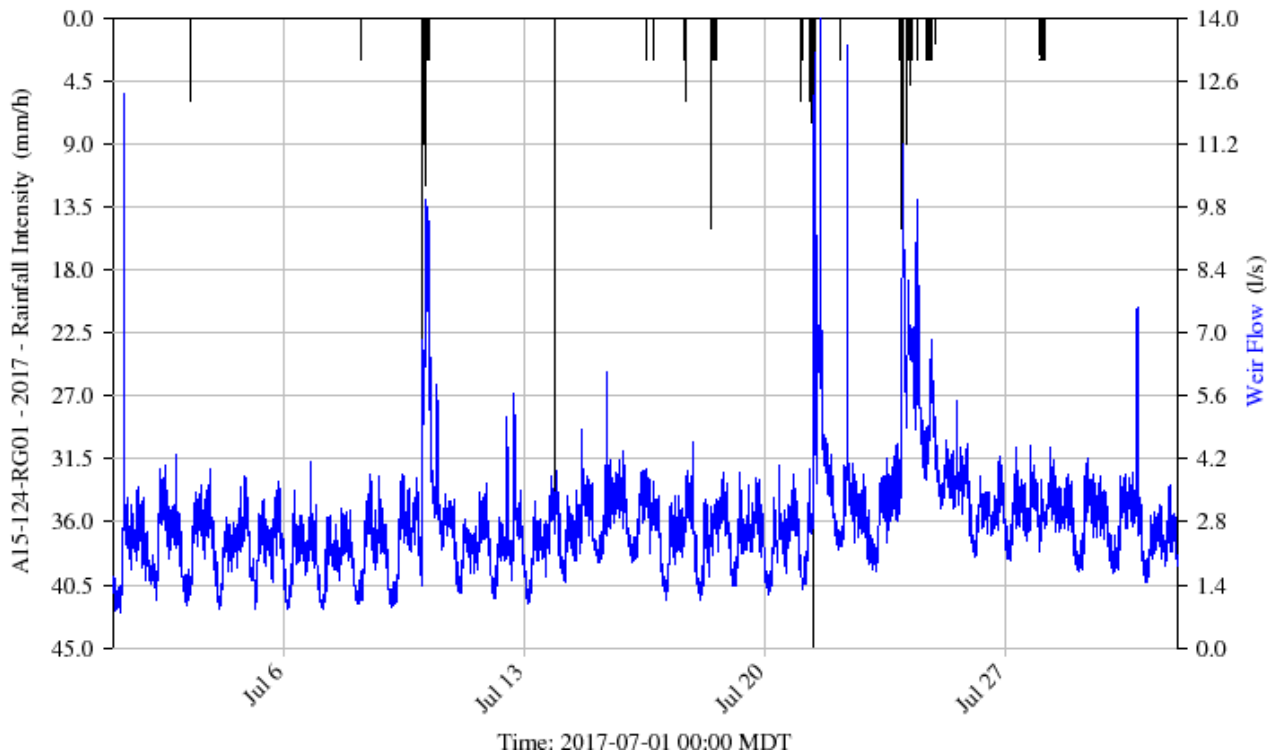


A15-124-12A – Summary report

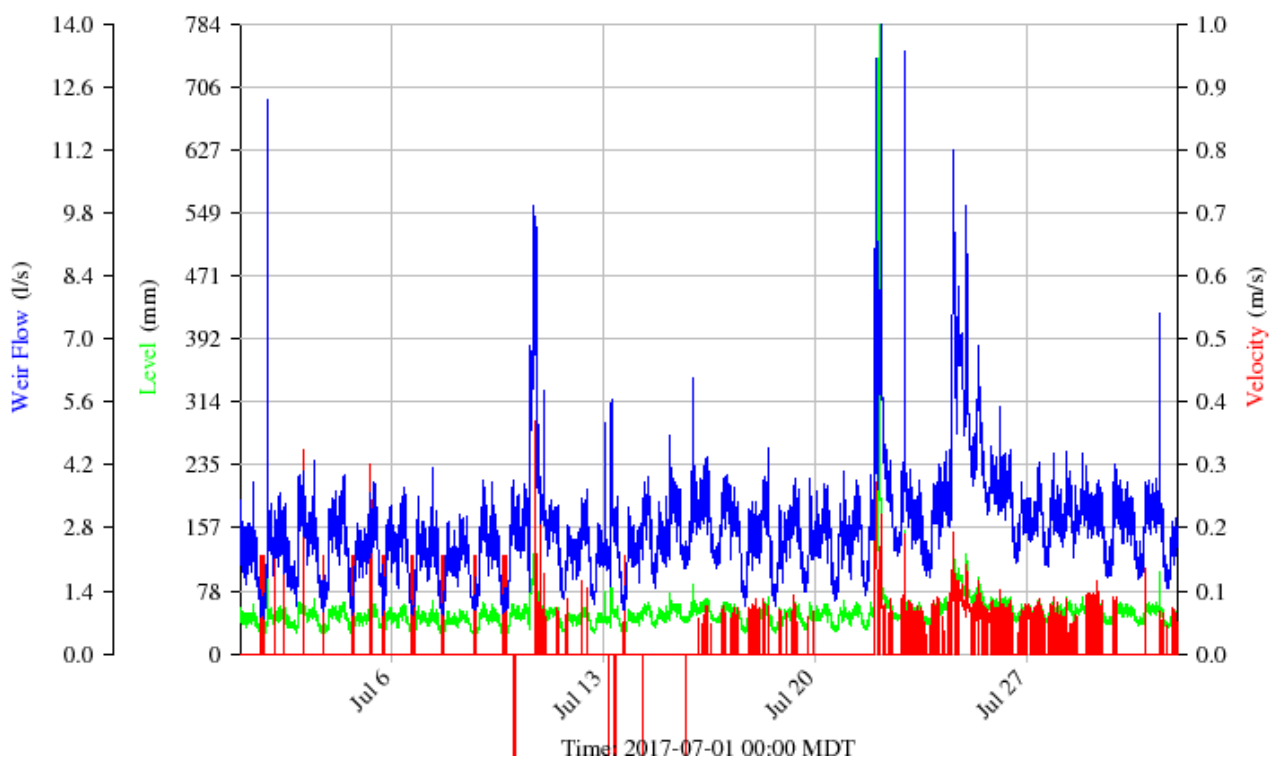
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.00	0.17	0.98	15.07	0.00
2	0.00	0.19	1.55	16.84	0.00
3	0.00	0.23	0.79	20.20	0.50
4	0.00	0.10	1.07	9.00	0.00
5	0.00	0.13	0.84	11.65	0.00
6	0.00	0.19	0.65	15.99	0.00
7	0.00	0.25	0.99	21.43	0.00
8	0.00	0.12	0.73	10.07	1.00
9	0.00	0.41	5.09	35.34	0.00
10	0.00	0.78	2.24	67.52	35.75
11	0.34	0.58	1.04	50.46	0.00
12	0.26	0.45	0.82	39.26	0.00
13	0.22	0.33	0.58	28.91	8.50
14	0.22	0.33	0.55	28.45	0.00
15	0.20	0.30	0.57	25.77	0.00
16	0.20	0.39	1.04	33.71	1.00
17	0.20	0.35	0.65	29.85	3.25
18	0.19	0.34	0.98	29.29	7.25
19	0.20	0.56	1.54	48.40	0.00
20	0.24	0.40	0.70	34.72	0.00
21	0.00	0.51	4.57	44.25	37.75
22	0.34	0.55	1.79	47.60	0.25
23	0.27	0.51	0.80	43.68	6.00
24	0.61	1.44	3.83	124.27	28.50
25	0.37	0.57	1.16	49.34	0.00
26	0.25	0.62	1.51	53.66	0.00
27	0.24	0.53	1.18	45.57	0.00
28	0.26	0.47	0.77	41.03	11.00
29	0.25	0.45	0.84	38.93	0.00
30	0.25	0.51	0.90	43.81	0.50
Mean	0.17	0.43	1.35	37.03	4.56
Minimum	0.00	0.10	0.55	9.00	0.00
Maximum	0.61	1.44	5.09	124.27	37.75
Total	n/a	n/a	n/a	1,147.99	141.25

A15-124-12B

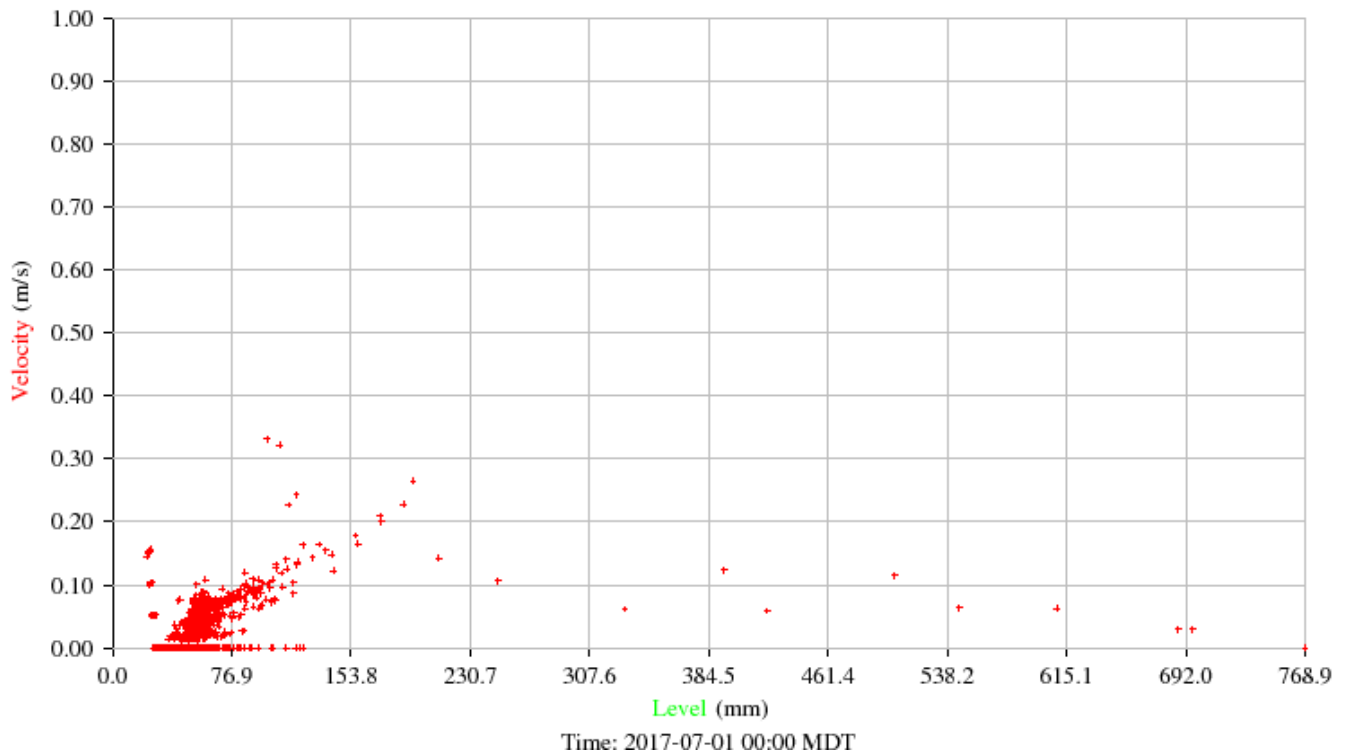
A15-124-12B – Flow with rain intensity



A15-124-12B – Level with velocity and flow



A15-124-12B – Level vs. velocity scatter plot



A15-124-12B – Summary report

	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.78	2.22	12.32	191.52	0.00
2	1.05	2.46	4.28	212.33	0.00
3	0.92	2.34	3.99	202.46	0.50
4	0.87	2.24	3.83	193.39	0.00
5	0.86	2.27	3.70	195.74	0.00
6	0.88	2.10	4.12	181.25	0.00
7	0.88	1.99	3.09	172.29	0.00
8	0.99	2.17	3.87	187.88	1.00
9	0.90	2.27	3.84	196.43	0.00
10	1.38	3.99	9.98	345.04	35.75
11	1.21	2.26	3.65	195.27	0.00
12	1.12	2.32	5.64	200.31	0.00
13	0.98	2.34	3.94	202.16	8.50
14	1.47	2.70	4.85	233.01	0.00
15	1.89	3.00	6.11	259.20	0.00
16	1.89	2.83	3.96	244.74	1.00
17	1.08	2.46	4.57	212.18	3.25
18	1.07	2.45	3.90	211.74	7.25
19	1.37	2.49	3.91	215.24	0.00
20	1.17	2.43	4.07	209.78	0.00
21	1.30	4.08	13.99	352.26	37.75
22	2.18	3.14	13.40	271.56	0.25
23	1.71	2.91	5.03	251.55	6.00
24	3.72	5.97	11.20	516.23	28.50
25	2.89	3.78	5.48	326.69	0.00
26	2.03	2.97	4.24	256.18	0.00
27	1.95	2.97	4.51	256.60	0.00
28	2.14	3.12	4.46	269.42	11.00
29	1.72	2.80	4.21	241.91	0.00
30	1.68	2.82	7.55	243.68	0.50
Mean	1.47	2.78	5.65	240.41	4.56
Minimum	0.78	1.99	3.09	172.29	0.00
Maximum	3.72	5.97	13.99	516.23	37.75
Total	n/a	n/a	n/a	7,452.79	141.25



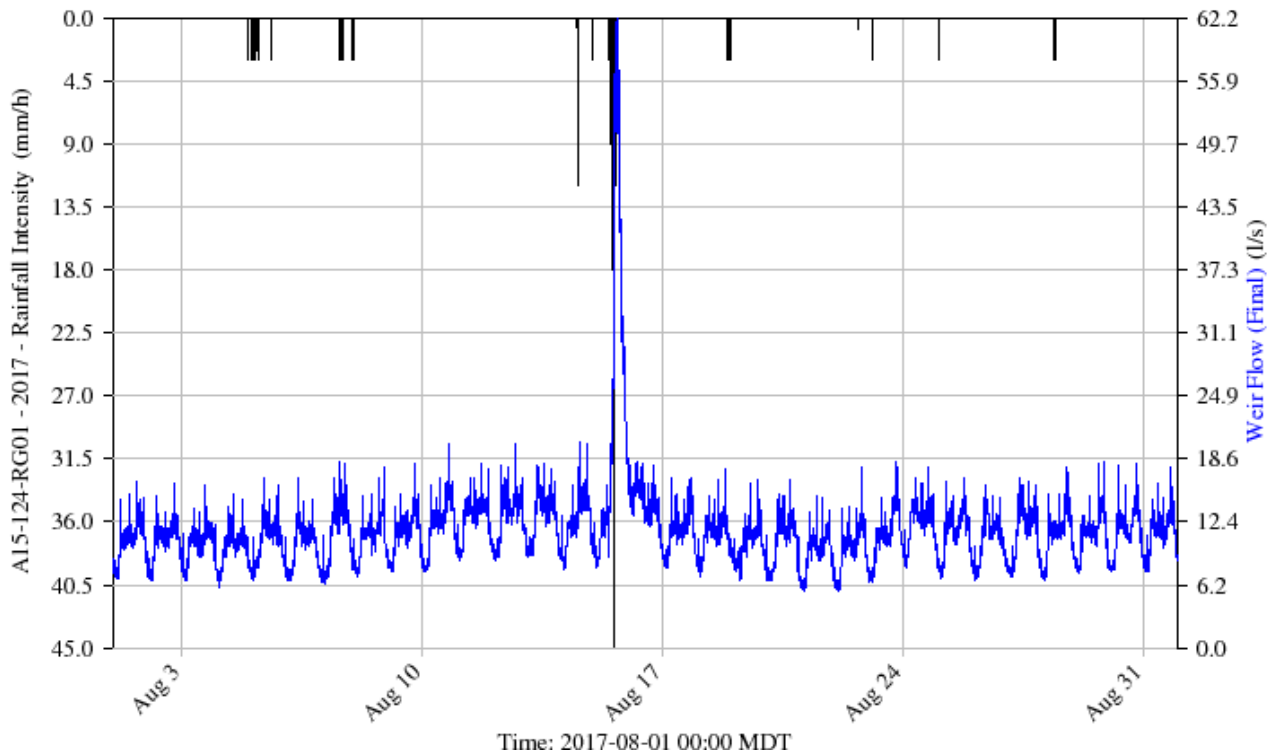
Monthly Report

A15-124 - Cold Lake TFM

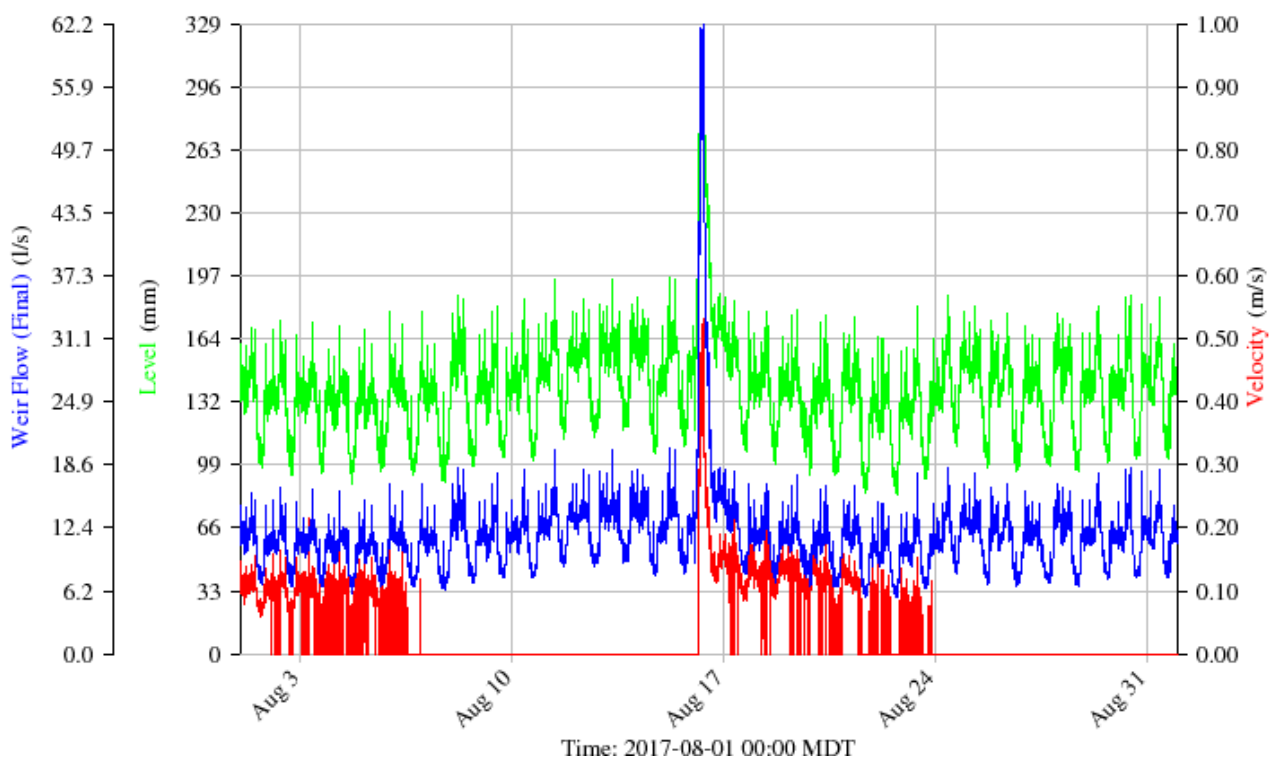
August 2017

A15-124-01

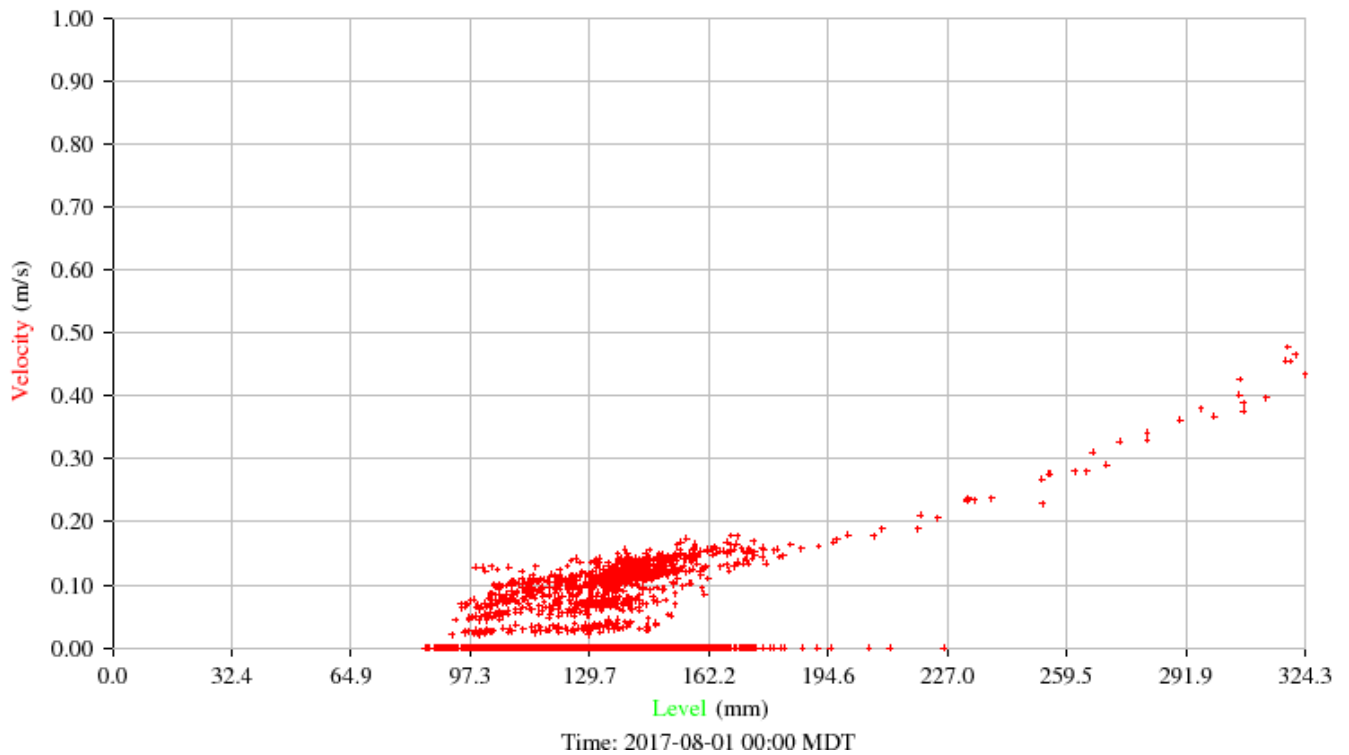
A15-124-01 – Flow with rain intensity



A15-124-01 – Level with velocity and flow



A15-124-01 – Level vs. velocity scatter plot

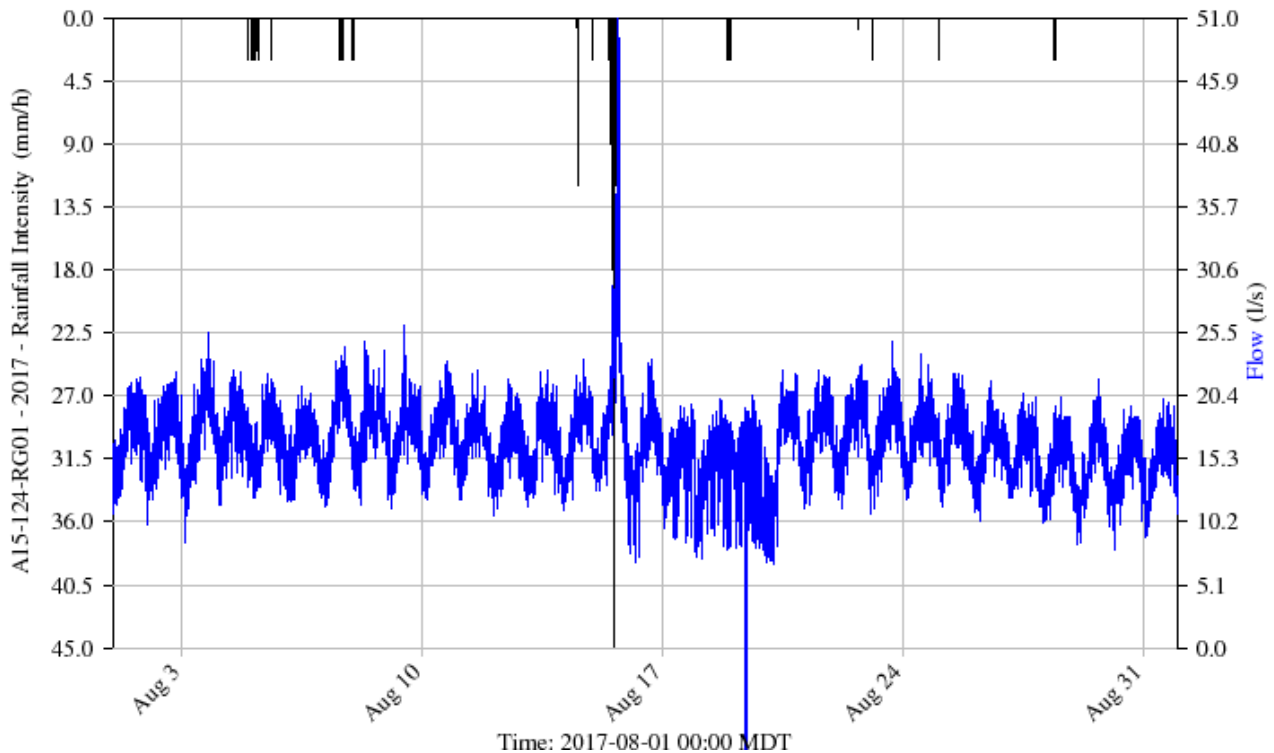


A15-124-01 – Summary report

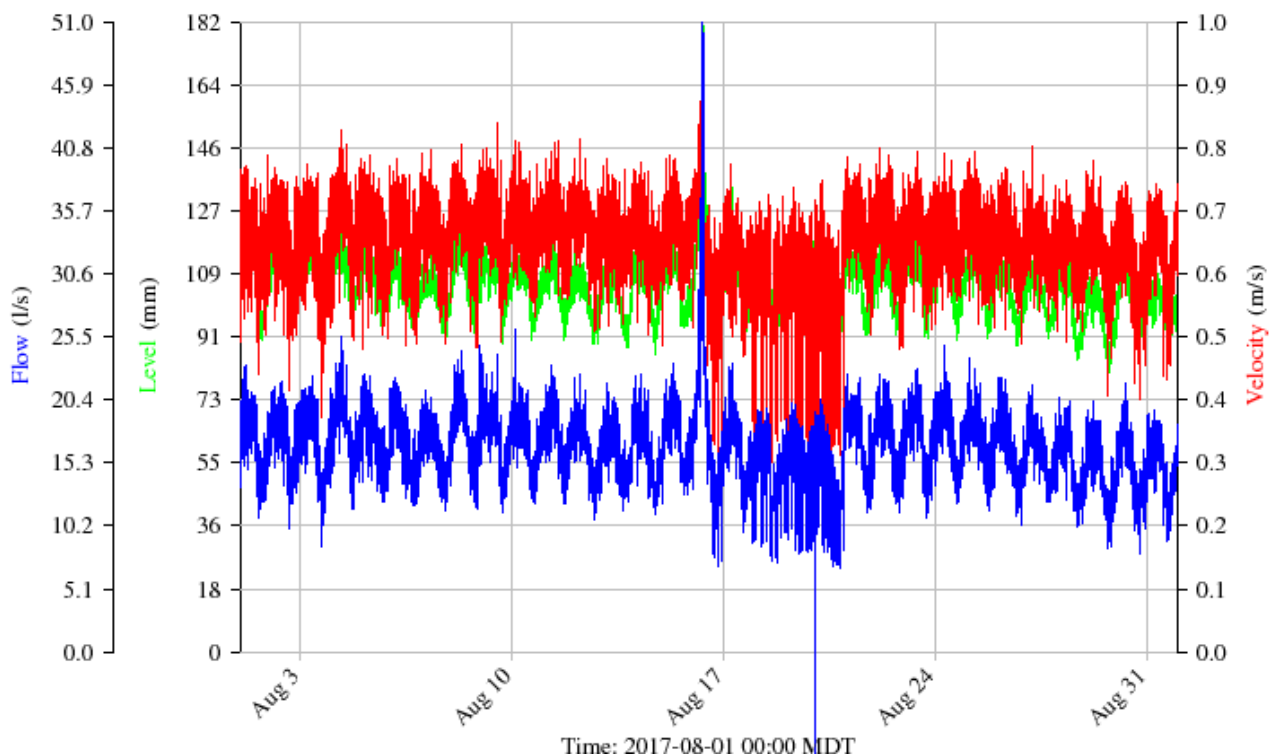
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	6.89	10.56	16.34	912.42	0.00
2	6.60	10.39	16.24	897.88	0.00
3	6.67	10.14	16.05	876.51	0.00
4	6.02	9.82	15.22	848.28	0.50
5	6.74	10.32	16.80	891.42	4.00
6	6.60	10.06	16.80	868.75	0.00
7	6.39	10.90	18.35	941.84	5.25
8	6.96	10.74	17.86	927.84	1.75
9	7.62	11.27	18.15	973.70	0.00
10	7.47	12.00	20.17	1,036.51	0.00
11	8.59	12.61	18.15	1,089.52	0.00
12	8.67	12.63	20.17	1,090.87	0.00
13	8.98	12.91	18.25	1,115.71	0.00
14	7.77	12.33	20.27	1,065.48	6.00
15	7.99	23.19	62.16	2,004.04	38.25
16	10.14	14.83	22.05	1,280.91	0.00
17	7.84	11.41	16.80	985.50	0.00
18	7.03	10.89	17.66	940.60	3.25
19	6.60	10.22	16.62	883.41	1.25
20	6.60	10.42	16.52	900.40	0.00
21	5.68	9.38	14.95	810.54	0.00
22	5.61	9.63	17.86	832.39	1.25
23	6.53	10.91	18.35	942.71	0.25
24	7.99	12.13	17.86	1,047.70	0.00
25	6.89	11.31	16.71	976.82	0.25
26	6.74	10.58	16.05	914.07	0.00
27	6.96	11.13	16.71	961.57	0.00
28	6.74	11.08	17.86	957.11	0.75
29	7.40	11.26	18.35	972.80	0.00
30	7.55	11.46	18.25	990.23	0.00
Mean	7.22	11.54	19.08	997.23	2.02
Minimum	5.61	9.38	14.95	810.54	0.00
Maximum	10.14	23.19	62.16	2,004.04	38.25
Total	n/a	n/a	n/a	30,914.15	62.75

A15-124-05

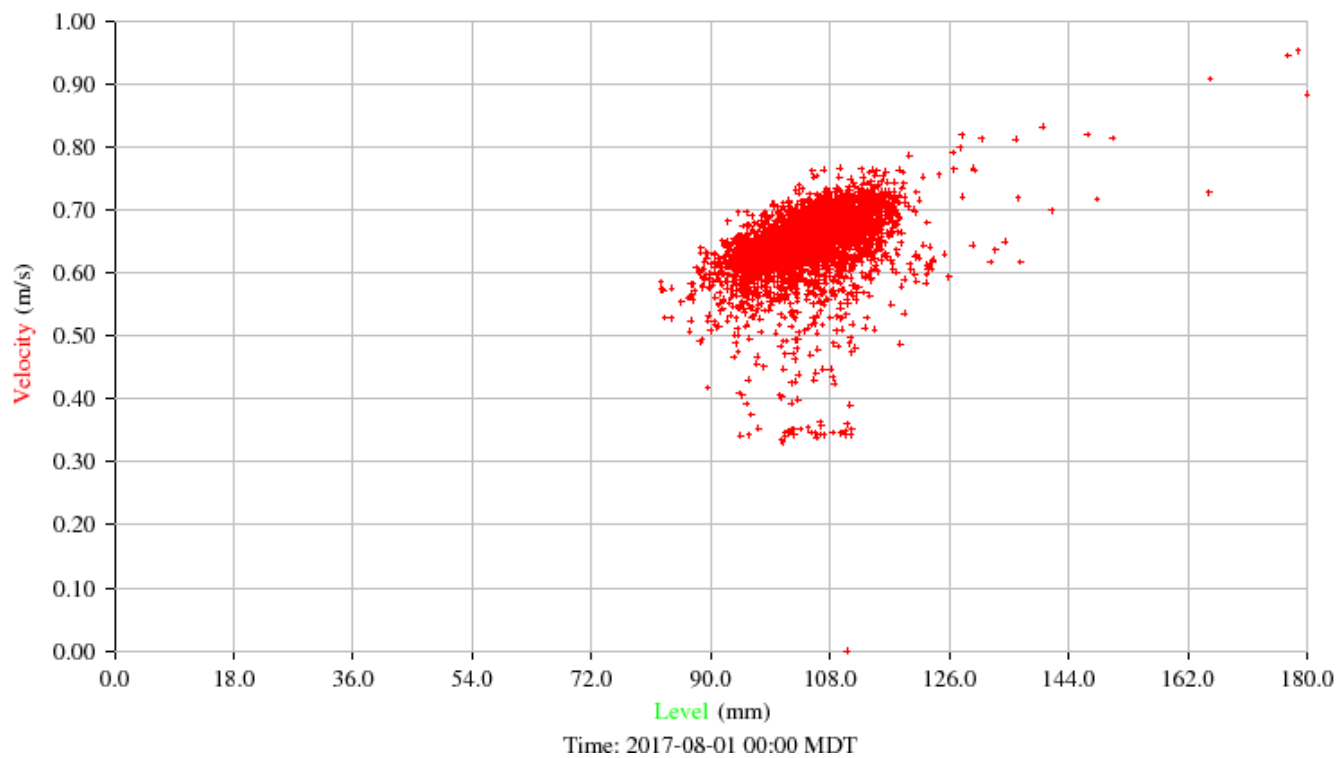
A15-124-05 – Flow with rain intensity



A15-124-05 – Level with velocity and flow



A15-124-05 – Level vs. velocity scatter plot

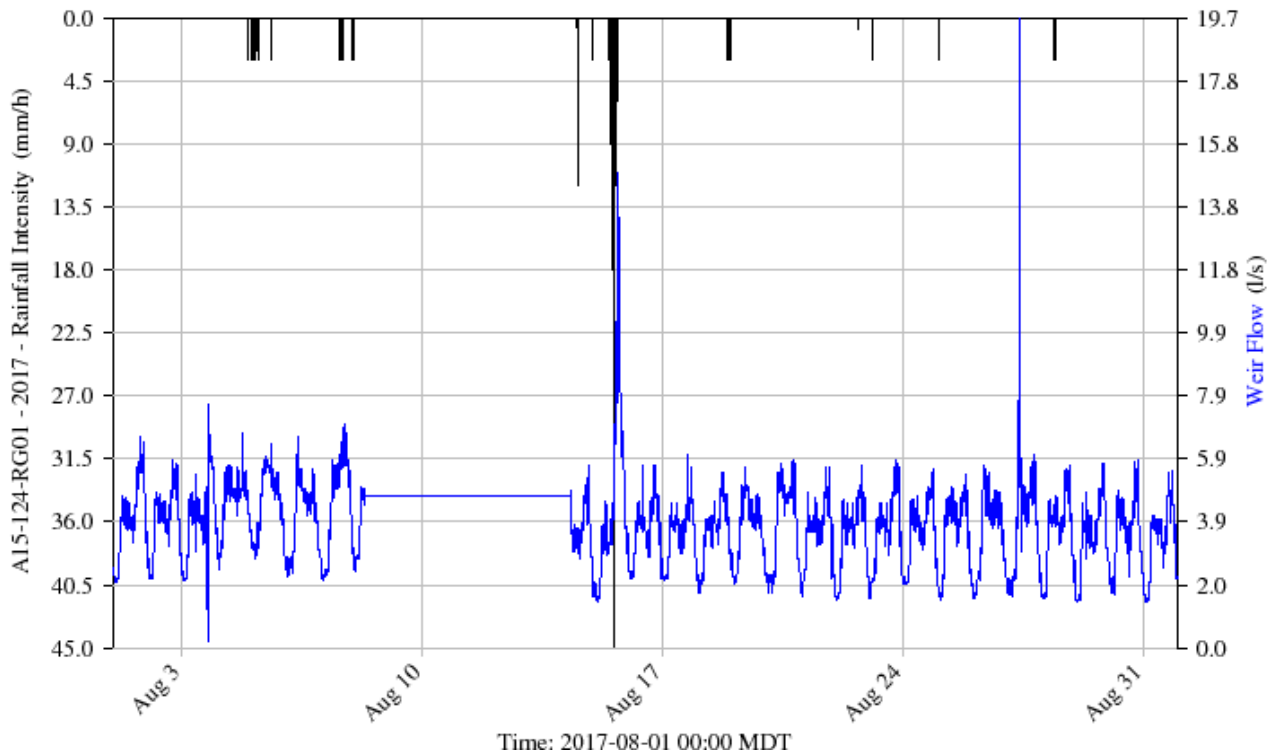


A15-124-05 – Summary report

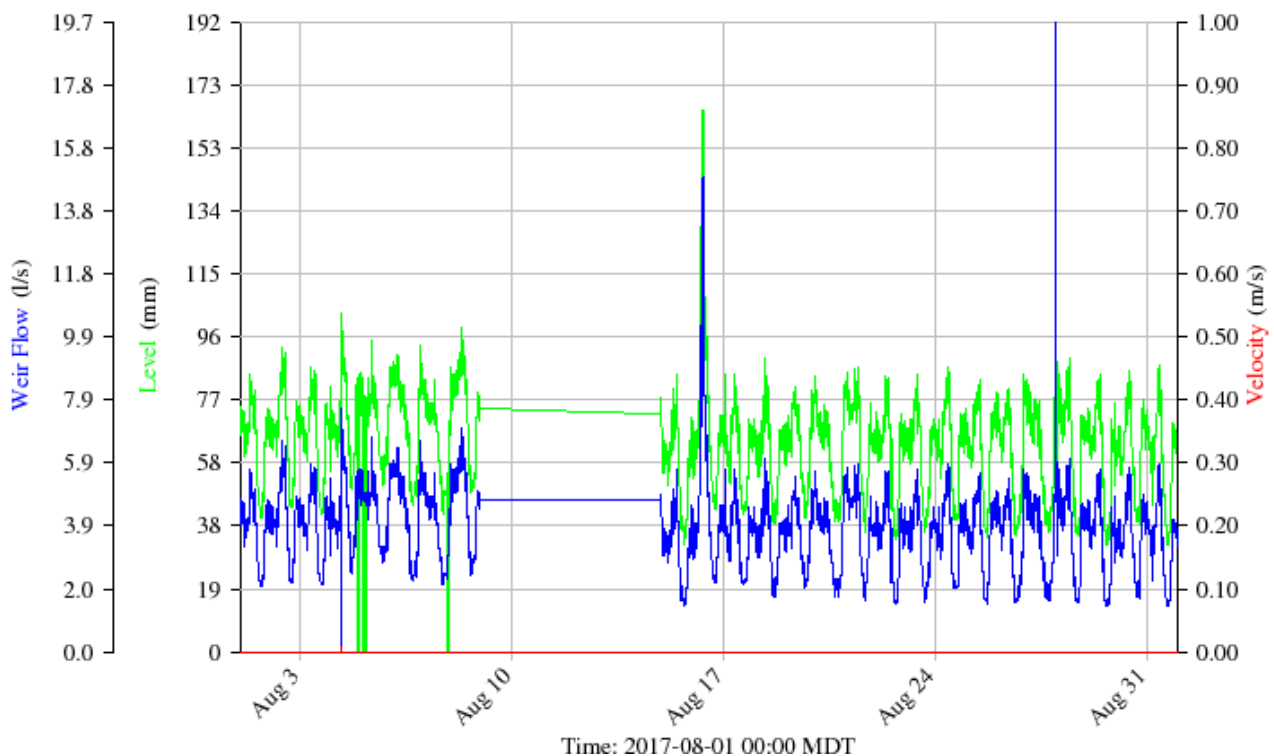
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	10.79	17.05	21.88	1,473.10	0.00
2	9.98	17.28	22.27	1,492.59	0.00
3	8.46	17.37	25.49	1,500.95	0.00
4	11.51	17.44	22.46	1,507.19	0.50
5	12.17	16.93	22.19	1,462.51	4.00
6	11.83	16.35	21.10	1,413.04	0.00
7	11.37	17.50	24.32	1,511.82	5.25
8	11.59	17.75	24.76	1,533.76	1.75
9	11.27	17.35	26.12	1,498.91	0.00
10	12.07	17.19	23.22	1,485.07	0.00
11	11.97	16.91	22.43	1,461.00	0.00
12	10.63	16.32	21.80	1,410.22	0.00
13	11.49	16.77	22.54	1,449.34	0.00
14	11.08	17.04	23.42	1,472.21	6.00
15	12.74	20.44	50.98	1,766.01	38.25
16	6.99	15.97	23.28	1,380.06	0.00
17	8.56	15.00	19.69	1,296.32	0.00
18	7.26	14.29	20.10	1,234.35	3.25
19	-8.65	14.20	20.51	1,226.70	1.25
20	6.77	15.88	22.44	1,371.74	0.00
21	11.31	17.36	22.48	1,499.91	0.00
22	11.22	17.58	22.89	1,518.61	1.25
23	10.87	17.48	24.73	1,510.49	0.25
24	11.97	17.34	23.79	1,498.55	0.00
25	11.47	16.95	22.25	1,464.76	0.25
26	10.25	15.88	21.61	1,372.38	0.00
27	12.11	15.96	20.57	1,379.15	0.00
28	10.10	14.69	20.23	1,269.16	0.75
29	8.31	14.81	21.72	1,279.42	0.00
30	8.00	14.66	19.56	1,266.24	0.00
Mean	9.82	16.54	23.26	1,428.69	2.02
Minimum	-8.65	14.20	19.56	1,226.70	0.00
Maximum	12.74	20.44	50.98	1,766.01	38.25
Total	n/a	n/a	n/a	44,289.28	62.75

A15-124-06

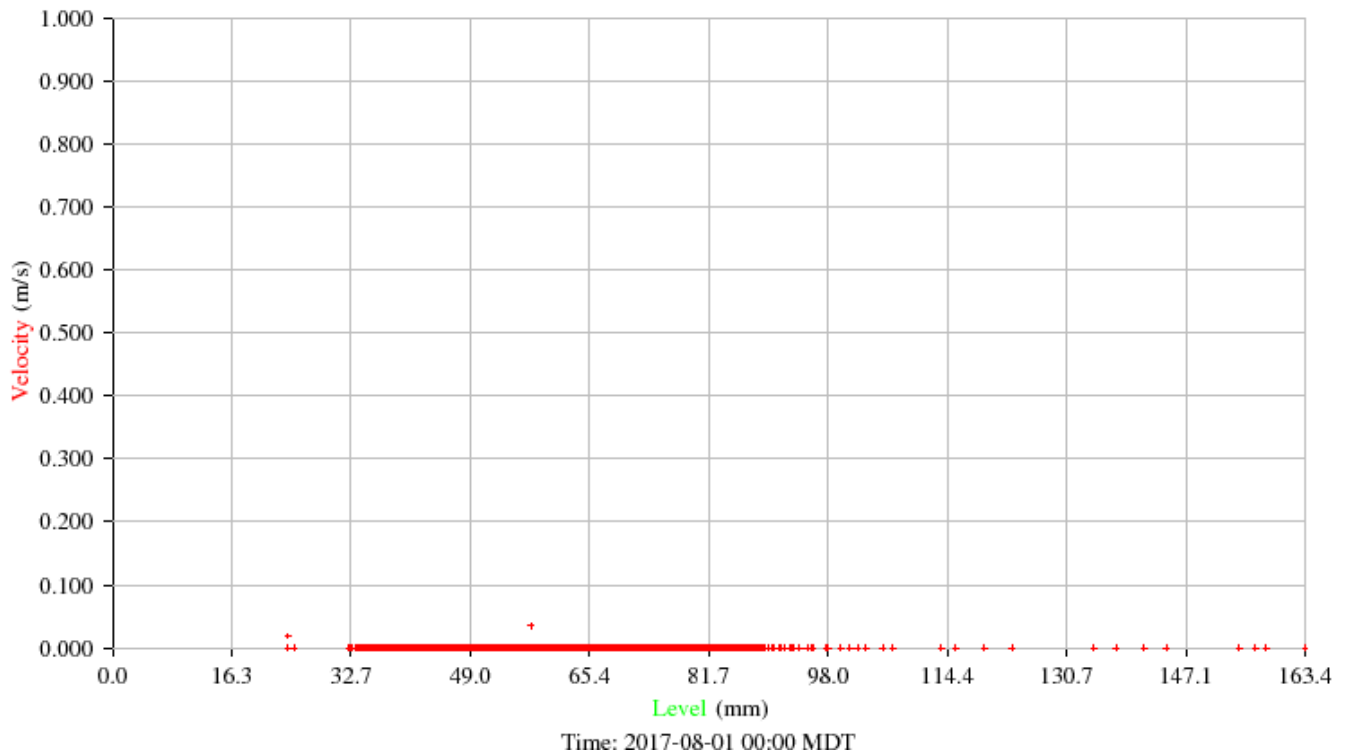
A15-124-06 – Flow with rain intensity



A15-124-06 – Level with velocity and flow



A15-124-06 – Level vs. velocity scatter plot

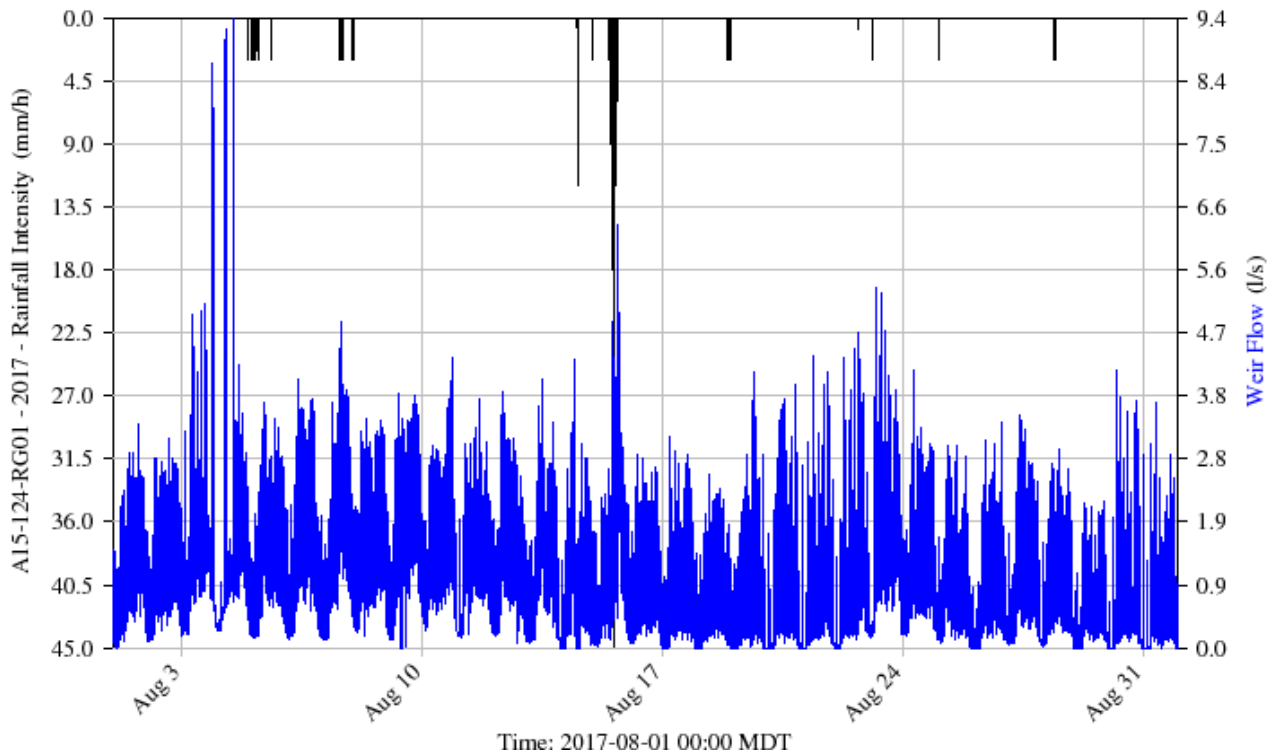


A15-124-06 – Summary report

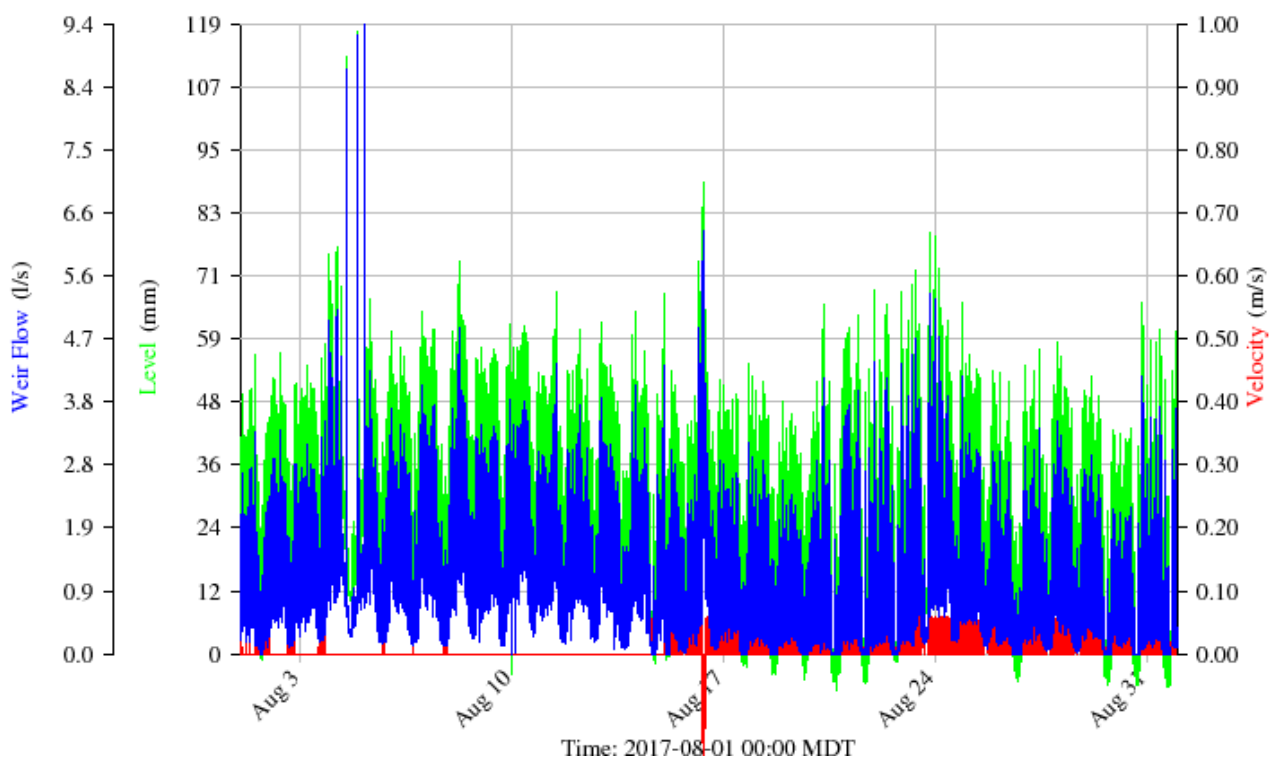
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	2.04	4.00	6.60	345.54	0.00
2	2.19	3.99	5.86	344.76	0.00
3	0.18	4.02	7.65	346.99	0.00
4	2.47	4.55	6.73	392.91	0.50
5	2.81	4.55	6.42	392.75	4.00
6	2.24	4.14	6.62	358.08	0.00
7	2.10	4.48	7.01	386.73	5.25
8	2.41	4.29	5.04	370.74	1.75
9	4.75	4.75	4.75	409.99	0.00
10	4.75	4.75	4.75	409.99	0.00
11	4.75	4.75	4.75	409.99	0.00
12	4.75	4.75	4.75	409.99	0.00
13	4.75	4.75	4.75	409.99	0.00
14	2.38	4.17	5.72	360.24	6.00
15	1.42	4.53	14.87	391.14	38.25
16	2.18	3.74	5.73	323.36	0.00
17	2.10	3.54	6.06	306.23	0.00
18	1.72	3.60	5.47	311.36	3.25
19	2.03	3.75	5.67	323.92	1.25
20	1.73	3.87	5.88	334.39	0.00
21	1.58	3.62	5.67	313.05	0.00
22	1.49	3.53	5.73	305.37	1.25
23	1.58	3.65	5.87	315.28	0.25
24	2.00	3.66	5.61	316.64	0.00
25	1.51	3.65	5.43	314.99	0.25
26	1.54	3.59	5.70	309.78	0.00
27	1.59	3.99	19.72	344.38	0.00
28	1.55	3.64	5.73	314.33	0.75
29	1.42	3.41	5.77	294.57	0.00
30	1.69	3.63	5.90	313.80	0.00
Mean	2.29	4.02	6.51	347.48	2.02
Minimum	0.18	3.36	4.75	290.46	0.00
Maximum	4.75	4.75	19.72	409.99	38.25
Total	n/a	n/a	n/a	10,771.76	62.75

A15-124-08

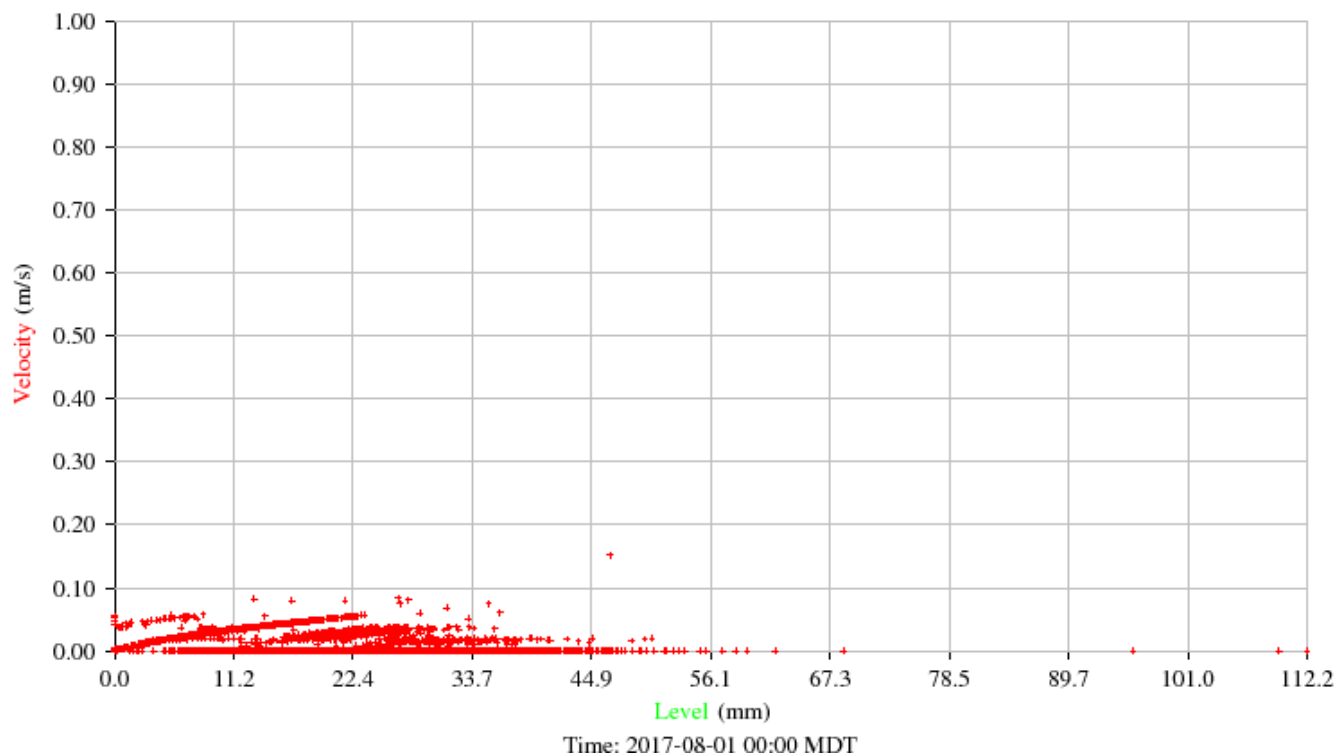
A15-124-08 – Flow with rain intensity



A15-124-08 – Level with velocity and flow



A15-124-08 – Level vs. velocity scatter plot

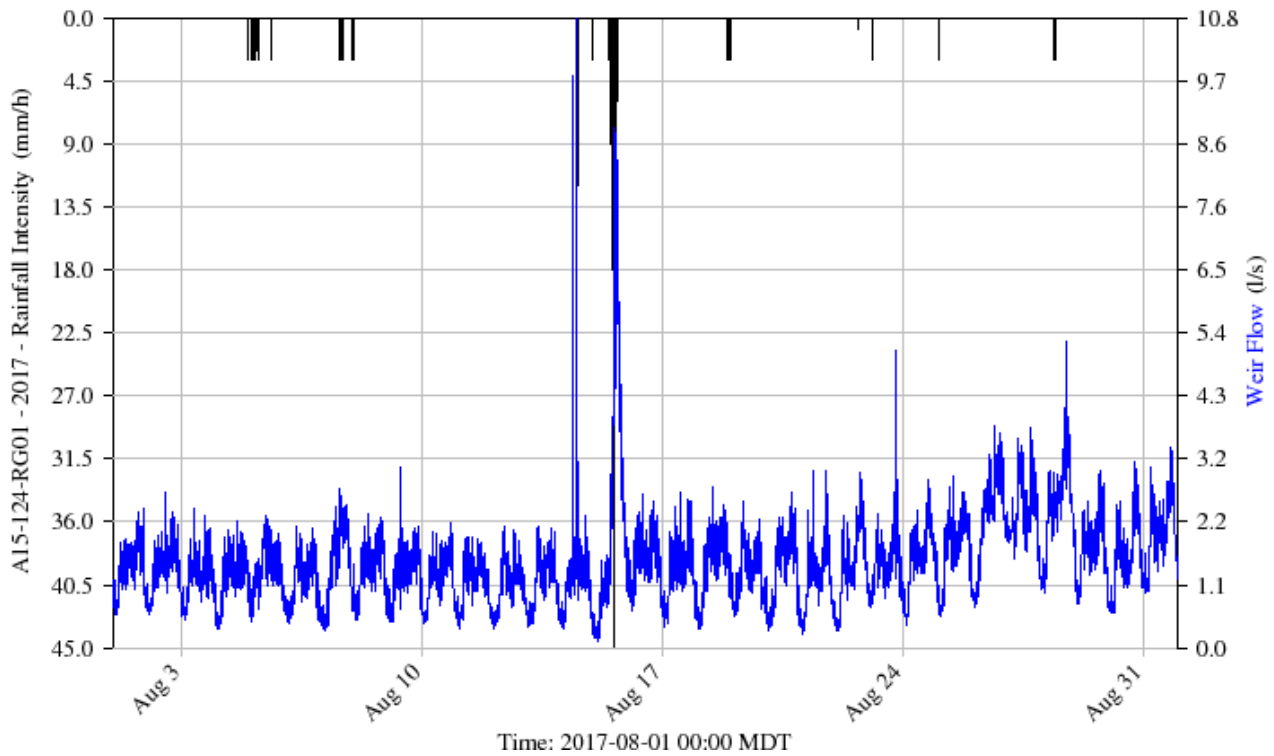


A15-124-08 – Summary report

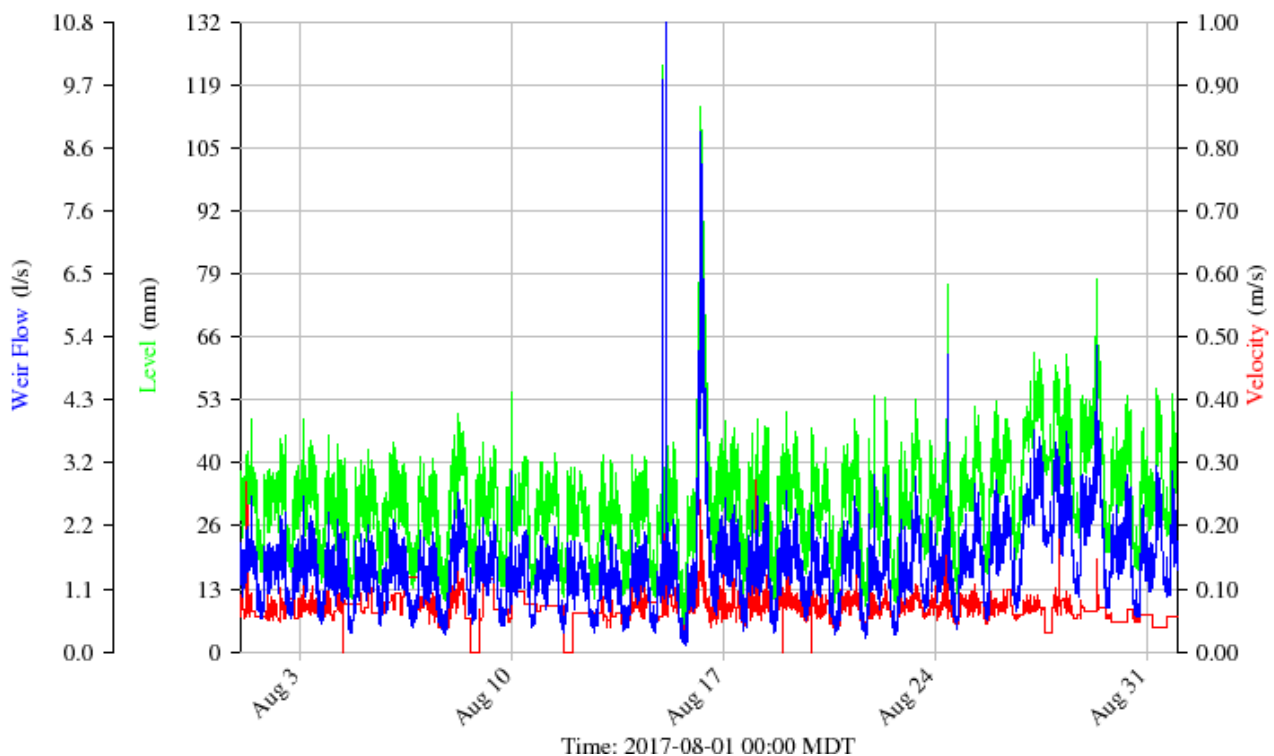
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.00	0.82	3.33	71.02	0.00
2	0.10	0.90	3.11	78.10	0.00
3	0.17	1.19	8.71	102.75	0.00
4	0.25	1.24	9.38	107.22	0.50
5	0.16	1.08	3.65	93.12	4.00
6	0.13	1.12	4.01	96.53	0.00
7	0.11	1.19	4.86	103.20	5.25
8	0.18	1.15	3.41	99.77	1.75
9	0.00	1.25	3.79	107.94	0.00
10	0.26	1.17	4.33	101.25	0.00
11	0.15	1.04	3.70	90.20	0.00
12	0.08	1.01	3.80	87.02	0.00
13	0.06	0.90	4.00	77.91	0.00
14	0.00	0.70	4.29	60.69	6.00
15	0.02	1.06	6.30	91.66	38.25
16	0.05	0.73	2.89	63.04	0.00
17	0.00	0.58	3.14	50.08	0.00
18	0.00	0.50	2.59	43.61	3.25
19	0.00	0.48	4.11	41.43	1.25
20	0.00	0.50	3.93	43.15	0.00
21	0.00	0.50	4.36	43.05	0.00
22	0.00	0.64	4.70	54.90	1.25
23	0.16	1.17	5.37	101.03	0.25
24	0.19	0.95	4.13	82.43	0.00
25	0.03	0.73	3.02	62.99	0.25
26	0.00	0.55	3.36	47.60	0.00
27	0.05	0.73	3.48	62.87	0.00
28	0.02	0.61	2.95	52.93	0.75
29	0.00	0.45	2.19	38.79	0.00
30	0.00	0.46	4.14	40.08	0.00
Mean	0.07	0.83	4.15	71.88	2.02
Minimum	0.00	0.37	2.19	32.02	0.00
Maximum	0.26	1.25	9.38	107.94	38.25
Total	n/a	n/a	n/a	2,228.37	62.75

A15-124-09

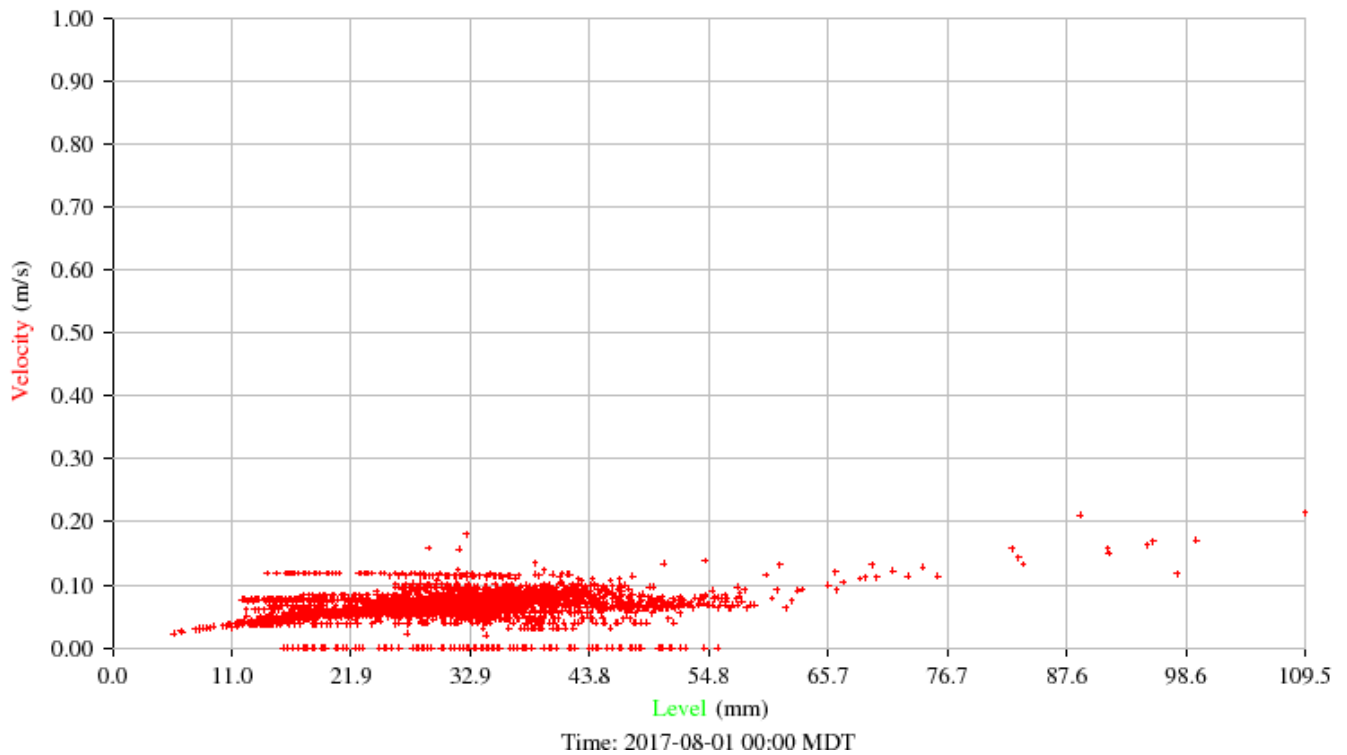
A15-124-09 – Flow with rain intensity



A15-124-09 – Level with velocity and flow



A15-124-09 – Level vs. velocity scatter plot

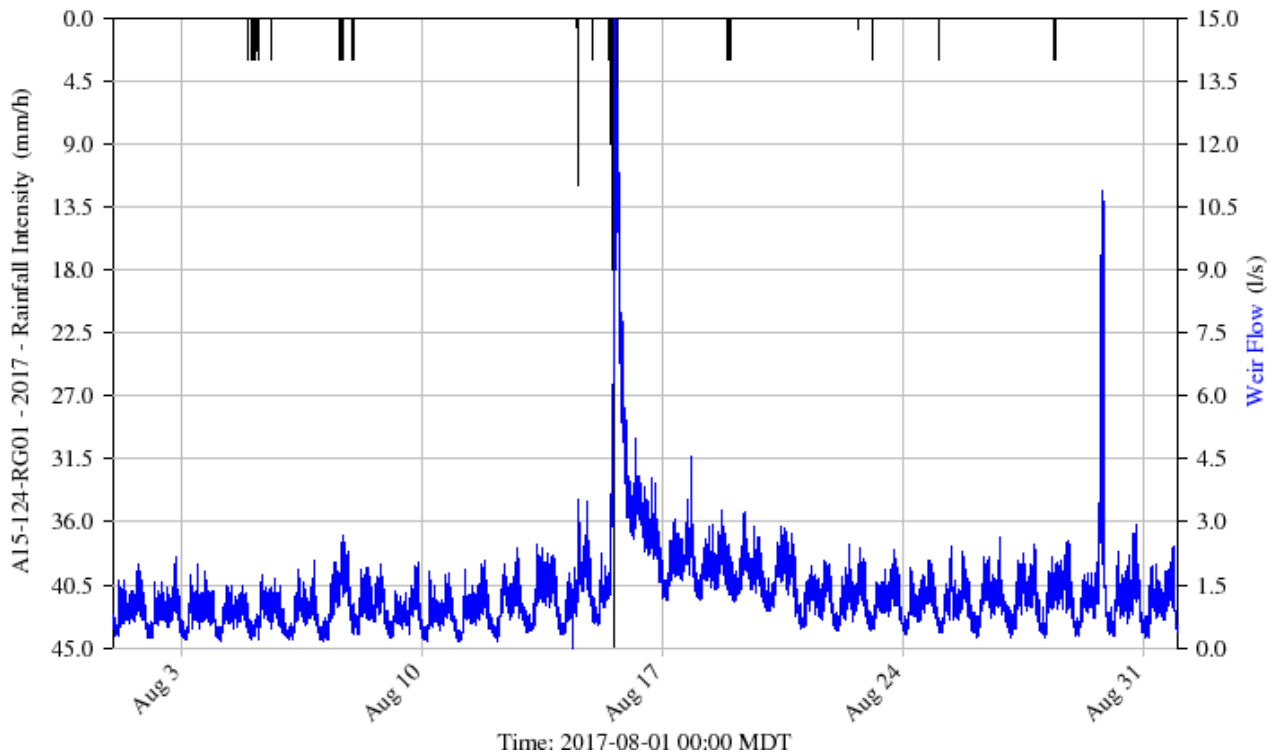


A15-124-09 – Summary report

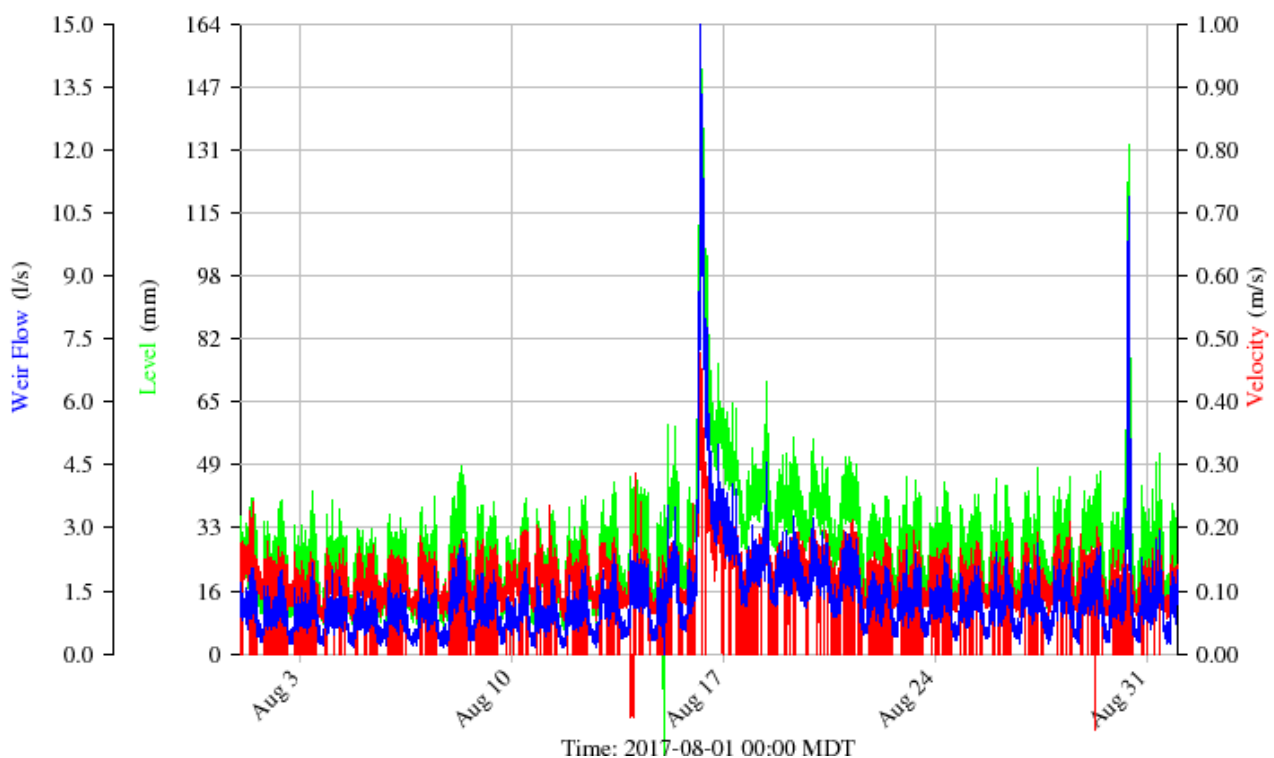
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.58	1.38	2.40	118.94	0.00
2	0.58	1.32	2.65	113.97	0.00
3	0.47	1.18	2.39	101.89	0.00
4	0.31	1.16	2.17	100.20	0.50
5	0.46	1.32	2.27	114.20	4.00
6	0.42	1.12	2.07	96.74	0.00
7	0.30	1.35	2.74	116.89	5.25
8	0.47	1.31	2.29	112.99	1.75
9	0.44	1.28	3.10	110.75	0.00
10	0.43	1.18	2.13	101.80	0.00
11	0.33	1.11	1.89	96.26	0.00
12	0.32	1.02	2.09	88.51	0.00
13	0.35	1.11	2.08	96.07	0.00
14	0.33	1.21	10.79	104.72	6.00
15	0.11	2.20	8.90	190.03	38.25
16	0.64	1.51	2.64	130.67	0.00
17	0.37	1.30	2.67	112.37	0.00
18	0.31	1.39	2.77	120.35	3.25
19	0.55	1.29	2.51	111.69	1.25
20	0.28	1.30	2.67	112.71	0.00
21	0.24	1.18	3.04	102.21	0.00
22	0.28	1.36	2.99	117.23	1.25
23	0.70	1.45	5.10	125.27	0.25
24	0.37	1.50	2.87	129.32	0.00
25	0.55	1.69	2.95	146.43	0.25
26	0.69	2.14	3.82	185.01	0.00
27	1.51	2.36	3.79	204.05	0.00
28	0.93	2.38	5.24	205.79	0.75
29	0.76	1.72	3.05	148.60	0.00
30	0.59	1.53	3.17	132.22	0.00
Mean	0.50	1.46	3.31	126.33	2.02
Minimum	0.11	1.02	1.89	88.51	0.00
Maximum	1.51	2.38	10.79	205.79	38.25
Total	n/a	n/a	n/a	3,916.14	62.75

A15-124-10

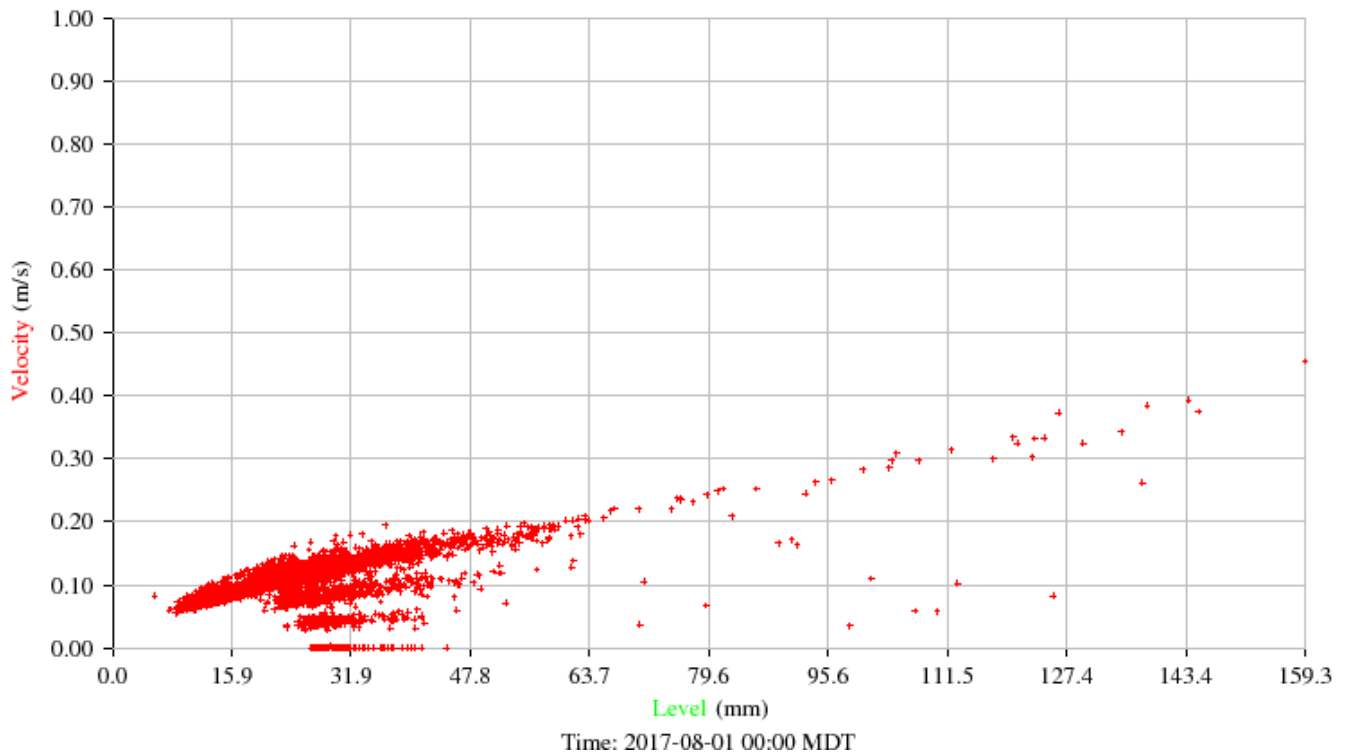
A15-124-10 – Flow with rain intensity



A15-124-10 – Level with velocity and flow



A15-124-10 – Level vs. velocity scatter plot

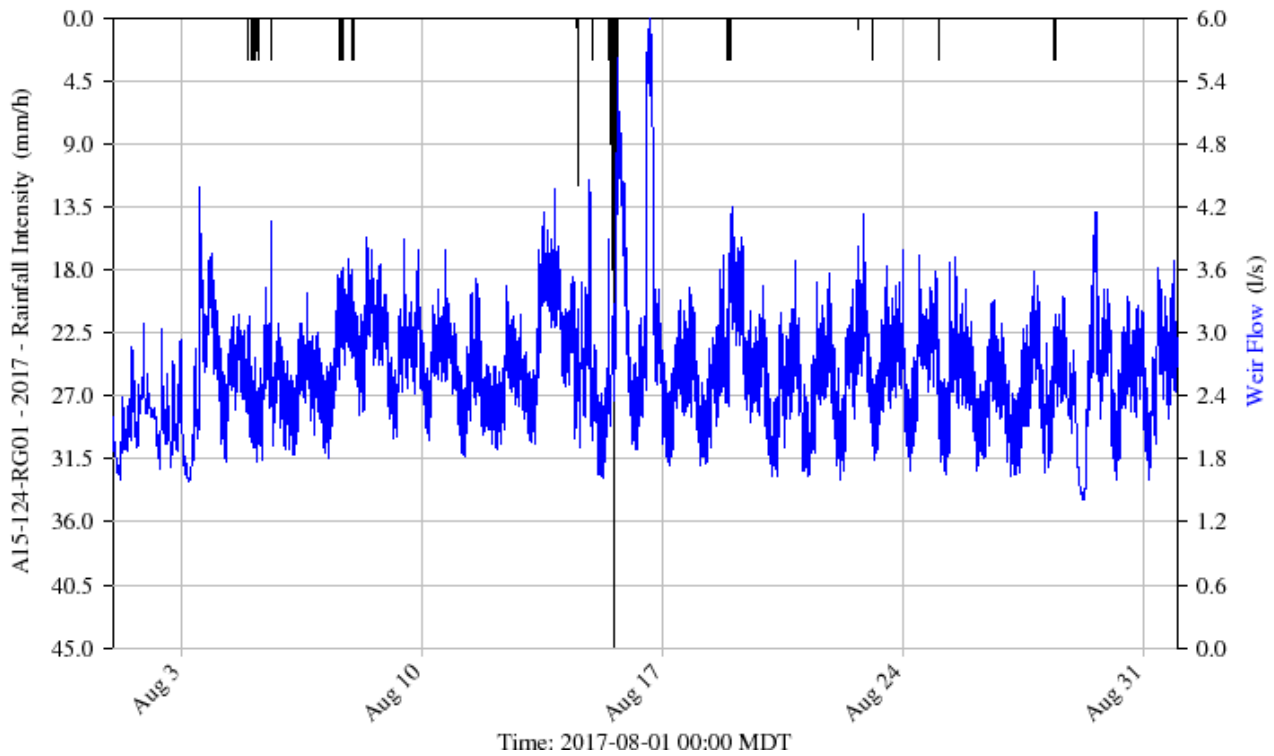


A15-124-10 – Summary report

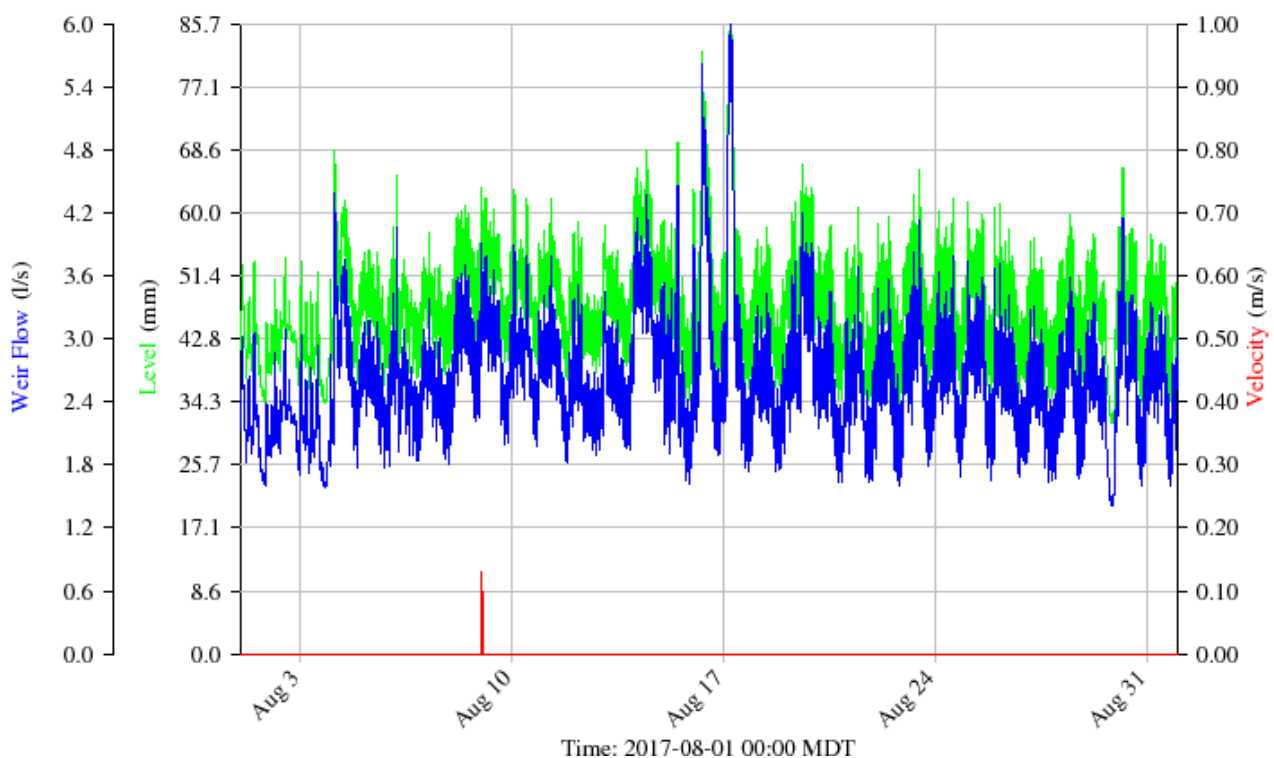
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.28	0.87	1.98	75.54	0.00
2	0.24	0.86	2.17	74.54	0.00
3	0.18	0.81	1.99	69.89	0.00
4	0.17	0.74	1.49	64.36	0.50
5	0.19	0.78	1.73	67.72	4.00
6	0.19	0.81	2.06	69.89	0.00
7	0.16	1.06	2.68	91.42	5.25
8	0.31	0.98	1.98	84.77	1.75
9	0.23	0.82	2.03	70.74	0.00
10	0.16	0.77	1.82	66.47	0.00
11	0.15	0.85	2.08	73.13	0.00
12	0.16	0.99	2.36	85.76	0.00
13	0.37	1.20	2.45	103.84	0.00
14	0.00	1.30	3.55	112.03	6.00
15	0.54	3.95	14.97	341.05	38.25
16	1.57	3.02	4.97	260.55	0.00
17	1.14	2.05	4.53	177.01	0.00
18	1.13	1.86	3.29	160.72	3.25
19	1.10	1.79	3.22	155.01	1.25
20	0.77	1.63	2.87	141.09	0.00
21	0.45	1.16	2.05	100.24	0.00
22	0.40	1.15	2.47	99.30	1.25
23	0.42	1.12	2.33	96.43	0.25
24	0.32	1.04	2.09	89.51	0.00
25	0.36	1.07	2.40	92.71	0.25
26	0.25	1.08	2.62	93.32	0.00
27	0.24	1.15	2.46	98.93	0.00
28	0.24	1.22	2.56	105.62	0.75
29	0.28	1.70	10.85	147.21	0.00
30	0.26	1.08	2.91	93.37	0.00
Mean	0.40	1.29	3.20	111.37	2.02
Minimum	0.00	0.74	1.49	64.36	0.00
Maximum	1.57	3.95	14.97	341.05	38.25
Total	n/a	n/a	n/a	3,452.46	62.75

A15-124-11

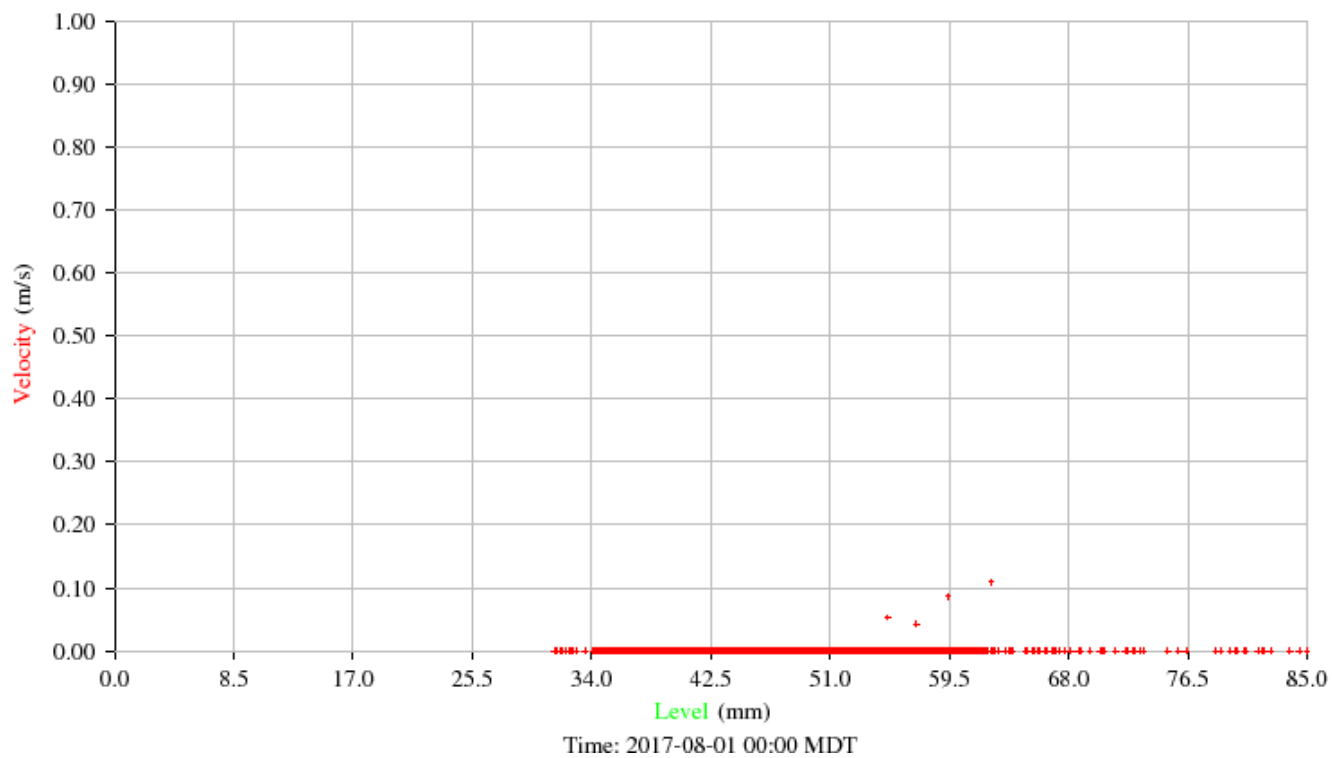
A15-124-11 – Flow with rain intensity



A15-124-11 – Level with velocity and flow



A15-124-11 – Level vs. velocity scatter plot

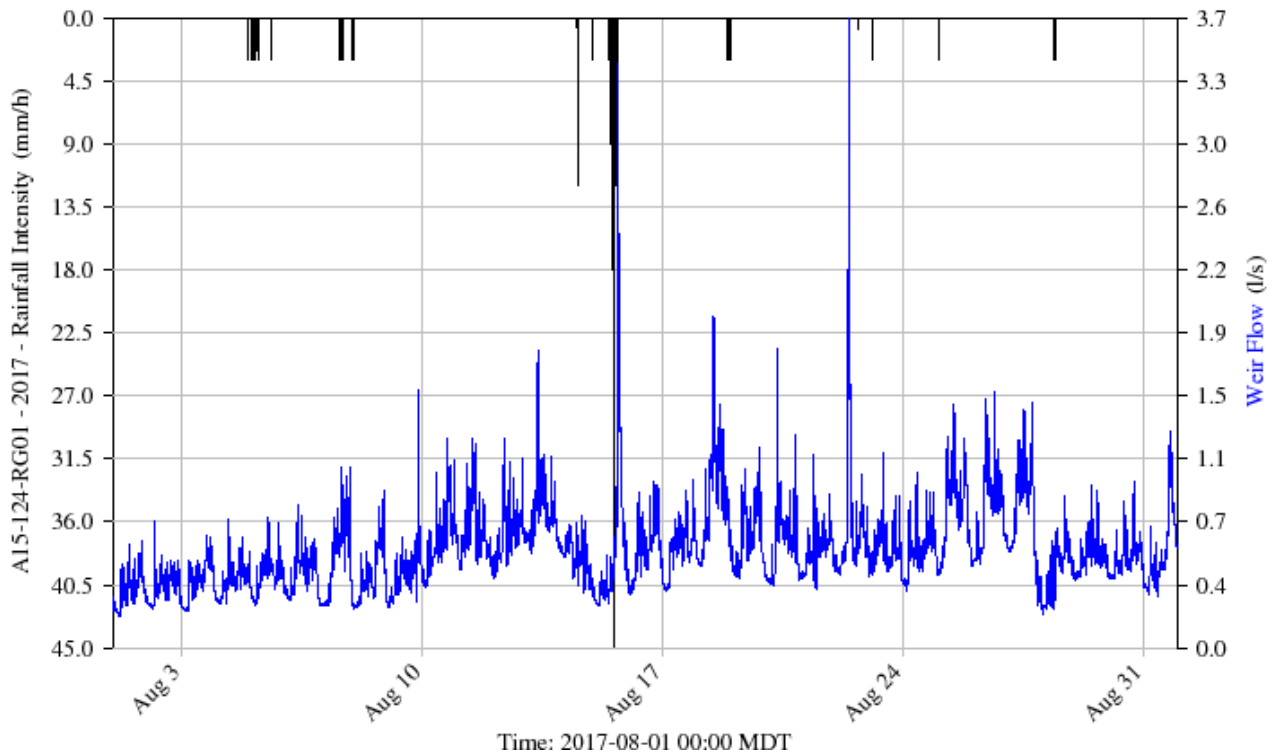


A15-124-11 – Summary report

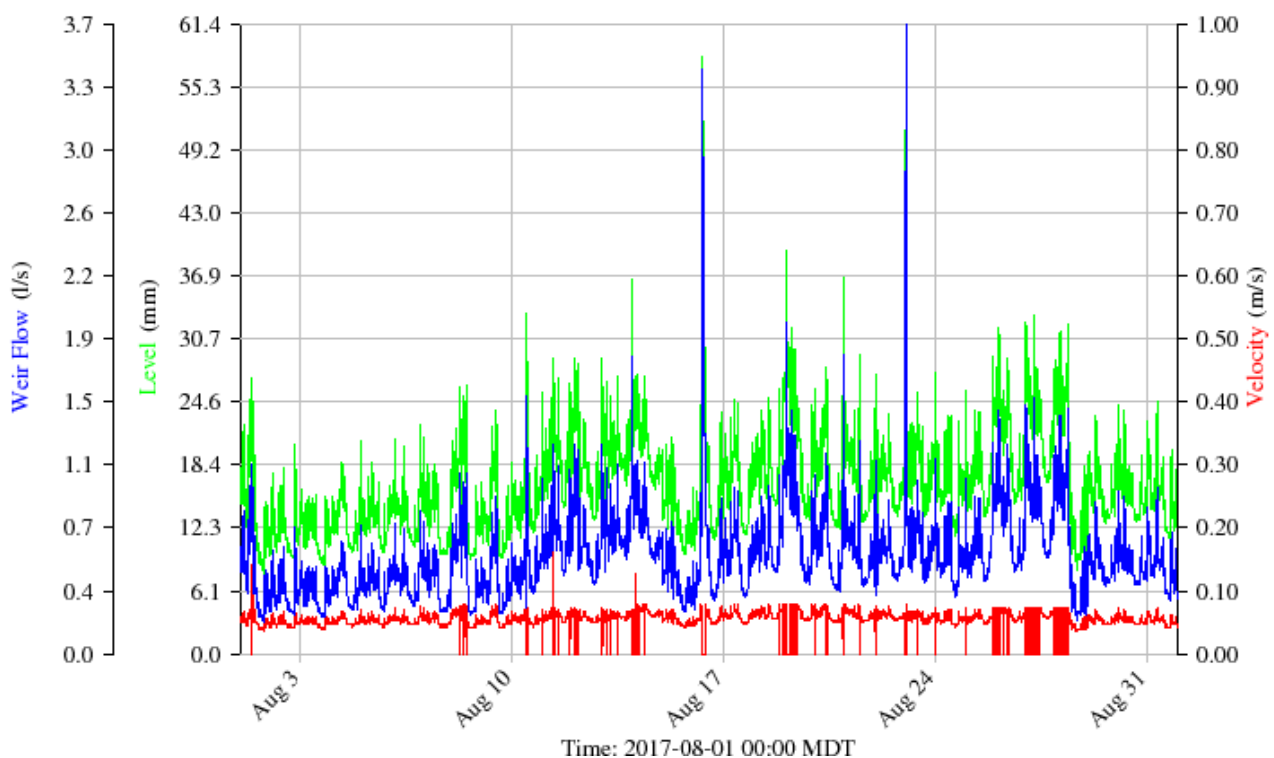
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.60	2.14	3.10	185.12	0.00
2	1.70	2.16	3.03	186.96	0.00
3	1.58	2.56	4.36	220.85	0.00
4	1.77	2.62	3.38	226.14	0.50
5	1.76	2.48	4.04	214.00	4.00
6	1.83	2.46	3.36	212.31	0.00
7	1.80	2.70	3.68	232.91	5.25
8	2.20	3.02	3.89	260.98	1.75
9	1.98	2.79	3.87	241.06	0.00
10	1.96	2.75	3.76	237.76	0.00
11	1.80	2.50	3.50	215.70	0.00
12	1.88	2.54	3.44	219.61	0.00
13	1.93	3.00	4.35	259.38	0.00
14	1.90	2.85	4.44	246.15	6.00
15	1.61	2.93	5.59	253.15	38.25
16	1.88	3.20	5.96	276.52	0.00
17	1.72	2.52	3.41	218.07	0.00
18	1.73	2.46	3.71	212.30	3.25
19	2.14	3.01	4.18	259.80	1.25
20	1.62	2.41	3.66	208.53	0.00
21	1.62	2.47	3.54	213.20	0.00
22	1.59	2.67	4.11	230.67	1.25
23	1.78	2.65	3.62	228.95	0.25
24	1.67	2.68	3.77	231.28	0.00
25	1.64	2.60	3.69	224.93	0.25
26	1.68	2.41	3.29	208.26	0.00
27	1.63	2.41	3.56	208.29	0.00
28	1.66	2.49	3.33	214.72	0.75
29	1.40	2.49	4.13	215.47	0.00
30	1.60	2.55	3.34	220.60	0.00
Mean	1.75	2.62	3.83	226.12	2.02
Minimum	1.40	2.14	3.03	185.12	0.00
Maximum	2.20	3.20	5.96	276.52	38.25
Total	n/a	n/a	n/a	7,009.73	62.75

A15-124-12A

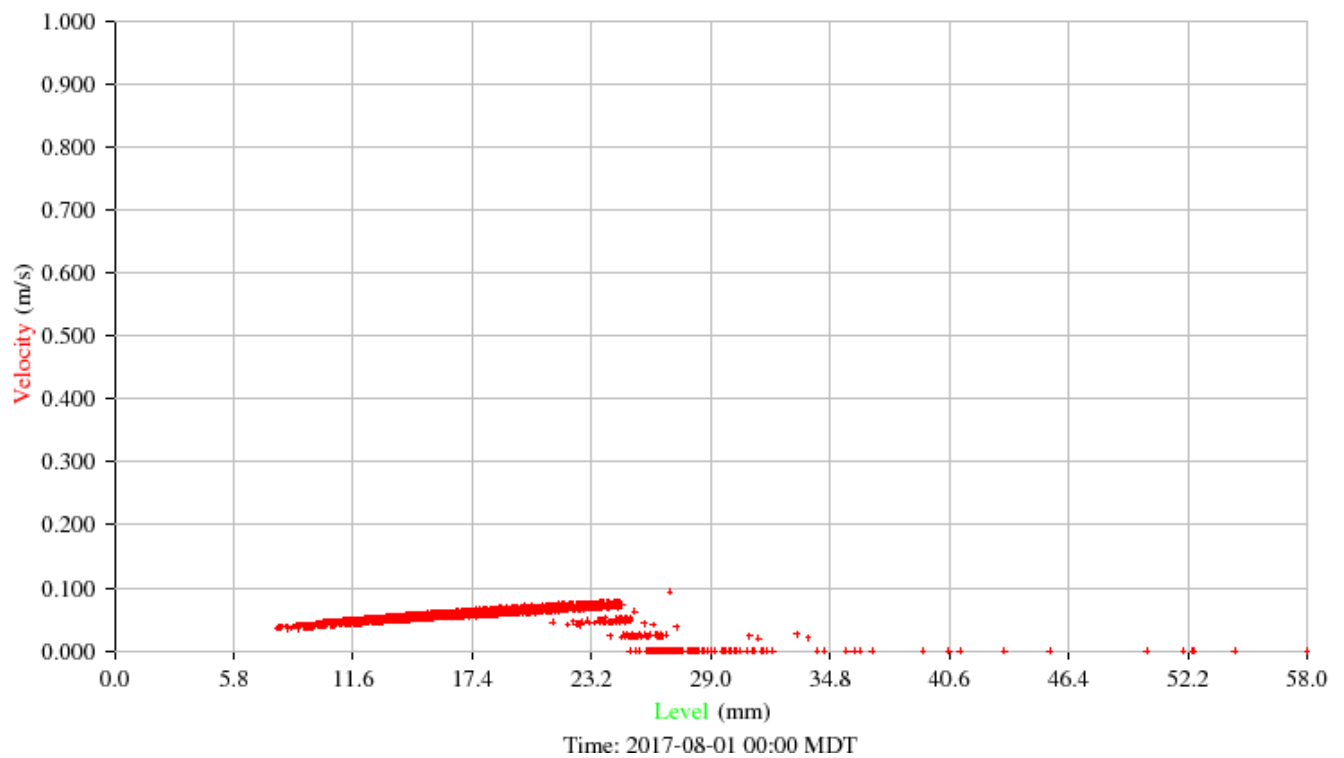
A15-124-12A – Flow with rain intensity



A15-124-12A – Level with velocity and flow



A15-124-12A – Level vs. velocity scatter plot

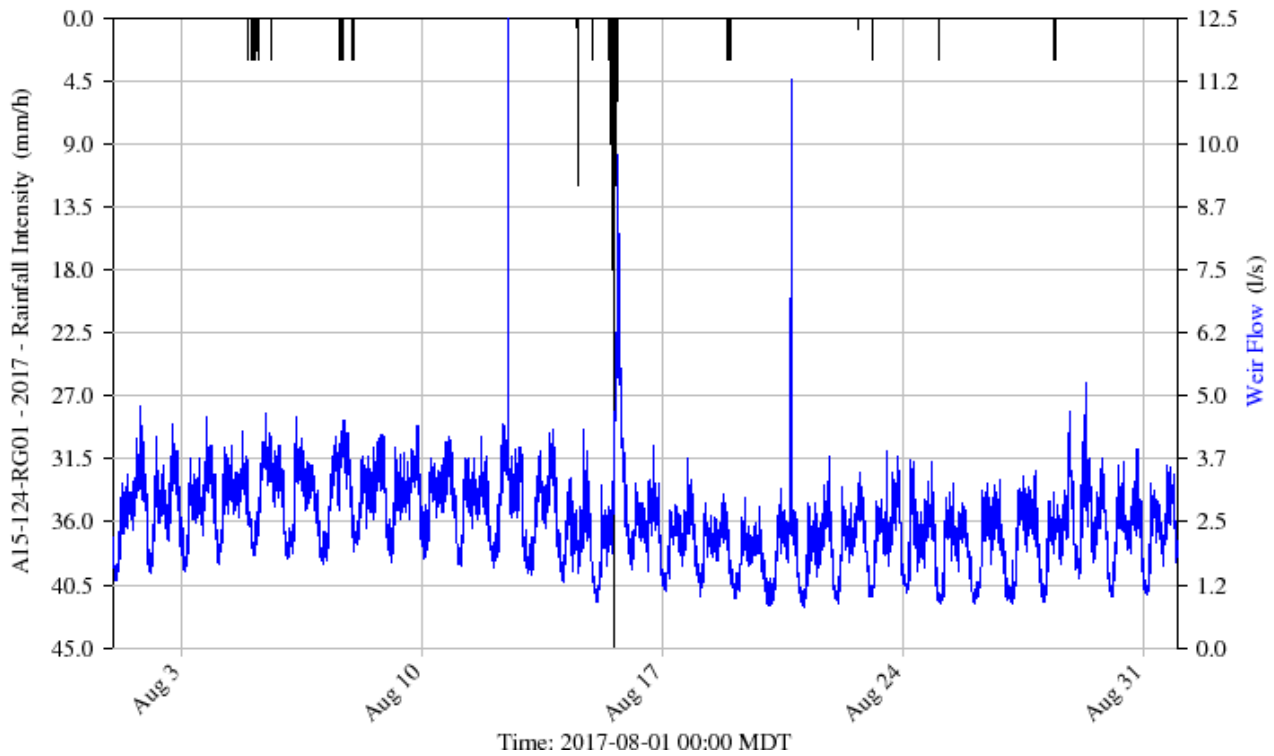


A15-124-12A – Summary report

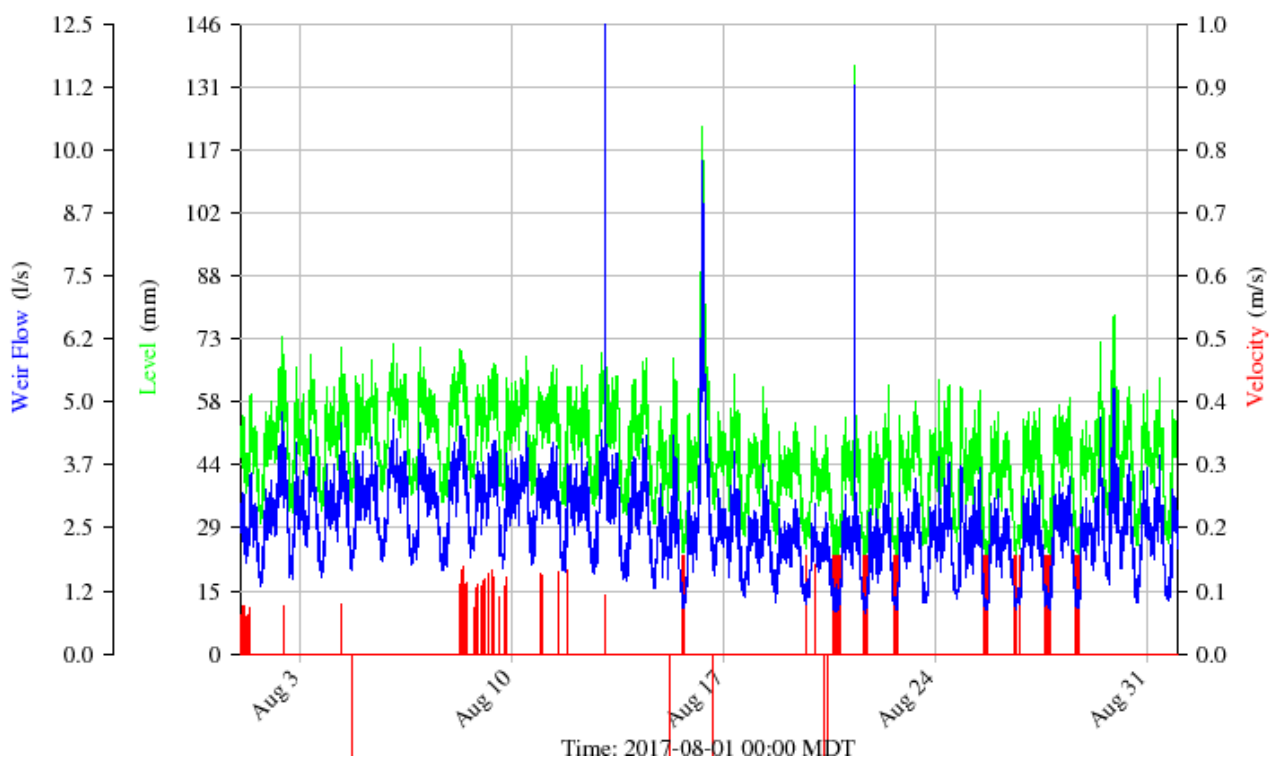
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.19	0.36	0.64	30.80	0.00
2	0.23	0.36	0.74	31.04	0.00
3	0.21	0.39	0.66	33.77	0.00
4	0.26	0.39	0.76	33.82	0.50
5	0.25	0.43	0.77	36.96	4.00
6	0.28	0.44	0.85	38.42	0.00
7	0.25	0.50	1.07	43.00	5.25
8	0.23	0.42	0.93	36.57	1.75
9	0.24	0.44	1.52	37.89	0.00
10	0.35	0.62	1.24	53.86	0.00
11	0.46	0.68	1.24	58.86	0.00
12	0.41	0.65	1.24	56.58	0.00
13	0.56	0.81	1.76	70.27	0.00
14	0.33	0.54	0.79	46.43	6.00
15	0.25	0.60	3.45	51.62	38.25
16	0.32	0.58	0.99	49.94	0.00
17	0.34	0.57	1.00	49.44	0.00
18	0.48	0.85	1.96	73.67	3.25
19	0.41	0.65	1.18	56.33	1.25
20	0.37	0.60	1.77	52.26	0.00
21	0.35	0.57	1.13	49.35	0.00
22	0.43	0.77	3.72	66.92	1.25
23	0.42	0.59	1.15	50.55	0.25
24	0.34	0.57	1.04	49.43	0.00
25	0.43	0.81	1.43	69.82	0.25
26	0.48	0.81	1.51	70.22	0.00
27	0.25	0.81	1.45	69.66	0.00
28	0.20	0.45	0.90	38.98	0.75
29	0.40	0.54	0.96	46.75	0.00
30	0.40	0.53	0.98	45.89	0.00
Mean	0.34	0.58	1.29	49.91	2.02
Minimum	0.19	0.36	0.64	30.80	0.00
Maximum	0.56	0.85	3.72	73.67	38.25
Total	n/a	n/a	n/a	1,547.19	62.75

A15-124-12B

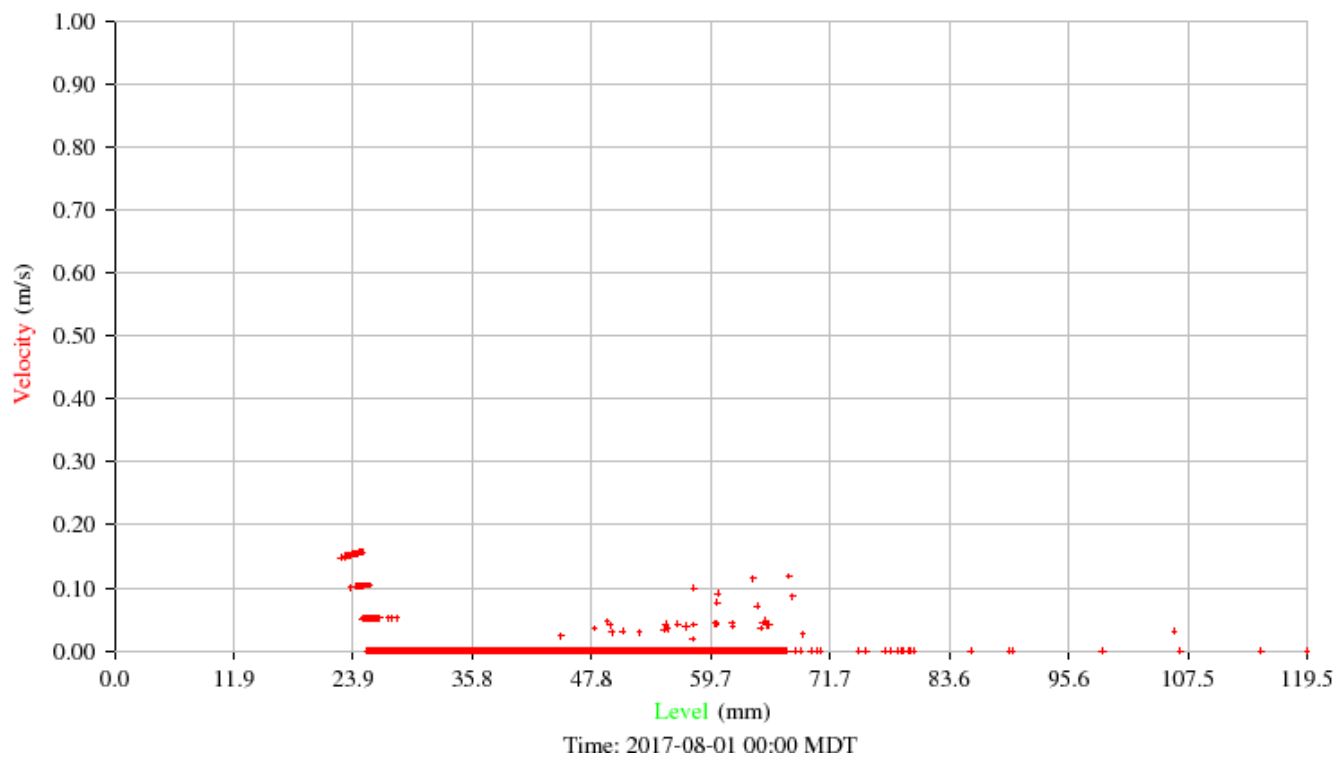
A15-124-12B – Flow with rain intensity



A15-124-12B – Level with velocity and flow



A15-124-12B – Level vs. velocity scatter plot



A15-124-12B – Summary report

	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.33	2.75	4.81	237.40	0.00
2	1.48	2.79	4.44	240.75	0.00
3	1.52	2.79	4.59	241.22	0.00
4	1.66	2.95	4.30	254.74	0.50
5	1.85	3.11	4.64	268.78	4.00
6	1.78	2.94	4.58	253.71	0.00
7	1.67	3.10	4.53	267.95	5.25
8	1.91	3.10	4.23	267.45	1.75
9	1.70	3.00	4.40	259.26	0.00
10	1.78	3.04	4.20	262.88	0.00
11	1.61	2.87	4.19	248.05	0.00
12	1.59	2.99	12.49	258.42	0.00
13	1.46	2.72	4.34	235.33	0.00
14	1.31	2.27	4.33	196.12	6.00
15	0.91	2.99	9.77	258.20	38.25
16	1.51	2.44	4.01	210.72	0.00
17	1.14	2.16	3.77	186.94	0.00
18	1.03	2.05	3.03	177.19	3.25
19	0.97	1.80	2.98	155.12	1.25
20	0.84	1.94	11.27	167.46	0.00
21	0.82	1.97	3.80	169.92	0.00
22	0.87	2.09	3.47	180.58	1.25
23	1.02	2.23	3.92	192.76	0.25
24	1.07	2.17	3.74	187.58	0.00
25	0.86	1.99	3.25	171.80	0.25
26	0.87	2.02	3.32	174.74	0.00
27	0.89	2.17	3.52	187.58	0.00
28	0.90	2.26	4.68	195.15	0.75
29	1.38	2.60	5.27	224.68	0.00
30	1.00	2.30	3.94	199.04	0.00
Mean	1.28	2.51	4.76	217.08	2.02
Minimum	0.82	1.80	2.98	155.12	0.00
Maximum	1.91	3.11	12.49	268.78	38.25
Total	n/a	n/a	n/a	6,729.63	62.75



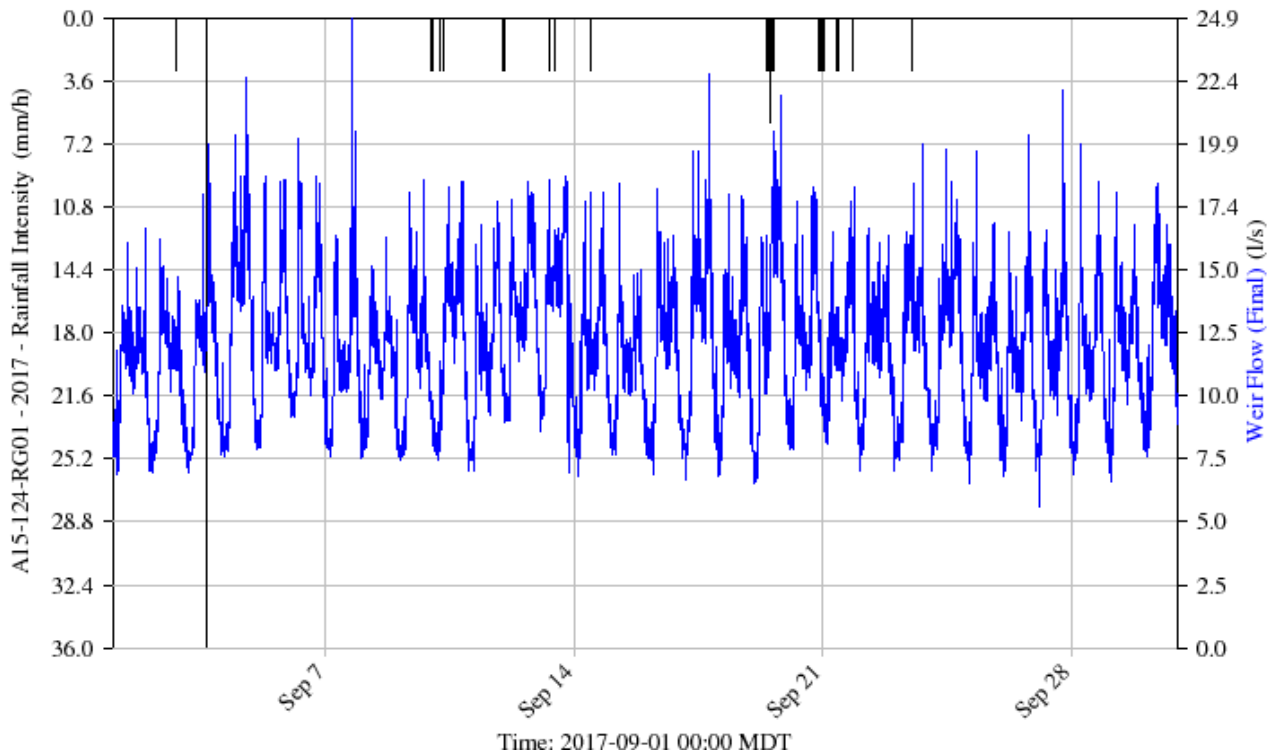
Monthly Report

A15-124 - Cold Lake TFM

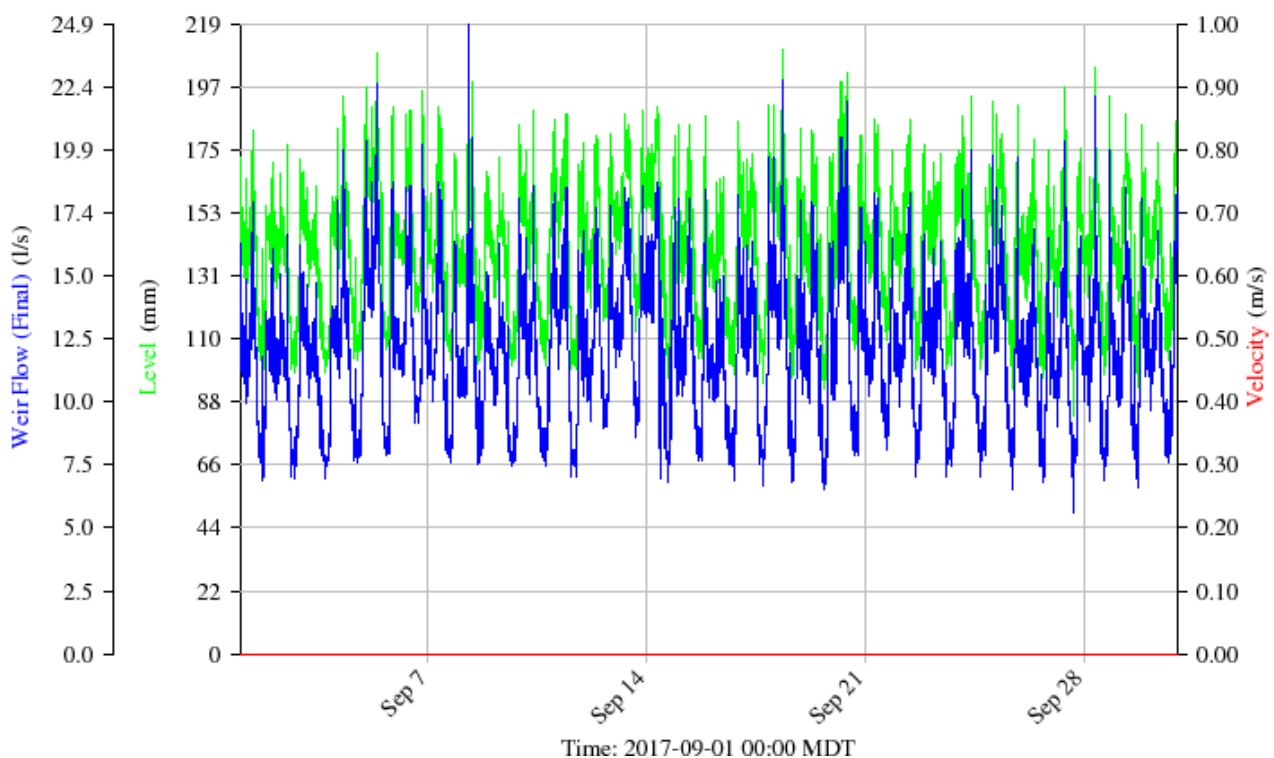
September 2017

A15-124-01

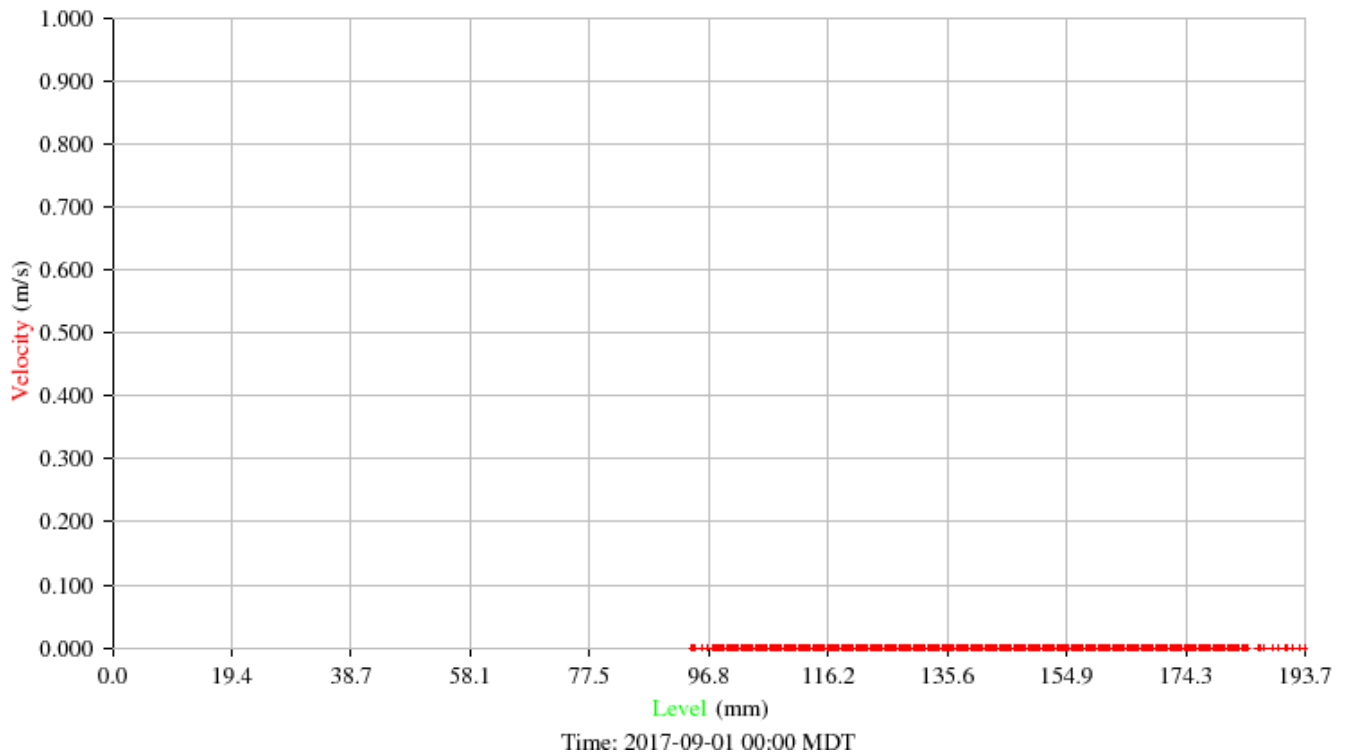
A15-124-01 – Flow with rain intensity



A15-124-01 – Level with velocity and flow



A15-124-01 – Level vs. velocity scatter plot

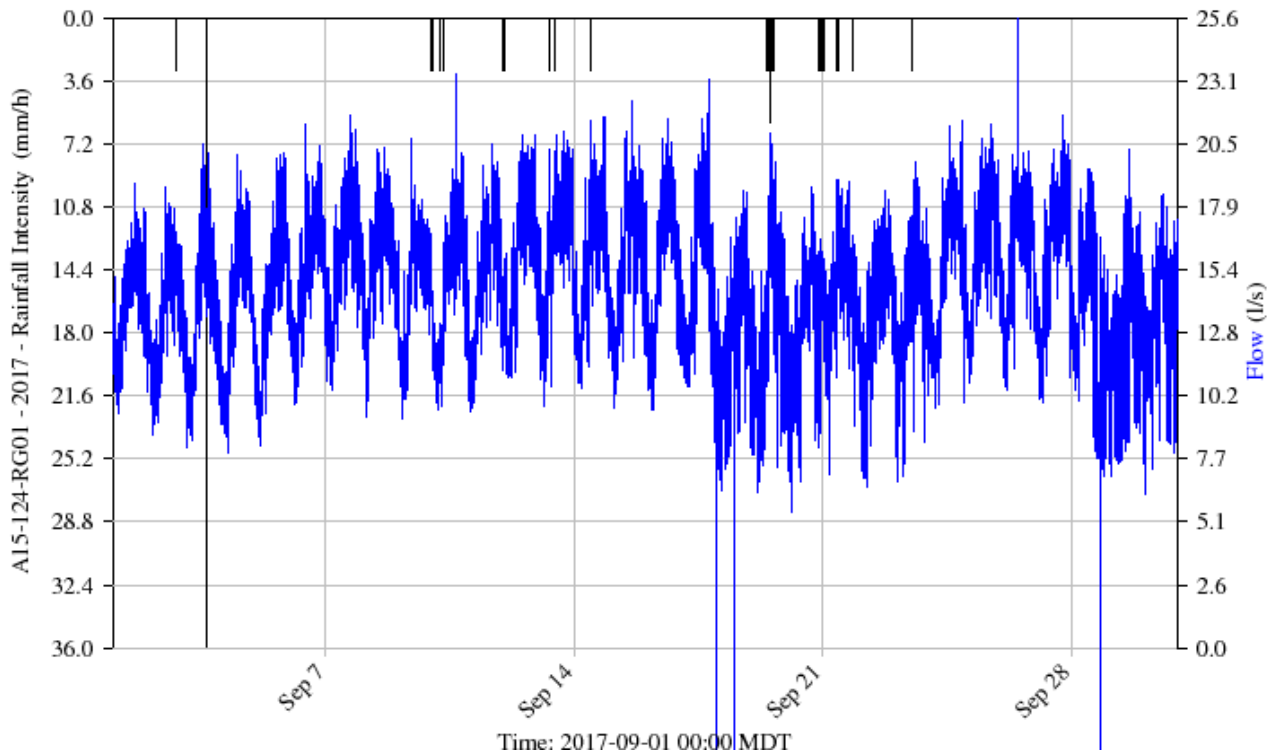


A15-124-01 – Summary report

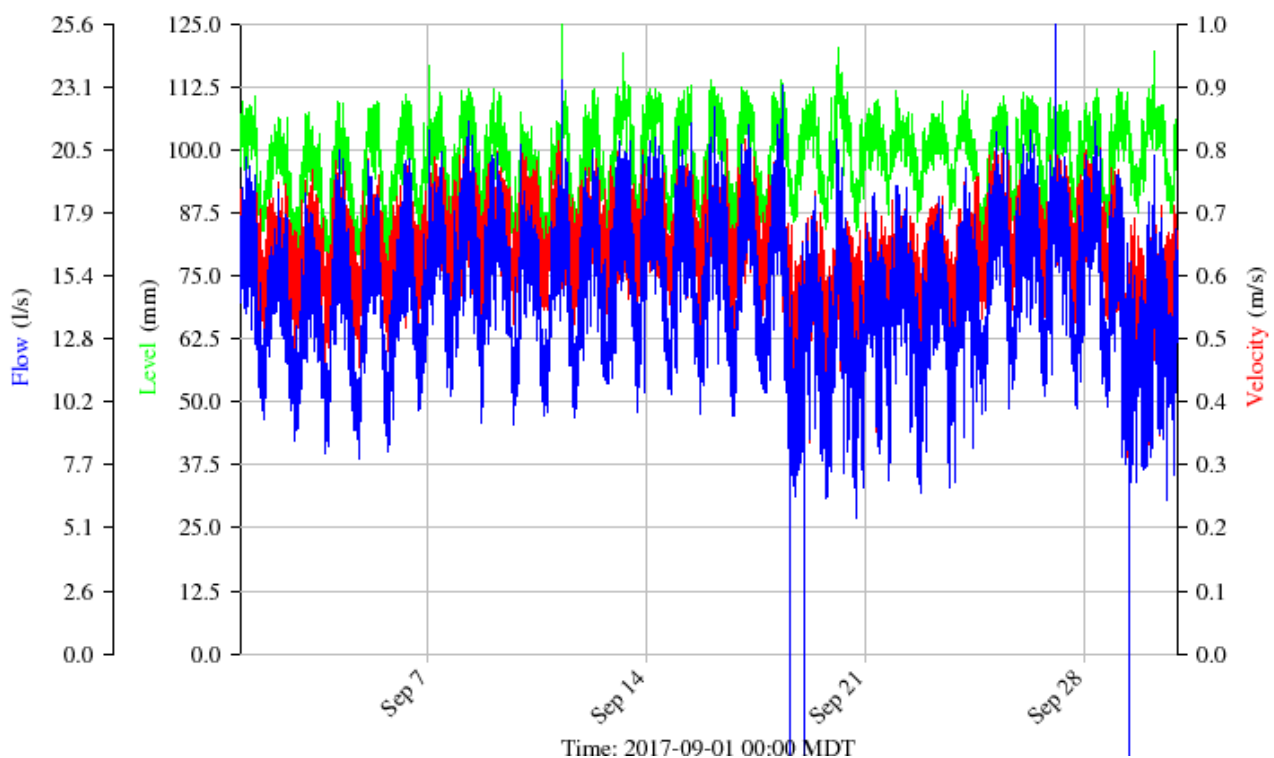
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	6.89	11.00	16.62	950.35	0.00
2	6.96	10.85	16.15	937.50	0.25
3	6.96	11.36	19.96	981.54	6.50
4	7.55	12.85	22.59	1,110.01	0.00
5	7.84	12.26	18.64	1,059.53	0.00
6	9.13	12.56	20.17	1,085.17	0.00
7	7.55	11.42	24.92	986.84	0.00
8	7.47	11.11	16.24	960.21	0.00
9	7.40	11.29	18.54	975.44	0.00
10	7.40	12.20	18.44	1,054.38	2.00
11	7.03	11.52	17.66	995.03	0.00
12	8.90	13.17	18.44	1,137.76	1.00
13	6.96	13.38	18.64	1,156.34	0.75
14	6.82	11.77	18.05	1,017.23	0.25
15	7.62	11.15	18.35	963.46	0.00
16	6.89	11.51	18.15	994.32	0.00
17	6.67	12.47	22.70	1,077.82	0.00
18	6.82	11.69	17.95	1,010.19	0.00
19	6.53	12.63	21.84	1,090.93	8.75
20	7.84	12.15	18.25	1,049.38	1.75
21	8.07	12.10	18.25	1,045.79	2.25
22	7.03	11.71	16.62	1,011.98	0.25
23	7.03	11.91	19.96	1,028.93	0.75
24	7.03	12.17	19.76	1,051.13	0.00
25	6.53	11.34	19.65	979.41	0.00
26	6.82	11.35	20.27	980.64	0.00
27	5.61	11.51	22.05	994.33	0.00
28	6.89	11.68	19.96	1,009.45	0.00
29	6.60	11.68	18.05	1,009.20	0.00
Mean	7.21	11.87	19.17	1,025.47	0.82
Minimum	5.61	10.85	16.15	937.50	0.00
Maximum	9.13	13.38	24.92	1,156.34	8.75
Total	n/a	n/a	n/a	30,764.06	24.50

A15-124-05

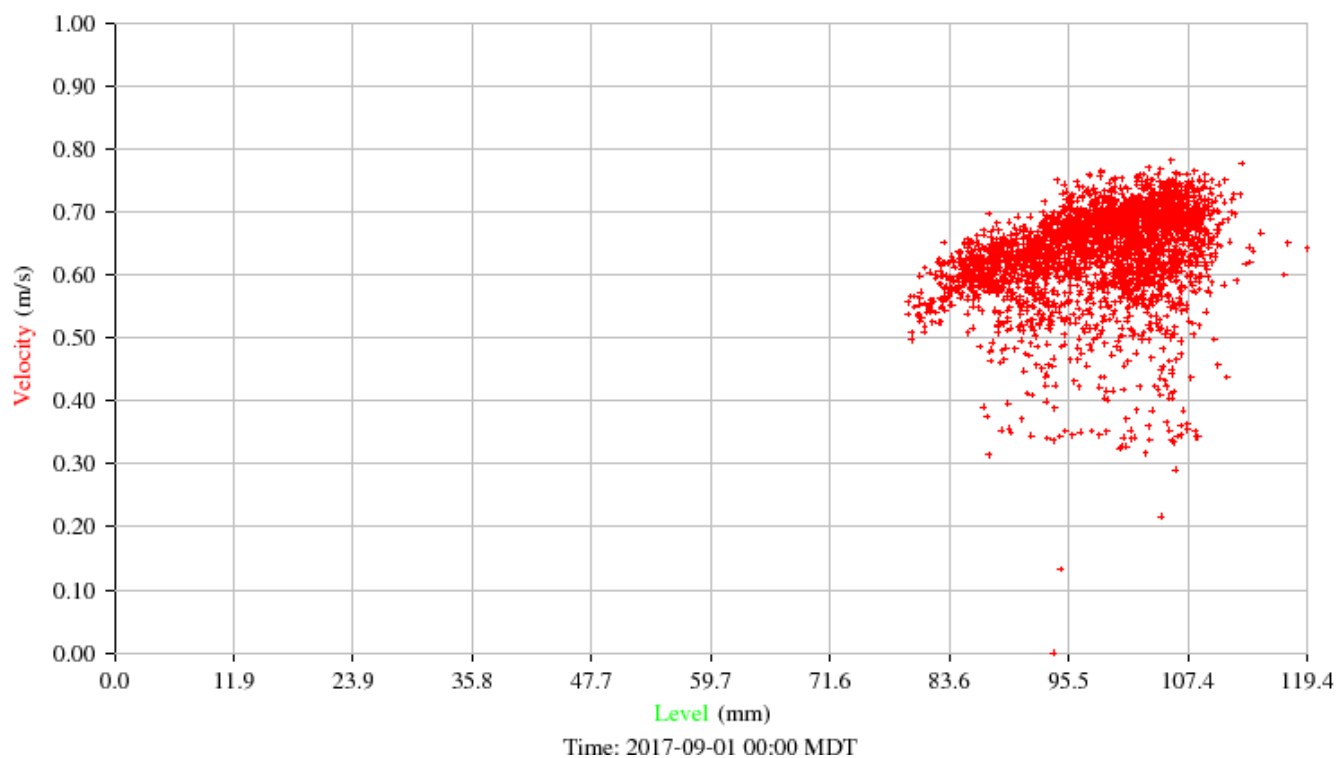
A15-124-05 – Flow with rain intensity



A15-124-05 – Level with velocity and flow



A15-124-05 – Level vs. velocity scatter plot

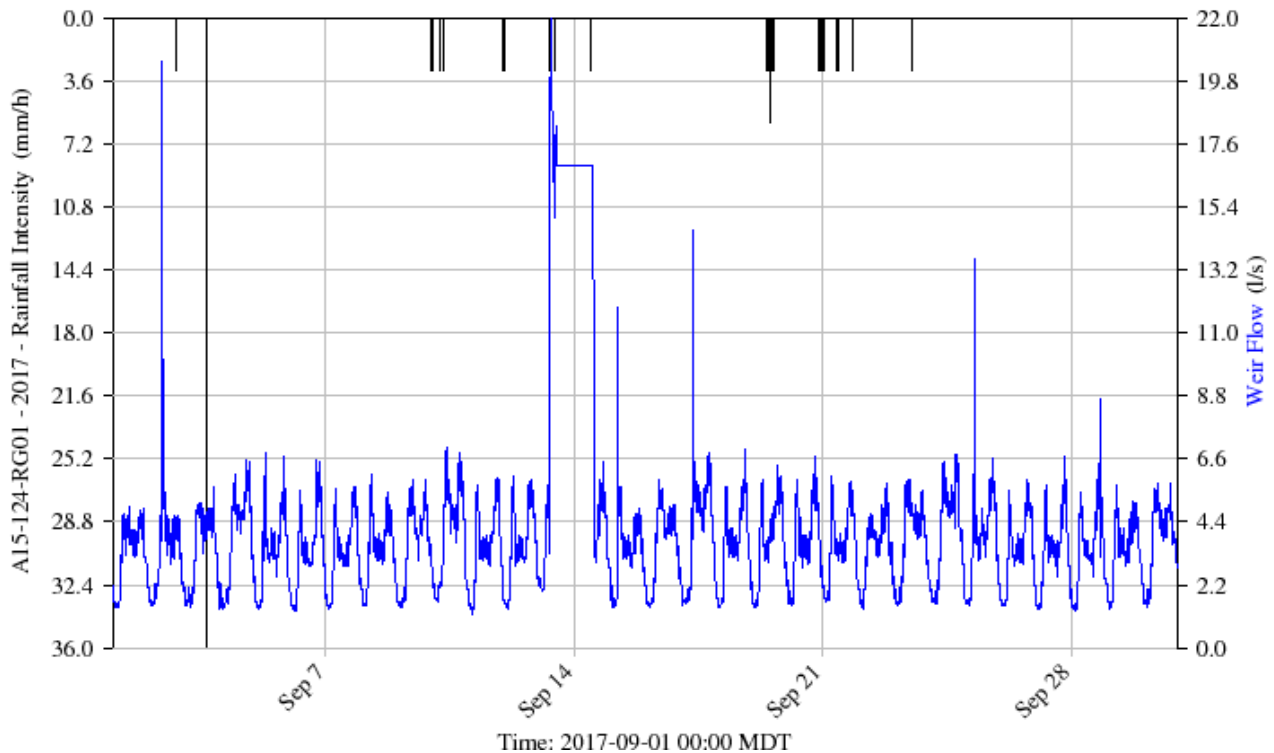


A15-124-05 – Summary report

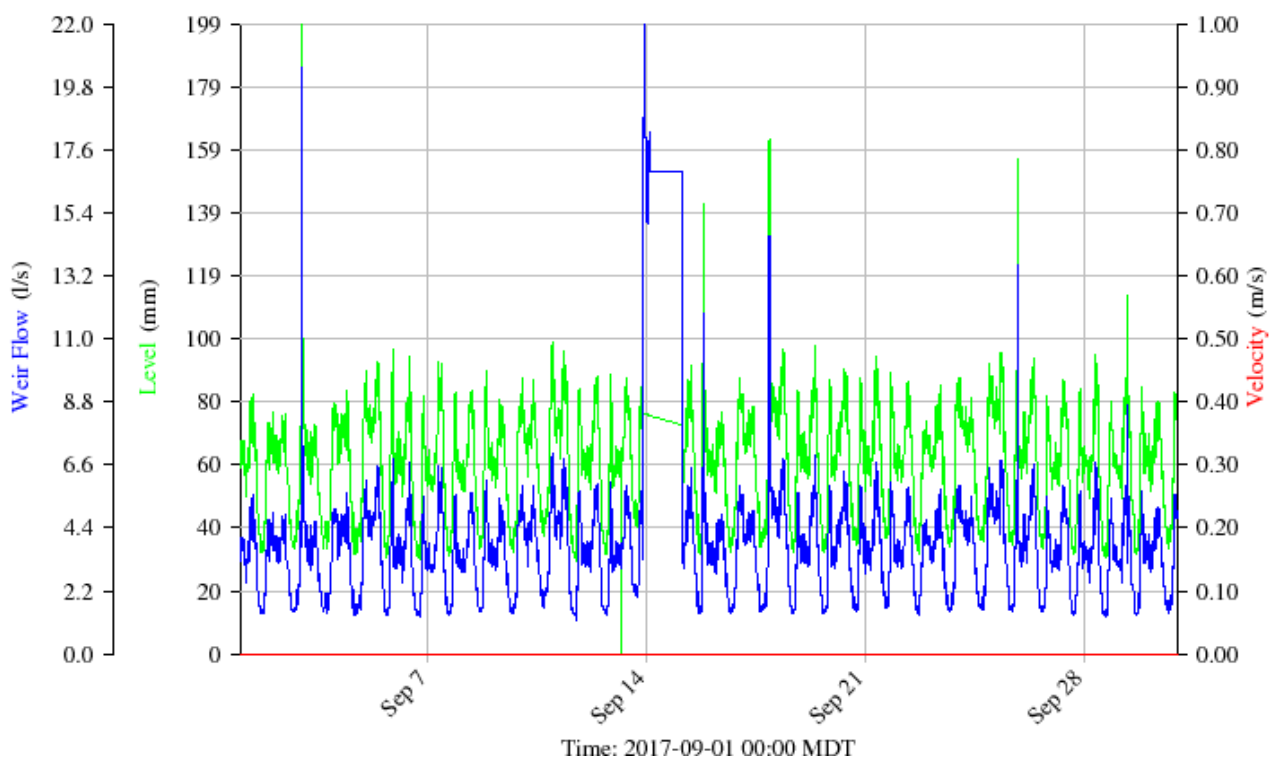
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	9.53	14.17	18.89	1,224.70	0.00
2	8.69	13.62	18.74	1,176.48	0.25
3	8.14	13.68	20.49	1,182.35	6.50
4	7.90	13.91	20.08	1,201.50	0.00
5	8.26	14.20	20.12	1,226.80	0.00
6	9.90	15.16	21.28	1,309.92	0.00
7	10.49	15.79	21.68	1,363.96	0.00
8	9.40	15.84	20.33	1,368.87	0.00
9	9.35	14.81	20.68	1,279.34	0.00
10	9.72	14.91	23.34	1,288.50	2.00
11	9.64	15.01	20.49	1,297.01	0.00
12	10.99	15.87	20.86	1,371.20	1.00
13	9.81	16.22	21.02	1,401.08	0.75
14	10.54	15.74	21.63	1,359.77	0.25
15	9.73	15.70	22.23	1,356.44	0.00
16	9.65	15.72	21.54	1,358.37	0.00
17	10.61	15.32	23.10	1,324.04	0.00
18	-7.30	12.44	18.62	1,074.69	0.00
19	6.33	13.17	20.92	1,137.88	8.75
20	5.50	12.89	18.74	1,114.12	1.75
21	7.05	14.52	19.00	1,254.53	2.25
22	6.52	13.83	18.58	1,195.08	0.25
23	6.75	13.97	19.80	1,206.89	0.75
24	9.76	15.46	21.48	1,335.88	0.00
25	10.00	16.14	21.33	1,394.18	0.00
26	10.46	16.15	25.62	1,395.34	0.00
27	9.97	15.98	21.66	1,380.63	0.00
28	-6.74	13.66	19.82	1,180.55	0.00
29	6.98	12.80	20.31	1,105.93	0.00
Mean	7.80	14.67	20.69	1,267.59	0.82
Minimum	-7.30	12.44	18.44	1,074.69	0.00
Maximum	10.99	16.22	25.62	1,401.08	8.75
Total	n/a	n/a	n/a	38,027.84	24.50

A15-124-06

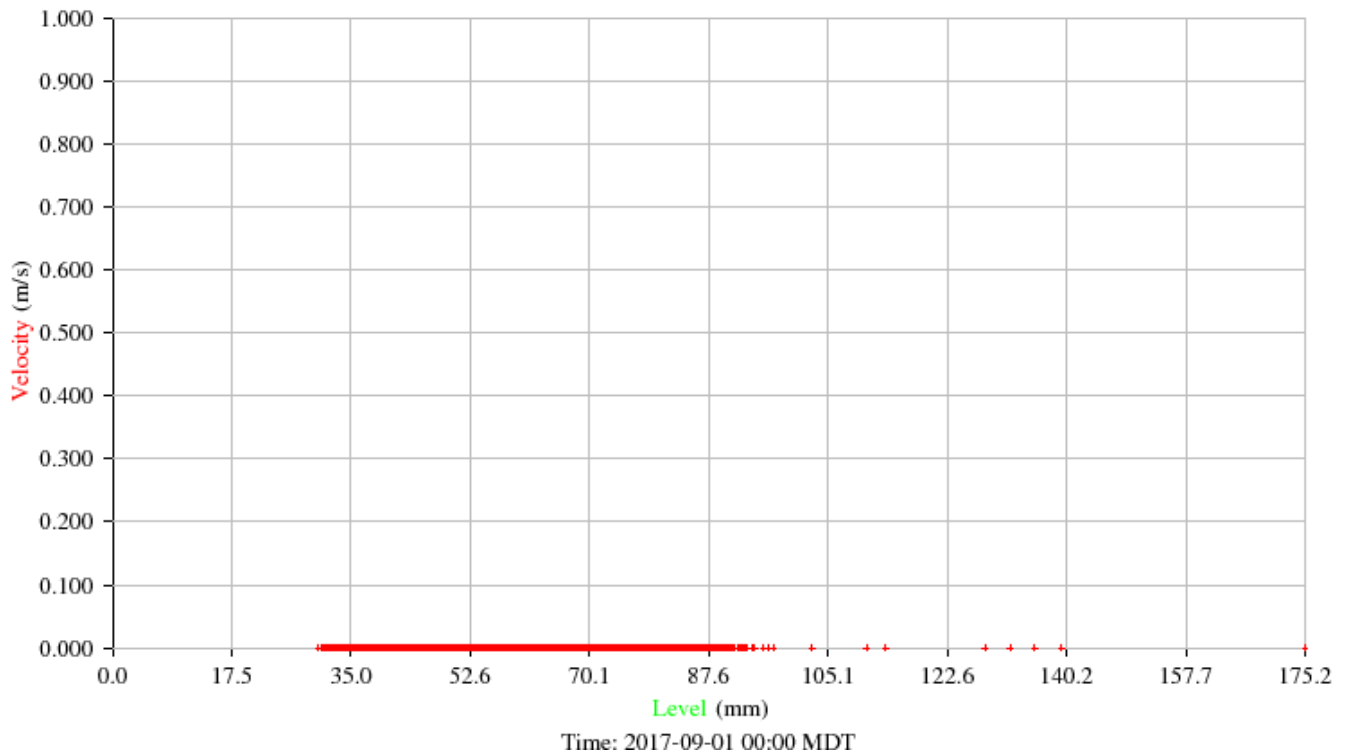
A15-124-06 – Flow with rain intensity



A15-124-06 – Level with velocity and flow



A15-124-06 – Level vs. velocity scatter plot

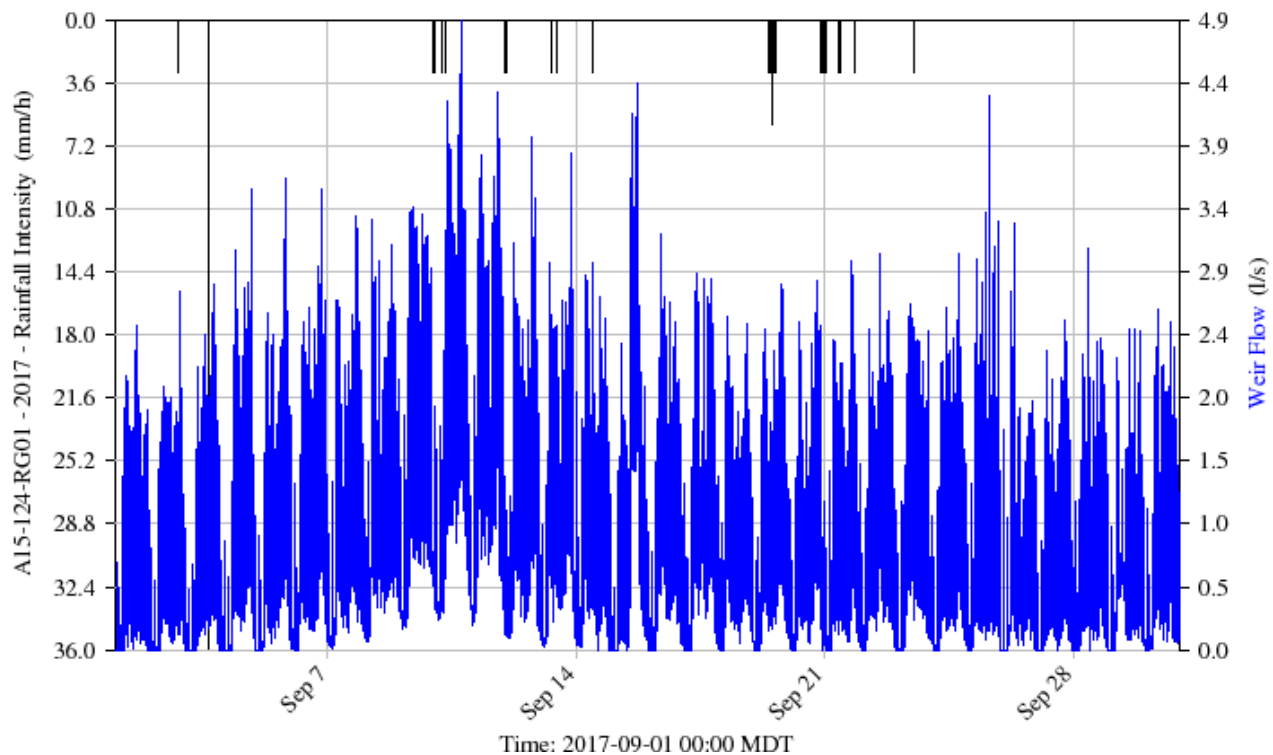


A15-124-06 – Summary report

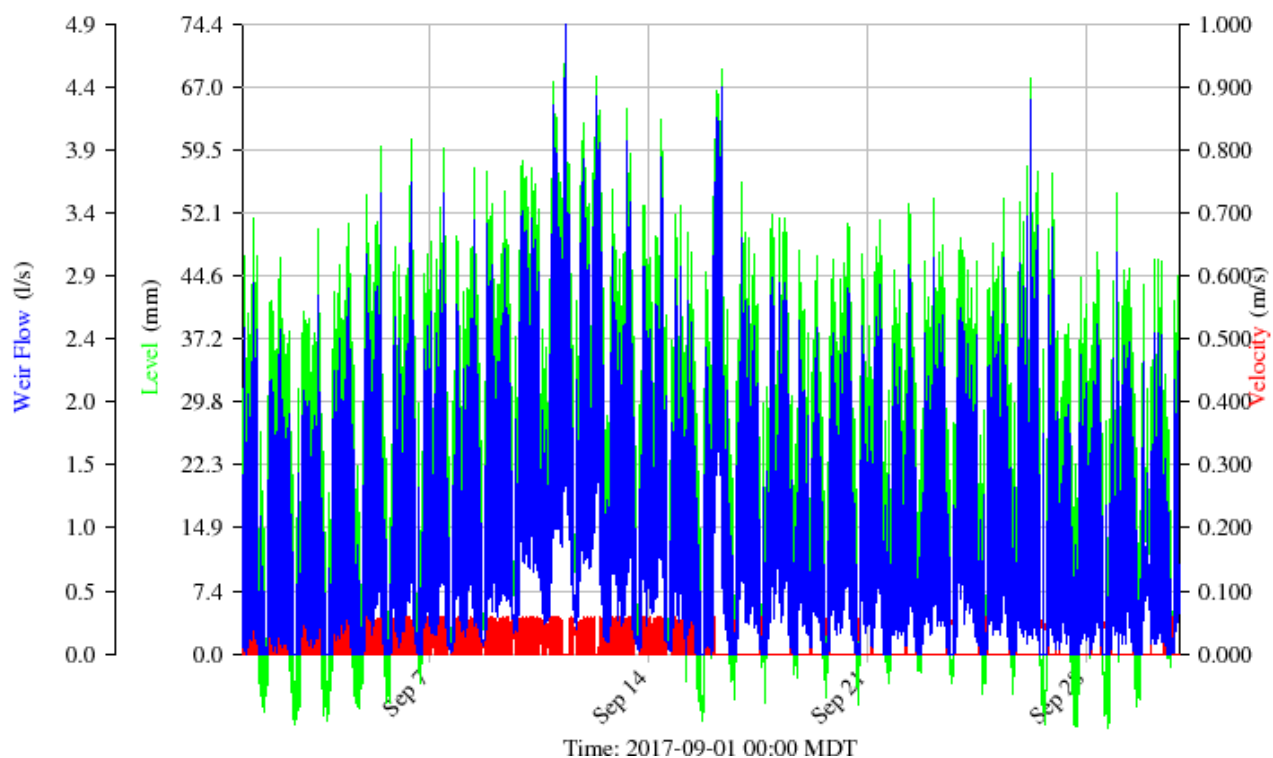
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.40	3.37	4.91	291.23	0.00
2	1.46	3.46	20.49	298.91	0.25
3	1.45	3.43	5.64	296.12	6.50
4	1.38	3.76	6.57	325.14	0.00
5	1.34	3.41	6.83	294.81	0.00
6	1.31	3.38	6.57	292.01	0.00
7	1.36	3.33	5.62	288.00	0.00
8	1.45	3.43	6.06	296.57	0.00
9	1.41	3.59	5.90	310.04	0.00
10	1.62	4.13	6.99	356.69	2.00
11	1.18	3.50	5.92	302.21	0.00
12	1.37	3.48	5.99	300.26	1.00
13	2.00	12.11	22.02	1,046.27	0.75
14	2.98	11.82	16.86	1,021.06	0.25
15	1.39	3.50	11.91	302.64	0.00
16	1.41	3.58	5.89	309.64	0.00
17	1.47	4.11	14.64	355.00	0.00
18	1.41	3.68	6.93	317.64	0.00
19	1.42	3.66	6.40	315.89	8.75
20	1.50	3.65	6.67	315.26	1.75
21	1.60	3.60	6.00	310.84	2.25
22	1.38	3.50	5.75	302.57	0.25
23	1.47	3.71	5.90	320.14	0.75
24	1.55	4.02	6.77	347.30	0.00
25	1.51	3.82	13.57	329.70	0.00
26	1.46	3.44	5.88	297.27	0.00
27	1.38	3.42	6.71	295.52	0.00
28	1.33	3.47	8.72	300.14	0.00
29	1.37	3.43	5.71	295.97	0.00
Mean	1.49	4.15	8.32	358.48	0.82
Minimum	1.18	3.33	4.91	288.00	0.00
Maximum	2.98	12.11	22.02	1,046.27	8.75
Total	n/a	n/a	n/a	10,754.51	24.50

A15-124-08

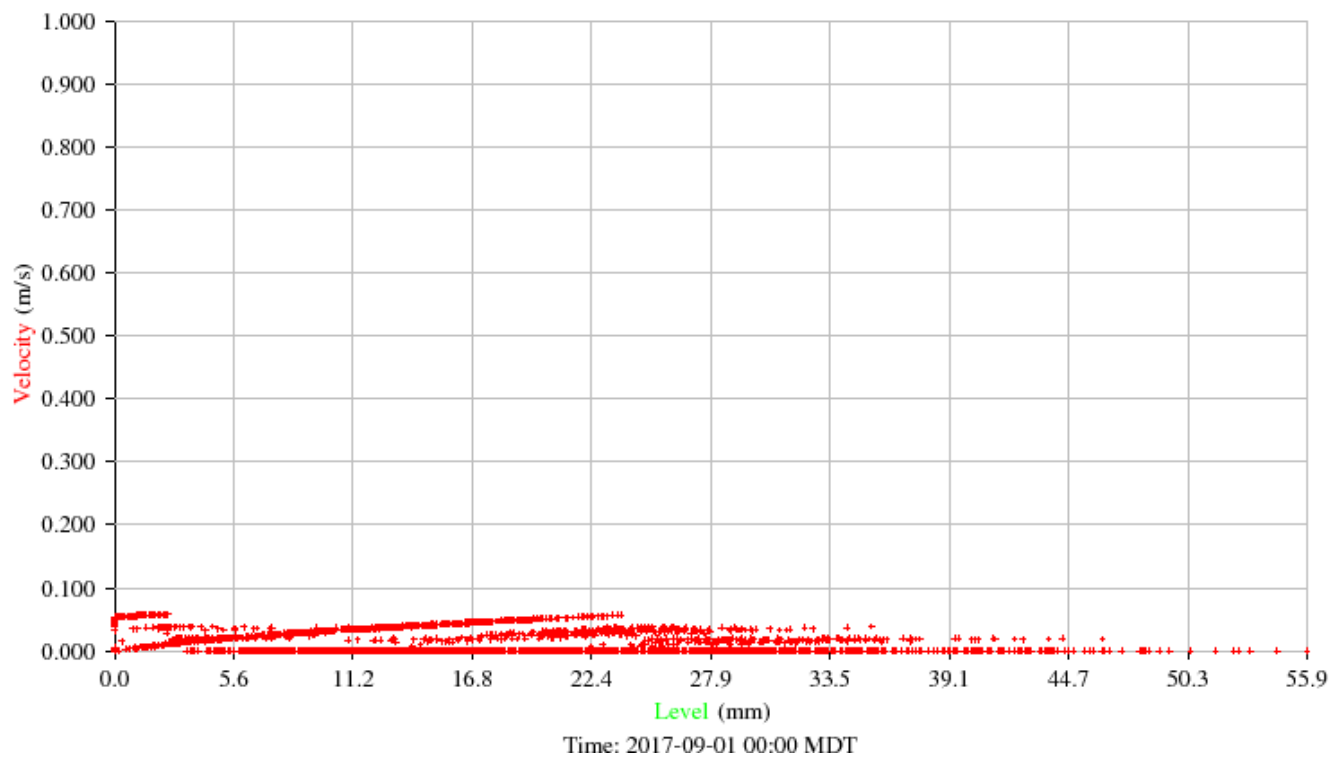
A15-124-08 – Flow with rain intensity



A15-124-08 – Level with velocity and flow



A15-124-08 – Level vs. velocity scatter plot

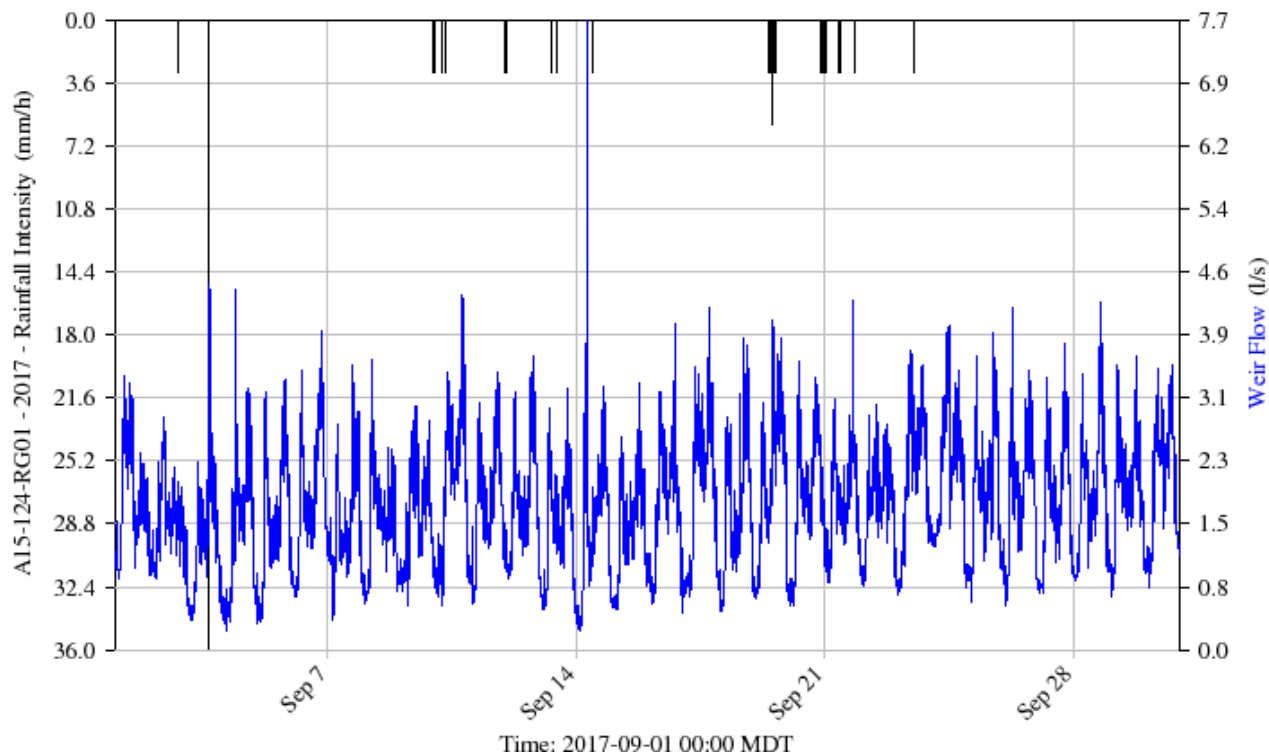


A15-124-08 – Summary report

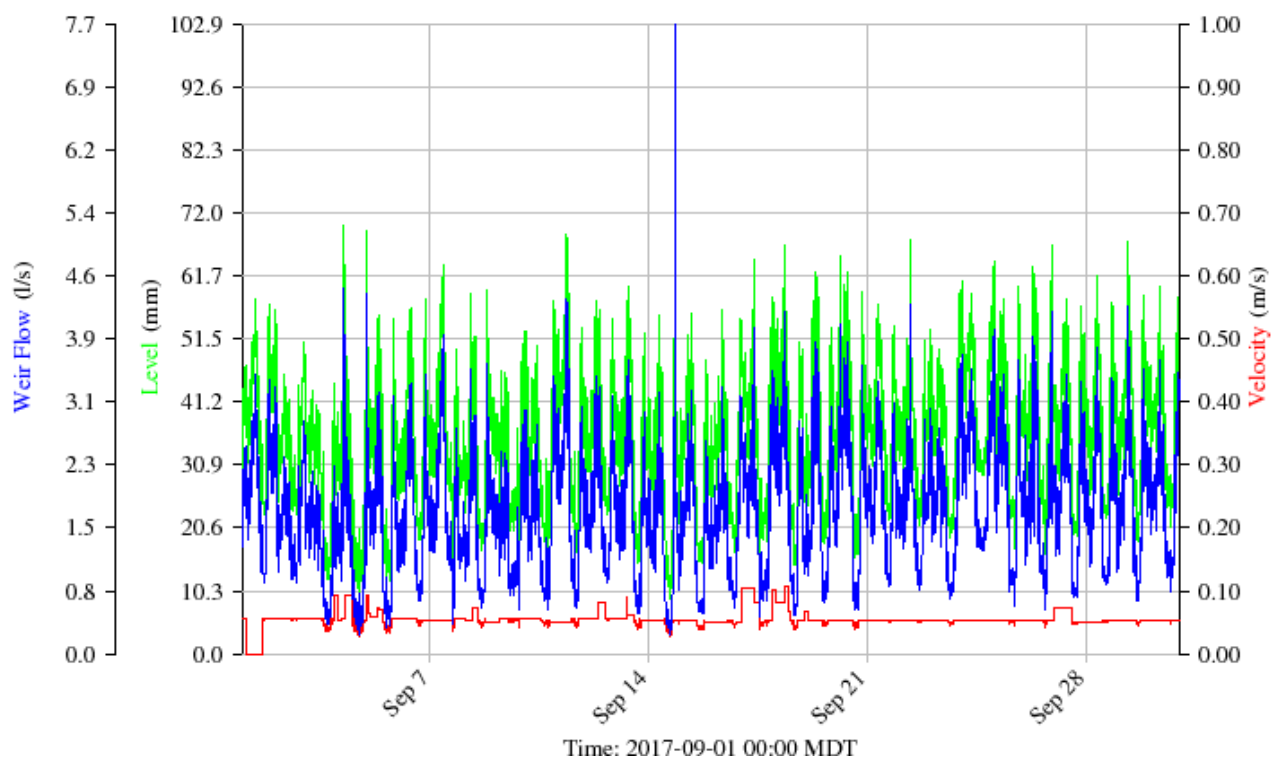
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.00	0.38	2.51	32.59	0.00
2	0.00	0.39	2.78	33.92	0.25
3	0.00	0.44	2.83	37.67	6.50
4	0.00	0.59	3.58	50.81	0.00
5	0.00	0.58	3.66	50.03	0.00
6	0.00	0.66	3.57	56.60	0.00
7	0.01	0.72	3.36	61.83	0.00
8	0.07	0.77	3.34	66.44	0.00
9	0.16	1.10	3.44	94.71	0.00
10	0.23	1.35	4.88	116.98	2.00
11	0.19	1.25	4.32	108.24	0.00
12	0.09	0.87	3.98	74.81	1.00
13	0.03	0.81	3.86	69.67	0.75
14	0.00	0.60	3.00	51.88	0.25
15	0.00	0.82	4.40	71.20	0.00
16	0.00	0.62	3.22	54.00	0.00
17	0.00	0.69	2.92	59.65	0.00
18	0.00	0.56	2.58	48.73	0.00
19	0.00	0.58	2.83	49.85	8.75
20	0.00	0.58	2.86	50.14	1.75
21	0.00	0.53	3.02	46.10	2.25
22	0.00	0.62	3.07	53.25	0.25
23	0.00	0.59	2.69	51.08	0.75
24	0.00	0.57	3.07	48.94	0.00
25	0.00	0.50	4.30	42.96	0.00
26	0.00	0.40	3.32	34.82	0.00
27	0.00	0.42	2.56	36.45	0.00
28	0.00	0.47	3.12	40.33	0.00
29	0.00	0.43	2.49	37.43	0.00
Mean	0.03	0.64	3.27	55.73	0.82
Minimum	0.00	0.38	2.49	32.59	0.00
Maximum	0.23	1.35	4.88	116.98	8.75
Total	n/a	n/a	n/a	1,671.83	24.50

A15-124-09

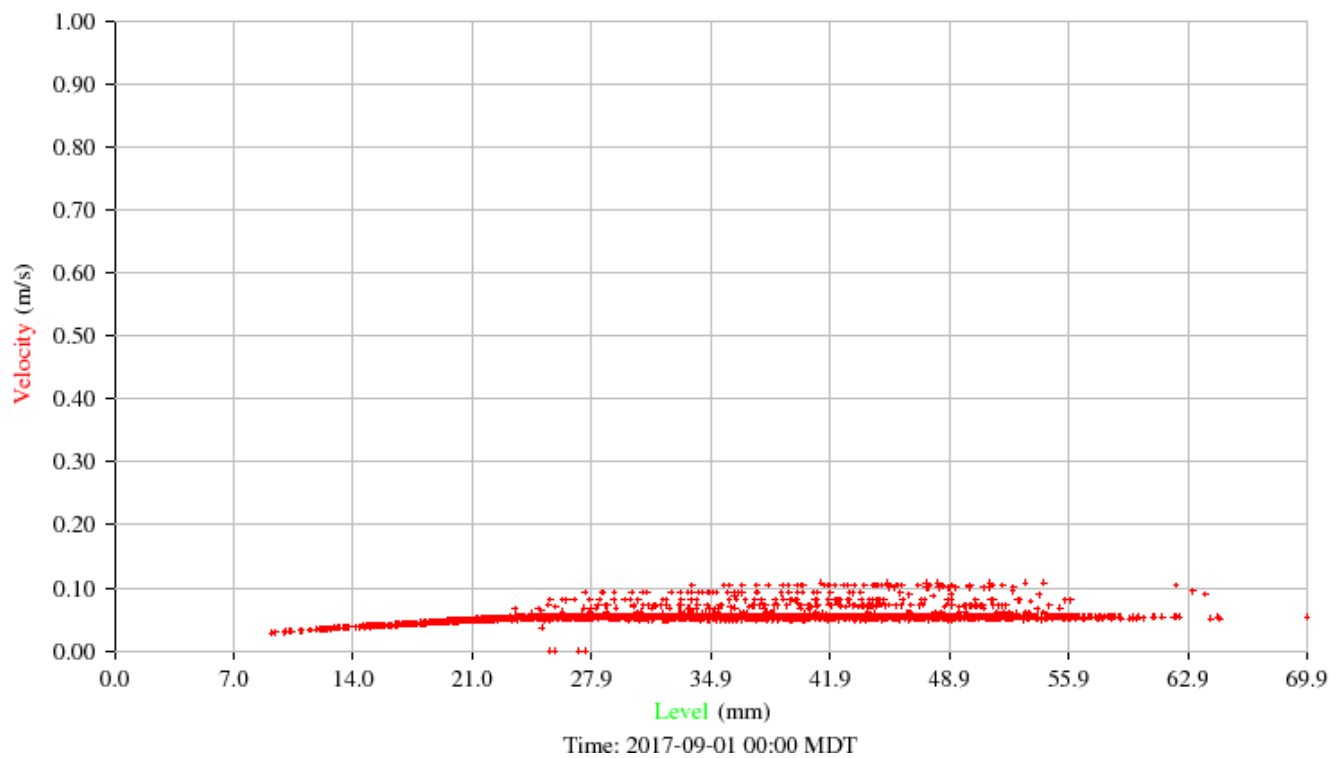
A15-124-09 – Flow with rain intensity



A15-124-09 – Level with velocity and flow



A15-124-09 – Level vs. velocity scatter plot

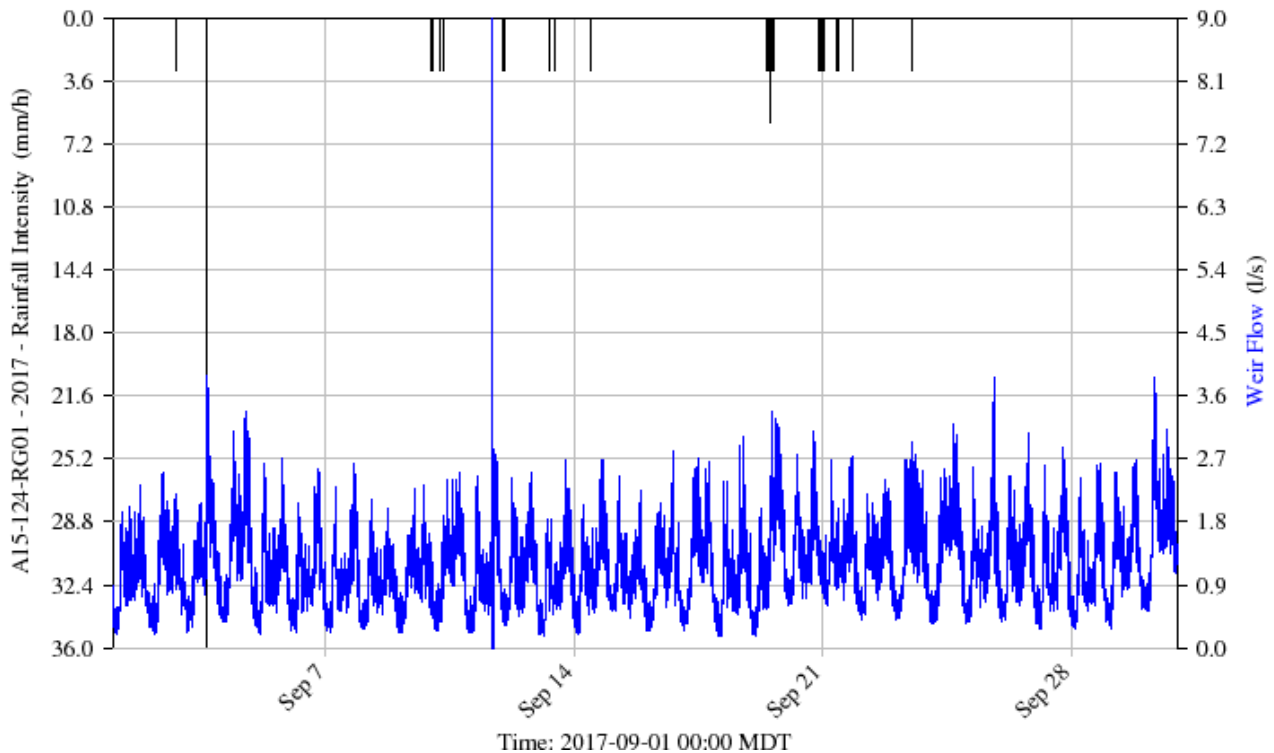


A15-124-09 – Summary report

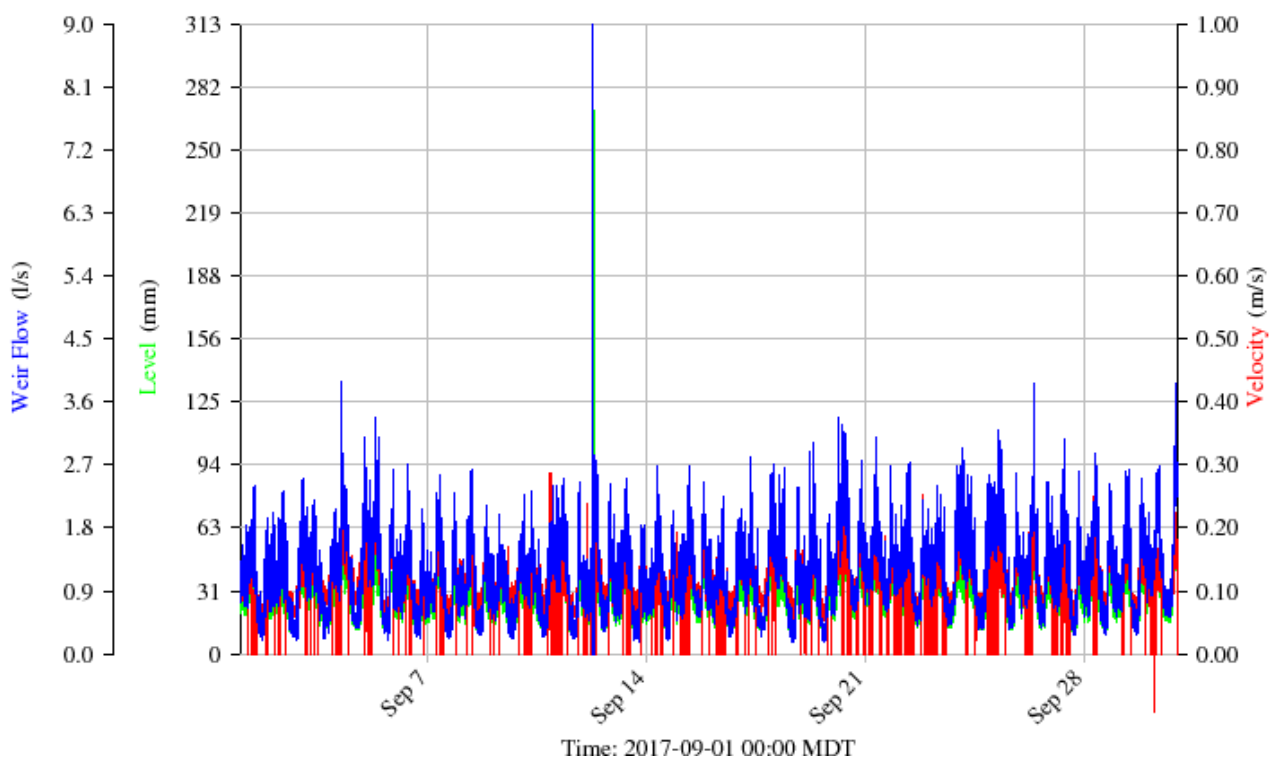
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.87	1.81	3.35	156.01	0.00
2	0.87	1.57	2.84	135.51	0.25
3	0.36	1.31	4.47	112.80	6.50
4	0.22	1.38	4.40	119.33	0.00
5	0.33	1.52	3.30	131.44	0.00
6	0.66	1.87	3.90	161.64	0.00
7	0.37	1.55	3.49	134.03	0.00
8	0.57	1.55	3.55	133.91	0.00
9	0.53	1.58	2.98	136.23	0.00
10	0.55	1.94	4.34	167.61	2.00
11	0.56	1.76	3.39	152.34	0.00
12	0.86	1.81	3.58	156.66	1.00
13	0.49	1.48	3.19	128.27	0.75
14	0.22	1.45	7.70	125.34	0.25
15	0.49	1.46	3.26	126.49	0.00
16	0.56	1.74	3.99	150.75	0.00
17	0.46	1.94	4.18	167.82	0.00
18	0.47	1.71	3.80	147.88	0.00
19	0.63	2.01	4.04	173.53	8.75
20	0.53	1.83	3.53	157.71	1.75
21	0.82	1.83	4.26	157.70	2.25
22	0.78	1.81	2.99	156.23	0.25
23	0.67	2.03	3.66	175.27	0.75
24	1.09	2.22	3.96	191.72	0.00
25	0.59	1.90	3.88	164.18	0.00
26	0.55	1.88	4.19	162.62	0.00
27	0.69	1.83	3.75	157.87	0.00
28	0.84	1.92	4.24	165.89	0.00
29	0.65	1.93	3.58	166.71	0.00
Mean	0.60	1.75	3.84	151.61	0.82
Minimum	0.22	1.31	2.84	112.80	0.00
Maximum	1.09	2.22	7.70	191.72	8.75
Total	n/a	n/a	n/a	4,548.41	24.50

A15-124-10

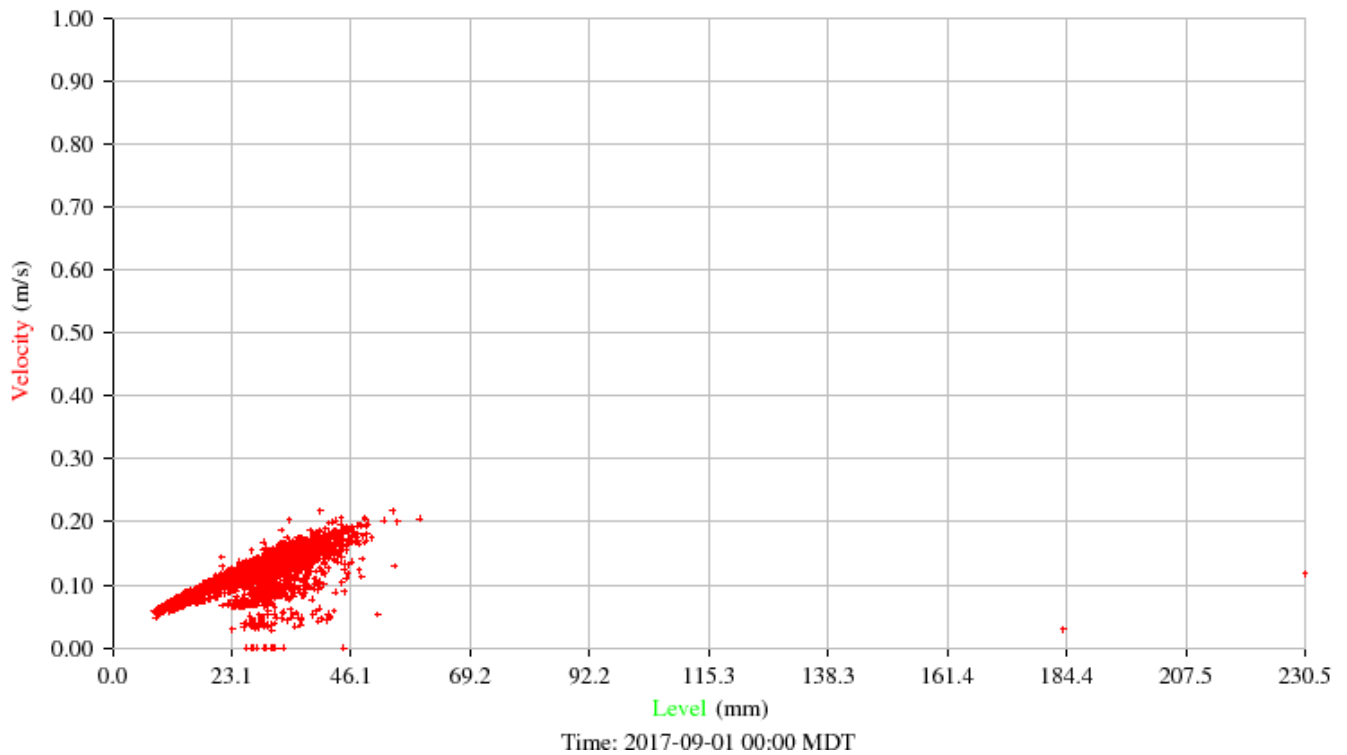
A15-124-10 – Flow with rain intensity



A15-124-10 – Level with velocity and flow



A15-124-10 – Level vs. velocity scatter plot

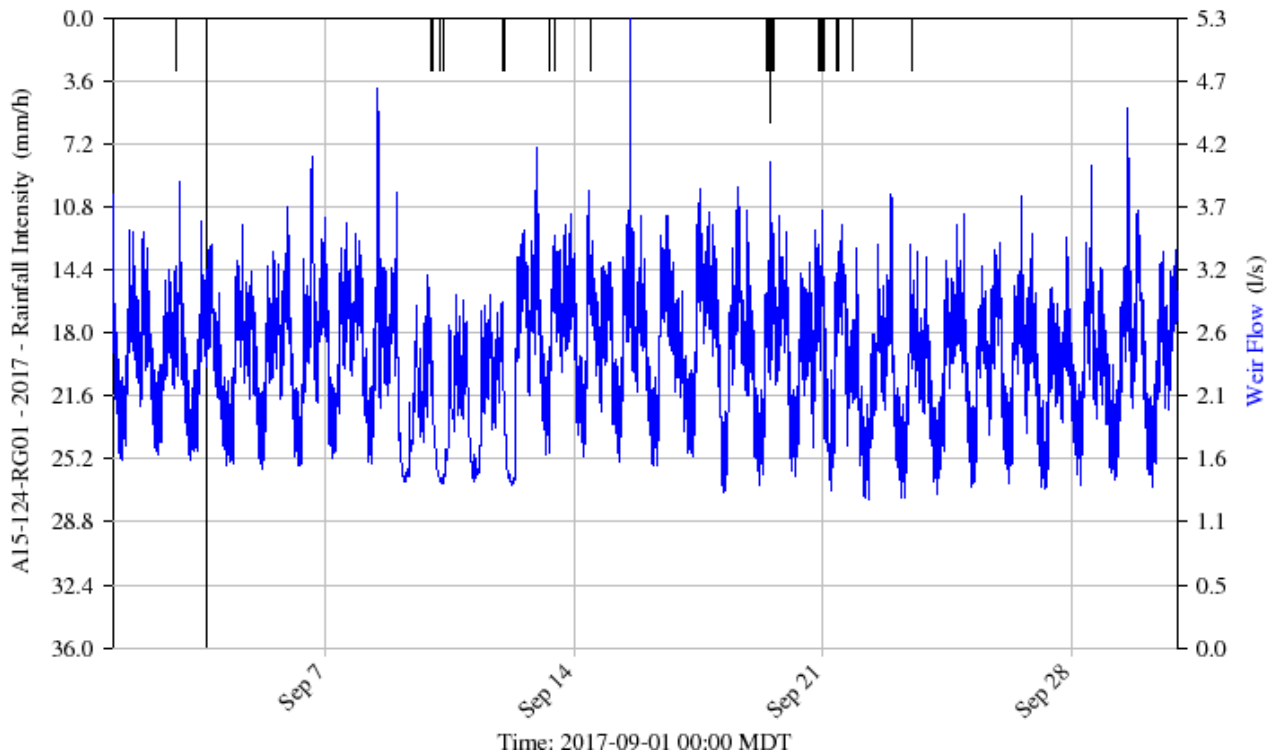


A15-124-10 – Summary report

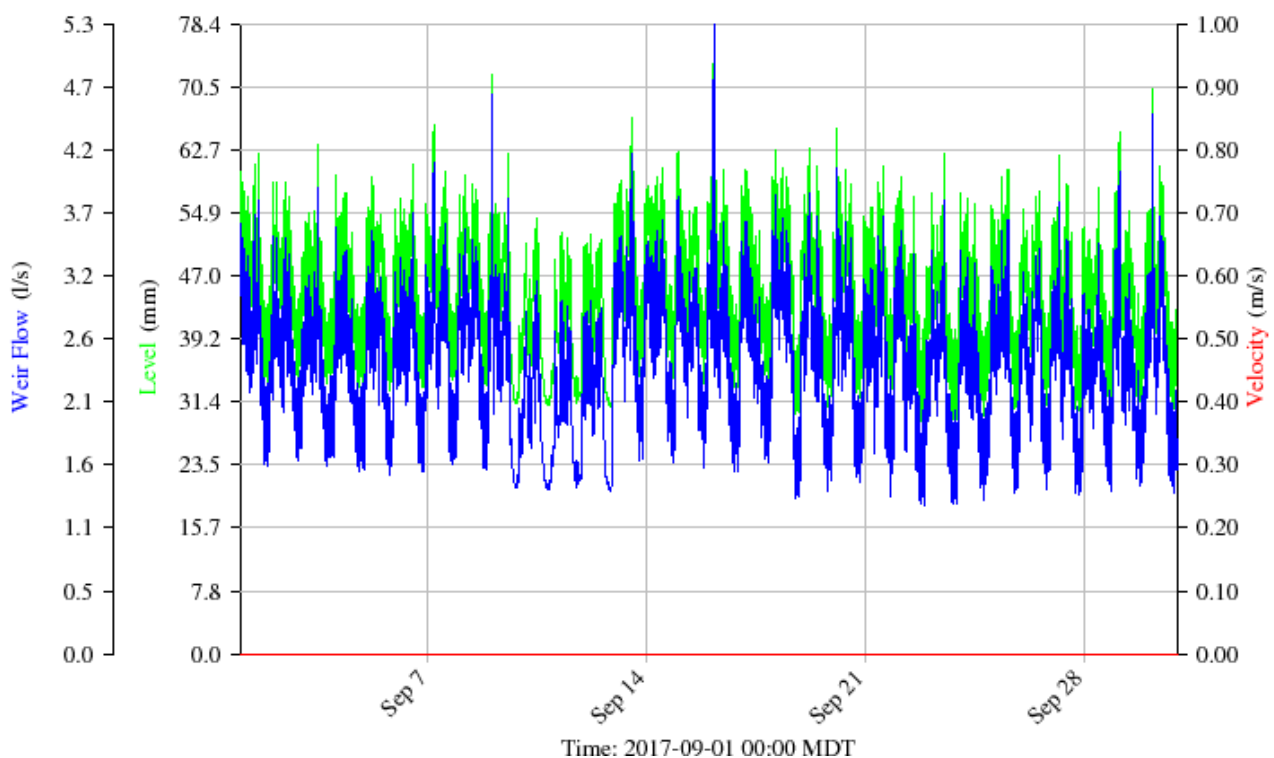
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.19	1.02	2.32	88.06	0.00
2	0.19	1.05	2.51	90.74	0.25
3	0.22	1.21	3.90	104.21	6.50
4	0.36	1.36	3.39	117.25	0.00
5	0.20	1.02	2.70	88.15	0.00
6	0.22	1.02	2.57	88.48	0.00
7	0.22	0.98	2.64	84.87	0.00
8	0.27	0.91	2.13	78.31	0.00
9	0.22	0.98	2.33	84.98	0.00
10	0.24	1.16	2.52	100.17	2.00
11	0.00	1.05	9.01	90.92	0.00
12	0.32	1.09	2.50	93.77	1.00
13	0.18	0.96	2.70	82.87	0.75
14	0.20	1.02	2.70	88.52	0.25
15	0.43	1.04	2.47	89.96	0.00
16	0.25	1.04	2.83	89.69	0.00
17	0.25	1.19	2.72	102.76	0.00
18	0.16	0.97	3.02	83.77	0.00
19	0.17	1.35	3.37	116.86	8.75
20	0.60	1.33	3.11	115.02	1.75
21	0.60	1.33	2.74	114.57	2.25
22	0.40	1.21	2.41	104.39	0.25
23	0.41	1.32	2.95	113.88	0.75
24	0.35	1.41	3.19	121.44	0.00
25	0.36	1.23	3.86	106.42	0.00
26	0.38	1.21	3.09	104.57	0.00
27	0.26	1.16	2.87	100.08	0.00
28	0.28	1.07	2.64	92.26	0.00
29	0.27	1.27	2.68	109.33	0.00
Mean	0.29	1.15	3.06	99.43	0.82
Minimum	0.00	0.91	2.13	78.31	0.00
Maximum	0.60	1.58	9.01	136.66	8.75
Total	n/a	n/a	n/a	2,982.94	24.50

A15-124-11

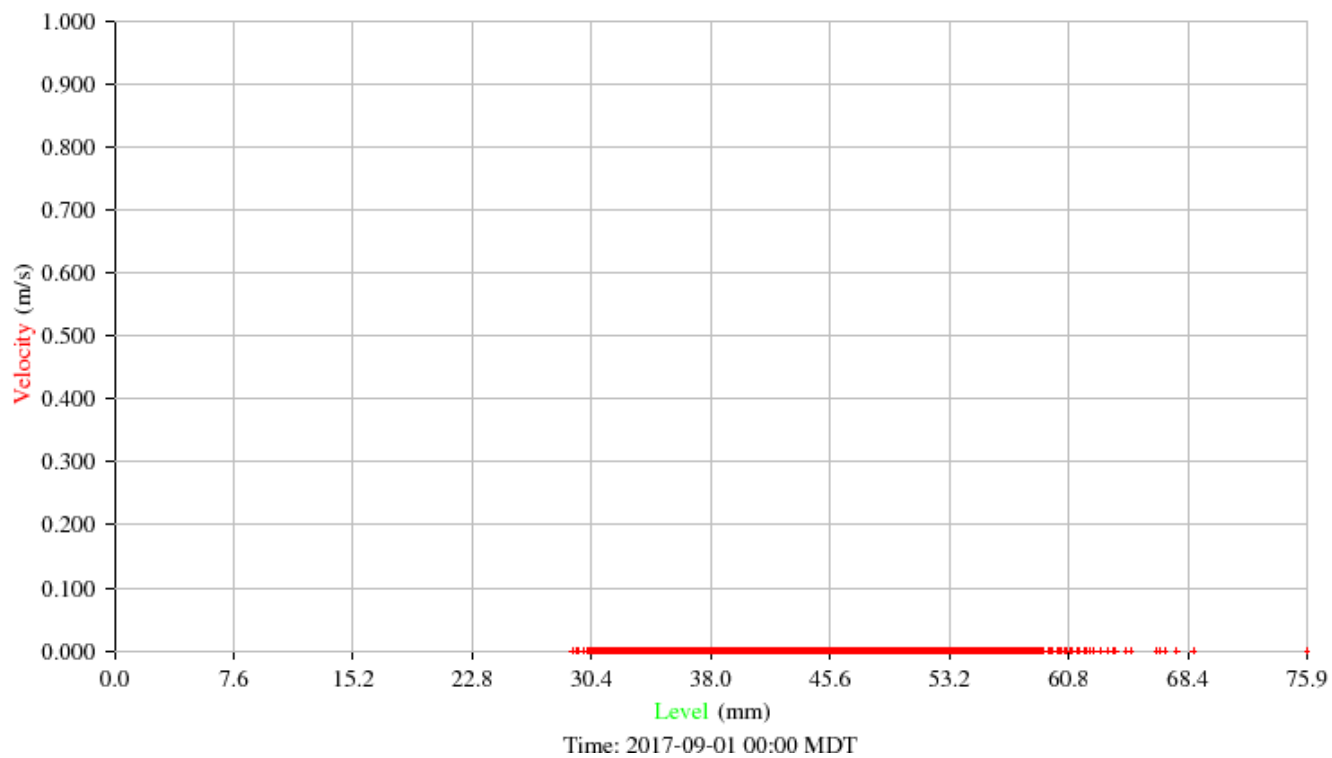
A15-124-11 – Flow with rain intensity



A15-124-11 – Level with velocity and flow



A15-124-11 – Level vs. velocity scatter plot

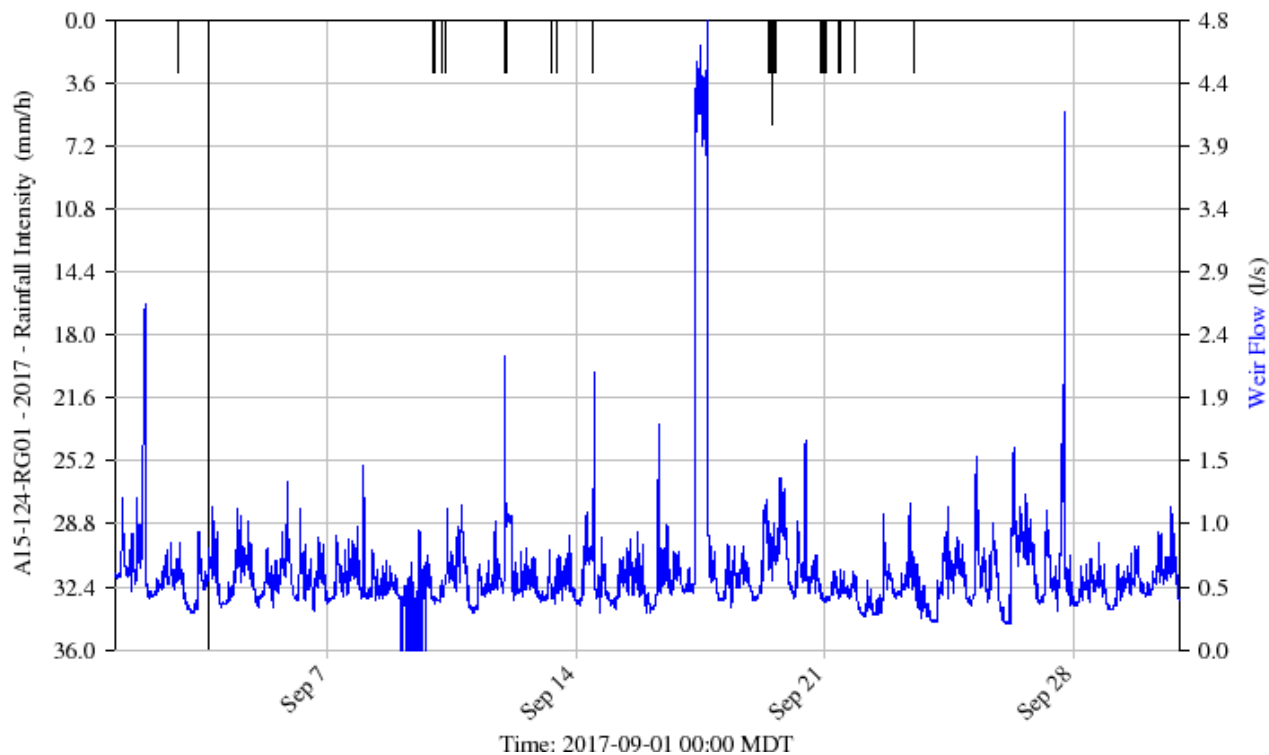


A15-124-11 – Summary report

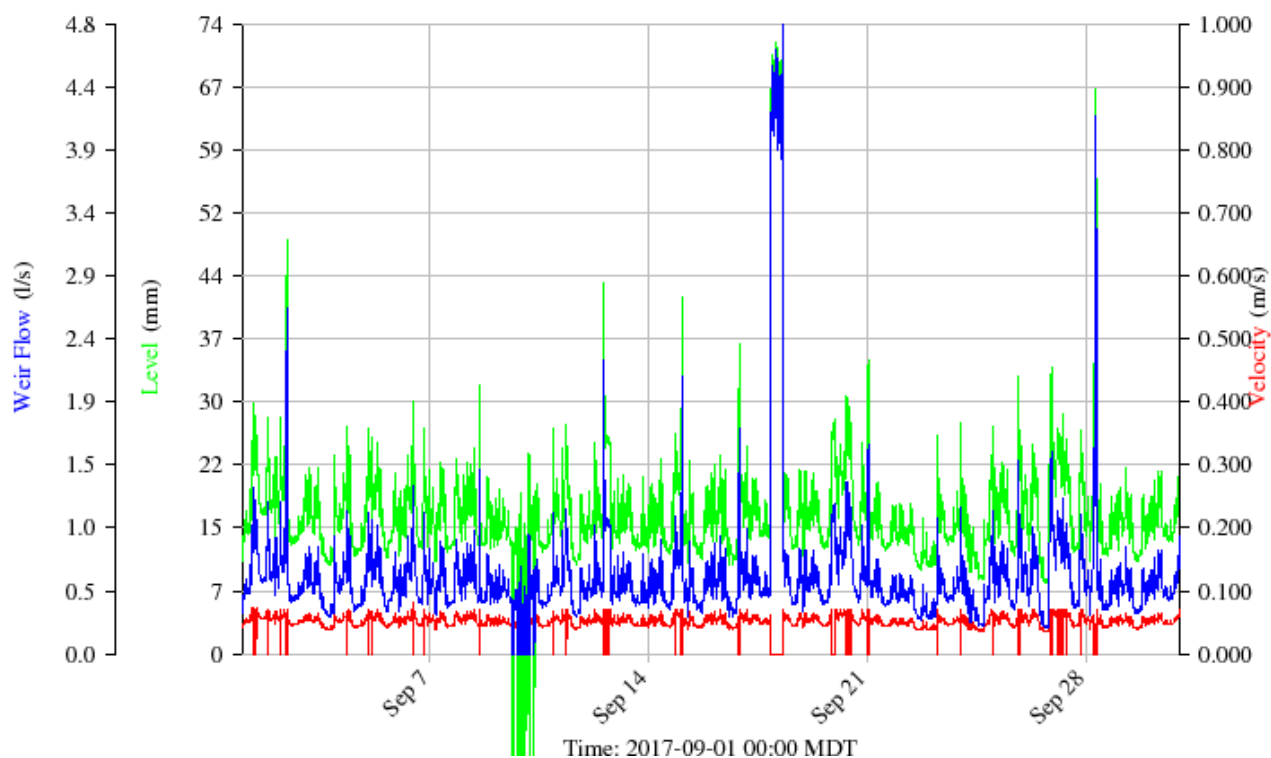
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.57	2.52	3.78	217.77	0.00
2	1.62	2.46	3.90	212.27	0.25
3	1.56	2.41	3.56	208.53	6.50
4	1.52	2.37	3.54	204.58	0.00
5	1.49	2.46	3.68	212.45	0.00
6	1.52	2.53	4.10	218.17	0.00
7	1.59	2.60	3.59	224.47	0.00
8	1.54	2.54	4.67	219.34	0.00
9	1.38	2.05	3.80	177.35	0.00
10	1.38	1.94	2.95	167.42	2.00
11	1.39	2.08	2.94	179.61	0.00
12	1.36	2.45	4.18	211.49	1.00
13	1.61	2.72	3.63	234.97	0.75
14	1.59	2.62	3.82	226.75	0.25
15	1.56	2.68	5.26	231.36	0.00
16	1.52	2.53	3.61	218.78	0.00
17	1.60	2.64	3.83	227.97	0.00
18	1.30	2.51	3.85	216.53	0.00
19	1.35	2.50	4.06	216.31	8.75
20	1.43	2.44	3.48	210.39	1.75
21	1.31	2.41	3.66	208.33	2.25
22	1.24	2.30	3.79	198.41	0.25
23	1.26	2.23	3.37	192.99	0.75
24	1.28	2.32	3.53	200.34	0.00
25	1.35	2.38	3.62	205.25	0.00
26	1.37	2.45	3.77	211.89	0.00
27	1.33	2.29	3.43	197.68	0.00
28	1.35	2.38	4.02	205.26	0.00
29	1.41	2.48	4.51	214.07	0.00
Mean	1.44	2.42	3.78	209.17	0.82
Minimum	1.24	1.94	2.94	167.42	0.00
Maximum	1.62	2.72	5.26	234.97	8.75
Total	n/a	n/a	n/a	6,275.22	24.50

A15-124-12A

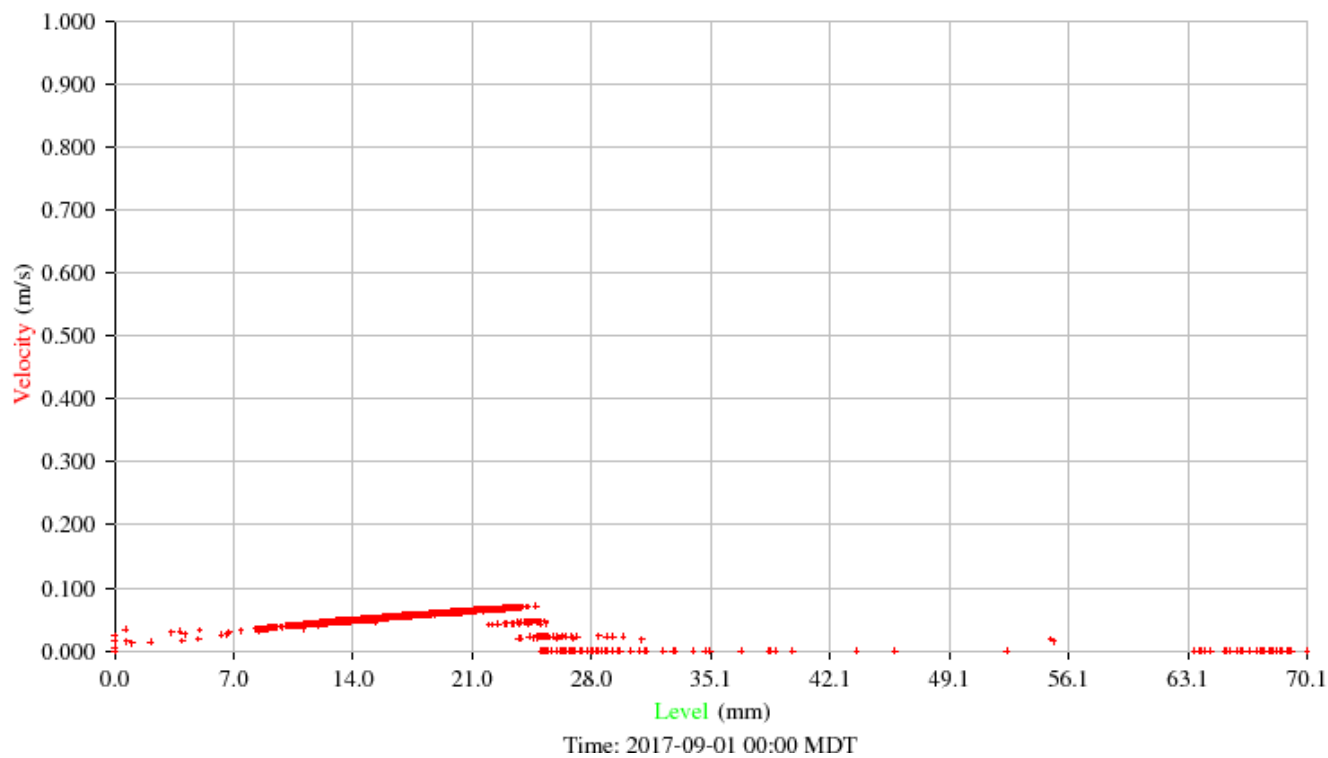
A15-124-12A – Flow with rain intensity



A15-124-12A – Level with velocity and flow



A15-124-12A – Level vs. velocity scatter plot

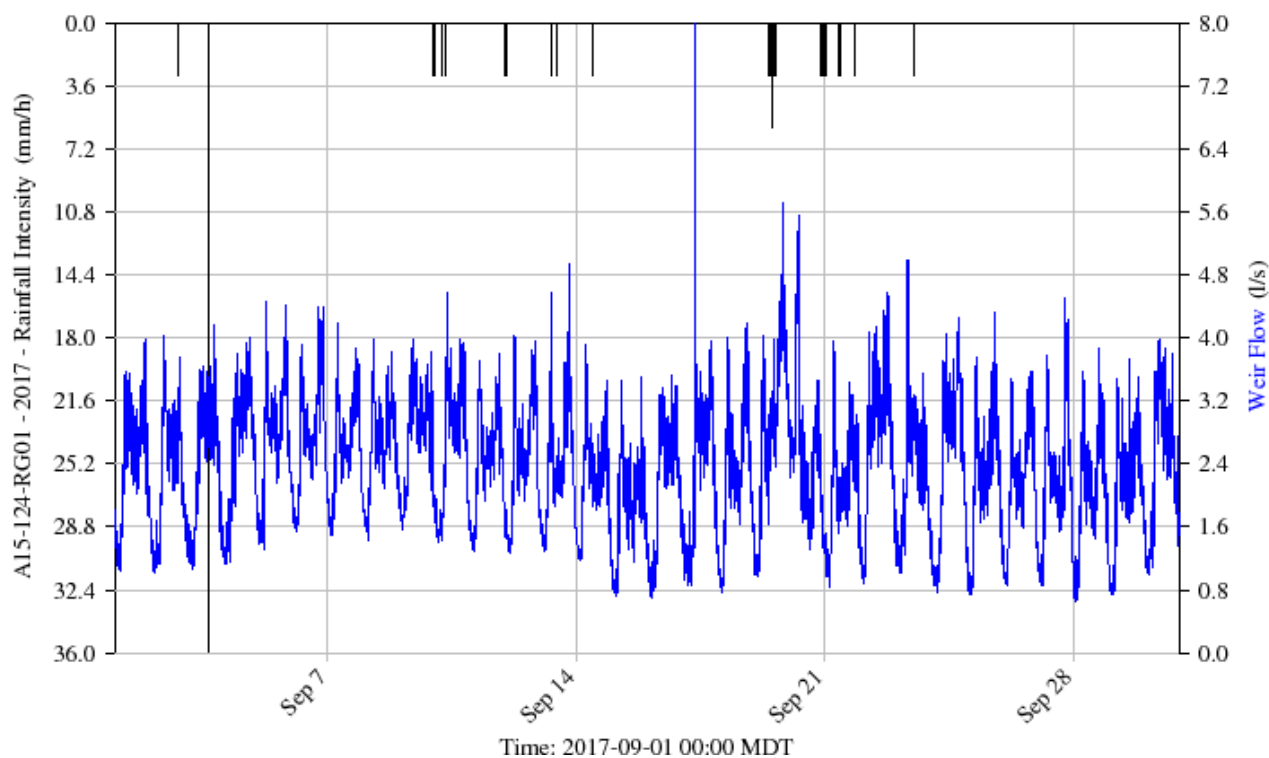


A15-124-12A – Summary report

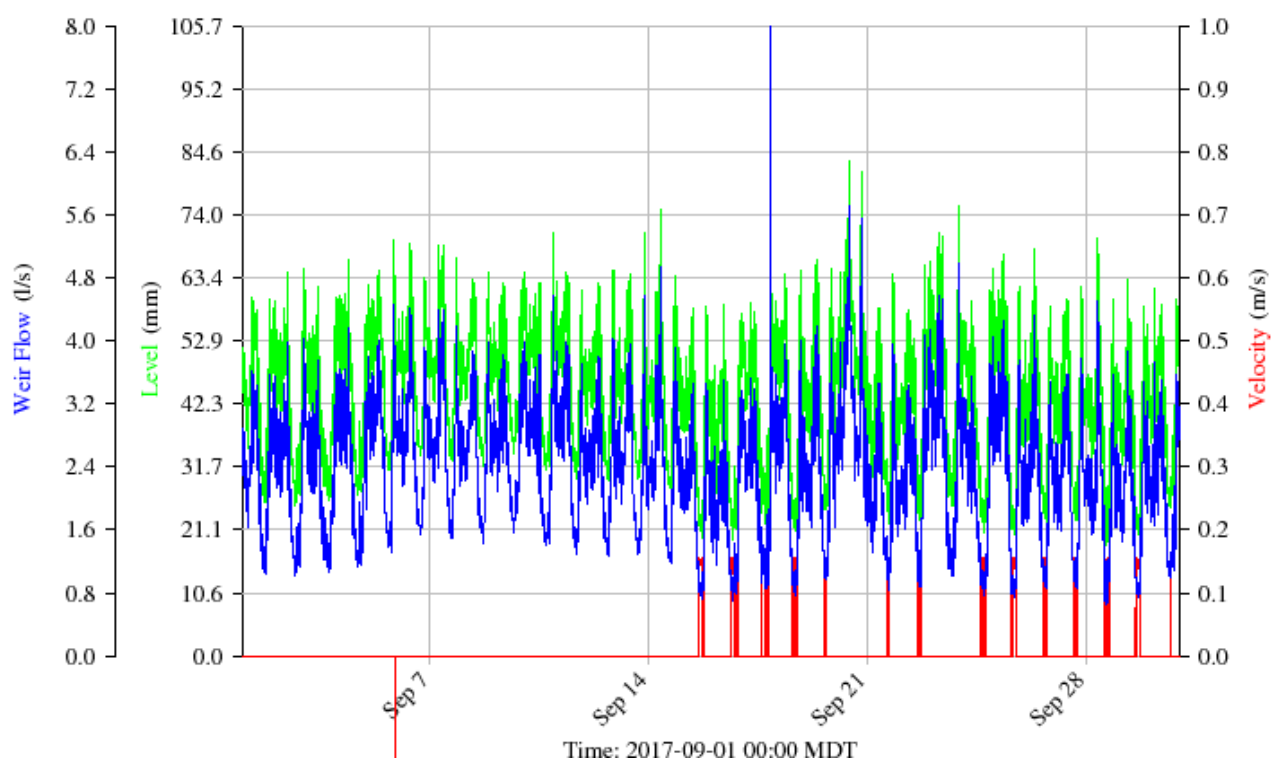
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.37	0.75	2.66	64.42	0.00
2	0.40	0.53	0.82	45.83	0.25
3	0.28	0.50	1.10	43.58	6.50
4	0.33	0.56	1.09	48.30	0.00
5	0.32	0.56	1.29	48.33	0.00
6	0.30	0.54	1.09	46.84	0.00
7	0.35	0.54	0.95	46.98	0.00
8	0.38	0.50	1.42	43.56	0.00
9	0.00	0.37	0.92	31.78	0.00
10	0.36	0.58	1.12	49.86	2.00
11	0.28	0.47	0.99	40.50	0.00
12	0.38	0.65	2.26	55.75	1.00
13	0.36	0.49	0.87	42.72	0.75
14	0.29	0.56	2.14	48.75	0.25
15	0.31	0.52	0.90	44.66	0.00
16	0.28	0.55	1.74	47.50	0.00
17	0.44	1.90	4.84	163.85	0.00
18	0.33	0.53	0.81	45.84	0.00
19	0.38	0.74	1.32	63.87	8.75
20	0.38	0.58	1.61	50.30	1.75
21	0.34	0.46	0.61	39.33	2.25
22	0.25	0.40	1.04	34.20	0.25
23	0.24	0.47	1.13	40.44	0.75
24	0.22	0.53	1.10	45.91	0.00
25	0.32	0.58	1.48	50.44	0.00
26	0.20	0.70	1.55	60.12	0.00
27	0.30	0.66	4.14	57.01	0.00
28	0.34	0.48	0.82	41.04	0.00
29	0.31	0.49	0.80	42.18	0.00
Mean	0.32	0.59	1.46	51.15	0.82
Minimum	0.00	0.37	0.61	31.78	0.00
Maximum	0.44	1.90	4.84	163.85	8.75
Total	n/a	n/a	n/a	1,534.61	24.50

A15-124-12B

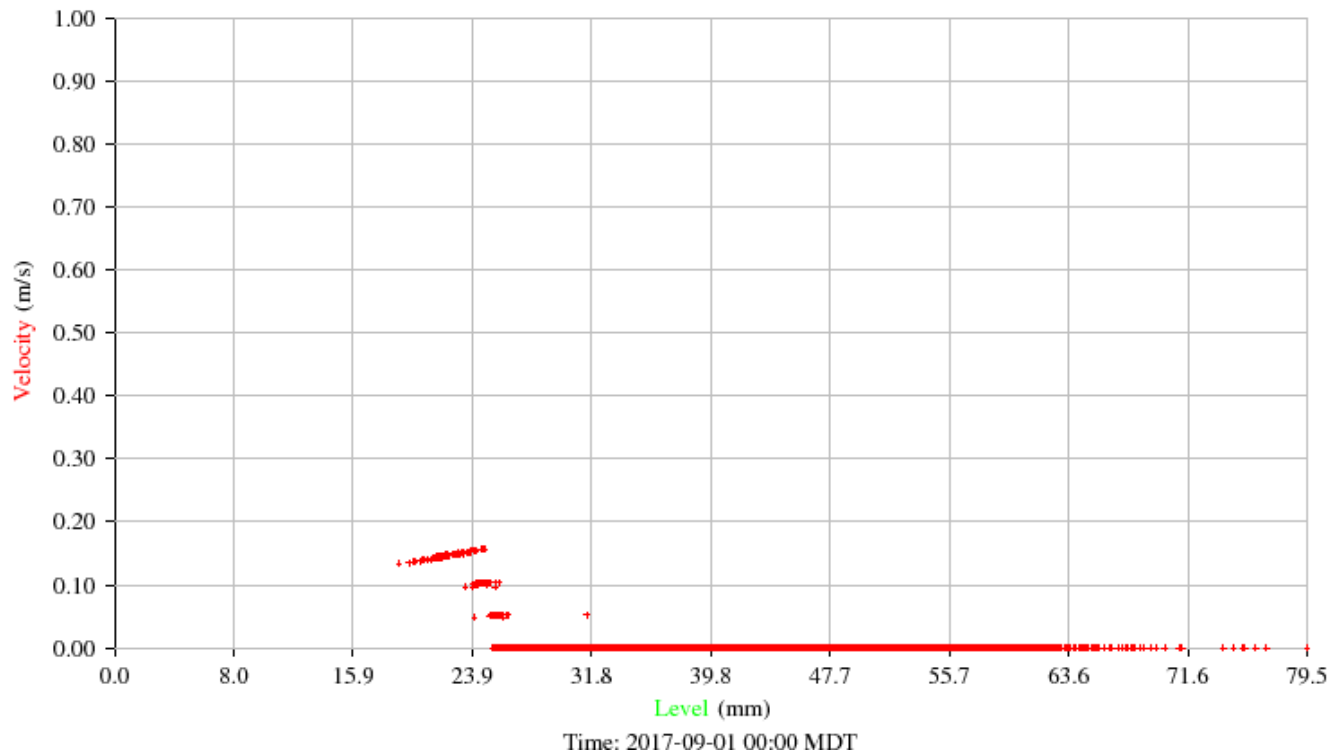
A15-124-12B – Flow with rain intensity



A15-124-12B – Level with velocity and flow



A15-124-12B – Level vs. velocity scatter plot



A15-124-12B – Summary report

	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.04	2.34	3.97	202.24	0.00
2	1.01	2.25	4.02	194.16	0.25
3	1.07	2.36	4.17	204.21	6.50
4	1.13	2.51	3.99	216.97	0.00
5	1.32	2.69	4.46	232.18	0.00
6	1.55	2.72	4.40	234.99	0.00
7	1.50	2.60	4.19	225.05	0.00
8	1.44	2.60	3.99	224.40	0.00
9	1.57	2.69	3.99	232.35	0.00
10	1.40	2.63	4.58	226.99	2.00
11	1.29	2.43	3.81	210.15	0.00
12	1.27	2.44	4.02	210.51	1.00
13	1.30	2.41	4.94	208.41	0.75
14	1.18	2.20	3.92	190.27	0.25
15	0.71	1.87	3.49	161.42	0.00
16	0.69	2.08	3.54	179.67	0.00
17	0.85	2.28	7.99	197.28	0.00
18	0.77	2.21	4.18	190.88	0.00
19	0.97	2.79	5.70	240.90	8.75
20	1.32	2.59	5.55	223.70	1.75
21	0.85	2.09	3.96	180.63	2.25
22	0.87	2.72	4.58	235.27	0.25
23	1.01	2.26	4.99	195.57	0.75
24	0.76	2.38	4.24	205.93	0.00
25	0.74	2.19	4.32	189.27	0.00
26	0.86	2.15	3.57	185.74	0.00
27	0.87	2.15	4.50	185.58	0.00
28	0.65	2.01	3.87	173.67	0.00
29	0.74	2.07	3.73	179.08	0.00
Mean	1.06	2.37	4.35	204.68	0.82
Minimum	0.65	1.87	3.49	161.42	0.00
Maximum	1.57	2.79	7.99	240.90	8.75
Total	n/a	n/a	n/a	6,140.48	24.50



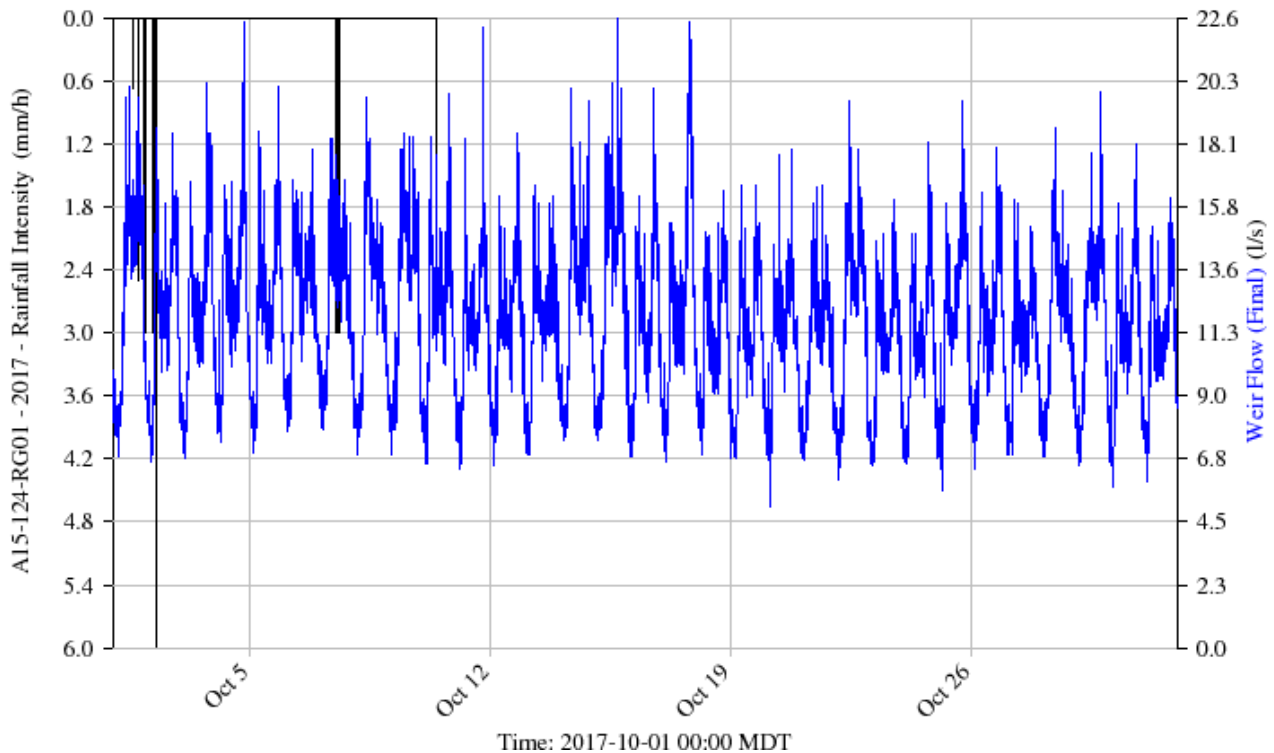
Monthly Report

A15-124 - Cold Lake TFM

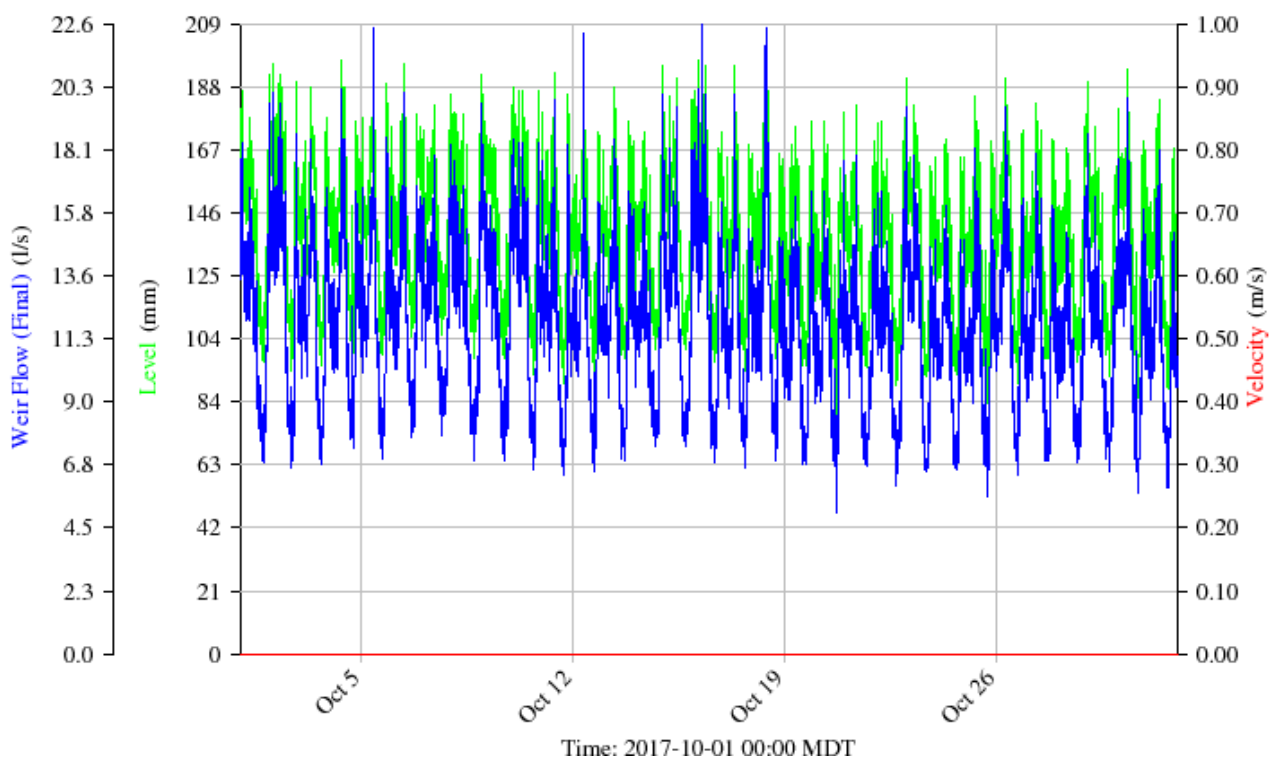
October 2017

A15-124-01

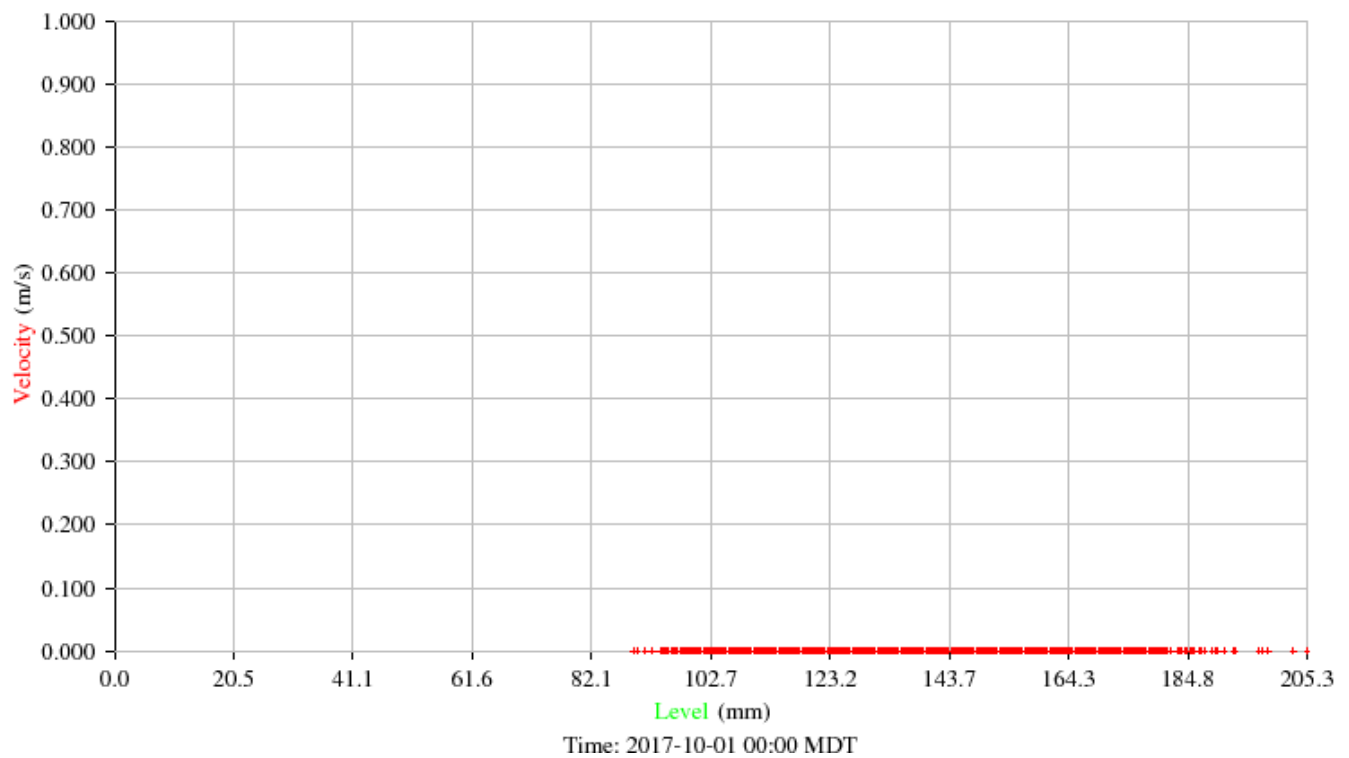
A15-124-01 – Flow with rain intensity



A15-124-01 – Level with velocity and flow



A15-124-01 – Level vs. velocity scatter plot

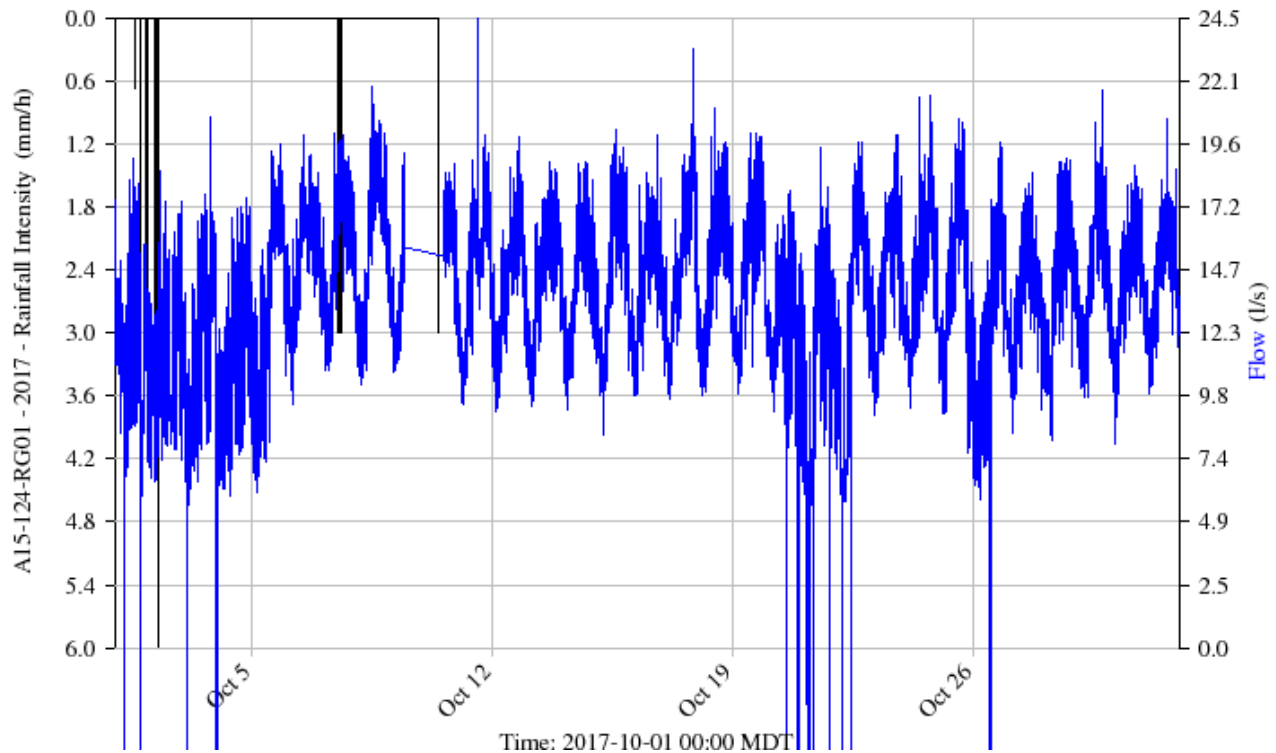


A15-124-01 – Summary report

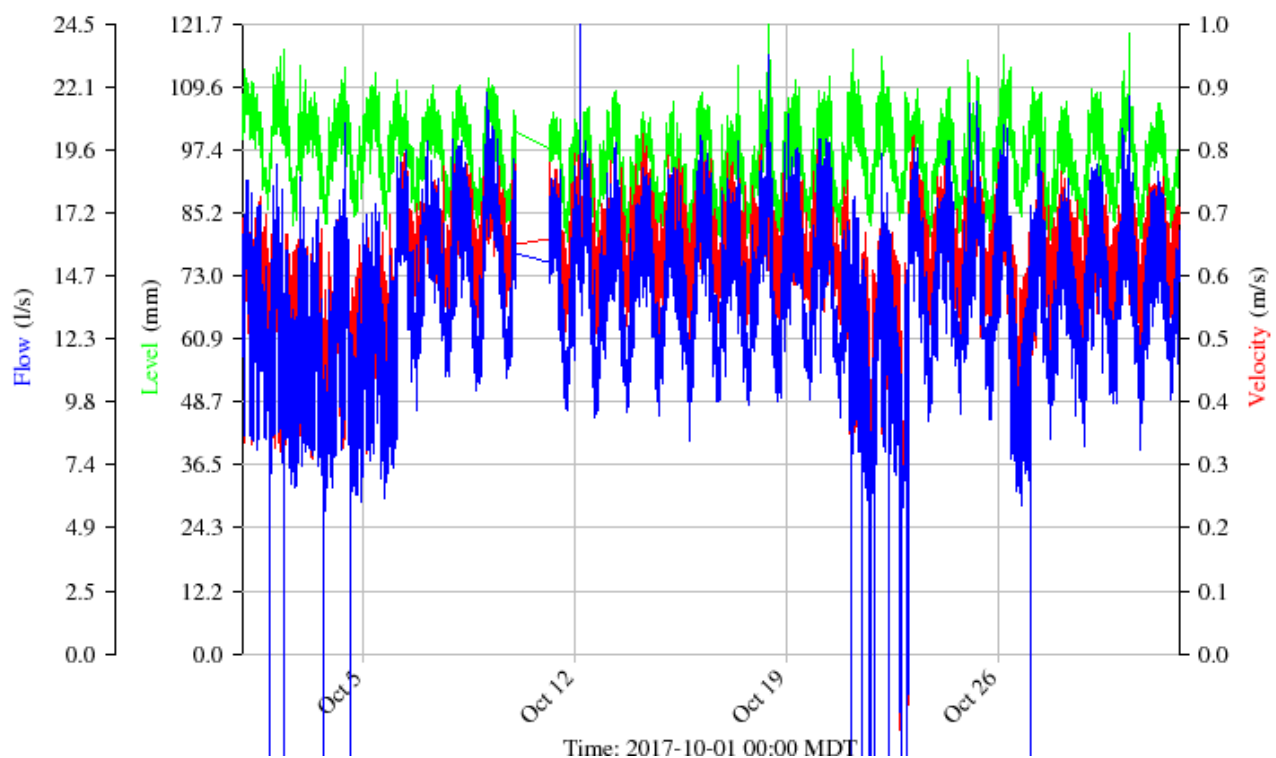
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	6.89	12.84	20.17	1,109.78	1.83
2	6.67	11.83	18.64	1,022.03	3.25
3	6.82	12.23	20.27	1,056.68	0.00
4	7.40	12.42	22.48	1,073.49	0.00
5	7.03	12.25	20.17	1,058.59	0.00
6	7.77	12.47	17.86	1,077.07	0.00
7	7.84	12.60	18.25	1,088.40	2.75
8	6.96	12.38	19.76	1,069.82	0.00
9	6.96	12.70	18.44	1,096.86	0.00
10	6.60	11.95	19.86	1,032.49	0.53
11	6.39	11.42	22.27	986.39	n/a
12	6.53	11.52	18.44	995.34	n/a
13	6.96	11.42	16.62	986.34	n/a
14	7.47	12.22	20.06	1,055.86	n/a
15	7.47	12.89	22.59	1,113.71	n/a
16	6.89	11.58	20.06	1,000.13	n/a
17	6.67	12.27	22.48	1,060.13	n/a
18	6.96	11.08	16.43	957.58	n/a
19	6.82	11.00	16.62	950.44	n/a
20	5.06	10.97	17.86	947.58	n/a
21	6.74	10.98	16.62	949.02	n/a
22	6.02	11.90	19.65	1,027.85	n/a
23	6.53	10.83	16.05	935.34	n/a
24	6.60	10.83	18.15	935.91	n/a
25	5.61	11.77	19.65	1,017.35	n/a
26	6.39	11.29	17.95	975.17	n/a
27	6.96	10.89	16.05	941.30	n/a
28	6.89	11.50	18.64	993.73	n/a
29	6.53	11.69	19.96	1,009.88	n/a
30	5.75	11.06	18.05	955.42	n/a
Mean	6.71	11.73	18.91	1,013.62	0.84
Minimum	5.06	10.83	16.05	935.34	0.00
Maximum	7.84	12.89	22.59	1,113.71	3.25
Total	n/a	n/a	n/a	31,422.32	8.36

A15-124-05

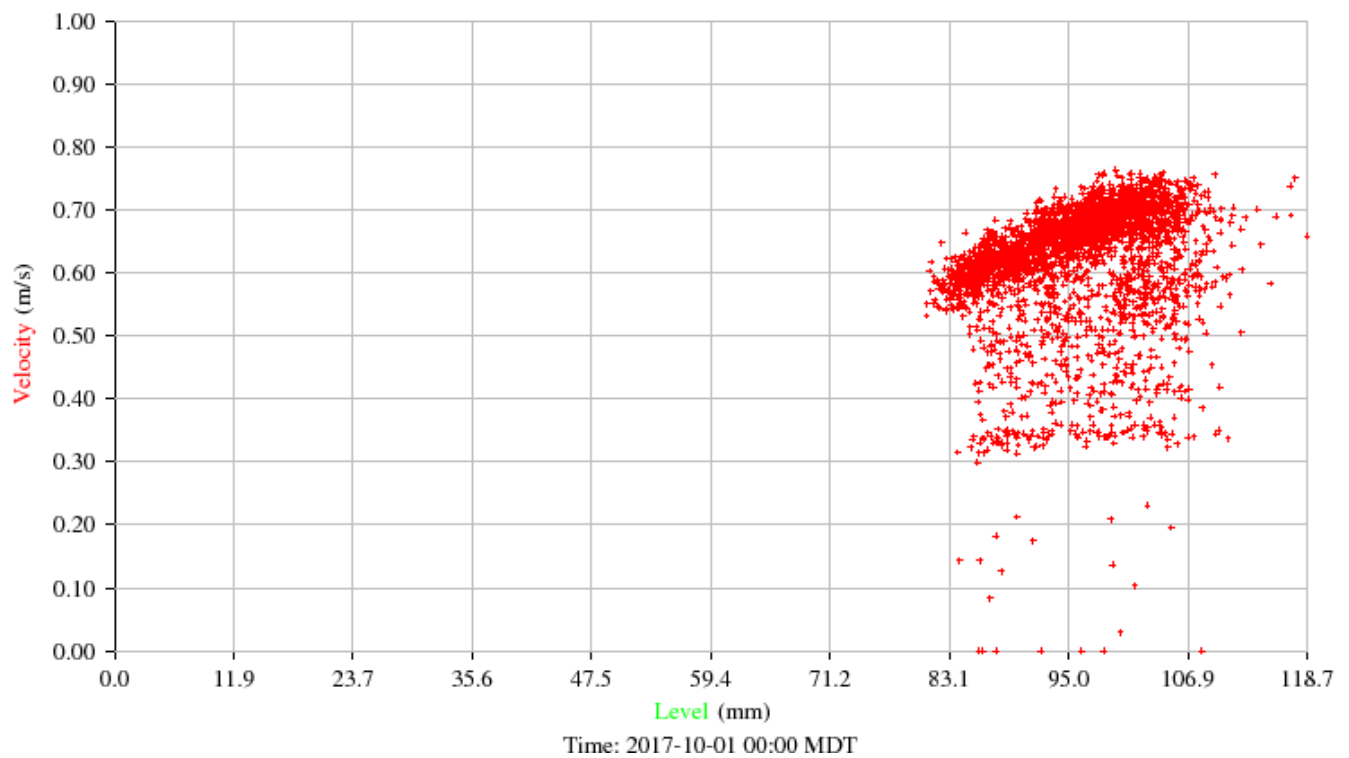
A15-124-05 – Flow with rain intensity



A15-124-05 – Level with velocity and flow



A15-124-05 – Level vs. velocity scatter plot

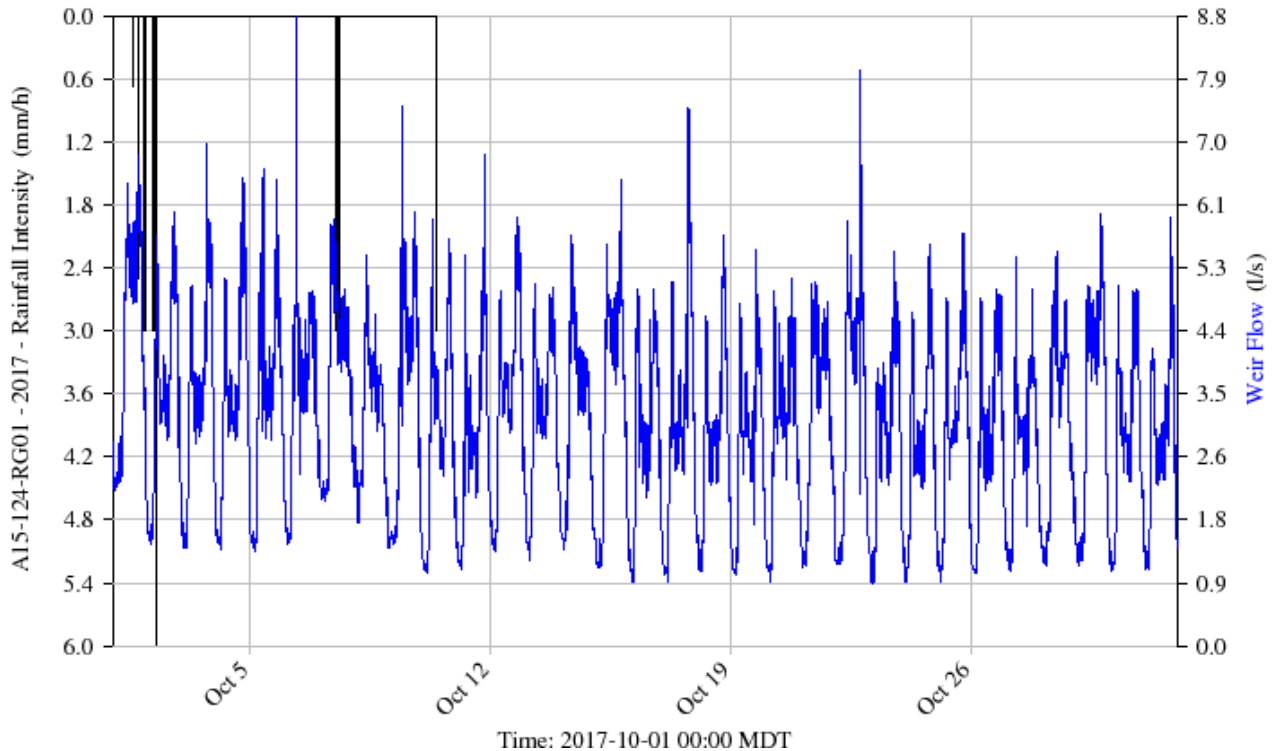


A15-124-05 – Summary report

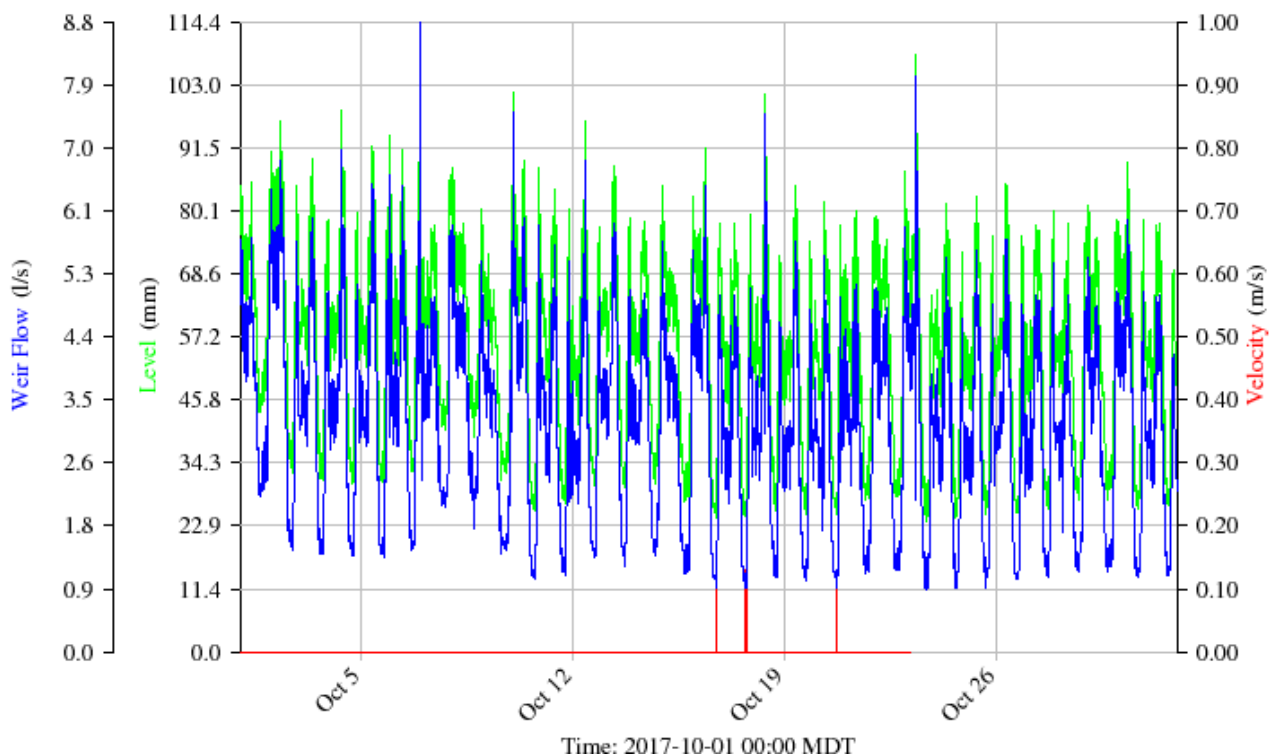
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	-6.91	12.16	19.08	1,050.37	1.83
2	6.50	11.55	18.57	997.68	3.25
3	-5.08	11.59	20.70	1,001.23	0.00
4	-6.27	11.16	17.51	963.81	0.00
5	6.06	13.24	19.61	1,144.36	0.00
6	9.49	15.20	19.98	1,313.06	0.00
7	10.78	15.57	20.05	1,345.64	2.75
8	10.25	15.59	21.84	1,346.55	0.00
9	10.72	13.70	19.30	1,183.84	0.00
10	12.62	16.38	18.84	1,415.26	0.53
11	9.48	14.67	24.52	1,267.82	n/a
12	9.21	14.20	19.92	1,226.51	n/a
13	9.41	14.25	18.91	1,231.04	n/a
14	9.27	14.13	18.92	1,220.80	n/a
15	8.32	14.58	20.19	1,259.51	n/a
16	9.81	14.19	19.97	1,225.92	n/a
17	9.69	14.90	23.30	1,286.98	n/a
18	9.86	14.85	21.01	1,283.20	n/a
19	9.88	14.80	20.06	1,278.84	n/a
20	-8.17	12.35	17.82	1,066.96	n/a
21	-6.97	10.88	19.45	940.25	n/a
22	-6.63	12.68	19.70	1,095.60	n/a
23	9.04	14.46	19.96	1,249.53	n/a
24	9.33	14.67	21.51	1,267.31	n/a
25	7.59	14.18	20.62	1,225.57	n/a
26	-7.23	12.10	19.72	1,045.61	n/a
27	8.39	13.66	18.49	1,180.31	n/a
28	8.11	14.15	19.07	1,222.71	n/a
29	9.74	14.64	21.70	1,265.26	n/a
30	7.94	14.19	18.76	1,226.15	n/a
Mean	5.62	13.84	19.99	1,195.98	0.84
Minimum	-8.17	10.88	17.51	940.25	0.00
Maximum	12.62	16.38	24.52	1,415.26	3.25
Total	n/a	n/a	n/a	37,075.40	8.36

A15-124-06

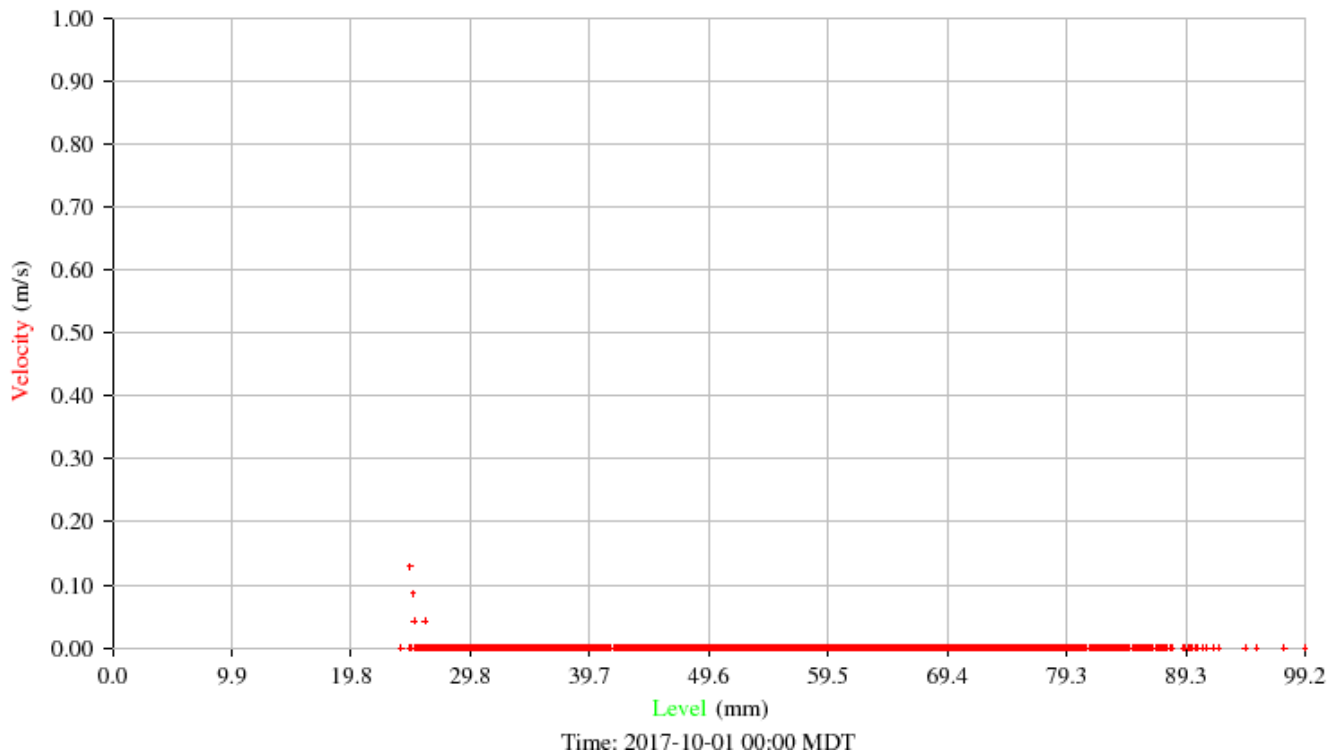
A15-124-06 – Flow with rain intensity



A15-124-06 – Level with velocity and flow



A15-124-06 – Level vs. velocity scatter plot

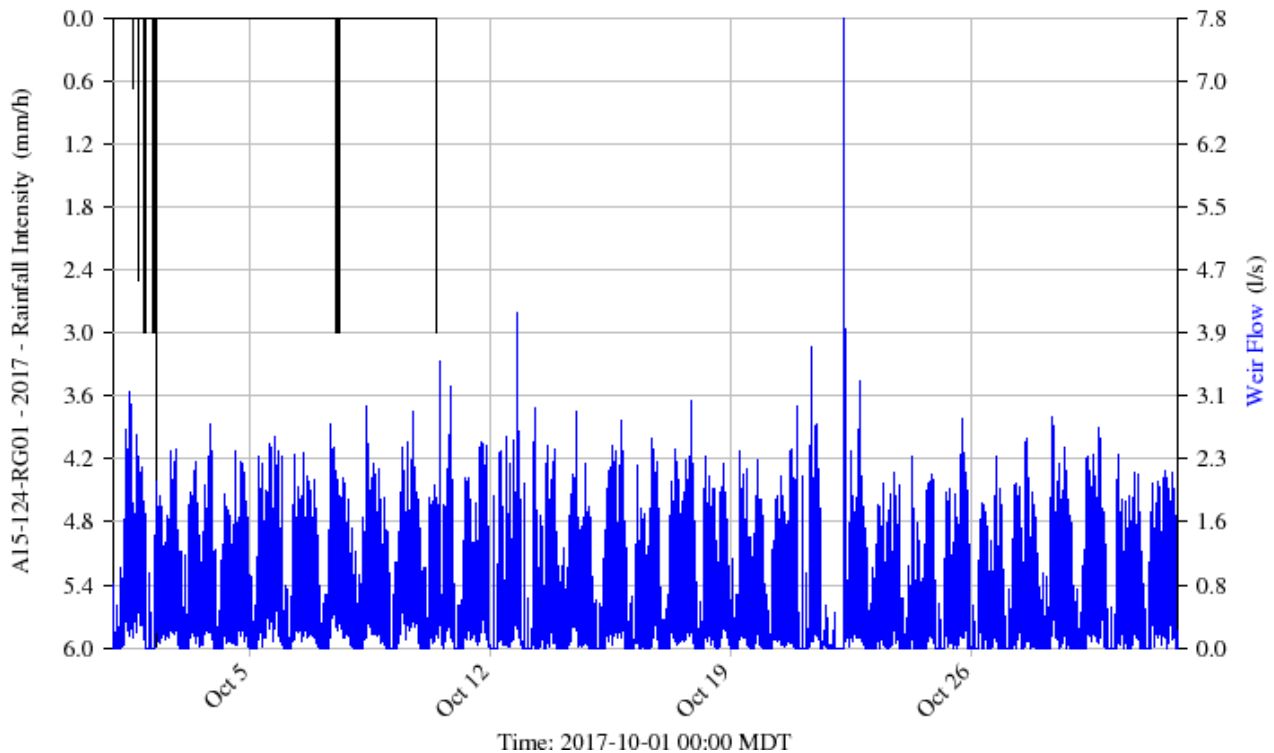


A15-124-06 – Summary report

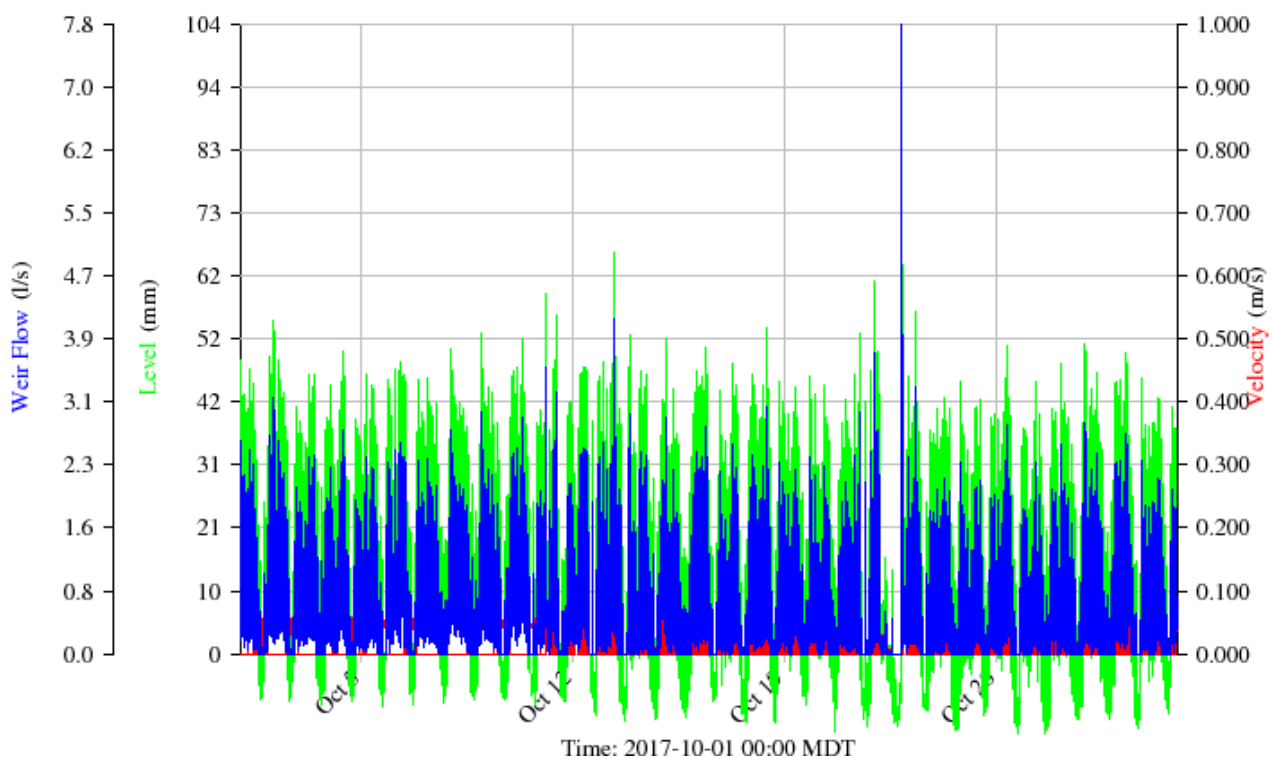
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.36	4.19	6.85	361.75	1.83
2	1.41	3.49	6.06	301.33	3.25
3	1.36	3.44	6.99	297.12	0.00
4	1.33	3.45	6.52	297.86	0.00
5	1.32	3.46	6.65	298.71	0.00
6	1.43	3.46	8.78	299.22	0.00
7	2.01	3.74	5.94	323.08	2.75
8	1.71	3.27	5.44	282.45	0.00
9	1.36	3.46	7.53	299.34	0.00
10	1.03	3.03	5.94	262.18	0.53
11	1.08	2.98	6.84	257.19	n/a
12	1.32	3.42	5.97	295.61	n/a
13	1.20	3.19	5.03	275.98	n/a
14	1.33	3.21	5.72	277.37	n/a
15	1.09	3.34	6.50	288.59	n/a
16	0.88	2.86	4.98	246.86	n/a
17	0.88	3.11	7.51	268.73	n/a
18	1.03	2.91	5.72	251.42	n/a
19	1.00	2.86	5.53	246.80	n/a
20	0.90	2.89	5.12	249.94	n/a
21	1.10	3.17	5.06	273.75	n/a
22	1.13	3.36	8.02	290.55	n/a
23	0.86	2.89	5.51	249.65	n/a
24	0.88	2.83	5.60	244.94	n/a
25	0.90	3.00	5.74	259.15	n/a
26	1.01	2.89	4.96	249.53	n/a
27	1.04	2.84	5.42	245.14	n/a
28	1.11	3.05	5.49	263.55	n/a
29	1.11	3.32	6.02	286.97	n/a
30	1.03	2.92	5.01	252.08	n/a
Mean	1.17	3.19	6.08	275.36	0.84
Minimum	0.86	2.77	4.96	239.20	0.00
Maximum	2.01	4.19	8.78	361.75	3.25
Total	n/a	n/a	n/a	8,536.03	8.36

A15-124-08

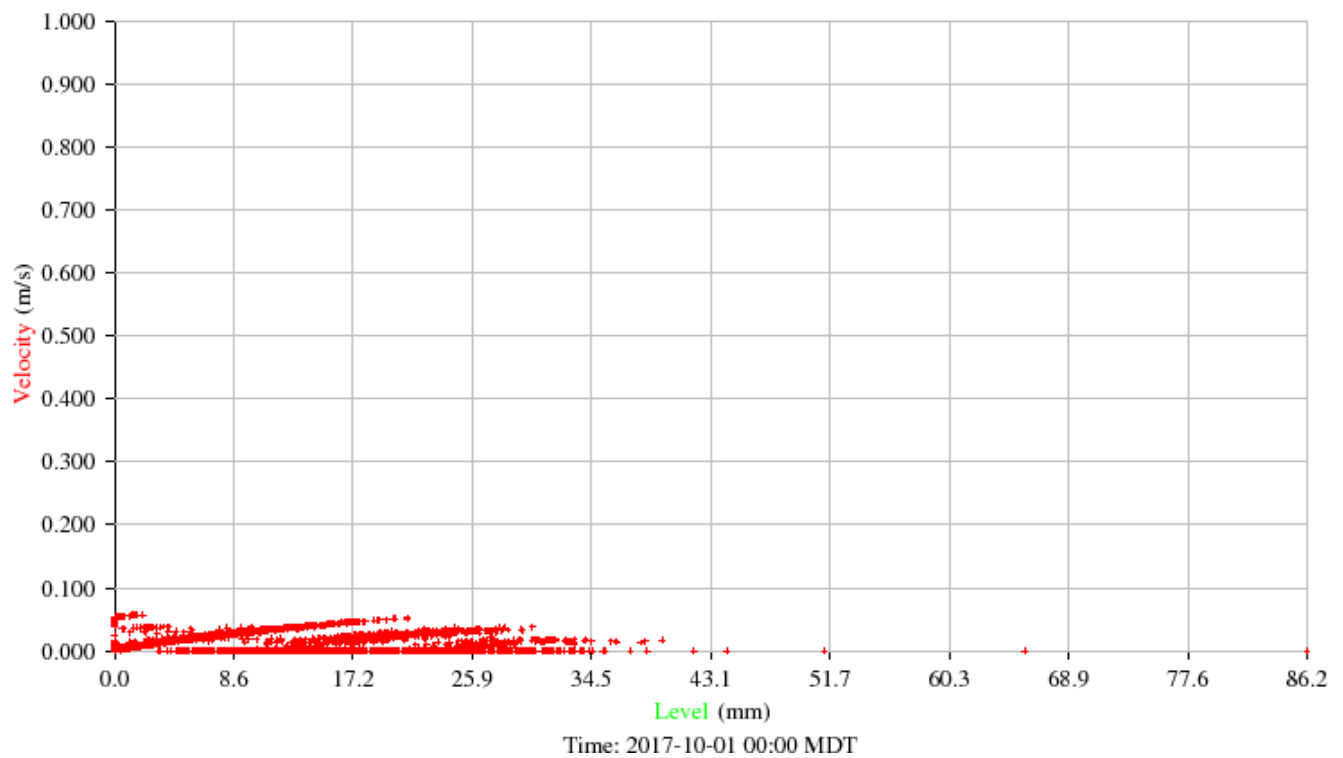
A15-124-08 – Flow with rain intensity



A15-124-08 – Level with velocity and flow



A15-124-08 – Level vs. velocity scatter plot

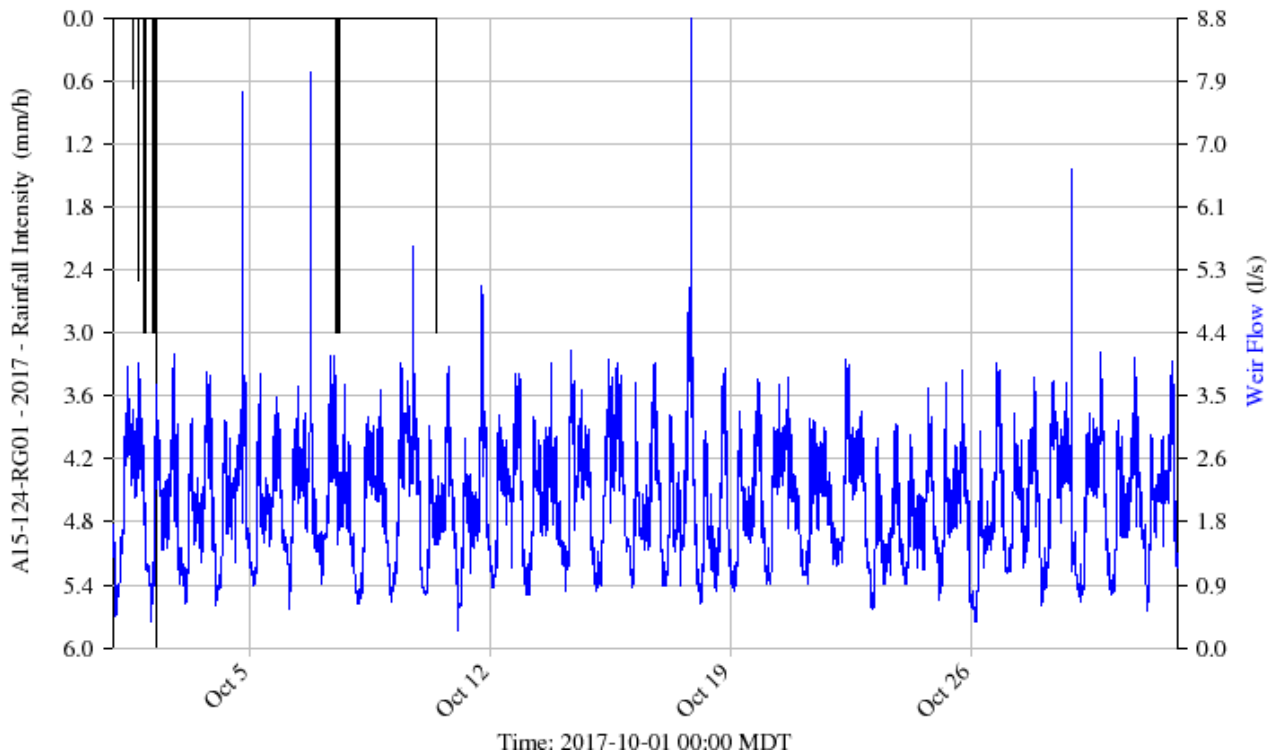


A15-124-08 – Summary report

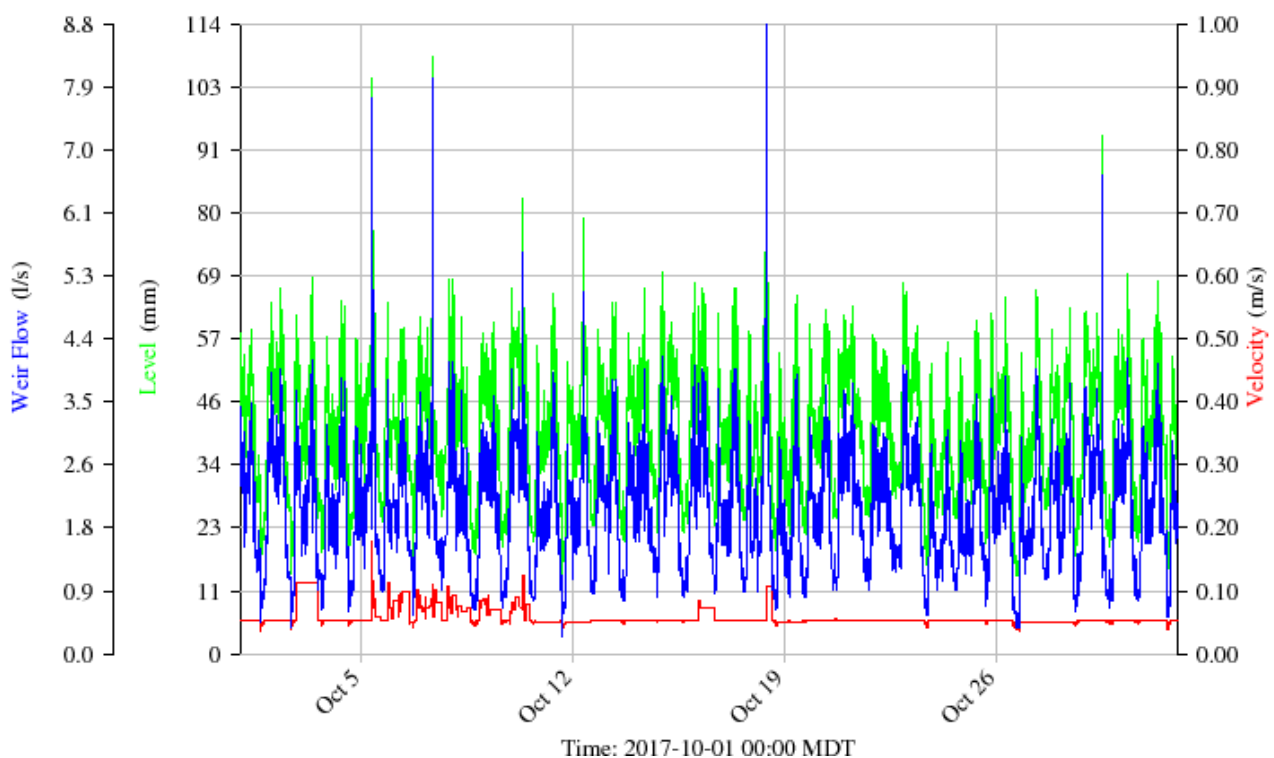
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.00	0.55	3.18	47.72	1.83
2	0.00	0.40	2.46	34.88	3.25
3	0.00	0.42	2.77	36.07	0.00
4	0.00	0.40	2.45	34.42	0.00
5	0.00	0.48	2.62	41.85	0.00
6	0.00	0.44	2.42	38.26	0.00
7	0.00	0.50	2.78	42.78	2.75
8	0.00	0.44	3.00	38.30	0.00
9	0.00	0.52	2.92	44.99	0.00
10	0.00	0.47	3.55	40.39	0.53
11	0.00	0.42	2.55	36.69	n/a
12	0.00	0.39	4.16	33.47	n/a
13	0.00	0.32	2.97	27.44	n/a
14	0.00	0.37	2.94	31.95	n/a
15	0.00	0.43	2.81	36.73	n/a
16	0.00	0.33	2.60	28.61	n/a
17	0.00	0.44	3.06	37.99	n/a
18	0.00	0.37	2.38	31.55	n/a
19	0.00	0.37	2.43	31.60	n/a
20	0.00	0.36	2.99	31.07	n/a
21	0.00	0.22	3.73	19.13	n/a
22	0.00	0.49	7.81	42.29	n/a
23	0.00	0.31	2.17	26.71	n/a
24	0.00	0.30	2.37	25.76	n/a
25	0.00	0.38	2.83	32.67	n/a
26	0.00	0.30	2.38	25.83	n/a
27	0.00	0.37	2.61	31.99	n/a
28	0.00	0.40	2.86	34.31	n/a
29	0.00	0.44	2.74	38.06	n/a
30	0.00	0.36	2.41	31.27	n/a
Mean	0.00	0.40	2.94	34.61	0.84
Minimum	0.00	0.22	2.17	19.13	0.00
Maximum	0.00	0.55	7.81	47.72	3.25
Total	n/a	n/a	n/a	1,072.87	8.36

A15-124-09

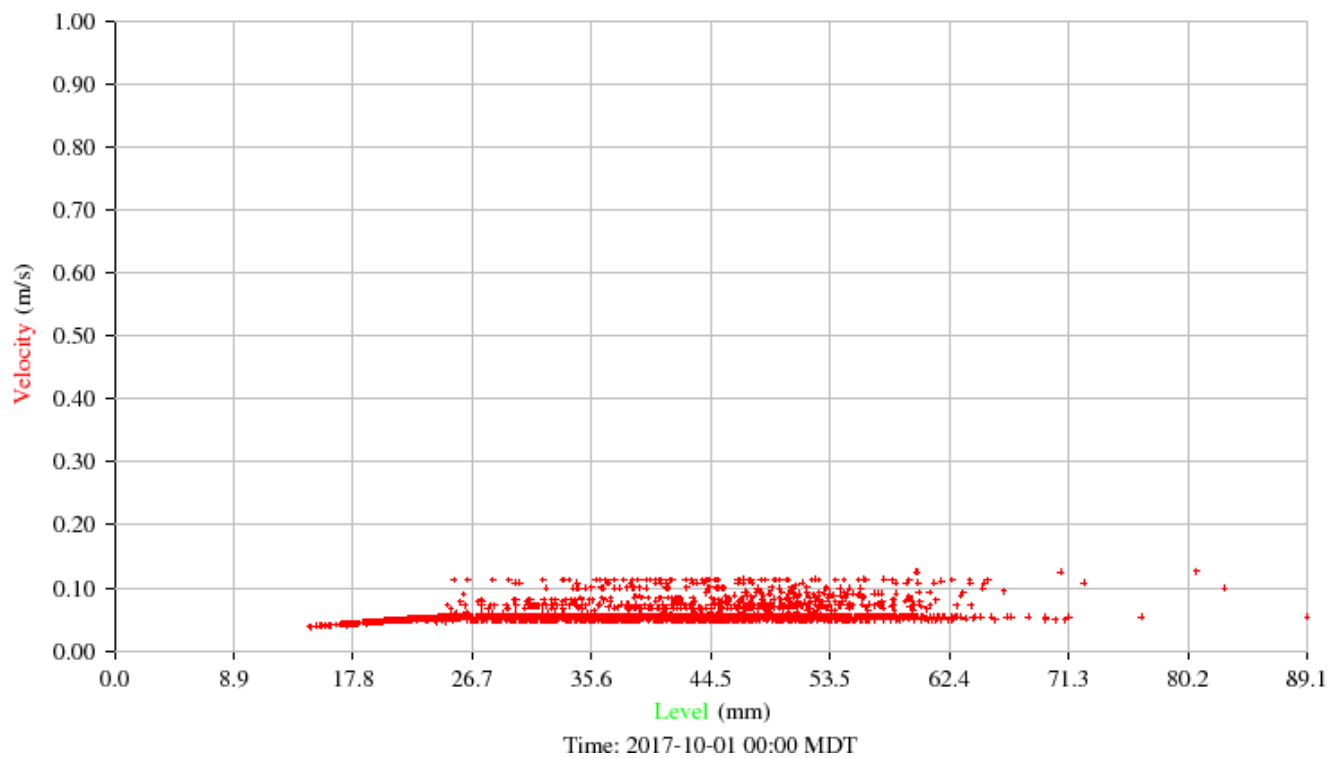
A15-124-09 – Flow with rain intensity



A15-124-09 – Level with velocity and flow



A15-124-09 – Level vs. velocity scatter plot

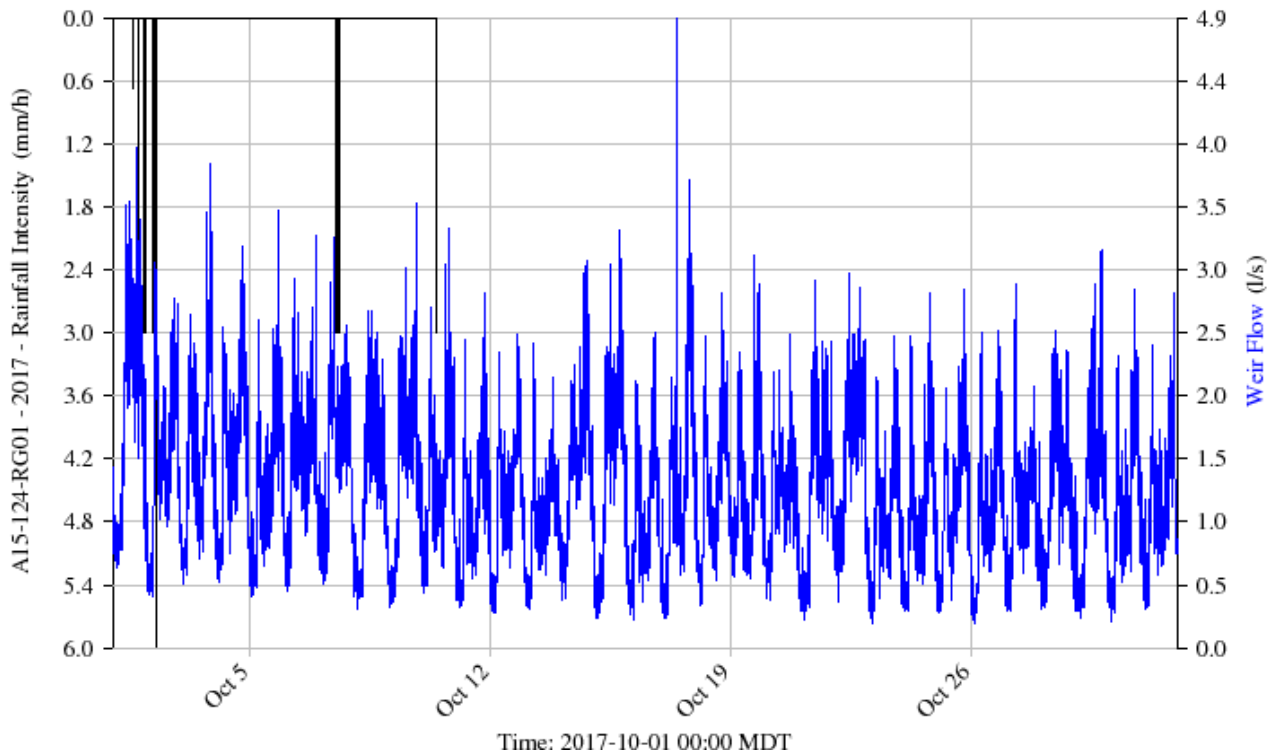


A15-124-09 – Summary report

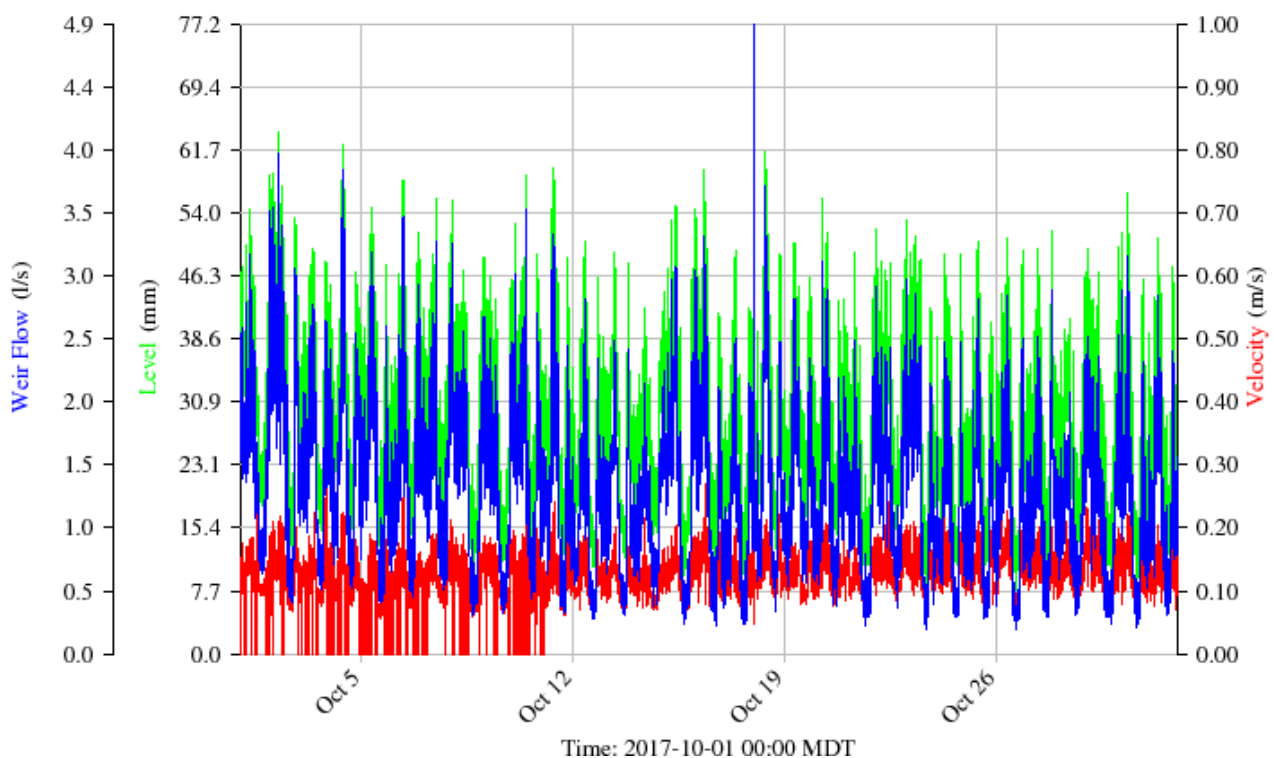
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.44	2.15	3.96	185.48	1.83
2	0.38	1.95	4.09	168.15	3.25
3	0.62	1.94	3.83	167.28	0.00
4	0.59	2.06	7.74	178.20	0.00
5	0.87	2.03	3.82	175.02	0.00
6	0.53	2.14	8.02	185.21	0.00
7	0.90	2.12	4.07	182.97	2.75
8	0.60	1.88	3.59	162.32	0.00
9	0.65	2.21	5.59	190.59	0.00
10	0.73	1.85	3.92	159.47	0.53
11	0.23	1.88	5.05	162.83	n/a
12	0.83	2.14	3.81	185.14	n/a
13	0.74	2.01	3.97	173.67	n/a
14	0.80	2.24	4.15	193.65	n/a
15	0.80	2.18	4.02	188.72	n/a
16	0.84	2.01	3.97	173.31	n/a
17	0.87	2.16	8.77	186.31	n/a
18	0.62	1.71	3.89	148.07	n/a
19	0.79	2.01	3.73	173.47	n/a
20	0.88	2.20	3.77	189.94	n/a
21	0.90	1.92	3.20	165.89	n/a
22	1.13	2.24	4.02	193.37	n/a
23	0.54	1.53	3.12	132.23	n/a
24	0.89	1.81	3.62	156.71	n/a
25	0.67	1.96	3.86	169.70	n/a
26	0.36	1.74	3.95	150.39	n/a
27	1.05	2.00	3.76	172.95	n/a
28	0.60	2.15	6.66	185.59	n/a
29	0.64	1.99	4.12	172.00	n/a
30	0.73	2.03	4.04	175.26	n/a
Mean	0.70	2.01	4.46	173.50	0.84
Minimum	0.23	1.53	3.12	132.23	0.00
Maximum	1.13	2.24	8.77	193.65	3.25
Total	n/a	n/a	n/a	5,378.58	8.36

A15-124-10

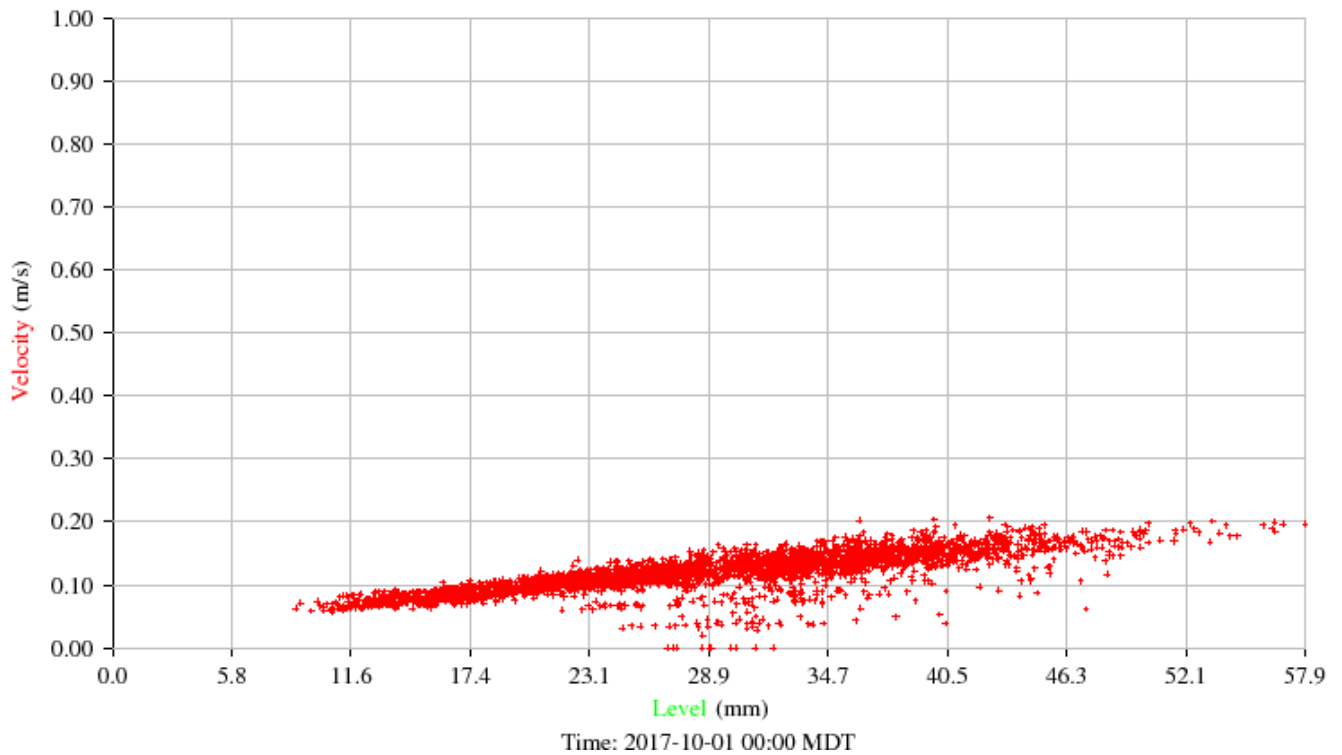
A15-124-10 – Flow with rain intensity



A15-124-10 – Level with velocity and flow



A15-124-10 – Level vs. velocity scatter plot

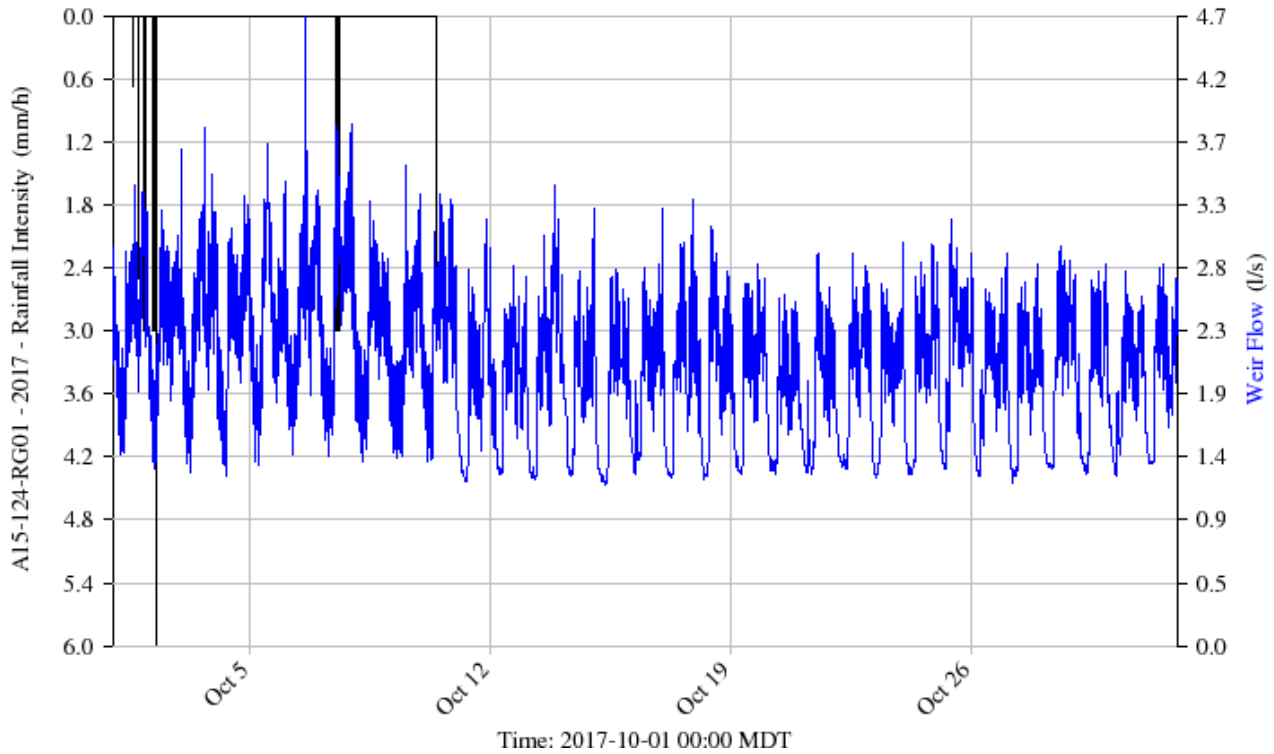


A15-124-10 – Summary report

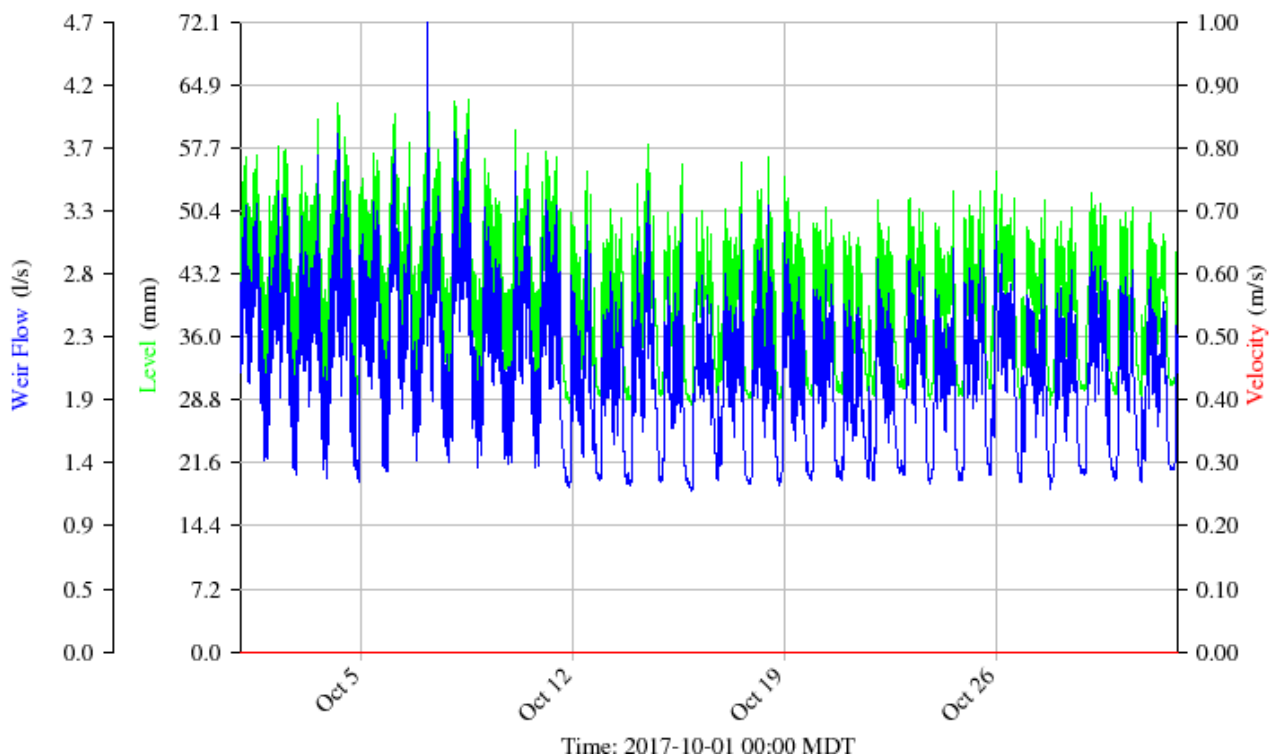
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.63	1.77	3.93	152.74	1.83
2	0.40	1.44	3.03	124.49	3.25
3	0.51	1.49	3.79	128.65	0.00
4	0.51	1.49	3.15	128.93	0.00
5	0.40	1.26	3.42	108.43	0.00
6	0.44	1.41	3.23	122.02	0.00
7	0.51	1.47	3.22	126.95	2.75
8	0.31	1.27	2.64	109.35	0.00
9	0.32	1.42	3.48	122.65	0.00
10	0.43	1.28	3.28	110.41	0.53
11	0.32	1.07	2.79	92.52	n/a
12	0.28	1.12	2.46	96.59	n/a
13	0.31	1.03	2.39	88.69	n/a
14	0.38	1.38	3.03	119.17	n/a
15	0.23	1.34	3.28	115.94	n/a
16	0.22	1.01	2.48	87.32	n/a
17	0.23	1.27	4.94	109.47	n/a
18	0.34	1.21	2.78	104.16	n/a
19	0.55	1.22	3.08	105.33	n/a
20	0.38	1.15	2.46	99.59	n/a
21	0.22	1.20	2.88	103.32	n/a
22	0.36	1.47	2.93	127.29	n/a
23	0.20	1.00	2.44	86.82	n/a
24	0.29	1.03	2.79	89.17	n/a
25	0.27	1.11	2.82	95.62	n/a
26	0.19	1.06	2.49	91.67	n/a
27	0.29	1.07	2.86	92.30	n/a
28	0.31	1.19	2.48	102.47	n/a
29	0.23	1.14	3.11	98.29	n/a
30	0.21	1.08	2.81	93.17	n/a
Mean	0.34	1.24	3.01	107.37	0.84
Minimum	0.19	1.00	2.39	86.82	0.00
Maximum	0.63	1.77	4.94	152.74	3.25
Total	n/a	n/a	n/a	3,328.42	8.36

A15-124-11

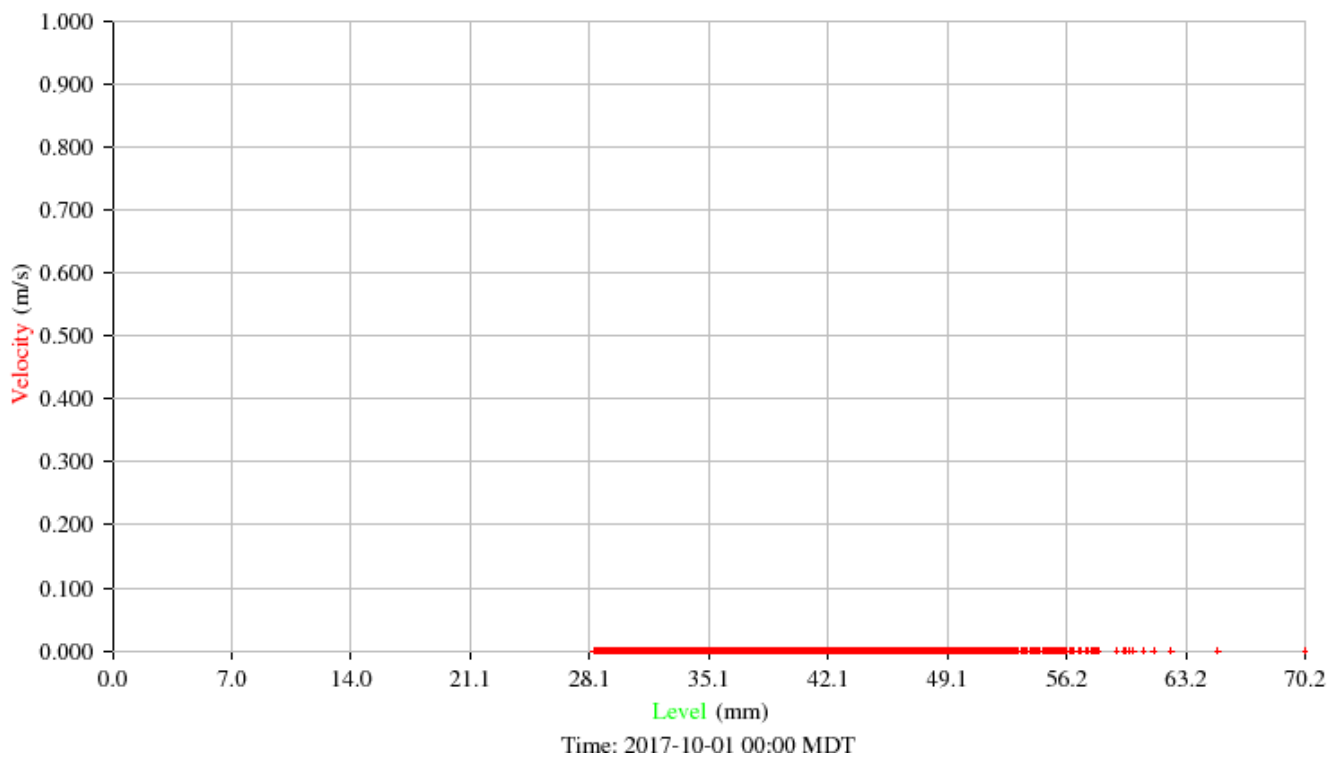
A15-124-11 – Flow with rain intensity



A15-124-11 – Level with velocity and flow



A15-124-11 – Level vs. velocity scatter plot

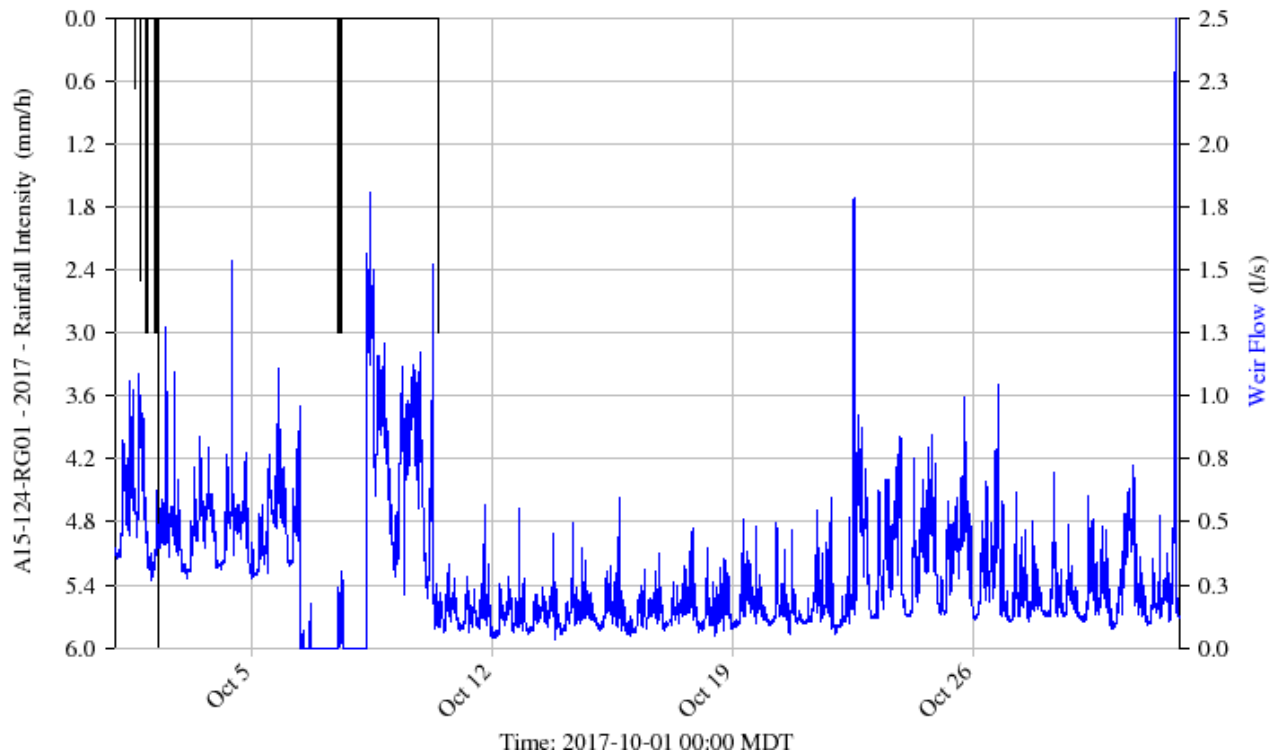


A15-124-11 – Summary report

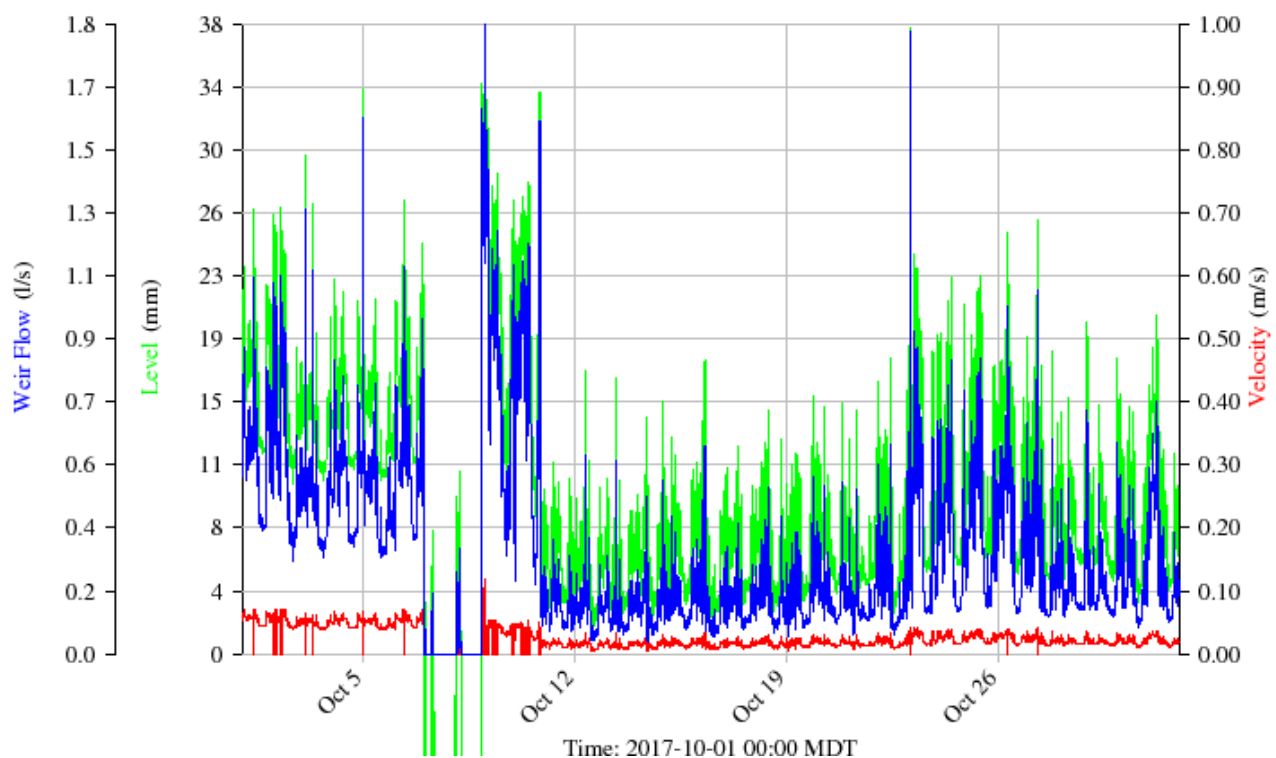
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.42	2.38	3.41	205.35	1.83
2	1.32	2.33	3.23	201.52	3.25
3	1.29	2.39	3.84	206.59	0.00
4	1.26	2.36	3.34	203.64	0.00
5	1.34	2.41	3.72	208.46	0.00
6	1.42	2.50	4.67	216.09	0.00
7	1.40	2.57	3.87	221.70	2.75
8	1.36	2.31	3.33	199.54	0.00
9	1.40	2.24	3.57	193.93	0.00
10	1.37	2.34	3.35	202.20	0.53
11	1.22	1.90	3.16	164.56	n/a
12	1.27	1.92	2.95	166.13	n/a
13	1.24	2.03	3.42	175.65	n/a
14	1.26	1.94	3.16	167.60	n/a
15	1.20	1.92	3.24	165.83	n/a
16	1.27	1.95	2.83	168.86	n/a
17	1.25	1.99	3.31	172.11	n/a
18	1.24	2.01	3.12	173.78	n/a
19	1.27	1.96	2.83	169.05	n/a
20	1.27	1.85	2.72	159.42	n/a
21	1.27	1.85	2.90	160.21	n/a
22	1.31	1.90	2.91	164.13	n/a
23	1.25	1.93	2.78	166.64	n/a
24	1.27	2.00	2.99	172.72	n/a
25	1.31	2.15	3.17	185.96	n/a
26	1.26	1.97	2.91	170.60	n/a
27	1.20	1.95	2.90	168.82	n/a
28	1.31	1.98	2.96	171.28	n/a
29	1.28	1.97	2.83	170.59	n/a
30	1.26	1.91	2.78	165.18	n/a
Mean	1.29	2.09	3.19	180.91	0.84
Minimum	1.20	1.85	2.72	159.42	0.00
Maximum	1.42	2.57	4.67	221.70	3.25
Total	n/a	n/a	n/a	5,608.36	8.36

A15-124-12A

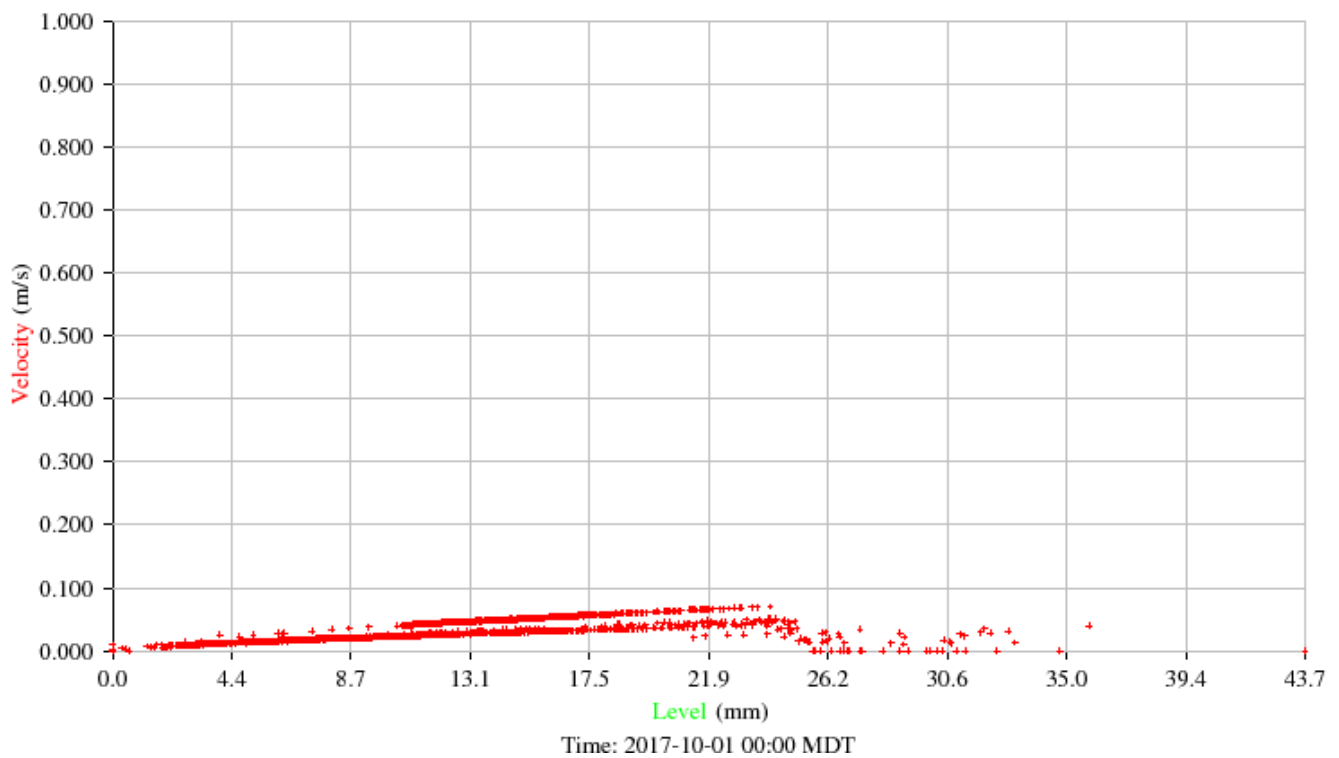
A15-124-12A – Flow with rain intensity



A15-124-12A – Level with velocity and flow



A15-124-12A – Level vs. velocity scatter plot

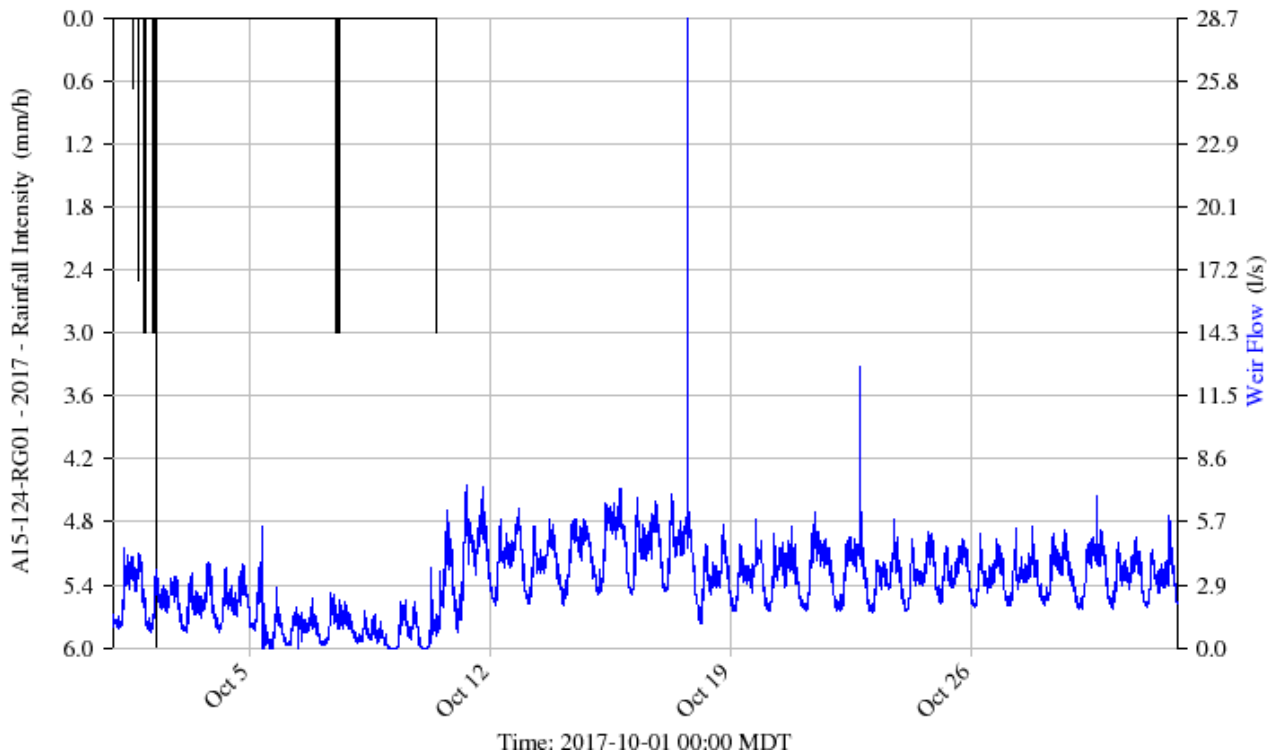


A15-124-12A – Summary report

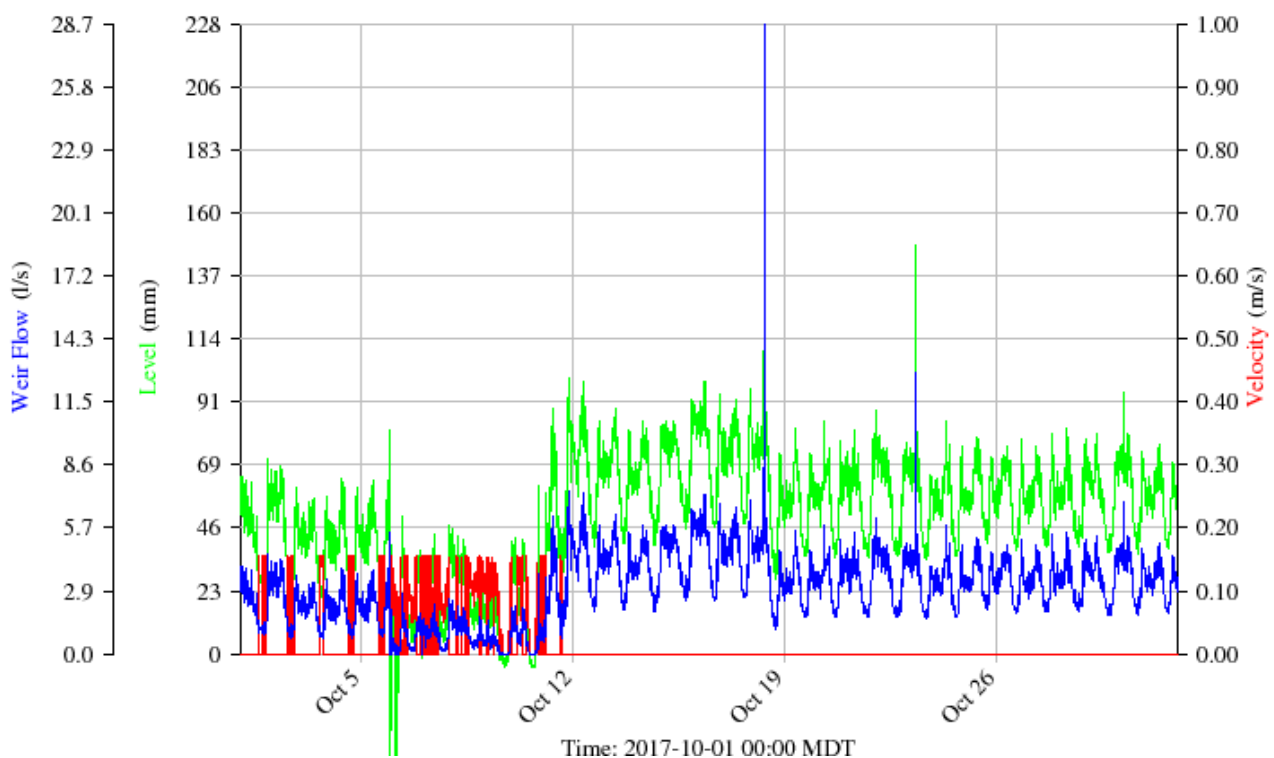
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.12	0.59	1.10	50.84	1.83
2	0.27	0.46	1.30	39.48	3.25
3	0.28	0.48	0.85	41.31	0.00
4	0.31	0.49	1.56	42.01	0.00
5	0.28	0.50	1.13	42.85	0.00
6	0.00	0.24	0.97	20.43	0.00
7	0.00	0.02	0.31	1.51	2.75
8	0.00	0.66	1.83	56.63	0.00
9	0.21	0.74	1.19	63.79	0.00
10	0.06	0.28	1.55	23.85	0.53
11	0.05	0.14	0.58	12.40	n/a
12	0.04	0.12	0.56	10.77	n/a
13	0.04	0.13	0.46	11.42	n/a
14	0.06	0.15	0.50	12.99	n/a
15	0.05	0.15	0.61	12.56	n/a
16	0.05	0.14	0.38	11.93	n/a
17	0.07	0.16	0.48	14.19	n/a
18	0.05	0.15	0.40	12.77	n/a
19	0.08	0.17	0.52	15.08	n/a
20	0.06	0.16	0.50	13.40	n/a
21	0.07	0.20	0.61	17.05	n/a
22	0.06	0.32	1.82	27.72	n/a
23	0.12	0.34	0.86	29.55	n/a
24	0.13	0.36	0.86	31.01	n/a
25	0.13	0.37	1.01	32.38	n/a
26	0.12	0.29	1.06	25.17	n/a
27	0.11	0.20	0.63	17.28	n/a
28	0.13	0.20	0.71	17.37	n/a
29	0.11	0.21	0.61	18.54	n/a
30	0.08	0.28	0.73	24.21	n/a
Mean	0.10	0.29	0.91	24.92	0.84
Minimum	0.00	0.02	0.31	1.51	0.00
Maximum	0.31	0.74	2.54	63.79	3.25
Total	n/a	n/a	n/a	772.38	8.36

A15-124-12B

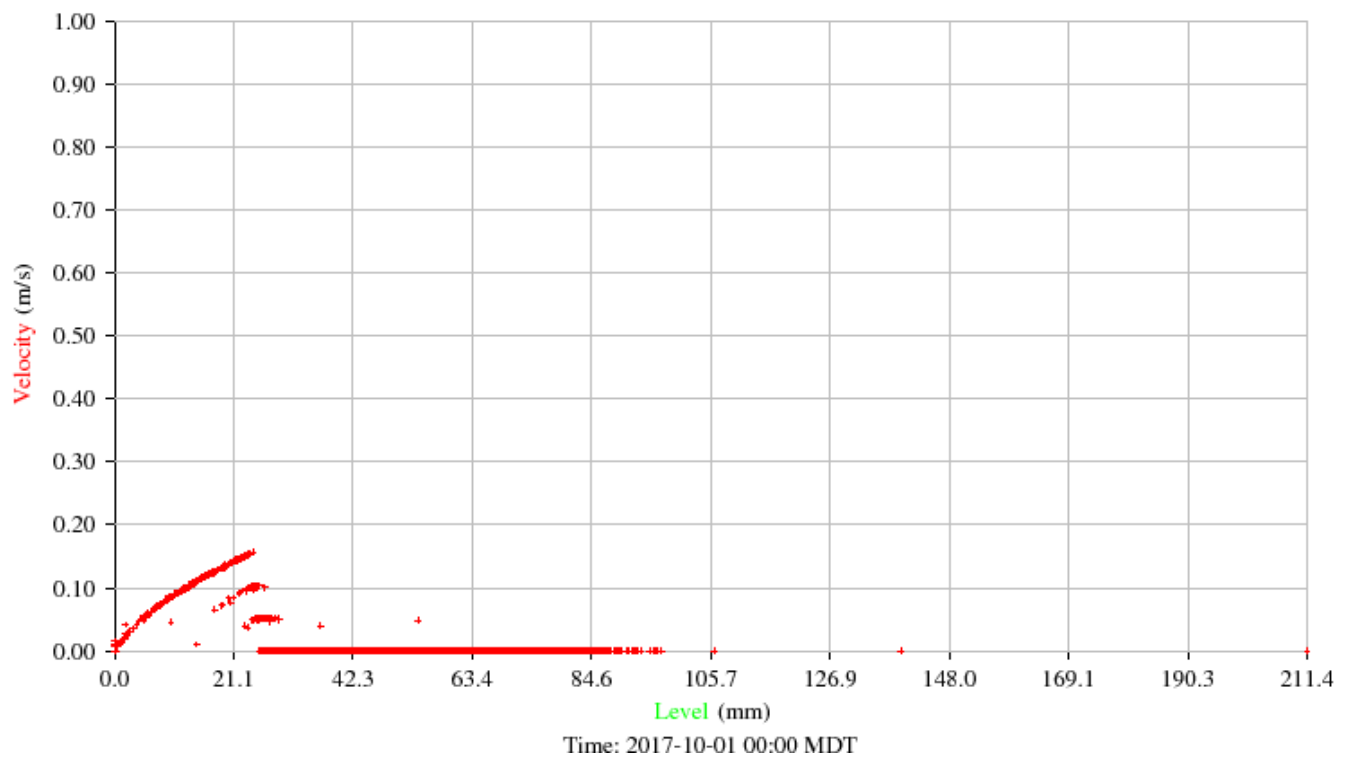
A15-124-12B – Flow with rain intensity



A15-124-12B – Level with velocity and flow



A15-124-12B – Level vs. velocity scatter plot



A15-124-12B – Summary report

	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.87	2.50	4.53	216.06	1.83
2	0.68	2.04	3.59	176.08	3.25
3	0.73	1.99	3.93	171.53	0.00
4	0.74	2.07	3.85	178.94	0.00
5	0.00	1.19	5.51	102.58	0.00
6	0.00	0.91	2.26	79.00	0.00
7	0.10	1.06	2.47	91.46	2.75
8	0.17	0.64	1.65	54.94	0.00
9	0.00	0.68	2.15	58.37	0.00
10	0.00	1.77	6.28	152.66	0.53
11	0.73	4.20	7.40	362.69	n/a
12	1.90	4.09	6.32	352.96	n/a
13	1.99	3.90	5.82	336.86	n/a
14	1.95	4.21	5.86	363.81	n/a
15	2.42	4.79	7.25	414.21	n/a
16	2.44	4.61	6.83	398.26	n/a
17	2.55	4.79	28.67	414.17	n/a
18	1.11	3.11	5.60	268.90	n/a
19	1.69	3.27	5.84	282.71	n/a
20	1.66	3.40	5.54	293.72	n/a
21	1.66	3.59	6.22	309.93	n/a
22	1.67	3.46	12.79	299.08	n/a
23	1.58	3.15	5.84	272.29	n/a
24	1.67	3.33	5.25	287.40	n/a
25	2.01	3.47	4.98	299.69	n/a
26	1.84	3.25	5.23	280.39	n/a
27	1.92	3.28	5.56	283.49	n/a
28	1.91	3.41	5.38	294.76	n/a
29	1.79	3.55	6.88	306.64	n/a
30	1.74	3.30	5.00	285.43	n/a
Mean	1.34	2.97	6.14	256.87	0.84
Minimum	0.00	0.64	1.65	54.94	0.00
Maximum	2.55	4.79	28.67	414.21	3.25
Total	n/a	n/a	n/a	7,963.12	8.36



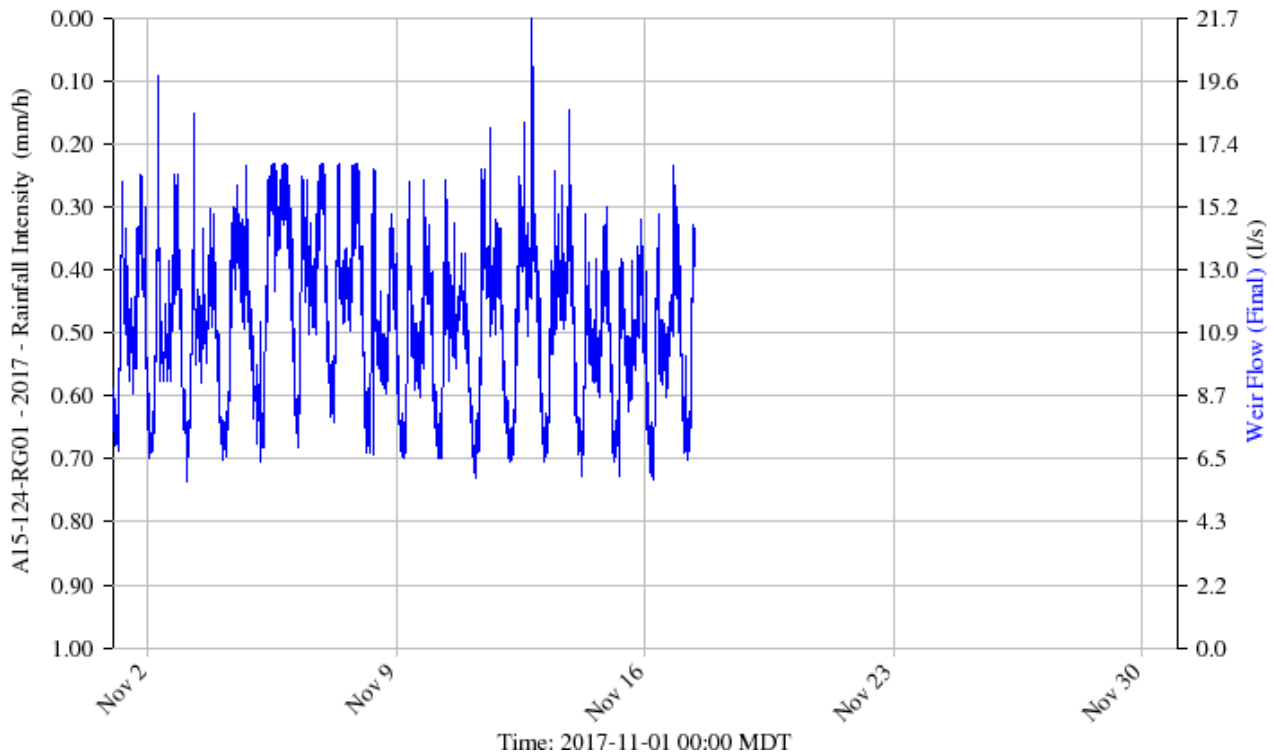
Monthly Report

A15-124 - Cold Lake TFM

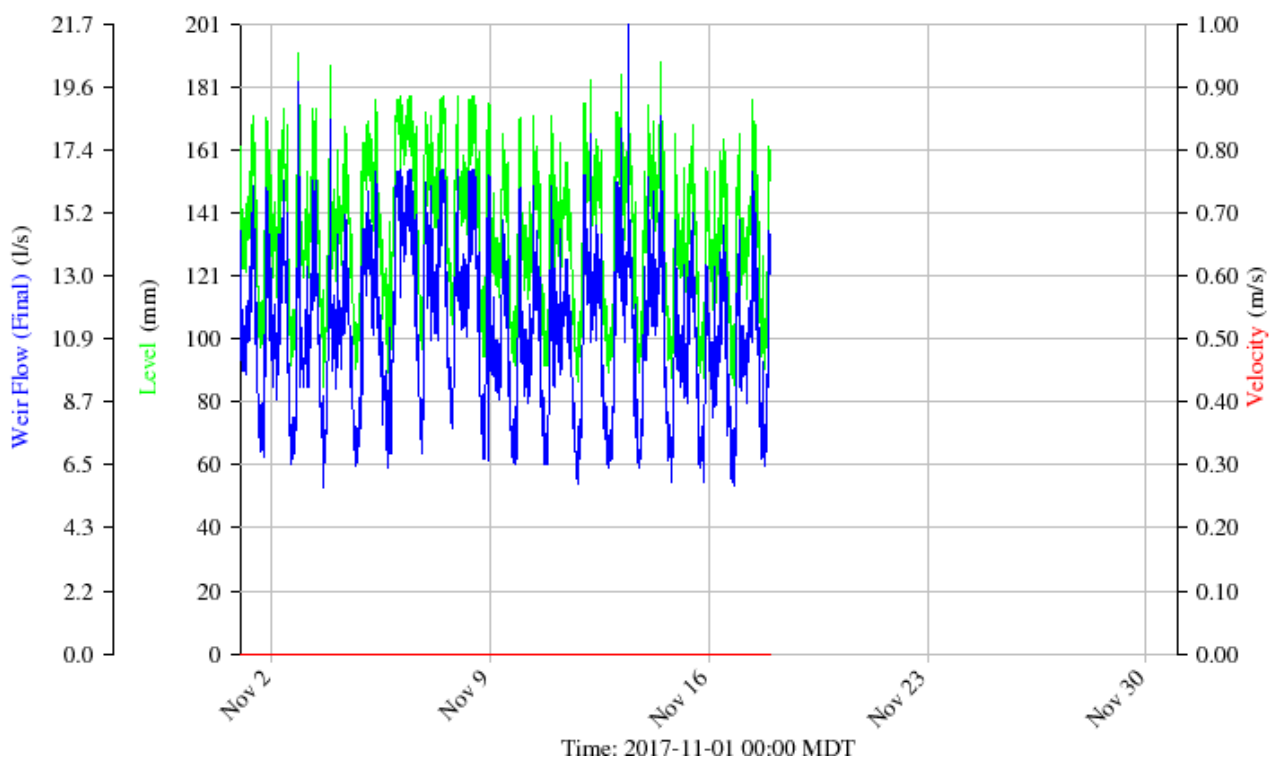
November 2017

A15-124-01

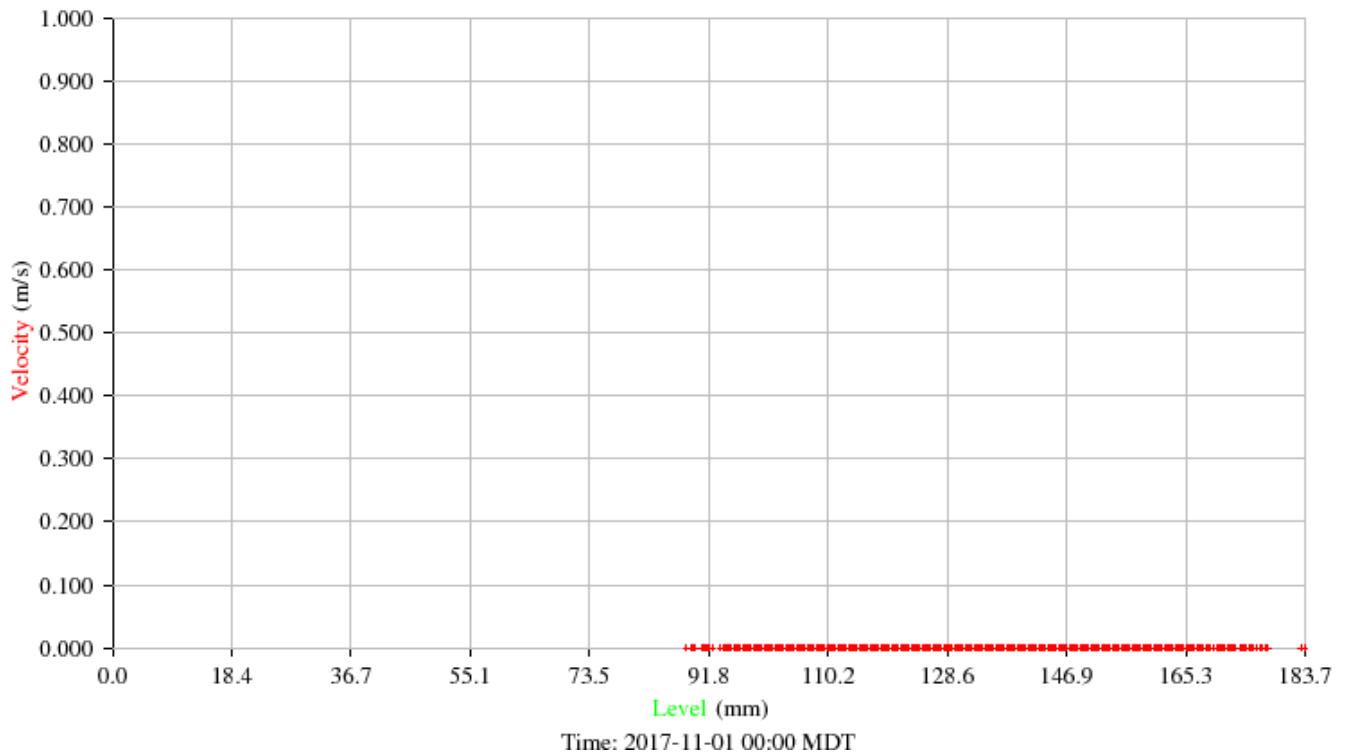
A15-124-01 – Flow with rain intensity



A15-124-01 – Level with velocity and flow



A15-124-01 – Level vs. velocity scatter plot

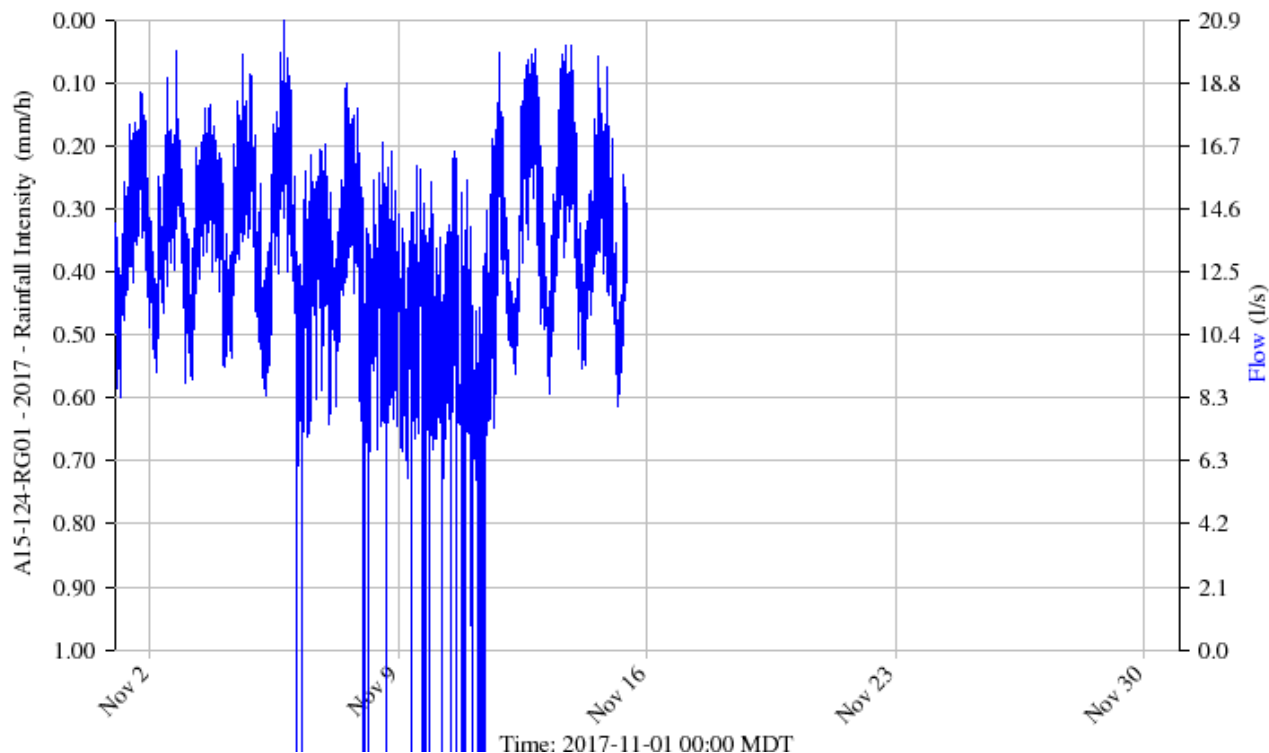


A15-124-01 – Summary report

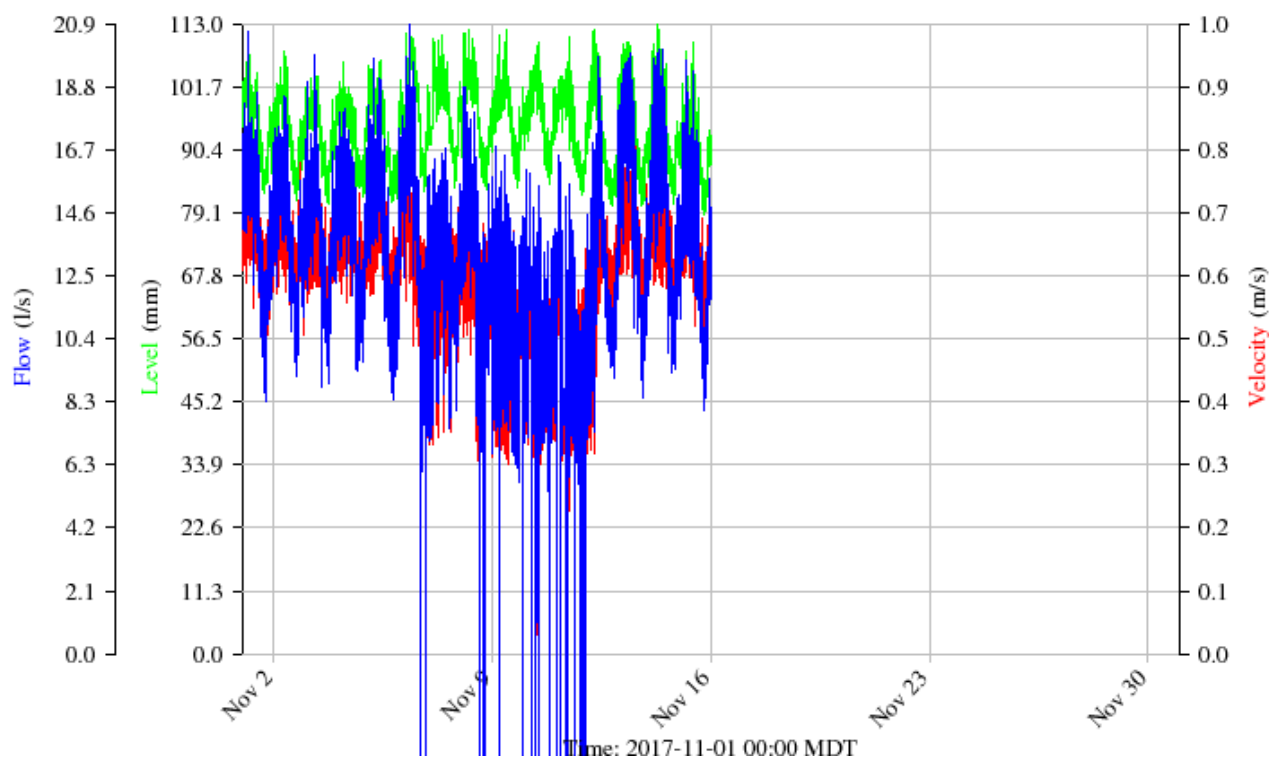
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	6.82	11.26	16.34	973.25	n/a
2	6.53	10.79	19.76	932.24	n/a
3	5.75	10.75	18.44	928.83	n/a
4	6.46	11.21	16.62	968.71	n/a
5	6.39	13.02	16.71	1,124.60	n/a
6	6.89	12.77	16.71	1,103.34	n/a
7	7.77	12.72	16.71	1,098.86	n/a
8	6.67	11.03	16.52	952.71	n/a
9	6.53	10.50	16.15	907.43	n/a
10	6.53	10.56	16.15	912.63	n/a
11	5.88	10.98	17.95	948.59	n/a
12	6.39	11.32	21.73	978.17	n/a
13	6.39	11.22	18.54	969.44	n/a
14	5.95	10.34	15.22	893.76	n/a
15	5.95	10.22	14.77	883.10	n/a
16	5.82	10.48	16.62	905.06	n/a
17	6.46	9.36	14.59	809.00	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	6.42	11.09	17.03	958.22	n/a
Minimum	5.75	9.36	14.59	809.00	n/a
Maximum	7.77	13.02	21.73	1,124.60	n/a
Total	n/a	n/a	n/a	16,289.72	0.00

A15-124-05

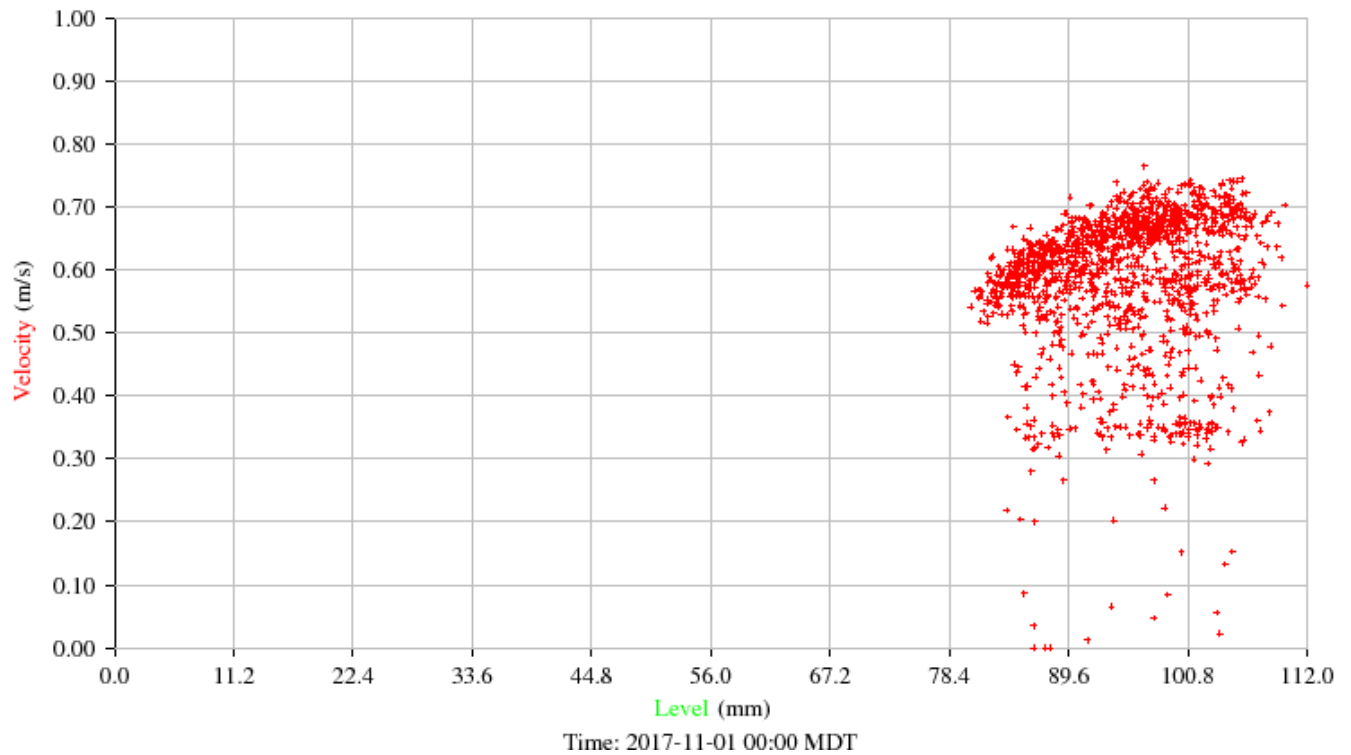
A15-124-05 – Flow with rain intensity



A15-124-05 – Level with velocity and flow



A15-124-05 – Level vs. velocity scatter plot

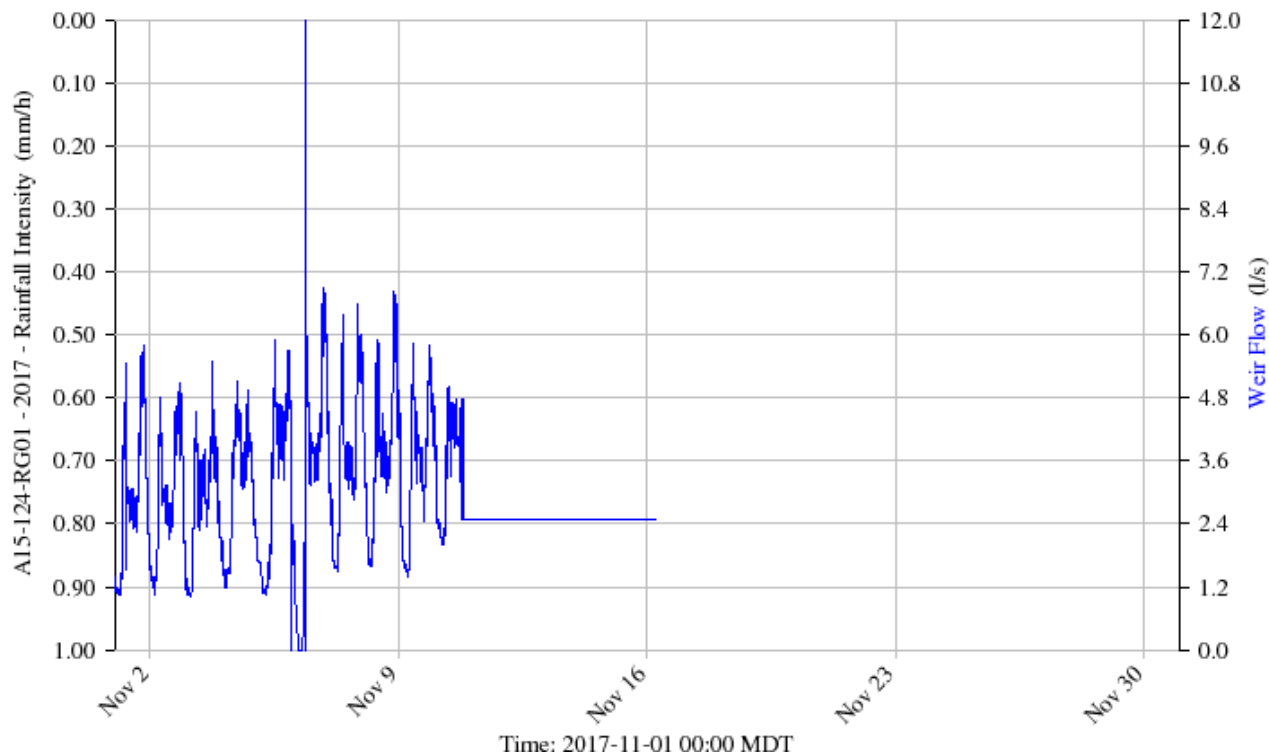


A15-124-05 – Summary report

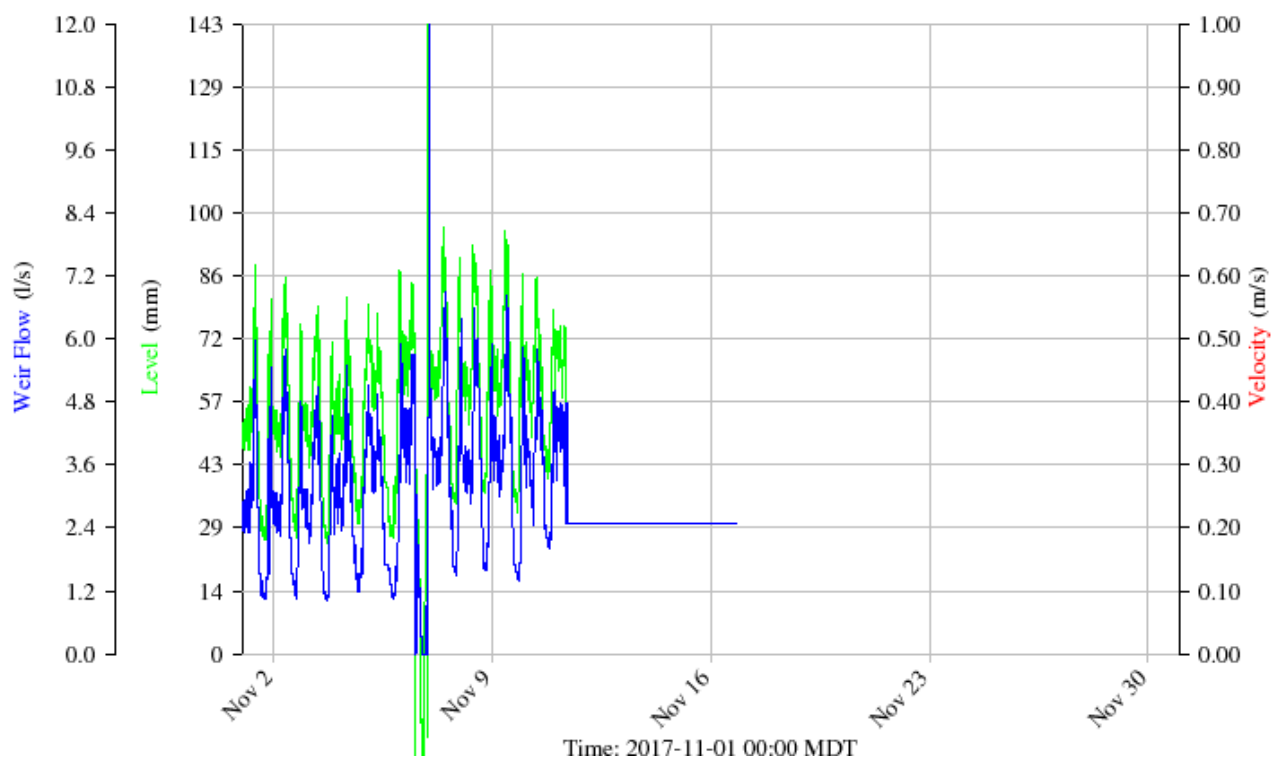
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	8.38	14.17	18.49	1,224.23	n/a
2	9.22	13.95	19.88	1,205.58	n/a
3	8.86	13.91	18.06	1,201.61	n/a
4	9.40	14.37	19.73	1,241.17	n/a
5	8.45	14.30	20.87	1,235.21	n/a
6	-4.13	12.01	18.51	1,037.33	n/a
7	7.49	13.34	18.80	1,152.68	n/a
8	-5.10	10.85	16.82	937.26	n/a
9	-6.82	9.91	16.02	855.81	n/a
10	-6.73	9.90	16.54	855.69	n/a
11	-6.45	10.39	19.78	897.74	n/a
12	9.11	14.53	19.89	1,255.46	n/a
13	8.46	14.52	20.01	1,254.55	n/a
14	9.34	13.98	19.65	1,208.29	n/a
15	8.08	11.97	16.94	1,033.84	n/a
16	n/a	n/a	n/a	n/a	n/a
17	n/a	n/a	n/a	n/a	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	3.84	12.81	18.66	1,106.43	n/a
Minimum	-6.82	9.90	16.02	855.69	n/a
Maximum	9.40	14.53	20.87	1,255.46	n/a
Total	n/a	n/a	n/a	16,596.45	0.00

A15-124-06

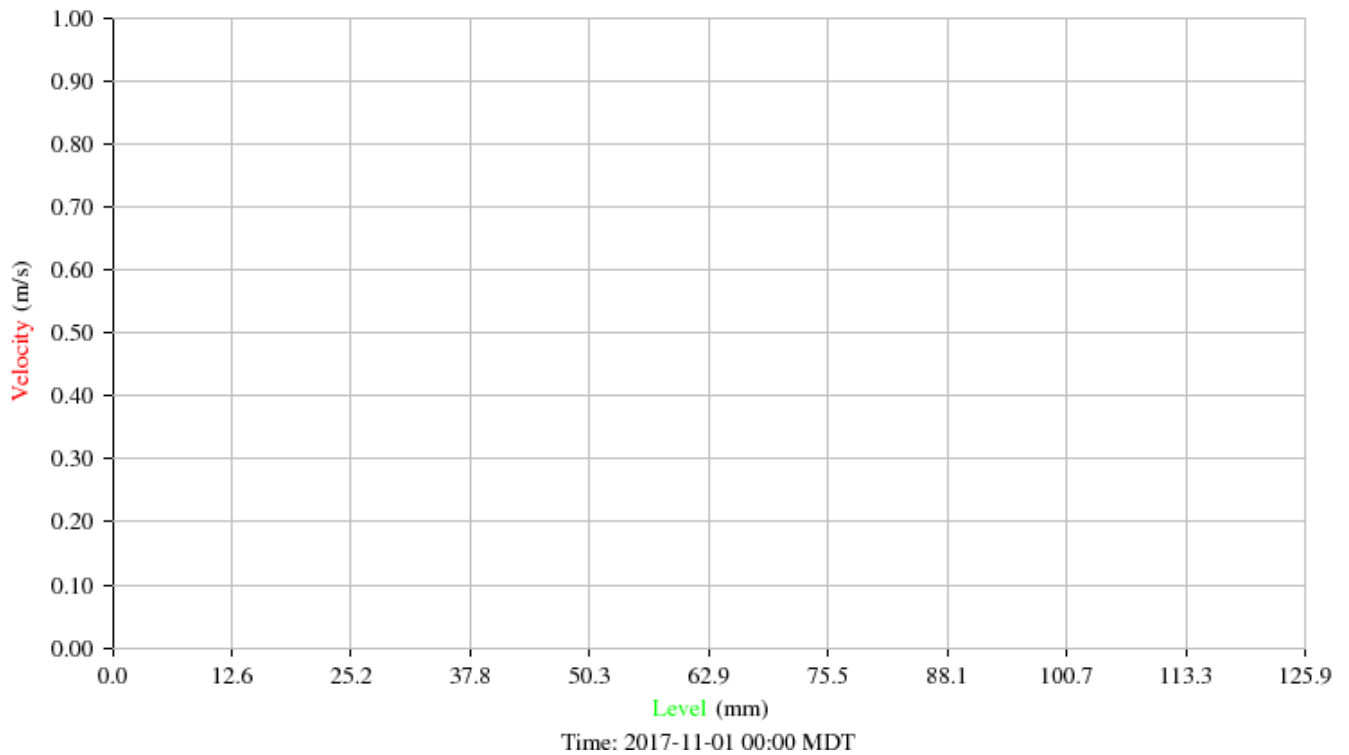
A15-124-06 – Flow with rain intensity



A15-124-06 – Level with velocity and flow



A15-124-06 – Level vs. velocity scatter plot

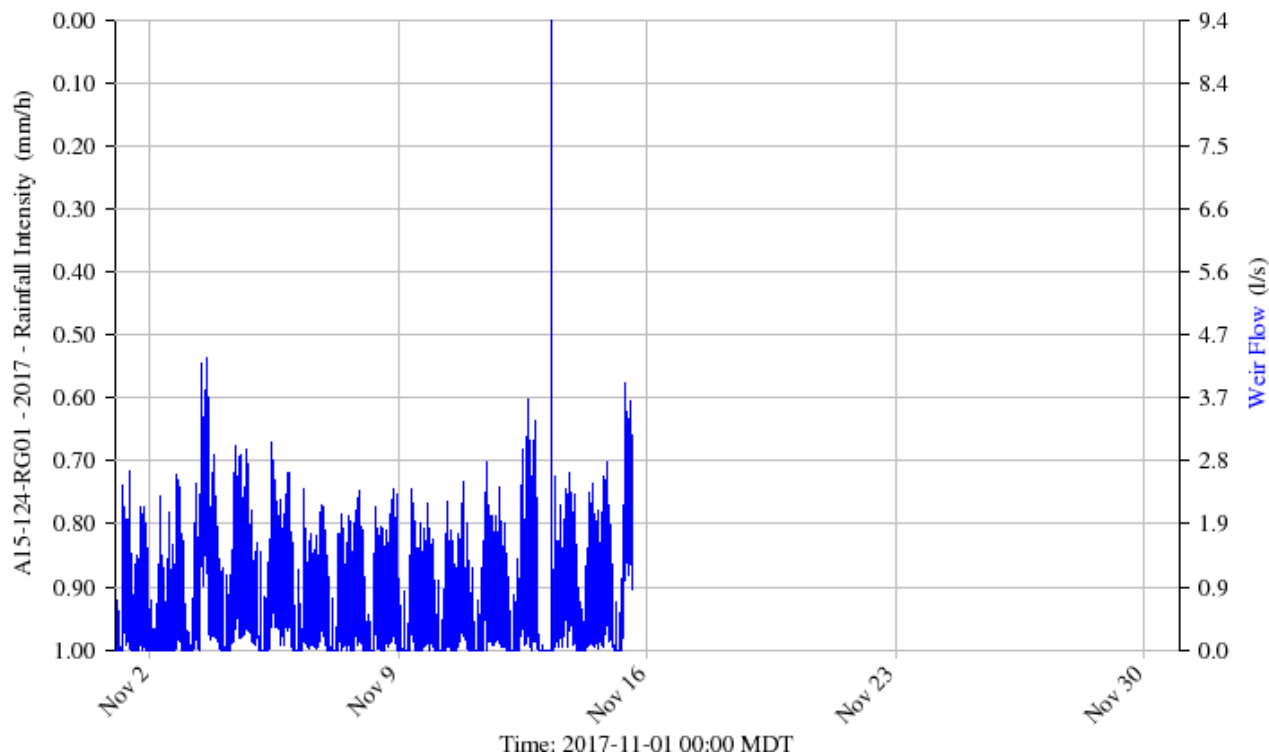


A15-124-06 – Summary report

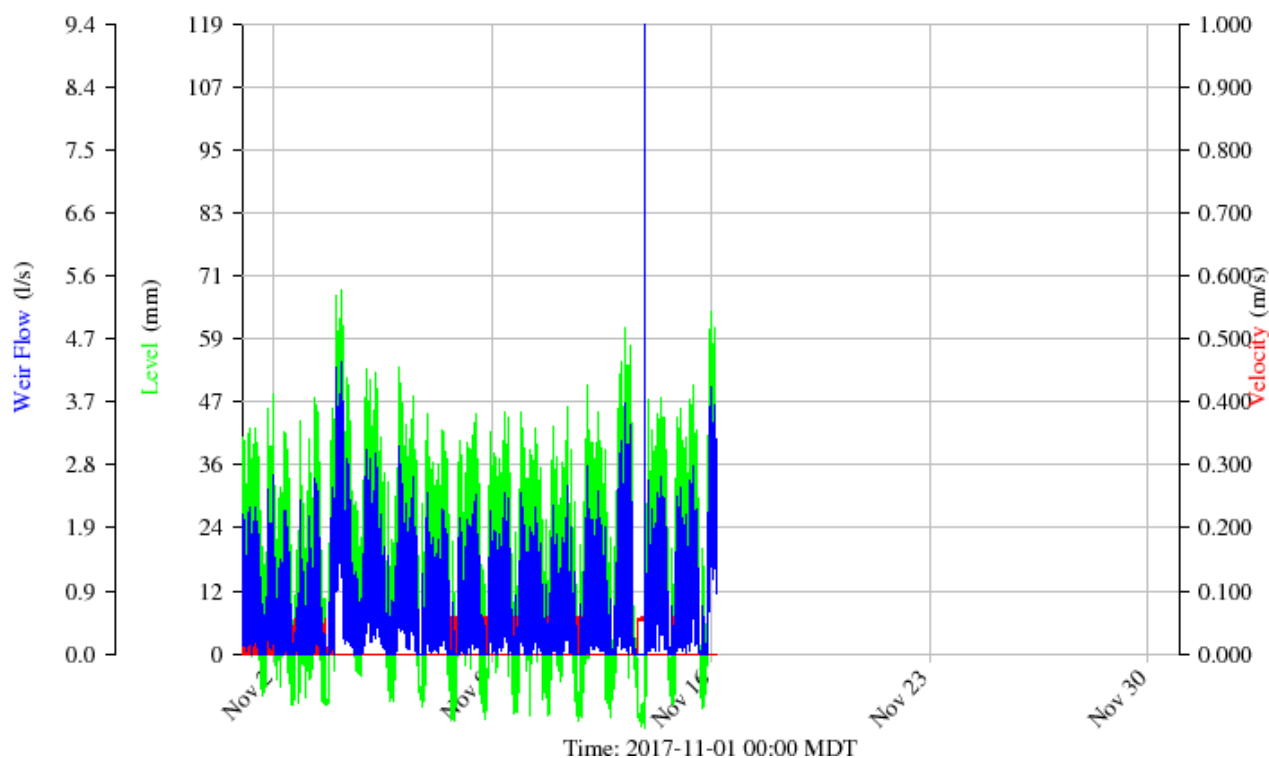
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.03	2.96	5.80	256.12	n/a
2	1.05	2.89	5.07	249.54	n/a
3	1.00	2.78	5.48	240.14	n/a
4	1.18	3.06	5.10	264.04	n/a
5	1.05	3.13	5.90	270.33	n/a
6	0.00	3.06	11.99	264.67	n/a
7	1.48	3.70	6.59	319.59	n/a
8	1.59	3.77	6.83	325.97	n/a
9	1.40	3.48	5.84	300.63	n/a
10	2.00	3.46	5.00	298.77	n/a
11	2.49	2.49	2.49	215.51	n/a
12	2.49	2.49	2.49	215.51	n/a
13	2.49	2.49	2.49	215.51	n/a
14	2.49	2.49	2.49	215.51	n/a
15	2.49	2.49	2.49	215.51	n/a
16	2.49	2.49	2.49	215.51	n/a
17	n/a	n/a	n/a	n/a	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	1.67	2.95	4.91	255.18	n/a
Minimum	0.00	2.49	2.49	215.51	n/a
Maximum	2.49	3.77	11.99	325.97	n/a
Total	n/a	n/a	n/a	4,082.87	0.00

A15-124-08

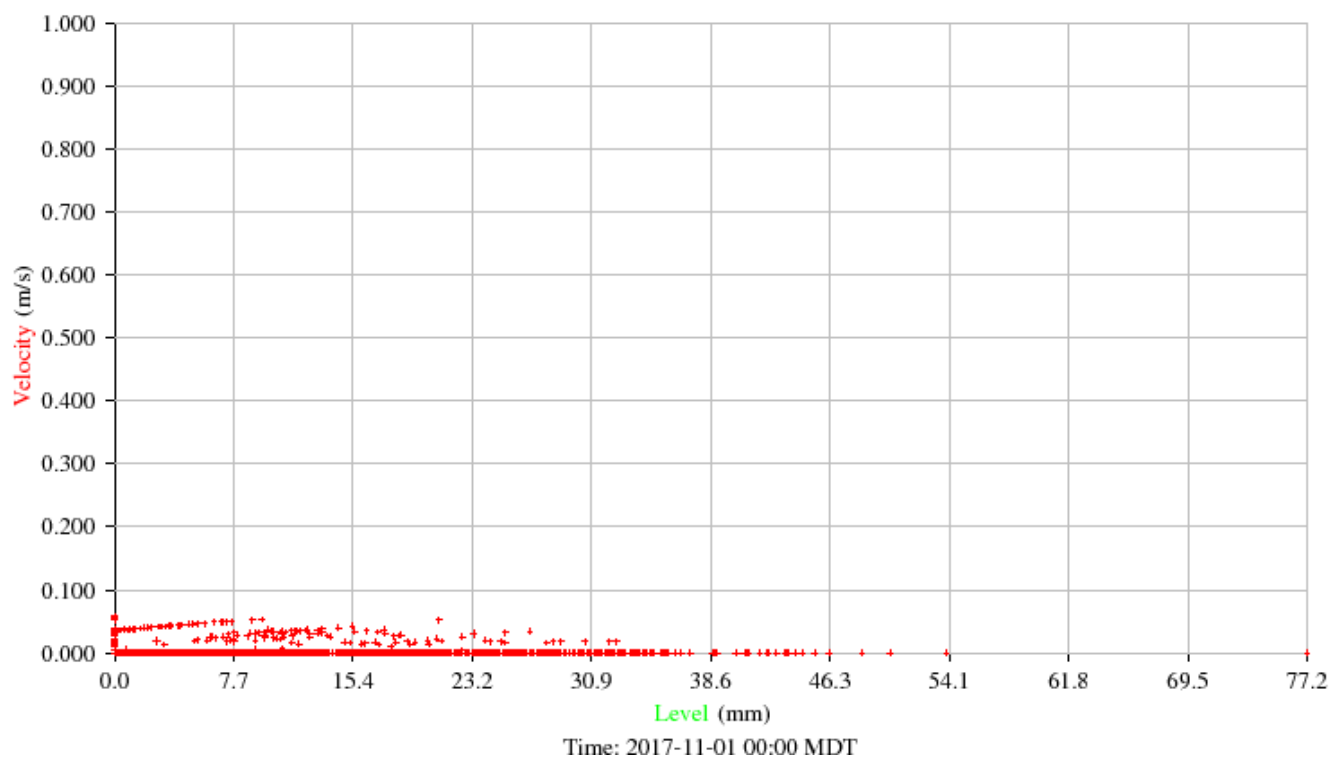
A15-124-08 – Flow with rain intensity



A15-124-08 – Level with velocity and flow



A15-124-08 – Level vs. velocity scatter plot

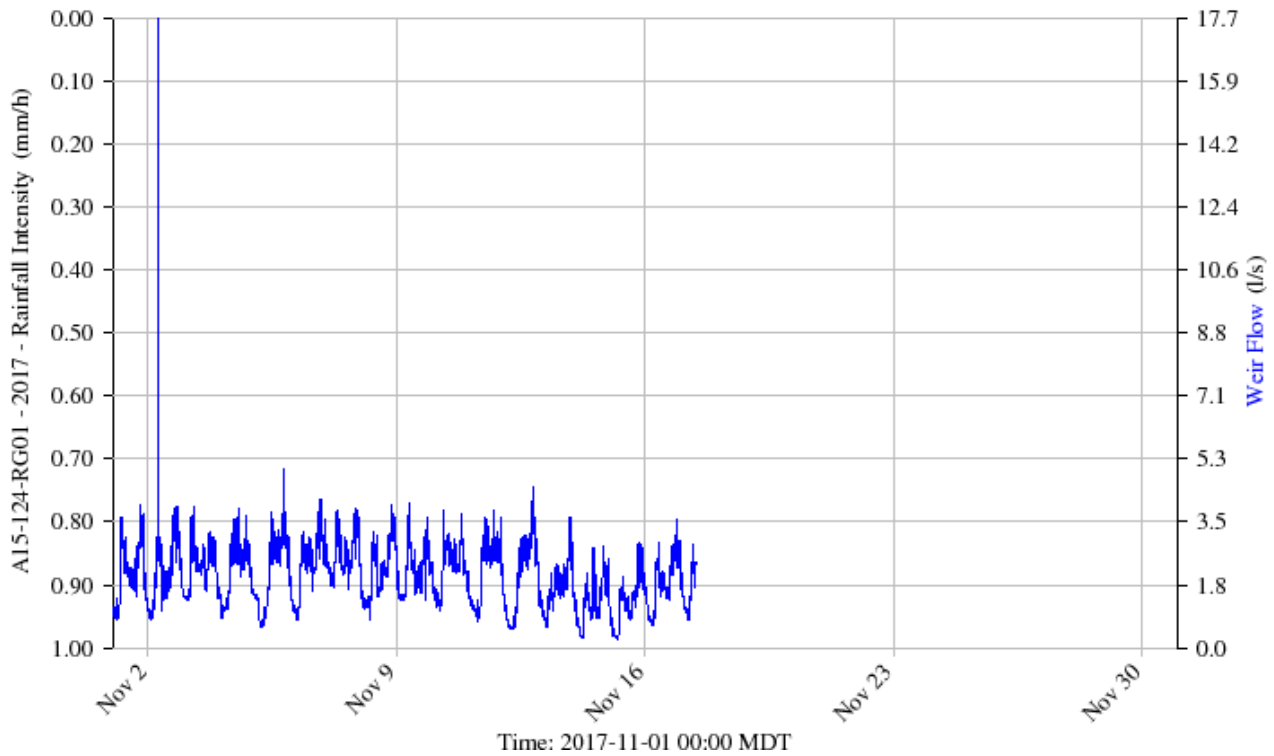


A15-124-08 – Summary report

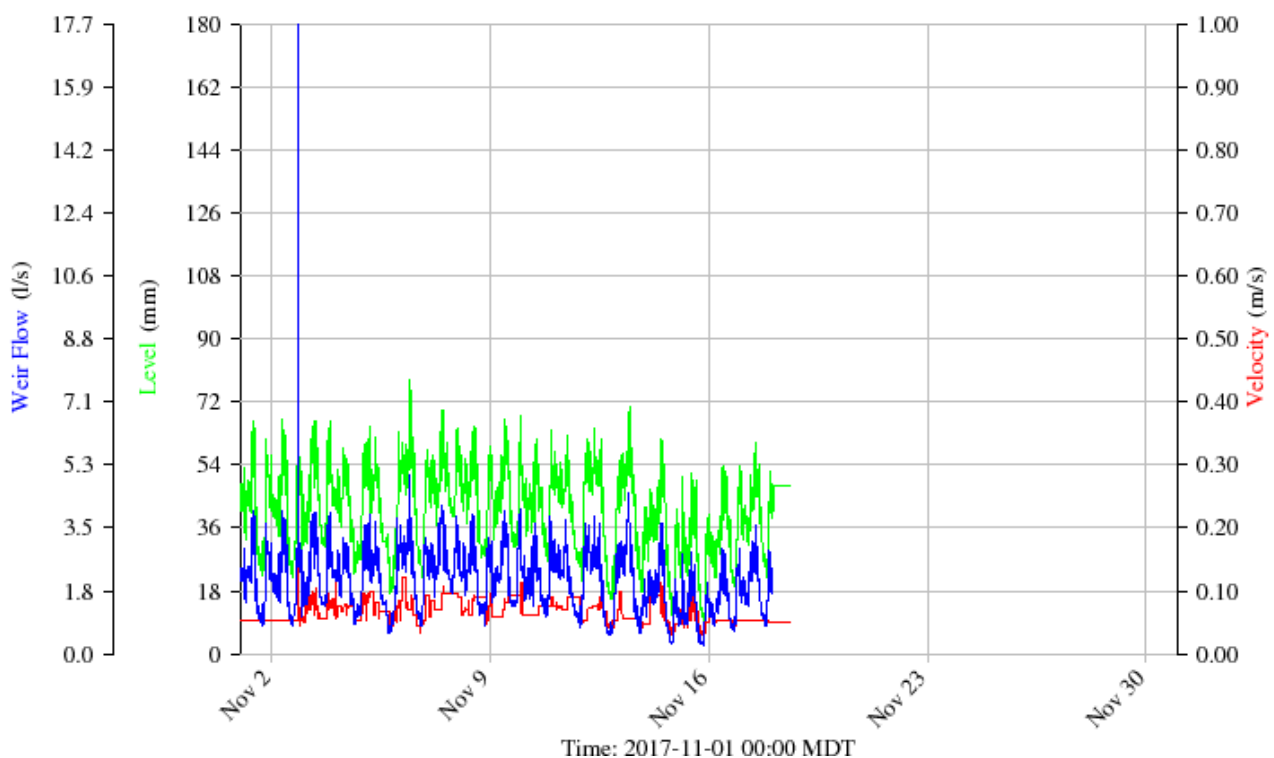
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.00	0.36	2.66	30.85	n/a
2	0.00	0.32	2.62	27.73	n/a
3	0.00	0.80	4.35	68.87	n/a
4	0.00	0.60	3.05	52.18	n/a
5	0.00	0.57	3.09	49.08	n/a
6	0.00	0.37	2.38	31.75	n/a
7	0.00	0.38	2.37	33.21	n/a
8	0.00	0.38	2.40	33.09	n/a
9	0.00	0.38	2.40	32.66	n/a
10	0.00	0.38	2.50	32.81	n/a
11	0.00	0.41	2.80	35.19	n/a
12	0.00	0.42	3.71	36.57	n/a
13	0.00	0.50	9.36	43.08	n/a
14	0.00	0.50	2.80	43.42	n/a
15	0.00	0.89	3.97	76.54	n/a
16	n/a	n/a	n/a	n/a	n/a
17	n/a	n/a	n/a	n/a	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	0.00	0.48	3.36	41.80	n/a
Minimum	0.00	0.32	2.37	27.73	n/a
Maximum	0.00	0.89	9.36	76.54	n/a
Total	n/a	n/a	n/a	627.01	0.00

A15-124-09

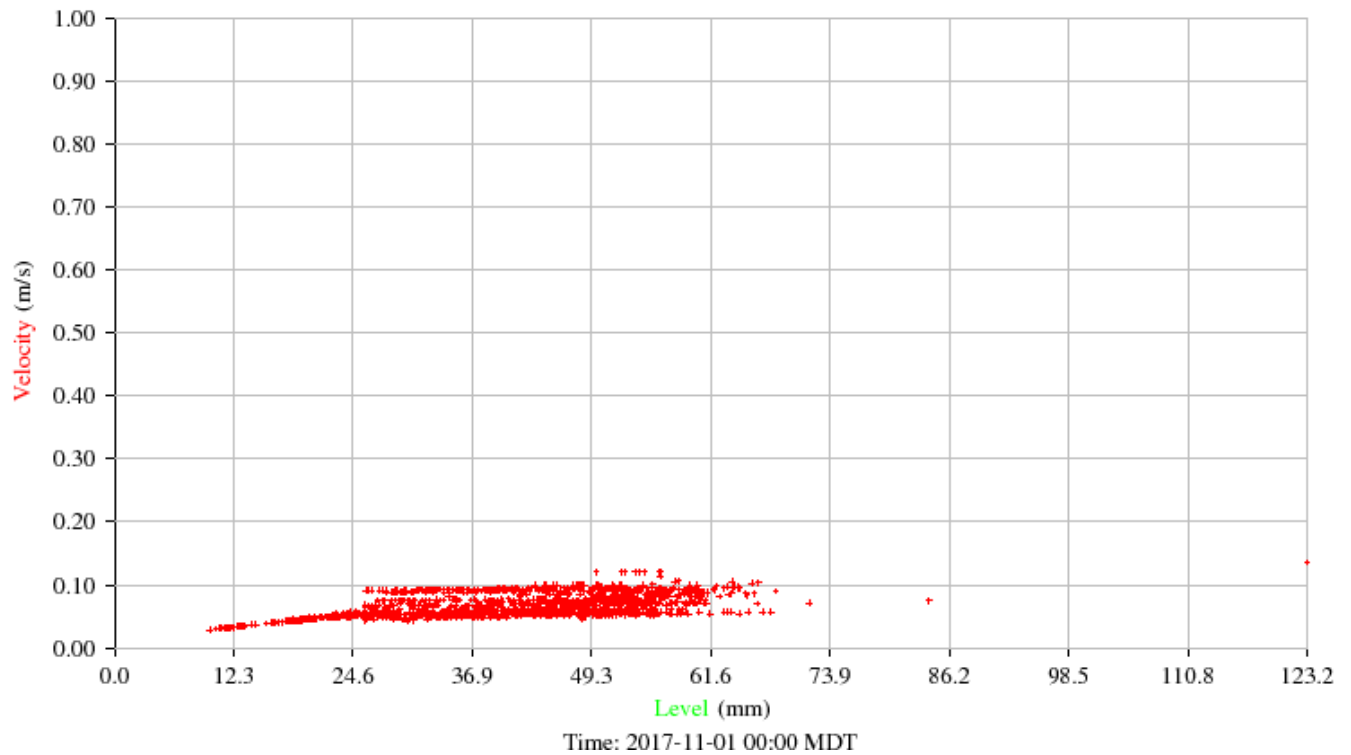
A15-124-09 – Flow with rain intensity



A15-124-09 – Level with velocity and flow



A15-124-09 – Level vs. velocity scatter plot

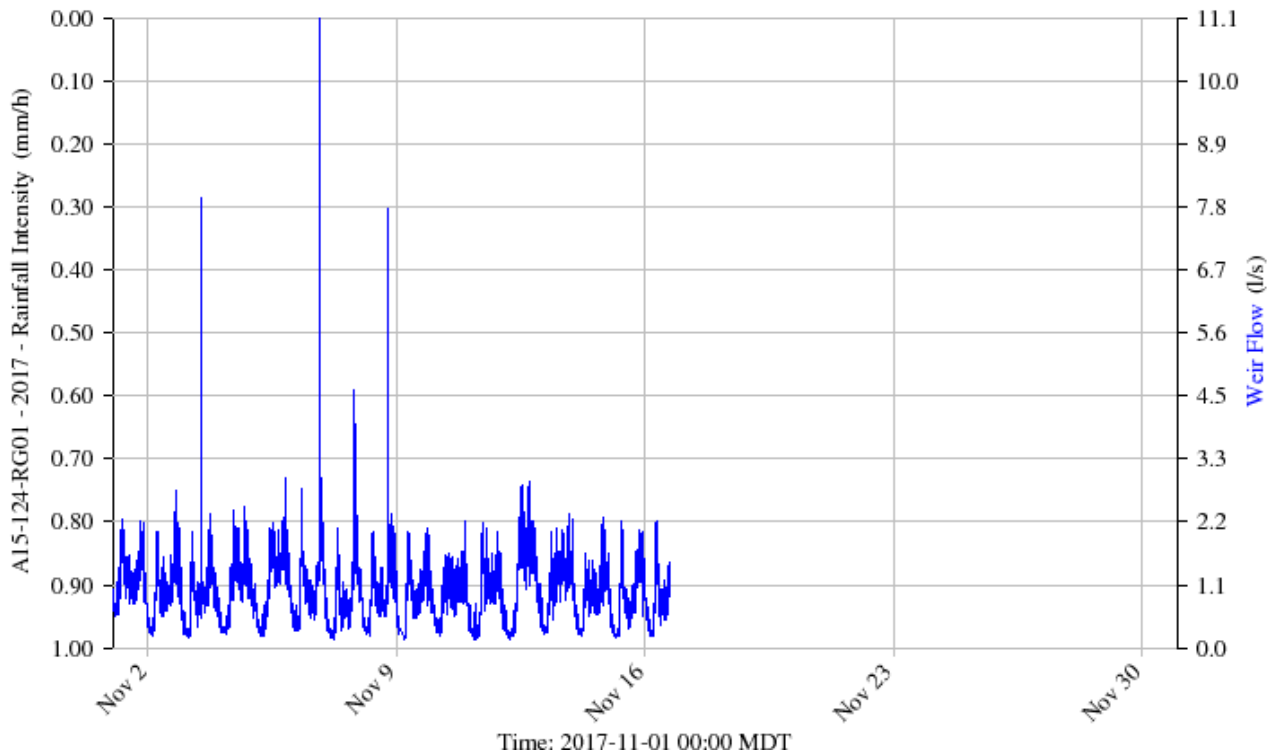


A15-124-09 – Summary report

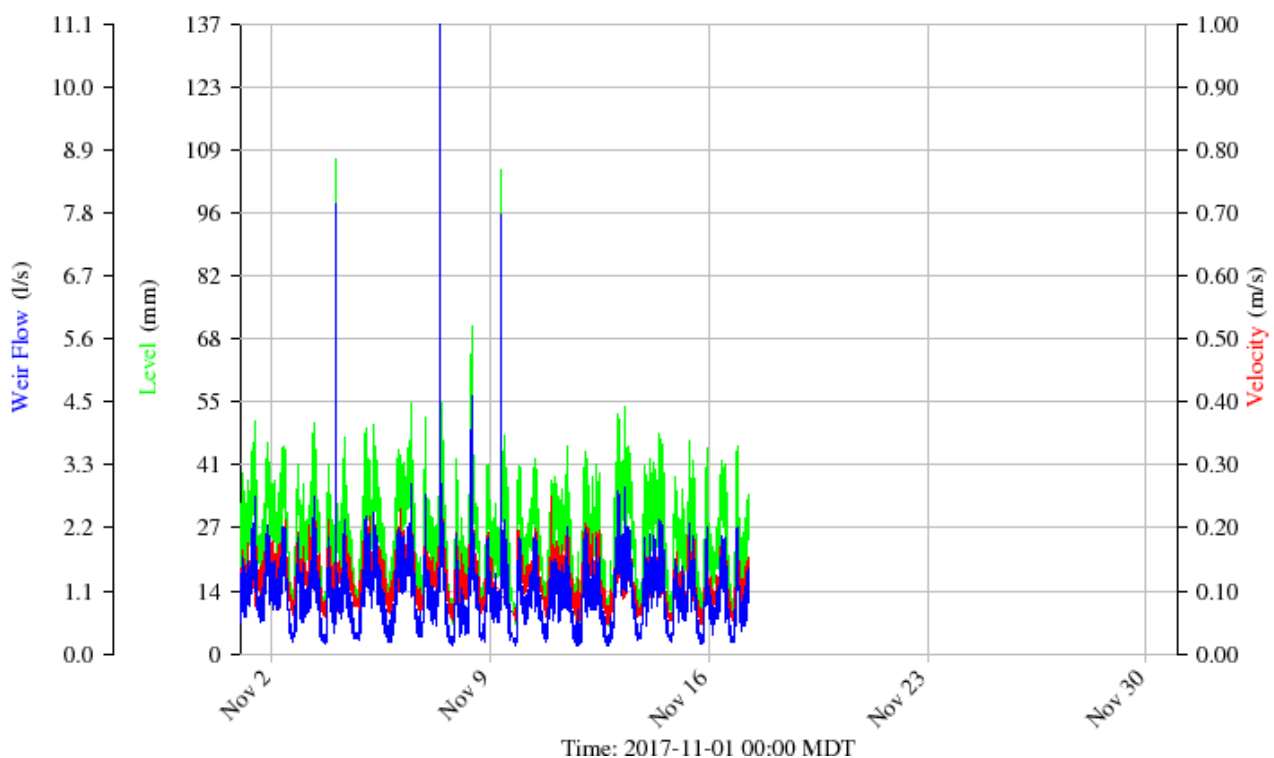
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.81	2.12	4.01	183.22	n/a
2	0.79	2.24	17.70	193.89	n/a
3	1.35	2.28	3.99	197.25	n/a
4	0.83	2.16	3.91	186.41	n/a
5	0.58	2.18	5.04	188.26	n/a
6	0.78	2.28	4.18	197.19	n/a
7	1.64	2.64	3.90	228.49	n/a
8	0.78	2.17	4.01	187.91	n/a
9	1.32	2.24	4.09	193.40	n/a
10	1.05	2.27	3.84	196.04	n/a
11	0.75	2.19	3.86	189.01	n/a
12	0.53	2.00	4.52	172.46	n/a
13	0.59	1.71	3.68	147.78	n/a
14	0.28	1.26	2.91	109.29	n/a
15	0.23	1.29	2.98	111.25	n/a
16	0.62	1.77	3.61	153.18	n/a
17	0.79	1.65	3.00	142.30	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	0.81	2.03	4.66	175.14	n/a
Minimum	0.23	1.26	2.91	109.29	n/a
Maximum	1.64	2.64	17.70	228.49	n/a
Total	n/a	n/a	n/a	2,977.33	0.00

A15-124-10

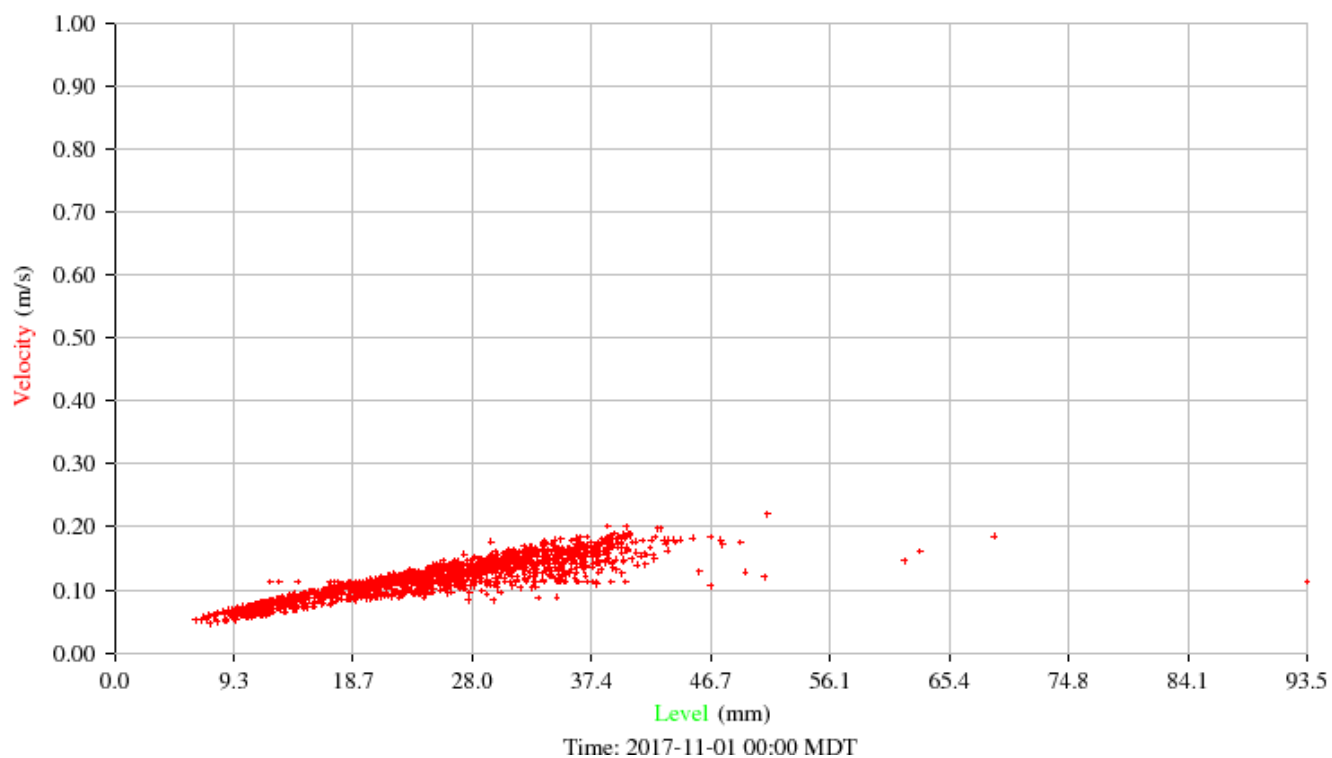
A15-124-10 – Flow with rain intensity



A15-124-10 – Level with velocity and flow



A15-124-10 – Level vs. velocity scatter plot

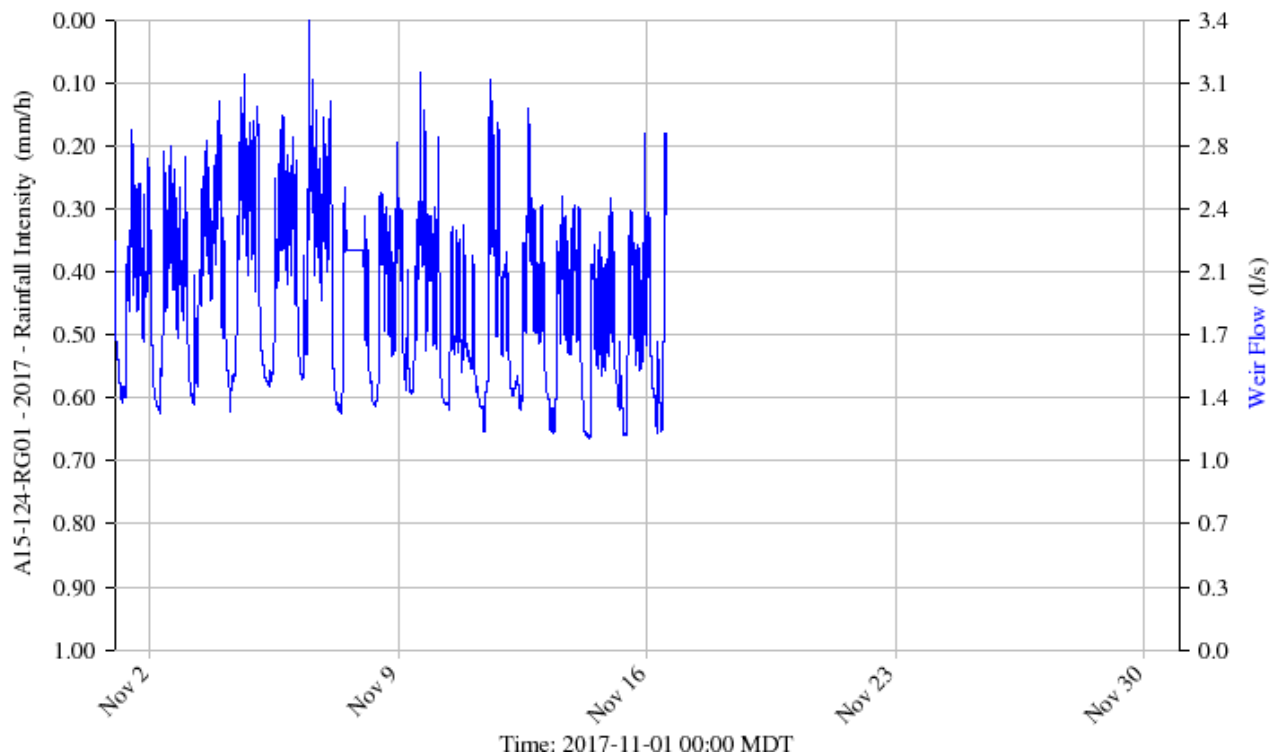


A15-124-10 – Summary report

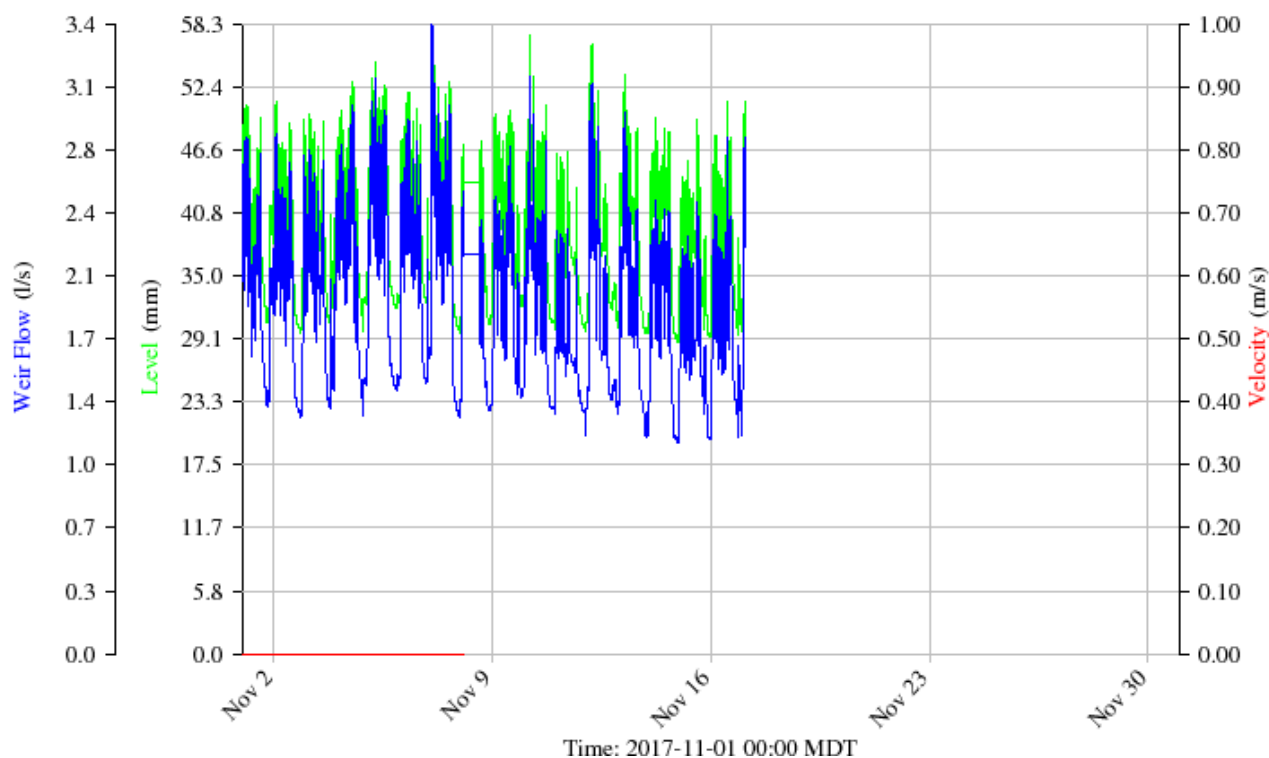
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.56	1.21	2.29	104.79	n/a
2	0.21	0.99	2.77	85.22	n/a
3	0.19	0.92	7.95	79.56	n/a
4	0.24	1.04	2.49	89.62	n/a
5	0.20	1.12	3.00	97.02	n/a
6	0.29	1.08	11.13	92.92	n/a
7	0.15	0.88	4.56	75.62	n/a
8	0.22	1.02	7.77	87.99	n/a
9	0.16	1.02	2.12	88.03	n/a
10	0.21	0.94	2.25	81.19	n/a
11	0.15	0.89	2.19	76.70	n/a
12	0.15	1.14	2.95	98.39	n/a
13	0.23	1.08	2.38	93.51	n/a
14	0.22	0.91	2.32	78.65	n/a
15	0.17	0.88	2.24	75.80	n/a
16	0.21	0.78	2.25	67.67	n/a
17	n/a	n/a	n/a	n/a	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	0.22	0.99	3.79	85.79	n/a
Minimum	0.15	0.78	2.12	67.67	n/a
Maximum	0.56	1.21	11.13	104.79	n/a
Total	n/a	n/a	n/a	1,372.70	0.00

A15-124-11

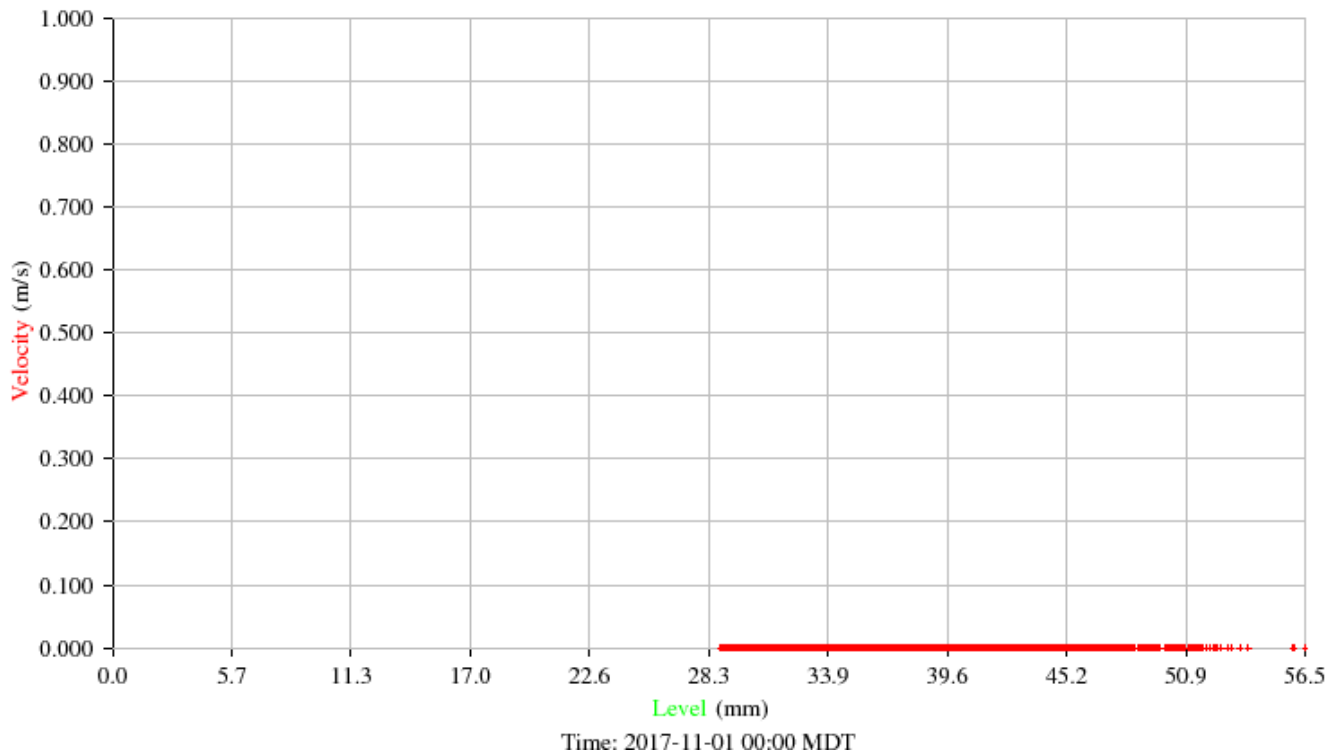
A15-124-11 – Flow with rain intensity



A15-124-11 – Level with velocity and flow



A15-124-11 – Level vs. velocity scatter plot

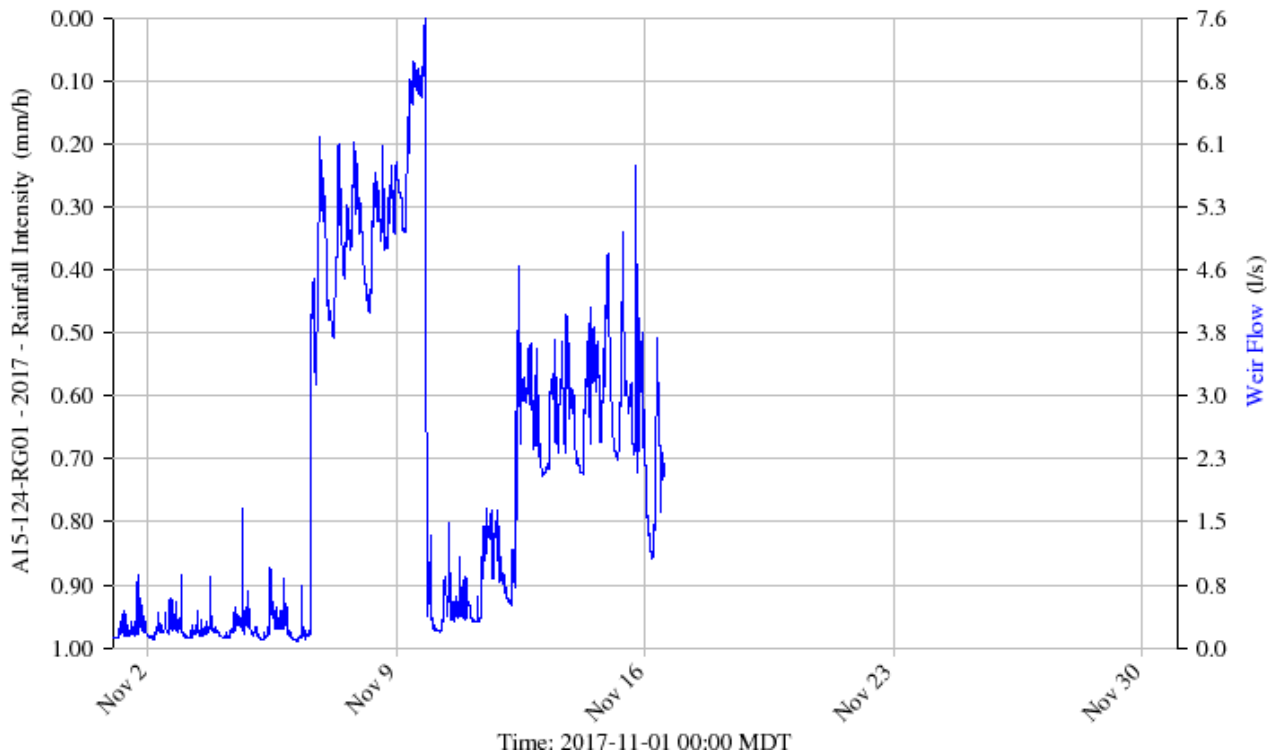


A15-124-11 – Summary report

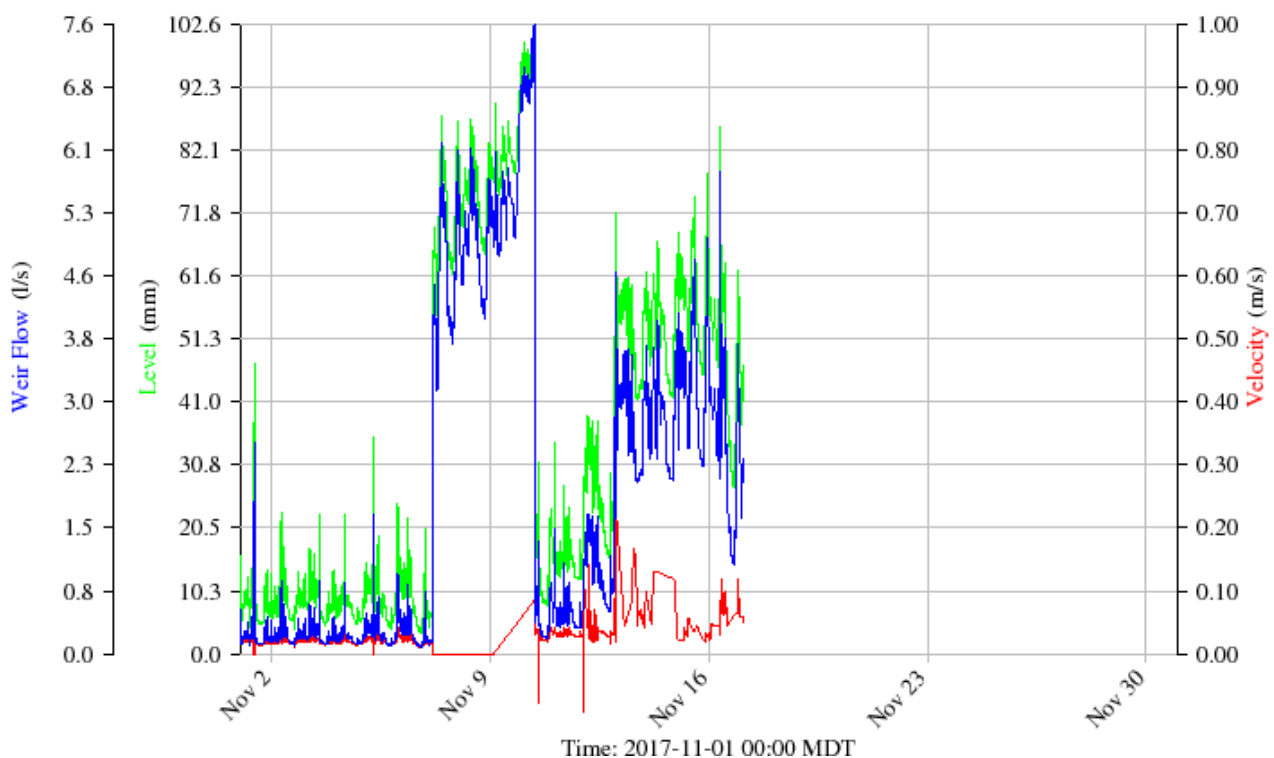
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.35	1.95	2.84	168.79	n/a
2	1.29	1.95	2.75	168.88	n/a
3	1.35	2.07	3.00	178.76	n/a
4	1.30	2.12	3.15	182.75	n/a
5	1.44	2.01	2.96	173.75	n/a
6	1.48	2.18	3.44	188.56	n/a
7	1.29	1.90	3.00	163.91	n/a
8	1.33	1.88	2.50	162.76	n/a
9	1.40	2.01	3.16	173.24	n/a
10	1.31	1.75	2.81	151.10	n/a
11	1.19	1.80	3.11	155.89	n/a
12	1.32	1.85	2.96	159.76	n/a
13	1.18	1.80	2.48	155.77	n/a
14	1.15	1.72	2.45	148.70	n/a
15	1.17	1.75	2.82	151.63	n/a
16	1.18	1.70	2.82	146.77	n/a
17	n/a	n/a	n/a	n/a	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	1.30	1.90	2.89	164.44	n/a
Minimum	1.15	1.70	2.45	146.77	n/a
Maximum	1.48	2.18	3.44	188.56	n/a
Total	n/a	n/a	n/a	2,631.02	0.00

A15-124-12A

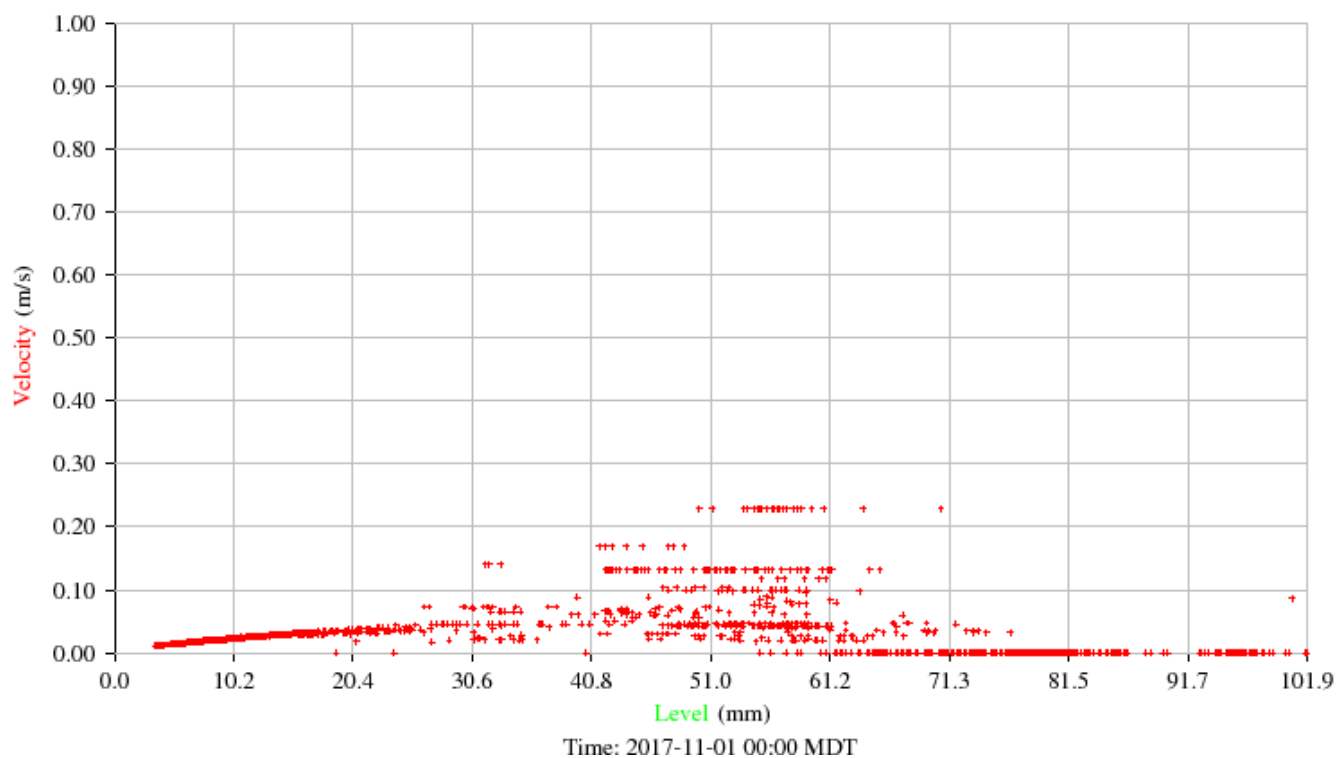
A15-124-12A – Flow with rain intensity



A15-124-12A – Level with velocity and flow



A15-124-12A – Level vs. velocity scatter plot

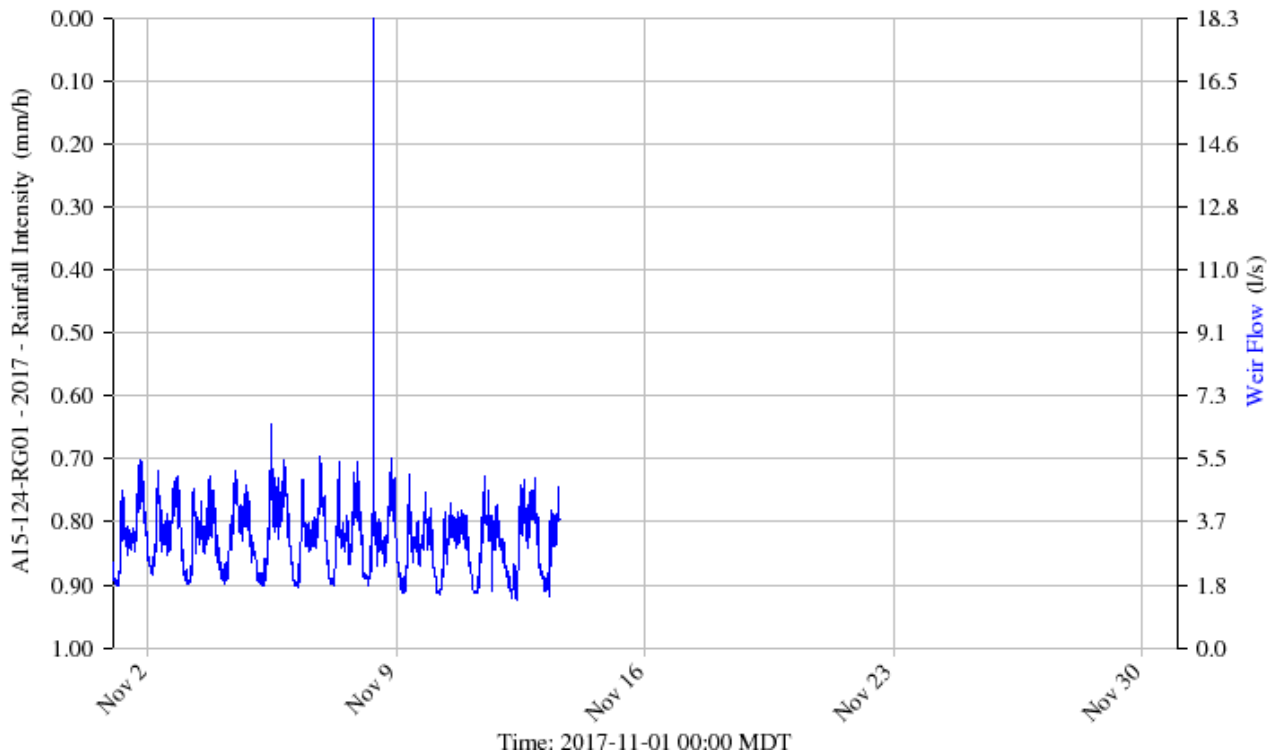


A15-124-12A – Summary report

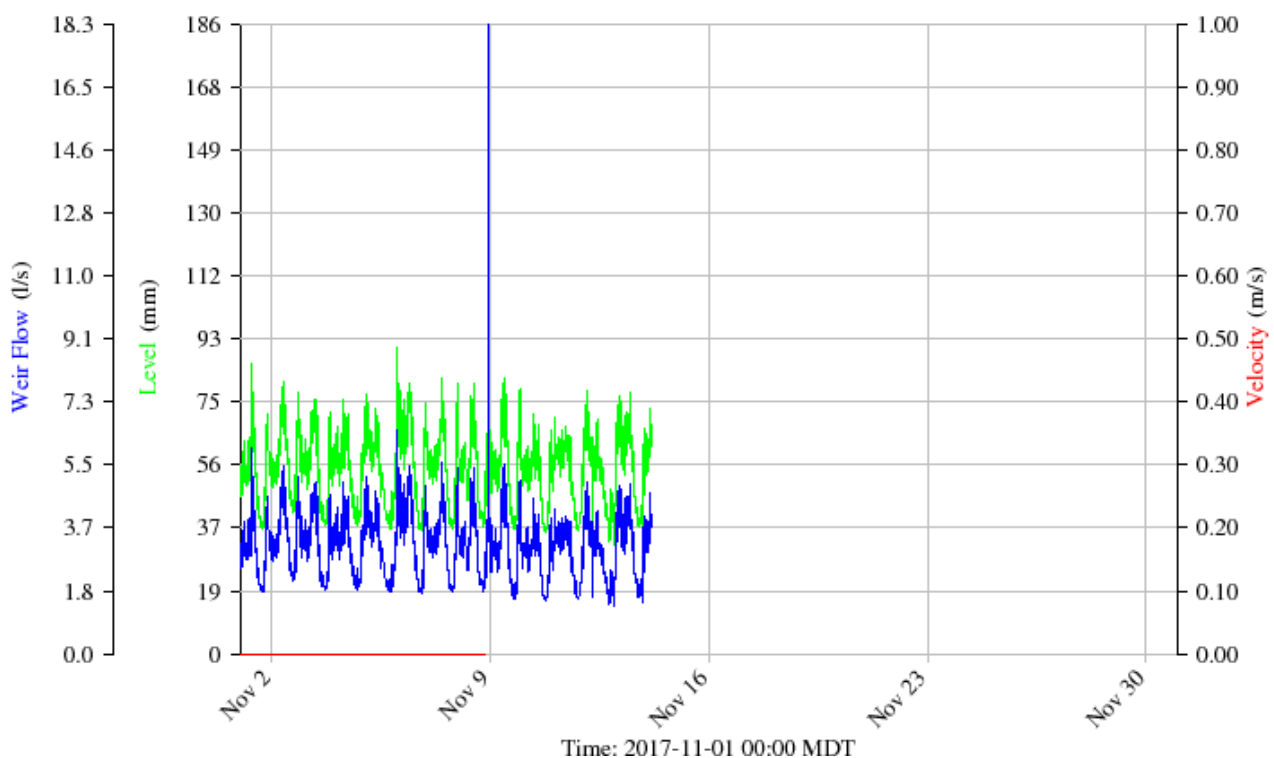
	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	0.11	0.22	0.88	19.20	n/a
2	0.09	0.24	0.87	20.36	n/a
3	0.11	0.20	0.86	17.35	n/a
4	0.12	0.25	1.67	21.32	n/a
5	0.10	0.28	0.96	24.25	n/a
6	0.08	1.78	6.16	153.53	n/a
7	3.74	4.89	6.10	422.77	n/a
8	4.04	5.00	6.06	431.79	n/a
9	0.37	5.63	7.59	486.14	n/a
10	0.19	0.45	1.50	39.02	n/a
11	0.32	0.90	1.69	78.13	n/a
12	0.52	2.10	4.60	181.62	n/a
13	2.06	2.78	4.02	240.02	n/a
14	2.09	3.06	4.76	264.09	n/a
15	2.11	3.09	5.81	266.61	n/a
16	1.08	1.98	3.74	171.04	n/a
17	n/a	n/a	n/a	n/a	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	1.07	2.05	3.58	177.33	n/a
Minimum	0.08	0.20	0.86	17.35	n/a
Maximum	4.04	5.63	7.59	486.14	n/a
Total	n/a	n/a	n/a	2,837.26	0.00

A15-124-12B

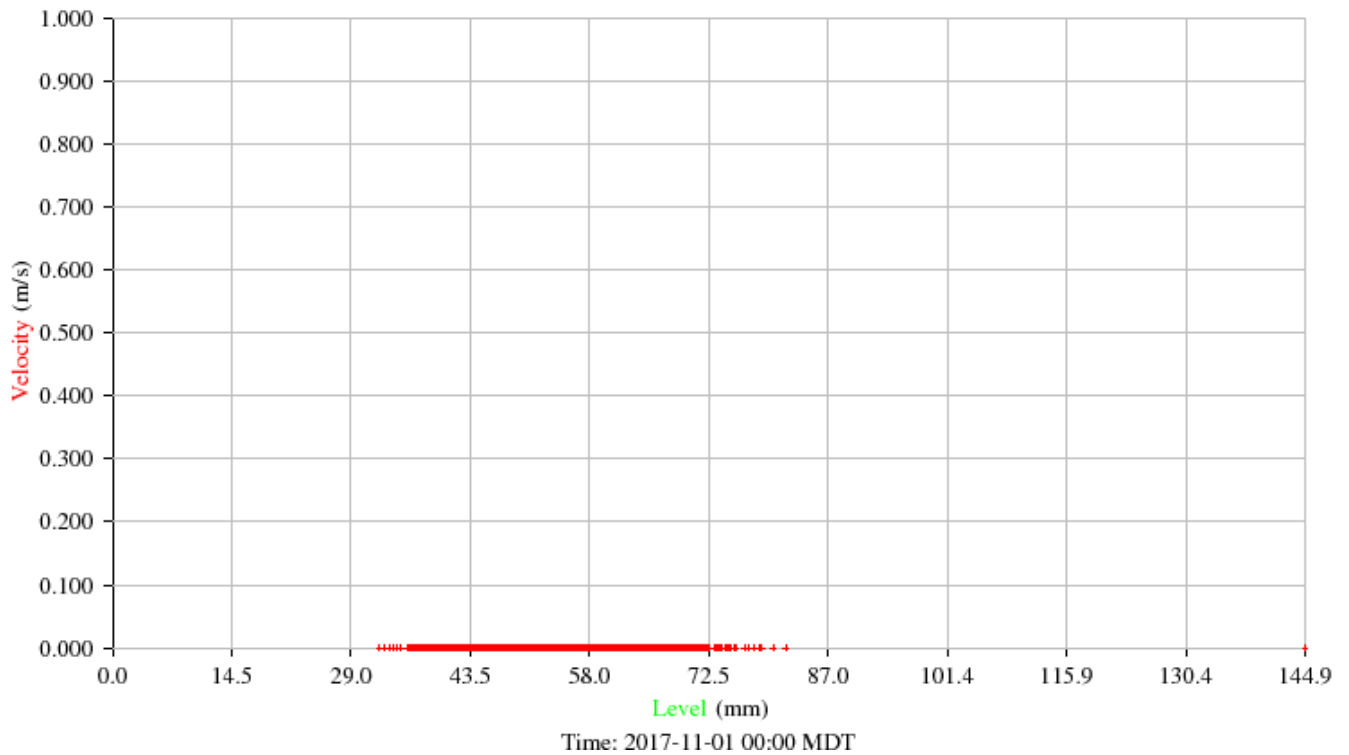
A15-124-12B – Flow with rain intensity



A15-124-12B – Level with velocity and flow



A15-124-12B – Level vs. velocity scatter plot



A15-124-12B – Summary report

	Min	Avg	Max	Volume	Rainfall
Day	(l/s)	(l/s)	(l/s)	(m3)	(mm)
1	1.80	3.32	5.48	287.08	n/a
2	2.12	3.38	5.14	292.01	n/a
3	1.86	3.20	4.96	276.23	n/a
4	1.86	3.24	5.13	279.95	n/a
5	1.80	3.44	6.48	297.20	n/a
6	1.74	3.18	5.54	274.82	n/a
7	1.78	3.20	5.40	276.65	n/a
8	1.81	3.24	18.28	279.51	n/a
9	1.61	2.90	5.03	250.19	n/a
10	1.56	2.93	4.18	253.40	n/a
11	1.60	2.93	4.98	252.97	n/a
12	1.40	3.03	4.94	262.20	n/a
13	1.51	2.71	4.65	234.44	n/a
14	n/a	n/a	n/a	n/a	n/a
15	n/a	n/a	n/a	n/a	n/a
16	n/a	n/a	n/a	n/a	n/a
17	n/a	n/a	n/a	n/a	n/a
18	n/a	n/a	n/a	n/a	n/a
19	n/a	n/a	n/a	n/a	n/a
20	n/a	n/a	n/a	n/a	n/a
21	n/a	n/a	n/a	n/a	n/a
22	n/a	n/a	n/a	n/a	n/a
23	n/a	n/a	n/a	n/a	n/a
24	n/a	n/a	n/a	n/a	n/a
25	n/a	n/a	n/a	n/a	n/a
26	n/a	n/a	n/a	n/a	n/a
27	n/a	n/a	n/a	n/a	n/a
28	n/a	n/a	n/a	n/a	n/a
29	n/a	n/a	n/a	n/a	n/a
Mean	1.73	3.13	6.17	270.51	n/a
Minimum	1.40	2.71	4.18	234.44	n/a
Maximum	2.12	3.44	18.28	297.20	n/a
Total	n/a	n/a	n/a	3,516.66	0.00

Appendix 4

Site Setup Books



Site Assessment Sheet



CLIENT FLOW MONITORING #: 1
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-01

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2017
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494
SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	<u>16-Jun-17</u>	<u>17-Nov-17</u>
Meter Make & Model:	<u>ISCO 2150</u>	
Meter I.D. - #1 and #2	<u>A-2150-06</u>	<u>N/A</u>
Wireless I.D # / Cell #:	<u>N/A</u>	<u>N/A</u>
Level / Velocity Type:	<u>Submerged</u>	<u>N/A</u>
Sensor Mounting:	<u>Compression</u>	
Primary Device:	<u>AV and Weir</u>	
Logging Rate / Call out:	<u>5 minute</u>	<u>Twice Daily</u>

Site Location Information

Client Manhole #: 1
Address (Location): 10 St, near 8 Ave
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4640 W-110.1731
Landmarks: Near strip mall entrance
Traffic Control Req's: Moderate - busy at rush hour
Additional Information: Middle of road

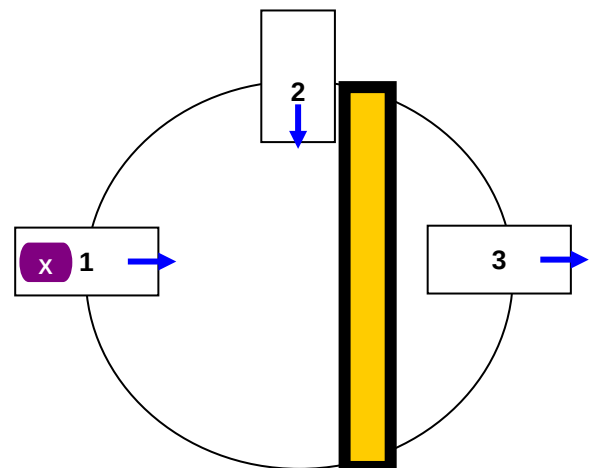
Site Profile

Manhole Depth (mm):	<u>3590</u>	Rungs?	<u>Yes</u>
Overall Site Condition:	<u>Fair</u>		
Pipe Size #1	<u>350</u>	#2	<u>200</u>
(mm): #3	<u>450</u>	#4	<u>N/A</u>
Location of Sensor (which pipe?):	<u>x</u>	=	<u>1</u>
Overall Pipe Condition:	<u>Fair</u>		
Additional Information:	<u>250mm SFE Weir</u>		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 1
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #:
SFE SITE #:

A15-124
A15-124-01

Site View



Site View



Meter



Install



Weir Install



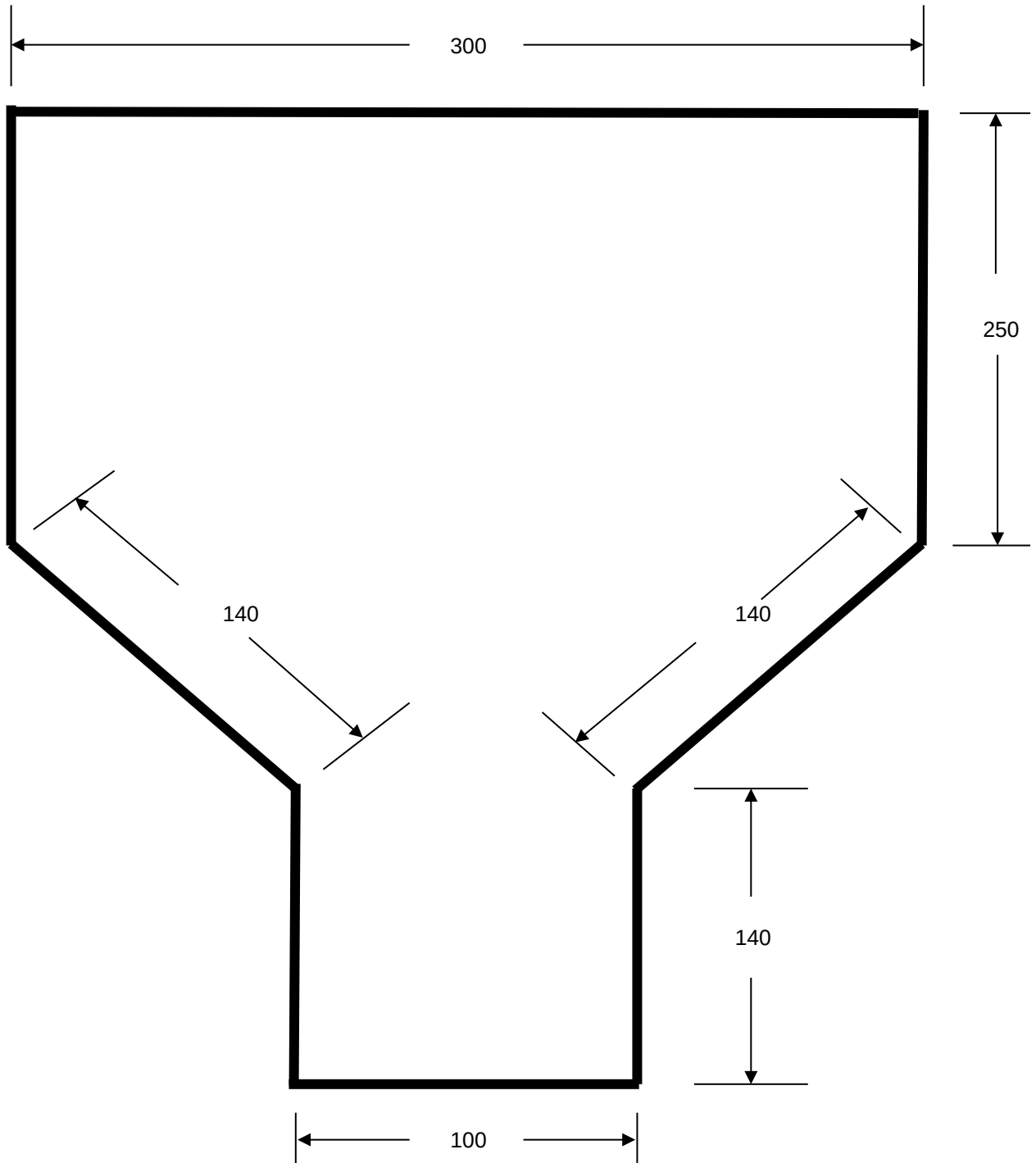
Downhole



CLIENT FLOW MONITORING #: 1
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 16-Jun-17 8:02

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-01
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) **250**





Site Assessment Sheet



CLIENT FLOW MONITORING #: 5
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-05

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2017
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494
SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	<u>15-Jun-17</u>	<u>15-Nov-17</u>
Meter Make & Model:	<u>ISCO 2150</u>	
Meter I.D. - #1 and #2	<u>215E01373</u>	<u>N/A</u>
Wireless I.D # / Cell #:	<u>211M01092</u>	<u>N/A</u>
Level / Velocity Type:	<u>Submerged</u>	<u>AV Sensor</u>
Sensor Mounting:	<u>Scissor Band</u>	
Primary Device:	<u>Area Velocity</u>	
Logging Rate / Call out:	<u>5 minute</u>	<u>Twice Daily</u>

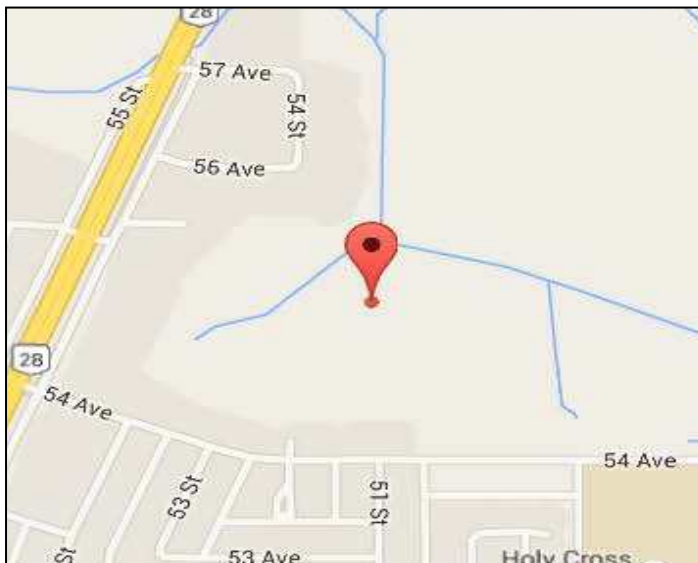
Site Location Information

Client Manhole #: 5
Address (Location): Off 54 Ave - In Field
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4197 W-110.2075
Landmarks: Behind Condos in field
Traffic Control Req's: N/A
Additional Information: Raised manhole

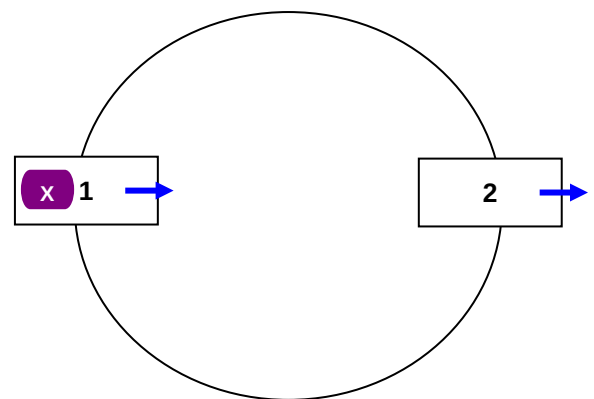
Site Profile

Manhole Depth (mm):	<u>5112</u>	Rungs?	<u>Yes</u>
Overall Site Condition:	<u>Fair</u>		
Pipe Size #1	<u>375</u>	#2	<u>375</u>
(mm): #3	<u>N/A</u>	#4	<u>N/A</u>
Location of Sensor (which pipe?):	<u>x</u>	=	<u>1</u>
Overall Pipe Condition:	<u>Fair</u>		
Additional Information:	<u>Possible weir Adder</u>		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 5
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #:
SFE SITE #:

A15-124
A15-124-05

Site View



Site View



Meter



Upstream



Install



Downhole





Area Velocity Install Sheet



CLIENT FLOW MONITORING #: 5
NAME: Cold Lake Flow Monitoring 2017

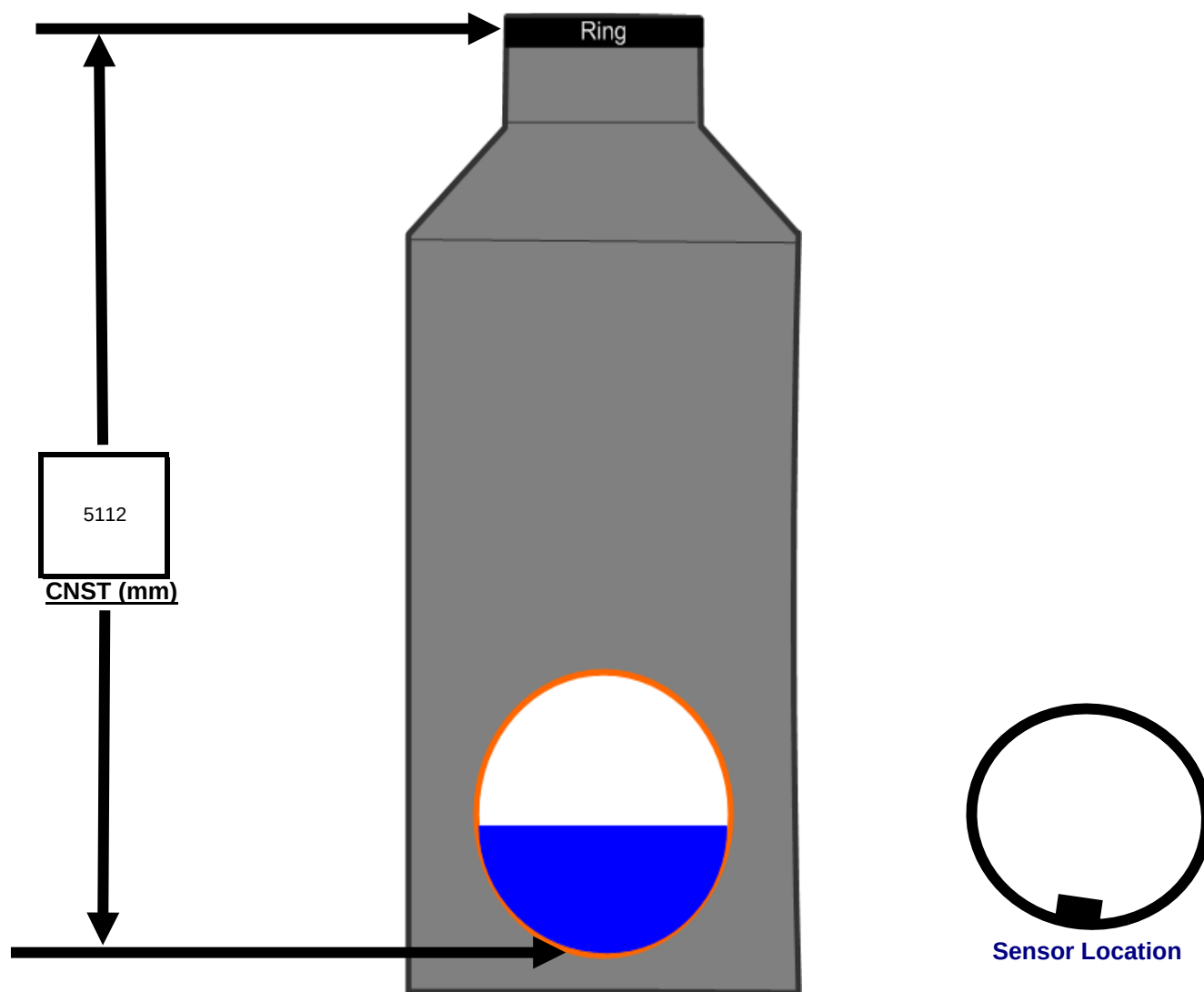
SFE PROJECT #: A15-124
SFE SITE #: A15-124-05
Technician 1: Nick Schellenberg
Technician 2: Ray Vos

Meter Depth vs.. Field Depth Calibration / Verification

Reading Number	Date (ddmmmyy)	Time (hh:mm)	Field Meas (mm)	Meter Depth (mm)	Comments (Zero Meter Level before Installation)
Initial	15-Jun-17	7:48	106	116	LA
1	15-Jun-17	7:50	106	107	
2	15-Jun-17	7:52	108	106	
3	15-Jun-17	7:54	106	107	
Average			107	107	

* Three Continuous Measurements Within 20 mm.

* Average Meter vs (WL1 and WL2) Within 5%



CLIENT FLOW MONITORING #: 6
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-06

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2017
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494
SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	<u>15-Jun-17</u>	<u>16-Nov-17</u>
Meter Make & Model:	<u>ISCO 2150</u>	
Meter I.D. - #1 and #2	<u>A-2150-38</u>	<u>N/A</u>
Wireless I.D # / Cell #:	<u>211E00960</u>	<u>N/A</u>
Level / Velocity Type:	<u>Submerged</u>	<u>N/A</u>
Sensor Mounting:	<u>Compression</u>	
Primary Device:	<u>AV and Weir</u>	
Logging Rate / Call out:	<u>5 minute</u>	<u>Twice Daily</u>

Site Location Information

Client Manhole #: 6
Address (Location): End of 49 St - Dirt Rd
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4241 W-110.2025
Landmarks: Middle of dirt road
Traffic Control Req's: N/A
Additional Information: Poor signal strength

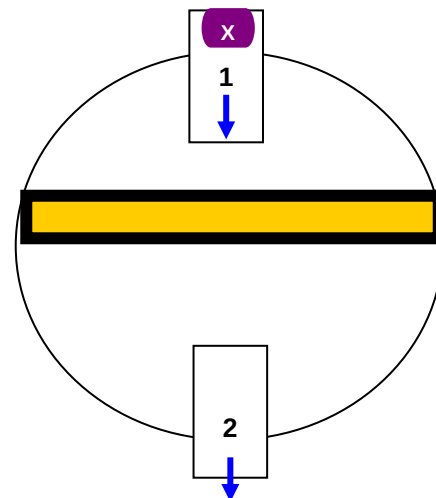
Site Profile

Manhole Depth (mm):	<u>3563</u>	Rungs?	<u>Yes</u>
Overall Site Condition:	<u>Fair</u>		
Pipe Size #1	<u>375</u>	#2	<u>375</u>
(mm): #3	<u>N/A</u>	#4	<u>N/A</u>
Location of Sensor (which pipe?):	<u>x</u>	=	<u>1</u>
Overall Pipe Condition:	<u>Fair</u>		
Additional Information:	<u>SFE 250mm Weir</u>		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 6
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-06

Site View



Site View



Meter



Install



Weir Install



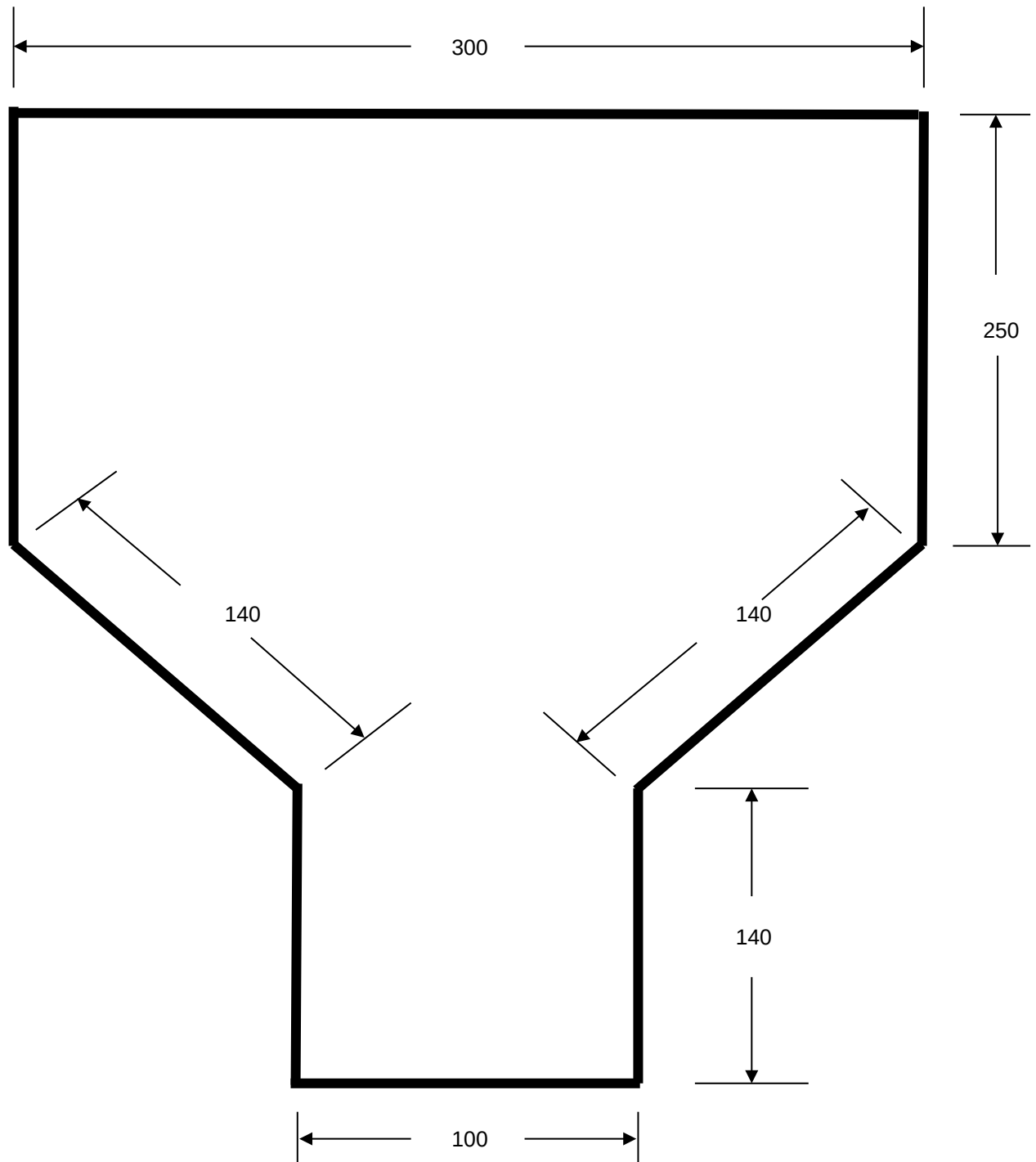
Downhole



CLIENT FLOW MONITORING #: 6
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 15-Jun-17 9:10

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-06
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) **250**



CLIENT FLOW MONITORING #: 8
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-08

Project Specific Information

Client Name: City of Cold Lake
 End User Name: City of Cold Lake
 Project Name: Flow Monitoring 2017
 Client Contact: Azam Khan 780-594-4494
 Field Contact: Azam Khan 780-594-4494
 SFE PM Contact: Nick Schellenberg 204-999-3547
 Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	<u>16-Jun-17</u>	<u>15-Nov-17</u>
Meter Make & Model:	<u>ISCO 2150</u>	
Meter I.D. - #1 and #2	<u>A-2150-21</u>	<u>N/A</u>
Wireless I.D # / Cell #:	<u>N/A</u>	<u>N/A</u>
Level / Velocity Type:	<u>Submerged</u>	<u>N/A</u>
Sensor Mounting:	<u>Compression</u>	
Primary Device:	<u>AV and Weir</u>	
Logging Rate / Call out:	<u>5 minute</u>	<u>Twice Daily</u>

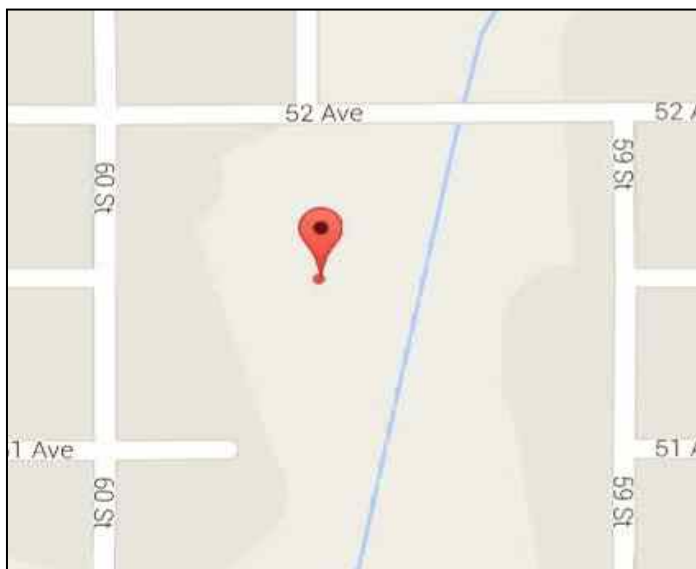
Site Location Information

Client Manhole #: 8
 Address (Location): Off 52 Ave - In field
 City, Province: Cold Lake, AB
 GPS (Lat - Long): N54.4151 W-110.2264
 Landmarks: In grass area
 Traffic Control Req's: N/A
 Additional Information: N/A

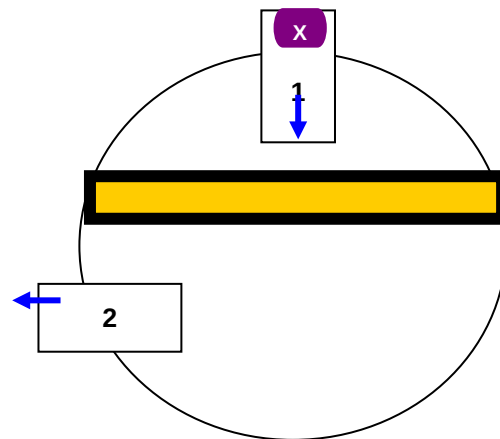
Site Profile

Manhole Depth (mm):	<u>7380</u>	Rungs?	<u>Yes</u>
Overall Site Condition:	<u>Fair</u>		
Pipe Size #1	<u>200</u>	#2	<u>200</u>
(mm): #3	<u>N/A</u>	#4	<u>N/A</u>
Location of Sensor (which pipe?):	<u>x</u>	=	<u>1</u>
Overall Pipe Condition:	<u>Fair</u>		
Additional Information:	<u>250mm SFE Weir</u>		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 8
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-08

Site View



Site View



Meter



Install



Weir Install



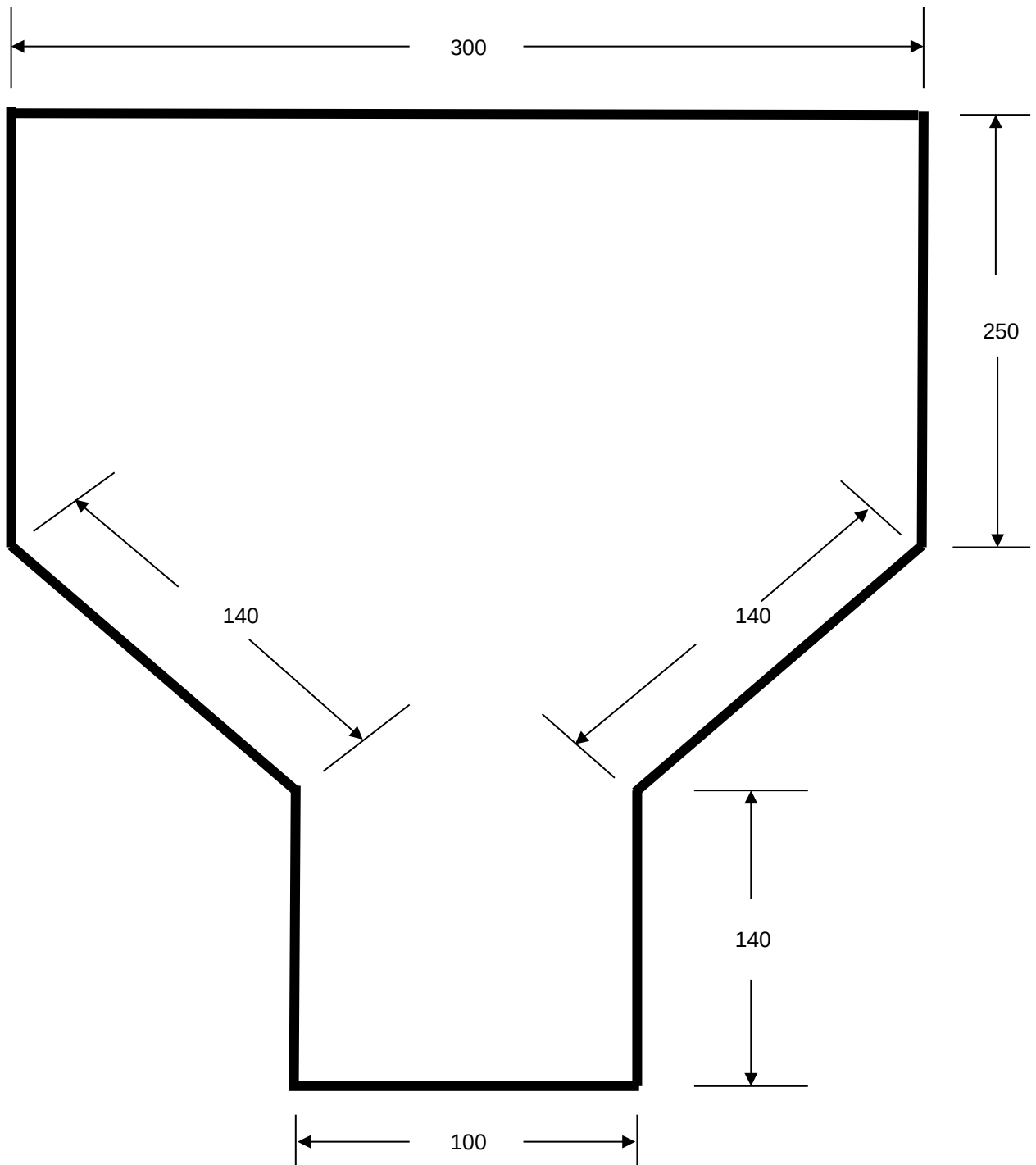
Downhole



CLIENT FLOW MONITORING #: 8
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 16-Jun-17 10:25

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-08
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) **250**



CLIENT FLOW MONITORING #: 9
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-09

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2017
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494
SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	<u>15-Jun-17</u>	<u>17-Nov-17</u>
Meter Make & Model:	<u>ISCO 2150</u>	
Meter I.D. - #1 and #2	<u>207H01732</u>	<u>N/A</u>
Wireless I.D # / Cell #:	<u>209L00585</u>	<u>N/A</u>
Level / Velocity Type:	<u>Submerged</u>	<u>N/A</u>
Sensor Mounting:	<u>Compression</u>	
Primary Device:	<u>AV and Weir</u>	
Logging Rate / Call out:	<u>5 minute</u>	<u>Twice Daily</u>

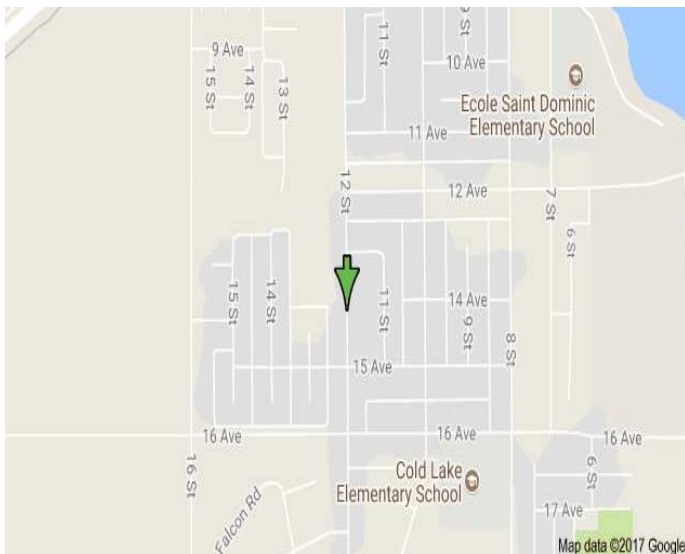
Site Location Information

Client Manhole #: 9
Address (Location): 1311 12 St
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.45880 W-110.17605
Landmarks: Middle of road
Traffic Control Req's: Low
Additional Information: N/A

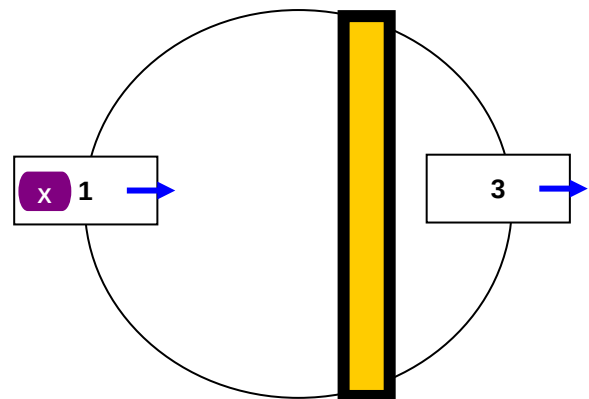
Site Profile

Manhole Depth (mm):	<u>4070</u>	Rungs?	<u>Yes</u>
Overall Site Condition:	<u>Fair</u>		
Pipe Size #1	<u>200</u>	#2	<u>200</u>
(mm): #3	<u>N/A</u>	#4	<u>N/A</u>
Location of Sensor (which pipe?):	<u>x</u>	=	<u>1</u>
Overall Pipe Condition:	<u>Fair</u>		
Additional Information:	<u>250mm SFE Weir</u>		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 9
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-09

Site View



Site View



Meter



Install



Weir Install



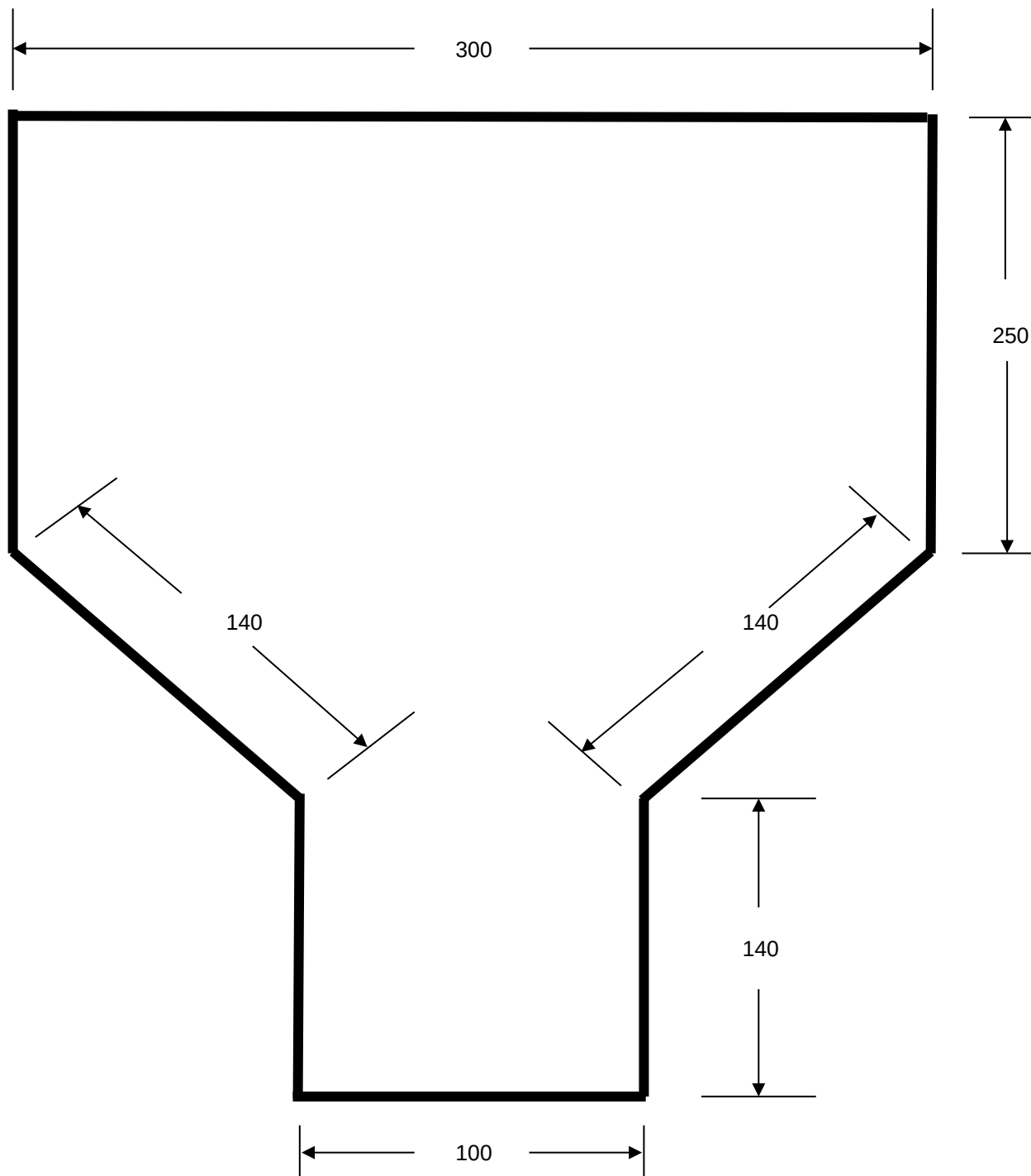
Downhole



CLIENT FLOW MONITORING #: 9
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 15-Jun-17 18:17

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-09
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) **250**



CLIENT FLOW MONITORING #: 10
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-10

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2017
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494
SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	<u>16-Jun-17</u>	<u>16Nov17</u>
Meter Make & Model:	<u>ISCO 2150</u>	
Meter I.D. - #1 and #2	<u>207K01073</u>	<u>N/A</u>
Wireless I.D # / Cell #:	<u>N/A</u>	<u>N/A</u>
Level / Velocity Type:	<u>Submerged</u>	<u>N/A</u>
Sensor Mounting:	<u>Compression</u>	
Primary Device:	<u>AV and Weir</u>	
Logging Rate / Call out:	<u>5 minute</u>	<u>Twice Daily</u>

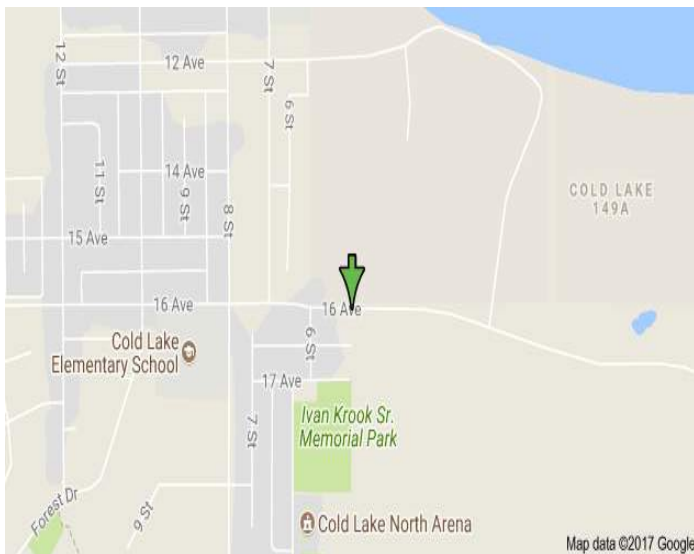
Site Location Information

Client Manhole #: 10
Address (Location): 502 16 Ave
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4569 W-110.1647
Landmarks: Middle of road
Traffic Control Req's: Low
Additional Information: Pipes/benching eroding

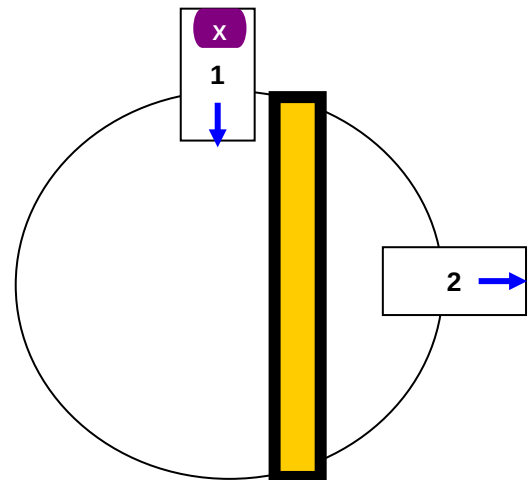
Site Profile

Manhole Depth (mm):	<u>1970</u>	Rungs?	<u>Yes</u>
Overall Site Condition:	<u>Poor</u>		
Pipe Size #1	<u>200</u>	#2	<u>200</u>
(mm): #3	<u>N/A</u>	#4	<u>N/A</u>
Location of Sensor (which pipe?):	<u>x</u>	=	<u>1</u>
Overall Pipe Condition:	<u>Very poor</u>		
Additional Information:	<u>250mm SFE Weir</u>		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 10
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-10

Site View



Site View



Meter



Install



Weir Install



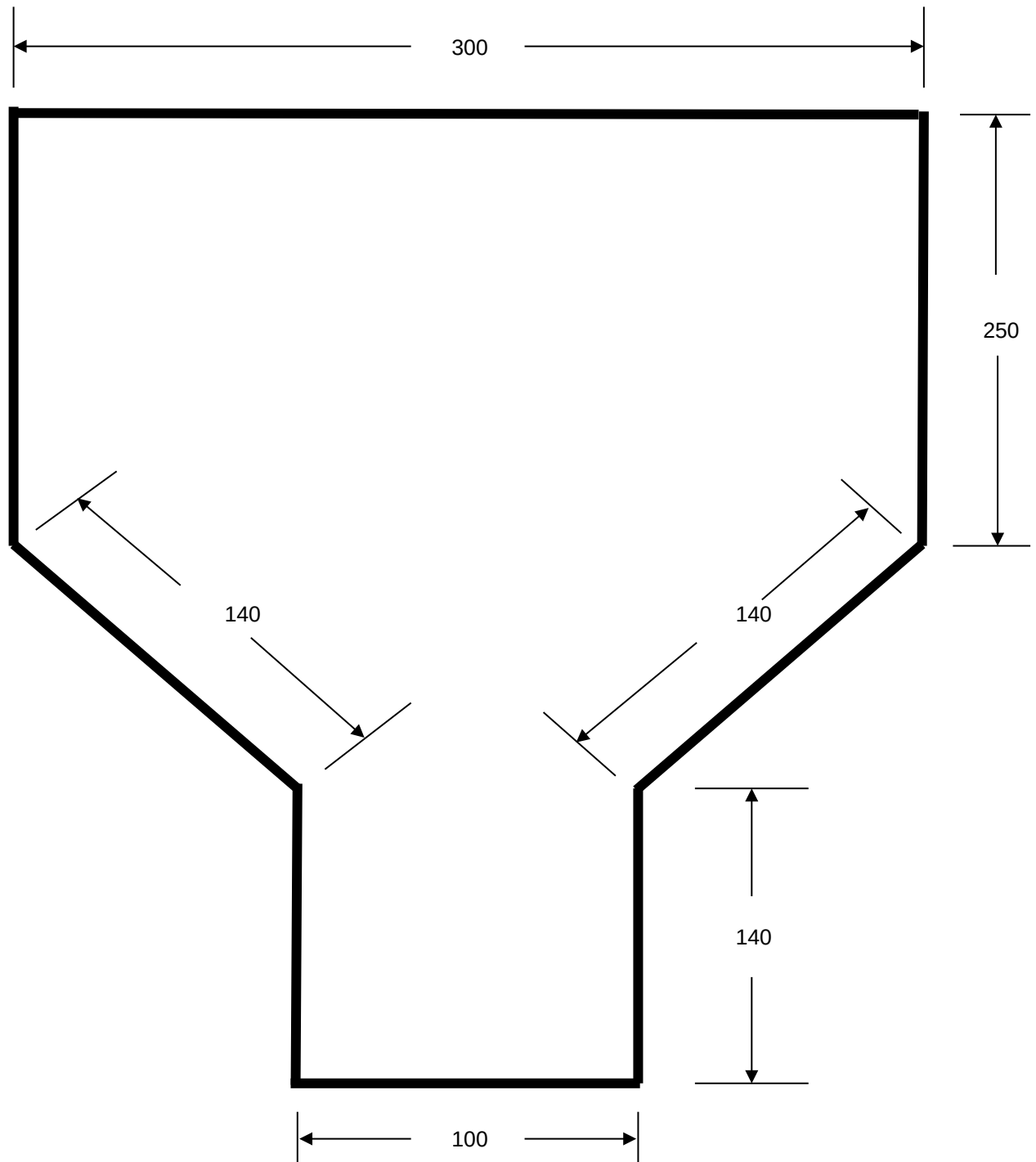
Downhole



CLIENT FLOW MONITORING #: 10
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 16-Jun-17 9:33

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-10
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) **250**



CLIENT FLOW MONITORING #: 11
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-11

Project Specific Information

Client Name: City of Cold Lake
 End User Name: City of Cold Lake
 Project Name: Flow Monitoring 2017
 Client Contact: Azam Khan 780-594-4494
 Field Contact: Azam Khan 780-594-4494
 SFE PM Contact: Nick Schellenberg 204-999-3547
 Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	15-Jun-17	16-Nov-17
Meter Make & Model:	ISCO 2150	
Meter I.D. - #1 and #2	207B02356	N/A
Wireless I.D # / Cell #:	211J00555	N/A
Level / Velocity Type:	Submerged	N/A
Sensor Mounting:	Scissor Band	
Primary Device:	AV and Weir	
Logging Rate / Call out:	5 minute	Twice Daily

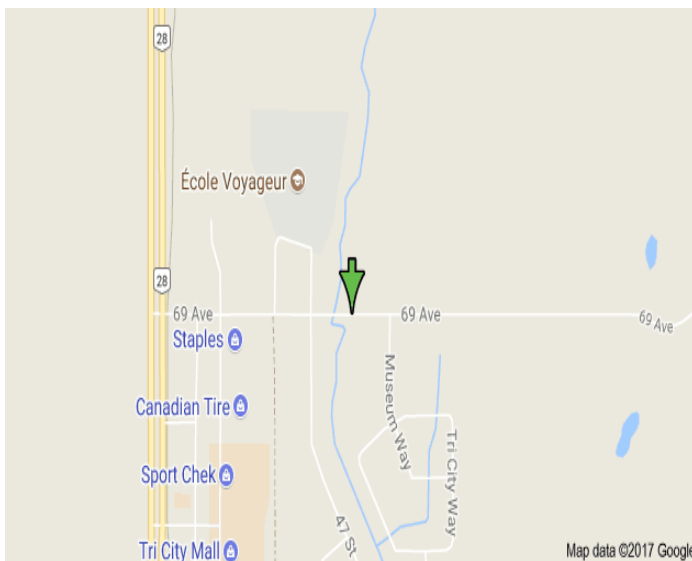
Site Location Information

Client Manhole #: 11
 Address (Location): 69 Ave, near 47 St
 City, Province: Cold Lake, AB
 GPS (Lat - Long): N54.4352 W-110.1995
 Landmarks: Middle of road
 Traffic Control Req's: Low
 Additional Information: N/A

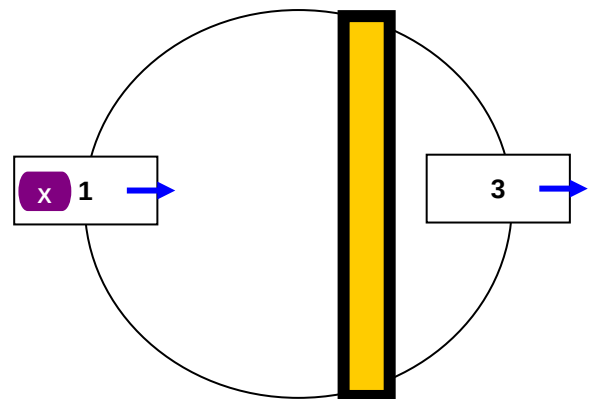
Site Profile

Manhole Depth (mm):	4620	Rungs?	Yes
Overall Site Condition:	Fair		
Pipe Size #1	350	#2	350
(mm): #3	N/A	#4	N/A
Location of Sensor (which pipe?):	x	=	1
Overall Pipe Condition:	Fair		
Additional Information:	250mm SFE Weir		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 11
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-11

Site View



Site View



Meter



Install



Weir Install



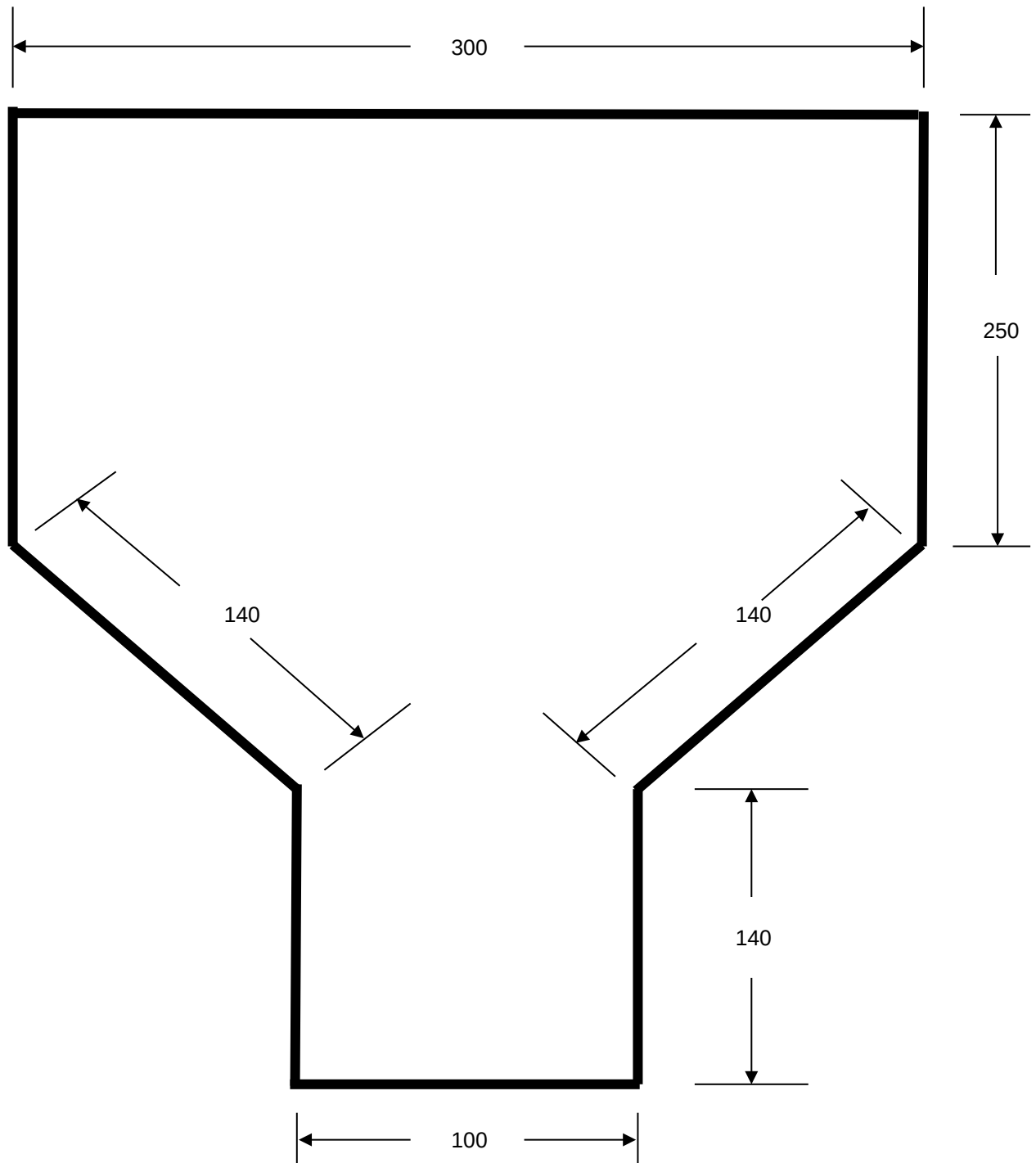
Downhole



CLIENT FLOW MONITORING #: 11
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 15-Jun-17 16:39

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-11
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) **250**



CLIENT FLOW MONITORING #: 12A
NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
SFE SITE #: A15-124-12A

Project Specific Information

Client Name: City of Cold Lake
End User Name: City of Cold Lake
Project Name: Flow Monitoring 2017
Client Contact: Azam Khan 780-594-4494
Field Contact: Azam Khan 780-594-4494
SFE PM Contact: Nick Schellenberg 204-999-3547
Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	<u>15-Jun-17</u>	<u>16-Nov-17</u>
Meter Make & Model:	<u>ISCO 2150</u>	
Meter I.D. - #1 and #2	<u>A-2150-63</u>	<u>N/A</u>
Wireless I.D # / Cell #:	<u>211E00965</u>	<u>N/A</u>
Level / Velocity Type:	<u>Submerged</u>	<u>N/A</u>
Sensor Mounting:	<u>Compression</u>	
Primary Device:	<u>AV and Weir</u>	
Logging Rate / Call out:	<u>5 minute</u>	<u>Twice Daily</u>

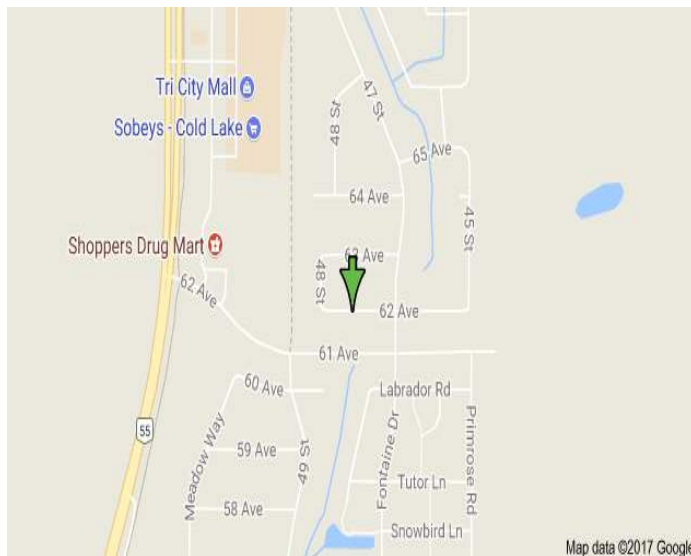
Site Location Information

Client Manhole #: 12A
Address (Location): 4712 62 Ave
City, Province: Cold Lake, AB
GPS (Lat - Long): N54.4284 W-110.2001
Landmarks: Middle of road
Traffic Control Req's: Low
Additional Information: Very slow velocity/flow

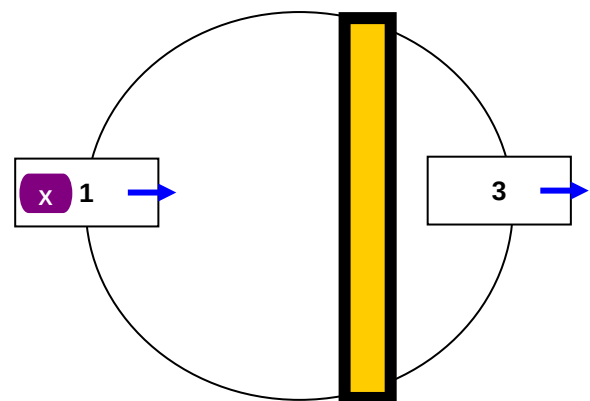
Site Profile

Manhole Depth (mm): Rungs? Yes
Overall Site Condition: Poor
Pipe Size #1 300 #2 300
(mm): #3 N/A #4 N/A
Location of Sensor (which pipe?): x = 1
Overall Pipe Condition: Fair
Additional Information: 250mm SFE Weir

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 12A
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-12A

Site View



Site View



Meter



Install



Weir Install



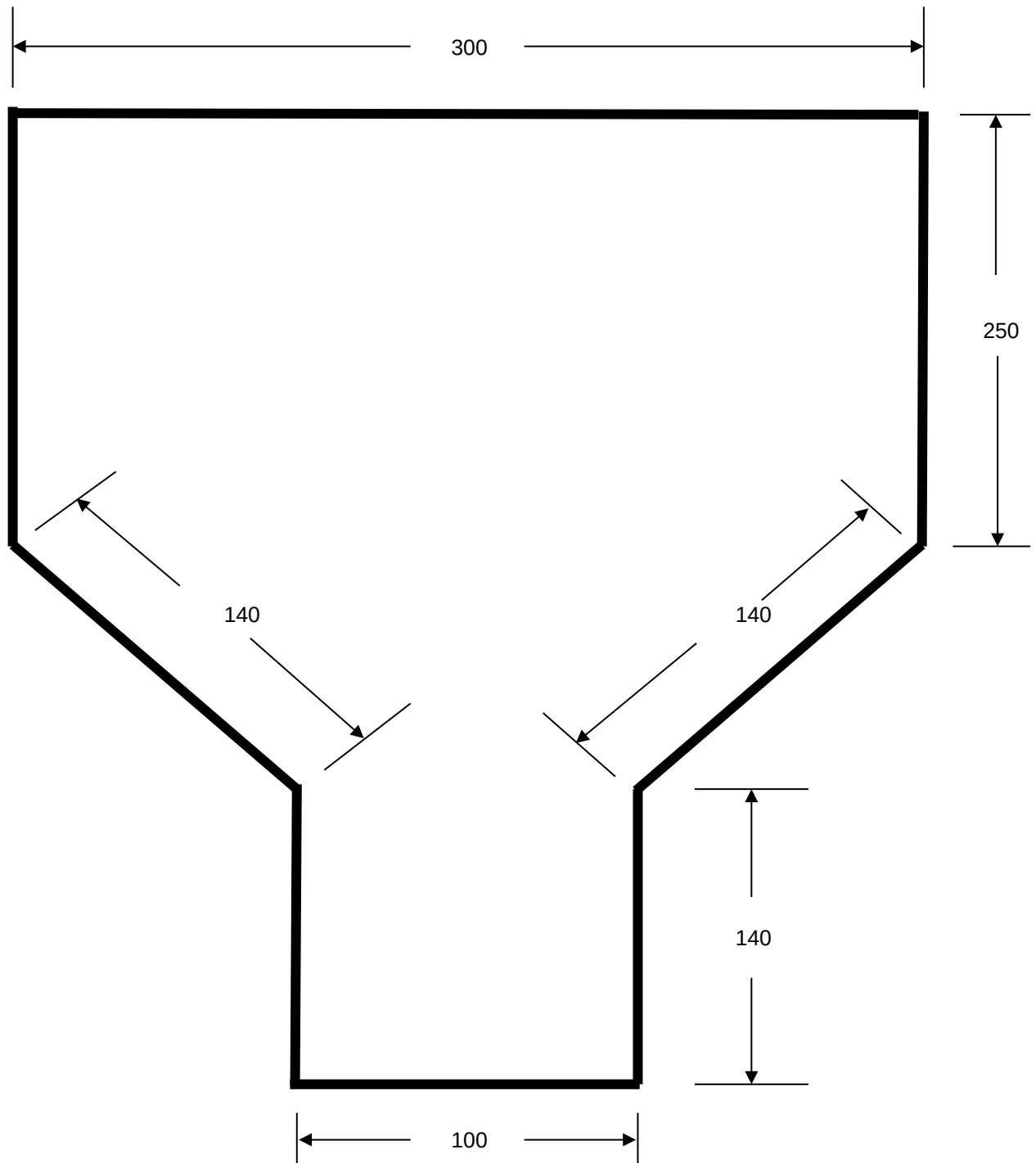
Downhole



CLIENT FLOW MONITORING #: 12A
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 15-Jun-17 11:06

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-12A
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) 250



CLIENT FLOW MONITORING #: 12B
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-12B

Project Specific Information

Client Name: City of Cold Lake
 End User Name: City of Cold Lake
 Project Name: Flow Monitoring 2017
 Client Contact: Azam Khan 780-594-4494
 Field Contact: Azam Khan 780-594-4494
 SFE PM Contact: Nick Schellenberg 204-999-3547
 Site Maintenance: Bi-weekly

Site Equipment

Install / Removal Date:	15-Jun-17	16-Nov-17
Meter Make & Model:	ISCO 2150	
Meter I.D. - #1 and #2	208D02248	N/A
Wireless I.D # / Cell #:	N/A	
Level / Velocity Type:	Submerged	N/A
Sensor Mounting:	Compression	
Primary Device:	AV and Weir	
Logging Rate / Call out:	5 minute	Twice Daily

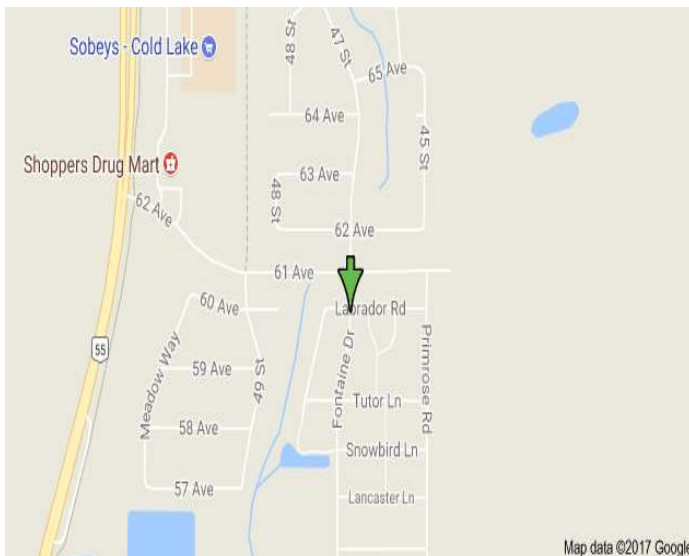
Site Location Information

Client Manhole #: 12B
 Address (Location): Fontaine Dr + Labrador Dr
 City, Province: Cold Lake, AB
 GPS (Lat - Long): N54.4272 W-110.1984
 Landmarks: Middle of intersection
 Traffic Control Req's: Moderate
 Additional Information: N/A

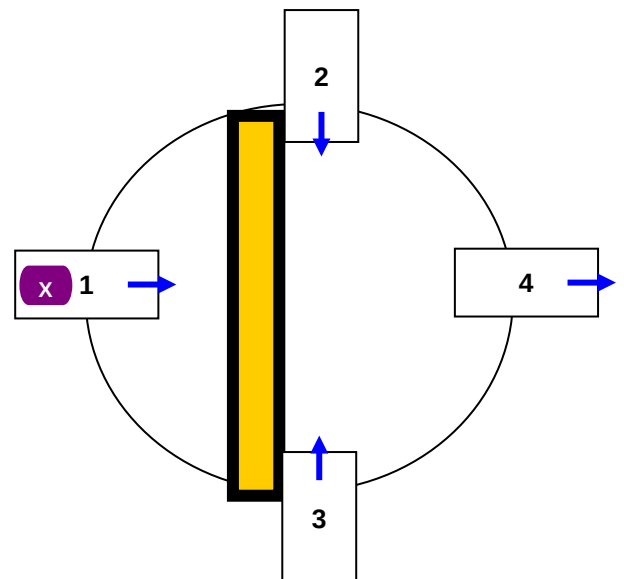
Site Profile

Manhole Depth (mm):	3990	Rungs?	Yes
Overall Site Condition:	Fair		
Pipe Size #1	300	#2	200
(mm): #3	200	#4	300
Location of Sensor (which pipe?):	☒ = 1		
Overall Pipe Condition:	Fair		
Additional Information:	250mm SFE Weir		

Map of Area



Manhole Layout



CLIENT FLOW MONITORING #: 12B
 NAME: Cold Lake Flow Monitoring 2017

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-12B

Site View



Site View



Meter



Install



Weir Install



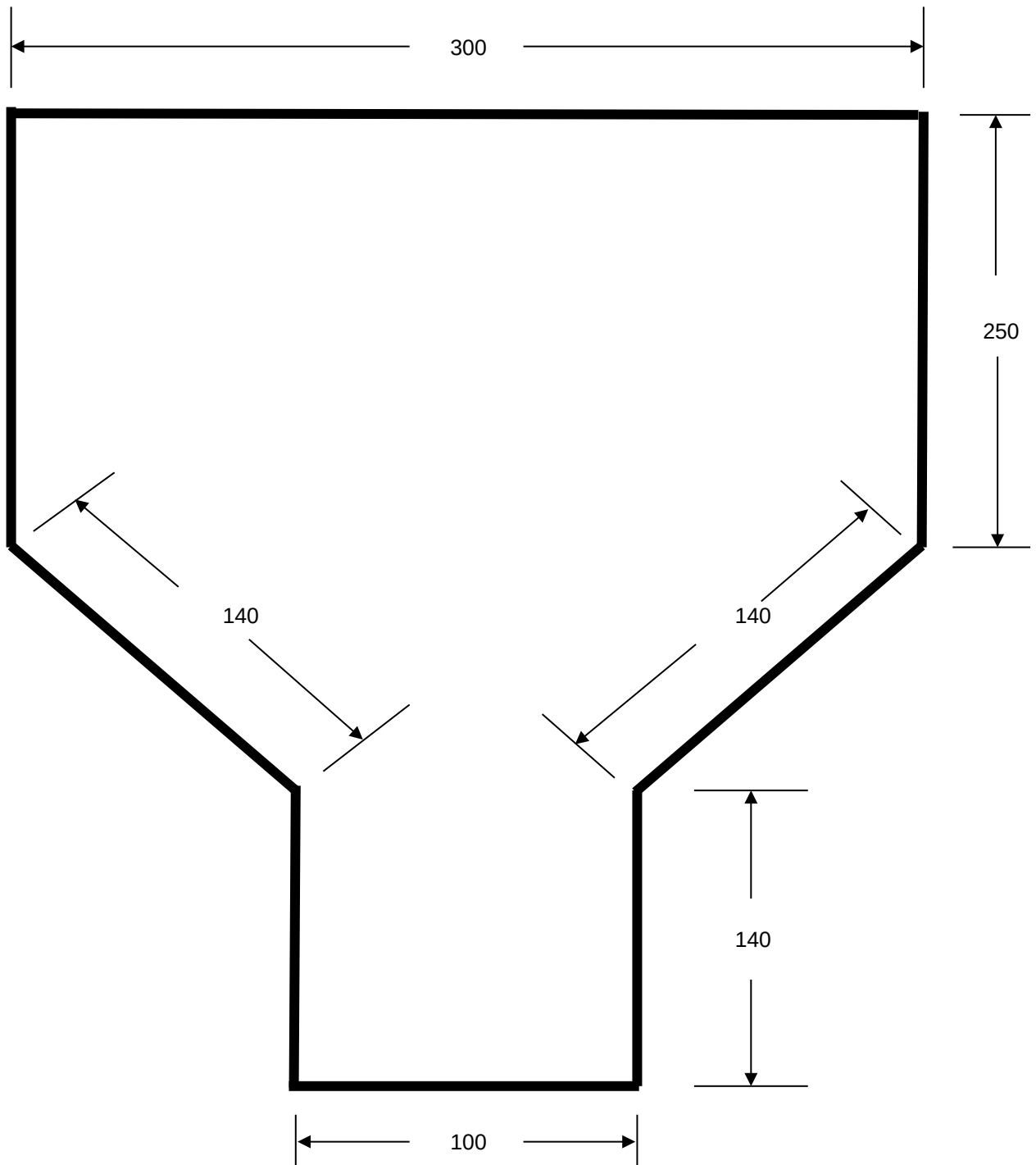
Downhole



CLIENT FLOW MONITORING #: 12B
 NAME: Cold Lake Flow Monitoring 2017
 Date / Time: 15-Jun-17 12:36

SFE PROJECT #: A15-124
 SFE SITE #: A15-124-12B
 Technician 1: Nick Schellenberg
 Technician 2: Ray Vos

WEIR SIZE (mm) **250**





Appendix D

Existing System Assessments – Longitudinal Profiles



Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS Figures\APP D - Existing System Assessment LPs\Figure 1 - LP #N1.1.mxd

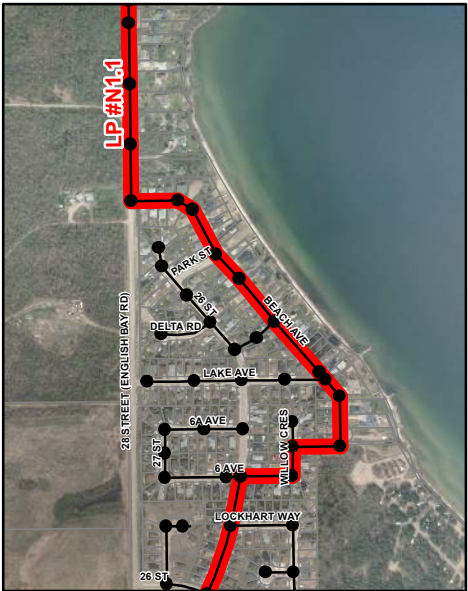
FIGURE APP D.1

LP #N1.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:15,000



THE CITY OF COLD LAKE
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MAXIMUM HGL PROFILE - LP #N1.1
EXISTING SANITARY CONDITIONS

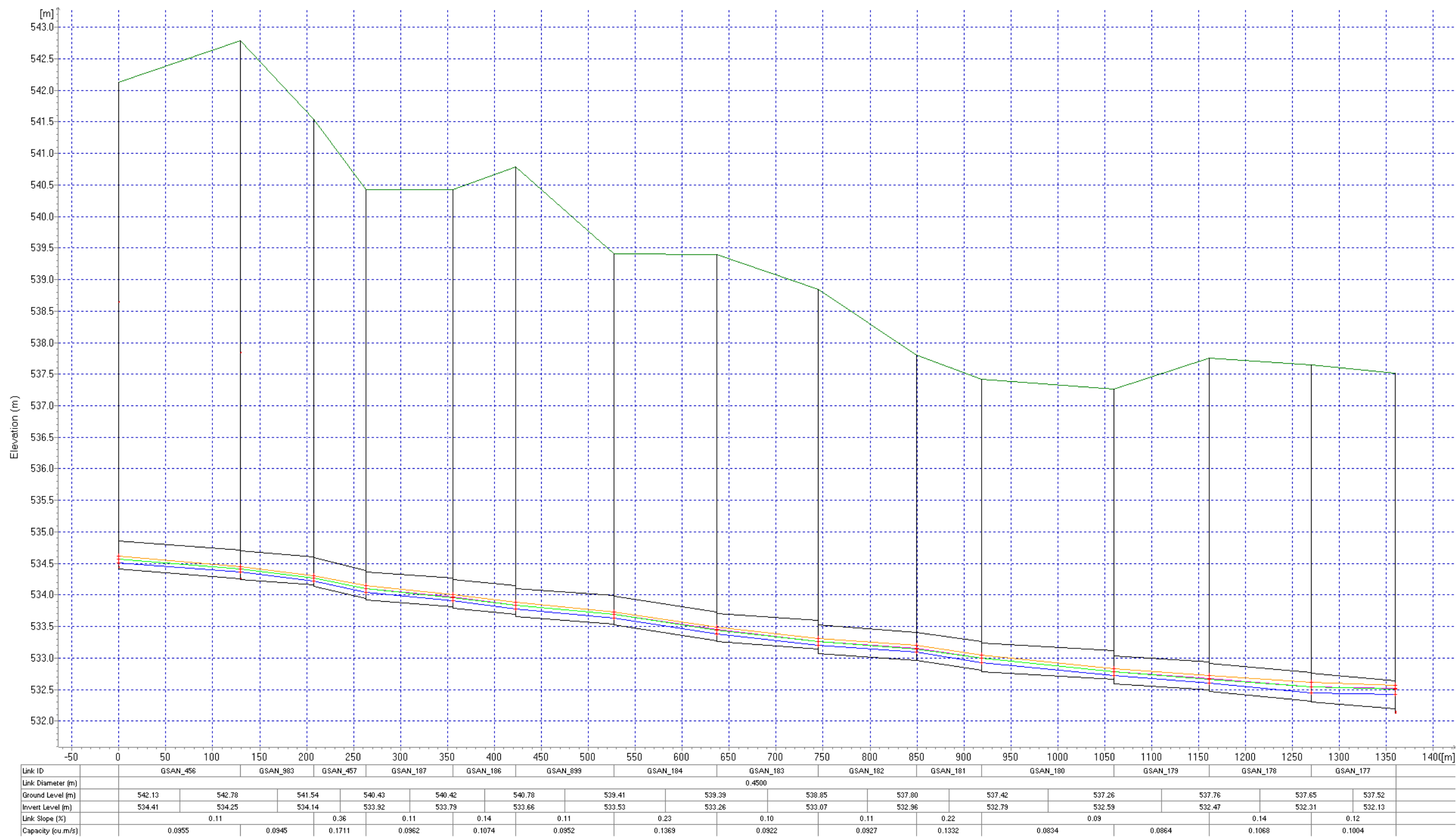


08/08/2015



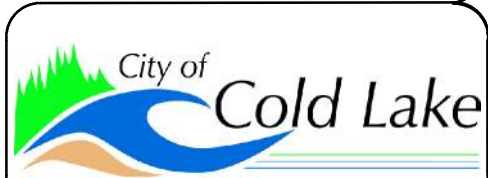
FIGURE APP D.2

LP #N1.2 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



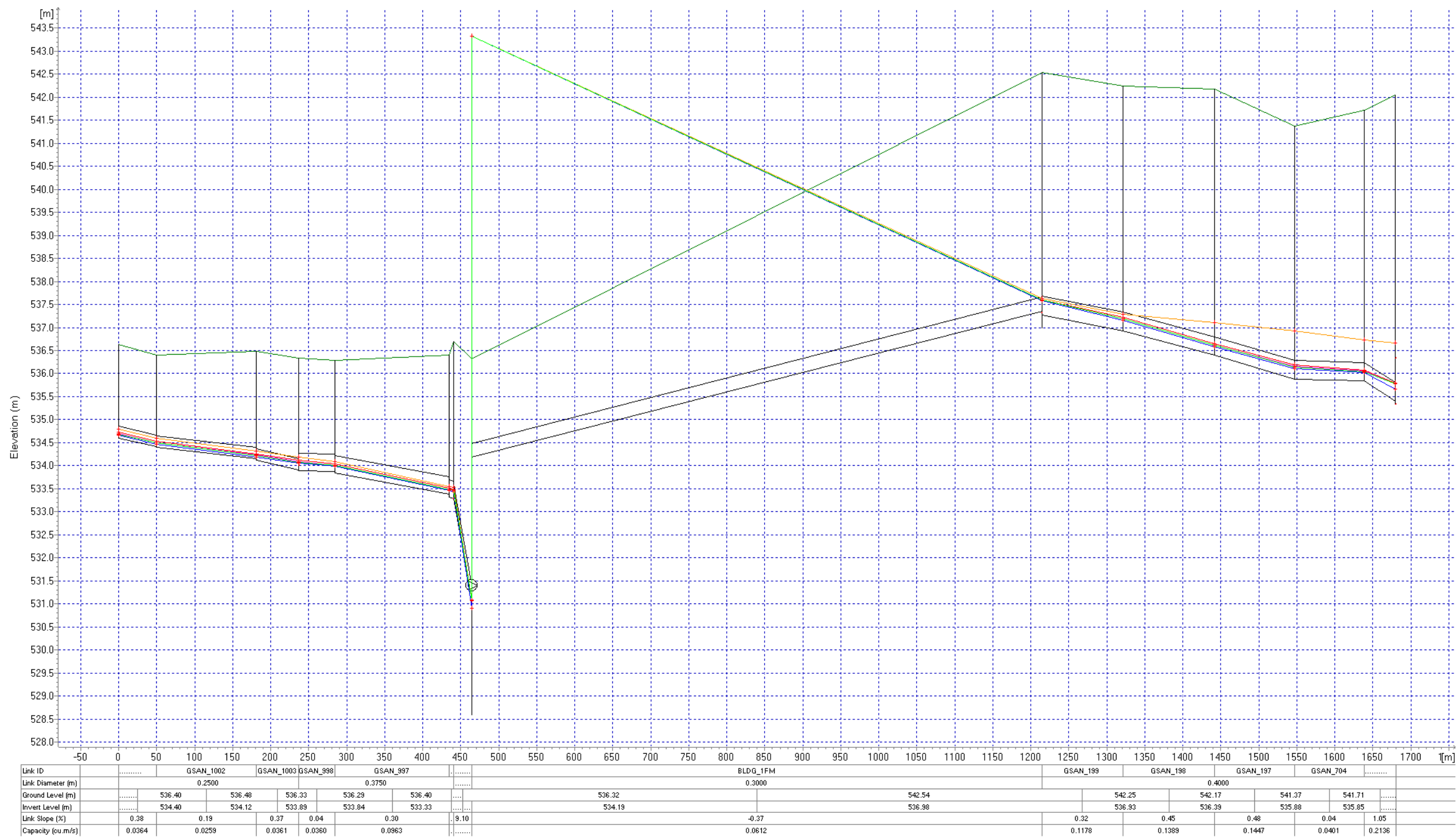
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N1.2
EXISTING SANITARY CONDITIONS



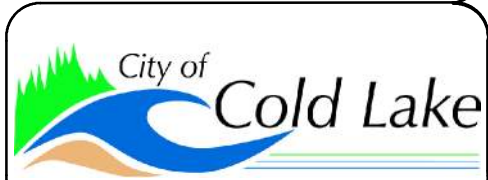
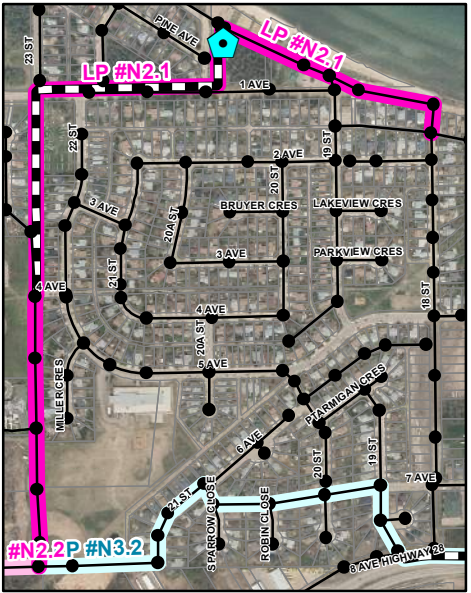
FIGURE APP D.3

LP #N2.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



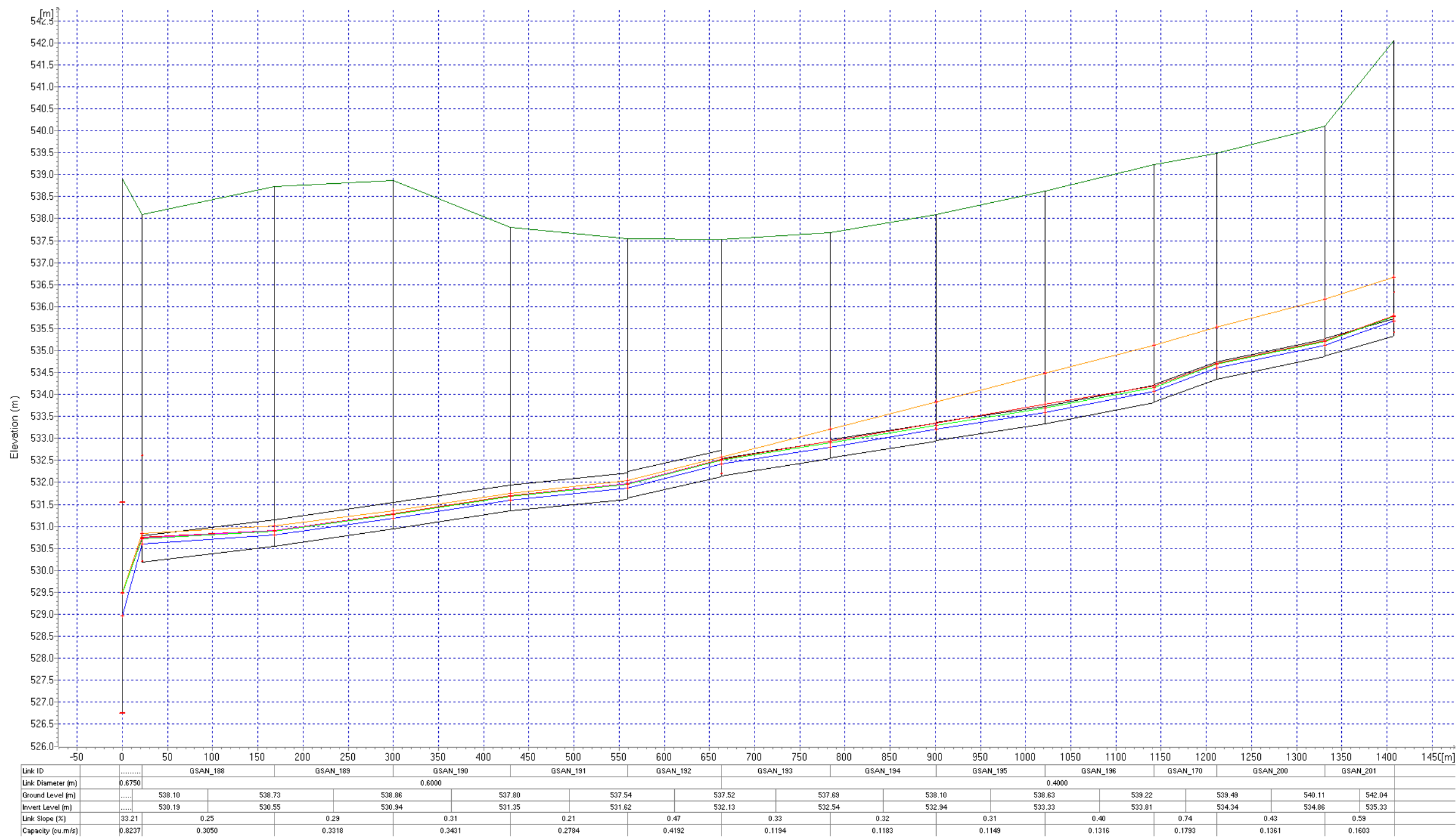
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N2.1
EXISTING SANITARY CONDITIONS



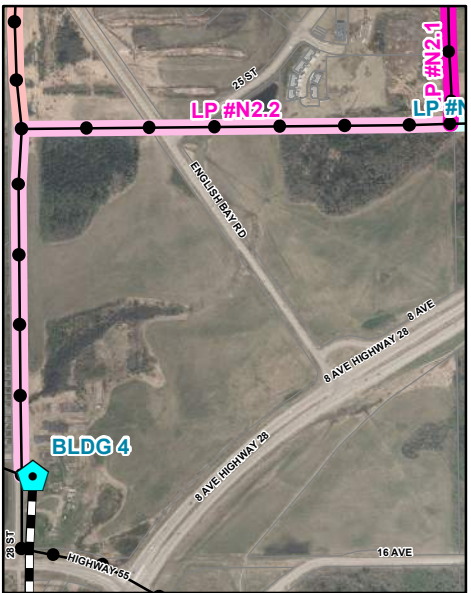
FIGURE APP D.4

LP #N2.2 - Maximum HGL Profile - Existing Conditions

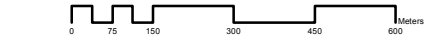


Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:14,000



THE CITY OF COLD LAKE
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MAXIMUM HGL PROFILE - LP #N2.2
EXISTING SANITARY CONDITIONS

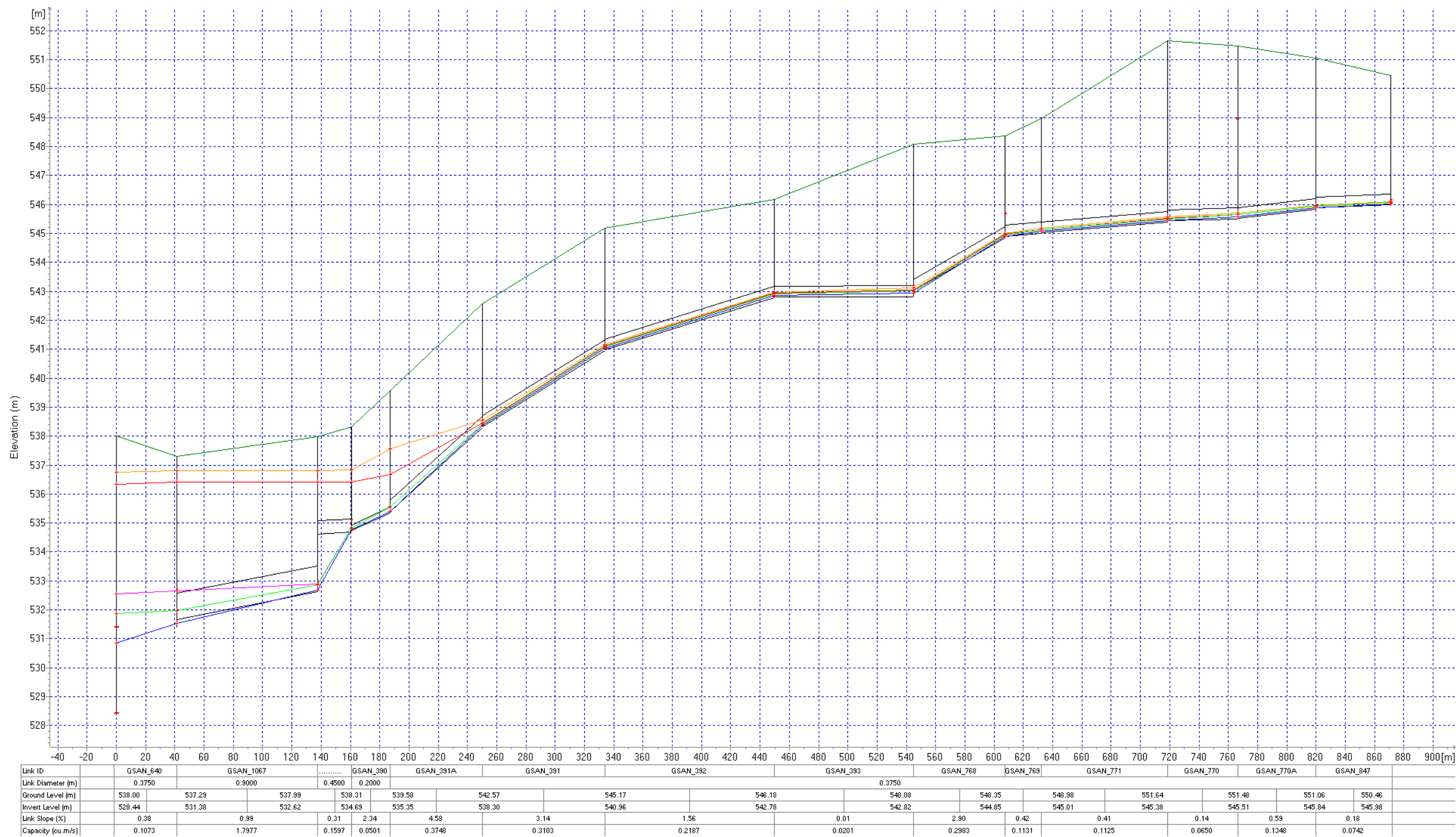


08/08/2015



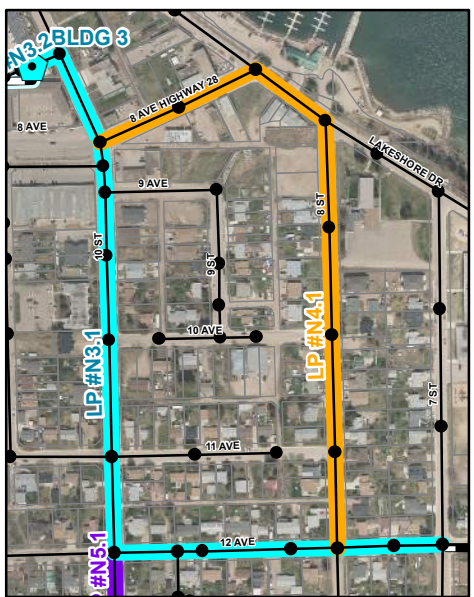
FIGURE APP D.5

LP #N3.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N3.1
EXISTING SANITARY CONDITIONS

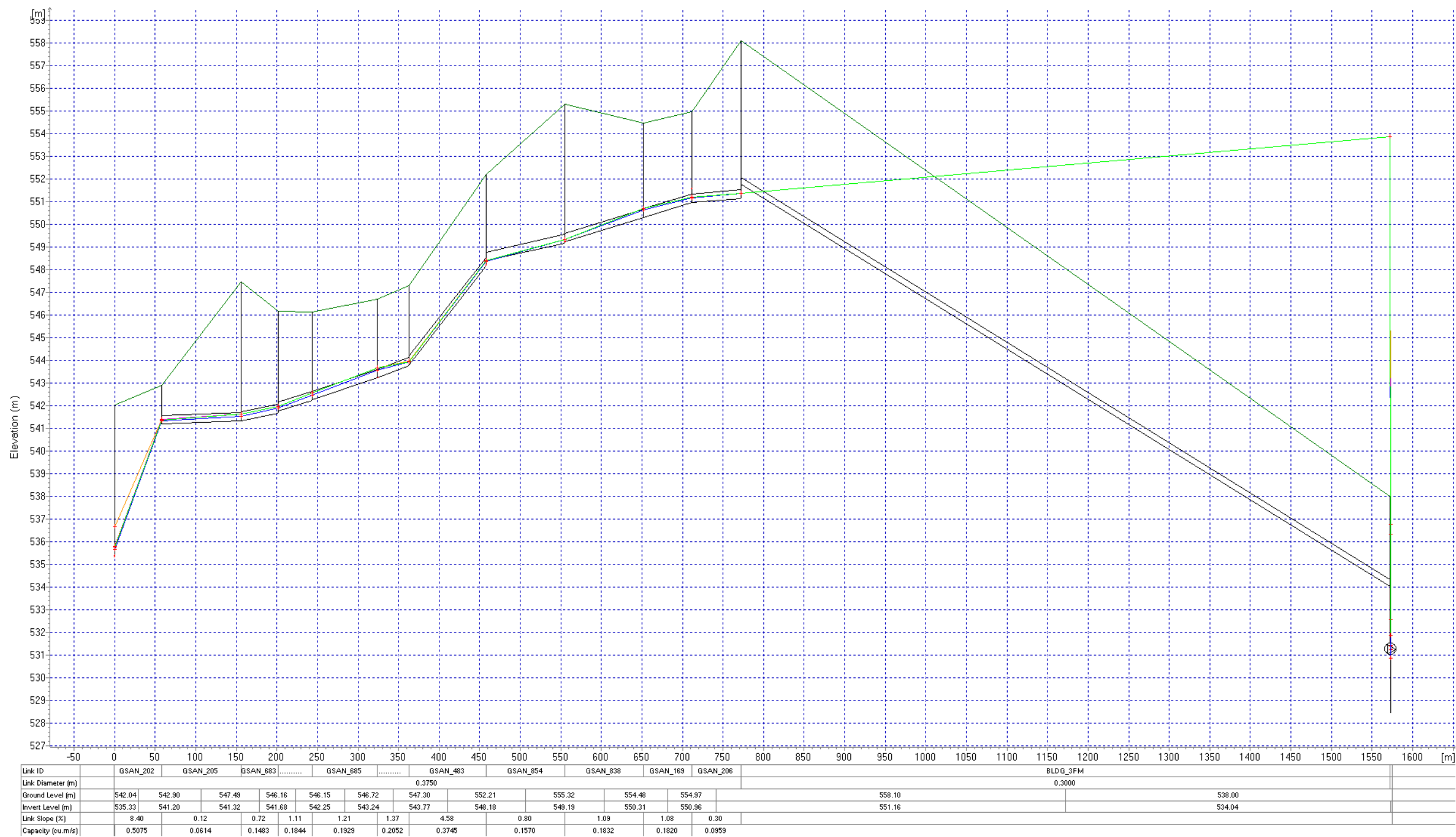


08/08/2015



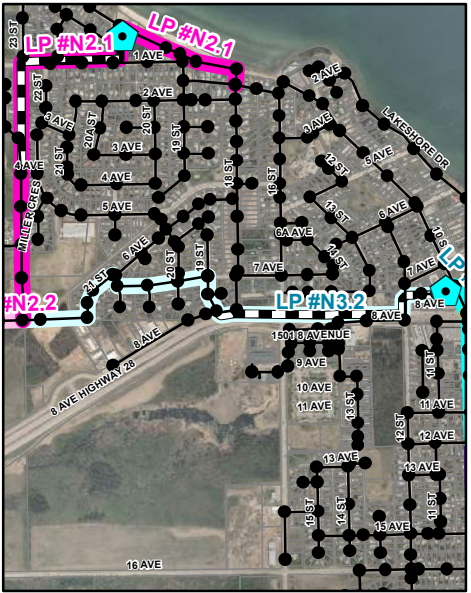
FIGURE APP D.6

LP #N3.2 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:24,000



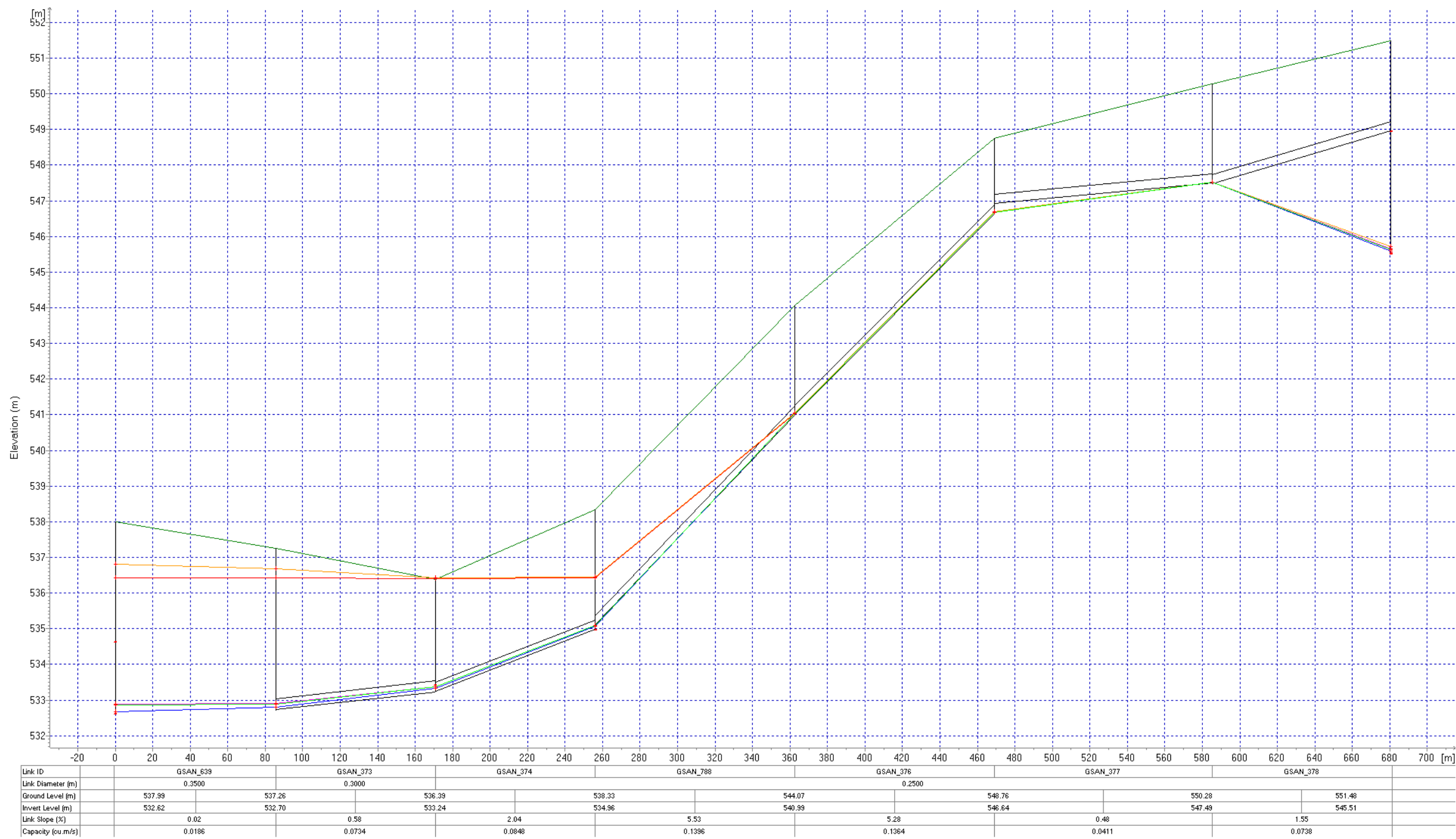
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MAXIMUM HGL PROFILE - LP #N3.2
EXISTING SANITARY CONDITIONS



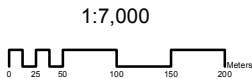
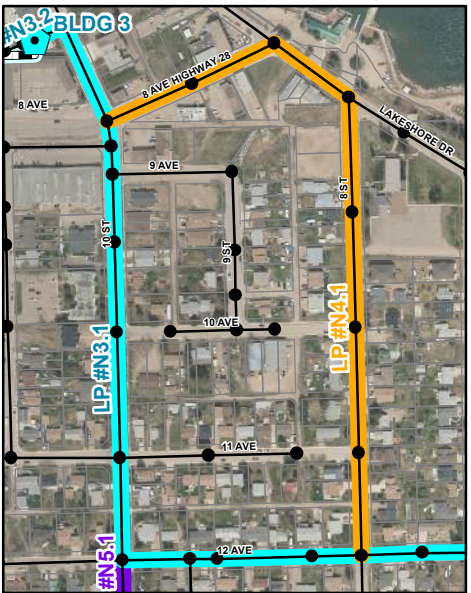
FIGURE APP D.7

LP #N4.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



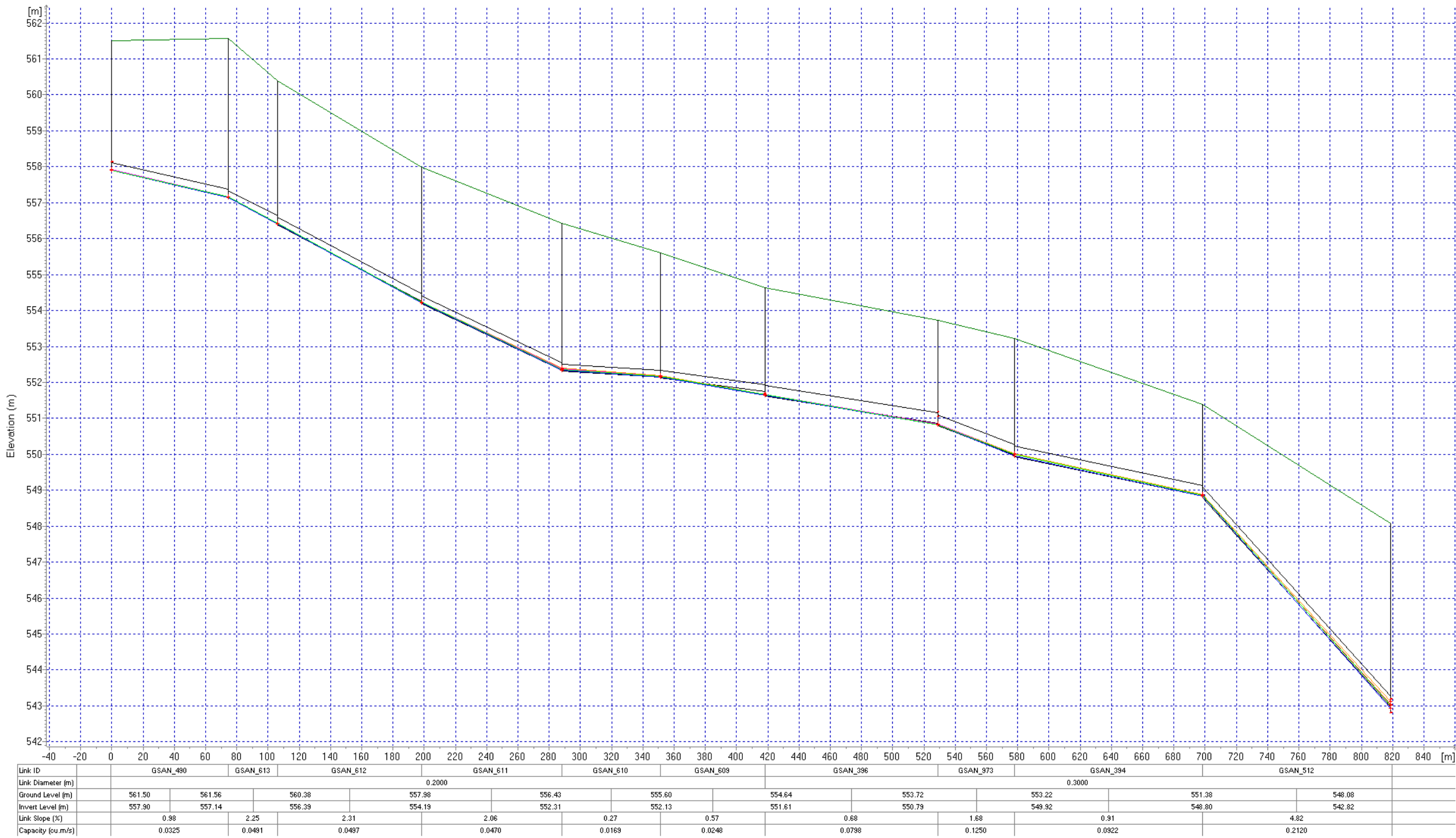
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N4.1
EXISTING SANITARY CONDITIONS



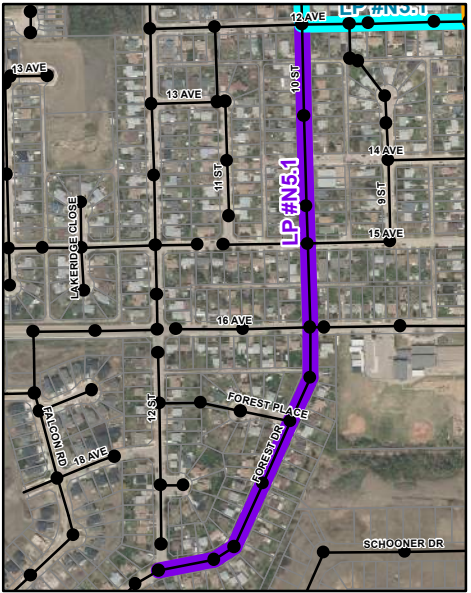
FIGURE APP D.8

LP #N5.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:10,000



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INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N5.1
EXISTING SANITARY CONDITIONS

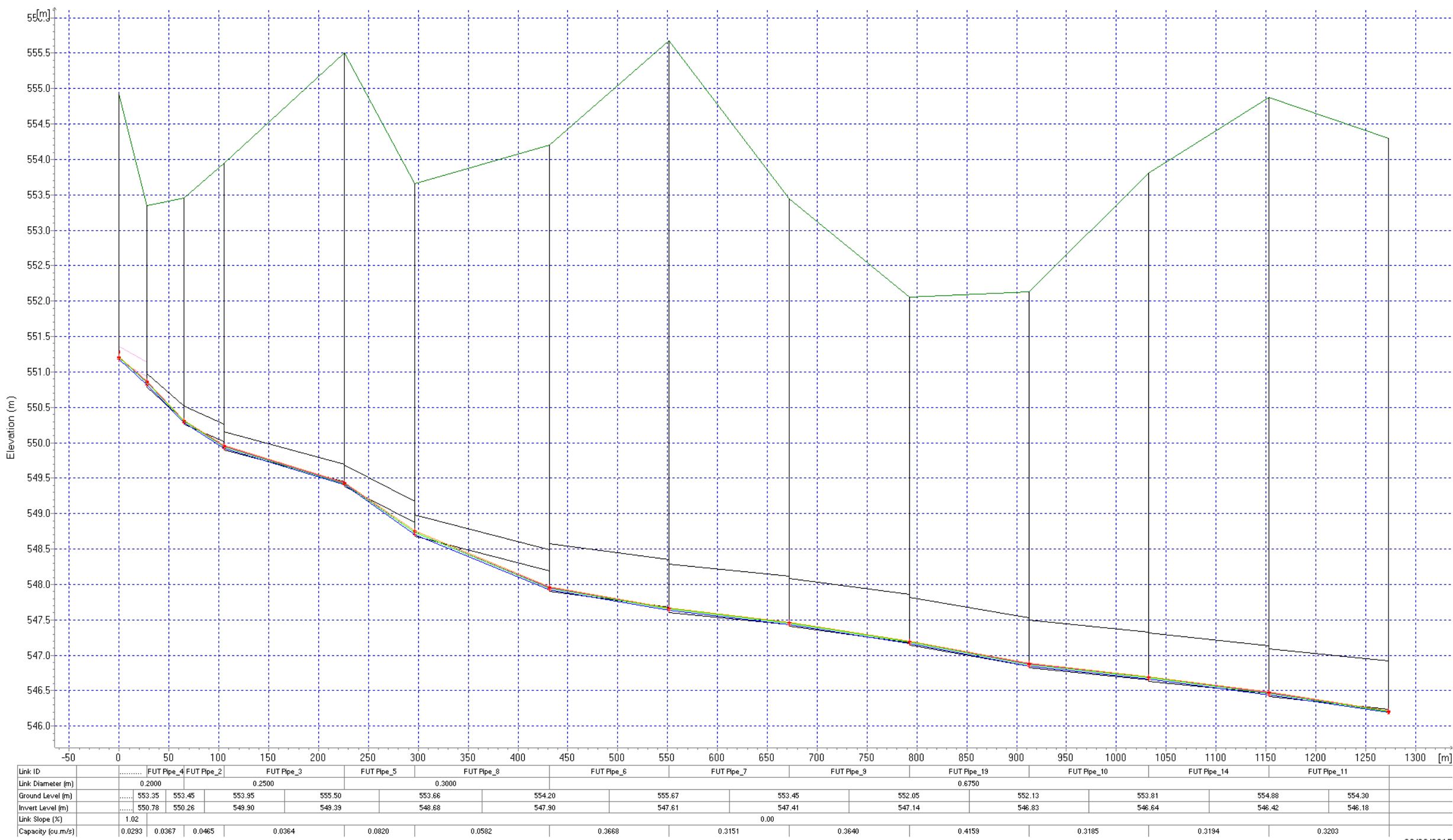


08/08/2015



FIGURE APP D.9

LP #N6.1 - Maximum HGL Profile - Existing Conditions

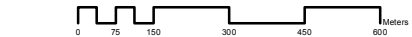


Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:15,000



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INFLOW - INFILTRATION PROGRAM

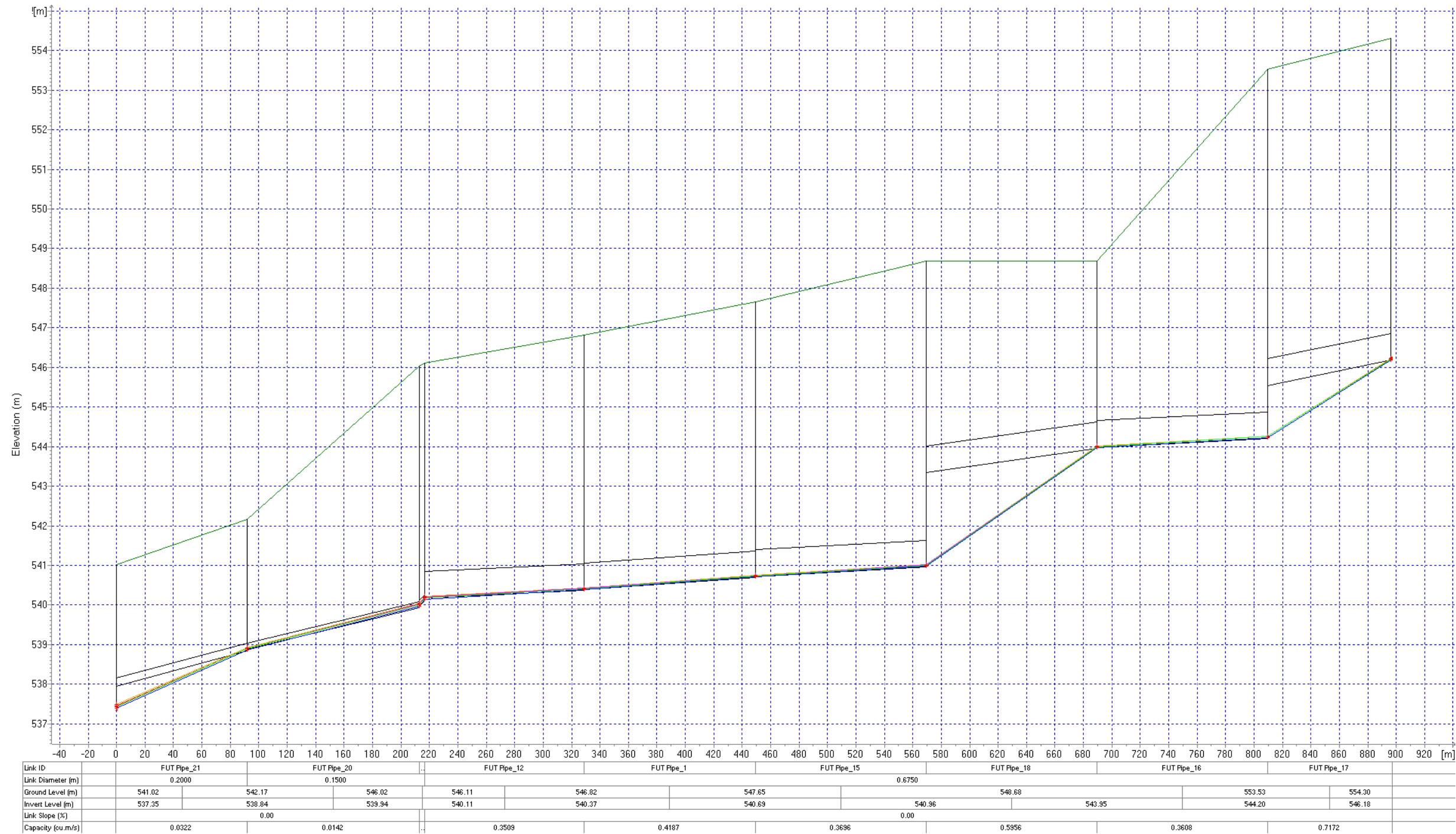
MAXIMUM HGL PROFILE - LP #N6.1
EXISTING SANITARY CONDITIONS



08/08/2015



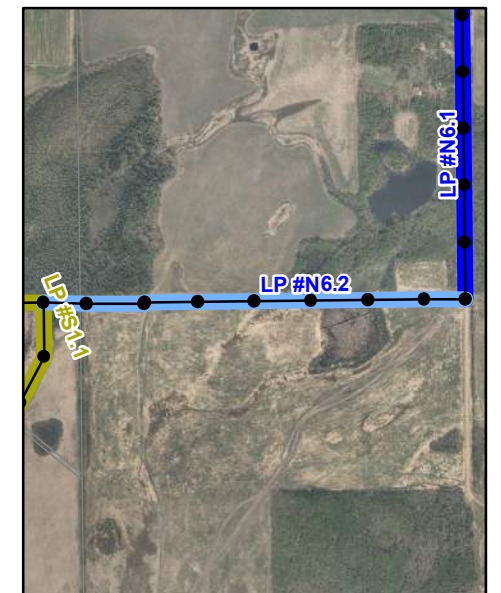
LP #N6.2 - Maximum HGL Profile - Existing Conditions



Legend

Maximum Water Level (m)

- Dry Weather Flow
- Constant 0.29L/s/ha
- Constant 0.60L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



1:16,000



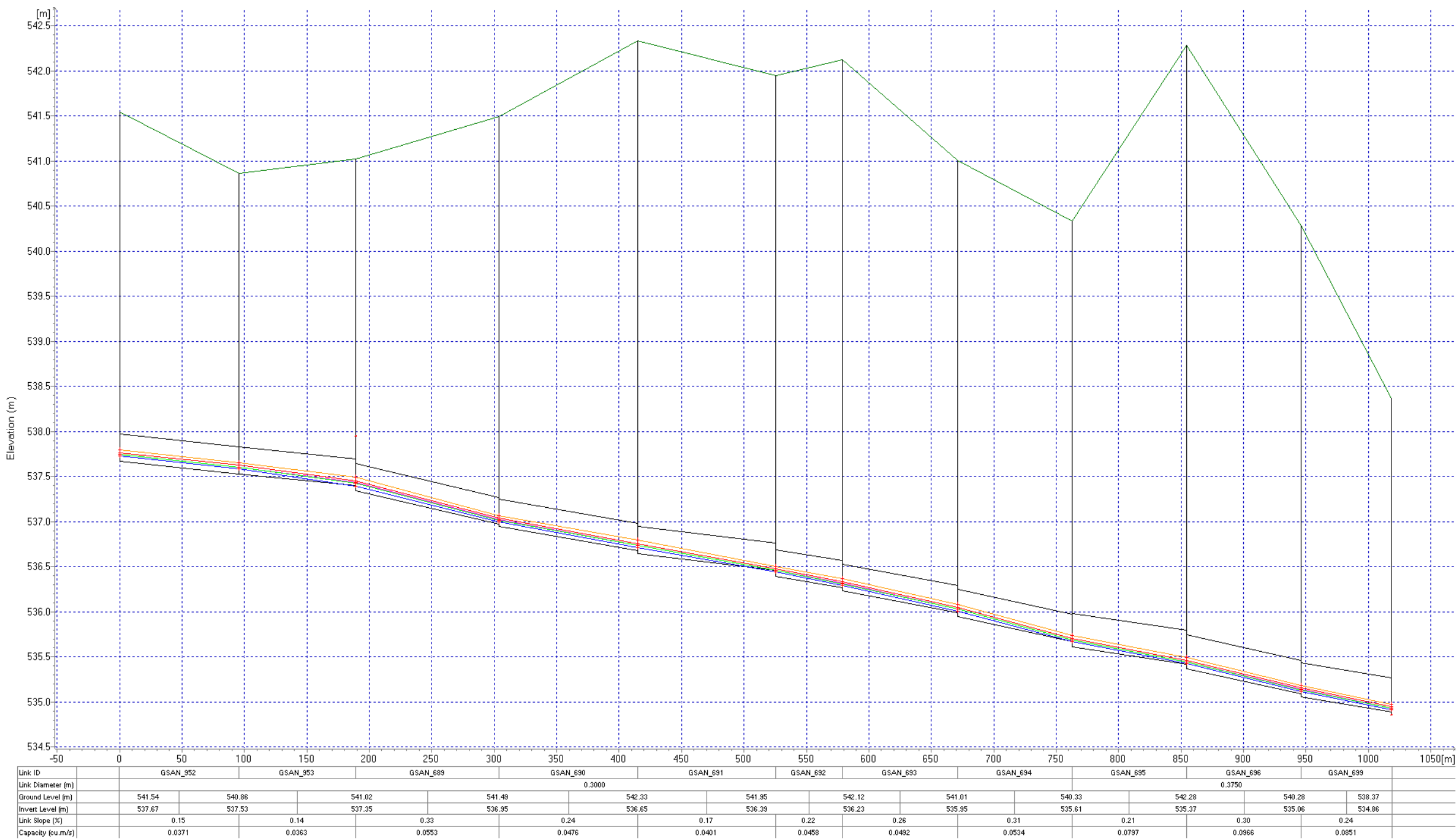
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N6.2
EXISTING SANITARY CONDITIONS



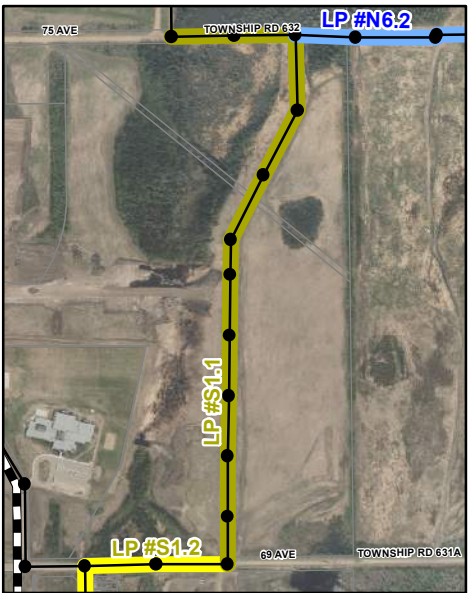
08/08/2015

LP #S1.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:11,500



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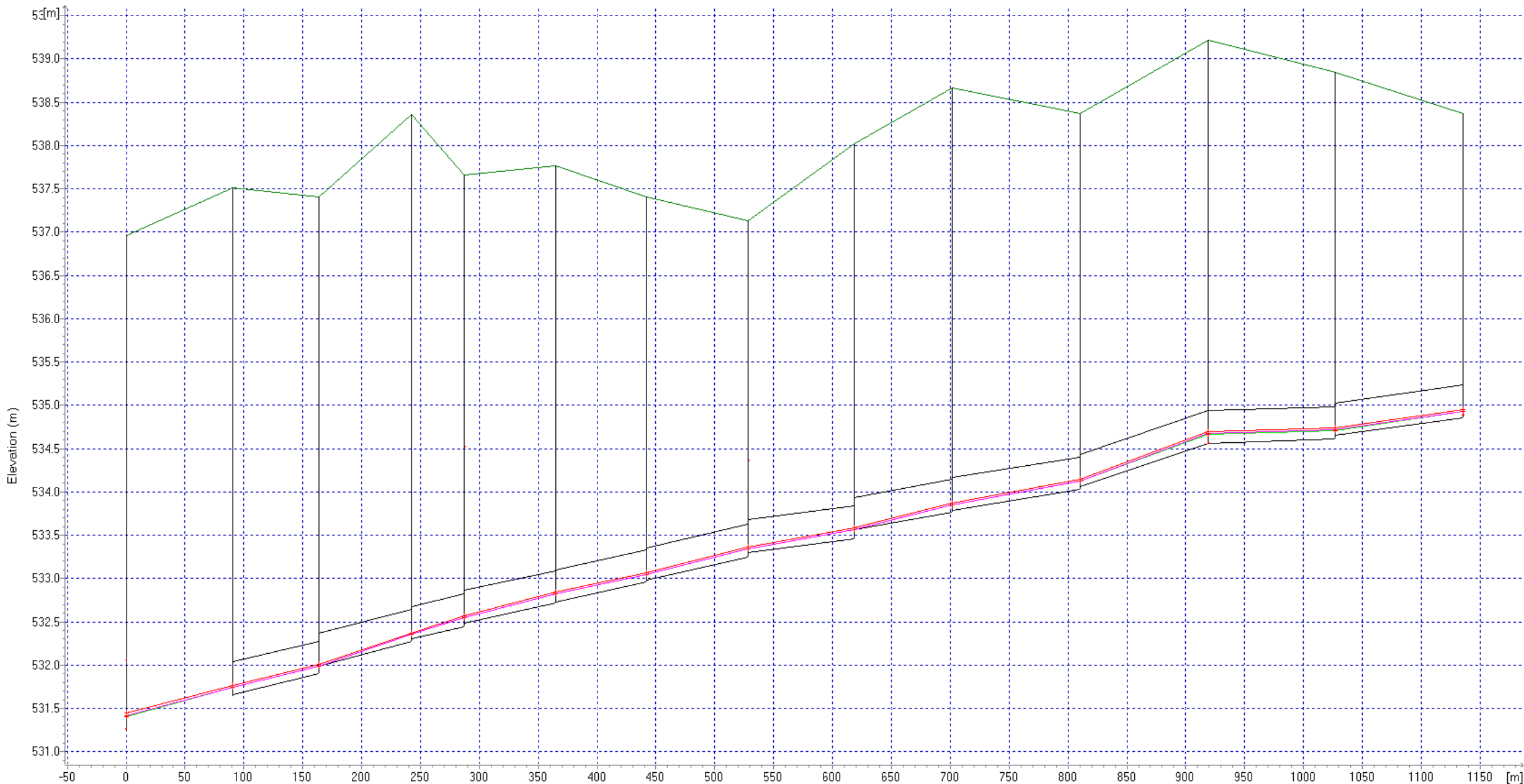
MAXIMUM HGL PROFILE - LP #S1.1
EXISTING SANITARY CONDITIONS



08/08/2015

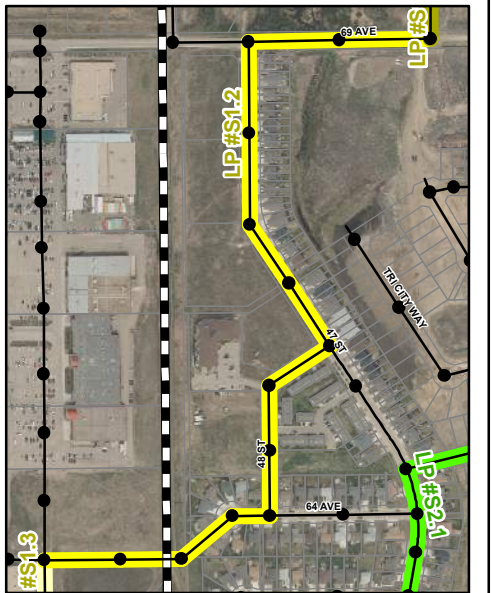


LP #S1.2 - Maximum HGL Profile - Existing Conditions



Link ID	GSAN_673		GSAN_674		GSAN_675		GSAN_676		GSAN_677		GSAN_678		GSAN_679		GSAN_680		GSAN_681		GSAN_682		GSAN_688		GSAN_697		GSAN_698		
Link Diameter (m)	0.3750																										
Ground Level (m)	536.96	537.51	537.41	538.36	537.66	537.76	537.40	537.13	538.02	538.67	538.37	539.22	538.85	538.37													
Invert Level (m)	531.25	531.64	531.90	532.27	532.45	532.72	532.96	533.25	533.46	533.77	534.03	534.56	534.61	534.86													
Link Slope (%)	0.42	0.33	0.35	0.33	0.30					0.31	0.18	0.25	0.22	0.46	0.05	0.19											
Capacity (cu.m/s)	0.1129	0.1006	0.1041	0.1000	0.0953	0.0965	0.0981	0.0735	0.0879	0.0822	0.1187	0.0377	0.0771														

- Legend**
- Maximum Water Level (m)**
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



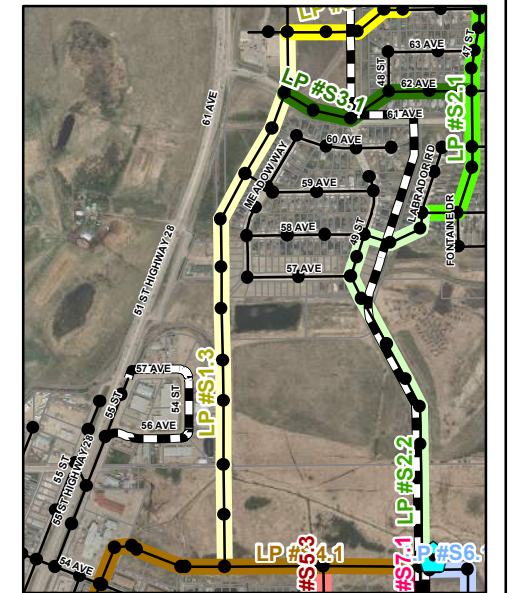
THE CITY OF COLD LAKE
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MAXIMUM HGL PROFILE - LP #S1.2
EXISTING SANITARY CONDITIONS



Legend

- Dry Weather Flow
- Constant 0.29L/s/ha
- Constant 0.60L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



The graph shows the distance in meters that a car has traveled over 600 seconds. The x-axis is labeled 'Seconds' and ranges from 0 to 600 with major ticks every 75 seconds. The y-axis is labeled 'Meters' and ranges from 0 to 100 with major ticks every 20 meters. The graph consists of several horizontal segments at different heights, indicating constant speed, and vertical segments, indicating instantaneous changes in position.

Time (Seconds)	Distance (Meters)
0	0
0	20
75	20
75	40
150	40
150	60
300	60
300	20
450	20
450	80
600	80



**THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM**

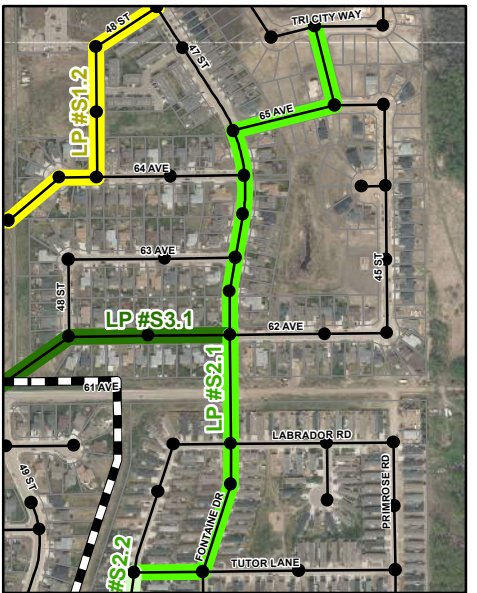
MAXIMUM HGL PROFILE - LP #S1.3
EXISTING SANITARY CONDITIONS



08/08/2015

Legend

- Dry Weather Flow
- Constant 0.29L/s/ha
- Constant 0.60L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



A step function graph showing a signal over 400 meters. The signal starts at 1, drops to 0 at 25m, rises to 2 at 50m, drops to 1 at 75m, rises to 3 at 100m, drops to 2 at 200m, rises to 3 at 300m, and drops to 2 at 400m.



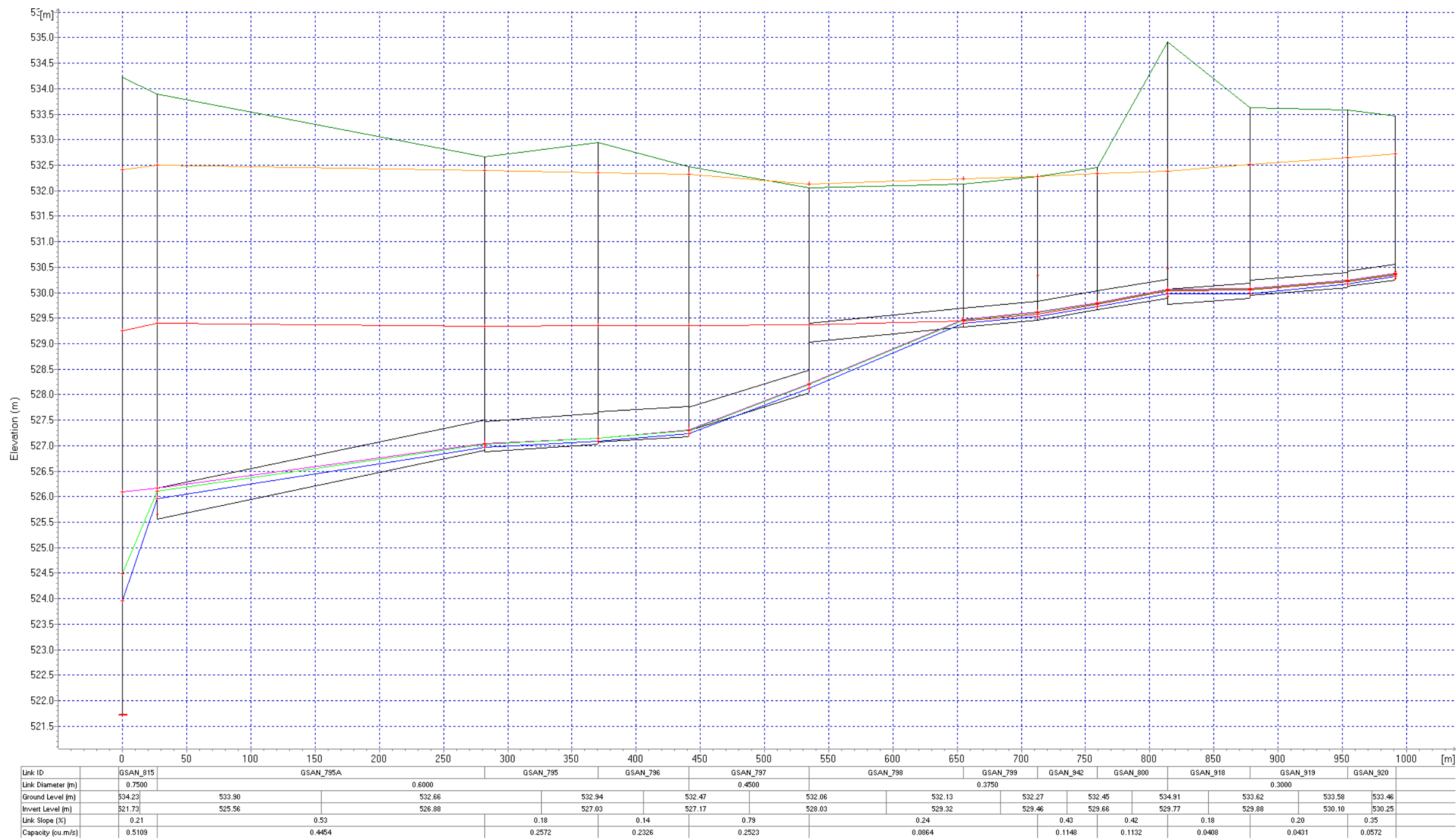
THE CITY OF COLD LAKE INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S2.1
EXISTING SANITARY CONDITIONS



08/08/2015

LP #S2.2 - Maximum HGL Profile - Existing Conditions



- Legend**
- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:11,500



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

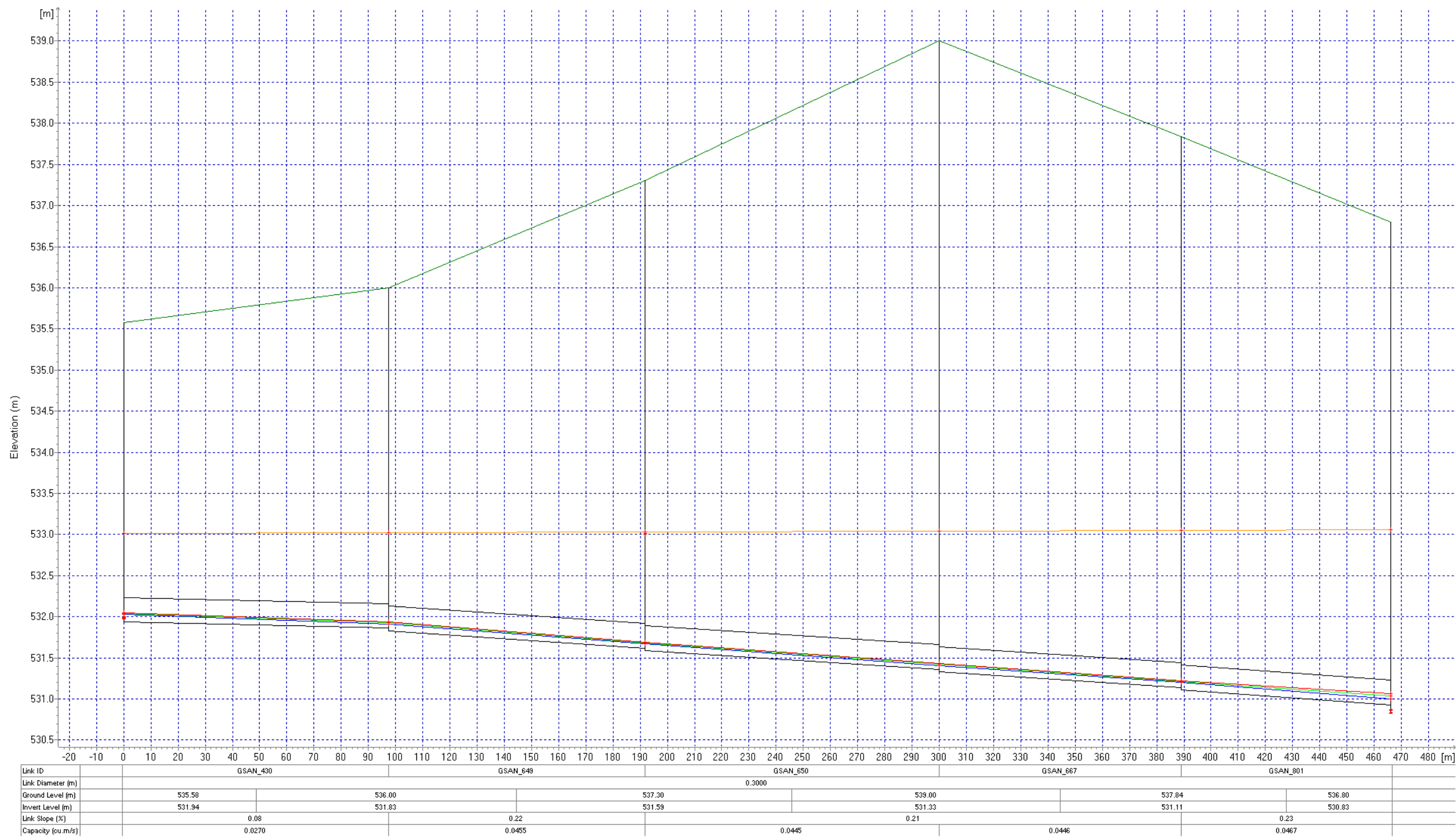
MAXIMUM HGL PROFILE - LP #S2.2
EXISTING SANITARY CONDITIONS



08/08/2015

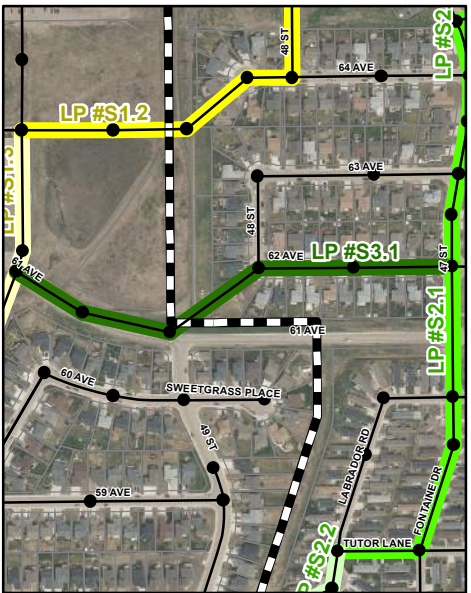


LP #S3.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



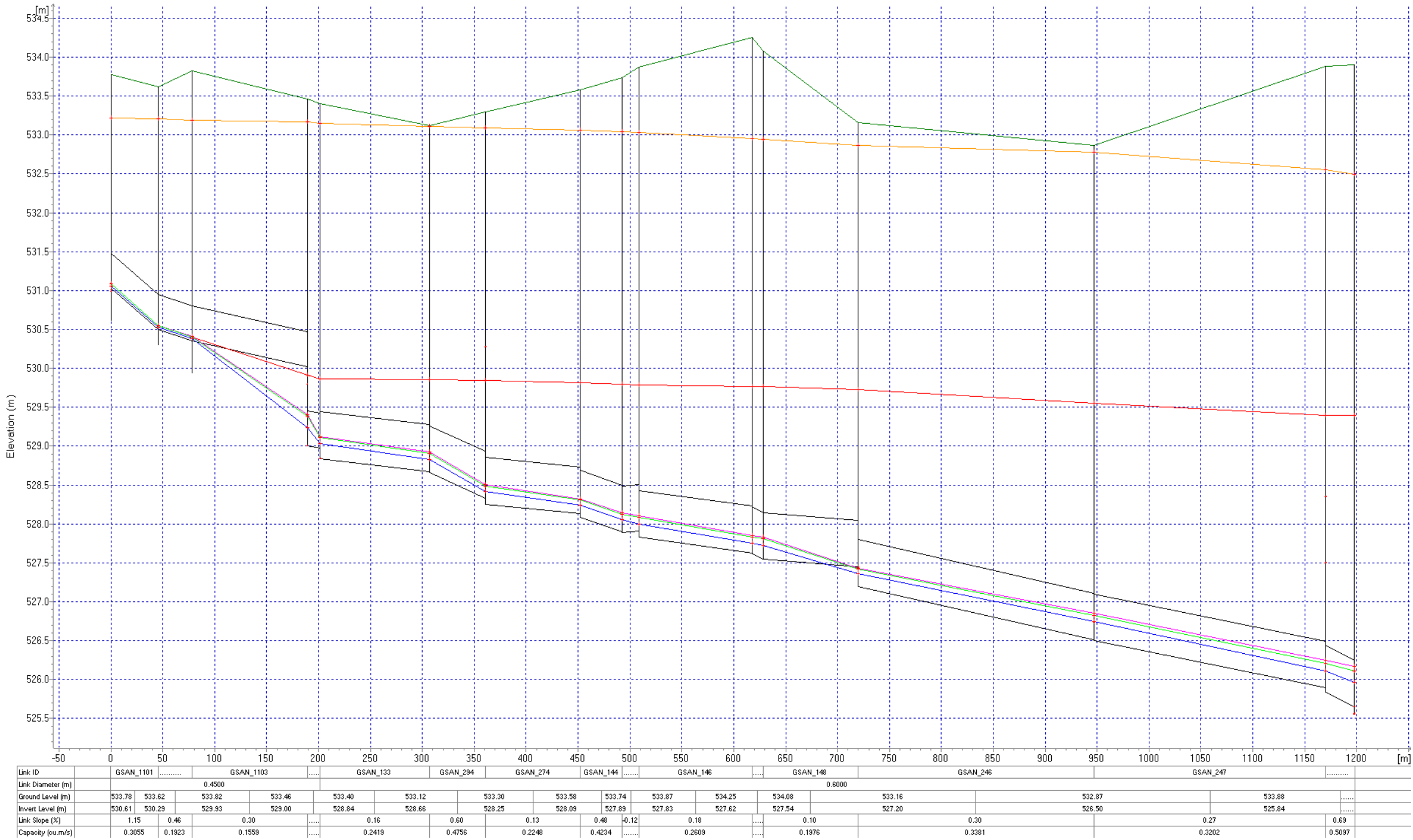
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S3.1
EXISTING SANITARY CONDITIONS



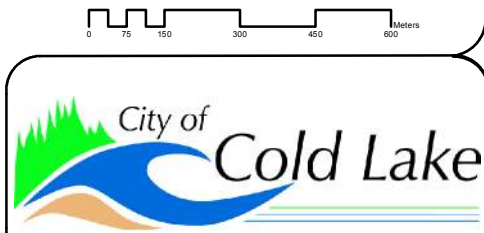
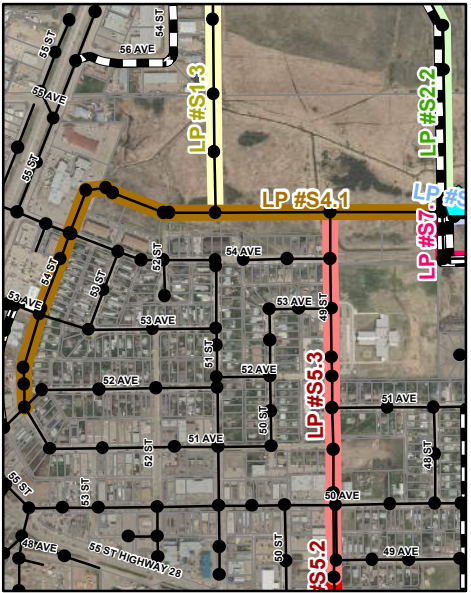
FIGURE APP D.17

LP #S4.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution

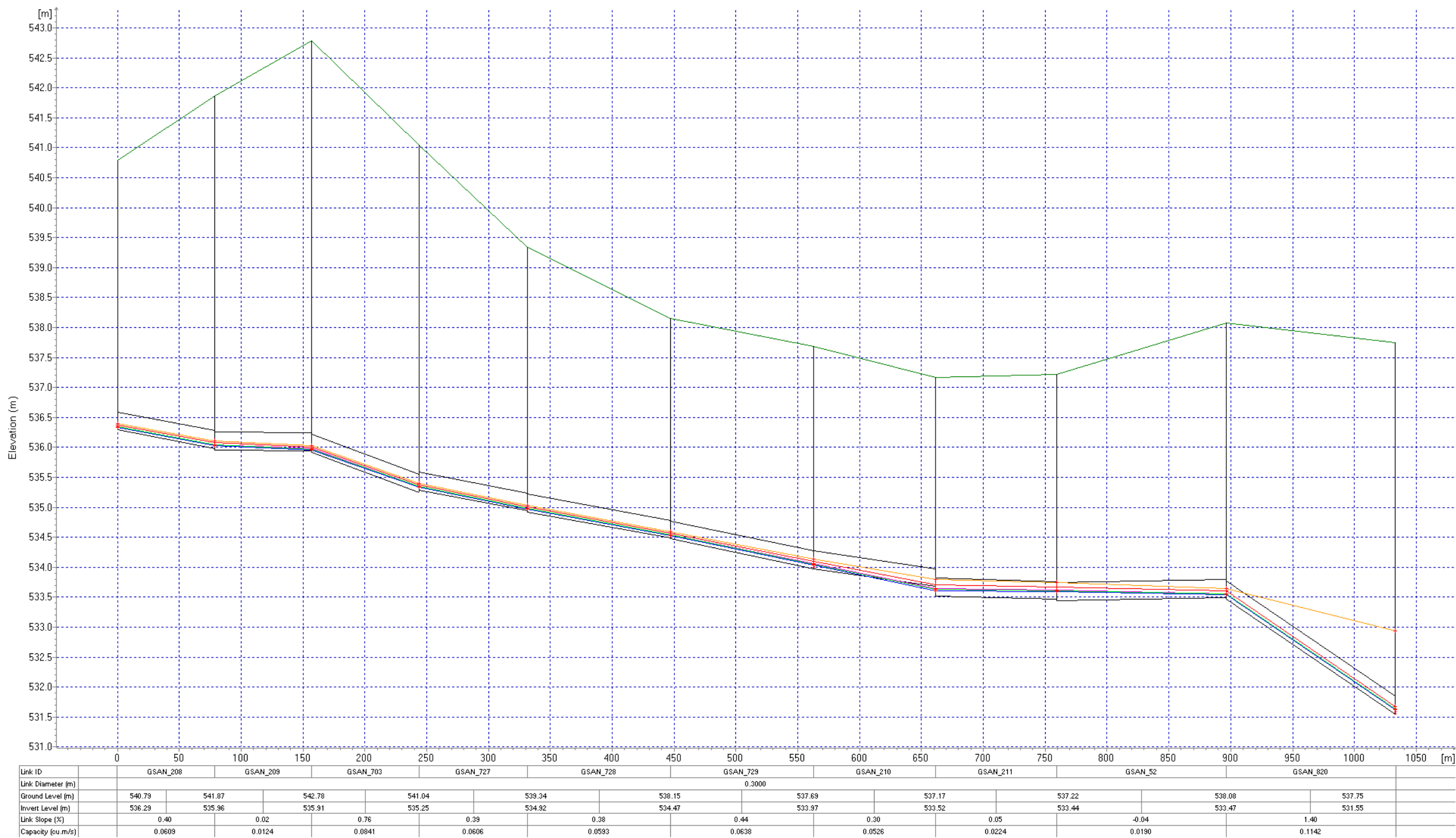


THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S4.1
EXISTING SANITARY CONDITIONS

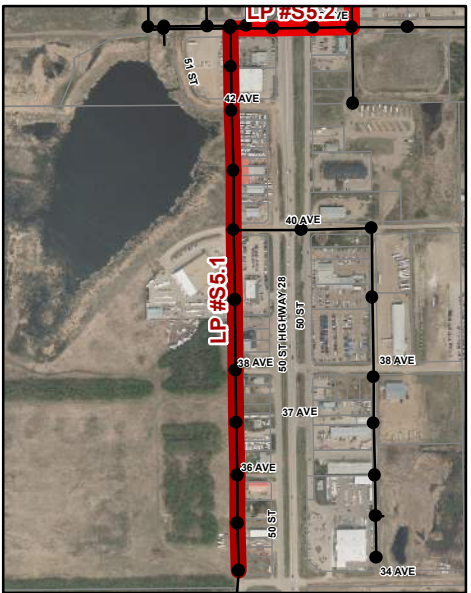


LP #S5.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:12,500

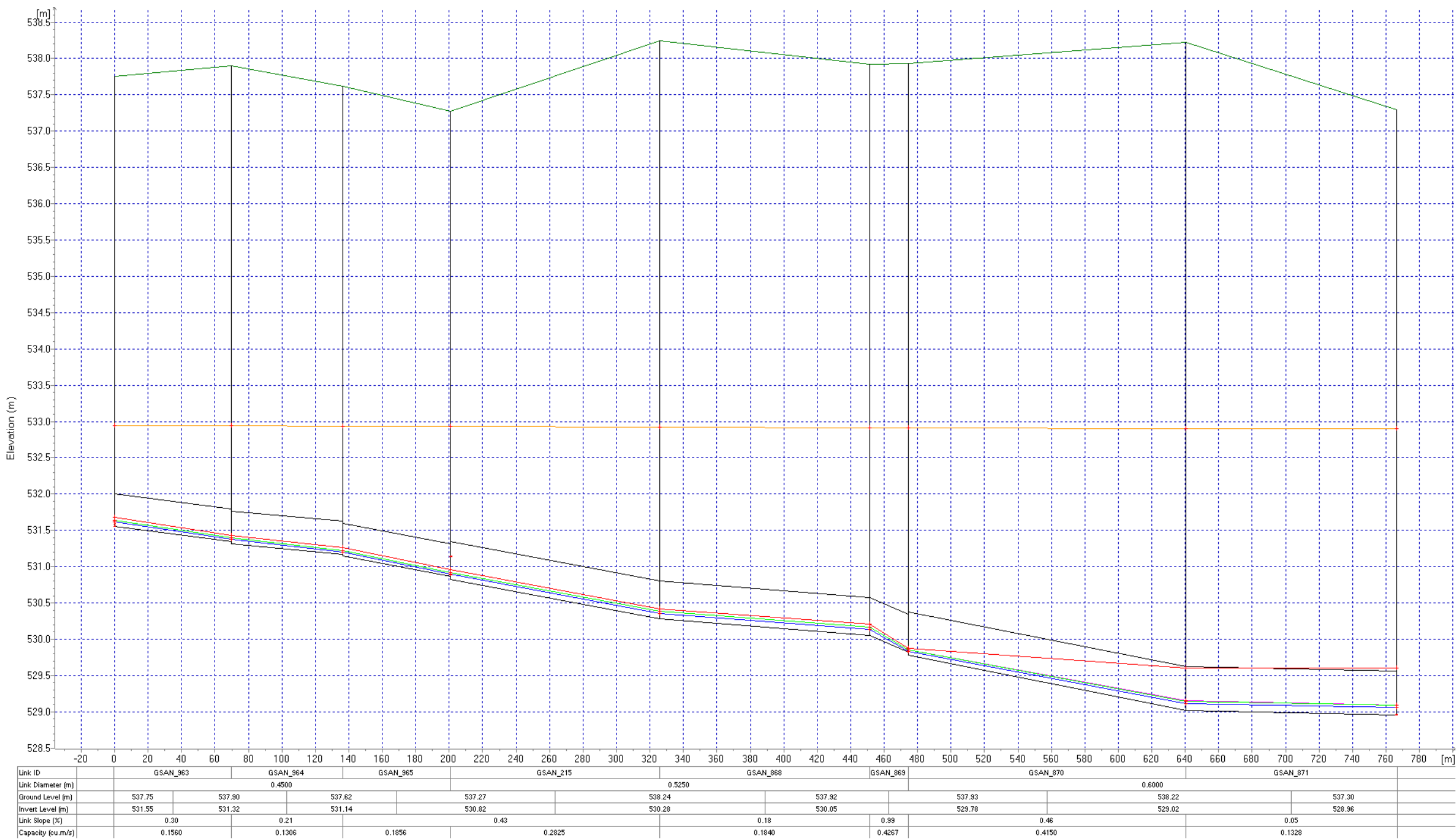


THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S5.1
EXISTING SANITARY CONDITIONS

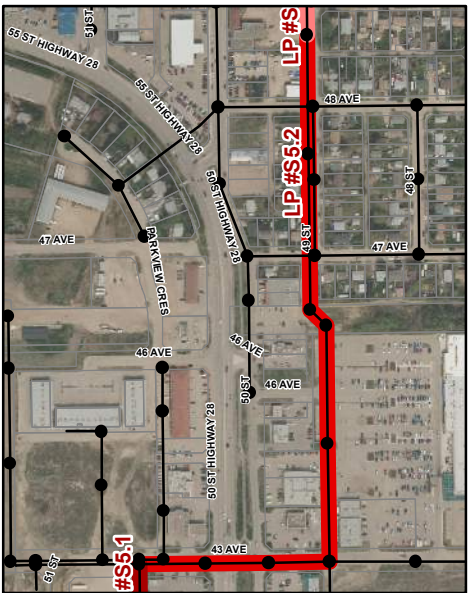


LP #S5.2 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:8,000



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

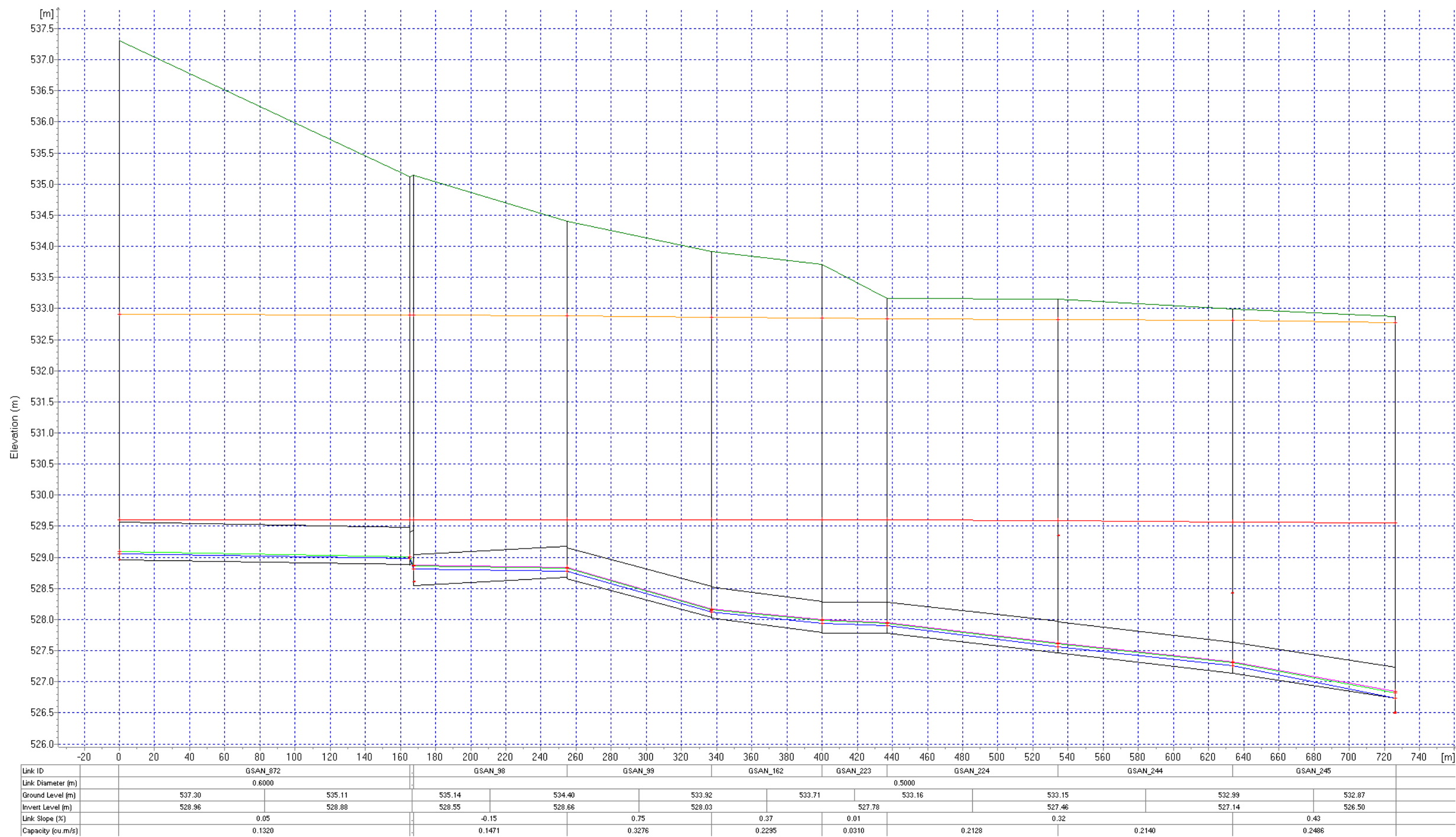
MAXIMUM HGL PROFILE - LP #S5.2
EXISTING SANITARY CONDITIONS



08/08/2015

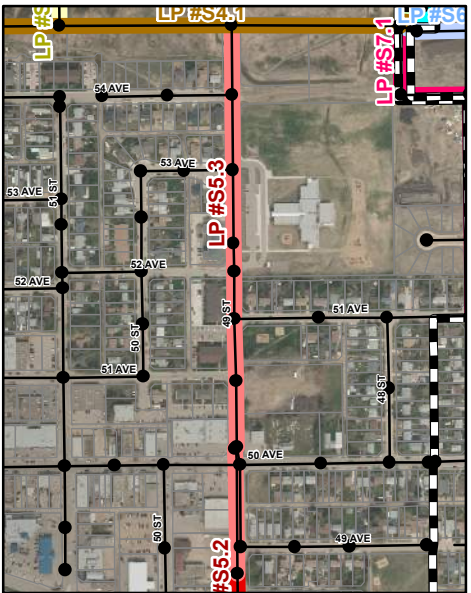


LP #S5.3 - Maximum HGL Profile - Existing Conditions

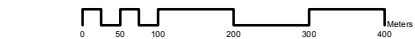


Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:10,000



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S5.3
EXISTING SANITARY CONDITIONS

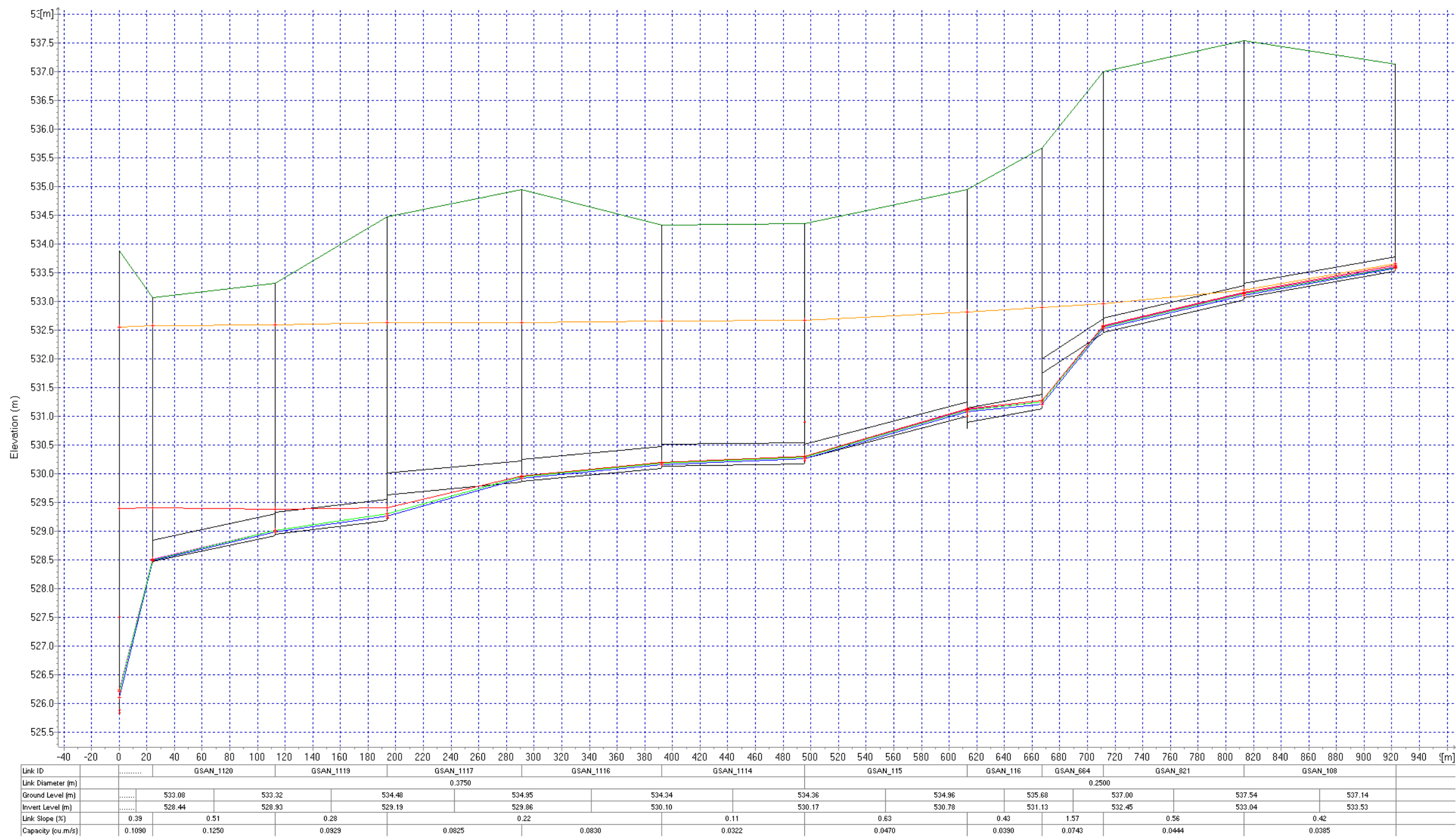


08/08/2015



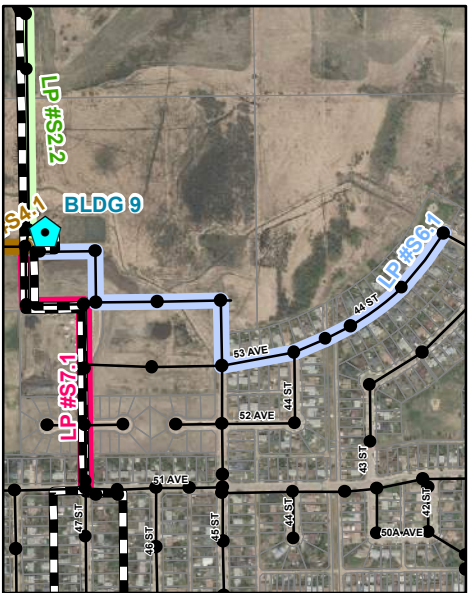
FIGURE APP D.21

LP #S6.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution

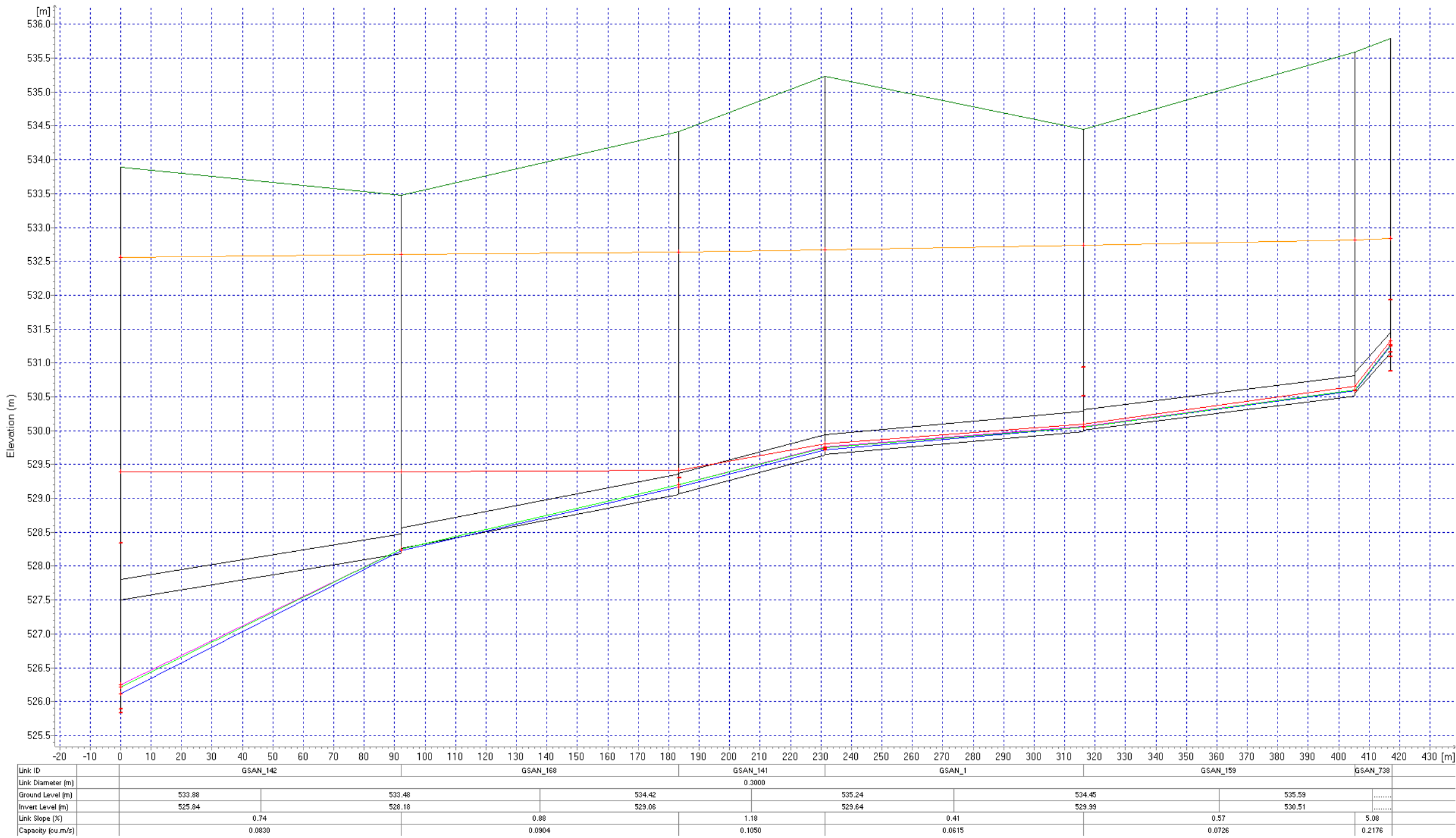


THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S6.1
EXISTING SANITARY CONDITIONS

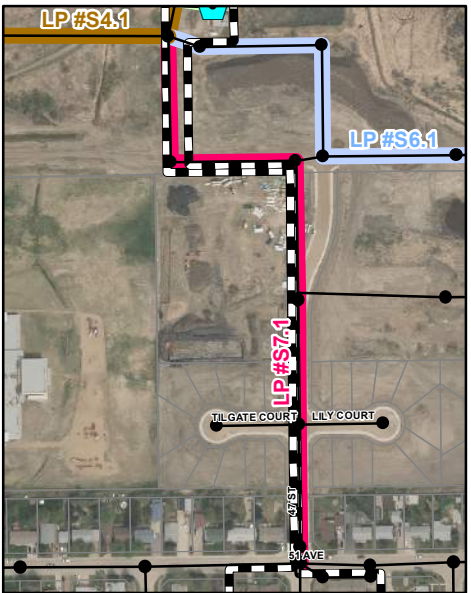


LP #S7.1 - Maximum HGL Profile - Existing Conditions



Legend

- Maximum Water Level (m)
- Dry Weather Flow
 - Constant 0.29L/s/ha
 - Constant 0.60L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S7.1
EXISTING SANITARY CONDITIONS





Appendix E

Existing Upgrades – Detailed Cost Estimates



Item Number	Detailed Breakdown of Cost Estimates - Existing Conditions							
	Upgrade	Quantity	Units	Unit Cost	Sub-Total	Contingency (30%)	Engineering (15%)	Total Cost
EX Upgrade 1	Pressure Gauge at BLDG 1 LS	1	Items	\$ 5,000.00	\$5,000	\$1,500	\$750	\$7,250
EX Upgrade 2	Pressure Gauge at BLDG 3 LS	1	Items	\$ 5,000.00	\$5,000	\$1,500	\$750	\$7,250
EX Upgrade 3	BLDG 3 Lift Station Upgrade - 76L/s from 61L/s (Additional 15L/s)	1	Items	\$ 150,000.00	\$150,000	\$45,000	\$22,500	\$217,500
Grand Total:					\$160,000	\$48,000	\$24,000	\$232,000

¹ It is recommended that the lift station is fitted with pressure gauges at headers and that drawdown tests are repeated prior to any upgrades being done on the lift station. The review of the pressure readings and flows will confirm whether the pumps or forcemains are the culprit of the capacity constraints.



Appendix F
Sanitary Sewer Smoke Testing Report



Final Report for
ISL Engineering and Land Service Ltd.

Attn: Mr. Geoffrey Schulmeister, P.Eng.

City of Cold Lake, AB
Sewer Smoke Testing 2016



GLOBAL

Prepared and submitted by:

SFE Global
10707 181 Street
Edmonton, Alberta T5S 1J6
Phone (780) 461-0171 Fax (780) 443-4613
Toll Free: 1-877-293-0173



October 27, 2017

Mr. Geoffrey Schulmeister, P.Eng.
ISL Engineering and Land Services Ltd.
6325 12 St. SE
Calgary, AB
T2H 2K1

**FINAL REPORT:
CITY OF COLD LAKE SANITARY SEWER SMOKE TESTING**

Dear Mr. Schulmeister,

Please find enclosed SFE's Final Report for the above mentioned project. If you have any questions, comments or concerns, please do not hesitate to contact us at your earliest convenience.

Thank you for having SFE conduct this work on your behalf. We are appreciative of the opportunity to work with you and your team on this project. We look forward to working together again in the near future.

Sincerely,
SFE Global

Nick Schellenberg
General Manager, Prairies
(780) 461-0171

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Introduction..... 1

Section 2
2.1 Smoke Testing Procedures 1
2.2 Smoke Testing Incidents..... 2

Section 3
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Section 4
Conclusion 4

Appendices
Appendix 1 – Maps
Appendix 2 – Smoke Test Run Reports
Appendix 3 – No Smoke Observations & Plugged Lines
Appendix 4 – Smoke Test Incident Reports

1. Introduction

SFE was retained by ISL Engineering and Land Services Ltd., under the direction of Mr. Geoffrey Schulmeister, to provide consulting, technical services and equipment related to Sanitary Sewer Smoke Testing of the City of Cold Lake, Alberta.

Initially smoke testing was conducted between September 21 and October 7, 2016. Due to unfavorable weather conditions, the completion of the project was postponed. Smoke testing was completed in the first priority area and approximately sixty (60) percent of the second priority area. The remaining priorities were completed August 14 to August 18, 2017. A copy of the aforementioned priority maps produced by ISL Engineering can be found in Appendix 1.

This final report provides details of the tests conducted by SFE and all incidents whereby smoke was observed or not observed during each testing run outlined in Appendix 2. Mr. Nick Schellenberg from SFE acted as Project Manager for this project.

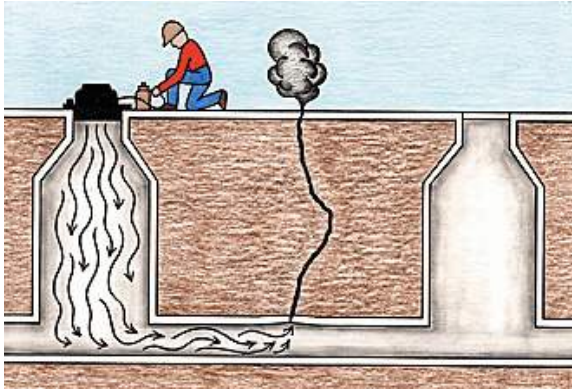
2. Smoke Testing

2.1 Smoke Testing Procedures

Smoke testing is one of the most efficient and cost effective methods of locating sources of inflow and infiltration (I&I) problems within sanitary sewers.

The non-toxic “smoke” will help find locations where storm and other sources of rain water enter the sanitary sewers. It is conducted by placing a blower over a centrally located manhole and forcing non-toxic smoke into the sanitary sewer line. As the air inside the sewer is pressurized, the smoke will fill the main line plus any and all connections. The smoke will then follow the path of any leaks to the ground’s surface, quickly revealing the source of inflow and infiltration (I&I).

The smoke will be noticeable wherever there is a leak in a sanitary sewer pipe, such as a crack in a sewer pipe, a cross-connection between a storm sewer and a sanitary sewer,



where a roof drain is connected to the sanitary sewer, from a broken or defective cleanout cap, or from damaged manhole.

2.2 Smoke Test Incidents

All smoke test runs are summarized and included as Appendix 2 of this report. All smoke observation incident report locations are included as Appendix 3. A smoke test incident is an occurrence whereby smoke is observed emanating from a particular fixture or area.

All instances where smoke was not observed emerging from the sanitary vent of a building, and instances where sanitary sewer lines were believed to be plugged or sagging, are included in Appendix 4.

3. QA/QC and Safety Statement

SFE confirms that all pipeline runs were smoke tested according to industry standards and SFE's QA/QC methodology and protocol, and standard industry practice. All equipment has been removed from the site locations.

SFE has a comprehensive Company Safety Manual and can be reviewed upon request.

Where required, confined space entry procedures and general site/traffic safety was adhered to during site installation and site maintenance. SFE utilizes the "DBI SALA" rescue system, a 2800 CFM air induction device and MSA air quality monitors. All of our staff members are thoroughly trained and certified in confined space entry procedures. Certificates are available upon request.

Where required, a thorough traffic control plan was established and used by SFE Global crews. All SFE crews and vehicles are outfitted with high visibility traffic safety equipment.

A pre-job safety inspection and meeting was conducted by SFE personnel and the following potential hazards were identified:

- Need for Personal Protective Equipment
- Traffic Control Requirements
- Heavy Lifting

This project was conducted in accordance with the WCB and OSHA safety standards as documented in SFE's Safety Procedures Manual. Local emergency response procedures were reviewed. A "tail-gate" meeting was conducted by SFE to review work to be completed and the hazards present prior to this work.

Quality Assurance and Quality Control Procedures:

- All Field Crews are supplied with SFE smoke test field sheets for documentation of pertinent information.
- All Field Crews are supplied with legible City maps detailing the sewer lines, manhole numbers and street names.
- Pre-planning shall include an outline of runs laid out on the map with smoke induction and run end manholes noted.
- All incidents are detailed on the field sheets by the SFE crew foreman and shall include addresses, photos, GPS coordinates (decimal degrees), incident description, etc.
- All data entry into the SFE Smoke Testing software shall be conducted by SFE Data Processing.
- The smoke test final report shall include report body, smoke test run details, incident details and locations, no smoke observations, and maps used during project planning.
- As a minimum 10% of the incidents shall be checked for a correlation between the incident location (i.e. address, street location) and the GPS coordinates. The SFE project manager (PM) shall ensure checks and balances are conducted for 10% of all readings. If mistakes are discovered, all incidents shall be checked by the PM.
- As a minimum, a PDF version of the final report shall be supplied to the client and printed only upon their request.

4. Conclusion

The sanitary sewer smoke test, conducted by SFE, has determined that there are several locations whereby storm and/or rain water is entering the Leduc system. All incidents are detailed in Appendix 3 of this report.

Should you have questions or comments please contact Nick Schellenberg at SFE Global (780) 461-0171.

Report End
October 2017

SFE Global
Project A15-124B

Appendix 1

Maps

FIGURE 1

1

Legend

Manhole

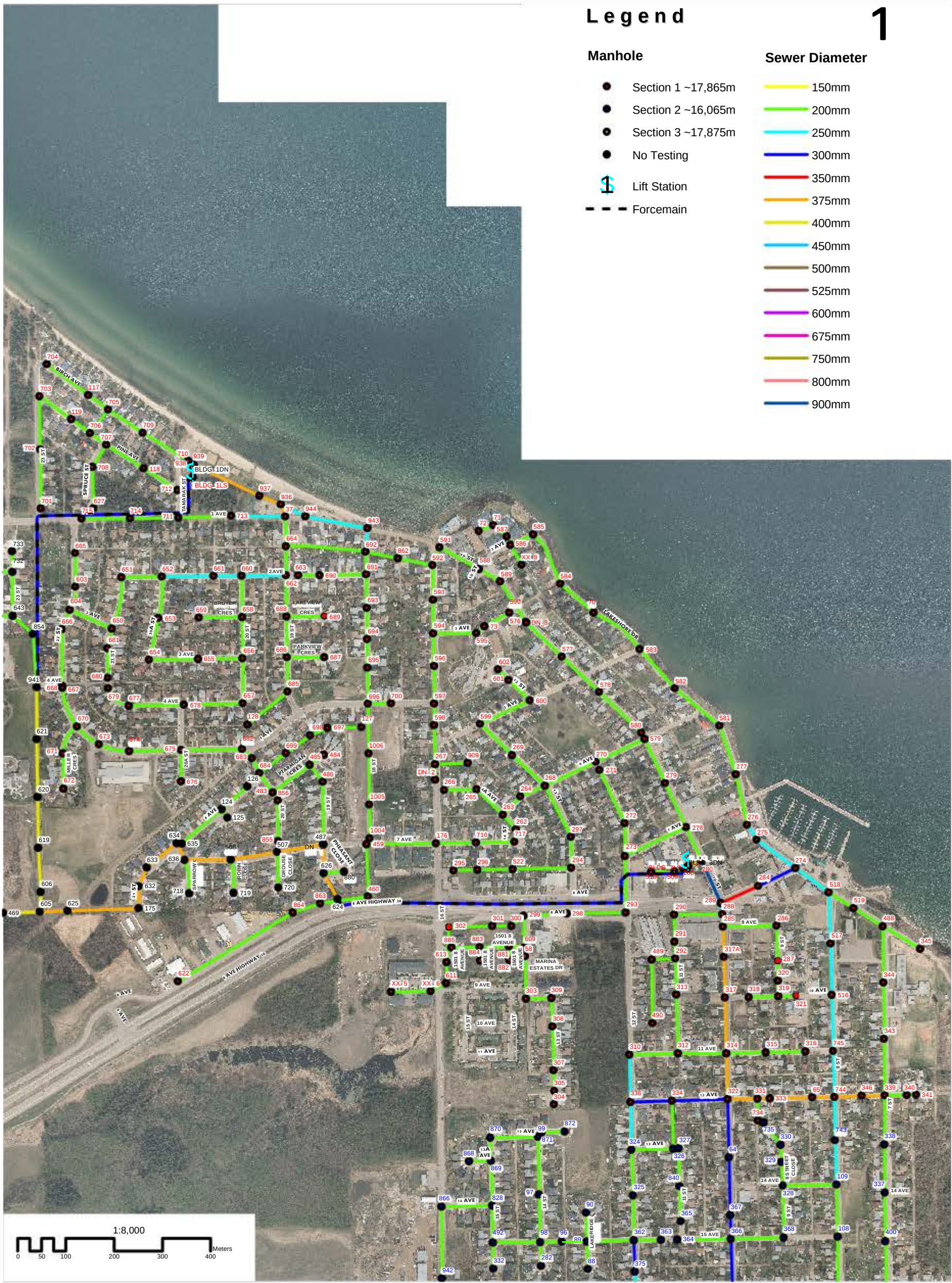
- Section 1 ~17,865m
- Section 2 ~16,065m
- Section 3 ~17,875m
- No Testing

— Lift Station

--- Forcemain

Sewer Diameter

- 150mm
- 200mm
- 250mm
- 300mm
- 350mm
- 375mm
- 400mm
- 450mm
- 500mm
- 525mm
- 600mm
- 675mm
- 750mm
- 800mm
- 900mm



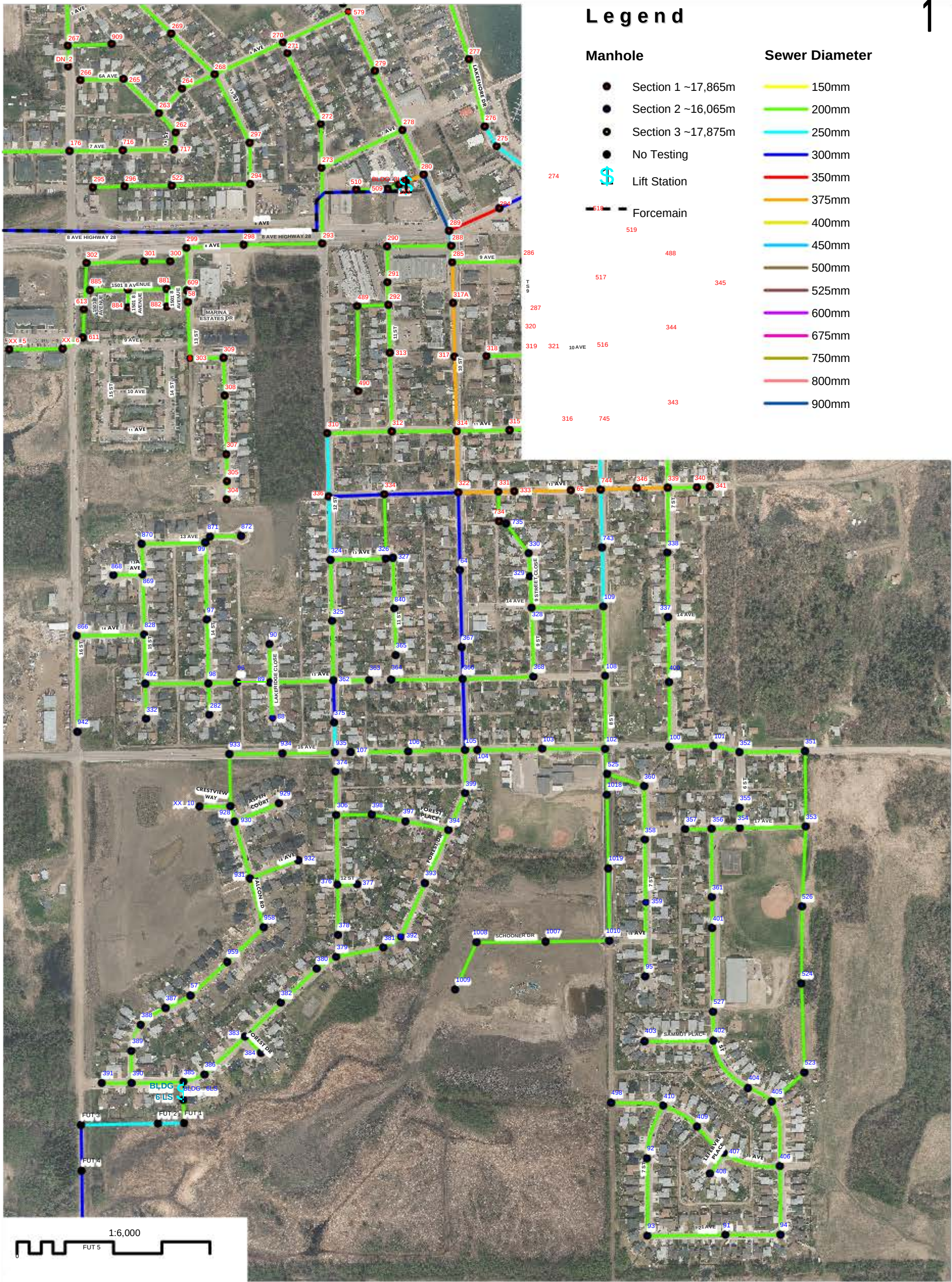
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

SANITARY COLLECTION SYSTEM
2016 SMOKE TESTING
SECTION #1
LOCATIONS IN THE NORTH



FIGURE 2

1



Date: 13/09/2016 Document: M12630026367 Cold Lake - I-1 Program02_CADD020_Drafting01_GIS Figures00A_Non-Report FiguresCL_2016 Smoke Testing - North_Section 2.mxd

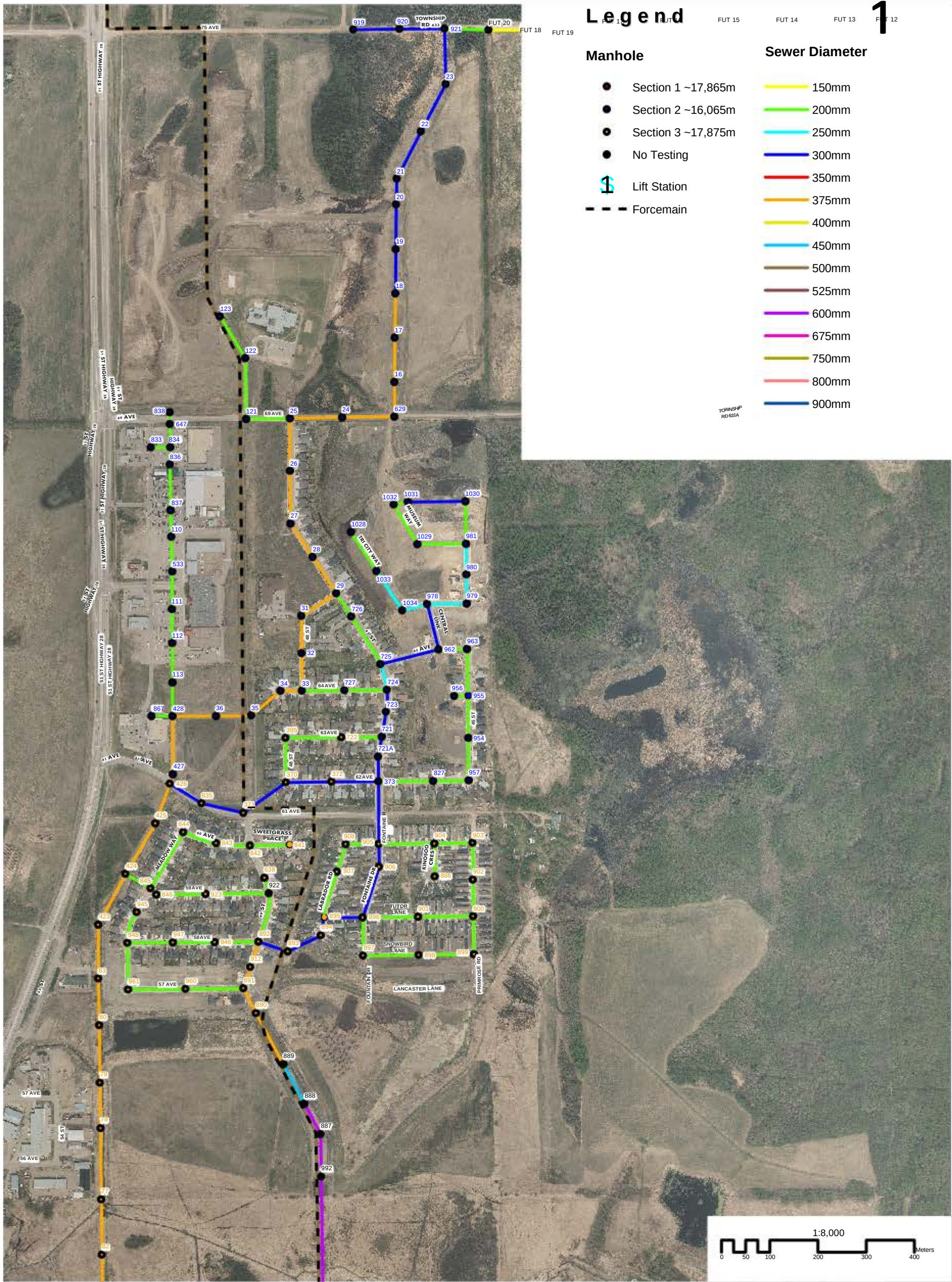


THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM
SANITARY COLLECTION SYSTEM
2016 SMOKE TESTING
SECTION #2
LOCATIONS IN THE NORTH



FIGURE 3

1



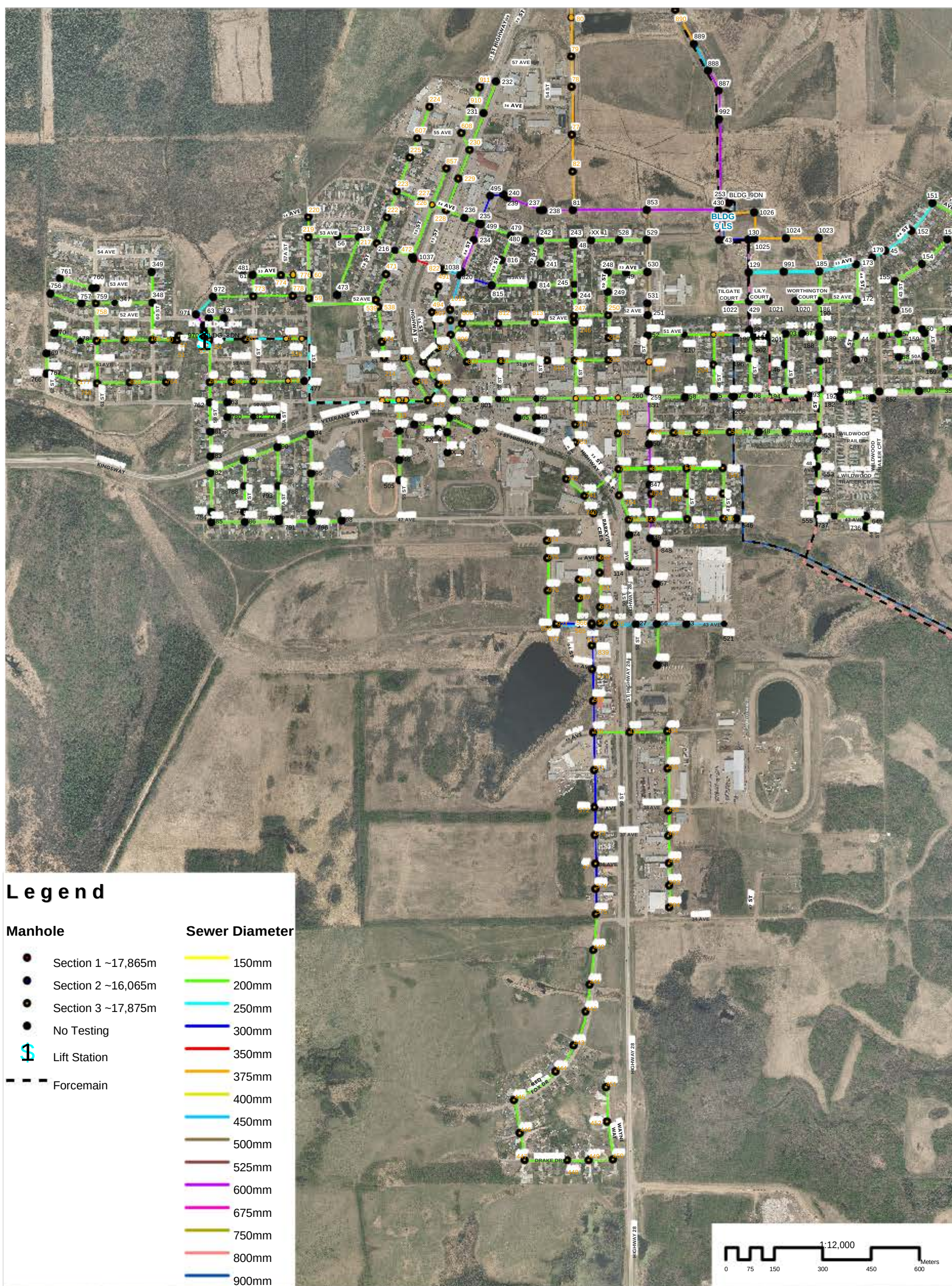
Date: 13/09/2016 Document: M126300/26367 Cold Lake_H1_Program02_CADD/20_Drafting/201_GIS Figures/00A_Non-Report Figures/CL_2016 Smoke Testing_South_Sections 2 & 3.mxd



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM
SANITARY COLLECTION SYSTEM
2016 SMOKE TESTING
SECTIONS #2 (PART 2 of 2) & #3 (PART 1 of 2)
LOCATIONS IN THE SOUTH



FIGURE 1



**THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM**

SANITARY COLLECTION SYSTEM
2016 SMOKE TESTING
SECTION #3 - PART 2 OF 2
LOCATIONS IN THE SOUTH



Appendix 2

Smoke Test Run Summaries



Cold Lake Smoke Testing - Run Summaries

Run 01

Run Date 09/21/2016

Time 08:40

Technician Name Nick Schellenberg

Weather +3C, wind negligible

Starting Manhole 704

Smoker Location 705

Ending Manhole 710

Manhole Latitude 54.4744

Manhole Latitude 54.4736

Manhole Latitude 54.4726

Manhole Longitude -110.1947

Manhole Longitude -110.1925

Manhole Longitude -110.1900

Comments

Run 02

Run Date 09/21/2016

Time 08:58

Technician Name Nick Schellenberg

Weather +3C, wind negligible

Starting Manhole 705

Smoker Location 705

Ending Manhole 706

Manhole Latitude 54.4736

Manhole Latitude 54.4736

Manhole Latitude 54.4731

Manhole Longitude -110.1925

Manhole Longitude -110.1925

Manhole Longitude -110.1931

Comments

Run 03

Run Date 09/21/2016

Time 09:20

Technician Name Nick Schellenberg

Weather +4C, wind negligible

Starting Manhole 703

Smoker Location 707

Ending Manhole 712

Manhole Latitude 54.4738

Manhole Latitude 54.4729

Manhole Latitude 54.4721

Manhole Longitude -110.1947

Manhole Longitude -110.1926

Manhole Longitude -110.1903

Comments

Run 04

Run Date 09/21/2016

Time 09:45

Technician Name Nick Schellenberg

Weather +4C, wind negligible

Starting Manhole 707

Smoker Location 707

Ending Manhole 627

Manhole Latitude 54.7429

Manhole Latitude 54.7429

Manhole Latitude 54.4717

Manhole Longitude -110.1926

Manhole Longitude -110.1926

Manhole Longitude -110.1930

Comments



Cold Lake Smoke Testing - Run Summaries

Run 05

Run Date 09/21/2016

Time 11:10

Technician Name Nick Schellenberg

Weather +12C, wind negligible

Starting Manhole 703

Smoker Location 702

Ending Manhole 701

Manhole Latitude 54.4738

Manhole Latitude 54.4728

Manhole Latitude 54.4717

Manhole Longitude -110.1947

Manhole Longitude -110.1947

Manhole Longitude -110.1947

Comments

Run 06

Run Date 09/21/2016

Time 11:30

Technician Name Nick Schellenberg

Weather +12C, wind negligible

Starting Manhole 715

Smoker Location 711

Ending Manhole 37

Manhole Latitude 54.4715

Manhole Latitude 54.4715

Manhole Latitude 54.4715

Manhole Longitude -110.1934

Manhole Longitude -110.1903

Manhole Longitude -110.1869

Comments

Run 07

Run Date 09/21/2016

Time 11:52

Technician Name Nick Schellenberg

Weather +15C, wind negligible

Starting Manhole 939

Smoker Location 936

Ending Manhole 943

Manhole Latitude 54.4725

Manhole Latitude 54.4725

Manhole Latitude 54.4713

Manhole Longitude -110.1898

Manhole Longitude -110.1899

Manhole Longitude -110.1843

Comments Possibly tied into storm drain between 18 St. & 19 St. (No Smoke)

Run 08

Run Date 09/21/2016

Time 13:21

Technician Name Nick Schellenberg

Weather +15C, wind negligible

Starting Manhole 665

Smoker Location 604

Ending Manhole 667

Manhole Latitude 54.4709

Manhole Latitude 54.4699

Manhole Latitude 54.4684

Manhole Longitude -110.1936

Manhole Longitude -110.1938

Manhole Longitude -110.1941

Comments



Cold Lake Smoke Testing - Run Summaries

Run 09

Run Date 09/21/2016

Time 13:35

Technician Name Nick Schellenberg

Weather +15C, wind negligible

Starting Manhole 604

Smoker Location 604

Ending Manhole 650

Manhole Latitude 54.4699

Manhole Latitude 54.4699

Manhole Latitude 54.4695

Manhole Longitude -110.1938

Manhole Longitude -110.1938

Manhole Longitude -110.1925

Comments

Run 10

Run Date 09/21/2016

Time 13:50

Technician Name Nick Schellenberg

Weather +15C, wind negligible

Starting Manhole 667

Smoker Location 673

Ending Manhole 675

Manhole Latitude 54.4684

Manhole Latitude 54.4673

Manhole Latitude 54.4672

Manhole Longitude -110.1941

Manhole Longitude -110.1929

Manhole Longitude -110.1903

Comments

Run 11

Run Date 09/21/2016

Time 14:15

Technician Name Nick Schellenberg

Weather +15C, wind negligible

Starting Manhole 670

Smoker Location 671

Ending Manhole 672

Manhole Latitude 54.4677

Manhole Latitude 54.4672

Manhole Latitude 54.4665

Manhole Longitude -110.1936

Manhole Longitude -110.1941

Manhole Longitude -110.1941

Comments

Run 12

Run Date 09/22/2016

Time 07:55

Technician Name Nick Schellenberg

Weather +3C, wind negligible

Starting Manhole 651

Smoker Location 652

Ending Manhole 654

Manhole Latitude 54.4705

Manhole Latitude 54.4705

Manhole Latitude 54.4689

Manhole Longitude -110.1921

Manhole Longitude -110.1909

Manhole Longitude -110.1913

Comments



Cold Lake Smoke Testing - Run Summaries

Run 13

Run Date 09/22/2016

Time 08:20

Technician Name Nick Schellenberg

Weather +3C, wind negligible

Starting Manhole 652
Manhole Latitude 54.4705
Manhole Longitude -110.1909

Smoker Location 652
Manhole Latitude 54.4705
Manhole Longitude -110.1909

Ending Manhole 654
Manhole Latitude 54.4689
Manhole Longitude -110.1913

Comments

Run 14

Run Date 09/22/2016

Time 08:46

Technician Name Nick Schellenberg

Weather +3C, wind negligible

Starting Manhole 654
Manhole Latitude 54.4689
Manhole Longitude -110.1913

Smoker Location 655
Manhole Latitude 54.4689
Manhole Longitude -110.1897

Ending Manhole 656
Manhole Latitude 54.4689
Manhole Longitude -110.1883

Comments

Run 15

Run Date 09/23/2016

Time 09:00

Technician Name Nick Schellenberg

Weather +10C, wind negligible

Starting Manhole 657
Manhole Latitude 54.4681
Manhole Longitude -110.1883

Smoker Location 656
Manhole Latitude 54.4689
Manhole Longitude -110.1883

Ending Manhole 658
Manhole Latitude 54.4697
Manhole Longitude -110.1883

Comments MH 658 plugged

Run 16

Run Date 09/23/2016

Time 09:15

Technician Name Nick Schellenberg

Weather +10C, wind negligible

Starting Manhole 659
Manhole Latitude 54.4967
Manhole Longitude -110.1897

Smoker Location 659
Manhole Latitude 54.4967
Manhole Longitude -110.1897

Ending Manhole 658
Manhole Latitude 54.4697
Manhole Longitude -110.1883

Comments



Cold Lake Smoke Testing - Run Summaries

Run 17

Run Date 09/22/2016

Time 09:30

Technician Name Nick Schellenberg

Weather +6C, wind negligible

Starting Manhole 675

Smoker Location 675

Ending Manhole 682

Manhole Latitude 54.4672

Manhole Latitude 54.4672

Manhole Latitude 54.4672

Manhole Longitude -110.1903

Manhole Longitude -110.1903

Manhole Longitude -110.1884

Comments

Run 18

Run Date 09/22/2016

Time 09:45

Technician Name Nick Schellenberg

Weather +6C, wind negligible

Starting Manhole 675

Smoker Location 675

Ending Manhole 676

Manhole Latitude 54.4672

Manhole Latitude 54.4672

Manhole Latitude 54.4666

Manhole Longitude -110.1903

Manhole Longitude -110.1903

Manhole Longitude -110.1903

Comments

Run 19

Run Date 09/22/2016

Time 10:22

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 679

Smoker Location 678

Ending Manhole 657

Manhole Latitude 54.4684

Manhole Latitude 54.4681

Manhole Latitude 54.4681

Manhole Longitude -110.1926

Manhole Longitude -110.1902

Manhole Longitude -110.1883

Comments

Run 20

Run Date 09/22/2016

Time 10:45

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 680

Smoker Location 681

Ending Manhole 651

Manhole Latitude 54.4686

Manhole Latitude 54.4691

Manhole Latitude 54.4705

Manhole Longitude -110.1926

Manhole Longitude -110.1926

Manhole Longitude -110.1921

Comments



Cold Lake Smoke Testing - Run Summaries

Run 21

Run Date 09/22/2016

Time 11:10

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 688

Smoker Location 688

Ending Manhole 687

Manhole Latitude 54.4697

Manhole Latitude 54.4697

Manhole Latitude 54.4689

Manhole Longitude -110.1869

Manhole Longitude -110.1869

Manhole Longitude -110.1857

Comments

Run 22

Run Date 09/22/2016

Time 11:20

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 37

Smoker Location 688

Ending Manhole 128

Manhole Latitude 54.4715

Manhole Latitude 54.4697

Manhole Latitude 54.4677

Manhole Longitude -110.1869

Manhole Longitude -110.1869

Manhole Longitude -110.1882

Comments

Run 23

Run Date 09/22/2016

Time 11:30

Technician Name Nick Schellenberg

Weather +12C, light wind

Starting Manhole 686

Smoker Location 686

Ending Manhole 687

Manhole Latitude 54.4689

Manhole Latitude 54.4689

Manhole Latitude 54.4689

Manhole Longitude -110.1869

Manhole Longitude -110.1869

Manhole Longitude -110.1857

Comments

Run 24

Run Date 09/22/2016

Time 11:45

Technician Name Nick Schellenberg

Weather +12C, light wind

Starting Manhole 663

Smoker Location 690

Ending Manhole 691

Manhole Latitude 54.4705

Manhole Latitude 54.4705

Manhole Latitude 54.4705

Manhole Longitude -110.1865

Manhole Longitude -110.1858

Manhole Longitude -110.1843

Comments



Cold Lake Smoke Testing - Run Summaries

Run 25

Run Date 09/22/2016

Time 12:00

Technician Name Nick Schellenberg

Weather +12C, light wind

Starting Manhole 664

Smoker Location 692

Ending Manhole 592

Manhole Latitude 54.4710

Manhole Latitude 54.4709

Manhole Latitude 54.4706

Manhole Longitude -110.1869

Manhole Longitude -110.1843

Manhole Longitude -110.1822

Comments Possibly tied into storm drain between 18 St. & 19 St. (No Smoke)

Run 26

Run Date 09/23/2016

Time 08:15

Technician Name Nick Schellenberg

Weather +10C, wind negligible

Starting Manhole 660

Smoker Location 660

Ending Manhole 658

Manhole Latitude 54.4705

Manhole Latitude 54.4705

Manhole Latitude 54.4697

Manhole Longitude -110.1883

Manhole Longitude -110.1883

Manhole Longitude -110.1883

Comments MH 658 plugged

Run 27

Run Date 09/23/2016

Time 08:45

Technician Name Nick Schellenberg

Weather +10C, moderate wind

Starting Manhole 943

Smoker Location 698

Ending Manhole 696

Manhole Latitude

Manhole Latitude 54.4675

Manhole Latitude 54.4680

Manhole Longitude

Manhole Longitude -110.1862

Manhole Longitude -110.1843

Comments

Run 28

Run Date 09/23/2016

Time 09:00

Technician Name Nick Schellenberg

Weather +10C, moderate wind

Starting Manhole 696

Smoker Location 696

Ending Manhole 700

Manhole Latitude 54.4680

Manhole Latitude 54.4680

Manhole Latitude 54.4680

Manhole Longitude -110.1843

Manhole Longitude -110.1843

Manhole Longitude -110.1836

Comments



Cold Lake Smoke Testing - Run Summaries

Run 29

Run Date 09/23/2016

Time 09:15

Technician Name Nick Schellenberg

Weather +10C, moderate wind

Starting Manhole 696

Smoker Location 1006

Ending Manhole 1004

Manhole Latitude 54.4680

Manhole Latitude 54.4671

Manhole Latitude 54.4655

Manhole Longitude -110.1843

Manhole Longitude -110.1843

Manhole Longitude -110.1843

Comments

Run 30

Run Date 09/23/2016

Time 10:30

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 127

Smoker Location 697

Ending Manhole 684

Manhole Latitude 54.4676

Manhole Latitude 54.4676

Manhole Latitude 54.4668

Manhole Longitude -110.1845

Manhole Longitude -110.1856

Manhole Longitude -110.1878

Comments MH 698-699 plugged

Run 31

Run Date 09/23/2016

Time 10:53

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 682

Smoker Location 684

Ending Manhole 855

Manhole Latitude 54.4672

Manhole Latitude 54.4668

Manhole Latitude 54.4655

Manhole Longitude -110.1884

Manhole Longitude -110.1878

Manhole Longitude -110.1872

Comments

Run 32

Run Date 09/23/2016

Time 11:30

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 484

Smoker Location 485

Ending Manhole 487

Manhole Latitude 54.4671

Manhole Latitude 54.4669

Manhole Latitude 54.4654

Manhole Longitude -110.1857

Manhole Longitude -110.1862

Manhole Longitude -110.1858

Comments



Cold Lake Smoke Testing - Run Summaries

Run 33

Run Date 09/23/2016

Time 12:20

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 622

Smoker Location 622

Ending Manhole 863

Manhole Latitude 54.4629

Manhole Latitude 54.4629

Manhole Latitude 54.4643

Manhole Longitude -110.1905

Manhole Longitude -110.1905

Manhole Longitude -110.1860

Comments MH 863-864 plugged

Run 34

Run Date 09/23/2016

Time 13:17

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 459

Smoker Location 176

Ending Manhole 717

Manhole Latitude 54.4654

Manhole Latitude 54.4654

Manhole Latitude 54.4654

Manhole Longitude -110.1844

Manhole Longitude -110.1822

Manhole Longitude -110.1797

Comments

Run 35

Run Date 09/23/2016

Time 13:30

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 459

Smoker Location 459

Ending Manhole 460

Manhole Latitude 54.4654

Manhole Latitude 54.4654

Manhole Latitude 54.4644

Manhole Longitude -110.1844

Manhole Longitude -110.1844

Manhole Longitude -110.1844

Comments

Run 36

Run Date 09/23/2016

Time 13:40

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole DN_2

Smoker Location 267

Ending Manhole 596

Manhole Latitude 54.4666

Manhole Latitude 54.4669

Manhole Latitude 54.4687

Manhole Longitude -110.1822

Manhole Longitude -110.1822

Manhole Longitude -110.1822

Comments



Cold Lake Smoke Testing - Run Summaries

Run 37

Run Date 09/23/2016

Time 13:45

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 267

Smoker Location 267

Ending Manhole 909

Manhole Latitude 54.4669

Manhole Latitude 54.4669

Manhole Latitude 54.4669

Manhole Longitude -110.1822

Manhole Longitude -110.1822

Manhole Longitude -110.1812

Comments

Run 38

Run Date 09/23/2016

Time 14:05

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 596

Smoker Location 594

Ending Manhole 594

Manhole Latitude

Manhole Latitude 54.4693

Manhole Latitude 54.4693

Manhole Longitude

Manhole Longitude -110.1822

Manhole Longitude -110.1822

Comments MH 593-594 plugged

Run 39

Run Date 09/23/2016

Time 14:15

Technician Name Nick Schellenberg

Weather +11C, moderate wind

Starting Manhole 593

Smoker Location 592

Ending Manhole 591

Manhole Latitude 54.4700

Manhole Latitude 54.4706

Manhole Latitude 54.4709

Manhole Longitude -110.1822

Manhole Longitude -110.1822

Manhole Longitude -110.1820

Comments

Run 40

Run Date 09/24/2016

Time 08:00

Technician Name Nick Schellenberg

Weather +9C, light wind

Starting Manhole 72

Smoker Location 586

Ending Manhole XX_8

Manhole Latitude 54.4712

Manhole Latitude 54.4710

Manhole Latitude 54.4706

Manhole Longitude -110.1807

Manhole Longitude -110.1797

Manhole Longitude -110.1793

Comments



Cold Lake Smoke Testing - Run Summaries

Run 41

Run Date 09/24/2016

Time 08:10

Technician Name Nick Schellenberg

Weather +9C, light wind

Starting Manhole 586

Smoker Location 586

Ending Manhole 585

Manhole Latitude 54.4710

Manhole Latitude 54.4710

Manhole Latitude 54.4712

Manhole Longitude -110.1797

Manhole Longitude -110.1797

Manhole Longitude -110.1789

Comments

Run 42

Run Date 09/24/2016

Time 08:20

Technician Name Nick Schellenberg

Weather +9C, light wind

Starting Manhole 585

Smoker Location 70

Ending Manhole 581

Manhole Latitude 54.4712

Manhole Latitude 54.4697

Manhole Latitude 54.4676

Manhole Longitude -110.1789

Manhole Longitude -110.1770

Manhole Longitude -110.1731

Comments

Run 43

Run Date 09/24/2016

Time 08:47

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 581

Smoker Location 275

Ending Manhole 518

Manhole Latitude 54.4676

Manhole Latitude 54.4654

Manhole Latitude 54.4644

Manhole Longitude -110.1731

Manhole Longitude -110.1719

Manhole Longitude -110.1697

Comments

Run 44

Run Date 09/24/2016

Time 08:50

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 274

Smoker Location 289

Ending Manhole 274

Manhole Latitude 54.4649

Manhole Latitude 54.4643

Manhole Latitude 54.4649

Manhole Longitude -110.1707

Manhole Longitude -110.1731

Manhole Longitude -110.1707

Comments



Cold Lake Smoke Testing - Run Summaries

Run 45

Run Date 09/24/2016

Time 09:15

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 576
Manhole Latitude 54.4695
Manhole Longitude -110.1792

Smoker Location 576
Manhole Latitude 54.4695
Manhole Longitude -110.1792

Ending Manhole 580
Manhole Latitude 54.4674
Manhole Longitude -110.1756

Comments

Run 46

Run Date 09/24/2016

Time 09:45

Technician Name Nick Schellenberg

Weather +10C, wind negligible

Starting Manhole 590
Manhole Latitude 54.4697
Manhole Longitude -110.1798

Smoker Location 590
Manhole Latitude 54.4697
Manhole Longitude -110.1798

Ending Manhole 594
Manhole Latitude 54.4693
Manhole Longitude -110.1822

Comments Entire run plugged

Run 47

Run Date 09/24/2016

Time 09:50

Technician Name Nick Schellenberg

Weather +10C, wind negligible

Starting Manhole 576
Manhole Latitude 54.4695
Manhole Longitude -110.1792

Smoker Location 589
Manhole Latitude 54.4703
Manhole Longitude -110.1800

Ending Manhole 591
Manhole Latitude 54.4709
Manhole Longitude -110.1820

Comments MH 576-589 plugged

Run 48

Run Date 09/24/2016

Time 11:00

Technician Name Nick Schellenberg

Weather +10C, light wind

Starting Manhole 600
Manhole Latitude 54.4681
Manhole Longitude -110.1792

Smoker Location 600
Manhole Latitude 54.4681
Manhole Longitude -110.1792

Ending Manhole 602
Manhole Latitude 54.4686
Manhole Longitude -110.1802

Comments MH 601-602 plugged



Cold Lake Smoke Testing - Run Summaries

Run 49

Run Date 09/24/2016

Time 11:05

Technician Name Nick Schellenberg

Weather +12C, light wind

Starting Manhole 600
Manhole Latitude 54.4681
Manhole Longitude -110.1792

Smoker Location 600
Manhole Latitude 54.4681
Manhole Longitude -110.1792

Ending Manhole 599
Manhole Latitude 54.4676
Manhole Longitude -110.1808

Comments

Run 50

Run Date 09/24/2016

Time 11:20

Technician Name Nick Schellenberg

Weather +12C, light wind

Starting Manhole 599
Manhole Latitude 54.4676
Manhole Longitude -110.1808

Smoker Location 269
Manhole Latitude 54.4671
Manhole Longitude -110.1797

Ending Manhole 294
Manhole Latitude 54.4649
Manhole Longitude -110.1779

Comments MH 694-697 plugged.

Run 51

Run Date 09/24/2016

Time 11:30

Technician Name Nick Schellenberg

Weather +12C, light wind

Starting Manhole 263
Manhole Latitude 54.4659
Manhole Longitude -110.1801

Smoker Location 264
Manhole Latitude 54.4663
Manhole Longitude -110.1795

Ending Manhole 579
Manhole Latitude 54.4673
Manhole Longitude -110.1755

Comments

Run 52

Run Date 09/24/2016

Time 11:40

Technician Name Nick Schellenberg

Weather +13C, light wind

Starting Manhole 266
Manhole Latitude 54.4664
Manhole Longitude -110.1819

Smoker Location 263
Manhole Latitude 54.4659
Manhole Longitude -110.1801

Ending Manhole 717
Manhole Latitude 54.4715
Manhole Longitude -110.1797

Comments



Cold Lake Smoke Testing - Run Summaries

Run 53

Run Date 09/24/2016

Time 12:07

Technician Name Nick Schellenberg

Weather +13C, light wind

Starting Manhole 294

Smoker Location 522

Ending Manhole 295

Manhole Latitude 54.4649

Manhole Latitude 54.4649

Manhole Latitude 54.4649

Manhole Longitude -110.1779

Manhole Longitude -110.1798

Manhole Longitude -110.1817

Comments

Run 54

Run Date 10/04/2016

Time 07:27

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 293

Smoker Location 273

Ending Manhole 271

Manhole Latitude 54.4641

Manhole Latitude 54.4651

Manhole Latitude 54.4667

Manhole Longitude -110.1762

Manhole Longitude -110.1762

Manhole Longitude -110.1770

Comments

Run 55

Run Date 10/04/2016

Time 07:35

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 273

Smoker Location 273

Ending Manhole 278

Manhole Latitude 54.4651

Manhole Latitude 54.4651

Manhole Latitude 54.4657

Manhole Longitude -110.1762

Manhole Longitude -110.1762

Manhole Longitude -110.1742

Comments

Run 56

Run Date 10/04/2016

Time 07:55

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 579

Smoker Location 280

Ending Manhole 289

Manhole Latitude 54.4673

Manhole Latitude 54.4650

Manhole Latitude 54.4643

Manhole Longitude -110.1755

Manhole Longitude -110.1737

Manhole Longitude -110.1731

Comments



Cold Lake Smoke Testing - Run Summaries

Run 57

Run Date 10/04/2016

Time 08:05

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 280

Smoker Location 280

Ending Manhole 510

Manhole Latitude 54.4650

Manhole Latitude 54.4650

Manhole Latitude 54.4648

Manhole Longitude -110.1737

Manhole Longitude -110.1737

Manhole Longitude -110.1753

Comments

Run 58

Run Date 10/04/2016

Time 08:39

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 302

Smoker Location 299

Ending Manhole 293

Manhole Latitude 54.4639

Manhole Latitude 54.4640

Manhole Latitude 54.4641

Manhole Longitude -110.1818

Manhole Longitude -110.1794

Manhole Longitude -110.1762

Comments

Run 59

Run Date 10/04/2016

Time 08:55

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 299

Smoker Location 299

Ending Manhole 303

Manhole Latitude 54.4640

Manhole Latitude 54.4640

Manhole Latitude 54.4625

Manhole Longitude -110.1794

Manhole Longitude -110.1794

Manhole Longitude -110.1794

Comments

Run 60

Run Date 10/04/2016

Time 09:15

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 855

Smoker Location 883

Ending Manhole 609

Manhole Latitude 54.4655

Manhole Latitude 54.4635

Manhole Latitude 54.4635

Manhole Longitude -110.1872

Manhole Longitude -110.1809

Manhole Longitude -110.1794

Comments



Cold Lake Smoke Testing - Run Summaries

Run 61

Run Date 10/04/2016

Time 09:25

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 883

Smoker Location 883

Ending Manhole 884

Manhole Latitude 54.4635

Manhole Latitude 54.4635

Manhole Latitude 54.4632

Manhole Longitude -110.1809

Manhole Longitude -110.1809

Manhole Longitude -110.1809

Comments

Run 62

Run Date 10/04/2016

Time 09:30

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 881

Smoker Location 881

Ending Manhole 882

Manhole Latitude 54.4635

Manhole Latitude 54.4635

Manhole Latitude 54.4632

Manhole Longitude -110.1800

Manhole Longitude -110.1800

Manhole Longitude -110.1800

Comments

Run 63

Run Date 10/04/2016

Time 09:45

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 302

Smoker Location 611

Ending Manhole 611

Manhole Latitude 54.4639

Manhole Latitude 54.4628

Manhole Latitude 54.4628

Manhole Longitude -110.1818

Manhole Longitude -110.1820

Manhole Longitude -110.1820

Comments

Run 64

Run Date 10/04/2016

Time 09:53

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 611

Smoker Location 611

Ending Manhole XX_5

Manhole Latitude 54.4628

Manhole Latitude 54.4628

Manhole Latitude 54.4627

Manhole Longitude -110.1820

Manhole Longitude -110.1820

Manhole Longitude -110.1838

Comments



Cold Lake Smoke Testing - Run Summaries

Run 65

Run Date 10/04/2016

Time 10:35

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 309
Manhole Latitude 54.4625
Manhole Longitude -110.1786

Smoker Location 309
Manhole Latitude 54.4625
Manhole Longitude -110.1786

Ending Manhole 303
Manhole Latitude 54.4625
Manhole Longitude -110.1794

Comments

Run 66

Run Date 10/04/2016

Time 10:40

Technician Name Nick Schellenberg

Weather +5C, high wind

Starting Manhole 309
Manhole Latitude 54.4625
Manhole Longitude -110.1786

Smoker Location 309
Manhole Latitude 54.4625
Manhole Longitude -110.1786

Ending Manhole 304
Manhole Latitude 54.4606
Manhole Longitude -110.1786

Comments

Run 67

Run Date 10/04/2016

Time 11:25

Technician Name Nick Schellenberg

Weather +6C, high wind

Starting Manhole 288
Manhole Latitude 54.4640
Manhole Longitude -110.1731

Smoker Location 288
Manhole Latitude 54.4640
Manhole Longitude -110.1731

Ending Manhole 290
Manhole Latitude 54.4640
Manhole Longitude -110.1746

Comments

Run 68

Run Date 10/04/2016

Time 11:35

Technician Name Nick Schellenberg

Weather +6C, high wind

Starting Manhole 285
Manhole Latitude 54.4638
Manhole Longitude -110.1731

Smoker Location 285
Manhole Latitude 54.4638
Manhole Longitude -110.1731

Ending Manhole 286
Manhole Latitude 54.4638
Manhole Longitude -110.1713

Comments



Cold Lake Smoke Testing - Run Summaries

Run 69

Run Date 10/04/2016

Time 11:40

Technician Name Nick Schellenberg

Weather +6C, high wind

Starting Manhole 290

Smoker Location 292

Ending Manhole 312

Manhole Latitude 54.4640

Manhole Latitude 54.4632

Manhole Latitude 54.4615

Manhole Longitude -110.1746

Manhole Longitude -110.1746

Manhole Longitude -110.1746

Comments

Run 70

Run Date 10/04/2016

Time 11:45

Technician Name Nick Schellenberg

Weather +7C, high wind

Starting Manhole 292

Smoker Location 292

Ending Manhole 489

Manhole Latitude 54.4632

Manhole Latitude 54.4632

Manhole Latitude 54.4632

Manhole Longitude -110.1746

Manhole Longitude -110.1746

Manhole Longitude -110.1753

Comments

Run 71

Run Date 10/04/2016

Time 11:50

Technician Name Nick Schellenberg

Weather +7C, high wind

Starting Manhole 489

Smoker Location 489

Ending Manhole 490

Manhole Latitude 54.4632

Manhole Latitude 54.4632

Manhole Latitude 54.4620

Manhole Longitude -110.1753

Manhole Longitude -110.1753

Manhole Longitude -110.1753

Comments

Run 72

Run Date 10/04/2016

Time 12:05

Technician Name Nick Schellenberg

Weather +7C, high wind

Starting Manhole 286

Smoker Location 319

Ending Manhole 319

Manhole Latitude 54.4638

Manhole Latitude 54.4625

Manhole Latitude 54.4625

Manhole Longitude -110.1713

Manhole Longitude -110.1713

Manhole Longitude -110.1713

Comments



Cold Lake Smoke Testing - Run Summaries

Run 73

Run Date 10/04/2016

Time 12:15

Technician Name Nick Schellenberg

Weather +7C, high wind

Starting Manhole 318
Manhole Latitude 54.4625
Manhole Longitude -110.1723

Smoker Location 319
Manhole Latitude 54.4625
Manhole Longitude -110.1713

Ending Manhole 321
Manhole Latitude 54.4625
Manhole Longitude -110.1708

Comments

Run 74

Run Date 10/04/2016

Time 13:00

Technician Name Nick Schellenberg

Weather +7C, high wind

Starting Manhole 518
Manhole Latitude 54.4644
Manhole Longitude -110.1697

Smoker Location 488
Manhole Latitude 54.4638
Manhole Longitude -110.1680

Ending Manhole 345
Manhole Latitude 54.4633
Manhole Longitude -110.1668

Comments

Run 75

Run Date 10/04/2016

Time 13:15

Technician Name Nick Schellenberg

Weather +7C, high wind

Starting Manhole 488
Manhole Latitude 54.4638
Manhole Longitude -110.1680

Smoker Location 488
Manhole Latitude 54.4638
Manhole Longitude -110.1680

Ending Manhole 339
Manhole Latitude 54.4606
Manhole Longitude -110.1680

Comments

Run 76

Run Date 10/05/2016

Time 07:25

Technician Name Nick Schellenberg

Weather +1C, high wind, light snow

Starting Manhole 333
Manhole Latitude 54.4606
Manhole Longitude -110.1716

Smoker Location 744
Manhole Latitude 54.4606
Manhole Longitude -110.1696

Ending Manhole 341
Manhole Latitude 54.4606
Manhole Longitude -110.1670

Comments



Cold Lake Smoke Testing - Run Summaries

Run 77

Run Date 10/05/2016

Time 08:30

Technician Name Nick Schellenberg

Weather +1C, high wind, light snow

Starting Manhole 518
Manhole Latitude 54.4644
Manhole Longitude -110.1697

Smoker Location 516
Manhole Latitude 54.4625
Manhole Longitude -110.1696

Ending Manhole 744
Manhole Latitude 54.4606
Manhole Longitude -110.1696

Comments

Run 78

Run Date 10/05/2016

Time 08:45

Technician Name Nick Schellenberg

Weather +1C, high wind, light snow

Starting Manhole 331
Manhole Latitude 54.4606
Manhole Longitude -110.1720

Smoker Location 331
Manhole Latitude 54.4606
Manhole Longitude -110.1720

Ending Manhole 734
Manhole Latitude 54.4602
Manhole Longitude -110.1720

Comments

Run 79

Run Date 10/05/2016

Time 09:05

Technician Name Nick Schellenberg

Weather +1C, high wind, light snow

Starting Manhole 336
Manhole Latitude 54.4606
Manhole Longitude -110.1761

Smoker Location 334
Manhole Latitude 54.4606
Manhole Longitude -110.1747

Ending Manhole 333
Manhole Latitude 54.4606
Manhole Longitude -110.1716

Comments

Run 80

Run Date 10/05/2016

Time 09:30

Technician Name Nick Schellenberg

Weather +1C, high wind, light snow

Starting Manhole 288
Manhole Latitude 54.4640
Manhole Longitude -110.1731

Smoker Location 317
Manhole Latitude 54.4625
Manhole Longitude -110.1731

Ending Manhole 322
Manhole Latitude 54.4606
Manhole Longitude -110.1730

Comments



Cold Lake Smoke Testing - Run Summaries

Run 81

Run Date 10/05/2016

Time 09:45

Technician Name Nick Schellenberg

Weather +1C, high wind, light snow

Starting Manhole 310
Manhole Latitude 54.4614
Manhole Longitude -110.1761

Smoker Location 314
Manhole Latitude 54.4614
Manhole Longitude -110.1730

Ending Manhole 316
Manhole Latitude 54.4615
Manhole Longitude -110.1705

Comments

Run 82

Run Date 10/05/2016

Time 10:45

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 310
Manhole Latitude 54.4614
Manhole Longitude -110.1761

Smoker Location 336
Manhole Latitude 54.4606
Manhole Longitude -110.1761

Ending Manhole 324
Manhole Latitude 54.4591
Manhole Longitude -110.1744

Comments

Run 83

Run Date 10/05/2016

Time 11:00

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 334
Manhole Latitude 54.4606
Manhole Longitude -110.1747

Smoker Location 326
Manhole Latitude 54.4597
Manhole Longitude -110.1746

Ending Manhole 326
Manhole Latitude 54.4597
Manhole Longitude -110.1746

Comments

Run 84

Run Date 10/05/2016

Time 11:05

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 324
Manhole Latitude 54.4591
Manhole Longitude -110.1744

Smoker Location 326
Manhole Latitude 54.4597
Manhole Longitude -110.1746

Ending Manhole 327
Manhole Latitude 54.4597
Manhole Longitude -110.1748

Comments



Cold Lake Smoke Testing - Run Summaries

Run 85

Run Date 10/05/2016

Time 11:10

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 327

Smoker Location 840

Ending Manhole 365

Manhole Latitude 54.4597

Manhole Latitude 54.4590

Manhole Latitude 54.4583

Manhole Longitude -110.1748

Manhole Longitude -110.1746

Manhole Longitude -110.1746

Comments

Run 86

Run Date 10/05/2016

Time 11:20

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 99

Smoker Location 99

Ending Manhole N/A

Manhole Latitude 54.4599

Manhole Latitude 54.4599

Manhole Latitude

Manhole Longitude -110.1787

Manhole Longitude -110.1787

Manhole Longitude

Comments

Run 87

Run Date 10/05/2016

Time 11:30

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 870

Smoker Location 99

Ending Manhole 872

Manhole Latitude 54.4599

Manhole Latitude 54.4599

Manhole Latitude 54.4600

Manhole Longitude -110.1806

Manhole Longitude -110.1787

Manhole Longitude -110.1782

Comments

Run 88

Run Date 10/05/2016

Time 11:40

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 869

Smoker Location 869

Ending Manhole 868

Manhole Latitude 54.4595

Manhole Latitude 54.4595

Manhole Latitude 54.4595

Manhole Longitude -110.1806

Manhole Longitude -110.1806

Manhole Longitude -110.1813

Comments



Cold Lake Smoke Testing - Run Summaries

Run 89

Run Date 10/05/2016

Time 11:45

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 332

Smoker Location 828

Ending Manhole 870

Manhole Latitude 54.4575

Manhole Latitude 54.4586

Manhole Latitude 54.4599

Manhole Longitude -110.1805

Manhole Longitude -110.1805

Manhole Longitude -110.1806

Comments

Run 90

Run Date 10/05/2016

Time 11:55

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 866

Smoker Location 828

Ending Manhole 828

Manhole Latitude 54.4587

Manhole Latitude 54.4586

Manhole Latitude 54.4586

Manhole Longitude -110.1822

Manhole Longitude -110.1805

Manhole Longitude -110.1805

Comments

Run 91

Run Date 10/05/2016

Time 12:04

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 942

Smoker Location 942

Ending Manhole 866

Manhole Latitude 54.4573

Manhole Latitude 54.4573

Manhole Latitude 54.4587

Manhole Longitude -110.1822

Manhole Longitude -110.1822

Manhole Longitude -110.1822

Comments

Run 92

Run Date 10/05/2016

Time 13:10

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 492

Smoker Location 89

Ending Manhole 363

Manhole Latitude 54.4581

Manhole Latitude 54.4580

Manhole Latitude 54.4580

Manhole Longitude -110.

Manhole Longitude -110.1775

Manhole Longitude -110.1752

Comments



Cold Lake Smoke Testing - Run Summaries

Run 93

Run Date 10/05/2016

Time 13:15

Technician Name Nick Schellenberg

Weather +2C, high wind, light snow

Starting Manhole 90
Manhole Latitude 54.4585
Manhole Longitude -110.1776

Smoker Location 89
Manhole Latitude 54.4580
Manhole Longitude -110.1775

Ending Manhole 88
Manhole Latitude 54.4575
Manhole Longitude -110.1776

Comments

Run 94

Run Date 10/05/2016

Time 13:25

Technician Name Nick Schellenberg

Weather +3C, high wind, light snow

Starting Manhole 935
Manhole Latitude 54.4502
Manhole Longitude -110.1899

Smoker Location 362
Manhole Latitude 54.4580
Manhole Longitude -110.1761

Ending Manhole 324
Manhole Latitude 54.4591
Manhole Longitude -110.1744

Comments

Run 95

Run Date 10/05/2016

Time 13:38

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 933
Manhole Latitude 54.4570
Manhole Longitude -110.1786

Smoker Location 934
Manhole Latitude 54.4570
Manhole Longitude -110.1773

Ending Manhole 935
Manhole Latitude 54.4502
Manhole Longitude -110.1899

Comments

Run 96

Run Date 10/05/2016

Time 13:40

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 933
Manhole Latitude 54.4570
Manhole Longitude -110.1786

Smoker Location 930
Manhole Latitude 54.4560
Manhole Longitude -110.17855

Ending Manhole 958
Manhole Latitude 54.4546
Manhole Longitude -110.1778

Comments



Cold Lake Smoke Testing - Run Summaries

Run 97

Run Date 10/05/2016

Time 13:50

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 928

Smoker Location 928

Ending Manhole XX_10

Manhole Latitude 54.4563

Manhole Latitude 54.4563

Manhole Latitude 54.4562

Manhole Longitude -110.1786

Manhole Longitude -110.1786

Manhole Longitude -110.1793

Comments

Run 98

Run Date 10/05/2016

Time 14:00

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 930

Smoker Location 930

Ending Manhole 929

Manhole Latitude 54.4560

Manhole Latitude 54.4560

Manhole Latitude 54.4563

Manhole Longitude -110.1785

Manhole Longitude -110.1785

Manhole Longitude -110.1774

Comments

Run 99

Run Date 10/05/2016

Time 14:10

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 931

Smoker Location 931

Ending Manhole 932

Manhole Latitude 54.4552

Manhole Latitude 54.4552

Manhole Latitude 54.4555

Manhole Longitude -110.1781

Manhole Longitude -110.1781

Manhole Longitude -110.1769

Comments

Run 100

Run Date 10/05/2016

Time 14:30

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 958

Smoker Location 57

Ending Manhole 390

Manhole Latitude 54.4546

Manhole Latitude 54.4536

Manhole Latitude 54.4524

Manhole Longitude -110.1778

Manhole Longitude -110.1796

Manhole Longitude -110.1810

Comments



Cold Lake Smoke Testing - Run Summaries

Run 101

Run Date 10/05/2016

Time 14:40

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 391
Manhole Latitude 54.4524
Manhole Longitude -110.1817

Smoker Location 385
Manhole Latitude 54.4524
Manhole Longitude -110.1798

Ending Manhole 383
Manhole Latitude 54.4530
Manhole Longitude -110.1783

Comments

Run 102

Run Date 10/05/2016

Time 14:50

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 385
Manhole Latitude 54.4524
Manhole Longitude -110.1798

Smoker Location 385
Manhole Latitude 54.4524
Manhole Longitude -110.1798

Ending Manhole FUT_1
Manhole Latitude 54.4518
Manhole Longitude -110.1797

Comments

Run 103

Run Date 10/05/2016

Time 14:55

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole FUT_1
Manhole Latitude 54.4518
Manhole Longitude -110.1797

Smoker Location FUT_1
Manhole Latitude 54.4518
Manhole Longitude -110.1797

Ending Manhole FUT_3
Manhole Latitude 54.4518
Manhole Longitude -110.1822

Comments Extra run included in project because leaks were spotted from adjacent run 102

Run 104

Run Date 10/05/2016

Time 15:05

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 383
Manhole Latitude 54.4530
Manhole Longitude -110.1783

Smoker Location 383
Manhole Latitude 54.4530
Manhole Longitude -110.1783

Ending Manhole 384
Manhole Latitude 54.4528
Manhole Longitude -110.1779

Comments



Cold Lake Smoke Testing - Run Summaries

Run 105

Run Date 10/05/2016

Time 15:10

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 383

Smoker Location 380

Ending Manhole 379

Manhole Latitude 54.4530

Manhole Latitude 54.4540

Manhole Latitude 54.4541

Manhole Longitude -110.1783

Manhole Longitude -110.1765

Manhole Longitude -110.1761

Comments

Run 106

Run Date 10/05/2016

Time 15:10

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 378

Smoker Location 376

Ending Manhole 374

Manhole Latitude 54.4544

Manhole Latitude 54.4551

Manhole Latitude 54.4567

Manhole Longitude -110.1760

Manhole Longitude -110.1760

Manhole Longitude -110.1760

Comments

Run 107

Run Date 10/05/2016

Time 15:15

Technician Name Nick Schellenberg

Weather +3C, high wind

Starting Manhole 376

Smoker Location 376

Ending Manhole 377

Manhole Latitude 54.4551

Manhole Latitude 54.4551

Manhole Latitude 54.4551

Manhole Longitude -110.1760

Manhole Longitude -110.1760

Manhole Longitude -110.1755

Comments

Run 108

Run Date 10/06/2016

Time 07:30

Technician Name Nick Schellenberg

Weather -1C, moderate wind

Starting Manhole 381

Smoker Location 394

Ending Manhole 105

Manhole Latitude 54.4543

Manhole Latitude 54.4559

Manhole Latitude

Manhole Longitude -110.1749

Manhole Longitude -110.1733

Manhole Longitude

Comments



Cold Lake Smoke Testing - Run Summaries

Run 109

Run Date 10/06/2016

Time 07:45

Technician Name Nick Schellenberg

Weather -1C, moderate wind

Starting Manhole 394
Manhole Latitude 54.4559
Manhole Longitude -110.1733

Smoker Location 394
Manhole Latitude 54.4559
Manhole Longitude -110.1733

Ending Manhole 306
Manhole Latitude 54.4561
Manhole Longitude -110.1760

Comments

Run 110

Run Date 10/06/2016

Time 08:00

Technician Name Nick Schellenberg

Weather -1C, moderate wind

Starting Manhole 107
Manhole Latitude 54.4570
Manhole Longitude -110.1757

Smoker Location 105
Manhole Latitude 54.4570
Manhole Longitude -110.1729

Ending Manhole 102
Manhole Latitude 54.4570
Manhole Longitude -110.1696

Comments

Run 111

Run Date 10/06/2016

Time 08:27

Technician Name Nick Schellenberg

Weather +0C, moderate wind

Starting Manhole 364
Manhole Latitude 54.4580
Manhole Longitude -110.1747

Smoker Location 366
Manhole Latitude 54.4580
Manhole Longitude -110.1713

Ending Manhole 368
Manhole Latitude 54.4580
Manhole Longitude -110.1713

Comments

Run 112

Run Date 10/06/2016

Time 08:38

Technician Name Nick Schellenberg

Weather +0C, moderate wind

Starting Manhole 105
Manhole Latitude 54.4570
Manhole Longitude -110.1729

Smoker Location 366
Manhole Latitude 54.4580
Manhole Longitude -110.1713

Ending Manhole 322
Manhole Latitude 54.4606
Manhole Longitude -110.1730

Comments



Cold Lake Smoke Testing - Run Summaries

Run 113

Run Date 10/06/2016

Time 08:56

Technician Name Nick Schellenberg

Weather +0C, light wind

Starting Manhole 368

Smoker Location 328

Ending Manhole 735

Manhole Latitude 54.4580

Manhole Latitude 54.4590

Manhole Latitude 54.4601

Manhole Longitude -110.1713

Manhole Longitude -110.1713

Manhole Longitude -110.1718

Comments

Run 114

Run Date 10/06/2016

Time 09:5

Technician Name Nick Schellenberg

Weather +0C, light wind

Starting Manhole 328

Smoker Location 328

Ending Manhole 109

Manhole Latitude 54.4590

Manhole Latitude 54.4590

Manhole Latitude 54.4590

Manhole Longitude -110.1713

Manhole Longitude -110.1713

Manhole Longitude -110.1696

Comments

Run 115

Run Date 10/06/2016

Time 09:30

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 744

Smoker Location 109

Ending Manhole 102

Manhole Latitude

Manhole Latitude 54.4590

Manhole Latitude 54.4570

Manhole Longitude

Manhole Longitude -110.1696

Manhole Longitude -110.1696

Comments

Run 116

Run Date 10/06/2016

Time 10:15

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 102

Smoker Location 102

Ending Manhole 1010

Manhole Latitude 54.4570

Manhole Latitude 54.4570

Manhole Latitude 54.4543

Manhole Longitude -110.1696

Manhole Longitude -110.1696

Manhole Longitude -110.1695

Comments



Cold Lake Smoke Testing - Run Summaries

Run 117

Run Date 10/06/2016

Time 10:35

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 525

Smoker Location 525

Ending Manhole 360

Manhole Latitude 54.4566

Manhole Latitude 54.4566

Manhole Latitude 54.4565

Manhole Longitude -110.1695

Manhole Longitude -110.1695

Manhole Longitude -110.1686

Comments

Run 118

Run Date 10/06/2016

Time 10:45

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 102

Smoker Location 102

Ending Manhole 104

Manhole Latitude 54.4570

Manhole Latitude 54.4570

Manhole Latitude 54.4570

Manhole Longitude -110.1696

Manhole Longitude -110.1696

Manhole Longitude -110.1726

Comments

Run 119

Run Date 10/06/2016

Time 10:58

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 1010

Smoker Location 1007

Ending Manhole 1009

Manhole Latitude 54.4543

Manhole Latitude 54.4543

Manhole Latitude 54.4536

Manhole Longitude -110.1695

Manhole Longitude -110.1710

Manhole Longitude -110.1732

Comments

Run 120

Run Date 10/06/2016

Time 11:25

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 95

Smoker Location 359

Ending Manhole 360

Manhole Latitude 54.4538

Manhole Latitude 54.4548

Manhole Latitude 54.4565

Manhole Longitude -110.1686

Manhole Longitude -110.1686

Manhole Longitude -110.1686

Comments



Cold Lake Smoke Testing - Run Summaries

Run 120

Run Date 10/06/2016

Time 11:55

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 402

Smoker Location 401

Ending Manhole 306

Manhole Latitude 54.4529

Manhole Latitude 54.4545

Manhole Latitude 54.4561

Manhole Longitude -110.1671

Manhole Longitude -110.1670

Manhole Longitude -110.1760

Comments

Run 122

Run Date 10/06/2016

Time 13:21

Technician Name Nick Schellenberg

Weather +1C, light wind

Starting Manhole 402

Smoker Location 402

Ending Manhole 403

Manhole Latitude 54.4529

Manhole Latitude 54.4529

Manhole Latitude 54.4529

Manhole Longitude -110.1671

Manhole Longitude -110.1671

Manhole Longitude -110.1687

Comments

Run 123

Run Date 10/06/2016

Time 13:45

Technician Name Nick Schellenberg

Weather +2C, light wind

Starting Manhole 406

Smoker Location 407

Ending Manhole 498

Manhole Latitude 54.4511

Manhole Latitude 54.4513

Manhole Latitude 54.4520

Manhole Longitude -110.1655

Manhole Longitude -110.1668

Manhole Longitude -110.1695

Comments

Run 124

Run Date 10/06/2016

Time 14:00

Technician Name Nick Schellenberg

Weather +2C, light wind

Starting Manhole 407

Smoker Location 407

Ending Manhole 408

Manhole Latitude 54.4513

Manhole Latitude 54.4513

Manhole Latitude 54.4510

Manhole Longitude -110.1668

Manhole Longitude -110.1668

Manhole Longitude -110.1671

Comments



Cold Lake Smoke Testing - Run Summaries

Run 125

Run Date 10/06/2016

Time 14:20

Technician Name Nick Schellenberg

Weather +2C, light wind

Starting Manhole 410
Manhole Latitude 54.4520
Manhole Longitude -110.1682

Smoker Location 93
Manhole Latitude 54.4502
Manhole Longitude -110.1687

Ending Manhole 93
Manhole Latitude 54.4502
Manhole Longitude -110.1687

Comments

Run 126

Run Date 10/06/2016

Time 14:35

Technician Name Nick Schellenberg

Weather +2C, light wind

Starting Manhole 93
Manhole Latitude 54.4502
Manhole Longitude -110.1687

Smoker Location 93
Manhole Latitude 54.4502
Manhole Longitude -110.1687

Ending Manhole 94
Manhole Latitude 54.4502
Manhole Longitude -110.1655

Comments

Run 127

Run Date 10/06/2016

Time 14:50

Technician Name Nick Schellenberg

Weather +2C, light wind

Starting Manhole 94
Manhole Latitude 54.4502
Manhole Longitude -110.1655

Smoker Location 405
Manhole Latitude 54.4520
Manhole Longitude -110.1657

Ending Manhole 402
Manhole Latitude 54.4529
Manhole Longitude -110.1671

Comments

Run 128

Run Date 10/06/2016

Time 15:27

Technician Name Nick Schellenberg

Weather +2C, light wind

Starting Manhole 405
Manhole Latitude 54.4520
Manhole Longitude -110.1657

Smoker Location 405
Manhole Latitude 54.4520
Manhole Longitude -110.1657

Ending Manhole 523
Manhole Latitude 54.4524
Manhole Longitude -110.1649

Comments



Cold Lake Smoke Testing - Run Summaries

Run 129

Run Date 10/07/2016

Time 07:30

Technician Name Nick Schellenberg

Weather -1C, wind negligible

Starting Manhole 100

Smoker Location 337

Ending Manhole 339

Manhole Latitude 54.4570

Manhole Latitude 54.4588

Manhole Latitude 54.4606

Manhole Longitude -110.1680

Manhole Longitude -110.1680

Manhole Longitude -110.1680

Comments

Run 130

Run Date 10/07/2016

Time 07:50

Technician Name Nick Schellenberg

Weather -1C, wind negligible

Starting Manhole 100

Smoker Location 352

Ending Manhole 351

Manhole Latitude 54.4570

Manhole Latitude 54.4569

Manhole Latitude 54.4569

Manhole Longitude -110.1680

Manhole Longitude -110.1663

Manhole Longitude -110.1648

Comments

Run 131

Run Date 10/07/2016

Time 08:15

Technician Name Nick Schellenberg

Weather -1C, wind negligible

Starting Manhole 355

Smoker Location 354

Ending Manhole 354

Manhole Latitude 54.4561

Manhole Latitude 54.4559

Manhole Latitude 54.4559

Manhole Longitude -110.1664

Manhole Longitude -110.1664

Manhole Longitude -110.1664

Comments

Run 132

Run Date 10/07/2016

Time 08:20

Technician Name Nick Schellenberg

Weather -1C, wind negligible

Starting Manhole 357

Smoker Location 354

Ending Manhole 353

Manhole Latitude 54.4559

Manhole Latitude 54.4559

Manhole Latitude 54.4559

Manhole Longitude -110.1677

Manhole Longitude -110.1664

Manhole Longitude -110.1648

Comments



Cold Lake Smoke Testing - Run Summaries

Run 133

Run Date 10/07/2016

Time 08:30

Technician Name Nick Schellenberg

Weather -1C, wind negligible

Starting Manhole 351
Manhole Latitude 54.4569
Manhole Longitude -110.1648

Smoker Location 353
Manhole Latitude 54.4559
Manhole Longitude -110.1648

Ending Manhole 526
Manhole Latitude 54.4547
Manhole Longitude -110.1649

Comments

Run 134

Run Date 10/07/2016

Time 09:15

Technician Name Nick Schellenberg

Weather -1C, wind negligible

Starting Manhole 526
Manhole Latitude 54.4547
Manhole Longitude -110.1649

Smoker Location 523
Manhole Latitude 54.4524
Manhole Longitude -110.1649

Ending Manhole 523
Manhole Latitude 54.4524
Manhole Longitude -110.1649

Comments

Run 135

Run Date 10/07/2016

Time 10:00

Technician Name Nick Schellenberg

Weather +0C, light wind

Starting Manhole 919
Manhole Latitude 54.4424
Manhole Longitude -110.1989

Smoker Location 920
Manhole Latitude 54.4424
Manhole Longitude -110.1975

Ending Manhole 921
Manhole Latitude 54.4424
Manhole Longitude -110.1960

Comments

Run 136

Run Date 10/07/2016

Time 10:20

Technician Name Nick Schellenberg

Weather +0C, light wind

Starting Manhole 921
Manhole Latitude 54.4424
Manhole Longitude -110.1960

Smoker Location 920
Manhole Latitude 54.4424
Manhole Longitude -110.1975

Ending Manhole 20
Manhole Latitude 54.4392
Manhole Longitude -110.1976

Comments MH 919 & 921 not found; buried under gravel road. Smoke was flowing to further MH's, so not counted as no smoke event.



Cold Lake Smoke Testing - Run Summaries

Run 137

Run Date 10/07/2016

Time 11:15

Technician Name Nick Schellenberg

Weather +0C, light wind

Starting Manhole 629

Smoker Location 629

Ending Manhole 20

Manhole Latitude 54.4352

Manhole Latitude 54.4352

Manhole Latitude 54.4392

Manhole Longitude -110.1978

Manhole Longitude -110.1978

Manhole Longitude -110.1976

Comments

Run 138

Run Date 09/14/2017

Time 13:10

Technician Name Nick Schellenberg

Weather +16C, light rain

Starting Manhole 629

Smoker Location 21

Ending Manhole 21

Manhole Latitude 54.4352

Manhole Latitude 54.4396

Manhole Latitude 54.4396

Manhole Longitude -110.1978

Manhole Longitude -110.1976

Manhole Longitude -110.1976

Comments

Run 139

Run Date 09/14/2017

Time 13:25

Technician Name Nick Schellenberg

Weather +16C, light rain

Starting Manhole 123

Smoker Location 21

Ending Manhole 21

Manhole Latitude 54.4371

Manhole Latitude 54.4396

Manhole Latitude 54.4396

Manhole Longitude -110.2033

Manhole Longitude -110.1976

Manhole Longitude -110.1976

Comments

Run 140

Run Date 09/14/2017

Time 13:50

Technician Name Nick Schellenberg

Weather +16C, light rain

Starting Manhole 25

Smoker Location 28

Ending Manhole 725

Manhole Latitude 54.4352

Manhole Latitude 54.4326

Manhole Latitude 54.4306

Manhole Longitude -110.2011

Manhole Longitude -110.2005

Manhole Longitude -110.1983

Comments



Cold Lake Smoke Testing - Run Summaries

Run 141

Run Date 09/14/2017

Time 14:45

Technician Name Nick Schellenberg

Weather +16C, light rain

Starting Manhole 1032

Smoker Location 1032

Ending Manhole 1030

Manhole Latitude 54.4336

Manhole Latitude 54.4336

Manhole Latitude 54.4336

Manhole Longitude -110.1978

Manhole Longitude -110.1978

Manhole Longitude -110.1955

Comments

Run 142

Run Date 09/14/2017

Time 15:10

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 1032

Smoker Location 1032

Ending Manhole 981

Manhole Latitude 54.4336

Manhole Latitude 54.4336

Manhole Latitude 54.4328

Manhole Longitude -110.1978

Manhole Longitude -110.1978

Manhole Longitude -110.1955

Comments

Run 143

Run Date 09/14/2017

Time 15:20

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 1030

Smoker Location 981

Ending Manhole 979

Manhole Latitude 54.4336

Manhole Latitude 54.4328

Manhole Latitude 54.4317

Manhole Longitude -110.1955

Manhole Longitude -110.1955

Manhole Longitude -110.1955

Comments

Run 144

Run Date 09/14/2017

Time 15:25

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 1028

Smoker Location 1033

Ending Manhole 1034

Manhole Latitude 54.4331

Manhole Latitude 54.4323

Manhole Latitude 54.4316

Manhole Longitude -110.1992

Manhole Longitude -110.1984

Manhole Longitude -110.1976

Comments



Cold Lake Smoke Testing - Run Summaries

Run 145

Run Date 09/14/2017
Time 15:35

Technician Name Nick Schellenberg
Weather +14C, cloudy

Starting Manhole 1034
Manhole Latitude 54.4316
Manhole Longitude -110.1976

Smoker Location 978
Manhole Latitude 54.4317
Manhole Longitude -110.1968

Ending Manhole 979
Manhole Latitude 54.4317
Manhole Longitude -110.1955

Comments

Run 146

Run Date 09/14/2017
Time 15:40

Technician Name Nick Schellenberg
Weather +14C, cloudy

Starting Manhole 978
Manhole Latitude 54.4317
Manhole Longitude -110.1968

Smoker Location 978
Manhole Latitude 54.4317
Manhole Longitude -110.1968

Ending Manhole 962
Manhole Latitude 54.4309
Manhole Longitude -110.1964

Comments

Run 147

Run Date 09/14/2017
Time 15:45

Technician Name Nick Schellenberg
Weather +14C, cloudy

Starting Manhole 725
Manhole Latitude 54.4306
Manhole Longitude -110.1983

Smoker Location 962
Manhole Latitude 54.4309
Manhole Longitude -110.1964

Ending Manhole 963
Manhole Latitude 54.4309
Manhole Longitude -110.1955

Comments

Run 148

Run Date 09/14/2017
Time 15:55

Technician Name Nick Schellenberg
Weather +14C, cloudy

Starting Manhole 963
Manhole Latitude 54.4309
Manhole Longitude -110.1955

Smoker Location 955
Manhole Latitude 54.4300
Manhole Longitude -110.1955

Ending Manhole 957
Manhole Latitude 54.4284
Manhole Longitude -110.1955

Comments



Cold Lake Smoke Testing - Run Summaries

Run 149

Run Date 09/14/2017

Time 16:15

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 373

Smoker Location 373

Ending Manhole 957

Manhole Latitude 54.4284

Manhole Latitude 54.4284

Manhole Latitude 54.4284

Manhole Longitude -110.1984

Manhole Longitude -110.1984

Manhole Longitude -110.1955

Comments

Run 150

Run Date 09/14/2017

Time 16:25

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 373

Smoker Location 373

Ending Manhole 724

Manhole Latitude 54.4284

Manhole Latitude 54.4284

Manhole Latitude 54.4301

Manhole Longitude -110.1984

Manhole Longitude -110.1984

Manhole Longitude -110.1981

Comments

Run 151

Run Date 09/14/2017

Time 16:35

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 373

Smoker Location 373

Ending Manhole 371

Manhole Latitude 54.4284

Manhole Latitude 54.4284

Manhole Latitude 54.4279

Manhole Longitude -110.1984

Manhole Longitude -110.1984

Manhole Longitude -110.2027

Comments

Run 152

Run Date 09/14/2017

Time 16:45

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 373

Smoker Location 373

Ending Manhole 905

Manhole Latitude 54.4284

Manhole Latitude 54.4284

Manhole Latitude 54.4273

Manhole Longitude -110.1984

Manhole Longitude -110.1984

Manhole Longitude -110.1984

Comments



Cold Lake Smoke Testing - Run Summaries

Run 153

Run Date 09/14/2017

Time 16:55

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 721

Smoker Location 395

Ending Manhole 395

Manhole Latitude 54.4292

Manhole Latitude 54.4292

Manhole Latitude 54.4292

Manhole Longitude -110.1983

Manhole Longitude -110.2014

Manhole Longitude -110.2014

Comments

Run 154

Run Date 09/14/2017

Time 17:15

Technician Name Nick Schellenberg

Weather +14C, cloudy

Starting Manhole 395

Smoker Location 395

Ending Manhole 373

Manhole Latitude 54.4292

Manhole Latitude 54.4292

Manhole Latitude 54.4284

Manhole Longitude -110.2014

Manhole Longitude -110.2014

Manhole Longitude -110.1984

Comments

Run 155

Run Date 09/15/2017

Time 11:00

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 724

Smoker Location 33

Ending Manhole 34

Manhole Latitude 54.4301

Manhole Latitude 54.4301

Manhole Latitude 54.4301

Manhole Longitude -110.1981

Manhole Longitude -110.2008

Manhole Longitude -110.2015

Comments

Run 156

Run Date 09/15/2017

Time 11:15

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 31

Smoker Location 33

Ending Manhole 33

Manhole Latitude 54.4315

Manhole Latitude 54.4301

Manhole Latitude 54.4301

Manhole Longitude -110.2008

Manhole Longitude -110.2008

Manhole Longitude -110.2008

Comments



Cold Lake Smoke Testing - Run Summaries

Run 157

Run Date 09/15/2017

Time 8:55

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 867

Smoker Location 428

Ending Manhole 34

Manhole Latitude 54.4297

Manhole Latitude 54.4297

Manhole Latitude 54.4301

Manhole Longitude -110.2056

Manhole Longitude -110.2050

Manhole Longitude -110.2015

Comments

Run 158

Run Date 09/15/2017

Time 9:25

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 427

Smoker Location 428

Ending Manhole 533

Manhole Latitude 54.4286

Manhole Latitude 54.4297

Manhole Latitude 54.4324

Manhole Longitude -110.2050

Manhole Longitude -110.2050

Manhole Longitude -110.2049

Comments

Run 159

Run Date 09/15/2017

Time 10:15

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 838

Smoker Location 837

Ending Manhole 533

Manhole Latitude 54.4354

Manhole Latitude 54.4335

Manhole Latitude 54.4324

Manhole Longitude -110.2049

Manhole Longitude -110.2049

Manhole Longitude -110.2049

Comments

Run 160

Run Date 09/15/2017

Time 15:25

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 371

Smoker Location 371

Ending Manhole 426

Manhole Latitude 54.4279

Manhole Latitude 54.4279

Manhole Latitude 54.4284

Manhole Longitude -110.2027

Manhole Longitude -110.2027

Manhole Longitude -110.2051

Comments



Cold Lake Smoke Testing - Run Summaries

Run 161

Run Date 09/16/2017
Time 12:05

Technician Name Nick Schellenberg
Weather +18C, sunny/clear

Starting Manhole 426
Manhole Latitude 54.4284
Manhole Longitude -110.2051

Smoker Location 423
Manhole Latitude 54.4258
Manhole Longitude -110.2074

Ending Manhole 83
Manhole Latitude 54.4248
Manhole Longitude -110.2074

Comments

Run 162

Run Date 09/16/2017
Time 8:45

Technician Name Nick Schellenberg
Weather +18C, sunny/clear

Starting Manhole 841
Manhole Latitude 54.5272
Manhole Longitude -110.2013

Smoker Location 842
Manhole Latitude 54.4272
Manhole Longitude -110.2026

Ending Manhole 844
Manhole Latitude 54.4275
Manhole Longitude -110.2047

Comments

Run 162A

Run Date 09/16/2017
Time 8:55

Technician Name Nick Schellenberg
Weather +18C, sunny/clear

Starting Manhole 842
Manhole Latitude 54.4272
Manhole Longitude -110.2026

Smoker Location 638
Manhole Latitude 54.4266
Manhole Longitude -110.2021

Ending Manhole 922
Manhole Latitude 54.4263
Manhole Longitude -110.2019

Comments

Run 163

Run Date 09/16/2017
Time 9:15

Technician Name Nick Schellenberg
Weather +18C, sunny/clear

Starting Manhole 845
Manhole Latitude 54.4265
Manhole Longitude -110.2057

Smoker Location 845
Manhole Latitude 54.4265
Manhole Longitude -110.2057

Ending Manhole 844
Manhole Latitude 54.4275
Manhole Longitude -110.2047

Comments



Cold Lake Smoke Testing - Run Summaries

Run 164

Run Date 09/16/2017

Time 9:35

Technician Name Nick Schellenberg

Weather +18C, sunny/clear

Starting Manhole 424

Smoker Location 845

Ending Manhole 923

Manhole Latitude 54.4267

Manhole Latitude 54.4265

Manhole Latitude 54.4264

Manhole Longitude -110.2065

Manhole Longitude -110.2057

Manhole Longitude -110.2040

Comments

Run 165

Run Date 09/16/2017

Time 9:45

Technician Name Nick Schellenberg

Weather +18C, sunny/clear

Starting Manhole 945

Smoker Location 948

Ending Manhole 961

Manhole Latitude 54.4260

Manhole Latitude 54.4255

Manhole Latitude 54.4246

Manhole Longitude -110.2062

Manhole Longitude -110.2065

Manhole Longitude -110.2065

Comments

Run 166

Run Date 09/16/2017

Time 10:10

Technician Name Nick Schellenberg

Weather +18C, sunny/clear

Starting Manhole 948

Smoker Location 946

Ending Manhole 892

Manhole Latitude 54.4255

Manhole Latitude 54.4255

Manhole Latitude 54.4255

Manhole Longitude -110.2065

Manhole Longitude -110.2037

Manhole Longitude -110.2023

Comments

Run 167

Run Date 09/16/2017

Time 10:45

Technician Name Nick Schellenberg

Weather +18C, sunny/clear

Starting Manhole 961

Smoker Location 960

Ending Manhole 891

Manhole Latitude 54.4246

Manhole Latitude 54.4246

Manhole Latitude 54.4246

Manhole Longitude -110.2065

Manhole Longitude -110.2046

Manhole Longitude -110.2028

Comments



Cold Lake Smoke Testing - Run Summaries

Run 168

Run Date 09/16/2017

Time 11:30

Technician Name Nick Schellenberg

Weather +18C, sunny/clear

Starting Manhole 892

Smoker Location 891

Ending Manhole 890

Manhole Latitude 54.4255

Manhole Latitude 54.4246

Manhole Latitude 54.4241

Manhole Longitude -110.2023

Manhole Longitude -110.2028

Manhole Longitude -110.2024

Comments

Run 169

Run Date 09/15/2017

Time 12:15

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 908

Smoker Location 902

Ending Manhole 903

Manhole Latitude 54.4273

Manhole Latitude 54.4266

Manhole Latitude 54.4273

Manhole Longitude -110.1995

Manhole Longitude -110.1954

Manhole Longitude -110.1954

Comments

Run 170

Run Date 09/15/2017

Time 13:45

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 908

Smoker Location 908

Ending Manhole 903

Manhole Latitude 54.4273

Manhole Latitude 54.4273

Manhole Latitude 54.4273

Manhole Longitude -110.1995

Manhole Longitude -110.1995

Manhole Longitude -110.1954

Comments MH#907 paved, could not locate.

Run 171

Run Date 09/15/2017

Time 14:15

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 896

Smoker Location 897

Ending Manhole 906

Manhole Latitude 54.4259

Manhole Latitude 54.4252

Manhole Latitude 54.4268

Manhole Longitude -110.1990

Manhole Longitude -110.1990

Manhole Longitude -110.1984

Comments



Cold Lake Smoke Testing - Run Summaries

Run 172

Run Date 09/15/2017

Time 11:50

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 904

Smoker Location 902

Ending Manhole 886

Manhole Latitude 54.4272

Manhole Latitude 54.4266

Manhole Latitude 54.4266

Manhole Longitude -110.1966

Manhole Longitude -110.1954

Manhole Longitude -110.1966

Comments

Run 173

Run Date 09/15/2017

Time 12:05

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 903

Smoker Location 902

Ending Manhole 899

Manhole Latitude 54.4273

Manhole Latitude 54.4266

Manhole Latitude 54.4252

Manhole Longitude -110.1954

Manhole Longitude -110.1954

Manhole Longitude -110.1954

Comments

Run 174

Run Date 09/15/2017

Time 14:35

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 895

Smoker Location 896

Ending Manhole 908

Manhole Latitude 54.4259

Manhole Latitude 54.4259

Manhole Latitude 54.4273

Manhole Longitude -110.2002

Manhole Longitude -110.1989

Manhole Longitude -110.1995

Comments

Run 175

Run Date 09/15/2017

Time 14:55

Technician Name Nick Schellenberg

Weather +11C, light rain

Starting Manhole 897

Smoker Location 898

Ending Manhole 899

Manhole Latitude 54.4252

Manhole Latitude 54.4252

Manhole Latitude 54.4252

Manhole Longitude -110.1990

Manhole Longitude -110.1972

Manhole Longitude -110.1954

Comments



Cold Lake Smoke Testing - Run Summaries

Run 176

Run Date 09/16/2017

Time 14:55

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 83

Smoker Location N/A

Ending Manhole 82

Manhole Latitude 54.4248

Manhole Latitude N/A

Manhole Latitude 54.4197

Manhole Longitude -110.2074

Manhole Longitude N/A

Manhole Longitude -110.2074

Comments Could not find Smoke Induction MH

Run 177

Run Date 09/16/2017

Time 14:05

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 911

Smoker Location N/A

Ending Manhole 230

Manhole Latitude 54.4220

Manhole Latitude 54.

Manhole Latitude 54.4203

Manhole Longitude -110.2117

Manhole Longitude -110.

Manhole Longitude -110.2123

Comments MH#608 – North Lead pipe collapsed/blocked, could not test.

Run 178

Run Date 09/17/2017

Time 11:50

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 230

Smoker Location 229

Ending Manhole 228

Manhole Latitude 54.4203

Manhole Latitude 54.4195

Manhole Latitude 54.4186

Manhole Longitude -110.2123

Manhole Longitude -110.2128

Manhole Longitude -110.2134

Comments

Run 179

Run Date 09/17/2017

Time 14:35

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 857

Smoker Location 227

Ending Manhole 222

Manhole Latitude 54.4198

Manhole Latitude 54.4189

Manhole Latitude 54.4184

Manhole Longitude -110.2134

Manhole Longitude -110.2146

Manhole Longitude -110.2162

Comments



Cold Lake Smoke Testing - Run Summaries

Run 179A

Run Date 09/17/2017

Time 14:50

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 226

Smoker Location 226

Ending Manhole 223

Manhole Latitude 54.4187

Manhole Latitude 54.4187

Manhole Latitude 54.4192

Manhole Longitude -110.2140

Manhole Longitude -110.2140

Manhole Longitude -110.2158

Comments

Run 180

Run Date 09/16/2017

Time 15:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 224

Smoker Location 225

Ending Manhole 217

Manhole Latitude 54.4215

Manhole Latitude 54.4201

Manhole Latitude 54.4177

Manhole Longitude -110.2141

Manhole Longitude -110.2151

Manhole Longitude -110.2167

Comments

Run 181

Run Date 09/16/2017

Time 16:05

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 220

Smoker Location 219

Ending Manhole 59

Manhole Latitude 54.4185

Manhole Latitude 54.4179

Manhole Latitude 54.4162

Manhole Longitude -110.2200

Manhole Longitude -110.2200

Manhole Longitude -110.2200

Comments

Run 182

Run Date 09/17/2017

Time 10:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 471

Smoker Location 471

Ending Manhole 538

Manhole Latitude 54.4168

Manhole Latitude 54.4168

Manhole Latitude 54.4159

Manhole Longitude -110.2163

Manhole Longitude -110.2163

Manhole Longitude -110.2167

Comments



Cold Lake Smoke Testing - Run Summaries

Run 183

Run Date 09/16/2017

Time 16:45

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 59

Smoker Location 59

Ending Manhole 538

Manhole Latitude 54.4162

Manhole Latitude 54.4162

Manhole Latitude 54.4159

Manhole Longitude -110.2200

Manhole Longitude -110.2200

Manhole Longitude -110.2167

Comments MH#59 to MH#538 does not connect.

Run 184

Run Date 09/16/2017

Time 10:35

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 538

Smoker Location 474

Ending Manhole 214

Manhole Latitude 54.4159

Manhole Latitude 54.4150

Manhole Latitude 54.

Manhole Longitude -110.2167

Manhole Longitude -110.2165

Manhole Longitude -110.

Comments

Run 185

Run Date 09/16/2017

Time 11:30

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 215

Smoker Location 476

Ending Manhole 475

Manhole Latitude 54.4145

Manhole Latitude 54.4139

Manhole Latitude 54.4133

Manhole Longitude -110.2155

Manhole Longitude -110.2149

Manhole Longitude -110.2144

Comments

Run 186

Run Date 09/16/2017

Time 11:45

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 475

Smoker Location 213

Ending Manhole 211

Manhole Latitude 54.4133

Manhole Latitude 54.4133

Manhole Latitude 54.4133

Manhole Longitude -110.2144

Manhole Longitude -110.2154

Manhole Longitude -110.2165

Comments



Cold Lake Smoke Testing - Run Summaries

Run 187

Run Date 09/16/2017

Time 17:00

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 774

Smoker Location 776

Ending Manhole 60

Manhole Latitude 54.4169

Manhole Latitude 54.4169

Manhole Latitude 54.4169

Manhole Longitude -110.2213

Manhole Longitude -110.2207

Manhole Longitude -110.2199

Comments

Run 188

Run Date 09/16/2017

Time 17:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 776

Smoker Location 776

Ending Manhole 778

Manhole Latitude 54.4169

Manhole Latitude 54.4169

Manhole Latitude 54.4163

Manhole Longitude -110.2207

Manhole Longitude -110.2207

Manhole Longitude -110.2208

Comments

Run 189

Run Date 09/17/2017

Time 8:10

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 535

Smoker Location 535

Ending Manhole 54

Manhole Latitude 54.4151

Manhole Latitude 54.4151

Manhole Latitude 54.4151

Manhole Longitude -110.2211

Manhole Longitude -110.2211

Manhole Longitude -110.2247

Comments

Run 190

Run Date 09/17/2017

Time 8:55

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 55

Smoker Location 772

Ending Manhole 478

Manhole Latitude 54.4139

Manhole Latitude 54.4139

Manhole Latitude 54.4139

Manhole Longitude -110.2248

Manhole Longitude -110.2227

Manhole Longitude -110.2211

Comments



Cold Lake Smoke Testing - Run Summaries

Run 191

Run Date 09/17/2017

Time 8:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 54

Smoker Location 54

Ending Manhole 55

Manhole Latitude 54.4151

Manhole Latitude 54.4151

Manhole Latitude 54.4139

Manhole Longitude -110.2247

Manhole Longitude -110.2247

Manhole Longitude -110.2248

Comments

Run 192

Run Date 09/17/2017

Time 8:45

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 52

Smoker Location 54

Ending Manhole 54

Manhole Latitude 54.

Manhole Latitude 54.4151

Manhole Latitude 54.4151

Manhole Longitude -110.

Manhole Longitude -110.2247

Manhole Longitude -110.2247

Comments

Run 193

Run Date 09/17/2017

Time 9:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 50

Smoker Location 765

Ending Manhole 771

Manhole Latitude 54.4151

Manhole Latitude 54.4151

Manhole Latitude 54.4151

Manhole Longitude -110.2265

Manhole Longitude -110.2275

Manhole Longitude -110.2302

Comments

Run 194

Run Date 09/17/2017

Time 9:45

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 758

Smoker Location 771

Ending Manhole 768

Manhole Latitude 54.4161

Manhole Latitude 54.4151

Manhole Latitude 54.4139

Manhole Longitude -110.2302

Manhole Longitude -110.2302

Manhole Longitude -110.2302

Comments



Cold Lake Smoke Testing - Run Summaries

Run 195

Run Date 09/17/2017

Time 9:55

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 768

Smoker Location 859

Ending Manhole 764

Manhole Latitude 54.4139

Manhole Latitude 54.4139

Manhole Latitude 54.4139

Manhole Longitude -110.2302

Manhole Longitude -110.2286

Manhole Longitude -110.2268

Comments

Run 196

Run Date 09/17/2017

Time 12:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 822

Smoker Location 822

Ending Manhole 472

Manhole Latitude 54.4170

Manhole Latitude 54.4170

Manhole Latitude 54.4173

Manhole Longitude -110.2135

Manhole Longitude -110.2135

Manhole Longitude -110.2150

Comments

Run 197

Run Date 09/17/2017

Time 12:10

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 822

Smoker Location 491

Ending Manhole 805

Manhole Latitude 54.4170

Manhole Latitude 54.4165

Manhole Latitude 54.4148

Manhole Longitude -110.2135

Manhole Longitude -110.2138

Manhole Longitude -110.2139

Comments

Run 198

Run Date 09/17/2017

Time 12:35

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 822

Smoker Location 806

Ending Manhole 809

Manhole Latitude 54.4170

Manhole Latitude 54.4151

Manhole Latitude 54.4144

Manhole Longitude -110.2135

Manhole Longitude -110.2132

Manhole Longitude -110.2125

Comments



Cold Lake Smoke Testing - Run Summaries

Run 199

Run Date 09/17/2017
Time 12:50

Technician Name Nick Schellenberg
Weather +20C, sunny/clear

Starting Manhole 808
Manhole Latitude 54.4155
Manhole Longitude -110.2127

Smoker Location 806
Manhole Latitude 54.4151
Manhole Longitude -110.2132

Ending Manhole 804
Manhole Latitude 54.4144
Manhole Longitude -110.2146

Comments

Run 200

Run Date 09/17/2017
Time 13:00

Technician Name Nick Schellenberg
Weather +20C, sunny/clear

Starting Manhole 804
Manhole Latitude 54.4144
Manhole Longitude -110.2146

Smoker Location 803
Manhole Latitude 54.4137
Manhole Longitude -110.2138

Ending Manhole 475
Manhole Latitude 54.4133
Manhole Longitude -110.2144

Comments

Run 201

Run Date 09/17/2017
Time 13:10

Technician Name Nick Schellenberg
Weather +20C, sunny/clear

Starting Manhole 808
Manhole Latitude 54.4155
Manhole Longitude -110.2127

Smoker Location 812
Manhole Latitude 54.4155
Manhole Longitude -110.2110

Ending Manhole 246
Manhole Latitude 54.4155
Manhole Longitude -110.2073

Comments

Run 202

Run Date 09/17/2017
Time 14:00

Technician Name Nick Schellenberg
Weather +20C, sunny/clear

Starting Manhole 809
Manhole Latitude 54.4144
Manhole Longitude -110.2125

Smoker Location 810
Manhole Latitude 54.4144
Manhole Longitude -110.2086

Ending Manhole 255
Manhole Latitude 54.4144
Manhole Longitude -110.2073

Comments



Cold Lake Smoke Testing - Run Summaries

Run 203

Run Date 09/17/2017

Time 14:55

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 247

Smoker Location 250

Ending Manhole 256

Manhole Latitude 54.4156

Manhole Latitude 54.4156

Manhole Latitude 54.4150

Manhole Longitude -110.2073

Manhole Longitude -110.2057

Manhole Longitude -110.2057

Comments

Run 204

Run Date 09/17/2017

Time 15:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 246

Smoker Location 739

Ending Manhole 750

Manhole Latitude 54.4155

Manhole Latitude 54.4133

Manhole Latitude 54.4121

Manhole Longitude -110.2073

Manhole Longitude -110.2073

Manhole Longitude -110.2073

Comments

Run 205

Run Date 09/18/2017

Time 8:30

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 739

Smoker Location 738

Ending Manhole 261

Manhole Latitude 54.4133

Manhole Latitude 54.4133

Manhole Latitude 54.4133

Manhole Longitude -110.2073

Manhole Longitude -110.2063

Manhole Longitude -110.2053

Comments

Run 206

Run Date 09/18/2017

Time 8:45

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 742

Smoker Location 741

Ending Manhole 740

Manhole Latitude 54.4111

Manhole Latitude 54.4106

Manhole Latitude 54.4101

Manhole Longitude -110.2078

Manhole Longitude -110.2069

Manhole Longitude -110.2066

Comments



Cold Lake Smoke Testing - Run Summaries

Run 207

Run Date 09/17/2017

Time 15:55

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 252

Smoker Location 257

Ending Manhole 259

Manhole Latitude 54.4151

Manhole Latitude 54.4143

Manhole Latitude 54.4135

Manhole Longitude -110.2039

Manhole Longitude -110.2039

Manhole Longitude -110.2039

Comments

Run 208

Run Date 09/17/2017

Time 16:20

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 209

Smoker Location 204

Ending Manhole 204

Manhole Latitude 54.4151

Manhole Latitude 54.4142

Manhole Latitude 54.4142

Manhole Longitude -110.2008

Manhole Longitude -110.2008

Manhole Longitude -110.2008

Comments

Run 209

Run Date 09/17/2017

Time 16:35

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 826

Smoker Location 649

Ending Manhole 540

Manhole Latitude 54.4123

Manhole Latitude 54.4123

Manhole Latitude 54.4123

Manhole Longitude -110.2038

Manhole Longitude -110.2016

Manhole Longitude -110.2000

Comments

Run 210

Run Date 09/18/2017

Time 9:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 753

Smoker Location 542

Ending Manhole 541

Manhole Latitude 54.4114

Manhole Latitude 54.4114

Manhole Latitude 54.4114

Manhole Longitude -110.2053

Manhole Longitude -110.2021

Manhole Longitude -110.2003

Comments



Cold Lake Smoke Testing - Run Summaries

Run 211

Run Date 09/18/2017

Time 9:00

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 261

Smoker Location 753

Ending Manhole 755

Manhole Latitude 54.4133

Manhole Latitude 54.4114

Manhole Latitude 54.4100

Manhole Longitude -110.2053

Manhole Longitude -110.2053

Manhole Longitude -110.2049

Comments

Run 212

Run Date 09/18/2017

Time 10:20

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 823

Smoker Location 824

Ending Manhole 825

Manhole Latitude 54.4100

Manhole Latitude 54.4107

Manhole Latitude 54.4114

Manhole Longitude -110.2038

Manhole Longitude -110.2038

Manhole Longitude -110.2038

Comments

Run 213

Run Date 09/18/2017

Time 9:35

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 542

Smoker Location 542

Ending Manhole 544

Manhole Latitude 54.4114

Manhole Latitude 54.4114

Manhole Latitude 54.4100

Manhole Longitude -110.2021

Manhole Longitude -110.2021

Manhole Longitude -110.2021

Comments

Run 214

Run Date 09/18/2017

Time 9:45

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 541

Smoker Location 547

Ending Manhole 545

Manhole Latitude 54.4114

Manhole Latitude 54.4106

Manhole Latitude 54.4100

Manhole Longitude -110.2003

Manhole Longitude -110.2003

Manhole Longitude -110.2003

Comments



Cold Lake Smoke Testing - Run Summaries

Run 215

Run Date 09/18/2017

Time 10:05

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 545

Smoker Location 544

Ending Manhole 755

Manhole Latitude 54.4100

Manhole Latitude 54.4100

Manhole Latitude 54.4100

Manhole Longitude -110.2003

Manhole Longitude -110.2021

Manhole Longitude -110.2049

Comments

Run 216

Run Date 09/18/2017

Time 11:50

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 568

Smoker Location 975

Ending Manhole 974

Manhole Latitude 54.4070

Manhole Latitude 54.4089

Manhole Latitude 54.4084

Manhole Longitude -110.2088

Manhole Longitude -110.2088

Manhole Longitude -110.2088

Comments

Run 217

Run Date 09/18/2017

Time 11:00

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 559

Smoker Location 560

Ending Manhole 566

Manhole Latitude 54.4083

Manhole Latitude 54.4078

Manhole Latitude 54.4070

Manhole Longitude -110.2073

Manhole Longitude -110.2073

Manhole Longitude -110.2073

Comments

Run 218

Run Date 09/18/2017

Time 10:35

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 562

Smoker Location 561

Ending Manhole 564

Manhole Latitude 54.4089

Manhole Latitude 54.4085

Manhole Latitude 54.4070

Manhole Longitude -110.2063

Manhole Longitude -110.2063

Manhole Longitude -110.2063

Comments



Cold Lake Smoke Testing - Run Summaries

Run 219

Run Date 09/18/2017

Time 10:50

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 926

Smoker Location 925

Ending Manhole 924

Manhole Latitude 54.4070

Manhole Latitude 54.4070

Manhole Latitude 54.4070

Manhole Longitude -110.2083

Manhole Longitude -110.2067

Manhole Longitude -110.2056

Comments

Run 220

Run Date 09/18/2017

Time 12:00

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 977

Smoker Location 570

Ending Manhole 116

Manhole Latitude 54.4070

Manhole Latitude 54.4058

Manhole Latitude 54.4040

Manhole Longitude -110.2083

Manhole Longitude -110.2067

Manhole Longitude -110.2067

Comments

Run 221

Run Date 09/18/2017

Time 12:30

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 116

Smoker Location 115

Ending Manhole 454

Manhole Latitude 54.4040

Manhole Latitude 54.4040

Manhole Latitude 54.4040

Manhole Longitude -110.2067

Manhole Longitude -110.2049

Manhole Longitude -110.2031

Comments

Run 222

Run Date 09/18/2017

Time 13:00

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 454

Smoker Location 455

Ending Manhole 457

Manhole Latitude 54.4040

Manhole Latitude 54.4030

Manhole Latitude 54.4011

Manhole Longitude -110.2031

Manhole Longitude -110.2031

Manhole Longitude -110.2031

Comments



Cold Lake Smoke Testing - Run Summaries

Run 223

Run Date 09/18/2017

Time 11:25

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 994

Smoker Location 993

Ending Manhole 457

Manhole Latitude 54.3991

Manhole Latitude 54.3997

Manhole Latitude 54.4011

Manhole Longitude -110.2031

Manhole Longitude -110.2031

Manhole Longitude -110.2031

Comments

Run 224

Run Date 09/18/2017

Time 12:15

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 116

Smoker Location 572

Ending Manhole 574

Manhole Latitude 54.4040

Manhole Latitude 54.4020

Manhole Latitude 54.3997

Manhole Longitude -110.2067

Manhole Longitude -110.2067

Manhole Longitude -110.2067

Comments

Run 225

Run Date 09/18/2017

Time 12:50

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 574

Smoker Location 575

Ending Manhole 441

Manhole Latitude 54.3997

Manhole Latitude 54.3990

Manhole Latitude 54.3970

Manhole Longitude -110.2067

Manhole Longitude -110.2066

Manhole Longitude -110.2069

Comments

Run 226

Run Date 09/18/2017

Time 13:15

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 442

Smoker Location 443

Ending Manhole 445

Manhole Latitude 54.3963

Manhole Latitude 54.3953

Manhole Latitude 54.3938

Manhole Longitude -110.2072

Manhole Longitude -110.2078

Manhole Longitude -110.2107

Comments



Cold Lake Smoke Testing - Run Summaries

Run 227

Run Date 09/18/2017

Time 13:35

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 445

Smoker Location 447

Ending Manhole 447

Manhole Latitude 54.3938

Manhole Latitude 54.3921

Manhole Latitude 54.3921

Manhole Longitude -110.2107

Manhole Longitude -110.2102

Manhole Longitude -110.2102

Comments

Run 228

Run Date 09/18/2017

Time 13:45

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 447

Smoker Location 447

Ending Manhole 450

Manhole Latitude 54.3921

Manhole Latitude 54.3921

Manhole Latitude 54.3921

Manhole Longitude -110.2102

Manhole Longitude -110.2102

Manhole Longitude -110.2059

Comments

Run 229

Run Date 09/18/2017

Time 14:15

Technician Name Nick Schellenberg

Weather +20C, sunny/clear

Starting Manhole 450

Smoker Location 452

Ending Manhole 451

Manhole Latitude 54.3921

Manhole Latitude 54.3932

Manhole Latitude 54.3941

Manhole Longitude -110.2059

Manhole Longitude -110.2062

Manhole Longitude -110.2062

Comments

Appendix 3

No Smoke Observations and Plugged Lines

No Smoke Observations and Potential Plugged Lines

D	ADDRESS	DETAILS	RUN
1	314 Birch Ave.	No Smoke	01
2	312 Birch Ave.	No Smoke	01
3	206 Pine Ave.	No Smoke	03
4	2005 1 Ave.	No Smoke	06
5	2003 1 Ave.	No Smoke	06
6	1901 1 Ave.	No Smoke, possibly related to other 1 Ave NS from run 7/25	06
7	1903 1 Ave.	No Smoke	06
8	1905 1 Ave.	No Smoke	06
9	1907 1 Ave.	No Smoke	06
10	2025 1 Ave.	No Smoke	06
11	MH 944	MH paved over	07
12	2534 22 St.	No Smoke	08
13	316 22 St.	No Smoke	08
14	2008 2 Ave.	No Smoke	12
15	2006 2 Ave.	No Smoke	12
16	1904 2 Ave.	No Smoke	12
17	2002 3 Ave.	No Smoke	14
18	2006 3 Ave.	No Smoke	14
19	MH 658	MH Plugged	15
20	305 20 St.	No Smoke	15
21	2027 4 Ave.	No Smoke	19
22	307/309 19 St.	No Smoke, duplex	22
23	211 19 St.	No Smoke	22
24	1879 2 Ave.	No Smoke	24

No Smoke Observations and Potential Plugged Lines

D	ADDRESS	DETAILS	RUN
25	1814-1802 2 Ave.	No Smoke, houses possibly tied into storm drain	24
26	1611 1 Ave.	No Smoke	25
27	1605 1 Ave.	No Smoke	25
28	1801-1813 1 Ave.	No Smoke, houses possibly tied into storm drain	25
29	208 20 St.	No Smoke, due to blockage at MH 658	26
30	106 18 St.	No Smoke	27
31	MH 698-699	MH Plugged	30
32	1911-1915 5 Ave.	No Smoke	30
33	1801 5 Ave.	No Smoke	30
34	MH 863-864	MH Plugged	33
35	608 7 Ave.	No Smoke	34
36	MH 593-594	MH Plugged	38
37	111 16 St.	No Smoke	39
38	109 16 St.	No Smoke	39
39	701 Lakeshore Dr.	No Smoke	43
40	305 10 St.	No Smoke	45
41	507 10 St.	No Smoke	45
42	504 10 St.	No Smoke	45
43	MH 590-594	MH Plugged, entire run.	46
44	MH 589-590	MH Plugged	47
45	205 10 St.	No Smoke	47
46	212 10 St.	No Smoke	47
47	MH 601-602	MH Plugged	48
48	1208 5 Ave.	No Smoke	49

No Smoke Observations and Potential Plugged Lines

D	ADDRESS	DETAILS	RUN
49	MH 294-297	MH Plugged	50
50	601 13 St.	No Smoke; blockage or sagged line suspected at MH 298 going towards 297, first 2-3 houses on either side of 13 St.	50
51	603 13 St.	No Smoke, blockage or sagged line suspected at MH 298 going towards 297, first 2-3 houses on either side of 13 St. NS	50
52	604 13 St.	No Smoke, blockage or sagged line suspected at MH 298 going towards 297, first 2-3 houses on either side of 13 St. NS	50
53	602 6A Ave.	No Smoke	52
54	1412 8 Ave.	No Smoke	53
55	1402 8 Ave.	No Smoke	53
56	1404 8 Ave.	No Smoke	53
57	1316 8 Ave.	No Smoke	53
58	1306 8 Ave.	No Smoke	53
59	1302 8 Ave.	No Smoke	53
60	619 12 St.	No Smoke	54
61	604 12 St.	No Smoke	54
62	606 12 St.	No Smoke	54
63	1008/1010 13 St.	No Smoke	66
64	1000/1002 13 St.	No Smoke	66
65	931 11 St.	No Smoke	69
66	906 9 St.	No Smoke	72
67	912 9 St.	No Smoke	72
68	602 12 Ave.	No Smoke	76
69	604 12 Ave.	No Smoke	76
70	608 12 Ave.	No Smoke	76
71	601 12 Ave.	No Smoke	76
72	603 12 Ave.	No Smoke	76

No Smoke Observations and Potential Plugged Lines

D	ADDRESS	DETAILS	RUN
73	605 12 Ave.	No Smoke	76
74	607 12 Ave.	No Smoke	76
75	705 12 Ave.	No Smoke	76
76	1202 12 Ave.	No Smoke	76
77	916 8 St.	No Smoke	77
78	1006 8 St.	No Smoke	77
79	810 11 Ave.	No Smoke	81
80	812 11 Ave.	No Smoke	81
81	1003 11 Ave.	No Smoke	81
82	2 Falcon Rd.	No Smoke	100
83	1914 Forest Dr.	No Smoke	101
84	1713 12 St.	No Smoke	106
85	1004 16 Ave.	No Smoke	110
86	1008 16 Ave.	No Smoke	110
87	1010 16 Ave.	No Smoke	110
88	1411 15 Ave.	No Smoke	111
89	1412 15 Ave.	No Smoke	111
90	1003 15 Ave.	No Smoke	111
91	1005 15 Ave.	No Smoke	111
92	1007 15 Ave.	No Smoke	111
93	1214 10 St.	No Smoke	112
94	1213 10 St.	No Smoke	112
95	1409 10 St.	No Smoke	112
96	1411 10 St.	No Smoke	112

No Smoke Observations and Potential Plugged Lines

D	ADDRESS	DETAILS	RUN
97	1501 10 St.	No Smoke	112
98	1503 10 St.	No Smoke	112
99	1404 9 St.	No Smoke	113
100	1406 9 St.	No Smoke	113
101	1412 9 St.	No Smoke	113
102	MH 328-329	Possible plug or sag in line, corner houses of 14 Ave. @ 9 St. not smoking	113
103	806 16 Ave.	No Smoke	118
104	MH 102-103	Possible plug or sag in line	118
105	1606 18 Ave.	No Smoke	120
106	1605 18 Ave.	No Smoke	120
107	1607 18 Ave.	No Smoke	120
108	1705 18 Ave.	No Smoke	120
109	1707 6 St.	No Smoke	121
110	1703 6 St.	No Smoke	121
111	2005 6 St.	No Smoke	127
112	2004 6 St.	No Smoke	127
113	603 14 Ave.	No Smoke	129
114	1407 7 St.	No Smoke	129
115	1217 7 St.	No Smoke	129
116	604 17 Ave.	No Smoke	132
117	MH 524	No Smoke, sitting in marsh	134
118	MH 919 & 921	No Smoke, MHs buried under gravel road	135
119	5913 Meadows Way	No Smoke	163
120	4901 57 Ave	No Smoke	167

No Smoke Observations and Potential Plugged Lines

D	ADDRESS	DETAILS	RUN
121	MH 907	Manhole covered in asphalt	170
122	MH 608-910	Pipe appears to be blocked/plugged	177
123	MH 910	Could not locate manhole	177
124	MH 229	North pipe full submerged – possible sag or blockage	178
125	MH 230	Manhole lid integrity is poor and made of wood. City replaced/corrected – Aug2017	178
126	5412 56 St	No Smoke	180
127	5302 56 St	No Smoke	180
128	5303 56 St	No Smoke	180
129	5305 56 St	No Smoke	180
130	MH 219-60	Possible plug or sag in line	181
131	5206 57 St	No Smoke	181
132	5707 53 Ave	No Smoke	187
133	MH 535	Could not locate manhole	189
134	MH 478	Manhole buried in gravel – poor grade in back lane	190
135	MH 766	Could not locate manhole	195
136	MH 806-809	Possible plug or sag in line – appears to be blocked	198
137	5205 55 St	No Smoke	198
138	5213 52 Ave	No Smoke	201
139	5107 50 St	No Smoke	203
140	MH 254	Could not open manhole	204
141	4820 49 Ave	No Smoke	210
142	MH 752	Could not locate manhole	211

Appendix 4

Smoke Test Incident Reports

Incident Report

Incident 01

Location 32 Birch Ave. **Run** 01

Latitude 54.4736 **Longitude** -110.1925

Leaking Manhole 705 **Leak Size** Medium Inflow

Adjacent Manhole 1 117 **Leak Source** Main Sewer

Adjacent Manhole 2 709 **Surface Cover** Asphalt Street

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Very small leak near MH collar



Incident 02

Location 230 Pine Ave. **Run** 03

Latitude 54.4734 **Longitude** -110.1937

Leaking Manhole 119 **Leak Size** Medium Inflow

Adjacent Manhole 1 703 **Leak Source** Main Sewer

Adjacent Manhole 2 706 **Surface Cover** Asphalt Street

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Smoke around MH collar, asphalt deteriorating/cracked



Incident 03

Location 116 23 St. **Run** 05

Latitude 54.4728 **Longitude** -110.1947

Leaking Manhole 702 **Leak Size** Light Inflow

Adjacent Manhole 1 703 **Leak Source** Main Sewer

Adjacent Manhole 2 701 **Surface Cover** Landscaped Area

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Smoke where sidewalk meets grass, directly beside manhole 701



Incident Report

Incident 04

Location 102 23 St. **Run** 05

Latitude 54.4717 **Longitude** -110.1947

Leaking Manhole 701	Leak Size Light Inflow
Adjacent Manhole 1 702	Leak Source Main Sewer
Adjacent Manhole 2 N/A	Surface Cover Sidewalk
Leak Type Sanitary MH Cover	Smoke Intensity Low

Incident Comments Leak where sidewalk meets grass, and slightly further into yard.



Incident 05

Location 1 Ave. @ 19 St. **Run** 07

Latitude 54.4717 **Longitude** -110.1874

Leaking Manhole N/A	Leak Size Very High Inflow
Adjacent Manhole 1 937	Leak Source Main Sewer
Adjacent Manhole 2 936	Surface Cover Permanent Building
Leak Type Swimming Pool Drain	Smoke Intensity High

Incident Comments Smoke from two (2) low elevated, grated manhole lid in Waterpark. Tamperproof, could not investigate.



Incident 06

Location 1 Ave. @ 19 St. **Run** 07

Latitude 54.4725 **Longitude** -110.1899

Leaking Manhole 936	Leak Size Light Inflow
Adjacent Manhole 1 937	Leak Source Main Sewer
Adjacent Manhole 2 944	Surface Cover Landscaped Area
Leak Type Sanitary MH Cover	Smoke Intensity Low

Incident Comments Leaking around MH collar



Incident Report

Incident 07

Location 1 Ave. @ 19 St.

Run 07

Latitude 54.4715 **Longitude** -110.1869

Leaking Manhole 37 **Leak Size** Light Inflow

Adjacent Manhole 1 936 **Leak Source** Main Sewer

Adjacent Manhole 2 944 **Surface Cover** Sidewalk

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Leaking through sidewalk pavers beside MH 37, also through nearby shrubs.



Incident 08

Location 211 22 St.

Run 08

Latitude 54.4699 **Longitude** -110.1926

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 604 **Leak Source** Main Sewer

Adjacent Manhole 2 N/A **Surface Cover** Landscaped Area

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Unidentified sanitary MH in yard leaking around MH collar.



Incident 09

Location 3 Ave @ 20 St.

Run 14

Latitude 54.4689 **Longitude** -110.1883

Leaking Manhole 656 **Leak Size** Light Inflow

Adjacent Manhole 1 657 **Leak Source** Main Sewer

Adjacent Manhole 2 658 **Surface Cover** Asphalt Street

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Leak around MH collar



Incident Report

Incident 10

Location 1 Ave. @ 18 St. **Run** 27
Latitude 54.4713 **Longitude** -110.1843
Leaking Manhole 943 **Leak Size** Little - If Any
Adjacent Manhole 1 692 **Leak Source** Main Sewer
Adjacent Manhole 2 944 **Surface Cover** Sidewalk
Leak Type Sanitary MH Cover **Smoke Intensity** Low
Incident Comments Very small leak near sidewalk and shrubs



Incident 11

Location 5 Ave. @ 18 St. **Run** 27
Latitude 54.4680 **Longitude** -110.1843
Leaking Manhole 696 **Leak Size** Light Inflow
Adjacent Manhole 1 1006 **Leak Source** Main Sewer
Adjacent Manhole 2 695 **Surface Cover** Asphalt Street
Leak Type Sanitary MH Cover **Smoke Intensity** Low
Incident Comments Leaking around MH collar



Incident 12

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29
Latitude 54.4677 **Longitude** -110.1840
Leaking Manhole N/A **Leak Size** Little - If Any
Adjacent Manhole 1 696 **Leak Source** Service Connection
Adjacent Manhole 2 1006 **Surface Cover** Landscaped Area
Leak Type Service Connection **Smoke Intensity** Low
Incident Comments Service cap leaking on empty lot for sale



Incident Report

Incident 13

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4673 **Longitude** -110.1846

Leaking Manhole	N/A	Leak Size	Little - If Any
Adjacent Manhole 1	696	Leak Source	Service Connection
Adjacent Manhole 2	1006	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Low

Incident Comments Service cap leaking on empty lot for sale



Incident 14

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4668 **Longitude** -110.1845

Leaking Manhole	N/A	Leak Size	Moderate Inflow
Adjacent Manhole 1	1005	Leak Source	Service Connection
Adjacent Manhole 2	1006	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Moderate

Incident Comments Service cap off on empty lot for sale



Incident 15

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4671 **Longitude** -110.1842

Leaking Manhole	N/A	Leak Size	Light Inflow
Adjacent Manhole 1	1005	Leak Source	Service Connection
Adjacent Manhole 2	1006	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Low

Incident Comments Service cap leaking on empty lot for sale



Incident Report

Incident 16

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4667 **Longitude** -110.1844

Leaking Manhole	N/A	Leak Size	Light Inflow
Adjacent Manhole 1	1005	Leak Source	Service Connection
Adjacent Manhole 2	1006	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Low

Incident Comments Service cap leaking on empty lot for sale



Incident 17

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4661 **Longitude** -110.1841

Leaking Manhole	N/A	Leak Size	Little - If Any
Adjacent Manhole 1	1005	Leak Source	Service Connection
Adjacent Manhole 2	1006	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Low

Incident Comments Service cap leaking on empty lot for sale



Incident 18

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4659 **Longitude** -110.1844

Leaking Manhole	N/A	Leak Size	Little - If Any
Adjacent Manhole 1	1005	Leak Source	Service Connection
Adjacent Manhole 2	1006	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Low

Incident Comments Service cap leaking on empty lot for sale



Incident Report

Incident 19

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4656 **Longitude** -110.1844

Leaking Manhole	N/A	Leak Size	Medium Inflow
Adjacent Manhole 1	1004	Leak Source	Service Connection
Adjacent Manhole 2	1005	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Moderate

Incident Comments Service cap off on empty lot for sale



Incident 20

Location 18 St. between 5 Ave. & 7 Ave. **Run** 29

Latitude 54.4657 **Longitude** -110.1841

Leaking Manhole	N/A	Leak Size	Light Inflow
Adjacent Manhole 1	1004	Leak Source	Service Connection
Adjacent Manhole 2	1005	Surface Cover	Landscaped Area
Leak Type	Service Connection	Smoke Intensity	Moderate

Incident Comments Service cap leaking on empty lot for sale



Incident 21

Location Behind 1801 5 Ave. **Run** 30

Latitude 54.4676 **Longitude** -110.1845

Leaking Manhole	127	Leak Size	Moderate Inflow
Adjacent Manhole 1	696	Leak Source	Main Sewer
Adjacent Manhole 2	697	Surface Cover	Landscaped Area
Leak Type	Sanitary MH Cover	Smoke Intensity	High

Incident Comments Low lying MH, very poor seals, infiltration around entire MH



Incident Report

Incident 22

Location Behind 1911 5 Ave. **Run** 30

Latitude 54.4671 **Longitude** -110.1870

Leaking Manhole 699 **Leak Size** Medium Inflow

Adjacent Manhole 1 698 **Leak Source** Main Sewer

Adjacent Manhole 2 684 **Surface Cover** Landscaped Area

Leak Type Sanitary MH Cover **Smoke Intensity** Moderate

Incident Comments Low lying areas around MH leaking



Incident 23

Location 611 20 St. **Run** 31

Latitude 54.4657 **Longitude** -110.1874

Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 855 **Leak Source** Service Connection

Adjacent Manhole 2 866 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Cleanout cap leaking on lawn



Incident 24

Location 614 20 St. **Run** 31

Latitude 54.4655 **Longitude** -110.1871

Leaking Manhole N/A **Leak Size** Medium Inflow

Adjacent Manhole 1 855 **Leak Source** Service Connection

Adjacent Manhole 2 856 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Moderate

Incident Comments Cleanout cap leaking on lawn



Incident Report

Incident 25

Location 616 20 St. **Run** 31

Latitude 54.4655 **Longitude** -110.1871

Leaking Manhole N/A **Leak Size** High Inflow

Adjacent Manhole 1 855 **Leak Source** Service Connection

Adjacent Manhole 2 856 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** High

Incident Comments Cleanout cap missing on lawn



Incident 26

Location 615 20 St. **Run** 31

Latitude 54.4654 **Longitude** -110.1874

Leaking Manhole N/A **Leak Size** High Inflow

Adjacent Manhole 1 855 **Leak Source** Service Connection

Adjacent Manhole 2 856 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** High

Incident Comments Cleanout cap missing on lawn



Incident 27

Location 602 19 St. **Run** 32

Latitude 54.4666 **Longitude** -110.1858

Leaking Manhole 486 **Leak Size** Light Inflow

Adjacent Manhole 1 485 **Leak Source** Main Sewer

Adjacent Manhole 2 487 **Surface Cover** Asphalt Street

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Multiple leaks around MH collar



Incident Report

Incident 28

Location 1606 7 Ave. **Run** 34

Latitude 54.4655 **Longitude** -110.1830

Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 459 **Leak Source** Service Connection

Adjacent Manhole 2 176 **Surface Cover** Concrete Driveway

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Leaking cap/plate on driveway



Incident 29

Location 209 Lakeshore Dr. **Run** 42

Latitude 54.4704 **Longitude** -110.1785

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 585 **Leak Source** Service Connection

Adjacent Manhole 2 584 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken cap



Incident 30

Location 5 Ave. @ Lakeshore Dr. **Run** 42

Latitude 54.4690 **Longitude** -110.1756

Leaking Manhole 583 **Leak Size** High Inflow

Adjacent Manhole 1 70 **Leak Source** Main Sewer

Adjacent Manhole 2 582 **Surface Cover** Asphalt Street

Leak Type Sanitary MH Cover **Smoke Intensity** Moderate

Incident Comments Cracked curb/road around MH



Incident Report

Incident 31

Location 308 10 St. **Run** 45

Latitude 54.4694 **Longitude** -110.1786

Leaking Manhole N/A	Leak Size Light Inflow
Adjacent Manhole 1 576	Leak Source Service Connection
Adjacent Manhole 2 577	Surface Cover Permanent Building
Leak Type Drain Tile	Smoke Intensity Low

Incident Comments Excavated area beside house revealed smoke coming from foundation, possibly weeping tile



Incident 32

Location 205 10 St. **Run** 47

Latitude 54.4702 **Longitude** -110.1808

Leaking Manhole N/A	Leak Size Light Inflow
Adjacent Manhole 1 588	Leak Source Main Sewer
Adjacent Manhole 2 584	Surface Cover Landscaped Area
Leak Type Sanitary MH Cover	Smoke Intensity Moderate

Incident Comments Unidentified MH leaking around collar



Incident 33

Location 8 Ave. West of @ 13 St. **Run** 58

Latitude 54.4639 **Longitude** -110.1798

Leaking Manhole 300	Leak Size Medium Inflow
Adjacent Manhole 1 299	Leak Source Main Sewer
Adjacent Manhole 2 301	Surface Cover Landscaped Area
Leak Type Sanitary MH Cover	Smoke Intensity Moderate

Incident Comments Low lying area in field, graded towards MH



Incident Report

Incident 34

Location West of 1 Marina Estates Dr. **Run** 63

Latitude 54.4632 **Longitude** -110.1819

Leaking Manhole 613	Leak Size Medium Inflow
Adjacent Manhole 1 611	Leak Source Main Sewer
Adjacent Manhole 2 885	Surface Cover Landscaped Area
Leak Type Sanitary MH Cover	Smoke Intensity Low

Incident Comments MH buried in empty lot on culdesac



Incident 35

Location Near 1516 9 Ave. **Run** 63

Latitude 54.4628 **Longitude** -110.1820

Leaking Manhole 611	Leak Size Light Inflow
Adjacent Manhole 1 613	Leak Source Main Sewer
Adjacent Manhole 2 N/A	Surface Cover Landscaped Area
Leak Type Sanitary MH Cover	Smoke Intensity Low

Incident Comments Leak around MH collar



Incident 36

Location 1202 13 St. **Run** 66

Latitude 54.4608 **Longitude** -110.1783

Leaking Manhole N/A	Leak Size Light Inflow
Adjacent Manhole 1 307	Leak Source Service Connection
Adjacent Manhole 2 306	Surface Cover Concrete Driveway
Leak Type Cleanout Cap Broken	Smoke Intensity Moderate

Incident Comments Broken cleanout cap on driveway



Incident Report

Incident 37

Location 1204 13 St. **Run** 66

Latitude 54.4608 **Longitude** -110.1783

Leaking Manhole N/A **Leak Size** Moderate Inflow

Adjacent Manhole 1 307 **Leak Source** Service Connection

Adjacent Manhole 2 306 **Surface Cover** Concrete Driveway

Leak Type Cleanout Cap Missing **Smoke Intensity** High

Incident Comments Missing cleanout cap on driveway



Incident 38

Location 1206 13 St. **Run** 66

Latitude 54.4607 **Longitude** -110.1784

Leaking Manhole N/A **Leak Size** Moderate Inflow

Adjacent Manhole 1 306 **Leak Source** Service Connection

Adjacent Manhole 2 304 **Surface Cover** Concrete Driveway

Leak Type Cleanout Cap Missing **Smoke Intensity** High

Incident Comments Missing cleanout cap on driveway



Incident 39

Location South of 10 Ave. @ 9 St. **Run** 73

Latitude 54.4623 **Longitude** -110.1715

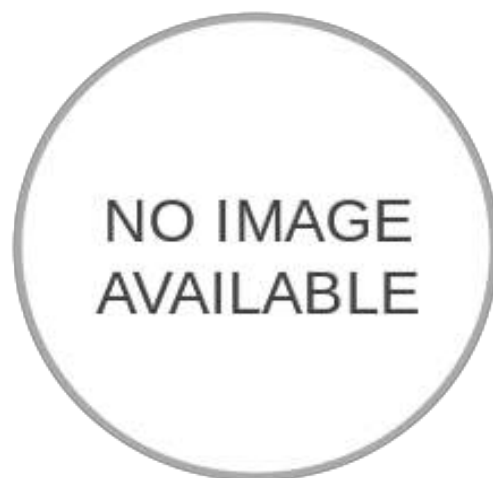
Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 319 **Leak Source** Service Connection

Adjacent Manhole 2 318 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective cleanout cap in grass area



Incident Report

Incident 40

Location 920 7 St. **Run** 75

Latitude 54.4629 **Longitude** -110.6745

Leaking Manhole N/A **Leak Size**

Adjacent Manhole 1 344 **Leak Source** Service Connection

Adjacent Manhole 2 488 **Surface Cover** Permanent Building

Leak Type Smoke Inside Building **Smoke Intensity** High

Incident Comments St. Dominic Elementary School had smoke come up from drain. Fire department called.



Incident 41

Location 10 St. @ 10 Ave. **Run** 80

Latitude 54.4625 **Longitude** -110.1730

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 317 **Leak Source** Service Connection

Adjacent Manhole 2 317A **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Moderate

Incident Comments Broken cleanout cap in front of Lakeview Suites



Incident 42

Location East of 402 13 Ave. **Run** 87

Latitude 54.4600 **Longitude** -110.7800

Leaking Manhole N/A **Leak Size** Medium Inflow

Adjacent Manhole 1 871 **Leak Source** Service Connection

Adjacent Manhole 2 872 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Moderate

Incident Comments Broken cleanout cap in vacant lot



Incident Report

Incident 43

Location 1314 15 St. **Run** 89
Latitude 54.4588 **Longitude** -110.1804
Leaking Manhole N/A **Leak Size** Little - If Any
Adjacent Manhole 1 869 **Leak Source** Service Connection
Adjacent Manhole 2 828 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Cracked cleanout cap



Incident 44

Location 1312 15 St. **Run** 89
Latitude 54.4590 **Longitude** -110.1804
Leaking Manhole N/A **Leak Size** Little - If Any
Adjacent Manhole 1 828 **Leak Source** Service Connection
Adjacent Manhole 2 869 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Cleanout cap leaking through screw hole



Incident 45

Location North of 1512 16 St. **Run** 91
Latitude 54.4590 **Longitude** -110.1819
Leaking Manhole N/A **Leak Size** Light Inflow
Adjacent Manhole 1 866 **Leak Source** Service Connection
Adjacent Manhole 2 942 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments No cap on vacant lot, covered with a rag.



Incident Report

Incident 46

Location North of 1512 16 St. **Run** 91
Latitude 54.4581 **Longitude** -110.1819
Leaking Manhole N/A **Leak Size** Light Inflow
Adjacent Manhole 1 866 **Leak Source** Service Connection
Adjacent Manhole 2 942 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments No cap on vacant lot, covered with a rag.



Incident 47

Location North of 1512 16 St. **Run** 91
Latitude 54.4580 **Longitude** -110.1819
Leaking Manhole N/A **Leak Size** Light Inflow
Adjacent Manhole 1 866 **Leak Source** Service Connection
Adjacent Manhole 2 942 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments No cap on vacant lot, covered with a rag.



Incident 48

Location North of 1512 16 St. **Run** 91
Latitude 54.4579 **Longitude** -110.1819
Leaking Manhole N/A **Leak Size** Light Inflow
Adjacent Manhole 1 866 **Leak Source** Service Connection
Adjacent Manhole 2 942 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments No cap on vacant lot, covered with a rag.



Incident Report

Incident 49

Location North of 1512 16 St. **Run** 91
Latitude 54.4577 **Longitude** -110.1819
Leaking Manhole N/A **Leak Size** Light Inflow
Adjacent Manhole 1 866 **Leak Source** Service Connection
Adjacent Manhole 2 942 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments No cap on vacant lot, covered with a rag.



Incident 50

Location North of 1512 16 St. **Run** 91
Latitude 54.4576 **Longitude** -110.1819
Leaking Manhole N/A **Leak Size** Light Inflow
Adjacent Manhole 1 942 **Leak Source** Service Connection
Adjacent Manhole 2 866 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments No cap on vacant lot, covered with a rag.



Incident 51

Location North of 1512 16 St. **Run** 91
Latitude 54.4576 **Longitude** -110.1819
Leaking Manhole N/A **Leak Size** Light Inflow
Adjacent Manhole 1 942 **Leak Source** Service Connection
Adjacent Manhole 2 866 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments No cap on vacant lot, covered with a rag.



Incident Report

Incident 52

Location North of 1512 16 St. **Run** 91

Latitude 54.4576 **Longitude** -110.1819

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 942 **Leak Source** Service Connection

Adjacent Manhole 2 866 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate

Incident Comments No cap on vacant lot, covered with a rag.



Incident 53

Location 1512 16 St. **Run** 91

Latitude 54.4573 **Longitude** -110.1820

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 942 **Leak Source** Service Connection

Adjacent Manhole 2 866 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken cap on lawn, also leaking in grass around cleanout pipe.



Incident 54

Location 1704 Falcon Rd. **Run** 96

Latitude 54.4559 **Longitude** -110.1785

Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 930 **Leak Source** Service Connection

Adjacent Manhole 2 931 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Leaking cleanout cap



Incident Report

Incident 55

Location 1211 18 Ave. **Run** 99

Latitude 54.4552 **Longitude** -110.1778

Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 931 **Leak Source** Service Connection

Adjacent Manhole 2 932 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Leaking cleanout cap



Incident 56

Location 6 Aspen Court **Run** 98

Latitude 54.4563 **Longitude** -110.1772

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 929 **Leak Source** Service Connection

Adjacent Manhole 2 930 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken cleanout cap



Incident 57

Location 7 Aspen Court **Run** 98

Latitude 54.4562 **Longitude** -110.1772

Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 929 **Leak Source** Service Connection

Adjacent Manhole 2 930 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Leaking cleanout cap



Incident Report

Incident 58

Location 31 Falcon Rd. **Run** 100
Latitude 54.4543 **Longitude** -110.1783
Leaking Manhole N/A **Leak Size** Little - If Any
Adjacent Manhole 1 959 **Leak Source** Service Connection
Adjacent Manhole 2 958 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Leaking cleanout cap



Incident 59

Location West of 1930 Forest Dr. **Run** 102
Latitude 54.4520 **Longitude** -110.1798
Leaking Manhole BLDG_6LS **Leak Size** Light Inflow
Adjacent Manhole 1 385 **Leak Source** Main Sewer
Adjacent Manhole 2 FUT_1 **Surface Cover** Landscaped Area
Leak Type Sanitary MH Cover **Smoke Intensity** Moderate
Incident Comments Leaking MH collar



Incident 60

Location SW of 1930 Forest Dr. **Run** 102
Latitude 54.4519 **Longitude** -110.1798
Leaking Manhole FUT_1 **Leak Size** Medium Inflow
Adjacent Manhole 1 BLDG_6LS **Leak Source** Main Sewer
Adjacent Manhole 2 FUT_2 **Surface Cover** Landscaped Area
Leak Type Sanitary MH Cover **Smoke Intensity** Moderate
Incident Comments Leaking/low lying MH collar



Incident Report

Incident 61

Location Behind 1934 Forest Dr. **Run** 103
Latitude 54.4519 **Longitude** -110.1801
Leaking Manhole FUT_2 **Leak Size** Medium Inflow
Adjacent Manhole 1 FUT_1 **Leak Source** Main Sewer
Adjacent Manhole 2 FUT_3 **Surface Cover** Landscaped Area
Leak Type Sanitary MH Cover **Smoke Intensity** Moderate
Incident Comments Leaking/low lying MH collar



Incident 62

Location Schooner Rd. **Run** 119
Latitude 54.4542 **Longitude** -110.1705
Leaking Manhole N/A **Leak Size** Little - If Any
Adjacent Manhole 1 1007 **Leak Source** Service Connection
Adjacent Manhole 2 1010 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Small leak from cleanout cap screw holes



Incident 63

Location 1801 7 St. **Run** 120
Latitude 54.4540 **Longitude** -110.1688
Leaking Manhole N/A **Leak Size** Little - If Any
Adjacent Manhole 1 95 **Leak Source** Service Connection
Adjacent Manhole 2 359 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Leaking cleanout cap



Incident Report

Incident 64

Location End of Sammut Pl. **Run** 122

Latitude 54.4529 **Longitude** -110.1687

Leaking Manhole 403 **Leak Size** Light Inflow

Adjacent Manhole 1 402 **Leak Source** Main Sewer

Adjacent Manhole 2 N/A **Surface Cover** Asphalt Street

Leak Type Sanitary MH Cover **Smoke Intensity** Moderate

Incident Comments MH collar leaking



Incident 65

Location 2101 7 St. **Run** 125

Latitude 54.4501 **Longitude** -110.1686

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 92 **Leak Source** Service Connection

Adjacent Manhole 2 93 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Moderate

Incident Comments Broken cleanout cap



Incident 66

Location 621 21 Ave. **Run** 126

Latitude 54.4501 **Longitude** -110.1680

Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 93 **Leak Source** Service Connection

Adjacent Manhole 2 91 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken cleanout cap



Incident Report

Incident 67

Location 616 21 Ave. **Run** 126

Latitude 54.4502 **Longitude** -110.1675

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 93 **Leak Source** Service Connection

Adjacent Manhole 2 91 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** High

Incident Comments Leaking cleanout cap



Incident 68

Location 2006 6 St. **Run** 127

Latitude 54.4506 **Longitude** -110.1653

Leaking Manhole N/A **Leak Size** Light Inflow

Adjacent Manhole 1 405 **Leak Source** Service Connection

Adjacent Manhole 2 406 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Moderate

Incident Comments Leaking cleanout cap



Incident 69

Location 2005 6 St. **Run** 127

Latitude 54.4506 **Longitude** -110.1655

Leaking Manhole N/A **Leak Size** Little - If Any

Adjacent Manhole 1 405 **Leak Source** Service Connection

Adjacent Manhole 2 406 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Buried, leaking cap



Incident Report

Incident 70

Location End of 17 Ave. **Run** 132

Latitude 54.4559 **Longitude** -110.1648

Leaking Manhole 353 **Leak Size** Little - If Any

Adjacent Manhole 1 354 **Leak Source** Main Sewer

Adjacent Manhole 2 526 **Surface Cover** Trees & Shrubs

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Leaking MH collar



Incident 71

Location Behind baseball diamond on 6 St. **Run** 133

Latitude 54.4547 **Longitude** -110.1649

Leaking Manhole 526 **Leak Size** Medium Inflow

Adjacent Manhole 1 524 **Leak Source** Main Sewer

Adjacent Manhole 2 353 **Surface Cover** Trees & Shrubs

Leak Type Sanitary MH Cover **Smoke Intensity** Moderate

Incident Comments Low lying MH, leaking MH collar



Incident 72

Location Behind arena on 6 St. **Run** 134

Latitude 54.4537 **Longitude** -110.1649

Leaking Manhole 524 **Leak Size** Very High Inflow

Adjacent Manhole 1 523 **Leak Source** Main Sewer

Adjacent Manhole 2 526 **Surface Cover** Trees & Shrubs

Leak Type Sanitary MH Cover **Smoke Intensity** None

Incident Comments MH located in swamp/sewer, very high inflow



Incident Report

Incident 73

Location Behind 1918 6 St. **Run** 134

Latitude 54.4524 **Longitude** -110.1649

Leaking Manhole 523 **Leak Size** Light Inflow

Adjacent Manhole 1 524 **Leak Source** Main Sewer

Adjacent Manhole 2 405 **Surface Cover** Landscaped Area

Leak Type Sanitary MH Cover **Smoke Intensity** Low

Incident Comments Leaking MH collar



Incident 74

Location Imperial Park 75 Ave. **Run** 135

Latitude 54.444024 **Longitude** -110.198270

Leaking Manhole N/A **Leak Size** High Inflow

Adjacent Manhole 1 919 **Leak Source** Main Sewer

Adjacent Manhole 2 N/A **Surface Cover** Landscaped Area

Leak Type Sanitary MH Cover **Smoke Intensity** High

Incident Comments Unidentified leaking MH collar/low lying MH East of Imperial Park Entrance. MH not part of project, but the incident was very obvious. MH directly N of MH 919.



Incident 75

Location South of 75 Ave. **Run** 136

Latitude 54.4414 **Longitude** -110.1960

Leaking Manhole 23 **Leak Size** Light Inflow

Adjacent Manhole 1 22 **Leak Source** Main Sewer

Adjacent Manhole 2 921 **Surface Cover** Trees & Shrubs

Leak Type Sanitary MH Cover **Smoke Intensity** Moderate

Incident Comments Leaking MH collar/low lying MH in field



Incident Report

Incident 76

Location South of 75 Ave. **Run** 136

Latitude 54.4397 **Longitude** -110.1976

Leaking Manhole 21 **Leak Size** Light Inflow
Adjacent Manhole 1 20 **Leak Source** Main Sewer
Adjacent Manhole 2 22 **Surface Cover** Trees & Shrubs
Leak Type Sanitary MH Cover **Smoke Intensity** Moderate

Incident Comments Leaking collar in field



Incident 77

Location North of 62 Ave. **Run** 137

Latitude 54.4383 **Longitude** -110.1977

Leaking Manhole 19 **Leak Size** Light Inflow
Adjacent Manhole 1 20 **Leak Source** Main Sewer
Adjacent Manhole 2 18 **Surface Cover** Trees & Shrubs
Leak Type Sanitary MH Cover **Smoke Intensity** Moderate

Incident Comments Leaking MH collar/ low lying MH



Incident 78

Location 6608 Tri City Way **Run** 143

Latitude 54.43235 **Longitude** -110.19553

Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 980 **Leak Source** Service Connection
Adjacent Manhole 2 981 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap on yard, middle of flower bed.



Incident Report

Incident 79

Location 4501 Tri City Way **Run** 145
Latitude 54.43176 **Longitude** -110.19569
Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 978 **Leak Source** Service Connection
Adjacent Manhole 2 979 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Defective service cap on yard.



Incident 80

Location Empty lot south of 6503 45 St. **Run** 147
Latitude 54.43076 **Longitude** -110.19526
Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 962 **Leak Source** Service Connection
Adjacent Manhole 2 963 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Defective service cap on empty lot.



Incident 81

Location 6503 45 St. **Run** 147
Latitude 54.43079 **Longitude** -110.19563
Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 962 **Leak Source** Service Connection
Adjacent Manhole 2 963 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Defective service cap on yard, lot for lease.



Incident Report

Incident 82

Location 4502 65 Ave.

Run 147

Latitude 54.4308 **Longitude** -110.19572

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 962

Leak Source Service Connection

Adjacent Manhole 2 963

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap on yard.



Incident 83

Location 4503 65 Ave.

Run 147

Latitude 54.43089 **Longitude** -110.19594

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 962

Leak Source Service Connection

Adjacent Manhole 2 963

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** Low

Incident Comments Missing service cap – wooden cover on yard.



Incident 84

Location 4501 65 Ave.

Run 147

Latitude 54.43082 **Longitude** -110.19575

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 962

Leak Source Service Connection

Adjacent Manhole 2 963

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** Low

Incident Comments Missing service cap – wooden cover on yard.



Incident Report

Incident 85

Location House #6404, no name culdesac East of 45 St. **Run** 148

Latitude 54.43012 **Longitude** -110.19586

Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 955 **Leak Source** Service Connection
Adjacent Manhole 2 956 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken service cap on yard.



Incident 86

Location 6306 47 St. **Run** 150

Latitude 54.42967 **Longitude** -110.19776

Leaking Manhole N/A **Leak Size** Light inflow
Adjacent Manhole 1 723 **Leak Source** Service Connection
Adjacent Manhole 2 724 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate

Incident Comments Missing service cap in yard



Incident 87

Location 4619 62 Ave. **Run** 149

Latitude 54.42827 **Longitude** -110.1978

Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 373 **Leak Source** Service Connection
Adjacent Manhole 2 827 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Low

Incident Comments Missing service cap – wooden cover on yard.



Incident Report

Incident 88

Location 4614 62 Ave.

Run 149

Latitude 54.42852 **Longitude** -110.19737

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 373

Leak Source Service Connection

Adjacent Manhole 2 827

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken

Smoke Intensity Low

Incident Comments Broken service cap on yard.



Incident 89

Location 4705 63 Ave.

Run 153

Latitude 54.42917 **Longitude** -110.19925

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 721

Leak Source Service Connection

Adjacent Manhole 2 722

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap on yard – under rock pile.



Incident 90

Location 4703 63 Ave.

Run 153

Latitude 54.42914 **Longitude** -110.19901

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 721

Leak Source Service Connection

Adjacent Manhole 2 722

Surface Cover Landscaped area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap on yard.



Incident Report

Incident 91

Location In field - See GPS

Run 157

Latitude 54.42968 **Longitude** -110.20246

Leaking Manhole 35 **Leak Size** Light inflow

Adjacent Manhole 1 34

Leak Source Main Sewer

Adjacent Manhole 2 36

Surface Cover Landscaped area

Leak Type Sanitary Manhole Cover **Smoke Intensity** Moderate

Incident Comments Manhole collar leaking in grass area.



Incident 92

Location In field - between Sobeys and Shoppers Drug Mart **Run** 158

Latitude 54.4303 **Longitude** -110.2049

Leaking Manhole 113

Leak Size Light inflow

Adjacent Manhole 1 112

Leak Source Main Sewer

Adjacent Manhole 2 428

Surface Cover Landscaped area

Leak Type Sanitary Manhole Cover **Smoke Intensity** Moderate

Incident Comments Manhole collar leaking in grass area.



Incident 93

Location Marks Work Warehouse - Parking lot in grass **Run** 159

Latitude 54.4343 **Longitude** -110.2049

Leaking Manhole 836

Leak Size Little - if any

Adjacent Manhole 1 834

Leak Source Main Sewer

Adjacent Manhole 2 837

Surface Cover Landscaped Area

Leak Type Sanitary Manhole Cover **Smoke Intensity** Low

Incident Comments Manhole collar leaking in grass area – parking lot.



Incident Report

Incident 94

Location 4717 64 Ave.

Run 155

Latitude 54.43001 **Longitude** -110.20051

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 33

Leak Source Service Connection

Adjacent Manhole 2 727

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken

Smoke Intensity Low

Incident Comments Broken service cap on yard.



Incident 95

Location 4801 64 Ave.

Run 155

Latitude 54.4300 **Longitude** -110.20112

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 33

Leak Source Service Connection

Adjacent Manhole 2 34

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken

Smoke Intensity Low

Incident Comments Broken service cap on yard.



Incident 96

Location 4803 64 Ave.

Run 155

Latitude 54.42994 **Longitude** -110.20145

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 33

Leak Source Service Connection

Adjacent Manhole 2 34

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap on yard.



Incident Report

Incident 97

Location 4710 64 Ave.

Run 155

Latitude 54.43024 **Longitude** -110.19955

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 724

Leak Source Service Connection

Adjacent Manhole 2 727

Surface Cover Landscaped area

Leak Type Cleanout Cap Broken

Smoke Intensity Low

Incident Comments Broken service cap on yard.



Incident 98

Location 48 St. - In grass area

Run 156

Latitude 54.43097 **Longitude** -110.20086

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 31

Leak Source Service Connection

Adjacent Manhole 2 32

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Moderate

Incident Comments Defective cap on yard.



Incident 99

Location 61 Ave. + 49 St.

Run 160

Latitude 54.4279 **Longitude** -110.2027

Leaking Manhole 371

Leak Size Light inflow

Adjacent Manhole 1 370

Leak Source Main Sewer

Adjacent Manhole 2 835

Surface Cover Landscaped Area

Leak Type Sanitary Manhole Cover

Smoke Intensity Moderate

Incident Comments Poor manhole seal – grade runs to manhole



Incident Report

Incident 100

Location 12 Sweetgrass Pl.

Run 162

Latitude 54.42745 **Longitude** -110.20223

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 841

Leak Source Service Connection

Adjacent Manhole 2 842

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing

Smoke Intensity Moderate

Incident Comments Service cap missing on yard.



Incident 101

Location 7 Sweetgrass Pl.

Run 162

Latitude 54.42733 **Longitude** -110.20117

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 841

Leak Source Service Connection

Adjacent Manhole 2 842

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap on yard.



Incident 102

Location 5902 Meadow Way

Run 163

Latitude 54.42664 **Longitude** -110.20587

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 844

Leak Source Service Connection

Adjacent Manhole 2 845

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap on yard.



Incident Report

Incident 103

Location In grass area off walking path **Run** 164

Latitude 54.4267 **Longitude** -110.2065

Leaking Manhole 424 **Leak Size** Little - if any

Adjacent Manhole 1 423 **Leak Source** Main Sewer

Adjacent Manhole 2 425 **Surface Cover** Landscaped Area

Leak Type Sanitary Manhole Cover **Smoke Intensity** Low

Incident Comments Leaking around manhole collar.



Incident 104

Location 4911 59 Ave. **Run** 164

Latitude 54.42632 **Longitude** -110.20355

Leaking Manhole N/A **Leak Size** Little - if any

Adjacent Manhole 1 922 **Leak Source** Service Connection

Adjacent Manhole 2 923 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap on yard.



Incident 105

Location 4908 59 Ave. **Run** 164

Latitude 54.42654 **Longitude** -110.20332

Leaking Manhole N/A **Leak Size** Little - if any

Adjacent Manhole 1 922 **Leak Source** Service Connection

Adjacent Manhole 2 923 **Surface Cover** Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap on yard.



Incident Report

Incident 106

Location 5714 Meadow Way **Run** 165
Latitude 54.42613 **Longitude** -110.20638
Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 945 **Leak Source** Service Connection
Adjacent Manhole 2 948 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Defective service cap on yard.



Incident 107

Location 5710 Meadow Way **Run** 165
Latitude 54.4261 **Longitude** -110.20645
Leaking Manhole N/A **Leak Size** Light inflow
Adjacent Manhole 1 948 **Leak Source** Service Connection
Adjacent Manhole 2 961 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate
Incident Comments Service cap missing on yard.



Incident 108

Location 5802 Meadow Way **Run** 165
Latitude 54.42613 **Longitude** -110.20655
Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 845 **Leak Source** Service Connection
Adjacent Manhole 2 945 **Surface Cover** Landscaped area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Defective service cap in yard.



Incident Report

Incident 109

Location 5814 Meadow Way

Run 165

Latitude 54.42652 **Longitude** -110.20619

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 844

Leak Source Service Connection

Adjacent Manhole 2 845

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap in yard.



Incident 110

Location 4916 58 Ave.

Run 166

Latitude 54.4256 **Longitude** -110.20544

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 946

Leak Source Service Connection

Adjacent Manhole 2 947

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken service cap on yard.



Incident 111

Location 4920 58 Ave.

Run 166

Latitude 54.42576 **Longitude** -110.20545

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 892

Leak Source Service Connection

Adjacent Manhole 2 946

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap in yard.



Incident Report

Incident 112

Location 4917 58 Ave.

Run 166

Latitude 54.42537 **Longitude** -110.20587

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 892

Leak Source Service Connection

Adjacent Manhole 2 946

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken

Smoke Intensity Low

Incident Comments Broken service cap in yard.



Incident 113

Location In grass - West of 4916 57 Ave. **Run** 167

Latitude 54.42465 **Longitude** -110.20497

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 960

Leak Source Service Connection

Adjacent Manhole 2 961

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap on vacant lot.



Incident 114

Location 4925 57 Ave.

Run 167

Latitude 54.42458 **Longitude** -110.2055

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 960

Leak Source Service Connection

Adjacent Manhole 2 961

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing

Smoke Intensity Moderate

Incident Comments Missing service cap in yard.



Incident Report

Incident 115

Location 4909 57 Ave.

Run 167

Latitude 54.42457 **Longitude** -110.20375

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 891

Leak Source Service Connection

Adjacent Manhole 2 960

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap in yard.



Incident 116

Location 4907 57 Ave.

Run 167

Latitude 54.42458 **Longitude** -110.20392

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 891

Leak Source Service Connection

Adjacent Manhole 2 960

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap in yard.



Incident 117

Location 4913 57 Ave.

Run 167

Latitude 54.42456 **Longitude** -110.2042

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 891

Leak Source Service Connection

Adjacent Manhole 2 960

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap in yard.



Incident Report

Incident 118

Location 4915 57 Ave.

Run 167

Latitude 54.42456 **Longitude** -110.20444

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 891

Leak Source Service Connection

Adjacent Manhole 2 960

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap in yard.



Incident 119

Location 4917 57 Ave.

Run 167

Latitude 54.42458 **Longitude** -110.20476

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 891

Leak Source Service Connection

Adjacent Manhole 2 960

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap in yard.



Incident 120

Location East of Highway 28 Off walking path **Run** 165

Latitude 54.4258 **Longitude** -110.2074

Leaking Manhole 428

Leak Size Light inflow

Adjacent Manhole 1 83

Leak Source Service Connection

Adjacent Manhole 2 424

Surface Cover Landscaped Area

Leak Type Sanitary Manhole Cover **Smoke Intensity** Moderate

Incident Comments Leaking around manhole collar



Incident Report

Incident 121

Location 5408 55 St. - in front of "The Rustic Trunk" (business)
Run179

Latitude 54.41932 **Longitude** -110.21393

Leaking Manhole N/A	Leak Size Light inflow
Adjacent Manhole 1 227	Leak Source Service Connection
Adjacent Manhole 2 857	Surface Cover Concrete Driveway
Leak Type Cleanout Cap Broken	Smoke Intensity Moderate

Incident Comments Broken service cap under manhole lid in a parking lot.



Incident 122

Location 5418 56 St. **Run** 180

Latitude 54.4203 **Longitude** -110.21553

Leaking Manhole N/A	Leak Size N/A
Adjacent Manhole 1 225	Leak Source Service Connection
Adjacent Manhole 2 607	Surface Cover Permanent Building
Leak Type Smoke Inside Building	Smoke Intensity High

Incident Comments Smoke in home. Suspected faulty plumbing connection.



Incident 123

Location In grass area - North of 5310 57 Ave. **Run** 181

Latitude 54.417994 **Longitude** -110.220425

Leaking Manhole N/A	Leak Size Light inflow
Adjacent Manhole 1 219	Leak Source Service Connection
Adjacent Manhole 2 220	Surface Cover Landscaped Area
Leak Type Service Connection	Smoke Intensity Moderate

Incident Comments Service cap missing on vacant yard. Pipe below grade.



Incident Report

Incident 124

Location 5204 - 57 St.

Run 181

Latitude 54.41616 **Longitude** -110.22036

Leaking Manhole N/A

Leak Size N/A

Adjacent Manhole 1 68

Leak Source Service Connection

Adjacent Manhole 2 69

Surface Cover Permanent Building

Leak Type Smoke Inside Building

Smoke Intensity High

Incident Comments Smoke in home. Suspected faulty plumbing connection – main floor bath tub.



Incident 125

Location 5708 52 Ave. - Backyard

Run 188

Latitude 54.41614 **Longitude** -110.22111

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 778

Leak Source Service Connection

Adjacent Manhole 2 779

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing

Smoke Intensity Moderate

Incident Comments Missing service cap in backyard.



Incident 126

Location 5708B 51 Ave. - Back lane

Run 189

Latitude 54.41499 **Longitude** -110.22119

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 535

Leak Source Service Connection

Adjacent Manhole 2 537

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken

Smoke Intensity Moderate

Incident Comments Broken service cap – back lane



Incident Report

Incident 127

Location 5802 51 Ave. - Backyard **Run** 189
Latitude 54.41493 **Longitude** -110.22312
Leaking Manhole N/A **Leak Size** Light inflow
Adjacent Manhole 1 54 **Leak Source** Service Connection
Adjacent Manhole 2 537 **Surface Cover** Landscaped Area
Leak Type Service Connection **Smoke Intensity** Moderate
Incident Comments Service cap missing in backyard



Incident 128

Location 5802 51 Ave. - Backyard **Run** 189
Latitude 54.41505 **Longitude** -110.22316
Leaking Manhole N/A **Leak Size** little - if any
Adjacent Manhole 1 54 **Leak Source** Service connection
Adjacent Manhole 2 537 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Defective **Smoke Intensity** Low
Incident Comments Defective service cap in backyard, close to back lane.



Incident 129

Location 5814 51 Ave. - Backyard **Run** 191
Latitude 54.41476 **Longitude** -110.22453
Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 772 **Leak Source** Service Connection
Adjacent Manhole 2 880 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Broken **Smoke Intensity** Low
Incident Comments Broken service cap.



Incident Report

Incident 130

Location 5804 50 Ave. - Backyard **Run** 190

Latitude 54.4137 **Longitude** -110.22392

Leaking Manhole N/A **Leak Size** Light inflow
Adjacent Manhole 1 772 **Leak Source** Service Connection
Adjacent Manhole 2 880 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate

Incident Comments Missing service cap in backyard.



Incident 131

Location 5203 56 St. - Backyard **Run** 182

Latitude 54.41621 **Longitude** -110.21684

Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 471 **Leak Source** Service Connection
Adjacent Manhole 2 538 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken service cap - in backyard, near back lane.



Incident 132

Location 5220 54 St. - Back Lane **Run** 197

Latitude 54.41663 **Longitude** -110.21356

Leaking Manhole N/A **Leak Size** Little - if any
Adjacent Manhole 1 491 **Leak Source** Service Connection
Adjacent Manhole 2 494 **Surface Cover** Landscaped Area
Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken service cap.



Incident Report

Incident 133

Location 5217 55 St.

Run 197

Latitude 54.41569 **Longitude** -110.2144

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 494

Leak Source Service Connection

Adjacent Manhole 2 805

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap (square)



Incident 134

Location 5214 52 Ave

Run 134

Latitude 54.41556 **Longitude** -110.21105

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 808

Leak Source Service Connection

Adjacent Manhole 2 812

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken service cap.



Incident 135

Location 5202 51 Ave in front of "The Red Rooster" **Run** 202

Latitude 54.4145 **Longitude** -110.20956

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 810

Leak Source Service Connection

Adjacent Manhole 2 811

Surface Cover Concrete Driveway

Leak Type Cleanout Cap Broken **Smoke Intensity** Moderate

Incident Comments Broken service cap.



Incident Report

Incident 136

Location 5030 50 St.

Run 202

Latitude 54.41409 **Longitude** -110.2059

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 254

Leak Source Service Connection

Adjacent Manhole 2 255

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing

Smoke Intensity Moderate

Incident Comments Missing Service cap - East of apartments, in grass near parking lot (black pipe)



Incident 137

Location 5109 51 Ave - "Herbs for Less" **Run** 202

Latitude 54.41428 **Longitude** -110.20862

Leaking Manhole N/A

Leak Size N/A

Adjacent Manhole 1 254

Leak Source Service Connection

Adjacent Manhole 2 810

Surface Cover Permanent Building

Leak Type Smoke Inside Building

Smoke Intensity Moderate

Incident Comments Smoke in business. Existing plumbing drain, requires cap.



Incident 138

Location 49 St. + 51 Ave. - In grass area **Run** 207

Latitude 54.41431 **Longitude** -110.20364

Leaking Manhole No MH ID on map **Leak Size** Little - if any

Adjacent Manhole 1 257

Leak Source Main Sewer

Adjacent Manhole 2 259

Surface Cover Landscaped Area

Leak Type Sanitary Manhole Cover **Smoke Intensity** Low

Incident Comments Raised manhole in field leaking around risers.



Incident Report

Incident 139

Location 49 St. + 51 Ave. - In grass area **Run** 119

Latitude 54.41427 **Longitude** -110.20358

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 257

Leak Source Service Connection

Adjacent Manhole 2 259

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing

Smoke Intensity Moderate

Incident Comments x6 Missing service caps. Raised white pipes in field.



Incident 140

Location 4701 50 St.

Run 211

Latitude 54.41021 **Longitude** -110.20492

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 754

Leak Source Service Connection

Adjacent Manhole 2 755

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken

Smoke Intensity Low

Incident Comments Broken service cap.



Incident 141

Location 4704B 48 St.

Run 213

Latitude 54.41027

Longitude -110.20225

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 543

Leak Source Service Connection

Adjacent Manhole 2 544

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap.



Incident Report

Incident 142

Location 4611 48 St.

Run 213

Latitude 54.40985 **Longitude** -110.20019

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 545

Leak Source Service Connection

Adjacent Manhole 2 546

Surface Cover Sidewalk

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap - Cast iron cap "Cavity"



Incident 143

Location 4611 48 St.

Run 214

Latitude 54.41052 **Longitude** -110.20003

Leaking Manhole N/A

Leak Size N/A

Adjacent Manhole 1 545

Leak Source Service Connection

Adjacent Manhole 2 547

Surface Cover Permanent Building

Leak Type Smoke Inside Building **Smoke Intensity** Moderate

Incident Comments Smoke in home. Open plumbing fitting in basement.



Incident 144

Location East end of 43 Ave

Run 219

Latitude 54.40709 **Longitude** -110.20797

Leaking Manhole 568

Leak Size Moderate inflow

Adjacent Manhole 1 976

Leak Source Main Sewer

Adjacent Manhole 2 977

Surface Cover Landscaped Area

Leak Type Sanitary Manhole Cover **Smoke Intensity** High

Incident Comments Manhole open. Riser broken.



Incident Report

Incident 145

Location 50 St. - Back lane

Run 224

Latitude 54.40111 **Longitude** -110.20667

Leaking Manhole 573

Leak Size Medium inflow

Adjacent Manhole 1 47

Leak Source Main Sewer

Adjacent Manhole 2 572

Surface Cover Gravel Area

Leak Type Sanitary Manhole Cover **Smoke Intensity** Moderate

Incident Comments Manhole offset, partially buried under gravel.



Incident 146

Location 3602 50 St.

Run 224

Latitude 54.40062 **Longitude** -110.20638

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 47

Leak Source Service Connection

Adjacent Manhole 2 573

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate

Incident Comments Missing service cap.



Incident 147

Location 34 Ave + 50 St. - Vacant lot

Run 225

Latitude 54.39898 **Longitude** -110.20613

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 440

Leak Source Service Connection

Adjacent Manhole 2 575

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate

Incident Comments Missing service cap - Vacant lot in grass area



Incident Report

Incident 148

Location 3013 Red Fox Dr.

Run 226

Latitude 54.39411 **Longitude** -110.20902

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 444

Leak Source Service Connection

Adjacent Manhole 2 445

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing

Smoke Intensity Moderate

Incident Comments Missing service cap.



Incident 149

Location 3021 Red Fox Dr.

Run 226

Latitude 54.39451 **Longitude** -110.2084

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 443

Leak Source Service Connection

Adjacent Manhole 2 444

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken

Smoke Intensity Moderate

Incident Comments Defective service cap, raise pipe cracked.



Incident 150

Location 3025 Red Fox Dr.

Run 226

Latitude 54.39467 **Longitude** -110.20805

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 443

Leak Source Service Connection

Adjacent Manhole 2 444

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective

Smoke Intensity Low

Incident Comments Defective service cap.



Incident Report

Incident 151

Location 3001 Red Fox Dr.

Run 226

Latitude 54.39381 **Longitude** -110.21004

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 444

Leak Source Service Connection

Adjacent Manhole 2 445

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap.



Incident 152

Location 5209 Drake Dr.

Run 229

Latitude 54.39195 **Longitude** -110.21043

Leaking Manhole N/A

Leak Size Little - if any

Adjacent Manhole 1 447

Leak Source Service Connection

Adjacent Manhole 2 448

Surface Cover Landscaped Area

Leak Type Cleanout Cap Broken **Smoke Intensity** Low

Incident Comments Broken service cap.



Incident 153

Location 5205 Drake Dr.

Run 229

Latitude 54.39193 **Longitude** -110.20994

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 447

Leak Source Service Connection

Adjacent Manhole 2 448

Surface Cover Landscaped Area

Leak Type Cleanout Cap Missing **Smoke Intensity** Moderate

Incident Comments Service cap missing - wooden cover. Grade sloped toward pipe.



Incident Report

Incident 154

Location 5109 Drake Dr.

Run 229

Latitude 54.39202 **Longitude** -110.20876

Leaking Manhole N/A

Leak Size Light inflow

Adjacent Manhole 1 447

Leak Source Service Connection

Adjacent Manhole 2 448

Surface Cover Landscaped Area

Leak Type Cleanout Cap Defective **Smoke Intensity** Low

Incident Comments Defective service cap.





Appendix G
July 21st, 2017 Memorandum





To: **Rezaur Bhuiyan, M.Sc., P.Eng.** Date: **September 15, 2017**

Attention: **Inflow-Infiltration Program Project Team** Project No.: **26367**

Cc: **Azam Khan, P.Eng., Colin Thibeau, C.E.T.**

Reference: **Cold Lake Inflow-Infiltration Program – July 21, 2017 Rainfall Event**

From: **Garnet Dawes, P.Eng., Rafal Jadzinski, P.Eng., Sarah Barbosa, E.I.T.**

1.0 Purpose

On July 21st, 2017, Cold Lake experienced a rainfall event that resulted in significant sewer back-up issues throughout the city. Sewer back-ups were recorded in roughly twelve locations in Cold Lake North and eleven locations in Cold Lake South. Existing assessment results that were provided in the draft Cold Lake Inflow-Infiltration Program report do not indicate pipe limitations in the noted back-up locations. Thus, the City has indicated that they would like insight into why these issues were not highlighted previously.

Consequently, the objective of this memo is to demonstrate that the high intensity and short duration thunderstorm experienced on July 21st 2017 resulted in unprecedented I-I rates which lead to the above noted sewer back-ups. This is despite the fact that the City's sanitary collection system was found to have adequate capacity under both theoretical inflow-infiltration (I-I) rates and those ensuing from the design rainfall events applied to a calibrated model based on the observed 2015-2016 flow monitoring data. The resulting system-wide I-I rates were determined to be very extreme, with the worst analyzed area yielding a value of roughly 30L/s/ha compared to the design standard of 0.29L/s/ha. The corresponding peak wet weather to peak dry weather flow (PWWF/PDWF) ratio for this particular area was calculated to be 126, when a ratio of four (4) would typically be considered a sound threshold to indicate significant inflow sources.

As a result, a number of aspects that might have contributed to the observed system surcharge were investigated to illustrate the point. These consisted of the following:

Rainfall Analysis

- A rainfall analysis of the July 21st, 2017 event based on the rain gauge data supplied by SFE Global, and a comparison to the previous events utilized for calibration of the sanitary model.
- A rainfall analysis of the July 21st, 2017 event based on the historical weather radar imagery obtained from Environment Canada's website to estimate the maximum return period for the thunderstorm and investigate the potential for spatial variability throughout the city.

Sanitary Collection System Analysis

- A comparison of the projected inflow-infiltration (I-I) rates for the theoretical design storms with the return period of 25-, 50-, 100-, and 200-Year, against those modelled based on the July 21st 2017 thunderstorm.



- A sanitary system response, based on the calibrated hydrodynamic model using the 2015-2016 flow monitoring and rain gauge data, under the July 21st 2017 thunderstorm, in addition to the 100-Year and 200-Year 24 Hour Huff Design Storms.

Flow Monitoring Analysis

- A comparison of the inflow-infiltration (I-I) rates for the observed July 21st, 2017 rainfall event, based on the flow monitoring data supplied by SFE Global, with the previously determined rates.

Smoke Testing / Field Investigation Observations

- An analysis of the 2016 / 2017 smoke testing and how the results likely influenced the surcharged state of the sanitary system on July 21st, 2017.

2.0 Rainfall Analysis

The purpose of the rainfall analysis is to determine the return period of the July 21st, 2017 rainfall event. Consequently, it allows for a form of comparison between the observed July 21st rainfall event, the observed events used for WWF calibration, as well as the theoretical 1:25 and 1:50 year design storms as the City's sanitary system was originally calibrated to roughly a 1 in 2 year rainfall event based on the available 2015-2016 flow monitoring and rainfall data. Rainfall analysis was performed in terms of the Rain Gauge 1 data provided by SFE Global as well as the historical weather radar imagery obtained by Environment Canada, as described below in Sections 2.1 and 2.2, respectively.

2.1 July 21st 2017 Return Period Based on Provided Rain Gauge Data

The rainfall event that occurred on July 21st, 2017 recorded 29.4 mm of precipitation according to historic weather data, and is classified as a thunderstorm. Thunderstorms are usually accompanied with intense rain that is frequently quite spatially varied. That said, due to the footprint of Cold Lake it is likely that portions of the city received higher intensity rainfall than others. This is consistent with the typical observations noted by the City in the past and the fact that two (2) rain gauges were installed in the 2015-2016 monitoring program to address the issue of spatial variability. Hence, this is an important factor to keep in mind when reviewing the rain gauge data, as it is possible that areas of the city experienced larger volumes of rain than others.

Rainfall data for Rain Gauge 1, located in the Cold Lake North, was obtained from SFE Global in order to conduct an analysis of the rainfall event at that specific location. It is noted that the data for Rain Gauge 2, located in Cold Lake South, was not available, thus has been excluded from the analysis. The obtained rainfall data was assessed in order to determine the return period of the storm. The maximum rainfall depth was recorded for the 5 minute, 10 minute, 15 minute, 30 minute, 60 minute, 1 hour, and 2 hour durations, and plotted onto Cold Lake's IDF curve to determine the maximum return period. This is illustrated below, following the radar imagery analysis in Figure 2.2.

From the IDF curve below, it is noted that the maximum return period of the storm at Rain Gauge 1 is right at the 1:10 year mark based on the 2-hour rainfall duration. That said, due to the spatial variance of thunderstorms, it is possible that the return period was greater in another portion of the city. As a result, an analysis of historical weather radar imagery was undertaken to determine the range in intensity in the city as a whole.



2.2 July 21st 2017 Return Period Based on Historical Weather Radar Imagery

A summary of the rainfall intensity ranges obtained from the historical weather radar imagery, published on the Environment Canada's website, from 9:20am to 11:20am are shown below in Table 2.1. An example of the historical weather radar is shown below in Figure 2.1.

Table 2.1: Intensity Ranges of Historical Weather Radar on July 21st, 2017

Time	Maximum Intensity (mm/hr)
9:20:00 AM	12
9:30:00 AM	100
9:40:00 AM	24
9:50:00 AM	12
10:00:00 AM	100
10:10:00 AM	100
10:20:00 AM	100
10:30:00 AM	50
10:40:00 AM	50
10:50:00 AM	24
11:00:00 AM	24
11:10:00 AM	12
11:20:00 AM	4



Figure 2.1: Historical Weather Radar on July 21st, 2017 (Environment Canada)



This analysis indicates that the rainfall event arrived in Cold Lake at roughly 9:20am MDT at an intensity ranging from 4mm/hr to 12mm/hr. For the next two hours, the event lingers over the city and varies in intensity, with the maximum intensity range over a 30 minute period of 50mm/hr to 100mm/hr. Hence, in actuality the return period of this storm could have been 1:100 year or greater event in various parts of the city based on the observed maximum rainfall intensity values. Cold Lake's IDF curve with the results of both the Rain Gauge 1 and historical weather radar imagery analysis are shown in Figure 2.2.

The historical radar images also indicate that the July 21st, 2017 thunderstorm was preceded by rainfall that started around midnight, in addition to rainfall events recorded in previous days leading to the thunderstorm. This in effect would contribute to the initialization of the antecedent moisture conditions (AMC) of the soil i.e. the ground would already be wetted and saturated to some extent thus resulting in a higher runoff volume compared to drier conditions.

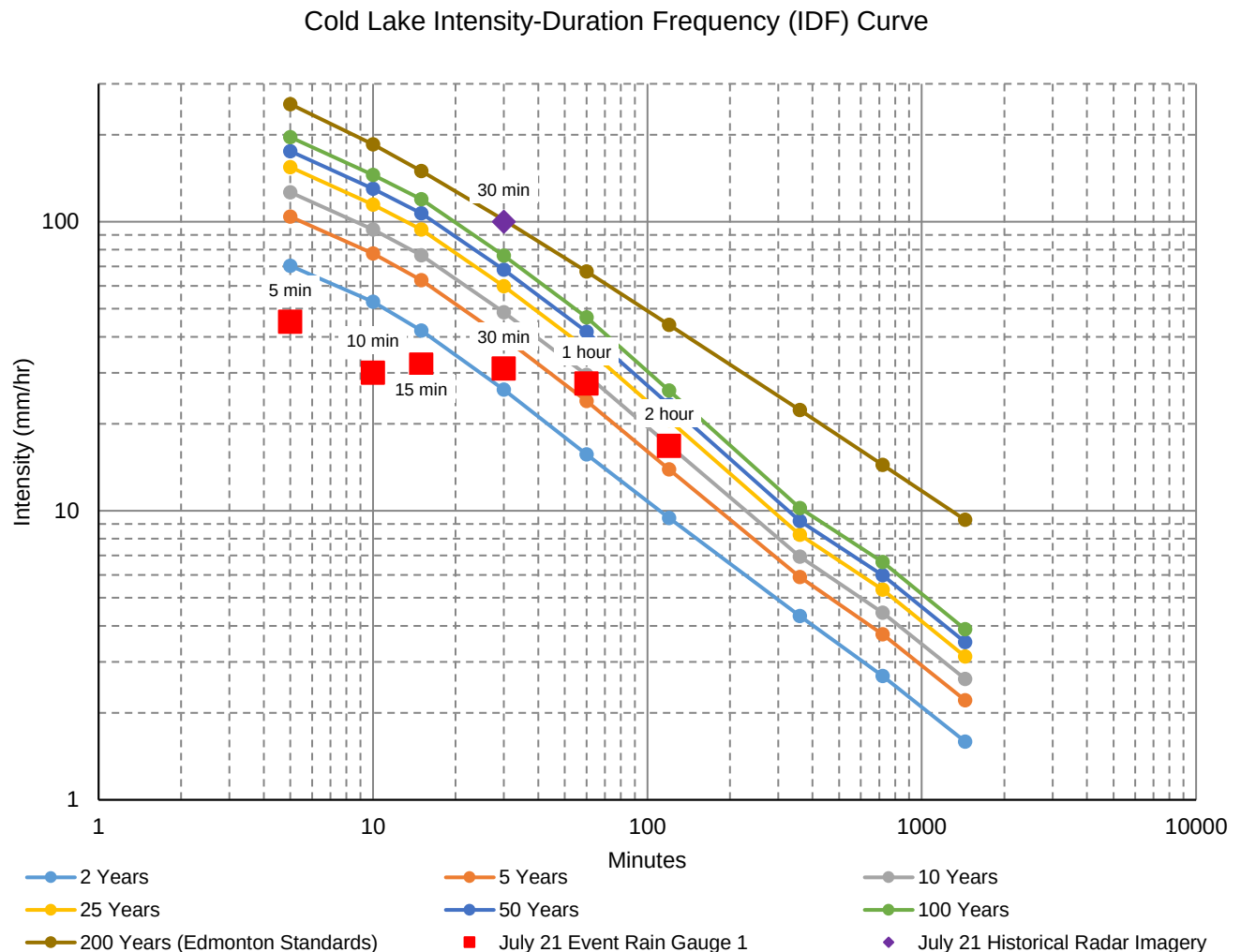


Figure 2.2: Identification of July 21st, 2017 Event Rain Gauge 1 and Historical Radar Imagery Return Period



3.0 Model Results

One of the critical factors when reviewing the results of assessment scenarios is the basis of the wet weather flow (WWF) calibration process which took place after the 2016 flow monitoring period. The WWF calibration is completely dependent on the quality of the flow monitoring data and severity of the rainfall events that were observed during the flow monitoring period. Due to a number of factors including the responsiveness of the system during each rainfall event, faulty data and lack of rainfall events of varying return periods, specific WWF periods were utilized for the calibration process. These are summarized below in Table 3.1:

Table 3.1: Summary of Selected WWF Periods used for the 2016 Calibration

Flow Monitor(s)	WWF Period	Peak WWF Date	Return Period
Site 1	September 30 th to October 7 th , 2016	October 1 st	Less than a 1:2 year event
Site 2	July 13 th to July 20 th , 2015	July 13 th	Less than a 1:2 year event
Site 3	August 21 st to August 28 th , 2016	August 22 nd	Less than a 1:2 year event
Sites 4, 5, 6, 8	August 8 th to August 15 th , 2016	August 9 th	Less than a 1:2 year event
Site 7A	May 27 th to June 3 rd , 2016	May 28 th	Less than a 1:2 year event
Site 7B	July 2 nd to July 9 th , 2016	July 3 rd and July 8 th	1:2 year event

Three additional modelling scenarios were undertaken for this analysis to determine what rainfall event would be required to observe the same backups as the July 21st, 2017 event, as described below:

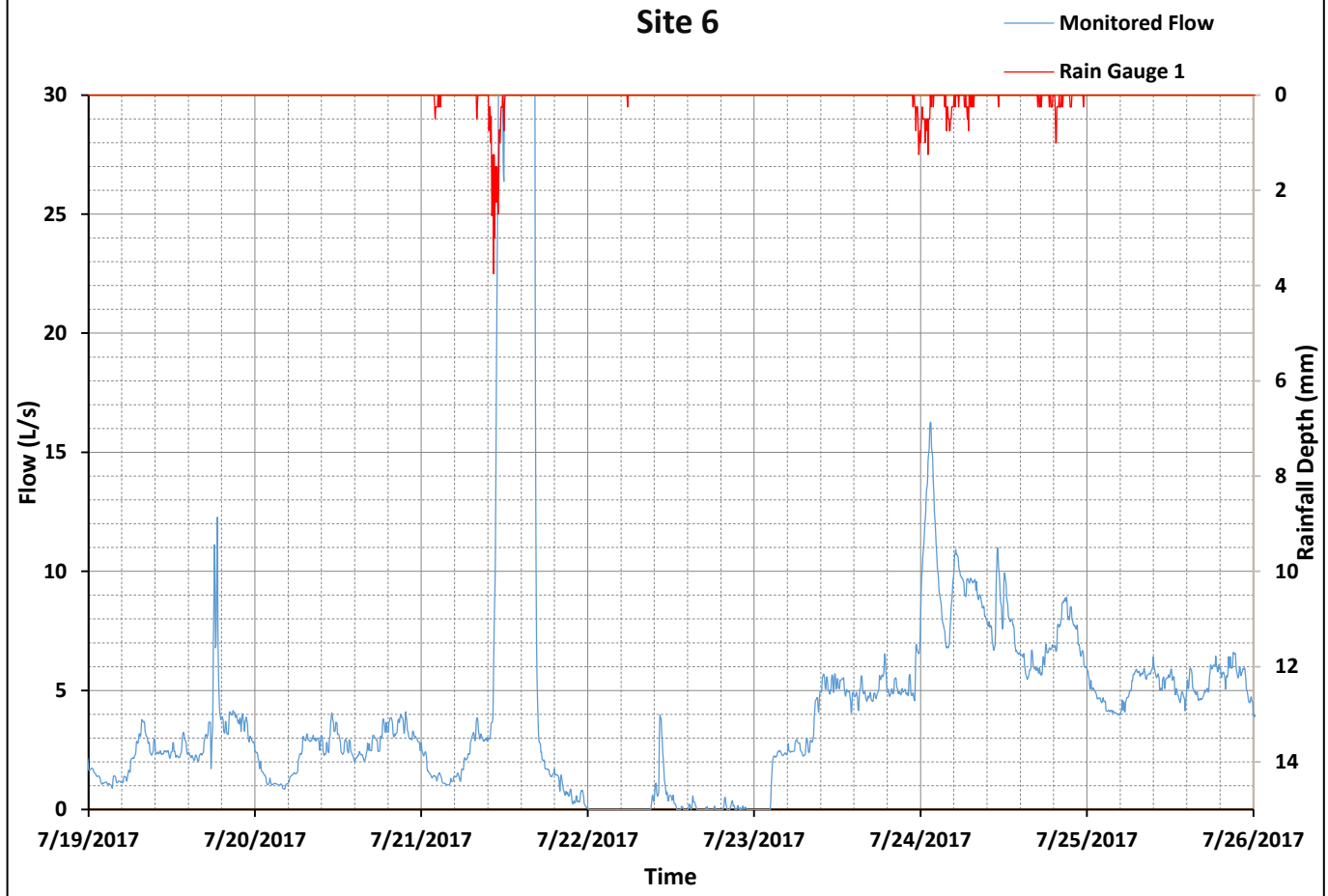
- Existing Dry Weather Flow plus 100 Year 24 Hour Q3 Huff Storm.
 - Figures 3.1 and 3.2 for Cold Lake North and South, respectively.
- Existing Dry Weather Flow plus 200 Year 24 Hour Q3 Huff Storm.
 - Figures 3.3 and 3.4 for Cold Lake North and South, respectively.
 - Note that the 200 Year Huff Storm was adopted from Edmonton, as no standards to this degree are available for Cold Lake.
- Existing Dry Weather Flow plus July 21st, 2017 Rain Gauge 1 Rainfall Event.
 - Figures 3.5 and 3.6 for Cold Lake North and South, respectively.
 - Note that the pumping rate at Building 3 Lift Station was adjusted to 120L/s and the pumping rate at Building 9 Lift Station was adjusted to 270L/s to represent real life operating conditions of that day.

The results from these assessments indicate that the sanitary system performs quite adequately under the 1:100 year and July 21st, 2017 storms. It is not until the 1:200 year event is applied where capacity constraints become evident. In this scenario, with the sewer back-up locations superimposed, it is evident that there is a fair amount of overlap. That said, the July 21st, 2017 rainfall event would be in the order of a 1:200 year event based on the calibrated model.

A key note is that the model was calibrated based on relatively tamed storms as it was the best data available at the time of calibration. The system appears to behave quite differently under the recently observed thunderstorm than other regular type storms. This is demonstrated in the following graphic, Figure 3.7.



Figure 3.7: Site 6 2017 Flow Monitoring Data – July 19th to July 24th



The longer but less intense storm on July 24th, 2017 (roughly a 1:2 year return period) at Site 6 has a peak flow of roughly 16L/s, compared to the peak of 567L/s just three days before. The July 24th rainfall indicates more of a slow response, in which baseflows rise quite significantly. This illustrates that the system responds quite differently depending on the type of storm, and due to the AMC and additional area activation of the July 21st event a much higher inflow was observed. That said, a thunderstorm like the one recorded on July 21st, produced very extreme I-I rates to unprecedented levels which would be erroneous to assess the system under. The peak WWF/DWF ratio of greater than 4 indicates that the City should put focus on I-I removal, since the assessments done to date indicate that the piped system does have relatively speaking adequate pipe capacity.



4.0 Flow Monitoring Analysis

To test the potential runoff rates generated in the system, a combination of flow monitoring data review and checking runoff rates generated by the July 21st, 2017 Rain Gauge 1 event was undertaken. The observed I-I rates could then be compared to the theoretical Huff design storms and the constant I-I rates in order to understand the magnitude of inflow from this thunderstorm event. Table 4.1 summarizes rates observed through the 2017 flow monitoring. The selected 2017 flow monitoring locations are illustrated in Figures 4.1 and 4.2 for Cold Lake North and South, respectively, while flow graphs are shown in Figures 4.3 to 4.8 for Sites 5, 6, 8, 11, 12A and 12B, respectively. Please note that flow monitoring data is unavailable at the moment for Sites 1, 9, and 10. The 2017 monitors are currently installed, and these specific sites do not have their wireless functions activated due to weak signal strength.

Table 4.1: Observed Inflow-Infiltration Rates based on 2017 Flow Monitoring Data

FM Site	DWF Peak Flow (L/s)	WWF Peak Flow (L/s)	Difference (L/s)	WWF/DWF Ratio	Upstream Area ¹ (ha)	2017 I-I Rate (L/s/ha)
FM #1	Flow Monitoring Data Not Yet Available					
FM #5	20	81.67	61.67	4.08	79.17	0.779
FM #6	4.5	567	562.5	126.00	18.45	30.494
FM #8	4	16.52	12.52	4.13	20.17	0.621
FM #9	Flow Monitoring Data Not Yet Available					
FM #10	Flow Monitoring Data Not Yet Available					
FM #11	4	18.55	14.55	4.64	20.72	0.702
FM #12A	1	8	7	8.00	52.88	0.132
FM #12B	3.8	182.6	178.8	48.05	54.78	3.264

¹ Based on 2016 Catchment Areas

I-I rates that are above the City's design guideline of 0.29L/s/ha are highlighted in red, while sites with I-I rates less than the 0.29L/s/ha are indicated in green. It is evident that from the flow monitoring data that was available for the July 21st, 2017 rainfall event all but one site is over the recommended rate. In many cases the I-I rate is twice the recommended value, in one case it is roughly ten times the recommended value, and at Site 6, the I-I rate is over one hundred times the recommended value. As mentioned, a WWF/DWF ratio greater than four (4) is a good indication that inflow is an issue; these are highlighted above in red.

For the 2017 flow monitoring program, it was decided to focus on the areas upstream of Site 1 and Site 6, as they showed the most significant I-I rates in previous years. Sites 9 and 10 are upstream of Site 1, and Sites 11 and 12B are upstream of Site 6. This year's flow monitoring program reconfirms the extreme I-I rates at Site 6, and it is expected to illustrate the same at Site 1 once the flow monitoring data has been completely updated. These findings are consistent with the analysis presented in the draft report, and only emphasizes that the inflow is severely magnified under high intensity- short duration thunderstorms. Unfortunately, as stated above a thunderstorm-like rainfall event was not apparent from the 2015/2016 flow monitoring data and thus such observation could not have been made based on that data.



The results clearly indicate that excessive inflow into the system during this event is a major reason for the backups. The calculated I-I rates indicate that most likely there is a direct stormwater discharge into the sanitary system, such as interconnections to the drainage system or missing manhole lids where the sewer runs in a depression that under intense thunderstorms fills with runoff amongst other possible sources of inflow. These findings instill the validity and appropriateness of the decision to undertake a system-wide I-I Program. The I-I rate upstream at Site 11 is 0.702L/s/ha, at Site 12B is 3.264L/s/ha and downstream at Site 6 is 30.494L/s/ha. This indicates that there are multiple sources of high inflow in the catchment area upstream of Site 6, as the rate is drastically increasing from each site.

The observed basement back-ups in the Cold Lake North and South are considered to be a result of extremely high inflows which consequently resulted in a number of key lift stations being inundated leading to propagation of the surcharge/backups further upstream of the sanitary collection system or additional flows beyond typical lift station discharges being pumped to the downstream sections of the system.

At Building 9 Lift Station, ISL was informed that two of the three pumps were pumping at 270L/s, while the third pump went out of operation the previous night. Previous drawdown tests of this lift station recorded a pumping capacity of 290L/s with two pumps running, meaning that during this storm the lift station was operating below capacity. With an inflow of 600L/s+, the sewer backups in Cold Lake South can be attributed to backups at the lift station due to significantly increased flows from inflow-infiltration sources. At Building 3 Lift Station, ISL was informed that the wet well was surged and the pumps were discharging at 120L/s. As the wet well was surged, backups upstream of the lift station were also likely to have occurred. This would explain the majority of sewer backups in Cold Lake North. These observations are consistent with the modelling results corresponding to a rainfall event with a return period between a 1:100 year and 1:200 year Huff design storm.



Figure 4.3: Site 5 2017 Flow Monitoring Data

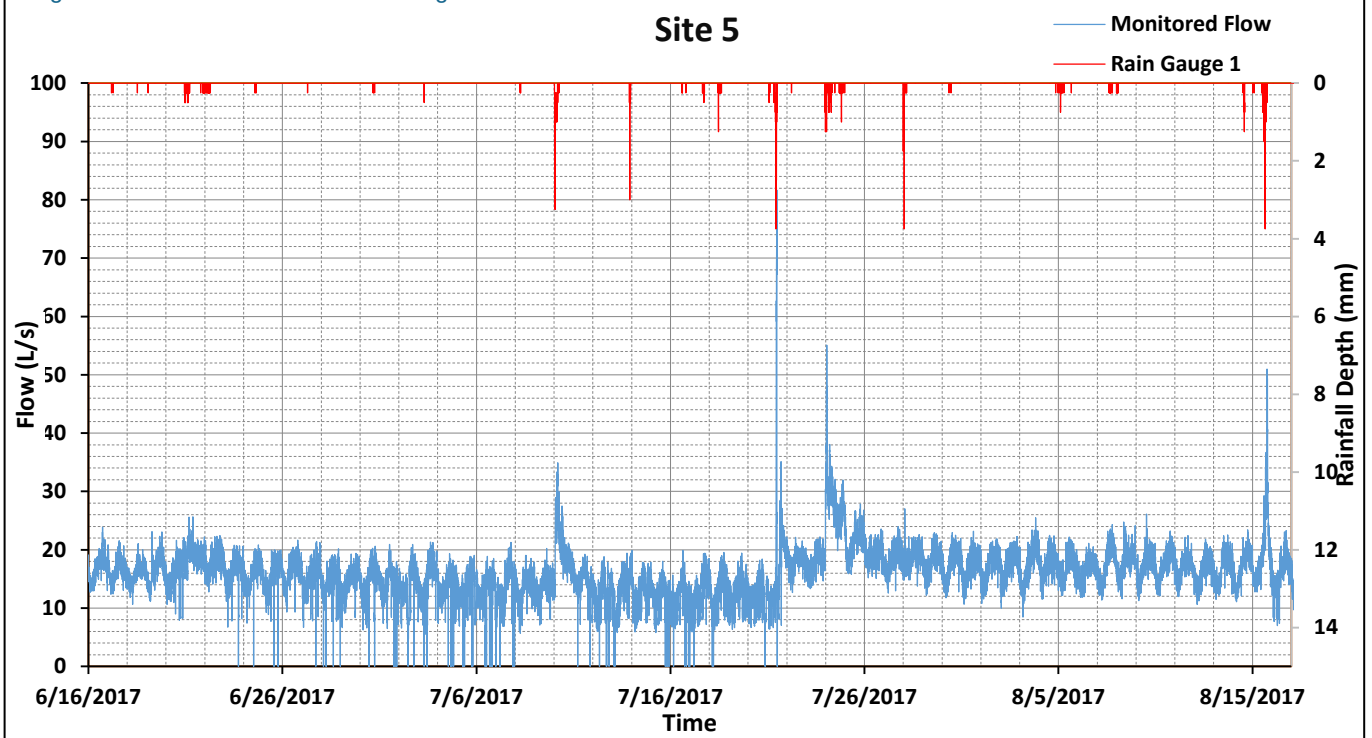


Figure 4.4: Site 6 2017 Flow Monitoring Data

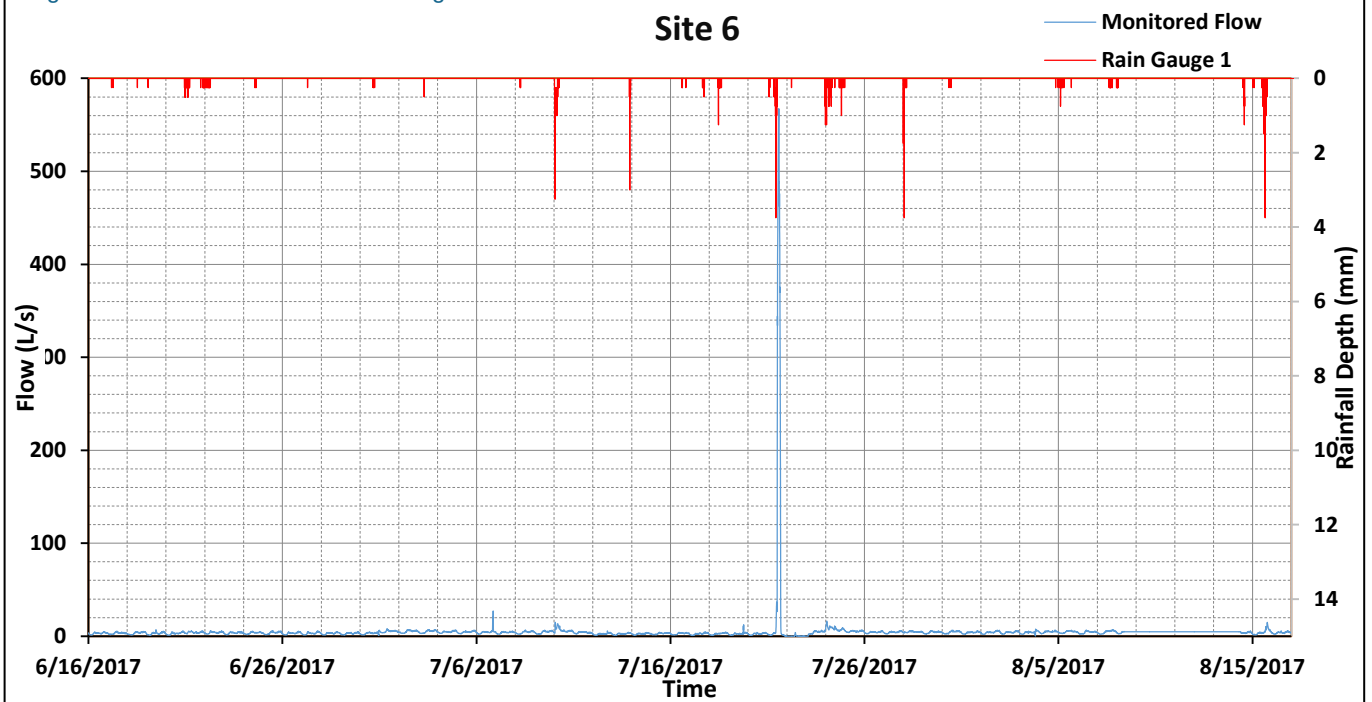




Figure 4.5: Site 8 2017 Flow Monitoring Data

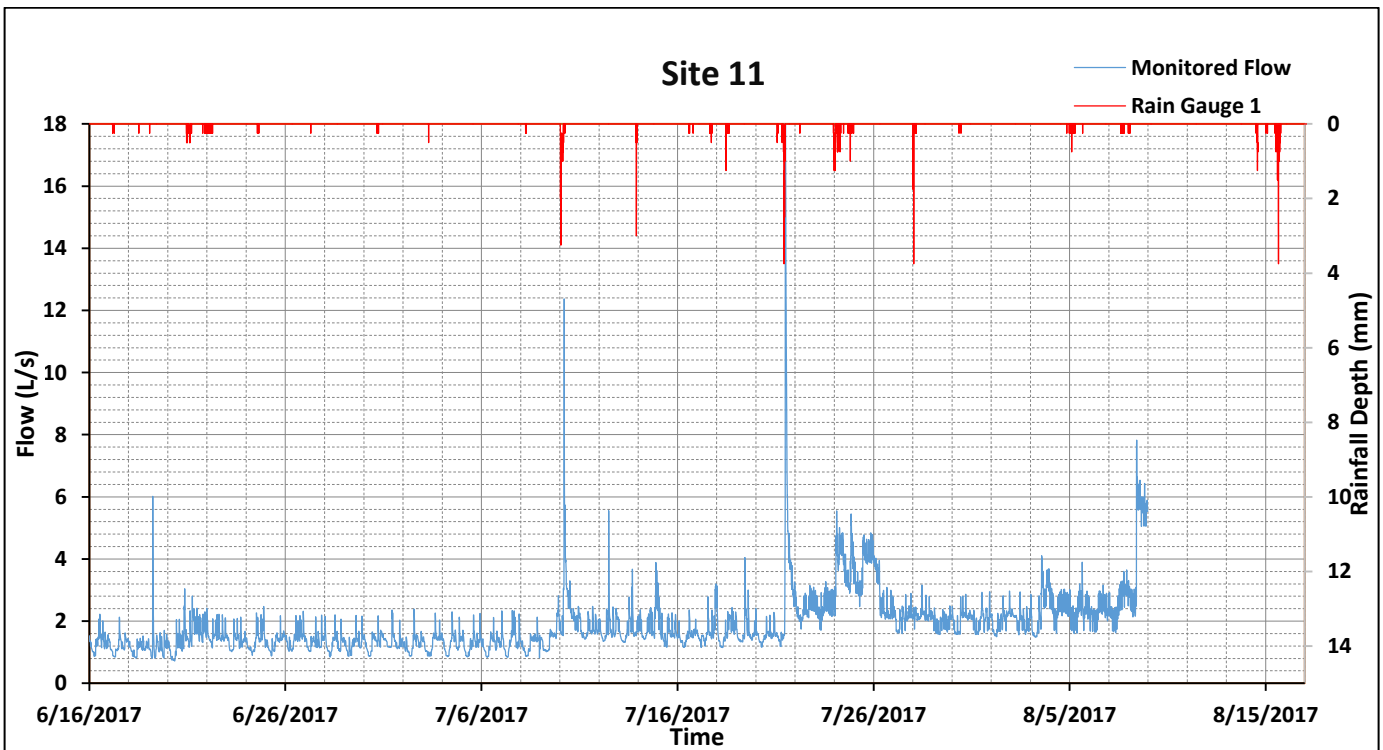
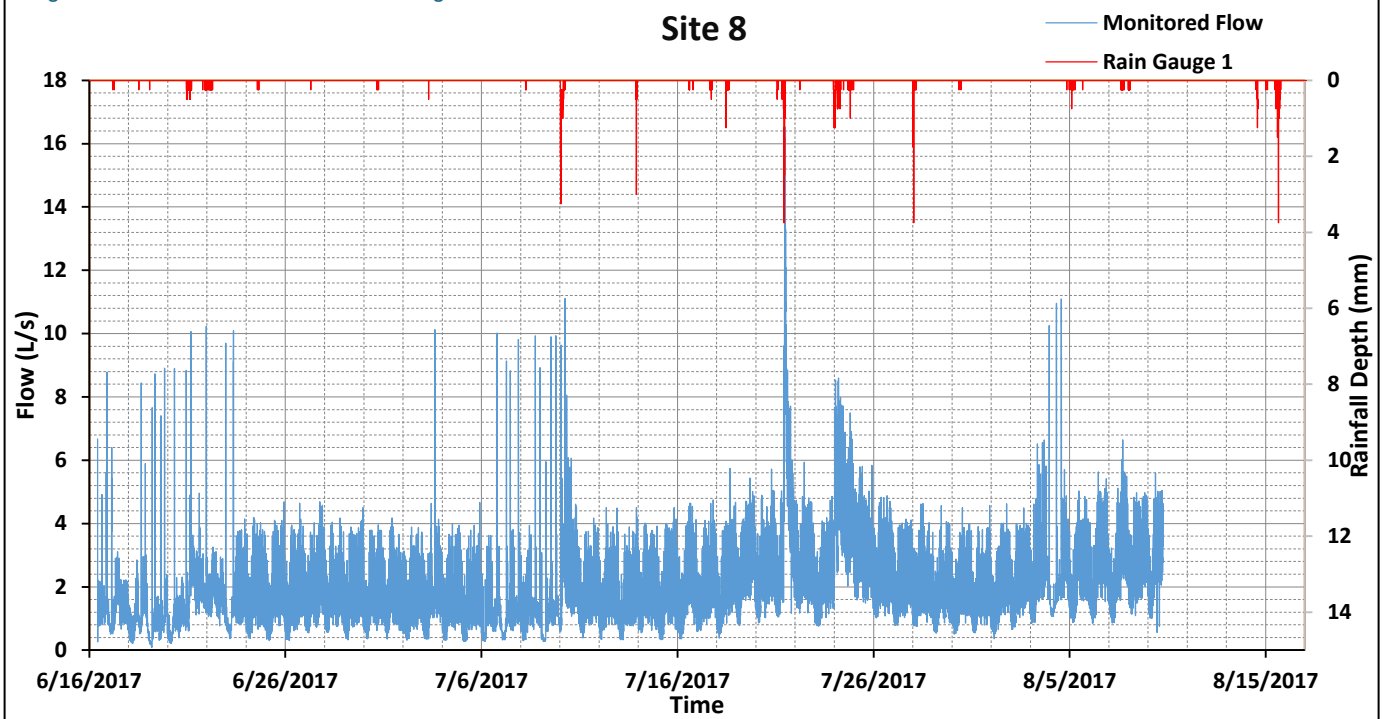




Figure 4.7: Site 12A 2017 Flow Monitoring Data

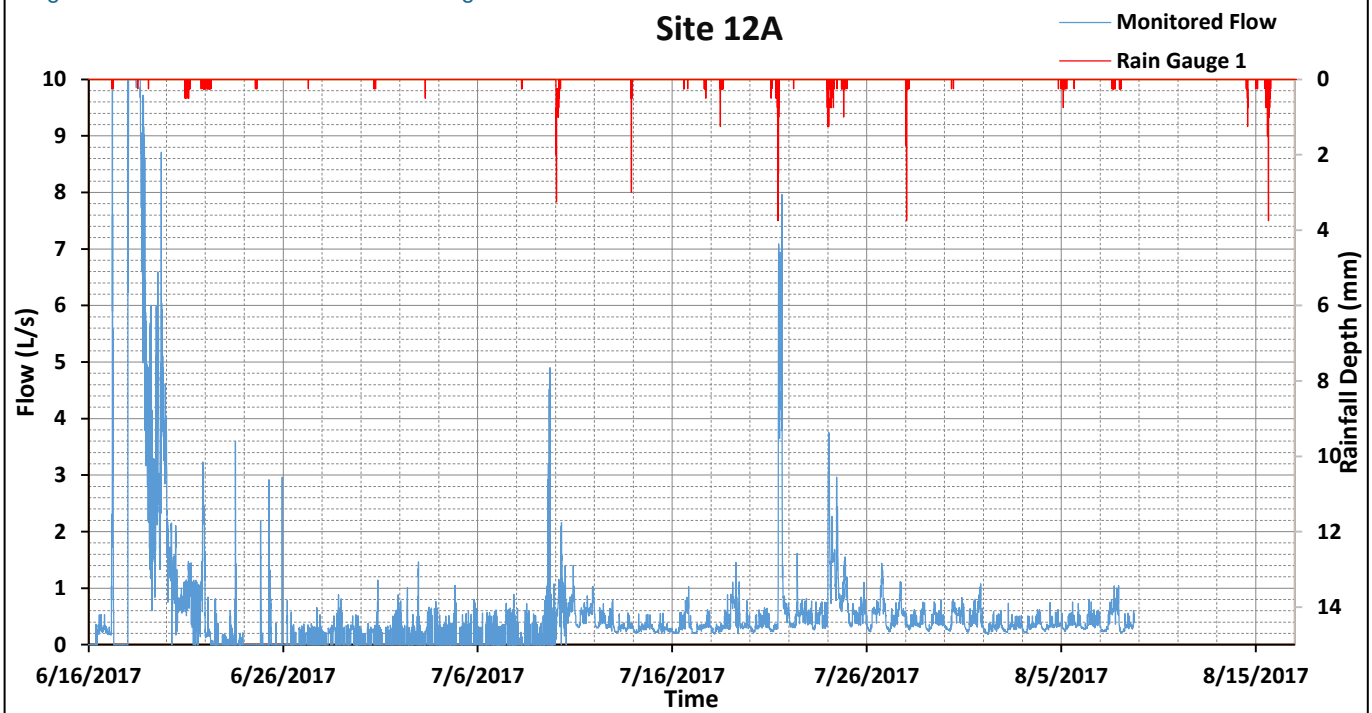
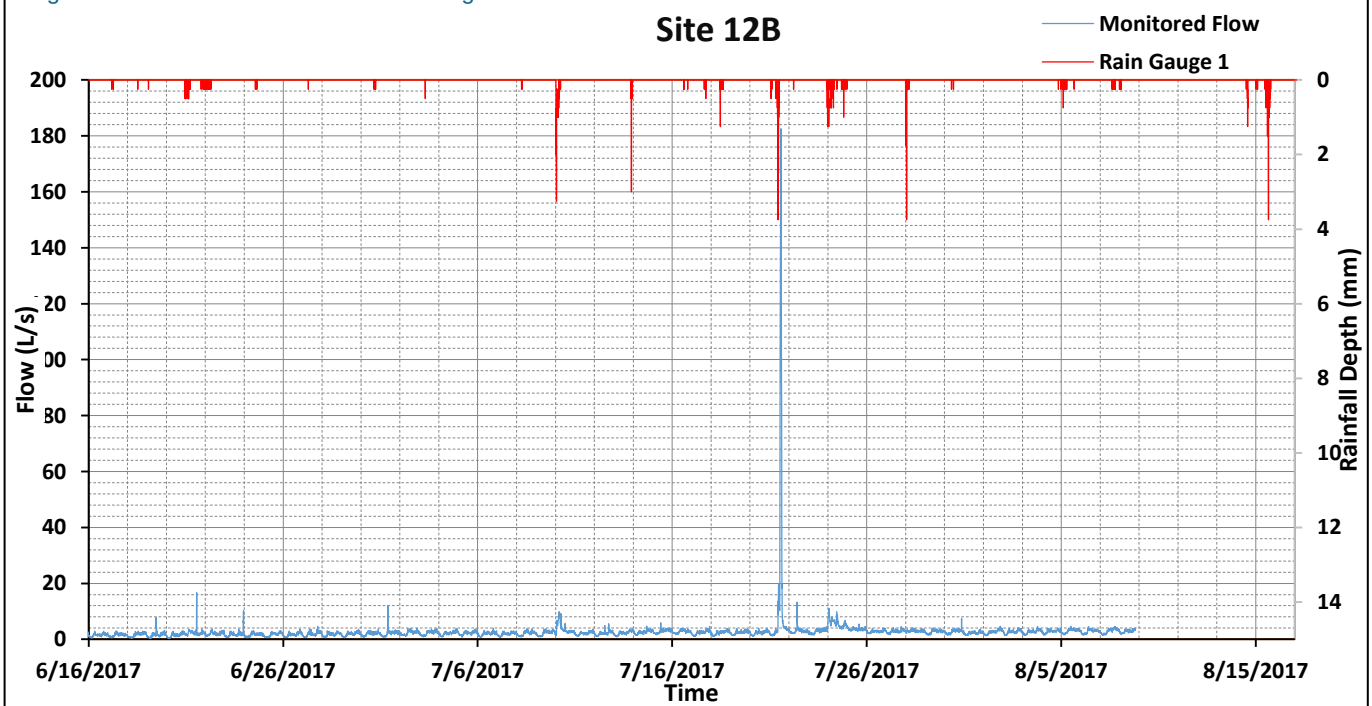


Figure 4.8: Site 12B 2017 Flow Monitoring Data





The runoff rates of each design scenario and the constant I-I rates of 0.29L/s/ha and 0.60L/s/ha are compared to the observed I-I rate from the July 21st, 2017 event in Figures 4.9 and 4.10 below. The observed I-I rates represent the measured peak WWF minus the measured peak DWF divided by the corresponding total upstream catchment area. Similarly, the modelled I-I rates represent the sum of discharge from the upstream catchments divided by the corresponding total upstream catchment area.

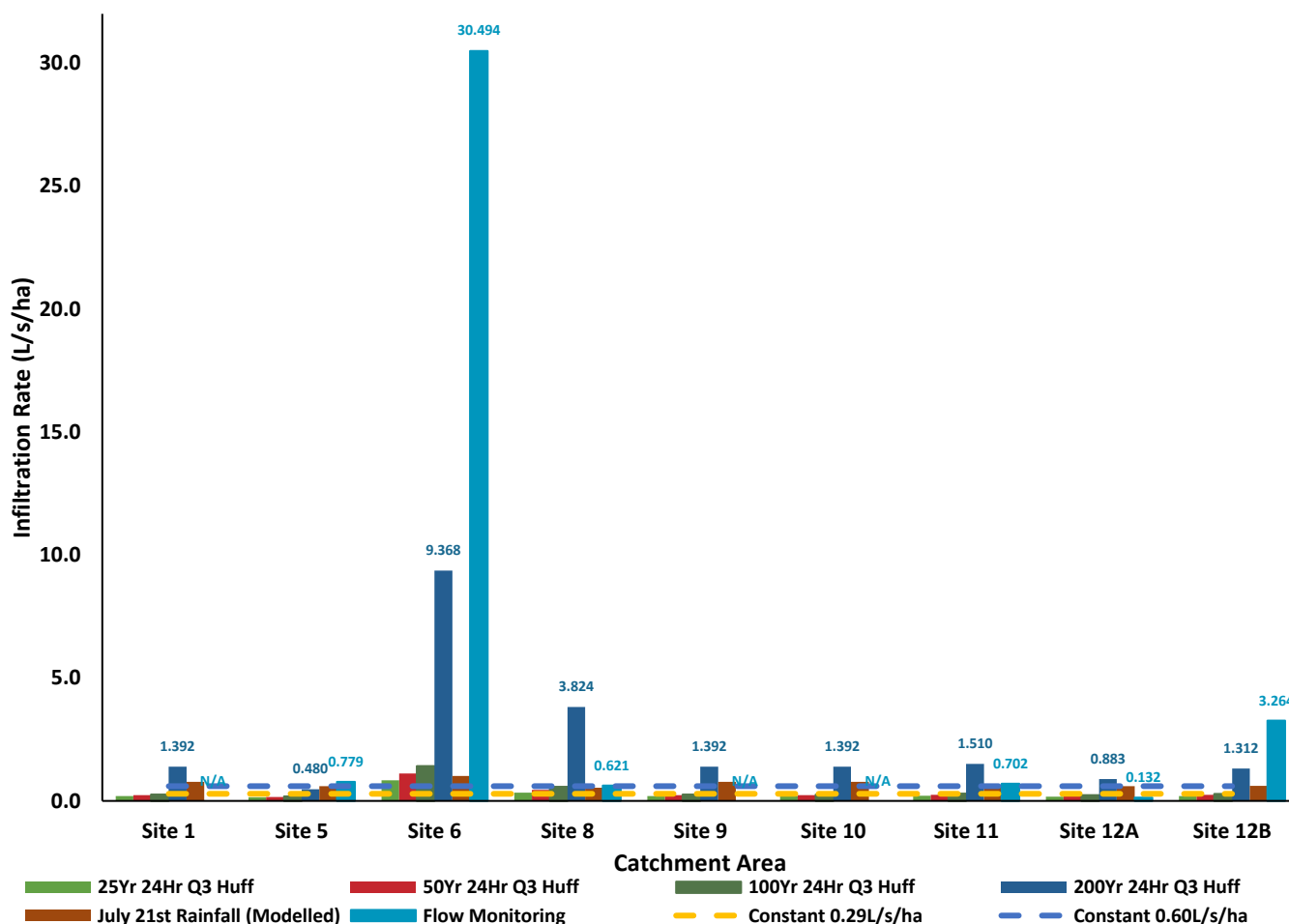


Figure 4.9: Comparison of Inflow-Infiltration Rates for Each Catchment Area

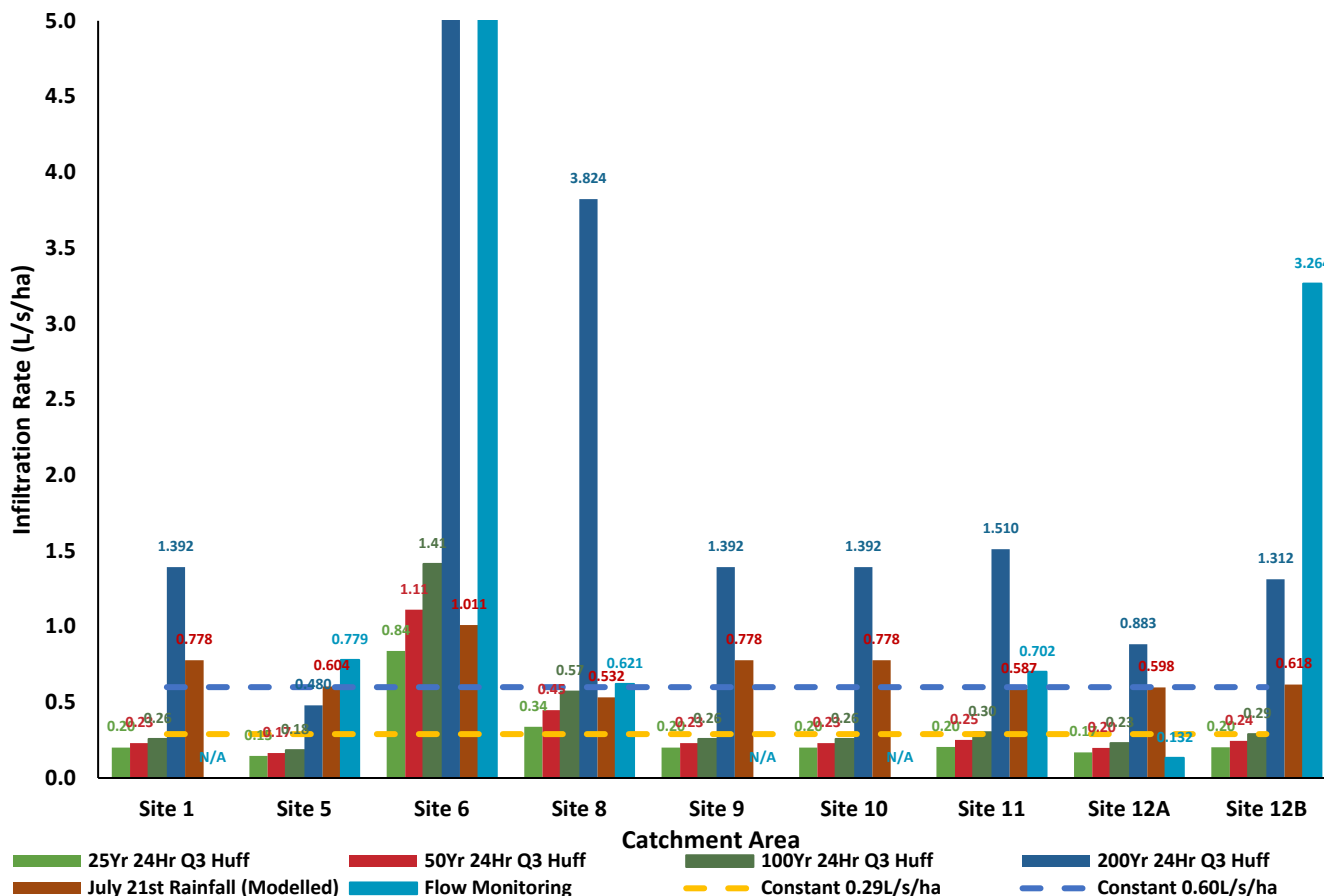


Figure 4.10: Comparison of Inflow-Infiltration Rates for Each Catchment Area, Zoomed

As shown, only the 1:200 year Huff design storm produces I-I rates that exceed many of the observed I-I rates of the July 21st, 2017 event. Even then, the I-I rates at Sites 6 and 12B cannot be matched with the ones observed under the thunderstorm event. Hence, it is expected that the results produced from all previous assessments would indicate fewer backups than the July 21st, 2017 event. This confirms that the thunderstorm, believed to have a return period of 1 in 10 years based on Rain Gauge 1 data, must have been severely more intense resulting in the unprecedented inflow and system response leading to noted basement floodings.

The assessment of the sanitary collection system undertaken to date demonstrated that the system does have sufficient capacity to accommodate relatively high I-I rates, even under a theoretical constant I-I rate of 0.6L/s/ha that was analyzed in the first year of the program.

Therefore, it is extremely evident that the issues in the City's system are not caused by pipe capacity limitations, but rather the severe inflow which is occurring in many areas. It is apparent that the observed short duration, high intensity storm of July 21st, 2017 caused what is known as additional area activation leading to a severe increase in inflow. This could not have been predicted or identified based on the 2015/2016 flow monitoring and rain gauge data.



5.0 Smoke Testing

The purpose of smoke testing is to see locations where non-toxic smoke, concentrated in the sewer system will escape. The logic here is to identify locations where water can get into the system (i.e. if smoke can get out, water can get in). SFE Global was retained to undertake smoke testing. Results of the smoke testing are shown on Figures 5.1 and 5.2. Roughly 52 kilometres (~61% of all sanitary sewers in Cold Lake) of sewers were selected to be a part of the 2016/2017 smoke testing program based on the stipulated budget of \$66,000. Of these sewers, approximately 34 kilometres (64% of program) were tested in 2016, and 18 kilometers (36% of program) in 2017.

Broadly depicted, the 2016 and 2017 flow monitoring programs both found 77 incidents for a total of 154 incidents. This included manhole covers that are not sealed or are open, as well as service connections and cleanout caps that showed smoke release. Thirteen incidents were identified as a high level of smoke intensity, as summarized in Table 5.1 below.

Table 5.1: High Level of Smoke Intensity Incidents

Incident ID	Year Tested	Location	Incident Comments	Leak Source
5	2016	1 Ave. at 19 St.	Smoke from two (2) low elevated, grated manhole lids in Waterpark. Tamperproof, could not investigate.	Main Sewer
21	2016	Behind 1801 5 Ave.	Low lying manhole, very poor seals, infiltration around entire manhole.	Main Sewer
25	2016	616 20 St.	Cleanout cap missing on lawn.	Service Connection
26	2016	615 20 St.	Cleanout cap missing on lawn.	Service Connection
37	2016	1204 13 St.	Missing cleanout cap on driveway.	Service Connection
38	2016	1206 13 St.	Missing cleanout cap on driveway.	Service Connection
40	2016	920 7 St.	St. Dominic Elementary School had smoke come up from drain. Fire department called.	Service Connection
67	2016	616 21 Ave.	Leaking cleanout cap.	Service Connection
72 ¹	2016	Behind arena on 6 St.	Manhole located in swamp/sewer, very high inflow.	Main Sewer
74	2016	Imperial Park 75 Ave.	Unidentified leaking manhole collar/low lying manhole east of Imperial Park Entrance. Manhole not part of project, but the incident was very obvious. Manhole directly north of MH 919.	Main Sewer
122	2017	5418 56 St.	Smoke in home. Suspected faulty plumbing connection.	Service Connection
124	2017	5204 - 57 St.	Smoke in home. Suspected faulty plumbing connection - main floor bath tub.	Service Connection
144	2017	East end of 43 Ave	Manhole open. Riser broken.	Main Sewer

¹ Incident flagged as having zero smoke intensity as it is located in a swamp. Very high inflows have been recorded.



It is highly recommended that the found incidents are addressed as soon as possible in order to greatly reduce the amount of unnecessary additional flows into the sanitary system. The ramifications of the July 21st, 2017 thunderstorm warrant that the City completes smoke testing along with other field investigative measures for the remaining ~40% of the sewers throughout the City. In the meantime, the City could do a visual inspection of any sewers not smoke tested by traversing the sewer paths for any obvious indications of sources of inflow such as missing cleanout caps, or low lying manholes.

As previously mentioned, the following inflow-infiltration reduction measures are recommended:

- Smoke test the remaining sewers not included in the 2016/2017 smoke testing program (roughly 33 kilometres (39%) remaining).
- Consider micro flow monitoring to pin-point the sources of inflow in areas with high I-I rates.
- Ensure all sanitary manholes in the city that are experiencing a high level of smoke intensity remediated or sealed if lying in the low areas. When doing so, it is crucial to ensure that appropriate exhaust and ventilation systems are incorporated throughout the system to ensure that the potential for H₂S gas build-up is mitigated. This could have a moderate impact on sewer inflows.
- Conduct CCTV testing on sewers in the city exhibiting large amounts of inflow-infiltration, but may not have shown much of a concern during smoke testing.
- Consider a sewer relining program where sewers are found to be degraded, but not sagged. Sewers with sags would need replacement. Please note that a CCTV inspection would be required to determine if a sewer is a good candidate for relining.
- Due to the difficulty in managing I-I on private lots, consider a resident education campaign, encouraging residents to ensure that within their lots that:
- Sump pumps do not discharge to the sanitary system
- Roof leaders discharge to the ground surface
- Positive drainage is maintained away from homes in case weeping tiles could be connected to the sanitary system.

A program like this could have a reasonable positive impact on the overall inflow-infiltration in the city.



6.0 Conclusions

The purpose of this memorandum was to assess the July 21st, 2017 rainfall event that caused severe flooding in roughly two dozen locations in Cold Lake. As previous existing assessment results provided to the City did not show surcharging or basement backups, the City wanted ISL to shed some more light onto the matter.

After analysis of the rainfall data, it was determined that at the Rain Gauge 1 location the event was classified as a 1:10 year return period. That said, thunderstorms vary spatially quite substantially, thus some areas of Cold Lake could have experienced a more severe event. Review of historical weather radar imagery indicated that the intensity of the storm could have reached a return period greater than 1:100 years.

Three additional modelling scenarios were conducted in order to determine the trigger point for the City's sanitary system under the calibrated model. Analysis of these assessments indicated that only under a 1:200 year Huff design storm would significant backups be observed throughout the city. That said, many of the locations where backups occurred under the 1:200 year Huff design storm agreed with the backup locations highlighted by the City that happened on July 21st, 2017. This indicates that the system response based on the July 21st, 2017 thunderstorm corresponds to a rainfall event between a 1:100 year and 1:200 year return period rather than a 1:10 year return period which is based on the isolated rainfall data captured by the rain gauge installed in Cold Lake North.

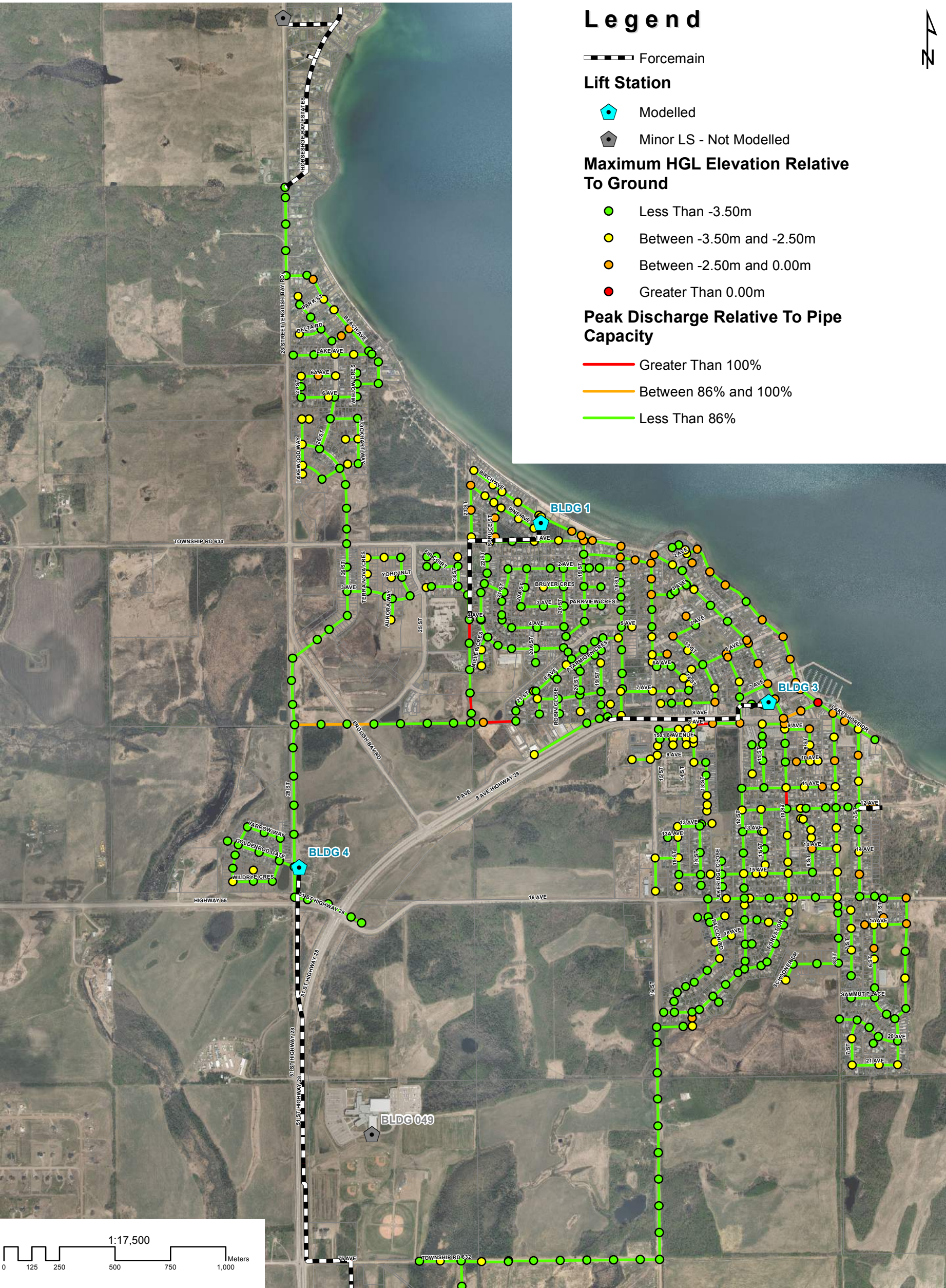
The summary of I-I rates concludes that many parts of the city have large sources of inflow into the sanitary system. This additional inflow into the system likely resulted in backups at lift stations. This is evident at Building 9 Lift Station, where the pumping rate of 270L/s on July 21st, 2017 (note that the pumping capacity recorded during drawdown tests with two pumps on was 290L/s) would not be able to keep up with an inflow of 600L/s+ at Building 3 Lift Station, where the wet well was observed to be surged. A comparison of I-I rates indicates that the observed I-I rates for Sites 6 and 12B are greater than a 1:200 year return period.

In 2015 Cold Lake's sanitary sewer system was analyzed under the constant I-I rates of 0.29L/s/ha and 0.60L/s/ha while in 2016 the system was calibrated in terms of WWF based on rainfall events of rather lower return periods given the available 2015/2016 data. Subsequently the system was assessed under the 1:25 year and 1:50 year Huff design storms. In all cases, the system performed quite adequately. The issue here is the unprecedented excessive inflow rather than capacity of the system.

Eventually, the model's WWF calibration could be updated once the I-I sources are removed and follow-up flow monitoring is done to reflect the new conditions. It is the industry best practice to undertake a hydrodynamic model recalibration roughly every five years, when I-I remediative measures are introduced, new developments come online, or a historical rainfall event occurs (for which flow monitoring and rain gauge data is available) that a municipality decides to use it as a level of service (LOS). Having said that, as stated above, the July 21st, 2017 thunderstorm was considered to be a rather extreme event and therefore would not be a suitable candidate to serve as a LOS event. Methods of minimizing the impacts of inflow-infiltration were recommended, and should be highly considered by the City to prevent future issues from occurring.

In all, the system was found to have sufficient capacity to accommodate relatively high I-I rates as per the draft report findings, however the July 21st, 2017 event produced such unprecedented I-I rates it would be erroneous to assess the system under this event. The City should continue with the I-I Program and focus on field investigative measures to pin point sources of I-I. These sources of I-I should be remediated in order to create a more robust system.

FIGURE 3.1



Date: 9/6/2017 Document: M126300\26367_Cold_Lake_I-I_Program\02_CADD\20_Drafting\201_GIS Figures\XX_July 21 Assessment\Figure 4.1 - EX DWF Plus 100yr 24hr Huff_North.mxd



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM
SANITARY COLLECTION SYSTEM
EXISTING NETWORK - NORTH
ASSESSMENT RESULTS - PEAK DISCHARGE RELATIVE TO PIPE CAPACITY
AND MAXIMUM HGL ELEVATION RELATIVE TO GROUND
EXISTING CONDITIONS PLUS 100YR 24HR Q3 HUFF STORM



FIGURE 3.2

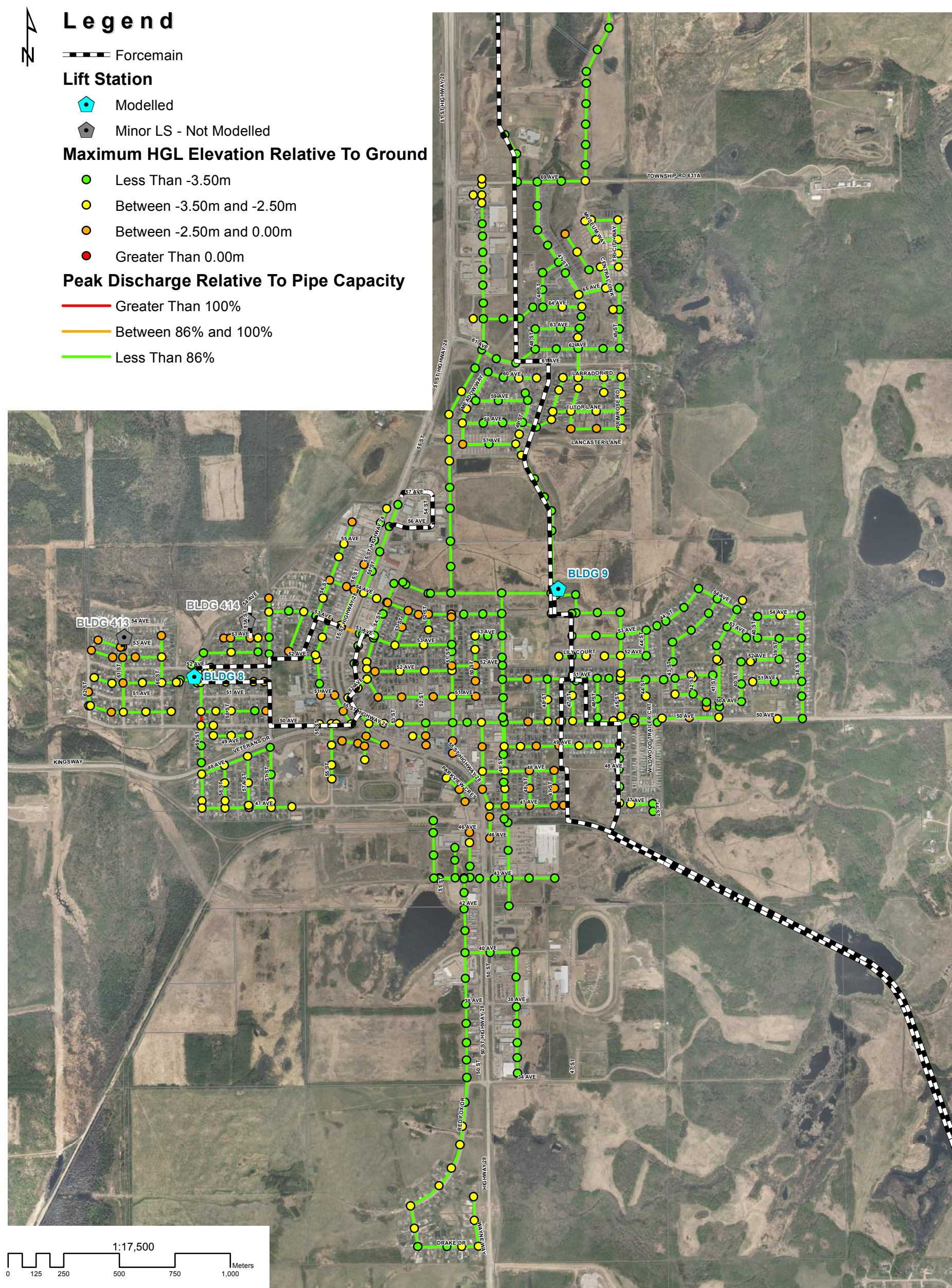


FIGURE 3.3

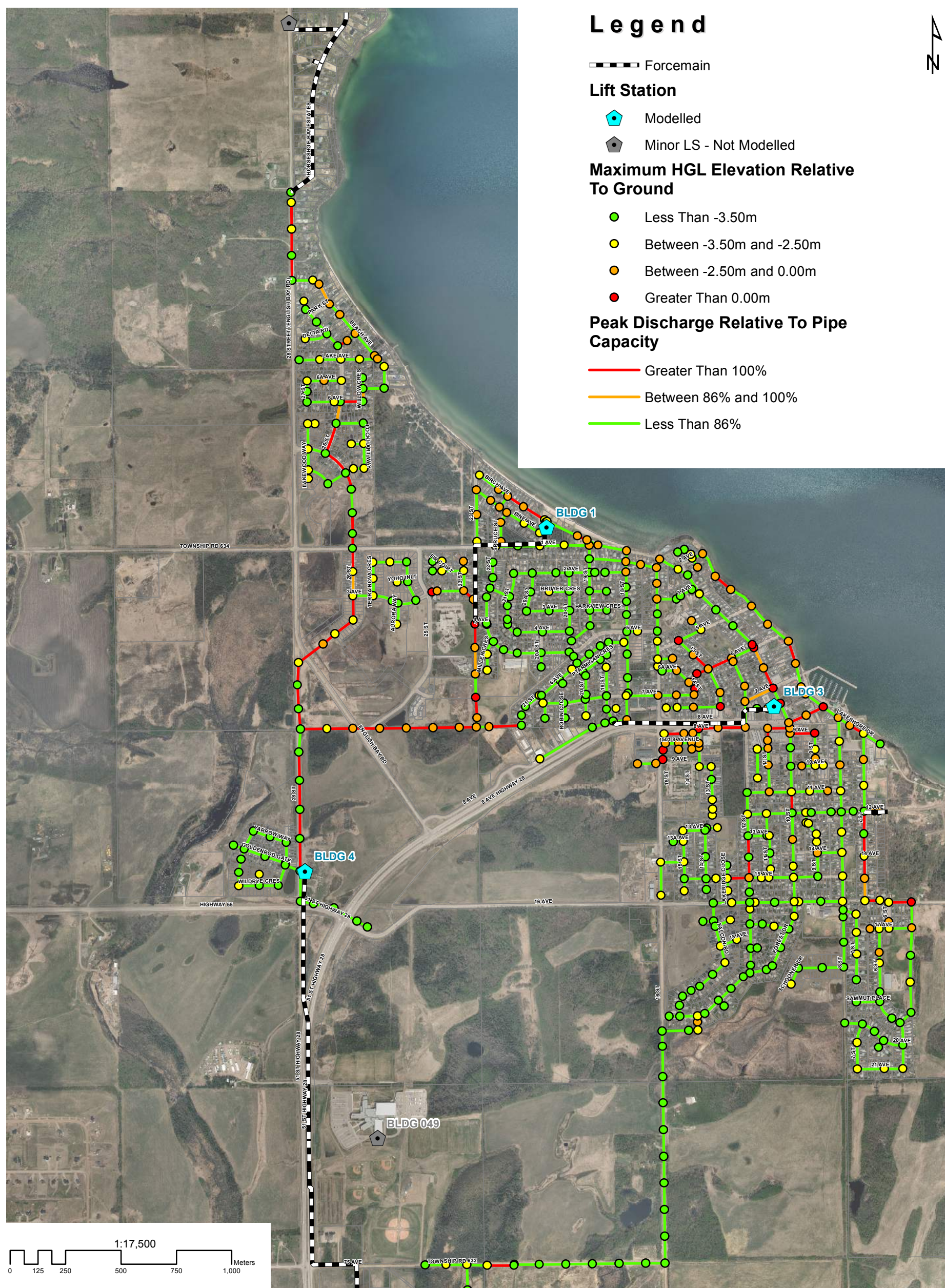


FIGURE 3.4

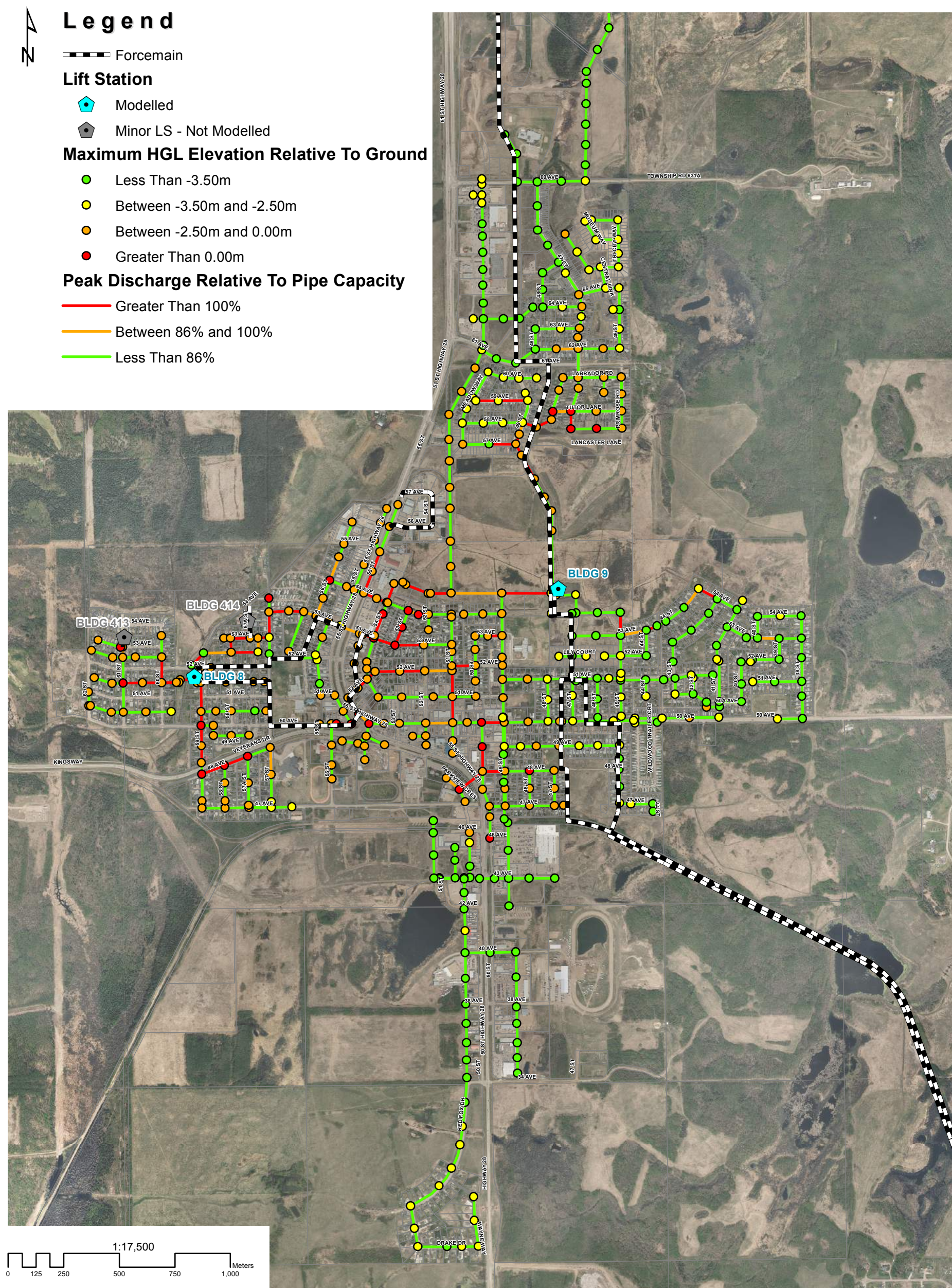


FIGURE 3.5

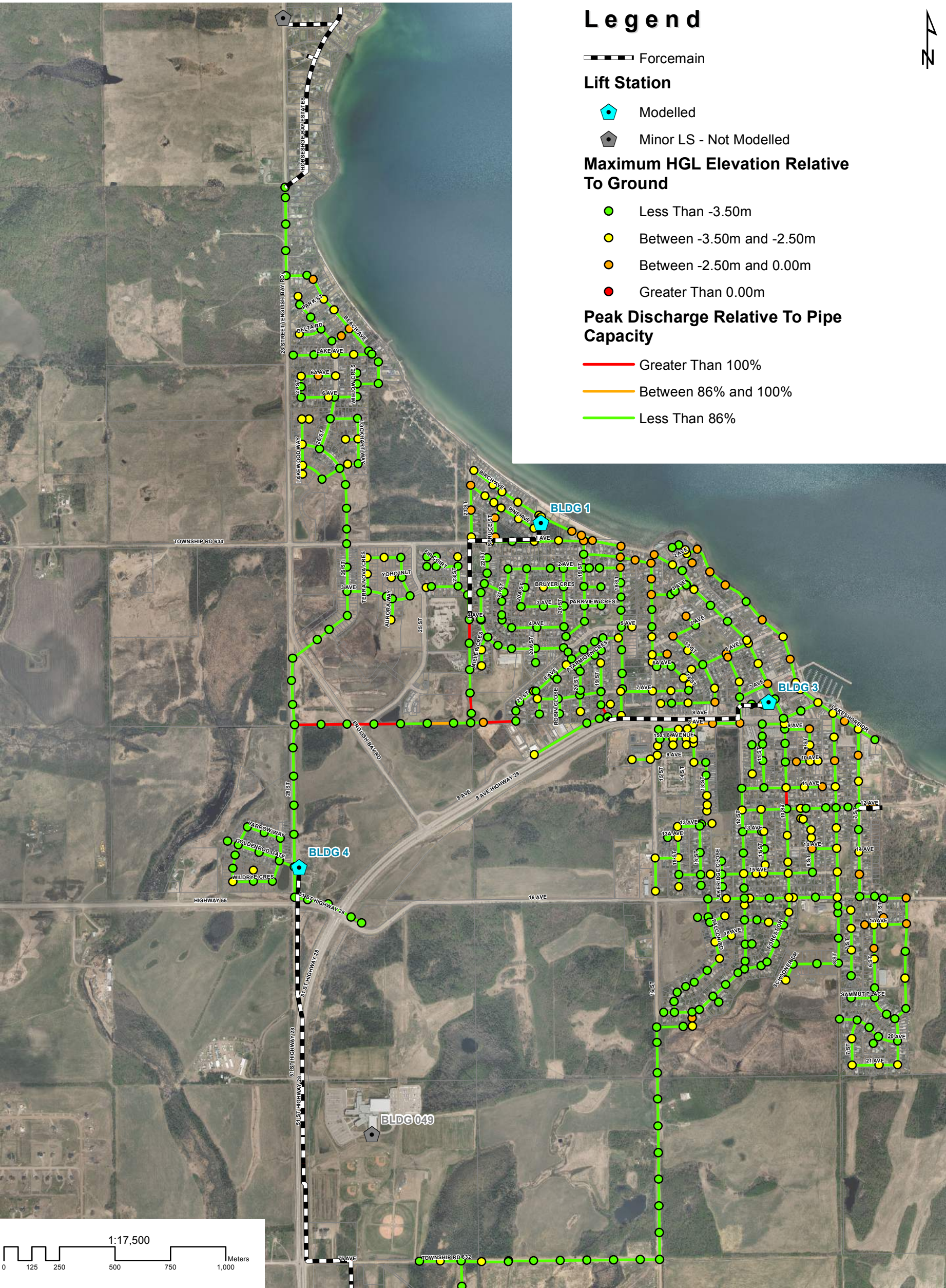


FIGURE 3.6

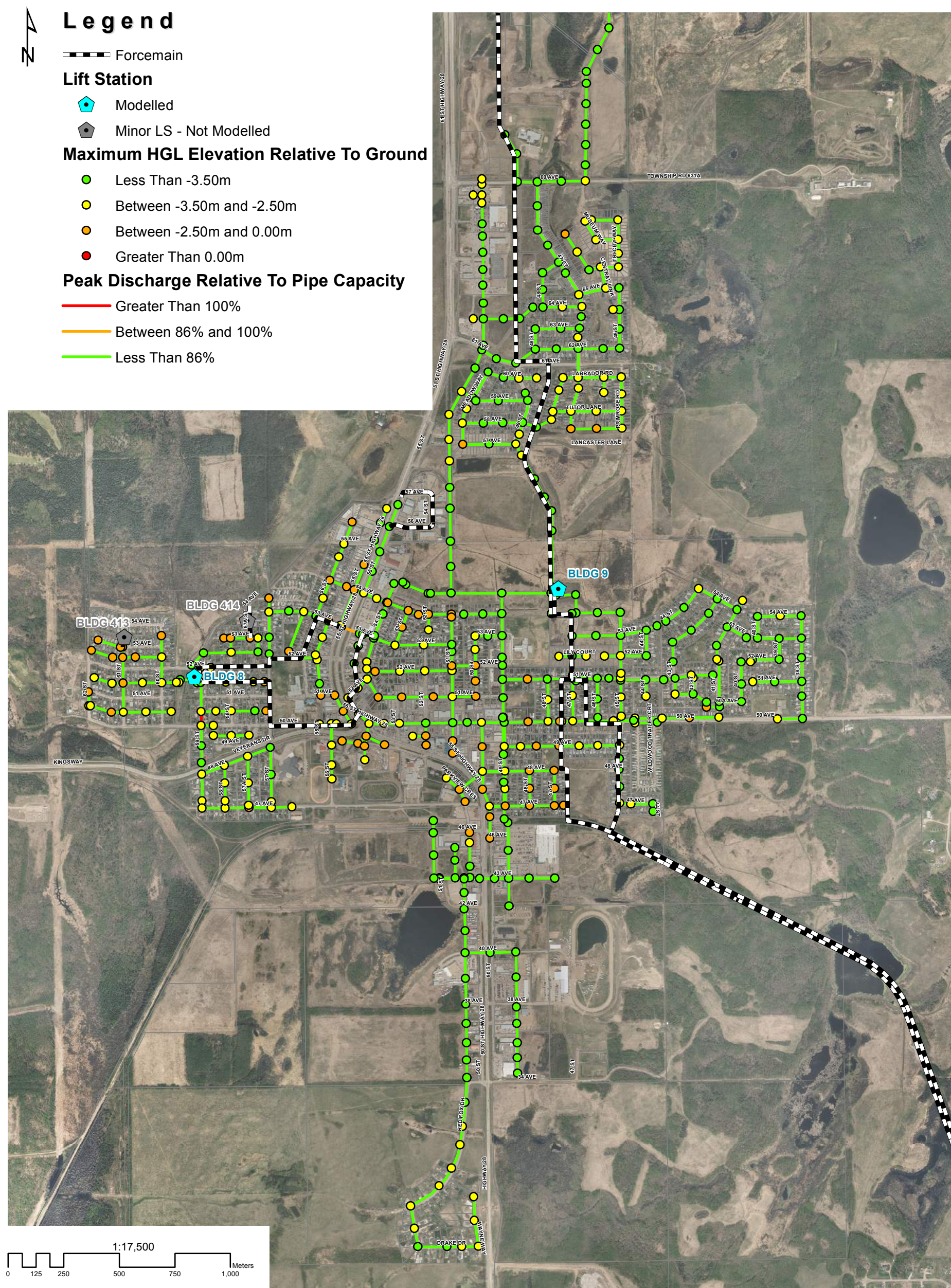
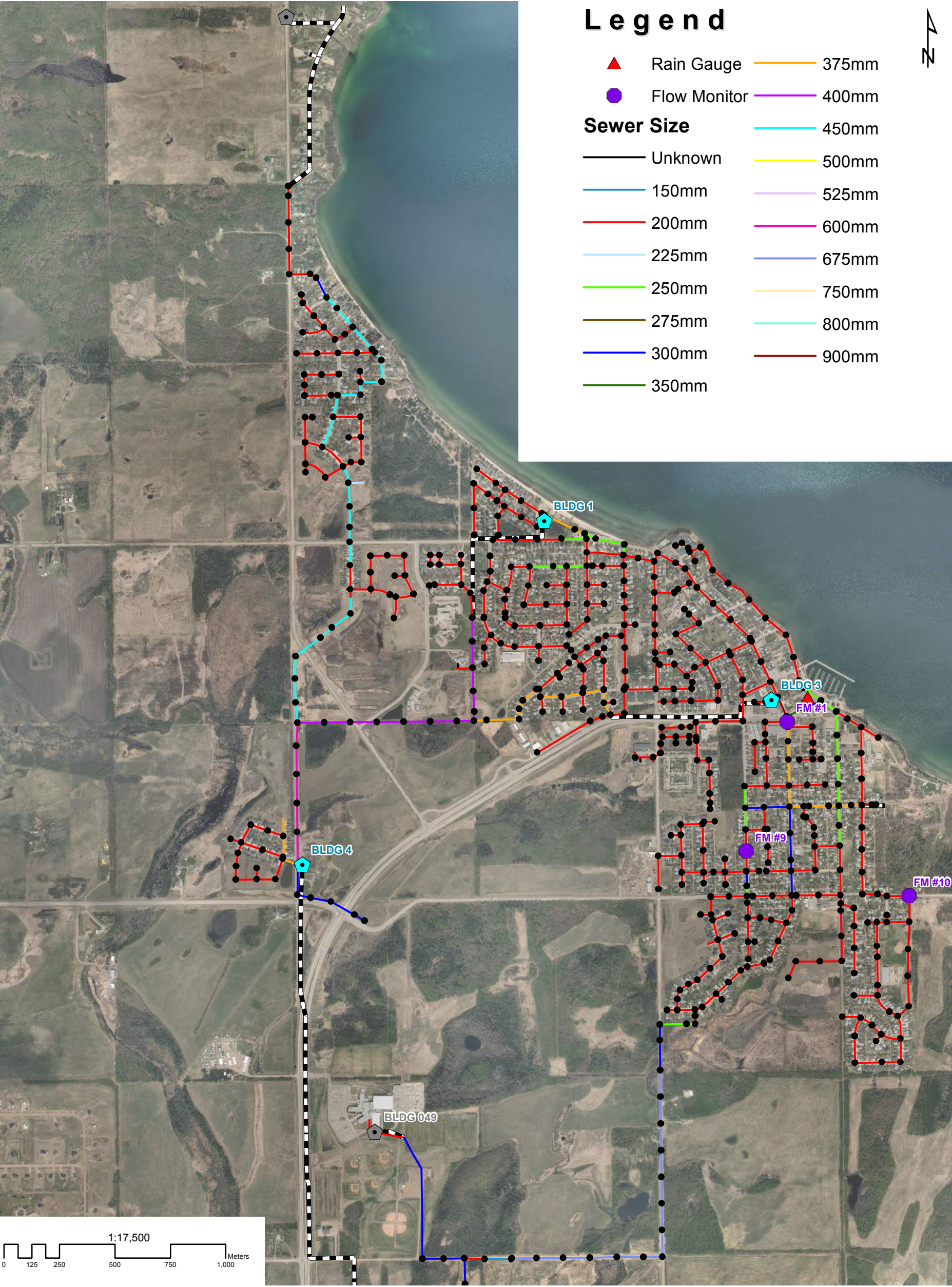


FIGURE 4.1



Date: 9/6/2017 Document: M:\26300\26367_Cold_Lake_I-I_Program\02_CADD\20_Drafting\201_GIS Figures\XX_July 21 Assessment\Figure 3.1 - 2017 Flow Monitoring Locations_North.mxd



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM
SANITARY COLLECTION SYSTEM
2017 FLOW MONITORING
LOCATIONS IN THE NORTH



FIGURE 4.2

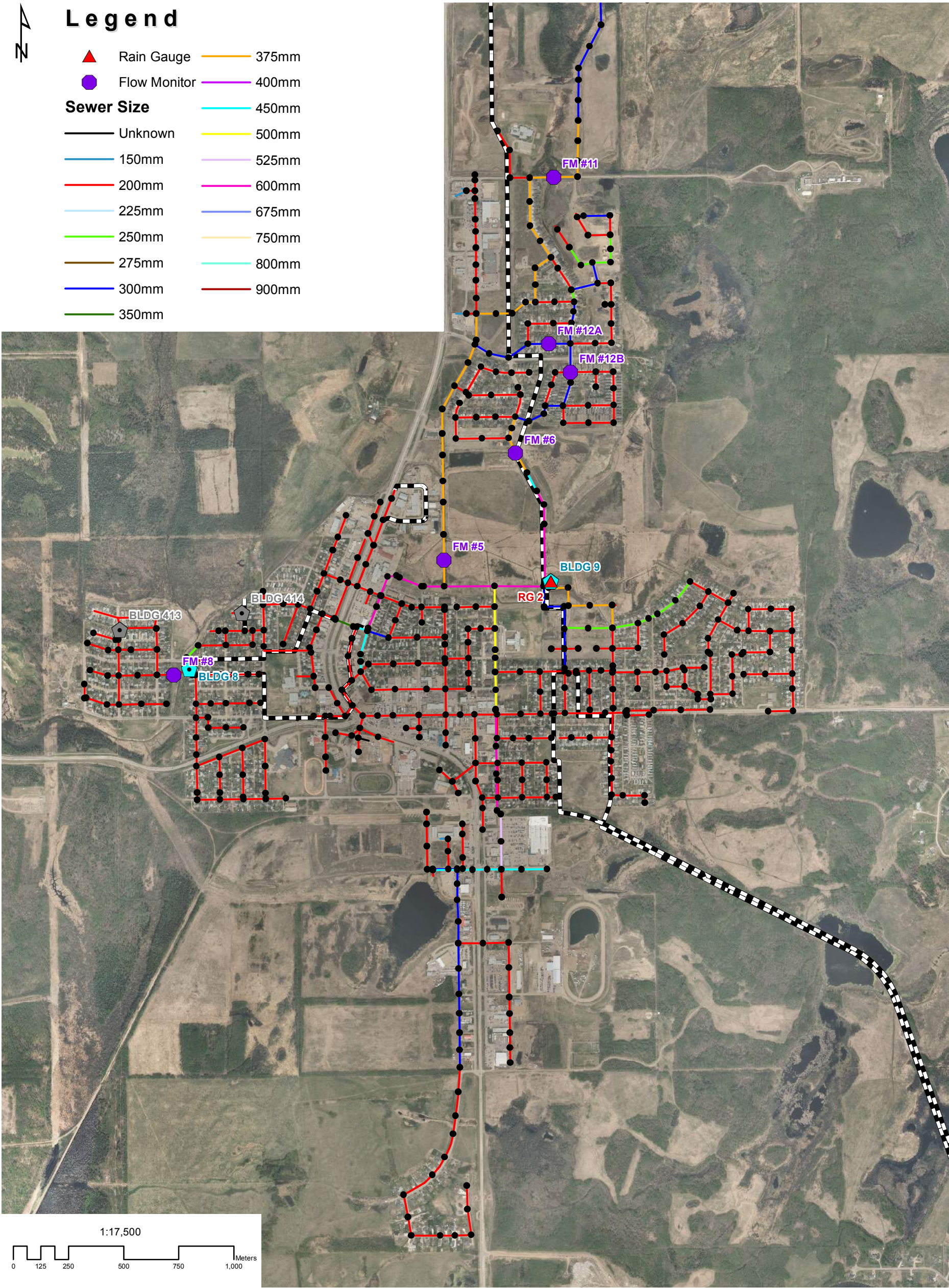
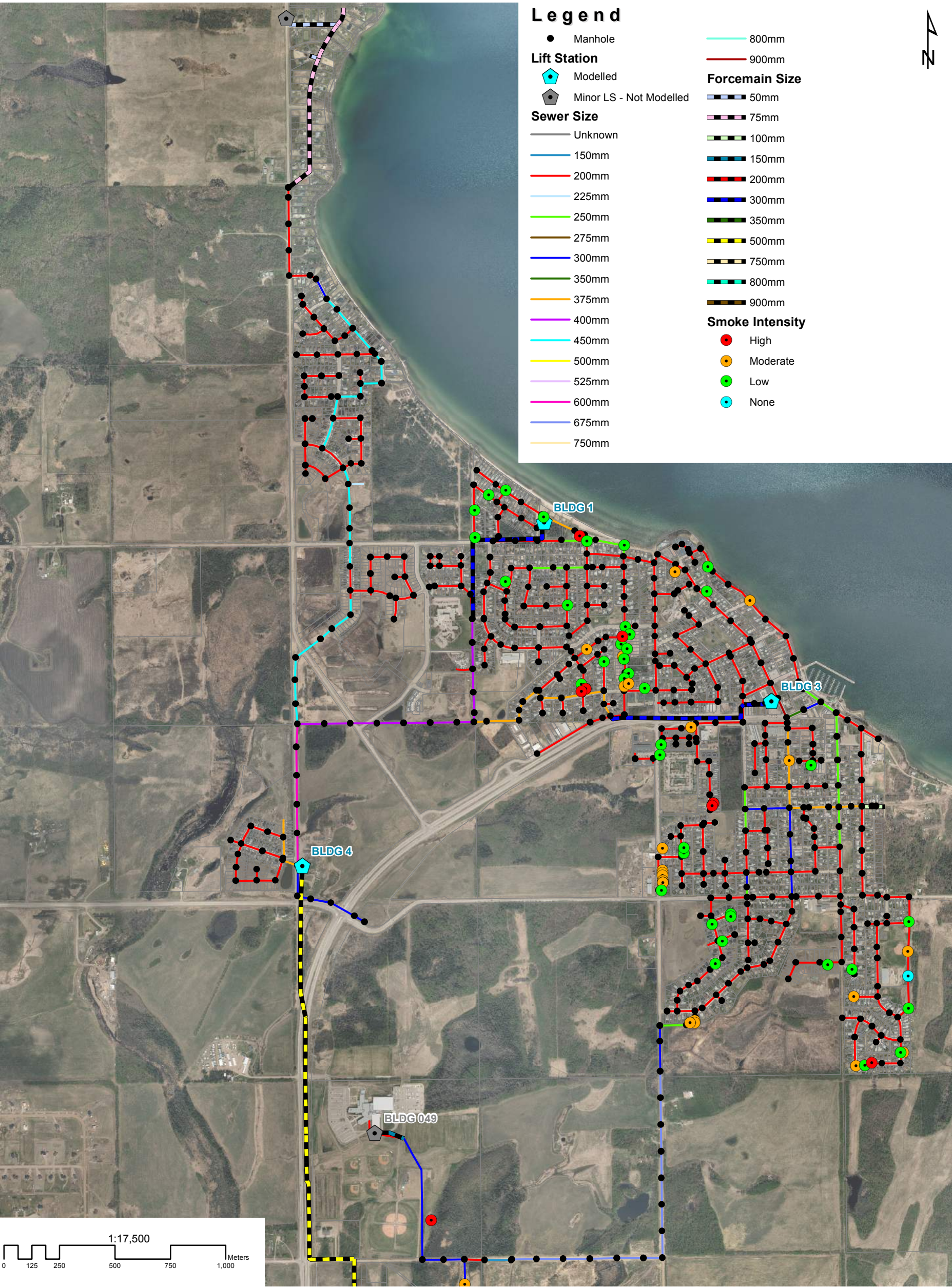


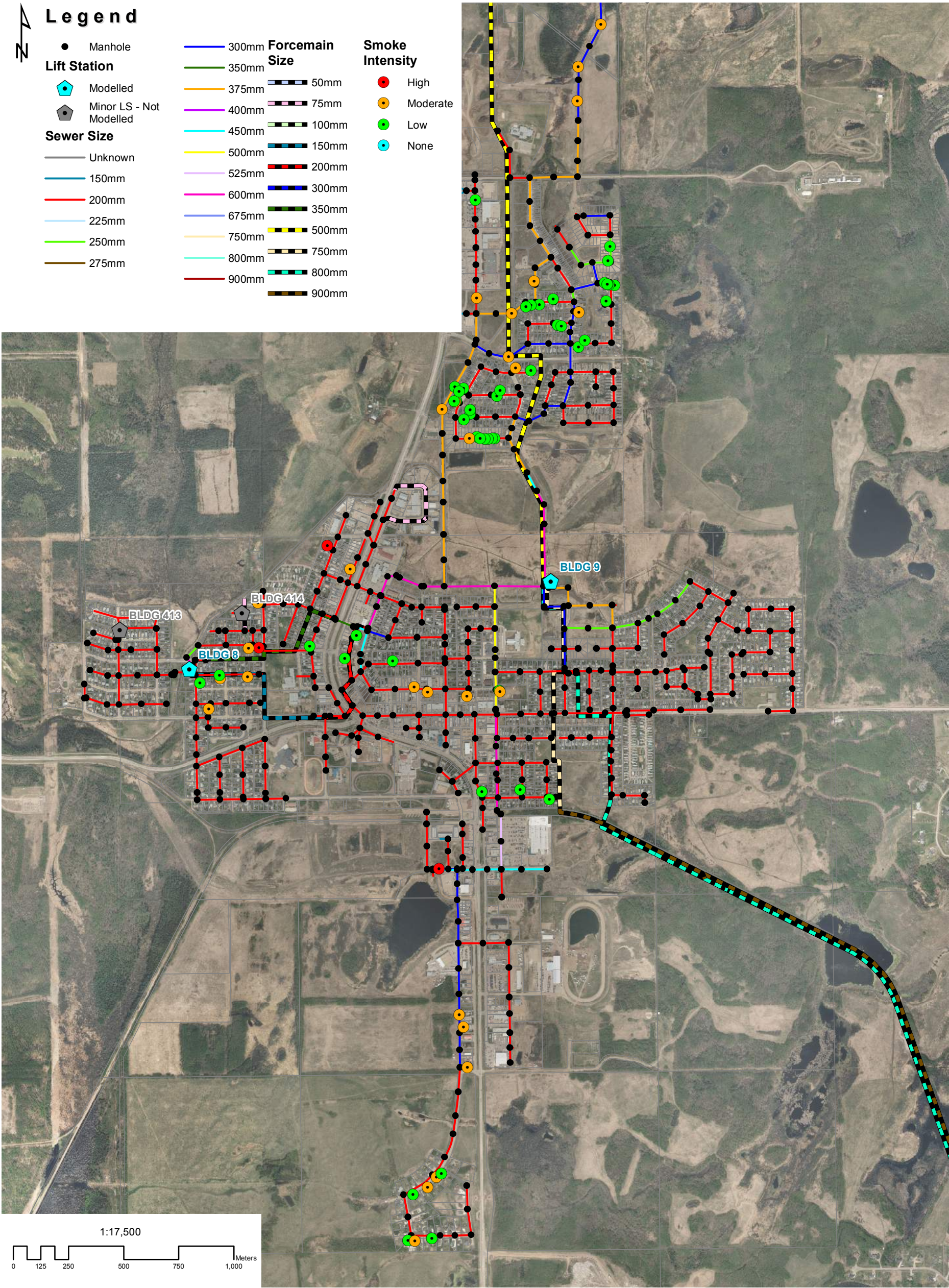
FIGURE 5.1



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM
SANITARY COLLECTION SYSTEM
EXISTING NETWORK - NORTH
SMOKE TESTING LOCATIONS



FIGURE 5.2





Appendix H

Future Wastewater Servicing Concept Sizing



Pipe		Contributing Service Area	Population		Area					DWF Rate					Average DWF (L/s)					Peaking Factors		RES Peak DWF (L/s)	Non-RES Peak DWF (L/s)	Total Peak DWF (L/s)	I ¹ Flow Rate (L/s/ha)	Inflow - Infiltration (L/s)	Total Peak WWF (L/s)	PIPE DESIGN										FORCEMAIN DESIGN (TWIN PIPES)							
			Residential (Persons)	Residential (ha)	Commercial (ha)	Industrial (ha)	Institutional (ha)	Total (ha)	Residential (L/p/d)	Commercial m ² /ha/d	Industrial m ² /ha/d	Institutional m ² /ha/d	Residential	Commercial	Industrial	Institutional	Total	Residential	Non-Residential	System Type	Pipe Roughness "n"							Min. Slope (m/m)	Design Flow (Q _{100yr} / L/s)	Actual Pipe Size (mm)	Design Pipe Size (mm)	Pipe Size/Min. Slope Check	Full-Flow Capacity (L/s)	Full-Flow Pipe Area (m ²)	Full-Flow Velocity (m/s)	Design Q _{100yr} Capacity Check	Required Capacity (100% of Q _{100yr}) (L/s)	Required Capacity per m (100% of Q _{100yr}) (L/s)	Design Velocity (m/s)	Actual Pipe Size (mm)	Design Pipe Size (mm)	Resultant Pipe Area (m ²)	Resultant Velocity (m/s)		
FUT STG 3+ NW_1 FUT STG 3+ NW_2 FUT STG 3+ NW_3 FUT STG 3+ FM_1 FUT STG 3+ NW_4 FUT STG 3+ NW_5 FUT STG 3+ NW_6	FUT Added_5	706	19	0	0	0	19	350	18	18	18	2.86	0.00	0.00	0.00	2.86	3.89	2.50	11.13	0.00	11.13	0.29	5.53	16.66	Gravity	0.013	0.004	19.4	194.9	200	OK	20.743555	0.031	0.66	OK	-	-	-	-	-	-	-	-		
	FUT Added_5 & FUT Added_4	2,283	62	0	0	0	62	350	18	18	18	9.25	0.00	0.00	0.00	9.25	3.54	2.50	32.74	0.00	32.74	0.29	17.89	50.64	Gravity	0.013	0.0015	58.9	355.5	375	OK	67.905072	0.110	0.61	OK	-	-	-	-	-	-	-	-		
	FUT Added_5, FUT Added_4 & FUT Added_3	3,119	84	0	0	0	84	350	18	18	18	12.64	0.00	0.00	0.00	12.64	3.43	2.50	43.31	0.00	43.31	0.29	24.45	67.76	Gravity	0.013	0.0012	78.8	413.4	450	OK	98.763664	0.159	0.62	OK	-	-	-	-	-	-	-	-		
	FUT Added_1	706	19	0	0	0	19	350	18	18	18	2.86	0.00	0.00	0.00	2.86	3.89	2.50	11.13	0.00	11.13	0.29	5.53	16.66	Forcemain	0.013	0.0012	-	-	-	-	-	-	16.66	8.33	1.5	84.1	100	0.008	1.06					
	FUT Added_5, FUT Added_4, FUT Added_3 & FUT Added_1	3,825	103	0	0	0	103	350	18	18	18	15.49	0.00	0.00	0.00	15.49	3.35	2.50	51.92	0.00	51.92	0.29	29.98	81.90	Gravity	0.013	0.001	95.2	459.3	525	OK	135.99763	0.216	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 3+ FM_2 FUT STG 3+ NW_18 FUT STG 3+ NW_11	FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	4,981	135	0	0	0	135	350	18	18	18	20.18	0.00	0.00	0.00	20.18	3.25	2.50	65.51	0.00	65.51	0.29	39.04	104.55	Gravity	0.013	0.001	121.6	503.4	525	OK	135.99763	0.216	0.63	OK	-	-	-	-	-	-	-	-		
	FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	4,981	135	0	0	0	135	350	18	18	18	20.18	0.00	0.00	0.00	20.18	3.25	2.50	65.51	0.00	65.51	0.29	39.04	104.55	Forcemain	0.013	0.001	-	-	-	-	-	-	104.55	52.27	1.5	210.6	250	0.049	1.06					
FUT STG 3+ NW_5 FUT STG 3+ NW_5	FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	5,025	136	0	0	0	136	350	18	18	18	20.36	0.00	0.00	0.00	20.36	3.24	2.50	66.02	0.00	66.02	0.29	39.39	105.40	Gravity	0.013	0.001	122.6	504.9	525	OK	135.99763	0.216	0.63	OK	-	-	-	-	-	-	-	-		
	FUT Annex_25, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Annex_22, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	5,141	137	31	59	0	226	350	18	18	18	20.83	6.39	12.20	0.00	39.42	3.23	2.73	67.35	50.83	118.18	0.29	65.52	183.69	Gravity	0.013	0.0008	213.6	648.4	675	OK	237.75423	0.358	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 3 NW_13	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	5,257	139	31	59	0	228	350	18	18	18	21.30	6.39	12.20	0.00	39.89	3.22	2.73	68.68	50.83	119.50	0.29	66.17	185.68	Gravity	0.013	0.0008	215.9	651.0	675	OK	237.75423	0.358	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 3 NW_18	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	6,959	185	76	64	0	326	350	18	18	18	28.19	15.87	13.42	0.00	57.48	3.11	2.50	87.64	73.23	160.87	0.29	94.40	255.27	Gravity	0.013	0.0008	296.8	733.6	750	OK	314.88229	0.442	0.71	OK	-	-	-	-	-	-	-	-		
FUT STG 3 NW_21	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Annex_22, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	7,806	208	156	64	0	428	350	18	18	18	31.62	32.52	13.42	0.00	77.56	3.06	2.50	96.78	114.86	211.64	0.29	124.22	335.86	Gravity	0.013	0.0008	390.5	813.1	900	OK	512.03332	0.636	0.80	OK	-	-	-	-	-	-	-	-		
FUT STG 3 NW_23	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Annex_22, FUT Annex_9, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	13,869	372	156	64	0	592	350	18	18	18	56.18	32.52	13.42	0.00	102.12	3.00	2.50	168.55	114.86	283.40	0.29	171.74	455.15	Gravity	0.013	0.0008	529.2	911.2	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-	-		
FUT STG 3 NW_25	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Annex_22, FUT Annex_9, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	16,925	454	156	64	0	675	350	18	18	18	68.56	32.52	13.42	0.00	114.50	3.00	2.50	205.68	114.86	320.54	0.29	195.69	516.23	Gravity	0.013	0.0008	600.3	955.3	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-	-		
FUT STG 3 NW_27	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Annex_22, FUT Annex_9, FUT Annex_11, FUT Annex_12, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	16,925	454	156	88	0	698	350	18	18	18	68.56	32.52	18.30	0.00	119.38	3.00	2.50	205.68	127.05	332.73	0.29	202.48	535.22	Gravity	0.013	0.0008	622.3	968.3	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-	-		
FUT STG 3 FM_3	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Annex_22, FUT Annex_9, FUT Annex_11, FUT Annex_12, FUT Annex_23, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	16,925	454	156	160	0	770	350	18	18	18	68.56	32.52	33.29	0.00	134.37	3.00	2.50	205.68	164.52	370.21	0.29	223.35	593.55	Forcemain	0.013	0.0008	-	-	-	-	-	-	593.55	296.78	1.5	501.9	525	0.216	1.37					
FUT STG 2 SW_1	FUT Buildout_166, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11, FUT Annex_23, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	17,162	461	156	160	0	777	350	18	18	18	69.52	32.52	33.29	0.00	135.33	3.00	2.50	208.57	164.52	373.09	0.29	225.21	598.30	Gravity																				

FUT STG 2 FM_1	FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124, FUT Buildout_165, FUT Buildout_131, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_24, FUT Annex_26, FUT Annex_28, FUT Annex_30, FUT Annex_11, FUT Annex_23, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	21,353	563	156	160	0	879	350	18	18	18	86.50	32.52	33.29	0.00	152.31	3.00	2.50	259.50	164.52	424.03	0.29	254.87	678.90	Forcemain	0.013	0.0008	-	-	-	-	-	-	-	-	678.90	339.45	1.5	536.8	600	0.283	1.20
FUT STG 2 FM_Lagoon	FUT Annex_29, FUT Annex_6, FUT Annex_19, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_5, FUT Annex_20, FUT Annex_26, FUT Annex_25, FUT Annex_18, FUT Annex_30, FUT Annex_24, FUT Annex_21, FUT Annex_10, FUT Annex_22, FUT Annex_9, FUT Annex_11, FUT Annex_12, FUT Annex_23, FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124, FUT Buildout_131, FUT Buildout_165, FUT Buildout_180, FUT Buildout_122, FUT Buildout_172, FUT Buildout_168, FUT Buildout_173, FUT Buildout_132, FUT Buildout_129, FUT Buildout_169, FUT Annex 15, FUT Annex_27, FUT Added_5, FUT Added_4, FUT Added_3, FUT Added_1 & FUT Added_2	30,287	787	156	160	0	1,103	350	18	18	18	122.69	32.52	33.29	0.00	188.50	3.00	2.50	368.07	164.52	532.59	0.29	319.98	852.57	Forcemain	0.013	0.004	-	-	-	-	-	-	-	-	852.57	426.29	1.5	601.5	675	0.358	1.19

Pipe		Contributing Service Area	Population			Area					DWF Rate					Average DWF (L/s)					Peaking Factors		RES Peak DWF	Non-RES Peak DWF	Total Peak DWF	H Flow Rate	Inflow - Infiltration	Total Peak WWF	PIPE DESIGN										FORCEMAIN DESIGN (TWIN PIPES)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
			Residential (Persons)	Residential (ha)	Commercial (ha)	Industrial (ha)	Institutional (ha)	Total	Residential (L/s/d)	Commercial m³/ha/d	Industrial m³/ha/d	Institutional m³/ha/d	Residential	Commercial	Industrial	Institutional	Total	Residential	Non-Residential	Pipe Roughness "n"	Min. Slope (m/m)	Design Flow (Q _{max} / F.O.B)							Actual Pipe Size (mm)	Design Pipe Size (mm)	Pipe Size/Min. Slope Check	Full-Flow Capacity (L/s)	Full-Flow Pipe Area (m²)	Full-Flow Velocity (m/s)	Design Q-Capacity Check	Required Capacity (100% of Q _{max}) (L/s)	Required Capacity per FM (100% of Q _{max}) (L/s)	Design Velocity (m/s)	Actual Pipe Size (mm)	Design Pipe Size (mm)	Resultant Pipe Area (m²)	Resultant Velocity (m/s)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
FUT STG 3 NE_1		FUT Annex_33	228	65	0	0	0	65	350	18	18	18	0.92	0.00	0.00	0.00	0.92	4.13	2.50	3.81	0.00	3.81	0.29	18.85	22.66	Gravity	0.013	0.0028	26.4	233.9	250	OK	31.47	0.049	0.64	OK	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
FUT STG 3 NE_2		FUT Annex_34	245	70	0	0	0	70	350	18	18	18	0.99	0.00	0.00	0.00	0.99	4.11	2.50	4.08	0.00	4.08	0.29	20.30	24.38	Gravity	0.013	0.0028	28.4	240.4	250	OK	31.47	0.049	0.64	OK	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
FUT STG 3 NE_3		FUT Annex_33 & FUT Annex_34	473	135	0	0	0	135	350	18	18	18	1.92	0.00	0.00	0.00	1.92	3.99	2.50	7.64	0.00	7.64	0.29	39.15	46.79	Gravity	0.013	0.0015	54.4	345.1	375	OK	67.91	0.110	0.61	OK	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
FUT STG 3 NE_4		FUT Annex_31	714	54	0	0	0	54	350	18	18	18	2.89	0.00	0.00	0.00	2.89	3.89	2.50	11.25	0.00	11.25	0.29	15.75	27.00	Gravity	0.013	0.0028	31.4	249.8	250	OK	31.47	0.049	0.64	OK	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
FUT STG 3 NE_5		FUT Annex_33, FUT Annex_34 & FUT Annex_31	1,187	189	0	0	0	189	350	18	18	18	4.81	0.00	0.00	0.00	4.81	3.75	2.50	18.04	0.00	18.04	0.29	54.90	72.93	Gravity	0.013	0.0012	84.8	425.0	450	OK	98.76	0.159	0.62	OK	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
FUT STG 3 NE_6		FUT Annex_32	928	71	0	0	0	71	350	18	18	18	3.76	0.00	0.00	0.00	3.76	3.82	2.50	14.36	0.00	14.36	0.29	20.45	34.81	Gravity	0.013	0.0022	40.5	287.5	300	OK	45.36	0.071	0.64	OK	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
FUT STG 3 FM_1		FUT Annex_33, FUT Annex_34, FUT Annex_31 & FUT Annex_32	2,115	260	0	0	0	260	350	18	18	18	8.57	0.00	0.00	0.00	8.57	3.57	2.50	30.56	0.00	30.56	0.29	75.34	105.90	Forcemain	0.013	0.0022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FUT STG 2 SW_2	FUT Buildout_166, FUT Buildout_113, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_6, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11 & FUT Annex_23	12,461	331	156	160	0	647	350	18	18	18	50.48	32.52	33.29	0.00	116.29	3.00	2.50	151.44	164.52	315.96	0.29	187.49	503.46	Gravity	0.013	0.0008	585.4	946.4	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-
FUT STG 2 SW_3	FUT Buildout_166, FUT Buildout_113 & FUT Buildout_120, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11 & FUT Annex_23	12,766	339	156	160	0	655	350	18	18	18	51.71	32.52	33.29	0.00	117.52	3.00	2.50	155.14	164.52	319.66	0.29	189.88	509.54	Gravity	0.013	0.0008	592.5	950.6	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-
FUT STG 2 SW_4	FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11 & FUT Annex_23	13,189	350	156	160	0	666	350	18	18	18	53.43	32.52	33.29	0.00	119.24	3.00	2.50	160.28	164.52	324.80	0.29	193.19	518.00	Gravity	0.013	0.0008	602.3	956.5	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-
FUT STG 2 SW_6	FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11 & FUT Annex_23	13,607	362	156	160	0	677	350	18	18	18	55.12	32.52	33.29	0.00	120.93	3.00	2.50	165.37	164.52	329.89	0.29	196.47	526.36	Gravity	0.013	0.0008	612.1	962.3	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-
FUT STG 2 SW_8	FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11 & FUT Annex_23	14,101	375	156	160	0	691	350	18	18	18	57.12	32.52	33.29	0.00	122.93	3.00	2.50	171.36	164.52	335.88	0.29	200.34	536.22	Gravity	0.013	0.0008	623.5	969.0	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-
FUT STG 2 SW_9	FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124, FUT Buildout_165, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11 & FUT Annex_23	14,396	383	156	160	0	699	350	18	18	18	58.32	32.52	33.29	0.00	124.13	3.00	2.50	174.95	164.52	339.47	0.29	202.65	542.13	Gravity	0.013	0.0008	630.4	973.0	1050	OK	772.36572	0.866	0.89	OK	-	-	-	-	-	-	-
FUT STG 2 FM_1	FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124, FUT Buildout_165, FUT Buildout_131, FUT Annex_6, FUT Annex_19, FUT Annex_30, FUT Annex_5, FUT Annex_4, FUT Annex_7, FUT Annex_8, FUT Annex_20, FUT Annex_21, FUT Annex_22, FUT Annex_9, FUT Annex_12, FUT Annex_24, FUT Annex_30, FUT Annex_26, FUT Annex_25, FUT Annex_28, FUT Annex_10, FUT Annex_11 & FUT Annex_23	16,372	428	156	160	0	744	350	18	18	18	66.32	32.52	33.29	0.00	132.13	3.00	2.50	198.97	164.52	363.49	0.29	215.83	579.33	Forcemain	0.013	0.004	-	-	-	-	-	-	-	-	579.33	289.66	1.5	495.9	525	0.216	1.34

Pipe		Contributing Service Area	Population							Area				DWF Rate				Average DWF (L/s)					Peaking Factors		RES Peak DWF (L/s)	Non-RES Peak DWF (L/s)	Total Peak DWF (L/s)	H Flow Rate (L/s/ha)	Inflow - Infiltration (L/s)	Total Peak WWF (L/s)	PIPE DESIGN										FORCEMAIN DESIGN (TWIN PIPES)					
			Residential (Persons)	Residential (ha)	Commercial (ha)	Industrial (ha)	Institutional (ha)	Total (ha)	Residential (L/s/d)	Commercial m³/ha/d	Industrial m³/ha/d	Institutional m³/ha/d	Residential	Commercial	Industrial	Institutional	Total	Residential	Non-Residential	Design Flow (Q _{max} / 0.8)	Actual Pipe Size (mm)	Design Pipe Size (mm)	Pipe Size / Min. Slope Check	Full-Flow Capacity (L/s)							Full-Flow Pipe Area (m²)	Full-Flow Velocity (m/s)	Design Q: Capacity Check	Required Capacity (100% of Q _{max}) (L/s)	Required Capacity per FM (100% of Q _{max}) (L/s)	Design Velocity (m/s)	Actual Pipe Size (mm)	Design Pipe Size (mm)	Resultant Pipe Area (m²)	Resultant Velocity (m/s)						
FUT STG 2 SW_1		FUT Buildout_166	238	6	0	0	0	6	350	18	18	18	0.96	0.00	0.00	0.00	0.96	4.12	2.50	3.97	0.00	3.97	0.29	1.86	5.83	Gravity	0.013	0.004	6.8	131.5	200	OK	20.74	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_2		FUT Buildout_166 & FUT Buildout_113	518	11	0	0	0	11	350	18	18	18	2.10	0.00	0.00	0.00	2.10	3.97	2.50	8.32	0.00	8.32	0.29	3.18	11.50	Gravity	0.013	0.004	13.4	169.7	200	OK	20.74	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_3		FUT Buildout_166, FUT Buildout_113 & FUT Buildout_120	822	19	0	0	0	19	350	18	18	18	3.33	0.00	0.00	0.00	3.33	3.85	2.50	12.83	0.00	12.83	0.29	5.57	18.40	Gravity	0.013	0.0028	21.4	216.3	250	OK	31.47	0.049	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_4		FUT Buildout_166, FUT Buildout_113, FUT Buildout_120 & FUT Buildout_164	1,245	31	0	0	0	31	350	18	18	18	5.04	0.00	0.00	0.00	5.04	3.74	2.50	18.85	0.00	18.85	0.29	8.88	27.73	Gravity	0.013	0.0022	32.2	264.0	300	OK	45.36	0.071	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_5		FUT Buildout_168	409	11	0	0	0	11	350	18	18	18	1.66	0.00	0.00	0.00	1.66	4.02	2.50	6.66	0.00	6.66	0.29	3.21	9.87	Gravity	0.013	0.004	11.5	160.2	200	OK	20.74	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_6		FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111 & FUT Buildout_168	1,664	42	0	0	0	42	350	18	18	18	6.74	0.00	0.00	0.00	6.74	3.65	2.50	24.58	0.00	24.58	0.29	12.16	36.74	Gravity	0.013	0.0022	42.7	293.3	300	OK	45.36	0.071	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_7		FUT Buildout_124	493	13	0	0	0	13	350	18	18	18	2.00	0.00	0.00	0.00	2.00	3.98	2.50	7.95	0.00	7.95	0.29	3.87	11.81	Gravity	0.013	0.004	13.7	171.4	200	OK	20.74	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_8		FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124	2,157	55	0	0	0	55	350	18	18	18	8.74	0.00	0.00	0.00	8.74	3.56	2.50	31.11	0.00	31.11	0.29	16.03	47.14	Gravity	0.013	0.0015	54.8	346.1	375	OK	67.91	0.110	0.61	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_10		FUT Buildout_131	1,977	53	0	0	0	53	350	18	18	18	8.01	0.00	0.00	0.00	8.01	3.59	2.50	28.74	0.00	28.74	0.29	15.49	44.24	Gravity	0.013	0.0015	51.4	337.9	375	OK	67.91	0.110	0.61	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SW_9		FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124 & FUT Buildout_165	2,452	63	0	0	0	63	350	18	18	18	9.93	0.00	0.00	0.00	9.93	3.52	2.50	34.92	0.00	34.92	0.29	18.35	53.27	Gravity	0.013	0.0015	61.9	362.3	375	OK	67.91	0.110	0.61	OK	-	-	-	-	-	-	-	-		
FUT STG 2 FM_1		FUT Buildout_166, FUT Buildout_113, FUT Buildout_120, FUT Buildout_164, FUT Buildout_111, FUT Buildout_168, FUT Buildout_124, FUT Buildout_165 & FUT Buildout_131	4,429	109	0	0	0	109	350	18	18	18	17.94	0.00	0.00	0.00	17.94	3.29	2.50	59.09	0.00	59.09	0.29	31.52	90.61	Forcemain	0.013		-	-	-	-	-	-	90.61	45.30	1.5	196.1	200	0.031	1.44					
FUT STG 2 SE_1		FUT Buildout_180	445	4	0	0	0	4.45	350	18	18	18	1.80	0.00	0.00	0.00	1.80	4.00	2.50	7.21	0.00	7.21	0.29	1.29	8.50	Gravity	0.013	0.004	9.9	151.4	200	OK	20.74	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_2		FUT Buildout_172	468	5	0	0	0	5.39	350	18	18	18	1.89	0.00	0.00	0.00	1.89	3.99	2.50	7.56	0.00	7.56	0.29	1.56	9.12	Gravity	0.013	0.004	10.6	155.5	200	OK	20.743555	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_3		FUT Buildout_122	232	3	0	0	0	2.67	350	18	18	18	0.94	0.00	0.00	0.00	0.94	4.12	2.50	3.87	0.00	3.87	0.29	0.77	4.64	Gravity	0.013	0.004	5.4	120.7	200	OK	20.743555	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_4		FUT Buildout_122 & FUT Buildout_172	699	8	0	0	0	8.06	350	18	18	18	2.83	0.00	0.00	0.00	2.83	3.89	2.50	11.03	0.00	11.03	0.29	2.34	13.37	Gravity	0.013	0.004	15.5	179.5	200	OK	20.743555	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 FM_2		FUT Buildout_180, FUT Buildout_122 & FUT Buildout_172	1,144	13	0	0	0	12.51	350	18	18	18	4.63	0.00	0.00	0.00	4.63	3.76	2.50	17.43	0.00	17.43	0.29	3.63	21.06	Forcemain	0.013	0.0028	-	-	-	-	-	-	21.06	10.53	1.5	94.5	100	0.008	1.34					
FUT STG 2 SE_5		FUT Buildout_180, FUT Buildout_122 & FUT Buildout_172	1,144	13	0	0	0	12.51	350	18	18	18	4.63	0.00	0.00	0.00	4.63	3.76	2.50	17.43	0.00	17.43	0.29	3.63	21.06	Gravity	0.013	0.0028	24.5	227.6	250	OK	31.467258	0.049	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_6		FUT Buildout_129	744	20	0	0	0	12.51	350	18	18	18	3.01	0.00	0.00	0.00	3.01	3.88	2.50	11.69	0.00	11.69	0.29	3.63	15.32	Gravity	0.013	0.0028	17.8	202.0	250	OK	31.467258	0.049	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_7		FUT Buildout_180, FUT Buildout_122, FUT Buildout_172 & FUT Buildout_129	1,888	33	0	0	0	32.62	350	18	18	18	7.65	0.00	0.00	0.00	7.65	3.61	2.50	27.57	0.00	27.57	0.29	9.46	37.03	Gravity	0.013	0.0022	43.1	294.2	300	OK	45.356676	0.071	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_8		FUT Buildout_68	623	17	0	0	0	16.83	350	18	18	18	2.52	0.00	0.00	0.00	2.52	3.92	2.50	9.90	0.00	9.90	0.29	4.88	14.78	Gravity	0.013	0.004	17.2	186.4	200	OK	20.743555	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_9		FUT Buildout_173	329	9	0	0	0	8.90	350	18	18	18	1.33	0.00	0.00	0.00	1.33	4.06	2.50	5.41	0.00	5.41	0.29	2.58	7.99	Gravity	0.013	0.004	9.3	148.0	200	OK	20.743555	0.031	0.66	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_10		FUT Buildout_68 & FUT Buildout_173	952	26	0	0	0	26	350	18	18	18	3.86	0.00	0.00	0.00	3.86	3.81	2.50	14.71	0.00	14.71	0.29	7.46	22.17	Gravity	0.013	0.0028	25.8	232.0	250	OK	31.467258	0.049	0.64	OK	-	-	-	-	-	-	-	-		
FUT STG 2 SE_11		FUT Buildout_180, FUT Buildout_122, FUT Buildout_172, FUT Buildout_129, FUT Buildout_68 & FUT Buildout_173	2,840	58	0	0	0	58	350	18	18	18	11.50	0.00	0.00	0.00	11.50	3.46	2.50	39.83	0.00	39.83	0.29	16.92	56.75	Gravity	0.013	0.0015	66.0	371.0	375	OK	67.905072	0.11												



Appendix I
Detailed Cost Estimate Breakdown - Future Wastewater Servicing Option



Detailed Breakdown of Cost Estimates - Future Conditions - Servicing Concept								
	Item	Quantity	Units	Unit Cost	Sub-Total	Contingency (30%)	Engineering (15%)	Total Cost
Stage 1	N/A - All Catchments Tie Into Existing System							
	Stage 1 Sub-Total:				N/A - All Catchments Tie Into Existing System			
Stage 2	200mm Gravity Sewer	3,707	Metres	\$ 387.50	\$1,436,592	\$430,978	\$215,489	\$2,083,058
	250mm Gravity Sewer	788	Metres	\$ 400.00	\$315,279	\$94,584	\$47,292	\$457,154
	300mm Gravity Sewer	1,464	Metres	\$ 437.50	\$640,291	\$192,087	\$96,044	\$928,422
	375mm Gravity Sewer	2,686	Metres	\$ 500.00	\$1,343,238	\$402,971	\$201,486	\$1,947,695
	450mm Gravity Sewer	1,206	Metres	\$ 600.00	\$723,870	\$217,161	\$108,581	\$1,049,612
	100mm Forcemain	2,135	Metres	\$ 375.00	\$800,551	\$240,165	\$120,083	\$1,160,798
	150mm Forcemain	2,839	Metres	\$ 437.50	\$1,242,047	\$372,614	\$186,307	\$1,800,968
	200mm Forcemain	11,356	Metres	\$ 500.00	\$5,678,158	\$1,703,447	\$851,724	\$8,233,329
	300mm Forcemain	8,806	Metres	\$ 656.25	\$5,779,032	\$1,733,709	\$866,855	\$8,379,596
	FUT STG 2 LS_1 (~90L/s)	1	Items	\$ 1,800,000.00	\$1,800,000	\$540,000	\$270,000	\$2,610,000
	FUT STG 2 LS_2 (~20L/s)	1	Items	\$ 400,000.00	\$400,000	\$120,000	\$60,000	\$580,000
	FUT STG 2 LS_3 (~85L/s)	1	Items	\$ 1,700,000.00	\$1,700,000	\$510,000	\$255,000	\$2,465,000
	FUT STG 2 LS_4 (~50L/s)	1	Items	\$ 1,000,000.00	\$1,000,000	\$300,000	\$150,000	\$1,450,000
	FUT STG 2 LS_Lagoon (~180L/s)	1	Items	\$ 3,200,000.00	\$3,200,000	\$960,000	\$480,000	\$4,640,000
Stage 2 Sub-Total:				\$26,059,000	\$7,818,000	\$3,909,000	\$37,786,000	
Stage 3	200mm Gravity Sewer	4,604	Metres	\$ 387.50	\$1,784,058	\$535,217	\$267,609	\$2,586,884
	250mm Gravity Sewer	1,807	Metres	\$ 400.00	\$722,704	\$216,811	\$108,406	\$1,047,921
	300mm Gravity Sewer	2,667	Metres	\$ 437.50	\$1,166,910	\$350,073	\$175,036	\$1,692,019
	375mm Gravity Sewer	5,340	Metres	\$ 500.00	\$2,670,093	\$801,028	\$400,514	\$3,871,635
	450mm Gravity Sewer	3,738	Metres	\$ 600.00	\$2,242,949	\$672,885	\$336,442	\$3,252,277
	525mm Gravity Sewer	1,624	Metres	\$ 681.25	\$1,106,372	\$331,912	\$165,956	\$1,604,239
	600mm Gravity Sewer	1,040	Metres	\$ 781.25	\$812,796	\$243,839	\$121,919	\$1,178,554
	675mm Gravity Sewer	2,057	Metres	\$ 912.50	\$1,876,816	\$563,045	\$281,522	\$2,721,383
	750mm Gravity Sewer	1,565	Metres	\$ 1,025.00	\$1,603,640	\$481,092	\$240,546	\$2,325,278
	900mm Gravity Sewer	2,315	Metres	\$ 1,218.75	\$2,821,694	\$846,508	\$423,254	\$4,091,456
	1050mm Gravity Sewer	2,081	Metres	\$ 1,500.00	\$3,121,750	\$936,525	\$468,263	\$4,526,538
	150mm Forcemain	2,839	Metres	\$ 437.50	\$1,242,047	\$372,614	\$186,307	\$1,800,968
	200mm Forcemain	5,405	Metres	\$ 500.00	\$2,702,575	\$810,773	\$405,386	\$3,918,734
	250mm Forcemain	7,454	Metres	\$ 562.50	\$4,193,154	\$1,257,946	\$628,973	\$6,080,073
	525mm Forcemain	10,672	Metres	\$ 968.75	\$10,338,081	\$3,101,424	\$1,550,712	\$14,990,217
	600mm Forcemain	8,806	Metres	\$ 1,093.75	\$9,631,719	\$2,889,516	\$1,444,758	\$13,965,993
	150mm Siphon	139	Metres	\$ 375.00	\$51,993	\$15,598	\$7,799	\$75,390
	200mm Siphon	741	Metres	\$ 387.50	\$287,088	\$86,126	\$43,063	\$416,278
	400mm Siphon	320	Metres	\$ 637.50	\$204,149	\$61,245	\$30,622	\$296,016
	Siphon Trenchless Pits	4	Pairs	\$ 75,000.00	\$300,000	\$90,000	\$45,000	\$435,000
	FUT STG 3 LS_1 (~105L/s)	1	Items	\$ 2,075,000.00	\$2,075,000	\$622,500	\$311,250	\$3,008,750
	FUT STG 3 LS_2 (~85L/s)	1	Items	\$ 1,700,000.00	\$1,700,000	\$510,000	\$255,000	\$2,465,000
	FUT STG 3 LS_3 (~495L/s)	1	Items	\$ 5,962,500.00	\$5,962,500	\$1,788,750	\$894,375	\$8,645,625
	FUT STG 2 LS_1 (~585L/s)	1	Items	\$ 6,637,500.00	\$6,637,500	\$1,991,250	\$995,625	\$9,624,375
	FUT STG 2 LS_2 (~105L/s)	1	Items	\$ 2,075,000.00	\$2,075,000	\$622,500	\$311,250	\$3,008,750
	FUT STG 2 LS_3 (~85L/s)	1	Items	\$ 1,700,000.00	\$1,700,000	\$510,000	\$255,000	\$2,465,000
	FUT STG 2 LS_4 (~50L/s)	1	Items	\$ 1,000,000.00	\$1,000,000	\$300,000	\$150,000	\$1,450,000
	FUT STG 2 LS_Lagoon (~760L/s)	1	Items	\$ 7,950,000.00	\$7,950,000	\$2,385,000	\$1,192,500	\$11,527,500
Stage 3 Sub-Total:				\$77,981,000	\$23,394,000	\$11,697,000	\$113,072,000	
3+	200mm Gravity Sewer	4,092	Metres	\$ 387.50	\$1,585,682	\$475,705	\$237,852	\$2,299,239
	250mm Gravity Sewer	2,099	Metres	\$ 400.00	\$839,409	\$251,823	\$125,911	\$1,217,144
	300mm Gravity Sewer	1,685	Metres	\$ 437.50	\$737,315	\$221,194	\$110,597	\$1,069,106
	375mm Gravity Sewer	5,331	Metres	\$ 500.00	\$2,665,415	\$799,625	\$399,812	\$3,864,852
	450mm Gravity Sewer	4,140	Metres	\$ 600.00	\$2,483,935	\$745,180	\$372,590	\$3,601,705
	525mm Gravity Sewer	3,939	Metres	\$ 681.25	\$2,683,640	\$805,092	\$402,546	\$3,891,279
	600mm Gravity Sewer	2,022	Metres	\$ 781.25	\$1,579,930	\$473,979	\$236,989	\$2,290,898
	675mm Gravity Sewer	1,206	Metres	\$ 912.50	\$1,100,551	\$330,165	\$165,083	\$1,595,798
	750mm Gravity Sewer	1,328	Metres	\$ 1,025.00	\$1,361,502	\$408,451	\$204,225	\$1,974,178
	900mm Gravity Sewer	1,565	Metres	\$ 1,218.75	\$1,906,767	\$572,030	\$286,015	\$2,764,812
	1050mm Gravity Sewer	4,396	Metres	\$ 1,500.00	\$6,594,604	\$1,978,381	\$989,191	\$9,562,176
	100mm Forcemain	1,030	Metres	\$ 375.00	\$386,083	\$115,825	\$57,913	\$559,821
	150mm Forcemain	2,839	Metres	\$ 437.50	\$1,242,047	\$372,614	\$186,307	\$1,800,968
	200mm Forcemain	5,405	Metres	\$ 500.00	\$2,702,575	\$810,773	\$405,386	\$3,918,734
	250mm Forcemain	8,850	Metres	\$ 562.50	\$4,978,297	\$1,493,489	\$746,744	\$7,218,530

Stage	525mm Forcemain	3,617	Metres	\$ 968.75	\$3,504,072	\$1,051,221	\$525,611	\$5,080,904
	600mm Forcemain	7,054	Metres	\$ 1,093.75	\$7,715,817	\$2,314,745	\$1,157,373	\$11,187,935
	675mm Forcemain	8,806	Metres	\$ 1,156.25	\$10,182,103	\$3,054,631	\$1,527,315	\$14,764,050
	150mm Siphon	139	Metres	\$ 375.00	\$51,993	\$15,598	\$7,799	\$75,390
	200mm Siphon	741	Metres	\$ 387.50	\$287,088	\$86,126	\$43,063	\$416,278
	400mm Siphon	320	Metres	\$ 637.50	\$204,149	\$61,245	\$30,622	\$296,016
	Siphon Trenchless Pits	4	Pairs	\$ 75,000.00	\$300,000	\$90,000	\$45,000	\$435,000
	FUT STG 3+ LS_1 (~17L/s)	1	Items	\$ 340,000.00	\$340,000	\$102,000	\$51,000	\$493,000
	FUT STG 3+ LS_2 (~105L/s)	1	Items	\$ 2,075,000.00	\$2,075,000	\$622,500	\$311,250	\$3,008,750
	FUT STG 3 LS_1 (~105L/s)	1	Items	\$ 2,075,000.00	\$2,075,000	\$622,500	\$311,250	\$3,008,750
	FUT STG 3 LS_2 (~85L/s)	1	Items	\$ 1,700,000.00	\$1,700,000	\$510,000	\$255,000	\$2,465,000
	FUT STG 3 LS_3 (~600L/s)	1	Items	\$ 6,750,000.00	\$6,750,000	\$2,025,000	\$1,012,500	\$9,787,500
	FUT STG 2 LS_1 (~690L/s)	1	Items	\$ 7,425,000.00	\$7,425,000	\$2,227,500	\$1,113,750	\$10,766,250
	FUT STG 2 LS_2 (~105L/s)	1	Items	\$ 2,075,000.00	\$2,075,000	\$622,500	\$311,250	\$3,008,750
	FUT STG 2 LS_3 (~85L/s)	1	Items	\$ 1,700,000.00	\$1,700,000	\$510,000	\$255,000	\$2,465,000
	FUT STG 2 LS_Lagoon (~865L/s)	1	Items	\$ 8,737,500.00	\$8,737,500	\$2,621,250	\$1,310,625	\$12,669,375
	Stage 3+ Sub-Total:				\$87,970,000	\$26,391,000	\$13,196,000	\$127,557,000
					\$192,010,000	\$57,603,000	\$28,802,000	\$278,415,000



Appendix J
Future System Assessments - Stage 1 - Longitudinal Profiles

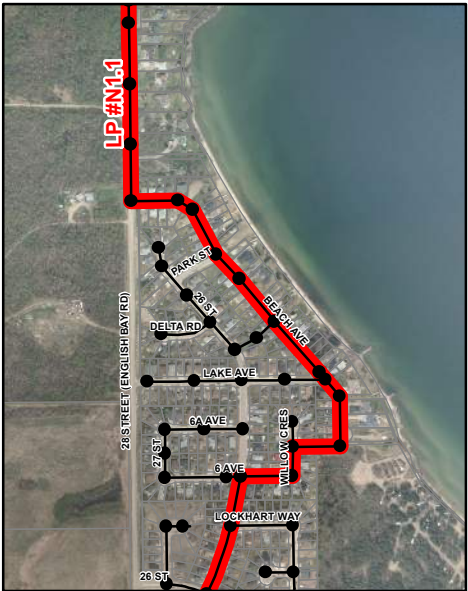
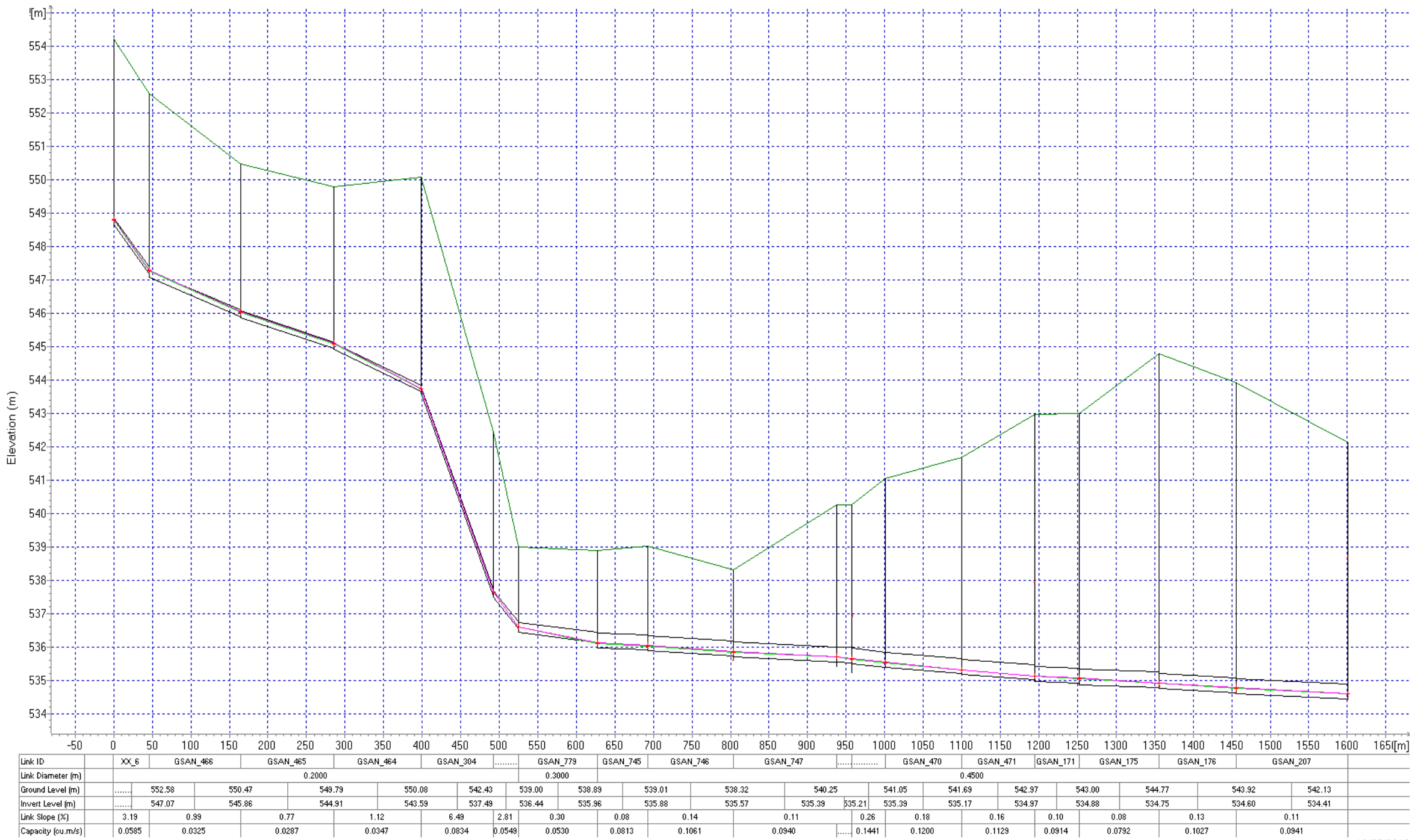


Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS Figures\App I - Future Stage 1 System Assessment LPs\Figure 1 - LP #N1.1.mxd

FIGURE APP J.1

LP #N1.1 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



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MAXIMUM HGL PROFILE - LP #N1.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



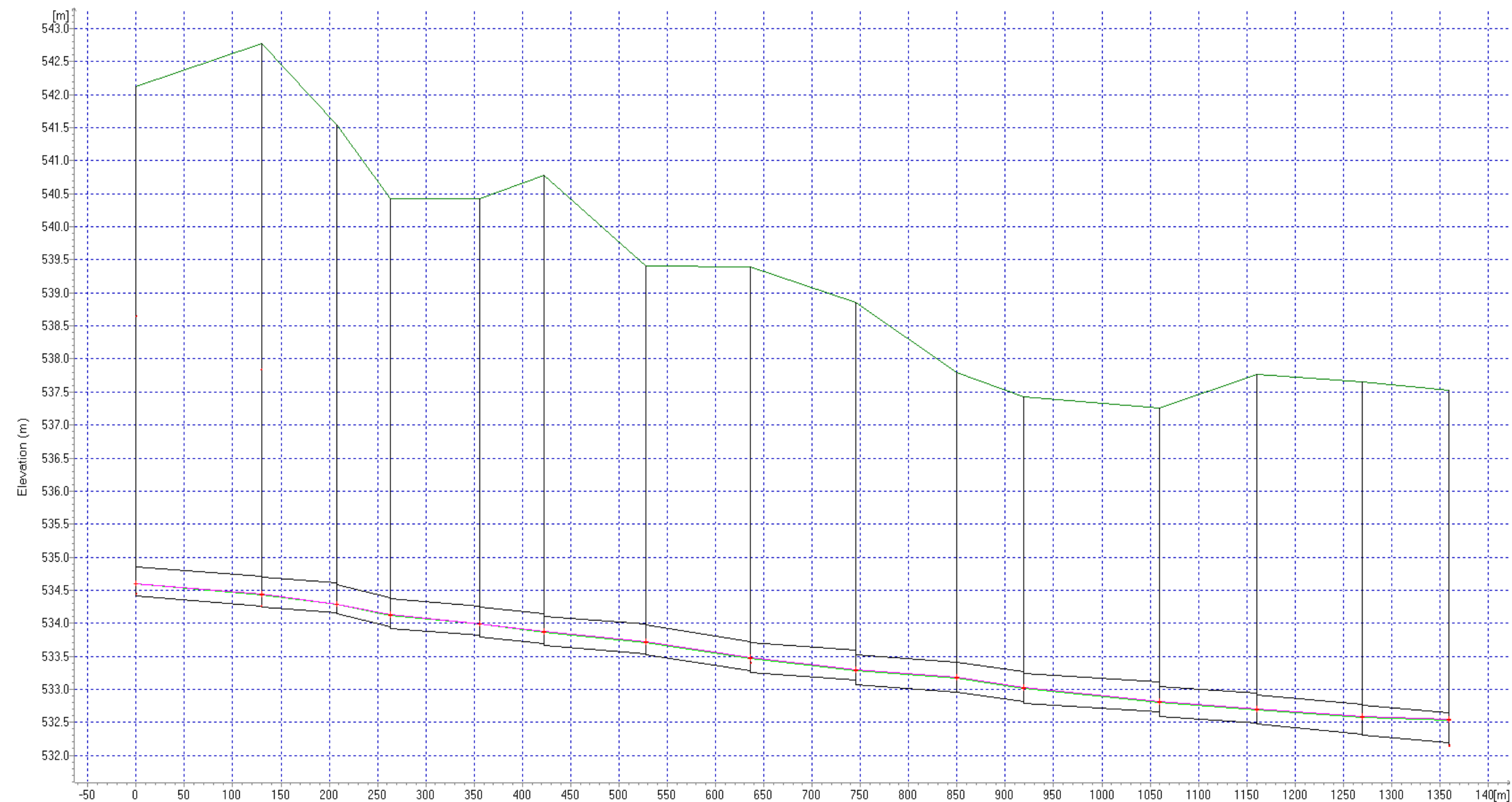
13/05/2016



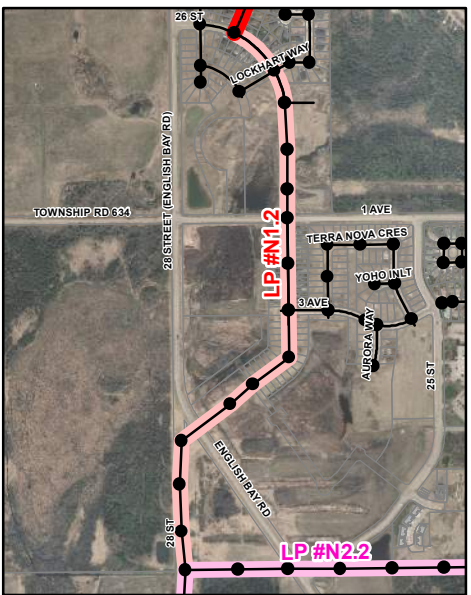
FIGURE APP J.2

LP #N1.2 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_456		GSAN_383	GSAN_457	GSAN_187	GSAN_186	GSAN_889	GSAN_184	GSAN_183	GSAN_182	GSAN_181	GSAN_180	GSAN_179	GSAN_178	GSAN_177
Link Diameter (m)									0.4500						
Ground Level (m)	542.13	542.78	541.54	540.43	540.42	540.78	539.41	539.39	538.85	537.80	537.42	537.26	537.76	537.65	537.52
Invert Level (m)	534.41	534.25	534.14	533.92	533.79	533.66	533.53	533.26	533.07	532.96	532.79	532.59	532.47	532.31	532.13
Link Slope (%)	0.11		0.36	0.11	0.14	0.11	0.23	0.10	0.11	0.22	0.09	0.0864	0.14	0.12	
Capacity (cu.m/s)	0.0955		0.0945	0.1711	0.0962	0.1074	0.0952	0.1369	0.0922	0.0927	0.1332	0.0834	0.0864	0.1068	0.1004



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INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N1.2
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



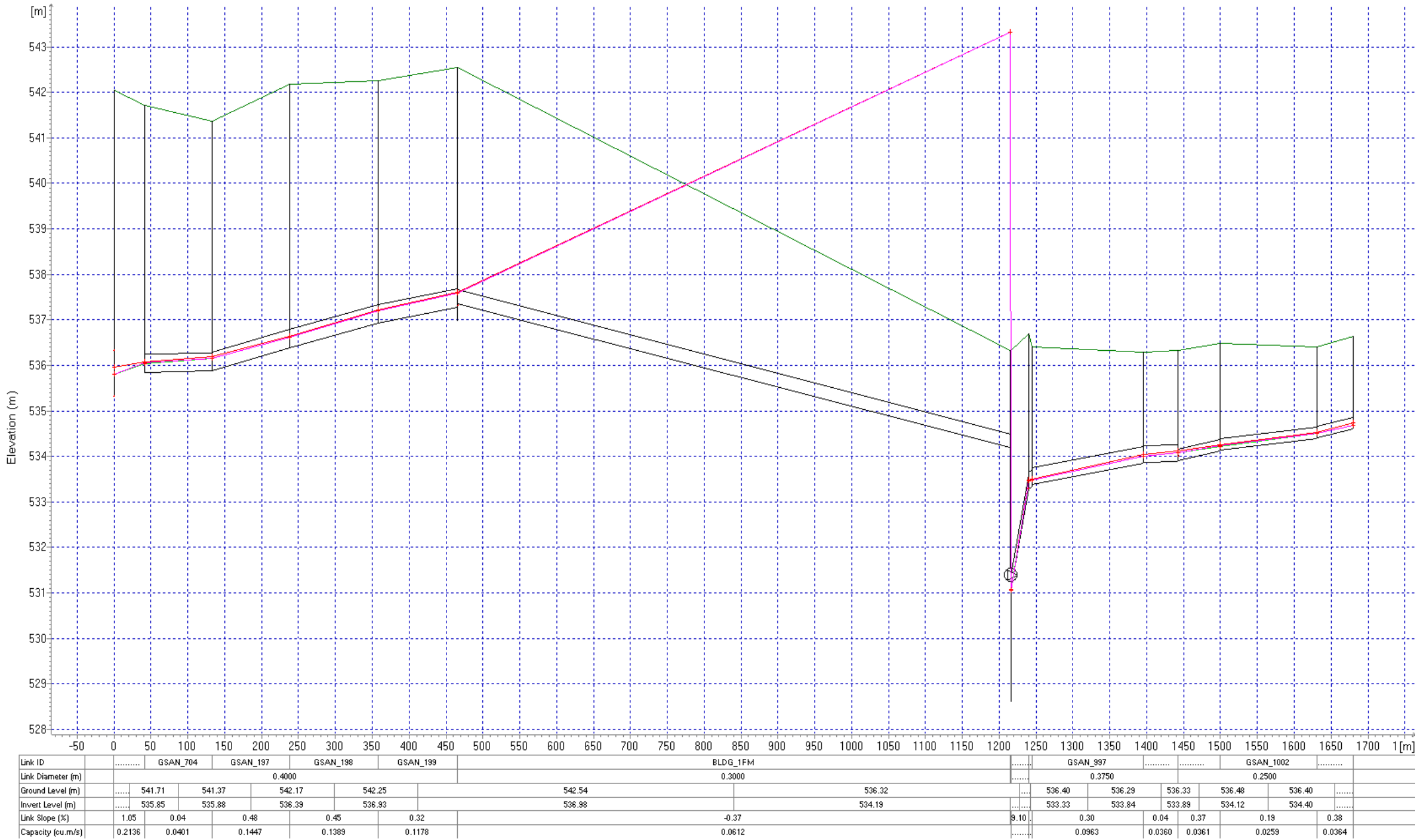
13/05/2016



Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\02_Drafting\201_GIS_Figures\APP I - Future Stage 1 System Assessment\LPs\Figure 3 - LP #N2.1.mxd

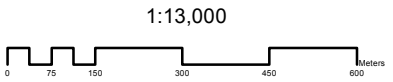
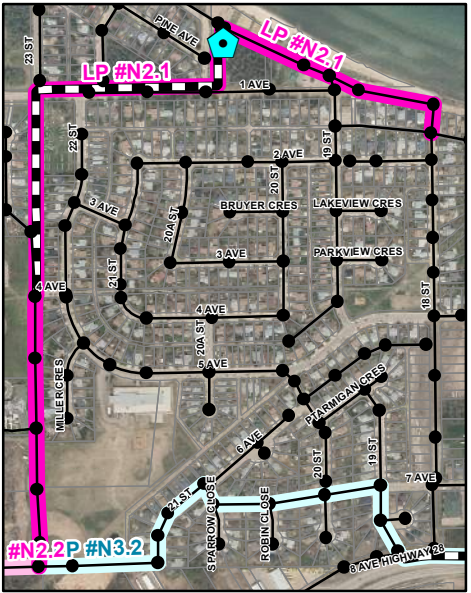
FIGURE APP J.3

LP #N2.1 - Maximum HGL Profile - Future Stage 1 Conditions



Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N2.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



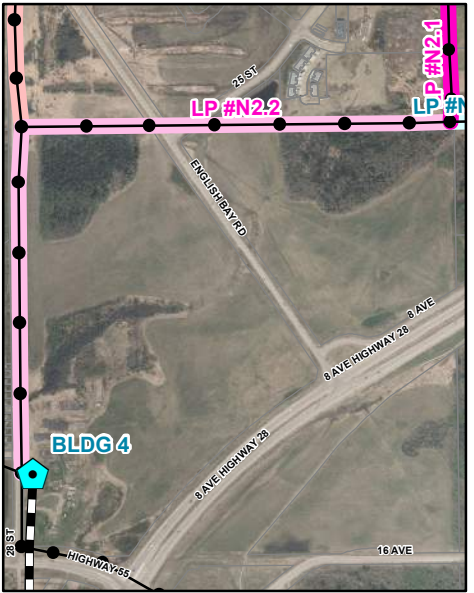
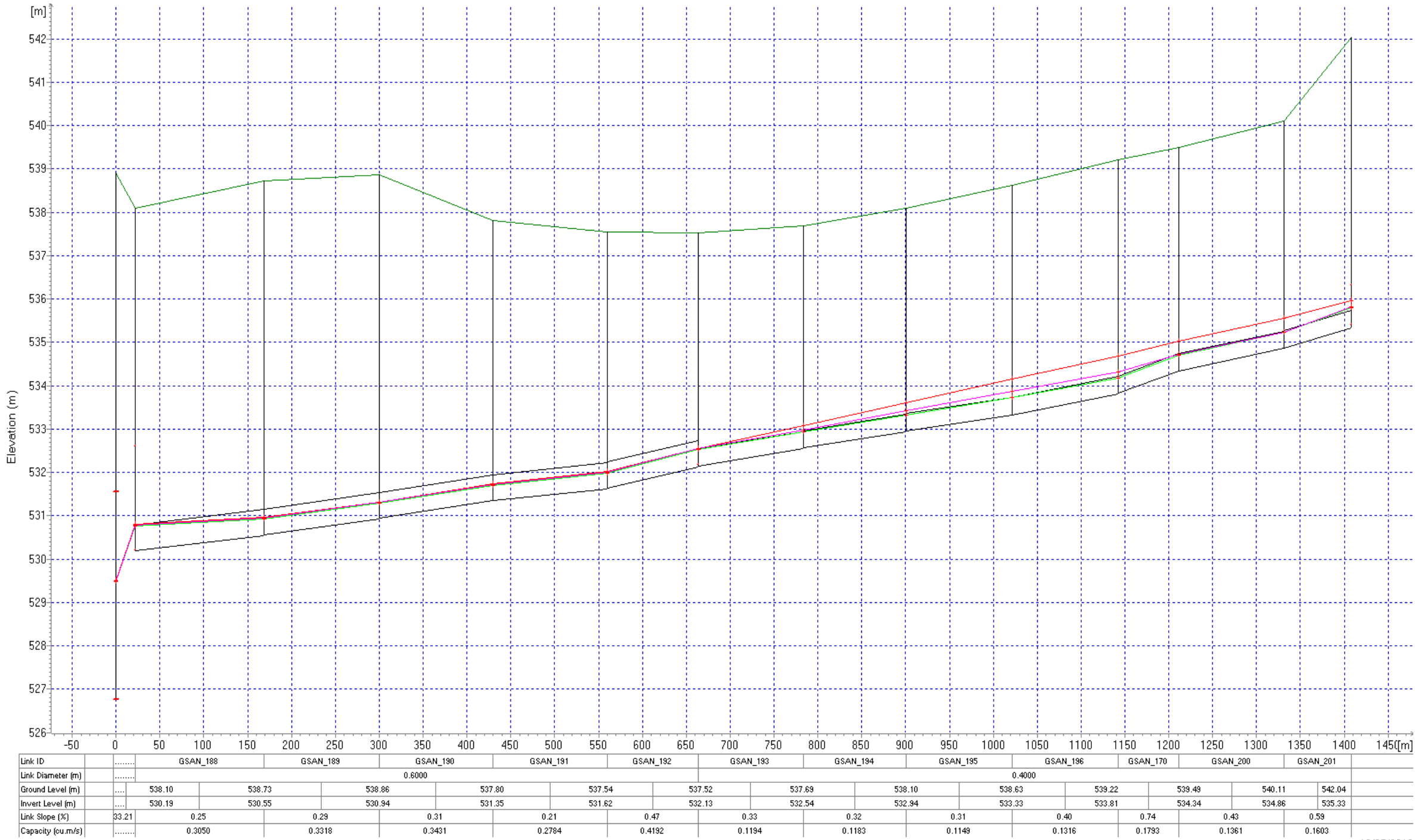
13/05/2016



FIGURE APP J.4

LP #N2.2 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



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INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N2.2
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



13/05/2016

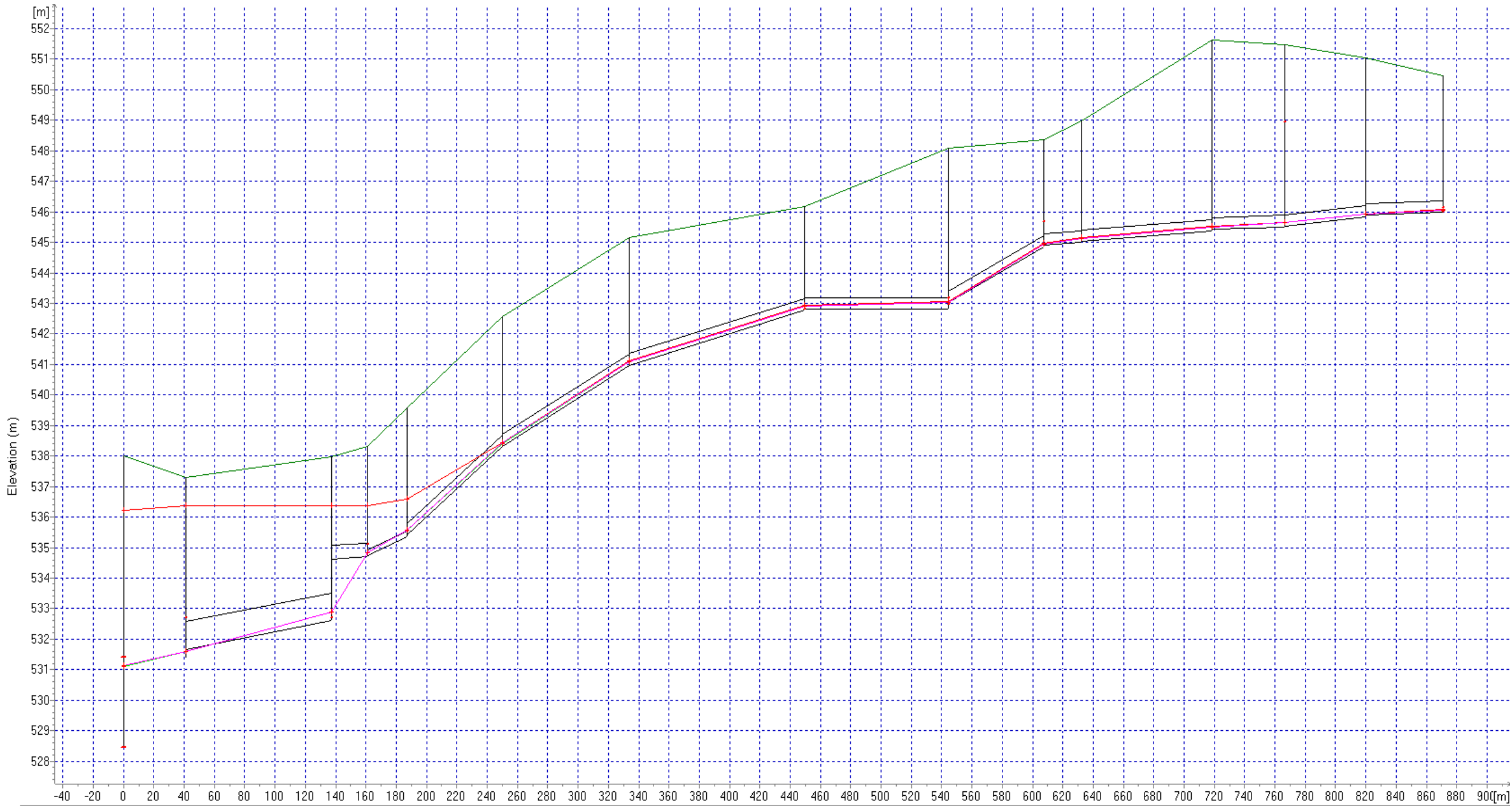


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FIGURE APP J.5

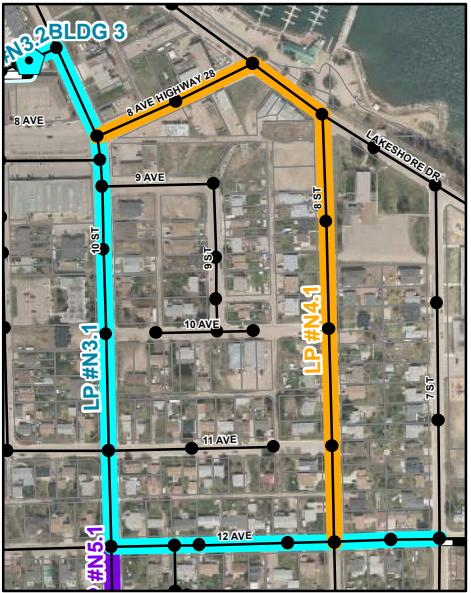
LP #N3.1 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_640		GSAN_1067		.....	.....	GSAN_391A		GSAN_391		GSAN_392		GSAN_393		GSAN_768		.....	GSAN_771		GSAN_770		GSAN_770A		GSAN_847						
Link Diameter (m)	0.3750		0.9000		0.4500		0.2000		0.3750																					
Ground Level (m)	538.00		537.29		537.99		538.31		539.58		542.57		545.17		546.18		548.08		548.35		548.98		551.64		551.48		551.06		550.46	
Invert Level (m)	528.44		531.38		532.62		534.69		535.35		538.30		540.96		542.78		542.82		544.85		545.01		545.38		545.51		545.84		545.98	
Link Slope (%)	0.38		0.99		0.31		2.34		4.58		3.14		1.56		0.01		2.90		0.42		0.41		0.14		0.59		0.18			
Capacity (cu.m/s)	0.1073		1.7977		0.1597		0.0501		0.3748		0.3103		0.2187		0.0201		0.2983		0.1131		0.1125		0.0650		0.1348		0.0742			

13/05/2016



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N3.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



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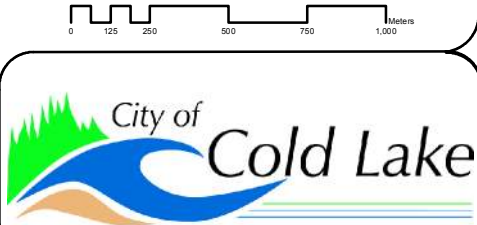
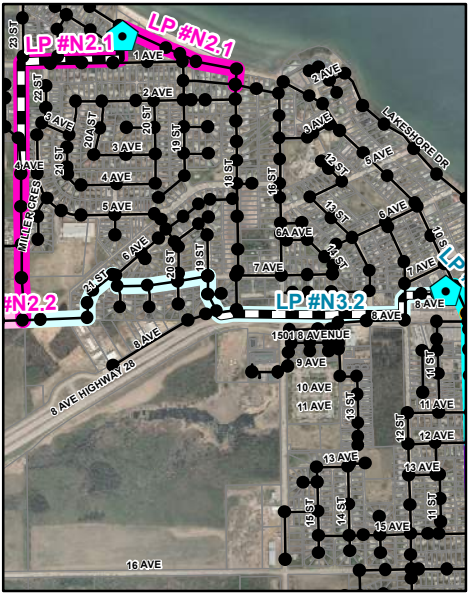
FIGURE APP J.6

LP #N3.2 - Maximum HGL Profile - Future Stage 1 Conditions



Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N3.2
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



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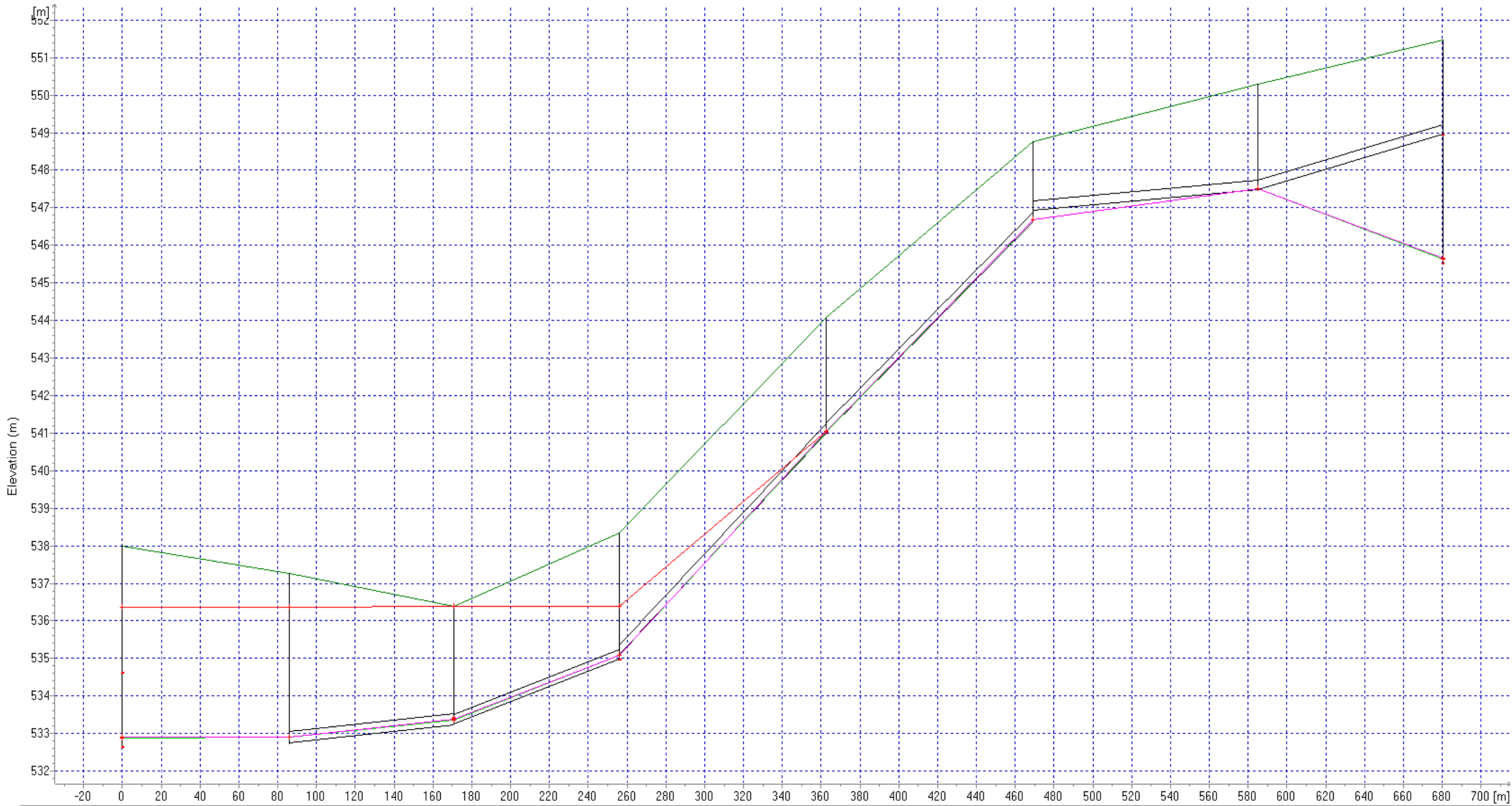
Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS_Figures\App I - Future Stage 1 System Assessment LPs\Figure 7 - LP #N4.1.mxd

FIGURE APP J.7

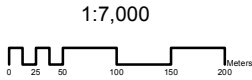
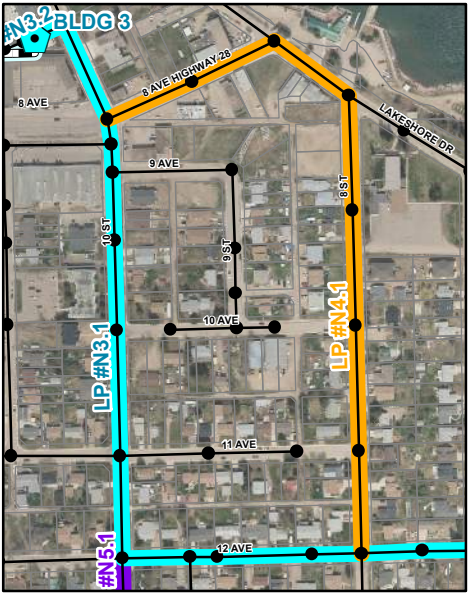
LP #N4.1 - Maximum HGL Profile - Future Stage 1 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_639		GSAN_373		GSAN_374		GSAN_788		GSAN_376		GSAN_377		GSAN_378	
Link Diameter (m)	0.3500		0.3000						0.2500					
Ground Level (m)	537.99		537.26		536.39		538.33		544.07		548.76		550.28	
Invert Level (m)	532.62		532.70		533.24		534.96		540.99		546.64		547.49	
Link Slope (%)	0.02		0.58		2.04		5.53		5.28		0.48		1.55	
Capacity (cu.m/s)	0.0186		0.0734		0.0848		0.1396		0.1364		0.0411		0.0738	



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INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N4.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



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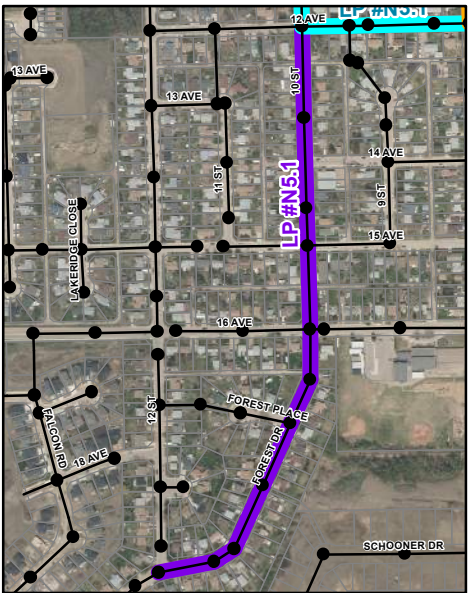
FIGURE APP J.8

LP #N5.1 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_490		GSAN_613	GSAN_612		GSAN_611		GSAN_610		GSAN_609		GSAN_396		GSAN_973		GSAN_394		GSAN_512	
Link Diameter (m)	0.2000											0.3000							
Ground Level (m)	561.50	561.56		560.38		557.98		556.43		555.60		554.64		553.72		553.22		551.38	548.08
Invert Level (m)	557.90	557.14		556.39		554.19		552.31		552.13		551.61		550.79		549.92		548.80	542.82
Link Slope (%)	0.98		2.25		2.31		2.06		0.27		0.57		0.68		1.68		0.91		4.82
Capacity (cu.m/s)	0.0325		0.0491		0.0497		0.0470		0.0169		0.0248		0.0798		0.1250		0.0922		0.2120



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INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N5.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



13/05/2016



FIGURE APP J.9

LP #N6.1 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend**
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	FUT Pipe_3												
Link Diameter (m)	0.2500												
Ground Level (m)	553.35	553.45	553.95	555.50	553.66	554.20	555.67	553.45	552.05	552.13	553.81	554.88	554.30
Invert Level (m)	550.78	550.26	549.90	549.39	548.68	547.90	547.61	547.41	547.14	546.83	546.64	546.42	546.18
Link Slope (%)	1.02						0.00						
Capacity (cu.m/s)	0.0293	0.0367	0.0465	0.0364	0.0820	0.0582	0.3668	0.3151	0.3640	0.4159	0.3185	0.3194	0.3203



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INFLOW - INFILTRATION PROGRAM

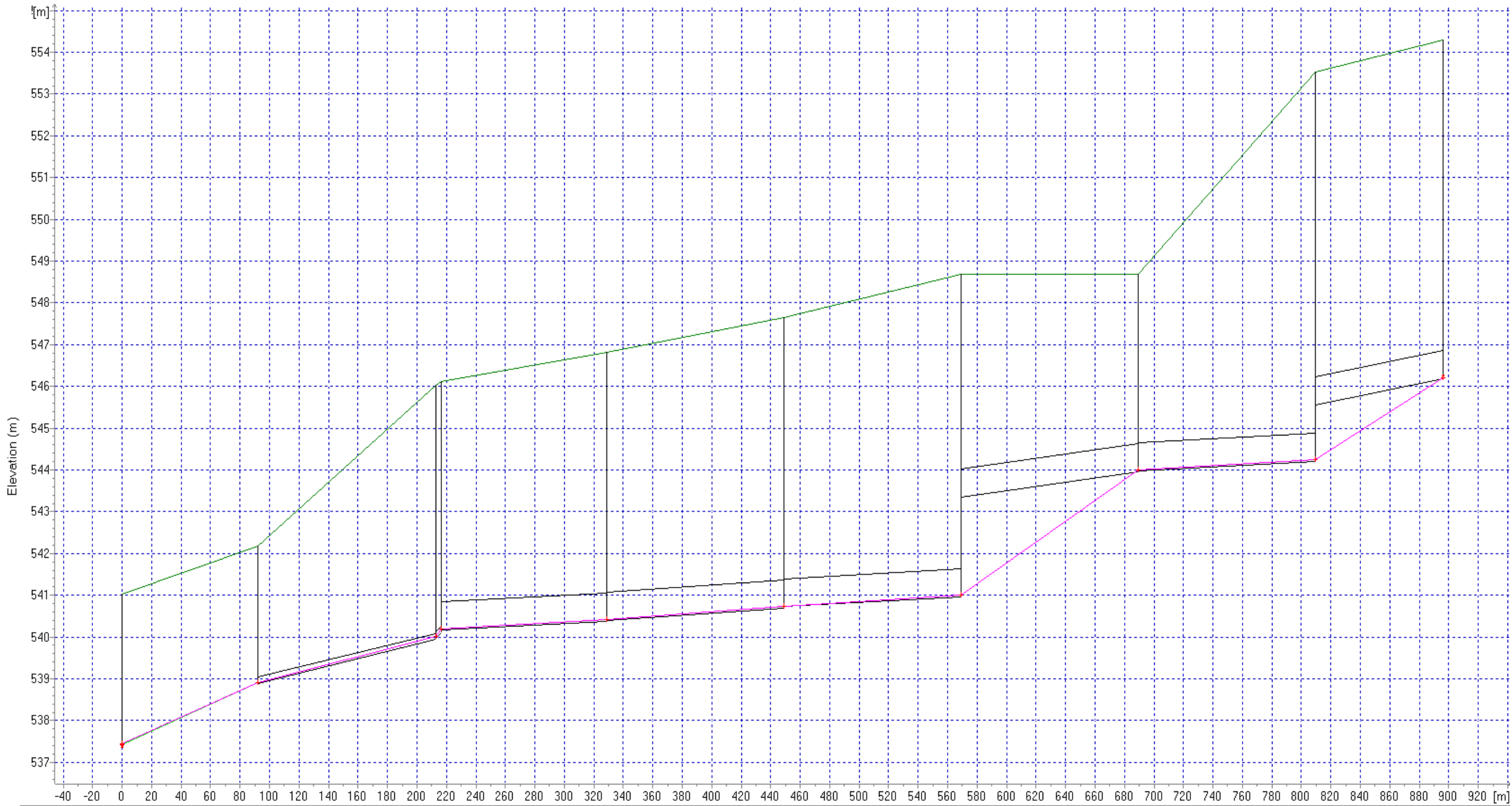
MAXIMUM HGL PROFILE - LP #N6.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS Figures\App I - Future Stage 1 System Assessment\LPs\Figure 10 - LP #N6.2.mxd

FIGURE APP J.10

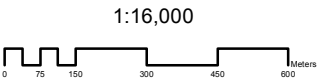
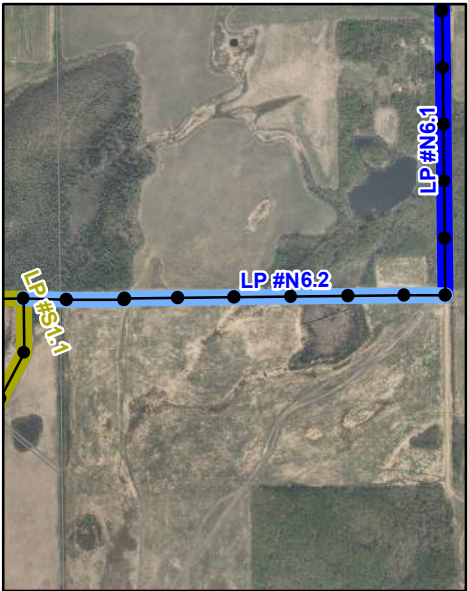
LP #N6.2 - Maximum HGL Profile - Future Stage 1 Conditions



Link ID	FUT Pipe_21		FUT Pipe_20		FUT Pipe_12		FUT Pipe_1		FUT Pipe_15		FUT Pipe_18		FUT Pipe_16		FUT Pipe_17	
Link Diameter (m)	0.2000		0.1500						0.6750							
Ground Level (m)	541.02	542.17	546.02	546.11	546.82	547.65	548.68	553.53	554.30							
Invert Level (m)	537.35	538.84	539.94	540.11	540.37	540.69	540.96	543.95	544.20	546.18						
Link Slope (%)	0.0322		0.00				0.00									
Capacity (cu.m/s)	0.0322		0.0142		0.3509		0.4187		0.3696		0.5956		0.3608		0.7172	

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N6.2
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



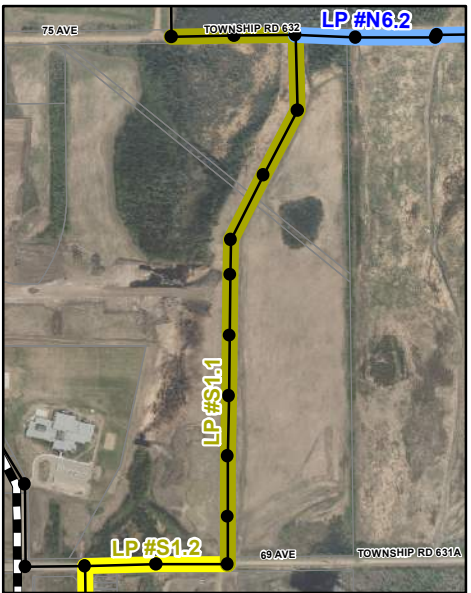
13/05/2016



FIGURE APP J.11

LP #S1.1 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



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INFLOW - INFILTRATION PROGRAM

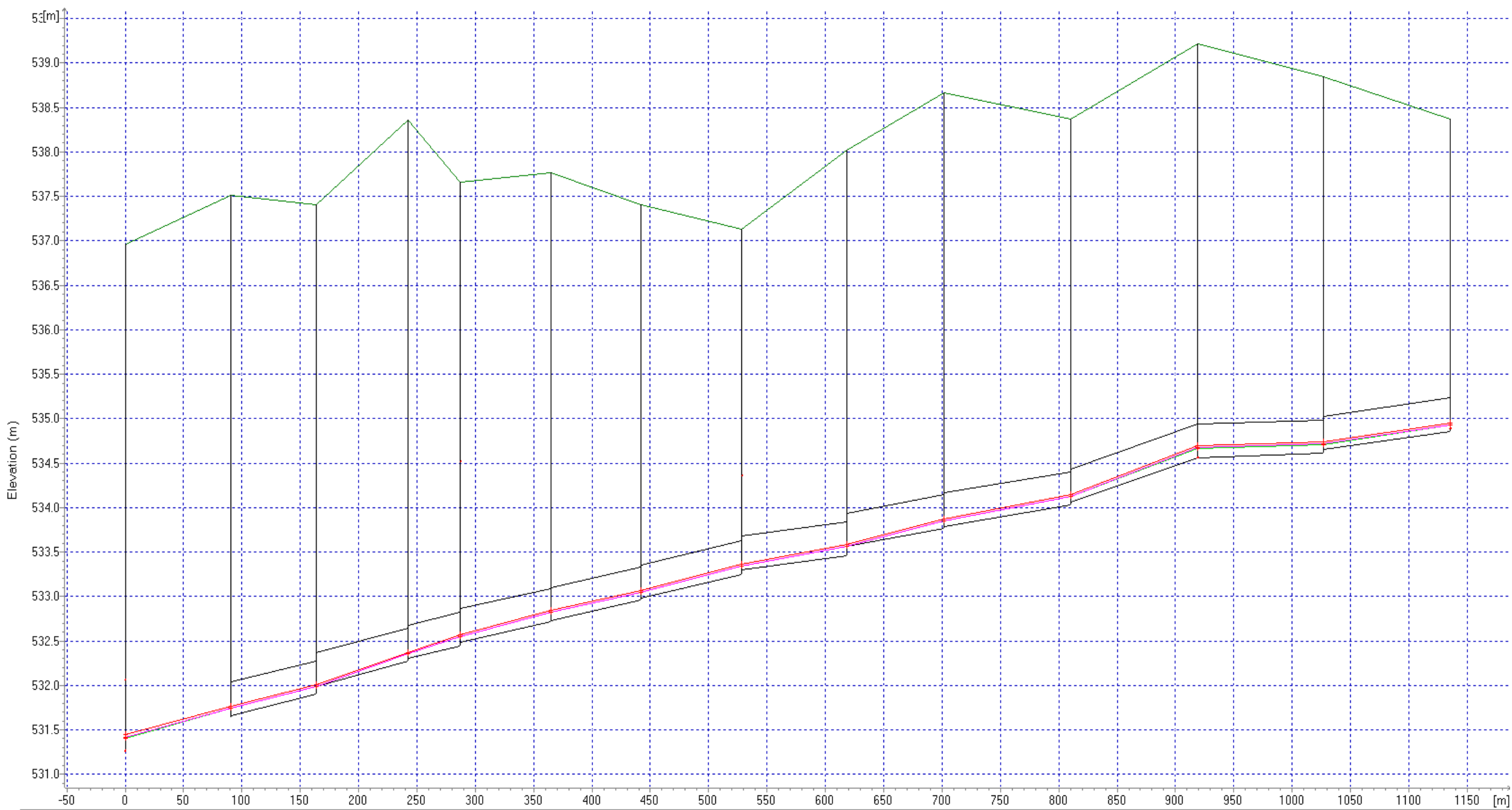
MAXIMUM HGL PROFILE - LP #S1.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS_Figures\APP I - Future Stage 1 System Assessment LPs\Figure 12 - LP #S1.2.mxd

FIGURE APP J.12

LP #S1.2 - Maximum HGL Profile - Future Stage 1 Conditions

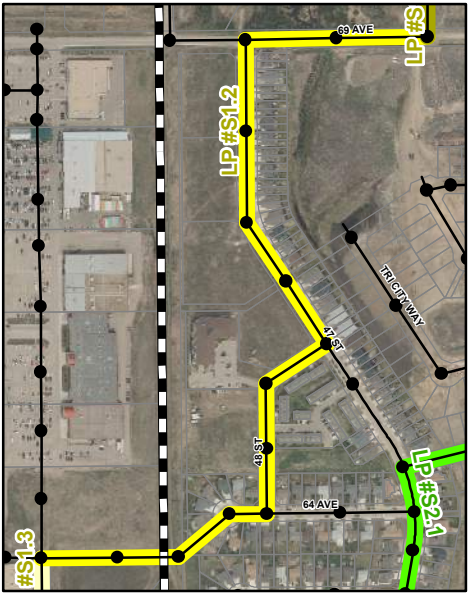


Link ID	GSAN_673		GSAN_674		GSAN_675		GSAN_676		GSAN_677		GSAN_678		GSAN_679		GSAN_680		GSAN_681		GSAN_682		GSAN_688		GSAN_697		GSAN_698		
Link Diameter (m)	0.3750																										
Ground Level (m)	536.96	537.51	537.41	538.36	537.66	537.76	537.40	537.13	538.02	538.67	538.37	539.22	538.85	538.37													
Invert Level (m)	531.25	531.64	531.90	532.27	532.45	532.72	532.96	533.25	533.46	533.77	534.03	534.56	534.61	534.86													
Link Slope (%)	0.42	0.33	0.35	0.33	0.30		0.31	0.18	0.25	0.22	0.46	0.05	0.19														
Capacity (cu.m/s)	0.1129	0.1006	0.1041	0.1000	0.0953	0.0965	0.0981	0.0735	0.0879	0.0822	0.1187	0.0377	0.0771														

13/05/2016

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S1.2
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



Legend

— Constant 0.29L/s/ha
— 25yr 24hr Q3 Huff Distribution
— 50yr 24hr Q3 Huff Distribution



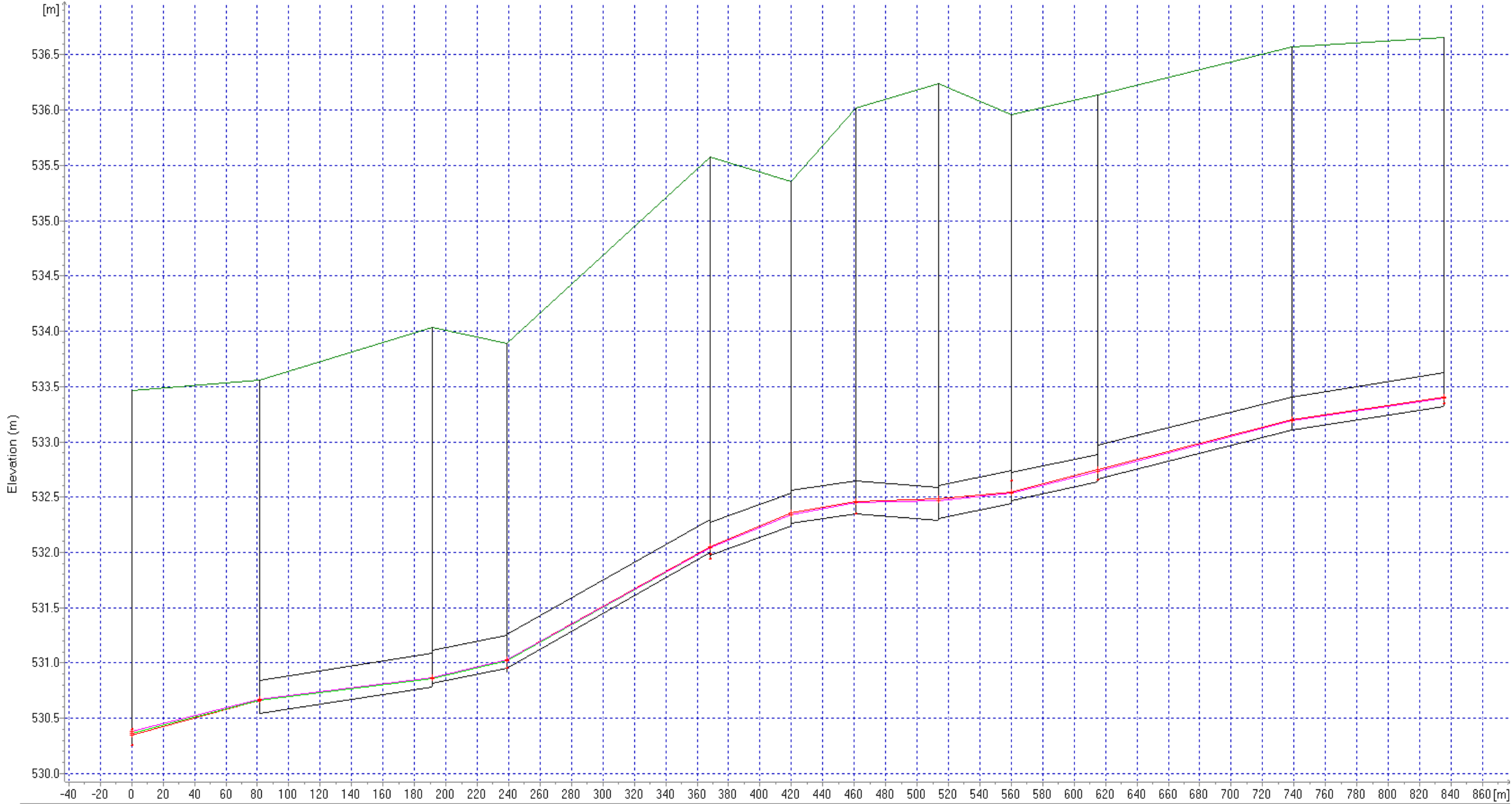
**THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM**

MAXIMUM HGL PROFILE - LP #S1.3
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM

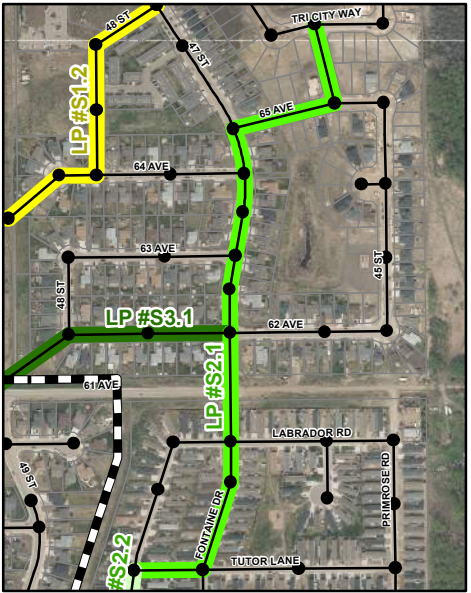


LP #S2.1 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_921		GSAN_934		GSAN_933		GSAN_938		GSAN_68		GSAN_68A	GSAN_69	GSAN_70	GSAN_91	GSAN_1033		GSAN_1062
Link Diameter (m)							0.3000							0.2500	0.3000		
Ground Level (m)	533.46	533.56	534.04	533.89	535.58	535.35	536.02	536.24	535.96	536.14	536.57	536.66					
Invert Level (m)	530.25	530.54	530.79	530.91	531.94	532.24	532.35	532.29	532.44	532.64	533.11	533.32					
Link Slope (%)	0.33	0.22	0.29		0.76	0.51	0.22	-0.12	0.28	0.30	0.36	0.22					
Capacity (cu.m/s)	0.0557	0.0452	0.0519		0.0865	0.0691	0.0452	0.0333	0.0515	0.0327	0.0576	0.0457					



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S2.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



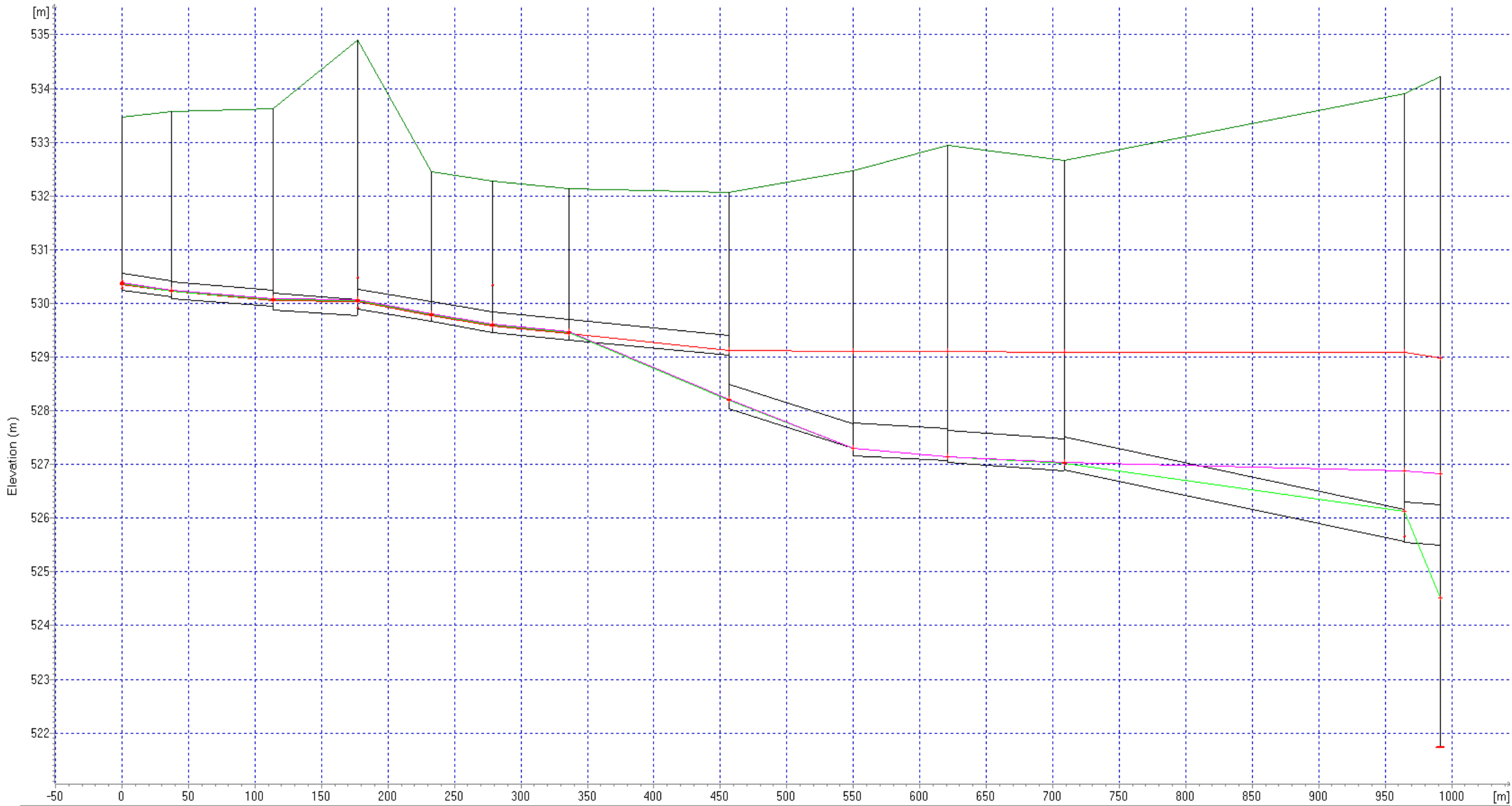
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Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS_Figures\APP I - Future Stage 1 System Assessment LPs\Figure 15 - LP #S2.2.mxd

FIGURE APP J.15

LP #S2.2 - Maximum HGL Profile - Future Stage 1 Conditions



Link ID	GSAN_920	GSAN_919	GSAN_918	GSAN_900	GSAN_942	GSAN_799	GSAN_798	GSAN_797	GSAN_796	GSAN_795	GSAN_795A	
Link Diameter (m)	0.3000			0.3750			0.4500			0.6000		
Ground Level (m)	533.46	533.58	533.62	534.91	532.45	532.27	532.13	532.06	532.47	532.94	532.66	533.90
Invert Level (m)	530.25	530.10	529.88	529.77	529.66	529.46	529.32	528.03	527.17	527.03	526.88	525.56
Link Slope (%)	0.35	0.20	0.18	0.42	0.43		0.24	0.79	0.14	0.18	0.53	0.21
Capacity (cu.m/s)	0.0572	0.0431	0.0408	0.1132	0.1148		0.0864	0.2523	0.2326	0.2572	0.4454	0.5109

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



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INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S2.2
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



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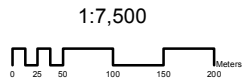
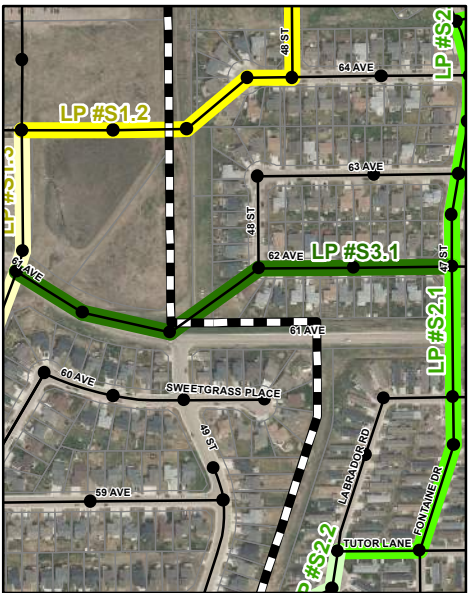
LP #S3.1 - Maximum HGL Profile - Future Stage 1 Conditions



Link ID	GSAN_801									
Link Diameter (m)	GSAN_667									
Ground Level (m)	536.80	537.84				539.00	537.30		536.00	535.58
Invert Level (m)	530.83	531.11				531.33	531.59		531.83	531.94
Link Slope (%)	0.23		0.21				0.22		0.08	
Capacity (cu.m/s)	0.0467		0.0446				0.0455		0.0270	

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



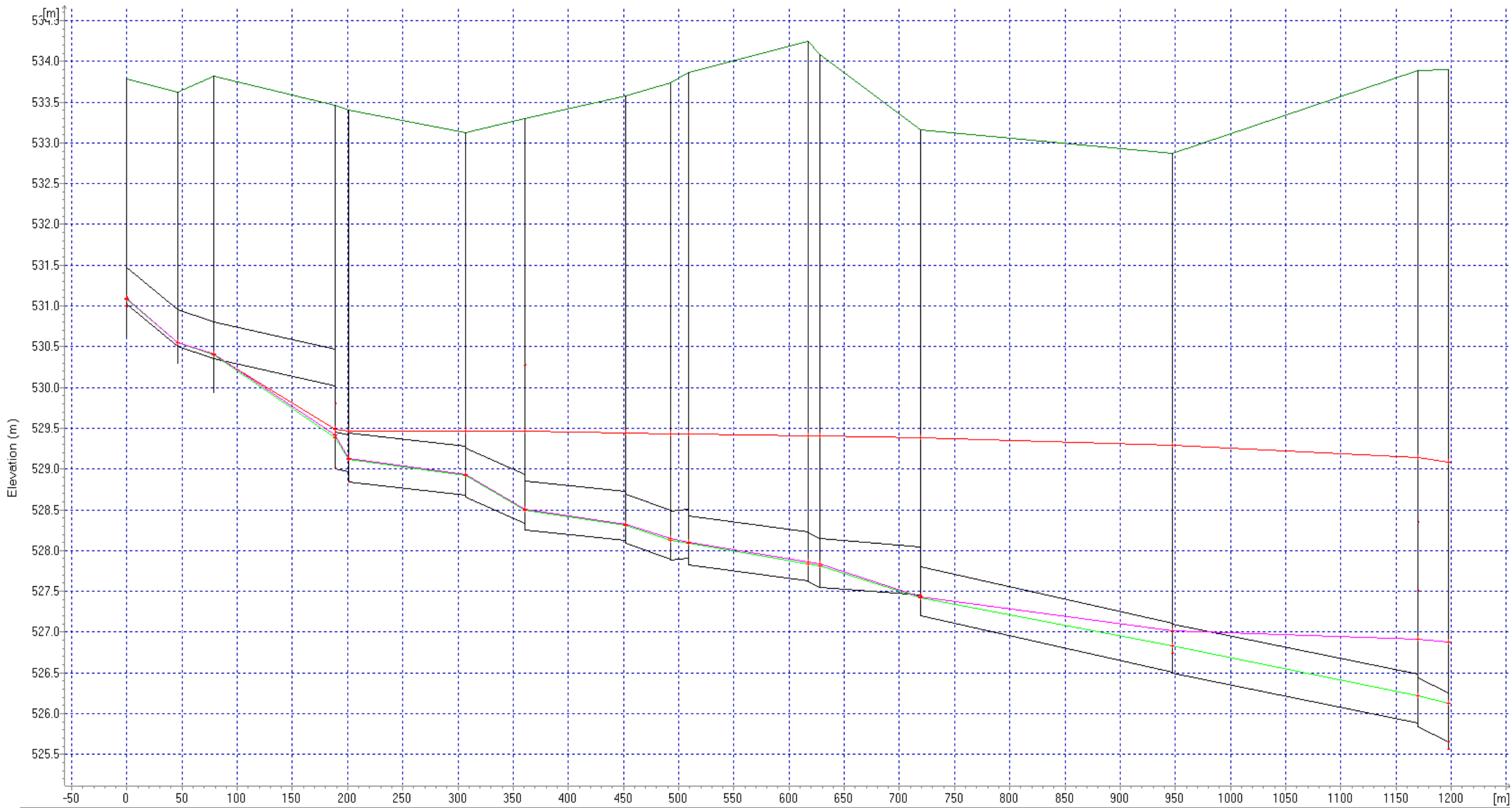
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S3.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



FIGURE APP J.17

LP #S4.1 - Maximum HGL Profile - Future Stage 1 Conditions

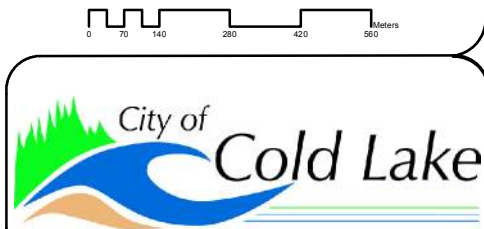
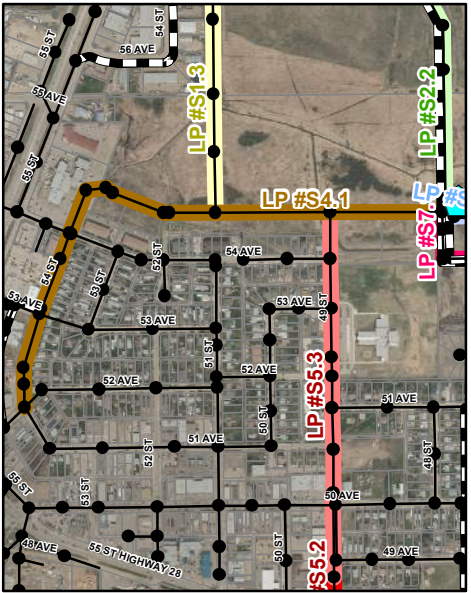


Link ID	GSAN_1101	GSAN_1103	GSAN_133	GSAN_294	GSAN_274	GSAN_144	GSAN_146	GSAN_148	GSAN_246	GSAN_247	
Link Diameter (m)	0.4500							0.6000			
Ground Level (m)	533.78	533.62	533.82	533.46	533.40	533.12	533.30	533.58	533.74	533.87	534.25
Invert Level (m)	530.61	530.29	529.93	529.00	528.84	528.66	528.25	527.89	527.83	527.54	527.20
Link Slope (X)	1.15	0.46	0.30		0.16	0.60	0.13	0.48	0.18	0.10	0.30
Capacity (cu.m/s)	0.3055	0.1923	0.1559		0.2419	0.4756	0.2248	0.4234	0.2609	0.1976	0.3381
											0.3202
											0.5097

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Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

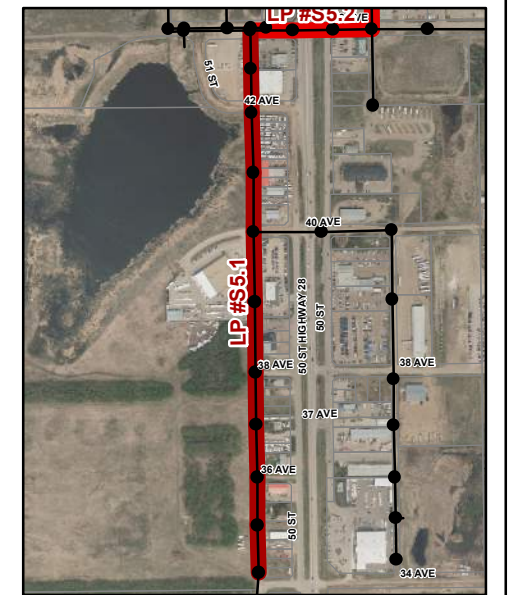
MAXIMUM HGL PROFILE - LP #S4.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



Legend

— Constant 0.29L/s/ha

50yr 24hr Q3 Huff Distribution



**THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM**

MAXIMUM HGL PROFILE - LP #S5.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



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FIGURE APP J.19

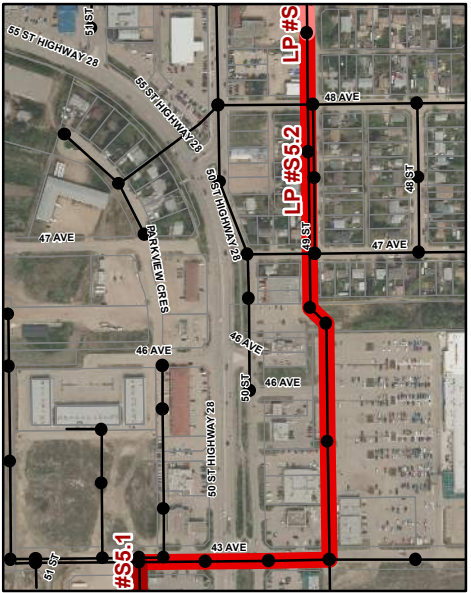
LP #S5.2 - Maximum HGL Profile - Future Stage 1 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_363		GSAN_364		GSAN_365		GSAN_215		GSAN_868		GSAN_870		GSAN_871	
Link Diameter (m)	0.4500		0.4500		0.4500		0.5250		0.5250		0.6000		0.6000	
Ground Level (m)	537.75	537.90	537.62	537.27	538.24	537.92	537.93	538.22	537.30					
Invert Level (m)	531.55	531.32	531.14	530.82	530.28	530.05	529.78	529.02	528.96					
Link Slope (%)	0.30	0.21		0.43		0.18	0.99	0.46		0.05				
Capacity (cu.m/s)	0.1560	0.1306	0.1856	0.2825	0.1840	0.4267	0.4150	0.1328						



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S5.2
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



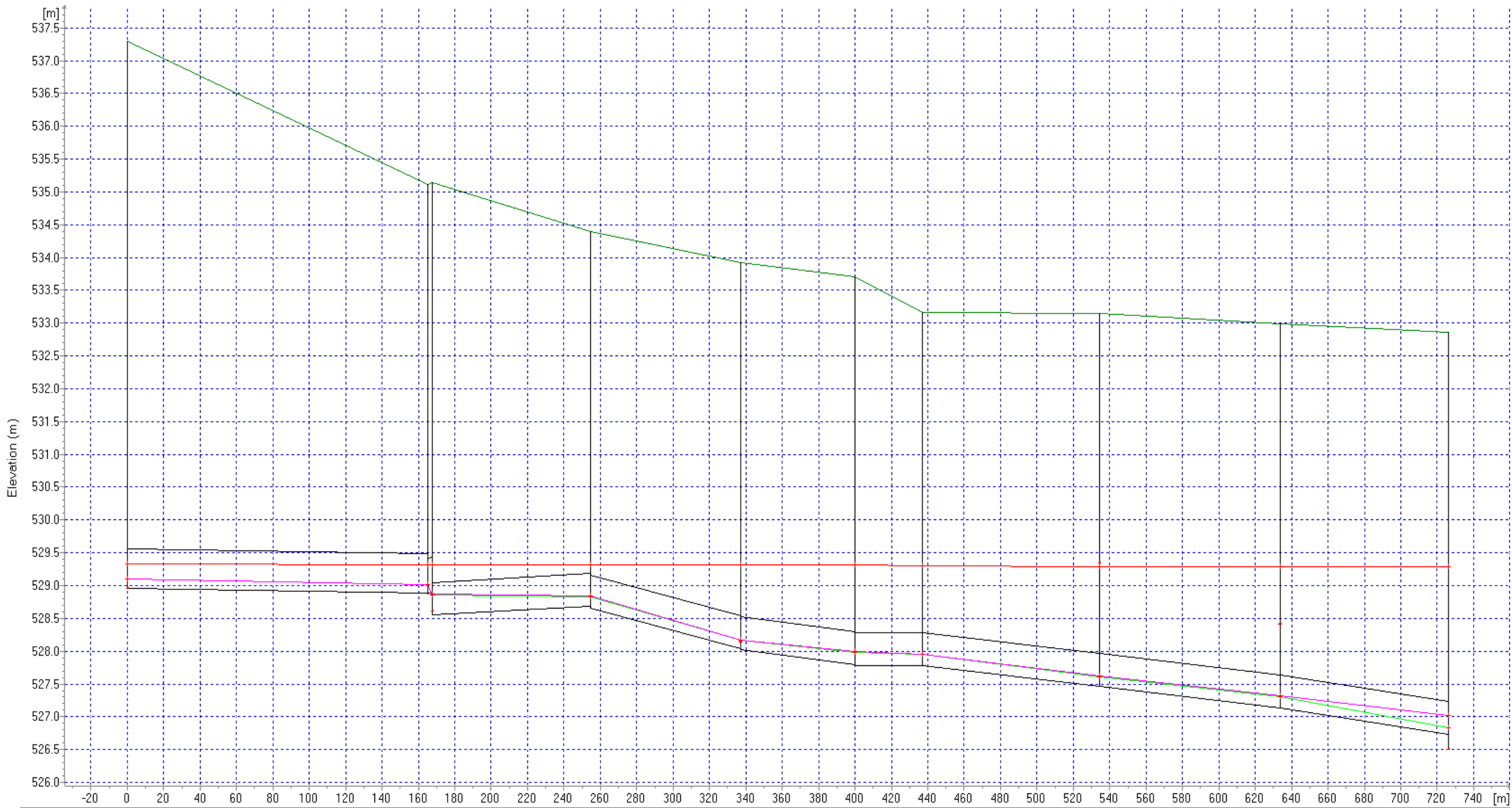
13/05/2016



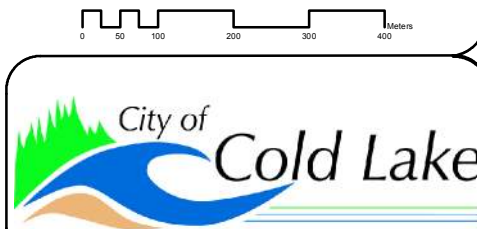
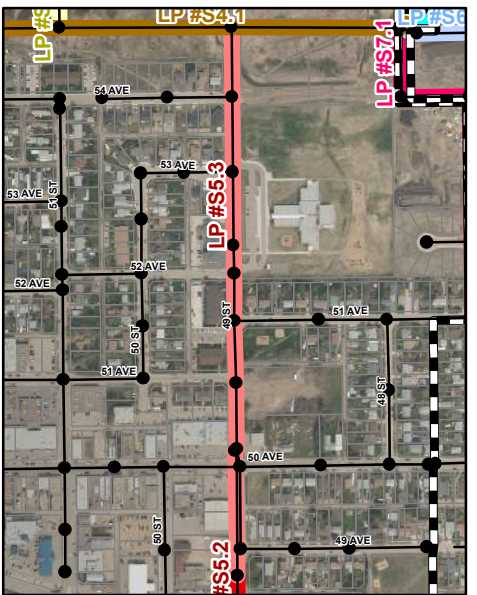
FIGURE APP J.20

LP #S5.3 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_872		GSAN_98		GSAN_99		GSAN_162		GSAN_223		GSAN_224		GSAN_244		GSAN_245	
Link Diameter (m)	0.6000								0.5000							
Ground Level (m)	537.30		535.11		535.14		534.40		533.92		533.71		533.16		533.15	
Invert Level (m)	528.96		528.88		528.55		528.66		528.03		527.78		527.46		527.14	
Link Slope (%)	0.05				-0.15		0.75		0.37		0.01		0.32		0.43	
Capacity (cu.m/s)	0.1320				0.1471		0.3276		0.2295		0.0310		0.2128		0.2140	



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

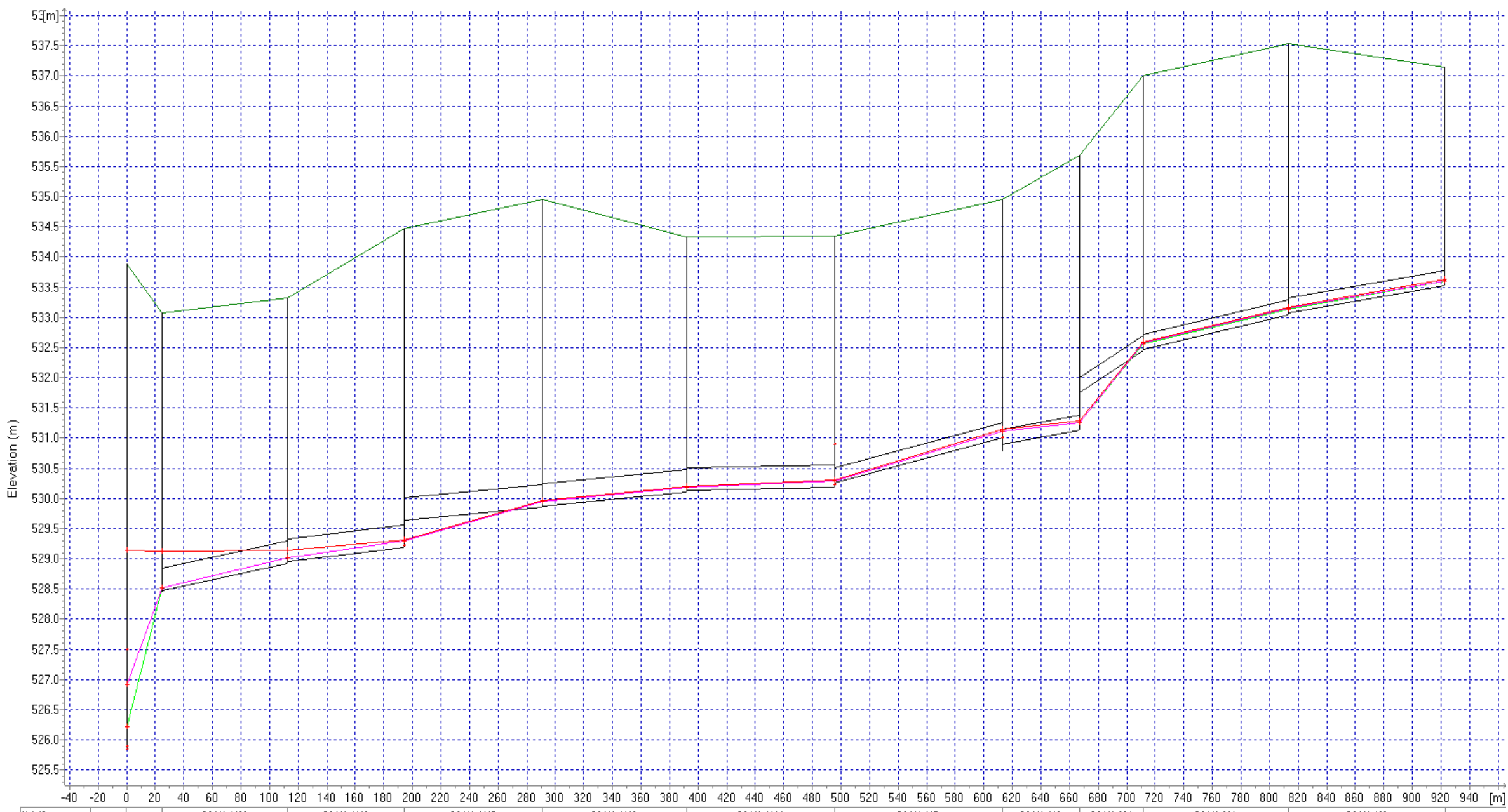
MAXIMUM HGL PROFILE - LP #S5.3
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



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FIGURE APP J.21

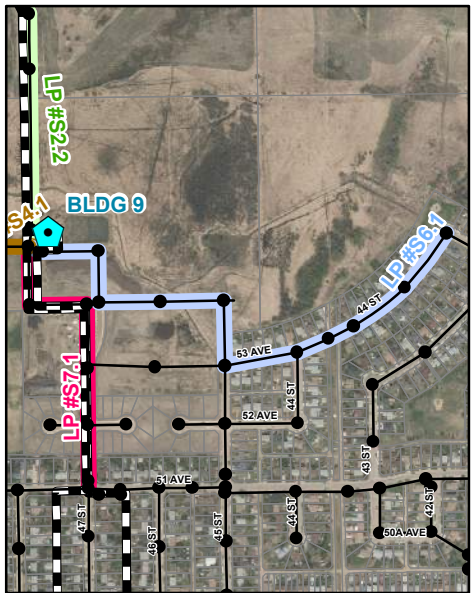
LP #S6.1 - Maximum HGL Profile - Future Stage 1 Conditions



Link ID			GSAN_1120		GSAN_1119		GSAN_1117		GSAN_1116		GSAN_1114		GSAN_1115		GSAN_1116		GSAN_664		GSAN_821		GSAN_108				
Link Diameter (m)			0.3750																						
Ground Level (m)		.....	533.08		533.32		534.48		534.95		534.34		534.36		534.96		535.68		537.00		537.54		537.14		
Invert Level (m)		.....	528.44		528.93		529.19		529.86		530.10		530.17		530.78		531.13		532.45		533.04		533.53		
Link Slope (%)			0.39		0.51		0.28		0.22		0.11		0.63		0.43		1.57		0.56		0.42				
Capacity (cu.m/s)			0.1090		0.1250		0.0929		0.0825		0.0830		0.0322		0.0470		0.0390		0.0743		0.0444		0.0385		

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S6.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM



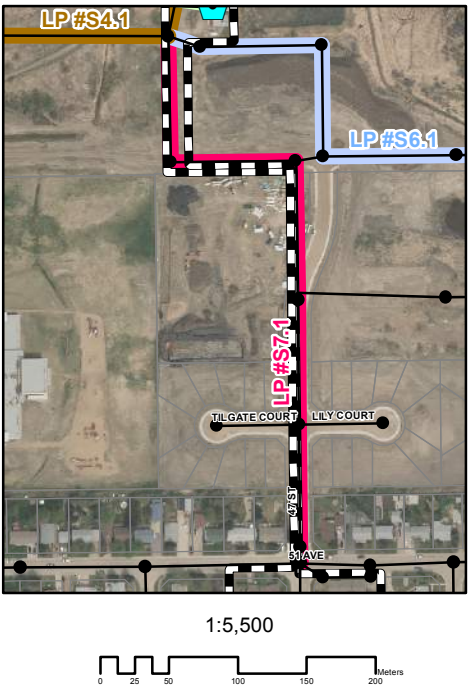
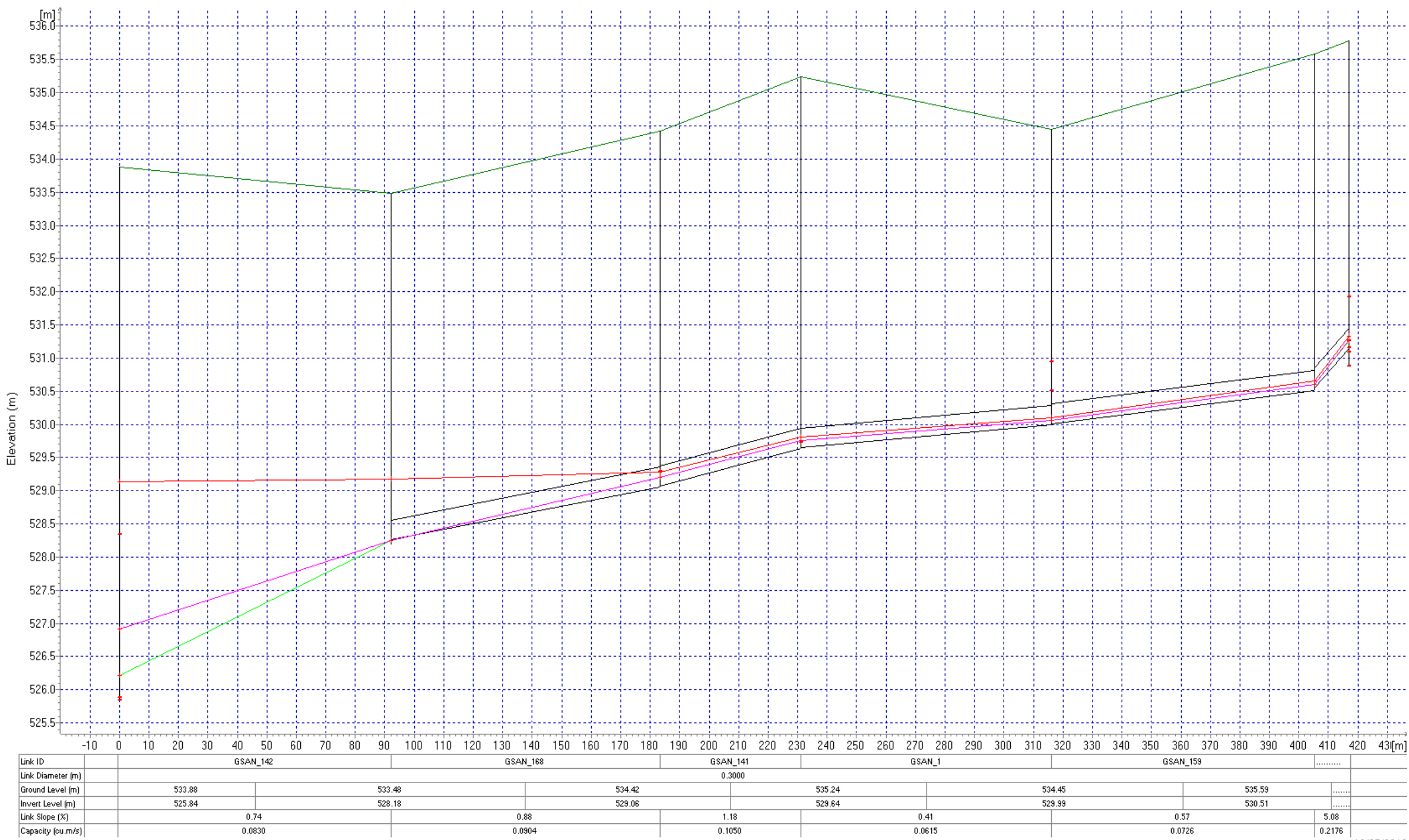
13/05/2016

Date: 10/19/2017 Document M:\2630026367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS_Figures\APP I - Future Stage 1 System Assessment LPs\Figure 22 - LP #S7.1.mxd

FIGURE APP J.22

LP #S7.1 - Maximum HGL Profile - Future Stage 1 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S7.1
PROPOSED SANITARY CONDITIONS
STAGE 1 - BUILD-OUT OF EXISTING SYSTEM





Appendix K

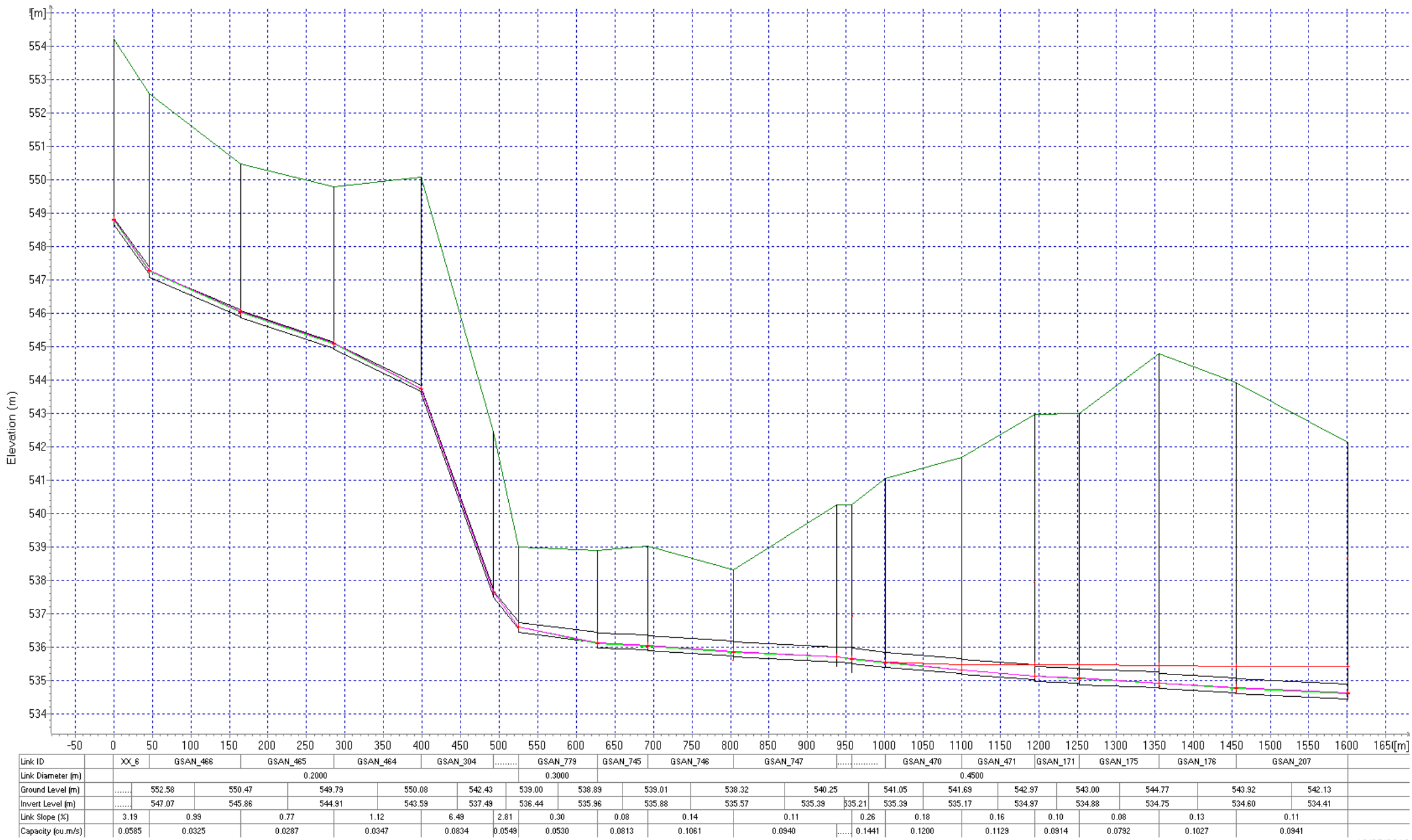
Future System Assessments - Stage 2 - Longitudinal Profiles



FIGURE APP K.1

LP #N1.1 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N1.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY

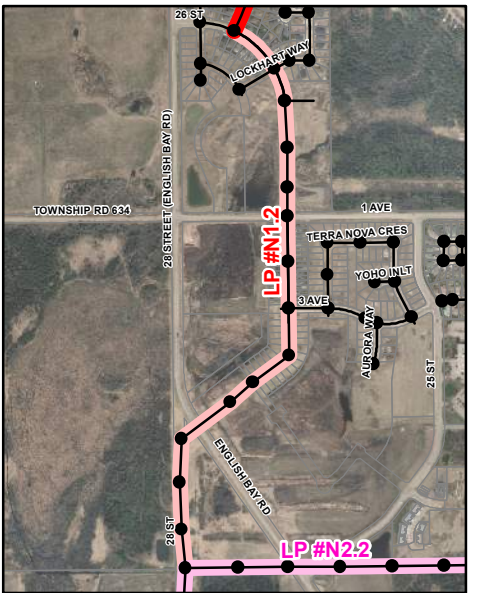


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Legend

— Constant 0.29L/s/ha
— 25yr 24hr Q3 Huff Distribution
— 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE INFLOW - INFILTRATION PROGRAM

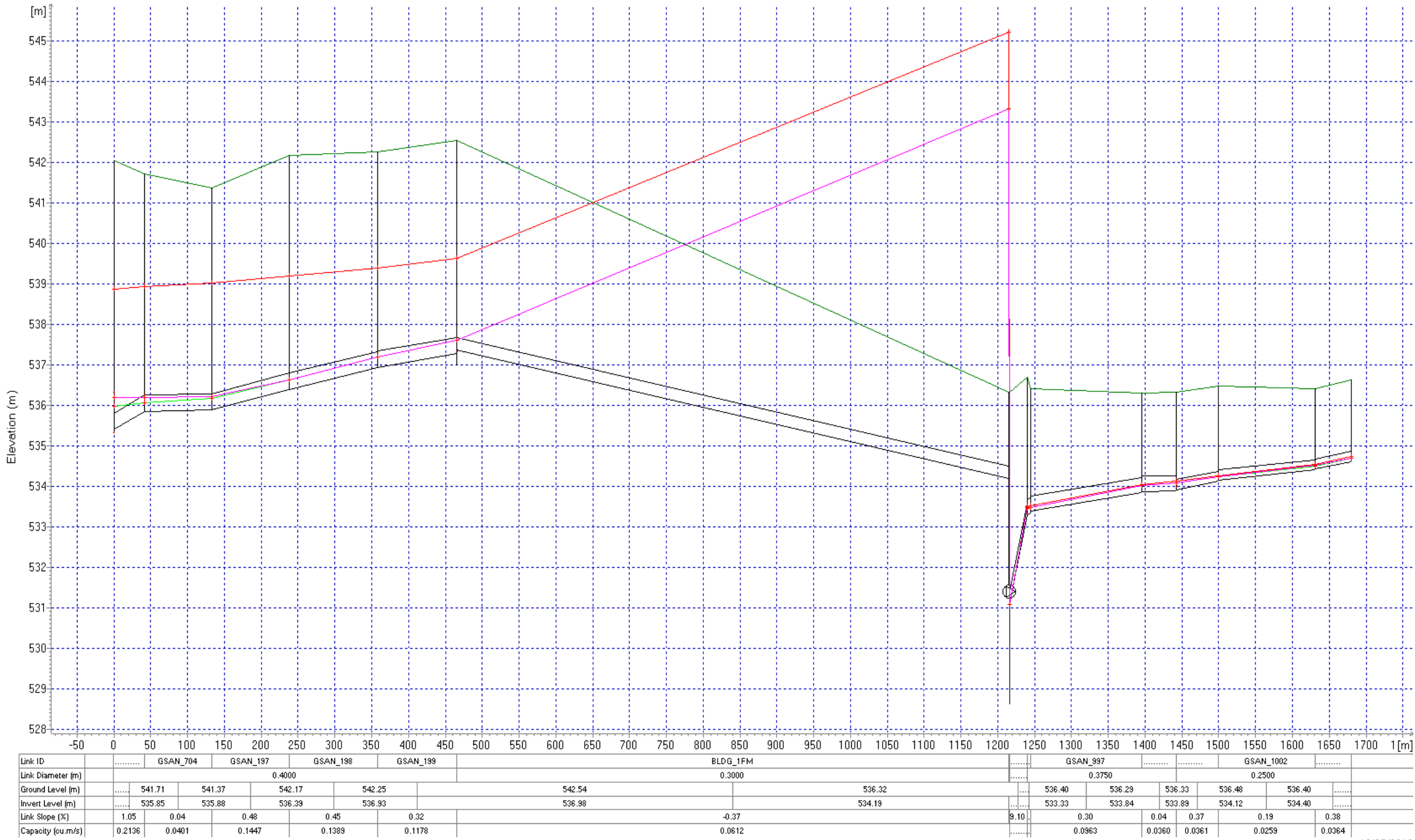
MAXIMUM HGL PROFILE - LP #N1.2
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



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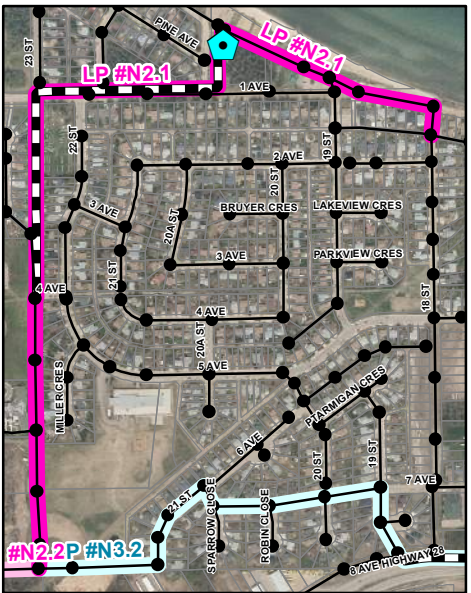
FIGURE APP K.3

LP #N2.1 - Maximum HGL Profile - Future Stage 2 Conditions



Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N2.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



13/05/2016

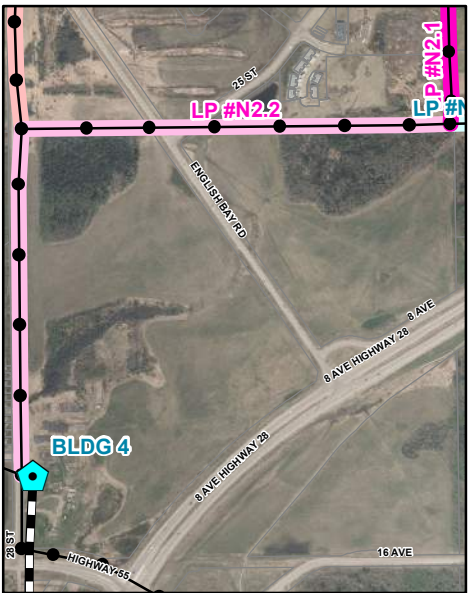
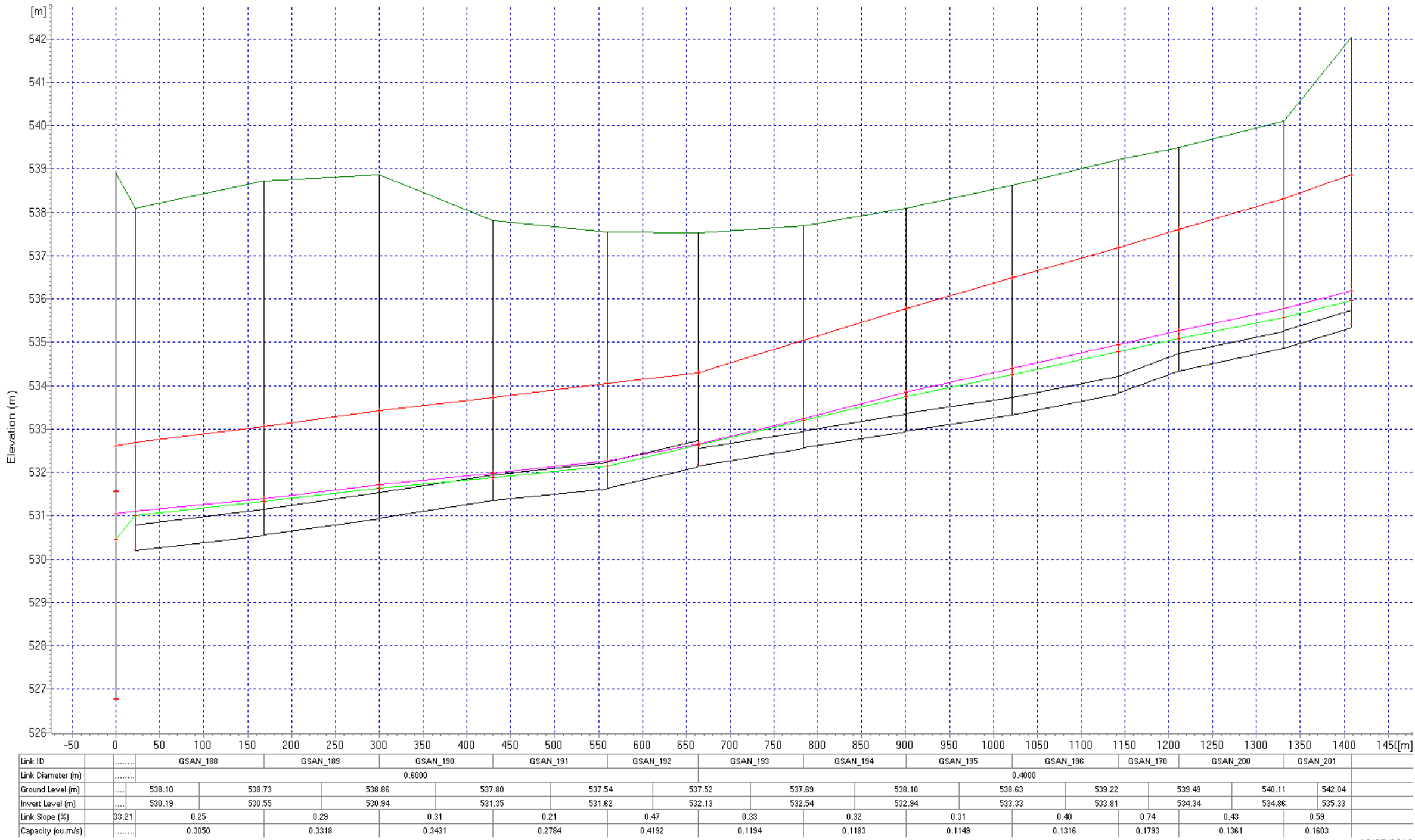
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FIGURE APP K.4

LP #N2.2 - Maximum HGL Profile - Future Stage 2 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N2.2
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



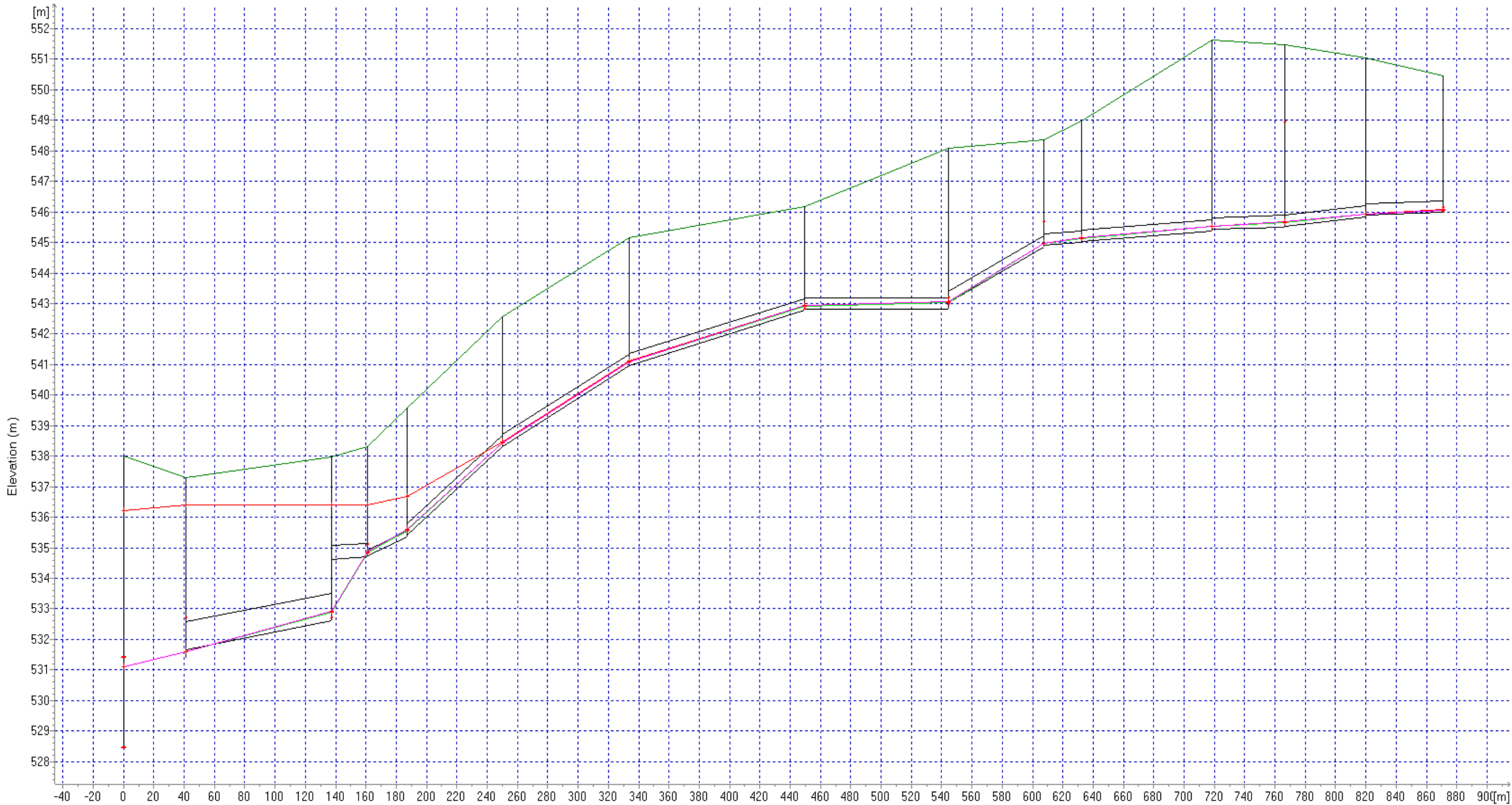
13/05/2016

Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS_Figures\APP J - Future Stage 2 System Assessment LPs\Figure 5 - LP #N3.1.mxd

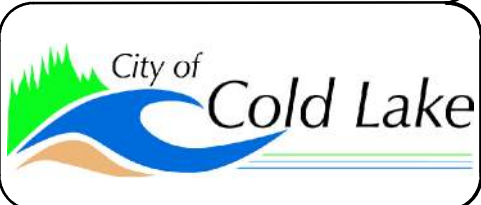
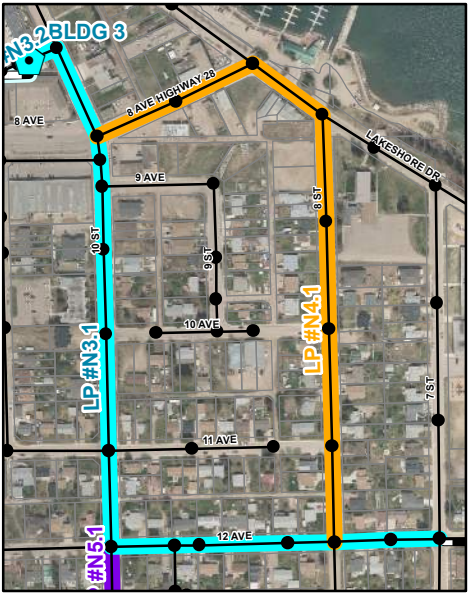
FIGURE APP K.5

LP #N3.1 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_640		GSAN_1067		.....	.....	GSAN_391A		GSAN_391		GSAN_392		GSAN_393		GSAN_768		.....	GSAN_771		GSAN_770		GSAN_770A		GSAN_847						
Link Diameter (m)	0.3750		0.9000		0.4500		0.2000		0.3750																					
Ground Level (m)	538.00		537.29		537.99		538.31		539.58		542.57		545.17		546.18		548.08		548.35		548.98		551.64		551.48		551.06		550.46	
Invert Level (m)	528.44		531.38		532.62		534.69		535.35		538.30		540.96		542.78		542.82		544.85		545.01		545.38		545.51		545.84		545.98	
Link Slope (%)	0.38		0.99		0.31		2.34		4.58		3.14		1.56		0.01		2.90		0.42		0.41		0.14		0.59		0.18			
Capacity (cu.m/s)	0.1073		1.7977		0.1597		0.0501		0.3748		0.3103		0.2187		0.0201		0.2983		0.1131		0.1125		0.0650		0.1348		0.0742			



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N3.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



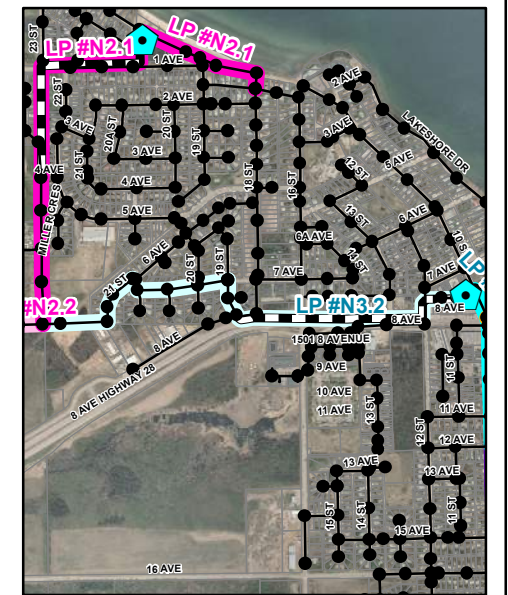
13/05/2016



Legend

— Constant 0.29L/s/ha

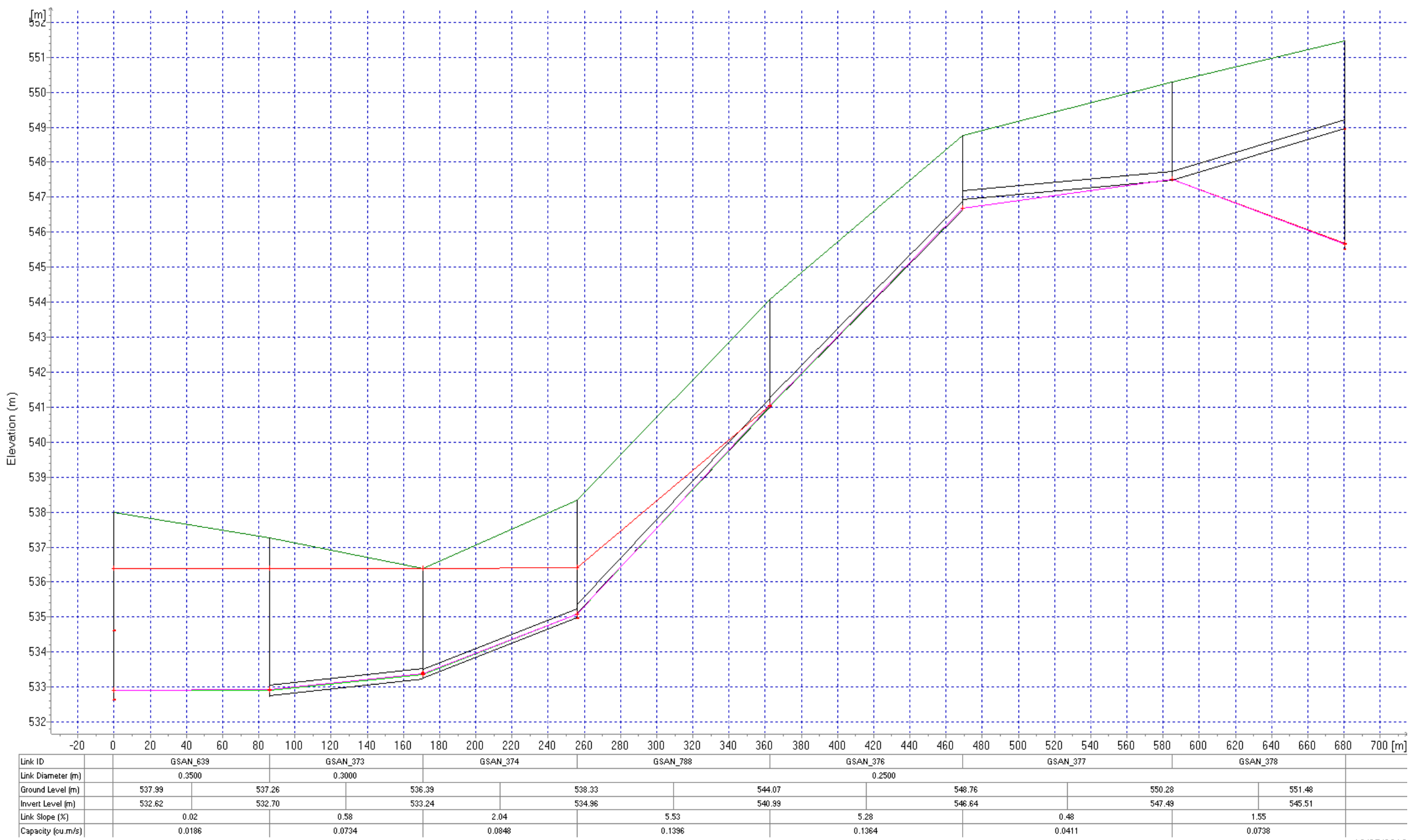
— 50yr 24hr Q3 Huff Distribution



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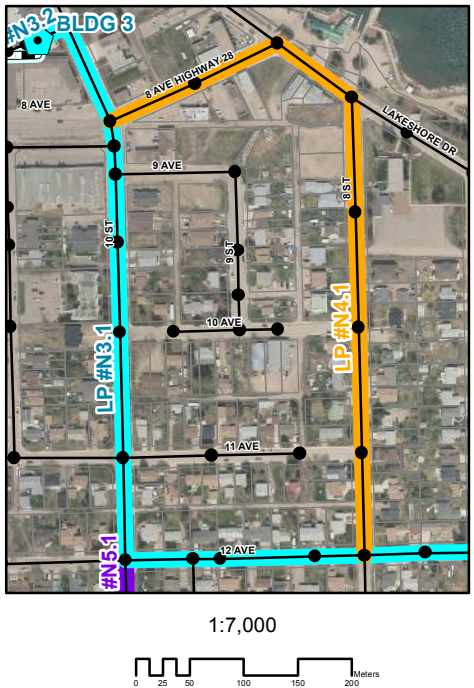
FIGURE APP K.7

LP #N4.1 - Maximum HGL Profile - Future Stage 2 Conditions



Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N4.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



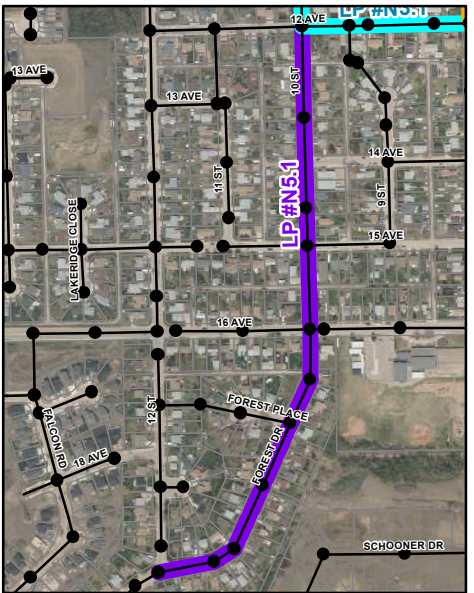
FIGURE APP K.8

LP #N5.1 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_490		GSAN_613	GSAN_612		GSAN_611		GSAN_610		GSAN_609		GSAN_396		GSAN_973		GSAN_394		GSAN_512	
Link Diameter (m)	0.2000											0.3000							
Ground Level (m)	561.50	561.56		560.38		557.98		556.43		555.60		554.64		553.72		553.22		551.38	548.08
Invert Level (m)	557.90	557.14		556.39		554.19		552.31		552.13		551.61		550.79		549.92		548.80	542.82
Link Slope (%)	0.98		2.25		2.31		2.06		0.27		0.57		0.68		1.68		0.91		4.82
Capacity (cu.m/s)	0.0325		0.0491		0.0497		0.0470		0.0169		0.0248		0.0798		0.1250		0.0922		0.2120



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N5.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY

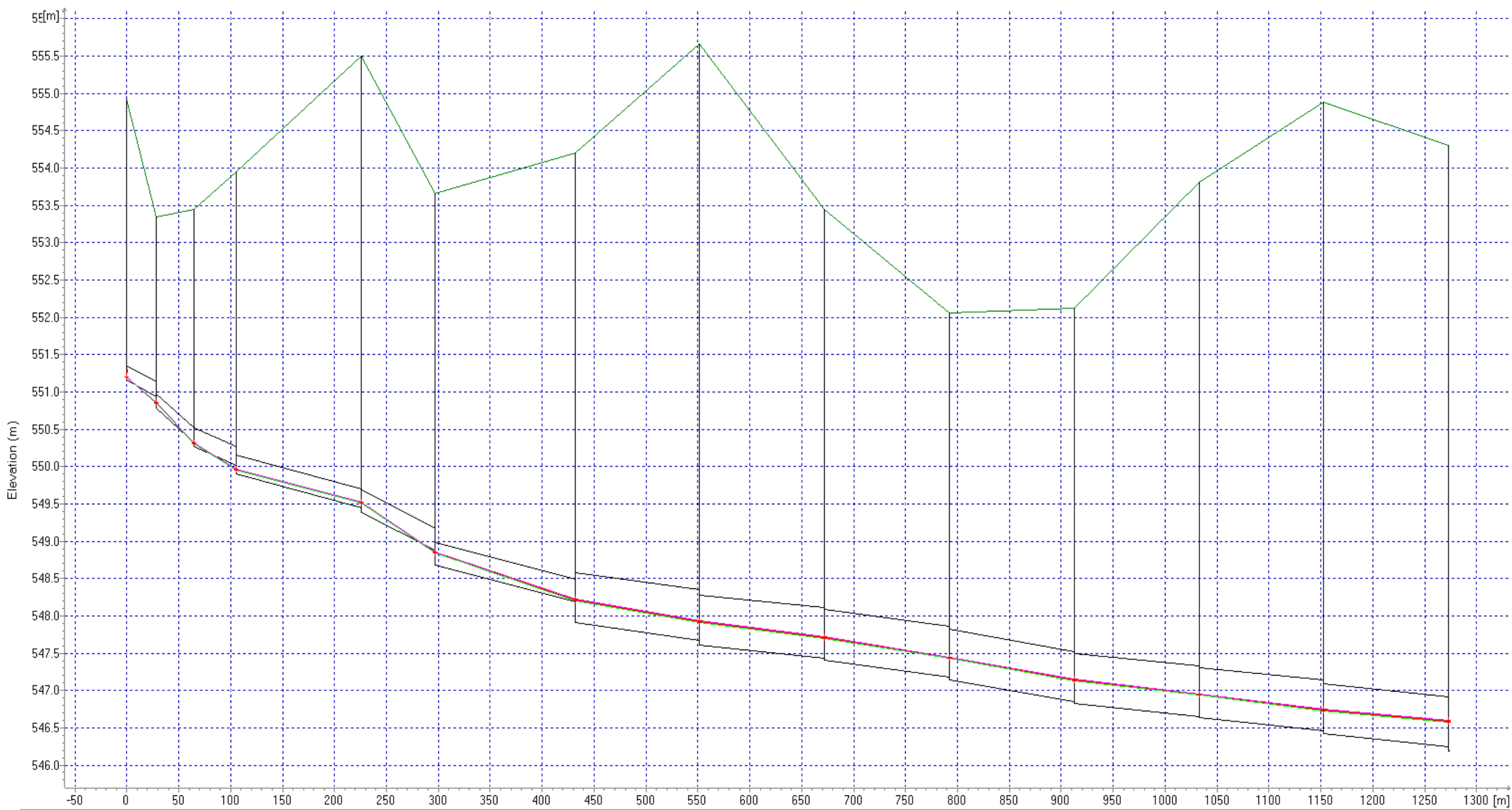


13/05/2016



FIGURE APP K.9

LP #N6.1 - Maximum HGL Profile - Future Stage 2 Conditions



Link ID	.....		FUT Pipe_3		FUT Pipe_5	FUT Pipe_8		FUT Pipe_6	FUT Pipe_7	FUT Pipe_9	FUT Pipe_19	FUT Pipe_10	FUT Pipe_14	FUT Pipe_11
Link Diameter (m)	0.2000		0.2500		0.3000						0.6750			
Ground Level (m)	553.35	553.45	553.95	555.50	553.66	554.20	555.67	553.45	552.05	552.13	553.81	554.88	554.30	
Invert Level (m)	550.78	550.26	549.90	549.39	548.68	547.90	547.61	547.41	547.14	546.83	546.64	546.42	546.18	
Link Slope (%)	1.02						0.00							
Capacity (cu.m/s)	0.0293	0.0367	0.0465	0.0364	0.0820	0.0582	0.3668	0.3151	0.3640	0.4159	0.3185	0.3194	0.3203	

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N6.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



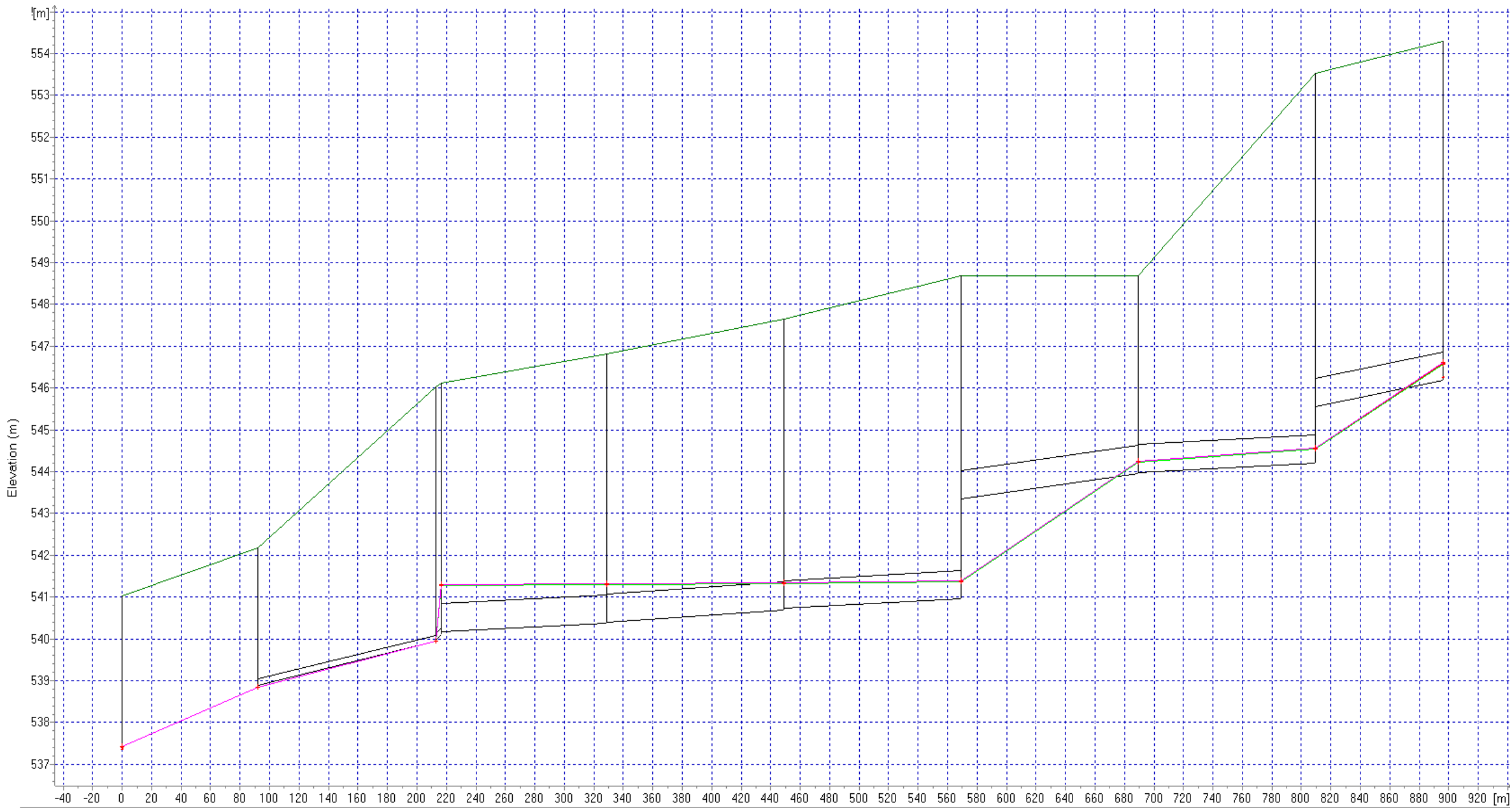
13/05/2016



Date: 10/19/2017 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS Figures\App J - Future Stage 2 System Assessment LPs\Figure 10 - LP #N6.2.mxd

FIGURE APP K.10

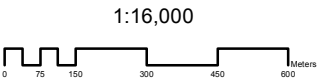
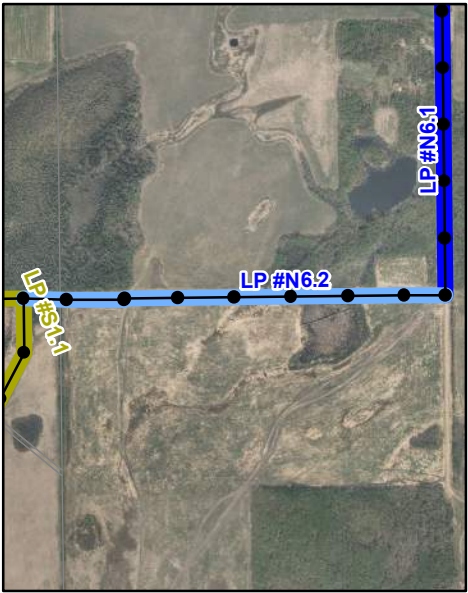
LP #N6.2 - Maximum HGL Profile - Future Stage 2 Conditions



Link ID	FUT Pipe_21		FUT Pipe_20		FUT Pipe_12		FUT Pipe_1		FUT Pipe_15		FUT Pipe_18		FUT Pipe_16		FUT Pipe_17	
Link Diameter (m)	0.2000		0.1500						0.6750							
Ground Level (m)	541.02	542.17	546.02	546.11	546.82	547.65		548.68		553.53	554.30					
Invert Level (m)	537.35	538.84	539.94	540.11	540.37	540.69		540.96		543.95	544.20	546.18				
Link Slope (%)	0.0322		0.00						0.00							
Capacity (cu.m/s)					0.3509		0.4187		0.3696		0.5956		0.3608		0.7172	

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N6.2
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



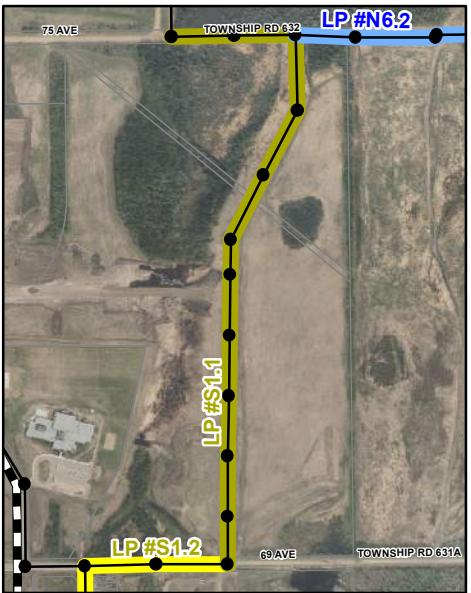
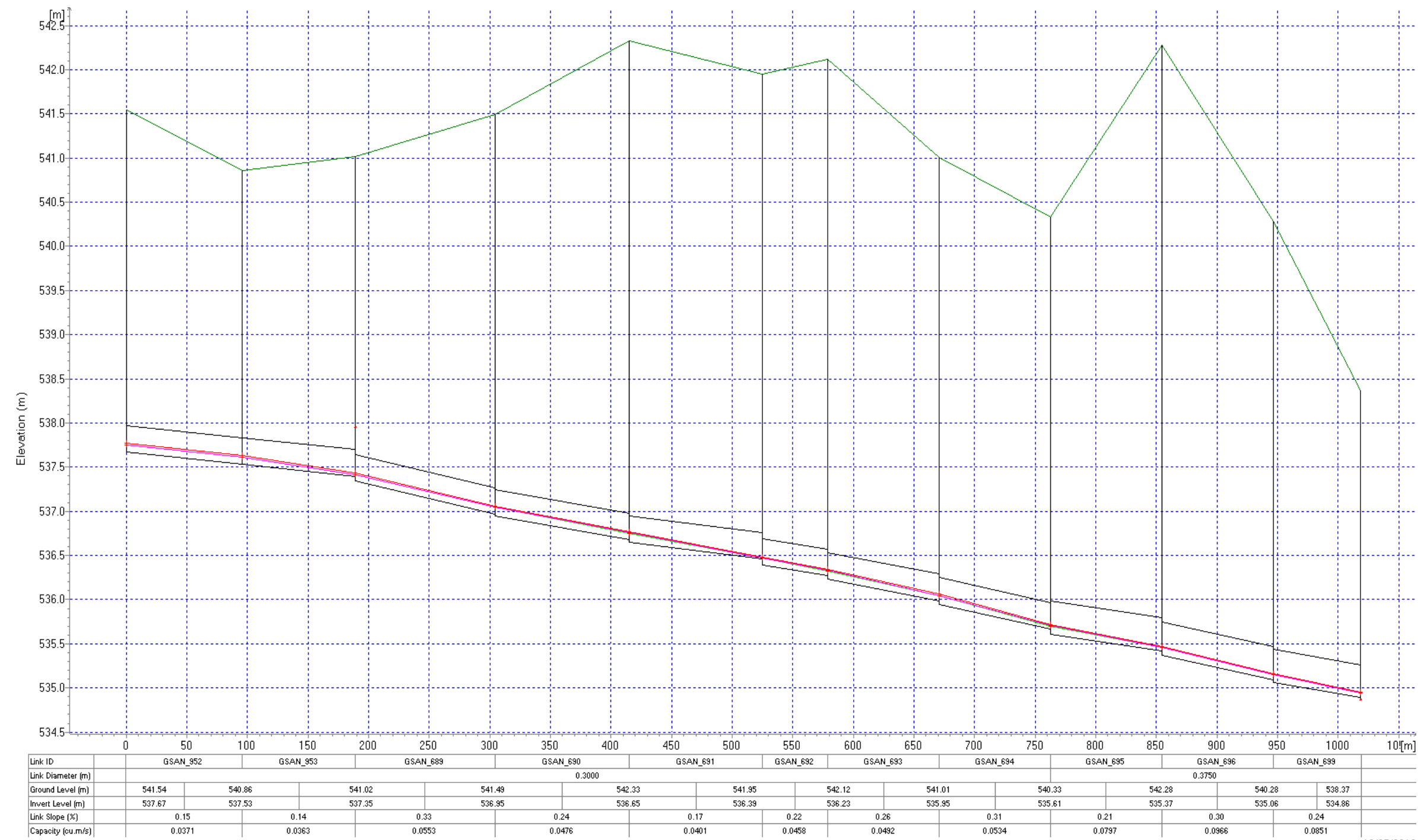
13/05/2016



FIGURE APP K.11

LP #S1.1 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



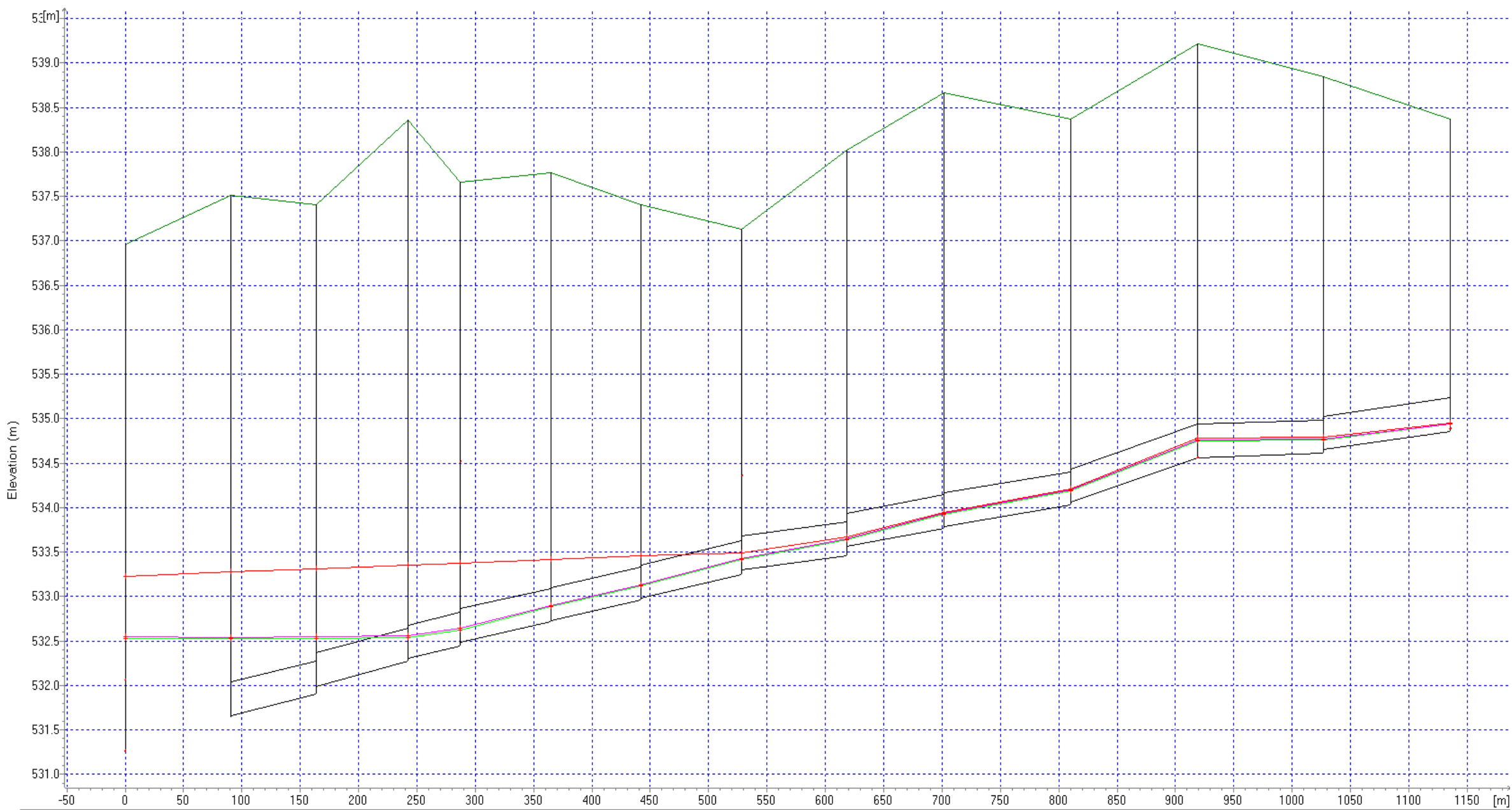
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S1.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



FIGURE APP K.12

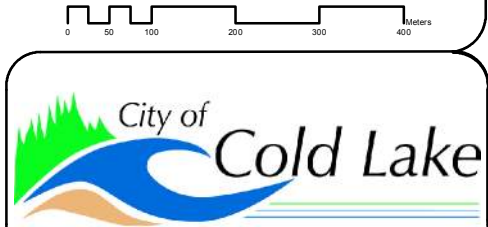
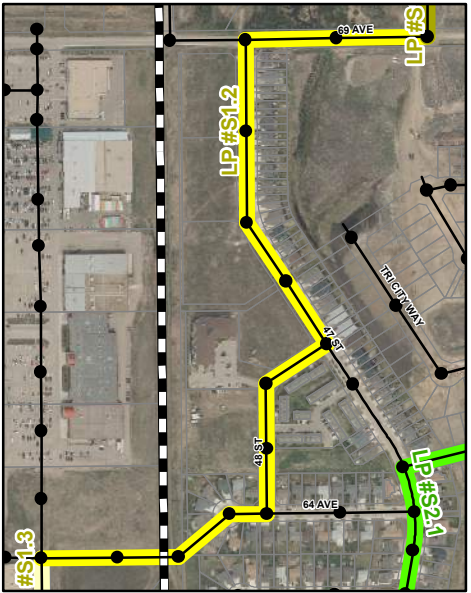
LP #S1.2 - Maximum HGL Profile - Future Stage 2 Conditions



Link ID	GSAN_673		GSAN_674		GSAN_675		GSAN_676		GSAN_677		GSAN_678		GSAN_679		GSAN_680		GSAN_681		GSAN_682		GSAN_688		GSAN_697		GSAN_698		
Link Diameter (m)	0.3750																										
Ground Level (m)	536.96	537.51	537.41	538.36	537.66	537.76	537.40	537.13	538.02	538.67	538.37	539.22	538.85	538.37													
Invert Level (m)	531.25	531.64	531.90	532.27	532.45	532.72	532.96	533.25	533.46	533.77	534.03	534.56	534.61	534.86													
Link Slope (%)	0.42	0.33	0.35	0.33	0.30		0.31	0.18	0.25	0.22	0.46	0.05	0.19														
Capacity (cu.m/s)	0.1129	0.1006	0.1041	0.1000	0.0953	0.0965	0.0981	0.0735	0.0879	0.0822	0.1187	0.0377	0.0771														

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

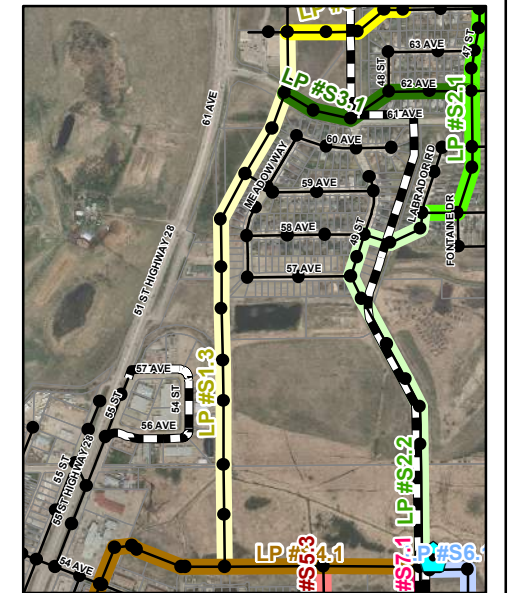
MAXIMUM HGL PROFILE - LP #S1.2
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



Legend

— Constant 0.29L/s/ha

50yr 24hr Q3 Huff Distribution



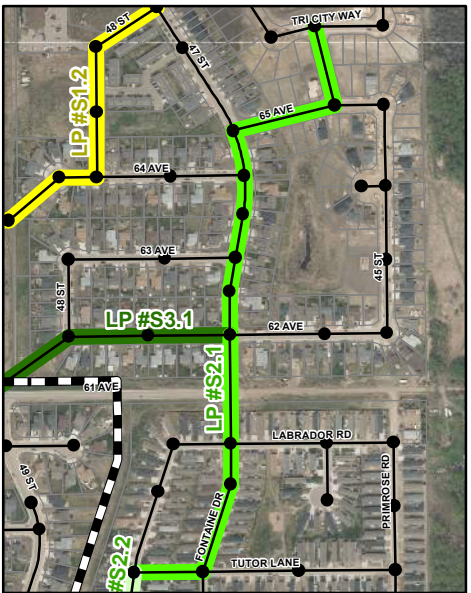
ISL Engineering
and Land Services

13/05/2016



LP #S2.1 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S2.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY

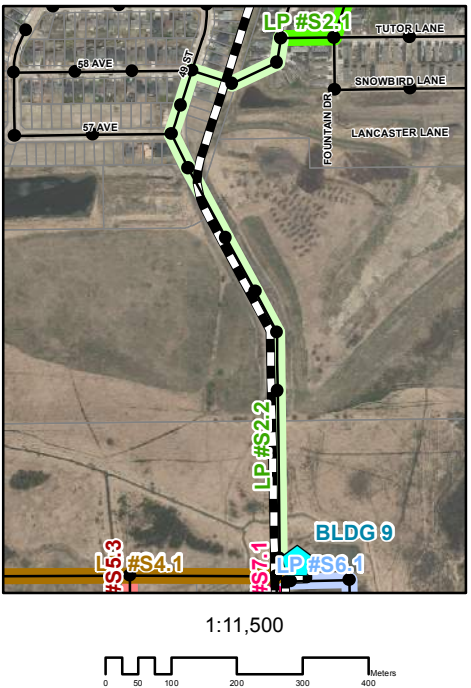
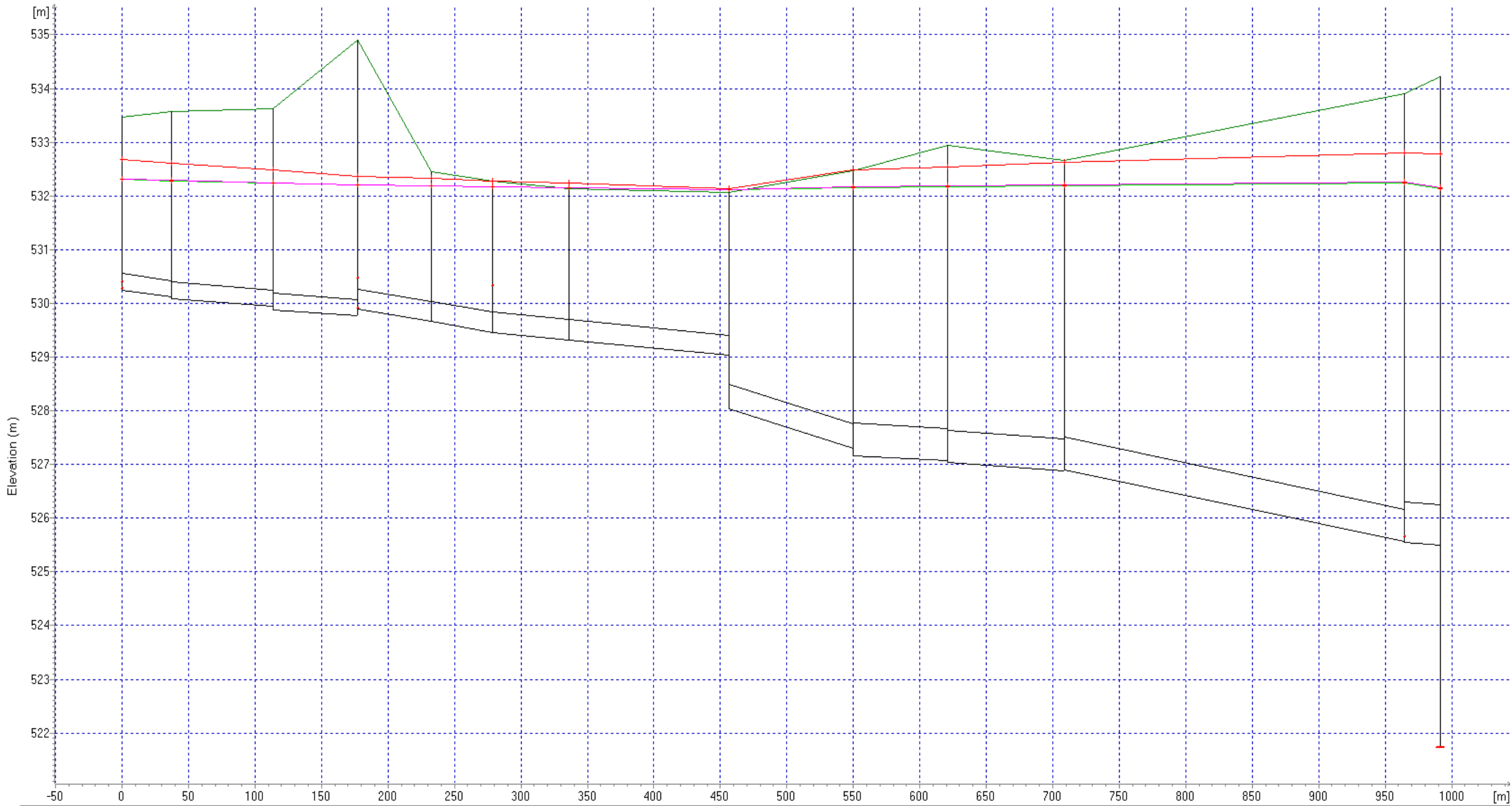


13/05/2016



LP #S2.2 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution

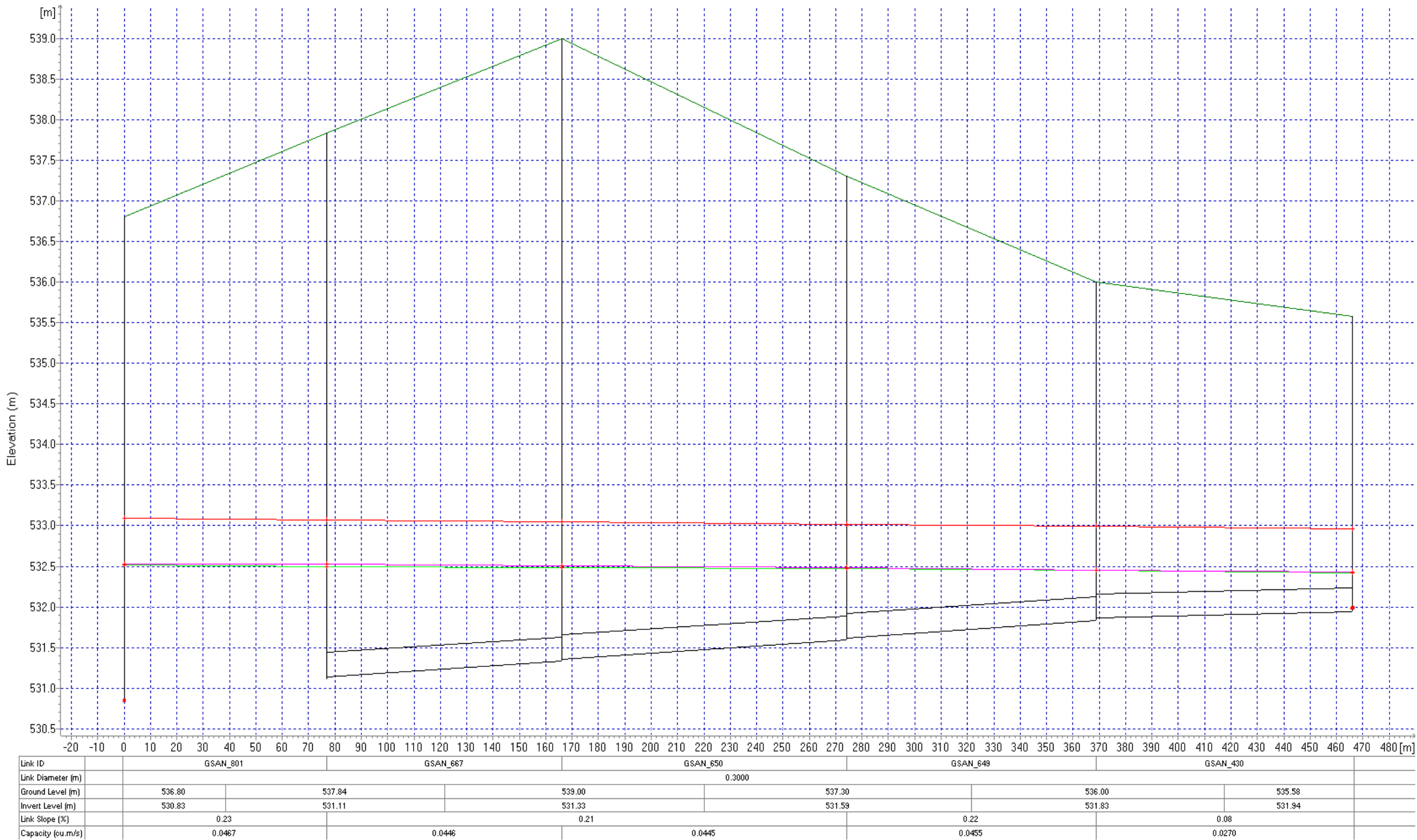


THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S2.2
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY

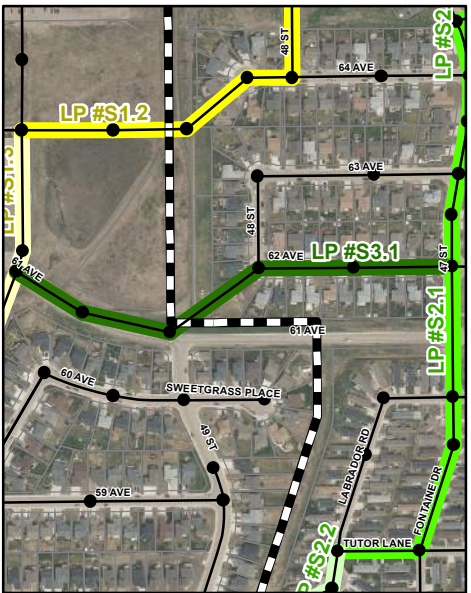


LP #S3.1 - Maximum HGL Profile - Future Stage 2 Conditions



Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S3.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY

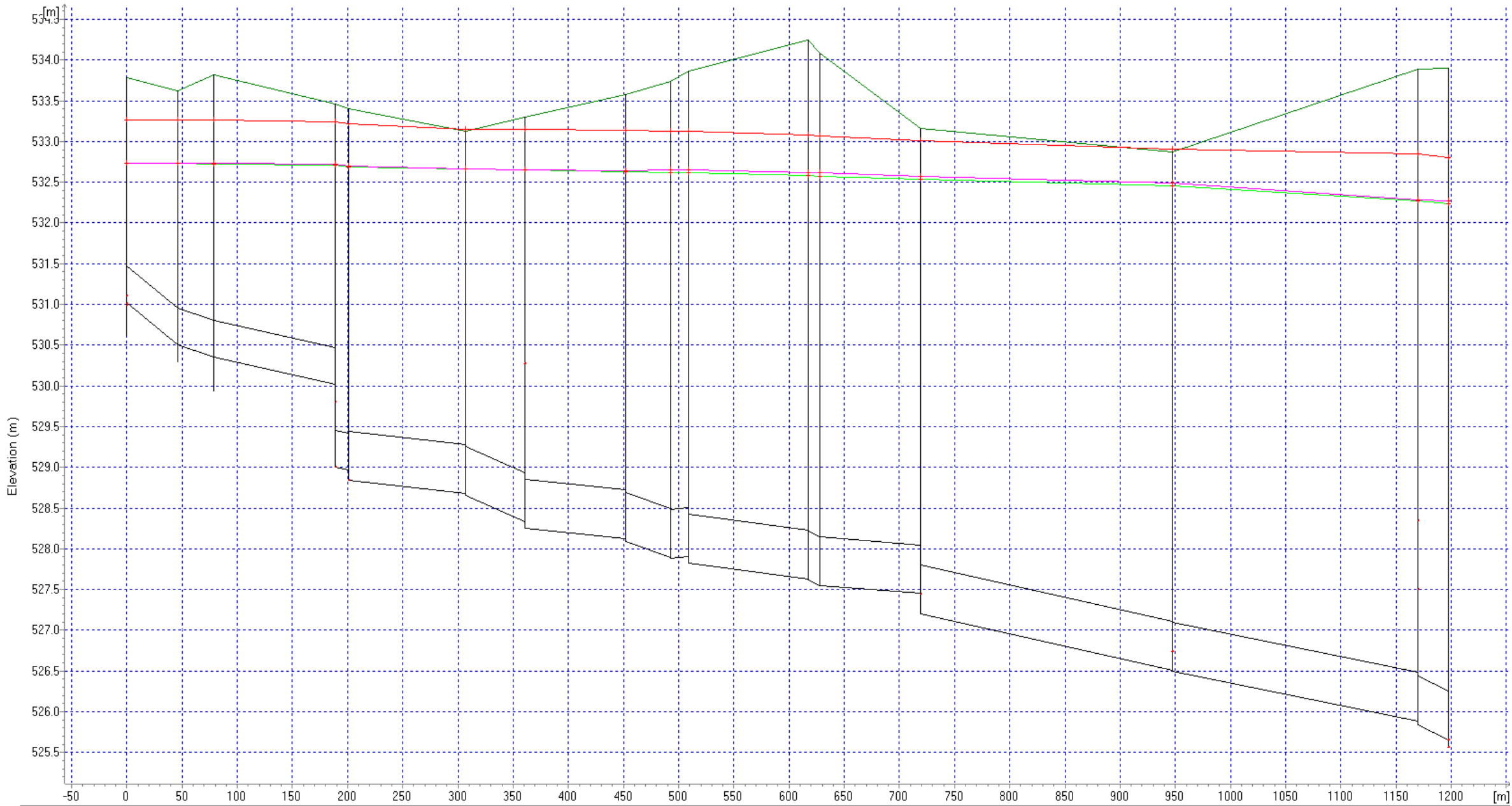


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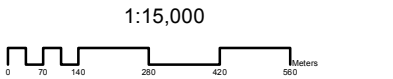
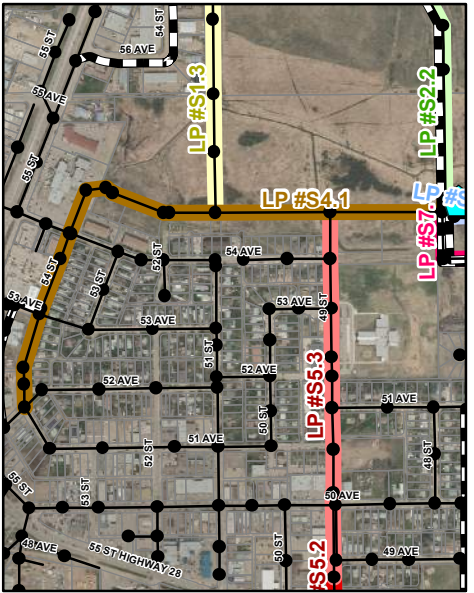
FIGURE APP K.17

LP #S4.1 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_1101	GSAN_1103	GSAN_133	GSAN_294	GSAN_274	GSAN_144	GSAN_146	GSAN_148	GSAN_246	GSAN_247	
Link Diameter (m)	0.4500							0.6000			
Ground Level (m)	533.78	533.62	533.82	533.46	533.40	533.12	533.30	533.58	533.74	533.87	534.25
Invert Level (m)	530.61	530.29	529.93	529.00	528.84	528.66	528.25	527.89	527.83	527.62	527.54
Link Slope (X)	1.15	0.46	0.30		0.16	0.60	0.13	0.48	0.18	0.10	0.30
Capacity (cu.m/s)	0.3055	0.1923	0.1559		0.2419	0.4756	0.2248	0.4234	0.2609	0.1976	0.3381



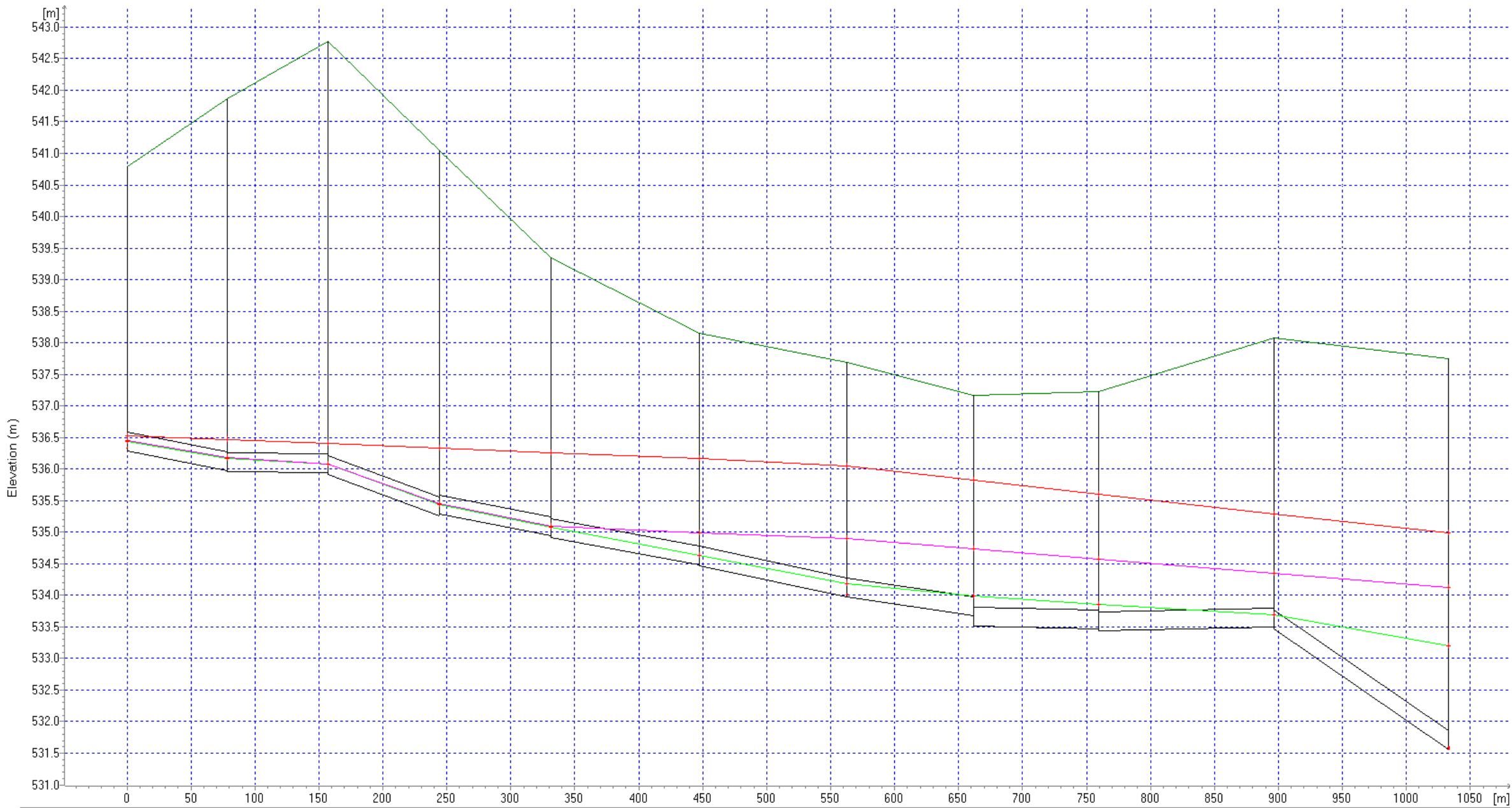
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S4.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY

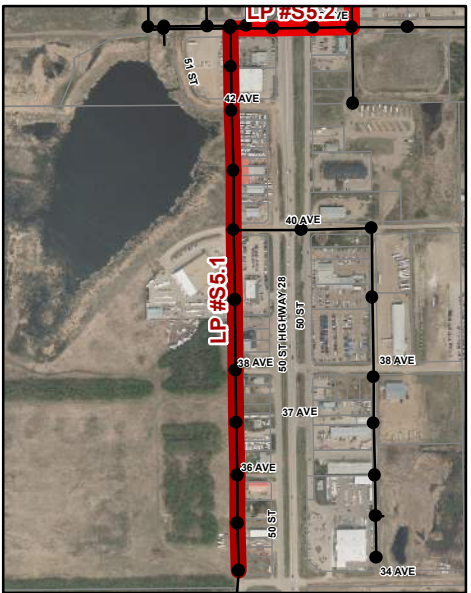


LP #S5.1 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_208		GSAN_209		GSAN_703		GSAN_727		GSAN_728		GSAN_729		GSAN_210		GSAN_211		GSAN_52		GSAN_820	
Link Diameter (m)	0.3000																			
Ground Level (m)	540.79	541.87	542.78		541.04		539.34		538.15		537.69		537.17		537.22		538.08		537.75	
Invert Level (m)	536.29	535.96	535.91		535.25		534.92		534.47		533.97		533.52		533.44		533.47		531.55	
Link Slope (%)	0.40	0.02		0.76		0.39		0.38		0.44		0.30		0.05		-0.04		1.40		
Capacity (cu.m/s)	0.0609		0.0124		0.0841		0.0606		0.0593		0.0638		0.0526		0.0224		0.0190		0.1142	



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INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S5.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY

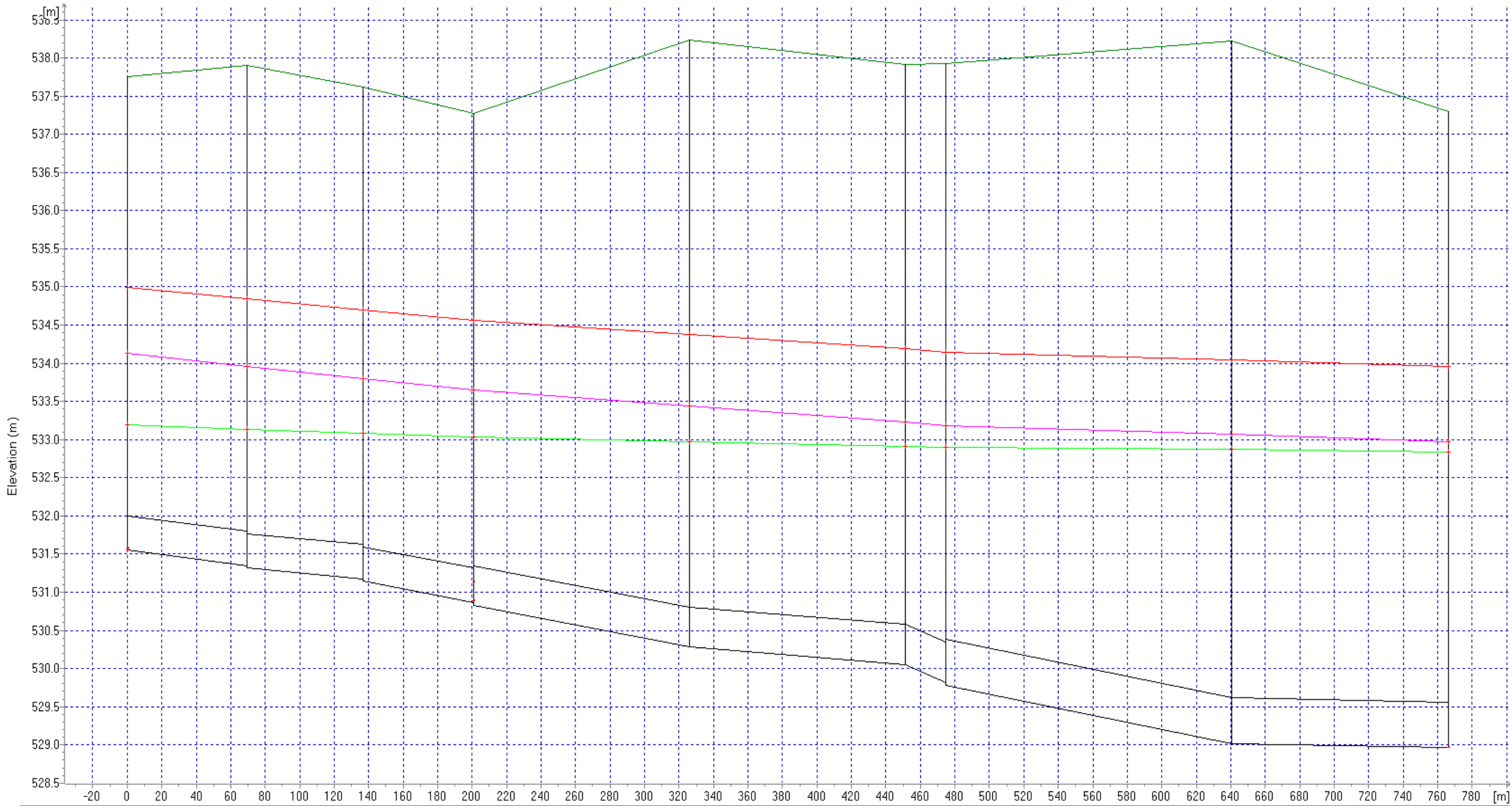


13/05/2016

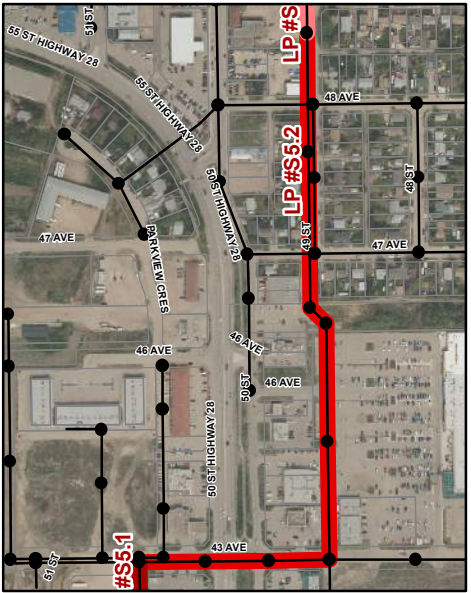


LP #S5.2 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_963		GSAN_964		GSAN_965		GSAN_215		GSAN_868		GSAN_870		GSAN_871	
Link Diameter (m)	0.4500		0.5250		0.6000									
Ground Level (m)	537.75	537.90	537.62	537.27	538.24	537.92	537.93	538.22	537.30					
Invert Level (m)	531.55	531.32	531.14	530.82	530.28	530.05	529.78	529.02	528.96					
Link Slope (X)	0.30		0.21		0.43		0.18		0.99		0.46		0.05	
Capacity (cu.m/s)	0.1560		0.1306		0.1856		0.2825		0.1840		0.4267		0.4150	



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S5.2
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



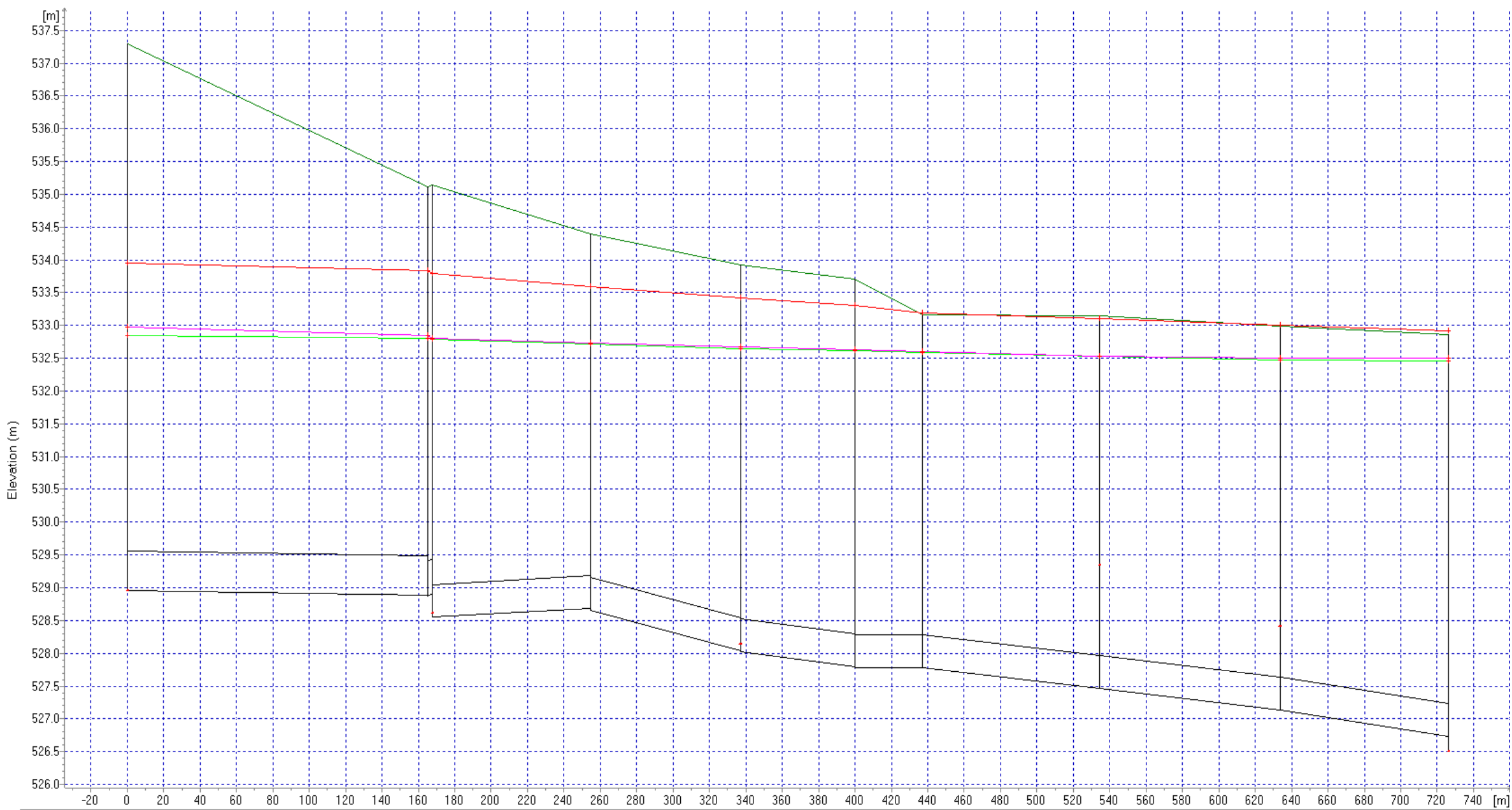
13/05/2016



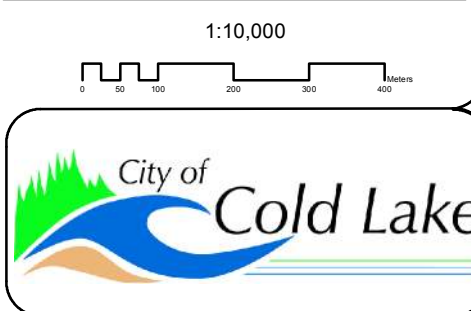
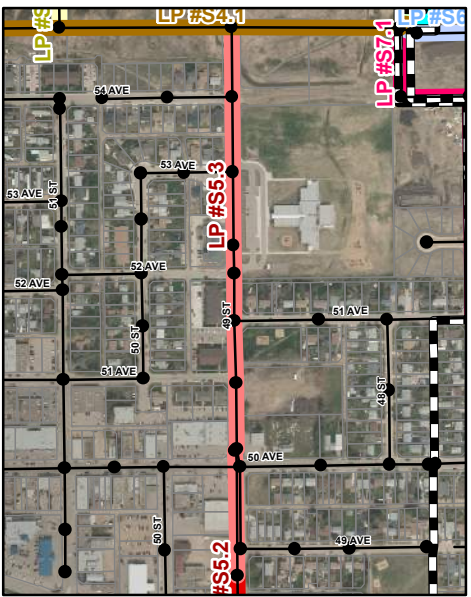
FIGURE APP K.20

LP #S5.3 - Maximum HGL Profile - Future Stage 2 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_872		GSAN_98		GSAN_99		GSAN_162		GSAN_223		GSAN_224		GSAN_244		GSAN_245	
Link Diameter (m)	0.6000								0.5000							
Ground Level (m)	537.30		535.11		535.14		534.40		533.92		533.71		533.16		533.15	
Invert Level (m)	528.96		528.88		528.55		528.66		528.03		527.78		527.46		527.14	
Link Slope (%)	0.05				-0.15		0.75		0.37		0.01		0.32		0.43	
Capacity (cu.m/s)	0.1320				0.1471		0.3276		0.2295		0.0310		0.2128		0.2140	



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INFLOW - INFILTRATION PROGRAM

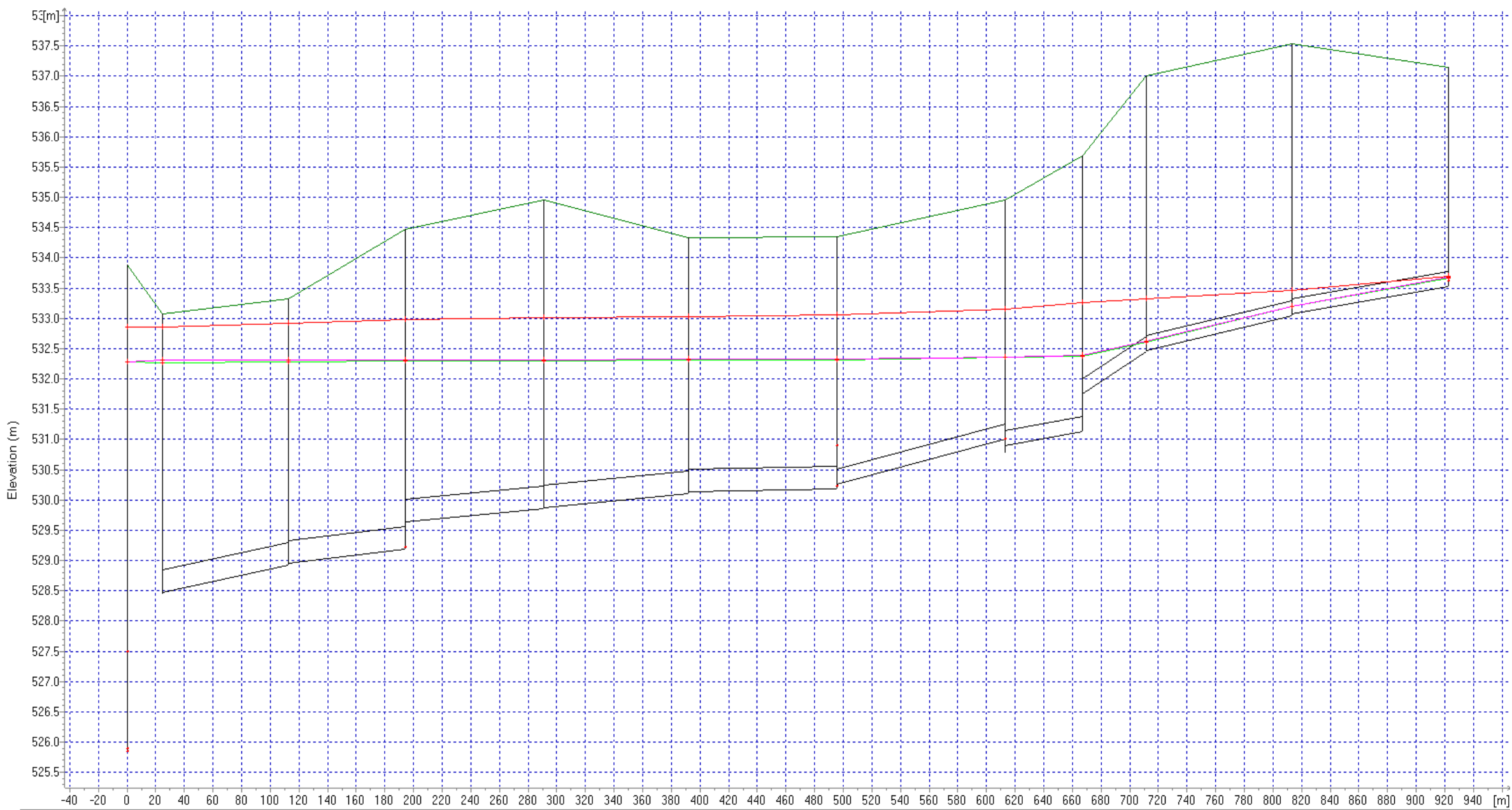
MAXIMUM HGL PROFILE - LP #S5.3
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



13/05/2016

FIGURE APP K.21

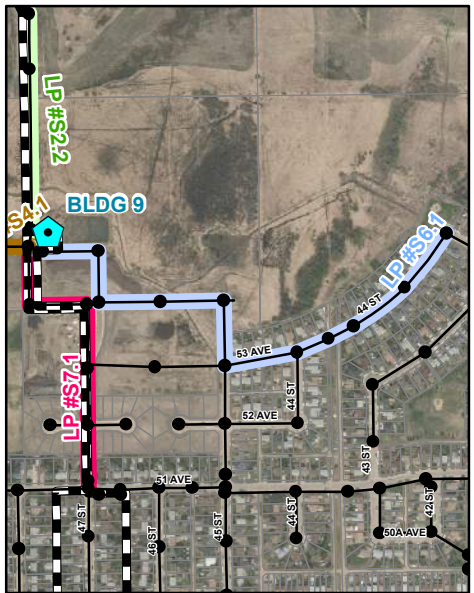
LP #S6.1 - Maximum HGL Profile - Future Stage 2 Conditions



Link ID	GSAN_1120		GSAN_1119		GSAN_1117		GSAN_1116		GSAN_1114		GSAN_1115		GSAN_1116		GSAN_684		GSAN_821		GSAN_108	
Link Diameter (m)	0.3750		0.2500																	
Ground Level (m)	533.08		533.32		534.48		534.95		534.34		534.36		534.96		535.68		537.00		537.54	
Invert Level (m)	528.44		528.93		529.19		529.86		530.10		530.17		530.78		531.13		532.45		533.04	
Link Slope (%)	0.39		0.51		0.28		0.22		0.11		0.63		0.43		1.57		0.56		0.42	
Capacity (cu.m/s)	0.1090		0.1250		0.0929		0.0825		0.0830		0.0322		0.0470		0.0390		0.0743		0.0444	

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

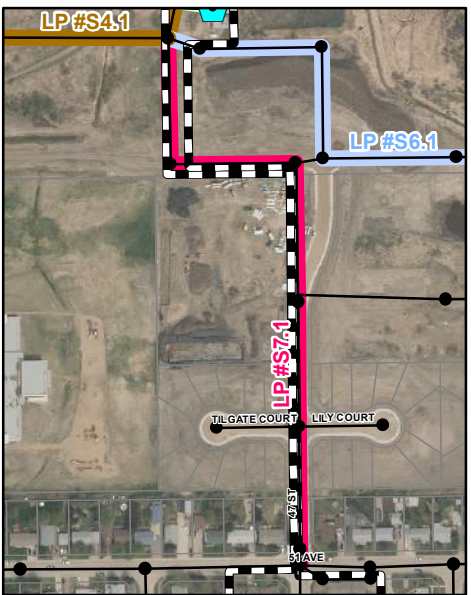
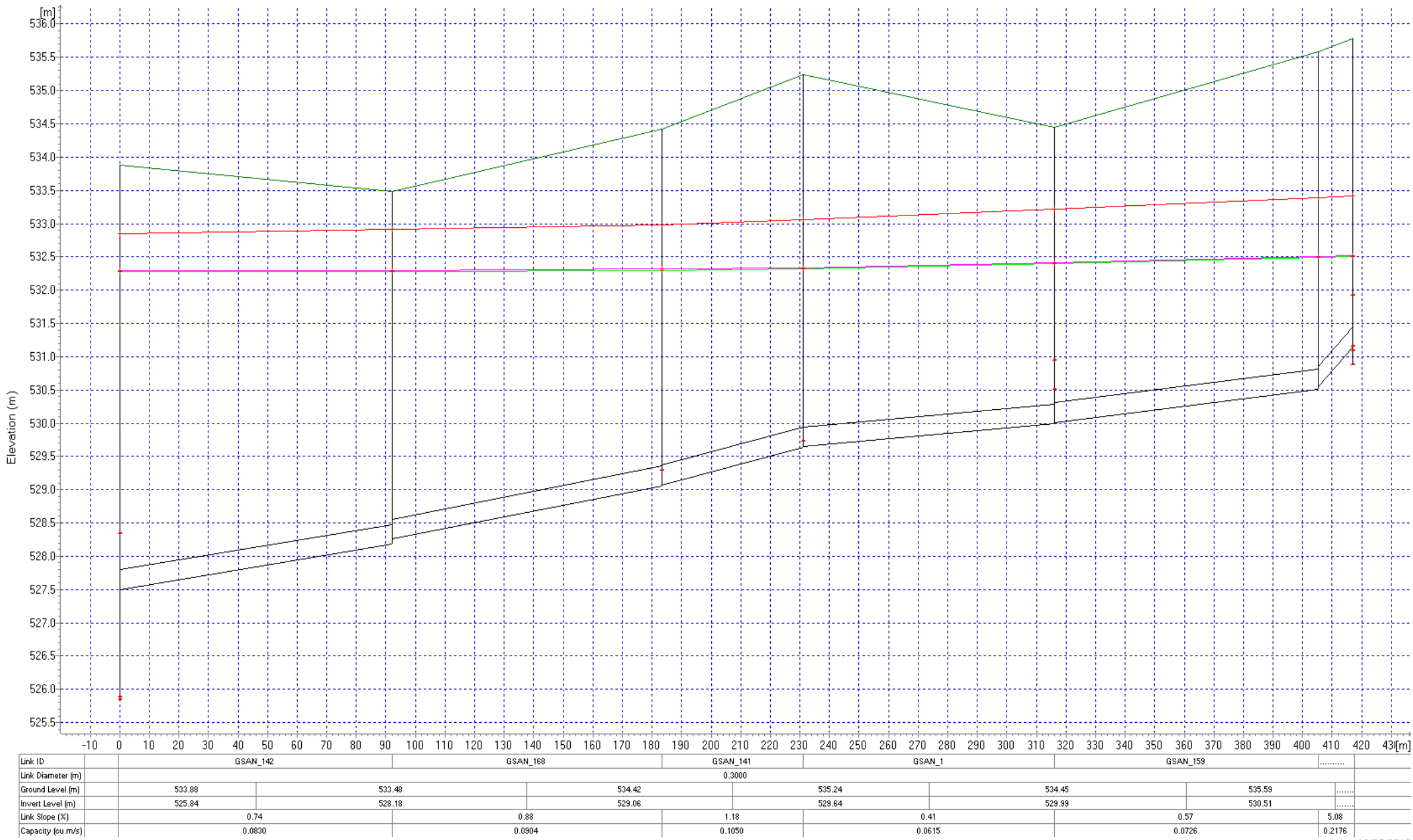
MAXIMUM HGL PROFILE - LP #S6.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY



LP #S7.1 - Maximum HGL Profile - Future Stage 2 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



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THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S7.1
PROPOSED SANITARY CONDITIONS
STAGE 2 - BUILD-OUT TO CURRENT
CITY BOUNDARY





Appendix L
Future System Assessments - Stage 3 - Longitudinal Profiles

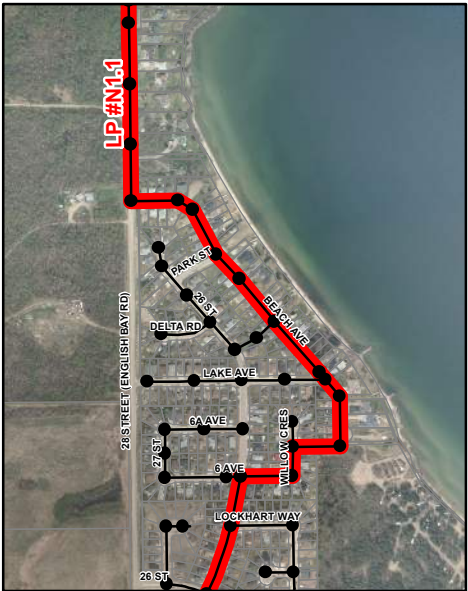
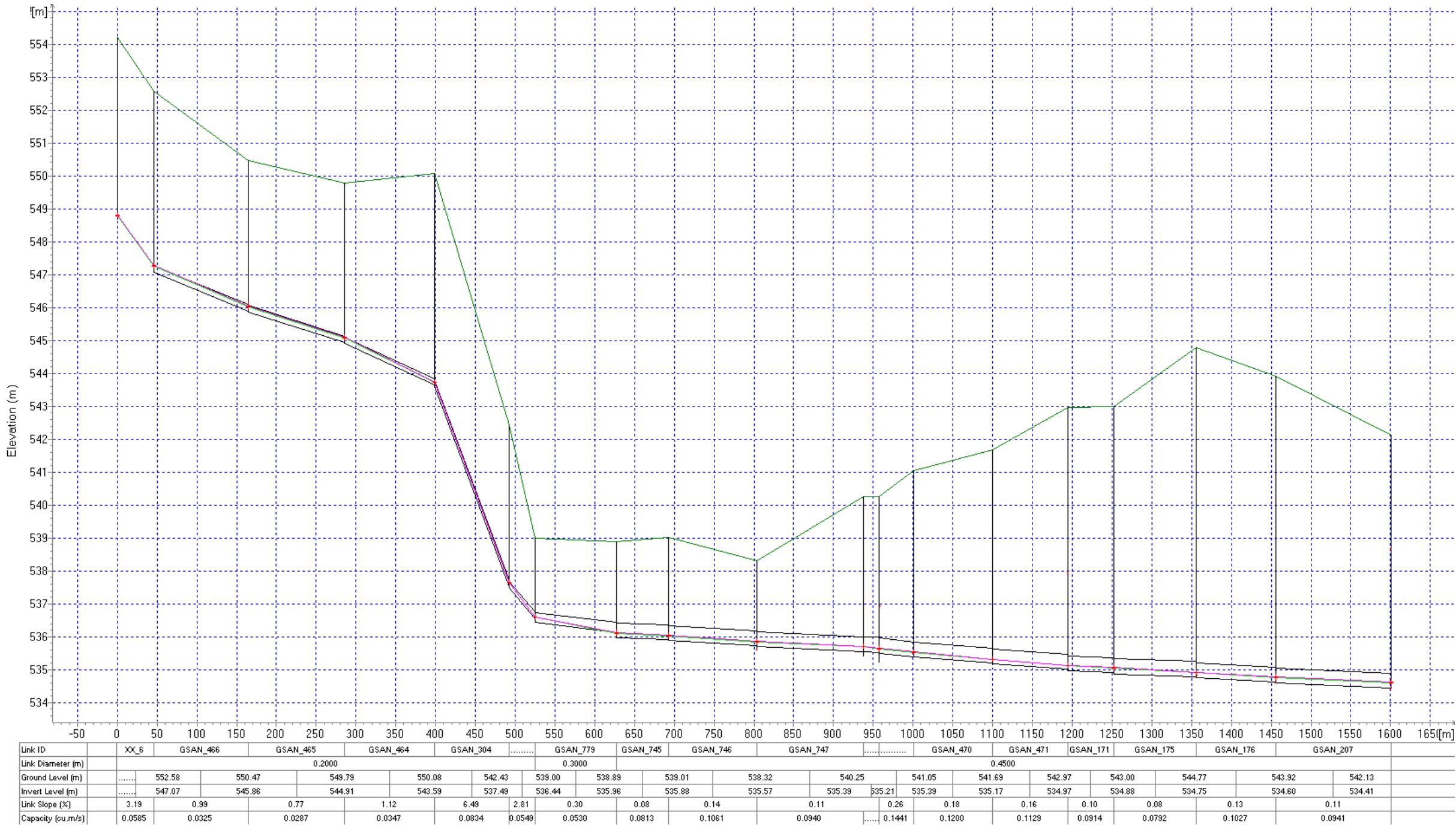


Date: 2017-11-15 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\02_Drafting\201_GIS Figures\App K - Future Stage 3 System Assessment LPs\Figure 1 - LP #N1.1.mxd

FIGURE APP L.1

LP #N1.1 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



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THE CITY OF COLD LAKE
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MAXIMUM HGL PROFILE - LP #N1.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016



FIGURE APP L.2

LP #N1.2 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_456		GSAN_383	GSAN_457	GSAN_187	GSAN_186	GSAN_399	GSAN_184	GSAN_183	GSAN_182	GSAN_181	GSAN_180	GSAN_179	GSAN_178	GSAN_177	
Link Diameter (m)	0.4500										0.6000					
Ground Level (m)	542.13	542.78	541.54	540.43	540.42	540.78	539.41	539.39	538.85	537.80	537.42	537.26	537.76	537.65	537.52	
Invert Level (m)	534.41	534.25	534.14	533.92	533.79	533.66	533.53	533.26	533.07	532.96	532.79	532.59	532.47	532.31	532.13	
Link Slope (%)		0.11		0.36	0.11	0.14		0.11		0.22		0.09		0.14	0.12	
Capacity (cu.m/s)	0.0955		0.0945	0.1711	0.0962	0.1074	0.0952	0.2948	0.1986	0.1996	0.2870	0.1795	0.1862	0.2301	0.2163	



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N1.2
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



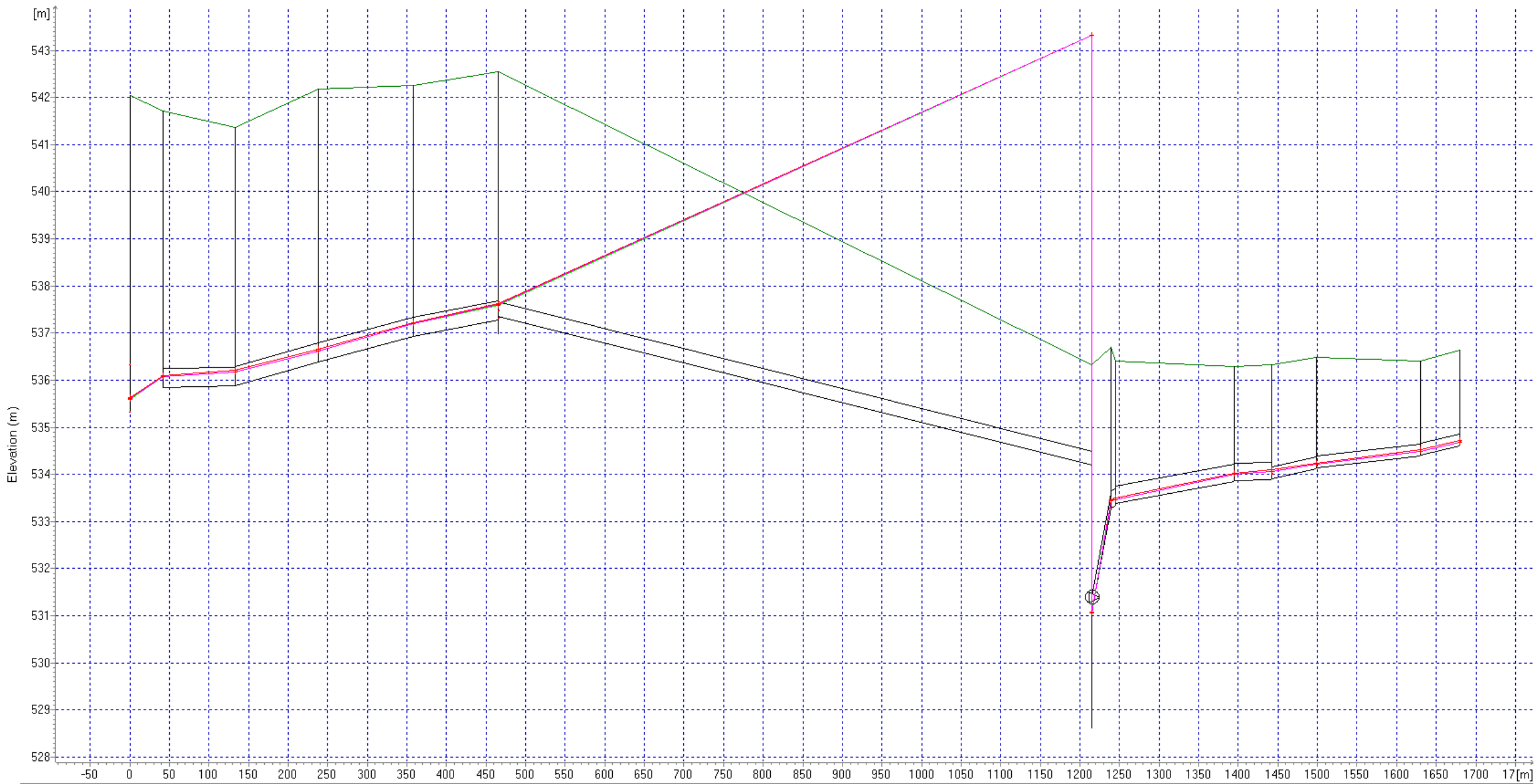
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FIGURE APP L.3

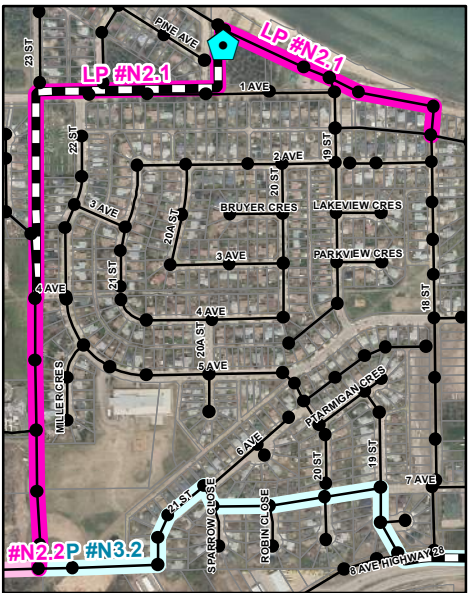
LP #N2.1 - Maximum HGL Profile - Future Stage 3 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	.....		GSAN_704		GSAN_197		GSAN_198		GSAN_199		BLDG_1FM					.....		GSAN_997		.....		.....		GSAN_1002		.....		
Link Diameter (m)	0.4000										0.3000					0.3750					0.2500							
Ground Level (m)	.....		541.71		541.37		542.17		542.25		542.54		536.32		.....		536.40		536.29		536.33		536.48		536.40		.....	
Invert Level (m)	.....		535.85		535.88		536.39		536.93		536.98		534.19		.....		533.33		533.84		533.89		534.12		534.40		.....	
Link Slope (%)	.....		1.05		0.04		0.48		0.45		0.32		-0.37		9.10		0.30		0.04		0.37		0.19		0.38			
Capacity (cu.m/s)	.....		0.2136		0.0401		0.1447		0.1389		0.1178		0.0612		.....		0.0963		0.0360		0.0361		0.0259		0.0364			



1:13,000

0 75 150 300 450 600 Meters



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N2.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016

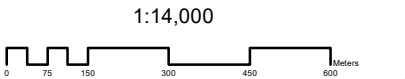
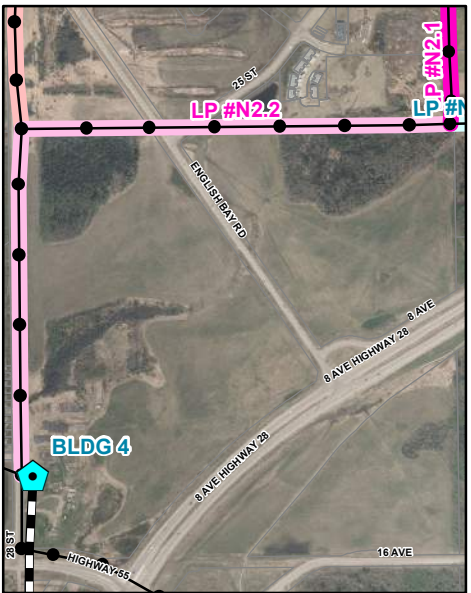
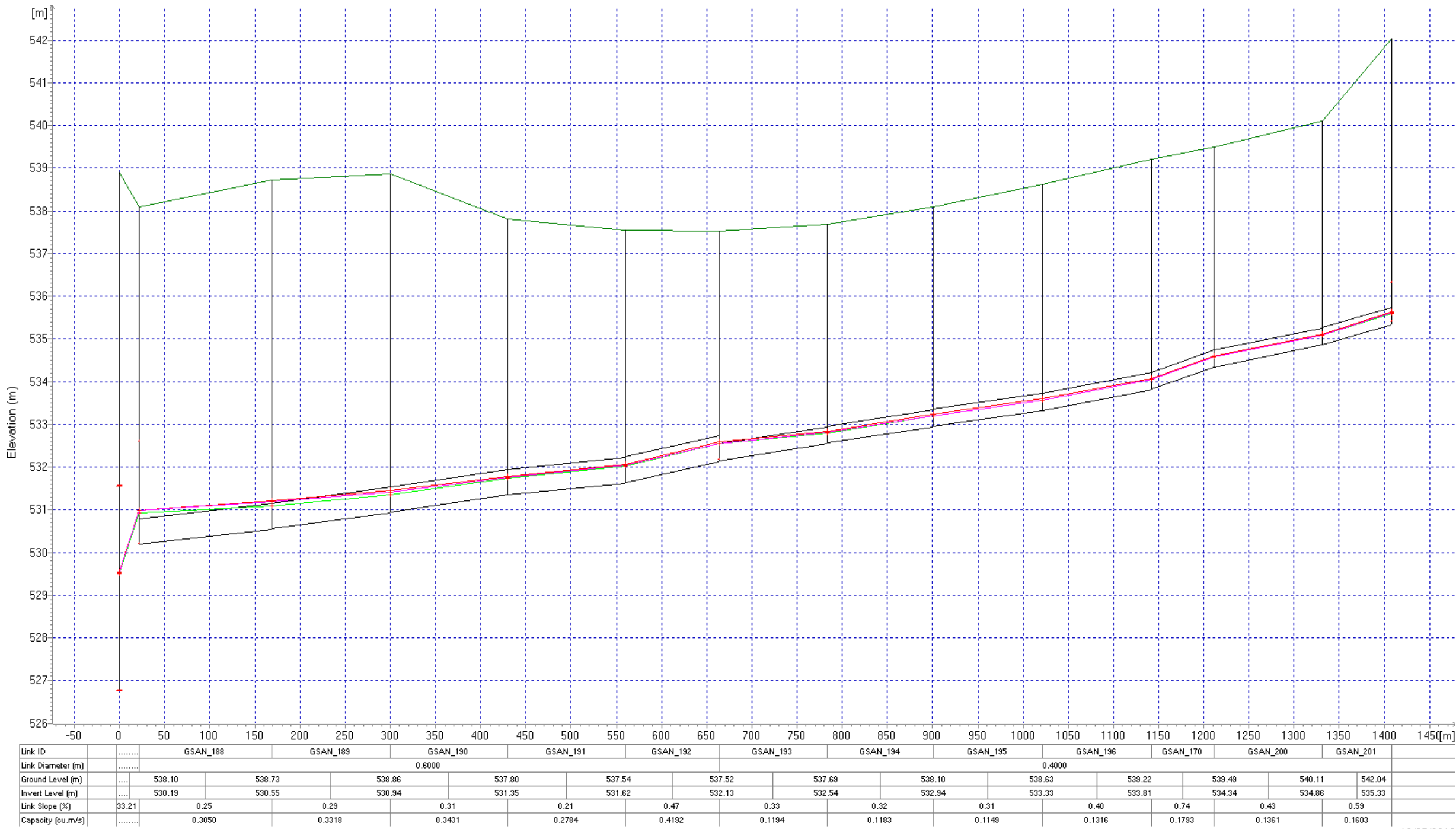


Date: 2017-11-15 Document M:\26300\26367_Cold_Lake_ILI_Program\02_CADD\20_Drafting\201_GIS Figures\APP K - Future Stage 3 System Assessment LPs\Figure 4 - LP #N2.2.mxd

FIGURE APP L.4

LP #N2.2 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N2.2
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016



Date: 2017-11-15 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\02_Drafting\201_GIS_Figures\APP K - Future Stage 3 System Assessment LPs\Figure 5 - LP #N3.1.mxd

FIGURE APP L.5

LP #N3.1 - Maximum HGL Profile - Future Stage 3 Conditions

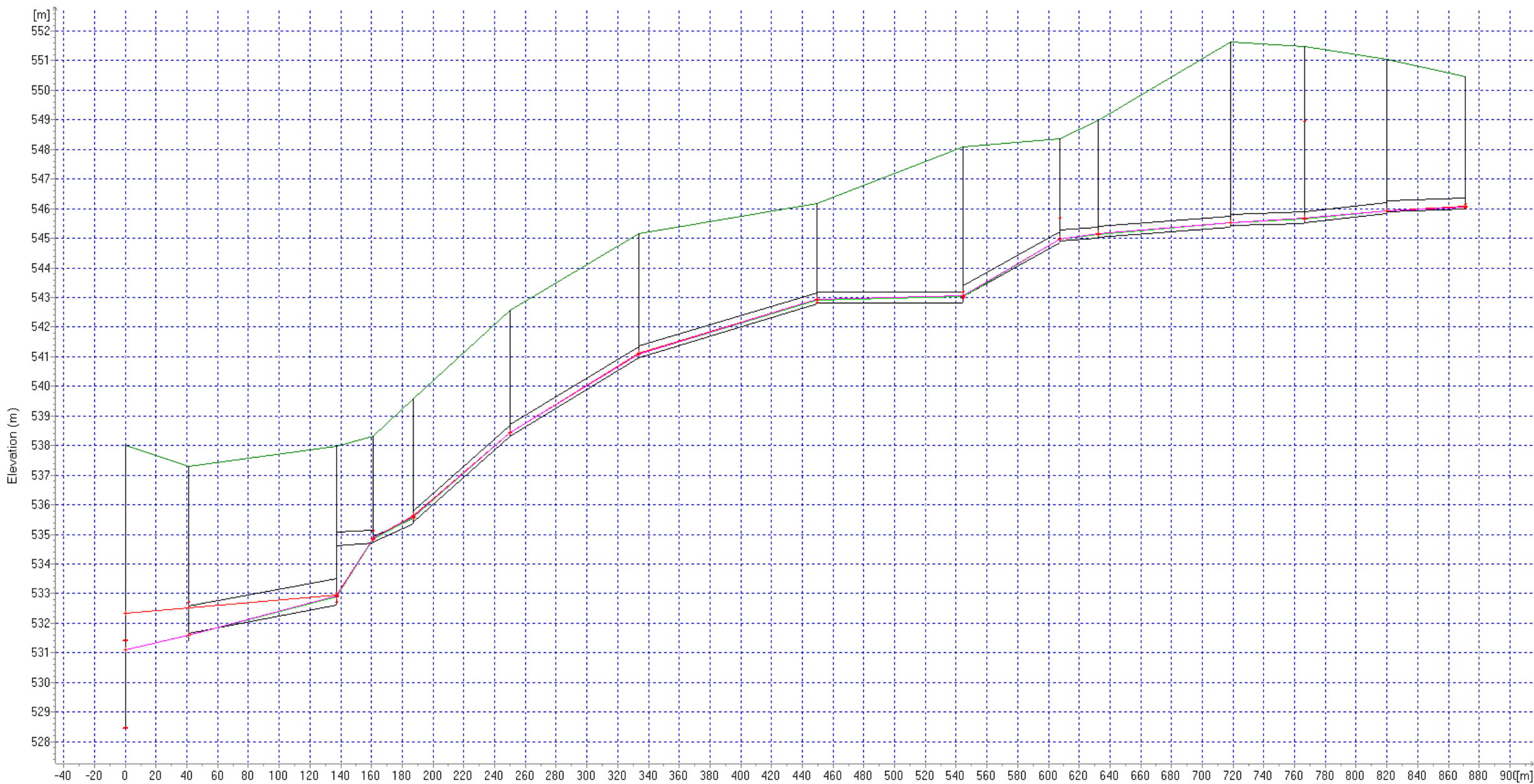
Legend

Maximum Water Level (m)

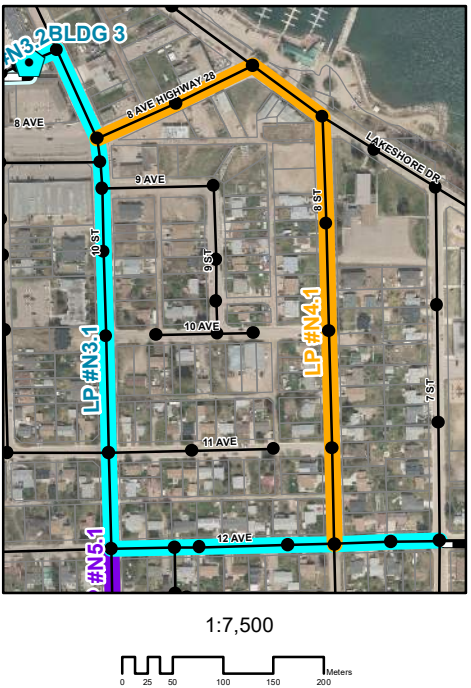
Constant 0.29L/s/ha

25yr 24hr Q3 Huff Distribution

50yr 24hr Q3 Huff Distribution



Link ID	GSAN_640		GSAN_1067		.....	.....	GSAN_391A		GSAN_391		GSAN_392		GSAN_393		GSAN_768		.....	GSAN_771		GSAN_770		GSAN_770A		GSAN_847						
Link Diameter (m)	0.3750		0.9000		0.4500	0.2000																								
Ground Level (m)	538.00		537.29		537.99		538.31		539.58		542.57		545.17		546.18		548.08		548.35		548.98		551.64		551.48		551.06		550.46	
Invert Level (m)	528.44		531.38		532.62		534.69		535.35		538.30		540.96		542.78		542.82		544.85		545.01		545.38		545.51		545.84		545.98	
Link Slope (%)	0.38		0.99		0.31	2.34	4.58		3.14		1.56		0.01		2.90		0.42	0.41		0.14		0.59		0.18						
Capacity (cu.m/s)	0.1073		1.7977		0.1597	0.0501	0.3748		0.3103		0.2187		0.0201		0.2983		0.1131	0.1125		0.0650		0.1348		0.0742						



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N3.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



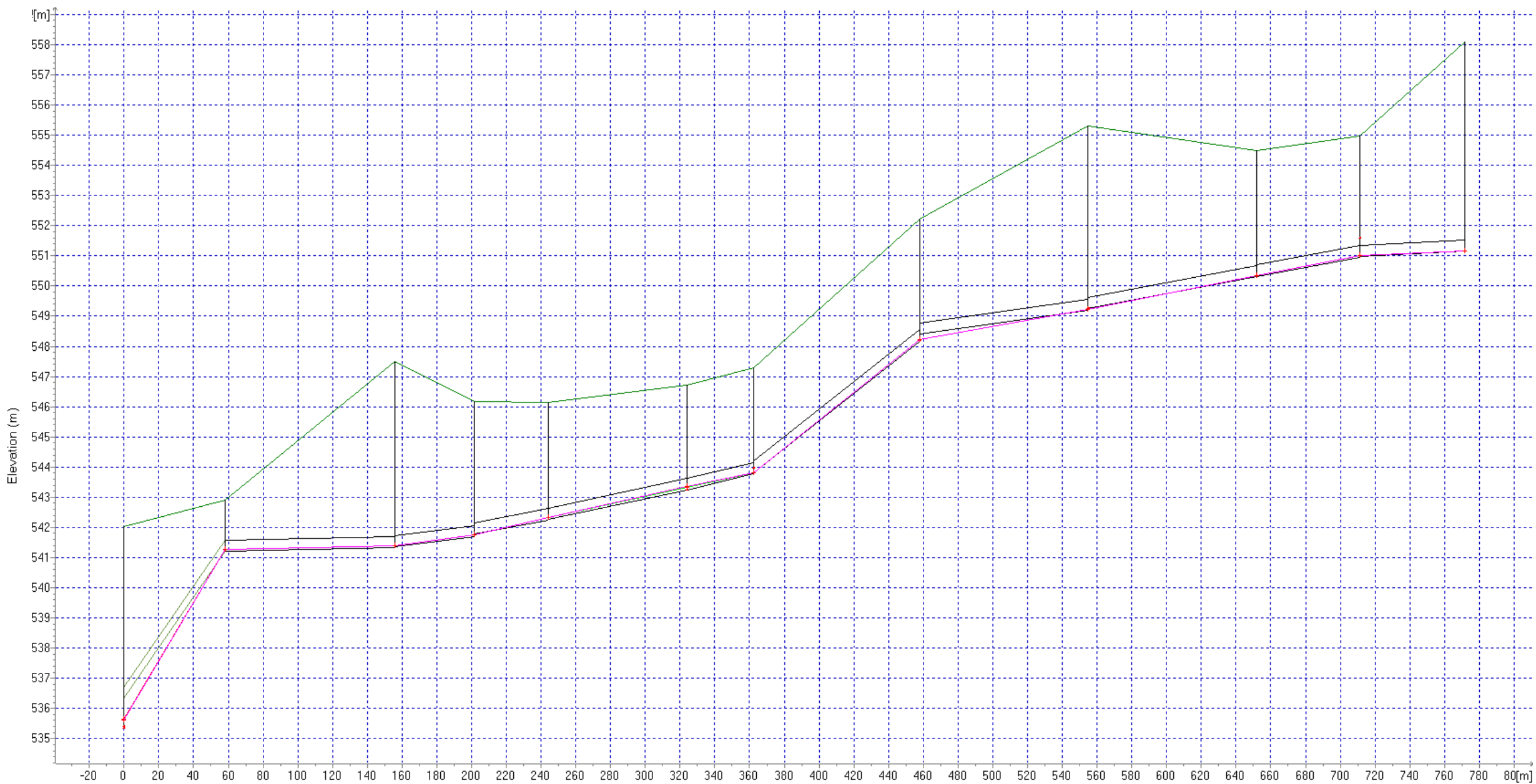
13/05/2016



Date: 2017-11-16 Document M:\26300\26367_Cold_Lake_ILI_Program\02_CADD\02_Drafting\201_GIS_Figures\APP K - Future Stage 3 System Assessment LPs\Figure 6 - LP #N3.2.mxd

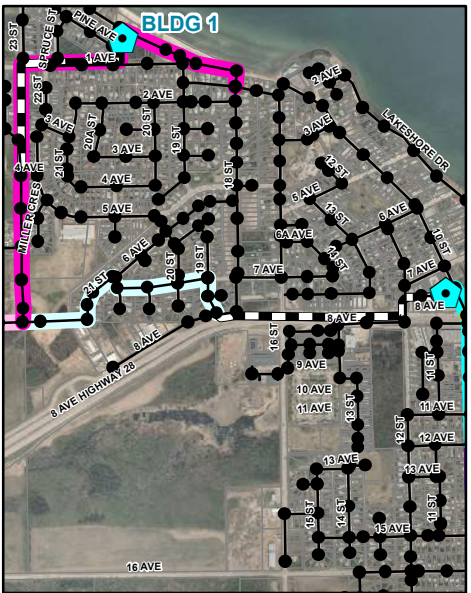
FIGURE APP L.6

LP #N3.2 - Maximum HGL Profile - Future Stage 3 Conditions



Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:24,000



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N3.2
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016

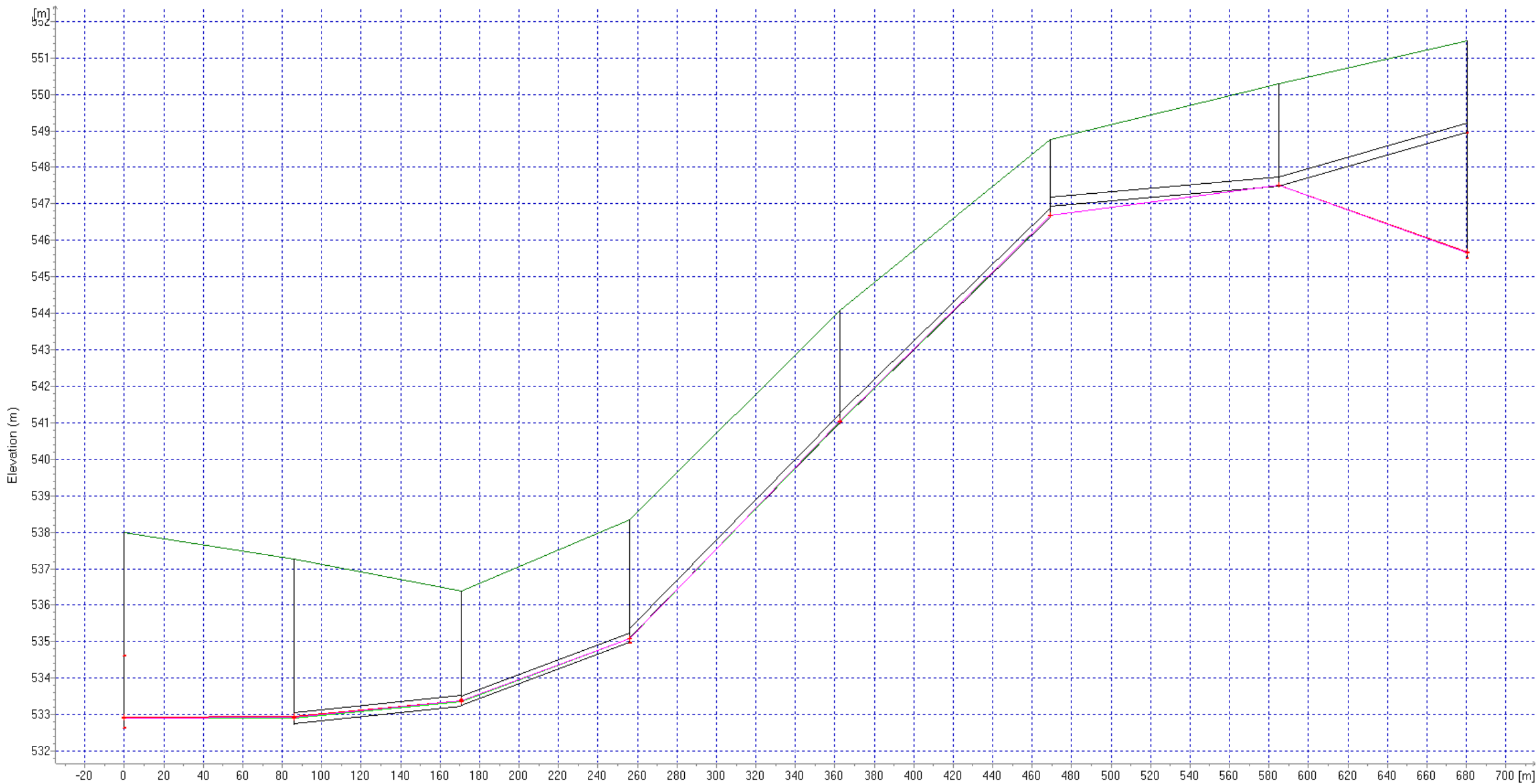


FIGURE APP L.7

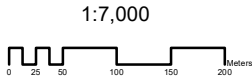
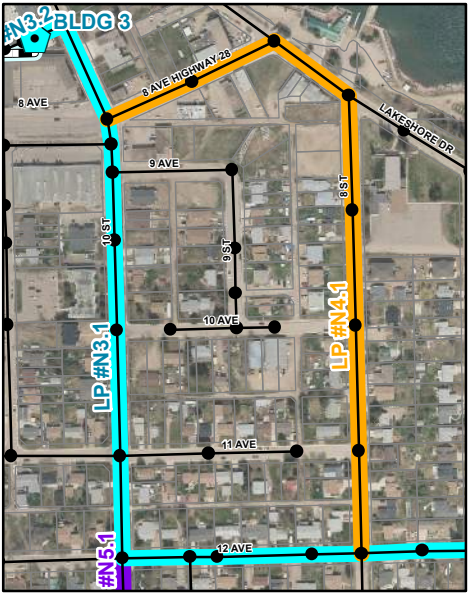
LP #N4.1 - Maximum HGL Profile - Future Stage 3 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_639		GSAN_373		GSAN_374		GSAN_788		GSAN_376		GSAN_377		GSAN_378	
Link Diameter (m)	0.3500		0.3000						0.2500					
Ground Level (m)	537.99		537.26		536.39		538.33		544.07		548.76		550.28	
Invert Level (m)	532.62		532.70		533.24		534.96		540.99		546.64		547.49	
Link Slope (%)	0.02		0.58		2.04		5.53		5.28		0.48		1.55	
Capacity (cu.m/s)	0.0186		0.0734		0.0848		0.1396		0.1364		0.0411		0.0738	



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N4.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



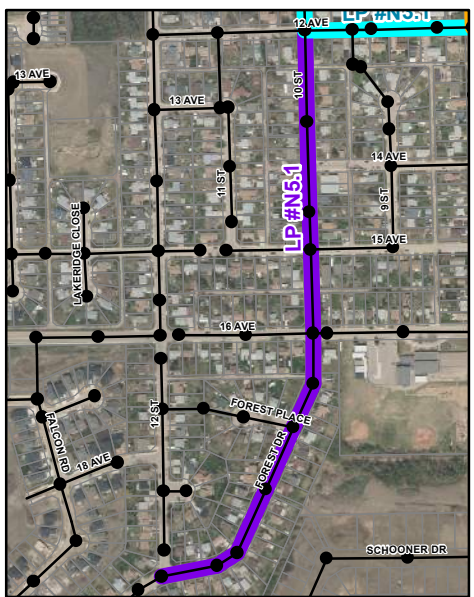
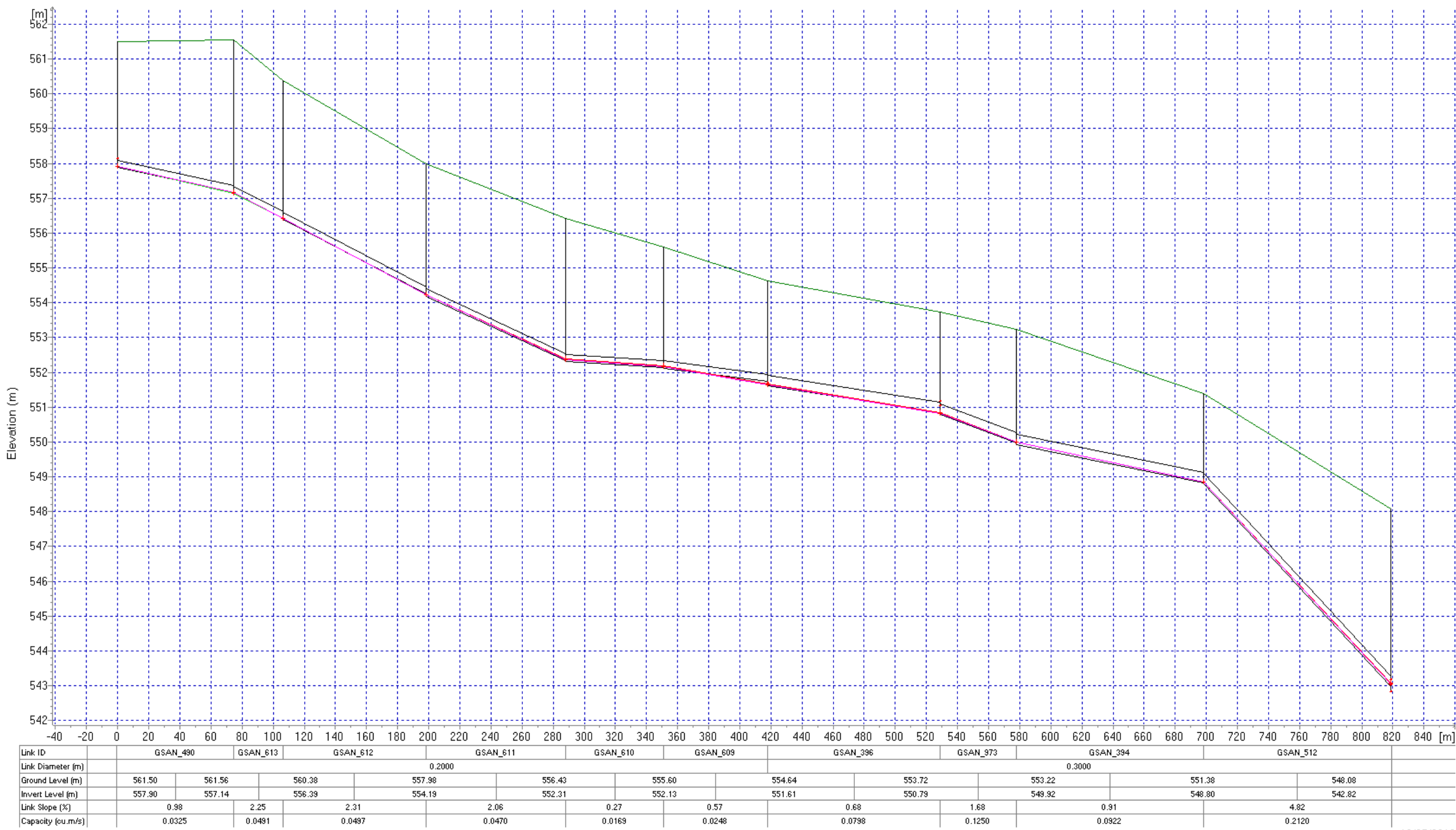
13/05/2016



FIGURE APP L.8

LP #N5.1 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:10,000



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N5.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016



FIGURE APP L.9

LP #N6.1 - Maximum HGL Profile - Future Stage 3 Conditions

Legend

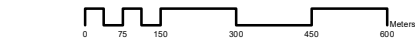
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	FUT Pipe_3													
Link Diameter (m)	0.2000													
Ground Level (m)	553.35	553.45	553.95	555.50	553.66	554.20	555.67	553.45	552.05	552.13	553.81	554.88	554.30	
Invert Level (m)	550.78	550.26	549.90	549.39	548.68	547.90	547.61	547.41	547.14	546.83	546.64	546.42	546.18	
Link Slope (%)	1.02						0.00							
Capacity (cu.m/s)	0.0293	0.0367	0.0465	0.0364	0.0820	0.0582	0.3668	0.3151	0.3640	0.4159	0.3185	0.3194	0.3203	



1:15,000



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #N6.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



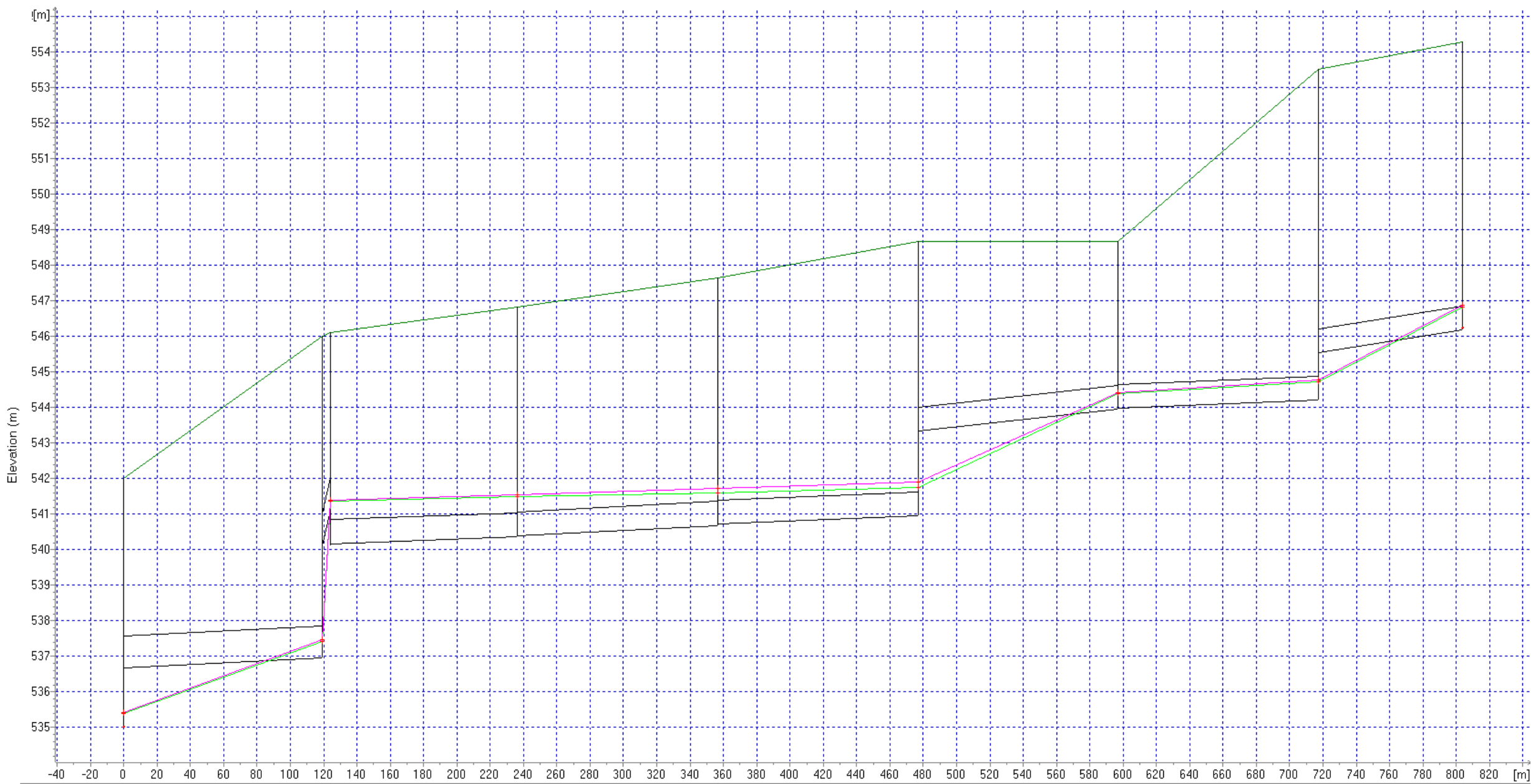
13/05/2016



Date: 2017-11-15 Document M:\26300\26367_Cold_Lake_ILI_Program\02_CADD\20_Drafting\201_GIS Figures\APP K - Future Stage 3 System Assessment LPs\Figure 10 - LP #N6.2.mxd

FIGURE APP L.10

LP #N6.2 - Maximum HGL Profile - Future Stage 3 Conditions

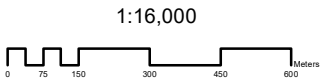
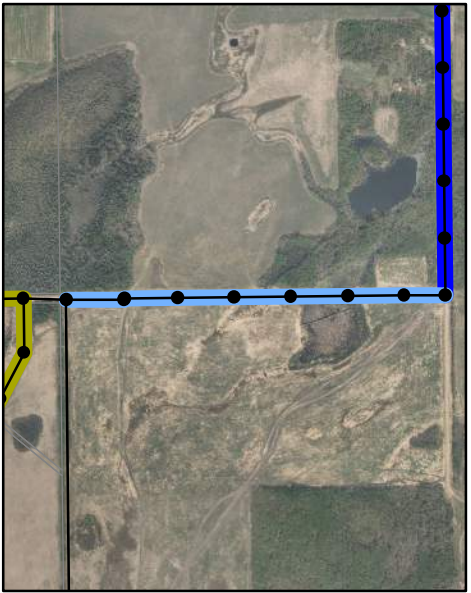


Link ID	FUT Pipe_23		FUT Pipe_12		FUT Pipe_1		FUT Pipe_15		FUT Pipe_18		FUT Pipe_16		FUT Pipe_17	
Link Diameter (m)	0.3000						0.6750							
Ground Level (m)	542.00	546.00	546.11	546.82	547.65	548.68	553.53	554.30						
Invert Level (m)	535.00	536.96	540.11	540.37	540.69	540.96	543.95	544.20	546.18					
Link Slope (%)							0.00							
Capacity (cu.m/s)	0.8664		0.3509		0.4187		0.3696		0.5956		0.3608		0.7172	

Legend

Maximum Water Level (m)

- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



**THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM**

MAXIMUM HGL PROFILE - LP #N6.2
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016

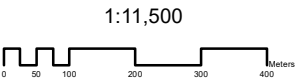
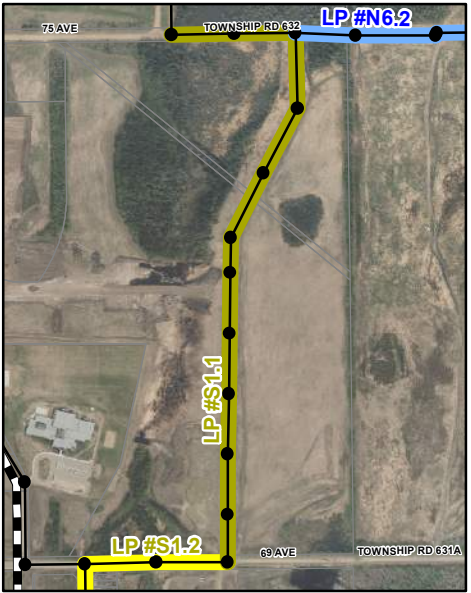
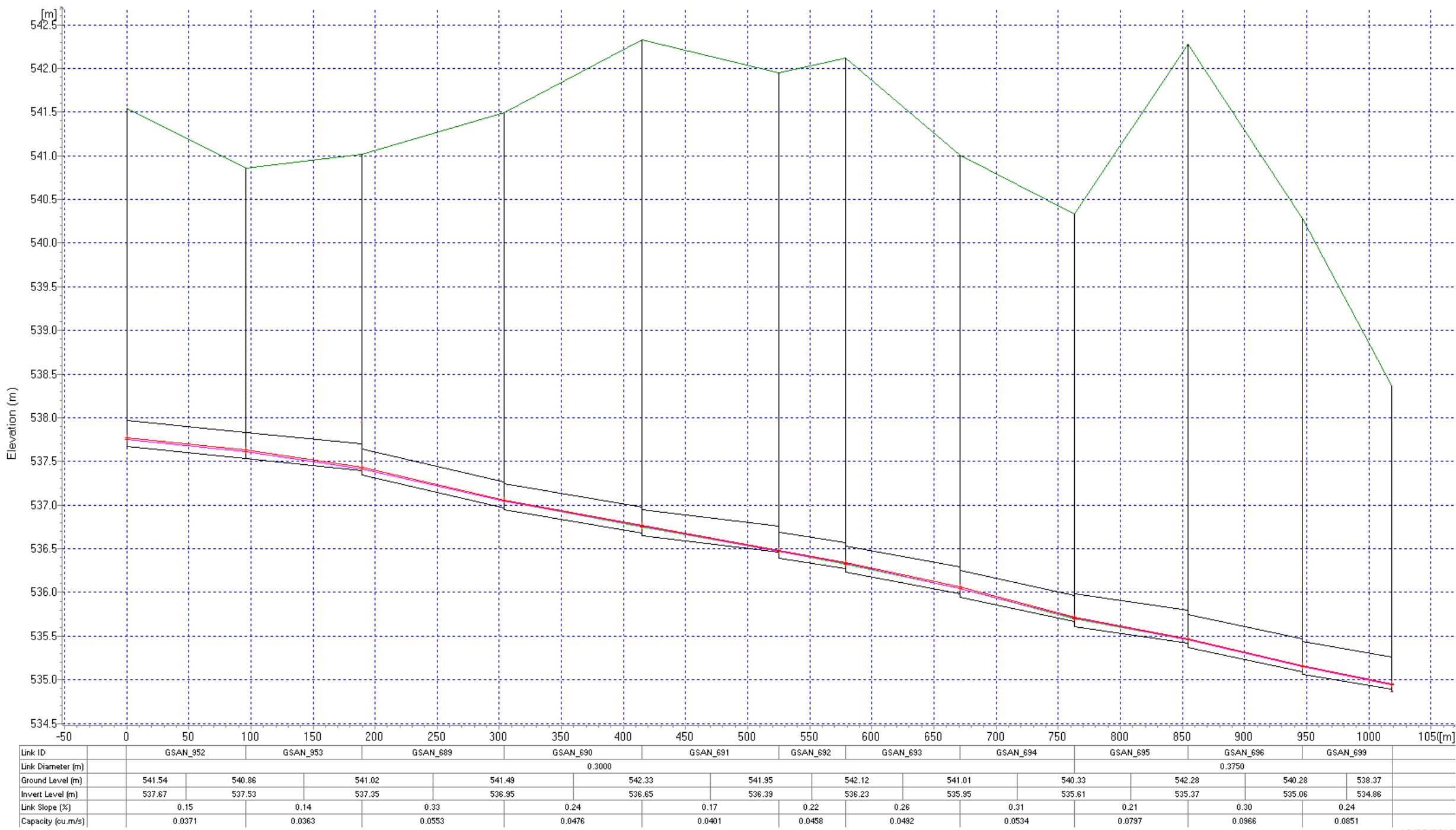


Date: 2017-11-15 Document M:\26300\26367_Cold_Lake_ILP_Program\02_CADD\20_Drafting\201_GIS Figures\App K - Future Stage 3 System Assessment LPs\Figure 11 - LP #S1.1.mxd

FIGURE APP L.11

LP #S1.1 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
- 25yr 24hr Q3 Huff Distribution
- 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S1.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016

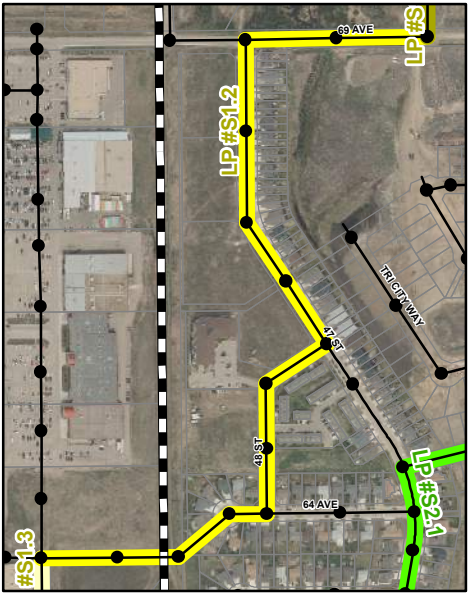


LP #S1.2 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_673														
Link Diameter (m)	0.3750														
Ground Level (m)	536.96	537.51	537.41	538.36	537.66	537.76	537.40	537.13	538.02	538.67	538.37	539.22	538.85	538.37	
Invert Level (m)	531.25	531.64	531.90	532.27	532.45	532.72	532.96	533.25	533.46	533.77	534.03	534.56	534.61	534.86	
Link Slope (%)	0.42	0.33	0.35	0.33	0.30		0.31	0.18	0.25	0.22	0.46	0.05		0.19	
Capacity (cu.m/s)	0.1129	0.1006	0.1041	0.1000	0.0953		0.0965	0.0981	0.0735	0.0879	0.0822	0.1187	0.0377	0.0771	



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S1.2
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS

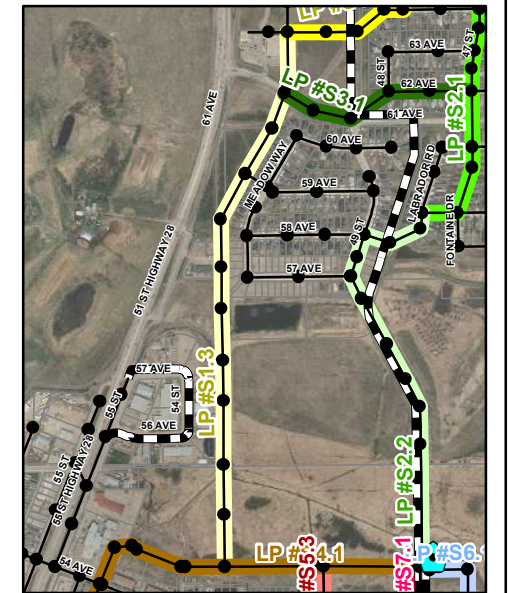


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Legend

— Constant 0.29L/s/ha
— 25yr 24hr Q3 Huff Distribution
— 50yr 24hr Q3 Huff Distribution



**THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM**

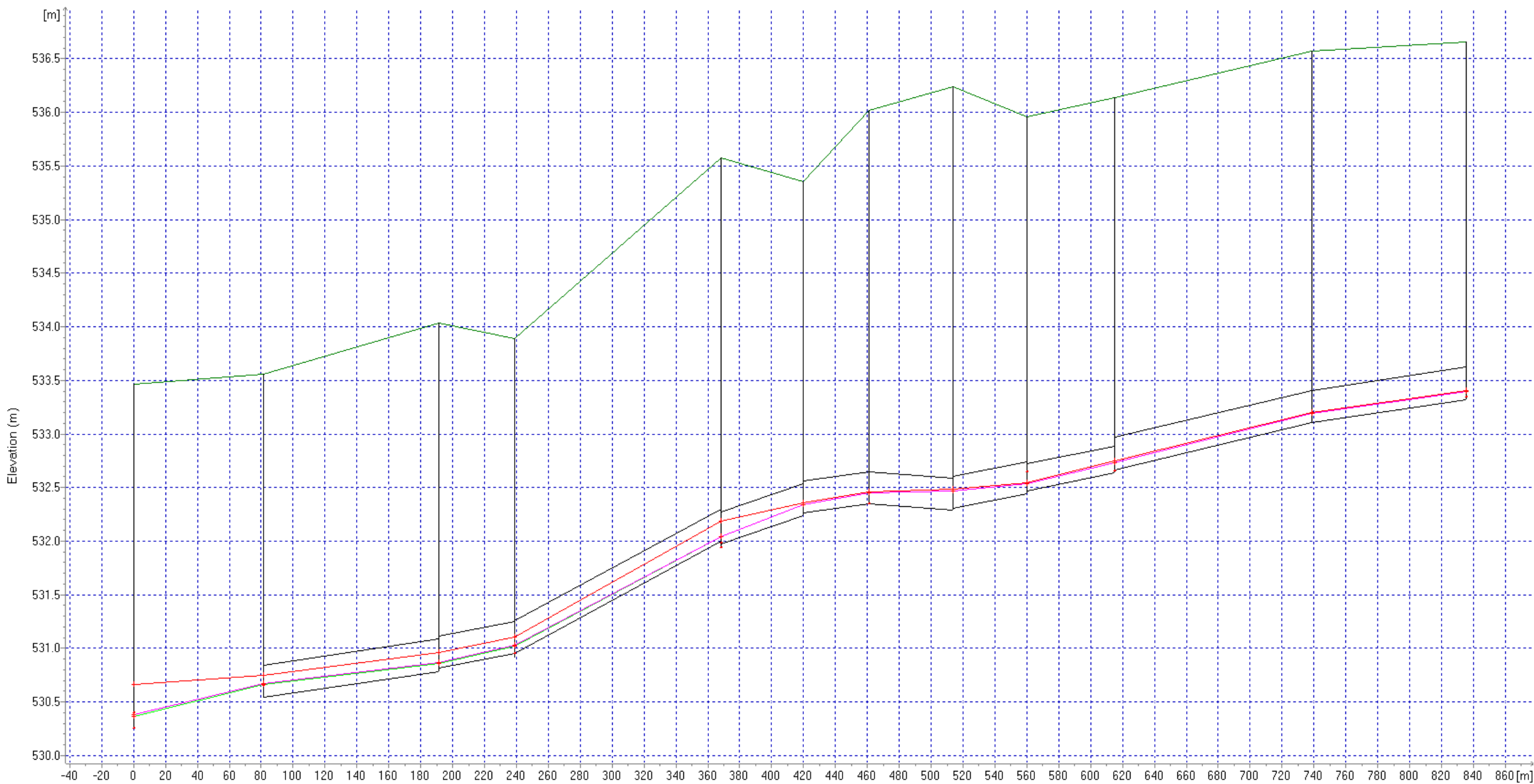
MAXIMUM HGL PROFILE - LP #S1.3
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



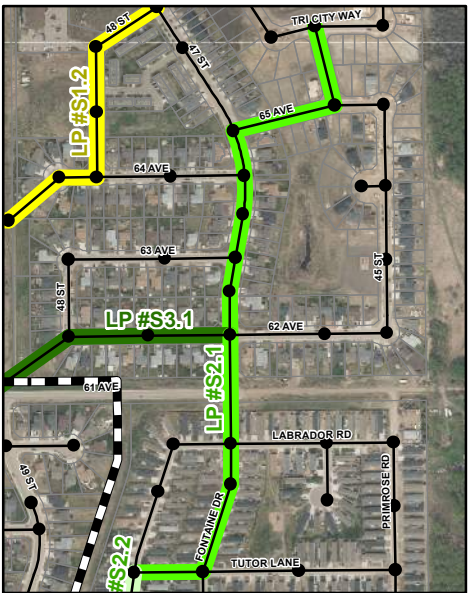
13/05/2016

LP #S2.1 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_921		GSAN_934		GSAN_933		GSAN_938		GSAN_68		GSAN_68A		GSAN_69		GSAN_70		GSAN_91		GSAN_1033		GSAN_1062		
Link Diameter (m)	0.3000																						
Ground Level (m)	533.46		533.56		534.04		533.89		535.58		535.35		536.02		536.24		535.96		536.14		536.57		536.66
Invert Level (m)	530.25		530.54		530.79		530.91		531.94		532.24		532.35		532.29		532.44		532.64		533.11		533.32
Link Slope (%)	0.33				0.22		0.29		0.76		0.51		0.22		-0.12		0.28		0.30		0.36		0.22
Capacity (cu.m/s)	0.0557				0.0452		0.0519		0.0865		0.0691		0.0452		0.0333		0.0515		0.0327		0.0576		0.0457



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S2.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
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LP #S2.2 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_920	GSAN_919	GSAN_918	GSAN_900	GSAN_942	GSAN_799	GSAN_798	GSAN_797	GSAN_796	GSAN_795	GSAN_795A	GSAN_815
Link Diameter (m)	0.3000					0.3750		0.4500			0.6000	0.7500
Ground Level (m)	533.58	533.62	534.91	532.45	532.27	532.13	532.06	532.47	532.94	532.66	533.90	534.23
Invert Level (m)	530.10	529.88	529.77	529.66	529.46	529.32	528.03	527.17	527.03	526.88	525.56	521.73
Link Slope (%)	0.35	0.20	0.18	0.42	0.43	0.24		0.79	0.14	0.18	0.53	0.21
Capacity (cu.m/s)	0.0572	0.0431	0.0408	0.1132	0.1148	0.0864		0.2523	0.2326	0.2572	0.4454	0.5109



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S2.2
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
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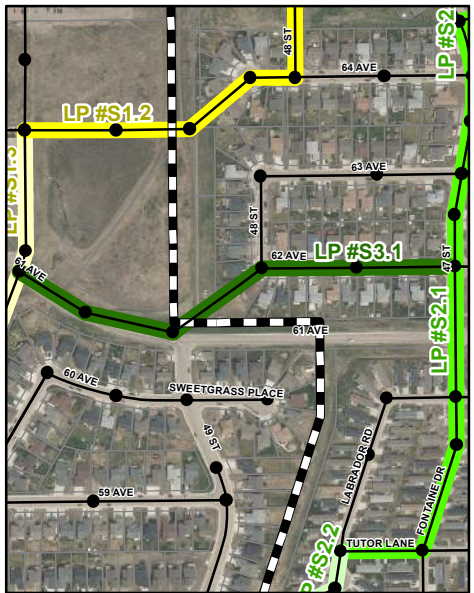
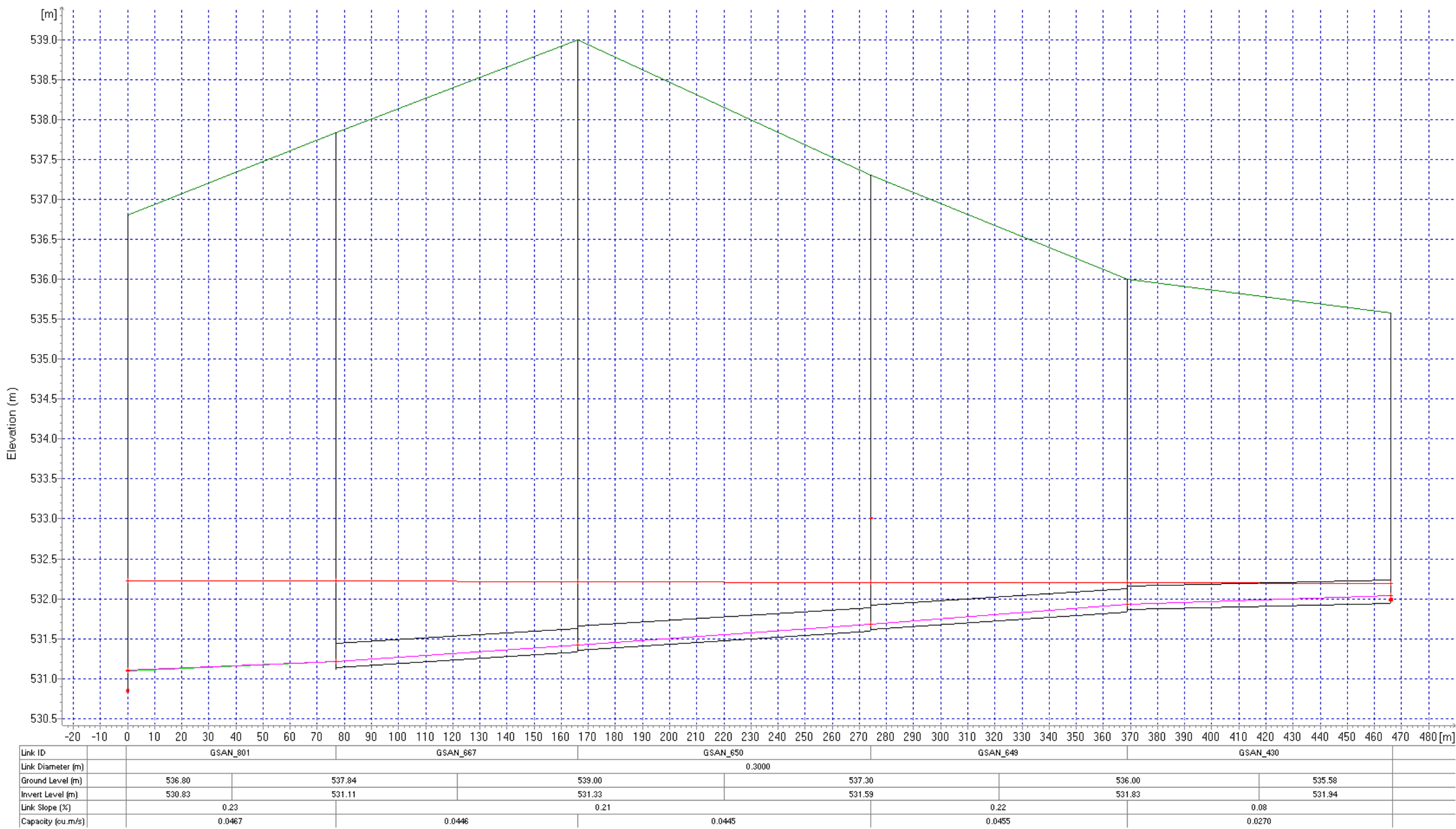


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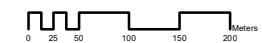


LP #S3.1 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:7,500



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S3.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS

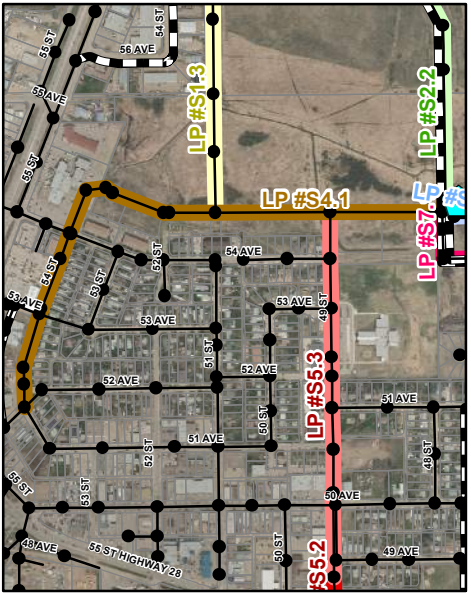
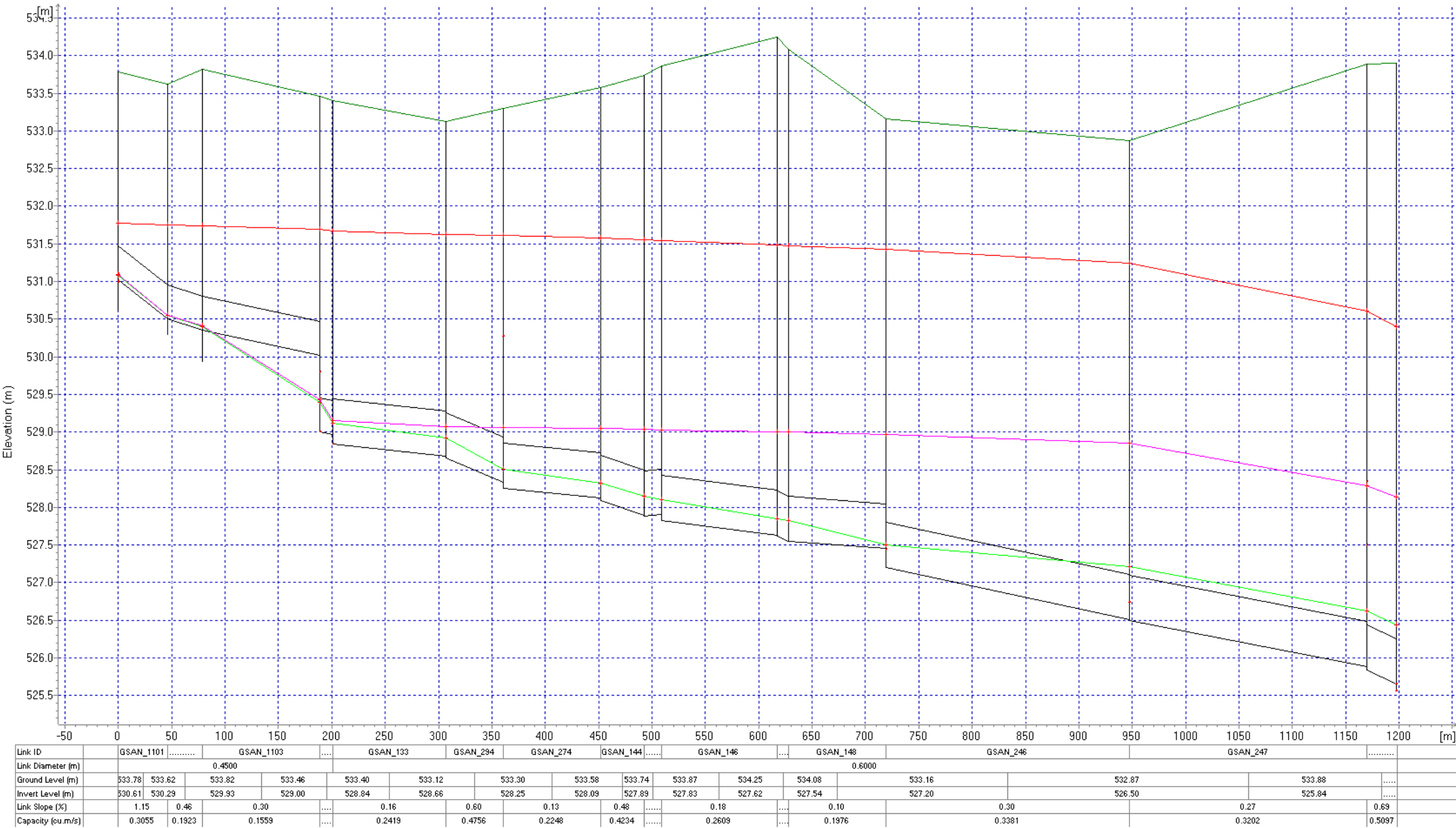


13/05/2016



LP #S4.1 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



1:15,000



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S4.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



13/05/2016

LP #S5.1 - Maximum HGL Profile - Future Stage 3 Conditions

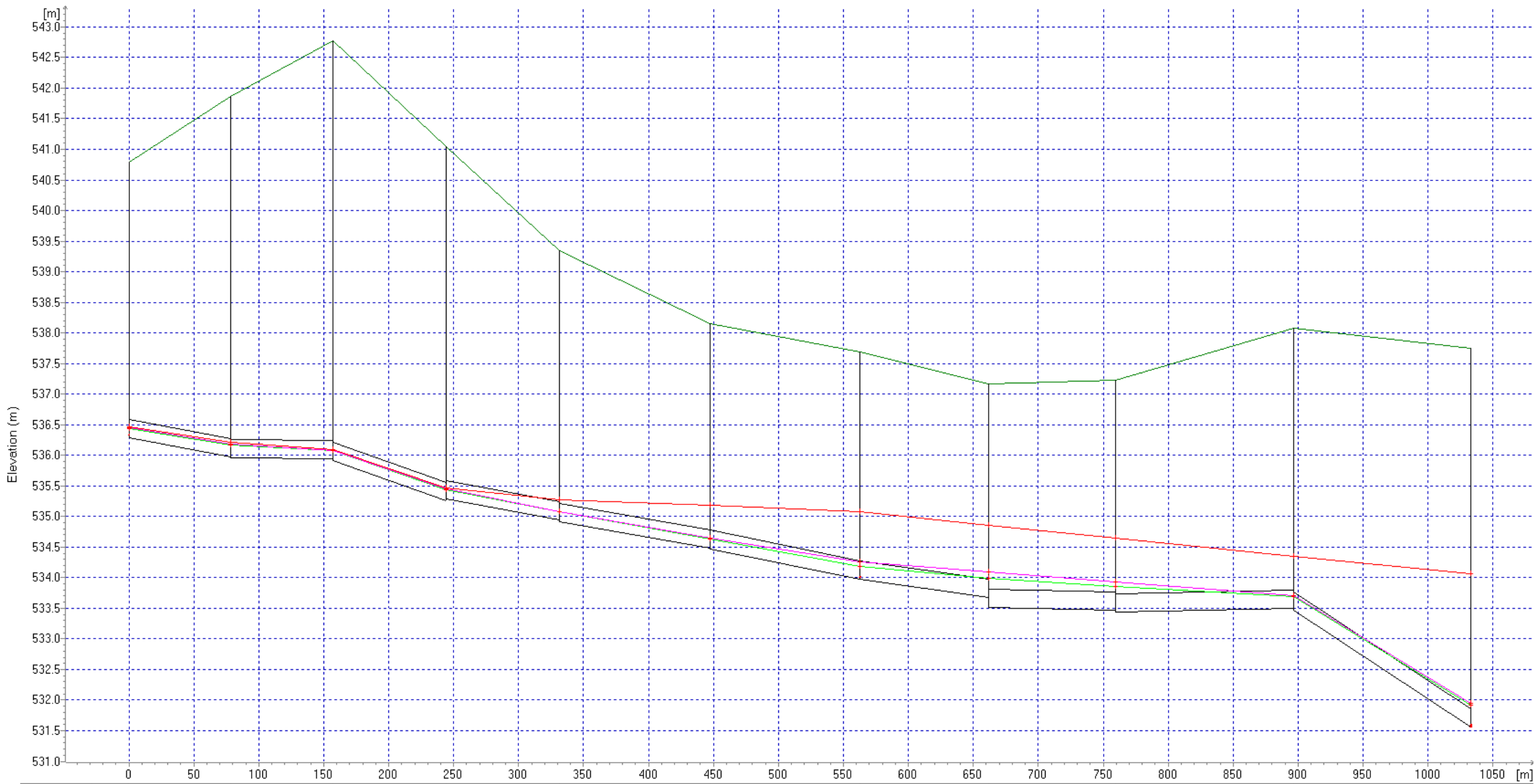
Legend

Maximum Water Level (m)

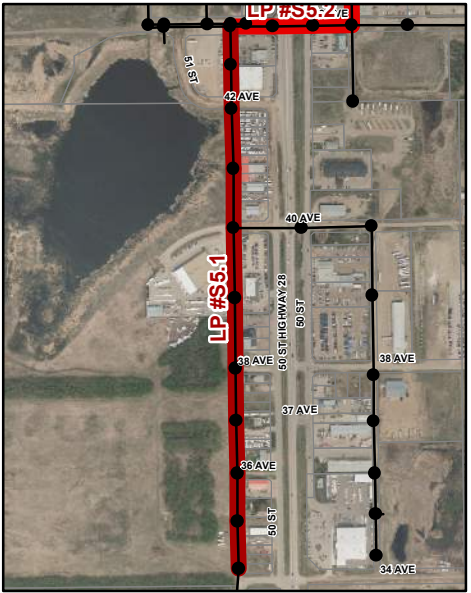
Constant 0.29L/s/ha

25yr 24hr Q3 Huff Distribution

50yr 24hr Q3 Huff Distribution



Link ID	GSAN_208		GSAN_209		GSAN_703		GSAN_727		GSAN_728		GSAN_729		GSAN_210		GSAN_211		GSAN_52		GSAN_820	
Link Diameter (m)	0.3000																			
Ground Level (m)	540.79	541.87	542.78	541.04	539.34	538.15	537.69	537.17	537.22	538.08	537.75									
Invert Level (m)	536.29	535.96	535.91	535.25	534.92	534.47	533.97	533.52	533.44	533.47	531.55									
Link Slope (%)	0.40	0.02	0.76	0.39	0.38	0.44	0.30	0.05	-0.04	1.40										
Capacity (cu.m/s)	0.0609	0.0124	0.0841	0.0606	0.0593	0.0638	0.0526	0.0224	0.0190	0.1142										



1:12,500



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM
MAXIMUM HGL PROFILE - LP #S5.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS

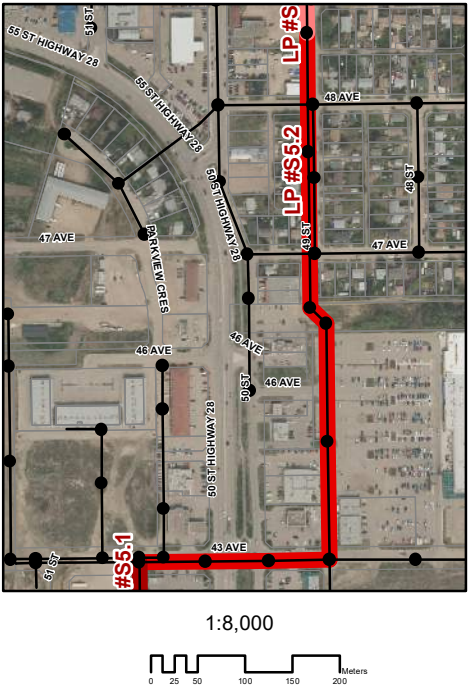
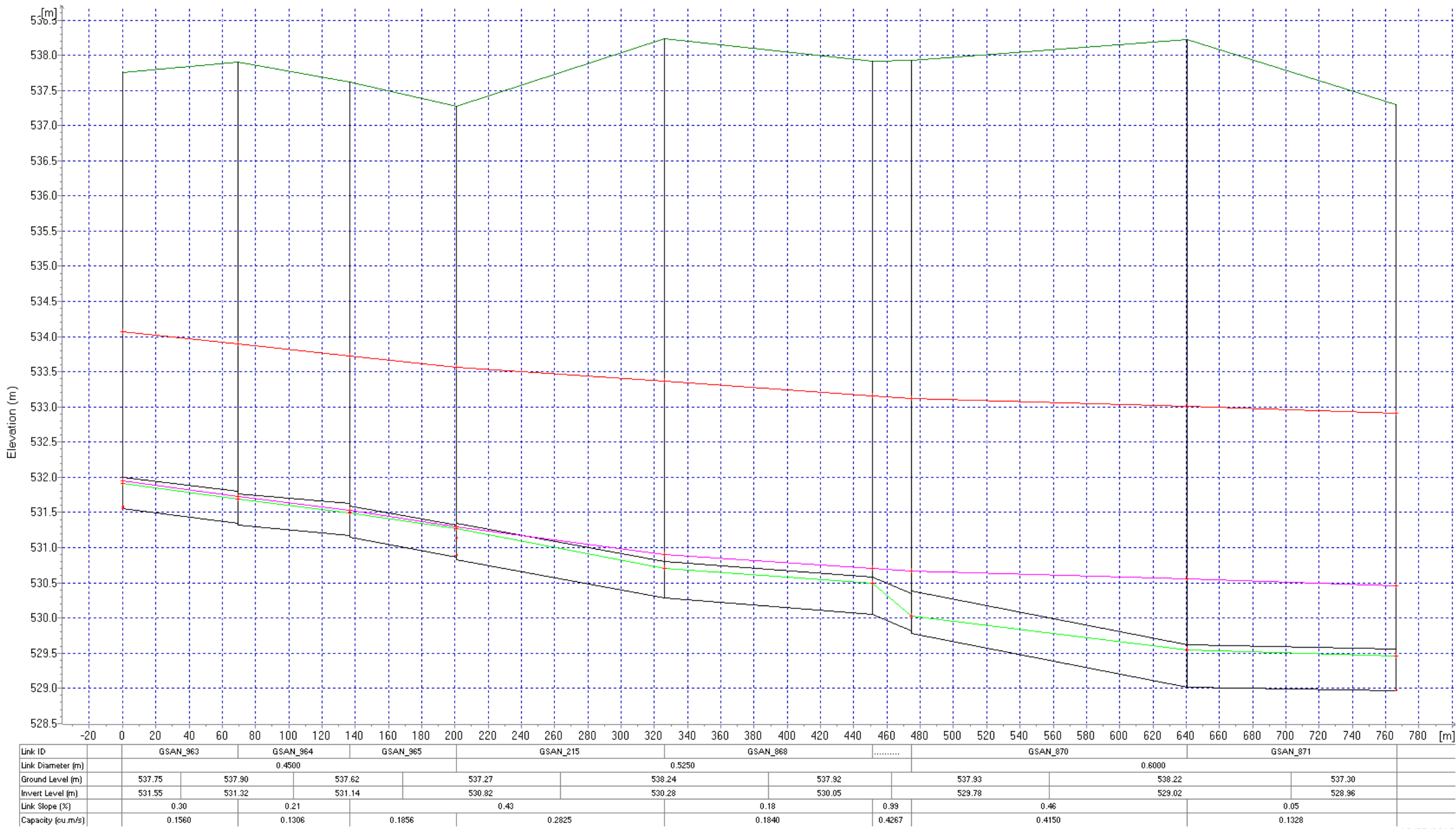


13/05/2016



LP #S5.2 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

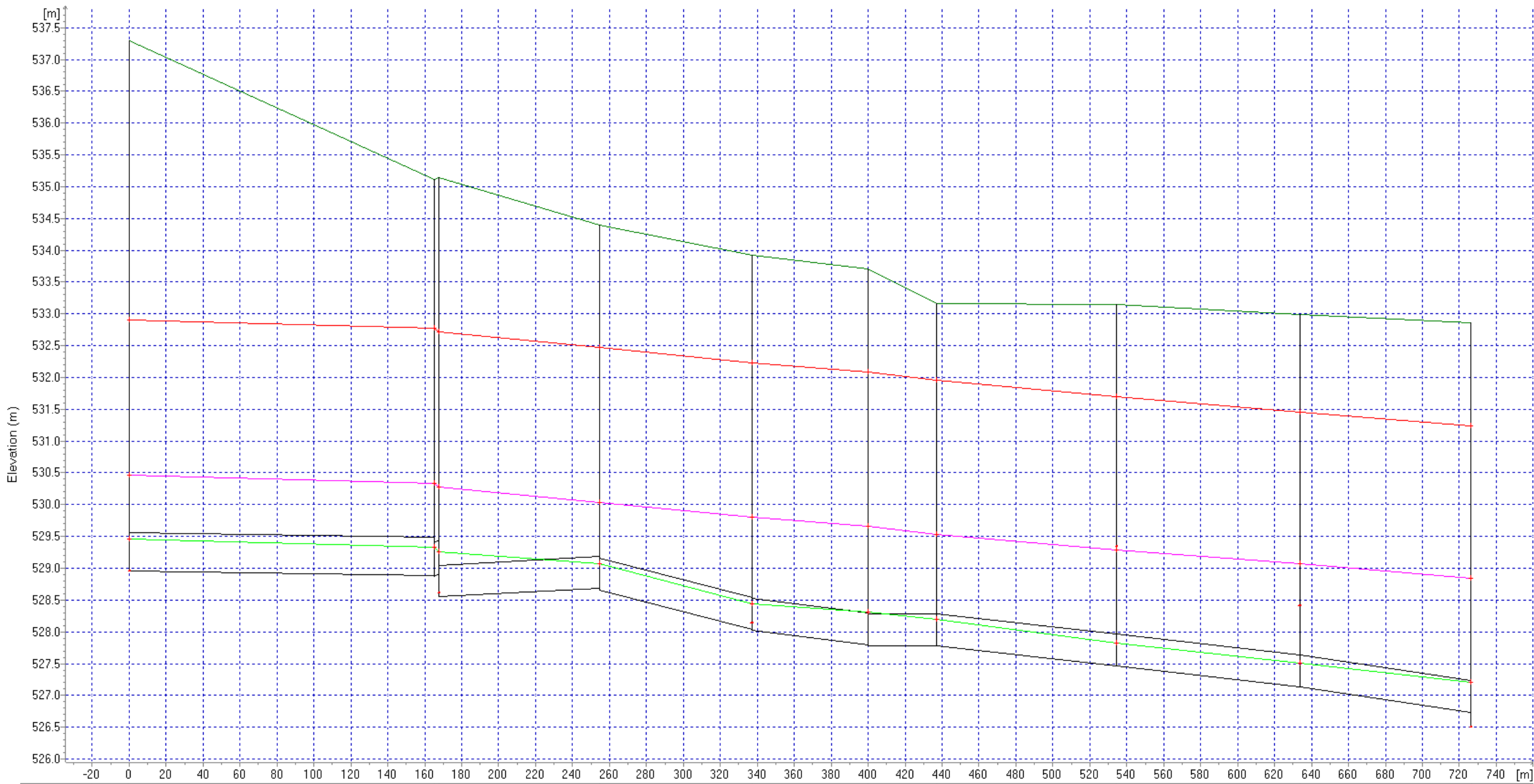
MAXIMUM HGL PROFILE - LP #S5.2
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



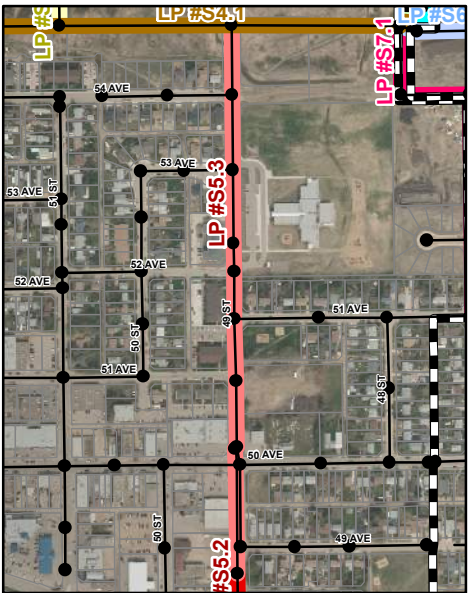
LP #S5.3 - Maximum HGL Profile - Future Stage 3 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



Link ID	GSAN_872		GSAN_98		GSAN_99		GSAN_162		GSAN_223		GSAN_224		GSAN_244		GSAN_245	
Link Diameter (m)	0.6000								0.5000							
Ground Level (m)	537.30		535.11		535.14		534.40		533.92		533.71		533.16		533.15	
Invert Level (m)	528.96		528.88		528.55		528.66		528.03		527.78		527.46		527.14	
Link Slope (%)	0.05				-0.15		0.75		0.37		0.01		0.32		0.43	
Capacity (cu.m/s)	0.1320				0.1471		0.3276		0.2295		0.0310		0.2128		0.2140	



1:10,000



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM
MAXIMUM HGL PROFILE - LP #S5.3
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



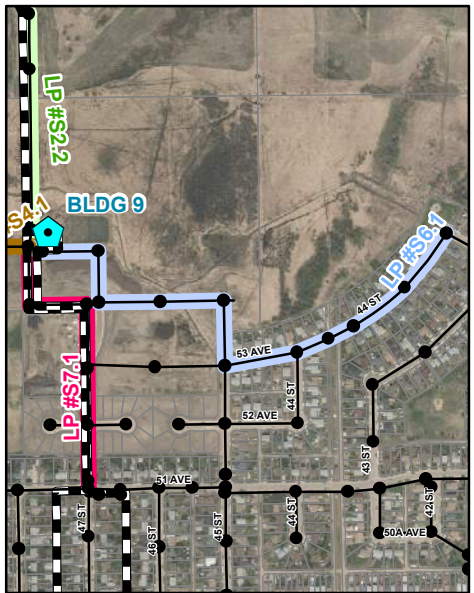
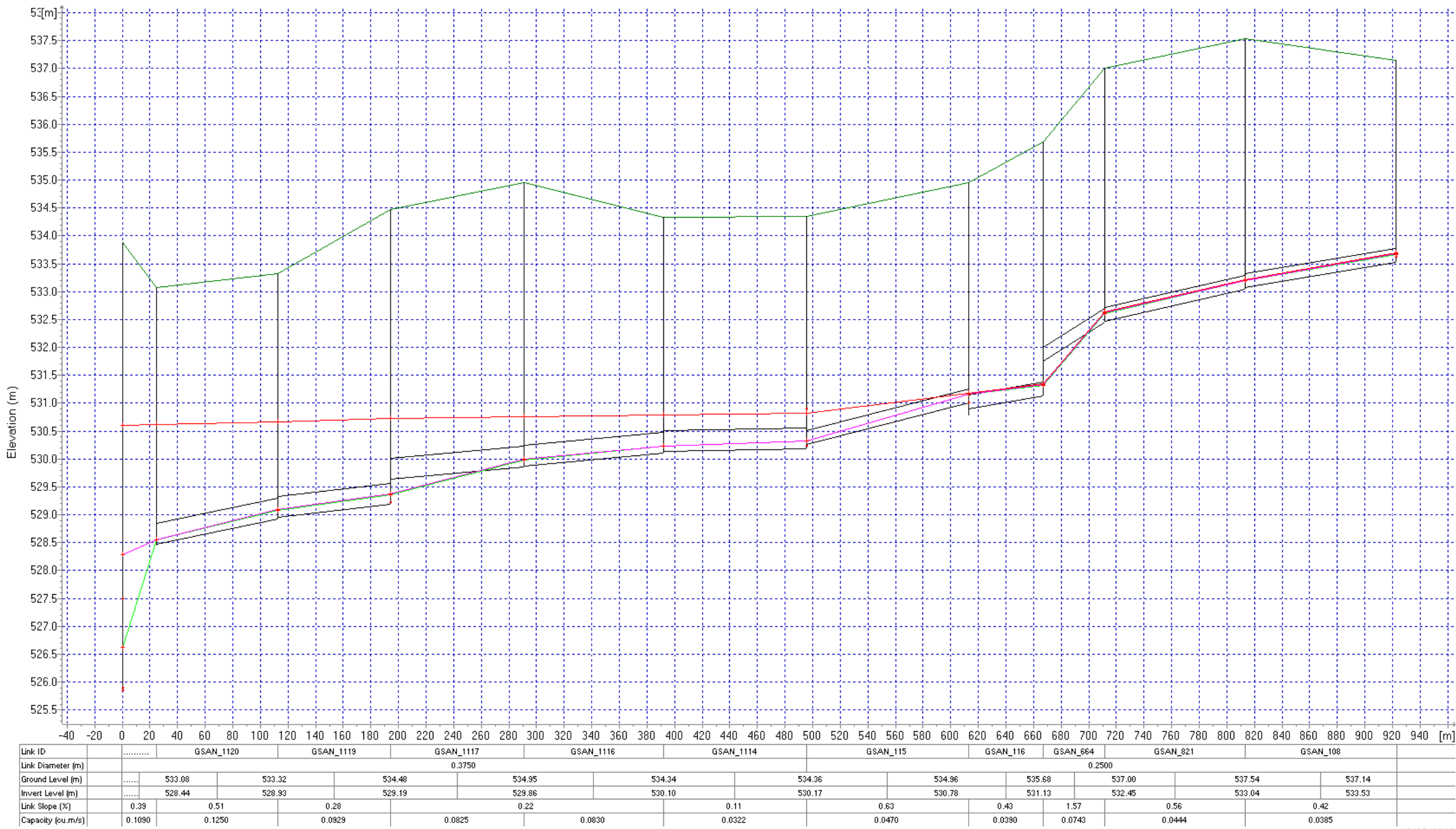
13/05/2016



LP #S6.1 - Maximum HGL Profile - Future Stage 3 Conditions

Legend

- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



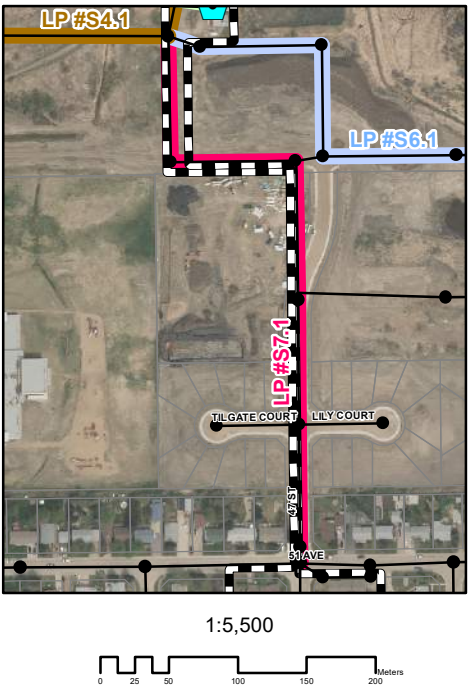
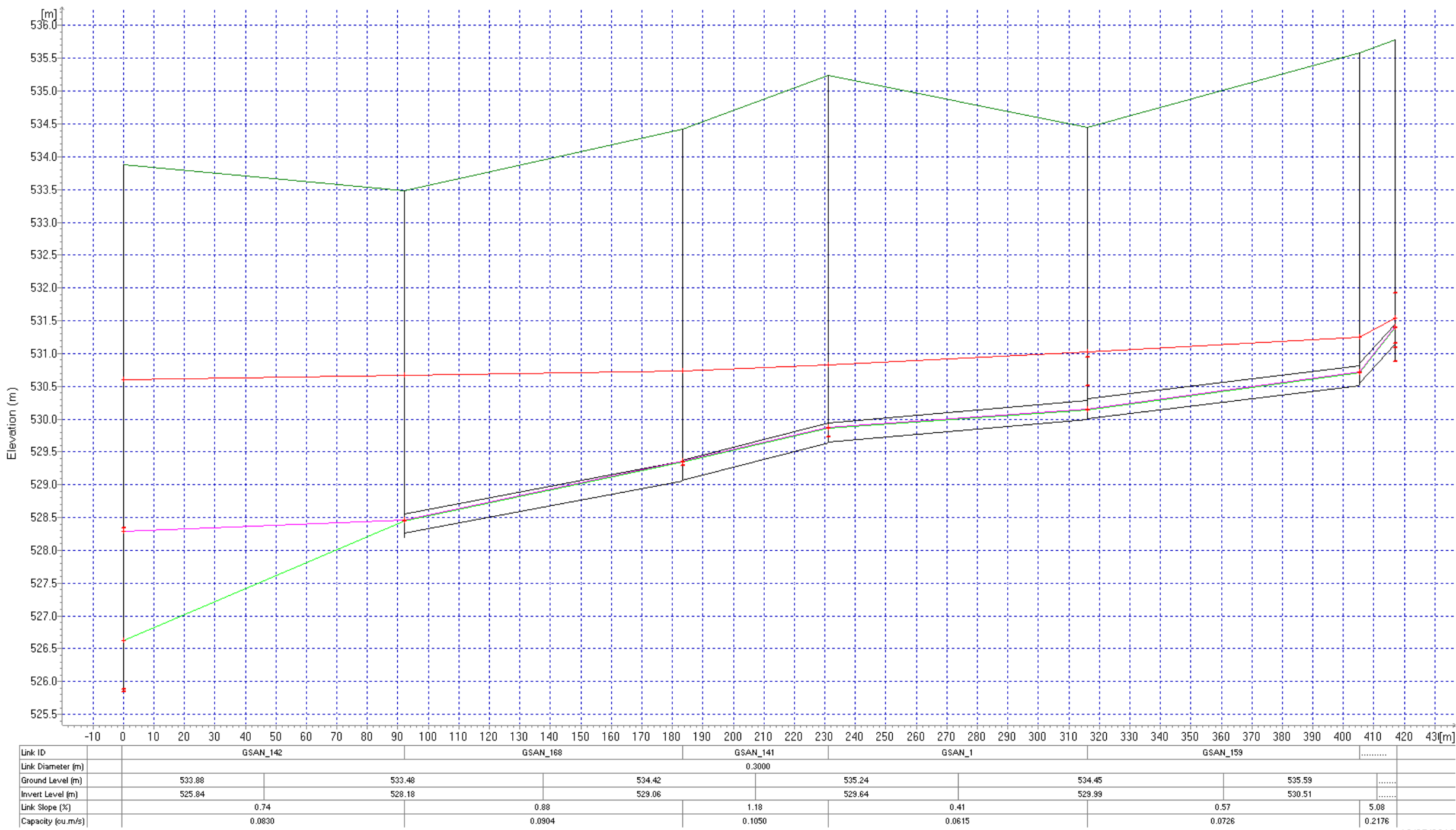
THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S6.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS



LP #S7.1 - Maximum HGL Profile - Future Stage 3 Conditions

- Legend
- Maximum Water Level (m)
- Constant 0.29L/s/ha
 - 25yr 24hr Q3 Huff Distribution
 - 50yr 24hr Q3 Huff Distribution



THE CITY OF COLD LAKE
INFLOW - INFILTRATION PROGRAM

MAXIMUM HGL PROFILE - LP #S7.1
PROPOSED WASTEWATER CONDITIONS
STAGE 3 - BUILD-OUT OF
ANNEXATION AREAS





Appendix M

Future Upgrades – Detailed Cost Estimates



	Item Number	Detailed Breakdown of Cost Estimates - Future Conditions - Required Upgrades								
		Upgrade	Item	Quantity	Units	Unit Cost	Sub-Total	Contingency (30%)	Engineering (15%)	Total Cost
Stage 1	FUT Upgrade 1	BLDG 3 Lift Station Upgrade - 81L/s from 76L/s (Additional 5L/s)	Capacity	1	Items	\$ 50,000.00	\$50,000	\$15,000	\$7,500	\$72,500
	Stage 1 Sub-Total:						\$50,000	\$15,000	\$8,000	\$73,000
Stage 2	FUT Upgrade 2	BLDG 3 Lift Station Upgrade - 86L/s from 81L/s (Additional 5L/s)	Capacity	1	Items	\$ 50,000.00	\$50,000	\$15,000	\$7,500	\$72,500
	FUT Upgrade 3	BLDG 4 Lift Station Upgrade - 382L/s from 282L/s (Additional 100L/s)	Capacity	1	Items	\$ 1,000,000.00	\$1,000,000	\$300,000	\$150,000	\$1,450,000
	FUT Upgrade 4	Diversion of flows from 22 nd Street to 23 rd Street	200mm Gravity Sewer	53	Metres	\$ 1,325.00	\$70,467	\$21,140	\$10,570	\$102,178
			Plug	1	Items	\$ 625.00	\$625	\$188	\$94	\$906
	FUT Upgrade 5	Reconnection of the Building 3 Forcemain directly to the Building 4 Lift Station	300mm Forcemain	285	Metres	\$ 1,600.00	\$456,000	\$136,800	\$68,400	\$661,200
			400mm Gravity Sewer	921	Metres	\$ 1,469.00	\$1,352,676	\$405,803	\$202,901	\$1,961,380
			450mm Gravity Sewer	367	Metres	\$ 1,538.00	\$564,446	\$169,334	\$84,667	\$818,447
			Bypass Pumping during Extension of 300mm Forcemain	3	Days	\$ 3,000.00	\$9,000	\$2,700	\$1,350	\$13,050
	FUT Upgrade 6	Completion of the Forest Heights Phase 2 900mm to 1050mm Trunk	900mm Gravity Sewer	Preliminary Cost Estimate Obtained from the Forest Heights Sanitary Sewer Trunk Preliminary Design Report			\$5,749,000	\$1,724,700	\$862,350	\$8,336,050
			1050mm Gravity Sewer							
FUT Upgrade 7	BLDG 9 Lift Station Upgrade - 950L/s from 300L/s (Additional 650L/s)	Capacity	1	Items	\$ 6,500,000.00	\$6,500,000	\$1,950,000	\$975,000	\$9,425,000	
FUT Upgrade 8	Upsize section of pipe from 200mm to 300mm	300mm Gravity Sewer	466	Metres	\$ 1,375.00	\$640,323	\$192,097	\$96,048	\$928,468	
Stage 2 Sub-Total:							\$16,393,000	\$4,918,000	\$2,459,000	\$23,769,000
Stage 3	FUT Upgrade 9	BLDG 9 Lift Station Upgrade - 1,350L/s from 950L/s (Additional 400L/s)	Capacity	1	Items	\$ 4,000,000.00	\$4,000,000	\$1,200,000	\$600,000	\$5,800,000
	Stage 3 Sub-Total:						\$4,000,000	\$1,200,000	\$600,000	\$5,800,000
	Grand Total:						\$20,443,000	\$6,133,000	\$3,067,000	\$29,642,000