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September 10, 2020

Mr. Bob Heeke
Suwannee River Water Management District
9225 CR 49
Live Oak, FL 32060

Re: Scope of Work for Hydrologic Restoration on the Lower Suwannee National Wildlife Refuge – Engineering and Design Phase, Dixie and Levy Counties, Florida
Wood Project No. 6572200372

Dear Mr. Heeke:

Wood Environment & Infrastructure Solutions, Inc. (Wood) is pleased to present this Scope of Work for Hydrologic Restoration services for the Lower Suwannee National Wildlife Refuge (LSNWR) Project. This project is for design and engineering assistance for the hydrologic restoration of the LSNWR.

This proposal includes hydrologic modeling, restoration practices alternatives and conceptual design plans for the hydrologic restoration of the LSNWR. This Scope of Work outlines our proposed services and associated fees to perform the requested services.

PROJECT INFORMATION

The overarching goal of the project is to restore the estuarine balance of the system by providing a more natural flow exchange between the estuarine waters of Suwannee Sound and its numerous freshwater tributaries, while simultaneously eliminating areas of repetitive unpaved road washouts during high water events. The 194 miles of roads and trails developed for the commercial timber industry across the 53,000-acre refuge serve as dikes and lateral diversions altering the natural flow patterns and restricting the flow of freshwater in ways suspected of truncating the salinity gradient of tidal creeks and concentrating Sound salinity during dry periods. The goal is not to necessarily restore pre-development hydrologic conditions but to focus on engineering measures



to facilitate the natural delivery of fresh water from the Refuge to the estuary to benefit and enhance ecological functions.

In addition to hydrologic alterations associated with the Refuge road network, portions of the bottomlands and flatwoods within the Refuge were utilized for logging and commercial silviculture prior to public ownership and as such, many historically wet areas were bedded and have drag scars also contributing to altered overland flow paths. Approaches meeting the prime objectives that also improve the terrestrial hydroecology of the refuge are desired, but palustrine habitat restoration is a secondary priority.

Wood proposes to develop hydrologic restoration and enhancement alternatives using proven methodologies, existing data including LiDAR, and working with the Suwannee River Water Management District (SRWMD) and the USFWS National Wildlife Refuge (NWR) Team.

The project includes online data collection, field reconnaissance, development of a GIS modeling database, existing and proposed hydrologic modeling, and development of restoration alternatives with associated modeling and preparation of design concepts.

The considered alternatives will restore to the greatest extent practicable hydrologic conditions in the Refuge. The Dixie Mainline will receive special consideration because of its dual use as a public road used for evacuations. The scope does not include designing improvements for the Dixie Mainline Road to meet hurricane evacuation-route standards. Wood will coordinate closely with Refuge and District staff and other interested parties regarding the desired level of service of public access roads and Refuge maintenance roads when considering road removal versus treatments allowing continuity of access.

PROPOSED SCOPE OF SERVICES

Wood will develop existing conditions and proposed conditions hydrologic and hydraulic models, conceptual restoration designs, and preliminary costing for the proposed restoration alternative designs. This work will include collection of GIS data, preparation of hydrologic models including existing conditions and proposed alternative restoration conditions, and development of conceptual construction plans and an estimate of probable costing.

The alternatives restoration practices to be considered include road removal, culvert replacement, the installation of additional culverts and low water crossings, causeways, ditch plugs, bridges, and areas of silviculture bed and berm removal. A model will be developed to determine the amount of restoration of surface water flows that will be provided by the alternatives and a costing per each restoration practice. These practices will be compiled for the alternatives and ranked based on criteria agreed to by the Team.



Task 1 – Dixie and Levy County Data Collection

As part of the project, Wood will review the proposed project with SRWMD and USFWS staff to ensure the key locations for potential restoration practices alternatives are identified. The SRWMD and the Refuge will coordinate outside interested parties as needed.

Wood will perform the following tasks for the north side of the Suwannee River with the Dixie Mainline Road as the focal point of the Study area North of the River. Wood will also perform these tasks for the south side of the Suwannee River with the Lower Suwannee National Wildlife Refuge Nature Drive (or Loop Road) as the focal point of the Study Area south of the River. **(Figure 1).**

- Wood will research, obtain and review desktop data for the project including current and historic aerials, LiDAR and Digital Elevation Model (DEM), landuse data from the SRWMD, soils information from NRCS, National Wetland Inventory (NWI) information, flora and fauna (FNAI) information, hydrologic basin and sub-basin delineations, Refuge roads, trails and culverts, and other upstream hydrologic conveyance feature data. Wood will also review the monitoring stations along the coast for use in development of tidal effects to be incorporated into the models.
- Wood will collect field data along roads and embankments of existing structures to include culverts and other berm features.
- Wood will develop a plan to collect survey information that will help further develop the hydrologic modeling efforts. This plan will include verification of DEM along roads along with visual verification of ditches and some typical cross sections of ditches and streams and elevations of main conveyance features across the site. Smaller pipe features may be field measured for inclusion in the model.

Deliverable

Outline of the Letter Report and a list of data collected and their sources.

Task 2 – GIS Database Compilation and Development

Wood will collect data and compile it into a GIS database for development of a surface water model. Included in the model will be water-level time-series curves representing tides propagating from the Gulf of Mexico up through the Suwannee River and creeks into the site.

- LiDAR Review: The LiDAR that Wood is proposing to use is dated 2020 and was prepared by NOAA's National Centers for Environmental Information (NCEI). A second LiDAR data set was developed by NOAA and is dated 2014. This data set's resolution is 5.5 feet per pixel and may be used in select places to verify the accuracy of the 2020 data set, which has a resolution of 1 meter per pixel.
- GIS Data: Wood will obtain various data sets to implement in the development of the hydrologic model and permitting. Wood will develop a database that covers the study



limits and will first be populated with observable information obtained from desktop references such as: Google Earth aerial and street view imagery, land use coverage from SRWMD GIS data sets, NRCS Soils data, NWI coverages, and the FNAI. Additionally, collection and review of USFWS available data and integrating information into the overall project GIS database. USFWS has provided GIS data that entails a layer with information and location of existing features.

- Tidal Data: Historical water levels will be obtained from the NOAA CO-OPS tide stations, available through the Tides and Currents portal, (<https://tidesandcurrents.noaa.gov>). While recent water level data is not available for LSNWR proper, water levels are available at other locations within the region at Cedar Key, FL [Station 8727520], Apalachicola, FL [Station 8728690] and Waccasassa River near Gulf Hammock [Station 02313700]. The water level observations, harmonic constituents and meteorological data will be reviewed. This information will be used to understand the surface water flows in the tidal creeks and will be incorporated into the ICPR model as a downstream node.
- Background Information: Wood will research previous hydrologic models, existing structure information and other pertinent data for reference in the development of this proposed hydrologic assessment. Possible sources include Federal Emergency Management Agency (FEMA), Suwannee River Water Management District and Florida State University Beaches and Shores Research Center (BSRC).
- Stormwater Structures: Collection and review of USFWS available data and integration of the information into the GIS database. USFWS has provided its data to Wood. Wood will check with FDOT to collect any relevant stormwater structure data available for the project area.
- Dixie and Levy Counties Additional Data Collection: Wood will select culverts, ditches and embankments to obtain additional survey information. These hydraulically significant structures will assist in development of the hydrologic model and help determine where additional features may be needed to control water flows during storm events.
 - 1-Woods staff will conduct a field visit to review areas and select the locations needed for additional survey data collection.
 - 2-Woods survey crew will obtain data on up to a total of 25 culverts/structures and 24 cross sections within the watershed to assist in model development. Cross-sections will be carefully selected to meet modeling objectives and diagnose areas of departure from geomorphic norms.
 - 2.1-All surveys will be consistent with SRWMD Survey Standards and will horizontally reference the Florida State Plane Coordinate System, North Zone, NAD83 (NSRS 2011) and vertically reference NAVD88 (Geoid 2012B). Assess use of Florida Permanent Reference Network (FPRN) for survey work and set additional control points and/or conduct site calibration to vertical control as necessary.
 - 2.2-Use horizontal positions of all QA checkpoints to overlay with Digital Elevation Model (DEM) developed in Initial Assessment through GIS Analysis.
 - 2.3-Extract elevation from DEM and compare Surveyed versus DEM elevations to Root Mean Square



- Wood will delineate sub-basins to capture water coming from the upstream watershed and in some areas, as we get closer to the Gulf of Mexico, capturing tidal influence focusing around the Dixie Mainline Road. Curve numbers and times of concentration will be established for each sub-basin.
- Wood will delineate sub-basins to capture water coming from the upstream watershed and in some areas, as we get closer to the Gulf of Mexico, capturing tidal influence focusing around the Refuge's Nature Drive Road in Levy County. Curve numbers and times of concentration will be established for each sub-basin.

Deliverable

Update Report with the methods of GIS database development. This will include survey data, as well as a writeup in the Report detailing the data collected and reviewed and figures and maps. The Report will include a summary of the existing available information that lists specific stormwater data as well as data coverage and specific infrastructure location. The report will include a summary table for the information gathered through desktop review, survey, and field verification of stormwater infrastructure. All collected stormwater information and inventory will be available under corresponding GIS layers. Mapping products created from the acquisition of the topographic data will consist of a 1" = 30' planimetric map depicting the topographic survey data collected.

Task 3 –Natural Conditions

After reviewing the historic aerials and FNAI information, provided by the District, Wood will develop a preliminary model to show how the wetlands within the refuge are hydrated based on their FNAI Classification. This information will be useful when determining wet areas and their hydration plus overall historic surface water flow patterns. The available aerial chronosequence will be interpreted for changes in habitat potentially associated with estuarine imbalance and such areas will be mapped and assessed in concert with georeferenced hydraulic structure features (e.g. road embankment, culvert history, bridges, known dredge areas, ditches, etc.). This map will be discussed with knowledgeable and reliable long-term observers at the Refuge including County and Refuge staff. This exercise may help prioritize areas for treatment concepts.

Deliverable

Develop shapefiles with historic wetlands and freshwater versus estuarine habitat changes.

Task 4– Dixie and Levy Counties Hydrologic Model of Existing Conditions

Hydrologic Assessment: Wood will use the DEM and other collected background information to develop a hydrologic model for approximate channel-sustaining flow (bankfull discharge) and design/permitting storm events, including the mean annual (2.33 year 24 hour), the 25 year 24 hour and the 100 year 24 hour critical storm events. It is anticipated that Interconnected Channel and Pond Routing Model version 4 (ICPRv4) will be used for the hydrologic model development, which will allow the flexibility to model the project area and the upstream watershed in conjunction with the tidal and coastal interaction. The upstream watershed will be delineated



along with detailed sub-basins around the Dixie Mainline Road for analysis in Dixie County. In Levy County the upstream watershed will be delineated along with detailed sub-basins bisected by the Refuge road for analysis. The model node-link connectivity will be established via field visits and notes, LiDAR data, historical data, survey data and best engineering judgement. The changes to offsite flows and water levels will be reviewed based on model results to show no adverse impacts to adjacent properties will occur, based on permitting guidelines, as a result of the project. Wood will use the hydrologic and hydraulic model to evaluate the depth and duration of inundation of the road and adjacent wetland features. The existing conditions model will be calibrated based on knowledge of water level elevations from recent storm events and information from nearby weather stations. This model will help identify the areas where the roads are restricting flows across the Refuge.

Deliverable

Update Report with the development of the existing conditions and the method of calibration.

Task 5 – Dixie and Levy Counties Develop Hydrologic Model of Proposed Conditions

- Wood will prepare a figure with locations identified where existing hydraulic conveyances should be updated or the addition of new conveyance features considered.
- Wood will develop preliminary construction costs for the different types of hydraulic features to be used in determining value of proposed feature additions and modifications. This information will be available to assist in determining the types of conveyance feature updates to be included in the model alternatives.
- After a Team discussion between Wood, SRWMD LSNWR, and other parties as necessary, proposed conditions hydrologic models will be developed for a maximum of two (2) proposed condition alternatives. Considerations during discussion of alternatives will include increased flow to the estuary and design storm output. The proposed conditions will be simulated in order to perform a pre versus post comparison of the stages and flows along the Dixie Mainline Road and the Levy County Refuge Road as a result of the proposed design changes. The model development will be clearly defined and documented in draft report. All input and output files and associated maps and diagrams used to set up the hydraulic and hydrologic models, along with model results, will be submitted as an attachment to the report. Assumptions made by the modeling professionals will be documented and detail will be provided explaining how the model was calibrated to the site to demonstrate why the models developed are valid.
- Wood will develop tables with existing versus proposed flows and velocities for the hydraulic features in the proposed alternatives. This information will be used to help determine approximate changes in flows downstream of the Refuge. In addition, a conceptual cost estimate to install the hydraulic feature upgrades will be provided. All of these components will be presented to the Team for input to help rank the priority of the various road modifications.
- Wood will review flows for existing versus proposed conditions.



Deliverable

Update Report with the development of the proposed alternative model information. The Report will include an anticipated range of increased water delivery based on rainfall and groundwater levels.

Task 6 – Meetings

Wood will prepare for and conduct up to three preliminary meetings with stakeholder groups. The three meetings will include an informational meeting in Levy County, an informational meeting in Dixie County and a potential pre-application meeting with permitting agencies. SRWMD and FWS will provide a location and invite stakeholders to attend the meetings. Wood will prepare meeting notices and conduct the meetings. The meetings may include poster boards and/or a formal presentation. Comment cards will be available at the stakeholder meetings to document feedback. Wood will prepare a spreadsheet with the comments and distribute them to the team for consideration. The Team will review all comments and determine model alterations required for the selected alternative.

Deliverable

Wood will prepare and submit meeting minutes to the Team.

Task 7 – Final Report and Conceptual Design Plans

Wood will finalize the selected alternative proposed model and provide a report with details of the model.

Wood will develop conceptual design plans for the selected alternatives. This will include typical construction details for installation and a figure with locations of the proposed new and modified hydraulic features. Information to be included are locations, approximate structure elevations and structure dimensions based on model input parameters.

Deliverable

Wood will finalize the hydrologic report and provide conceptual design plans for the selected alternative design features. All shapefiles .dwg files Word and.pdf and other digital products will be delivered to District and Refuge.

SCHEDULE

Wood will complete the following tasks within the following proposed schedule for the Dixie County Mainline Project area and the Levy County Project area. After each deliverable Wood will continue with the next task. Comments provided by the District and the U.S Fish and Wildlife Service and Refuge are anticipated within two (2) weeks of submittal of the deliverables. Response to these comments will be incorporated into the subsequent deliverable. See the attached Schedule. It is anticipated that the total project duration will be approximately 390 days.



FEES

This task assignment has been priced according to the fee schedule included in Wood's Contract with the District, #19/20-041. The total estimated cost for completing the tasks described above is **\$375,000**. The fees associated with our scope of services will be invoiced as time and materials on a monthly basis.

ASSUMPTIONS

- Minimal survey data will be collected as previously stated. This data will be incorporated into the GIS database to assist with development of the hydrologic modeling. Additional survey data will need to be collected prior to development of construction bid documents of the proposed hydrologic features.
- Conceptual designs and costs for the alternatives are included in this proposal. Complete designs including geotechnical exploration and survey of final feature locations are not included in this proposal.
- Permitting of the hydrologic structures/alterations are not included in this proposal.
- The majority of the biweekly meetings will be conducted via teleconference. Wood will attend up to 4 onsite meetings with the Team. The District will assist in providing a location and invitations for the stakeholder meetings.

COVID-19

During these uncertain and changing times we would like to inform you that meeting project schedules and budgets may be difficult if not impossible because of issues related to COVID-19. Federal, state and local governments have instituted stay at home orders and other criteria that could restrict our project execution and affect our ability to meet project schedules and stay within budget. If schedule and budget impacts become a reality, we will inform you of the impacts that are outside of Wood's control. We appreciate your understanding during these challenging times.

AUTHORIZATION

Please provide Wood a Task Work Authorization that references this proposal granting Notice to Proceed with the items outlined in the above proposal. If you have any questions concerning this proposal, please feel free to contact us.



We appreciate your consideration of Wood to perform these services and look forward to continuing to work with you on this important project. If you have any questions or require any additional information, please contact us.

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.



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Christine Mehle, PE, CFM
Service Line Leader

CS/CM:jrb
Attachment – Figure 1



FIGURE 1





Source: Imagery, ESRI 2017; Wood 2020

Explanation of Features

- Sub Basins
- Area Omitted from Model



1 inch = 22,000 feet

0 11,000 22,000 44,000 Feet

SRWMD - Hydrologic Restoration on the LSNWR

Sub Basins Included in Hydrologic Model

Drawn	Date
DLA	9/9/2020
Checked	Date
CES	9/9/2020

Gainesville
Florida
Project No.

wood.

Figure
1

