Sarasota County Watershed Model Conversion and Maintenance

(RPS202061 MN)

Roberts Bay Model Update Report

August 2024

Prepared For:
Sarasota County
1001 Sarasota Center Boulevard
Sarasota, Florida 34240

Under Contract 2021-269

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1. Introduction

Collective Water Resources (Collective) performed an update of the Interconnected Pond and Routing Version 4 (ICPR4) model and associated Geographic Watershed Information System (GWIS) Version 2.1 geodatabase to include recent developments based on the best data currently available, incorporate additional overland connections for the 500-year storm event, and to address watershed boundary gaps and overlaps with adjacent watersheds for eight Sarasota County watersheds as requested by Sarasota County (County). Collective performed these updates to eight watersheds models as assigned by the County, which includes:

- Dona Bay/Roberts Bay Coastal Fringe,
- Lemon Bay Coastal Fringe,
- Sarasota Bay Coastal Fringe,
- Hudson Bayou,
- Lemon Bay (Alligator Creek, Forked Creek, Woodmere Creek, Gotfried Creek, and Ainger Creek),
- Roberts Bay (Hatchett Creek and Curry Creek),
- Upper Myakka River (Big Slough, Deer Prairie Slough, Howard Creek, and Flatford Swamp), and
- Whitaker Bayou

This report summarizes the model update task and preliminary modeling results for the Roberts Bay (RB) watershed. This is a deliverable under Task 2, Model Update, of Agreement 2021-269 for professional services in support of Watershed Model Conversion and Maintenance. These model updates build upon the work previously completed by Collective under this agreement in converting the ICPR version 3 model and associated GWIS Version 1.6 geodatabase, documented in *Task 1.2 Model Conversion Adjustment and Results Comparison Roberts Bay* technical memorandum, finalized on July 26, 2022.

2. Developments

Agreement 2021-269 identified three developments to be included in the model update of the watershed: Watercrest, Venice Isles Apartments, and Jacaranda Junction – Times Circle. Additionally, Collective reviewed the watershed's GWIS data provided by the County relative to 2020 aerial imagery to identify developments that have been constructed or show groundbreaking as of the 2020 imagery but are not reflected in the model and GWIS data. **Table 1** summarizes the recent developments identified within the watershed having an impact on the intermediate and/or regional hydrology and hydraulics and warranted updates to the watershed model. The associated Southwest Florida Water Management District (SWFWMD) Environmental Resource Permit (ERP) number is also included in Table 1. **Figure 1** illustrates the locations of these developments within the watershed.

Table 1. Summary of Developments included with Model Update

Name	SWFWMD ERP
Jacaranda Junction Lots 1 and 2	43-12595-52
Venice Isles Apartments	43-12595-54
SR 45A (US41, Venice Bypass)	43-15482-16
SR 45A (US41, Venice Bypass - Center Road to Gulf Coast Blvd)	43-21831-4
Sarasota Memorial Hospital - Venice Phase 1	43-29067-4
The Floridian at Jacaranda	43-32369-2
Villages of Milano – Phases 1A and 1B	43-41590-3
Villages of Milano – Phase 2	43-41590-4
Aria	43-41590-5
Woods at Venice	43-41669-1
Watercrest	43-41734-1
Watercrest	43-41734-2
Jacaranda Junction II	43-43080-0
Jacaranda Junction II	43-43080-1
Vicenza – Phase 1	43-43400-2
City of Venice Public Safety Facility	43-43924-0
Jacaranda Junction, Business Center Lots 1 and 2	44-12595-47

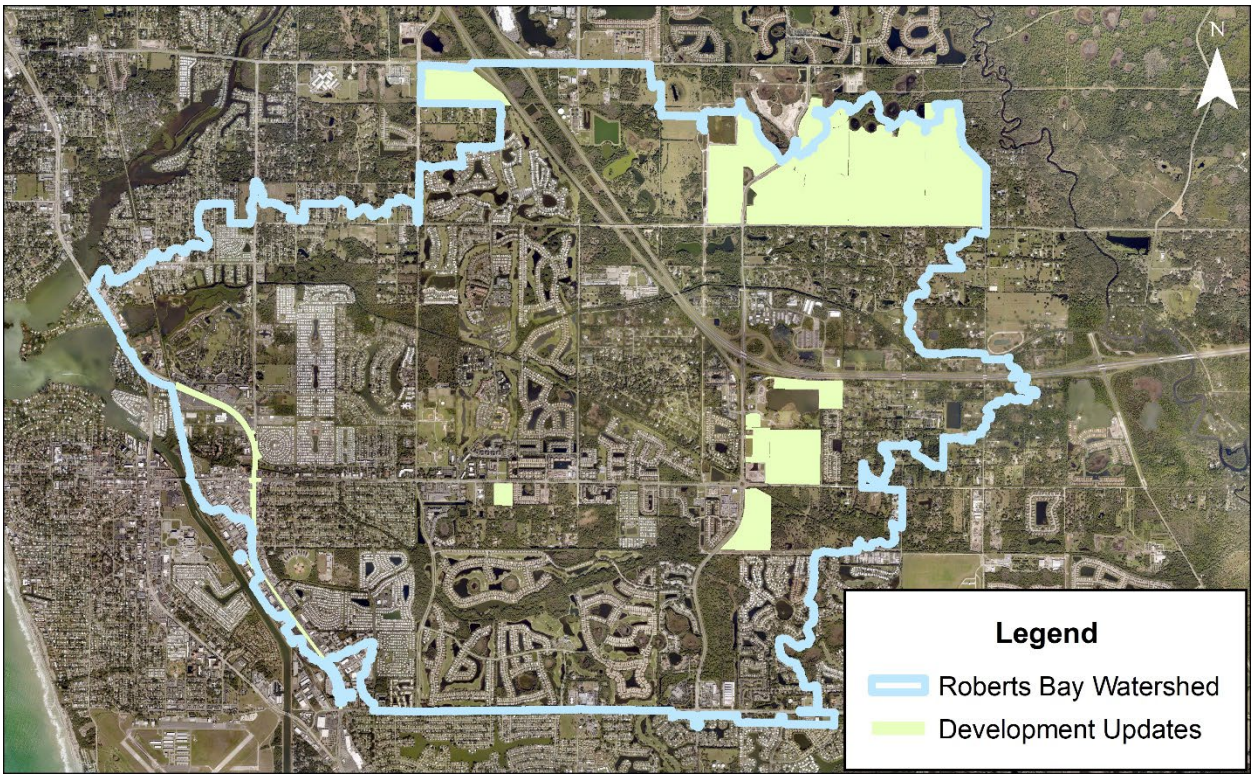


Figure 1. Location of Development Updates Within Watershed

3. Topographic Data Voids

The most recent digital topographic data for the county was published by the United States Geological Service (USGS) in partnership with the Florida Department of Emergency Management (FDEM) reflecting light detection and ranging (lidar) data acquisition between November 30, 2018, and January 10, 2019 (Dewberry 2020). The Sarasota County project was completed as part of the Florida Peninsular 2018 D19 DRRA project. Lidar products include classified LAS point files, breaklines, digital elevation model (DEM) rasters, and associated reports for a total of 694 5,000 feet by 5,000 feet tiles (approximately 622 square miles) of coverage across the county.

The Southwest Florida Water Management District (SWFWMD) provided enhancements of the Sarasota County lidar products including additional breakline features for waterbodies and building footprints. SWFWMD produced a countywide, DEM raster (as an IMAGINE Image file, floating point, 32-bit, 1 band) with 2.5 feet by 2.5 feet cell size referenced to North American Datum of 1983 with the 2011 Adjustment (NAD83_2011) horizontal datum, Florida State Plane Zone West coordinate system and North American Vertical Datum of 1988 (NAVD88) vertical datum. This 2019 SWFWMD DEM served as the base topographic layer for the model updates performed in the watershed.

Collective reviewed the 2019 SWFWMD DEM against the grading and surface elevations defined in the plans for the developments listed in Table 1 as well as 2020 aerial imagery and found seven developments where the DEM does not reflect the ground surface. The elevation differences were

significant enough within these developments to warrant updating the DEM. **Table 2** summarizes the developments where topographic voids were identified.

Table 2. Developments with Topographic Voids

Name	SWFWMD ERP
Venice Isles Apartments	43-12595-54
SR 45A (US41, Venice Bypass - Center Road to Gulf Coast Blvd)	43-21831-4
Sarasota Memorial Hospital - Venice Phase 1	43-29067-4
Aria	43-41590-5
Woods at Venice	43-41669-1
Vicenza – Phase 1	43-43400-2
City of Venice Public Safety Facility	43-43924-0

For each development listed in Table 2, Collective geo-referenced the appropriate as-built plans or, when as-builts were not available, approved construction plans, in GIS; captured elevation features for major site elements such as ponds, roadways, parking lots, lots, building footprints, and/or swales. **Figure 2** represents the types of elevation features that were created by Collective within GIS from the plans for the Woods at Venice and Vicenza – Phase 1 developments, which were subsequently used to generate a terrain and updated DEM for the site. The updated DEM, compared to the original DEM, is illustrated for the same development in **Figure 3**. Each of the site DEMs were mosaiced into the 2019 SWFWMD DEM to produce an updated, countywide DEM. Additionally, at the request of the County, Collective projected the updated DEM to the North American Datum of 1983 with the HARN Adjustment (NAD83_HARN) horizontal datum.

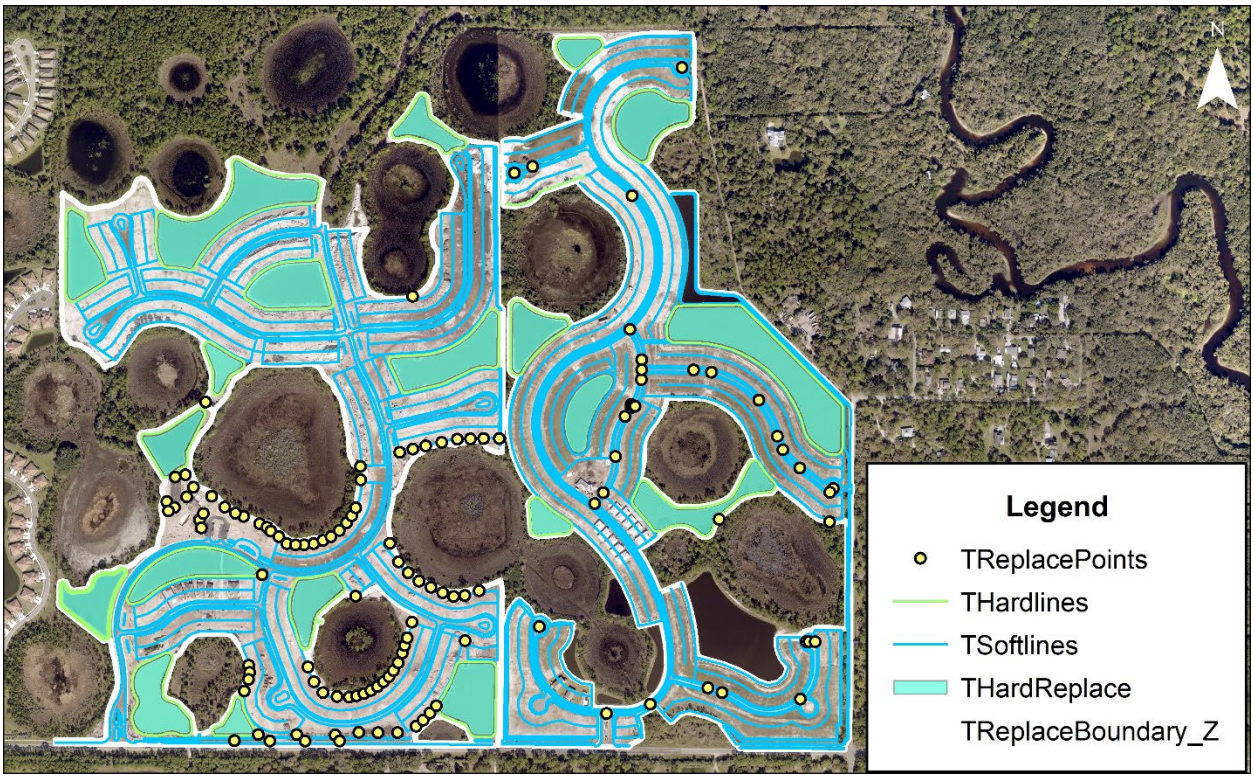
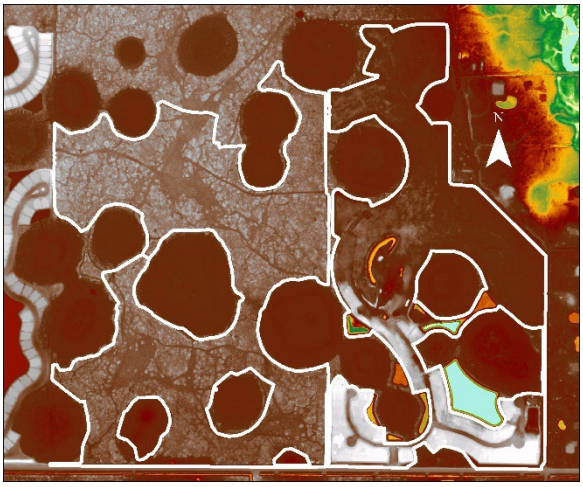


Figure 2. ERP 43-41669-1, Woods at Venice, and 43-43400-2, Vicenza – Phase 1, Elevation Features Captured from Plans

Original, 2019 SWFWMD DEM



Updated DEM

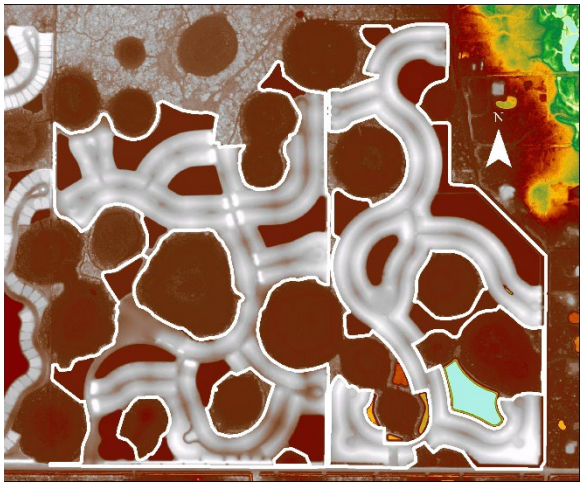


Figure 3. DEM Comparison

4. Model Development Updates

For each development listed in Table 1, the design plans and other relevant permit information were obtained from the District's ERP data warehouse application – Water Management Information System (WMIS). If available, the as-built plans were used for the updates, otherwise the approved permit set was utilized. For the three developments specifically identified in the Agreement for this update, the County also provided existing, revised existing, and proposed conditions ICPR3 models.

The plans were reviewed to identify the sheets that have relevant information to the GWIS being updated. The plan view sheets and a model schematic (if available in the permit files) were exported to image files (JPEG), clipped to the limits of the development, and georeferenced in ArcMap to make it easier to correlate the existing GWIS features to the modifications shown in the plans.

Next, a new ArcMap MXD file was created with the following data:

- The GWIS to be updated under this task
- The original GWIS - for comparison purposes
- The GWIS of adjacent watersheds, as needed
- The georeferenced plan sheets and permit model schematic
- The 2019 SWFWMD DEM
- Current aerial imagery (2020 and 2022 from the County's image service)
- Current 2020 land use feature class
- County impervious area (IA) feature class

Any modifications/updates to the GWIS were noted in the *Comment* field of the appropriate feature class. The elevation datum of the plans was noted so that, if needed, plan elevations were converted to NAVD88 using a conversion factor of -1.08 feet.

4.1. Hydrologic Parameterization Methodology

Collective's overall hydrologic parameterization approach for model updates is summarized below. Specifics related to the individual development included in this update are presented in section 4.3.

The design plans and permit information are reviewed to identify any appropriate changes to the basin boundaries. When available, the model schematic from the permit application is used as a guide, considering the permit model may have been developed to a differing level of detail than appropriate for the watershed model. The permit model's basins, hydraulic features, and 2019 DEM are collectively used to perform any needed modifications to the ICPR_BASIN feature class.

For any basins that are modified, they are reviewed to determine if revisions to the time of concentration (TOC) and IA are required.

TOCs for modified small, urban basins with minimum TOCs (10 minutes) originally assigned are maintained. If the estimated flow path for a revised basin changes by more than 10-percent from the original basin, a revised flow path is digitized and the Natural Resources Conservation Service (NRCS)

TR55 methodology used to calculate new TOC(s), which is/are entered into the *TC [min]* field of the ICPR_BASIN feature class.

If the revised basin area differs by more than one-percent from the original, it is reviewed to determine if changes to the curve number (CN) and IA/directly connected impervious area (DCIA) are needed. If the overall land use remains the same, no adjustment is needed. However, if the land use or the acres of IA/DCIA change, the land use and impervious area mapping are used to update these values. Where needed, buildings, roads, and other impervious areas are digitized to obtain complete IA coverage for the revised basins.

Next, the IA is assigned as either directly connected or non-directly connected and the acreage of each determined. The revised curve number is calculated using the County-approved methodology as described below (Sarasota County 2021):

- The DCIA is not used to calculate the CN
- Pervious area assigned a CN of 78
- NDCIA assigned a CN of 98
- Basin CN calculated using: CN = (($A_{pervious}$ * 78) + (A_{NDCIA} * 98))/ ($A_{pervious}$ + A_{NDCIA}), where A is the area in acres and the subscript indicates the type of area (pervious or NDCIA).

Any updated *CurveNumber*, *PctImpervious*, and *PctDCIA* fields are entered into the ICPR4_Simple_Basin, ICPR4_CURVE_NUMBER_ZONES, and ICPR4_IMPERVIOUS_ZONES tables of the GWIS geodatabase accordingly.

4.2. Hydraulic Connectivity and Parameterization Methodology

Collective's overall approach to updating hydraulic connectivity and parameterization for new developments is summarized below. Specifics related to the individual development included in this update are presented in section 4.3.

The as-built and approved construction plans are reviewed to identify any hydraulic features that should be included in the model, such as:

- Pipes connecting stormwater ponds
- Stormwater system trunk lines
- Control structures
- Outfall pipes
- New/modified channels
- New/modified stormwater ponds

Features that would not typically be included in the watershed model/GWIS include:

- Local drainage systems
- Individual inlets along the trunk lines
- Exfiltration trenches

The georeferenced plan sheets are compared to the existing GWIS to identify differences. Where possible, existing node and link names are maintained, though the location and connectivity may be changed.

Nodes

New nodes are placed at the following locations:

- For stormwater trunklines, new nodes would be placed at manholes/junction boxes where the pipe diameter changes or to divide exceptionally long runs of pipe.
- Stormwater ponds

Where appropriate, basins are subdivided to load to the new nodes. The *INITIAL_STAGE* field of the ICPR_NODE feature class of new or modified nodes is updated to be the elevation of the invert of the lowest connecting pipe or the normal water elevation of a connected water body, whichever is highest.

For nodes associated with basins that are modified, the storage is updated using the ArcHydro Drainage Area Characterization (DAC) tool with the 2019 DEM as the elevation raster input. If a channel link is inside the modified basin, the Storage_Exclusion_Polygon feature class is updated to include the channel and its area excluded from the DAC storage calculations.

Pipe Links

The georeferenced plans are reviewed to identify both new pipes to be added to GWIS and ones that should be modified. Potential updates to pipe links would be:

- Changes in connectivity (upstream and downstream nodes)
- Pipe diameter and material
- Length
- Inverts
- Entrance and exit losses

New pipes are added to the ICPR_LINK feature class and, for both new and modified pipes, the appropriate parameter changes are made to the associated PIPE_BARREL table.

Drop Structure Links

Drop structures have both pipe and weir components and are most commonly used for watershed modeling to simulate control structures. Plans are reviewed to identify new drop structures and existing ones that were modified or differ from current model parameters. New/modified drop structure links are set to use the “interval halving” solution method based on the County’s standard by setting the *Solution* field to “Combined” and the *Increments* field to “0” in the DROP_STRUCTURE table.

The PIPE_BARREL and WEIR tables are modified as needed to capture parameters of the drop structure's components. WEIR table entry updates would typically include:

- Weir shape
- Weir type
- Weir crest
- Weir span and rise
- Weir discharge coefficient

Structural Weir Links

For purposes of the watershed GWIS updates, structural weirs are manufactured structures controlling flow between two points that do not have an integrated pipe component like a drop structure does. The structural weirs are added to the ICPR_LINK feature class and associated WEIR table entries completed.

Surface Overflow Weirs

Surface overflow weirs (SOWs) simulate flow across basin boundaries. When basins are modified, they are examined to determine if existing SOW(s) cross(es) basin boundary segments that were modified. If so, the cross-section representing the ground elevations of the modified basin segment is generated to replace the existing cross-section and the ArcGIS 3D Analyst Stack Profile tool is used to obtain station/elevation data to define the cross-section's geometry. The associated WEIR table entry is updated with the crest elevation (minimum cross-section elevation) and the ICPR_XSECT_STATIONS table data replaced with the new data.

For modified basin segments without an existing SOW, they are reviewed to determine if they are likely to have flow across them for the 500-year/24-hour design storm. If so, a new SOW link is added to the ICPR_LINK feature class, a cross-section added to the ICPR_XSECT feature class, and the associated WEIR and ICPR_XSECT_STATIONS tables completed.

Channels

If a development area includes a channel (natural or constructed), it is reviewed to determine if any modifications are necessary to GWIS. Potential modifications may include:

- Existing channel connectivity changing
- Existing channel length, inverts, or geometry changing
- A new channel was constructed

For existing channels that are modified, the ICPR_LINK and ICPR_XSECT feature classes and the CHANNEL and ICPR_XSECT_STATIONS tables are modified as appropriate.

For new channels, a new channel link is added to the ICPR_LINK feature class and new channel cross-sections added to the ICPR_XSECT feature class. The CHANNEL table entries are completed, and

design plan data combined with the 2019 DEM are used to complete the ICPR_XSECT_STATIONS table entries.

4.3. 43-12595-52 & 44-12595-47, Jacaranda Junction Lots 1 and 2, Business Center

The updates for ERP 43-12595-52 & 44-12595-47 are related to the same overall development and included modifications to basins, nodes, pipes, surface overflow weirs, and cross-sections as shown in **Figure 4**. One of the basins was also modified for a separate ERP.

The updates included:

- Basins – six basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – six nodes were added/modified
- Pipes – three pipe links was added/modified along with the associated pipe barrel table entries
- Surface Overflow Weirs – seven surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

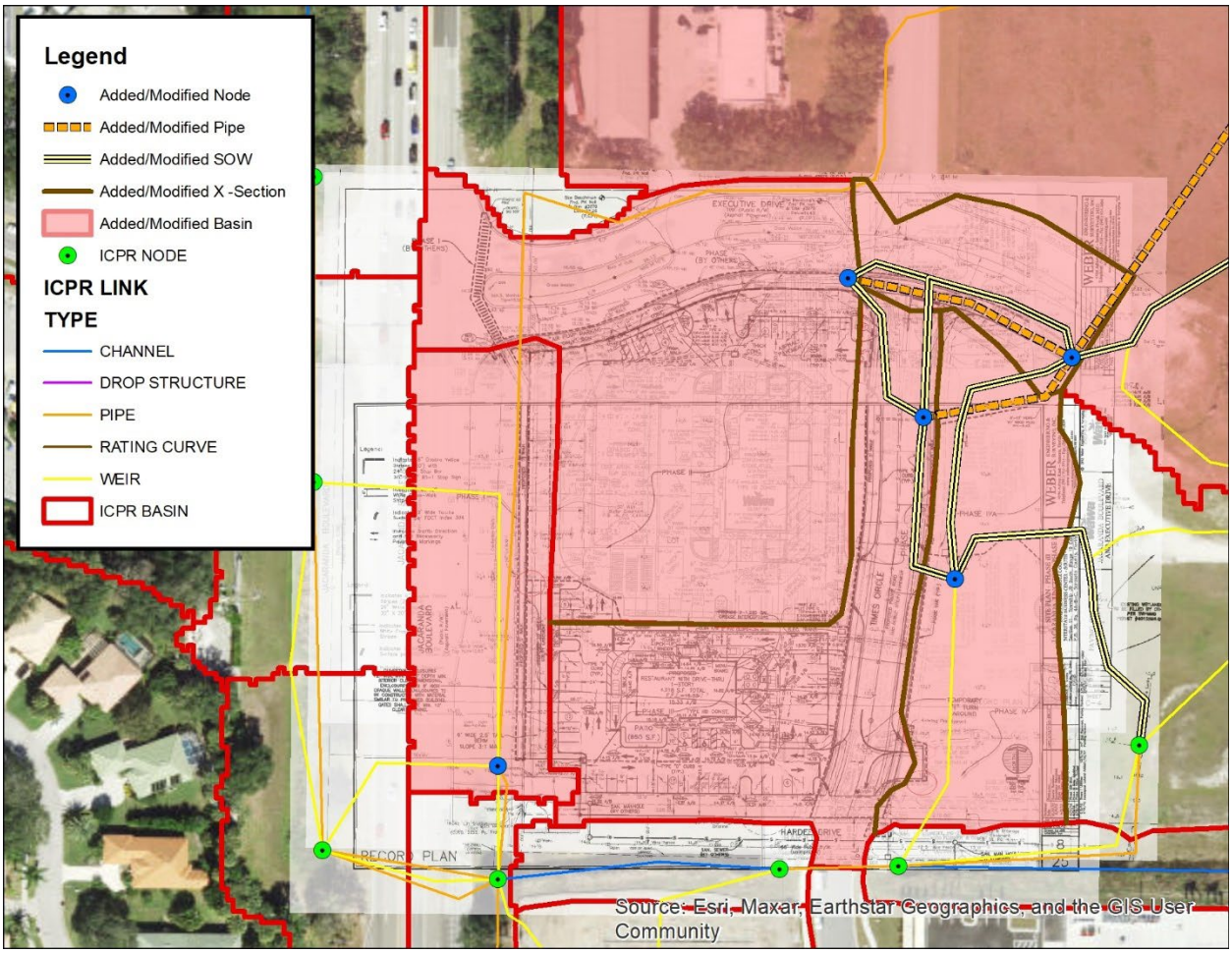


Figure 4. ERPs 43-12595-52 & 44-12595-47 Updates

4.4. ERP 43-12595-54, Venice Isles Apartments

The updates for ERP 43-12595-54 included modifications to basins, nodes, pipes, drop structures, surface overflow weirs, and cross-sections as shown in **Figure 5**. One of the basins was also modified for a separate ERP.

The updates included:

- Basins – eight basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 13 nodes were added/modified
- Pipes – six pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – two drop structure links were added/modified, and the associated pipe barrel and weir tables were updated
- Surface Overflow Weirs – 14 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

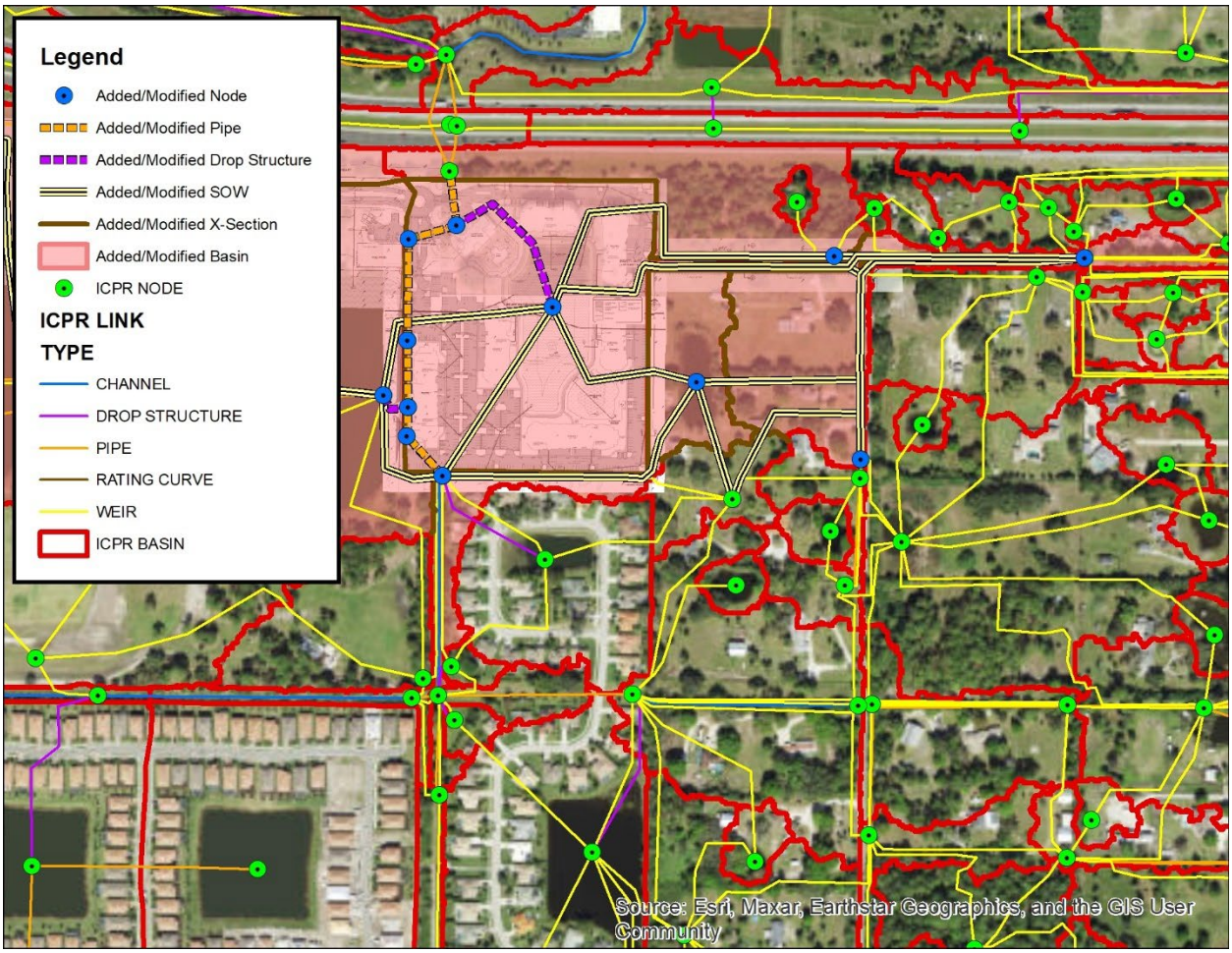


Figure 5. ERPs 43-12595-54 Updates

4.5. ERP 43-15482-16, SR 45A (US41, Venice Bypass) – Gulf Coast Blvd. to Bird Bay Drive

The updates for ERP 43-15482-16 included modifications to basins, nodes, pipes, drop structures, surface overflow weirs, and cross-sections as shown in **Figure 6**. The project involved improvements along approximately one mile of major roadway. One node and basin were also modified as part of another ERP.

The updates included:

- Basins – 38 basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 64 nodes were added/modified
- Pipes – 54 pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – four drop structure links were added/modified, and the associated pipe barrel and weir tables were updated

- Surface Overflow Weirs – 74 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

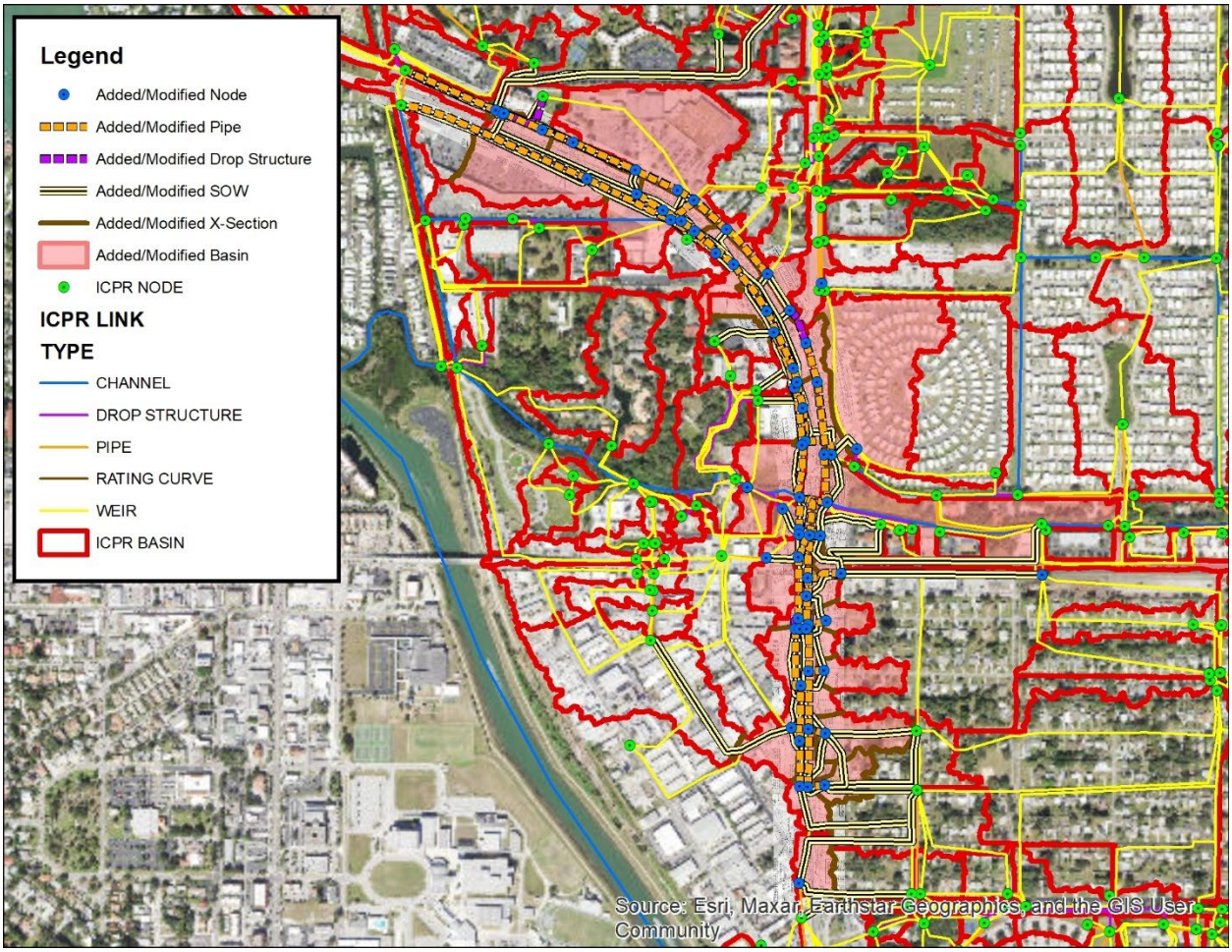


Figure 6. ERP 43-15482-16 Updates

4.6. ERP 43-21831-4, SR 45A (US41, Venice Bypass) - Center Road to Gulf Coast Blvd.

The updates for ERP 43-21831-4 included modifications to basins, nodes, pipes, drop structures, structural weir, surface overflow weirs, and cross-sections as shown in **Figure 7**. One node and basin were also modified as part of another ERP. Updates associated with this development modified the overall watershed boundary and portions of this development are also reflected in the updates to the adjacent Lemon Bay Coastal Fringe watershed.

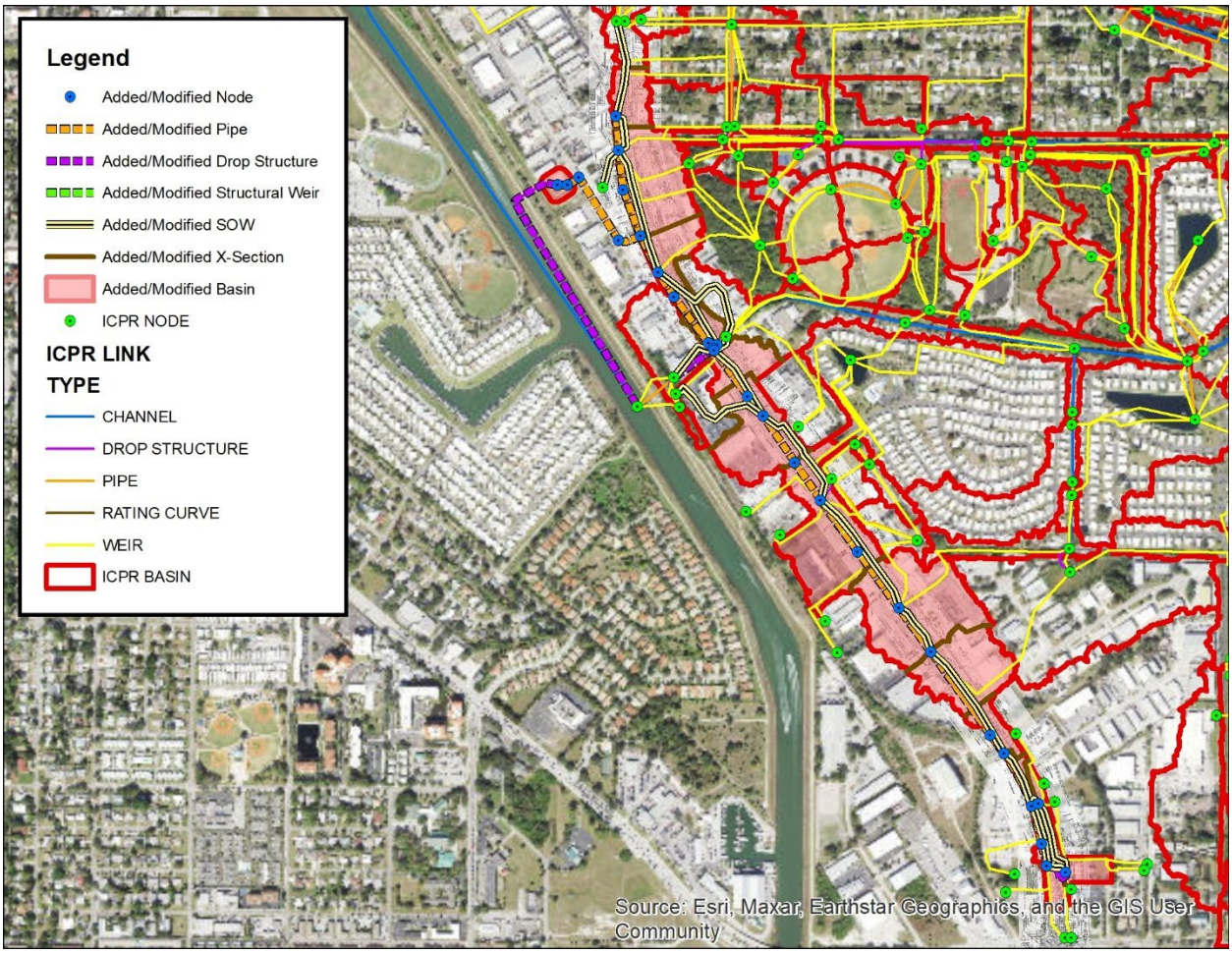


Figure 7. ERP 43-21831-4 Updates

The updates included:

- Basins – 15 basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 28 nodes were added/modified
- Pipes – 25 pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – three drop structure links were added/modified, and the associated pipe barrel and weir tables were updated
- Surface Overflow Weirs – 22 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries
- Structural Weirs – one structural weir link was added/modified, and its weir table updated.

4.7. ERP 43-29067-4, Sarasota Memorial Hospital - Venice Phase 1

The updates for ERP 43-29067-4 included modifications to basins, nodes, pipes, drop structures, surface overflow weirs, and cross-sections as shown in **Figure 8**. Updates associated with this development modified the overall watershed boundary and the adjacent Dona Bay watershed.

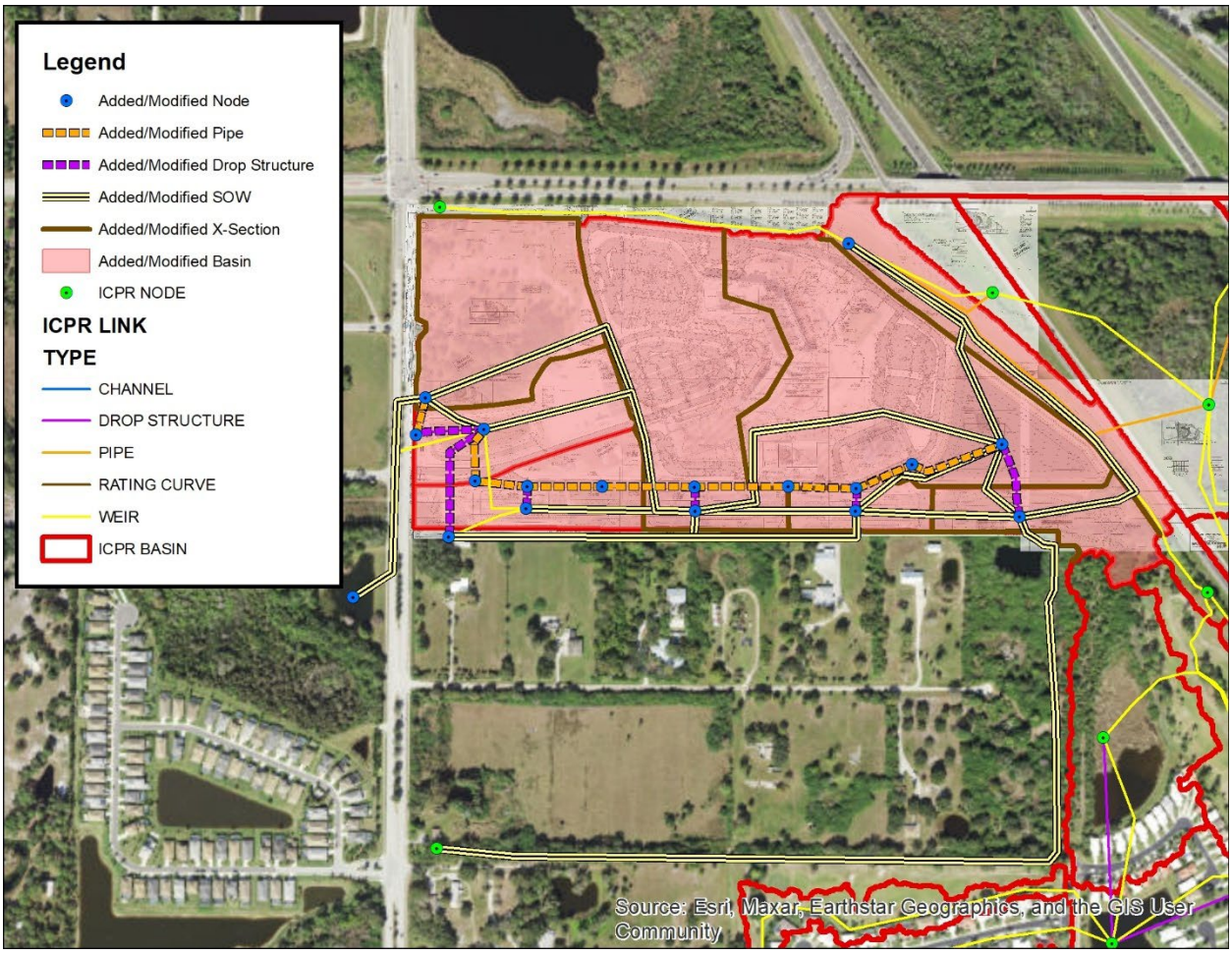


Figure 8. ERP 43-29067-4 Updates

The updates included:

- Basins – eight basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 18 nodes were added/modified
- Pipes – nine pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – six drop structure links were added/modified, and the associated pipe barrel and weir tables were updated
- Surface Overflow Weirs – 15 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

4.8. ERP 43-32369-2, The Floridian at Jacaranda

The updates for ERP 43-32369-2 included modifications to basins, nodes, pipes, drop structures, channels, surface overflow weirs, and cross-sections as shown in **Figure 9**.

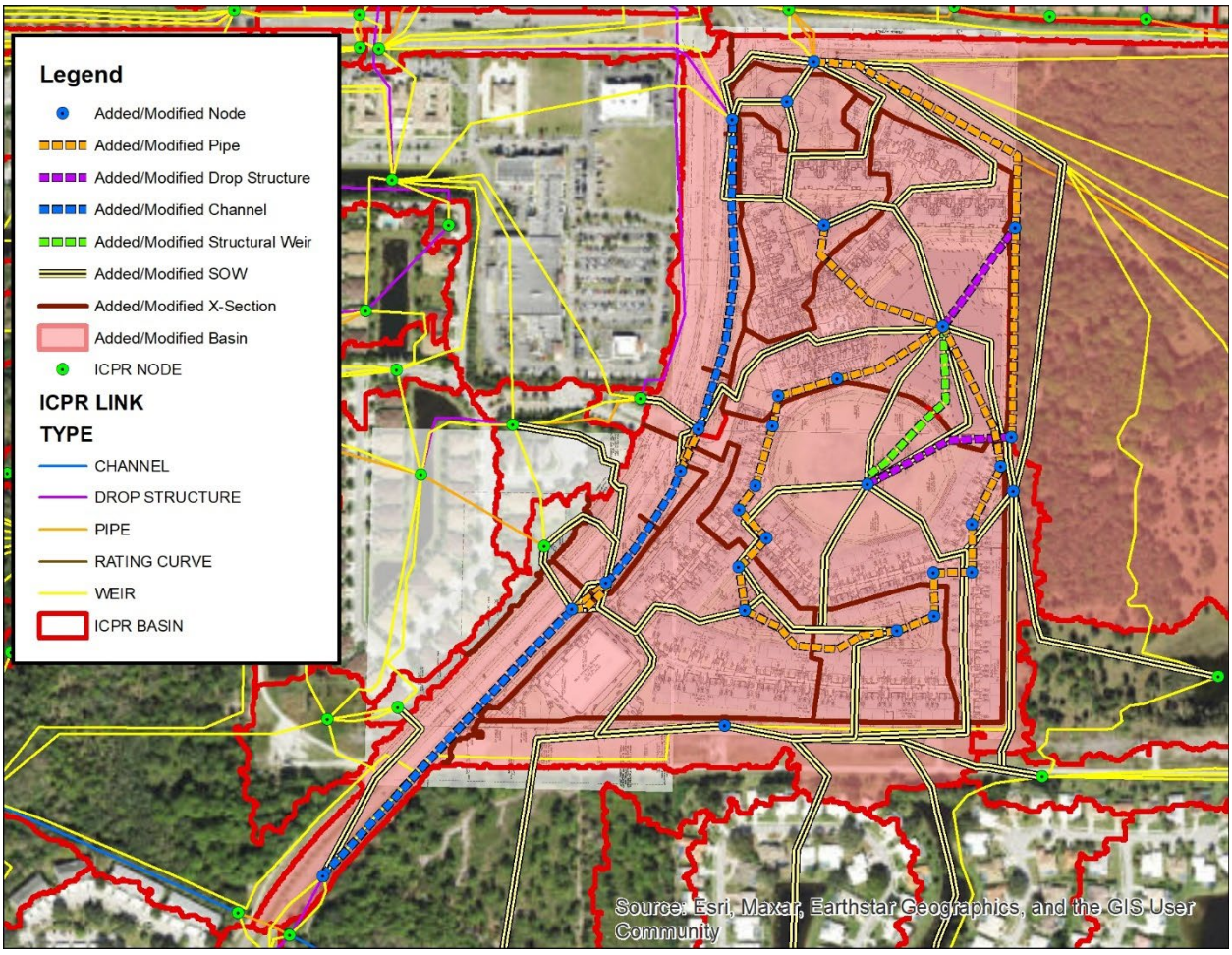


Figure 9. ERP 43-32369-2 Updates

The updates included:

- Basins – 12 basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 29 nodes were added/modified
- Pipes – 22 pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – two drop structure links were added/modified, and the associated pipe barrel and weir tables were updated
- Channels – three channel links were added/modified along with their associated cross-sections and table entries
- Surface Overflow Weirs – 35 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries

- Structural Weirs – one structural weir link was added/modified, and its weir table updated.

4.9. ERP 43-41590-3, Villages of Milano – Phases 1A and 1B

The updates for ERP 43-41590-3 included modifications to basins, nodes, pipes, drop structures, structural weirs, surface overflow weirs, and cross-sections as shown in **Figure 10**. Updates associated with this development modified the overall watershed boundary and the adjacent Dona Bay watershed.

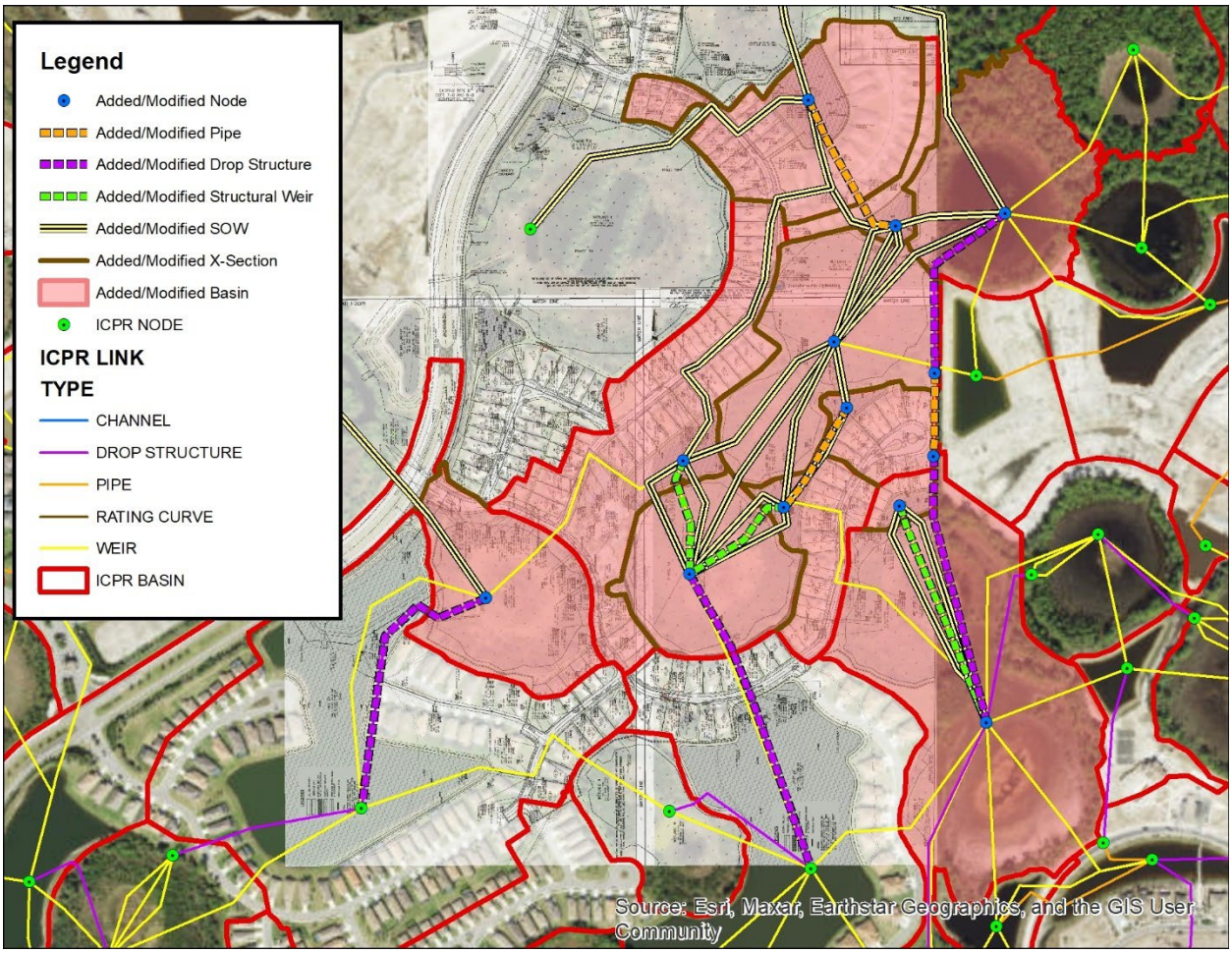


Figure 10. ERP 43-41590-3 Updates

The updates included:

- Basins – 11 basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 13 nodes were added/modified
- Pipes – three pipe links was added/modified along with the associated pipe barrel table entries

- Drop Structures – four drop structure links were added/modified, and the associated pipe barrel and weir tables were updated
- Surface Overflow Weirs – 22 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries
- Structural Weirs – three structural weir links were added/modified, and the weir tables updated.

4.10. ERP 43-41590-4, Villages of Milano – Phase 2

The updates for ERP 43-41590-4 included modifications to basins, nodes, pipes, drop structures, structural weirs, surface overflow weirs, and cross-sections as shown in **Figure 11**.

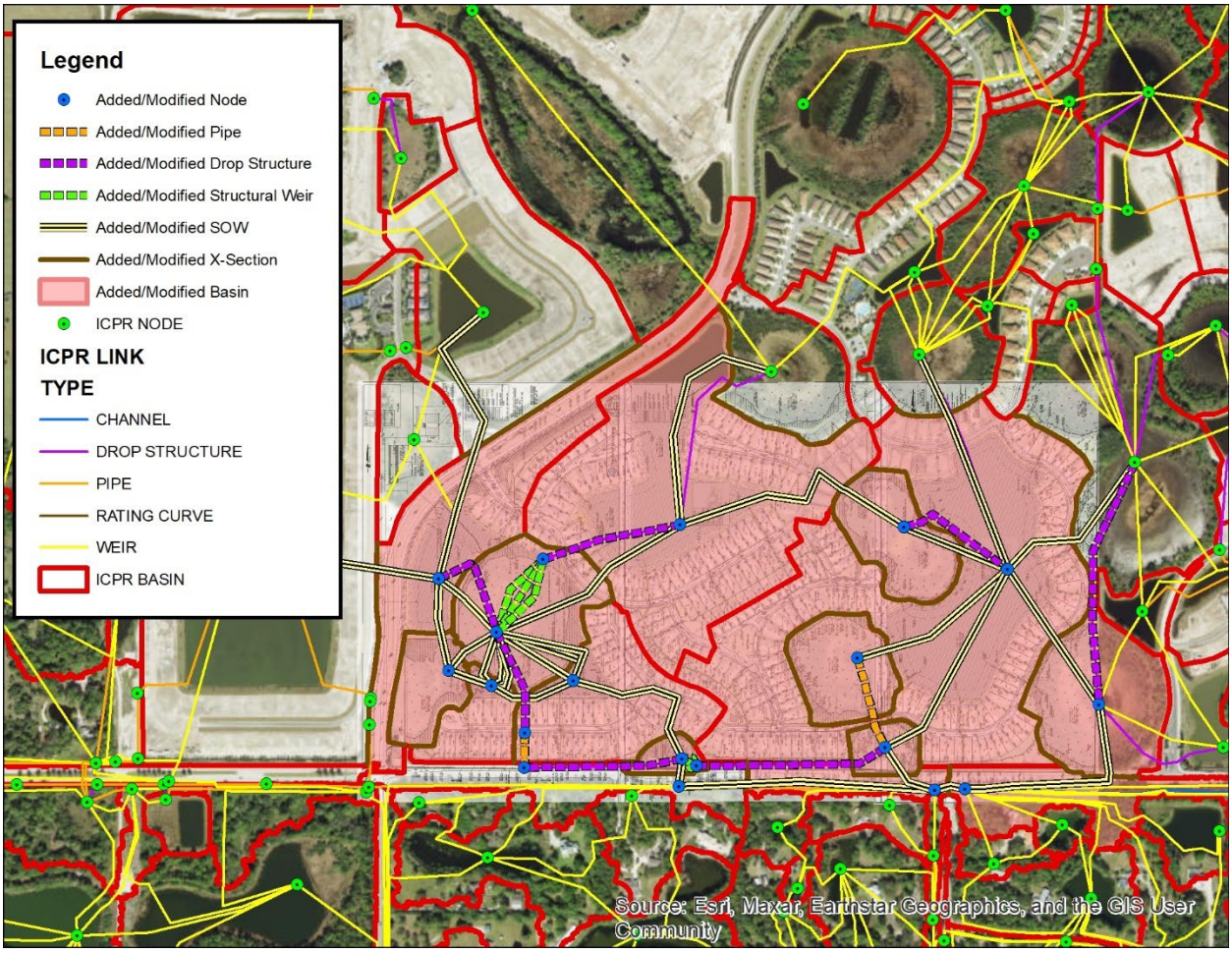


Figure 11. ERP 43-41590-4 Updates

The updates included:

- Basins – 14 basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 19 nodes were added/modified

- Pipes – two pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – seven drop structure links were added/modified, and the associated pipe barrel and weir tables were updated
- Surface Overflow Weirs – 28 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries
- Structural Weirs – six structural weir links were added/modified, and the weir tables updated.

4.11. ERP 43-41590-5, Aria

The updates for ERP 43-41590-5 included modifications to basins, nodes, pipes, drop structures, structural weirs, surface overflow weirs, and cross-sections as shown in **Figure 12**. Updates associated with this development modified the overall watershed boundary and the adjacent Dona Bay watershed.

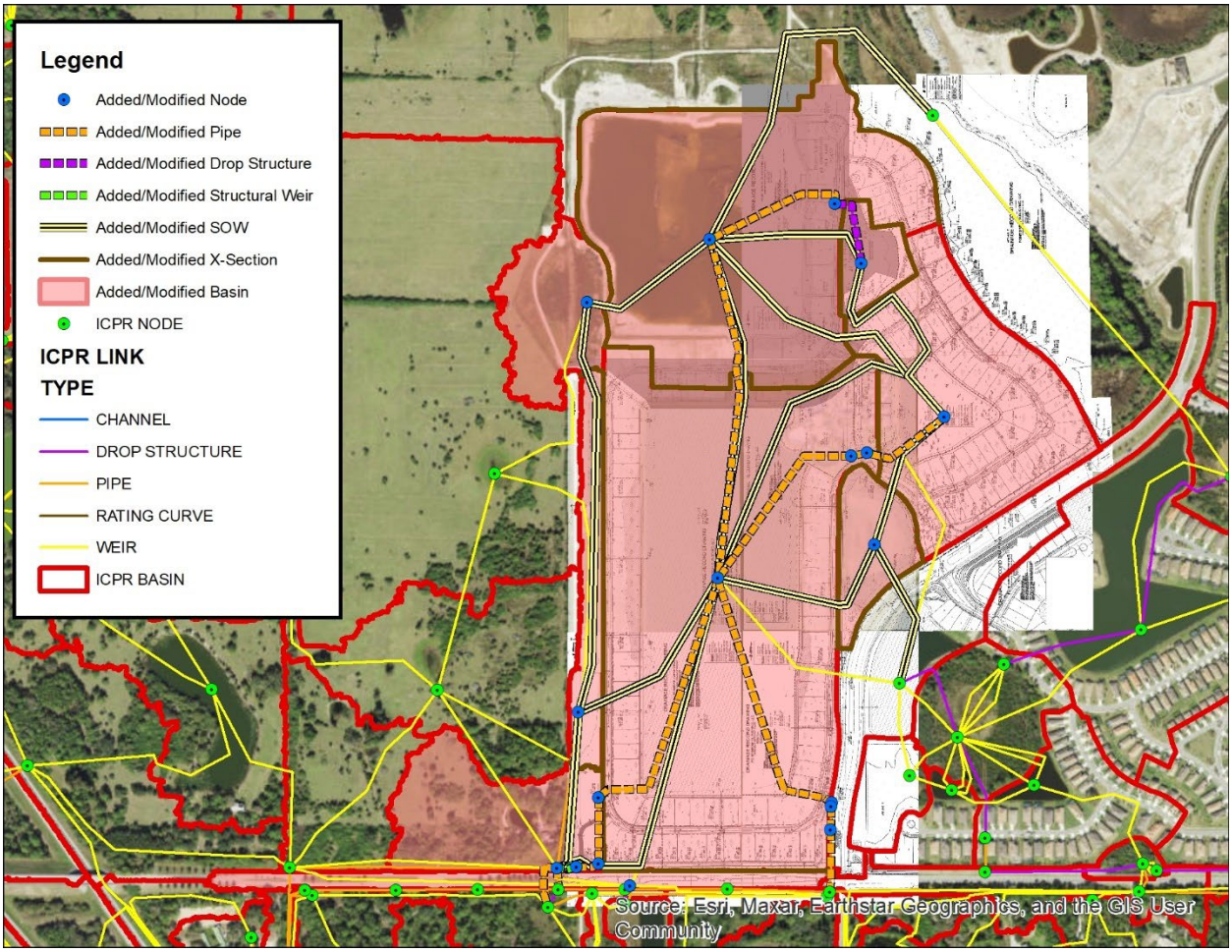


Figure 12. ERP 43-41590-5 Updates

The updates included:

- Basins – nine basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 18 nodes were added/modified
- Pipes – 13 pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – one drop structure link was added/modified, and the associated pipe barrel and weir table was updated
- Surface Overflow Weirs – 14 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries
- Structural Weirs – four structural weir links were added/modified, and the weir tables updated.

4.12. ERP 43-41669-1, Woods at Venice

The updates for ERP 43-41699-1 included modifications to basins, nodes, pipes, drop structures, structural weirs SOWs, and cross-sections as shown in **Figure 13**. Updates associated with this development modified the overall watershed boundary and the adjacent Lower Myakka watershed.

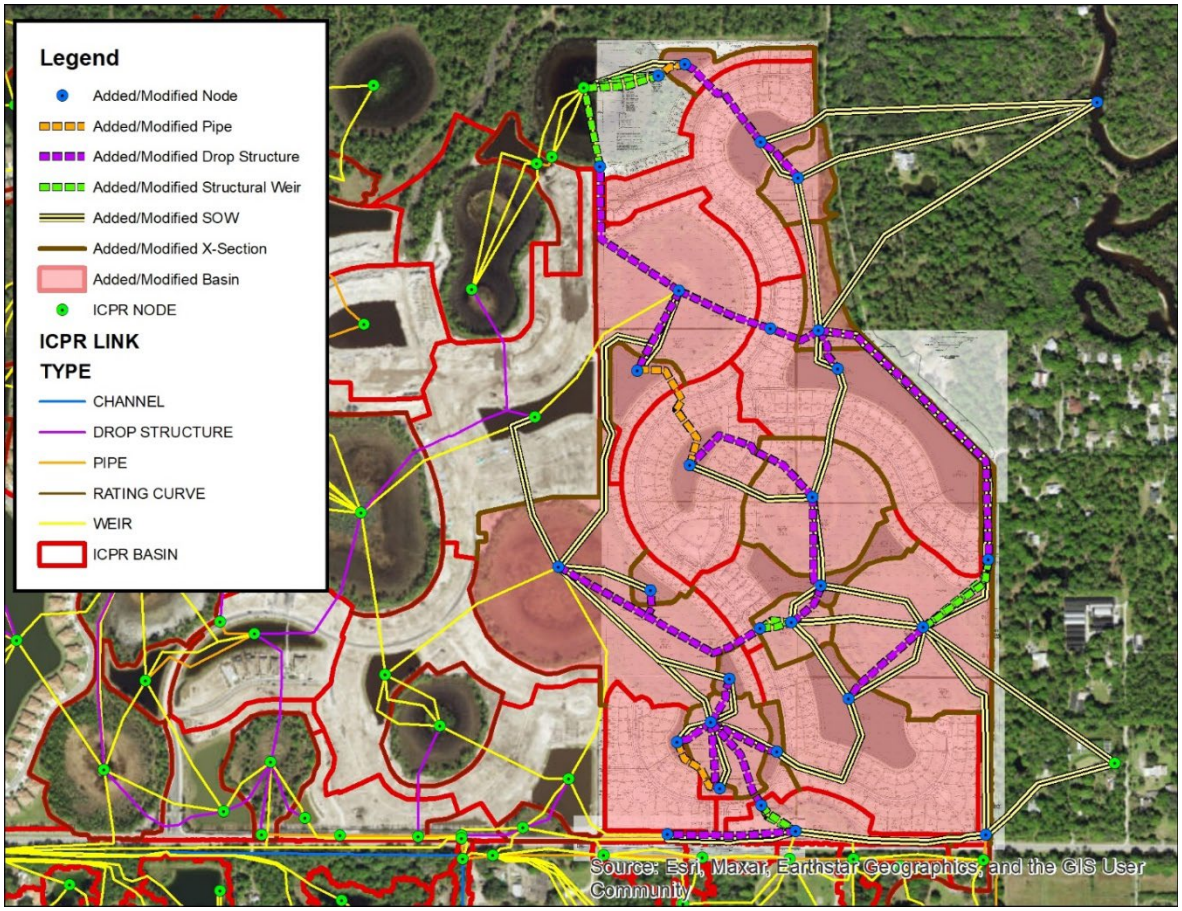


Figure 13. ERP 43-41669-1 Updates

The updates included:

- Basins – 23 basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 30 nodes were added/modified
- Pipes – three pipe links was added/modified along with the associated pipe barrel table entries
- Drop Structures – 20 drop structure link was added/modified, and the associated pipe barrel and weir table was updated
- Surface Overflow Weirs – 32 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries
- Structural Weirs – 10 structural weir links were added/modified, and the weir tables updated.

4.13. ERP 43-41734-1 and 43-41734-2, Watercrest

ERPs 43-41734-1 and 43-41734-2 are related and were updated together. The updates included modifications to basins, nodes, pipes, drop structures, SOWs, and cross-sections as shown in **Figure 14**.

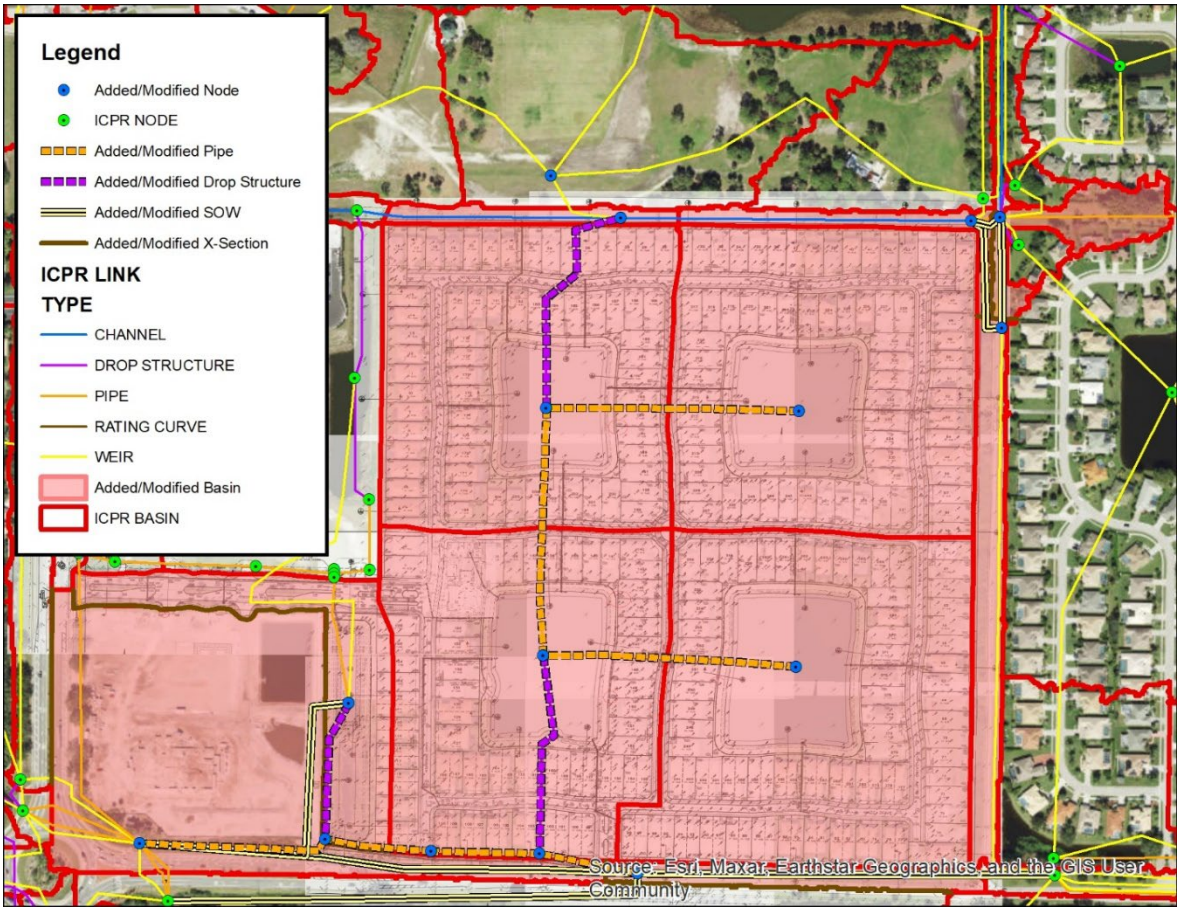


Figure 14. ERP 43-41734-1 and 43-41734-2 Updates

The updates included:

- Basins – 11 basins were modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 15 nodes were modified
- Drop Structures – three drop structure links were added/modified along with their associated pipe barrel and weir table entries
- Pipes – seven pipe links were added/modified, and the pipe barrel table entries updated
- Surface Overflow Weirs – seven surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

4.14. ERPs 43-43080-0 and 43-43080-1, Jacaranda Junction II

ERPs 43-41734-1 and 43-41734-2 are related and were updated together. The updates included modifications to basins, nodes, pipes, channels, drop structures, structural weirs, SOWs, and cross-sections as shown in **Figure 15**.

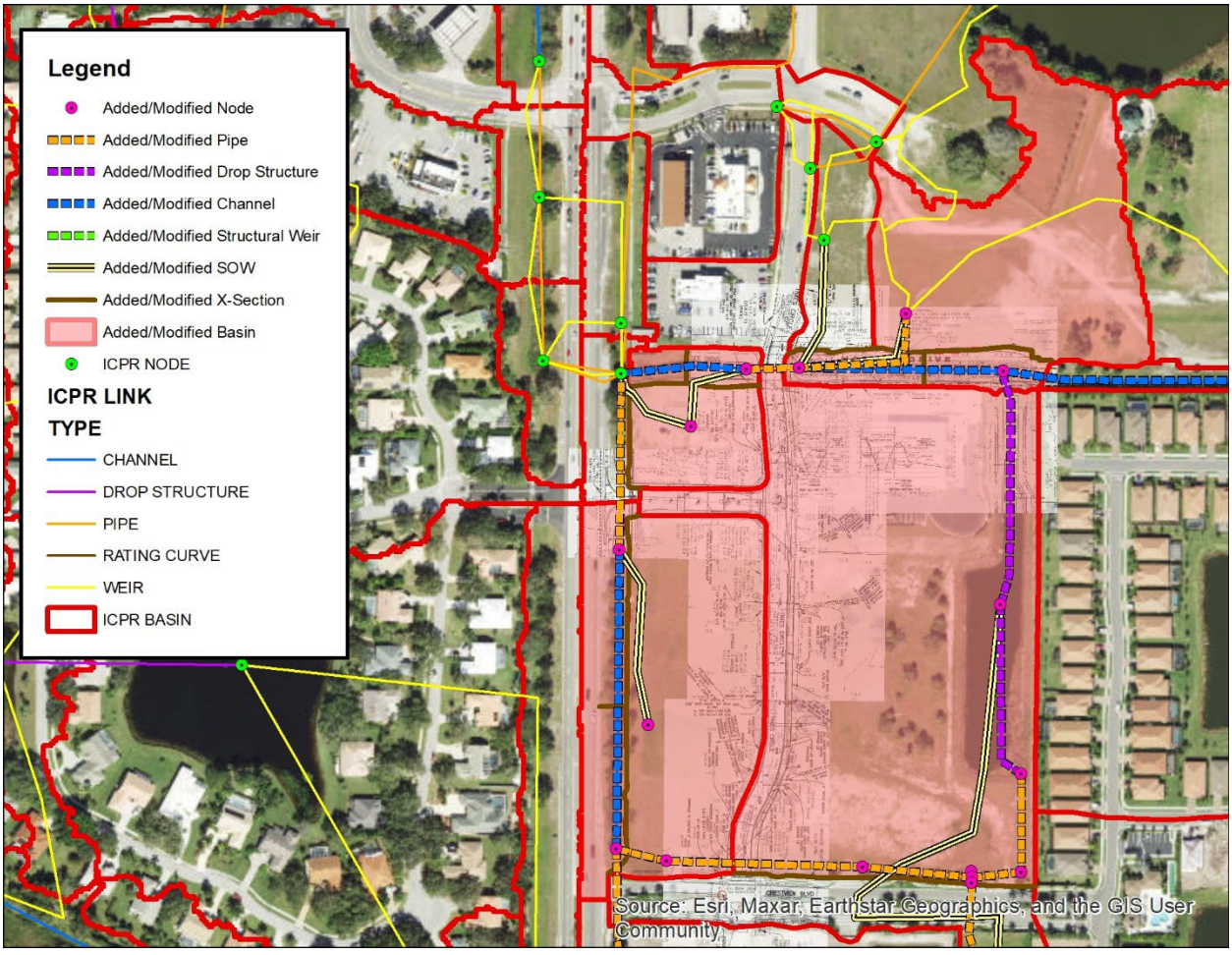


Figure 15. ERPs 43-43080-0 and 43-43080-1 Updates

The updates included:

- Basins – seven basins were modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 16 nodes were added/modified
- Pipes – 11 pipe links were added/modified, and the pipe barrel table entries updated
- Drop Structures – two drop structure links were added/modified, and the pipe barrel and weir table entries updated
- Channels – four channel links were added/modified along with their associated cross-sections and table entries
- Structural Weirs – two structural weir links were added/modified along with the associated weir table entries.
- Surface Overflow Weirs – six surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

4.15. ERP 43-43400-2, Vicenza – Phase 1

The updates for ERP 43-35649-1 included modifications to basins, nodes, pipes, drop structures, structural weirs, SOWs, and cross-sections as shown in **Figure 16**. Updates associated with this development modified the overall watershed boundary and the adjacent Lower Myakka watershed.

The updates included:

- Basins – 20 basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – 28 nodes were added/modified
- Pipes – 11 pipe links were added/modified, and the pipe barrel table entries updated
- Drop Structures – 14 drop structure links were added/modified, and the pipe barrel and weir table entries updated
- Structural Weirs – seven structural weir links were added/modified along with the associated weir table entries.
- Surface Overflow Weirs – 39 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

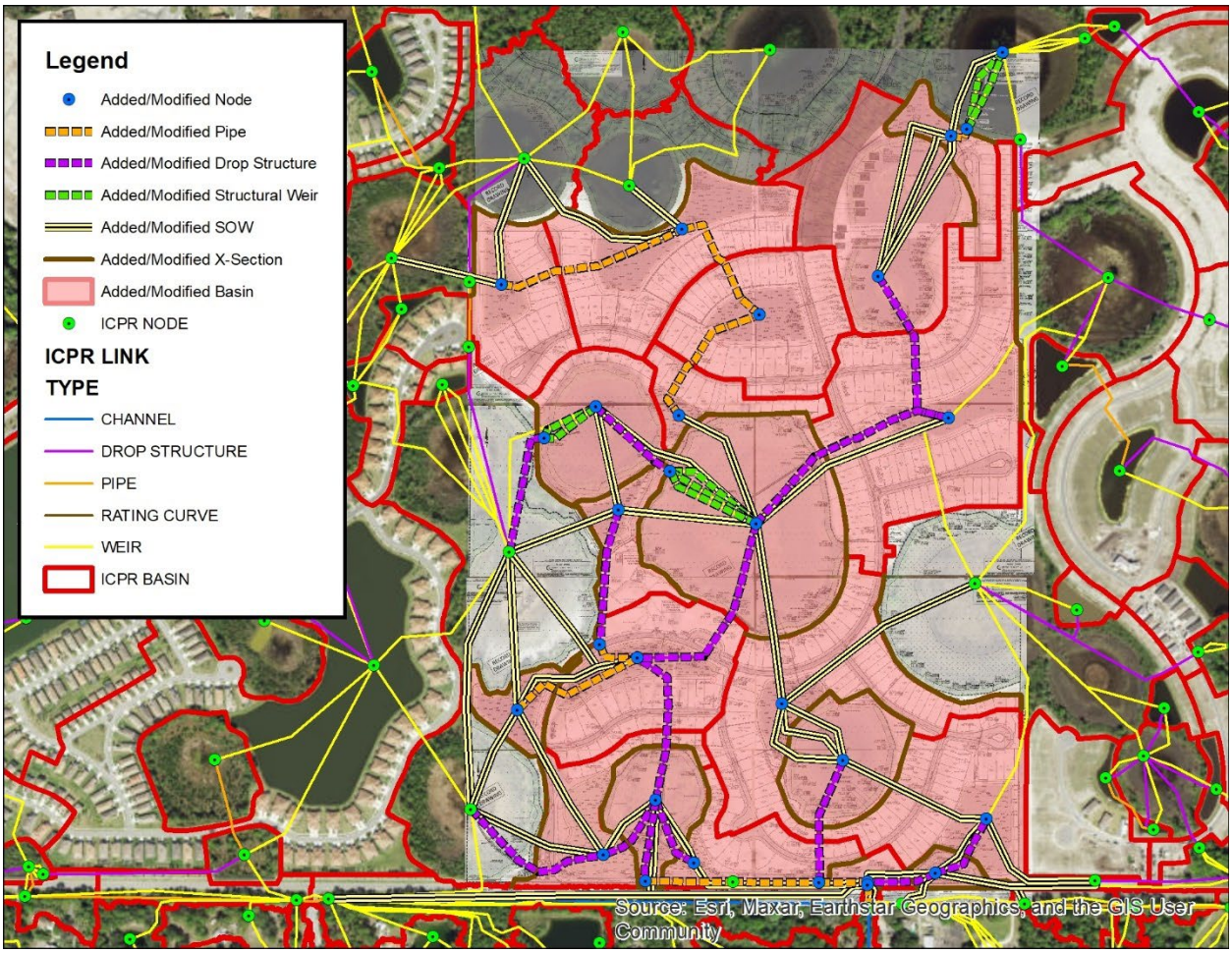


Figure 16. ERP 43-43400-2 Updates

4.16. ERP 43-43924-0, City of Venice Public Safety Facility

The updates for ERP 43-43924-0 included modifications to basins, nodes, pipes, drop structures, SOWs, and cross-sections as shown in **Figure 17**.

The updates included:

- Basins – nine basins were added/modified, and the associated node storage, TOC, CN, and IA were updated
- Nodes – nine nodes were added/modified
- Pipes – one pipe link was added/modified, and its pipe barrel table entries updated
- Drop Structures – one drop structure link was added/modified, and the pipe barrel and weir table entries updated
- Surface Overflow Weirs – 10 surface overflow weir links were added/modified along with their associated cross-sections and weir table entries.

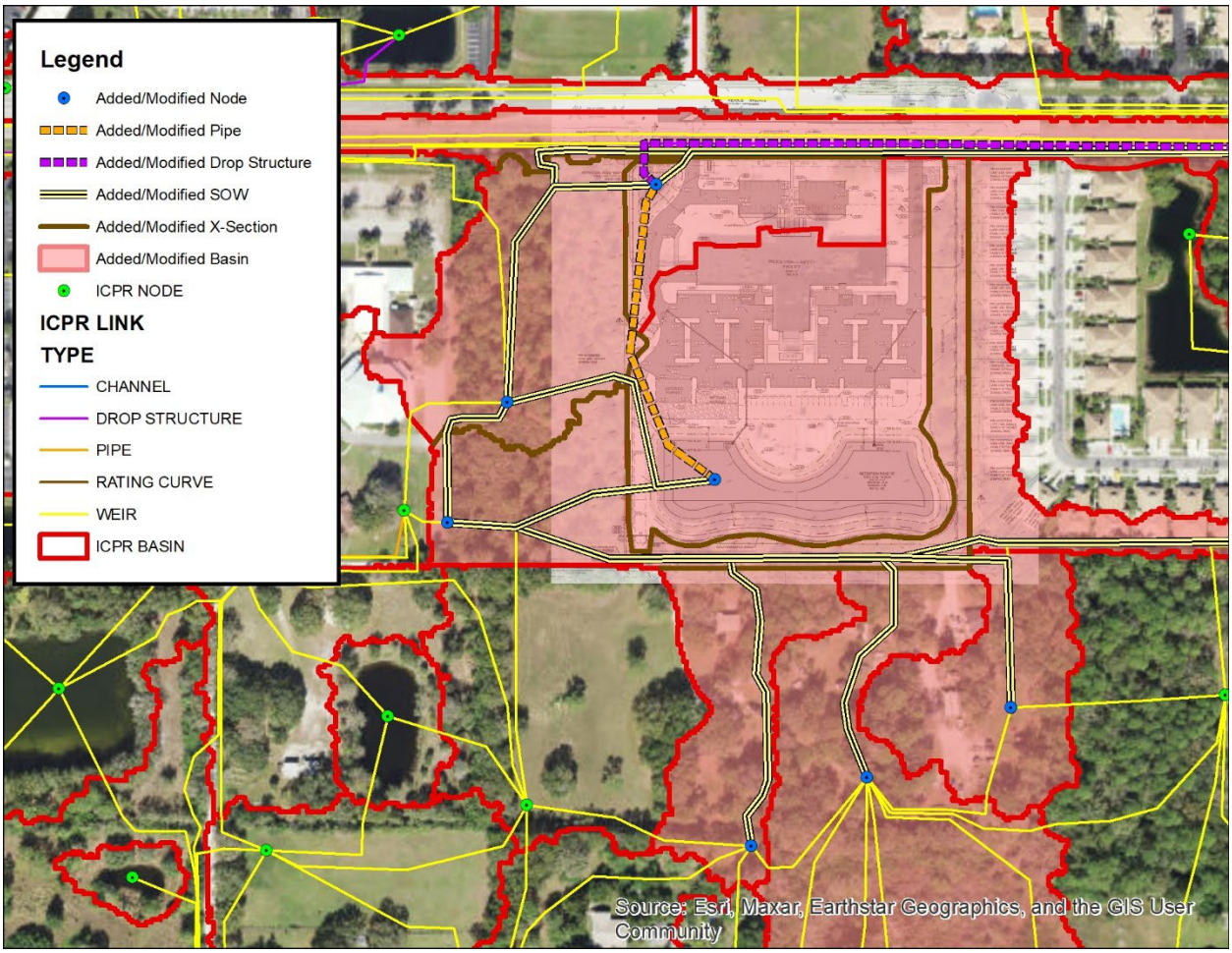


Figure 17. ERP 43-43924-0 Updates

4.17. Miscellaneous Updates

The leading "0" in the name of two basins was being truncated in the GWIS to ICPR export causing the export csv files to improperly load into ICPR4. These two basins were renamed to place a "B" at the start of the name to correct this issue.

4.18. QA/QC Process Description

The GWIS/ICPR4 model undergoes QAQC checks both during and after the update process. During the update process, when a new feature or table entry was added, the connections to all of the related tables were verified and the data inputs were checked to ensure they matched plan set data.

After the development updates were initially completed, the revised data were reviewed for reasonableness. The GWIS was exported to csv format, imported to ICPR4, and the model simulated for the 100-year/24-hour storm. The model results were reviewed for reasonableness.

Additionally, the GWIS updates were independently reviewed by another member of the project team based on QAQC checklist prepared by Collective for this model update task and provided as a separate deliverable.

5. Adjacent Watershed Connectivity and Boundary Updates

Since the County's watershed models have been developed and updated over the course of a several decades, relying on the best available data at the time, individual watershed's basin delineations may not match those of adjacent watersheds. Included in the model updates for this project, Collective is tasked to review and update model elements along shared watershed boundaries and will be merging coastal fringe watersheds with their respective mainland model(s). It should be noted that the project scope does not include updating the basin/watershed boundaries based on the current 2019 DEM.

The RB watershed borders the Lemon Bay Coastal Fringe (CF_LB), Lower Myakka (LM), Lemon Bay (LB), Dona Bay (DB), and Dona Bay/Roberts Bay Coastal Fringe (CF_DBRB) watersheds. The geometric union of the RB's ICPR_BASIN feature class was computed with all the adjacent watersheds' basin feature classes to generate polygons of the gaps and overlaps between the basins. The gaps and overlaps by watershed are listed below.

RB and CF_LB

- Gaps: 29
- Overlaps: 9

RB and DB

- Gaps: 20
- Overlaps: 71

RB and LM

- Gaps: 198
- Overlaps: 148

RB and CF_DBRB

- Gaps: 8
- Overlaps: 5

RB and LB

- Gaps: 729
- Overlaps: 60

RB, CF_LB, and LB

- Gaps: 2
- Overlaps: 0

Gaps were reviewed against the 2019 DEM and hydraulic features and assigned to the appropriate watershed. Similarly, the overlaps were reviewed and assigned to be kept in one watershed and removed for the other. The GWIS of each watershed was updated appropriately based on these gap/overlap assignments. Twenty-one RB basins had their area changed by more than one-percent as part of the watershed check and had their associated CN, IA, and node storage updated. Seven of the basins were modified enough to require an update to the TOC. Twenty-eight SOWs and their associated cross-sections were also updated.

6. 500-year/24-hour Interconnectivity Updates

Most of the County's watershed models were developed and parameterized to simulate design storm events up to and including the 100-year/24-hour storm. Collective, as directed by the County,

developed additional SOW interconnectivity to ensure overland flow routing occurs within the model during the 500-year/24-hour design storm. A preliminary ICPR4 model was generated from the GWIS based on the development and watershed boundary updates completed in the watershed and used to simulate the 500-year/24-hour storm. Preliminary, node peak stages were used to generate a level-pool floodplain raster to facilitate the identification of missing overflow weir connectivity. The basins were reviewed to identify locations where:

- The floodplain raster abutted a basin boundary and there was not an associated SOW link
- The floodplain raster abutted a basin boundary with an associated SOW, but the cross-section did not cover the entire basin boundary segment along the floodplain.

Thirty-seven (37) SOWs and the associated cross-sections were added or modified.

7. Summary of Changes

A total of 209 basins, 337 nodes, 676 links, and 395 cross-sections were added or modified as part of the updates completed by Collective. **Table 3** summarizes the basin, node, link, and cross section changes compared to the converted adjusted ICPR4 model and GWIS v2.1 geodatabase prepared by Collective for the County in July 2022. In addition to the changes to these features, associated hydrologic and hydraulic parameters within the watershed were updated as previously discussed in this report.

Table 3. Summary of Model Feature Changes

Feature	Converted Adjusted ICPR4 Model (July 2022)	Updated ICPR4 Model (April 2023)	Added/Modified As Part Of Update
ICPR_BASIN	1528	1627	209
ICPR_NODE	1801	2017	337
ICPR_LINK	4544	4979	676
ICPR_XSECT	3389	3588	395

8. Response to Model Update Peer Review Comments

On May 31, 2023, Collective received review comments related to the development, watershed boundary, and 500-year simulation surface overflow weir updates as well as general ICPR4 quality control/quality assurance (QAQC) comments generated from a tool developed by Jones Edmunds for the County. Comments were provided as peer review comments submitted in a comment geodatabase (72 comments), a technical memorandum, and an Excel spreadsheet summarizing the ICPR4 QAQC tool results. An additional comment from Sarasota County related to 11 weir features

without parameters was received on June 1, 2023. Collective reviewed the provided comments and responded to all. Three of the points within the comment geodatabase are associated with areas outside of the development update areas and outside the scope of this project. Two comment points relate to the adjacent Dona Bay/Roberts Bay Coastal Fringe watershed. Additionally, the majority of the items flagged by the QAQC tool reflect comments outside of the update areas; these are future maintenance items to be addressed in subsequent updates. Those QAQC tool items that fell with updated areas were addressed according to the responses noted in the appended comment geodatabase and spreadsheet.

Additionally, during the process of addressing review comments, Collective adjusted basin boundaries to eliminate remaining gaps and overlaps with the adjacent watersheds and added additional interconnections to be consistent with the surface overflow links represented in these adjacent watersheds.

The total number of model feature changes in response to review comments and additional watershed boundary adjustments increased compared to the initial development updates. **Table 4** summarizes the basin, node, link, and cross section changes compared to the converted and adjusted ICPR4 model prepared by Collective for the County in July 2020.

Table 4. Summary of Model Feature Changes

Feature	Converted Adjusted ICPR4 Model (July 2022)	Updated ICPR4 Model (December 2023)	Added/Modified As Part Of Update
ICPR_BASIN	1528	1631	233
ICPR_NODE	1801	2032	404
ICPR_LINK	4544	4979	696
ICPR_XSECT	3389	3581	393

Revised GWIS geodatabase and ICPR4 model have been provided addressing comments along with updates to both the comment shapefile and QAQC Tool summary spreadsheet noting Collective's responses.

9. Model Verification

Model verification was not performed for the RB watershed, since no available water level or flow data are available for model calibration and validation purposes. Three water level stations exist with the watershed – two Sarasota County Automated Rainfall Management System (ARMS) stations and one USGS monitoring station. Sarasota ARMS Station CUR-1 Jackson Road is located at a boundary node for the RB watershed, reflecting inflows from the Lower Myakka watershed, and not suitable

for validating the RB updated model. Sarasota ARMS Station CUR-2 Capri Isle does not have any measured stage or flow data for major storm events since 2015. Pre-2016 events reflect land use conditions prior to any of the developments included in the updates performed as part of this project and are not suitable for assessing that the model accurately represents 2020 conditions or for model calibration purposes. Lastly, USGS Station 2299734 for Curry Creek at US Highway 41 reflects tidal boundary conditions and is not suitable for validating the updated RB model.

10. Watershed Merge

As requested by the County, Collective merged the adjacent CF_DBRB watershed GWIS and model into the RB GWIS/ICPR4 model. Original names for all model elements have been maintained with the merger. The CF_DBRB watershed is adjacent to both RB and CF_LB. All CF_DBRB model elements were assigned to RB based on a review of the surface topography and stormwater management system. A summary of the model conversion and maintenance efforts performed by Collective for the CF_DBRB watershed is documented in the separate *Dona Bay/Roberts Bay Coastal Fringe Model Update Report* (2024) prepared by Collective as part of this same project.

As part of the merge efforts basin, node, and link topologies were reviewed and corrected to address basin gaps and overlaps as well as snapping links to nodes. Additionally, boundary stage conditions were updated to include boundary stage sets and associated draft data for both the 25-year/24-hour and 500-year/24-hour simulations. The boundary stage data will be updated under the next task based on the countywide model simulation results.

11. Model Boundary Conditions Updates

The merged RB watershed boundary and boundary interconnections required additional updates to be consistent with adjacent watersheds. Collective coordinated with Jones Edmunds to update basin boundaries to resolve basin gaps and overlaps and connectivity with both DB and LM. Additionally, basins and interconnections were reviewed and updated with the adjacent LB watershed, which Collective is updating a part of this project, too. As needed, associated node storage, TOC, CN, and IA were updated for revised RB basins. Hydraulic links were reviewed by Collective to ensure consistency with adjacent watersheds, which required both adding and modifying link features and updating parameter data (e.g., to/from nodes, etc.).

Since all County watersheds are being updated concurrently, the RB watershed was merged into a countywide watershed model by Jones Edmunds to establish boundary conditions efficiently and consistently for all watersheds at once. During the process of merging the watersheds into the countywide master model, Jones Edmunds performed the following (Jones Edmunds 2024):

- Additional updates to basin delineations to eliminate gaps and overlaps
- Renamed nodes and links to eliminate duplicate names between watersheds
- Addressed link/node topology errors
- Updated spatial features to match model inputs

- For features represented in adjacent models but reflecting mismatched information, reviewed and retained the features with the more credible source

Jones Edmunds provided Collective the merged, countywide GWIS 2.1 geodatabase and ICPR4 model with simulation results for the 10-year/24-hour, 25-year/24-hour, 50-year/24-hour, 100-year/24-hour, and 500-year/24-hour design storm events. The Type II Florida-Modified rainfall distribution was maintained for all watersheds. Rainfall amounts for each storm event applied to all watersheds are summarized in **Table 5**.

Table 5. Design Storm Rainfall Depths for Countywide Model

Rainfall Return Period and Duration	Rainfall Depth (inches)
10 years/24 hours	7.0
25 year/24 hours	8.0
50 years/24 hours	9.0
100 years/24 hours	10.0
500 years/24 hours	12.4

Collective extracted the RB watershed from the countywide master model into a new, separate GWIS 2.1 geodatabase. Based on the County's request, watershed assignments were modified for several basins:

- **Added to RB watershed from LM**: 182563
- **Removed from RB watershed and assigned to LB**: 112030, 1146517, 1146518, 1146520, 1146521, J0090, J0100, J0110, J0120, J0130, J0140, J0170, J0190, J0210, J0240, J0370, J0400, J0410

Additionally, boundary stage time series were assigned based on the results of the countywide model for all storm events. An ICPR4 model was generated by Collective from the extracted, RB geodatabase and all simulations were executed. Collective performed a review of the results of the extracted model to confirm consistency with the countywide model.

12. Floodplain Development

Node peak results of the 100-year/24-hour simulation and the previously discussed 2019 DEM (see Section 3) were used by Collective to generate level-pool floodplains for the RB watershed. Additional processing was performed to remove gaps and holes and delete insignificantly small inundation polygons applying a threshold of 2,500 square feet. Results were compared with preliminary floodplain information developed by Collective after responding to model update peer review

comments (see Section 8) as well as floodplain mapping provided by the County with the original RB and CF_DBRB ICPR3 models and GWIS version 1.6 geodatabases.

13. Response to Boundary Conditions Updates and Floodplain Peer Review

On March 19, 2024, Jones Edmunds provided peer review comments related to the boundary condition updates and floodplain delineation performed by Collective. **Table 6** summarizes the comments received and Collective's responses.

Table 6. Peer Review Comments and Responses Related to Boundary Condition Updates and Floodplain Mapping

Peer Review Comment	Response
All standard pipe sizes should be updated with the original pipe sizes (e.g., 11.8-inch-x-18.4-inch should be 12-inch-x-18-inch).	*Justification for this request is needed. Pipe dimensions were adjusted for model conversion to account for differences in how ICPR3 and ICPR4 non-standard pipes geometries are determined and to satisfy peak stage metrics for model conversion, per scope of work. Reverting these dimensions to original, non-standard sizes is a considerable effort, not within Collective's current scope of work, and will impact stages throughout the model.*
Jones Edmunds reviewed the level-pool floodplains for the 100-year/24-hour design storm event. The mapped floodplains are generally consistent with the peak water-surface elevations at the model nodes; however, the post-processing appears to overestimate the floodplain extent in some locations. An example is shown in Figure 1 where the lighter blue polygon illustrates the level-pool extent and the dark blue polygon is the raster that depicts the inundation cells.	*Post-processing of floodplain to remove minor floodplain areas and fill minor gaps is consistent with the approach employed by Jones Edmunds for other Sarasota County watersheds. Raw, level-pool floodplain can be provided as well, if County desires.*

14. Flood Protection Level of Service

Collective performed an existing conditions, stormwater quantity Level of Service (LOS) analysis of all basins in the RB watershed in accordance with the LOS and design criteria described in the County's

Unified Development Code (UDC), Appendix C14 (Sarasota County, 2023). More specifically, Collective evaluated the LOS for buildings and road access based on the criteria summarized in **Table 7**. Site flooding was not included in the analysis.

Table 7. Sarasota County Stormwater Quantity LOS Design Criteria

Category	Type	Storm Design
Building	All	Finished floor elevation greater than or equal to 100-year/24-hour peak flood elevation
Road Access	Evacuation	No flooding at outside edge of pavement from 100-year/24-hour design storm
	Arterial	Less than 6-inches of flooding at outside edge of pavement from 100-year/24-hour design storm
	Collector	Less than 6-inches of flooding at outside edge of pavement from 25-year/24-hour design storm
	Neighborhood	Less than 6-inches of flooding at outside edge of pavement from 10-year/24-hour design storm

The methodology to assess LOS within the watershed is similar in approach to previous assessments performed for the County. The following sections detail the supporting data and methodology used by Collective to evaluate both buildings and roadway access.

13.1 Building LOS Methodology

Collective utilized the *BuildingFootprint* feature class published by Sarasota County and available from ArcGIS Online to identify buildings where the estimated finished floor elevations (FFE) are below the 100-year/24-hour flood elevations. FFEs were estimated for all buildings as follows:

- Building polygons were buffered to the outside by five feet.
- The mean and maximum surface elevations within the five-foot buffer polygon were determined from the 2019 SWFWMD DEM.
- For all buildings except mobile and manufactured housing, the average of the mean and maximum elevations was used to establish the FFEs.
- For mobile and manufactured housing, one foot was added to average of the mean and maximum elevations to establish the FFEs.

Each building was intersected with associated basin(s) and the FFE compared to the associated basin's 100-year/24-hour flood elevation. Each building where the FFE is less than the flood elevation was flagged as deficient and compared to the flood depth grid. These flagged buildings were visually reviewed for reasonableness. In some instances, FFE estimates needed to be revised due to noise

within the DEM around the building that appeared inconsistent with the ground surface and skewed the maximum elevation. Non-habitable structures, defined as having a square footage of less than 400 square feet (ICC, 2023), were removed from the list. Additionally, buildings no longer visible in recent aerial imagery (i.e., 2020 and 2023) were removed. Lastly, buildings constructed after 2020, which are not reflected in the updated DEM and aerials indicating a topographic void, were not flagged. **Appendix A** includes a table summarizing the LOS deficient structures for the watershed as well as a map illustrating the locations. A total of 22 buildings within the watershed have been identified as stormwater LOS deficient.

13.2 Road Access LOS Methodology

For the road access assessment, Collective utilized the *Streets* feature class published by Sarasota County and available from ArcGIS Online to identify roadway segments within the watershed that do not meet the access criteria established by the County. The Street feature class was supplemented with information from the County's *Thoroughfare* feature class (also available via ArcGIS Online) to classify the *Streets* segments as Evacuation, Arterial (both major and minor arterials not identified as Evacuation routes), or Collector (both major and minor collectors not identified as Evacuation routes). Remaining segments were classified as Neighborhood roads.

For this analysis, Collective assumed the *Streets* layer reflects the roadway centerlines. Edge of pavement elevation for each road segment was estimated assuming the centerline represents the crown elevation, and the edge of pavement is 12-feet offset with a 2-percent cross slope from the crown (equivalent to 0.24-feet below crown elevation). The *Streets* layer, along with the 2019 DEM, floodplain mapping and depth rasters for the 10-year/24-hour, 25-year/24-hour, and 100-year/24-hour storm events were used by Collective to identify the segments of roadways where the flooding depth exceeds the LOS criteria and flagged these as deficient. Small (i.e., less than 25 linear feet), isolated segments of roadways were removed from the list. Additionally, flagged roadways were visually reviewed for reasonableness. Lastly, Collective performed a visual review to identify any roadway segments where EOP estimates (depth and/or width) did not flag deficient roadways. Street segments that were constructed post-2020, and not reflected in the model updates and associated DEM, were not flagged. Duration of flooding for each deficient segment was estimated as well.

Table 8 summarizes by road classification and LOS status the length of roadway and percentage of total length for the roads located within the watershed. **Appendix B** includes a detailed list identifying each of the 101 road segments not satisfying the County's design criteria as well as a figure illustrating their locations. Lengths represent roadway segments as defined by the County's mapping, not the length of edge of pavement inundated by the specific storm event. A total of nine roadway segments were flagged in Collective's review where the estimated edge of pavement elevations did not adequately capture flooding on the roadway. These segments are evacuation routes with multiple lanes or roadways where elevations at curb inlets are not captured by the edge of pavement estimation approach. For these nine segments, the edge of pavement elevations were updated based

on the DEM and are noted in Appendix B with an asterisk next to the edge of pavement elevation. The depths of flooding for these segments were also revised accordingly.

Table 8. Road Access LOS Summary by Roadway Classification

LOS Roadway Classification	Meets Stormwater LOS Criteria	Linear Feet	Percent of Total LOS Roadway Classification
Evacuation	Yes	22,207	13.6
	No	**141,325**	**86.4**
Arterial	Yes	0	0.0
	No	**35,603**	**100.0**
Collector	Yes	1,568	2.4
	No	**63,377**	**97.6**
Neighborhood	Yes	41,818	5.4
	No	**739,323**	**94.6**

15. Response to Level of Service Peer Review

No peer comments were included for the Roberts Bay watershed in the level-of-service peer review technical memorandum submitted by Jones Edmunds on July 22, 2024.

16. Conclusions and Recommendations

The watershed model was converted by Collective from ICPR3 to ICPR4, updated to reflect multiple developments, updated to address gaps and overlaps with the adjacent watersheds, updated to add surface overland flow connections where appropriate, and updated to reflect improved boundary condition stages generated by Jones Edmunds from a countywide Master Model. Updated model results were used by Collective to map level pool floodplains and generate depth grids. Floodplain information was used to perform a flood protection level of service assessment of buildings and roadways within the watershed. Based on the available information and assumptions used for the level of service assessment, most of the deficient structures appear to flood during extreme events (i.e., the 100-year/24-hour design storm) compared to more frequent events (i.e., 10-year/24-hour event). One hundred and one roadway segments, mostly neighborhood roads, have been identified as deficient. Numerous segments of East Venice Avenue, Jacaranda Boulevard, and US. Highway 41 Bypass, which are all designated evacuation routes, are identified as deficient.

Throughout the course of the project, Collective developed a list of recommended updates for items that fell outside of the project's scope of work. In total 43 future update items were noted, ranging

from updating basin delineations and cross section geometry to align with current surface topography, updating node storage or locations, verifying hydraulic structure sizes and/or inverts, as well as general modeling improvements (such as modeling a couple of bridges using HEC-RAS and converting the current pipe links to rating curve links). These recommendations are reflected as point features ("RB_future_fixes" within the "Misc" feature dataset) included in the final GWIS geodatabase.

17. References

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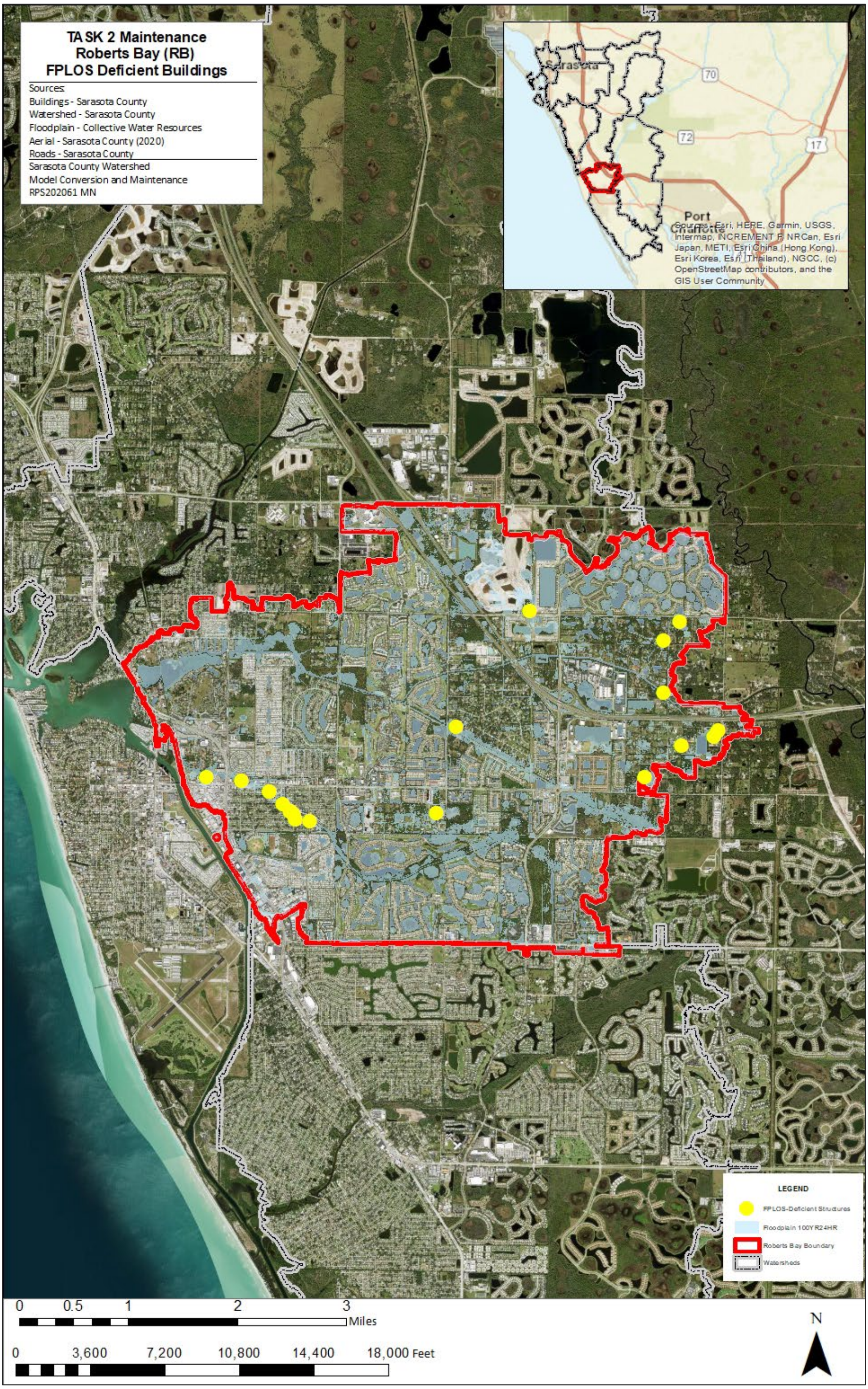
Appendix A

Stormwater LOS Deficient Buildings

Table A-1. Stormwater LOS Deficient Buildings

FACILITY ID	Address	Building Type	FFE (ft, NAVD88)	Node Name	Stage 100YR (ft, NAVD88)	Stage 25YR (ft, NAVD88)	Stage 10YR (ft, NAVD88)
BF_08182016_314967	2114 BORDER RD VENICE FL, 34292	Single Family Detached	12.63	10922	**12.72**	12.39	12.19
BF_08182016_315441	2971 BORDER RD VENICE FL, 34292	Single Family Detached	11.58	10252	**11.62**	11.34	11.16
BF_08182016_316564	220 HIGH POINT DR VENICE FL, 34292	Single Family Detached	11.11	RB1043	**11.17**	11.07	11.04
BF_08182016_319430	266 BEAVER CT VENICE FL, 34292	Single Family Detached	4.24	10802	**6.13**	**5.17**	**4.68**
BF_08182016_321406	1278 THOREAU CIR VENICE FL, 34292	Single Family Detached	7.17	RB1189	**8.53**	**8.09**	**7.63**
BF_08182016_321497	395 N JACKSON RD VENICE FL, 34292	Single Family & Other Bldg	10.70	10819A	**10.83**	10.3	9.99
BF_08182016_321571	395 N JACKSON RD VENICE FL, 34292	Single Family & Other Bldg	10.77	10819A	**10.83**	10.3	9.99
BF_08182016_321968	365 N JACKSON RD VENICE FL, 34292	Single Family Detached	10.62	10819A	**10.83**	10.3	9.99
BF_08182016_322621	326 N HAVANA RD VENICE FL, 34292	AG - Ornamentals	11.40	RB1075	**11.89**	**11.83**	**11.8**
BF_08182016_325393	172 GREENCOVE RD VENICE FL, 34292	Single Family Detached	11.06	RB1102	**11.64**	**11.41**	**11.3**
BF_08182016_325595	404 WARFIELD AVE N VENICE FL, 34285	Church	6.03	119801	**6.44**	5.69	5.26
BF_08182016_325796	801 E VENICE AVE VENICE FL, 34285	Commercial Condo and Common Areas/Elements	6.85	11200	**7.64**	6.8	6.35
BF_08182016_326186	933 CYPRESS AVE VENICE FL, 34285	Single Family Detached	8.03	1122231S	**8.05**	7.81	7.64
BF_08182016_326190	933 CYPRESS AVE VENICE FL, 34285	Single Family Detached	7.99	1122231S	**8.05**	7.81	7.64
BF_08182016_326980	301 HOME PARK RD VENICE FL, 34285	Single Family Detached	7.98	11218	**8.3**	7.72	7.4
BF_08182016_327453	1123 GROVELAND AVE VENICE FL, 34285	Single Family Detached	8.31	11226	**8.58**	8.12	7.87
BF_08182016_327518	1125 GROVELAND AVE VENICE FL, 34285	Single Family Detached	8.35	11226	**8.58**	8.12	7.87
BF_08182016_327535	181 S AUBURN RD VENICE FL, 34292	Single Family & Other Bldg	12.86	11710	**12.96**	12.8	12.67
BF_08182016_327567	1129 GROVELAND AVE VENICE FL, 34285	Single Family Detached	8.30	11226	**8.58**	8.12	7.87
BF_08182016_327660	1133 GROVELAND AVE VENICE FL, 34285	Single Family Detached	8.32	11226	**8.58**	8.12	7.87
BF_08182016_328062	1200 GROVELAND AVE VENICE FL, 34285	Single Family Detached	8.50	11226	**8.58**	8.12	7.87
BF_08182016_328154	1239 GROVELAND AVE VENICE FL, 34285	Single Family Detached	8.65	RB1394	**8.89**	8.55	8.22

Figure A-1. Location Map of LOS Deficient Buildings



Appendix B

Stormwater LOS Deficient Roadways

Street ID	Full Street Name	From Address Left	To Address Left	From Address Right	To Address Right	FPLOS_Road_Class	Road Centerline Length (feet)	NODENAME	EOP (feet)	FPLOS Design Storm	Max Stage 100yr/24hr (feet)	Max Stage 25yr/24hr (feet)	Max Stage 10yr/24hr (feet)	FPLOS Depth (feet)	Duration (hours)
ST_102012_000317	ALBEE FARM RD	1039	1041	1032	1040	Collector	1568.08	11149S	**9.87***	25 Year	10.99	10.73	10.32	0.86	1.75
ST_102012_001309	E VENICE AVE	0	0	0	0	Evacuation Route	767.97	11984	7.34	100 Year	7.71	7.62	7.58	0.37	3.00
ST_102012_001116	E VENICE AVE	501	599	500	598	Evacuation Route	459.59	111821	7.32	100 Year	7.77	7.65	7.58	0.45	3.25
ST_102012_023583	E VENICE AVE	701	801	700	798	Evacuation Route	680.61	11200	**7.10***	100 Year	7.64	6.8	6.35	0.58	4.50
ST_102012_000799	E VENICE AVE	803	879	800	898	Evacuation Route	645.87	11200	6.76	100 Year	7.64	6.8	6.35	0.88	6.75
ST_102012_000745	E VENICE AVE	881	921	900	920	Evacuation Route	658.51	11206	6.79	100 Year	7.95	7.35	7.07	1.16	14.25
ST_102012_031242	E VENICE AVE	2500	2650	2501	2663	Evacuation Route	1463.48	10906	10.30	100 Year	10.95	10.76	10.52	0.65	12.50
ST_102012_031836	JACARANDA BLVD	0	0	201	401	Evacuation Route	1160.87	10907	10.06	100 Year	10.12	9.78	9.59	0.06	2.50
ST_01102024_088538	JACARANDA BLVD	0	0	0	0	Evacuation Route	2633.03	11804	**11.06***	100 Year	11.35	10.91	10.57	0.29	16.00
ST_102012_030654	JACARANDA BLVD	1302	1338	0	0	Evacuation Route	313.04	RB1377S	**14.12***	100 Year	14.39	14.36	14.34	0.27	20.75
ST_102012_001500	US 41 BYP N	0	0	406	598	Evacuation Route	2129.38	11124	9.64	100 Year	9.72	9.29	8.77	0.08	0.25
ST_102012_001422	US 41 BYP N	0	0	600	998	Evacuation Route	1211.12	11125	6.93	100 Year	7.23	7.13	7	0.30	1.25
ST_102012_022820	US 41 BYP S	0	0	522	698	Evacuation Route	710.60	11201	11.79	100 Year	11.98	11.98	11.58	0.19	8.00
ST_102012_026235	US 41 BYP S	0	0	700	1014	Evacuation Route	1849.21	1146512	12.24	100 Year	13.38	13.27	13.07	1.14	3.00
ST_102012_001235	US 41 BYP S	0	0	1016	1266	Evacuation Route	1963.86	1146513	13.01	100 Year	13.88	13.7	13.53	0.87	4.00
ST_102012_000901	US 41 BYP S	101	199	100	198	Evacuation Route	339.95	112013	**8.95***	100 Year	9.31	9.2	8.95	0.29	0.25
ST_102012_000316	US 41 BYP S	321	499	322	398	Evacuation Route	357.08	112016	**11.56***	100 Year	11.83	11.14	10.43	0.32	0.25
ST_102012_000916	US 41 BYP S	501	699	400	520	Evacuation Route	368.11	112017	11.81	100 Year	11.98	11.99	11.73	0.17	5.50
ST_102012_025318	US 41 BYP S	701	773	0	0	Evacuation Route	693.22	11201	10.98	100 Year	11.98	11.98	11.58	1.00	85.75
ST_102012_025397	US 41 BYP S	775	999	0	0	Evacuation Route	1837.76	1146512	12.68	100 Year	13.38	13.27	13.07	0.70	2.00
ST_102012_002031	US 41 BYP S	1001	1261	0	0	Evacuation Route	1963.78	1146513	12.50	100 Year	13.88	13.7	13.53	1.38	4.50
ST_102012_024016	1ST AVE	501	599	500	598	Neighborhood	342.73	11226	6.81	10 Year	8.58	8.12	7.87	1.06	9.00
ST_102012_011158	2ND ST	601	699	600	698	Neighborhood	350.38	RB1394	7.23	10 Year	8.89	8.55	8.22	0.99	9.00
ST_102012_022544	BAVENO DR	817	829	818	828	Neighborhood	547.38	11495A	10.14	10 Year	11.67	11.55	11.46	1.32	76.00
ST_102012_008073	BAY INDIES BLVD	0	0	0	0	Neighborhood	190.35	11160	10.67	10 Year	12.17	12.01	11.91	1.24	16.25
ST_102012_008208	BAY INDIES BLVD	0	0	0	0	Neighborhood	127.22	11160	10.89	10 Year	12.17	12.01	11.91	1.02	14.00
ST_102012_010888	BAY INDIES BLVD	0	0	0	0	Neighborhood	126.96	11160	10.75	10 Year	12.17	12.01	11.91	1.16	15.75
ST_102012_012846	BAY INDIES BLVD	0	0	0	0	Neighborhood	99.82	11160	10.93	10 Year	12.17	12.01	11.91	0.98	13.75
ST_102012_020312	BAY INDIES BLVD	0	0	0	0	Neighborhood	193.04	11160	10.90	10 Year	12.17	12.01	11.91	1.01	14.00
ST_102012_024841	BAY INDIES BLVD	0	0	0	0	Neighborhood	139.65	11160	11.06	10 Year	12.17	12.01	11.91	0.85	12.25
ST_102012_028216	BAY INDIES BLVD	0	0	0	0	Neighborhood	139.45	11160	11.06	10 Year	12.17	12.01	11.91	0.85	12.25
ST_102012_007871	BAY LAKE BLVD	0	0	0	0	Neighborhood	177.32	10112B	1.80	10 Year	3.25	3.18	3.13	1.33	19.50
ST_102012_008010	BAY LAKE BLVD	0	0	0	0	Neighborhood	168.29	10112B	1.68	10 Year	3.25	3.18	3.13	1.45	23.00
ST_102012_024426	BAY LAKE BLVD	0	0	0	0	Neighborhood	89.63	10112B	2.06	10 Year	3.25	3.18	3.13	1.07	9.75
ST_102012_026455	BOXWOOD DR	423	423	424	424	Neighborhood	145.76	11520	11.95	10 Year	13.33	13.19	13.06	1.11	6.00
ST_102012_024363	CARISSA ST	193	204	205	212	Neighborhood	579.89	10112B	1.96	10 Year	3.25	3.18	3.13	1.17	14.50
ST_102012_018943	COCO PALM DR	101	199	100	198	Neighborhood	755.40	10755	10.26	10 Year	11.24	11.1	11.03	0.77	6.25
ST_102012_004026	COMO DR	211	299	206	298	Neighborhood	593.28	11415	11.57	10 Year	12.69	12.53	12.4	0.83	22.75
ST_102012_021699	COUNTRY CLUB WAY	101	199	100	198	Neighborhood	345.49	11206	6.36	10 Year	7.95	7.35	7.07	0.71	3.75
ST_102012_013613	CYPRESS AVE	901	1099	900	1098	Neighborhood	1311.09	1122231S	6.39	10 Year	8.05	7.81	7.64	1.25	10.75
ST_102012_002504	E INAGUA AVE	949	999	948	998	Neighborhood	539.87	11160	10.83	10 Year	12.17	12.01	11.91	1.08	15.00
ST_102012_018641	E JACINTO AVE	949	999	948	998	Neighborhood	542.83	11160	11.04	10 Year	12.17	12.01	11.91	0.87	12.50
ST_102012_032159	E LUCAYA AVE	901	999	900	998	Neighborhood	653.33	11160	10.98	10 Year	12.17	12.01	11.91	0.93	13.00
ST_102012_001656	E VENICE AVE	0	0	400	498	Neighborhood	763.26	11983A	**6.65***	10 Year	7.71	7.62	7.58	0.93	2.50
ST_102012_000135	E VENICE AVE	401	499	0	0	Neighborhood	780.73	11983	**6.76***	10 Year	7.68	7.54	7.44	0.68	1.00
ST_102012_010235	EAST GATE DR	1211	1219	1210	1218	Neighborhood	365.04	RB1159N	7.65	10 Year	8.55	8.48	8.44	0.79	3.75
ST_102012_022163	EAST GATE DR	1221	1299	1220	1298	Neighborhood	477.76	RB1159	7.56	10 Year	8.56	8.48	8.44	0.88	5.25
ST_102012_027664	EAST GATE DR	1301	1309	1300	1308	Neighborhood	503.01	11224A	**8.08***	10 Year	8.93	8.78	8.7	0.62	0.50

ST_102012_020570	EAST GATE DR	1400	1412	1401	1413	Neighborhood	542.99	112281	7.98	10 Year	8.95	8.81	8.73	0.75	1.25
ST_102012_009091	ELAINE ST	1001	1073	1000	1072	Neighborhood	914.12	112141	10.60	10 Year	12.19	12.11	12.06	1.46	84.00
ST_102012_018631	ELAINE ST	1075	1099	1074	1098	Neighborhood	110.43	112141	10.77	10 Year	12.19	12.11	12.06	1.29	84.00
ST_102012_006806	FLAMBOYANT ST	1	6	222	226	Neighborhood	303.93	10112B	2.13	10 Year	3.25	3.18	3.13	1.00	5.00
ST_102012_007316	FLAMBOYANT ST	7	15	205	215	Neighborhood	475.33	10112B	2.01	10 Year	3.25	3.18	3.13	1.12	13.25
ST_102012_012644	FLAMBOYANT ST	16	19	0	0	Neighborhood	179.56	10112B	1.89	10 Year	3.25	3.18	3.13	1.24	16.50
ST_102012_019180	GRADO DR	0	0	816	878	Neighborhood	135.51	11495A	9.95	10 Year	11.67	11.55	11.46	1.51	83.50
ST_102012_026278	GRADO DR	701	815	700	814	Neighborhood	792.61	11495A	10.42	10 Year	11.67	11.55	11.46	1.04	55.00
ST_102012_007366	GRADO DR	817	877	0	0	Neighborhood	145.15	11495A	10.18	10 Year	11.67	11.55	11.46	1.28	73.75
ST_102012_027852	GROVELAND AVE	0	0	0	0	Neighborhood	55.31	11226	6.80	10 Year	8.58	8.12	7.87	1.07	9.25
ST_102012_004946	GROVELAND AVE	0	0	0	0	Neighborhood	63.31	RB1394	7.29	10 Year	8.89	8.55	8.22	0.93	8.25
ST_102012_022177	GROVELAND AVE	1101	1199	1100	1198	Neighborhood	692.95	11226	6.87	10 Year	8.58	8.12	7.87	1.00	8.50
ST_102012_021580	GROVELAND AVE	1201	1299	1200	1298	Neighborhood	880.69	11226	6.84	10 Year	8.58	8.12	7.87	1.03	8.75
ST_102012_020426	GROVELAND AVE	1301	1399	1300	1398	Neighborhood	569.48	RB1394	7.03	10 Year	8.89	8.55	8.22	1.19	10.75
ST_102012_024616	HOME PARK RD	111	123	110	122	Neighborhood	345.95	112223	6.37	10 Year	8.31	7.89	7.67	1.30	11.00
ST_102012_005997	HOME PARK RD	301	399	300	398	Neighborhood	217.77	11222	6.65	10 Year	8.41	7.94	7.68	1.03	8.00
ST_102012_009720	HOPE ST	1001	1099	1000	1098	Neighborhood	1045.79	112141	10.77	10 Year	12.19	12.11	12.06	1.29	84.00
ST_102012_011270	IRONWOOD CIR	0	0	0	0	Neighborhood	41.52	RB1537	11.96	10 Year	13.03	12.94	12.89	0.93	3.25
ST_102012_012945	IRONWOOD CIR	0	0	0	0	Neighborhood	109.43	RB1538	11.71	10 Year	12.78	12.73	12.7	0.99	3.50
ST_102012_025171	KAREN DR	1201	1213	1200	1212	Neighborhood	243.34	112141	11.29	10 Year	12.19	12.11	12.06	0.77	2.75
ST_102012_005645	KAREN DR	1215	1299	1214	1298	Neighborhood	284.67	112141	11.18	10 Year	12.19	12.11	12.06	0.88	11.75
ST_102012_008474	KAREN DR	1301	1309	1300	1310	Neighborhood	284.97	112141	10.66	10 Year	12.19	12.11	12.06	1.40	84.00
ST_102012_006565	KAREN DR	1311	1315	1312	1316	Neighborhood	263.26	112141	10.88	10 Year	12.19	12.11	12.06	1.18	84.00
ST_102012_020812	KAREN DR	1317	1399	1318	1398	Neighborhood	764.81	112141	10.88	10 Year	12.19	12.11	12.06	1.18	84.00
ST_102012_025893	LAUREL AVE	901	1099	900	1098	Neighborhood	1306.23	112224	6.35	10 Year	8.32	7.9	7.67	1.32	11.25
ST_102012_006766	LAUREL AVE	1201	1299	1200	1298	Neighborhood	1027.20	RB1159N	7.71	10 Year	8.55	8.48	8.44	0.73	2.75
ST_102012_016540	LILLIAN ST	1001	1099	1000	1098	Neighborhood	1043.31	112141	11.03	10 Year	12.19	12.11	12.06	1.03	83.75
ST_102012_023071	LONGWOOD DR	398	421	410	420	Neighborhood	926.69	11520	11.36	10 Year	13.33	13.19	13.06	1.70	8.25
ST_102012_020500	MANGO AVE	1201	1299	1200	1298	Neighborhood	854.06	RB1159	7.54	10 Year	8.56	8.48	8.44	0.90	5.75
ST_102012_021309	MANTUA DR	201	399	200	398	Neighborhood	957.95	11415	10.86	10 Year	12.69	12.53	12.4	1.54	83.50
ST_102012_026013	MISSION TRL E	400	428	401	429	Neighborhood	707.29	11682	12.45	10 Year	13.73	13.62	13.56	1.11	2.75
ST_102012_005688	MYRTLE AVE	1101	1199	1100	1198	Neighborhood	575.04	11226	6.77	10 Year	8.58	8.12	7.87	1.10	9.75
ST_102012_023522	N INDIES CIR	1257	1274	1192	1210	Neighborhood	1122.74	RB1348	3.01	10 Year	4.5	4.2	4.1	1.09	4.50
ST_102012_027621	PERIWINKLE ST	0	0	217	221	Neighborhood	318.42	10112B	2.13	10 Year	3.25	3.18	3.13	1.00	4.50
ST_102012_009287	PINELAND AVE	1201	1299	1200	1298	Neighborhood	821.34	RB1394	7.31	10 Year	8.89	8.55	8.22	0.91	8.00
ST_102012_025644	POND WILLOW LN	501	699	500	698	Neighborhood	1736.57	10016	9.34	10 Year	10.83	10.76	10.71	1.37	85.25
ST_102012_027489	ROBERTA ST	1001	1099	1000	1098	Neighborhood	1020.66	112141	11.16	10 Year	12.19	12.11	12.06	0.90	12.25
ST_102012_014957	ROMA RD	213	399	212	398	Neighborhood	943.01	11415	10.66	10 Year	12.69	12.53	12.4	1.74	83.50
ST_102012_017500	SPRUCE AVE	433	439	440	446	Neighborhood	703.15	11520	12.26	10 Year	13.33	13.19	13.06	0.80	4.00
ST_102012_021945	TANGELO PL	216	246	201	255	Neighborhood	251.78	1120311	7.10	10 Year	8.4	8.3	8.18	1.08	3.75
ST_102012_012871	TANGELO PL	850	880	855	895	Neighborhood	231.55	1120311	7.00	10 Year	8.4	8.3	8.18	1.18	4.00
ST_102012_024709	VASTO DR	801	899	800	898	Neighborhood	184.32	11495A	10.19	10 Year	11.67	11.55	11.46	1.27	73.25
ST_102012_023394	VENICE PALMS BLVD	147	215	146	216	Neighborhood	966.98	10755	10.04	10 Year	11.24	11.1	11.03	0.99	25.50
ST_102012_010085	VIA VENETO	501	519	500	520	Neighborhood	661.54	11495A	9.91	10 Year	11.67	11.55	11.46	1.55	83.50
ST_102012_002474	VIA VENETO	521	525	522	526	Neighborhood	115.94	11495A	9.94	10 Year	11.67	11.55	11.46	1.52	83.50
ST_102012_011896	VIA VENETO	527	529	528	530	Neighborhood	162.24	11495A	10.53	10 Year	11.67	11.55	11.46	0.93	44.25
ST_102012_019123	VILLAGE CIR	701	717	700	716	Neighborhood	222.36	RB1538	11.64	10 Year	12.78	12.73	12.7	1.06	3.75
ST_102012_027447	VILLAGE CIR	719	799	718	798	Neighborhood	1006.31	RB1538	10.69	10 Year	12.78	12.73	12.7	2.01	5.75
ST_102012_007559	W INAGUA AVE	901	947	900	946	Neighborhood	538.17	11160	10.82	10 Year	12.17	12.01	11.91	1.09	15.00
ST_102012_008022	W JACINTO AVE	901	947	900	946	Neighborhood	540.03	11160	11.02	10 Year	12.17	12.01	11.91	0.89	12.75
ST_102012_012626	W LUCAYA AVE	901	999	900	998	Neighborhood	2003.89	11160	10.30	10 Year	12.17	12.01	11.91	1.61	18.75
ST_102012_004004	WARFIELD AVE N	101	299	100	298	Neighborhood	188.02	11983	6.84	10 Year	7.68	7.54	7.44	0.60	0.50
ST_102012_003813	WARFIELD AVE S	101	119	100	119	Neighborhood	169.68	11983A	6.87	10 Year	7.71	7.62	7.58	0.71	1.50

Figure B-1. Location Map of LOS Deficient Roadways