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Lake Harney Basin
Watershed Flood Resiliency Plan

Final Watershed Flood Resiliency Plan Report

Prepared for

Seminole County Public Works
100 E 1st St
Sanford, FL 32771

Prepared by

Geosyntec Consultants, Inc.
3504 Lake Lynda Dr, Suite 155
Orlando, FL 32817

Project Number: FW3579

April 21, 2021

PS170918/RTB NPDES Engineering Services

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The engineering material and data contained within the enclosed report was prepared by Geosyntec Consultants, Inc. for sole use by the Seminole County Public Works Department. This report was prepared under the supervision and direction of the respective undersigned, whose seal as a registered professional engineer is affixed below.

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ACRONYMS AND ABBREVIATIONS

AH	Arc Hydro
ARC I	ARC – Type I (Dry Conditions)
ARC II	ARC – Type II (Average Conditions)
ARC III	ARC – Type III (Wet Conditions)
ARC	Antecedent Runoff Conditions
BCR	Benefit / Cost Ratio
BFE	Base Flood Elevation
BMP	Best Management Practice
CAD	Computer-Aided Design
CFCA	Central Florida Coordination Area
CFS	Cubic feet per second
CIP	Capital Improvement Project
CIR	Color Infrared
CMP	Corrugated Metal Pipe
CN	Curve Number
DCIA	Directly Connected Impervious Area
DDF	Depth-Damage Function
DEM	Digital Elevation Model
DOR	Department of Revenue
ERP	Environmental Resource Permit
FDEM	Florida Division of Emergency Management
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FFE	Finished Floor Elevation
FHWA	Federal Highway Administration
FIA	Federal Insurance Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FPLOS	Flood Protection Level of Service
FT	Feet

GIS	Geographic Information System
GWIS	Geographic Watershed Information System
H&H	Hydrologic and Hydraulic
HDPE	High-Density Polyethylene
HEC-RAS	Hydrologic Engineering Center - River Analysis System
HR	Hour
HSG	Hydrologic Soils Group
ICPR	Interconnected Channel and Pond Routing Model
ICPR4	ICPR version 4
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
LOMR-F	Letter of Map Revision Based on Fill
LOS	Level of Service
MA	Mean Annual
MIN	Minute
NAVD88	North American Vertical Datum of 1988
nDCIA	Non - DCIA
NEH	National Engineering Handbook
NGVD 29	National Geodetic Vertical Datum of 1929
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PF	Peaking Factor
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance / Quality Control
RCP	Reinforced Concrete Pipe
ROW	Right-of-Way
SCS	Soil Conservation Service
SFHA	Special Flood Hazard Area

SJR	St. Johns River
SJRWMD	St. Johns River Water Management District
SSMC	Southeastern Surveying and Mapping Corporation
SSMC	Southeastern Surveying and Mapping Corporation
SWFWMD	Southwest Florida Water Management District
Tc	Time of Concentration
TR-55	Technical Release 55
UH	Unit Hydrograph
USACE	Unite States Army Corps of Engineers
USGS	United States Geological Survey
YR	Year

1. INTRODUCTION

1.1 Authorization

Geosyntec Consultants, Inc. (Geosyntec) was tasked by Seminole County Public Works (County) to conduct engineering assessments, develop hydrologic and hydraulic (H&H) models, and conceptualize improvement measures to reduce flooding within the Lake Harney Watershed. Geosyntec completed this work under the Seminole County Master Services Agreement for National Pollutant Discharge Elimination Systems (NPDES) contract PS170918/RTB.

1.2 Project Location and General Description

The Lake Harney Watershed is in northeast Seminole County and encompasses approximately 26.5 square miles (~17,000 acres). A watershed location map is included as **Exhibit 1**. The Lake Harney Watershed in Seminole County is bounded to the north and northwest by the St. Johns River Basin, to the east by Lake Harney, to the south and southwest by the Big Econlockhatchee River Basin. The watershed is within the St. Johns River Water Management District (SJRWMD). The major water features in the watershed are Lake Harney, Harts Lake, Lake Geneva, Lake Proctor (Upper and Lower), Still Lake, and Jane Creek (Little Run and Big Run), the Old Mims Road ditch, the SR46 ditches, and several unnamed County and private ditches and streams that flow into Lake Harney. Lake Harney is part of the St. Johns River (SJR), which enters the lake from the south and exits the lake from the north. The watershed is characterized by low topographic relief ranging in elevation from approximately 85 feet (NAVD 88) at the Geneva Ridge along the western boundary of the watershed to approximately 0 feet along the Lake Harney shore. The watershed is predominantly rural and undeveloped.

Flooding is a significant concern in the Lake Harney Watershed. Severe flooding occurred during several previous events, including Hurricane Irma in September 2017. As a result of these events, yard, road, and structure flooding occurred at multiple locations in the watershed. While flooding has been attributed to insufficient infrastructure within the watershed and high tailwater conditions in the lake, the analyses and recommendations of this study are focused solely on flooding issues related to insufficient infrastructure.

1.3 Purpose and Objectives

The primary goal of this study was to develop the tools necessary to effectively manage flooding within the Lake Harney Watershed. This was accomplished by completing the following objectives:

- Collect and compile relevant watershed related data and develop existing GIS representations of watershed characteristics (Section 2).
- Develop a detailed hydrologic and hydraulic (H&H) model (Section 3).
- Establish flood protection level of service (FPLOS) and estimate annual flood damages for roads and structures (Section 4).
- Develop alternatives to reduce flooding at specific focus problem areas in the watershed identified by modeling and concurred by the County (Section 5). The focus problem areas include:

  - Old Mims Road at Jungle Road
  - Lake Harney Circle Area
  - Fort Lane Road
  - Whitcomb Drive
  - Osceola Road at Gun Range Road
- Develop updated floodplain maps (Section 6).
- Summarize project efforts in a Watershed Flood Resiliency Plan (This Report). This report documents the efforts and results per scope of work. Refer to the electronic deliverables for a copy of the project scope of work.

1.4 Quality Assurance

A project / deliverable specific QA/QC checklist was used to document the review. An independent engineer reviewed the FPLOS deliverables (inundation polygons, structure footprints, basin LOS polygons, and damage calculations) and alternatives analysis deliverables (concept models, mapping, cost estimates, etc.) to ensure accuracy. Refer to the QC submittal checklist in the electronic deliverables for a list of items checked and names of those that performed the QC.

2. ASSEMBLY AND EVALUATION OF WATERSHED DATA

This section presents information on the collection and review of existing watershed data, development of watershed data and characteristics, and collection of additional data needed for watershed modeling. All the data, reports, surveys and other reference information discussed are included in the electronic deliverables.

2.1 Data Compilation, Evaluation, and Gap Analysis

Data from multiple sources were collected and reviewed to refine the watershed boundary (**Exhibit 1**). These data are discussed in the following sections.

2.1.1 GIS Data

- **County Drainage Basins** – The polygon feature class \ provided an approximate watershed boundary for the Lake Harney Watershed. This served as the initial watershed boundary during preliminary investigations. which was used as the initial watershed boundary during preliminary watershed boundary delineation.
- **USGS National Hydrography Dataset** - The US Geological Survey (USGS) National Hydrography Dataset (NHD) waterbodies and flowlines were overlaid on the initial Lake Harney Watershed boundary to help identify areas for watershed boundary refinement and identify drainage features to include in the model.
- **Topographic Information** – The 2009 LiDAR-based digital elevation model (DEM) for the Central Florida Coordination Area (CFCA) was obtained from SJRWMD. The DEM was compared with the initial watershed boundary to refine the boundary where necessary. The DEM was also utilized to generate subbasins, overland weir cross sections, and characterize storage. The DEM for the Lake Harney Watershed is presented in **Exhibit 2**.
- **County Stormwater Infrastructure Inventory** – The County stormwater asset inventory

  infrastructure (e.g., culverts, structures, canals, and ponds) was reviewed to determine drainage patterns. The inventory was sparse within the Lake Harney Watershed. For example, there were only eight (8) culverts previously digitized. Building upon the County inventory, Geosyntec digitized additional infrastructure assets from As-Builts, construction plans, surveys, aerials, Google Street View and Bing Maps Streetside, and DEM interpretation. The updated drainage infrastructure inventory is shown on **Exhibit 3**.
- **County Drainage Easement and Right-of-way Boundaries** – Based on email communication with County staff on 7/16/2019, the County does not have their easement or right-of-way (ROW) boundaries mapped in GIS or CAD. General descriptions of the extent of County maintenance were described by County staff during a field tour of the watershed on 8/1/2019. A map dated 2005 for ditch cleanup following Hurricanes Charlie, Frances, and Jeanne (CIP #233608) shows County ROWs along two ditches draining from Osceola Road to Lake Harney.
- **FEMA Floodplains and Flood Insurance Study** – The 2007 effective regulatory floodplains, Flood Insurance Rate Maps (FIRMs), and Flood Insurance Study (FIS) for

Seminole County, Florida and Incorporated Areas (FIS No. 12117CV000A) were obtained from the Federal Emergency Management Agency (FEMA). The study area is covered by FIRM numbers 12117C0115F, 12117C0120F, and 12117C0205F, and 12117C0210F. The base flood elevation (BFE) of Lake Harney were not assessed as part of this study since this would require modeling of the SJR.

- **Aerial Imagery** – Aerial orthophotos of Seminole County in the vicinity of Lake Harney were obtained from the Florida Department of Transportation (FDOT). The primary aerial images used during the watershed evaluation were dated 2018. Flooding from elevated lake levels obscured the roads and land cover in some areas, so additional aerials dated 2015 was also utilized. Color-infrared (CIR) aerial photographs dated 2018 and 2009 were also obtained from FDOT and used to help identify inundated areas obscured by vegetation.

2.1.2 Previous Reports, Studies, and Models

The following studies, provided by the County, were reviewed for data relevant to the watershed boundary delineation and model development. These study reports are included in the electronic deliverables.

- East Settlers Loop Drainage Investigation Project – Final Technical Memorandum (Inwood Consulting Engineers [Inwood], 2010): Inwood conducted a study to address flooding and poor conveyance along East Osceola Road near East Settlers Loop. Model and survey data from this study were used to refine the Lake Harney Watershed and supplement the survey data collected for the current study.
- Lake Proctor Basin Outfall Study – Final Engineering Report (Inwood, 2002): Inwood conducted a study of the Lake Proctor drainage basin to its outfall at the ditch on the south side of Old Mims Road. Model and survey data from this study were used to refine the Lake Harney Watershed and supplement the survey data collected for the current study.

2.1.3 ERPs and County Plans

Geosyntec collected environmental resource permit (ERP) data from the SJRWMD. The ERPs include as-built, record, and construction drawings of the permitted developments within the Lake Harney Watershed. Additional plans, surveys, models, and maps were
OnBase database and from the County Development Review Division. The ERP information were used to examine drainage patterns within the watershed and digitize drainage infrastructure.

2.1.4 Horizontal and Vertical Datum

data generated during this project were projected in State Plane Florida East FIPS 0901 (feet) and referenced to the North American Datum of 1983 (NAD83) horizontal datum.

Elevations were referenced to the NAVD88 vertical datum. The conversion factor of -1.06 feet for Seminole County, referenced from the FEMA FIS for Seminole County, Florida and Incorporated Areas (September 2007) was used to convert data from National Geodetic Vertical Datum of 1929 (NGVD29) to NAVD88.

2.2 Drainage Pattern and Watershed Boundary

This task consisted of developing preliminary catchments, surface connectivity, and preferential flow paths for the watershed. The ESRI Arc Hydro (AH) tools were used to identify and fill sinks, revise the DEM (5-
generate the raster flow direction grid, sink, and stream grids necessary to generate catchments for the watershed. The preliminary watershed boundary, catchment boundaries, and drainage infrastructure data were reviewed to determine the areas where initial sinks and streams should be included in the initial catchment development process. Locations requiring field investigation to confirm the accuracy of the catchment boundaries were identified. Based on the field investigation, survey, and additional desktop evaluation, the preliminary catchment boundaries were refined using a combination of manual methods and additional application of AH tools.

Following preliminary catchment development, the AH tools were utilized to generate the surface connectivity and overland preferential flow paths in the watershed. These were ultimately converted into the overland weir links.

2.3 Hydrological Characteristics and Percolation

2.3.1 Soils Characterization

Soils data was obtained from the U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS) web soil survey. Approximately 80% of the soils within the preliminary watershed boundary are hydrologic soil group (HSG) A/D or B/D (**Exhibit 4**). These soils are typically poorly drained under wet conditions. The minimum depth to the water table typically ranges from 0 to 12 inches below the ground surface throughout most of the watershed, although depths of 23 inches or more are possible along the Geneva Ridge. The soils polygons are included in the electronic deliverables. The distribution of HSGs within the model domain is summarized in **Table 2-1**.

Table 2-1: Hydrologic Soil Group Distribution within the Model Domain

Hydrologic Soils Group	Total Area (ac)	Percent of Model Domain (%)
A	2,125	20
A/D	7,740	74
B/D	633	6
Water	65	1

2.3.2 Percolation Locations

The criteria for selecting potential percolation modeling locations were 1) no water visible in a ponded area, 2) group A soils (determined from soils data or geotechnical data in relevant ERPs),

SJRWMD potentiometric surface map, or ERP information). No dry ponds located over group A soils were identified within the watershed, so no percolation links were included in the model.

2.3.3 Land Use Characterization

Land use data (2014) was obtained from the SJRWMD Open Data portal. Land use and cover descriptions were spot checked against aerial photographs and edited as needed. Road ROWs were delineated and manually classified

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domain is presented in **Exhibit 5** and summarized by classification in **Table 2-2**. The land use polygons are included in the electronic deliverables.

Table 2-2: Land Use Distribution within Model Domain

Land Use Class[1]	Total Area (ac)	Percent of Model Domain (%)
Urban and Built-up	2,421	22.9
Agriculture	1,882	17.8
Rangeland	828	7.8
Upland Forest	1,227	11.6
Water	105	1.0
Wetlands	3,494	33.1
Barren Land	31	0.3
Transportation, Communication, and Utilities	570	5.4

1-Land use classifications based on FDOT (1999).

2.4 Existing Problem Identification

Geosyntec identified existing problem locations based on previous report findings (Section 2.1.2), interviews with County staff (7/25/2019, 8/1/2019, and 8/16/2019), and resident input via public meeting comment forms (6/18/2019), field interviews (8/12/2019 and 8/12/2019), and emails and phone calls (6/12/2019 through 8/14/2019). This evaluation was summarized in the Existing Problem Identification Summary technical memorandum provided to the County on 9/3/2019 (included in the electronic deliverables). The identified locations served as initial candidates for improvement alternatives evaluation. Refer to **Exhibit 1** for the preliminary problem area locations.

2.5 Field Reconnaissance, Investigation, and Survey

2.5.1 Field Investigations

Geosyntec staff conducted field investigations on 8/1/19, 8/8/19, and 8/12/19 to verify drainage infrastructure locations and attributes, confirm drainage patterns and boundaries, and interview County staff and residents. The collected information was used to identify problem locations, refine the watershed delineation and connectivity, and parameterize the model.

2.5.2 Survey

Based on the infrastructure data gaps identified during the review of the County stormwater infrastructure inventory and desired model level of detail, Geosyntec provided the Survey Needs technical memorandum to the County on 9/18/2020 and the Request for Supplemental Survey Budget on 10/30/2019 (both included in the electronic deliverables). Southeastern Surveying and Mapping Corporation (SSMC) collected survey for 100 pipes and 86 cross sections in two phases between 10/23/2019 and 2/28/2020. Geosyntec received the final survey deliverables on 3/4/2020.

2.6 Meetings

Ten (10) meetings were held over the course of this project both to share project goals/status and solicit input from stakeholders regarding flooding issues (for model validation and problem location identification), consensus on modeling and survey approach, and permitting and other implementation considerations:

- Project Kick-off Meeting (5/2/2019)
- Initial Public Meeting (6/18/2019)
- Status Meeting (7/25/2019)
- Modeling Approach Meeting (8/16/2019)
- Survey Needs Meeting (10/16/2019)
- Preliminary Model Results and Alternative Area Selection Meeting (5/14/2020)
- SJRWMD Permit Determination Meeting (5/21/2020)
- Final Public Meeting (8/26/2020)
- Board of County Commissioners Meeting (10/13/2020)
- Whitcomb Drive Improvement Alternative Public Meeting (12/9/2020)

Please refer to the electronic deliverables for detailed meeting summaries, sign in sheets, presentations, and other meeting related information.

3. WATERSHED MODEL PARAMETERIZATION

The Interconnected Channel and Pond Routing computer model (ICPR, Version 4.05.02) was used as the hydrologic and hydraulic modeling tool for the project. Model schematic features and parameters, and support data were stored in a Geographic Watershed Information System (GWIS) Version 2.1 geodatabase. The GWIS is a standard geodatabase template designed by the Southwest Florida Water Management District (SWFWMD) for storing and organizing watershed and model data. Refer to **Table 3-1** below for a summary of the model features. Refer to **Exhibit 6** for a map of the model basin, node, link schematic.

Table 3-1: Summary of Model Features

Model Feature	GWIS Feature Class	Type	Count
Basin	ICPR_BASIN	Manual	619
Node	ICPR_NODE	Stage-Area (Storage)	619
		Stage-Area (Junction)	1
		Time-Stage (Boundary)	2
Link	ICPR_LINK	Pipe	206
		Channel	106
		Weir (Structure)	7
		Weir (Overland)	1836
		Drop Structure	3
Cross section	ICPR_XSECT	Channel	141
		Weir	1840

3.1 Hydrologic Model Features and Parameterization

To assess the impacts of stormwater runoff in the watershed, the study area was divided into discrete subbasin areas which represent specific contributing areas to a location of interest (pond, inlet, culvert, ditch, etc.). Subbasin delineation was conducted using the 2009 LiDAR DEM (Section 2.1.1). The extent of the hydrologic model is shown on **Exhibit 6**.

The model uses the subbasins to provide the hydrologic parameters used to generate the runoff volume routed in the hydraulic portion of the model. Using the Soil Conservation Service (SCS) Runoff Hydrograph Method, each basin is assigned the appropriately determined curve number parameters, time of concentration, and unit hydrograph peaking factor to simulate the runoff from the represented area. Each basin translates a hydrograph to one specific assigned model node. These parameters are described in more detail below.

3.1.1 Curve Number

The Lake Harney Watershed model uses the Curve Number (CN) method to calculate the rainfall excess. The CN method was selected as the preferred method due to the high prevalence of poorly drained soils within the watershed. Since the watershed is predominately rural with little directly connected impervious area (DCIA), CNs were taken directly from TR-55 in most cases. These are composite CN values that account for the proportion of open spaces and impervious areas typical

of each land use and are representative of average antecedent runoff conditions (ARC-II). Dual hydrologic group soils were assigned CNs based on their undrained condition (e.g., A/D → D) to represent the high water table typical of this watershed. Design CN values for central Florida wet prairies, pine flatwoods, cypress swamps, and marshes were taken from Suphunvorranop (1985). These values are independent of HSG, since during wet season conditions the water table would be at or above the ground surface at these locations. The land use and soils data are stored in the . The CN values used in the model are included in **Table 3-2**.

-polygons for each combination of underlying land cover and soil type. The CN for each sub-polygon is determined by the model by looking up the matching land use and soil combination in the Curve Number Set table (see **Table 2-2**).

Table 3-2: Curve Number Lookup Table

Land Use Description[1]	Hydrologic Soils Group			
	A	B	C	D
1100: Residential, low density - less than 2 dwelling units/acre	51	68	79	84
1180: Rural residential	46	65	77	82
1200: Residential, medium density - 2-5 dwelling units/acre	57	72	81	86
1400: Commercial and services	89	92	94	95
1480: Cemeteries	49	69	79	84
1620: Sand & gravel pits (must be active)	77	86	91	94
1700: Institutional	89	92	94	95
1840: Marinas & fish camps	89	92	94	95
2110: Improved pastures (monocult, planted forage crops)	39	61	74	80
2120: Unimproved pastures	30	48	65	73
2130: Woodland pastures	31	57	71	78
2140: Row crops	67	78	85	89
2150: Field crops	63	75	83	87
2200: Tree crops	32	58	72	79
2210: Citrus groves	32	58	72	79
2240: Abandoned tree crops	32	58	72	79
2400: Nurseries and vineyards	32	58	72	79
2410: Tree nurseries	32	58	72	79
2430: Ornamentals	89	92	94	95
2500: Specialty farms	89	92	94	95
2510: Horse farms	54	70	80	86
3100: Herbaceous upland nonforested	30	48	65	73
3200: Shrub and brushland (wax myrtle or saw palmetto, occasionally scrub oak)	30	48	65	73
3300: Mixed upland nonforested	30	48	65	73
4110: Pine flatwoods	93	93	93	93
4120: Longleaf pine - xeric oak	30	55	70	77

Land Use Description[1]	Hydrologic Soils Group			
	A	B	C	D
4200: Upland hardwood forests	30	55	70	77
4210: Xeric oak	30	55	70	77
4340: Upland mixed coniferous/hardwood	30	55	70	77
4410: Pine plantation	93	93	93	93
4430: Forest regeneration	93	93	93	93
5100: Streams and waterways	100	100	100	100
5200: Lakes	100	100	100	100
5250: Open water within a freshwater marsh / Marshy Lakes	100	100	100	100
5300: Reservoirs - pits, retention ponds, dams	100	100	100	100
5600: Slough waters	100	100	100	100
6110: Bay swamp (if distinct)	95	95	95	95
6170: Mixed wetland hardwoods	95	95	95	95
6181: Cabbage palm hammock	95	95	95	95
6210: Cypress	95	95	95	95
6250: Hydric pine flatwoods	93	93	93	93
6300: Wetland forested mixed	95	95	95	95
6410: Freshwater marshes	98	98	98	98
6430: Wet prairies	95	95	95	95
6440: Emergent aquatic vegetation	98	98	98	98
6460: Mixed scrub-shrub wetland	95	95	95	95
6500: Non-vegetated wetland	98	98	98	98
7400: Disturbed land	77	86	91	94
7430: Spoil areas	100	100	100	100
8140: Roads and highways, paved - open ditches	83	89	92	93
8140: Roads and highways, dirt	72	82	87	89
8200: Communications	89	92	94	95
8320: Electrical power transmission lines	39	61	74	80
8330: Water supply plants	81	88	91	93
8350: Solid waste disposal	81	88	91	93
8360: Treatment ponds	100	100	100	100
8370: Surface water collection basins	39	61	74	80

1-Land use classifications based on FDOT (1999). Shading is used to visually group the level 1 classifications (Urban and Built-up, Agriculture, Rangeland, Upland Forest, Water, Wetlands, Barren Land, and Transportation, Communication, and Utilities).

3.1.2 Time of Concentration

The SCS Unit Hydrograph method requires a time of concentration be specified for each subbasin. The time of concentration (Tc) represents the amount of time it takes for a particle of water to travel from the hydraulically most distant point in the drainage basin to the point of interest (e.g.,

the basin outlet, the edge of a lake or pond in the model). Tc was calculated using the watershed lag method as described in Section 630.1502 of the NRCS National Engineering Handbook (NEH).

In practice, this approach can express Tc (minutes) as a function of three characteristics of a given subbasin:

$$T_c = \frac{l^{0.8}\left(\frac{1000}{CN_{aw}} - 9\right)^{0.7}}{19Y^{0.5}}$$

where:

l = flow length (feet)

Y = average land slope (%)

CN_{aw} = area weighted average Curve Number

The longest flow path output from Arc Hydro was used as the starting point for determining the characteristic length of each basin. Each flow path was reviewed and adjusted for reasonableness. Flow paths for subbasins delineated after AH processing were digitized manually.

Average slope was extracted from a slope raster generated from the DEM. The DEM was first smoothed using the Focal Statistics tool (circular smoothing, 100-foot radius) in ArcGIS to expand the averaging window in order to minimize the influence of microtopography in the average slope calculation. For example, a landscape may have a gentle slope, but the slope from one 5-foot cell to the next could oscillate more dramatically. A slope raster was generated from the smoothed DEM using the Slope tool in ArcGIS. Finally, the average, non-zero slope within each basin was extracted from the slope raster using the Zonal Statistics as Table tool in ArcGIS.

The CN for each unique combination of soil and land use within each subbasin was determined from **Table 3-2** and multiplied by the area within the subbasin covered by that combination. These values were summed by subbasin and then divided by the total area of the corresponding subbasin area to determine the area weighted average CN. Per the NEH (NRCS, 2010), the minimum and maximum final CN value used in calculations were 50 and 95, respectively. Note that the area weighted CNs determined for each subbasin were only used for the Tc calculations. While a lumped approach is suitable for the Tc calculations, ICPR uses a distributed approach to provide a more accurate estimate of runoff volume.

A minimum Tc of 10 minutes was used in the calculations. Refer to the electronic deliverables for the Tc C_lag _Lag Method distribution of Tc values is summarized in **Table 3-3.**

Table 3-3: Summary of Time of Concentration Values

Time of Concentration (minutes)	Basin Count
10 (minimum Tc)	91
10-20	113
20-30	115
30-40	107

Time of Concentration (minutes)	Basin Count
40-50	59
50-60	45
60-70	36
70-80	26
80-90	9
90-100	4
100-110	5
110-120	3
120-130	2
>130	4

3.1.3 Peaking Factor

The SCS Unit Hydrograph Method requires a unit hydrograph peak attenuation factor be specified. The value of this factor affects the shape and peak flow rate of the unit hydrograph, and it is usually considered constant throughout a watershed. A peaking factor of 256 was set for all subbasins. This value is representative of very mild slopes, significant surface storage, and limited on-site drainage.

3.2 Hydraulic Model Features and Parameterization

Refer to **Exhibit 6** for a map of the model node-link network. The model features and parameterization are described in the following sections.

3.2.1 Nodes

Nodes in the model are typically either defined as Stage/Area or Time/Stage. Stage/Area nodes are used to model storage areas like water bodies/depressions and can also be used as junctions in channels and manholes in pipe networks. Time/Stage nodes typically represent the discharge point(s) or boundary condition(s) in the model. Refer to **Table 3-1** for the number of nodes included in the existing conditions model.

3.2.1.1 Initial Conditions

Initial Stages were set such that the model simulation would begin in static equilibrium. In dry pond locations the initial stage was set at the pond bottom based on the DEM. Wet pond initial stages were set at the lowest pond control structure weir elevation, typically an orifice or notch. In nodes connected to a waterbody, the initial stage was set at the greater of the waterbody initial stage or pipe/weir invert elevations. Initial stages in wetlands where the water boundary was obscured by vegetation were set equal to the average elevation of the DEM under the corresponding SJRWMD wetlands polygon. Baseflow was not incorporated into the model since parameterization data was not available.

3.2.1.2 Node Storage

Stage-area relationship tables were developed for each Stage/Area type node. These tables include stages ranging from below the node initial stage to above the peak node stage from the model results for each node. This was done to accurately define the available storage in each node and prevent any extrapolation or performance issues in the model. The stage/area information for storage nodes was extracted at 0.1-foot increments from the study DEM using the Arc Hydro Drainage Area Characterization tool, with channel exclusion polygons applied for subbasins with channel links (described in Section 3.2.3.2). The tool subdivides each drainage area into slices based on a user provided slice count or slice increment and calculates the cumulative area and volume for each slice. A row with nominal area was manually added for an elevation below the initial stage in cases where the initial stage equaled the minimum elevation for that basin (e.g., dry ponds) for model stability. The stage area tables for junction nodes were manually created with a nominal area for an elevation below the bottom of the manhole structure and an elevation above the

3.2.2 Pipes Links

These links were used to represent the various pipe and culvert sections included in the model. Pipe inverts, dimensions, geometry, and material data were referenced from a combination of survey data from other sources, as-built plans, construction plans, and previous model inputs. Manning roughness coefficients (*n*) were varied based on material as follows:

- Corrugated Metal Pipe (CMP): 0.024
- Reinforced Concrete Pipe (RCP): 0.012
- Plastic Pipe (e.g., ABS, PVC, HDPE): 0.01
- Steel: 0.014

ICPR has two options for accounting for entrance losses. The user can either specify the entrance loss coefficient directly or specify the Federal Highway Administration (FHWA) culvert code based on pipe shape, material, and inlet configuration. If specified, the FHWA culvert code overrides the entrance loss coefficient since ICPR will use empirical FHWA equations that include inlet losses. Although FHWA culvert codes were specified, Geosyntec also included the entrance loss coefficients for completeness since both parameters can be determined at the same time based on the inlet description. Entrance and exit losses were assigned to pipes based on conditions at each end of the pipe. These values were assigned based on literature values, or default values were used where exact conditions were uncertain. In general, the values were applied as follows:

- Entrance Losses:
  - 0.9 for CMP projecting from fill
  - 0.7 for mitered end sections
  - 0.5 for headwalls or other conditions
  - 0.4 for box culverts with wingwalls at 30° to 75° to barrel
- Exit Losses:

- 1.0 for discharge into a static water body
- 1.0 for discharge perpendicular to flow direction
- 0.0 for other conditions

Pipe link data are stored in the GWIS ta Refer to **Table 3-1** for the number of pipe links included in the existing conditions model.

3.2.3 Channel Links

These links were used to represent open drainage ways like ditches, swales, creeks etc., in the model. Channel geometry was represented by irregular cross-sections. The energy equation was specified as the energy switch method. Contraction and expansion coefficients were set at 0.1 and 0.3, respectively, based on HEC-RAS reference manual recommendations for gradual transitions. Bend loss coefficients and locations were specified
coefficients ranged from 0.12 to 0.25 depending on the ratio of the curve radius to channel width. Bend locations were expressed as the ratio of the distance of the bend location from the upstream node to the total length of the channel link. Channel link data are stored in the GWIS table Refer to **Table 3-1** for the number of channel links included in the existing conditions model.

3.2.3.1 Channel Cross-Sections

Cross-sections were assigned to specific channel links in the model to provide the irregular geometric properties for these links. Location specific irregular cross-sections were extracted from a combination of topographic survey data and the project DEM. A total of 141 channel cross-sections were developed for the project. The model utilized surveyed cross sections (referenced to NAVD 88) collected at 78 locations. The overbank portion of these cross sections beyond the survey were extracted from the DEM. Between surveyed locations, model cross sections were interpolated based on the neighboring surveyed channel cross-sections. The cross-sections are used ng roughness
coefficient values were assigned from the values recommended by Chow (1959) for the channel description matching field photos, aerial imagery, and survey photos at a given location. Cross Refer to **Table 3-1** for
the number of channel cross sections included in the existing conditions model.

3.2.3.2 Exclusion Polygons

ICPR calculates the storage within channels based on cross-section data. This volume should be separated from the overbank storage assigned to the subbasin node to ensure that this storage volume is not duplicated. Exclusion polygons define the areas where storage will be attributed to the channel (i.e., the conveyance way). These polygons are stored in the GWIS feature class

Area Characterization tool subtracts the storage within the exclusion polygons from the total storage of the corresponding subbasin to determine the overbank storage to assign to the node.

3.2.4 Weir Links

These links are used to represent outflow weirs at ponds, inlet characteristics to some outfall structures, overtopping of roadways, and overland flow. The specific geometry of the weir was

input into the model. In general, horizontal weirs were used to model flat inlet structures and ditch bottom inlets. Vertical weirs were used to model control structure slots and bleeders along with true weir structures (sharp or broad crested) and overtopping situations. Where complex multi-level weirs are present, two or more separate model weirs were used to account for outflow. Each weir was assigned a specific weir coefficient based on its configuration. Discharge coefficients were applied as follows:

- Overland / Saddle Flow / Overtopping Roadway: 2.6
- Broad Crested Weir Control Structure: 2.8
- Sharp Crested Weir (typically pond outfall): 3.2
- Orifice: 0.6

Weir link data Refer to **Table 3-1** for the number of weir links included in the existing conditions model.

3.2.4.1 Weir Cross-Sections

For weirs associated with outfall structures, regular geometric cross-sectional properties (i.e., trapezoidal, triangular, etc.) were used whenever practical. For more complicated outfall structure weirs, irregular cross section data was extracted from as-built plans, construction plans, or previous model inputs.

For weirs representing overland flow and/or overtopping, location-specific irregular cross-section data was extracted from the project DEM using the Generate Cross Section Data tool in ICPR. The polyline segments defining the cross section at the interface of two basins were based on the output of the Arc Hydro Drainage Boundary Definition tool. The raw output of this tool follows the edges of the DEM cells, which results in a jagged and artificially lengthened cross section. These polylines were simplified using the Smooth Line tool in ArcGIS (PAEK smoothing with 20-foot tolerance) to better represent the weir length and avoid overestimating overflow capacity. The extracted cross section data was reviewed and manually adjusted where necessary to ensure that the proper invert was represented. This included the following:

- into the DEM (LH_D00020_XW3).
- Inserting a surveyed cross section segment where additional detail was needed (LH_E00520_XW1).
- Removing segments along structural weirs or channels that were being explicitly modeled.

These extracted cross-sections were considered a reasonable approximation as best available information where no survey data exists. It should be recognized that vegetation can typically obscure finer details of flow lines when derived from an aerial based topographical surface. Cross Refer to **Table 3-1** for the number of weir cross sections included in the existing conditions model.

3.2.5 Drop Structure Links

These links are used to simulate control structure-to-pipe or inlet-to-pipe in series combinations. The weir and pipe data associated with these links is identical to the weir and pipe data discussed above. The weir/orifice and drop pipe data for drop structures are stored in the GWIS tables

Refer to **Table 3-1** for the number of drop structure links included in the existing conditions model.

3.2.6 Boundary Conditions

There are two boundary condition locations in the Lake Harney Watershed model: one at Lake Harney / SJR and another generic boundary along the remaining watershed boundary. Each boundary condition was applied as a static elevation at a time/stage node. The design storm simulations for the existing conditions model (Section 3.5) were evaluated with three boundary conditions at Lake Harney to demonstrate performance of the watershed under varying tailwater conditions. Determination of the Lake Harney tailwater elevations is described in the following sections. In the absence of better information, the generic boundary condition was set to an elevation of 0 feet, assuming free discharge, for all simulations.

3.2.6.1 Typical Seasonal Average

Daily stage data (1941-2020) measured by USGS Site No. 02234000 (St. Johns River above Lake Harney Near Geneva, FL) were obtained from USGS and averaged by month (**Figure 3-1**). After reviewing the results and concurrence with the County on 4/8/2020, the peak stage season (July through December) was selected instead of the peak wet season stage (May through October) to better capture the lag in elevated stages seen at Lake Harney. The average peak stage season elevation was 2.51 feet. This boundary condition was used for the level of service analysis (Section 4) and floodplain evaluation (Section 6) since it represents average tailwater conditions and puts less emphasis on issues directly connected to elevated lake stages.

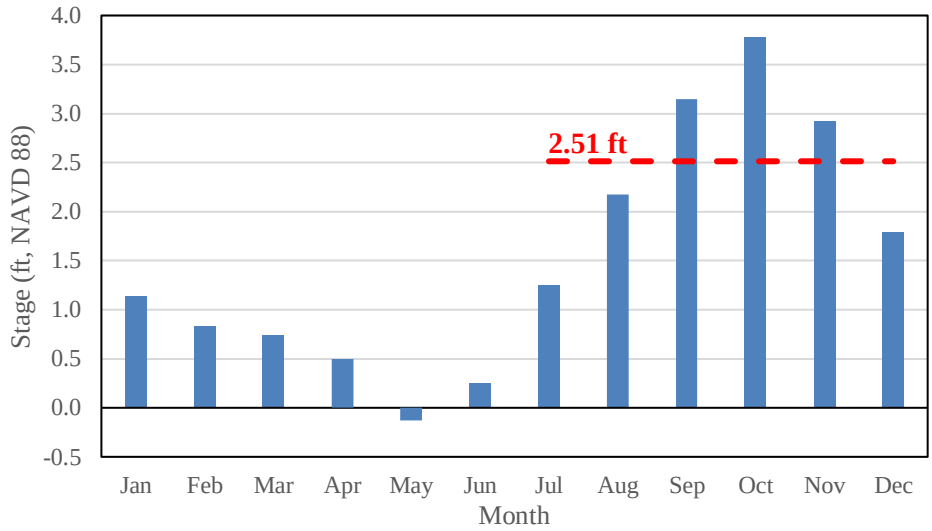

Figure 3-1: Lake Harney Stage - Monthly Averages (1941-2020)

3.2.6.2 Observed Typical High

Daily stage data (1941-2020) measured by USGS Site No. 02234000 (St. Johns River above Lake Harney Near Geneva, FL) were obtained from USGS. Completed years were used to generate an annual maximum series (**Figure 3-2**). After reviewing the results and concurrence with the County on 4/8/2020, the average of the annual maximum series (5.53 feet) was selected as the observed typical high elevation. This boundary condition was included per the project scope to provide additional information that the County may find useful. It was not used for the level of service analysis (Section 4) and floodplain evaluation (Section 6).

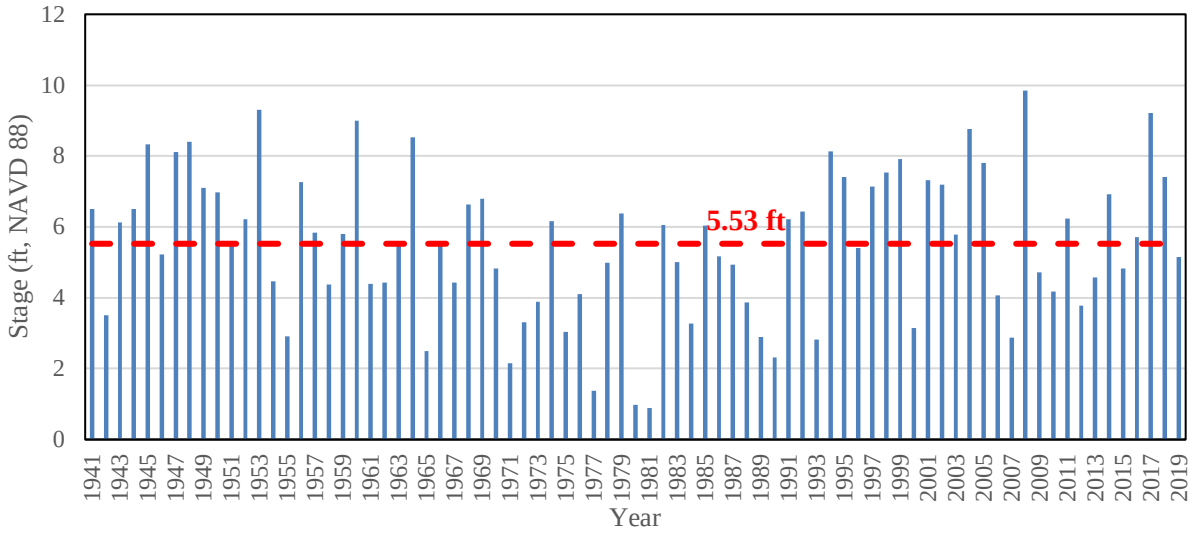

Figure 3-2: Lake Harney Stage - Annual Maximum Series (1941-2019)

3.2.6.3 FEMA 100-Year Flood Elevation

The FEMA 100-year flood elevation for Lake Harney (9 feet) was obtained from FIRM number 12117C0205F dated 2007. This boundary condition was only assessed for the 100-year simulations and included per the project scope to provide additional information that the County may find useful. It was not used for the level of service analysis (Section 4) and floodplain evaluation (Section 6).

3.3 Initial Model Setup and Review

The model schematic and data stored in the GWIS 2.1 geodatabase were imported into ICPR using its GWIS migration tools. Land use, soils, and background imagery were imported separately. After rasterizing the basins, land use, and
the soils-landuse tables for each basin. Initial model runs were performed to confirm that the simulation duration was adequate for nodes to reach their peak stage. The preliminary model was generally stable (i.e., node hydrographs were smooth to the peak stage) and free of mass balance errors and model build errors.

3.4 Model Validation

Since no stage or flow measurements independent of the Lake Harney boundary condition were available, model calibration and verification could not be performed. A limited validation was performed to check reasonableness of model results to bolster confidence in using the model to delineate floodplains, perform level of service analysis, and evaluate improvement alternative concept designs.

Two validation events were identified based on flood complaints and photographs from residents:

- Hurricane Irma and an unnamed event the week prior (September 8-11, 2017): 13.96 inches
- Unnamed June 2018 event (June 16, 2018): 1.35 inches

While Hurricane Irma is the primary validation event, the June 2018 event was included as a second line of validation since timestamped photographs were provided and this was a localized convective event (i.e., thunderstorm) that was not followed by significant changes to Lake Harney stage.

3.4.1 Validation Data Collection

3.4.1.1 Rainfall Data

Sub-hourly (i.e., 15-minute interval) rainfall measurements were obtained from USGS Site No. 284254081021000. This data was
the This rainfall time series is applied globally during validation simulations.

3.4.1.2 Boundary Conditions

The historical time-series from USGS Site No. 02234000 was used as the Lake Harney boundary condition for validation simulations. Sub-hourly stage data was processed to remove redundant, interme

3.4.2 Validation Results

Based on comparisons of the model and reported flooding locations and events, the model seems to produce reasonable results and should be sufficient for design storm simulations and the basis for floodplain and alternatives evaluations.

3.4.2.1 Hurricane Irma

While several locations flooded during this event, this validation focused on the road flooding reported by Fort Lane Road residents during an unnamed storm that occurred during the week before Hurricane Irma and flooding that occurred after Hurricane Irma but before Lake Harney stage peaked.

Based on node stages and the DEM, the model simulation only indicated flooding of Fort Lane Road after Hurricane Irma (**Figure 3-3**). Discrepancies between the modelled and reported pre-Irma event were attributed to model detail (i.e., side drains were not included in the model) or clogging or other maintenance issues not represented in the model.

Figure 3-3: Simulated Hurricane Irma Flooding – Fort Lane Road

3.4.2.2 June 2018 Event

This validation was based on flood photographs provided by residents showing yard flooding and driveway overtopping at 1450 Lake Harney Road. The County has since replaced side drain culverts along Lake Harney Road which according to residents has seemed to improve drainage in the area.

The flood inundation polygons generated from model results (**Figure 3-4**) did not show overtopping of the driveway at 1450 Lake Harney Road but were able to show that the swale was wet without overtopping the next driveway to the east (1470 Lake Harney Road). The discrepancy between model results and observations was attributed to a combination of model level of detail (i.e., the culvert under the driveways were not modeled), the representation of the current culverts under the FP&L power easement and Winona Drive instead of those in place at the time of the photograph, and spatial variability of summer rainfall events. The reduced flooding shown by the

Figure 3-4: Simulated and Observed June 2018 Flooding – Lake Harney Road

3.4.3 Future Data Collection Recommendations

Model calibration and verification are important steps in model development since it allows adjustment of parameters so predicted values more closely match historical values. Both of these procedures require a reliable historical record (stage and/or flow data) to compare against model predictions. For calibration purposes, this data must be independent from boundary conditions used by the model. While continuous recorders are preferred, they are not always practical due to the cost and maintenance requirements. In cases where continuous data is unavailable, historic water marks can provide useful information. Historic water marks can be surveyed or photograph and then surveyed to provide a point of comparison. In addition to improving model predictions, comparisons to observational data can help the County justify the model results to developers. A county-wide program to collect level and flow measurements, survey historic water marks, or document flood events with photographs at key road crossings is recommended to provide observational data for model calibration, verification, and validation.

3.5 Design Storm Simulations

Six design storms were evaluated with various tailwater conditions at Lake Harney for a total of thirteen (13) existing condition simulations (**Table 3-4**). Rainfall depths were obtained from Rao (1988) with the exception of the 50-year event (not included in that report) which was obtained from the NOAA Atlas 14 Point Precipitation Frequency Estimates (accessed on 6/7/2019).

Table 3-4: Design Storm Parameters

Frequency (years)	Event Duration (hours)	Depth (in)	Distribution	Lake Harney Boundary Conditions
2.33 (MA)	24	4.70	SCSII – FLMOD	Avg, High
10	24	7.25	SCSII – FLMOD	Avg, High
25	24	9.00	SCSII – FLMOD	Avg, High
50	24	10.00	SCSII – FLMOD	Avg
100	24	12.00	SCSII – FLMOD	Avg, High, FEMA
100	96	15.75	SJRWMD-96	Avg, High, FEMA

Avg = typical seasonal average (2.51 ft, NAVD 88)
High = typical observed high (5.53 ft, NAVD 88)
FEMA = FEMA 100-year flood elevation (9. 00 ft, NAVD 88)

The peak node stage and link maximum/minimum flow results for the existing conditions model are included in **Appendices A-C**. The number of nodes whose warning stages were exceeded under each combination of storm and boundary conditions are summarized in **Table 3-5**. Based on the relatively few (approximately 5) nodes with potential structure or public roadway impacts sensitive to the boundary condition, the typical seasonal average boundary condition (Section 3.2.6.1) was deemed appropriate for level of service analysis. This boundary condition was selected since it would allow assessment of drainage deficiencies independent of elevated lake / SJR stages. Refer to the level of service analysis (Section 4) for detailed evaluation of model results.

Table 3-5: Comparison of Warning Stage Exceedance[1]

Frequency (years)	Event Duration (hours)	Boundary Condition		
		Average	High	FEMA
2.33 (MA)	24	68	68	-
10	24	90	90	-
25	24	100	100	-
50	24	107	-	-
100	24	113	113	118
100	96	119	119	124

1-Warning stages only set at 379 nodes that had at least one FFE or road LOS elevation within their respective subbasin. Refer to Section 4.1.2 for more details on determination of these elevations.

Avg = typical seasonal average (2.51 ft, NAVD 88)
High = typical observed high (5.53 ft, NAVD 88)
FEMA = FEMA 100-year flood elevation (9. 00 ft, NAVD 88)

4. FLOOD PROTECTION LEVEL OF SERVICE (FPLOS) ANALYSIS

4.1 FPLOS Methodology

The following subsections describe the methodology used to establish FPLOS in the watershed. As there was no known, established LOS methodology for Seminole County, Geosyntec referred Approach to Assessing Level-of-Service, Surface Water Resources, and Best Management Practice Alternatives for Watershed in Hernando County establishing LOS within the Lake Harney Watershed. The Approach Document is one of the standard reference documents adopted by the SWFWMD. While the approach is based upon the Approach Document, some changes to the assumptions and procedures were made to ensure that the results were compatible with Seminole County LOS criteria.

4.1.1 Supporting Data

The FPLOS analysis was performed utilizing data from the model basin polygons, flood inundation polygons, DEM, 2015 and 2018 aerial imagery, FDOT and County traffic counts, and County GIS datasets for road centerlines, parcels, land use, and structure footprints.

Road and structure inundation locations were based on the inundation polygons developed from the 100-year / 96-hour and 50, 25, 10, and mean annual (MA) / 24-hour existing conditions model results with the typical seasonal average boundary condition at Lake Harney (Section 3.2.6.1). The 100-year / 96-hour event was used for analysis instead of the 24-hour event to be consistent with the 100-year floodplain delineation (Section 6.1). Note that the inundation polygons used for this analysis were used directly from the ArcGIS tool output and do not include boundary smoothing, elimination of small areas, or transition zones.

4.1.2 Level of Service Assignments

Multi-tiered LOS grades (i.e., A, B, C, and D) were used to better identify incremental improvements than pass/fail grades. For example, in a pass/fail evaluation, any flood elevation above a threshold would receive a fail grade regardless of the depth of flooding but using a multi-tiered approach could capture whether the road is meeting LOS, inundated but passible, or impassible. -tiered approach is equivalent

4.1.2.1 Roadways

Based on email communication with the County on 4/8/2020, only public roads were evaluated in the FPLOS analysis. Public roads within the watershed were extracted from the County road (i.e., values other than Private or Private Easements). The selected road centerlines were dissolved by Street and assigned a typical lane width based on aerial imagery. Road pavement polygons were created by buffering the road centerlines by the assigned lane width. Overlapping polygons at intersections were corrected using topology rules.

None of the County streets GIS features were classified as Evacuation Routes. Seminole map website (https://maps.floridadisaster.org/county/EVAC_SEMINOLE.pdf) was reviewed to identify evacuation routes in the watershed. SR 46 was the only evacuation route identified by

FDEM within the watershed. The roadway classifications for LOS purposes were captured in the The LOS class was used to assign the corresponding design storm the criteria in the Seminole County Public Works Engineering Manual (2013). Specifically, the 10-year 24-hour storm was used to evaluate all collector (flood elevation 1 foot below edge of pavement) and local roads (flood elevation 0.5 foot below edge of pavement). Evacuation routes were evaluated using the 100-year / 96-hour storm (no inundation).

Road polygons were intersected with model basins to identify the corresponding node for inundation comparisons. The lowest point within the road polygon for each basin was extracted from
This value was then compared to the peak stage of the corresponding node for the specified design storm simulation. field. LOS grades were assigned based on the criteria shown in **Table 4-1** and **Figure 4-1**

Table 4-1: Flooding LOS Classification for Roads

Flood Depth (feet)	Road LOS Classification (Design Storm)		
	Evacuation Route (100-yr / 96-hr)	Arterial / Collector Street (10-yr / 24-hr)	Local Street (10-yr /24-hr)
-1.0	A	A	A
-1.0 to -0.5	A	B	A
-0.5 to 0	A	B	B
0 to 0.5	C	C	C
>0.5	D	D	D

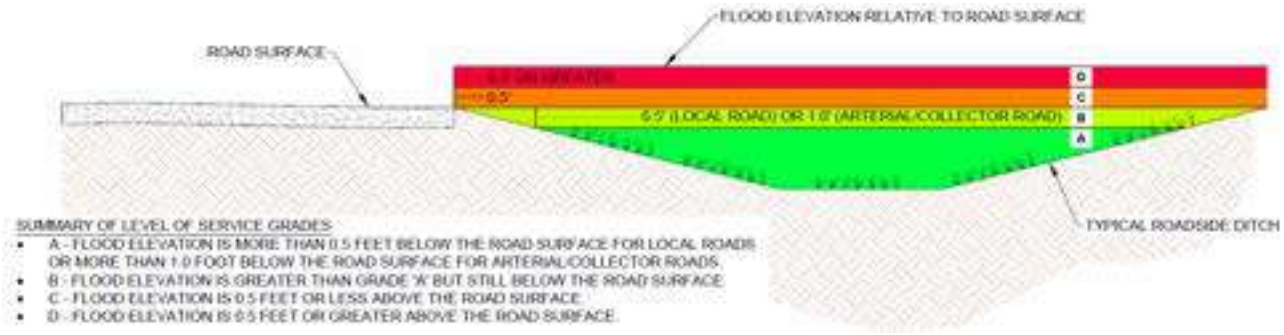

Figure 4-1: Flooding LOS Classification Diagram for Roads

4.1.2.2 Structures

Building footprints dated 2008 were obtained from the Seminole County Property Appraiser. Based on review of the data, Geosyntec used footprints generated by the Bing Maps Team for Florida and limited manual digitization to fill gaps in coverage of structures within the watershed.

Note that ancillary structures less than 600 square feet (e.g., sheds, boat houses, and pavilions) were removed from the structure FPLOS analysis to focus on primary structures.

Structure characteristics were determined as follows:

- The c (DOR) code and description and County land use description were extracted from The land use description was used to assign the LOS classification as either Permanent Habitable Structure, Mobile Home / Manufactured Home, or Employment Service Center. LOS

- The parcel number, appraised building value, appraised extra feature value, appraised land value, and total justified land value were GIS layer and associated tables.

- Emergency shelters and e

  Not all named facilities were classified as essential. FEMA considers police stations, fire stations, critical vehicle and equipment storage facilities, emergency operation centers, medical facilities, schools and day care centers (especially those designated as shelters), power generating stations, public and private utility facilities, drinking water and wastewater treatment plants, and structures that produce, use, or store hazardous materials. Based on this criteria, four essential services were identified in the watershed: Fire Station 42, First Baptist Church of Geneva (emergency shelter), Geneva Elementary School, and Seminole County Landfill.
  designations.

- Structure finished flood elevations (FFE) were estimated from the DEM. The average ground elevation under each structure was calculated as the average of the maximum and minimum elevation within 2 feet of the footprint or dripline. This value was stored in the a foundation-specific factor to the ground elevation. Based on FEMA (2013) and the Approach Document, slab foundations were assumed to be 1 foot above grade and mobile homes and structures built on fill were assumed to be 2 feet above grade.

- Corresponding nodes were assigned by overlaying the structures with the model basins in GIS. Structures that intersected more than one basin were reviewed to ensure the appropriate basin assignment.

The structures peak stage elevations for their corresponding node for the 100-year design storm simulation to identify all the structures where flooding is expected to occur based on the modeling (peak stage > FFE). Structures where no flooding was indicated by the modeling were assigned a LOS gr
remaining structures, FFEs were compared with the peak stage elevations for the other design storms simulations and the smallest storm that resulted in flooding was recorded in the . LOS grades were assigned based on the minimum design storm that results in flooding and the structure classification using the criteria provided in **Table 4-2**. For example, a mobile home where the 10-year model results are above the finished flood elevation would be

. Note that ancillary / secondary structures were not assigned an LOS classification.

Table 4-2: Flooding LOS Classification for Structures[1]

Lowest Storm Event that Causes Flooding	Structural LOS Classification			
	Emergency Shelter/Essential Services	Permanent Habitable Structures	Mobile Home/ Manufactured Home	Employment Service Center
No Flooding in Listed Design Storm Events	A	A	A	A
100 Year (0.01 chance)	D	B	B	B
50 Year (0.02 chance)	D	C	B	B
25 Year (0.04 chance)	D	D	C	C
10 Year (0.1 chance)	D	D	D	C
MA (0.43 chance)	D	D	D	D

1-
lowest LOS grade for consistency with the roadway LOS.

4.2 Level of Service Results

4.2.1 Roadway LOS Results

A total of thirty-five (35) public roads were identified within the watershed. Approximately half (18) of the roads were meeting their intended LOS based on the model results. The seventeen (17) roads that were not meeting LOS along their entire length are summarized in **Table 4-3** along with the forty-six (46) cross drains associated with potential LOS issues. With the exception of Marion Avenue (highest LOS grade = B), all of the roads listed in **Table 4-3** had segments that were meeting LOS (grade = A). Detailed roadway LOS results and associated culvert locations are shown in **Exhibit 7**. Specific recommendations are provided in Section 4.3.

Table 4-3: Roadway LOS Results Summary

Road Name	LOS Road Class	Lowest LOS Grade	LOS Associated Culvert Asset IDs (CUL#####)
Crossover Ln	Local	D	23156
E Osceola Rd	Collector	D	21474, 21475, 21476, 21477, 21487, 23195, 23199, 23208, 23209, 23215, 23216, 23516, 23518
E SR 46	Evacuation Route	D	23369, 23384, 23385, 23387, 23389
Fort Lane Rd	Local	D	23053
Harney Heights Rd	Local	C	21472
Lake Geneva Rd	Local	C	-
Lake Harney Cir	Local	D	23483
Lake Harney Rd	Local	D	-
Marion Ave	Local	D	-

Road Name	LOS Road Class	Lowest LOS Grade	LOS Associated Culvert Asset IDs (CUL#####)
Meade Rd	Local	B	-
N CR 426	Collector	C	23363
N Jungle Rd	Local	D	23059, 23062, 23063, 23076, 23077, 23078, 23094, 23096, 23098, 23104
Old Mims Rd	Local	D	23394, 23395, 23396, 23476
Rest Haven Rd	Local	D	23159, 23444
S Jungle Rd	Local	D	23373, 23374
W SR 46	Evacuation Route	C	-
Whitcomb Dr	Local	D	23110, 23111, 23112, 23142, 23378

4.2.2 Structure LOS Results

LOS was evaluated for a total of 1,549 structures across the watershed. Based on the modeling results, only six (6) were identified as potentially impacted by flooding (**Table 4-4**). Refer to **Exhibit 7** for the locations of potentially flooded structures. All of the potentially impacted buildings were classified as permanent habitable structures. County staff had mentioned that 2160 Old Mims Road had experience yard flooding that surrounded the house, but none of the other structures have known flooding issues.

Note that the accuracy of the structure LOS analysis was dependent upon estimated FFEs based on the project DEM. For example, the structures on Old Mims Road and Lake Harney Circle appeared to have been constructed after the 2009 LiDAR was flown, so the DEM may not accurately represent the current ground surface. While fill was clearly visible under the Old Mims Road structure based on 2018 aerial imagery, the actual height of fill may be different than the default assumption of 2 feet.

Since none of the potentially impacted structures were emergency shelters / essential services, improvement concept development to specifically address these localized issues is not recommended. Prior to submitting the Letter of Map Revision (LOMR) application package (Section 6.3.2) to FEMA, it is recommended that the County contact these residents to inform them of the proposed floodplain delineation and its implications related to flood insurance. These residents should have their FFE surveyed and obtain an elevation certificate. The elevation certificate can be used to determine proper flood insurance premium rates or, if the FFE is above the base flood elevation (BFE), support a request for a Letter of Map Amendment (LOMA) or a Letter of Map Revision Based on Fill (LOMR-F). A LOMA/LOMR-F would remove the federal flood insurance requirements.

Table 4-4: Structure LOS Results Summary

Parcel No.	Address	LOS Classification	Minimum Flooding Event	LOS Grade
1520325BC0000015A	1130 Teal Rd	Permanent Habitable Structure	25-YR / 24-HR	D
262032302016B0000	2160 Old Mims Rd	Permanent Habitable Structure	10-YR / 24-HR	D
3020335010200001B	3725 Lake Harney Cir	Permanent Habitable Structure	10-YR / 24-HR	D
16203230003100000	555 Hale Rd	Permanent Habitable Structure	25-YR / 24-HR	D
16203230003100000	559 Hale Rd	Permanent Habitable Structure	25-YR / 24-HR	D
162032300030A0000	575 Hale Rd	Permanent Habitable Structure	10-YR / 24-HR	D

4.3 Characterization of Flood Prone Areas

4.3.1 Potential Drainage Deficiency Identification and Recommendations

Flood-prone areas were identified based on historical data (resident complaints, etc.), discussions with Seminole County staff, and LOS deficiencies based on model results (Section 4.2). A brief description of the historical and modeled flooding at each area is provided below:

- **Canvasback Trail:** Refer to Problem Location 22 on **Exhibit 1**. The south end of the road near the intersection with Waccassa Street was identified as a potential problem area by previous modeling completed by Inwood (2010). Based on Lake Harney Watershed model results, private road flooding occurs during the MA / 24-hour event. No structure flooding was identified based on model results. ***Recommendation: This is a private issue, so no action is recommended at this time. ROW/easements would need to be acquired before the County could provide drainage improvements.***
- **Fort Lane Road:** Refer to Problem Location 5 on **Exhibit 1**. This location was identified by County staff and residents as having drainage issues. Residents reported road flooding independent of high stages in Lake Harney (e.g., flooding during the unnamed storm in the week prior to Hurricane Irma). The current system is co
that discharges into Jane Creek. Currently, only the upstream inlet of the pipe is within the County ROW. Based on the existing conditions model, road flooding (LOS = D) may occur during the MA / 24-hour event. Both lanes appear to be impassible during the 10-year / 24-hour event (LOS=D). No structure flooding was identified based on model results. ***Recommendation: Evaluation of improvement alternatives at this location appears warranted. See Section 5 for detailed improvement evaluation for this location.***
- **Harney Heights Road**: Refer to Problem Location 9 on **Exhibit 1**. County staff and residents have observed standing water in the roadside ditch at the intersection with Meade Road. Based on model results, road flooding may occur during the 10-year / 24-hour event but both lanes remain passible (LOS = B-C). No structure flooding was identified based on model results. There are four cross drain locations: at the north end of the road, near the intersection with Meade Road, near the intersection with Teal Road, and near the intersection with Lake Harney Road. There is no known, clearly defined, major conveyance from the road to Lake Harney. ***Recommendation: Continue monitoring the***

area for flooding issues. If chronic problems persist, a small study to evaluate alternatives to enhance conveyance to Lake Harney may be completed in conjunction with addressing issues along Winona Drive.

- **Jungle Road:** Based on model results, road flooding may occur during the MA / 24-hour event at the intersection with Lake Harney Road and during the 10-year / 24-hour event northwest of the intersection with Crossover Lane (LOS =D). No structure flooding was identified based on model results. This area was not identified as a problem location by County staff or residents. ***Recommendation: The intersection with Lake Harney Road may be addressed as part of the Whitcomb Drive recommendations. Monitor the area for flooding issues and consider further evaluation if it continues to be a problem.***
- **Lake Geneva Road:** The existing conditions model results indicated road flooding (LOS=C) during the 10-year / 24-hour event. Based on the model results, this road is expected to be passible during the design event. No structure flooding was identified based on model results. This area has not been previously identified as problem location and no structure flooding was identified based on the model results. There is no known cross drain at this location. ***Recommendation: Monitor the area for flooding issues and consider further evaluation if it continues to be a problem.***
- **Lake Harney Circle Area:** Refer to Problem Location 13 on **Exhibit 1**. The area enclosed by Lake Harney Circle, Rest Haven Road, and Marion Avenue was identified by County

  culvert under Rest Haven Road and then to Lake Harney via private swales along the south side of Lake Harney Circle. Although another series of culverts are connected to the area, they do not appear to connect to a definitive conveyance to the lake. Based on the existing conditions model, road flooding may occur during the MA / 24-hour event. During the 10-year / 24-hour event, both lanes on all three roads may be impassible (LOS=D) and one structure may be at risk of flooding (LOS=D). During survey, SSMC noted that one of the side drains along Marion Avenue has a deteriorating headwall. ***Recommendation: Evaluation of improvement alternatives at this location appears warranted. See Section 5 for detailed improvement evaluation for this location.***
- **Lake Harney Road**: Refer to Problem Location 11 on **Exhibit 1**. This area was identified as a potential problem location by residents. Based on model results, road flooding may occur during the MA / 24-hour event, with both lanes impassible during the 10-year / 24-hour event (LOS=D). No structure flooding was identified based on model results. ***Recommendations: In addition to raising the road as part of the Whitcomb Drive recommendations, install additional cross drains to help equalize levels in roadside ditches and perform enhanced maintenance, specifically cleaning culverts.***
- **Old Mims Road:** Refer to Problem Location 4 on **Exhibit 1**. This road was identified as a flood prone area based on input from County staff, resident comments, and previous modeling completed by Inwood (2002). The primary flooding location was the intersection with Jungle Road. According to County staff, this area seems to have chronic flooding issues with at least one report of structure impacts on the property at the northwest corner of the intersection. Based on Lake Harney Watershed model results,

structure (LOS=D) and road flooding (LOS = D) may occur during the 10-year / 24-hour event. Currently, the County ROW only contains infrastructure on the north side of Old Mims Road and there is one cross drain location outside of the Lake Proctor area. The system ultimately crosses to a private ditch on the south side of the road that ultimately discharges to the SJR via the SR 46 ditch. ***Recommendation: Evaluation of improvement alternatives at this location appears warranted. See Section 5 for detailed improvement evaluation for this location.***

- **Osceola Road:** Refer to Problem Locations 17, 18, and 19 on **Exhibit 1**. These areas were previously identified as potential road flooding locations based on modeling completed by Inwood (2010). The Lake Harney Watershed model results indicated potential deficiencies between Liberty Lane and the Seminole County Landfill access road (LOS = B-D). The two locations that may have impassible lane(s) during the 10-year event (LOS=D) should be addressed first. These two locations are described below.
    - **Osceola Road near the intersection with Gun Range Road:** This is the confluence of three ditches draining lands north of Osceola Road. This system discharges southeast to Lake Harney via a County maintained ditch (Problem Location 10 on **Exhibit 1**). Based on the Lake Harney Watershed existing conditions model results, Osceola Road may flood during the MA / 24-hour event. Both lanes appear to be impassible during the 10-year / 24-hour event (LOS =D). No structure flooding was identified based on model results. ***Recommendation: Evaluation of improvement alternatives at this location appears warranted. See Section 5 for detailed improvement evaluation for this location.***
    - **Osceola Road between Liberty Lane and Bee Lane:** This area has not previously been identified as a problem location. Model results indicated road flooding may occur during the MA / 24-hour event. While one lane appears to be impassible during the 10-year / 24-hour event (LOS=D), the other lanes remained passible for all design storm simulations. No structure flooding was identified based on model results. ***Recommendation: Monitor the area for flooding issues and consider installing additional cross drains or completing a small area study if needed.***
- **Prevatt Road:** Refer to Problem Location 14 on **Exhibit 1**. Residents reported extended private road flooding following Hurricane Irma. While addressing river related flooding is beyond the scope of this study, model results showed that private road flooding may occur in the MA / 24-hour event. No structure flooding was identified based on model results. During survey, SSMC noted that the cross drain near the bend in the road decreases ***Recommendation: This is a private issue, so no action is recommended at this time. ROW/easements would need to be acquired before the County could provide drainage improvements.***
- **Private Issues between SR46 and Old Mims Road:** Refer to Problem Location 3 and 6 on **Exhibit 1**. The resident at Problem Location 3 reported structure flooding during Hurricane Irma and chronic road and driveway flooding. Model results did not indicate flooding above the FFE in any of the design storm simulations, although flood inundation up to the side of the house may start occuring between the 10-year and 25-year / 24-hour events. The resident at Problem Location 6 reported that the private ditch at this location

was not draining properly. Based on model results, private road flooding may occur during the 10-year / 24-hour event. ***Recommendation: This is a private issue, so no action is recommended at this time. ROW/easements would need to be acquired before the County could provide drainage improvements.***

- **Rest Haven Road:** In addition to the issue described above in the Lake Harney Circle Area, the section between SR46 and Beatrice Cove was identified as a potential flood prone area. This area was not previously identified by County staff or residents as a problem location. Model results indicate that road flooding may occur during the MA / 24-hour event. One lane appears to become impassible during the 10-year / 24-hour event (LOS=D). No structure flooding was identified based on model results. There are no known cross drains along this section of the road. ***Recommendation: Monitor the area for flooding issues and consider installing additional cross drains to help equalize the roadside ditches.***

- **Settlers Loop:** Refer to Problem Locations 1, 2, 20, and 21 on **Exhibit 1**. This area was identified as a flood prone area based on resident reports and previous modeling completed by Inwood (2010). Based on Lake Harney Watershed model results, private road flooding occurs during the MA / 24-hour event. No structure flooding was identified based on model results. ***Recommendation: This is a private issue, so no action is recommended at this time. ROW/easements would need to be acquired before the County could provide drainage improvements.***

- **SR 46:** Based on model results, this evacuation route may have potential road flooding during the 100-year event along three segments: between N Hart Road and the intersection with N CR 426 (LOS=C), between Lake Proctor and the FP&L power easement (LOS=C-D), and between Cabbage Palm Point and Rest Haven Road (LOS =C). While most of these segments remain passible, both lanes in the segment in the vicinity of Lake Proctor may have flood depths exceeding 0.5 foot, which would make the road impassible. The specific cross drained mentioned at Problem Location 7 on **Exhibit 1** did not seem to be contributing to LOS issues. No structure flooding was identified based on model results. ***Recommendation: Coordinate with FDOT to confirm flooding issues and determine the appropriate course of actions (e.g., small study, raising the road through the Lake Proctor area).***

- **Waccassa Street:** Refer to Problem Location 8 on **Exhibit 1**. Residents along Waccassa Street have reported yard flooding with sluggish drainage to Lake Harney. Based on existing conditions model results, no public road or structure LOS issues were identified, but private road flooding may occur during the MA / 24-hour event. No structure flooding was identified based on model results. During survey, SSMC noted that the two cross drains under Waccassa Street have corroded bottoms and are 29-33% filled with sediment. Semindation was also observed in the cross drained under Osceola Road. Additionally, dense vegetation was observed on the right side of the channel. ***Recommendation: Replace cross drains and complete ditch maintenance (cleaning). Capture GIS/CAD data to map County ROW/easements to clearly delineate any future retrofit project limits and access.***

- **Whitcomb Drive:** Refer to Problem Location 15 on **Exhibit 1**. Residents along Whitcomb drive have experienced chronic road, yard, and driveway flooding issues associated with elevated stages in Lake Harney / SJR. This road is relatively low, flat, and surrounded by swamp. The County currently maintains three cross drains that allow water to pass under the road to Lake Harney via individual ditches. While addressing river related flooding is beyond the scope of this study, the Lake Harney Watershed existing conditions model results showed that Whitcomb Drive may flood in the MA / 24-hour event. Both lanes appear to be impassible during the 10-year / 24-hour event (LOS=D). No structure flooding was identified based on model results. During survey, SSMC noted that the outfall culvert for the southern ditch is 42% filled with sediment. ***Recommendation: Evaluation of improvement alternatives at this location appears warranted. See Section 5 for detailed improvement evaluation for this location.***
- **Winona Drive:** Refer to Problem Location 16 on Exhibit 1. Residents have reported extended yard and driveway flooding. Based on model results, private road flooding occurs during the MA / 24-hour event. No structure flooding was identified based on model results. During survey, SSMC noted that the cross drains under Winona Drive have corroded, crushed barrels, and are 28-44% filled with sediment. ***Recommendation: This is a private issue, so no action is recommended at this time. ROW/easements would need to be acquired before the County could provide drainage improvements.***

4.3.2 Selection of Alternative Analysis Locations

After reviewing the identified drainage deficiencies (Section 4.3.1), five locations were selected for alternatives analysis per the project scope. These locations were selected based on presence of observed/reported flooding, potential for impassible flood depths (LOS = D), and current maintenance responsibility (i.e., public roads that are not maintained by FDOT):

1. Whitcomb Drive
2. Osceola Road (near the intersection with Gun Range Road)
3. Lake Harney Circle area (including Marion Avenue and Rest Haven Road)
4. Fort Lane Road
5. Old Mims and Jungle Road Intersection

The selected locations were shared with the County on 5/14/2020 for concurrence (refer to the Preliminary Flood Modeling Results and Improvement Alternatives Locations meeting summary included in the electronic deliverables for more detail). The improvement alternatives analysis is discussed in Section 5.

5. IMPROVEMENT ALTERNATIVES ANALYSIS

5.1 Flood Damage Estimate Determination

Estimated flood damages were only calculated at the five (5) focus areas selected for alternative analysis (Section 4.3.2) in order to quantify the benefit offered by each alternative. The following sections describe the flood damage estimate calculation method, flood damage estimate results, and the benefit cost analysis method.

5.1.1 Road Damage

Roadway inundation polygons were generated by intersecting the road polygons (Section 4.1.2.1) and the inundation polygons generated from the ICPR model results.

Road damage costs were estimated for each road where the inundation elevation exceeded the apparent low point of the road. Vehicle delay costs were estimated for each road where the inundation elevation exceeded what was considered the impassable depth for the road classification. For the purposes of this calculation, six (6) inches of inundation depth is considered impassable for any inundated roads. The resulting road flooding costs were calculated as the road damage costs plus the vehicle delay costs using the following equation (unit conversion factors were applied to the below equation where needed):

Road Flooding Cost = Road Damage Cost + Vehicle Delay Cost

where:

Road Damage Cost = length of road flooded (feet) x number of lanes[1] x unit repair cost[2] ($ / lane * ft)

Vehicle Delay Cost = traffic volume (vehicles/day) x average detour time (minutes) x flooding duration (hours) x delay cost[3] ($ / vehicle * hour) x conversion factor (1 day / 1440 min)

1 - Number of lanes consists of inundated lanes, not total lanes of the road.

2 – Per the Approach Document, unit repair costs are $220, $115, and $60 per lane-foot for Arterial, Collector, and Local Roads, respectively.

3 – $38.15 per vehicle-hour per the Approach Document.

The expected annual structure flood damages were then calculated according to the methodology in the Approach Document. The following changes to the assumptions from the Approach Document were made during development of the road flooding cost estimates:

- Roadways specific traffic volumes were used instead of the default, class-specific values

  Traffic Online (2019) online map viewer (https://tdaappsprod.dot.state.fl.us/fto/), Seminole (http://seminolegis.maps.arcgis.com/apps/MapTools/index.html?appid=82953aba96ac4e0e8df9075265ecde6f). Traffic volume was determined by calculating the average of the data from 2014 through 2019. For roads without traffic count data, traffic volume was

calculated based on the number of parcels and assuming 8.53 trips generated per parcel per day for rural Florida (BST, 2009).

- The Approach Document

  minutes for urban areas with dense road networks and 45 minutes for rural areas were

  alternative routes were present such that delay times would be expected to be approximately 45 minutes or less.

- The Approach Document states that only roadway flooding that exceeds the maximum allowable depth should be identified. However, road flooding less than allowable depth could cause damage to the road. Therefore, all instances of road flooding were included in the feature class and damages were calculated at each location.

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  However, it was considered appropriate to consider flood duration, for the purpose of calculating flood delay costs, as the time flooding exceeds six (6) inches above the low point of the road. The road flooding durations were estimated from the ICPR model node time-stage results.

5.1.2 Structure Damage

Geosyntec estimated the expected annual structure flood damages in general accordance with the methodology provided in the Approach Document. Damages were estimated using the footprints compiled and attributed for the LOS analysis (Section 4.1.2.2).

The total building value for each parcel was taken as the appraised building value from the County parcel data. If no appraised value was listed, the building value was estimated by multiplying the footprint area by the average unit value for its corresponding land use class. Since flooding might affect each building within a parcel to different degrees, damages were estimated for each building. For parcels with multiple buildings, the individual building value was determined by dividing the total building value for the parcel among the buildings based on building area.

Building and contents damages were estimated using depth-damage functions (DDFs), which express flood-related economic losses (i.e., percent damage to building and content value) as a function of flood depth above the FFE. FEMA provides numerous DDFs in its HAZUS natural hazard analysis tool. These DDFs are compiled from historic data collected by agencies such as the Federal Insurance Administration (FIA) and U.S. Army Corps of Engineers (USACE). A unique ID is given for the building and contents DDF for each occupancy description. For example, a single-family home with one floor and no basement would have an Occupancy Class function ID of 105, and a contents damage function ID of 21. Each structure was assigned an Occupancy Class, building damage function ID, and contents damage function ID based on the County land use description for that parcel. The DDFs used in this analysis were obtained from the databases included with the Hazus 4.2 software download for Florida. Percent damages were only listed for integer flood depths, so percent damages were interpolated for each 0.1-foot increment. The interpolated DDFs used for this analysis are provided in **Table 5-1**. Note that structure related flood damages begin when flood elevations are

less than 1 foot below FFE. Damages calculated below the FFE account for yard flooding impacts and potential damage to foundations, vehicles, buried utilities, etc.

Table 5-1: Depth – Damage Functions[1]

	Flood Damage as Percent of Total Value (%)					
Occupancy Type	**RES1**		**RES2**		**COM4**	
Structure Description	**One floor, no basement, A-Zone**		**Mobile home, A-Zone**		**Average Prof/Tech Services**	
Damage Function ID	**105[2]**	**21[2]**	**189[2]**	**74[2]**	**431**	**280**
Depth (feet)	**Building**	**Content**	**Building**	**Content**	**Building**	**Content**
-1.0	0.0	0.0	0.0	0.0	0.0	0.0
-0.9	1.8	1.2	1.1	0.3	0.2	0.2
-0.8	3.6	2.4	2.2	0.6	0.4	0.4
-0.7	5.4	3.6	3.3	0.9	0.6	0.6
-0.6	7.2	4.8	4.4	1.2	0.8	0.8
-0.5	9.0	6.0	5.5	1.5	1.0	1.0
-0.4	10.8	7.2	6.6	1.8	1.2	1.2
-0.3	12.6	8.4	7.7	2.1	1.4	1.4
-0.2	14.4	9.6	8.8	2.4	1.6	1.6
-0.1	16.2	10.8	9.9	2.7	1.8	1.8
0.0	18.0	12.0	11.0	3.0	2.0	2.0
0.1	18.4	13.3	14.3	5.4	2.9	3.6
0.2	18.8	14.6	17.6	7.8	3.8	5.2
0.3	19.2	15.9	20.9	10.2	4.7	6.8
0.4	19.6	17.2	24.2	12.6	5.6	8.4
0.5	20.0	18.5	27.5	15.0	6.5	10.0
0.6	20.4	19.8	30.8	17.4	7.4	11.6
0.7	20.8	21.1	34.1	19.8	8.3	13.2
0.8	21.2	22.4	37.4	22.2	9.2	14.8
0.9	21.6	23.7	40.7	24.6	10.1	16.4
1.0	22.0	25.0	44.0	27.0	11.0	18.0
1.1	22.3	26.0	45.9	29.2	11.5	18.7
1.2	22.6	27.0	47.8	31.4	12.0	19.4
1.3	22.9	28.0	49.7	33.6	12.5	20.1
1.4	23.2	29.0	51.6	35.8	13.0	20.8
1.5	23.5	30.0	53.5	38.0	13.5	21.5
1.6	23.8	31.0	55.4	40.2	14.0	22.2
1.7	24.1	32.0	57.3	42.4	14.5	22.9
1.8	24.4	33.0	59.2	44.6	15.0	23.6
1.9	24.7	34.0	61.1	46.8	15.5	24.3
2.0	25.0	35.0	63.0	49.0	16.0	25.0

1 – FEMA Hazus 4.2 data interpolated from integer depths at 0.1-foot intervals. Only occupancy classes used in the Lake Harney Watershed flood damage estimate are presented. Original source is USACE – Galveston unless noted otherwise.

2 – Original Source: FIA

The depth of flooding expected for each structure was calculated by subtracting the FFE from the

nearest tenth was used to lookup the building and content percent damages from the assigned DDFs. Building damage costs were calculated by multiplying the building value by the building percent damage. Contents damage costs required an estimate of contents value. Occupancy class specific ratios of contents value to building value recommended in the Hazus-MH Flood Technical Manual (FEMA, 2013) are provided in **Table 5-2**. Contents damages were calculated as the product of the building value, contents-building value ratio, and contents percent damage.

Table 5-2: Estimated Ratio of Contents Value to Building Value[1]

Occupancy Class Label	Occupancy Class Description	Contents-Building Value Ratio
COM4	Professional/Technical/Business Services	1
RES1	Single Family Dwelling	0.5
RES2	Mobile Home	0.5

1 – Adapted from Hazus-MH Flood Technical Manual (FEMA, 2013). Only occupancy classes used in the Lake Harney Watershed flood damage estimate are presented.

Other structure related damages could include displacement costs and lost business. Other damages for residential structures were calculated using factors based on communication with FDEM (45 days/foot of flood depth * $55/day). For displacement damages, the flood depth was rounded up to the next 0.5 foot. This approach assumes that displacement duration would increase in a stepwise fashion. Lacking similar factors for non-residential buildings, other damages for the remaining structures were calculated by multiplying the building damage cost by a factor of 1.5 per the Approach Document.

The estimated structural damages, content damages, and other (displacement) damages were then summed to estimate the total structure flood damages. The expected annual structure flood damages were then calculated according to the methodology in the Approach Document.

5.1.3 Flood Damage Estimate Results

Refer to **Table 5-3** for the estimated annual flood damages for the focus areas included in the improvement alternatives analysis (Section 5.2). Road damage costs accounted for virtually all of the overall damage costs with the exception of the Lake Harney Circle and Old Mims Road areas.

Table 5-3: Estimated Annual Flood Damage Costs at Focus Areas[1]

Focus Area	Road	Structure	Total
Whitcomb Drive	$168,292.71	$181.42	$168,474.13
Osceola Road	$119,549.34	$16.34	$119,565.68
Lake Harney Circle	$58,200.54	$13,651.67	$71,852.21
Fort Land Road	$35,177.81	$0.00	$35,177.81
Old Mims and Jungle Road Intersection	$26,440.98	$35,082.27	$61,523.25

1 – Based on existing conditions model.

5.1.4 Benefit Cost Analysis

Benefit costs analysis was performed to help prioritize concepts based on their potential cost effectiveness. This is quantified by the benefit-cost ratio (BCR), which is the potential benefits offered by a project divided by the total cost (including maintenance) of the project. All values must be expressed as present value.

Annual flood damages were calculated (following method described in Section 5.1.1 and 5.1.2) based on the proposed conditions model results developed for each of the alternatives. The potential annual benefits value was calculated as the difference between the damage estimates estimated for existing and proposed conditions. The annual benefits value was converted to present value by multiplying with a tabulated interest rate factor. Assuming a project life of fifty (50) years and an interest rate of 7%, the interest rate factor to convert an annual payment to present value (P/A, 7%, 50) is 13.8007. The total cost of each alternative was already expressed as present value, so no conversion was needed. Annual maintenance costs were assumed to be 1% of the construction cost subtotal. The maintenance cost was multiplied by the same interest rate factor to convert to present value. The calculated BCR values are presented in their corresponding subsection in section 5.2.

5.2 Improvement Alternatives Analysis

Preliminary discussions between Geosyntec and the County concerning improvement alternatives in the watershed occurred on 5/14/2020. The following alternative concepts were developed to improve flooding conditions at the areas listed in Section 4.3.2. The intent was to develop alternatives that were considered feasible, based on preliminary evaluation, to implement. Therefore, the alternatives evaluated did not include concepts that would require displacement of residents to construct flood improvements, construction of pumped systems, bridge replacement, or construction of flood walls. Although, these alternatives may be effective for reducing flooding, experience has shown that they normally cost much more than the benefits provided.

A permit determination meeting with SJRWMD was held on 5/21/2020 to present the improvement alternative concepts and solicit input on potential permitting issues. Refer to the meeting summary included in the electronic deliverables for a detailed description of the meeting discussions. Permitting issues specific to each concept are discussed in under their respective sections

5.2.1 Whitcomb Drive Improvement Concept

The purpose of these drainage improvements is to address road flooding (LOS = D) along Whitcomb Drive.

The following flood improvement concepts were developed for this area. Refer to **Exhibit 8** for a map of the improvement concept.

- Raise the minimum road grade elevation from 7.1 to 9.1 feet within the limits shown on **Exhibit 8** to ensure that the road is meeting its LOS requirements (0.5 foot above 10-year / 24-hour flood elevation).
- Installation of cross drains along Whitcomb Drive and upsizing of existing pipes as shown on **Exhibit 8** to allow water to pass under the raised road instead of backing up on the upstream side and overtopping it.
- Modification of existing side ditches and driveway culverts to accommodate the elevated road grade.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results, this improvement would eliminate roadway flooding along Whitcomb Drive during the 10-year, 24-hour design storm event. As seen in **Exhibit 9**, the 10-year, 24-hour floodplain does not inundate Whitcomb Drive and the extent is modestly decreased in the residential areas along Whitcomb Drive. Refer to **Exhibit 9** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would require acquisition of portions of forty-five (45) private parcels. Per the Seminole County Public Works Engineering Manual (2013), eighty (80) feet is the required ROW for rural local streets. See **Exhibit 8** for the parcel locations and **Table D-1** in **Appendix D** for the land acquisition costs. For permitting purposes, permanent easements are recommended to demonstrate to SJRWMD that there are long-term operation, management, and access plans.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality treatment. If water quality enhancement is desired or needed, BMPs could be implemented.
- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland vegetation data indicate wetlands adjacent to Whitcomb Drive. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.
- Permitting Considerations: Since the area of work within wetlands and non-artificial surface waters will likely exceed the 0.5-acre limit covered under a General Permit, the alternative is anticipated to require an individual permit from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream

flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for any wetland and surface water impacts may be required. Mitigation costs were not included in the cost estimate. Actual mitigation costs would depend on the quality and extent of wetland impacts determined during the ecological survey.

- Opinion of Probable Construction Costs: The estimated cost to construct the project is $2,560,657. Refer to **Table D-1** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $168,474 and $35,463, respectively. The estimated annual benefit was $133,011, which translates to a present value of $1,835,649. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 0.67. Refer to **Table 5-4** for information on how the BCR was determined.
- Public Input: The original concept was revised based on input provided by residents at the Whitcomb Drive Improvement Alternative Public Meeting held on 12/9/2020.

Table 5-4: Benefit / Cost Ratio for Whitcomb Drive Improvement Concept

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$1,835,649	$2,560,657	$13,045	$180,032	$2,740,689	0.67

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.2.2 Osceola Road Improvement Concept

The purpose of these drainage improvements is to address road flooding (LOS = D) along Osceola Road and increase the conveyance capacity of the existing ditch that outfalls to Lake Harney.

The following flood improvement concepts were developed for this area. Refer to **Exhibit 10** for a map of the improvements.

- Upsize existing pipes at the intersection of Gun Range Road and Osceola Road as shown in **Exhibit 10** to allow more water to pass under the road instead of overtopping.
- as shown in **Exhibit 10** to increase conveyance capacity.
- Regrading of the existing ditch from Osceola Road to the Lake Harney outfall to improve the conveyance capacity.
- Increase conveyance capacity under Waccassa Street and Canvasback Trail.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results, this improvement would reduce or eliminate roadway flooding along Osceola Road near the intersection with Gun Range Road during the 10-year, 24-hour design storm event. As seen in **Exhibit 11**, the 10-year, 24-hour floodplain does not inundate Osceola Road and the extent is decreased, specifically on the north/west side of Osceola Road. Refer to **Exhibit 11** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would not require any land-acquisition as the improvements are confined to the ROW and an existing County easement.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality treatment. If water quality enhancement is desired or needed, BMPs could be implemented.
- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland vegetation data indicate wetlands along the existing ditch. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.
- Permitting Considerations: The alternative is anticipated to require an Environmental Resource General Permit for stormwater retrofit activities from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and/or wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for wetland or surface water impacts are not anticipated since no new fill or excavation are proposed.
- Opinion of Probable Construction Costs: The estimated cost to construct the project is $792,409. Refer to **Table D-2** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $119,566 and $6,612, respectively. The estimated annual benefit was $112,954, which translates to a present value of $1,558,848. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 1.80. Refer to **Table 5-5** for information on how the BCR was determined.

Table 5-5: Benefit / Cost Ratio for Osceola Road Improvement Concept

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$1,558,848	$792,409	$5,283	$72,906	$865,314	1.80

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.2.3 Lake Harney Circle Improvement Concepts

The purpose of these drainage improvements is to address road (LOS = D) and structure (LOS = D) flooding along Lake Harney Circle, Marion Avenue, and Rest Haven Road. Two alternative concepts were evaluated at this location to determine whether omitting certain project components (e.g., easement acquisitions, long pipe runs, road raising) would result in a more feasible alternative.

5.2.3.1 Lake Harney Circle Improvement Concept 1

The following flood improvement concepts were developed for this area. Refer to **Exhibit 12** for a map of the improvements.

- Construct a new outfall on the east side of Lake Harney Circle as shown in **Exhibit 12** to divert a portion of the flow away from the ditch on the south side of Marion Avenue.
- Construct a cross drain at the intersection of Rest Haven Road and Marion Avenue to divert a portion of the runoff to the south side of Marion Avenue.
- Upsize existing pipes along Lake Harney Circle, Marion Avenue, and Rest Haven Road as shown in **Exhibit 12** to increase conveyance and accommodate the additional flows from west of Rest Haven Road.
- Regrade the existing roadside ditch on the south side of Marion Avenue to increase conveyance and accommodate the additional flows from west of Rest Haven Road.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results, this improvement would reduce or eliminate roadway flooding along Lake Harney Circle, Rest Haven Road, and Marion Avenue within the limits shown during the 10-year, 24-hour design storm event. As seen in **Exhibit 13**, the 10-year, 24-hour floodplain does not inundate the roadways within the limits shown and the extent is substantially decreased, specifically in the area between Marion Avenue and Lake Harney Circle, and north of Lake Harney Circle. Refer to **Exhibit 13** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would require acquisition of portions of ten (10) private parcels. See **Exhibit 12** for the parcel locations and **Table D-3** in **Appendix D** for the land acquisition costs. For permitting purposes, permanent easements are recommended to demonstrate to SJRWMD that there are long-term operation, management, and access plans.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality treatment. If water quality enhancement is desired or needed, BMPs could be implemented.
- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland

vegetation data indicate wetlands in the general vicinity. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.

- Permitting Considerations: The alternative is anticipated to require an Environmental Resource General Permit for stormwater retrofit activities from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and/or wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for wetland or surface water impacts are not anticipated since no new fill or excavation are proposed.
- Opinion of Probable Construction Costs: The estimated cost to construct the project is $1,052,833. Refer to **Table D-3** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $71,852 and $930, respectively. The estimated annual benefit was $70,922, which translates to a present value of $978,782. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 0.85. Refer to **Table 5-6** for information on how the BCR was determined.

Table 5-6: Benefit / Cost Ratio for Lake Harney Circle Improvement Concept 1

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$978,782	$1,052,833	$6,779	$93,562	$1,146,395	0.85

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.2.3.2 Lake Harney Circle Improvement Concept 2

The following flood improvement concepts were developed for this area. Refer to **Exhibit 14** for a map of the improvements.

- Construct a cross drain at the intersection of Rest Haven Road and Marion Avenue to divert a portion of the runoff to the south side of Marion Avenue.
- Upsize existing pipes along Lake Harney Circle, Marion Avenue, and Rest Haven Road as shown in **Exhibit 14** to increase conveyance and accommodate the additional flows from west of Rest Haven Road.
- Regrade the existing roadside ditch on the south side of Marion Avenue to increase conveyance and accommodate the additional flows from west of Rest Haven Road.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results, this improvement would reduce or eliminate roadway flooding along Lake Harney Circle, Rest Haven Road, and Marion Avenue within the limits shown during the 10-year, 24-hour design storm event. As seen in **Exhibit 15**, roadway inundation is reduced for the 10-year, 24-hour floodplain within the limits shown and the extent of the floodplain is decreased, specifically along Marion Avenue and Lake Harney Circle. Refer to **Exhibit 15** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would require acquisition of portions of three (3) private parcels. See **Exhibit 14** for the parcel locations and **Table D-4** in **Appendix D** for the land acquisition costs. For permitting purposes, permanent easements are recommended to demonstrate to SJRWMD that there are long-term operation, management, and access plans.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality treatment. If water quality enhancement is desired or needed, BMPs could be implemented.
- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland vegetation data indicate wetlands in the general vicinity. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.
- Permitting Considerations: The alternative is anticipated to require an Environmental Resource General Permit for stormwater retrofit activities from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and/or wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for wetland or surface water impacts are not anticipated since no new fill or excavation are proposed.
- Opinion of Probable Construction Costs: The estimated cost to construct the project is $541,906. Refer to **Table D-4** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $71,852 and $20,669, respectively. The estimated annual benefit was $51,184, which translates to a present value of $706,371. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 1.20. Refer to **Table 5-7** for information on how the BCR was determined.

Table 5-7: Benefit / Cost Ratio for Lake Harney Circle Improvement Concept 2

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$706,371	$541,906	$3,507	$48,405	$590,311	1.20

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.2.4 Fort Lane Road Improvement Concepts

The purpose of these drainage improvements is to address road flooding (LOS = D) along Fort Lane Road. Two alternative concepts were evaluated at this location to determine whether omitting certain project components (e.g., easement acquisitions, long pipe runs, road raising) would result in a more feasible alternative.

5.2.4.1 Fort Lane Road Improvement Concept 1

The following flood improvement concepts were developed for this area. Refer to **Exhibit 16** for a map of the improvements.

- Upsize the existing pipe on the south side of Forth Lane Road that discharges to Jane Creek as shown in **Exhibit 16** to increase conveyance capacity.
- Regrade the mouth of Jane Creek where it discharges to Lake Harney as shown in **Exhibit 16** to restore creek conveyance capacity.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results, this improvement would reduce or eliminate roadway flooding along Fort Lane Road within the limits shown during the 10-year, 24-hour design storm event. As seen in **Exhibit 17**, the 10-year, 24-hour floodplain does not inundate Fort Lane Road and the extent is substantially decreased, specifically on the north and south sides near the east end of Fort Lane Road. Refer to **Exhibit 17** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would require acquisition of portions of one (1) private parcel. An additional temporary construction easement would be required to perform channel restoration at the mouth of the creek. See **Exhibit 16** for the parcel locations and **Table D-5** in **Appendix D** for the land acquisition costs. For permitting purposes, permanent easements are recommended to demonstrate to SJRWMD that there are long-term operation, management, and access plans.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality

treatment. If water quality enhancement is desired or needed, BMPs could be implemented.

- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland vegetation data indicate wetlands near the mouth of Jane Creek. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.
- Permitting Considerations: The alternative is anticipated to require an Environmental Resource General Permit for stormwater retrofit activities from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and/or wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for wetland or surface water impacts are not anticipated since no new fill or excavation are proposed.
- Opinion of Probable Construction Costs: The estimated cost to construct the project is $423,047. Refer to **Table D-5** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $35,178 and $5,363, respectively. The estimated annual benefit was $29,815, which translates to a present value of $411,473. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 0.89. Refer to **Table 5-8** for information on how the BCR was determined.

Table 5-8: Benefit / Cost Ratio for Fort Lane Road Improvement Concept 1

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$411,473	$423,047	$2,668	$36,825	$459,872	0.89

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.2.4.2 Fort Lane Road Improvement Concept 2

The following flood improvement concepts were developed for this area. Refer to **Exhibit 18** for a map of the improvements.

- Upsize the existing pipe on the south side of Forth Lane Road that discharges to Jane Creek as shown in **Exhibit 18** to increase conveyance capacity.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results, this improvement would reduce roadway flooding along Fort Lane Road within the limits shown during the 10-year, 24-hour design storm event. As seen in **Exhibit 19**, the 10-year, 24-hour floodplain still inundates a small area of Fort Lane Road; however, the extent is decreased, specifically on the north and south sides near the east end of Fort Lane Road. Refer to **Exhibit 19** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would require acquisition of portions of one (1) private parcel. See **Exhibit 18** for the parcel locations and **Table D-6** in **Appendix D** for the land acquisition costs. For permitting purposes, permanent easements are recommended to demonstrate to SJRWMD that there are long-term operation, management, and access plans.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality treatment. If water quality enhancement is desired or needed, BMPs could be implemented.
- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland vegetation data indicate wetlands in the general vicinity. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.
- Permitting Considerations: The alternative is anticipated to require an Environmental Resource General Permit for stormwater retrofit activities from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and/or wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for wetland or surface water impacts are not anticipated since no new fill or excavation are proposed.
- Opinion of Probable Construction Costs: The estimated cost to construct the project is $372,762. Refer to **Table D-6** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $35,178 and $14,047, respectively. The estimated annual benefit was $21,131, which translates to a present value of $291,627. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 0.72. Refer to **Table 5-9** for information on how the BCR was determined.

Table 5-9: Benefit / Cost Ratio for Fort Lane Road Improvement Concept 2

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$291,627	$372,762	$2,347	$32,395	$405,157	0.72

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.2.5 Old Mims and Jungle Road Improvement Concepts

The purpose of these drainage improvements is to address road (LOS = D) and structure (LOS= D) flooding near the intersection of Old Mims Road and Jungle Road. Two alternative concepts were evaluated at this location to determine whether omitting certain project components (e.g., easement acquisitions, long pipe runs, road raising) would result in a more feasible alternative.

5.2.5.1 Old Mims and Jungle Road Improvement Concept 1

The following flood improvement concepts were developed for this area. Refer to **Exhibit 20** for a map of the improvement concept.

- Raise the minimum road grade elevation from 14.9 to 16.3 feet within the limits shown on **Exhibit 20** to ensure that the road is meeting its LOS requirements (0.5 foot above 10-year / 24-hour flood elevation).
- Installation of cross drains to divert a portion of the runoff from the existing ditch on the north side of Old Mims Road to the existing ditch on the south side of Old Mims Road as shown on **Exhibit 20**.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results, this improvement would eliminate roadway flooding at the intersection of Old Mims and Jungle Road, within the limits shown, during the 10-year, 24-hour design storm event. As seen in **Exhibit 21**, the 10-year, 24-hour floodplain does not inundate the Old Mims and Jungle Road intersection; however, the floodplain is relatively similar to existing condition outside of the roadway. Refer to **Exhibit 21** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would require acquisition of portions of two (2) private parcels. See **Exhibit 20** for the parcel locations and **Table D-7** in **Appendix D** for the land acquisition costs. For permitting purposes, permanent easements are recommended to demonstrate to SJRWMD that there are long-term operation, management, and access plans.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality

treatment. If water quality enhancement is desired or needed, BMPs could be implemented.

- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland vegetation data indicate wetlands on the south side of Old Mims Road. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.
- Permitting Considerations: The alternative is anticipated to require an Environmental Resource General Permit for stormwater retrofit activities from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and/or wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for wetland or surface water impacts are not anticipated since no new fill or excavation are proposed.
- Opinion of Probable Construction Costs: The estimated cost to construct the project is $302,051. Refer to **Table D-7** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $61,523 and $33,539, respectively. The estimated annual benefit was $27,984, which translates to a present value of $386,206. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 1.19. Refer to **Table 5-10** for information on how the BCR was determined.

Table 5-10: Benefit / Cost Ratio for Old Mims and Jungle Road Improvement Concept 1

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$386,206	$302,051	$1,638	$22,611	$324,662	1.19

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.2.5.2 Old Mims and Jungle Road Improvement Concept 2

The following flood improvement concepts were developed for this area. Refer to **Exhibit 22** for a map of the improvement concept.

- Installation of cross drains to divert a portion of the runoff from the existing ditch on the north side of Old Mims Road to the existing ditch on the south side of Old Mims Road as shown on **Exhibit 22**.

The flood improvements evaluation considered the following:

- Model Results: Based on modeling results and as seen in **Exhibit 23**, the 10-year, 24-hour floodplain is relatively similar to existing condition for this improvement concept. Refer to **Exhibit 23** for a comparison of existing and proposed peak stages at selected locations in the vicinity of the improvement alternative.
- Land-Acquisition Requirements: The alternative would not require any land-acquisition as the improvements are confined to the ROW.
- Water Quality Considerations: The alternative is not considered a significant impact or benefit to water quality. As such, no water quality BMPs were included for water quality treatment. If water quality enhancement is desired or needed, BMPs could be implemented.
- Ecological Considerations: An ecological survey is recommended during design to evaluate potential impacts of the proposed improvement concept. SJRWMD wetland vegetation data indicate wetlands on the south side of Old Mims Road. As a result, delineation of wetland boundaries to quantify impacts would be necessary for this alternative.
- Permitting Considerations: The alternative is anticipated to require an Environmental Resource General Permit for stormwater retrofit activities from SJRWMD. It is also anticipated that a permit from the USACE would also be required due to proposed activities in surface waters and/or wetlands. It is anticipated that SJRWMD would require reasonable assurance that the proposed construction would not cause or contribute to downstream flood issues or have a negative impact to water quality. SJRWMD requires that impacts to surface waters and wetlands are quantified. Mitigation for wetland or surface water impacts are not anticipated since no new fill or excavation are proposed.
- Opinion of Probable Construction Costs: The estimated cost to construct the project is $116,315. Refer to **Table D-7** in **Appendix D** for the itemized cost estimate.
- Benefit / Cost Comparison: The estimated annual flood damages for this location under existing and proposed conditions were $61,523 and $58,600, respectively. The estimated annual benefit was $2,924, which translates to a present value of $40,350. Comparing with the concept cost estimate and maintenance, this alternative has a BCR of 0.33. Refer to **Table 5-11** for information on how the BCR was determined.

Table 5-11: Benefit / Cost Ratio for Old Mims and Jungle Road Improvement Concept 2

Present Value of Benefits	Concept Cost	Annual Maintenance	Present Value of Maintenance	Present Value of Cost + Maintenance	BCR
$40,350	$116,315	$323	$4,459	$120,774	0.33

Notes:
1) Concept Cost is the total present value of construction costs, land acquisition, engineering, and contingency.
2) Annual maintenance was assumed to be 1% of the construction cost.
3) A lifespan of 50 years and interest rate of 7% was assumed for present value calculations.

5.3 Summary and Recommendations

Improvement alternatives were evaluated at a total of five (5) areas, three of which had two alternatives considered. These alternatives included a mix of approaches ranging from providing additional culvert crossing locations, increasing channel conveyance, and road raising.

The preliminary improvement project prioritization ranking, based on BCR, and preliminary recommendations are summarized below. Model results indicate that these alternatives would provide flood benefits. Also, based on evaluation of land-acquisition, water quality, ecological, permitting, and cost considerations, implementation of these alternatives appears feasible. The alternatives not listed were determined to be unfeasible or otherwise offer no additional benefit to their higher ranked counterpart. **Therefore, the following alternatives received a high rank and are recommended for implementation**:

1. Osceola Road Improvement Concept (BCR = 1.80): Model results show the alternative achieves County roadway LOS in the vicinity. Based on the BCR calculation (See **Table 5-5**), this alternative seems to offer a cost-effective solution.
2. Lake Harney Circle Improvement Concept 2 (BCR = 1.20): Model results show the alternative red
   completely achieved in the vicinity. Based on the BCR calculation (See **Table 5-7**), this alternative seems to offer a cost-effective solution. Note that surveyed FFE for the potentially impacted structure may differ from that estimated in this study which could influence the BCR and ranking.
3. Old Mims and Jungle Road Intersection Improvement Concept 1 (BCR = 1.19): Model results show the alternative achieves County roadway LOS in the vicinity. Based on the BCR calculation (See **Table 5-10**), this alternative seems to offer a cost-effective solution. Note that surveyed FFE for the potentially impacted structure may differ from that estimated in this study which could influence the BCR and ranking.
4. Fort Lane Road Improvement Concept 1 (BCR = 0.89): Model results show the alternative achieves County roadway LOS. Also, based on the BCR calculation (See **Table 5-8**), this alternative seems to offer a cost-effective solution. The major implementation challenge would likely be the easement acquisition for the creek restoration.
5. Whitcomb Drive Improvement Concept (BCR = 0.67): While model results showed this , it would require significant land acquisitions and possibly wetland impact mitigation. Although the BCR for this alternative is < 1 (See **Table 5-4**), there are other intangible factors (e.g., providing access for emergency vehicles) that are not considered in flood benefit calculations. Additionally, this location has generated significant public interest. Further investigation of wetland boundaries, wetland mitigation requirements, and level of difficulty acquiring necessary ROW or easements are recommended to determine final project prioritization. For example, donation of land needed to expand the ROW could make this a more cost-effective solution.

6. FLOODPLAIN EVALUATION AND JUSTIFICATION

6.1 100-Year Duration Evaluation and Justification

Single and multiple day durations were considered to address potential flooding caused by rainfall intensity and volume, respectively. Of the 619 basins, 551 basins (89%) achieved a greater peak during the 96-hour storm simulation. In these basins, the 96-hour storm peak was greater than the 24-hour peak by an average of 0.09 feet and as much as 2.24 feet. In 57 basins (9%), there was no difference in the peaks of the 96-hour and 24-hour storms. In the remaining 11 basins (2%), maximum peaks were achieved in the 24-hour storm simulation, although the average difference was 0.01 feet. Additionally, the unrefined floodplain polygon areas for the 96-hour storm were 119 acres (3%) larger than those generated from the 24-hour storm results. Based on this comparison, the 96-hour storm duration was selected for generating 100-year floodplains for all basins in the Lake Harney Watershed.

6.2 100-Year Floodplain Delineation Methodology

Preliminary inundation polygons (floodplains) were delineated based on the project DEM and basin node peak stages for the 100-year, 96-hour storm. The preliminary floodplains for this and the remaining design storms are provided in the electronic deliverables. The 100-year / 96-hour flood depth grid (5-foot resolution) generated during this process is provided with the electronic deliverables. The following sections describe additional processing of the floodplains.

6.2.1 Inundation Polygon Refinement

Floodplains were assigned Special Flood Hazard Area (SFHA) classifications as follows:

- Zone X (Shaded) – The entire polygon has a flood depth < 1 foot.
- Zone AE – The polygon intersects a basin node. The peak stage of the node is assigned as the Base Flood Elevation (BFE).
- Zone A – The polygon does not intersect a basin node or is a transition zone (Section 6.2.1.1).

Filtering and processing for mapping involved the following steps:

1. Remove polygons <100 square feet that intersect a basin node (none were present in this watershed)
2. Fill gaps and holes < 2,500 square feet
3. Remove polygons < 2,500 square feet
4. Smooth polygons (ArcGIS Smooth Polygon tool, using PAEK method and 20-foot tolerance)

The 2,500 square foot threshold was used since it is a typical threshold in Flood Insurance Rate Map (FIRM) production.

6.2.1.1 Transition Zones

Transition zones are manually drawn floodplains used to indicate that flood waters may flow through an area during the 100-year event even though the model results do not show water staging up to that location. They are added to ensure continuity of the floodplains between basins where

enough to create a gap in the floodplain between the two basins even though overland weir link flow occurs.

Floodplains along overland weir links with peak flows 10 cfs and depth
to determine whether transition zones were needed. Transition zones were not added if the floodplain polygons were already continuous across basin boundaries, if the weir connected to a boundary node, or if the resulting transition zone would be smaller than 2,500 square feet (see Section 6.2.1). Transition zones were not used to connect floodplains within a basin. A total of thirty seven (37) transition zones were manually delineated.

6.2.1.2 Updates to the Lake Harney – St. Johns River Floodplain

The floodplains generated based on the modeling performed for this study account for direct rainfall over the Lake Harney watershed; however, along the Lake Harney shore there is a separate flood risk of elevated river stages due to a major event over the larger SJR watershed. In order to account for this additional flood risk and prevent discontinuities based on different topographic data sources, the 100-year Lake Harney / SJR floodplain was re-delineated and merged with the floodplains developed based on the modeling performed for this study. Since modeling of the SJR was not evaluated during this study, the current BFE of 9.0 feet was maintained and the floodplain was re-delineated based on the 2009 LiDAR DEM. The re-delineation was limited to approximately 2 miles upstream and 1.5 miles downstream of Lake Harney where the re-delineated floodplain tied into the current floodplain. Polygon smoothing and area filtering were performed similar to the model floodplains. The Lake Harney / SJR floodplain was then merged with the model floodplains. In overlap areas, the floodplain with the higher BFE was selected for the final output.

6.3 Letter of Map Revision (LOMR)

6.3.1 Comparison to FEMA Special Flood Hazard Areas

The study area is covered by FIRM No. 12117C (Panel No. 0115F, 0120F, 0205F, and 0210F)

delineated for Lake Harney / SJR, Lake Geneva, Still Lake, Moran Lake, and Upper and Lower

Additionally, while more detailed modeling of the SJR was not performed, the effective floodplain boundary for Lake Harney / SJR are based on older topographic data and should be updated to reflect newer topographic data (2009).

The 100-year / 96-hour floodplain delineation is mapped against the FEMA SFHAs in **Exhibit 24**. The overall areal extant of the delineated floodplains is 1,556 acres (67%) greater than the FEMA Special Flood Hazard Areas (SFHAs) or floodplains. Within the study area, the FEMA 100-year

floodplains intersect 698 parcels and the delineated floodplains intersect 1,080 parcels. Detailed maps of the preliminary floodplains are provided along with an index map in **Appendix E**.

The delineated floodplains captured all of the FEMA floodplains, but appeared to provide greater detail at individual floodplains (e.g., the boundary tightened and was less generalized) and fill gaps between existing floodplains. The discrepancies between the delineated floodplains and the FEMA floodplains are attributed to updated topographic data (2009 LiDAR) and a more detailed H&H model (e.g., more surveyed culverts and cross sections). The processed 100-year floodplain polygons are shown in **Exhibit 25** Based on the comparison with existing floodplains, a LOMR to update the floodplains appears warranted.

6.3.2 LOMR Application Package

Geosyntec compiled a LOMR application package to support the County request to FEMA to update the regulatory floodplains in the Lake Harney watershed. The application package includes a narrative (tech memo description of the purpose of the request and analysis methods), MT-2 forms (Forms 1 and 2), H&H analyses (existing conditions model), certified topographic work maps, annotated FIRMs, reference data (e.g., plans and surveys used to parameterize hydraulic structures in the model), and sample property owner notification letter. The LOMR application package was provided to the County on 1/6/2021 and is included in the electronic deliverables for this report.

7. SUMMARY

The Lake Harney Watershed is a rural watershed encompassing approximately 26.5 square miles (~17,000 acres) in northeast Seminole County. The watershed discharges to Lake Harney which is part of the St. Johns River. This watershed had not been evaluated previously in detail, and much of the data which did exist was out of date or incomplete based on more recent development in the area. This area has seen significant impacts from flooding based on insufficient infrastructure and high tailwater conditions in the lake. The objectives of this Watershed Flood Resiliency plan were to establish 100-year floodplains, assess flood level of service (LOS) of drainage infrastructure, and evaluate improvement alternatives to address flooding.

Existing topographic and watershed feature data were collected and compiled and initial watershed drainage inventory and model network features necessary for the development of a watershed model were generated. Existing data collected included previous reports, permits, soils data, digital elevation model (DEM), and known flooding locations. The County
GIS inventory was updated as needed for structures considered significant for future modeling purposes. A data acquisition plan was developed that identified the location and method of additional data collection and survey needed to complete the model. A one-dimensional (1D) model schematic was developed for the watershed and contains 619 basins, 622 nodes, and 2,158 links. The model was validated by comparing simulations of historic events with reported flood complaints.

Six design storms were evaluated with various tailwater conditions at Lake Harney for a total of thirteen (13) existing condition simulations. Flood inundation areas were generated from the design storm simulation results. The 100-year events were compared, and the 100-year / 96-hour design storm was selected as the basis for floodplain development.

Roadway and structure LOS criteria were established and assigned based on the design storm simulation results. The LOS results were used in conjunction with input from County staff and residents to identify five (5) problem focus areas. Annual structure (building and content) and roadway (structural and delay time) flood damage costs were estimated in the vicinity of the problem focus areas. Flooding improvement concepts were developed for each of the five locations. Eight (8) concepts were evaluated and qualitatively ranked based on the estimated benefits and costs of the concepts. Of these concepts, five (5) were recommended based on high ranking. The preliminary project prioritization, based on benefit-cost ratio (BCR) is listed below:

1. Osceola Road Improvement Concept (BCR = 1.80)
2. Lake Harney Circle Improvement Concept 2 (BCR = 1.20)
3. Old Mims and Jungle Road Intersection Improvement Concept 1 (BCR = 1.19)
4. Fort Lane Road Improvement Concept 1 (BCR = 0.89)
5. Whitcomb Drive Improvement Concept (BCR = 0.67)

Additional drainage deficiencies were identified throughout the watershed. While improvement alternative analysis was not performed for these locations, provided recommendations included monitoring/verification of issue, enhanced maintenance, ROW/easement acquisition, new cross drain locations, and additional small studies. No actions were recommended for private issues.

8. REFERENCES

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EXHIBITS

Problem Locations Summary Table

Location ID	Problem Description	Source
1	Large amout of debris blocking ditch drainage. (Ditch is shown on property survey completed in 2018)	Resident Complaints
2	Receiving drainage from County property across Osceola Rd. Historically, ditches were dug around the two sides of the property to improve drainage.	Resident Complaints
3	Flooded 2 inches inside home during Hurricane Irma. Road and driveway flood repeatedly.	Resident Complaints
4	Culverts are silted in and/or too small and restrictive.	Resident Complaints
5	Jane Creek outlet/mouth is blocked and restricting drainage. (Not clear whether refering to Big Run or Little Run)	Resident Complaints
6	Ditch is not draining properly.	Resident Complaints
7	Culverts are too high. SR 46 prohibits natural drainage towards the north.	Resident Complaints
8	Berm has been partially removed but is still obstructing drainage.	Resident Complaints
9	Drainage ditches seem to flow from both ends of the street to the middle and then sit on those properties. Standing water at the intersection of Harney Heights Rd and Meade Rd.	Resident Complaints
10	Culverts are clogged with debris. Ditch needs to be cleaned.	Resident Complaints
11	Culverts clog up fast and do not seem to help drainage.	Resident Complaints
12	Natural springs that use to fill Lake Hart have been blocked.	Resident Complaints
13	Lake Harney Cir and Rest Haven Rd were under water for 3 months after last major storm. Collapsed culverts on Rest Haven Rd and Marion Ave. Ditches need to be cleaned.	Resident Complaints
14	Road was under 2-4 ft of water for about 2 months after Hurricane Irma.	Resident Complaints
15	Whitcomb Dr was under water for 3 months after last major storm. Ditches are always full of water. Culverts are too high for water to drain properly. Ditches overflow into yards.	Resident Complaints
16	Lake floods yards and leaves homes on an island for weeks/months. Driveways are impassable.	Resident Complaints
17	East Osceola Road begins to overtop during the 100-year / 24-hour event. The access road to the power easement at this location begins to overtop during the mean annual event.	Settlers Loop Study
18	East Osceola Road begins to flood (encroachment into travel lanes) during the mean annual event and overtopping of East Osceola Road occurs during the 100-year / 24-hour event.	Settlers Loop Study
19	Flooding of East Osceola Road starts between mean annual and 10-year / 24-hour event.	Settlers Loop Study
20	Flooding starts at mean annual event.	Settlers Loop Study
21	Flooding starts at the mean annual event.	Settlers Loop Study
22	Flooding starts at mean annual event.	Settlers Loop Study

Le Fils Slough
Mullet Lake
Harts Lake
Lake Geneva
Upper Lake Proctor
Still Lake
Moran Lake
Lower Lake Proctor
Buck Lake
Geneva Pond
Lake Harney
Jane Creek
Big Run
St Johns River
Econlockhatchee River

Seminole County, Florida
Study Area
Saint Johns River Water Management District

Legend
Study Area
Problem Locations

Sources:
Aerials: ESRI, 2020
Waterbodies: Seminole County
County Boundary: Seminole County

N
0 700 1,400 Feet

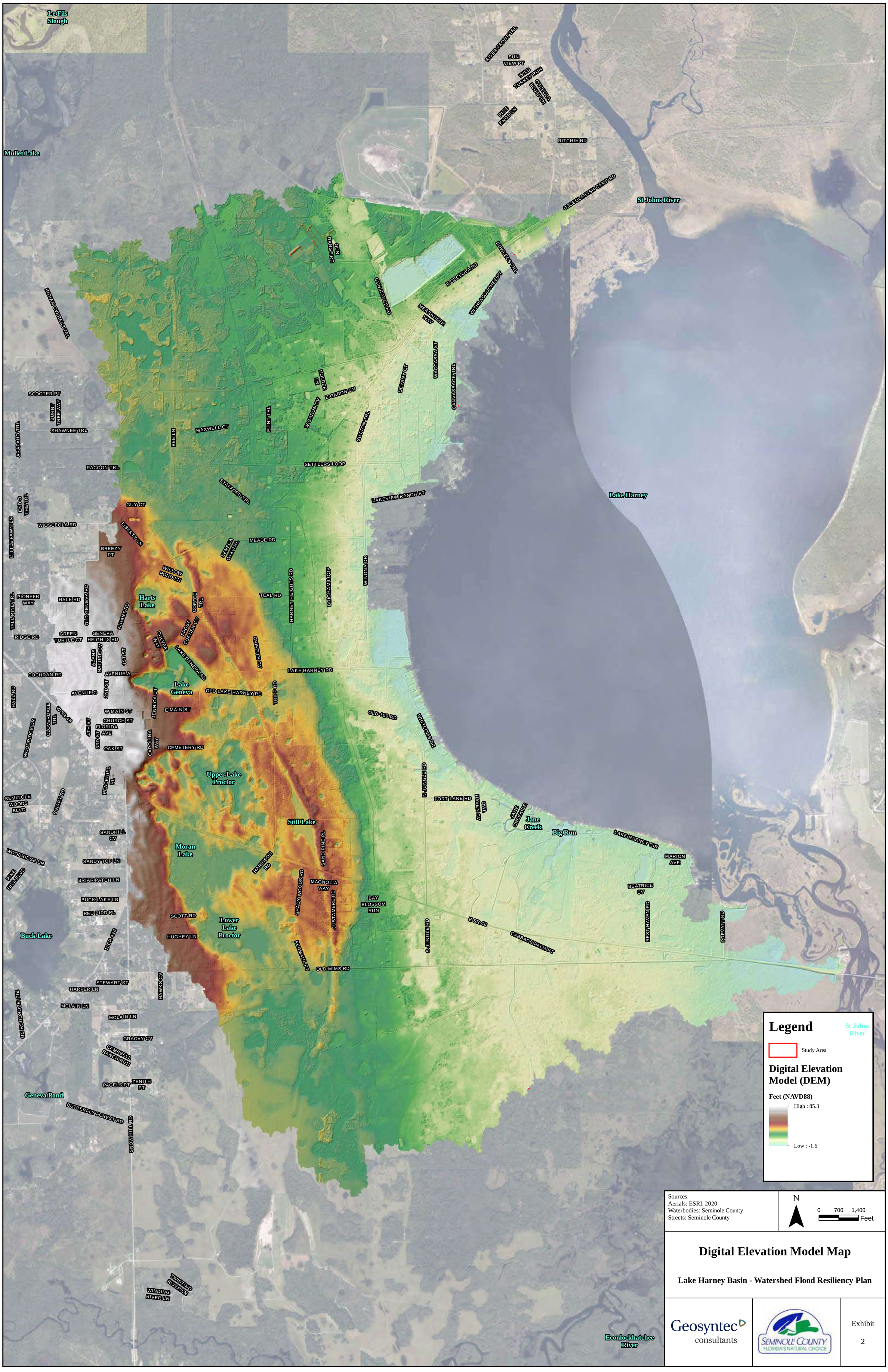
Watershed and Problem Locations Map

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

Seminole County Florida's Natural Choice

Exhibit 1



Legend

St Johns River

Study Area

Digital Elevation Model (DEM)

Feet (NAVD88)

High : 85.3

Low : -1.6

Sources:
Aerials: ESRI, 2020
Waterbodies: Seminole County
Streets: Seminole County

N

0 700 1,400 Feet

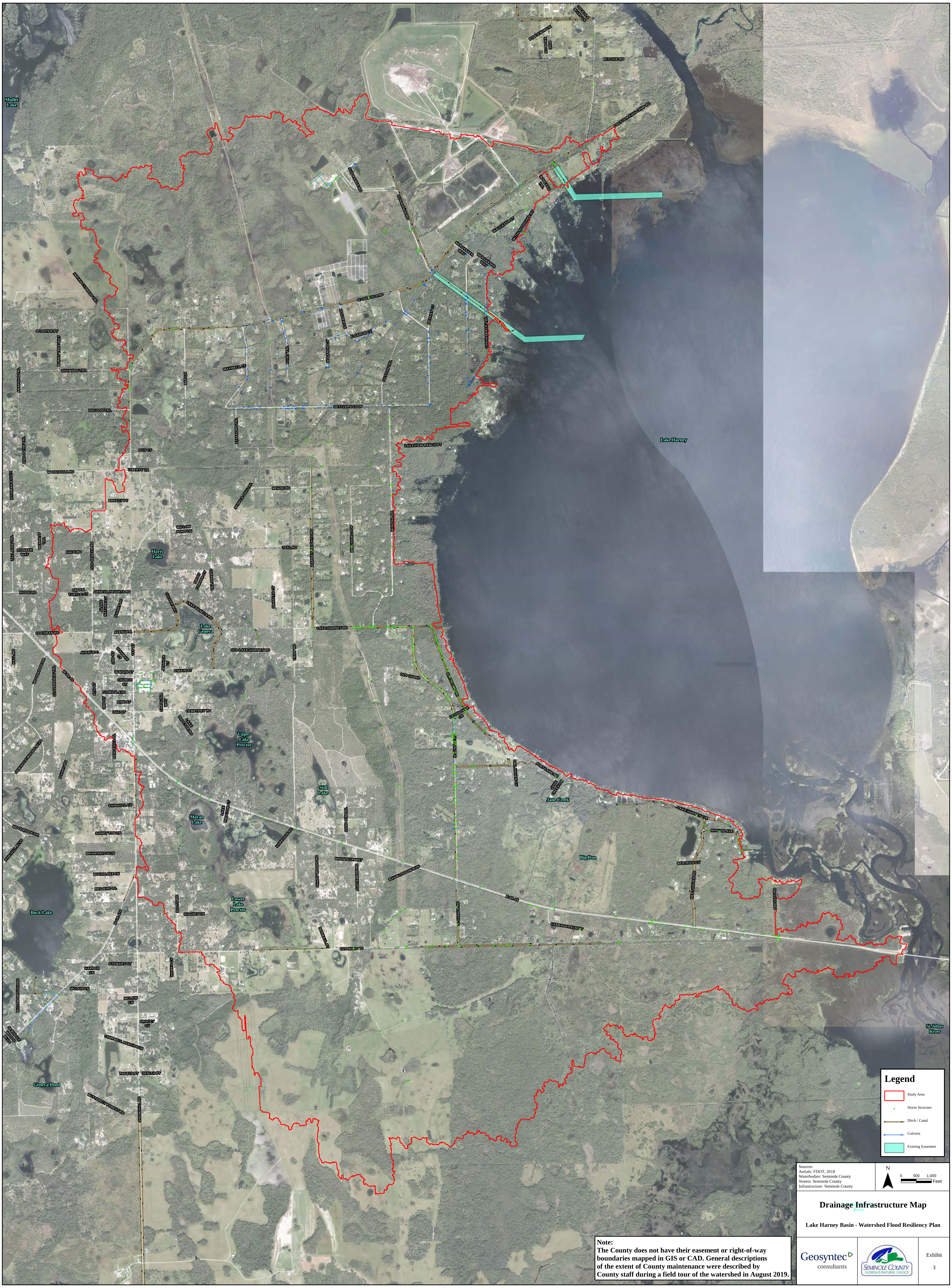
Digital Elevation Model Map

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

Seminole County Florida's Natural Choice

Exhibit 2


Mullet Lake
Lake Harney
St Johns River
Harts Lake
Lake Geneva
Upper Lake Proctor
Lower Lake Proctor
Still Lake
Moran Lake
Buck Lake
Geneva Pond
Jane Creek
Big Run
OSCEOLA BLUFF LN
PINE KNOB LN
RITCHIE RD
OSCEOLA FISH CAMP RD
BOWLEGS TRL
WACCASSA ST
WITHLACOOCHEE PT
MERGANSER WAY
CANVASBACK TRL
GUN RANGE RD
E OSCEOLA RD
HOLDER LN
E GARON CV
W GARON CV
DEVANY CT
SUTTON TRL
FLINT TRL
MAXWELL CT
BEE LN
SETTLERS LOOP
STAFFORD TRL
LAKEVIEW RANCH PT
INDIAN CYPRESS TRL
SCOOTER PT
BURNT TREE WAY
SHAWNEE TRL
ARAPAHO TRL
RACOON TRL
GUY CT
END O THE TRL
W OSCEOLA RD
LIBERTY LN
LITTLE FAWN LN
BREEZY PT
MEADE RD
SENECA OAK TRL
WILLOW POND LN
TEAL RD
HARNEY HEIGHTS RD
BRIGHAM LOOP
WINONA DR
TALL PINE TRL
PIONEER WAY
BENNETT TRL
HALE RD
OLD GENEVA RD
RIDGE RD
GREEN TURTLE CT
GENEVA HEIGHTS RD
ALANS NATURE CV
N HART RD
FROST CORNER CV
COFFEE TRL
CULVER WAY
LAKE GENEVA RD
GRIFFITH CV
COCHRAN RD
AVENUE A
LAKE HARNEY RD
AVENUE C
DISHMAN CT
2ND ST
1ST ST
OLD LAKE HARNEY RD
TRIPP RD
HALL RD
WOODRIDGE DR
CLOVERDALE TRL
W SR 46
JENNICA CT
W MAIN ST
E MAIN ST
CHURCH ST
4TH ST
FLORIDA AVE
OLD 100 RD
W AZTEC RD
CROSSOVER LN
PINE ST
3RD ST
CAROLINA WAY
OAK ST
CEMETERY RD
LAKE PROCTOR RD
SEMINOLE WOODS BLVD
S HART RD
PEACEHILL PL
N JUNGLE RD
SANDHILL CV
LAKE PROCTOR CT
SAND PINE PL
SANDY TOP LN
HARRISON RD
PINE HILL BLVD
BRIAR PATCH LN
MAGNOLIA WAY
SHADY WOODS RD
JUSTAMERE RD
BAY BLOSSOM RUN
BUCK LAKE LN
RED BIRD PL
SCOTT RD
HUGHEY LN
N CR 426
S JUNGLE RD
PERMAUL PT
OLD MIMS RD
STEWART ST
HARPER LN
HAWKS CV
MCLAIN LN
BILLSBOROUGH RD
GRACEY CV
CAMPBELL RANCH RUN
PAGELS PT
ZENITH PT
BUTTERFLY FOREST RD
SNOW HILL RD
OWL HAVEN CV
FORT LANE RD
JANE CREEK DR
LAKE HARNEY CIR
MARION AVE
BEATRICE CV
REST HAVEN RD
PREVATT RD
E SR 46
CABBAGE PALM PT
N
0 500 1,000 Feet

Legend

- Study Area
- Storm Structure
- Ditch / Canal
- Culverts
- Existing Easement

Sources:
Aerials: FDOT, 2018
Waterbodies: Seminole County
Streets: Seminole County
Infrastructure: Seminole County

Drainage Infrastructure Map

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants | SEMINOLE COUNTY FLORIDA'S NATURAL CHOICE | Exhibit 3

Note:
The County does not have their easement or right-of-way boundaries mapped in GIS or CAD. General descriptions of the extent of County maintenance were described by County staff during a field tour of the watershed in August 2019.

Soils Table		
Hydrologic Soil Group	**Description**	**Percent of Study Area**
A	Low runoff potential	20.1%
A/D	Dual classification, low to high runoff potential	73.3%
B/D	Dual classification, moderately low to high runoff potential	6.0%
N/A	Water, a hydrologic class is typically not assigned	0.6%

Le Fils Slough
Mullet Lake
Lake Harney
Harts Lake
Lake Geneva
Upper Lake Proctor
Still Lake
Moran Lake
Lower Lake Proctor
Buck Lake
Jane Creek
Big Run
St Johns River
Geneva Pond
Econlockhatchee River

Legend

- Study Area
- **Hydrologic Soil Group**
  - A
  - A/D
  - B/D
  - Water

Sources:
Aerials: ESRI, 2020
Waterbodies: Seminole County
Soils: NRCS, 2013

N

0 700 1,400 Feet

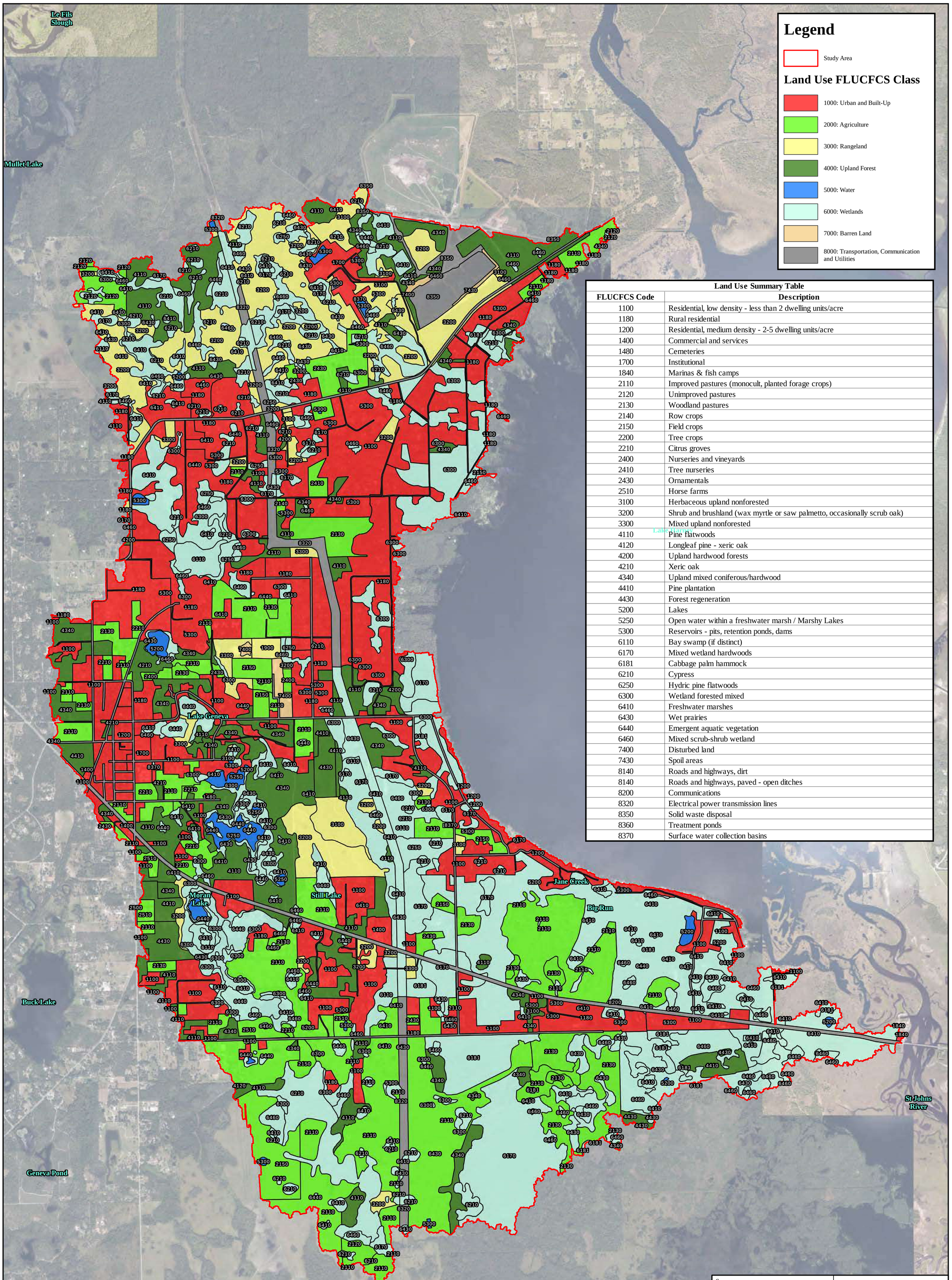
Soils Map

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

SEMINOLE COUNTY FLORIDA'S NATURAL CHOICE

Exhibit 4



Legend

Study Area

Land Use FLUCFCS Class

- 1000: Urban and Built-Up
- 2000: Agriculture
- 3000: Rangeland
- 4000: Upland Forest
- 5000: Water
- 6000: Wetlands
- 7000: Barren Land
- 8000: Transportation, Communication and Utilities

Land Use Summary Table

FLUCFCS Code	Description
1100	Residential, low density - less than 2 dwelling units/acre
1180	Rural residential
1200	Residential, medium density - 2-5 dwelling units/acre
1400	Commercial and services
1480	Cemeteries
1700	Institutional
1840	Marinas & fish camps
2110	Improved pastures (monocult, planted forage crops)
2120	Unimproved pastures
2130	Woodland pastures
2140	Row crops
2150	Field crops
2200	Tree crops
2210	Citrus groves
2400	Nurseries and vineyards
2410	Tree nurseries
2430	Ornamentals
2510	Horse farms
3100	Herbaceous upland nonforested
3200	Shrub and brushland (wax myrtle or saw palmetto, occasionally scrub oak)
3300	Mixed upland nonforested
4110	Pine flatwoods
4120	Longleaf pine - xeric oak
4200	Upland hardwood forests
4210	Xeric oak
4340	Upland mixed coniferous/hardwood
4410	Pine plantation
4430	Forest regeneration
5200	Lakes
5250	Open water within a freshwater marsh / Marshy Lakes
5300	Reservoirs - pits, retention ponds, dams
6110	Bay swamp (if distinct)
6170	Mixed wetland hardwoods
6181	Cabbage palm hammock
6210	Cypress
6250	Hydric pine flatwoods
6300	Wetland forested mixed
6410	Freshwater marshes
6430	Wet prairies
6440	Emergent aquatic vegetation
6460	Mixed scrub-shrub wetland
7400	Disturbed land
7430	Spoil areas
8140	Roads and highways, dirt
8140	Roads and highways, paved - open ditches
8200	Communications
8320	Electrical power transmission lines
8350	Solid waste disposal
8360	Treatment ponds
8370	Surface water collection basins

Sources:
Aerials: ESRI, 2020
Land Use: SJRWMD, 2014
Waterbodies: Seminole County

N

0 700 1,400 Feet

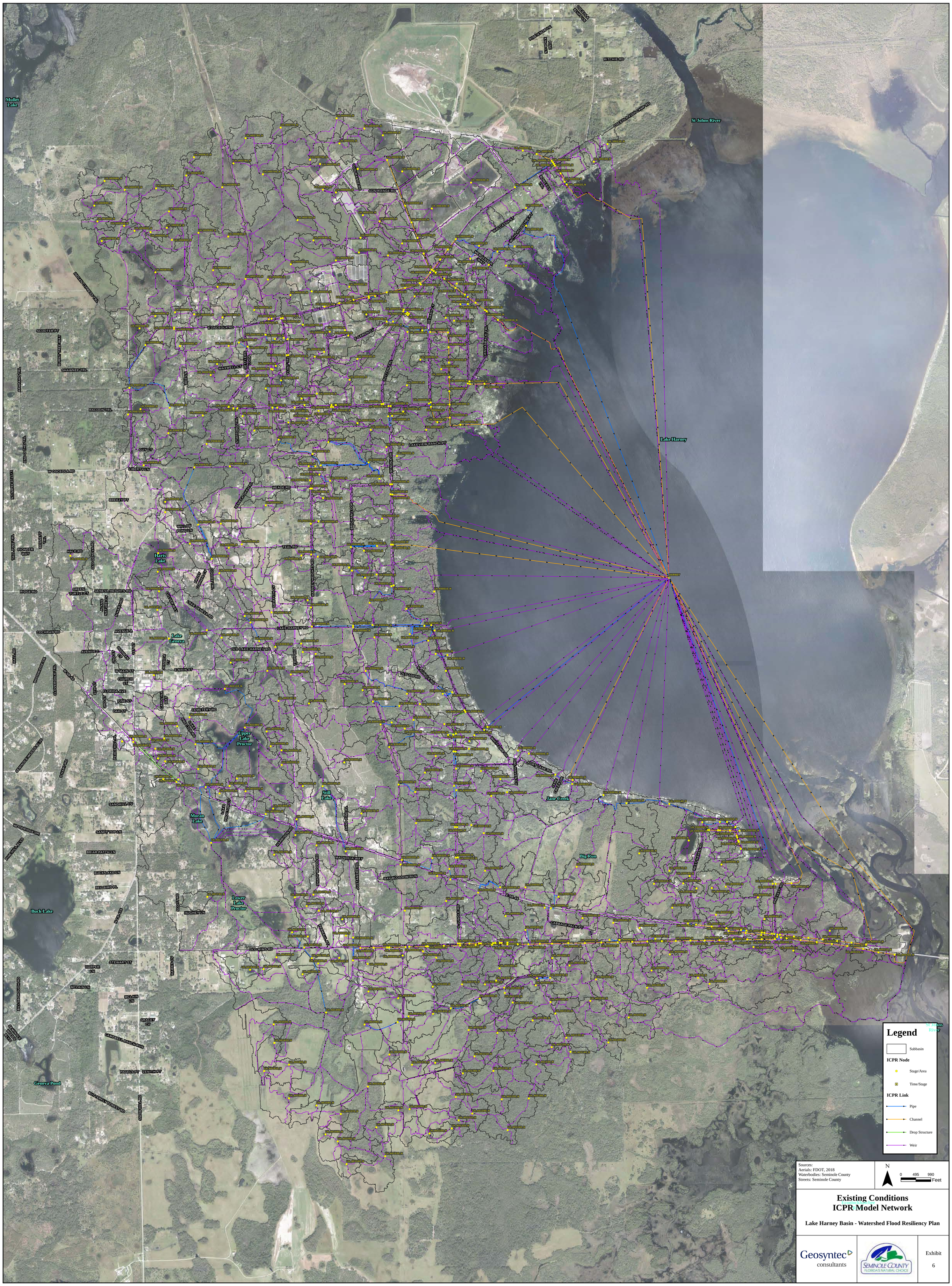
Land Use Map

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

Seminole County Florida's Natural Choice

Exhibit 5


Mullet Lake
St Johns River
Lake Harney
Harts Lake
Lake Geneva
Upper Lake Proctor
Lower Lake Proctor
Still Lake
Moran Lake
Jane Creek
Big Run
Buck Lake
Geneva Pond
OSCEOLA CAMP RD
RITCHIE RD
GUN RANGE RD
E OSCEOLA RD
W OSCEOLA RD
SHAWNEE TRL
RACOON TRL
LAKEVIEW RANCH PT
LAKE HARNEY RD
OLD LAKE HARNEY RD
OLD MIMS RD
E SR 46
CABBAGE PALM PT
MAGNOLIA WAY
BAY BLOSSOM RUN
TEAL RD
MEADE RD
HARNEY
Legend
Subbasin
ICPR Node
Stage/Area
Time/Stage
ICPR Link
Pipe
Channel
Drop Structure
Weir
Sources:
Aerials: FDOT, 2018
Waterbodies: Seminole County
Streets: Seminole County
N
0 495 990
Feet
Existing Conditions
ICPR Model Network
Lake Harney Basin - Watershed Flood Resiliency Plan
Geosyntec consultants
Seminole County Florida's Natural Choice
Exhibit
6

Street Segment	Level of Service Class	Basin of Street Segment Location	Design Level of Service	Existing LOS Grade
E SR 46	Evacuation Route	LH_A01880_S	100-YR / 96-HR	D
E OSCEOLA RD	Arterial/Collector Street	LH_F00660_S	10-YR / 24-HR	D
E OSCEOLA RD	Arterial/Collector Street	LH_H00200_S	10-YR / 24-HR	D
E OSCEOLA RD	Arterial/Collector Street	LH_H00220_S	10-YR / 24-HR	D
E OSCEOLA RD	Arterial/Collector Street	LH_H00440_S	10-YR / 24-HR	D
E OSCEOLA RD	Arterial/Collector Street	LH_H00460_S	10-YR / 24-HR	D
CROSSOVER LN	Local Street	LH_E00150_S	10-YR / 24-HR	D
FORT LANE RD	Local Street	LH_D00030_S	10-YR / 24-HR	D
LAKE HARNEY CIR	Local Street	LH_C00220_S	10-YR / 24-HR	D
LAKE HARNEY CIR	Local Street	LH_C00230_S	10-YR / 24-HR	D
LAKE HARNEY RD	Local Street	LH_E00550_S	10-YR / 24-HR	D
LAKE HARNEY RD	Local Street	LH_E00540_S	10-YR / 24-HR	D
LAKE HARNEY RD	Local Street	LH_E00580_S	10-YR / 24-HR	D
MARION AVE	Local Street	LH_C00220_S	10-YR / 24-HR	D
N JUNGLE RD	Local Street	LH_E00550_S	10-YR / 24-HR	D
N JUNGLE RD	Local Street	LH_E00160_S	10-YR / 24-HR	D
REST HAVEN RD	Local Street	LH_C00180_S	10-YR / 24-HR	D
REST HAVEN RD	Local Street	LH_C00220_S	10-YR / 24-HR	D
REST HAVEN RD	Local Street	LH_C00150_S	10-YR / 24-HR	D
S JUNGLE RD	Local Street	LH_A00700_S	10-YR / 24-HR	D
WHITCOMB DR	Local Street	LH_E00530_S	10-YR / 24-HR	D
WHITCOMB DR	Local Street	LH_E00520_S	10-YR / 24-HR	D
WHITCOMB DR	Local Street	LH_E00030_S	10-YR / 24-HR	D
WHITCOMB DR	Local Street	LH_E00510_S	10-YR / 24-HR	D
WHITCOMB DR	Local Street	LH_E00500_S	10-YR / 24-HR	D
WHITCOMB DR	Local Street	LH_E00150_S	10-YR / 24-HR	D
WHITCOMB DR	Local Street	LH_E00120_S	10-YR / 24-HR	D
OLD MIMS RD	Local Street	LH_A00570_S	10-YR / 24-HR	D
OLD MIMS RD	Local Street	LH_A00760_S	10-YR / 24-HR	D
OLD MIMS RD	Local Street	LH_A00680_S	10-YR / 24-HR	D
E SR 46	Evacuation Route	LH_A00330_S	100-YR / 96-HR	C
E SR 46	Evacuation Route	LH_A01900_S	100-YR / 96-HR	C
E SR 46	Evacuation Route	LH_A01860_S	100-YR / 96-HR	C
E SR 46	Evacuation Route	LH_E00360_S	100-YR / 96-HR	C
E SR 46	Evacuation Route	LH_A00320_S	100-YR / 96-HR	C
E SR 46	Evacuation Route	LH_A01840_S	100-YR / 96-HR	C
W SR 46	Evacuation Route	LH_A01960_S	100-YR / 96-HR	C
W SR 46	Evacuation Route	LH_A01840_S	100-YR / 96-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_G00740_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_G00800_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00240_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00230_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00210_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00430_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00450_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00470_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00480_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_G00810_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_J00090_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_F00700_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_H00580_S	10-YR / 24-HR	C
N CR 426	Arterial/Collector Street	LH_A01840_S	10-YR / 24-HR	C
CROSSOVER LN	Local Street	LH_E00140_S	10-YR / 24-HR	C
HARNEY HEIGHTS RD	Local Street	LH_F00140_S	10-YR / 24-HR	C
LAKE GENEVA RD	Local Street	LH_A02180_S	10-YR / 24-HR	C
LAKE HARNEY CIR	Local Street	LH_C00250_S	10-YR / 24-HR	C
MARION AVE	Local Street	LH_C00350_S	10-YR / 24-HR	C
MARION AVE	Local Street	LH_C00330_S	10-YR / 24-HR	C
MARION AVE	Local Street	LH_C00340_S	10-YR / 24-HR	C
N JUNGLE RD	Local Street	LH_E00190_S	10-YR / 24-HR	C
REST HAVEN RD	Local Street	LH_C00360_S	10-YR / 24-HR	C
S JUNGLE RD	Local Street	LH_A00710_S	10-YR / 24-HR	C
WHITCOMB DR	Local Street	LH_E00130_S	10-YR / 24-HR	C
WHITCOMB DR	Local Street	LH_E00140_S	10-YR / 24-HR	C
WHITCOMB DR	Local Street	LH_E00020_S	10-YR / 24-HR	C
OLD MIMS RD	Local Street	LH_A00580_S	10-YR / 24-HR	C
OLD MIMS RD	Local Street	LH_C00110_S	10-YR / 24-HR	C
OLD MIMS RD	Local Street	LH_A00710_S	10-YR / 24-HR	C
OLD MIMS RD	Local Street	LH_A00540_S	10-YR / 24-HR	C
OLD MIMS RD	Local Street	LH_A00560_S	10-YR / 24-HR	C
OLD MIMS RD	Local Street	LH_A00600_S	10-YR / 24-HR	C
OLD MIMS RD	Local Street	LH_A00700_S	10-YR / 24-HR	C
E OSCEOLA RD	Arterial/Collector Street	LH_G00770_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_G00790_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_H00130_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_H00490_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_H00510_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_G00820_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_H00530_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_H00540_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_F00720_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_F00710_S	10-YR / 24-HR	B
E OSCEOLA RD	Arterial/Collector Street	LH_H00570_S	10-YR / 24-HR	B
FORT LANE RD	Local Street	LH_D00040_S	10-YR / 24-HR	B
HARNEY HEIGHTS RD	Local Street	LH_F00270_S	10-YR / 24-HR	B
LAKE HARNEY CIR	Local Street	LH_C00300_S	10-YR / 24-HR	B
LAKE HARNEY CIR	Local Street	LH_C00290_S	10-YR / 24-HR	B
LAKE HARNEY CIR	Local Street	LH_C00240_S	10-YR / 24-HR	B
LAKE HARNEY RD	Local Street	LH_F00040_S	10-YR / 24-HR	B
MARION AVE	Local Street	LH_C00310_S	10-YR / 24-HR	B
MARION AVE	Local Street	LH_C00320_S	10-YR / 24-HR	B
MEADE RD	Local Street	LH_F00500_S	10-YR / 24-HR	B
MEADE RD	Local Street	LH_F00390_S	10-YR / 24-HR	B
N JUNGLE RD	Local Street	LH_E00280_S	10-YR / 24-HR	B
REST HAVEN RD	Local Street	LH_A00190_S	10-YR / 24-HR	B
REST HAVEN RD	Local Street	LH_C00350_S	10-YR / 24-HR	B
OLD MIMS RD	Local Street	LH_A00510_S	10-YR / 24-HR	B
OLD MIMS RD	Local Street	LH_A00530_S	10-YR / 24-HR	B
OLD MIMS RD	Local Street	LH_A00550_S	10-YR / 24-HR	B
OLD MIMS RD	Local Street	LH_A00610_S	10-YR / 24-HR	B
OLD MIMS RD	Local Street	LH_A00690_S	10-YR / 24-HR	B
OLD MIMS RD	Local Street	LH_A00620_S	10-YR / 24-HR	B

Note: Road segments that received a Grade of 'A' are not presented in this table.

Summary of Level of Service Grades

A - Flood elevation is more than 0.5 feet below the road surface for local roads or more than 1.0 foot below the road surface for arterial / collector roads for the design LOS storm event.

B - Flood elevation is greater than Grade 'A' but still below the road surface.

C - Flood elevation is 0.5 feet or less above the road surface.

D - Flood elevation is 0.5 feet or greater above the road surface.

Legend

- Study
- Modeled Structure
- Culvert Locations

Existing Road Level of Service (LOS)

- A
- B
- C
- D

Sources:
Aerials: FDOT, 2018
Waterbodies: Seminole County
Streets: Seminole County

N

0 500 1,000 Feet

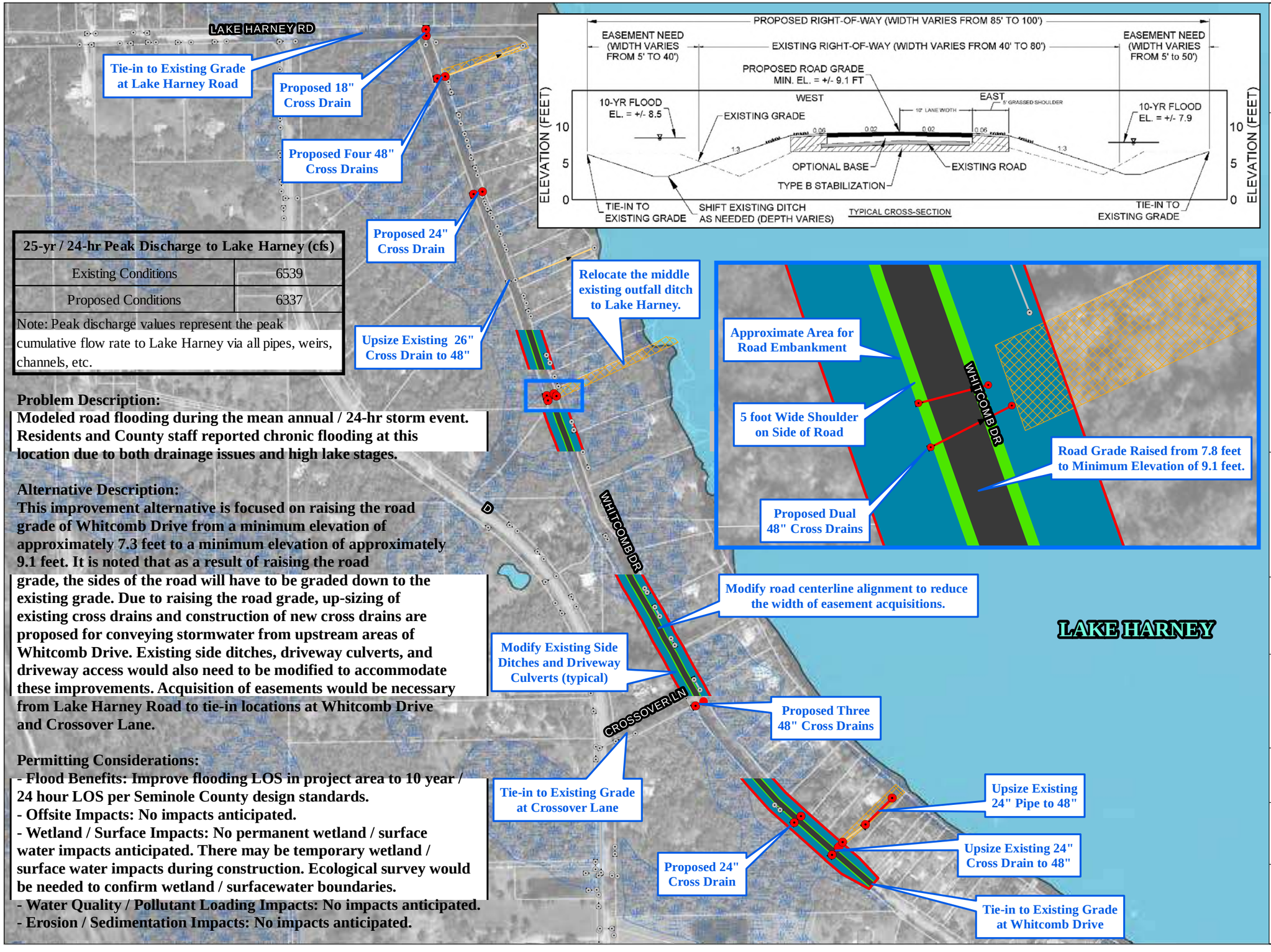
Existing Condition Structure and Road Level of Service

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

Seminole County Florida's Natural Choice

Exhibit 7



25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6337

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.

Problem Description:
Modeled road flooding during the mean annual / 24-hr storm event. Residents and County staff reported chronic flooding at this location due to both drainage issues and high lake stages.

Alternative Description:
This improvement alternative is focused on raising the road grade of Whitcomb Drive from a minimum elevation of approximately 7.3 feet to a minimum elevation of approximately 9.1 feet. It is noted that as a result of raising the road grade, the sides of the road will have to be graded down to the existing grade. Due to raising the road grade, up-sizing of existing cross drains and construction of new cross drains are proposed for conveying stormwater from upstream areas of Whitcomb Drive. Existing side ditches, driveway culverts, and driveway access would also need to be modified to accommodate these improvements. Acquisition of easements would be necessary from Lake Harney Road to tie-in locations at Whitcomb Drive and Crossover Lane.

Permitting Considerations:
- Flood Benefits: Improve flooding LOS in project area to 10 year / 24 hour LOS per Seminole County design standards.
- Offsite Impacts: No impacts anticipated.
- Wetland / Surface Impacts: No permanent wetland / surface water impacts anticipated. There may be temporary wetland / surface water impacts during construction. Ecological survey would be needed to confirm wetland / surfacewater boundaries.
- Water Quality / Pollutant Loading Impacts: No impacts anticipated.
- Erosion / Sedimentation Impacts: No impacts anticipated.

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Proposed Easement
- Proposed Raised Road Grade
- Proposed Road Shoulder
- Proposed Embankment and Ditch
- Proposed Drainage Easement
- Wetlands
- Water
- Existing Drainage Structure
- Existing Culverts
- Existing Ditch Outfall

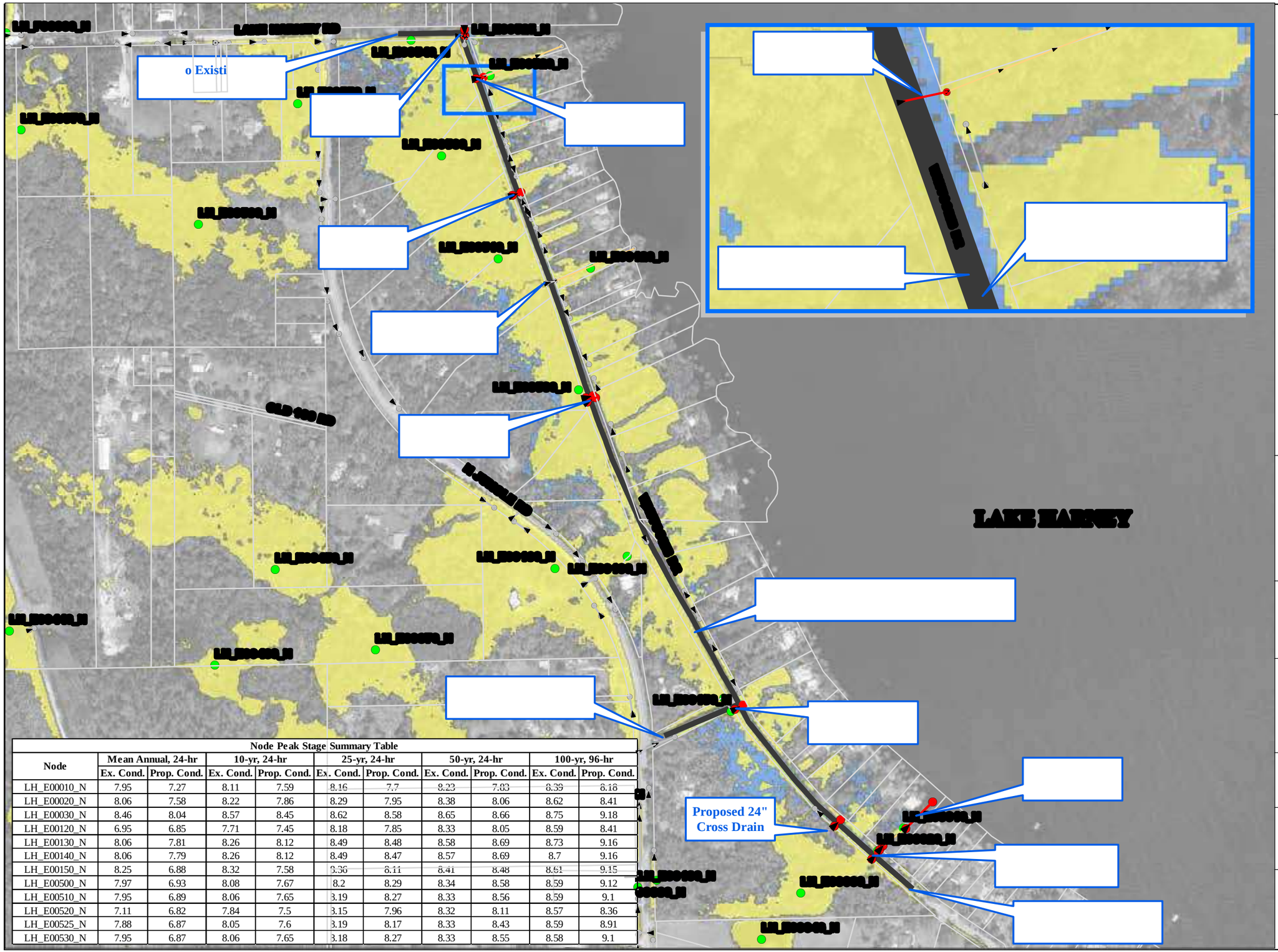
Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Wetlands: SJRWMD, 2018

N
0 200 400 Feet

Exhibit 8
Whitcomb Drive
Improvement Concept

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E08_Whitcomb_Drive_Concept_11x17.mxd	April 2021	NH/MW



Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_E00010_N	7.95	7.27	8.11	7.59	8.16	7.7	8.23	7.83	8.39	8.16
LH_E00020_N	8.06	7.58	8.22	7.86	8.29	7.95	8.38	8.06	8.62	8.41
LH_E00030_N	8.46	8.04	8.57	8.45	8.62	8.58	8.65	8.66	8.75	9.18
LH_E00120_N	6.95	6.85	7.71	7.45	8.18	7.85	8.33	8.05	8.59	8.41
LH_E00130_N	8.06	7.81	8.26	8.12	8.49	8.48	8.58	8.69	8.73	9.16
LH_E00140_N	8.06	7.79	8.26	8.12	8.49	8.47	8.57	8.69	8.7	9.16
LH_E00150_N	8.25	6.88	8.32	7.58	8.36	8.11	8.41	8.48	8.61	9.15
LH_E00500_N	7.97	6.93	8.08	7.67	8.2	8.29	8.34	8.58	8.59	9.12
LH_E00510_N	7.95	6.89	8.06	7.65	8.19	8.27	8.33	8.56	8.59	9.1
LH_E00520_N	7.11	6.82	7.84	7.5	8.15	7.96	8.32	8.11	8.57	8.36
LH_E00525_N	7.88	6.87	8.05	7.6	8.19	8.17	8.33	8.43	8.59	8.91
LH_E00530_N	7.95	6.87	8.06	7.65	8.18	8.27	8.33	8.55	8.58	9.1

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Drainage Structure
- Proposed Culvert
- Proposed Raised Road Grade
- Parcels
- Existing Drainage Structure
- Existing Culverts
- Existing Ditch Outfall

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

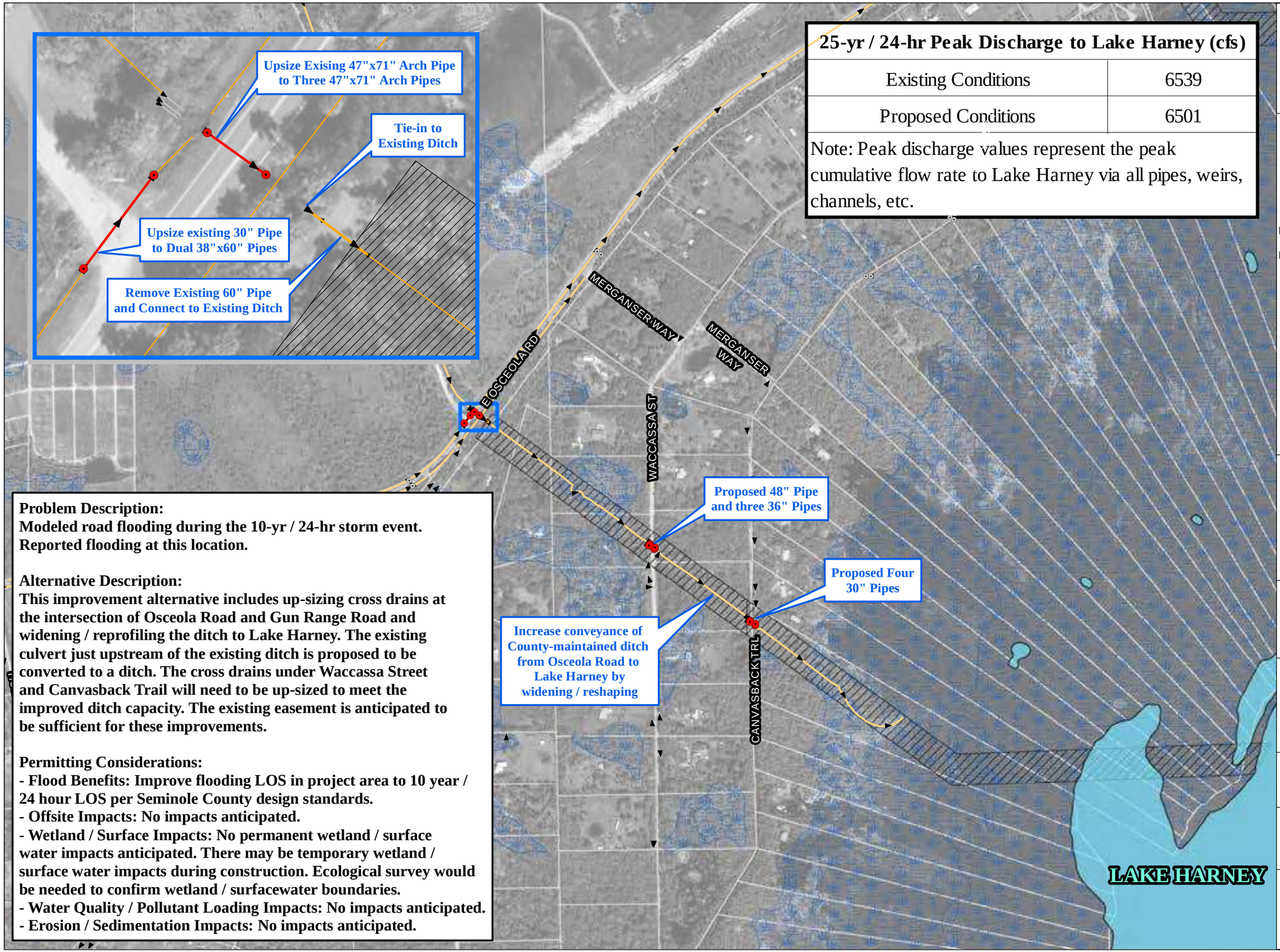
0 200 400 Feet

N

Exhibit 9
Whitcomb Drive
Improvement Concept Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E09_Whitcomb_Drive_Concept_Results_11x17.mxd	April 2021	NH/MW



25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6501

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.

Problem Description:
Modeled road flooding during the 10-yr / 24-hr storm event. Reported flooding at this location.

Alternative Description:
This improvement alternative includes up-sizing cross drains at the intersection of Osceola Road and Gun Range Road and widening / reprofiling the ditch to Lake Harney. The existing culvert just upstream of the existing ditch is proposed to be converted to a ditch. The cross drains under Waccassa Street and Canvasback Trail will need to be up-sized to meet the improved ditch capacity. The existing easement is anticipated to be sufficient for these improvements.

Permitting Considerations:
- Flood Benefits: Improve flooding LOS in project area to 10 year / 24 hour LOS per Seminole County design standards.
- Offsite Impacts: No impacts anticipated.
- Wetland / Surface Impacts: No permanent wetland / surface water impacts anticipated. There may be temporary wetland / surface water impacts during construction. Ecological survey would be needed to confirm wetland / surfacewater boundaries.
- Water Quality / Pollutant Loading Impacts: No impacts anticipated.
- Erosion / Sedimentation Impacts: No impacts anticipated.

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- Proposed Drainage Structure

Proposed Conveyance

- Culvert
- Ditch
- Easements
- Wetlands
- Water
- Parcels
- Existing Drainage Structure
- Existing Culverts
- Existing Canal

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Easements: Seminole County, 2005
Wetlands: SJRWMD, 2018

N
0 300 600
Feet

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Exhibit 10
Osceola Road Ditch
Improvement Concept

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E10_Osceola_GunRange_Concept_11x17	April 2021	MW

Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_H00010_N	7.11	7.17	7.26	7.29	7.34	7.37	7.38	7.40	7.46	7.49
LH_H00020_N	8.14	8.23	8.43	8.46	8.61	8.62	8.69	8.70	8.89	8.90
LH_H00030_N	8.62	8.67	8.85	8.86	8.99	9.00	9.07	9.07	9.26	9.27
LH_H00040_N	9.11	9.16	9.45	9.31	9.68	9.45	9.78	9.52	9.97	9.72
LH_H00050_N	9.54	9.73	9.93	9.87	10.19	10.00	10.30	10.07	10.52	10.28
LH_H00150_N	10.00	10.10	10.72	10.34	10.84	10.50	10.89	10.56	11.00	10.72
LH_H00170_N	10.23	11.09	10.83	11.17	10.94	11.23	10.99	11.26	11.11	11.35
LH_H00180_N	10.70	12.10	11.16	12.32	11.32	12.42	11.41	12.47	11.69	12.65
LH_H00190_N	11.13	12.69	11.50	13.03	11.64	13.18	11.72	13.24	11.93	13.50
LH_H00200_N	14.86	12.90	15.21	13.46	15.38	13.72	15.44	13.83	15.57	14.28
LH_H00210_N	15.41	13.20	15.82	14.22	15.92	15.19	15.96	15.57	16.04	15.81
LH_H00260_N	15.47	13.89	15.87	14.56	15.98	15.38	16.03	15.70	16.13	15.95
LH_H00430_N	15.43	13.41	15.87	14.77	15.99	15.49	16.04	15.73	16.15	15.98

LH_H00280_N
LH_H00270_N
GUN RANGE RD
LH_H00220_N
LH_H00260_N
LH_H00210_N
LH_H00200_N
LH_H00430_N
LH_H00190_N
LH_H00180_N
LH_H00440_N
LH_H00130_N
LH_H00160_N
LH_H00450_N
E OSCEOLA RD
LH_H00170_N
LH_H00140_N
LH_H00150_N
LH_H00050_N
LH_H00040_N
LH_H00070_N
LH_H00060_N
LH_H00030_N
LH_H00020_N
LH_H00010_N
LH_H00090_N
LH_H00080_N
LH_G00450_N
WAC
CANVASBACK TRL
DEVANY CT
SETTLERS LOOP
SUTTON TRL
LH_H00120_N
LH_G00510_N
LH_G00500_N
LH_H00110_N
LH_G00490_N
LH_H00100_N
LH_G00520_N
LH_G00470_N
LH_G00480_N
LH_G00460_N

Proposed 48" Pipe and three 36" Pipes

Increase conveyance of County-maintained ditch from Osceola Road to Lake Harney by widening / reshaping

Proposed Four 30" Pipes

Proposed Three 47"x71" Arch Pipes

Proposed Dual 38"x60" Pipes

Proposed Ditch

LAKE HARNEY

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Drainage Structure

Proposed Conveyance

- Culvert
- Ditch
- Parcels
- Existing Drainage Structure
- Existing Culverts
- Existing Canal

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

N
0 160 320
Feet

Exhibit 11
Osceola Road Ditch
Improvement Concept Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E11_Osceola_GunRange_Concept_Results_11x17.mxd	April 2021	MW

25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6558

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.

LAKE HARNEY

LAKE HARNEY CIR

MARION AVE

REST HAVEN RD

Replaced exist. 24" RCP with 34"x53" ERCP

Acquire easement

Replace exist. 30" RCP with 34"x53" ERCP

Regrade exist. roadside ditch to Lake Harney outfall pipe

Proposed 34"x53" ERCP

Proposed Dual 29x45" ERCP

Replace exist. 30" RCP with dual 36" RCP

Replace exist. 24" PVC with dual 36" RCP

Acquire easement

Replace exist. 36" PVC with dual 36" RCP

Replace exist. 30" RCP with dual 36" RCP

Replace exist. 30" PVC with dual 48" RCP (outfall to Lake Harney)

Problem Description: Modeled road flooding during the mean annual / 24-hour storm event. Residents and County staff reported chronic flooding at this location due to both drainage issues and high lake stages.

Alternative Description: Install additional cross drains under Rest Haven Road and Lake Harney Circle. Install additional side drains and regrade existing roadside ditch along Marion Avenue and Lake Harney Circle. Install additional outfall pipe to Lake Harney. Acquire easements as needed to construct improvements.

Permit Considerations:
- Flood Benefits: Prevents flooding of Lake Harney Circle and Marion Avenue in 10-year / 24-hour storm. Flood elevations are reduced so Rest Haven Road is passable.
-Offsite Impact Evaluation: Based on detailed modeling, no increases to downstream peak stages. The 25-year / 24-hour peak flow to Lake Harney increases by 19 cfs.
- Wetland / Surface Water Impacts: Temporary impacts during construction.
- Water Quality / Pollutant Loading Impacts: No additional impervious area is proposed, so no impacts anticipated.

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- Easements to Acquire
- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Existing Easement
- Existing Drainage Structure
- Existing Culverts
- Existing Ditch
- Wetlands
- Water

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Wetlands/Waterbodies: SJRWMD, 2018

N

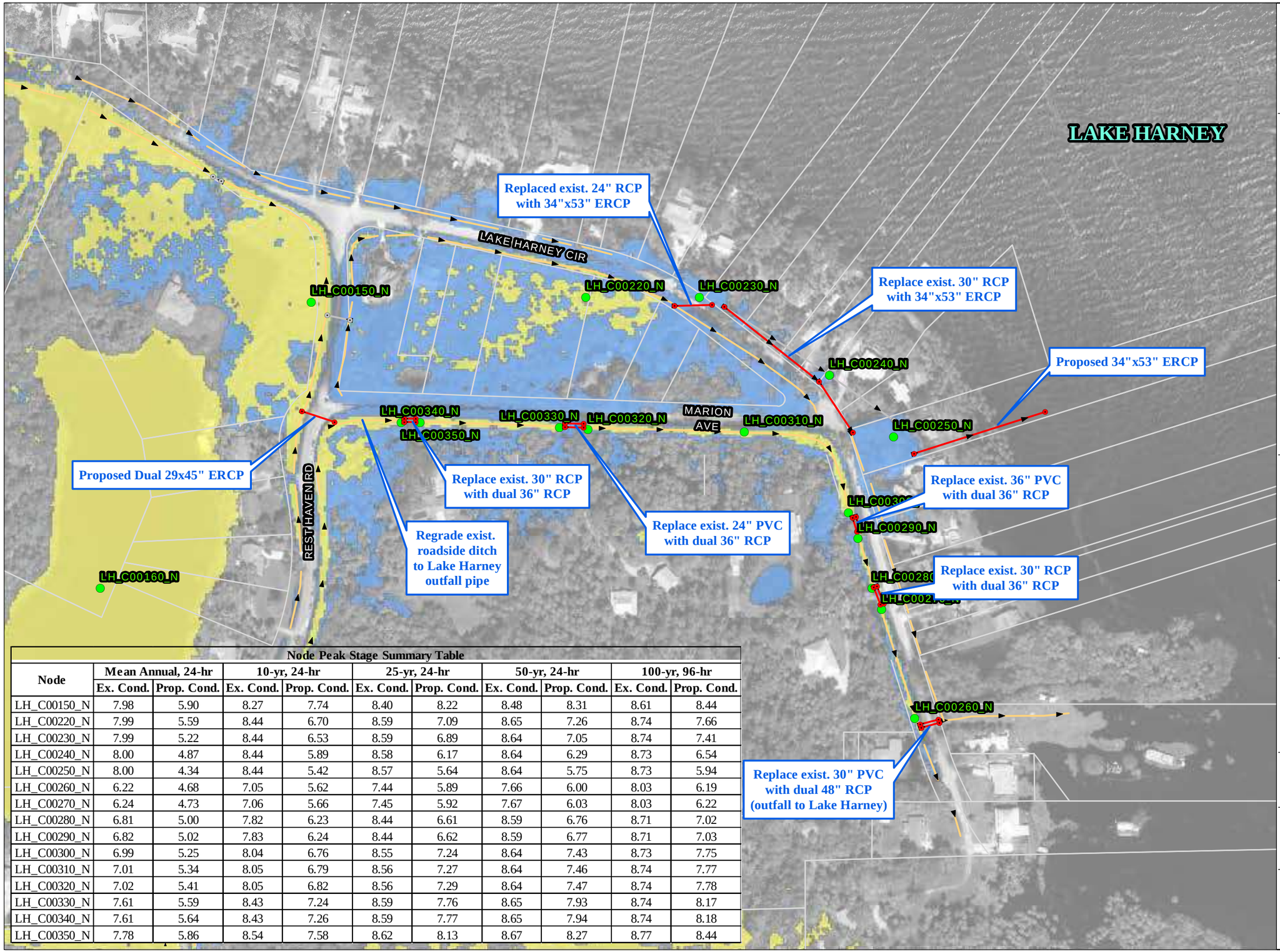
0 100 200 Feet

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Exhibit 12
Lake Harney Circle
Improvement Concept 1

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E12_Lake_Harney_Cir_Concept1_11x17.mxd	April 2021	MW



Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_C00150_N	7.98	5.90	8.27	7.74	8.40	8.22	8.48	8.31	8.61	8.44
LH_C00220_N	7.99	5.59	8.44	6.70	8.59	7.09	8.65	7.26	8.74	7.66
LH_C00230_N	7.99	5.22	8.44	6.53	8.59	6.89	8.64	7.05	8.74	7.41
LH_C00240_N	8.00	4.87	8.44	5.89	8.58	6.17	8.64	6.29	8.73	6.54
LH_C00250_N	8.00	4.34	8.44	5.42	8.57	5.64	8.64	5.75	8.73	5.94
LH_C00260_N	6.22	4.68	7.05	5.62	7.44	5.89	7.66	6.00	8.03	6.19
LH_C00270_N	6.24	4.73	7.06	5.66	7.45	5.92	7.67	6.03	8.03	6.22
LH_C00280_N	6.81	5.00	7.82	6.23	8.44	6.61	8.59	6.76	8.71	7.02
LH_C00290_N	6.82	5.02	7.83	6.24	8.44	6.62	8.59	6.77	8.71	7.03
LH_C00300_N	6.99	5.25	8.04	6.76	8.55	7.24	8.64	7.43	8.73	7.75
LH_C00310_N	7.01	5.34	8.05	6.79	8.56	7.27	8.64	7.46	8.74	7.77
LH_C00320_N	7.02	5.41	8.05	6.82	8.56	7.29	8.64	7.47	8.74	7.78
LH_C00330_N	7.61	5.59	8.43	7.24	8.59	7.76	8.65	7.93	8.74	8.17
LH_C00340_N	7.61	5.64	8.43	7.26	8.59	7.77	8.65	7.94	8.74	8.18
LH_C00350_N	7.78	5.86	8.54	7.58	8.62	8.13	8.67	8.27	8.77	8.44

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Existing Drainage Structure
- Existing Culverts
- Existing Ditch

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

0 100 200 Feet

N

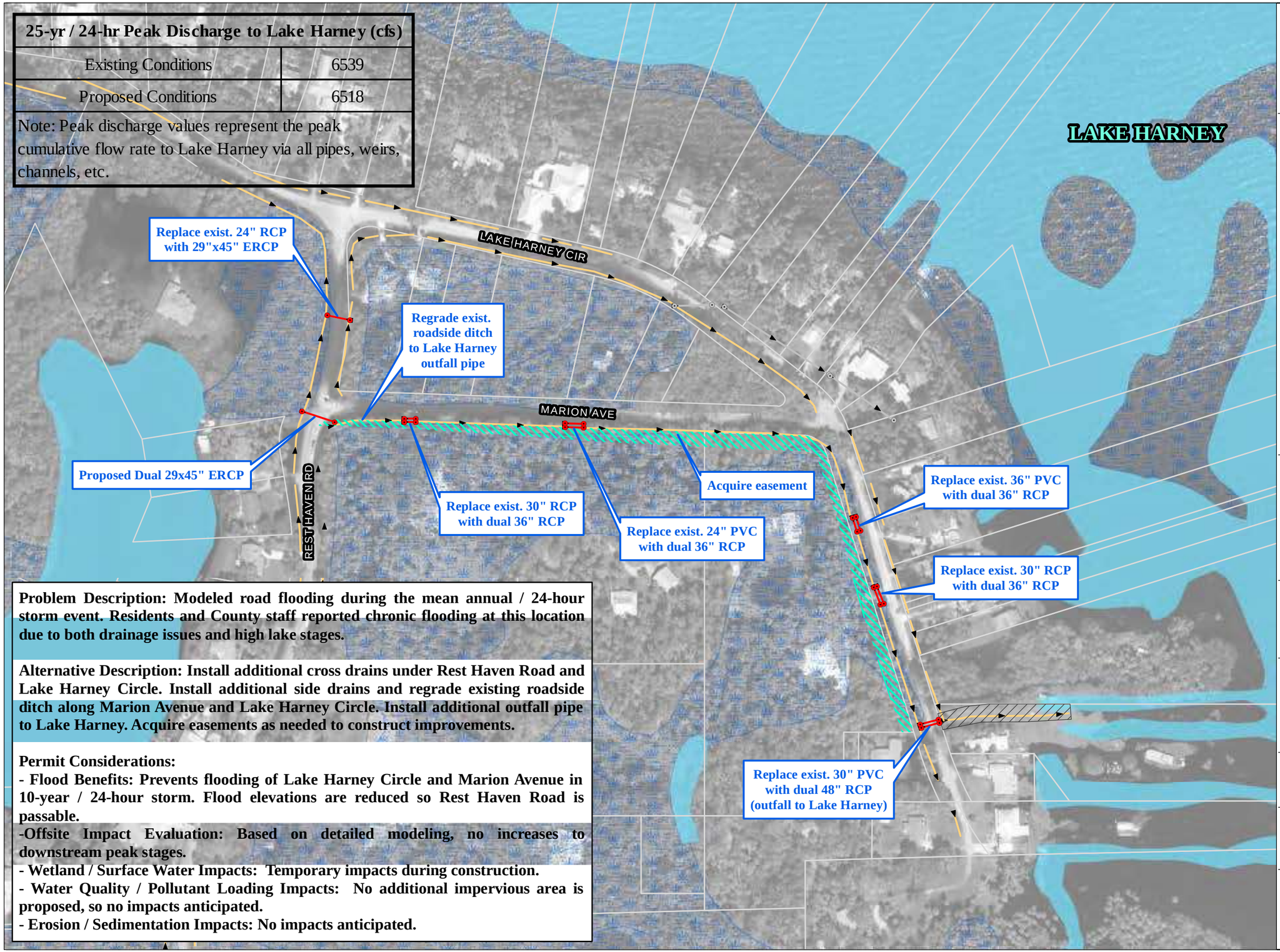
Exhibit 13
Lake Harney Circle
Improvement Concept 1 Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E13_Lake_Harney_Cir_Concept1_Results_11x17.mxd	April 2021	MW

25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6518

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.



Problem Description: Modeled road flooding during the mean annual / 24-hour storm event. Residents and County staff reported chronic flooding at this location due to both drainage issues and high lake stages.

Alternative Description: Install additional cross drains under Rest Haven Road and Lake Harney Circle. Install additional side drains and regrade existing roadside ditch along Marion Avenue and Lake Harney Circle. Install additional outfall pipe to Lake Harney. Acquire easements as needed to construct improvements.

Permit Considerations:
- Flood Benefits: Prevents flooding of Lake Harney Circle and Marion Avenue in 10-year / 24-hour storm. Flood elevations are reduced so Rest Haven Road is passable.
-Offsite Impact Evaluation: Based on detailed modeling, no increases to downstream peak stages.
- Wetland / Surface Water Impacts: Temporary impacts during construction.
- Water Quality / Pollutant Loading Impacts: No additional impervious area is proposed, so no impacts anticipated.
- Erosion / Sedimentation Impacts: No impacts anticipated.

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Easements to Acquire
- Existing Easement
- Existing Drainage Structure
- Existing Culverts
- Existing Ditch
- Wetlands
- Water

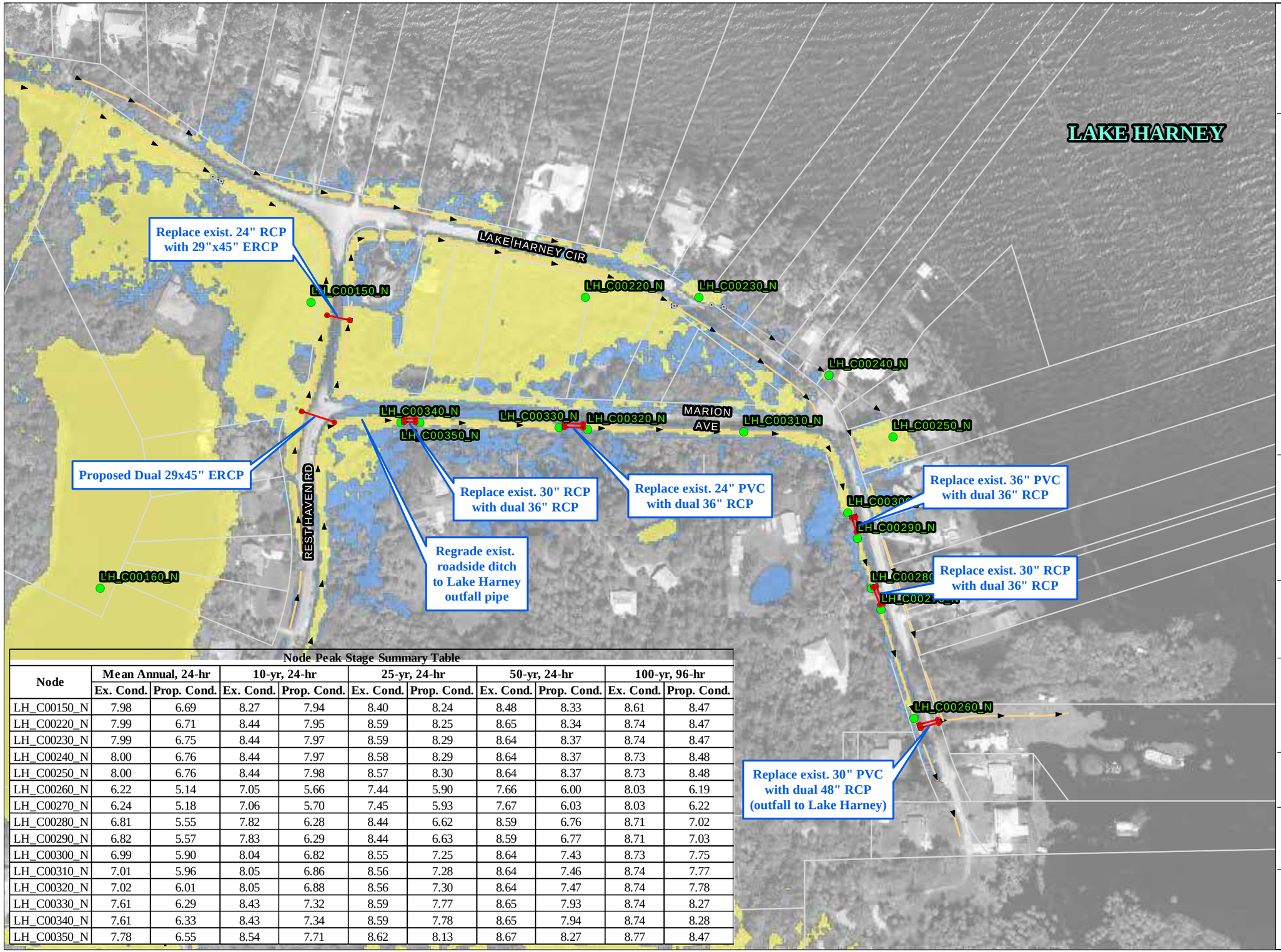
Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Wetlands/Waterbodies: SJRWMD, 2018

N
0 100 200 Feet

Exhibit 14
Lake Harney Circle
Improvement Concept 2

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E14_Lake_Harney_Cir_Concept2_11x17.mxd	April 2021	MW



Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_C00150_N	7.98	6.69	8.27	7.94	8.40	8.24	8.48	8.33	8.61	8.47
LH_C00220_N	7.99	6.71	8.44	7.95	8.59	8.25	8.65	8.34	8.74	8.47
LH_C00230_N	7.99	6.75	8.44	7.97	8.59	8.29	8.64	8.37	8.74	8.47
LH_C00240_N	8.00	6.76	8.44	7.97	8.58	8.29	8.64	8.37	8.73	8.48
LH_C00250_N	8.00	6.76	8.44	7.98	8.57	8.30	8.64	8.37	8.73	8.48
LH_C00260_N	6.22	5.14	7.05	5.66	7.44	5.90	7.66	6.00	8.03	6.19
LH_C00270_N	6.24	5.18	7.06	5.70	7.45	5.93	7.67	6.03	8.03	6.22
LH_C00280_N	6.81	5.55	7.82	6.28	8.44	6.62	8.59	6.76	8.71	7.02
LH_C00290_N	6.82	5.57	7.83	6.29	8.44	6.63	8.59	6.77	8.71	7.03
LH_C00300_N	6.99	5.90	8.04	6.82	8.55	7.25	8.64	7.43	8.73	7.75
LH_C00310_N	7.01	5.96	8.05	6.86	8.56	7.28	8.64	7.46	8.74	7.77
LH_C00320_N	7.02	6.01	8.05	6.88	8.56	7.30	8.64	7.47	8.74	7.78
LH_C00330_N	7.61	6.29	8.43	7.32	8.59	7.77	8.65	7.93	8.74	8.27
LH_C00340_N	7.61	6.33	8.43	7.34	8.59	7.78	8.65	7.94	8.74	8.28
LH_C00350_N	7.78	6.55	8.54	7.71	8.62	8.13	8.67	8.27	8.77	8.47

Geosyntec consultants
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Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Existing Drainage Structure
- Existing Culverts
- Existing Ditch

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

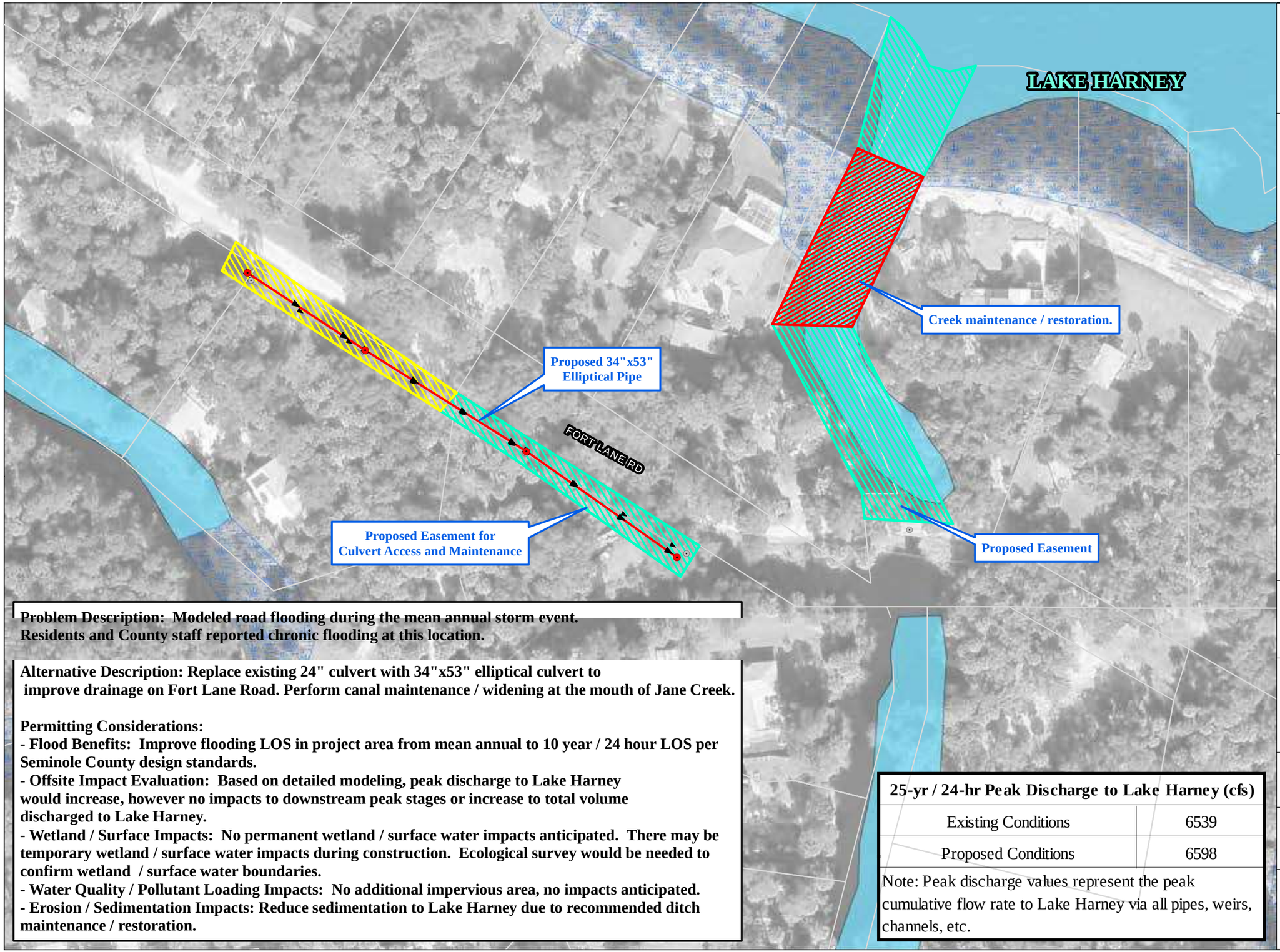
N

0 100 200 Feet

Exhibit 15
Lake Harney Circle
Improvement Concept 2 Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E15_Lake_Harney_Cir_Concept2_Results_11x17.mxd	April 2021	MW



Problem Description: Modeled road flooding during the mean annual storm event. Residents and County staff reported chronic flooding at this location.

Alternative Description: Replace existing 24" culvert with 34"x53" elliptical culvert to improve drainage on Fort Lane Road. Perform canal maintenance / widening at the mouth of Jane Creek.

Permitting Considerations:
- Flood Benefits: Improve flooding LOS in project area from mean annual to 10 year / 24 hour LOS per Seminole County design standards.
- Offsite Impact Evaluation: Based on detailed modeling, peak discharge to Lake Harney would increase, however no impacts to downstream peak stages or increase to total volume discharged to Lake Harney.
- Wetland / Surface Impacts: No permanent wetland / surface water impacts anticipated. There may be temporary wetland / surface water impacts during construction. Ecological survey would be needed to confirm wetland / surface water boundaries.
- Water Quality / Pollutant Loading Impacts: No additional impervious area, no impacts anticipated.
- Erosion / Sedimentation Impacts: Reduce sedimentation to Lake Harney due to recommended ditch maintenance / restoration.

25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6598

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.

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Orlando, FL 32817

Legend

- Proposed Drainage Structure
- Proposed Culvert
- Proposed Easement
- Creek Maintenance / Widening
- Existing Easement
- Parcels
- Existing Drainage Structures
- Existing Culverts
- Wetlands
- Water

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Wetlands & Surface Water: SJRWMD, 2018

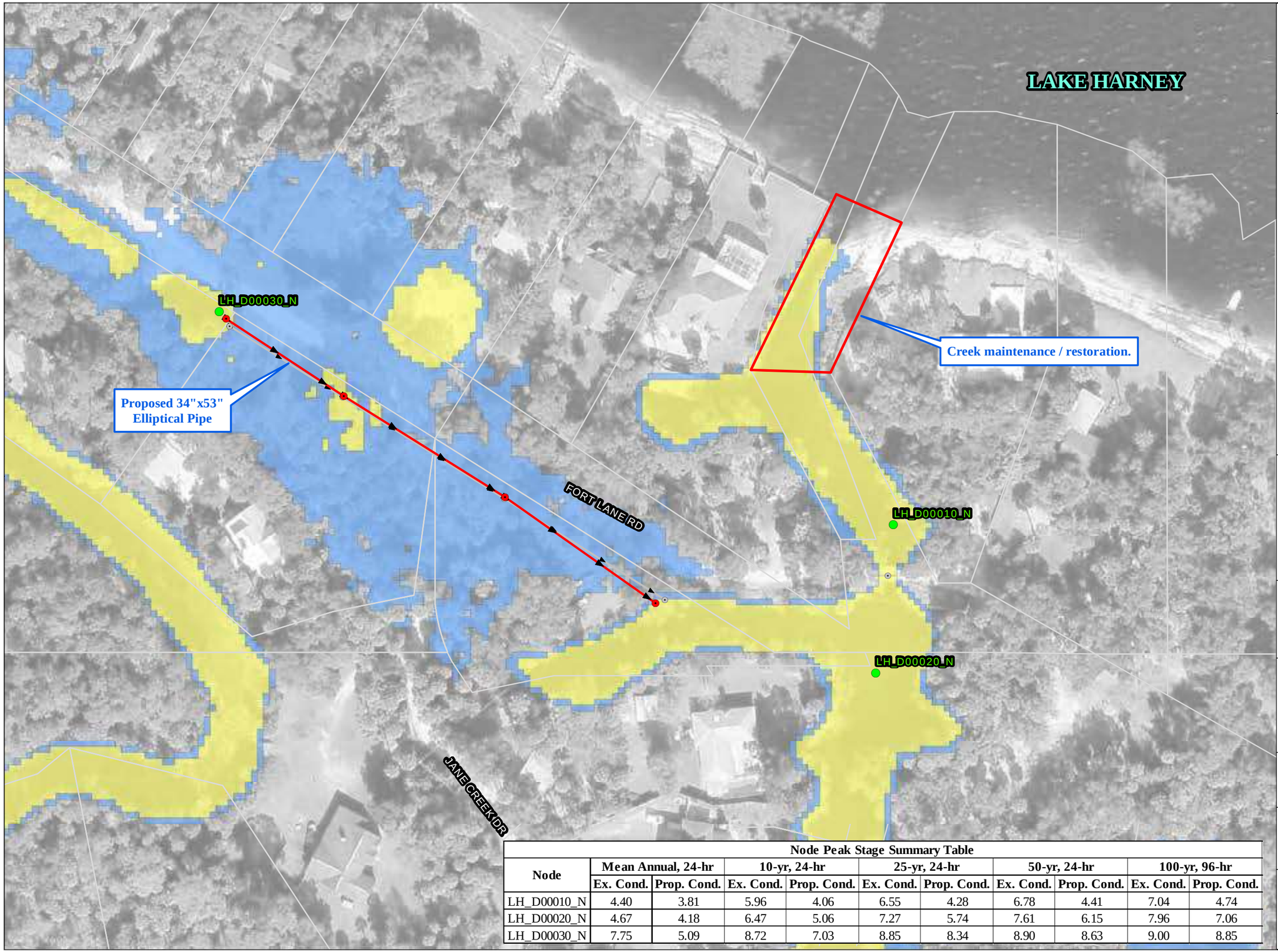
0 40 80 Feet

N

Exhibit 16
Fort Lane Road and Jane Creek Improvement Concept 1

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E16_FortLane_and_JanesCreek_Concept1_11x17.mxd	April 2021	NH



Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_D00010_N	4.40	3.81	5.96	4.06	6.55	4.28	6.78	4.41	7.04	4.74
LH_D00020_N	4.67	4.18	6.47	5.06	7.27	5.74	7.61	6.15	7.96	7.06
LH_D00030_N	7.75	5.09	8.72	7.03	8.85	8.34	8.90	8.63	9.00	8.85

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Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Drainage Structure
- Proposed Culvert
- Creek Maintenance / Widening
- Parcels
- Existing Drainage Structures
- Existing Culverts

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

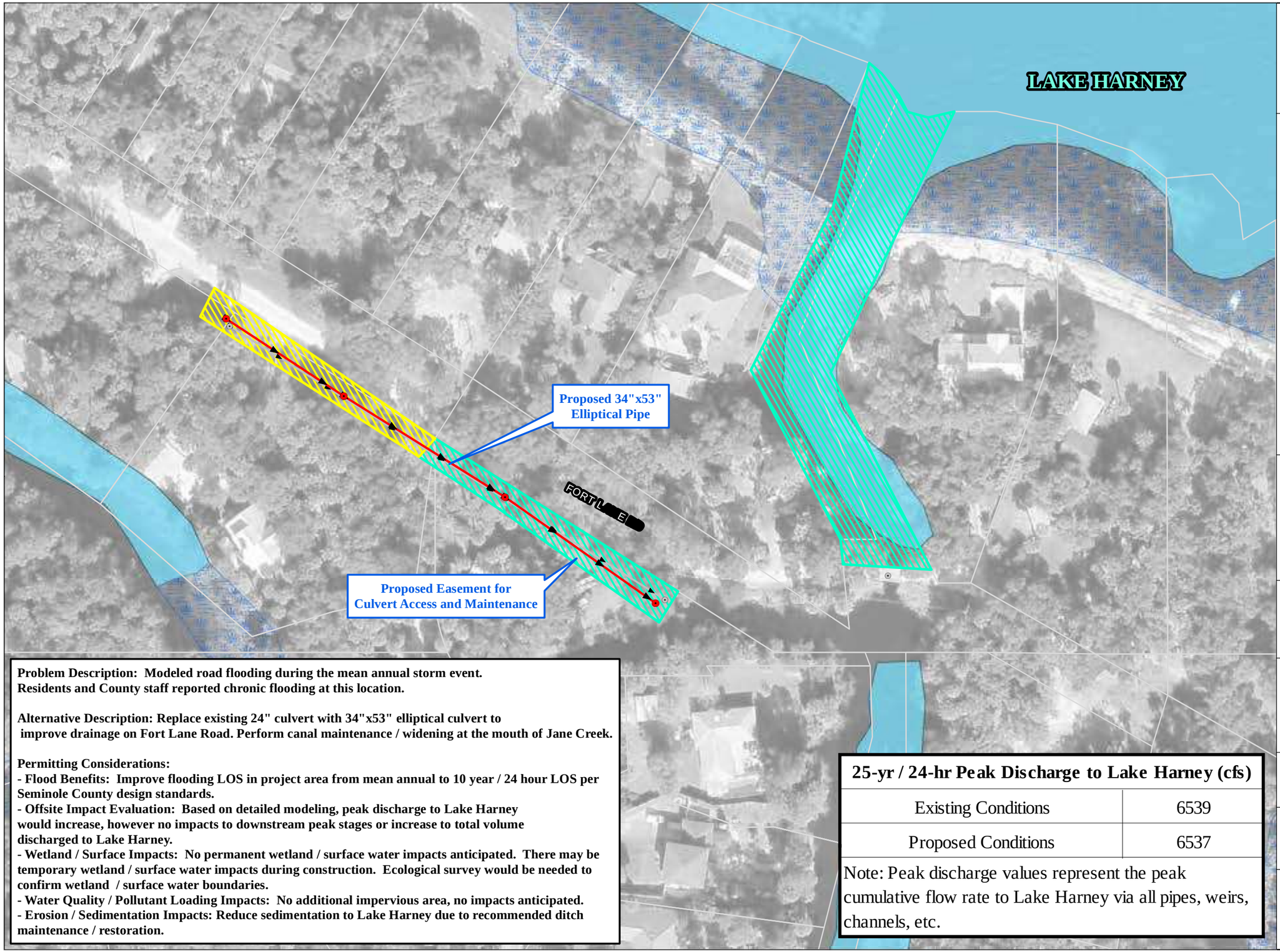
0 40 80 Feet

N

Exhibit 17
Fort Lane Road and Jane Creek
Improvement Concept 1 Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E17_FortLane_and_JanesCreek_Concept1_Results_11x17.mxd	April 2021	NH



Problem Description: Modeled road flooding during the mean annual storm event. Residents and County staff reported chronic flooding at this location.

Alternative Description: Replace existing 24" culvert with 34"x53" elliptical culvert to improve drainage on Fort Lane Road. Perform canal maintenance / widening at the mouth of Jane Creek.

Permitting Considerations:
- Flood Benefits: Improve flooding LOS in project area from mean annual to 10 year / 24 hour LOS per Seminole County design standards.
- Offsite Impact Evaluation: Based on detailed modeling, peak discharge to Lake Harney would increase, however no impacts to downstream peak stages or increase to total volume discharged to Lake Harney.
- Wetland / Surface Impacts: No permanent wetland / surface water impacts anticipated. There may be temporary wetland / surface water impacts during construction. Ecological survey would be needed to confirm wetland / surface water boundaries.
- Water Quality / Pollutant Loading Impacts: No additional impervious area, no impacts anticipated.
- Erosion / Sedimentation Impacts: Reduce sedimentation to Lake Harney due to recommended ditch maintenance / restoration.

25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6537

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.

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Orlando, FL 32817

Legend

- Proposed Drainage Structure
- Proposed Culvert
- Proposed Easement
- Existing Easement
- Parcels
- Existing Drainage Structures
- Existing Culverts
- Wetlands
- Water

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Wetlands & Surface Water: SJRWMD, 2018

N
0 40 80
Feet

Exhibit 18
Fort Lane Road and Jane Creek Improvement Concept 2

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E18_FortLane_and_JanesCreek_Concept2_11x17.mxd	April 2021	NH

Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_D00010_N	4.40	4.47	5.96	6.02	6.55	6.54	6.78	6.77	7.04	7.03
LH_D00020_N	4.67	4.77	6.47	6.56	7.27	7.26	7.61	7.59	7.96	7.95
LH_D00030_N	7.75	5.11	8.72	7.90	8.85	8.63	8.90	8.76	9.00	8.90

Geosyntec consultants
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Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Existing Drainage Structures
- Existing Culverts

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

N

0 40 80 Feet

Exhibit 19
Fort Lane Road and Jane Creek
Improvement Concept 2 Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E19_FortLane_and_JanesCreek_Concept2_Results_11x17.mxd	April 2021	NH

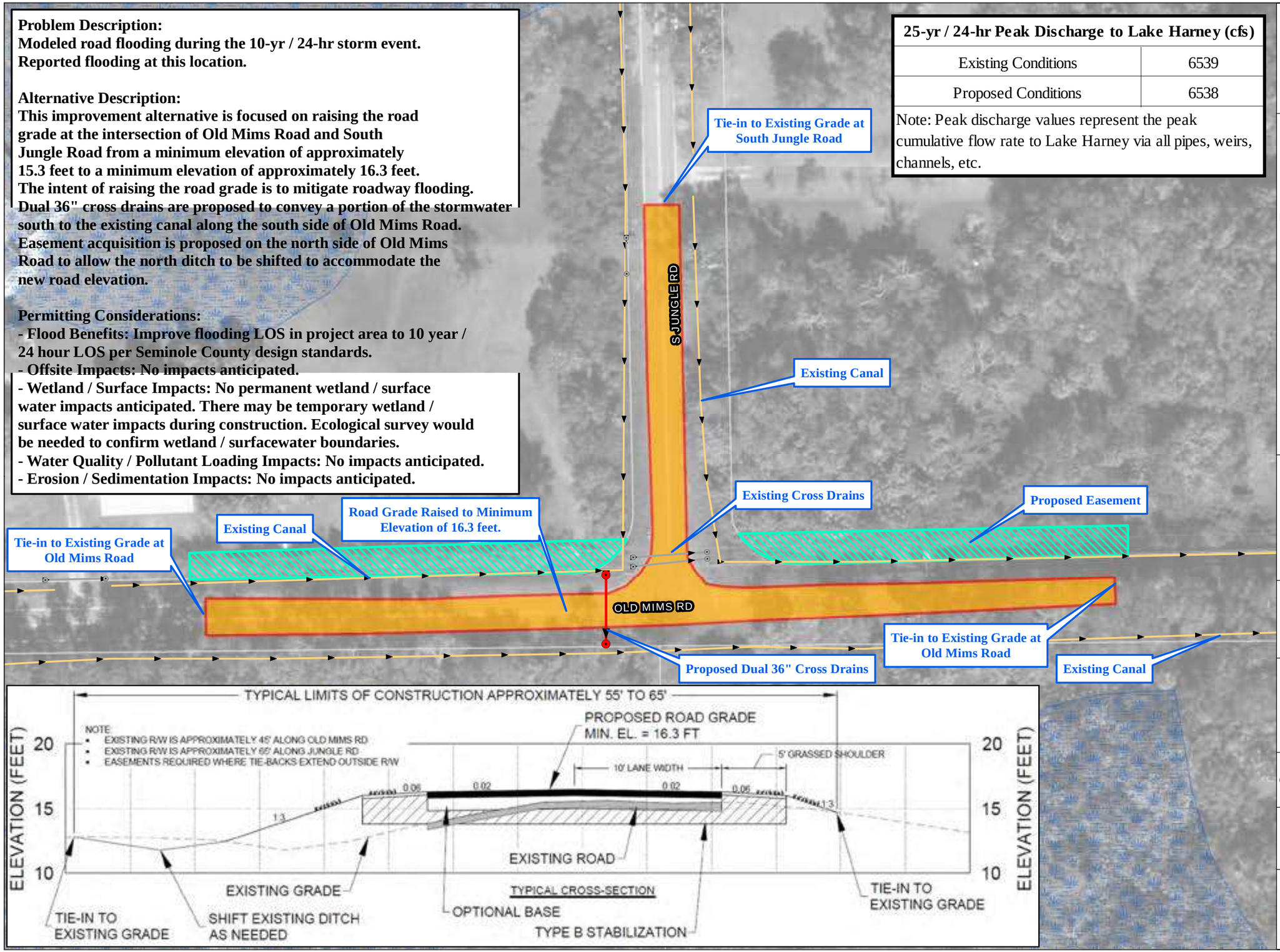
Problem Description:
Modeled road flooding during the 10-yr / 24-hr storm event.
Reported flooding at this location.

Alternative Description:
This improvement alternative is focused on raising the road grade at the intersection of Old Mims Road and South Jungle Road from a minimum elevation of approximately 15.3 feet to a minimum elevation of approximately 16.3 feet. The intent of raising the road grade is to mitigate roadway flooding. Dual 36" cross drains are proposed to convey a portion of the stormwater south to the existing canal along the south side of Old Mims Road. Easement acquisition is proposed on the north side of Old Mims Road to allow the north ditch to be shifted to accommodate the new road elevation.

Permitting Considerations:
- Flood Benefits: Improve flooding LOS in project area to 10 year / 24 hour LOS per Seminole County design standards.
- Offsite Impacts: No impacts anticipated.
- Wetland / Surface Impacts: No permanent wetland / surface water impacts anticipated. There may be temporary wetland / surface water impacts during construction. Ecological survey would be needed to confirm wetland / surfacewater boundaries.
- Water Quality / Pollutant Loading Impacts: No impacts anticipated.
- Erosion / Sedimentation Impacts: No impacts anticipated.

25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6538

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.



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Legend
- Proposed Raised Road Grade
- Proposed Drainage Structure
- Proposed Culvert
- Proposed Easement
- Parcels
- Wetlands
- Existing Drainage Structure
- Existing Culverts
- Existing Canal

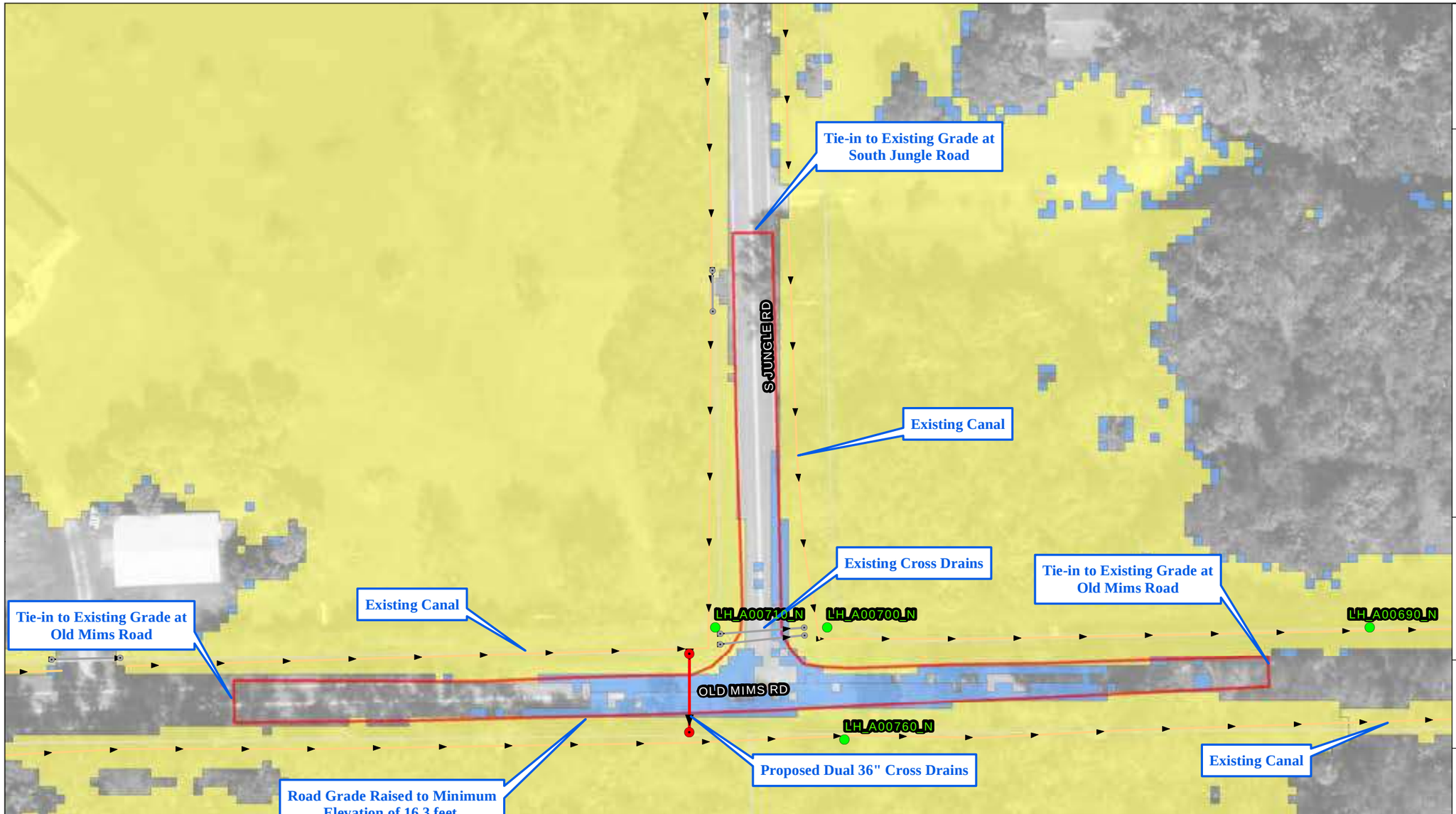
Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Wetlands: SJRWMD, 2018

N
0 30 60
Feet

Exhibit 20
Old Mims Road and South Jungle Road Improvement Concept 1

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E20_Old_Mims_Jungle_Concept1_11x17.mxd	April 2021	NH



Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_A00690_N	14.75	14.56	15.73	15.60	16.27	16.17	16.42	16.39	16.65	16.63
LH_A00700_N	14.76	14.57	15.73	15.60	16.27	16.17	16.42	16.39	16.65	16.63
LH_A00710_N	14.83	14.62	15.79	15.75	16.28	16.31	16.42	16.46	16.66	16.73
LH_A00760_N	14.54	14.61	15.75	15.75	16.28	16.29	16.42	16.46	16.66	16.73

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Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Raised Road Grade
- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Existing Drainage Structure
- Existing Culverts
- Existing Canal

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

N

0 30 60 Feet

Exhibit 21
Old Mims Road and South Jungle Road Improvement Concept 1 Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E21_Old_Mims_Jungle_Concept1_Results_11x17.mxd	April 2021	NH

Problem Description:
Modeled road flooding during the 10-yr / 24-hr storm event.

Alternative Description:
Dual 29"x45" cross drains are proposed to convey a portion of the stormwater south to the existing canal along the south side of Old Mims Road.

Permitting Considerations:
- Flood Benefits: Decrease extent and severity of flooding.
- Offsite Impacts: No impacts anticipated.
- Wetland / Surface Impacts: No permanent wetland / surface water impacts anticipated. There may be temporary wetland / surface water impacts during construction. Ecological survey would be needed to confirm wetland / surfacewater boundaries.
- Water Quality / Pollutant Loading Impacts: No impacts anticipated.
- Erosion / Sedimentation Impacts: No impacts anticipated.

25-yr / 24-hr Peak Discharge to Lake Harney (cfs)	
Existing Conditions	6539
Proposed Conditions	6539

Note: Peak discharge values represent the peak cumulative flow rate to Lake Harney via all pipes, weirs, channels, etc.

S JUNGLE RD

OLD MIMS RD

Existing Canal

Existing Cross Drains

Existing Canal

Proposed Dual 29"x45" Cross Drains

Existing Canal

Geosyntec consultants
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Orlando, FL 32817

Legend
- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Wetlands
- Existing Drainage Structure
- Existing Culverts
- Existing Canal

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019
Wetlands: SJRWMD, 2018

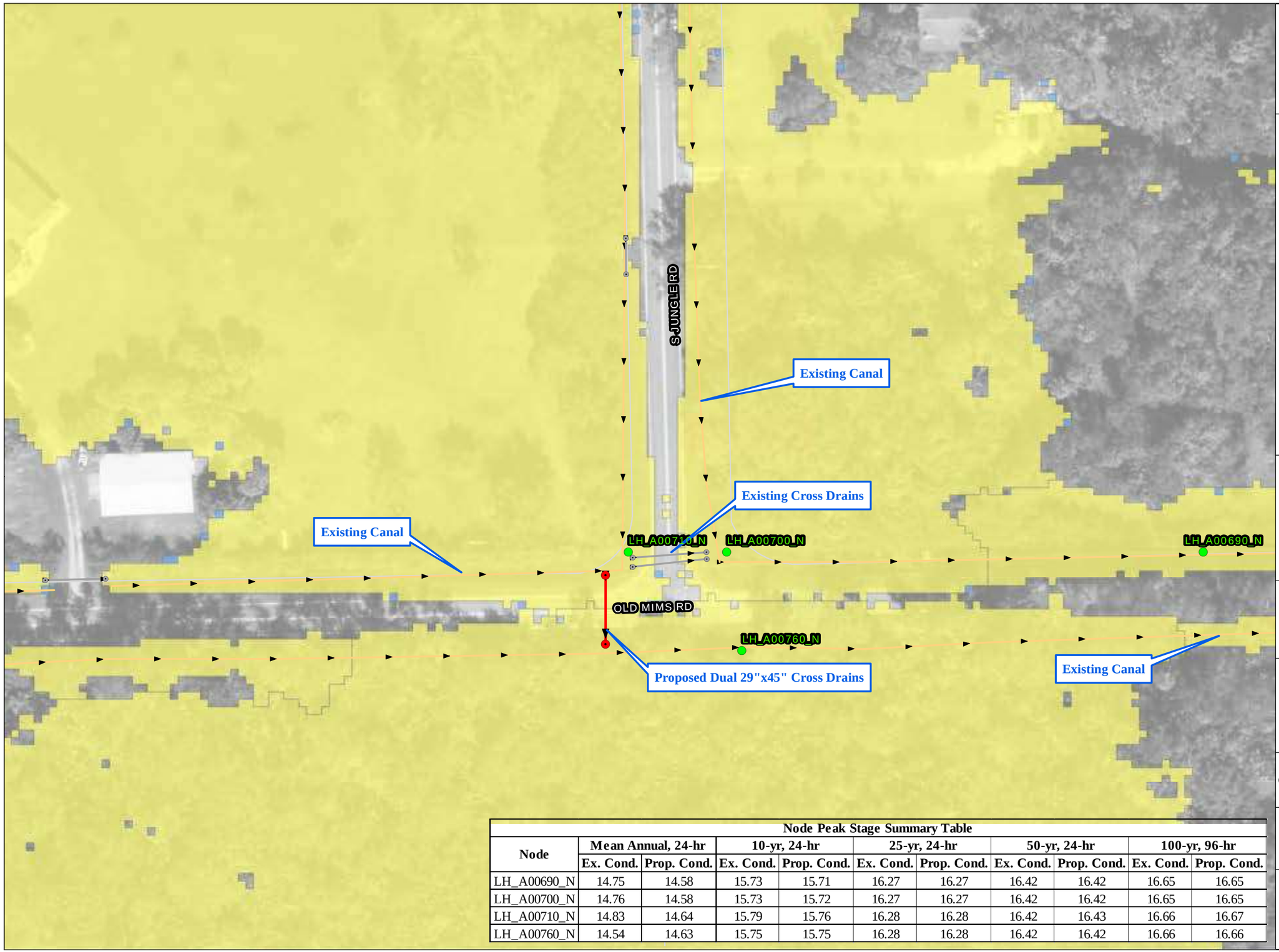
0 30 60 Feet

N

Exhibit 22
Old Mims Road and South Jungle Road Improvement Concept 2

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E22_Old_Mims_Jungle_Concept2_11x17.mxd	April 2021	NH



Node Peak Stage Summary Table

Node	Mean Annual, 24-hr		10-yr, 24-hr		25-yr, 24-hr		50-yr, 24-hr		100-yr, 96-hr	
	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.	Ex. Cond.	Prop. Cond.
LH_A00690_N	14.75	14.58	15.73	15.71	16.27	16.27	16.42	16.42	16.65	16.65
LH_A00700_N	14.76	14.58	15.73	15.72	16.27	16.27	16.42	16.42	16.65	16.65
LH_A00710_N	14.83	14.64	15.79	15.76	16.28	16.28	16.42	16.43	16.66	16.67
LH_A00760_N	14.54	14.63	15.75	15.75	16.28	16.28	16.42	16.42	16.66	16.66

Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817

Legend

- ICPR Nodes
- Proposed Drainage Structure
- Proposed Culvert
- Parcels
- Existing Drainage Structure
- Existing Culverts
- Existing Canal

10-year, 24-hour Floodplain

- Existing Condition
- Improvement Concept

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
Infrastructure: Seminole County, 2019

0 30 60 Feet

N

Exhibit 23
Old Mims Road and South Jungle Road Improvement Concept 2 Results

Lake Harney Basin
Watershed Flood Resiliency Plan

Filename:	Map Date:	Map Prepared By:
E23_Old_Mims_Jungle_Concept2_Results_11x17.mxd	April 2021	NH

FEMA Floodzones	
Floodzone	**Description**
A	Areas with 1% annual chance of flooding. Base flood elevations (BFE) are not available for these zones.
AE	Areas with 1% annual chance of flooding. BFE and flood hazard factors are determined.

Floodplain Comparison Summary[1]	
Source	**Area (ac)**
FEMA SFHA (2007)	2,330
Proposed revised floodplains (100-yr/96-hr delineated floodplain and revised Lake Harney / SJR floodplain based on updated topographic data)	3,886

1 - Comparison of floodplain extents limited to area within study area

Tie back into existing floodplain

Revisions stop at county boundary

Revisions stop at county boundary

Revisions stop at county boundary

Tie back into existing floodplain

Le Fils Slough

St Johns River

Lake Harney

Harts Lake

Lake Geneva

Upper Lake Proctor

Still Lake

Moran Lake

Lower Lake Proctor

Buck Lake

Big Run

Geneva Pond

Econlockhatchee River

Mills Creek

St Johns River

CYPRESS BND
GATOR GROWL TRL
CYPRESS SLOUGH WAY
SAGE BRUSH LN
CHARLIE B CV
RIVER FR INTTRL
SUN VIEW PT
WILD TURKEY RUN
PINE KNOB LN
RITCHIE RD
OSCEOLA FISH CAMP RD
GUN RANGE RD
BOWLEGS TRL
WITHLACOOCHEE PT
MERGANSER WAY
WACCASSA ST
CANVASBACK TRL
DEVANY CT
HOLDER LN
E OSCEOLA RD
INDIAN CYPRESS TRL
SCOOTER PT
BURNT TREE WAY
SHAWNEE TRL
BEE LN
MAXWELL CT
FLINT TRL
W GARON CV
SUTTON TRL
SETTLERS LOOP
RACOON TRL
STAFFORD TRL
GUY CT
LAKEVIEW RANCH PT
W OSCEOLA RD
LIBERTY LN
BREEZY PT
SENECA OAK TRL
MEADE RD
WILLOW POND LN
PIONEER WAY
HALE RD
OLD GENEVA RD
FROST CORNER CV
HARNEY HEIGHTS RD
BRIGHAM LOOP
WINONA DR
TEAL RD
RIDGE RD
GREEN TURTLE CT
GENEVA HEIGHTS RD
CULVER WAY
COFFEE TRL
GRIFFITH CV
1ST ST
COCHRAN RD
AVENUE A
AVENUE C
2ND ST
LAKE GENEVA RD
OLD LAKE HARNEY RD
LAKE HARNEY RD
TRIPP RD
JENNICA CT
E MAIN ST
CHURCH ST
FLORIDA AVE
3RD ST
OAK ST
CAROLINA WAY
CEMETERY RD
LAKE PROCTOR RD
OLD 100 RD
WHITCOMB DR
WOODRIDGE DR
CLOVERDALE TRL
W SR 46
N HART RD
WOODS BLVD
SEMINOLE
PEACEHILL PL
S HART RD
N JUNGLE RD
FORT LANE RD
HAVEN CV
OWL
JANE CREEK DR
SANDHILL CV
SAND PINE PL
HARRISON RD
SHADY WOODS RD
MAGNOLIA WAY
BAY BLOSSOM RUN
JUSTAMERE RD
S JUNGLE RD
E SR 46
CABBAGE PALM PT
REST HAVEN RD
PREVATT RD
LAKE HARNEY CIR
MARION AVE
BEATRICE CV
WOODRIDGE DR
SANDY TOP LN
BRIAR PATCH LN
BUCK LAKE LN
RED BIRD PL
HUGHEY LN
N CR 426
SCOTT RD
PERMAUL PT
OLD MIMS RD
STEWART ST
HARPER LN
HAWKS CV
MCLAIN LN
MCLAIN LN
GRACEY CV
CAMPBELL RANCH RUN
PAGELS PT
ZENITH PT
BUTTERFLY FOREST RD
SNOW HILL RD

Legend

- Study Area

FEMA Special Flood Hazard Area (SFHA) Zones

- A
- AE

Delineated Floodplains

- Modeled 100-year, 96-hour Floodplain
- Revised Lake Harney / SJR Floodplain

Note:
Preliminary information provided for review purposes and subject to additional revisions. Do not use for flood insurance determinations. Flood elevations given in feet above the North American Verical Datum of 1988 (NAVD88). Proposed changes to the Lake Harney/St. Johns River (SJR) floodplain are based on more detailed topographic data; SJR modeling was not performed or reevaluated for this study.

Sources:
Aerials: ESRI, 2020
Waterbodies: Seminole County
Streets: Seminole County
Floodzones: FEMA, 2007

N

0 800 1,600 Feet

Comparison of Modeled Floodplain and FEMA Floodzones Map

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

SEMINOLE COUNTY FLORIDA'S NATURAL CHOICE

Exhibit 24

Tie back into existing floodplain

Revisions stop at county boundary

Revisions stop at county boundary

Revisions stop at county boundary

Tie back into existing floodplain

Revisions stop at county boundary

Le Fils Slough

Mullet Lake

St Johns River

Lake Harney

Harts Lake

Lake Geneva

Upper Lake Proctor

Still Lake

Moran Lake

Lower Lake Proctor

Buck Lake

Geneva Pond

Big Run

St Johns River

Econlockhatchee River

CYPRESS SLOUGH WAY
BRUSH LN
SAGE
RIVER FR NATL TRL
CHARLIE B CV
SUN VIEW PT
WILD TURKEY RUN
PINE KNOB LN
RITCHIE RD
OSCEOLA FISH CAMP RD
GUN RANGE RD
GUN RANGE RD
E OSCEOLA RD
BOWLEGS TRL
WITHLACOOCHEE PT
MERGANSER WAY
WACCASSA ST
CANVASBACK TRL
DEVANY CT
HOLDER LN
INDIAN CYPRESS TRL
SCOOTER PT
BURNT TREE WAY
SHAWNEE TRL
ARAPAHO TRL
BEE LN
MAXWELL CT
FLINT TRL
W GARON CV
SUTTON TRL
RACOON TRL
SETTLERS LOOP
STAFFORD TRL
LAKEVIEW RANCH PT
END O THE TRL
GUY CT
W OSCEOLA RD
LIBERTY LN
BREEZY PT
SENECA OAK TRL
MEADE RD
N HART RD
WILLOW POND LN
PIONEER WAY
HALE RD
OLD GENEVA RD
TEAL RD
HARNEY HEIGHTS RD
BRIGHAM LOOP
WINONA DR
FROST CORNER CV
RIDGE RD
GREEN TURTLE CT
GENEVA HEIGHTS RD
CULVER WAY
1ST ST
COFFEE TRL
GRIFFITH CV
LAKE HARNEY RD
COCHRAN RD
AVENUE C
2ND ST
LAKE GENEVA RD
OLD LAKE HARNEY RD
TRIPP RD
HALL RD
CLOVERDALE TRL
W SR 46
W MAIN ST
CHURCH ST
E MAIN ST
JENNICA CT
FLORIDA AVE
3RD ST
OAK ST
CAROLINA WAY
CEMETERY RD
LAKE PROCTOR RD
WOODRIDGE DR
SEMINOLE WOODS BLVD
S HART RD
PEACEHILL PL
SANDHILL CV
WOODRIDGE DR
SANDY TOP LN
BRIAR PATCH LN
BUCK LAKE LN
RED BIRD PL
N CR 426
HUGHEY LN
SCOTT RD
STEWART ST
HARPER LN
MCLAIN LN
MCLAIN LN
BILLSBOROUGH RD
GRACEY CV
CAMPBELL RANCH RUN
PAGELS PT
ZENITH PT
BUTTERFLY FOREST RD
SNOW HILL RD
OLD 100 RD
WHITCOMB DR
N JUNGLE RD
FORT LANE RD
HAVEN CV
OWL
JANE CREEK DR
LAKE HARNEY CIR
MARION AVE
BEATRICE CV
REST HAVEN RD
PREVATT RD
SAND PINE PL
HARRISON RD
SHADY WOODS RD
MAGNOLIA WAY
JUSTAMERE RD
BAY BLOSSOM RUN
S JUNGLE RD
E SR 46
CABBAGE PALM PT
PERMAUL PT
OLD MIMS RD
HAWKS CV

Legend

- Study Area

Flood Zone

- AE
- A
- A, Transition Zone
- X (Shaded)
- Revised Lake Harney / SJR Floodplain

Note:
Preliminary information provided for review purposes and subject to additional revisions. Do not use for flood insurance determinations. Flood elevations given in feet above the North American Verical Datum of 1988 (NAVD88). Proposed changes to the Lake Harney/St. Johns River (SJR) floodplain are based on more detailed topographic data; SJR modeling was not performed or reevaluated for this study.

Sources:
Aerials: ESRI, 2020
Waterbodies: Seminole County

N

0 800 1,600 Feet

Refined 100-year Floodplain

Puzzle Lake

Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

SEMINOLE COUNTY FLORIDA'S NATURAL CHOICE

Exhibit 25

APPENDIX A
Existing Conditions Model
Peak Stages and Flows
(Typical Seasonal Average Boundary Condition)

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
HARNEY	6.65	2.51	2.51	2.51	2.51	2.51	2.51
LH_A00010_N	12.10	2.61	2.71	2.77	2.80	2.87	2.88
LH_A00020_N	10.14	2.87	3.09	3.20	3.26	3.38	3.39
LH_A00030_N	9.38	3.08	3.38	3.52	3.60	3.74	3.76
LH_A00040_N	-	3.29	3.42	3.55	3.62	3.76	3.78
LH_A00050_N	9.92	3.32	3.62	3.76	3.84	3.98	4.01
LH_A00060_N	10.09	4.05	4.30	4.43	4.50	4.63	4.67
LH_A00070_N	10.17	5.22	5.39	5.49	5.54	5.64	5.67
LH_A00080_N	10.18	6.60	6.68	6.74	6.77	6.82	6.84
LH_A00090_N	9.96	7.13	7.21	7.25	7.27	7.32	7.33
LH_A00100_N	10.39	8.04	8.26	8.32	8.35	8.41	8.41
LH_A00110_N	10.58	8.45	8.84	9.01	9.06	9.13	9.13
LH_A00120_N	10.65	8.49	8.87	9.03	9.08	9.15	9.15
LH_A00130_N	11.24	8.64	9.02	9.14	9.18	9.24	9.24
LH_A00140_N	11.51	8.92	9.23	9.31	9.34	9.39	9.38
LH_A00150_N	11.58	9.26	9.74	9.99	10.10	10.35	10.33
LH_A00160_N	12.10	9.58	9.98	10.20	10.30	10.49	10.48
LH_A00170_N	12.64	10.04	10.38	10.55	10.62	10.75	10.73
LH_A00180_N	13.15	10.56	10.85	11.01	11.08	11.19	11.18
LH_A00190_N	10.92	10.87	11.26	11.49	11.61	11.79	11.78
LH_A00200_N	13.02	3.19	4.06	4.48	4.61	4.78	4.82
LH_A00210_N	13.88	3.61	4.46	4.94	5.16	5.45	5.54
LH_A00220_N	12.39	4.02	4.86	5.31	5.51	5.77	5.85
LH_A00230_N	9.68	4.24	5.07	5.46	5.62	5.85	5.93
LH_A00240_N	9.60	4.41	5.21	5.58	5.72	5.93	6.00
LH_A00250_N	9.84	5.10	5.72	5.98	6.08	6.25	6.31
LH_A00260_N	10.07	6.27	6.72	6.89	6.98	7.16	7.23
LH_A00270_N	9.99	6.42	6.81	6.94	7.02	7.19	7.27
LH_A00280_N	10.32	6.60	7.07	7.18	7.26	7.46	7.55
LH_A00290_N	10.40	6.72	9.86	10.02	10.10	10.27	10.35
LH_A00300_N	10.62	7.08	9.89	10.06	10.14	10.34	10.43
LH_A00310_N	11.26	7.92	9.99	10.24	10.38	10.66	10.79
LH_A00320_N	12.00	9.13	10.63	11.23	11.65	12.09	12.22
LH_A00330_N	14.20	12.93	13.55	13.79	13.91	14.12	14.21
LH_A00340_N	-	12.93	13.55	13.79	13.91	14.12	14.22
LH_A00360_N	-	8.83	8.96	9.11	9.19	9.38	9.46
LH_A00370_N	-	8.87	9.03	9.21	9.32	9.55	9.66
LH_A00380_N	-	8.87	9.01	9.15	9.25	9.47	9.57
LH_A00390_N	-	9.21	9.61	10.03	10.24	10.50	10.58

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A00400_N	-	9.70	10.26	10.77	11.04	11.54	11.75
LH_A00410_N	-	10.37	11.04	11.57	11.84	12.20	12.34
LH_A00420_N	-	11.06	11.57	11.93	12.12	12.45	12.59
LH_A00430_N	-	11.69	12.29	12.58	12.71	12.92	13.02
LH_A00440_N	-	12.07	12.70	12.98	13.09	13.26	13.34
LH_A00450_N	-	12.23	12.85	13.16	13.29	13.53	13.64
LH_A00460_N	-	12.46	13.07	13.38	13.53	13.78	13.89
LH_A00470_N	14.79	12.46	13.54	13.78	13.89	14.06	14.14
LH_A00480_N	-	12.66	13.28	13.66	13.87	14.21	14.34
LH_A00490_N	-	12.88	13.53	13.94	14.13	14.38	14.47
LH_A00500_N	17.37	12.92	13.55	13.80	13.92	14.12	14.22
LH_A00510_N	13.08	12.94	13.55	13.80	13.92	14.13	14.23
LH_A00520_N	14.91	13.49	13.94	14.19	14.30	14.47	14.54
LH_A00530_N	14.20	14.03	14.30	14.42	14.48	14.59	14.64
LH_A00540_N	13.51	14.03	14.30	14.43	14.49	14.60	14.66
LH_A00550_N	13.94	14.04	14.30	14.43	14.49	14.61	14.66
LH_A00560_N	13.62	14.04	14.31	14.44	14.50	14.61	14.67
LH_A00570_N	12.76	14.05	14.31	14.44	14.50	14.62	14.67
LH_A00580_N	12.89	13.55	13.74	13.85	13.97	14.18	14.28
LH_A00590_N	15.81	14.38	14.47	14.53	14.55	14.61	14.61
LH_A00600_N	13.71	14.05	14.32	14.44	14.51	14.62	14.68
LH_A00610_N	14.20	14.06	14.32	14.45	14.52	14.64	14.70
LH_A00620_N	14.01	14.06	14.30	14.38	14.46	14.60	14.67
LH_A00630_N	15.00	14.06	14.31	14.39	14.48	14.67	14.77
LH_A00640_N	14.92	14.10	14.38	14.49	14.59	14.79	14.87
LH_A00650_N	15.40	14.11	14.39	14.50	14.60	14.80	14.87
LH_A00660_N	15.59	14.18	14.54	14.67	14.81	15.06	15.13
LH_A00670_N	15.91	14.18	14.55	14.68	14.82	15.07	15.15
LH_A00680_N	14.65	14.75	15.73	16.27	16.41	16.58	16.64
LH_A00690_N	15.30	14.75	15.73	16.27	16.42	16.58	16.65
LH_A00700_N	14.69	14.76	15.73	16.27	16.42	16.59	16.65
LH_A00710_N	14.88	14.83	15.79	16.28	16.42	16.59	16.66
LH_A00720_N	16.19	15.45	15.80	16.29	16.43	16.60	16.67
LH_A00730_N	21.74	20.36	20.74	20.90	20.96	21.04	21.06
LH_A00740_N	15.09	14.10	14.54	14.75	14.83	14.96	15.02
LH_A00750_N	15.75	14.33	15.29	15.79	15.97	16.16	16.25
LH_A00760_N	14.44	14.54	15.75	16.28	16.42	16.59	16.66
LH_A00770_N	-	14.70	15.77	16.30	16.45	16.62	16.70
LH_A00780_N	-	16.18	16.36	16.47	16.52	16.63	16.70

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A00790_N	-	19.73	19.82	19.85	19.88	19.92	19.93
LH_A00800_N	15.95	14.55	15.75	16.28	16.42	16.59	16.66
LH_A00810_N	19.06	15.76	16.15	16.45	16.55	16.69	16.74
LH_A00820_N	20.71	17.98	18.44	18.52	18.57	18.69	18.71
LH_A00830_N	21.07	18.69	18.94	18.99	19.02	19.08	19.10
LH_A00840_N	23.01	20.71	21.87	22.05	22.08	22.10	22.11
LH_A00850_N	22.99	21.96	22.03	22.06	22.07	22.10	22.11
LH_A00860_N	23.87	20.77	21.88	22.06	22.09	22.12	22.12
LH_A00870_N	24.33	21.02	22.35	22.67	22.72	22.82	22.84
LH_A00880_N	24.59	21.25	22.38	22.69	22.74	22.85	22.87
LH_A00890_N	30.71	23.76	23.81	23.84	23.85	23.87	23.87
LH_A00900_N	25.42	22.74	23.07	23.22	23.26	23.34	23.36
LH_A00910_N	27.70	24.52	25.11	25.44	25.63	26.05	26.16
LH_A00920_N	27.35	26.00	26.85	27.45	27.80	28.36	28.47
LH_A00930_N	-	26.82	27.57	28.12	28.43	29.05	30.05
LH_A00940_N	35.30	29.59	30.54	31.18	31.53	32.16	32.27
LH_A00950_N	-	6.67	6.78	6.92	7.00	7.18	7.25
LH_A00960_N	-	12.60	12.67	12.70	12.72	12.75	12.76
LH_A00970_N	-	12.79	12.88	12.93	12.96	13.00	13.01
LH_A00980_N	-	13.37	13.44	13.48	13.50	13.53	13.53
LH_A00990_N	-	14.46	14.53	14.55	14.56	14.57	14.58
LH_A01000_N	-	14.24	14.37	14.43	14.47	14.52	14.52
LH_A01010_N	-	14.03	14.30	14.43	14.49	14.60	14.66
LH_A01020_N	-	14.43	14.47	14.50	14.51	14.55	14.58
LH_A01030_N	-	14.03	14.30	14.43	14.49	14.60	14.66
LH_A01040_N	-	14.12	14.31	14.44	14.50	14.60	14.66
LH_A01050_N	-	14.90	14.96	14.99	15.00	15.02	15.02
LH_A01060_N	-	14.04	14.31	14.44	14.50	14.61	14.67
LH_A01070_N	-	14.06	14.32	14.45	14.52	14.63	14.69
LH_A01080_N	-	14.38	14.57	14.69	14.74	14.82	14.87
LH_A01090_N	-	14.07	14.32	14.46	14.52	14.63	14.69
LH_A01100_N	-	14.07	14.32	14.45	14.52	14.63	14.69
LH_A01110_N	-	14.07	14.31	14.44	14.50	14.61	14.67
LH_A01120_N	-	14.07	14.31	14.43	14.49	14.59	14.65
LH_A01130_N	-	14.75	14.84	14.90	14.94	15.00	15.01
LH_A01140_N	-	14.07	14.29	14.41	14.47	14.57	14.62
LH_A01150_N	-	15.32	15.44	15.52	15.55	15.62	15.63
LH_A01160_N	-	14.80	14.88	14.92	14.94	14.97	14.97
LH_A01170_N	-	15.06	15.15	15.20	15.23	15.27	15.27

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A01180_N	-	14.60	14.68	14.73	14.76	14.83	14.87
LH_A01190_N	-	15.34	15.47	15.55	15.60	15.67	15.69
LH_A01200_N	-	15.93	16.05	16.14	16.21	16.32	16.37
LH_A01210_N	-	16.47	16.58	16.69	16.75	16.84	16.90
LH_A01220_N	-	16.29	16.34	16.37	16.42	16.50	16.54
LH_A01230_N	-	16.47	16.69	16.78	16.82	16.87	16.88
LH_A01240_N	-	16.31	16.40	16.49	16.54	16.61	16.62
LH_A01250_N	-	17.11	17.18	17.26	17.30	17.37	17.40
LH_A01260_N	-	20.64	20.72	20.76	20.77	20.80	20.82
LH_A01270_N	-	21.29	21.39	21.45	21.48	21.52	21.55
LH_A01280_N	-	17.81	17.93	18.03	18.08	18.17	18.22
LH_A01290_N	-	17.17	17.31	17.37	17.40	17.44	17.45
LH_A01300_N	-	17.18	17.33	17.39	17.43	17.48	17.48
LH_A01310_N	-	17.39	17.54	17.63	17.67	17.74	17.75
LH_A01320_N	-	17.99	18.10	18.16	18.19	18.25	18.26
LH_A01330_N	-	21.16	21.24	21.29	21.31	21.35	21.36
LH_A01340_N	-	22.50	22.57	22.60	22.62	22.64	22.65
LH_A01350_N	-	22.52	22.58	22.62	22.63	22.66	22.67
LH_A01360_N	-	14.06	14.33	14.45	14.52	14.64	14.70
LH_A01370_N	-	15.19	15.26	15.30	15.32	15.36	15.37
LH_A01380_N	-	15.88	15.97	16.02	16.05	16.10	16.11
LH_A01390_N	-	14.53	14.95	15.21	15.31	15.47	15.55
LH_A01400_N	-	15.90	16.16	16.27	16.34	16.45	16.51
LH_A01410_N	-	16.73	17.45	17.60	17.66	17.77	17.83
LH_A01420_N	-	17.46	18.29	18.59	18.68	18.81	18.87
LH_A01430_N	-	19.22	19.28	19.31	19.33	19.38	19.43
LH_A01440_N	-	18.79	19.93	20.34	20.50	20.74	20.85
LH_A01450_N	-	21.78	22.09	22.19	22.24	22.32	22.37
LH_A01460_N	-	23.24	23.54	23.63	23.67	23.73	23.78
LH_A01470_N	-	21.78	22.09	22.20	22.24	22.32	22.37
LH_A01480_N	26.99	24.06	24.16	24.20	24.21	24.23	24.24
LH_A01490_N	25.82	23.98	24.12	24.20	24.24	24.32	24.39
LH_A01500_N	-	23.41	23.55	23.63	23.67	23.73	23.77
LH_A01510_N	-	23.69	23.80	23.87	23.91	23.97	24.02
LH_A01520_N	-	23.68	23.80	23.86	23.90	23.96	24.00
LH_A01530_N	-	23.67	23.78	23.85	23.88	23.94	23.98
LH_A01540_N	-	25.28	25.41	25.46	25.48	25.51	25.52
LH_A01550_N	-	23.68	23.79	23.86	23.89	23.95	24.00
LH_A01560_N	-	26.26	26.35	26.41	26.43	26.46	26.48

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A01570_N	-	25.40	25.47	25.51	25.53	25.56	25.56
LH_A01580_N	-	26.55	26.61	26.64	26.66	26.69	26.69
LH_A01590_N	-	26.99	27.07	27.11	27.12	27.15	27.15
LH_A01600_N	-	25.48	25.62	25.68	25.71	25.76	25.77
LH_A01610_N	-	27.42	27.82	28.07	28.17	28.21	28.29
LH_A01620_N	-	24.80	24.89	24.94	24.96	25.00	25.01
LH_A01630_N	-	24.40	24.60	24.71	24.75	24.83	24.84
LH_A01640_N	34.21	27.60	28.26	28.37	28.41	28.49	28.58
LH_A01650_N	30.94	27.08	28.02	28.17	28.21	28.29	28.37
LH_A01660_N	28.12	26.88	27.26	27.38	27.45	27.60	27.75
LH_A01670_N	-	24.69	24.75	24.78	24.79	24.81	24.82
LH_A01680_N	-	24.47	24.77	24.96	25.03	25.17	25.23
LH_A01690_N	27.31	24.48	24.82	25.07	25.22	25.52	26.06
LH_A01700_N	26.07	25.27	25.72	26.03	26.15	26.40	26.51
LH_A01710_N	26.61	25.28	25.75	26.18	26.39	26.99	27.68
LH_A01715_N	-	25.28	25.96	26.77	26.99	27.30	27.71
LH_A01720_N	32.12	26.39	26.56	26.63	26.66	27.00	27.68
LH_A01730_N	27.78	26.27	26.69	26.92	27.06	27.33	27.72
LH_A01740_N	41.92	29.48	29.65	29.75	29.80	29.88	29.95
LH_A01750_N	31.19	28.24	28.52	28.66	28.71	28.80	28.86
LH_A01760_N	-	28.38	29.24	29.82	30.15	30.79	31.89
LH_A01770_N	35.79	29.05	29.22	29.27	29.29	29.32	29.33
LH_A01780_N	37.12	30.92	31.08	31.16	31.19	31.25	31.28
LH_A01790_N	-	27.98	28.85	29.51	29.89	30.60	31.62
LH_A01800_N	31.28	29.67	30.21	30.31	30.35	30.40	30.47
LH_A01810_N	38.43	32.68	34.04	34.89	35.30	35.86	36.00
LH_A01820_N	30.85	29.76	30.02	30.13	30.18	30.26	30.30
LH_A01830_N	51.70	33.50	35.62	36.55	36.58	36.66	36.81
LH_A01840_N	56.95	57.26	58.25	58.35	58.40	58.46	58.49
LH_A01850_N	-	60.20	61.09	61.14	61.20	61.29	61.38
LH_A01860_N	31.47	29.67	30.29	30.80	31.15	31.79	31.96
LH_A01870_N	-	32.06	32.59	32.69	32.73	32.81	32.90
LH_A01880_N	28.54	28.53	29.02	29.25	29.31	29.40	29.41
LH_A01890_N	29.57	28.54	29.02	29.25	29.32	29.40	29.42
LH_A01900_N	28.52	26.28	26.70	27.07	27.37	27.98	28.54
LH_A01910_N	31.51	27.81	28.27	28.35	28.42	28.53	28.63
LH_A01920_N	31.16	29.77	30.08	30.23	30.32	30.49	30.57
LH_A01930_N	35.22	34.68	34.76	34.79	34.82	34.86	34.87
LH_A01940_N	-	40.79	40.86	40.89	40.90	40.92	40.92

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A01950_N	39.09	30.41	32.23	33.47	34.15	35.18	35.39
LH_A01960_N	59.86	59.18	59.93	60.04	60.08	60.14	60.19
LH_A01970_N	37.96	30.13	30.42	30.50	30.53	30.59	30.66
LH_A01980_N	30.22	26.31	26.97	27.55	27.87	28.51	29.61
LH_A01990_N	33.77	30.75	30.86	30.91	30.93	30.96	30.98
LH_A02000_N	-	29.65	29.71	29.75	29.76	29.79	29.80
LH_A02010_N	33.63	31.88	32.55	32.97	33.19	33.60	34.07
LH_A02020_N	-	31.34	31.67	31.80	31.85	31.94	31.97
LH_A02030_N	-	31.04	32.61	33.49	33.53	33.66	33.83
LH_A02040_N	-	29.18	29.58	29.74	29.82	29.94	30.06
LH_A02050_N	-	28.33	29.37	29.75	29.78	29.84	29.98
LH_A02060_N	31.29	29.58	30.01	30.09	30.15	30.27	30.40
LH_A02070_N	39.95	28.19	29.08	29.66	29.97	30.36	30.44
LH_A02080_N	39.50	28.78	29.45	29.90	30.16	32.04	33.84
LH_A02090_N	55.26	30.22	32.23	33.47	34.15	35.19	35.39
LH_A02100_N	63.79	31.51	32.23	33.47	34.15	35.19	35.39
LH_A02110_N	30.98	27.97	28.58	29.34	29.73	30.18	30.34
LH_A02120_N	56.51	55.79	56.19	56.27	56.31	56.38	56.43
LH_A02130_N	33.42	29.01	29.92	30.13	30.20	30.31	30.48
LH_A02140_N	-	32.85	33.29	33.82	33.89	33.95	34.04
LH_A02150_N	37.44	31.52	31.95	32.28	32.48	32.87	33.62
LH_A02160_N	36.93	31.91	32.53	32.96	33.21	33.71	33.85
LH_A02170_N	29.34	28.47	29.09	29.35	29.73	30.18	30.34
LH_A02180_N	30.22	30.26	30.99	31.32	31.34	31.40	31.45
LH_A02190_N	29.58	23.85	24.41	24.83	25.09	25.66	27.52
LH_A02200_N	29.62	24.56	25.52	26.20	26.59	27.35	27.58
LH_A02210_N	55.02	33.68	36.00	37.85	38.81	40.37	42.00
LH_A02220_N	32.73	29.81	29.92	30.14	30.21	30.32	30.50
LH_A02230_N	32.93	31.19	32.03	32.72	33.10	33.68	33.94
LH_A02240_N	47.59	31.19	32.04	32.73	33.10	33.68	33.95
LH_B00010_N	11.40	3.52	3.81	4.08	4.30	4.74	4.68
LH_B00020_N	-	4.07	4.44	4.78	4.98	5.32	5.28
LH_B00030_N	9.32	8.03	8.17	8.22	8.25	8.30	8.30
LH_B00040_N	-	8.92	9.00	9.08	9.12	9.18	9.17
LH_B00050_N	-	10.61	10.69	10.72	10.74	10.76	10.76
LH_B00060_N	-	8.31	8.39	8.43	8.45	8.50	8.50
LH_B00070_N	-	10.57	10.66	10.71	10.73	10.76	10.77
LH_B00080_N	12.86	10.21	10.28	10.32	10.34	10.38	10.38
LH_B00090_N	10.52	9.72	9.78	9.81	9.83	9.86	9.86

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_C00010_N	8.36	3.90	4.26	4.47	4.59	4.90	4.94
LH_C00020_N	-	14.46	14.52	14.55	14.57	14.59	14.60
LH_C00030_N	15.91	14.51	14.58	14.61	14.63	14.66	14.66
LH_C00040_N	15.52	14.84	15.22	15.40	15.46	15.55	15.54
LH_C00050_N	15.11	12.50	12.70	12.81	12.86	12.93	12.97
LH_C00060_N	-	10.19	10.40	10.51	10.58	10.69	10.77
LH_C00070_N	15.14	11.53	11.63	11.67	11.70	11.74	11.78
LH_C00090_N	13.66	12.93	13.55	13.80	13.92	14.13	14.23
LH_C00100_N	15.39	12.93	13.55	13.80	13.92	14.13	14.22
LH_C00110_N	12.68	12.94	13.56	13.80	13.92	14.13	14.23
LH_C00120_N	-	11.70	11.73	11.76	11.77	11.79	11.79
LH_C00130_N	8.89	6.60	7.17	7.44	7.59	7.85	7.88
LH_C00140_N	9.21	7.97	8.25	8.38	8.45	8.56	8.56
LH_C00150_N	7.26	7.98	8.27	8.40	8.48	8.60	8.61
LH_C00160_N	9.35	8.68	8.86	8.95	9.00	9.08	9.09
LH_C00170_N	-	11.14	11.21	11.25	11.27	11.30	11.31
LH_C00180_N	10.14	11.15	11.22	11.25	11.26	11.29	11.29
LH_C00190_N	14.67	11.15	11.23	11.26	11.27	11.30	11.30
LH_C00200_N	13.07	12.32	12.36	12.39	12.40	12.42	12.42
LH_C00210_N	-	12.38	12.42	12.45	12.46	12.48	12.49
LH_C00220_N	6.86	7.99	8.44	8.59	8.65	8.73	8.74
LH_C00230_N	7.42	7.99	8.44	8.59	8.64	8.73	8.74
LH_C00240_N	8.39	8.00	8.44	8.58	8.64	8.72	8.73
LH_C00250_N	7.53	8.00	8.44	8.57	8.64	8.72	8.73
LH_C00260_N	7.73	6.22	7.05	7.44	7.66	7.99	8.03
LH_C00270_N	7.98	6.24	7.06	7.45	7.67	7.99	8.03
LH_C00280_N	7.97	6.81	7.82	8.44	8.59	8.70	8.71
LH_C00290_N	7.81	6.82	7.83	8.44	8.59	8.70	8.71
LH_C00300_N	7.66	6.99	8.04	8.55	8.64	8.72	8.73
LH_C00310_N	7.77	7.01	8.05	8.56	8.64	8.73	8.74
LH_C00320_N	7.77	7.02	8.05	8.56	8.64	8.73	8.74
LH_C00330_N	7.55	7.61	8.43	8.59	8.65	8.73	8.74
LH_C00340_N	7.60	7.61	8.43	8.59	8.65	8.73	8.74
LH_C00350_N	7.72	7.78	8.54	8.62	8.67	8.76	8.77
LH_C00360_N	10.19	10.81	10.86	10.88	10.89	10.92	10.92
LH_D00010_N	10.58	4.40	5.96	6.55	6.78	7.04	7.04
LH_D00020_N	10.73	4.67	6.47	7.27	7.61	7.96	7.96
LH_D00030_N	7.02	7.75	8.72	8.85	8.90	8.99	9.00
LH_D00040_N	9.08	9.43	9.56	9.62	9.65	9.72	9.79

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_D00050_N	11.97	10.22	10.35	10.46	10.50	10.56	10.61
LH_D00060_N	14.08	11.49	11.60	11.66	11.68	11.73	11.73
LH_D00070_N	14.72	12.67	12.83	12.89	12.92	12.98	12.98
LH_D00080_N	12.65	12.24	12.39	12.44	12.47	12.51	12.51
LH_D00090_N	15.58	13.01	13.10	13.13	13.14	13.17	13.17
LH_D00100_N	14.93	12.96	13.17	13.27	13.32	13.42	13.42
LH_D00110_N	-	13.72	13.84	13.89	13.92	13.97	13.97
LH_E00010_N	9.01	7.95	8.11	8.16	8.23	8.38	8.39
LH_E00020_N	7.44	8.06	8.22	8.29	8.38	8.60	8.62
LH_E00030_N	7.28	8.46	8.57	8.62	8.65	8.74	8.75
LH_E00040_N	-	8.65	8.72	8.75	8.76	8.78	8.79
LH_E00050_N	14.93	12.00	12.04	12.06	12.08	12.09	12.10
LH_E00060_N	12.19	10.79	11.15	11.35	11.43	11.61	11.64
LH_E00070_N	13.94	12.34	12.70	12.84	12.90	12.95	12.96
LH_E00080_N	15.03	12.36	12.76	12.93	13.01	13.13	13.12
LH_E00090_N	15.27	14.24	14.36	14.40	14.42	14.45	14.45
LH_E00100_N	15.62	14.74	14.83	14.87	14.89	14.92	14.93
LH_E00110_N	16.00	15.32	15.39	15.43	15.45	15.48	15.48
LH_E00120_N	6.63	6.95	7.71	8.18	8.33	8.58	8.59
LH_E00130_N	7.57	8.06	8.26	8.49	8.58	8.72	8.73
LH_E00140_N	7.41	8.06	8.26	8.49	8.57	8.69	8.70
LH_E00150_N	7.09	8.25	8.32	8.36	8.41	8.59	8.61
LH_E00160_N	9.21	9.53	11.04	11.21	11.27	11.36	11.36
LH_E00170_N	16.81	12.07	12.41	12.94	13.15	13.43	13.45
LH_E00180_N	-	11.42	12.38	12.94	13.15	13.42	13.45
LH_E00190_N	11.86	11.43	12.39	12.94	13.15	13.42	13.45
LH_E00200_N	13.60	12.53	13.12	13.47	13.64	13.96	13.99
LH_E00210_N	-	14.90	14.95	14.98	14.99	15.02	15.02
LH_E00220_N	14.93	14.24	14.47	14.65	14.74	14.90	14.92
LH_E00230_N	-	15.58	15.69	15.76	15.80	15.87	15.89
LH_E00240_N	18.75	16.17	16.26	16.32	16.34	16.40	16.42
LH_E00250_N	27.61	18.74	18.97	19.03	19.06	19.11	19.14
LH_E00260_N	-	28.83	29.16	29.68	30.05	30.90	32.68
LH_E00270_N	38.02	32.24	33.78	33.85	33.91	34.00	34.12
LH_E00280_N	15.33	15.20	15.42	15.52	15.56	15.64	15.64
LH_E00290_N	21.08	16.47	16.60	16.65	16.68	16.73	16.74
LH_E00300_N	16.61	15.40	15.67	15.79	15.84	15.92	15.93
LH_E00310_N	17.65	15.57	15.73	15.85	15.90	15.99	16.00
LH_E00320_N	17.57	16.67	16.74	16.78	16.80	16.84	16.84

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_E00330_N	21.30	20.95	21.09	21.14	21.16	21.20	21.21
LH_E00340_N	16.43	15.59	15.80	15.98	16.10	16.39	16.61
LH_E00350_N	17.69	17.19	17.34	17.41	17.45	17.54	17.57
LH_E00360_N	20.77	20.96	21.02	21.05	21.07	21.10	21.12
LH_E00370_N	-	13.87	14.11	14.21	14.25	14.33	14.34
LH_E00380_N	-	15.62	15.74	15.80	15.83	15.88	15.89
LH_E00390_N	-	16.14	16.25	16.29	16.32	16.35	16.36
LH_E00400_N	-	18.07	18.54	18.84	18.98	19.17	19.17
LH_E00410_N	-	18.86	18.94	18.97	18.98	19.01	19.02
LH_E00420_N	-	19.03	19.17	19.24	19.28	19.35	19.38
LH_E00430_N	-	15.85	15.92	15.96	15.98	16.03	16.04
LH_E00440_N	-	18.35	18.76	18.85	18.89	18.96	18.97
LH_E00450_N	15.95	14.61	14.69	14.73	14.75	14.80	14.81
LH_E00460_N	-	18.80	18.96	19.02	19.06	19.11	19.13
LH_E00470_N	-	19.94	20.04	20.09	20.11	20.16	20.17
LH_E00480_N	-	22.47	22.53	22.57	22.59	22.63	22.64
LH_E00490_N	-	33.33	33.79	33.90	33.97	34.09	34.21
LH_E00500_N	6.66	7.97	8.08	8.20	8.34	8.58	8.59
LH_E00510_N	6.67	7.95	8.06	8.19	8.33	8.57	8.59
LH_E00520_N	6.68	7.11	7.84	8.15	8.32	8.56	8.57
LH_E00525_N	-	7.88	8.05	8.19	8.33	8.57	8.59
LH_E00530_N	6.62	7.95	8.06	8.18	8.33	8.56	8.58
LH_E00540_N	7.00	7.96	8.09	8.20	8.35	8.58	8.60
LH_E00550_N	9.44	10.47	10.78	10.89	10.95	11.05	11.08
LH_E00560_N	14.77	11.65	11.85	11.94	11.98	12.05	12.06
LH_E00570_N	-	11.90	12.03	12.09	12.12	12.18	12.19
LH_E00580_N	16.17	17.18	17.34	17.41	17.47	17.57	17.63
LH_E00590_N	30.94	28.39	28.60	28.90	28.99	29.12	29.20
LH_E00600_N	-	28.70	28.82	28.92	29.01	29.14	29.22
LH_E00610_N	31.14	28.59	29.54	30.08	30.32	30.68	30.74
LH_E00620_N	30.27	28.71	28.83	28.93	29.01	29.15	29.23
LH_E00630_N	33.73	33.21	33.35	33.42	33.45	33.51	33.53
LH_F00010_N	9.49	4.51	4.64	4.73	4.78	4.89	4.90
LH_F00020_N	7.34	5.50	5.59	5.68	5.73	5.85	5.86
LH_F00030_N	13.83	13.33	13.45	13.52	13.55	13.63	13.68
LH_F00040_N	16.37	16.49	16.75	16.90	16.97	17.15	17.25
LH_F00050_N	28.04	27.37	27.75	28.11	28.39	28.54	28.59
LH_F00060_N	-	10.79	11.10	11.30	11.39	11.52	11.54
LH_F00070_N	13.41	11.11	11.37	11.45	11.49	11.56	11.58

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_F00080_N	19.67	12.87	13.20	13.29	13.33	13.39	13.40
LH_F00090_N	-	12.52	12.82	12.95	13.00	13.08	13.09
LH_F00100_N	15.53	13.81	14.00	14.07	14.10	14.16	14.17
LH_F00110_N	18.15	14.49	14.62	14.68	14.71	14.75	14.76
LH_F00120_N	-	15.37	15.48	15.54	15.56	15.59	15.59
LH_F00130_N	20.46	19.99	20.02	20.08	20.11	20.17	20.21
LH_F00140_N	20.77	20.92	21.66	21.82	21.88	21.98	22.02
LH_F00150_N	22.53	21.04	21.67	21.82	21.88	21.98	22.02
LH_F00160_N	26.64	22.52	22.59	22.63	22.64	22.68	22.70
LH_F00170_N	33.82	32.44	32.49	32.52	32.54	32.56	32.58
LH_F00180_N	29.35	23.40	23.46	23.50	23.52	23.56	23.60
LH_F00190_N	-	7.76	8.25	8.53	8.67	9.05	9.16
LH_F00200_N	12.66	10.12	10.25	10.31	10.34	10.40	10.42
LH_F00210_N	13.23	10.13	10.26	10.32	10.35	10.42	10.44
LH_F00220_N	14.92	12.09	12.22	12.29	12.35	12.46	12.50
LH_F00230_N	15.50	13.17	13.27	13.34	13.38	13.44	13.46
LH_F00240_N	18.33	15.30	15.84	16.02	16.12	16.28	16.34
LH_F00250_N	23.46	19.68	20.23	20.27	20.30	20.34	20.38
LH_F00260_N	21.20	20.33	20.40	20.44	20.46	20.49	20.49
LH_F00270_N	21.48	21.44	21.93	22.12	22.20	22.32	22.40
LH_F00280_N	35.05	34.54	34.92	35.09	35.18	35.30	35.39
LH_F00290_N	38.42	35.21	35.38	35.49	35.56	35.67	35.80
LH_F00300_N	10.93	3.58	4.93	5.54	5.83	6.36	6.58
LH_F00310_N	14.25	9.97	10.19	10.28	10.32	10.41	10.44
LH_F00320_N	12.98	10.39	10.43	10.45	10.46	10.48	10.48
LH_F00330_N	14.92	10.34	10.71	10.87	10.95	11.09	11.15
LH_F00340_N	-	10.71	10.90	11.01	11.07	11.20	11.27
LH_F00350_N	14.14	10.85	11.25	11.50	11.64	11.87	11.99
LH_F00360_N	-	18.64	18.69	18.72	18.75	18.80	18.81
LH_F00370_N	23.09	19.69	20.69	20.85	20.91	20.99	21.00
LH_F00380_N	22.25	20.96	20.99	21.00	21.01	21.04	21.05
LH_F00390_N	21.46	21.42	21.93	22.12	22.19	22.32	22.40
LH_F00400_N	35.50	23.94	24.01	24.05	24.07	24.10	24.12
LH_F00410_N	-	13.83	14.08	14.24	14.32	14.48	14.58
LH_F00420_N	-	20.80	20.89	20.94	20.96	21.03	21.04
LH_F00430_N	20.94	20.81	20.89	20.94	20.96	21.03	21.04
LH_F00440_N	21.26	21.01	21.15	21.24	21.28	21.35	21.36
LH_F00450_N	21.44	21.17	21.41	21.49	21.52	21.56	21.57
LH_F00460_N	-	18.64	19.02	19.18	19.27	19.43	19.53

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_F00470_N	-	21.22	21.44	21.53	21.58	21.66	21.70
LH_F00480_N	26.95	23.75	23.96	24.06	24.11	24.19	24.26
LH_F00490_N	28.21	24.16	24.87	25.27	25.42	25.45	25.54
LH_F00500_N	24.77	24.79	24.88	24.91	24.93	24.96	24.99
LH_F00510_N	36.04	29.52	30.79	31.59	31.99	32.67	32.75
LH_F00520_N	28.87	24.80	24.89	24.93	24.95	24.98	25.02
LH_F00530_N	34.41	30.44	31.28	31.85	32.15	32.32	32.38
LH_F00540_N	36.12	34.34	35.40	35.95	36.20	36.57	36.77
LH_F00550_N	32.95	27.62	28.47	29.03	29.34	29.96	31.70
LH_F00560_N	-	31.09	31.23	31.37	31.48	31.71	32.06
LH_F00570_N	38.70	35.39	35.60	35.72	35.77	35.86	35.95
LH_F00580_N	33.11	29.87	30.06	30.17	30.23	30.34	31.72
LH_F00590_N	32.38	28.54	29.69	30.53	31.15	32.35	32.83
LH_F00600_N	44.22	30.14	30.18	30.53	31.15	32.35	32.83
LH_F00610_N	43.33	32.08	34.04	35.78	36.79	38.76	41.00
LH_F00620_N	65.49	64.96	65.82	66.35	66.55	66.72	66.81
LH_F00630_N	33.78	24.79	24.88	24.92	24.94	24.97	25.01
LH_F00640_N	-	39.22	39.28	39.32	39.34	39.38	39.43
LH_F00650_N	27.72	24.81	24.91	24.96	24.98	25.02	25.03
LH_F00660_N	23.41	24.70	24.97	25.09	25.17	25.31	25.47
LH_F00670_N	27.06	24.84	24.97	25.10	25.17	25.31	25.47
LH_F00680_N	29.42	24.70	24.97	25.10	25.17	25.31	25.47
LH_F00690_N	28.98	25.34	25.39	25.41	25.43	25.45	25.47
LH_F00700_N	25.23	26.36	26.65	26.78	26.82	26.86	26.87
LH_F00710_N	25.03	24.71	25.36	25.59	25.67	25.77	25.84
LH_F00720_N	24.69	25.39	25.44	25.48	25.50	25.54	25.57
LH_G00010_N	-	7.35	7.44	7.46	7.47	7.49	7.49
LH_G00020_N	-	9.03	9.27	9.33	9.36	9.40	9.42
LH_G00030_N	-	9.32	9.70	9.85	9.91	10.01	10.04
LH_G00040_N	-	9.57	9.94	10.10	10.16	10.26	10.30
LH_G00050_N	11.55	9.67	9.81	9.91	9.97	10.06	10.09
LH_G00060_N	-	10.88	11.07	11.16	11.20	11.27	11.29
LH_G00070_N	-	11.94	11.99	12.01	12.02	12.04	12.04
LH_G00080_N	-	10.93	11.09	11.18	11.21	11.28	11.30
LH_G00090_N	15.23	11.19	11.30	11.35	11.38	11.42	11.43
LH_G00100_N	13.95	11.39	11.48	11.52	11.55	11.59	11.60
LH_G00110_N	-	14.56	14.63	14.66	14.67	14.70	14.70
LH_G00120_N	19.63	17.06	17.13	17.17	17.19	17.22	17.24
LH_G00130_N	-	11.12	11.92	12.37	12.50	12.67	12.72

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_G00140_N	-	16.89	17.31	17.57	17.63	17.71	17.73
LH_G00150_N	-	18.08	19.06	19.83	20.23	20.91	21.09
LH_G00160_N	23.97	21.18	21.24	21.27	21.29	21.32	21.33
LH_G00170_N	-	23.75	23.90	23.99	24.03	24.09	24.14
LH_G00180_N	-	21.27	21.75	22.02	22.15	22.33	22.43
LH_G00190_N	25.04	22.21	22.32	22.37	22.40	22.43	22.45
LH_G00200_N	-	22.06	22.37	22.46	22.50	22.56	22.63
LH_G00210_N	25.83	22.80	23.24	23.31	23.33	23.37	23.39
LH_G00220_N	27.48	23.51	24.12	24.29	24.36	24.46	24.52
LH_G00230_N	-	24.21	24.31	24.35	24.37	24.46	24.52
LH_G00240_N	25.71	24.21	24.41	24.45	24.47	24.51	24.55
LH_G00250_N	13.51	10.38	10.67	10.78	10.84	10.92	10.95
LH_G00260_N	14.04	11.04	11.13	11.17	11.19	11.21	11.22
LH_G00270_N	13.88	11.82	11.99	12.07	12.10	12.14	12.15
LH_G00280_N	14.36	11.28	11.56	11.68	11.74	11.85	11.90
LH_G00290_N	16.85	13.78	13.90	13.95	13.97	14.01	14.04
LH_G00300_N	23.45	19.29	19.39	19.44	19.46	19.49	19.50
LH_G00310_N	19.16	17.30	17.49	17.60	17.65	17.75	17.83
LH_G00320_N	-	17.44	17.84	18.14	18.36	18.79	18.99
LH_G00330_N	-	21.19	21.32	21.37	21.38	21.41	21.42
LH_G00340_N	25.59	20.40	20.67	20.81	20.88	21.00	21.08
LH_G00350_N	-	22.94	23.04	23.10	23.13	23.17	23.18
LH_G00360_N	22.81	21.95	22.15	22.29	22.35	22.45	22.50
LH_G00370_N	26.85	23.72	23.85	23.96	24.02	24.15	24.21
LH_G00380_N	-	10.37	10.66	10.77	10.82	10.90	10.93
LH_G00390_N	12.62	9.19	9.60	9.73	9.78	9.87	9.90
LH_G00400_N	-	9.22	9.61	9.73	9.78	9.86	9.88
LH_G00410_N	-	9.31	9.67	9.78	9.83	9.90	9.93
LH_G00420_N	10.34	10.25	10.50	10.60	10.65	10.73	10.76
LH_G00430_N	-	9.49	9.88	10.07	10.17	10.32	10.37
LH_G00440_N	12.25	9.76	10.13	10.31	10.38	10.50	10.55
LH_G00450_N	-	9.97	10.39	10.55	10.62	10.72	10.77
LH_G00460_N	-	10.65	11.10	11.31	11.40	11.54	11.61
LH_G00470_N	15.57	11.05	11.66	11.91	12.02	12.21	12.29
LH_G00480_N	15.13	12.85	12.98	13.04	13.07	13.13	13.14
LH_G00490_N	-	13.02	13.43	13.60	13.67	13.77	13.82
LH_G00500_N	-	13.53	14.47	14.72	14.82	14.98	15.05
LH_G00510_N	16.06	14.31	15.29	15.67	15.81	16.02	16.11
LH_G00520_N	16.60	15.23	15.57	15.76	15.87	16.06	16.15

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_G00530_N	21.75	17.33	17.42	17.47	17.49	17.53	17.54
LH_G00540_N	16.89	15.53	15.89	16.03	16.09	16.22	16.28
LH_G00550_N	19.81	16.73	16.92	17.03	17.08	17.18	17.23
LH_G00560_N	24.46	17.25	18.22	18.49	18.59	18.73	18.77
LH_G00570_N	20.83	17.98	18.42	18.52	18.60	18.73	18.78
LH_G00580_N	-	17.29	17.75	18.06	18.22	18.53	19.09
LH_G00590_N	23.77	19.90	20.10	20.18	20.22	20.30	20.33
LH_G00600_N	22.35	19.92	20.14	20.23	20.28	20.37	20.41
LH_G00610_N	23.96	20.84	21.11	21.23	21.29	21.41	21.47
LH_G00620_N	25.09	21.21	21.51	21.60	21.65	21.72	21.76
LH_G00630_N	-	21.94	22.10	22.23	22.29	22.39	22.44
LH_G00640_N	-	21.22	21.53	21.64	21.69	21.78	21.83
LH_G00650_N	-	22.01	22.11	22.23	22.29	22.39	22.44
LH_G00660_N	24.70	22.54	22.70	22.80	22.84	22.91	22.95
LH_G00670_N	25.96	23.45	23.52	23.56	23.59	23.64	23.67
LH_G00680_N	26.28	23.86	24.08	24.14	24.17	24.20	24.21
LH_G00690_N	26.33	24.12	24.23	24.28	24.31	24.35	24.36
LH_G00700_N	20.57	19.82	19.91	20.01	20.07	20.17	20.20
LH_G00710_N	-	21.21	21.50	21.60	21.64	21.72	21.75
LH_G00720_N	-	21.31	21.55	21.64	21.68	21.75	21.78
LH_G00730_N	24.69	21.90	22.02	22.08	22.11	22.16	22.18
LH_G00740_N	21.63	22.23	22.73	22.88	22.95	23.07	23.10
LH_G00750_N	-	23.46	23.66	23.76	23.80	23.87	23.88
LH_G00760_N	24.01	23.60	23.77	23.83	23.87	23.92	23.93
LH_G00770_N	23.64	23.61	23.79	23.86	23.90	23.96	23.97
LH_G00780_N	-	23.87	24.00	24.06	24.08	24.11	24.13
LH_G00790_N	16.36	16.63	16.72	17.05	17.16	17.33	17.41
LH_G00800_N	16.51	17.48	17.72	17.83	17.89	18.00	18.06
LH_G00810_N	20.45	21.19	21.45	21.54	21.59	21.67	21.70
LH_G00820_N	21.05	21.32	21.57	21.66	21.70	21.78	21.81
LH_G00830_N	12.54	4.89	5.54	5.67	5.72	5.80	5.84
LH_G00840_N	9.48	5.50	6.24	6.45	6.55	6.72	6.78
LH_G00850_N	14.32	5.70	7.47	7.69	7.79	7.96	8.03
LH_G00860_N	-	7.65	7.78	7.81	7.83	7.85	7.87
LH_H00010_N	-	7.11	7.26	7.34	7.38	7.44	7.46
LH_H00020_N	-	8.14	8.43	8.61	8.69	8.84	8.89
LH_H00030_N	11.34	8.62	8.85	8.99	9.07	9.20	9.26
LH_H00040_N	-	9.11	9.45	9.68	9.78	9.92	9.97
LH_H00050_N	12.03	9.54	9.93	10.19	10.30	10.47	10.52

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_H00060_N	12.12	9.57	9.80	9.95	10.02	10.16	10.21
LH_H00070_N	11.16	9.95	10.10	10.21	10.27	10.38	10.44
LH_H00080_N	11.33	10.02	10.17	10.30	10.37	10.49	10.55
LH_H00090_N	13.34	10.47	10.64	10.79	10.87	11.01	11.07
LH_H00100_N	-	12.96	13.43	13.61	13.67	13.78	13.82
LH_H00110_N	-	13.78	14.52	14.79	14.90	15.07	15.15
LH_H00120_N	15.78	14.02	15.29	15.66	15.80	16.00	16.09
LH_H00130_N	14.70	14.87	15.00	15.17	15.23	15.33	15.36
LH_H00140_N	-	14.82	14.98	15.16	15.24	15.34	15.39
LH_H00150_N	13.55	10.00	10.72	10.84	10.89	10.97	11.00
LH_H00160_N	-	10.51	10.73	10.85	10.90	10.99	11.02
LH_H00170_N	-	10.23	10.83	10.94	10.99	11.08	11.11
LH_H00180_N	14.36	10.70	11.16	11.32	11.41	11.62	11.69
LH_H00190_N	-	11.13	11.50	11.64	11.72	11.88	11.93
LH_H00200_N	13.22	14.86	15.21	15.38	15.44	15.54	15.57
LH_H00210_N	14.35	15.41	15.82	15.92	15.96	16.02	16.04
LH_H00220_N	14.27	15.40	15.80	15.88	15.92	15.98	16.00
LH_H00230_N	14.41	15.40	15.79	15.88	15.91	15.97	15.99
LH_H00240_N	14.67	15.39	15.79	15.88	15.91	15.97	15.99
LH_H00260_N	-	15.47	15.87	15.98	16.03	16.11	16.13
LH_H00270_N	-	15.71	16.07	16.18	16.23	16.32	16.34
LH_H00280_N	-	17.17	17.25	17.29	17.30	17.33	17.34
LH_H00290_N	-	15.88	16.25	16.39	16.45	16.57	16.60
LH_H00300_N	-	19.33	19.40	19.44	19.46	19.49	19.49
LH_H00310_N	-	20.88	21.21	21.41	21.52	21.71	21.73
LH_H00320_N	-	16.19	16.52	16.67	16.75	16.88	16.91
LH_H00330_N	-	9.01	9.53	9.93	10.18	10.76	11.32
LH_H00340_N	-	9.01	9.53	9.93	10.18	10.76	11.32
LH_H00350_N	-	16.90	17.39	17.69	17.84	18.08	18.12
LH_H00360_N	-	16.99	17.53	17.80	17.94	18.17	18.21
LH_H00370_N	22.47	17.00	17.53	17.81	17.95	18.17	18.22
LH_H00380_N	22.61	19.68	19.89	19.97	20.01	20.07	20.09
LH_H00390_N	-	17.31	17.54	17.81	17.95	18.18	18.22
LH_H00400_N	-	17.40	17.54	17.81	17.95	18.18	18.22
LH_H00410_N	-	20.07	20.22	20.29	20.33	20.39	20.40
LH_H00420_N	-	20.09	20.29	20.40	20.45	20.54	20.56
LH_H00430_N	14.40	15.43	15.87	15.99	16.04	16.12	16.15
LH_H00440_N	14.37	15.44	15.89	16.01	16.06	16.15	16.18
LH_H00450_N	14.69	15.83	16.09	16.16	16.19	16.25	16.27

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_H00460_N	16.61	17.40	18.16	18.34	18.39	18.47	18.51
LH_H00470_N	17.10	17.59	18.52	18.82	18.91	19.07	19.16
LH_H00480_N	17.57	18.26	18.58	18.85	18.94	19.09	19.18
LH_H00490_N	19.55	19.68	19.97	20.06	20.10	20.16	20.19
LH_H00500_N	22.04	18.82	19.13	19.28	19.35	19.49	19.57
LH_H00510_N	19.75	20.10	20.41	20.51	20.56	20.65	20.70
LH_H00520_N	22.86	20.52	20.61	20.67	20.70	20.75	20.77
LH_H00530_N	21.89	21.98	22.20	22.31	22.37	22.47	22.49
LH_H00540_N	22.18	22.76	22.90	22.96	22.99	23.04	23.05
LH_H00550_N	25.45	22.98	23.14	23.23	23.28	23.36	23.38
LH_H00560_N	27.38	25.94	26.05	26.10	26.12	26.17	26.18
LH_H00570_N	26.12	26.12	26.31	26.46	26.51	26.59	26.62
LH_H00580_N	25.54	25.89	26.57	26.75	26.80	26.86	26.88
LH_H00590_N	29.55	26.83	26.99	27.04	27.07	27.11	27.14
LH_H00600_N	-	18.21	18.34	18.42	18.45	18.51	18.54
LH_H00610_N	-	19.40	19.52	19.59	19.65	19.76	19.80
LH_H00620_N	-	20.54	20.65	20.71	20.74	20.79	20.82
LH_H00630_N	21.28	20.68	20.90	20.99	21.04	21.12	21.17
LH_H00640_N	-	21.11	21.43	21.62	21.73	21.95	22.07
LH_H00650_N	-	21.27	21.49	21.67	21.78	21.99	22.12
LH_H00660_N	-	20.15	20.44	20.54	20.58	20.65	20.67
LH_H00670_N	-	22.90	23.17	23.30	23.36	23.46	23.50
LH_H00680_N	-	22.91	23.18	23.30	23.36	23.47	23.50
LH_H00690_N	-	21.66	21.84	21.99	22.06	22.18	22.24
LH_H00700_N	-	21.89	22.02	22.11	22.16	22.26	22.31
LH_H00710_N	23.67	22.70	22.81	22.86	22.89	22.93	22.94
LH_H00720_N	27.17	24.16	24.22	24.25	24.27	24.29	24.30
LH_H00730_N	26.06	24.29	24.37	24.42	24.44	24.49	24.50
LH_H00740_N	-	22.29	22.46	22.54	22.58	22.64	22.68
LH_H00750_N	-	23.17	23.26	23.34	23.40	23.50	23.53
LH_H00760_N	26.77	22.93	23.18	23.31	23.37	23.47	23.51
LH_H00770_N	-	23.45	23.63	23.72	23.76	23.84	23.89
LH_H00780_N	-	22.33	22.55	22.65	22.71	22.80	22.85
LH_H00790_N	-	22.33	22.55	22.65	22.70	22.79	22.84
LH_H00800_N	-	22.49	22.60	22.67	22.72	22.81	22.86
LH_H00810_N	-	23.98	24.40	24.47	24.53	24.65	24.79
LH_H00820_N	-	24.22	24.48	24.55	24.61	24.70	24.81
LH_H00830_N	-	23.16	23.31	23.39	23.43	23.50	23.53
LH_H00840_N	-	23.49	23.65	23.73	23.77	23.84	23.85

Table A-1

Existing Conditions, Seasonal Average Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation					
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	50-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_H00850_N	-	24.08	24.25	24.35	24.40	24.50	24.50
LH_H00860_N	-	23.46	23.68	23.81	23.88	24.01	24.06
LH_H00870_N	26.73	24.81	25.28	25.45	25.53	25.66	25.78
LH_H00880_N	29.31	26.16	26.24	26.28	26.30	26.33	26.35
LH_H00890_N	27.98	25.63	25.70	25.74	25.76	25.79	25.84
LH_H00900_N	-	24.43	25.27	25.43	25.50	25.61	25.72
LH_H00910_N	-	24.05	25.12	25.26	25.31	25.40	25.50
LH_H00920_N	-	25.05	25.21	25.39	25.46	25.57	25.68
LH_H00930_N	-	25.29	25.41	25.49	25.53	25.60	25.60
LH_H00940_N	-	24.93	25.01	25.06	25.09	25.17	25.21
LH_H00950_N	-	25.52	25.81	26.00	26.11	26.26	26.29
LH_H00960_N	-	24.53	24.72	24.83	24.89	25.00	25.00
LH_H00970_N	-	24.74	24.93	25.02	25.06	25.14	25.18
LH_H00980_N	-	24.74	24.93	25.01	25.05	25.12	25.15
LH_H00990_N	-	25.26	25.35	25.41	25.43	25.48	25.49
LH_H01000_N	-	25.69	25.79	25.84	25.86	25.91	25.93
LH_I00010_N	9.69	5.92	6.13	6.27	6.35	6.46	6.49
LH_I00020_N	-	6.00	6.03	6.04	6.05	6.06	6.07
LH_I00030_N	10.79	6.43	6.60	6.72	6.78	6.88	6.90
LH_I00040_N	12.09	8.19	8.29	8.33	8.35	8.39	8.41
LH_I00050_N	13.92	8.03	8.12	8.16	8.19	8.25	8.27
LH_I00060_N	13.06	8.56	8.80	8.94	9.02	9.16	9.23
LH_I00070_N	10.42	8.34	8.67	8.76	8.79	8.84	8.85
LH_I00080_N	15.17	10.84	10.96	11.03	11.06	11.12	11.13
LH_J00010_N	-	8.87	8.90	8.93	8.94	8.96	8.97
LH_J00020_N	17.50	11.15	11.31	11.37	11.41	11.45	11.46
LH_J00030_N	-	11.82	12.11	12.25	12.32	12.40	12.40
LH_J00040_N	-	13.30	13.72	13.95	14.05	14.14	14.15
LH_J00050_N	15.55	13.51	14.08	14.49	14.80	15.25	15.30
LH_J00060_N	16.74	13.88	14.60	15.11	15.43	15.91	15.97
LH_J00065_N	-	14.71	15.23	15.47	15.62	16.03	16.08
LH_J00070_N	-	14.72	15.25	15.49	15.63	16.03	16.08
LH_J00080_N	22.94	18.23	18.33	18.38	18.40	18.43	18.43
LH_J00090_N	16.46	17.48	17.62	17.67	17.69	17.72	17.73
LH_J00100_N	17.61	11.76	11.84	11.87	11.89	11.91	11.93
LH_J00110_N	-	14.39	14.59	14.66	14.69	14.74	14.76

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00010_C	87.86	0.00	130.31	0.00	152.54	0.00	165.34	0.00	190.90	0.00	200.54	0.00
LH_A00010_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00010_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.47	0.00	0.54	0.00
LH_A00010_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00010_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00010_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00020_C	68.48	0.00	98.33	0.00	113.87	0.00	122.72	0.00	140.44	0.00	142.20	0.00
LH_A00020_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00020_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00020_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00030_C	64.59	0.00	92.29	0.00	106.82	0.00	114.99	0.00	131.24	0.00	133.16	0.00
LH_A00030_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00030_W2	0.00	-21.32	0.00	-35.02	0.00	-42.36	0.00	-46.09	0.00	-52.89	0.00	-53.30
LH_A00030_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00030_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00040_W	4.61	0.00	7.36	0.00	10.88	0.00	13.21	0.00	18.41	0.00	19.02	0.00
LH_A00050_C	41.13	0.00	59.00	0.00	70.09	0.00	76.12	0.00	87.87	0.00	91.73	0.00
LH_A00050_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
LH_A00050_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00050_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_C	39.48	0.00	55.91	0.00	66.28	0.00	71.94	0.00	82.94	0.00	86.64	0.00
LH_A00060_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00070_C	31.70	0.00	43.55	0.00	50.76	0.00	54.69	0.00	62.27	0.00	64.78	0.00
LH_A00070_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00070_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00070_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_C	22.71	0.00	27.90	0.00	31.36	0.00	33.18	0.00	36.60	0.00	37.54	0.00
LH_A00080_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00090_P1	6.90	0.00	7.84	0.00	8.30	0.00	8.57	0.00	9.11	0.00	9.30	0.00
LH_A00090_P2	6.56	0.00	7.49	0.00	7.94	0.00	8.18	0.00	8.60	0.00	8.75	0.00
LH_A00090_P3	5.00	0.00	5.67	0.00	6.00	0.00	6.20	0.00	6.57	0.00	6.71	0.00
LH_A00090_P4	3.35	0.00	4.03	0.00	4.37	0.00	4.58	0.00	4.99	0.00	5.14	0.00
LH_A00090_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00090_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00090_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00100_P1	9.76	0.00	11.18	0.00	11.51	0.00	11.73	0.00	12.14	0.00	12.10	0.00
LH_A00100_P2	11.85	0.00	13.40	0.00	13.77	0.00	14.02	0.00	14.49	0.00	14.44	0.00
LH_A00100_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00100_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00100_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06	0.00	-1.20	0.00	-1.09
LH_A00100_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00100_W5	8.49	-5.52	14.68	-5.40	16.76	-5.53	17.39	-5.55	20.28	-5.51	20.03	-5.64
LH_A00110_P1	15.08	0.00	19.46	0.00	20.22	0.00	20.88	0.00	21.74	0.00	21.70	0.00
LH_A00110_P2	13.85	0.00	18.59	0.00	19.78	0.00	19.80	0.00	20.66	0.00	20.62	0.00
LH_A00110_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00110_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00110_W3	0.00	0.00	0.00	0.00	2.26	0.00	4.64	0.00	9.67	0.00	9.34	0.00
LH_A00110_W4	0.00	-0.62	0.00	-2.57	0.00	-7.14	0.00	-10.30	0.00	-15.73	0.00	-15.40
LH_A00120_C	26.67	-0.01	34.82	-0.02	36.01	-0.02	36.43	-0.02	36.62	-0.02	36.89	-0.01
LH_A00120_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.25	0.00
LH_A00120_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00120_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00130_P1	13.65	0.00	17.90	0.00	18.55	0.00	18.68	0.00	18.67	0.00	18.81	0.00
LH_A00130_P2	12.79	0.00	17.02	0.00	17.66	0.00	17.80	0.00	17.81	0.00	17.95	0.00
LH_A00130_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00130_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00130_W3	0.00	-0.26	1.48	-1.23	4.92	-1.56	6.39	-1.58	8.68	-1.48	8.54	-1.50
LH_A00140_C	26.05	0.00	34.72	0.00	37.14	0.00	38.17	0.00	39.58	0.00	40.11	0.00
LH_A00140_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00140_W2	0.00	0.00	3.88	0.00	10.49	0.00	14.01	0.00	20.41	0.00	19.89	0.00
LH_A00140_W3	0.00	0.00	0.00	0.00	0.10	0.00	0.38	0.00	1.13	0.00	1.06	0.00
LH_A00150_P1	12.85	0.00	17.39	0.00	20.47	0.00	21.81	0.00	24.81	0.00	24.66	0.00
LH_A00150_P2	9.73	0.00	15.41	0.00	18.61	0.00	20.06	0.00	21.98	0.00	21.98	0.00
LH_A00150_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.35	0.00
LH_A00150_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00160_C	22.34	0.00	32.54	0.00	38.75	0.00	41.46	0.00	44.91	0.00	44.96	0.00
LH_A00160_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.01	0.00
LH_A00160_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
LH_A00160_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00170_C	21.77	0.00	32.07	0.00	38.17	0.00	40.73	0.00	43.83	0.00	43.92	0.00
LH_A00170_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.39	0.00
LH_A00170_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00170_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00170_W4	0.00	0.00	0.00	0.00	0.36	0.00	1.31	0.00	4.75	0.00	4.30	0.00
LH_A00180_C	19.25	0.00	29.00	0.00	35.08	0.00	38.17	0.00	43.32	0.00	42.99	0.00
LH_A00180_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00180_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00180_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00180_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_P	17.87	0.00	27.33	0.00	33.07	0.00	35.87	0.00	40.24	0.00	40.10	0.00
LH_A00190_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	3.28	0.00	3.12	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00190_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
LH_A00200_C	352.32	0.00	557.01	0.00	665.12	0.00	714.54	0.00	768.21	0.00	784.44	0.00
LH_A00200_W1	0.00	0.00	1.26	0.00	85.80	0.00	168.66	0.00	313.84	0.00	356.27	0.00
LH_A00200_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00210_C	352.06	0.00	558.60	0.00	750.53	0.00	882.74	0.00	1081.38	0.00	1140.09	0.00
LH_A00210_W	0.00	0.00	0.00	0.00	0.00	0.00	3.65	0.00	57.67	0.00	96.44	0.00
LH_A00220_C	351.82	0.00	546.61	0.00	668.17	0.00	717.66	0.00	772.97	0.00	792.96	0.00
LH_A00220_W1	0.00	0.00	0.00	0.00	0.00	0.00	1.81	0.00	25.19	0.00	41.72	0.00
LH_A00220_W2	0.00	0.00	13.17	0.00	81.88	0.00	168.15	0.00	365.29	0.00	442.85	0.00
LH_A00220_W3	0.00	0.00	0.00	-11.17	0.00	-179.91	0.00	-344.17	0.00	-627.10	0.00	-729.58
LH_A00230_C	347.46	-0.01	543.06	-0.01	592.98	-0.01	603.21	-0.01	610.96	-0.01	611.64	0.00
LH_A00230_W	0.00	0.00	0.00	0.00	5.64	0.00	44.38	0.00	240.24	0.00	373.32	0.00
LH_A00240_C	250.55	0.00	356.87	0.00	396.83	0.00	397.42	0.00	397.37	0.00	398.46	0.00
LH_A00240_W	0.00	0.00	0.00	0.00	11.75	0.00	47.38	0.00	152.88	0.00	196.39	0.00
LH_A00250_C	261.58	0.00	362.20	0.00	375.94	0.00	366.85	0.00	384.90	0.00	394.58	0.00
LH_A00250_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	0.00	7.43	0.00
LH_A00250_W2	0.03	0.00	25.24	0.00	58.45	0.00	82.27	0.00	137.16	0.00	163.03	0.00
LH_A00260_C	234.86	0.00	306.75	0.00	335.12	0.00	353.28	0.00	393.94	0.00	412.23	0.00
LH_A00260_W1	0.00	0.00	0.00	0.00	0.06	0.00	0.46	0.00	8.88	0.00	21.36	0.00
LH_A00260_W2	14.67	0.00	49.29	0.00	72.25	0.00	87.73	0.00	129.53	0.00	151.73	0.00
LH_A00270_C	108.61	0.00	126.01	0.00	129.34	0.00	129.84	0.00	130.35	0.00	126.80	0.00
LH_A00270_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00270_W2	19.72	0.00	93.73	0.00	121.87	0.00	134.82	0.00	168.61	0.00	188.17	0.00
LH_A00280_C	117.26	0.00	192.06	0.00	201.01	0.00	210.25	0.00	246.46	0.00	269.77	0.00
LH_A00280_W	0.00	0.00	0.00	0.00	0.10	0.00	0.84	0.00	5.64	0.00	9.51	0.00
LH_A00290_P1	13.08	0.00	47.56	0.00	48.66	0.00	49.20	0.00	50.30	0.00	50.80	0.00
LH_A00290_P2	13.17	0.00	48.44	0.00	49.52	0.00	50.05	0.00	51.13	0.00	51.63	0.00
LH_A00290_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00
LH_A00300_C	26.55	0.00	96.86	0.00	109.94	0.00	124.60	0.00	174.42	0.00	208.16	0.00
LH_A00300_W1	0.00	0.00	0.97	0.00	9.01	0.00	16.06	0.00	37.73	0.00	51.20	0.00
LH_A00300_W2	0.00	0.00	45.43	0.00	150.00	0.00	230.98	0.00	458.59	0.00	594.63	0.00
LH_A00300_W3	0.00	0.00	0.00	0.00	0.01	0.00	0.53	-3.39	0.80	-37.00	0.82	-62.46
LH_A00310_C	25.45	0.00	111.18	0.00	172.60	0.00	212.61	0.00	289.17	0.00	323.55	0.00
LH_A00310_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00310_W2	0.00	0.00	31.65	0.00	95.89	0.00	157.35	0.00	348.02	0.00	471.00	0.00
LH_A00310_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00
LH_A00310_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.39
LH_A00310_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_C	22.00	0.00	142.27	0.00	267.69	0.00	365.15	0.00	483.06	0.00	522.28	0.00
LH_A00320_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W2	0.00	0.00	0.00	0.00	0.00	0.00	3.84	0.00	152.57	0.00	270.90	0.00
LH_A00320_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00330_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W2	15.68	0.00	137.50	0.00	239.05	0.00	306.09	0.00	448.48	0.00	527.15	0.00
LH_A00330_W3	4.70	-7.50	8.85	-14.53	8.41	-30.23	8.12	-52.03	6.55	-103.58	0.95	-135.88
LH_A00330_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W6	0.00	0.00	0.06	-2.92	0.07	-11.35	0.08	-17.54	0.08	-38.28	0.05	-53.24
LH_A00330_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W8	0.07	-0.89	0.48	-17.02	1.16	-34.69	1.54	-48.29	2.24	-84.32	1.87	-106.66
LH_A00360_P	92.00	0.00	95.94	0.00	99.97	0.00	102.36	0.00	107.46	0.00	109.76	0.00
LH_A00360_W1	0.00	0.00	0.00	0.00	0.41	0.00	3.07	0.00	18.77	0.00	32.15	0.00
LH_A00360_W2	0.00	0.00	0.00	-0.79	0.00	-11.83	0.00	-25.46	0.00	-73.16	0.00	-105.70
LH_A00360_W3	0.00	-81.27	0.00	-156.37	0.00	-269.69	0.00	-353.49	0.00	-555.28	0.00	-659.93
LH_A00360_W4	126.57	0.00	259.94	0.00	460.77	0.00	611.34	0.00	997.04	0.00	1202.34	0.00
LH_A00360_W5	0.00	0.00	0.01	0.00	2.83	0.00	9.32	0.00	42.93	0.00	66.62	0.00
LH_A00370_C	133.21	-0.02	184.07	-0.03	243.93	-0.04	281.66	-0.05	359.29	-0.06	394.26	-0.01
LH_A00380_W1	4.69	0.00	15.80	0.00	29.62	0.00	50.41	0.00	139.97	0.00	199.72	0.00
LH_A00380_W2	15.32	-2.36	19.58	-10.69	22.64	-26.04	23.92	-35.72	26.53	-53.84	25.28	-69.91
LH_A00380_W3	0.00	0.00	0.00	0.00	0.00	-0.24	0.00	-14.26	0.00	-84.64	0.00	-122.22
LH_A00380_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-6.55
LH_A00380_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.00	4.72	0.00
LH_A00390_C	216.75	0.00	308.13	0.00	403.04	0.00	456.21	0.00	517.11	0.00	536.49	0.00
LH_A00400_C	216.63	0.00	307.57	0.00	403.12	0.00	473.43	0.00	637.23	0.00	718.09	0.00
LH_A00410_C	216.48	0.00	307.38	0.00	402.36	0.00	456.39	0.00	513.35	0.00	529.60	0.00
LH_A00410_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	5.40	0.00
LH_A00410_W2	0.00	0.00	0.00	0.00	0.40	0.00	16.55	0.00	123.37	0.00	194.84	0.00
LH_A00410_W3	0.00	-2.88	0.00	-58.23	0.00	-145.81	0.00	-215.23	0.00	-357.69	0.00	-431.22
LH_A00410_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.28	0.00	-1.39
LH_A00410_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00420_C	213.07	0.00	248.17	0.00	257.60	0.00	260.53	0.00	276.37	0.00	294.35	0.00
LH_A00430_C	215.70	0.00	301.42	0.00	340.69	0.00	351.42	0.00	362.28	0.00	366.04	0.00
LH_A00430_W1	0.00	0.00	4.54	0.00	60.17	0.00	119.37	0.00	273.26	0.00	362.65	0.00
LH_A00430_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00
LH_A00440_C	214.51	0.00	300.04	0.00	339.84	0.00	351.98	0.00	368.86	0.00	375.85	0.00
LH_A00440_W	0.00	0.00	3.32	0.00	56.50	0.00	112.54	0.00	255.07	0.00	338.77	0.00
LH_A00450_C	213.08	0.00	299.86	0.00	377.64	0.00	429.68	0.00	542.61	0.00	600.00	0.00
LH_A00450_W	0.00	0.00	0.32	0.00	13.75	0.00	28.80	0.00	70.01	0.00	95.68	0.00
LH_A00460_C	211.92	0.00	273.81	0.00	303.79	0.00	324.66	0.00	359.26	0.00	373.41	0.00
LH_A00460_W	0.00	0.00	24.60	0.00	84.54	0.00	130.23	0.00	251.85	0.00	326.75	0.00
LH_A00470_P	4.19	0.00	5.68	-0.06	5.82	0.00	5.87	0.00	5.92	0.00	5.70	-0.99
LH_A00470_W1	0.00	0.00	0.04	0.00	20.15	0.00	53.15	0.00	166.15	0.00	241.97	0.00
LH_A00470_W2	0.00	0.00	0.00	-10.35	0.51	-28.23	2.10	-65.69	5.90	-196.10	8.01	-285.01
LH_A00470_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00
LH_A00470_W4	0.00	0.00	0.13	0.00	3.76	0.00	8.63	0.00	27.07	0.00	40.06	-0.09
LH_A00480_C	210.94	0.00	291.87	0.00	379.91	0.00	440.28	0.00	543.78	0.00	579.37	0.00
LH_A00480_W	0.00	0.00	0.00	0.00	0.00	0.00	2.66	0.00	39.74	0.00	81.82	0.00
LH_A00490_C	210.32	0.00	290.77	0.00	374.63	0.00	405.53	0.00	420.38	0.00	425.00	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00490_W1	0.00	0.00	0.00	0.00	3.54	0.00	36.55	0.00	200.52	0.00	305.18	0.00
LH_A00490_W2	0.00	-20.26	0.00	-108.32	0.00	-203.82	0.00	-268.84	0.00	-417.17	0.00	-502.96
LH_A00500_P	12.76	-0.24	16.28	-14.40	16.54	-20.37	16.56	-22.77	16.66	-25.56	15.18	-26.50
LH_A00500_W1	1.08	-2.20	11.23	-6.52	14.90	-6.91	16.45	-6.95	25.53	-7.02	33.86	-6.01
LH_A00500_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00500_W3	0.00	0.00	0.00	0.00	0.08	-2.00	0.36	-8.20	0.37	-34.05	0.34	-49.41
LH_A00510_P	9.10	-1.69	9.47	-6.43	9.49	-8.40	9.47	-9.38	9.42	-10.53	8.07	-10.92
LH_A00510_W1	4.96	0.00	23.91	-0.01	41.77	-0.10	56.48	-0.15	99.85	-0.07	125.68	0.00
LH_A00510_W10	0.00	-40.78	0.00	-86.93	0.00	-111.52	0.00	-127.62	0.00	-158.43	0.00	-155.32
LH_A00510_W2	0.00	0.00	9.34	0.00	27.73	0.00	45.23	0.00	81.56	-0.12	106.28	-0.39
LH_A00510_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-3.62	0.00	-10.09
LH_A00510_W4	12.28	-0.22	14.47	-8.58	14.59	-19.80	14.55	-24.20	14.47	-30.00	21.70	-24.72
LH_A00510_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00510_W6	0.00	0.00	0.00	-1.45	0.00	-5.87	0.00	-9.52	0.00	-18.63	0.00	-24.41
LH_A00510_W7	0.00	0.00	0.00	-0.82	0.00	-4.32	0.00	-7.82	0.00	-19.46	0.00	-27.79
LH_A00510_W8	0.00	0.00	0.00	-0.13	0.00	-2.19	0.00	-4.14	0.00	-9.40	0.00	-13.28
LH_A00510_W9	36.25	0.00	75.78	-1.69	99.50	-7.12	112.31	-10.79	132.80	-17.74	117.72	-20.09
LH_A00520_C	210.60	0.00	203.50	0.00	202.69	0.00	202.62	0.00	218.42	0.00	219.59	0.00
LH_A00520_W1	0.00	0.00	1.30	0.00	25.42	0.00	48.29	0.00	91.60	0.00	107.86	0.00
LH_A00520_W2	0.00	-3.11	0.00	-20.07	0.00	-44.40	0.00	-59.65	0.00	-89.24	0.00	-103.24
LH_A00530_C	180.75	0.00	187.12	0.00	182.24	0.00	179.20	0.00	174.56	0.00	175.52	0.00
LH_A00540_C	91.33	0.00	86.60	0.00	85.27	0.00	85.12	0.00	85.09	0.00	90.80	0.00
LH_A00540_W1	68.24	0.00	88.02	0.00	116.20	0.00	138.53	0.00	192.35	0.00	222.19	0.00
LH_A00540_W2	0.00	-82.70	0.00	-104.14	0.00	-93.20	0.00	-79.85	0.00	-69.23	0.00	-50.40
LH_A00540_W3	0.00	-109.15	0.00	-172.29	0.00	-196.14	0.00	-204.09	0.00	-207.57	0.00	-153.93
LH_A00550_C	154.96	0.00	145.28	0.00	118.45	0.00	112.06	0.00	109.87	0.00	94.93	0.00
LH_A00560_C	88.92	0.00	127.79	0.00	131.49	0.00	126.89	0.00	115.22	0.00	90.00	0.00
LH_A00560_W1	2.60	0.00	6.57	0.00	9.33	0.00	11.78	0.00	18.17	0.00	22.33	0.00
LH_A00560_W2	0.00	-0.38	0.00	-1.61	0.00	-3.53	0.00	-4.89	0.00	-8.58	0.00	-10.85
LH_A00560_W3	8.58	-22.80	41.66	-12.06	54.13	-16.75	54.48	-23.30	76.46	-28.68	88.94	-51.37
LH_A00570_C	98.06	0.00	156.18	0.00	200.68	0.00	220.23	0.00	247.49	0.00	225.36	0.00
LH_A00580_P	14.51	-13.29	12.78	-14.26	12.58	-14.80	12.46	-14.96	12.29	-15.10	11.27	-15.21
LH_A00580_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00580_W2	0.00	-11.43	0.00	-42.62	0.00	-67.52	0.00	-82.01	0.00	-112.57	0.00	-129.76
LH_A00580_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00580_W4	0.00	-17.06	0.00	-112.68	0.00	-170.36	0.00	-233.52	0.00	-391.44	0.00	-483.36
LH_A00580_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W1	24.91	0.00	42.10	0.00	54.29	0.00	62.19	0.00	84.38	0.00	82.67	0.00
LH_A00590_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00600_C	110.00	0.00	162.37	0.00	177.42	0.00	175.35	0.00	159.10	0.00	123.82	0.00
LH_A00600_W	8.45	0.00	15.84	0.00	26.26	0.00	31.45	0.00	37.43	0.00	30.04	0.00
LH_A00610_C	112.06	0.00	169.34	0.00	195.38	0.00	200.22	0.00	193.83	0.00	152.83	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00610_W1	21.19	0.00	51.48	0.00	74.99	0.00	91.25	0.00	124.65	0.00	143.21	0.00
LH_A00610_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00610_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00620_P1	11.21	-0.01	16.42	-19.19	20.82	-33.82	22.48	-38.68	23.08	-44.48	13.12	-47.23
LH_A00620_P2	11.21	-0.01	16.42	-19.19	20.82	-33.82	22.48	-38.68	23.08	-44.48	13.12	-47.23
LH_A00620_P3	11.21	0.00	16.42	-19.19	20.82	-33.82	22.48	-38.68	23.08	-44.48	13.12	-47.23
LH_A00620_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00630_C	33.16	-0.01	45.51	-0.02	63.11	-0.02	103.28	-0.02	189.01	-0.03	233.19	-0.01
LH_A00630_W	4.98	0.00	8.91	0.00	16.62	0.00	43.72	0.00	130.74	0.00	188.42	0.00
LH_A00640_P	37.00	-0.02	52.49	-0.03	57.19	-0.03	61.23	-0.03	64.91	-0.04	64.87	-0.01
LH_A00640_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00640_W2	0.00	0.00	0.00	0.00	0.13	0.00	0.55	0.00	2.48	0.00	4.80	0.00
LH_A00650_C	53.52	-0.01	84.17	-0.01	88.43	-0.01	96.82	-0.01	103.77	-0.02	111.98	-0.01
LH_A00650_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.12	0.00	7.21	0.00
LH_A00650_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00660_P	36.64	0.00	52.07	0.00	56.85	0.00	61.19	0.00	68.24	0.00	68.84	0.00
LH_A00660_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41	0.00	5.48	0.00
LH_A00670_C	36.61	0.00	52.08	0.00	56.77	0.00	61.17	0.00	69.62	0.00	74.28	0.00
LH_A00670_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00680_P	36.31	0.00	51.67	0.00	55.50	0.00	56.49	0.00	57.59	0.00	58.03	0.00
LH_A00680_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00680_W2	0.00	0.00	0.00	0.00	0.90	0.00	4.32	0.00	11.71	0.00	15.72	0.00
LH_A00680_W3	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.14	0.00	-0.50	0.00	-0.91
LH_A00690_C	36.75	0.00	52.10	0.00	57.13	0.00	61.10	0.00	68.94	0.00	73.17	0.00
LH_A00690_W	0.00	0.00	0.00	0.00	0.43	0.00	6.33	0.00	23.89	0.00	36.55	0.00
LH_A00700_C	36.86	0.00	49.23	0.00	57.35	0.00	62.64	0.00	71.56	0.00	75.34	0.00
LH_A00700_W1	0.00	0.00	0.00	0.00	19.52	0.00	74.72	0.00	215.74	0.00	297.61	0.00
LH_A00700_W2	0.00	0.00	3.43	0.00	4.49	0.00	5.25	0.00	6.84	0.00	7.91	0.00
LH_A00700_W3	0.00	0.00	0.00	0.00	0.00	-25.02	0.00	-40.88	0.00	-70.60	0.00	-95.69
LH_A00710_P1	17.91	0.00	27.00	-2.50	31.04	-3.62	31.50	-3.75	30.25	-2.50	20.91	0.00
LH_A00710_P2	17.91	0.00	27.00	-2.50	31.04	-3.62	31.50	-3.75	30.25	-2.50	20.91	0.00
LH_A00720_W	53.26	0.00	102.39	0.00	141.06	0.00	162.21	0.00	199.44	0.00	192.05	0.00
LH_A00730_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00730_W2	32.87	0.00	58.91	0.00	80.76	0.00	91.57	0.00	111.08	0.00	117.12	0.00
LH_A00730_W3	0.00	0.00	0.00	0.00	2.78	0.00	8.03	0.00	21.37	0.00	26.14	0.00
LH_A00740_C	65.08	0.00	173.57	0.00	232.76	0.00	249.28	0.00	268.01	0.00	274.37	0.00
LH_A00740_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00740_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00740_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00740_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00750_C	65.37	0.00	173.78	0.00	239.26	0.00	263.28	0.00	293.53	0.00	306.84	0.00
LH_A00750_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00750_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
LH_A00750_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00760_C	65.09	0.00	173.33	0.00	238.69	0.00	261.40	0.00	292.42	0.00	305.61	0.00
LH_A00760_W1	0.00	0.00	0.00	0.00	6.79	0.00	14.06	0.00	26.25	0.00	37.16	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00760_W2	0.00	0.00	20.78	-0.54	53.80	-0.47	77.48	-0.32	197.14	-0.27	258.90	0.00
LH_A00760_W3	0.00	0.00	0.00	-16.42	0.00	-48.04	1.42	-53.04	20.77	-66.46	92.63	-64.72
LH_A00760_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00760_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00770_W1	44.35	0.00	145.56	0.00	213.56	0.00	256.13	0.00	356.24	0.00	423.18	0.00
LH_A00770_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00770_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00770_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00780_W1	22.51	0.00	58.14	0.00	84.00	0.00	99.46	0.00	133.95	0.00	140.41	0.00
LH_A00780_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00790_W1	15.61	0.00	34.30	0.00	45.41	0.00	53.53	0.00	68.49	0.00	71.65	0.00
LH_A00790_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00790_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00800_C	14.43	-0.05	18.08	-0.07	19.79	-0.08	21.57	-0.09	24.70	-0.10	24.02	-0.02
LH_A00800_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00800_W2	0.00	0.00	3.74	0.00	6.54	0.00	7.21	0.00	7.72	0.00	7.85	0.00
LH_A00810_C	14.48	0.00	20.75	0.00	21.96	0.00	22.94	0.00	25.67	0.00	26.52	0.00
LH_A00810_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00810_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00820_P	14.40	0.00	20.70	0.00	21.87	0.00	22.50	0.00	24.19	0.00	24.53	0.00
LH_A00820_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00820_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00820_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00830_C	14.35	0.00	20.63	0.00	21.68	0.00	22.09	0.00	23.12	0.00	23.29	0.00
LH_A00830_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00840_P	14.27	0.00	20.53	0.00	21.42	0.00	21.54	0.00	21.68	0.00	21.70	0.00
LH_A00840_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00850_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00850_W2	0.30	0.00	4.32	0.00	8.18	0.00	11.97	0.00	18.96	0.00	20.65	0.00
LH_A00850_W3	13.47	0.00	28.31	0.00	36.80	0.00	43.66	0.00	54.65	0.00	57.10	0.00
LH_A00850_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00850_W5	0.68	0.00	1.58	0.00	2.19	-0.37	2.20	-0.87	1.82	-1.55	1.61	-1.83
LH_A00850_W6	0.00	0.00	0.00	0.00	0.00	-0.23	0.00	-1.10	0.00	-4.65	0.00	-5.84
LH_A00850_W7	0.09	0.00	0.97	0.00	1.93	0.00	3.01	0.00	5.37	0.00	5.99	0.00
LH_A00850_W8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00860_C	13.57	0.00	19.65	0.00	21.38	0.00	21.95	0.00	22.54	0.00	22.59	0.00
LH_A00860_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00860_W2	0.00	-0.40	0.00	-1.14	0.93	-1.56	1.22	-1.57	1.97	-1.30	2.12	-1.15
LH_A00860_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00870_P	13.19	0.00	19.04	0.00	22.08	0.00	22.81	0.00	23.71	0.00	23.87	0.00
LH_A00870_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00880_C	13.19	0.00	18.99	0.00	22.16	0.00	23.49	0.00	27.51	0.00	28.92	0.00
LH_A00880_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00880_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00890_W1	6.04	0.00	13.69	0.00	18.54	0.00	21.28	0.00	26.75	0.00	28.51	0.00
LH_A00890_W2	1.81	0.00	3.39	0.00	4.34	0.00	4.87	0.00	5.94	0.00	6.28	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00900_C	11.94	0.00	17.83	0.00	20.79	0.00	22.17	0.00	24.97	0.00	25.73	0.00
LH_A00900_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00900_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_P	11.83	0.00	17.69	0.00	20.64	0.00	22.02	0.00	24.78	0.00	25.52	0.00
LH_A00910_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	5.87	0.00
LH_A00910_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_P	10.51	0.00	17.16	0.00	20.11	0.00	21.59	0.00	23.76	0.00	24.01	0.00
LH_A00920_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
LH_A00920_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.79	0.00	11.09	0.00
LH_A00920_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00930_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00930_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00940_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	0.00
LH_A00940_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00950_W1	0.00	0.00	0.00	0.00	1.37	0.00	6.10	0.00	38.98	0.00	64.21	0.00
LH_A00950_W2	75.87	0.00	163.34	0.00	334.75	0.00	473.07	0.00	843.50	0.00	1033.65	0.00
LH_A00950_W3	132.87	0.00	210.48	0.00	225.30	0.00	228.94	0.00	264.49	0.00	279.69	0.00
LH_A00960_W1	17.17	0.00	33.92	0.00	47.49	0.00	55.14	0.00	70.02	0.00	71.42	0.00
LH_A00960_W2	27.38	0.00	57.50	0.00	83.56	0.00	99.02	0.00	130.12	0.00	133.12	0.00
LH_A00960_W3	0.00	-37.10	0.00	-79.93	0.00	-115.34	0.00	-135.84	0.00	-176.31	0.00	-180.01
LH_A00970_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00970_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00970_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00980_W1	0.00	0.00	0.08	0.00	0.42	0.00	0.73	0.00	1.74	0.00	1.87	0.00
LH_A00980_W2	14.19	0.00	24.73	0.00	31.88	0.00	35.81	0.00	43.36	0.00	44.05	0.00
LH_A00980_W3	0.25	0.00	1.14	0.00	1.88	0.00	2.36	0.00	3.34	-3.37	3.44	-9.89
LH_A00980_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00990_W1	2.58	0.00	7.92	0.00	10.70	0.00	11.99	0.00	14.18	0.00	14.95	0.00
LH_A00990_W2	0.60	0.00	3.14	0.00	5.12	0.00	6.19	0.00	8.15	0.00	8.88	0.00
LH_A00990_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00990_W4	0.02	0.00	0.75	0.00	1.55	0.00	1.98	0.00	2.80	0.00	3.13	0.00
LH_A01000_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01000_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01000_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01000_W4	8.42	0.00	29.04	0.00	47.19	0.00	58.36	0.00	81.21	0.00	85.57	0.00
LH_A01000_W5	0.00	-0.52	0.00	-1.79	0.00	-2.41	0.00	-2.71	0.00	-3.23	0.00	-3.42
LH_A01000_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01010_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01010_W2	34.72	0.00	60.73	0.00	64.59	0.00	67.68	0.00	94.34	0.00	111.46	0.00
LH_A01010_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01010_W4	0.75	-2.07	2.68	-5.78	4.17	-10.99	4.12	-17.88	2.21	-36.95	0.11	-50.01
LH_A01020_W1	8.20	0.00	15.45	0.00	20.29	0.00	23.07	0.00	35.21	0.00	48.20	0.00
LH_A01020_W2	7.01	0.00	12.95	0.00	16.79	0.00	18.95	0.00	28.18	0.00	37.88	0.00
LH_A01020_W3	0.03	0.00	0.45	0.00	0.94	0.00	1.25	0.00	2.76	0.00	4.66	0.00
LH_A01020_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01020_W5	7.09	0.00	11.55	0.00	14.42	-0.12	16.04	-9.39	19.29	-36.06	19.03	-56.02
LH_A01030_W1	69.11	0.00	113.33	0.00	158.20	0.00	189.09	0.00	259.60	0.00	302.56	0.00
LH_A01030_W2	7.22	-58.02	19.66	-104.87	44.96	-123.54	60.07	-128.09	90.08	-120.26	107.44	-44.14
LH_A01030_W3	0.00	-46.80	0.00	-81.19	0.00	-99.32	0.00	-106.81	0.00	-118.79	0.00	-95.02
LH_A01030_W4	0.00	-33.02	0.00	-84.85	0.00	-121.86	0.00	-140.28	0.00	-169.19	0.00	-189.29
LH_A01030_W5	0.00	-4.19	0.00	-42.88	0.00	-79.37	0.00	-102.35	0.00	-150.10	0.00	-176.62
LH_A01040_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01040_W2	21.79	0.00	39.39	0.00	61.54	0.00	73.58	0.00	88.93	0.00	74.62	0.00
LH_A01040_W3	0.00	0.00	0.41	0.00	1.65	0.00	2.54	0.00	4.69	-0.01	5.28	-0.18
LH_A01040_W4	0.00	-0.02	0.00	-1.28	0.00	-2.59	0.00	-3.35	0.00	-4.87	0.00	-5.18
LH_A01040_W5	5.91	-1.77	13.52	-17.54	17.95	-31.06	18.73	-39.72	17.19	-56.79	4.75	-74.04
LH_A01040_W6	0.00	0.00	1.96	-2.08	8.81	-5.95	13.75	-8.91	23.90	-15.64	29.31	-16.63
LH_A01050_W	0.29	0.00	1.74	0.00	3.42	0.00	4.54	0.00	6.95	0.00	7.46	0.00
LH_A01060_W	135.58	0.00	119.71	0.00	97.90	0.00	98.58	0.00	96.73	0.00	86.67	0.00
LH_A01070_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01070_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01070_W3	248.68	0.00	350.21	0.00	379.65	0.00	387.08	0.00	379.35	0.00	268.37	0.00
LH_A01070_W4	0.00	-171.01	11.31	-234.12	26.74	-260.02	33.10	-269.32	40.69	-269.27	44.24	-154.64
LH_A01080_P1	5.73	0.00	5.82	0.00	5.82	0.00	5.80	0.00	5.69	0.00	5.67	0.00
LH_A01080_P2	5.73	0.00	5.82	0.00	5.82	0.00	5.80	0.00	5.69	0.00	5.67	0.00
LH_A01080_W1	55.07	0.00	135.63	0.00	215.89	0.00	264.63	0.00	354.72	0.00	411.41	0.00
LH_A01080_W2	0.00	-72.18	0.00	-165.54	0.00	-263.63	0.00	-323.06	0.00	-431.65	0.00	-499.64
LH_A01090_W1	24.52	0.00	41.48	0.00	49.45	0.00	52.67	0.00	55.04	0.00	41.31	0.00
LH_A01090_W2	0.00	-8.33	0.00	-23.66	0.00	-42.15	0.00	-53.32	0.00	-72.91	0.00	-84.92
LH_A01090_W3	8.34	-20.01	23.46	-32.96	41.82	-33.80	51.96	-33.38	68.43	-30.20	77.15	-5.99
LH_A01090_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01110_W1	1.84	0.00	6.77	-4.98	10.01	-10.58	11.20	-15.12	12.08	-24.55	5.75	-30.14
LH_A01110_W2	147.54	0.00	193.73	-101.07	177.94	-183.10	167.82	-231.77	139.10	-327.60	57.50	-383.08
LH_A01120_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
LH_A01120_W2	0.00	-4.06	0.00	-8.27	0.00	-10.87	0.00	-12.21	0.00	-14.63	0.00	-15.10
LH_A01120_W3	101.92	0.00	143.95	-131.75	147.29	-249.66	142.37	-321.17	124.03	-464.19	52.27	-543.76
LH_A01130_W1	1.79	0.00	4.36	0.00	7.04	0.00	9.19	0.00	14.59	0.00	15.95	0.00
LH_A01130_W2	13.46	0.00	29.26	0.00	42.40	0.00	52.20	0.00	73.53	0.00	78.32	0.00
LH_A01130_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01130_W4	0.00	-7.77	0.00	-21.21	0.00	-37.06	0.00	-47.64	0.00	-69.60	0.00	-75.85
LH_A01130_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01140_W1	44.18	0.00	247.10	0.00	436.17	0.00	551.59	0.00	795.63	0.00	939.35	0.00
LH_A01140_W2	80.75	-1.77	117.99	-155.53	128.08	-297.13	128.49	-383.02	117.71	-561.23	47.18	-662.75

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01150_W1	13.56	0.00	44.57	0.00	78.40	0.00	98.75	0.00	139.53	0.00	150.77	0.00
LH_A01150_W2	80.40	0.00	141.10	0.00	198.22	0.00	230.84	0.00	292.61	0.00	309.07	0.00
LH_A01150_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W2	17.73	0.00	32.49	0.00	43.30	0.00	49.62	0.00	62.40	0.00	64.18	0.00
LH_A01160_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01170_W1	8.77	0.00	15.93	0.00	21.39	0.00	24.61	0.00	31.20	0.00	31.79	0.00
LH_A01170_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01180_W1	59.84	0.00	99.02	0.00	126.64	0.00	143.81	0.00	192.45	0.00	226.17	0.00
LH_A01180_W2	40.99	0.00	82.47	0.00	114.89	0.00	135.90	0.00	197.43	0.00	240.89	0.00
LH_A01180_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01190_W1	2.91	0.00	9.81	0.00	17.04	0.00	22.31	0.00	35.75	0.00	40.31	0.00
LH_A01190_W2	92.78	0.00	195.55	0.00	296.02	0.00	355.24	0.00	470.90	0.00	504.98	0.00
LH_A01190_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01200_W1	62.71	0.00	120.18	0.00	175.45	0.00	229.31	0.00	341.58	0.00	412.12	0.00
LH_A01200_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01210_W1	28.57	0.00	58.45	0.00	99.87	0.00	124.76	0.00	171.60	0.00	203.90	0.00
LH_A01210_W2	0.00	0.00	0.00	0.00	0.05	0.00	1.06	0.00	8.28	0.00	15.99	0.00
LH_A01220_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01220_W2	12.71	0.00	23.37	0.00	32.76	0.00	47.42	0.00	84.50	0.00	113.03	0.00
LH_A01220_W3	16.65	0.00	27.69	0.00	37.30	0.00	52.00	0.00	86.45	0.00	109.83	0.00
LH_A01230_W1	32.60	0.00	91.55	0.00	137.06	0.00	162.16	0.00	208.07	0.00	216.14	0.00
LH_A01230_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01230_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01240_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01240_W2	28.88	0.00	49.05	0.00	74.77	0.00	89.97	0.00	119.52	0.00	124.07	0.00
LH_A01250_W1	4.40	0.00	12.87	0.00	26.80	0.00	36.38	0.00	56.52	0.00	69.52	0.00
LH_A01250_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01250_W3	9.73	0.00	26.38	0.00	55.74	0.00	76.89	0.00	123.27	0.00	154.83	0.00
LH_A01250_W4	0.00	0.00	0.39	0.00	3.57	0.00	6.21	0.00	11.94	0.00	16.11	0.00
LH_A01250_W5	0.00	0.00	0.00	-16.90	0.00	-50.02	0.00	-72.54	0.00	-120.52	0.00	-152.45
LH_A01260_W1	1.63	0.00	6.54	0.00	10.19	0.00	12.04	0.00	15.78	0.00	18.81	0.00
LH_A01260_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01270_W1	0.00	0.00	0.21	0.00	0.90	0.00	1.60	0.00	3.67	0.00	5.66	0.00
LH_A01270_W2	0.01	0.00	1.05	0.00	2.61	0.00	3.64	0.00	5.86	0.00	7.73	0.00
LH_A01270_W3	0.00	0.00	0.25	0.00	0.87	0.00	1.39	0.00	2.60	0.00	3.55	0.00
LH_A01270_W4	19.52	0.00	56.82	0.00	91.71	0.00	111.58	0.00	151.40	0.00	180.37	0.00
LH_A01270_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01270_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01280_W1	22.81	0.00	55.41	0.00	95.84	0.00	120.64	0.00	172.10	0.00	211.55	0.00
LH_A01280_W2	3.77	0.00	22.37	0.00	53.98	0.00	77.05	0.00	129.87	0.00	172.01	0.00
LH_A01280_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01280_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.62	0.00	2.43	0.00
LH_A01280_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01280_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01290_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01290_W2	0.01	0.00	2.03	0.00	5.17	0.00	7.86	0.00	15.67	0.00	17.55	0.00
LH_A01290_W3	30.40	0.00	82.69	0.00	119.57	0.00	138.93	0.00	173.91	0.00	180.71	0.00
LH_A01290_W4	11.13	0.00	30.17	0.00	45.93	0.00	54.97	0.00	71.88	0.00	75.24	0.00
LH_A01290_W5	0.00	-29.49	0.00	-65.11	0.00	-93.53	0.00	-109.16	0.00	-139.29	0.00	-147.06
LH_A01300_W1	10.55	-0.15	27.60	-0.15	40.33	-0.15	47.33	-0.15	60.72	-0.16	63.77	-0.08
LH_A01300_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01310_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01320_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01320_W2	15.97	0.00	30.85	0.00	41.09	0.00	46.93	0.00	58.59	0.00	61.85	0.00
LH_A01330_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01330_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01330_W3	9.73	0.00	18.25	0.00	24.08	0.00	27.41	0.00	34.05	0.00	35.77	0.00
LH_A01340_W1	0.01	0.00	0.24	0.00	0.44	0.00	0.56	0.00	0.78	0.00	0.85	0.00
LH_A01340_W2	1.81	0.00	9.07	0.00	15.49	0.00	19.19	0.00	26.29	0.00	28.76	0.00
LH_A01340_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00
LH_A01350_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01350_W2	11.20	0.00	23.48	0.00	31.64	0.00	36.38	0.00	46.04	0.00	49.39	0.00
LH_A01350_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01350_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01360_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01360_W2	42.66	-1.25	73.35	0.00	92.40	0.00	97.38	0.00	106.92	0.00	117.76	0.00
LH_A01360_W3	0.00	0.00	0.00	-0.46	0.00	-7.29	0.00	-13.74	0.00	-26.19	0.00	-33.14
LH_A01360_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01360_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01370_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01370_W2	12.86	0.00	22.55	0.00	29.43	0.00	33.45	0.00	41.67	0.00	44.19	0.00
LH_A01370_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01380_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01380_W2	8.62	0.00	14.88	0.00	19.32	0.00	21.91	0.00	27.24	0.00	29.03	0.00
LH_A01380_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01390_W	0.00	0.00	0.00	0.00	0.00	0.00	2.31	0.00	18.61	0.00	31.84	0.00
LH_A01400_W	58.07	0.00	79.98	0.00	94.81	0.00	105.17	0.00	126.66	0.00	140.57	0.00
LH_A01410_P	57.75	0.00	78.26	0.00	82.36	0.00	84.27	0.00	87.35	0.00	88.96	0.00
LH_A01410_W1	26.90	0.00	87.75	0.00	116.48	0.00	133.55	0.00	169.02	0.00	192.25	0.00
LH_A01410_W2	0.00	0.00	52.49	0.00	96.27	0.00	121.57	0.00	168.03	0.00	194.84	0.00
LH_A01410_W3	0.00	0.00	0.53	0.00	6.87	0.00	11.88	0.00	22.90	0.00	30.25	0.00
LH_A01420_W1	2.45	0.00	57.14	0.00	99.69	0.00	118.32	0.00	150.62	0.00	169.64	0.00
LH_A01420_W2	62.95	0.00	167.80	0.00	238.94	0.00	284.90	0.00	377.10	0.00	434.23	0.00
LH_A01430_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01430_W2	7.78	0.00	17.21	0.00	23.89	0.00	28.11	0.00	42.08	0.00	57.66	0.00
LH_A01430_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01430_W4	5.37	0.00	10.94	0.00	14.59	0.00	16.77	0.00	23.77	0.00	31.66	0.00
LH_A01440_W1	60.96	0.00	209.67	0.00	310.74	0.00	366.70	0.00	471.01	0.00	536.06	0.00
LH_A01440_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01450_P	37.16	0.00	39.88	0.00	40.76	0.00	41.15	0.00	41.29	0.00	41.31	0.00
LH_A01450_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01450_W2	0.00	0.00	0.76	0.00	3.30	0.00	5.55	0.00	12.33	0.00	18.86	0.00
LH_A01450_W3	23.27	0.00	168.69	0.00	266.98	0.00	321.24	0.00	424.65	0.00	489.57	0.00
LH_A01460_P	29.32	0.00	31.90	0.00	32.47	0.00	32.73	0.00	33.18	0.00	33.48	0.00
LH_A01460_W1	4.96	0.00	71.48	0.00	112.52	0.00	134.94	0.00	180.42	0.00	214.60	0.00
LH_A01460_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01470_W1	0.00	0.00	0.21	0.00	1.76	0.00	3.66	0.00	12.59	0.00	22.42	0.00
LH_A01470_W2	12.68	-8.24	24.93	-8.60	29.77	-9.90	31.81	-12.47	30.53	-19.48	49.00	-1.66
LH_A01480_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01480_W2	0.67	0.00	6.50	0.00	13.32	0.00	17.48	0.00	25.30	0.00	30.09	0.00
LH_A01490_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01490_W2	0.00	0.00	0.00	0.00	0.22	0.00	0.73	0.00	2.36	0.00	4.34	0.00
LH_A01490_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01490_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01490_W5	0.00	-3.90	0.00	-8.63	0.00	-11.37	0.00	-12.92	0.00	-16.03	0.00	-17.43
LH_A01490_W6	0.00	-2.82	0.00	-29.52	0.00	-79.37	0.00	-106.66	0.00	-173.11	0.00	-209.72
LH_A01500_W1	17.13	0.00	51.87	0.00	83.90	0.00	102.91	0.00	142.27	0.00	174.50	0.00
LH_A01500_W2	0.43	0.00	15.38	0.00	40.60	0.00	57.74	0.00	96.30	0.00	130.21	0.00
LH_A01500_W3	31.33	0.00	86.75	0.00	132.19	0.00	157.68	0.00	207.46	0.00	246.07	0.00
LH_A01500_W4	19.94	0.00	45.05	0.00	58.99	0.00	65.56	0.00	77.14	-14.69	48.20	-27.36
LH_A01510_W1	8.73	0.00	34.72	0.00	63.67	0.00	84.15	0.00	130.42	0.00	172.30	0.00
LH_A01510_W2	0.04	0.00	0.59	0.00	1.26	0.00	1.73	0.00	2.75	0.00	3.66	0.00
LH_A01510_W3	29.42	0.00	75.62	0.00	112.78	0.00	135.34	0.00	183.02	0.00	224.80	0.00
LH_A01510_W4	0.00	-127.45	0.00	-312.15	0.00	-471.60	0.00	-576.94	0.00	-802.74	0.00	-1014.39
LH_A01510_W5	67.73	0.00	174.73	0.00	260.98	0.00	314.07	0.00	423.42	0.00	514.45	0.00
LH_A01510_W6	29.69	-6.33	54.13	-1.92	74.40	-1.17	88.90	-2.03	121.05	-2.88	151.07	-0.21
LH_A01520_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01520_W2	1.94	-4.56	3.35	-12.63	4.30	-20.09	6.09	-25.93	9.31	-40.22	6.76	-53.72
LH_A01520_W3	1.41	0.00	5.13	0.00	8.84	0.00	11.56	0.00	18.39	0.00	25.20	0.00
LH_A01520_W4	7.90	-0.69	11.98	0.00	17.29	0.00	21.51	0.00	31.08	0.00	40.79	-0.02
LH_A01530_W1	49.74	0.00	108.85	0.00	157.39	0.00	188.52	0.00	257.73	0.00	317.94	0.00
LH_A01530_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01530_W3	0.77	-40.89	0.60	-84.26	0.61	-119.77	0.65	-143.01	0.70	-193.93	0.11	-242.31
LH_A01540_W1	0.00	0.00	1.77	0.00	4.77	0.00	6.72	0.00	10.59	0.00	13.63	0.00
LH_A01540_W2	0.86	0.00	3.52	0.00	6.09	0.00	8.05	0.00	12.53	0.00	16.01	0.00
LH_A01540_W3	0.00	0.00	0.00	0.00	0.19	0.00	0.53	0.00	1.47	0.00	2.22	0.00
LH_A01550_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01560_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01560_W2	0.01	0.00	1.69	0.00	6.86	0.00	10.52	0.00	18.13	0.00	25.35	0.00
LH_A01560_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01570_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01570_W2	0.00	0.00	0.01	0.00	0.18	0.00	0.33	0.00	0.75	0.00	0.86	0.00
LH_A01570_W3	11.70	0.00	24.18	0.00	32.57	0.00	37.41	0.00	47.06	0.00	49.07	0.00
LH_A01570_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01580_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01580_W2	7.08	0.00	13.38	0.00	17.81	0.00	20.35	0.00	25.44	0.00	26.68	0.00
LH_A01580_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01590_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01590_W2	13.30	0.00	30.34	0.00	42.02	0.00	48.43	0.00	60.90	0.00	62.17	0.00
LH_A01590_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01590_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01600_W1	13.44	0.00	27.29	0.00	37.31	0.00	43.04	0.00	54.48	0.00	56.78	0.00
LH_A01600_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01610_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01610_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00
LH_A01610_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.74	0.00	2.77	0.00
LH_A01610_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01610_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01620_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01620_W2	15.75	0.00	28.08	0.00	36.56	0.00	41.40	0.00	51.05	0.00	52.49	0.00
LH_A01630_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01630_W2	20.68	0.00	51.88	0.00	77.32	0.00	92.01	0.00	120.59	0.00	122.39	0.00
LH_A01640_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01640_W2	0.00	0.00	0.01	0.00	2.71	0.00	6.00	0.00	15.94	0.00	34.19	0.00
LH_A01650_W1	0.00	0.00	0.08	0.00	5.91	0.00	10.65	0.00	26.13	0.00	52.19	0.00
LH_A01650_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01660_W1	0.00	0.00	0.84	0.00	2.23	0.00	3.52	0.00	6.76	0.00	13.32	0.00
LH_A01660_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01660_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
LH_A01690_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01690_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
LH_A01690_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01700_P	6.18	0.00	7.40	0.00	7.95	0.00	8.16	0.00	8.56	0.00	8.73	0.00
LH_A01700_W1	15.22	0.00	40.56	0.00	73.98	0.00	91.88	0.00	145.41	0.00	179.81	0.00
LH_A01700_W2	1.73	0.00	28.87	0.00	78.05	0.00	105.00	0.00	170.18	0.00	205.24	0.00
LH_A01710_P	20.29	0.00	76.24	0.00	158.77	0.00	203.62	0.00	322.06	0.00	368.87	0.00
LH_A01710_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01710_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01710_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01710_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.05	0.00
LH_A01715_P	14.82	0.00	70.88	0.00	124.59	0.00	133.53	0.00	136.63	0.00	136.77	-0.05
LH_A01715_W	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	24.33	0.00	87.11	0.00
LH_A01720_W1	3.94	0.00	9.93	0.00	15.81	0.00	19.61	0.00	27.17	-6.75	30.78	-31.96
LH_A01720_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W4	0.00	0.00	1.15	0.00	22.72	0.00	56.25	0.00	176.85	0.00	254.78	0.00
LH_A01730_W5	14.75	0.00	70.37	0.00	123.83	0.00	132.66	0.00	138.02	0.00	144.56	0.00
LH_A01730_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01740_W	0.08	0.00	3.90	0.00	8.97	0.00	12.60	0.00	20.58	0.00	28.84	0.00

Table A-2

Existing Conditions, Seasonal Average Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation											
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		50-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01750_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W3	3.34	0.00	23.36	0.00	46.23	0.00	64.27	0.00	106.09	0.00	153.28	0.00
LH_A01750_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W5	0.00	-1.82	0.00	-13.66	0.00	-23.05	0.00	-28.23	0.00	-36.47	0.00	-39.53
LH_A01750_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01780_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01780_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01780_W3	2.55	0.00	15.00	0.00	26.95	0.00	34.18	0.00	47.60	0.00	55.15	0.00
LH_A01780_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01790_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01790_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01800_W	0.00	0.00	5.00	0.00	11.76	0.00	16.10	0.00	24.30	0.00	39.72	0.00
LH_A01810_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01810_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01810_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88	0.00	5.43	0.00
LH_A01820_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01820_W2	31.37	0.00	84.42	0.00	117.79	0.00	137.72	0.00	175.27	0.00	196.18	0.00

APPENDIX B
Existing Conditions Model
Peak Stages and Flows
(Observed Typical High Boundary Condition)

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
HARNEY	6.65	5.53	5.53	5.53	5.53	5.53
LH_A00010_N	12.10	5.53	5.53	5.53	5.53	5.53
LH_A00020_N	10.14	5.53	5.53	5.53	5.53	5.53
LH_A00030_N	9.38	5.53	5.54	5.54	5.54	5.54
LH_A00040_N	-	5.53	5.54	5.54	5.54	5.54
LH_A00050_N	9.92	5.54	5.54	5.54	5.55	5.55
LH_A00060_N	10.09	5.55	5.56	5.57	5.58	5.59
LH_A00070_N	10.17	5.71	5.80	5.85	5.94	5.96
LH_A00080_N	10.18	6.61	6.71	6.77	6.85	6.87
LH_A00090_N	9.96	7.13	7.21	7.25	7.32	7.33
LH_A00100_N	10.39	8.05	8.27	8.32	8.41	8.41
LH_A00110_N	10.58	8.45	8.84	9.01	9.13	9.13
LH_A00120_N	10.65	8.49	8.87	9.03	9.15	9.15
LH_A00130_N	11.24	8.64	9.02	9.14	9.24	9.24
LH_A00140_N	11.51	8.92	9.23	9.31	9.39	9.38
LH_A00150_N	11.58	9.26	9.74	9.99	10.35	10.33
LH_A00160_N	12.10	9.58	9.98	10.20	10.49	10.48
LH_A00170_N	12.64	10.04	10.38	10.55	10.75	10.73
LH_A00180_N	13.15	10.56	10.85	11.01	11.19	11.18
LH_A00190_N	10.92	10.87	11.26	11.49	11.79	11.78
LH_A00200_N	13.02	5.54	5.55	5.55	5.57	5.57
LH_A00210_N	13.88	5.56	5.60	5.63	5.74	5.77
LH_A00220_N	12.39	5.59	5.65	5.71	5.88	5.93
LH_A00230_N	9.68	5.60	5.68	5.74	5.93	5.99
LH_A00240_N	9.60	5.64	5.74	5.81	5.99	6.04
LH_A00250_N	9.84	5.83	5.99	6.08	6.28	6.33
LH_A00260_N	10.07	6.45	6.74	6.90	7.16	7.23
LH_A00270_N	9.99	6.55	6.83	6.95	7.20	7.27
LH_A00280_N	10.32	6.69	7.08	7.19	7.46	7.55
LH_A00290_N	10.40	6.82	9.86	10.02	10.27	10.35
LH_A00300_N	10.62	7.13	9.89	10.06	10.34	10.43
LH_A00310_N	11.26	7.92	9.99	10.24	10.66	10.79
LH_A00320_N	12.00	9.13	10.63	11.23	12.09	12.22
LH_A00330_N	14.20	12.93	13.55	13.79	14.12	14.21
LH_A00340_N	-	12.93	13.55	13.79	14.12	14.22
LH_A00360_N	-	8.83	8.96	9.11	9.38	9.46
LH_A00370_N	-	8.87	9.03	9.21	9.55	9.66
LH_A00380_N	-	8.87	9.01	9.15	9.47	9.57
LH_A00390_N	-	9.21	9.61	10.03	10.50	10.58

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A00400_N	-	9.70	10.26	10.77	11.54	11.75
LH_A00410_N	-	10.37	11.04	11.57	12.20	12.34
LH_A00420_N	-	11.06	11.57	11.93	12.45	12.59
LH_A00430_N	-	11.69	12.29	12.58	12.92	13.02
LH_A00440_N	-	12.07	12.70	12.98	13.26	13.34
LH_A00450_N	-	12.23	12.85	13.16	13.53	13.64
LH_A00460_N	-	12.46	13.07	13.38	13.78	13.89
LH_A00470_N	14.79	12.46	13.54	13.78	14.06	14.14
LH_A00480_N	-	12.66	13.28	13.66	14.21	14.34
LH_A00490_N	-	12.88	13.53	13.94	14.38	14.47
LH_A00500_N	17.37	12.92	13.55	13.80	14.12	14.22
LH_A00510_N	13.08	12.94	13.55	13.80	14.13	14.23
LH_A00520_N	14.91	13.49	13.94	14.19	14.47	14.54
LH_A00530_N	14.20	14.03	14.30	14.42	14.59	14.64
LH_A00540_N	13.51	14.03	14.30	14.43	14.60	14.66
LH_A00550_N	13.94	14.04	14.30	14.43	14.61	14.66
LH_A00560_N	13.62	14.04	14.31	14.44	14.61	14.67
LH_A00570_N	12.76	14.05	14.31	14.44	14.62	14.67
LH_A00580_N	12.89	13.55	13.74	13.85	14.18	14.28
LH_A00590_N	15.81	14.38	14.47	14.53	14.61	14.61
LH_A00600_N	13.71	14.05	14.32	14.44	14.62	14.68
LH_A00610_N	14.20	14.06	14.32	14.45	14.64	14.70
LH_A00620_N	14.01	14.06	14.30	14.38	14.60	14.67
LH_A00630_N	15.00	14.06	14.31	14.39	14.67	14.77
LH_A00640_N	14.92	14.10	14.38	14.49	14.79	14.87
LH_A00650_N	15.40	14.11	14.39	14.50	14.80	14.87
LH_A00660_N	15.59	14.18	14.54	14.67	15.06	15.13
LH_A00670_N	15.91	14.18	14.55	14.68	15.07	15.15
LH_A00680_N	14.65	14.75	15.73	16.27	16.58	16.64
LH_A00690_N	15.30	14.75	15.73	16.27	16.58	16.65
LH_A00700_N	14.69	14.76	15.73	16.27	16.59	16.65
LH_A00710_N	14.88	14.83	15.79	16.28	16.59	16.66
LH_A00720_N	16.19	15.45	15.80	16.29	16.60	16.67
LH_A00730_N	21.74	20.36	20.74	20.90	21.04	21.06
LH_A00740_N	15.09	14.10	14.54	14.75	14.96	15.02
LH_A00750_N	15.75	14.33	15.29	15.79	16.16	16.25
LH_A00760_N	14.44	14.54	15.75	16.28	16.59	16.66
LH_A00770_N	-	14.70	15.77	16.30	16.62	16.70
LH_A00780_N	-	16.18	16.36	16.47	16.63	16.70

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A00790_N	-	19.73	19.82	19.85	19.92	19.93
LH_A00800_N	15.95	14.55	15.75	16.28	16.59	16.66
LH_A00810_N	19.06	15.76	16.15	16.45	16.69	16.74
LH_A00820_N	20.71	17.98	18.44	18.52	18.69	18.71
LH_A00830_N	21.07	18.69	18.94	18.99	19.08	19.10
LH_A00840_N	23.01	20.71	21.87	22.05	22.10	22.11
LH_A00850_N	22.99	21.96	22.03	22.06	22.10	22.11
LH_A00860_N	23.87	20.77	21.88	22.06	22.12	22.12
LH_A00870_N	24.33	21.02	22.35	22.67	22.82	22.84
LH_A00880_N	24.59	21.25	22.38	22.69	22.85	22.87
LH_A00890_N	30.71	23.76	23.81	23.84	23.87	23.87
LH_A00900_N	25.42	22.74	23.07	23.22	23.34	23.36
LH_A00910_N	27.70	24.52	25.11	25.44	26.05	26.16
LH_A00920_N	27.35	26.00	26.85	27.45	28.36	28.47
LH_A00930_N	-	26.82	27.57	28.12	29.05	30.05
LH_A00940_N	35.30	29.59	30.54	31.18	32.16	32.27
LH_A00950_N	-	6.67	6.79	6.92	7.18	7.25
LH_A00960_N	-	12.60	12.67	12.70	12.75	12.76
LH_A00970_N	-	12.79	12.88	12.93	13.00	13.01
LH_A00980_N	-	13.37	13.44	13.48	13.53	13.53
LH_A00990_N	-	14.46	14.53	14.55	14.57	14.58
LH_A01000_N	-	14.24	14.37	14.43	14.52	14.52
LH_A01010_N	-	14.03	14.30	14.43	14.60	14.66
LH_A01020_N	-	14.43	14.47	14.50	14.55	14.58
LH_A01030_N	-	14.03	14.30	14.43	14.60	14.66
LH_A01040_N	-	14.12	14.31	14.44	14.60	14.66
LH_A01050_N	-	14.90	14.96	14.99	15.02	15.02
LH_A01060_N	-	14.04	14.31	14.44	14.61	14.67
LH_A01070_N	-	14.06	14.32	14.45	14.63	14.69
LH_A01080_N	-	14.38	14.57	14.69	14.82	14.87
LH_A01090_N	-	14.07	14.32	14.46	14.63	14.69
LH_A01100_N	-	14.07	14.32	14.45	14.63	14.69
LH_A01110_N	-	14.07	14.31	14.44	14.61	14.67
LH_A01120_N	-	14.07	14.31	14.43	14.59	14.65
LH_A01130_N	-	14.75	14.84	14.90	15.00	15.01
LH_A01140_N	-	14.07	14.29	14.41	14.57	14.62
LH_A01150_N	-	15.32	15.44	15.52	15.62	15.63
LH_A01160_N	-	14.80	14.88	14.92	14.97	14.97
LH_A01170_N	-	15.06	15.15	15.20	15.27	15.27

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A01180_N	-	14.60	14.68	14.73	14.83	14.87
LH_A01190_N	-	15.34	15.47	15.55	15.67	15.69
LH_A01200_N	-	15.93	16.05	16.14	16.32	16.37
LH_A01210_N	-	16.47	16.58	16.69	16.84	16.90
LH_A01220_N	-	16.29	16.34	16.37	16.50	16.54
LH_A01230_N	-	16.47	16.69	16.78	16.87	16.88
LH_A01240_N	-	16.31	16.40	16.49	16.61	16.62
LH_A01250_N	-	17.11	17.18	17.26	17.37	17.40
LH_A01260_N	-	20.64	20.72	20.76	20.80	20.82
LH_A01270_N	-	21.29	21.39	21.45	21.52	21.55
LH_A01280_N	-	17.81	17.93	18.03	18.17	18.22
LH_A01290_N	-	17.17	17.31	17.37	17.44	17.45
LH_A01300_N	-	17.18	17.33	17.39	17.48	17.48
LH_A01310_N	-	17.39	17.54	17.63	17.74	17.75
LH_A01320_N	-	17.99	18.10	18.16	18.25	18.26
LH_A01330_N	-	21.16	21.24	21.29	21.35	21.36
LH_A01340_N	-	22.50	22.57	22.60	22.64	22.65
LH_A01350_N	-	22.52	22.58	22.62	22.66	22.67
LH_A01360_N	-	14.06	14.33	14.45	14.64	14.70
LH_A01370_N	-	15.19	15.26	15.30	15.36	15.37
LH_A01380_N	-	15.88	15.97	16.02	16.10	16.11
LH_A01390_N	-	14.53	14.95	15.21	15.47	15.55
LH_A01400_N	-	15.90	16.16	16.27	16.45	16.51
LH_A01410_N	-	16.73	17.45	17.60	17.77	17.83
LH_A01420_N	-	17.46	18.29	18.59	18.81	18.87
LH_A01430_N	-	19.22	19.28	19.31	19.38	19.43
LH_A01440_N	-	18.79	19.93	20.34	20.74	20.85
LH_A01450_N	-	21.78	22.09	22.19	22.32	22.37
LH_A01460_N	-	23.24	23.54	23.63	23.73	23.78
LH_A01470_N	-	21.78	22.09	22.20	22.32	22.37
LH_A01480_N	26.99	24.06	24.16	24.20	24.23	24.24
LH_A01490_N	25.82	23.98	24.12	24.20	24.32	24.39
LH_A01500_N	-	23.41	23.55	23.63	23.73	23.77
LH_A01510_N	-	23.69	23.80	23.87	23.97	24.02
LH_A01520_N	-	23.68	23.80	23.86	23.96	24.00
LH_A01530_N	-	23.67	23.78	23.85	23.94	23.98
LH_A01540_N	-	25.28	25.41	25.46	25.51	25.52
LH_A01550_N	-	23.68	23.79	23.86	23.95	24.00
LH_A01560_N	-	26.26	26.35	26.41	26.46	26.48

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A01570_N	-	25.40	25.47	25.51	25.56	25.56
LH_A01580_N	-	26.55	26.61	26.64	26.69	26.69
LH_A01590_N	-	26.99	27.07	27.11	27.15	27.15
LH_A01600_N	-	25.48	25.62	25.68	25.76	25.77
LH_A01610_N	-	27.42	27.82	28.07	28.21	28.29
LH_A01620_N	-	24.80	24.89	24.94	25.00	25.01
LH_A01630_N	-	24.40	24.60	24.71	24.83	24.84
LH_A01640_N	34.21	27.60	28.26	28.37	28.49	28.58
LH_A01650_N	30.94	27.08	28.02	28.17	28.29	28.37
LH_A01660_N	28.12	26.88	27.26	27.38	27.60	27.75
LH_A01670_N	-	24.69	24.75	24.78	24.81	24.82
LH_A01680_N	-	24.47	24.77	24.96	25.17	25.23
LH_A01690_N	27.31	24.48	24.82	25.07	25.52	26.06
LH_A01700_N	26.07	25.27	25.72	26.03	26.40	26.51
LH_A01710_N	26.61	25.28	25.75	26.18	26.99	27.68
LH_A01715_N	-	25.28	25.96	26.77	27.30	27.71
LH_A01720_N	32.12	26.39	26.56	26.63	27.00	27.68
LH_A01730_N	27.78	26.27	26.69	26.92	27.33	27.72
LH_A01740_N	41.92	29.48	29.65	29.75	29.88	29.95
LH_A01750_N	31.19	28.24	28.52	28.66	28.80	28.86
LH_A01760_N	-	28.38	29.24	29.82	30.79	31.89
LH_A01770_N	35.79	29.05	29.22	29.27	29.32	29.33
LH_A01780_N	37.12	30.92	31.08	31.16	31.25	31.28
LH_A01790_N	-	27.98	28.85	29.51	30.60	31.62
LH_A01800_N	31.28	29.67	30.21	30.31	30.40	30.47
LH_A01810_N	38.43	32.68	34.04	34.89	35.86	36.00
LH_A01820_N	30.85	29.76	30.02	30.13	30.26	30.30
LH_A01830_N	51.70	33.50	35.62	36.55	36.66	36.81
LH_A01840_N	56.95	57.26	58.25	58.35	58.46	58.49
LH_A01850_N	-	60.20	61.09	61.14	61.29	61.38
LH_A01860_N	31.47	29.67	30.29	30.80	31.79	31.96
LH_A01870_N	-	32.06	32.59	32.69	32.81	32.90
LH_A01880_N	28.54	28.53	29.02	29.25	29.40	29.41
LH_A01890_N	29.57	28.54	29.02	29.25	29.40	29.42
LH_A01900_N	28.52	26.28	26.70	27.07	27.98	28.54
LH_A01910_N	31.51	27.81	28.27	28.35	28.53	28.63
LH_A01920_N	31.16	29.77	30.08	30.23	30.49	30.57
LH_A01930_N	35.22	34.68	34.76	34.79	34.86	34.87
LH_A01940_N	-	40.79	40.86	40.89	40.92	40.92

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_A01950_N	39.09	30.41	32.23	33.47	35.18	35.39
LH_A01960_N	59.86	59.18	59.93	60.04	60.14	60.19
LH_A01970_N	37.96	30.13	30.42	30.50	30.59	30.66
LH_A01980_N	30.22	26.31	26.97	27.55	28.51	29.61
LH_A01990_N	33.77	30.75	30.86	30.91	30.96	30.98
LH_A02000_N	-	29.65	29.71	29.75	29.79	29.80
LH_A02010_N	33.63	31.88	32.55	32.97	33.60	34.07
LH_A02020_N	-	31.34	31.67	31.80	31.94	31.97
LH_A02030_N	-	31.04	32.61	33.49	33.66	33.83
LH_A02040_N	-	29.18	29.58	29.74	29.94	30.06
LH_A02050_N	-	28.33	29.37	29.75	29.84	29.98
LH_A02060_N	31.29	29.58	30.01	30.09	30.27	30.40
LH_A02070_N	39.95	28.19	29.08	29.66	30.36	30.44
LH_A02080_N	39.50	28.78	29.45	29.90	32.04	33.84
LH_A02090_N	55.26	30.22	32.23	33.47	35.19	35.39
LH_A02100_N	63.79	31.51	32.23	33.47	35.19	35.39
LH_A02110_N	30.98	27.97	28.58	29.34	30.18	30.34
LH_A02120_N	56.51	55.79	56.19	56.27	56.38	56.43
LH_A02130_N	33.42	29.01	29.92	30.13	30.31	30.48
LH_A02140_N	-	32.85	33.29	33.82	33.95	34.04
LH_A02150_N	37.44	31.52	31.95	32.28	32.87	33.62
LH_A02160_N	36.93	31.91	32.53	32.96	33.71	33.85
LH_A02170_N	29.34	28.47	29.09	29.35	30.18	30.34
LH_A02180_N	30.22	30.26	30.99	31.32	31.40	31.45
LH_A02190_N	29.58	23.85	24.41	24.83	25.66	27.52
LH_A02200_N	29.62	24.56	25.52	26.20	27.35	27.58
LH_A02210_N	55.02	33.68	36.00	37.85	40.37	42.00
LH_A02220_N	32.73	29.81	29.92	30.14	30.32	30.50
LH_A02230_N	32.93	31.19	32.03	32.72	33.68	33.94
LH_A02240_N	47.59	31.19	32.04	32.73	33.68	33.95
LH_B00010_N	11.40	5.54	5.55	5.56	5.61	5.61
LH_B00020_N	-	5.55	5.59	5.65	5.81	5.80
LH_B00030_N	9.32	8.03	8.17	8.23	8.31	8.30
LH_B00040_N	-	8.92	9.00	9.08	9.18	9.17
LH_B00050_N	-	10.61	10.69	10.72	10.76	10.76
LH_B00060_N	-	8.31	8.39	8.43	8.50	8.50
LH_B00070_N	-	10.57	10.66	10.71	10.76	10.77
LH_B00080_N	12.86	10.21	10.28	10.32	10.38	10.38
LH_B00090_N	10.52	9.72	9.78	9.81	9.86	9.86

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_C00010_N	8.36	5.55	5.58	5.60	5.67	5.68
LH_C00020_N	-	14.46	14.52	14.55	14.59	14.60
LH_C00030_N	15.91	14.51	14.58	14.61	14.66	14.66
LH_C00040_N	15.52	14.84	15.22	15.40	15.55	15.54
LH_C00050_N	15.11	12.50	12.70	12.81	12.93	12.97
LH_C00060_N	-	10.19	10.40	10.51	10.69	10.77
LH_C00070_N	15.14	11.53	11.63	11.67	11.74	11.78
LH_C00090_N	13.66	12.93	13.55	13.80	14.13	14.23
LH_C00100_N	15.39	12.93	13.55	13.80	14.13	14.22
LH_C00110_N	12.68	12.94	13.56	13.80	14.13	14.23
LH_C00120_N	-	11.70	11.73	11.76	11.79	11.79
LH_C00130_N	8.89	6.68	7.20	7.47	7.87	7.89
LH_C00140_N	9.21	7.97	8.25	8.38	8.56	8.57
LH_C00150_N	7.26	7.98	8.27	8.41	8.60	8.61
LH_C00160_N	9.35	8.68	8.86	8.95	9.08	9.09
LH_C00170_N	-	11.14	11.21	11.25	11.30	11.31
LH_C00180_N	10.14	11.15	11.22	11.25	11.29	11.29
LH_C00190_N	14.67	11.15	11.23	11.26	11.30	11.30
LH_C00200_N	13.07	12.32	12.36	12.39	12.42	12.42
LH_C00210_N	-	12.38	12.42	12.45	12.48	12.49
LH_C00220_N	6.86	7.99	8.45	8.60	8.73	8.74
LH_C00230_N	7.42	7.99	8.46	8.59	8.73	8.74
LH_C00240_N	8.39	8.00	8.46	8.58	8.73	8.74
LH_C00250_N	7.53	8.00	8.46	8.58	8.72	8.73
LH_C00260_N	7.73	6.60	7.20	7.51	8.01	8.05
LH_C00270_N	7.98	6.61	7.21	7.52	8.01	8.05
LH_C00280_N	7.97	7.13	7.92	8.47	8.70	8.71
LH_C00290_N	7.81	7.13	7.93	8.48	8.71	8.72
LH_C00300_N	7.66	7.29	8.13	8.57	8.73	8.74
LH_C00310_N	7.77	7.30	8.14	8.58	8.73	8.74
LH_C00320_N	7.77	7.31	8.14	8.58	8.73	8.74
LH_C00330_N	7.55	7.84	8.45	8.59	8.74	8.74
LH_C00340_N	7.60	7.85	8.45	8.60	8.74	8.75
LH_C00350_N	7.72	8.00	8.54	8.62	8.76	8.77
LH_C00360_N	10.19	10.81	10.86	10.88	10.92	10.92
LH_D00010_N	10.58	5.65	6.05	6.45	6.92	6.93
LH_D00020_N	10.73	5.90	6.64	7.27	7.94	7.95
LH_D00030_N	7.02	8.24	8.74	8.86	8.99	9.00
LH_D00040_N	9.08	9.43	9.56	9.62	9.72	9.79

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_D00050_N	11.97	10.22	10.35	10.46	10.56	10.61
LH_D00060_N	14.08	11.49	11.60	11.66	11.73	11.73
LH_D00070_N	14.72	12.67	12.83	12.89	12.98	12.98
LH_D00080_N	12.65	12.24	12.39	12.44	12.51	12.51
LH_D00090_N	15.58	13.01	13.10	13.13	13.17	13.17
LH_D00100_N	14.93	12.96	13.17	13.27	13.42	13.42
LH_D00110_N	-	13.72	13.84	13.89	13.97	13.97
LH_E00010_N	9.01	8.01	8.14	8.19	8.40	8.41
LH_E00020_N	7.44	8.09	8.24	8.30	8.60	8.62
LH_E00030_N	7.28	8.46	8.57	8.62	8.74	8.75
LH_E00040_N	-	8.65	8.72	8.75	8.78	8.79
LH_E00050_N	14.93	12.00	12.04	12.06	12.09	12.10
LH_E00060_N	12.19	10.79	11.15	11.35	11.61	11.64
LH_E00070_N	13.94	12.34	12.70	12.84	12.95	12.96
LH_E00080_N	15.03	12.36	12.76	12.93	13.13	13.12
LH_E00090_N	15.27	14.24	14.36	14.40	14.45	14.45
LH_E00100_N	15.62	14.74	14.83	14.87	14.92	14.93
LH_E00110_N	16.00	15.32	15.39	15.43	15.48	15.48
LH_E00120_N	6.63	6.98	7.73	8.19	8.58	8.59
LH_E00130_N	7.57	8.06	8.26	8.49	8.72	8.73
LH_E00140_N	7.41	8.07	8.26	8.49	8.69	8.70
LH_E00150_N	7.09	8.25	8.32	8.36	8.60	8.61
LH_E00160_N	9.21	9.53	11.04	11.21	11.36	11.36
LH_E00170_N	16.81	12.07	12.41	12.94	13.43	13.45
LH_E00180_N	-	11.42	12.38	12.94	13.42	13.45
LH_E00190_N	11.86	11.43	12.39	12.94	13.42	13.45
LH_E00200_N	13.60	12.53	13.12	13.47	13.96	13.99
LH_E00210_N	-	14.90	14.95	14.98	15.02	15.02
LH_E00220_N	14.93	14.24	14.47	14.65	14.90	14.92
LH_E00230_N	-	15.58	15.69	15.76	15.87	15.89
LH_E00240_N	18.75	16.17	16.26	16.32	16.40	16.42
LH_E00250_N	27.61	18.74	18.97	19.03	19.11	19.14
LH_E00260_N	-	28.83	29.16	29.68	30.90	32.68
LH_E00270_N	38.02	32.24	33.78	33.85	34.00	34.12
LH_E00280_N	15.33	15.20	15.42	15.52	15.64	15.64
LH_E00290_N	21.08	16.47	16.60	16.65	16.73	16.74
LH_E00300_N	16.61	15.40	15.67	15.79	15.92	15.93
LH_E00310_N	17.65	15.57	15.73	15.85	15.99	16.00
LH_E00320_N	17.57	16.67	16.74	16.78	16.84	16.84

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_E00330_N	21.30	20.95	21.09	21.14	21.20	21.21
LH_E00340_N	16.43	15.59	15.80	15.98	16.39	16.61
LH_E00350_N	17.69	17.19	17.34	17.41	17.54	17.57
LH_E00360_N	20.77	20.96	21.02	21.05	21.10	21.12
LH_E00370_N	-	13.87	14.11	14.21	14.33	14.34
LH_E00380_N	-	15.62	15.74	15.80	15.88	15.89
LH_E00390_N	-	16.14	16.25	16.29	16.35	16.36
LH_E00400_N	-	18.07	18.54	18.84	19.17	19.17
LH_E00410_N	-	18.86	18.94	18.97	19.01	19.02
LH_E00420_N	-	19.03	19.17	19.24	19.35	19.38
LH_E00430_N	-	15.85	15.92	15.96	16.03	16.04
LH_E00440_N	-	18.35	18.76	18.85	18.96	18.97
LH_E00450_N	15.95	14.61	14.69	14.73	14.80	14.81
LH_E00460_N	-	18.80	18.96	19.02	19.11	19.13
LH_E00470_N	-	19.94	20.04	20.09	20.16	20.17
LH_E00480_N	-	22.47	22.53	22.57	22.63	22.64
LH_E00490_N	-	33.33	33.79	33.90	34.09	34.21
LH_E00500_N	6.66	7.97	8.08	8.21	8.58	8.59
LH_E00510_N	6.67	7.95	8.06	8.19	8.57	8.59
LH_E00520_N	6.68	7.13	7.84	8.16	8.56	8.57
LH_E00525_N	-	7.89	8.06	8.19	8.57	8.59
LH_E00530_N	6.62	7.95	8.06	8.19	8.57	8.58
LH_E00540_N	7.00	7.96	8.09	8.21	8.59	8.60
LH_E00550_N	9.44	10.47	10.78	10.89	11.05	11.08
LH_E00560_N	14.77	11.65	11.85	11.94	12.05	12.06
LH_E00570_N	-	11.90	12.03	12.09	12.18	12.19
LH_E00580_N	16.17	17.18	17.34	17.41	17.57	17.63
LH_E00590_N	30.94	28.39	28.60	28.90	29.12	29.20
LH_E00600_N	-	28.70	28.82	28.92	29.14	29.22
LH_E00610_N	31.14	28.59	29.54	30.08	30.68	30.74
LH_E00620_N	30.27	28.71	28.83	28.93	29.15	29.23
LH_E00630_N	33.73	33.21	33.35	33.42	33.51	33.53
LH_F00010_N	9.49	5.53	5.54	5.54	5.55	5.55
LH_F00020_N	7.34	5.55	5.60	5.68	5.85	5.86
LH_F00030_N	13.83	13.33	13.45	13.52	13.63	13.68
LH_F00040_N	16.37	16.49	16.75	16.90	17.15	17.25
LH_F00050_N	28.04	27.37	27.75	28.11	28.54	28.59
LH_F00060_N	-	10.79	11.10	11.30	11.52	11.54
LH_F00070_N	13.41	11.11	11.37	11.45	11.56	11.58

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_F00080_N	19.67	12.87	13.20	13.29	13.39	13.40
LH_F00090_N	-	12.52	12.82	12.95	13.08	13.09
LH_F00100_N	15.53	13.81	14.00	14.07	14.16	14.17
LH_F00110_N	18.15	14.49	14.62	14.68	14.75	14.76
LH_F00120_N	-	15.37	15.48	15.54	15.59	15.59
LH_F00130_N	20.46	19.99	20.02	20.08	20.17	20.21
LH_F00140_N	20.77	20.92	21.66	21.82	21.98	22.02
LH_F00150_N	22.53	21.04	21.67	21.82	21.98	22.02
LH_F00160_N	26.64	22.52	22.59	22.63	22.68	22.70
LH_F00170_N	33.82	32.44	32.49	32.52	32.56	32.58
LH_F00180_N	29.35	23.40	23.46	23.50	23.56	23.60
LH_F00190_N	-	7.76	8.25	8.53	9.05	9.16
LH_F00200_N	12.66	10.12	10.25	10.31	10.40	10.42
LH_F00210_N	13.23	10.13	10.26	10.32	10.42	10.44
LH_F00220_N	14.92	12.09	12.22	12.29	12.46	12.50
LH_F00230_N	15.50	13.17	13.27	13.34	13.44	13.46
LH_F00240_N	18.33	15.30	15.84	16.02	16.28	16.34
LH_F00250_N	23.46	19.68	20.23	20.27	20.34	20.38
LH_F00260_N	21.20	20.33	20.40	20.44	20.49	20.49
LH_F00270_N	21.48	21.44	21.93	22.12	22.32	22.40
LH_F00280_N	35.05	34.54	34.92	35.09	35.30	35.39
LH_F00290_N	38.42	35.21	35.38	35.49	35.67	35.80
LH_F00300_N	10.93	5.57	5.76	5.97	6.42	6.58
LH_F00310_N	14.25	9.97	10.19	10.28	10.41	10.44
LH_F00320_N	12.98	10.39	10.43	10.45	10.48	10.48
LH_F00330_N	14.92	10.34	10.71	10.87	11.09	11.15
LH_F00340_N	-	10.71	10.90	11.01	11.20	11.27
LH_F00350_N	14.14	10.85	11.25	11.50	11.87	11.99
LH_F00360_N	-	18.64	18.69	18.72	18.80	18.81
LH_F00370_N	23.09	19.69	20.69	20.85	20.99	21.00
LH_F00380_N	22.25	20.96	20.99	21.00	21.04	21.05
LH_F00390_N	21.46	21.42	21.93	22.12	22.32	22.40
LH_F00400_N	35.50	23.94	24.01	24.05	24.10	24.12
LH_F00410_N	-	13.83	14.08	14.24	14.48	14.58
LH_F00420_N	-	20.80	20.89	20.94	21.03	21.04
LH_F00430_N	20.94	20.81	20.89	20.94	21.03	21.04
LH_F00440_N	21.26	21.01	21.15	21.24	21.35	21.36
LH_F00450_N	21.44	21.17	21.41	21.49	21.56	21.57
LH_F00460_N	-	18.64	19.02	19.18	19.43	19.53

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_F00470_N	-	21.22	21.44	21.53	21.66	21.70
LH_F00480_N	26.95	23.75	23.96	24.06	24.19	24.26
LH_F00490_N	28.21	24.16	24.87	25.27	25.45	25.54
LH_F00500_N	24.77	24.79	24.88	24.91	24.96	24.99
LH_F00510_N	36.04	29.52	30.79	31.59	32.67	32.75
LH_F00520_N	28.87	24.80	24.89	24.93	24.98	25.02
LH_F00530_N	34.41	30.44	31.28	31.85	32.32	32.38
LH_F00540_N	36.12	34.34	35.40	35.95	36.57	36.77
LH_F00550_N	32.95	27.62	28.47	29.03	29.96	31.70
LH_F00560_N	-	31.09	31.23	31.37	31.71	32.06
LH_F00570_N	38.70	35.39	35.60	35.72	35.86	35.95
LH_F00580_N	33.11	29.87	30.06	30.17	30.34	31.72
LH_F00590_N	32.38	28.54	29.69	30.53	32.35	32.83
LH_F00600_N	44.22	30.14	30.18	30.53	32.35	32.83
LH_F00610_N	43.33	32.08	34.04	35.78	38.76	41.00
LH_F00620_N	65.49	64.96	65.82	66.35	66.72	66.81
LH_F00630_N	33.78	24.79	24.88	24.92	24.97	25.01
LH_F00640_N	-	39.22	39.28	39.32	39.38	39.43
LH_F00650_N	27.72	24.81	24.91	24.96	25.02	25.03
LH_F00660_N	23.41	24.70	24.97	25.09	25.31	25.47
LH_F00670_N	27.06	24.84	24.97	25.10	25.31	25.47
LH_F00680_N	29.42	24.70	24.97	25.10	25.31	25.47
LH_F00690_N	28.98	25.34	25.39	25.41	25.45	25.47
LH_F00700_N	25.23	26.36	26.65	26.78	26.86	26.87
LH_F00710_N	25.03	24.71	25.36	25.59	25.77	25.84
LH_F00720_N	24.69	25.39	25.44	25.48	25.54	25.57
LH_G00010_N	-	7.35	7.44	7.46	7.48	7.49
LH_G00020_N	-	9.03	9.27	9.33	9.40	9.42
LH_G00030_N	-	9.32	9.70	9.85	10.01	10.04
LH_G00040_N	-	9.57	9.94	10.10	10.26	10.30
LH_G00050_N	11.55	9.67	9.81	9.91	10.06	10.09
LH_G00060_N	-	10.88	11.07	11.16	11.27	11.29
LH_G00070_N	-	11.94	11.99	12.01	12.04	12.04
LH_G00080_N	-	10.93	11.09	11.18	11.28	11.30
LH_G00090_N	15.23	11.19	11.30	11.35	11.42	11.43
LH_G00100_N	13.95	11.39	11.48	11.52	11.59	11.60
LH_G00110_N	-	14.56	14.63	14.66	14.70	14.70
LH_G00120_N	19.63	17.06	17.13	17.17	17.22	17.24
LH_G00130_N	-	11.12	11.92	12.37	12.67	12.72

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_G00140_N	-	16.89	17.31	17.57	17.71	17.73
LH_G00150_N	-	18.08	19.06	19.83	20.91	21.09
LH_G00160_N	23.97	21.18	21.24	21.27	21.32	21.33
LH_G00170_N	-	23.75	23.90	23.99	24.09	24.14
LH_G00180_N	-	21.27	21.75	22.02	22.33	22.43
LH_G00190_N	25.04	22.21	22.32	22.37	22.43	22.45
LH_G00200_N	-	22.06	22.37	22.46	22.56	22.63
LH_G00210_N	25.83	22.80	23.24	23.31	23.37	23.39
LH_G00220_N	27.48	23.51	24.12	24.29	24.46	24.52
LH_G00230_N	-	24.21	24.31	24.35	24.46	24.52
LH_G00240_N	25.71	24.21	24.41	24.45	24.51	24.55
LH_G00250_N	13.51	10.38	10.67	10.78	10.92	10.95
LH_G00260_N	14.04	11.04	11.13	11.17	11.21	11.22
LH_G00270_N	13.88	11.82	11.99	12.07	12.14	12.15
LH_G00280_N	14.36	11.28	11.56	11.68	11.85	11.90
LH_G00290_N	16.85	13.78	13.90	13.95	14.01	14.04
LH_G00300_N	23.45	19.29	19.39	19.44	19.49	19.50
LH_G00310_N	19.16	17.30	17.49	17.60	17.75	17.83
LH_G00320_N	-	17.44	17.84	18.14	18.79	18.99
LH_G00330_N	-	21.19	21.32	21.37	21.41	21.42
LH_G00340_N	25.59	20.40	20.67	20.81	21.00	21.08
LH_G00350_N	-	22.94	23.04	23.10	23.17	23.18
LH_G00360_N	22.81	21.95	22.15	22.29	22.45	22.50
LH_G00370_N	26.85	23.72	23.85	23.96	24.15	24.21
LH_G00380_N	-	10.37	10.66	10.77	10.90	10.93
LH_G00390_N	12.62	9.19	9.60	9.73	9.87	9.90
LH_G00400_N	-	9.22	9.61	9.73	9.86	9.88
LH_G00410_N	-	9.31	9.67	9.78	9.90	9.93
LH_G00420_N	10.34	10.25	10.50	10.60	10.73	10.76
LH_G00430_N	-	9.49	9.88	10.07	10.32	10.37
LH_G00440_N	12.25	9.76	10.13	10.31	10.50	10.55
LH_G00450_N	-	9.97	10.39	10.55	10.72	10.77
LH_G00460_N	-	10.65	11.10	11.31	11.54	11.61
LH_G00470_N	15.57	11.05	11.66	11.91	12.21	12.29
LH_G00480_N	15.13	12.85	12.98	13.04	13.13	13.14
LH_G00490_N	-	13.02	13.43	13.60	13.77	13.82
LH_G00500_N	-	13.53	14.47	14.72	14.98	15.05
LH_G00510_N	16.06	14.31	15.29	15.67	16.02	16.11
LH_G00520_N	16.60	15.23	15.57	15.76	16.06	16.15

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_G00530_N	21.75	17.33	17.42	17.47	17.53	17.54
LH_G00540_N	16.89	15.53	15.89	16.03	16.22	16.28
LH_G00550_N	19.81	16.73	16.92	17.03	17.18	17.23
LH_G00560_N	24.46	17.25	18.22	18.49	18.73	18.77
LH_G00570_N	20.83	17.98	18.42	18.52	18.73	18.78
LH_G00580_N	-	17.29	17.75	18.06	18.53	19.09
LH_G00590_N	23.77	19.90	20.10	20.18	20.30	20.33
LH_G00600_N	22.35	19.92	20.14	20.23	20.37	20.41
LH_G00610_N	23.96	20.84	21.11	21.23	21.41	21.47
LH_G00620_N	25.09	21.21	21.51	21.60	21.72	21.76
LH_G00630_N	-	21.94	22.10	22.23	22.39	22.44
LH_G00640_N	-	21.22	21.53	21.64	21.78	21.83
LH_G00650_N	-	22.01	22.11	22.23	22.39	22.44
LH_G00660_N	24.70	22.54	22.70	22.80	22.91	22.95
LH_G00670_N	25.96	23.45	23.52	23.56	23.64	23.67
LH_G00680_N	26.28	23.86	24.08	24.14	24.20	24.21
LH_G00690_N	26.33	24.12	24.23	24.28	24.35	24.36
LH_G00700_N	20.57	19.82	19.91	20.01	20.17	20.20
LH_G00710_N	-	21.21	21.50	21.60	21.72	21.75
LH_G00720_N	-	21.31	21.55	21.64	21.75	21.78
LH_G00730_N	24.69	21.90	22.02	22.08	22.16	22.18
LH_G00740_N	21.63	22.23	22.73	22.88	23.07	23.10
LH_G00750_N	-	23.46	23.66	23.76	23.87	23.88
LH_G00760_N	24.01	23.60	23.77	23.83	23.92	23.93
LH_G00770_N	23.64	23.61	23.79	23.86	23.96	23.97
LH_G00780_N	-	23.87	24.00	24.06	24.11	24.13
LH_G00790_N	16.36	16.63	16.72	17.05	17.33	17.41
LH_G00800_N	16.51	17.48	17.72	17.83	18.00	18.06
LH_G00810_N	20.45	21.19	21.45	21.54	21.67	21.70
LH_G00820_N	21.05	21.32	21.57	21.66	21.78	21.81
LH_G00830_N	12.54	5.54	5.63	5.72	5.83	5.86
LH_G00840_N	9.48	5.73	6.24	6.45	6.72	6.79
LH_G00850_N	14.32	5.94	7.47	7.69	7.96	8.03
LH_G00860_N	-	7.65	7.78	7.81	7.85	7.87
LH_H00010_N	-	7.02	7.19	7.29	7.40	7.43
LH_H00020_N	-	8.14	8.43	8.61	8.84	8.89
LH_H00030_N	11.34	8.62	8.85	8.99	9.20	9.26
LH_H00040_N	-	9.11	9.45	9.68	9.92	9.97
LH_H00050_N	12.03	9.54	9.93	10.19	10.47	10.52

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_H00060_N	12.12	9.57	9.80	9.95	10.16	10.21
LH_H00070_N	11.16	9.95	10.10	10.21	10.38	10.44
LH_H00080_N	11.33	10.02	10.17	10.30	10.49	10.55
LH_H00090_N	13.34	10.47	10.64	10.79	11.01	11.07
LH_H00100_N	-	12.96	13.43	13.61	13.78	13.82
LH_H00110_N	-	13.78	14.52	14.79	15.07	15.15
LH_H00120_N	15.78	14.02	15.29	15.66	16.00	16.09
LH_H00130_N	14.70	14.87	15.00	15.17	15.33	15.36
LH_H00140_N	-	14.82	14.98	15.16	15.34	15.39
LH_H00150_N	13.55	10.00	10.72	10.84	10.97	11.00
LH_H00160_N	-	10.51	10.73	10.85	10.99	11.02
LH_H00170_N	-	10.23	10.83	10.94	11.08	11.11
LH_H00180_N	14.36	10.70	11.16	11.32	11.62	11.69
LH_H00190_N	-	11.13	11.50	11.64	11.88	11.93
LH_H00200_N	13.22	14.86	15.21	15.38	15.54	15.57
LH_H00210_N	14.35	15.41	15.82	15.92	16.02	16.04
LH_H00220_N	14.27	15.40	15.80	15.88	15.98	16.00
LH_H00230_N	14.41	15.40	15.79	15.88	15.97	15.99
LH_H00240_N	14.67	15.39	15.79	15.88	15.97	15.99
LH_H00260_N	-	15.47	15.87	15.98	16.11	16.13
LH_H00270_N	-	15.71	16.07	16.18	16.32	16.34
LH_H00280_N	-	17.17	17.25	17.29	17.33	17.34
LH_H00290_N	-	15.88	16.25	16.39	16.57	16.60
LH_H00300_N	-	19.33	19.40	19.44	19.49	19.49
LH_H00310_N	-	20.88	21.21	21.41	21.71	21.73
LH_H00320_N	-	16.19	16.52	16.67	16.88	16.91
LH_H00330_N	-	9.01	9.53	9.93	10.76	11.32
LH_H00340_N	-	9.01	9.53	9.93	10.76	11.32
LH_H00350_N	-	16.90	17.39	17.69	18.08	18.12
LH_H00360_N	-	16.99	17.53	17.80	18.17	18.21
LH_H00370_N	22.47	17.00	17.53	17.81	18.17	18.22
LH_H00380_N	22.61	19.68	19.89	19.97	20.07	20.09
LH_H00390_N	-	17.31	17.54	17.81	18.18	18.22
LH_H00400_N	-	17.40	17.54	17.81	18.18	18.22
LH_H00410_N	-	20.07	20.22	20.29	20.39	20.40
LH_H00420_N	-	20.09	20.29	20.40	20.54	20.56
LH_H00430_N	14.40	15.43	15.87	15.99	16.12	16.15
LH_H00440_N	14.37	15.44	15.89	16.01	16.15	16.18
LH_H00450_N	14.69	15.83	16.09	16.16	16.25	16.27

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_H00460_N	16.61	17.40	18.16	18.34	18.47	18.51
LH_H00470_N	17.10	17.59	18.52	18.82	19.07	19.16
LH_H00480_N	17.57	18.26	18.58	18.85	19.09	19.18
LH_H00490_N	19.55	19.68	19.97	20.06	20.16	20.19
LH_H00500_N	22.04	18.82	19.13	19.28	19.49	19.57
LH_H00510_N	19.75	20.10	20.41	20.51	20.65	20.70
LH_H00520_N	22.86	20.52	20.61	20.67	20.75	20.77
LH_H00530_N	21.89	21.98	22.20	22.31	22.47	22.49
LH_H00540_N	22.18	22.76	22.90	22.96	23.04	23.05
LH_H00550_N	25.45	22.98	23.14	23.23	23.36	23.38
LH_H00560_N	27.38	25.94	26.05	26.10	26.17	26.18
LH_H00570_N	26.12	26.12	26.31	26.46	26.59	26.62
LH_H00580_N	25.54	25.89	26.57	26.75	26.86	26.88
LH_H00590_N	29.55	26.83	26.99	27.04	27.11	27.14
LH_H00600_N	-	18.21	18.34	18.42	18.51	18.54
LH_H00610_N	-	19.40	19.52	19.59	19.76	19.80
LH_H00620_N	-	20.54	20.65	20.71	20.79	20.82
LH_H00630_N	21.28	20.68	20.90	20.99	21.12	21.17
LH_H00640_N	-	21.11	21.43	21.62	21.95	22.07
LH_H00650_N	-	21.27	21.49	21.67	21.99	22.12
LH_H00660_N	-	20.15	20.44	20.54	20.65	20.67
LH_H00670_N	-	22.90	23.17	23.30	23.46	23.50
LH_H00680_N	-	22.91	23.18	23.30	23.47	23.50
LH_H00690_N	-	21.66	21.84	21.99	22.18	22.24
LH_H00700_N	-	21.89	22.02	22.11	22.26	22.31
LH_H00710_N	23.67	22.70	22.81	22.86	22.93	22.94
LH_H00720_N	27.17	24.16	24.22	24.25	24.29	24.30
LH_H00730_N	26.06	24.29	24.37	24.42	24.49	24.50
LH_H00740_N	-	22.29	22.46	22.54	22.64	22.68
LH_H00750_N	-	23.17	23.26	23.34	23.50	23.53
LH_H00760_N	26.77	22.93	23.18	23.31	23.47	23.51
LH_H00770_N	-	23.45	23.63	23.72	23.84	23.89
LH_H00780_N	-	22.33	22.55	22.65	22.80	22.85
LH_H00790_N	-	22.33	22.55	22.65	22.79	22.84
LH_H00800_N	-	22.49	22.60	22.67	22.81	22.86
LH_H00810_N	-	23.98	24.40	24.47	24.65	24.79
LH_H00820_N	-	24.22	24.48	24.55	24.70	24.81
LH_H00830_N	-	23.16	23.31	23.39	23.50	23.53
LH_H00840_N	-	23.49	23.65	23.73	23.84	23.85

Table B-1

Existing Conditions, Typical High Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation				
		MA / 24-HR	10-YR / 24-HR	25-YR / 24-HR	100-YR / 24-HR	100-YR / 96-HR
LH_H00850_N	-	24.08	24.25	24.35	24.50	24.50
LH_H00860_N	-	23.46	23.68	23.81	24.01	24.06
LH_H00870_N	26.73	24.81	25.28	25.45	25.66	25.78
LH_H00880_N	29.31	26.16	26.24	26.28	26.33	26.35
LH_H00890_N	27.98	25.63	25.70	25.74	25.79	25.84
LH_H00900_N	-	24.43	25.27	25.43	25.61	25.72
LH_H00910_N	-	24.05	25.12	25.26	25.40	25.50
LH_H00920_N	-	25.05	25.21	25.39	25.57	25.68
LH_H00930_N	-	25.29	25.41	25.49	25.60	25.60
LH_H00940_N	-	24.93	25.01	25.06	25.17	25.21
LH_H00950_N	-	25.52	25.81	26.00	26.26	26.29
LH_H00960_N	-	24.53	24.72	24.83	25.00	25.00
LH_H00970_N	-	24.74	24.93	25.02	25.14	25.18
LH_H00980_N	-	24.74	24.93	25.01	25.12	25.15
LH_H00990_N	-	25.26	25.35	25.41	25.48	25.49
LH_H01000_N	-	25.69	25.79	25.84	25.91	25.93
LH_I00010_N	9.69	5.92	6.13	6.27	6.46	6.49
LH_I00020_N	-	6.00	6.03	6.04	6.06	6.07
LH_I00030_N	10.79	6.43	6.60	6.72	6.88	6.90
LH_I00040_N	12.09	8.19	8.29	8.33	8.39	8.41
LH_I00050_N	13.92	8.03	8.12	8.16	8.25	8.27
LH_I00060_N	13.06	8.56	8.80	8.94	9.16	9.23
LH_I00070_N	10.42	8.34	8.67	8.76	8.84	8.85
LH_I00080_N	15.17	10.84	10.96	11.03	11.12	11.13
LH_J00010_N	-	8.87	8.90	8.93	8.96	8.97
LH_J00020_N	17.50	11.15	11.31	11.37	11.45	11.46
LH_J00030_N	-	11.82	12.11	12.25	12.40	12.40
LH_J00040_N	-	13.30	13.72	13.95	14.14	14.15
LH_J00050_N	15.55	13.51	14.08	14.49	15.25	15.30
LH_J00060_N	16.74	13.88	14.60	15.11	15.91	15.97
LH_J00065_N	-	14.71	15.23	15.47	16.03	16.08
LH_J00070_N	-	14.72	15.25	15.49	16.03	16.08
LH_J00080_N	22.94	18.23	18.33	18.38	18.43	18.43
LH_J00090_N	16.46	17.48	17.62	17.67	17.72	17.73
LH_J00100_N	17.61	11.76	11.84	11.87	11.91	11.93
LH_J00110_N	-	14.39	14.59	14.66	14.74	14.76

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00010_C	14.07	-0.01	22.61	-0.01	26.01	-0.01	38.02	-0.01	35.94	-0.01
LH_A00010_W1	9.53	0.00	15.81	0.00	20.27	0.00	28.33	-0.01	30.62	0.00
LH_A00010_W2	4.64	0.00	7.65	0.00	9.78	0.00	13.62	0.00	14.71	0.00
LH_A00010_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00010_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00010_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00020_C	2.81	0.00	4.37	0.00	5.54	0.00	8.76	0.00	9.08	0.00
LH_A00020_W1	25.67	0.00	42.52	0.00	51.76	0.00	67.72	-0.01	71.12	0.00
LH_A00020_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00020_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00030_C	21.76	0.00	36.54	0.00	44.65	0.00	59.25	0.00	62.16	0.00
LH_A00030_W1	4.84	0.00	5.92	0.00	6.55	0.00	7.90	0.00	8.28	0.00
LH_A00030_W2	0.43	-0.02	0.51	-0.10	0.59	-1.72	0.54	-7.41	0.58	-8.59
LH_A00030_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00030_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00040_W	52.88	0.00	75.64	0.00	92.03	0.00	118.67	0.00	124.24	0.00
LH_A00050_C	23.25	0.00	35.95	0.00	41.92	0.00	50.31	0.00	51.86	0.00
LH_A00050_W1	20.65	0.00	25.85	0.00	31.16	0.00	41.86	0.00	44.37	0.00
LH_A00050_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00050_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_C	30.41	0.00	40.66	0.00	46.83	0.00	56.77	0.00	58.83	0.00
LH_A00060_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_W3	9.76	0.00	16.12	0.00	20.40	0.00	27.56	0.00	29.05	0.00
LH_A00060_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00060_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00070_C	31.76	0.00	43.56	0.00	50.79	0.00	62.36	0.00	64.71	0.00
LH_A00070_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00070_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00070_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_C	22.74	0.00	27.89	0.00	31.31	0.00	36.56	0.00	37.51	0.00
LH_A00080_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00080_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00090_P1	6.93	0.00	7.85	0.00	8.30	0.00	9.11	0.00	9.29	0.00
LH_A00090_P2	6.60	0.00	7.50	0.00	7.94	0.00	8.60	0.00	8.75	0.00
LH_A00090_P3	5.03	0.00	5.68	0.00	6.00	0.00	6.57	0.00	6.71	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00090_P4	3.37	0.00	4.04	0.00	4.37	0.00	4.99	0.00	5.13	0.00
LH_A00090_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00090_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00090_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00100_P1	9.82	0.00	11.19	0.00	11.51	0.00	12.14	0.00	12.10	0.00
LH_A00100_P2	11.92	0.00	13.42	0.00	13.78	0.00	14.49	0.00	14.45	0.00
LH_A00100_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00100_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00100_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.20	0.00	-1.09
LH_A00100_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00100_W5	8.49	-5.54	14.52	-5.40	16.44	-5.53	20.29	-5.51	20.06	-5.64
LH_A00110_P1	15.08	0.00	19.46	0.00	20.22	0.00	21.74	0.00	21.70	0.00
LH_A00110_P2	13.85	0.00	18.60	0.00	19.79	0.00	20.66	0.00	20.62	0.00
LH_A00110_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00110_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00110_W3	0.00	0.00	0.00	0.00	2.26	0.00	9.67	0.00	9.34	0.00
LH_A00110_W4	0.00	-0.62	0.00	-2.57	0.00	-7.14	0.00	-15.73	0.00	-15.40
LH_A00120_C	26.67	-0.01	34.80	-0.02	36.01	-0.02	36.61	-0.02	36.89	-0.01
LH_A00120_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.25	0.00
LH_A00120_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00120_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00130_P1	13.65	0.00	17.90	0.00	18.55	0.00	18.67	0.00	18.81	0.00
LH_A00130_P2	12.79	0.00	17.02	0.00	17.66	0.00	17.81	0.00	17.95	0.00
LH_A00130_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00130_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00130_W3	0.00	-0.26	1.50	-1.23	4.92	-1.56	8.68	-1.48	8.55	-1.50
LH_A00140_C	26.05	0.00	34.71	0.00	37.13	0.00	39.58	0.00	40.11	0.00
LH_A00140_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00140_W2	0.00	0.00	3.89	0.00	10.50	0.00	20.41	0.00	19.89	0.00
LH_A00140_W3	0.00	0.00	0.00	0.00	0.10	0.00	1.13	0.00	1.06	0.00
LH_A00150_P1	12.85	0.00	17.39	0.00	20.47	0.00	24.81	0.00	24.66	0.00
LH_A00150_P2	9.73	0.00	15.41	0.00	18.61	0.00	21.98	0.00	21.98	0.00
LH_A00150_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.36	0.00
LH_A00150_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00160_C	22.34	0.00	32.54	0.00	38.75	0.00	44.91	0.00	44.96	0.00
LH_A00160_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.01	0.00
LH_A00160_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04
LH_A00160_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00170_C	21.77	0.00	32.07	0.00	38.17	0.00	43.83	0.00	43.92	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00170_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.39	0.00
LH_A00170_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00170_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00170_W4	0.00	0.00	0.00	0.00	0.36	0.00	4.75	0.00	4.30	0.00
LH_A00180_C	19.25	0.00	29.00	0.00	35.08	0.00	43.32	0.00	42.99	0.00
LH_A00180_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00180_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00180_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00180_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_P	17.87	0.00	27.33	0.00	33.07	0.00	40.24	0.00	40.10	0.00
LH_A00190_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00190_W4	0.00	0.00	0.00	0.00	0.00	0.00	3.28	0.00	3.12	0.00
LH_A00190_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
LH_A00200_C	139.68	0.00	188.50	0.00	218.67	0.00	289.10	0.00	306.04	0.00
LH_A00200_W1	106.97	0.00	189.49	0.00	250.33	0.00	419.34	0.00	464.89	0.00
LH_A00200_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00210_C	245.52	-0.02	376.86	-0.02	468.20	-0.02	707.76	-0.02	770.27	-0.02
LH_A00210_W	71.06	0.00	120.80	0.00	155.35	0.00	269.18	0.00	309.01	0.00
LH_A00220_C	228.44	-0.01	331.03	-0.01	397.38	-0.01	559.61	-0.01	602.01	-0.01
LH_A00220_W1	5.65	0.00	10.77	0.00	16.56	0.00	50.82	0.00	69.12	0.00
LH_A00220_W2	87.53	0.00	165.30	0.00	225.67	0.00	416.50	0.00	476.47	0.00
LH_A00220_W3	0.00	-106.64	0.00	-206.97	0.00	-297.27	0.00	-574.80	0.00	-666.91
LH_A00230_C	208.51	-0.02	287.53	-0.03	339.72	-0.03	448.19	-0.05	476.94	0.00
LH_A00230_W	38.54	0.00	74.23	0.00	118.06	0.00	378.26	0.00	504.43	0.00
LH_A00240_C	232.19	0.00	301.67	0.00	322.47	0.00	337.59	0.00	338.98	0.00
LH_A00240_W	20.62	0.00	49.66	0.00	79.27	0.00	181.30	0.00	215.32	0.00
LH_A00250_C	217.50	-0.01	285.88	0.00	318.45	0.00	370.24	0.00	382.16	-0.01
LH_A00250_W1	0.00	0.00	0.00	0.00	0.00	0.00	4.26	0.00	9.84	0.00
LH_A00250_W2	34.32	0.00	60.83	0.00	82.62	0.00	147.62	0.00	171.15	0.00
LH_A00260_C	226.33	0.00	291.65	0.00	326.95	-0.01	391.05	-0.01	410.10	0.00
LH_A00260_W1	0.00	0.00	0.00	0.00	0.07	0.00	9.02	0.00	21.52	0.00
LH_A00260_W2	24.38	0.00	52.16	0.00	73.29	0.00	129.85	0.00	151.96	0.00
LH_A00270_C	99.12	-0.01	111.83	-0.01	114.71	-0.02	115.61	-0.02	112.79	-0.01
LH_A00270_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00270_W2	30.68	0.00	96.95	0.00	122.46	0.00	168.63	0.00	188.16	0.00
LH_A00280_C	117.66	-0.01	192.05	-0.01	200.99	-0.01	246.45	-0.01	269.75	0.00
LH_A00280_W	0.00	0.00	0.00	0.00	0.12	0.00	5.67	0.00	9.53	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00290_P1	13.24	0.00	47.56	0.00	48.66	0.00	50.30	0.00	50.80	0.00
LH_A00290_P2	13.29	0.00	48.44	0.00	49.52	0.00	51.13	0.00	51.63	0.00
LH_A00290_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00
LH_A00300_C	26.67	0.00	96.85	0.00	110.02	0.00	174.43	0.00	208.19	0.00
LH_A00300_W1	0.00	0.00	0.97	0.00	9.01	0.00	37.73	0.00	51.20	0.00
LH_A00300_W2	0.00	0.00	45.44	0.00	150.02	0.00	458.59	0.00	594.62	0.00
LH_A00300_W3	0.00	0.00	0.00	0.00	0.01	0.00	0.80	-36.99	0.82	-62.46
LH_A00310_C	25.45	0.00	111.17	0.00	172.60	0.00	289.17	0.00	323.55	0.00
LH_A00310_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00310_W2	0.00	0.00	31.65	0.00	95.89	0.00	348.02	0.00	471.00	0.00
LH_A00310_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00
LH_A00310_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.39
LH_A00310_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_C	22.01	0.00	142.28	0.00	267.69	0.00	483.06	0.00	522.28	0.00
LH_A00320_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W2	0.00	0.00	0.00	0.00	0.00	0.00	152.56	0.00	270.90	0.00
LH_A00320_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00320_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W2	15.68	0.00	137.50	0.00	239.05	0.00	448.48	0.00	527.15	0.00
LH_A00330_W3	4.70	-7.50	8.85	-14.53	8.41	-30.23	6.55	-103.58	0.95	-135.88
LH_A00330_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W6	0.00	0.00	0.06	-2.92	0.07	-11.35	0.08	-38.27	0.05	-53.24
LH_A00330_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00330_W8	0.07	-0.89	0.48	-17.02	1.16	-34.69	2.24	-84.32	1.87	-106.66
LH_A00360_P	91.99	0.00	95.94	0.00	99.97	0.00	107.46	0.00	109.76	0.00
LH_A00360_W1	0.00	0.00	0.00	0.00	0.41	0.00	18.77	0.00	32.15	0.00
LH_A00360_W2	0.00	0.00	0.00	-0.79	0.00	-11.83	0.00	-73.17	0.00	-105.71
LH_A00360_W3	0.00	-81.26	0.00	-156.37	0.00	-269.69	0.00	-555.27	0.00	-659.94
LH_A00360_W4	126.56	0.00	259.94	0.00	460.77	0.00	997.04	0.00	1202.35	0.00
LH_A00360_W5	0.00	0.00	0.01	0.00	2.83	0.00	42.93	0.00	66.62	0.00
LH_A00370_C	133.21	-0.01	184.07	-0.02	243.93	-0.02	359.29	-0.02	394.26	-0.01
LH_A00380_W1	4.69	0.00	15.80	0.00	29.62	0.00	139.97	0.00	199.72	0.00
LH_A00380_W2	15.32	-2.36	19.58	-10.69	22.64	-26.04	26.53	-53.85	25.28	-69.91
LH_A00380_W3	0.00	0.00	0.00	0.00	0.00	-0.24	0.00	-84.63	0.00	-122.22

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00380_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-6.55
LH_A00380_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.00	4.72	0.00
LH_A00390_C	216.72	-0.01	308.08	-0.01	403.04	-0.01	517.11	-0.01	536.49	0.00
LH_A00400_C	216.61	0.00	307.56	0.00	403.12	0.00	637.23	0.00	718.08	0.00
LH_A00410_C	216.47	0.00	307.38	0.00	402.36	0.00	513.35	0.00	529.60	0.00
LH_A00410_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	5.40	0.00
LH_A00410_W2	0.00	0.00	0.00	0.00	0.40	0.00	123.37	0.00	194.84	0.00
LH_A00410_W3	0.00	-2.88	0.00	-58.23	0.00	-145.81	0.00	-357.69	0.00	-431.22
LH_A00410_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.28	0.00	-1.39
LH_A00410_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00420_C	213.08	0.00	248.17	0.00	257.60	0.00	276.37	0.00	294.35	0.00
LH_A00430_C	215.69	0.00	301.42	0.00	340.69	0.00	362.28	0.00	366.04	0.00
LH_A00430_W1	0.00	0.00	4.54	0.00	60.17	0.00	273.25	0.00	362.65	0.00
LH_A00430_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00
LH_A00440_C	214.50	0.00	301.12	0.00	339.85	0.00	368.86	0.00	375.85	0.00
LH_A00440_W	0.00	0.00	3.32	0.00	56.49	0.00	255.06	0.00	338.77	0.00
LH_A00450_C	213.04	0.00	299.84	0.00	377.62	0.00	542.60	0.00	599.99	0.00
LH_A00450_W	0.00	0.00	0.32	0.00	13.75	0.00	70.01	0.00	95.68	0.00
LH_A00460_C	211.93	0.00	273.81	0.00	303.78	0.00	359.26	0.00	373.41	0.00
LH_A00460_W	0.00	0.00	24.59	0.00	84.54	0.00	251.83	0.00	326.76	0.00
LH_A00470_P	4.19	0.00	5.68	-0.06	5.82	0.00	5.92	0.00	5.70	-0.99
LH_A00470_W1	0.00	0.00	0.04	0.00	20.15	0.00	166.15	0.00	241.97	0.00
LH_A00470_W2	0.00	0.00	0.00	-10.35	0.51	-28.23	5.90	-196.10	8.01	-285.01
LH_A00470_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00
LH_A00470_W4	0.00	0.00	0.13	0.00	3.76	0.00	27.07	0.00	40.06	-0.09
LH_A00480_C	210.94	0.00	291.89	0.00	379.91	0.00	543.79	0.00	579.37	0.00
LH_A00480_W	0.00	0.00	0.00	0.00	0.00	0.00	39.73	0.00	81.82	0.00
LH_A00490_C	210.32	0.00	290.76	0.00	374.63	0.00	420.38	0.00	425.00	0.00
LH_A00490_W1	0.00	0.00	0.00	0.00	3.54	0.00	200.53	0.00	305.19	0.00
LH_A00490_W2	0.00	-20.26	0.00	-108.32	0.00	-203.82	0.00	-417.17	0.00	-502.96
LH_A00500_P	12.76	-0.24	16.28	-14.40	16.54	-20.37	16.66	-25.56	15.18	-26.50
LH_A00500_W1	1.08	-2.20	11.23	-6.52	14.90	-6.91	25.54	-7.02	33.86	-6.01
LH_A00500_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00500_W3	0.00	0.00	0.00	0.00	0.08	-2.00	0.37	-34.05	0.34	-49.41
LH_A00510_P	9.10	-1.69	9.47	-6.43	9.49	-8.40	9.42	-10.53	8.07	-10.92
LH_A00510_W1	4.96	0.00	23.91	-0.01	41.77	-0.10	99.85	-0.07	125.68	0.00
LH_A00510_W10	0.00	-40.78	0.00	-86.93	0.00	-111.52	0.00	-158.43	0.00	-155.32
LH_A00510_W2	0.00	0.00	9.34	0.00	27.73	0.00	81.56	-0.12	106.28	-0.39
LH_A00510_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-3.62	0.00	-10.09

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00510_W4	12.28	-0.22	14.47	-8.58	14.58	-19.80	14.47	-30.00	21.70	-24.72
LH_A00510_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00510_W6	0.00	0.00	0.00	-1.45	0.00	-5.87	0.00	-18.63	0.00	-24.41
LH_A00510_W7	0.00	0.00	0.00	-0.82	0.00	-4.32	0.00	-19.46	0.00	-27.79
LH_A00510_W8	0.00	0.00	0.00	-0.13	0.00	-2.19	0.00	-9.40	0.00	-13.28
LH_A00510_W9	36.25	0.00	75.78	-1.69	99.50	-7.12	132.80	-17.74	117.72	-20.09
LH_A00520_C	210.60	0.00	202.77	0.00	203.01	0.00	203.65	0.00	219.22	0.00
LH_A00520_W1	0.00	0.00	1.30	0.00	25.42	0.00	91.60	0.00	107.86	0.00
LH_A00520_W2	0.00	-3.11	0.00	-20.07	0.00	-44.40	0.00	-89.24	0.00	-103.24
LH_A00530_C	180.75	0.00	187.12	0.00	182.24	0.00	174.56	0.00	175.52	0.00
LH_A00540_C	91.33	0.00	86.60	0.00	85.27	0.00	85.09	0.00	90.80	0.00
LH_A00540_W1	68.24	0.00	88.02	0.00	116.22	0.00	192.36	0.00	222.18	0.00
LH_A00540_W2	0.00	-82.70	0.00	-104.15	0.00	-93.20	0.00	-69.23	0.00	-50.40
LH_A00540_W3	0.00	-109.15	0.00	-172.29	0.00	-196.14	0.00	-207.57	0.00	-153.93
LH_A00550_C	154.97	0.00	145.28	0.00	118.45	0.00	109.87	0.00	94.94	0.00
LH_A00560_C	88.92	0.00	127.79	0.00	131.49	0.00	115.22	0.00	89.99	0.00
LH_A00560_W1	2.60	0.00	6.57	0.00	9.33	0.00	18.17	0.00	22.33	0.00
LH_A00560_W2	0.00	-0.37	0.00	-1.61	0.00	-3.53	0.00	-8.58	0.00	-10.85
LH_A00560_W3	8.54	-22.80	41.66	-12.06	54.13	-16.76	76.46	-28.68	88.94	-51.37
LH_A00570_C	98.06	0.00	156.18	0.00	200.68	0.00	247.49	0.00	225.36	0.00
LH_A00580_P	14.51	-13.29	12.78	-14.26	12.58	-14.80	12.29	-15.10	11.27	-15.21
LH_A00580_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00580_W2	0.00	-11.43	0.00	-42.63	0.00	-67.52	0.00	-112.57	0.00	-129.76
LH_A00580_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00580_W4	0.00	-17.06	0.00	-112.67	0.00	-170.34	0.00	-391.41	0.00	-483.35
LH_A00580_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W1	24.91	0.00	42.10	0.00	54.29	0.00	84.38	0.00	82.67	0.00
LH_A00590_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00590_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00600_C	110.00	0.00	162.37	0.00	177.42	0.00	159.10	0.00	123.82	0.00
LH_A00600_W	8.49	0.00	15.84	0.00	26.26	0.00	37.43	0.00	30.04	0.00
LH_A00610_C	112.06	0.00	169.34	0.00	195.38	0.00	193.83	0.00	152.84	0.00
LH_A00610_W1	21.19	0.00	51.51	0.00	75.00	0.00	124.64	0.00	143.21	0.00
LH_A00610_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00610_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00620_P1	11.21	-0.01	16.43	-19.18	20.82	-33.81	23.08	-44.48	13.12	-47.23

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00620_P2	11.21	-0.01	16.43	-19.18	20.82	-33.81	23.08	-44.48	13.12	-47.23
LH_A00620_P3	11.21	0.00	16.43	-19.18	20.82	-33.81	23.08	-44.48	13.12	-47.23
LH_A00620_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00630_C	33.12	-0.01	45.51	-0.02	63.14	-0.02	189.01	-0.03	233.20	-0.01
LH_A00630_W	5.02	0.00	8.91	0.00	16.71	0.00	130.78	0.00	188.39	0.00
LH_A00640_P	37.13	-0.02	52.61	-0.03	57.14	-0.03	64.76	-0.04	64.83	-0.01
LH_A00640_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00640_W2	0.00	0.00	0.00	0.00	0.13	0.00	2.48	0.00	4.82	0.00
LH_A00650_C	53.68	-0.01	85.80	-0.01	91.65	-0.01	101.30	-0.02	103.74	-0.02
LH_A00650_W1	0.00	0.00	0.00	0.00	0.00	0.00	3.13	0.00	7.20	0.00
LH_A00650_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00660_P	36.72	0.00	52.14	0.00	56.83	0.00	68.25	0.00	68.84	0.00
LH_A00660_W	0.00	0.00	0.00	0.00	0.00	0.00	1.41	0.00	5.49	0.00
LH_A00670_C	36.58	0.00	52.25	0.00	56.78	0.00	69.76	0.00	74.05	0.00
LH_A00670_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00680_P	36.31	0.00	51.67	0.00	55.50	0.00	57.59	0.00	58.03	0.00
LH_A00680_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00680_W2	0.00	0.00	0.00	0.00	0.90	0.00	11.70	0.00	15.72	0.00
LH_A00680_W3	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.50	0.00	-0.91
LH_A00690_C	36.79	0.00	52.24	0.00	57.31	0.00	69.01	0.00	73.08	0.00
LH_A00690_W	0.00	0.00	0.00	0.00	0.43	0.00	23.88	0.00	36.55	0.00
LH_A00700_C	36.85	0.00	49.20	0.00	57.35	0.00	71.56	0.00	75.34	0.00
LH_A00700_W1	0.00	0.00	0.00	0.00	19.52	0.00	215.74	0.00	297.60	0.00
LH_A00700_W2	0.00	0.00	3.44	0.00	4.49	0.00	6.92	0.00	7.77	0.00
LH_A00700_W3	0.00	0.00	0.00	0.00	0.00	-25.03	0.00	-70.63	0.00	-95.69
LH_A00710_P1	17.91	0.00	27.00	-2.50	31.04	-3.62	30.25	-2.50	20.91	0.00
LH_A00710_P2	17.91	0.00	27.00	-2.50	31.04	-3.62	30.25	-2.50	20.91	0.00
LH_A00720_W	53.26	0.00	102.39	0.00	141.06	0.00	199.44	0.00	192.05	0.00
LH_A00730_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00730_W2	32.87	0.00	58.91	0.00	80.76	0.00	111.08	0.00	117.12	0.00
LH_A00730_W3	0.00	0.00	0.00	0.00	2.78	0.00	21.37	0.00	26.14	0.00
LH_A00740_C	65.08	0.00	173.57	0.00	232.76	0.00	268.02	0.00	274.36	0.00
LH_A00740_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00740_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00740_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00740_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00750_C	65.37	0.00	173.78	0.00	239.26	0.00	293.53	0.00	306.84	0.00
LH_A00750_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00750_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.07

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00750_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00760_C	65.09	0.00	173.33	0.00	238.69	0.00	292.42	0.00	305.61	0.00
LH_A00760_W1	0.00	0.00	0.00	0.00	6.80	0.00	26.27	0.00	37.14	0.00
LH_A00760_W2	0.00	0.00	20.78	-0.54	53.80	-0.47	197.11	-0.27	258.88	0.00
LH_A00760_W3	0.00	0.00	0.00	-16.42	0.00	-48.04	20.77	-66.46	92.63	-64.72
LH_A00760_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00760_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00770_W1	44.35	0.00	145.56	0.00	213.56	0.00	356.24	0.00	423.18	0.00
LH_A00770_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00770_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00770_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00780_W1	22.51	0.00	58.14	0.00	84.00	0.00	133.95	0.00	140.41	0.00
LH_A00780_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00790_W1	15.61	0.00	34.30	0.00	45.41	0.00	68.49	0.00	71.65	0.00
LH_A00790_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00790_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00800_C	14.43	-0.05	18.08	-0.07	19.79	-0.08	24.70	-0.10	24.02	-0.03
LH_A00800_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00800_W2	0.00	0.00	3.71	0.00	6.53	0.00	7.72	0.00	7.85	0.00
LH_A00810_C	14.48	0.00	20.75	0.00	21.96	0.00	25.67	0.00	26.52	0.00
LH_A00810_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00810_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00820_P	14.40	0.00	20.70	0.00	21.87	0.00	24.19	0.00	24.53	0.00
LH_A00820_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00820_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00820_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00830_C	14.35	0.00	20.63	0.00	21.68	0.00	23.12	0.00	23.29	0.00
LH_A00830_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00840_P	14.27	0.00	20.53	0.00	21.42	0.00	21.68	0.00	21.70	0.00
LH_A00840_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00850_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00850_W2	0.30	0.00	4.32	0.00	8.18	0.00	18.96	0.00	20.65	0.00
LH_A00850_W3	13.47	0.00	28.31	0.00	36.80	0.00	54.65	0.00	57.10	0.00
LH_A00850_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00850_W5	0.68	0.00	1.58	0.00	2.19	-0.37	1.82	-1.55	1.61	-1.83
LH_A00850_W6	0.00	0.00	0.00	0.00	0.00	-0.23	0.00	-4.65	0.00	-5.84
LH_A00850_W7	0.09	0.00	0.97	0.00	1.93	0.00	5.37	0.00	5.99	0.00
LH_A00850_W8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00860_C	13.57	0.00	19.68	0.00	21.38	0.00	22.53	0.00	22.57	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00860_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00860_W2	0.00	-0.40	0.00	-1.14	0.93	-1.56	1.97	-1.30	2.12	-1.15
LH_A00860_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00870_P	13.19	0.00	19.04	0.00	22.08	0.00	23.71	0.00	23.87	0.00
LH_A00870_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00880_C	13.19	0.00	18.99	0.00	22.14	0.00	27.51	0.00	28.92	0.00
LH_A00880_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00880_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00890_W1	6.04	0.00	13.69	0.00	18.54	0.00	26.75	0.00	28.51	0.00
LH_A00890_W2	1.81	0.00	3.39	0.00	4.34	0.00	5.94	0.00	6.28	0.00
LH_A00900_C	11.95	0.00	17.83	0.00	20.79	0.00	24.97	0.00	25.73	0.00
LH_A00900_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00900_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_P	11.83	0.00	17.69	0.00	20.64	0.00	24.78	0.00	25.52	0.00
LH_A00910_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	5.87	0.00
LH_A00910_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00910_W8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_P	10.51	0.00	17.16	0.00	20.11	0.00	23.76	0.00	24.01	0.00
LH_A00920_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
LH_A00920_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_W3	0.00	0.00	0.00	0.00	0.00	0.00	4.79	0.00	11.09	0.00
LH_A00920_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00920_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00930_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00930_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00940_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	0.00
LH_A00940_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00950_W1	0.00	0.00	0.00	0.00	1.50	0.00	39.24	0.00	64.44	0.00
LH_A00950_W2	75.87	0.00	176.71	0.00	341.80	0.00	845.72	0.00	1035.20	0.00
LH_A00950_W3	132.87	0.00	194.36	0.00	207.06	0.00	261.42	0.00	277.22	0.00
LH_A00960_W1	17.17	0.00	33.92	0.00	47.49	0.00	70.02	0.00	71.42	0.00
LH_A00960_W2	27.38	0.00	57.50	0.00	83.56	0.00	130.12	0.00	133.12	0.00
LH_A00960_W3	0.00	-37.10	0.00	-79.93	0.00	-115.34	0.00	-176.31	0.00	-180.01

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A00970_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00970_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00970_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00980_W1	0.00	0.00	0.08	0.00	0.42	0.00	1.74	0.00	1.87	0.00
LH_A00980_W2	14.19	0.00	24.73	0.00	31.88	0.00	43.36	0.00	44.06	0.00
LH_A00980_W3	0.25	0.00	1.14	0.00	1.88	0.00	3.34	-3.37	3.44	-9.90
LH_A00980_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00990_W1	2.58	0.00	7.92	0.00	10.70	0.00	14.18	0.00	14.95	0.00
LH_A00990_W2	0.60	0.00	3.14	0.00	5.12	0.00	8.15	0.00	8.88	0.00
LH_A00990_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A00990_W4	0.02	0.00	0.75	0.00	1.55	0.00	2.80	0.00	3.13	0.00
LH_A01000_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01000_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01000_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01000_W4	8.42	0.00	29.04	0.00	47.19	0.00	81.21	0.00	85.57	0.00
LH_A01000_W5	0.00	-0.52	0.00	-1.79	0.00	-2.41	0.00	-3.23	0.00	-3.42
LH_A01000_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01010_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01010_W2	34.72	0.00	60.73	0.00	64.59	0.00	94.34	0.00	111.46	0.00
LH_A01010_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01010_W4	0.75	-2.07	2.68	-5.78	4.17	-10.99	2.21	-36.94	0.11	-50.02
LH_A01020_W1	8.20	0.00	15.45	0.00	20.29	0.00	35.21	0.00	48.20	0.00
LH_A01020_W2	7.01	0.00	12.95	0.00	16.79	0.00	28.18	0.00	37.88	0.00
LH_A01020_W3	0.03	0.00	0.45	0.00	0.94	0.00	2.76	0.00	4.66	0.00
LH_A01020_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01020_W5	7.09	0.00	11.55	0.00	14.42	-0.12	19.29	-36.06	19.03	-56.02
LH_A01030_W1	69.11	0.00	113.33	0.00	158.20	0.00	259.60	0.00	302.56	0.00
LH_A01030_W2	7.22	-58.02	19.66	-104.87	44.95	-123.54	90.08	-120.26	107.44	-44.14
LH_A01030_W3	0.00	-46.80	0.00	-81.19	0.00	-99.32	0.00	-118.79	0.00	-95.02
LH_A01030_W4	0.00	-33.02	0.00	-84.85	0.00	-121.86	0.00	-169.19	0.00	-189.29
LH_A01030_W5	0.00	-4.19	0.00	-42.88	0.00	-79.37	0.00	-150.10	0.00	-176.62
LH_A01040_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01040_W2	21.79	0.00	39.39	0.00	61.54	0.00	88.93	0.00	74.62	0.00
LH_A01040_W3	0.00	0.00	0.41	0.00	1.65	0.00	4.69	-0.01	5.28	-0.18
LH_A01040_W4	0.00	-0.02	0.00	-1.28	0.00	-2.59	0.00	-4.87	0.00	-5.18
LH_A01040_W5	5.91	-1.77	13.52	-17.54	17.95	-31.06	17.19	-56.79	4.75	-74.04
LH_A01040_W6	0.00	0.00	1.96	-2.08	8.81	-5.95	23.90	-15.64	29.31	-16.63
LH_A01050_W	0.29	0.00	1.74	0.00	3.42	0.00	6.95	0.00	7.46	0.00
LH_A01060_W	135.58	0.00	119.71	0.00	97.90	0.00	96.73	0.00	86.67	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01070_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01070_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01070_W3	248.68	0.00	350.21	0.00	379.65	0.00	379.35	0.00	268.37	0.00
LH_A01070_W4	0.00	-171.01	11.31	-234.12	26.74	-260.02	40.69	-269.27	44.24	-154.64
LH_A01080_P1	5.73	0.00	5.82	0.00	5.82	0.00	5.69	0.00	5.67	0.00
LH_A01080_P2	5.73	0.00	5.82	0.00	5.82	0.00	5.69	0.00	5.67	0.00
LH_A01080_W1	55.07	0.00	135.63	0.00	215.89	0.00	354.72	0.00	411.41	0.00
LH_A01080_W2	0.00	-72.18	0.00	-165.54	0.00	-263.63	0.00	-431.65	0.00	-499.64
LH_A01090_W1	24.52	0.00	41.48	0.00	49.45	0.00	55.04	0.00	41.31	0.00
LH_A01090_W2	0.00	-8.33	0.00	-23.66	0.00	-42.15	0.00	-72.91	0.00	-84.92
LH_A01090_W3	8.34	-20.01	23.46	-32.96	41.81	-33.80	68.43	-30.20	77.15	-5.99
LH_A01090_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01110_W1	1.84	0.00	6.77	-4.98	10.01	-10.59	12.08	-24.55	5.75	-30.14
LH_A01110_W2	147.54	0.00	193.73	-101.07	177.94	-183.10	139.10	-327.60	57.50	-383.07
LH_A01120_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
LH_A01120_W2	0.00	-4.06	0.00	-8.27	0.00	-10.87	0.00	-14.63	0.00	-15.10
LH_A01120_W3	101.92	0.00	143.95	-131.75	147.29	-249.66	124.03	-464.18	52.27	-543.77
LH_A01130_W1	1.79	0.00	4.36	0.00	7.04	0.00	14.59	0.00	15.95	0.00
LH_A01130_W2	13.46	0.00	29.26	0.00	42.40	0.00	73.54	0.00	78.32	0.00
LH_A01130_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01130_W4	0.00	-7.77	0.00	-21.21	0.00	-37.06	0.00	-69.60	0.00	-75.85
LH_A01130_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01140_W1	44.18	0.00	247.10	0.00	436.17	0.00	795.63	0.00	939.35	0.00
LH_A01140_W2	80.75	-1.77	117.99	-155.53	128.08	-297.14	117.71	-561.23	47.18	-662.74
LH_A01150_W1	13.57	0.00	44.57	0.00	78.40	0.00	139.53	0.00	150.77	0.00
LH_A01150_W2	80.40	0.00	141.10	0.00	198.22	0.00	292.61	0.00	309.07	0.00
LH_A01150_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W2	17.73	0.00	32.49	0.00	43.30	0.00	62.40	0.00	64.18	0.00
LH_A01160_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01160_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01170_W1	8.77	0.00	15.93	0.00	21.39	0.00	31.20	0.00	31.79	0.00
LH_A01170_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01180_W1	59.84	0.00	99.02	0.00	126.64	0.00	192.45	0.00	226.17	0.00
LH_A01180_W2	40.99	0.00	82.47	0.00	114.89	0.00	197.43	0.00	240.89	0.00
LH_A01180_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01190_W1	2.91	0.00	9.81	0.00	17.04	0.00	35.75	0.00	40.31	0.00
LH_A01190_W2	92.78	0.00	195.55	0.00	296.02	0.00	470.90	0.00	504.98	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01190_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01200_W1	62.71	0.00	120.18	0.00	175.45	0.00	341.58	0.00	412.12	0.00
LH_A01200_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01210_W1	28.57	0.00	58.45	0.00	99.87	0.00	171.60	0.00	203.90	0.00
LH_A01210_W2	0.00	0.00	0.00	0.00	0.05	0.00	8.28	0.00	15.99	0.00
LH_A01220_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01220_W2	12.71	0.00	23.37	0.00	32.76	0.00	84.50	0.00	113.03	0.00
LH_A01220_W3	16.65	0.00	27.69	0.00	37.30	0.00	86.45	0.00	109.83	0.00
LH_A01230_W1	32.60	0.00	91.55	0.00	137.06	0.00	208.07	0.00	216.14	0.00
LH_A01230_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01230_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01240_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01240_W2	28.88	0.00	49.05	0.00	74.77	0.00	119.52	0.00	124.07	0.00
LH_A01250_W1	4.40	0.00	12.87	0.00	26.80	0.00	56.52	0.00	69.52	0.00
LH_A01250_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01250_W3	9.73	0.00	26.38	0.00	55.74	0.00	123.27	0.00	154.83	0.00
LH_A01250_W4	0.00	0.00	0.39	0.00	3.57	0.00	11.94	0.00	16.11	0.00
LH_A01250_W5	0.00	0.00	0.00	-16.90	0.00	-50.02	0.00	-120.52	0.00	-152.45
LH_A01260_W1	1.63	0.00	6.54	0.00	10.19	0.00	15.78	0.00	18.81	0.00
LH_A01260_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01270_W1	0.00	0.00	0.21	0.00	0.90	0.00	3.67	0.00	5.66	0.00
LH_A01270_W2	0.01	0.00	1.05	0.00	2.61	0.00	5.86	0.00	7.73	0.00
LH_A01270_W3	0.00	0.00	0.25	0.00	0.87	0.00	2.60	0.00	3.55	0.00
LH_A01270_W4	19.52	0.00	56.82	0.00	91.71	0.00	151.40	0.00	180.37	0.00
LH_A01270_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01270_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01280_W1	22.81	0.00	55.41	0.00	95.84	0.00	172.10	0.00	211.55	0.00
LH_A01280_W2	3.77	0.00	22.37	0.00	53.98	0.00	129.87	0.00	172.01	0.00
LH_A01280_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01280_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.00	2.43	0.00
LH_A01280_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01280_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01290_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01290_W2	0.01	0.00	2.03	0.00	5.17	0.00	15.67	0.00	17.55	0.00
LH_A01290_W3	30.40	0.00	82.69	0.00	119.57	0.00	173.91	0.00	180.71	0.00
LH_A01290_W4	11.13	0.00	30.17	0.00	45.93	0.00	71.88	0.00	75.24	0.00
LH_A01290_W5	0.00	-29.49	0.00	-65.11	0.00	-93.53	0.00	-139.29	0.00	-147.06
LH_A01300_W1	10.55	-0.15	27.60	-0.15	40.33	-0.15	60.72	-0.16	63.77	-0.08
LH_A01300_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01310_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01320_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01320_W2	15.97	0.00	30.85	0.00	41.09	0.00	58.59	0.00	61.85	0.00
LH_A01330_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01330_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01330_W3	9.73	0.00	18.25	0.00	24.08	0.00	34.05	0.00	35.77	0.00
LH_A01340_W1	0.01	0.00	0.24	0.00	0.44	0.00	0.78	0.00	0.85	0.00
LH_A01340_W2	1.81	0.00	9.07	0.00	15.49	0.00	26.29	0.00	28.76	0.00
LH_A01340_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00
LH_A01350_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01350_W2	11.20	0.00	23.48	0.00	31.64	0.00	46.04	0.00	49.39	0.00
LH_A01350_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01350_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01360_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01360_W2	42.66	-1.25	73.35	0.00	92.40	0.00	106.92	0.00	117.75	0.00
LH_A01360_W3	0.00	0.00	0.00	-0.46	0.00	-7.29	0.00	-26.18	0.00	-33.14
LH_A01360_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01360_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01370_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01370_W2	12.86	0.00	22.55	0.00	29.43	0.00	41.67	0.00	44.19	0.00
LH_A01370_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01380_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01380_W2	8.62	0.00	14.88	0.00	19.32	0.00	27.24	0.00	29.03	0.00
LH_A01380_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01390_W	0.00	0.00	0.00	0.00	0.00	0.00	18.61	0.00	31.84	0.00
LH_A01400_W	58.07	0.00	79.98	0.00	94.81	0.00	126.66	0.00	140.57	0.00
LH_A01410_P	57.75	0.00	78.26	0.00	82.36	0.00	87.36	0.00	88.97	0.00
LH_A01410_W1	26.90	0.00	87.75	0.00	116.48	0.00	169.02	0.00	192.25	0.00
LH_A01410_W2	0.00	0.00	52.49	0.00	96.27	0.00	168.03	0.00	194.84	0.00
LH_A01410_W3	0.00	0.00	0.53	0.00	6.87	0.00	22.90	0.00	30.25	0.00
LH_A01420_W1	2.45	0.00	57.14	0.00	99.69	0.00	150.62	0.00	169.64	0.00
LH_A01420_W2	62.95	0.00	167.80	0.00	238.94	0.00	377.10	0.00	434.23	0.00
LH_A01430_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01430_W2	7.78	0.00	17.21	0.00	23.89	0.00	42.08	0.00	57.66	0.00
LH_A01430_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01430_W4	5.37	0.00	10.94	0.00	14.59	0.00	23.77	0.00	31.66	0.00
LH_A01440_W1	60.96	0.00	209.67	0.00	310.74	0.00	471.01	0.00	536.06	0.00
LH_A01440_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01450_P	37.16	0.00	39.88	0.00	40.76	0.00	41.29	0.00	41.31	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01450_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01450_W2	0.00	0.00	0.76	0.00	3.30	0.00	12.33	0.00	18.86	0.00
LH_A01450_W3	23.27	0.00	168.69	0.00	266.98	0.00	424.65	0.00	489.57	0.00
LH_A01460_P	29.32	0.00	31.90	0.00	32.47	0.00	33.18	0.00	33.48	0.00
LH_A01460_W1	4.96	0.00	71.48	0.00	112.52	0.00	180.42	0.00	214.61	0.00
LH_A01460_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01470_W1	0.00	0.00	0.21	0.00	1.76	0.00	12.59	0.00	22.42	0.00
LH_A01470_W2	12.68	-8.24	24.93	-8.60	29.77	-9.90	30.53	-19.48	49.00	-1.66
LH_A01480_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01480_W2	0.67	0.00	6.50	0.00	13.32	0.00	25.30	0.00	30.09	0.00
LH_A01490_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01490_W2	0.00	0.00	0.00	0.00	0.22	0.00	2.36	0.00	4.34	0.00
LH_A01490_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01490_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01490_W5	0.00	-3.90	0.00	-8.63	0.00	-11.37	0.00	-16.03	0.00	-17.43
LH_A01490_W6	0.00	-2.82	0.00	-29.52	0.00	-79.37	0.00	-173.11	0.00	-209.72
LH_A01500_W1	17.13	0.00	51.87	0.00	83.90	0.00	142.27	0.00	174.50	0.00
LH_A01500_W2	0.43	0.00	15.38	0.00	40.60	0.00	96.30	0.00	130.21	0.00
LH_A01500_W3	31.33	0.00	86.75	0.00	132.19	0.00	207.46	0.00	246.07	0.00
LH_A01500_W4	19.94	0.00	45.05	0.00	58.99	0.00	77.14	-14.69	48.21	-27.36
LH_A01510_W1	8.73	0.00	34.72	0.00	63.67	0.00	130.42	0.00	172.30	0.00
LH_A01510_W2	0.04	0.00	0.59	0.00	1.26	0.00	2.75	0.00	3.66	0.00
LH_A01510_W3	29.42	0.00	75.62	0.00	112.78	0.00	183.02	0.00	224.80	0.00
LH_A01510_W4	0.00	-127.45	0.00	-312.15	0.00	-471.60	0.00	-802.74	0.00	-1014.39
LH_A01510_W5	67.73	0.00	174.73	0.00	260.98	0.00	423.42	0.00	514.46	0.00
LH_A01510_W6	29.69	-6.33	54.13	-1.92	74.40	-1.17	121.05	-2.88	151.07	-0.21
LH_A01520_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01520_W2	1.94	-4.56	3.35	-12.63	4.30	-20.09	9.31	-40.22	6.76	-53.72
LH_A01520_W3	1.41	0.00	5.13	0.00	8.84	0.00	18.39	0.00	25.20	0.00
LH_A01520_W4	7.90	-0.69	11.98	0.00	17.29	0.00	31.08	0.00	40.79	-0.02
LH_A01530_W1	49.74	0.00	108.85	0.00	157.39	0.00	257.73	0.00	317.94	0.00
LH_A01530_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01530_W3	0.77	-40.89	0.60	-84.26	0.61	-119.77	0.70	-193.93	0.11	-242.31
LH_A01540_W1	0.00	0.00	1.77	0.00	4.77	0.00	10.59	0.00	13.63	0.00
LH_A01540_W2	0.86	0.00	3.52	0.00	6.09	0.00	12.53	0.00	16.01	0.00
LH_A01540_W3	0.00	0.00	0.00	0.00	0.19	0.00	1.47	0.00	2.22	0.00
LH_A01550_W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01560_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01560_W2	0.01	0.00	1.69	0.00	6.86	0.00	18.13	0.00	25.35	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01560_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01570_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01570_W2	0.00	0.00	0.01	0.00	0.18	0.00	0.75	0.00	0.86	0.00
LH_A01570_W3	11.70	0.00	24.18	0.00	32.57	0.00	47.06	0.00	49.07	0.00
LH_A01570_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01580_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01580_W2	7.08	0.00	13.38	0.00	17.81	0.00	25.44	0.00	26.68	0.00
LH_A01580_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01590_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01590_W2	13.30	0.00	30.34	0.00	42.02	0.00	60.90	0.00	62.17	0.00
LH_A01590_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01590_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01600_W1	13.44	0.00	27.29	0.00	37.31	0.00	54.48	0.00	56.78	0.00
LH_A01600_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01610_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01610_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00
LH_A01610_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	2.77	0.00
LH_A01610_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01610_W5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01620_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01620_W2	15.75	0.00	28.08	0.00	36.56	0.00	51.05	0.00	52.49	0.00
LH_A01630_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01630_W2	20.68	0.00	51.88	0.00	77.32	0.00	120.59	0.00	122.39	0.00
LH_A01640_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01640_W2	0.00	0.00	0.01	0.00	2.71	0.00	15.94	0.00	34.19	0.00
LH_A01650_W1	0.00	0.00	0.08	0.00	5.91	0.00	26.13	0.00	52.19	0.00
LH_A01650_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01660_W1	0.00	0.00	0.84	0.00	2.23	0.00	6.76	0.00	13.32	0.00
LH_A01660_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01660_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
LH_A01690_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01690_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
LH_A01690_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01700_P	6.18	0.00	7.40	0.00	7.95	0.00	8.56	0.00	8.73	0.00
LH_A01700_W1	15.22	0.00	40.56	0.00	73.98	0.00	145.41	0.00	179.81	0.00
LH_A01700_W2	1.73	0.00	28.87	0.00	78.05	0.00	170.17	0.00	205.24	0.00
LH_A01710_P	20.46	0.00	76.21	0.00	158.77	0.00	322.04	0.00	368.87	0.00
LH_A01710_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01710_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B-2

Existing Conditions, Typical High Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation									
	MA / 24-HR		10-YR / 24-HR		25-YR / 24-HR		100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
LH_A01710_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01710_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.05	0.00
LH_A01715_P	14.83	0.00	70.88	0.00	124.59	0.00	136.63	0.00	136.76	-0.06
LH_A01715_W	0.00	0.00	0.00	0.00	0.00	0.00	24.33	0.00	87.12	0.00
LH_A01720_W1	3.94	0.00	9.93	0.00	15.81	0.00	27.17	-6.75	30.78	-31.96
LH_A01720_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01730_W4	0.00	0.00	1.15	0.00	22.72	0.00	176.85	0.00	254.78	0.00
LH_A01730_W5	14.75	0.00	70.37	0.00	123.83	0.00	138.02	0.00	144.56	0.00
LH_A01730_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01740_W	0.08	0.00	3.90	0.00	8.97	0.00	20.58	0.00	28.84	0.00
LH_A01750_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W3	3.34	0.00	23.36	0.00	46.23	0.00	106.09	0.00	153.28	0.00
LH_A01750_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W5	0.00	-1.82	0.00	-13.66	0.00	-23.05	0.00	-36.47	0.00	-39.53
LH_A01750_W6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01750_W7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01760_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01780_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01780_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01780_W3	2.55	0.00	15.00	0.00	26.95	0.00	47.60	0.00	55.15	0.00
LH_A01780_W4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01790_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01790_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01800_W	0.00	0.00	5.00	0.00	11.76	0.00	24.30	0.00	39.72	0.00
LH_A01810_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01810_W2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01810_W3	0.00	0.00	0.00	0.00	0.00	0.00	1.88	0.00	5.43	0.00
LH_A01820_W1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LH_A01820_W2	31.37	0.00	84.42	0.00	117.79	0.00	175.27	0.00	196.18	0.00

APPENDIX C
Existing Conditions Model
Peak Stages and Flows
(FEMA 100-Year Flood Elevation Boundary Condition)

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
HARNEY	6.65	9.00	9.00
LH_A00010_N	12.10	9.00	9.00
LH_A00020_N	10.14	9.00	9.00
LH_A00030_N	9.38	9.00	9.00
LH_A00040_N	-	9.00	9.00
LH_A00050_N	9.92	9.00	9.00
LH_A00060_N	10.09	9.00	9.00
LH_A00070_N	10.17	9.00	9.00
LH_A00080_N	10.18	9.00	9.00
LH_A00090_N	9.96	9.00	9.00
LH_A00100_N	10.39	9.02	9.02
LH_A00110_N	10.58	9.22	9.22
LH_A00120_N	10.65	9.23	9.23
LH_A00130_N	11.24	9.30	9.30
LH_A00140_N	11.51	9.41	9.41
LH_A00150_N	11.58	10.36	10.34
LH_A00160_N	12.10	10.50	10.49
LH_A00170_N	12.64	10.75	10.74
LH_A00180_N	13.15	11.19	11.18
LH_A00190_N	10.92	11.79	11.78
LH_A00200_N	13.02	9.00	9.00
LH_A00210_N	13.88	9.00	9.00
LH_A00220_N	12.39	9.00	9.00
LH_A00230_N	9.68	9.00	9.00
LH_A00240_N	9.60	9.01	9.01
LH_A00250_N	9.84	9.01	9.01
LH_A00260_N	10.07	9.01	9.02
LH_A00270_N	9.99	9.02	9.02
LH_A00280_N	10.32	9.03	9.04
LH_A00290_N	10.40	10.29	10.37
LH_A00300_N	10.62	10.35	10.44
LH_A00310_N	11.26	10.66	10.79
LH_A00320_N	12.00	12.09	12.22
LH_A00330_N	14.20	14.12	14.21
LH_A00340_N	-	14.12	14.22
LH_A00360_N	-	9.39	9.48
LH_A00370_N	-	9.57	9.67
LH_A00380_N	-	9.49	9.58
LH_A00390_N	-	10.50	10.58

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_A00400_N	-	11.54	11.75
LH_A00410_N	-	12.20	12.34
LH_A00420_N	-	12.45	12.59
LH_A00430_N	-	12.92	13.02
LH_A00440_N	-	13.26	13.34
LH_A00450_N	-	13.53	13.64
LH_A00460_N	-	13.78	13.89
LH_A00470_N	14.79	14.06	14.14
LH_A00480_N	-	14.21	14.34
LH_A00490_N	-	14.38	14.47
LH_A00500_N	17.37	14.12	14.22
LH_A00510_N	13.08	14.13	14.23
LH_A00520_N	14.91	14.47	14.54
LH_A00530_N	14.20	14.59	14.64
LH_A00540_N	13.51	14.60	14.66
LH_A00550_N	13.94	14.61	14.66
LH_A00560_N	13.62	14.61	14.67
LH_A00570_N	12.76	14.62	14.67
LH_A00580_N	12.89	14.18	14.28
LH_A00590_N	15.81	14.61	14.61
LH_A00600_N	13.71	14.62	14.68
LH_A00610_N	14.20	14.64	14.70
LH_A00620_N	14.01	14.60	14.67
LH_A00630_N	15.00	14.67	14.77
LH_A00640_N	14.92	14.79	14.87
LH_A00650_N	15.40	14.80	14.87
LH_A00660_N	15.59	15.06	15.13
LH_A00670_N	15.91	15.07	15.15
LH_A00680_N	14.65	16.58	16.64
LH_A00690_N	15.30	16.58	16.65
LH_A00700_N	14.69	16.59	16.65
LH_A00710_N	14.88	16.59	16.66
LH_A00720_N	16.19	16.60	16.67
LH_A00730_N	21.74	21.04	21.06
LH_A00740_N	15.09	14.96	15.02
LH_A00750_N	15.75	16.16	16.25
LH_A00760_N	14.44	16.59	16.66
LH_A00770_N	-	16.62	16.70
LH_A00780_N	-	16.63	16.70

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_A00790_N	-	19.92	19.93
LH_A00800_N	15.95	16.59	16.66
LH_A00810_N	19.06	16.69	16.75
LH_A00820_N	20.71	18.69	18.71
LH_A00830_N	21.07	19.08	19.10
LH_A00840_N	23.01	22.10	22.11
LH_A00850_N	22.99	22.10	22.11
LH_A00860_N	23.87	22.12	22.12
LH_A00870_N	24.33	22.82	22.84
LH_A00880_N	24.59	22.85	22.87
LH_A00890_N	30.71	23.87	23.87
LH_A00900_N	25.42	23.34	23.36
LH_A00910_N	27.70	26.05	26.16
LH_A00920_N	27.35	28.36	28.47
LH_A00930_N	-	29.05	30.05
LH_A00940_N	35.30	32.16	32.27
LH_A00950_N	-	9.01	9.02
LH_A00960_N	-	12.75	12.76
LH_A00970_N	-	13.00	13.01
LH_A00980_N	-	13.53	13.53
LH_A00990_N	-	14.57	14.58
LH_A01000_N	-	14.52	14.52
LH_A01010_N	-	14.60	14.66
LH_A01020_N	-	14.55	14.58
LH_A01030_N	-	14.60	14.66
LH_A01040_N	-	14.60	14.66
LH_A01050_N	-	15.02	15.02
LH_A01060_N	-	14.61	14.67
LH_A01070_N	-	14.63	14.69
LH_A01080_N	-	14.82	14.87
LH_A01090_N	-	14.63	14.69
LH_A01100_N	-	14.63	14.69
LH_A01110_N	-	14.61	14.67
LH_A01120_N	-	14.59	14.65
LH_A01130_N	-	15.00	15.01
LH_A01140_N	-	14.57	14.62
LH_A01150_N	-	15.62	15.63
LH_A01160_N	-	14.97	14.97
LH_A01170_N	-	15.27	15.27

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_A01180_N	-	14.83	14.87
LH_A01190_N	-	15.67	15.69
LH_A01200_N	-	16.32	16.37
LH_A01210_N	-	16.84	16.90
LH_A01220_N	-	16.50	16.54
LH_A01230_N	-	16.87	16.88
LH_A01240_N	-	16.61	16.62
LH_A01250_N	-	17.37	17.40
LH_A01260_N	-	20.80	20.82
LH_A01270_N	-	21.52	21.55
LH_A01280_N	-	18.17	18.22
LH_A01290_N	-	17.44	17.45
LH_A01300_N	-	17.48	17.48
LH_A01310_N	-	17.74	17.75
LH_A01320_N	-	18.25	18.26
LH_A01330_N	-	21.35	21.36
LH_A01340_N	-	22.64	22.65
LH_A01350_N	-	22.66	22.67
LH_A01360_N	-	14.64	14.70
LH_A01370_N	-	15.36	15.37
LH_A01380_N	-	16.10	16.11
LH_A01390_N	-	15.47	15.55
LH_A01400_N	-	16.45	16.51
LH_A01410_N	-	17.77	17.83
LH_A01420_N	-	18.81	18.87
LH_A01430_N	-	19.38	19.43
LH_A01440_N	-	20.74	20.85
LH_A01450_N	-	22.32	22.37
LH_A01460_N	-	23.73	23.78
LH_A01470_N	-	22.32	22.37
LH_A01480_N	26.99	24.23	24.24
LH_A01490_N	25.82	24.32	24.39
LH_A01500_N	-	23.73	23.77
LH_A01510_N	-	23.97	24.02
LH_A01520_N	-	23.96	24.00
LH_A01530_N	-	23.94	23.98
LH_A01540_N	-	25.51	25.52
LH_A01550_N	-	23.95	24.00
LH_A01560_N	-	26.46	26.48

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_A01570_N	-	25.56	25.56
LH_A01580_N	-	26.69	26.69
LH_A01590_N	-	27.15	27.15
LH_A01600_N	-	25.76	25.77
LH_A01610_N	-	28.21	28.29
LH_A01620_N	-	25.00	25.01
LH_A01630_N	-	24.83	24.84
LH_A01640_N	34.21	28.49	28.58
LH_A01650_N	30.94	28.29	28.37
LH_A01660_N	28.12	27.60	27.75
LH_A01670_N	-	24.81	24.82
LH_A01680_N	-	25.17	25.23
LH_A01690_N	27.31	25.52	26.06
LH_A01700_N	26.07	26.40	26.51
LH_A01710_N	26.61	26.99	27.68
LH_A01715_N	-	27.30	27.71
LH_A01720_N	32.12	27.00	27.68
LH_A01730_N	27.78	27.33	27.72
LH_A01740_N	41.92	29.88	29.95
LH_A01750_N	31.19	28.80	28.86
LH_A01760_N	-	30.79	31.89
LH_A01770_N	35.79	29.32	29.33
LH_A01780_N	37.12	31.25	31.28
LH_A01790_N	-	30.60	31.62
LH_A01800_N	31.28	30.40	30.47
LH_A01810_N	38.43	35.86	36.00
LH_A01820_N	30.85	30.26	30.30
LH_A01830_N	51.70	36.66	36.81
LH_A01840_N	56.95	58.46	58.49
LH_A01850_N	-	61.29	61.38
LH_A01860_N	31.47	31.79	31.96
LH_A01870_N	-	32.81	32.90
LH_A01880_N	28.54	29.40	29.41
LH_A01890_N	29.57	29.40	29.42
LH_A01900_N	28.52	27.98	28.54
LH_A01910_N	31.51	28.53	28.63
LH_A01920_N	31.16	30.49	30.57
LH_A01930_N	35.22	34.86	34.87
LH_A01940_N	-	40.92	40.92

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_A01950_N	39.09	35.18	35.39
LH_A01960_N	59.86	60.14	60.19
LH_A01970_N	37.96	30.59	30.66
LH_A01980_N	30.22	28.51	29.61
LH_A01990_N	33.77	30.96	30.98
LH_A02000_N	-	29.79	29.80
LH_A02010_N	33.63	33.60	34.07
LH_A02020_N	-	31.94	31.97
LH_A02030_N	-	33.66	33.83
LH_A02040_N	-	29.94	30.06
LH_A02050_N	-	29.84	29.98
LH_A02060_N	31.29	30.27	30.40
LH_A02070_N	39.95	30.36	30.44
LH_A02080_N	39.50	32.04	33.84
LH_A02090_N	55.26	35.19	35.39
LH_A02100_N	63.79	35.19	35.39
LH_A02110_N	30.98	30.18	30.34
LH_A02120_N	56.51	56.38	56.43
LH_A02130_N	33.42	30.31	30.48
LH_A02140_N	-	33.95	34.04
LH_A02150_N	37.44	32.87	33.62
LH_A02160_N	36.93	33.71	33.85
LH_A02170_N	29.34	30.18	30.34
LH_A02180_N	30.22	31.40	31.45
LH_A02190_N	29.58	25.66	27.52
LH_A02200_N	29.62	27.35	27.58
LH_A02210_N	55.02	40.37	42.00
LH_A02220_N	32.73	30.32	30.50
LH_A02230_N	32.93	33.68	33.94
LH_A02240_N	47.59	33.68	33.95
LH_B00010_N	11.40	9.00	9.00
LH_B00020_N	-	9.00	9.00
LH_B00030_N	9.32	9.01	9.01
LH_B00040_N	-	9.24	9.24
LH_B00050_N	-	10.76	10.76
LH_B00060_N	-	9.01	9.01
LH_B00070_N	-	10.76	10.77
LH_B00080_N	12.86	10.38	10.38
LH_B00090_N	10.52	9.86	9.86

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_C00010_N	8.36	9.07	9.07
LH_C00020_N	-	14.59	14.60
LH_C00030_N	15.91	14.66	14.66
LH_C00040_N	15.52	15.55	15.54
LH_C00050_N	15.11	12.93	12.97
LH_C00060_N	-	10.69	10.77
LH_C00070_N	15.14	11.74	11.78
LH_C00090_N	13.66	14.13	14.23
LH_C00100_N	15.39	14.13	14.22
LH_C00110_N	12.68	14.13	14.23
LH_C00120_N	-	11.79	11.79
LH_C00130_N	8.89	9.10	9.10
LH_C00140_N	9.21	9.12	9.12
LH_C00150_N	7.26	9.13	9.13
LH_C00160_N	9.35	9.19	9.19
LH_C00170_N	-	11.30	11.31
LH_C00180_N	10.14	11.29	11.29
LH_C00190_N	14.67	11.30	11.30
LH_C00200_N	13.07	12.42	12.42
LH_C00210_N	-	12.48	12.49
LH_C00220_N	6.86	9.13	9.13
LH_C00230_N	7.42	9.13	9.13
LH_C00240_N	8.39	9.12	9.12
LH_C00250_N	7.53	9.09	9.09
LH_C00260_N	7.73	9.01	9.01
LH_C00270_N	7.98	9.01	9.01
LH_C00280_N	7.97	9.08	9.08
LH_C00290_N	7.81	9.08	9.08
LH_C00300_N	7.66	9.10	9.10
LH_C00310_N	7.77	9.12	9.13
LH_C00320_N	7.77	9.13	9.13
LH_C00330_N	7.55	9.13	9.13
LH_C00340_N	7.60	9.13	9.13
LH_C00350_N	7.72	9.13	9.14
LH_C00360_N	10.19	10.92	10.92
LH_D00010_N	10.58	9.00	9.00
LH_D00020_N	10.73	9.09	9.10
LH_D00030_N	7.02	9.15	9.15
LH_D00040_N	9.08	9.72	9.79

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_D00050_N	11.97	10.56	10.61
LH_D00060_N	14.08	11.73	11.73
LH_D00070_N	14.72	12.98	12.98
LH_D00080_N	12.65	12.51	12.51
LH_D00090_N	15.58	13.17	13.17
LH_D00100_N	14.93	13.42	13.42
LH_D00110_N	-	13.97	13.97
LH_E00010_N	9.01	9.05	9.05
LH_E00020_N	7.44	9.10	9.11
LH_E00030_N	7.28	9.11	9.11
LH_E00040_N	-	9.11	9.12
LH_E00050_N	14.93	12.09	12.10
LH_E00060_N	12.19	11.61	11.64
LH_E00070_N	13.94	12.95	12.96
LH_E00080_N	15.03	13.13	13.12
LH_E00090_N	15.27	14.45	14.45
LH_E00100_N	15.62	14.92	14.93
LH_E00110_N	16.00	15.48	15.48
LH_E00120_N	6.63	9.09	9.09
LH_E00130_N	7.57	9.12	9.12
LH_E00140_N	7.41	9.09	9.09
LH_E00150_N	7.09	9.09	9.09
LH_E00160_N	9.21	11.37	11.37
LH_E00170_N	16.81	13.43	13.45
LH_E00180_N	-	13.42	13.45
LH_E00190_N	11.86	13.42	13.45
LH_E00200_N	13.60	13.96	13.99
LH_E00210_N	-	15.02	15.02
LH_E00220_N	14.93	14.90	14.92
LH_E00230_N	-	15.87	15.89
LH_E00240_N	18.75	16.40	16.42
LH_E00250_N	27.61	19.11	19.14
LH_E00260_N	-	30.90	32.68
LH_E00270_N	38.02	34.00	34.12
LH_E00280_N	15.33	15.64	15.64
LH_E00290_N	21.08	16.73	16.74
LH_E00300_N	16.61	15.92	15.93
LH_E00310_N	17.65	15.99	16.00
LH_E00320_N	17.57	16.84	16.84

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_E00330_N	21.30	21.20	21.21
LH_E00340_N	16.43	16.39	16.61
LH_E00350_N	17.69	17.54	17.57
LH_E00360_N	20.77	21.10	21.12
LH_E00370_N	-	14.33	14.34
LH_E00380_N	-	15.88	15.89
LH_E00390_N	-	16.35	16.36
LH_E00400_N	-	19.17	19.17
LH_E00410_N	-	19.01	19.02
LH_E00420_N	-	19.35	19.38
LH_E00430_N	-	16.03	16.04
LH_E00440_N	-	18.96	18.97
LH_E00450_N	15.95	14.80	14.81
LH_E00460_N	-	19.11	19.13
LH_E00470_N	-	20.16	20.17
LH_E00480_N	-	22.63	22.64
LH_E00490_N	-	34.09	34.21
LH_E00500_N	6.66	9.09	9.09
LH_E00510_N	6.67	9.09	9.09
LH_E00520_N	6.68	9.08	9.08
LH_E00525_N	-	9.09	9.09
LH_E00530_N	6.62	9.08	9.08
LH_E00540_N	7.00	9.09	9.09
LH_E00550_N	9.44	11.05	11.08
LH_E00560_N	14.77	12.05	12.06
LH_E00570_N	-	12.18	12.19
LH_E00580_N	16.17	17.57	17.63
LH_E00590_N	30.94	29.12	29.20
LH_E00600_N	-	29.14	29.22
LH_E00610_N	31.14	30.68	30.74
LH_E00620_N	30.27	29.15	29.23
LH_E00630_N	33.73	33.51	33.53
LH_F00010_N	9.49	9.01	9.01
LH_F00020_N	7.34	9.02	9.02
LH_F00030_N	13.83	13.63	13.68
LH_F00040_N	16.37	17.15	17.25
LH_F00050_N	28.04	28.54	28.59
LH_F00060_N	-	11.52	11.54
LH_F00070_N	13.41	11.56	11.58

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_F00080_N	19.67	13.39	13.40
LH_F00090_N	-	13.08	13.09
LH_F00100_N	15.53	14.16	14.17
LH_F00110_N	18.15	14.75	14.76
LH_F00120_N	-	15.59	15.59
LH_F00130_N	20.46	20.17	20.21
LH_F00140_N	20.77	21.98	22.02
LH_F00150_N	22.53	21.98	22.02
LH_F00160_N	26.64	22.68	22.70
LH_F00170_N	33.82	32.56	32.58
LH_F00180_N	29.35	23.56	23.60
LH_F00190_N	-	9.13	9.16
LH_F00200_N	12.66	10.40	10.42
LH_F00210_N	13.23	10.42	10.44
LH_F00220_N	14.92	12.46	12.50
LH_F00230_N	15.50	13.44	13.46
LH_F00240_N	18.33	16.28	16.34
LH_F00250_N	23.46	20.34	20.38
LH_F00260_N	21.20	20.48	20.49
LH_F00270_N	21.48	22.32	22.40
LH_F00280_N	35.05	35.30	35.39
LH_F00290_N	38.42	35.67	35.80
LH_F00300_N	10.93	9.08	9.10
LH_F00310_N	14.25	10.41	10.44
LH_F00320_N	12.98	10.48	10.48
LH_F00330_N	14.92	11.09	11.15
LH_F00340_N	-	11.20	11.27
LH_F00350_N	14.14	11.87	11.99
LH_F00360_N	-	18.80	18.81
LH_F00370_N	23.09	20.99	21.00
LH_F00380_N	22.25	21.04	21.05
LH_F00390_N	21.46	22.32	22.40
LH_F00400_N	35.50	24.10	24.12
LH_F00410_N	-	14.48	14.58
LH_F00420_N	-	21.03	21.04
LH_F00430_N	20.94	21.03	21.04
LH_F00440_N	21.26	21.35	21.36
LH_F00450_N	21.44	21.56	21.57
LH_F00460_N	-	19.43	19.53

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_F00470_N	-	21.66	21.70
LH_F00480_N	26.95	24.19	24.26
LH_F00490_N	28.21	25.45	25.54
LH_F00500_N	24.77	24.96	24.99
LH_F00510_N	36.04	32.67	32.75
LH_F00520_N	28.87	24.98	25.02
LH_F00530_N	34.41	32.32	32.38
LH_F00540_N	36.12	36.57	36.77
LH_F00550_N	32.95	29.96	31.70
LH_F00560_N	-	31.71	32.06
LH_F00570_N	38.70	35.86	35.95
LH_F00580_N	33.11	30.34	31.72
LH_F00590_N	32.38	32.35	32.83
LH_F00600_N	44.22	32.35	32.83
LH_F00610_N	43.33	38.76	41.00
LH_F00620_N	65.49	66.72	66.81
LH_F00630_N	33.78	24.97	25.01
LH_F00640_N	-	39.38	39.43
LH_F00650_N	27.72	25.02	25.03
LH_F00660_N	23.41	25.31	25.47
LH_F00670_N	27.06	25.31	25.47
LH_F00680_N	29.42	25.31	25.47
LH_F00690_N	28.98	25.45	25.47
LH_F00700_N	25.23	26.86	26.87
LH_F00710_N	25.03	25.77	25.84
LH_F00720_N	24.69	25.54	25.57
LH_G00010_N	-	9.01	9.01
LH_G00020_N	-	9.45	9.47
LH_G00030_N	-	10.02	10.05
LH_G00040_N	-	10.27	10.30
LH_G00050_N	11.55	10.07	10.10
LH_G00060_N	-	11.27	11.29
LH_G00070_N	-	12.04	12.04
LH_G00080_N	-	11.28	11.30
LH_G00090_N	15.23	11.42	11.43
LH_G00100_N	13.95	11.59	11.60
LH_G00110_N	-	14.70	14.70
LH_G00120_N	19.63	17.22	17.24
LH_G00130_N	-	12.67	12.72

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_G00140_N	-	17.71	17.73
LH_G00150_N	-	20.91	21.09
LH_G00160_N	23.97	21.32	21.33
LH_G00170_N	-	24.09	24.14
LH_G00180_N	-	22.33	22.43
LH_G00190_N	25.04	22.43	22.45
LH_G00200_N	-	22.56	22.63
LH_G00210_N	25.83	23.37	23.39
LH_G00220_N	27.48	24.46	24.52
LH_G00230_N	-	24.46	24.52
LH_G00240_N	25.71	24.51	24.55
LH_G00250_N	13.51	10.92	10.95
LH_G00260_N	14.04	11.21	11.22
LH_G00270_N	13.88	12.14	12.15
LH_G00280_N	14.36	11.85	11.90
LH_G00290_N	16.85	14.01	14.04
LH_G00300_N	23.45	19.49	19.50
LH_G00310_N	19.16	17.75	17.83
LH_G00320_N	-	18.79	18.99
LH_G00330_N	-	21.41	21.42
LH_G00340_N	25.59	21.00	21.08
LH_G00350_N	-	23.17	23.18
LH_G00360_N	22.81	22.45	22.50
LH_G00370_N	26.85	24.15	24.21
LH_G00380_N	-	10.90	10.93
LH_G00390_N	12.62	9.88	9.91
LH_G00400_N	-	9.86	9.89
LH_G00410_N	-	9.90	9.93
LH_G00420_N	10.34	10.73	10.76
LH_G00430_N	-	10.32	10.37
LH_G00440_N	12.25	10.50	10.55
LH_G00450_N	-	10.72	10.77
LH_G00460_N	-	11.54	11.61
LH_G00470_N	15.57	12.21	12.29
LH_G00480_N	15.13	13.13	13.14
LH_G00490_N	-	13.77	13.82
LH_G00500_N	-	14.98	15.05
LH_G00510_N	16.06	16.02	16.11
LH_G00520_N	16.60	16.06	16.15

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_G00530_N	21.75	17.53	17.54
LH_G00540_N	16.89	16.22	16.28
LH_G00550_N	19.81	17.18	17.23
LH_G00560_N	24.46	18.73	18.77
LH_G00570_N	20.83	18.73	18.78
LH_G00580_N	-	18.53	19.09
LH_G00590_N	23.77	20.30	20.33
LH_G00600_N	22.35	20.37	20.41
LH_G00610_N	23.96	21.41	21.47
LH_G00620_N	25.09	21.72	21.76
LH_G00630_N	-	22.39	22.44
LH_G00640_N	-	21.78	21.83
LH_G00650_N	-	22.39	22.44
LH_G00660_N	24.70	22.91	22.95
LH_G00670_N	25.96	23.64	23.67
LH_G00680_N	26.28	24.20	24.21
LH_G00690_N	26.33	24.35	24.36
LH_G00700_N	20.57	20.17	20.20
LH_G00710_N	-	21.72	21.75
LH_G00720_N	-	21.75	21.78
LH_G00730_N	24.69	22.16	22.18
LH_G00740_N	21.63	23.07	23.10
LH_G00750_N	-	23.87	23.88
LH_G00760_N	24.01	23.92	23.93
LH_G00770_N	23.64	23.96	23.97
LH_G00780_N	-	24.11	24.13
LH_G00790_N	16.36	17.33	17.41
LH_G00800_N	16.51	18.00	18.06
LH_G00810_N	20.45	21.67	21.70
LH_G00820_N	21.05	21.78	21.81
LH_G00830_N	12.54	9.00	9.00
LH_G00840_N	9.48	9.01	9.01
LH_G00850_N	14.32	9.02	9.02
LH_G00860_N	-	9.01	9.01
LH_H00010_N	-	9.00	9.00
LH_H00020_N	-	9.08	9.10
LH_H00030_N	11.34	9.22	9.27
LH_H00040_N	-	9.93	9.97
LH_H00050_N	12.03	10.47	10.52

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_H00060_N	12.12	10.16	10.21
LH_H00070_N	11.16	10.38	10.44
LH_H00080_N	11.33	10.49	10.55
LH_H00090_N	13.34	11.01	11.07
LH_H00100_N	-	13.78	13.82
LH_H00110_N	-	15.07	15.15
LH_H00120_N	15.78	16.00	16.09
LH_H00130_N	14.70	15.33	15.36
LH_H00140_N	-	15.34	15.39
LH_H00150_N	13.55	10.97	11.00
LH_H00160_N	-	10.99	11.02
LH_H00170_N	-	11.08	11.11
LH_H00180_N	14.36	11.62	11.69
LH_H00190_N	-	11.88	11.93
LH_H00200_N	13.22	15.54	15.57
LH_H00210_N	14.35	16.02	16.04
LH_H00220_N	14.27	15.98	16.00
LH_H00230_N	14.41	15.97	15.99
LH_H00240_N	14.67	15.97	15.99
LH_H00260_N	-	16.11	16.13
LH_H00270_N	-	16.32	16.34
LH_H00280_N	-	17.33	17.34
LH_H00290_N	-	16.57	16.60
LH_H00300_N	-	19.49	19.49
LH_H00310_N	-	21.71	21.73
LH_H00320_N	-	16.88	16.91
LH_H00330_N	-	10.76	11.32
LH_H00340_N	-	10.76	11.32
LH_H00350_N	-	18.08	18.12
LH_H00360_N	-	18.17	18.21
LH_H00370_N	22.47	18.17	18.22
LH_H00380_N	22.61	20.07	20.09
LH_H00390_N	-	18.18	18.22
LH_H00400_N	-	18.18	18.22
LH_H00410_N	-	20.39	20.40
LH_H00420_N	-	20.54	20.56
LH_H00430_N	14.40	16.12	16.15
LH_H00440_N	14.37	16.15	16.18
LH_H00450_N	14.69	16.25	16.27

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_H00460_N	16.61	18.47	18.51
LH_H00470_N	17.10	19.07	19.16
LH_H00480_N	17.57	19.09	19.18
LH_H00490_N	19.55	20.16	20.19
LH_H00500_N	22.04	19.49	19.57
LH_H00510_N	19.75	20.65	20.70
LH_H00520_N	22.86	20.75	20.77
LH_H00530_N	21.89	22.47	22.49
LH_H00540_N	22.18	23.04	23.05
LH_H00550_N	25.45	23.36	23.38
LH_H00560_N	27.38	26.17	26.18
LH_H00570_N	26.12	26.59	26.62
LH_H00580_N	25.54	26.86	26.88
LH_H00590_N	29.55	27.11	27.14
LH_H00600_N	-	18.51	18.54
LH_H00610_N	-	19.76	19.80
LH_H00620_N	-	20.79	20.82
LH_H00630_N	21.28	21.12	21.17
LH_H00640_N	-	21.95	22.07
LH_H00650_N	-	21.99	22.12
LH_H00660_N	-	20.65	20.67
LH_H00670_N	-	23.46	23.50
LH_H00680_N	-	23.47	23.50
LH_H00690_N	-	22.18	22.24
LH_H00700_N	-	22.26	22.31
LH_H00710_N	23.67	22.93	22.94
LH_H00720_N	27.17	24.29	24.30
LH_H00730_N	26.06	24.49	24.50
LH_H00740_N	-	22.64	22.68
LH_H00750_N	-	23.50	23.53
LH_H00760_N	26.77	23.47	23.51
LH_H00770_N	-	23.84	23.89
LH_H00780_N	-	22.80	22.85
LH_H00790_N	-	22.79	22.84
LH_H00800_N	-	22.81	22.86
LH_H00810_N	-	24.65	24.79
LH_H00820_N	-	24.70	24.81
LH_H00830_N	-	23.50	23.53
LH_H00840_N	-	23.84	23.85

Table C-1

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition Node Peak Stages (feet, NAVD 88)

Node	Warning Stage (ft)	Design Storm Simulation	
		100-YR / 24-HR	100-YR / 96-HR
LH_H00850_N	-	24.50	24.50
LH_H00860_N	-	24.01	24.06
LH_H00870_N	26.73	25.66	25.78
LH_H00880_N	29.31	26.33	26.35
LH_H00890_N	27.98	25.79	25.84
LH_H00900_N	-	25.61	25.72
LH_H00910_N	-	25.40	25.50
LH_H00920_N	-	25.57	25.68
LH_H00930_N	-	25.60	25.60
LH_H00940_N	-	25.17	25.21
LH_H00950_N	-	26.26	26.29
LH_H00960_N	-	25.00	25.00
LH_H00970_N	-	25.14	25.18
LH_H00980_N	-	25.12	25.15
LH_H00990_N	-	25.48	25.49
LH_H01000_N	-	25.91	25.93
LH_I00010_N	9.69	9.00	9.00
LH_I00020_N	-	9.00	9.00
LH_I00030_N	10.79	9.01	9.01
LH_I00040_N	12.09	9.01	9.01
LH_I00050_N	13.92	9.01	9.02
LH_I00060_N	13.06	9.23	9.28
LH_I00070_N	10.42	9.01	9.01
LH_I00080_N	15.17	11.12	11.13
LH_J00010_N	-	9.24	9.24
LH_J00020_N	17.50	11.45	11.46
LH_J00030_N	-	12.40	12.40
LH_J00040_N	-	14.14	14.15
LH_J00050_N	15.55	15.25	15.30
LH_J00060_N	16.74	15.91	15.97
LH_J00065_N	-	16.03	16.08
LH_J00070_N	-	16.03	16.08
LH_J00080_N	22.94	18.43	18.43
LH_J00090_N	16.46	17.72	17.73
LH_J00100_N	17.61	11.91	11.93
LH_J00110_N	-	14.74	14.76

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00010_C	33.62	0.00	35.56	0.00
LH_A00010_W1	26.15	-0.04	26.78	-0.04
LH_A00010_W2	8.95	-0.02	9.16	-0.02
LH_A00010_W3	0.00	0.00	0.00	0.00
LH_A00010_W4	0.00	0.00	0.00	0.00
LH_A00010_W5	0.00	0.00	0.00	0.00
LH_A00020_C	0.08	0.00	0.07	0.00
LH_A00020_W1	19.66	-0.01	20.40	-0.01
LH_A00020_W2	0.00	0.00	0.00	0.00
LH_A00020_W3	0.00	0.00	0.00	0.00
LH_A00030_C	2.41	0.00	2.53	0.00
LH_A00030_W1	13.07	0.00	13.76	0.00
LH_A00030_W2	0.15	-0.06	0.22	-0.06
LH_A00030_W3	0.00	0.00	0.00	0.00
LH_A00030_W4	0.00	0.00	0.00	0.00
LH_A00040_W	86.54	0.00	91.15	0.00
LH_A00050_C	4.06	-0.02	4.47	-0.02
LH_A00050_W1	3.76	0.00	3.78	0.00
LH_A00050_W2	0.00	0.00	0.00	0.00
LH_A00050_W3	0.00	0.00	0.00	0.00
LH_A00060_C	0.01	-1.17	0.01	-1.25
LH_A00060_W1	22.79	0.00	24.04	0.00
LH_A00060_W2	0.49	-0.01	0.51	0.00
LH_A00060_W3	0.01	-0.31	0.01	-0.29
LH_A00060_W4	0.00	0.00	0.00	0.00
LH_A00060_W5	0.00	0.00	0.00	0.00
LH_A00070_C	0.01	0.00	0.01	0.00
LH_A00070_W1	31.96	0.00	33.78	0.00
LH_A00070_W2	0.01	0.00	0.01	0.00
LH_A00070_W3	0.00	0.00	0.00	0.00
LH_A00080_C	3.84	0.00	3.91	0.00
LH_A00080_W1	1.61	0.00	1.67	0.00
LH_A00080_W2	2.34	0.00	2.40	0.00
LH_A00080_W3	0.00	-0.02	0.00	-0.02
LH_A00080_W4	0.00	0.00	0.00	0.00
LH_A00080_W5	0.00	0.00	0.00	0.00
LH_A00090_P1	0.03	-0.01	0.03	-0.01
LH_A00090_P2	0.03	-0.01	0.03	-0.01
LH_A00090_P3	0.03	-0.01	0.03	-0.01

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00090_P4	0.03	-0.01	0.03	-0.01
LH_A00090_W1	7.73	0.00	8.15	0.00
LH_A00090_W2	0.00	0.00	0.00	0.00
LH_A00090_W3	0.00	0.00	0.00	0.00
LH_A00100_P1	1.64	0.00	1.64	0.00
LH_A00100_P2	1.70	0.00	1.70	0.00
LH_A00100_W1	29.25	0.00	29.24	0.00
LH_A00100_W2	0.00	0.00	0.00	0.00
LH_A00100_W3	0.00	-7.41	0.00	-7.48
LH_A00100_W4	0.00	0.00	0.00	0.00
LH_A00100_W5	6.17	0.00	6.14	0.00
LH_A00110_P1	13.03	0.00	13.05	0.00
LH_A00110_P2	13.05	0.00	13.07	0.00
LH_A00110_W1	0.00	0.00	0.00	0.00
LH_A00110_W2	0.00	0.00	0.00	0.00
LH_A00110_W3	20.55	0.00	20.65	0.00
LH_A00110_W4	5.27	-15.31	5.98	-15.62
LH_A00120_C	27.82	0.00	28.31	0.00
LH_A00120_W1	0.89	0.00	0.89	0.00
LH_A00120_W2	0.00	0.00	0.00	0.00
LH_A00120_W3	0.00	0.00	0.00	0.00
LH_A00130_P1	13.49	0.00	13.50	0.00
LH_A00130_P2	12.99	0.00	13.00	0.00
LH_A00130_W1	0.00	0.00	0.00	0.00
LH_A00130_W2	0.00	0.00	0.00	0.00
LH_A00130_W3	10.90	0.00	10.87	0.00
LH_A00140_C	35.53	0.00	35.35	0.00
LH_A00140_W1	0.00	0.00	0.00	0.00
LH_A00140_W2	24.57	0.00	24.53	0.00
LH_A00140_W3	1.73	0.00	1.72	0.00
LH_A00150_P1	24.77	0.00	24.65	0.00
LH_A00150_P2	21.98	0.00	21.98	0.00
LH_A00150_W1	0.80	0.00	0.54	0.00
LH_A00150_W2	0.00	0.00	0.00	0.00
LH_A00160_C	44.58	0.00	44.66	0.00
LH_A00160_W1	0.10	0.00	0.04	0.00
LH_A00160_W2	0.00	0.00	0.00	-0.04
LH_A00160_W3	0.00	0.00	0.00	0.00
LH_A00170_C	43.42	0.00	43.55	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00170_W1	0.64	0.00	0.49	0.00
LH_A00170_W2	0.00	0.00	0.00	0.00
LH_A00170_W3	0.00	0.00	0.00	0.00
LH_A00170_W4	4.98	0.00	4.58	0.00
LH_A00180_C	43.41	0.00	43.03	0.00
LH_A00180_W1	0.00	0.00	0.00	0.00
LH_A00180_W2	0.00	0.00	0.00	0.00
LH_A00180_W3	0.00	0.00	0.00	0.00
LH_A00180_W4	0.00	0.00	0.00	0.00
LH_A00190_P	40.24	0.00	40.11	0.00
LH_A00190_W1	0.00	0.00	0.00	0.00
LH_A00190_W2	0.00	0.00	0.00	0.00
LH_A00190_W3	0.00	0.00	0.00	0.00
LH_A00190_W4	3.28	0.00	3.12	0.00
LH_A00190_W5	0.02	0.00	0.01	0.00
LH_A00200_C	11.93	0.00	11.90	0.00
LH_A00200_W1	4.73	-0.01	5.28	-0.01
LH_A00200_W2	0.27	0.00	0.31	0.00
LH_A00210_C	5.14	-0.04	6.79	-0.04
LH_A00210_W	18.13	0.00	19.09	0.00
LH_A00220_C	9.37	-0.01	13.34	-0.01
LH_A00220_W1	52.62	0.00	56.31	0.00
LH_A00220_W2	2.18	-0.01	3.04	-0.01
LH_A00220_W3	0.05	-17.18	0.02	-24.16
LH_A00230_C	33.67	-0.05	44.14	-0.01
LH_A00230_W	545.91	0.00	647.92	0.00
LH_A00240_C	24.47	0.00	29.39	0.00
LH_A00240_W	14.48	0.00	17.50	0.00
LH_A00250_C	30.70	0.00	36.72	0.00
LH_A00250_W1	86.70	0.00	99.37	0.00
LH_A00250_W2	7.34	0.00	8.91	0.00
LH_A00260_C	89.85	-0.03	101.88	-0.01
LH_A00260_W1	96.88	0.00	117.23	0.00
LH_A00260_W2	32.98	0.00	42.01	0.00
LH_A00270_C	65.41	-0.01	71.08	0.00
LH_A00270_W1	0.00	0.00	0.00	0.00
LH_A00270_W2	65.34	-0.01	76.07	0.00
LH_A00280_C	130.25	-0.02	146.81	-0.01
LH_A00280_W	74.48	0.00	91.22	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00290_P1	39.80	0.00	40.87	0.00
LH_A00290_P2	39.67	0.00	40.74	0.00
LH_A00290_W	0.03	0.00	0.27	0.00
LH_A00300_C	160.63	0.00	196.14	0.00
LH_A00300_W1	39.02	0.00	52.34	0.00
LH_A00300_W2	471.69	0.00	606.05	0.00
LH_A00300_W3	1.06	-37.41	1.09	-62.85
LH_A00310_C	287.09	0.00	321.82	0.00
LH_A00310_W1	0.00	0.00	0.00	0.00
LH_A00310_W2	350.21	0.00	472.92	0.00
LH_A00310_W3	0.00	0.00	0.27	0.00
LH_A00310_W4	0.00	0.00	0.00	-0.40
LH_A00310_W5	0.00	0.00	0.00	0.00
LH_A00320_C	483.15	0.00	522.36	0.00
LH_A00320_W1	0.00	0.00	0.00	0.00
LH_A00320_W2	152.57	0.00	271.00	0.00
LH_A00320_W3	0.00	0.00	0.00	0.00
LH_A00320_W4	0.00	0.00	0.00	0.00
LH_A00320_W5	0.00	0.00	0.00	0.00
LH_A00320_W6	0.00	0.00	0.00	0.00
LH_A00320_W7	0.00	0.00	0.00	0.00
LH_A00330_W1	0.00	0.00	0.00	0.00
LH_A00330_W2	448.54	0.00	527.24	0.00
LH_A00330_W3	6.51	-103.60	0.93	-135.92
LH_A00330_W4	0.00	0.00	0.00	0.00
LH_A00330_W5	0.00	0.00	0.00	0.00
LH_A00330_W6	0.08	-38.28	0.05	-53.25
LH_A00330_W7	0.00	0.00	0.00	0.00
LH_A00330_W8	2.24	-84.34	1.85	-106.69
LH_A00360_P	77.02	-0.01	84.50	-0.01
LH_A00360_W1	21.33	0.00	35.10	0.00
LH_A00360_W2	0.00	-81.30	0.00	-114.40
LH_A00360_W3	0.00	-564.33	0.00	-667.09
LH_A00360_W4	1041.81	0.00	1240.38	0.00
LH_A00360_W5	47.87	0.00	71.25	0.00
LH_A00370_C	358.93	0.00	394.50	0.00
LH_A00380_W1	143.74	0.00	202.93	0.00
LH_A00380_W2	20.68	-56.99	19.89	-73.04
LH_A00380_W3	0.00	-85.31	0.00	-122.75

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00380_W4	0.00	0.00	0.00	-6.58
LH_A00380_W5	1.01	0.00	5.40	0.00
LH_A00390_C	516.03	0.00	535.37	-0.01
LH_A00400_C	637.29	-0.01	718.14	-0.01
LH_A00410_C	513.31	0.00	529.59	0.00
LH_A00410_W1	0.11	0.00	5.41	0.00
LH_A00410_W2	123.46	0.00	194.92	0.00
LH_A00410_W3	0.00	-357.74	0.00	-431.30
LH_A00410_W4	0.00	-0.28	0.00	-1.39
LH_A00410_W5	0.00	0.00	0.00	0.00
LH_A00420_C	276.36	0.00	294.36	0.00
LH_A00430_C	362.26	0.00	366.01	0.00
LH_A00430_W1	273.32	0.00	362.74	0.00
LH_A00430_W2	0.00	0.00	0.30	0.00
LH_A00440_C	368.86	0.00	375.85	0.00
LH_A00440_W	255.11	0.00	338.86	0.00
LH_A00450_C	542.65	0.00	600.05	0.00
LH_A00450_W	70.02	0.00	95.70	0.00
LH_A00460_C	359.27	-0.01	373.41	0.00
LH_A00460_W	251.88	0.00	326.82	0.00
LH_A00470_P	5.91	0.00	5.69	-0.99
LH_A00470_W1	166.20	0.00	242.07	0.00
LH_A00470_W2	5.91	-196.16	8.02	-285.12
LH_A00470_W3	0.00	0.00	0.34	0.00
LH_A00470_W4	27.08	0.00	40.07	-0.09
LH_A00480_C	543.80	0.00	579.38	0.00
LH_A00480_W	39.75	0.00	81.86	0.00
LH_A00490_C	420.36	-0.03	424.97	0.00
LH_A00490_W1	200.57	0.00	305.25	0.00
LH_A00490_W2	0.00	-417.20	0.00	-503.01
LH_A00500_P	16.65	-25.56	15.13	-26.49
LH_A00500_W1	25.54	-7.01	33.86	-5.98
LH_A00500_W2	0.00	0.00	0.00	0.00
LH_A00500_W3	0.37	-34.05	0.34	-49.42
LH_A00510_P	9.39	-10.53	8.04	-10.91
LH_A00510_W1	99.87	-0.07	125.71	0.00
LH_A00510_W10	0.00	-158.38	0.00	-155.35
LH_A00510_W2	81.58	-0.12	106.31	-0.39
LH_A00510_W3	0.00	-3.62	0.00	-10.09

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00510_W4	14.42	-30.01	21.71	-24.69
LH_A00510_W5	0.00	0.00	0.00	0.00
LH_A00510_W6	0.00	-18.63	0.00	-24.41
LH_A00510_W7	0.00	-19.47	0.00	-27.80
LH_A00510_W8	0.00	-9.40	0.00	-13.28
LH_A00510_W9	132.82	-17.75	117.11	-20.12
LH_A00520_C	202.93	-0.06	218.28	-0.02
LH_A00520_W1	91.61	0.00	107.87	0.00
LH_A00520_W2	0.00	-89.25	0.00	-103.24
LH_A00530_C	174.52	-0.01	175.46	0.00
LH_A00540_C	84.72	0.00	90.81	0.00
LH_A00540_W1	192.35	0.00	222.19	0.00
LH_A00540_W2	0.00	-69.14	0.00	-50.33
LH_A00540_W3	0.00	-207.35	0.00	-153.93
LH_A00550_C	109.53	0.00	94.61	0.00
LH_A00560_C	115.11	0.00	89.89	0.00
LH_A00560_W1	18.17	0.00	22.34	0.00
LH_A00560_W2	0.00	-8.58	0.00	-10.85
LH_A00560_W3	76.52	-28.69	88.89	-51.37
LH_A00570_C	247.41	0.00	225.14	0.00
LH_A00580_P	12.27	-15.10	11.27	-15.21
LH_A00580_W1	0.00	0.00	0.00	0.00
LH_A00580_W2	0.00	-112.58	0.00	-129.77
LH_A00580_W3	0.00	0.00	0.00	0.00
LH_A00580_W4	0.00	-391.43	0.00	-483.41
LH_A00580_W5	0.00	0.00	0.00	0.00
LH_A00590_W1	84.37	0.00	82.67	0.00
LH_A00590_W2	0.00	0.00	0.00	0.00
LH_A00590_W3	0.00	0.00	0.00	0.00
LH_A00590_W4	0.00	0.00	0.00	0.00
LH_A00590_W5	0.00	0.00	0.00	0.00
LH_A00590_W6	0.00	0.00	0.00	0.00
LH_A00600_C	158.91	0.00	123.71	0.00
LH_A00600_W	37.40	0.00	30.00	0.00
LH_A00610_C	193.64	0.00	152.67	0.00
LH_A00610_W1	124.64	0.00	143.21	0.00
LH_A00610_W2	0.00	0.00	0.00	0.00
LH_A00610_W3	0.00	0.00	0.00	0.00
LH_A00620_P1	23.06	-44.49	13.07	-47.24

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00620_P2	23.06	-44.49	13.07	-47.24
LH_A00620_P3	23.06	-44.49	13.07	-47.24
LH_A00620_W	0.00	0.00	0.00	0.00
LH_A00630_C	189.02	-0.03	233.20	-0.01
LH_A00630_W	130.76	0.00	188.42	0.00
LH_A00640_P	64.74	-0.04	64.82	-0.01
LH_A00640_W1	0.00	0.00	0.00	0.00
LH_A00640_W2	2.49	0.00	4.74	0.00
LH_A00650_C	103.37	-0.02	101.97	-0.01
LH_A00650_W1	3.12	0.00	7.04	0.00
LH_A00650_W2	0.00	0.00	0.00	0.00
LH_A00660_P	68.24	0.00	68.84	0.00
LH_A00660_W	1.41	0.00	5.48	0.00
LH_A00670_C	69.70	0.00	74.37	0.00
LH_A00670_W	0.00	0.00	0.00	0.00
LH_A00680_P	57.59	0.00	58.03	0.00
LH_A00680_W1	0.00	0.00	0.00	0.00
LH_A00680_W2	11.71	0.00	15.72	0.00
LH_A00680_W3	0.00	-0.51	0.00	-0.91
LH_A00690_C	69.30	0.00	73.09	0.00
LH_A00690_W	23.89	0.00	36.54	0.00
LH_A00700_C	71.56	0.00	75.33	0.00
LH_A00700_W1	215.75	0.00	297.64	0.00
LH_A00700_W2	6.94	0.00	7.99	0.00
LH_A00700_W3	0.00	-70.60	0.00	-95.71
LH_A00710_P1	30.25	-2.49	20.91	0.00
LH_A00710_P2	30.25	-2.49	20.91	0.00
LH_A00720_W	199.41	0.00	192.00	0.00
LH_A00730_W1	0.00	0.00	0.00	0.00
LH_A00730_W2	111.08	0.00	117.12	0.00
LH_A00730_W3	21.37	0.00	26.14	0.00
LH_A00740_C	268.02	0.00	274.36	0.00
LH_A00740_W1	0.00	0.00	0.00	0.00
LH_A00740_W2	0.00	0.00	0.00	0.00
LH_A00740_W3	0.00	0.00	0.00	0.00
LH_A00740_W4	0.00	0.00	0.00	0.00
LH_A00750_C	293.53	0.00	306.84	0.00
LH_A00750_W1	0.00	0.00	0.00	0.00
LH_A00750_W2	0.00	0.00	0.00	-0.07

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00750_W3	0.00	0.00	0.00	0.00
LH_A00760_C	292.42	0.00	305.61	0.00
LH_A00760_W1	26.27	0.00	37.17	0.00
LH_A00760_W2	197.17	-0.27	258.92	0.00
LH_A00760_W3	20.73	-66.51	92.57	-64.71
LH_A00760_W4	0.00	0.00	0.00	0.00
LH_A00760_W5	0.00	0.00	0.00	0.00
LH_A00770_W1	356.25	0.00	423.19	0.00
LH_A00770_W2	0.00	0.00	0.00	0.00
LH_A00770_W3	0.00	0.00	0.00	0.00
LH_A00770_W4	0.00	0.00	0.00	0.00
LH_A00780_W1	133.95	0.00	140.41	0.00
LH_A00780_W2	0.00	0.00	0.00	0.00
LH_A00790_W1	68.49	0.00	71.65	0.00
LH_A00790_W2	0.00	0.00	0.00	0.00
LH_A00790_W3	0.00	0.00	0.00	0.00
LH_A00800_C	24.70	-0.11	24.02	-0.03
LH_A00800_W1	0.00	0.00	0.00	0.00
LH_A00800_W2	7.72	0.00	7.85	0.00
LH_A00810_C	25.67	0.00	26.52	0.00
LH_A00810_W1	0.00	0.00	0.00	0.00
LH_A00810_W2	0.00	0.00	0.00	0.00
LH_A00820_P	24.19	0.00	24.53	0.00
LH_A00820_W1	0.00	0.00	0.00	0.00
LH_A00820_W2	0.00	0.00	0.00	0.00
LH_A00820_W3	0.00	0.00	0.00	0.00
LH_A00830_C	23.12	0.00	23.29	0.00
LH_A00830_W	0.00	0.00	0.00	0.00
LH_A00840_P	21.68	0.00	21.70	0.00
LH_A00840_W	0.00	0.00	0.00	0.00
LH_A00850_W1	0.00	0.00	0.00	0.00
LH_A00850_W2	18.96	0.00	20.65	0.00
LH_A00850_W3	54.65	0.00	57.10	0.00
LH_A00850_W4	0.00	0.00	0.00	0.00
LH_A00850_W5	1.82	-1.55	1.61	-1.83
LH_A00850_W6	0.00	-4.65	0.00	-5.84
LH_A00850_W7	5.37	0.00	5.99	0.00
LH_A00850_W8	0.00	0.00	0.00	0.00
LH_A00860_C	22.54	0.00	22.60	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00860_W1	0.00	0.00	0.00	0.00
LH_A00860_W2	1.97	-1.30	2.12	-1.15
LH_A00860_W3	0.00	0.00	0.00	0.00
LH_A00870_P	23.71	0.00	23.87	0.00
LH_A00870_W	0.00	0.00	0.00	0.00
LH_A00880_C	27.51	0.00	28.93	0.00
LH_A00880_W1	0.00	0.00	0.00	0.00
LH_A00880_W2	0.00	0.00	0.00	0.00
LH_A00890_W1	26.75	0.00	28.51	0.00
LH_A00890_W2	5.94	0.00	6.28	0.00
LH_A00900_C	24.97	0.00	25.73	0.00
LH_A00900_W1	0.00	0.00	0.00	0.00
LH_A00900_W2	0.00	0.00	0.00	0.00
LH_A00910_P	24.78	0.00	25.52	0.00
LH_A00910_W1	0.00	0.00	0.00	0.00
LH_A00910_W2	0.00	0.00	0.00	0.00
LH_A00910_W3	0.00	0.00	0.00	0.00
LH_A00910_W4	0.00	0.00	0.00	0.00
LH_A00910_W5	0.00	0.00	0.00	0.00
LH_A00910_W6	0.51	0.00	5.87	0.00
LH_A00910_W7	0.00	0.00	0.00	0.00
LH_A00910_W8	0.00	0.00	0.00	0.00
LH_A00920_P	23.76	0.00	24.01	0.00
LH_A00920_W1	0.00	0.00	0.03	0.00
LH_A00920_W2	0.00	0.00	0.00	0.00
LH_A00920_W3	4.79	0.00	11.09	0.00
LH_A00920_W4	0.00	0.00	0.00	0.00
LH_A00920_W5	0.00	0.00	0.00	0.00
LH_A00920_W6	0.00	0.00	0.00	0.00
LH_A00930_W1	0.00	0.00	0.00	0.00
LH_A00930_W2	0.00	0.00	0.00	0.00
LH_A00940_W1	0.00	0.00	1.42	0.00
LH_A00940_W2	0.00	0.00	0.00	0.00
LH_A00950_W1	847.51	0.00	1000.25	0.00
LH_A00950_W2	348.97	-0.05	423.63	-0.02
LH_A00950_W3	0.00	-38.06	0.00	-37.63
LH_A00960_W1	70.02	0.00	71.42	0.00
LH_A00960_W2	130.12	0.00	133.12	0.00
LH_A00960_W3	0.00	-176.31	0.00	-180.01

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A00970_W1	0.00	0.00	0.00	0.00
LH_A00970_W2	0.00	0.00	0.00	0.00
LH_A00970_W3	0.00	0.00	0.00	0.00
LH_A00980_W1	1.74	0.00	1.87	0.00
LH_A00980_W2	43.36	0.00	44.05	0.00
LH_A00980_W3	3.34	-3.37	3.44	-9.90
LH_A00980_W4	0.00	0.00	0.00	0.00
LH_A00990_W1	14.18	0.00	14.95	0.00
LH_A00990_W2	8.15	0.00	8.88	0.00
LH_A00990_W3	0.00	0.00	0.00	0.00
LH_A00990_W4	2.80	0.00	3.13	0.00
LH_A01000_W1	0.00	0.00	0.00	0.00
LH_A01000_W2	0.00	0.00	0.00	0.00
LH_A01000_W3	0.00	0.00	0.00	0.00
LH_A01000_W4	81.21	0.00	85.57	0.00
LH_A01000_W5	0.00	-3.23	0.00	-3.42
LH_A01000_W6	0.00	0.00	0.00	0.00
LH_A01010_W1	0.00	0.00	0.00	0.00
LH_A01010_W2	94.35	0.00	111.48	0.00
LH_A01010_W3	0.00	0.00	0.00	0.00
LH_A01010_W4	2.20	-36.94	0.11	-50.01
LH_A01020_W1	35.22	0.00	48.22	0.00
LH_A01020_W2	28.18	0.00	37.89	0.00
LH_A01020_W3	2.77	0.00	4.66	0.00
LH_A01020_W4	0.00	0.00	0.00	0.00
LH_A01020_W5	19.29	-36.07	19.03	-56.03
LH_A01030_W1	259.61	0.00	302.57	0.00
LH_A01030_W2	90.10	-120.05	107.45	-43.83
LH_A01030_W3	0.00	-118.73	0.00	-94.88
LH_A01030_W4	0.00	-169.12	0.00	-189.29
LH_A01030_W5	0.00	-150.10	0.00	-176.60
LH_A01040_W1	0.00	0.00	0.00	0.00
LH_A01040_W2	88.86	0.00	74.62	0.00
LH_A01040_W3	4.69	-0.01	5.28	-0.18
LH_A01040_W4	0.00	-4.87	0.00	-5.18
LH_A01040_W5	17.16	-56.77	4.72	-74.03
LH_A01040_W6	23.91	-15.63	29.32	-16.61
LH_A01050_W	6.95	0.00	7.46	0.00
LH_A01060_W	96.41	0.00	86.41	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A01070_W1	0.00	0.00	0.00	0.00
LH_A01070_W2	0.00	0.00	0.00	0.00
LH_A01070_W3	378.89	0.00	268.36	0.00
LH_A01070_W4	40.69	-269.01	44.24	-154.21
LH_A01080_P1	5.69	0.00	5.67	0.00
LH_A01080_P2	5.69	0.00	5.67	0.00
LH_A01080_W1	354.72	0.00	411.41	0.00
LH_A01080_W2	0.00	-431.64	0.00	-499.64
LH_A01090_W1	54.99	0.00	41.25	0.00
LH_A01090_W2	0.00	-72.91	0.00	-84.92
LH_A01090_W3	68.43	-30.16	77.15	-5.97
LH_A01090_W4	0.00	0.00	0.00	0.00
LH_A01110_W1	12.07	-24.55	5.71	-30.15
LH_A01110_W2	138.83	-327.61	57.38	-383.09
LH_A01120_W1	0.00	0.00	0.03	0.00
LH_A01120_W2	0.00	-14.63	0.00	-15.10
LH_A01120_W3	123.82	-464.20	52.00	-543.79
LH_A01130_W1	14.59	0.00	15.95	0.00
LH_A01130_W2	73.53	0.00	78.32	0.00
LH_A01130_W3	0.00	0.00	0.00	0.00
LH_A01130_W4	0.00	-69.60	0.00	-75.85
LH_A01130_W5	0.00	0.00	0.00	0.00
LH_A01140_W1	795.69	0.00	939.44	0.00
LH_A01140_W2	117.53	-561.25	46.87	-662.80
LH_A01150_W1	139.53	0.00	150.77	0.00
LH_A01150_W2	292.61	0.00	309.07	0.00
LH_A01150_W3	0.00	0.00	0.00	0.00
LH_A01160_W1	0.00	0.00	0.00	0.00
LH_A01160_W2	62.40	0.00	64.18	0.00
LH_A01160_W3	0.00	0.00	0.00	0.00
LH_A01160_W4	0.00	0.00	0.00	0.00
LH_A01160_W5	0.00	0.00	0.00	0.00
LH_A01170_W1	31.20	0.00	31.79	0.00
LH_A01170_W2	0.00	0.00	0.00	0.00
LH_A01180_W1	192.45	0.00	226.17	0.00
LH_A01180_W2	197.43	0.00	240.89	0.00
LH_A01180_W3	0.00	0.00	0.00	0.00
LH_A01190_W1	35.75	0.00	40.31	0.00
LH_A01190_W2	470.89	0.00	504.98	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A01190_W3	0.00	0.00	0.00	0.00
LH_A01200_W1	341.57	0.00	412.11	0.00
LH_A01200_W2	0.00	0.00	0.00	0.00
LH_A01210_W1	171.60	0.00	203.90	0.00
LH_A01210_W2	8.28	0.00	15.99	0.00
LH_A01220_W1	0.00	0.00	0.00	0.00
LH_A01220_W2	84.50	0.00	113.03	0.00
LH_A01220_W3	86.45	0.00	109.82	0.00
LH_A01230_W1	208.06	0.00	216.14	0.00
LH_A01230_W2	0.00	0.00	0.00	0.00
LH_A01230_W3	0.00	0.00	0.00	0.00
LH_A01240_W1	0.00	0.00	0.00	0.00
LH_A01240_W2	119.52	0.00	124.07	0.00
LH_A01250_W1	56.51	0.00	69.52	0.00
LH_A01250_W2	0.00	0.00	0.00	0.00
LH_A01250_W3	123.27	0.00	154.83	0.00
LH_A01250_W4	11.94	0.00	16.11	0.00
LH_A01250_W5	0.00	-120.52	0.00	-152.45
LH_A01260_W1	15.78	0.00	18.81	0.00
LH_A01260_W2	0.00	0.00	0.00	0.00
LH_A01270_W1	3.67	0.00	5.66	0.00
LH_A01270_W2	5.86	0.00	7.73	0.00
LH_A01270_W3	2.60	0.00	3.55	0.00
LH_A01270_W4	151.40	0.00	180.36	0.00
LH_A01270_W5	0.00	0.00	0.00	0.00
LH_A01270_W6	0.00	0.00	0.00	0.00
LH_A01280_W1	172.10	0.00	211.55	0.00
LH_A01280_W2	129.87	0.00	172.01	0.00
LH_A01280_W3	0.00	0.00	0.00	0.00
LH_A01280_W4	0.62	0.00	2.43	0.00
LH_A01280_W5	0.00	0.00	0.00	0.00
LH_A01280_W6	0.00	0.00	0.00	0.00
LH_A01290_W1	0.00	0.00	0.00	0.00
LH_A01290_W2	15.67	0.00	17.55	0.00
LH_A01290_W3	173.90	0.00	180.70	0.00
LH_A01290_W4	71.88	0.00	75.23	0.00
LH_A01290_W5	0.00	-139.29	0.00	-147.06
LH_A01300_W1	60.72	-0.16	63.77	-0.08
LH_A01300_W2	0.00	0.00	0.00	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A01310_W	0.00	0.00	0.00	0.00
LH_A01320_W1	0.00	0.00	0.00	0.00
LH_A01320_W2	58.59	0.00	61.85	0.00
LH_A01330_W1	0.00	0.00	0.00	0.00
LH_A01330_W2	0.00	0.00	0.00	0.00
LH_A01330_W3	34.05	0.00	35.77	0.00
LH_A01340_W1	0.78	0.00	0.85	0.00
LH_A01340_W2	26.29	0.00	28.76	0.00
LH_A01340_W3	0.01	0.00	0.03	0.00
LH_A01350_W1	0.00	0.00	0.00	0.00
LH_A01350_W2	46.04	0.00	49.39	0.00
LH_A01350_W3	0.00	0.00	0.00	0.00
LH_A01350_W4	0.00	0.00	0.00	0.00
LH_A01360_W1	0.00	0.00	0.00	0.00
LH_A01360_W2	106.92	0.00	117.78	0.00
LH_A01360_W3	0.00	-26.19	0.00	-33.14
LH_A01360_W4	0.00	0.00	0.00	0.00
LH_A01360_W5	0.00	0.00	0.00	0.00
LH_A01370_W1	0.00	0.00	0.00	0.00
LH_A01370_W2	41.67	0.00	44.19	0.00
LH_A01370_W3	0.00	0.00	0.00	0.00
LH_A01380_W1	0.00	0.00	0.00	0.00
LH_A01380_W2	27.24	0.00	29.03	0.00
LH_A01380_W3	0.00	0.00	0.00	0.00
LH_A01390_W	18.61	0.00	31.84	0.00
LH_A01400_W	126.66	0.00	140.57	0.00
LH_A01410_P	87.36	0.00	88.96	0.00
LH_A01410_W1	169.02	0.00	192.25	0.00
LH_A01410_W2	168.02	0.00	194.84	0.00
LH_A01410_W3	22.90	0.00	30.25	0.00
LH_A01420_W1	150.62	0.00	169.64	0.00
LH_A01420_W2	377.09	0.00	434.23	0.00
LH_A01430_W1	0.00	0.00	0.00	0.00
LH_A01430_W2	42.08	0.00	57.66	0.00
LH_A01430_W3	0.00	0.00	0.00	0.00
LH_A01430_W4	23.77	0.00	31.66	0.00
LH_A01440_W1	471.00	0.00	536.05	0.00
LH_A01440_W2	0.00	0.00	0.00	0.00
LH_A01450_P	41.29	0.00	41.31	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A01450_W1	0.00	0.00	0.00	0.00
LH_A01450_W2	12.33	0.00	18.86	0.00
LH_A01450_W3	424.64	0.00	489.57	0.00
LH_A01460_P	33.18	0.00	33.48	0.00
LH_A01460_W1	180.42	0.00	214.60	0.00
LH_A01460_W2	0.00	0.00	0.00	0.00
LH_A01470_W1	12.59	0.00	22.42	0.00
LH_A01470_W2	30.52	-19.48	49.00	-1.66
LH_A01480_W1	0.00	0.00	0.00	0.00
LH_A01480_W2	25.30	0.00	30.09	0.00
LH_A01490_W1	0.00	0.00	0.00	0.00
LH_A01490_W2	2.36	0.00	4.34	0.00
LH_A01490_W3	0.00	0.00	0.00	0.00
LH_A01490_W4	0.00	0.00	0.00	0.00
LH_A01490_W5	0.00	-16.03	0.00	-17.43
LH_A01490_W6	0.00	-173.10	0.00	-209.72
LH_A01500_W1	142.27	0.00	174.49	0.00
LH_A01500_W2	96.30	0.00	130.21	0.00
LH_A01500_W3	207.46	0.00	246.06	0.00
LH_A01500_W4	77.14	-14.69	48.20	-27.36
LH_A01510_W1	130.42	0.00	172.30	0.00
LH_A01510_W2	2.75	0.00	3.66	0.00
LH_A01510_W3	183.02	0.00	224.80	0.00
LH_A01510_W4	0.00	-802.73	0.00	-1014.37
LH_A01510_W5	423.42	0.00	514.45	0.00
LH_A01510_W6	121.05	-2.88	151.07	-0.21
LH_A01520_W1	0.00	0.00	0.00	0.00
LH_A01520_W2	9.31	-40.22	6.76	-53.72
LH_A01520_W3	18.39	0.00	25.20	0.00
LH_A01520_W4	31.08	0.00	40.79	-0.02
LH_A01530_W1	257.73	0.00	317.94	0.00
LH_A01530_W2	0.00	0.00	0.00	0.00
LH_A01530_W3	0.70	-193.93	0.11	-242.31
LH_A01540_W1	10.59	0.00	13.63	0.00
LH_A01540_W2	12.53	0.00	16.01	0.00
LH_A01540_W3	1.47	0.00	2.21	0.00
LH_A01550_W	0.00	0.00	0.00	0.00
LH_A01560_W1	0.00	0.00	0.00	0.00
LH_A01560_W2	18.13	0.00	25.35	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A01560_W3	0.00	0.00	0.00	0.00
LH_A01570_W1	0.00	0.00	0.00	0.00
LH_A01570_W2	0.75	0.00	0.86	0.00
LH_A01570_W3	47.06	0.00	49.07	0.00
LH_A01570_W4	0.00	0.00	0.00	0.00
LH_A01580_W1	0.00	0.00	0.00	0.00
LH_A01580_W2	25.44	0.00	26.68	0.00
LH_A01580_W3	0.00	0.00	0.00	0.00
LH_A01590_W1	0.00	0.00	0.00	0.00
LH_A01590_W2	60.90	0.00	62.17	0.00
LH_A01590_W3	0.00	0.00	0.00	0.00
LH_A01590_W4	0.00	0.00	0.00	0.00
LH_A01600_W1	54.48	0.00	56.78	0.00
LH_A01600_W2	0.00	0.00	0.00	0.00
LH_A01610_W1	0.00	0.00	0.00	0.00
LH_A01610_W2	0.00	0.00	0.32	0.00
LH_A01610_W3	0.74	0.00	2.77	0.00
LH_A01610_W4	0.00	0.00	0.00	0.00
LH_A01610_W5	0.00	0.00	0.00	0.00
LH_A01620_W1	0.00	0.00	0.00	0.00
LH_A01620_W2	51.05	0.00	52.49	0.00
LH_A01630_W1	0.00	0.00	0.00	0.00
LH_A01630_W2	120.59	0.00	122.39	0.00
LH_A01640_W1	0.00	0.00	0.00	0.00
LH_A01640_W2	15.94	0.00	34.18	0.00
LH_A01650_W1	26.12	0.00	52.18	0.00
LH_A01650_W2	0.00	0.00	0.00	0.00
LH_A01660_W1	6.76	0.00	13.32	0.00
LH_A01660_W2	0.00	0.00	0.00	0.00
LH_A01660_W3	0.00	0.00	0.12	0.00
LH_A01690_W1	0.00	0.00	0.00	0.00
LH_A01690_W2	0.00	0.00	0.15	0.00
LH_A01690_W3	0.00	0.00	0.00	0.00
LH_A01700_P	8.56	0.00	8.73	0.00
LH_A01700_W1	145.41	0.00	179.81	0.00
LH_A01700_W2	170.17	0.00	205.24	0.00
LH_A01710_P	322.06	0.00	368.87	0.00
LH_A01710_W1	0.00	0.00	0.00	0.00
LH_A01710_W2	0.00	0.00	0.00	0.00

Table C-2

Existing Conditions, FEMA 100-Year Lake Harney Boundary Condition
Link Maximum and Minimum Flows (cfs)

Link	Design Storm Simulation			
	100-YR / 24-HR		100-YR / 96-HR	
	Max	Min	Max	Min
LH_A01710_W3	0.00	0.00	0.00	0.00
LH_A01710_W4	0.00	0.00	22.05	0.00
LH_A01715_P	136.63	0.00	136.76	-0.09
LH_A01715_W	24.33	0.00	87.11	0.00
LH_A01720_W1	27.17	-6.75	30.78	-31.96
LH_A01720_W2	0.00	0.00	0.00	0.00
LH_A01730_W1	0.00	0.00	0.00	0.00
LH_A01730_W2	0.00	0.00	0.00	0.00
LH_A01730_W3	0.00	0.00	0.00	0.00
LH_A01730_W4	176.85	0.00	254.78	0.00
LH_A01730_W5	138.02	0.00	144.55	0.00
LH_A01730_W6	0.00	0.00	0.00	0.00
LH_A01740_W	20.58	0.00	28.84	0.00
LH_A01750_W1	0.00	0.00	0.00	0.00
LH_A01750_W2	0.00	0.00	0.00	0.00
LH_A01750_W3	106.08	0.00	153.28	0.00
LH_A01750_W4	0.00	0.00	0.00	0.00
LH_A01750_W5	0.00	-36.47	0.00	-39.53
LH_A01750_W6	0.00	0.00	0.00	0.00
LH_A01750_W7	0.00	0.00	0.00	0.00
LH_A01760_W1	0.00	0.00	0.00	0.00
LH_A01760_W2	0.00	0.00	0.00	0.00
LH_A01760_W3	0.00	0.00	0.00	0.00
LH_A01760_W4	0.00	0.00	0.00	0.00
LH_A01780_W1	0.00	0.00	0.00	0.00
LH_A01780_W2	0.00	0.00	0.00	0.00
LH_A01780_W3	47.60	0.00	55.15	0.00
LH_A01780_W4	0.00	0.00	0.00	0.00
LH_A01790_W1	0.00	0.00	0.00	0.00
LH_A01790_W2	0.00	0.00	0.00	0.00
LH_A01800_W	24.29	0.00	39.72	0.00
LH_A01810_W1	0.00	0.00	0.00	0.00
LH_A01810_W2	0.00	0.00	0.00	0.00
LH_A01810_W3	1.88	0.00	5.43	0.00
LH_A01820_W1	0.00	0.00	0.00	0.00
LH_A01820_W2	175.27	0.00	196.18	0.00

APPENDIX D
Opinion of Probable Costs

Table D-1

WHITCOMB DRIVE

PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (15% of Total)	LS	varies	1	$139,769
2	102-1	Maintenance of Traffic (10% of Total)	LS	varies	1	$93,179
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (5% of Total)	LS	varies	1	$46,590
4	110-1-1	Clearing and Grubbing (10% of Total)	LS	varies	1	$93,179
5	120-6	Embankment	CY	$10.50	9450	$99,225
6	160-4	Type B Stabilization (12")	SY	$4.00	16050	$64,200
7	285-704	Optional Base, Base Group 04 (6")	SY	$15.00	10700	$160,500
8	334-1-13	Superpave Asphaltic Concrete, Traffic C (2")	SY	$10.50	10700	$112,350
9	430-175-118	Pipe Culvert, Optional Material, Round, 18"	LF	$65.00	40	$2,600
10	430-175-124	Pipe Culvert, Optional Material, Round, 24"	LF	$75.00	1050	$78,750
11	430-175-148	Pipe Culvert, Optional Material, Round, 48"	LF	$220.00	750	$165,000
12	430-984-125	Mitered End Section, Optional Material, Round, 18"	EA	$1,325.00	2	$2,650
13	430-984-129	Mitered End Section, Optional Material, Round, 24"	EA	$1,500.00	54	$81,000
14	430-984-141	Mitered End Section, Optional Material, Round, 48"	EA	$6,875.00	22	$151,250
15	570-1-2	Performance Turf, Sod	SY	$2.75	4825	$13,269
16	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
CONSTRUCTION SUBTOTAL[1,2]:						**$1,304,511**
LAND ACQUISITION SUBTOTAL (PORTIONS OF 39 PARCELS)[3]:						**$503,241**
ENGINEERING SUBTOTAL (25% OF CONSTRUCTION)[4]:						**$326,128**
CONTINGENCY (20%):						**$426,776**
ESTIMATED TOTAL COST:						**$2,560,657**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Parcel land values were obtained from Seminole County and used to estimate the cost of Easement Acquisition. Land values were multiplied by a factor of 1.5 to account for administrative costs.
4) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

Table D-2

OSCEOLA ROAD AND GUN RANGE ROAD

PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (15% of Total)	LS	varies	1	$56,601
2	102-1	Maintenance of Traffic (5% of Total)	LS	varies	1	$18,867
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (5% of Total)	LS	varies	1	$18,867
4	110-1-1	Clearing and Grubbing (15% of Total)	LS	varies	1	$56,601
5	120-5	Channel Excavation	CY	$40.00	1980	$79,200
6	160-4	Type B Stabilization (12")	SY	$4.00	375	$1,500
7	285-704	Optional Base, Base Group 04 (6")	SY	$15.00	375	$5,625
8	334-1-13	Superpave Asphaltic Concrete, Traffic C (2")	SY	$10.50	375	$3,938
9	400-1-2	Concrete Class I, Endwall	CY	$1,500.00	81	$121,500
10	430-175-130	Pipe Culvert, Optional Material, Round, 30"	LF	$110.00	160	$17,600
11	430-175-136	Pipe Culvert, Optional Material, Round, 36"	LF	$130.00	115	$14,950
12	430-175-148	Pipe Culvert, Optional Material, Round, 48"	LF	$220.00	40	$8,800
13	430-175-248	Pipe Culvert, Optional Material, Elliptical, 48"	LF	$245.00	125	$30,625
14	430-175-260	Pipe Culvert, Optional Material, Arch, 60"	LF	$450.00	130	$58,500
15	570-1-2	Performance Turf, Sod	SY	$2.75	12400	$34,100
16	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
					CONSTRUCTION SUBTOTAL[1,2]:	**$528,273**
					ENGINEERING SUBTOTAL (25% OF CONSTRUCTION)[3]:	**$132,068**
					CONTINGENCY (20%):	**$132,068**
					ESTIMATED TOTAL COST:	**$792,409**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

Table D-3

LAKE HARNEY CIRCLE - IMPROVEMENT CONCEPT 1

PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (15% of Total)	LS	varies	1	$72,637
2	102-1	Maintenance of Traffic (10% of Total)	LS	varies	1	$48,425
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (5% of Total)	LS	varies	1	$24,212
4	110-1-1	Clearing and Grubbing (10% of Total)	LS	varies	1	$48,425
5	120-1	Regular Excavation	CY	$7.00	4175	$29,225
6	160-4	Type B Stabilization (12")	SY	$4.00	240	$960
7	285-704	Optional Base, Base Group 04 (6")	SY	$15.00	240	$3,600
8	334-1-13	Superpave Asphaltic Concrete, Traffic C (2")	SY	$10.50	240	$2,520
9	400-1-2	Concrete Class I, Endwall	CY	$1,500.00	110	$165,000
10	430-175-136	Pipe Culvert, Optional Material, Round, 36"	LF	$130.00	275	$35,750
11	430-175-148	Pipe Culvert, Optional Material, Round, 48"	LF	$220.00	85	$18,700
12	430-175-236	Pipe Culvert Optional Material, Elliptical, 36"	LF	$155.00	170	$26,350
13	430-175-242	Pipe Culvert Optional Material, Elliptical, 42"	LF	$245.00	805	$197,225
14	570-1-2	Performance Turf, Sod	SY	$2.75	1425	$3,919
15	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
CONSTRUCTION SUBTOTAL[1,2]:						**$677,948**
LAND ACQUISITION SUBTOTAL (PORTIONS OF 10 PARCELS)[3]:						**$29,925**
ENGINEERING SUBTOTAL (25% OF CONSTRUCTION)[4]:						**$169,487**
CONTINGENCY (20%):						**$175,472**
ESTIMATED TOTAL COST:						**$1,052,833**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Parcel land values were obtained from Seminole County and used to estimate the cost of Easement Acquisition. Land values were multiplied by a factor of 1.5 to account for administrative costs.
4) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

Table D-4

LAKE HARNEY CIRCLE - IMPROVEMENT CONCEPT 2

PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (15% of Total)	LS	varies	1	$37,579
2	102-1	Maintenance of Traffic (10% of Total)	LS	varies	1	$25,053
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (5% of Total)	LS	varies	1	$12,526
4	110-1-1	Clearing and Grubbing (10% of Total)	LS	varies	1	$25,053
5	120-1	Regular Excavation	CY	$7.00	4175	$29,225
6	160-4	Type B Stabilization (12")	SY	$4.00	180	$720
7	285-704	Optional Base, Base Group 04 (6")	SY	$15.00	180	$2,700
8	334-1-13	Superpave Asphaltic Concrete, Traffic C (2")	SY	$10.50	180	$1,890
9	400-1-2	Concrete Class I, Endwall	CY	$1,500.00	83	$124,500
10	430-175-136	Pipe Culvert, Optional Material, Round, 36"	LF	$130.00	275	$35,750
11	430-175-148	Pipe Culvert, Optional Material, Round, 48"	LF	$220.00	85	$18,700
12	430-175-236	Pipe Culvert Optional Material, Elliptical, 36"	LF	$155.00	225	$34,875
13	570-1-2	Performance Turf, Sod	SY	$2.75	425	$1,169
14	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
					CONSTRUCTION SUBTOTAL[1,2]:	**$350,740**
					LAND ACQUISITION SUBTOTAL (PORTIONS OF 3 PARCELS)[3]:	**$13,163**
					ENGINEERING SUBTOTAL (25% OF CONSTRUCTION)[4]:	**$87,685**
					CONTINGENCY (20%):	**$90,318**
					ESTIMATED TOTAL COST:	**$541,906**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Parcel land values were obtained from Seminole County and used to estimate the cost of Easement Acquisition. Land values were multiplied by a factor of 1.5 to account for administrative costs.
4) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

Table D-5

FORT LANE ROAD - IMPROVEMENT CONCEPT 1

PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (15% of Total)	LS	varies	1	$26,683
2	102-1	Maintenance of Traffic (10% of Total)	LS	varies	1	$17,789
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (10% of Total)	LS	varies	1	$17,789
4	110-1-1	Clearing and Grubbing (15% of Total)	LS	varies	1	$26,683
5	120-5	Channel Excavation	CY	$40.00	535	$21,400
6	400-1-2	Concrete Class I, Endwall	CY	$1,500.00	8.5	$12,750
7	425-158-3	Inlet, Ditch Bottom, Type H, J Bottom, <10'	EA	$15,750.00	2	$31,500
8	430-175-242	Pipe Culvert, Optional Material, Elliptical, 42"	LF	$245.00	440	$107,800
9	570-1-2	Performance Turf, Sod	SY	$2.75	1250	$3,438
10	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
					CONSTRUCTION SUBTOTAL[1,2]:	**$266,831**
					LAND ACQUISITION SUBTOTAL (PORTIONS OF 3 PARCELS)[3]:	**$5,659**
					ENGINEERING SUBTOTAL (30% OF CONSTRUCTION)[4]:	**$80,049**
					CONTINGENCY (20%):	**$70,508**
					ESTIMATED TOTAL COST:	**$423,047**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Parcel land values were obtained from Seminole County and used to estimate the cost of Easement Acquisition. Land values were multiplied by a factor of 1.5 to account for administrative costs.
4) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

Table D-6

FORT LANE ROAD - IMPROVEMENT CONCEPT 2

PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (15% of Total)	LS	varies	1	$23,473
2	102-1	Maintenance of Traffic (10% of Total)	LS	varies	1	$15,649
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (10% of Total)	LS	varies	1	$15,649
4	110-1-1	Clearing and Grubbing (15% of Total)	LS	varies	1	$23,473
5	400-1-2	Concrete Class I, Endwall	CY	$1,500.00	8.5	$12,750
6	425-158-3	Inlet, Ditch Bottom, Type H, J Bottom, <10'	EA	$15,750.00	2	$31,500
7	430-175-242	Pipe Culvert, Optional Material, Elliptical, 42"	LF	$245.00	440	$107,800
8	570-1-2	Performance Turf, Sod	SY	$2.75	1250	$3,438
9	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
					CONSTRUCTION SUBTOTAL[1,2]:	**$234,731**
					LAND ACQUISITION SUBTOTAL (PORTION OF 1 PARCELS)[3]:	**$5,485**
					ENGINEERING SUBTOTAL (30% OF CONSTRUCTION)[4]:	**$70,419**
					CONTINGENCY (20%):	**$62,127**
					ESTIMATED TOTAL COST:	**$372,762**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Parcel land values were obtained from Seminole County and used to estimate the cost of Easement Acquisition. Land values were multiplied by a factor of 1.5 to account for administrative costs.
4) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

Table D-7

OLD MIMS ROAD AND JUNGLE ROAD INTERSECTION - IMPROVEMENT CONCEPT 1

PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (20% of Total)	LS	varies	1	$21,141
2	102-1	Maintenance of Traffic (15% of Total)	LS	varies	1	$15,855
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (10% of Total)	LS	varies	1	$10,570
4	110-1-1	Clearing and Grubbing (10% of Total)	LS	varies	1	$10,570
5	120-6	Embankment	CY	$10.50	1520	$15,960
6	160-4	Type B Stabilization (12")	SY	$4.00	3160	$12,640
7	285-704	Optional Base, Base Group 04 (6")	SY	$15.00	2180	$32,700
8	334-1-13	Superpave Asphaltic Concrete, Traffic C (2")	SY	$10.50	2180	$22,890
9	430-175-136	Pipe Culvert, Optional Material, Round, 36"	LF	$130.00	50	$6,500
10	430-984-138	Mitered End Section, Optional Material, Round, 36"	EA	$4,750.00	2	$9,500
11	570-1-2	Performance Turf, Sod	SY	$2.75	580	$1,595
12	706-3	Raised Pavement Marker, Type B	EA	$4.50	250	$1,125
13	709-12-116	Traffic Stripe-2, Standard, Yellow, Solid 6"	GM	$14,500.00	0.11	$1,595
14	710-11-101	Painted Pavement Mark, Standard, White, Solid, 6"	GM	$900.00	0.22	$198
15	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
					CONSTRUCTION SUBTOTAL[1,2]:	**$163,840**
					LAND ACQUISITION SUBTOTAL (PORTIONS OF 2 PARCELS)[3]:	**$5,950**
					ENGINEERING SUBTOTAL (50% OF CONSTRUCTION)[4]:	**$81,920**
					CONTINGENCY (20%):	**$50,342**
					ESTIMATED TOTAL COST:	**$302,051**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Parcel land values were obtained from Seminole County and used to estimate the cost of Easement Acquisition. Land values were multiplied by a factor of 1.5 to account for administrative costs.
4) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

Table D-8

OLD MIMS ROAD AND JUNGLE ROAD INTERSECTION - IMPROVEMENT CONCEPT 2

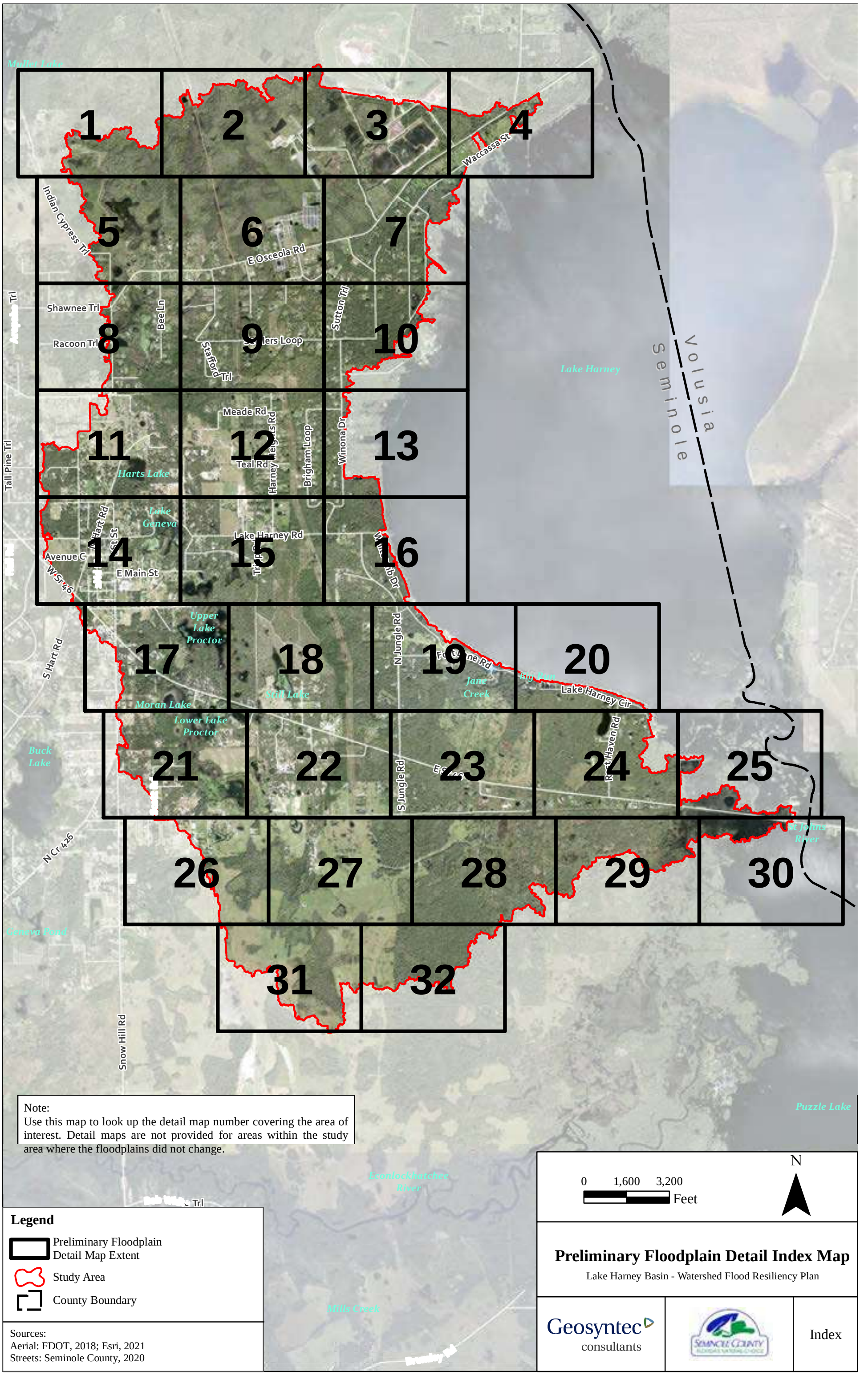
PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS

Item	Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (20% of Total)	LS	varies	1	$4,169
2	102-1	Maintenance of Traffic (15% of Total)	LS	varies	1	$3,127
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (10% of Total)	LS	varies	1	$2,085
4	110-1-1	Clearing and Grubbing (10% of Total)	LS	varies	1	$2,085
5	430-175-236	Pipe Culvert, Optional Material, Elliptical, 36"	LF	$155.00	50	$7,750
6	430-984-638	Mitered End Section, Optional Material, Elliptical, 36"	EA	$5,250.00	2	$10,500
7	570-1-2	Performance Turf, Sod	SY	$2.75	580	$1,595
8	900-1	As-Built Plans	LS	$1,000.00	1	$1,000
					CONSTRUCTION SUBTOTAL[1,2]:	**$32,310**
					ENGINEERING SUBTOTAL (200% OF CONSTRUCTION)[3]:	**$64,620**
					CONTINGENCY (20%):	**$19,386**
					ESTIMATED TOTAL COST:	**$116,315**

Notes:

1) Estimate does not include cost for potential utility relocations.
2) Estimate does not include removal of muck or other unsuitable soils.
3) Estimate includes cost of topographic survey, ecological investigations, geotechnical investigation and testing, design engineering, permitting, and construction inspection and oversight.

APPENDIX E
Preliminary 100-Year Floodplain Detail Maps



Note:
Use this map to look up the detail map number covering the area of interest. Detail maps are not provided for areas within the study area where the floodplains did not change.

Legend

- Preliminary Floodplain Detail Map Extent
- Study Area
- County Boundary

Sources:
Aerial: FDOT, 2018; Esri, 2021
Streets: Seminole County, 2020

0 1,600 3,200
Feet

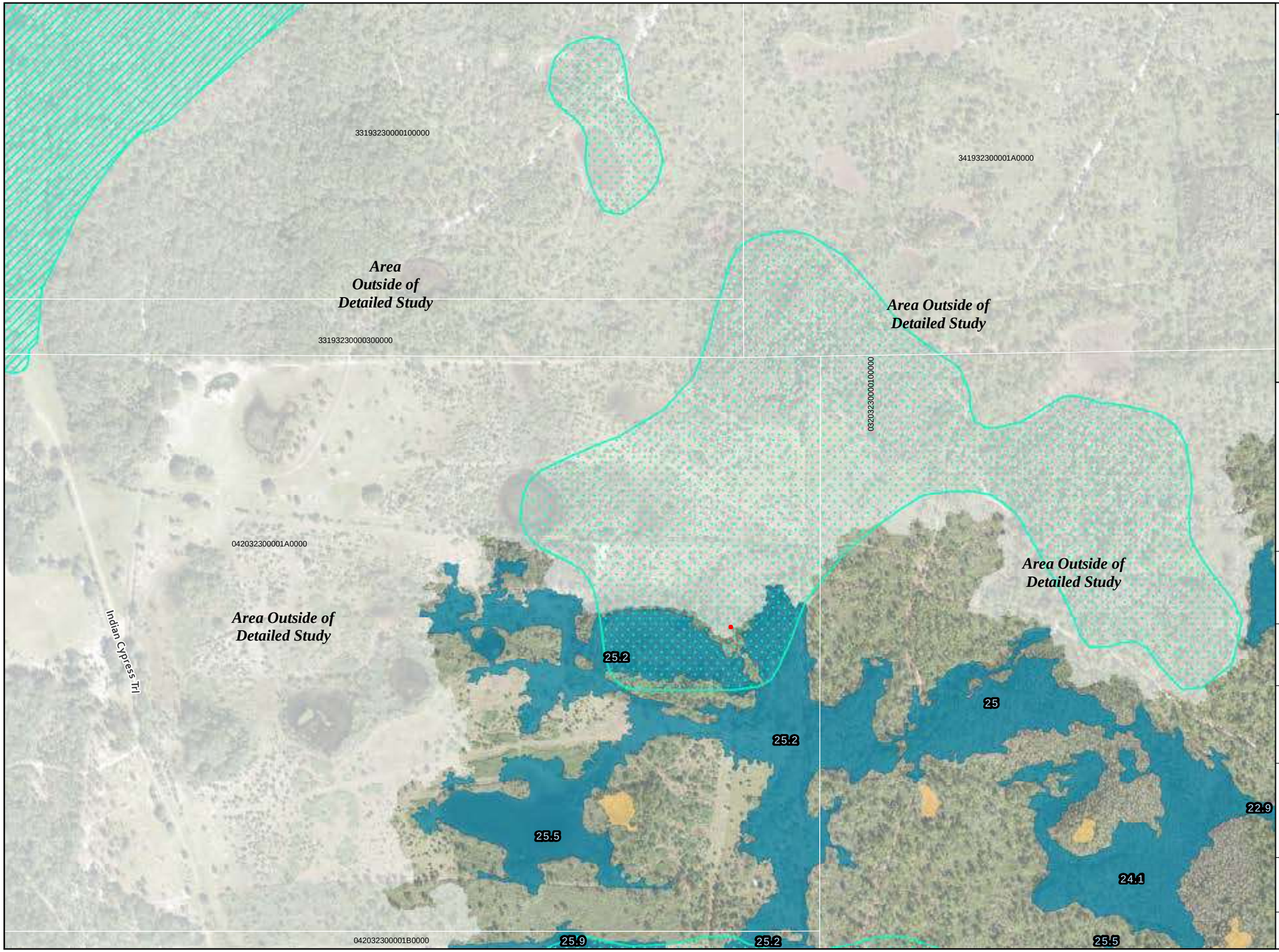
N

Preliminary Floodplain Detail Index Map

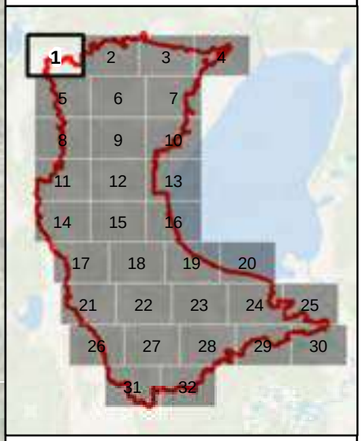
Lake Harney Basin - Watershed Flood Resiliency Plan

Geosyntec consultants

Index



Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

- A
- AE

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

N

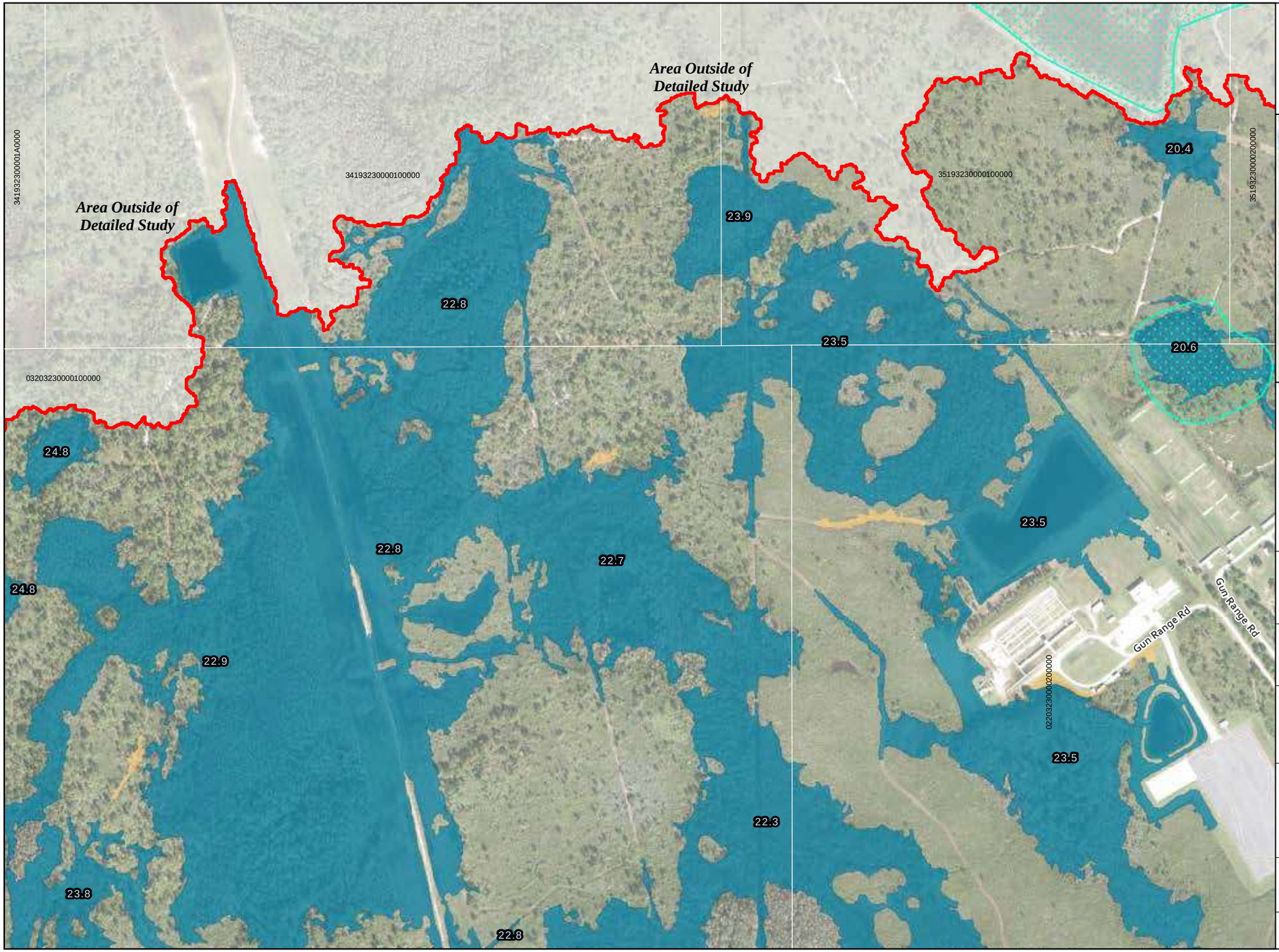
0 200 400
Feet

Seminole County
Florida's Natural Choice

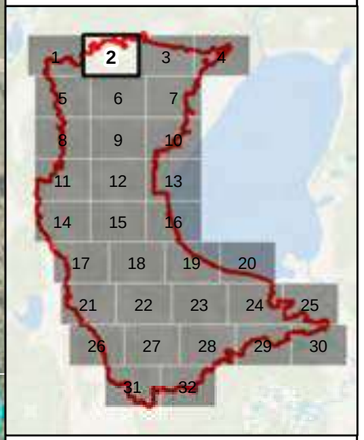
Preliminary Floodplains Detail Map

1

Lake Harney Basin
Watershed Flood Resiliency Plan



Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

0 200 400 Feet

N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map

2

Lake Harney Basin
Watershed Flood Resiliency Plan

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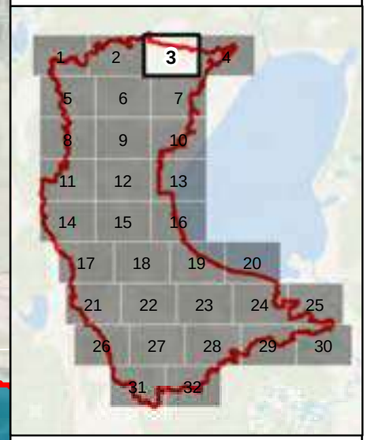
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

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- AE

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

0 200 400 Feet

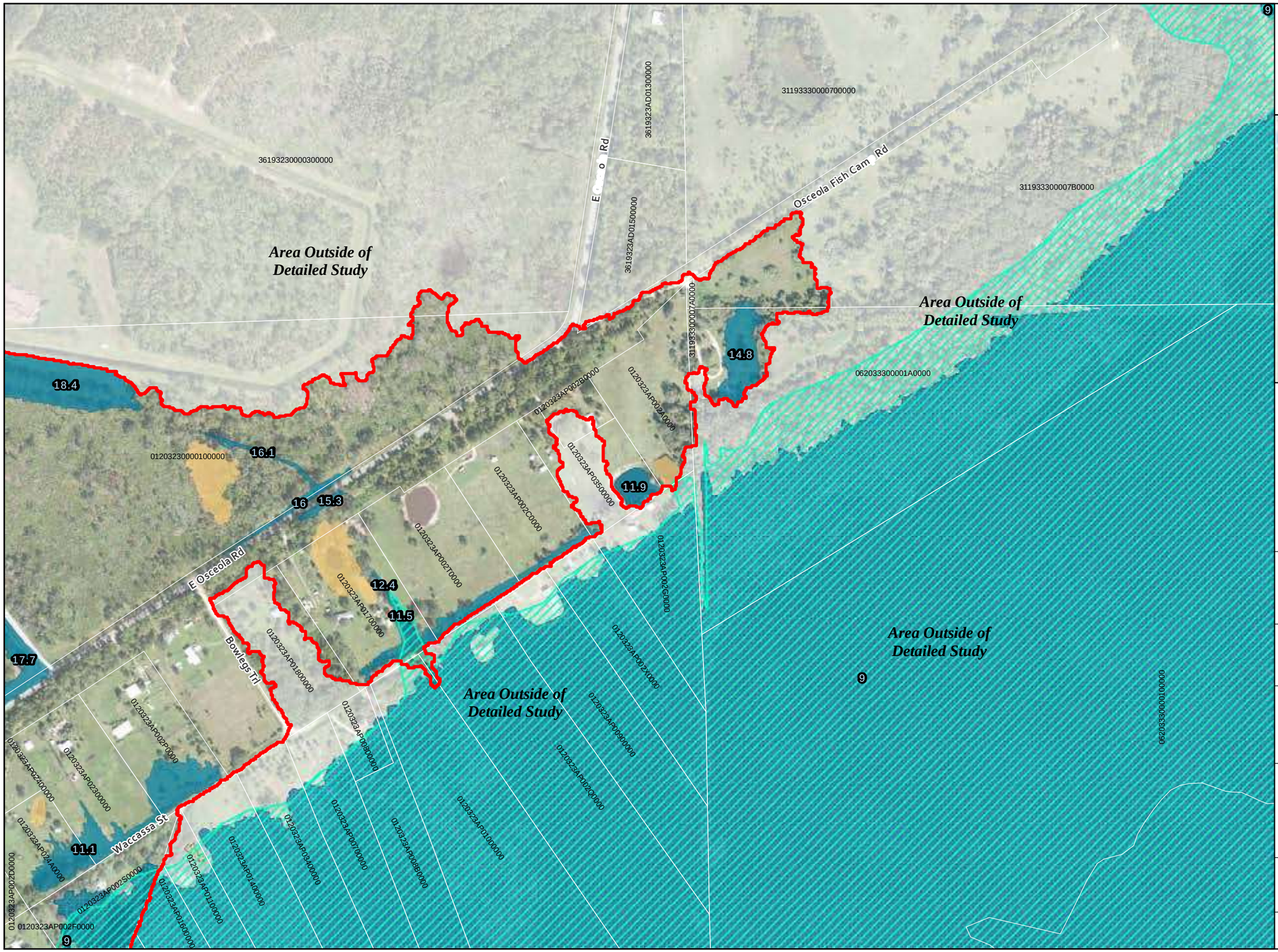
N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map

3

Lake Harney Basin
Watershed Flood Resiliency Plan



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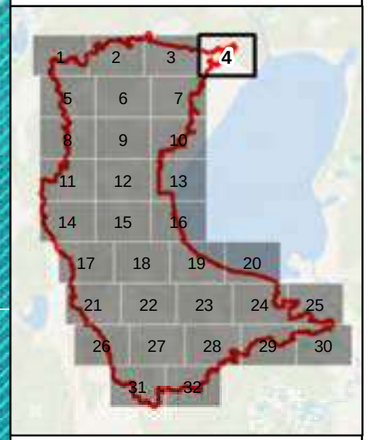
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

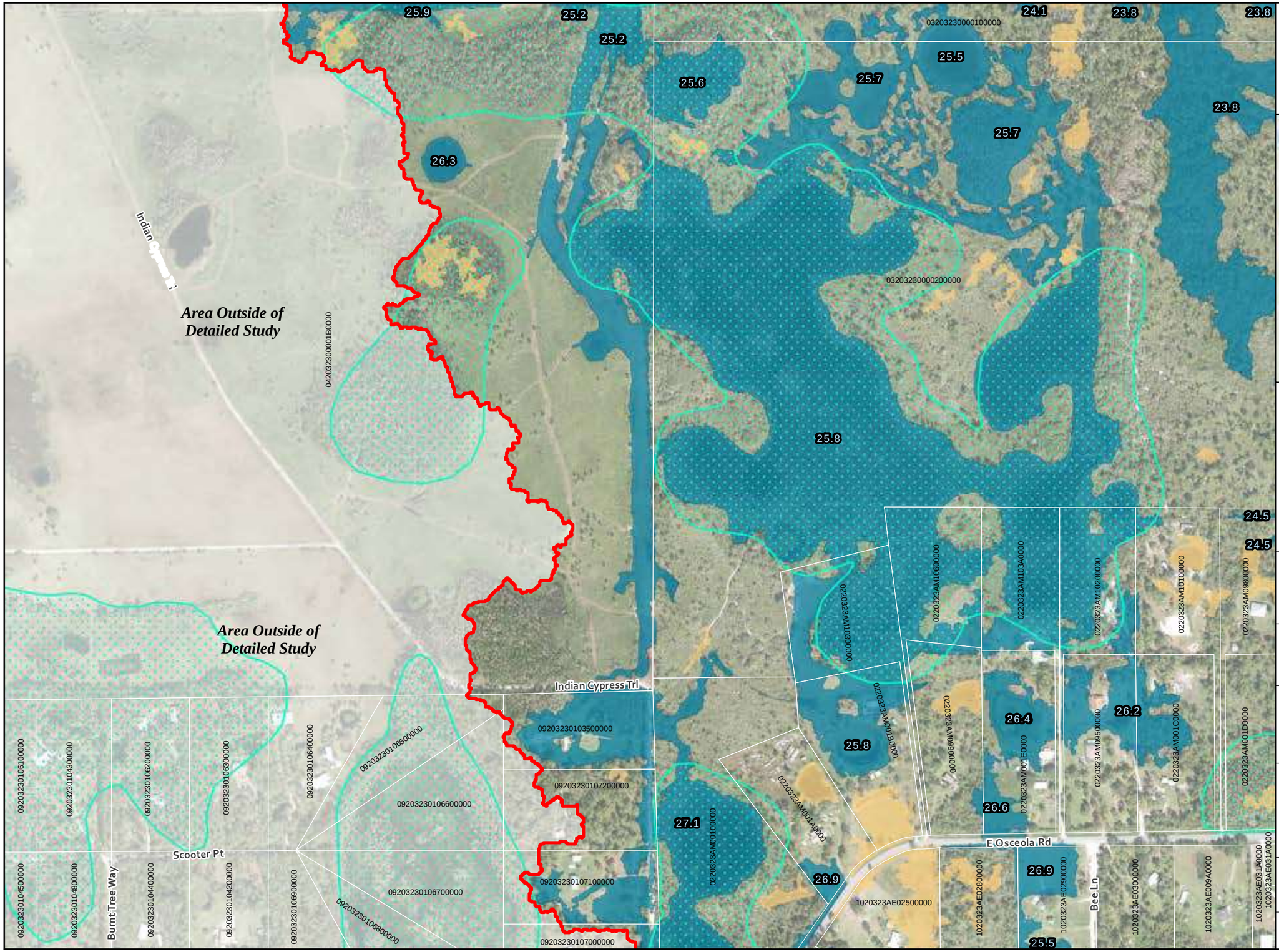
0 200 400 Feet

N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **4**

Lake Harney Basin
Watershed Flood Resiliency Plan



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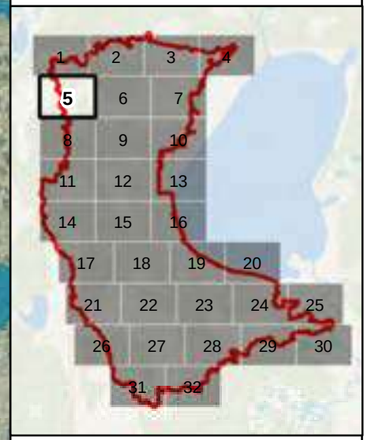
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

- A
- AE

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

N

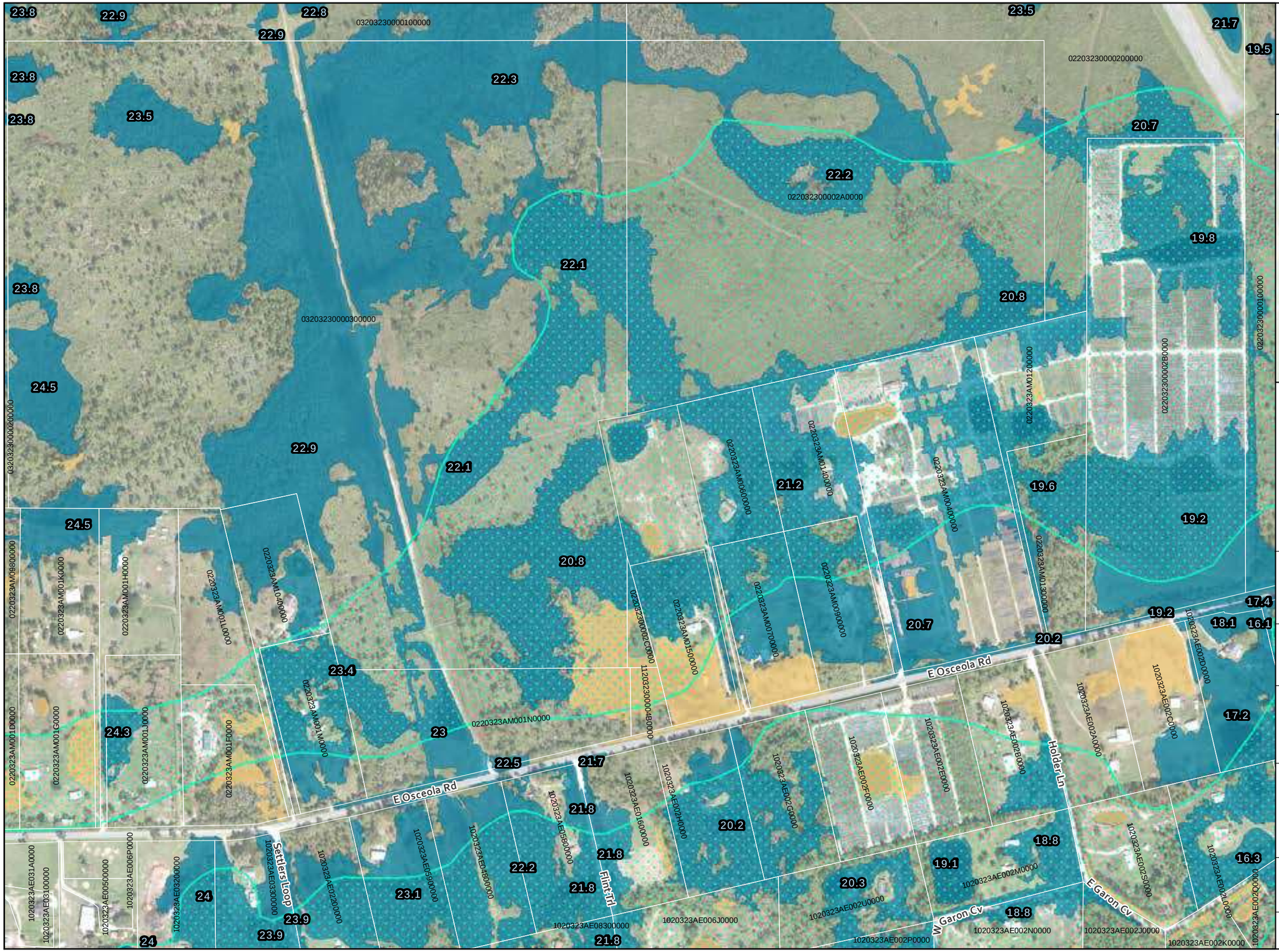
0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map

5

Lake Harney Basin
Watershed Flood Resiliency Plan



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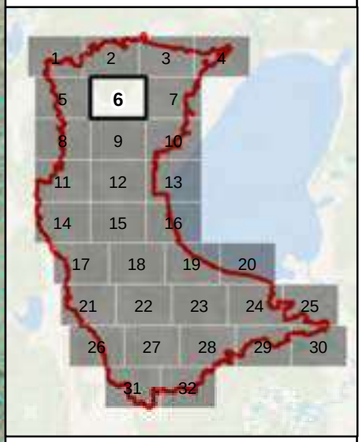
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

0 200 400 Feet

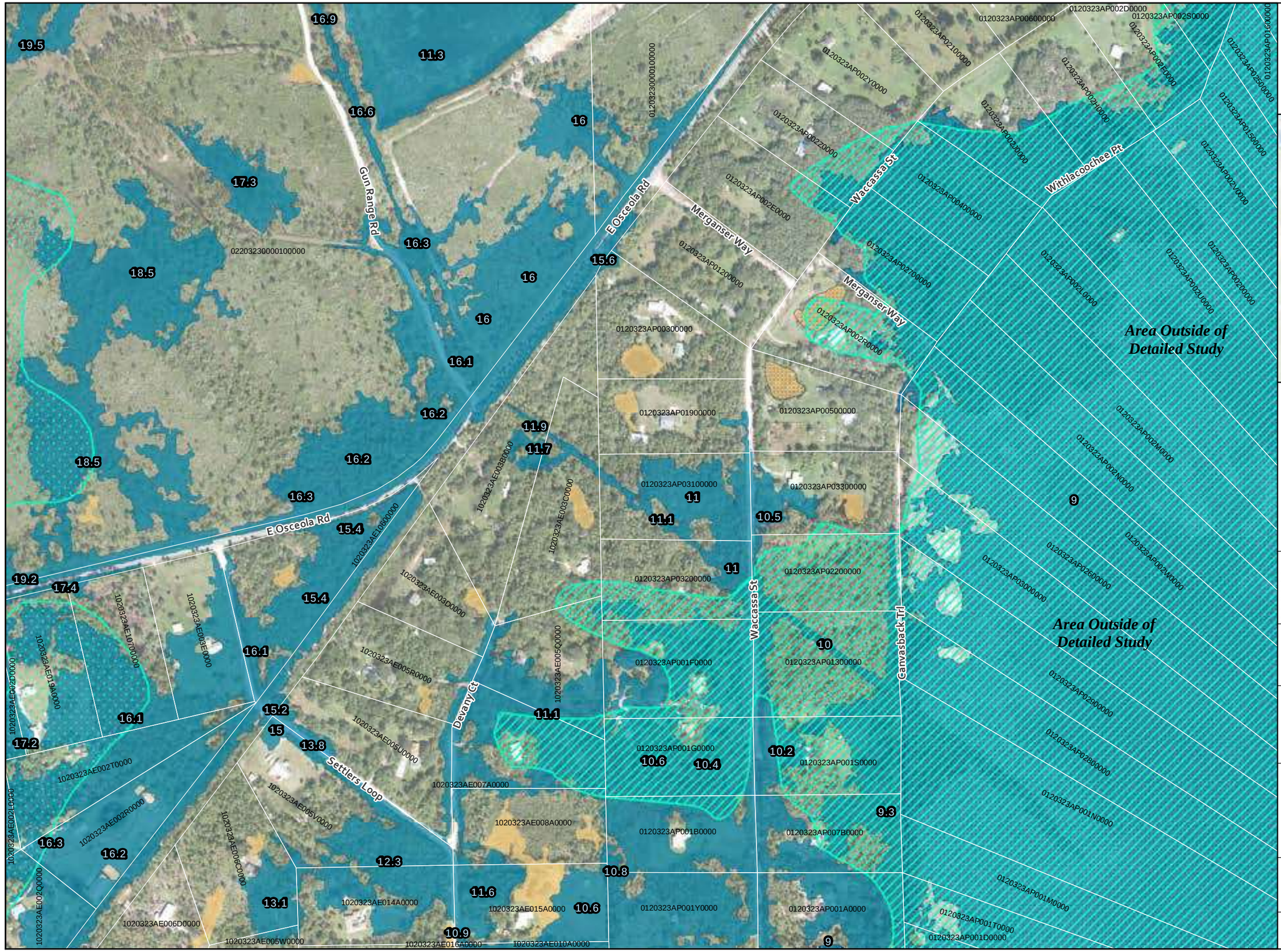
N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map

6

Lake Harney Basin
Watershed Flood Resiliency Plan



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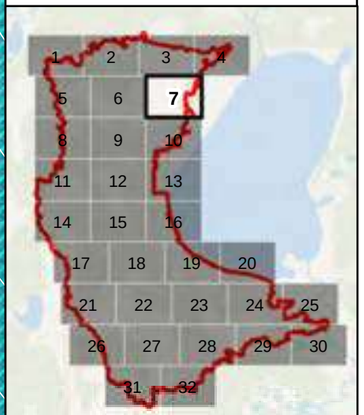
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

0 200 400 Feet

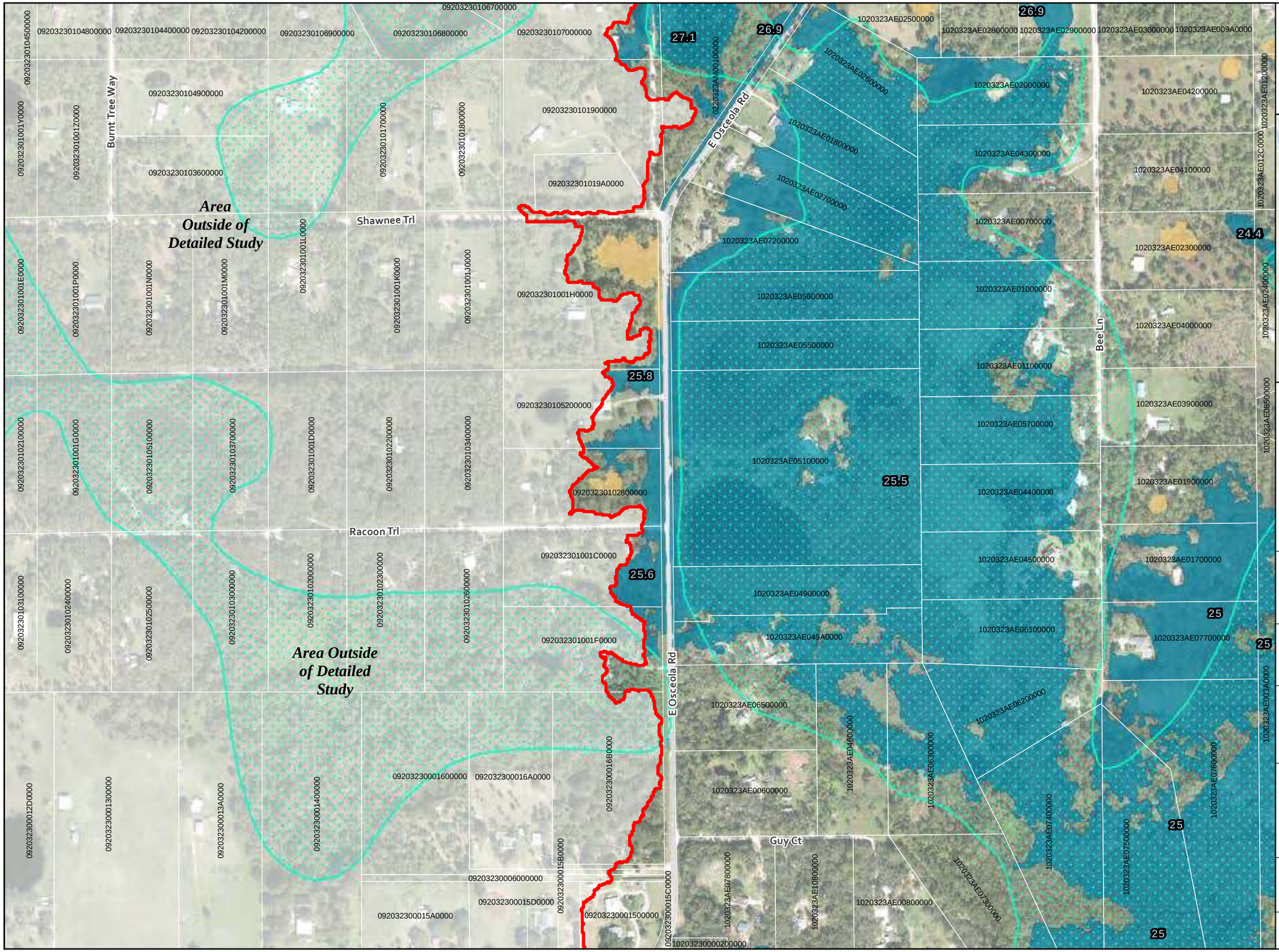
N

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map

7

Lake Harney Basin
Watershed Flood Resiliency Plan



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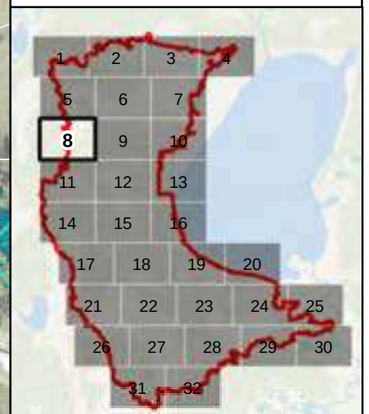
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
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Sources:
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Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

N

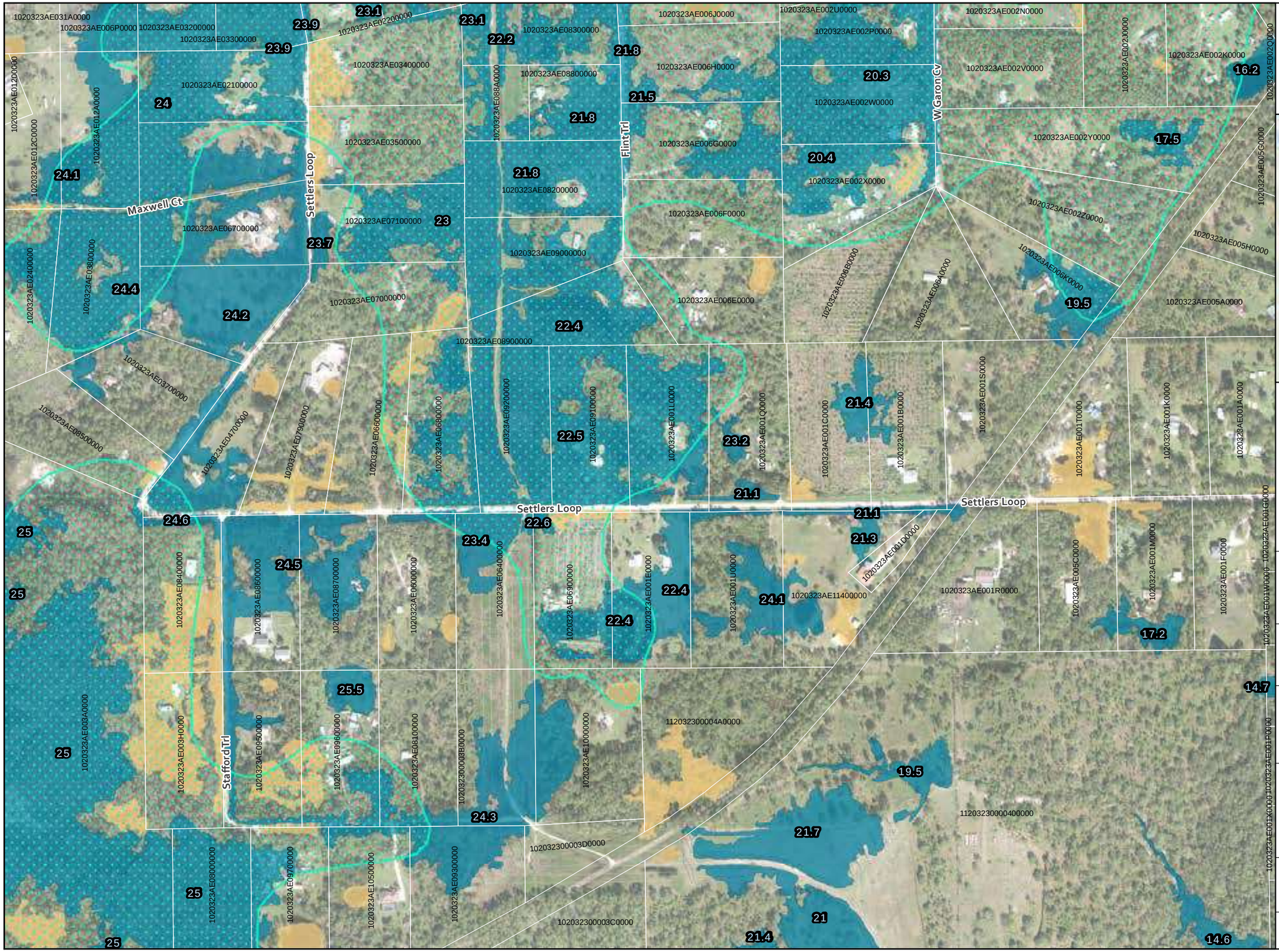
0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map

8

Lake Harney Basin
Watershed Flood Resiliency Plan



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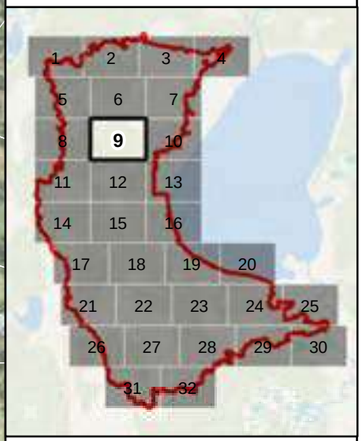
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

N

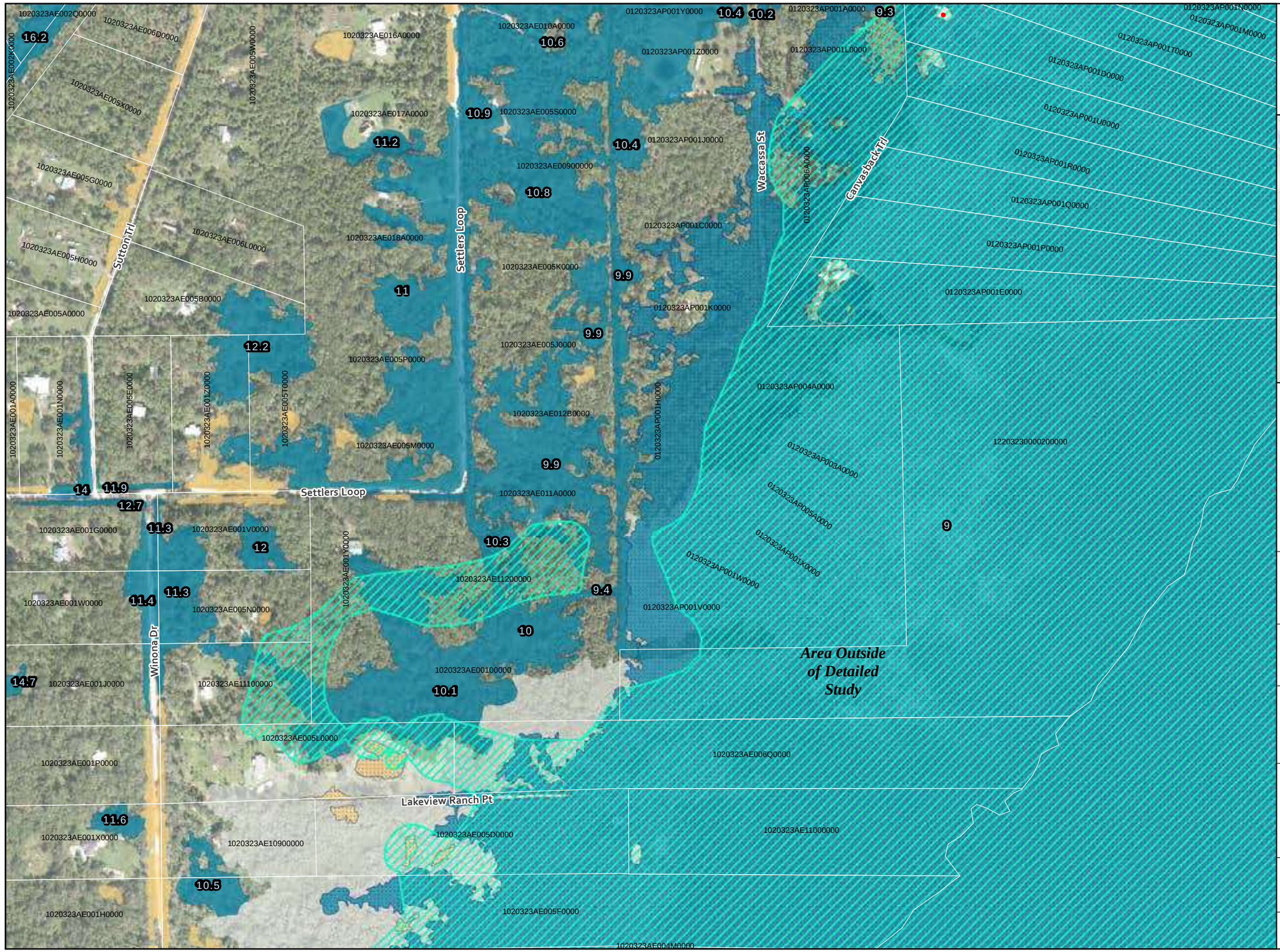
0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map

9

Lake Harney Basin
Watershed Flood Resiliency Plan



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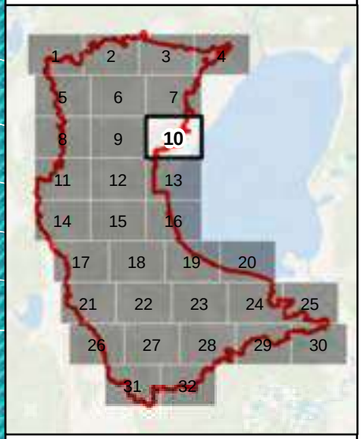
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

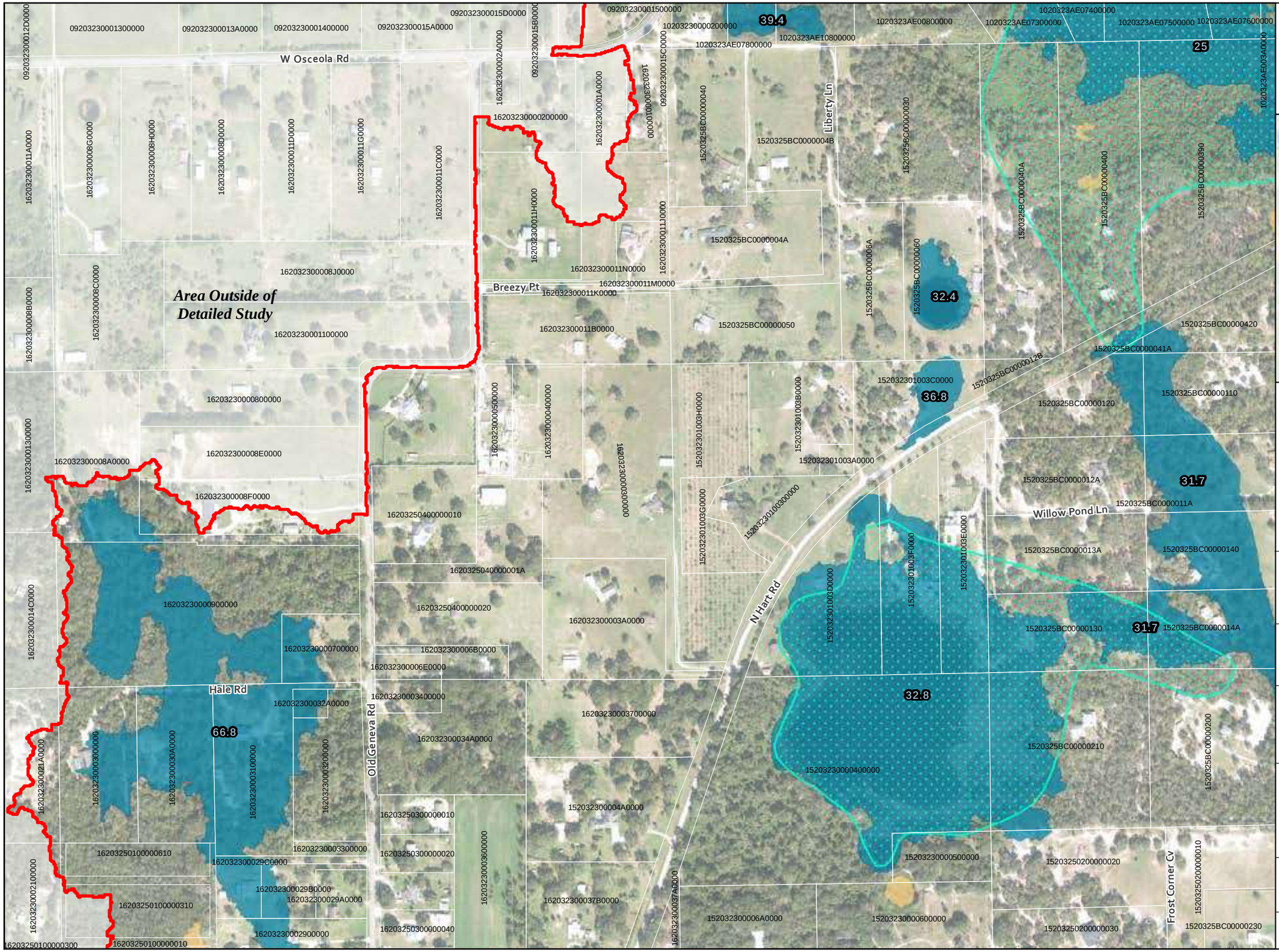
0 200 400 Feet

N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **10**

Lake Harney Basin
Watershed Flood Resiliency Plan



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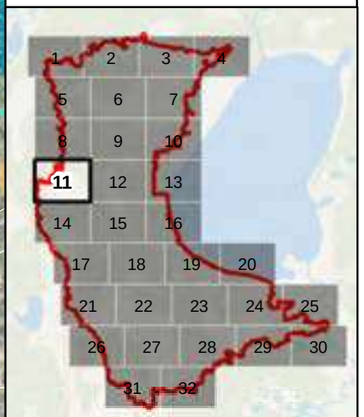
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
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- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

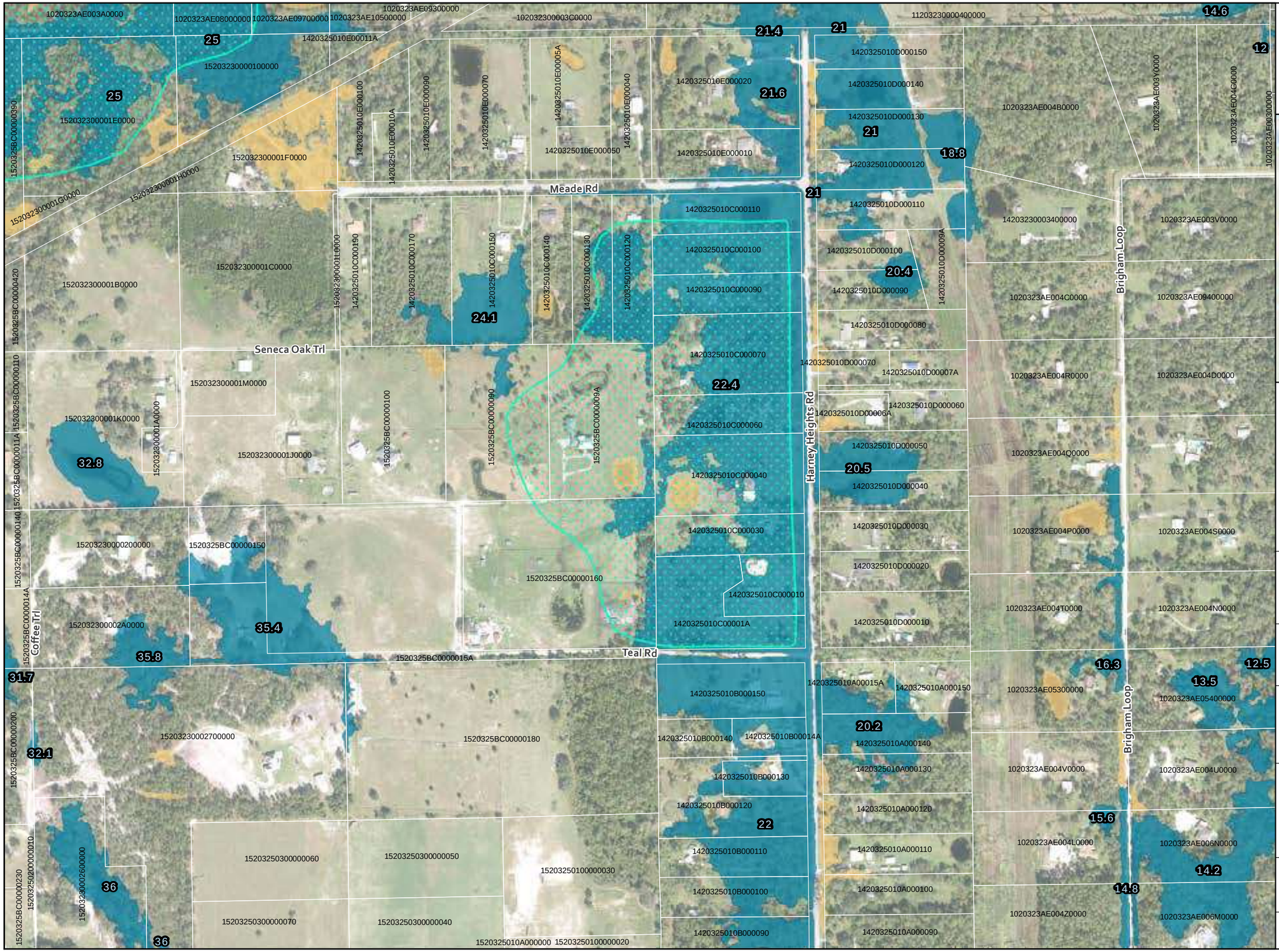
0 200 400 Feet

N

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map **11**

Lake Harney Basin
Watershed Flood Resiliency Plan



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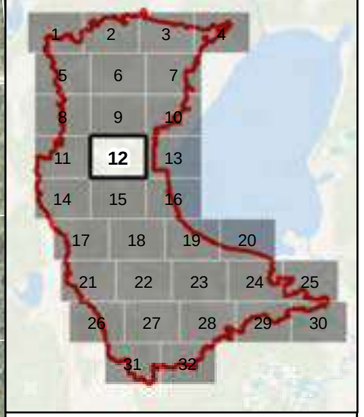
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

- A
- AE

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

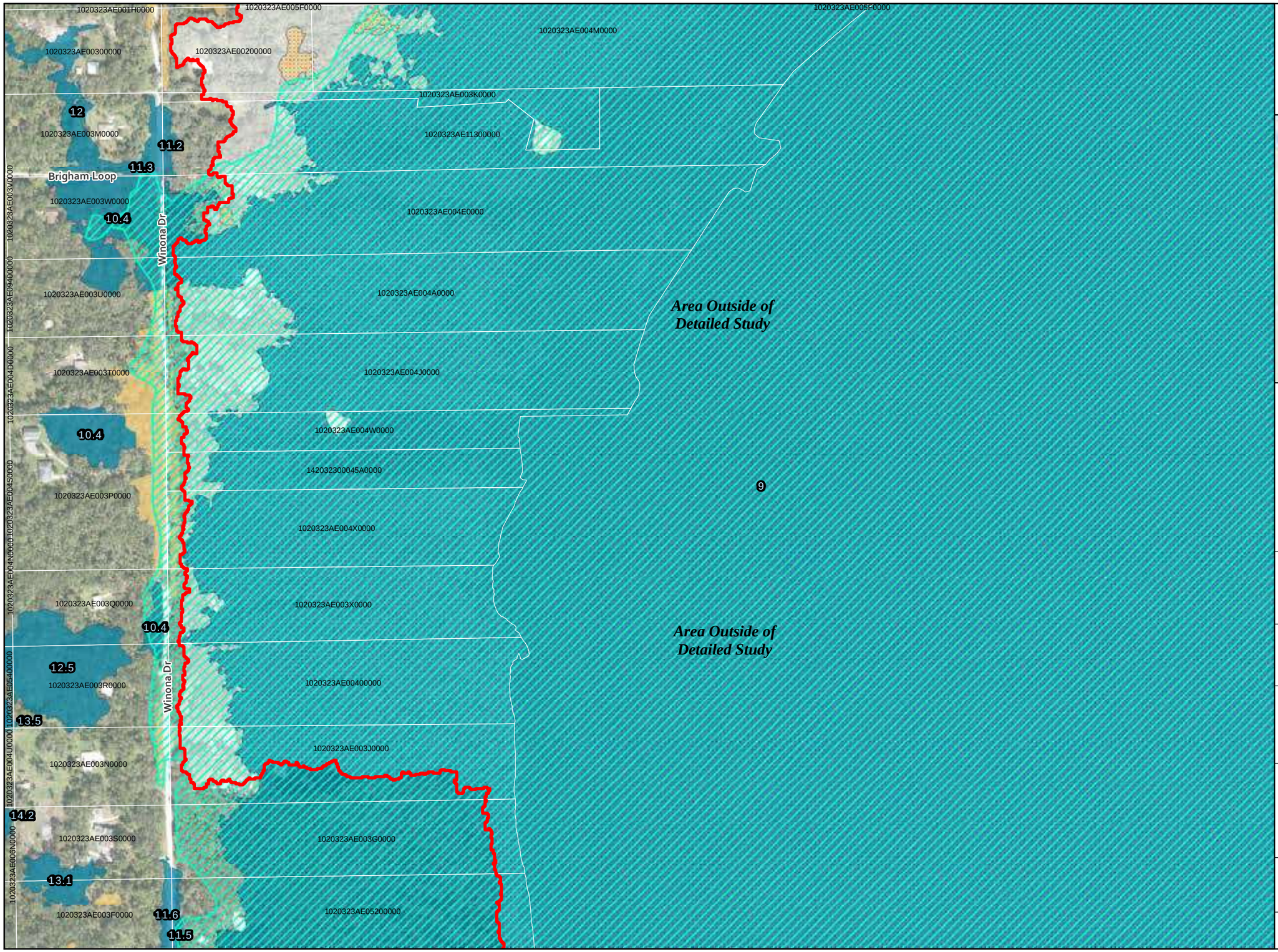
N

0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **12**

Lake Harney Basin
Watershed Flood Resiliency Plan



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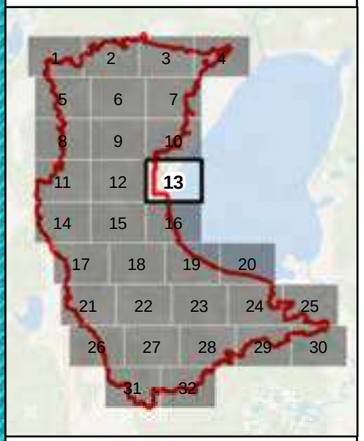
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

- A
- AE

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

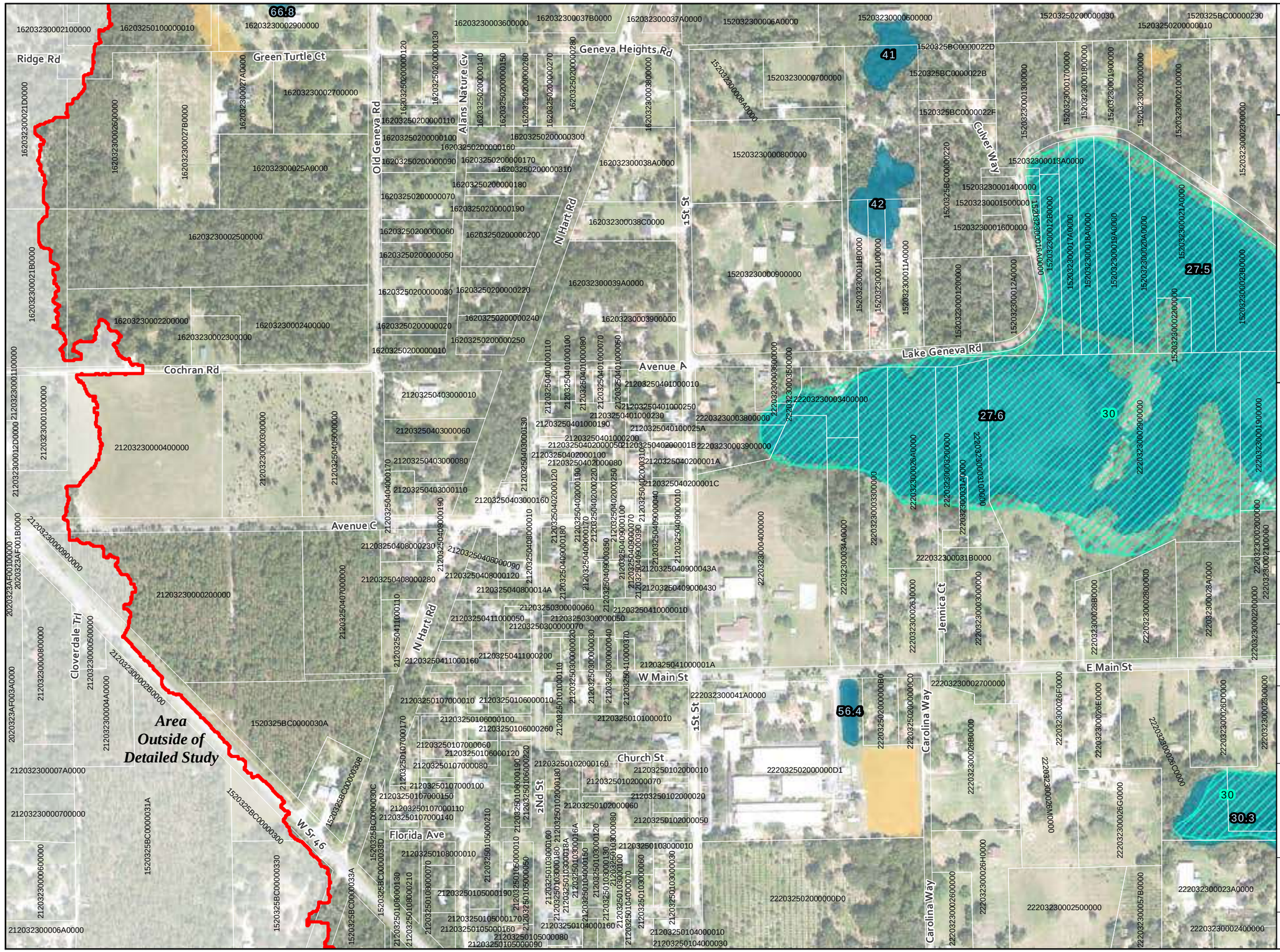
0 200 400
Feet

N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **13**

Lake Harney Basin
Watershed Flood Resiliency Plan



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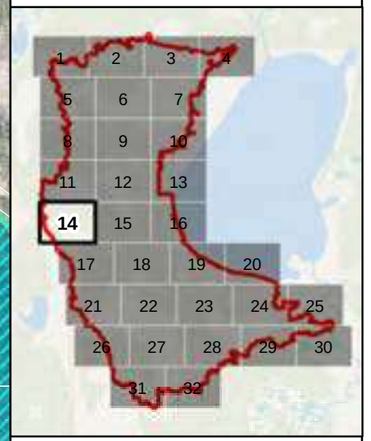
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains
- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains
- A
- AE

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Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

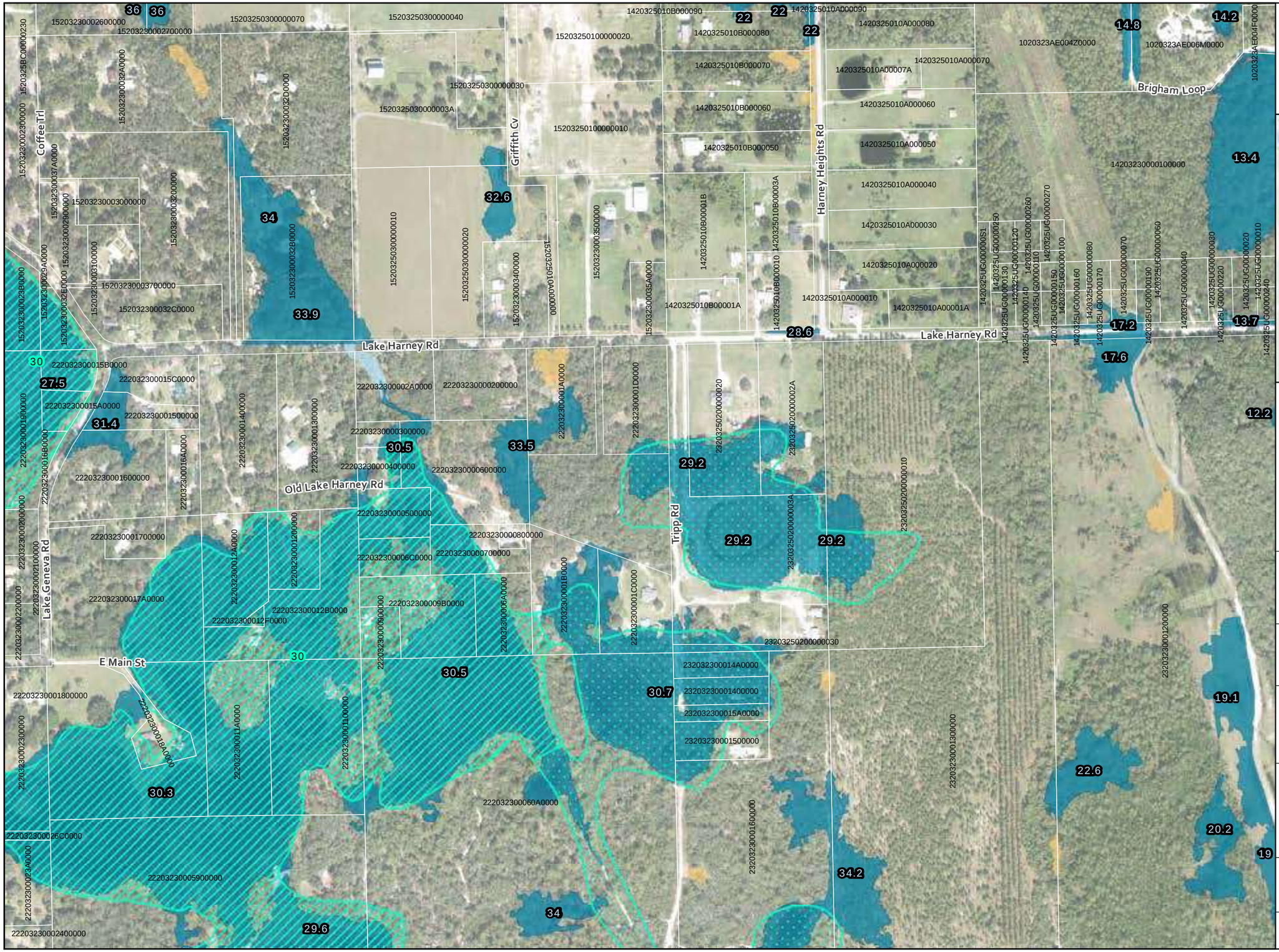
N

0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **14**

Lake Harney Basin
Watershed Flood Resiliency Plan



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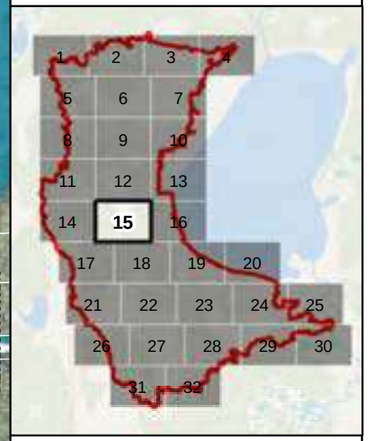
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

- A
- AE

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Sources:
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Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

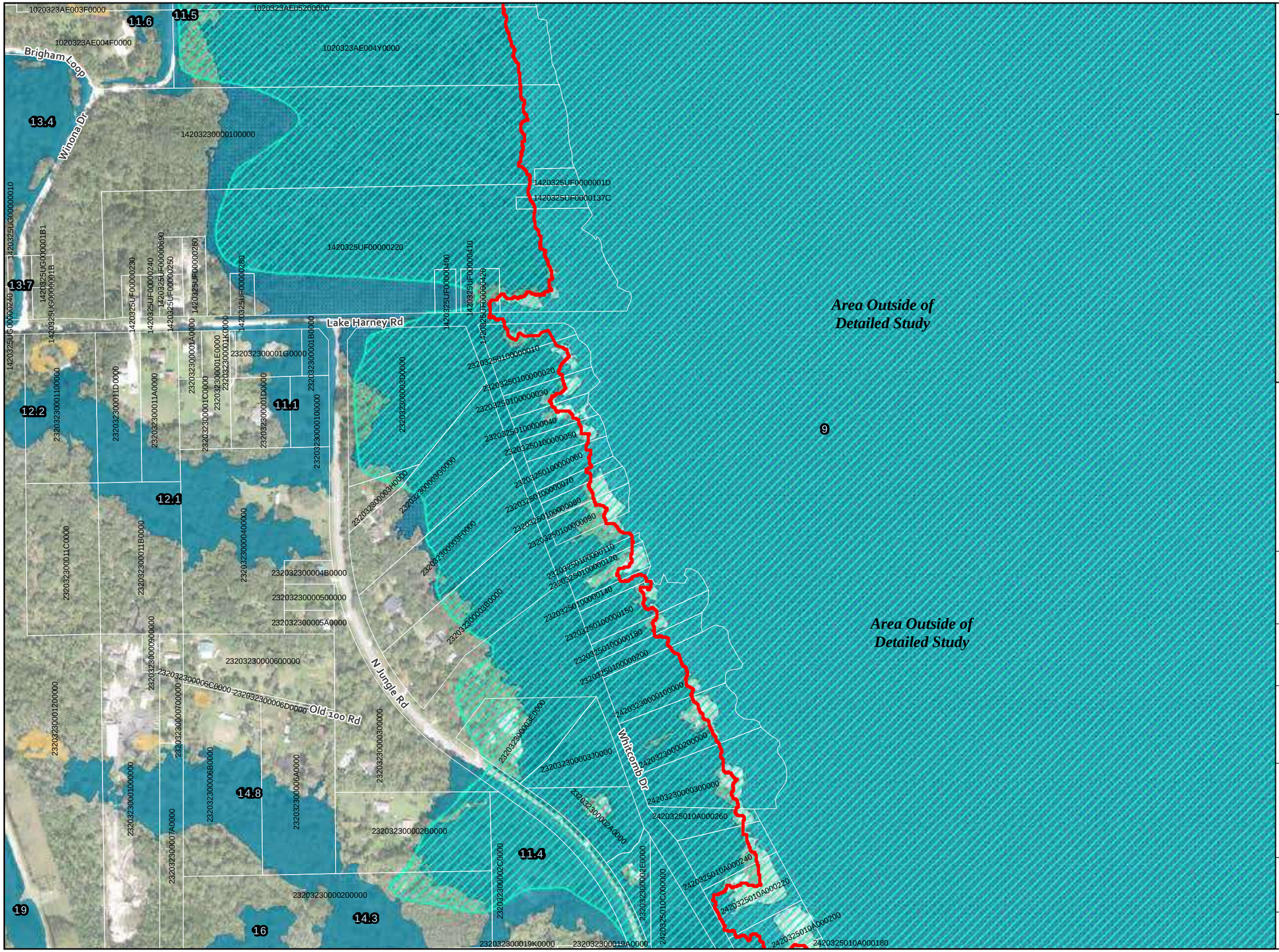
0 200 400 Feet

N

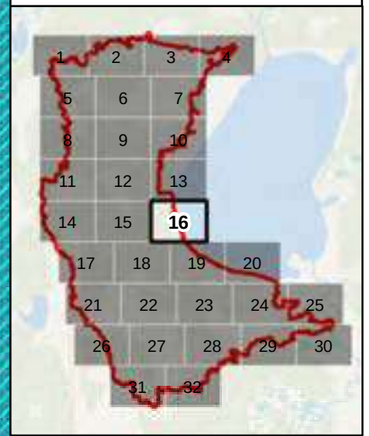
Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **15**

Lake Harney Basin
Watershed Flood Resiliency Plan



Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

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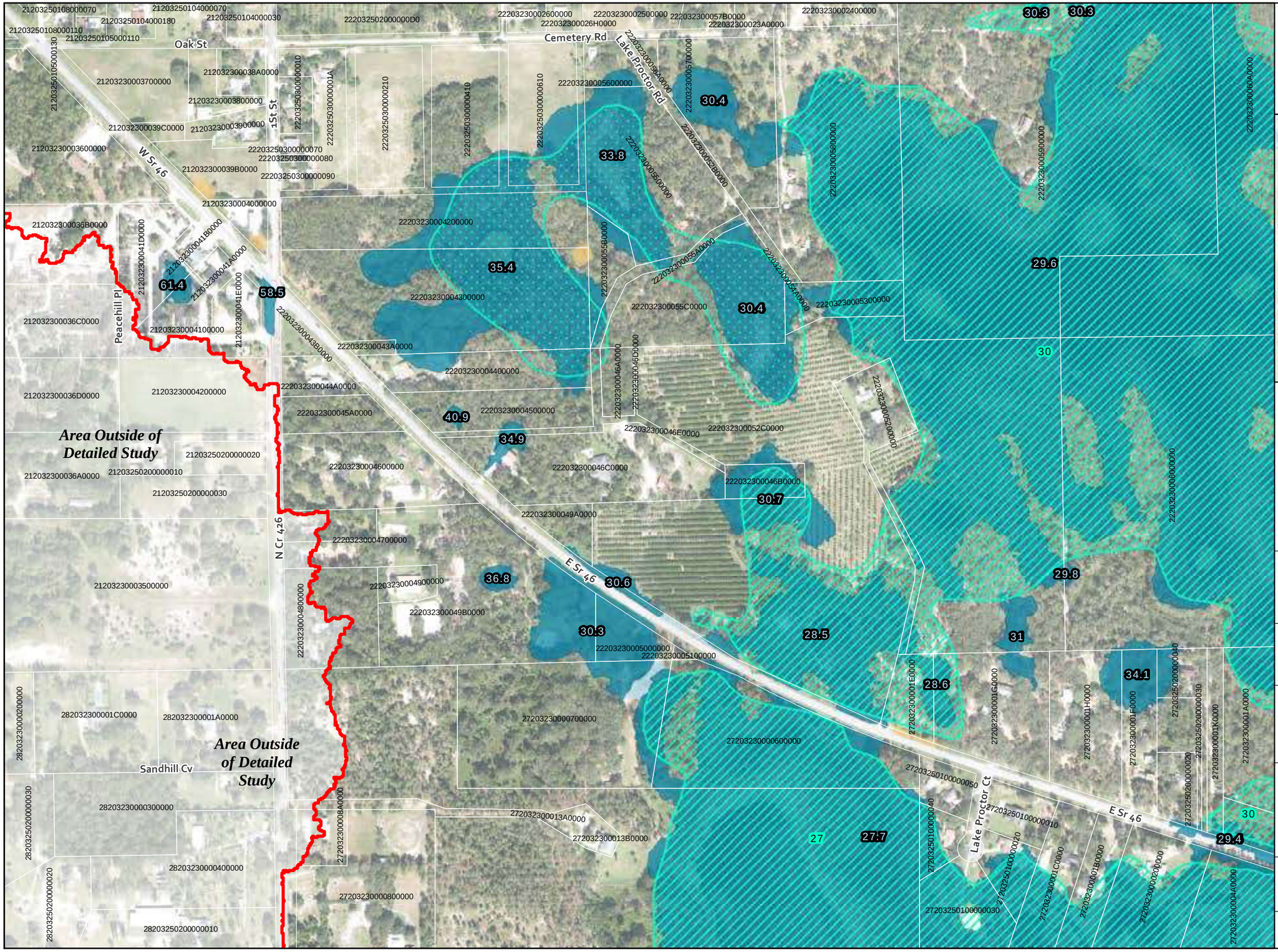
0 200 400 Feet

N

Seminole County
Florida's Natural Choice

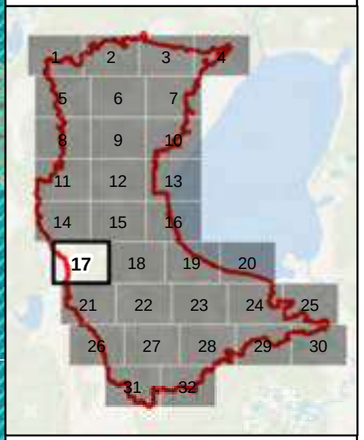
Preliminary Floodplains Detail Map **16**

Lake Harney Basin
Watershed Flood Resiliency Plan



Geosyntec consultants

3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
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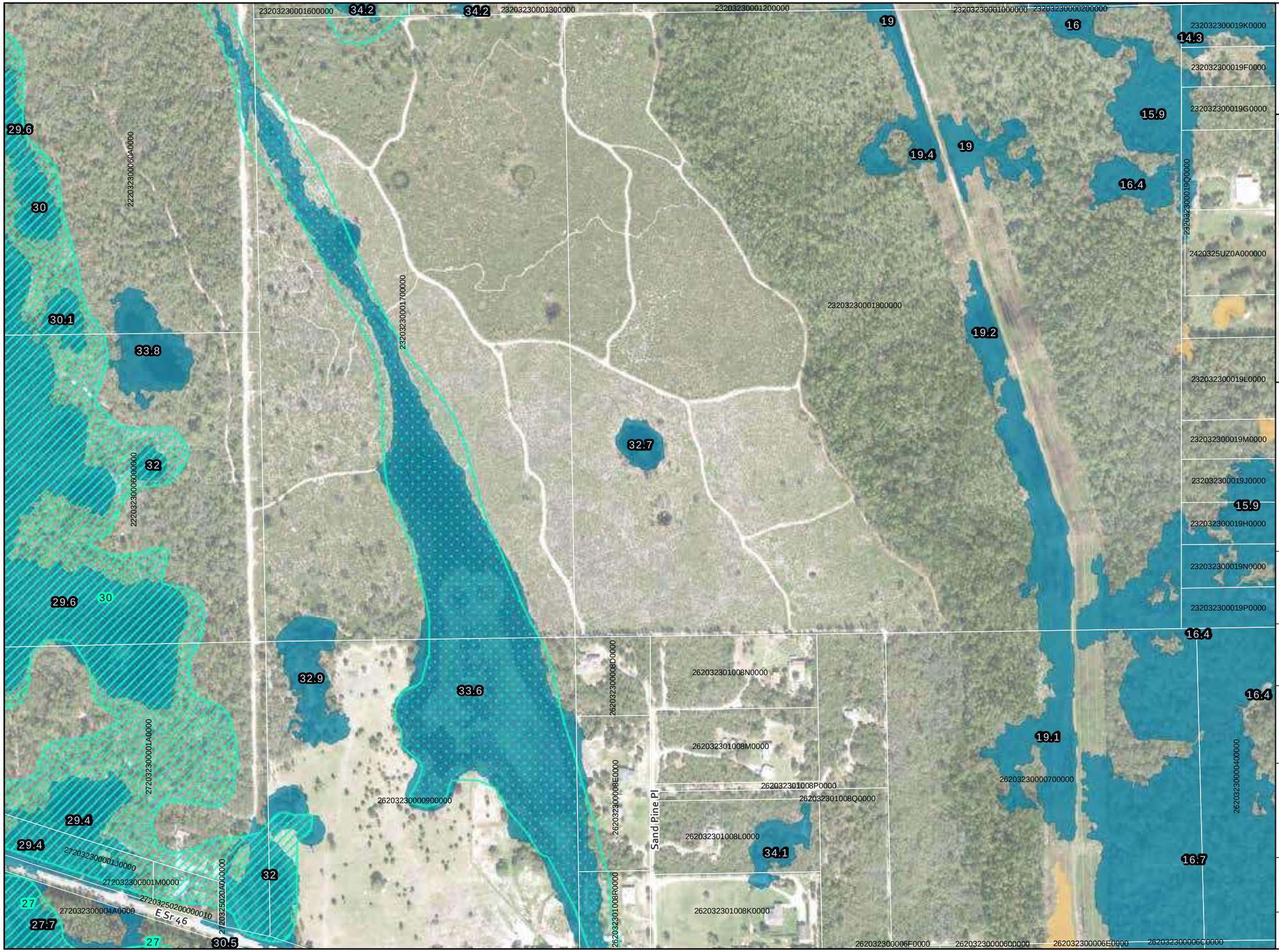
N

0 200 400 Feet

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map **17**

Lake Harney Basin
Watershed Flood Resiliency Plan



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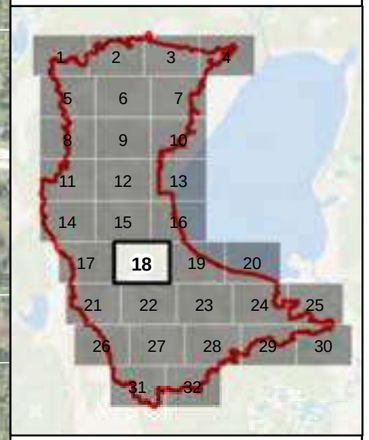
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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SFHA: FEMA, 2007

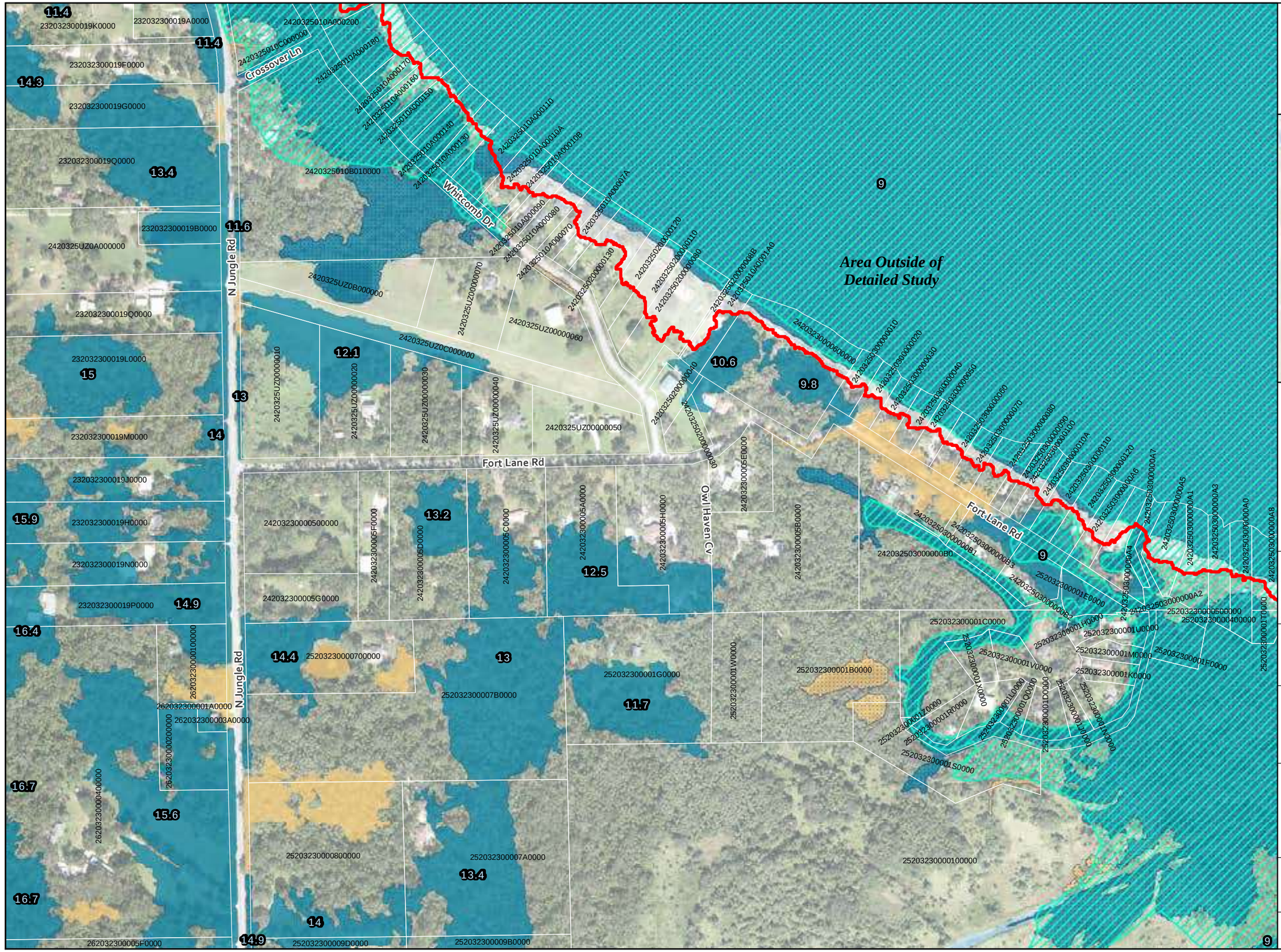
N

0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **18**

Lake Harney Basin
Watershed Flood Resiliency Plan



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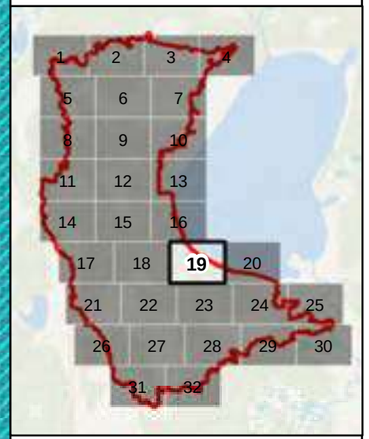
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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SFHA: FEMA, 2007

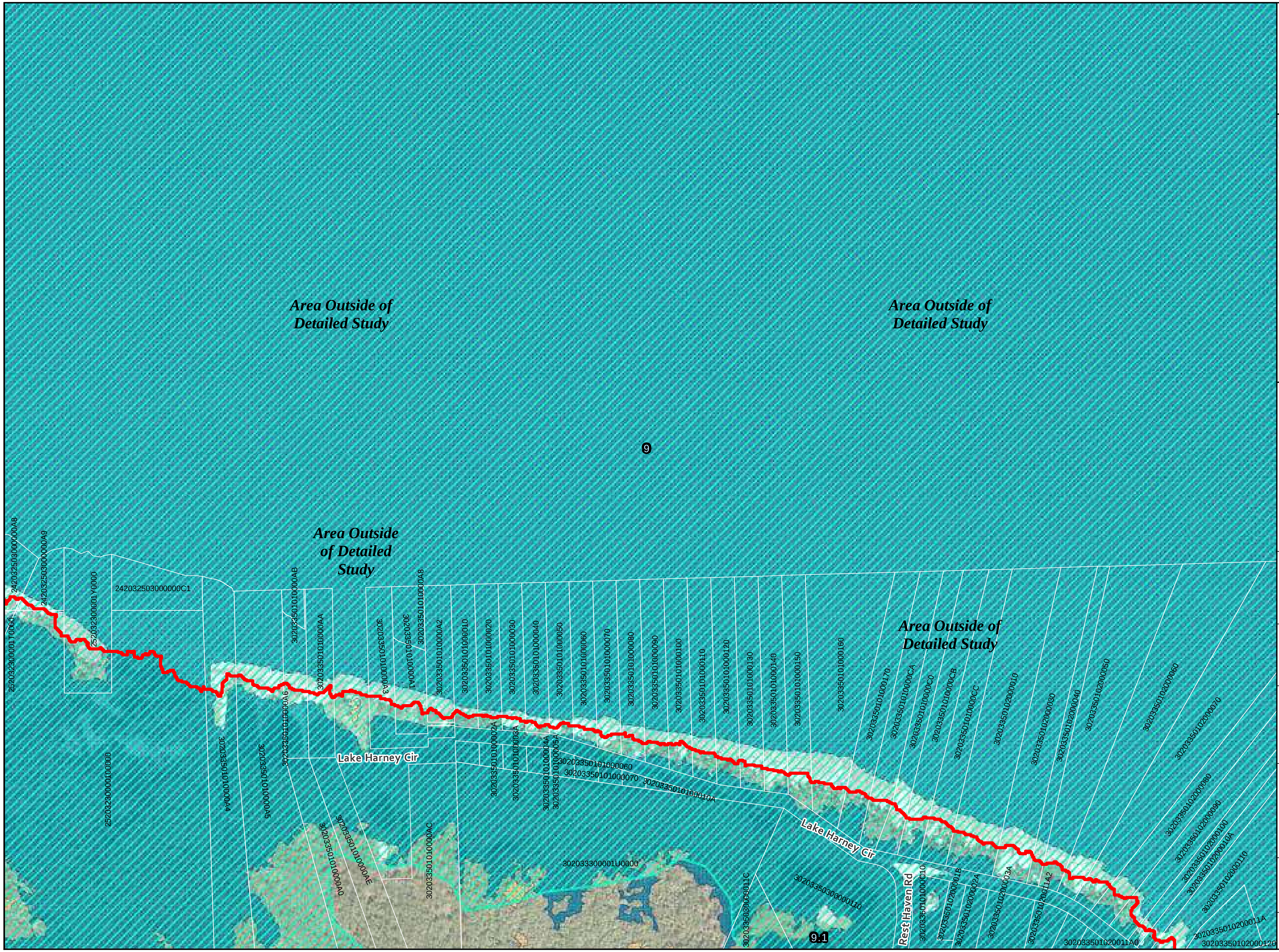
0 200 400 Feet

N

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map **19**

Lake Harney Basin
Watershed Flood Resiliency Plan



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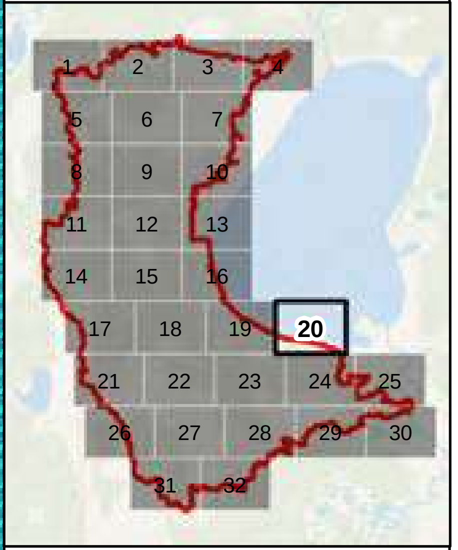
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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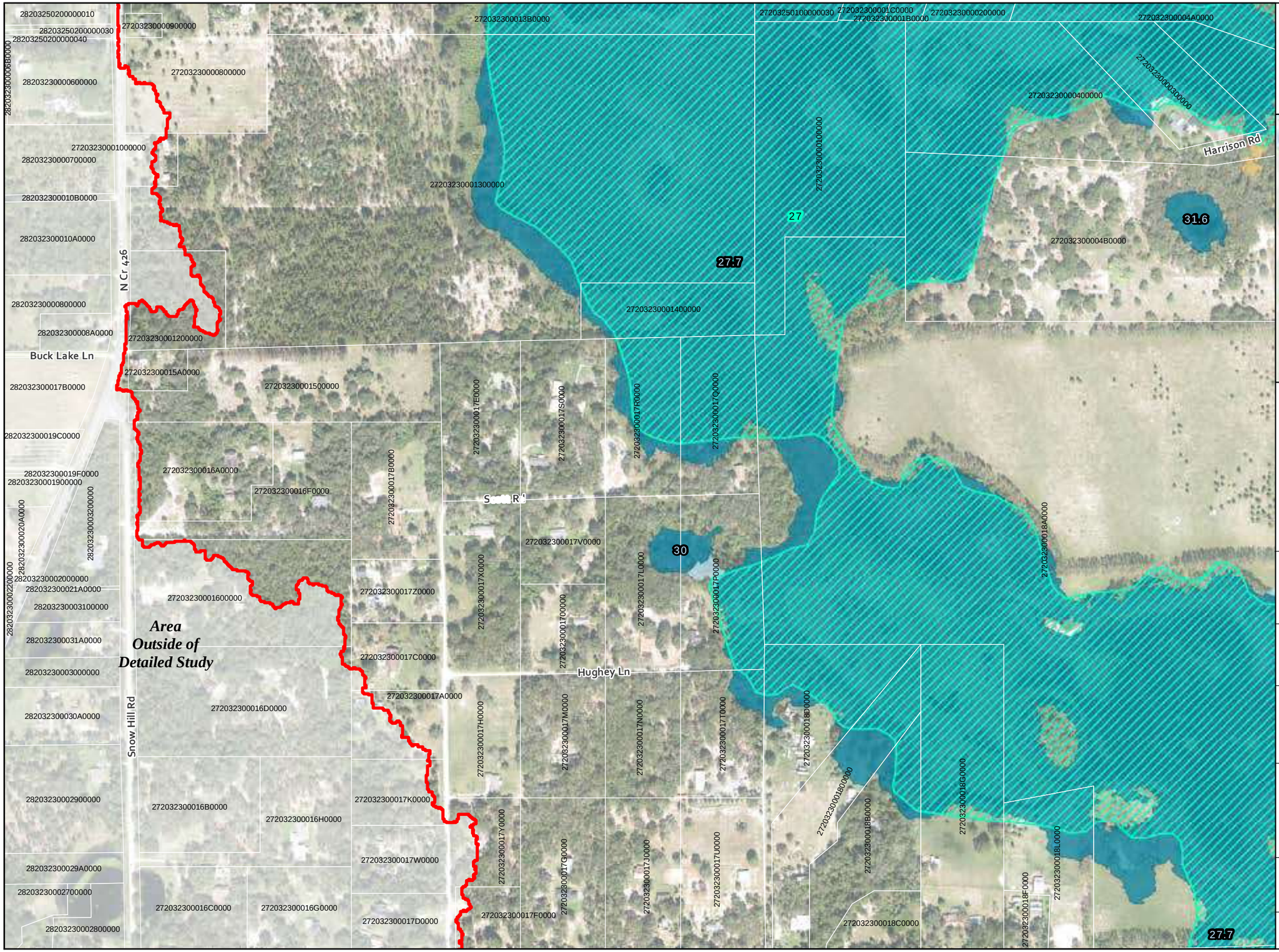
0 200 400 Feet

N

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map **20**

Lake Harney Basin
Watershed Flood Resiliency Plan



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3504 Lake Lynda Drive, Ste 155
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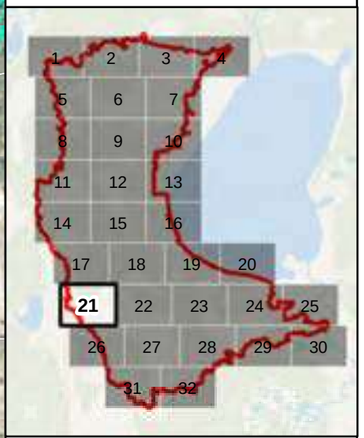

Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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Streets: Seminole County, 2020
SFHA: FEMA, 2007

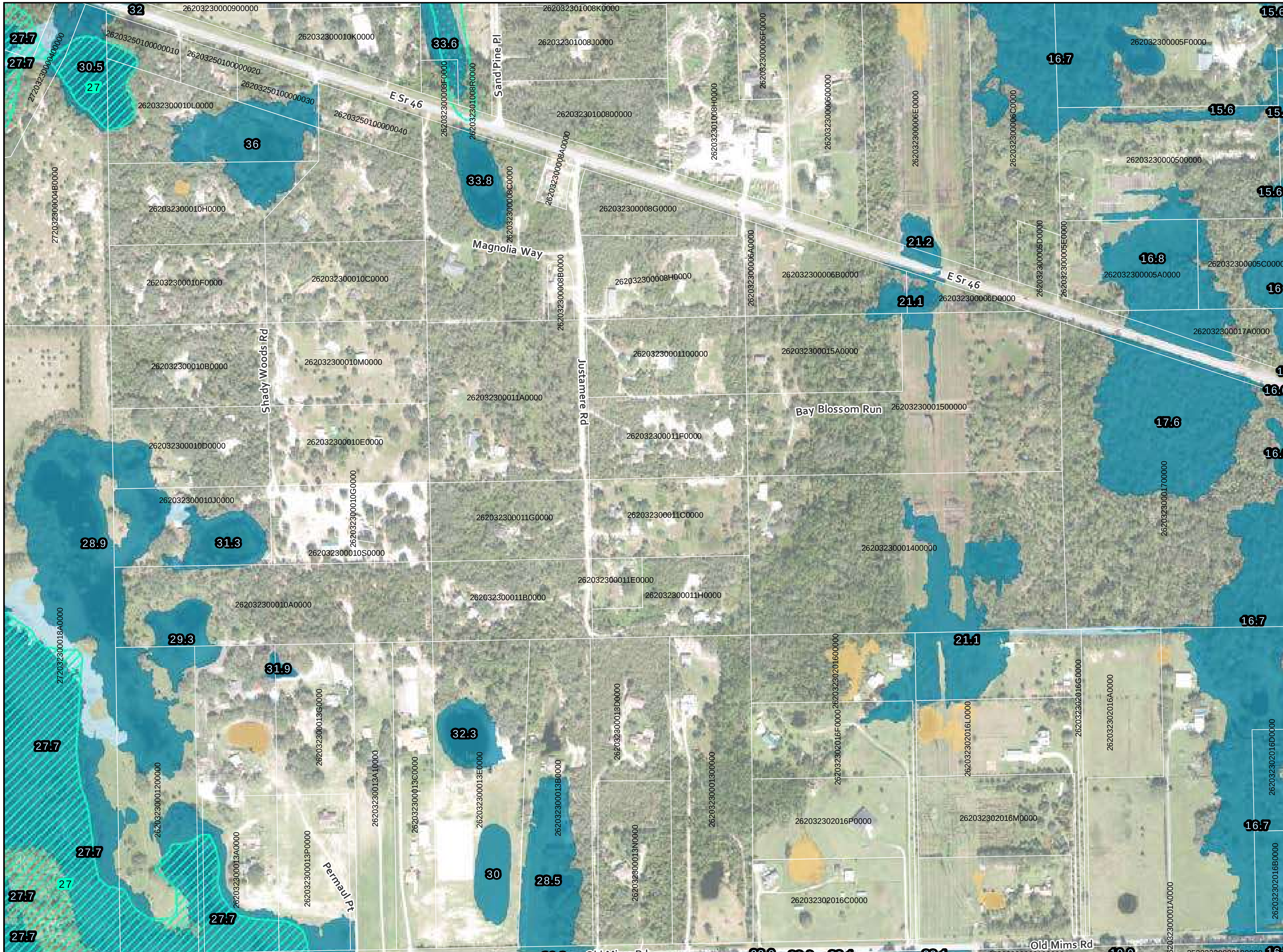
N

0 200 400
Feet

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map **21**

Lake Harney Basin
Watershed Flood Resiliency Plan



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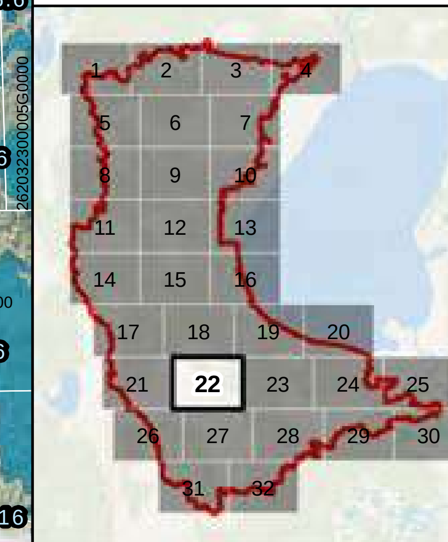

Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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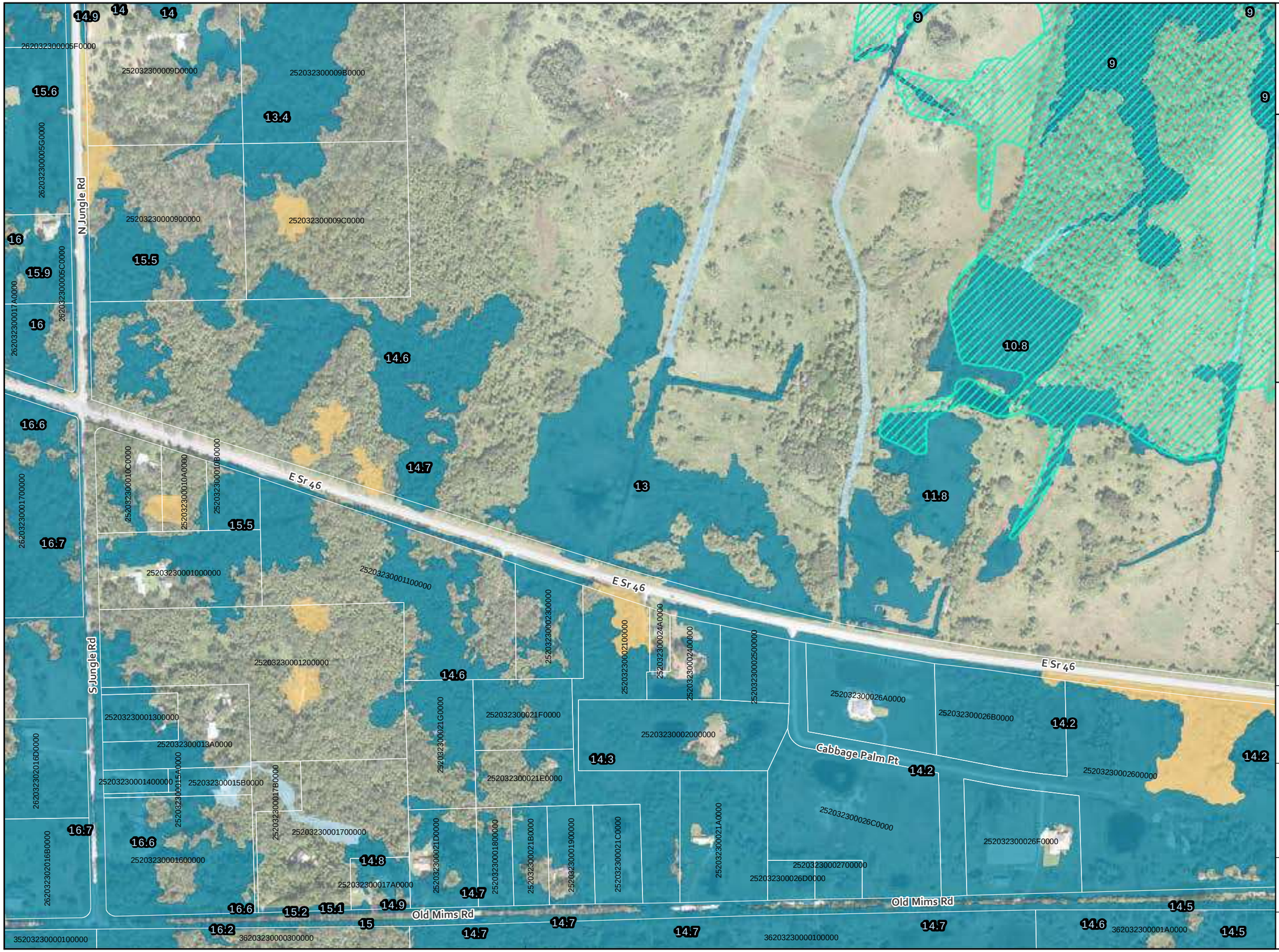
Streets: Seminole County, 2020
SFHA: FEMA, 2007

0 200 400 Feet

N

Preliminary Floodplains Detail Map 22

Lake Harney Basin
Watershed Flood Resiliency Plan



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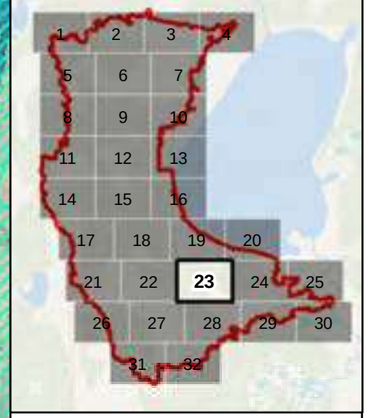

Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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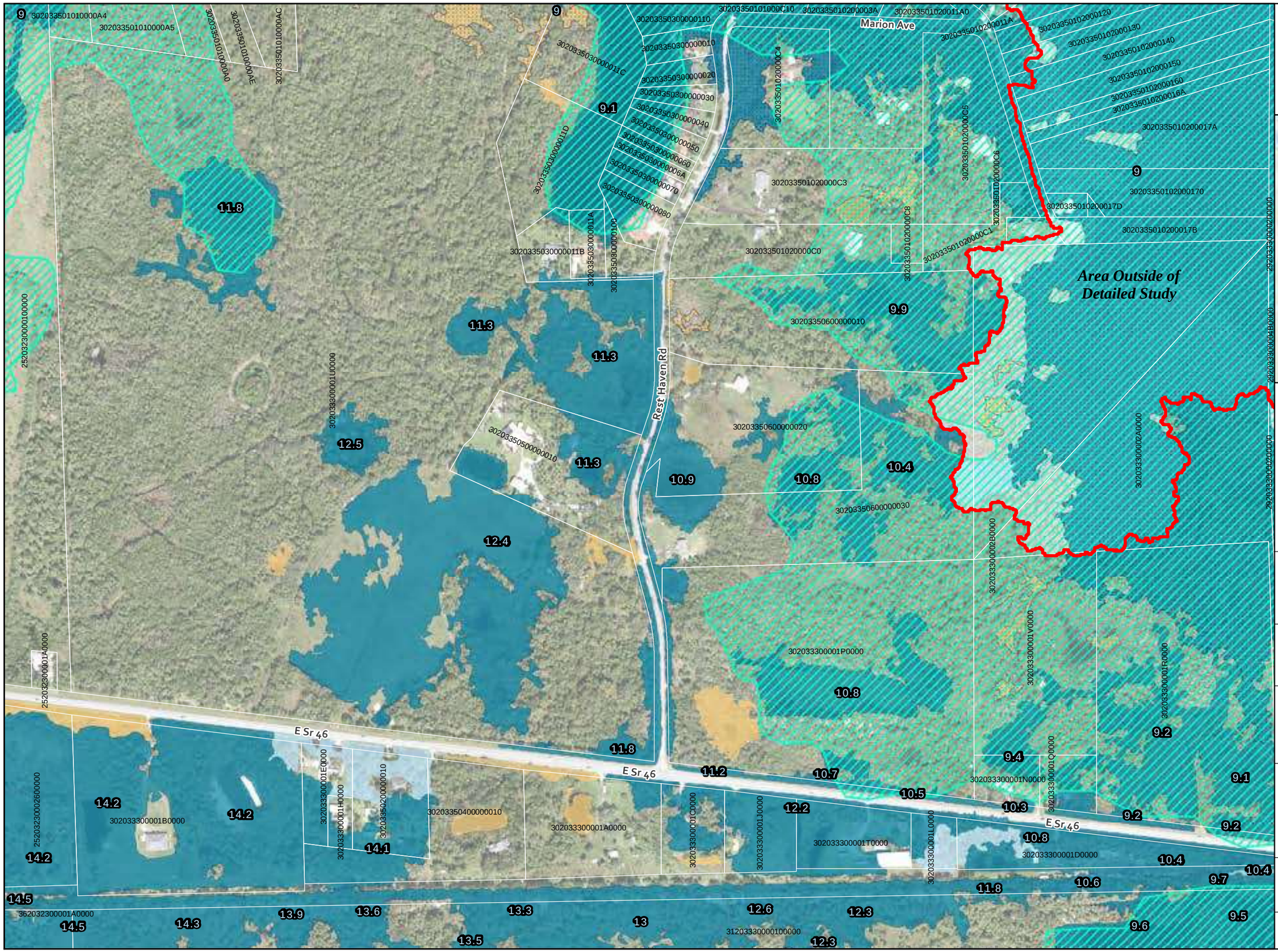
N

0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **23**

Lake Harney Basin
Watershed Flood Resiliency Plan



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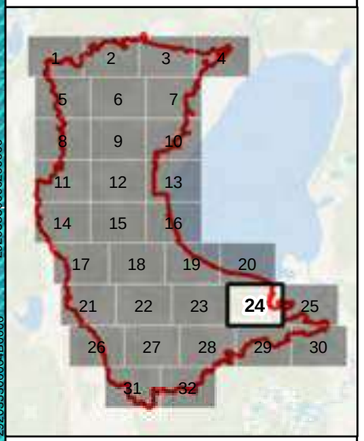
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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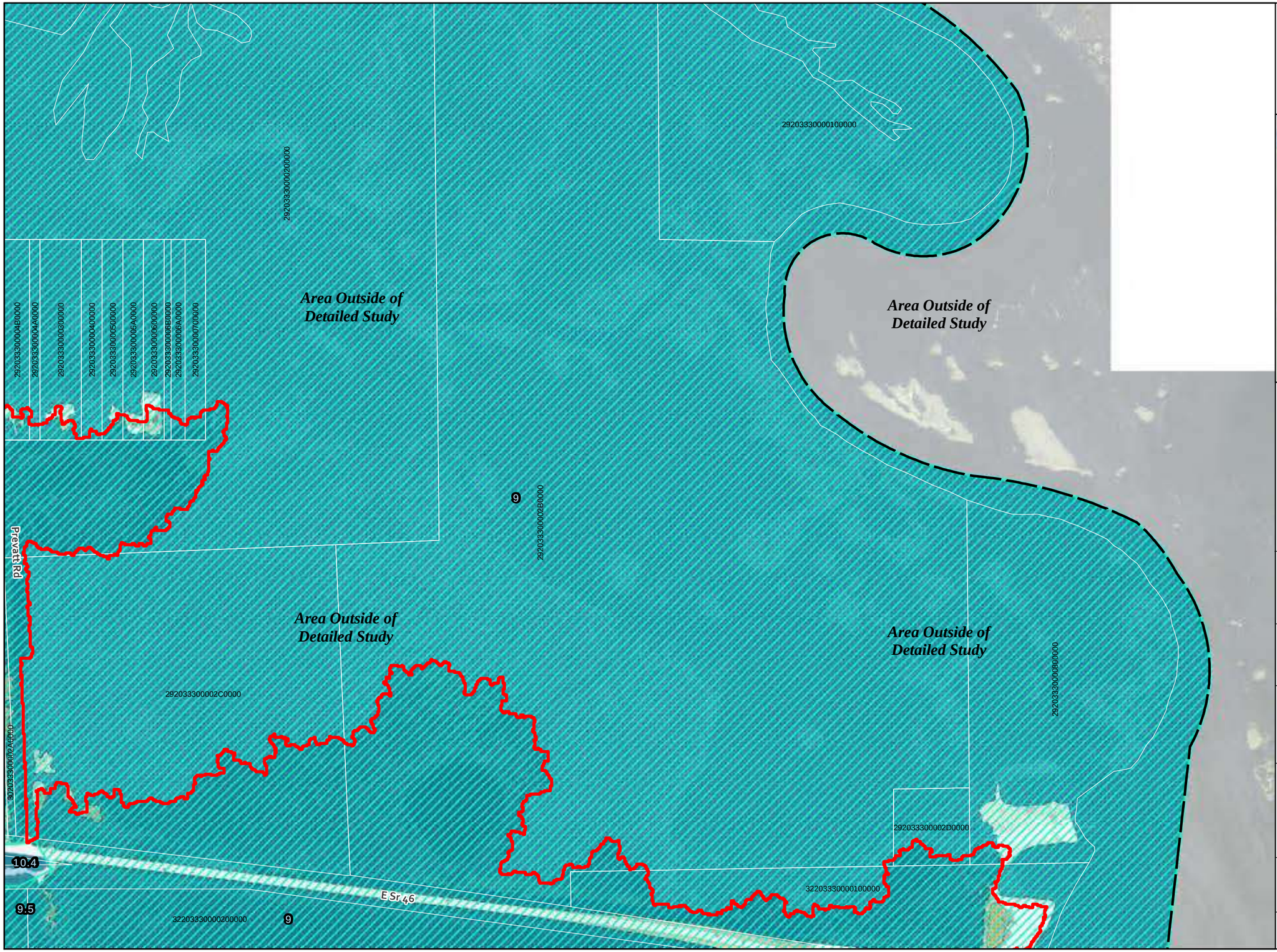
0 200 400 Feet

N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **24**

Lake Harney Basin
Watershed Flood Resiliency Plan



Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
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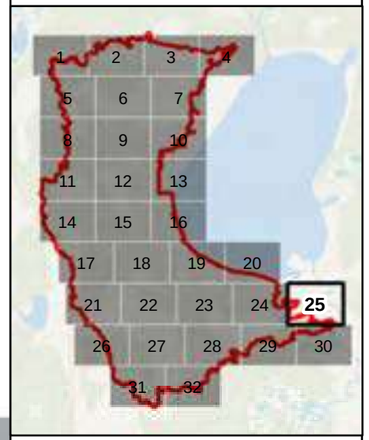

Legend
- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains
- AE
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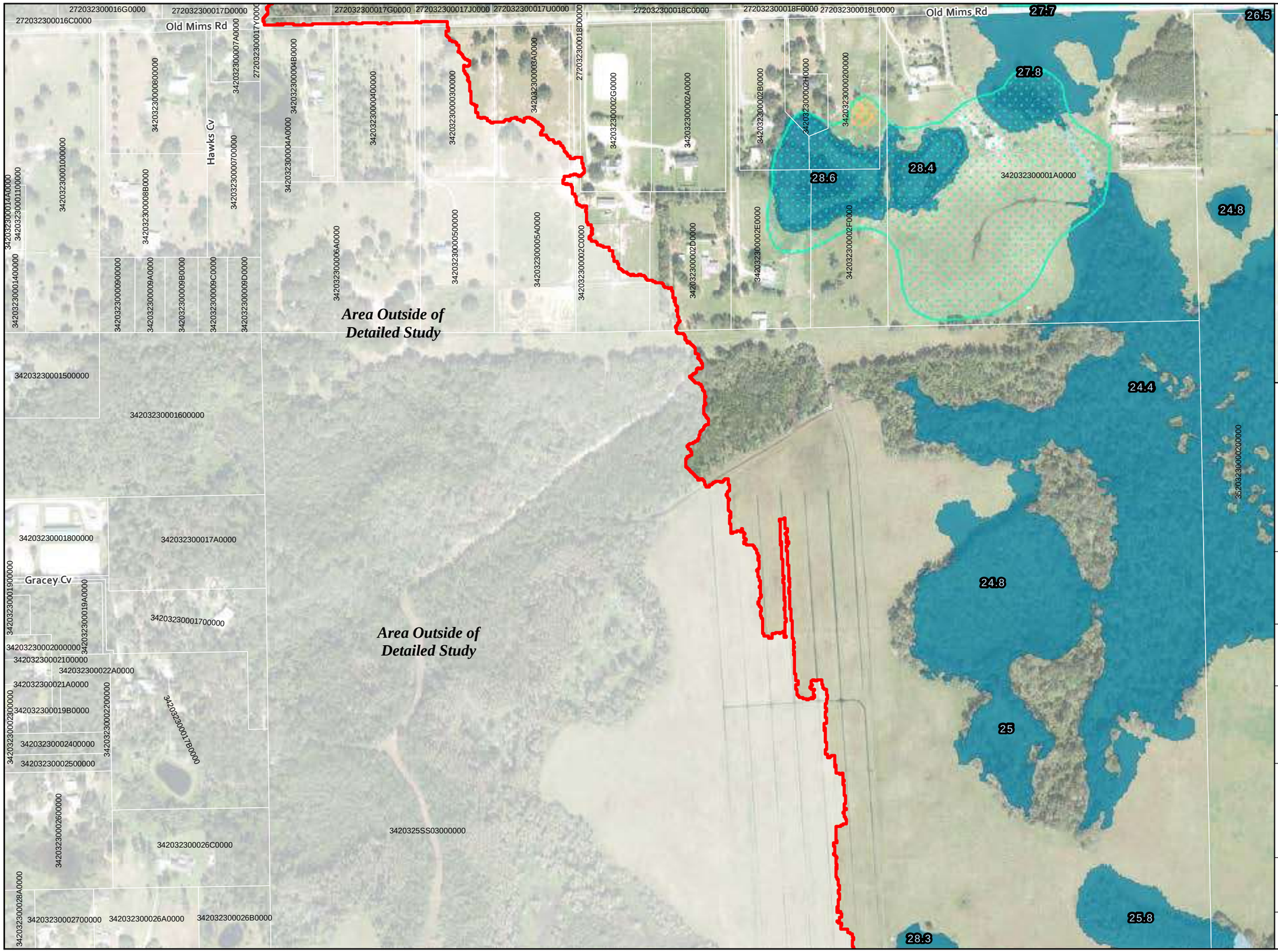
SFHA: FEMA, 2007

N
0 200 400
Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **25**

Lake Harney Basin
Watershed Flood Resiliency Plan



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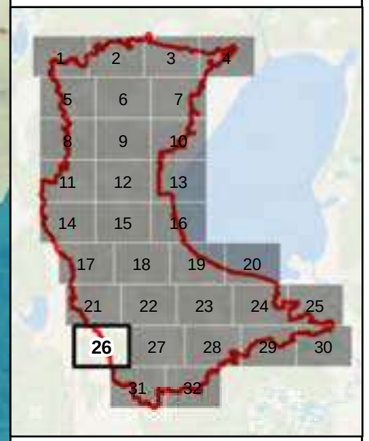

Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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SFHA: FEMA, 2007

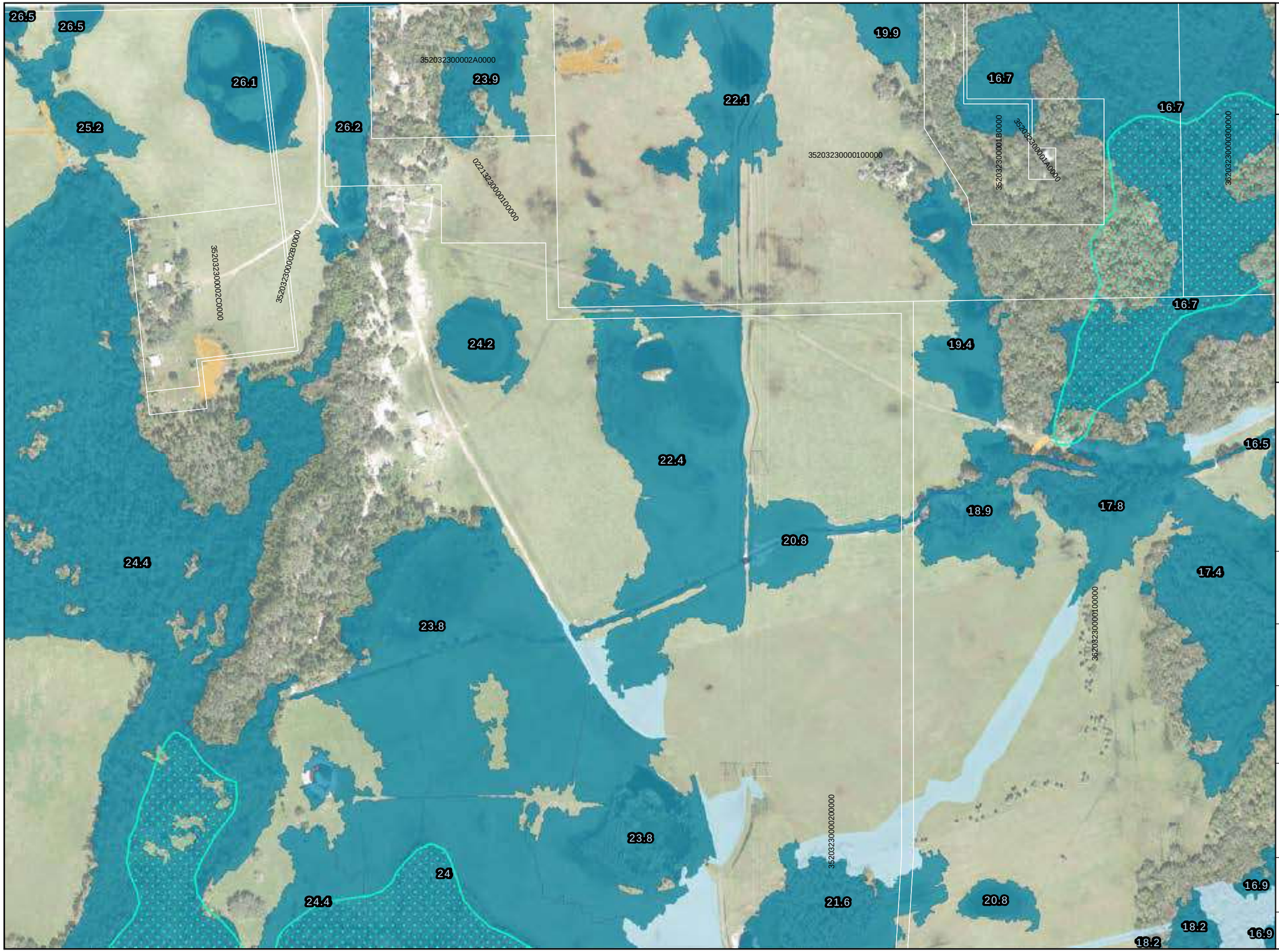
0 200 400 Feet

N

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **26**

Lake Harney Basin
Watershed Flood Resiliency Plan



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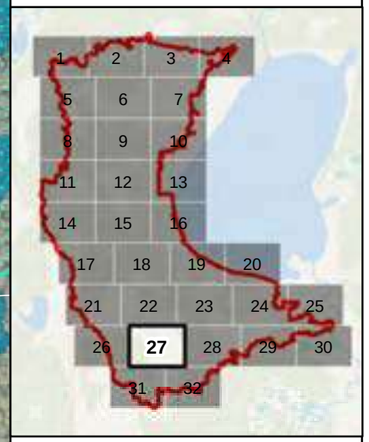

Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

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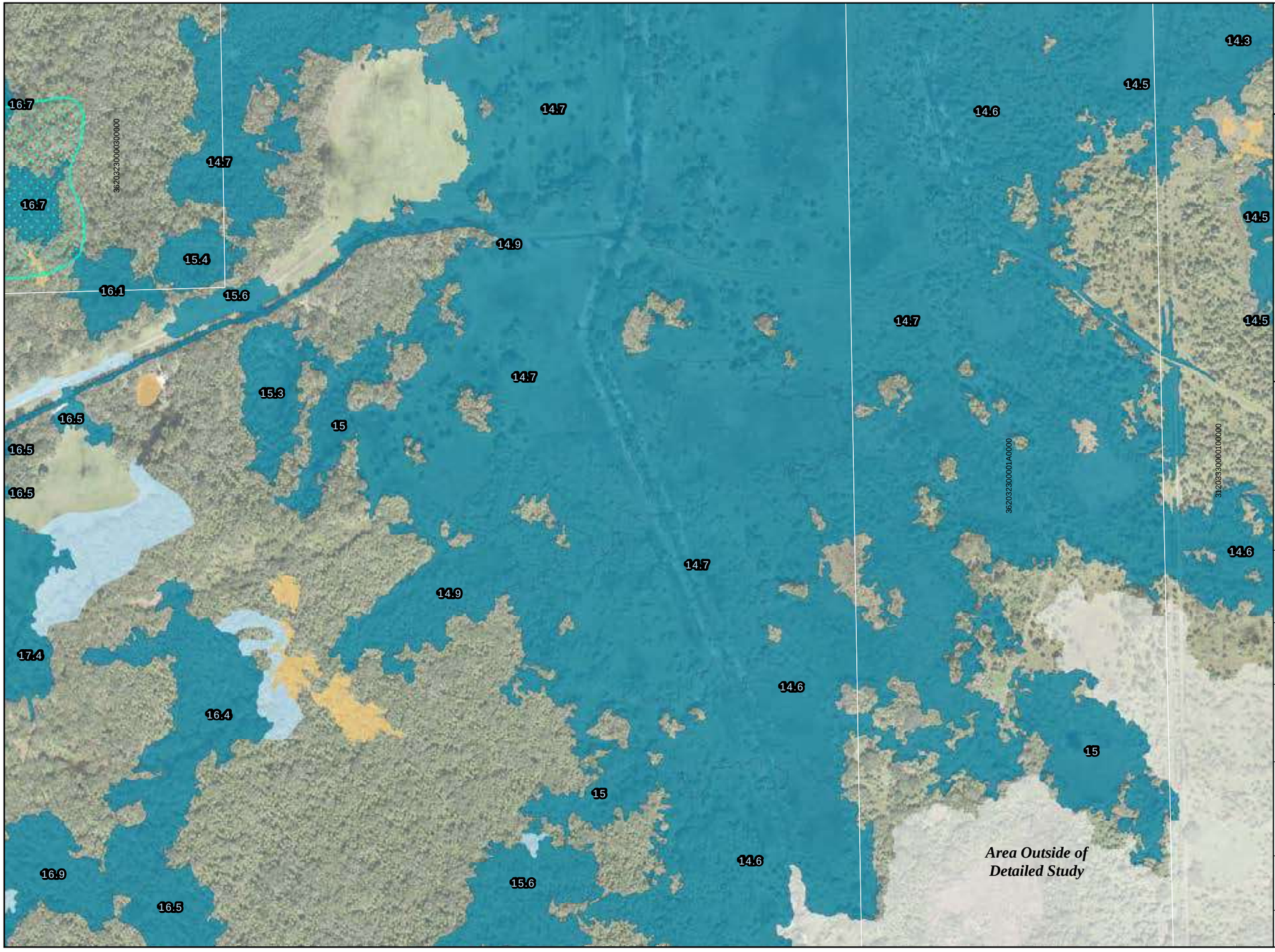
N

0 200 400
Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **27**

Lake Harney Basin
Watershed Flood Resiliency Plan



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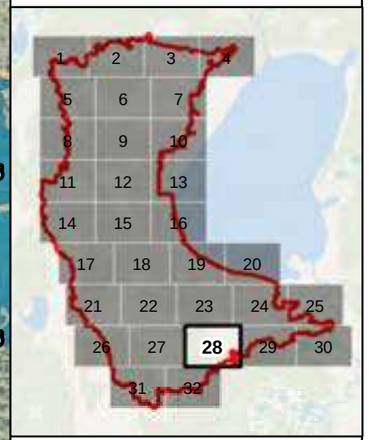

Legend

- Detailed Study Area
- County Boundary
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Preliminary 100-Year Floodplains

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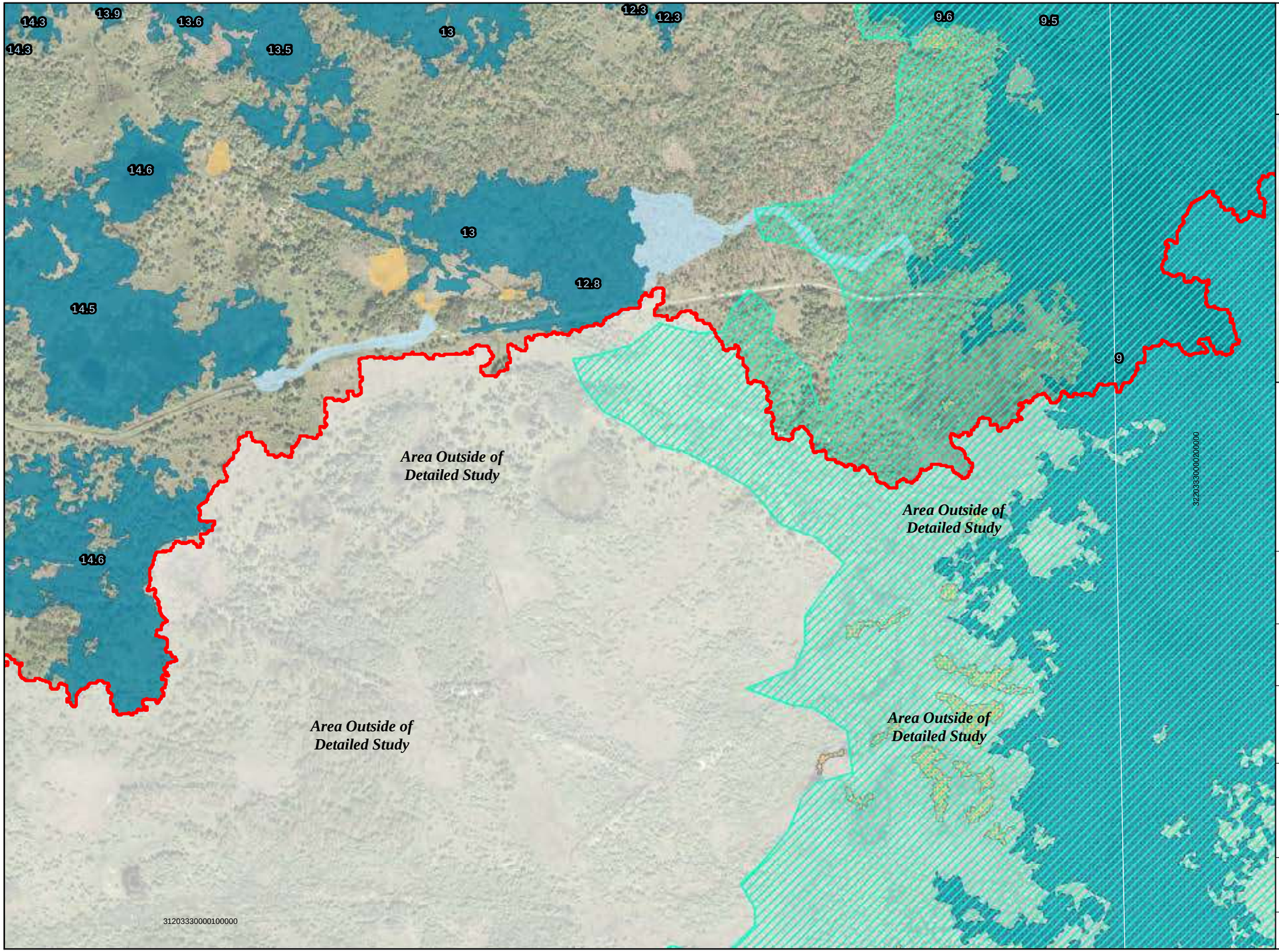
N

0 200 400
Feet

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map **28**

Lake Harney Basin
Watershed Flood Resiliency Plan



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3504 Lake Lynda Drive, Ste 155
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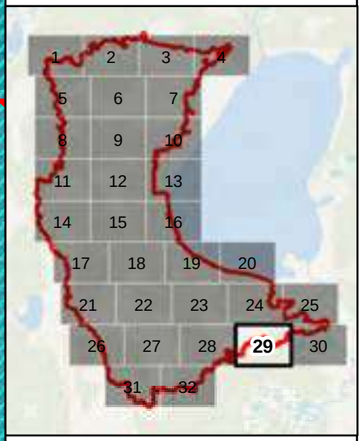

Legend

- Detailed Study Area
- County Boundary
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Preliminary 100-Year Floodplains

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SFHA: FEMA, 2007

N

0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **29**

Lake Harney Basin
Watershed Flood Resiliency Plan

Geosyntec consultants
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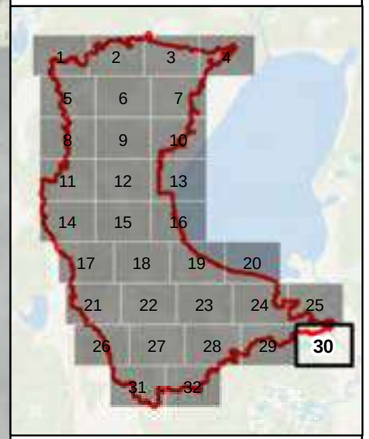

Legend

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- County Boundary
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Preliminary 100-Year Floodplains

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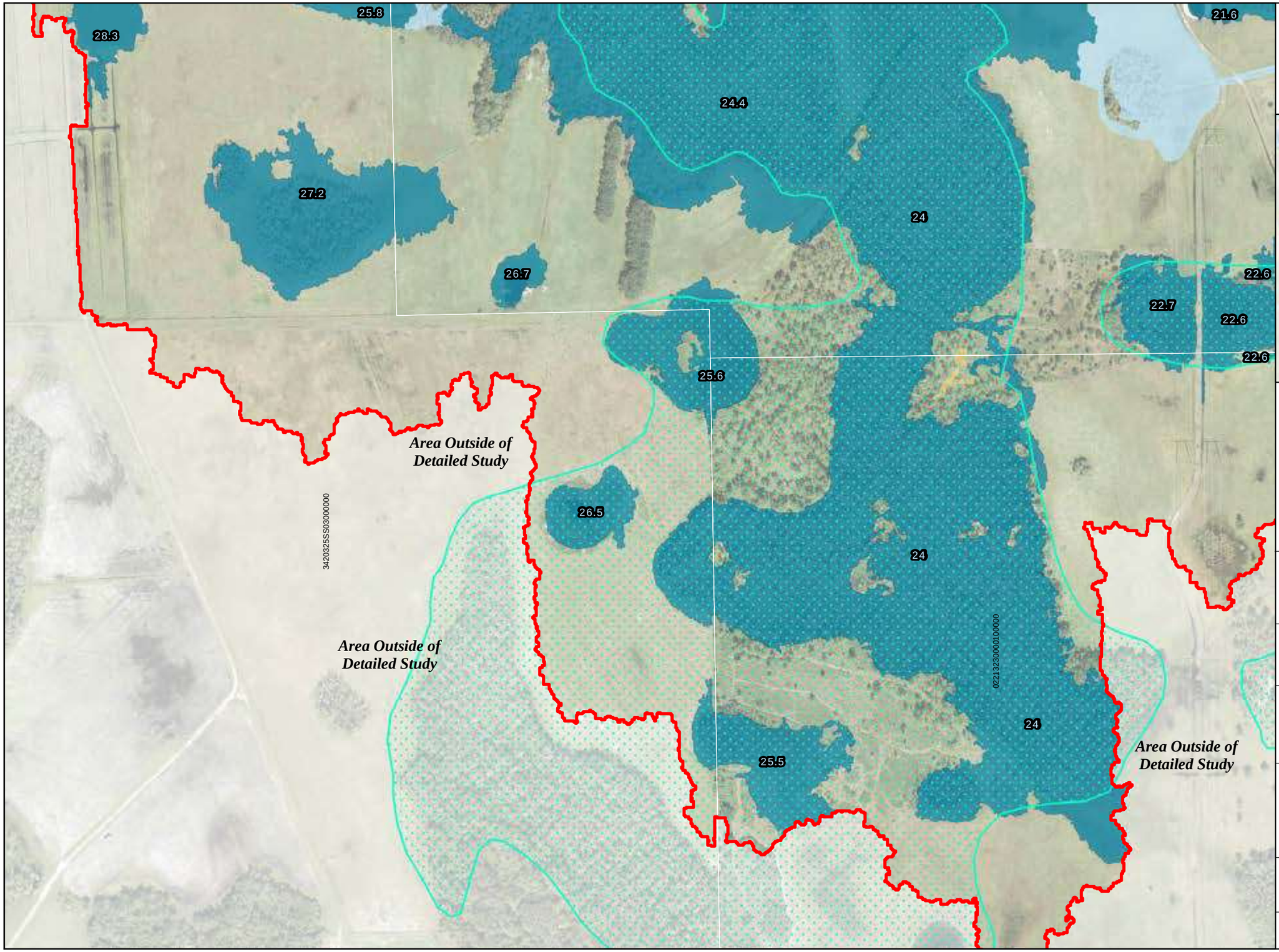
0 200 400 Feet

N

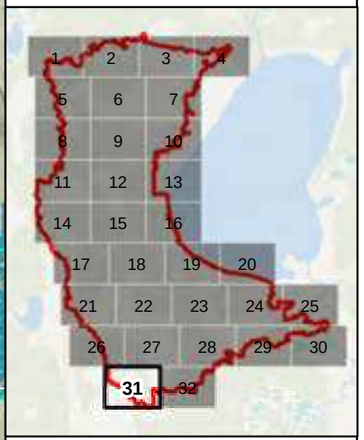
Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **30**

Lake Harney Basin
Watershed Flood Resiliency Plan



Geosyntec consultants
3504 Lake Lynda Drive, Ste 155
Orlando, FL 32817



Legend

- Detailed Study Area
- County Boundary
- Parcels

Preliminary 100-Year Floodplains

- AE
- A
- A, Transition Zone
- Revised Lake Harney / SJR Floodplain

Effective FEMA Floodplains

- A
- AE

Note: Preliminary information provided for review purposes and subject to additional revisions. Do not use for flood insurance determinations. Flood elevations given in feet above the North American Vertical Datum of 1988 (NAVD88). Proposed changes to the Lake Harney/St. Johns River (SJR) floodplain are based on more detailed topographic data; SJR modeling was not performed or reevaluated for this study.

Sources:
Aerial: FDOT, 2018
Parcels: Seminole County, 2020
Streets: Seminole County, 2020
SFHA: FEMA, 2007

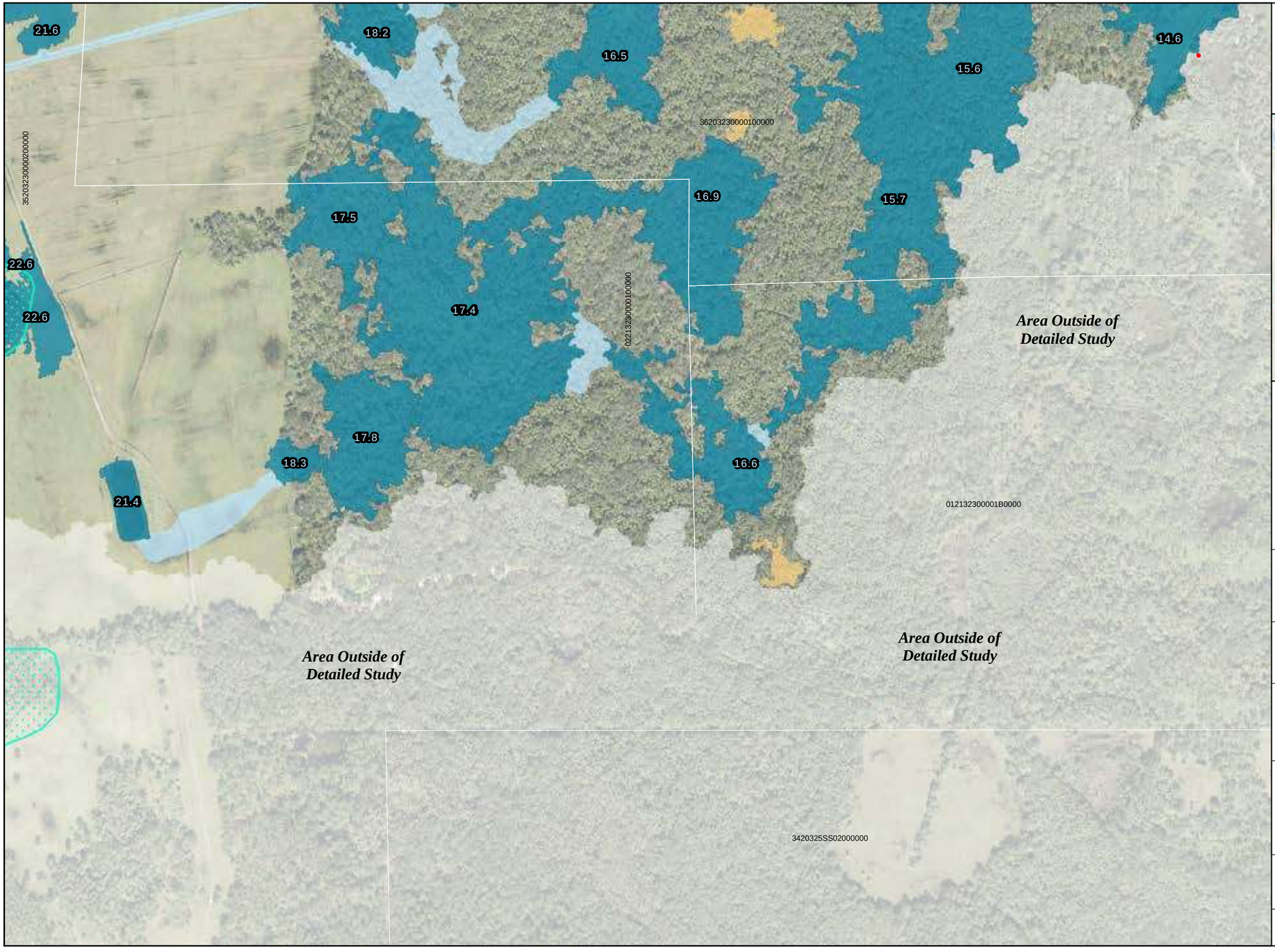
N

0 200 400 Feet

Seminole County
Florida's Natural Choice

Preliminary Floodplains Detail Map **31**

Lake Harney Basin
Watershed Flood Resiliency Plan



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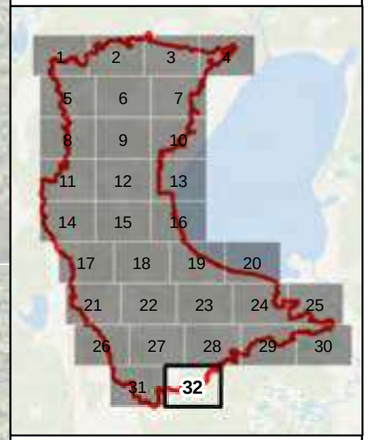

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N

0 200 400
Feet

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

Preliminary Floodplains Detail Map **32**

Lake Harney Basin
Watershed Flood Resiliency Plan