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FAIRFAX COUNTY
DEPARTMENT OF PUBLIC WORKS & ENVIRONMENTAL SERVICES
LAKE ACCOTINK PRESERVATION STUDY PROPOSAL

Introduction

In May of 2023 the Fairfax County Board of Supervisors (the Board) established the Lake Accotink Task Force (Task Force) to review and develop findings on the previous dredging studies, ensure that all options have been considered to preserve Lake Accotink in the most sustainable, equitable, and cost-effective manner, identify information needs and questions that should be addressed should the Board proceed with studying a managed wetland or smaller lake option, and consider the impacts to the environment, surrounding communities, recreational uses of the park, and financing, including the need for ongoing maintenance. Based on the Task Force's findings, the Board, in the January 23,2024 Joint Board Matter, directed the Department of Public Works and Environmental Services (DPWES) to proceed with the following concurrent efforts:

- Sedimentation Study
- Dam Assessment (led by Fairfax County Park Authority [FCPA] and supported by DPWES)
- Feasibility Study
- Community Engagement Plan

DPWES has tasked Arcadis U.S. Inc. (Arcadis) with conducting a preservation (feasibility) study of the 20- to 40-acre, 4- to 8-foot deep smaller lake option identified in the Task Force's findings and supporting efforts of the overall Lake Accotink Project Team, including the sediment study team (WSP/LimnoTech/United States Geological Survey [USGS]), dam assessment team (GKY & Associates, Inc. [GKY]/ Stantec Inc [Stantec]/Triad Engineering, Inc. [Triad]), and community engagement team (WSP/PRR, Inc. [PRR]).

The term "preservation" refers to maintaining a smaller lake that would preserve much of the aesthetic and recreational value of Lake Accotink that would continue to benefit park visitors.

Background

Lake Accotink was created after a dam was constructed first in 1918 and then rebuilt in 1943 to provide a source of drinking water for Camp Humphreys (now Fort Belvoir). The Lake Accotink watershed encompasses approximately 19,600 acres and the original Lake Accotink reservoir was approximately 110 acres in size. The Lake Accotink Park area was acquired by the FCPA in 1967 and now serves as a recreation area and nature park for Fairfax County and the surrounding community. The current Lake Accotink footprint covers approximately 49 to 55 acres due to sediment inflow from the Lake Accotink watershed. Sediment from the watershed is deposited in Lake Accotink, reducing the depth of water and storage volume across the lake. Based on available information from the County, Lake Accotink was previously dredged twice for the purposes of removing deposited sediment, including:

- In 1985, when 211,000 cubic yards of sediment were removed via hydraulic dredging and deposited in sedimentation basins near the park; and
- Most recently in 2008, when 193,000 cubic yards of sediment were removed via hydraulic dredging. Some of the sediment was placed at the island in the lake to expand the island, create wetland, and create beneficial habitat. The remaining sediment was deposited in an off-site facility.

Analysis of the lake performed in 2016 as part of the master planning process for the park indicated that Lake Accotink was continuing to fill in with sediment. Based on community interest in preserving Lake Accotink in its existing footprint, an alternatives analysis, dredging plan, and permitting study was initiated in 2020 to evaluate dredging the entire Lake Accotink to a depth of 8 feet.

Between 2020 and 2022, the Arcadis team performed an in-depth field assessment and alternatives analysis for dredging the entire Lake Accotink to a depth of 8 feet. Subsequently, the Arcadis team produced the following as part of these efforts:

- Lake Accotink Dredging Project Field Assessment Report (dated June 18, 2021), which describes the in-depth field assessment program implemented including:
  - Hydrographic survey of Lake Accotink consisting of bathymetry, side scan sonar, and magnetometer surveys.
  - Probing of soft sediments and the collection and processing of sediment cores at 100 locations within Lake Accotink.
  - Collection and analysis of 25 sediment samples for physical properties.
  - Collection and analysis of five composite samples for waste characterization.
  - Treatability testing on composite sediment samples, including polymer testing and laboratory scale geotextile bag dewatering tests.
  - Geotechnical boring and material analysis at potential access and dewatering locations in Lake Accotink Park and Wakefield Park.
  - Desktop review for potential wetlands and streams and high-level desktop evaluation of vegetative communities within Lake Accotink Park and Wakefield Park.
- Lake Accotink Dredging Project Alternatives Analysis Report (dated December 23, 2021), which included:
  - Identification and evaluation of dredging methods, dewatering methods, and disposal methods.
  - Identification and initial screening of 10 dewatering locations and 11 sediment conveyance pipeline alignments.
  - Detailed analysis 12 combined dewatering location/pipeline alignment
- Lake Accotink Dredging Project Offline Lake Evaluation Technical Memorandum (dated June 24, 2022), which included:
  - Results of a geotechnical investigation performed in Lake Accotink by ECS in February 2022 to evaluate the offline lake alternative. ECS prepared a preliminary geotechnical engineering analysis for the offline lake (ECS 2022 Interim Geotechnical Engineering Report Lake Accotink Dredging – Off-line Lake Investigation). The investigation included four soil borings in Lake Accotink. Standard Penetration Testing and soil logging was performed on each boring. A relatively undisturbed soil sample was collected from one boring from a depth of 11 to 13 feet for analysis of strength and consolidation parameters. ECS prepared an evaluation of soil conditions including sediment, natural soils below the sediment, and bedrock below the natural soils.

As discussed in the introduction, the Task Force was established in May 2023 to review results of the previous studies and ensure that all options have been considered to preserve Lake Accotink in the most sustainable, equitable, and cost-effective manner. The Task Force found that a 20- to 40-acre lake would preserve much of the aesthetic and recreational value of Lake Accotink. This would continue to benefit the evolving communities surrounding the lake. This size lake is also similar to other lakes in the county on FCPA property including: Huntsman Lake (28.6 acres), Lake Mercer (43 acres), Royal Lake Park (38

acres), and Woodglen Lake (12.5 acres). Each of these lakes offer some recreational amenities (e.g., hiking, fishing, canoeing) in addition to environmental and ecological benefits to their communities.

Based on the direction by the Board, this preservation study will focus on a smaller lake option of 20 to 40 acres of open water that is 4 to 8 feet deep. The smaller lake option will also consider development of managed wetlands, grasslands, navigable kayak trails, and other creative recreational and educational amenities.

Purpose

The objective of this scope is to assess, evaluate, and identify feasible options to preserve Lake Accotink, as well as to detail long-term operations and maintenance (O&M) requirements to ensure its functionality for the foreseeable future. The Joint Board Matter, dated January 23, 2024, included a motion to evaluate 20- to 40- acre, 4-to-8-foot-deep smaller lake options identified in the Task Force's Findings. The Arcadis team will identify various conceptual designs for the smaller lake and identify sediment disposal needs and locations with intent to determine potential for beneficial reuse with the smaller volumes of dredge material. Any alternatives that are outside of the bounds of the defined constraints below will be considered an infeasible alternative for preserving Lake Accotink.

- Construction Budget: Maximum base design, permitting, and construction cost for smaller lake option dredge is $60.5 million.
- Permitting: Alternatives and practices will be determined to be feasible if they are able to be permitted based on requirements of the applicable permitting agencies.
- Constructability: Alternatives will be determined to be feasible if they are constructible within budget constraints using currently available and proven construction methods.
- Offsite Dewatering Locations: Two offsite dewatering locations have been identified (Southern Drive and Wakefield Park), alternatives will be determined to be feasible if any sediment dewatering can be accommodated logistically, spatially, and within cost at either (or both) of the two defined offsite sites.

Any alternatives that meet the above constraints will be studied further for overall feasibility with the consideration of optimizing the construction and O&M costs to lake size. O&M may include bathymetric surveys, periodic dredging with sediment processing and disposal, vegetative surveys, invasive plant controls, and landscaping (e.g., mowing, cutting, supplemental seeding and planting), as necessary. Arcadis will prepare opinions of probable construction and O&M costs during the preservation study in consultation with County staff and in accordance with the American Association of Cost Engineering (AACE), Class 4. Information received from the concurrent efforts (e.g., field and modeling results from the USGS and WSP/LimnoTech team, dam assessment study from the GKY/Stantec/Triad team; community input from the WSP/PRR team) will be incorporated into the preservation study as appropriate.

Scope of Work

This scope of work describes the tasks that will be performed by the Arcadis team to develop the preservation study in close coordination with the sedimentation and dam studies being performed by others. The tasks below identify the specific activities, assumptions, and deliverables of the Lake Accotink preservation study and associated supporting activities. PDF deliverables will be provided to the County

in ADA accessible PDF format in anticipation of the documents being posted to the project webpage by the County.

In addition to Arcadis, the team performing the scope of work presented below includes:

- Wetland Studies and Solutions, Inc. (WSSI; Attachment 1)
- Waterway Surveys & Engineering, Ltd. (Waterway; Attachment 2)
- ECS Mid-Atlantic, LLC (ECS; Attachment 3).

Task 1 Team Kickoff Meeting and Coordination

Given the concurrent efforts associated with the overall Lake Accotink project and need to share information between teams to complete those efforts, routine coordination and meetings will be necessary between the Arcadis team (including WSSI [Attachment 1]) and the other members of the Lake Accotink Project Team, including the County, the WSP/LimnoTech/USGS sediment study team, and the WSP/PRR community engagement team.

Task 1.1 Kickoff Meeting (Hourly Not to Exceed [HNTE])

Arcadis will convene a kickoff meeting for the preservation study effort within 10 days of notice to proceed. This meeting will involve key personnel from Arcadis, including the Project Principal, Project Manager, and two Technical Leads. Additionally, Arcadis will collaborate with other members of Lake Accotink project team in coordination with the County to compile an attendee list.

The primary objective of the kickoff meeting is to:

1. Review the study objectives.
2. Discuss the scope of work.
3. Discuss the project schedule.
4. Establish clear lines of communication.

During the meeting, the team will formalize coordination among the various study teams and ensure effective communication channels. Furthermore, the preservation study's schedule and associated activities will be thoroughly examined and confirmed with the County.

To ensure effective communication during the project, Arcadis will employ several strategies:

1. **Clear Roles and Responsibilities**: Each team member's role and responsibilities will be well-defined. This clarity ensures that everyone understands their tasks and can communicate effectively within their designated areas.
2. **Communication Channels**: Arcadis will establish formal communication channels. These will include calls, email, project management tools, and collaborative platforms. Having designated channels ensures that information flows smoothly and reaches the right recipients.
3. **Documented Processes**: Clear documentation of processes, workflows, and protocols will be essential. Arcadis will follow County guidelines and Arcadis' guidelines for project management, reporting, and design.
4. **Feedback Loops**: Regular feedback loops will encourage open communication. Team members can share insights, raise concerns, and propose improvements. Constructive feedback helps refine communication practices.

5. **Stakeholder Engagement**: Arcadis will support the Community Engagement Plan as needed. Regular updates, progress reports, and transparent communication will foster collaboration.

Task 1.1 Deliverables

- RACI (Responsible, Accountable, Consulted, Informed) Matrix to provide understanding of the interconnection between various technical teams and stakeholders. To be provided 10 days following the kickoff meeting.

Task 1.2 Lake Accotink Project Team Coordination (HNTE)

The success of the Lake Accotink project hinges on coordination and sharing of information between teams working on the concurrent efforts. Arcadis will coordinate with the County to facilitate ongoing communication among stakeholders. It is anticipated that coordination meetings will be held at the discretion of the County based on team needs. A not to exceed meeting budget is included for coordination between the Arcadis team and the other teams performing work in parallel.

A meeting will be held with WSP/LimnoTech, the team that developed the Lake Accotink Discovery Report (November 27, 2023), to discuss the wetland, grassland, and island concepts that were developed in that report. The goal of the meeting will be to share information and workshop ideas related to the smaller lake option with the intent of identifying the most feasible implementation of managed wetland, grasslands, and islands to support on-site dredge material handling. Rough conceptual sketches will be developed with this team for the smaller lake alternatives.

Arcadis will work closely with WSP/PRR through the defined steps in this scope. It is anticipated that Arcadis will meet and discuss technical information and graphics that WSP/PRR, the community engagement team, may need to support their information sharing and outreach with the community. These meetings and exchanges will occur as requested by the County.

Task 1.2 Deliverable

- Coordination Meeting Summary (as it relates to the preservation study), to be provided five days following the meeting.

Task 2 Document Review and Desktop Assessments

The first step of the preservation study process will be to compare existing data from the previous dredge alternatives analysis to the data needed to adequately assess the feasibility of a small lake option that includes managed wetlands, grasslands, and/or islands (referred to collectively herein as habitat features). The data assessment will also need to support the assessment of dredge methods, handling of dredge material (for short term and long-term dredge operations and maintenance), and permitting. Permitting requirements for the small lake concept with habitat features will also be identified as part of this task.

Task 2.1 Document Review (Fixed Fee)

The document review will build on the previous documents reviewed as part of the 2020-2021 alternatives analysis work completed by the Arcadis team. Arcadis will further include in the document review the following documents:

- Lake Accotink Task Force Findings Report (December 8, 2023)
- Lake Accotink Discovery Report (November 27, 2023) by LimnoTech

Relevant information that could be used in this preservation study will be summarized in a technical memorandum.

Task 2.1 Deliverable

- Document Review Technical Memorandum (final in ADA accessible PDF)

Task 2.2 Desktop Assessment (Fixed Fee)

Following a comprehensive review of previous reports, studies, and findings, the Arcadis team will utilize existing digital data (GIS/CAD) to identify potential locations of the smaller lake options within the existing lake boundary and additional habitat features. This desktop assessment will specifically address the following aspects:

1. **Managed Wetlands Locations:** Considering environmental permitting constraints, we will coordinate with the WSP/LimnoTech team and identify suitable areas for implementing managed wetlands. Wetlands will contribute to ecological balance and enhance biodiversity.
2. **Established Grasslands Locations:** Referring to the Task Force Finding report, we recognize that the northwest area of Lake Accotink may hold promise for establishing grassland. We will further coordinate with the WSP/LimnoTech team and explore this region to determine the feasibility of establishing grasslands. This habitat could create opportunities for diverse wildlife and plants as well as community interactions. The analysis will include consideration of different vegetative community types to include the feasibility and cost/benefit for wildlife, permitting requirements, methods and timing of establishment, and ability to effectively maintain them over time.
3. **Potential Island Layout:** Building upon the LimnoTech's previous assessment in the discovery report, we will design a layout for additional islands within the lake. The presence of multiple islands would provide additional habitat and potential recreational opportunities (e.g., creation of navigable kayak trails between islands).
4. **Dredge Material Handling Areas:** Proper identification and management of dredge material handling areas is crucial for long-term success and maintenance of Lake Accotink. As indicated in the January 23, 2024, Joint Board Matter, the preservation study will consider the option of having dredge material remain on-site in Lake Accotink Park; therefore a desktop assessment of potential material handling requirements to utilize the dredged sediment for the first three preceding options will be performed. The two dredge material handling areas identified as potential options as part of the previous full dredging alternatives analysis will be reviewed for potential modifications based on smaller dredging volumes to reduce impacts to each location. Additionally, previous onsite dewatering and disposal sites used during the 1985 lake dredging (i.e. the sedimentation basins) will be re-

evaluated for use as disposal locations and will include a high-level evaluation for the potential to remove the 1985 dredged material from these areas and placing newly dredged material.

5. **Lake Volume Determination and Virginia Department of Conservation and Recreation (VDCR) Coordination:** Arcadis will discuss the results of the 2022 geotechnical investigation with VDCR in regards to whether the sediment thickness meets VDCR requirements for deregulating the dam by leaving the dam in place and through meeting the dam impounding capacity of less than 50 acre-feet combined volume of water and sediment. Using this option for deregulating the dam also requires a dam height under 25 feet. Using the 2022 geotechnical investigation, Arcadis will confirm the lake volume reduction based on the presence of the natural soil layer (hardened layer) below the sediment thickness. Arcadis will provide meeting minutes to the County on the meeting with VDCR.

The desktop assessment will reveal any high-level fatal flaws or significant considerations that may require further evaluation during the preservation study. Additionally, Arcadis team member WSSI will conduct a preliminary (desktop) wetland impact assessment within proposed work areas, conduct a preliminary threatened and endangered species assessment as required to comply with federal and state permitting requirements, and provide a preliminary tree impact assessment for selected habitat feature area(s) (see Attachment 1).

Based on the results of the desktop assessment, key assumptions necessary to complete the preservation study will be identified and determined in consultation with the County. A meeting between Arcadis and the County will be scheduled to discuss the results of the desktop assessment and finalize parameters for the selection of initial conceptual designs and assumptions to incorporate into the preservation study.

Task 2.2 Deliverable

- Desktop Assessment Technical Memorandum (final in ADA accessible PDF)

Task 2.3 Permitting Assessment (Fixed Fee)

Based on findings from the 2020 and 2021 dredge assessment, it is established that an Individual Permit issued by the U.S. Army Corps of Engineers and Virginia Department of Environmental Quality is necessary pursuant to Sections 404 and 401 of the Clean Water Act for dredging and construction activities within Lake Accotink. It is assumed that similar permit requirements will apply to the dredge activities associated with the smaller lake option. Additionally, the process of filling open water to create wetlands, grasslands, and islands presents certain permitting challenges. As part of the permitting assessment, the Arcadis team will coordinate with the following agencies:

- **Federal Emergency Management Agency (FEMA):** FEMA's involvement is necessary pursuant to Title 44, Chapter I, Subchapter B of the Code of Federal Regulations due to changes and placement of fill within the floodplain and the impact to FEMA regulated floodplain.
- **United States Army Corps of Engineers (USACE):** USACE's expertise and oversight are crucial for ensuring compliance with regulations related to discharges of dredge or fill material into Waters of the U.S. (i.e. impacts to wetlands and WOTUS) pursuant to Section 33, Part 323 within the Code of Federal Regulations.

- **Virginia Department of Environmental Quality (VDEQ):** VDEQ plays a vital role in environmental protection and permitting. Collaboration with them is essential for successful project implementation and adherence to their authority to protect wetlands and streams as well as authorize stormwater discharges from construction activities pursuant to Sections 62.1-44.15:20 and 62.1-44.15:51 of the Code of Virginia.
- **Virginia Marine Resources Commission (VMRC):** VMRC's involvement is necessary due to the project's encroachment on state-owned submerged lands pursuant to Section 28.2-1204 of the Code of Virginia.
- **VDCR:** VDCR's involvement is necessary due to changes to the lake size (pursuant to Section 10.1-603 of the Code of Viriginia) and presence and/or potential rehabilitation of the Lake Accotink dam (pursuant to Section 10.1-605 of the Code of Virginia).

To facilitate this process, a pre-application meeting will be scheduled by the Arcadis team and the pre-application meeting will include the County, WSSI (see Attachment 1), Arcadis, and the regulatory agencies. Following the pre-application meeting, a technical memorandum will be prepared that summarizes the permitting requirements and any prohibited activities that need to be considered as part of the preservation study and permitting strategies to be employed to feasibly construct proposed alternatives.

Task 2.3 Deliverable

- Permitting Determination Technical Memorandum (final in ADA accessible PDF)

Task 3 Data Collection

Data needed for the preservation study includes properties of sediment to be dredged, geotechnical properties of dewatering area(s) and pipeline alignment(s), current lake bathymetry, current topography of dewatering area(s) and pipeline alignment(s), and environmental surveys (e.g., threatened and endangered species survey, tree survey, wetland survey). Based on the in-depth field data collection performed during the 2020/2021 alternatives analysis phase described in the background section, sufficient data exists on the geotechnical properties of identified dewatering area(s), the physical and environmental properties of the sediment to be dredged, and waste characterization for off-site disposal identification to perform the preservation study; therefore, additional collection of these data is not proposed under this scope. A topographic survey is not proposed under this scope because the County will be performing a LIDAR survey that is anticipated to meet the needs of the preservation study as it will collect current topography data of areas within 500 feet of:

- Each bank of Long Branch from approximately 500 feet upstream of USGS station 01654500 to Accotink Creek,
- Each bank of Accotink Creek from approximately 500 feet upstream of USGS station 01654000 to Lake Accotink,
- Lake Accotink, and
- Each bank of Accotink Creek from Lake Accotink to approximately 500 feet downstream of proposed USGS station at Old Keene Mill Road.

Data collection needed for the preservation study to be performed under this scope includes bathymetric survey to document current sediment surface (Task 3.1) and environmental impact assessments as needed to support permitting (Task 3.2). In addition, in-lake sediment sampling needed by the WSP/LimnoTech team will be performed by the Arcadis team (Task 3.3).

Task 3.1 Bathymetric Survey (Fixed Fee)

The Arcadis team member Waterway will perform a minimum of two bathymetric surveys per year (see Attachment 2) for a three-year period in coordination with the Accotink Creek sedimentation study by the WSP/LimnoTech team. Arcadis will provide WSP/LimnoTech the opportunity to review and advise on the plan for bathymetric survey including the locations of soundings. The bathymetric survey frequency will include:

- One spring survey event each year prior to summer rain events (three total spring survey events)
- One late fall survey event each year following hurricane season (three total late fall survey events)
- Up to one optional survey event each year (following any historic rain events, at the request of DPWES).

Soundings will be taken on maximum 25 feet on centers and 5-foot intervals across all areas of the Lake from bank to bank, including the areas directly behind the island and into the canal, that are accessible by a small boat. The soundings will be used to develop and map the 1-foot bathymetric contours within accessible areas. Results of the bathymetric survey along with the previous bathymetric survey data will be used to create a high-level lake evolution characterization in order to assess how has the lake changed in volume and area between different bathymetric surveys over time. The changes in sediment surface will be included on figures provided in the Bathymetry Data Report, which will be updated following each bathymetric survey event. All data collected will be U.S. survey feet referenced horizontally to the North American Datum of 1983 (NAD 83) State Plane Coordinate System (Zone Virginia North) and vertically to the National Geodetic Vertical Datum of 1929. The scope of work in Attachment 2 provides additional information for this task.

Task 3.1 Deliverables

- Bathymetry Data Report (updated after each event)
- Bathymetric Survey Drawing Files (AutoCAD and ADA accessible PDF formats)

Task 3.2 In-Lake Sediment Sampling (Fixed Fee)

Sediment sampling of Lake Accotink is needed to support the sedimentation study efforts being performed as part of the overall Lake Accotink Project. The Arcadis team will develop an in-lake sediment sampling work plan and coordinate with WSP/LimnoTech team on the location, type, and frequency of samples that need to be collected and the number and type of analyses to be performed. Up to 12 sediment samples are assumed to be collected by the Arcadis team and tested for geotechnical properties, including coarse grain size analysis (gradation analysis/washed sieve), fine grain size analysis (hydrometer analysis), and bulk density. Additionally, WSP/LimnoTech will collect and deliver to the Arcadis team nine sediment bed material samples to characterize the sediment grain size distribution and

bulk density. Results of the sediment sample collection and geotechnical testing performed by Arcadis will be submitted to the WSP/LimnoTech team for their use in the sedimentation study effort. Further details, assumptions, and deliverables are included in the scope of work in Attachment 3.

Task 3.2 Deliverables

- In-Lake Sediment Sampling Work Plan
- Sediment Data Report (ADA accessible PDF)
- Laboratory Electronic Data Delivery Files

Task 4 Preservation Study

Task 4.1 Concept Design and Mass Balance Analysis (Fixed Fee)

Based on the findings of the Lake Accotink Task Force and the Board's direction, concepts of the following scenarios for the small lake alternative will be developed, including conceptual design figures and supporting information describing estimated dredge quantities, onsite management volumes, offsite management volumes, habitat restoration requirements, anticipated long term O&M activities, benefits and potential impacts to environmental, ecological, social and recreational resources, and associated planning level costs (AACE Class 4) for each alternative:

1. **Small Lake Scenario –** This will include an approximately 20-acre open water feature and expanded wetlands, new island(s), and/or new grassland areas. A sensitivity analysis will be performed to estimate how varying lake depths from 4-to 8-feet influences dredge volumes, disposal options (short-term and long-term), and construction costs.
2. **Medium Lake Scenario -** This will include an approximately 30-acres open water feature and expanded wetlands, new island(s), and/or new grassland areas. A sensitivity evaluation will be performed to estimate how varying lake depths from 4-to 8-feet influences dredge volumes, disposal options (short-term and long-term), and construction costs.
3. **Large Lake Scenario -** This will include an approximately 40-acre water feature and expanded wetlands and/or new grassland areas. A sensitivity analysis will be performed to estimate how varying lake depths from 4-to 8-feet influences dredge volumes, disposal options (short-term and long-term), and construction costs.

In addition to the scenarios listed above, relevant information on the "full dredge alternative" from 2021 Alternatives Analysis Report , as well as a "no action alternative" will be summarized to allow a comprehensive picture of all possible alternatives that could be applied to Lake Accotink. For the "no action alternative", no dredging or any other modifications would be performed and the lake would continue to fill in naturally.

In addition to traditional construction methodologies, consideration will be given to managed succession scenarios where incoming sediments could be managed over time to arrive at a targeted footprints/volumes without constructing them all at once. Arcadis will work with the County and the WSP/LimnoTech/USGS team to establish an annual sediment delivery to the Lake. This rate will be used to evaluate how long managed succession, if implemented, may take as well as to perform a sediment

mass balance assessment on each alternative to determine when an offsite disposal will need to be implemented to support the long-term O&M program.

Initial concepts identified during Task 1.2 and Task 2.2 will be screened in an initial feasibility assessment in cooperation with the WSP/LimnoTech team that will run initial concepts in their lake model and feasible concepts will be developed into a conceptual design for each alternative in the preservation study. The conceptual design for each alternative will include a plan and profile (transect[s] showing shallow and deep areas of the lake) along with a sediment mass balance analysis to inform the feasibility of implementing habitat features. Renderings of each concept design are anticipated to be prepared by WSSI (Attachment 1). A cost versus sediment removal/handling curve will be developed for each alternative to determine the critical point of each alternative where the sediment removal and handling becomes cost prohibitive. We will review the conceptual design for each alternative with the County to confirm they meet their expectations. The conceptual design for each alternative will be provided to the County for use with other project teams as well as for outreach with the community.

Task 4.1 Deliverables

- PowerPoint slides summarizing the conceptual design for each of the alternatives with ADA accessible PDF versions for each iteration intended for public use
- Plan and profile (lake transect[s]) of conceptual designs (draft and final version based on public and County comments) with ADA accessible PDF versions for each iteration intended for public use
- AutoCAD files of the conceptual design for each alternative for the WSP/LimnoTech team to use in modeling

Task 4.2 Feasibility Evaluation (Fixed Fee)

The Arcadis team will develop, in coordination with Fairfax County, the criteria against which each lake alternative will be evaluated and their associated ratings. The creation of the criteria draws on insights from the Lake Accotink Task Force Findings Report Section 6.1. The goal is to assess the feasibility and compatibility of each alternative with the project objectives to allow the County and community to ultimately identify the most cost-effective and advantageous path forward.

It is anticipated that the evaluation criteria will include the following categories:

- **Environmental Compatibility:** Assessing how well each alternative aligns with environmental regulations, conservation goals, and habitat preservation.
- **Feasibility of Implementation:** Examining the practicality of executing each alternative, considering technical constraints, permitting challenges, resource availability, logistical challenges, and long-term maintenance needs.
- **Cost-Effectiveness**: Analyzing the financial implications associated with implementing each alternative, including opinions of probable construction and O&M costs (AACE Class 4).
- **Community Impact**: Gauging how each alternative affects the community, recreational opportunities, aesthetics, and overall well-being.

The specific evaluation criteria and criteria ratings will be documented in an Evaluation Criteria Technical Memorandum. Ratings will be qualitative high, medium, and low. General descriptions of the ratings for the criteria will be determined when setting the evaluation criteria.

Once established, each of the lake alternatives will be evaluated and rated using the established evaluation criteria and ratings. The results of this evaluation will be summarized in tables, with columns representing the different dredging options, rows corresponding to the evaluation criteria, and individual cells indicating the relative rating of low, medium, or high. The evaluation summary tables will be shared with the County for review and input.

Task 4.2 Deliverables

- Evaluation and Scoring Criteria Technical Memorandum with final version in ADA accessible PDF format
- Draft Evaluation Summary Tables with final version in ADA accessible PDF format

Task 4.3 Preservation Study Report (Fixed Fee)

A comprehensive report will be prepared by the Arcadis team to document the outcomes of the preservation study and present a comprehensive summary of the work performed under this scope. The report will include a description and supporting figures for each alternative and the results of the feasibility evaluation. The report will accommodate decision making for preserving Lake Accotink for the foreseeable future and will be one of the tools for County staff, the Board and the community to consider which alternative they prefer. Importantly, the preservation study will not make any recommendations or endorse a specific alternative.

The Preservation Study Report, which will be ADA compliant, will be submitted to the County. It will serve as a valuable resource for informed decision-making and ensures transparency throughout the process.

Task 4.3 Deliverables

- Lake Accotink Preservation Study Report (final version in ADA accessible PDF following the first year of the WSP/LimnoTech/USGS study)

Task 4.4 Preservation Study Report Updates (HNTE)

It is anticipated that this study will conclude sometime following the first year of the WSP/LimnoTech/USGS sediment study. Therefore, new sedimentation data available after submittal of the Lake Accotink Preservation Study Report will be reviewed as it becomes available in years 2026 and 2027 to evaluate potential changes in sediment mass balance that may impact O&M costs. Update(s) to the Preservation Study Report using the new sedimentation data will be prepared by the Arcadis team to document updated sediment mass balance evaluations if the sedimentation data results in a change in O&M costs of 10% or more. The report will include the same contents of the Preservation Study Reports prepared in Task 4.3 and will specifically identify changes in the outcomes of the preservation study due to the new sedimentation data. Importantly, the preservation study will not make any recommendations or endorse a specific alternative. The Revised Preservation Study Report, which will be ADA compliant, will be submitted to the County.

Task 4.4 Deliverables

- Revised Lake Accotink Preservation Study Report(s) (final version in ADA accessible PDF)

Task 5 Project Management (HNTE)

It is anticipated that bi-weekly meetings will occur with Arcadis, the County, and others invited by the County for the first four months of the project. Monthly meetings will replace the biweekly meeting following the initial four-month period. These meetings will serve as platforms for discussing progress and addressing challenges. Where practical, Arcadis will combine progress meetings and coordination meetings to minimize overlap. Arcadis will use Microsoft Project to track tasks, deadlines, and milestones. This software allows team members to stay informed about project progress and communicate directly within the platform.

Arcadis will provide the following services through the project management task:

- Project Management Plan
- Detailed Schedule and on-going schedule management through project completion.
- Bi-weekly/monthly status meeting with the County and other project consultants, as needed.
- Monthly invoicing, work completion and status report.

Schedule

The anticipated schedule for completion of the preservation study, including the tasks identified above, is approximately 58 weeks after the issuance of the Notice-to-Proceed by the County following public review of this scope. This schedule is subject to change depending on scope revisions to address public comments. The preliminary detailed schedule with deliverables is provided in Attachment 4.

List of Attachments

Attachment 1 – WSSI Scope of Work

Attachment 2 – Waterway Scope of Work

Attachment 3 – ECS Scope of Work

Attachment 4 – Preservation Study Schedule

Attachment 1

WSSI Scope of Work – Tasks 1 (Team Kickoff Meeting and Coordination), 2.2 (Desktop Assessment), 2.3 (Permitting Assessment) and 4.1 (Concept Design and Mass Balance Analysis)

SHORT FORM CONTRACT
PROFESSIONAL SERVICES AGREEMENT

CLIENT:	ARCADIS U.S., Inc.	**DATE:**	May 3, 2024
ADDRESS:	4301 North Fairfax Drive		Revised July 24, 2024
	Suite 530	**VIA E-MAIL:**	James.Kelly@arcadis.com
	Arlington, VA 22203	**PROJECT NAME:**	Lake Accotink Dredging Feasibility
		WSSI PROJECT #:	
ATTENTION:	Mr. James Kelly	**WSSI PROPOSAL #:**	P23924C

Per your request during our meeting on April 29, 2024, and revised per our meeting on May 17, 2024, Wetland Studies and Solutions, Inc. (WSSI) will provide professional services in accordance with the scope of work outlined below.

SCOPE AND FEE

Task 1 – Team Kickoff Meeting and Coordination

Follow-up meetings or coordination with Client or Client's consultants to discuss the tasks undertaken will be billed on an hourly basis.

Task 2.2 – Desktop Assessment

As part of the Lake Accotink Feasibility Study, WSSI staff will provide supporting consulting services for determining management and disposal options for dredge material associated with the development of concepts for a smaller lake. This task assumes that up to nine (9) concepts will be developed by the project team that require varying extents of lake dredging and spoil material disposal. For each concept WSSI will coordinate with the project team and advise on suitable/preferred on-site and off-site locations for material disposal.

WSSI will advise the project team on technical aspects for the creation of potential managed wetlands, grasslands, and/or islands utilizing dredge spoil material generated from each concept. Technical guidance will include preliminary tree impact assessment, preliminary wetland impact assessment, locations/elevations of managed wetlands, locations of grasslands, vegetation community reestablishment methods, and management practices.

Task 2.3 – Permitting Assessment

WSSI will provide an analysis of anticipated federal and state regulatory permitting protocols and requirements for up to nine (9) concepts to include on-site dredge disposal as well as off-site disposal when needed. This analysis will outline the anticipated resource presence, condition, impacts, potential restoration opportunities, and mitigation requirements under each concept. The results of this analysis will be provided in a memo to Client.

Task 4.1 – Concept Design and Mass Balance Analysis

WSSI will develop illustrative plan-view and/or perspective renderings for the proposed lake options for visual aids in Client meetings or public presentations. The graphics will be delivered as a high-quality pdf and jpeg format.

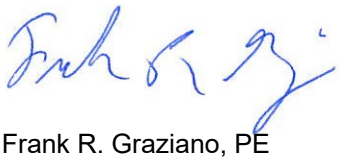
EXCLUSIONS/LIMITATIONS

1. Topographic survey and/or tree location survey are excluded from the scope of this proposal. If topographic survey and/or tree location survey are required for development of the concepts, WSSI can include this work as an additional service to this proposal.

2. This proposal assumes that Arcadis will perform and provide all earthwork calculations associated with dredge spoil material disposal.

3. A formal Waters of the United States delineation is excluded from the scope of this proposal.

Sincerely,
Wetland Studies and Solutions, Inc.



Frank R. Graziano, PE
Vice President

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Attachment 2

Waterway Scope of Work – Task 3.1 Bathymetric Survey

Waterway
Surveys & Engineering, Ltd.

321 Cleveland Place, Virginia Beach, VA 23462
Phone (757) 490-1691 Fax (757) 490-1348

July 12, 2024

Ms. Amanda Kohler, P.E.
Arcadis
4301 North Fairfax Drive Suite 530
Arlington, VA 22203

RE: 2024 Bathymetric Survey for Lake Accotink, Annandale, VA

Dear Amanda:

The following is my firm's proposal for performing professional services in connection with the above referenced project. The scope of work is outlined as follows:

Waterway Surveys & Engineering, Ltd. will provide the following services:

Waterway will perform a Bathymetric survey of the Lake, as shown, including the areas directly behind the island and into the canal. We would take soundings on maximum 25' centers and 5' intervals across all areas of the Lake from bank to bank where accessible by a small boat to develop 1-foot contours.

All data collected by **Waterway** will be referenced to Virginia State Grid NAD 83 horizontally and project datum (NGVD 29) referenced to NAVD88 vertically as entire Lake Dredging survey.

A map showing the depths within the limits provided will be delivered to you in AutoCad and .pdf format.

We hope you find this proposal acceptable and look forward to beginning work soon. Should you have any questions or need additional information, please call me.

Sincerely:

Robert L. Taliaferro, L.S., C.I.H.
President

Legend

- Bathymetric Survey Extent
- Lake; Pond; River; Stream
- Dam
- 54-inch Sanitary Sewer
- Standard Manholes
- 30ft Buffer Sewer
- Topographic Contours

INV ELV:
165.82ft

INV ELV:
161.17ft

LAKE ACCOTINK PARK
BOATING & HIKING

LAKE
ACCOTINK DAM

BOAT LAUNCH
ACCESS

N

0 200 400 800
Feet

EXHIBIT 1 -
HYDROGRAPHIC SURVEY EXTENT

Source: Esri, Maxar, GeoEye, Earthstar Geograp

Attachment 3

ECS Scope of Work – Task 3.3 In-Lake Sediment Sampling

ECS MID-ATLANTIC, LLC

Proposal for Subsurface Exploration and Geotechnical Engineering

Lake Accotink

Fairfax County, Virginia

ECS Proposal Number 01:70080-GP

August 14, 2024

August 14, 2024

Mr. James Kelly, P.E.
Arcadis, U.S. Inc.
4301 North Fairfax Drive
Suite 530
Arlington, Virginia 22203

ECS Proposal No. 01:70080-GP_rev4

Reference: Proposal for Subsurface Exploration and Geotechnical Engineering
Lake Accotink
Lake Accotink Park, Springfield, Fairfax County, Virginia 22150

Dear Mr. Kelly,

As requested, ECS Mid-Atlantic, LLC (ECS) is pleased to present the following scope only proposal for providing subsurface exploration and geotechnical engineering services for the Lake Accotink project located in Springfield, Fairfax County, Virginia.

In preparing this proposal, we have had the opportunity to review the Draft Scope Outline, prepared by Fairfax County DPWES Stormwater Planning Division, as well as discussed, the overall project requirements with you.

Project Description

ECS understands that the overall project will involve dredging of the existing Lake Accotink in Springfield, Virginia. The process is anticipated to take several years and has been subdivided into several phases. The overall goal is to preserve Lake Accotink as a smaller lake on the site along with managed wetlands, grasslands, kayak trails and other recreational amenities. At this time, the project is in the feasibility phase, and final details on the size and configuration of the lake are not known. This proposal is intended to provide a general scope of services to assist in the feasibility study for the dredging operations to support the sedimentation teams effort to reuse the lake sediment.

GEOTECHNICAL SERVICES

Scope of Services – Feasibility

Our proposed scope of field and laboratory services are as follows:

Field Exploration

a. Field locate test locations by use of Global Positioning System (GPS) device based upon field datum points and available plans.
b. Mobilize a canoe or kayak to the lake.
c. Obtain up to 12 grab samples of the sediment using a hand auger or similar equipment. ECS has anticipated that up to 12 grab samples can be collected in one day.

Laboratory Testing (Sediment Samples)

a. Perform up to 12 Natural Moisture Tests.
b. Perform up to 12 Gradation Analysis Tests (coarse grain size analysis).
c. Perform up to 12 Hydrometer Analyses (fine grain size analysis).
d. Perform up to 12 Atterberg Limit Tests.
e. Perform up to 12 Bulk Density Tests.

An additional nine sediment bed material samples collected and provided by others will be tested for sediment grain size distribution (including coarse [wash sieve] and fine [hydrometer analyses] grain size) and for bulk density.

Deliverables

Upon completion of the laboratory testing, ECS will provide a letter report summarizing the results of our laboratory testing. ECS has assumed that one report will be provided upon completion of all lab testing, and the data will be transmitted at one time. If additional reporting is necessary, the report preparation will be billed in accordance with our approved unit rates.

Schedule

In preparing this proposal, we have assumed that the client will assist in the coordination of our access to the site. We anticipate being able to mobilize to the site within approximately seven to ten days after authorization to proceed and notification that the appropriate on-site personnel have been informed.

We anticipate that the drilling operations will require about one day, and that the laboratory testing, after drilling is completed, will require about seven days. Therefore, for time budget purposes, the entire scope should take about four weeks from initial authorization through final report submission. Verbal comments on findings can be provided within three days of completion of the borings, if requested.

Utility Clearance and Site Restoration

We will contact Miss Utility to locate underground utilities at the site; however, our experience indicates that Miss Utility will not locate utilities beyond the point of distribution (meters or gauge points) on private property. We will coordinate our test boring locations in order to avoid any underground utilities indicated by the Miss Utility locating system. However, we will not be responsible for any private utilities not pointed out to us by the land owner or client prior to drilling activities. If private utilities are a concern, we can provide a private utility line locator to reduce your liability. Please read the following section on private utility locator services and if desired, indicate your request for their services on the attached Proposal Acceptance sheet.

Contracting a private utility locator service is not a guarantee that all utilities within a work site will be identified, but a service that is offered to lower the risk of the owner/client. ECS and our clients have had great success in avoiding utility contact by augmenting the Miss Utility services with a private locator service. Private locator services can identify utility alignments that incorporate significant iron content in the conduit materials. However, private utilities possessing the higher likelihood of not being easily identifiable, beyond the point of distribution, include all utilities not containing significant ferrous (iron) content (examples would include but not be limited to most sanitary sewer alignments, copper or PVC water lines, fiber optic lines without tracer ribbons, copper electric lines with no surface exposure, drainage tiles/pipes, and irrigation lines).

Where a private locator service identifies a potential risk that is not traceable through conventional methods, ECS will notify the client immediately and work to resolve the issue. Additional costs related to the resolution of these potential utility conflicts will be invoiced out per our unit rates, as identified in this proposal, or as negotiated and approved at the time of the occurrence.

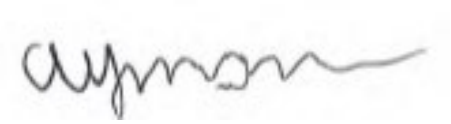
Please note that some disturbance to off-pavement/gravel covered the surface areas, including the possible cutting of trees, running over of brush and understory in wooded areas might occur. We will attempt to minimize such disturbance; however, we have not budgeted for site restoration of the site including filling of tire ruts, seeding of lawn areas, or the planting of trees. If necessary, additional site restoration can be provided at an additional cost.

Closing

If other items are required because of unexpected field conditions or because of a request for additional services, they would be invoiced in accordance with our current Fee Schedule. Before modifying or expanding the extent of our exploration program, you would be informed of our intentions for both your review and authorization. Work will not be performed without prior written authorization and will only be billed in accordance with County approved amounts. This applies to all primary and optional tasks. Hours and reimbursable will be billed with amounts, times, labor categories, rates and multipliers shown on the invoice.

Our insurance carrier requires that we receive written authorization prior to initiation of work, and a signed contract prior to the release of any work product. This letter is the agreement for our services. Your acceptance of this proposal may be indicated by signing and returning the enclosed copy to us. We are pleased to have this opportunity to offer our services and look forward to working with you on the project.

Respectfully,
ECS MID-ATLANTIC, LLC



Ayman A. Abed
Staff Project Manager
AAAbed@ecslimited.com

Michael D. Yasek, P.E.
Principal Engineer
MYasek@ecslimited.com

[https://ecslimited365.sharepoint.com/sites/1Chantilly/GeoProp/{eProposals}/70000-70999/70080-GP Lake Accotink/a-Working/70080-GP_rev4.docx

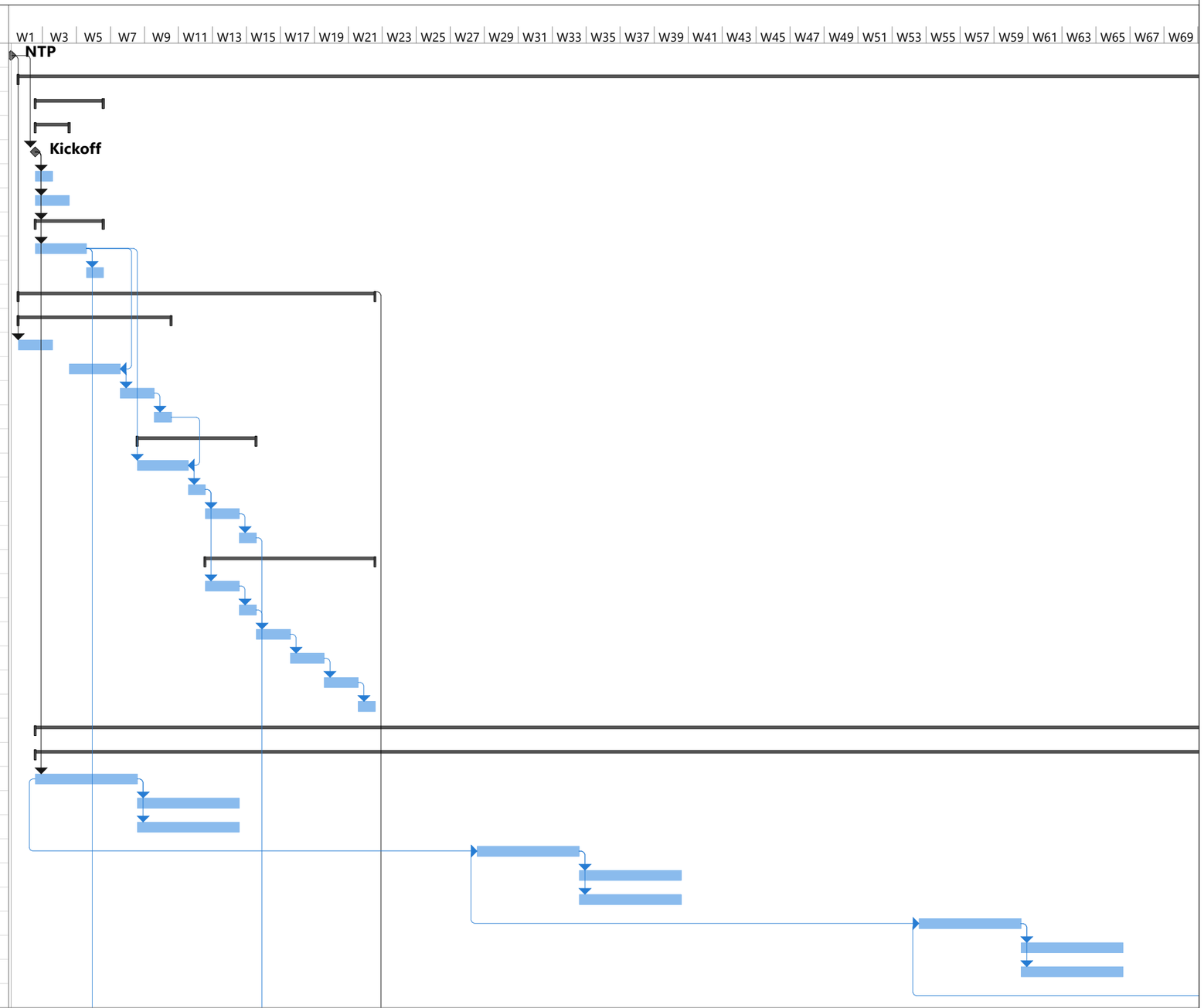
Attachment 4

Preservation Study Schedule

LAKE ACCOTINK PRESERVATION STUDY SCHEDULE

NOTE: DURATIONS SHOWN ARE BEST ESTIMATES BASED ON THE SCOPE OF WORK DESCRIBED IN THE PROPOSAL AND ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND/OR CHANGES IN SCOPE.

ID	Task Name
1	Notice to Proceed
2	**Lake Accotink Preservation Study**
3	**Task 1 - Kickoff Meeting and Coordination**
4	**Task 1.1 - Kickoff Meeting**
5	**Meeting: Kickoff Meeting**
6	Kickoff Meeting Summary Delivery
7	**Deliverable: RACI Matrix**
8	**Task 1.2 Lake Accotink Project Team Coordination**
9	**Meeting: Discovery Report Team Coordination**
10	**Deliverable: Coordination Meeting Summary**
11	**Task 2 - Document Review and Desktop Assessment**
12	**Task 2.1 - Document Review**
13	Acquisition and Review of New Documents
14	**Deliverable: Draft Document Review TM**
15	County Review of Document Review TM
16	**Deliverable: Final Document Review TM**
17	**Task 2.2 - Desktop Assessment**
18	Desktop Assessment and Identification of Key Assumptions
19	**Deliverable: Draft Desktop Assessment TM**
20	County Review of Draft Desktop Assessment TM
21	**Deliverable: Final Desktop Assessment TM**
22	**Task 2.3 - Permitting Assessment**
23	Assessment of Permitting Prior to Pre-Application Meeting
24	**Meeting: Preparation with DPWES for Pre-Application Meeting**
25	**Meeting: Pre-Application Meeting with Permitting Agencies**
26	**Deliverable: Draft Permitting Determination TM**
27	County Review of Draft Permitting Determination TM
28	**Deliverable: Final Permitting Determination TM**
29	**Task 3 - Data Collection**
30	**Task 3.1 Bathymetric Survey**
31	Fall Survey #1
32	**Deliverable: Bathymetry Data Report**
33	**Deliverable: Bathymetric Survey Drawing Files for Fall Survey #1**
34	Spring Survey #1
35	**Deliverable: Bathymetry Data Report (Update 1)**
36	**Deliverable: Bathymetric Survey Drawing Files for Spring Survey #1**
37	Fall Survey #2
38	**Deliverable: Bathymetry Data Report (Update 2)**
39	**Deliverable: Bathymetric Survey Drawing Files for Fall Survey #2**
40	Spring Survey #2



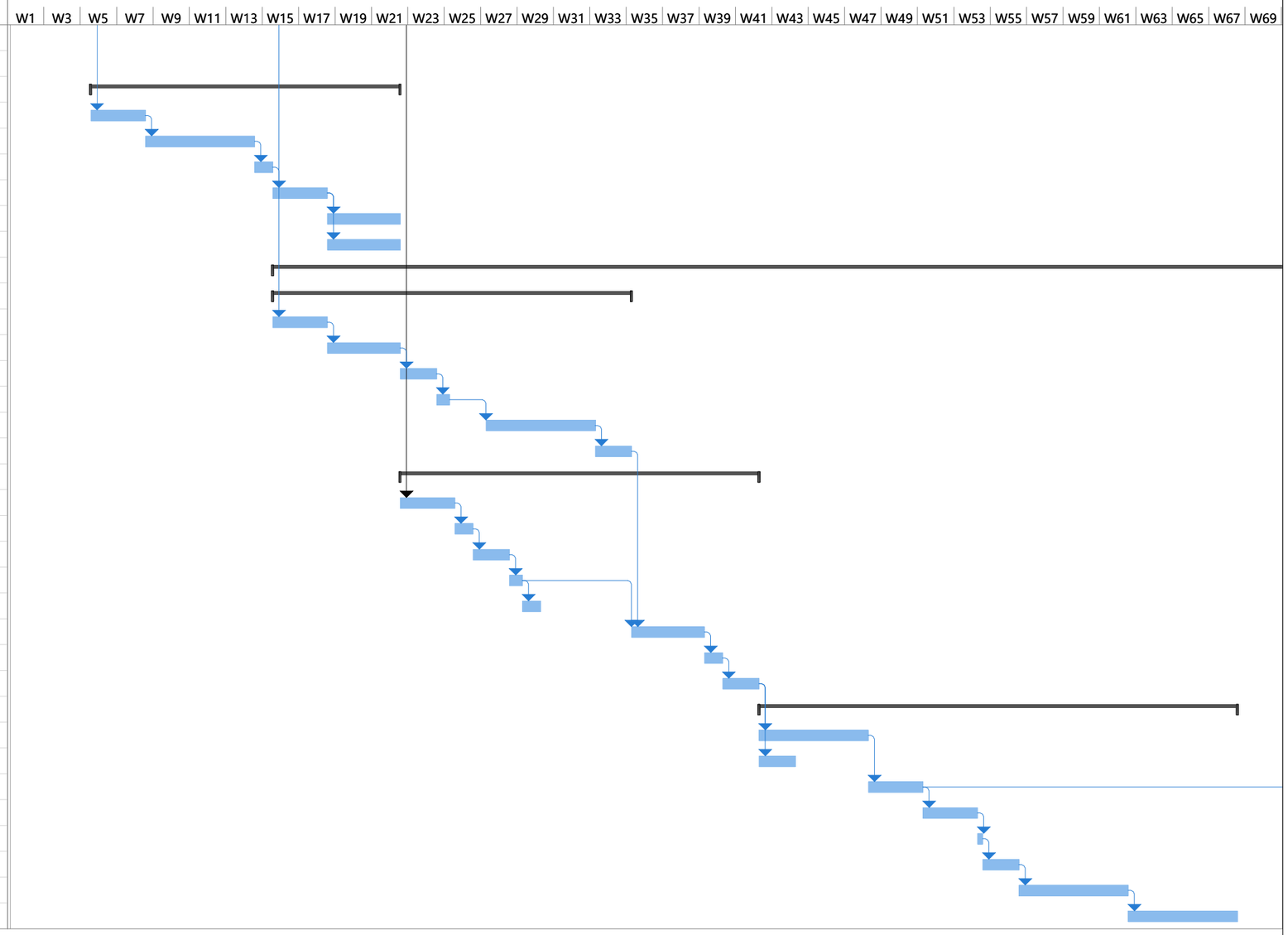
Durations shown are in business days.

Task | Split | Milestone | Summary | Project Summary

LAKE ACCOTINK PRESERVATION STUDY SCHEDULE

NOTE: DURATIONS SHOWN ARE BEST ESTIMATES BASED ON THE SCOPE OF WORK DESCRIBED IN THE PROPOSAL AND ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND/OR CHANGES IN SCOPE.

ID	Task Name
41	**Deliverable: Bathymetry Data Report (Update 3)**
42	**Deliverable: Bathymetric Survey Drawing Files for Spring Survey #2**
43	**Task 3.2 In-Lake Sediment Sampling**
44	Coordination with Sedimentation Team
45	**Deliverable: In-Lake Sediment Sampling Work Plan**
46	Field Collection
47	Laboratory Analysis
48	**Deliverable: Sediment Data Report**
49	**Deliverable: Lab Electronic Data**
50	**Task 4 Development of Concept Designs and Preservation Study Report**
51	**Task 4.1 Concept Design/Mass Balance Analysis**
52	Develop Concept Designs
53	Mass Balance Analysis and Sediment/Cost Curve Development
54	**Deliverable: Draft Concept Designs**
55	**Meeting: Arcadis and the County to Review Preliminary Concept Designs**
56	Other Reviews of Draft Concept Designs
57	**Deliverable: Final Concept Designs**
58	**Task 4.2 Feasibility Evaluation**
59	Develop Smaller Lake Evaluation and Scoring Criteria
60	**Deliverable: Draft Evaluation and Scoring Criteria TM**
61	County Review of Draft Evaluation and Scoring Criteria TM
62	**Meeting: Review of Draft Evaluation and Scoring Criteria TM**
63	**Deliverable: Evaluation and Scoring Criteria TM**
64	Perform Assessment on Draft Concept Designs
65	**Deliverable: Draft Evaluation Summary Table**
66	County Review of Draft Evaluation Summary Table
67	**Task 4.3 Preservation Study Report**
68	Develop Draft Preservation Study Report
69	Finalize Evaluation Summary Table
70	**Deliverable: Draft Preservation Study Report**
71	County Review of Draft Preservation Study Report
72	**Meeting: Draft Preservation Study Report Review**
73	**Deliverable: Final Preservation Study Report**
74	Other Reviews of Final Preservation Study Report
75	Additional Adjustment to Preservation Study Report



Durations shown are in business days.

Task | Split | Milestone | Summary | Project Summary

LAKE ACCOTINK PRESERVATION STUDY SCHEDULE

NOTE: DURATIONS SHOWN ARE BEST ESTIMATES BASED ON THE SCOPE OF WORK DESCRIBED IN THE PROPOSAL AND ARE SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND/OR CHANGES IN SCOPE.

ID	Task Name
76	**Task 4.4 Preservation Study Report Updates**
77	Receipt of Year 2 (2026) Sedimentation Data
78	Review New Data for Potential Impact on Mass Balance Used for O&M
79	**Meeting: Review of Sedimentation Data Impacts on O&M Mass Balance**
80	**Deliverable: Draft Revised Preservation Study Report**
81	County Review of Draft Revised Preservation Study Report
82	**Meeting: Draft Revised Preservation Study Report Review**
83	**Deliverable: Final Revised Preservation Study Report**
84	Receipt of Year 3 (2027) Sedimentation Data
85	Review New Data for Potential Impact on Mass Balance Used for O&M
86	**Meeting: Review of Sedimentation Data Impacts on O&M Mass Balance**
87	**Deliverable: Draft Revised Preservation Study Report**
88	County Review of Draft Revised Preservation Study Report
89	**Meeting: Draft Revised Preservation Study Report Review**
90	**Deliverable: Final Revised Preservation Study Report**

Durations shown are in business days.

Task | Split | Milestone | Summary | Project Summary