

NY FEMA R2 – WUID#214093 USGS FEEDBACK

Hydro Flattening Issue

USGS provided feedback for WUID#214093 on various issues related to hydroflattening, misclassification, withheld points and geometry errors using NY_FEMAR2_Central_3_2018_2021-08-04_Errors.gpkg and supplemental report files received 08/04/2021 for the deliverables submitted by Dewberry on 03/26/2021.

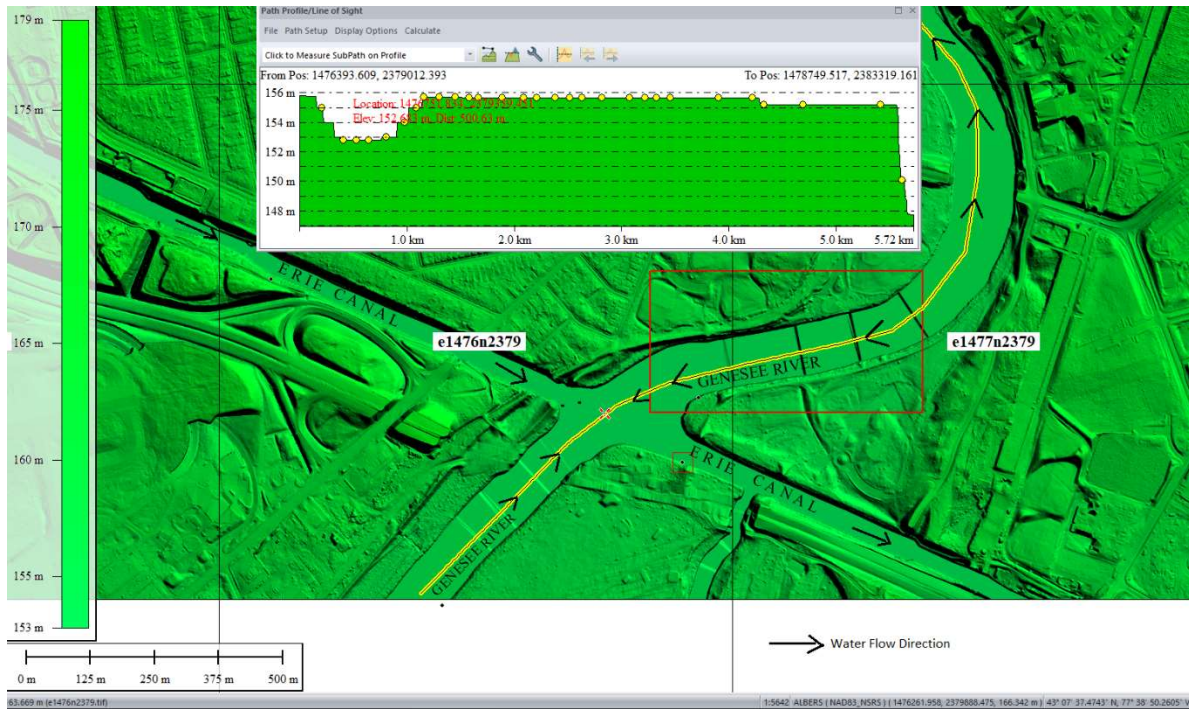
While reviewing the errors and performing corrections on the data, Dewberry observed an unusual monotonicity issue for error call id-113 for hydro breakline causing geometry / hydroflattening of DEM on tile ids : e1476n2379 and e1477n2379.

Error Call Feature id: 113

DELIV_TYPE	DELIV_ID	TYPE	SUBTYPE
Hydroflattened Polygon Breaklines	7556	Geometry Error	Downstream Constraint



On further review of the error call and monotonicity issue at the location, Dewberry observed that the issue extends beyond the two tiles identified due to temporal variation of the water levels maintained in the Erie Canal during the lidar acquisition period. As the monotonicity was maintained in the Erie Canal for the deliverables submitted on 03/26/2021, Genesee River was shown as water flows in opposite direction from the northern section of the river at the Erie Canal intersection.



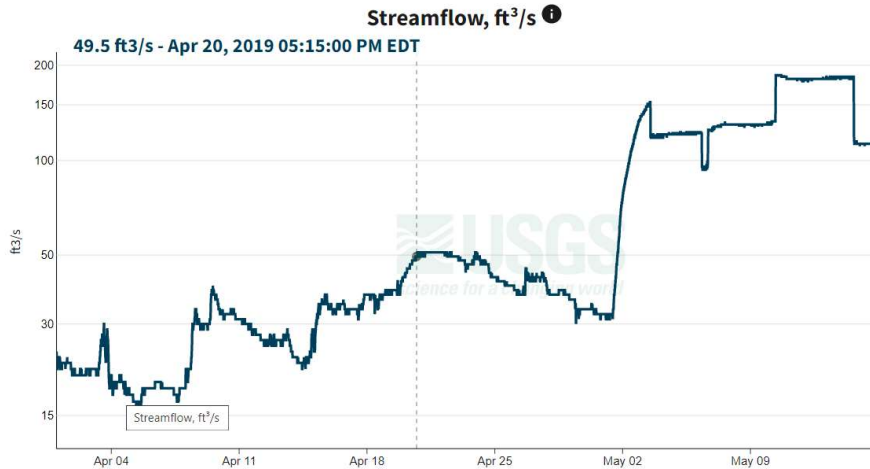
Erie Canal Annual Drain

After observing the downstream constraint issue at the above location, Dewberry performed detailed study on the lidar acquisition dates, Erie Canal and its lock systems, and correlated the data to find the actual issue. This led to a review of the entire Western Erie Canal system in the DPA and observed that water from the Erie canal was drained during winter 2018/2019 which dropped the water level by approximately 3 (three) meters west of Genesee River intersection.

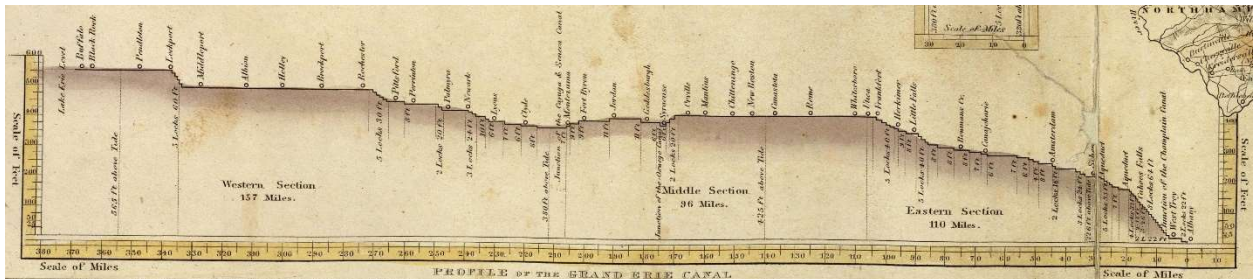
Some facts and sources for reference:

- 1) Water levels between the locks in the canal are normally maintained at a steady flow with discharge rate as low as 20 ft³/ second to 200 ft³/second. Water does not flow like a river system. Source: https://waterdata.usgs.gov/ny/nwis/uv/?site_no=04219000&agency_cd=USGS

<https://waterdata.usgs.gov/monitoring-location/04219000/#parameterCode=00060&startDT=2019-04-01&endDT=2019-05-15>



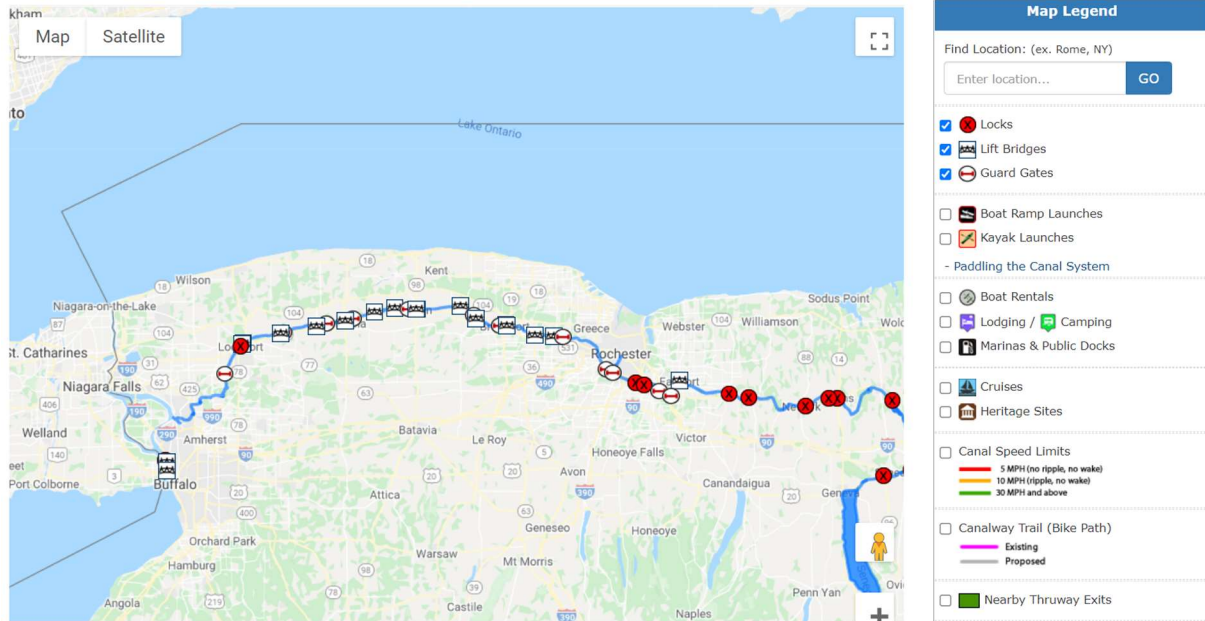
- 2) Waterways between the locks (sometimes as little as a ¼ mile and other times 50 or more miles) are called “pools”. Because it’s difficult and unsafe for vessels to attempt going “uphill” or “downhill”, the “pools” must be level to provide safe navigation. The method used to level the “pools” is to build a dam either downstream of a lock (or sometimes at the lock itself). The dam raises the water level of the “pool”. This creates a level and deeper channel that makes the “pool” safely navigable. Source: <https://eriecanalcruises.com/locks/>



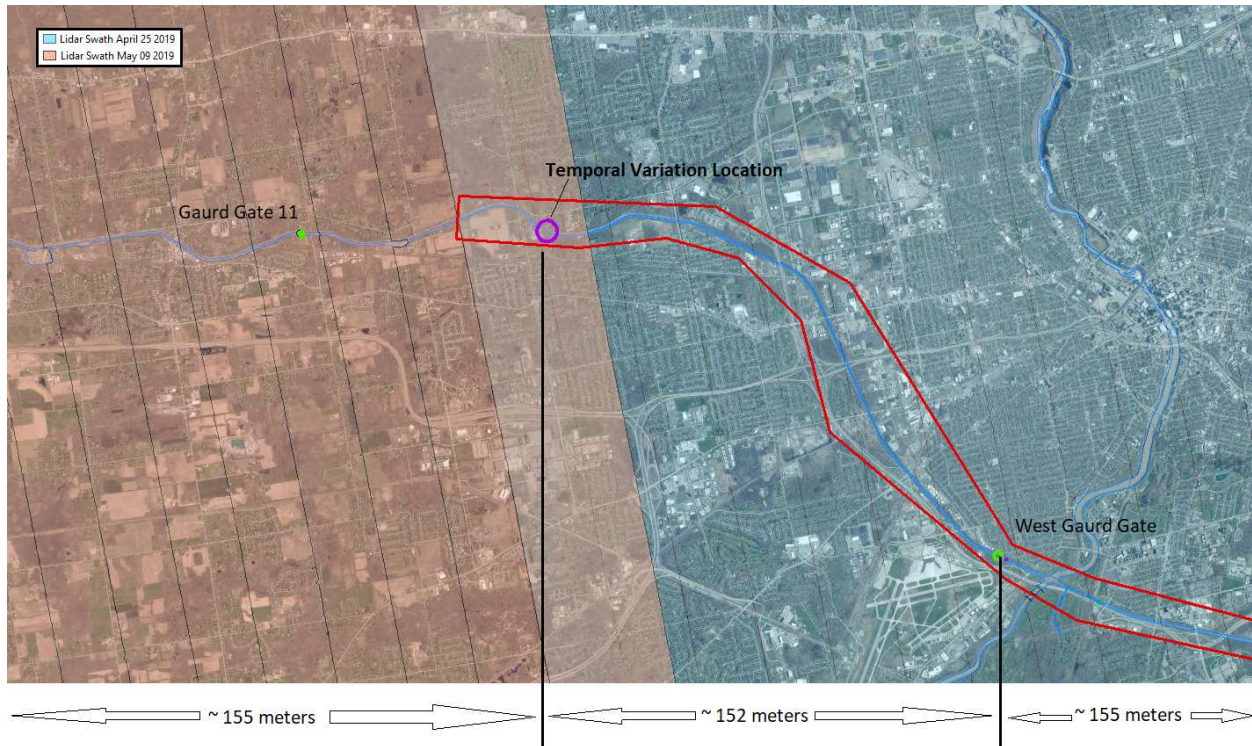
Source: https://upload.wikimedia.org/wikipedia/commons/d/da/1832_Erie_Canal.jpg

- 3) Erie Canal crossing at the Genesee River (near Rochester, NY) is described as “always a problem area” due to muddy Genesee River. The area is regularly dredged and the water elevation maintained to avoid canal flooding. Source: <http://www.tug44.org/erie.canal/genesee-river-crossing/>
- 4) Barrier features between the locks are called “Guard Gates”. These are used to regulate water levels and drain water from the canal for maintenance or winter freeze protection. Every year, water is drained from the canal during October / November. Water will be filled during April / May (weather permitting) the following year and then the canal opens for navigation. Source: <https://eriecanalway.org/explore/locks>

NY FEMA R2 – WUID#214093 USGS FEEDBACK

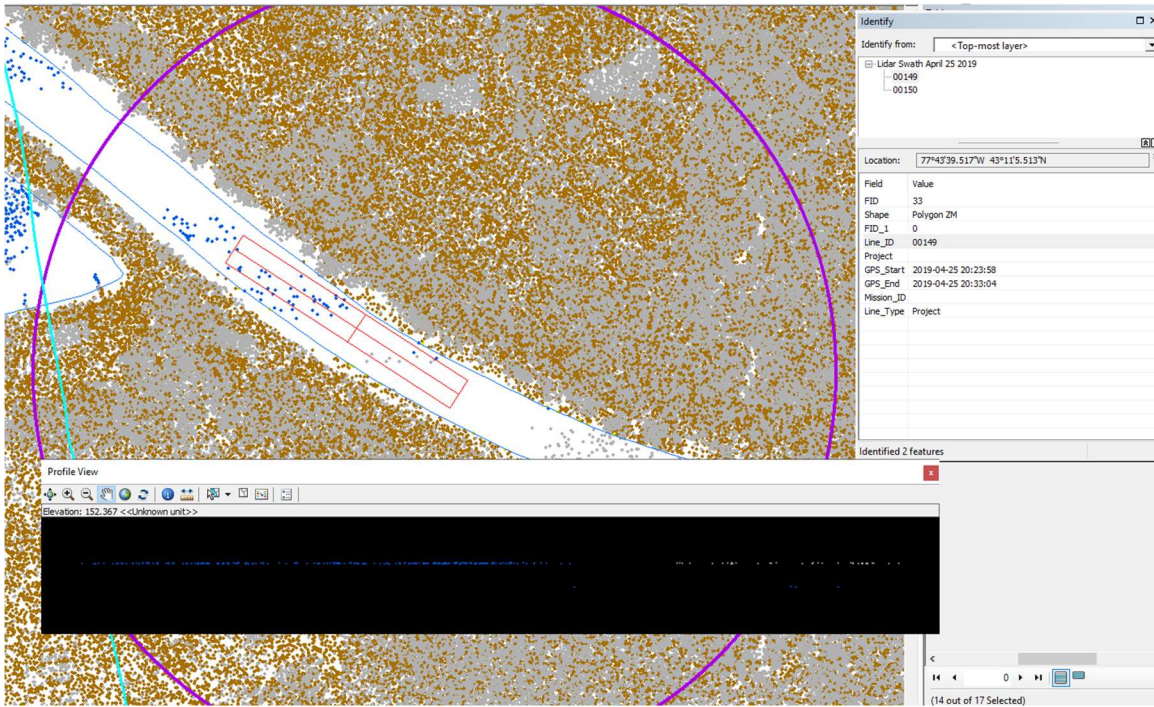


5) The reason for low water level in the canal during April 2019 corresponds with the annual water drain period. In the lidar data, water levels are low at approximately 152 m elevation between West Guard Gate (near Genesee River) and Guard Gate 11 (Spencerport). However, it appears the water was filled during early May 2019 which caused the water level to raise to its normal level of approximately 155 meters.

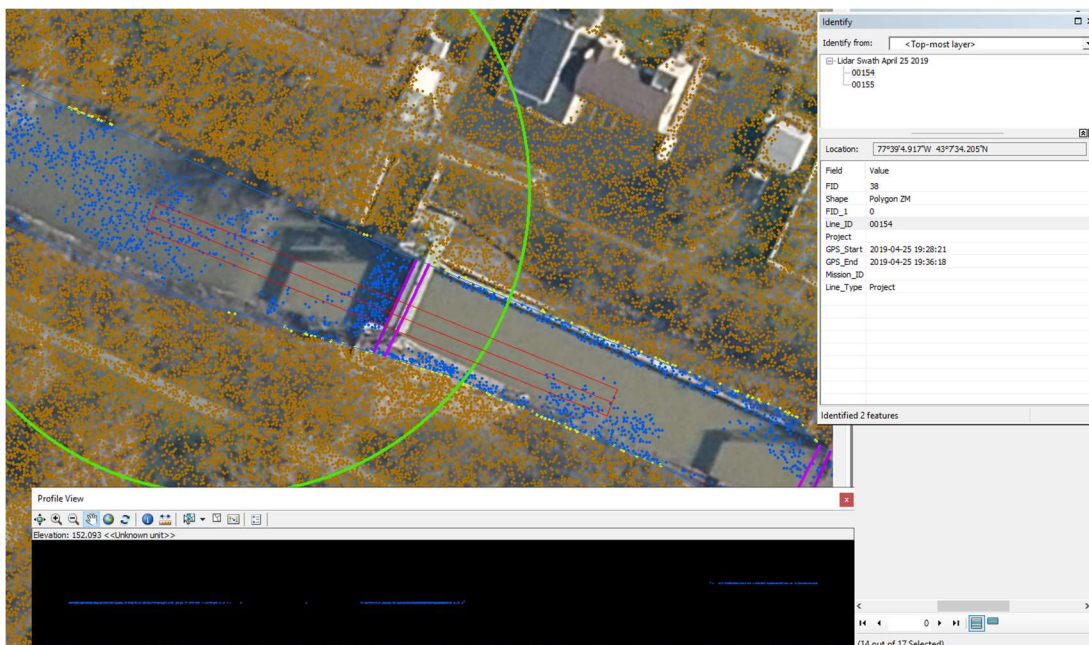


Dewberry's Approach to resolve the issue

Based on the lidar acquisition dates and point cloud data, the water elevation in the Western Erie Canal is at approximately 152 meters for the swaths (PSID 149 thru 155) acquired on 04/25/2019 up to the physical barrier feature West Guard Gate on Erie Canal. Water Level is approximately 155 meters for the swaths (PSID 136 thru 148, and reflight 10149) acquired on 05/09/2019. Temporal variation of 3 meters is occurring at 77°43'39.517"W 43°11'5.513"N (PSID 149).



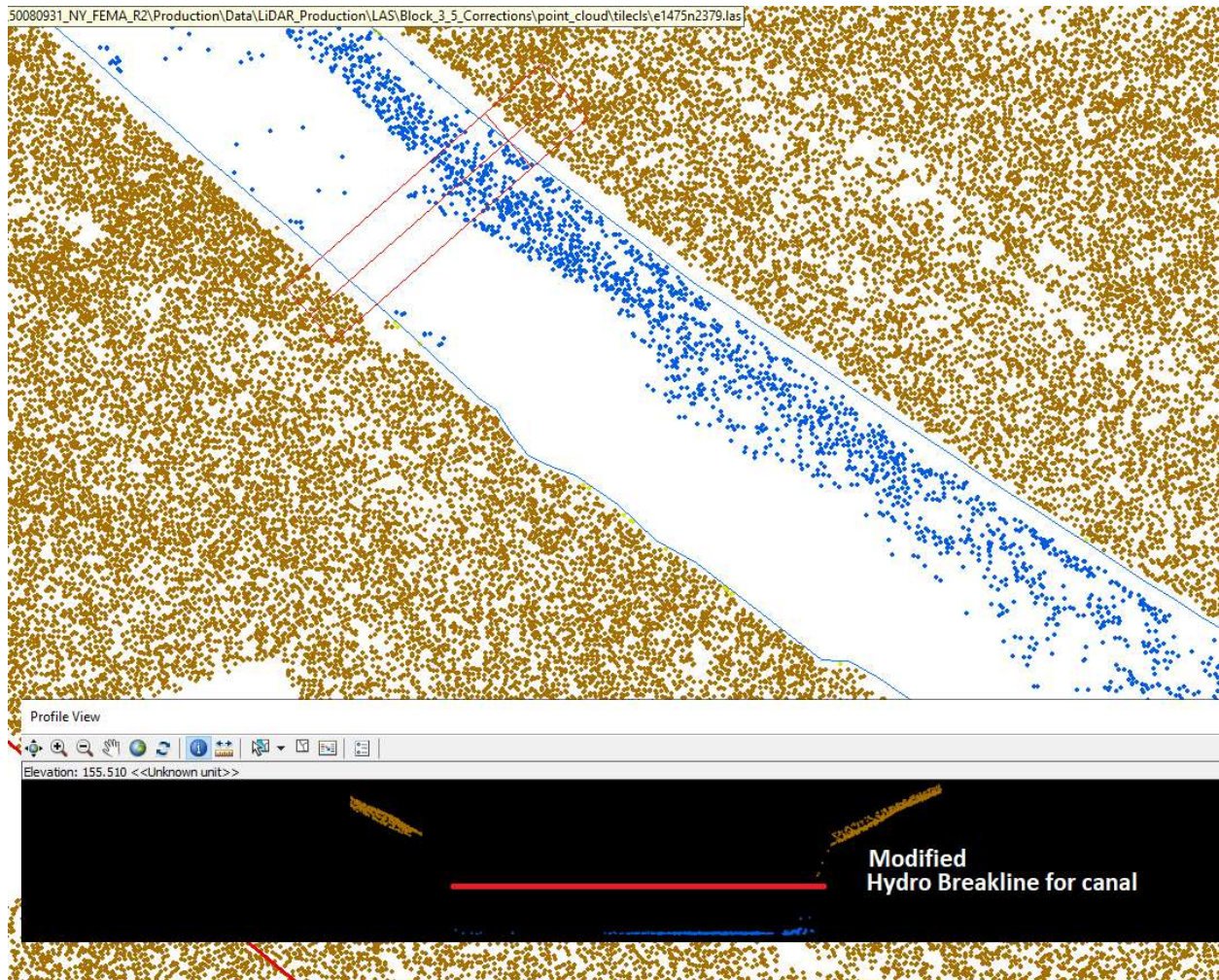
Profile view of Swaths flown on 04/25/2019 and 05/09/2019

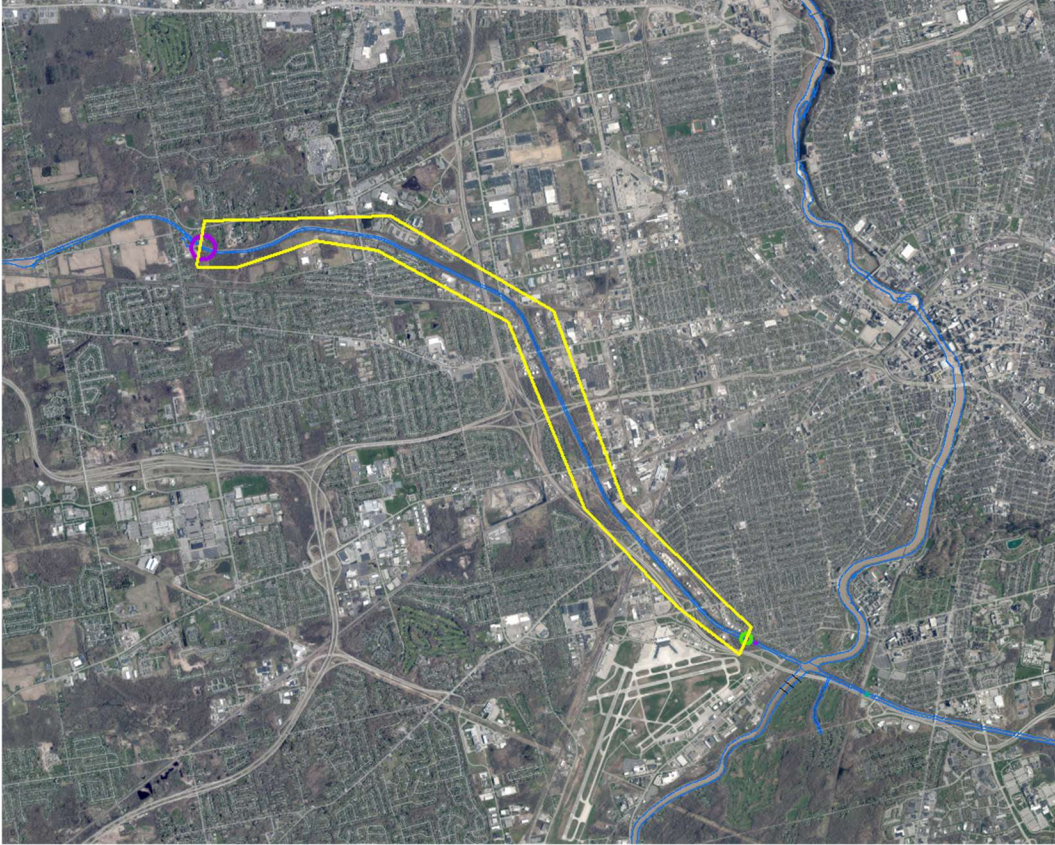


Water Elevation at West Guard Gate

Conclusion

To mitigate the issue and maintain monotonicity for the Erie Canal and Genesee River, Dewberry collected Erie Canal hydro breakline with 155.350 m elevation based on the acquisition date 05/09/2019 and swaths east of West Guard Gate (04/25/2019) to align with rest of the canal elevation. This approach resolved the issue with downstream constraint occurring for Genesee river at the intersection of Erie Canal. The Erie Canal polygon width was expanded to match with canal walls / terrain. Water drained out / temporal change segment with 152m elevation (swaths collection date 04/25/2019) of the hydrographic polygon was created as a separate feature class and attributed with appropriate comments in the feature class attribute table. Dewberry classified the lidar points on the temporarily exposed canal walls of this impacted section between 152 m -155.350 m in elevation as Class-32.





The above approach resolved the downstream constraint issue for Genesee River as well as fixed the elevation for Western Erie Canal.

