Dewberry

Technical Memorandum

Evaluation of Alternatives for Additional Second High Storage

Fairfax Water

Purchase Order Number: 4500013079-00

Dewberry Project Number: 50077481

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QUALITY CONTROL SUBMITTAL SHEET
FOR TECHNICAL MEMORANDUM

EVALUATION OF ALTERNATIVES FOR
ADDITIONAL SECOND HIGH STORAGE

FAIRFAX WATER

DATED: FEBRUARY 17, 2016

QUALITY CONTROL MANAGER:

Glenn D. Pearson 2.17.2016

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SECTION 1: EXECUTIVE SUMMARY

Upon acquiring the City of Falls Church water system, Fairfax Water identified a requirement for additional storage within its Second High Pressure Zone to meet future system needs. Three properties, currently owned by Fairfax Water, are considered potential sites to locate an elevated storage tank in this study: the Powhatan site, the Poplar Heights site, and the Falls Hill site. The Powhatan site is the only undeveloped site and is the largest in acreage among the three, while the Poplar Heights and Falls Hill sites currently have existing Fairfax Water storage tanks that would need to be upsized to meet future demand requirements.

Each alternative storage tank site presents challenges that will need to be addressed during property acquisition, the Special Exception and 2232 approval, and the design and construction processes. The new elevated storage tank, given the planned height and desired storage volume, will likely encounter scrutiny from the surrounding local community. However, Fairfax Water has an obligation to provide adequate water storage and pressure to its customers in accordance with the Virginia Department of Health Waterworks Regulations.

The feasibility analysis summarized by this report reveals that the three alternative sites have similar characteristics that present equal challenges with Special Exception/2232 approvals, landscape and screening requirements, stormwater management, geotechnical considerations, and tank design and construction within existing residential areas.

In selecting a site location to advance for further evaluation, the unique characteristics of each site and the opinion of probable construction cost (OPCC) need to be weighed to determine which site presents the best opportunity to address the operational needs of Fairfax Water within the Second High pressure zone. The Evaluation Summary table, attached at the end of this Section, lists many of the items considered at each site. For comparison purposes, a tank size of 2.5 million gallons (MG) was considered at each site location. The unique characteristics of each site are summarized as follows:

Powhatan Site: This undeveloped seven-acre parcel is currently owned by Fairfax Water and appears to be sufficient in size to accommodate the phased construction of up to three 2.5 MG water storage tanks. Thus, this site offers the potential for significant additional water storage, while the other alternative sites are each limited in size to one new 2.5 MG tank. Despite these advantages, this site requires the construction of 14,800 linear feet of new water main at an estimated cost of at least $7,265,000 to convey water to and from the tank. Fairfax Water staff indicated that there is an additional 15,700 linear feet of large diameter water mains required,

shown in **Appendix H** (prepared by Fairfax Water staff). Fairfax Water staff responsible for hydraulic modeling have also indicated that even with these water transmission improvements, the other two tank sites considered in this study maintain a hydraulic advantage over the Powhatan tank site. These details are included in **Appendix I** (prepared by Fairfax Water staff). The total project cost for the construction of one 2.5 MG tank at this site, including the initial 14,800 linear feet of water transmission improvements, is $19,000,000 to make one tank there functional. This is much higher than the total cost for each of the other alternative sites.

Falls Hill Site: While the Falls Hill site does not require water transmission improvements like the other candidate sites, it carries the largest property acquisition costs when compared to other alternatives. Its proximity to an identified historic property (as defined by national regulation) presents possible additional issues in achieving the zoning approvals, especially given the aesthetic impacts to the neighborhood with the substantial increase in the height and mass of the proposed tank structure as compared to the existing tank located at this site. The total project cost for the construction of a single 2.5 MG tank at this site is estimated at approximately $13,046,000.

Poplar Heights Site: Two options were considered at this site. This site requires the construction of approximately 3,050 linear feet of new water main at an estimated cost of $1,150,000. Proposed Option 2 for locating a single 2.5 MG elevated tank at the Poplar Heights site near the existing radio tower has a project cost of approximately $9,571,000 (not including land acquisition costs at this site) which is lower than that of Option 1. The land acquisition costs for tank construction for each option are anticipated to be less than those of the Falls Hill site, making the Poplar Heights site a less expensive site location than the Falls Hill and Powhatan sites. In Dewberry's opinion, a tank at the Poplar Heights Option 2 site presents the least perceived impact to the adjacent neighborhood relative to the other site locations considered in this study. While the volume of the proposed tank is much larger, its height is similar to that of the existing tank which would limit the impact to the view shed as compared to the alternative sites. The height of the new tank at this location is approximately 90 feet tall to the overflow elevation compared to 128 feet tall at Falls Hill and 151 feet tall at Powhatan. The adjacent existing tall radio antenna tower at a height of 323 feet at Poplar Heights also mitigates the additional aesthetic impact of the proposed elevated tank, and would require less buffer area next to the radio tower.

Recommendation: Weighing the unique characteristics of the alternative sites and the estimated opinion of probable total cost for each alternative, Dewberry recommends the Poplar Heights alternative site Option 2 be advanced for further study. The proposed use appears to be more harmonious with the neighboring properties when compared to the other site alternatives, and will not adversely affect the use of the neighboring properties to remain in accordance with the

applicable zoning district regulations and the adopted Comprehensive Plan. Since the zoning ordinance allows Fairfax Water staff the leeway to analyze whether the proposed project is suitable without identifying specific height and size limitations for the tank, early meetings with Fairfax County's Planning and Zoning staff and the District Supervisor should be conducted to gain their support of the project location, and to identify any additional complications that may not have been identified by this feasibility study. In Dewberry's opinion, the Board's decision will likely be influenced by:

- Precedence established by tank sites elsewhere in the County,
- The opinion of adjacent property owners and active citizen/neighborhood organizations in the vicinity of the project, and
- Proof that feasible and cost-effective alternative solutions do not exist.

EVALUATION SUMMARY

Evaluation Criteria	Powhatan	Poplar Heights (Option 1)	Poplar Heights (Option 2)	Falls Hill
Hydraulic Factors				
Hydraulic Service Deficiencies (1)	Yes	No	No	No
Transmission Main Improvements Required	At least 12,000 feet of 24"	2,700 feet of 16"	2,700 feet of 16"	None
Tank Construction				
Existing tank for demolition	No	Yes	Yes	Yes
Existing cellular antenna	No	Yes	Yes	No
Additional Temporary Access Easement Required	No	No	No	No
Work Area Restrictions	No	Yes	Yes	Yes
Geotechnical Concerns	No	No	No	No
Inadequate Offset to Adjacent Residential	Yes	Yes	Yes	Yes
Long Term Maintenance Concerns	No	Yes (2)	Yes (2)	Yes (2)
Opinion of Probable Construction Cost (including 30% contingency)	At least $19,000,000	$9,761,000	$9,571,000	$13,046,000
Site Work and Permitting				
Existing Zoning Designation	R-1	R-4	R-4	R-1
Further Investigation for Possibility of Comprehensive Plan Amendment	Yes	No	No	No
Special Exception/ 2232 Approval Required	Yes	Yes	Yes	Yes
Transitional Screen Yard Required	Yes (3)	Yes	Yes	Yes
Barrier Required	Yes (4)	Yes (4)	Yes (4)	Yes (4)
Site Plan Approval Required	Yes	Yes	Yes	Yes
Stormwater Management				
Offsite Drainage Easement Required	Yes	No	No	Yes
Offsite Outfall Improvements Required	Yes	Yes	Yes	Yes
Environmental Review				
Jurisdictional Wetlands	No	No	No	No
Chesapeake Bay Resource Protection Areas	No	No	No	No
Cultural Resource Concerns	No	No	No	Yes
Hazardous Material Abatement	No	No (5)	No (5)	No (5)
Time of Year Restrictions for Tree Clearing	Yes	Yes	Yes	Yes
Phase I Environmental Assessment Required	No	Yes	Yes	Yes
Land Acquisition Requirements				
Existing Parcel Area (acres)	7 ac	0.15 ac	0.15 ac	0.8 ac
Property Acquisition Required	No	Yes	Yes	Yes
Opinion of Probable Property Acquisition Costs	$0	TBD	TBD	$3,218,611
Offsite Permanent Easement Acquisition Required	Yes	No	No	Yes
Opinion of Probable Offsite Permanent Easement Acquisition Costs	$19,004	$0	$0	$18,713

Notes:

(1) Relative to other sites, as determined by Fairfax Water based on their hydraulic modeling and system requirements.
(2) Shroud required for tank painting.
(3) Modification of transitional screen yard requirement to utilize existing vegetative buffer could be considered.
(4) Modification of barrier requirements in favor of Fairfax Water standard security fence to be considered.
(5) Evaluation of residential buildings to be demolished is required.
(6) All costs are in December 2015 Dollars.

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SECTION 2: INTRODUCTION

Fairfax Water acquired the existing City of Falls Church (City) water system in January 2014 and is in the process of fully integrating what was the former City water system with the Fairfax Water system. In addition to the replacement of several existing City water storage tanks, Fairfax Water has identified a requirement for additional storage within its Second High Pressure Zone (overflow elevation 570 feet above mean sea level) to meet future system needs. The exact location for the additional storage has not yet been determined; however, three candidate sites (one site offers two options for a total of three sites offering four options) have been identified by Fairfax Water for further investigation. These sites are located near existing Fairfax Water properties on high ground.

- The Powhatan Site is located at 2029 Powhatan Street on Fairfax County Tax Map Parcel 41-1-((1))-59. This site is currently an undeveloped wooded 7-acre parcel, which could accommodate one or more tanks as shown in **Figure 2-1**:

Figure 2-1: Powhatan Site

- The Poplar Heights Site is located east of Tower Street on Fairfax County Tax Map Parcel 50-1-((2))-94A. An existing Fairfax Water standpipe is located at this site as shown in **Figure 2-2** and consideration should be given to locating the new tank in the vicinity of the existing standpipe (tank):

Figure 2-2: Poplar Heights Site

Two different options at this site location are considered.

- The Falls Hill Site is located just north of the Hill Place cul-de-sac on Fairfax County Tax Map Parcel 40-3-((5))-17B. An existing Fairfax Water standpipe is located at this site as shown in **Figure 2-3** and consideration should be given to locating the new tank in the vicinity of the existing standpipe (tank).

Figure 2-3: Falls Hill Site

Based on Fairfax Water's established system requirements, Dewberry has evaluated the feasibility of constructing an elevated Second High storage tank at each of the above locations. The evaluation considers site size and location, land use requirements, access, constructability, topography, and other pertinent factors. The evaluation includes:

- Identification of benefits and challenges associated with construction at each alternative site,
- Assessment of potential land-use approvals and permitting requirements, and
- Planning-level opinion of probable construction costs (OPCCs) for each site, including identification of land and easement acquisition requirements.

This memorandum presents a general feasibility analysis, which is applicable to each of the three potential tank alternative sites, including an analysis of tank options, storage volume requirements, tank erection considerations, geotechnical considerations, required County land-use approvals and permits, land development requirements, environmental considerations, stormwater management, and methodology for estimating construction and property acquisition costs. The memorandum then assesses the site specific feasibility analysis of erecting a new tank

at each site for these factors. Finally, a preliminary Opinion of Probable Construction Cost for each alternative is included with a recommendation for one site for further evaluation.

SECTION 3: GENERAL INFORMATION

The feasibility of three sites and four alternatives is evaluated for a new elevated storage tank location, based on tank storage and operational requirements, the physical dimensions of the property, permitting requirements, site/civil engineering and stormwater management requirements, environmental concerns, geotechnical conditions, and property acquisition and construction costs. General information pertaining to these evaluation criteria common to all of the alternative tank sites is discussed in this Section.

3.1 Elevated Storage Tank Considerations

Size and Overflow Elevation of New Second High Water Storage Tanks

Based on discussions with Fairfax Water staff, the need for an additional elevated storage tank in the Second High Storage Pressure Zone is dictated by two criteria:

- In order to satisfy peak water demand in the distribution system Fairfax Water's hydraulic modeling indicates that additional storage at overflow elevation 570 feet is needed as close to water demands as possible to minimize the need for additional transmission mains and pumping capacity.

- Useful storage volume should be maximized at the selected tank site to increase the total volume of available storage throughout the Fairfax Water service area.

Based on these criteria, Dewberry's evaluation prioritized maximizing storage volume at each of the evaluated alternative sites. The maximum commercially available elevated tank size is approximately 4 million gallons (MG). Based on discussions with Fairfax Water on their need for additional storage, a 2.5 MG elevated water storage tank was used for the purposes of this study. An elevation of a typical 2.5 MG elevated storage tank is included in **Appendix A**.

Types of Water Elevated Water Storage Tanks

Single pedestal tanks such as the Composite Elevated Tank (CET) and the hydropillar Fluted Column Tank (FCT) are often selected when a large storage capacity of up to 4 MG is required. These tank styles date back to the 1970s and have been constructed throughout the United States and Canada. Both styles are common in today's market. Although these tanks are similar in shape and function, the tanks have differences that affect the initial construction and long-term maintenance costs and benefits.

The FCT, made completely of steel, typically has a larger pedestal diameter that accommodates more equipment and storage. An all-steel tank can also be easily inspected from both inside and outside of the tank and measured by ultrasonic thickness gauges to quickly and accurately determine its strength. Repairs and modifications to an all-steel FCT may also be easier to complete and more economical than repairs and modifications to a CET.

A CET typically has a smaller pedestal diameter, which can reduce aesthetic impacts to adjacent properties. The CET has the following characteristics that result in lower initial construction and life-cycle maintenance costs:

- The reduced tank size has a significantly smaller painting area.
- Containment during initial painting can be reduced when the tank is erected around the base and lifted into place.
- The thicker concrete pedestal may have more impact resistance to flying debris in high wind storms.

Disadvantages of the CET may include:

- A separate lightning grounding system, is required for CET tanks, as they are not inherently grounded.
- If not carefully controlled during construction, the column appearance may not meet the desired architectural tolerances and finished appearance.
- The concrete pedestal can collect moisture, which allows for dirt and mildew accumulation and discoloring if the concrete is left unsealed.
- Modifications or repairs to the pedestal and structural nondestructive examination of the reinforcement may be more difficult.

The erection sequence differs slightly between an FCT and a CET. The FCT is commonly built by three different primary crews. The first is the foundation/concrete crew, which excavates and constructs the foundation, and installs below grade piping in the vicinity of the tank, then backfills the tank site. The tank erection crew begins their work after the foundation crew has begun theirs, and erects the steel that comprises the pedestal and tank, tank accessories, and tank piping. Finally, the tank painting crew completes the tank. A shroud is often placed around the tank during painting to prevent paint from falling on adjacent property, vehicles or structures. Other work such as site landscaping, paving, and connecting power is handled by subcontractors.

For the CET, the construction sequence begins with the foundation/concrete crew. However, this is often the same crew that constructs the concrete pedestal and dome tank bottom. The steel tank erection crew follows, building the tank around the base of the pedestal on a jig structure and lifting it into place, securing it with a cast-in place closure at the ring beam at the top of the pedestal. Finally, the roof is placed and the painting is completed. Typically, the tank is painted while it is still on the ground to save time and money. Provisions should be included to minimize surrounding exposure to airborne paint particles.

Recommended Tank Type

Based on field inspections of the alternative sites, the construction of a hydropillar Fluted Column Tank (FCT) is generally feasible at each of the sites, provided the acquisition of sufficient property at two of the three alternative sites is achievable and the necessary zoning approvals can be obtained. While both tanks are viable, our study evaluates the construction of a 2.5 MG standard size Hydropillar FCT to be conservative, due to its larger diameter pedestal and larger footprint. The 2.5 MG standard size Hydropillar FCT has a pedestal diameter of 78 feet, a bowl diameter of 108 feet and a head range of 44 feet at each of the sites.

Tank Site Requirements

Each of the alternative tank sites was evaluated based on the following criteria:

Minimum Parcel Size. The minimum working clearance around the tank's maximum bowl diameter should be a minimum of 10 feet. This allows sufficient room for shrouding, lifting, and erection of equipment during construction, while also providing adequate room for future maintenance. A shroud contains airborne particles such as dust and paint and prevents them from escaping into adjacent properties. The parcel should support construction of a ring road of at least 10 to 12 feet in width for service trucks at the base of the pedestal. A ring road is generally recommended for tank maintenance purposes.

Public Exclusion Zone (cutting and welding debris hazard). The construction process involves lifting assemblies of large heavy plates, welding, arc gouging, torch cutting, and other heavy construction activities. Ideally, a 50-foot wide public exclusion zone, or more, should be established for safety purposes with a temporary fence around the outside of the largest diameter of the tank.

Access/Parking. During construction, site construction access roads will need to accommodate a fully loaded semi-truck (40 tons) of standard length since some of the equipment and sub-assemblies for the proposed tank may be up to 40 feet long. The truck route to the selected site will need to be examined for electric power line clearance, tree limb clearance, adequate turning

radii, the probability that existing pavement restoration will be needed following construction, hidden vaults/culverts/bridges that might not be rated for the load, adequate turn-around space or alternate path away from site, and adequate parking space for unloading.

Traffic Control. The effect of large trucks regularly accessing the neighborhood to existing traffic and parking in the neighborhood were considered. Large trucks and construction equipment are not compatible with streets that are clogged with parked cars. It may be necessary to designate no parking areas in some zones during working hours to provide space for trucks. To gain approval for this no parking zone, a contingent parking zone may be required for residents. Also, worker off-site parking areas were considered, where necessary.

Lay down/Pre-assembly Area. An area for storing assemblies and pre-assembling parts before lifting into final position is essential for tank erection, including, but not limited to, access tubes, mast/derricks, column sections, cone assemblies, and roof assemblies.

Water Source. Ideally, potable water should be available on site during construction. This reduces the cost for the contractor to haul water onto the site for drinking and cleaning the tank. In addition, a sufficient water source should be available for water leakage testing with the tank full.

Sanitary Facilities. Temporary sanitary facilities are required for the Contractor during construction; adequate space for these facilities will need to be provided.

Temporary Office Space/Tools. An office and a tool trailer are required for the erection crews.

Generator/Welder. A self-contained diesel powered generator/welder unit is often utilized on tank erection sites unless the power is provided by the Owner. While this unit is noisy, and especially considering its location in residential neighborhoods, it is the most efficient and reliable source for providing the necessary power for erection equipment.

Lifting Equipment. These tanks use two primary lifting devices. The first is the center tower/mast combination, which extends up the center of the pedestal and tank and is used to lift plate assemblies or formwork into their final positions. The second, which is similar to a cherry picker or Mantis-type ground device, can move around the site assisting with unloading trucks, moving plates and assemblies and placing assemblies within reach of the primary central crane.

Erosion and Sediment Control. The tank construction site is typical of any heavy construction work. It remains rutted, muddy and can cause sediment to run off onto adjacent property or drainageways if not properly controlled. This is especially important with residential housing nearby because of the risk to damage to homes or basement areas. Perimeter erosion and

sediment controls should be utilized to control erosion during construction in compliance with County PFM and State requirements.

Noise and Dust Control. The heavy construction work associated with building a tank is noisy and sometimes dusty. When working in or near a residential neighborhood, sounds of hammering, diesel generator running, arc gouging, and cherry pickers can disturb neighbors. On November 17, 2015, the Fairfax County Board of Supervisors adopted a new noise ordinance that prohibits outdoor construction between 9 pm and 7 am on Sunday through Thursday, and between 9 pm and 9 am on Friday, Saturday and the day before a Federal Holiday. Outdoor truck loading and unloading is prohibited within 100 yards of a residential dwelling from 9 pm to 6 am. The maximum sound level in residential areas between 7 am to 10 pm is a continuous sound of 60 dBA and an impulse sound of 100 dBA. Between 10 pm and 7 am the limit is a continuous sound of 55 dBA and an impulse sound of 80 dBA. Dewberry anticipates that the approval of the Special Exception to permit construction at this site may entail even stricter conditions which could limit working hours, noise levels and the general construction process.

Fencing. Fairfax Water's standard chain link fencing is required for permanent security at each tank site. Temporary fencing will be utilized to provide security for the work area during construction.

Tank Electrical/Lighting. Electric power is recommended for tank cathodic protection, lighting and electrical outlets.

3.2 Site Work and Permitting

Comprehensive Plan

The Fairfax County Comprehensive Plan consists of a Policy Plan, four Area Plans, and the Comprehensive Plan and Transportation Plan maps. The Comprehensive Plan is required by state law, to be used as a guide in decision-making about the built and natural environment by the County's Board of Supervisors and other agencies, including the Planning Commission. The Code of Virginia requires localities to review their Comprehensive Plans at least once every five years. The Fairfax County Comprehensive Plan is evaluated more frequently to manage the dynamic changes in the County and to conduct Plan maintenance. Plan amendments are initiated by a motion by the Board of Supervisors. In order for an amendment to be adopted, it must be the subject of a public hearing before the Planning Commission and the Board of Supervisors. The Board of Supervisors must vote to adopt the amendment in order to change the Plan. Fairfax County Planning and Zoning staff will consider Comprehensive Plan recommendations at any of the potential tank sites as part of the evaluation of the suitability of erecting an elevated water

storage tank on these properties.

The Public Facilities Element of the County's Comprehensive Plan is organized into four major sections: Education - Higher Education and Public Schools; Libraries; Public Safety - Police, Fire and Rescue, Sheriff, Courts and Animal Control; and Utilities and Services - Water Supply, Sanitary Sewer, Solid Waste, Drainage Systems and Stormwater Management Facilities, County Vehicle Maintenance Facilities, Gas, Electric, Telephone, and Communication Towers.

These guidelines provide policies and standards for the following factors:

- Location - where should facilities be located in order to provide accessibility, support planned land uses, and adequately serve their function.
- Character and Extent - the quantity of the facility which should be constructed in relation to the population, the appropriate facility size, and design requirements to achieve neighborhood compatibility.
- Other - factors which must be addressed to provide an acceptable level of service or community or user benefit.

Objective 29 of the Public Facilities Element of the Comprehensive Plan addresses site location for water facilities. It states “locate sites, for adequate and appropriate facilities to treat, transmit and distribute a safe and adequate potable water supply, which conform to the land use goals of the Comprehensive Plan.” “Policy a” of this objective further instructs that, “elevated water storage tanks and standpipes should be grouped together, designed to harmonize with surrounding development, and be screened as much as possible.”

As part of its Comprehensive Plan, Fairfax County has a comprehensive countywide trails system which supports pedestrian, bicycle and equestrian usage and provides both transportation and recreational benefits. The overall trails system is planned to ultimately connect major activity centers and key destination points to establish desirable recreational corridors. It is typical for Fairfax County to require that a proposed site plan for development address the provisions of the County’s comprehensive trail system. These provisions may be met by preserving an existing trail on the subject parcel, by dedicating easements or right-of-way for future trail construction, or by constructing the comprehensive plan identified trail. Any site plan for tank construction will need to address the requirements of the County’s trail plan, if the County’s trail plan includes trails through the subject site or across the site’s roadway frontage.

Special Exception Approval

In Fairfax County, water storage facilities (tanks) are defined to be Category 1 Light Special Exception Public Uses per the County's Zoning Ordinance. Relevant Zoning Regulations are attached in **Appendix C,** and Zoning Maps of the three potential sites are attached in **Appendix D**. A Special Exception requires approval by the Fairfax County Board of Supervisors under the provisions of Article 9-006 of the County's Zoning Ordinance. The Board evaluates if the proposed use complies with all specified standards and if the proposed use will be compatible with existing or planned development in the general area. In approving the Special Exception, the Board typically stipulates conditions and restrictions to ensure the use will be compatible with the neighborhood where it is proposed to be located. Where such cannot be accomplished, or it is determined that the use is not in accordance with all applicable standards in the ordinance, the Board may deny the Special Exception.

In addition to the general requirements outlined in article 9-006, Category 1 Special Exception uses shall also satisfy the following standards:

- Category 1 Special Exception uses shall not have to comply with the lot size requirements or the bulk regulations set forth in the zoning district in which it is located. Since a Category 1 Special Exception use is not bound to the bulk regulations set forth in the zoning district in which it is located, the maximum height of a proposed water storage tank and the minimum setbacks from the property limits to the water storage tank are not specifically defined by the Zoning Ordinance.

- If the proposed location of the Category 1 use is in an R district (all of the proposed sites are located in R districts), it must be demonstrated that there is no alternative site available for such a use in a C (commercial) or I (industrial) zoned district within 500 feet of the proposed location. Our evaluation confirms that there are no C- or I- zoned districts within 500 feet of the proposed potential site locations.

- Before establishing the use, a site plan demonstrating adherence to the site plan submission requirements as outlined by Article 17 of the Zoning Ordinance must be approved by Fairfax County.

Fairfax County Planning & Zoning Department staff will evaluate the compatibility of the water storage tank height and location with the surrounding community as part of their review of the Special Exception application in an effort to formulate a staff recommendation to the County Planning Commission and Board. Until meetings are initiated with County staff and/or the District Supervisor and Planning Commissioner, it is unclear what limitations to the tank height and size might be set. For purposes of this report/analysis, a tank size of 2.5 MG has been

evaluated at all potential sites; the tank height has been based upon system hydraulic requirements.

2232 Review

The term "2232 Review" is derived from a Code of Virginia requirement under Section 15.2-2232. The County's 2232 Review Process determines the compatibility of proposed public facilities with the locational guidelines established in the Comprehensive Plan. Specifically, this process determines if the **general or approximate location, character and extent** are in substantial accord with the Fairfax County Comprehensive Plan. Fairfax County's 2232 Review Process applies to all public areas, public buildings or structures, and public utility or public service corporation facilities (whether publicly or privately owned). Enlargements, changes of use, and other changes to public areas may also be subject to these provisions. Water supply facilities are generally reviewed under this process.

There are three general categories of 2232 Review:

- **Feature Shown:** A 2232 Review may be processed and recommended for approval as a "Feature Shown." In general, a public facility, public utility facility, or public service corporation facility, use or area may be determined to be a current feature of the Comprehensive Plan when it is either specifically identified on the Comprehensive Plan map or described in and supported by the Plan text. A Feature Shown staff report is a recommendation prepared by the Department of Planning and Zoning. If the Planning Commission concurs with the staff recommendation, approval is granted administratively without a public hearing. As defined under Policy Plan guidelines, certain telecommunications proposals of very low impact are processed administratively without a staff report. These cases are approved by the individual Planning Commissioner under the Commission's consent agenda.

- **Public Hearing**: The 2232 application generally requires a public hearing before the Planning Commission if it is not directly supported by the Comprehensive Plan and cannot be processed as a “Feature Shown”. Under this process, staff circulates the application for review by county agencies and prepares a staff report that is made available to the public two weeks prior to a public hearing. Notice of a public hearing is through newspaper advertisement, posting of the property, and written notification of adjacent and nearby property owners. At the close of the public hearing, the Planning Commission determines if the general location, character, and extent of the proposal is in substantial accord with the county's Comprehensive Plan and either approves, denies, or defers decision on the application.

- **2232 Reviews with a Special Exception or other Zoning Approval(s):** Some 2232 applications are subject to and must obtain a Special Exception or other approval under the county's Zoning Ordinance. In these cases, typically, the 2232 Review and the zoning case are heard concurrently by the Planning Commission. A zoning staff report is prepared that includes a separate section to address the 2232 Review and is made available to the public two weeks prior to a public hearing.

Since all of the potential tank site alternatives would be subject to a Special Exception review, it is anticipated that the 2232 review and Special Exception review would be heard concurrently by the Planning Commission.

Landscaping Requirements – Transition Screening and Barriers

Transitional screening and barriers must be provided in accordance with the matrix presented in Article 13 of the County Zoning Ordinance and in accordance with the provisions of Sections 13-302, 13-303 and 304.

Barriers shall be generally located between the required transitional screening and the use or activity in connection with which they are required where they will most adequately screen such activities from the existing or proposed first floor level of adjoining development. Any bracing, supports or posts shall be on the side of the barrier facing the use, which must provide the barrier. Where options are presented on the matrix for a type of barrier, such option shall be available to the developer unless otherwise qualified.

Transitional screening and barriers may be waived or modified by the Director of Fairfax County Department of Public Works and Environmental Services (the Director) for any public use when such use has been specifically designed to minimize adverse impact on adjacent properties.

Landscaping Requirements – Tree Cover Requirements

The Site Plan requires a landscape plan as specified in the County Public Facilities Manual showing existing vegetation to be preserved and any of the following proposed landscape materials required to be installed:

- Parking lot landscaping, transitional screening and tree conservation as required by the provisions of Article 13, to include the location, type and height of barriers. (Parking lot landscaping will not be required for a tank site application since the number of parking spaces proposed is less than 20).

- Replacement vegetation in accordance with the policies and requirements of the Public Facilities Manual.

- Plantings required by a proffered condition or development condition of an approved rezoning, special permit, Special Exception or variance.

The Site Plan for the site will include the submission of a Tree Preservation Plan and narrative as required by Article 12-0509 of the County's Zoning Ordinance to show the accurate trunk location and common name of all trees with trunks 12 inches or greater in diameter located within 25 feet of the proposed limits of clearing, within the undisturbed area and within 10 feet of the limits of clearing in the disturbed area. Trees less than 12 in diameter may be required to be addressed as part of these requirements if the Fairfax County Director of Public Works and Environmental Services determines the trees to have significant ecological, cultural or environmental significance.

Site Plan Permit

A Site Plan addressing the requirements as outlined by Article 17 of the Zoning Ordinance must be approved by the County to allow issuance of a site construction permit to permit construction of a new water storage tank. The County reviews site plans for conformance to the County land development regulations. The major items evaluated during the site plan review process are:

- Erosion and sedimentation controls;

- Drainage and water quality provisions;

- Curbs, gutters, streets, sanitary and storm sewers, water mains, water availability and fire protection access;

- Integration with existing and future development;

- Adequate tree cover and landscaping;

- Fairfax County Zoning Ordinance and the Public Facilities Manual compliance; and

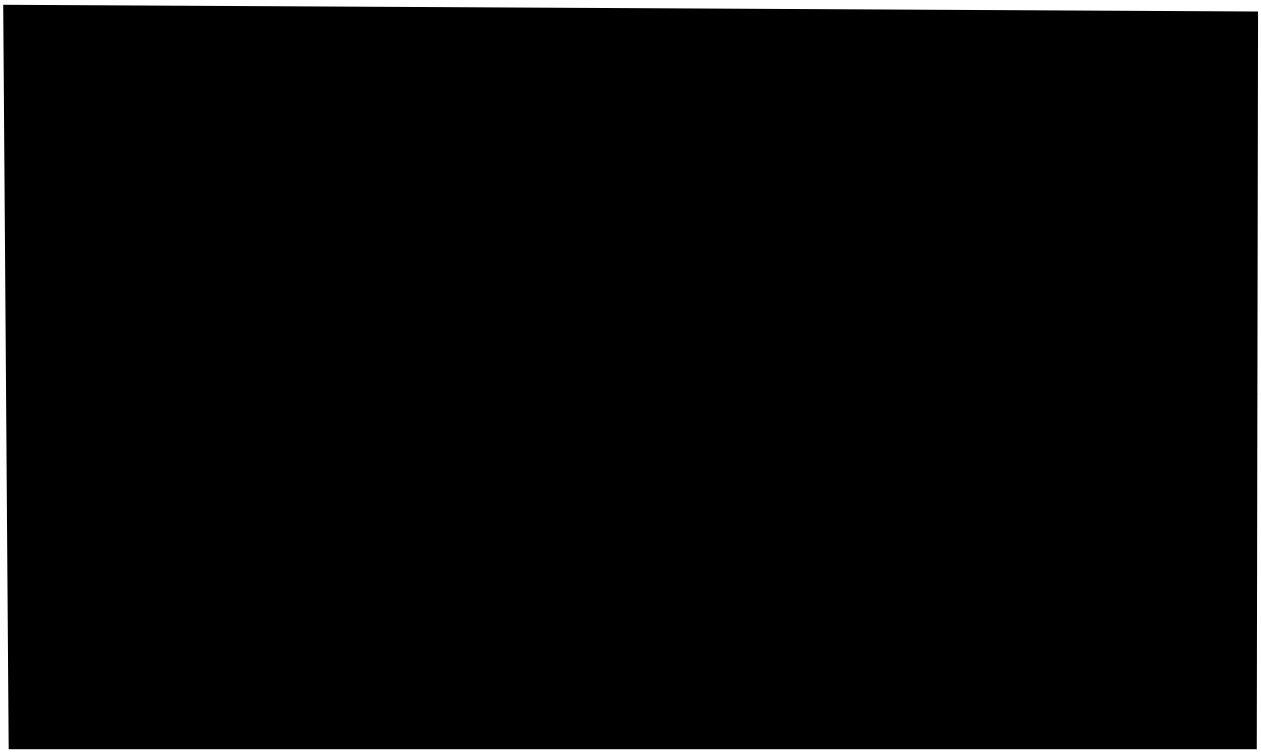
- Compliance with special conditions, proffers, etc., required through Phase 1, Zoning.

Site Access Requirements

A minimum asphalt access roadway width of 15 feet is required between the site's frontage road and the tank pedestal access door. A minimum of two parking spaces are required for

maintenance vehicles. The base of the pedestal should have a ring road of a minimum 12 feet wide for service trucks. Access roadway geometry and parking will be sized to accommodate extended cab pick-up trucks that will routinely access the tank site for testing/maintenance and the occasional access by a pick-up truck pulling a double-axle trailer. Contour Maps of the alternative tank site locations are provided in **Appendix E**.

Site Security



3.3 Stormwater Management Requirements

Stormwater Management (SWM) will be required for the selected tank site in accordance with Chapter 124 (SWM Ordinance) of the Code of the County of Fairfax, Virginia 1976, and Fairfax County PFM. Both water quality and water quantity will need to be provided by Fairfax Water in accordance with Article 4 of the SWM Ordinance. Minimum requirements for each individual site, such as Water Quality, Water Quality Compliance, Water Quantity Compliance (Channel Protection), Water Quantity Compliance (Flood Protection), and Water Quantity Compliance (2- and 10-year Detention) are addressed in Section 4 of this memorandum. The minimum Water Quantity requirements applicable to each of the potential sites are listed below.

Water Quantity

1. Outfall channel protection requirement shall be demonstrated in the downstream limit of analysis by providing 1-year, 24-hour onsite detention in accordance with the Energy Balance methodology:

   $Q_{Developed} < (Q_{Forest} * RV_{Forest})/RV_{Developed}$

   Where:

   $Q_{Developed}$ = The allowable peak flow rate of runoff from the developed site.

   $RV_{Developed}$ = The volume of runoff from the site in the developed condition.

   Q_{Forest} = The peak flow rate of runoff from the site in a forested condition.

   RV_{Forest} = The volume of runoff from the site in a forested condition.

2. Outfall flooding protection requirement shall be demonstrated in the downstream limit of analysis by confining the post-development peak flow rate from the 10-year, 24-hour storm event within manmade stormwater conveyance systems and the 2-year, 24-hour event within natural stormwater conveyance systems. Onsite detention of stormwater and/or downstream improvements may be incorporated into the project to meet this criterion, at the discretion of the Director.

3. In lieu of 2 above, and to avoid potential offsite drainage improvements, 2- and/or 10-year 24-hour detention can be provided onsite using the Energy Balance methodology as described in 1 above.

4. The downstream limits of analysis in 1 and 2, above, shall be to a watershed point along the outfall that is at least 100 times the site's contributing drainage area in said outfall.

5. Unless waived by the Director, the post-development peak flow for the 2-year, 24-hour storm event shall be released at a rate that is equal to, or less than, the pre-development peak flow rate from the 2-year, 24-hour storm event and the post-development peak flow for the 10-year, 24-hour storm event shall be released at a rate that is less than, or equal to the pre-development peak flow rate from the 10-year, 24-hour storm event.

3.4 Environmental Review

State, federal, and local database reviews were conducted to determine the environmental constraints for each of the potential tank sites. These results can be found in Section 4 of this

Technical Memorandum. The Virginia Department of Environmental Quality, "What's in My Backyard" online mapper was reviewed for documented petroleum releases. Information concerning the presence of threatened and endangered species, critical habitat, and natural heritage resources was obtained from the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) database, Virginia Department of Conservation and Recreation (DCR) Natural Heritage Data Explorer (NHDE), and Virginia Department of Game and Inland Fisheries (DGIF) Fish and Wildlife Information Service (FWIS). The Virginia Department of Historic Resources (VCRIS) database was reviewed for the presence of known architectural and archaeological resources. Field investigation included a walkover and visual inspection of the potential tank sites. Our environmental review findings for each of the potential sites are summarized in Section 4 of this report.

3.5 Geotechnical Study

ECS provided a geotechnical review of conditions at the alternative tank sites relative to erecting a new elevated water storage tank. The ECS review is not based on subsurface exploration work performed at these sites. It is based on a review of both private and public information related to geotechnical conditions at each site.

ECS has extensive geotechnical experience in the vicinity of Falls Church, Virginia; a map showing the geotechnical work completed by ECS within a one-mile radius in the vicinity of each site is included in Section 4. The Fairfax County Soils Mapping, available online at the Fairfax County website, and the geologic mapping through USGS were also reviewed.

While there is extensive geotechnical information that has been considered, this initial review is intended to assist Fairfax Water in making decisions regarding which alternative project site to study further. Some preliminary bearing pressures for foundations that can be used for the tanks that are being considered are provided in Section 4 of this report, but should not be considered for final design. Instead, subsurface exploration should include geotechnical borings and specific testing to support actual design recommendations.

While some excavation is expected in development of the selected site, it is expected that the selected site will be developed at or near existing grade, with minimal cut and fill.

Regional Geology

Geologically, all of the alternative sites are located in the Piedmont Physiographic Province in Fairfax County, Virginia. Based upon available geologic mapping, the sites appear to be underlain locally by moderately deep residual soil weathered from the underlying Cambrian age Sykesville Formation, a metasedimentary mélange [from expanded explanation (ref. VA002):

Sykesville Formation (Hopson, 1964; Drake, 1985]. Typically encountered in the western piedmont of Northern Virginia, this formation is often viewed as a light- to medium-gray, medium-grained metasedimentary melange consisting of a quartzofeldspathic matrix that contains quartz "eyes" and a heterogeneous suite of pebble- to boulder and larger-size olistoliths. These include: the Mather Gorge Formation migmatite, phyllonite, and metagraywacke; and, ultramafic, metagabbroic, and felsic and mafic metavolcanic rocks, plagiogranite, and quartzite. The Sykesville is often intruded by elements of the Occoquan Granite.

Typical Soil Conditions

Where previous development of the site has occurred (such as the Poplar Heights and Falls Hill sites), existing fill materials may be encountered; however, it is anticipated to be relatively minor fill depths on the order of ±5 feet. Existing fill materials, if encountered, will likely consist of soils founded within the regional geology. Typical natural near-surface soils encountered usually consist of low to moderate plasticity sandy SILT (ML) as well as more granular silty SAND (SM) soils. Lenses of highly elastic SILT (MH) soils may also be encountered. The natural soils generally transition into weathered rock at highly variable depths ranging from approximately 20 to more than 50 feet below site grades.

Typical Groundwater Conditions

Long term groundwater levels are likely well below planned constructed grades; however, groundwater seepage may be encountered at variable depths within borings performed at any of the alternative sites. The alternative sites are subject to shallower perched water conditions, where water becomes trapped within the existing fill, or the granular deposits overlying less permeable cohesive soils at the soil/weathered rock interface, or potentially at the weathered rock/intact rock interface. For this reason, perched groundwater should be anticipated within the proposed excavation limits, especially along deep utility trenches.

The highest groundwater observations are normally encountered in late winter and early spring, and current groundwater observations are expected to be close to the seasonal water table due to the normal amount of precipitation this area is experiencing. Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of exploration. Free water may also be encountered at the interface of fill materials and natural soils.

Foundation Types and Considerations

Based on ECS's local experience and current understanding of the proposed elevated tank type and size, the on-site soils appear to be generally suitable for support of the planned structure.

Shallow foundations may be feasible depending on the maximum anticipated loading and total allowable settlement. The natural silt and sand soils likely to be encountered at foundation subgrades consist of loose to medium dense soils which may be capable of providing preliminary allowable bearing pressures on the order of 3,000 to 5,000 psf; however, due to the thick nature of the residual soil profile, anticipated settlements may be greater than 1 inch. Based on experience, tanks can be designed for higher settlement tolerances than is typical to buildings. In the event that estimated total settlements are not tolerable for the planned structures, a deep foundation system consisting of auger cast-in-place (ACIP) piles would be a feasible alternative. The ACIP piles would be extended to the denser silt and sand soils near the weathered rock interface.

Exterior Pavements

Important considerations with the design and construction of pavements are the surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should minimize the possibility of the subgrade materials becoming saturated over a long period of time. ECS typically recommends using a design California Bearing Ratio (CBR) value of 3 or 4, which is based on expectations of long-term performance of the onsite materials, for the design of onsite pavements. Actual CBR values should be confirmed during final design, and certainly prior to construction.

Fill Placement

Fill materials underneath the proposed structure, in backfill, and pavements should consist of an approved material, free of organic matter and debris, rocks greater than 4-inches and have a Liquid Limit and Plasticity Index less than 40 and 15, respectively. Unacceptable fill materials include topsoil and organic materials (OH, OL) and high plasticity silts and clays (CH, MH). If encountered during grading operations, such materials should be removed and either stockpiled for later use in landscape fills, or placed in approved disposal areas. All other soil materials not excluded above are generally acceptable for reuse as fill. The soils in the general vicinity of the site consist of low to moderately plastic silts and silty sand soils which are generally suitable for use as structural fill; however, it should be noted that lenses of moderately to highly plastic materials with a Liquid Limit and Plasticity Index greater than the recommended 40 and 15 may be encountered.

Fill materials should be placed in lifts not exceeding 8-inches in loose thickness and moisture conditioned to within ±2% of the optimum moisture content. Soil bridging lifts within the expanded building limits should not be used since excessive settlement of the structures will

likely occur. Controlled fill soils should be compacted to a minimum of 95% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor Method. The upper one foot of soil supporting slabs-on-grade, pavements, sidewalks, or gutters should be compacted to a minimum of 100% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor Method.

Preliminary Geotechnical Construction Considerations

In general, significant construction difficulties at any of the site alternatives are not expected. Proper monitoring of new structural fill placement as well as the observation of the subgrades of footings or deep foundation installations are important aspects of this project. Observation by a geotechnical engineer or an experienced soil technician under the direction of the geotechnical engineer to evaluate suitability of subgrades as well as to determine if minimum compaction requirements are being met is recommended.

The surficial soils contain fines which are considered erodible. The Contractor should provide and maintain good site drainage during earthwork operations to help maintain the integrity of the surficial soils. All erosion and sedimentation shall be controlled in accordance with sound engineering practice and current County requirements. In a dry and undisturbed state, the majority of the soil at the site will provide good subgrade support for fill placement and construction operations. However, when wet, this soil will degrade quickly with disturbance from contractor operations.

A 2-inch lean concrete mud mat is recommended at the bottom of each excavation after the geotechnical engineer has confirmed the soil encountered is as expected. This "seals" the site, reduces the mud, and provides a solid base for rebar chairs and reinforcing bar placements.

The type of foundation for the tank is not only controlled by the geotechnical requirements, but also by the dimensional requirements to keep the working area of the excavation within the property lines. For this initial evaluation, the foundations are assumed to be spread footers, which are the most common tank foundation. To achieve the necessary resistance, a deep foundation (piling) may be required.

The foundation excavation will be backfilled with engineered material compacted in lifts to achieve density required and reduce settlement. Backfilling is usually completed prior to start of tank pedestal construction.

3.6 Land and Easement Acquisition

Some of the tank site alternatives require the purchase of additional property (beyond that currently owned by Fairfax Water) or easements from adjacent properties to make erection of a storage tank size proposed feasible. In order to estimate the cost of purchasing properties and/or acquiring easements, ERM conducted Market Value Assessments (MVA) and acquired the Tax Assessment data near the potential sites.

Barring conducting individual MVA's for each of the affected properties, using the per SF improvement value average is the best methodology to come to an estimated cost for the properties. It was found that the total value of the MVA's are in line with the total values of the Tax Assessment; therefore, the results are acceptable.

The comparable properties (comps) that were used in estimating the property values, as well as ERM's cost of services to acquire full fee simple property acquisitions, are detailed in Section 4.

Some sites also require permanent stormwater easements on adjacent properties. To determine the cost for land required for permanent easements, ERM used the 2015 Land Tax Assessment of the property for which permanent easement would be required, found the cost per square foot, and multiplied that cost by the square footage of easement required. 30% of this cost, plus ERM's cost of services to acquire a property for permanent easement is included in Section 4 as the final cost for acquiring necessary permanent easements on the different sites, if permanent easements are required.

3.7 Opinion of Probable Construction Cost (OPCC)

A preliminary Class 4 OPCC, per AACE 18R-97, was completed for each site, with an upside contingency factor of 30%. Assumptions used for the OPCC include:

- All costs reported are in December 2015 Dollars. Dewberry recommends using a 3.5% inflation rate per year for obtaining the midpoint of construction cost.

- Tank construction, site improvements, temporary facilities, and the land and permanent easement acquisition costs are based on planned land and easement acquisition. Costs may differ if the square footage of property acquisition for each site changes during the actual property acquisition process. It is anticipated that the land acquisition costs at the Poplar Heights site will be less than that of Falls Hill, and is to be determined. However, estimated figures for the Falls Hill site are provided.

- Dewberry used costs provided by Fairfax Water for the transmission mains for the

Powhatan and Poplar Heights sites. This cost does not include easement and land acquisition costs of the water transmission mains.

- Bonds, mobilization, and insurance costs were estimated at 2.5% of the tank construction, site improvements, and temporary facilities costs.
- Administrative, engineering, and inspection costs were estimated at 15% of the tank construction, site improvements, and temporary facilities costs. Costs associated with permitting and zoning approval for each site were not included.
- The cost for a Cell-On-Wheels (COW) to be used during tank construction for the existing cellular antennas on the Poplar Heights tank is not included, as this cost may be borne by the owners of the antennas.

OPCCs for all four options can be found in **Appendix J** of this report.

Life cycle costs should be nearly the same at each alternative site, given that all tanks considered in this study are 2.5 MG hydropillar fluted column tanks. However, the painting and maintenance costs for the taller tanks at the Powhatan and Falls Hill sites will be higher when compared to that of the Poplar Heights tank.

SECTION 4: SITE SPECIFIC EVALUATIONS

The three alternative site locations evaluated for a new tank location are the Powhatan Tank site, Poplar Heights Tank site and the Falls Hill Tank site. Two optional layouts for the new tank were considered for the Poplar Heights location. A feasibility analysis of each site for possible location for the proposed tank is included in this Section.

4.1 Powhatan Tank Site

4.1.1 Elevated Storage Tank Considerations

Introduction

This alternative tank site is on a 7-acre parcel of undeveloped land owned by Fairfax Water located off Powhatan Street just east of its intersection with Freedom Lane as shown in **Figure 4-1**:

Figure 4-1: Powhatan Site

The primary advantage of this site is that the land, already owned by Fairfax Water, provides sufficient space for construction of one or more elevated water storage tanks. Preliminary site layouts identify that up to three 2.5 MG storage tanks could be erected on the property while still maintaining an undisturbed existing tree buffer of 50-feet wide, or more. Multiple tanks could satisfy Fairfax Water's overall system storage volume objectives. The preliminary site plan, included in **Appendix F,** illustrates a possible construction sequence for the site, reflecting the initial construction of one 2.5 MG elevated water storage tank, followed by the future construction of two additional 2.5 MG elevated water storage tanks.

The primary disadvantage of this site is that substantial water transmission infrastructure improvements are necessary, in addition to the storage tank construction. Additional transmission/distribution improvements are required to increase system pressures at higher elevations within the Second High pressure zone. The initial transmission mains and their associated costs provided by Fairfax Water for the Powhatan site are shown in **Appendix G.** Fairfax Water hydraulic modeling later indicated that for one tank, a total of 30,500 linear feet (16-, 24-, and 36-inch diameter) of water transmission main and possibly a new booster pump station is actually needed to convey flow from the Powhatan site (this is an additional 15,700 linear feet of pipe from the initial 14,800 linear feet of pipe used in the cost estimate). These improvements are discussed in **Appendix H** (prepared by Fairfax Water staff).

Proposed Tank

The tank overflow elevation at this site, per Fairfax Water hydraulic modeling, is 575 feet, which is 5 feet higher than the overflow elevation required at the other alternative sites to provide an acceptable level of service. The preliminary grading for construction of the first tank at the Powhatan Site reflects a tank floor elevation of 424 feet, resulting in a 151-foot tank height from the floor to overflow.

Land Acquisition

While the parcel is large enough to facilitate the proposed tank, acquisition of a temporary construction easement to facilitate construction of the site access road and permanent offsite drainage easement to address outfall adequacy requirements is anticipated.

4.1.2 Site Work and Permitting

Site Description

The Powhatan site is located on the east side of Powhatan Street. The site is generally covered with trees and slopes down from the southern side of the site (approximate EL. 450 feet) toward the northeast (EL. 410 feet) and northwest (EL. 390 feet).

Existing Zoning

The Powhatan tank site parcel is identified as Fairfax County Tax Map parcel 41-1 ((1)) 59. The parcel area is 6.998 acres and is currently zoned R-1. It is bounded by the R-2 zoned Franklin Forest subdivision to the north and east, the R-4 zoned Nantucket subdivision to the west and the PDH-2 zoned Franklin Cluster subdivision to the south. The City of Falls Church (City) acquired the parcel in July of 1973 at the request of the City Engineer. The parcel, when acquired by the City, was identified to be at a beneficial elevation for future development of a

water storage facility.

The parcel has remained undeveloped since its acquisition by the City. The property is wooded with a good mix of hardwood trees.

Comprehensive Plan

The Powhatan tank site parcel is part of the Fairfax County Comprehensive Plan (Area Plan II) and is within the M3 Kirby Community Planning Sector located in the McLean Planning District of Area II. The Comprehensive Plan map identifies the parcel to be planned for public park uses; the Comprehensive Plan text for this sector does not mention the park use. The Comprehensive Plan map is a potential conflict to developing the parcel for public water storage; the need for an amendment to the County's Comprehensive Plan may require further investigation.

The countywide trails plan map identifies a minor paved trail across the site frontage along Powhatan Street. A minor paved trail, per County definition, is composed of an asphalt or concrete paved surface between 4' and 7'-11" wide. The existing sidewalk across the site frontage with Powhatan Street meets the definition of a minor paved trail. The existing sidewalk will need to be maintained with development of the site, which will allow the site to remain in compliance with countywide trails plan. Additional sidewalk improvements will not be required.

Special Exception

In Fairfax County, water storage facilities (tanks) are defined to be Category 1 Light Special Exception Public Uses per the County's Zoning Ordinance. Category 1 uses may be allowed by Special Exception in R-1 districts, which is the current zoning of the Powhatan tank site parcel. Until meetings are initiated with County staff and/or the District Supervisor and Planning Commissioner, it is not clear what limitations to the tank height or size may be set. A tank size of 2.5 MG has been evaluated to meet Fairfax Water's storage requirements in the area; the tank height has been based upon system hydraulic requirement.

2232 Review

Since the Powhatan tank site parcel would be subject to a Special Exception review, it is anticipated that the 2232 review and Special Exception review would be heard concurrently by the Planning Commission.

Landscaping Requirements –Transition Screening and Barriers

The proposed Category 1 Light Public Use on the Powhatan parcel for development of a water storage tank requires a Transitional Screening Type 3 to buffer it from the surrounding residential

neighborhood. A Transitional Screening Type 3 consists of an unbroken strip of open space a minimum of 50 feet wide planted with all of the following:

- A mixture of large and medium evergreen trees and large deciduous trees that achieves a minimum 10 year tree canopy of 75 percent or greater;
- A mixture of trees consisting of at least 70 percent evergreen trees, and consisting of no more than 35 percent of any single species of evergreen or deciduous tree; and
- A mixture of predominately medium evergreen shrubs at a rate of 3 shrubs for every 10 linear feet for the length of the transition yard area. The shrubs shall generally be located away from the barrier and staggered along the outer boundary of the transition yard.

It is anticipated that a modification of the transitional screen yard requirements would be requested with the Special Exception application to utilize the mature hardwood trees existing on the site, rather than planting per the Type 3 screening requirements.

The proposed Category 1 Light Industrial use requires any of the following barriers:

- Barrier D shall consist of a 42-48 inch high chain link fence and may be required by the Director to have inserts in the fence fabric, to be coated, or to be supplemented by trees and/or shrubs.
- Barrier E shall consist of a 6-foot wall, brick or architectural block faced on the side facing the existing use and may be required to be so faced on both sides as determined by the Director.
- Barrier F shall consist of a 6-foot high solid wood or otherwise architecturally solid fence.

It is anticipated that a modification of the barrier requirement would be sought for development of a water storage tank to utilize Fairfax Water's typical security fencing as part of the Special Exception review.

Landscaping Requirements – Tree Cover

The Site Plan for the project will require the submission of a Tree Preservation Plan and narrative as required by Article 12-0509 of the County's Zoning Ordinance to show the accurate trunk location and common name of all trees with trunks 12 inches or greater in diameter located within 25 feet of the proposed limits of clearing, within the undisturbed area and within 10 feet of the limits of clearing in the disturbed area. Trees less than 12 inches in diameter may be required to be addressed as part of these requirements if it is determined by the County that the

trees have significant ecological, cultural or environmental significance.

The site plan will also need to demonstrate that the tree cover requirements of the ordinance are met. Given the existing R-1 zoning, the tree cover requirement will be 30% of the parcel area. The tree cover can be met with a combination of existing and proposed trees (measured utilizing their 10-year canopy). The trees proposed with the transition screen yard can be utilized to meet the tree cover requirement.

Site Grading

The site topography requires a stepped approach to site grading to ensure the tank spread footings are maintained in undisturbed soil to minimize the potential for settlement. It is anticipated with the preliminary grading plan that the first tank to be constructed would be placed at a tank floor elevation of 424 feet, the second future tank located to the northeast of the first would be placed at a tank floor elevation of 408 feet. The preliminary site plan shown in Appendix F includes a retaining wall to facilitate the first tank, while maintaining the undisturbed tree buffer along the periphery of the property.

Site Access Requirements

Permanent site access to the tank site is from Powhatan Street (Route 3972) by way of I-66 and Idylwood Road which becomes Kirby Road. Visual observation of the proposed tank access road connection to Powhatan Street verifies that adequate sight distance exists along this street to facilitate safe access to the parcel. There is an existing speed hump and pedestrian cross walk on Powhatan Street in the vicinity of the proposed access connection. This speed hump and cross walk may require relocation with site construction of the site access roadway.

Staging and Construction Access Requirements

This site offers many advantages over the other alternative sites in terms of constructability. There are mature trees surrounding the site that will help screen both construction activities and the constructed tank(s) from adjacent properties. There is adequate room for a truck unloading and laydown areas, an office and tool trailer locations, lifting equipment placement and worker parking during construction. The proposed construction sequence plan utilizes an onsite loop road to facilitate large truck access for tank construction. This same construction road can be utilized to construct the future additional tanks on the property while maintaining adequate space for unloading and laydown areas.

While Powhatan Street appears to be adequate for large trucks and construction equipment, it may not work well if the streets are clogged with parked cars. It may be necessary to designate

no parking areas in some zones along this roadway during the working hours to provide ample space for the trucks.

Temporary Erosion and Sediment Control Requirements

Temporary erosion and sediment control measures, expected for construction of a new water storage tank, include a stabilized construction entrance, perimeter silt/super silt fence and a temporary sediment basin at the northeast corner of the site construction limits. Dewberry anticipates that the approval of the Special Exception to permit construction at this site would entail strict conditions limiting working hours, noise levels and the general construction process.

4.1.3 Stormwater Management Requirements

Water Quality

The total phosphorus load requirement for new development shall not exceed 0.41 pounds per acre per year, as calculated using the Virginia Runoff Reduction Method.

Water Quality Compliance

While only one tank will initially be constructed, stormwater management for this site was planned for a potential of up to three 2.5 MG tanks. Assuming three 2.5 MG tanks, it is estimated that approximately 2.2 lb of phosphorus will need to be removed from the proposed Powhatan tank site. This can be accomplished by providing onsite BMPs or purchasing offsite nutrient credits as allowed under Article 4. Types of non-proprietary BMPs that can be designed onsite to remove the proposed phosphorus load include bioretention practices, grass channels and dry swales. Sample proprietary BMPs include the Stormtech Isolator Row and Bayfilter systems by ADS among others. Both non-proprietary and proprietary designs shall follow Virginia BMP Clearinghouse and/or County PFM specifications and requirements. Instead of providing onsite BMPs, a one-time purchase of approximately $55,000.00 of nutrient credits may also be considered. This cost is based on an assumed unit price of $25,000 per pound of phosphorus, which is consistent with the unit price currently offered by nutrient credit banks in this area.

Water Quantity Compliance (Channel Protection)

It is estimated that approximately 6,000 cf of dry storage volume would be required at the Powhatan tank site to provide the requisite 1-year, 24-hour detention for channel protection as described in Section 3.3. The dry storage volume could be provided in an onsite detention basin or an underground detention vault.

Water Quantity Compliance (Flood Protection)

Currently the onsite drainage system does not exist on the Powhatan tank site that can adequately convey proposed stormwater runoff and tank overflow from the site to the drainage system located downstream of Lorraine Avenue. Stormwater runoff and tank overflow would need to be piped from the site to the drainage system at Lorraine Avenue. It is estimated that a 24" RCP would be required to convey proposed stormwater runoff and 10 MGD tank overflow from the site. Before reaching the drainage system at Lorrain Avenue, the 24" RCP would need to pass between two residential properties, either along Lorraine Avenue or Franklin Avenue. Such a pipe would require a storm drainage easement from one or both properties. The capacity of open channels and storm sewer along the drainage system would need to be evaluated from the site to a point downstream where the total drainage area is approximately 500 acres. If any of these systems are determined to be inadequate for capacity then onsite detention and/or offsite drainage improvements make them adequate, but these costs are not considered. Detailed survey and hydrologic/hydraulic analysis of the entire drainage system would be required before a determination could be made with regard to outfall capacity.

Water Quantity Compliance (2- and 10-year Detention)

It's estimated that approximately 25,000 cf of dry storage volume would be required at the Powhatan tank site to provide the requisite 2- and 10-year, 24-hour detention described under Section 3.3. This is in addition to the 1-year, 24-hour dry storage volume required. The 2- and 10-year dry storage volume could be provided in an onsite detention basin or an underground detention vault with the 1-year detention.

4.1.4 Environmental Review

The Powhatan Site was reviewed for Environmental feasibility on October 19, 2015. The review of the Powhatan property found that there were no onsite wetlands, Chesapeake Bay Resource Protection Areas, cultural resources or hazardous material concerns. The site is primarily old growth forest located on natural high ground. There are currently no improvements on the property. Based on preliminary reviews of the Threatened and Endangered Species databases, the only listed species identified was federally threatened Northern Long Eared Bat (NLEB). The presence of the NLEB has not been documented within the area but based on regulatory guidance the project would be subject to a time of year restriction on tree clearing from April 15th through September 15th unless further studies were performed to document the absence of the NLEB.

The Powhatan property has no ascertainable environmental issues based on database and site review, aside from a time-of-year restriction for NLEB. Initial observation and database review

does not yield reasonable suspicion that any Recognized Environmental Conditions would be found at the site.

4.1.5 Geotechnical

Geotechnical work (yellow flags) that was completed by ECS within a one-mile radius of the Powhatan site (red square) is shown in **Figure 4-2**. The Fairfax County Soils Map for the Powhatan site area is reflected in **Figure 4-3**.

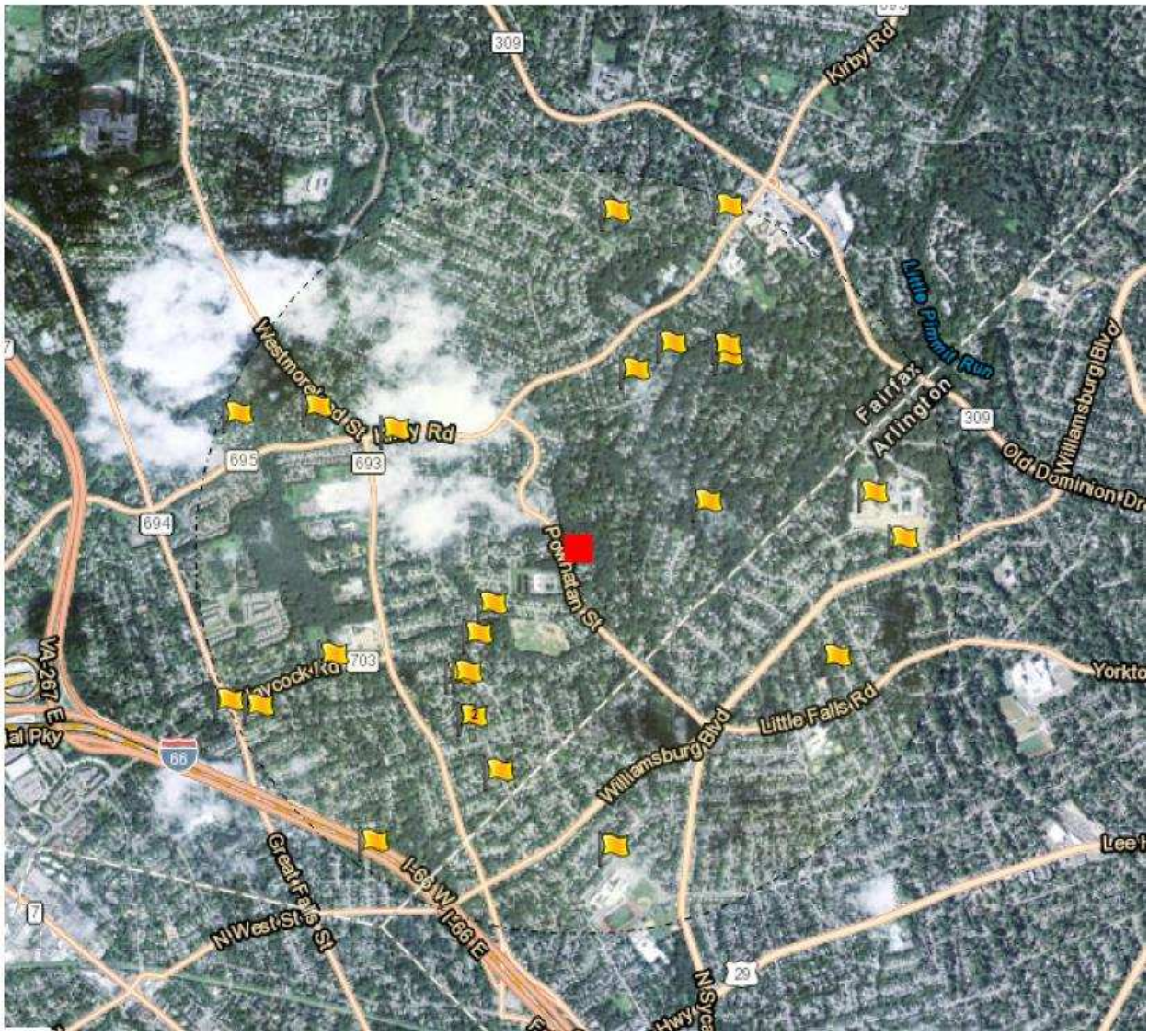


Figure 4-2: ECS Project Experience at Powhatan Site

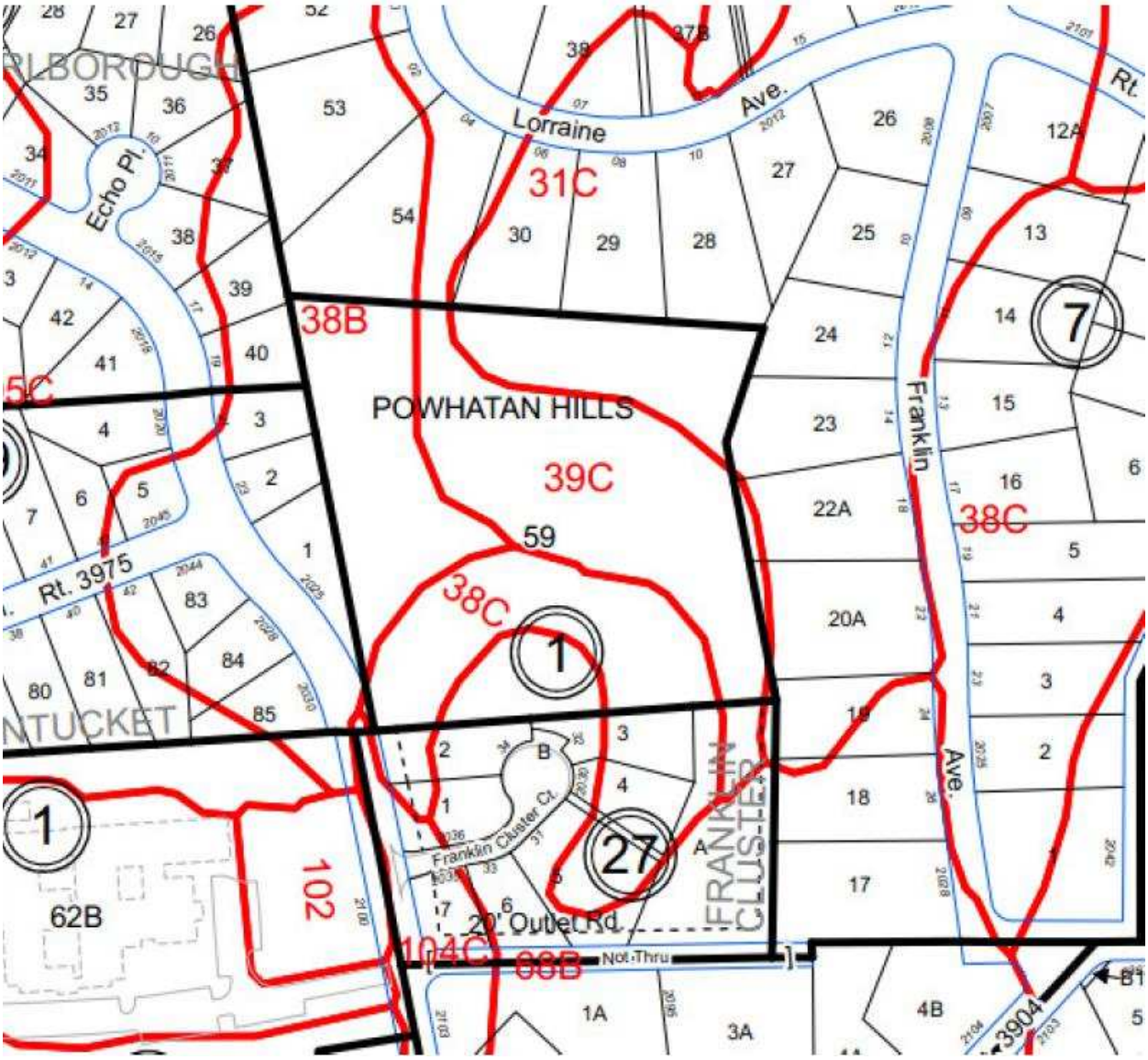


Figure 4-3: Fairfax County Soils Map at Powhatan Site

Soils Mapping Information

The surficial soils at the Powhatan site are mapped as 31C (Danripple), 38B and 38C (Fairfax) and 39C (Glenelg). The Fairfax and Glenelg soils are rated as Problem Class I and the Danripple is rated as Problem Class II.

Danripple soils form in old alluvium on flat stream terraces near the border of the Piedmont and Coastal Plain soils. The topsoil can be gravelly and the subsoil is clay. Depth to bedrock is typically greater than 5 feet.

The Fairfax soils consist of silty old alluvium over silty and sandy soil materials weathered from the underlying micaceous schist and phyllite bedrock. The subsoil can be quite clayey but the clays are only slightly plastic. Depth to bedrock is between 10 and 100 feet below the surface. Glenelg soils consist of silts and clays over silty and sandy decomposed micaceous schist and phyllite rock. Depth to bedrock ranges between 5 and 100 feet below the surface. Both the Fairfax and Glenelg soils have high mica content and tends to "fluff" up when disturbed and can be difficult to compact when used as structural fill.

4.1.6 Land and Easement Acquisition

Fairfax Water owns Powhatan tank site parcel which is of sufficient size to accommodate the construction of the proposed storage tank. If one of the other site alternative options are chosen as the new tank location, Fairfax Water can consider selling the Powhatan property to help fund the new tank construction at one of the other sites discussed in this report. In an attempt to assess the market value of this parcel for a potential future sale, ERM reviewed the following comps:

- 2014 Franklin Ave., Mclean, VA. The property size is 0.59 acres and last sold in 2014.
- 2022 Franklin Ave., Mclean, VA. The property size is 0.78 acres and last sold in 1984.
- 2004 Lorraine Ave., Mclean, VA. The property size is 1.18 acres and last sold in 2015.
- 2032 Franklin Cluster Ct., Falls Church, VA. The property size is 0.33 acres and last sold in 2007.

A map of these locations follows in **Figure 4-4**:

Figure 4-4: Comparable Property Locations for Potential Tank Site at Powhatan

The following **Table 4-1** shows the Sq. Ft. and Assessed Value of the individual properties:

Table 4-1: ERM's Assessed Property Values near Powhatan Site

Property	Sq. Ft.	Land Tax Assessed Value
2014 Franklin Ave.	25,791	$563,000
2022 Franklin Ave.	33,883	$525,000
2004 Lorraine Ave.	51,556	$562,000
2032 Franklin Cluster Ct.	14,388	$516,000

The average price for the four properties is $541,500. Even with the properties substantially varied in size, the values of the lots are very similar. This could imply that a buildable lot in the vicinity of the subject parcel is valued at approximately $550,000. Taking into account the cost to develop the property and the associated real estate fees for the 7-acre parcel, a reasonable per lot value is $500,000. The likely purchaser of the property, taking into account the R1 Zoning, is a Developer/Home Builder. Therefore, for planning purposes the potential value of the 7-acres

sold to a builder in bulk is $2,500,000 - $3,000,000. If the property were re-zoned for R2, these estimates could possibly increase two-fold.

To remain conservative, the minimum value of the Powhatan site, if sold to developers with current zoning, could be $2,500,000.

If a new tank were to be constructed on this site, offsite permanent stormwater easements need to be acquired from nearby properties. The opinion of probable cost of this required easement is $13,229, and including the cost of ERM's services to acquire the easement, the total cost for acquiring offsite permanent stormwater easements is estimated at $19,004.

The total land and easement acquisition costs for this site is estimated at $19,004, and a potential conservative resale value of the existing Fairfax Water property of about $2,500,000.

4.1.7 Opinion of Probable Construction Cost (OPCC)

The preliminary OPCC cost for the Powhatan site, not including the cost of all the necessary transmission main and other improvements, totaled about $14,615,000. Including a 30% contingency, and rounded to the nearest thousand, total project cost at this site is estimated to be **$19,000,000**.

4.2 Poplar Heights Tank Site

4.2.1 Elevated Storage Tank Considerations

Introduction

This alternative tank site is the site of an existing Fairfax Water tank site, which is located adjacent to an existing 323-foot high AM frequency radio tower, between Tower Street and Buckelew Drive, as shown in **Figure 4-5**:

Figure 4-5: Poplar Heights Site

The primary advantage of this site is that the new tank will have nearly the same overflow elevation as the existing tank. It appears that the impact of the new tank on the residential community at this site is less than at the other sites due to the already existing tall radio antenna tower and because the existing tank and proposed tank would be at a similar height.

The primary disadvantages of the site are the size of the Fairfax Water owned parcel, proximity of the existing residential neighborhood, and the required water infrastructure improvements that would allow the tank to operate effectively (shown in **Appendix G**). Additional land acquisition is required to provide a parcel of sufficient size to locate the proposed tank with the larger storage volume and footprint. The proximity to existing homes complicates construction activities and presents aesthetic concerns. The Fairfax Water hydraulic model indicates that

approximately 6,100 feet of new 16-inch transmission main is needed from the Poplar Heights tank site to West Broad Street near its intersection with West Street.

Proposed Tank

Two optional tank layouts were examined for the Poplar Heights site. The proposed tank overflow elevation at this site, per the Fairfax Water hydraulic model, is required to be 570 feet; which is 2 feet higher than the existing tank. The preliminary foundation floor elevation for both tank layout options at this site is 480 feet, resulting in a 90-foot tank height from the floor to overflow. **Appendix B** includes a drawing prepared by Fairfax Water illustrating the elevation view of the new tank compared to the existing tank. It should be noted that the drawing was revised to indicate a new standard size 2.5 MG tank with a 44-foot head range, resulting in an overflow elevation of 574 feet.

Existing Tank

The existing tank is a 652,000 gallon steel tank constructed in 1951. The tank is 35 feet in diameter and 90.5 feet high from existing grade to the overflow elevation. Approximately half of the existing tank volume is usable according to Fairfax Water's hydraulic model of the system. The first stage of construction of the new storage tank would be the demolition of the existing tank. Fairfax Water's model indicates that demolition of the existing tank will not present a significant obstacle to maintaining adequate water service such as fire flow and pressure that would require additional costs within the service area.

Land Acquisition

The parcel owned by Fairfax Water is insufficient to accommodate the larger tank footprint and temporary construction access, which includes adequate site area for construction vehicle access, worker parking, laydown areas and sufficient offsets to maintain public safety during construction. Due to the close proximity of the existing residential neighborhood, both proposed tank options at this site involve challenges.

4.2.2 Site Work and Permitting

Existing Zoning

The Poplar Heights tank site parcel is identified as Fairfax County Tax Map parcel 50-1 ((2)) 94A. The parcel area is 6,400 SF and it is currently zoned R-4; subject to Special Permit SP 4163, which was approved by the Fairfax County Board of Zoning Appeals on March 20, 1951 for the construction of a 650,000 gallon, 35-foot diameter and 90-foot tall water tank. There are no proffered conditions, Special Exception or variance approvals associated with the referenced

property. According to the Fairfax County Zoning Administrator, the property was developed in accordance with all applicable provisions of the Fairfax County Zoning Ordinance in effect at the time of the development, and there are no conforming issues associated with the property. The parcel is bounded by existing single-family detached homes of the R-4 zoned Poplar Heights subdivision on the west, north and east. The parcel is bounded by the R-4 zoned Tower Heights subdivision to the south. Fairfax County Tax Map parcel 50-1 ((2)) 00 within the Tower Heights subdivision and immediately south of the tank parcel is owned by the I Heart Media Tower Co. and is the site of a 323-foot high radio tower.

Comprehensive Plan

The Poplar Heights tank site parcel is part of the Fairfax County Comprehensive Plan Area Plan I and is within the J8 Shreve-West Community Planning Sector located in the Jefferson Planning District of Area I. The Comprehensive Plan map identifies the parcel to be planned for residential use at a density of 4 – 5 dwelling units per acre.

Special Exception

In Fairfax County, water storage facilities (tanks) are defined to be Category 1 Light Special Exception Public Uses which require Special Exception approval from the Board of Supervisors in the R-4 District per the County's Zoning Ordinance. The existing water tank can continue to operate under the previous permit approval, provided that the use does not discontinue for a period of more than two years. Except as provided in Paragraph 3 and 4 of Section 8-044 of the Zoning Ordinance, any enlargement, expansion, increase in intensity, relocation or reduction in land area will require Special Exception approval from the Board. Until meetings are initiated with County staff and/or the District Supervisor and Planning Commissioner, it is not clear what limitations to the tank height and size may be set. A tank size of 2.5 MG has been evaluated for comparison purposes.

2232 Review

Since the Poplar Heights tank site parcel would be subject to a Special Exception review, it is anticipated that the 2232 Review and Special Exception review would be heard concurrently by the Planning Commission.

Landscaping Requirements – Transition Screening and Barriers

The Category 1 Light Public Use on the Poplar Heights parcel requires a Transitional Screening Type 3 buffer from the surrounding residential neighborhood. A Transitional Screening Type 3

consists of an unbroken strip of open space, a minimum of 50-feet wide, planted with all of the following:

- A mixture of large and medium evergreen trees and large deciduous trees that achieves a minimum 10 year tree canopy of 75 percent or greater;

- A mixture of trees consisting of at least 70 percent evergreen trees, and consisting of no more than 35 percent of any single species of evergreen or deciduous tree; and

- A mixture of predominately medium evergreen shrubs at a rate of 3 shrubs for every 10 linear feet for the length of the transition yard area. The shrubs shall generally be located away from the barrier and staggered along the outer boundary of the transition yard.

For this site, there are few existing trees to screen the tank. The parcel assembled to provide adequate acreage to locate the proposed larger tank will need to be of adequate size to include the 50-feet wide planted buffer on all sides.

The proposed Category 1 Light Industrial use requires any of the following barriers:

- Barrier D shall consist of a 42-48 inch high chain link fence and may be required by the Director to have inserts in the fence fabric, to be coated, or to be supplemented by trees and/or shrubs.

- Barrier E shall consist of a 6-foot wall, brick or architectural block faced on the side facing the existing use and may be required to be so faced on both sides as determined by the Director.

- Barrier F shall consist of a 6-foot high solid wood or otherwise architecturally solid fence.

It is anticipated that Fairfax Water would seek a modification to the barrier requirement for the tank site to utilize its typical security fencing as part of the Special Exception review.

Landscaping Requirements – Tree Cover

The Site Plan for the project will require the submission of a Tree Preservation Plan and narrative, as required by Article 12-0509 of the County's Zoning Ordinance, to show the accurate trunk location and common name of all trees with trunks 12 inches or greater in diameter located within 25 feet of the proposed limits of clearing within the undisturbed area and within 10-foot limit of clearing in the disturbed area. Trees less than 12 inches in diameter may be required to

be addressed as part of these requirements if the Director determines the trees to have significant ecological, cultural or environmental significance.

The site plan will also need to demonstrate that the tree cover requirements of the ordinance are met. Given the existing R-4 zoning, the tree cover requirement will be 25% of the parcel area. The tree cover can be met with a combination of existing and proposed trees (measured utilizing their 10-year canopy). The trees proposed with the transition screen yard can be utilized to meet the tree cover requirement.

Site Grading

It is anticipated with the preliminary grading plan that the storage tank located at site Option 1 would be constructed at a tank floor elevation of 477 feet and the storage tank located at site Option 2 would be constructed at a tank floor elevation of 475 feet. Therefore, the tank height with a set overflow elevation of 570 feet for both options, results in minimal differences in the overall height of the tank between the two options.

Site Access Requirements

Existing access to the tank site is provided with an existing 15-foot right-of-way between Tower Street (Route 2360) and the tank parcel, located along the east side of Fairfax County Tax Map parcel 50-1 ((2)) 0089. This right-of way was recorded in February of 1951. Permanent site access to a new tank located in the vicinity of the current tank site is anticipated to be maintained from Tower Street. A typical 12-foot wide ring road will also be provided around the tank for tank maintenance purposes.

Staging and Construction Access Requirements

The site can be accessed via I-66, to Rt. 7 Leesburg Pike, to Shreve Road, to Buckelew Drive and Tower Street. Tower Street is a narrow existing roadway with appears inadequate for large trucks and construction equipment and may not work well if the streets are clogged with parked cars especially in tight turns. It may be necessary to designate no parking areas in some zones during the working hours to provide ample space for the trucks. It is anticipated that a truck pull-off parallel to Tower Street would be utilized for truck unloading and staging for both site layout options to minimize impacts to street traffic and parking. The heavy trucks would pull off the side of the road to unload and then would continue on Tower Street without the need to turn around. A maintenance of traffic plan will be required with consideration given to providing residents with additional parking options to restricted parking areas off Tower Street required for truck unloading.

The site will need to be fenced off to provide a public exclusion zone for protection from cutting and welding debris hazards. Offsite parking for construction workers and storage of materials may be necessary. A shroud will be required for tank painting.

The construction specifications will need to include provisions over and above the zoning ordinance minimum requirements to limit noise and dust as part of tank construction. For example, an electric power service meter may be needed to reduce construction noise levels in lieu of utilizing an on-site generator set. The Contractor will have problems complying with the new Fairfax County noise ordinance.

Buckelew Drive and Tower Street are likely to experience deterioration in level of service due to the heavy truck use during construction. Following construction, both streets would likely require milling and asphalt overlay for pavement restoration.

Temporary Erosion and Sediment Control Requirements

Temporary erosion and sediment control measures expected for construction of a new water storage tank include a stabilized construction entrance and perimeter silt/super silt fence at the site construction limits. It is anticipated that the approval of the Special Exception to permit construction at this site will entail strict conditions limiting working hours, noise levels and the general construction process.

4.2.3 Stormwater Management Requirements

Water Quality

For redevelopment that results in a net increase in impervious cover over the predevelopment condition, the design criteria for new development shall be applied to the increased impervious area whereby the phosphorus load shall not exceed 0.41 pounds per acre per year and the remainder of the site shall have its phosphorus load reduced at least 20 percent below the predevelopment phosphorus load. Phosphorus loads shall be calculated using the Virginia Runoff Reduction Method.

Water Quality Compliance

Phosphorous removal for water quality compliance can be accomplished by providing onsite BMPs or purchasing offsite nutrient credits as allowed under Article 4. Types of non-proprietary BMPs that can be designed onsite to remove the proposed phosphorus load include bioretention practices, grass channels and dry swales. Sample proprietary BMPs include the Stormtech Isolator Row and Bayfilter systems by ADS among others. Both non-proprietary and proprietary designs shall follow Virginia BMP Clearinghouse and/or County PFM specifications and

requirements. Cost for nutrient credits will be based on an assumed unit price of $25,000 per pound of phosphorus, which is consistent with the unit price currently offered by nutrient credit banks in this area.

Water Quantity Compliance (Channel Protection)

Water Quantity Compliance will depend on the approximate dry storage volume required for the two options at Poplar Heights to provide the requisite 1-year, 24-hour detention for channel protection, as described in Section 3.3.

Water Quantity Compliance (Flood Protection)

No drainage system currently exists at the Poplar Heights site area that can convey proposed concentrated stormwater runoff and tank overflow from the Option 1 or Option 2 site layout to the drainage system located downstream of Allan Avenue at Buckelew Drive. Stormwater runoff and tank overflow would need to be piped from the site to this drainage system. It is estimated that an 18" RCP could convey proposed stormwater runoff and 10 MGD tank overflow from the site. Before reaching the drainage system at Allan Avenue, the 18" RCP would need to pass between two residential properties either along Tower Avenue or Buckelew Drive. Such a pipe would require a storm drainage easement from one or both properties. The capacity of open channels and storm sewer along the drainage system would need to be evaluated from the site to a point downstream where the total drainage area is approximately 200 acres. If any of these systems are determined to be inadequate for capacity then onsite detention and/or offsite drainage improvements could be made to make them adequate. Detailed survey and hydrologic/hydraulic analysis of the entire drainage system would be required before a determination could be made with regard to outfall capacity.

Water Quantity Compliance (2- and 10-year Detention)

A minor net increase in impervious area is expected for either Poplar Heights tank layout. Because of this, the dry storage volume required to satisfy 2- and 10-year detention is expected to be minor for either alternative. It is possible that this site could qualify for a detention waiver provided that the downstream drainage system has adequate capacity.

4.2.4 Environmental Review

The Poplar Heights site was reviewed for Environmental feasibility on October 19, 2015. The review of the site found that the site was void of wetlands, Chesapeake Bay Resource Protection Areas, and cultural resources or hazardous material concerns. Based on preliminary reviews of the Threatened and Endangered Species databases, the only listed species identified in the area of

the site was the federally threatened Northern Long Eared Bat (NLEB). The presence of NLEB has not been documented within the area, but based on regulatory guidance the project would be subject to a time of year restriction on tree clearing from April 15th through September 15th unless further studies were performed to document the absence of the NLEB.

The Poplar Heights site has no ascertainable environmental issues based on database and site review, aside from a time-of-year restriction for NLEB. However, this site would require the largest amount of additional property acquisition to erect a new larger tank and therefore likely subject to greater scrutiny under the Phase I ESA process. Initial observation and database review, however, did not yield reasonable suspicion that any Recognized Environmental Conditions would be found at the site.

4.2.5 Geotechnical Study

Geotechnical work (yellow flags) completed by ECS within a one-mile radius in the vicinity of the Poplar Heights site (red square) is shown in **Figure 4-6**. The Fairfax County Soils Map is shown for the Poplar Heights site in **Figure 4-7**.

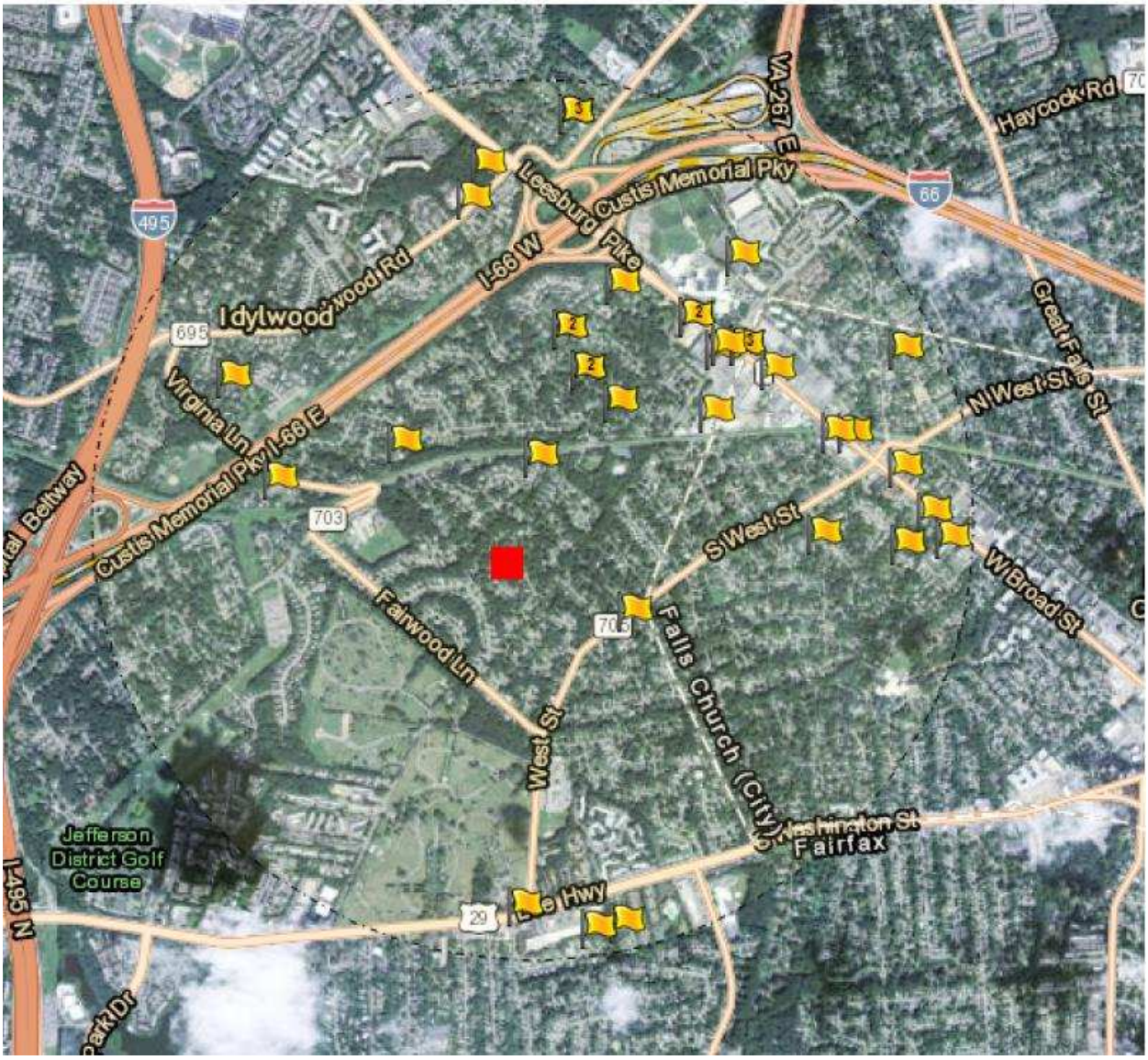


Figure 4-6: ECS Project Experience at Poplar Heights Site

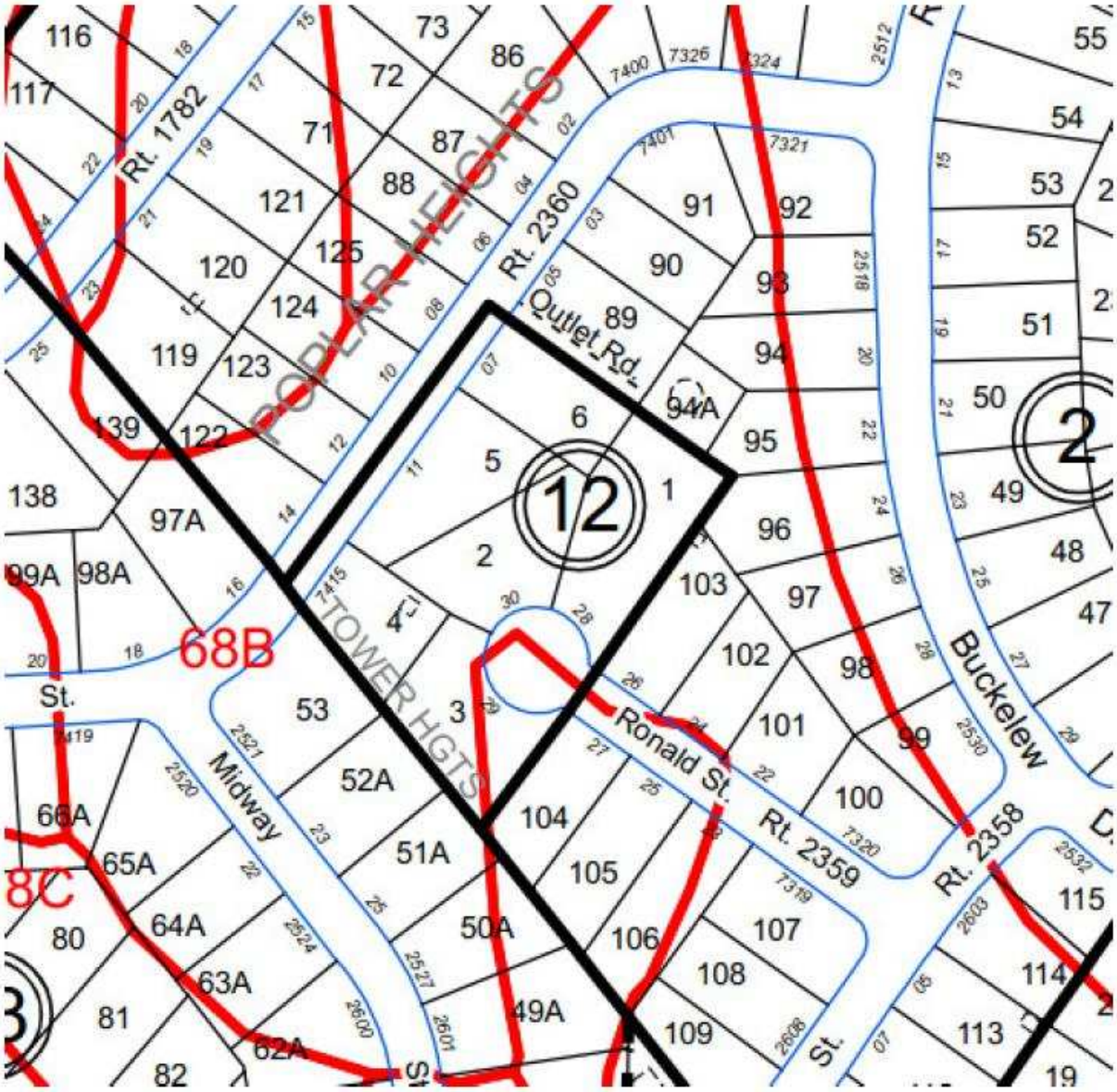


Figure 4-7: Fairfax County Soils Map at Poplar Heights Site

Site Descriptions

The Poplar Heights site is located west of Buckelew Drive and south of Tower Street in Falls Church, Virginia. The site is located within the middle of a residential development and is generally level and covered with grass. Based upon our review of historic aerials and older topographic maps, the existing tank structure has been in place since the 1950s-1960s. Development since that time has been generally limited to the areas surrounding the tank, but not on the site itself.

Soils Mapping Information

The surficial soils at the Poplar Heights sites are mostly mapped as 68B and 68C (Kingstowne-Danripple). According to the "Description and Interpretice Guide to Soils in Fairfax County", the Kingstowne-Danripple and Urban Land-wheaton soils are rated as Problem Class IV B soils.

The Kingstowne-Danripple complex is described as a mixture of the Kingstowne soils and the Danripple soils. The Kingstowne soils consist of sandy, silty and clayey sediments of the Coastal Plain that have been mixed, graded and compacted during development and construction. Depth to bedrock is typically greater than 20 feet. Danripple soils form in old alluvium on flat stream terraces near the border of the Piedmont and Coastal Plain soils. The topsoil can be gravelly and the subsoil is clay. Depth to bedrock is typically greater than 5 feet. Urban Land-Wheaton complex is a mixture of impervious man made materials and Wheaton soils which consist of sand, silt and clay weathered from granite bedrock. Depth to bedrock is greater than 5 feet and can be found in developed areas of the Piedmont with micaceous schist and phyllite bedrock.

4.2.6 Land and Easement Acquisition

Land and easement acquisition costs are expected to be less than those expected for the Falls Hill site. If a new tank were to be constructed on this site, offsite permanent stormwater easements will likely not need to be acquired from nearby properties for both options.

4.2.7 Opinion of Probable Construction Cost (OPCC)

The preliminary OPCC cost for both Poplar Heights Options do not include the cost of land acquisition (however, the cost of land acquisition is expected to be lower than that of Falls Hill.) The preliminary OPCC cost for Poplar Heights Option 1 totaled about $7,508,000, and for Option 2, totaled $7,362,400. Including a 30% contingency, and rounded to the nearest thousand, total project cost at this site is estimated to be **$9,761,000** for Option 1 and **$9,571,000** for Option 2.

4.3 Falls Hill Tank Site

4.3.1 Elevated Storage Tank Considerations

Introduction

This alternative tank site is an existing Fairfax Water tank location which lies just north of Hill Place, as shown in **Figure 4-8**:

Figure 4-8: Falls Hill Site

The existing access easement to the tank is located off Highland Estates Place. The primary advantage of this site is that it does not require additional transmission piping.

The primary disadvantages of the Falls Hill site are anticipated impacts to the surrounding existing residential neighborhood due to land acquisition requirements, site grading, the mass/size and height of the proposed tank, and construction activities all in close proximity to existing homes and a historic property.

Proposed Tank

The new tank overflow elevation at this site per Fairfax Water hydraulic modeling is required to be at an elevation of 570 feet, which is 106 feet higher than the existing tank overflow elevation. The recommended finished floor elevation of the proposed tank based upon the conceptual grading plan for the site is at an elevation of 442 feet, resulting in a 128-foot tank height from the floor to proposed overflow elevation. **Appendix B** includes a drawing showing the elevation view of a new 2.5 MG tank next to the existing tank.

Existing Tank

The existing steel 1,000,000 gallon tank was constructed in 1949 and is 90 feet in diameter and 21.5 feet high to the overflow elevation. Only about 800,000 gallons of the existing tank volume is usable according to Fairfax Water's system hydraulic model. The first stage of construction of a new tank at this site location would be the demolition of the existing tank. Fairfax Water's model indicates that demolition of the existing tank will not present a significant obstacle to maintaining adequate water service such as fire flow and pressure that would require additional costs within the service area.

Land Acquisition

The parcel that is the location of the existing water storage tank is of inadequate size to support the demolition of the existing tank and the re-development with a larger tank of up to 2.5 MG in storage capacity. Due to close proximity of the existing residential neighborhood, the proposed tank option at this site involves challenges.

4.3.2 Site Work and Permitting

Existing Zoning

The Falls Hill tank site parcel is identified as Fairfax County Tax Map parcel 40-3 ((5)) 17B. The parcel area is 0.790 acres and it is currently zoned R-1 and is subject to Special Permit SP 1876, which was approved by the Fairfax County Board of Zoning Appeals on July 19, 1949 to erect a steel water tank. There are no proffered conditions, Special Exception or variance approvals associated with the property. It is bounded by the R-1 zoned Falls Hill Section 1 subdivision to the south and east, the R-3 zoned Podolnick subdivision to the east and the PDH-3 zoned Highland Estates subdivision to the west.

Comprehensive Plan

The Falls Hill tank site parcel is part of the Fairfax County Comprehensive Plan Area Plan I and is within the J10 Jefferson North Community Planning Sector located in the Jefferson Planning District of Area I. The Comprehensive Plan map identifies the parcel to be planned for residential use at a density of 2 - 3 dwelling units per acre.

Special Exception

In Fairfax County, water storage facilities (tanks) are defined to be Category 1 Light Special Exception Public Uses which require Special Exception approval from the Board of Supervisors in the R-1 District per the County's Zoning Ordinance. The existing water tank can continue to operate under the previous permit approval provided that the use does not discontinue for a period of more than 2-years. Except as provided for in Paragraph 3 and 4 of Section 8-044 of the Zoning Ordinance, any enlargement, expansion, increase in intensity, relocation or reduction in land area will require Special Exception approval from the Board. Until meetings are initiated with County staff and/or the District Supervisor and Planning Commissioner, it is not clear what limitations to the tank height and size may be set. A tank size of 2.5 MG has been evaluated for comparison purposes.

2232 Review

Since the Falls Hill tank site parcel would be subject to a Special Exception review, it is anticipated that the 2232 review and Special Exception review would be heard concurrently by the Planning Commission.

Landscaping Requirements – Transition Screening and Barriers

The Category 1 Light Public Use on the Falls Hill parcel requires a Transitional Screening Type 3 to buffer it from the surrounding residential neighborhood. A Transitional Screening Type 3 consists of an unbroken strip of open space a minimum of 50 feet wide planted with all of the following:

- A mixture of large and medium evergreen trees and large deciduous trees that achieves a minimum 10 year tree canopy of 75 percent or greater;
- A mixture of trees consisting of at least 70 percent evergreen trees, and consisting of no more than 35 percent of any single species of evergreen or deciduous tree; and

- A mixture of predominately medium evergreen shrubs at a rate of 3 shrubs for every 10 linear feet for the length of the transition yard area. The shrubs shall generally be located away from the barrier and staggered along the outer boundary of the transition yard.

The parcel assembled to provide adequate acreage to locate the proposed larger tank will need to be of adequate size to include the 50 feet wide planted buffer on all sides.

The proposed Category 1 Light Industrial use requires any of the following barriers:

- Barrier D shall consist of a 42-48 inch high chain link fence and may be required by the Director to have inserts in the fence fabric, to be coated, or to be supplemented by trees and/or shrubs.

- Barrier E shall consist of a 6-foot wall, brick or architectural block faced on the side facing the existing use and may be required to be so faced on both sides as determined by the Director.

- Barrier F shall consist of a 6-foot high solid wood or otherwise architecturally solid fence.

It is anticipated that a modification of the barrier requirement would be sought for the tank site to utilize Fairfax Water's typical security fencing as part of the Special Exception review.

Landscaping Requirements – Tree Cover

The Site Plan for the project will require the submission of a Tree Preservation Plan and narrative as required by Article 12-0509 of the County's Zoning Ordinance to show the accurate trunk location and common name of all trees with trunks 12 inches or greater in diameter located within 25 feet of the proposed limits of clearing, within the undisturbed area and within 10 feet of the limits of clearing in the disturbed area. Trees less than 12 inches in diameter may be required to be addressed as part of these requirements if determined the trees to have significant ecological, cultural or environmental significance.

The site plan will also need to demonstrate that the tree cover requirements of the ordinance are met. Given the existing R-1 zoning, the tree cover requirement will be 30% of the parcel area. The tree cover can be met with a combination of existing and proposed trees (measured utilizing their 10-year canopy). The trees proposed with the transition screen yard can be utilized to meet the tree cover requirement.

Site Grading

It is anticipated with the preliminary grading plan that the storage tank located at the Falls Hill site would be constructed at a tank floor elevation of 442 feet. Therefore, the overall tank height with a set overflow elevation of 570 feet would be 130 feet.

Site Access Requirements

Due to the proximity of the existing residential neighborhood this site has numerous constructability challenges. Permanent site access to the tank site is provided as an access easement from the west, accessed from Highland Estates Place (Rte 10610) between Fairfax County Tax Map parcel 40-3 (36)) parcels 15 and 16. The access easement continues across the southern portion of Fairfax County Tax Map parcel 40-3 (36)) parcel A, which is developed as a stormwater management facility connecting with the tank parcel. This existing easement is inadequate for the demolition of the existing tank and the erection of a new tank in this location. It is assumed that the access to a new tank would be from Hill Place (Route 1130).

Staging and Construction Access Requirements

The site can be accessed via I-66, to Rt. 7 Leesburg Pike, to Dale Drive, to Gordons Road and to Hill Place. Dale Drive, Gordons Road and Hill Place likely would not withstand the heavy truck loading. Following construction, portions these roadways will likely need to be milled and overlaid to restore the roadway pavements.

Hill Place (Route 1130) is not of adequate width to accommodate large trucks and construction equipment, especially if the streets are clogged with parked cars. It may be necessary to designate no parking areas in some zones during working hours to provide ample space for the trucks. A maintenance of traffic plan should be prepared with consideration given to providing residents with additional parking options to restricted parking areas off Hill Place required for truck unloading.

The site will need to be fenced off to provide a public exclusion zone for protection from cutting and welding debris hazards. Offsite parking for construction workers and storage of materials may be necessary. A shroud will be required for tank painting.

A flat site is required for a truck unloading and laydown area at the cul-de-sac at the end of Hill Place. Use of the existing tank access easement off Highlands Estates Place does not accommodate heavy truck access. The heavy trucks would pull into the laydown area to unload and would be required to execute a three-point turn to turn around on the site.

The construction specifications will likely need to include additional provisions beyond the minimum required by the Zoning Ordinance to limit noise and dust during tank construction. For example, an electric power service meter may be provided to reduce noise instead of utilizing an on-site generator set.

Temporary Erosion and Sediment Control Requirements

These measures are expected to include a stabilized construction entrance and perimeter silt/super silt fence. It is anticipated that the approval of the Special Exception to permit construction at this site will entail strict conditions limiting working hours, noise levels and the general construction process.

4.3.3 Stormwater Management Requirements

Water Quality

For redevelopment that results in a net increase in impervious cover over the predevelopment condition, the design criteria for new development shall be applied to the increased impervious area whereby the phosphorus load shall not exceed 0.41 pounds per acre per year and the remainder of the site shall have its phosphorus load reduced at least 20 percent below the predevelopment phosphorus load. Phosphorus loads shall be calculated using the Virginia Runoff Reduction Method.

Water Quality Compliance

Phosphorous removal for water quality compliance can be accomplished by providing onsite BMPs or purchasing offsite nutrient credits as allowed under Article 4. Types of non-proprietary BMPs that can be designed onsite to remove the proposed phosphorus load include bioretention practices, grass channels and dry swales. Sample proprietary BMPs include the Stormtech Isolator Row and Bayfilter systems by ADS among others. Both non-proprietary and proprietary designs shall follow Virginia BMP Clearinghouse and/or County PFM specifications and requirements. Cost for nutrient credits will be based on an assumed unit price of $25,000 per pound of phosphorus, which is consistent with the unit price currently offered by nutrient credit banks in this area.

Water Quantity Compliance (Channel Protection)

Water Quantity Compliance will depend on the approximate dry storage volume required at the Falls Hill site to provide a requisite 1-year, 24-hour detention for channel protection. Existing

offsite SWM pond 1333DP located just north-west of the site could be retrofitted to accommodate this additional dry storage, but this would require permission from DPWES and could be costly as the facility may need to conform to current PFM dam and spillway design standards.

Water Quantity Compliance (Flood Protection)

Currently no drainage system exists on the Falls Hill tank site that can convey proposed concentrated stormwater runoff and tank overflow from the site to the drainage system located downstream of existing SWM pond 1333DP. Stormwater runoff and tank overflow would need to be piped from the site to this drainage system. It is estimated that an 18" RCP could convey proposed stormwater runoff and 10 MGD tank overflow from the site. The capacity of open channels and storm sewer along the drainage system would need to be evaluated from the site to a point downstream where the total drainage area is approximately 270 acres. If any of these systems are determined to be inadequate for capacity then onsite detention and/or offsite drainage improvements could be made to make them adequate. Detailed survey and hydrologic/hydraulic analysis of the entire drainage system would be required before a determination can be made with regard to outfall capacity.

Water Quantity Compliance (2- and 10-year Detention)

A minor net increase in impervious area is expected at the Falls Hill site. Because of this, the dry storage volume required to satisfy 2- and 10-year detention is expected to be minor. It is possible that this site could qualify for a detention waiver provided that the downstream drainage system has adequate capacity.

4.3.4 Environmental Review

A search of Virginia's Dept. of Historic Resources VCRIS database identified two known architectural resources in the vicinity of the project. The Highland View historic site (DHR# 029-0111) is considered eligible for the National Register of Historic Places (NRHP). Although the surrounding area has been altered by recent residential development, the County architectural historian may require a viewshed study to assess the visual impact of a water tower located less than 100' from an NRHP eligible house. A second recorded historic resource within view of site consists of a farmstead located at the bottom of the hill slope along Leesburg Pike. The County may require additional studies to determine the farmstead's NRHP eligibility.

Based on a field and database reviews of the site, there were no jurisdictional wetlands, Chesapeake Bay Resource Protection Areas, or hazardous material concerns on the Falls Hill site. According to the Fish & Wildlife IPaC database, federally threatened Northern Long Eared

Bat (NLEB) was identified as a species that could be potentially affected by the project. The presence of the NLEB has not been documented within the area but based on regulatory guidance the project would be subject to a time of year restriction on tree clearing from April 15th through September 15th unless further studies were performed to document the absence of the NLEB.

Although initial observation and database review did not yield reasonable suspicion that any Recognized Environmental Conditions would be found at the Falls Hill site, a Phase I ESA would be required for property acquired for site access.

4.3.5 Geotechnical Study

A map showing the geotechnical work (yellow flags) that has been completed by ECS within a one-mile radius in the vicinity of the Falls Hill site (red square) is shown in **Figure 4-9**. The Fairfax County Soils Map is shown for the Falls Hill area in **Figure 4-10**.

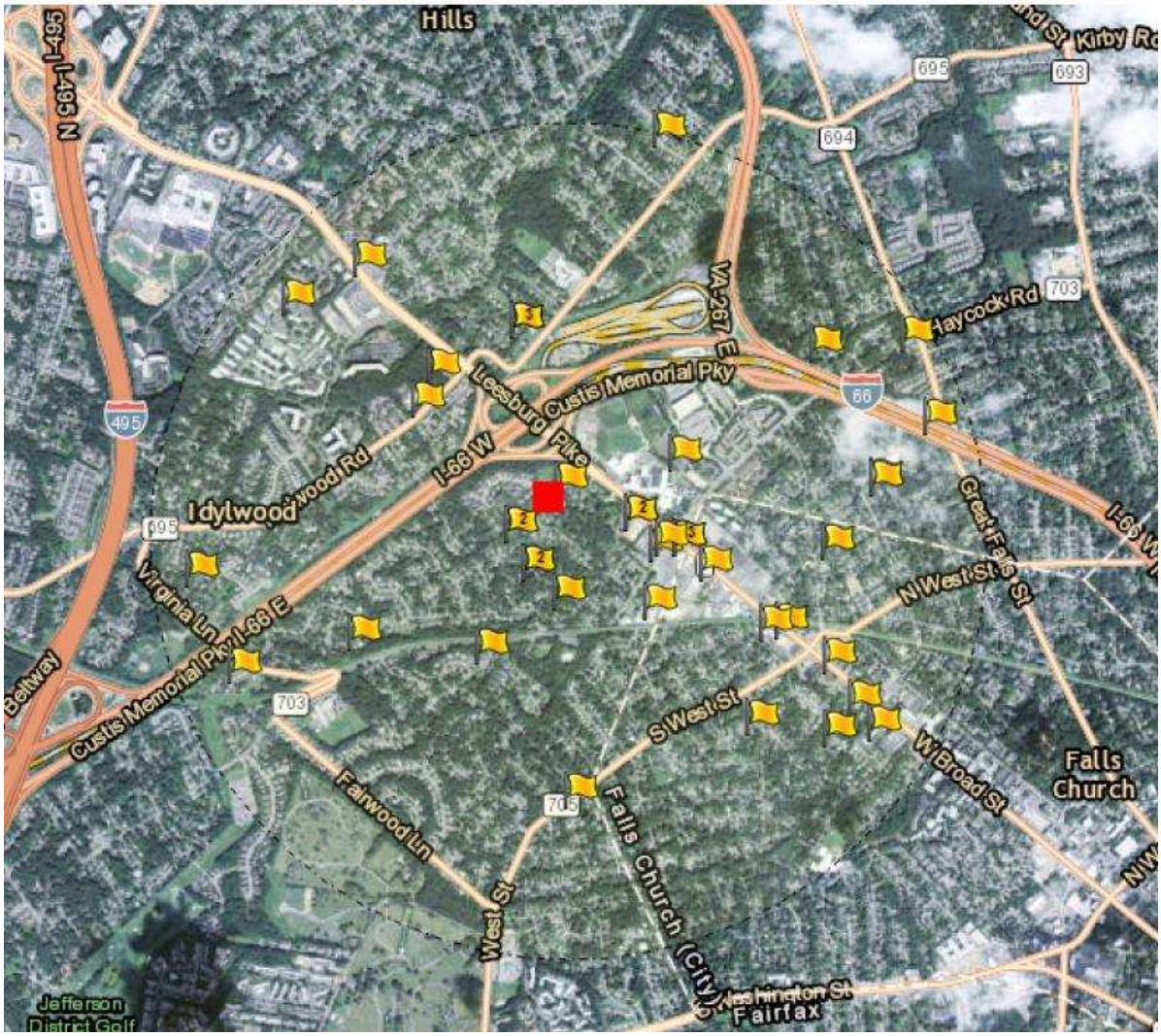


Figure 4-9: ECS Project Experience at Falls Hill Site

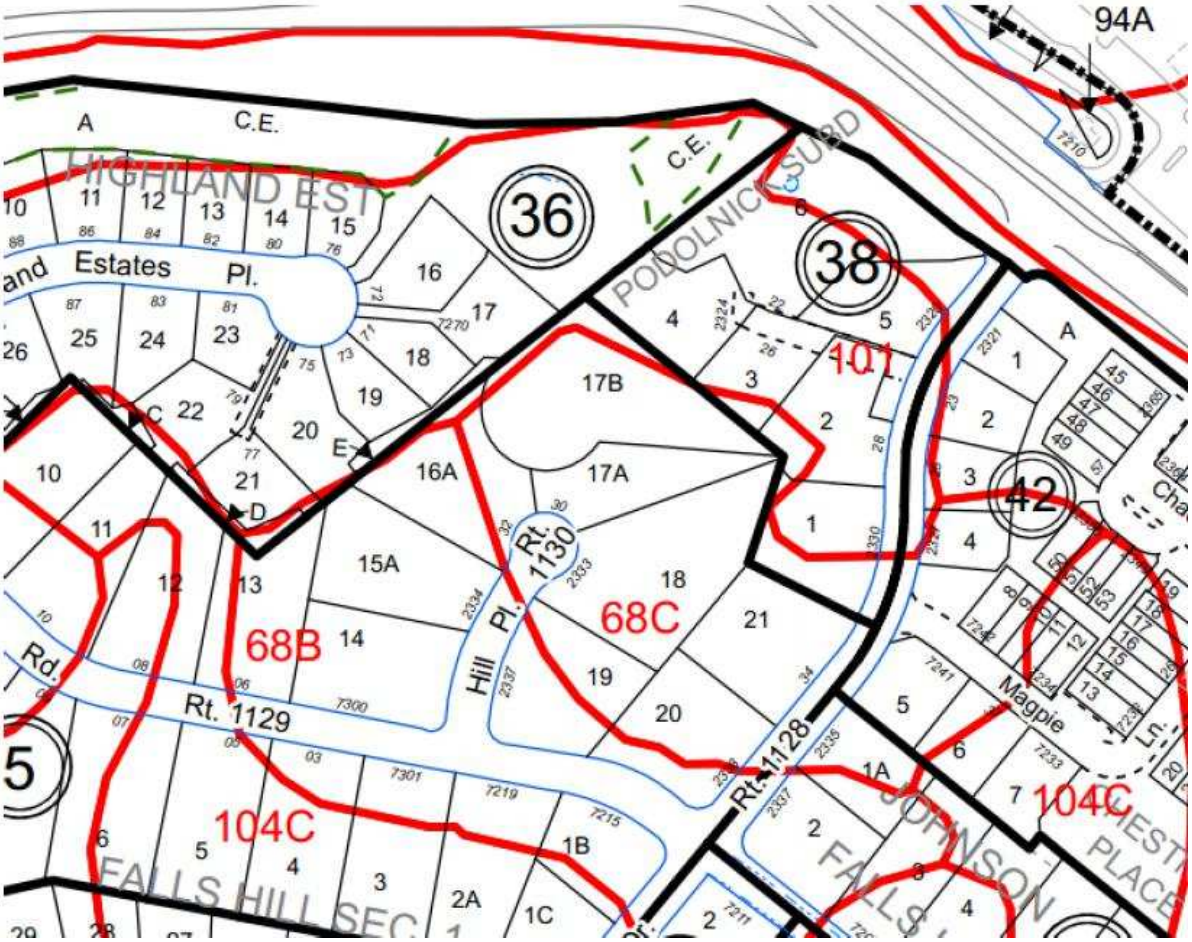


Figure 4-10: Fairfax County Soils Map at Falls Hill Site

Site Descriptions

The Falls Hill site is located near the north end of Hill Place in Falls Church, Virginia. An existing ground storage tank occupies a portion of the existing parcel and is planned to be replaced with a new tank. The site generally slopes from approximately EL. 450 feet on the west side down to approximately EL. 420 in the eastern portion of the site. Based upon our review of historic aerials and older topographic maps, the existing tank structure has been in place since the 1950s-1960s. Development since that time has been generally limited to the areas surrounding the tank, but not on the site itself.

Soils Mapping Information

The surficial soils at the Falls Hill site are mostly mapped as 68B and 68C (Kingstowne-Danripple). According to the "Description and Interpretice Guide to Soils in Fairfax County", the

Kingstowne-Danripple and Urban Land-wheaton soils are rated as Problem Class IV B soils.

The Kingstowne-Danripple complex is described as a mixture of the Kingstowne soils and the Danripple soils. The Kingstowne soils consist of sandy, silty and clayey sediments of the Coastal Plain that have been mixed, graded and compacted during development and construction. Depth to bedrock is typically greater than 20 feet. Danripple soils form in old alluvium on flat stream terraces near the border of the Piedmont and Coastal Plain soils. The topsoil can be gravelly and the subsoil is clay. Depth to bedrock is typically greater than 5 feet. Urban Land-Wheaton complex is a mixture of impervious man made materials and Wheaton soils which consist of sand, silt and clay weathered from granite bedrock. Depth to bedrock is greater than 5 feet and can be found in developed areas of the Piedmont with micaceous schist and phyllite bedrock.

4.3.6 Land and Easement Acquisition

If a new tank were to be constructed on this site, offsite land and permanent easements would need to be acquired from nearby properties. The cost of the required easement is $7,164, and including the cost of ERM's services to acquire the easement from possibly multiple properties, the total cost for acquiring offsite permanent stormwater easements is estimated at $18,714. The total land and easement acquisition costs for this site is estimated at $3,237,325.

4.3.7 Opinion of Probable Construction Cost (OPCC)

The preliminary OPCC cost for the Falls Hill site totaled about $10,036,000. Including a 30% contingency, and rounded to the nearest thousand, total project cost at this site is estimated to be **$13,046,000**.

SECTION 5: SUMMARY AND RECOMMENDATIONS

5.1 Summary of Alternatives

Each alternative storage tank site presents challenges that will need to be addressed during property acquisition, the Special Exception and 2232 approval, and the design and construction processes. In navigating the public hearing process associated with the Special Exception and 2232 approvals, it will be imperative to garner the support of Fairfax County Department of Planning and Zoning staff and the District Supervisor. The new elevated storage tank, given the planned height and desired storage volume, will likely encounter scrutiny from the surrounding local community, owing to neighborhood short- and long-term aesthetic impacts created by the constructed tank.

The feasibility analysis summarized by this report reveals that the three alternative sites have similar characteristics that present equal challenges. These include:

- Special Exception/2232 Approvals: The proposed Category 1 Light Special Exception Public Use will require Special Exception approval from the Board of Supervisors for each site. The required 2232 review would be heard concurrently by the Planning Commission for each site.

- Landscape and Screening Requirements: Each site, given its current zoning and surrounding residential community, requires similar landscape screening and barrier requirements.

- Stormwater Management: Construction onsite BMPs or purchasing offsite nutrient credits to address water quality requirements is required at each of the site alternatives.

- Geotechnical: All three sites are generally similar, both geographically and geologically and appear suitable for the proposed construction. The primary factors affecting the potential foundation design are maximum anticipated loading, total settlement tolerances and the subsurface soil profile. Once the final site and option is chosen, a geotechnical exploration and report is required based on the type of construction and regardless of the soil class, as defined by Fairfax County.

- Environmental: Based on a field and database reviews of the site, there were no jurisdictional wetlands, Chesapeake Bay Resource Protection Areas, or hazardous material concerns identified at any of the sites. Only the federally threatened Northern

Long Eared Bat (NLEB) was identified as a species that could be potentially affected by the project at each of the sites.

In selecting a site location to advance for further evaluation, the unique characteristics of each site and the opinion of probable construction cost (OPCC) need to be weighed to determine which site presents the best opportunity to address the operational needs of Fairfax Water within the Second High pressure zone. The Evaluation Summary table, attached at the end of this Section, lists many of the items considered at each site. The unique characteristics of each site are summarized as follows:

Powhatan Site: This seven-acre parcel is currently owned by Fairfax Water and appears to be sufficient in size to accommodate the phased construction of up to three 2.5 MG water storage tanks. Thus, this site offers the potential for significant additional water storage, while the other alternative sites are each limited in size to one new 2.5 MG tank. Despite these advantages, this site requires the construction of an initial 14,800 linear feet of new water main at an estimated cost of $7,265,000 for one tank to be operational on this site. Fairfax Water staff indicated additional water main costs required, shown in **Appendix H.** Fairfax Water staff responsible for hydraulic modeling have also indicated that even with these transmission improvements, the other two tank sites considered in this study maintain a hydraulic advantage over the Powhatan tank site, as discussed in **Appendix I**. The total project cost for the construction of one 2.5 MG tank at this site, including only partial water transmission improvements costs, is $19,000,000. This is much higher than the total cost for each of the other alternative sites. Furthermore, there is a potential for conflict with the County's Comprehensive Plan to develop this parcel for public water storage; the need for an amendment to the County's Comprehensive Plan may require further investigation.

Falls Hill Site: While the Falls Hill site avoids the infrastructure improvement costs associated with other candidate sites, it also carries the largest property acquisition costs when compared to other alternatives. Its proximity to an identified historic property presents possible additional difficulties in achieving the zoning approvals, especially given the aesthetic impacts to the neighborhood with the large increase of height and mass of the proposed tank structure as compared to the existing tank. The total project cost for the construction of a single 2.5 MG tank at this site is estimated at approximately $13,046,000.

Poplar Heights Site: Like the Falls Hill site, both options at the Poplar Heights site carry significant land acquisition costs to make it a viable site location. While the site acquisition costs are less than those of the Falls Hill site, the required infrastructure improvements to allow the tank to be used effectively offsets a portion of the savings from property acquisition costs. This site requires the construction of approximately 3,050 linear feet of new water main at an

estimated cost of $1,150,000, as estimated by Fairfax Water during the course of this evaluation. However, proposed Option 2 for locating a single 2.5 MG elevated tank at the Poplar Heights site near the existing radio tower has a total project cost of approximately $9,571,000 (not including land acquisition costs at this site). The land acquisition costs for tank construction at this site are anticipated to be less than those of the Falls Hill site, making the Poplar Heights site less expensive than either the Falls Hill or Powhatan sites. In Dewberry's opinion, a tank at the Poplar Heights site presents the least perceived impact to the adjacent neighborhood relative to the site locations considered in this study, due to the nearby existing radio tower and the similar heights of the existing and proposed tanks. The adjacent radio antenna tower at Poplar Heights also mitigates the additional aesthetic impact of the proposed elevated tank, and would require less buffer area next to the radio tower. While the volume of the proposed tank is much larger, its height is similar to that of the existing tank. The height of the new tank at this location is approximately 90 feet tall to the overflow elevation compared to 128 feet tall at Falls Hill and 151 feet tall at Powhatan.

5.2 Recommendations

Weighing the unique characteristics of the alternative sites and the estimated opinion of probable total cost for each alternative, Dewberry recommends that Poplar Heights, Option 2 be advanced for further study. The proposed use appears to be more harmonious with the neighboring properties when compared to the other site alternatives, and will not adversely affect the use of the neighboring properties to remain in accordance with the applicable zoning district regulations and the adopted Comprehensive Plan. Since the zoning ordinance allows Fairfax Water staff the leeway to analyze whether the proposed project is suitable without identifying specific height and size limitations for the tank, early meetings with Fairfax County's Planning and Zoning staff and the District Supervisor should be conducted to gain their support of the project location, and to identify any additional complications that may not have been identified by this feasibility study. In Dewberry's opinion, the Board's decision will be influenced by

- Precedence established by tank sites elsewhere in the County,
- The opinion of adjacent property owners and active citizen/neighborhood organizations in the vicinity of the project, and
- Proof that feasible and cost-effective alternative solutions do not exist.

EVALUATION SUMMARY

Evaluation Criteria	Powhatan	Poplar Heights (Option 1)	Poplar Heights (Option 2)	Falls Hill
Hydraulic Factors				
Hydraulic Service Deficiencies (1)	Yes	No	No	No
Transmission Main Improvements Required	At least 12,000 feet of 24"	2,700 feet of 16"	2,700 feet of 16"	None
Tank Construction				
Existing tank for demolition	No	Yes	Yes	Yes
Existing cellular antenna	No	Yes	Yes	No
Additional Temporary Access Easement Required	No	No	No	No
Work Area Restrictions	No	Yes	Yes	Yes
Geotechnical Concerns	No	No	No	No
Inadequate Offset to Adjacent Residential	Yes	Yes	Yes	Yes
Long Term Maintenance Concerns	No	Yes (2)	Yes (2)	Yes (2)
Opinion of Probable Construction Cost (including 30% contingency)	At least $19,000,000	$9,761,000	$9,571,000	$13,046,000
Site Work and Permitting				
Existing Zoning Designation	R-1	R-4	R-4	R-1
Further Investigation for Possibility of Comprehensive Plan Amendment	Yes	No	No	No
Special Exception/ 2232 Approval Required	Yes	Yes	Yes	Yes
Transitional Screen Yard Required	Yes (3)	Yes	Yes	Yes
Barrier Required	Yes (4)	Yes (4)	Yes (4)	Yes (4)
Site Plan Approval Required	Yes	Yes	Yes	Yes
Stormwater Management				
Offsite Drainage Easement Required	Yes	No	No	Yes
Offsite Outfall Improvements Required	Yes	Yes	Yes	Yes
Environmental Review				
Jurisdictional Wetlands	No	No	No	No
Chesapeake Bay Resource Protection Areas	No	No	No	No
Cultural Resource Concerns	No	No	No	Yes
Hazardous Material Abatement	No	No (5)	No (5)	No (5)
Time of Year Restrictions for Tree Clearing	Yes	Yes	Yes	Yes
Phase I Environmental Assessment Required	No	Yes	Yes	Yes
Land Acquisition Requirements				
Existing Parcel Area (acres)	7 ac	0.15 ac	0.15 ac	0.8 ac
Property Acquisition Required	No	Yes	Yes	Yes
Opinion of Probable Property Acquisition Costs	$0	TBD	TBD	$3,218,611
Offsite Permanent Easement Acquisition Required	Yes	No	No	Yes
Opinion of Probable Offsite Permanent Easement Acquisition Costs	$19,004	$0	$0	$18,713

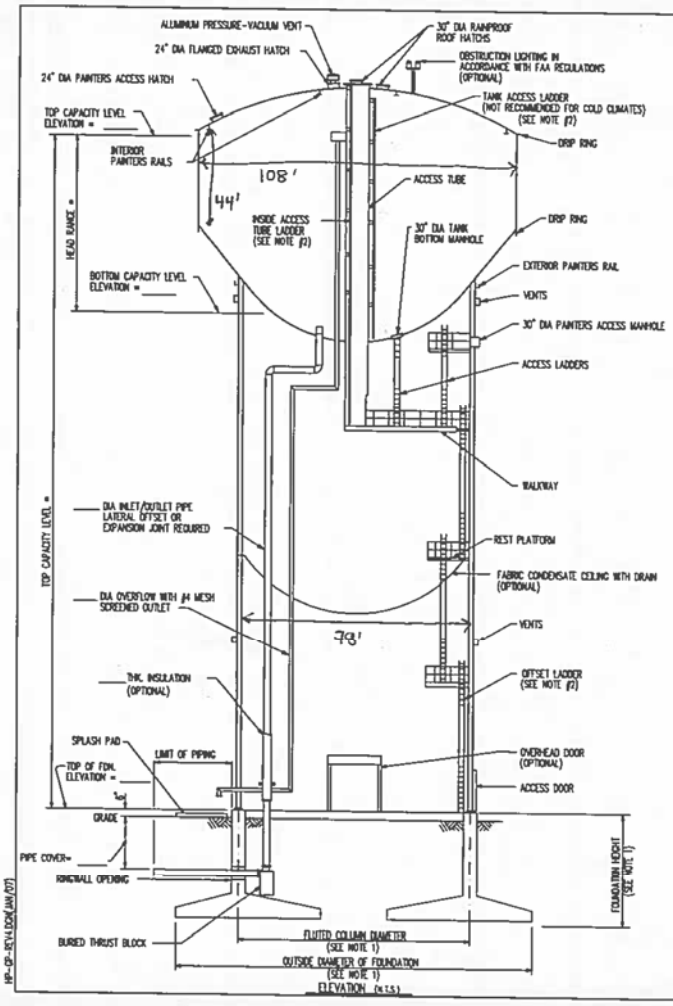
Notes:

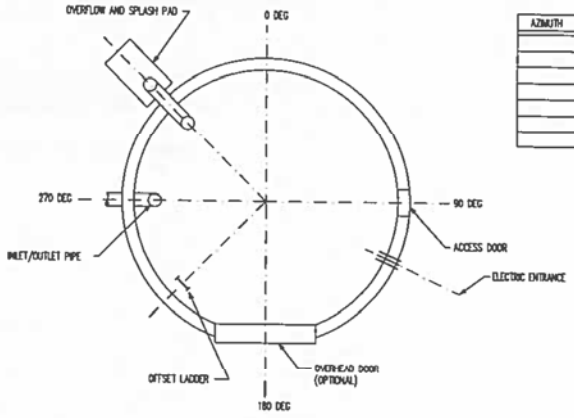
(1) Relative to other sites, as determined by Fairfax Water based on their hydraulic modeling and system requirements.
(2) Shroud required for tank painting.
(3) Modification of transitional screen yard requirement to utilize existing vegetative buffer could be considered.
(4) Modification of barrier requirements in favor of Fairfax Water standard security fence to be considered.
(5) Evaluation of residential buildings to be demolished is required.
(6) All costs are in December 2015 Dollars.

Dewberry

APPENDIX A

TYPICAL 2.5 MG FLUTED COLUMN TANK (FCT) SECTION





ORIENTATION PLAN

AZIMUTH	DESCRIPTION
	NORTH ARROW
	ELECTRIC ENTRANCE
	OVERFLOW SPLASH PAD
	ACCESS DOOR
	INLET/OUTLET PIPE
	SIGN/LOGO

GENERAL NOTES

1. FLUTED COLUMN DIAMETER AND DIMENSIONS OF FOUNDATION SHALL BE DETERMINED BY THE TANK CONTRACTOR BASED UPON THE INFORMATION IN THE GEOTECHNICAL REPORT.
2. A GALVANIZED LADDER SAFETY DEVICE MEETING OSHA STANDARDS SHALL BE PROVIDED WHEN REQUIRED.
3. SEE SPECIFICATIONS FOR OPTIONAL ACCESSORIES AND ALTERNATE ITEMS.

GENERAL PLAN
ELEVATED WATER STORAGE TANK
HYDROPILLAR ®
_____ GALLON CAPACITY

BY _____ DATE _____ PROJECT NO.
CHKD ___ DATE _____ DWG. ____ REV. ____

HP-GP-REV4 (JAN/07)

9D1200 REV 4 (JAN/07)

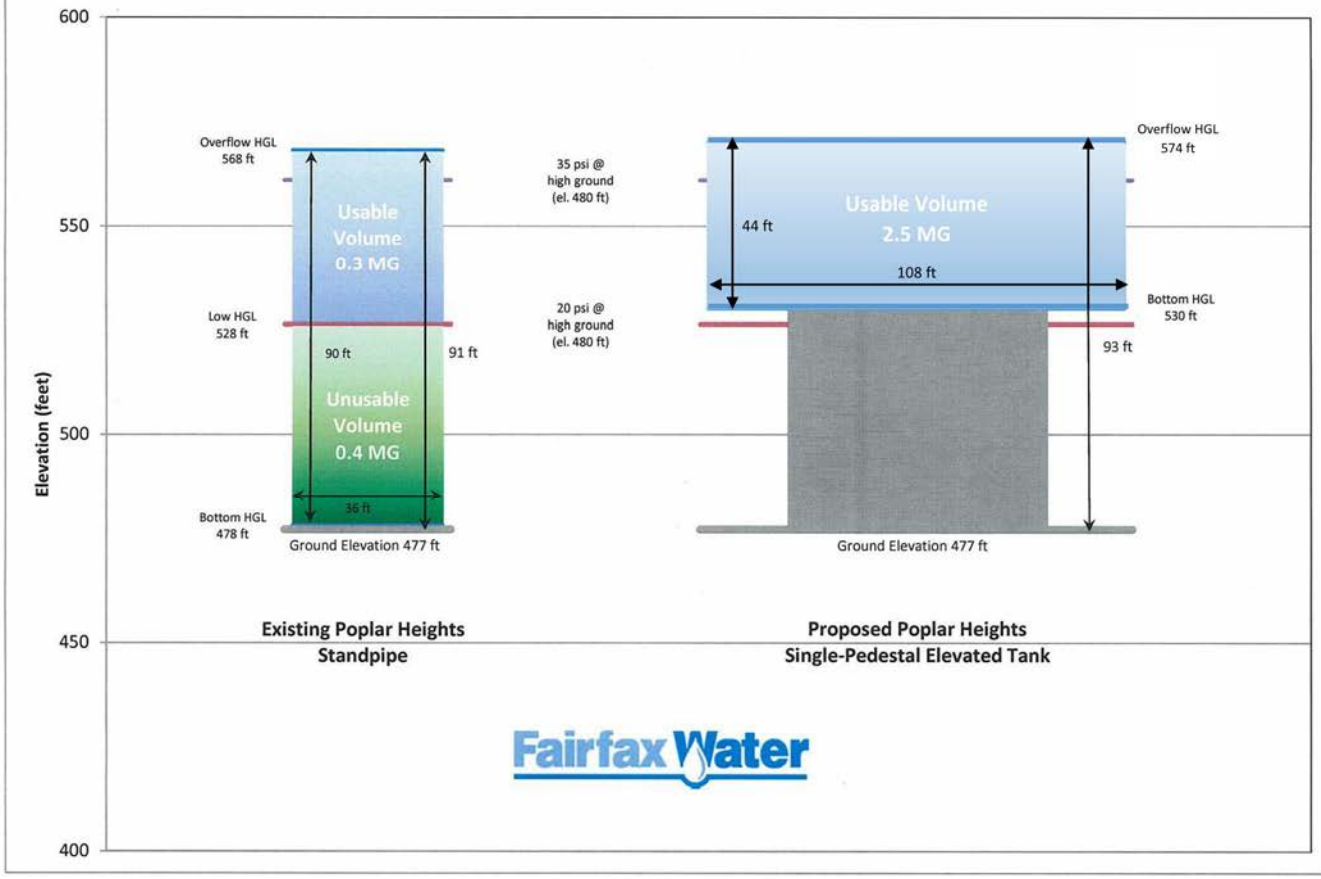
APPENDIX B

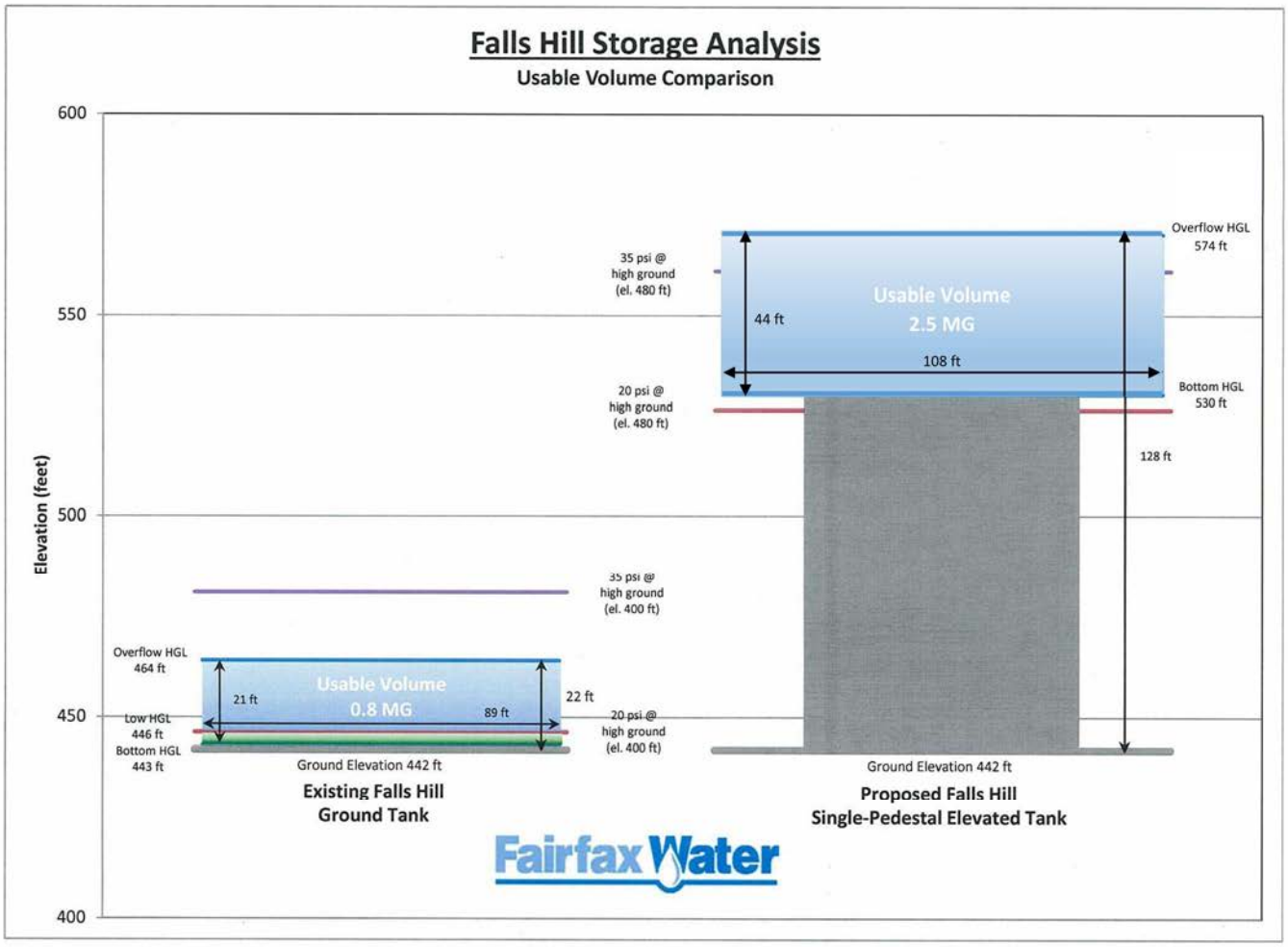
REVISED FAIRFAX WATER POPLAR HEIGHTS

AND FALLS HILL STORAGE ANALYSIS FIGURES

Poplar Heights Storage Analysis

Usable Volume Comparison




Falls Hill Storage Analysis
Usable Volume Comparison
Elevation (feet)
600
550
500
450
400
35 psi @
high ground
(el. 480 ft)
Usable Volume
2.5 MG
44 ft
108 ft
Overflow HGL
574 ft
20 psi @
high ground
(el. 480 ft)
Bottom HGL
530 ft
128 ft
35 psi @
high ground
(el. 400 ft)
Overflow HGL
464 ft
21 ft
Usable Volume
0.8 MG
89 ft
22 ft
Low HGL
446 ft
Bottom HGL
443 ft
20 psi @
high ground
(el. 400 ft)
Ground Elevation 442 ft
Existing Falls Hill
Ground Tank
Ground Elevation 442 ft
Proposed Falls Hill
Single-Pedestal Elevated Tank
Fairfax Water

APPENDIX C

RELEVANT ZONING REGULATIONS

PART 1 9-100 CATEGORY 1 LIGHT PUBLIC UTILITY USES

9-101 Category 1 Special Exception Uses

1. Electric substations and distribution centers including transformer stations.

2. Natural gas, oil and other petroleum product metering, regulating, compressor, control and distribution stations, and local office space incidental thereto and necessary for the operation of such station, but not including any storage facilities.

3. Radio and television broadcasting tower facilities, microwave facilities and satellite earth stations.

4. Sewerage pumping facilities.

5. Telecommunication facilities, including central offices and repeat stations, but not including ordinary telephone or telegraph transmission poles and lines located in public rights-of-way or easements of not more than twenty-five (25) feet in width.

6. Utility transmission facilities, including but not limited to poles, structures, wires, conduits, cables, vaults, laterals, pipes, mains, valves or other similar equipment for the transmission of telephone or other communication, electricity, gas or water.
   For the purpose of this Part, utility transmission facilities shall not include:

   A. Ordinary distribution facilities for delivery of such utilities to customers where such facilities are located in the public right-of-way or are located in easements, or strips of property owned in fee simple not more than twenty-five (25) feet in width; or

   B. Transmission lines approved by the State Corporation Commission pursuant to Sect. 56-46.1 of the Code of Virginia, as amended.

7. Water storage, control, and pumping facilities.

8. Mobile and land based telecommunication facilities.

9-102 Districts in Which Category 1 Uses May be Located

1. Category 1 uses may be permitted by right in the following districts:

   R-12, R-16, R-20, R-30 Districts: Limited to use 8

   All P Districts: All uses when represented on an approved development plan or as permitted by Sect. 2-514

   All C Districts: Limited to uses 5 and 8

   I-1, I-2 Districts: Limited to uses 5 and 8
   I-3, I-4, I-5, I-6 Districts: Limited to uses 1, 2, 4, 5, 6, 7 and 8

2. Category 1 uses may be allowed by special exception in the following districts:

R-A District: Limited to uses 5, 6, 7 and 8
All other R Districts: All uses

All C Districts: All uses

I-I District: Limited to use 4
I-1, I-2 Districts: All uses
I-3, I-4, I-5, I-6 Districts: Limited to uses 3 and 8

9-103 Additional Submission Requirements

In addition to the submission requirements set forth in Sect. 011 above, all applications for Category 1 uses shall be accompanied by the following items:

1. Four (4) copies of a map showing the utility system of which the proposed use will be an integral part, together with a written statement outlining the functional relationship of the proposed use to the utility system.

2. Four (4) copies of a statement, prepared by a certified engineer, giving the exact technical reasons for selecting the particular site as the location for the proposed facility and certifying that the proposed use will meet the performance standards of the district in which located.

9-104 Standards for all Category 1 Uses

In addition to the general standards set forth in Sect. 006 above, all Category 1 special exception uses shall satisfy the following standards:

1. Category 1 special exception uses shall not have to comply with the lot size requirements or the bulk regulations set forth for the zoning district in which located.

2. No land or building in any district other than the I-5 and I-6 District shall be used for the storage of materials or equipment, or for the repair or servicing of vehicles or equipment, or for the parking of vehicles except those needed by employees connected with the operation of the immediate facility.

3. If the proposed location of a Category 1 use is in an R district, there shall be a finding that there is no alternative site available for such use in a C or I district within 500 feet of the proposed location; except that in the case of electric transformer stations and telecommunication central offices, there shall be a finding that there is no alternative site available in a C or I district within a distance of one (1) mile, unless there is a substantial showing that it is impossible for satisfactory service to be rendered from an available location in such C or I district.

4. Before establishment, all uses, including modifications or alterations to existing uses, shall be subject to the provisions of Article 17, Site Plans.

9-105 Additional Standards for Mobile and Land Based Telecommunication Facilities

1. Except for antennas completely enclosed within a structure, all antennas and their supporting mounts shall be of a material or color that closely matches and blends with the structure on which it is mounted.

2. Except for a flag mounted on a flagpole as permitted under the provisions of Par. 2 of Sect. 12-203, no commercial advertising or signs shall be allowed on any monopole, tower, antenna, antenna support structure, or related equipment cabinet or structure.

3. If any additions, changes or modifications are to be made to monopoles or towers, the Director shall have the authority to require proof, through the submission of engineering and structural data, that the addition, change, or modifications conforms to structural wind load and all other requirements of the Virginia Uniform Statewide Building Code.

4. No signals, lights or illumination shall be permitted on an antenna unless required by the Federal Communications Commission, the Federal Aviation Administration or the County, provided, however, that on all antenna structures which exceed 100 feet in height, a steady red marker light shall be installed and operated at all times, unless the Zoning Administrator waives the red marker light requirement upon a determination by the Police Department that such marker light is not necessary for flight safety requirements for police and emergency helicopter operations. All such lights shall be shielded to prevent the downward transmission of light.

5. All antennas and related equipment cabinets or structures shall be removed within 120 days after such antennas or related equipment cabinets or structures are no longer in use.

PART 1 3-100 R-1 RESIDENTIAL DISTRICT, ONE DWELLING UNIT/ACRE

3-101 Purpose and Intent

The R-1 District is established to provide for single family detached dwellings; to allow other selected uses which are compatible with the low density residential character of the district; and otherwise to implement the stated purpose and intent of this Ordinance.

3-102 Permitted Uses

1. Accessory uses and home occupations as permitted by Article 10.
2. Agriculture, as defined in Article 20.
3. Dwellings, single family detached.
4. Public uses.

3-103 Special Permit Uses

For specific Group uses, regulations and standards, refer to Article 8.

1. Group 2 - Interment Uses.
2. Group 3 - Institutional Uses.
3. Group 4 - Community Uses.
4. Group 5 - Commercial Recreation Uses, limited to:
   A. Commercial swimming pools, tennis courts and similar courts
5. Group 6 - Outdoor Recreation Uses.
6. Group 7 - Older Structures.
7. Group 8 - Temporary Uses, limited to:
   A. Carnival, circus, festival, fair, horse show, dog show, steeplechase, music festival, turkey shoot, sale of Christmas trees or other seasonal commodities and other similar activities
   B. Construction material yards accessory to a construction project
   C. Contractors' offices and equipment sheds to include trailers accessory and adjacent to an active construction project
   D. Subdivision and apartment sales and rental offices

E. Temporary dwellings or mobile homes

F. Temporary farmers' markets

G. Temporary mobile and land based telecommunications testing facility

H. Temporary portable storage containers

8. Group 9 - Uses Requiring Special Regulation, limited to:

A. Barbershops or beauty parlors as a home occupation

B. Home professional offices

C. Sawmilling of timber

D. Veterinary hospitals

E. Accessory dwelling units

3-104 Special Exception Uses

For specific Category uses, regulations and standards, refer to Article 9.

1. Category 1 - Light Public Utility Uses.

2. Category 2 - Heavy Public Utility Uses, limited to:

A. Electrical generating plants and facilities

B. Landfills

C. Water purification facilities

3. Category 3 - Quasi-Public Uses, limited to:

A. Alternate uses of public facilities

B. Child care centers and nursery schools

C. Churches, chapels, temples, synagogues and other such places of worship with a child care center, nursery school or private school of general or special education

D. Colleges, universities

E. Congregate living facilities

F. Cultural centers, museums and similar facilities

G. Dormitories, fraternity/sorority houses, rooming/boarding houses, or other residence halls

H. Independent living facilities

I. Medical care facilities

J. Private clubs and public benefit associations

K. Private schools of general education

L. Private schools of special education

M. Quasi-public parks, playgrounds, athletic fields and related facilities

4. Category 4 - Transportation Facilities.

5. Category 5 - Commercial and Industrial Uses of Special Impact, limited to:

A. Baseball hitting and archery ranges, outdoor

B. Bed and breakfasts

C. Commercial off-street parking in Metro Station areas as a temporary use

D. Establishments for scientific research and development

E. Funeral chapels

F. Golf courses, country clubs

G. Golf driving ranges

H. Kennels, animal shelters

I. Marinas, docks and boating facilities, commercial

J. Miniature golf courses ancillary to golf driving ranges

K. Offices

L. Plant nurseries

M. Veterinary hospitals, but only ancillary to kennels

6. Category 6 – Miscellaneous Provisions Requiring Board of Supervisors' Approval:

Refer to Article 9, Special Exceptions, Part 6, Miscellaneous Provisions Requiring Board of Supervisors' Approval, for provisions which may qualify or supplement these district regulations.

3-105 Use Limitations

1. No sale of goods or products shall be permitted, except as accessory and incidental to a permitted, special permit or special exception use.

2. All uses shall comply with the performance standards set forth in Article 14.

3. Cluster subdivisions may be permitted in accordance with the provisions of Sect. 9-615.

3-106 Lot Size Requirements

1. Minimum district size for cluster subdivisions: 10 acres

2. Average lot area: No Requirement

3. Minimum lot area

   A. Conventional subdivision lot: 36,000 sq. ft.

   B. Cluster subdivision lot: 25,000 sq. ft.

4. Minimum lot width

   A. Conventional subdivision lot:

      (1) Interior lot - 150 feet

      (2) Corner lot - 175 feet

   B. Cluster subdivision lot:

      (1) Interior lot - No Requirement

      (2) Corner lot - 125 feet

5. The minimum district size requirement presented in Par. 1 above may be waived by the Board in accordance with the provisions of Sect. 9-610.

3-107 Bulk Regulations

1. Maximum building height

   A. Single family dwellings: 35 feet

   B. All other structures: 60 feet

2. Minimum yard requirements

   A. Single family dwellings

(1) Conventional subdivision lot

(a) Front yard: 40 feet

(b) Side yard: 20 feet

(c) Rear yard: 25 feet

(2) Cluster subdivision lot

(a) Front yard: 30 feet

(b) Side yard: 12 feet, but a total minimum of 40 feet

(c) Rear yard: 25 feet

B. All other structures

(1) Front yard: Controlled by a 50° angle of bulk plane, but not less than 40 feet

(2) Side yard: Controlled by a 45° angle of bulk plane, but not less than 20 feet

(3) Rear yard: Controlled by a 45° angle of bulk plane, but not less than 25 feet

3. Maximum floor area ratio:

A. 0.15 for uses other than residential or public

B. 0.20 for public uses

3-108 Maximum Density

1. Conventional subdivisions: One (1) dwelling unit per acre.

2. Cluster subdivisions: 1.1 dwelling units per acre for cluster subdivisions approved by special exception and one (1) dwelling unit per acre for cluster subdivisions that are the result of a proffered rezoning from a district that allows a permitted maximum density of less than one (1) dwelling unit per acre.

3-109 Open Space

In subdivisions approved for cluster development, 30% of the gross area shall be open space.

3-110 Additional Regulations

1. Refer to Article 2, General Regulations, for provisions which may qualify or supplement the regulations presented above, including the shape factor limitations contained in Sect. 2-401. The shape factor limitations may be modified by the Board in accordance with the provisions of Sect. 9-626.

2. Refer to Article 11 for off-street parking, loading and private street requirements.

3. Refer to Article 12 for regulations on signs.

4. Refer to Article 13 for landscaping and screening requirements.

5. Refer to Article 17 for uses and developments which are subject to site plan provisions.

PART 4 3-400 R-4 RESIDENTIAL DISTRICT, FOUR DWELLING UNITS/ACRE

3-401 Purpose and Intent

The R-4 District is established to provide for single family detached dwellings at densities set forth in Sect. 408 below; to provide for affordable dwelling unit developments; to allow other selected uses which are compatible with the low density residential character of the district; and otherwise to implement the stated purpose and intent of this Ordinance.

3-402 Permitted Uses

1. Accessory uses and home occupations as permitted by Article 10.
2. Affordable dwelling unit developments.
3. Dwellings, single family detached.
4. Public uses.

3-403 Special Permit Uses

For specific Group uses, regulations and standards, refer to Article 8.

1. Group 2 - Interment Uses.
2. Group 3 - Institutional Uses, limited to:
   - A. Churches, chapels, temples, synagogues and other such places of worship
   - B. Churches, chapels, temples, synagogues and other such places of worship with a child care center, nursery school or private school of general or special education
   - C. Convents, monasteries, seminaries and nunneries
   - D. Group housekeeping units
   - E. Home child care facilities
3. Group 4 - Community Uses.
4. Group 5 - Commercial Recreation Uses, limited to:
   - A. Commercial swimming pools, tennis courts and similar courts
5. Group 7 - Older Structures, limited to:
   - A. Antique shops
   - B. Art and craft galleries

C. Rooming houses

D. Summer theatres

6. Group 8 - Temporary Uses, limited to:

A. Carnival, circus, festival, fair, horse show, dog show, steeplechase, music festival, turkey shoot, sale of Christmas trees or other seasonal commodities and other similar activities

B. Construction material yards accessory to a construction project

C. Contractors' offices and equipment sheds to include trailers accessory and adjacent to an active construction project

D. Subdivision and apartment sales and rental offices

E. Temporary dwellings or mobile homes

F. Temporary farmers' markets

G. Temporary mobile and land based telecommunications testing facility

H. Temporary portable storage containers

7. Group 9 - Uses Requiring Special Regulation, limited to:

A. Home professional offices

B. Accessory dwelling units

3-404 Special Exception Uses

For specific Category uses, regulations and standards, refer to Article 9.

1. Category 1 - Light Public Utility Uses.

2. Category 3 - Quasi-Public Uses, limited to:

A. Alternate uses of public facilities

B. Child care centers and nursery schools

C. Churches, chapels, temples, synagogues and other such places of worship with a child care center, nursery school or private school of general or special education

D. Colleges, universities

E. Conference centers and retreat houses, operated by a religious or nonprofit organization

F. Congregate living facilities

G. Cultural centers, museums and similar facilities

H. Dormitories, fraternity/sorority houses, rooming/boarding houses, or other residence halls

I. Independent living facilities

J. Medical care facilities

K. Private clubs and public benefit associations

L. Private schools of general education

M. Private schools of special education

N. Quasi-public parks, playgrounds, athletic fields and related facilities

3. Category 4 - Transportation Facilities, limited to:

A. Electrically-powered regional rail transit facilities

B. Regional non-rail transit facilities

4. Category 5 - Commercial and Industrial Uses of Special Impact, limited to:

A. Commercial off-street parking in Metro Station areas as a temporary use

B. Convenience centers

C. Funeral chapels

D. Golf courses, country clubs

E. Marinas, docks and boating facilities, commercial

F. Offices

G. Plant nurseries

5. Category 6 – Miscellaneous Provisions Requiring Board of Supervisors' Approval:

Refer to Article 9, Special Exceptions, Part 6, Miscellaneous Provisions Requiring Board of Supervisors' Approval, for provisions which may qualify or supplement these district regulations.

3-405 Use Limitations

1. No sale of goods or products shall be permitted, except as accessory and incidental to a permitted, special permit or special exception use.

2. All uses shall comply with the performance standards set forth in Article 14.

3. Cluster subdivisions may be permitted in accordance with the provisions of Sect. 9-615 when the cluster subdivision has a minimum district size of two (2) acres or greater but less than three and one-half (3.5) acres, and with the provisions of Sect. 2-421 when the cluster subdivision has a minimum district size of three and one-half (3.5) acres or greater.

3-406 Lot Size Requirements

1. Minimum district size for cluster subdivisions:

   A. Cluster subdivisions containing a minimum district size of two (2) acres or greater but less than three and one-half (3.5) acres shall be subject to special exception approval.

   B. Cluster subdivisions containing a minimum district size of three and one-half acres (3.5) acres or greater shall be subject to approval by the Director.

2. Average lot area

   A. Conventional subdivision lot: 8,800 sq. ft.

   B. Cluster subdivision lot: No Requirement

3. Minimum lot area

   A. Conventional subdivision lot: 8,400 sq. ft.

   B. Cluster subdivision lot approved by the Director: 6,000 sq. ft., except that if any portion of a cluster subdivision lot is located within 25 feet of a peripheral boundary of the cluster subdivision and any portion of any lot located outside of the cluster subdivision that is contiguous to that cluster subdivision's peripheral boundary is zoned to a district that permits a maximum density equal to or less than 4 dwelling units per acre and contains a single family detached dwelling or is vacant, then such cluster subdivision lot shall contain a minimum lot area of 8,000 square feet. Notwithstanding the above, when the contiguous development is zoned to the PDH-4 District or to an R-4 District and is developed with and/or approved for a cluster subdivision, all lots within the proposed cluster subdivision shall contain a minimum lot area of 6,000 square feet.

   C. Cluster subdivision lot approved by special exception: 6,000 sq. ft.

4. Minimum lot width

   A. Conventional subdivision lot:

(1) Interior lot - 70 feet

(2) Corner lot - 95 feet

B. Except as qualified below, cluster subdivision lot approved by the Director:

(1) Interior lot - No Requirement

(2) Corner lot - 70 feet

If any portion of a cluster subdivision lot is located within 25 feet of a peripheral boundary of the cluster subdivision and any portion of any lot located outside of the cluster subdivision that is contiguous to that peripheral cluster subdivision's boundary is zoned to a district that permits a maximum density equal to or less than 4 dwelling units per acre and contains a single family detached dwelling or is vacant, then such cluster subdivision lot shall contain a minimum lot width of 70 feet for interior lots and 95 feet for corner lots. Notwithstanding the above, when the contiguous development is zoned to the PDH-4 District or to an R-4 District and is developed with and/or approved for a cluster subdivision, all lots within the proposed cluster subdivision shall have no minimum required lot width for interior lots and shall contain a minimum lot width of 70 feet for corner lots.

C. Cluster subdivision lot approved by special exception:

(1) Interior lot – No Requirement

(2) Corner lot – 70 feet

3-407 Bulk Regulations

1. Maximum building height

A. Single family dwellings: 35 feet

B. All other structures: 60 feet

2. Minimum yard requirements

A. Single family dwellings

(1) Conventional subdivision lot

(a) Front yard: 30 feet

(b) Side yard: 10 feet

(c) Rear yard 25 feet

(2) Cluster subdivision lot

(a) Front yard: 20 feet

(b) Side yard: 8 feet

(c) Rear yard: 25 feet

B. All other structures

(1) Front yard: Controlled by a 35° angle of bulk plane, but not less than 25 feet

(2) Side yard: Controlled by a 30° angle of bulk plane, but not less than 10 feet

(3) Rear yard: Controlled by a 30° angle of bulk plane, but not less than 25 feet

3. Maximum floor area ratio:

A. 0.30 for uses other than residential or public

B. 0.35 for public uses

3-408 Maximum Density

1. Conventional subdivisions: Four (4) dwelling units per acre.

2. Cluster subdivisions:

A. Four (4) dwelling units per acre for cluster subdivisions approved by the Director in accordance with Sect. 2-421, or that are the result of proffered rezoning from a district that allows a permitted maximum density of less than four (4) dwelling units per acre.

B. Four dwelling units per acre plus one (1) bonus dwelling unit for cluster subdivisions containing a minimum district size of two (2) acres or greater but less than three and one-half (3.5) acres and approved by special exception.

3-409 Open Space

In subdivisions approved for cluster development, 25% of the gross area shall be open space.

3-410 Affordable Dwelling Unit Developments

Affordable dwelling unit developments may consist of single family detached dwelling units, either in a conventional subdivision or cluster subdivision. Cluster subdivisions shall be subject to the approval of the Director in accordance with Sect. 2-421. In addition, single family attached dwelling units are permitted, provided that no more than forty-five (45) percent of the

total number of dwelling units allowed within the development shall be single family attached dwelling units. The following regulations shall apply to dwelling units in affordable dwelling unit developments:

1. Minimum lot area

   A. Single family detached conventional subdivision lot: 6,720 sq. ft.

   B. Single family detached cluster subdivision lot: 4,800 sq. ft., except that if any portion of a cluster subdivision lot is located within 25 feet of a peripheral boundary of the cluster subdivision and any portion of any lot located outside of the cluster subdivision that is contiguous to that cluster subdivision's peripheral boundary is zoned to a district that permits a maximum density equal to or less than 4 dwelling units per acre and contains a single family detached dwelling or is vacant, then such cluster subdivision lot shall contain a minimum lot area of 6,720 square feet. Notwithstanding the above, when the contiguous development is zoned to the PDH-4 District or to an R-4 District and is developed with and/or approved for a cluster subdivision, all lots within the proposed cluster subdivision shall contain a minimum lot area of 4,800 square feet.

   C. Single family attached: No Requirement

2. Minimum lot width

   A. Single family detached conventional subdivision lot:

      (1) Interior lot - 56 feet

      (2) Corner lot - 76 feet

   B. Except as qualified below, single family detached cluster subdivision lot:

      (1) Interior lot - No Requirement

      (2) Corner lot - 56 feet

      If any portion of a cluster subdivision lot is located within 25 feet of a peripheral boundary of the cluster subdivision, and any portion of any lot located outside of the cluster subdivision that is contiguous to that peripheral cluster subdivision's boundary is zoned to a district that permits a maximum density equal to or less than 4 dwelling units per acre and contains a single family detached dwelling or is vacant, then such cluster subdivision lot shall contain a minimum lot width of 56 feet for interior lots and 76 feet for corner lots. Notwithstanding the above, when the contiguous development is zoned to the PDH-4 District or to a R-4 District and is developed with and/or approved for a cluster subdivision, all lots within the proposed cluster subdivision shall have no minimum required lot width for interior lots and shall contain a minimum lot width of 56 feet for corner lots.

   C. Single family attached dwellings: 14 feet

3. Maximum building height

   A. Single family detached dwellings: 35 feet

   B. Single family attached dwellings: 40 feet

4. Minimum yard requirements

   A. Single family detached conventional subdivision lot

      (1) Front yard: 24 feet

      (2) Side yard: 8 feet

      (3) Rear yard: 25 feet

   B. Single family detached cluster subdivision lot

      (1) Front yard: 16 feet

      (2) Side yard: 8 feet

      (3) Rear yard: 25 feet

   C. Single family attached dwellings

      (1) Front yard: Controlled by 15° angle of bulk plane, but not less than 5 feet

      (2) Side yard: Controlled by 15° angle of bulk plane, but not less than 10 feet

      (3) Rear yard: Controlled by 30° angle of bulk plane, but not less than 20 feet

5. Refer to Par. 4 of Sect. 2-307 for provisions that qualify the minimum yard requirements for individual units in single family attached dwellings.

6. All other structures shall be subject to the lot size requirements and bulk regulations of Sections 406 and 407 above.

7. Single family attached dwelling units shall be located so to minimize their impact on single family detached dwelling unit developments located adjacent to the ADU development.

8. The maximum density shall be four and eight-tenths (4.8) dwelling units per acre.

9. Open space

   A. In conventional subdivisions containing both single family detached and attached dwelling units, open space in an amount equivalent to 200 square feet per single

family attached dwelling unit shall be provided and such open space shall be located adjacent to the single family attached dwelling units.

B. In cluster subdivisions with single family detached dwelling units, 22% of the gross area shall be open space. When such developments also contain single family attached dwelling units, within such 22% open space, 200 square feet of open space per single family attached dwelling unit shall be provided adjacent to the single family attached dwelling units.

3-411 Additional Regulations

1. Refer to Article 2, General Regulations, for provisions which may qualify or supplement the regulations presented above, including the shape factor limitations contained in Sect. 2-401. The shape factor limitations may be modified by the Board in accordance with the provisions of Sect. 9-626.

2. Refer to Article 11 for off-street parking, loading and private street requirements.

3. Refer to Article 12 for regulations on signs.

4. Refer to Article 13 for landscaping and screening requirements.

5. Refer to Article 17 for uses and developments which are subject to site plan provisions.

ARTICLE 9

SPECIAL EXCEPTIONS

PART 0 9-000 GENERAL PROVISIONS

9-001 Purpose and Intent

There are certain uses, like those regulated by special permit, which by their nature or design can have an undue impact upon or be incompatible with other uses of land. In addition, there are times when standards and regulations specified for certain uses allowed within a given district should be allowed to be modified, within limitations, in the interest of sound development. These uses or modifications as described may be allowed to locate within given designated zoning districts under the controls, limitations, and regulations of a special exception.

The Board of Supervisors may approve a special exception under the provisions of this Article when it is concluded that the proposed use complies with all specified standards and that such use will be compatible with existing or planned development in the general area. In addition, in approving a special exception, the Board may stipulate such conditions and restrictions, including but not limited to those specifically contained herein, to ensure that the use will be compatible with the neighborhood in which it is proposed to be located. Where such cannot be accomplished or it is determined that the use is not in accordance with all applicable standards of this Ordinance, the Board shall deny the special exception.

9-002 Authorization

In consideration of an application filed with the Zoning Administrator, the Board may authorize the establishment of those special exception uses that are expressly listed in a particular zoning district; provided, however, that no special exception shall be required for a use specifically permitted in a given district, notwithstanding that such use may also be included in a use category available by special exception.

9-003 Limits on Authority

The Board shall have no authority to waive any of the regulations or standards prescribed for any use or purpose for which a special exception is required, however, the Board may modify the additional standards for a special exception use where deemed necessary as long as the resultant development will not adversely affect the use or development of adjacent properties.

9-004 Status of Special Exception Uses

1. Once a special exception has been approved, such use may only be established in accordance with such approval and any site plan, subdivision plat, Building Permit, Residential or Non-Residential Use Permit hereafter submitted for the development or use of the property in accordance with the special exception shall be in substantial conformance with the approved special exception, and no development or use shall be approved by any County official in the absence of such conformance.

2. Once established, the use shall be conducted in substantial conformance with any conditions or restrictions imposed by the Board and all other requirements of this Ordinance. Except as may be permitted under Paragraphs 3 and 4 below, no use shall be

enlarged, expanded, increased in intensity or relocated and no condition of the special exception shall be modified unless an application is made and approved for an amendment to the special exception in accordance with Sect. 014 below or a new special exception is approved.

3. Notwithstanding the above, any modification to an approved and currently valid special exception to provide an accessibility improvement shall be permitted and shall not require approval of an amendment to the special exception or a new special exception.

4. Minor modifications to an approved special exception may be permitted when it is determined by the Zoning Administrator that such are in substantial conformance with the approved special exception and that such: are in response to issues of topography, drainage, underground utilities, structural safety, layout, design, vehicular circulation, or requirements of the Virginia Department of Transportation or Fairfax County; or are accessory uses; or are accessory structures or minor building additions as permitted by Par. 4A(7) or 4B(7) below.

   A. For approved special exceptions for all uses, other than churches, chapels, temples, synagogues and other such places of worship (hereinafter places of worship) and places of worship with a child care center, nursery school or private school of general or special education the modifications shall, in no event:

      (1) Change the amount of land area or permit a more intensive use which shall include but not be limited to an expansion of the hours of operation or an increase in number of seats, dwellings, students or employees from that approved pursuant to the special exception; or

      (2) Result in an increased parking requirement, except for any additional parking which may be required for any building additions or modifications permitted under Par. 4A(7) below; or

      (3) Permit uses other than those approved pursuant to the special exception, except that accessory uses in accordance with this paragraph may be permitted; or

      (4) Reduce the effectiveness of approved transitional screening, buffering, landscaping or open space; or

      (5) Permit changes to bulk, mass, orientation or location which adversely impact the relationship of the development or part thereof to adjacent property; or

      (6) Result in an increase in the amount of clearing and/or grading for a stormwater management facility, including any clearing and/or grading associated with spillways, inlets, outfall pipes or maintenance roads, that reduces non-stormwater management open space, tree save and/or landscaping area on the lot; or

      (7) Include the addition of any building or additions to buildings except that accessory structures clearly subordinate to the use, and minor additions to

buildings may be permitted, provided that the sum total of all such structures or additions shall not exceed the following:

(a) five (5) percent of the approved gross floor area or 500 square feet of gross floor area, whichever is less, when the total gross floor area shown on the approved special exception plat is less than 50,000 square feet; or

(b) one (1) percent of the approved gross floor area when the total gross floor area shown on the approved special exception plat is 50,000 square feet or more; or

(c) 250 square feet of gross floor area of accessory storage structure uses when the total gross floor area shown on the approved special exception plat is 10,000 square feet or less; and

(d) the maximum permitted FAR for the zoning district in which located; or

(e) the maximum density permitted by the approved special exception.

B. For approved special exceptions for places of worship and places of worship with a child care center, nursery school or private school of general or special education, the modifications shall, in no event:

(1) Permit an expansion of the hours of operation from that approved pursuant to the special exception; or

(2) Permit an increase in the number of seats, parking spaces or students, if applicable, which exceeds more than ten (10) percent of the amount approved pursuant to the special exception; or

(3) Permit uses other than those approved pursuant to the special exception, except that accessory uses in accordance with this paragraph may be permitted; or

(4) Reduce the effectiveness of approved transitional screening, buffering, and landscaping or open space; or

(5) Permit changes to bulk, mass, orientation or location which adversely impact the relationship of the development or part thereof to adjacent property; or

(6) Result in an increase in the amount of clearing and/or grading for a stormwater management facility, including any clearing and/or grading associated with spillways, inlets, outfall pipes or maintenance roads, that reduces non-stormwater management open space, tree save and/or landscaping area on the lot; or

(7) Include the addition of any building or additions to buildings except that accessory structures clearly subordinate to the use, and minor additions to buildings may be permitted, provided that:

(a) the sum total of all such structures or additions shall not exceed the greater of 500 square feet of gross floor area, or five (5) percent of the approved gross floor area up to a maximum of 2500 square feet of gross floor area; and

(b) the maximum permitted FAR for the zoning district shall not be exceeded.

C. For all approved special exception uses, any request for an addition shall require the provision of written notice by the requester in accordance with the following:

(1) the notice shall include the letter of request with all attachments as submitted to the Zoning Administrator, a statement that the request has been submitted, and where to call for additional information; and

(2) the notice shall be sent to the last known address of the owners, as shown in the real estate assessment files of the Department of Tax Administration, of all property abutting and across the street from the site, or portion thereof, which is the subject of the request, and shall be delivered by hand or sent by certified mail, return receipt requested.

The request for an addition submitted to the Zoning Administrator shall include: an affidavit from the requester affirming that the required notice has been provided in accordance with the above; the date that the notice was delivered or sent; the names and addresses of all persons notified; and the Tax Map references for all parcels notified. No request for an addition shall be considered by the Zoning Administrator unless the affidavit has been provided in accordance with this paragraph.

When it is determined by the Zoning Administrator that a modification is not in substantial conformance with the approved special exception, such modification shall require the approval of an amendment to the special exception in accordance with Sect. 014 below or a new special exception.

9-005 Establishment of Categories

For purposes of applying specific conditions upon certain types of special exception uses, and for allowing special exception uses to be established only in those zoning districts which are appropriate areas for such uses, all special exception uses are divided into categories of associated or related uses, as hereinafter set forth in this Article 9.

9-006 General Standards

In addition to the specific standards set forth hereinafter with regard to particular special exception uses, all such uses shall satisfy the following general standards:

1. The proposed use at the specified location shall be in harmony with the adopted comprehensive plan.

2. The proposed use shall be in harmony with the general purpose and intent of the applicable zoning district regulations.

3. The proposed use shall be such that it will be harmonious with and will not adversely affect the use or development of neighboring properties in accordance with the applicable zoning district regulations and the adopted comprehensive plan. The location, size and height of buildings, structures, walls and fences, and the nature and extent of screening, buffering and landscaping shall be such that the use will not hinder or discourage the appropriate development and use of adjacent or nearby land and/or buildings or impair the value thereof.

4. The proposed use shall be such that pedestrian and vehicular traffic associated with such use will not be hazardous or conflict with the existing and anticipated traffic in the neighborhood.

5. In addition to the standards which may be set forth in this Article for a particular category or use, the Board shall require landscaping and screening in accordance with the provisions of Article 13.

6. Open space shall be provided in an amount equivalent to that specified for the zoning district in which the proposed use is located.

7. Adequate utility, drainage, parking, loading and other necessary facilities to serve the proposed use shall be provided. Parking and loading requirements shall be in accordance with the provisions of Article 11.

8. Signs shall be regulated by the provisions of Article 12; however, the Board may impose more strict requirements for a given use than those set forth in this Ordinance.

9-007 Conditions and Restrictions

In addition to those standards set forth in this Article, the Board, in approving a special exception, may impose such conditions and restrictions upon the proposed use as it may deem necessary in the public interest to secure compliance with the provisions of this Ordinance and to protect the viability of the implementation of the adopted comprehensive plan. Such conditions or restrictions may include but need not be limited to a time limitation on the length of the exception in accordance with the provisions of Sect. 008 below and may require the posting of a guarantee or bond in a reasonable amount by the applicant.

9-008 Time Limitations, Extensions, Renewals

In addition to the time limits set forth in this Article, the Board may require, as a condition of the approval of any special exception, that it shall be approved for a specified period of time; that it may be subsequently extended for a designated period by the Zoning Administrator; or that it

may be periodically renewed by the Board. The procedure of granting an extension or renewal shall be as presented in Sections 012 and 014 below.

Unless otherwise stipulated by the Board, a specified period of time shall commence on the date of approval of a special exception.

9-009 Application for a Special Exception

1. An application for a special exception may be made by any property owner, owner of an easement, possessor of the right of entry under the power of eminent domain, lessee, contract purchaser, official, department, board or bureau of any government or their agent, or condominium in accordance with the provisions of Sect. 2-518.

2. The application shall be filed with the Zoning Administrator on forms provided by the County. The application shall be complete, and shall be accompanied by those submission requirements set forth in Sect. 011 below, such specified information as may be required for a given category or use, and such additional information as may be required by the Board. The application shall be accompanied by a fee as provided for in Sect. 18-106. No application shall be deemed to be on file with the County until all required submissions have been presented. All applications shall be subject to the provisions of Part 1 of Article 18.

3. The Zoning Administrator shall transmit a copy of every special exception to the Planning Commission. The Planning Commission shall hold a public hearing on each application and shall make recommendations on each application setting forth any conditions or restrictions for consideration by the Board.

4. In addition, the Zoning Administrator shall forward a copy of the application to any other review body as may be specified for a particular use.

5. Every application shall be scheduled for public hearing in a timely manner, and shall be heard in the order in which accepted unless otherwise specified by the Board. All public hearings shall be conducted in accordance with the provisions of Sect. 18-109.

9-010 (Deleted by Amendment #93-248, Adopted July 26, 1993)

9-011 Submission Requirements

All applications for special exception uses shall be accompanied by the following items, except that additional or modified submission requirements are set forth in Part 1 for all Light Public Utility Uses, in Part 2 for all Heavy Public Utility Uses, in Part 3 for all Quasi-Public Uses, in Part 4 for all Transportation Facilities, in Part 5 for certain Commercial and Industrial Uses of Special Impact, in Part 6 for a Cluster Subdivision and Modifications/Waivers/Increases and Uses in a Commercial Revitalization District, and Part 9 of Article 2 for Uses in a Floodplain. Upon receipt of a written request with justification, the Zoning Administrator may modify or waive a submission requirement of Par. 2 below or the archaeological submission requirement of Par. 9 below, if it is determined that the requirement is clearly not necessary for the review of the application.

1. Four (4) copies of an application on forms provided by the County, completed and signed by the applicant.

2. Twenty-three (23) copies of a plat, including any resubmissions of the plat and supporting graphics, drawn to designated scale of not less than one inch equals fifty feet (1" = 50'), certified by a professional engineer, land surveyor, architect or landscape architect licensed by the State of Virginia, presented on a sheet having a maximum size of 24" x 36", and one 8 ½" x 11" reduction of the plat. If the proposal cannot be accommodated on one 24" x 36" sheet at a scale of 1" = 50', a scale not less than 1" = 100' may be used. If presented on more than one (1) sheet, match lines shall clearly indicate where the several sheets join. Such plat shall contain the following information:

   A. Boundaries of entire property, with bearings and distances of the perimeter property lines and of each zoning district.

   B. Total area of the property and of each zoning district in square feet or acres.

   C. Scale and north arrow, with north, to the extent feasible, oriented to the top of the plat and on all supporting graphics.

   D. Location, dimensions and maximum height in feet, including penthouses, of all existing and proposed structures, and if known, the location, dimensions and lighting of all signs, and the construction date(s) of all existing structures and an indication whether they will be retained or demolished.

   E. All required minimum yards to include front, side and rear, and a graphic depiction of the angle of bulk plane, if applicable, transitional yards, and the distances from all existing and proposed structures to lot lines.

   F. Public right(s)-of-way, indicating names, route numbers and width, any required and/or proposed improvements to the public right(s)-of-way and delineation of the existing centerline of all streets abutting the property, including dimensions from the existing centerline to the edge of the pavement and to the edge of the right-of-way.

   G. Proposed means of ingress and egress to the property from a public street(s).

   H. Location of parking spaces, existing and/or proposed, indicating minimum distance from the nearest property line(s), and a schedule showing the number of parking spaces provided and the number required by the provisions of Article 11.

   I. Location of well and/or septic field, or indication that the property is served by public water and/or sewer. Where applicable, a statement from the Health Department that available facilities are adequate for the proposed use.

   J. Approximate location, estimated size of footprint in acres and type of all proposed stormwater management facilities, including the full extent of side slopes, embankments, spillways, dams and approximate water surface elevation for design storms, if applicable. In addition, a preliminary stormwater management plan that

includes information about the adequacy of downstream drainage, including the sufficiency of capacity of any storm drainage pipes and other conveyances into which stormwater runoff will be conveyed. When there is 2500 square feet or more of land disturbing activity on the entire application property, in addition to the above, the preliminary stormwater management plan shall include:

(1) A graphic depicting:

(a) The approximate footprint of the stormwater management facility and, where applicable, the height of the dam embankment and the location of the emergency spillway outlet for each stormwater management facility.

(b) The approximate on-site and off-site areas to be served by each stormwater management facility, along with the acreage draining to each facility.

(c) A preliminary layout of all on-site drainage channels, outfalls and pipes, including inlet and outlet pipes within the stormwater management facility.

(d) The approximate location or alternative locations, if any, of any maintenance access road or other means of access to the stormwater management facility, and the identification of the types of surfaces to be used for any such road.

(e) Proposed landscaping and tree preservation areas in and near the stormwater management facility.

(f) The approximate limits of clearing and grading on-site and off-site for the stormwater management facility, storm drainage pipes, spillways, access roads and outfalls, including energy dissipation, storm drain outlet protection and/or stream bank stabilization measures.

(2) A preliminary stormwater management narrative setting forth the following:

(a) Description of how the detention and best management practice requirements will be met.

(b) The estimated area and volume of storage of the stormwater management facility to meet stormwater detention and best management practice requirements.

(c) For each watercourse into which drainage from the property is discharged, a description of the existing outfall conditions, including any existing ponds or structures in the outfall area. The outfall area shall include all land located between the point of discharge from the property that is located farthest upstream, down to the point where the drainage area of the receiving watercourse exceeds 100 times the area

of that portion of the property that drains to it or to a floodplain that drains an area of at least 1 square mile, whichever comes first.

(d) Description of how the adequate outfall requirements of the Public Facilities Manual will be satisfied.

K. A statement setting forth the maximum gross floor area and FAR proposed for all uses other than residential, and the maximum density of dwelling units, if applicable.

L. Existing topography with a maximum contour interval of two (2) feet and a statement indicating whether it is air survey or field run.

M. A plan showing limits of clearing, existing vegetation, and proposed landscaping and screening in accordance with the provisions of Article 13, to include existing vegetation to be preserved, and when there is 2500 square feet or more of land disturbing activity, an existing vegetation map.

N. Approximate delineation of any floodplain designated by the Federal Emergency Management Agency, United States Geological Survey, or Fairfax County, delineation of any Resource Protection Area and Resource Management Area, and the approximate delineation of any environmental quality corridor as defined in the adopted comprehensive plan, and, if applicable, the distance of any existing and proposed structures from the floodplain, Resource Protection Area and Resource Management Area, or environmental quality corridor.

O. Where applicable, seating capacity, usable outdoor recreation area, emergency access, bicycle parking, fencing, outside lighting, and loudspeakers.

P. Location of all existing utility easements having a width of twenty-five (25) feet or more, and all major underground utility easements regardless of width.

Q. Location of all trails required by the adopted comprehensive plan.

R. Approximate delineation of any grave, object or structure marking a place of burial if known, and a statement indicating how the proposed development will impact the burial site.

S. Seal and signature of professional person certifying the plat.

3. One (1) copy of the current Fairfax County Zoning Section Sheet(s) at a scale of one inch equals five hundred feet (1" = 500'), covering the area within at least a 500 foot radius of the proposed use, showing the existing zoning classification for all land appearing on the map. If more than one (1) Zoning Section Sheet is required to cover the area, such sheets shall be attached so as to create an intelligible map. The boundaries of the subject site shall be outlined in red thereon.

4. Photographs of the application property and abutting properties showing existing structures, terrain and vegetation as viewed from all lot lines and street lines of the

application property. The photographs shall be clearly dated and labeled as to the location and direction from which the photographs were taken. The use of digital photography is preferred in which case a disk containing those digital photographs shall also be provided.

5. For all applications proposing residential development, five (5) copies of a map identifying classification of soil types at a scale of one inch equals five hundred feet (1" = 500'), covering the area within at least a 500 foot radius of the proposed use, showing the existing zoning classification for all land appearing on the map.

6. An affidavit, as presented on an affidavit form approved by the Board of Supervisors and provided by the County, completed, signed by the applicant or the applicant's authorized agent and notarized, including a statement indicating whether or not a member of the Board or Planning Commission or any member of his or her immediate household owns or has any financial interest in the subject land either individually, by ownership in stock in a corporation owning such land, or through an interest in a partnership owning such land. If the applicant's agent completes the application or affidavit on the applicant's behalf, a certified statement from the applicant must be submitted showing the agent's authorization to act in such capacity.

   Prior to each public hearing on the application, the applicant shall reaffirm the affidavit required by this Paragraph in accordance with the reaffirmation procedure outlined on the affidavit form approved by the Board of Supervisors and provided by the County.

   Additionally, for developments which are subject to the provisions of Part 8 of Article 2, the owner and or/applicant shall submit an affidavit which shall include:

   A. The names of the owners of each parcel of the sites or portions thereof, as such terms are defined in Par. 1 of Sect. 2-802; and

   B. The Fairfax County Property Identification Map Number, parcel size and zoning district classification for each parcel which is part of the site or portion thereof.

7. A written statement from the applicant describing the proposed use, giving all pertinent data, including specifically:

   A. Type of operation(s).

   B. Hours of operation.

   C. Estimated number of patrons/clients/patients/pupils/etc.

   D. Proposed number of employees/attendants/teachers/etc.

   E. Estimate of traffic impact of the proposed use, including the maximum expected trip generation and the distribution of such trips by mode and time of day.

   F. Vicinity or general area to be served by the use.

   G. Description of building facade and architecture of proposed new building or additions.

H. A listing, if known, of all hazardous or toxic substances as set forth in Title 40, Code of Federal Regulations Parts 116.4, 302.4 and 355; all hazardous waste as set forth in Virginia Department of Environmental Quality Hazardous Waste Management Regulations; and/or petroleum products as defined in Title 40, Code of Federal Regulations Part 280; to be generated, utilized, stored, treated, and/or disposed of on site and the size and contents of any existing or proposed storage tanks or containers.

I. A statement that the proposed use conforms to the provisions of all applicable ordinances, regulations, adopted standards and any applicable conditions, or, if any waiver, exception or variance is sought by the applicant from such ordinances, regulations, standards and conditions, such shall be specifically noted with the justification for any such modification.

8. A statement which confirms the ownership of the subject property, and the nature of the applicant's interest in same. If the applicant is not the owner of the property involved in the application, evidence must be submitted showing that the applicant will have the right to use the property as proposed. For a condominium, the provisions of Sect. 2-518 shall be applicable.

9. Where applicable, any information as may be required by the provisions of Article 7, including the submission of the Archaeological Survey Data Form and a Phase I Archaeological Survey to the Fairfax County Park Authority as may be required pursuant to Sect. 7-210 for applications resulting in 2500 square feet or more of land disturbing activity and where the application property is located wholly or partially within or contiguous to a Historic Overlay District.

10. An application fee as provided for in Sect. 18-106.

9-012 Extension of a Special Exception

1. A request for an extension of a special exception shall be filed in writing with the Zoning Administrator a minimum of thirty (30) days before the expiration date of the exception unless a lesser time is approved by the Zoning Administrator for good cause shown. The exception shall remain valid until the request for extension is acted upon by the Zoning Administrator.

   Failure to request the extension in a timely manner shall cause the special exception to expire without notice on the expiration date.

2. The Zoning Administrator shall inspect the special exception use; review the applicant's record of compliance with those conditions and restrictions previously imposed by the Board; and make a determination on whether the special exception use still satisfies the provisions of this Ordinance.

3. Upon a favorable finding, the Zoning Administrator shall approve an extension of the special exception for the period of time that may be specified for a particular category or use or that may have been specified by the Board.

4. If it is determined that the use is not in compliance with all conditions and restrictions previously imposed by the Board, the Zoning Administrator shall, depending on the nature of the noncompliance, either deny the request for extension or require the remedy of any violation within a specified time. If the request for extension is denied or the applicant fails to correct the violation within the time specified, the special exception shall expire. The approval of a new special exception shall be required prior to any subsequent reinstatement of the use.

5. If it is determined that the use is no longer allowed as a special exception use in the zoning district in which located, the Zoning Administrator shall deny the request and the special exception shall expire.

   If the use is not in compliance with any other applicable provisions of this Ordinance, the Zoning Administrator shall deny the request and notify the applicant by certified mail, return receipt requested. Within thirty (30) days of receipt, in order to continue the use, the applicant shall file an amendment application for renewal in accordance with the provisions of Sect. 014 below. Failure to file an application in a timely manner shall cause the special exception to expire.

9-013 **(Deleted by Amendment #95-277, Adopted July 31, 1995, Effective August 1, 1995 at 12:01 AM)**

9-014 **Amendment of a Special Exception**

1. Except as provided for in Paragraphs 3 and 4 of Sect. 004 above, an amendment is a request for any enlargement, expansion, increase in intensity, relocation, reduction in land area, modification of any condition of a previously approved and currently valid special exception use or renewal of a currently valid special exception for a new period of time. An amendment application may be filed on a portion of the property subject to a currently valid special exception, upon a determination by the Zoning Administrator that the amendment (a) would not adversely affect the use of the property subject to the special exception but not incorporated into the amendment application, (b) would not inhibit, adversely affect, or preclude in any manner the fulfillment of the special exception conditions applicable to the area not incorporated into the amendment application, and (c) would not increase the overall approved density/intensity for the development. Previously approved special exception conditions which are not subject to the amendment request shall remain in full force and effect. Except as qualified below, the procedure for an amendment of a special exception shall be the same as specified in this Part for the approval of the original exception, to include the imposition of conditions and restrictions, except the Zoning Administrator may waive any submission requirement if such requirement is deemed not necessary for an adequate review of the application.

   An application to renew a special exception use to allow a new period of time for the operation of the use shall be filed prior to the expiration date of the exception and the exception shall remain valid until the application is acted upon by the Board. However, the Board shall not approve a renewal application for a use which is no longer allowed as a special exception use in the zoning district in which located. Failure to apply for renewal in a timely manner shall cause the special exception to expire without notice on the expiration date.

   In reviewing a renewal application, the Board shall review the applicant's record of compliance with those conditions and restrictions previously imposed and determine if the

use still satisfies the provisions of this Ordinance. Upon a favorable finding, the Board may approve the application. If it is determined that the use is not in accordance with all applicable provisions of this Ordinance, the Board may, depending on the nature of the noncompliance, deny the application or for an application solely requesting a new period of time, may impose such conditions and restrictions to ensure that the use will be harmonious with and will not adversely affect the use or development of neighboring properties. No alteration of a structure shall be required if such structure was in conformance with the provisions of this Ordinance, the Building Code and other applicable regulations at the time the special exception was first approved, unless the Board deems such alteration necessary to protect the public health, safety or welfare.

2. For an existing and currently valid special exception use which use is no longer allowed by special exception or special permit in the zoning district in which located, the Board, upon receipt of an application, may review and approve an amendment to said exception, provided such amendment does not permit the use to be enlarged, expanded, increased in intensity, relocated or continued beyond any time limitation specified in the existing exception.

9-015 Expiration of a Special Exception

1. Except for Category 6 waivers, whenever a special exception is approved by the Board, the use authorized thereby shall be established or any construction authorized shall be commenced and diligently prosecuted within such time as the Board may have specified, or, if no such time has been specified, then within thirty (30) months from the approval date of such exception, unless additional time is approved by the Board in accordance with Par. 2 below.

2. The Board may approve a request for additional time, but only in accordance with all of the following:

   A. A request is filed in writing with the Zoning Administrator prior to the expiration date. Such request shall specify the basis for and the amount of additional time requested and shall include an explanation of why the use has not been established or construction commenced and diligently prosecuted in accordance with the time specified in the approval of the special exception. Such explanation may include the occurrence of conditions unforeseen at the time of special exception approval.

   B. It is determined by the Board that the use is in accordance with all applicable provisions of the Zoning Ordinance, unless the Board has specifically provided that an amendment adopted subsequent to the approval of the special exception is not applicable to the request for additional time, and that approval of additional time is consistent with the public interest.

3. If a request is timely filed, the special exception shall remain valid until the request for additional time is acted upon by the Board; however, during this period, the use shall not be established nor shall construction commence.

4. If the use or construction has not commenced in accordance with the above provisions, the special exception shall automatically expire without notice.

9-016 Termination or Revocation of a Special Exception

1. Unless a time limit is specified for a special exception, the same shall be valid for an indefinite period of time, except that if the use or activity should cease for any reason for a continuous period of two (2) years or more, the special exception shall automatically terminate without notice. The approval of a new special exception shall be required prior to any subsequent reinstatement of the use.

2. A special exception shall be revocable by the Board at any time because of the failure of the owner or operator of the use covered by the special exception to comply with the terms or conditions of the special exception.

   Before revoking any special exception, the Board shall conduct a public hearing and provide notice in accordance with the provisions of Sect. 18-110. The Board or its agent shall give the holder of the special exception at least twenty (20) days advance written notice of the hearing date either by certified mail, return receipt requested, or by hand delivery, and the notice shall contain:

   A. The grounds for the proposed revocation of the special exception; and

   B. The date, time and place of the public hearing.

   The above provisions shall remain applicable to a use covered by a special exception which use has, subsequent to the approval of the special exception, been reclassified to a special permit use, until a special permit is approved for the use due to an enlargement, expansion, increase in intensity, relocation or modification of a special exception condition and then the revocation provisions of Sect. 8-016 shall apply.

3. The foregoing provisions shall not be deemed to preclude the use of any other remedy prescribed by law or by this Ordinance with respect to violations of the provisions of this Ordinance.

PART 3 13-300 TRANSITIONAL SCREENING AND BARRIERS

13-301 Purpose and Intent

The purpose and intent of this Part is to promote the development of a harmonious community; to protect the neighborhood character by preserving existing vegetation and requiring the planting and maintenance of vegetative screening and other barriers to lessen the visual and noise impact of a more intensive use on nearby properties. The required vegetative buffer contributes toward attractive and enhanced development design and enhances air and water quality.

13-302 Transitional Screening and Barriers, General Provisions

1. Transitional screening and barriers shall be provided in accordance with the matrix presented at the end of this Article and in accordance with the provisions of this Section and Sections 303 and 304 below.

2. Transitional screening and barriers shall be provided within the zoning district and on the lot of the use indicated in the left column of the matrix where it is contiguous or across the street from land used or zoned for uses indicated across the top of the matrix.

3. Where the structure is to contain more than one use or category of uses as presented in the matrix, the more stringent requirements of the matrix shall apply; provided, however, that the Director may allow the lesser requirements of the matrix upon a finding that the need for the more stringent requirements has been eliminated by the arrangement of the uses.

4. The uses in the matrix are listed in abbreviated form. Other similar uses, as may be included in a listing presented in the district regulations, shall be subject to the same regulations as are presented for a use listed on the matrix.

5. In those instances where a proposed use and/or an existing use on the abutting property is not listed in the matrix, the Director, using the matrix as a guide, shall determine whether or not and to what extent transitional screening and barriers shall be provided.

6. In addition to the standards set forth in Articles 8 and 9 for a particular use, all uses allowed by special permit or special exception in a given district shall be required to provide transitional screening and barriers as determined by the BZA or Board, as the case may be, using the matrix as a guide.

7. In affordable dwelling unit developments which contain a mixture of different dwelling unit types, transitional screening and barriers shall not be required between different dwelling unit types within the affordable dwelling unit development.

8. In a Commercial Revitalization District, transitional screening and barriers shall be provided in accordance with the provisions of that district.

9. In the PTC District, transitional screening and barriers shall be provided in accordance with the provisions of that district.

13-303 Transitional Screening Requirements

1. Barriers shall be generally located between the required transitional screening and the use or activity in connection with which they are required where they will most adequately screen such activities from the existing or proposed first floor level of adjoining development as determined by the Director. Any bracing, supports or posts shall be on the side of the barrier facing the use which must provide the barrier.

2. Where options are presented on the matrix for a type of barrier, such option shall be available to the developer unless otherwise qualified.

3. There shall be three (3) different transitional screening requirements as identified on the matrix, which shall be provided pursuant to Chapter 12 of the Public Facilities Manual and as follows:

   A. Transitional Screening 1 shall consist of an unbroken strip of open space a minimum of twenty-five (25) feet wide and planted with all of the following:

      (1) A mixture of large and medium evergreen trees and large deciduous trees that achieve a minimum ten (10) year tree canopy of seventy-five (75) percent or greater;

      (2) A mixture of trees consisting of at least seventy (70) percent evergreen trees, and consisting of no more than thirty-five (35) percent of any single species of evergreen or deciduous tree; and

      (3) A mixture of predominately medium evergreen shrubs at a rate of three (3) shrubs for every ten (10) linear feet for the length of the transition yard area. The shrubs shall generally be located away from the barrier and staggered along the outer boundary of the transition yard.

   B. Transitional Screening 2 shall consist of an unbroken strip of open space a minimum of thirty-five (35) feet wide and planted with all of the following:

      (1) A mixture of large and medium evergreen trees that achieves a minimum ten (10) year tree canopy of seventy-five (75) percent or greater;

      (2) A mixture of trees consisting of at least seventy (70) percent evergreen trees, and consisting of no more than thirty-five (35) percent of any single species of evergreen or deciduous tree; and

      (3) A mixture of predominately medium evergreen shrubs at a rate of three (3) shrubs for every ten (10) linear feet for the length of the transition yard area. The shrubs shall generally be located away from the barrier and staggered along the outer boundary of the transition yard.

   C. Transitional Screening 3 shall consist of an unbroken strip of open space a minimum of fifty (50) feet wide planted with all of the following:

(1) A mixture of large and medium evergreen trees and large deciduous trees that achieves a minimum ten (10) year tree canopy of seventy-five (75) percent or greater;

(2) A mixture of trees consisting of at least seventy (70) percent evergreen trees, and consisting of no more than thirty-five (35) percent of any single species of evergreen or deciduous tree; and

(3) A mixture of predominately medium evergreen shrubs at a rate of three (3) shrubs for every ten (10) linear feet for the length of the transition yard area. The shrubs shall generally be located away from the barrier and staggered along the outer boundary of the transition yard.

13-304 Barrier Requirements

1. Barriers shall be generally located between the required transitional screening and the use or activity in connection with which they are required where they will most adequately screen such activities from the existing or proposed first floor level of adjoining development as determined by the Director. Any bracing, supports or posts shall be on the side of the barrier facing the use which must provide the barrier.

2. Where options are presented on the matrix for a type of barrier, such option shall be available to the developer unless otherwise qualified.

3. In certain unusual circumstances of topography, or to alleviate certain specific problems, i.e., the blocking of glare, muting of noise, etc., the Director may require the use of an earth berm or more specialized fence material in lieu of, or in combination with, any of the barrier types set forth below.

4. There shall be different barrier requirements as identified on the matrix, which shall be provided as follows:

   A. Barrier A shall consist of a 42-48 inch wall, brick or architectural block faced on the side facing the existing use and may be required to be so faced on both sides as determined by the Director.

   B. Barrier B shall consist of a 42-48 inch solid wood or otherwise architecturally solid fence.

   C. Barrier C shall consist of an evergreen hedge with an ultimate height of at least 42-48 inches, planted size of 36 inches and planted 36 inches on center.

   D. Barrier D shall consist of a 42-48 inch chain link fence and may be required by the Director to have inserts in the fence fabric, to be coated, or to be supplemented by trees and/or shrubs.

   E. Barrier E shall consist of a 6 foot wall, brick or architectural block faced on the side facing the existing use and may be required to be so faced on both sides as determined by the Director.

F. Barrier F shall consist of a 6 foot high solid wood or otherwise architecturally solid fence.

G. Barrier G shall consist of a 6 foot chain link fence and may be required by the Director to have inserts in the fence fabric or to be coated.

H. Barrier H shall consist of one row of 6 foot trees averaging 50 feet on centers, such trees being a variety of types. This requirement may be omitted in cases where the building is 6 feet or less from the property line.

13-305 Transitional Screening and Barrier Waivers and Modifications

Transitional screening and barriers may be waived or modified by the Director in any of the following circumstances. The Director may attach conditions to any waiver or modification which would assure that the results of the waiver or modification would be in accordance with the purpose and intent of this Part.

1. Transitional screening and barriers may be waived or modified between uses that are to be developed under a common development plan in the PDC or PRM Districts or a common development or site plan or series of development or site plans within a PRC District when compatibility between uses has been addressed through a combination of the location and arrangement of buildings or through architectural or landscaping treatments.

2. Where the strict provisions of this Part would reduce the usable area of a lot due to lot configuration or size to a point which would preclude a reasonable use of the lot, transitional screening and/or barriers may be waived or modified by the Director where the side of a building, a barrier and/or the land between that building and the property line has been specifically designed to minimize adverse impact through a combination of architectural and landscaping techniques.

3. Transitional screening may be modified where the building, a barrier and/or the land between that building and the property line has been specifically designed to minimize adverse impact through a combination of architectural and landscaping techniques.

4. The transitional screening yard width and planting requirements may be reduced as much as two-thirds (2/3) where the developer chooses to construct a seven (7) foot brick or architectural block wall instead of the lesser barrier indicated by the matrix. This wall may be reduced to a height of six (6) feet where the Director deems such a height will satisfy the purpose and intent of this Part.

5. Transitional screening and barriers may be waived or modified where the adjoining land is designated in the adopted comprehensive plan for a use which would not require the provision of transitional screening between the land under site plan and the adjoining property.

6. Transitional screening and barriers may be waived or modified where the adjacent property is zoned to allow a use similar to that of the parcel under site plan.

7. Transitional screening and barriers may be waived or modified where the adjoining property is used for any public purpose other than a school or hospital.

8. Transitional screening and barriers may be waived or modified when the adjoining land is used for a sawmilling operation or for a wayside stand.

9. Transitional screening and barriers may be waived or modified where adjacent residential property is used for any use permitted by the Board of Zoning Appeals or the Board of Supervisors as a special permit or special exception use except nursery schools, day care centers, schools of general and special education.

10. Transitional screening may be waived or modified when the adjoining land is an R district and is used for off-street parking as permitted by the provisions of Sect. 9-609.

11. Transitional screening and barriers may be waived or modified where the subject property abuts a railroad or interstate highway right-of-way, except the right-of-way of the Dulles International Airport Access Highway or the combined Dulles International Airport Access Highway and Dulles Toll Road.

12. The Director may waive or modify the barrier requirements where the topography of the lot providing the transitional screening and the lot being protected is such that a barrier would not be effective.

13. The Director may waive or modify the barrier requirements for single family attached dwelling units where a six (6) foot fence has been provided to enclose a privacy yard on all sides, and such fence is architecturally designed and coordinated with landscaping techniques to minimize adverse impact on adjacent properties.

14. Transitional screening and barriers may be waived or modified for any public use when such use has been specifically designed to minimize adverse impact on adjacent properties.

15. In affordable dwelling unit developments, where the strict application of the provisions of this Article would preclude compliance with the provisions of Part 8 of Article 2, transitional screening and/or barriers may be waived or modified.

TRANSITIONAL SCREENING AND BARRIER MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Dwellings, detached																	
2. Dwellings, attached	1 B,A *																
3. Dwellings, multiple family Dwellings, mobile home	1 D,E or F	1															
4. Child care centers Churches, chapels Nursery schools Private schools	1 D,E or F	1 D,E or F	H														
5. Community uses (Group 4)	1 D,E or F	1 D,E or F	1 D,E or F	A,B or C	H				H								
6. Congregate living facilities Medical care facilities	2 D,E or F	2 D,E or F	1 D,E or F														
7. Financial institutions Funeral chapels	1 D,E or F	1 D,E or F	1 B or C	H													
8. Business service & supply service establishments Eating establishments Funeral homes Garment cleaning establishments Kennels Offices Personal service establishments Repair service establishments Retail sales establishments w/out outside display Veterinary hospitals	2 D or F E*	2 D or F E*	1 D or F E*	1 A,B or C	H												
9. Bus, railroad stations Car washes Drive-in financial institutions Drive-through pharmacies Fast food restaurants Plant nurseries Retail sales establishments with outside display Retail sales establishments-large Service stations Service station/mini-marts Truck rental establishments Theatres, to include drive-in motion picture Vehicle light service estab. Vehicle sale & rental estab.	3 E,F or G	3 E,F or G	2 E,F or G	D,E or F	H												
10. Hotels, motels	2 E,F or	2 E,F or	1 E,F or	H	H												

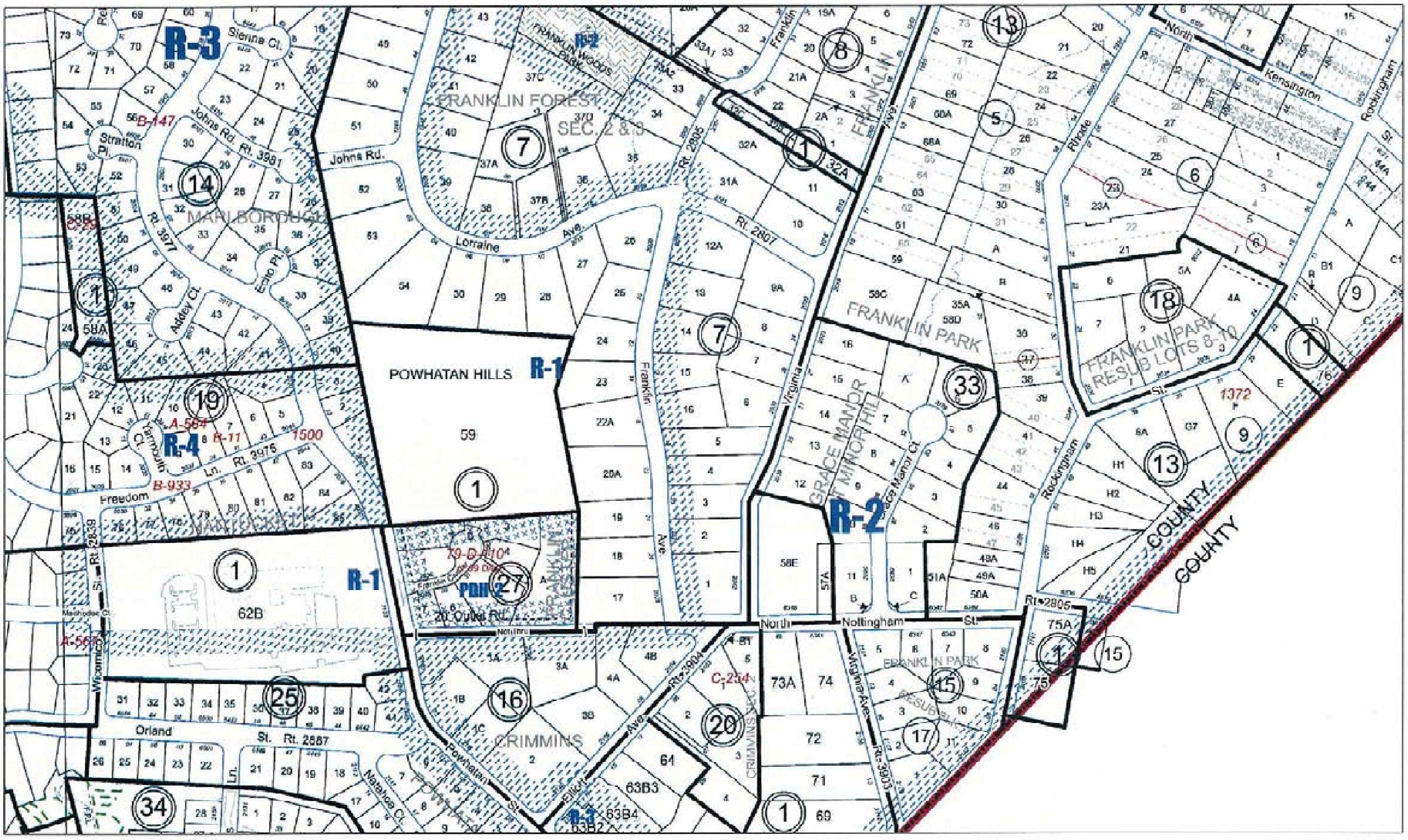
TRANSITIONAL SCREENING AND BARRIER MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	G	G	G														
11. Commercial recreation uses (Group 5)	2 D,E or F	2 D,E or F	1 D,E or F	D,E or F	H												
12. All other quasi-public uses (Category 3)	2 D,E or F	2 D,E or F	2 D,E or F	1 A,B or C	D,E or F												
13. Mini-warehousing estab. Production, processing estab. as permitted in I-3, I-4 Districts Scientific research & dev. estab. Wholesale trade estab.	2 D,E or F	2 D,E or F	2 D,E or F	D,E or F	H	H		H	H								
14. Light public utility uses (Category 1)	3 D,E or F	2 D,E or F	2 D,E or F	1 D,E or F	1 D,E or F	1 A,B or C	1 A,B or C	D,E or F	D,E or F								
15. Contractor's offices & shops Heavy equip. & spec. vehicle sale, rental & service estab. Heavy public utility uses (Category 2) Lumber & bldg. material yards Motor freight terminals New vehicle storage Storage yards Vehicle transportation service estab. Warehousing facilities	3 D,E or F	3 D,E or F	3 D,E or F	1 D,E or F	1 D,E or F	1 A,B or C	1 A,B or C	D,E or F	D,E or F								
16. Production, processing estab. as permitted in I-5, I-6 Districts Junk yards Motor vehicle storage & impoundment yards Recycling centers Vehicle major service estab.	3 D,E or F	3 D,E or F	2 D,E or F	1 D,E or F	1 D,E or F	1 D,E or F	1 D,E or F	1 D,E or F	1 A,B or C	1 A,B or C	1 A,B or C	D,E or F			1 A,B or C		
17. Heavy industrial uses (Category 5) Mixed waste reclamation facilities	3 D,E or F	3 D,E or F	2 D,E or F	1 D,E or F	1 A,B or C	1 D,E or F	1 D,E or F	1 A,B or C	1 A,B or C	1 A,B or C	1 A,B or C	D,E or F			1 D,E or F	1 D,E or F	

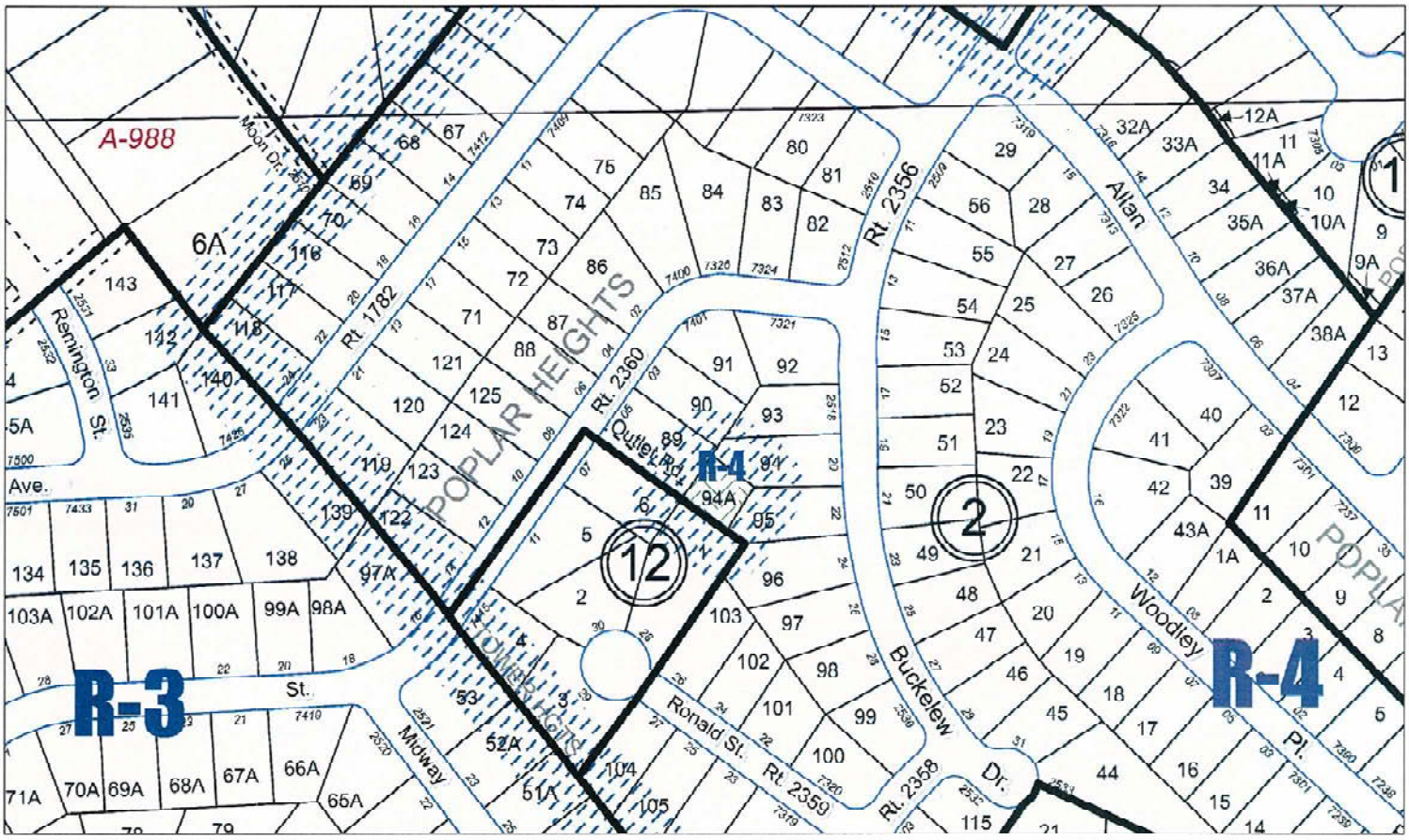
* As may be required by the Director

APPENDIX D

ZONING MAPS OF POTENTIAL SITES



SOURCE: FAIRFAX COUNTY ZONING MAPS (2015)



SOURCE: FAIRFAX COUNTY ZONING MAPS (2015)

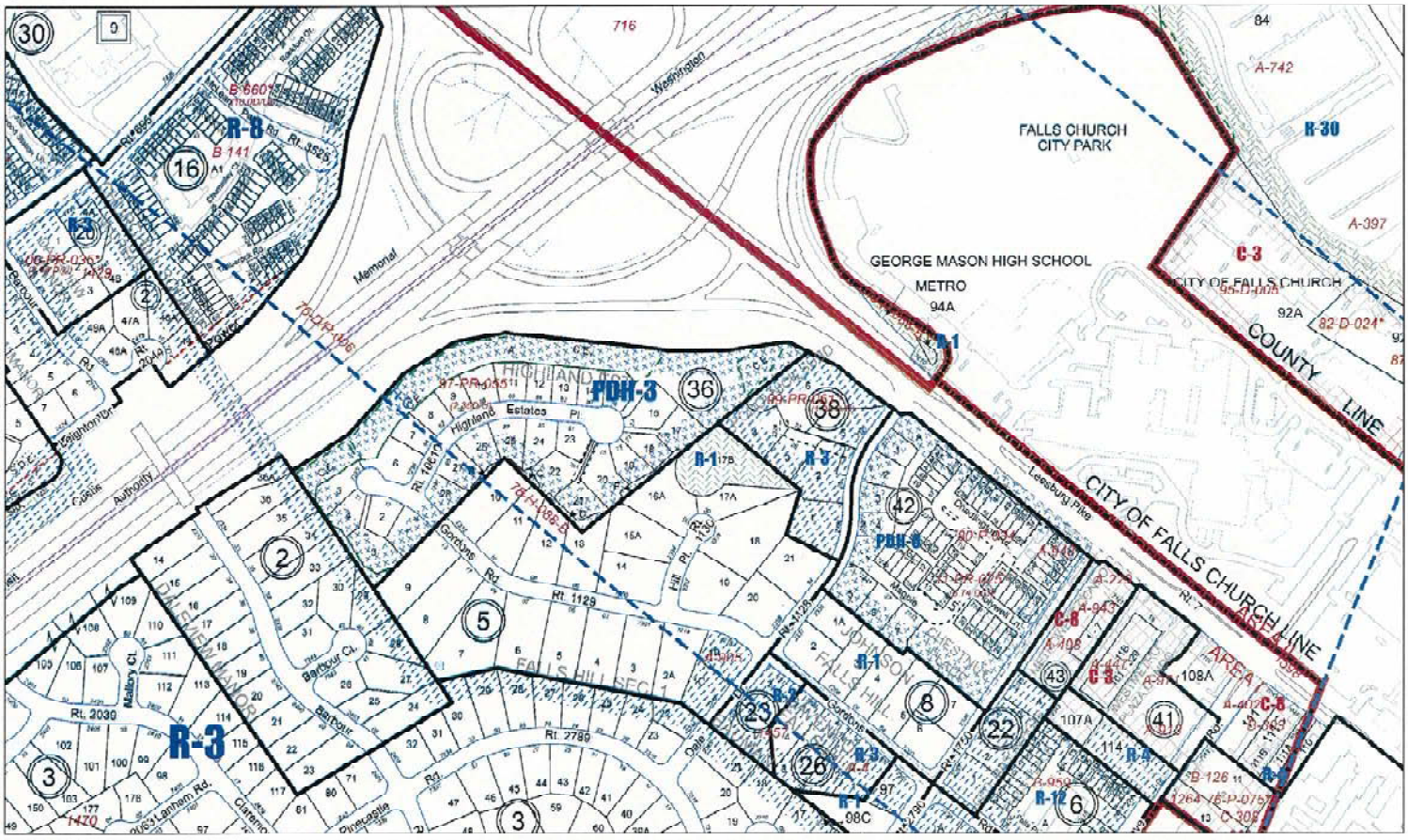
DECEMBER 2015

FAIRFAX WATER
POPLAR HEIGHTS TANK SITE

TAX MAP # 50-1 ((2)) 94A
ZONING

0 200
SCALE IN FEET
North

Dewberry



SOURCE: FAIRFAX COUNTY ZONING MAPS (2015)

DECEMBER 2015

FAIRFAX WATER

FALLS HILL TANK SITE

TAX MAP # 40-3 ((5)) 17B

ZONING

0 400

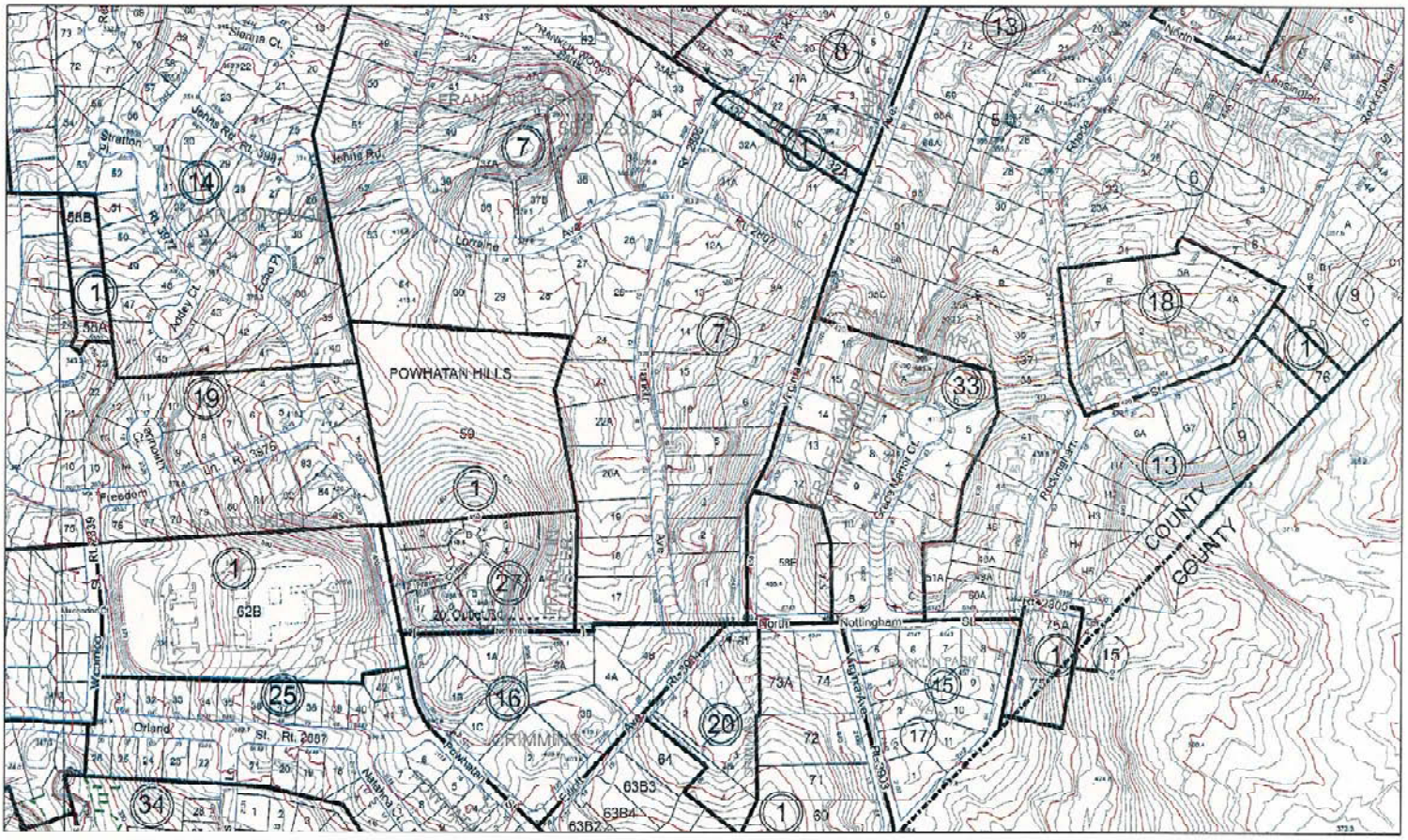
North

SCALE IN FEET

Dewberry

APPENDIX E

CONTOUR MAPS OF POTENTIAL SITES



SOURCE: FAIRFAX COUNTY ZONING MAPS (2015)

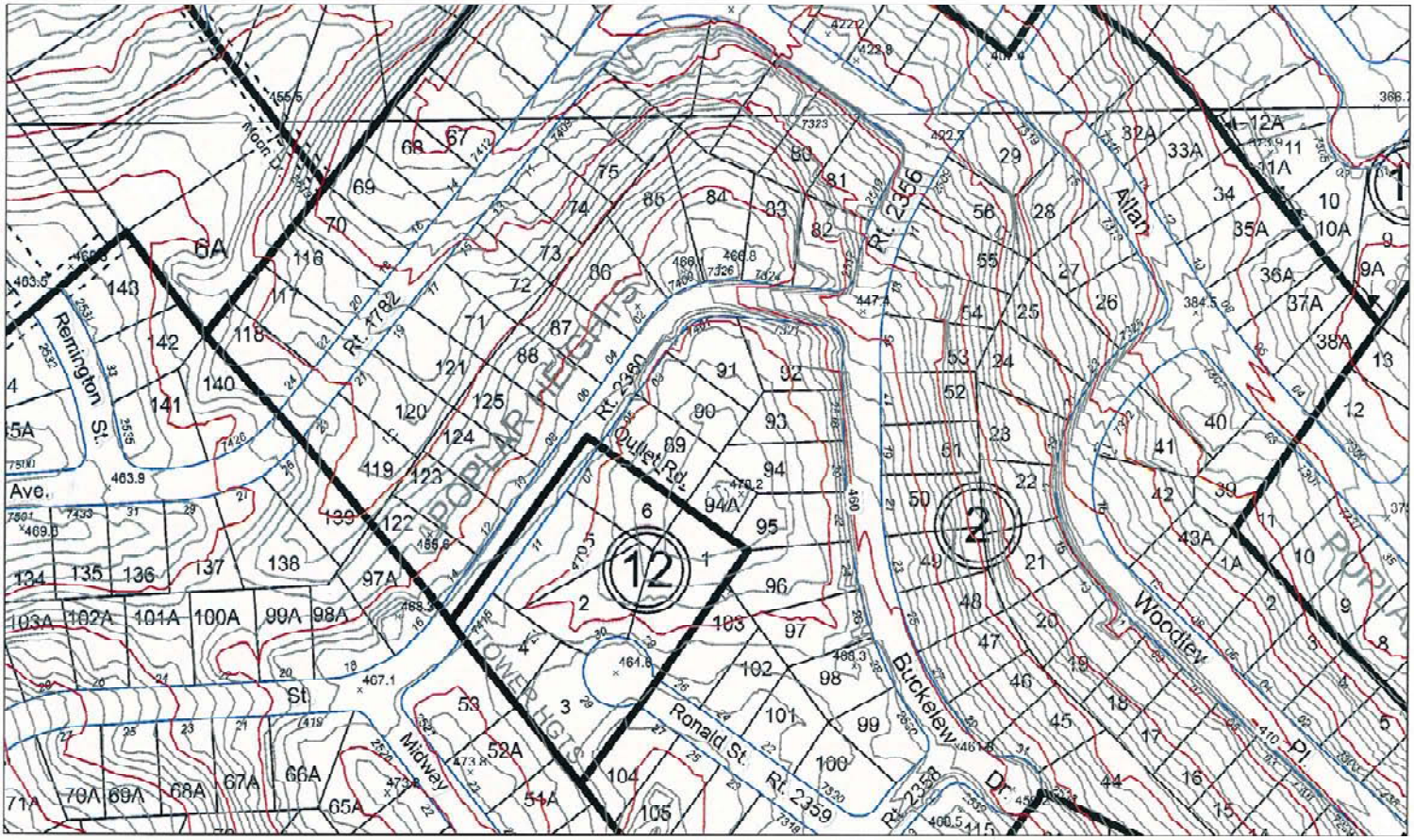
DECEMBER 2015

FAIRFAX WATER
POWHATAN TANK SITE

TAX MAP # 41 1 ((1)) 59
CONTOURS

0 400
North
SCALE IN FEET

Dewberry



SOURCE: FAIRFAX COUNTY ZONING MAPS (2015)

DECEMBER 2016

FAIRFAX WATER

POPLAR HEIGHTS TANK SITE

TAX MAP # 50-1 ((2)) 94A

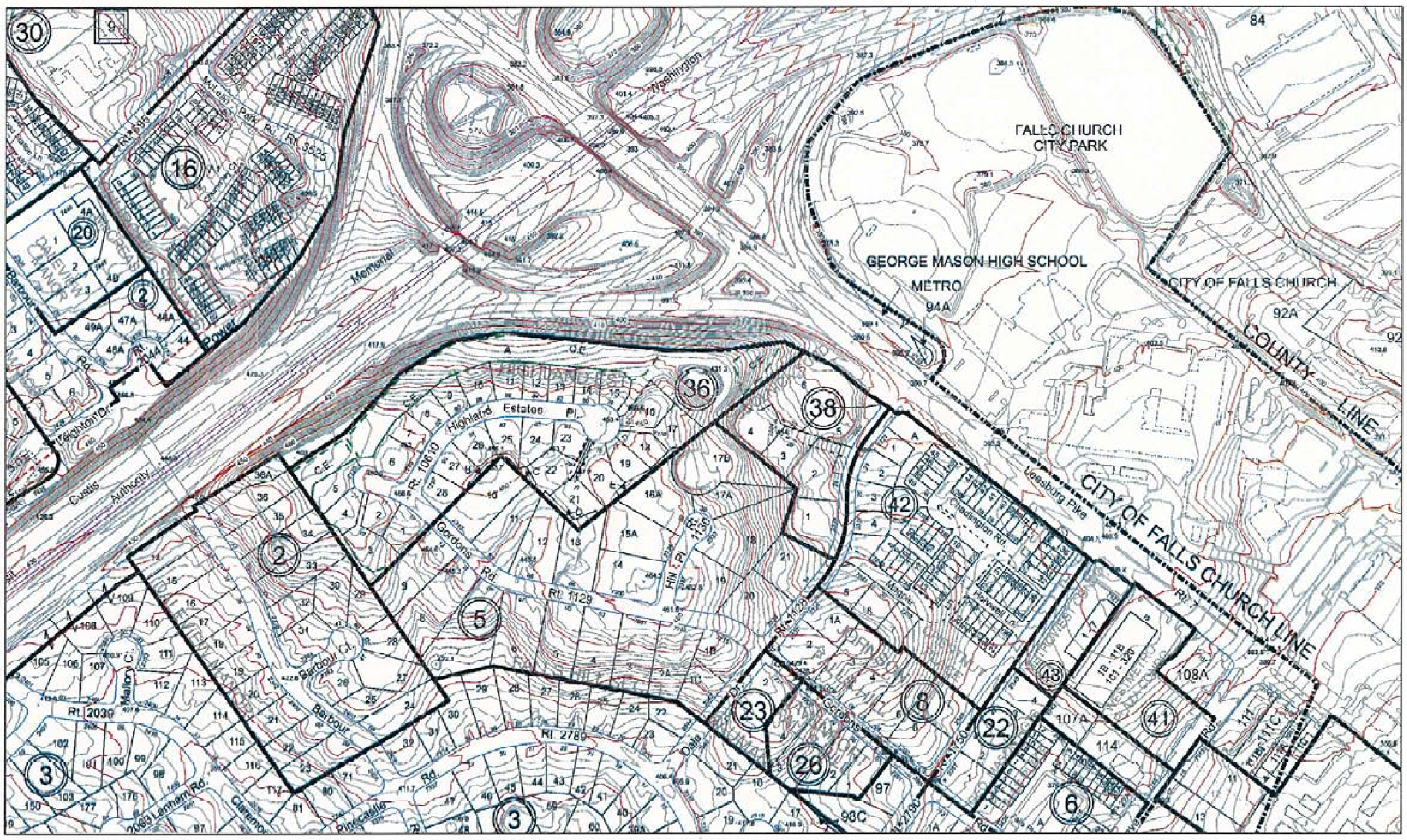
CONTOURS

0 200

SCALE IN FEET

North

Dewberry



SOURCE: FAIRFAX COUNTY ZONING MAPS (2015)

DECEMBER 2015

FARIFAX WATER
FALLS HILL TANK SITE

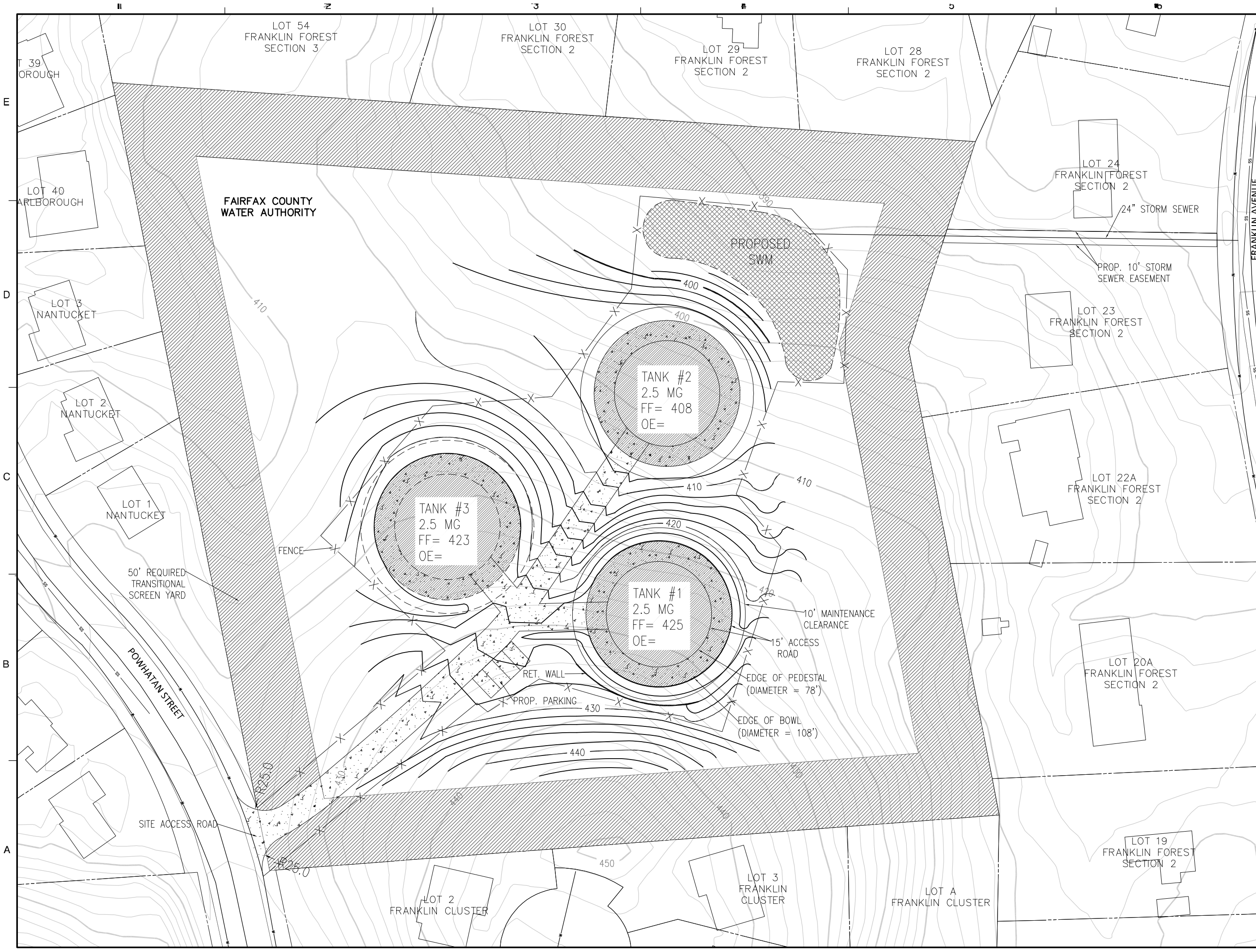
TAX MAP # 40-3 ((5)) 17B
CONTOURS

0 400
SCALE IN FEET
North

Dewberry®

APPENDIX F

PRELIMINARY POWHATAN SITE PLAN



Dewberry®

Dewberry Consultants LLC
8401 ARLINGTON BLVD.
FAIRFAX, VA 22031
703.849.0100 (PHONE)
703.849.0518 (FAX)

POWHATAN
SITE ALTERNATIVE
FAIRFAX WATER
FAIRFAX COUTNY, VA

SEAL

KEY PLAN

SCALE
SCALE IN FEET
1" = 30'
1 INCH

NORTH
VCS-83

No.	DATE	BY	Description

REVISIONS

DRAWN BY
APPROVED BY
CHECKED BY
DATE DECEMBER 2015

TITLE

THREE TANK
SITE PLAN

PROJECT NO. #

SHEET NO. OF XX

Dewberry®

Dewberry Consultants LLC
8401 ARLINGTON BLVD.
FAIRFAX, VA 22031
703.849.0100 (PHONE)
703.849.0518 (FAX)

POWHATAN
SITE ALTERNATIVE
FAIRFAX WATER
FAIRFAX COUTNY, VA

SEAL

KEY PLAN

SCALE
SCALE IN FEET
1" = 30'
1 INCH

NORTH

No.	DATE	BY	Description

REVISIONS

DRAWN BY

APPROVED BY

CHECKED BY

DATE DECEMBER 2015

TITLE

TANK #1
STAGING PLAN

PROJECT NO. #

SHEET NO. OF XX

APPENDIX G

WATER MAIN SYSTEM IMPROVEMENTS MAPS

FAIRFAX WATER
PLANNING AND ENGINEERING DIVISION
PRELIMINARY COST ESTIMATE

Cost Estimate For **Second High Elevated Storage Tank Site Evaluation**
Poplar Heights Required Transmission Mains

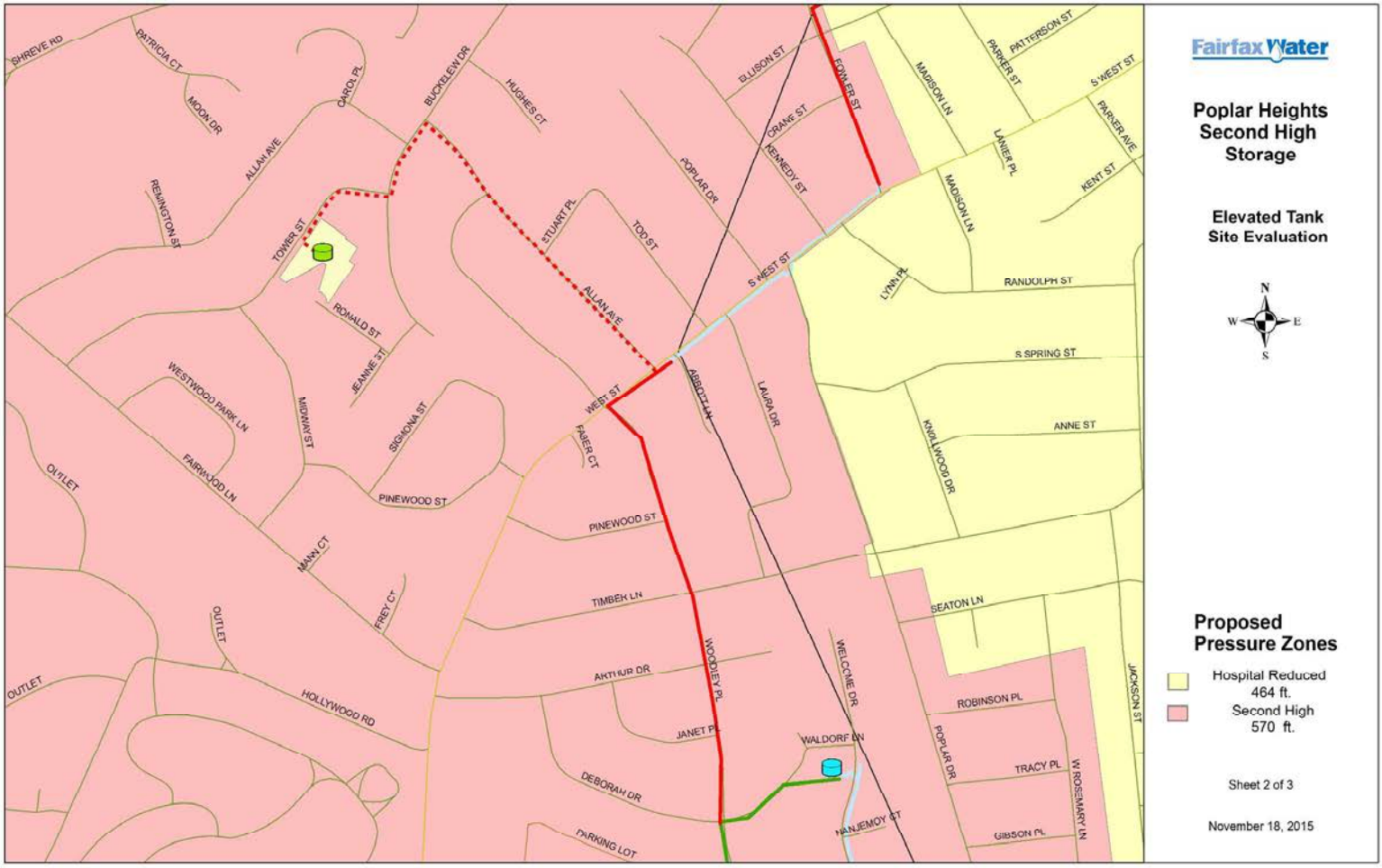
Computed By **JMB** Checked By **RCC**
Approved By _____ Date **11/30/15**

COST OF MINIMUM REQUIRED FACILITIES			
2,700 - 16" DIP at $250/LF w/pavement		$675,000.00	
100 - 12" DIP at $225/LF w/pavement		$22,500.00	
150 - 8" DIP at $190/LF w/pavement		$28,500.00	
100 - 6" DIP at $180/LF w/pavement		$18,000.00	
1 - Std. Conn. Type I @ $3,920/EA		$3,920.00	
7 - Std. Conn. Type II @ $4,780/EA		$33,460.00	
2 - Hydrant @ $5,190/EA		$10,380.00	
2 - 2" Air Release @ $1,650/EA		$3,300.00	
1 - 2" Blow-Off @ $1,460/EA		$1,460.00	
55 Service Reconnections at $1,545/Ea.		$84,975.00	
1,200 SY Additional Mill & Overlay @ $20/SY		$24,000.00	
VDOT Permit		$1,100.00	
	Sub-Total	$906,595.00	
Contingencies @	10%	$90,659.50	
	Sub-Total	$997,254.50	
Administration, Engineering, Inspection & Overhead @	15%	$149,588.18	
	TotalCost Of Minimum Required Facilities	$1,146,842.68	
		USE	$1,150,000.00

Notes:			
1. Costs assume survey and design by BOA Design Consultant.			
2. Costs assume all work performed by WMISC Contractor.			
3. Costs do not include easements and acquisition fees.			
		USE	
		TOTAL COST	$1,150,000.00

APPORTIONMENT OF COST:

Item	FW's Share	Applicant's Share	Total Cost
MINIMUM REQUIRED FACILITIES	$1,150,000.00	---	$1,150,000.00
	---	---	---
TOTAL COST	$1,150,000.00	---	$1,150,000.00
		PRIOR APPROPRIATIONS	
		ADDITIONAL APPROPRIATIONS	$1,150,000.00


SHREVE RD
PATRICIA CT
MOON DR
ALLAN AVE
CAROL PL
BUCKLEIGH DR
HUGHES CT
ELLISON ST
FOWLER ST
PATTERSON ST
PARKER ST
S WEST ST
PARKER AVE
MADISON LN
LANIER PL
KENT ST
CRANE ST
KENNEDY ST
POPLAR DR
REMINGTON ST
TOWER ST
STUART PL
TOD ST
ALLAN AVE
S WEST ST
LYNN PL
RANDOLPH ST
ROHALD ST
JEANNE ST
S SPRING ST
WESTWOOD PARK LN
MIDWAY ST
SIGMONA ST
WEST ST
ABBOTT LN
LAURA DR
KNOLLWOOD DR
ANNE ST
FAIRWOOD LN
FABER CT
OUTLET
PINEWOOD ST
PINEWOOD ST
MANN CT
TIMBER LN
SEATON LN
FREY CT
OUTLET
WOODLEY PL
WELCOME DR
ARTHUR DR
JACKSON ST
OUTLET
HOLLYWOOD RD
ROBINSON PL
JANET PL
WALDORF DR
POPLAR DR
TRACY PL
W ROSEMARY LN
DEBORAH DR
HANJEMOY CT
GIBSON PL
PARKING LOT
Fairfax Water
Poplar Heights
Second High
Storage
Elevated Tank
Site Evaluation
N
W
E
S
Proposed
Pressure Zones
Hospital Reduced
464 ft.
Second High
570 ft.
Sheet 2 of 3
November 18, 2015

FAIRFAX WATER
PLANNING AND ENGINEERING DIVISION
PRELIMINARY COST ESTIMATE

Cost Estimate For **Second High Elevated Storage Tank Site Evaluation**
Powhatan Required Transmission Mains
Computed By **JMB** Checked By **RCC**
Approved By _____ Date **12/2/15**

COST OF MINIMUM REQUIRED FACILITIES			
9,700 - 24" DIP at $335/LF w/pavement		$3,249,500.00	
2,500 - 16" DIP at $250/LF w/pavement		$625,000.00	
500 - 12" DIP at $225/LF w/pavement		$112,500.00	
700 - 8" DIP at $190/LF w/pavement		$133,000.00	
1,400 - 6" DIP at $180/LF w/pavement		$252,000.00	
400 LF - 30" Trenchless Crossing @ $1,200/LF		$480,000.00	
Corrosion Control @ $100,000 LS		$100,000.00	
38 - Std. Conn. Type II @ $4,780/EA		$181,640.00	
4 - Std. Conn. Type II (16"-24") @ $5,400/EA		$21,600.00	
18 - Hydrant @ $5,190/EA		$93,420.00	
5 - 2" Air Release @ $1,650/EA		$8,250.00	
2 - 2" Blow-Off @ $1,460/EA		$2,920.00	
180 Service Reconnections at $1,545/Ea.		$278,100.00	
10,000 SY Additional Mill & Overlay @ $20/SY		$200,000.00	
VDOT Permit		$4,000.00	
	Sub-Total	$5,741,930.00	
Contingencies @	10%	$574,193.00	
	Sub-Total	$6,316,123.00	
Administration, Engineering, Inspection & Overhead @	15%	$947,418.45	
	TotalCost Of Minimum Required Facilities	$7,263,541.45	
		USE	$7,265,000.00

Notes:		
1. Costs assume survey and design by BOA Design Consultant.		
2. Costs assume all work performed by WMISC Contractor.		
3. Costs do not include easements and acquisition fees.		
		USE	
		TOTAL COST	$7,265,000.00

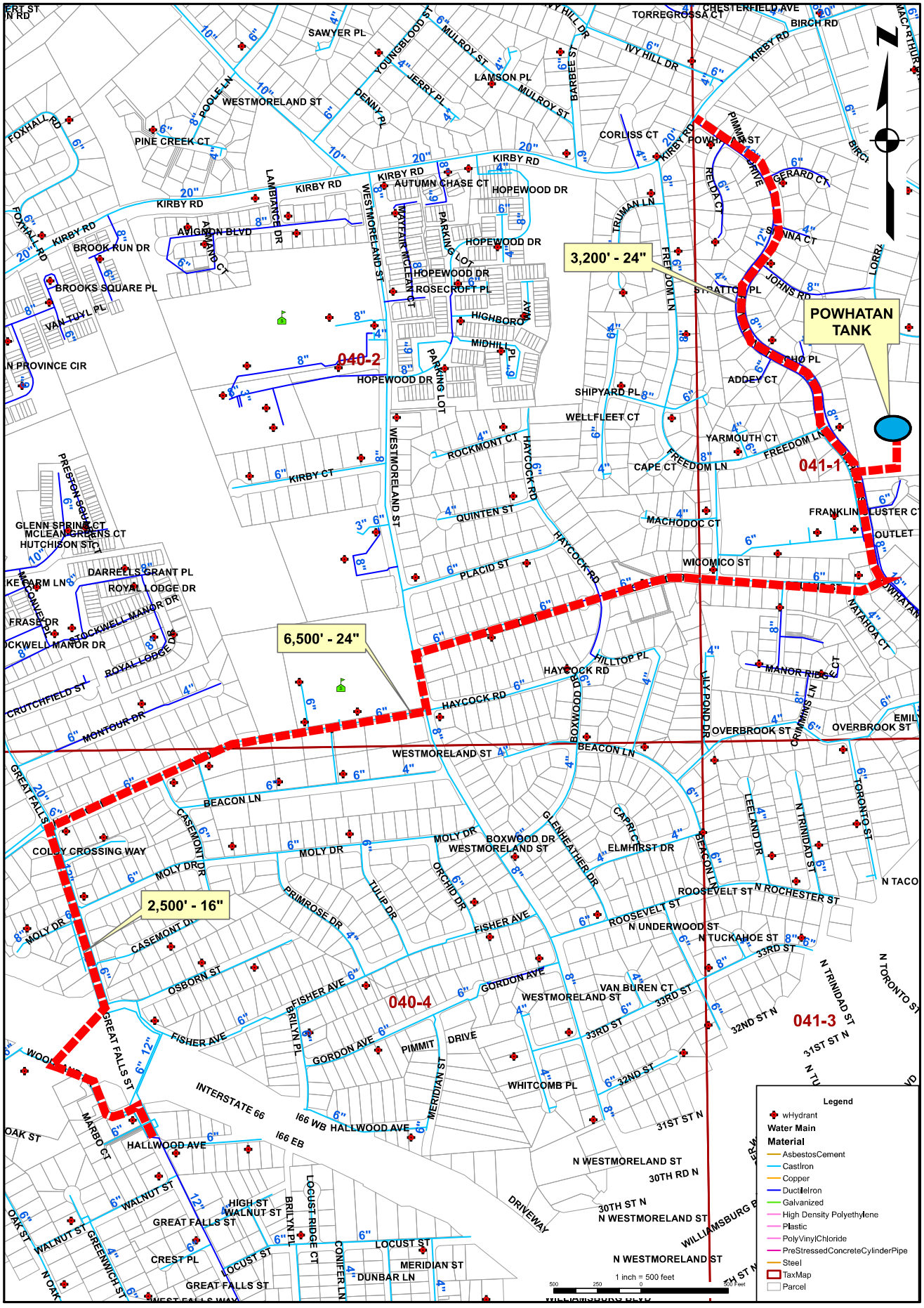
APPORTIONMENT OF COST:

Item	FW's Share	Applicant's Share	Total Cost
MINIMUM REQUIRED FACILITIES	$7,265,000.00	---	$7,265,000.00
	---	---	---
TOTAL COST	$7,265,000.00	---	$7,265,000.00
		PRIOR APPROPRIATIONS	
		ADDITIONAL APPROPRIATIONS	$7,265,000.00

Fairfax Water

POWHATAN
REQUIRED TRANSMISSION MAINS

DECEMBER 2, 2015

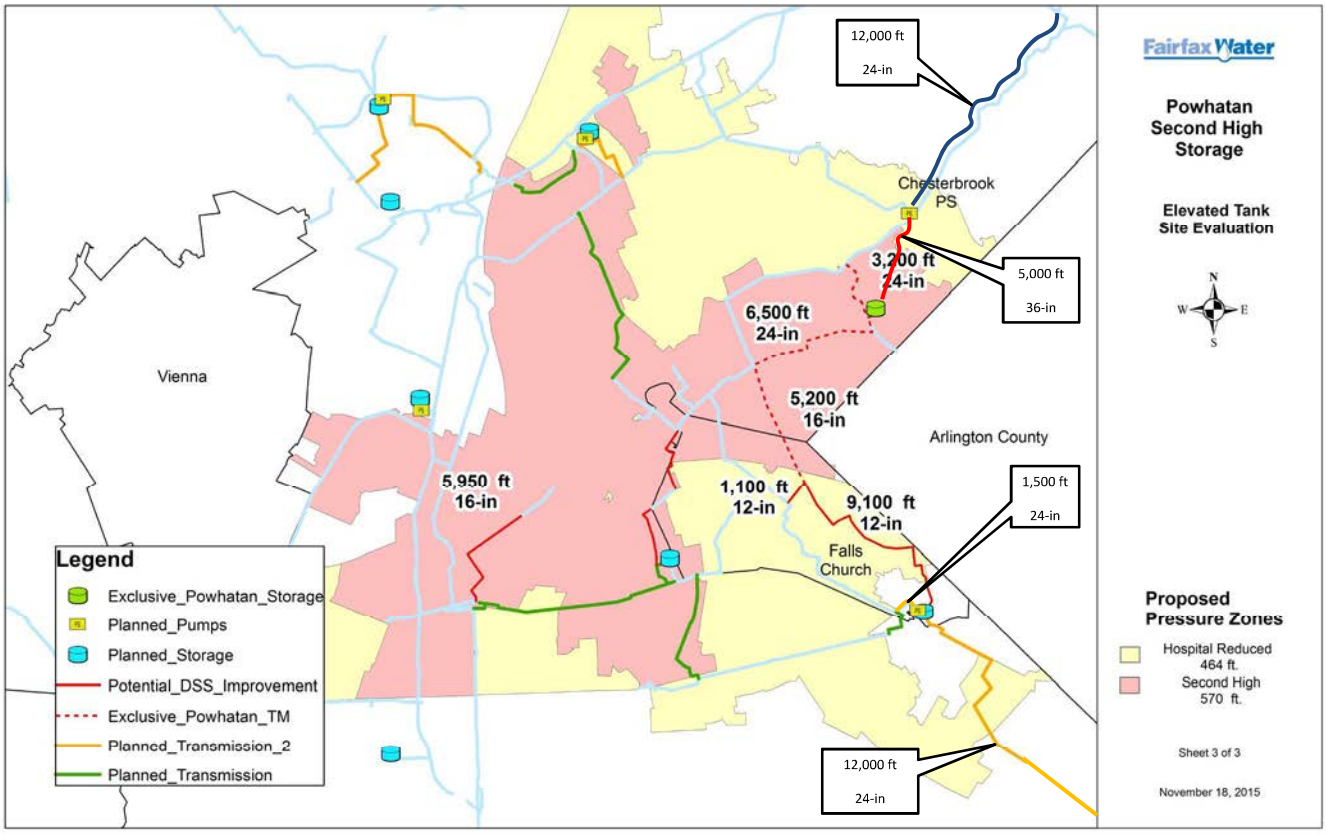


APPENDIX H

TRANSMISSION FACILITIES REQUIRED TO MAXIMIZE POWHATAN SITE

Facilities Required to Maximize Elevated Storage at the Powhatan Site (7.5-10 MG)

- In addition to the facilities required for one 2.5 MG elevated storage tank (see attached map), assuming primary supply is from the Washington Aqueduct:
    - Replace existing Pumps 2 and 4 at the existing Chesterbrook Pumping Station with new pumps having the same characteristics as existing Pumps 1, 3, and 5 (to maintain sufficient firm pumping capacity).
    - Install approximately 12,000 feet of 24-inch diameter main from the existing Chain Bridge Pumping Station to the existing Chesterbrook Pumping Station (via Kirby Road or an alternative parallel path).
    - Install approximately 5,000 feet of 36-inch diameter main from the existing Chesterbrook Pumping Station to the proposed Powhatan Storage Site (via MacArthur Drive and Franklin Avenue or an alternative parallel path).
    - Isolate the existing 20-inch diameter main in Kirby Road at the existing Chesterbrook Pumping Station discharge, so that the main will be supplied from the proposed Powhatan Storage Site - not the pumping station.
    - Replace approximately 1,500 feet of 16-inch diameter main with 24-inch diameter main from the junction of two (existing and future) 16-inch diameter mains at Hillwood Avenue to the new Seven Corners Tank (via Roosevelt Street or an alternative parallel path).
    - Install a third pump, having the same characteristics as the other two pumps at the new Seven Corners Pumping Station (to maintain sufficient firm pumping capacity).
    - Accelerate completion of the proposed Seven Corners / Route 7 East Transmission Main, which is approximately 12,000 feet of 24-inch diameter main from the new Seven Corners Tank to the existing 16-inch diameter main at Baileys Crossroads (via Route 7 or an alternative parallel path).
- These additional facilities are required to transfer the water to where the demand is located, cycle the storage (50%) daily, and maintain reasonable water age and quality.
- Maximizing storage at the Powhatan Site diverges from the fundamental strategy of the Integrated System Master Plan, which has been to maximize the use of existing facilities while minimizing investment in new facilities.
    - It essentially reverts to the previous City of Falls Church Master Plan, requiring complete transmission system upgrades from the water source (Chain Bridge Pumping Station) to its ultimate destination (consumers).

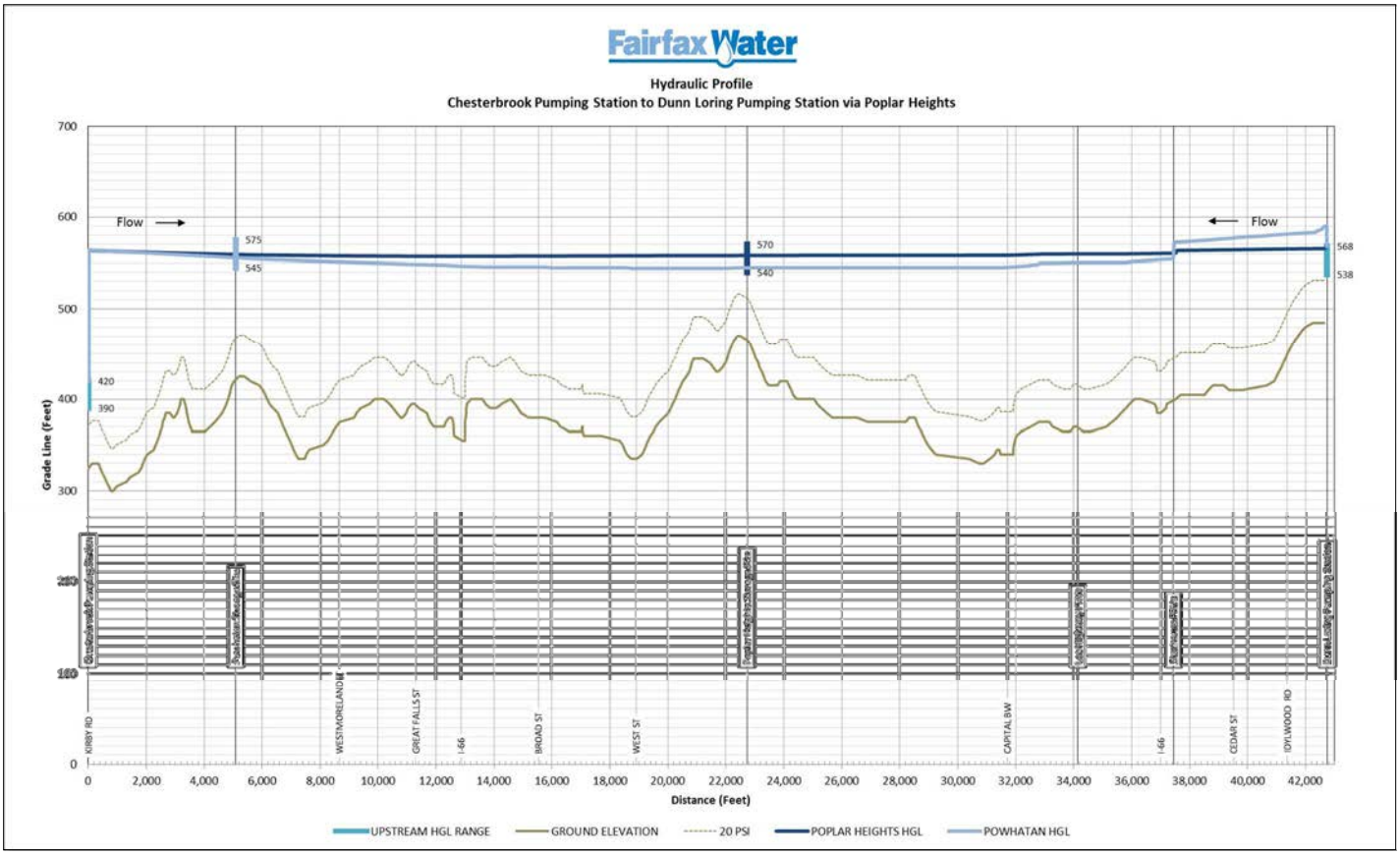

12,000 ft
24-in
Chesterbrook
PS
3,200 ft
24-in
5,000 ft
36-in
6,500 ft
24-in
5,200 ft
16-in
Vienna
Arlington County
5,950 ft
16-in
1,100 ft
12-in
9,100 ft
12-in
1,500 ft
24-in
Falls
Church
12,000 ft
24-in
Legend
Exclusive_Powhatan_Storage
Planned_Pumps
Planned_Storage
Potential_DSS_Improvement
Exclusive_Powhatan_TM
Planned_Transmission_2
Planned_Transmission
Fairfax Water
Powhatan
Second High
Storage
Elevated Tank
Site Evaluation
N
W
E
S
Proposed
Pressure Zones
Hospital Reduced
464 ft.
Second High
570 ft.
Sheet 3 of 3
November 18, 2015

APPENDIX I

HYDRAULIC ADVANTAGE FOR POPLAR HEIGHTS AND FALLS HILL SITES

Hydraulic Advantage of Poplar Heights and Falls Hill Sites over Powhatan Site

- To address existing areas of inadequate service (low pressure, poor water quality, poor hydrant flow) in the legacy City of Falls Church service area, the Integrated System Master Plan proposes the following:
    - Overcome hydraulic limitations of the existing 20-inch diameter transmission main downstream of the Chesterbrook Pumping Station by creating new transmission from the West (Lee Highway Transmission Main Project) and North (Route 7 Transmission Main Project).
    - Overcome hydraulic limitations and water quality issues in the pressure zone downstream of the Chesterbrook Pumping Station by disconnecting and repurposing the three existing remote storage sites (Falls Hill, Prout Hill, and Seven Corners).
    - Improve service to areas of existing high ground experiencing chronically low pressure downstream of the Chesterbrook Pumping Station by reconfiguring pressure zone boundaries and changing the target tank for the pumping station.
- The proposed reconfiguration of an expanded Second High pressure zone (570' HGL) in the center of the legacy City of Falls Church service area will ultimately have three points of supply:
    - Existing Chesterbrook Pumping Station – from the East (Kirby Road).
    - Pre 2025 – Existing Tysons Storage and Pumping Facility and existing Dunn Loring Storage and Pumping Facility – from the West, upon completion of the Lee Highway Transmission Main Project.
    - Post 2025 – Existing Tysons Storage and Pumping Facility and future Lewinsville Storage and Pumping Facility – from the North, upon completion of the Route 7 Transmission Main Project.
- The existing Poplar Heights and Falls Hill storage sites are centrally located within the expanded Second High pressure zone, while the Powhatan site is located toward the eastern edge of the zone.
- The attached hydraulic profile demonstrates the hydraulic advantage of the Poplar Heights storage site over the Powhatan storage site following completion of the Lee Highway transmission main, when the expanded Second High pressure zone will be supplied from both the East (Chesterbrook Pumping Station) and the West (Dunn Loring Storage and Pumping Facility). Given the constraints of the existing network:
    - Placing the storage on high ground in the center of the pressure zone provides a higher level of service to all customers within the zone throughout the daily cycling of the tank.
    - Placing the storage nearer the Chesterbrook source of supply, results in reduced service levels to customers located on high ground away from the storage site during daily cycling of the tank.


Fairfax Water
Hydraulic Profile
Chesterbrook Pumping Station to Dunn Loring Pumping Station via Poplar Heights
Flow
Flow
575
545
570
540
568
538
420
390
Grade Line (Feet)
Distance (Feet)
KIRBY RD
WESTMORELAND
GREAT FALLS ST
I-66
BROAD ST
WEST ST
CAPITAL BW
I-66
CEDAR ST
IDYLWOOD RD
UPSTREAM HGL RANGE
GROUND ELEVATION
20 PSI
POPLAR HEIGHTS HGL
POWHATAN HGL

APPENDIX J

OPINION OF PROBABLE CONSTRUCTION COSTS

Fairfax Water
Evaluation of Alternatives for Additional Second High Storage
Preliminary Opinion of Probable Construction Cost

POWHATAN

	Description		Total Cost
1	**Section 1 - Tank Construction**		
1.1	2.5 MG Fluted Column Elevated Storage Tank and Foundation	$	4,650,000.00
1.2	Tank Mixing Equipment	$	125,000.00
1.3	Tank Upgrade to Support Future Antennas	$	30,000.00
1.4	Tank Disinfection	$	10,000.00
1.5	Pedestal Sealing	$	60,000.00
1.6	Cathodic Protection Installation	$	25,000.00
1.7	Tank Electrical and I&C (Site Security, SCADA, Temp. Electric Service)	$	232,500.00
	SUBTOTAL	**$**	**5,132,500.00**
2	**Section 2 - Water Infrastructure Improvements**		
2.1	Water Transmission Main Improvements	$	7,265,000.00
	SUBTOTAL	**$**	**7,265,000.00**
3	**Section 3 - Site Improvements**		
3.1	Existing Tank Demolition (See Note 2)	$	-
3.2	Building Demolition	$	-
3.3	3.3 Acres Clear & Grub	$	53,000.00
3.4	Site Earthwork (2000 CY Excavation, 9000 CY Fill, 15800 SY Site Grading)	$	382,300.00
3.5	Site Access Roadway&Parking Pavement (1500 SY 1.5" Top Course(SM-9.5A), 3.0" Base Asphalt (BM 25.0), 6" Subbase Type 1, Prime and Tack Coats, Sidewalk; 12 SY CG-9 Entrance	$	73,500.00
3.6	Landcaping (687 Shrubs, 13750 SY Seeding and Fertilizer)	$	75,000.00
3.7	Storm Water Management Water Quality (Purchase Nutrient Credits)	$	55,000.00
3.8	Storm Water Management Water Quantity (Onsite SWM Dry Pond)	$	75,000.00
3.9	Storm Drainage Outfall Storm Sewer (320 LF 24" RCP pipe)	$	30,000.00
3.10	Pavement Restoration - 1" Mill & Overlay (800 SY)	$	56,500.00
3.11	Security Fence - 1700 LF 8' High Chainlink, 1 Access Gate	$	110,000.00
	SUBTOTAL	**$**	**910,300.00**
4	**Section 4 - Temporary Facilities**		
4.1	4700 SY Laydown and Staging Areas (8" Gravel)	$	67,000.00
4.2	1800 LF Temporary Construction Fence	$	55,500.00
4.3	Erosion and Sediment Controls (1 Construction Entrance, 1800 LF Tree Protection Fence, 1800 LF Silt Fence)	$	29,000.00
4.4	Traffic Management	$	20,000.00
4.5	Noise and Dust Reduction Controls (Screening, Muffling of Equipment, Electrical Connections)	$	25,000.00
	SUBTOTAL	**$**	**196,500.00**
5	**Section 5 - Other Costs**		
5.1	Land Acquisition		
5.2	Offsite Permanent Easement Acquisition	$	19,003.98
5.3	Bonds, Mobilization, and Insurance @ 2.5%	$	155,982.50
5.4	Administrative, Engineering, and Inspection Costs @ 15% (See Note 3)	$	935,895.00
	SUBTOTAL	**$**	**1,110,881.48**
	TOTAL COST	**$**	**14,615,181.48**
	PROJECT CONTINGENCY 30% OF TOTAL COSTS	**$**	**4,384,554**
	TOTAL PROJECT COST	**$**	**18,999,736**
	TOTAL PROJECT COST (ROUNDED)	**$**	**19,000,000**

Notes:
(1) All costs are in 2015 Dollars.
(2) Construction costs are based on planned land and easement acquisition.
(3) Does not include costs associated with permitting and zoning approval.

Dewberry

Fairfax Water
Evaluation of Alternatives for Additional Second High Storage
Preliminary Opinion of Probable Construction Cost

POPLAR HEIGHTS (OPTION 1)

	Description	Total Cost
1	**Section 1 - Tank Construction**	
1.1	2.5 MG Fluted Column Elevated Storage Tank and Foundation	$ 4,100,000.00
1.2	Tank Mixing Equipment	$ 125,000.00
1.3	Tank Upgrade to Support Future Antennas	$ 30,000.00
1.4	Tank Disinfection	$ 10,000.00
1.5	Pedestal Sealing	$ 60,000.00
1.6	Cathodic Protection Installation	$ 25,000.00
1.7	Tank Electrical and I&C (Site Security, SCADA, Temp. Electric Service)	$ 205,000.00
	SUBTOTAL	**$ 4,555,000.00**
2	**Section 2 - Water Infrastructure Improvements**	
2.1	Water Transmission Main Improvements	$ 1,150,000.00
	SUBTOTAL	**$ 1,150,000.00**
3	**Section 3 - Site Improvements**	
3.1	Existing Tank Demolition - 1 Tank (See Notes 2 and 3)	$ 125,000.00
3.2	Building Demolition - 6 Buildings (See Note 4)	$ 112,400.00
3.3	1.3 Acres Clear & Grub	$ 20,900.00
3.4	Site Earthwork (1200 CY Excavation, 2150 CY Fill, 5900 SY Site Grading)	$ 115,000.00
3.5	Site Access Roadway&Parking Pavement (1200 SY 1.5" Top Course(SM-9.5A), 3.0" Base Asphalt (BM 25.0), 6" Subbase Type 1, Prime and Tack Coats, Sidewalk; 12 SY CG-9 Entranc	$ 56,500.00
3.6	Landcaping (51 Deciduous Trees, 209 Evergreen Trees, 313 Shrubs, 4200 SY Seeding and Fertilizer)	$ 155,200.00
3.7	Storm Water Management Water Quality (Purchase Nutrient Credits)	$ 7,000.00
3.8	Storm Water Management Water Quantity (Onsite SWM Dry Pond)	$ 20,000.00
3.9	Storm Drainage Outfall Storm Sewer (530 LF 18" RCP pipe)	$ 35,500.00
3.10	Pavement Restoration - 1" Mill & Overlay (1600 SY)	$ 26,500.00
3.11	Security Fence - 600 LF 8' High Chainlink, 1 Access Gate	$ 40,600.00
	SUBTOTAL	**$ 714,600.00**
4	**Section 4 - Temporary Facilities**	
4.1	1200 SY Laydown and Staging Areas (8" Gravel)	$ 16,700.00
4.2	1150 LF Temporary Construction Fence	$ 35,000.00
4.3	Erosion and Sediment Controls (1 Construction Entrance, 1150 LF Tree Protection Fence, 1150 LF Silt Fence)	$ 20,000.00
4.4	Traffic Management	$ 20,000.00
4.5	Noise and Dust Reduction Controls (Screening, Muffling of Equipment, Electrical Connections)	$ 50,000.00
	SUBTOTAL	**$ 141,700.00**
5	**Section 5 - Other Costs**	
5.1	Land Acquisition	TBD
5.2	Offsite Permanent Easement Acquisition	$ -
5.3	Bonds, Mobilization, and Insurance @ 2.5%	$ 135,282.50
5.4	Administrative, Engineering, and Inspection Costs @ 15% (See Note 5)	$ 811,695.00
	SUBTOTAL	**$ 946,978**
	TOTAL COST	**$ 7,508,278**
	PROJECT CONTINGENCY 30% OF TOTAL COSTS	**$ 2,252,483**
	TOTAL PROJECT COST	**$ 9,760,761**
	TOTAL PROJECT COST (ROUNDED)	**$ 9,761,000**

Notes:
(1) All costs are in 2015 Dollars.
(2) Construction costs are based on planned land and easement acquisition.
(3) Cost for Cell-On-Wheels is not included.
(4) Existing building demolition excludes the cost of hazardous materials abatement.
(5) Does not include costs associated with permitting and zoning approval.

Dewberry

Fairfax Water
Evaluation of Alternatives for Additional Second High Storage
Preliminary Opinion of Probable Construction Cost

POPLAR HEIGHTS (OPTION 2)

	Description		Total Cost
1	**Section 1 - Tank Construction**		
1.1	2.5 MG Fluted Column Elevated Storage Tank and Foundation	$	4,100,000.00
1.2	Tank Mixing Equipment	$	125,000.00
1.3	Tank Upgrade to Support Future Antennas	$	30,000.00
1.4	Tank Disinfection	$	10,000.00
1.5	Pedestal Sealing	$	60,000.00
1.6	Cathodic Protection Installation	$	25,000.00
1.7	Tank Electrical and I&C (Site Security, SCADA, Temp. Electric Service)	$	205,000.00
	SUBTOTAL	**$**	**4,555,000.00**
2	**Section 2 - Water Infrastructure Improvements**		
2.1	Water Transmission Main Improvements	$	1,150,000.00
	SUBTOTAL	**$**	**1,150,000.00**
3	**Section 3 - Site Improvements**		
3.1	Existing Tank Demolition - 1 Tank (See Notes 2 and 3)	$	125,000.00
3.2	Building Demolition - 4 Buildings (See Note 4)	$	75,000.00
3.3	1.4 Acres Clear & Grub	$	22,500.00
3.4	Site Earthwork (440 CY Excavation, 230 CY Fill, 6800 SY Site Grading)	$	27,800.00
3.5	Site Access Roadway&Parking Pavement (1100 SY 1.5" Top Course(SM-9.5A), 3.0" Base Asphalt (BM 25.0), 6" Subbase Type 1, Prime and Tack Coats, Sidewalk; 12 SY CG-9 Entranc	$	53,200.00
3.6	Landcaping (51 Deciduous Trees, 209 Evergreen Trees, 313 Shrubs, 5200 SY Seeding and Fertilizer)	$	157,600.00
3.7	Storm Water Management Water Quality (Purchase Nutrient Credits)	$	8,750.00
3.8	Storm Water Management Water Quantity (Onsite SWM Dry Pond)	$	20,000.00
3.9	Storm Drainage Outfall Storm Sewer (430 LF 18" RCP pipe)	$	29,000.00
3.10	Pavement Restoration - 1" Mill & Overlay (1600 SY)	$	26,500.00
3.11	Security Fence - 620 LF 8' High Chainlink, 1 Access Gate	$	41,800.00
	SUBTOTAL	**$**	**587,150.00**
4	**Section 4 - Temporary Facilities**		
4.1	1250 SY Laydown and Staging Areas (8" Gravel)	$	18,000.00
4.2	1200 LF Temporary Construction Fence	$	36,500.00
4.3	Erosion and Sediment Controls (1 Construction Entrance, 1200 LF Tree Protection Fence, 1200 LF Silt Fence)	$	20,500.00
4.4	Traffic Management	$	20,000.00
4.5	Noise and Dust Reduction Controls (Screening, Muffling of Equipment, Electrical Connections)	$	50,000.00
	SUBTOTAL	**$**	**145,000.00**
5	**Section 5 - Other Costs**		
5.1	Land Acquisition		TBD
5.2	Offsite Permanent Easement Acquisition	$	-
5.3	Bonds, Mobilization, and Insurance @ 2.5%	$	132,178.75
5.4	Administrative, Engineering, and Inspection Costs @ 15% (See Note 5)	$	793,072.50
	SUBTOTAL	**$**	**925,251**
	TOTAL COST	**$**	**7,362,401**
	PROJECT CONTINGENCY 30% OF TOTAL COSTS	**$**	**2,208,720**
	TOTAL PROJECT COST	**$**	**9,571,122**
	TOTAL PROJECT COST (ROUNDED)	**$**	**9,571,000**

Notes:
(1) All costs are in 2015 Dollars.
(2) Construction costs are based on planned land and easement acquisition.
(3) Cost for Cell-On-Wheels is not included.
(4) Existing building demolition excludes the cost of hazardous materials abatement.
(5) Does not include costs associated with permitting and zoning approval.

Dewberry

Fairfax Water
Evaluation of Alternatives for Additional Second High Storage
Preliminary Opinion of Probable Construction Cost

FALLS HILL

	Description	Total Cost
1	**Section 1 - Tank Construction**	
1.1	2.5 MG Fluted Column Elevated Storage Tank and Foundation	$ 4,350,000.00
1.2	Tank Mixing Equipment	$ 125,000.00
1.3	Tank Upgrade to Support Future Antennas	$ 30,000.00
1.4	Tank Disinfection	$ 10,000.00
1.5	Pedestal Sealing	$ 60,000.00
1.6	Cathodic Protection Installation	$ 25,000.00
1.7	Tank Electrical and I&C (Site Security, SCADA, Temp. Electric Service)	$ 217,500.00
	SUBTOTAL	**$ 4,817,500.00**
2	**Section 2 - Water Infrastructure Improvements**	
2.1	Water Transmission Main Improvements	$ -
	SUBTOTAL	**$ -**
3	**Section 3 - Site Improvements**	
3.1	Existing Tank Demolition - 1 Tank (See Note 2)	$ 125,000.00
3.2	Building Demolition - 3 Buildings (See Note 3)	$ 78,800.00
3.3	2.3 Acres Clear & Grub	$ 36,900.00
3.4	Site Earthwork (2000 CY Excavation, 5100 CY Fill, 11100 SY Site Grading)	$ 243,500.00
3.5	Site Access Roadway&Parking Pavement (950 SY 1.5" Top Course(SM-9.5A), 3.0" Base Asphalt (BM 25.0), 6" Subbase Type 1, Prime and Tack Coats, Sidewalk; 12 SY CG-9 Entrance)	$ 45,500.00
3.6	Landcaping (42 Deciduous Trees, 170 Evergreen Trees, 402 Shrubs, 9650 SY Seeding and Fertilizer)	$ 150,700.00
3.7	Storm Water Management Water Quality (Purchase Nutrient Credits)	$ 9,750.00
3.8	Storm Water Management Water Quantity (Onsite SWM Dry Pond)	$ 25,000.00
3.9	Storm Drainage Outfall Storm Sewer (200 LF 18" RCP pipe)	$ 13,500.00
3.10	Pavement Restoration - 1" Mill & Overlay (820 SY)	$ 14,200.00
3.11	Security Fence - 840 LF 8' High Chainlink, 1 Access Gate	$ 55,500.00
	SUBTOTAL	**$ 798,350.00**
4	**Section 4 - Temporary Facilities**	
4.1	2900 SY Laydown and Staging Areas (8" Gravel)	$ 40,700.00
4.2	1250 LF Temporary Construction Fence	$ 38,000.00
4.3	Erosion and Sediment Controls (1 Construction Entrance, 1250 LF Tree Protection Fence, 1250 LF Silt Fence)	$ 21,300.00
4.4	Traffic Management	$ 20,000.00
4.5	Noise and Dust Reduction Controls (Screening, Muffling of Equipment, Electrical Connections)	$ 50,000.00
	SUBTOTAL	**$ 170,000.00**
5	**Section 5 - Other Costs**	
5.1	Land Acquisition	$ 3,218,611.00
5.2	Offsite Permanent Easement Acquisition	$ 18,713.37
5.3	Bonds, Mobilization, and Insurance @ 2.5%	$ 144,646.25
5.4	Administrative, Engineering, and Inspection Costs @ 15% (See Note 4)	$ 867,877.50
	SUBTOTAL	**$ 4,249,848**
	TOTAL COST	**$ 10,035,698**
	PROJECT CONTINGENCY 30% OF ALL COSTS	**$ 3,010,709**
	TOTAL PROJECT COST	**$ 13,046,408**
	TOTAL PROJECT COST (ROUNDED)	**$ 13,046,000**

Notes:
(1) All costs are in 2015 Dollars.
(2) Construction costs are based on planned land and easement acquisition.
(3) Existing building demolition excludes the cost of hazardous materials abatement.
(4) Does not include costs associated with permitting and zoning approval.

Dewberry