



*Presented at the FIG Working Week 2023,
28 May - 1 June 2023 in Orlando, Florida, USA*

International Great Lakes Datum (IGLD) GNSS Campaign

A case study for leveraging digital tools to enhance QA/QC on large scale static GNSS observation campaign



International Great Lakes Datum (IGLD)

Prior Presentations at FIG Working Week 2023

Monday, 29 May

11:30–13:00

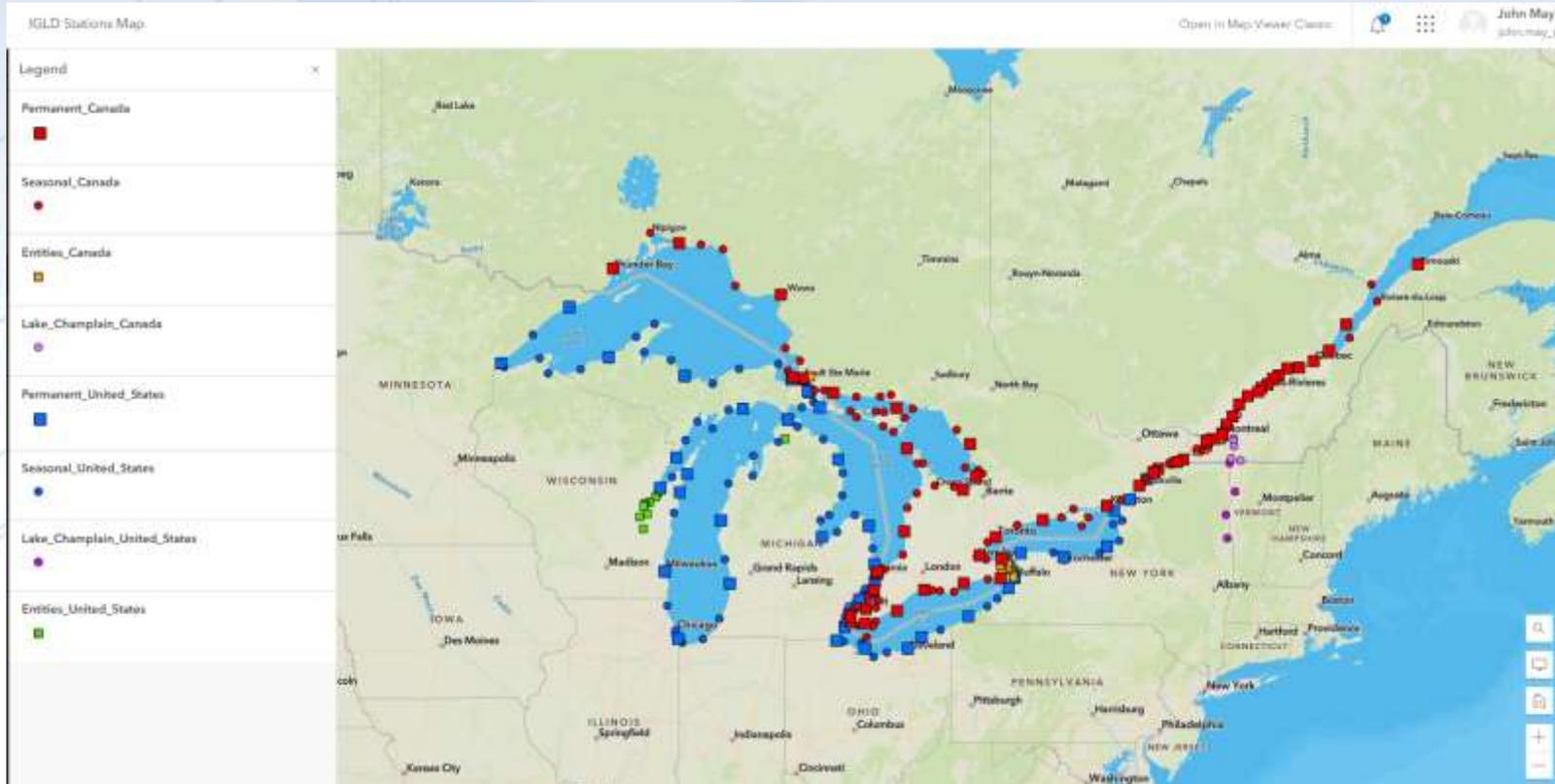
Ryan Hippenstiel, John May, Jacob Heck (USA), Michael Craymer and Rachel van Herpt (Canada):
The 2022 GNSS Survey for a New International Great Lakes Datum: Overcoming Challenges with
International Planning and Digital Tools (12007)

Tuesday, 30 May

11:30–13:00

Daniel Roman (USA) and John Crowley (Canada):
Dynamic Heights for the International Great Lakes Datum of 2020 (11980)

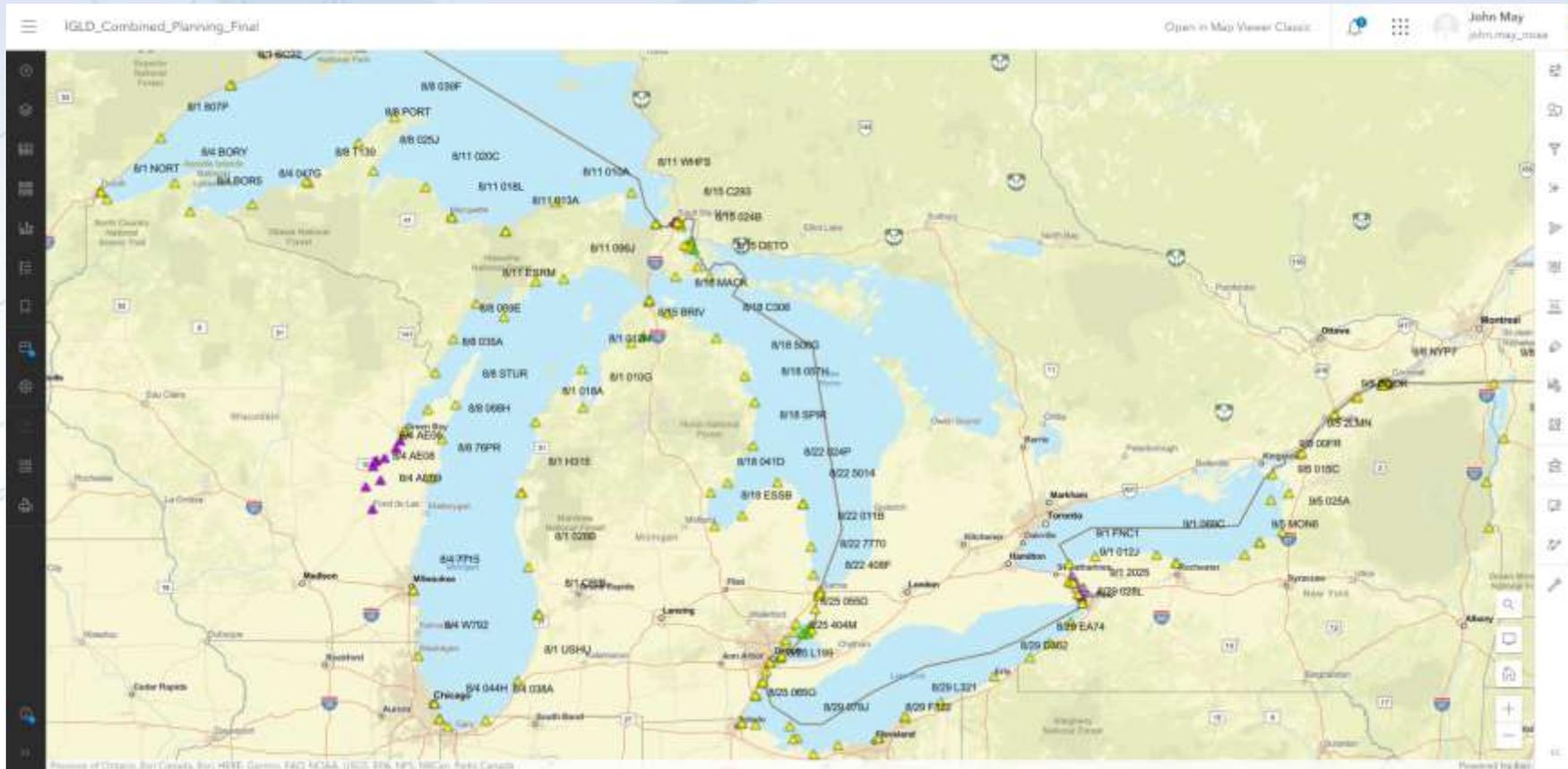
Scope of the IGLD GNSS Survey

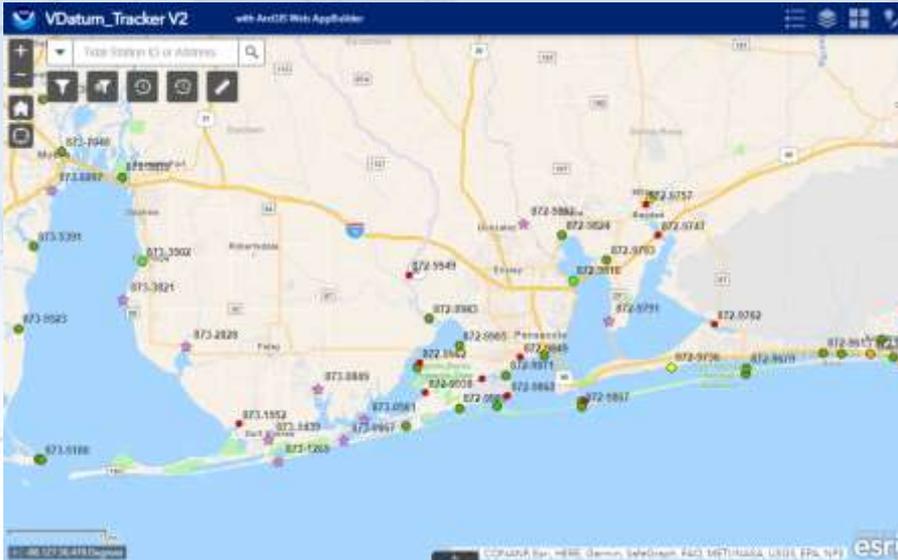


Survey parameters were established by Binational Planning Group

Station ID	Station Name	Country	Water Body	Station Name	Station ID	Recor 2019-2022	Observer 2022	4CID	Database ID (CGS Sta # / NGS PD)	SSN (Station Serial Number)	Stamping ID	Backup BM #	BM Latitude	BM Longitude	GNSS BM Occupations
521	Entrées	United States	Chicago River	Chicago Lock	4187440	DONE USACE	USACE - LRC	AE13	CHI-LOCK				41.868550	-87.60660	
522	Entrées	United States	Chicago River	Chicago Lock					90CT/INR3201						
520	Entrées	United States	Crooked Lake	Crooked River	CRAW4	DONE USACE LRE	USACE - LRE	AE14	MP1				45.43550	-84.456122	
39	Permanent	Canada	Detroit River	Amherstburg	11895	DONE CGS	CGS/CHS	GA8	71027			M20US578	42.1442E	-83.11400	2005, 2010, 2015
94	Permanent	United States	Detroit River	Gibraltar	9044020	DONE CO-OPS	NGS	L19F	194/ND0508				-83.081572	-83.11860	
95	Permanent	United States	Detroit River	Gibraltar	9044030	DONE CO-OPS	NGS	H13E	100/ND0508	1018		Primary	-82.049083	-81.19044	2005, 2010, 2015
96	Permanent	United States	Detroit River	Wyandotte	9044030	DONE CO-OPS	NGS	45K	4250 R/DC9585				-82.339889	-81.147247	
87	Permanent	United States	Detroit River	Fort Wayne	9044036	DONE CO-OPS	NGS	FTWB	Fort Wayne B/AA8056	1065		Primary	-82.28044	-83.096753	2015
87.5	Permanent	United States	Detroit River	Fort Wayne	9044036	DONE CO-OPS	NGS	FTWA	Fort Wayne A/AA8055	1003		Backup -> Primary	-82.297338	-83.094331	2015
88	Permanent	United States	Detroit River	Windmill Point	9044049	DONE CO-OPS	NGS	404M	4049 M/DC9582				-82.359750	-82.350361	
513	Entrées	United States	Detroit River	Belle Isle	915M	DONE USACE LRE	USACE - LRE	AE10	8103				42.834440	-82.961420	
527	Entrées	United States	Fox River	DePue	N/A	DONE USACE	USACE - LRC	AE01	0P2						
528	Entrées	United States	Fox River	Little Kaukauna	N/A	DONE USACE	USACE - LRC	AE02	0K3						
529	Entrées	United States	Fox River	Kaukauna	N/A	DONE USACE	USACE - LRC	AE03	CEY0134						
530	Entrées	United States	Fox River	Kaukauna	N/A	DONE USACE	USACE - LRC	AE03	CEY0134						
531	Entrées	United States	Fox River	Appleton Lower	N/A	DONE USACE	USACE - LRC	AE04	AL1						
534	Entrées	United States	Fox River	Appleton Upper	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
535	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
536	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
537	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
538	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
539	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
540	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
541	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
542	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
543	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
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547	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
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566	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
567	Entrées	United States	Fox River	Appleton	N/A	DONE USACE	USACE - LRC	AE05	APPUPP9						
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612	Entrées	United States	Fox River	Appleton											

Pre-Survey Logistics





ArcGIS Field Maps

The all-in-one app for mobile work

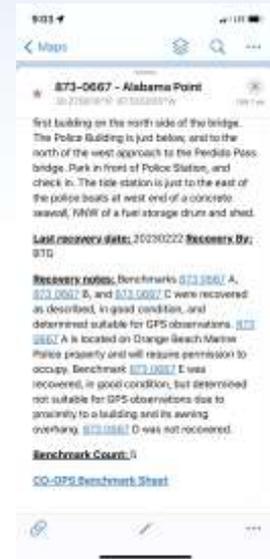
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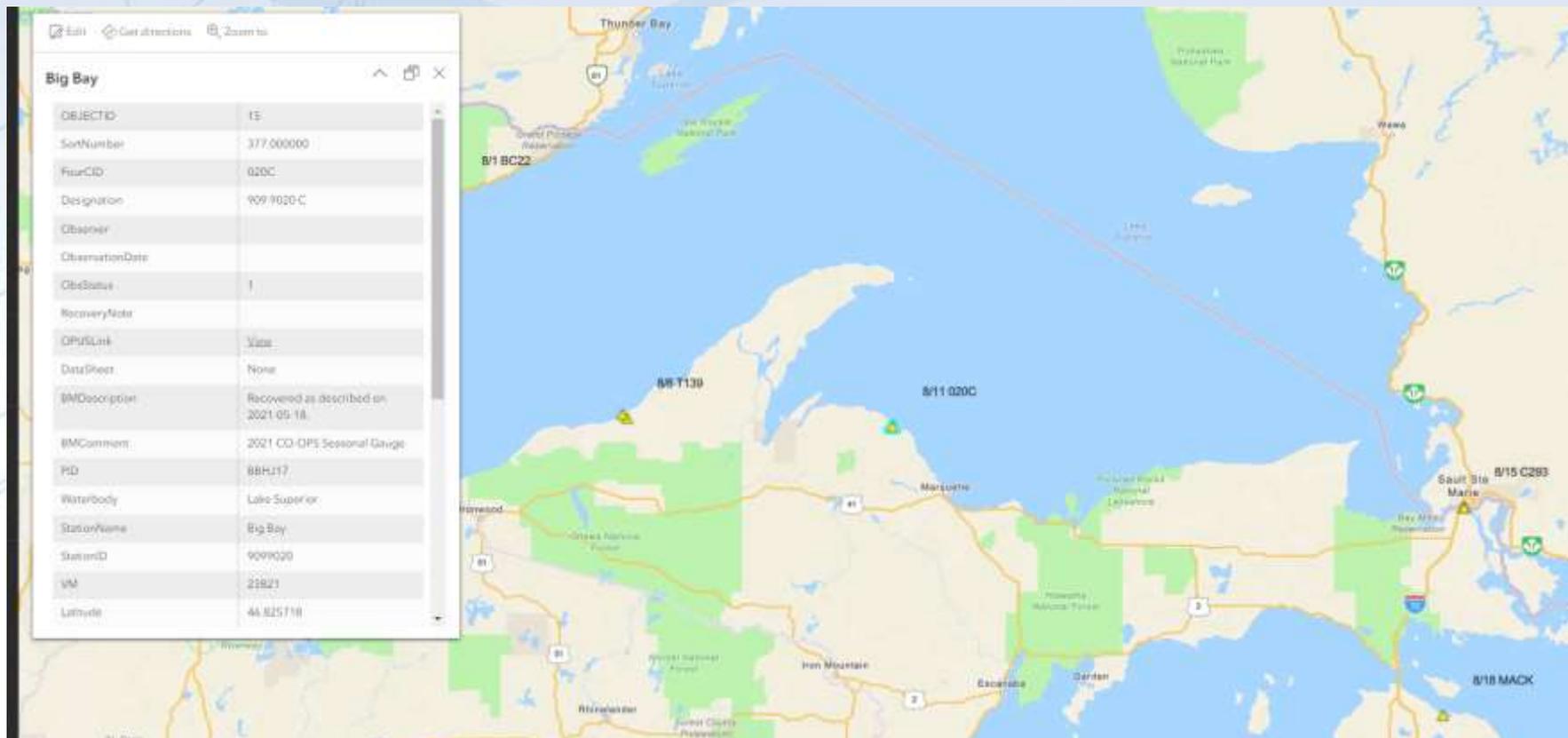
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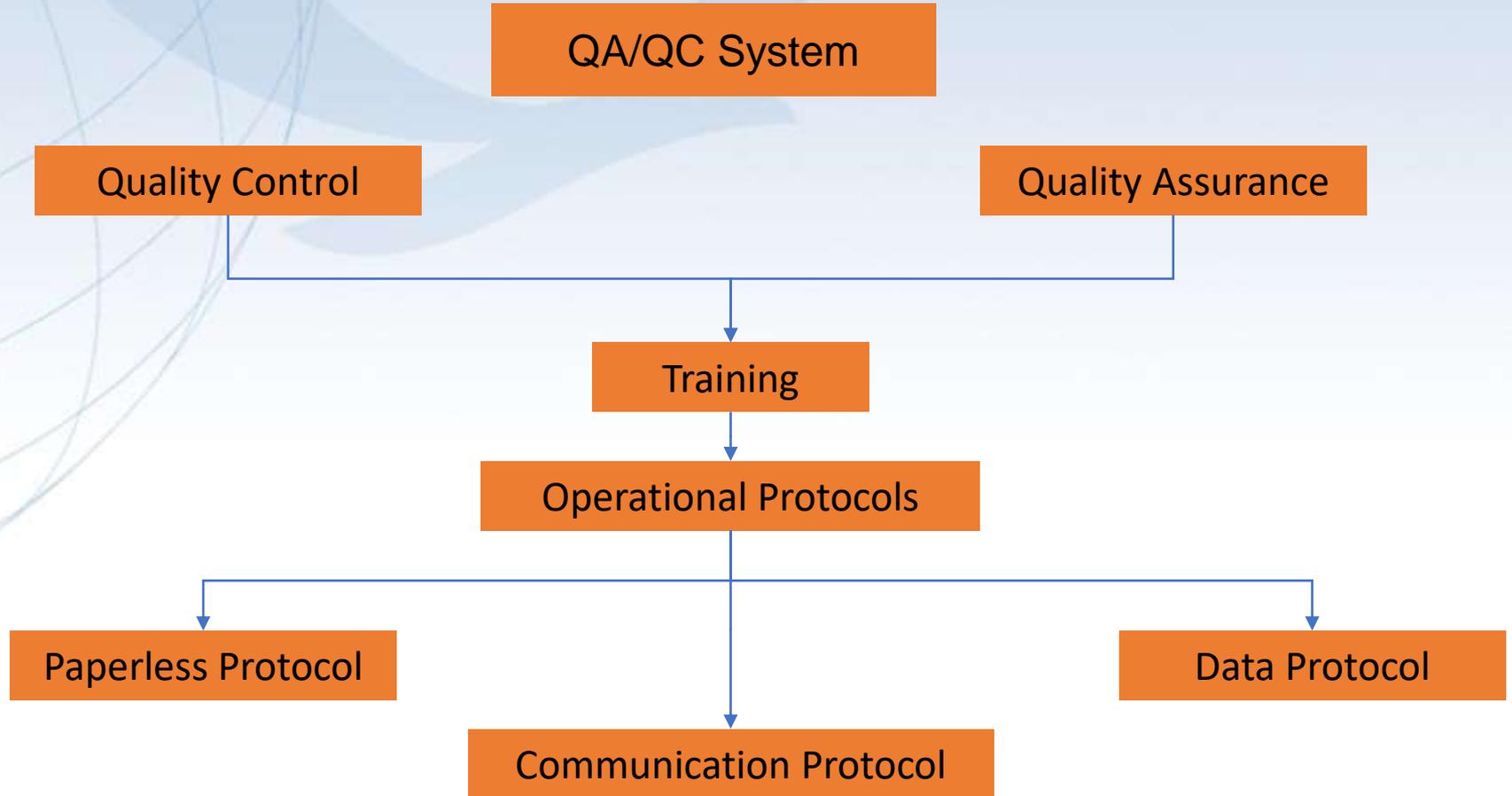


Locate



IGLD Survey Web Map





Hand Written paper Logs

Station Information: Station Name: 906 3012 RAIL, Station ID: 9063012, Station Description: RAILING POST SSE OF STATION (2nd RAILING POST S OF STATION)

Antenna Information: Antenna Type: TRIMBLE, Antenna Model: TRIMBLE Z GEODETIC, Antenna Serial: 322222888

Monument Information: Monument Name: 906 3012 RAIL, Monument ID: 9063012, Monument Description: RAILING POST SSE OF STATION (2nd RAILING POST S OF STATION)

Date	Time	Temp	Humidity	Pressure	Wind Speed	Wind Dir	Cloud	Visibility	Remarks
2022-09-01	11:00	21.0	65	1013.2	1.5	135	0.5	10	
2022-09-01	11:15	21.0	65	1013.2	1.5	135	0.5	10	
2022-09-01	11:30	21.0	65	1013.2	1.5	135	0.5	10	
2022-09-01	11:45	21.0	65	1013.2	1.5	135	0.5	10	
2022-09-01	12:00	21.0	65	1013.2	1.5	135	0.5	10	

Observation Summary: RE-012-FOB on 906 3012 RAIL on Day 244

GNSS LOG SHEET DETAILS:

Project: IGLD (2020)

Project Number: FY22

Site Name: Niagara Intake DOY: 244

Site Number: Niagara River Date: Sep 01, 2022

4CID: 2RAI

MONUMENT:

Designation: 906 3012 RAIL

Stamping: Local ID: 9063012

IDB PID: 060217 VM Number:

OPUS PID: Condition:

PUBLISHED POSITION:

Latitude: N 43°04'35.81990" Ellip Height: --

Longitude: W 79°00'45.12350" Geoid Height: --

Datum: Ortho Height: --

Pos Src: Geoid:

PUBLISHED DESCRIPTION:

UNSTAMPED USCOE DISK .6 FT SW OF THE NE EDGE OF SEAWALL/SIDEMALK 5.4 FT NE OF SW EDGE OF SEAWALL/SIDEMALK 23.4 FT N OF DANGER SIGN RAILING POST SSE OF STATION (2nd RAILING POST S OF STATION)

Clean, Digital PDF Logs

GNSS OBSERVATION LOG SHEET

PROJECT NAME: IGLD (2020) Date: 2022 DOY: 244

Site Name: Niagara Intake 4 Character ID: 2RAI

Designation: 906 3012 RAIL Monument: Stamp: Station Description: IDB PID: 060217 VM #: OPUS PID: Condition:

OBSERVED POSITION:

Latitude: N 43°04'35.82038" Ellipsoid Height: 137.025

Longitude: W 79°00'45.12352" Geoid Height: 135.831

Scheduled Start Time: 12:00:00 GMT Actual Start Time: 12:02:00 GMT

Scheduled End Time: 12:00:00 GMT Actual End Time: 12:00:00 GMT

TRIPOD:

Start (m)	End (m)	Height Entered into Receiver
2.0000	2.0000	2.0000
0.0000	0.0000	
3.0000	3.0000	

EQUIPMENT:

Receiver: Trimble Type: TRIMBLE Model: TRIMBLE Z GEODETIC Serial: 322222888

Antenna: Power Supply: Internal

CONDITIONS:

Weather Condition Comments: Clear, B, 21.0, 65, 1013.2, 1.5, 135, 0.5, 10

OBSERVER:

Organization: NOAA/NSIS Name: John May Phone: 301.616.1762 Email: john.may@noaa.gov



GNSS Log App
GNSS Static Observation Log
John May
Free

<https://apps.apple.com/us/app/gnss-log-app/id1554968869?platform=iphone>

Equipment Preparation



Training



- Use of Field Maps
- Use of GNSS Log App
- Communication protocols
- Security protocols
- Daily observer routine

Conducting the Survey



Issues Encountered



Summary and Questions

