

Hi Sharon!

Please see the following attached items:

1. Update to Task Force

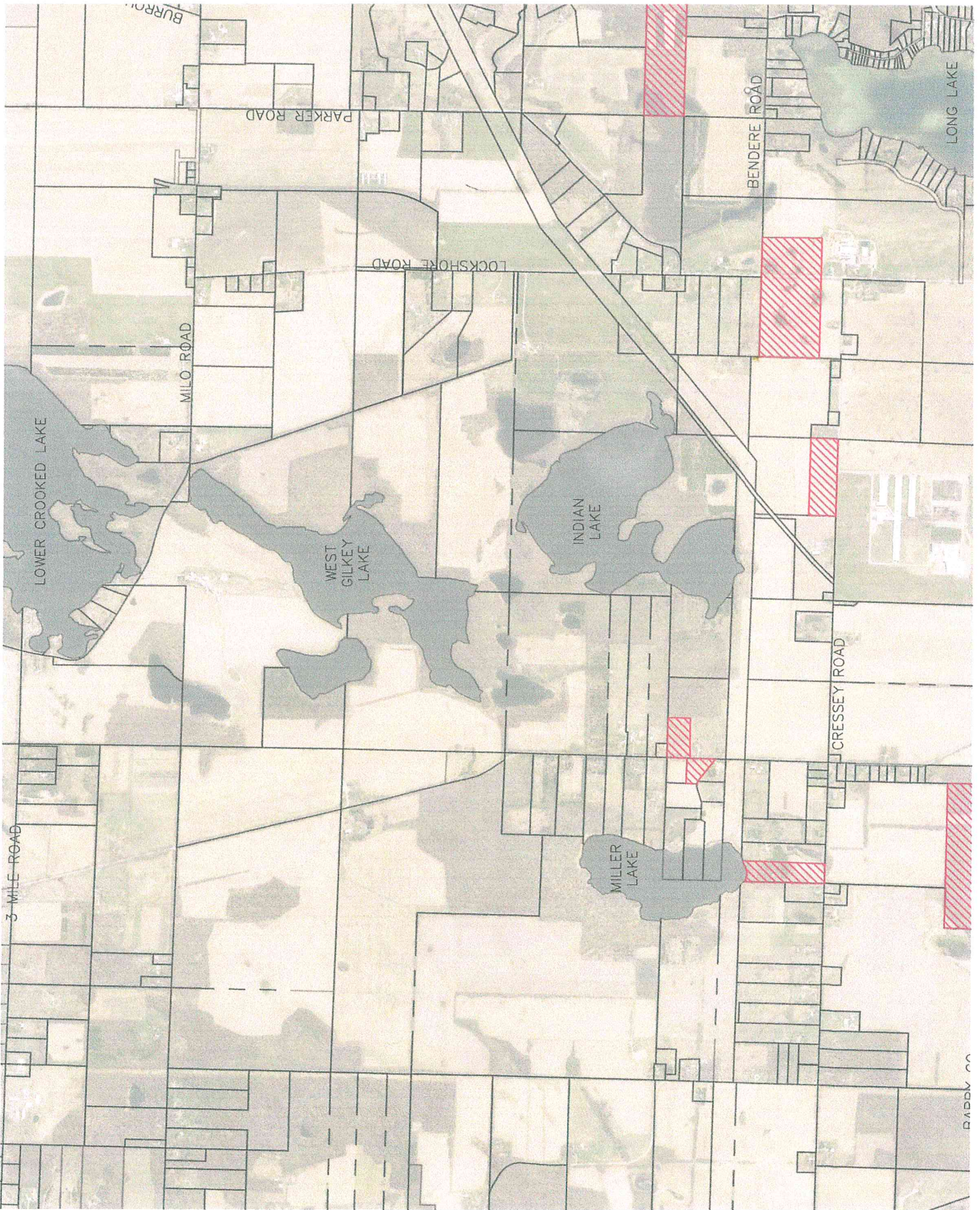
2. ^(Rec'd) Areas of Interest South of Lower Crooked Lake - This is a map identifying some properties south of Lower Crooked Lake that would make most sense in terms of elevation for a constructed wetland and infiltration field. As can be seen on the 'Update to Task Force' document, this is one of the long-term solutions we currently view to be most viable. If anyone is aware of land owners near these areas that would be interested in selling property or conveying an easement, please let us know!

If you have any questions on any of the items I've mentioned, feel free to call my cell.

Thank you,

Nick

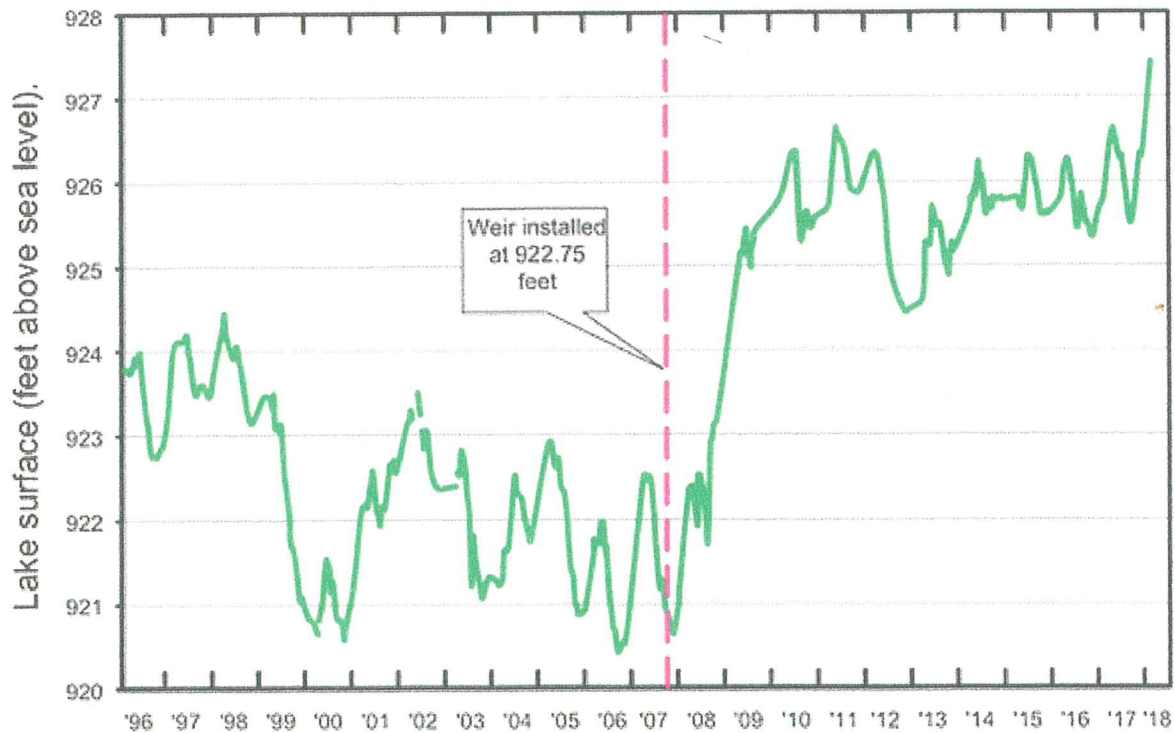
Nicholas J. DeSimpelare
Staff Engineer



Sharon,

In your response to your text message, please see the graph below:

Lower Crooked Lake Water Levels (1996-March 2018)
Steve Hamilton, Kellogg Biological Station, MSU



This is the only information we have from Steve Hamilton that I am aware of.

Thank you,

Nick

Nicholas J. DeSimpelare
Staff Engineer

Short – Term Solution Alternatives under Current Consideration

1. Darrell Jones Property
2. Irrigation

Long – Term Solution Alternatives under Current Consideration

1. Constructed Wetland and Infiltration Field to the south
2. Irrigation on purchased land
3. West Gilkey Lake & Indian Lake

Tasks Completed Since last Meeting

1. Jones Property
 - a. Soil Borings
 - b. Finalized Grading Plan
 - c. DEQ Meeting to discuss permit requirements
 - d. Wetland Delineation
 - e. Finalize purchase area with seller
 - f. Well and septic mapping
 - g. Initial correspondence with Dewind
2. Submit Draft Alternatives Report to BCDC
3. Watershed Subbasin Delineation for Storm Modeling
4. Infiltration Field
 - a. Meeting with hydrogeologist to discuss feasibility and preliminary site selection
 - b. Meeting with DEQ to discuss permit requirements
 - c. Second meeting with hydrogeologist to develop plan for groundwater mapping
5. Irrigation
 - a. Correspondence with MSU Extension on irrigation rates
 - b. Volume prediction calculations

Next Steps

1. ALTA survey on Jones property
2. Pump selection and construction plan for Jones property
3. Piezometer installation for groundwater mapping
 - a. Soil borings for site selection of infiltration field
 - b. Research on land availability south of Lower Crooked Lake

Short-Term Solution Alternatives

Alternative	Lakes Affected	Depth reduction of Crooked Lake (in)	Easements Required	Advantages	Drawbacks	Current Status
West Gilkey Lake & Indian Lake	Upper & Lower Crooked Lake	35	20	Large depth reduction and positive reception from MDEQ	Extensive easement acquisition	Not currently in consideration
Central Irrigation Pivots near Lake	Upper & Lower Crooked Lake	4	5	Simple permitting and construction process	Withdrawals may be reduced during wet periods	In consideration
Glasby Marsh	Upper Crooked Lake	5	NA	Simple permitting process	Low depth reduction	Completed
Condemnation	NA	NA	NA	No permits or construction	Lake level could continue to rise	Not currently in consideration
Darrell Jones Property	Upper Crooked Lake	3.5	5	Takes advantage of for-sale land near Crooked Lake	Compensatory wetland mitigation	In consideration
Philip Maass Property	Upper Crooked Lake	9.5	3	Takes advantage of for-sale land near Crooked Lake	Compensatory wetland mitigation	Not currently in consideration
Spring Brook	Upper & Lower Crooked Lake	3	8	Takes advantage of existing irrigation infrastructure to reduce temporary piping	Low depth reduction for extensive permit requirements	Not currently in consideration

Long - Term Solution Alternatives

Alternative	Lakes Affected	Pumping Required	Easements Required	Advantages	Drawbacks	Current Status
Gull Lake	Upper & Lower Crooked Lake	No	10	Discharge to a surface water with natural drainage to the Kalamazoo River	Permit requirements involved with discharging to a different watershed	Not currently in consideration
Spring Brook	Upper & Lower Crooked Lake	Yes	6	Discharge to a surface water that is the current receiving stream of Crooked Lake	Permit requirements associated with discharging to a low flow trout stream	Not currently in consideration
West Gilkey Lake & Indian Lake	Upper & Lower Crooked Lake	Yes	20	Limited infrastructure required	Significant easement requirements and possible necessity for condemnation	In consideration
Chain of Lakes to Northeast & Fall Creek	Upper Crooked Lake	Yes	15	Discharge to a surface body with natural drainage to the Thornapple River	Permit requirements involved with discharging to a different watershed	Not currently in consideration
Deep Gravity Wells	Upper Crooked Lake	No	1	Limited infrastructure and easement acquisition required	Permit requirements involved with treating discharge water to drinking water quality	Not preferred
Stormwater Drain Field on South Lockshore LLC. Property	Upper & Lower Crooked Lake	Yes	8	No wetlands or fisheries impacts and discharges water within Spring Brook watershed	Necessity for groundwater mapping	In consideration
Stormwater Drain Field in Esker East of Cloverdale Lake	Upper Crooked Lake	Yes	4	No wetlands or fisheries impacts	Permit requirements involved with discharging in a different watershed and necessity for groundwater mapping	Not preferred
Big Cedar Lake	Upper Crooked Lake	No	3	Limited infrastructure required and discharge to a surface water with natural drainage to the Thornapple River	Permit requirements associated with discharging upstream of a Cisco Lake in a different watershed	Not currently in consideration

Project Expense Transaction Detail Report

BARRY COUNTY

12/17/2018

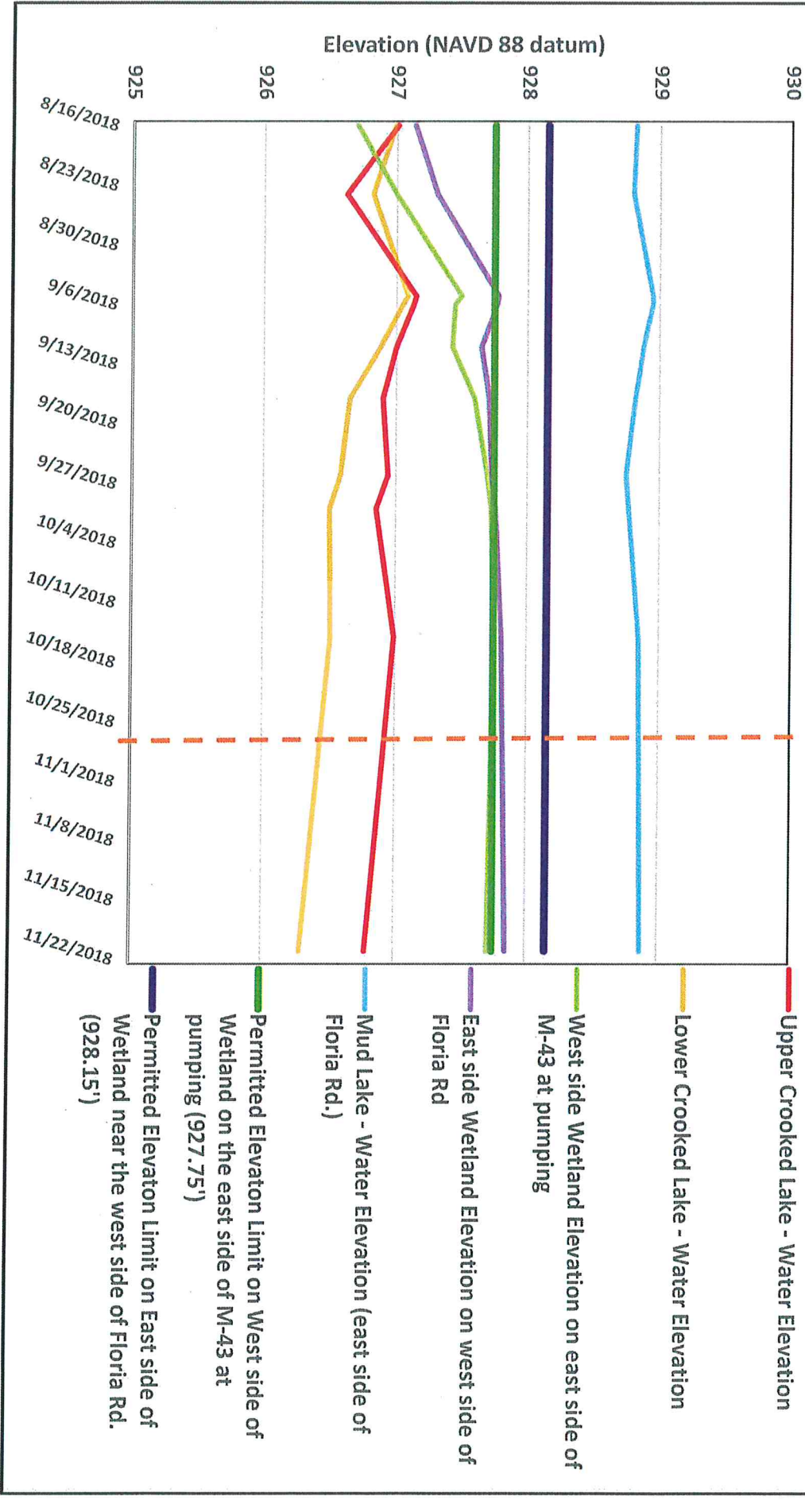
through

1/31/2019

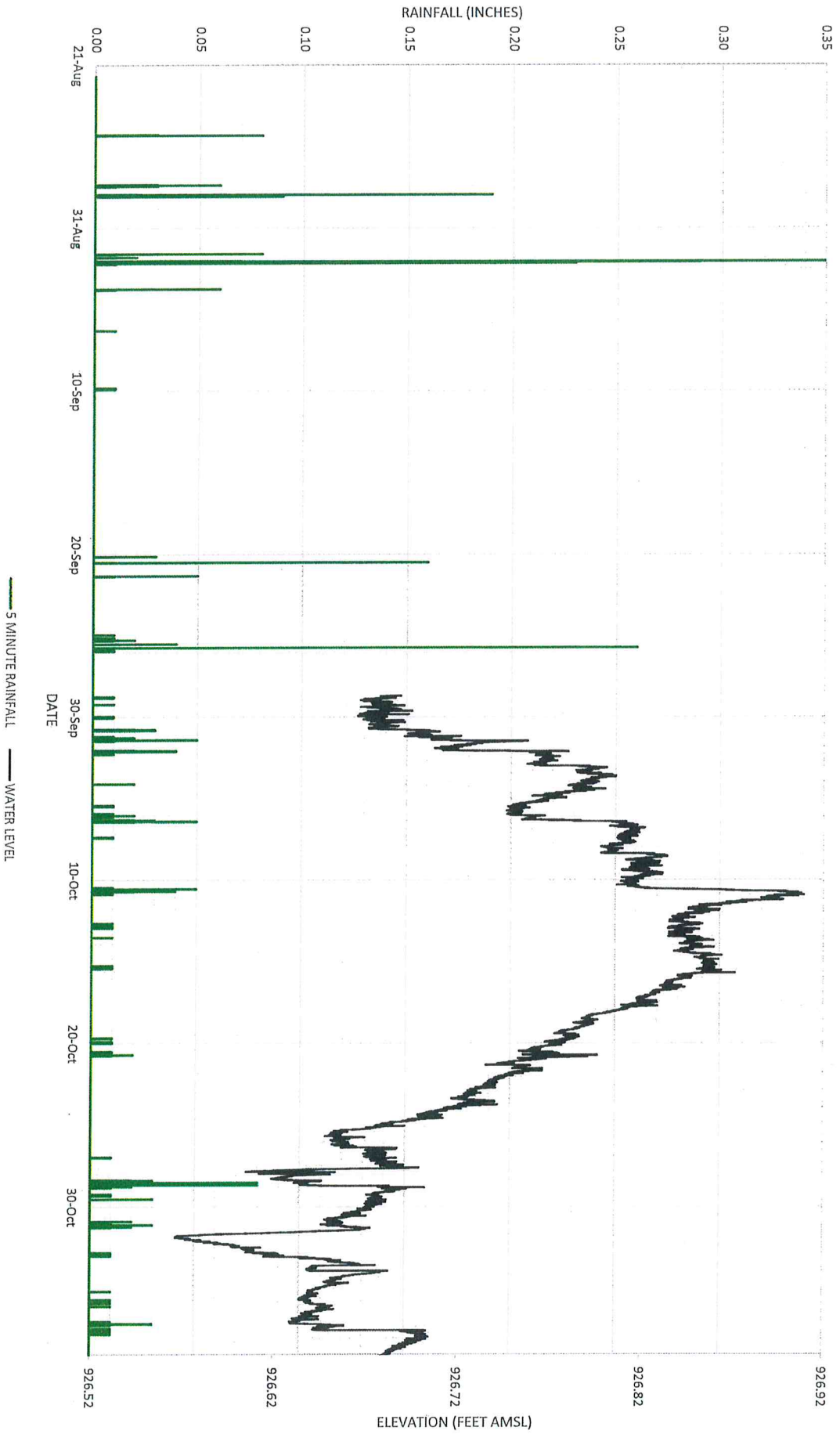
Drain Number: 0350 Watson

Date	Reference	Description	Account #	Labor	Benefits	Hours	Materials	Other
Expense Acct.:	1700	Expenditure Account						
Expense Descr:	engnrng	Engineering						
1/2/2019	0013675	DRAIN - ENG THRU 11/30/18	E 801-000-700-000					25,239.70
		045190 ENG., INC.	Check: 306768 1/3/2019					
Expense Descr. Total:	engnrng	Engineering		0.00	0.00	0.00	0.00	25,239.70
Expense Descr:	legal1	Legal						
1/8/2019	834999	DRAIN - LEGAL THRU 11/30/18	E 801-000-700-000					4,461.60
		048441 CLARK HILL PLC	Check: 306852 1/10/2019					
Expense Descr. Total:	legal1	Legal		0.00	0.00	0.00	0.00	4,461.60
Expense Descr:	maint1	Maintenance						
1/8/2019	29949	DRAIN - MATERIALS FOR WORK	E 801-000-700-000					636.97
		051855 CARPENTER GRAVEL INC.	Check: 306844 1/10/2019					
Expense Descr. Total:	maint1	Maintenance		0.00	0.00	0.00	0.00	636.97
Expense Acct. Total:	700	Expenditure Account		0.00	0.00	0.00	0.00	30,338.27
Drain Number Total:	0350	Watson		0.00	0.00	0.00	0.00	30,338.27
GRAND TOTAL:				0.00	0.00	0.00	0.00	30,338.27

Watson Drain, Upper Crooked Lake - Pumping Analysis (all measured elevations shown)



Rainfall vs. Crooked Lake Surface Level



Rainfall vs. Crooked Lake Surface Level

