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Environmental Sciences • Planning • Surveying • Civil & Environmental Engineering • Landscape Architecture

May 7, 2014

Corps of Engineers, Norfolk Regulatory Office
Attn: Mr. Tucker Smith
803 Front Street
Norfolk, VA. 23510

Re: Centerville Properties Development, JPA 2000-1688

Greetings Mr. Smith,

On behalf of Tri-City Properties, LLC, MSA, P.C. is pleased to provide this final Supplemental Joint Permit Application Submission for the proposed Centerville Properties Development in Chesapeake, VA. This preparation is in response to a written request from your office for a consolidation of all documents into one cohesive package to facilitate further review as this project continues in the permitting process. Tri-City Properties, LLC. has retained MSA, P.C. as agent to represent this project for the resubmission process.

This submission contains a collective summary of the permitting process to date, including a completed alternatives analysis to determine the LEDPA, a Wetland Function Assessment of the project site, and a brief summary of the proposed mitigation efforts that will be completed upon receipt of permits. As requested, this document has been arranged in the Savannah District format.

Thanks for your assistance with this project. MSA, P.C. and Tri-City Properties LLC. will be more than happy to answer any questions, provide additional information or other assistance to the Corps of Engineers to facilitate review of this project.

Sincerely,

Brian Owen
Environmental Scientist, MSA, P.C.

Supplemental JPA Submission
Centerville Properties Development, Chesapeake, VA
USACE JPA # 2000-1688

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Summary of Proposed Project

The project is a proposed 53.8-acre development (which is a further minimized version of the 61.1 acre development proposed in April 2009) in Chesapeake, Virginia situated along Centerville Turnpike in the northwestern portion of a larger +428-acre tract of land located in the Greenbrier Market Area. See attached Figures 2 and 5 for a vicinity map showing the location of the Project Site, as well as the proposed site plan. The overall project purpose is to provide a mixed-use community, consisting of a variety of residential opportunities and community related commercial services to support the housing needs generated by the rapidly expanding commerce and employment center situated in the Greenbrier section of Chesapeake. The currently proposed development has been condensed and significantly minimized to reduce wetland impacts to the maximum extent practicable.

Tri-City Properties, LLC (Tri-City) now seeks authorization from the Corps to impact 24.6 acres of wetlands as part of this reduced scope project. As compensation, Tri-City has offered to preserve in perpetuity a 145-acre forested conservation buffer (5.9:1 conservation) and provide re-establishment and/or creation of like kind wetland functions on 50 acres of prior-converted cropland and cut-over upland areas located onsite as an integral part of the 428-acre tract (2:1 mitigation). The Proposed Project is compatible with and fully conforms to the previously obtained 401 and Virginia Water Protection (VWP) permits as well as the City of Chesapeake's comprehensive plan and current zoning.

1. INTRODUCTION

A. Proposed Project

i. Project Description

Tri-City proposes to develop a 53.8 acre portion of land that is part of a larger 428-acre tract located on the east side of Centerville Turnpike in the Greenbrier area of Chesapeake, Virginia, Parcel # 0390000000380. The overall parcel has road frontage to both Centerville Turnpike and Elbow Road. The currently proposed project site, located in the northwest quadrant along Centerville Road, is presently designated as High Density Mixed Use under the City's comprehensive plan Suburban Overlay.

The 53.8 acre proposed project includes approximately 12.5 developable acres of commercially zoned land and 33 developable acres of multifamily land, net of roads and BMPs. The commercial development will allow a mix of community related retail and commercial services for the users and residents of the proposed development as well as adjacent neighborhoods. The residential construction will consist of approximately 480 multifamily units providing a diverse housing community including condominium, apartment, and senior living opportunities.

ii. Site and Area Description

The proposed site is conveniently located within 3 driving miles of significant employment, shopping, recreational, and emergency service opportunities, within 3.5 miles of the Interstate 64 and Greenbrier Parkway interchange, and within 5.5 miles of multiple medical services, including Chesapeake General Hospital.

The project site currently consists of an approximately 50-60-year-old mixed deciduous, late succession forest. The elevation of the subject property ranges from 9 – 12 feet with typical soils, vegetation, and topography to the surrounding vicinity. Based on historic photography, abandoned logging equipment and skidder rutting, it appears that the timber in the area was completely harvested at least once in the last century. The dominant canopy vegetation consists of a mixture of oaks (*Quercus* spp.), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), hickories (*Carya* spp.), American beech (*Fagus grandifolia*), ironwood (*Carpinus caroliniana*), and loblolly pine (*Pinus taeda*). Representative understory species consist of giant cane (*Arundinaria gigantea*), greenbrier (Smilax spp.), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and saplings of the aforementioned tree species.

iii. Ownership and Zoning

The Applicant and related entities purchased 5 parcels of land totaling 428 acres, now known collectively as the Centerville Properties, in the mid-1980s for the purpose of developing a mixed-use community to serve the needs of the Greenbrier Market Area. The

Centerville Properties include the 53.8 acres of the proposed project which specifically were acquired as part of a larger parcel in June of 1986. The combined property subsequently was transferred between related parties for estate and tax planning purposes; however the ownership has remained within the Garcia family at all times, except for a 20-acre parcel (Parcel 10-A Trans America Services, Inc.) that was conveyed to the City of Chesapeake in November 1997 as a proffered park site. Transfer documentation from the City of Chesapeake Real Estate Assessor's Office for Parcel 10-A is included (S1: Exhibit A.1).

In March 1989, the City of Chesapeake unanimously approved zoning for the overall property. Tri-City obtained rezoning approval in August 1995 to reconfigure land uses within the previously zoned property. The 1995 zoning and proffers remain in effect. On March 12, 2013, Chesapeake Assistant Planning Director, Karen Shaffer, sent a letter to the Corps verifying that the proposed 61-acre development is consistent with existing zoning (S1: Exhibit A.2). An updated letter based on the minimized 53.8-acre conceptual layout is also included (S1: Exhibit A.3). Any potential proffer amendments based on the size and location of the reduced development proposal would be related to the school site, park improvements, and offsite road improvements.

iv. Project History Summary

(Refer to Appendixes for complete historic and alternatives documentation)

The owners purchased the five parcels that comprise the property in the mid-1980s as an investment with the expectation that this land could be developed to meet the project goals. Subsequent to the purchases, the Corps began asserting significant jurisdictional power over similarly situated wetlands and limiting activities that could affect such areas as a result of the release of the 1987 Corps of Engineers Wetland Delineation Manual which established the guidelines and processes that form the backbone of the modern wetland delineating and permitting process.

The Centerville Properties have since undergone a thirteen-year permitting process which began with the enactment of new wetland regulations in Virginia in July 2000 and the subsequent filing of a permit application with the Virginia Department of Environmental Quality (DEQ). On November 21, 2003, after multiple site visits, several public comment periods and public hearings, and a comprehensive three-year review, DEQ issued Virginia Water Protection Permit 00-1688, granting Tri-City state authorization, subject to compensatory mitigation, preservation and other enumerated conditions, to fill or drain 144.6 acres of palustrine, forested wetlands to facilitate development of a master-planned, mixed use community (S1: Exhibit B.1). The DEQ required impact compensation that equated to a 2:1 wetland restoration and the preservation of 145 acres of similar wetlands on adjacent land owned by Tri-City (documentation provided in S1: Exhibit B.1-B.2). At

the time, the DEQ viewed the original proposal favorably since it was a net benefit to wetland resources (S1: Exhibit B.2).

In January 2005, Tri-City filed a Joint Permit Application (S1: Exhibit C) with the Corps requesting federal approval to carry out the development of the Centerville Properties in accordance with the permissions and conditions approved and permitted by the state. Since that time, extensive meetings, correspondence, and filings have taken place between representatives of Tri-City, the Corps, and the City of Chesapeake in order to determine the Least Environmentally Damaging Practicable Alternative (LEDPA).

At the request of the Corps in September 2006, Tri-City submitted an Alternative Site Evaluation performed by Bruce F. Hatfield, MAI-SRA based on the proposed Full Parcel development. Subsequent negotiations with the Corps have necessitated an evaluation of reduced scope project alternatives, including the current proposal. Therefore, Tri-City retained Mr. Hatfield to conduct a second extensive survey of property located within the geographic area suitable to accommodate the Proposed Purpose and Need of the then Proposed LEDPA option (S1: Exhibit D.1). In addition to submitting these offsite analyses, Tri-City has submitted detailed economic analysis of 17 onsite alternatives which included No Build, Full Site, Scaled Back, Elbow Road, and Reduced Development/Proposed LEDPA. An additional Reduced Impact alternative also has been recently explored. These options are provided in Section 3 below.

Three formal ACOE Public Notices have been filed with regard to the Centerville Properties:

- February 1, 2005: Full Site with 144.6 acre impact in accordance with DEQ Permit (S1: Exhibit E.1)
- January 30, 2007: Full Site with 181.3 acre impact, resulting from Corps revised wetland delineation (S1: Exhibit E.2)
- August 4, 2009: Reduced Development with 29.8 acre impact (S1: Exhibit E.3)

Subsequent to each public notice, Tri-City provided responses to the Corps, addressing public comments including the U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), the cities of Virginia Beach and Chesapeake, and various environmental groups and individuals (S1: Exhibit F).

v. Current Proposal

Through a series of project modifications, Tri-City has condensed the scope and reconfigured the design to avoid wetland impacts to the maximum extent practicable while still meeting the Proposed Purpose and Need and minimally maintaining a **financially viable project**. The revised development now totals 53.8 acres, a 233-acre reduction from

the original development proposal. The proposed development includes approximately 12.5 developable acres of commercially zoned land and 33 developable acres of multifamily land (the remaining acreage is common space for roads, storm water management facilities, etc.). Like the original development proposal, the Proposed LEDPA involves construction of a mixed use community in the Greenbrier area of Chesapeake to support the housing needs created by the commerce and employment center situated in the Greenbrier section of Chesapeake. This project will be constructed as a horizontal mixed-use development based on the current zoning and the City of Chesapeake's Comprehensive Plan.

A total of 24.6 acres of wetlands would be impacted by the proposed LEDPA. This reduction in project size has decreased the wetland impacts 86% from the original proposal and the impacts approved by the DEQ. Further, the selected orientation of the current proposed development within the larger parcel maximizes use of available fragmented uplands within the property, minimizing wetland impacts.

B. Applicant's Purpose and Need Statement

Housing is an identified need in the Greenbrier section of Chesapeake. One of the housing goals set forth by the City of Chesapeake in the 2026 Comprehensive Plan is to "Locate new housing so that it provides safe and convenient access to employment, shopping, recreation and educational facilities."

Per the City of Chesapeake's Planning Department, Greenbrier is the fastest growing area in the city. Due to its easy access to Interstate 64 and waterways critical for regional commerce, the Greenbrier market area has become the job center of Southside Hampton Roads – employing over 50,000 people and making it the City of Chesapeake's "New Downtown." The Hampton Roads Planning District Commission's 2034 population projection further forecasts that the population in this section of Greenbrier will increase by 12,275 over the next twenty years, increasing the housing demand by over 4,500 units. Further, while the overall population in the City of Chesapeake has been projected by the Virginia Employment Commission to increase 15% from 2010 to 2020 and 30% from 2010 to 2030, this population increase is especially significant in the over 55 age groups, totaling increases of 46% and 65% respectively.

This continuing growth trend establishes the need for housing, shopping, and community services in this region to support the expanding population.

The goal of Tri-City is to provide a quality, mixed-use development with construction of this project to support the aforementioned need. The Proposed Project Purpose is to provide a mixed-use, multifamily community, consisting of a variety of residential opportunities, including rentals, condominium ownership, and senior over fifty-five suites,

integrated with community related commercial services to support the housing needs created by the rapidly expanding commerce and employment center situated in the Greenbrier section of Chesapeake.

See Figure 5 for the current site layout.

Public Interest Analysis

Pursuant to Corps regulation at 33 CFR 230.4(a)(1), determination of public interest is a balancing act involving many factors. "All factors which may be relevant to the proposal must be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people."

The Proposed LEDPA Plan is consistent with the public interest.

The proposed project offers significant conservation benefits. The plan, in addition to providing restoration and/or creation of like kind wetland functions on 50 acres of cutover forest and prior converted cropland, would preserve 145 acres of wetlands as conservation buffers, as well as include storm water detention ponds, grassy swales and emergent wetlands bench enhancements onsite.

The project will have a positive economic impact on the City of Chesapeake. Construction of the proposed development will benefit the City of Chesapeake in the form of increased employment opportunities, residential housing to support job growth, increased property tax revenue and sales and use tax revenue, a dedicated park, proffers for a school site, and increased public amenities. The projected annual real estate revenue for the proposed development is well over $1.1 million per year. By letter dated May 23, 2003, former Chesapeake Mayor, William Ward, notified the State Water Control Board that "the City of Chesapeake feels that this development project would be beneficial to the long-term economic development of the City."

The project will provide an aesthetically pleasing mixed-use alternative for residents of Chesapeake. A Marketing Review prepared by Prudential Decker Realty during the state review process stated the following regarding the proposed mixed-use development: "This type of community not only will maximize the potential gross value but will also create the most aesthetically pleasing environment for the city. Combined with the Conservation and Park aspects of this development, the total package will be a very desirable area to live in. With the adjacent commercial area, residents would have a self-contained neighborhood that catered to their needs as well as providing a recreational area for their leisure time." Extensive planning has gone into assuring the aesthetic value of this community.

Adverse effects to the aquatic resources will be fully mitigated, reducing them to less than significant levels. The proposed mitigation package for the 24.6 acres of impact includes onsite preservation in perpetuity of 145 acres of an adjacent forested conservation buffer as well as in-kind restoration of 50 acres of cutover forest and prior converted wetlands now used as cropland. All in all, 195 acres of compensatory mitigation is being offered to offset the 24.6 acre impact at a compensation rate of 7.9:1. Further, former Virginia DEQ Director, Bob Burnley, has cited the proposed project as "an excellent example of the success of Virginia's wetland protection program" due to the significant restoration, preservation, and minimization efforts incorporated into the development plan. (S1: Exhibit B.3)

Independent state and local agencies have found that the habitat and water quality concerns have been addressed. During the state wetlands permitting process, the Virginia Department of Game and Inland Fisheries evaluated the impact of the proposed development on both state and federally endangered or threatened species. They concluded that the compensatory mitigation package, then proposed, minimized project impacts and provided "valuable replacement habitat for these species in perpetuity."

The DEQ and State Water Control Board concluded, after thorough evaluation, that: "The proposed activity is consistent with the provisions of the Clean Water Act and State Water Control Law and will protect instream beneficial uses." The Board also determined that: "The effect of the impact, together with other existing or proposed impacts to wetlands, will not cause or contribute to significant impairment of the state waters or fish and wildlife resources." (S1: Exhibit B.2)

Further, the City of Virginia Beach has stated that, "the applicant made modifications to the project which alleviated the City's concerns relative to water quality and water quantity issues associated with the project as they relate to maintaining Stumpy Lake reservoir."

The proposed project is not situated within the 100-year flood plain and does not pose a flood hazard. Use of erosion control measures during construction, as well as storm water BMP's in the design of the proposed community, will minimize short and long-term effects to nearby floodplains.

The storm water runoff management benefits of a proposed project have been influential in ongoing state/federal permit applications. A significant benefit of the proposed development is that it will include a storm water runoff management system that will significantly improve storm water runoff management both for the subject property and the surrounding area and will substantially reduce nitrogen and phosphorous pollution entering the estuary.

The proposed land use conforms to both local zoning on the property and the City of Chesapeake's 2026 Comprehensive Plan prepared by the Chesapeake Planning Department and adopted on March 9, 2005. (S1: Exhibits A.2, A.3, and D.1)

Public recreation benefits of the land will not be negatively altered by this project. As the land is privately held, it currently has no recreation value to the general public.

The LEDPA project as proposed with a 24.6-acre wetland impact is the only alternative that is economically and logistically feasible and provides for a modest return to the property owner for the substantial investment in the property.

Taken as a whole, the needs and welfare of the people benefit as a result of this development. Environmental habitat and water quality issues will be fully mitigated. Further, the City of Chesapeake zoned the property for this use and has determined that the project would be an economic benefit to the citizens of Chesapeake, and the DEQ calls this project "an excellent example of the success of Virginia's wetland protection program."

Therefore, when all relevant factors are considered and balanced against each other, the preponderance of documentation supports the assertion that this project as proposed by the applicant and fully evaluated by numerous state and local agencies is in keeping with the public interest.

C. Basic Project Purpose

The basic purpose of the proposed development is to provide a quality, mixed-use development in support of the housing, shopping, and community service needs of the growing Greenbrier Market Area.

D. Water Dependency

The purpose and need of the proposed project necessitate that the development be located within close proximity to the major employment and commerce center within the Greenbrier Market Area. The development itself is not water dependent. However, based on the alternatives analysis, the selected location is the least environmentally damaging practicable alternative (LEDPA) that accomplishes the project purpose.

E. Overall Project Purpose

The Overall Project Purpose is to provide a mixed-use, multifamily community, consisting of a variety of residential opportunities, including rentals, condominium ownership, and senior over fifty-five suites, integrated with community related commercial services to support housing needs created by the rapidly expanding commerce and employment center situated in the Greenbrier section of Chesapeake.

F. Geographic Area of Review for Alternative Project Sites

In February of 2013, Mr. Bruce Hatfield, MAI-SRA, prepared an Alternative Site Evaluation for the Centerville Properties, which was further amended in April 2013 at the request of the Corps after initial review (S1: Exhibit D.1). Subsequent site updates have also been included with this submission (S1: Exhibit D.2).

In keeping with the Project's Purpose and Need, Mr. Hatfield focused on the Greenbrier study area which he defined as " located west of Indian River Road (Kempsville Area) and east of Battlefield Boulevard . . .split by Interstate 64" and identified 4 potential sites for review. He also identified 2 sites outside of Greenbrier Area, 1 to the west of Great Bridge and another just south of Great Bridge, which were considered and excluded from further evaluation.

The selected area of review for alternative sites was limited to locations that could reasonably support the Greenbrier Market Area. In the March 2008 denial of the 181-acre impact request, the Corps stated: "We concur with the search area . . . ." The commerce center in Greenbrier is rapidly expanding as discussed in Section 1-B, and placement of the proposed development near this area will facilitate achieving the purpose and need. Farther sites would minimize the benefit to this market location due to long commute times and road configurations. As such, they have been rejected from further analysis.

G. Selection of Alternative Project Sites

The current availability of land must be considered in the selection of alternative project sites for evaluation. However, due to increasing developments in the vicinity, availability of appropriately zoned developable properties within this proximity has diminished rapidly. The project site was acquired prior to 1987 for this specific purpose, was subsequently rezoned by the City of Chesapeake, and has a VWP permit valid for the proposed development establishing its availability and suitability.

i. Site Selection Screening Criteria

In considering site selection criteria, several factors must be considered, including:

a. **Project Size** (Alternative properties must be large enough for development)
b. **Availability** (The property must be available for acquisition and development)
c. **Wetlands** (Environmental constraints must be considered that may limit development)
d. **Infrastructure availability** (Municipal utilities are required for this size development) See S1: Exhibit D.3: Map 12
e. **Zoning** (City zoning would prohibit this size/type of development in certain areas)
f. **Characterization per the Comprehensive Plan** (The project must agree with the City's long-term growth objectives) See S1: Exhibit D.3: Map 2

ii. Summary of Alternative Sites Screened for Practicability

During Mr. Bruce Hatfield's second analysis of off-site alternatives for the reduced scale development, it was not possible to find a parcel of similar size and zoning in the area required to meet the project purpose. However, 4 parcels that met at least some of the criteria were selected for in-depth analysis. The results of this study were originally reported to the Corps in February 2013, modified in April 2013 at the request of the Corps after an initial review (S1: Exhibit D.1), and subsequent site updates have been included with this submission (S1: Exhibit D.2). Key details are provided as Alternative Sites 1 – 4

in Table 1 below. Map 2 of S1: Exhibit D.3 has been marked to indicate sites chosen for review. A narrative description of each alternative follows.

Table 1
Onsite vs. Offsite Alternatives

	Onsite Alternative	Adjacent Site	Alt Site 1	Alt Site 2	Alt Site 3	Alt Site 4
Number of Acres	53.8	641.74	67	236	195.66	63.82
Is land available?	Yes	Yes	No	Under Development	Yes	Yes
Wetlands identified?	Yes	Yes	No	No	No	No
Infrastructure available?	Utilities Available	None	Utilities Available	Utilities Available	Utilities Available	None
Current zoning?	Commercial and Multi-Family	A-1	Commercial	PUD R-10S and O&I	A-1	A-1
Comprehensive Plan	High Density Mixed Use	Rural	High Density Mixed Use	Regional Mixed Use	ORC and Conservation	Low Density Residential
Does required zoning align with comprehensive plan?	Yes	No	Yes	Yes	No	No
Does alternative meet the project purpose and need?	Yes	No	No	No	No	No
If fails to meet project purpose, why not?		Wetland Impact Comprehensive Plan Incompatible	Land Not Available	Land Not Available	Zoning and Comprehensive Plan Incompatible	Zoning and Comprehensive Plan Incompatible

Onsite Alternative: Centerville Property

Tri-City proposes to develop 53.8 acres along Centerville Turnpike. A total of 24.6 acres of wetlands would be impacted. This land is part of a 428-acre tract located north of the intersection of Centerville Turnpike and Elbow Road, just south of the Virginia Beach and Chesapeake city lines. The proposed development area includes approximately 12.5 acres of developable commercially zoned land and 33 acres of developable multifamily and town house land that would allow for 480 residential units. This area is designated as High Density Mixed Use under the comprehensive plan. Zoning and use designations are compatible with the Proposed Purpose and Need.

Adjacent Site: Lakewood Property

In early 2007, the Corps investigated the feasibility of using property owned by Tri-City on an adjacent site, the Lakewood Property, as an alternative. No utilities are available to this site, and the A-1 zoning and Rural Use designation under the comprehensive plan are not suitable to the project purpose. After conducting a site visit in February 2007, Corps' representative, Robert Berg, concluded the adjacent property contained too many wetlands for feasible development to occur, and the Corps took this alternative off the table. It is listed for comparative purposes only.

Alternative Site 1: Vakos Site

Located near Battlefield and I-64 in Northwestern Greenbrier, the Vakos site is compatible in size with the proposed development and public utilities are available. This is the only site found with a similar land use designation under the comprehensive plan as the subject, High Density Mixed Use; however, it has an underlying commercial zoning and would require rezoning to be considered an alternative for the proposed mixed use community. The site is currently under development, and therefore the land is no longer available.

Alternative Site 2: CBN Regent Site

Located in North Greenbrier, this site is part of the overall CBN-Regent University Complex. The portion of the site located within Chesapeake city lines is actively being developed with multi-family housing. The use designation under the comprehensive plan is Regional Mixed Use with a small portion of Office and High Density Residential. It is located in a high density residential land use area and would not support any neighborhood commercial development on the Chesapeake side similar to that necessary to meet the Project Purpose and Need. The site is currently under development, and therefore the land is no longer available.

Alternative Site 3: Southern Greenbrier Site

Located at the intersection of Clearfield Avenue and Kempsville Road, this 195.66 acre site is adjacent and contiguous to the Chesapeake's Oak Brooke Commerce Park. The rear wooded land falls within a conservation district. The zoning is A-1 which is not compatible with the Proposed Purpose and Need. Terry Peterson, Inc. withdrew an unsuccessful rezoning bid on this property in early 2013. The comprehensive plan, which called for Office/Research Uses similar to the existing adjacent park, was then amended in October 2013 to include a portion of Business/Commercial Use (S1: Exhibit D.2), but specifically excluded Residential Use, eliminating the hope of developing this site as a mixed-use community.

Alternative Site 4: 1900 Block, Elbow Road Site

Located in Greenbrier East, this 63.82 acre site is the only site found with a similar land size within the immediate area of the subject. No utilities are available to the site. The property is zoned A-1, and the comprehensive plan would restrict future development to Low Density Residential, making it incompatible with the Proposed Purpose and Need.

Documentation provided on the four alternative sites identified by Mr. Hatfield, along with the prior examination by the Corps of the adjacent Lakewood Site, clearly demonstrates that there are no current off-site practicable alternatives to the proposed development that would meet the Proposed Purpose and Need.

In addition to the parcels analyzed within the Greenbrier area, 2 parcels of comparable land outside of the Greenbrier area were examined and excluded from consideration. Details are provided in Table 2.

Table 2
Comparable Sites Deemed Unsuitable as Alternatives

	West of Great Bridge	South of Great Bridge
Number of Acres	Multiple Large Tracts	Multiple Large Tracts
Is land available?	Yes	Yes
Air rights Easements?	Yes	No
Franchise Area Infrastructure limitations?	Yes	Yes
Current zoning?	A-1	A-1
Comprehensive Plan	Rural	Rural
Does required zoning align with comprehensive plan?	No	No
Does parcel qualify as an alternative?	No	No
If parcel fails to qualify as alternative, why?	Air rights restrictions; Utilities unavailable; incompatible with Comprehensive Plan	Utilities unavailable; incompatible with Comprehensive Plan

H. Regulatory Guidance Letter (RGL) 93-02

Based on the levels of impacts from this project, it is not considered a minor impact. Alternatives and other inclusions to satisfy the requirements of RGL 93-02 are discussed below.

2. PROPOSED ACTION AND ALTERNATIVES

A. Factors Used to Analyze Practicable Alternatives

This alternatives analysis examines the current proposal and compares it to other possible alternatives, both on and off site, to determine which feasible alternative is the least environmentally damaging practicable alternative (LEDPA).

i. Environmental Factors

In considering the alternatives to the proposed project, environmental constraints such as wetlands and waterways, Chesapeake Bay Preservation Act where applicable, noise zones due to commercial and military installations in the vicinity, and flood zones must be considered.

ii. Other Factors

Many other factors must be considered when analyzing alternatives. These include availability of land, proximity of the land to the target market area, cost of land acquisition, zoning and land use restrictions, and available infrastructure to support the development.

B. Proposed Action or Applicant's Proposed Alternative

The proposed LEDPA alternative will minimize environmental impact of the on-site alternatives. These impacts are:

a. **Stream impacts**: None
b. **Stream function**: N/A
c. **Wetland impacts**: 24.6 acres of Palustrine Forested (PFO) functionally impaired wetlands, which will be fully mitigated to less than significant levels as discussed in other sections of this report.
d. **Wetland function**: Wetland Function Assessment is discussed in Section 4.
e. **Impacts to other waters**: Ditch impacts within the project site are present, consisting of maintained ditch systems. Some of these ditches originate within the project site (intra-site ditches). Other ditches pass through the project site (inter-site ditches) draining off-site properties and the project site toward Stumpy Lake.
f. **Other waters function**: Maintained ditch systems that provide minimal habitat value.
g. **Federally listed threatened or endangered species**: None known to be present.
h. **Cultural resources**: None known to be present.

C. No Action Alternative

The No-Action alternative discussed in Section 3-A-i, results in no environmental impacts of any kind, does not achieve the project purpose, and does not result in the substantial net increase in wetland functions and benefits which would be derived from the proposed mitigation efforts that would be undertaken should this project be approved.

D. Off-Site Alternatives

Off-site alternatives were evaluated for availability of land and public utilities as well as conflicts with zoning or other land use restrictions. Based on an evaluation of these factors, the alternatives were deemed not feasible and rejected from further analysis. Therefore, the environmental analysis summarized for the LEDPA in Section 2-B was not reviewed for these alternatives. The complete off-site alternatives analysis is discussed in Section 1-G-2.

E. Summary of Alternatives Analysis

Based on the results of the off-site analysis, all off-site options were rejected from further analysis due to concerns involving the availability of land, infrastructure and utilities, as well as zoning and other land use constraints. The applicant's selected project site is the only effective location where the LEDPA can occur that would meet the overall project purpose. On-site alternatives are discussed below.

3. AVOIDANCE, MINIMIZATION, AND COMPENSATORY MITIGATION

A. Measures Considered to Avoid Unnecessary Aquatic Impacts

Since 2006, Tri-City has provided detailed economic analysis for seventeen onsite alternatives using various portions of the entire 428-acre property. This analysis has been conducted per guidance for analysis of residential development provided by the Corps in 2006.

Regarding costs, many factors are taken into account in considering the financial feasibility of a project, including acquisition cost of the land, the cost of project design and approvals, and construction costs including clearing and site preparation earthworks, road construction and utility improvements. Analyzing these costs versus the projected revenues (sales of housing lots and commercial land) determine whether a particular project alternative is financially viable.

Although the total investment in land and carrying costs to date is over $24,000,000, Tri-City reduced the land cost figure to $4,562,084 in the April 2007 analysis in response to the Corps contention that we should use the cost of the cash consideration of the property transfer to a related party in 1998 as the starting point for calculating total investment. Tri-City further reduced land cost to $3,748,992 in the October 2007 submission to address Corps' concerns regarding the calculation of interest carry. In the current projections, Tri-City has included an additional $500,000 estimate of the proffer cost toward an offsite school site.

It should be noted that Tri-City's use of the lower cost figure is not an admission that the figure is correct. In a recent case the United States Court of Appeals for the DC Circuit in *Sierra Club v. Van Antwerp*, ruled that it is the fair market value of the land at the time of the analysis, and not the investment cost, that should be utilized to appropriately compare alternatives. Although this case provides precedent for using the fair market value, Tri-City is moving forward with the lower value to avoid further delays in the permitting process.

The on-site alternatives evaluated can be categorized as follows**:**

No Build Alternative: This alternative includes no development and depicts the sale of the land or an easement for conservation.

Full Site Alternatives: These alternatives are all derivative of the full development plan that was used in obtaining the initial VWP Permit. In August 2007, Colonel Anninos stated that an impact of this size was too big to receive a 404 permit and suggested we pursue alternatives that focused on utilizing the uplands adjacent to Elbow Road and creating connectivity through wetlands to consolidate the fragmented uplands along Centerville Turnpike.

Scaled Back Alternatives: These alternatives are various scenarios that include isolated developments along Elbow Road and Centerville Turnpike.

Elbow Road Alternatives: These no impact alternatives examine and refute the possibility of developing the 90 acres of uplands adjacent to Elbow Road.

Reduced Development with Uplands Tied Together /LEDPA/Reduced Impact Alternatives: These alternatives focus on ways to connect the fragmented uplands along Centerville Turnpike to create a site suitable for the proposed mixed-use development.

i. Total Avoidance of Impacts to Waters of the US

No Build Alternative

A No Build Alternative (Alt 1) was originally provided to the Corps in September 2006. Revenue projected in this scenario would be generated by the sale of the land/easement for conservation purposes. This No Build alternative would frustrate the Tri-City's investment backed expectations of developing a mixed use multi-family residential and commercial development to support the rapidly expanding economic hub around the I-64 Greenbrier interchange and result in a significant loss in economics value of the Centerville property.

It is important to note that the land was purchased before the 1987 Corps Wetland Delineation Manual enacted changes to relevant wetland definitions and regulations. Tri-City and its predecessors could not have anticipated the difficulties in developing the parcel due to the new laws and regulations now in place. Therefore, the applicant's investment-backed expectations are worthy of consideration, and financial hardship has been imposed by wetland regulations.

The detailed economic analysis for this No Build Alternative is attached (S2: Exhibit L), and the economic matrix is provided in Table 3.

Table 3
No Build Alternative

***** Table redacted – Not subject to FOIA. *****

As this No Build Alternative is not financially practicable and fails to meet the Project Purpose and Need, it cannot be considered the LEDPA.

ii. Original Site Development Plan
Full Site Alternatives

In addition to a No Build Alternative discussed above, the initial submissions on September 18, 2006 and April 26, 2007 analyzed a Best Case Alternative (Alt 2) to develop the entire 428 acres, the Original Plan Alternative (Alt 3) to develop 286.9 acres with a 181.3 acre wetland impact, and four derivative alternatives (Alt 4 – 7) at 75%, 50%, 25%, and 10% of the Original Plan impact. In October 2007, the Original Plan Alternative was updated (Alt 3 Rev) using then current sales data and construction and mitigation costs, and utilizing without agreement, the Corps previous assertion of the reduced cost of land purchase as explained in Section 3-A above.

The detailed analyses for these scenarios are attached (S2: Exhibit M), and the economic matrices for the Full Site Alternatives are provided in Table 4.

Table 4
Full Site Alternatives

***** Table redacted – Not subject to FOIA. *****

iii. Alternative Site Development Plan
Scaled-back Alternatives

In August of 2007, several representatives of the Corps, Tri-City, and the City of Chesapeake met at the Corps' Norfolk offices to discuss the Original Plan Alternative of developing 286.9 acres with a 181.3 acre impact (Alt 3). Colonel Anninos indicated that a 404 permit could not be approved for that preferred scenario because the impact was too large. He proposed instead that Tri-City submit an alternative that included isolated development along Centerville Turnpike (utilizing wetlands as necessary to connect fragmented uplands) and Elbow Road (utilizing upland acreage). A detailed economic analysis of this Scaled Back Alternative (Alt 8) was provided in October 2007.

During a follow-up telephone conference, the Corps further requested that we look at this Scaled Back Alternative with an interior road connecting the isolated development sites which increased wetland impacts by over 8 acres (Alt 9) and with an office park included along Elbow Road (Alt 10). Economic options for these scenarios were submitted in December 2007.

The detailed economic analysis for these Scaled Back Alternatives (S2: Exhibit N) are attached, and the economic matrices for the above-described scenarios are provided in Table 5.

Table 5
Scaled Back Alternatives

***** Table redacted – Not subject to FOIA. *****

In addition to the Scaled Back Alternatives being financially impracticable, segregation of the subject site into multiple areas would defeat the project purpose and economic viability of a mixed-use development as well as have a negative effect on the regional air quality according to EPA guidance for mixed-use developments (S1: Exhibit G). The benefits of mixed land uses are many, including: substantial fiscal and economic benefits to a region, quality housing for people of varying income levels, efficient use of infrastructure resources, better jobs-housing balance, and a strong support system for neighborhoods, commercial centers, and public amenities and services. Walkable, mixed use communities are desirable places to live, work, learn, worship and play, and are a key component of smart growth. Segmentation would degrade the proposed benefits of the planned mixed-use community.

Elbow Road Alternatives

On March 3, 2008, the Corps issued a denial of the Original Plan permit request and stated that Tri-City had failed to rebut the presumption that a LEDPA to development exists. Specifically, the Corps requested an evaluation of developing the 90 acres of uplands along Elbow Road as a stand-alone project.

Tri-City has asserted from the beginning that any development of the 90 acres along Elbow Road without Plantation Woods Parkway (the connector road from Centerville Turnpike to Elbow Road as included in the proffers) would require a new rezoning and ultimate approval by the Chesapeake City Council.

Although such a rezoning was not practicable due to significant safety concerns regarding Elbow Road, Tri-City agreed to submit economic analysis for various Elbow Road Alternatives as follows: Residential Only (Alt 11), Mix of Residential and a 37-acre Business Park, factoring in the maximum and minimum cost estimates for road improvements (Alt 12 and Alt 13), and 5-unit and 20-unit Ranchette Options (Alt 14 and Alt 15).

As part of the protracted discussions over the feasibility of developing the upland portion along Elbow Road, Tri-City submitted numerous letters to the Corps from the majority of the members of the Chesapeake City Council and the Chesapeake Department of Neighborhood Services which clarified that Tri-City cannot develop the upland acreage along Elbow Road without developing Plantation Woods Parkway as the main area of ingress/egress or receiving an approved rezoning that would require substantial improvements to Elbow Road, making any of these alternatives economically unfeasible. Tri-City provided the Corps with documentation from an engineer and a land planner estimating the associated cost of these improvements as ranging from $5,000,000 to $10,620,000. Economic analysis was provided at both the maximum (Alt 12) and minimum (Alt 13) cost range, making the stand alone development even more unfeasible.

The Ranchette Alternatives (Alt 14 and Alt 15) would also require re-zoning of the property back to the pre-existing agricultural zoning. Even if Chesapeake Council would agree to rezone the property, no more than 5 3-acre parcels could be developed based on road frontage requirements. The 20-ranchette option (Alt 15) was submitted only to show that even developing the entire Elbow Road parcel, net of proffered land, into ranchettes would still result in a net loss and not be economically practicable.

The detailed economic analysis for these Elbow Road alternatives are attached (S2: Exhibit O), and the economic matrices are provided in Table 6.

Table 6
Elbow Road Alternatives

***** Table redacted – Not subject to FOIA. *****

As shown in the table above, the Elbow Road Alternatives have all proven to be financially infeasible. The limited development of ranchettes would not generate sufficient income to cover the associated costs of the project, and a more extensive development on the uplands would trigger the need for costly and significant improvements to Elbow Road.

Even if cost considerations were set aside, Tri-City's ability to purchase the right-of-way necessary to make the road improvements from a variety of individual landowners is unlikely. The required road improvements would also result in wetland impacts, thus this would not be a no-impact alternative. Finally, the marketability of business or commercial acreage on this isolated piece is doubtful. Therefore, the development of the Elbow upland acreage alone is logistically impracticable.

On April 17, 2013, Tucker Smith of the Corps met with Jay Tate, Director of the Chesapeake Department of Development and Permits, Pete Burkhimer of Engineering Services, Inc., and Tri-City representatives Mike Gelardi and Andrea Kilmer to discuss the City's concerns regarding the inferior safety and service level of Elbow Road as well as the extensive infrastructure improvements that would be required by the City to develop the upland portion of the property. These improvements were outlined by Jay Tate in his letter of April 21, 2009 to Colonel Anninos and reconfirmed in his letter of March 12, 2013 to Colonel Olsen. (S1: Exhibit H) As a result of this discussion and the volume of documentation previously provided to the Corps, Mr. Smith agreed that it would be impracticable to develop the Elbow Road uplands as a stand-alone project.

If an upland development along Elbow Road was indeed a feasible alternative, one must logically assume that Tri-City would have developed this portion of the site long ago to recoup some of its investment as no wetland permit would be necessary to do so. However, due to economic, zoning, and safety considerations regarding Elbow Road, all versions of the Elbow Road Alternatives are financially, politically, and logistically not practicable, and therefore cannot be considered the LEDPA.

Use of the Elbow Road uplands for development has been extensively evaluated and determined by both Tri-City and Corps representatives to be cost prohibitive and impracticable. The farm fields, therefore, are currently proposed for on-site mitigation.

Reduced Development with Uplands Tied Together Alternatives

Tri-City first submitted a Reduced Development with Uplands Tied Together Alternative (Alt 16) of developing 108.5 acres along Centerville Turnpike in October 2007.

The detailed economic analysis for this Reduced Development Alternative (S2: Exhibit P) is attached, and the economic matrix for this scenario is provided in Table 7.

Table 7

***** Table redacted – Not subject to FOIA. *****

Mitigation Bank Alternative

An onsite alternative based on converting the property to a mitigation bank was considered; however, as further detailed in Section 3-C-iii, approximately 1,758 acres of mitigation credits currently are available in the southern watershed. Given the small amount of permitted impacts in the Norfolk district, there is presently over a 15 year supply of credits already on the market, rendering the credits virtually worthless and therefore financially impracticable.

iv Final Site Development Plan

LEDPA and Further Reduced Alternatives

After further discussions and negotiations with the Corps, Tri-City submitted the Proposed LEDPA Alternative (Alt 17) for development of 61.1 acres along Centerville Turnpike in September 2009. We have included a revised version of this analysis (Alt 17 Rev) with this submission, reducing the footprint to 53.8 acres and the wetland impacts to 24.6 acres, updating sales figures to current market value, construction costs to reflect current costs, and mitigation costs to reflect the amended proposal to provide onsite re-establishment of 50 acres of prior-converted cropland.

We have also provided analysis of this general configuration along Centerville Turnpike with additional minimization of wetland impacts. This Reduced Impact analysis (Alt 18) shows that further minimization from the Proposed LEDPA Revised alternative is not financially practicable.

The location and configuration of the LEDPA as proposed minimizes environmental impacts by utilizing available upland areas along Centerville Turnpike and the northern property boundary along the tributary to Stumpy Lake. Any other location within the larger parcel would result in significantly increased wetland impacts.

The detailed economic analysis for this Proposed LEDPA and Reduced Impact Alternatives (S2: Exhibit Q) are attached, and the economic matrices for the above-described scenarios are provided in Table 8.

Table 8
Proposed LEDPA Alternative

***** Table redacted – Not subject to FOIA. *****

The further reduced alternative (Alt 18) involves essentially tying the uplands within the LEDPA footprint together, impacting those wetlands between the upland areas to provide for the proposed development and access. This option explores the placement of 390 housing units with the necessary entrance from Centerville Turnpike. However, due to the narrow footprint available along Centerville Turnpike, this project allows for only half of the commercial development of the proposed LEDPA and results in significantly less revenue. As can be seen in the table above, this alternative results in a net economic loss, and is not feasible.

While the Proposed LEDPA does not result in significant profit to Tri-City, it is still in the applicant's best interest to pursue this alternative due to the partial recovery of the land costs previously expended.

Alternatives Discussion:

Through a series of project modifications, Tri-City has condensed the scope and reconfigured the design of the Proposed Project to reduce wetland impacts to the minimum extent practicable while meeting the Proposed Purpose and Need. As suggested by Colonel Anninos in August 2007, wetlands would be impacted in the Proposed Project only to create connectivity with useable uplands along Centerville Turnpike to form a practical and cohesive multi-use development. The Proposed Project reduces the impact by 156.7 acres. This reduction is the result of 9 years of work with the Corps, the City of Chesapeake, and relevant experts and engineers to devise a plan that would minimally meet the Proposed Purpose and Need while maintaining financial viability and reducing the wetland impacts to the maximum extent practicable, about one-seventh of those previously proposed. However, further reduction of wetland impacts from the LEDPA results in an economically unfeasible project.

Off-site analysis was conducted to identify and evaluate alternative sites within and around the Greenbrier Market Area that could replace the proposed 61-acre development (now further reduced in size to 53.8 acres). No sites were found that could replace the subject site in terms of location, size, density of development, road infrastructure, and zoning necessary to meet the Proposed Purpose and Need as opined by the Hatfield Evaluation.

As part of an extensive onsite analysis, Tri-City analyzed the projected revenue, expenses, profit and return of the proposed development plan as compared to 17 other onsite

alternatives, utilizing the Corps previous assertion of the reduced cost of land purchase even though Tri-City does not agree with these cost numbers. Even with this significantly reduced figure, the analysis (presented per the Corps' proposed economic format) bears out that the proposed LEDPA would result in a modest return of 1.4% as compared to original potential of over 22% without wetland considerations.

In the worst case, without the issuance of a permit, the No-Build alternative becomes effective; the applicant will suffer a multi-million dollar loss, and the project will be unable to fulfill the Proposed Purpose and Need.

Therefore, the 53.8-acre Updated Development alternative (Alt 17 Rev) is the LEDPA.

B. Aquatic Impact Minimization Measures

Through the efforts expended with the alternatives analysis, wetland impacts have been minimized to the maximum extent practicable without rendering the project unfeasible. The proposed footprint of development makes maximum use of available uplands within the property close to Centerville Turnpike.

i. Site Specific Minimization Measures

Due to the condensing of the development footprint, space within the project site is at a premium. However, where able, the engineering design of the Proposed Project will incorporate current state-of-the-art low impact developmental (LID) technologies as recommended by the EPA and through utilization of storm water best management practices and facilities (BMPs). See EPA Storm Water Technology Fact Sheet for Vegetated Swales (S1: Exhibit I). Impervious surfaces will be kept to a minimum by reducing paved areas and road widths to the minimum allowable under VDOT and City standards. Vegetated swales will be utilized where possible in place of curb and gutter. The system design will maintain surface flow to the preservation and undisturbed areas. Peak discharge flows will be limited to predevelopment levels with lower protracted flows to mimic the natural preexisting hydrological process. Applicable checklists and LID calculations will be utilized in the construction design stage in accordance with all regulatory requirements and best management practices. Extensive erosion and sedimentation (E&S) control measures will be implemented during construction, such as silt fencing, sediment basins, inlet and outlet protection, diversion dikes, forebays, check dams, turbidity curtains, and temporary and permanent seeding to control the quality of storm water leaving the site.

The upper strata of the soil profile consist of soils that have low permeability and lack the opportunity to perform significant groundwater recharge. However, as indicated by the enclosed map and corresponding soil boring test reports performed by McCallum Testing Laboratories Inc. (S1. Exhibit J), the underlying soils are of high permeability and hydraulic conductivity and provide an excellent opportunity for the use of LID

storm water technologies. LID technologies such as engineered vegetated swales and wet storm water detention ponds will substantially enhance the post development opportunity for groundwater recharge and water quality.

As detailed in the December 2002 Drainage Study for Centerville Properties, Chesapeake, VA prepared by Gasper Aluzzo, P.E. (Exhibit K), the pre-development and post-development drainage will be comparable with Tri-City's use of the above site-specific minimization measures. This study assumed a larger development footprint than the current LEDPA proposal, which will affect the watershed even less. The effects of storm water discharge will be fully mitigated onsite post-development by the measures outlined herein.

ii. Minimization Special Permit Conditions

The DEQ issued a permit for a prior edition of this project, and that permit remains current. Per VWP 00-1688, The Virginia Water Control Board authorized impacts to 144.6-acres of PFO wetlands within the project site for construction of a mixed-use community.

Construction of the proposed project and mitigation site must meet or exceed the permit requirements. Specifically, the applicant agreed to the special conditions therein, including:

- water quality standards would not be violated in any surface waters as a result of the project,
- erosion and sediment controls were used,
- meeting with the DGIF staff and contractors for training in endangered species,
- non-impacted wetlands areas to be clearly marked, and
- photo monitoring of construction activities must be conducted in accordance with the permit requirements.

Additional specific requirements are provided for construction entrances, staging and storage areas, and storm water management facilities.

The permittee must also complete a final wetland compensation plan prior to construction which will include, among other requirements:

- the goals and objectives
- discussions of buffers and structures needed for success
- schedule of construction
- hydrologic analysis
- water budget
- planting scheme
- soil plan

- invasive species control plan
- erosion and sediment control plan
- monitoring plan

This final wetland compensation plan must be approved by the DEQ prior to construction of the project. The mitigation site must be preserved in perpetuity, must be surveyed for proper elevations, and must meet success criteria.

In his April 28, 2005 formal comment to the Norfolk Army Corps District Engineer, Donald S. Welsh, EPA Regional Administrator, Region III acknowledged that the DEQ "worked diligently and effectively to limit project impacts, reducing affected wetlands by more than 100 acres compared with the initial development proposal. In addition, DEQ was able to negotiate several environmentally beneficial project features, including improved storm water management and the establishment of significant mitigation package that involved wetland restoration and preservation components, including low impact development technology."

See S1: Exhibit B.1 for a full list of permit conditions.

C. Compensatory Mitigation

i. Applicant's Proposed Mitigation Plan

The Proposed Mitigation concept for the Project will include a combination of engineering design and construction management, as discussed in Section 3-B-i, together with direct compensatory action on land controlled within the subject property.

Direct compensation for the 24.6 acres of wetland impacts consists of:

1. Creation in perpetuity of a 145-acre conservation buffer of currently undeveloped but privately owned PFO wetlands between the proposed development and the Stumpy Lake natural area. This buffer extends farther within the natural area to preserve a continuous forested wetland–upland ecosystem corridor.

2. Re-establishment of wetland conditions to restore wetland function and value to 50-acres of prior-converted cropland and cut-over area located within the overall 428-acre parcel. The restored wetland will be contiguous with the conservation buffer, will create connectivity of wetland-upland ecosystem corridor, and will facilitate continuity of storm water flow toward the Stumpy Lake and Gum Swamp watersheds.

Alternative locations for the wetland mitigation effort were previously evaluated during the prior permitting actions on this project. The onsite alternative is preferred since it is

1) within the same sub-watershed as the proposed impact, preserving overall wetland benefits, (See Figures 6-8) and 2) allows for newly created wetland habitat to be contiguous with the existing wetlands preserved within the conservation area, which also 3) complies with the DEQ permit requirement for the location of the mitigation effort.

The mitigation site is partially comprised of a former cut-over area that had been extensively ditched in the past such that it is currently (based on the wetland delineation in S1:Exhibit J) non-wetland due to those hydrologic impacts. See Figure 2 for the approximate location of the mitigation area. Volunteer species within this area are dominated by pine, poplar, and sweet gum trees and saplings, and by cane grass in places. The remainder of the mitigation area is active agricultural cropland. Compensatory mitigation will provide for both areas being converted back into forested wetland conditions by closing the drainage ditches across the mitigation area as well as down-gradient of the mitigation area to restore the more natural hydrologic conditions. Then, the agricultural field conversion area will be graded and planted with tree and shrub seedlings to restore and maximize biodiversity and regeneration.

To fully evaluate the expected environmental benefits of the proposed mitigation, MSA used the same processes as those applied to the project area in the Wetland Function Assessment (WFA) as discussed in Section 4. The immediate environmental benefit will be the cessation of farming operations in the mitigation area. Fertilizers and pesticides routine to agricultural activities will no longer be applied to this acreage, reducing discharge into Gum Swamp and North Landing River via the farm ditches. Cessation of tilling will eliminate sedimentation inherent to soil disturbance. Hydrology restoration will quickly result from closing the ditch system, allowing nitrogen fixation to occur more effectively. These benefits will be realized in advance of project impacts thereby reducing temporal losses of wetland functions and uncertainty over whether the mitigation will be successful in offsetting wetland losses.

One of the long-term benefits of restoring the mitigation site will be its ability to store and then buffer the release of storm water that falls on the area, providing storm water quality treatment. The WFA determined that the existing wetlands impacted by construction of the Centerville Properties LEDPA project currently receive no surface hydrologic input from off-site sources, thereby minimizing any current benefit for potential storm water treatment. The mitigation site design will restore the buffering and water quality treatment functions for a portion of the nearby agricultural lands, providing an added offsite environmental benefit.

ii. Mitigation Requirement

A final compensation plan must be filed with the DEQ for approval per the VWP Permit. As an additional requirement, "The compensation site shall be constructed prior

to or concurrently with permitted excavation or fill. Compensation site construction shall be completed within 180 days of commencement of excavation or fill activities, unless otherwise authorized by the DEQ." (S1: Exhibit B.1).

Upon approval of the LEDPA project, the completed mitigation design will be submitted to the Corps and DEQ and permitted separately through the regulatory agencies as required by the DEQ permit. This permitting process includes completion of a Wetland Mitigation Plan with objectives, site selection, site protection instrument, baseline information, determination of credits, mitigation work plan, maintenance plan, performance standards, monitoring plan, long-term management plan, adaptive management plan, and financial assurances.

Engineered plans will be prepared showing the designs of the mitigation effort and submitted with the Wetland Mitigation Plan. The site will be designed to minimize long-term maintenance/management needs. Once permitted, all necessary measures will be taken to ensure success of the mitigation effort, including construction monitoring, hydrologic monitoring, and success monitoring as required by the agencies.

The successful mitigation effort for this site will require replacement of all functions that may be impacted by construction of the proposed project, as outlined in the Wetland Function Assessment provided in Section 4. The goal of the mitigation project includes creation of 50 acres of self-maintaining ecologically viable wetland areas that have demonstrated wetland hydrology and vegetative communities. Unless otherwise authorized by the regulatory agencies, the site will be monitored for vegetative success and hydrologic success (groundwater wells) for ten (10) years. Financial assurances will be provided to allow corrective actions on a case-by-case basis where needed, or to fund alternative mitigation efforts in the unlikely event that such measures are needed.

Plantings will achieve:

- 75% Survival after the first growing season of planted species
- Stem count success within the site to demonstrate vegetative regeneration
- Demonstrated viability
- Elimination of all invasive species to no more than 2% coverage during any monitoring period

iii. Available Mitigation Credits

Mitigation credits are abundant in the southern watershed (03010205). The Dismal Swamp Mitigation Bank currently has +/- 200 acres, and Dover Farms Mitigation Bank has around 1,000 acres of approved mitigation that is available for immediate sale. Regarding an in-lieu fee option, the Virginia Aquatic Resources Trust Fund (VARTF) has four sites within this watershed, Fentress with 22.79 acres, Hall with 30.8 acres, Su with 133.28 acres, and Stephens with 371.81 acres.

There are approximately 1,758 acres of mitigation credit available for purchase should that option be needed, more than 35 times the amount required for this project. However, we do not anticipate needing this resource pending the success of the on-site mitigation effort.

iv. Conclusions

Based on the above analysis, onsite compensatory mitigation will more than offset the environmental impacts from this proposed project. The project impacts 24.6 acres of existing PFO functionally impaired wetlands, and the proposed mitigation effort will provide 50 acres of wetland area to compensate. Based on the function of the existing wetlands within the project area (discussed in Section 4 below), and the expected function of the mitigation effort onsite, the mitigation effort will exceed the functions of the impacted wetlands within the project site and eliminate the negative effects of farming activities currently occurring within the mitigation area. Therefore, construction of the LEDPA and mitigation efforts will result in a significant net environmental benefit.

4. ENVIRONMENTAL SETTING/EXISTING CONDITIONS

MSA, P.C. completed a Wetland Function Assessment that is a stand-alone report and is included herein as a section of this narrative.

4.0. WETLAND FUNCTION ASSESSMENT (WFA)

Contents:

1. **INTRODUCTION**
    - **A. Subject Property Area**
    - **B. Study Approach**
2. **INVESTIGATION**
    - **A. Data Point Selection**
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3. **ASSESSMENT**
    - **A. Project and Reference Sites**
    - **B. Mitigation Site**
4. **DISCUSSION**

References

Attachments

- WFA Plot Location Exhibit (2)
- Evaluation Criteria Outline
- Datasheets
- Site Photographs

1. INTRODUCTION.

A. Subject Property Description.

MSA, P.C. has performed a Wetland Function Assessment (WFA) for Tri-Cities Properties, LLC (the "Owner"). The Tri-City Properties site (Parcel 0390000000380) is approximately 428-acres with frontage to both Centerville Turnpike and Elbow Road, hereinafter referred to in its entirety as the "subject property".

A 53.8-acre portion of the subject property adjacent to Centerville Turnpike, referred to herein as "project site", is being planned for a mixed-use development with apartment and commercial buildings. A complete description of the project site is presented in Section 1 of the Project Narrative. Figure 1 of the Supplemental JPA Submission depicts the outline of the project site on a section of the Kempsville Virginia quadrangle USGS topographic map. The project site is forested and surrounded by a residential subdivision and forested land to the north, forested land to the south and east (some of which is part of the overall subject property), Centerville Turnpike to the west, and several residences, a horse pasture, and Atlantic Shores Christian School to the northwest (see aerial photograph provided in Figure 2 of the Supplemental JPA Submission). The project site contains a mix of uplands and wetland areas.

Most of the center of the subject property is forested wetlands. Agricultural fields are located in the southern portion of the project site adjacent to Elbow Road. Wetland mitigation will be required for impacts to these wetlands. The proposed mitigation site is a 50-acre tract of subject property that includes the northern portion of the agricultural fields and extends northward into a previously logged area that is regenerating with vegetation. Figure 2 of the Supplemental JPA Submission shows the location of the mitigation site.

A drainage divide is present within the subject property. The northern half drains eastward into the Stumpy Lake drainage basin while the southern half drains southward to Gum Swamp – all of which drain into the North Landing River and eventually into the Albemarle Sound of North Carolina. There are three primary drainageways leading into Stumpy Lake: northern, northwestern, and western. The subject property is located along the southern side of the

western drainageway. The southern half of the subject property drains southward toward Gum Swamp via agricultural ditches.

The 24-acre wetland area proposed to be impacted is a relatively small portion of both the 6,651-acre headwaters for the Stumpy Lake system and the 26,990-acre headwaters of the North Landing River above the Intercostal Canal. Its positioning within the landscape and small size relative to the overall watershed limits the proposed impacted wetlands capacity to significantly influence downstream water quality. Intra-site ditches convey storm water from the wetland area without allowing significant treatment of water. Channelized storm water ditches sending offsite water through the system also bypass potential benefits that could be provided to downstream water quality, depriving the wetlands the opportunity to perform significant wetland functions, as more fully described in the expanded WFA.

While the City of Virginia Beach purchased the Stumpy Lake property in 2001 primarily as a recreational asset, the lake is still required (by agreement with Norfolk) to be tied into Lake Lawson as part of the Norfolk reservoir system. In practice however, the lake is not used for drinking water and historically had only been pumped monthly to ensure operational condition. It has been over two years (February 2012) since the pump and pipeline was last exercised.

B. Study Approach

The purpose of this WFA is to provide a descriptive qualitative assessment of certain wetlands with respect to reference sites within the subject property. Specifically, wetlands representative of project site areas that would be impacted by the proposed development are assessed to determine their value and function as would relate to an important resource or ARNI designation.

There are various standardized methods for assessing the function of wetlands, since wetlands vary widely in type, composition, and function, and not all wetlands provide the same function or benefits. Examples of these techniques that have historically been used are discussed below.

- HEP: An early attempt at assessing the value of wetlands was developed in 1980 by the U.S. Fish and Wildlife Service. The HEP (Habitat Evaluation Procedure) used a numeric

index and compared baseline conditions to anticipated post-development conditions. But, as its name implies, the HEP method was primarily intended for use in evaluating wetlands for habitat suitability and does not consider other beneficial properties or conditions.

æ WET: The Wetland Evaluation Technique (WET) was developed in 1983 under the direction of the Corps to evaluate wetland functions for effectiveness, opportunity, social significance, and habitat, and despite its limitations is still widely used today. The scoring method of this system has yet to be formally developed or adopted; rather it has been widely modified for specific applications across the US. Evaluation of wetlands within the limits of the Tri-Cities property requires a more detailed determination of specific portions of each function than what is generally utilized by the WET method. Furthermore, rating different functions on an ill-defined grading or numeric weighted scale can be arbitrary, subjected to bias, and increases the likelihood of controversy.

æ EMAP: The Environmental Monitoring Assessment Program (EMAP) system was developed in 1988 by the EPA to evaluate status and trends of national ecological resources including wetlands. This method used a determination of actual wetland conditions and when they could not be specifically identified relied on identification of *indicators* of those conditions. The use of indices then enabled comparison of reference wetlands to areas of interest. However, this method focused more on apparent function over longer-term periods and over larger areas.

æ NWCA: The National Wetland Condition Assessment (NWCA) was also developed by the EPA to determine the ecological integrity of wetlands at regional and national scales. While useful for blanket evaluations of large areas, like the drainage basin that Stumpy Lake and the project site lie within, these methods do not provide the level of site specific detail needed for a specific project site.

Other biologic-focused methods have also been developed, evaluating the biological components of wetlands as an indicator of function. However, these methods often do not consider the

geologic and hydrologic characteristics and benefits of wetlands, which is the major interest for this WFA. Other methods of wetland assessment have also been developed specific to various regions; for example.

- æ WRAP: South Florida has the Wetlands Rapid Assessment Procedure (WRAP), a rating index for that area, used typically for mitigation sites. WRAP uses numerical rating systems for ecological and anthropogenic factors, including wildlife use, plant cover, upland support and buffer, hydrology, and water quality input and treatment.

A number of states have created local wetland assessment tools utilizing variations of the above methods. The developed methods reviewed were considered too general or too localized in nature to adequately apply to this assessment.

- æ NCWAM: The North Carolina Wetland Assessment Method (NCWAM) can evaluate any of 16 wetland types for sub-components of hydrology, water quality, and habitat, rating 22 field metrics on an observation-based spreadsheet that calculates high, medium or low for each function and the assessment area depending on the aforementioned wetland type. This method appears comprehensive in design and tested on and referenced to wetlands that are comparable to this area, but remains a work in progress and is still being developed.

- æ HGM: The Hydrogeomorphic Approach (HGM) approach was developed in 1990 by the U.S. Army Corps of Engineers (Corps) to evaluate wetland functions and predict potential changes due to a proposed activity. Used for evaluating alternatives to a project and their potential impacts to different wetland functions, this approach considers hydrologic characteristics, biogeochemical characteristic, and physical habitat of reference wetlands. The Corps has not formalized the methodology, however it has been modified for a variety of studies of specific wetland types, such as the pine savannas in Georgia. These studies have been scientifically documented.

- DECAP: Delaware used a modified HGM approach for the local level and developed the Delaware Comprehensive Assessment Procedure (DECAP), evaluating vegetation, hydrology, topography and buffer, rating each from least to most disturbed to create an index of wetland condition. These numeric variables are then used to evaluate functions like wildlife habitat, buffer, plant community, and hydrologic and biogeochemical processes. The DECAP methodology was developed to create a rapid assessment of general conditions, and allows assessment of six common wetland types in the coastal plain. Although this modified methodology utilizes many of the characteristics that need to be assessed on this project site, a concern remains about using a numeric weighted scale.
- HGM: In another modification to the HGM approach, the New England Corps District developed an HGM procedure known as the Highway Methodology Workbook Supplement – Wetland Functions and Values, A Descriptive Approach in 1999. This Corps method, developed in collaboration with Connecticut and New Hampshire Department of Transportation, assesses wetland function and values with a descriptive approach that was developed for characterization of wetland resources for use with wetland permitting. The data collected under this approach can be very site specific since the method is adaptable for variable wetland types and size of study areas. It is also useful for evaluating wetland condition and function at a point in time – rather than documenting changes over time. This methodology was then modeled after the Wetland Delineation, Functional Evaluation and Impact Assessment for a quarry expansion site in Connecticut, (Klein, 2013).

In review of the various methods, a descriptive and qualitative evaluation technique appears best to achieve the purpose of this assessment rather than a weighted, numerical system. Also an approach that is adaptable over variable study area sizes and conditions and that can assess function at the time of evaluation was more desirable than a fixed methodology to a specific region outside our study area. Therefore, this assessment utilized the general functional criteria of the HGM method as modified by the New England Corps District. The Highway Methodology approach provides a framework for data collection and interpretation methods that have been adopted for use in this WFA. The modified approach also incorporates field

datasheets modeled similar to those used in that study but specifically created for analysis of the project site.

2. INVESTIGATION.

Pursuant to the Corps of Engineers request, Roth Environmental has prepared an updated wetland delineation of the proposed site, dated January 27, 2014, a copy of which is submitted under separate cover.

Based on the wetland delineation, the project site can be grouped into three general land types, upland areas, an Upland-Wetland mixed area and Contiguous wetland area. The upland areas are generally located between wetlands and the north and west boundaries of the project site. The Contiguous wetland area is situated along the southern portion of the project site. The land between those areas and along the eastern extent of the property is termed the "Upland-Wetland mix" since it is a patchwork characterized by five disconnected irregularly shaped uplands varying from 0.53-1.44 acres in size (See WFA Plot Location Exhibit within the Attachments).

While these areas have distinct physiographic difference, some influences are present that significantly affect the project area and surrounding lands. Hydrologic controls have been identified that influence the water storage and retention over the entire vicinity, including the Stumpy Lake spillway, located at 6.5 feet AMSL that acts as a water control for the entire system. Additional water controls include intra and inter site ditching, ruts and soil compaction from historic logging activities, as well as beaver dams. For instance, recent beaver activity resulted in a dam that raised water levels approximately 2 feet (see Photo 7 and 8) above the receiving waters of western branch tributary to Stumpy Lake, causing a significant inundation effect to areas around 8.5 feet and saturation of the areas above that elevation. Efforts have been undertaken to remove the beaver dam and restore natural hydrologic conditions.

A. Data Point Selection.

Topographic data from the City of Chesapeake, infrared and color aerial photographs, NRCS Soil Survey maps, and maps provided by the Owner were reviewed utilizing GIS (geographic

information systems). A data point location was selected near the middle of the Contiguous wetland area, hereinafter referred to as Plot 1, located at 10' elevation (all elevations based on City topo GIS data). This plot is representative of an estimated 7-acres of the wetlands that are proposed to be impacted. A Reference location (Plot 2) was chosen from the Contiguous wetland within the Conservation area of the larger parcel outside of the development footprint, located at 10.4' elevation. Plot 2, representative of the 145 acres of the proposed Conservation area, has similar topographic elevation and relief, similar hardwood plant community and comparable age of plant community (based on aerial photographs), similar soil type, wetland type, and similar infrared photograph hydrologic signatures, and is the same distance from the Stumpy Lake western drainageway – the main source of site drainage. However, Plot 2 did not appear to have the same ditching, logging, and other human impacts as Plot 1. Plot 3, located at 8.2' elevation, was selected in the Upland-Wetland mix area, but on the east side closer to the Stumpy Lake tributary to evaluate those wetlands using the same criteria.

In evaluating the plot choices, it was determined that an additional plot would be needed to more fully characterize the Contiguous wetland area. Plot 4 was selected within the contiguous wetland area west of Plot 1, at 10.2' elevation, but closer to the Upland-Wetland area. Plot 4 is representative of approximately 7 acres within the proposed project site. Plot 3, although chosen within the Upland-Wetland mix area, represented only a small portion of the wetlands within this area – estimated at two acres. However, a majority of the wetlands that would be impacted by this project are west of (landward of) the uplands, and at higher elevation. Therefore, Plot 5 was selected still within the Upland-Wetland mix area, but closer to the Contiguous wetland location than Plot 3 and located at elevation of 9.4'. Plot 5 represents the approximately 7 acres of wetlands between and immediately landward of the Upland-Wetland mix areas. None of these plots are within the Stumpy Lake floodplain. Once selected, the plot locations were field-located using GIS as shown in the attached figure.

Choosing plots in the office avoided the potential for bias inherent to field data site selection. While standard wetland data points typically use a 30' radius, these test plots are approximately 140-ft diameter circles around a central point resulting in approximately 1/3-acre plots. Use of larger plot sizes is beneficial for multiple reasons. They avoid the potential for skewness if the

locations were cherry-picked. The larger plot sizes also account for micro-topography and other size-related factors that would have a stronger influence in a smaller plot area, and they provide a better larger scale picture of wetland function.

B. Methods.

In accordance with the HGM approach, various wetland features and functions are examined. The following list presents general topics and examples of the criteria used to evaluate each plot:

1. Water Input Sources (sources of water into the wetland area, including rainfall, stormwater input via sheetflow and ditches).
2. Water Output Sources (presence and effect of ditches, sheetflow, potential evapotranspiration, groundwater recharge).
3. Soil Quality (NRCS Soil Series, soil texture, duff layer and detritus accumulation, organic soil development, clay deposits, sand / mineral layer deposits).
4. Wetland Terrain (ground surface microtopography, wetland continuity / corridor, wetland pockets or upland islands).
5. Water Processes (surface water drainage, groundwater drainage, floodplain stormwater and flooding storage, sediment filtration).
6. Contributing Surface Water Quality (input sources and quantities, potential for nutrients or toxicants from input sources).
7. Downstream Water Quality (downstream water use, condition of downstream water and water bodies, prior impacts, potential benefits of wetlands on downstream water and ditches, creeks, rivers, lakes, or basins).
8. Biogeochemical Processes (biological, earth, and chemical processes that act upon soil and water as it falls within or passes through the plot. Nutrient flux, nitrogen, phosphorus inputs and outputs, determined by organic decomposition and apparent plant uptake).
9. Vegetative Communities (species composition and dominance across all strata, determined by dividing the plot into quarters, evaluating each quarter and adding up the cumulative dominance).

10. Wildlife Habitat Quality (mast production, potential for animal use based on plant communities and stratification, presence of surface water or other features that might benefit a specific type of wildlife).
11. Human Use / Benefit (recreation, natural viewsheds, sociological/historical resources, indirect benefits such as water quality).

The above criteria are organized in outline form such that there is a number designation for each feature and function reviewed. This outline of review criteria is presented as an attachment for reference. These designations are noted on the evaluation form under the Rationale Reference # column and indicate if the given feature is a suitable wetland function or value and if the feature is a principal wetland function. "Principal" functions are those features or processes that a wetland should have or be able to perform based on its wetland type and physiography. Where a wetland has a given feature or provides the function, it is termed "suitable". Completed evaluation forms are included within the attachments. Also included are vegetation data sheets for documentation of vegetation present.

3. ASSESSMENT.

A. Project and Reference Sites.

Charles Hall, P.G., and Brian Owen (wetland scientist), visited Plots 1-3 on December 12, 2013, and Plots 4-5 on April 10, 2014. The plots were located in the field utilizing a Trimble Geo-5T GPS. Once the center of each plot was located, the northern, eastern, southern, and western extents were also flagged allowing the plot to be quartered for inspection. Photographs of the plots were taken looking in each direction from the center, included in the Attachments.

Each of the test plots was inspected in the field and observation notes entered into the field forms. The completed forms were then typed for clarification and are presented as an attachment of this document for reference. Plots 1, 2, and 4 are located within and surrounded by Contiguous wetlands. Plots 1 and 4 have been affected by the historic presence of ditches, while Plot 2 is not near any ditch and has no direct man-made influences. Plot 4 is located adjacent to the Upland-Wetland mixed area, just inside the Contiguous wetland area, and appears to be more

affected by the presence of ditches. Plots 3 and 5 are located within the Upland-Wetland mixed area – being situated between two upland islands, primarily defined by natural topography. Field observations are summarized in the sections below and documented on the forms presented as an attachment.

1. Water Input Sources:

   No geographic or meteorological conditions that would affect potential depth of precipitation between Plots.

   a. Plot 1. Distributed vertical story (upper, middle, lower) leads to slightly more precipitation interception. Area gently sloping northeast; 12" micro-topography on east side of transecting ditch, 6" micro-topography on west side of ditch; little potential for sheetflow into area due to extensive ditching and logging ruts. Most ditches originate within site (intra-site); outside source water inputs are limited due to existing perimeter ditch systems.
   b. Plot 2. Less middle story but a very dense canopy may still result in slightly less precipitation interception. Subtle surface slope; broad 6" micro-topography with insignificant potential for sheetflow into area.
   c. Plot 3. Less low story leads to slightly less precipitation interception. Area gently sloping northeast; broad 6" to wider 12" micro-topography with minor potential for sheetflow into area from adjacent onsite undeveloped upland. Main ditch to creek of Stumpy Lake western drainageway. Ditches in vicinity appeared artificially flooded (due to beaver dam activity downstream)
   d. Plot 4. Less low story leads to slightly less precipitation interception. Area relatively flat; little potential for sheetflow into area due to extensive ditching and logging ruts. Most ditches originate within site (intra-site), outside source water inputs are limited due to existing perimeter ditch systems.
   e. Plot 5. Less low story leads to slightly less precipitation interception. Area drainage naturally constrained by upland inclusions to the east, minor sheetflow into site from upland onsite undeveloped upland to the north and west. Outside source water inputs are limited due to existing perimeter ditch systems.

2. Water Outflow Sources:
    a. Plot 1. Uniform vertical stratification of canopy, good transpiration. Numerous drainage and conveyance ditches, fairly well open, provides some area drainage. Some micro-topography – shallow groundwater, but that is perched on clayey subsoil that decreases the infiltration potential.
    b. Plot 2. Low story typified by cane, little middle story, dense canopy may still result in slightly reduced transpiration. No ditches to provide drainage. While low slopes result in slow, but natural, drainage and increases the potential for infiltration, little micro-topography is present to converge precipitation and induce infiltration.
    c. Plot 3. Less ground cover and low story vegetation, some middle story, relatively dense upper canopy to transpire soil water. One ditch provides some drainage for a limited area – drains directly to the Stumpy Lake western drainageway creek. Variable micro-topography and soil type that could allow for minimal infiltration.
    d. Plot 4. Uniform vertical stratification of canopy, good transpiration. Numerous drainage and conveyance ditches provide significant drainage. Some micro-topography, mostly from tire ruts, result in shallow groundwater, but this water is perched on clayey subsoil that limits infiltration potential.
    e. Plot 5. Less ground cover and low story vegetation, some middle story, relatively dense upper canopy to transpire soil water. Some micro-topography, mostly from tire ruts, result in shallow groundwater, but this water is perched on clayey subsoil that limits infiltration potential.

3. Soil Quality:

    Entire area including all plot locations mapped as Acredale silt loam (NRCS).
    a. Plot 1. Onsite auger borings revealed clayey-silt to fine sandy silty-clay overlying gleyed clay. The clayey soil is a thick stratum. East side of transecting ditch contains 1" forest litter. West side of ditch contains 2" – 3" forest litter. Variable duff accumulation across plot indicates variation in rate of biomass production and/or decomposition over the small area; suggests a possible result of impacts to these processes. Compacted soil is present from prior logging efforts.

b. Plot 2. Onsite auger borings revealed silty-clay with 10YR-6/6 mottles at 18". The clayey soil is a thick stratum. 1" forest litter. Thin duff layer throughout plot indicates rapid decomposition.

c. Plot 3. Onsite auger borings revealed 6" topsoil horizon (with perched water at 4") overlying soft, wet, clayey-silt. Becomes tight moist clay by 10"-14" that goes wet again between 12" and 14". The clayey soil is a thick stratum. 2" forest litter. Lack of duff accumulation is commensurate with the less dense canopy for production of detritus but could also indicate healthy decomposition processes.

d. Plot 4. Onsite auger borings revealed a 1"-2" layer of forest litter over a thin topsoil layer that overlies a thick clayey horizon. Consistent thin duff layer suggests low biomass production or enhanced decomposition. Thick clay layer contains some wet pockets that are perched within 12" of the ground surface.

e. Plot 5. Onsite auger borings revealed thin to moderate thickness (3"-6") topsoil horizon with water perched at 4" down. Organic layer overlies softer, wet, clayey-silt. Becomes tight moist clay by 12" that goes wet again between 12" and 14". The clayey soil is a thick stratum. Duff accumulation and topsoil thickness is commensurate with the low to moderate density canopy for production of detritus.

4. Wetland Terrain:

a. Plot 1. Microtopography is present within site from natural relief that has also been impacted by logging and ditching; no upland areas present in the vicinity. Wetland is Contiguous to other wetlands but not part of a larger corridor.

b. Plot 2. Site virtually flat with little microtopography, terrain not significantly affected by prior logging, no uplands in vicinity. Wetland is Contiguous and part of a larger corridor.

c. Plot 3. Site has variable microtopography with uplands present in the vicinity. Wetland is Contiguous and part of a larger corridor but broken up by upland islands.

d. Plot 4. Limited microtopography present within site primarily due to logging ruts, uplands present to the north.

e. Plot 5. Site has variable microtopography with uplands present in vicinity, onsite microtopography primarily from logging rut impacts. Wetland is discontinuous and part of a larger corridor but broken up by upland islands.

5. Water Processes:

All plots are outside of mapped floodplain.

a. Plot 1. Ditches facilitate site drainage, reducing floodplain storage and surface hydrology and limiting ponding of water. Surface soils can dry out seasonally once growing season gets underway. Ditches can increase water velocity through area increasing transport of sediments, although no flow was observed at the time of assessment. Intra-site ditches transport precipitation from site before wetland can provide significant benefit. Better permeability of soils and sediment filtration potential on west side of transecting ditch than east side. Some micro-topography to induce groundwater recharge but sub-soils too heavy to facilitate much infiltration.

b. Plot 2. Flat topography, thin duff, thin topsoil, slow infiltration due to heavy texture soil but still possible due to high retention time, potential for sediment filtration or stormwater storage limited primarily to onsite precipitation.

c. Plot 3. Micro-topography and adjacent upland areas will facilitate some floodwater storage in lower elevation wetlands; limited ditch presence. Thin duff layer but good topsoil with infiltration potential, sediment filtration, and some stormwater storage although heavy textured sub-soil will limit recharge.

d. Plot 4. Ditches facilitate better site drainage than Plot 1; can transport sediment in ditches. Intra-site ditches convey precipitation from site before wetland can provide significant benefit. Surface soils can dry out seasonally once growing season gets underway. Some man-made micro-topography can serve to induce groundwater recharge but sub-soils too heavy to facilitate much infiltration.

e. Plot 5. Man-made micro-topography and adjacent upland areas will facilitate some floodwater storage in wetlands. Micro-topography primarily related to logging ruts – could facilitate storage potential and groundwater recharge but

heavy textured sub-soil will limit effectiveness. Less ditch presence than Plot 3 and variable duff layer limits sediment transport.

6. Contributing Surface Water Quality:
   a. Plot 1. No surface connection to offsite developments due to perimeter ditch systems. Upstream areas are mixed land uses, including urban, with potential for toxicants and nutrients and increased sediments from off-site.
   b. Plot 2. Limited off-site sheetflow from forested and wetland areas, limited off-site loading into wetland area.
   c. Plot 3. Limited stormwater input from offsite, no surface connection to offsite developments due to perimeter ditch systems. Upstream areas are mixed land uses, including urban, with potential for toxicants and nutrients and increased sediments from off-site.
   d. Plot 4. No surface connection to offsite developments due to perimeter ditch systems. Upstream areas are mixed land uses, including urban with potential for toxicants and nutrients and increased sediments from off-site.
   e. Plot 5. No surface connection to offsite developments due to perimeter ditch systems. Upstream areas are mixed land uses, including urban with potential for toxicants and nutrients and increased sediments from off-site.

7. Downstream Water Quality:

   Downstream Stumpy Lake water quality has been impaired and is unreliable as a water source, as determined by a study for the City of Virginia Beach prepared by O'Brien & Gere Engineers, Inc. (November 14, 2002) entitled "Environmental Constraints & Use Compatibility Analysis", as well as the "Master Land Use and Management Plan for Stumpy Lake Natural Area" prepared later by the City of Virginia Beach Department of Parks and Recreation (November 7, 2003). Both reports (prepared after the ARNI designation) conclude that Stumpy Lake is already severely impaired due to the poor quality of storm water flowing into the lake from development in the watershed to the north, east and west as well as the golf course. In essence, the impounded lake and dam serves as a large regional storm water BMP. These studies state:

"While most reservoirs are constructed within substantially large drainage basins suitable to continuously supply an excess of water, Stumpy Lake is not. More than half of the time water does not flow over the weir with any substantial volume. Consequently, the lake experiences large fluctuations during the year in water depths. At full capacity the maximum water depth is only 4.35 feet and more than half of the lake is less than 3.3 feet deep. Numerous stumps and fallen trees amplify the shallow water depths. All these factors contribute negatively to the lake's overall water quality and recreational opportunities. High nutrient loading and turbidity were found to be the main water quality issues of Stumpy Lake."

Stumpy Lake is a former emergency water supply reservoir but not currently being used as such. The lake is receiving body for stormwater runoff from very large upstream contributing areas including all five plots. Lake depth has decreased due to sedimentation.

a. Plot 1. Site is a small portion of headwaters for the Stumpy Lake system. Its small size relative to the overall watershed limits the capacity to influence downstream water quality. Intra-site ditches convey stormwater from wetland area without allowing significant treatment of water. Channelized stormwater ditches sending offsite water through system also bypasses potential benefits that could be provided to downstream water quality.
b. Plot 2. No ditches present in vicinity, no off-site stormwater treatment, benefits primarily limited to onsite precipitation and adjacent natural wetland areas.
c. Plot 3. No ditches present within plot, no stormwater inflow from offsite to these wetlands, benefit to downstream water quality limited to treatment of onsite precipitation only and due to low elevation, occasionally water backup from Stumpy Lake can inundate the lower areas.
d. Plot 4. Site is a small portion of headwaters for the Stumpy Lake system. Its small size relative to the overall watershed limits the capacity to influence downstream water quality. Intra-site ditches convey stormwater from wetland

area without allowing significant treatment of water. Channelized stormwater ditches sending offsite water through system also bypasses potential benefits that could be provided to downstream water quality.

e. Plot 5. No significant ditches present, no stormwater inflow from offsite to these wetlands, benefit to downstream water quality limited to treatment of onsite precipitation only.

8. Biogeochemical Processes:

a. Plot 1. East side of transecting ditch contains a 2" A_o horizon; west of the ditch contains a better-developed 2" – 4" A_o horizon that is drier and shows evidence of some oxygenation. Biogeochemical processes vary laterally across plot, however results in no continuity of function. Healthy vegetation. Ditching reduces stormwater residence time and potential for nutrient reduction.

b. Plot 2. Longer stormwater residence time and good ground cover and low plants allows for potential nutrient reduction. Less well-developed 2" A_3 topsoil horizon suggests limited biogeochemical functions. Lack of duff accumulation in area with thick tree canopy (where duff layer should be thick) suggests moisture and rapid decomposition processes indicating good nutrient cycling.

c. Plot 3. Well-developed 6" A_o horizon, evidence of oxygenation within shallow soils. Healthy but less dense vegetation. Some stormwater drainage by a small ditch, moderate stormwater retention and nutrient reduction potential.

d. Plot 4. Poorly developed thin A_o layer, limited evidence of oxygenation within shallow soils. Healthy but not very dense herbaceous/shrub vegetation – cane abundant. Limited stormwater retention limits processes. Based on topsoil layer some nutrient reduction potential but lack of low-story vegetation suggests not a significant process.

e. Plot 5. Moderately developed 3"-6" A_o horizon, limited evidence of oxygenation within shallow soils. Healthy but sparse herbaceous/shrub vegetation – cane abundant. No significant ditches in plot; limited stormwater retention in old ruts. Based on topsoil layer, some nutrient reduction potential but lack of low-story vegetation suggests not a significant process.

9. Vegetative Communities: (see attached Wetland Analysis Data Sheets)
    a. Plot 1. Dominance test indicates 85% wetland vegetation dominance, meets FAC-neutral. 27 total species present, of which 6 are FACU, 6 are FACW, 1 not identified to species, and the rest are FAC. Canopy 84% aerial coverage (estimated), shrub layer 41%, herbaceous at 97%. High herbaceous likely due to the thinner canopy. Vine layer at 9%. Invasive species like *Lonicera japonica* and *Ligustrum* present, but not significant. Mixed vegetative community appears indicative of changing conditions due to hydrologic impacts.
    b. Plot 2. Dominance test indicates 100% wetland vegetation dominance, meets FAC-neutral. 25 total species present, of which are 3 are FACU, 10 are FACW, 1 not identified to species, and the rest are FAC. Sphagnum is present. Canopy 100% aerial coverage, shrub layer at 13%, herbaceous at 79%. Vine layer at 9%. The invasive *Lonicera japonica* is present, but not significant.
    c. Plot 3. Dominance test indicates 89% wetland vegetation dominance, meets FAC-neutral. 21 total species present, of which 5 are FACU, 6 are FACW, 2 are not identified to species, and the rest are FAC. Canopy 95% aerial coverage (estimated), shrub layer 32%, herbaceous at 47%. Vine layer at 8%. The invasive *Lonicera japonica* is present, but not significant. Mixed community of upland and wetland species appears healthy.
    d. Plot 4. Dominance test indicates 89% wetland vegetation dominance, meets FAC-neutral. 20 total species present, of which 4 are FACU, 4 are FACW, 1 not identified to species, and the rest are FAC. Canopy 87% aerial coverage (estimated), shrub layer 26%, herbaceous at 50%. Vine layer at 4%. Invasive *Lonicera japonica* present, but not significant. Mixed vegetative community appears indicative of changing conditions due to hydrologic impacts.
    e. Plot 5. Dominance test indicates 83% wetland vegetation dominance, meets FAC-neutral. 18 total species present, of which 4 are FACU, 3 are FACW, 2 are not identified to species, and the rest are FAC. Canopy 87% aerial coverage (estimated), shrub layer 30%, herbaceous at 30%. Vine layer at 11%. The

invasive *Lonicera japonica* is present, but not significant. Mixed community of upland and wetland species appears healthy.

10. Wildlife Habitat Quality:
    a. Plot 1. Distributed vertical story. Higher shrub layer presence under a thinner canopy. Mast production ok as evidenced by acorn crop and biomass. 44% of tree canopy is from mast producing trees. Site is closer to developed land. Surface roots and woody debris present for small animal habitat.
    b. Plot 2. Dense low story (cane dominant) habitat, less dense middle story. Dense closed canopy overhead. No ditches with surface water in test plot. Good mast production as evidenced by acorn crop and biomass. 52% of tree canopy is from mast producing trees. Surface roots and woody debris present for small animal habitat.
    c. Plot 3. Sparse low story habitat and moderate mast production limits use by wildlife; test plot is contiguous with drainageway creek to Stumpy Lake. Canopy is closed, with 40% of tree canopy is from mast producing trees. Surface roots and woody debris present for small animal habitat.
    d. Plot 4. Sparse low story but high mast production (51% of canopy) provides mixed benefit to wildlife use, some surface root habitat present, but old logging ruts are the primary topographic variation .
    e. Plot 5. Sparse low story habitat and moderate mast production limit use by wildlife. Canopy is closed, with 42% of tree canopy is from mast producing trees. Surface roots and woody debris present for small animal habitat.

11. Human Use / Benefit:
    a. Plot 1. Property is in private ownership. No public access.
    b. Plot 2. Property is in private ownership. No public access. This plot is within the 145-acre proposed preservation area and will be leased to The Virginia Sportsmen's Foundation, a non-profit 501(c)(3) whose mission is: "promoting Virginia's outdoor traditions, including hunting, fishing and natural resource conservation, the organization provides hunting and fishing opportunities for

Wounded Warriors and military veterans, as well as outdoor education for first-time hunters."

c. Plot 3. Property is in private ownership. No public access.
d. Plot 4. Property is in private ownership. No public access.
e. Plot 5. Property is in private ownership. No public access.

B. Mitigation Site.

Construction of the proposed LEDPA project will be accompanied by the creation of 50 acres of wetland for mitigation of impacts resulting from the project. A complete description of the mitigation site is provided in Section 3-C of the Project Narrative. The mitigation site is composed of two regions; cultivated farmland and woodland. Currently the partially cutover forest is regenerating with secondary growth around 15 years of age. This woodland contains a mix of common volunteer species primarily loblolly pine, sweet gum, and poplar with a few red maples. The understory is primarily limited to saplings of the aforementioned species and cane grass in places. Due to the hydrologic impacts of historic extensive ditching, this area was not considered jurisdictional wetlands when previously delineated. The rest of the mitigation site is actively tilled agricultural field and, due to ditching and agricultural activities, provides no current wetland function.

The HGM method was also used to evaluate the mitigation site and estimate the potential resultant wetland functions to determine the suitability of the mitigation effort in replacing the lost functions of wetlands characterized by Plot 1, 3, 4 and 5 within the LEDPA area. Below are discussions on the various reviewed HGM features once the mitigation project is complete.

1. Water Input Sources. No expected geographic or meteorological conditions that would affect potential depth of precipitation. Minor inter-site ditches bring limited amounts of runoff into the mitigation site from adjacent wetlands. Vertical story will develop as forested area continues to mature.
2. Water Output Sources. Transpiration will be comparable with other forested areas as the forest matures – the wooded portion already provides some benefit. Planted farm field will also result in increased transpiration from the former farmland. Intra-site ditches will be plugged or filled to eliminate offsite drainage and restore water retention. Flow was

observed leaving the site through the agricultural ditch, suggesting that plugging this ditch will restore shallow water levels. Micro-topography can be engineered to decrease offsite runoff and increase soil infiltration potential, although clayey subsoil will limit the ultimate infiltration potential.

3. Soil Quality. The woodland area contains Gertie Silt Loam that extends half way into the farm field before transitioning into Acredale Silt Loam (same as other plots). This region is underlain by heavy clay deposits that limit water infiltration. Existing soil organic content and placement of additional organic materials from clearing the project site will enhance the soil profile. Primary production and natural regeneration will contribute organic content in time. Forest litter layer will develop as forest matures.
4. Wetland Terrain. Much of the woodland is level with some micro-topography conducive to transformation into wetland terrain. Micro-topography of the farm field can also be engineered to retain water. The site is bordered on three sides by existing mature wetland forests and additional farmland on the fourth side. Once the mitigation effort is complete, the mitigation site will provide excellent continuity with the existing forested wetland ecosystems.
5. Water Processes. Site is outside of mapped floodplain. Intra-site ditches will be plugged or filled, allowing residence time for treatment of onsite waters and sheet flow draining onto the mitigation site. Cessation of current agricultural activities will remove considerable sediment inputs and all added nutrient and pesticide loading inherent to agricultural activities providing significant and immediate benefit. Groundwater infiltration is limited due to the clay content of the soil but the lighter soil compaction from years of cultivation activities, added organic matter, and new plantings will enhance infiltration and resultant groundwater recharge.
6. Contributing Surface Water Quality. Off-site sheetflow from adjacent forested and wetland areas into the mitigation site is expected; low potential for toxicants or added nutrients.
7. Downstream Water Quality. Drains to Gum Swamp below Stumpy Lake. Elimination of inter-site ditch drainage will increase residence time of onsite waters allowing nutrient transformation and sediment removal, increasing benefits to downstream water quality. Ceasing agricultural activities (eliminating sediment, nutrient and pesticide loading)

within the mitigation area will provide significant and immediate water quality benefit to the downstream watershed.

8. Biogeochemical Processes. Increased residence time of surface water within site allows for nutrient transformation, sediment removal, and carbon sequestration. Plantings within farm fields will enhance biological processes.
9. Vegetative Communities. Plantings will boost biodiversity beyond that of just the common volunteer species. Areas can be engineered to support a more heterogeneous plant community further improving biodiversity.
10. Wildlife Habitat Quality. Site will transition from its current condition to mature forest. Each stage provides enhanced habitat benefits to a variety of species. Plantings will boost biodiversity within site, improving habitat quality. Mitigation site is Contiguous to wetland areas on three sides, preserving a larger wildlife corridor, and providing continuity with that corridor.
11. Human Use / Benefit. Property is in private ownership. No public access. Mitigation site will be leased to The Virginia Sportsmen's Foundation, a non-profit 501(c)(3).

4. DISCUSSION.

The project site (represented by Plots 1-5) was historically part of a much larger wetland complex that drained via natural topography and defined drainage systems (most of which have been subsequently ditched or channelized) to Stumpy Lake. Stumpy Lake spillway is at elevation +6.5 feet, while elevations within the project site vary from approximately +7 to 11 feet, generally from 9-10 feet within the project site. Regional man-made activities consisting of road construction, ditching, and conversion of buffering forested areas to residential development have historically altered the natural flow of this system. A well-established beaver dam impounds the western tributary branch of Stumpy Lake, increasing water levels approximately two feet above normal and causing flooding of local ditches and preventing normal drainage. The project site wetlands are nearly isolated from adjacent wetlands systems by two main drainage ditches and an inter-site canal with development on the fourth side. Due to this isolation, the project site receives little to no surface water inflow and the hydrology is primarily precipitation driven.

Two types of ditches occur within the subject property; intra-site and inter-site. Intra-site ditches originate from within the subject property and drain stormwater runoff that occurs from precipitation falling directly on the property and from rising water tables in response to area precipitation. Inter-site ditches originate offsite and drain stormwater runoff that originates beyond the subject property and pass through it into Stumpy Lake. Some of these features are former drainageways that have been ditched to increase drainage capacity and performance. Intra-site ditches also tie into the larger drainage features that pass through the property. Land within the project site contains both types of drainage ditches, while land within the mitigation site contains only intra-site ditches. For comparison, the reference area encompasses land where no ditches are present. These un-ditched areas would, in effect, contain and transform carbon and nutrients that occur from within that land or deposited from the atmosphere.

In reviewing existing site conditions, two distinct physiographic settings were identified for evaluation: Contiguous Uninterrupted Wetland (Plot 1 and 4), and Mixed Upland-Wetland (Plot 3 and 5). These two distinctive areas were evaluated by studying plots created within their respective areas and comparing them to an additional reference plot, located offsite but near the

project site. The reference plot (Plot 2) was established as a control for comparison of the function and values of both wetland areas. Plot 2 is in a similar physiographic setting as Plot 1 and 4 but had been less impacted by intra and inter-site ditching, prior logging, proximity to adjacent development, and Centerville Turnpike.

The wetland function of each plot was evaluated using general criteria of the HGM approach, following a similar format to the Highway Methodology Workbook Supplement – as described in the Introduction section of this WFA. Data sheets were created for this assessment and completed in the field. In addition, wetland vegetation forms were also prepared to document vegetative communities. All data generated in conducting this assessment is included at attachments to this report.

Two considerations are identified in the data sheets to determine wetland value: the suitability of the plot to perform a given function, and if suitable functions were a principal function of that wetland system. All of the wetland plots were considered to have principal functions related to vegetative communities and wildlife habitat quality. All plots had hydrophytic plant communities, although more upland species were present within the project limits than Plot 2. Although common in character and species composition to this region, all plots appear to have good potential for wildlife habitat for birds, mammals, reptiles, and amphibians.

In general, the assessment found that the wetlands of the Contiguous Uninterrupted Wetland, represented by Plot 1 and 4, have been degraded and were of reduced function due to prior onsite and offsite impacts. The wetlands were generally impacted by the combined effects of logging, intra-site ditching, ditch maintenance, road building, land clearing, and land development. Only 2 of the 11-function/value features in Plot 1 were present or suitable as good functions/values for wetlands in general, all of which were associated with *principal* wetland functions for this system. The best features of Plot 1 and Plot 4 *suitability* include vegetative communities and wildlife habitat as mentioned above. Vegetative analysis indicates that the plant composition in the area represented by Plot 1 and 4 are common native species that overall prefer wetland conditions. However, more species that prefer upland conditions have colonized this area than around the other plots, possibly due to affects on hydrology from ditches and other influences.

The presence of these upland species reduces the continuity of the wetland plant community, but can add an element of diversity. While Plot 1 was average mast production, Plot 4 had high mast production due to high oak and elm dominance in the canopy. Wildlife habitat was good in both plots due to mast production, and ground cover habitat structure.

Plot 2 contains the same wetland type and is in the same physiographic setting as Plot 1 and 4, with the primary exception that Plot 2 has not been impacted by prior ditching, and logging impacts are minimal. Analysis revealed 8 suitable features, with 6 of them being principal wetland functions. As will be discussed later, the only three features that were not suitable for wetland functions or value include water inputs, water outputs, and soil quality. This plot had very good wildlife potential due to mast and biomass production and the continuity with adjacent habitat. The site was dominated by wetland plant species with very few upland species present, none of which were dominant, likely due to the lack of hydrologic disturbances.

The Upland-Wetland mixed area represented by Plots 3 and 5 is in a different physiographic setting than that of Plots 1, 2, and 4. Analysis of Plot 3, which evaluates the east side of the mixed area closest to Stumpy Lake system revealed 8 of the features to be present or suitable as good function/value and 3 of those features were associated with principal wetland functions. Of all the plots, Plot 3 was the only one that had flood plain storage potential due to low elevation and a thicker topsoil layer, although all plots and proposed developed areas are outside of mapped floodplains. Plot 5 had 5 suitable as good function/value, two of which were principal functions. The plant community of Plots 3 and 5 were generally less diverse than Plots 1 and 2 with fewer mast producing trees. Due to the mixed Upland-Wetland nature of this vicinity, upland species were present within the wetland community. The presence of these upland species appear to be more of a function of the natural varied habitat condition and not a result of transition caused by prior impacts or stresses observed around Plots 1 and 4. Plot 5, like Plots 1 and 4, had been impacted from prior logging ruts. Although no ditches were present within or immediately adjacent to Plot 5, ditch networks throughout the vicinity appeared to still be affecting this region.

Using the HGM approach, the wooded portion of the mitigation site has the potential to result in 11 of 11 suitable features being created or enhanced to high wetland function or value; 6 of these features will be principal functions. Once restored to wetland wooded condition, the farm fields has the potential to result in 9 of 11 suitable features being created or enhanced to high wetland function or value; 7 of these will be principal functions. The potential exists that, through proper design and construction, the mitigation site can provide high quality wetland function comparable to the reference site, and exceeding the function of wetlands within the project site.

The two features that were not considered suitable wetland functions for all of the plots were water input sources and soil quality. In general, wetlands often provide the benefit of storing and slowly releasing stormwater. Water input sources are an unsuitable function and of limited wetland value within the assessment area since stormwater input from offsite land is limited due to 1) most water conveyance originates from within the project site from intra-site ditches, and 2) channelized perimeter ditches convey offsite stormwater around or through the project area without retention time that might allow significant wetland benefit. The wetland areas represented by Plots 1, 2, 4 and 5 were primarily recharged by direct precipitation upon those lands. Plot 3 also receives periodic limited inputs from the nearby creek/canal and can also be impacted by backing up of Stumpy Lake due to the elevation of the spillway or other influences like the beaver dam. In terms of drainage, the mixed wetland upland area is partially drained by natural topography and original drainageways while the Contiguous Wetland area is better drained through ditching. Intra-site ditches drain surface water from the areas represented by Plot 1 and 4 limiting biogeochemical processes like stormwater treatment. By contrast, the Contiguous Reference Wetland area has very little surface drainage opportunities, but what water does drain from this area has high treatment potential due to longer residence time. Soil quality was not considered suitable for all plots due to the heavy clays that were ubiquitous throughout the area that limit several wetland functions including groundwater recharge.

Summary of Functions and Values

Wetland Region		Water Input Sources	Water Output Sources	Soil Quality	Wetland Terrain	Water Processes	Contrib. Surface Water Quality	Downstream Water Quality	Biogeochemical Processes	Vegetative Communities	Wildlife Habitat Quality	Human Use / Benefit	Suitable	Principal
Continuous	Plot 1	N	N	N	N	N	N	N	N	P	P	N		2
Continuous	Plot 4	N	N	N	N	N	N	N	N	P	P	N		2
Upland-Wetland	Plot 3	N	S	S	N	P	S	N	S	P	P	N	4	3
Upland-Wetland	Plot 5	N	S	S	N	N	N	N	N	P	P	N	2	2
Reference	Plot 2	N	N	N	P	P	S	P	P	P	P	S	2	6

Wetland Functions and Values
S = Suitable function or process
P = Principle function or process
N = Neither suitable nor principle

Wetlands determined "not suitable" for a function or value may exhibit some of the qualifying characteristics listed. Functions and values were considered not suitable or not principal for one of the following reasons: (1) the wetland exhibits a minimal number of qualifiers; (2) the wetland exhibits weak qualifiers of the function or value; (3) wetland characteristics indicate the function or value is not occurring, or (4) professional judgment based on a comparison of a wetland's characteristics to other evaluated wetlands.

Wetland soils are hydric and typically deep organic or fine-grained mineral sediments. Soils in the subject property area are mapped by the NRCS-Soil Conservation Service as belonging to the Acredale silt loam soil series. Those soils are typified by poorly drained silt loam to a depth of at least 5.5-ft below ground surface. Test borings conducted across the area (McCallum, 1998) confirm the presence of low permeability soil in boring logs that indicate fine sandy lean clay

(CL) to depths of at least 6-ft. The typical hydraulic conductivity of this type of soil is 10^{-6} cm/sec indicating that it is not readily absorptive of precipitation. In addition, as the capillary fringe within these fine-grained soils extends upward fairly high, these nearly saturated soils will neither store nor transmit significant volumes of water. As such, this restrictive area acts more as a discharge point than it serves as a groundwater recharge area.

Beneficial biogeochemical processes that can occur in wetlands include removal of carbon and nutrients (primarily nitrate, sulfate, and phosphorus). The subject property is not an important carbon sink. By far, the dominant source of carbon within a wetland is the biomass of the wetland itself; it is a carbon source. It would be pointless to make the circular argument that a given wetland is important for removal of the carbon created within itself. There are other sources of carbon that have the opportunity to pass through the subject property including atmospheric (CO_2), dry deposition, dissolved carbon (DOC), and suspended plant matter. Atmospheric carbon is primarily removed through plant respiration, but that process is neither unique to this wetland nor limited in the region and is not considered a significant wetland function there. Other sources of carbon including dry deposition, dissolved organic carbon (DOC), and suspended organic solids in stormwater runoff from offsite. Biodegradation of organic matter by aerobic processes is limited and slow in wetland environments due to the inherent reducing conditions. However the subject property contains a few inter-site ditches that transport offsite waters with those sources of carbon through the subject property. While anaerobic processes can sequester some carbon prior to offsite transport, the kinetics of these processes are relatively slow, so under conditions of active surface water flow, inter-site ditches would not offer significant amount of carbon removal. There is more of an opportunity for those processes to occur within the slowly moving Stumpy Lake.

Sulfur is a nutrient that can be transformed within wetland environments. The primary sources would be organic matter (vegetation) and dry deposition from the atmosphere. In the wetland environment, sulfate is reduced by anaerobes that use it as a terminal electron acceptor thereby releasing a considerable amount as hydrogen sulfide. Site visits to the subject property did not reveal olfactory evidence of that process being significant but it is still likely occurring. Some sulfate can be adsorbed to clay minerals and some can also be utilized by vegetation. Due to the

slow routing of sulfate through unsaturated areas of the subject property, there is opportunity for reduction of atmospherically deposited sulfate within the wetland.

As with sulfur, nitrogen compounds will also pass through the subject property. The sources are primarily dry deposition from the atmosphere but also include anthropogenic inputs. Upstream sources from developed areas passing through the subject property via inter-site ditches would be significant contributors of total nitrogen. Similar to sulfate, nitrate can be metabolized by different biologic processes but anaerobes using sulfate as a terminal electron acceptor would be the most prominent mechanism. Since nitrogen is often the most limiting nutrient in wetlands, there is a strong potential for its transformation within wetlands. Nitrate from dry deposition onto the subject property can be reduced but (as with carbon) the kinetics of anaerobic processes are relatively slow, so nitrate in stormwater runoff from upstream sources transporting through inter-site ditches would not offer significant amount of nitrogen removal. Once reaching Stumpy Lake, nitrogen is more efficiently transformed by sub-aquatic vegetation and plankton due to the longer residence time within that water body.

Phosphorus mostly occurs as an anthropogenic nutrient. It is also a limiting nutrient in wetlands so there is a strong potential for its transformation in wetlands. While its use in detergents and lawn amendments has been greatly reduced, the major source of this nutrient in this area is still related to stormwater runoff. Therefore, its occurrence within the subject property is mostly limited to waters passing through the site via inter-site ditches. Wetlands can function as a phosphorus sink through plant uptake, adsorption onto clay particles, and precipitation. Considering the occurrence and transformation mechanisms, riparian wetlands along inter-site ditches are more important for phosphorus removal than intra-site ditches or lands located away from them.

In summary, important substances that pass through the subject property would include carbon, nitrogen, sulfur, and phosphorus. These substances are supplied by natural sources, atmospheric deposition across the subject property, and inputs from offsite sources via surface water flow. While some of these substances are sourced from within the subject property itself, others are transported to or through the subject property wetlands and can be effectively removed by plant uptake, precipitation/ absorption, or transformation there. In terms of important wetland functions and in consideration of sources of important substances, the subject property wetlands

are most effective at managing carbon and nutrients within inter-site ditches and their associated riparian wetlands as stormwater is routed through the subject property. However, the intra-site ditches reduce water residence time within the wetlands of the project site, reducing the potential for these biogeochemical processes to occur as suitable functions. Perhaps more important would be processes that occur downstream within Stumpy Lake where the extended residence time allows for slower biogeochemical processes to occur. As a result of minimal residence time of waters moving through the project site wetlands, the downstream benefits of filtration, nutrient transformation, and stormwater retention are primarily limited to processes that occur within Stumpy Lake.

In general, the subject wetlands and the Stumpy Lake system as a whole function as a perched water table system, with surface and shallow groundwater sitting atop a relatively impermeable clayey layer that impedes interaction with deeper aquifers. Geotechnical soil borings taken within the project site found static groundwater at -7 feet, or 17 feet below ground surface. A hydrogeologic study (approximately 10 years ago) was conducted on a proposed borrow pit site east of Elbow Road, which has soils similar to the project site. That study involved an aquifer test whereby groundwater withdrawal lowered the water table to -30' elevation and reported observations that the groundwater withdrawal had no effect on the nearby perched water tables, demonstrating, in reverse, that the ability of the subject wetlands to recharge groundwater is very limited.

This function analysis has demonstrated, through direct onsite observations and review, that the wetlands and uplands within the project area are not unique systems. The function of the Contiguous Wetland area within the project site has been previously impacted and thereby its value and benefits have been significantly degraded as compared to the Reference Contiguous area that has not experienced such impacts. The reference plot was found to be of high function and value, and provides overall a higher on and off-site benefit and value. The Wetland Upland Mixed area is also of relatively high function, although variable in condition due to natural topography between the Upland-Wetland areas within this system. However, once farther away from Stumpy Lake within the project site, and at higher elevations, wetland function and value diminish. Based on the HGM evaluation of the impacted areas and proposed mitigation site,

proper design and construction of the mitigation site will result in an equal or better function and value wetland than the area being compensated for and will preserve continuity and connectivity with adjacent preservation area as well as existing wetland and natural resources

References:

http://water.usgs.gov/nwsum/WSP2425/functions.html US Geological Survey.

Jacobs, A.D. and D.F. Whigham, D. Fillis, E. Rehm, and A. Howard, 2009. Delaware Comprehensive Assessment Procedure Version 5.2. Delaware Department of Natural Resources and Environmental Control, Dover De. 72pp.

Mitsch, W.J., Gosselink, J.G. 1993. Wetlands, 2nd ed.

Novitzki, Richard P, Smith, R. Daniel, and Fretwell, Judy D. 1997. Restoration, Creation, and Recovery of Wetlands – Wetland Functions, Values, and Assessment.

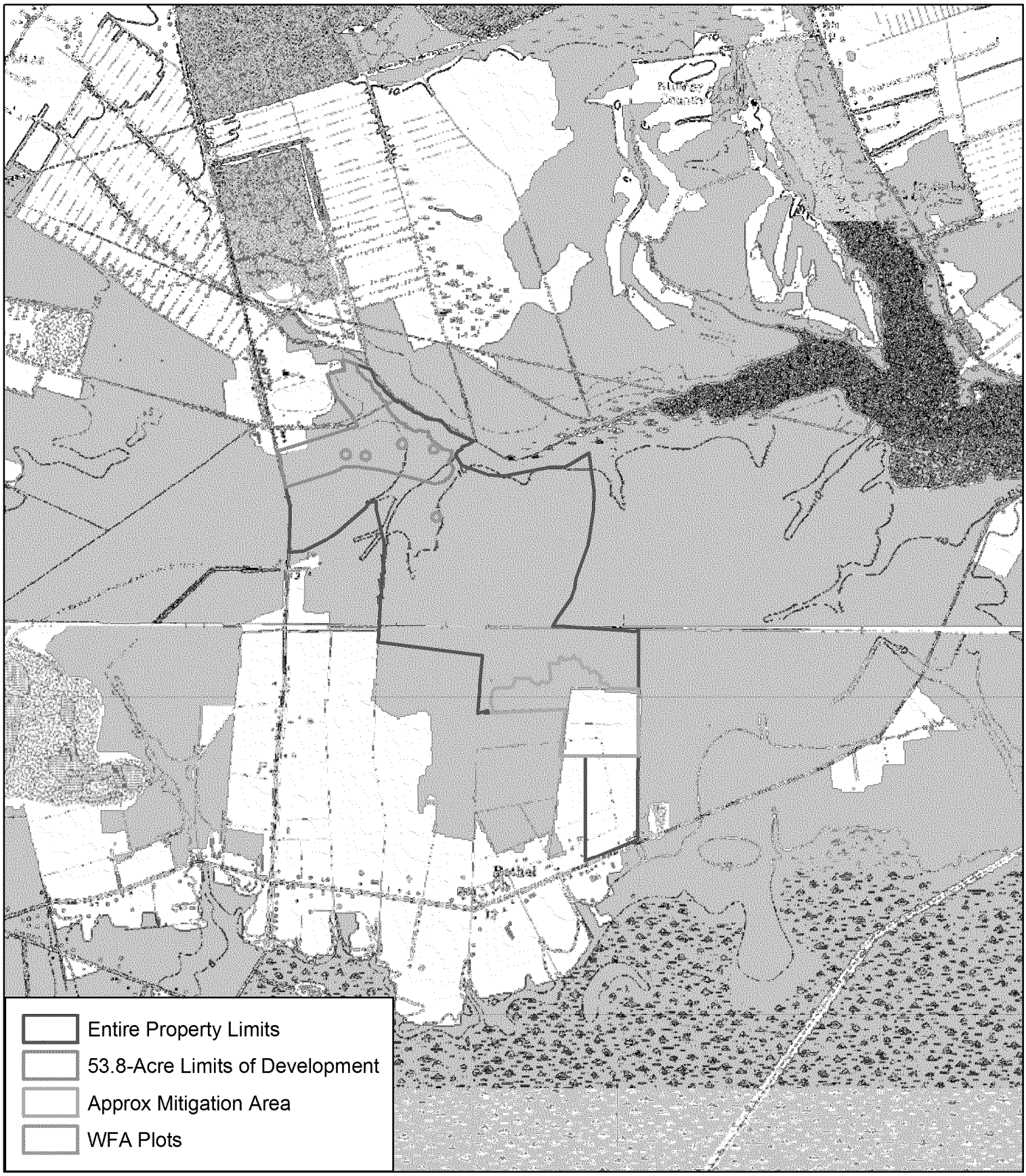
Raumond E. Miller, Jr. and Boyd E. Gunsalus, 1997. Wetland Rapid Assessment Proceedure (WRAP). Natural Resources Management Division, Regulation Department, South Florida Management District.

US Corps of Engineers. 1999. The Highway Methodology Workbook Supplement, Wetland Functions and Values – A Descriptive Approach. Army Corps of Engineers New England Division 32pp. NAEEP-360-1-30a.

US Environmental Protection Agency. 1998. Wetland Biological Assessments and HGM Functional Assessment. http://water.epa.gov/type/wetlands/assessment/fact6.cfm EPA843-F-98-001f

Klein, Michael S. 2013. Wetland Delineation, Functional Evaluation and Impact Assessmen – Galasso Quarry Expansion. Environmental Planning Services, LLC.

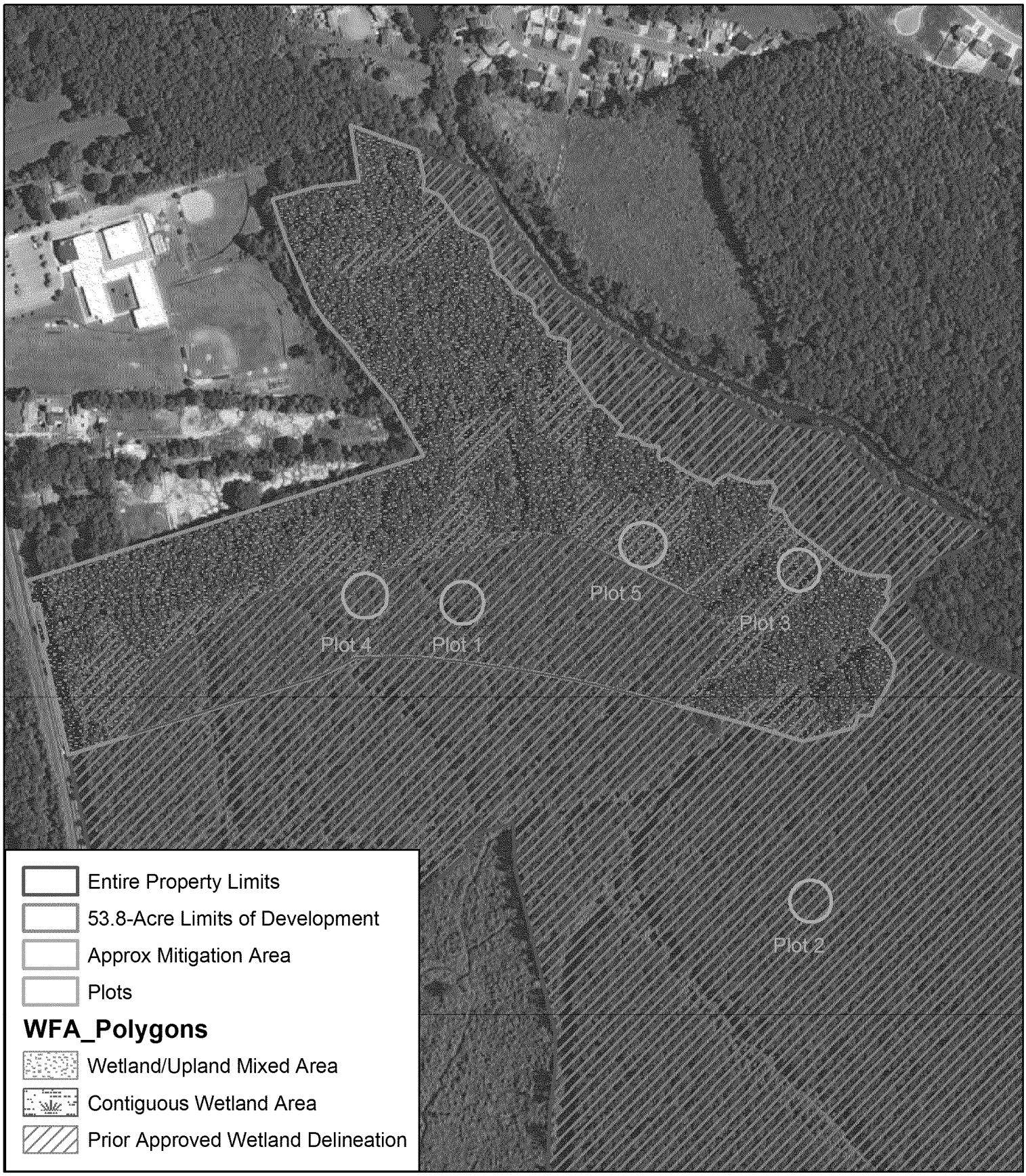
Tri City Properties, LLC - WFA Plot Location Exhibit



April 16, 2014
MSA # 13217
Mapped by BRO
2012 Arial photograph from USDA-NAIP, Virginia Beach, VA

0 1,000 2,000 4,000 6,000 8,000 Feet

Tri City Properties, LLC - WFA Plot Location Exhibit



April 16, 2014
MSA # 13217
Mapped by BRO
2012 Arial photograph from USDA-NAIP, Virginia Beach, VA

0 250 500 1,000 1,500 Feet

WETLAND FUNCTION ASSESSMENT

Function / Value Evaluation Features

I. Water Input Sources
   1. Precipitation.
      a. Meteorological/geographical influences affect precipitation.
      b. Dense canopy interception provides more interception surface area.
      c. Distributed vertical story canopy provides more interception surface area.
   2. Water sheetflows into wetland from offsite or upland areas.
      a. Area of wetland is small relative to its watershed.
      b. Wetland occurs in upper portions of its watershed.
      c. Wetland watershed contains high percentage of impervious surfaces.
   3. Ditches – convey water into wetland from offsite or upland areas.
   4. Evidence of fluctuating water levels.
      a. Function of supply and losses.
      b. Reverse inundation as result of downstream / offsite influences.
   5. Other

II. Water Output Sources
   1. Downstream surface water level controls are present.
   2. Area wells or other such groundwater affecting devices are present.
   3. Water sheetflows offsite from wetland.
   4. Evapotranspiration lowers water table.
   5. Ditches facilitate wetland drainage.
   6. Other

III. Soil Quality
   1. NRCS Soil Series.
   2. Thick mineral soil present.
   3. High clay content in shallow soil.
   4. Sand in shallow soil clay.
   5. Sandy or gravelly soil present in or adjacent to wetland.
   6. High organic content in shallow soils.
   7. Compacted shallow soils present.
   8. Poor water storage capacity.
   9. Other

IV. Wetland Terrain
   1. Microtopography present within wetland.
   2. Uplands present in the vicinity or within wetlands as islands.
   3. Wetland is part of corridor / larger contiguous natural system.
   4. Terrain significantly altered by human impacts like logging, roads, ditches

5. Other

V. Water Processes

1. Soil water condition.
   a. Wetland saturated for most of the season.
   b. Ponded water present in wetland.
   c. Wetland goes dry to 18" or less for most of the season.
2. Flood mitigation.
   a. Microtopography interferes with sheetflow.
   b. Ditches reduce floodplain storage.
3. Groundwater recharge.
   a. Microtopography holds water onsite.
   b. Absorptive surface present.
   c. High potential evapotranspiration.
4. Sediment transport.
   a. Ditches increase stormwater velocity increasing transport capability.
   b. High-energy sheetflow entraining sediments for transport.
   c. Microtopography captures sediment.
   d. Duff layer intercepts sediment transport.
   e. Surface tree roots intercept sediment transport.
   f. Sediment deposition processes present.
5. Other

VI. Contributing Surface Water Quality

1. Originates under more natural / unimpacted conditions.
2. Originates under urban conditions / influences.
3. Physical controls interfere with movement of offsite water into wetland
4. Potential source of excess sediments / toxicants in watershed above wetland.
5. Other

VII. Downstream Water Quality

1. Storage of waters within wetland
   a. Allows treatment of onsite precipitation
   b. Allows treatment of offsite stormwater inputs
2. Retention time for stormwater within wetland limited
   a. Due to natural topography
   b. Due to man-made impacts like ditches
3. Receiving body could be used as a source of drinking water.
4. Downstream water is suitable for drinking water supply / has not been degraded.
5. Other

VIII. Biogeochemical Processes

1. Thick organic layer present indicative of productive biogeochemical processes.

2. Thin organic layer indicative of good decomposition and nutrient cycling
3. Healthy vegetation indicative of nutrient uptake / reduction.
4. Indications of good oxygenation within soil layer.
5. Longer stormwater residence / retention time allowing more thorough biogeochemical processes to occur.
6. Presence of algae / algal blooms in surface water features indicating low nutrient reduction or sequestration.
7. Other

IX. Vegetative Communities

1. Wetland species dominate plant community.
2. Mixed (upland/wetland) but healthy vegetative community.
3. Stressed community or indications of impacted / changing conditions.
4. High species diversity
5. Good plant coverage in all layers (tree, shrub, herbaceous)
6. Exotic species < 5% prevalence
7. Evidence of recent vegetative disturbance (logging, clearing, significant browsing)
8. Other

X. Wildlife Habitat Quality

1. Wildlife food sources / mast production high in this wetland.
2. Detritus development is present.
3. Diverse plant community.
4. High vegetation density is present.
   a. Dense tree layer.
   b. Dense shrub layer.
   c. Dense herbaceous layer.
5. Wetland is not fragmented by development.
6. Wetland is not degraded by human activity.
7. Presence of habitat structures.
   a. Surface tree roots – small critter habitat.
   b. Coarse woody debris.
8. Wetland has high habitat potential for:
   a. Birds
   b. Mammals
   c. Reptiles
   d. Amphibians
   e. Fish
9. Evidence of wildlife signs.
10. Other

XI. Human Use / Benefit

1. Wetland is open to the public.

2. Good accessibility for foot traffic.
3. Good recreation potential.
4. Hiking occurs or has potential to occur.
5. Hunting / fishing possible.
6. Good visibility or significant viewshed present.
7. Historic or sociologically valuable property, resources, or structures located within the wetland.
8. Surrounding upland is developing rapidly.
9. Other

WETLAND FUNCTION ASSESSMENT - FEATURE EVALUATION FORM

Project Name	Centerville Properties (Tri-Cities)
Project Location	Centerville Turnpike near Stumpy Lake
	Chesapeake, Virginia
Total area of subject property (acres)	54.8
Total wetland area in subject property (acres)	~ 24
Adjacent land use	undeveloped, residential, school/comm.
Dominant wetland classification	PF0
Is wetland part of Wildlife Corridor/Habitat Island?	HI
Is wetland a separate hydraulic system?	No
How many tributaries contribute to the wetland	0 (ditched out)

Wetland ID:	Plot #1		
Latitude:	36° 45' 26.937" N	Longitude:	76° 10' 49.379" W
Prepared by:	Charles Hall	Date:	12/12/2013
Evaluation based on (office / field):	field inspection		

Corps manual wetland delineation	yes; previously delineated
Distance to nearest development (ft)	± 500-ft from wetland test plot area.
Wildlife/vegetation diversity/abundance	(see attached list)
Contiguous undeveloped buffer present	In parts
If not, where does wetland lie within drainage basin?	portions of wetland borders areas cut off or impacted by logging, development, or roadways.

Function / Value Feature	Suitability Y	Suitability N	*Rationale Reference #	Principle Function	Comments (see report text for more complete description)
I. Water Input Sources		X	1,4a,5	N	Distributed vertical story; area gently sloping but no sheetflow from offsite; most ditches originate from wthin wetland, perimeter ditches limit offsite water inputs
II. Water Output Sources		X	1,4,5	N	Good transpiration; numerous drainage ditches in effect; some recharge but shallow groundwater primarily perched on heavy textured soils.
III. Soil Quality		X	1,2,4,7	N	Variable duff layer; variable topsoil layer; thick compacted clay.
IV. Wetland Terrain		X	1,4	N	Some microtopography due to both natural source and logging impacts.
V. Water Processes		X	1c,2b,3c, 4a,4d	N	Surface soils can dry out seasonally, ditches drain area and transport sediment before wetlands can perform significant process
VI. Contributing Surface Water Quality		X	3	N	Perimeter ditches prevent off-site stormwter water input.
VII. Downstream Water Quality		X	2b,3	N	Intra-site ditches convey stormwater without allowing significant wetland benefit to water quality
VIII. Biogeochemical Processes		X	1,3,4	N	Variable site conditions result in variable benefit to some areas; shorter residence time due to ditching reduces overall biogeochemical benefit.
IX. Vegetative Communities	X		2,3,4,5,6	Y	Mixed community that indicates changing or stressing conditions. Wetland species less dominant than at other test Plots.
X. Wildlife Habitat Quality	X		2,3,4a,4b,4c, 7,8,9	Y	Distributed vertical story; good mast and biomass production; surface water present in ditches, surface root habitat present; closer proximity to developed land and highway.
XI. Human Use / Benefit		X	8	N	Private property; limited foot access due to ditches; within viewshed of adjacent developments; no significant natural viewshed; no fishing; limited hunting potential due to proximity to housing and school.

* *See Wetland Function Assessment - Function/Value Evaluation Features outline.*

WETLAND ANALYSIS DATA SHEET

Project/Site: Tri-Cities Centerville Development Sampling Date: December 12, 2013 Sampling Point: Plot 1

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1) _____ inches
___ High Water Table (A2) _____ inches
___ Saturation (A3) _____ inches
___ Water Marks (B1)
___ Inundation visible on Aerial Imagery (B7)
X Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Thin Muck Surface (C7)
___ Shallow Aquitard (D3)
X Other (Explain in Remarks)

Secondary Indicators (two needed)

___ Sparsely Vegetated Concave (B8)
___ Drainage Patterns (B10)
___ Dry Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial (C9)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Remarks: Shallow roots observed on trees.

Vegetation analysis

Tree Stratum:	% Cover /quarter				Total	Status:
1. Liquidambar styraciflua	5		3		**8**	FAC
2. Acer rubrum	4	2	2		**8**	FAC
3. Pinus taeda		4		2	6	FAC
4. Quercus michauxii	4	4	2	3	**13**	FACW
5. Ulmus americana	8		8	7	**23**	FAC
6. Liriodendron tulipifera	2	3	2		7	FACU
7. Fagus grandifolia			3	4	7	FACU
8. Carpinus caroliniana			2	2	4	FAC
9. Quercus pagoda		4			4	FACW
10. Carya ovata				4	4	FACU
			Total cover:		84%	

Shrub Stratum:	% Cover /quarter				Total	Status:
1. Carpinus caroliniana	5	5	3	2	**15**	FAC
2. Acer rubrum	1		1	2	**4**	FAC
3. Ulmus americana	1			2	3	FAC
4. Quercus michauxii			1		1	FACW
5. Ostrya virginiana	1	1		1	3	FACU
6. Aralia spinosa	2	2			4	FAC
7. Liquidambar styraciflua	1				1	FAC
8. Liriodendron tulipifera		5			**5**	FACU
9. Fagus grandifolia			2	2	**4**	FACU
10. Ilex opaca				1	1	FAC
			Total cover:		41%	

Herb Stratum:	% Cover /quarter				Total	Status:
1. Arundinaria tecta	15	10	12	10	**47**	FACW
2. Smilax rotundifolia	1	2	4	1	8	FAC
3. Carex sp.		1	1	1	3	
4. Lonicera japonica	2	3	2	2	**9**	FAC
5. Chasmanthium laxum	1	4	2		7	FAC
6. Quercus pagoda			1		1	FACW
7. Pinus taeda	1	1	1	2	5	FAC
8. Smilax glauca		1	1		2	FAC
9. Duchesnea indica			1		1	FACU
10. Rubus argustus		2	1		3	FAC
11. Magnolia grandifolia			1		1	FAC
12. Solidago rugosa				3	3	FAC
13. Ligustrum sinense			1		1	FAC
14. Bignonia capreolata	2				2	FACW
15. Tipularia discolor	1	1	2	1	5	FACU
16.						
			Total cover:		97	

Vine Stratum:	% Cover /quarter				Total	Status:
1. Smilax rotundifolia				1	**1**	FAC
2. Decumaria barbera	1				**1**	FACW
3. Lonicera japonica	1				**1**	FAC
			Total cover:		9	

Analysis:

Number of Dominant OBL, FACW, or FAC:	11
Total Number of Dominant Species	13
Percent of Dominant WL Species	85%
Percent of all wetland species	78%
Total Species Present in all strata	27
% canopy coverage of mast trees	44%

WETLAND FUNCTION ASSESSMENT - FEATURE EVALUATION FORM

Project Name	Centerville Properties (Tri-Cities)
Project Location	Centerville Turnpike near Stumpy Lake
	Chesapeake, Virginia
Total area of subject property (acres)	53.8
Total wetland area in subject property (acres)	
Adjacent land use	undeveloped, residential, school/comm.
Dominant wetland classification	PF0
Is wetland part of Wildlife Corridor/Habitat Island?	WC
Is wetland a separate hydraulic system?	No
How many tributaries contribute to the wetland	1-2 ditches

Wetland ID:	Plot #2		
Latitude:	36° 45' 17.576" N	Longitude:	76° 10' 35.420" W
Prepared by:	Charles Hall	Date:	12/12/2013
Evaluation based on (office / field):	field inspection		

Corps manual wetland delineation	yes; previously delineated
Distance to nearest development (ft)	± 1,500-ft from wetland test plot area.
Wildlife/vegetation diversity/abundance	(see attached list)
Contiguous undeveloped buffer present	Yes
If not, where does wetland lie within drainage basin?	Near headwaters

Function / Value Feature	Suitability Y	Suitability N	*Rationale Reference #	Principle Function	Comments
I. Water Input Sources		X	1,4	N	Less distributed vertical story; less microtopography, insignificant potential for sheetflow from offsite; insignificant ditching.
II. Water Output Sources		X	1,4	N	Transpiration potential; less microtopography; slightly greater potential for groundwater recharge due to residence time, no ditches to allow outflow
III. Soil Quality		X	1,2,3	N	Thin duff layer; thin topsoil layer; thick clay.
IV. Wetland Terrain	X		1,3	Y	Some microtopography but does not significantly enhance or reduce wetland function, no significant impacts to site, excellent continuity
V. Water Processes	X		1a,1b,3c,4e	Y	Less drainage due to lack of ditches; stores precip that falls onsite.
VI. Contributing Surface Water Quality	X		1	N	Less offsite contribution of water; mostly originates from surrounding wetland areas.
VII. Downstream Water Quality	X		1a,3	Y	Benefits to downstream water quality is limited to treatment of onsite precipitation for nutrients and sediments
VIII. Biogeochemical Processes	X		2,3,5	Y	Shallow duff layer indicates decomposition occurs quickly resulting in good nutrient cycling
IX. Vegetative Communities	X		1,4,6	Y	Wetland dominant community; health conditons.
X. Wildlife Habitat Quality	X		1,2,3,4a,4c, 5,6,7,8,9	Y	Less distributed vertical story; good mast and biomass production; less surface water present; good habitat; no development encroachment.
XI. Human Use / Benefit	X		2,3,4,5	N	Private property; better foot access; no significant natural viewshed; no fishing; hunting potential.

* *See Wetland Function Assessment - Function/Value Evaluation Features outline.*

WETLAND ANALYSIS DATA SHEET

Project/Site: Tri-Cities Centerville Development Sampling Date: December 12, 2013 Sampling Point: Plot 2

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	_____ inches	___ Aquatic Fauna (B13)	
___ High Water Table (A2)	22" inches	___ Hydrogen Sulfide Odor (C1)	
___ Saturation (A3)	18" inches	___ Oxidized Rhizospheres on Living Roots (C3)	
___ Water Marks (B1)		___ Thin Muck Surface (C7)	
___ Inundation visible on Aerial Imagery (B7)		___ Shallow Aquitard (D3)	
X Water-Stained Leaves (B9)		X Other (Explain in Remarks)	

Secondary Indicators (two needed)

___ Sparsely Vegetated Concave (B8)
___ Drainage Patterns (B10)
___ Dry Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial (C9)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Remarks: Shallow roots observed on trees. Sphagnum present

Vegetation analysis

Tree Stratum:	% Cover /quarter				Total	Status:
1. Liquidambar styraciflua	8	4	5	9	**26**	FAC
2. Acer rubrum	2	5	6	2	**15**	FAC
3. Quercus nigra				4	4	FAC
4. Quercus michauxii	5	12	4		**21**	FACW
5. Ulmus americana			3	2	5	FAC
6. Quercus falcata	5				5	FACU
7. Quercus laurifolia			5		5	FACW
8. Carpinus caroliniana	2	3	1	1	7	FAC
9. Quercus pagoda	4	3		5	12	FACW
10.						
Total cover:					100%	

Shrub Stratum:	% Cover /quarter				Total	Status:
1. Carpinus caroliniana	3	2			**5**	FAC
2. Acer rubrum	2	1			**3**	FAC
3. Ulmus americana			2		2	FAC
4. Quercus michauxii			2		2	FACW
5. Ilex opaca		1			1	FAC
6.						
7.						
8.						
9.						
10.						
Total cover:					13%	

Herb Stratum:	% Cover /quarter				Total	Status:
1. Arundinaria tecta	12	8	12	12	**44**	FACW
2. Smilax rotundifolia	1	1	2	2	6	FAC
3. Carex sp.	1	1	1	2	5	
4. Lonicera japonica	1	1	1	1	4	FAC
5. Toxicodendron radicans	1				1	FAC
6. Quercus pagoda	1				1	FACW
7. Quercus michauxii		1	1		2	FACW
8. Smilax glauca		1		1	2	FAC
9. Duchesnea indica				1	1	FACU
10. Carex albolutescens			1	2	3	FACW
11. Magnolia virginiana				1	1	FACW
12. Quercus laurifolia				2	2	FACW
13. Osmunda regalis				2	2	FACW
14. Woodwardia aerolata			2		2	OBL
15. Tipularia discolor			1		1	FACU
16. Bignonia capreolata				2	2	FAC
Total cover:					79	

Vine Stratum:	% Cover /quarter				Total	Status:
1. Smilax rotundifolia			1		1	FAC
2. Decumaria barbera	1	1	2		**4**	FACW
3. Toxicodendron radicans	2			2	**4**	FAC
Total cover:					9	

Analysis:

Number of Dominant OBL, FACW, or FAC:	8
Total Number of Dominant Species	8
Percent of Dominant WL Species	100%
Percent of all wetland species	88%
Total Species Present in all strata	25
% canopy coverage of mast trees	52%

WETLAND FUNCTION ASSESSMENT - FEATURE EVALUATION FORM

Project Name	Centerville Properties (Tri-Cities)		
Project Location	Centerville Turnpike near Stumpy Lake		
	Chesapeake, Virginia		
Total area of subject property (acres)	53.8		
Total wetland area in subject property (acres)	~ 24	Corps manual wetland delineation	yes; previously delineated
Adjacent land use	undeveloped, residential, school/comm.	Distance to nearest development (ft)	± 1,000-ft from wetland test plot area.
Dominant wetland classification	PF0	Wildlife/vegetation diversity/abundance	(see attached list)
Is wetland part of Wildlife Corridor/Habitat Island?	WC	Contiguous undeveloped buffer present	Yes
Is wetland a separate hydraulic system?	No	If not, where does wetland lie within drainage basin?	Near headwaters
How many tributaries contribute to the wetland	3 (ditches; creek)		

Wetland ID:	Plot #3			
Latitude:	36° 45' 27.528" N	Longitude:	76° 10' 37.331" W	
Prepared by:	Charles Hall	Date:	12/12/2013	
Evaluation based on (office / field):	field inspection			

Function / Value Feature	Suitability Y	Suitability N	*Rationale Reference #	Principle Function	Comments
I. Water Input Sources		X	2a,2c,3,4b	N	Less distribution of vertical story; slightly more microtopography - greater but still limited potential for sheetflow from offsite (flooding); backup of water from Stumpy Lake may provide input source due to low elevation
II. Water Output Sources	X		1,3,4	N	Primarily only upper story canopy provides ppt interception; some drainage by ditches and sheetflow; limited groundwater recharge from infiltration.
III. Soil Quality	X		1,2,3,6,7	N	Moderate duff layer; thick topsoil layer over thick clay.
IV. Wetland Terrain		X	1,2,3	N	Adjacent to otherwise natural corridor but discontinuous due to alternating upland/wetland terrain.
V. Water Processes	X		1a,1b,4d	Y	Good drainage; moderate storage potential, low elevation increases water storage potential
VI. Contributing Surface Water Quality	X		1,2,4	N	Some offsite water contributions and those waters can be affected by quality and sediment impact fromupstream offsite development.
VII. Downstream Water Quality		X	2a,3	N	limited potential for treatment of on and off-site stormwater due to elevation and topography
VIII. Biogeochemical Processes	X		1,3	N	Good duff layer, limited oxygenation in shallow soils, limited low story vegetation, topsoil indicates sime processes
IX. Vegetative Communities	X		1,2,4,5,6	Y	Good variety of species; wetland plants dominant. Healthy condition and distribution.
X. Wildlife Habitat Quality	X		2,3,4a,4b, 5,6,7,8,9	Y	Less distributed vertical story; less mast production but surface water present; ok biomass; good habitat; no development encroachment.
XI. Human Use / Benefit	X		2,3,4,5,6	N	Private property; better foot access; good natural viewshed to lake (from within area); fishing and hunting potential.

* *See Wetland Function Assessment - Function/Value Evaluation Features outline.*

WETLAND ANALYSIS DATA SHEET

Project/Site: Tri-Cities Centerville Development Sampling Date: December 12, 2013 Sampling Point: Plot 3

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1) _____ inches
___ High Water Table (A2) _____ inches
___ Saturation (A3) _____ inches
___ Water Marks (B1)
___ Inundation visible on Aerial Imagery (B7)
X Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Thin Muck Surface (C7)
___ Shallow Aquitard (D3)
X Other (Explain in Remarks)

Secondary Indicators (two needed)

___ Sparsely Vegetated Concave (B8)
___ Drainage Patterns (B10)
___ Dry Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial (C9)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Remarks: Shallow roots observed on trees.

Vegetation analysis

Tree Stratum:	% Cover /quarter				Total	Status:
1. Liquidambar styraciflua	3			4	7	FAC
2. Acer rubrum	5	4	3		**12**	FAC
3. Carya ovata	6		6	5	**17**	FACU
4. Quercus michauxii	4		4	5	**13**	FACW
5. Ulmus americana	3			4	7	FAC
6. Quercus falcata	4		4		8	FACU
7. Ulmus rubra		7	3		10	FAC
8. Liriodendron tulipifera		7			7	FACU
9. Quercus pagoda		6		6	**12**	FACW
10. Capinus caroliniana				2	2	FAC
			Total cover:		95%	

Shrub Stratum:	% Cover /quarter				Total	Status:
1. Ostrya virginiana	1				1	FACU
2. Acer rubrum	3		3	2	**8**	FAC
3. Fagus grandifolia	1			3	4	FACU
4. Quercus michauxii			2		2	FACW
5. Ulmus americana	2	1		1	4	FAC
6. Carya ovata	2				2	FACU
7. Vaccinium corymbosum		1			1	FACW
8. Ulmus rubra		4		1	**5**	FAC
9. Carpinus caroliniana		1	1	3	**5**	FAC
10.						
			Total cover:		32%	

Herb Stratum:	% Cover /quarter				Total	Status:
1. Arundinaria tecta	6	6	10	8	**30**	FACW
2. Smilax rotundifolia	2	2	2	1	7	FAC
3. Carex sp.	1	1	1	1	4	
4. Lonicera japonica		1	1		2	FAC
5. Chasmanthium laxum			1	1	2	FAC
6. Solidago rugosa			1	1	2	FAC
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
			Total cover:		47	

Vine Stratum:	% Cover /quarter				Total	Status:
1. Smilax rotundifolia	2	2	1		**5**	FAC
2. Vitis sp.		2			2	
3. Toxicodendron radicans			1		1	FAC
			Total cover:		8	

Analysis:

Number of Dominant OBL, FACW, or FAC:	8
Total Number of Dominant Species	9
Percent of Dominant WL Species	89%
Percent of all wetland species	76%
Total Species Present in all strata	21
% canopy coverage of mast trees	40%

WETLAND FUNCTION ASSESSMENT - FEATURE EVALUATION FORM

Project Name	Centerville Properties (Tri-Cities)
Project Location	Centerville Turnpike near Stumpy Lake
	Chesapeake, Virginia
Total area of subject property (acres)	53.8
Total wetland area in subject property (acres)	~ 24
Adjacent land use	undeveloped, residential, school/comm.
Dominant wetland classification	PF0
Is wetland part of Wildlife Corridor/Habitat Island?	WC
Is wetland a separate hydraulic system?	No
How many tributaries contribute to the wetland	0 (Ditched out)

Wetland ID:	Plot #4		
Latitude:	36° 45' 27.076" N	Longitude:	76° 10' 53.204" W
Prepared by:	Charles Hall	Date:	4/10/2014
Evaluation based on (office / field):	field inspection		

Corps manual wetland delineation	yes; previously delineated
Distance to nearest development (ft)	± 320-ft from wetland test plot area.
Wildlife/vegetation diversity/abundance	(see attached list)
Contiguous undeveloped buffer present	Yes
If not, where does wetland lie within drainage basin?	portions of wetland borders areas cut off or impacted by logging, development, or roadways.

Function / Value Feature	Suitability Y	Suitability N	*Rationale Reference #	Principle Function	Comments
I. Water Input Sources		X	4a,5	N	Less distribution of vertical story; perimeter ditches limit offsite inputs - area gently sloping but no sheetflow potential from offsite due to perimeter ditches; most ditches originate from within wetland.
II. Water Output Sources		X	1,4,5	N	Good transpiration; drainage ditches in effect, shallow groundwater primarily perched on heavy textured soils.
III. Soil Quality		X	1,2,3,7	N	Variable duff layer; thin topsoil (organic) layer; thick compacted clay.
IV. Wetland Terrain		X	2,4	N	Only significant microtopography associated with old logging ruts.
V. Water Processes		X	1c,2b,3c,	N	Surface soils can dry out seasonally, ditches drain areas, ditches could transport sediment but apparent flow rate too slow to be significant.
VI. Contributing Surface Water Quality		X	3	N	Perimeter ditches limit offsite water input to wetland area.
VII. Downstream Water Quality		X	2b,3	N	Intra-site ditches convey stormwater without allowing significant wetland benefit to water quality
VIII. Biogeochemical Processes		X	3	N	Thin organic layer, sparse lower story and herbaceous vegetation, soils can dry out but less evidence of oxygenation, limited retention time of storrmwater due to ditches
IX. Vegetative Communities	X		2,3,6	Y	Mixed wetland/upland community indicates changing or stressing conditions.
X. Wildlife Habitat Quality	X		2,4a,7,8,9	Y	Less distributed vertical story; high mast and moderate biomass production; surface water present in ditches, some surface root habitat present; closer proximity to developed land and highway.
XI. Human Use / Benefit		X	8	N	Private property; limited foot access due to ditches; within viewshed of adjacent developments; no significant natural viewshed; no fishing; limited hunting potential due to proximity to housing and school.

* *See Wetland Function Assessment - Function/Value Evaluation Features outline.*

WETLAND ANALYSIS DATA SHEET

Project/Site: Tri-Cities Centerville Development Sampling Date: April 10, 2014 Sampling Point: Plot 4

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1) _____ inches
___ High Water Table (A2) _____ inches
_X_ Saturation (A3) _____ inches
___ Water Marks (B1)
___ Inundation visible on Aerial Imagery (B7)
_X_ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Thin Muck Surface (C7)
___ Shallow Aquitard (D3)
___ Other (Explain in Remarks)

Secondary Indicators (two needed)

___ Sparsely Vegetated Concave (B8)
___ Drainage Patterns (B10)
___ Dry Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial (C9)
___ Geomorphic Position (D2)
_X_ FAC-Neutral Test (D5)

Remarks: Shallow roots observed on trees. Faint and limited water staining present. Sphagnum present. Saturation in depressions only

Vegetation analysis

Tree Stratum:	% Cover /quarter				Total	Status:
1. Quercus pagoda	2	8	7	5	**22**	FACW
2. Acer rubrum	4	6	1	1	12	FAC
3. Ulmus americana	6	3	4	6	**19**	FAC
4. Liquidambar styraciflua	4		3	1	8	FAC
5. Quercus michauxii	1	2	3	4	10	FACW
6. Pinus taeda			3	2	5	FAC
7. Liriodendron tulipifera		3	3	5	**11**	FACU
8.						
9.						
10.						
			Total cover:		87	

Shrub Stratum:	% Cover /quarter				Total	Status:
1. Carpinus caroliniana	3	4	1	2	**10**	FAC
2. Vaccinium corymbosum	1				1	FACW
3. Acer rubrum	2	1	1		**4**	FAC
4. Ulmus americana	2		2		**4**	FAC
5. Fagus grandifolia	2	1			3	FACU
6. Ostrya americana	1				1	FACU
7. Quercus michauxii				1	1	FACW
8. Liquidambar styraciflua				2	2	FAC
9.						
10.						
			Total cover:		26	

Herb Stratum:	% Cover /quarter				Total	Status:
1. Arundinaria tecta	8	5	6	4	**23**	FACW
2. Lonicera japonica	3	2	3	2	**10**	FAC
3. Carex sp.	3	2	1		6	
4. Duchesnea indica	1				1	FACU
5. Smilax glauca		1	1		1	FAC
6. Tipularia discolor		1	1	1	3	FACU
7. Ulmus americana		1	1	1	3	FAC
8. Bignonia capreolata			1	1	2	FAC
9. Liquidambar styraciflua			1		1	FAC
10.						
11.						
12.						
13.						
14.						
15.						
16.						
			Total cover:		50	

Vine Stratum:	% Cover /quarter				Total	Status:
1. Smilax rotundifolia	1	1		2	**4**	FAC
2.						
3.						
			Total cover:		4	

Analysis:

Number of Dominant OBL, FACW, or FAC:	8
Total Number of Dominant Species	9
Percent of Dominant WL Species	89%
Percent of all wetland species	75%
Total Species Present in all strata	20
% canopy coverage of mast trees	51%

WETLAND FUNCTION ASSESSMENT - FEATURE EVALUATION FORM

Project Name	Centerville Properties (Tri-Cities)
Project Location	Centerville Turnpike near Stumpy Lake
	Chesapeake, Virginia

Wetland ID:	Plot #5		
Latitude:	36° 45' 28.880" N	Longitude:	76° 10' 42.246" W
Prepared by:	Charles Hall	Date:	4/10/2014
Evaluation based on (office / field):	field inspection		

Total area of subject property (acres)	53.8		
Total wetland area in subject property (acres)	~ 24	Corps manual wetland delineation	yes; previously delineated
Adjacent land use	undeveloped, residential, school/comm.	Distance to nearest development (ft)	± 1,200-ft from wetland test plot area.
Dominant wetland classification	PF0	Wildlife/vegetation diversity/abundance	(see attached list)
Is wetland part of Wildlife Corridor/Habitat Island?	WC	Contiguous undeveloped buffer present	Yes
Is wetland a separate hydraulic system?	No	If not, where does wetland lie within drainage basin?	Near headwaters
How many tributaries contribute to the wetland	3 (ditches; creek)		

Function / Value Feature	Suitability Y	Suitability N	*Rationale Reference #	Principle Function	Comments
I. Water Input Sources		X	1,4a,5	N	Less distribution of vertical story; limited microtopography - limited sheetflow from offsite due to perimeter ditches
II. Water Output Sources	X		1,3,4	N	Primarily only upper story canopy provides ppt interception; some drainage by ditches and limited sheetflow; limitted groundwater recharge due to clay
III. Soil Quality	X		1,2,3,7	N	Thin duff layer; variable but good topsoil layer; moderate amount of organics present; thick clay.
IV. Wetland Terrain		X	2,3,4	N	Adjacent to otherwise natural corridor but discontinuous due to alternating wetland/upland terrain; Minor microtopography associated with logging ruts.
V. Water Processes		X	1b,1c,4d	N	Good drainage due to natural topography provides limited storage opportunity and limits processes
VI. Contributing Surface Water Quality		X	1,3	N	Perimeter ditches significantly limit offsite stormwater input to wetland area
VII. Downstream Water Quality		X	2a,3	N	Some natural drainage limits retention time and wetland benefit to water quality
VIII. Biogeochemical Processes		X	1,3,4	N	Decent duff layer, limited oxygenation
IX. Vegetative Communities	X		2,6	Y	Lowest variety of species among the plots; wetland plants dominant. Healthy condition and distribution.
X. Wildlife Habitat Quality	X		1,2,3,4a,4b, 5,6,7,8,9	Y	Less distributed vertical story; some mast production and biomass present, surface water present in ruts and microtopography; good habitat; no development encroachment.
XI. Human Use / Benefit	X		2,3,4,5,6	N	Private property; better foot access; good natural viewshed to lake (from within area); fishing and hunting potential.

* *See Wetland Function Assessment - Function/Value Evaluation Features outline.*

WETLAND ANALYSIS DATA SHEET

Project/Site: Tri-Cities Centerville Development Sampling Date: April 10, 2014 Sampling Point: Plot 5

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1) 0-2" inches
- ___ High Water Table (A2) ___ inches
- X Saturation (A3) ___ inches
- ___ Water Marks (B1)
- ___ Inundation visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Thin Muck Surface (C7)
- ___ Shallow Aquitard (D3)
- ___ Other (Explain in Remarks)

Secondary Indicators (two needed)

- ___ Sparsely Vegetated Concave (B8)
- ___ Drainage Patterns (B10)
- ___ Dry Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial (C9)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Remarks: Shallow roots observed on trees. Surface water and saturation in tire ruts only

Vegetation analysis

Tree Stratum:	% Cover /quarter				Total	Status:
1. Acer rubrum	2	4	4	8	**18**	FAC
2. Carpinus caroliniana	1			2	3	FAC
3. Quercus michauxii	10	6	5	1	**22**	FACW
4. Liquidambar styraciflua	2		2	1	5	FAC
5. Liriodendron tulipifera	4	2	5	6	**17**	FACU
6. Quercus pagoda	3	5	5		13	FACW
7. Ulmus americana	2			3	5	FAC
8. Diospyros virginiana		2			2	FAC
9. Carya ovata			2		2	FACU
10.						
			Total cover:		87	

Shrub Stratum:	% Cover /quarter				Total	Status:
1. Carpinus caroliniana	4	2	3	5	**14**	FAC
2. Acer rubrum	2	2	3		**7**	FAC
3. Fagus grandifolia	1				1	FACU
4. Quercus michauxii		1		1	2	FACW
5. Liquidambar styraciflua		1			1	FAC
6. Ulmus americana			3	2	5	FAC
7.						
8.						
9.						
10.						
			Total cover:		30	

Herb Stratum:	% Cover /quarter				Total	Status:
1. Arundinaria tecta	6	2	4	4	**16**	FACW
2. Ulmus americana	1			1	2	FAC
3. Podophyllum peltatum	1	2			3	FACU
4. Carex sp.	1	2	3	1	7	
5. Bignonia capreolata			1		1	FAC
6. Villa sp.		1			1	
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
			Total cover:		30	

Vine Stratum:	% Cover /quarter				Total	Status:
1. Smilax rotundifolia		2	4	2	8	FAC
2. Campsis radicans				2	2	FAC
3. Vitis sp.				1	1	
			Total cover:		11	

Analysis:

Number of Dominant OBL, FACW, or FAC:	5
Total Number of Dominant Species	6
Percent of Dominant WL Species	83%
Percent of all wetland species	78%
Total Species Present in all strata	18
% canopy coverage of mast trees	42%

WETLAND FUNCTION ASSESSMENT - FEATURE EVALUATION FORM

Project Name	Centerville Properties (Tri-Cities)
Project Location	Proposed Mitigation Area near Elbow Road
	Chesapeake, Virginia

Wetland ID:	Mitigation Site Existing Fields		
Latitude:	36° 44' 44.5" N	Longitude:	76° 10' 1.7"W
Prepared by:	Charles Hall	Date:	4/4/2014
Evaluation based on (office / field):	field inspection		

Total area of subject property (acres)	50		
Total wetland area in subject property (acres)	NA	Corps manual wetland delineation	yes; previously delineated
Adjacent land use	Undeveloped	Distance to nearest development (ft)	± 800-ft from field area.
Dominant wetland classification	Non-wet	Wildlife/vegetation diversity/abundance	Minimal (tilled farm fields)
Is wetland part of Wildlife Corridor/Habitat Island?	WC	Contiguous undeveloped buffer present	Yes
Is wetland a separate hydraulic system?	No	If not, where does wetland lie within drainage basin?	Near headwaters
How many tributaries contribute to the wetland	0 (ditched out)		

Function / Value Feature	Suitability Y	Suitability N	*Rationale Reference #	Principle Function	Comments
I. Water Input Sources	X		2b, 4b	N	Plugging of ditches will back water into site
II. Water Output Sources	X		1,3	Y	
III. Soil Quality	X		1,2,6	Y	Organics will be added to soil profile during construction
IV. Wetland Terrain		X	3,4	N	Site currently plowed field, any wetland terrain will have to be engineered into site design
V. Water Processes	X		1b, 1c, 4d	Y	Plugging ditches will improve water processes by allowing residence time
VI. Contributing Surface Water Quality	X		1	Y	Ending agricultural activities will remove sediment and toxicants
VII. Downstream Water Quality	X		1a,1b,	Y	Mitigation will improve water quality
VIII. Biogeochemical Processes	X		1,4,5	Y	Organics will be added to soil profile during construction
IX. Vegetative Communities	X		8	Y	Will be planted to maximize diversity and benefit
X. Wildlife Habitat Quality	X		3,5,6,8a-d,9	Y	Mast will take time to develop, regeneration will provide progressive habitats as area matures, will add continuity to adjacent wetland areas
XI. Human Use / Benefit	X		2,3,4,5	N	Site will offer hunting possibilities, Educational benefits are also possible

* *See Wetland Function Assessment - Function/Value Evaluation Features outline.*

\+ Site inspected as it appears currently, and evaluated based on potential function/value after restoration

WETLAND FUNCTION ASSESSMENT - FEATURE EVALUATION FORM

Project Name	Centerville Properties (Tri-Cities)
Project Location	Proposed Mitigation Area near Elbow Road
	Chesapeake, Virginia

Wetland ID:	Mitigation Site Existing Woods		
Latitude:	36° 44' 54.2" N	Longitude:	76° 10' 10.0" W
Prepared by:	Charles Hall	Date:	4/4/2014
Evaluation based on (office / field):	field inspection		

Total area of subject property (acres)	50		
Total wetland area in subject property (acres)	NA	Corps manual wetland delineation	yes; previously delineated
Adjacent land use	Undeveloped	Distance to nearest development (ft)	± 2,400-ft from wooded area.
Dominant wetland classification	Non-wet	Wildlife/vegetation diversity/abundance	Pine, Sweet Gum, Poplar, and giant cane doninant
Is wetland part of Wildlife Corridor/Habitat Island?	WC	Contiguous undeveloped buffer present	Yes
Is wetland a separate hydraulic system?	No	If not, where does wetland lie within drainage basin?	Near headwaters
How many tributaries contribute to the wetland	0 (ditched out)		

Function / Value Feature	Suitability Y	Suitability N	*Rationale Reference #	Principle Function	Comments
I. Water Input Sources	X		2b, 4b	N	Plugging of downstream ditches will back water into site
II. Water Output Sources	X		1,3,4	N	
III. Soil Quality	X		1, 2,6	Y	Organics will be added to soil profile
IV. Wetland Terrain	X		1, 3	Y	
V. Water Processes	X		3a,3b,4c,4d	N	Existing site microtopography and duff will slow water movement, improve processes once ditches are plugged to allow residence time.
VI. Contributing Surface Water Quality	X		1	N	Most water entering site comes from adjacent woodland
VII. Downstream Water Quality	X		1a,1b,2a,	Y	Improved water retention time imcreases filtration and downstream water quality
VIII. Biogeochemical Processes	X		1, 3,4,5	Y	Improved water residence time imcreases biogeochemical processes
IX. Vegetative Communities	X		2	Y	Will add to site diversity through plantings and management
X. Wildlife Habitat Quality	X		2,5,7b,8a-d,9	Y	
XI. Human Use / Benefit	X		2,3,4,5	Y	Educational benefits are also possible

* *See Wetland Function Assessment - Function/Value Evaluation Features outline.*

\+ Site inspected as it appears currently, and evaluated based on potential function/value after restoration

Photo 1. View of Plot 1, looking north from the center. Photo by BRO.

Photo 2. View of Plot 1, looking east from the center. Photo by BRO.

PLOT 1 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA

MSA, P.C.
5033 Rouse Drive, Virginia Beach, VA. 23462
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www.msaonline.com
Environmental Sciences + Planning + Surveying
Civil and Environmental Engineering + Landscape Architecture

MSA JOB #	DATE:	SCALE
13217	12/12/2013	NTS

Photo 3. View of Plot 1, looking south from the center. Photo by BRO.

Photo 4. View of Plot 1, looking west from the center. Photo by BRO.

PLOT 1 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
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13217	12/12/2013	NTS

Photo 1. View of Plot 2, looking north from the center. Photo by BRO.

Photo 2. View of Plot 2, looking east from the center. Photo by BRO.

PLOT 2 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA

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MSA JOB #	DATE:	SCALE
13217	12/12/2013	NTS

Photo 3. View of Plot 2, looking south from the center. Photo by BRO.

Photo 4. View of Plot 2, looking west from the center. Photo by BRO.

PLOT 2 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
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13217	12/12/2013	NTS

Photo 1. View of Plot 3, looking north from the center. Photo by BRO.

Photo 2. View of Plot 3, looking east from the center. Photo by BRO.

PLOT 3 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA

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MSA JOB #	DATE:	SCALE
13217	12/12/2013	NTS

Photo 3. View of Plot 3, looking south from the center. Photo by BRO.

Photo 4. View of Plot 3, looking west from the center. Photo by BRO.

PLOT 3 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA

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MSA JOB #	DATE:	SCALE
13217	12/12/2013	NTS

Photo 1. View of Plot 4, looking north from the center. Photo by BRO.

Photo 2. View of Plot 4, looking east from the center. Photo by BRO.

PLOT 4 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA

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MSA JOB #	DATE:	SCALE
13217	4/11/2014	NTS

Photo 3. View of Plot 4, looking south from the center. Photo by BRO.

Photo 4. View of Plot 4, looking west from the center. Photo by BRO.

PLOT 4 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA

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13217	4/11/2014	NTS

Photo 1. View of Plot 5, looking north from the center. Photo by BRO.

Photo 2. View of Plot 5, looking east from the center. Photo by BRO.

PLOT 5 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA

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13217	4/11/2014	NTS

Photo 3. View of Plot 5, looking south from the center. Photo by BRO.

Photo 4. View of Plot 5, looking west from the center. Photo by BRO.

PLOT 5 SITE PHOTOGRAPHS

WETLAND FUNCTION ASSESSMENT
TRI CITIES CENTERVILLE PROPERTIES
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5. PROHIBITIONS AND SIGNIFICANT DEGRADATION

Aquatic Resource of National Importance

Prior comments received from the US EPA indicated that the wetland system below Stumpy Lake had been considered an Aquatic Resource of National Importance (ARNI). The ARNI review criteria identified the use of Stumpy Lake as a possible emergency reservoir – at the time, part of the Norfolk Reservoir System. In prior review comments, EPA pointed out that the 4,150 acre Gum Swamp Natural Area is located south of Stumpy Lake and that to the east is the 1,160 acre Upper West Neck Creek Natural Area, both of which contain stands of old growth cypress and tupelo and bottomland hardwood swamp which have been recognized as significant natural areas by the Virginia Department of Conservation and Recreation (DCR). EPA also pointed out that the site is the headwaters of the North Landing River Wetland Ecosystem, located approximately one mile south of the site. General concerns expressed by the EPA also include historic wetland losses in the Virginia Tidewater area and the importance of wetland functions and values. Prior developments to the north and west of the site and the resulting storm water runoff have negatively impacted Stumpy Lake, Gum Swamp and the North Landing River. The concern was raised by review agencies that impacting wetlands within the project site would adversely impact these aquatic systems downstream due to loss of nutrient and pollution filtration benefits. As discussed in the WFA, wetlands within the project footprint lack a surface hydrological connection to adjacent wetlands, are functionally impaired due to numerous drainage ditches that convey channelized flow of up-slope rain water through the wetland directly to the Charlestown Lake drainage canal, provide minimal groundwater recharge due to soil types and short concentration time as the ditches rapidly remove precipitation from the wetlands. The wetlands on the subject site therefore lack the opportunity to perform significant wetland functions, minimizing their benefits to downstream systems. The environmental measures proposed in Section 3-B-i will minimize impacts from construction and operation of the development. Mitigation will yield a net benefit to these systems as discussed in Section 3-C.

The 24-acre wetland area proposed to be impacted is a relatively small portion of both the 6,651-acre headwaters for the Stumpy Lake system and the 26,990-acre headwaters of the North Landing River above the Intercostal Canal. It's positioning within the landscape and small size relative to the overall watershed limits the wetland capacity to significantly influence downstream water quality. Intra-site ditches convey storm water from the wetland area without allowing significant treatment of water. Channelized storm water ditches sending offsite water through the system also bypass potential benefits that could be provided to downstream water quality, depriving the wetlands the opportunity to perform significant wetland functions, as more fully described in the expanded WFA.

Virginia Beach's primary source of potable water is Lake Gaston via pipeline. While Stumpy Lake is still tied into the Virginia Beach emergency reservoir system, the wells can be exercised, but the pipeline is not used to replenish Lake Lawson or provide drinking water.

Stumpy Lake water quality has been impaired and is unreliable as a water source, as determined by a study for the City of Virginia Beach prepared by O'Brien & Gere Engineers, Inc. (November 14, 2002) entitled *"Environmental Constraints & Use Compatibility Analysis"*, as well as the *"Master Land Use and Management Plan for Stumpy Lake Natural Area"* prepared later by the City of Virginia Beach Department of Parks and Recreation (November 7, 2003). Both reports (prepared after the ARNI designation) conclude that Stumpy Lake is already severely impaired due to the poor quality of storm water flowing into the lake from development in the watershed to the north, east and west as well as the golf course. In essence, the impounded lake and dam serves as large regional storm water BMP. These studies state:

> *"While most reservoirs are constructed within substantially large drainage basins suitable to continuously supply an excess of water, Stumpy Lake is not. More than half of the time water does not flow over the weir with any substantial volume. Consequently, the lake experiences large fluctuations during the year in water depths. At full capacity the maximum water depth is only 4.35 feet and more than half of the lake is less than 3.3 feet deep. Numerous stumps and fallen trees amplify the shallow water depths. All these factors contribute negatively to the lake's overall water quality and recreational opportunities. High nutrient loading and turbidity were found to be the main water quality issues of Stumpy Lake."*

While visually pleasing to passers-by, this man-made impoundment is shallow and already impaired and can be inhospitable to aquatic life. Summer heat, shallow depths, organic acid-stained water, and existing nutrient and chemical inputs from the golf course and surrounding developments including portions of City Landfill #2 within the drainage basin combine to result in a biologically harsh environment within the lake. Fish kills in Stumpy Lake are not uncommon. Common carp, an invasive fish species, seems to be one of the few species that survives in this diminished habitat particularly because it can withstand reduced oxygen environments and poor water quality. Algae blooms are frequent. Turbidity is also bad due to damage by the carp and from current sediment input and nutrient enrichment.

The City of Virginia Beach expressed concern that the proposed development within the headwaters of the North Landing River has the potential to adversely affect the ecosystem. However, as demonstrated by the previously provided hydrology and drainage study for the proposed project, storm water will be extensively treated utilizing best management practices incorporating wet detention ponds with wetland treatment areas and vegetated swales. In addition, low impact development will be utilized which will reduce impervious services as well as the effects of standard curb and gutter construction. Peak discharge flows will be

limited to predevelopment flows with lower protracted flows to mimic the natural preexisting hydrological process.

The impounding of the upper end of Gum Swamp to create the Stumpy Lake Reservoir severed Gum Swamp from over 7,000 acres of its headwater and disrupted the natural hydrological processes and deprives Gum Swamp of flow except during and immediately after precipitation events, resulting in periods when Gum Swamp is completely dry. The City of Virginia Beach stated in letter dated 3/1/2005 that, "the applicant made modifications to the project which alleviated the City's concerns relative to water quality and water quantity issues associated with the project as they relate to maintaining Stumpy Lake reservoir."

Wildlife and habitat issues were fully evaluated by the Virginia Department of Game and Inland Fisheries during the Virginia wetlands permitting process. They found that the preserve areas within and adjacent to the development tract will provide an adequate buffer around the nearby bald eagle nest. The on-site and adjacent habitat preservation coupled with the forested wetland restoration… will result in a long-term net gain of habitat for the canebrake rattlesnake and Dismal Swamp Southeastern shrew and accomplish the objective of providing "valuable replacement of habitat for these species in perpetuity."

The overall 428-acre parcel that encompasses the area that is the subject of this permit application consists of approximately 65 acres of prior converted cropland with the remainder being forested woodlands. The elevation of the property ranges from 9 – 12 feet with typical soils, vegetation and topography to surrounding developments. For example, Woodbridge Pointe lies adjacent to the subject property and has houses now constructed that back up within 40 feet of the Stumpy Lake Nature Preserve without a conservation buffer. We are unaware of any permit having been obtained on this property.

A concern was previously raised that impacting the subject wetlands would result in nutrient loading. The degree to which a watershed can retain nitrogen is a function of hydrology, soil characteristics, topography, underlying geology, the amount and type of surface vegetation, and the degree of impervious cover (Paerl, 1993). The Centerville Property does not have the opportunity to serve as a significant sink for waterborne nutrients such as nitrogen and phosphorus, as determined by and discussed in the WFA. This is because there are no streams that bring water from offsite that discharge over or through the wetlands on the property. The manmade perennial ditch onsite conveys water from offsite developed areas through the site, but the ditch is box cut and has no wetland side slopes or other wetland areas to interact with the flows through the site. The canal that forms a portion of the northern border does convey water from offsite development and is a source of nutrients for Stumpy Lake; however, since this feature does not discharge onto the Centerville Property, the wetlands onsite do not have the ability to fix any of these nutrients. Storm flows go straight through the site untreated to Stumpy Lake with no interaction with wetlands or attenuation of flow.

The rate of carbon sequestration on a given acre of land will vary exstensively depending on site-specific conditions such as postioning, type and amount of vegetation, age, type of soils, and hydrology. Seasonally flooded and wetter vegetated wetlands are rated as high for the carbon sequestration function, while drier seasonally saturated wetlands are assigned a moderate rating (Predicting Wetland Functions at the Landscape Level for Coastal Georgia Using NWI Plus Data). The subject wetlands consist of seasonally saturated forested wetlands which due to short infrequent hydroperiods and extensive dry periods during the growing season provide only moderate carbon sequestration. Proposed mitigation will provide higher function due to increased acreage, improved hydrology and organic soils.

The property is generally flat with only micro-topographic elevation changes in some areas on the property. The underlying soils are described as silt loams in the Soil Survey of Norfolk County, Virginia. The amount of moisture the soil can hold and the amount of water that can be fixed by the onsite vegetation dictate the amount of water storage available on the property. There is limited potential for ground water recharge or storage of surface water as much of the water goes through evapo-transpiration. Water availability onsite is primarily dictated by rainfall. There is a small perennial, man-made, box cut/v cut ditch that crosses the property. There is also a man-made drainage canal that carries water from the surrounding developed lands to Stumpy Lake. This canal forms a portion of the northern boundary of the site; however, it does not flow onto the site nor does it discharge water onto the site. The capacity of the box cut/v cut ditch onsite is very limited; therefore, this feature provides only a limited amount of water to the onsite water budget. A significant benefit of the proposed development is that it will include a storm water runoff management system that will significantly improve storm water runoff management both for the subject property and the surrounding area and will substantially reduce nitrogen and phosphorous pollution entering the downstream estuary.

A. Subpart C – Potential Effects on Physical and Chemical Characteristics of the Aquatic Ecosystem

1. Substrate (40 CFR Section 230.20)

   a. Substrate –The impacts are entirely outside of existing submerged lands, and no direct impacts are anticipated. Use of environmental measures as discussed in Section 3-B-i will minimize secondary impacts from construction and long-term operation.

   b. Possible loss of environmental characteristics and values – Based on the environmental measures discussed in Section 2-B-i, no direct impacts are expected to the aquatic substrate, or to water circulation, depths, water fluctuations or temperatures.

   c. Discussion – Based on the scope of the project and environmental precautions taken as discussed in Section 3-B-i, negligible short term and no long-term effects are expected to the aquatic substrate.

FINDINGS:	**___ No Effect**	**_X_ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

2. Suspended Particulates/Turbidity (40 CFR Section 230.21)

   a. Suspended Particulates/Turbidity – The project will not disturb any existing open waters, and no direct impacts are anticipated. Potential secondary impacts are limited to sediment runoff from construction activities and long-term operation of the site. Use of environmental measures as discussed in Section 3-B-i will minimize secondary impacts from construction and long-term operation.

   b. Possible loss of environmental characteristics and values – This project is not expected to significantly affect turbidity of downstream waters, or result in oxygen depletion, increased biological demand, or the release of toxic metals or chemicals into the water that might affect aquatic life.

   c. Discussion – Based on the scope of the project and environmental precautions taken as discussed in Section 3-B-i, negligible short term and no long-term effects are expected from suspended particulates or turbidity.

FINDINGS:	**___ No Effect**	**_X_ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

3. Water (40 CFR Section 230.22)

   a. Water – As previously discussed, this project will not directly impact surface waters. Potential secondary impacts include storm water runoff from construction and long-term operation.

   b. Possible loss of environmental characteristics and values – Based on the scope of the project, it is not expected to change the physical, chemical, or biological characteristics of downstream waters.

   c. Discussion - Based on the scope of the project and environmental precautions taken as discussed in Section 3-B-i, negligible short term and no long-term effects are expected to surface waters in the area.

FINDINGS*:*	**___ No Effect**	**_X_ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

4. Current Patterns and Water Circulation (40 CFR Section 230.23)

   a. Current Patterns and Water Circulation – Water currently flows through the project site via ditches into the Stumpy Lake system. As discussed in the Drainage Study for Centerville Properties by Gasper Aluzzo, P.E. (Exhibit K), post-development storm water and drainage will not be altered by the proposed project.

   b. Possible loss of environmental characteristics and values – Since the project will not directly affect surface waters, no effects are expected to circulation, direction or velocity of flow or dimensions of surface waters. Use of environmental measures as discussed in Section 3-B-i will match post development water runoff to pre-development, eliminating the potential for impacts to water patterns or circulation.

   c. Discussion – No effects are anticipated.

FINDINGS*:*	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

5. Normal Water Fluctuations (40 CFR Section 230.24)

   a. Normal Water Fluctuations – Since the project does not directly affect surface waters, no changes are anticipated to water levels or physical movement. This project incorporates storm water management practices and LID technologies as discussed in Section 3-B-I, which based on the Drainage Study, will maintain storm water flow into the downstream wetlands/waters at pre-development levels, minimizing secondary impacts to water movement from construction and operation.

   b. Possible loss of environmental characteristics and values – Due to the scope of this project and environmental measures previously discussed, it will not affect or obstruct water levels in Stumpy Lake or other downstream systems.

   c. Discussion – Based on the scope of this project, no effects are anticipated.

FINDINGS:	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

6. Salinity Gradients (40 CFR Section 230.25)

   a. Salinity Gradients – This project is not near the salt water environments. The site drains through Stumpy Lake, a fresh water system, through Gum Swamp and eventually into the Albermarle Sound.

   b. Possible loss of environmental characteristics and values – Due to the scope and location of the project relative to salt water systems, no effects will result to salinity gradients.

   c. Discussion – Based on the scope of the project and distance from salt water systems, no effects are expected.

FINDINGS:	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

B. Subpart D – Potential Effects on Biological Characteristics of the Aquatic Ecosystem

1. Threatened or Endangered Species (40 CFR Section 230.30)

   a. Endangered Species – The project involves impacting upland and wetland forests for construction of a mixed use development. Based on comments received during prior permitting actions on the site, the Virginia Department of Game and Inland Fisheries (VDGIF) indicated in a June 28, 2002 letter to the DEQ that the potential presence of the bald eagle, canebrake rattlesnake, and Dismal Swamp southeastern shrew that may be negatively impacted by the proposed project. Currently, data from the VDGIF indicates that bald eagles have been delisted at the federal level, but remain as state threatened. Rattlesnakes are no longer separated into subspecies, but southeast populations of the timber rattlesnake are distinct and still referred to as canebrake rattlesnakes. Populations in southeast Virginia are still considered state endangered due to rarity, and only a handful of isolated populations are expected to remain. This species prefers mature forest environments. The shrew is more widespread and locally abundant than original surveys suggested. It is still listed as state threatened, but delisted from the federal T/E species lists. This species occurs in all ground covers from early succession to mature forests, with highest densities in early succession forested habitats.

   b. Possible loss of environmental characteristics and values – Comments from the VDGIF from prior permitting actions indicated that proposed mitigation efforts would result in a long-term net gain for the canebrake rattlesnake and the shrew. Since eagles primarily nest along waterways, construction of the project is not expected to directly impact eagles or the habitat thereof. VDGIF indicated that they would provide training to site contractors should these species be found present during construction, and Tri-City will fully accept this effort to minimize the potential for direct impacts. Use of environmental measures as discussed in Section 3-B-i will minimize short and long-term indirect affects to the environment from construction and operation.

   c. Discussion – Based on prior review comments and current analysis, this project may have short term minimal effects, and no long-term negative effects, on threatened or endangered species in the vicinity. Long-term positive benefits are expected to rattlesnake and shrew populations.

FINDINGS:	**___ No Effect**	**___ Negligible**	**___ Major (Significant)**
	_X_ Short Term Minor	**___ Long Term Minor**	

2. Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in Food Web (40 CFR Section 230.31)

   a. Aquatic Organisms – As stated previously, this project will not directly impact open waters. Secondary impacts are limited to storm water runoff from construction and operation.

   b. Possible loss of environmental characteristics and values – No direct impacts are anticipated. This project is not expected to contribute sediment load, chemical input, or particulates to downstream aquatic environments. Use of environmental measures as discussed in Section 3-B-i will minimize short and long-term indirect affects to the environment from construction and operation.

   c. Discussion – No effects are anticipated based on the scope of the project and environmental measures discussed in Section 2-B-i.

FINDINGS:	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

3. Other Wildlife (40 CFR Section 230.32)

   a. Wildlife – Potential effects to wildlife includes common species that may be present on the site, including deer, squirrels and other small rodents, box turtles, possible salamanders, and passerines or other upland birds of various species.

   b. Possible loss of environmental characteristics and values – The project involves conversion of 54 acres of current forest land to residential and commercial development, resulting in loss of that habitat. Mitigation efforts as discussed in Section 3-C will result in a net increase in habitat for local wildlife.

   c. Discussion – This project will result in a temporary short term loss of forested habitat, and a long-term net gain in habitat that will initially be early succession and eventually forested. Therefore, this project will result in a long-term benefit to wildlife.

FINDINGS:	**___ No Effect**	**___ Negligible**	**___ Major (Significant)**
	_X_ Short Term Minor	**___ Long Term Minor**	

C. Subpart E – Potential Effects on Special Aquatic Sites

1. Sanctuaries and Refuges (40 CFR Section 230.40)

   a. Sanctuaries and Refuges – the wetlands below Stumpy Lake have been designated as an ARNI, as discussed in Section 5. Gum Swamp Natural Area, Upper Neck Creek Natural Area, and North Landing River Wetland Ecosystem are located farther down-gradient from the project site.

   b. Possible loss of environmental characteristics and values – Potential losses of values and characteristics are fully discussed in Section 5.

   c. Discussion – Based on the analysis provided in Section 5, the environmental measures discussed in Section 3-B-i and the mitigation portion of this project discussed in Section 3-C, short term impacts from this project are expected to be negligible, short term benefits of the mitigation effort will provide an immediate positive effect, and long-term effects will provide a net positive benefit to the environment.

FINDINGS*:*	**___ No Effect**	**_X_ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

2. Wetlands (40 CFR Section 230.41))

   a. Wetlands – As discussed in Section 3-B, this project will result in impacting 24.6 acres of existing PFO seasonally saturated wetlands.

   b. Possible loss of environmental characteristics and values – The Wetland Function Assessment conducted by MSA (Section 4) demonstrates the functions and value of the current PFO wetlands within the project area, comparing them to reference wetlands that have not been significantly impacted by prior human activities. The function of wetlands within the project site have already been diminished by historic impacts, and any loss in function will be more than adequately mitigated as discussed in Section 3-C.

   c. Discussion – This project will result in a short-term impact to existing wetland resources, and based on the mitigation efforts discussed in Section 3-C, will also result in a long-term net benefit.

FINDINGS*:*	**___ No Effect**	**___ Negligible**	**___ Major (Significant)**

	_X_ Short Term Minor	**___ Long Term Minor**	

3. Mudflats (40 CFR Section 230.42)

   a. Mudflats – The project site is not near any mud flat habitats associated with marine coast geology.

   b. Possible loss of environmental characteristics and values – Due to the proximity of the project to the nearest mud flat areas, no impacts are expected.

   c. Discussion – Due to the proximity of the project to the nearest mud flat areas, no impacts are expected.

FINDINGS*:*	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

4. Vegetated Shallows (40 CFR Section 230.43)

   a. Vegetated Shallows – The project site is not near any marine vegetated shallows.

   b. Possible loss of environmental characteristics and values – Based on the proximity of the project to marine vegetated shallows, no impacts are expected.

   c. Discussion– Due to the proximity of the project to the nearest vegetated shallows areas, no impacts are expected.

FINDINGS*:*	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

5. Coral Reefs (40 CFR Section 230.44)

   a. Coral Reefs – The project site is not near any coral reefs.

   b. Possible loss of environmental characteristics and values – Based on the proximity of the project to coral reefs, no impacts are expected.

   c. Discussion– Based on the proximity of the project to coral reefs, no impacts are expected.

FINDINGS*:*	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

6. Riffle and Pool Complexes (40 CFR Section 230.45)

   a. Riffle and Pools – The project is located within the coastal plain, with generally flat topography. No streams with riffle-pool sequences are located near the project area.

   b. Possible loss of environmental characteristics and values – The project does not involve discharges to streams or open waters. No waterways with riffle-pool sequences are located near the project that might be affected.

   c. Discussion – No effects are anticipated, based on the lack of riffle-pool sequence streams in this area.

FINDINGS*:*	**_X_ No Effect**	**___ Negligible**	**___ Major (Significant)**
	___ Short Term Minor	**___ Long Term Minor**	

D. Subpart F – Potential Effects on Human Use Characteristics

1. Municipal and Private Water Supplies (40 CFR Section 230.50)

   a. Municipal and Private Water Supplies – Virginia Beach's primary source of potable water is Lake Gaston via pipeline. While Stumpy Lake is still tied in as a potential Virginia Beach emergency water source, and while the pumps are exercised occasionally, they are not used to transfer Stumpy Lake water to Lake Lawson.

   b. Possible loss of environmental characteristics and values – Potential effects on Stumpy Lake include storm water runoff from construction activities and long-term operation of the development. Use of environmental best management measures discussed in Section 3-B-i will minimize effects to the water and ensure that water quality of the Stumpy Lake system is not further degraded. By letter dated March 1, 2005, the City of Virginia Beach informed the Corps that "the applicant made modifications to the project which alleviated the City's concerns relative to water quality and water quantity issues associated with the project as they relate to maintaining Stumpy Lake reservoir."

   c. Discussion – Negligible short-term effects and no long-term negative impacts are anticipated due to use of the environmental measures as discussed in Section 3-B-i.

FINDINGS:	**___ No Effect**	**_X_ Negligible**	**___ Major (Significant)**
	____ Short Term Minor	**___ Long Term Minor**	

2. Recreational and Commercial Fisheries (40 CFR Section 230.51)

   a. Recreational and Commercial Fisheries – No recreational fisheries are located within the project area. Stumpy Lake is used for recreational fishing. No commercial fisheries or resources that contribute to commercial fisheries are present within the project vicinity.

   b. Possible loss of environmental characteristics and values – Based on the scope and location of this project, it is not expected to negatively impact Stumpy Lake or the fishing potential thereof.

   c. Discussion – Based on the scope and location of this project, it is not expected to impact Stumpy Lake or the fishing potential thereof.

FINDINGS:	_X_ No Effect	___ Negligible	___ Major (Significant)
	___ Short Term Minor	___ Long Term Minor	

3. Water-related Recreation (40 CFR Section 230.52)

   a. Water-related Recreation – No water related recreational activities occur within the seasonally saturated wetlands within the project site. Stumpy Lake provides fishing and wildlife watching opportunities. Boating potential within Stumpy Lake is limited due to the shallow nature of the lake and abundant wood debris.

   b. Possible loss of environmental characteristics and values – The project will not directly impact Stumpy Lake, or the use thereof. Potential secondary impacts are limited to storm water runoff from construction activities. These impacts will be minimized by the environmental measures discussed in Section 3-B-i.

   c. Discussion – No direct or indirect impacts are anticipated based on the environmental measures discussed in Section 3-B-i.

FINDINGS:	_X_ No Effect	___ Negligible	___ Major (Significant)
	___ Short Term Minor	___ Long Term Minor	

4. Aesthetics (40 CFR Section 230.53)

   a. Aesthetics – The project site is privately owned, and does not provide any direct aesthetic benefits to the public. The project site is not within the viewshed of Stumpy Lake.

   b. Possible loss of environmental characteristics and values – Since the project is not within view of Stumpy Lake, no direct effects on aesthetics are anticipated. The environmental measures discussed in Section 3-B-i will minimize erosion or other potential secondary impacts associated with this project that might affect aesthetics.

   c. Discussion – No direct or indirect impacts are anticipated based on the environmental measures discussed in Section 3-B-i.

FINDINGS:	_X_ No Effect	___ Negligible	___ Major (Significant)

	___ **Short Term Minor**	___ **Long Term Minor**	

5. Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites and Similar Preserves (40 CFR Section 230.54)

   a. Preserves – Special aquatic resources, their proximity to the project site, and potential impacts are discussed in Section 5.

   b. Possible loss of values – Due to the distance of the project from these resources, and the environmental measures discussed in Section 3-B-i, no direct or indirect impacts are anticipated.

   c. Discussion – Due to the distance of the project from these resources, and the environmental measures discussed in Section 3-B-i, no direct or indirect impacts are anticipated. The mitigation efforts proposed with this project will result in a long-term benefit to the environment and the resources protected by the ARNI as discussed in Section 5.

FINDINGS:	**_X_ No Effect**	___ **Negligible**	___ **Major (Significant)**
	___ **Short Term Minor**	___ **Long Term Minor**	

For Cultural Resources Subject to Section 106 of the National Historic Preservation Act:

FINDINGS: _X__ No Effect ____ No Adverse Effect ____ Adverse Effect

No historic or cultural resources known to be present in the development area. Based on comments received from the prior permitting actions on this property, the only known historic properties are archaeological resources on the agricultural fields north of Elbow Road within the subject property, but outside of the proposed LEDPA project location. No impacts to this area are expected.

E. Subpart G – Evaluation and Testing

1. General Evaluation of Dredged or Fill Material (40 CFR Section 230.60)

   a. General – No fill material will be imported; overburden and sand excavated onsite from storm water ponds will be used for building pads, utility backfill, sub base for streets and parking lots and final grading. Wetlands will be cleared and re-graded as required by City of Chesapeake development ordinances, to construct building and streets. The project site has been forested, and does not contain any known contaminants.

   b. Factors – The sources of fill required for this development will be onsite.

   c. Determinations – No testing is to be conducted, since the fill needed for this project will be from onsite sources.

   d. Constraints – No constraints are proposed related to contaminants. Erosion and sediment controls, storm water management and other environmental measures discussed in Section 3-B-i will minimize potential for off-site impacts from construction and operation.

   e. Discussion – As previously stated, the fill materials will be from onsite, which is wooded land and is not expected to contain any contaminants. Therefore, this project will not result in release of chemicals, petroleum, or other hazards into the environment.

2. Chemical, Biological, and Physical Evaluation and Testing (40 CFR Section 230.61)

   a. Evaluation and Testing – The fill materials will be from onsite excavation of BMP ponds. No contaminants are expected, and no testing will be conducted. Should evidence of impairment be found during construction activities, the contractor will stop all work and notify the DEQ.

   b. Chemical-biological interactive effects

      1) Evaluation of chemical-biological interactive effects – No contaminants are expected. Therefore, no evaluation of interactive effects will be necessary for this project. Use of environmental measures discussed in Section 3-B-i will prevent discharge beyond the approved limits of construction.

      2) Water column effects –All wetland fill activities will occur on land, not within standing or flowing water. Therefore, no direct sedimentation effects on the water column are anticipated.

      3) Effects on benthos –The placement of fill for this development will occur on land. Based on this placement and the environmental measures discussed in Section 3-B-i, no effects are anticipated on aquatic benthos offsite.

c. Procedure for comparison of sites

1) Sediment analysis –The project occurs on land, the fill materials to be used are pre-screened from standard construction sources, and no contaminants are expected. Therefore, no sediment analysis will be needed for this project.

2) Biological analysis - The project occurs on land, the fill materials to be used are pre-screened from standard construction sources, and no contaminants are expected. Therefore, no biological analysis will be needed for this project.

d. Physical tests and evaluation – As discussed in Section 5-A and 5-B, no effects are anticipated on water flow, circulation or fluctuation, salinity, or suspended particulates therein.

e. Discussion – Based on the above considerations, this project will not result in discharge of contaminants. Therefore, no testing for contaminants is proposed.

6. SUBPART H – ACTIONS TO MINIMIZE ADVERSE EFFECTS

A. Actions concerning the location of the discharge (40 CFR Section 230.70)

The project site is the only location where discharge of fill materials is proposed. The fill soils and materials are required for construction of buildings and roads. No other discharge locations are possible for this project.

B. Actions concerning the material to be discharged (40 CFR Section 230.71)

Fill soils are from onsite excavation of storm water BMP systems, and since from onsite sources, no contamination or incompatibilities are expected. The environmental measures as discussed in Section 3-B-i will minimize environmental effects from construction of the proposed project. Tri-City will consider other measures to further reduce environmental impacts where able.

C. Actions controlling the material after discharge (40 CFR Section 230.72)

The environmental measures as discussed in Section 3-B-i include erosion and sedimentation control, storm water management, and other measures to minimize environmental effects from construction of the proposed project.

D. Actions affecting the method of dispersion (40 CFR Section 230.73)

The environmental measures discussed in Section 3-B-i will minimize dispersion of soils from the construction site.

E. Actions related to technology (40 CFR Section 230.74)

The environmental measures discussed in Section 3-B-i include state-of-the-art LID technologies to minimize environmental impact.

F. Actions affecting plant and animal populations (40 CFR Section 230.75)

The environmental measures discussed in Section 3-B-i will minimize effects to off-site plant and animal populations during construction activities. As discussed in Section 5, the project site is not a unique habitat, and provides limited environmental benefit in its current condition. The mitigation measures discussed in Section 3-C will provide a net long-term benefit to plant and animal populations.

G. Actions affecting human use (40 CFR Section 230.76)

The project site currently serves very limited human use, since it is privately owned, and is too close to adjacent developments to allow hunting, a recreational activity that occurs elsewhere on the larger parcel. Construction of the proposed project will not negatively affect human use of adjacent properties.

H. Other actions (40 CFR Section 230.77)

The environmental measures discussed in Section 3-B-i will minimize adverse impacts from this project. The mitigation efforts discussed in Section 3-C will more than offset all losses to the environment and ecosystem, providing a net long-term benefit.

I. Discussion

This project will fully comply with the environmental measures as discussed in Section 3-B-i, and the mitigation efforts discussed in Section 3-C. All construction and mitigation efforts will be monitored in accordance with permit conditions. These efforts will ensure that the project succeeds as proposed, and that environmental impacts are minimized and fully mitigated.

7. DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM [40 CFR Section 230.11 (g)]

The cumulative impacts of this project to the aquatic ecosystem are:

- Direct impacts to 24.6 acres of existing PFO wetlands of limited function, based on the analysis provided in Section 5.
- Construction of 50 acres of wetland mitigation that per acre will exceed the function of the existing wetlands (to begin concurrent with or prior to construction of the proposed project to minimize time-loss of function). Cessation of agricultural activities within the mitigation area will provide immediate benefit to the environment.
- Preservation of 145-acres of onsite high quality PFO wetlands in perpetuity.
- Use of environmental measures as discussed in Section 3-B-i to minimize short-term effects from construction activities and long-term effects from the proposed development.

Therefore, based on our analysis of all relevant factors the cumulative short-term effects of this project are less than significant. Cumulative long-term impacts of this project are positive.

8. DETERMINATION OF SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM [40 CFR Section 230.11(h)]

As discussed in Section 1-A-iv, the project already has been through several permitting actions. The potential for primary and secondary effects have been discussed at length during these efforts and are summarized below.

Wetlands on the northwestern portion of the property (LEDPA site) are situated above a topographic ridge within the landscape and drain into Stumpy Lake. The only source inflow is channelized storm water flow from approximately 70 acres of undeveloped woodlands west of Centerville Turnpike, as well a drainage from a section of the road itself. This discharge flows within channelized drainage ditches through the wetlands directly into Stumpy Lake. Water from nearby urban developments discharges around the project site via man-made channelized drainage ditches. Therefore wetlands within the LEDPA site do not have the opportunity to perform significant storm water functions.

The subject wetlands do not serve as valuable storage areas for storm and floodwaters. Prior comments, which concluded that the proposed development would constitute a flood hazard and that the loss of wetland areas will reduce the flood storage capacity functions that wetlands perform, are not supported and lack a reasoned basis of fact. The wetlands that will be impacted by the proposed development are situated at an elevation of 8.00' to 10.00' above mean sea level, are not located within the 100-year flood plain or within a category III storm surge zone, and will not increase the risk of flooding in the immediate area since storm water will be contained and treated onsite to maintain discharge to equal to or less than pre-development levels. The area proposed to be impacted does not receive surface or groundwater inflow from the adjacent subdivisions located to the north. Flooding in these areas is directly attributable to back water from Stumpy Lake due to the inadequate capacity of the lake's weir to release storm water. Beaver activity has also caused impounding of the western tributary of Stumpy Lake, causing approximately 2' of water above normal pool as shown in Photo 7-8. The conversion of the subject wetlands to uplands, with consideration of the proposed compensatory mitigation and environmental measures discussed in Section 3-B-i, will not detrimentally affect natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other storm water characteristics.

The subject wetlands consist of a low gradient succession forested wetland with seasonally saturated soils positioned well above the groundwater table due to an impervious clay strata. These wetlands lack the opportunity to perform many of the functions commonly attributable to wetlands due to soils, topography and positioning within the landscape as further described in

the National Research Council (NRC) report, Compensating for Wetland Losses under the Clean Water Act (June, 2001). Historic human impacts have further degraded the wetlands natural functions, as discussed in Section 5. The project site sits at a slight topographic ridge that divides the wetlands between the Stumpy Lake drainage area and the Gum Swamp drainage area. Due to their positioning within the landscape and elevation relative to adjacent property and surrounding ditch networks as shown in Figure 4, they receive no surface or subsurface water in-flow, are essentially precipitation dominated, are not located within a flood plain and therefore have limited opportunity to store precipitation. Soils have low permeability and hydraulic conductivity, and therefore lack the opportunity for significant ground water recharge. Only a passive contribution to water quality is provided because the only water input is rain, and the only water quality function is simply to provide an area of runoff where the surface drainage waters are uncontaminated with pollutants. It is likely that the mitigation site will have functions superior to the impact site due to its improved position within the landscape and greater opportunity to provide these functions.

The prior conclusion that issuance of the subject permit would affect downstream water quality by increasing sedimentation and pollution, adversely affect fish and wildlife, and lead to clouding of the water due to sediment and algae from excess nutrients is based on speculation and conjecture and not supported by empirical data. Water quality issues have been addressed by the DEQ, and habitat issues have been fully addressed by the VDGIF which found that the preserve areas within and adjacent to the development tract will provide an adequate buffer around the nearby bald eagle nest. In addition, the on-site and adjacent habitat preservation coupled with the forested wetland restoration will result in a long-term net gain of habitat for the canebrake rattlesnake and Dismal Swamp Southeastern shrew and accomplish the objective of providing "valuable replacement of habitat for these species in perpetuity." The EPA and Corps fail to clearly articulate what, if any, issues they consider to be the significant national issues, and explain whether they alone or in combination, override The Virginia Water Protection Individual Permit Number 00-1688 issued by the Virginia State Water Control Board on November 21, 2003.

The potential of adverse effects raised during prior permitting actions lacks supporting data that the anticipated effects are in fact reasonably foreseeable, in light of the environmental measures and mitigation discussed in Section 3-B-i and 3-C. The Corps has cited that the subject property lies within the outer perimeter of an area designated by the Virginia Department of Conservation and Recreation, as the North Landing River-Gum Swamp Conservation Site. This is not supported by the record and is contrary to the Corps regulations. The designation is primarily to encourage voluntary participation or acquisition by conservation groups (a wish list so to speak), is not a regulatory classification or a federally funded project, lacks standing over private property, does not subject property to a public servitude or constitute a legal impediment to its development.

The Clean Water Act assigns responsibility for control of non-point sources of pollution to the states. Certification of compliance with applicable effluent limitations and water quality standards required under provisions of section 401 of the Clean Water Act will be considered conclusive with respect to water quality considerations unless the Regional Administrator, Environmental Protection Agency (EPA), advises of other water quality aspects to be taken into consideration. The DEQ, after a three year exhaustive review, found that "the proposed activity is consistent with the provisions of the Clean Water Act and State Water Control Law and will protect in-stream beneficial uses. The proposed permit application addresses avoidance and minimization of wetland impacts to the maximum extent practicable. The effect of the proposed impact, together with other existing or proposed impacts to wetlands, will not cause or contribute to significant impairment of state waters or fish and wildlife resources." Further, "the proposed permit conditions address no net loss of wetland acreage and functions through compensatory mitigation" and success monitoring and reporting.

33 CFR Part 320.4 states in part that mitigation is an important aspect of the review and balancing process on the Department of the Army permit applications. Consideration of mitigation will occur throughout the permit application review process and includes avoiding, minimizing, rectifying, reducing, or compensating for resource losses. Losses will be avoided to the maximum extent practicable. Therefore, adequate consideration must be given to the applicant's extensive avoidance and minimization efforts and the appropriate and practicable compensatory mitigation being provided. When implemented, this will reduce and offset adverse impacts to **less than significant levels**, result in no overall net loss of wetland values and functions, and ultimately result in a net increase in aquatic resources and wildlife habitat.

9. FINDINGS

A. Status of other authorizations and legal requirements

1. Water Quality Certification
   The Virginia State Water Control Board issued a VWP permit on November 21, 2003 for a larger project that fully included the area encompassed by the currently proposed development, and that permit is still valid. This project complies with all terms and conditions of that permit, insuring that the state Water Quality Certification has been met.

2. Coastal Zone Management Consistency Determination
   Resources protected by the Coastal Zone Management Plan include fisheries, subaqueous lands, wetlands, dunes, non-point source and point-source pollution control, shoreline sanitation and air pollution control. Based on the location and scope of the project, and the mitigation efforts proposed, the project is expected to have less than significant long-term impacts to coastal resources. Long-term benefits are expected to be positive.

3. Compliance with Section 106 of the National Historic Preservation Act
Based on comments received from the prior permitting actions on this property, the only known historic properties are archaeological resources on the agricultural fields north of Elbow Road within the subject property, but outside of the proposed LEDPA project location. No impacts to this area are expected.

4. Compliance with Endangered Species Act
Based on prior review by the VDGIF, the project will not negatively affect the Bald Eagle and will have a net positive on the Canebrake rattlesnake and Dismal Swamp southeastern shrew. The mitigation sites will more than offset impacts to habitats that might be utilized by threatened or endangered species. The location of the mitigation effort is ideal in that it enhances the wildlife corridor already present surrounding Stumpy Lake.

5. Compliance with Clean Air Act
Tri-City and its contractor will take measures to minimize fugitive dust by complying with the Regulations for the Control and Abatement of Air Pollution. The following are techniques which will be utilized, including but are not limited to: (1) when possible the use of water or chemicals for dust control; (2) covering of open equipment for conveying materials; (3) removal of spilled/tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion; (4) curtailing the use of heavy equipment during ozone alert days or high wind days; and (5) fueling early or late in the day. Additionally, heavy equipment used will be properly tuned and maintained, and should use low sulfur content diesel fuel to reduce emissions. In summary, accepted engineering and construction practices will be utilized to limit any fugitive dust emissions during the construction phase of the project, and minimal impacts to the region's air shed are expected. The operation of the proposed improvements is not expected to create significant emissions or air quality impacts.

6. Other State and/or Local Authorizations
This project fully complies with the City of Chesapeake property zoning and land uses, as discussed in Section 1-A-iii.

B. Evaluation of Compliance with 404(b)(1) guidelines (40 CFR 230.10)

(A check in a block denoted by an asterisk indicates that the project does not comply with the guidelines).

1. Alternatives test:

___ Yes X No

(a) Based on the discussion in Section 2, are there available, practicable alternatives having less adverse impact on the aquatic ecosystem and without other significant adverse environmental consequences that do not involve discharges into"waters of the US" or at the other locations within these waters?

X	___	**(b)** Based on the discussion in Section 2, if the project is in a special aquatic site and is not water-dependent, has the applicant clearly demonstrated that there are no practicable alternative sites available?
Yes	No	

2. Special restrictions: Will the discharge:

___	X	**(a)** Violate state water quality standards? [Note: Section 401 Water Quality Certification has been issued by the Virginia State Water Control Board]
Yes	No	
___	X	**(b)** Violate toxic effluent standards (under Section 307 of the Act)?
Yes	No	
___	X	**(c)** Jeopardize endangered or threatened species or their critical habitat?
Yes	No	
___	X	**(d)** Violate standards set by the Department of Commerce to protect marine sanctuaries?
Yes	No	
X	___	**(e)** Evaluation of the information in Section 3 – 8 indicates that the proposed discharge material meets testing exclusion criteria for the following reason(s).
Yes	No	

(X) based on the above information, the material is not a carrier of contaminants

( ) the levels of contamination are substantially similar at the extraction and disposal sites and the discharge is not likely to result in degradation of the disposal site and pollutants will not be transported to less contaminated areas

( ) acceptable constraints are available and will be implemented to reduce contamination to acceptable levels within the disposal site and prevent contaminants from being transported beyond the boundaries of the disposal site

3. Other restrictions: Will the discharge contribute to significant degradation of "waters of the US" through adverse impacts to:

___ Yes _X_ No **(a)** Human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and special aquatic sites?

___ Yes _X_ No **(b)** Life states of aquatic life and other wildlife?

___ Yes _X_ No **(c)** Diversity, productivity and stability of the aquatic ecosystem, such as the loss of fish or wildlife habitat, or loss of the capacity of wetland to assimilate nutrients, purify water or reduce wave energy?

___ _X (d) Recreational, aesthetic and economic values?
Yes No

4. Actions to minimize potential adverse impacts (mitigation): Will all appropriate and practicable steps (40 CFR 23.70-77) be taken to minimize the potential adverse impacts of the discharge on the aquatic ecosystem? If yes, measures are in Section 3.

_X ___
Yes No

C. Findings of Compliance or Non-compliance with the Restrictions on Discharge (40 CFR Section 230.12)

Based on our analysis:

(X) The discharge complies with the guidelines. The proposed project is the least environmentally damaging practicable alternative (LEDPA).

( ) All of the appropriate and practicable conditions are listed in Sections 3.A and B to mitigate pollution or adverse effects to the affected ecosystem. These conditions have been included as part of the proposed action or will be required by special conditions of the permit. This revised and/or conditioned project is the LEDPA.

( ) The discharge fails to comply with the requirements of these guidelines because:

( ) There is a practicable alternative to the proposed discharge that would have less adverse effect on the aquatic ecosystem and that alternative does not have other significant adverse environmentalconsequences.

( ) The proposed discharge will result in significant degradation of the aquatic ecosystem under 40 CFR 230.10(b) or (c).

( ) The discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem, namely...

( ) There is not sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with the guidelines.

10. SUMMARY AND CONCLUSIONS

The subject property is being planned for partial development, which will result in wetland impacts. With the ultimate goal of minimizing wetland impacts, alternatives have been developed and explored for economic feasibility. Based on those analyses, the Least Environmentally Damaging Practical Alternative (LEDPA) was determined to be the currently proposed 53.8-acre development.

The alternatives analysis demonstrates that the development of the Proposed Project (Alt 17 Rev) is the LEDPA due to its ability to meet the project purpose and need, be economically viable, and minimize impacts to wetlands of value. The other alternatives evaluated were not practicable due to failure to comply with the city comprehensive plan, a lack of public utilities, a lack of zoning compatibility, road safety constraints, financial constraints or environmental impacts.

The function and value of wetlands in the areas of potential impact have been assessed. Based on the WFA, wetlands within the proposed development area of the LEDPA have been found to be of diminished function and value due to natural and man-influenced processes and features. Based on this diminished condition, these wetlands do not appear to be of significant importance with respect to the protection, maintenance, enhancement, or use of area wetlands or the Stumpy Lake system. Although the Stumpy Lake system had been previously designated as an ARNI, that system has been degraded since then as a result of the above referenced factors as well as changes in drainage basin land use. The WFA documentation demonstrates that construction of the current proposed LEDPA would not have a substantial adverse impact on the area.

Once the project is permitted, compensatory mitigation efforts will result in a net gain of just over 2:1 in wetland area (an additional 25.4 acres). In addition, the applicant has also proposed preservation in perpetuity of 145 acres of higher value wetlands (as documented through the WFA process) within the larger property. Selection of the LEDPA and use of LID practices will help minimize any additional degradation to the area and, once completed, the mitigation efforts should result in a net benefit to the Stumpy Lake ARNI and other down-stream environmentally significant areas.

As a result of these findings of the least environmentally damaging practical alternative, the proposed project will result in <u>less than significant impacts</u> on the environment. Tri-City

therefore requests a permit to construct the proposed LEDPA development and associated wetland mitigation.

Based on the above analysis, it is our professional opinion that,

A. The proposed project represents the least environmentally damaging, practicable alternative. In addition, adverse impacts on the aquatic environment (including wetland functions and values) by this project would be fully compensated for and reduced to less than significant by the proposed mitigation.

B. The discharge does not cause or contribute to violation of any applicable state water quality standard, does not violate any applicable toxic effluent standard, and does not impact any endangered or threatened species or marine sanctuary.

C. The discharge does not cause or contribute to significant degradation of the waters of the US.

D. All appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

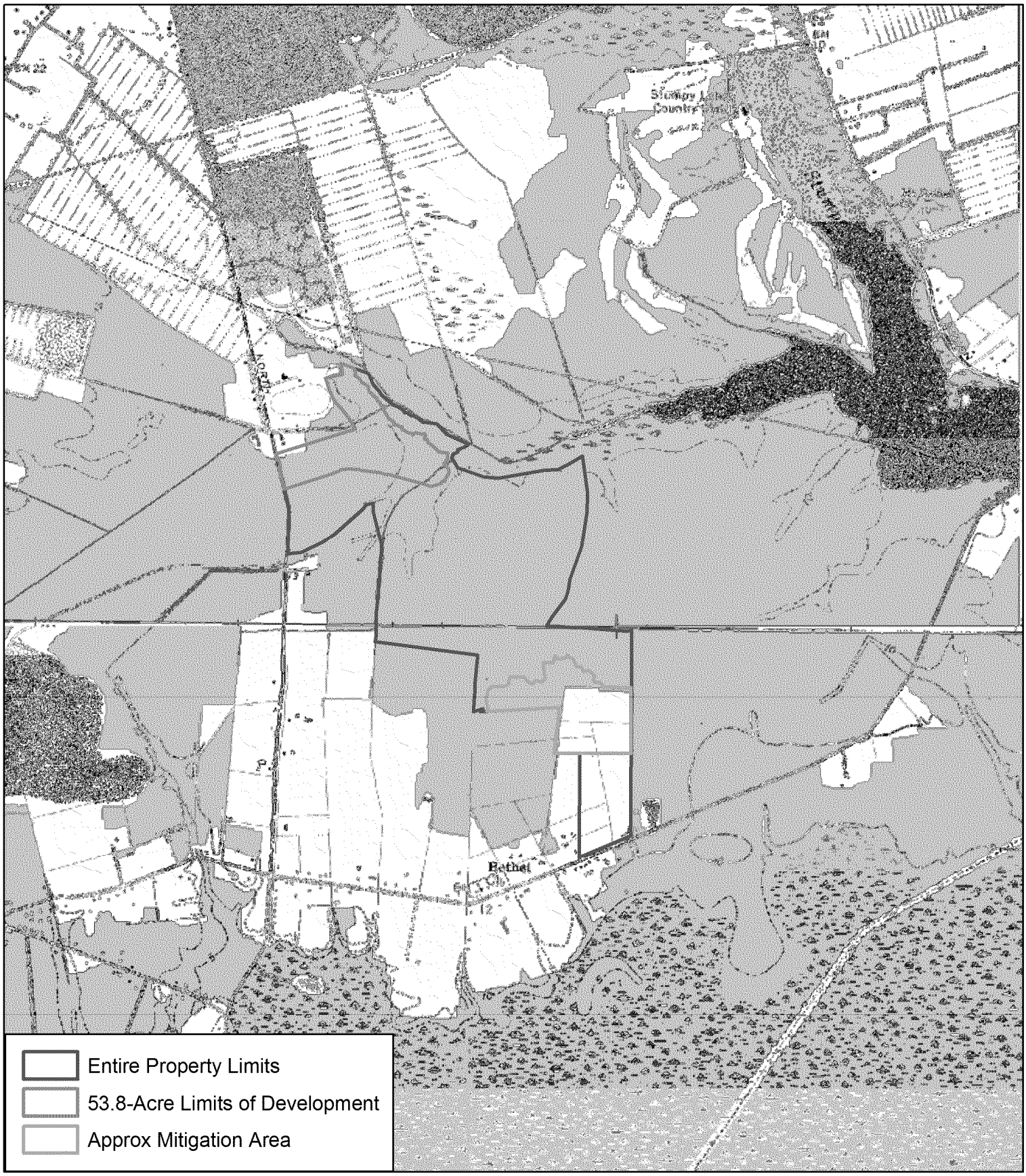
E. The proposed discharge, with the standard conditions placed on Department of the Army permits and other special conditions would comply with the guidelines pursuant to Section 404(b) of the Clean Water Act.

11. EVALUATION RESPONSIBILITY

PREPARED BY:

- Brian Owen, Environmental/Wetland Scientist of MSA, P.C.
- Charles Hall, P.G. Director of Environmental Sciences, MSA, P.C.
- Michael Gelardi, Tri-City Properties, LLC
- Valerie Wilkinson, Tri-City Properties, LLC

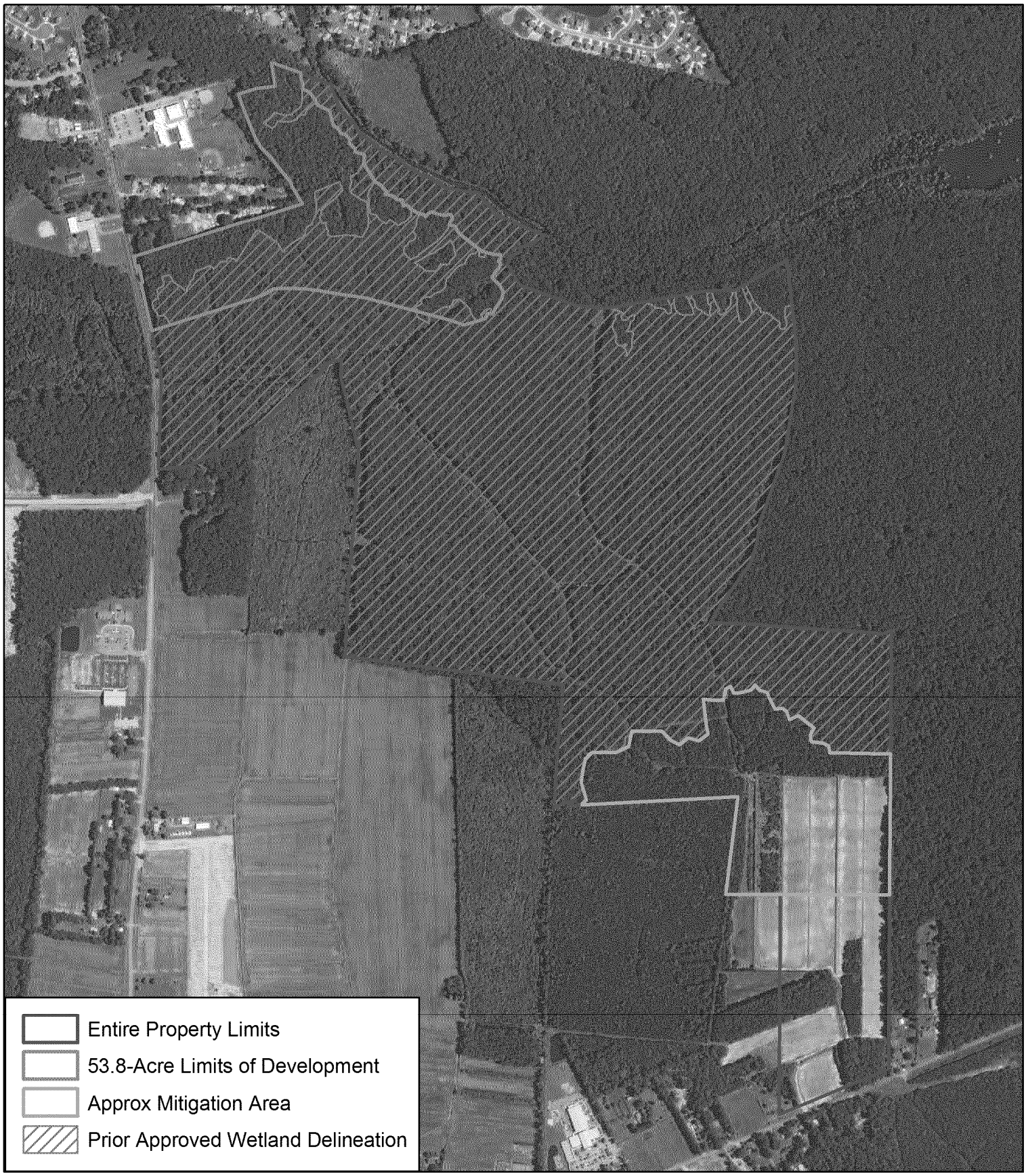
Figure 1. Tri City Properties, LLC USGS Topographic Map Exhibit



April 16, 2014
MSA # 13217
Mapped by BRO
2012 Arial photograph from USDA-NAIP, Virginia Beach, VA

0 1,000 2,000 4,000 6,000 8,000 Feet

Figure 2. Tri City Properties, LLC 2011 Aerial Photograph Exhibit



April 16, 2014
MSA # 13217
Mapped by BRO
2012 Arial photograph from USDA-NAIP, Virginia Beach, VA

0 500 1,000 2,000 3,000 4,000 Feet

Figure 3. Tri City Properties, LLC USGS Soil Survey Exhibit

April 16, 2014
MSA # 13217
Mapped by BRO
2012 Arial photograph from USDA-NAIP, Virginia Beach, VA

0 500 1,000 2,000 3,000 4,000 Feet

Figure 4. Tri City Properties, LLC Topo and Drainage Exhibit

April 16, 2014
MSA # 13217
Mapped by BRO
2012 Arial photograph from USDA-NAIP, Virginia Beach, VA

0 500 1,000 2,000 3,000 4,000 Feet

TOTAL LIMITS OF DEVELOPMENT = 2,343,810.9082 sf or 53.806 ac
TOTAL AREA OF WETLAND IMPACT = 1,071,618.5946 sf or 24.600 ac

WETLANDS

PROPOSED COMMERCIAL DEVELOPMENT
GROSS AREA WITHIN B-1 = 826,762.8061 SF, 18.980 AC
DEVELOPABLE AREA = 545,493.8791 sf 12.5228 ac
(excludes lakes and right of way)

PROPOSED 480± MULTI FAMILY UNITS
TOTAL WITHIN LIMITS OF DEVELOPMENT

VIRGINIA STATE PLANE COORDINATES SYSTEM, SOUTH ZONE, NAD 1983 (1994 HARN ADJUSTMENT)

NOTE:
The improvements shown on this plan are intended for illustration purposes. The ultimate layout of improvements within limits of development will be subject to compliance with the City of Chesapeake's development ordinance and applicable codes and regulations, including the proffers of R(C)-95-08.

PROPOSED COMMERCIAL DEVELOPMENT

Right of Way = 175,988.4449 sf or 4.040 ac

Right of Way = 17,309.9434 sf or 0.397 ac

Lake

RMF-1 = 1,440,826.4814 sf or 33.076 ac (Excludes ROW)

B-1

RMF-1

PROPOSED PRIVATE STREET (TYP)

LIMITS OF DEVELOPMENT

PROPOSED PUBLIC STREET

Centerville Turnpike

Approximate Location, Centerline of 115' R/W Reservation for Future Hunningdon Woods Boulevard

NO.	DATE	REVISIONS

SCALE: 0 400 800 1200

Centerville Properties Development
Alternative C-1

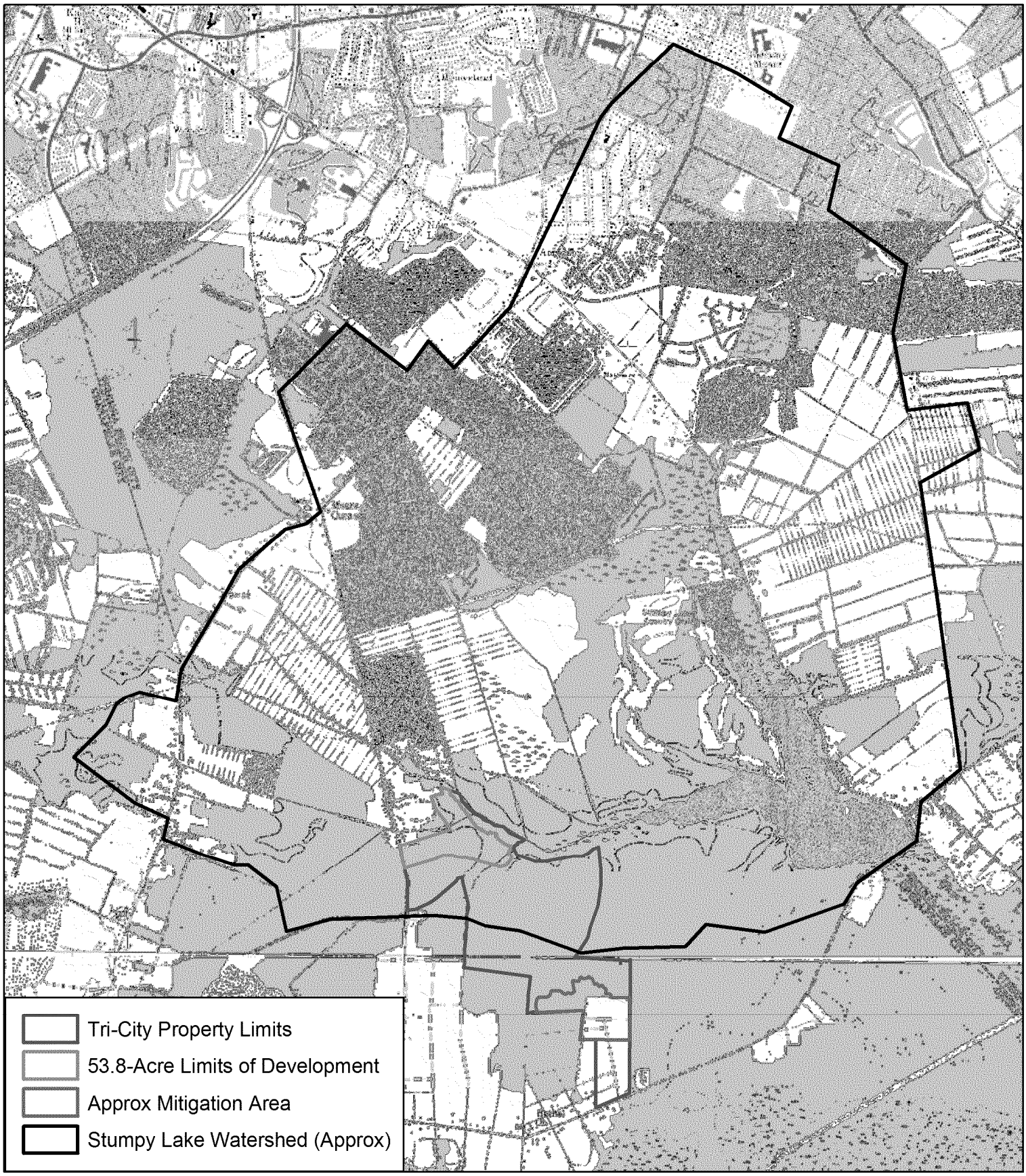
TAX PARCEL'S 000000000000 & 000000000000
WASHINGTON BOROUGH CHESAPEAKE, VIRGINIA

Conceptual Layout 1

engineering services inc
Civil Engineering - Land Surveying
2331 Centerville Turnpike, Chesapeake, VA 23322
(757) 488-8800 FAX (757) 488-8808
E-mail: email@esinc.com

SCALE: 1"=100'
FILE NAME: K:\CNBR\Centerville Inc. Pres\Conceptual Alt#2.DWG Layout: 1 01-26-2010AM
APPROVAL DATE: 00-00-00
PROJECT: 99004
DRAWN: KES
CHECKED: SDH
DATE: 02/04/10
SHEET 1

Figure 6. Tri City Properties, LLC - Stumpy Lake Watershed



April 16, 2014
MSA # 13217
Mapped by BRO
Kempsville and Fentress, VA USGS Topographic Maps

0 2,100 4,200 8,400 12,600 Feet

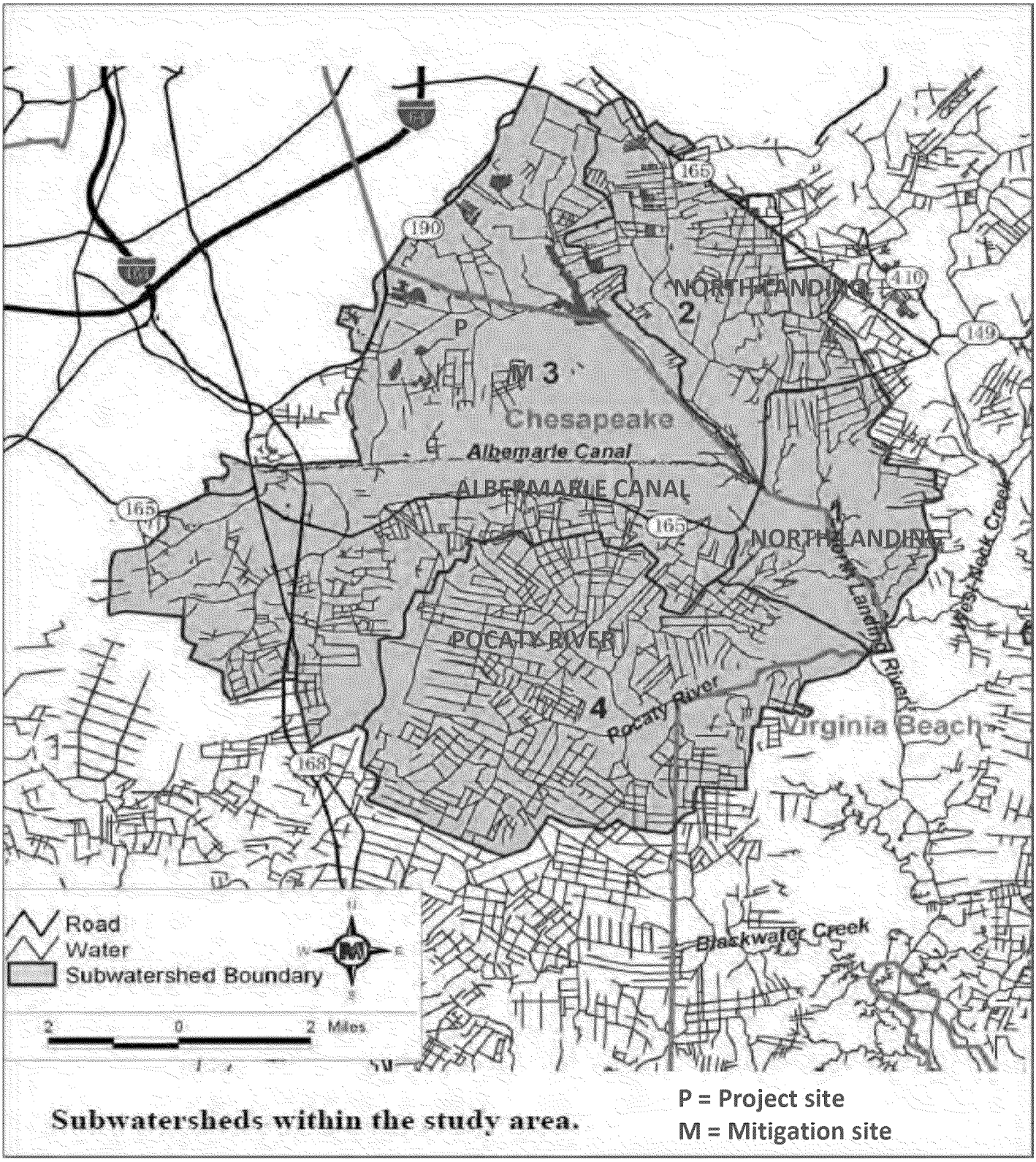


Image from Total Maximum Daily Load - Development for the Back Bay, North Landing River, and Pocaty River Watersheds.

FIGURE 7. NORTH LANDING RIVER SUBWATERSHEDS	MSA, P.C. 5033 Rouse Drive, Virginia Beach, VA. 23462 (757) 490-9264 (ofc) (757) 490-0634 (fax) www.msaonline.com Environmental Sciences + Planning + Surveying Civil and Environmental Engineering + Landscape Architecture		
SUPPLIMENTAL JPA SUBMISSION **TRI CITIES CENTERVILLE PROPERTIES** CENTERVILLE TURNPIKE, CHESAPEAKE, VIRGINIA	MSA JOB # 13217	DATE: 4/11/2014	SCALE NTS

P = Project site
M = Mitigation site

Image from DEQ North Landing River TMDL 2014

FIGURE 8. STUMPY LAKE AND UPPER NORTH LANDING RIVER WATERSHEDS

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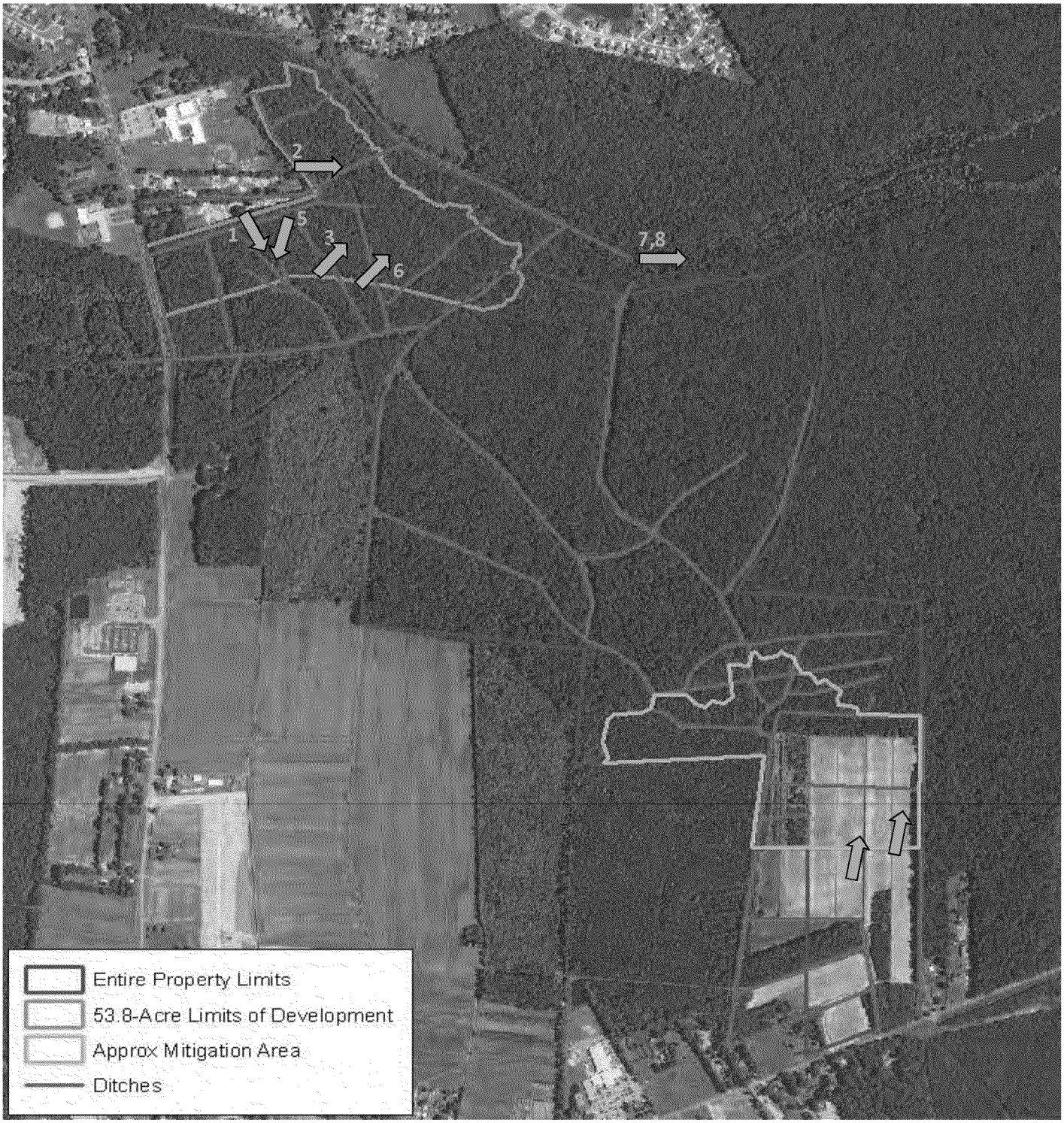

2012 Aerial Photograph from USDA-NAIP, Chesapeake, VA.

PROJECT SITE PHOTOGRAPHS

SUPPLIMENTAL JPA SUBMISSION

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Photo 1. View of a small intra-site ditch originating within the project site. Photo by BRO.

Photo 2. View of an inter-site ditch near the southern border of the site. Photo by BRO.

PROJECT SITE PHOTOGRAPHS

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Photo 3. View of logging ruts that are frequent within the project limits. Photo by BRO.

Photo 4. One of several holes found within the project site, possibly relic of logging actions. Photo by BRO.

PROJECT SITE PHOTOGRAPHS

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Photo 5. Tire ruts observed within the project site. Photo by BRO.

Photo 6. View of tire ruts within the project site. Photo by BRO.

PROJECT SITE PHOTOGRAPHS

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Photo 7. Beaver dam that stretched across mouth of Stumpy Lake, causing water backup of ~ 3 feet. Photo provided by Tri-City.

Photo 8. Water level drop after removal of beaver dam, as indicated by the water stain line. Photo provided by Tri-City Properties, LLC.

PROJECT SITE PHOTOGRAPHS

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Photo 9. Topographic relief within the agricultural fields that will provide benefit to the mitigation effort.

Photo 10. View of the main ditch that bisects the field, one of the ditches that will be plugged to restore hydrology to the mitigation area.

PROJECT SITE PHOTOGRAPHS

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