Memorandum

To: Kevin Madson, 3M Chemical Operations LLC
From: Barr Engineering Co.
Subject: Draft Modeling Summary
Date: September 24, 2024
Project: 3M Oakdale Surface Water Diversion Project

Barr Engineering Co. (Barr) completed a hydrologic and hydraulic (H&H) modeling analysis for 3M Chemical Operations LLC's (3M) Oakdale Surface Water Diversion Project (Project) in the City of Oakdale, Minnesota (Figure 1). The purpose of this Project is to significantly reduce the intermittent stormwater discharge through the ditch at the eastern boundary (Site Outfall) of the Abresch Disposal Site (Site). Stormwater that flows through the Site is impacted by polyfluoroalkyl substances (PFAS), which impacts downstream waters. To reduce the downstream PFAS impacts, the discharges would be reduced by diverting stormwater from a large watershed, which intermittently sends surface water through the Site, to a new discharge point located downstream of the Site.

With the new discharge point, the Project would decrease the frequency of the discharge from the Site which would reduce the discharge of PFAS to downstream waters. The Project would include construction of a diversion structure, diversion pipe, flood retention basin, and basin outlet structure (Figure 2). This memorandum evaluates if the reduction in surface water entering the Site would 1) reduce the surface water discharge from the Site, and 2) affect the character of the wetlands located within the 98-acre Project area.

Currently, the Project area receives stormwater runoff from an approximately 423-acre drainage area (Figure 3). With the implementation of the Project, 185 acres of the drainage area will be diverted away from the Site (Figure 3). In addition, the wetlands on the Site will continue to receive surface water from their subwatershed, precipitation, and snowmelt. The remaining 238 acres of drainage area will not be diverted and will continue to drain to the Site. The subwatersheds within the Project area that are discussed in this memorandum are identified on Figure 4.

Field wetland delineations were conducted for the Project on May 13, 2021, October 27, 2022, June 22, 2023, and August 31, 2023 (Reference (1)). The wetland delineations were conducted within a 164-acre wetland survey area, which extends outside of the Project area (Figure 5). A total of 65.2 acres of aquatic resources (wetlands, ponds, ditches, etc.) were delineated within the wetland survey area; a total of 19 wetlands (32.0 acres) were delineated within the Project area (Figure 5). Within the Project area, 2 areas of aquatic resources are identified as Minnesota Department of Natural Resources (DNR) public waters wetlands (Figure 5). The wetlands and their respective subwatersheds are shown on Figure 6. The wetlands within the Project area are located either on or adjacent to the Site, and some wetlands contain PFAS-contaminated sediment.

1.1 Modeling Methodology

1.1.1 Model Updates

The model used to evaluate the wetlands is derived from an existing XPSWMM model (model) of the Raleigh Creek watershed that is typically provided to consultants by the Valley Branch Watershed District

(VBWD). The model was updated with the following changes to create the existing conditions model used to provide information for this memorandum:

Revisions to model elements to reflect the storm sewer survey conducted by Alliant Engineering, Inc. (Alliant Engineering) in October 2022, September 2023, and November 2023.

Revisions to the normal water level for the ponds northwest of the project (RLE_950 and RLE_940; Figure 4) based on the storm sewer survey collected by Alliant Engineering in October 2022, September 2023, and November 2023.

Subwatershed refinements to simulate direct stormwater runoff to each wetland within the Project area.

Subwatershed modifications to reflect the newly constructed walking trail south of 34th Street North/County Road 14.

- Subwatershed and storm sewer modifications in the Tilsen Park area to reflect the storm sewer survey conducted by Alliant Engineering in October 2022, September 2023, and November 2023 and the site visit conducted by Barr in February 2024.
- Revisions to stage-storage curves for wetland subwatersheds RLE-800, RLE-800a, RLE-830, RLE-831, RLE-890 to RLE-896, RLE-904 and RLE-910 to reflect LiDAR topography data collected by SkySkopes in 2020.
- Revisions to the stage-storage curve for subwatersheds adjacent to the Project area (RLE-801, RLE-897, RLE-900, RLE-902, RLE-914, and RLE-940) to reflect LiDAR topography data collected by SkySkopes in 2020.
- Revisions to wetland runout elevations and overflow transects for subwatersheds RLE-800, RLE-800a, RLE-801, RLE-830, RLE-831, RLE-890 to RLE-896, RLE-904, and RLE-910 to reflect LiDAR topography data collected by SkySkopes in 2020.
- Revisions to runout elevations and overflow transects for watersheds adjacent to the Project area (RLE-801, RLE-820, RLE-881, and RLE-897) to reflect LiDAR topography data collected by SkySkopes in 2020.
- Revisions to the storm sewer culverts beneath the access road south of 34th Street North/County Road 14 and beneath the access road between Wetland C and A to reflect Barr survey data collected during wetland monitoring activities.

Using the updated existing conditions model, a proposed conditions model was developed which includes the proposed Project features.

1.1.2 Design Storm Events

For the purposes of understanding the effect of the Project on the surrounding wetlands, the 0.5-inch, 1-inch, 1-year, and 2-year Atlas 14, 24-hour design storm events were simulated (Table 1). The 24-hour duration design storm events were simulated using the Atlas 14 MSE3 precipitation distribution. The 24-hour duration 1-year and 2-year rainfall depths were provided by the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 estimates for the Site and are consistent with the estimates used by the VBWD.

Table 1 Atlas 14 Design Storm Depths

Design Storm Event (24 Hour Duration)	Design Storm Event Depth (inches)
0.5-inch	0.50
1.0-inch	1.00
1-year	2.44
2-year	2.80

1.1.3 Scenarios for the Existing and Proposed Conditions Models

The design storm events were simulated in the existing and proposed condition models under the following three scenarios:

1. **Scenario 1 - "OHWL conditions model"**
    a. The starting water elevations in the wetlands are at the Ordinary High Water Level (OHWL) or wetland runout elevation.
    b. This scenario represents a wetter condition with high surface water levels.
2. **Scenario 2 - "dry conditions model"**
    a. The year 2011 was a dry year with less than average rainfall.
    b. The starting water elevations in the wetlands are at the 2011 LiDAR elevation
    c. This scenario represents a drier condition with low surface water levels.
3. **Scenario 3 - "dry conditions model with groundwater in flux"**
    a. The year 2011 was a dry year with less than average rainfall.
    b. The starting water elevations in the wetlands are at the 2011 LiDAR elevation.
    c. This scenario represents a drier condition with low surface water levels.
    d. The average groundwater/surface water flux for each wetland was derived from groundwater modeling previously developed for the Site (Reference [2]). The flux was modeled as a constant inflow to or outflow from the respective wetland subwatershed.

Water levels for the Site typically have a large flux during the growing season depending on precipitation events. However, a review of recent on-site monitoring data confirmed that the two starting water levels for Scenario 1 and Scenario 2 provide a reasonable representation of the typical high and low water levels within the wetlands. Scenario 3 was evaluated to determine if the groundwater pumping had a significant effect on the surface water levels in the wetlands. In most cases, the groundwater flux was from the surface water to the groundwater, resulting in a loss of surface water runoff from the wetlands. The results of Scenario 3 were minimally different, and in most cases resulted in smaller wetland impacts, compared with Scenario 2. Therefore, additional evaluation of the wetland impacts associated with Scenario 3 are not included in the modeling results.

1.2 Modeling Results

1.2.1 Comparison of Volumes and Peak Flows at Site Outfall

The purpose of the Project is to reduce PFAS-impacted stormwater discharges at the Site Outfall. As a result of the Project, less stormwater runoff will be routed through the existing ditch and adjacent wetlands. The decrease in stormwater outflow from the ditch west of Hadley Avenue for the 0.5-inch, 1.0-inch, 1-year, and 2-year events under Scenario 1 and Scenario 2 are presented in Table 2.

As shown in Table 2, the Project could result in approximately 60 to 70 percent reduction in PFAS-impacted stormwater at the Site Outfall for 24-hour duration rainfall events between 0.5- and 1.0-inches in depth. In review of precipitation records collected at the Minneapolis-St. Paul International Airport weather station from 1949 to 2024, approximately 70 percent of rainfall events are smaller than 0.5 inches, and 90 percent of rainfall events are smaller than 1.0 inches suggesting that the results below generally reflect the impacts of the Project on stormwater observed at the Site Outfall under an average annual condition.

Table 2 Comparison of Volumes and Peak Flows at Site Outfall

0.5-inch Event					
Scenario 2	0.2	0.2	0.2	0.2	0
1.0-inch Event					
Scenario 1	0.7	0.7	4.4	1.7	60
Scenario 2	1.3	1.3	1.9	0.6	67
1-Year Event					
Scenario 1	16.3	15.7	35.6	17.8	50
Scenario 2	15.0	14.9	34.5	16.7	52
2-Year Event					
Scenario 1	21.7	21.1	45.4	23.2	49
Scenario 2	22.0	21.9	44.8	34.5	23

1.2.2 Comparison of Inundation Duration

Elevation hydrographs for the wetland subwatersheds compared the existing conditions model with the proposed conditions model results for Scenario 1 and Scenario 2 in Attachment A and Attachment B, respectively. Under the existing conditions model, the stormwater runoff flows into the Project area through a culvert beneath Granada Avenue North into Wetland H (Figure 4). The surface water then flows through Wetland H into a ditch that flows south through a culvert under 34th Street North/County Highway 14, through Wetland A, through a culvert under Hadley Avenue North, through Wetland T, through culverts under U.S. Interstate 694 (I-94), and into Raleigh Creek. This flow path is shown on Figure 4.

The elevation hydrographs for both the existing and proposed conditions (both scenarios) indicate peak water elevations, or the maximum water surface elevation (MWSE), are reached within the first day of the simulated design storm event. This peak in water elevation is caused by surface water runoff within the direct wetland subwatershed (see Figure 2). In some cases (for example, in subwatershed RLE_800), a second or third smaller peak may form resulting from inflow from upstream areas.

Surface water conveyed through the upstream ditch results in the attenuation of the receding limb of the elevation hydrograph. As demonstrated under both proposed conditions scenarios, the duration of attenuation of the receding limb of the elevation hydrograph is shorter and less pronounced compared to existing conditions. This reduced inundation time within the wetlands is a result of the Project diverting 185 acres of drainage area and associated stormwater runoff away from the wetlands. As demonstrated by the elevation hydrographs, the reduction in inundation times within the wetlands are generally on the order of a few days.

1.2.3 Comparison of Maximum Surface Water Elevations

Table 3 summarizes the changes in MWSE for each of the wetland subwatershed under both proposed conditions scenarios. The range of values listed in the Reduction in MWSE (feet) column in Table 3 represents the change in the MWSE from the existing conditions to the proposed conditions (Scenario 1 and Scenario 2) during the 0.5-inch, 1.0-inch, 1-year, and 2-year design storm event simulations. Attachment A and Attachment B provide detailed tables and elevation hydrographs of the existing and proposed MWSE for each wetland under Scenario 1 and Scenario 2, respectively.

The reduction in the MWSE from existing conditions to proposed conditions generally ranges from no change to 0.5 feet. Under both proposed conditions scenarios, the MWSE for nine of the 12 subwatersheds are unchanged compared to existing conditions indicating that the wetlands within these subwatersheds would not be affected by the Project (Table 3; Figure 4). Subwatersheds RLE_910, RLE_800a, and RLE_720 would experience a change in MWSE as described below.

- Subwatershed RLE_910 would experience the largest change in the MWSE during the 2-year event under Scenario 2. Under Scenario 2, Wetland H is assumed to have an initial water level approximately 0.5 feet below its runout elevation, so there is approximately 2.2 acre-feet of storage available in the wetland before inflows would discharge to the downstream wetland in subwatershed RLE_897. The 0.5-foot reduction in MWSE during this event corresponds to a 0.48-acre reduction in the inundation area (Figure 8; Table 3, Attachment B).

- Subwatershed RLE_800a would experience the largest change in the MWSE during the 1-inch event under Scenario 2. The 0.2-foot reduction in MWSE during this event corresponds to a 0.53-acre reduction in the inundation area (Table 3; Attachment B).

- Subwatershed RLE_720 would experience the largest change in the MWSE during the 2-year event under Scenario 2. The 0.1-foot reduction in MWSE during this event corresponds to a 0.34-acre reduction in the inundation area (Figure 8; Table 3; Attachment B).

1.2.4 Summary of Model Results

Under the proposed conditions, the wetlands on the Site will continue to receive runoff from their immediate subwatersheds (Figure 6) and the 238-acre drainage area that will not be diverted by the Project (Figure 3). The wetland areas currently receiving runoff from the ditch (identified in Table 3) will have a change (reduction) in surface water inflow (see inflow volumes in the Attachment A and

Attachment B summary tables), resulting in a change (reduction) in inundation duration and, in the cases previously mentioned, MWSE. The change in the duration and depth of inundation could potentially affect the wetland function. The Scenario 2 0.5-inch and 2-year design storm event inundation areas under existing and proposed conditions within the three subwatersheds that experienced a change in MWSE (RLE_910, RLE_800a, and RLE_720) are shown in Figure 7 and Figure 8, respectively. As demonstrated spatially and also tabulated in Table 3, the reduction in inundation areas are relatively minor.

Table 3 Change in Maximum Water Surface Elevation for Wetland Subwatersheds

Sub watershed ID	Wetland ID	VBWD Management Class	Proposed Conditions Scenario	Starting Water Elevation (feet)	DNR OHWL (feet)[3]	Runout Elevation (feet)	Reduction in MWSE (feet)[1]	Change in Wetland Area from Existing to Proposed Conditions (ac)
RLE_904	I	C-Manage 2	1	1004.4[2]	N/A	1004.4	0.0 (No Change)	0.0 (No Change)
			2	1004.4[2]	N/A	1004.4	0.0 (No Change)	0.0 (No Change)
RLE_910	H	B-Manage 1	1	1005.8[2]	N/A	1005.8	<0.1– 0.3	0.00-0.19
			2	1005.3[5]	N/A	1005.8	0.3 – 0.5	0.12-0.48
RLE_897	N	N/A[4]	1	1000.1	N/A	1000.1	0.0 (No Change)	0.0 (No Change)
			2	1000.1	N/A	1000.1	0.0 (No Change)	0.0 (No Change)
RLE_896	A	C-Manage 2	1	998.1[2]	N/A	998.1	0.0 (No Change)	0.0 (No Change)
			2	998.1[2]	N/A	998.1	0.0 (No Change)	0.0 (No Change)
RLE_895	A	C-Manage 2	1	995.4[2]	N/A	995.4	0.0 (No Change)	0.0 (No Change)
			2	995.0	N/A	995.4	0.0 (No Change)	0.0 (No Change)
RLE_894	A	C-Manage 2	1	994.7[2]	N/A	994.7	0.0 (No Change)	0.0 (No Change)
			2	994.7[2]	N/A	994.7	0.0 (No Change)	0.0 (No Change)
RLE_893	A	C-Manage 2	1	994.1	994.1	994.2	0.0 (No Change)	0.0 (No Change)
			2	993.5	994.1	994.2	0.0 (No Change)	0.0 (No Change)
RLE_892	E	C-Manage 2	1	996.1[2]	N/A	996.1	0.0 (No Change)	0.0 (No Change)
			2	994.9	N/A	996.1	0.0 (No Change)	0.0 (No Change)
RLE_890	A	C-Manage 2	1	993.6[2]	994.1	993.6	0.0 (No Change)	0.0 (No Change)
			2	992.4	994.1	993.6	0.0 (No Change)	0.0 (No Change)
RLE_800a	A	C-Manage 2	1	992.5[2]	994.1	992.5	0.0 (No Change)	0.0 (No Change)
			2	990.9	994.1	992.5	<0.1 – 0.2	0.00 – 0.53

Sub watershed ID	Wetland ID	VBWD Management Class	Proposed Conditions Scenario	Starting Water Elevation (feet)	DNR OHWL (feet)[3]	Runout Elevation (feet)	Reduction in MWSE (feet)[1]	Change in Wetland Area from Existing to Proposed Conditions (ac)
RLE_800	A	C-Manage 2	1	989.2[2]	994.1	989.2	0.0 (No Change)	0.0 (No Change)
			2	989.2	994.1	989.2	0.0 (No Change)	0.0 (No Change)
RLE_720	T	C-Manage 2	1	985.8	N/A	985.8	<0.1 – 0.1	0.03 – 0.34
			2	985.8	N/A	985.8	<0.1 – 0.1	0.01 – 0.34

[1] Reported as a range of reduction in MWSE based on the 0.5-inch, 1-inch, 1-year, and 2-year design storm events.
[2] Starting water elevation set at runout elevation.
[3] N/A means that no OHWL has been identified by the DNR.
[4] N/A means that VBWD has not assigned a management class to the wetland.
[5] The starting elevation used in the model was 1005.25 feet as requested by the DNR.

1.3 Indirect Wetland Impact Results

Seven wetlands within the Project area were identified that may be potentially indirectly impacted by the Project. Wetlands A, E, H, I, N, U, and T were evaluated to determine if the Project would reduce the wetland area (acreage), result in a change in wetland type, or result in a loss of wetland function (Figure 5). The remainder of the wetlands in the Project area would not be affected by the Project since they are not connected to the ditch going through the Site. Therefore, impacts to these wetlands and stormwater ponds are not addressed in this memorandum.

Figure 5 identifies the regulatory status of the seven wetlands. Wetlands E, I, and N are isolated wetlands so are not regulated under the Clean Water Act; the remainder of the wetlands are adjacent to the ditch which is considered to be a WOTUS. Wetlands N are incidental wetlands so are exempt under the Wetland Conservation Act (WCA); wetlands H, I, U, and T are regulated by WCA. Wetlands A and H are partially regulated by WCA and by the DNR Public Waters Program.

1.3.1 Wetland A

Wetland A is a temporary and seasonally flooded emergent wetland complex (fresh wet meadow/PEMB/Type 2, shallow marsh/PEMC/Type 3, and deep marsh/PEMF/Type 5) located in subwatersheds RLE_800, RLE_890, RLE_893, RLE_893, RLE_895, and RLE_896 (Figure 6; Table 3). Dominant plant species identified in the wetland included quaking aspen (*Populus tremuloides*), reed canary grass (*Phalaris arundinacea*), hybrid cattail (*Typha X glauca*), and giant goldenrod (*Solidago gigantea*). Dominant vegetation at the upland sample points included northern red oak (*Quercus rubra*), northern white oak (*Quercus alba*) and common buckthorn (*Rhamnus cathartica*).

Based on the XPSWMM model results, Wetland A would receive less hydrology (surface water) under the proposed conditions compared to the existing conditions. However, the change in the MWSE is negligible and results in no loss in the RLE_896, RLE_895, RLE_894, RLE_893, RLE_800, and RLE_890 subwatersheds under Scenario 1 and 2. Subwatershed RLE_800a would experience no change in MWSE under Scenario 1 but would experience a loss in MWSE under Scenario 2 (Table 3). The change in MWSE under Scenario 2 is up to 0.2 feet (2.4 inches).

The model results indicate that subwatershed RLE_800a would have a maximum 0.2-foot reduction in the MWSE during the 1-inch event under Scenario 2. This corresponds with a 0.53-acre reduction in the inundation area (Table 3; Attachment B).

The temporarily flooded portions of Wetland A are dominated by reed canary grass. Reed canary grass is an introduced species that has adapted to a variety of conditions (wet to dry). It is moderately drought tolerant but requires 18 inches of annual precipitation and can withstand continuous inundation for 60 to 70 days (Reference (3)). With its wide range of growth conditions, it is anticipated that the Project would not significantly affect the existing population of reed canary grass. The temporarily flooded portion of the wetland would continue to receive surface water from the surrounding subwatersheds that would continue to support the growth of hydrophytic wet meadow species, such as reed canary grass.

The seasonally flooded portion of Wetland A is dominated by hybrid cattail, which is obligate wetland species. Cattails, like many emergent wetland species, tolerate flood drawdown cycles that occur in riparian wetland systems. Based on the modeling results, it is anticipated that the seasonally flooded portions of Wetland A would continue to flood from hydrology (surface water) received from the surrounding subwatersheds.

The change in hydrology is not anticipated to affect the wetland vegetation or habitat given dominance of reed canary grass and hybrid cattail. The wetland would still provide flood protection (retain water) to the surrounding residences during a 100-year storm event.

1.3.2 Wetland E

Wetland E is a seasonally flooded emergent wetland (fresh wet meadow/PEMB/Type 2) located in the RLE_892 subwatershed (Figure 6). Dominant vegetation in the wetland includes lake sedge (*Carex lacustris*) and hybrid cattail, with reed canary grass also present. Dominant vegetation at the upland sample points included northern red oak, northern white oak, and common buckthorn.

Wetland E is an isolated wetland that is not connected to Wetland A or the existing ditch. The modeling results indicate that the MWSE for Wetland E would not change from the existing to proposed conditions under Scenarios 1 and 2. This indicates that Wetland E is only receiving hydrology from the RLE_892 subwatershed (Table 3). Therefore, it is anticipated that the Project would have no effect on Wetland E since the Project will not divert flows from the RLE_892 subwatershed (Figure 6). Furthermore, the Project would not impact the vegetation within the subwatershed or increase impervious surfaces.

1.3.3 Wetland H

Wetland H is a permanently flooded excavated wetland (deep marsh/PEMF/Type 4 and open water/PUBHx/Type 5) located in the RLE_910 subwatershed (Figure 6). Dominant vegetation at the wetland sample points included lesser duckweed (*Lemna minor*). Dominant vegetation at the upland sample points included northern red oak, northern white oak, and common buckthorn.

This wetland receives hydrology (surface water) through the culvert under Granada Avenue and outlets the surface water through the ditch at an elevation of 1005.8 feet (Table 3). Based on the modeling results, the Project would reduce the MWSE in this watershed by <0.1 to 0.5 feet under Scenarios 1 and 2 (Table 3). This wetland would maintain the existing outlet elevation of 1005.8 feet under proposed conditions. The model indicates that subwatershed RLE_910 would have a maximum 0.5-foot reduction

in the MWSE during the 2-year event under Scenario 2. This corresponds with a 0.48-acre reduction in the inundation area (Table 3; Attachment B).

The steep side slopes along the wetland edges would moderate the water level fluctuations so the Project is not anticipated to have a significant impact on the wetland hydrology or the vegetation.

The vegetation surrounding the wetland is dominated by buckthorn, which is an introduced species. This species is considered a semi-hydric species and is known to establish in saturated soils and tolerate intermittent flooding (Reference (4)). It is not anticipated that the Project would affect the existing population of buckthorn.

1.3.4 Wetland I

Wetland I is a seasonally flooded and shallow, open water wetland (deep marsh/PEMF/Type 4 and deep water/PUBH/Type 5) located in the RLE_904 subwatershed (Figure 6). Dominant vegetation at the wetland sample points included lesser duckweed. Dominant vegetation at the upland sample points included boxelder and common buckthorn. The modeling results indicate that the MWSE for Wetland I would not change from the existing to proposed conditions under either scenario indicating that Wetland I does not receive hydrology from the RLE_910 subwatershed but does receive inflow from other subwatersheds not within the Project area (Table 3). Therefore, it is anticipated that the Project would have no effect on Wetland I since the Project will not divert flows that currently flow to the RLE_892 subwatershed (Figure 3). Furthermore, the Project would not disturb the vegetation within the subwatershed or increase impervious surface.

1.3.5 Wetland N

Wetland N is a wet ditch and fresh (wet) meadow wetland (PEMB/Type 2) located in RLE_897 subwatershed (Figure 6). Dominant vegetation at the wetland sample points included hybrid cattail and reed canarygrass. Dominant vegetation at the upland sample point included smooth brome (*Bromus inermis)* and Canada thistle (*Cirsium arvense*).

Wetland N is located in a ditch south of CSAH 14 between the roadway and the bike trail. A culvert under CSAH 14 directs water from the ditch into the wetland and outfall is into the ditch through a culvert under the bike trail. Wetland N was created within the low area created by the construction of CSAH and the bike trail. Based on the modeling results for subwatershed RLE_897, the Project would not change the MWSE in this watershed under Scenarios 1 and 2 (Table 3). This wetland would maintain the existing outlet elevation of 1000.1 feet under proposed conditions indicting that there would be no change in the normal water elevation of the wetland.

1.3.6 Wetland U

Wetland U is a shallow marsh (PEMC/Type 3) wetland located at the proposed flood retention basin. Dominant vegetation at the wetland sample points included hybrid cattail and reed canarygrass. Dominant vegetation at the upland sample points included smooth brome, reed canarygrass, Canada thistle, and Canada goldenrod (*Solidago canadensis*).

The Project would divert stormwater from the Site to the flood retention basin which would be constructed in the uplands adjacent to Wetland U. The Project would maintain the existing surface water elevations in Wetland U by grading the flood retention basin up to the boundary of the wetland. This would avoid draining the existing wetland area and would allow the diverted stormwater to overflow into the flood

retention basin. The flood retention basin is designed to accommodate up to a 100-year flood event; larger rain events would flow through the diversion overflow and would be conveyed to the Site as it does under the existing conditions. It is anticipated that the Project would not impact Wetland U by maintaining the existing surface water elevations and creating additional area to accommodate the increased stormwater conveyance.

1.3.7 Wetland T

Wetland T is a shallow marsh wetland (PEMC/Type 3) located downstream from the site and the proposed flood retention basin. The vegetation in wetland T was dominated by hybrid cattails and reed canary grass. Currently this wetland receives hydrology from the Site through the existing ditch that flows under Hadley Avenue. Under the proposed conditions, the wetland would receive hydrology from the flood retention basin to the north.

Based on the modeling results for subwatershed RLE_720, the Project would reduce the MWSE in this watershed by <0.1 to 0.1 feet under Scenarios 1 and 2 (Table 3). This wetland would maintain the existing outlet elevation of 985.8 feet under proposed conditions. The model indicates that subwatershed RLE_720 would have a maximum 0.1-foot reduction in the MWSE during the 2-year event under Scenario 2. This corresponds with a 0.34-acre reduction in the inundation area (Table 3; Attachment B).

The Project would reduce the amount of PFAS-impacted water conveyed to Wetland T by diverting stormwater to the flood retention basin to the north. Therefore, it is anticipated that the Project would have a net benefit to Wetland T.

1.4 Potential Indirect Impacts to Public Waters Wetlands

There are two public waters wetlands located within the Project area including PWI 82-401W and 82-404W (Figure 5, Table 4). In Minnesota, public waters wetlands are defined as any Type 3, 4, or 5 (Cowardin et. al. 1979) wetland that is ten (10) or more acres in size in unincorporated areas or 2.5 acres or more in incorporated areas (Minn. Stat. 103G.003, Subd 15).

The DNR regulates any project-related impact below the OHWL of a public water wetlands. The OHWL is defined as an elevation identified at the highest water level that has been maintained for a sufficient period of time to leave evidence up on the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial (Minn. Stat. 103G.005, Subd. 14). DNR staff visited the Project area in 2023 to determine the OHWL for the public water wetlands. The OHWLs for the public waters wetlands within the Project area are identified in Table 4.

Table 4 OHWLs for Public Waters Wetlands within the Project Area

Public Waters Inventory Wetland	Associated Wetland ID	Circular 39 Wetland Classification	Subwatershed ID(s)	OHWL
82-401W	Wetland H	Type 4/5	RLE_910	1006.5
82-404W	Wetland A	Type 2/3/4	RLE_800a, RLE_890	941.1

Based on the modeling results (Table 3; Attachment B):

- For subwatershed RLE_910, maximum 0.5-foot reduction in the MWSE during the 2-year event under Scenario 2 corresponds with a 0.48-acre reduction in the inundation area for Wetland H.
- For subwatershed RLE_800a, the maximum 0.2-foot reduction in the MWSE during the 1-inch event under Scenario 2 corresponds with a 0.53-acre reduction in the inundation area for Wetland A.

1.5 Results

Overall, the Project would improve downstream water quality by diverting surface water around the Site and reducing the discharge of PFAS-contaminated water to downstream waters. However, because the watershed to through the wetlands is reduced by approximately 40%, the Project could result in a loss of hydrology to the wetlands located within the Project area that receive inflow from the ditch. Based on the modeling results, the reduced hydrology from the diverted stormwater could indirectly impact by reducing the inundation areas for Wetland H (PWI 82-401W) and A (PWI 82-404W) by 0.48 acres and 0.53 acres, respectively. In addition, the modeling results indicate that Wetland T could also be indirectly impacted with a corresponding reduction in the inundation area of 0.34 acres.

The indirect wetland impacts would be regulated by WCA (1.35 acres for Wetlands A, H, and T) and by the Public Waters Program (1.01 acres for Wetlands A and H). Since there is no fill activity in WOTUS for the Project, no indirect wetland impacts would be regulated under the Clean Water Act.

References

Stantec Consulting Services Inc. Wetland Delineation Report. Revised November 2023

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Attachments

Attachment A Scenario 1 OHWL Condition Stage Hydrographs and MWSE Comparisons
Attachment B Scenario 2 Dry Condition Stage Hydrographs and MWSE Comparisons

Attachment A

Scenario 1 OHWL Condition Stage Hydrographs and MWSE Comparisons

Summary Node: RLE-904

Wetland ID: I
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	1004.4	1004.4	0.0	0.00	0.0	0.0	0%	<1	<1	0
1-Inch	1004.5	1004.5	0.0	0.00	0.0	0.0	0%	<1	<1	0
1-Year	1004.7	1004.7	0.0	0.00	0.6	0.6	0%	1	1	0
2-Year	1004.8	1004.8	0.0	0.00	0.8	0.8	0%	1	1	0

Summary Node: RLE-910

Wetland ID: H
Wetland Classification: B-Manage 1

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	1005.9	1005.8	<0.1	-0.03	1.2	0.2	-87%	<1	<1	0
1-Inch	1006.0	1006.0	-0.1	0.00	3.5	0.6	-82%	5	1	-3
1-Year	1006.7	1006.4	-0.3	-0.19	22.0	4.0	-82%	7	2	-5
2-Year	1006.8	1006.5	-0.3	-0.18	27.2	4.8	-82%	7	2	-5

Summary Node: RLE-897

Wetland ID: N
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	1000.6	1000.6	0.0	0.00	1.4	0.4	-69%	<1	<1	0
1-Inch	1000.9	1000.9	0.0	0.00	4.2	1.4	-66%	3	1	-2
1-Year	1002.1	1002.1	0.0	0.00	24.4	6.5	-73%	6	2	-4
2-Year	1002.3	1002.3	0.0	0.00	30.2	7.8	-74%	6	2	-4

Summary Node: RLE-896

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	999.3	999.3	0.0	0.00	1.4	0.4	-69%	17	4	-13
1-Inch	999.8	999.8	0.0	0.00	4.2	1.4	-66%	>20	7	<-12
1-Year	1001.6	1001.6	0.0	0.00	24.4	6.5	-73%	>20	8	<-11
2-Year	1001.8	1001.8	0.0	0.00	30.2	7.9	-74%	>20	8	<-11

Summary Node: RLE-895

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	995.9	995.9	0.0	0.00	1.4	0.5	-68%	<1	<1	0
1-Inch	996.1	996.1	0.0	0.00	4.3	1.5	-65%	4	1	-3
1-Year	996.7	996.7	0.0	0.00	24.8	6.9	-72%	7	2	-4
2-Year	996.9	996.9	0.0	0.00	30.7	8.3	-73%	7	2	-4

Summary Node: RLE-894

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	995.1	995.1	0.0	0.00	1.4	0.5	-67%	<1	<1	0
1-Inch	995.3	995.3	0.0	0.00	4.3	1.5	-64%	5	1	-3
1-Year	995.5	995.5	0.0	0.00	25.1	7.2	-71%	7	3	-5
2-Year	995.6	995.6	0.0	0.00	31.1	8.7	-72%	8	3	-5

Summary Node: RLE-893

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	994.4	994.4	0.0	0.00	1.4	0.5	-67%	18	18	0
1-Inch	994.6	994.6	0.0	0.00	4.3	1.6	-64%	>20	>20	0
1-Year	995.3	995.3	0.0	0.00	25.5	7.6	-70%	>20	>20	0
2-Year	995.5	995.5	0.0	0.00	31.5	9.2	-71%	>20	>20	0

Summary Node: RLE-892

Wetland ID: E
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	996.1	996.1	0.0	0.00	0.0	0.0	0%	<1	<1	0
1-Inch	996.1	996.1	0.0	0.00	0.0	0.0	0%	<1	<1	0
1-Year	996.3	996.3	0.0	0.00	0.1	0.1	0%	<1	<1	0
2-Year	996.3	996.3	0.0	0.00	0.2	0.2	0%	<1	<1	0

Summary Node: RLE-890

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	993.7	993.7	0.0	0.00	1.4	0.4	-69%	<1	<1	0
1-Inch	994.0	994.0	0.0	0.00	4.4	1.6	-63%	5	2	-3
1-Year	994.8	994.8	0.0	0.00	26.2	8.3	-68%	7	3	-5
2-Year	994.9	994.9	0.0	0.00	32.5	10.1	-69%	8	3	-5

Summary Node: RLE-800a

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	992.6	992.6	0.0	0.00	1.4	0.4	-69%	6	1	-5
1-Inch	992.8	992.7	0.0	0.00	4.5	1.7	-62%	10	4	-6
1-Year	993.3	993.3	0.0	0.00	35.8	17.9	-50%	18	18	0
2-Year	993.4	993.4	0.0	0.00	45.6	23.3	-49%	18	18	0

Summary Node: RLE-800

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	989.1	989.1	0.0	0.00	1.6	0.7	-58%	<1	<1	0
1-Inch	989.3	989.3	0.0	0.00	5.1	2.4	-54%	5	2	-3
1-Year	990.2	990.2	0.0	0.00	38.6	20.7	-46%	16	15	-2
2-Year	990.4	990.4	0.0	0.00	48.9	26.6	-46%	18	17	-2

Summary Node: RLE-720

Wetland ID: T
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	987.3	987.2	-0.1	-0.01	2.5	2.7	5%	1	3	2
1-Inch	988.0	987.9	-0.1	-0.03	8.2	8.4	2%	7	6	-1
1-Year	989.8	989.7	-0.1	-0.14	58.2	58.3	0%	>20	>20	0
2-Year	990.2	990.0	-0.1	-0.34	72.9	73.0	0%	>20	>20	0

1 - Duration that wetland stage is >0.1 feet above starting elevation. Events were simulated over a 20-day duration.

Summary Node
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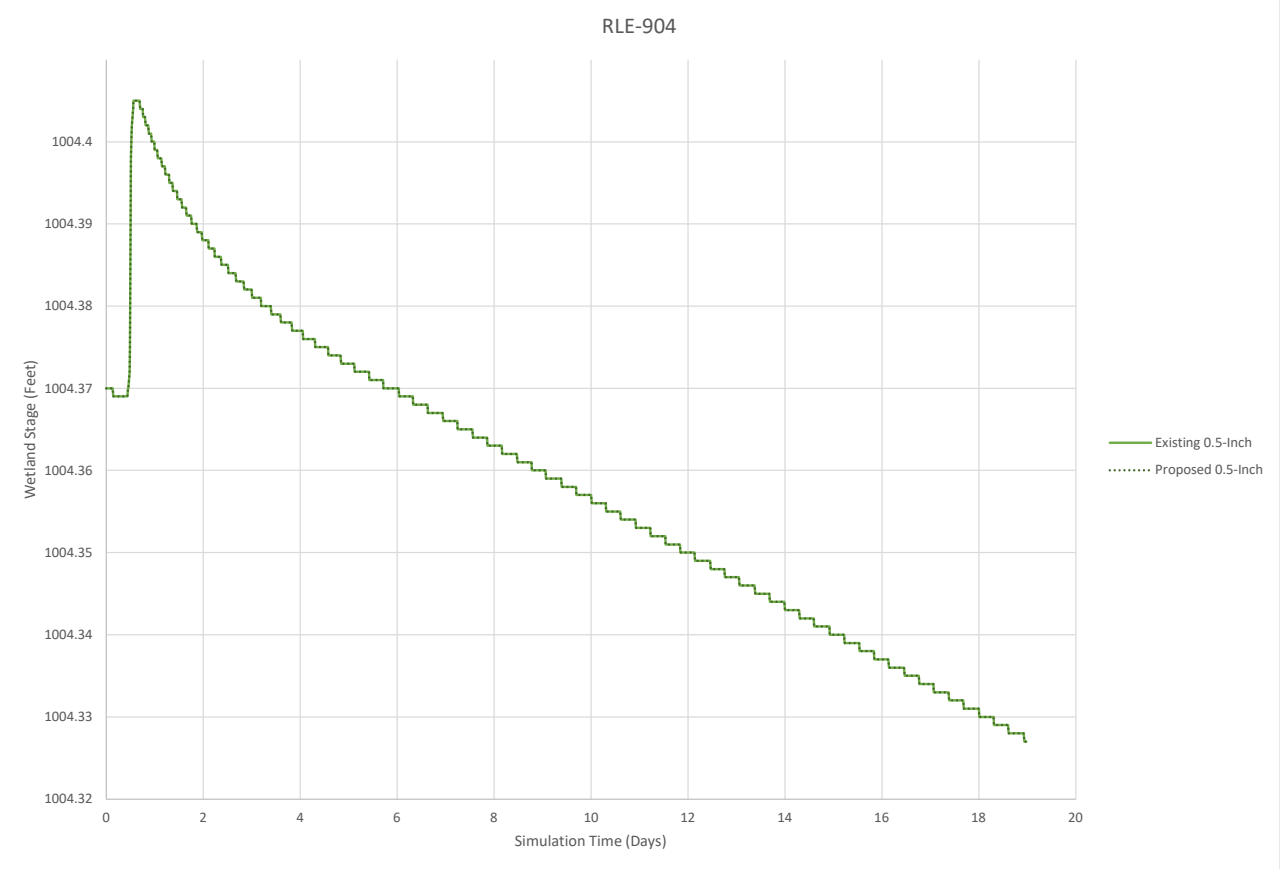

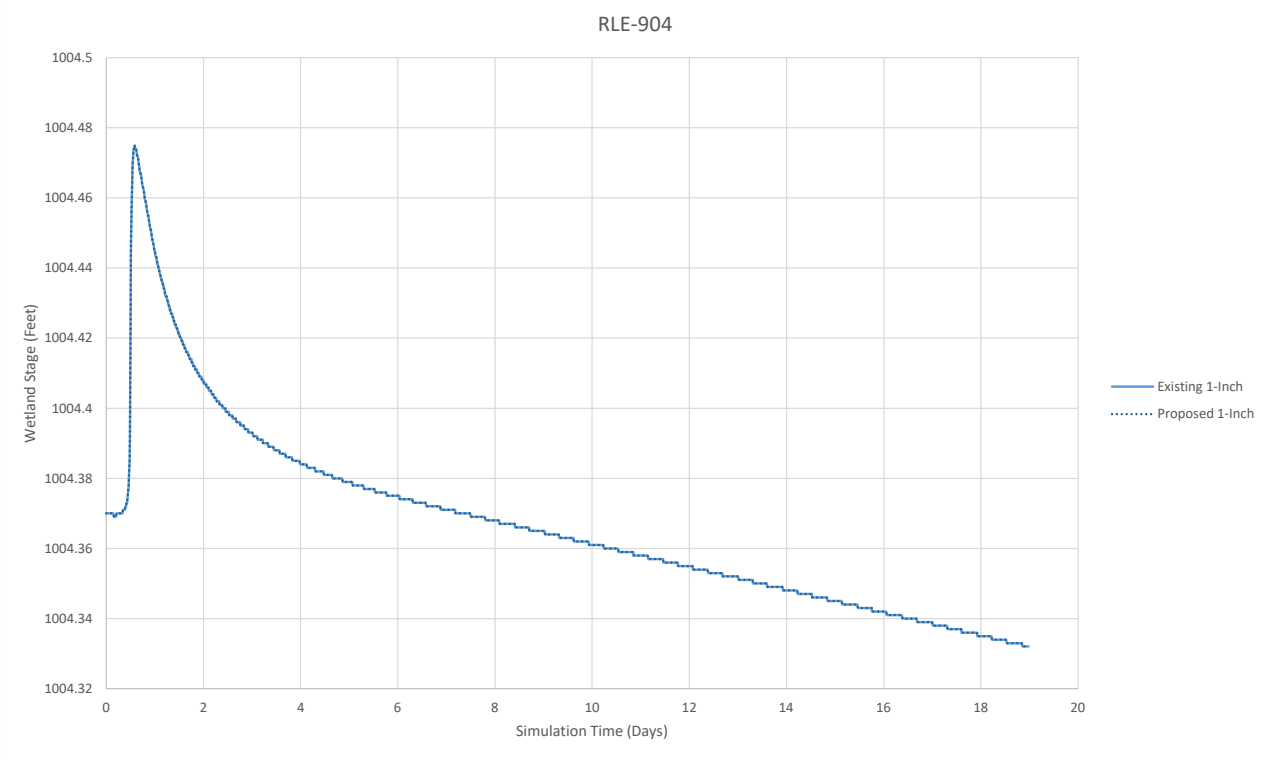

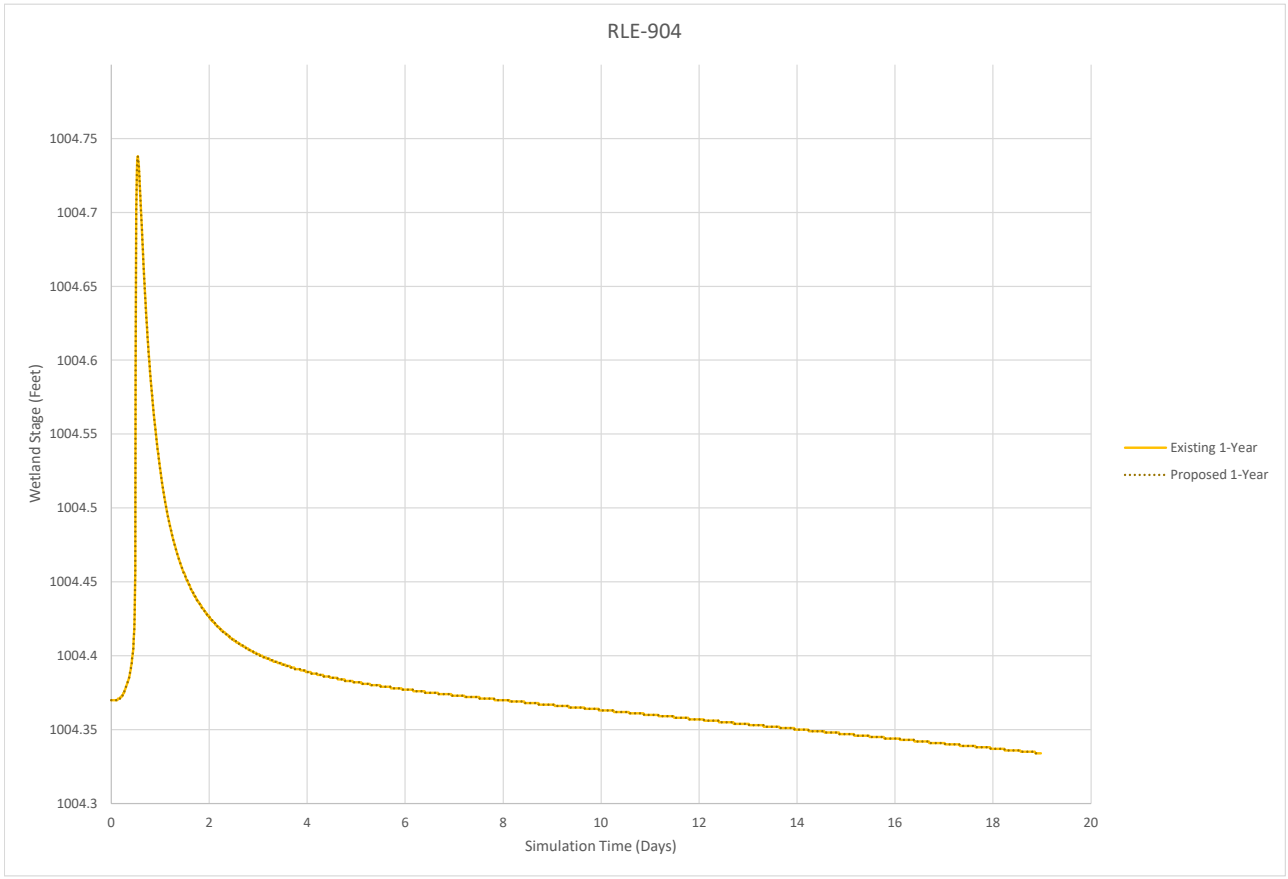
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1004.3
Wetland Stage (Feet)
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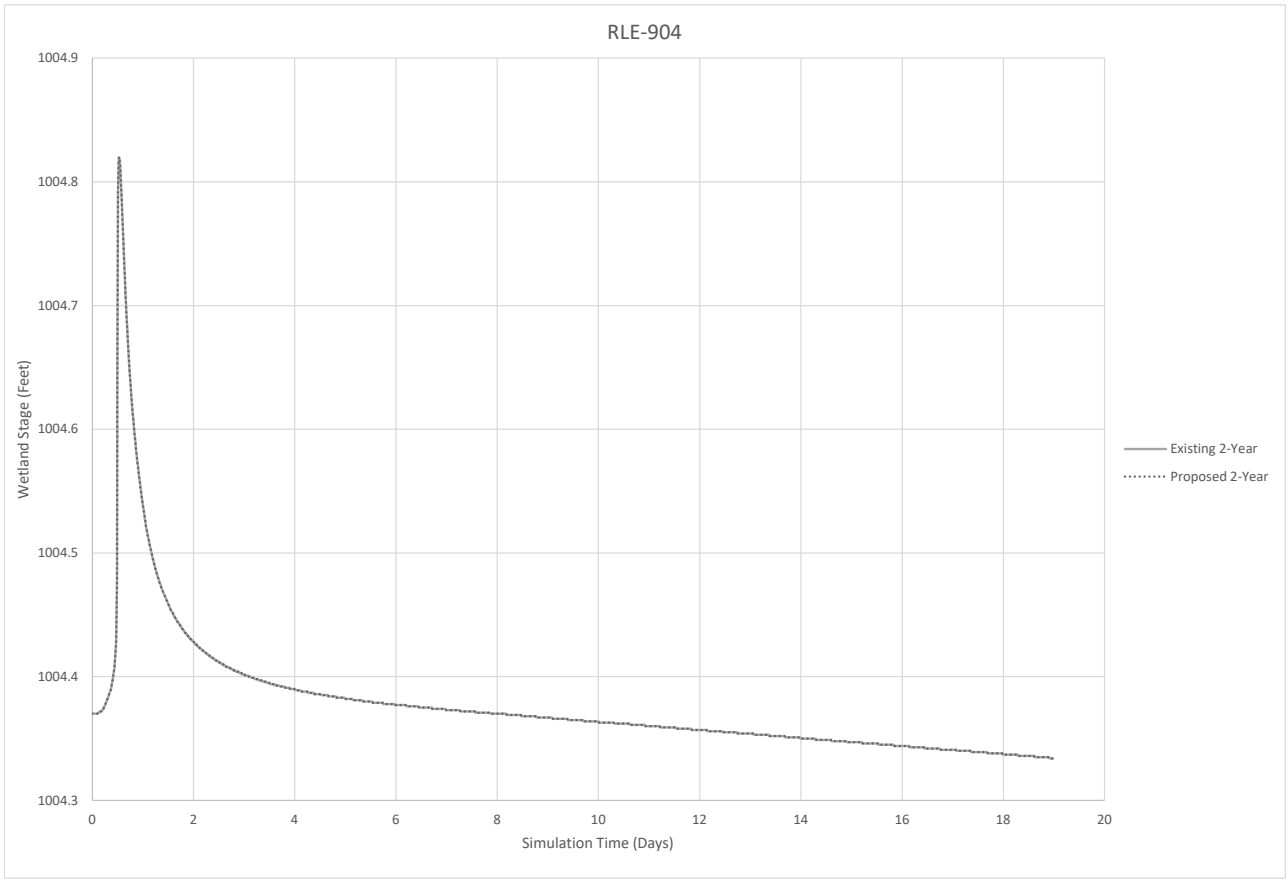
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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1004.4
1004.3
Wetland Stage (Feet)
0
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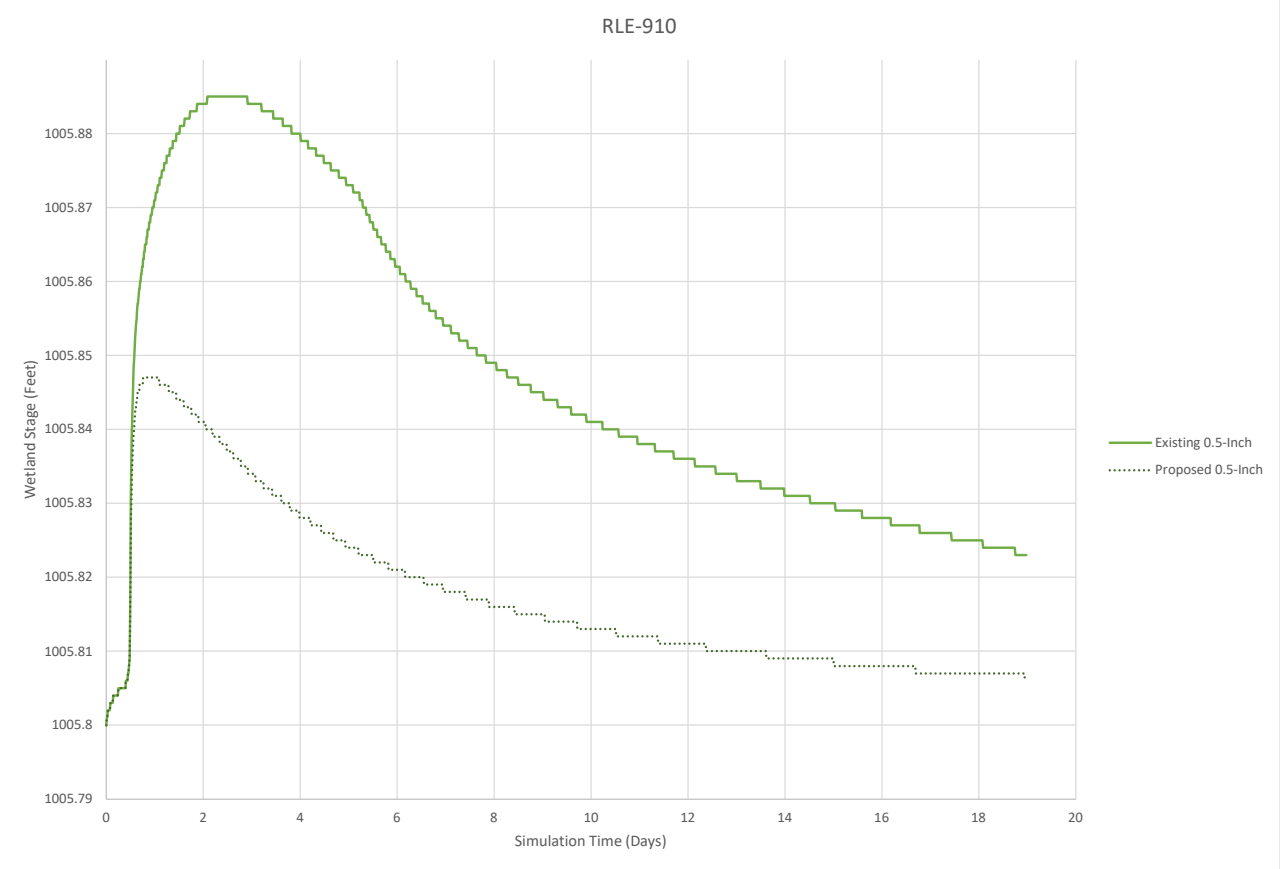
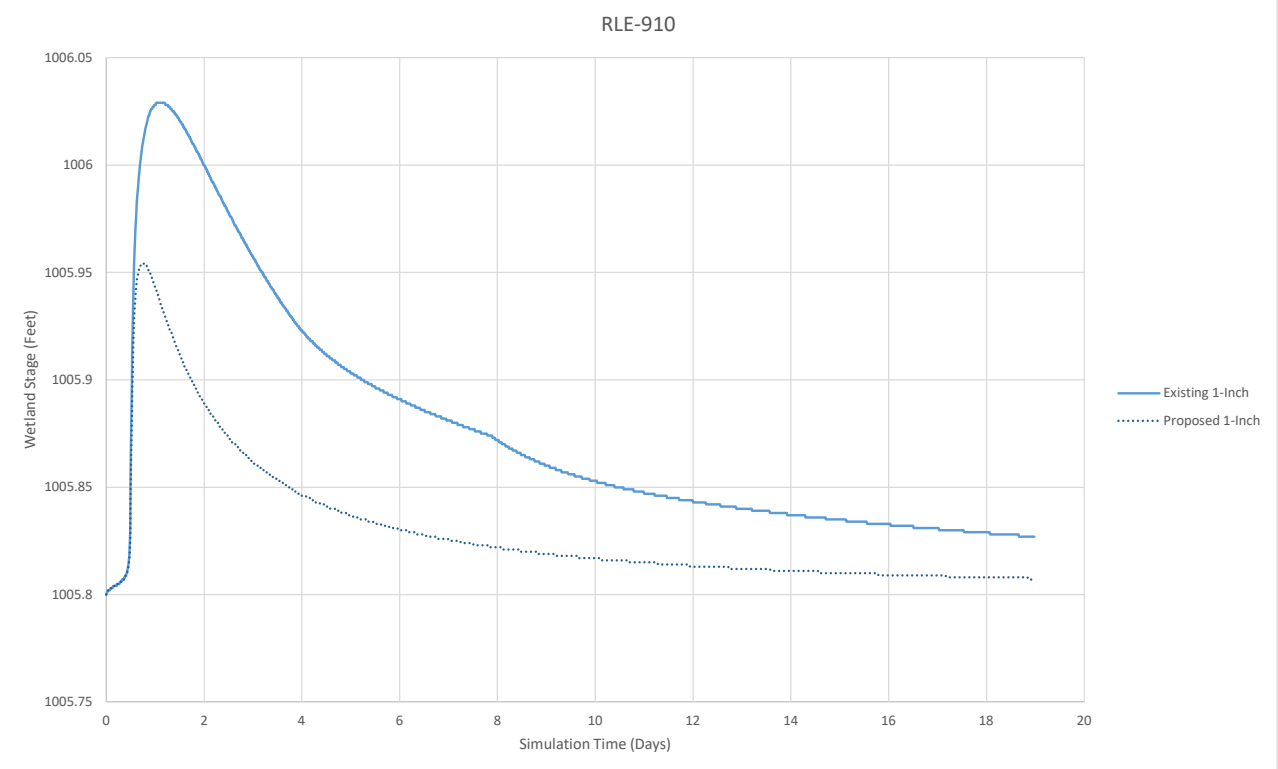
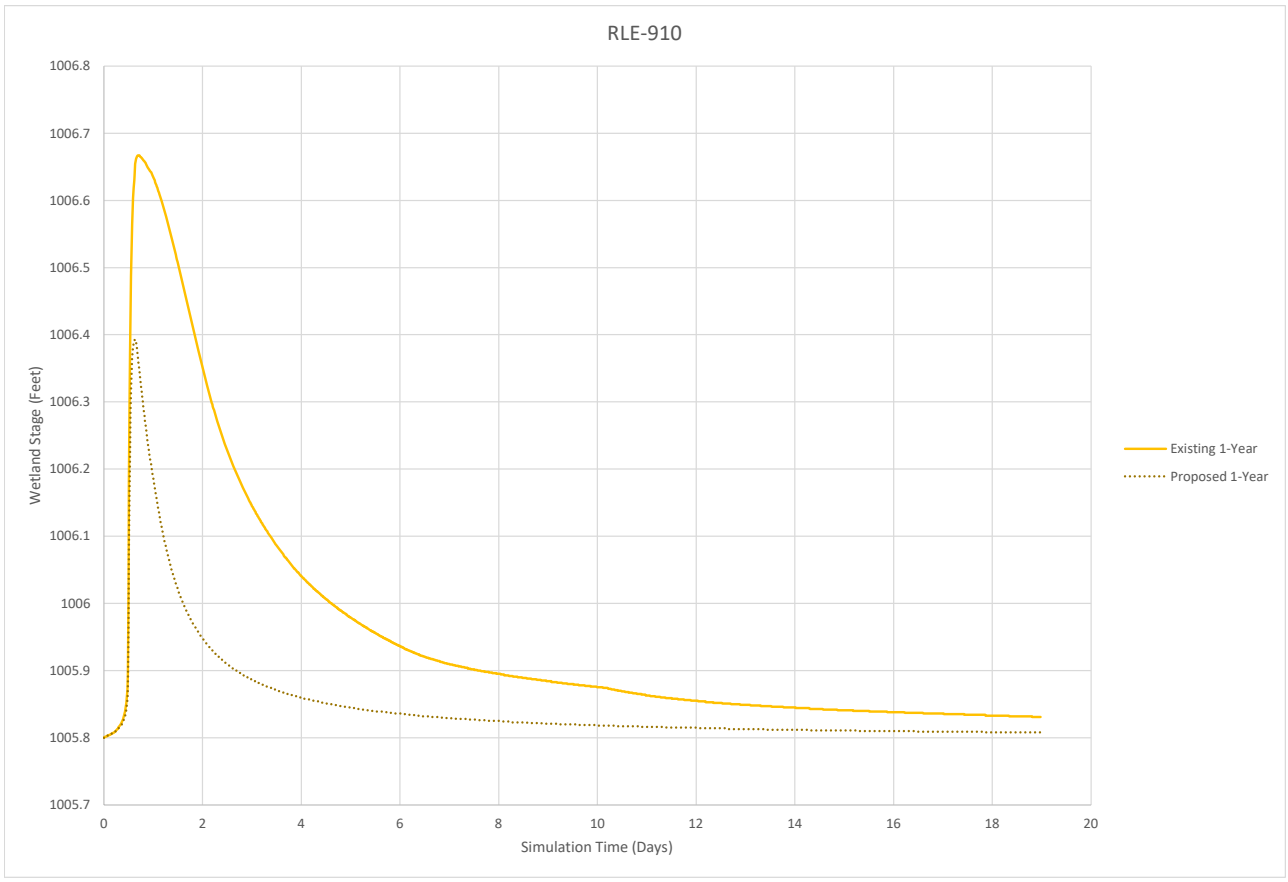
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-910



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1006
1005.9
1005.8
1005.7
Wetland Stage (Feet)
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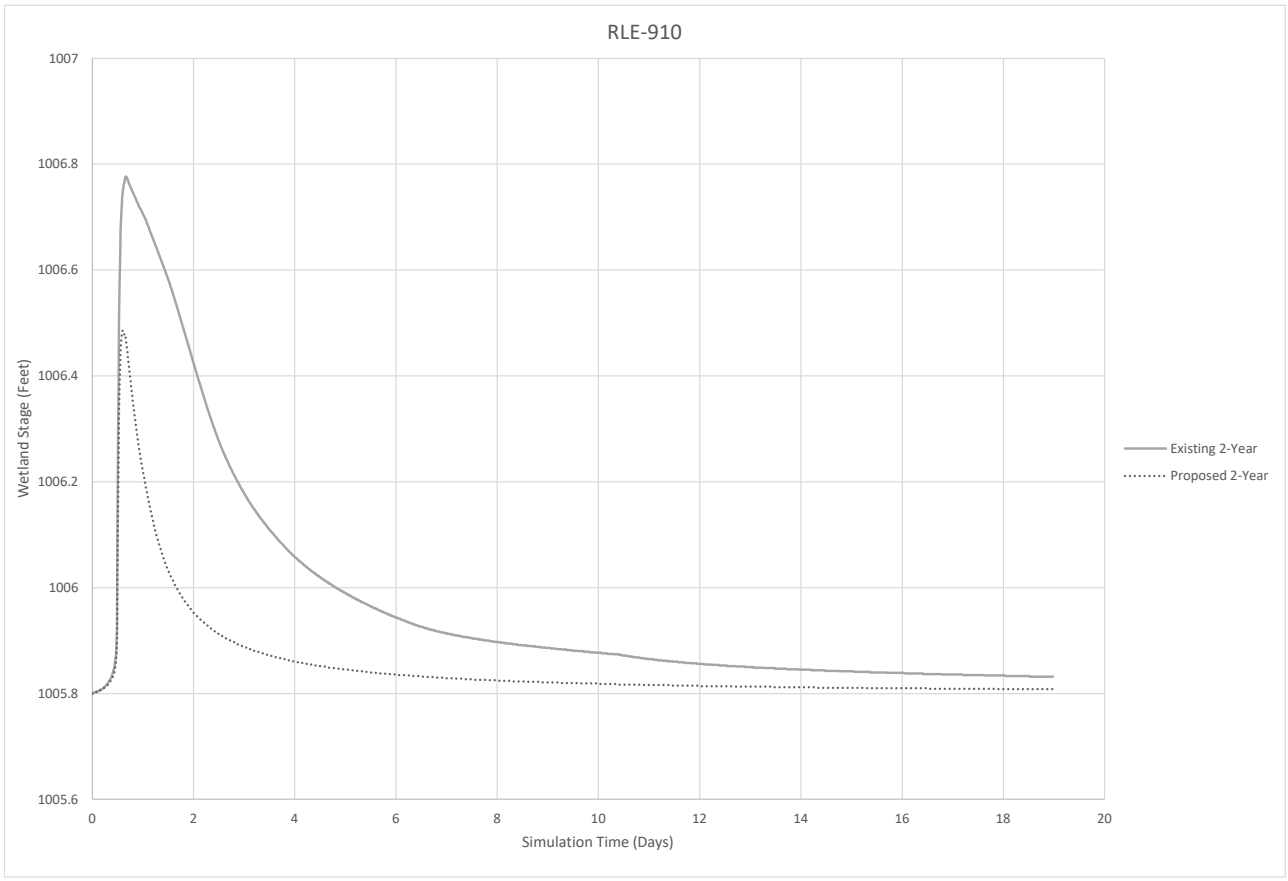
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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1006.6
1006.4
1006.2
1006
1005.8
1005.6
Wetland Stage (Feet)
0
2
4
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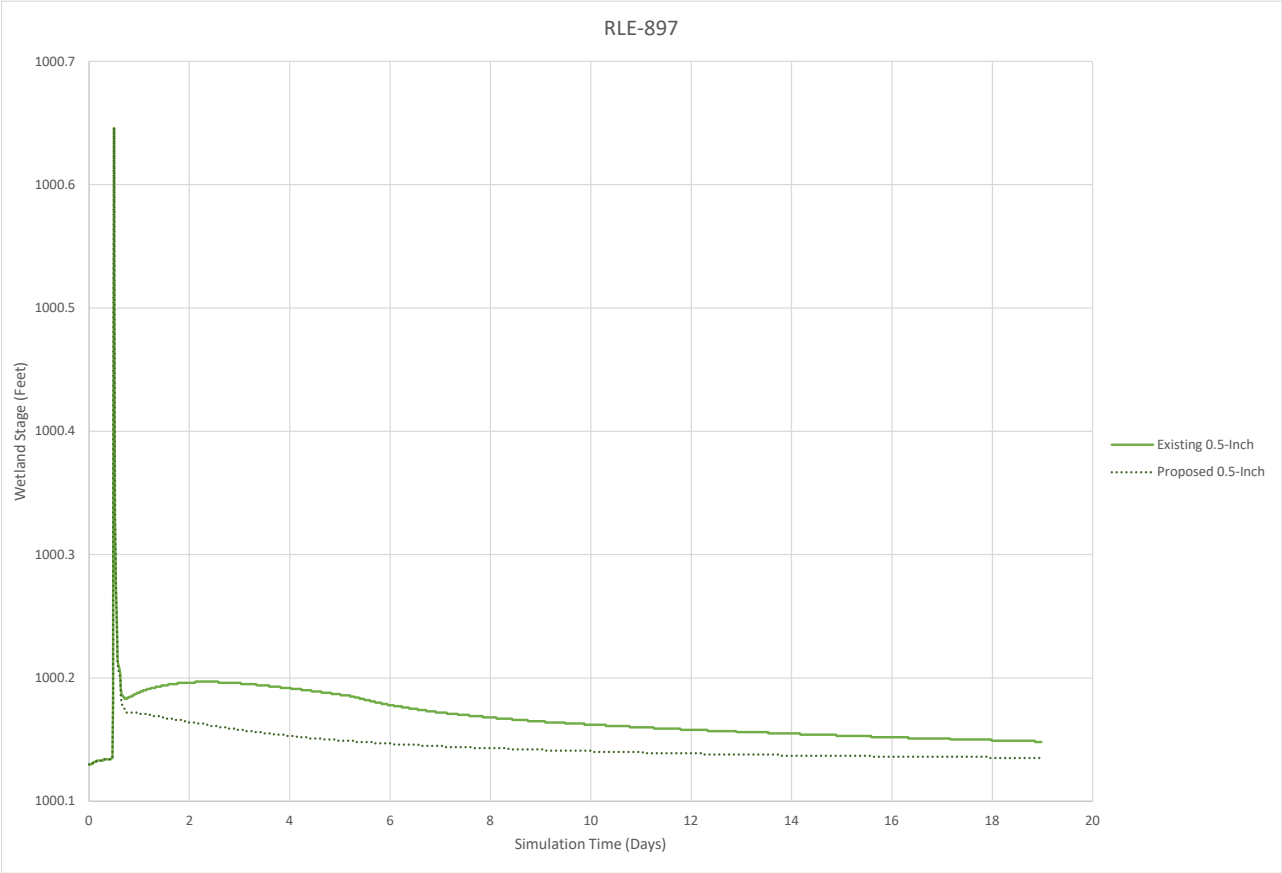
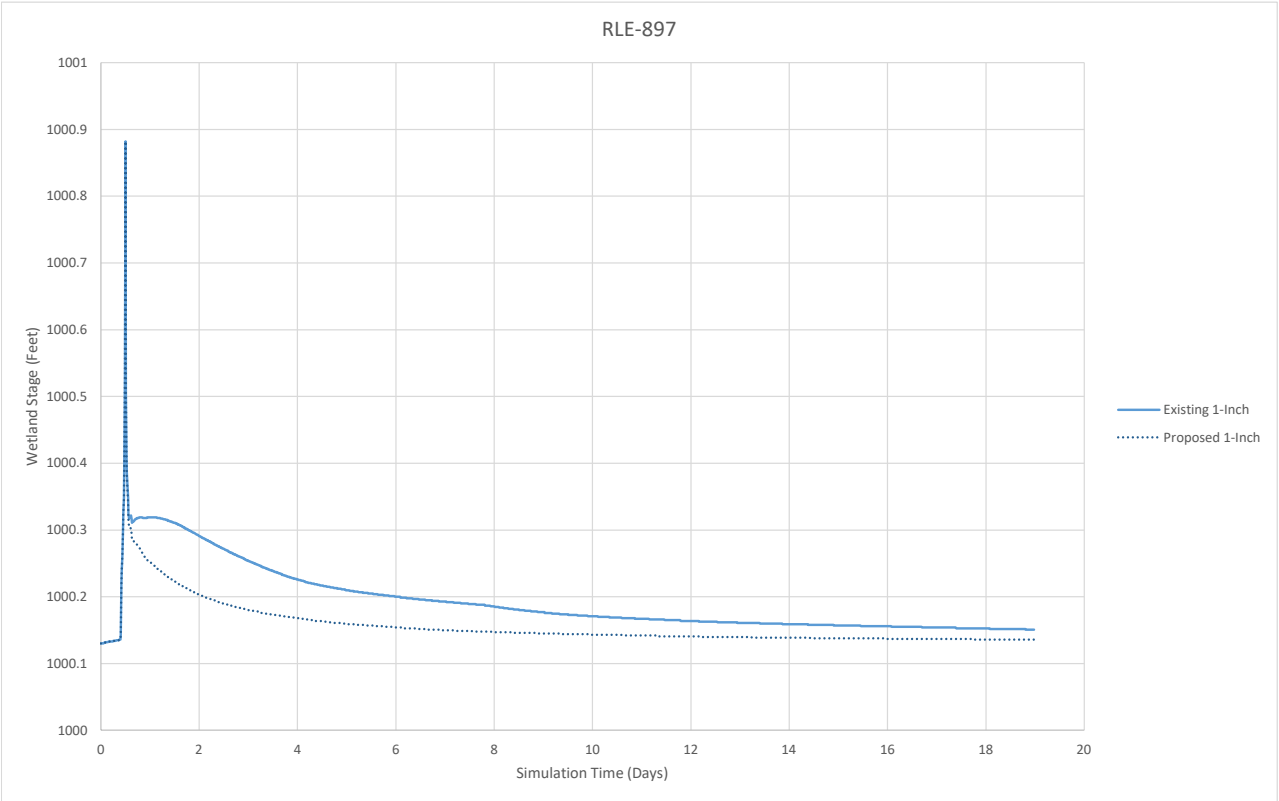
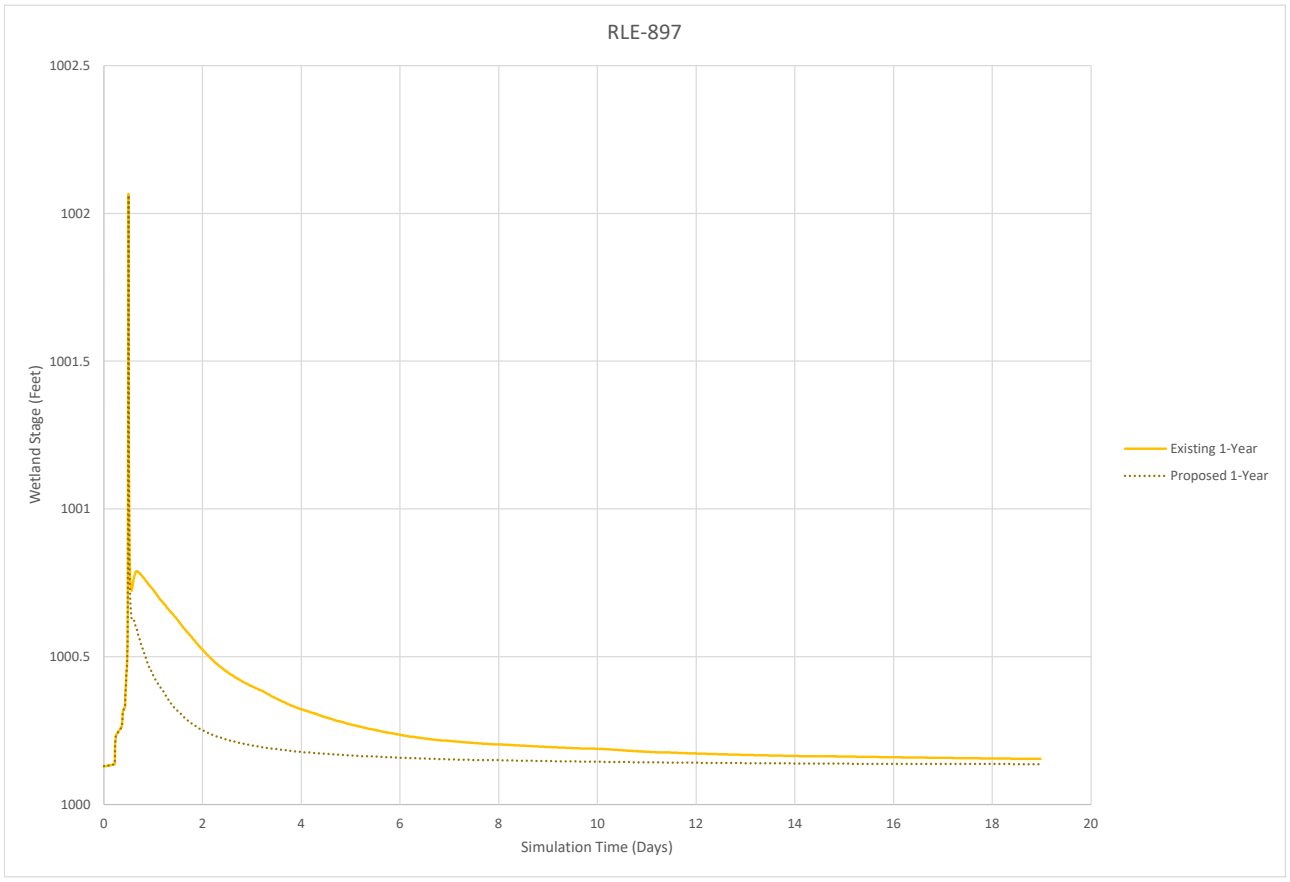
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-897



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1001.5
1001
1000.5
1000
Wetland Stage (Feet)
0
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4
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12
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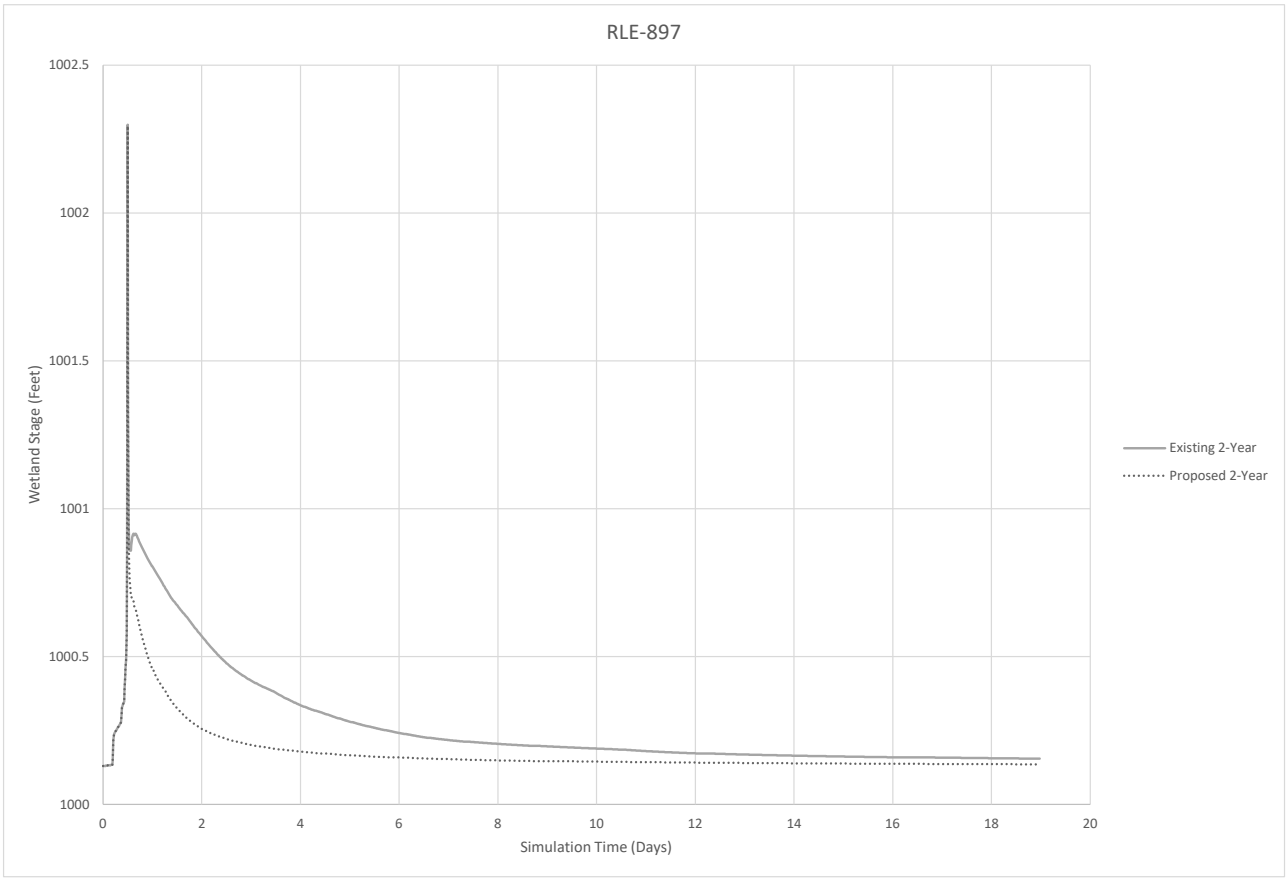
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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1002
1001.5
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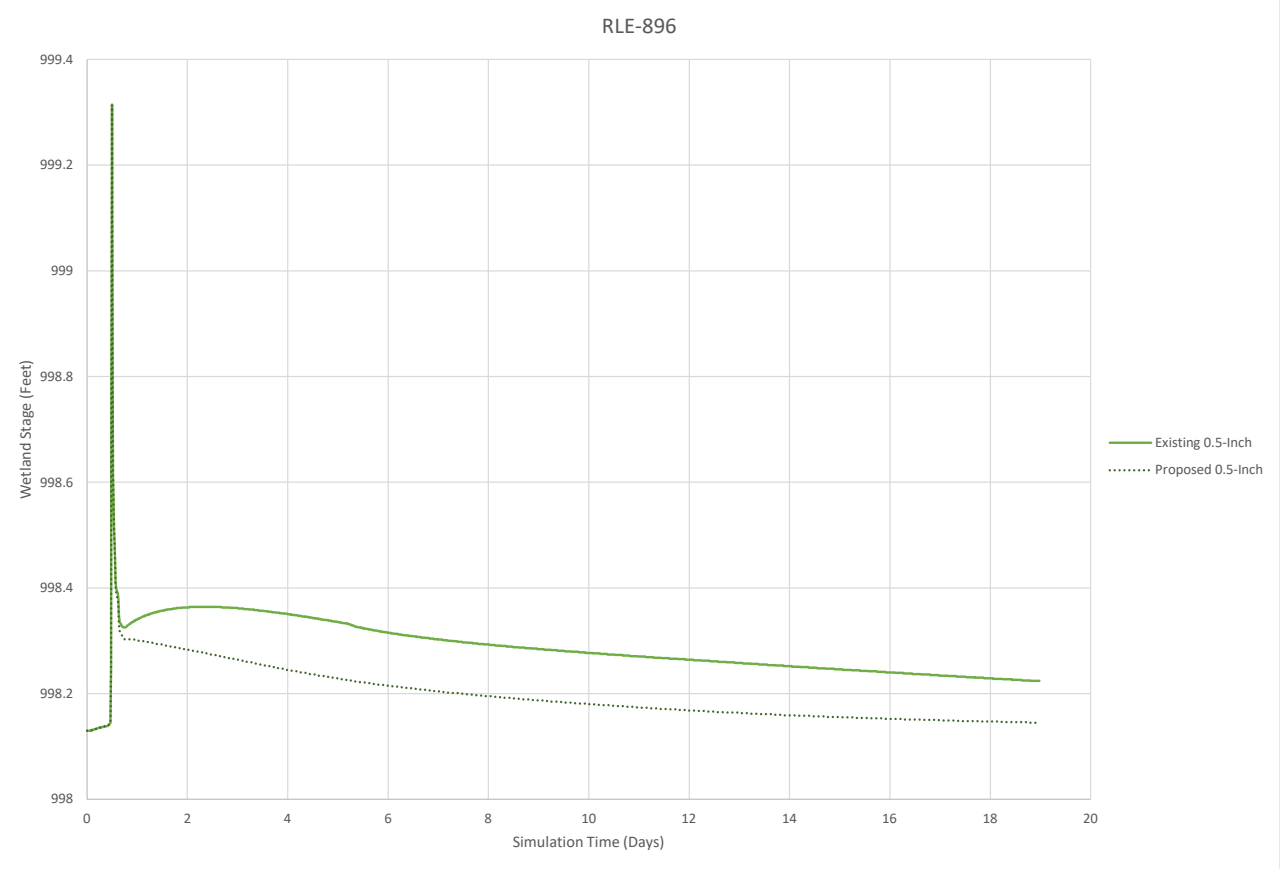
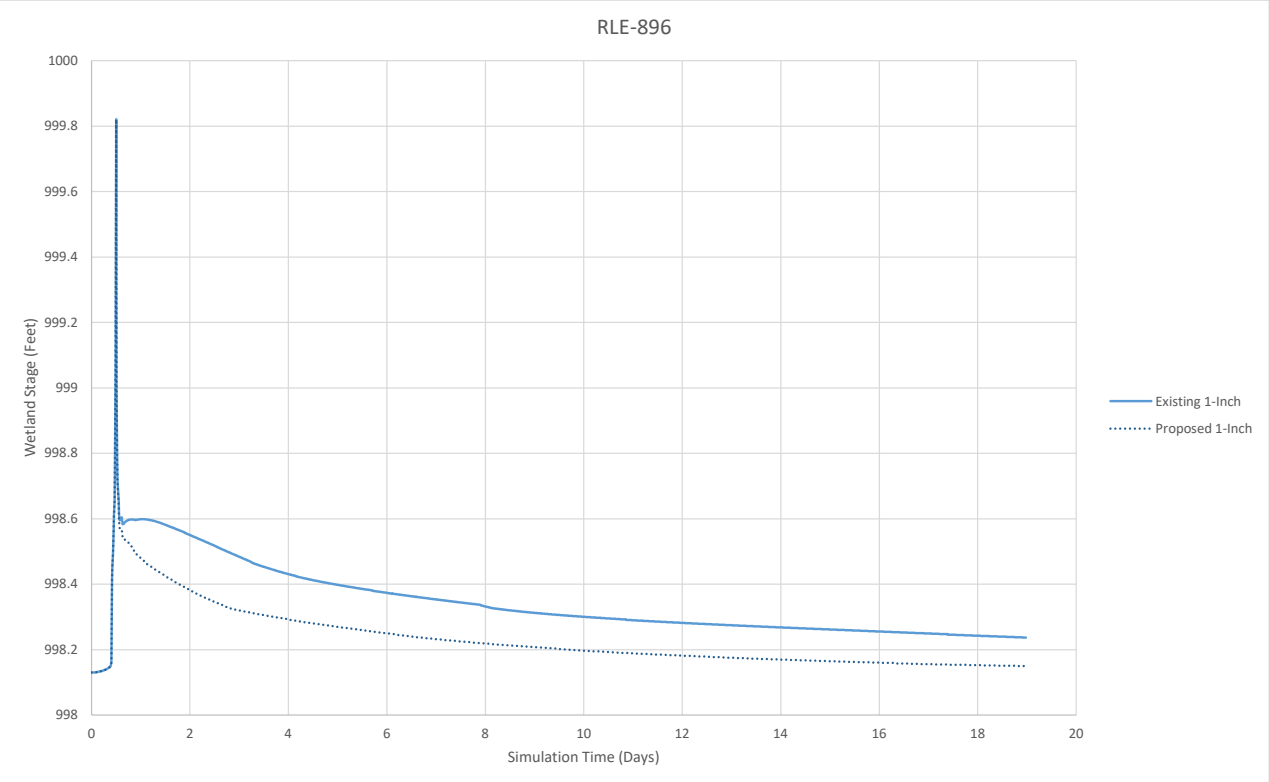
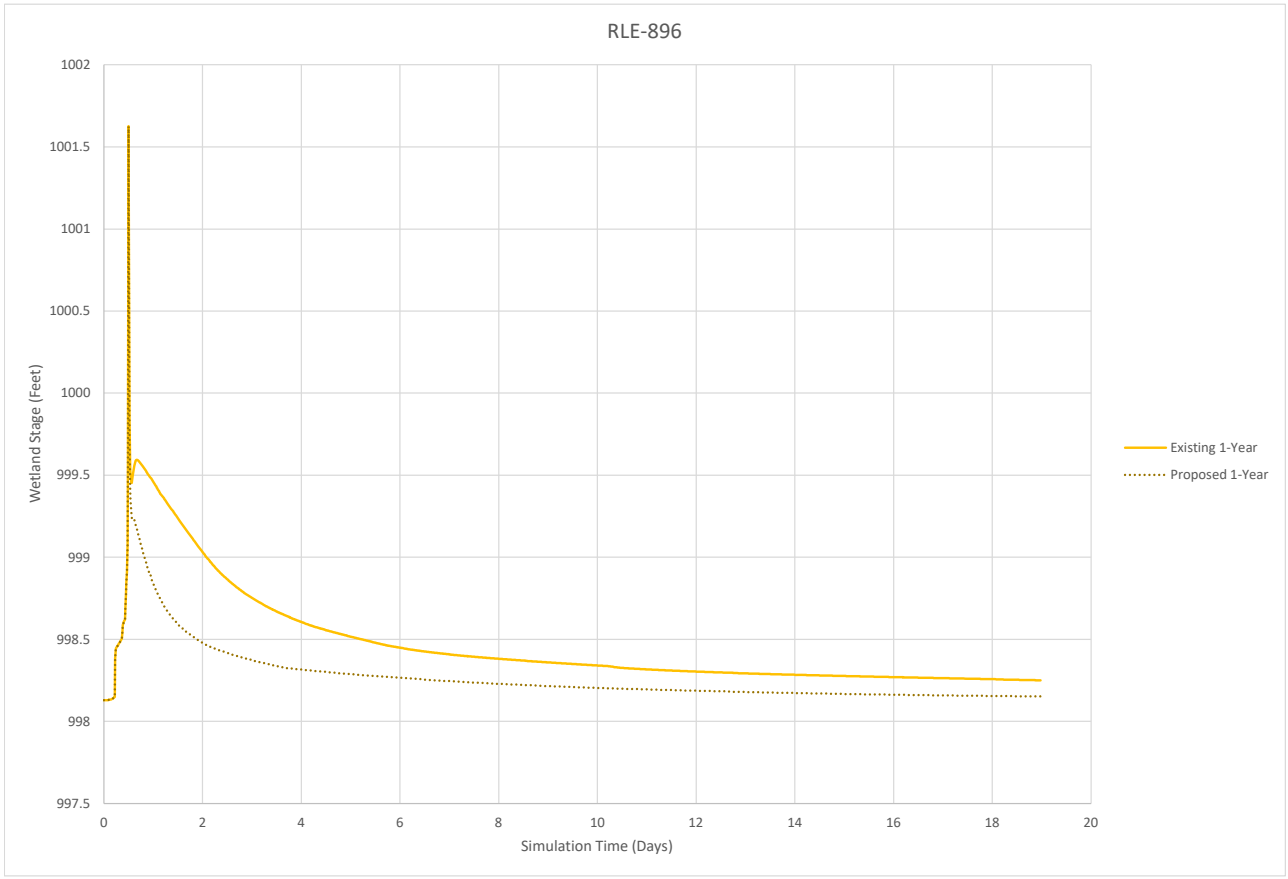
1000.5
1000
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-896



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1001
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999.5
999
998.5
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997.5
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4
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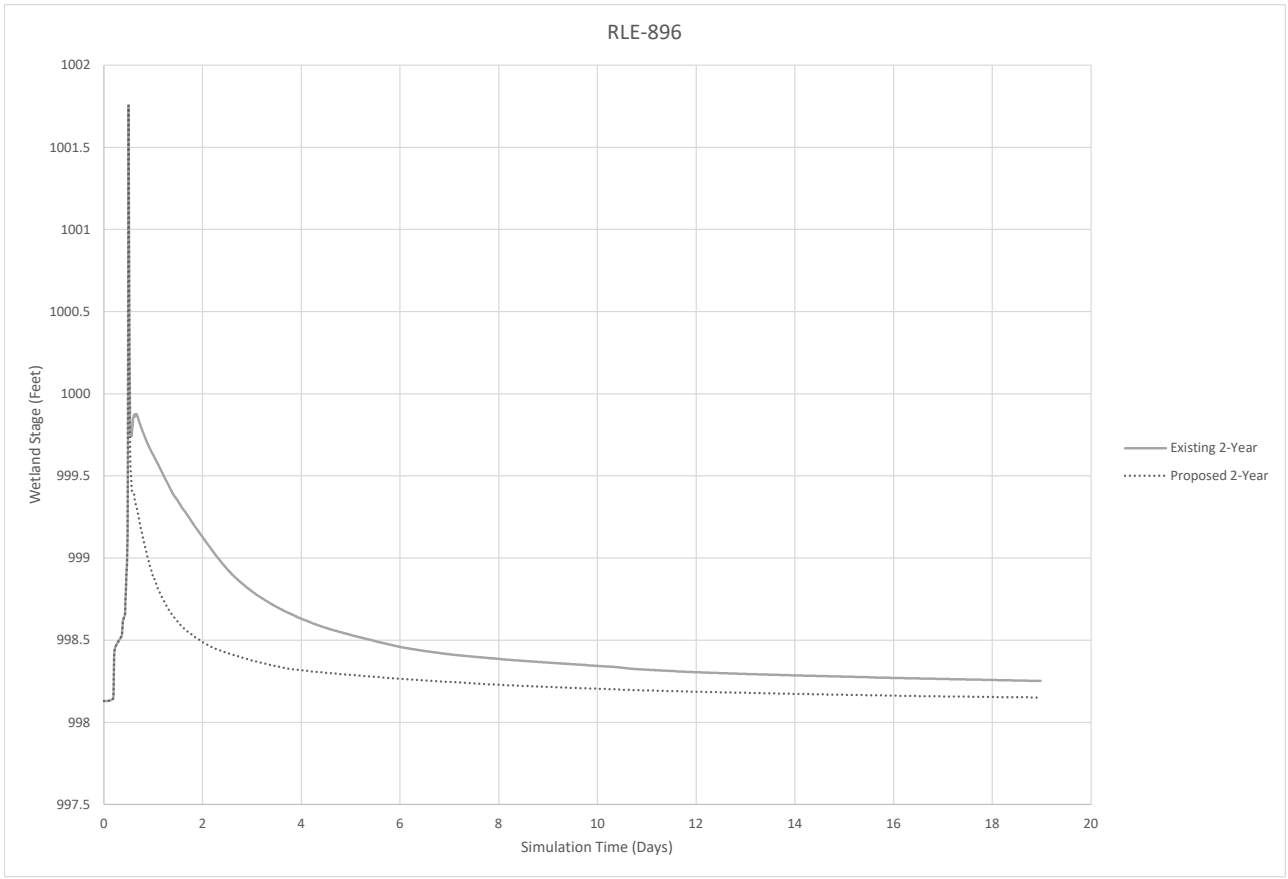
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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999.5
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998.5
998
997.5
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2
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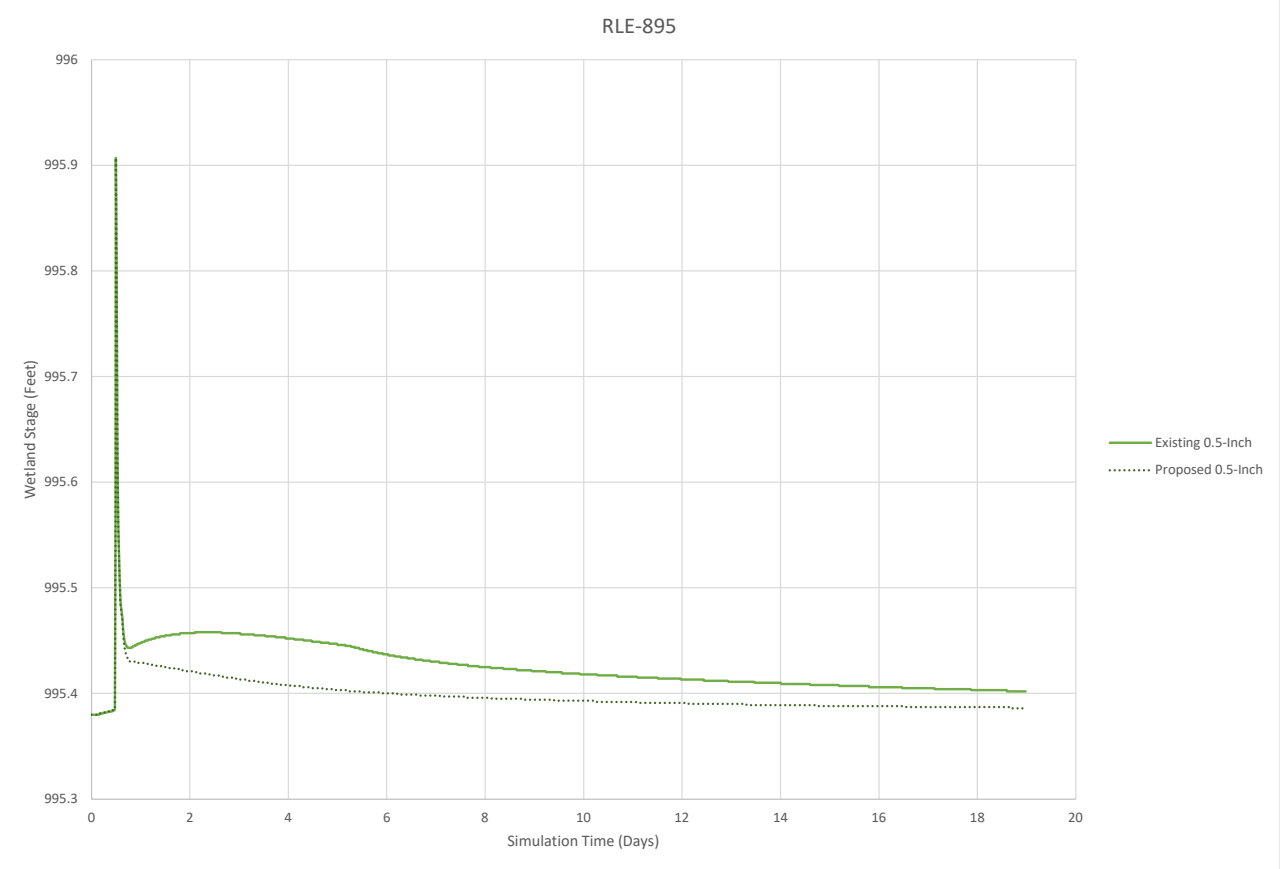
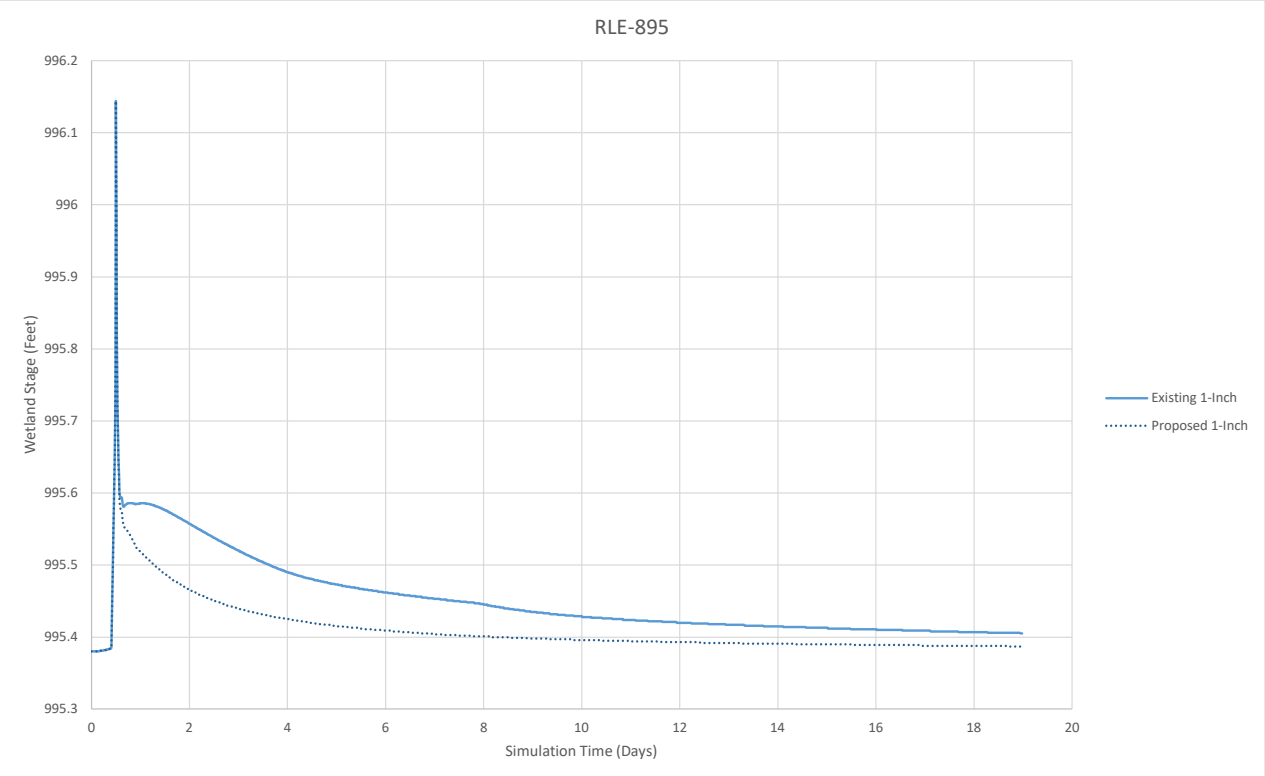
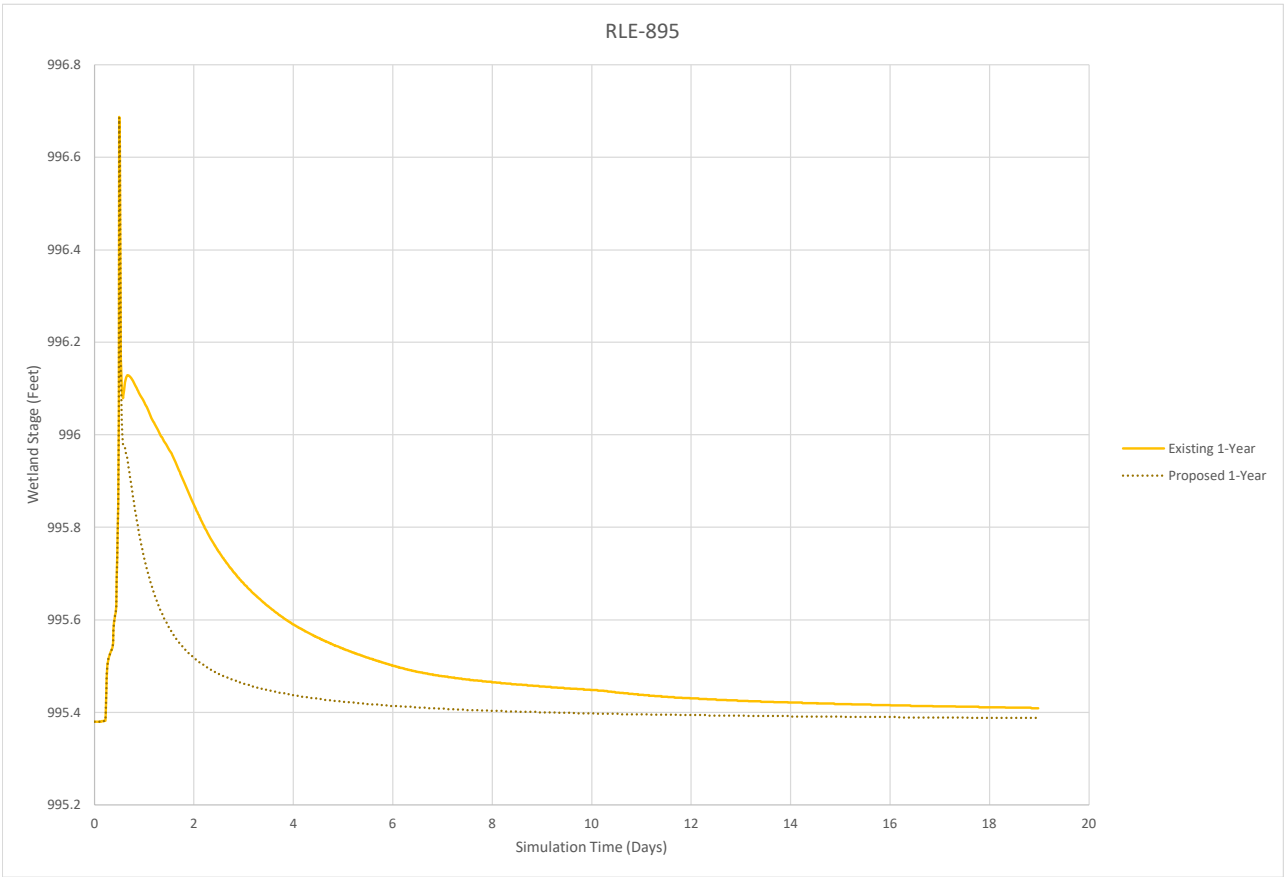
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-895



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995.2
Wetland Stage (Feet)
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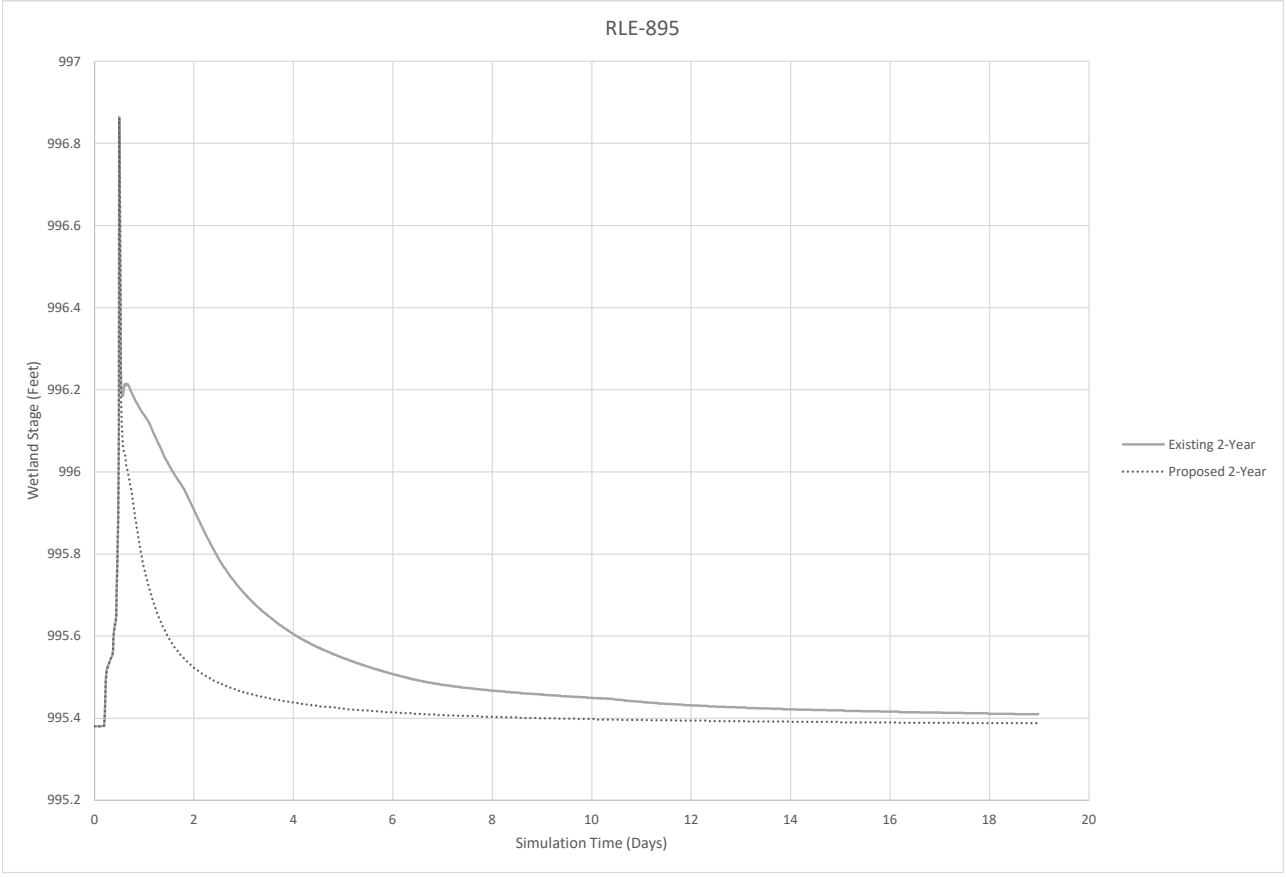
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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995.4
995.2
Wetland Stage (Feet)
0
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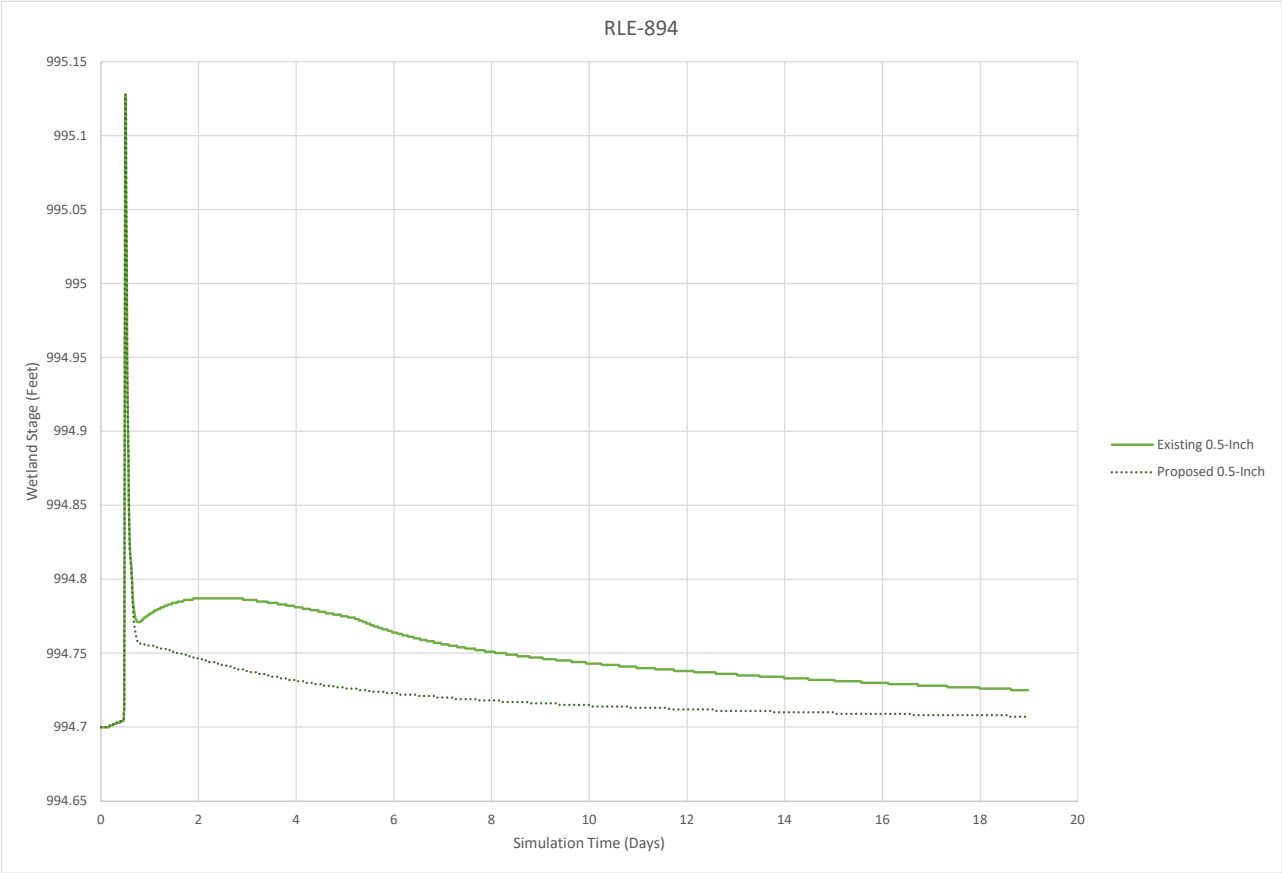
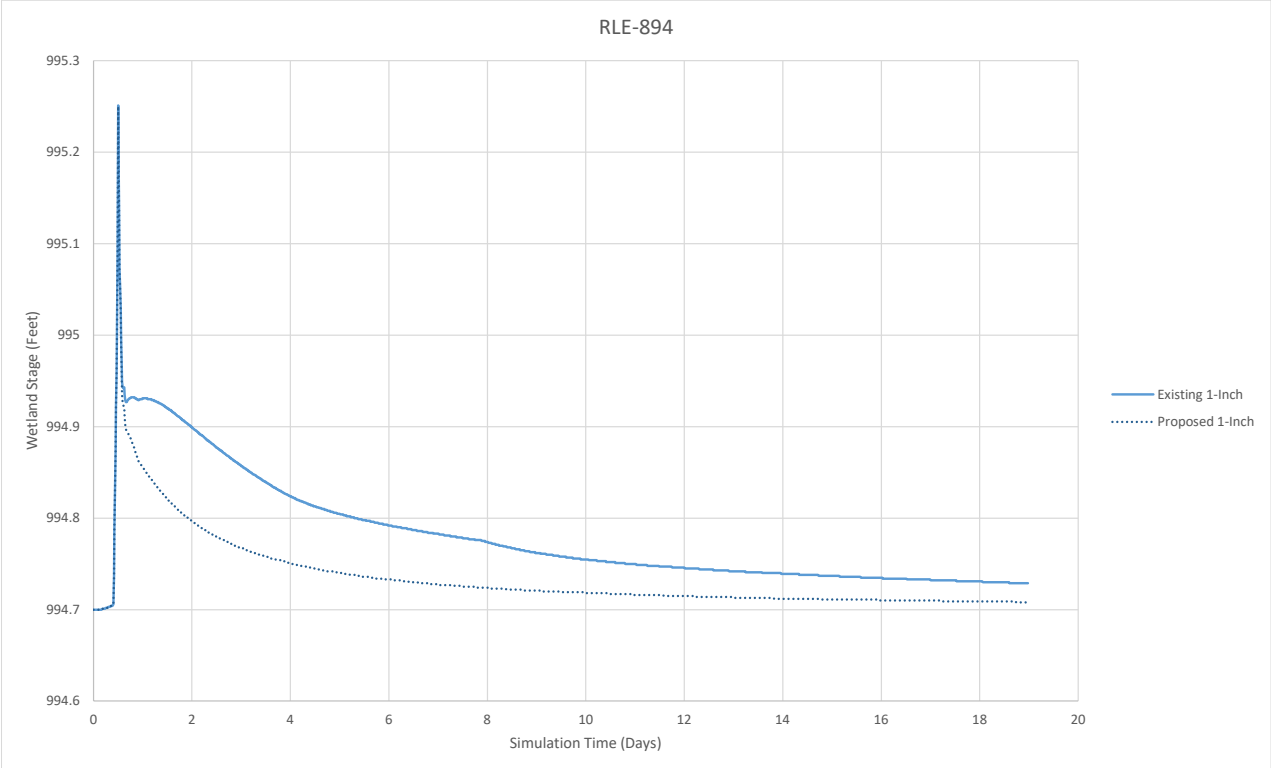
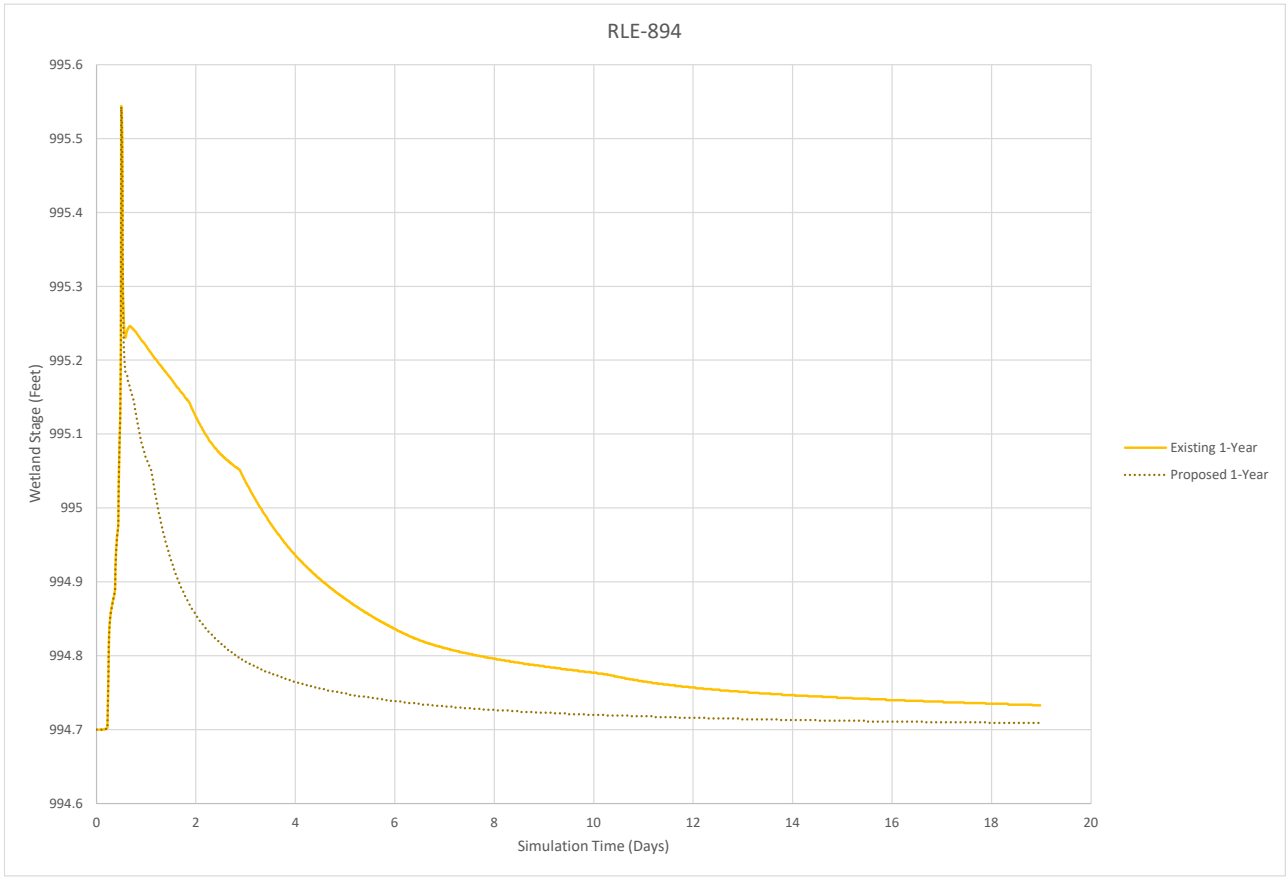
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-894



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995.5
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995.2
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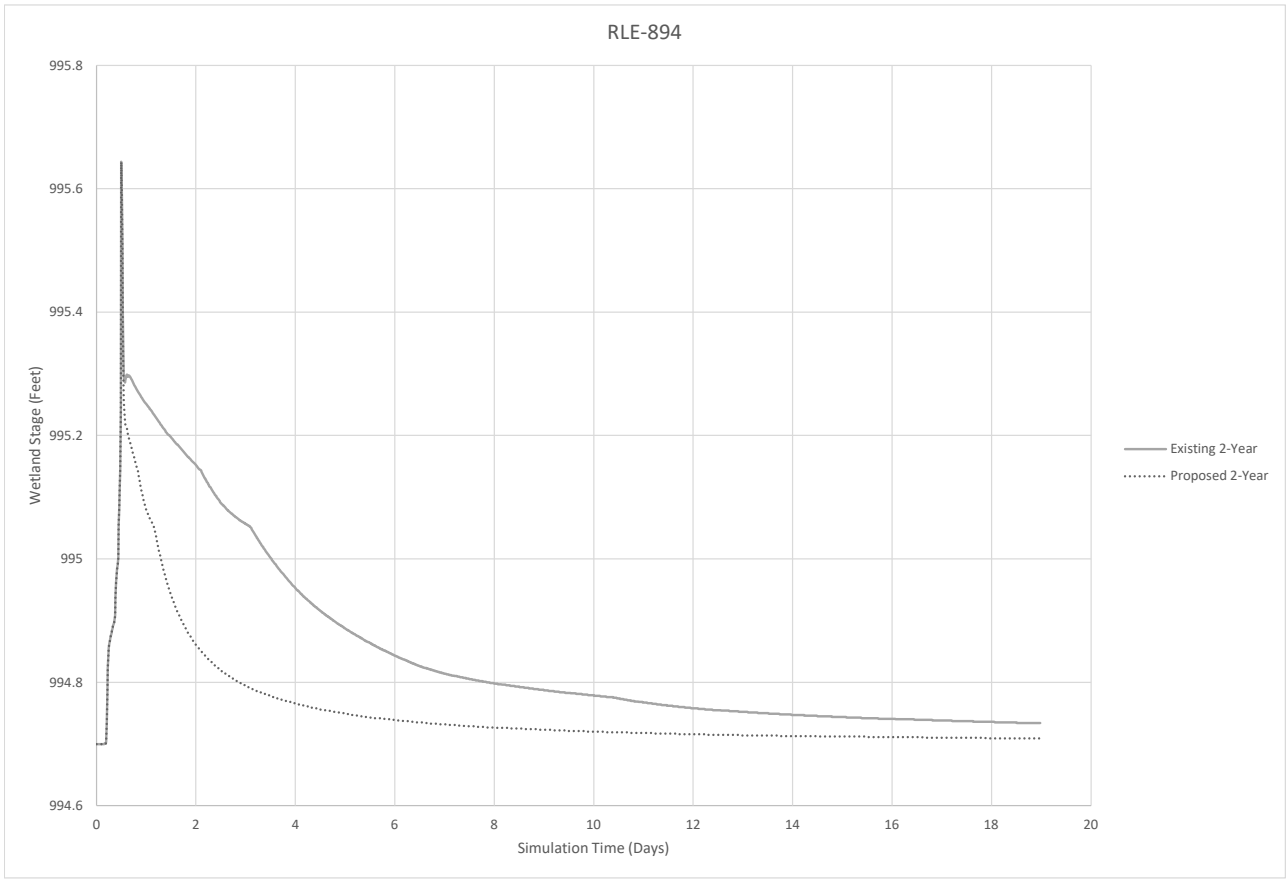
994.9
994.8
994.7
994.6
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year


RLE-894
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995.6
995.4
995.2
995
994.8
994.6
Wetland Stage (Feet)
0
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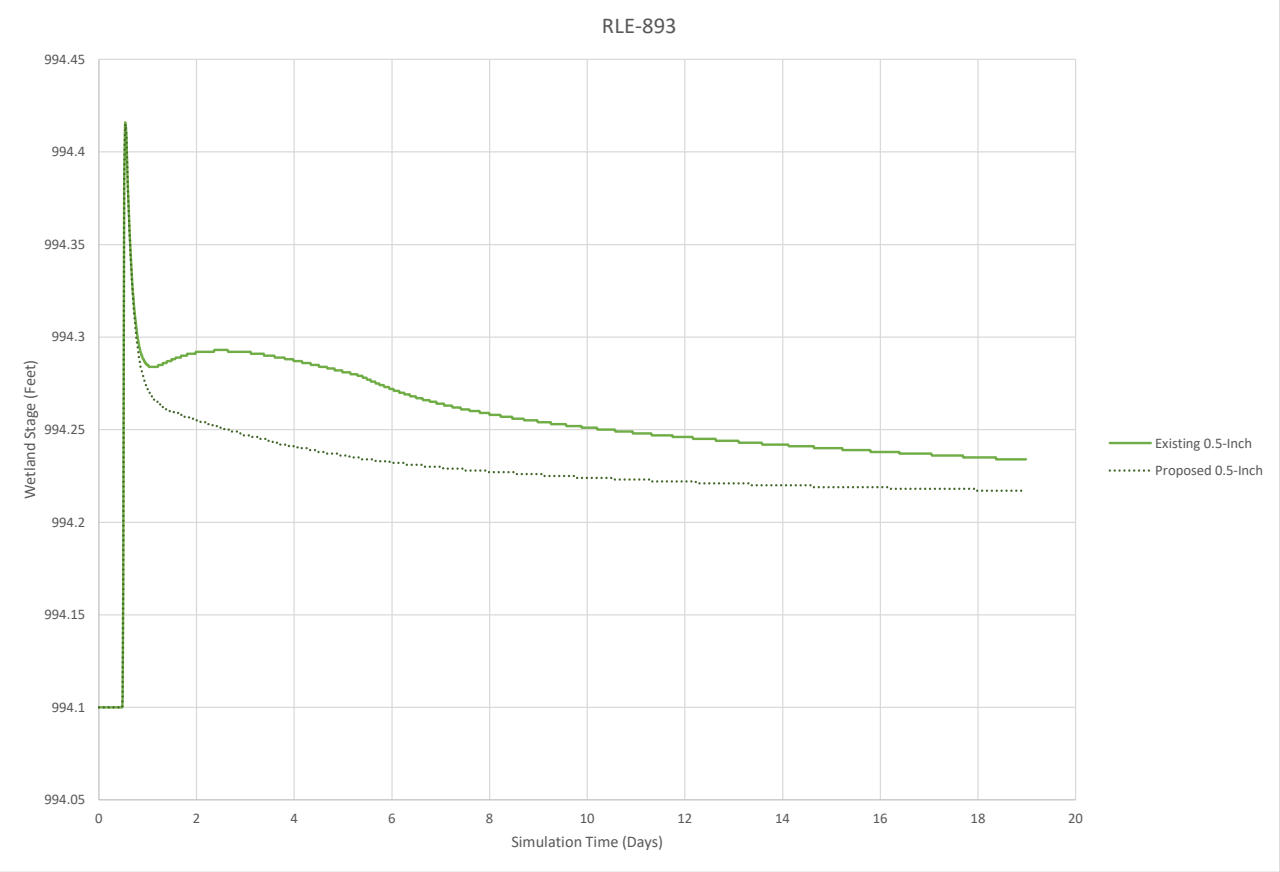
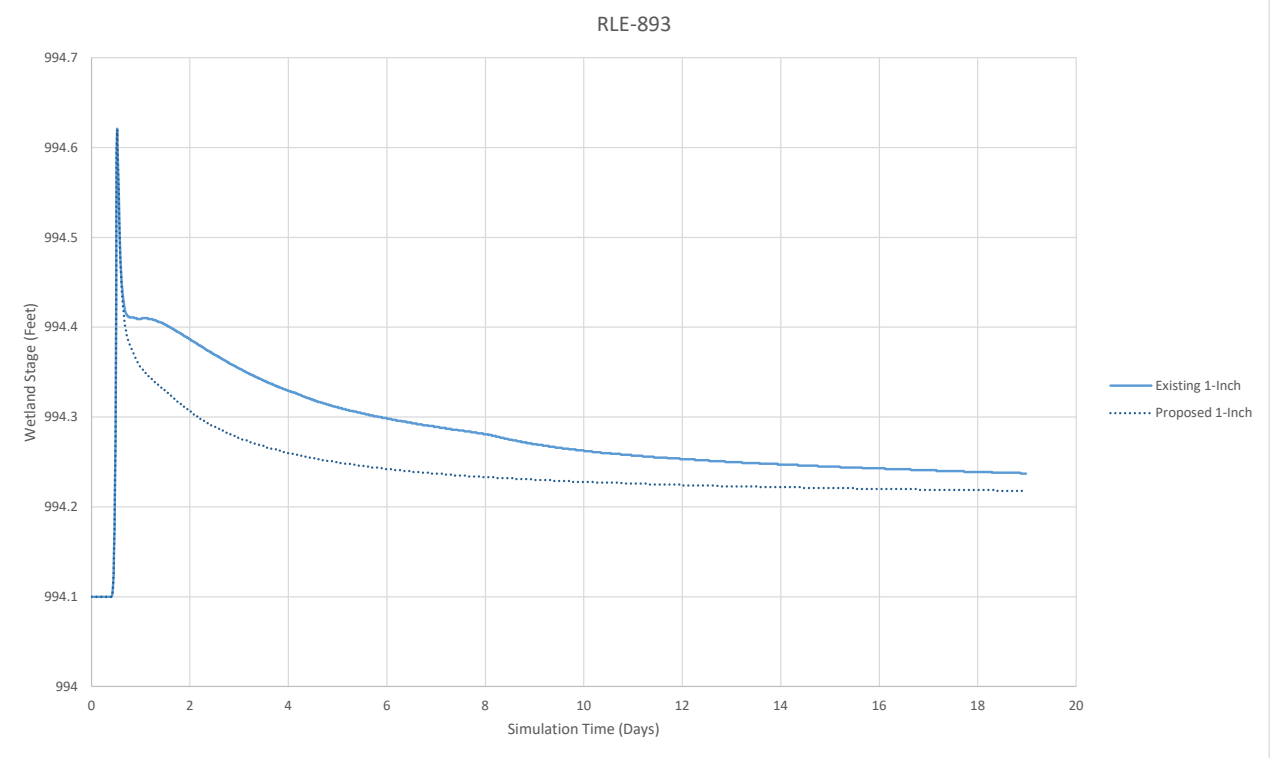
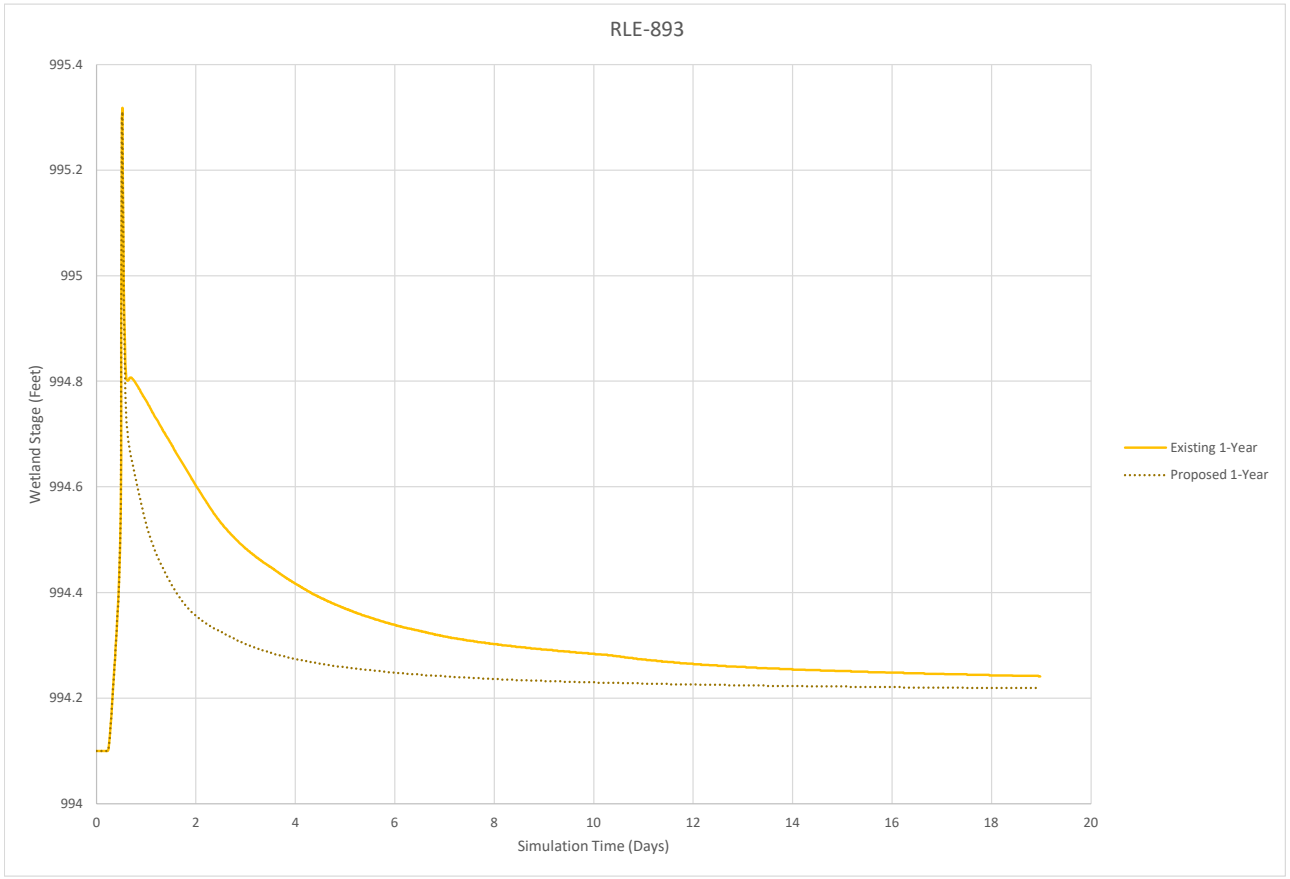
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-893



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995.2
995
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994.6
994.4
994.2
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Wetland Stage (Feet)
0
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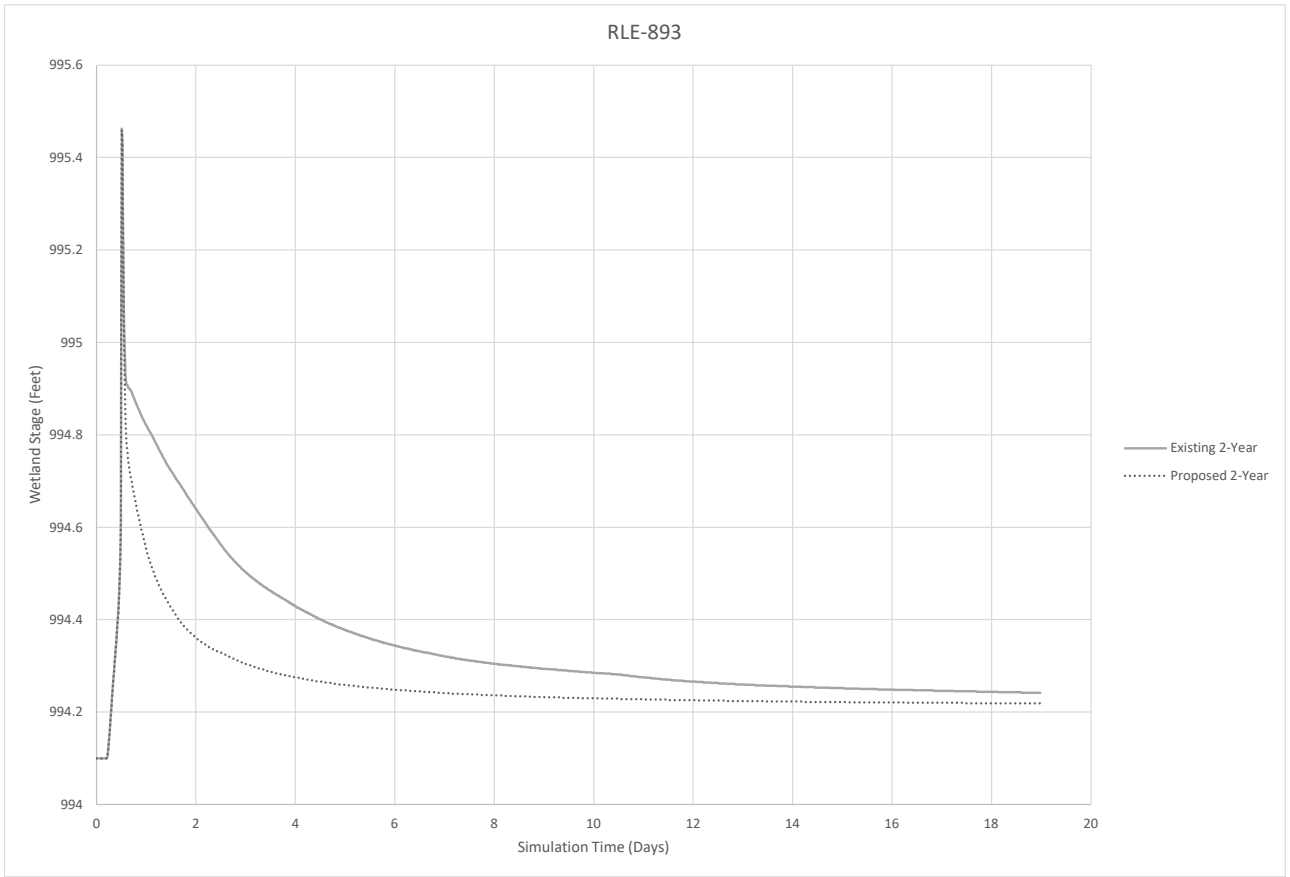
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year


RLE-893
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995.4
995.2
995
994.8
994.6
994.4
994.2
994
Wetland Stage (Feet)
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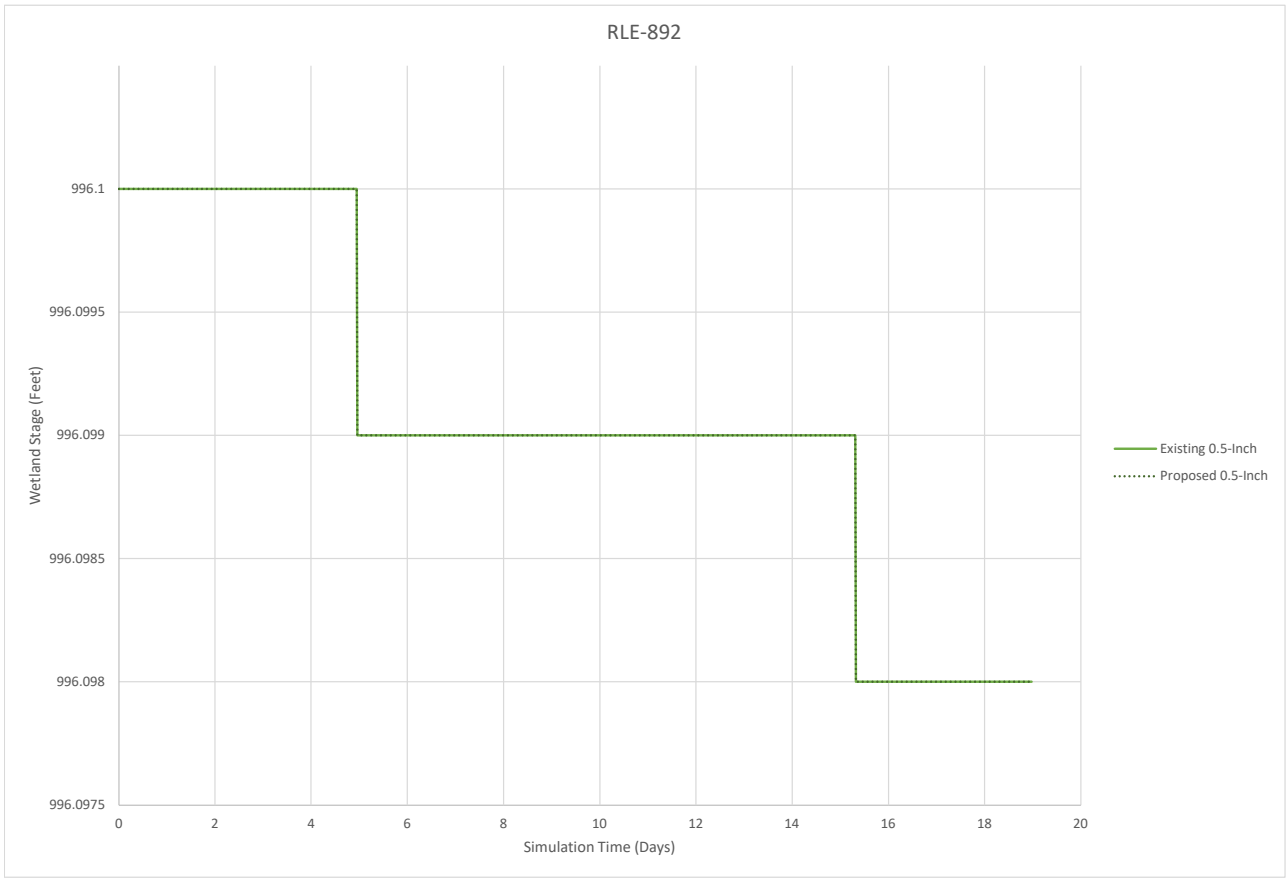
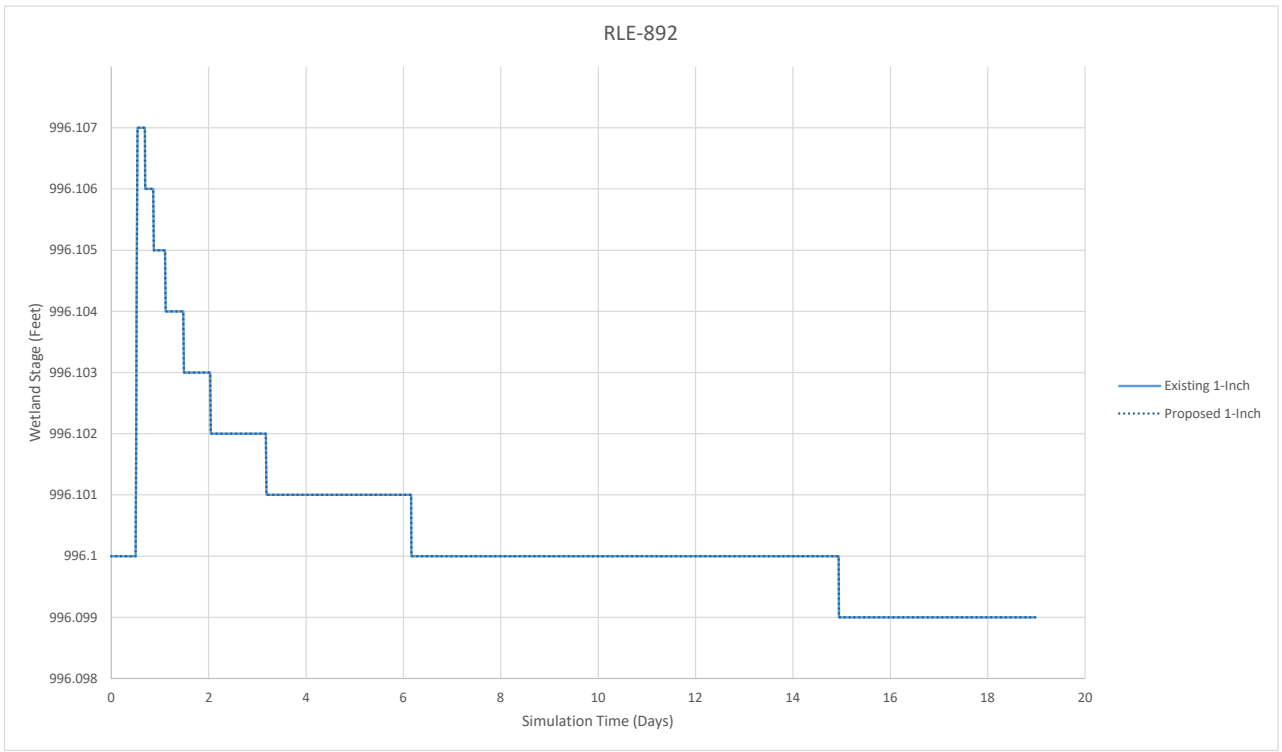
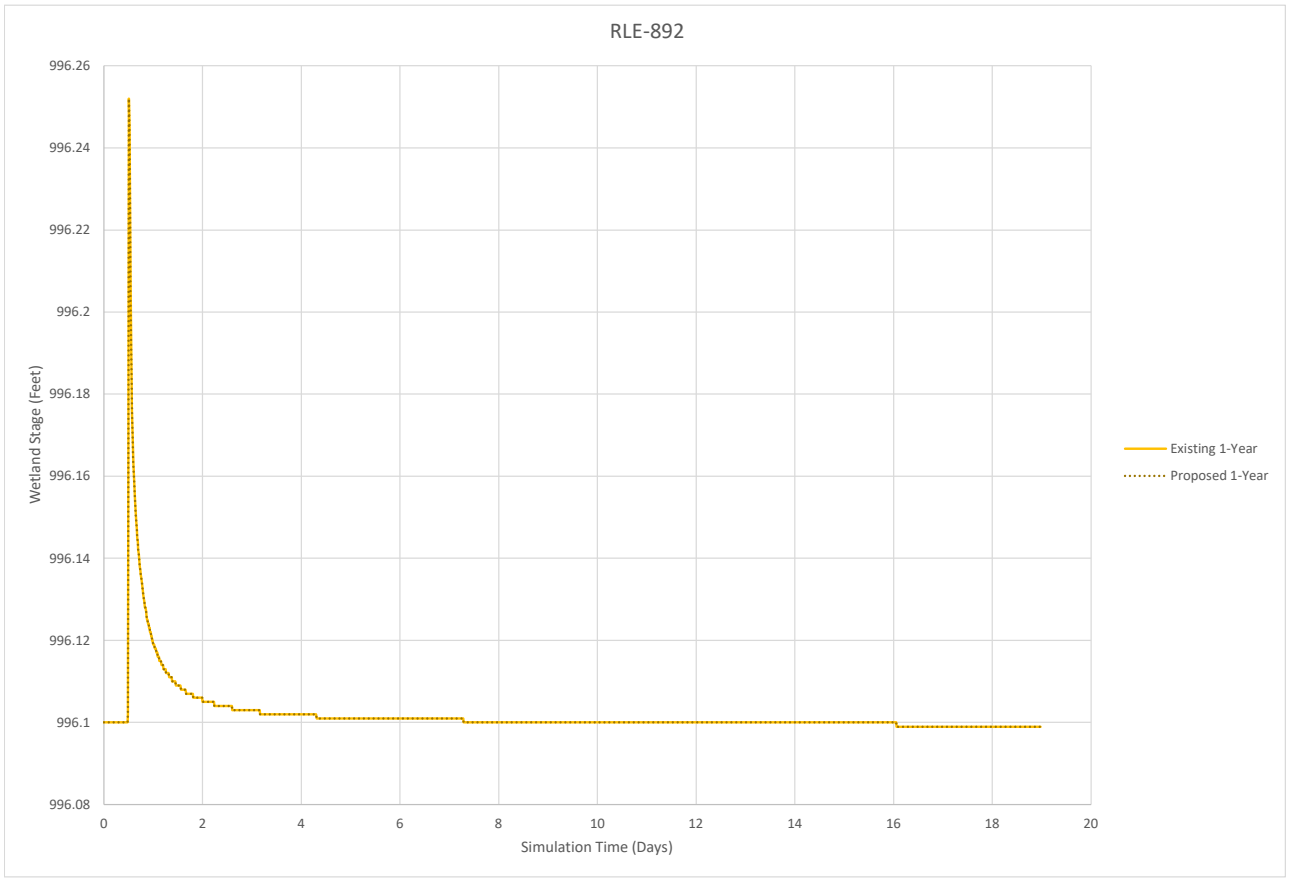
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-892



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996.14
996.12
996.1
996.08
Wetland Stage (Feet)
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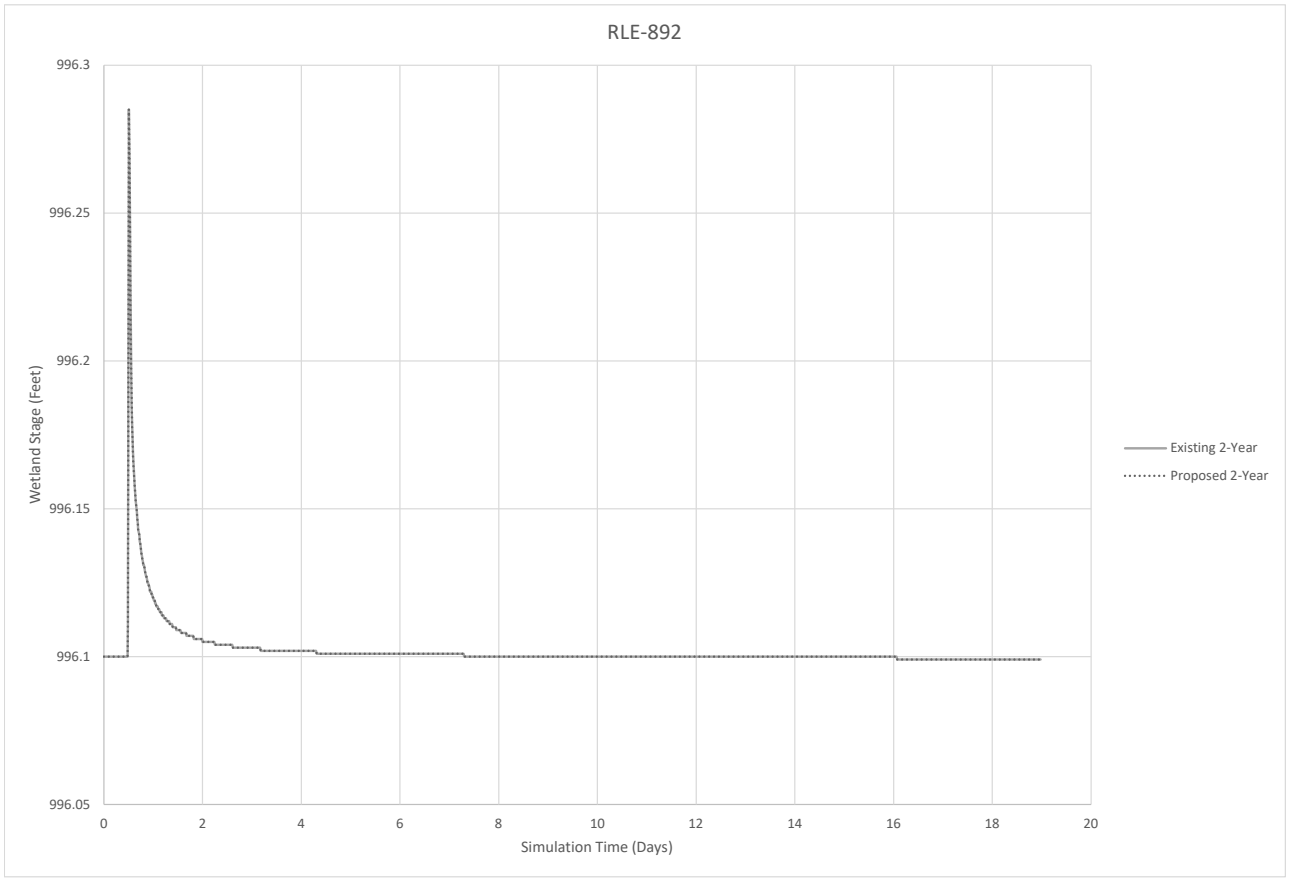
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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996.1
996.05
Wetland Stage (Feet)
0
2
4
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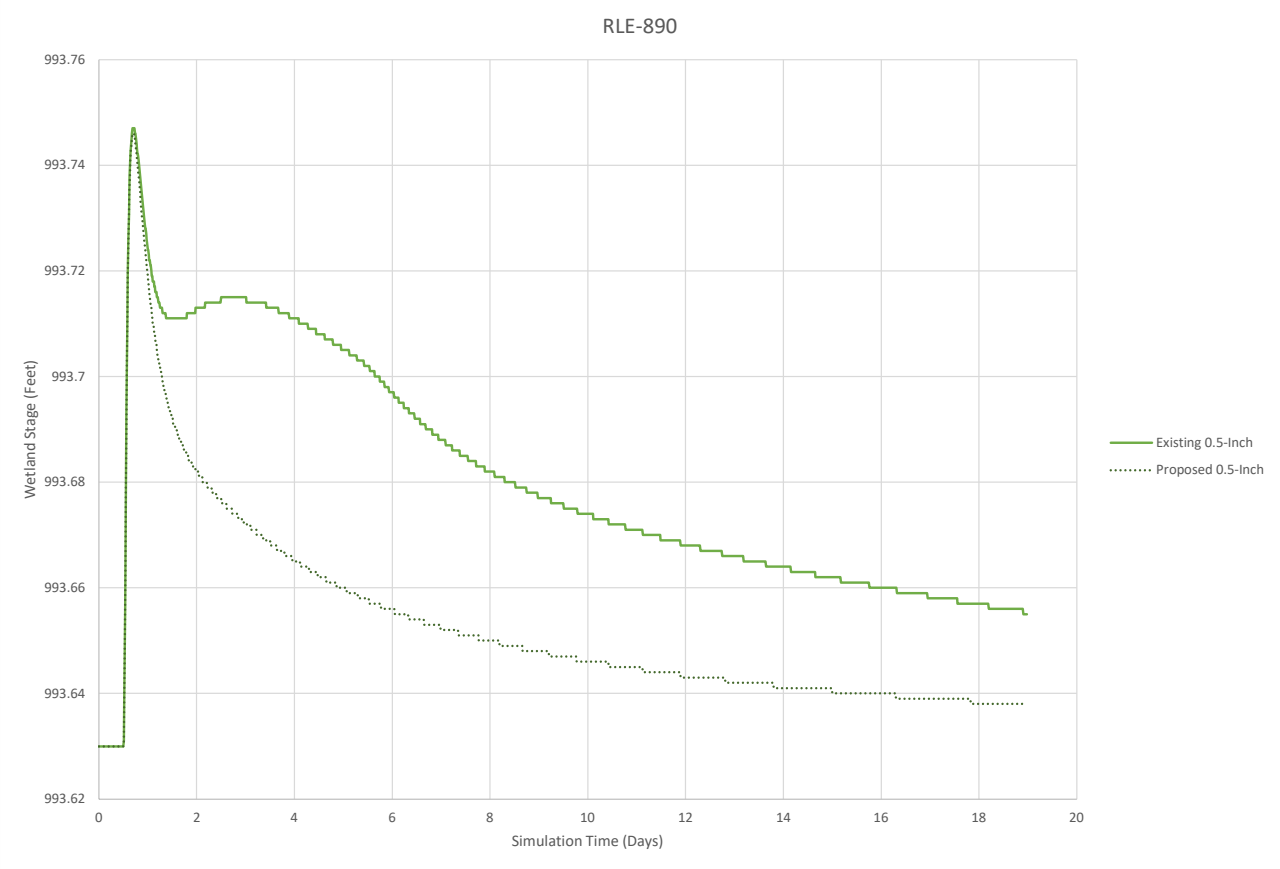
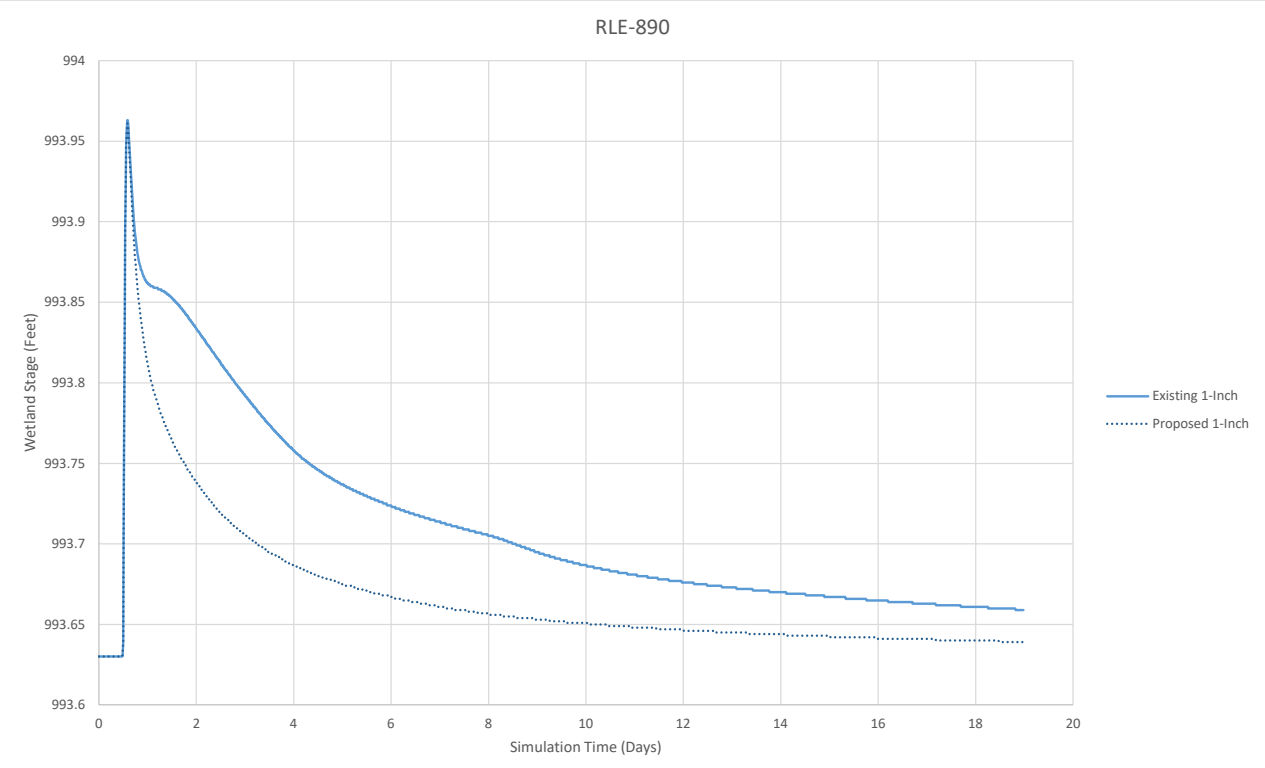
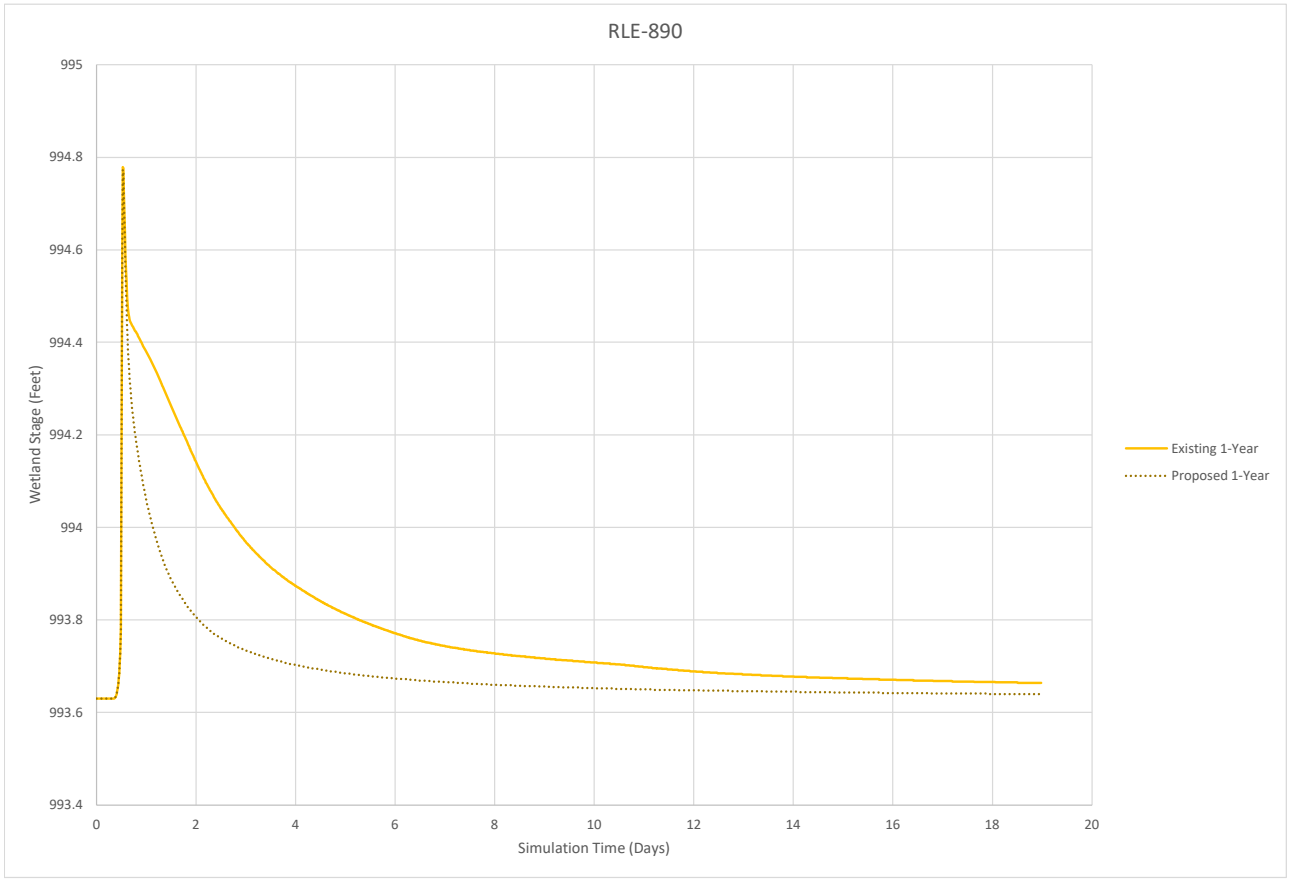
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-890



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994.4
994.2
994
993.8
993.6
993.4
Wetland Stage (Feet)
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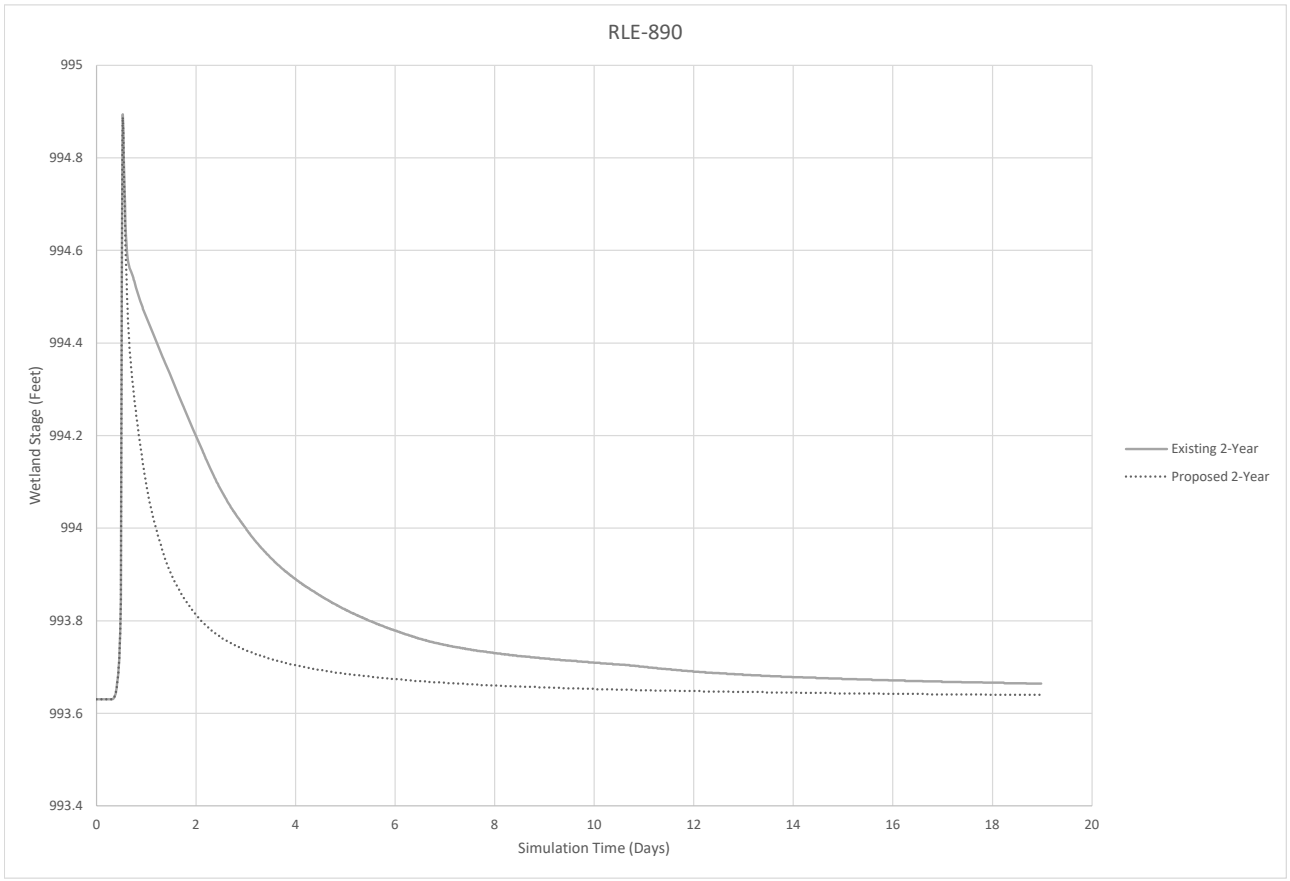
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year


RLE-890
995
994.8
994.6
994.4
994.2
994
993.8
993.6
993.4
Wetland Stage (Feet)
0
2
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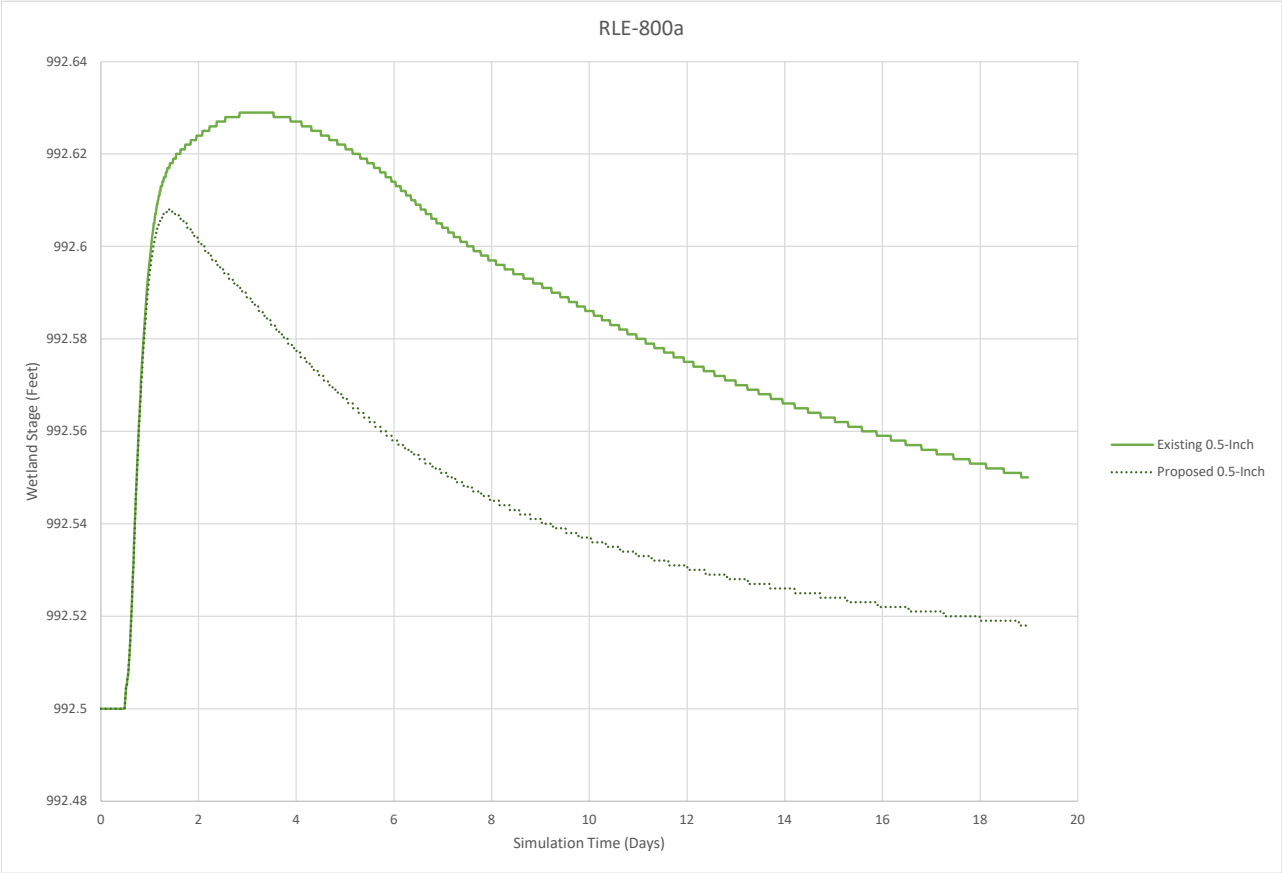
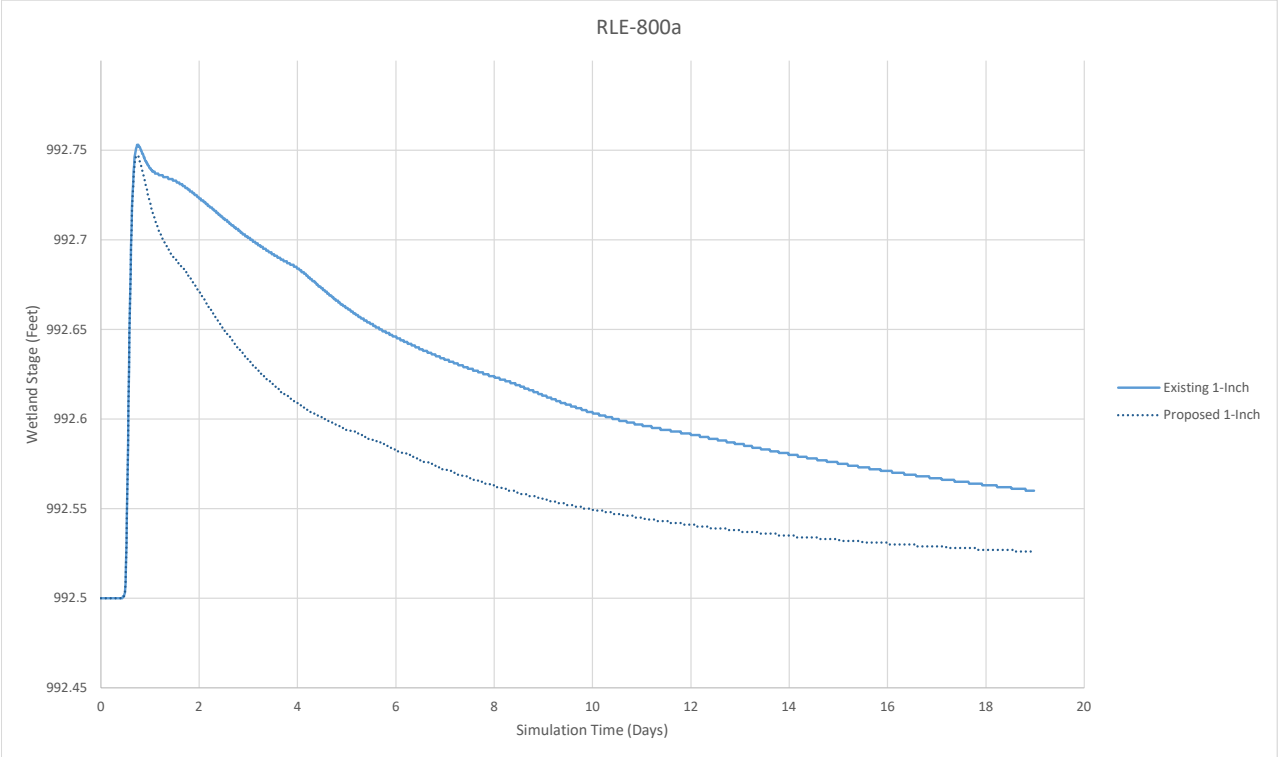
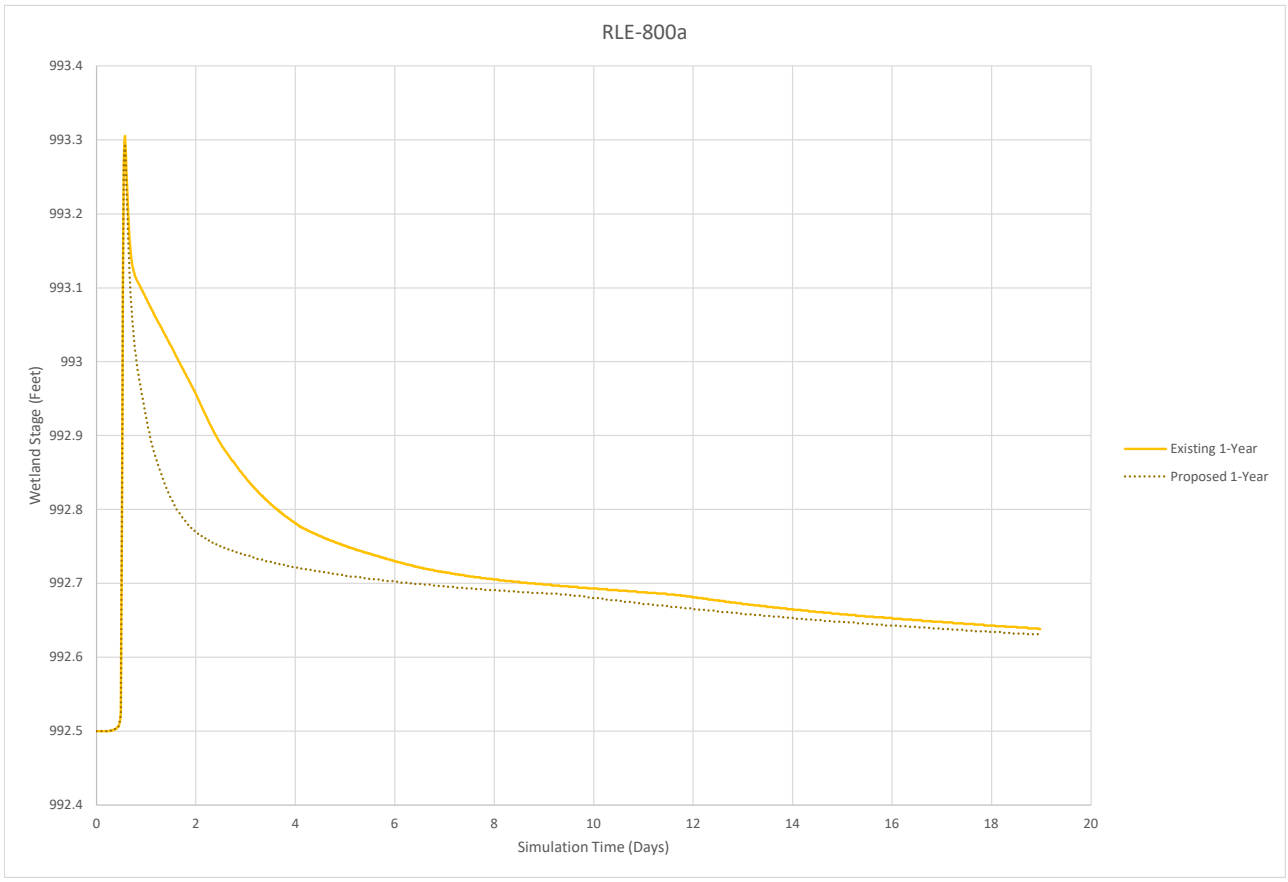
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-800a



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993.3
993.2
993.1
993
992.9
992.8
992.7
992.6
992.5
992.4
Wetland Stage (Feet)
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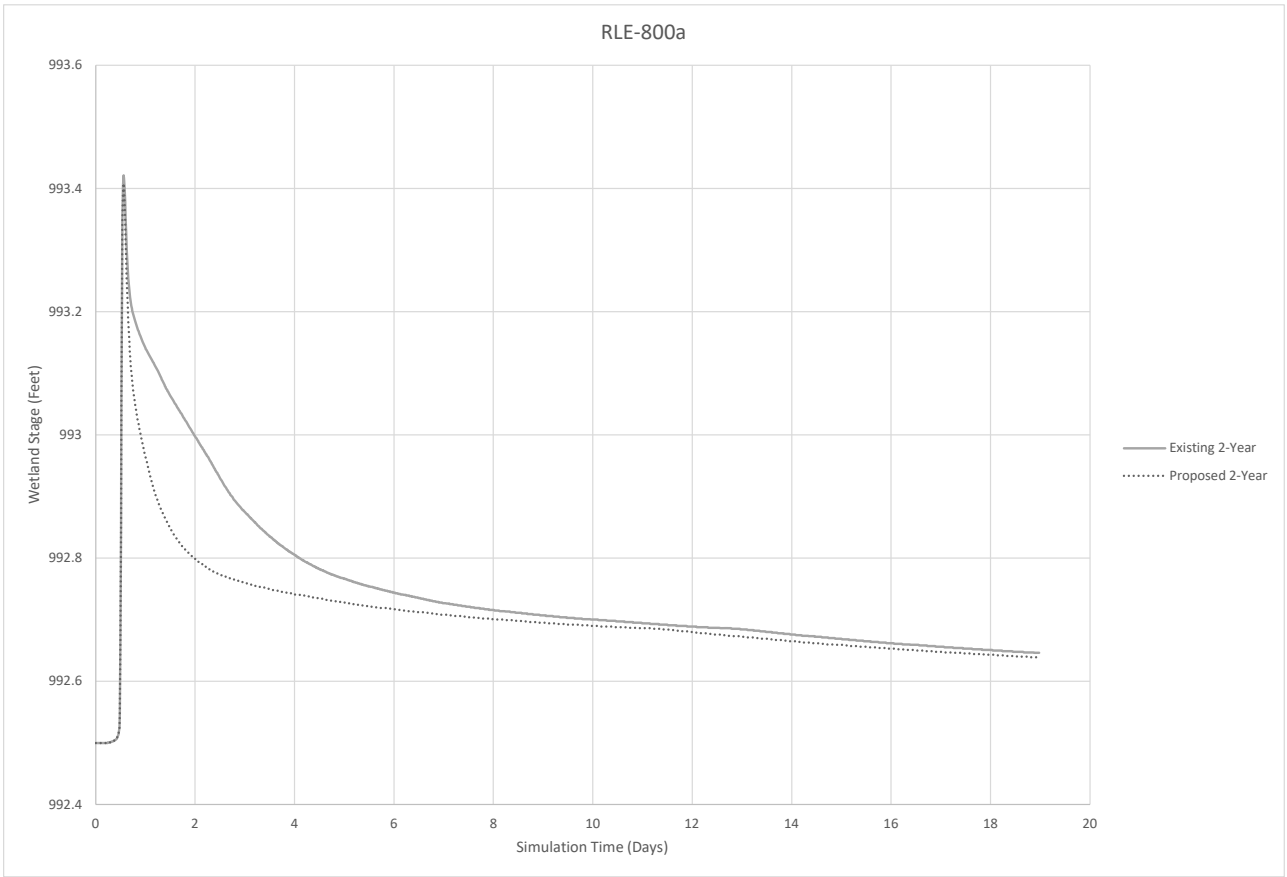
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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993.4
993.2
993
992.8
992.6
992.4
Wetland Stage (Feet)
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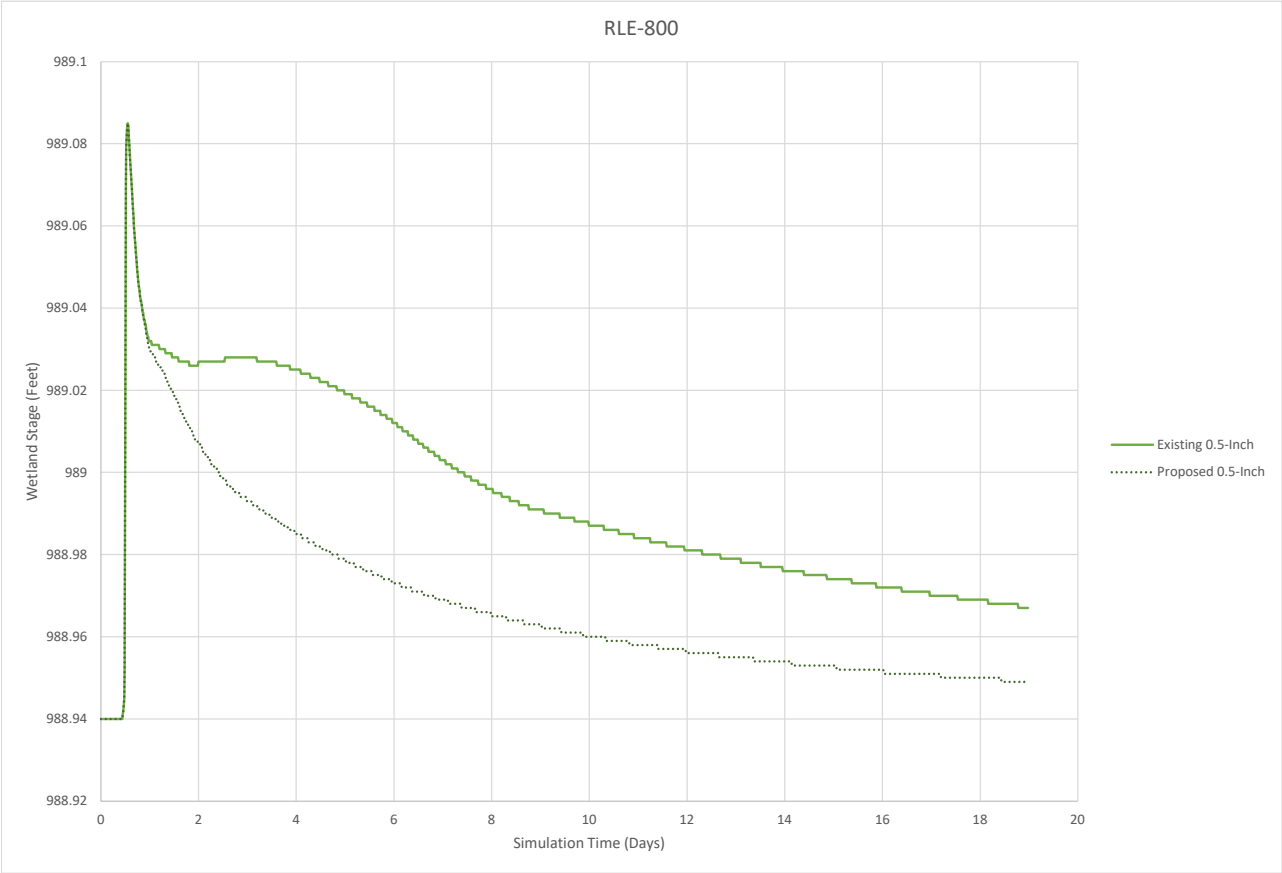
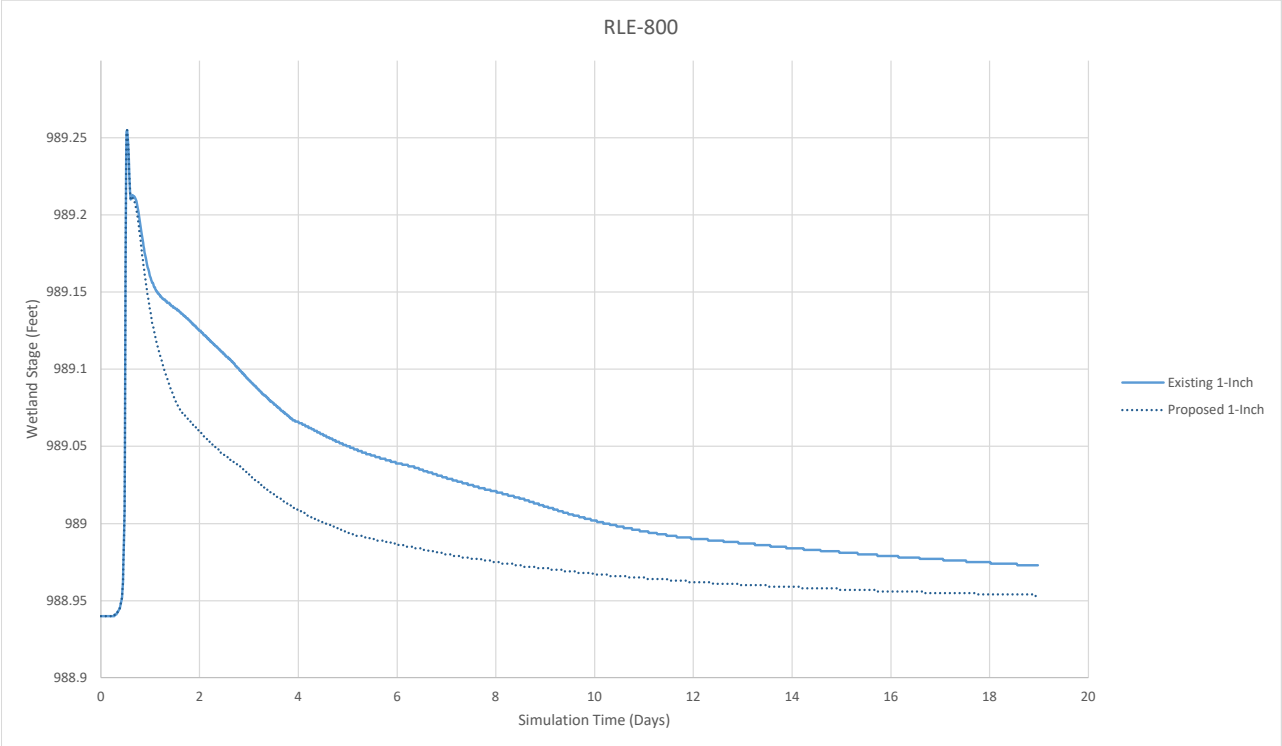
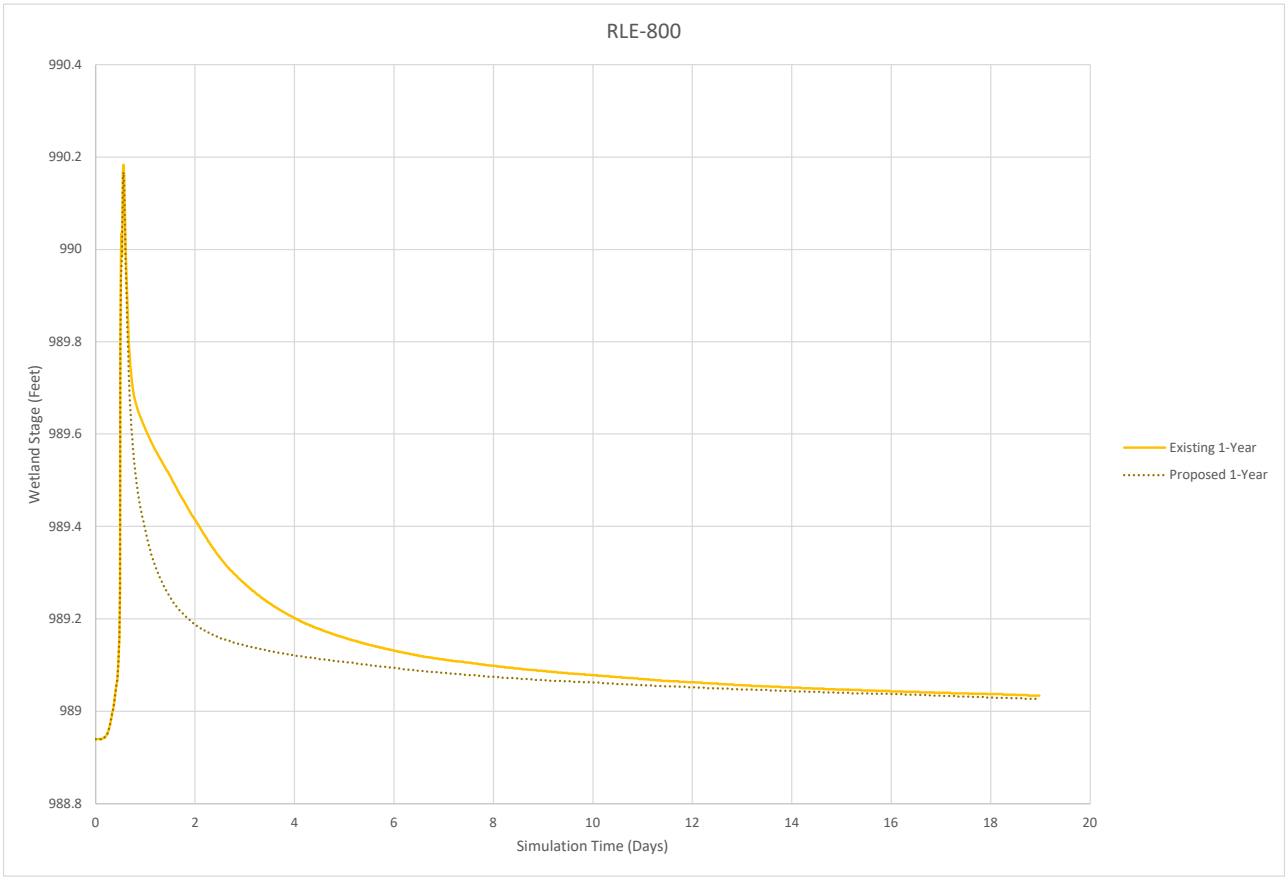
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-800






RLE-800
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990.2
990
989.8
989.6
989.4
989.2
989
988.8
Wetland Stage (Feet)
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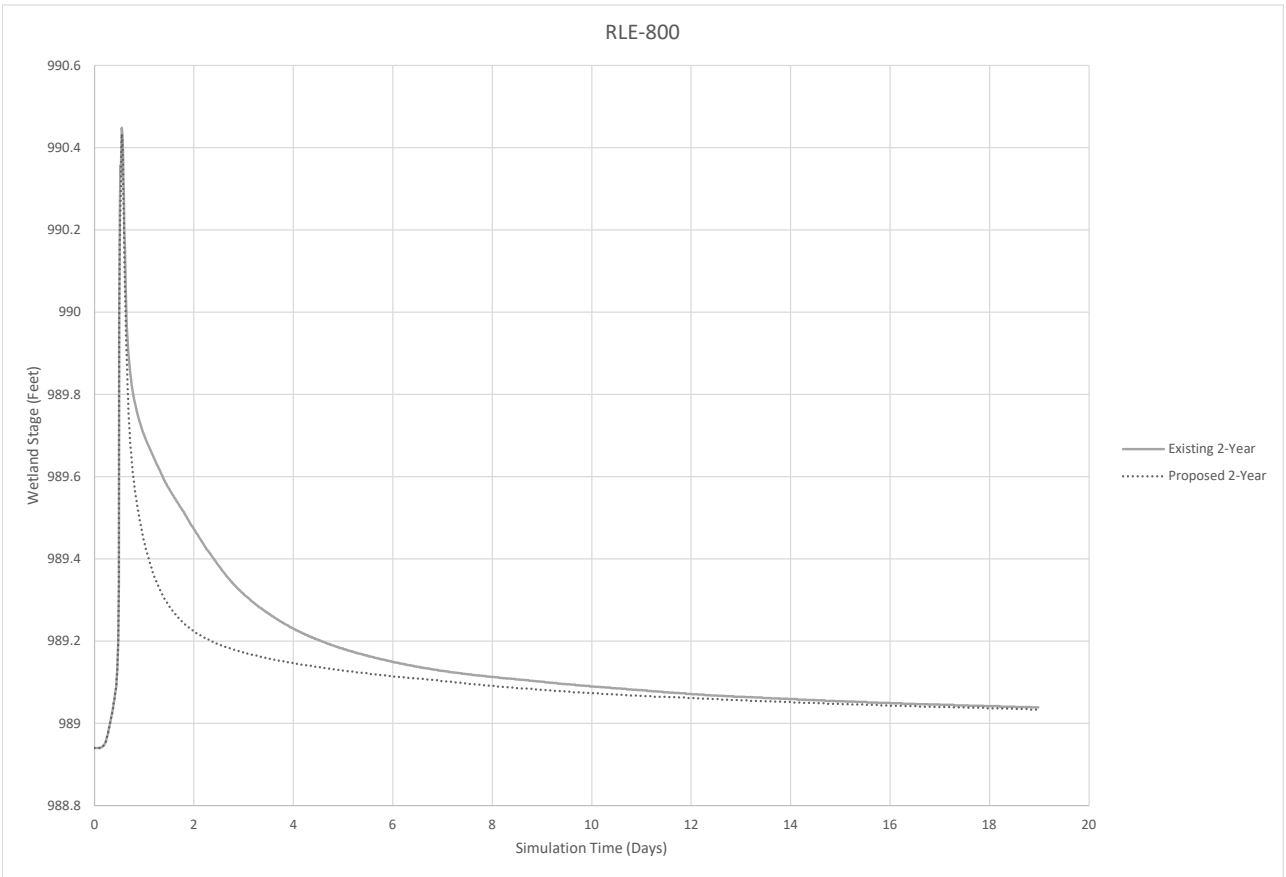
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year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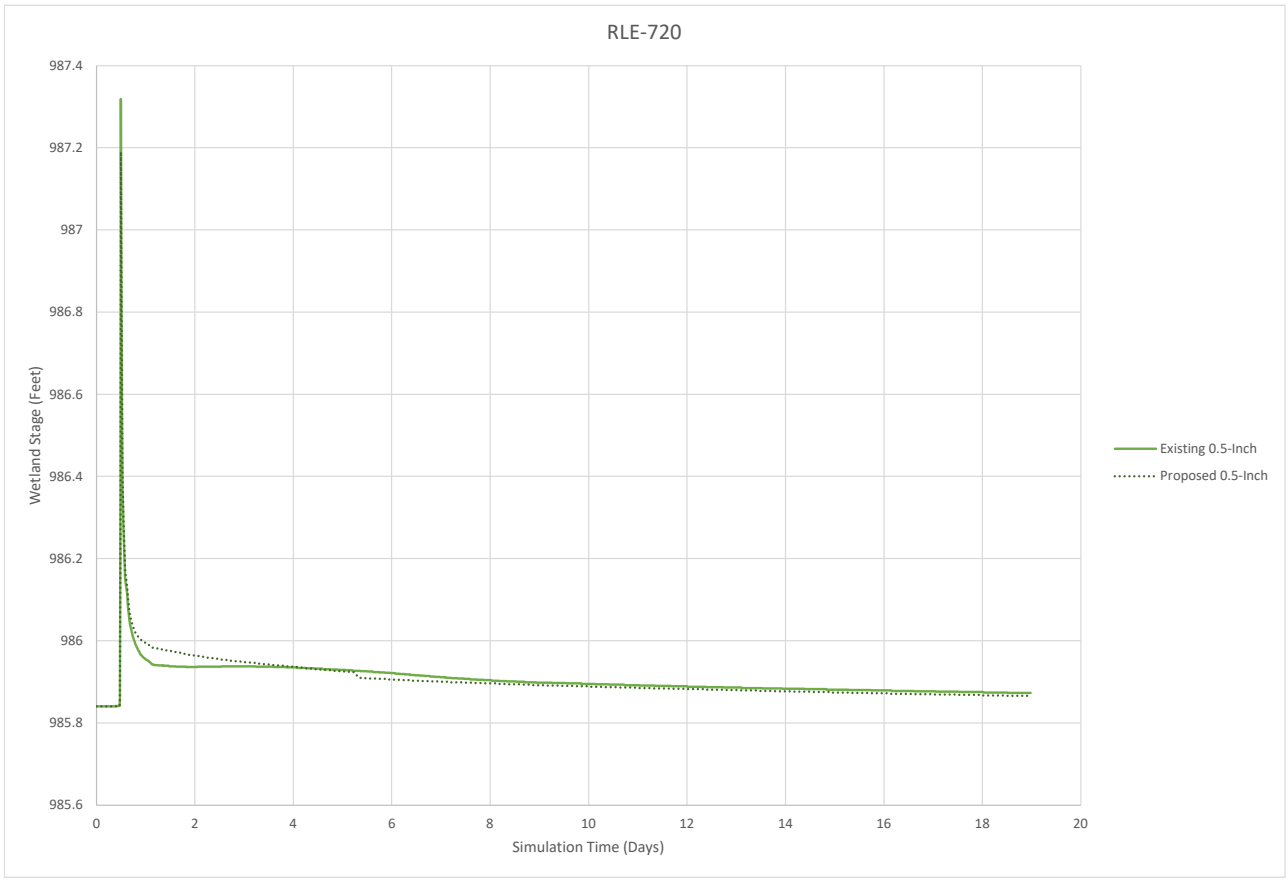
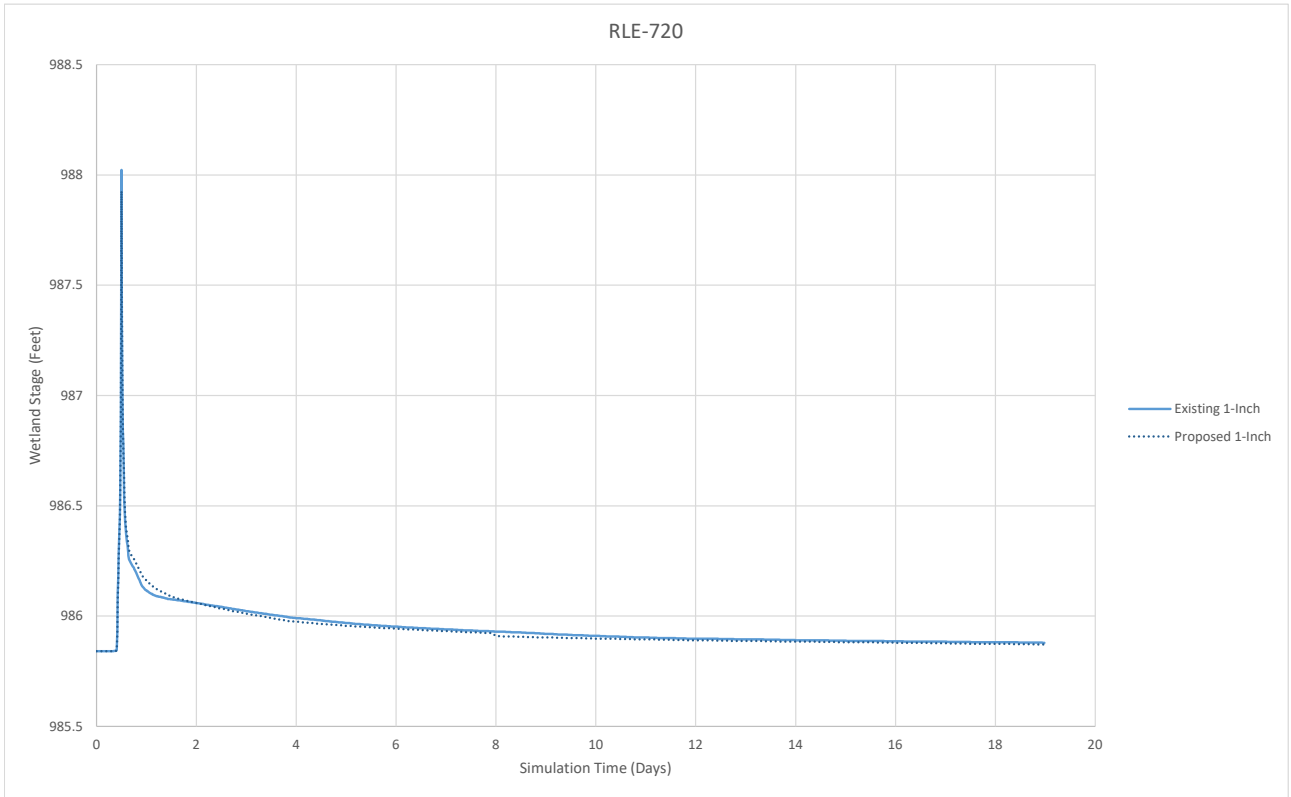
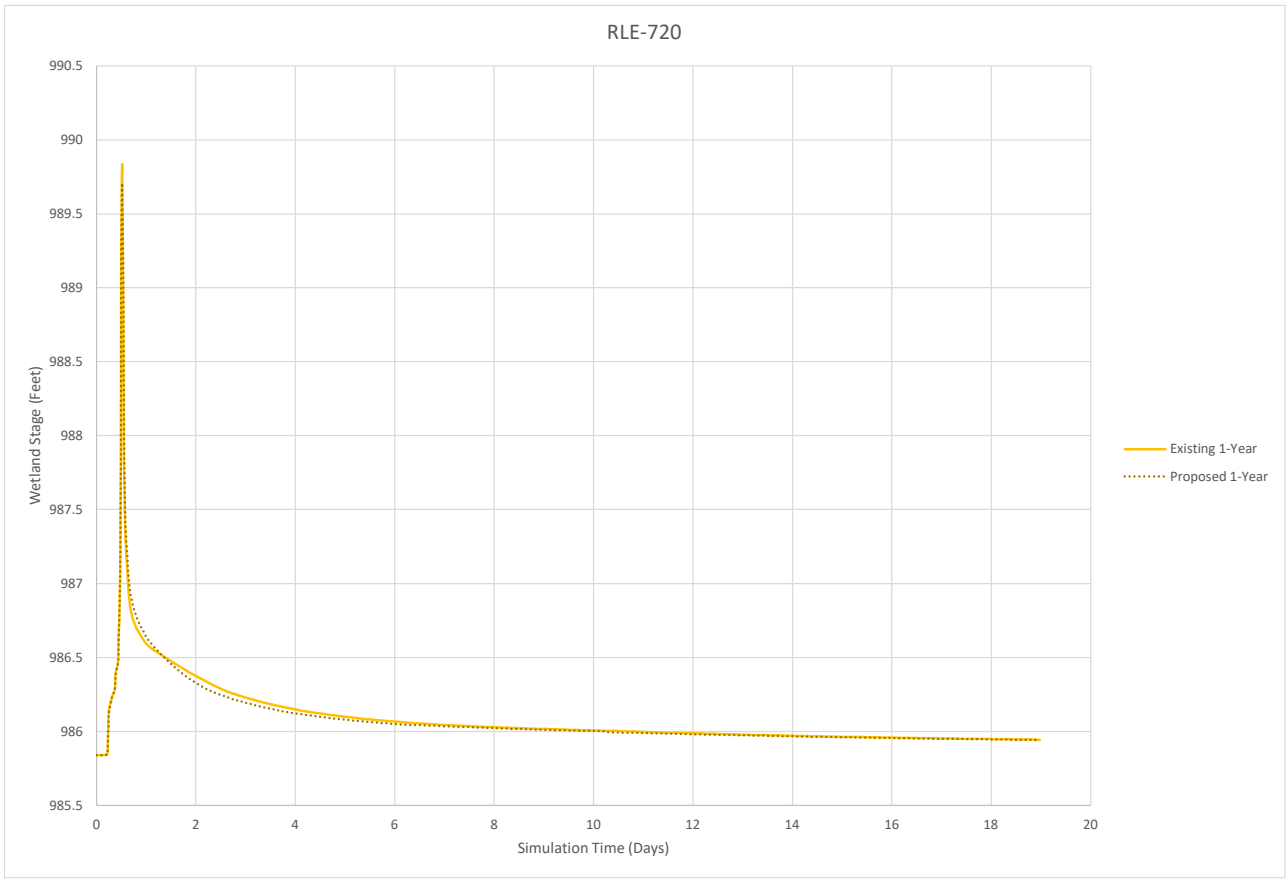
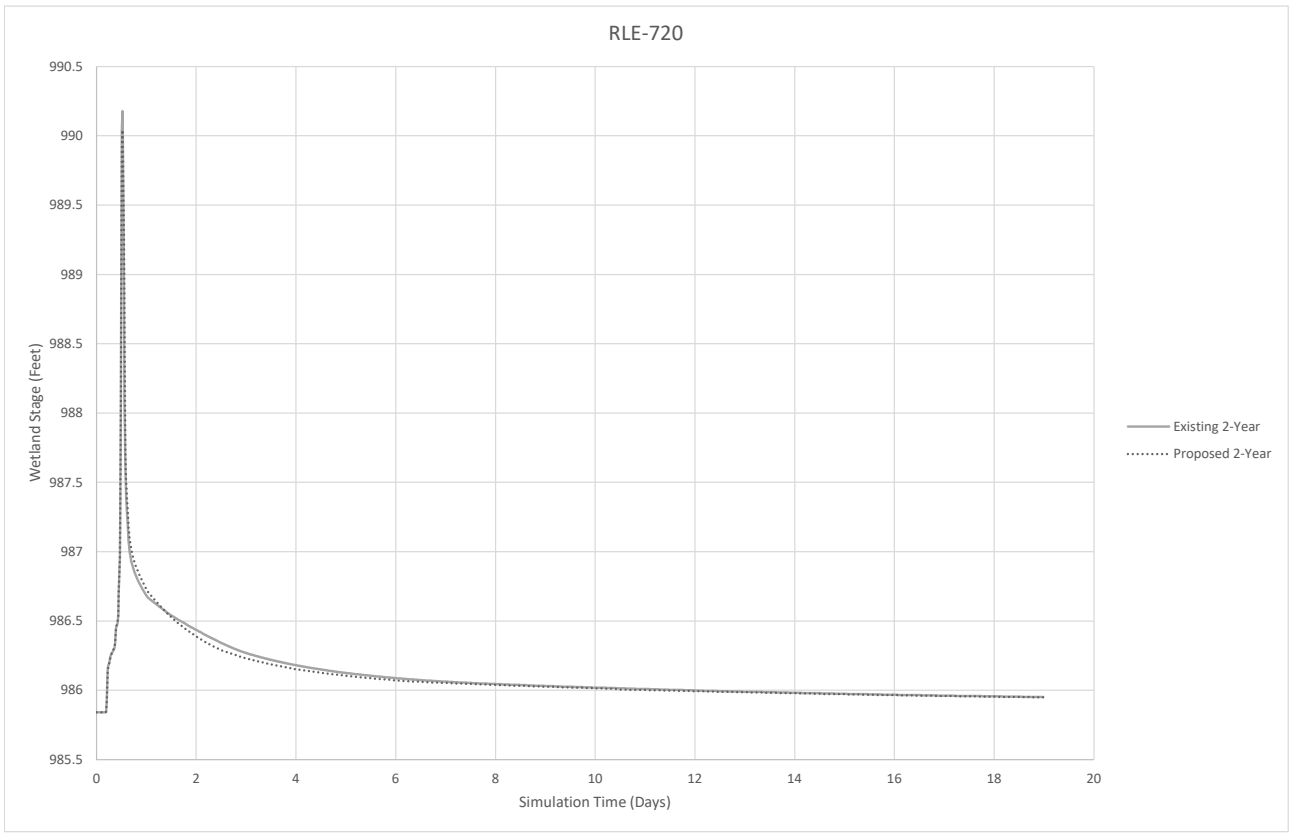
990.4
990.2
990
989.8
989.6
989.4
989.2
989
988.8
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-720






RLE-720
990.5
990
989.5
989
988.5
988
987.5
987
986.5
986
985.5
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year


RLE-720
990.5
990
989.5
989
988.5
988
987.5
987
986.5
986
985.5
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Attachment B

Scenario 2 Dry Condition Stage Hydrographs and MWSE Comparisons

Summary Node: RLE-904

Wetland ID: I
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	1004.4	1004.4	0.0	0.00	0.0	0.0	0%	<1	<1	0
1-Inch	1004.5	1004.5	0.0	0.00	0.0	0.0	0%	<1	<1	0
1-Year	1004.7	1004.7	0.0	0.00	0.1	0.1	0%	1	1	0
2-Year	1004.8	1004.8	0.0	0.00	0.8	0.8	0%	1	1	0

Summary Node: RLE-910

Wetland ID: H
Wetland Classification: B-Manage 1

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	1005.6	1005.3	-0.3	-0.12	1.2	0.2	-87%	18	<1	18
1-Inch	1005.9	1005.5	-0.4	-0.17	3.5	0.6	-82%	18	18	0
1-Year	1006.6	1006.1	-0.5	-0.48	20.9	3.0	-86%	19	18	0
2-Year	1006.7	1006.2	-0.5	-0.48	27.2	4.9	-82%	19	19	0

Summary Node: RLE-897

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	1000.6	1000.6	0.0	0.00	0.2	0.2	0%	<1	<1	0
1-Inch	1000.9	1000.9	0.0	0.00	2.0	0.6	-72%	<1	<1	0
1-Year	1002.1	1002.1	0.0	0.00	21.7	3.9	-82%	6	2	-4
2-Year	1002.3	1002.3	0.0	0.00	28.0	5.7	-79%	6	2	-4

Summary Node: RLE-896

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	999.3	999.3	0.0	0.00	0.2	0.2	0%	<1	<1	0
1-Inch	999.8	999.8	0.0	0.00	2.0	0.6	-72%	19	2	-17
1-Year	1001.6	1001.6	0.0	0.00	22.2	4.3	-80%	19	8	-11
2-Year	1001.8	1001.8	0.0	0.00	28.0	5.8	-79%	19	8	-11

Summary Node: RLE-895

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	995.9	995.9	0.0	0.00	0.2	0.2	0%	19	19	0
1-Inch	996.1	996.1	0.0	0.00	2.1	0.7	-69%	19	19	0
1-Year	996.7	996.7	0.0	0.00	22.2	4.4	-80%	19	19	0
2-Year	996.9	996.9	0.0	0.00	28.5	6.3	-78%	19	19	0

Summary Node: RLE-894

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	995.1	995.1	0.0	0.00	0.2	0.2	0%	<1	<1	0
1-Inch	995.3	995.3	0.0	0.00	2.1	0.7	-68%	9	1	-8
1-Year	995.5	995.5	0.0	0.00	22.6	4.7	-79%	13	4	-8
2-Year	995.6	995.6	0.0	0.00	28.9	6.6	-77%	13	5	-8

Summary Node: RLE-893

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	994.3	994.3	0.0	0.00	0.2	0.2	0%	19	19	0
1-Inch	994.6	994.6	0.0	0.00	2.2	0.7	-68%	19	19	0
1-Year	995.3	995.3	0.0	0.00	22.9	5.1	-78%	19	19	0
2-Year	995.5	995.5	0.0	0.00	29.3	7.1	-76%	19	19	0

Summary Node: RLE-892

Wetland ID: E
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	994.9	994.9	0.0	0.00	0.0	0.0	0%	<1	<1	0
1-Inch	995.2	995.2	0.0	0.00	0.0	0.0	0%	18	18	0
1-Year	996.0	996.0	0.0	0.00	0.0	0.0	0%	19	19	0
2-Year	996.1	996.1	0.0	0.00	0.2	0.2	0%	19	19	0

Summary Node: RLE-890

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	993.0	993.0	0.0	0.00	0.1	0.1	0%	18	18	0
1-Inch	993.7	993.7	0.0	0.00	2.1	0.6	-70%	18	18	0
1-Year	994.6	994.6	0.0	0.00	23.1	5.3	-77%	19	19	0
2-Year	994.8	994.8	0.0	0.00	29.7	7.5	-75%	19	19	0

Summary Node: RLE-800a

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	991.4	991.4	0.0	0.00	0.0	<0.1	99%	19	19	0
1-Inch	992.6	992.4	-0.2	-0.53	1.7	0.2	-86%	19	19	0
1-Year	993.2	993.2	0.0	0.00	31.6	13.7	-56%	19	19	0
2-Year	993.3	993.3	0.0	0.00	42.1	19.9	-53%	19	19	0

Summary Node: RLE-800

Wetland ID: A
Wetland Classification: C-Manage 2

Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	989.1	989.1	0.0	0.00	0.2	0.2	0%	<1	<1	0
1-Inch	989.2	989.2	0.0	0.00	1.9	0.6	-68%	1	1	0
1-Year	989.9	989.9	0.0	0.00	33.8	16.0	-53%	16	14	-2
2-Year	990.2	990.2	0.0	0.00	44.8	22.6	-50%	18	16	-2

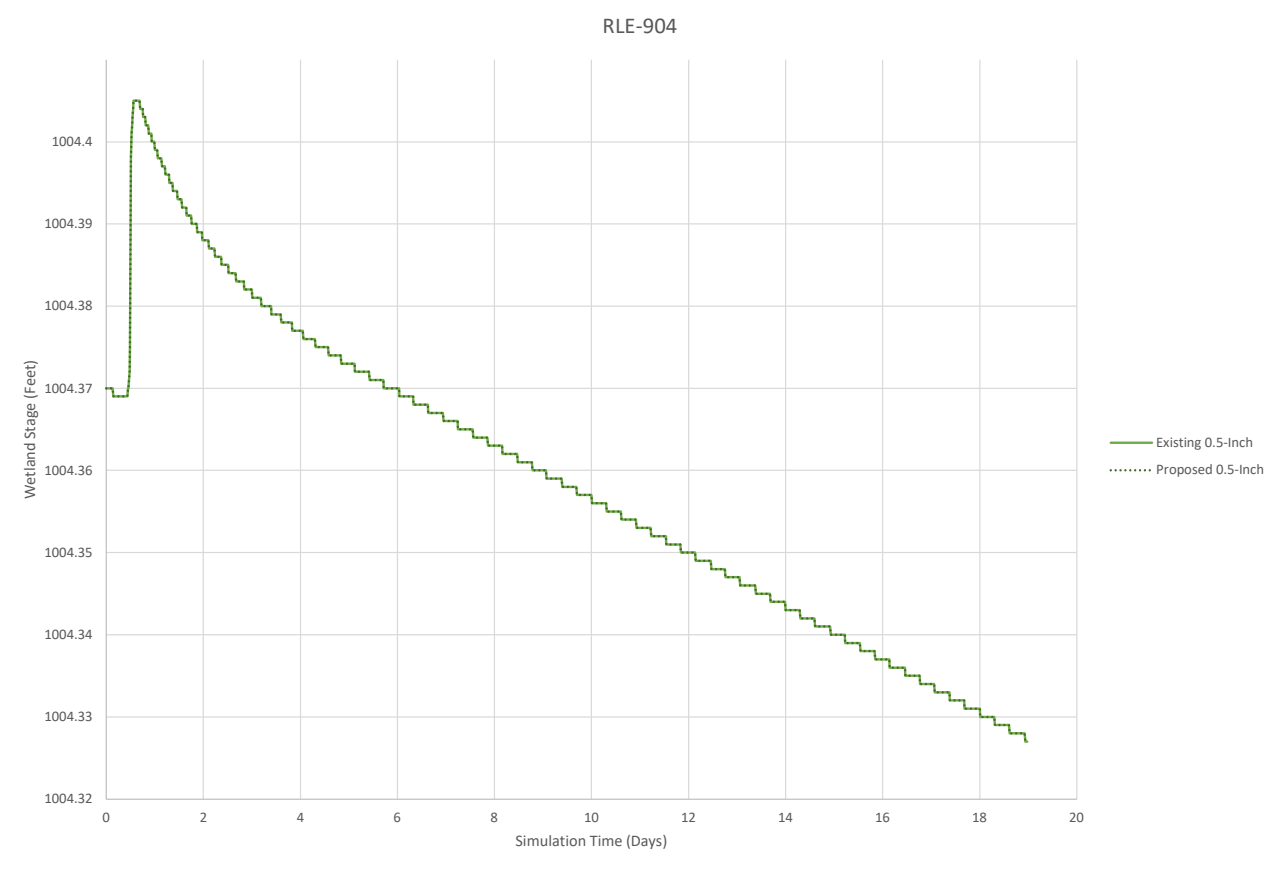
Summary Node: RLE-720

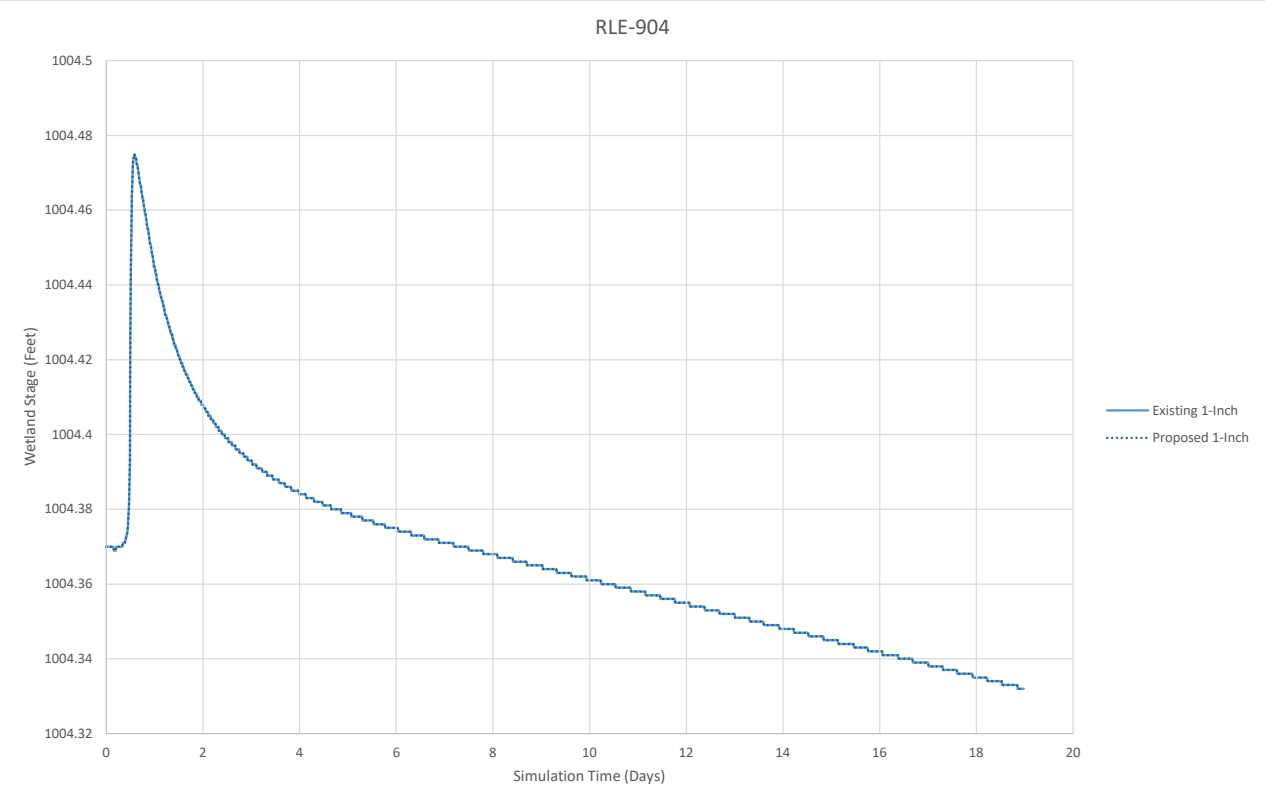
Wetland ID: T
Wetland Classification: C-Manage 2

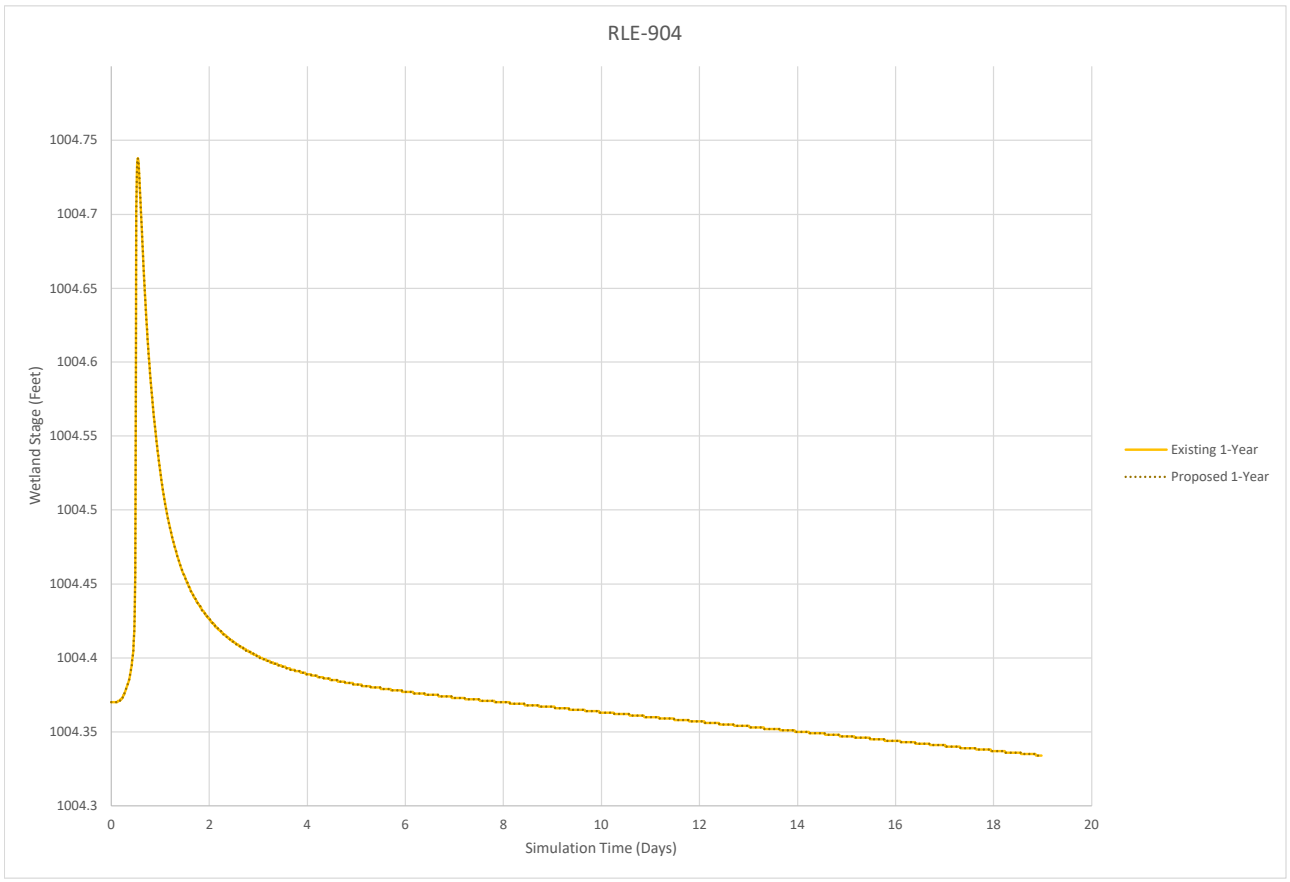
Design Storm Event (24 Hour Duration)	Existing MWSE (feet)	Proposed MWSE (feet)	Difference in MWSE (feet)	Difference in Inundation Area (acres)	Existing Inflow Volume (ac ft)	Proposed Inflow Volume (ac ft)	Volume Difference (%)	Existing Inundation Time (Days)[1]	Proposed Inundation Time (Days)[1]	Difference in Inundation (Days)[1]
0.5-Inch	987.3	987.2	-0.1	-0.01	1.6	2.2	38%	<1	2	2
1-Inch	988.0	987.9	-0.1	-0.03	7.2	7.4	2%	2	4	2
1-Year	989.7	989.6	-0.1	-0.15	52.0	52.1	0%	19	19	0
2-Year	990.1	989.9	-0.1	-0.34	71.0	71.0	0%	19	19	0

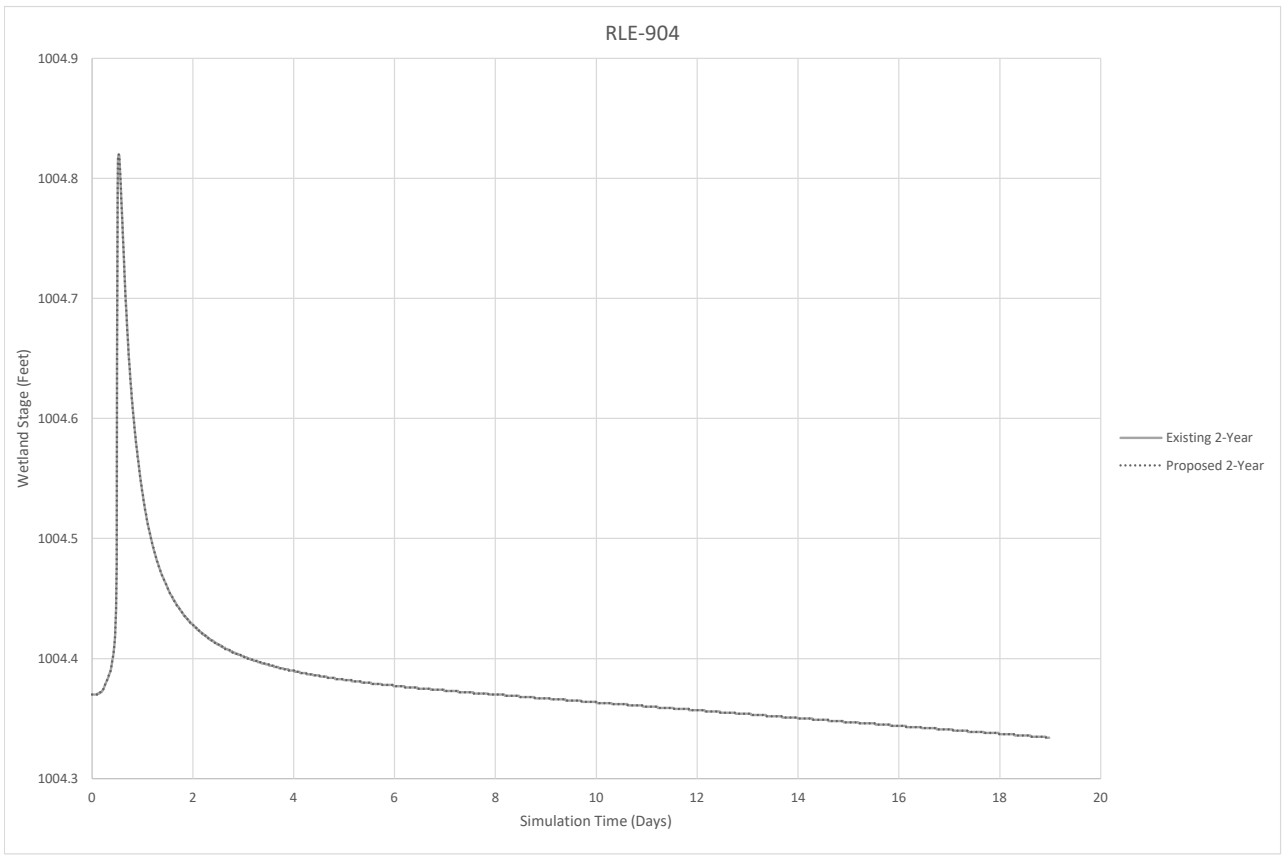
1 - Duration that wetland stage is >0.1 feet above starting elevation. Events were simulated over a 20-day duration.

Summary Node
RLE-904

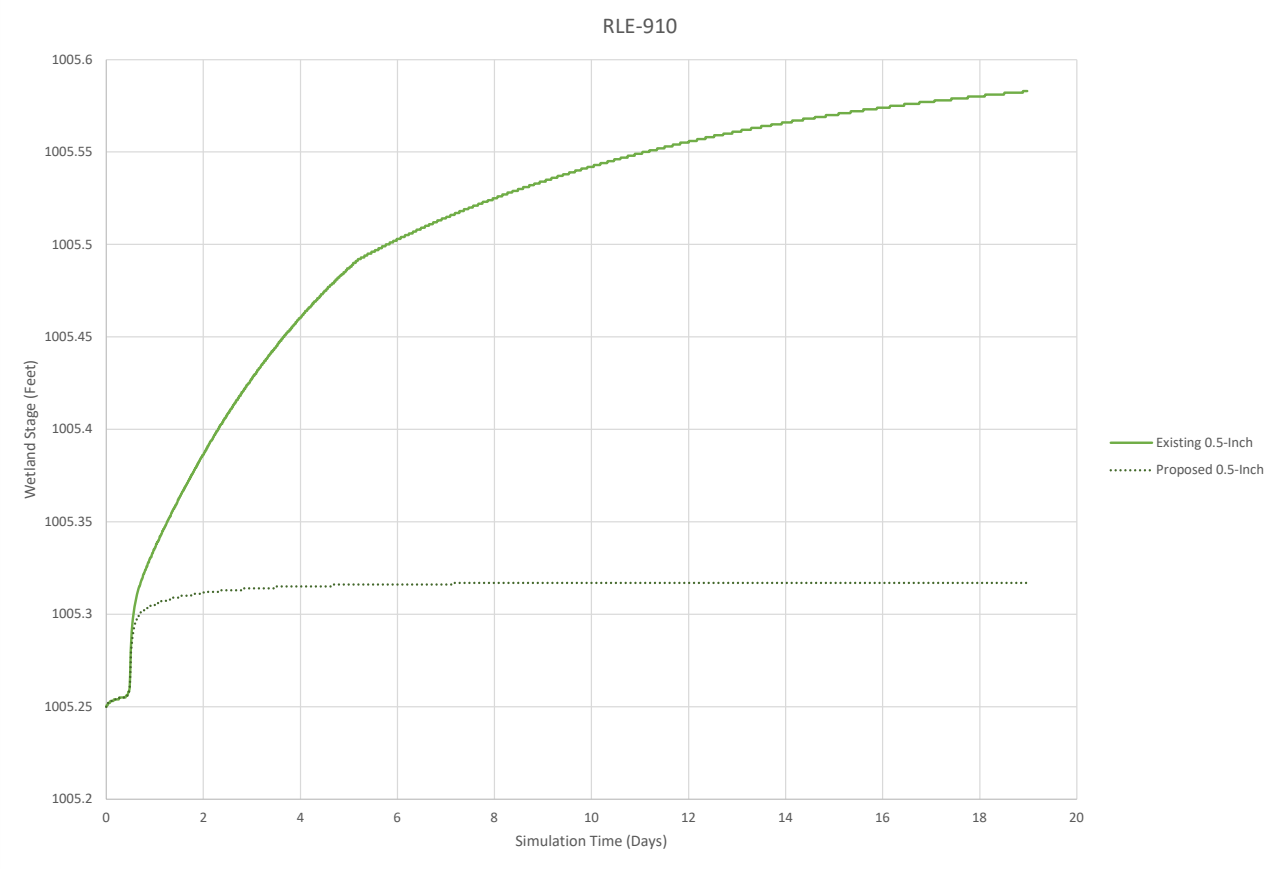


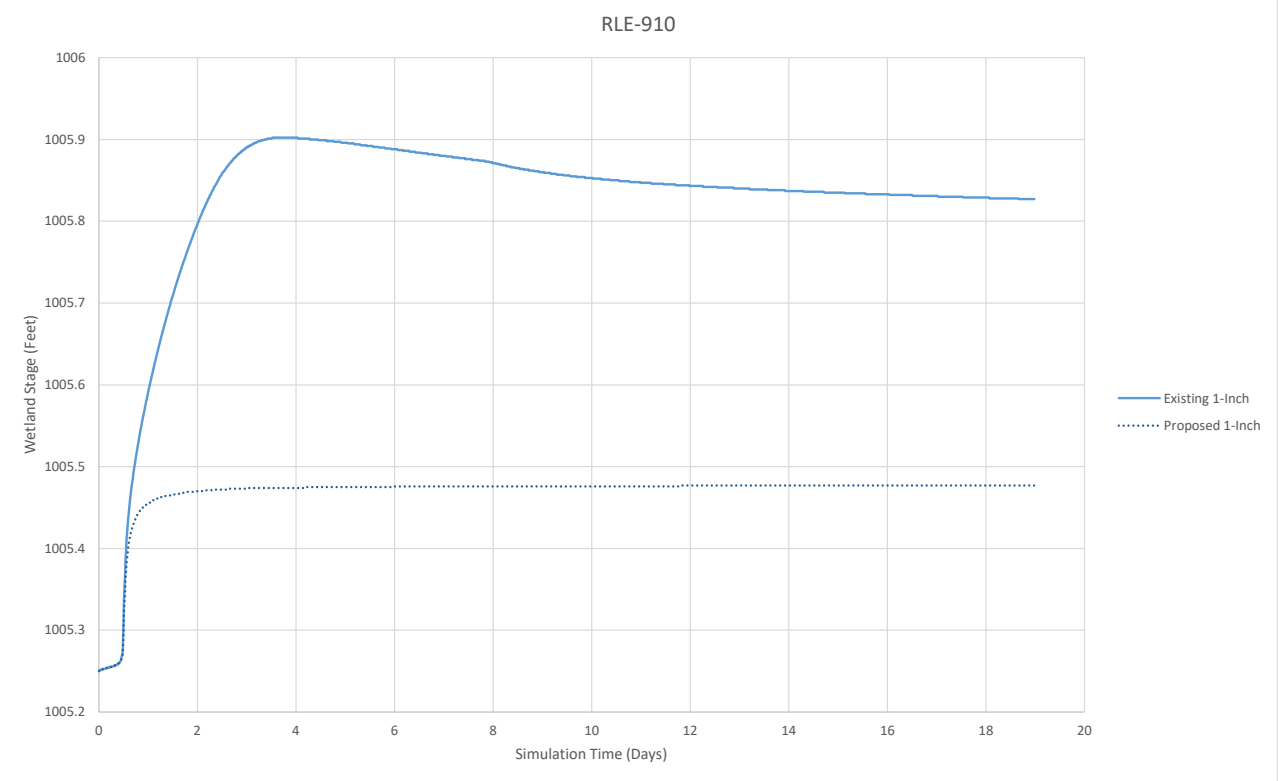


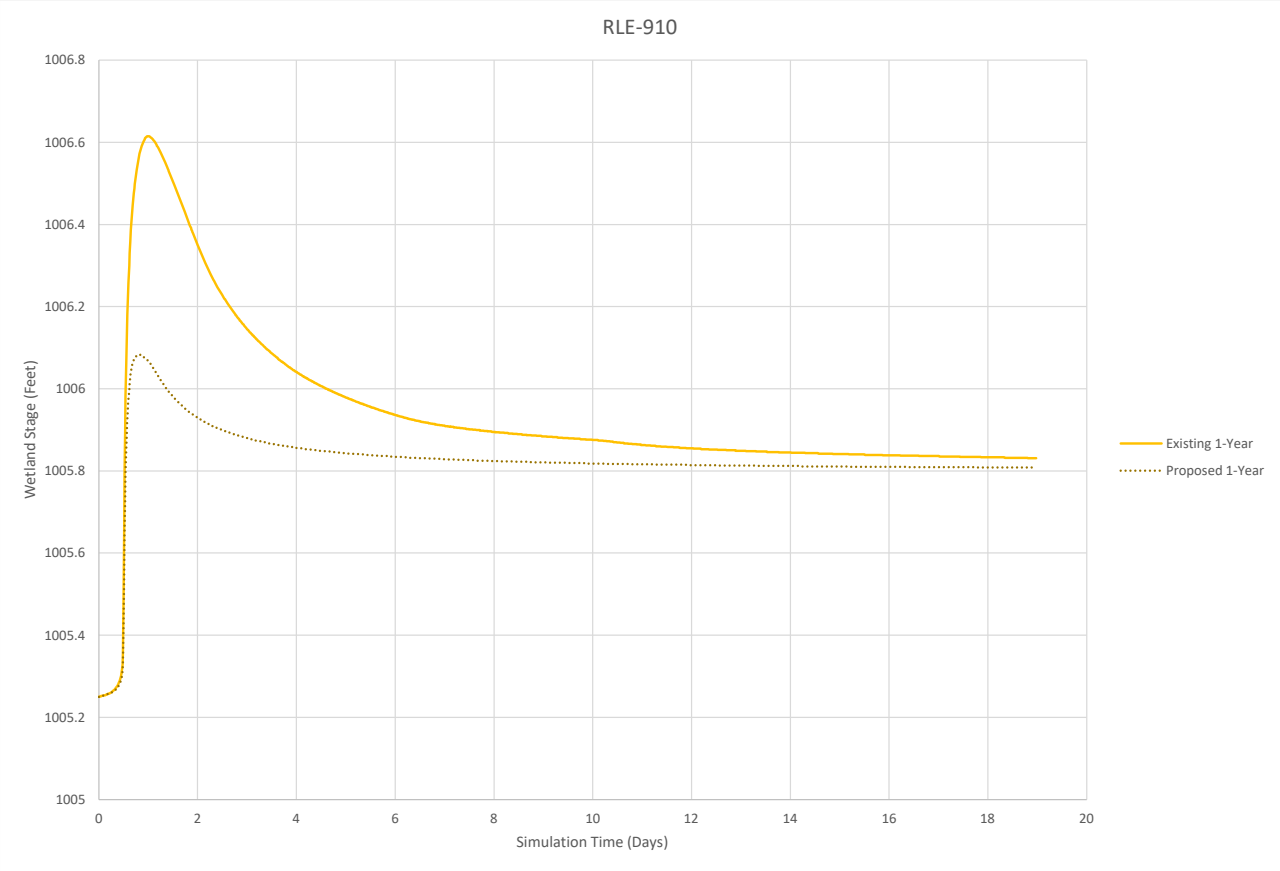

RLE-904
Wetland Stage (Feet)
1004.75
1004.7
1004.65
1004.6
1004.55
1004.5
1004.45
1004.4
1004.35
1004.3
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

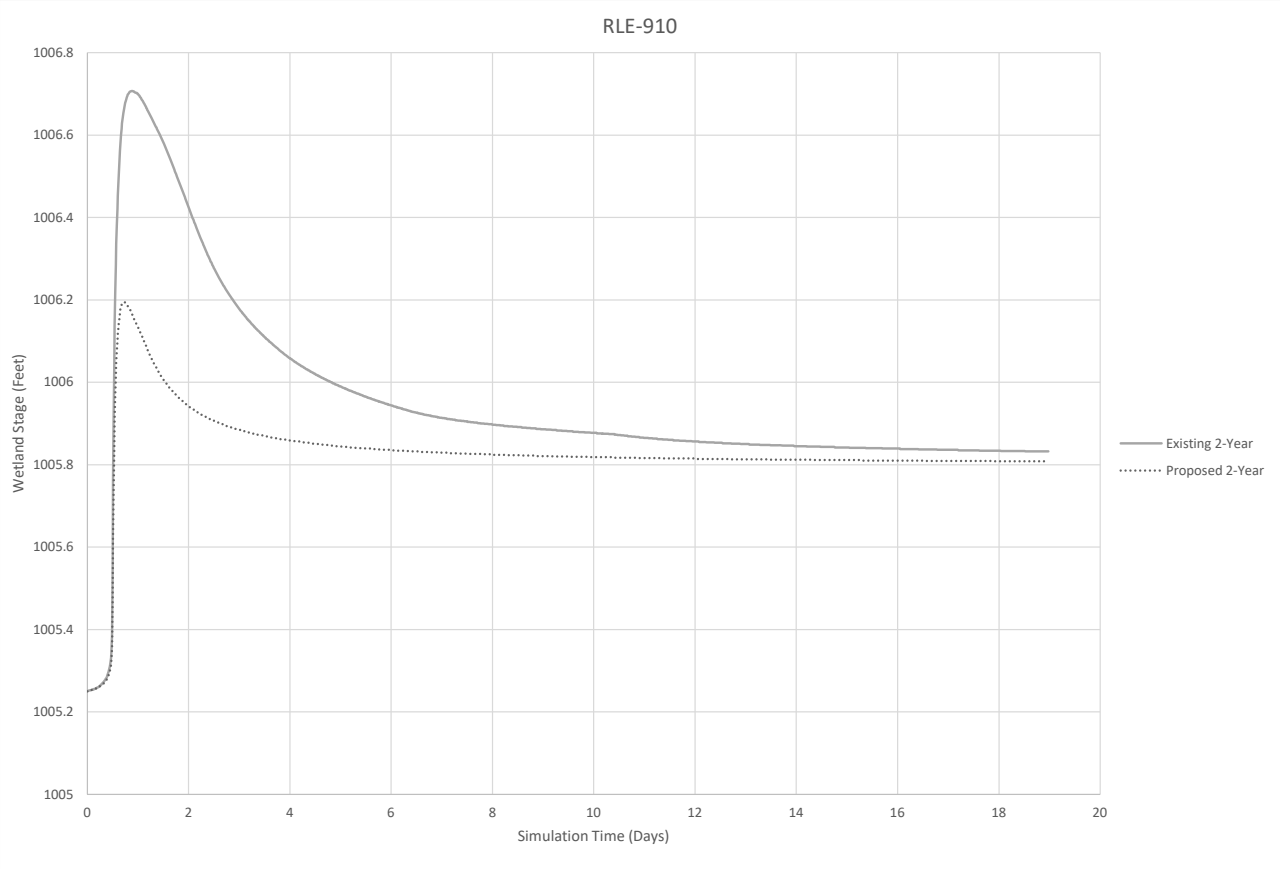

RLE-904
Wetland Stage (Feet)
1004.9
1004.8
1004.7
1004.6
1004.5
1004.4
1004.3
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-910

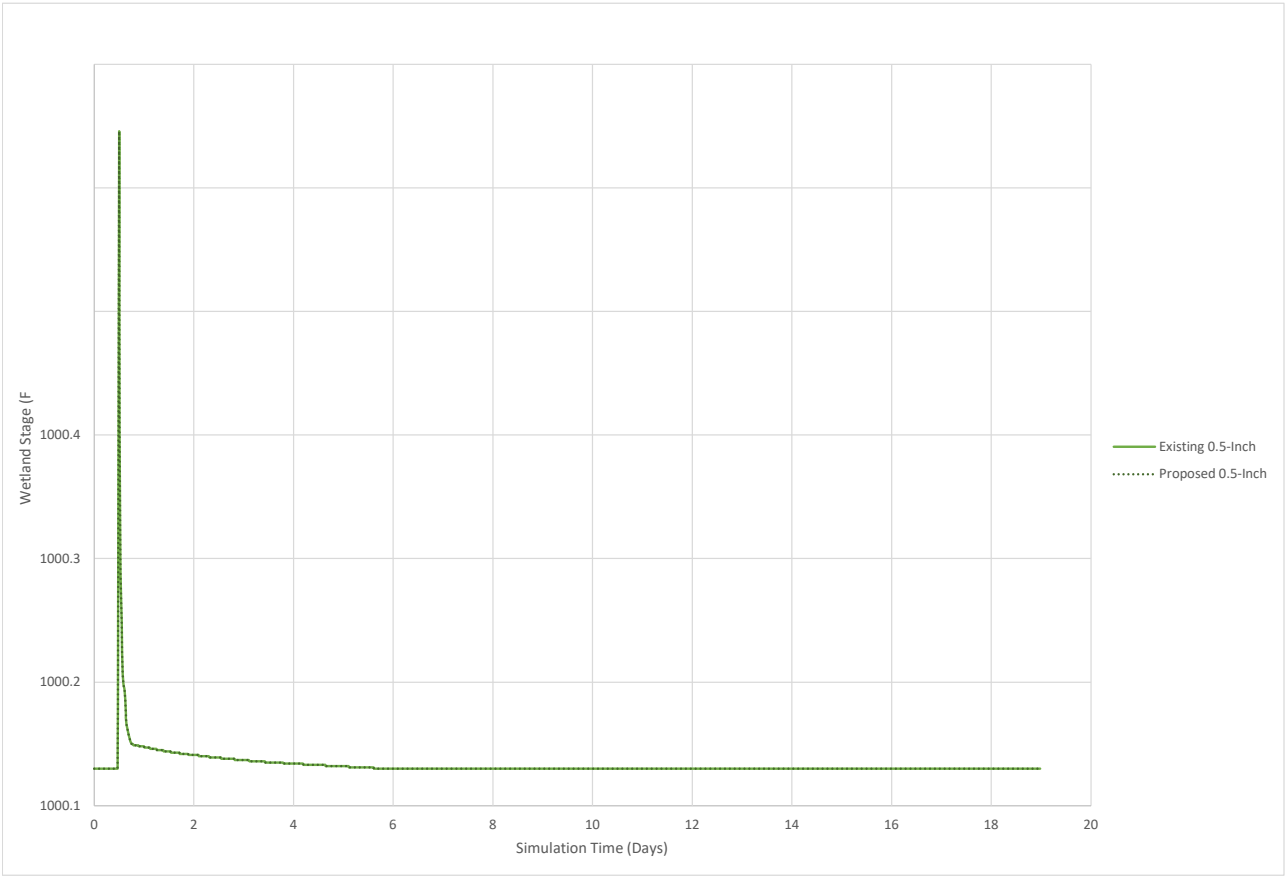


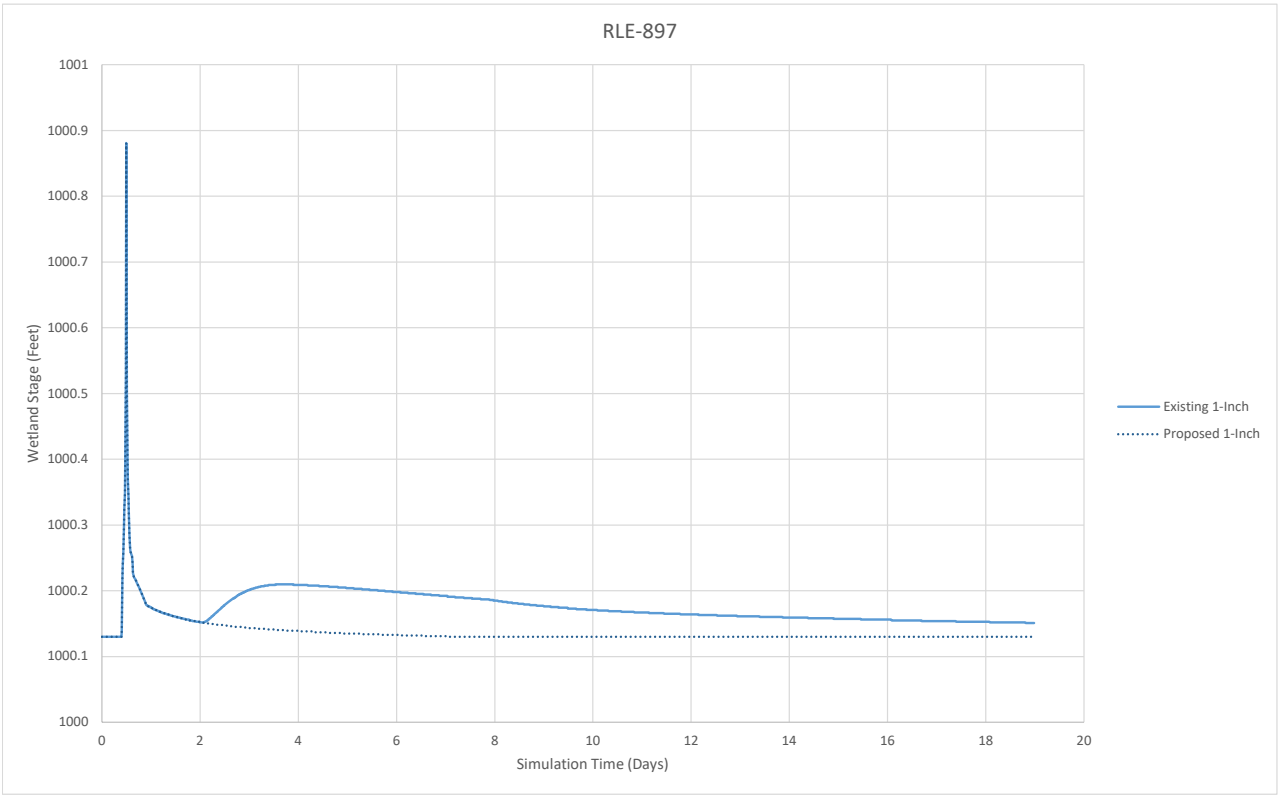


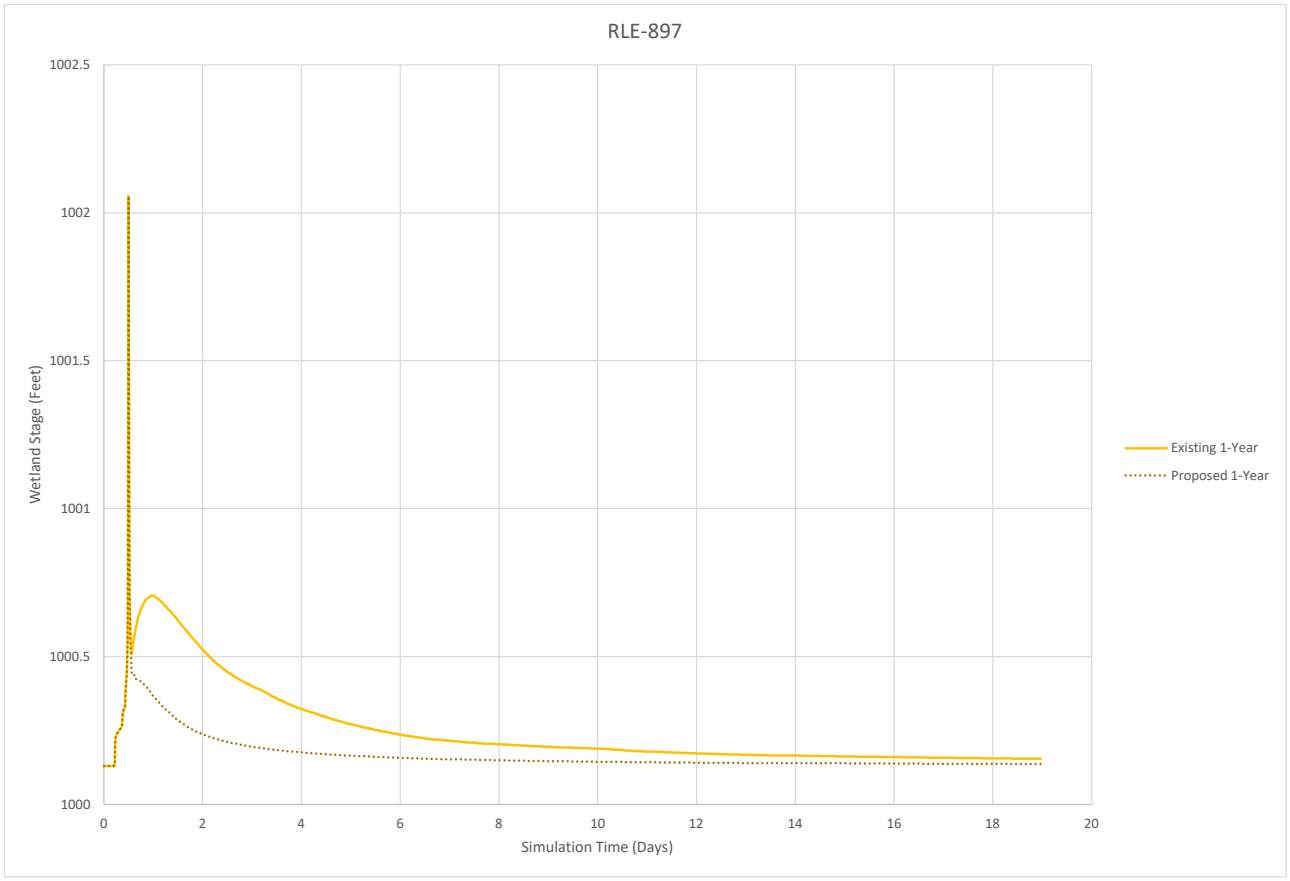

RLE-910
Wetland Stage (Feet)
1006.8
1006.6
1006.4
1006.2
1006
1005.8
1005.6
1005.4
1005.2
1005
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

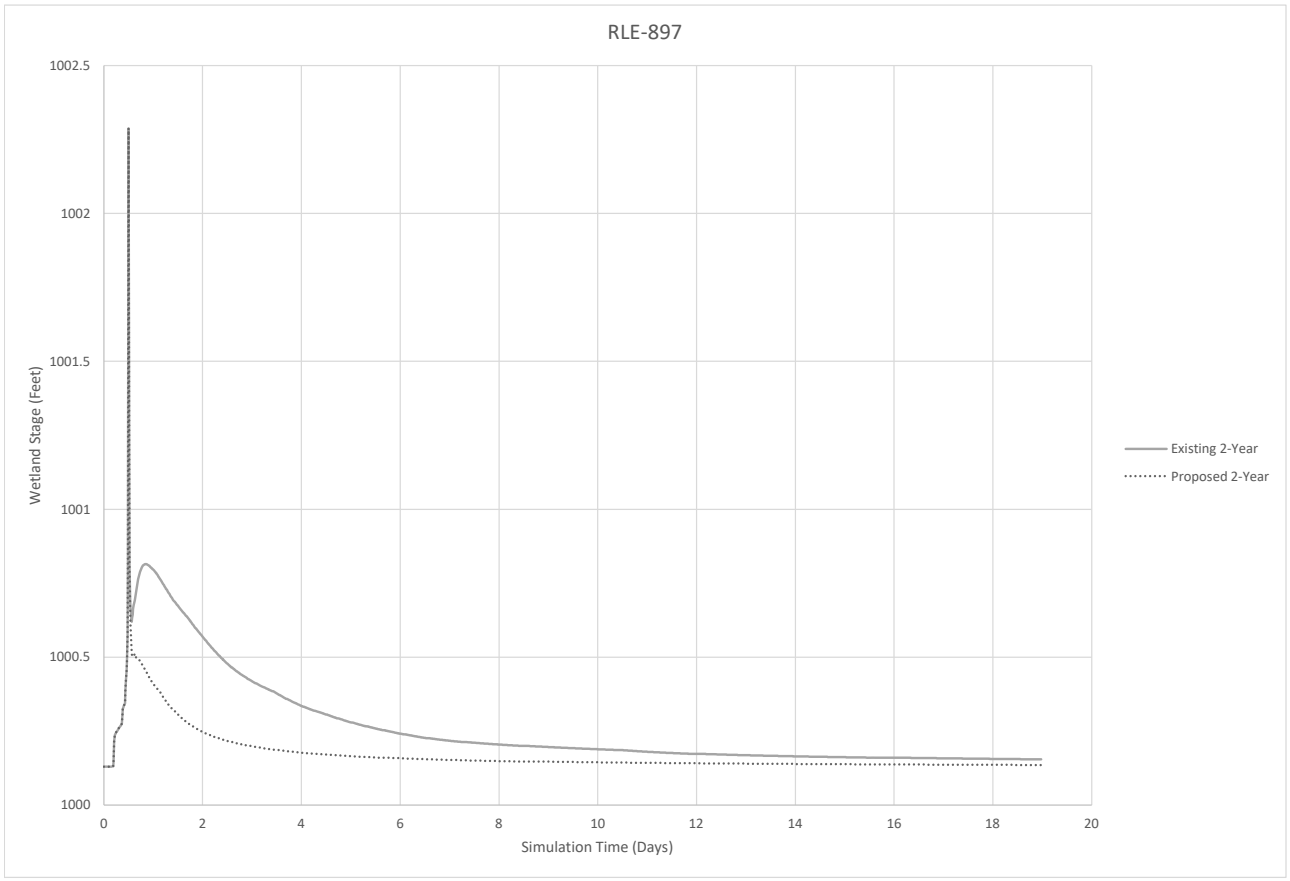

RLE-910
Wetland Stage (Feet)
1006.8
1006.6
1006.4
1006.2
1006
1005.8
1005.6
1005.4
1005.2
1005
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-897

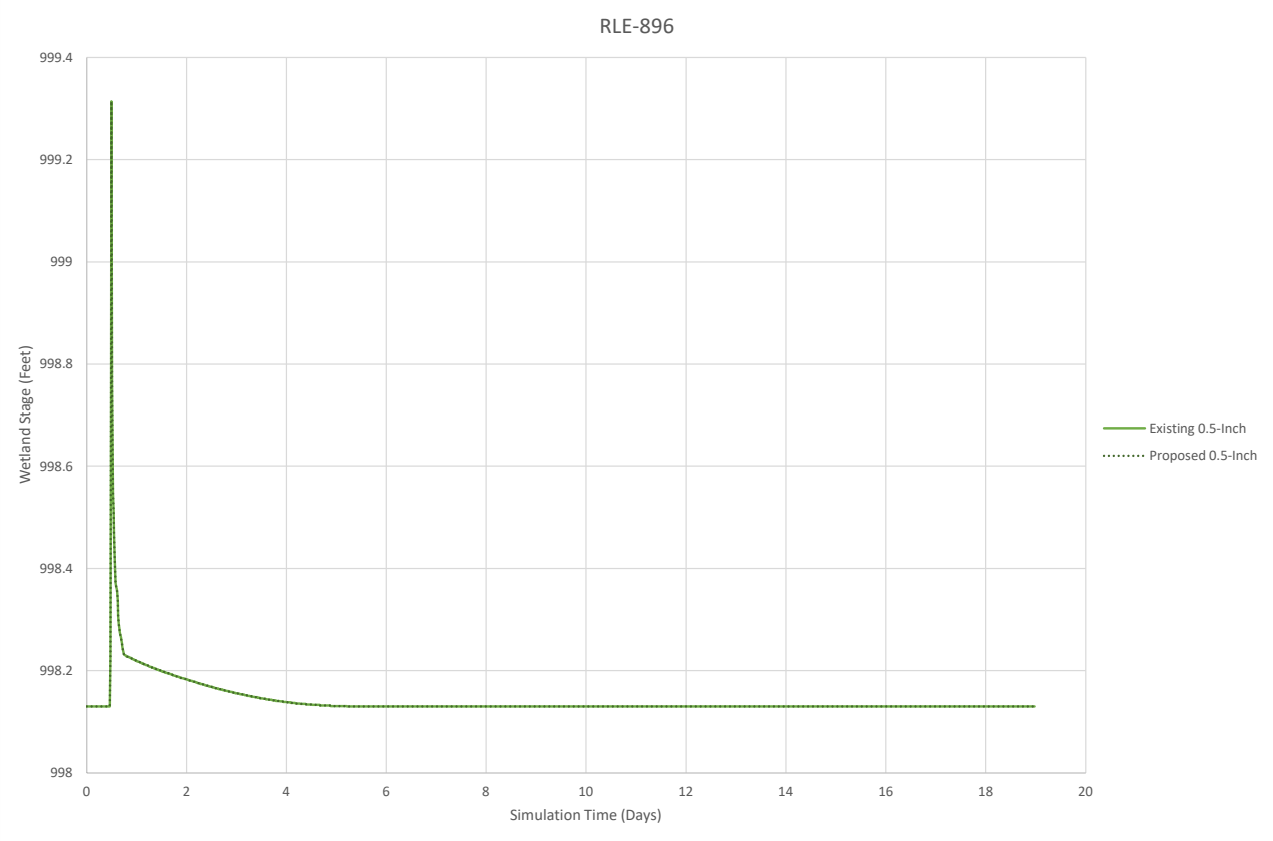


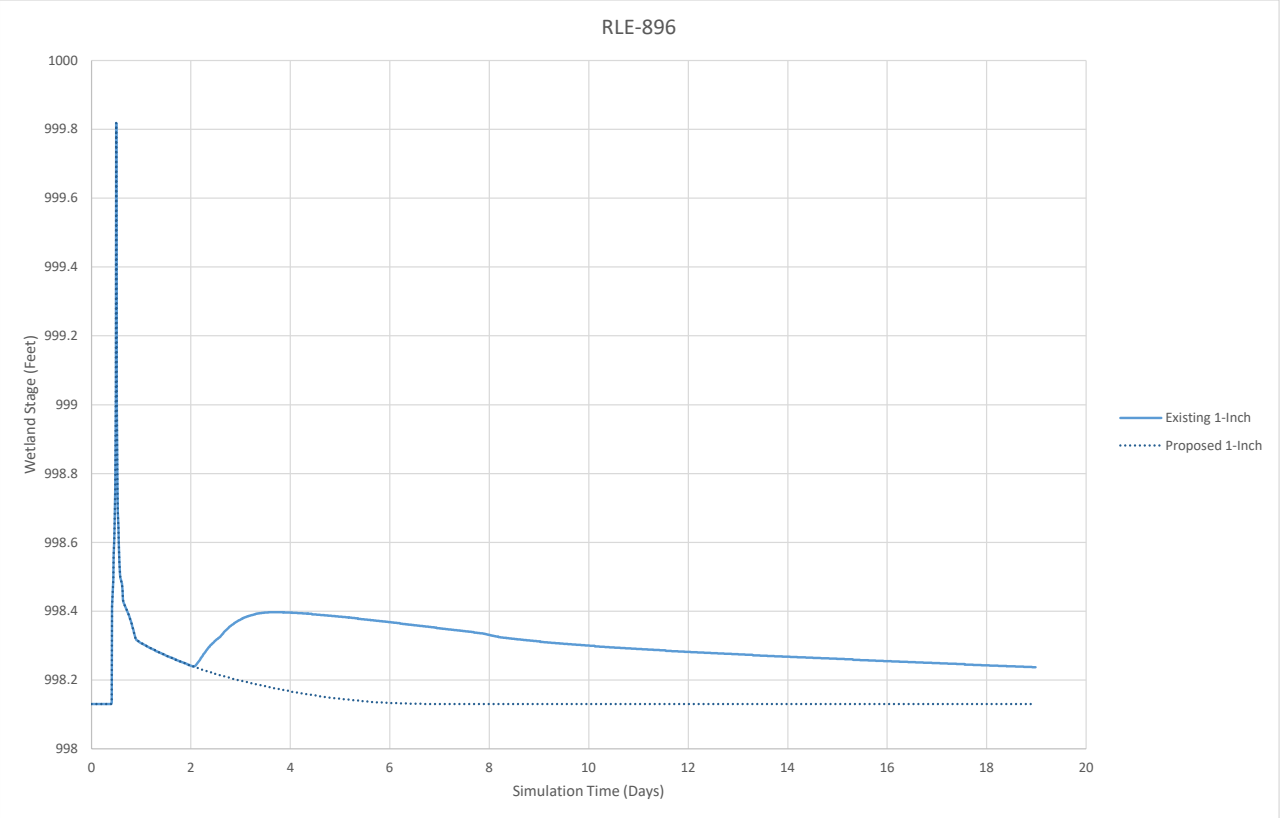


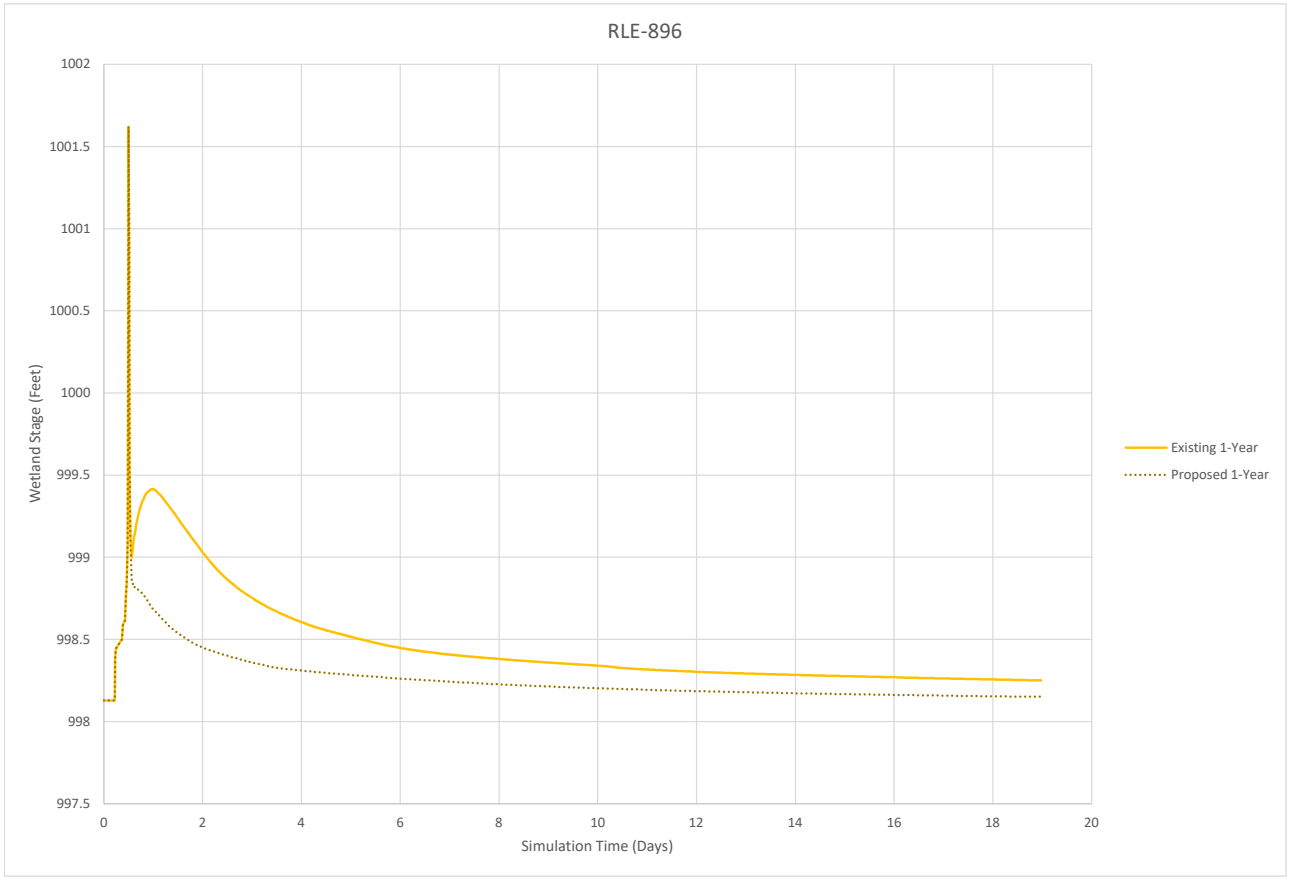

RLE-897
1002.5
1002
1001.5
1001
1000.5
1000
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

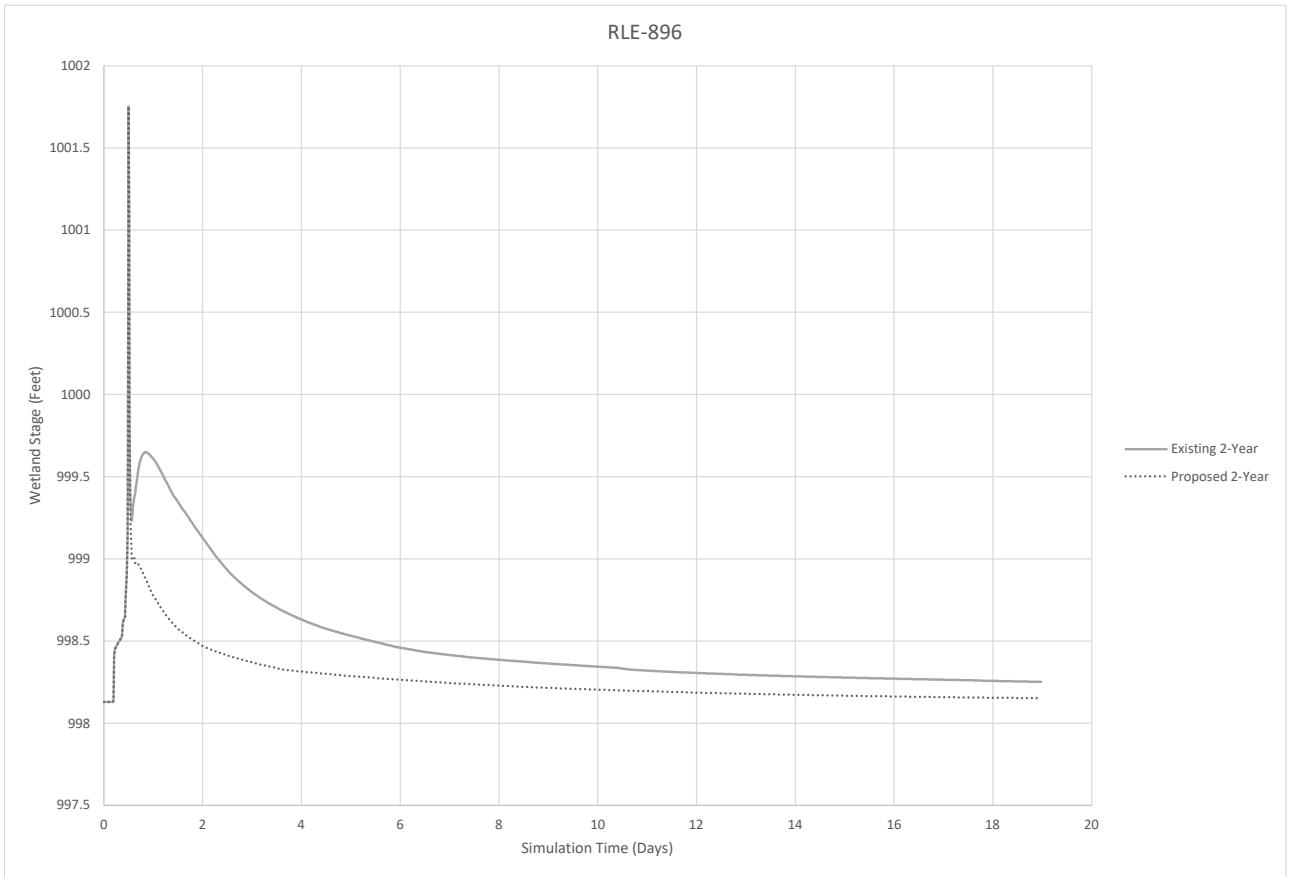

RLE-897
1002.5
1002
1001.5
1001
1000.5
1000
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-896

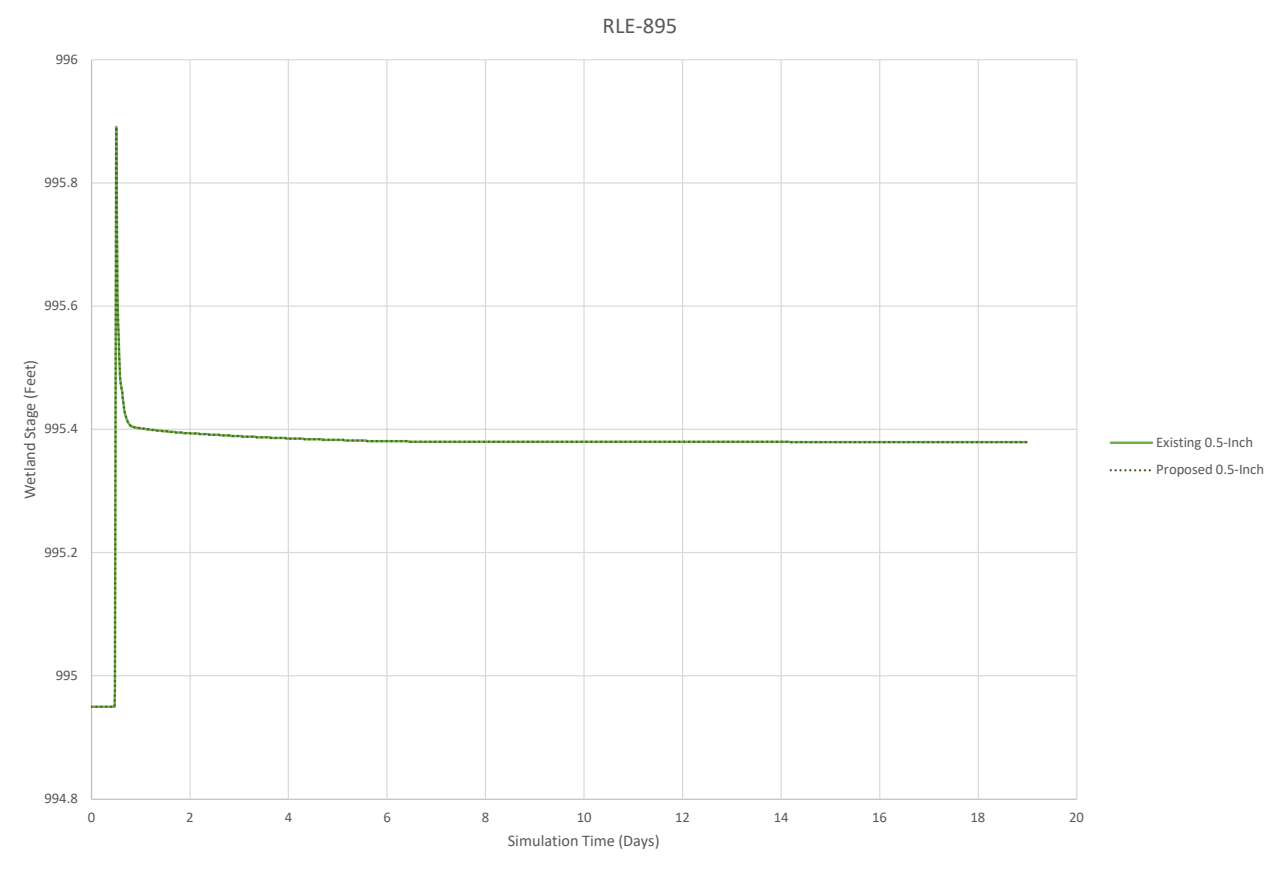


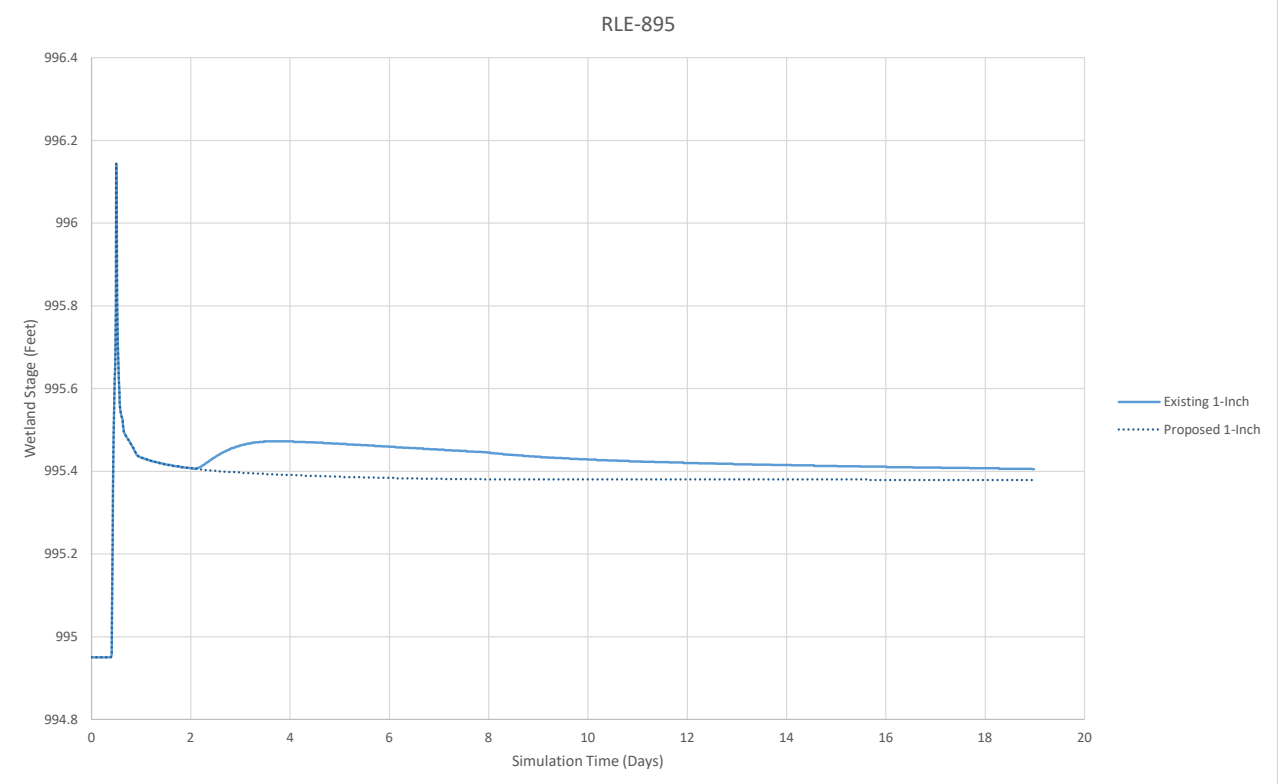


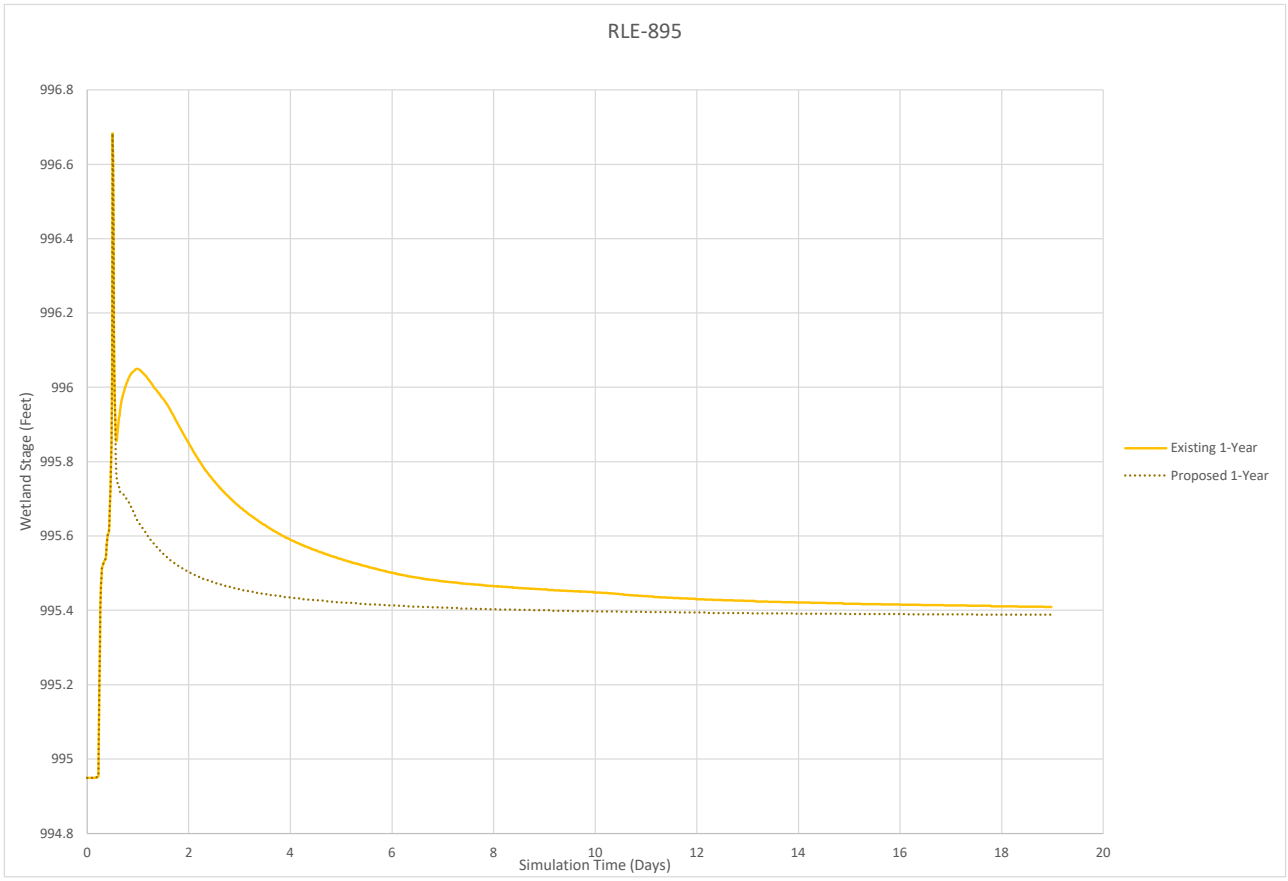

RLE-896
Wetland Stage (Feet)
1002
1001.5
1001
1000.5
1000
999.5
999
998.5
998
997.5
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

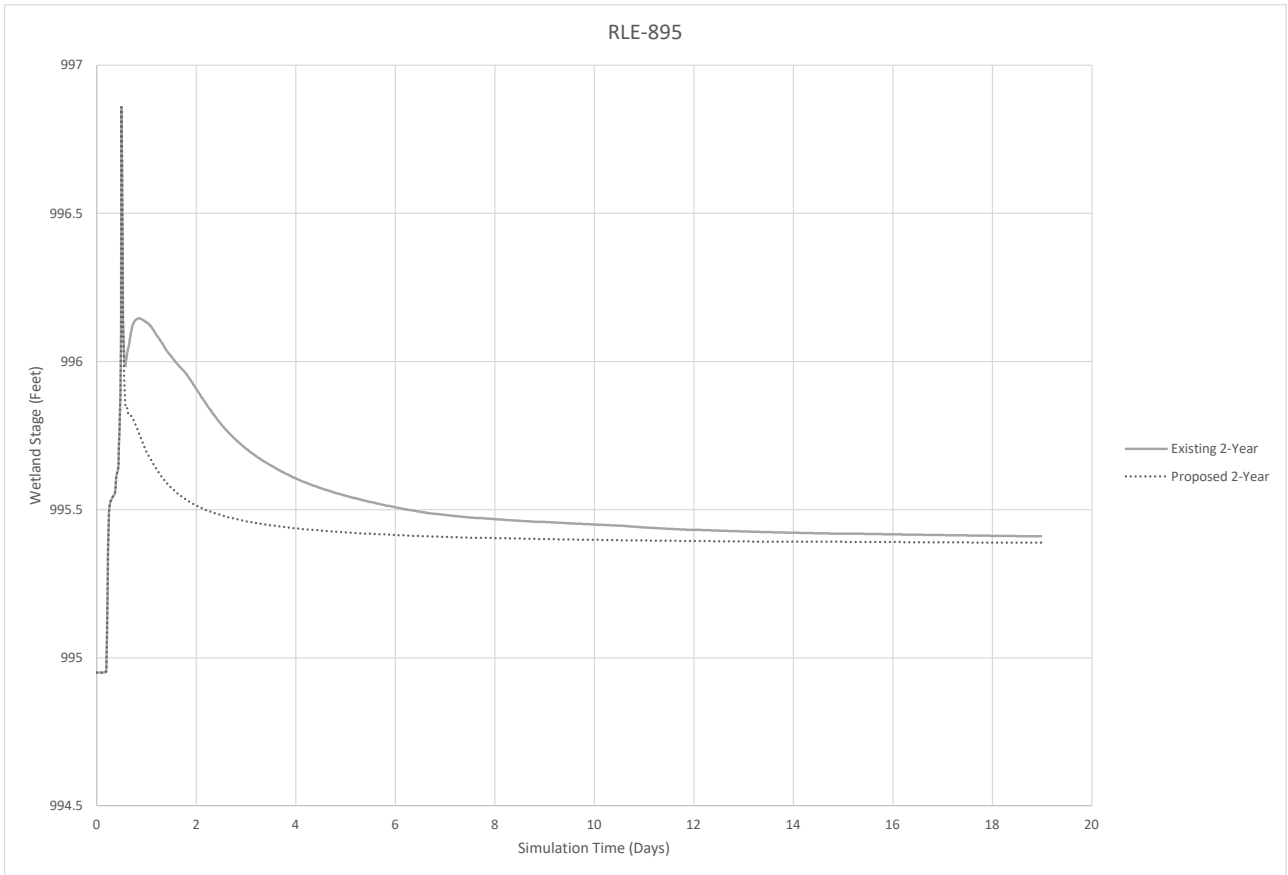

RLE-896
Wetland Stage (Feet)
1002
1001.5
1001
1000.5
1000
999.5
999
998.5
998
997.5
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-895

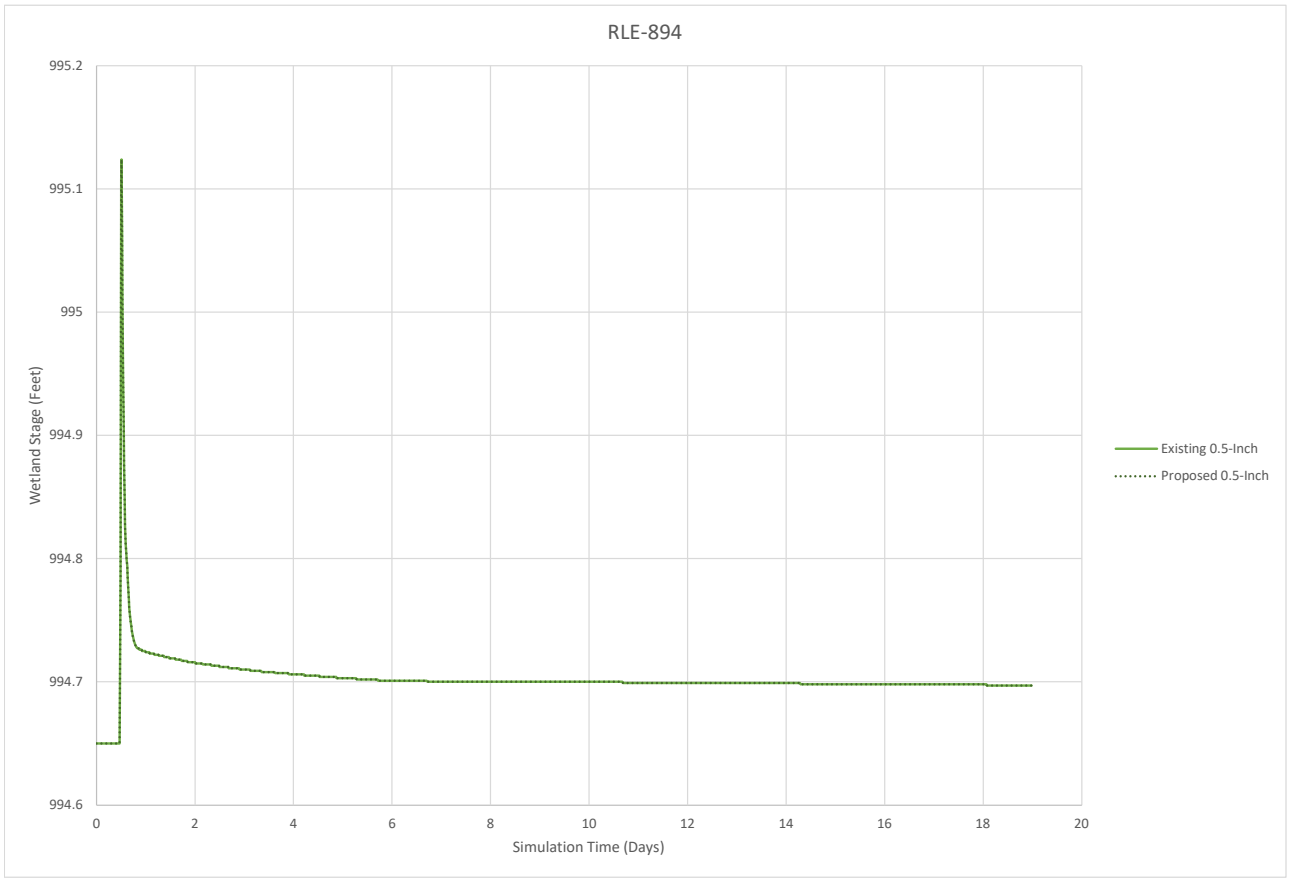


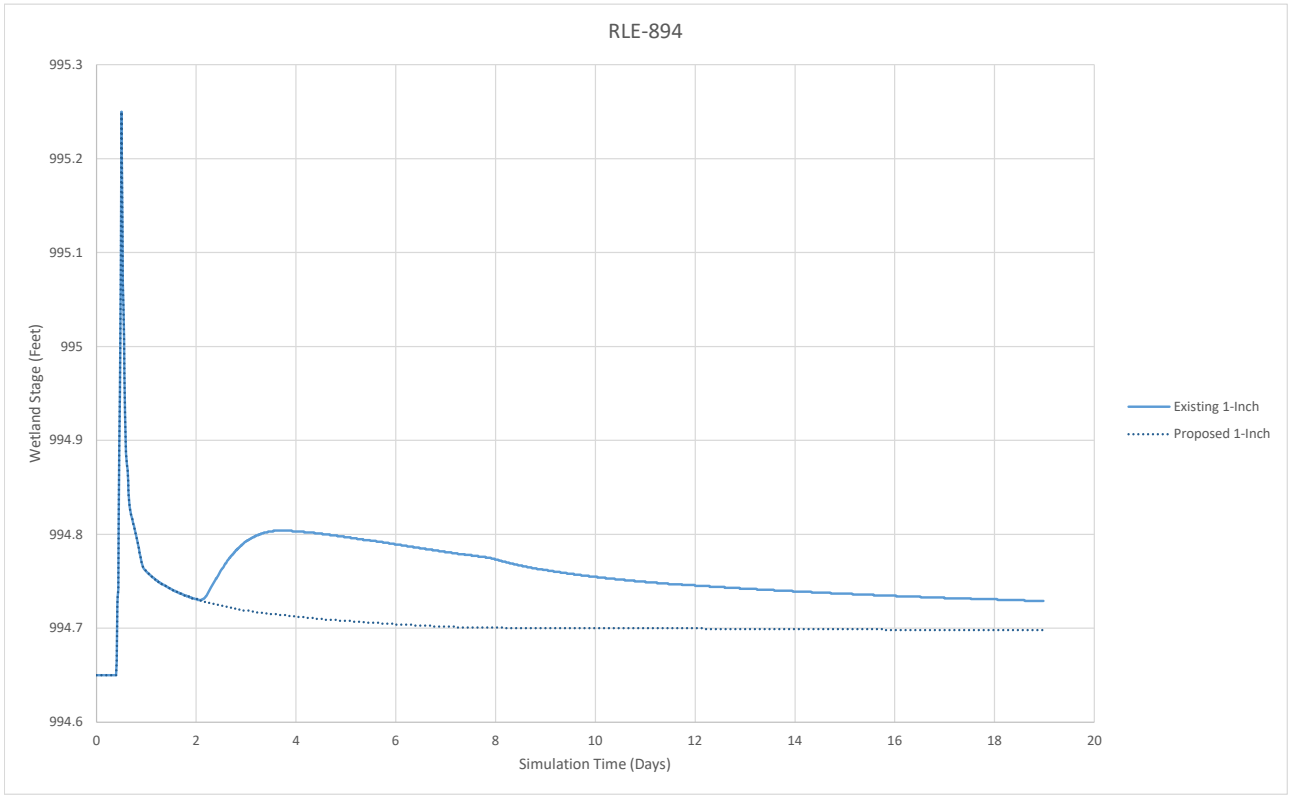


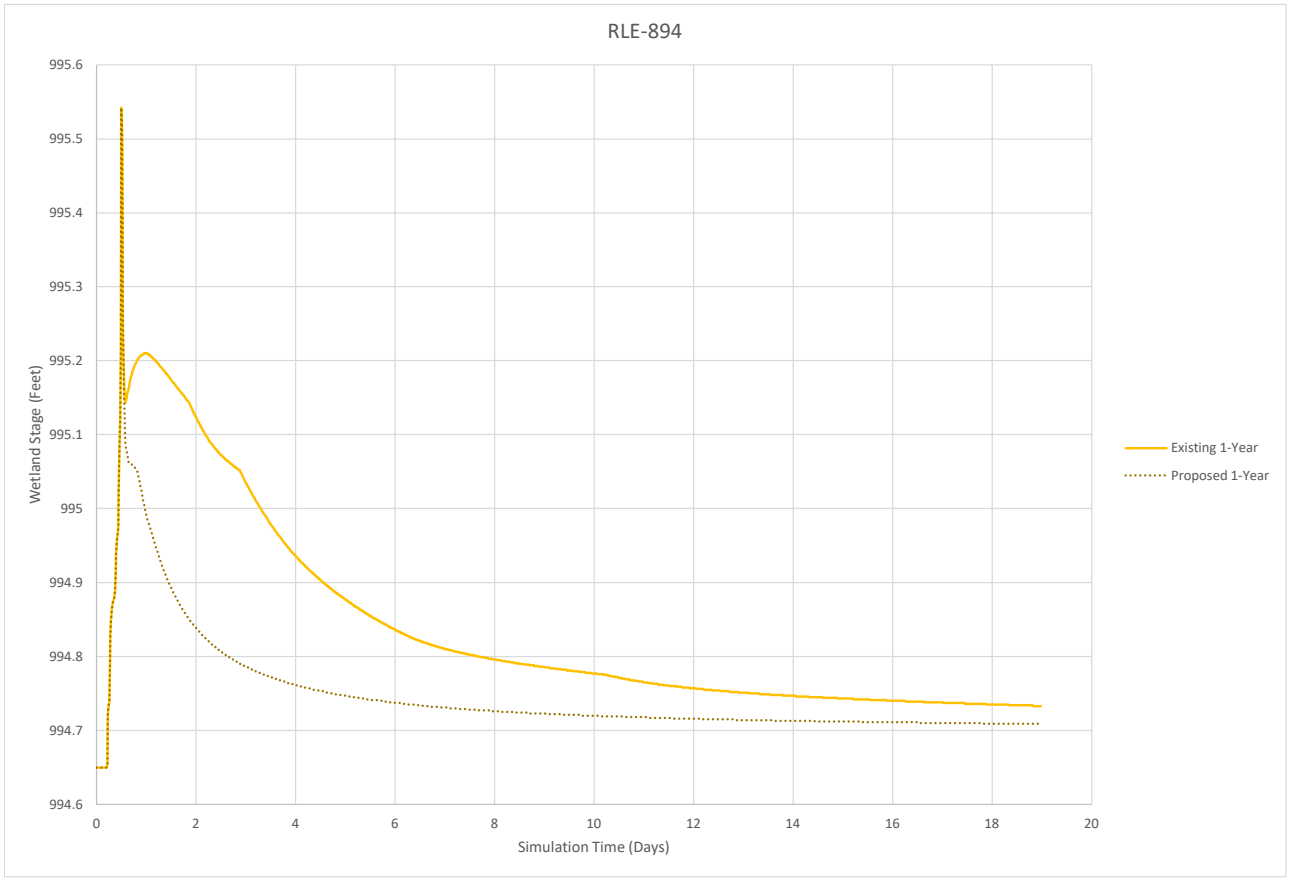

RLE-895
996.8
996.6
996.4
996.2
996
995.8
995.6
995.4
995.2
995
994.8
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

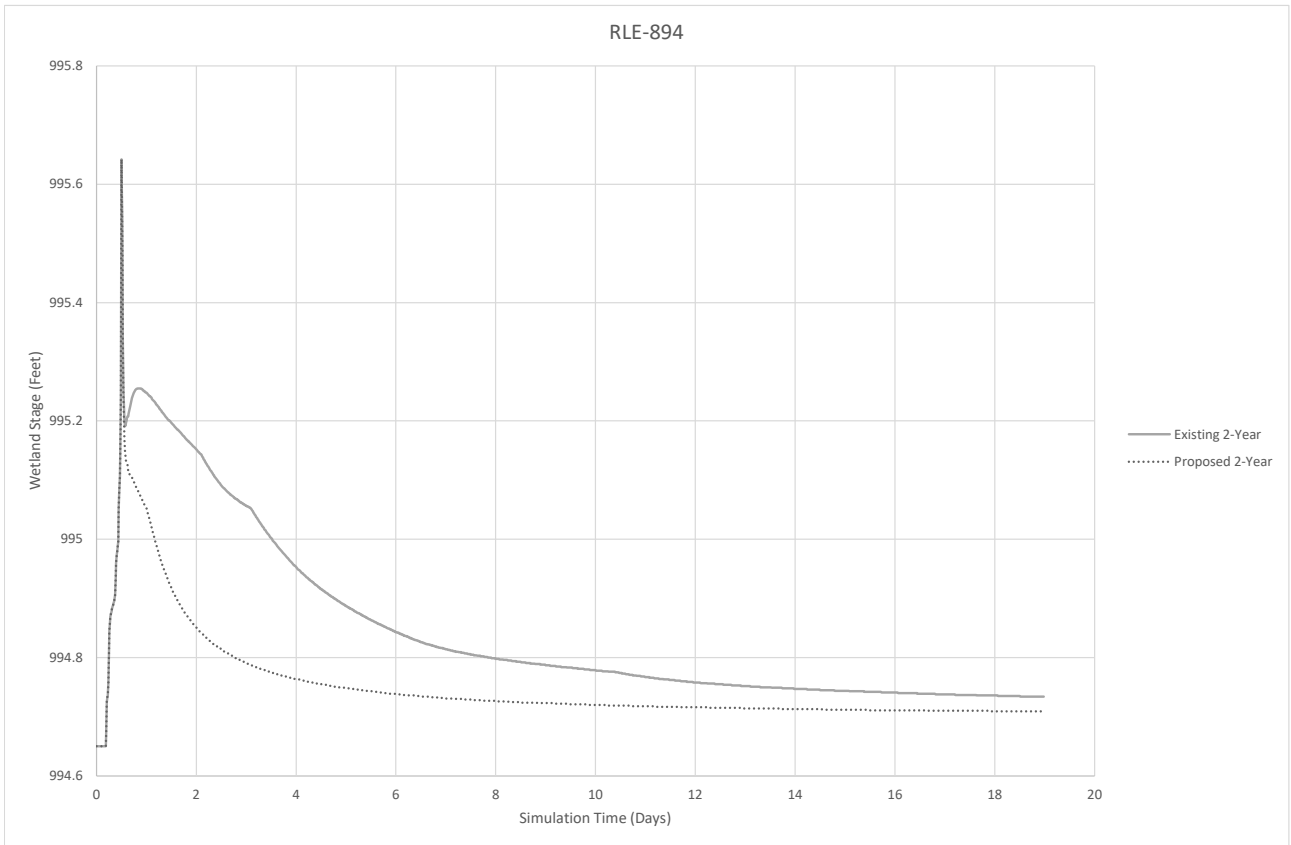

RLE-895
997
996.5
996
995.5
995
994.5
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-894

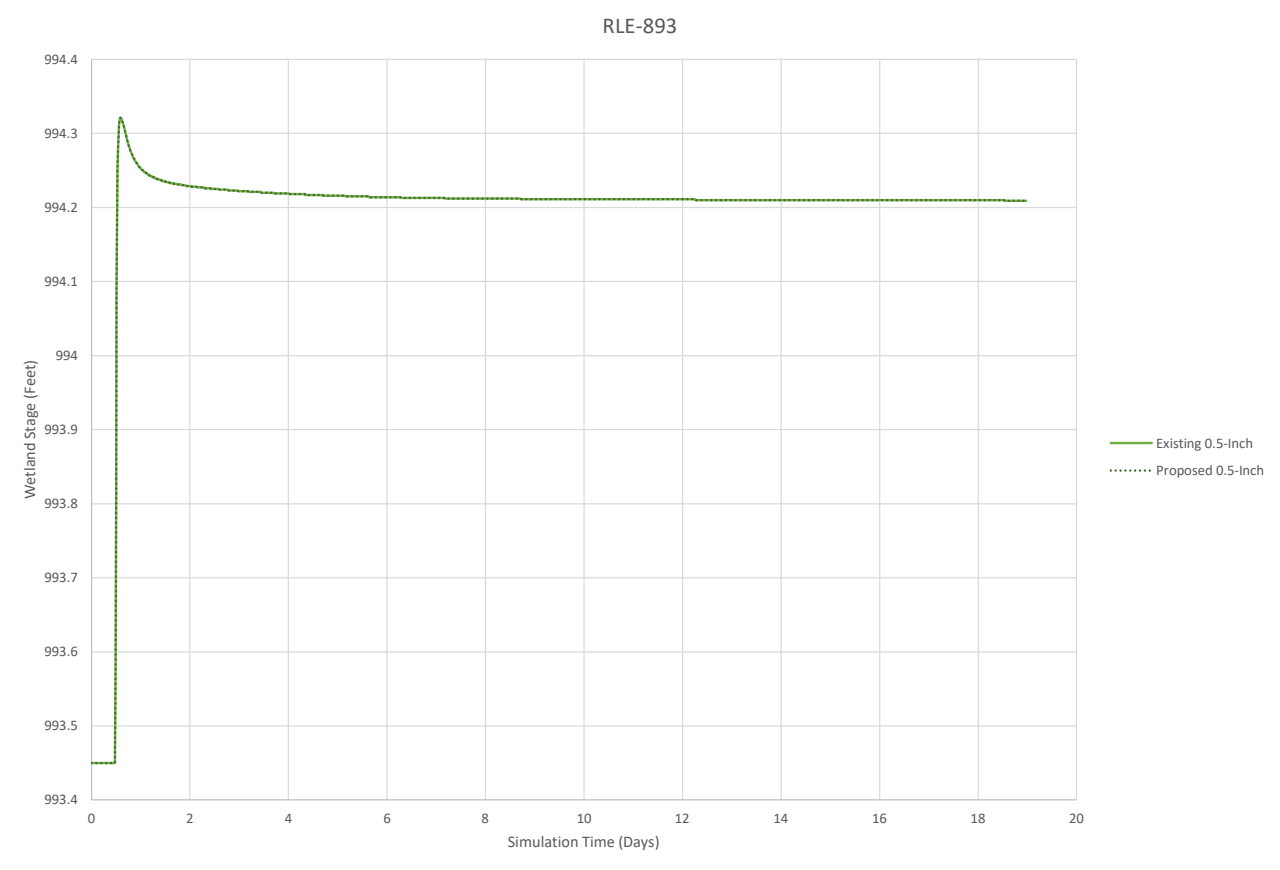


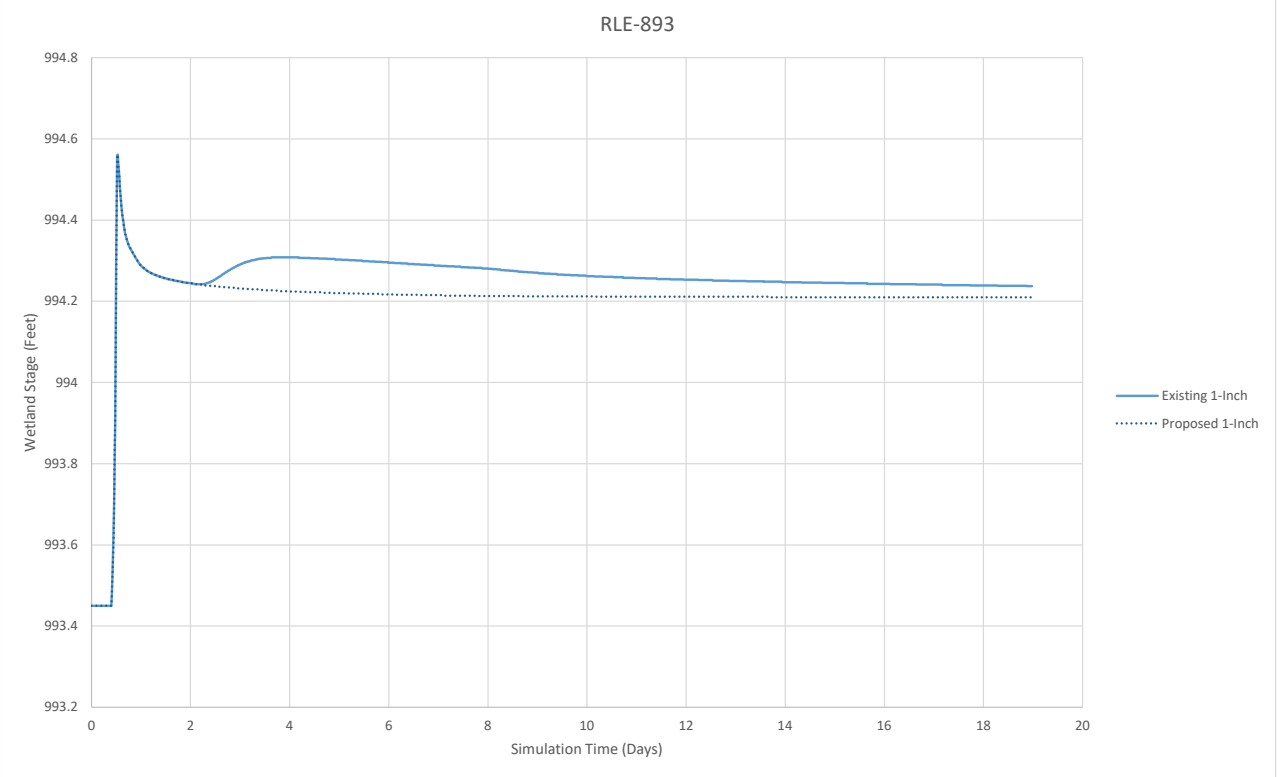


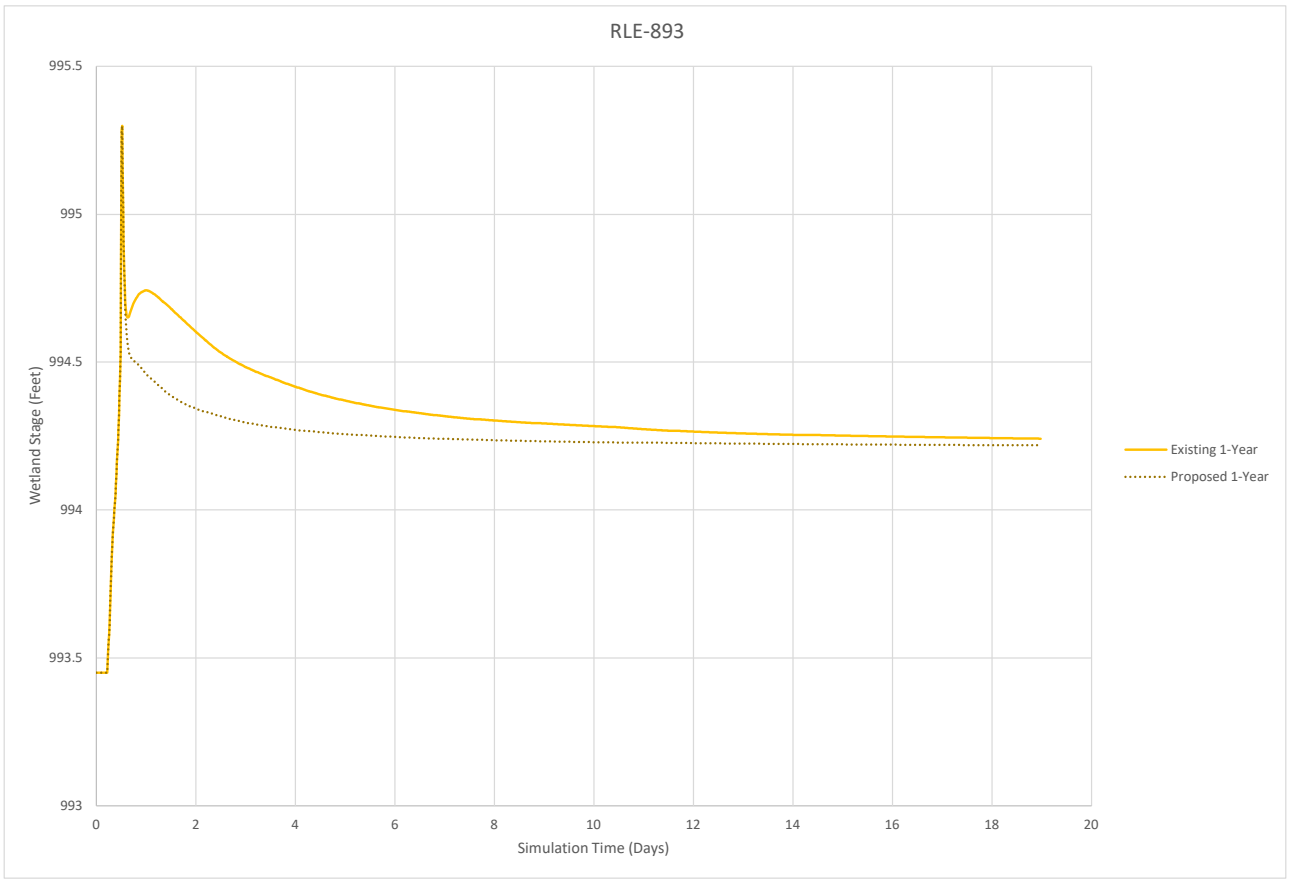

RLE-894
995.6
995.5
995.4
995.3
995.2
995.1
995
994.9
994.8
994.7
994.6
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

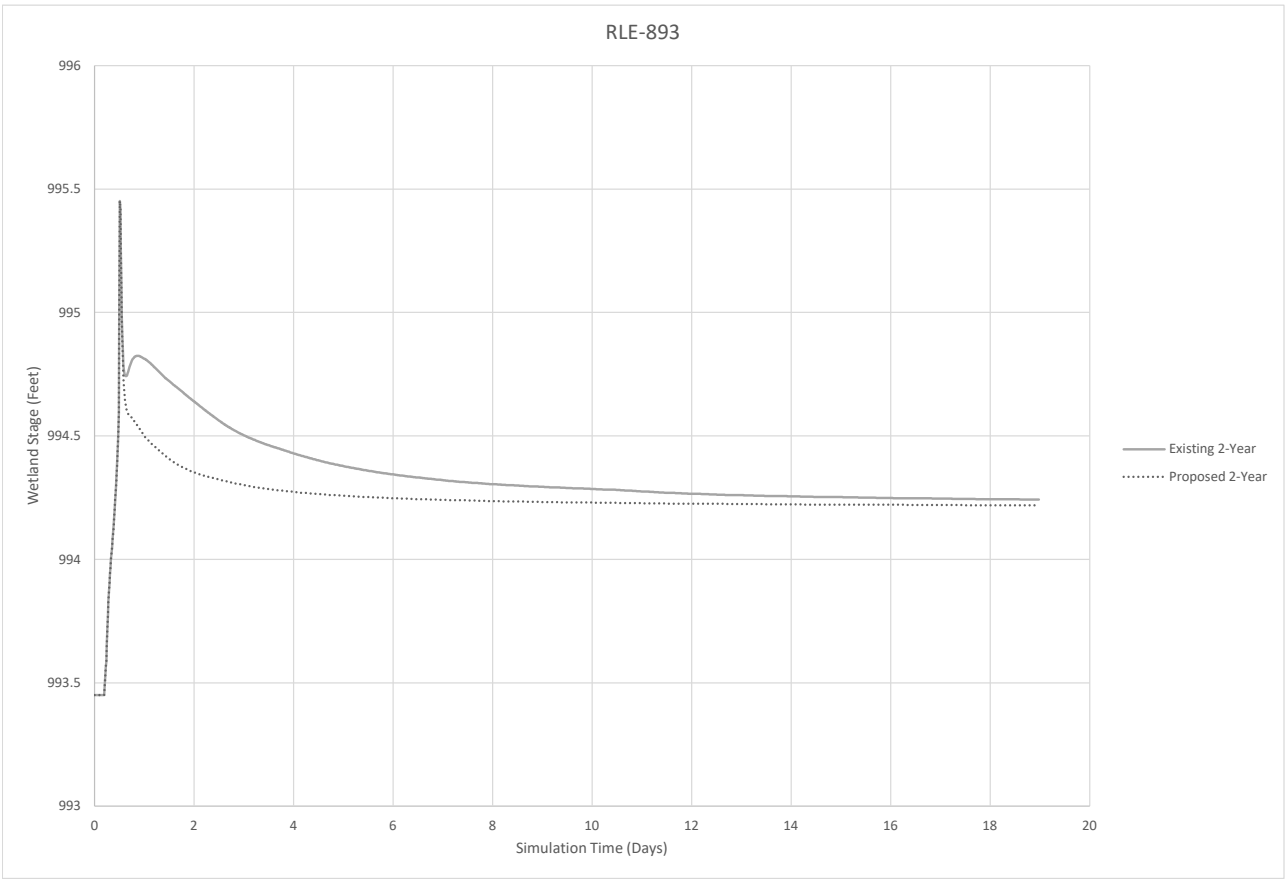

RLE-894
995.8
995.6
995.4
995.2
995
994.8
994.6
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-893

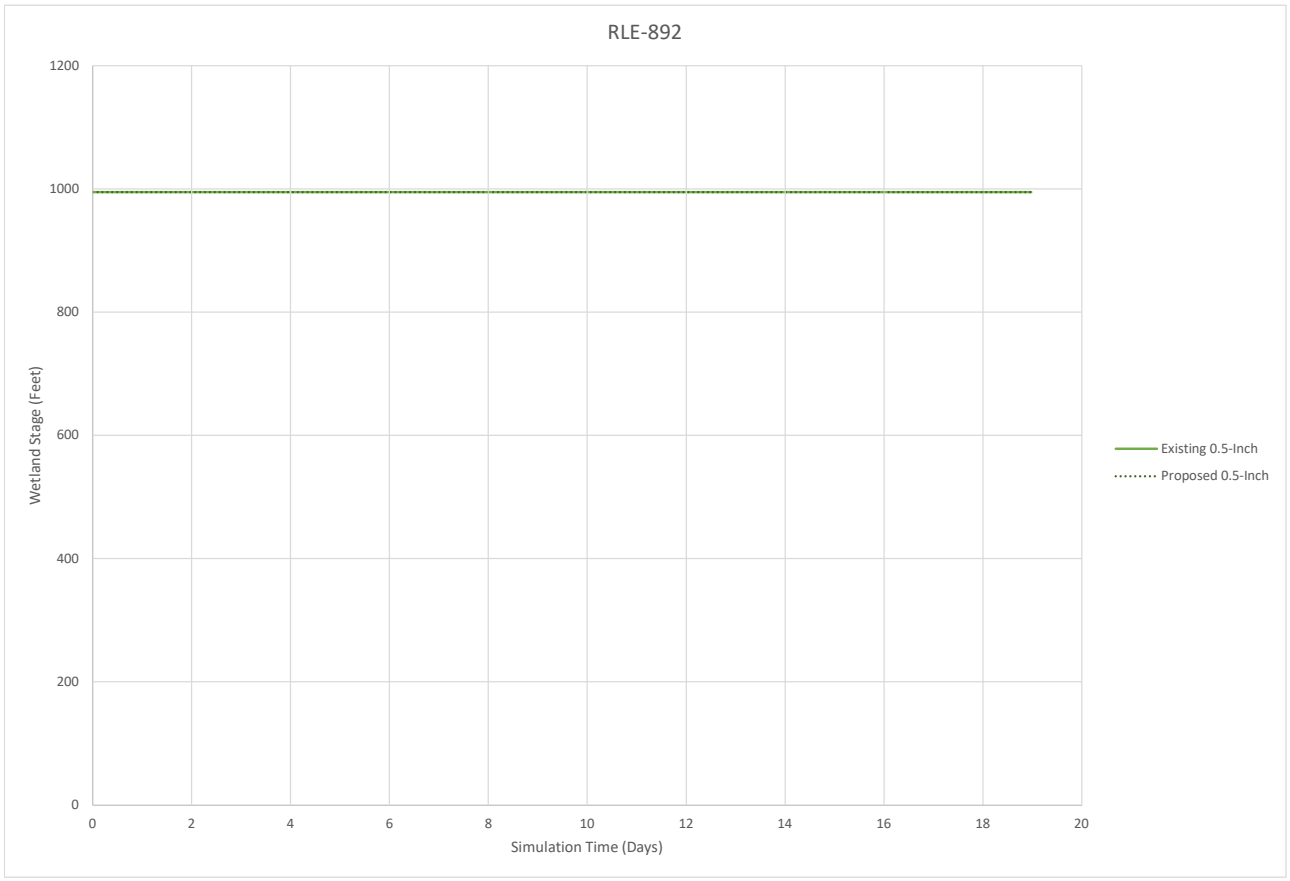


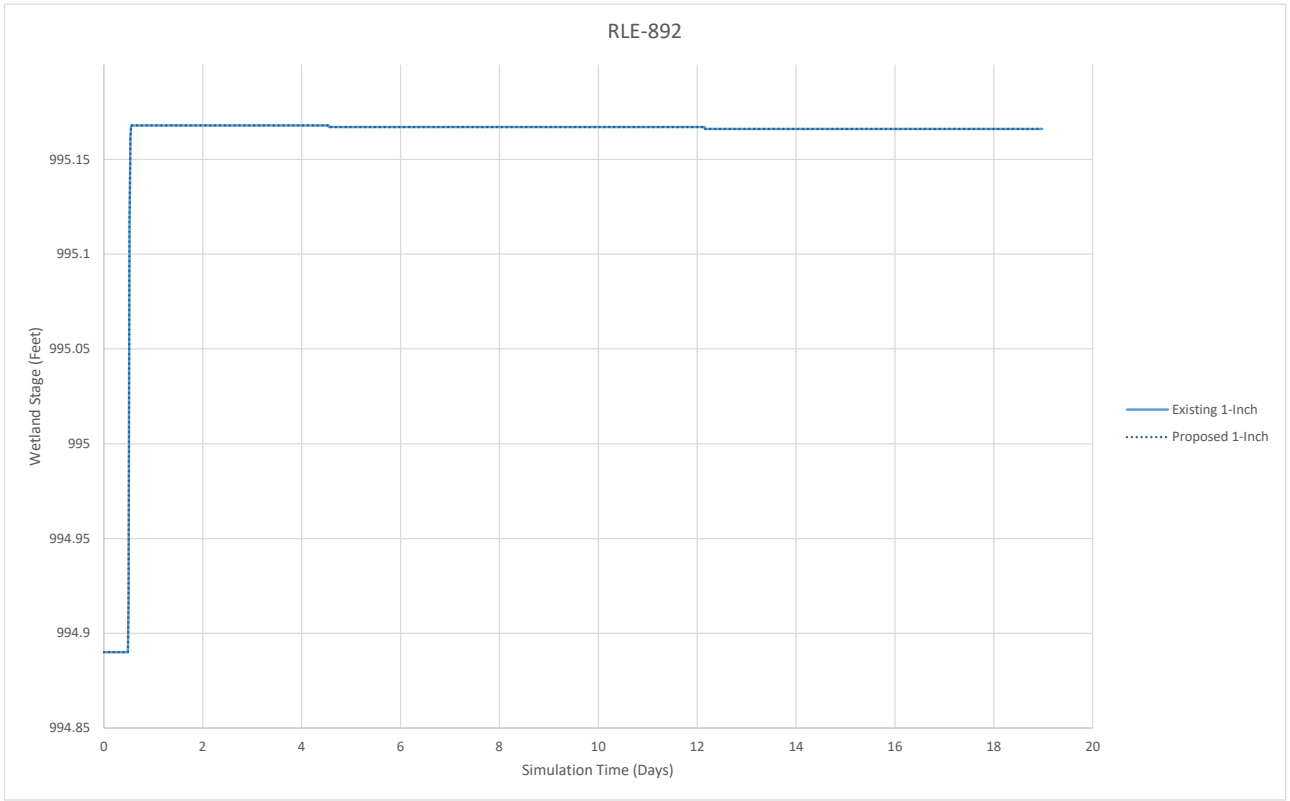


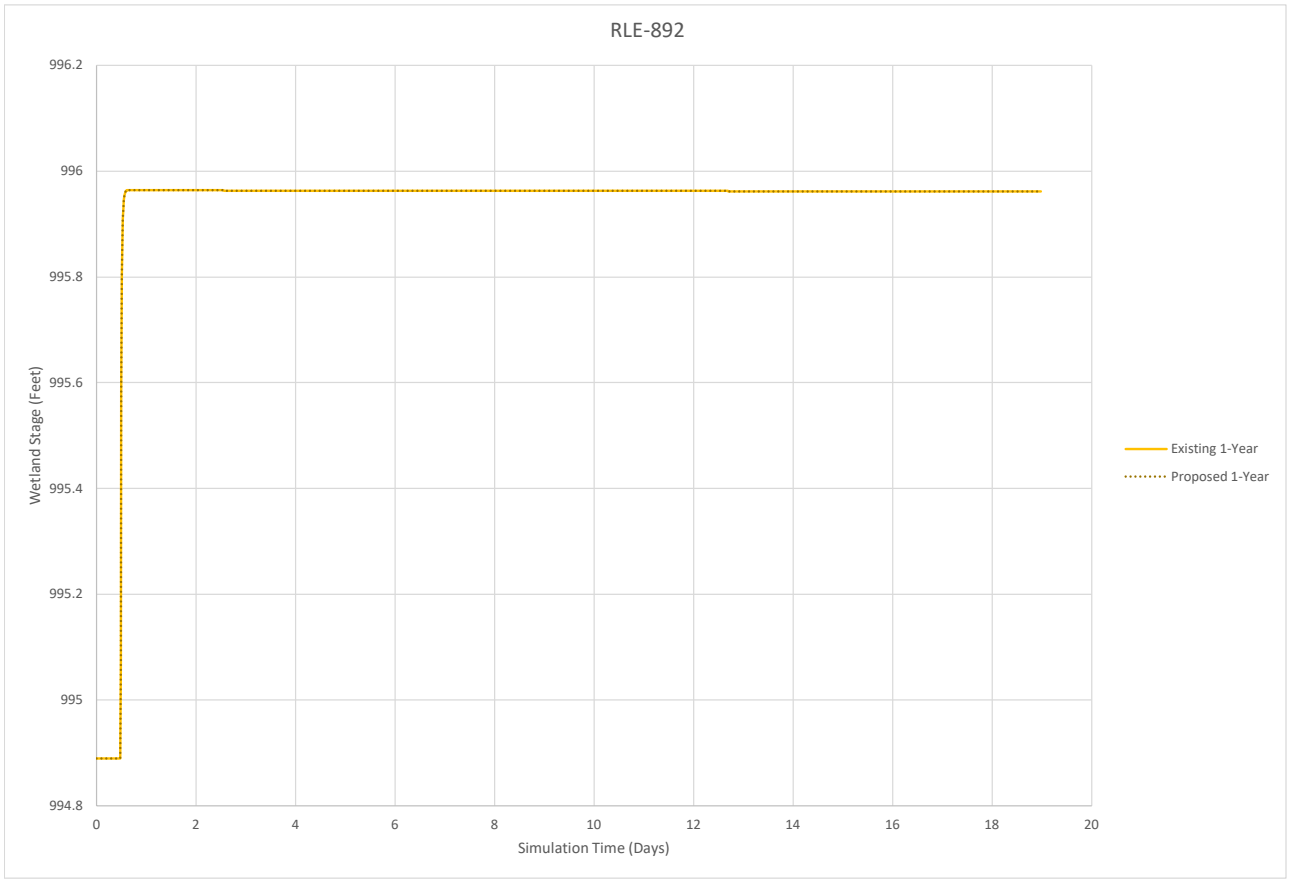

RLE-893
995.5
995
994.5
994
993.5
993
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

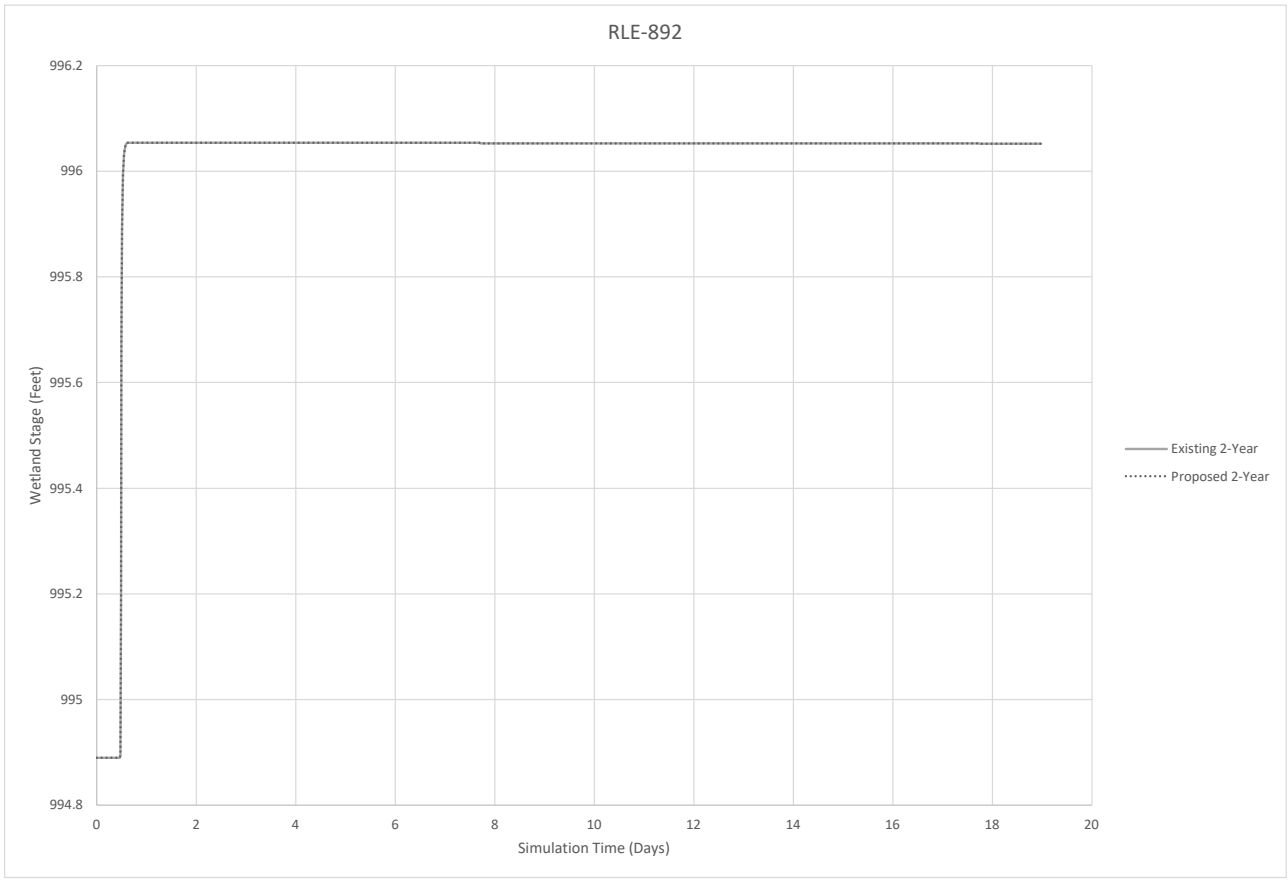

RLE-893
996
995.5
995
994.5
994
993.5
993
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-892

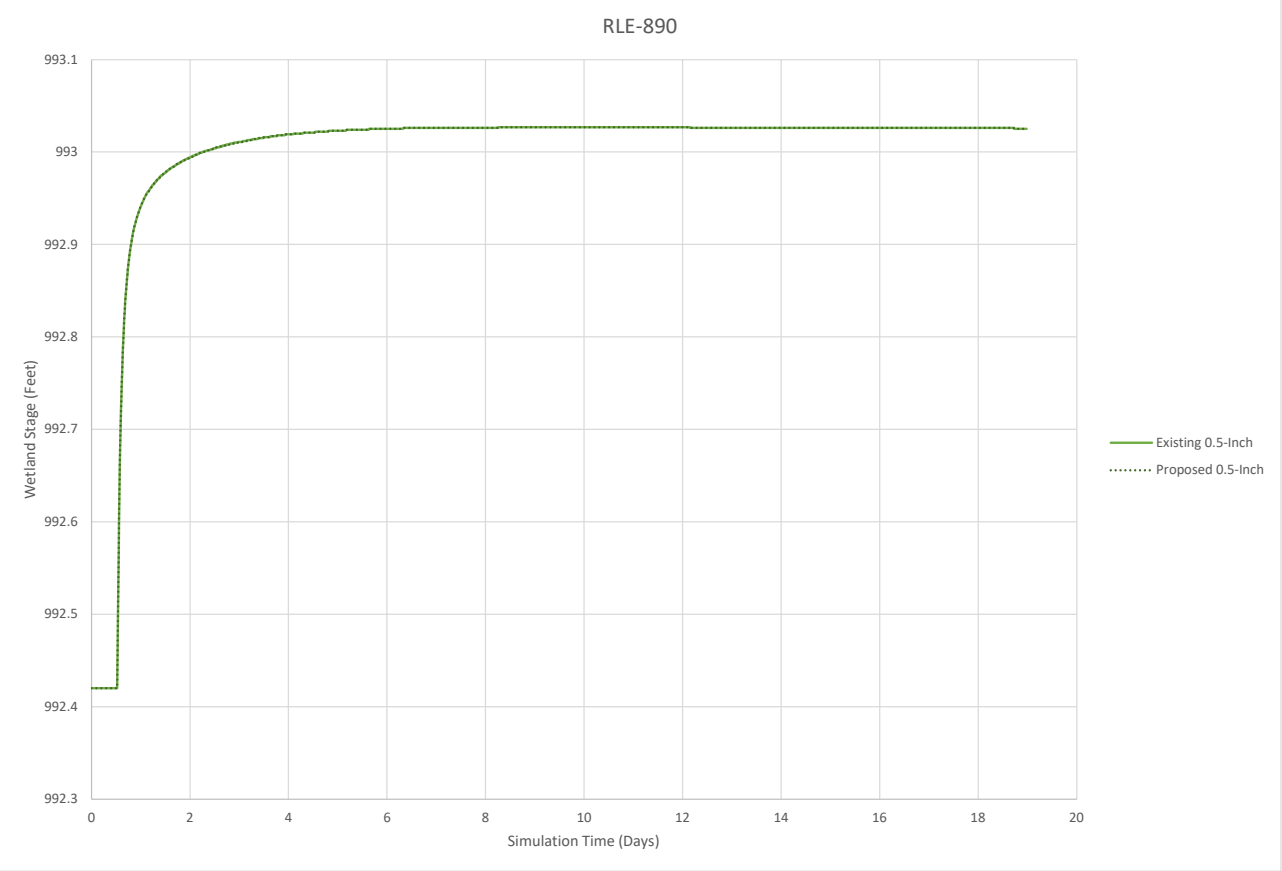


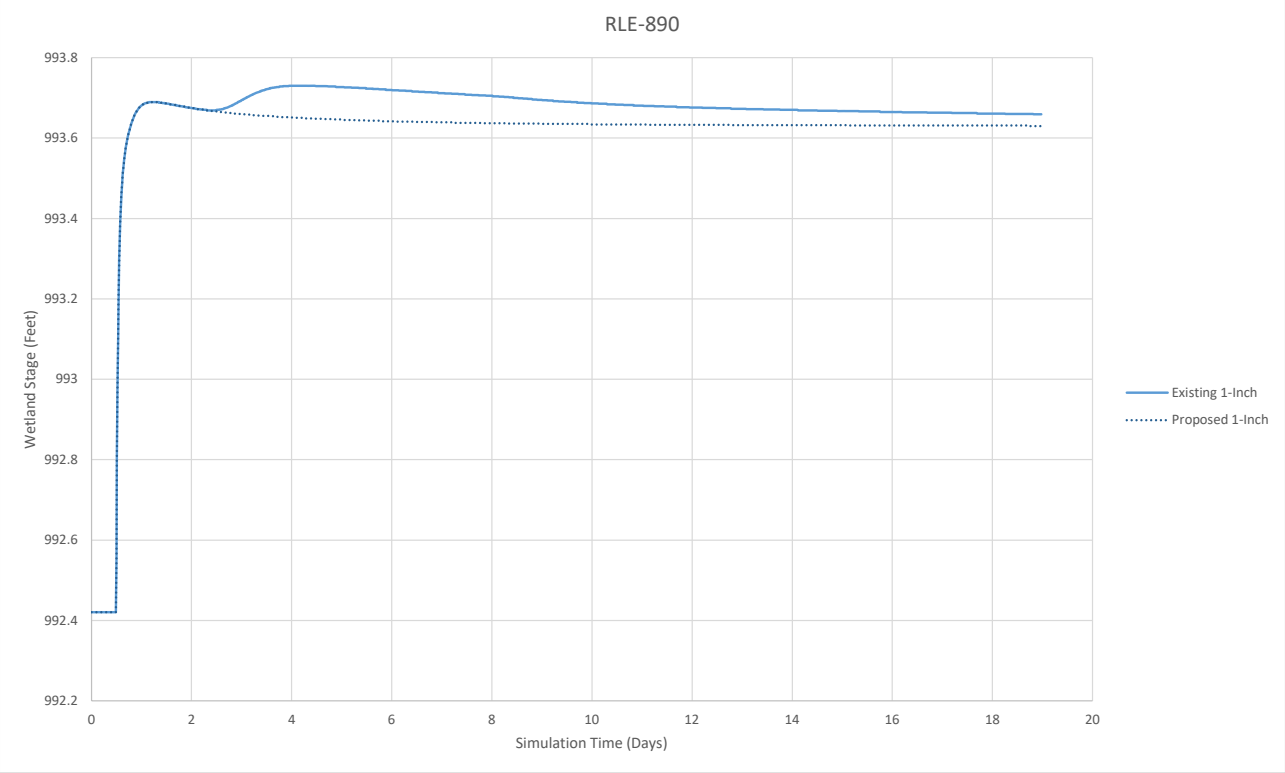


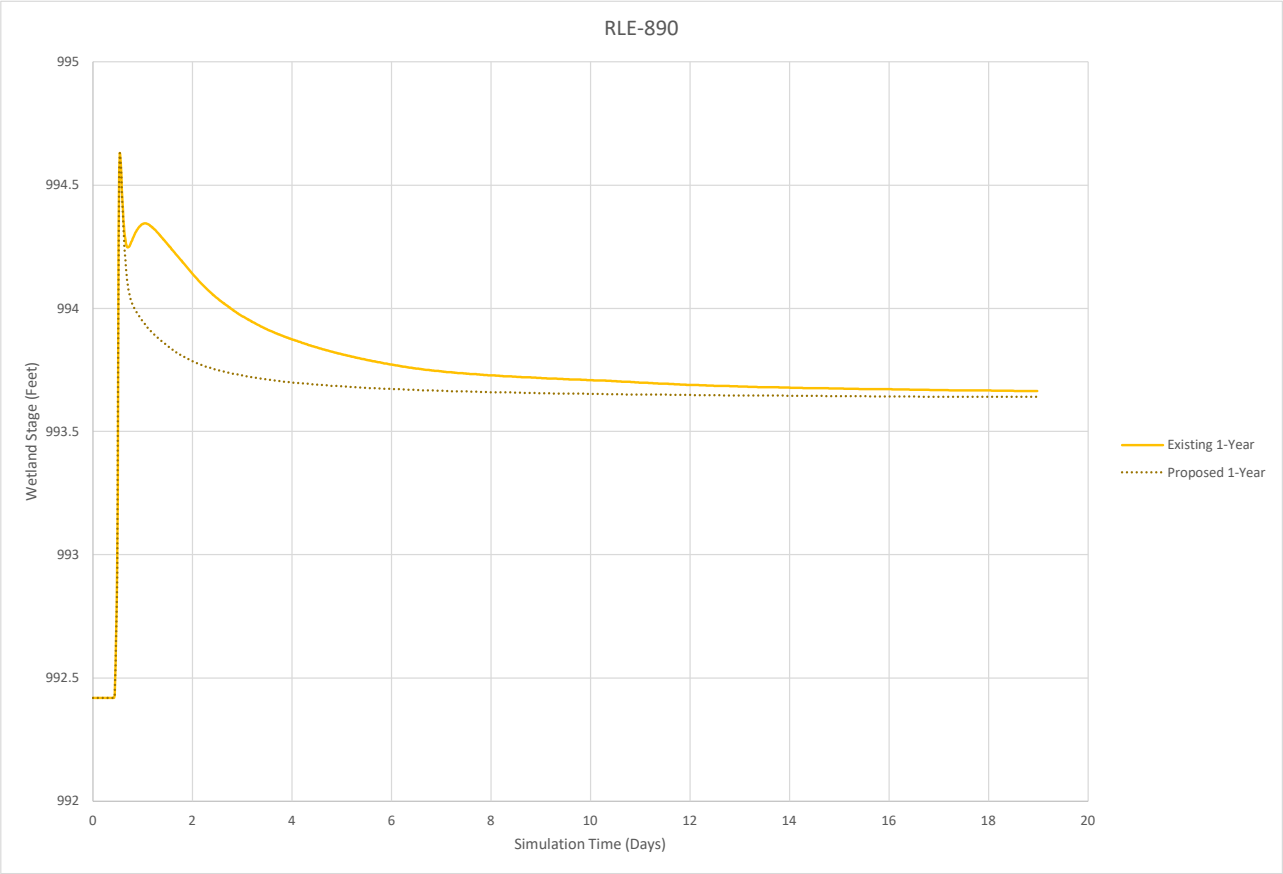

RLE-892
996.2
996
995.8
995.6
995.4
995.2
995
994.8
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

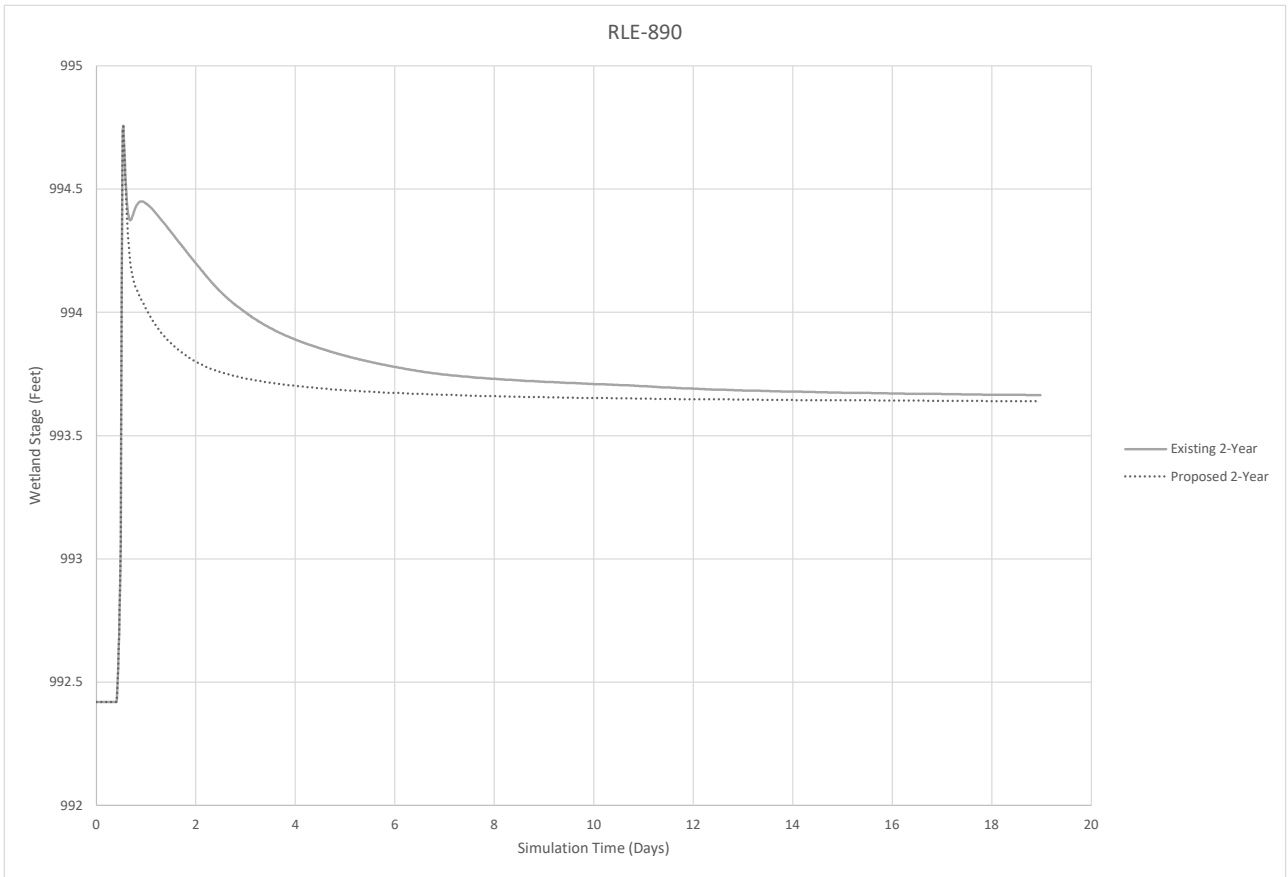

RLE-892
996.2
996
995.8
995.6
995.4
995.2
995
994.8
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-890

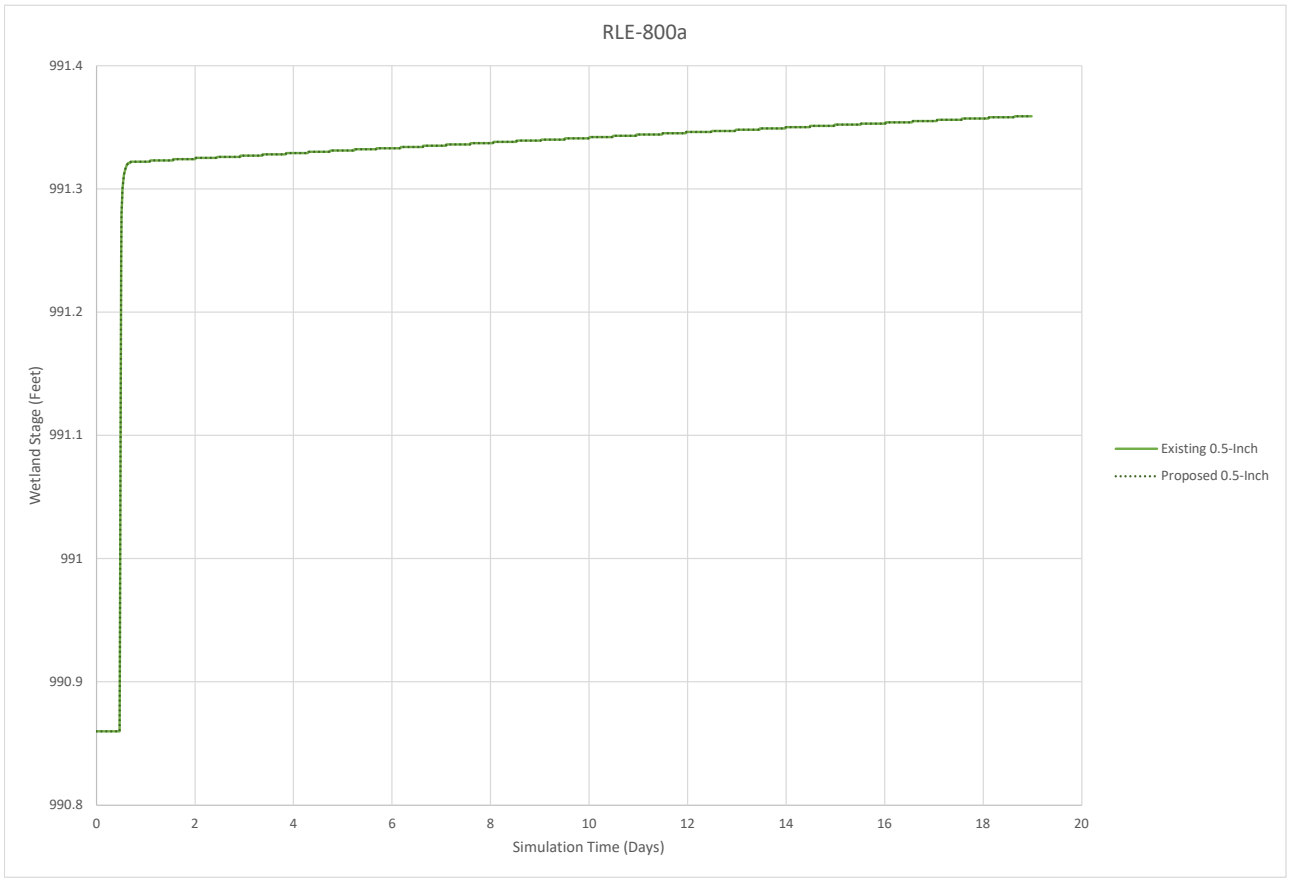


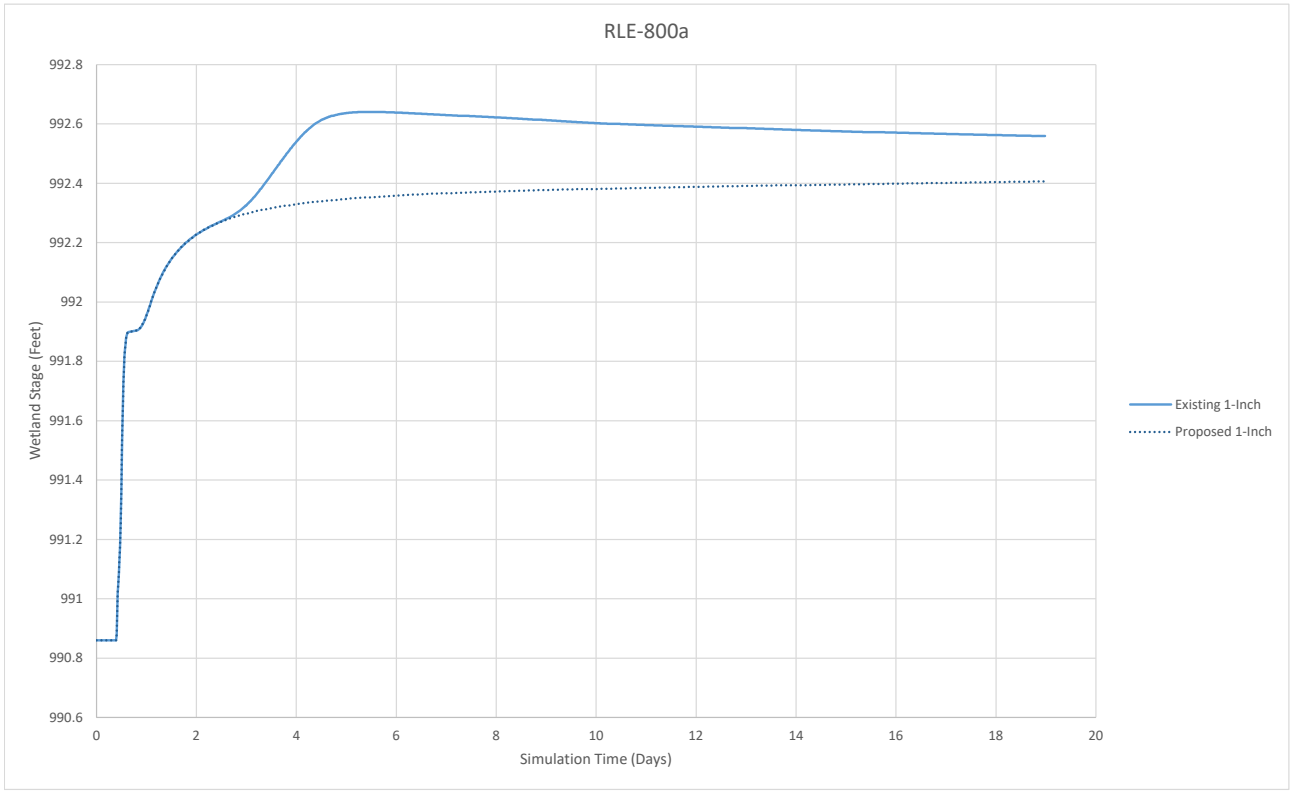


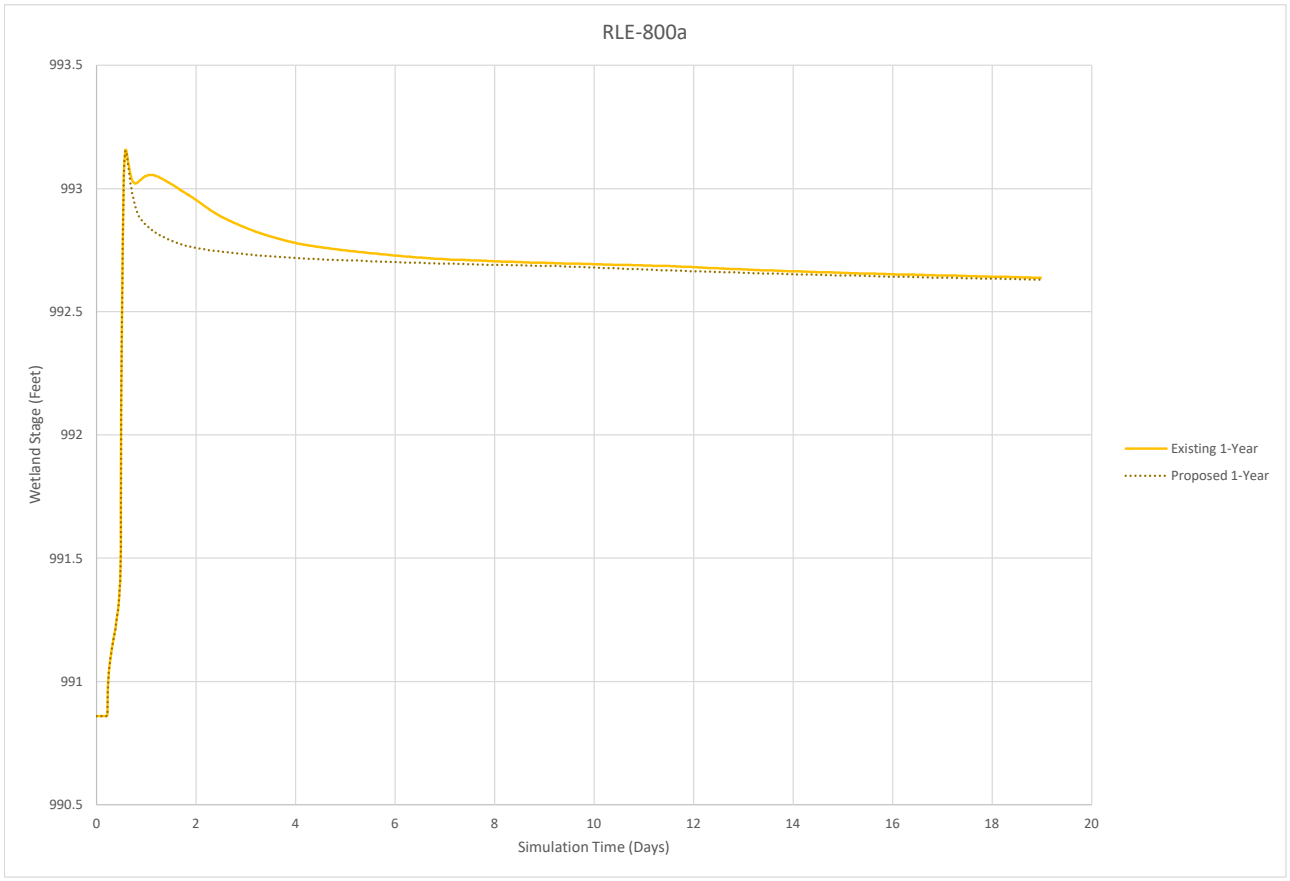

RLE-890
995
994.5
994
993.5
993
992.5
992
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

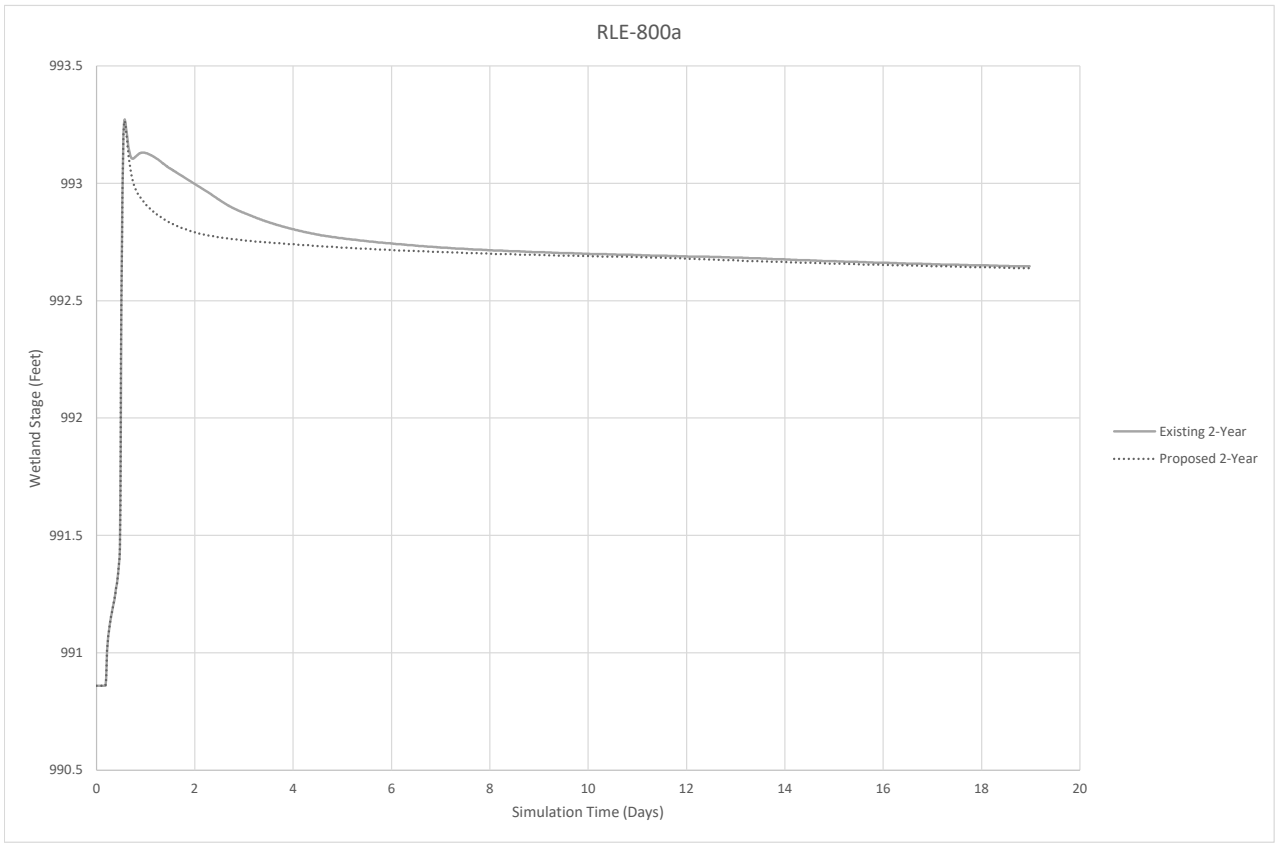

RLE-890
995
994.5
994
993.5
993
992.5
992
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-800a

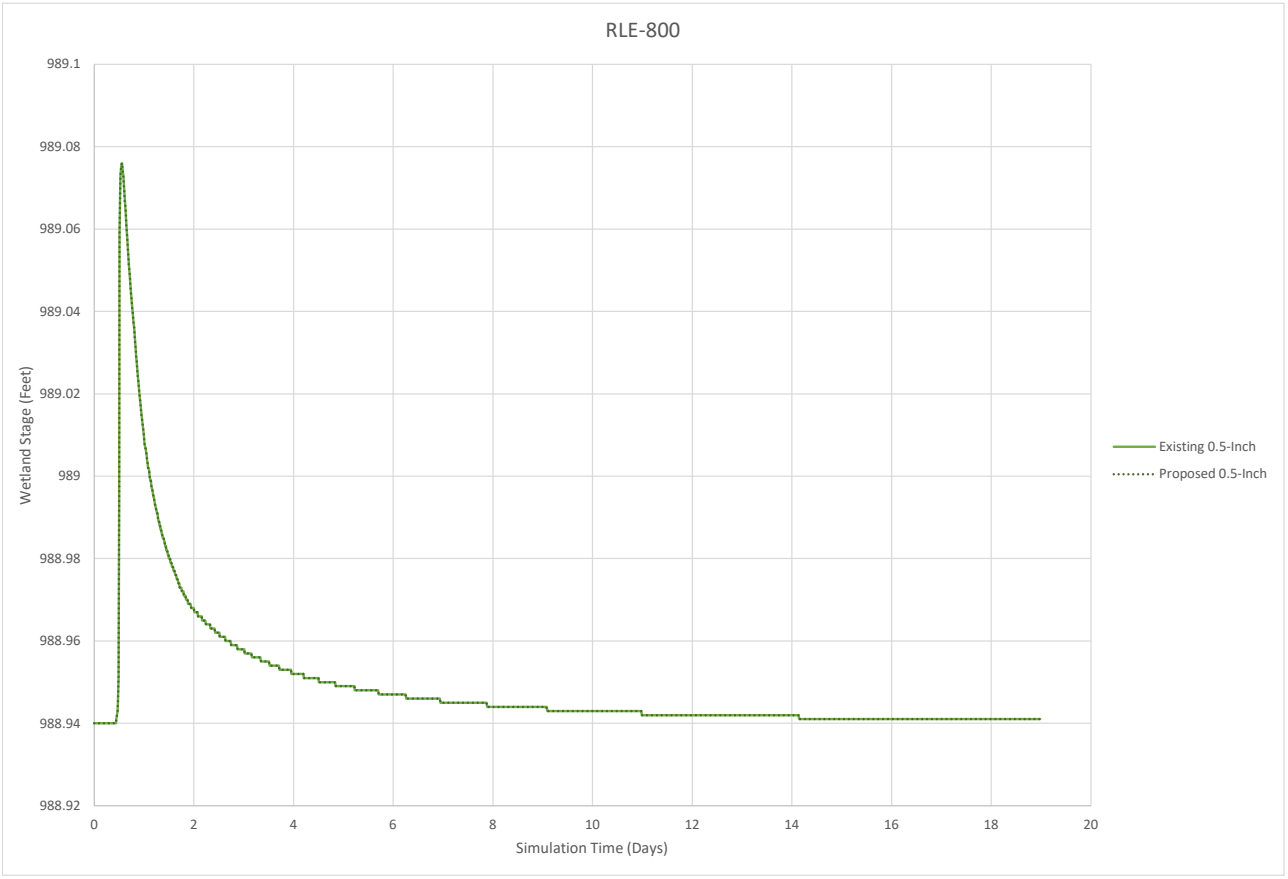


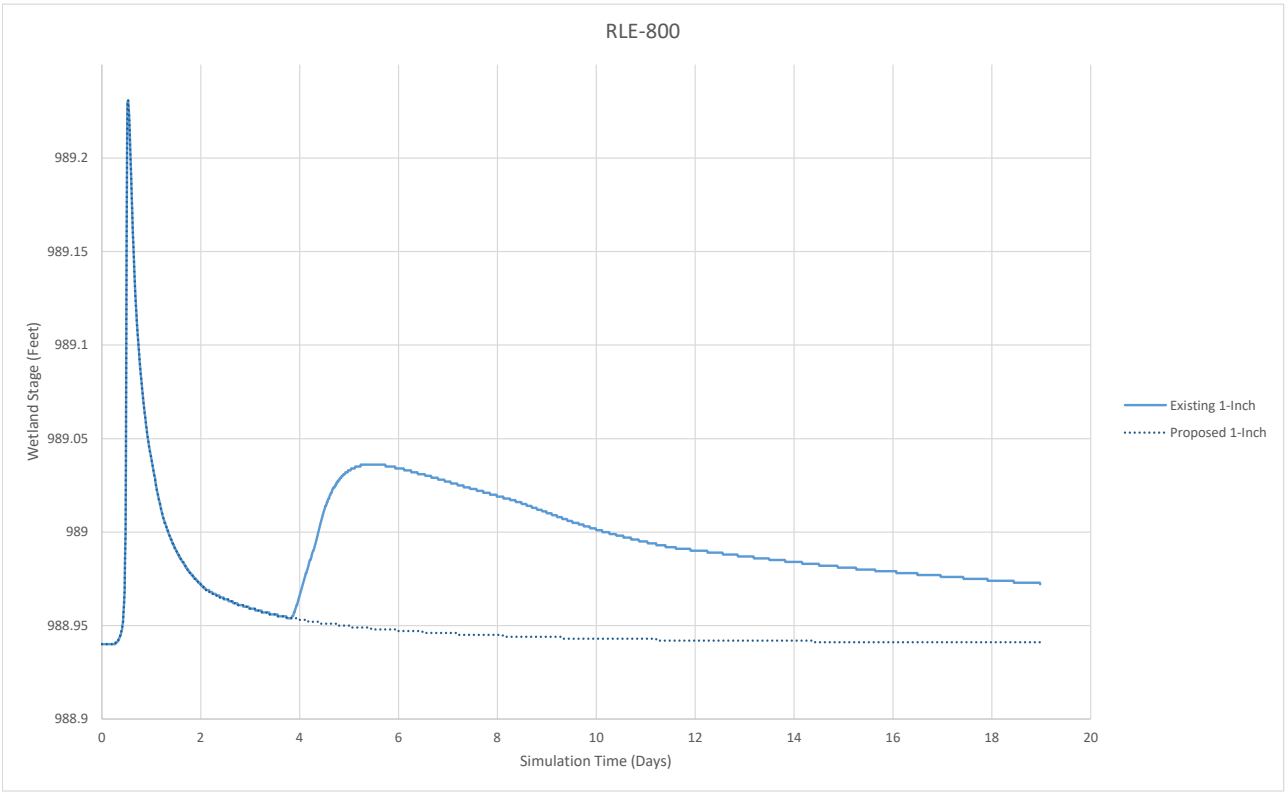


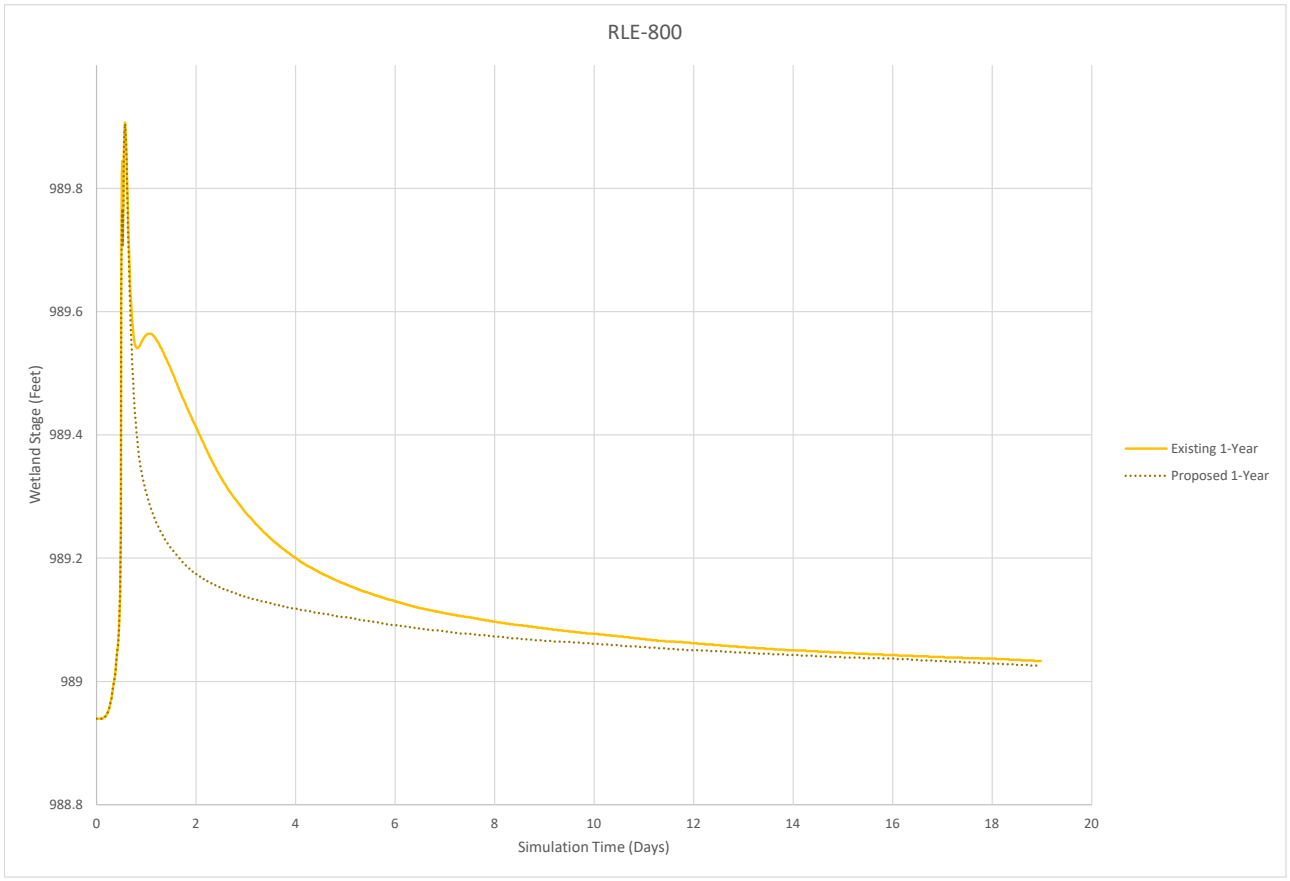

RLE-800a
993.5
993
992.5
992
991.5
991
990.5
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

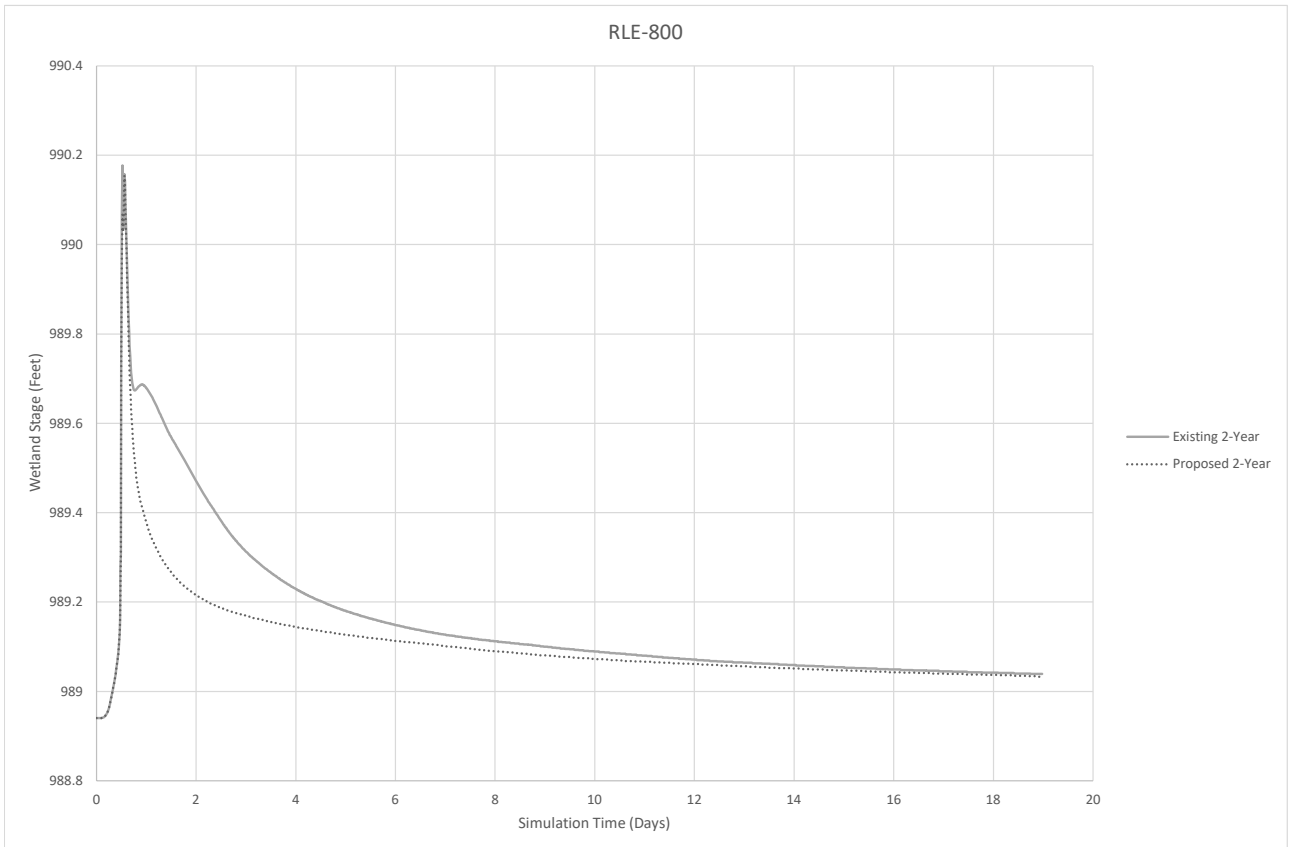

RLE-800a
993.5
993
992.5
992
991.5
991
990.5
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-800

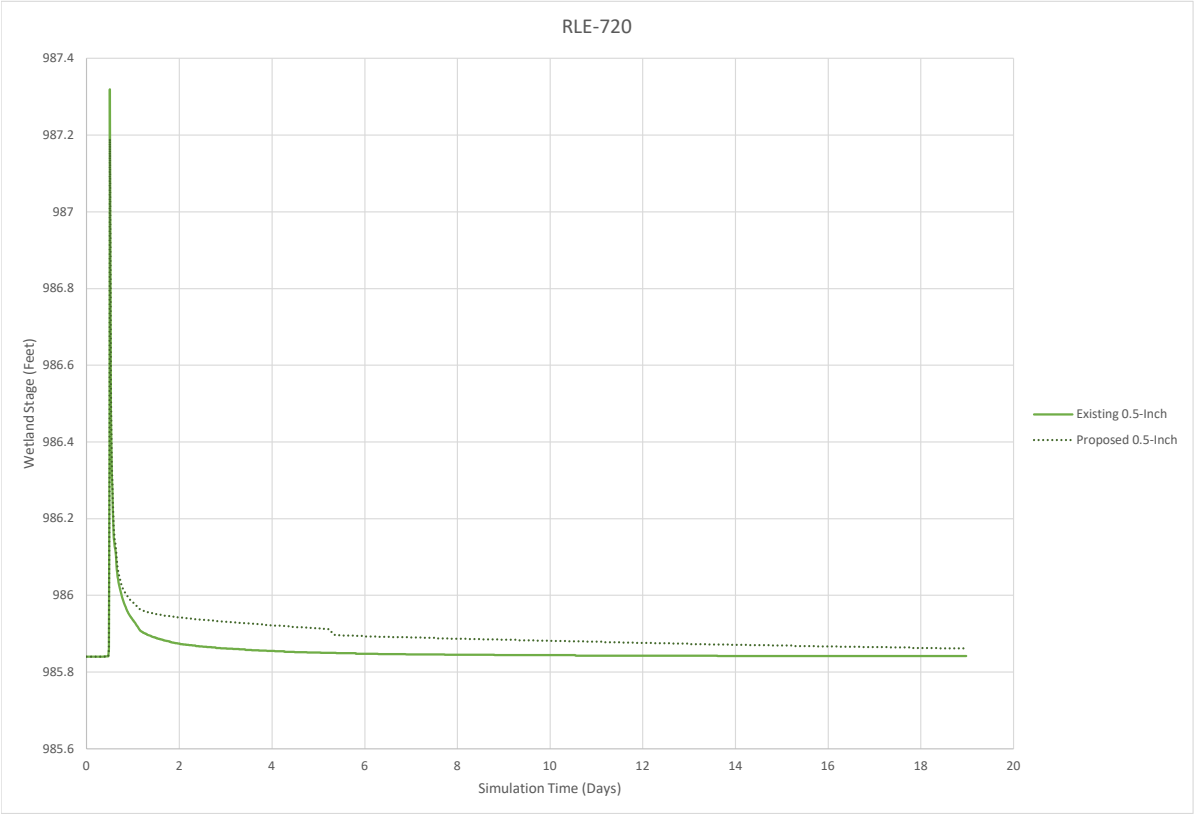


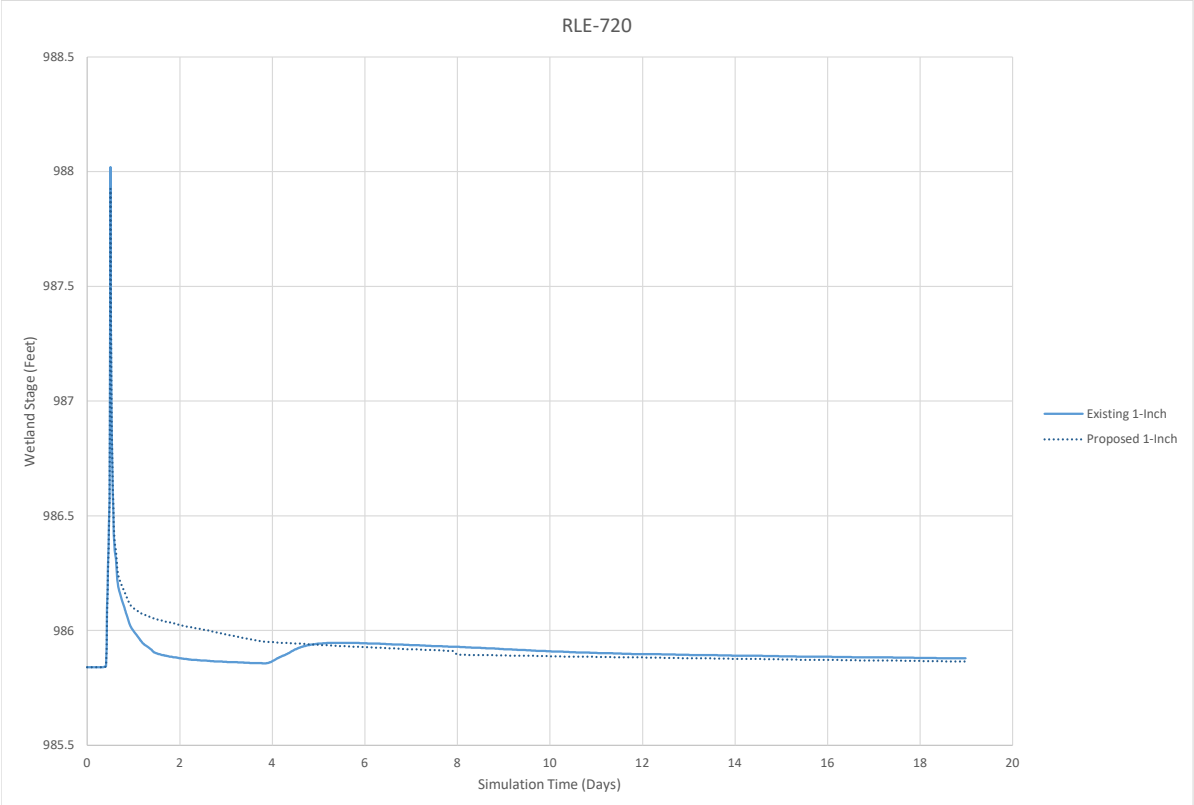


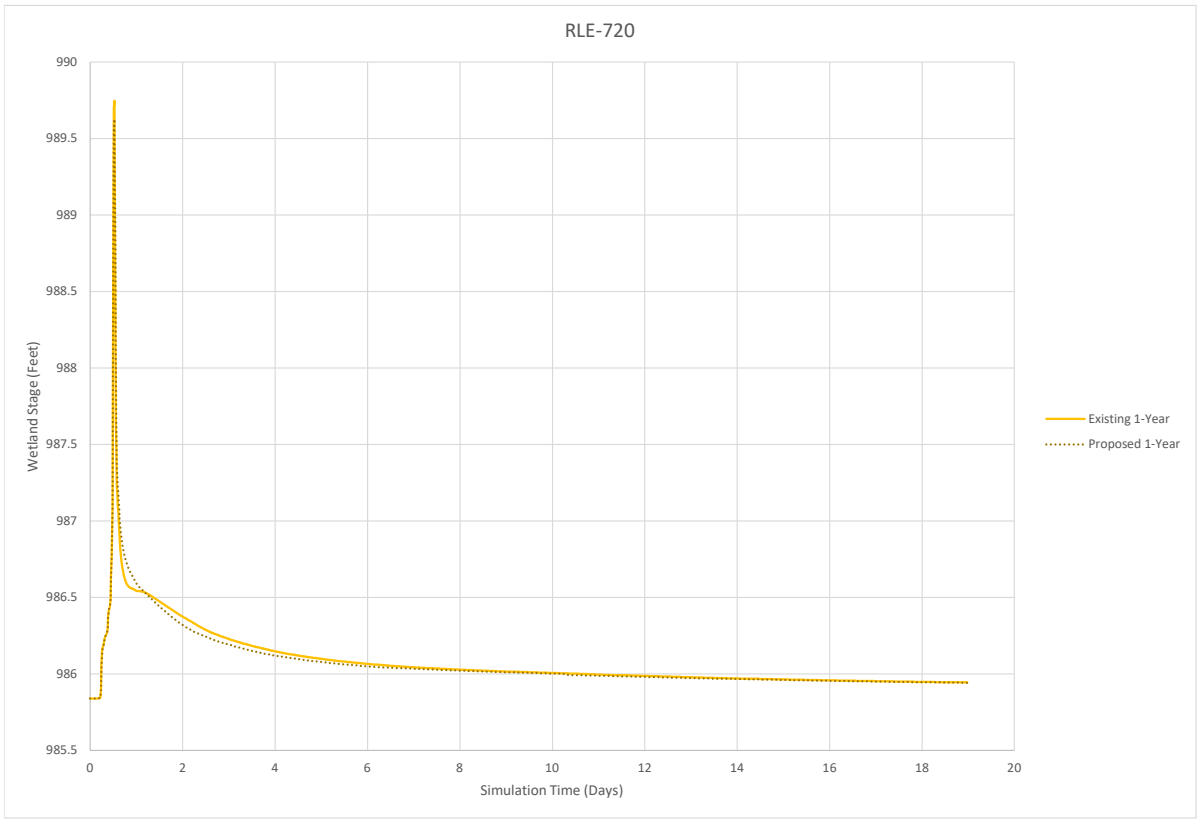

RLE-800
Wetland Stage (Feet)
989.8
989.6
989.4
989.2
989
988.8
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year

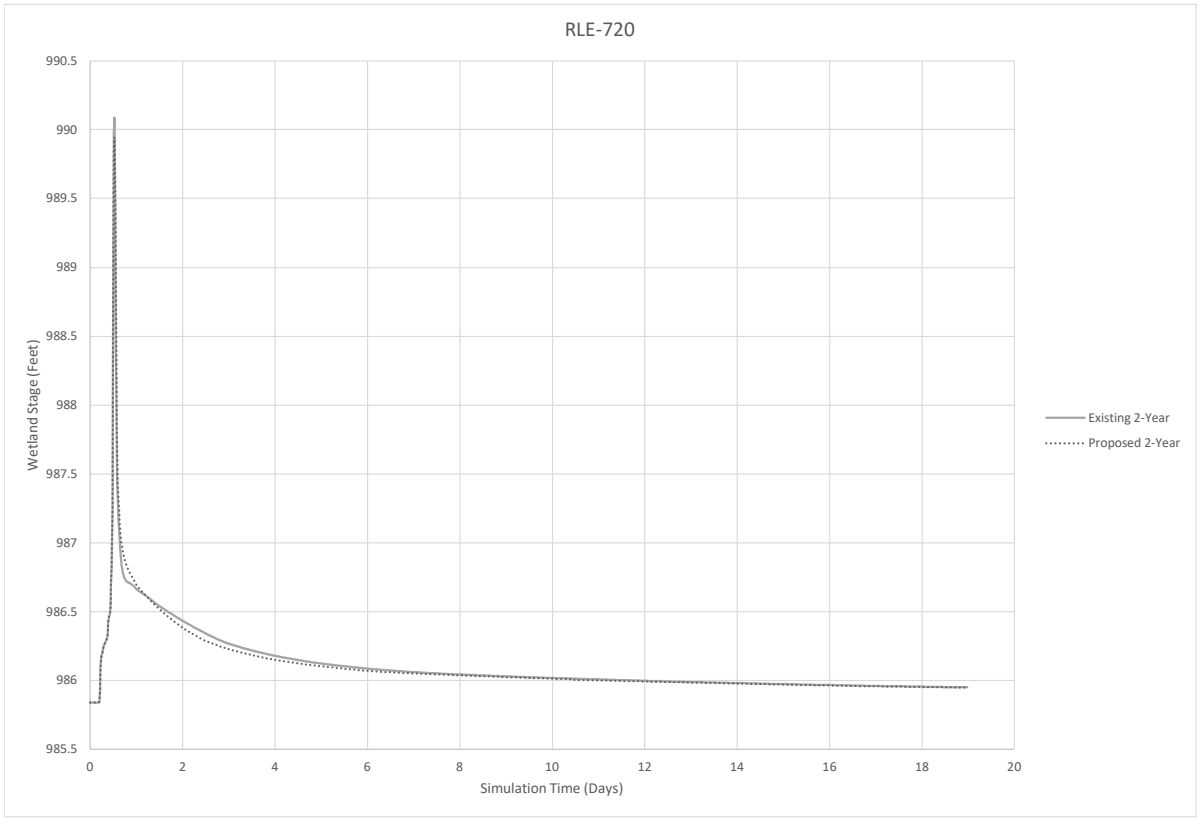

RLE-800
Wetland Stage (Feet)
990.4
990.2
990
989.8
989.6
989.4
989.2
989
988.8
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Summary Node
RLE-720

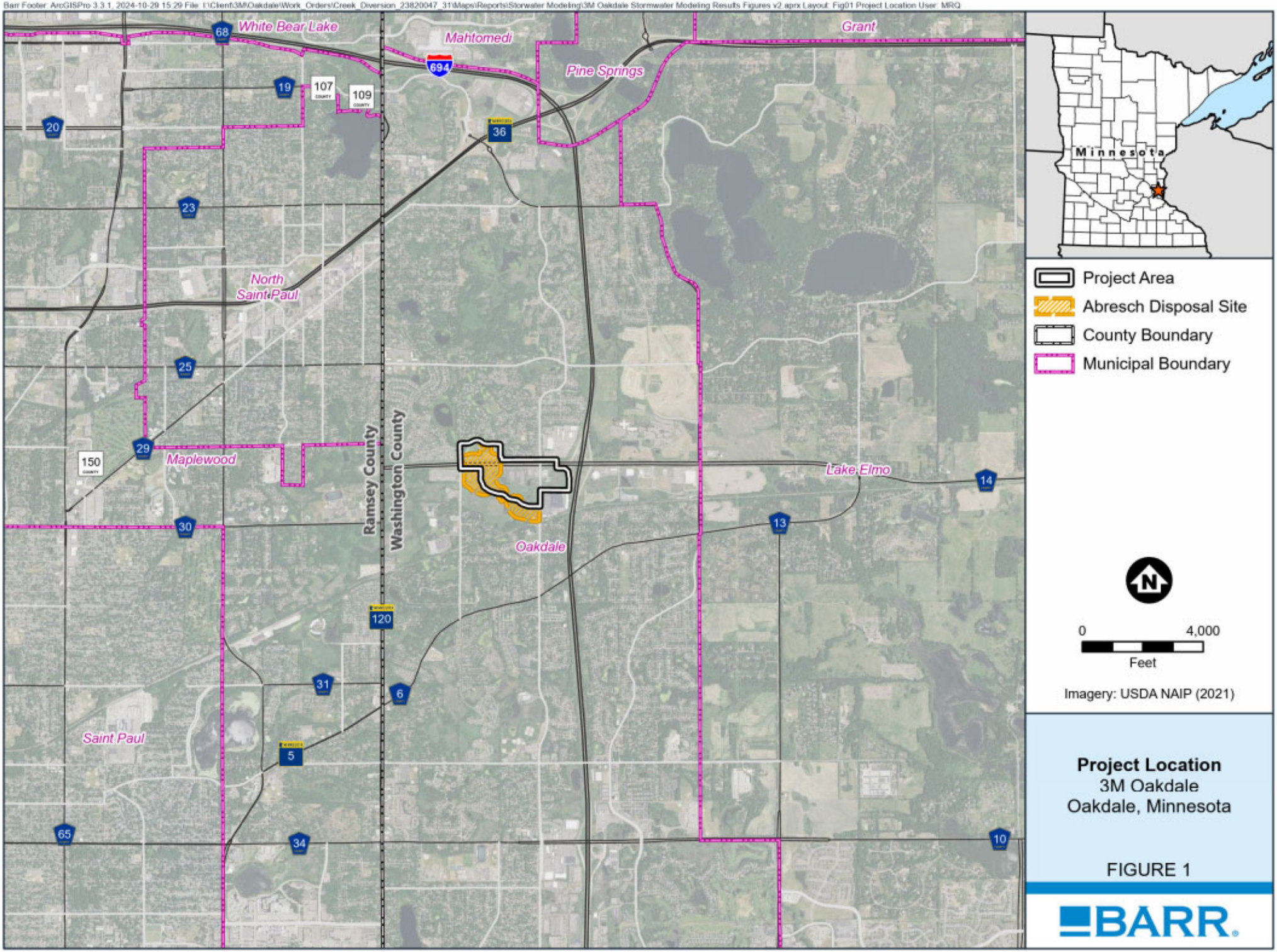





RLE-720
990
989.5
989
988.5
988
987.5
987
986.5
986
985.5
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 1-Year
Proposed 1-Year


RLE-720
990.5
990
989.5
989
988.5
988
987.5
987
986.5
986
985.5
Wetland Stage (Feet)
0
2
4
6
8
10
12
14
16
18
20
Simulation Time (Days)
Existing 2-Year
Proposed 2-Year

Figures



Project Area

Abresch Disposal Site

County Boundary

Municipal Boundary

N

0 4,000

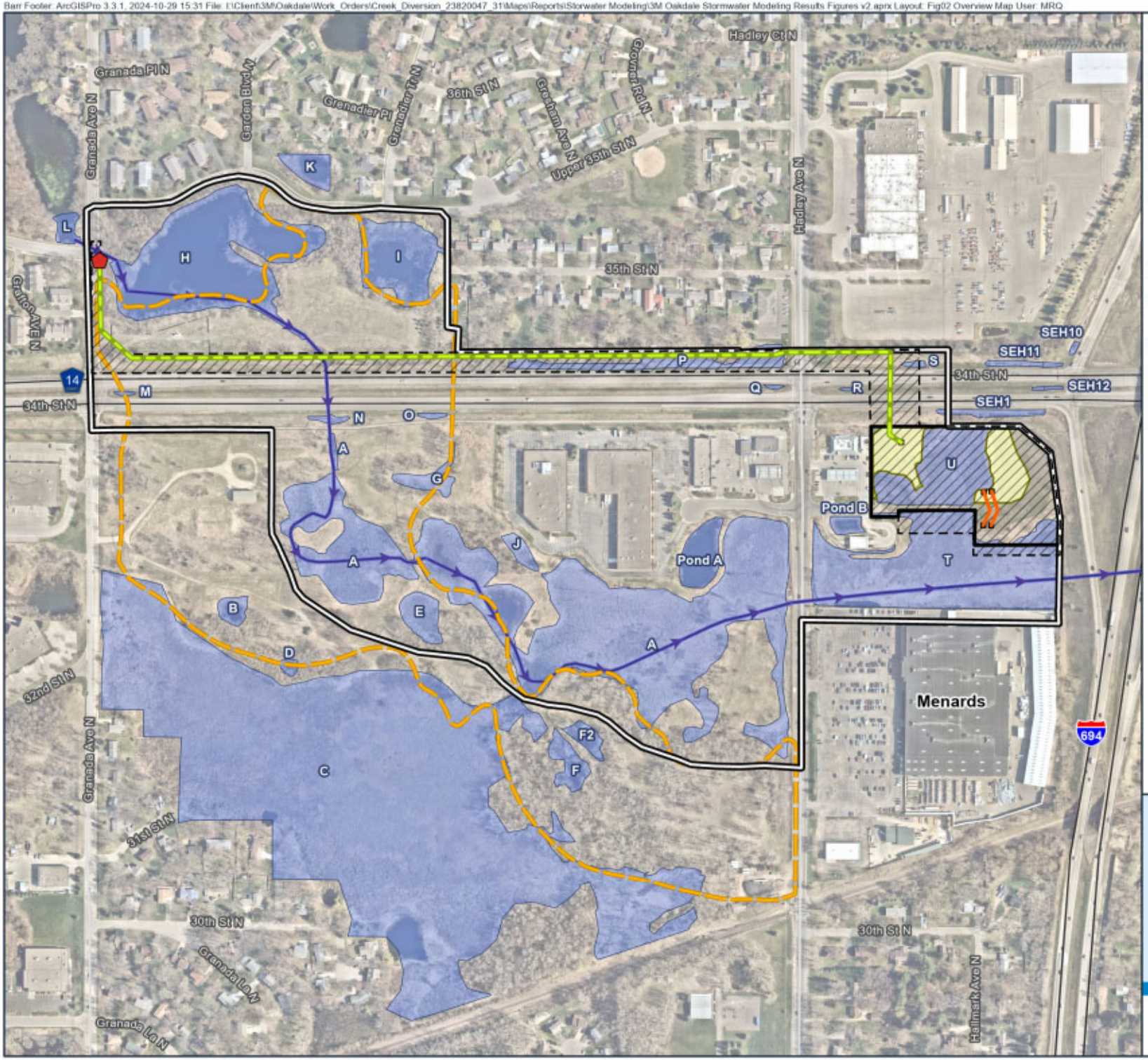
Feet

Imagery: USDA NAIP (2021)

Project Location
3M Oakdale
Oakdale, Minnesota

FIGURE 1

BARR



- Project Area
- Inferred Limits of Abresch Disposal Site
- Parcel B
- Construction Limit
- Delineated Wetlands (2023)
- Ditch

Proposed Project Features

- Diversion Pipe
- Flood Retention Basin Outlet
- Flood Retention Basin
- Riprap
- Diversion Structure

N

0 500

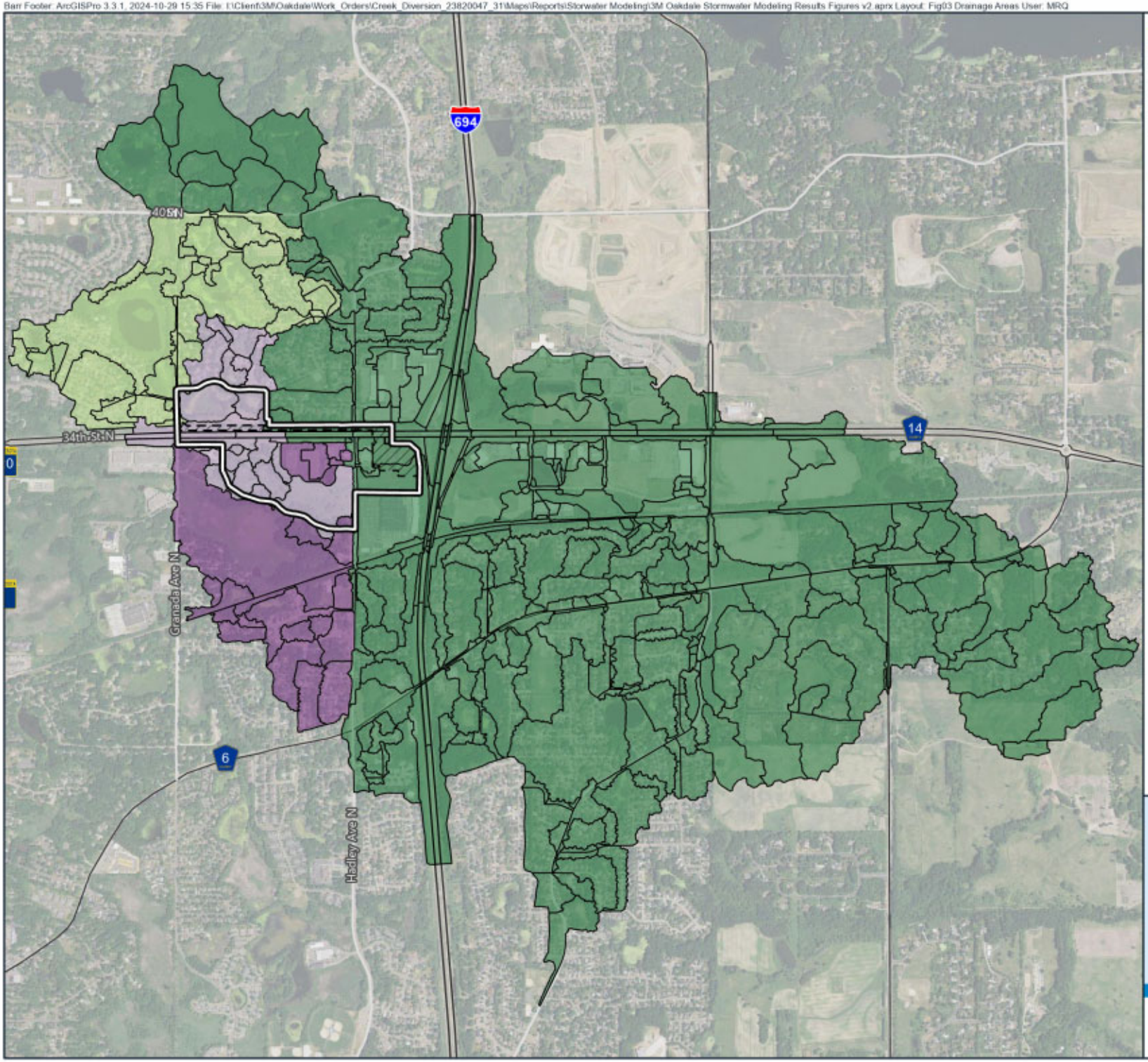
Feet

Imagery: NearMap (May 2022)

Overview Map
3M Oakdale
Oakdale, Minnesota

FIGURE 2

BARR



Project Area

Construction Limit

Drainage Areas to Raleigh Creek

- Drainage to Project Area, Diverted (185 acres)
- Direct Drainage to Project Area, Not Diverted (92 acres)
- Drainage to Project Area, Not Diverted (158 acres)
- Drainage to Downstream Subwatersheds, No Drainage to Project (1,650 acres)

N

0 2,000

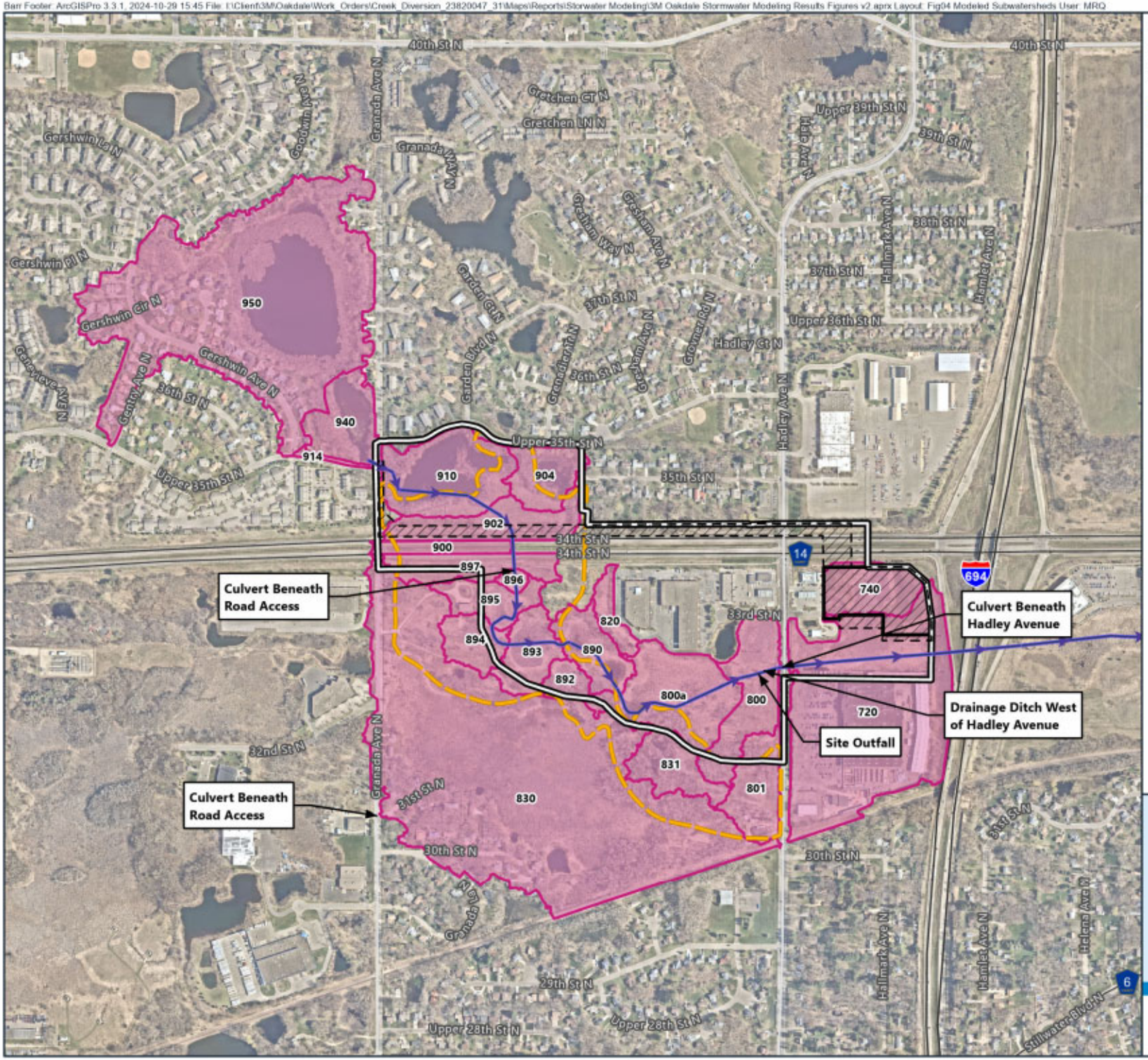
Feet

Imagery: NearMap (May 2022)

Drainage Areas
3M Oakdale
Oakdale, Minnesota

FIGURE 3

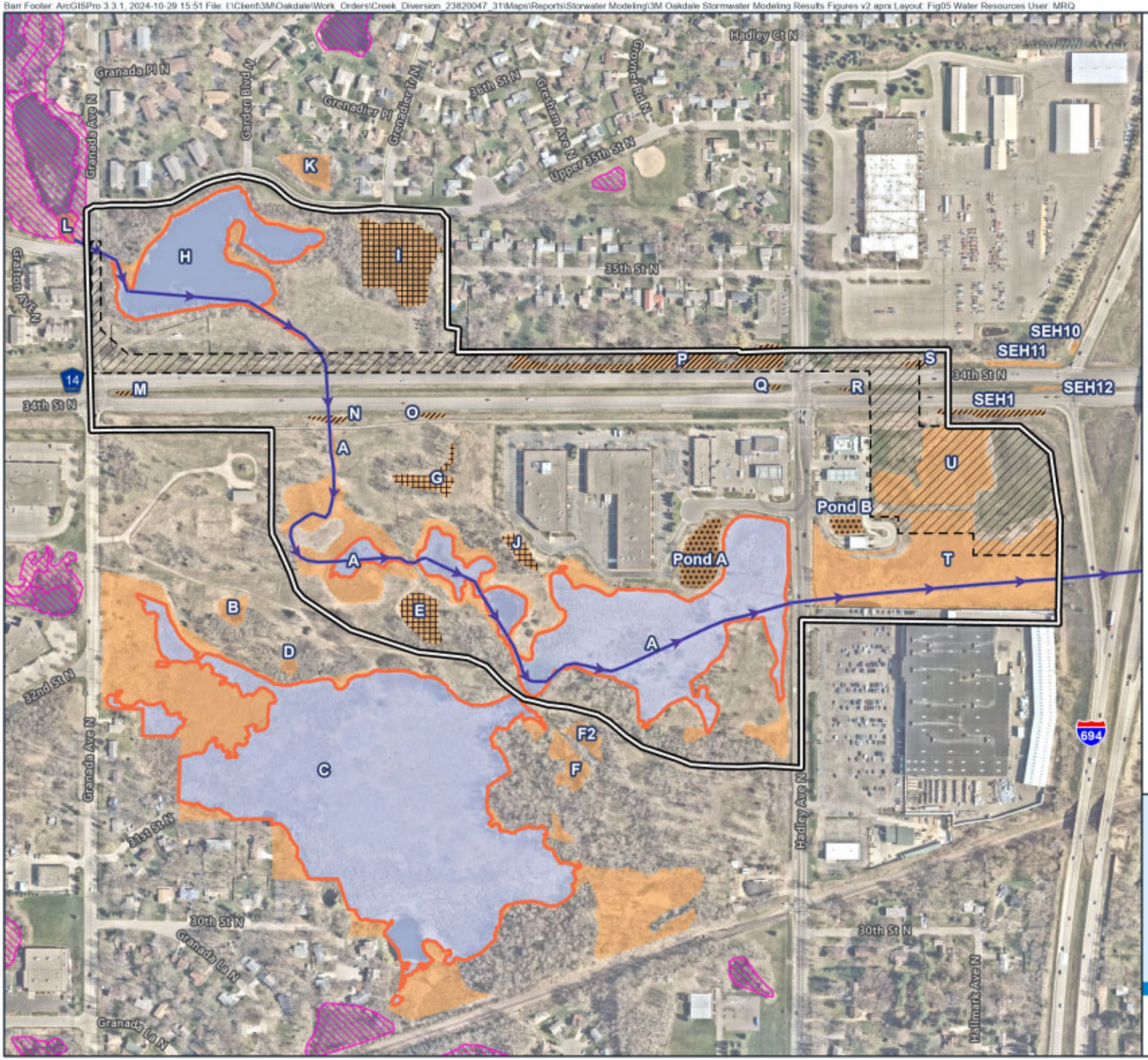
BARR



Modeled Subwatersheds
3M Oakdale
Oakdale, Minnesota

FIGURE 4

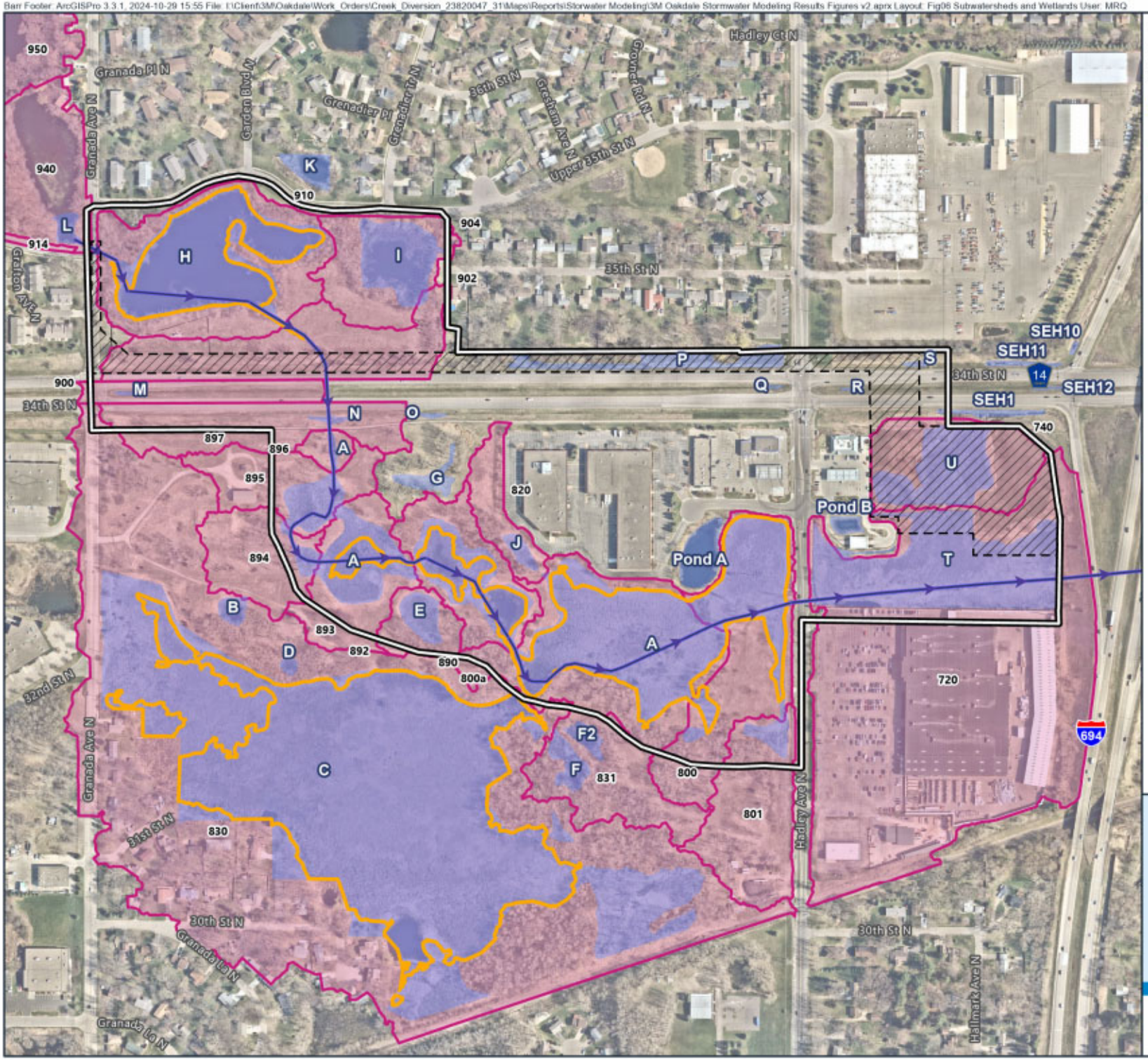
BARR



Water Resources
3M Oakdale
Oakdale, Minnesota

FIGURE 5

BARR



Project Area
Construction Limit
Public Waters OHWL
Delineated Wetlands (2023)
Modeled Subwatersheds
Drainage

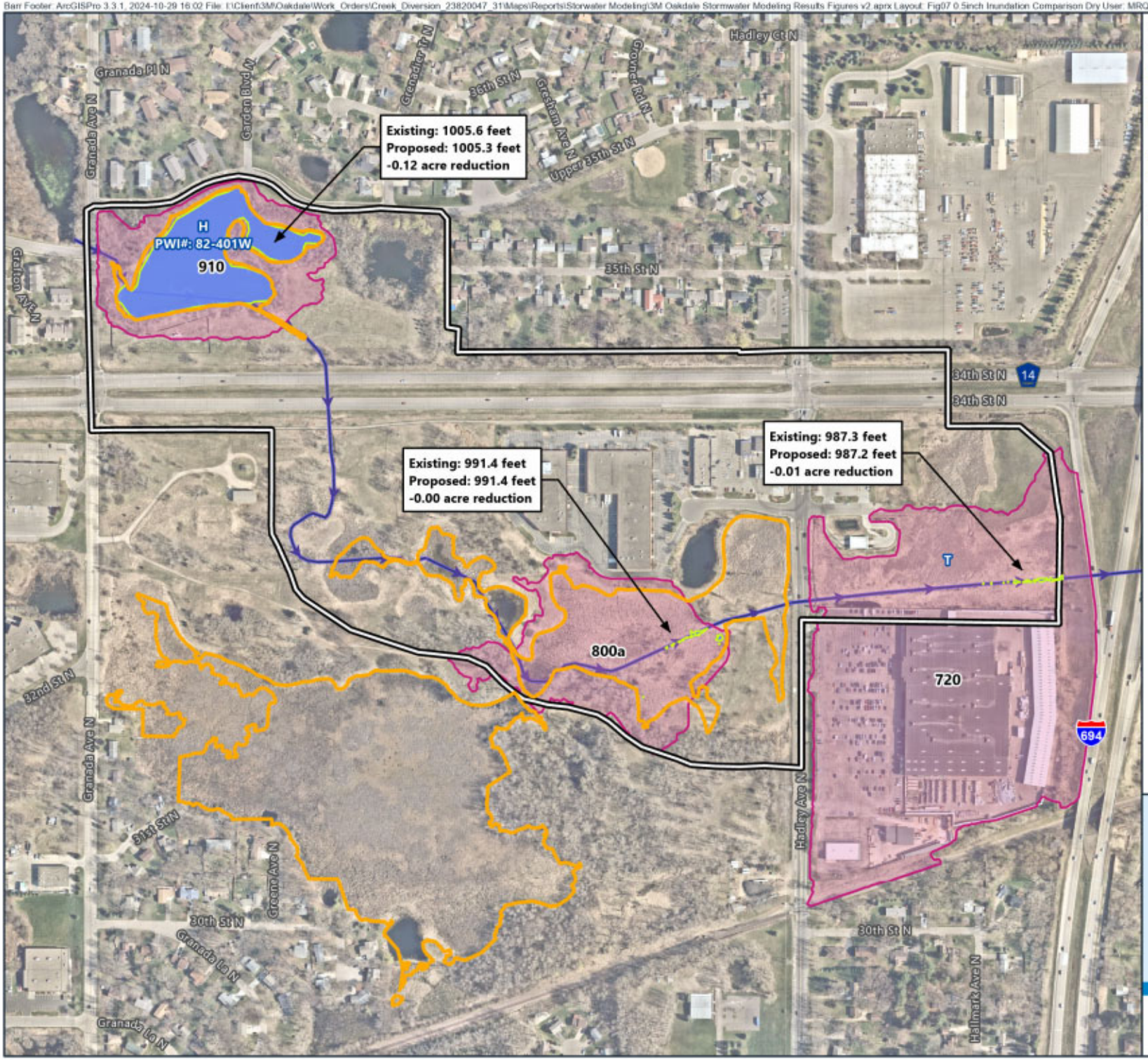
0 500
Feet

Imagery: NearMap (May 2022)

Subwatersheds and Wetlands
3M Oakdale
Oakdale, Minnesota

FIGURE 6

BARR



- Project Area
- Public Waters OHWL
- Existing 0.5-inch Inundation Extents
- Proposed 0.5-inch Inundation Extents
- Subwatersheds with MWSE Changes
- Existing Drainage Ditch

N

0 500

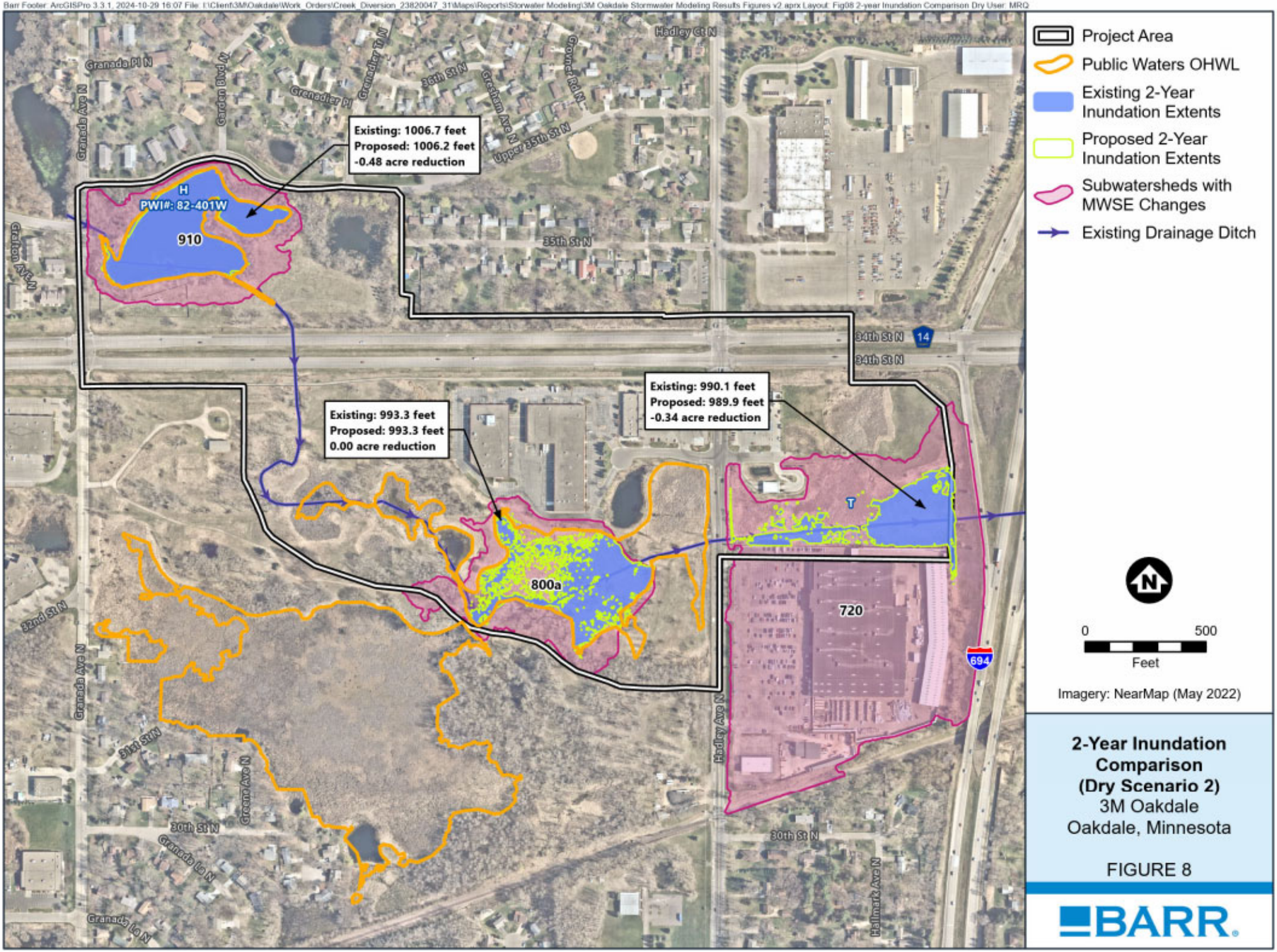
Feet

Imagery: NearMap (May 2022)

0.5-in Inundation Comparison (Dry Scenario 2)
3M Oakdale
Oakdale, Minnesota

FIGURE 7

BARR



Project Area
Public Waters OHWL
Existing 2-Year Inundation Extents
Proposed 2-Year Inundation Extents
Subwatersheds with MWSE Changes
Existing Drainage Ditch

0 500
Feet

Imagery: NearMap (May 2022)

2-Year Inundation Comparison (Dry Scenario 2)
3M Oakdale
Oakdale, Minnesota

FIGURE 8

BARR