

FINAL REPORT

Clarksburg - Ten Mile Creek Area Sewer Facility Study

WSSC Contract PM0007A07

Job Number 23202537C

Washington Suburban
Sanitary Commission

September 6, 2016

**CDM
Smith**

in association with

Environ-Civil Engineering, Ltd.

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Section 1

Introduction

1.1 Background

This “Clarksburg – Ten Mile Creek Area Sewer Facility Study” presents conceptual alternatives to provide public sewer service to areas north of Clarksburg Road on either side of Interstate 270 (I-270) in Montgomery County, MD. This area, located within the Ten Mile Creek watershed, includes “Stage 4 Ten Mile Creek East Development Area” or “Future Area Service Area C” as described in the Clarksburg Master Plan and Hyattstown Special Study Area, the Clarksburg Historic District and other properties in the vicinity of the Historic District. This work was performed under the WSSC Sewer Planning Basic Order Agreement: Clarksburg – Ten Mile Creek Area Sewer Facility Study (BOA Contract No. PM0007A07, Task Order No.20 - Job No. 23202537C).

The following documents were used as references in this report:

- Clarksburg Master Plan & Hyattstown Special Study Area (Approved and Adopted, June 1994)
- Ten Mile Creek Area Limited Amendment to the Clarksburg Master Plan and Hyattstown Special Study Area (Approved and Adopted, July 2014)
- Comprehensive Water/Sewer Category Map Amendment for the Ten Mile Creek Limited Master Plan Amendment Area (Montgomery County Resolution No. 18-66, Adopted February 24, 2015)

1.2 Montgomery County Resolution No. 18-66

The Montgomery County Resolution No. 18-66 titled “Comprehensive Water/Sewer Category Map Amendment for the Ten Mile Creek Limited Master Plan Amendment Area” was adopted February 24, 2015. The resolution revised the sewer and water categories of the property parcels in the study area. The sewer category for almost all the parcels in the study area was changed to S-3 with a few exceptions. A few parcels west of I-270, the largest of which being the county owned parcel (not part of the County Correctional Facility) and other smaller properties next to Clarksburg Road retained the S-6 sewer category. Sewer area categories S-3 and S-6 are defined by Montgomery County as follows:

Sewer Area Category S-3: “Areas where improvements to or construction of new community systems will be given immediate priority and service will generally be provided within two years or as development and requests for community service are planned and scheduled.”

Sewer Area Category S-6: “Areas where there is no planned community service either within the ten-year scope of this plan or beyond that time period. Category 6 includes all areas not designated as categories 1 through 5. It includes areas that are planned or staged for community service beyond the scope of the plan’s ten-year planning period and areas that are never expected to have community service on the basis of adopted plans.”

Additional information can be found at <http://www.montgomerycountymd.gov/dep/water/service-categories.html>.

The resolution also outlines the County Council’s expectations for the WSSC comprehensive sewer study as follows: *“The County Council expects the Washington Suburban Sanitary Commission’s comprehensive sewer study of the Ten Mile Creek Limited Master Plan Area to review all feasible alternatives for the maximum environmental protection of the area. Sewer infrastructure should avoid Ten Mile Creek, its tributaries, and other water resources unless it is technologically infeasible to do so. Disturbance to all environmentally sensitive areas should be minimized. Only capital projects that satisfy the Master Plan’s recommendation for service and minimize environmental impacts to Ten Mile Creek will be approved by the Council.”*

1.3 Ten Mile Creek Sewer Facility Plan Citizen Advisory Committee Process

The Ten Mile Creek Sewer Facility Plan Citizen Advisory Committee (CAC) was composed of representatives of community, environmental, and development interests in the area covered by the Ten Mile Creek Limited Master Plan Amendment (TMC-LMPA) (2014) of the Clarksburg Master Plan (1994). The CAC was composed of approximately ten representatives that volunteered to participate in a detailed review of sewer infrastructure system alternatives that will provide sewer service to the areas envisioned to be served by public sewer in the TMC-LMPA. In December of 2014, WSSC presented five initial alternatives in a public meeting at Rocky Hill Middle School to inform the public of the sewer study. Volunteers for the CAC were obtained through coordination with representatives of the Montgomery County Government, the Montgomery County Upcounty Regional Services Center, and through requests via WSSC’s web site. The volunteers comprising the membership of the Ten Mile Creek Sewer Facility Plan CAC are:

- Bette Buffington, Buffington Property/Historic Clarksburg
- Stephen Carpenter, Ph.D., Historic Clarksburg District/Boys Civic Association
- Julius Cinque, Past President Boys Civic Association, Past President and Current Board Member of Sugarloaf Citizens Association, Member of Friends of Ten Mile Creek
- Stephen Collins, Pulte Group
- Bob Egan, Mattlyn/Egan, LLC
- Scott Graham, Upcounty Citizens Advisory Board
- Phil Isaja, Soltesz, LLC
- Anne James, Friends of Ten Mile Creek
- Michael Norton, Norton Land Design, Monaco Exclusive Renovation, LLC
- Dan Stein, Clarksburg Chamber of Commerce
- Cathy Wiss, Audubon Naturalist Society

Following the December public meeting, six CAC meetings were held several evenings, at the Montgomery County Upcounty Regional Services Center in Germantown, from February 12th to September 24th, 2015. All meetings were open to the public. The CAC met with WSSC and support staff from Montgomery County’s Department of Environmental Protection (DEP), Parks Department,

and Planning Department to discuss and review sewer system alternatives. The goal of the CAC was to provide a forum for the exchange of ideas and perspectives on sewer infrastructure alternatives as referenced above. Various perspectives and opinions were voiced in a courteous manner during the CAC process. Public attendees to the meeting were allowed to comment at a specified time in the meeting agenda. Additional alternatives were developed and added to the study from the CAC meetings and discussions. CAC input was used to develop a working draft of the Ten Mile Creek Sewer Facility Plan.

Meeting summaries of the CAC's proceedings were developed and sent out shortly after each meeting for review and comment by the CAC members (see Appendix A). WSSC revised these meeting summaries based on any comments received. Members who felt the meeting summary did not accurately reflect their input after CAC review and comment had the option to submit their comments in writing to be a part of the meeting summary. Meeting summaries, agendas, presentations, CAC comments, and other supporting documentation were posted to a web page created for public information on the Ten Mile Creek Sewer Study on WSSC's website (URL link: <https://www.wsscwater.com/business--construction/major-projects/ten-mile-creek--clarksburg-sewer.html>).

The CAC did not vote on any items and all perspectives were considered during the CAC discussion on alternatives. WSSC and its consultant responded to various inquiries regarding alternatives for feasibility of implementation, followed by CAC discussions of relevant issues.

WSSC and its consultant proposed a working draft of the sewer infrastructure plan. This working draft of the sewer study was provided to the CAC for review and comment on October 30, 2015. Upon receipt in December 2015 of the CAC members' comments on the working draft and since no consensus was reached with the CAC on a final draft plan, WSSC has completed a final draft plan, with documentation of CAC input on the plan. WSSC has also provided in this plan a summary table showing its responses to comments and revisions made to this final draft plan where warranted (see Appendix B).

This WSSC final draft plan with CAC input and WSSC responses will be forwarded by WSSC for briefings with the Planning Board and the County Council's Transportation, Infrastructure, Energy & Environment (T&E) Committee in early 2016. The briefings to the Planning Board and the County Council T&E Committee are required to determine the ultimate sewer infrastructure for the Ten Mile Creek Service Area and the Historic District before specific facility projects are developed and programmed through WSSC's Capital Improvements Plan (CIP) and initial planning commences with Montgomery County's Planning Department and WSSC's Development Services Process in developing the specific properties identified in Ten Mile Creek LMPA.

1.4 Study Purpose

The objective is to perform a facility study for WSSC to provide public sanitary sewer service to areas in the Clarksburg – Ten Mile Creek Area. The study identifies and evaluates alternatives to serve planned development described in the Ten Mile Creek Area Limited Amendment to the Clarksburg Master Plan and Hyattstown Special Study Area as adopted by the Montgomery County Council.

1.5 Study Area

The study area includes the Stage 4 Ten Mile Creek East Development Area or Future Service Area C, the boundaries of which are delineated in Chapter 9 of the June 1994 Clarksburg Master Plan. This

area is approximately 980 acres, 220 acres of which are located north of Clarksburg Road and east of I-270. The remaining area is located north of Clarksburg Road and west of I-270.

The study area also includes about 40 acres of the Clarksburg Historic District and about 30 acres of other properties in the vicinity (northeast) of the Historic District.

Figure 1-1 provides an overview showing the study area and the downstream sewer facilities.

Figure 1-2 provides an overview of the Study Area, Ten Mile Creek and its tributaries and Little Seneca Lake.

1.6 WSSC Sanitary Sewer System Downstream of Study Area

As shown in Figure 1-1, the study area is located in the northern portion of the Seneca Creek basin of the WSSC sanitary sewer system. **Figure 1-3** shows the study area and the WSSC sewer facilities that will receive the flows from the planned development. There are two main sewer reaches south of the study area. They are the newly constructed gravity sewers located in the Cabin Branch development west of I-270 and the existing gravity sewers along Gateway Center Drive, east of I-270. Both sewer reaches convey wastewater to either the Little Seneca Wastewater Pumping Station (WWPS) or the Crystal Rock WWPS, which in turn pump the wastewater to the gravity sewers feeding into the Seneca Wastewater Treatment Plant (WWTP).

The gravity sewers along Gateway Center Drive have limited capacity to convey the wastewater flows from the Stage 4 Development Area when combined with other planned development. **Figure 1-4** shows the diameters, capacities and existing peak wastewater flows in the gravity sewers along Gateway Center Drive.

Conversely, the newly constructed gravity sewers, west of I-270 in Cabin Branch development were specifically sized to receive wastewater flows from the Stage 4 Development Area. Therefore, all conceptual alternatives described in this report are designed to convey the wastewater flows to the gravity sewer connection points in the Cabin Branch development at Clarksburg Road as shown on Figure 1-3.

1.7 2014 Ten Mile Creek Limited Amendment

The Montgomery County Planning Department prepared a Limited Amendment to the 1994 Clarksburg Master Plan focusing on the Ten Mile Creek area in response to a request from the County Council. In July 2014, the County Council approved the Ten Mile Creek Area Ten Mile Creek Area Limited Amendment.

The Ten Mile Creek Area Limited Amendment included properties in the Stage 4 Development Area and documented a comprehensive analysis of the environmentally sensitive areas in the Ten Mile Creek Watershed. The limited amendment expanded Special Protection Areas, created new Environmental Overlay Zones, and also rezoned several of the properties located in the project area.

1.7.1 Special Protection Areas

Special Protection Areas (SPAs) established under the 1994 Clarksburg Master Plan included geographic areas “where identified sensitive environmental resources that require measures beyond current standards to assure those resources are protected to the greatest extent possible from development activities”. Environmentally sensitive watersheds in Little Seneca Creek, Ten Mile Creek

and Wildcat Branch were included in the SPAs. Since 1994, the Montgomery County DEP has been monitoring conditions in the Clarksburg SPA (which includes Stage 4 Development Area of the Ten Mile Creek). Under the Ten Mile Creek Area Limited Amendment, the SPA was updated to include additional areas east of I-270.

1.7.2 East and West Environmental Overlay Zones

Within the Special Protection Areas, the Ten Mile Creek Area Limited Amendment created the Clarksburg East and Clarksburg West Environmental Overlay Zones. These zones were created to regulate new development in properties within the overlay zones by establishing limits on maximum imperviousness and minimum open space requirements.

The Clarksburg East Environmental Overlay Zone includes properties east of I-270 within the Ten Mile Creek Watershed and has a maximum imperviousness limit of 15 percent with an open space requirement of 80 percent. The Clarksburg West Environmental Overlay Zone includes properties west of I-270 within the Ten Mile Creek Watershed and has a maximum imperviousness limit of 6 percent with an open space requirement of 80 percent.

1.7.3 Major Properties and Proposed Rezoning in Study Area

The project area includes four major properties, the Clarksburg Historic District, and a few other smaller properties east of I-270. The four major properties are designated as Egan/Mattlyn, Miles/Coppola, County Owned, and Pulte/King. The County Owned and Pulte/King properties are located west of I-270 while the rest are located east of I-270. **Figure 1-5** and **Figure 1-6** provide details of the properties east and west of I-270, respectively.

1.7.3.1 Egan/Mattlyn Property

Egan/Mattlyn property encompasses approximately 100 acres in the northern portion of the study area, east of I-270 between I-270 and Frederick Road. Approximately 33 acres is within an environmental buffer zone.

In the Ten Mile Creek Area Limited Amendment this property is zoned R-90 with a maximum density of three units per acre (approximately a 297 unit limit), or up to 3.66 units per acre with a Moderately Priced Dwelling Unit (MPDU) bonus. This property is in the Clarksburg East Environmental Overlay Zone.

1.7.3.2 Miles/Coppola Property

Miles/Coppola property includes 101 acres located east of I-270 and south of Egan/Mattlyn property. Approximately 70 acres of this property is within an environmental buffer zone.

In the Ten Mile Creek Area Limited Amendment, 5 acres of this property near Clarksburg Road (near the Wright Property) is zoned CRT 2.0, C2, R2 and H120. The remaining property is zoned R-90 with a maximum density of three units per acre (approximately a 279 unit limit), or up to 3.66 units per acre with a Moderately Priced Dwelling Unit (MPDU) bonus. This property is in the Clarksburg East Environmental Overlay Zone.

1.7.3.3 County Owned Properties

Montgomery County owns more than 380 acres in the upper reaches of the Ten Mile Creek watershed, west of I-270 and north of Clarksburg Road. The properties include 220 forested acres of County Correctional Facility and two vacant parcels that are not part of the correctional facility. The property

is heavily wooded and the County does not have any development plans for the property beyond the planned expansion of the correctional facility. This future planned expansion is limited in scope and takes place within the current cleared area of the site. Most of the wooded area on this property has been identified by the Parks Department as a Legacy Open Space Natural Resource that is suitable for transfer to Parks as a part of the Ten Mile Creek Conservation Park.

The Ten Mile Creek Area Limited Amendment included this area under the Clarksburg West Environmental Overlay Zone with no additional imperviousness permitted. In the future, the Environmental Overlay Zone may be amended to allow a minimal amount of imperviousness of less than 1 acre for the planned expansion of the correctional facility.

1.7.3.4 Pulte/King Properties

This property includes approximately 540 acres west of I-270 between Clarksburg Road and Shiloh Church Road.

This property is zoned RNC in the Ten Mile Creek Area Limited Amendment which allows optional method development with public sewer at a permitted density of one unit per acre, provided it meets the open space requirements. The amendment included these properties in Clarksburg West Environmental Overlay Zone which has a maximum imperviousness limit of 6 percent with an open space requirement of 80 percent. Also, a significant portion of the property (about 200 acres) falls within environmental buffer zones. Some portions of the property may also be acquired by the Parks Department under the Legacy Open Space Program. As a result of the zoning change, development in this property may not be one single development but rather two separate developments.

1.7.3.5 Clarksburg Historic District

The Clarksburg Historic District includes multiple properties totaling approximately 40 acres. The district straddles Frederick Road on either side of Clarksburg Road. The eastern edge of the district is bound by Stringtown Road. The Ten Mile Creek Area Limited Amendment rezoned the properties in the Historic district to a CRT zone specifically, CRT 0.5, C 0.5, R 0.5 and H45. The district is excluded from the Clarksburg East Environmental Overlay Zone.

1.7.3.6 Other Properties

Three property parcels north of Egan/Mattlyn

There are three properties in the northern most portion of the study area. These properties are bound by Comus Road on the north, Frederick Road on the east, I-270 on the West, and Egan/Mattlyn property on the south.

The Ten Mile Creek Area Limited Amendment retained the existing zoning of R-200 for these properties but eliminated the potential to use a Planned Development Zone as a part of a single development plan with the Egan/Mattlyn property. The Clarksburg East Environmental Overlay Zone applies to areas within the Ten Mile Creek watershed.

Five property parcels between Egan/Mattlyn and Miles/Coppola

There are five properties between Egan/Mattlyn and Miles/Coppola properties. Two of these properties are closer to I-270. Of these two properties, one houses an electric substation (Potomac Electric) while the other is almost entirely in an environmental buffer zone. The remaining three properties are smaller and closer to Frederick Road.

The Ten Mile Creek Area Limited Amendment rezoned all five properties to R-90. These properties are included in the Clarksburg East Environmental Overlay Zone.

Nine property parcels between Miles/Coppola and Frederick Road

There are nine property parcels between Miles/Coppola Property and Frederick Road. Of the nine parcels, five are vacant, two are residential, and two are commercial. These property parcels were rezoned to CRN 0.25, C 0.25, R 0.25 and H35. These properties are included in the Clarksburg East Environmental Overlay Zone.

Five properties north of Historic District along Frederick Road

Of the five property parcels north of the Historic District along Frederick Road, three are vacant. These parcels are rezoned to CRT 0.75, C 0.75, R 0.25 and H 65. These properties are also included in the Clarksburg East Environmental Overlay Zone.

Wright Property

The Wright property is a small one acre parcel at the intersection of Gateway Center Drive and Clarksburg Road. The Ten Mile Creek Area Limited Amendment rezoned this parcel to CRT 2.0, C2.0, R2.0 and H120, (similar to a portion of the Miles/Coppola Property) to allow for a possibility of joint development with Miles/Coppola also zoned CRT.

1.8 Report Overview

This section provides an overview of the purpose of the study, the study area, the WSSC sanitary sewer system downstream of the study area, the 2014 Ten Mile Creek Area Limited Amendment to the 1994 Clarksburg Master Plan, and an overview of this Facility Plan Report.

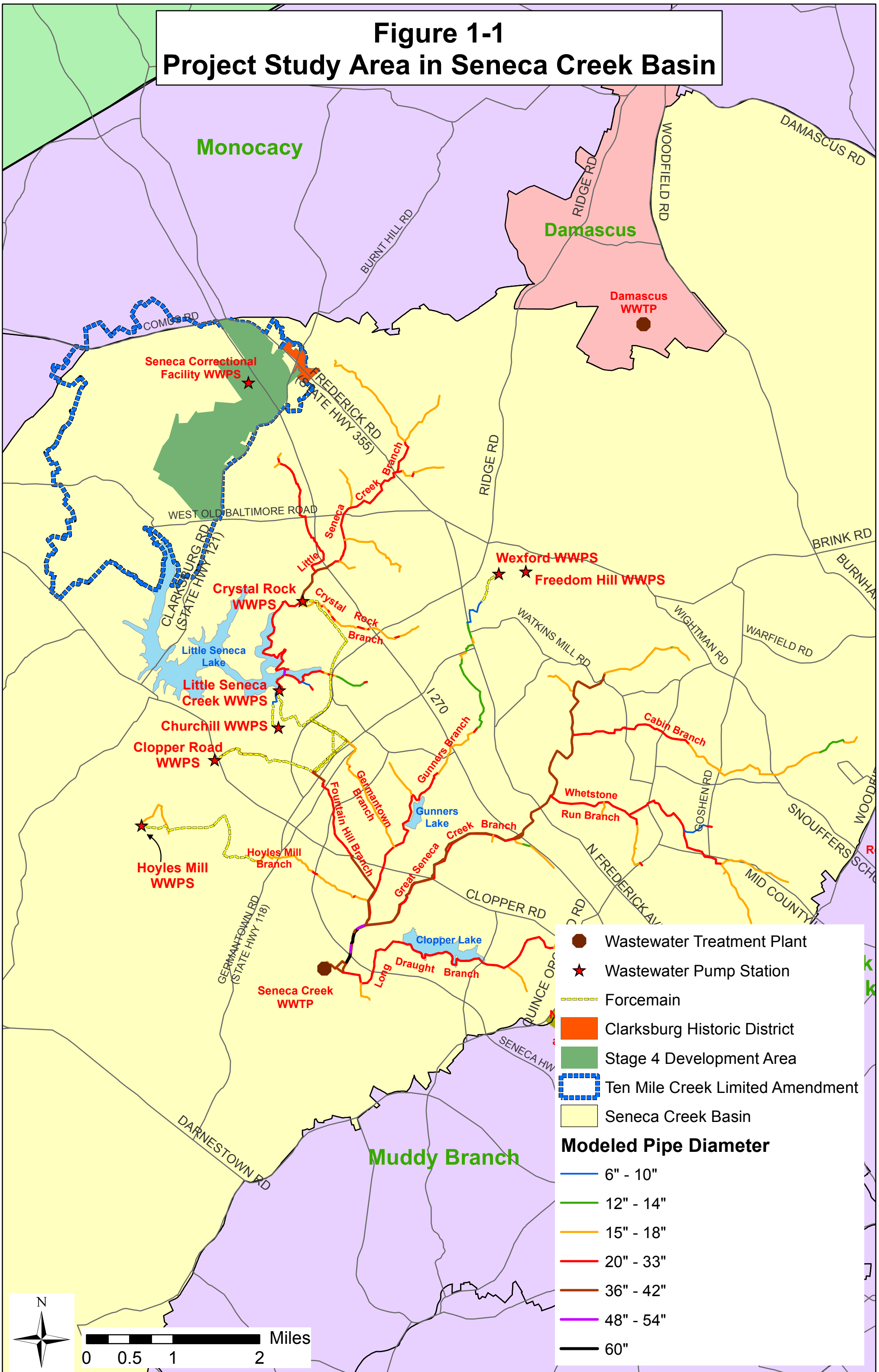
Section 2 of this report provides an overview of the data collected for the properties in the study area and estimates of existing and future flows based on proposed development.

Section 3 includes a discussion of the alternative development process and a description of each alternative identified to provide sewer service to the study area. Twelve alternatives were developed, of which ten were selected for further evaluation.

Section 4 provides an evaluation of the selected alternatives.

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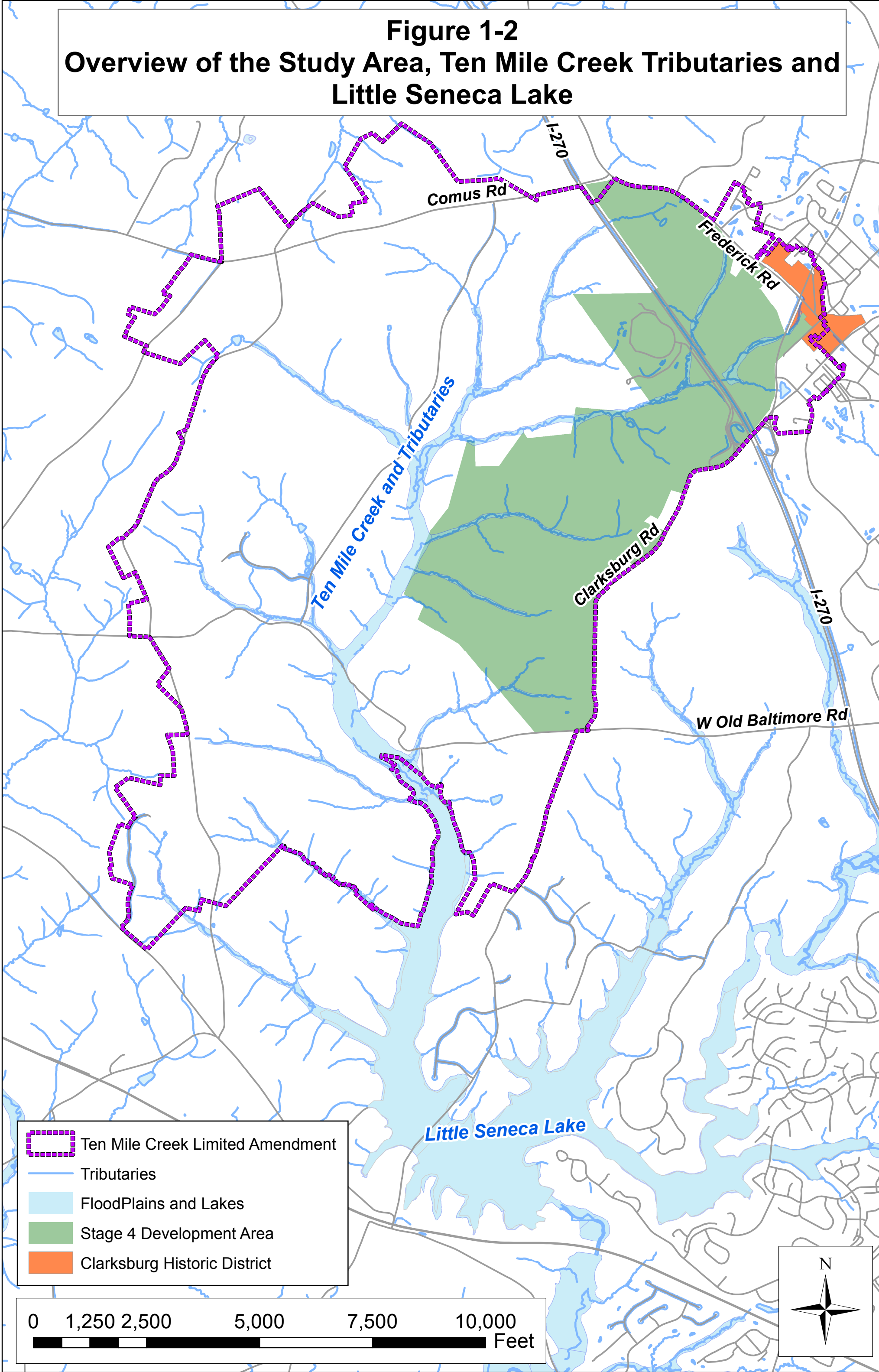
Figure 1-1 Project Study Area in Seneca Creek Basin

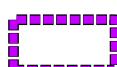

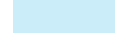




	Wastewater Treatment Plant
	Wastewater Pump Station
	Force main
	Clarksburg Historic District
	Stage 4 Development Area
	Ten Mile Creek Limited Amendment
	Seneca Creek Basin
Modeled Pipe Diameter	
	6" - 10"
	12" - 14"
	15" - 18"
	20" - 33"
	36" - 42"
	48" - 54"
	60"

Miles
 0 0.5 1 2

Figure 1-2
Overview of the Study Area, Ten Mile Creek Tributaries and
Little Seneca Lake



-  Ten Mile Creek Limited Amendment
-  Tributaries
-  FloodPlains and Lakes
-  Stage 4 Development Area
-  Clarksburg Historic District

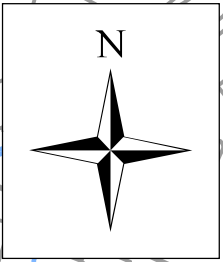
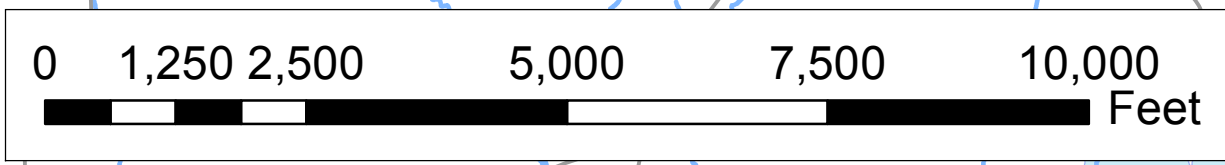


Figure 1-3 Study Area and Downstream WSSC Sewers

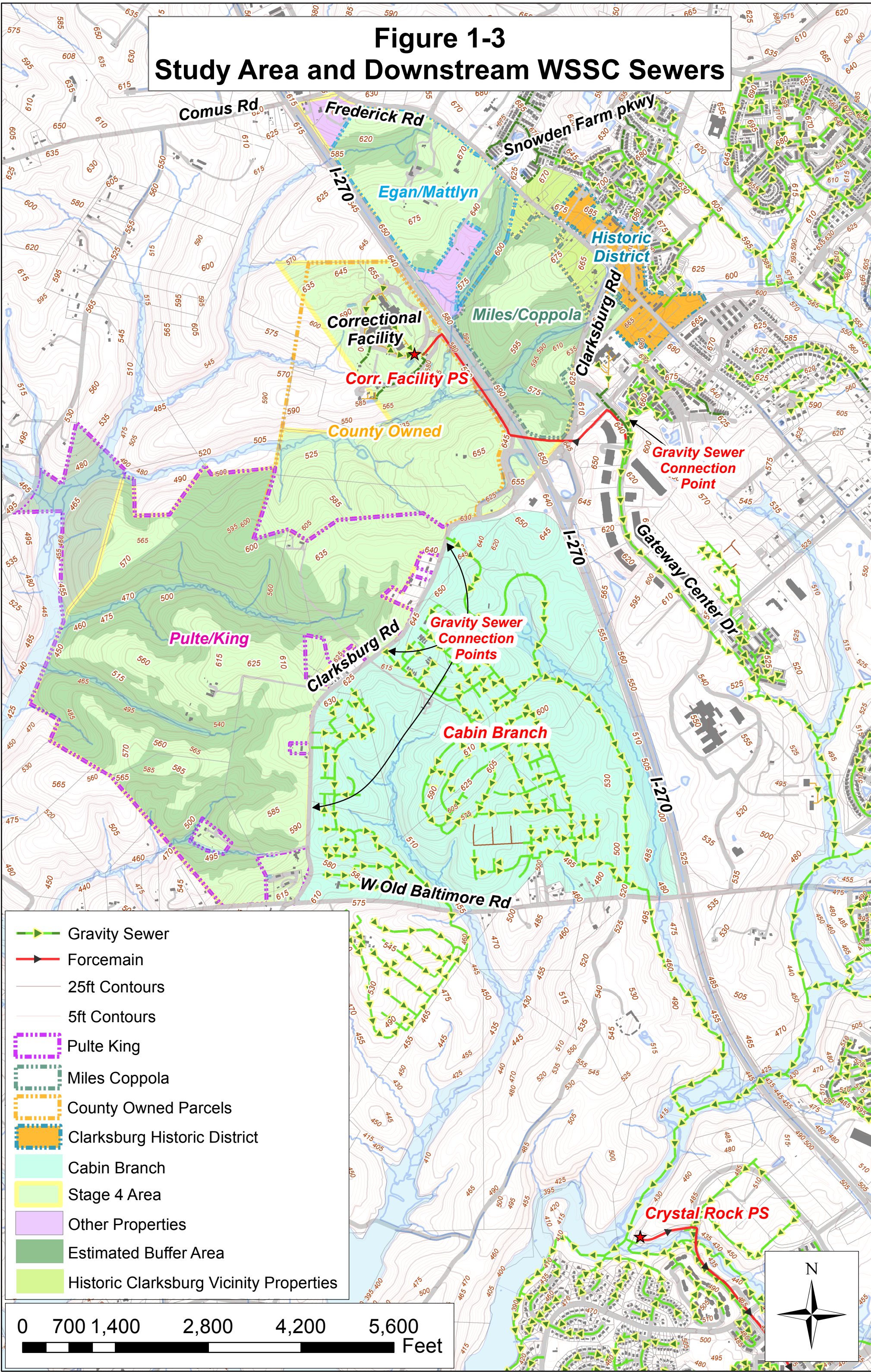
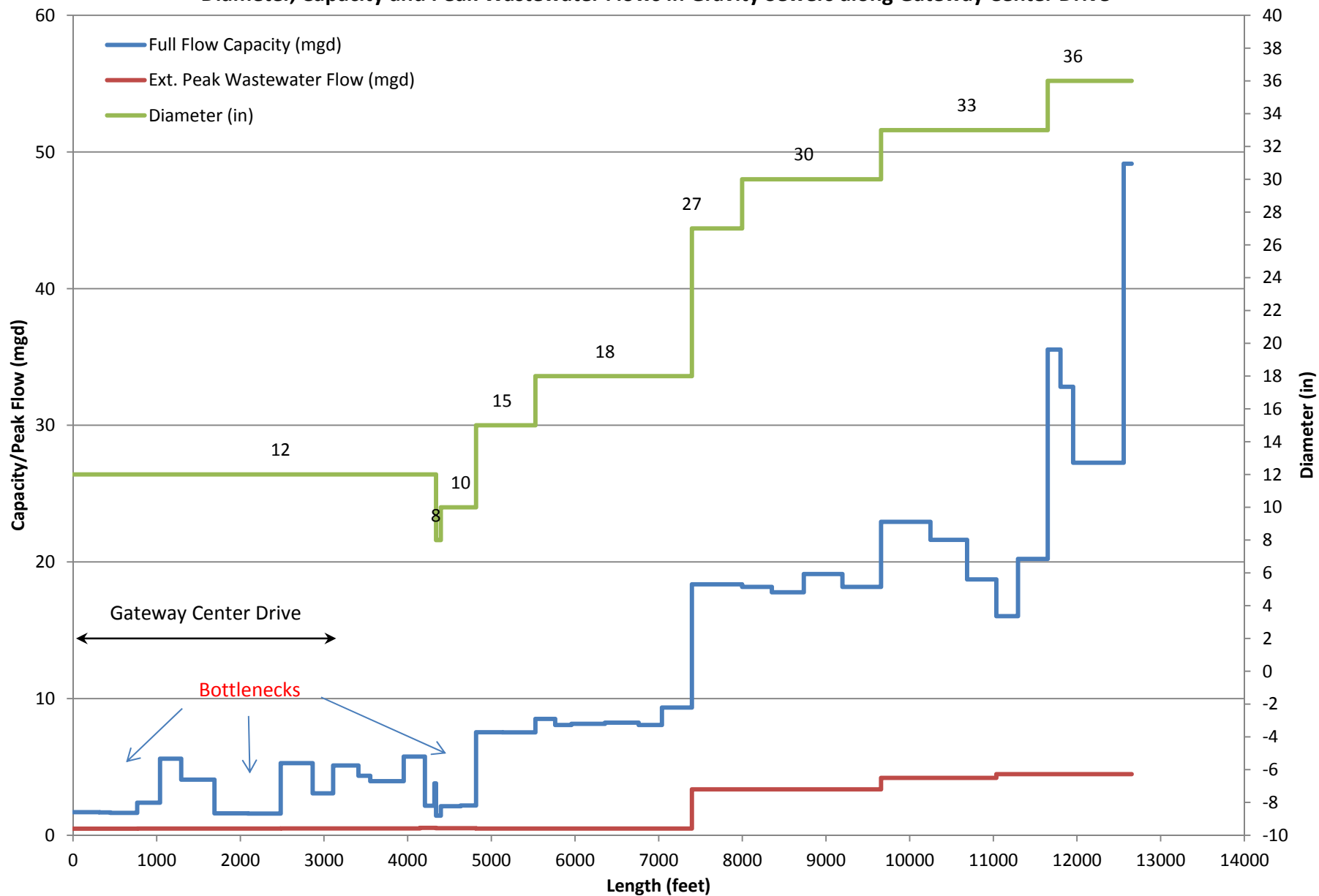
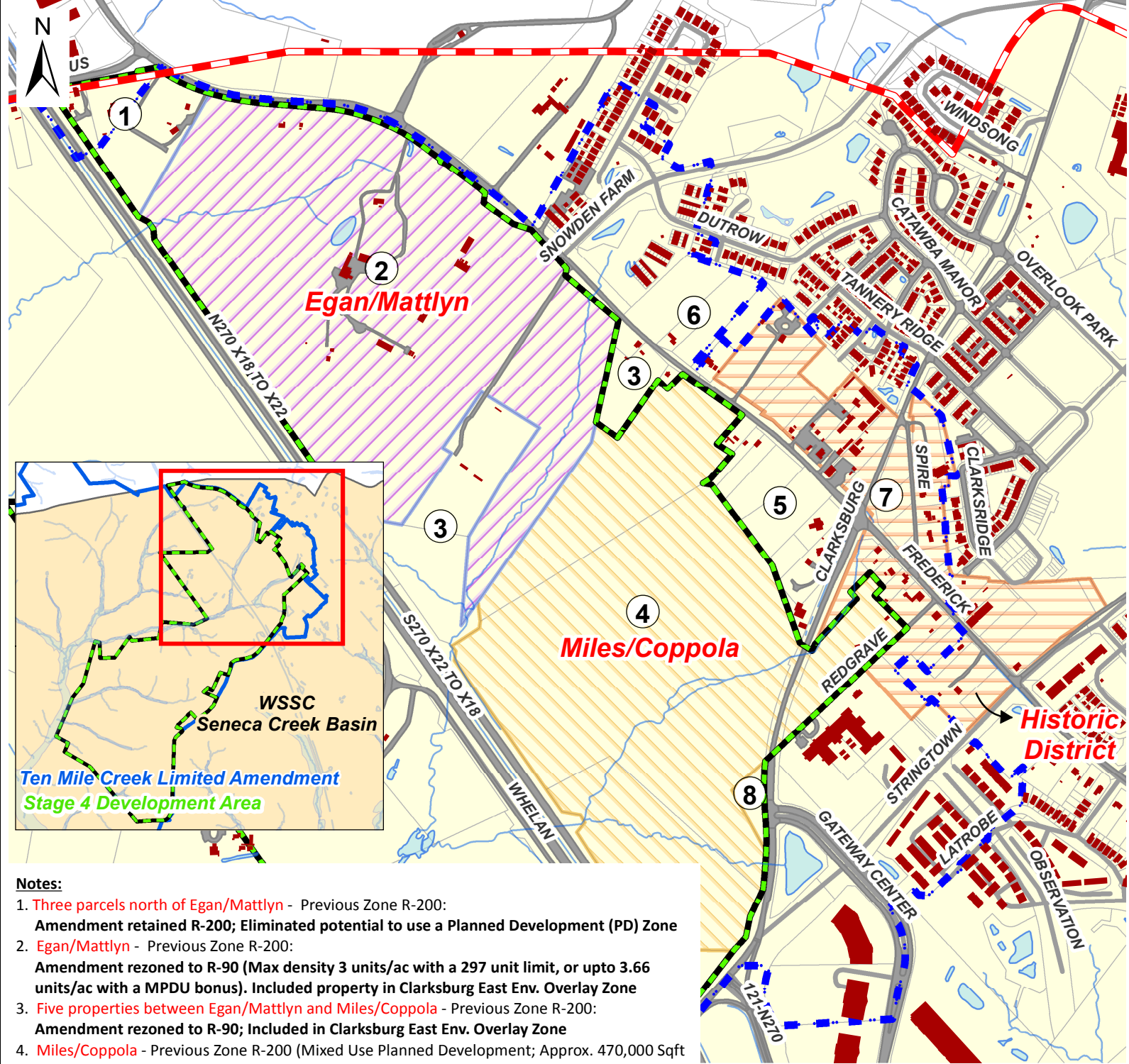


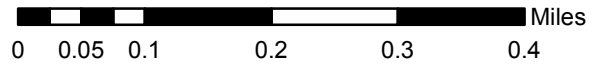
Figure 1-4
Diameter, Capacity and Peak Wastewater Flows in Gravity Sewers along Gateway Center Drive





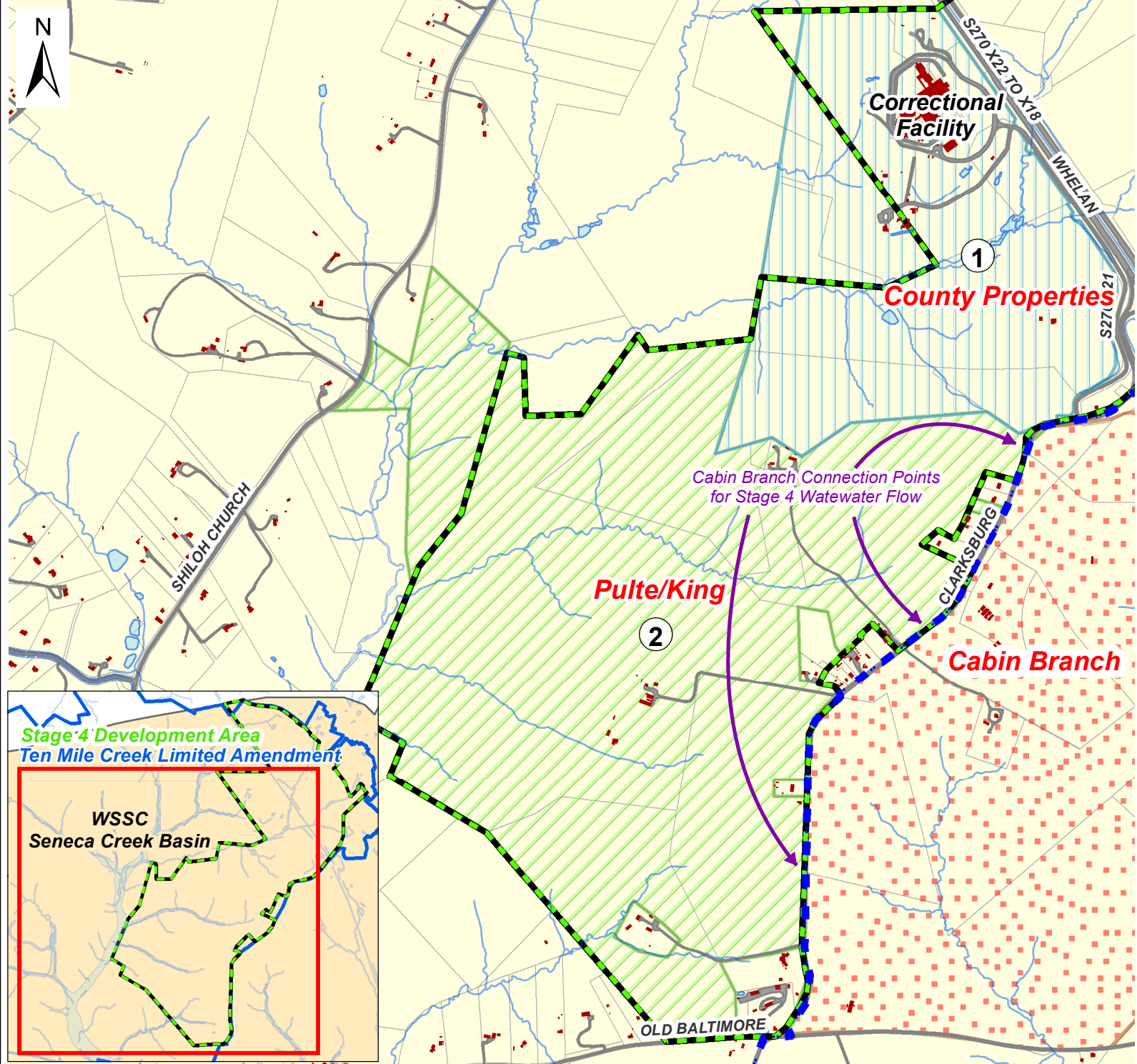
- Notes:**
1. **Three parcels north of Egan/Mattlyn** - Previous Zone R-200:
Amendment retained R-200; Eliminated potential to use a Planned Development (PD) Zone
 2. **Egan/Mattlyn** - Previous Zone R-200:
Amendment rezoned to R-90 (Max density 3 units/ac with a 297 unit limit, or upto 3.66 units/ac with a MPDU bonus). Included property in Clarksburg East Env. Overlay Zone
 3. **Five properties between Egan/Mattlyn and Miles/Coppola** - Previous Zone R-200:
Amendment rezoned to R-90; Included in Clarksburg East Env. Overlay Zone
 4. **Miles/Coppola** - Previous Zone R-200 (Mixed Use Planned Development; Approx. 470,000 Sqft for employment activities)
Amendment rezoned 5 acres near MD121 and towncenter to CRT 2.0, C2, R2 and H120;
Mix of residential and commercial development. Rezoned the remainder of property to R-90 (Max density 3 units/ac with a 279 unit limit, or upto 3.66 units/ac with a MPDU bonus)
Included property in Clarksburg East Env. Overlay Zone
 5. **Property Parcels between Miles/Coppola and MD355** - Previous Zones C-1, C-2 and R-200:
Amendment rezoned to CRN 0.25, C0.25, R0.25 and H35. Included from Clarksburg East Env. Overlay Zone
 6. **Property Parcels North of Historic District** - Previous Zone R-200:
Amedment rezoned to CRT 0.75, C 0.75, R 0.25, H 65.
 7. **Clarksburg Historic District** - Previous Zone C-1, C-2 and R-200:
Amendment rezoned to CRT 0.5, C0.5, R0.5 and H45. Excluded from Clarksburg East Env. Overlay Zone
 8. **One-acre Wright property east of MD121 near the intersection with Gateway Center Drive** - Previous Zone R-200:
Amendment rezoned to CRT 2.0, C2.0, R2.0, H 120. Allowed for the possibility of joint development with the portion of the Miles-Coppola property also zoned CRT.

Clarksburg East Env. Overlay Zone: 15% imperviousness limit and 80% open space requirement.



**Figure 1-5
Stage 4
East of I-270 Rezoning**

- Seneca Creek Basin
- Ten Mile Creek Ltd. Amnd.
- Stage 4 Boundary
- Clarksburg Historic Distric
- Egan/Mattlyn
- Miles/Coppola



- Notes:**
- County Properties** - Previous Zone I-3: Houses the County Correctional Facility Amendment includes the property in the Clarksburg West Environmental Zone with no additional imperviousness permitted. Forested areas should remain undisturbed and the designated portion protected under the Legacy Open Space Program. This plan intends to accommodate the small planned expansion of the correctional facility, but limits further development on the site.
 - Pulte/King** - Previous Zone RE-1/TDR: Amendment includes the property in the Clarksburg West Environmental Zone Amendment rezoned to RNC (Rural Neighbourhood Cluster) with a permitted density of one unit per acre. MPDU beyond the minimum 12.5 percent would be in addition to the recommended density, in accordance with Chapter 25A of the Montgomery County Code, if the development does not exceed the impervious surface cap.

Clarksburg West Env. Overlay Zone: 6% imperviousness limit and 80% open space requirement.

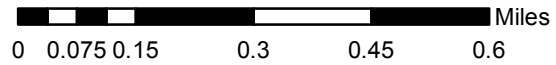








Figure 1-6
Stage 4 West of I-270 Rezoning

-  Seneca Creek Basin
-  Ten Mile Creek Ltd. Amnd.
-  Stage 4 Boundary
-  County Owned Parcels
-  Pulte/King
-  Cabin Branch

Section 2

Existing and Future Wastewater Flows

This section describes the data collected for existing properties, procedures used to estimate existing and future wastewater flows for the planned development, and documents the projected wastewater flows. These wastewater flow estimates are used to evaluate and size sanitary sewer facilities to serve the proposed development.

2.1 Data Collection for Existing Properties

As described in Section 1, the study area includes numerous properties. Data for existing development in these properties were obtained from various sources including the Maryland Department of Assessments and Taxation, WSSC GIS Database, 2014 Limited Amendment, GIS data from Montgomery County Planning Department, and WSSC's Customer Services Information System (CSIS).

Data collected for the parcels included boundaries, area, any existing development information, existing and proposed zoning, WSSC account numbers, and the daily average water consumption (DAC) in gallons per day. Most of the study area is undeveloped, with existing development primarily located in the Clarksburg Historic district and vicinity. A few existing buildings are present on the Egan/Mattlyn property, east of I-270. The other major existing development is the County Correctional Facility, west of I-270.

Currently, none of the properties (with the exception of the County Correctional Facility) have public sewer service. The Montgomery County Water and Sewer Plan categorized all the properties in the study area under a planned service area needing public sewer service.

2.2 Seneca Correctional Facility Pump Station and Force Main

Currently, a small WSSC wastewater pumping station (Seneca Correctional Facility Pump Station – rated safe capacity 0.612 mgd) pumps the wastewater from the correctional facility to gravity sewers along Gateway Center Drive on the other side of I-270 via an 8 inch force main. The force main crosses I-270 and Clarksburg Road in a 5-foot diameter tunnel. The tunnel also carries a 16-inch water main that currently provides water service to the Correctional Facility.

Alternatives to provide sewer service to the Stage 4 Area discussed in later sections consider options to eliminate this pump station.

2.3 Existing Dry Weather Flow Procedures

WSSC design criteria for sizing new non-CIP (less than 15 inches in diameter) sewers and evaluating existing sewers were used to estimate the base, average, peak, and design wastewater flows for the existing development within and around the study area as described below. The County Council has designated this area to have sewer service (category S-3) in adopting Resolution 18-66.

One procedure for estimating the Base Sanitary Flow (BSF) from the existing development is to use WSSC wastewater flow factors. Alternatively, BSF for existing land use can be assumed to equal the Daily Average Consumption (DAC). The larger of these two BSF estimates is used below.

Average Wastewater Flow (AWF) is calculated as follows:

$$AWF = 1.44 \times BSF$$

Peak Wastewater Flow (PWF) used for the evaluation of existing sanitary sewers is computed from the AWF using the Maryland Peaking Curve, which is computed as follows:

$$PWF = 4 \times AWF \quad \text{when AWF is less than 0.25 mgd}$$

$$PWF = 3.2 \times (AWF)^{(5/6)} \quad \text{when AWF is between 0.25 and 16 mgd}$$

$$PWF = 2 \times AWF \quad \text{when AWF is greater than 16 mgd}$$

The peak wastewater flow includes a wet weather inflow and infiltration allowance. Existing sewers are considered adequate if the full-flow capacity (estimated using a 0.013 Manning's roughness coefficient) is less than the peak wastewater flow plus pool backwash and pumped flow.

The Design Flow (DF) is used to size new sewers and includes a safety factor to account for uncertainties in land use and the flow generated from these land uses:

$$DF = 1.5 \times PWF \quad \text{when PWF is less than or equal to 3.75 mgd}$$

$$DF = 5.63 \text{ mgd} \quad \text{when PWF is between 3.75 mgd and 5.11 mgd}$$

$$DF = 1.1 \times PWF \quad \text{when PWF is greater than 5.11 mgd}$$

2.4 Future Dry Weather Flows

Future BSF were developed based on proposed zoning, maximum permitted dwelling units, and other factors such as the Environmental Overlay Zones and Environmental Buffer Zones. Proposed zoning in the study area are as follows:

- R-200 (three parcels north of Egan/Mattlyn)
- R-90 (Egan/Mattlyn and Miles/Coppola)
- RNC (Pulte/King)
- Four CRT/CRN zones (Clarksburg Historic District, Miles/Coppola, Wright Property and Others)

Future base sanitary flow estimates for properties zoned R-200 were based on a WSSC wastewater flow factor of 420 gpd/acre. Flow estimates for Egan/Mattlyn, Miles/Coppola, and Pulte/King properties were based on the latest information provided by the individual developers, using a factor of 143 gpd per dwelling unit. No new development is permitted in the county-owned properties west of I-270. However, the County could still potentially locate a new fire station on the county-owned property along Route 355 (East of I270). Under this sewer study, future base sanitary flows were estimated for these county-owned parcels based on the new CRT zoning.

For the properties zoned CRT and CRN, a maximum allowable area that can be developed (square footage) was estimated based on total FAR (Floor Area Ratio), limits on imperviousness and building height restrictions. This area was then distributed among the commercial and residential components

of the respective CRT/CRN zones. A WSSC wastewater flow factor of 0.048 gpd/square foot was used for the commercial development and a wastewater flow factor of 100 gpd/unit (typical for an apartment) was used for residential properties assuming 1,600 square feet per residential unit.

Peak and design wastewater flows were estimated using the procedures described in Section 2.3.

Table 2-1 summarizes the future BSF estimates for major properties in the study area.

Table 2-1 Future Base Sanitary Flow Estimates

Property	Estimated Future Base Sanitary Flow (mgd)
Egan/Mattlyn	51,900
Miles/Coppola	48,200
Historic District	44,100
Pulte/King	94,200
Misc./Other	28,300

Appendix C provides an overview of data collected and future BSF estimates for all the individual parcels in the study area.

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Section 3

Development of Alternatives

This section documents potential alternatives developed to provide sanitary sewer service to the Clarksburg Ten Mile Creek study area. Selected feasible alternatives are evaluated in Section 4.

The Ten Mile Creek Limited Master Plan recommends that sewer main alignments and pumping stations be located so as to “minimize, as feasible, disturbance of environmental buffers and forested areas”. The Water and Sewer Plan amendment resolution notes:

“The County Council expects the Washington Suburban Sanitary Commission’s comprehensive sewer study of the Ten Mile Creek Limited Master Plan Area to review all feasible alternatives for the maximum environmental protection of the area. Sewer infrastructure should avoid Ten Mile Creek, its tributaries, and other water resources unless it is technologically infeasible to do so. Disturbance to all environmentally sensitive areas should be minimized. Only capital projects that satisfy the Master Plan’s recommendation for service and minimize environmental impacts to Ten Mile Creek will be approved by the Council.”

Sanitary sewer service is being considered for new development planned in the Clarksburg Ten Mile Creek area, referred to as the Stage 4 Area, in the following open land properties: Pulte/King, Egan/Mattlyn and Miles Coppola. In addition, sewer service is planned to be provided to Historic Clarksburg and other miscellaneous properties that currently rely on septic systems. Service is also to continue to be provided to the existing Correctional Facility.

This facility plan identifies an appropriate solution that serves these properties while minimizing cost and impacts to environmental resources (e.g., stream crossings, impervious areas, stream buffer disturbance, excessive impervious areas, forest disturbance and excessive grade changes) and the community during construction activities. Also, a consideration is given to implementability issues such as minimizing tunnel crossings of I-270 and avoiding construction of sewer facilities within stream buffer areas. Of primary concern is overall protection of the Ten Mile Creek watershed, which is a high quality stream within the plan area, with preservation of this natural resource deemed critical to the County’s wellbeing.

The alternatives provide service through combinations of gravity sewers, pump stations, and force mains. The alternatives extend sanitary sewer service from the study area to existing WSSC sewers, which drain south via two gravity trunk sewers to the Crystal Rock or Little Seneca Wastewater Pump Stations (see **Figure 1-3**). The Cabin Branch sewers (west of I-270) have been sized to handle future flows from the Stage 4 Area. The sewers east of I-270 have limited capacity to convey Stage 4 flows when added to other planned development. Therefore, inherent in the development of alternatives is the need to direct Stage 4 Area flows to the existing WSSC sewers in the Cabin Branch basin.

The following presents each of the alternatives evaluated as part of this study. It should be understood that the areas noted on the Pulte/King, Egan/Mattlyn, and Miles Coppola properties in purple do not designate the development footprint. These areas were strictly used for planning purposes only to conceptually designate areas for future sewer service. Areas allowed for actual development on these

properties will be decided by the Montgomery County Planning Department through its development review process.

3.1 Alternative 1

Alternative 1 (Gravity and 1 Pump Station) extends service to the Pulte/King area by constructing a new pump station (Pulte PS) at the lower elevations of this sub-sewershed. This pump station would receive wastewater from new gravity sewers in the planned development area and pump the flows through a force main discharging to a Cabin Branch gravity sewer connection point at Clarksburg Road. A small sewer reach to the north would collect wastewater and drain to a second gravity sewer connection point along Clarksburg Road.

A gravity trunk sewer would be installed along the northern portion of Ten Mile Creek to route much of the Egan/Mattlyn wastewater to the new Pulte PS. The Miles Coppola property would drain via gravity flow along a second trunk sewer adjacent to Ten Mile Creek also to the Pulte PS. Historic Clarksburg would be provided with sewer service with gravity sewers along Frederick Road to gravity sewers within the Miles/Coppola property and along Clarksburg Road. A small portion of properties in the southern area of Historic Clarksburg would drain to an existing WSSC manhole north of the area. The existing Correctional Facility PS would be eliminated, with flows re-directed to the new trunk sewer along Ten Mile Creek.

This alternative would require construction of 1 new pump station, 27,570 feet of gravity sewer, 5,180 feet of force main, three tunnel crossings of I-270, 24 stream crossings and minor increases to impervious areas (3,200 SF). **Table 3-1** summarizes the gravity sewers and force main length (including lengths within buffer area), tunneling and stream crossing requirements, and pump station flows. See **Figure 3-1** for a layout of Alternative 1.

3.2 Alternative 2

Alternative 2 (Gravity and 2 Pump Stations) provides service to the study area, with an approach similar to Alternative 1. However, the northern gravity trunk sewer along Ten Mile Creek is eliminated and instead a new pump station would be constructed at the Egan/Mattlyn property (Egan North PS). Flows from the Egan/Mattlyn area would be directed towards Frederick Road to travel via new gravity trunk sewers serving the Historic Clarksburg area. This reduces the total length of gravity sewer to 20,320 feet while increasing the force main length to 7,080 feet. The Correctional Facility pump station is eliminated. Two pump stations would be operated (Pulte PS and Egan North PS). Also, two I-270 tunnel crossings and 21 stream crossings would be necessary, and minor increases to impervious areas (6,400 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-2** presents the layout of Alternative 2.

3.3 Alternative 3

Alternative 3 (Gravity and 3 Pump Stations) is similar to Alternative 2 but with the second gravity trunk sewer along Ten Mile Creek eliminated, through the addition of a third pump station (New Correctional Facility PS) and removing the existing Correctional Facility pump station. The Pulte PS would be moved further east towards Clarksburg Road. This reduces the total length of gravity sewer to 13,620 feet and decreases the force main length to 5,350 feet. Three pump stations would be

operated (Pulte PS, Egan North PS and New Correctional Facility PS). Also, two I-270 tunnel crossings and 14 stream crossings are required and minor increases to impervious areas (9,600 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-3** presents the layout of Alternative 3.

3.4 Alternative 4

Alternative 4 (Gravity and 4 Pump Stations) is similar to Alternative 3 with the exception of modifications to the conveyance system along Clarksburg Road north of I-270. A new pump station would be constructed (Clarksburg Road PS) with the new force main installed within the existing I-270 tunnel crossing (previously used for the Existing Correctional Facility PS which would be taken out of service). The existing 8-inch force main inside the 16-inch casing would be upsized to 10-inch diameter to accommodate additional flows. Both the New Correctional Facility PS and Clarksburg Road PS would discharge to a new gravity trunk sewer west of I-270 which drains to a Cabin Branch gravity sewer connection point along Clarksburg Road.

This alternative would have a gravity sewer length increased to 12,670 feet, while the force main length would increase to 7,050 feet. Four pump stations would be operated (Pulte PS, Egan North PS, New Correctional Facility PS and Clarksburg Road PS). Also, one new I-270 tunnel crossing and 13 stream crossings would be needed, and minor increases to impervious areas (12,800 SF).

Table 3-1 presents a summary of the alternative's components, and **Figure 3-4** presents the layout of Alternative 4.

3.5 Alternative 5

Alternative 5 (Gravity and 5 Pump Stations) is similar to Alternative 4 with the exception that the Existing Correctional Facility PS would continue to operate, with wastewater re-directed to a new gravity trunk sewer west of I-270. Also, much of the flow from the Miles/Coppola property would be re-routed via a new pump station (Miles PS) and discharge to the new gravity trunk sewer along Frederick Road that drains along Clarksburg Road to the Clarksburg Road PS. As with Alternative 4, the existing 8-inch force main inside the 16-inch casing would be upsized to 10-inch diameter to accommodate additional flows from the Clarksburg Road PS.

This alternative further reduces the total length of gravity sewer to 10,120 feet, while the force main length increases slightly to 7,310 feet. Five pump stations would operate (Pulte PS, Egan North PS, Clarksburg Road PS, Miles North PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 7 stream crossings and minor increases to impervious areas (12,800 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-5** presents the layout of Alternative 5.

3.6 Alternative 6

Alternative 6 (Gravity and 6 Pump Stations) is similar to Alternative 5 with the exception that the Existing Correctional Facility PS would continue to operate, with wastewater directed to the existing gravity trunk sewer east of I-270. Flow from the Egan property would be routed via two new pump stations (Egan North PS and Egan PS) and discharge to the new gravity trunk sewer along Frederick

Road that drains to the Miles North PS. Also, a portion of the Miles/Coppola property would be served by a second pump station on the property (Miles PS) and routed to an existing gravity trunk sewer east of Clarksburg Road at Gateway Center Drive.

This alternative further reduces the total length of gravity sewer to 9,460 feet, and slightly decreases the force main length to 7,260 feet. Six pump stations would operate (Pulte PS, Egan North PS, Egan PS, Miles North PS, Miles PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 9 stream crossings and minor increases to impervious areas (16,000 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-6** presents the layout of Alternative 6.

3.7 Alternative 7

Alternative 7 (Gravity and 4 Pump Stations and Grinder Pump System) is similar to Alternative 6 with the exception that new pump stations on the Egan/Mattlyn property would be eliminated, and instead, this area would be served with a grinder pump system that discharges to a new gravity trunk sewer along Frederick Road. The Egan/Mattlyn grinder system would consist of 2,600 feet of low pressure sewers and 383 individual grinder units.

This alternative would require 9,460 feet of gravity sewers and 4,310 feet of force main. Four pump stations would operate (Pulte PS, Miles North PS, Miles PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 9 stream crossings and minor increases to impervious areas (9,600 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-7** presents the layout of Alternative 7.

3.8 Alternative 8

Alternative 8 (Gravity and 5 Pump Stations) is similar to Alternative 6 with the exception that the Miles North PS is eliminated, and instead, this area is served by deep gravity sewers along Frederick Road and Observation Drive (possible future County roadway that would also provide access to new development area) that discharge to a new truck sewer along Clarksburg Road.

This alternative would require 8,470 feet of gravity sewers and 7,140 feet of force main. Five pump stations would operate (Pulte PS, Egan North PS, Egan PS, Miles PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 7 stream crossings and minor increases to impervious areas (12,800 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-8** presents the layout of Alternative 8.

3.9 Alternative 9

Alternative 9 (Gravity and 4 Pump Stations and Grinder Pump System) is similar to Alternative 8 with the exception that the Pulte PS would be eliminated, and instead, this area would be served with a

grinder pump system that discharges to a new gravity trunk sewer along Clarksburg Road. The Pulte grinder system would consist of 3,500 feet of low pressure sewers and 284 individual grinder units.

This alternative would require 8,470 feet of gravity sewers and 5,490 feet of force main. Four pump stations would operate (Egan North PS, Egan PS, Miles PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 6 stream crossings and minor increases to impervious areas (9,600 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-9** presents the layout of Alternative 9.

3.10 Alternative 10

Alternative 10 (Gravity and 4 Pump Stations and Grinder Pump System – No Observation Drive) is similar to Alternative 9 with the exception that the central portion of Miles/Coppola property served by gravity sewer will discharge along a yet to be defined access road to this new development area rather than along Observation Drive (possible future County roadway) which will not be built. The Pulte grinder system would consist of 3,500 feet of low pressure sewers and 284 individual grinder units.

This alternative would require 8,100 feet of gravity sewers and 6,450 feet of force main. Four pump stations would operate (Egan North PS, Egan PS, Miles PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 3 stream crossings and minor increases to impervious areas (9,600 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-10** presents the layout of Alternative 10.

3.11 Alternative 11

Alternative 11 (Gravity and 3 Pump Stations and Grinder Pump System) is similar to Alternative 9 with the exception that the Miles North PS would be eliminated, and instead, this area would be served with a grinder pump system that discharges to the Egan PS. This alternative would consist of 6,100 feet of low pressure sewers and 304 individual grinder units.

This alternative would require 8,470 feet of gravity sewers and 3,440 feet of force main. Three pump stations would operate (Egan PS, Miles PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 6 stream crossings and minor increases to impervious areas (6,400 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-11** presents the layout of Alternative 11.

3.12 Alternative 12

Alternative 12 (Gravity and 3 Pump Stations and Grinder Pump System – No Observation Drive) is similar to Alternative 11 with the exception that the central portion of Miles/Coppola property served by gravity sewer will discharge along a yet to be defined access road to this new development area. This alternative would consist of 6,100 feet of low pressure sewers and 304 individual grinder units.

This alternative would require 8,100 feet of gravity sewers and 4,400 feet of force main. Four pump stations would operate (Egan North PS, Egan PS, Miles PS, and Existing Correctional Facility PS). Three pump stations would operate (Egan PS, Miles PS, and Existing Correctional Facility PS). Also, this approach would eliminate the need for any new I-270 tunnel crossings and requires 3 stream crossings and minor decrease to impervious areas (6,400 SF).

Table 3-1 presents a summary of the alternative's components and **Figure 3-12** presents the layout of Alternative 12.

3.13 Alternatives Selected for Evaluation

The twelve alternatives were initially screened based on consideration for impacts to the community and reasonably acceptable risk to the Ten Mile Creek watershed. The following provides the rationale for selecting ten of the alternatives for evaluation in Section 4:

- Alternative 1 was not selected. The potential risk to the sensitive ecosystem within the Ten Mile Creek during installation of the two gravity trunk sewers along the stream banks, and long term risk throughout operation of the gravity sewers was deemed unacceptable.
- Alternative 2 was not selected. Similar to Alternative 1, this alternative also relies on gravity trunk sewers along Ten Mile Creek. While the length of sewer within this sensitive ecosystem is less than Alternative 1, impacts during installation and long term risk was determined to be unacceptable.
- Alternative 3 was selected because it provides service to all of the development areas and Historic Clarksburg, while reducing the potential impacts to Ten Mile Creek, compared to Alternatives 1 and 2.
- Alternative 4 was selected because it reduces the length of gravity trunk sewers located within the buffer areas and number of I-270 tunnel and stream crossings compared to Alternative 3. An additional pump station will be necessary for this alternative, and the impacts to the community and long term operation and maintenance issues will need to be considered further in Section 4.
- Alternative 5 was selected for further evaluation. This alternative further reduces the length of gravity trunk sewers, eliminates the need for any new I-270 tunnel crossings, and minimizes impacts to the community during construction. This alternative requires five pump stations in operation, and the associated disruptions to the community and long term issues will need to be evaluated further in Section 4.
- Alternative 6 was selected for further evaluation. This alternative further reduces the length of gravity trunk sewers, eliminates the need for any new I-270 tunnel crossings, and minimizes impacts to the community during construction. This alternative requires the largest number of pump stations in operation, and the associated disruptions to the community and long term issues will need to be evaluated further in Section 4.
- Alternative 7 was selected for further evaluation. This alternative reduces the number of pump stations by using grinder pump systems in the Egan/Mattlyn area. The length of force mains is

reduced, however, there would be low pressure sewers. The long term issues of operating hundreds of grinder pump systems will need to be evaluated further in Section 4.

- Alternative 8 was selected for further evaluation. This alternative further reduces the length of gravity trunk sewers, while making use of deep gravity sewers to carry flow along Frederick Road and Observation Drive. The impacts to buildings and the community for tunneling through rock during construction of the deep gravity sewers will need to be evaluated further in Section 4.
- Alternative 9 was selected for further evaluation. This alternative reduces the number of pump stations by using grinder pump systems in the Pulte areas. The long term issues of operating hundreds of grinder pump systems and the impacts for installing deep gravity sewers will need to be evaluated further in Section 4.
- Alternative 10 was selected for further evaluation. This alternative takes into consideration the possibility that Observation Drive is not available to install a gravity trunk sewer to Clarksburg Road. Instead, an access road for the future property development would provide a path for the new gravity trunk sewer. The issues with uncertainties of the access road location, and the impacts for installing deep gravity sewers will need to be evaluated further in Section 4.
- Alternative 11 was selected for further evaluation. This alternative reduces the number of pump stations by using grinder pump systems in the Egan/Mattlyn and Pulte areas. The long term issues of operating hundreds of grinder pump systems and the impacts for installing deep gravity sewers will need to be evaluated further in Section 4.
- Alternative 12 was selected for further evaluation. This alternative takes into consideration the possibility that Observation Drive is not available to install a gravity trunk sewer to Clarksburg Road. Instead, an access road for the future property development would provide a path for the new gravity trunk sewer. The issues with uncertainties of the access road location and the impacts for installing deep gravity sewers will need to be evaluated further in Section 4.

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TABLE 3-1
SUMMARY OF ALTERNATIVE COMPONENTS

Sewer Lengths Summary

Alternative	Description	Gravity Sewer (Feet)							Forcemain (Feet)							Low Pressure Sewer	Total Gravity Sewer Length (Feet)	Total Forcemain Length (Feet)	Total Low Pressure Sewer (Feet)	
		Gravity Trunk Sewer Along Ten Mile Creek	Frederick Rd Sewer and other Misc	Clarksburg Rd Sewer	Spire St Sewer	Whelan Ln Gravity Sewer	Observation Drive and Other Misc	Deep Sewer (Frederick Rd and Observation Drive)	Pulte PS FM	Egan North PS FM	Egan Forcemain	New PS near Correctional Facility FM	Clarksburg Rd PS FM	Miles PS FM (North)	Miles PS FM					Existing Correctional Facility PS FM Redirect
Alternative 1	Gravity + 1 PS	21,090	4,360	1,550	570	-	-	-	5,180	-	-	-	-	-	-	-	-	27,570	5,180	-
Alternative 2	Gravity + 2 PS	13,840	4,360	1,550	570	-	-	-	5,180	1,900	-	-	-	-	-	-	-	20,320	7,080	-
Alternative 3	Gravity + 3 PS	5,160	3,690	2,710	570	1,490	-	-	1,650	1,900	-	1,800	-	-	-	-	-	13,620	5,350	-
Alternative 4	Gravity + 4 PS	3,330	3,690	3,590	570	1,490	-	-	1,650	1,900	-	1,800	1,700	-	-	-	-	12,670	7,050	-
Alternative 5	Gravity + 5 PS	780	3,690	3,590	570	1,490	-	-	1,650	1,900	-	-	1,700	1,400	-	660	-	10,120	7,310	-
Alternative 6	Gravity + 6 PS	780	4,360	2,530	570	-	1,220	-	1,650	1,600	1,350	-	-	1,400	1,260	-	-	9,460	7,260	-
Alternative 7	Gravity + 4 PS + Grinder Systems	780	4,360	2,530	570	-	1,220	-	1,650	-	-	-	-	1,400	1,260	-	2,600	9,460	4,310	2,600
Alternative 8	Gravity + 5 PS	-	2,000	2,530	570	-	1,620	1,750	1,650	2,050	2,180	-	-	-	1,260	-	-	8,470	7,140	-
Alternative 9	Gravity + 4 PS + Grinder Systems	-	2,000	2,530	570	-	1,620	1,750	-	2,050	2,180	-	-	-	1,260	-	3,500	8,470	5,490	3,500
Alternative 10	Gravity + 4 PS + Grinder Systems	-	5,000	2,530	570	-	-	-	-	2,050	3,140	-	-	-	1,260	-	3,500	8,100	6,450	3,500
Alternative 11	Gravity + 3 PS + Grinder Systems	-	2,000	2,530	570	-	1,620	1,750	-	-	2,180	-	-	-	1,260	-	6,100	8,470	3,440	6,100
Alternative 12	Gravity + 3 PS + Grinder Systems	-	5,000	2,530	570	-	-	-	-	-	3,140	-	-	-	1,260	-	6,100	8,100	4,400	6,100

Alternative	Description	Total Gravity Sewer Length (Feet)	Total Forcemain Length (Feet)	Total Low Pressure Sewer Length (Feet)	Total Gravity Sewer Length in buffer (Feet)	Total Forcemain Length in buffer (Feet)	Total Low Pressure Sewer Length in buffer (Feet)	Percentage of Gravity Sewer in buffer	Percentage of FM in buffer	Percentage of FM in buffer	No. of Grinder Units
Alternative 1	Gravity + 1 PS	27,570	5,180	-	20,400	-	-	74%	-	-	-
Alternative 2	Gravity + 2 PS	20,320	7,080	-	13,150	340	-	65%	5%	-	-
Alternative 3	Gravity + 3 PS	13,620	5,350	-	4,870	700	-	36%	13%	-	-
Alternative 4	Gravity + 4 PS	12,670	7,050	-	3,330	780	-	26%	11%	-	-
Alternative 5	Gravity + 5 PS	10,120	7,310	-	1,210	150	-	12%	2%	-	-
Alternative 6	Gravity + 6 PS	9,460	7,260	-	1,630	150	-	17%	2%	-	-
Alternative 7	Gravity + 4 PS + Grinder Systems	9,460	4,310	2,600	1,630	150	-	17%	3%	-	383
Alternative 8	Gravity + 5 PS	8,470	7,140	-	850	-	-	10%	-	-	-
Alternative 9	Gravity + 4 PS + Grinder Systems	8,470	5,490	3,500	720	-	-	9%	-	-	284
Alternative 10	Gravity + 4 PS + Grinder Systems	8,100	6,450	3,500	-	-	-	-	-	-	284
Alternative 11	Gravity + 3 PS + Grinder Systems	8,470	3,440	6,100	720	-	-	9%	-	-	304
Alternative 12	Gravity + 3 PS + Grinder Systems	8,100	4,400	6,100	-	-	-	-	-	-	304

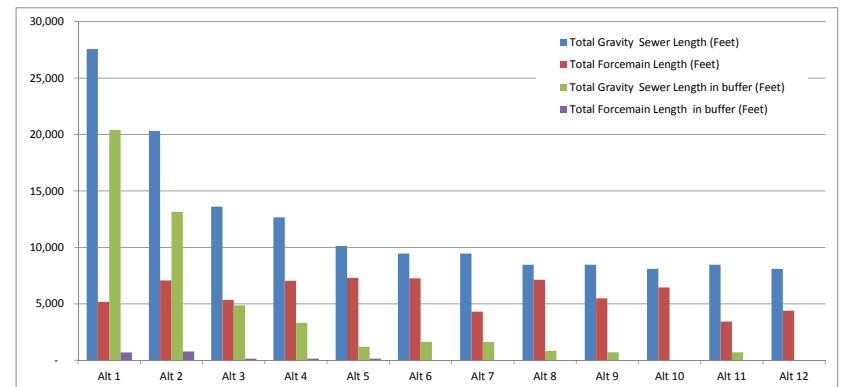
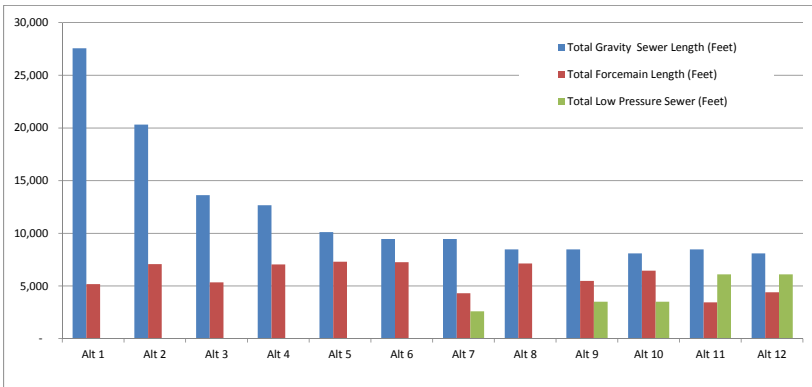


TABLE 3-1
SUMMARY OF ALTERNATIVE COMPONENTS

Tunnels Summary

Alternative	Description	No. of New Tunnels across I-270	FM in Existing Tunnel Abandoned (Yes/No)	Existing Tunnel used for New FM (Yes/No)
Alternative 1	Gravity + 1 PS	3	Yes	No
Alternative 2	Gravity + 2 PS	2	Yes	No
Alternative 3	Gravity + 3 PS	2	Yes	No
Alternative 4	Gravity + 4 PS	1	No	Yes
Alternative 5	Gravity + 5 PS	0	No	Yes
Alternative 6	Gravity + 6 PS	0	No	No
Alternative 7	Gravity + 4 PS + Grinder Systems	0	No	No
Alternative 8	Gravity + 5 PS	0	No	No
Alternative 9	Gravity + 4 PS + Grinder Systems	0	No	No
Alternative 10	Gravity + 4 PS + Grinder Systems	0	No	No
Alternative 11	Gravity + 3 PS + Grinder Systems	0	No	No
Alternative 12	Gravity + 3 PS + Grinder Systems	0	No	No

Stream Crossings Summary (Including Ephemeral Streams)

Alternative	Description	Total No. of Stream Crossings	Main Trunk Sewer	Egan North Trunk Sewer	Frederick Rd Sewer	Clarksburg Rd Sewer	Observation Drive	New Corr FM	Other
Alternative 1	Gravity + 1 PS	24	17	3	1	1	0	0	2
Alternative 2	Gravity + 2 PS	21	16	0	1	1	0	1	2
Alternative 3	Gravity + 3 PS	14	8	0	1	1	0	1	3
Alternative 4	Gravity + 4 PS	13	6	0	1	2	0	1	3
Alternative 5	Gravity + 5 PS	7	2	0	1	2	0	0	2
Alternative 6	Gravity + 6 PS	9	2	0	1	1	4	0	1
Alternative 7	Gravity + 4 PS + GS	9	2	0	1	1	4	0	1
Alternative 8	Gravity + 5 PS	7	0	0	1	1	4	0	1
Alternative 9	Gravity + 4 PS + GS	6	0	0	1	1	4	0	0
Alternative 10	Gravity + 4 PS + GS	3	0	0	2	1	0	0	0
Alternative 11	Gravity + 3 PS + GS	6	0	0	1	1	4	0	0
Alternative 12	Gravity + 3 PS + GS	3	0	0	2	1	0	0	0

Pump Stations Summary

Alternative	Description	Pulte PS	Egan North PS	Egan PS	New PS at Correctional Facility	Clarksburg Rd PS	Miles North PS	Miles PS	Existing Correctional Facility PS in use	Total Number of Pump stations in service
Alternative 1	Gravity + 1 PS	Yes	No	No	No	No	No	No	No	1
Alternative 2	Gravity + 2 PS	Yes	Yes	No	No	No	No	No	No	2
Alternative 3	Gravity + 3 PS	Yes	Yes	No	Yes	No	No	No	No	3
Alternative 4	Gravity + 4 PS	Yes	Yes	No	Yes	Yes	No	No	No	4
Alternative 5	Gravity + 5 PS	Yes	Yes	No	No	Yes	Yes	No	Yes	5
Alternative 6	Gravity + 6 PS	Yes	Yes	Yes	No	No	Yes	Yes	Yes	6
Alternative 7	Gravity + 4 PS + Grinder Systems	Yes	No	No	No	No	Yes	Yes	Yes	4
Alternative 8	Gravity + 5 PS	Yes	Yes	Yes	No	No	No	Yes	Yes	5
Alternative 9	Gravity + 4 PS + Grinder Systems	No	Yes	Yes	No	No	No	Yes	Yes	4
Alternative 10	Gravity + 4 PS + Grinder Systems	No	Yes	Yes	No	No	No	Yes	Yes	4
Alternative 11	Gravity + 3 PS + Grinder Systems	No	No	Yes	No	No	No	Yes	Yes	3
Alternative 12	Gravity + 3 PS + Grinder Systems	No	No	Yes	No	No	No	Yes	Yes	3

Pump Station Sizing (mgd)

Alternative	Description	Pulte PS	Egan North PS	Egan PS	New PS at Correctional Facility	Clarksburg Rd PS	Miles PS (North)	Miles PS	Existing Correctional Facility PS in use
Alternative 1	Gravity + 1 PS	1.98	-	-	-	-	-	-	-
Alternative 2	Gravity + 2 PS	1.98	0.17	-	-	-	-	-	-
Alternative 3	Gravity + 3 PS	0.27	0.17	-	1.71	-	-	-	-
Alternative 4	Gravity + 4 PS	0.27	0.17	-	1.45	0.26	-	-	-
Alternative 5	Gravity + 5 PS	0.27	0.17	-	-	0.94	0.68	-	0.61
Alternative 6	Gravity + 6 PS	0.27	0.022	0.30	-	-	0.47	0.94	0.61
Alternative 7	Gravity + 4 PS + Grinder Systems	0.27	-	-	-	-	0.47	0.94	0.61
Alternative 8	Gravity + 5 PS	0.27	0.022	0.32	-	-	-	0.94	0.61
Alternative 9	Gravity + 4 PS + Grinder Systems	-	0.022	0.32	-	-	-	0.94	0.61
Alternative 10	Gravity + 4 PS + Grinder Systems	-	0.022	0.46	-	-	-	0.94	0.61
Alternative 11	Gravity + 3 PS + Grinder Systems	-	-	0.32	-	-	-	0.94	0.61
Alternative 12	Gravity + 3 PS + Grinder Systems	-	-	0.46	-	-	-	0.94	0.61

*Sizing is based on Peak Wastewater Flow (PWF) as described in Appendix C, WSSC Design Criteria for Sewer Systems.

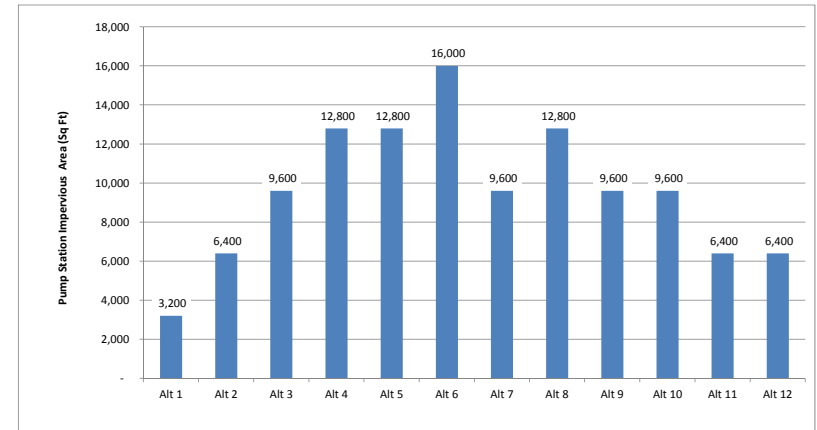
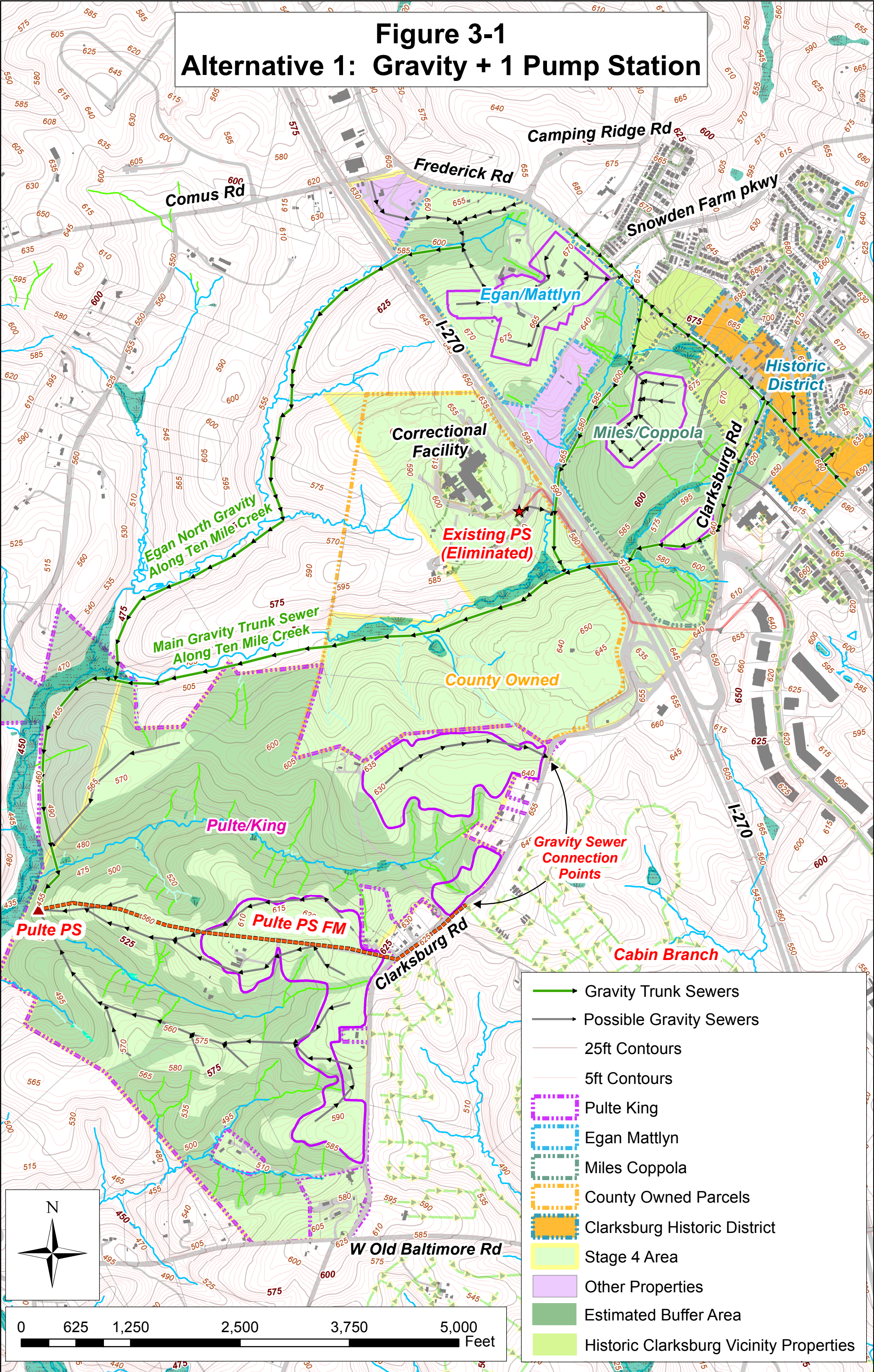


Figure 3-1 Alternative 1: Gravity + 1 Pump Station



- Gravity Trunk Sewers
- Possible Gravity Sewers
- 25ft Contours
- 5ft Contours
- Pulte King
- Egan Mattlyn
- Miles Coppola
- County Owned Parcels
- Clarksburg Historic District
- Stage 4 Area
- Other Properties
- Estimated Buffer Area
- Historic Clarksburg Vicinity Properties

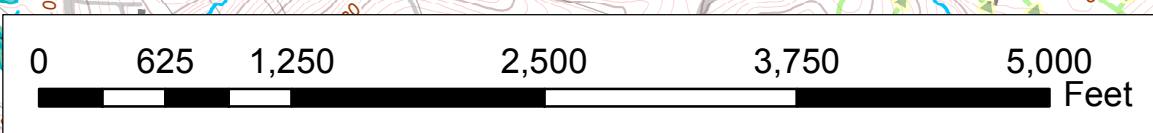
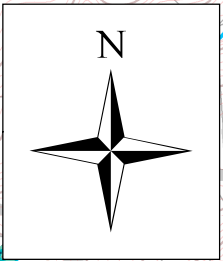


Figure 3-2 Alternative 2: Gravity + 2 Pump Stations

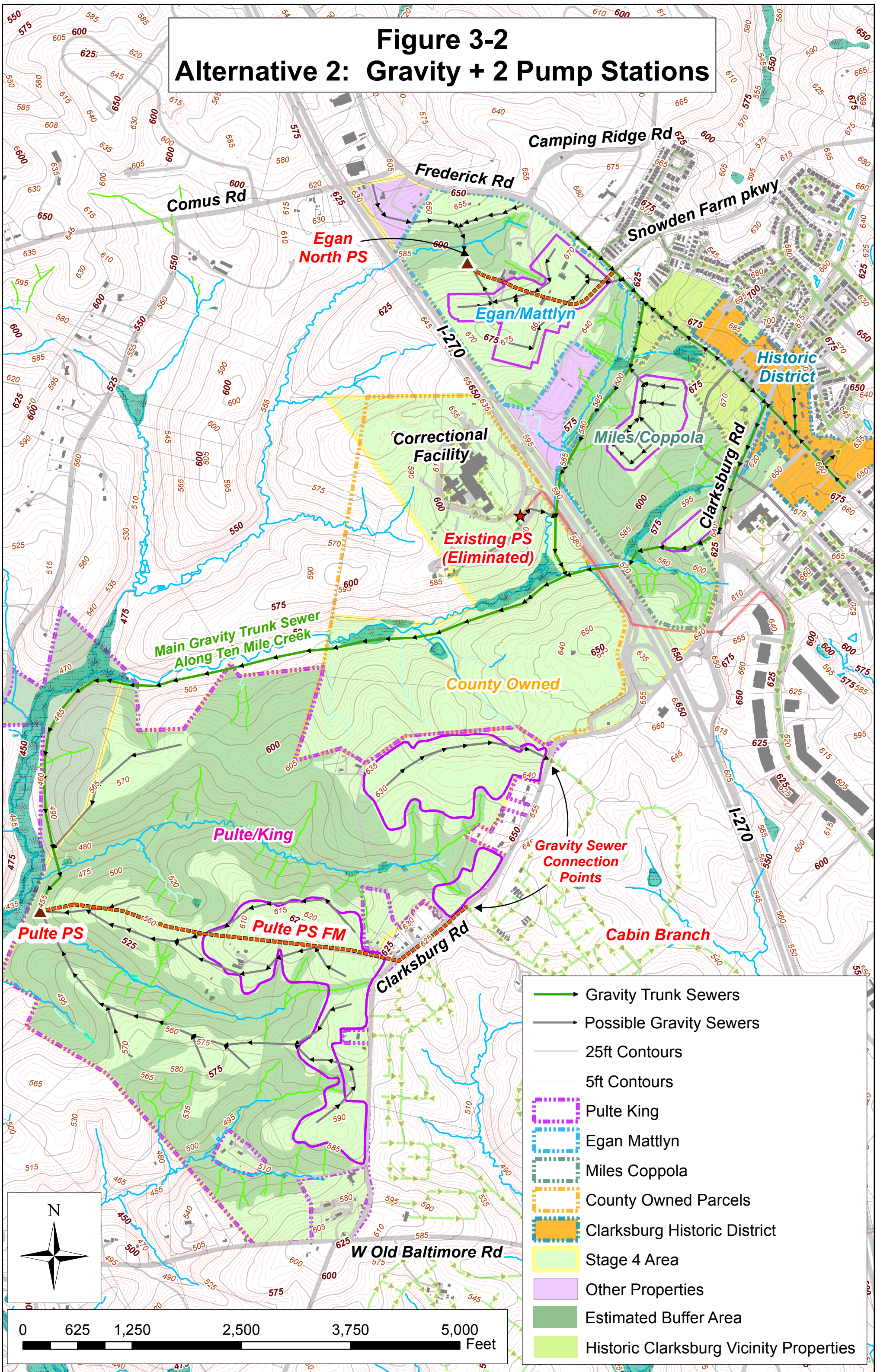


Figure 3-3 Alternative 3: Gravity + 3 Pump Stations

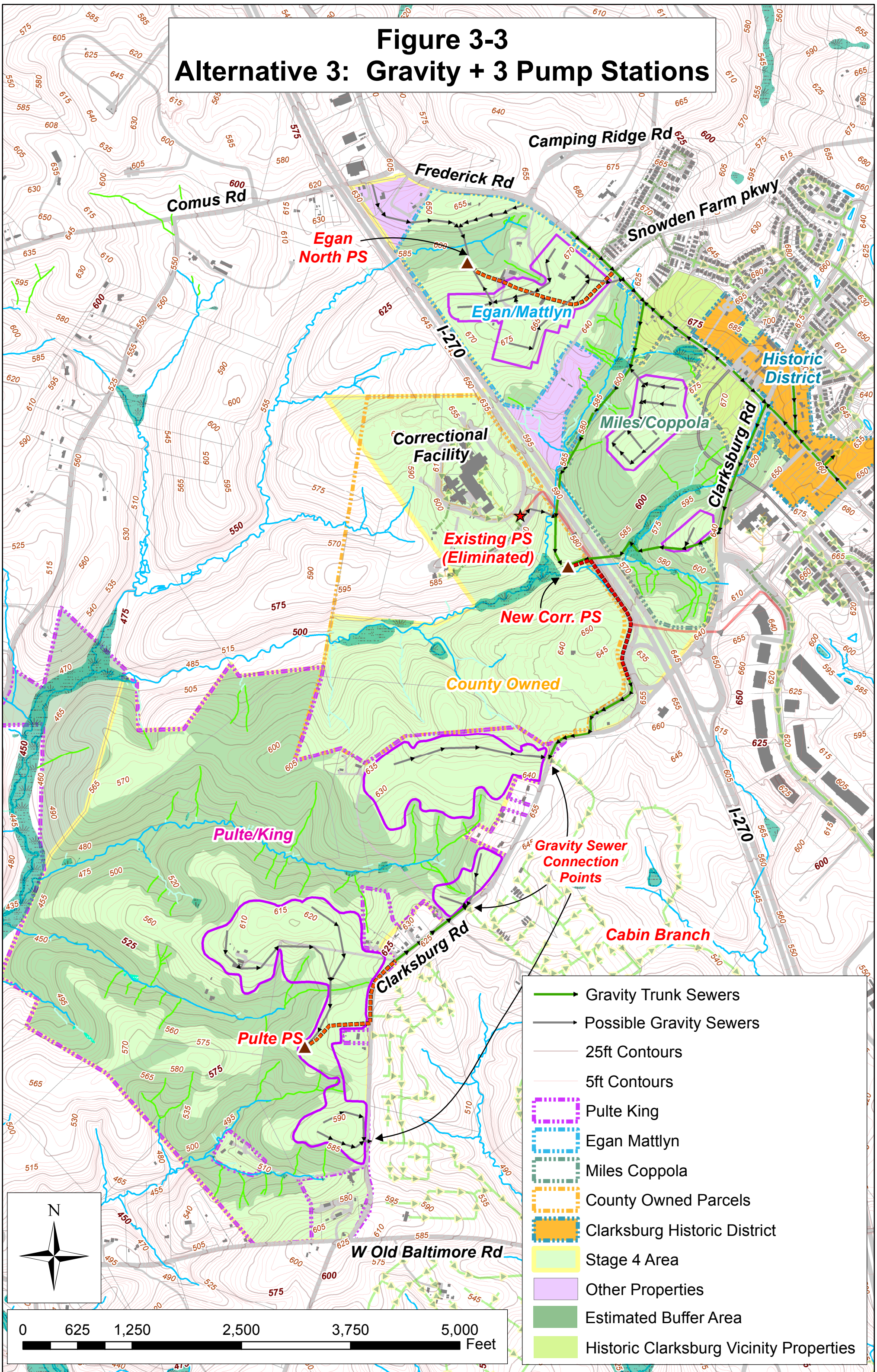
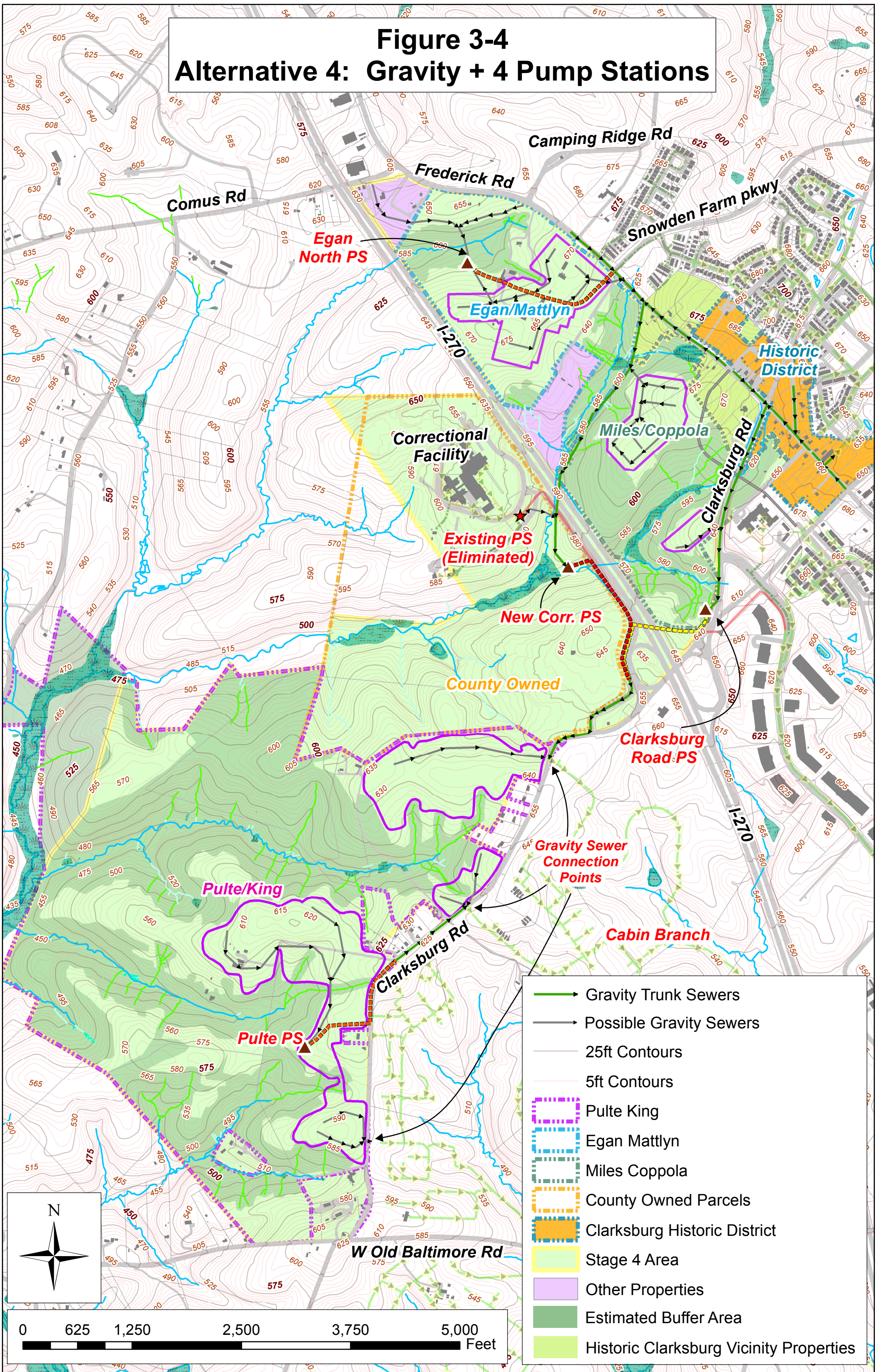












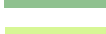


Figure 3-4 Alternative 4: Gravity + 4 Pump Stations



-  Gravity Trunk Sewers
-  Possible Gravity Sewers
-  25ft Contours
-  5ft Contours
-  Pulte King
-  Egan Mattlyn
-  Miles Coppola
-  County Owned Parcels
-  Clarksburg Historic District
-  Stage 4 Area
-  Other Properties
-  Estimated Buffer Area
-  Historic Clarksburg Vicinity Properties

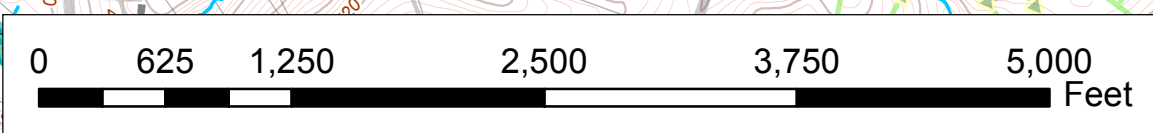
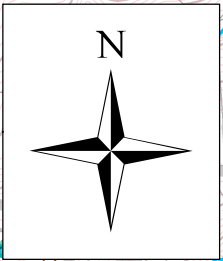
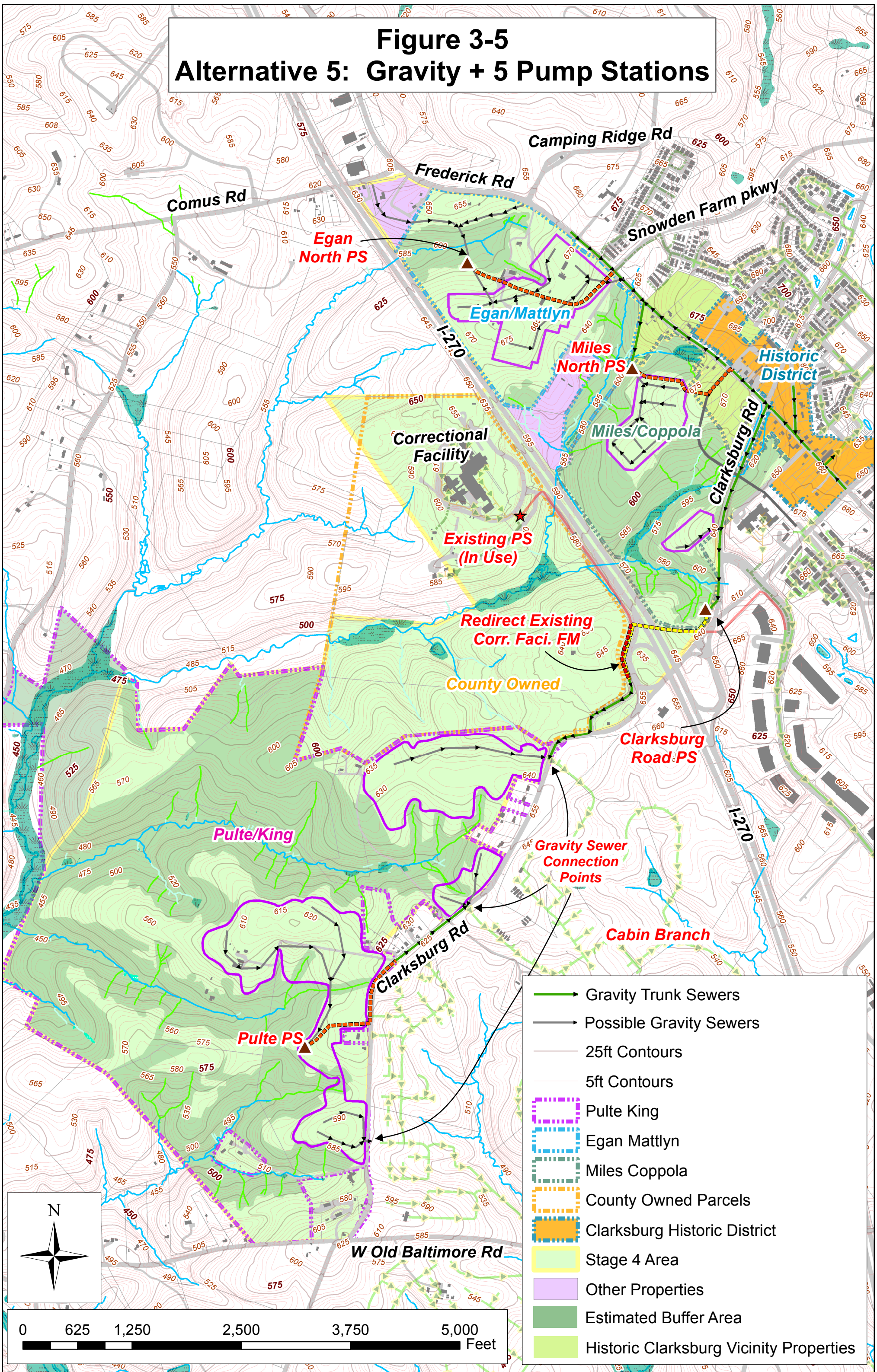
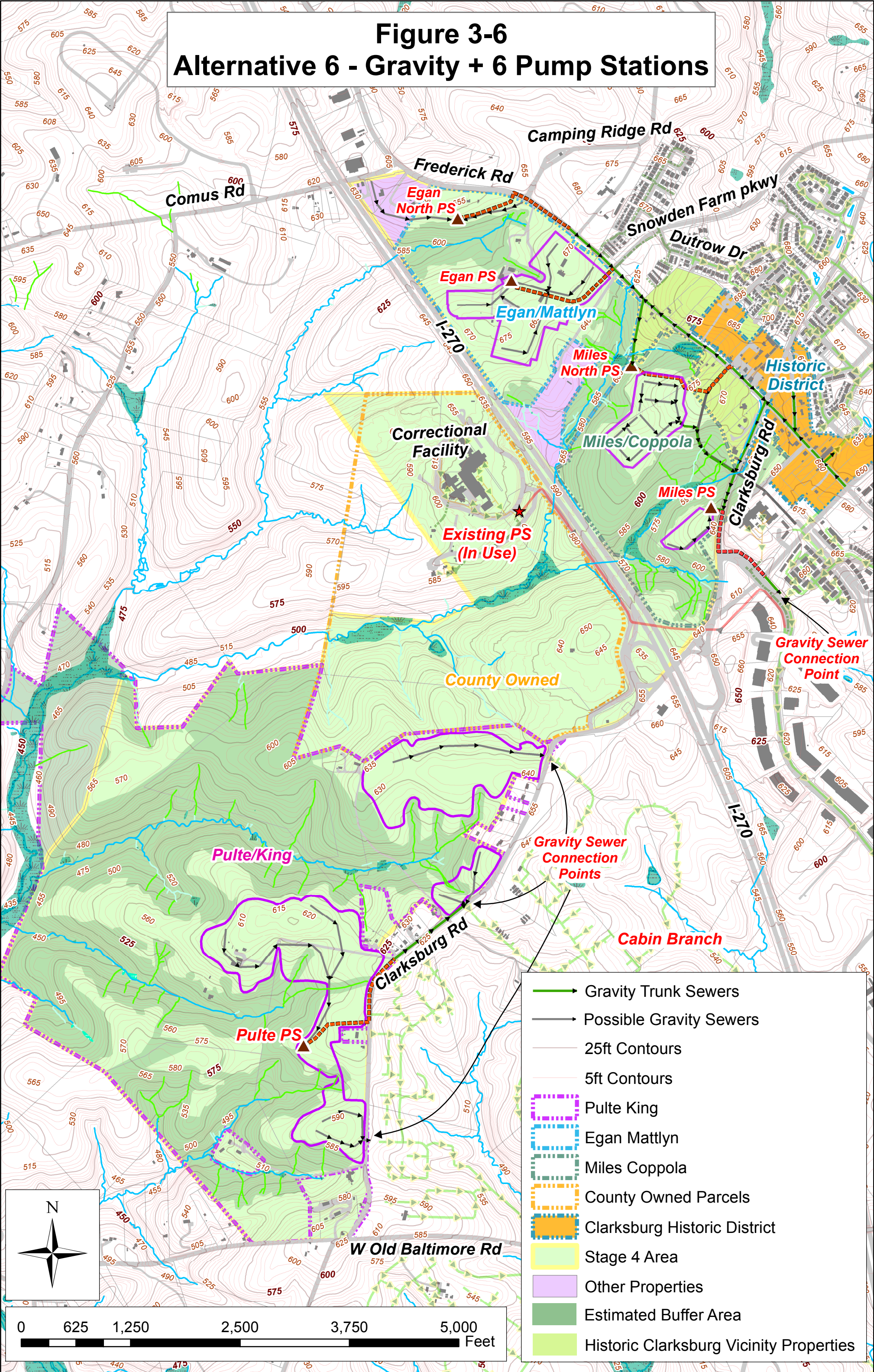


Figure 3-5 Alternative 5: Gravity + 5 Pump Stations



- Gravity Trunk Sewers
- Possible Gravity Sewers
- 25ft Contours
- 5ft Contours
- Pulte King
- Egan Mattlyn
- Miles Coppola
- County Owned Parcels
- Clarksburg Historic District
- Stage 4 Area
- Other Properties
- Estimated Buffer Area
- Historic Clarksburg Vicinity Properties

Figure 3-6 Alternative 6 - Gravity + 6 Pump Stations



- Gravity Trunk Sewers
- Possible Gravity Sewers
- 25ft Contours
- 5ft Contours
- Pulte King
- Egan Mattlyn
- Miles Coppola
- County Owned Parcels
- Clarksburg Historic District
- Stage 4 Area
- Other Properties
- Estimated Buffer Area
- Historic Clarksburg Vicinity Properties

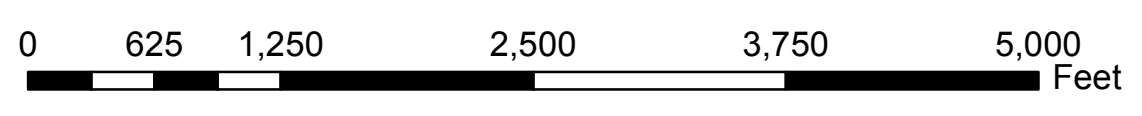
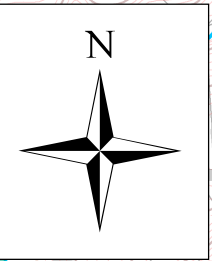
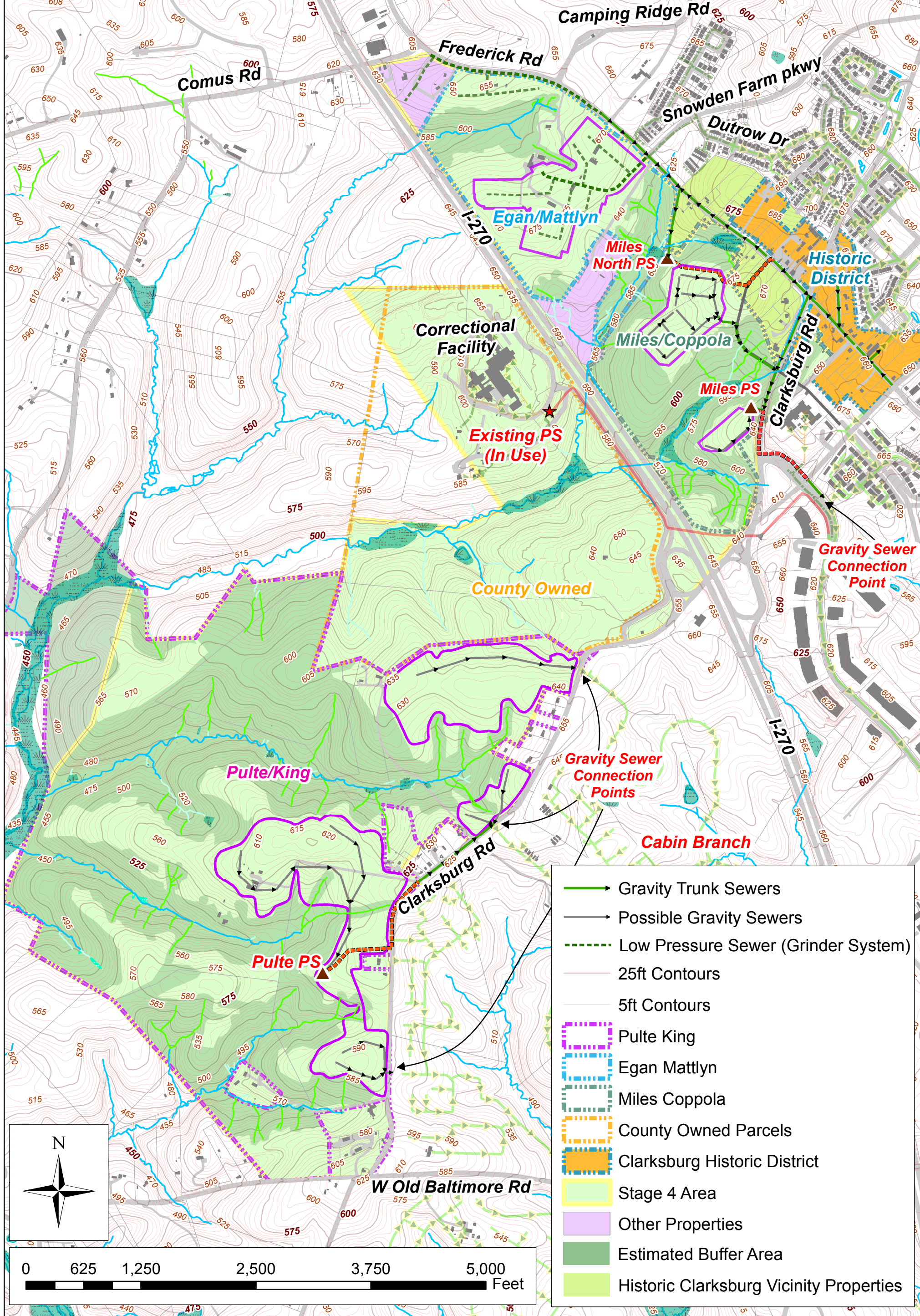
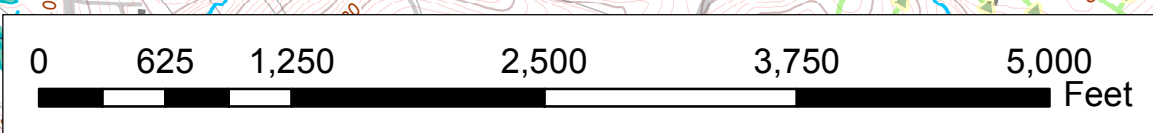
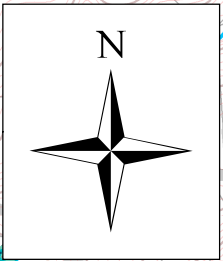
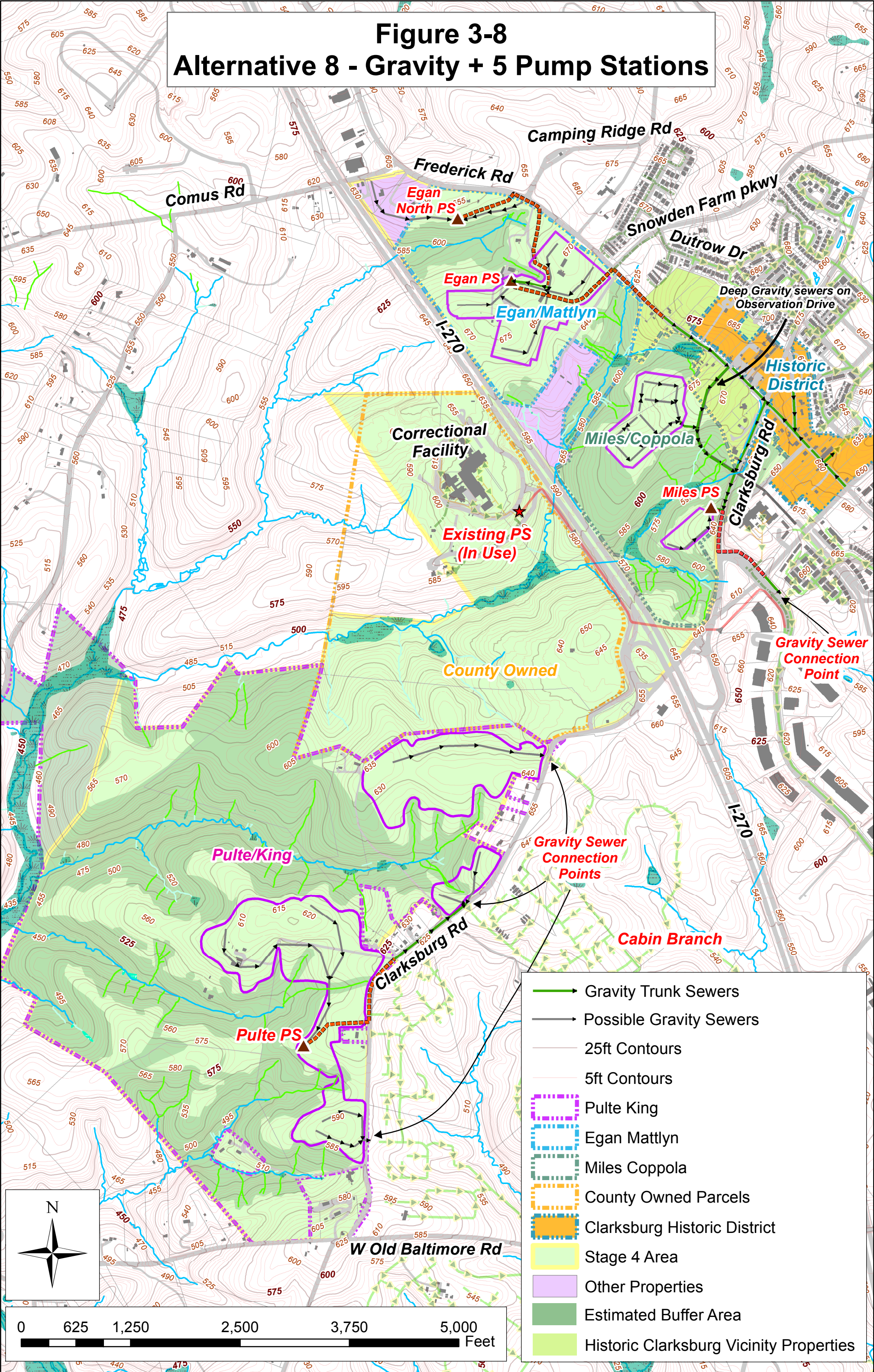


Figure 3-7 Alternative 7 - Gravity + 4 Pump Stations and Grinder Pump Systems



- ▶ Gravity Trunk Sewers
- ▶ Possible Gravity Sewers
- - - Low Pressure Sewer (Grinder System)
- 25ft Contours
- 5ft Contours
- Pulte King
- Egan Mattlyn
- Miles Coppola
- County Owned Parcels
- Clarksburg Historic District
- Stage 4 Area
- Other Properties
- Estimated Buffer Area
- Historic Clarksburg Vicinity Properties

Figure 3-8 Alternative 8 - Gravity + 5 Pump Stations



- Gravity Trunk Sewers
- Possible Gravity Sewers
- 25ft Contours
- 5ft Contours
- Pulte King
- Egan Mattlyn
- Miles Coppola
- County Owned Parcels
- Clarksburg Historic District
- Stage 4 Area
- Other Properties
- Estimated Buffer Area
- Historic Clarksburg Vicinity Properties

Figure 3-9 Alternative 9 - Gravity + 4 Pump Stations and Grinder Pump Systems

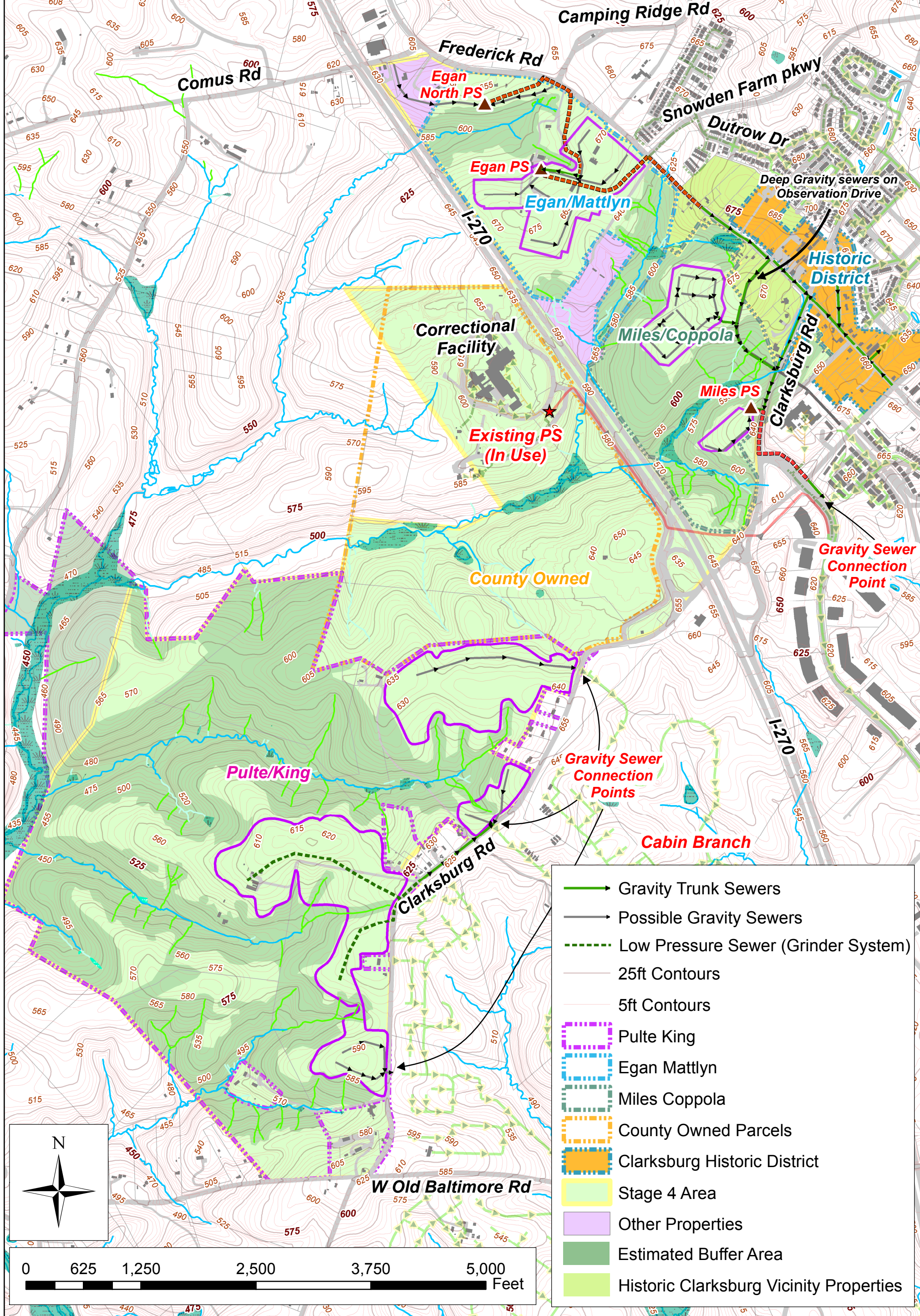
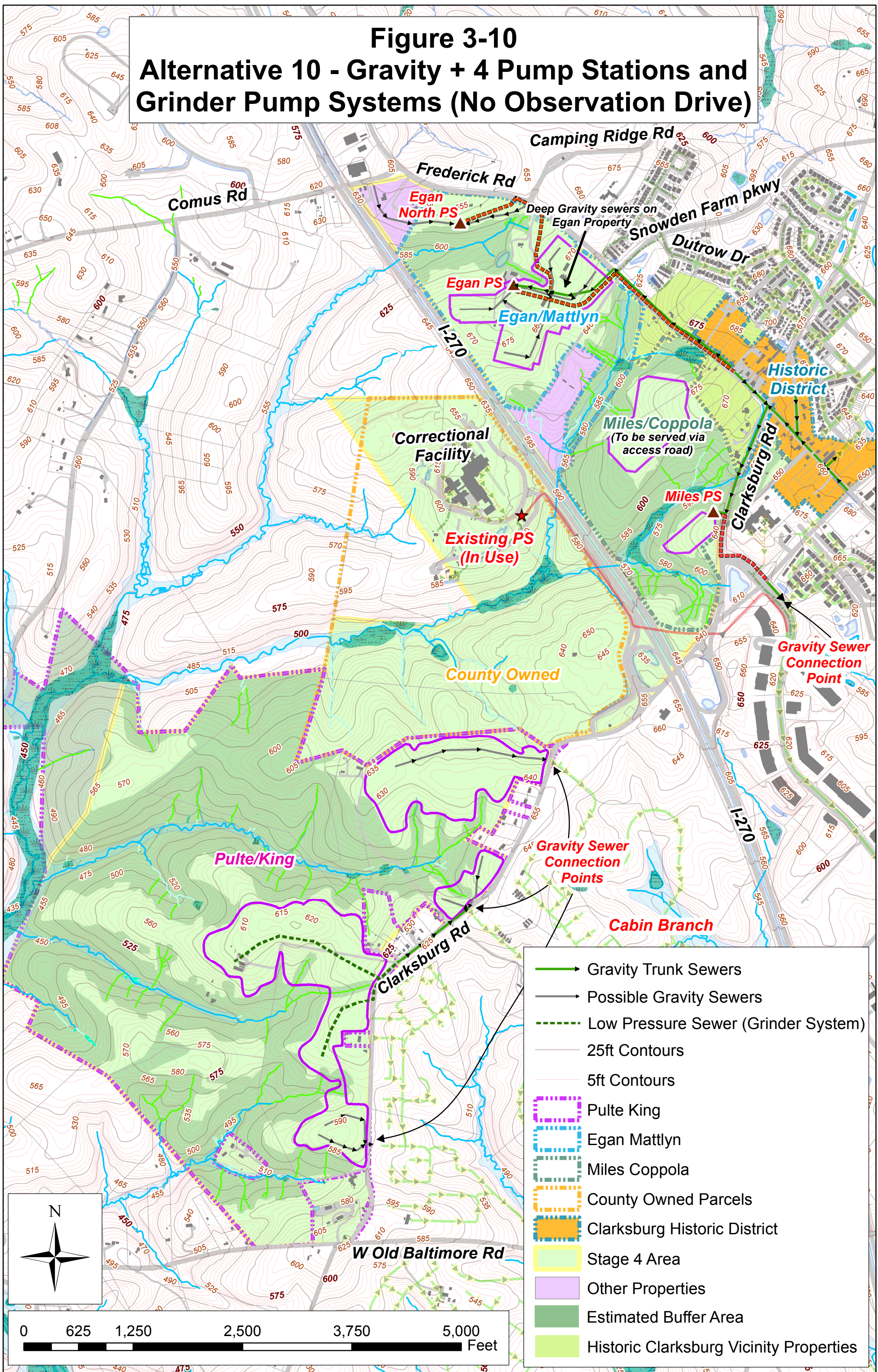
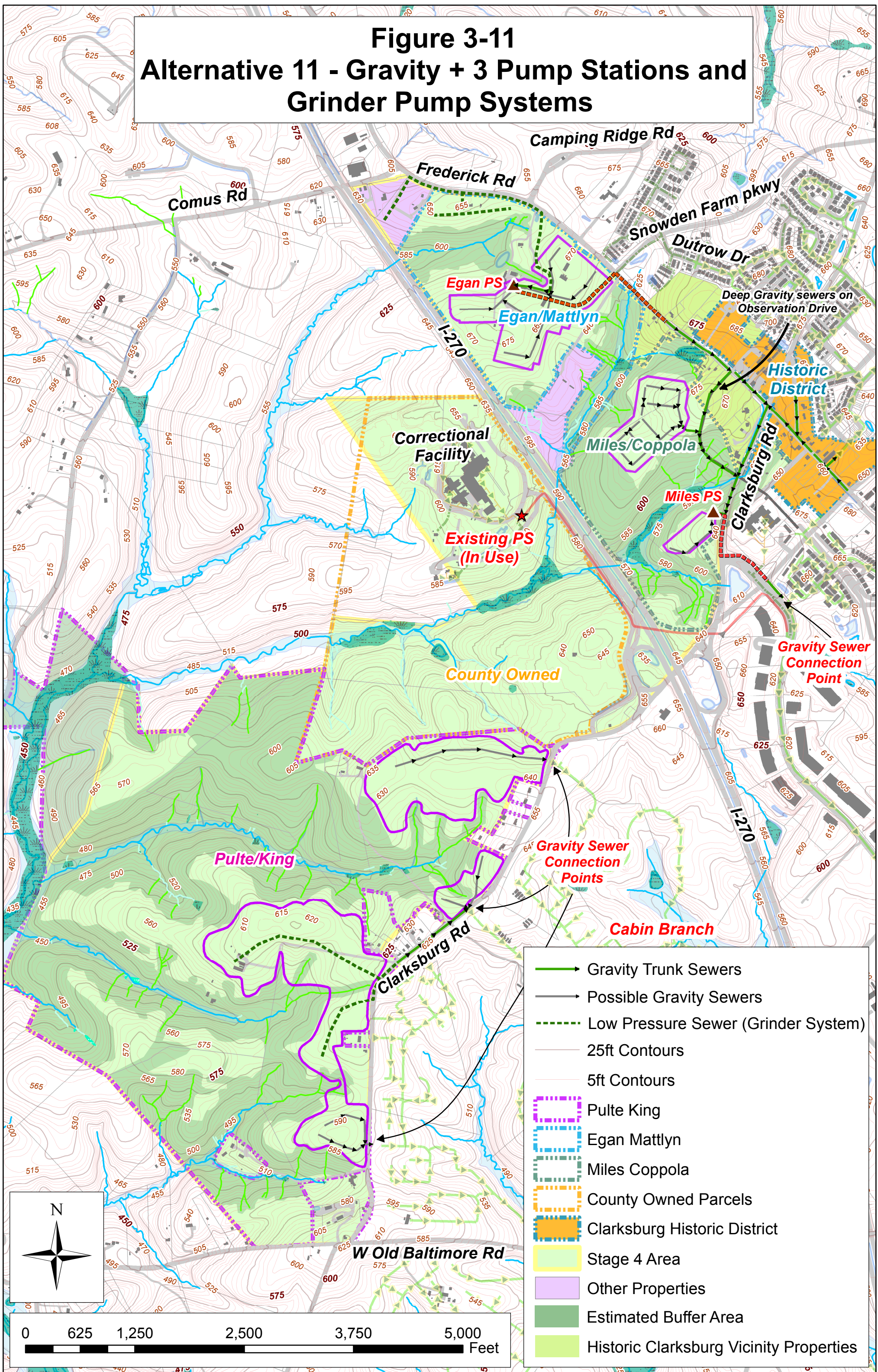


Figure 3-10 Alternative 10 - Gravity + 4 Pump Stations and Grinder Pump Systems (No Observation Drive)



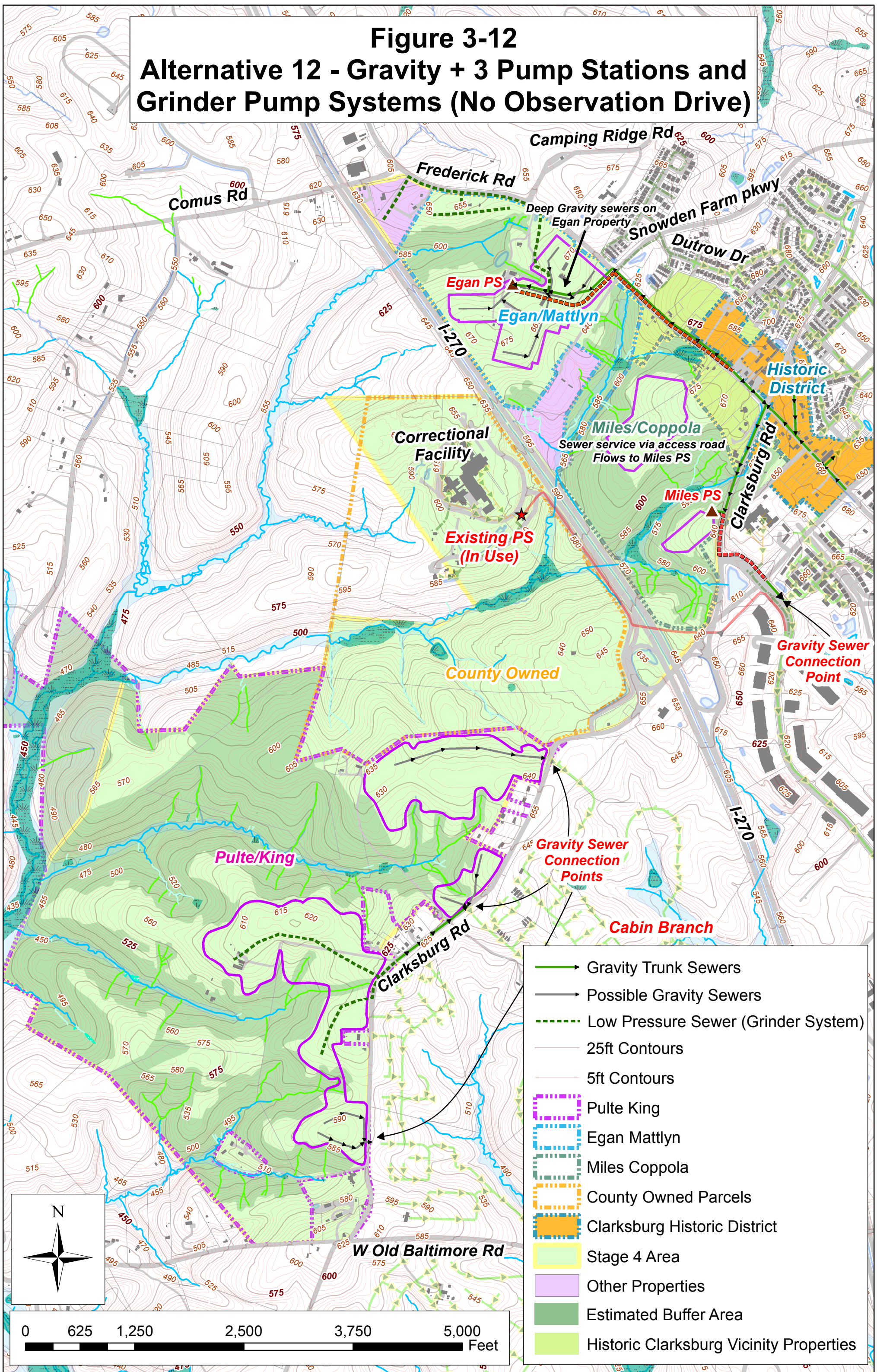
- ▶ Gravity Trunk Sewers
- ▶ Possible Gravity Sewers
- - - Low Pressure Sewer (Grinder System)
- 25ft Contours
- - - 5ft Contours
- - - Pulte King
- - - Egan Mattlyn
- - - Miles Coppola
- - - County Owned Parcels
- - - Clarksburg Historic District
- - - Stage 4 Area
- - - Other Properties
- - - Estimated Buffer Area
- - - Historic Clarksburg Vicinity Properties

Figure 3-11 Alternative 11 - Gravity + 3 Pump Stations and Grinder Pump Systems



- ▶ Gravity Trunk Sewers
- ▶ Possible Gravity Sewers
- - - Low Pressure Sewer (Grinder System)
- 25ft Contours
- 5ft Contours
- Pulte King
- Egan Mattlyn
- Miles Coppola
- County Owned Parcels
- Clarksburg Historic District
- Stage 4 Area
- Other Properties
- Estimated Buffer Area
- Historic Clarksburg Vicinity Properties

Figure 3-12
Alternative 12 - Gravity + 3 Pump Stations and
Grinder Pump Systems (No Observation Drive)



- ▶ Gravity Trunk Sewers
- ▶ Possible Gravity Sewers
- - - Low Pressure Sewer (Grinder System)
- 25ft Contours
- 5ft Contours
- Pulte King
- Egan Mattlyn
- Miles Coppola
- County Owned Parcels
- Clarksburg Historic District
- Stage 4 Area
- Other Properties
- Estimated Buffer Area
- Historic Clarksburg Vicinity Properties

Section 4

Evaluation of Alternatives

4.1 Introduction

This section documents the analysis of selected alternatives to provide sanitary sewer service to the Clarksburg Ten Mile Creek study area. In Section 3, ten alternatives were selected for evaluation from the ten identified major alternatives. At the end of this section, recommendations are discussed.

4.2 Evaluation Criteria

4.2.1 Opinion of Probable Construction Cost

Planning-level order-of-magnitude costs were developed for each alternative. The American Association of Cost Engineers (AACE) defines order-of-magnitude as estimates made without detailed engineering data, and relies on the use of previous estimates and historical data from comparable work, estimating guides, handbooks, and costing curves. Order-of-magnitude cost estimates have an expected accuracy range of +50 to -30 percent.

The following planning level contingencies are included in the project cost estimates:

- Permits, bonds, and insurance (indirect costs) are 3.65 percent of the capital cost
- General conditions (GC) is 10 percent of the capital and indirect costs
- Overhead and profit (OH&P) is 10 percent of the capital and indirect costs
- Construction contingency is 30 percent of the capital, indirect, GC and OH&P costs
- Escalation is 3 percent to the mid-point of construction assumed to be September 2017

The economic analysis includes capital costs, annual operation and maintenance (O&M) costs, and present worth that include both capital and O&M costs. Present worth calculated for long term O&M costs assumes a 25-year planning period at an interest rate of 6 percent.

Cost estimates for the ten alternatives were developed based on the lengths of new gravity sewers and force mains, number of pump stations and predicted flows, number of I-270 road crossings and stream crossings, and number of grinder pumps and lengths of low pressure sewers (where applicable). Cost estimates for the ten alternatives are provided on **Tables 4-1** through **4-10**, and the costs are summarized on **Table 4-11**.

The present worth cost to implement the alternatives are fairly similar in value, and range from \$9M to \$11M. Alternative 11 has the lowest present worth cost (\$9,076,000) and Alternative 4 has the highest cost (\$11,107,000).

Table 4-1 Cost Estimate for Alternative 3

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$178,000	1	\$178,000
Gravity Sewers	LF	\$215	13,620	\$2,928,000
Force Mains	LF	\$170	5,350	\$910,000
Pulte Pump Station (0.27 mgd)	LS	\$1,000,000	1	\$1,000,000
Egan North Pump Station (0.17 mgd)	LS	\$1,000,000	1	\$1,000,000
New Pump Station at Correctional Facility (1.71 mgd)	LS	\$1,200,000	1	\$1,200,000
I-270 Crossings (two gravity sewers)	LF	\$2,500	600	\$1,500,000
Stream Crossings	EA	\$15,000	14	\$210,000
Total Capital Cost				\$8,926,000
Long Term O&M Cost (\$35,000/year x 3 pump stations)				\$1,342,000
Present Worth				\$10,268,000

Table 4-2 Cost Estimate for Alternative 4

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$168,000	1	\$168,000
Gravity Sewers	LF	\$215	12,670	\$2,724,000
Force Mains	LF	\$170	7,050	\$1,198,000
Pulte Pump Station (0.27 mgd)	LS	\$1,000,000	1	\$1,000,000
Egan North Pump Station (0.17 mgd)	LS	\$1,000,000	1	\$1,000,000
New Pump Station at Correctional Facility (1.45 mgd)	LS	\$1,200,000	1	\$1,200,000
Clarksburg Road Pump Station (0.26 mgd)	LS	\$1,000,000	1	\$1,000,000
I-270 Crossing (one gravity sewer)	LF	\$2,500	300	\$750,000
Replace Force Main inside Existing Casing under I-270	LF	\$275	300	\$82,000
Stream Crossings	EA	\$15,000	13	\$195,000
Total Capital Cost				\$9,317,000
Long Term O&M Cost (\$35,000/year x 4 pump stations)				\$1,790,000
Present Worth				\$11,107,000

Table 4-3 Cost Estimate for Alternative 5

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$137,000	1	\$137,000
Gravity Sewers	LF	\$215	10,120	\$2,176,000
Force Mains	LF	\$170	7,310	\$1,243,000
Reroute Existing Correctional Facility Force Main	LF	\$170	650	\$110,000
Pulte Pump Station (0.27 mgd)	LS	\$1,000,000	1	\$1,000,000
Egan North Pump Station (0.14 mgd)	LS	\$1,000,000	1	\$1,000,000
Clarksburg Road Pump Station (0.94 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles North Pump Station (0.68 mgd)	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Replace Force Main inside Existing Casing under I-270	LF	\$275	300	\$82,000
Stream Crossings	EA	\$15,000	7	\$105,000
Total Capital Cost				\$7,853,000
Long Term O&M Cost (\$35,000/year x 5 pump stations)				\$2,237,000
Present Worth				\$10,090,000

Table 4-4 Cost Estimate for Alternative 6

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$140,000	1	\$140,000
Gravity Sewers	LF	\$215	9,460	\$2,034,000
Force Mains	LF	\$170	7,260	\$1,234,000
Pulte Pump Station (0.27 mgd)	LS	\$1,000,000	1	\$1,000,000
Egan North Pump Station (0.022 mgd)	LS	\$800,000	1	\$800,000
Egan Pump Station (0.30 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles North Pump Station (0.47 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles Pump Station (0.94 mgd)**	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Stream Crossings	EA	\$15,000	9	\$135,000
Total Capital Cost				\$8,343,000
Long Term O&M Cost (\$35,000/year x 6 pump stations)				\$2,684,000
Present Worth				\$11,027,000

Notes: **To be built by WSSC

Table 4-5 Cost Estimate for Alternative 7

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$140,000	1	\$140,000
Gravity Sewers	LF	\$215	9,460	\$2,034,000
Force Mains	LF	\$170	4,310	\$733,000
Low Pressure Sewers	LF	\$125	2,600	\$325,000
Low Pressure Connections	EA	\$125	383	\$48,000
Grinder Pumps*	EA	\$5,000	383	\$1,915,000
Pulte Pump Station (0.27 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles North Pump Station (0.47 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles Pump Station (0.94 mgd)**	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Stream Crossings	EA	\$15,000	9	\$135,000
Total Capital Cost				\$8,330,000
Long Term O&M Cost (\$35,000/year x 4 pump stations)				\$1,790,000
Long Term O&M Cost (\$200/Year x 383 grinder pumps)*				\$979,000
Present Worth				\$11,099,000

Notes: *Private costs
 **To be built by WSSC

Table 4-6 Cost Estimate for Alternative 8

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$140,000	1	\$140,000
Gravity Sewers	LF	\$215	8,470	\$1,821,000
Force Mains	LF	\$170	7,140	\$1,214,000
Pulte Pump Station (0.27 mgd)	LS	\$1,000,000	1	\$1,000,000
Egan North Pump Station (0.022 mgd)	LS	\$800,000	1	\$800,000
Egan Pump Station (0.32 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles Pump Station (0.94 mgd)**	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Stream Crossings	EA	\$15,000	7	\$105,000
Total Capital Cost				\$7,080,000
Long Term O&M Cost (\$35,000/year x 5 pump stations)				\$2,237,000
Present Worth				\$9,317,000

Notes: **To be built by WSSC

Table 4-7 Cost Estimate for Alternative 9

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$140,000	1	\$140,000
Gravity Sewers	LF	\$215	8,470	\$1,821,000
Force Mains	LF	\$170	5,490	\$933,000
Low Pressure Sewers	LF	\$125	3,500	\$438,000
Low Pressure Connections	EA	\$125	284	\$36,000
Grinder Pumps*	EA	\$5,000	284	\$1,420,000
Egan North Pump Station (0.022 mgd)	LS	\$800,000	1	\$800,000
Egan Pump Station (0.32 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles Pump Station (0.94 mgd)**	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Stream Crossings	EA	\$15,000	6	\$90,000
Total Capital Cost				\$7,678,000
Long Term O&M Cost (\$35,000/year x 4 pump stations)				\$1,790,000
Long Term O&M Cost (\$200/year x 284 grinder pumps)*				\$726,000
Present Worth				\$10,194,000

Notes: *Private costs
 **To be built by WSSC

Table 4-8 Cost Estimate for Alternative 10

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$140,000	1	\$140,000
Gravity Sewers	LF	\$215	8,100	\$1,742,000
Force Mains	LF	\$170	6,450	\$1,096,000
Low Pressure Sewers	LF	\$125	3,500	\$438,000
Low Pressure Connections	EA	\$125	284	\$36,000
Grinder Pumps*	EA	\$5,000	284	\$1,420,000
Egan North Pump Station (0.022 mgd)	LS	\$800,000	1	\$800,000
Egan Pump Station (0.46 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles Pump Station (0.94 mgd)**	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Stream Crossings	EA	\$15,000	3	\$45,000
Total Capital Cost				\$7,717,000
Long Term O&M Cost (\$35,000/year x 4 pump stations)				\$1,790,000
Long Term O&M Cost (\$200/year x 284 grinder pumps)*				\$726,000
Present Worth				\$10,233,000

Notes: *Private costs
 **To be built by WSSC

Table 4-9 Cost Estimate for Alternative 11

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$140,000	1	\$140,000
Gravity Sewers	LF	\$215	8,470	\$1,821,000
Force Mains	LF	\$170	3,440	\$585,000
Low Pressure Sewers	LF	\$125	6,100	\$763,000
Low Pressure Connections	EA	\$125	304	\$38,000
Grinder Pumps*	EA	\$5,000	304	\$1,520,000
Egan Pump Station (0.32 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles Pump Station (0.94 mgd)**	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Stream Crossings	EA	\$15,000	6	\$90,000
Total Capital Cost				\$6,957,000
Long Term O&M Cost (\$35,000/year x 3 pump stations)				\$1,342,000
Long Term O&M Cost (\$200/year x 304 grinder pumps)*				\$777,000
Present Worth				\$9,076,000

Notes: *Private costs
 **To be built by WSSC

Table 4-10 Cost Estimate for Alternative 12

Item	Unit	Unit Cost	Quantity	Cost
Traffic Control	LS	\$140,000	1	\$140,000
Gravity Sewers	LF	\$215	8,100	\$1,742,000
Force Mains	LF	\$170	4,400	\$748,000
Low Pressure Sewers	LF	\$125	6,100	\$763,000
Low Pressure Connections	EA	\$125	304	\$38,000
Grinder Pumps*	EA	\$5,000	304	\$1,520,000
Egan Pump Station (0.46 mgd)	LS	\$1,000,000	1	\$1,000,000
Miles Pump Station (0.94 mgd)**	LS	\$1,000,000	1	\$1,000,000
Use Existing Pump Station at Correctional Facility (0.61 mgd)	LS	\$0	1	\$0
Stream Crossings	EA	\$15,000	3	\$45,000
Total Capital Cost				\$6,996,000
Long Term O&M Cost (\$35,000/year x 3 pump stations)				\$1,342,000
Long Term O&M Cost (\$200 x 304 grinder pumps)*				\$777,000
Present Worth				\$9,115,000

Notes: *Private costs
 **To be built by WSSC

Table 4-11 Cost Estimate Summary for Alternatives

Alternative	Capital Cost	Long Term O&M Cost	Present Worth
Alternative 3 - Gravity & 3 Pump Stations	\$8,926,000	\$1,342,000	\$10,268,000
Alternative 4 - Gravity & 4 Pump Stations	\$9,317,000	\$1,790,000	\$11,107,000
Alternative 5 - Gravity & 5 Pump Stations	\$7,853,000	\$2,237,000	\$10,090,000
Alternative 6 - Gravity & 6 Pump Stations	\$8,343,000	\$2,684,000	\$11,027,000
Alternative 7 - Gravity & 4 Pump Stations & Grinder Systems	\$8,330,000	\$2,769,000	\$11,099,000
Alternative 8 - Gravity & 5 Pump Stations	\$7,080,000	\$2,237,000	\$9,317,000
Alternative 9 - Gravity & 4 Pump Stations & Grinder Systems	\$7,678,000	\$2,516,000	\$10,194,000
Alternative 10 - Gravity & 4 Pump Stations & Grinder Systems	\$7,717,000	\$2,516,000	\$10,233,000
Alternative 11 - Gravity & 3 Pump Stations & Grinder Systems	\$6,957,000	\$2,119,000	\$9,076,000
Alternative 12 - Gravity & 3 Pump Stations & Grinder Systems	\$6,996,000	\$2,119,000	\$9,115,000

4.2.2 Reliability

In this context, reliability is a measure of the degree to which the alternative addresses immediate operational concerns and will continue to do so into the future. In general terms, pump stations are considered to have many safeguards and are reliable, typically designed with redundant electrical systems (e.g., onsite backup generator or separate power feeds to each pump) and pumping systems (e.g., emergency backup pumps) to minimize risk of failure that could result in backup conditions and sewer overflows.

The design and construction of low pressure sewer systems with grinder pumps are based on the assumption that the specified pumps will be installed, maintained, and replaced in-kind (when necessary) in a satisfactory manner by the homeowner. Conceptually, this should result in a fairly reliable wastewater conveyance system; however, the potential exists for a lower level of service than that expected of more conventional systems. Grinder pumps are equipped with alarms that notify the homeowner of equipment malfunctions; however, the alarms are not fail-safe and conditions could exist whereby a sewage backup within the home occurs without the homeowner being warned in advance. Back-ups could also arise from the homeowner's lack of proper grinder pump maintenance. Grinder pumps should be checked regularly for proper operation by a qualified service provider on a regular basis. Grinder pump maintenance is an added expense to the homeowner. Since grinder pumps operate from the electricity supplied from each individual home, homeowners must be cognizant that during power outages they should not use faucets, toilets, tubs and showers to avoid sewage back-ups in their home unless they have a back-up power source such as a portable or whole-house generator. Without such a power back-up, it can be extremely inconvenient during long power outages. The cost of electricity and generator power sources is an added expense to the homeowner. The life of a grinder pump varies and depends partly on the homeowner's level of maintenance. Pumps will have to be replaced periodically at the homeowner's expense. Replacing the grinder pump

with another model different than what was originally specified can lead to system problems not only for the homeowner but potentially for other grinder pumps connected to the same pipe network since the pumps are designed to work in unison. A replacement pump that operates at a lower shut-off head than the previous pump could cause the pump output to be less or shut-off when many pumps within the system are running. Conversely, a replacement pump that operates at a higher shut-off head than the previous pump could affect other grinder pumps within the network by reducing their output. Both conditions could cause sewage back-ups within homes. Low pressure sewer systems that contain long distances of pipeline between the pumps and the outfall into the closest gravity sewer can result in long-detention times of sewage within the pressure sewer. This can create odorous conditions at the outfall and a nuisance to nearby homeowners. In summary, it is incumbent upon each individual homeowner to properly install, maintain and replace their grinder pump to maximize the reliability of the low pressure sewers. Although it may cost less to construct low pressure systems with grinder pumps, publicly-owned centralized pumping stations are considered to provide a higher level of service to the WSSC customer due to redundant pumps, emergency back-up power, and shorter pipeline detention times.

Gravity sewers would be considered more reliable because they do not require any mechanical equipment or a continuous power source. Gravity sewers are hydraulically modeled and sized to meet current and future demands, such that overflows are not a likely scenario.

As a result, Alternative 3 which has the least number of pump stations, is considered more reliable, while Alternative 6 would be less reliable given the need to maintain six pump stations. Also, Alternatives 7, 9, 10, 11 and 12 would have low reliability because they include hundreds of individual grinder pumps with associated long term issues for the homeowners.

4.2.3 Constructability

The potential construction challenges, such as accessibility, need for new land or easement acquisitions, and potential issues with subsurface conditions and dewatering during construction were evaluated.

Alternative 3 is expected to encounter the most hurdles during construction as more gravity sewers would be constructed. This would be partially offset by a lower length of force mains and less number of pump stations. In addition, this alternative includes the greatest number of I-270 tunnel crossings adding to potential issues with construction (e.g., dewatering of the jacking pits, open face versus closed face tunneling), and uncertainties in the types and possible changes in subsurface soil conditions (e.g., boulders/cobbles, excessively hard rock or mixed soil/rock conditions, highway fill) that may be encountered.

Alternatives 8 through 12, which include deep gravity sewers, would be the most likely to encounter rock during tunneling. A detailed geotechnical investigation would be necessary to determine the best course of action for selecting the tunneling approach.

Overall, Alternative 8 would have the least constructability issues, given that it includes a relatively short length of gravity sewers, while not requiring any low pressure sewers.

4.2.4 Engineering Impacts

Engineering considerations were evaluated, including operational considerations and long term maintenance requirements.

Alternative 3 would have the least long term operational considerations given that it includes the lowest number of pump stations and no individual grinder pumps.

4.2.5 Environmental Impacts

The potential adverse environmental impacts of the alternatives, such as stream crossings and construction activity near stream banks and buffers were analyzed. A more detailed assessment of environmental conditions may be needed to determine the impact of the alternatives on groundwater, surface water, air quality, historic sites, rare, threatened, and endangered species, wetlands, hazardous sites, forested areas, erodible soils etc. within the project area. A detailed assessment would also help to determine structural and non-structural mitigation measures needed at locations where adverse impacts are unavoidable and to develop mitigation costs. Earlier iterations of some of the alternatives were analyzed by Montgomery County DEP and the results of the analysis were presented during the August 20, 2015 CAC meeting. The presentation included a summary of environmental impacts on streams, wetlands, environmental buffers etc. During the same meeting WSSC presented modifications to sewer and force main alignments to mitigate a majority of the impacts identified by the DEP.

Alternative 3 would have the greatest potential to impact the environment as this alternative has the largest number of stream crossings (14), length and percentage of gravity sewers in buffer zones (4,870 feet and 36 percent) and relatively high amount of force mains in buffer zones (700 feet and 13 percent), see **Table 3-1**. Alternatives 8 through 12 would generally have less impact on the environment, given that they have relatively few stream crossings or gravity sewers within buffer zones, and no force mains within buffer zones.

4.2.6 Community Impacts

Potential adverse impacts such as road closures during construction, construction duration and long term impacts on the local community were evaluated.

Most of the alternatives have similar levels of community disruption during construction, given that the same roadways would be impacted, requiring traffic control, and temporarily increasing congestion. Alternatives 8 through 12 are expected to have more short term impact to the community with deep sewer tunneling in rock, which has the potential to cause vibration and damage to buildings and structures in the Historic Clarksburg district. These impacts would be minimized by geotechnical monitoring, as discussed further in Section 4.4.3. With respect to long term community impacts, Alternative 6 would have more significant impact, with six pump stations and associated periodic visits for monitoring and maintenance, fuel delivery, potential noise and odor issues, and disturbance during future upgrades to the pump station to maintain operability. Similarly, Alternatives 7, 9, 10, 11 and 12, which include grinder pump systems, would directly impact the homeowners that must maintain their individual grinder pumps.

4.3 Evaluation Summary

4.3.1 Ranking of Alternatives Based on Evaluation Criteria

Table 4-12 provides a scoring of the alternatives relative to each evaluation criteria, ranging from best (score of 1 being the highest rank or lowest impact) to worst (score of 5 being the lowest rank or highest impact). Using an equal weight for all criteria, Alternative 12 has the lowest overall score, and is generally considered the most favorable for selection.

Table 4-12 Ranking Based on Evaluation Criteria

Alternative	Cost	Reliability	Constructability	Engineering Impacts	Environmental Impacts	Community Impacts	Total Score
Alternative 3 – Gravity & 3 Pump Stations	4	1	5	1	5	1	<u>17</u>
Alternative 4 – Gravity & 4 Pump Stations	5	2	4	2	5	2	<u>20</u>
Alternative 5 – Gravity & 5 Pump Stations	3	3	3	3	4	3	<u>19</u>
Alternative 6 – Gravity & 6 Pump Stations	5	4	3	4	4	4	<u>24</u>
Alternative 7 – Gravity & 4 Pump Stations & Grinder Systems	5	5	1	5	4	3	<u>23</u>
Alternative 8 – Gravity & 5 Pump Stations	2	3	1	5	3	4	<u>18</u>
Alternative 9 – Gravity & 4 Pump Stations & Grinder Systems	3	5	2	4	2	4	<u>20</u>
Alternative 10 – Gravity & 4 Pump Stations & Grinder Systems	3	5	2	4	1	4	<u>19</u>
Alternative 11 – Gravity & 3 Pump Stations & Grinder Systems	1	4	2	3	2	3	<u>15</u>
Alternative 12 – Gravity & 3 Pump Stations & Grinder Systems	1	4	2	3	1	3	<u>14</u>

Lower score indicates higher ranking or smaller impact.

4.3.2 Advantages and Disadvantages

Table 4-13 summarizes the pros and cons of each of the alternatives evaluated.

Table 4-13 Advantages and Disadvantages of Alternatives

Alternative	Pros	Cons
Alternative 3 – Gravity & 3 Pump Stations	<ul style="list-style-type: none"> ▪ Higher reliability ▪ Lower engineering and long term maintenance concerns ▪ Lower impact on community 	<ul style="list-style-type: none"> ▪ Higher cost ▪ Higher constructability issues with gravity sewer tunnels under I-270 ▪ Higher environmental impacts due to stream crossings and sewers and force mains constructed in buffer zones
Alternative 4 – Gravity & 4 Pump Stations	<ul style="list-style-type: none"> ▪ Higher reliability ▪ Lower engineering and long term maintenance concerns ▪ Lower impacts on community 	<ul style="list-style-type: none"> ▪ Higher cost ▪ Higher constructability issues with longer gravity sewers ▪ Higher environmental impacts due to steam crossings and sewers and force mains constructed in buffer zones
Alternative 5 – Gravity & 5 Pump Stations	<ul style="list-style-type: none"> ▪ Moderate cost ▪ Moderate constructability issues ▪ Moderate impacts on community 	<ul style="list-style-type: none"> ▪ Moderate reliability due to need for continuous power and possible equipment issues at 5 pump stations ▪ Moderate engineering concerns from operational and long term maintenance requirements ▪ Higher environmental impacts due to steam crossings and sewers and force mains constructed in buffer zones
Alternative 6 – Gravity & 6 Pump Stations	<ul style="list-style-type: none"> ▪ Moderate constructability issues 	<ul style="list-style-type: none"> ▪ Higher cost ▪ Lower reliability due to need for continuous power and possible equipment issues at 6 pump stations ▪ Higher engineering concerns from operational and long term maintenance requirements for 6 pump stations ▪ Higher environmental impacts and stream crossings ▪ Higher long term impacts on community from periodic maintenance visits and potential noise and odor issues at 6 pump stations
Alternative 7 – Gravity & 4 Pump Stations & Grinder Pump Systems	<ul style="list-style-type: none"> ▪ Lower constructability issues ▪ Moderate impacts on community 	<ul style="list-style-type: none"> ▪ Higher cost ▪ Lower reliability due to need for continuous power and possible equipment issues at 4 pump stations and 383 grinder pumps ▪ Higher engineering concerns from operational and long term maintenance requirements for 4 pump stations and 383 grinder pumps ▪ Higher environmental impacts
Alternative 8 – Gravity & 5 Pump Stations	<ul style="list-style-type: none"> ▪ Lower cost ▪ Lower constructability issues ▪ Moderate environmental impacts 	<ul style="list-style-type: none"> ▪ Moderate reliability due to need for continuous power and possible equipment issues at 5 pump stations ▪ Higher engineering concerns from operational and long term maintenance requirements for 5 pump stations ▪ Higher long term impacts on community from periodic maintenance visits and potential noise and odor issues at 5 pump stations
Alternative 9 – Gravity & 4 Pump Stations & Grinder Pump Systems	<ul style="list-style-type: none"> ▪ Moderate cost ▪ Lower constructability issues ▪ Lower environmental impacts 	<ul style="list-style-type: none"> ▪ Lower reliability due to need for continuous power and possible equipment issues at 4 pump stations and 284 grinder pumps ▪ Higher engineering concerns from operational and long term maintenance requirements for 4 pump stations and 284 grinder pumps ▪ Higher long term impacts on community from periodic maintenance visits and potential noise and odor issues at 4 pump stations, and homeowner nuisance for maintaining grinder pumps

Alternative 10 – Gravity & 4 Pump Stations & Grinder Pump Systems	<ul style="list-style-type: none"> ▪ Moderate cost ▪ Lower constructability issues ▪ Lower environmental impacts 	<ul style="list-style-type: none"> ▪ Lower reliability due to need for continuous power and possible equipment issues at 4 pump stations and 284 grinder pumps ▪ Higher engineering concerns from operational and long term maintenance requirements for 4 pump stations and 284 grinder pumps ▪ Higher long term impacts on community from periodic maintenance visits and potential noise and odor issues at 4 pump stations, and homeowner nuisance for maintaining grinder pumps
Alternative 11 – Gravity & 3 Pump Stations & Grinder Pump Systems	<ul style="list-style-type: none"> ▪ Lower cost ▪ Lower constructability issues ▪ Lower environmental impacts 	<ul style="list-style-type: none"> ▪ Lower reliability due to need for continuous power and possible equipment issues at 3 pump stations and 304 grinder pumps ▪ Moderate engineering concerns from operational and long term maintenance requirements for 3 pump stations and 304 grinder pumps ▪ Moderate long term impacts on community from periodic maintenance visits and potential noise and odor issues at 3 pump stations, and homeowner nuisance for maintaining grinder pumps
Alternative 12 – Gravity & 3 Pump Stations & Grinder Pump Systems	<ul style="list-style-type: none"> ▪ Lower cost ▪ Lower constructability issues ▪ Lower environmental impacts 	<ul style="list-style-type: none"> ▪ Lower reliability due to need for continuous power and possible equipment issues at 3 pump stations and 304 grinder pumps ▪ Moderate engineering concerns from operational and long term maintenance requirements for 3 pump stations and 304 grinder pumps ▪ Moderate long term impacts on community from periodic maintenance visits and potential noise and odor issues at 3 pump stations, and homeowner nuisance for maintaining grinder pumps

4.4 Additional Considerations

4.4.1 Recent Force Main Failures in WSSC System

During this study, a major wastewater force main break occurred at the Olney PS. The Olney PS force main's length is approximately 9,300 feet of 20-inch diameter ductile iron pipe, and was constructed in 1992.

Three breaks with significant failures occurred on the Olney PS force main:

- July 29, 2015 (460,320 gallons)
- July 30, 2015 (533,906 gallons)
- August 12, 2015 (110,880 gallons) and associated Olney PS overflow (159,911 gallons)

Repairs were completed to the force main immediately following each break event. As of the completion of this report, the cause of the force main break has not been fully determined, but preliminary indications are that Hydrogen Sulfide generation in the force main contributed to these breaks.

During the Community Advisory Committees meetings, WSSC staff informed the CAC that three other wastewater force main breaks with significant failures have occurred recently in the Sanitary District:

- March 5, 2013 (2,028,000 gallons) - Reddy Branch PS, Montgomery County
- October 29, 2013 (269,325 gallons) - Reddy Branch PS, Montgomery County
- May 3, 2015 (15,000 gallons) - Forest Heights PS, Prince George's County

Overall, annual overflow volume is trending lower in WSSC's service area since the Commission entered into a Consent Decree with the Environmental Protection Agency, U.S. Department of Justice, Maryland Department of the Environment and various environment groups, but WSSC acknowledges that the impact of force main breaks to the community can be significant and the Commission is striving to improve.

Currently, wastewater force main design is coordinated with the design of new wastewater pump stations. Generally 'uphill' pumping is preferred (the force main discharge point elevation is greater than the pump station) in order to keep the force main under pressure. Additional design requirements include:

- Minimum force main sizing is 4 inches in diameter.
- Force main should be designed without intermediate high points.
- If intermediate high points cannot be eliminated or if the design requires long, relatively flat alignments, the design may require air release and air and vacuum valves.

Also, WSSC determines during force main design as to whether Hydrogen Sulfide corrosion mitigation is required:

- Design may require downstream manholes and pipeline sections in gravity system to have interior coatings.
- Analysis is required to determine potential for Hydrogen Sulfide generation into proposed or existing sewers (using Pomeroy's Equation).
- Pipe layout design should minimize sewage detention time in system (preferably no downhill pumping or high points in the alignment).
- Selection of pipe and structure material (coatings, PVC, HDPE) is important, if substantial Hydrogen Sulfide generation is predicted and design changes (slope, size) cannot prevent it.

Finally, WSSC has commenced an Asset Management program to determine when existing assets (buried, facilities or 'vertical' assets, etc.) should be repaired or replaced (e.g., asset useful life, consequence of failure).

Figure 4-1 provides a comparison of force main lengths for the proposed pump stations in the various alternatives with those of Olney, Reddy Branch and Forest Heights pump stations.

Figure 4-2 provides a comparison of size (capacity) of the proposed pump stations in the various alternatives with those of Olney, Reddy Branch and Forest Heights pump stations.

As shown in Figures 4-1 and 4-2, most of the proposed pumping stations in the alternatives are smaller than Olney, Reddy Branch or Forest Heights pump stations.

4.4.2 Emergency Response Plans

WSSC has put in place a comprehensive general emergency response plan for sanitary overflows from force main failures. The plan provides the Utility Management Group of WSSC with information regarding equipment and techniques that can be utilized for short term responses to contain, store, and recover sanitary overflows. The plan includes an overview of overflow response equipment and techniques such as drain covers, berms, dams, pits, trenches, containment booms, vacuum systems, collapsible tanks and bladders and culvert blocking. The plan also provides a matrix with a recommended method of containment based on the overflow scenario, flow and its location.

WSSC is currently in the process of developing site specific emergency response plans for the forty seven existing force mains in the WSSC sanitary sewer system. WSSC is finalizing a ranking system for these existing force mains based on factors such as size, age, failure history, valve and pipeline inspections, environmental features impacted etc. This evaluation also includes a detailed analysis of likelihood and consequence of failure for the force mains. WSSC will develop site specific emergency response plans based on the ranking. A couple of site specific emergency response plans (Horsepen Branch PS and Bladensburg Pressure Sewer) have already been developed and will serve as a template for future plans. Eventually, all existing force mains will have a site specific emergency response plan developed by WSSC.

4.4.3 Geotechnical Considerations for Gravity Sewer Construction

Inherent in each of the alternatives is the construction of gravity sewers of varying lengths and depths. Deeper sewer construction is more likely to encounter bedrock, requiring methods other than open cut. Depending on the final selection of gravity sewer locations and depths, construction methods to overcome rock may include tunneling or controlled blasting, with tunneling likely having less noise and vibration impacts to the community than controlled blasting.

With any gravity sewer tunneling or controlled blasting construction project, pre and post inspections, and geotechnical and structural monitoring will be necessary, particularly in the Historic Clarksburg district, where buildings and foundations would be more susceptible to impacts from tunneling or blasting vibrations. A typical geotechnical monitoring program would consider employing the following components:

- Pre and post construction inspections and videotaping to document conditions.
- Surface Settlement Points - fixed markers placed on ground surface for purpose of monitoring changes in elevations of ground and monitored by optical survey methods to determine vertical displacements.
- Inclinedometers in Soil - instruments installed in a drilled hole in soil to monitor lateral ground movements.
- Multiple Point Borehole Extensometers - instruments installed in a drilled borehole to monitor ground deformation at multiple locations below the ground surface.
- Utility Monitoring Points - fixed markers placed on existing utilities for purpose of monitoring elevation changes detected by optical survey methods to determine vertical displacements.

- Optical Survey Prisms - instruments installed on the face or ground surface of a structure or object to monitor horizontal and vertical movements during construction by precision optical survey methods.
- Seismographs - electronic recording device with vibration transducer capable of monitoring and recording ground vibrations induced by construction activity.

The specific monitoring program would be documented in the construction plans and specifications, and used to detect movement during construction, with values compared to pre-selected action levels. Readings would be collected on a regular basis (e.g., continuous, daily, weekly) and reported. Should action levels be exceeded, work would be stopped and adjustments to the construction approach required before proceeding, to minimize disturbance and damage to existing features.

4.5 Recommendation

As the study progressed several different alternatives were iteratively developed, as the limited amendment recommends, minimizing, as feasible, disturbance of environmental buffers and forested areas. Overall, 12 alternatives were developed comprised of varying sewer service options of gravity sewer, wastewater pumping station/force main, and low-pressure/grinder pumping system. These alternatives were developed and reviewed during the sewer study and CAC process. They have also been evaluated (see Section 4) for their advantages and disadvantages concerning cost, reliability, constructability, engineering and environmental impacts, and community impacts. WSSC determined that its Asset Management Program Unit should assist in the study to evaluate and validate the recommendations as is now their policy with most initiatives regarding their buried and vertical assets. An abbreviated business case evaluation (see Appendix D) was performed on only six of the highest ranking alternatives. The business case evaluation is comprised of (1) a lifecycle cost analysis that determines the costs and benefits (in terms of capital and operation and maintenance costs) of the additional assets to WSSC, and (2) a risk absorption analysis that looks at the additional risk WSSC would absorb associated with implementation of the alternatives.

From the business case evaluation, Alternative 12 – Gravity & 3 Pump Stations and Grinder Systems, is the recommended alternative for implementation in the Clarksburg Ten Mile Creek Area. This alternative consists of approximately 8,100 feet of gravity sewer, two new wastewater pumping stations, continued operation of a third pumping station, 4,400 feet of force mains, 6,100 feet of low pressure sewer, and potentially 304 individual grinder pump units. Alternative 12 was the optimal alternative of the six top alternatives considered. Alternative 12 has the highest net present value (\$20,613,988) and highest annuitized value (\$937,000) considering the business case determined small differences between the six alternatives for the amount of risk absorption to WSSC.

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**Figure 4-1
Comparison of Forcemain Lengths**

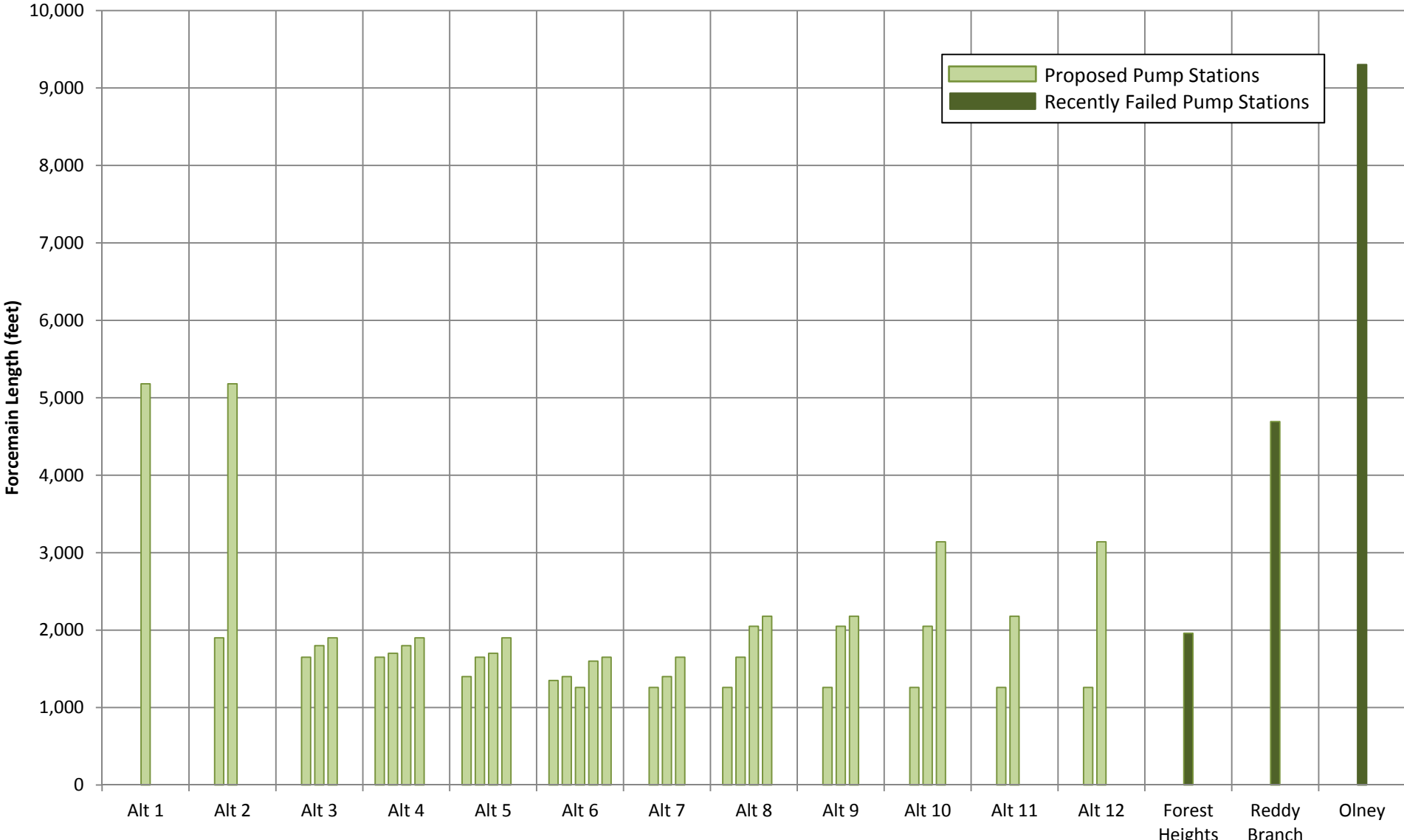


Figure does not include Seneca Correctional Facility Pump Station

**Figure 4-2
Comparison of Pump Station Sizes**

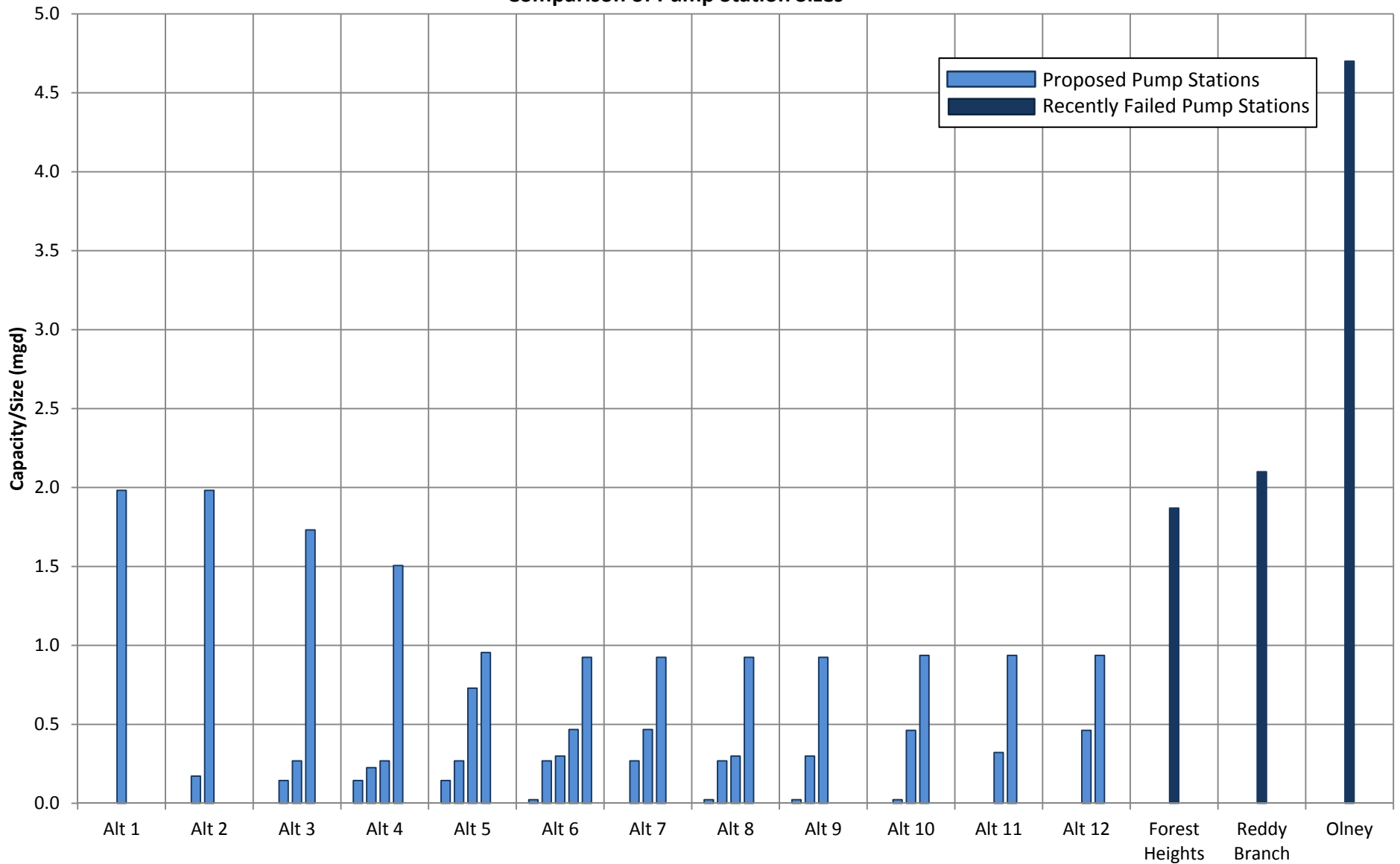


Figure does not include Seneca Correctional Facility Pump Station

Appendix A

Citizen Advisory Committee Meeting Summaries

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

Date: February 12, 2015

Place: Room A, Upcounty Regional Services Center, 12900 Middlebrook Road, Suite 100,
Germantown, MD 20874

Time: 7:00 PM – 9:00 PM

Attendees

CAC Members - Jay Cinque, Phil Isaja, Bob Egan, Steve Collins, Steve Carpenter, Scott Graham, David Stein, Bette Buffington

Staff – Dave Lake (MCDEP), Steve Shofar (MCDEP), Katherine Nelson (M-NCP&PC), Geoffrey Mason (M-NCP&PC, Parks), Ken Dixon (WSSC), Craig Fricke (WSSC)

Members of the Public - Casey Cirner, Alfred Wurglitz, Julia Wurglitz, Tenley Elizabeth Wurglitz, Dale Tibbits (Montgomery County Government), Bailey Condrey, Chris Kendrick, Keith Levchenko (Montgomery County Government)

Agenda: See attached

Other attachments: WSSC PowerPoint presentation, “Ten-Mile Creek Sewer Facility Plan, WSSC citizen Advisory Committee”

Meeting Summary

- Ken Dixon of WSSC welcomed everyone, thanked them for coming and went over the agenda for the evening.
- Each person present was asked to introduce themselves and briefly explain their interest in this project. The purpose of the Citizens Advisory Committee was then discussed along with some basic ground rules for participation. Finally the anticipated process towards a final recommendation was discussed.
- Ken then provided a brief overview of the scope of the sewer study, assumptions, study area and limitations. This also included a brief review of relevant existing WSSC sewers and facilities in the surrounding area.
- Katherine Nelson of M-NCP&PC then provided a review of environmental features in the Ten-Mile Creek watershed including forested areas, wetlands and steep slopes.
- In response to previous comments from citizens, the County Council and the Planning Board, WSSC provided a brief overview of alternative sewer systems, their current use in the WSSC service area and potential use in the Ten-Mile Creek watershed.
- WSSC then indicated expected topics for the next meeting which included presentation and review of new and/or modified alternatives and information on alternative construction techniques that may be feasible in environmentally sensitive areas.

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

- Finally, the committee discussed a suitable date and time of the next meeting and the possibility of establishing a standing date and time for future meetings. There did not appear to be any particular day of the week that worked for everyone in the room and therefore no decision was made. WSSC will set a date and time for the next meeting in mid-March and get that information out to the CAC.

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

Date: March 25, 2015

Place: Room A, Upcounty Regional Services Center, 12900 Middlebrook Road, Suite 100, Germantown, MD 20874

Time: 7:00 PM – 9:00 PM

Attendees: See sign-in sheet

Agenda: See attached

Other attachments: WSSC PowerPoint presentation

Meeting Summary

- Ken Dixon of WSSC welcomed everyone for coming and went over the agenda for the evening.
- The “Ground Rules” for these CAC meetings were reviewed and clarified and are included in the attached PowerPoint presentation.
- Some members of the CAC expressed concern that their comments and concerns were not adequately reflected in the meeting summary. Ms. James requested that future meetings be recorded.
- Some CAC members had questioned the suitability of soils in Ten Mile Creek for gravity sewer construction. Mr. Dixon reviewed WSSC’s investigation using available USGS maps and experience in constructing sewers in adjacent areas. Ms. Wiss suggested a review of USDA maps pointing out that the 1994 Master Plan indicated that the soils in Ten Mile Creek were different than those in Cabin Branch and Little Seneca Creek.
- In response to CAC members who suggested pursuing sewer service for the Historic District independent of the rest of the sewer study area, Mr. Dixon indicated that WSSC desired to take a more holistic view of all of the areas to be served and would only recommend pursuing sewer service for the Historic District independently if it was logical, economical and efficient in the context of the entire area to be served.
- Ms. Wiss had previously expressed concern of flooding and flood damage to any wastewater pumping stations. Mr. Dixon indicated that any WSSC pumping stations would be constructed outside of the 100-year flood plain. Ms. Wiss indicated that she had personally experienced shallow water tables and floods in the area and was still concerned about their impact on a wastewater pumping station.
- In response to CAC members who have requested that WSSC retain an independent expert to assist with this study, Mr. Dixon indicated that WSSC felt a wide range of expertise was available at the County, M-NP&PC and WSSC but welcome any

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

suggestions. Some CAC members suggested that representatives of Environment One grinder pumps address the CAC.

- Mr. Dixon and Mr. Fricke then presented WSSC's opinion regarding the pros and cons of grinder pumps versus centralized pumping stations. Several CAC members expressed their opinions that grinder pumps were more advanced technology, more environmentally friendly and suitable for use in developments such as those being proposed in Ten Mile Creek.
- Mr. Dixon and Mr. Fricke then discussed how different types of capital projects are funded by WSSC (i.e. who pays for what). Mr. Carpenter and Ms. Buffington expressed their concern that extension of sewer to areas with failing septic continues to be unaffordable and their frustration that nothing is being done about this issue. Mr. Fricke explained that this issue is widespread in both counties and is not the focus of the Ten Mile Creek Sewer Study. Mr. Levchenko indicated that the County Councils and their staffs are taking this issue up in the near future and hope to make recommendations by the Fall.
- Mr. Dixon explained why it was not possible or necessary to determine how to serve the Pulte property based on the information currently available. Pulte and the other Ten-Mile Creek (Miles Coppola, Egan) properties have no hydraulic connection or dependency since alternatives 1 and 2 were eliminated.
- Mr. Dixon and Mr. Fricke then presented two new alternatives developed by WSSC in response to comments from the CAC to date and a comparison of these new alternatives to the alternatives previously developed.
- There was good deal of discussion on these alternatives and, in particular, the pros, cons, desirability, applicability of using grinder pumps versus centralized pumping stations.
- A number of CAC members requested better maps of the new alternatives. WSSC agreed to post these on their website.
- It was decided that, for the next meeting, WSSC would verify and/or refine cost estimates for Alternatives 3-7 without the Pulte property infrastructure included. Similarly the various tables and charts comparing the alternatives would be revised to eliminate any consideration of the Pulte property.
- A couple of CAC members also requested that a grinder pump representative, specifically an Environment One representative, be invited to address the group and answer questions at the next meeting. WSSC agreed to try to arrange that.
- Mr. Dixon and Mr. Fricke indicated that WSSC needed some time to pull together the new information and that a date and time for the next meeting would be sought after they determined how long that would take.

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

Date: April 30, 2015

Place: Room A, Upcounty Regional Services Center, 12900 Middlebrook Road, Suite 100,
Germantown, MD 20874

Time: 7:00 PM – 9:00 PM

Attendees: See sign-in sheet

Agenda: See attached

Other attachments: WSSC Powerpoint Presentation, EnvironmentOne Grinder Pump
Powerpoint Presentation, Friends of Ten Mile Creek and Little Seneca
Reservoir Powerpoint Presentation

Meeting Summary

- Ken Dixon of WSSC welcomed everyone for coming and went over the agenda for the evening.
- The “Ground Rules” for these CAC meetings were reviewed and clarified and are included in the attached PowerPoint presentation.
- One of the citizens in attendance indicated that they would be videotaping the meeting.
- Mr. Dixon asked if there were any additional comments on the March 25 Meeting Summary. There were none.
- Mr. Dixon indicated that WSSC was still working on updated cost and environmental impact data for Alternatives 3-7 and that this information would not be available until the next meeting.
- Mr. Dixon then introduced Mr. Mark Wehland of Freemire Associates, the authorized EnvironmentOne grinder pump representative for Central Maryland. Mr. Wehland’s presentation is attached.
- Mr. Dixon then introduced Mr. Thomas Leedy of the Friends of Ten Mile Creek and Little Seneca Reservoir entitled the “Reliability of Sewer System Components.” Mr. Leedy’s presentation is also attached.
- Ms. Catherine Wiss of the CAC expressed specific concern over the environmental impacts of the “Miles North” wastewater pumping station shown in Alternatives 6 and 7 from the March CAC meeting and the sewer lines into and out of this station. Ms. Wiss provided a handout and photo of the environmentally sensitive area. These are attached. WSSC indicated that they would take a closer look at the possibility of eliminating this station or moving it to reduce these potential impacts.
- During the public comments portion of the meeting, Ms. Tenley Wurglitz requested that a 100% grinder pump alternative be considered. WSSC indicated that they did not see a

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need to consider such an alternative as long as a centralized pumping station(s) alternative, or “hybrid” alternative using centralized pumping and grinder pumps, could be developed that would adequately minimize or eliminate impacts on the buffer areas.

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

Date: June 25, 2015

Place: Room A, Upcounty Regional Services Center, 12900 Middlebrook Road, Suite 100,
Germantown MD 20874

Time: 7:00 PM - 9:00 PM

Attendees: See Attached

Agenda: See Attached

Other Attachments: WSSC PowerPoint Presentation

Meeting Summary:

- Ken Dixon of WSSC welcomed everyone for coming and went over the agenda for the evening.
- The “Ground Rules” for these CAC meeting were reviewed and clarified and are included in the attached PowerPoint presentation.
- Mr. Dixon asked if there were any additional comments on the April 30 meeting Summary.
 - Tenley Wurglitz noted that the last bullet in the meeting summary of the April 30th meeting does not match her recollection of the proceedings. Specifically, the sentence “WSSC indicated that they did not see a need to consider such an alternative (*100% grinder pump*) as long as a centralized pumping station (s) alternative or “hybrid” alternative using centralized pumping and grinder pumps could be developed that would adequately minimize or eliminate impacts on the buffer areas”.
 - Ms. Wurglitz mentioned that as per her recollection WSSC would evaluate a 100% grinder pump alternative.
 - Mr. Dixon stated that if Ms. Wurglitz were to email her comments on the April 30th meeting summary to him, they will included as an addendum to the meeting summary.
- Mr. Dixon provided an update regarding the Pulte property.
 - Following the last CAC meeting during which the alternatives presented excluded sewer service to Pulte property, the representatives met with WSSC to express their concerns and insisted that the Pulte property be a part of the current sewer study.
 - In the same meeting the representatives of the Pulte Property provided conceptual maps to WSSC depicting possible “development pods” within the property.
 - WSSC revised the alternatives to include Pulte property
 - The revised alternatives provide a conceptual idea of how the property could potentially be served in the future.
- Ms. Tenley enquired if a pressure sewer/forcemain can be utilized to cross the stream on Frederick Rd instead of a gravity sewer. Mr. Dixon responded that under Alternative 8, a

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force-main is used along Frederick Rd stream crossing to convey the wastewater to the deep gravity sewer.

- On questions regarding the schedule and timeline of the sewer study and its effect on the upcoming CIP budget, Mr. David Lake of MC County DEP noted the following:
 - When it's decided what infrastructure will go in to provide the sewer service to the study area, WSSC will determine the normal assessment to the owners.
 - Then a deficit charge shall be calculated and the county will discuss options to fund the deficit.
 - Regarding when the sewer infrastructure can be constructed, Mr. Lake noted that the financing of the system needs to be settled before any construction can take place.
 - In addition to this Mr. Lake noted that July 13th CIP work session is another avenue for the citizens to provide input and communicate their concerns.
- Mr. Dale Tibbitts from the office of the councilmember Elrich noted that citizens can also provide their comments regarding the CIP budget their office.
- Ms. Bette Buffington enquired if the alignment of the Observation drive finalized. Mr Dixon responded that WSSC understands that the alignment is final as per the information provided by the developer.
- Mr. Dixon noted that the graphic shown in the presentation depicting “Orphaned Parcels” under Alternative 8 will be updated to provide clarity.
- Mr. Bob Egan enquired if WSSC, at this point had a preference for an alternative. Mr Dixon responded that WSSC will make a recommendation after reviewing the findings of the DEP.
- Mr. Bob Egan enquired if DEP has an opinion on any of the alternatives. Mr. Lake responded that DEP is reviewing some alternatives and also waiting for additional information from WSSC, such as GIS shape files for Alternative 8. Mr. Lake stated that an official from the DEP’s office will be available to discuss their findings in the next CAC meeting.
- Mr. Dixon noted that WSSC has submitted the sewer alternative plans (1-7) previously to DEP and waiting for their review to be completed. *(A comprehensive GIS shapefiles package including the new Alternative 8 was forwarded to MC DEP the following day on Friday, June 26, 2015)*
- Mr. Dixon stated that WSSC will review the feasibility of a 100% grinder pump alternative and provide the findings in the next CAC meeting.
- Various members of the CAC enquired if the sewer study could be bifurcated into an “East Study” and a “West Study” in order to expedite the process. Mr. Dixon stated that WSSC does not intend to bifurcate the study.
- In the interest of keeping the process moving forward, a majority of the CAC members agreed to meet through summer instead of taking a break.
- The next CAC meeting is tentatively scheduled for July 30, 2015.

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

Date: August 20, 2015

Place: Room A, Upcounty Regional Services Center, 12900 Middlebrook Road, Suite 100,
Germantown MD 20874

Time: 7:00 PM - 9:00 PM

Attendees: See Sign In Sheet on WSSC Web Page*

Agenda: See WSSC Web Page*

Other Attachments: See WSSC PowerPoint Presentation on WSSC Web Page*

Meeting Summary:

- Ken Dixon of WSSC welcomed everyone for coming and went over the agenda for the evening.
- The “Ground Rules” for these CAC meetings were reviewed and clarified and are included in the attached PowerPoint presentation.
- Mr. Dixon asked if there were any additional comments on the June 25 meeting Summary. There were no comments.
- Mr. Dixon introduced Ms. Jenny St. John of Montgomery County DEP to the CAC.
- Ms. St. John presented the findings of MC DEP’s environmental analysis of the sewer alternatives.
- Mr. Dixon presented an overview of the modifications to the sewer alternatives made in response to the DEP analysis and comments.
- Mr. Dixon presented a summary of the feasibility study performed by the Environmental Group at WSSC for implementing a 100% grinder system alternative to serve the properties in the study area.
- Ms. Cathy Wiss inquired if the properties close to the boundary could be served by grinder systems rather than gravity. Mr. Dixon responded that proximity to the boundary can be taken into consideration in addition to topography.
- Ms. Wiss inquired if the impact of the extra deep sewer was reviewed by DEP. Mr. Dave Lake responded that they did not.
- M. Dixon described a new Conceptual Alternative 9, under which development pod 3 of the Pulte property is served by grinder systems instead of the pump station. Under Alternative 9, the study area east of I-270 shall be served similar to Alternative 8.
- Mr. Dave Lake stated that when a recommendation is made and adopted by WSSC, DEP would like to see how soon the infrastructure can go in. He also stated that DEP would recommend that WSSC proceed with the construction of the critical infrastructure needed to serve the Historic District instead of waiting for developer(s) to submit detailed plans.
- Mr. Bob Egan inquired if DEP reviewed Alternative 9. Mr. Dixon responded that while DEP has not reviewed Alternative 9 directly, comments made by DEP on other alternatives apply to Alternative 9 in many areas. For example, in Alternative 9, the study area east of I-270 is

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

served identical to the (already reviewed) Alternative 8. In the study area west of I-270, the utilization of the low-pressure sewer system instead of the pump station will address previous DEP comments for this area.

- Mr. Jay Cinque asked if WSSC has a count of number of grinder systems per alternative. Mr. Dixon responded that WSSC needs to have the design plans to determine the exact number of grinder systems in a development.
- Mr. Dixon addressed the recent Olney forcemain break.
 - He provided a summary of the location, size, and previous failures of the Olney forcemain as well as the probable cause of the break.
 - He also presented a history of the significant forcemain breaks in the past, WSSC design guidelines for forcemain design and H₂S mitigation requirements.
 - Mr. Dixon also presented an overview of the WSSC Asset Tracking systems, Emergency Response Plans and future design standards currently being considered such as new pipe materials (PVC, HDPE, coatings) and redundant forcemains for back up.
- Mr. Dixon provided a comparison of the forcemain lengths in alternatives (3-9) vs. the length of the Olney forcemain.
- Mr. Lake asked if WSSC did a comparison of pump station capacities (Alternatives vs Olney). Mr. Dixon responded that WSSC has not done it yet, but will do so and provide it for CAC's review before the next meeting.
- Mr. Lake stated that DEP may recommend having parallel forcemain as an option to mitigate possible failures.
- Ms. Cathy Wiss of the Audubon Naturalist Society noted that a she was concerned about a future forcemain failure along Frederick Rd (355) and wanted to know what WSSC was doing to mitigate such failures.
- Mr. Lake asked if Ms. Wiss or any other participants of the CAC, could draft their comments and questions in an email to WSSC, and give WSSC a chance to provide a detailed response.
- Mr. Bob Egan asked if there were any new technologies being proposed for review by WSSC. There were none.
- Mr. Cinque stated that they needed time to review DEP's environmental analysis. Mr. Dixon stated that any additional information requested during the meeting will be provided in the next two weeks.
- Mr. Keith Levchenko asked if Alternatives 8 & 9 are the preferred alternatives for DEP. Ms. St. John responded that they (Alternative 8 & 9) appears to have the least impact on the environment.
- A CAC participant asked if the sewer study will be on the agenda for an upcoming public WSSC Capital Improvements Program hearing. Mr. Levchenko stated that while not on the agenda, public can provide comments on any issue at these public meetings.
- The next CAC meeting is tentatively scheduled for late September 2015.

*Clarksburg Ten Mile Creek Sewer Study CAC Web Page - <https://www.wsscwater.com/business--construction/major-projects/ten-mile-creek--clarksburg-sewer.html>

Clarksburg Ten-Mile Creek Sewer Study – Citizens Advisory Committee Meeting Summary

Date: September 24, 2015

Place: Room A, Upcounty Regional Services Center, 12900 Middlebrook Road, Suite 100,
Germantown MD 20874

Time: 7:00 PM - 9:00 PM

Actual Start Time: 7:25 PM

Attendees: See Sign In Sheet on WSSC Web Page*

Agenda: See WSSC Web Page*

Other Attachments: See WSSC PowerPoint Presentation on WSSC Web Page*

Meeting Summary:

- Ken Dixon of WSSC welcomed everyone for coming and went over the agenda for the evening.
- The “Ground Rules” for these CAC meetings were reviewed and clarified and are included in the attached PowerPoint presentation.
- Mr. Dixon asked if there were any additional comments on the August 20 meeting Summary. There were no comments.
- Mr. Dixon provided a summary of the questions and comments from the CAC members (Email Sep 14, 2015).
- The primary agenda of this CAC presentation was to address these comments and questions.
- Comments regarding Observation Drive
 - Ms. Cathy Wiss noted that the observation drive’s current alignment is not final and that it might not get built because of issues like environmental impact availability of state funding.
 - Mr. Timothy Hoffman stated that if Observation drive is built as a part of the Miles/Coppola development, it will not depend on state funding. So, the funding of the road is not a constraint.
 - Ms. Wiss noted that a timeframe for the Miles Coppola property is not confirmed and that some of the alternatives rely on the deep gravity sewer along Observation drive. Given that this stretch of sewer is critical in serving other portions of the Stage 4 Area, she asked if WSSC can provide an alternative to provide sewer service if Observation Drive is not built.
 - In response to the comments, Mr. Dixon provided a sketch from the Approved and Adopted TMC Area Limited Amendment depicting the proposed alignment of the Observation Drive. He concluded that WSSC will develop an Alternative 10 (which does not rely on Observation Drive) in response to this request. He also stated that sewer service to Miles/Coppola property can follow any access road built to connect the property to Frederick Rd or Clarksburg Rd.

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- Comments regarding “Orphaned Properties”
 - Mr. Dixon provided an overview of how WSSC envisions these properties will be served. He stated that while there are multiple ways these properties can be served, the solutions will depend on the what alternative is chosen/built and also on specific development plans for the properties (which are not available now).
 - Mr. Dave Lake noted that calling these properties “Orphaned Properties” may not be an accurate characterization since there are ways these properties can be served.
- Comments regarding the use of Dutrow Drive
 - Mr. Dixon provided WSSC’s response to the CAC regarding the use of Dutrow drive sewers or a parallel sewer main along Dutrow Drive to serve Egan/Mattlyn property. Specifically, he stated that there are capacity and clearance issues that preclude this option.
- Comments regarding Shallow Depth Bedrock/Blasting
 - Mr. Dixon noted that controlled blasting and tunneling through rock may be necessary to construct the deep sewer along portions of Frederick Rd and Observation Drive (in some alternatives)
 - He mentioned that both options are technically feasible and can be done in a safe manner. He also stated that WSSC has successfully used controlled blasting in the past.
 - Multiple CAC members voiced concerns with controlled blasting in the vicinity of old historical structures in the study area.
 - Mr. Dixon stated that if controlled blasting were to be used to construct a deep sewer in the area, a carefully planned pre and post structural and geotechnical monitoring program will be put into place.
 - Mr. Jay Cinque asked if WSSC uses in-house staff or consultants to perform the geo technical/structural monitoring program. He suggested that WSSC use both in this scenario.
 - Mr. Dixon responded that WSSC has used both in the past will take Mr. Cinque recommendation into consideration.
- Comments regarding Forcemain Design Requirements
 - Mr. Dixon responded to questions regarding specific design requirements for forcemains in the study area. He stated that while many new measures are being evaluated at WSSC (as described in this and previous CAC presentations) they haven’t been adopted into the design guidelines yet.
 - Mr. Lake reiterated that the forcemains in this study are smaller in diameter and much shorter than the Olney forcemain (which experienced a break in the recent past). He stated that each forcemain’s potential for Hydrogen Sulfide generation will be evaluated on a case-by-case basis and if needed, measures such as looking alternative materials and possible redundancies will be taken. Mr. Lake would like to have the slide comparing the length of Olney Forcemain and the new pump station forcemains added to the Working Draft.
- Mr. Dixon provided an overview of possible relief needed along Gateway Center Drive.

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- Mr. Dixon stated that WSSC will try to submit the Final Draft of the alternatives and evaluations to the CAC members by the end of October. WSSC's objective is to present a recommendation to the County Council by Dec 2015/Jan 2016.
- Mr. Jay Cinque asked if the next report can be called a "Working Draft" instead of "Final". Mr. Dixon agreed.
- Mr. Bob Egan asked how the timing of this process will effect on the availability of funding from the County Council.
- Mr. Lake noted that the Dec 2015/Jan 2016 timeframe is not a deadline and that the process might take a little longer. He also stated that this CAC process has be extremely good and that WSSC has been open to questions and recommendations throughout the process.
- Ms. Tenley Wurglitz asked if MC DEP recommends a parallel forcemain for this area.
- Mr. Lake responded that it will depend on the Hydrogen Sulfide analysis.
- Ms. Wurglitz asked if there were any site specific emergency plans.
- Mr. Dixon responded that WSSC has general emergency response plans but not site specific.
- Mr. Lake noted that the comments regarding site specific emergency response plans can apply to any alternative recommended by WSSC.
- Mr. Dan Poudrier (Owner of Bennigan's) from the Historic District commended WSSC on its handling of the process and emphasized the urgency for providing sewer service to the area.
- Mr. Pat Darby also from the Historic District stated that he wanted to build a store on his property in the district and wanted WSSC to avoid any unnecessary delays in providing a recommendation. In addition, he also had concerns with controlled blasting in the area and its effect on old stone buildings.
- Mr. Lake stated that he was aware of the urgency to provide sewer service to the Historic District and mentioned that both the County Council and County Executive are on the record supporting the infrastructure development for the Historic District. He stated that if the implementation schedule is too far out, an interim pump station could be built to serve the district but the funding mechanisms for such an effort need to be analyzed.
- Mr. Wurglitz stated that the County Council's mandate was for maximum protection of the watershed. He encouraged WSSC to think outside the box and to "get it right" even if the option is more expensive.
- Multiple CAC Members wanted to know if there would be a formal vote
- Mr. Lake responded that there will be no formal vote, only comments will be submitted. He recommends that each group meet separately and then submit their comments.
- This is the last CAC Meeting and WSSC will incorporate these comments into the Working Draft Report

*Clarksburg Ten Mile Creek Sewer Study CAC Web Page - <https://www.wsscwater.com/business--construction/major-projects/ten-mile-creek--clarksburg-sewer.html>

Appendix B

Working Draft Report Comments and Responses

Number	Date	Representative/Party	Comment	WSSC Response
1	11/16/2015	Lerch, Early and Brewer (Pulte Property)	<i>We assume WSSC is not restricting the location or form of permitted development on the Pulte property, leaving that determination to subsequent development approvals. In this respect, we believe the scope of this study was not to identify where development would occur within each of the various properties, or the form of that development, but rather to identify and evaluate feasible options for sewerage for each property. We believe each of the eight alternatives, and the "Preferred Approach" all would work as ways to provide sewer to all of the developable areas of the Pulte property, not just that portion within the purple lines.</i>	The study's focus is to evaluate alternatives to provide sewer service to properties within the Stage 4 Area and the location of infrastructure in relation to environmentally sensitive areas. Determining the location/form of development or the limits of disturbance is not within the scope of the current study.
2	11/16/2015	Lerch, Early and Brewer (Pulte Property)	<i>Finally, we reiterate the point in our August 27 letter, that it would be preferable not to mix low-pressure and force-main sewers on the Pulte property. Any pump station on the Pulte property could serve all of the units planned there. Although Pulte is not opposed to grinder pump systems, they do not believe the study has demonstrated a need or even a measurable benefit from including a partial grinder pump system on the Pulte property. At the same time, using a pump station alone would be more reliable and cost effective.</i>	None of the alternatives mix a low pressure sewers system and forcemain sewers. However, a mix of low pressure sewers and gravity sewers was recommended for some portions of the Pulte property. This was done to provide sewer service to low-lying areas of the property that may not be hydraulically accessible to a gravity sewer.
3	11/11/2015	Diane Cameron (Audubon Naturalist Society - ANS)	<i>Dark reddish-purple solid line – what does it delineate? The map key doesn't include it</i>	<u>(Ken Dixon via email dated 11/12/2015)</u> The developable area of Pulte as provided by representatives/engineers of the Pulte property. We requested this information but a lot of the development project information provided for this report is still conceptual with not a lot of detail or specifics. However, the delineation is based on an interpretation of the Limited Master Plan Amendment (the purple lines do not represent any interpretation by WSSC or County staff).
4	11/11/2015	Diane Cameron (ANS)	<i>Does it depict the "sewershed" (area to be served by a sewer system)?</i>	<u>(Ken Dixon via email dated 11/12/2015)</u> These are more or less development pods areas that – again based on an interpretation of the limits of LMPA – can be served by sewer. Of course, I should mention that Pulte is currently in a dispute with Montgomery County regarding the developable limits (including the areas to be sewerage) of their property. WSSC will not address the issues involving the dispute between Pulte and Montgomery County in this study.
5	11/11/2015	Diane Cameron (ANS)	<i>And/or, does it depict the Limits of Disturbance for construction activities for the building of sewer lines as well as for other construction activities?</i>	<u>(Ken Dixon via email dated 11/12/2015)</u> I cannot really say for certain at this time since this sewer study is based primarily on concepts and conceptual alignments required for sewer service in the Stage 4/Ten Mile Creek area as defined by the LMPA. The true limits for disturbance would likely be determined once specific site plan development plans are provided to the Montgomery County Planning Department, WSSC, and the other Montgomery County agencies in their review processes for the properties in this study area.
6	11/11/2015	Diane Cameron (ANS)	<i>In the southernmost areas of the Pulte-King property, the reddish-purple line in question is shown crossing over four distinct small/ ephemeral streams and their associated buffers. However, in other areas of the map showing the same reddish-purple solid line, on both sides of I-270, the line appears to curve around such buffers, rather than cut into and across them.</i>	<u>(Ken Dixon via email dated 11/12/2015)</u> Again, these development pod areas were provided to WSSC by a representative of the Pulte project for this sewer study. We are proposing an additional alternative/option for Pulte (with the exception of the proposed Pulte pumping station) that in concept could avoid the stream buffers.
7	11/11/2015	Diane Cameron (ANS)	<i>We are seeking to know the detailed basis for such proposed incursions into these streams and their buffers, in the sensitive subwatershed areas in the southern portion of the Pulte/King property.</i>	<u>(Ken Dixon via email dated 11/12/2015)</u> Currently, there exist one to, possibly, two stream crossings from 'conceptual' gravity sewers on the Pulte property based on site topography to allow gravity sewers to convey wastewater from this central area to a proposed wastewater pumping station on the Pulte property. Again, I am not able to address how these 'pod' concepts were developed and determined. I would also note that our alternatives to date have

Number	Date	Representative/Party	Comment	WSSC Response
				been reviewed and evaluated by the Montgomery County Department of Environmental Resources for environmental impacts.
8	12/17/2015	Bob Egan (Mattlyn/Egan LLC)	<i>After extensively reviewing all of the alternative studies presented by WSSC, I believe that Alternative number 10 will provide the most benefits for not only my property but for the Historic District which is in need of a public sewer system.</i>	Acknowledged.
9	12/17/2015	Bob Egan (Mattlyn/Egan LLC)	<i>The proposed pump labeled "Egan North" will not be required for the future development of the Egan property. This pump station is located outside of the development envelope for the property. The Egan property should not be responsible for the design or construction of this facility.</i>	Agreed. However, depending on the alternative selected for implementation, Egan pump station should be sized to accommodate other development that may convey wastewater flow to the pump station. Additionally, ROWs may need to be provided and on site utilities have to be designed and located to provide connections points for wastewater flow from such developments.
10	12/18/2015	Dave Lake (MCDEP)	<p>1.1 Background:</p> <ul style="list-style-type: none"> <i>Please reference the Montgomery County Comprehensive Water and Sewerage Plan Category Map Amendment approved by the Council for the Ten Mile Creek Limited Master Plan Amendment. This document is the official Council recognition of the intent for sewer service for this area. It was adopted on February 24, 2015 (Resolution 18-66). The properties to be served need to be referenced, the categories designated should be referenced and the language the Council included on environmental protection needs to be cited.</i> <i>It would be beneficial to identify the creation and role of the Citizens Advisory Committee in development of this study. As background it would be useful to outline the process that WSSC followed in the development of this plan (e.g., WSSC/Consultant developed the first 5 alternatives before the CAC was involved, coordination with CAC in the development of Alternatives 6-10, and WSSC's development of the "Preferred Alternatives A and B" . DEP believes this is important to presenting the background to the study.</i> 	Final Draft Report revised to address comments regarding Resolution 18-66 and Citizens Advisory Committee.
11	12/18/2015	Dave Lake (MCDEP)	<i>Figure 1-1: The Project Study Area need a companion map that identifies the TMC and tributaries as Figure 1-1 does for the downstream areas.</i>	An additional companion map (<i>New Fig 1-2</i>) is included in the Final Draft Report to address the comment.
12	12/18/2015	Dave Lake (MCDEP)	<p>Figure 1-2:</p> <ul style="list-style-type: none"> <i>This figure should include all of the Study Area and not be partially blocked by the table heading. It appears map legend for the Historic District Vicinity Properties is not accurately depicted.</i> <i>Legend colors and designations should align better.</i> 	Figure 1-3 (<i>Figure 1-2 in Working Draft Report</i>) of the Final Draft Report includes extent and legend modifications to address comment.
13	12/18/2015	Dave Lake (MCDEP)	<i>Figure 1-4: Cabin Branch is two different colors with no explanation.</i>	Figure 1-4 (of the Working Draft Report) has been deleted from the Final Draft Report since it relies on outdated information.
14	12/18/2015	Dave Lake (MCDEP)	<p>Section 2:</p> <ul style="list-style-type: none"> <i>2.3 Existing Dry Weather Flow Procedures: Last sentence on page 2-1 should not state "The study assumes that sewer service will be provided ... " The study should state that the County Council has designated this area to have sewer service (category S-3) in adopting Resolution 18-66.</i> <i>Top of page 2-2 define "DAC"</i> 	<ul style="list-style-type: none"> Revised Section 2.3 to address comments Defined DAC in section 2.3 Estimated future base sanitary flows are detailed in Appendix A of the report.

Number	Date	Representative/Party	Comment	WSSC Response
			<ul style="list-style-type: none"> 2.4 Future Dry Weather Flows: Page 2-2 second to last paragraph states, "Flow estimates for Egan/Mattlyn, Miles/Coppola and Pulte/King properties were based on the latest information provided by the individual developers ... " Please provide a reference for this statement (appendix?). 	
15	12/18/2015	Dave Lake (MCDEP)	<p>Section 3:</p> <ul style="list-style-type: none"> Alternative presentations: All stream crossing numbers need to be verified and corrected as necessary. Ephemeral streams should be counted as stream crossings. <ul style="list-style-type: none"> Section 3.7- Alternative 6- stream crossings should be 9, not 2. Section 3.8- Alternative 7- stream crossings should be 9, not 2. Section 3.9- Alternative 8- stream crossings should be 7, not 1. Section 3.10- Alternative 9- stream crossings should be 6, not 1. Section 3.11- Alternative 10-stream crossings should be 3, not 2. Table 3-1(Pg 29) - Sewer lengths within buffers need to be corrected. Alternative 10 is the only alternative with no sewer length within buffers. Currently 8, 9, 10, and Preferred Alternatives all show zero length within buffers. Table 3-1 (Pg 30) - Correct stream crossing information. 	<ul style="list-style-type: none"> Number of stream crossings updated to include Ephemeral Streams in the Final Draft Report Sewer lengths in buffer updated in the Final Draft Report.
16	12/18/2015	Dave Lake (MCDEP)	<p>Section 4:</p> <ul style="list-style-type: none"> Cost tables- Need to adjust cost estimates after correcting stream crossing information in Section 3. <ul style="list-style-type: none"> 4.2.5 Environmental Impacts, Pg 4-7- Recommend incorporating DEP comments from the Aug 20 presentation into this section. Not clear what is meant by "damage to environmental receptors" or what analysis was performed to evaluate "the potential adverse environmental impacts of the alternatives." It appears that the evaluation was based solely on number of stream crossings and length of sewer within buffers. Need to correct stream crossing and lengths within buffers information. Alternatives 8, 9, and 10 should have differing levels of impact once the environmental data (stream crossings) is corrected. 4.3 Evaluation Summary, Pg 4-8- <ul style="list-style-type: none"> Must revise section after correcting information in Section 3. Table 4-10- Recommend using a larger scale {1-5 or 1-10} to allow for finer analysis. Alternatives 7, 8, 9, and 10 should not be rated the same for environmental impacts due to actual number of stream crossings. The evaluation of alternatives need to be more discriminating based on the detail of the available data. Table 4-11- Do not agree that Alternatives 7, 8, 9, and 10 should be lumped together as having "lower environmental impacts." 	<ul style="list-style-type: none"> Cost estimates revised after correcting new stream crossing information <ul style="list-style-type: none"> Section 4.2.5 of the revised report incorporates DEP comments from Aug 20, 2015 presentation. Agreed. Language revised in Final Draft Report. Stream crossings and sewer lengths in buffer updated in the revised report. Agreed. Table 4-10 revised in Final Draft Report. 4.3 Evaluation Summary <ul style="list-style-type: none"> Agreed. Table 4-10 revised in Final Draft Report. Agreed. Table 4-10 revised to use a larger scale in Final Draft Report. Agreed. Table 4-11 revised in Final Draft Report. WSSC has established procedures to review existing pump stations and rank them based on various factors age, condition and affected environmental features so as to prioritize each pump stations/forcemain for a site specific emergency response plan.

Number	Date	Representative/Party	Comment	WSSC Response
			<ul style="list-style-type: none"> Pg 4-11- DEP recommends development of location-based Emergency Response Plans (ERPs) alongside the design process, rather than after the facilities are built. Section 4.4.3, Pg 4-12- Geotechnical Considerations for Gravity Sewer Construction" Impacts to the community" (i.e. historic district) is listed as the reason for needing geotechnical monitoring. DEP recommends that impacts to the environment also be considered for implementing applicable components of a geotechnical monitoring program. Section 4.5 Preferred Approach ,Pg 4-13- <ul style="list-style-type: none"> According to Table 4-10, the most favorably rated alternatives are 9 and 10, however, the Preferred Alternatives deviate from the alignments in these alternatives. The Preferred Alternatives seem to be just two additional alternatives-- and there is no clear connection to the analysis done in Section 4. DEP recommends the "Preferred Approach" name be dropped in favor of Alternatives 11 and 12. These alternatives need to be evaluated in Section 3 similar to Alternatives 3 through 10, so that they can be compared on the same basis. If the WSSC has then recommended either Alternative 11 and/or 12 there needs to be a clear and complete explanation of why WSSC has recommended these alternatives. This is in addition to the previous comments that the Section 4 evaluation needs to be revised after information is corrected from Section 3. Ensure that ranking in Table 4-10 are compatible with text in Table 4-11 	<p>Any new facility shall also be evaluated based on these criteria and prioritized for a site specific emergency response plan.</p> <ul style="list-style-type: none"> Acknowledged. Impacts to the environment for implementing the geotechnical monitoring program are considered very minor, and will not drive the alternative selection process. Section 4.5 Preferred Approach <ul style="list-style-type: none"> Modified versions of Preferred Approaches A and B are evaluated as Alternatives 11 and 12 in the Final Draft Report. Section 4.5, now titled "Recommendation" includes a recommendation based on the business case analysis performed by the Asset Management Planning group. Agreed. Agreed.
17	12/18/2015	Dave Lake (MCDEP)	<p>DEP does not understand the concept contained in the "Preferred Alternatives" where Figures 4-3 and 4-4 state "Gravity to Onsite Pulte PS with the option to implement a 100% grinder pump solution". DEP recommends that the gravity sewer with an onsite PS should be compared to the option for 100% grinder pumps and the least environmental impact should be supported. Smaller diameter pressure sewers that are placed much shallower than gravity sewers and a PS may well be the more environmentally acceptable option for area, particularly if it incorporates the LSTM 111 tributary area. If there are issues that have not been raised that would favor the gravity sewer and PS this information needs to be explicitly identified.</p>	<p>Revised language in the Final Draft Report to address the comment. Final Draft Report includes a recommendation as opposed to preferred alternatives/approaches.</p>
18	12/18/2015	Dave Lake (MCDEP)	<p>In all alternatives the Clarksburg Historic District would be served by the Miles PS. DEP recommends the Clarksburg Historic District needs to be addressed in terms of implementation of this PS and the infrastructure to serve the Historic District. The WSSC General Manager committed to WSSC forward funding of this PS once it was the</p>	<p>The sewer study's scope includes development and evaluation of alternatives to identify critical infrastructure needed to provide sewer service to the Stage 4 area. The schedule for building the infrastructure is beyond the scope of this study. That said, possible next steps will be outlined in a cover letter to the Montgomery County Council and Planning Board.</p>

Number	Date	Representative/Party	Comment	WSSC Response
			<i>accepted by the Council as a component of a sewer study of the TMC area. This study should propose next steps for this area and the Miles PS since this has been communicated by Montgomery County as a priority area for action from before the start of this study.</i>	
19	12/18/2015	Dave Lake (MCDEP)	<i>During the development of this study WSSC had a sewage spill in Olney associated with the failure of the Olney PS force main. It was discussed that WSSC may consider dual forcemains for future PS. DEP would like this considered for all PS in the TMC area as a measure to protect the environmental resources in this area consistent with the sensitive streams in this area.</i>	Various technologies and design guidelines modifications are under preliminary discussions at WSSC. However, they have not been approved and/or adopted as a part of WSSC's Pipeline Design Manual yet.
20	12/18/2015	Keith Levchenko (MC Council Staff)	<i>Remove the word "Draft" in all references to the approved "Ten Mile Creek Area Limited Amendment" (see Section 1.5, 1.51, and 1.52 for example). Since the document was approved by the Council, any reference to "Draft" should be removed.</i>	Agreed. Revised in Final Draft Report.
21	12/18/2015	Keith Levchenko (MC Council Staff)	<p><i>The report notes that projected flows are based on assuming no new development on County-owned properties. However, the County could still potentially locate a new fire station on the county-owned property along Route 355. While the Master Plan directs the Executive to search for a new site outside the Ten Mile Creek area (see Master Plan text below), it is possible that a better site may not be found or available, resulting in the current site being used. WSSC should make sure to take this possibility into account in its sewer plans.</i></p> <p><u>Master Plan Language Regarding the New Fire Station</u></p> <p><i>Fire Station</i> <i>Montgomery County has acquired a vacant, forested property within the Ten Mile Creek Watershed to build a fire station. The site is directly outside the Historic District, between MD 355 and the Miles-Coppola properties. If developed as currently planned and approved, the fire station would result in 37 percent of the property with impervious cover.</i></p> <p><i>Given this property's location at the headwaters of Ten Mile Creek, every effort should be made to explore other possible sites, either outside the Ten Mile Creek Watershed, or on land within the Planning Area that is already developed with impervious surfaces. Leaving the current fire station site undeveloped would not only reduce overall subwatershed imperviousness, but also would provide greater flexibility in the alignment of the planned bypass. While an extensive search for an alternate location should be conducted, if another one is not found, a fire station at the current location should not be ruled out.</i></p> <p><i>Consider other locations for a fire station, either outside the Ten Mile Creek Watershed, or on already developed land within the watershed where building the fire station would result in reducing existing imperviousness. If no other site is found, allow station development on the current site, but redesign the station to reduce imperviousness, to the extent feasible.</i></p>	The "no new development on County-owned properties" applies to parcels south of I-270. Added language in the Final Draft report to provide clarification.

Number	Date	Representative/Party	Comment	WSSC Response
22	12/18/2015	Keith Levchenko (MC Council Staff)	<p><i>Section 3-1: Add language noting that the Master Plan and the approved Water and Sewer Amendment direct WSSC to minimize environmental impacts. (see actual environmental language below).</i></p> <p><u>Environmental Language</u></p> <p><i>The Ten Mile Creek Limited Master Plan recommends that sewer main alignments and pumping stations be located so as to “minimize, as feasible, disturbance of environmental buffers and forested areas”.</i></p> <p><i>The Water and Sewer Plan amendment resolution notes:</i></p> <p><i>“The County Council expects the Washington Suburban Sanitary Commission’s comprehensive sewer study of the Ten Mile Creek Limited Master Plan Area to review all feasible alternatives for the maximum environmental protection of the area. Sewer infrastructure should avoid Ten Mile Creek, its tributaries, and other water resources unless it is technologically infeasible to do so. Disturbance to all environmentally sensitive areas should be minimized. Only capital projects that satisfy the Master Plan’s recommendation for service and minimize environmental impacts to Ten Mile Creek will be approved by the Council.”</i></p>	Added language to the Final Draft Report.
23	12/18/2015	Keith Levchenko (MC Council Staff)	<p><i>Section 3-1: Add language noting that five initial alternatives were developed by WSSC with the assistance of a consultant. Subsequently, WSSC developed five additional alternatives based on further review and analysis by the Citizens Advisory Committee (CAC) and the Department of Environmental Protection. This point should be made clear to readers, since environmental groups expressed major concerns with the initial alternatives and feel the later alternatives are a big improvement (from an environmental standpoint).</i></p>	Final Draft Report includes new section describing the formation of CAC and its role.
24	12/18/2015	Keith Levchenko (MC Council Staff)	<p><i>Section 4.5 should be expanded. WSSC’s “preferred approach” A and B should be included as alternatives 11 and 12. Although not vetted directly with the CAC, these alternatives share much in common with the other later alternatives. WSSC should include in Section 4.5 or a new section how these two approaches compare to the other alternatives (both similarities and differences).</i></p>	Modified versions of Preferred Approaches A and B are evaluated as Alternatives 11 and 12 in the Final Draft Report.
25	12/18/2015	Keith Levchenko (MC Council Staff)	<p><i>DEP should review WSSC’s “preferred approach” A and B and provide comments comparing the environmental impacts of A and B with the other alternatives.</i></p>	Agreed.
26	12/18/2015	Keith Levchenko (MC Council Staff)	<p><i>Both of the “preferred approaches” assume a pump station to serve a portion of the Pulte property. A 100% low pressure sewer concept without a pump station is identified as an option. WSSC should clarify why a Pulte pump station is assumed at this time and the low pressure sewer approach is considered an option. If the low pressure sewer approach is determined to be the better approach environmentally (based on further DEP review), then it should be assumed and the pump station approach should be a potential option considered later if information (such as a future subdivision plan) provides a rationale for the need for a pump station.</i></p>	Modified versions of Preferred Approaches A and B are evaluated as Alternatives 11 and 12 in the Final Draft Report. A business case analysis was performed by WSSC on four alternatives with the best scores as evaluated under Section 4 of this report (Table 4-2). Additionally, the business case analysis was also performed with and without the pump station on Pulte property. The final recommendation is presented in section 4.5 of the Final Draft Report

Number	Date	Representative/Party	Comment	WSSC Response
27	12/18/2015	Keith Levchenko (MC Council Staff)	<i>The CAC should be discussed somewhere in the report (the formation, membership, dates it met, etc.). I recall that comments received by WSSC from CAC members are to be included in appendices. WSSC should reference these comments (and provide responses where appropriate) in this same section.</i>	Final Draft Report includes new section describing the formation of CAC and its role. Comments from the CAC members and WSSC responses are included in this document.
28	12/18/2015	Keith Levchenko (MC Council Staff)	<i>Some discussion how the Historic District is assumed to ultimately be served by sewer via Stage IV development (i.e. Miles Coppola pump station and possibly an interim pump station) should be noted in the report. Montgomery County received assurances from the WSSC General Manager/CEO that WSSC would work with the County to provide the needed pump station infrastructure in a timely manner (potentially in advance of the Mile Coppola development).</i>	The sewer study's scope includes development and evaluation of alternatives to identify critical infrastructure needed to provide sewer service to the Stage 4 area. The schedule for building the infrastructure or others is beyond the scope of this study. That said, possible next steps will be outlined in a WSSC correspondence to the Montgomery County Council and Planning Board.
29	12/18/2015	Mile Coppola Property Owners	<i>The ownership group of the Miles Coppola Property Owners finds Option 9 acceptable. In addition, it is hereby noted that the ownership group will grant a sanitary sewer easement (subject to reasonable and customary easement language and terms) to the benefit of WSSC for construction of the gravity line as indicated on the plans we have received from WSSC. We will grant the necessary easements to WSSC .as required by their design engineering standards (subject to reasonable and custom my easement language and terms), so that full gravity sewer access is available to all areas of the historic district. Our willingness to grant the easements necessary to implement Option 9 is premised and conditioned upon all other property owners also granting such easements for the benefit of WSSC as may be necessary to construct, use and maintain the full length of the sanitary sewer as contemplated in Option 9.</i>	Acknowledged.
30	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<i>Alternatives 9 and 10 fulfill the Council's charge to WSSC by locating sewer infrastructure outside of Ten Mile Creek's protected buffers. The only stream crossings are under existing roadways or the planned Observation Drive bypass. We were dismayed to find that WSSC has now proposed two additional alternatives in the Working Draft Report – Preferred Approaches A and B – that are a step backward from Alternatives 9 and 10 in that they allow an unnecessary intrusion into one of Ten Mile Creek's most sensitive and high quality tributaries and its protected buffer.</i>	Acknowledged.
31	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	1. Objection to Preferred Approaches A and B <i>We strongly object to WSSC's new Preferred Approaches which allow gravity sewers to be built through the headwaters of LSTM 111 on the Pulte property and its protected environmental buffer. The Preferred Approaches would also require an extra pump station on the Pulte property right next to the buffer. Because of this, both Preferred Approaches now violate the Council's charge in the Master Plan Amendment and the Comprehensive Water/Sewer Map Amendment to minimize disturbance of environmental buffers and avoid the tributaries of Ten Mile Creek. The changes that WSSC is proposing on the Pulte Property in their Preferred Approaches are a grave disappointment. Alternatives 9 and 10 were adopted to address DEP's specific environmental concerns, including a recommendation to seek an alternative sewer alignment outside LSTM 111 and its buffer. These alternatives demonstrate that it is technically feasible to avoid stream crossings, intrusions into</i>	Modified versions of Preferred Approaches A and B are evaluated as Alternatives 11 and 12 in the Final Draft Report. A business case analysis was performed by WSSC on four alternatives with the best scores as evaluated under Section 4 of this report (Table 4-2). Additionally, the business case analysis was also performed with and without the pump station on Pulte property. The final recommendation is presented in section 4.5 of the Final Draft Report.

Number	Date	Representative/Party	Comment	WSSC Response
			<p><i>buffers and forests, and construction of a pump station on the Pulte property by using low pressure sewers with grinder pumps.</i></p> <p><i>The WSSC plan should strictly adhere to the Council’s policy in the Comprehensive Water/Sewer Map Amendment for protecting Ten Mile Creek. Given the particularly sensitive nature of this part of the watershed and the fact that the Council tasked WSSC with finding the most environmentally sensitive, technically feasible means of providing sewer service, the low-pressure sewer/grinder pump solution should be the only recommended approach for this area.</i></p> <p><u><i>That said, we are pleased that WSSC’s Preferred Approaches not only keep the design of Alternatives 9 and 10 for the east side of I-270, but also will allow low pressure sewers on the northern part of the Egan property, thereby eliminating a pump station.</i></u></p>	
32	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>2. Erroneous designation of the “buildable area” on the Pulte property</p> <p><i>All of WSSC’s maps of the watershed show, by blue lines, green lines, and darker green shading, the location of the protected streams and their environmental buffers, where construction is not to occur. Yet starting with the June 25, 2015, CAC meeting, maps of all of the alternatives, including the Preferred Approaches, now contain purple lines purporting to designate the buildable areas on the Pulte property that clearly disregard the buffers adopted by the Council and approved by the Planning Board. Shockingly, these “buildable areas” are shown to include four segments of the most sensitive tributaries in the watershed and their protected buffers.</i></p> <p><i>These lines were supplied by Pulte without review or approval by any agency. They have no business being included in an official document like this. Their presence sets a dangerous precedent by suggesting that they have been approved. Perhaps this is why WSSC felt free to allow a sewer to intrude into LSTM 111 and its protected buffer.</i></p> <p><i>Similar “limits of disturbance” lines on the Egan and Miles-Coppola properties do not include the protected buffers within their buildable areas. <u>The limits of disturbance boundaries on the Pulte property should be redrawn on all maps of Alternatives 1-10 and the Preferred Approaches (Figures 3-1 through 3-10 and Figures 4-3 and 4-4) to accurately show full avoidance of all streams and protected buffers.</u></i></p>	<p>It is WSSC’s position that the “development pods” delineated in the figures of this conceptual sewer plans in the working draft report should be treated as a general indication of where future development might eventually occur. To develop these conceptual sewer plans WSSC has sought information from various sources such as anticipated scope of development from property owners/developers and environmental features (buffers, wetlands, streams etc) from government agencies such as the Department of Environmental Protection and Maryland-National Capital Park and Planning Commission.</p> <p>The information collected provides WSSC a general idea for the location of critical infrastructure to be able to provide sewer service to various portions of the study area that may potentially be developed.</p> <p>WSSC is neither endorsing these areas as “buildable areas” nor as “limits of disturbance”. Any detailed plans for development in the study area will need to be vetted and approved by all relevant government agencies /regulatory authorities.</p>
33	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>3. Inaccuracies and omissions in the evaluation of alternatives</p> <p><i>a) As DEP clearly showed in its presentation on August 20, 2015, environmental impacts are serious for Alternatives 6, 7, and 8. For example, DEP found 16 separate severe impacts to streams, groundwater resources, and protected buffers in Alternative 6; 15 severe impacts in Alternative 7; and 10 severe impacts in Alternative 8. Alternative 5 has even more impacts. None of these alternatives could be considered to have a minor, low, or even moderate environmental impact.</i></p> <p><i>Not until Alternatives 9 and 10 were introduced were environmental impacts reduced to acceptable levels under the Master Plan Amendment. Although both Alternatives 9 and 10 include stream crossings, WSSC showed they are unavoidable to provide sewer service to properties east of I-270. The impact of these sewers is minimized, however, by routing them under roadways. Inaccuracies and omissions in the evaluation of alternatives</i></p>	<p>Section revised in Final Draft Report to address the comment (and similar comments from DEP/M-NCPPC).</p>

Number	Date	Representative/Party	Comment	WSSC Response
			<u>Tables 4-10 and 4-11 should be revised to accurately show that environmental impacts in Alternatives 5, 6, 7, and 8 will be severe, i.e., ranked “3” in Table 4-10, and have a “high impact on the environment” in Table 4-11.</u>	
34	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>3. Inaccuracies and omissions in the evaluation of alternatives</p> <p>b) We were surprised to see that Table 3-1 shows only 780 linear feet of gravity sewers and 150 linear feet of force mains in the buffers for Alternatives 5, 6, and 7, and no sewers at all in the buffers for Alternatives 8 or both Preferred Approaches! These figures clearly under-represent the length of gravity sewers and force mains in the protected environmental buffers.</p> <p>In WSSC’s presentation at the March 25, 2015, CAC meeting, we learned that Alternatives 6 and 7 would have 720 feet of gravity sewers and 700 feet of force mains in the buffers between the Egan and Miles Coppola properties near Frederick Road. In addition, a gravity sewer would traverse a buffer near Clarksburg Road by the Liberty gas station (length unknown), and another intrude into the LSTM 111 buffer on the Pulte property (presumed to be at least 100 feet). In Alternative 8, WSSC did remove the gravity sewer and force main in the buffer near Frederick Road, but Alternative 8 still includes the buffer crossing near Clarksburg Road and the one on the Pulte property. The buffer crossing on the Pulte property is also included in Preferred Approaches A and B. These sewer lengths have been omitted from Table 3-1.</p> <p><u>Table 3-1 and its accompanying column chart should be revised to show an accurate count of gravity sewer and force main lengths in the protected buffers.</u></p>	Section revised in Final Draft Report to address the comment. (and similar comments from DEP/M-NCPPC)
35	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>3. Inaccuracies and omissions in the evaluation of alternatives</p> <p>c) WSSC also undercounts the number of stream crossings for most, if not all, of the alternatives. Table 3-1 omits a column for stream crossings on the Pulte property, but we know that in Alternatives 3-8, as well as in both Preferred Approaches, a gravity sewer will cross the headwaters of tributary LSTM 111. The column for a stream crossing on Clarksburg Road is blank for all alternatives, as well as the Preferred Approaches, but we know a gravity sewer will have to cross a tributary near the Liberty gas station. Stream crossings under the bypass alignment were also omitted, but alternatives following the bypass will cross four ephemeral streams. Ephemeral streams are protected by the Master Plan Amendment.</p> <p><u>WSSC should revise Table 3-1 to accurately show the number of stream crossings for each alternative. Tables 4-1 through 4-9 should be revised to show the costs for all stream crossings.</u></p>	Section revised in Final Draft Report to address the comment. (and similar comments from DEP/M-NCPPC)
36	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>3. Inaccuracies and omissions in the evaluation of alternatives</p> <p>d) At the March 25, 2015, CAC meeting, we learned that capital costs and expenses for ongoing operation and maintenance are borne, to varying degrees, by developers, WSSC and ratepayers, the System Development Charge Fund, and property owners. Tables 4-1 through 4-9 lump together cost estimates for all sources. It is impossible to tell what costs are expected to be borne by the public, by developers, and by private property owners. <u>A breakdown by each source would make the costs more understandable.</u></p> <p>What comprises long-term operating and maintenance costs is also a puzzle. In each of the tables, they exceed the public costs of operating and maintaining the pump stations (each @ \$35,000/year) as well as private homeowners’ costs for operating grinder</p>	Cost tables in Section 4 of the Final Draft report were revised to provide additional clarity. Private capital and O&M expenses and the pump station to be built by WSSC are identified in the revised cost tables. Generally, infrastructure projects need to provide sewer service to a property is built by the developers. Some of these projects may be eligible to receive System Development Charge (SDC) credits. This is determined on a case to case basis. Identifying funding mechanisms for construction of the critical infrastructure needed to serve the entire project area is beyond the scope of this current sewer study. Long term O&M costs for pumping stations is borne by WSSC, O&M costs for grinder pumps were estimated based on WSSC’s past experience maintaining grinder pumps within the service area.

Number	Date	Representative/Party	Comment	WSSC Response
			<i>pumps (estimated to be \$46/year for each home by Mark Wheland of Freemire Associates, provider of grinder pumps to WSSC, a sum considerably smaller than WSSC's \$200/year estimate). <u>How did WSSC arrive at the substantial figures for long-term operating and maintenance costs?</u></i>	
37	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>4. Other inaccuracies in the Working Draft</p> <p>a) <i>In Sections 1 and 2, WSSC's document refers to the "draft" Limited Amendment. The Ten Mile Creek Master Plan Amendment was approved by the Council and adopted by the Planning Board in 2014. <u>The word "draft" should be deleted in Sections 1.5 (twice); 1.5.1; 1.5.2; 1.5.3.1; 1.5.3.2; 1.5.3.3; 1.5.3.4; 1.5.3.5; 1.5.3.6 (three times); 1.6; and 2.1.</u></i></p> <p>b) <i>Figures 1-4 and 1-5 are also inaccurate. They refer to zoning under the 1994 Clarksburg Master Plan, which was superseded by the 2014 amendment. Figure 1-4, "Stage 4 – Existing Zoning Map", shows the previous zoning, which no longer exists. Likewise, Figure 1-5 includes captions with "Ext Zone . . ." referring to zones that no longer apply. Figure 1-4, as well as references in Figure 1-5 to "Ext Zone . . .," should be removed.</i></p>	<p>Sections 1 and 2 revised in Final Draft Report to address the comment. (and similar comments from Keith Levchenko, County Council)</p> <p>Figure 1-4 has been deleted from the Final Draft Report. Also, Fig 1-5 and 1-6 were revised to clarify "Ext Zone" as the zone prior to the limited amendment.</p>
38	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>5. Remaining sewer issues</p> <p>a) <i>WSSC developed Alternative 10 after the last CAC meeting. In this alternative as well as in Preferred Approach B, deep gravity sewers are proposed for the Egan property, presumably to accept flows from the Historic District if sewers cannot be routed along the bypass. More detail is needed about the anticipated depth of these sewers and how they will affect the nearby mainstem of Ten Mile Creek. <u>That said, we endorse the geotechnical monitoring program that WSSC proposes in Section 4.4.3.</u></i></p>	<p>The depth of the deep gravity sewers is dependent on detailed development/grading plans for the Egan property. They are not available at the time of this study.</p>
39	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>5. Remaining sewer issues</p> <p>b) <i>In Section 4.4.2, WSSC discusses its emergency response plan for sanitary sewer overflows from force main failures. WSSC is in the process of developing site-specific emergency response plans throughout its system and envisions developing emergency response plans for the Ten Mile Creek watershed "at a later time after the facilities are built." <u>We urge WSSC to develop specific site and location-based emergency response plans before the facilities in Ten Mile Creek are completed so that WSSC is prepared to respond to an emergency from day one. In addition, we strongly urge that redundant force mains be used to minimize the impact of any overflows that may occur and recommend the adoption of other safety measures, such as hydrogen sulfide corrosion mitigation measures.</u></i></p> <p><i>Furthermore, WSSC should immediately develop a site-specific emergency response plan for the existing pump station at the Correctional Facility and force main connecting it to sewers on Gateway Center Drive if one does not already exist. A spill from this pump station or force main, which crosses the mainstem of Ten Mile Creek, could pose a huge threat to the creek.</i></p>	<p>WSSC has established procedures to review existing pump stations and rank them based on various factors age, condition and affected environmental features so as to prioritize each pump stations/forcemain for a site specific emergency response plan. Any new facility shall also be evaluated based on these criteria and prioritized for a site specific emergency response plan.</p>
40	12/18/2015	Jay Cinque, Anne James, Cathy Wiss, (CAC Members)	<p>5. Remaining sewer issues</p> <p>c) <i>On the maps for each of the alternatives, sewers in the southern part of the Pulte property appear to stop abruptly. We understand that they will connect to planned sewers in the Cabin Branch watershed that have not yet been built. A notation of this planned connection would be helpful on Figures 1-2, 3-1 through 3-10, 4-3, and 4-4.</i></p>	<p>Revised figures 3-1 through 3-12 in the Final Draft Report to address the comment</p>
41	12/18/2015	Jay Cinque,	5. Remaining sewer issues	

Number	Date	Representative/Party	Comment	WSSC Response
		Anne James, Cathy Wiss, (CAC Members)	<i>d) In Figure 1-3, WSSC shows anticipated bottlenecks in the gravity sewers along Gateway Center Drive. What are the plans to alleviate them?</i>	When new development plans are submitted to WSSC for review and approval, a Hydraulic Planning Analysis (HPA) is conducted to review available capacity in the downstream sewers and determines the necessity for a relief sewer. At this point in the process WSSC does not have the necessary information to determine when such a relief sewer may be needed.
42	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>1. Section 1, Page 1-3 - County Owned Properties – 220 forested acres of correctional facility are protected by a permanent conservation easement. Also, the future planned expansion is limited in scope and takes place within the current cleared area of the site. The County owns two vacant parcels that are not part of the correctional facility.</i>	Section revised in Final Draft Report to address the comment.
43	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>2. Section 1, Page 1-3 - Pulte/King Properties – this section should reference that there is an impervious limitation on site as well as other environmental constraints.</i>	Section revised in Final Draft Report to address the comment.
44	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>3. Section 3, Page 3-1 - Development Alternatives – The third paragraph references impacts to environmental resources in parentheses. These should include stream buffer disturbance, excessive impervious areas, forest disturbance and excessive grade changes</i>	Section revised in Final Draft Report to address the comment.
45	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>4. Table 3-1, Page 3.7 – All of the alternatives appear to have some minimal buffer disturbance, but the table shows no disturbance for alternatives 8, 9 and 10.</i>	Revised Table 3-1 in the Final Draft Report to reflect comment(s) pertaining to sewers lengths in stream buffers and number of stream crossings.
46	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>5. Figures 3-1 through 3-10 (the Alternatives) – These figures identify “Buffer Areas”. Since these buffer areas have not been determined yet, they should be identified as “anticipated” or “estimated” buffers. These figures should also identify all existing and future gravity sewer connection points on the east side of Clarksburg Road.</i>	Revised figures 3-1 through 3-12 in the Final Draft Report to address the comment
47	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>6. Tables 4-1 through 4-8, pages 4-2 through 4-5 – Long-term operation and maintenance should only include the O&M that will be performed at PUBLIC expense. At the very least, the difference between public and private O&M should be shown. This relates primarily to grinder pumps located in private homes.</i>	Cost tables in Section 4 of the Final Draft report were revised to provide additional clarity. Private capital and O&M expenses and the pump station to be built by WSSC are identified in the revised cost tables. Generally, infrastructure projects need to provide sewer service to a property is built by the developers. Some of these projects may be eligible to receive System Development Charge (SDC) credits. This is determined on a case to case basis. Identifying funding mechanisms for construction of the critical infrastructure needed to serve the entire project area is beyond the scope of this current sewer study. Long term O&M costs for pumping stations is borne by WSSC,
48	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>7. Table 4-9, page 4-6 – This table should show which capital costs will be at the public or private expense. Operation and Maintenance should also show costs to the public vs. costs at private expense.</i>	Please see response to comment 47.
49	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>8. Section 4, Reliability, page 4-6 – Given the recent catastrophic failure of several pump stations in Montgomery County, these facilities cannot be described and “very reliable”</i>	Section revised in Final Draft Report to address the comment.
50	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>9. Section 4, Environmental Impacts, page 4-7 – List of environmental features should include “forested areas and erodible soils”.</i>	Section revised in Final Draft Report to address the comment.

WORKING DRAFT REPORT COMMENTS AND RESPONSES

Number	Date	Representative/Party	Comment	WSSC Response
51	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>10. Table 4-10, page 4-8 – This matrix seems arbitrary and was never discussed by the group. Careful consideration should have been given to the various criteria and how they are weighted. At best this matrix should be removed from the report. Otherwise, more criteria for both permanent and temporary environmental impacts should be included and discussed. Costs should distinguish among those associated with public and private, long-term and short-term expense. Engineering impact is redundant given that it has to do with long term maintenance, which is already covered in cost. Community impacts should be identified as both long-term and short term. Finally only three ranking levels fail to distinguish these differing alternatives.</i>	Table 4-10 revised in the Final Draft Report to provide additional details and ranking from 1 to 5.
2	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>11. Figure 4-1 and 4-2 pages 4-14 and 4-15 – Should identify “recently failed” pump stations rather than “existing” pump stations. It implies that these are the only pump stations in the WSSC system.</i>	Revised figures 4-1 and 4-2 in the Final Draft Report to address the comment.
53	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>12. Figure 4-3 and 4-4 (the Preferred Approaches) – The graphics reference “Grinder Systems” and “grinder pump solution”, but the legend identifies “Low Pressure Sewer”. One term should be used when describing these systems, both on these graphics and in the text.</i>	Revised figures in the Final Draft Report to address the comment.
54	12/21/2015	Katherine E. Nelson Planner Coordinator M-NCPPC	<i>13. Criteria for the successful use of low pressure sewers should be provided by this study. At a minimum, examples of the successful use of low pressure sewers should be provided.</i>	Refer to WSSC SP ENG-04-10, Grinder Systems Policy and Procedure, as to successes we have achieved based on experience and meeting policy requirements.

Appendix C

Future Base Sanitary Flow Estimates Detail

APPENDIX C – FUTURE BASE SANITARY FLOW ESTIMATES DETAIL

Properties	Owner	Address	Tax ID	Size (acres)	Current Use	Proposed Zone	WSSC Wastewater Flow Factor (gpd/acre)	Daily Average Consumption DAC (gpd)	Base Sanitary Flow Estimate if developed under new zoning (gpd)
East of I-270									
3 Properties north of Egan/Mattlyn at the intersection of Comus Rd and MD355*	Dorothy Schaefer	14224 Comus Rd	00027657	1.11	Single Family Dwelling with outbuildings	R-200	420	-	466
	Potomac Conference Corp of Seventh Day Adventists	14210 Comus Rd	00018458	2.02	Conference Center	R-200	420	-	848
	Monacco Exclusive Renovation LLC	23820 Frederick Rd	00018174	6.12	House and Barns	R-200	420	-	2,570
Egan/Mattlyn	Mattlyn	23730 Frederick Rd	03441612	100.16	Residential/Barns (2,576 sqft)	R-90	750	-	51,909
Properties between Egan/Mattlyn and Miles/Coppola (3 Parcels near MD355)** Not in the Historic District	Coleen Culbertson	23540 Frederick Rd	00018881	0.58	Single family house (1,606 Sqft)	R-90	750	98	435
	Payne Family LLC	00000 Frederick Rd	00020508	2.90	Vacant	R-90	750	-	2,175
	Andre Paese	23530 Frederick Rd	00018846	0.23	Single family house (600 Sqft)	R-90	750	245	173
Properties between Egan/Mattlyn and Miles/Coppola (2 Parcels near I-270)***	Michael Redgrave	00000 Frederick Rd	00028162	6.23	Vacant, No access and in env. buffer	R-90	750	-	-
	Potomac Edison Co	00000 Frederick Rd	00027737	7.20	Electric Power substation	R-90	750	-	-
Miles/Coppola	Ardwin H Barsanti Rev Trust/Sandra D Cambell Et Al Trust	00000 Frederick Rd	00018824 00026128	5.00 93.54	Vacant	CRT 2.0, C2.0, R2.0, H 120 R-90	N/A 750	-	10,830 37,323
	Lawrence Musser	23506 Frederick Rd	00018857	0.60	2 Small buildings - Vacant	CRN 0.25, C0.25, R 0.25 H35	N/A	-	361
Clarksburg Historic District Vicinity (9 Parcels between Miles/Coppola and MD355)**** Not in the Historic District	Null	Null	U279767	0.60	Garage/Shed - Vacant	CRN 0.25, C0.25, R 0.25 H35	N/A	-	363
	LH Musser and sons	23500 Frederick Rd	00029623	0.93	Single Family Home (872 Sqft)	CRN 0.25, C0.25, R 0.25 H35	N/A	-	560
	Montgomery County	23420 Frederick Rd	00025716	2.08	Vacant	CRN 0.25, C0.25, R 0.25 H35	N/A	-	1,252
	Montgomery County	23410 Frederick Rd	00019395	3.06	Vacant	CRN 0.25, C0.25, R 0.25 H35	N/A	-	1,842
	Damascus Community Bank	23400 Frederick Rd	00016461	0.92	Commercial - bank (2892 Sqft)	CRN 0.25, C0.25, R 0.25 H35	N/A	1083	552
	Burge W Burkett Jr	00000 Frederick Rd	00017795	0.69	Vacant	CRN 0.25, C0.25, R 0.25 H35	N/A	-	415
	Bonnie W cooley & J F	23320 Clarksburg Rd	00030702	1.88	Single Family Home (1172 sqft)	CRN 0.25, C0.25, R 0.25 H35	N/A	98	1,130
	23300 Clarksburg Rd LLC	23300 Clarksburg Rd	00030713	0.71	Commercial - Gas station (3700 Sqft)	CRN 0.25, C0.25, R 0.25 H35	N/A	155	425
Clarksburg Historic District Vicinity (Other properties in the Historic Clarksburg District and Vicinity - East of Frederick Rd and North of the Historic District) *****	Carlisle J Maurice Jr & M A	23543 Frederick Rd	00029691	3.21	Vacant	CRT 0.75, C 0.25, R 0.5 H 65	N/A	-	4,631
	Puckett John C & M E	23535 Frederick Rd	00023466	0.56	Single Family Home (1,660 Sqft)	CRT 0.75, C 0.25, R 0.5 H 65	N/A	191	808
	Vu Chung D & Q T	23529 Frederick Rd	00030792	2.65	Vacant	CRT 0.75, C 0.25, R 0.5 H 65	N/A	-	3,823
	Le Duy Cong	00000 Frederick Rd	01926226	1.41	Vacant	CRT 0.75, C 0.25, R 0.5 H 65	N/A	-	2,034
	Le Duy Cong	23521 Frederick Rd	00030781	0.64	Single Family Home (1,480 Sqft)	CRT 0.75, C 0.25, R 0.5 H 65	N/A	245	923
	Clarksburg United Methodist	23419 Spire St	00018870	0.42	Church (924 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	5	505
Clarksburg Historic District	Hart Briget Kline &	23411 Spire St	00029942	0.52	Single Family Home (924 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	124	626
	Watkins William K & B L	23314 Frederick Rd	00030347	0.53	Single Family Home (990 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	641
	Potomac Holdings LLC	23200 Stringtown Rd	00018436	3.80	Vacant (1,352 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	4,573
	Aries Investment Group LLC	23329 Frederick Rd	00027316	0.82	Grocery / Deli (1,374 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	218	987
	Haddad Lana &	23415 Spire St	00019522	0.38	Single Family Home (1,415 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	109	454
	Muller Ebba H	23356 Frederick Rd	00026722	0.36	Single Family Home (1,652 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	431
	Espinoza Albert M & Dawn M	23345 Frederick Rd	00022267	0.46	Single Family Home (1,698 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	91	554
	Modjarrad Amir H Et Al	23321 Frederick Rd	00024404	0.48	Post Office (1,724 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	79	582
	Amaya Julio C & R L	23360 Frederick Rd	00030677	0.41	Single Family Home (1,728 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	171	492
	Nguyen Phuong Et Al	23515 Frederick Rd	00021387	3.89	Single Family Home (2,114 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	245	4,681
	Nnp Ii - Clarksburg LLC	23330 Frederick Rd	00021684	1.37	Single Family Home (2,560 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	245	1,643
	Lewis Nichole	23341 Frederick Rd	00024255	0.14	Commercial (2,868 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	78	172
	Randall Albert B & L M	23340 Frederick Rd	00020771	0.86	Single Family Home (3,510 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	203	1,035

APPENDIX C – FUTURE BASE SANITARY FLOW ESTIMATES DETAIL

Clarksburg Historic District	Hamerhill LLC	23310 Frederick Rd	00021673	2.83	Single Family Home (3,688 Sqft)	CRT 0.5, C 0.5, R 0.5, H 45	N/A	9	3,405
	ME Church North	23425 Spire St	00026048	1.91	Church / Cemetery	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	2,298
	Ben Lewis Real Estate LLC	23425 Frederick Rd	00021013	1.73	Retail - Other	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	2,082
	Ben Lewis Real Estate LLC	23421 Frederick Rd	00028127	0.47	Retail - Other	CRT 0.5, C 0.5, R 0.5, H 45	N/A	11	562
	Ben Lewis Real Estate LLC	23415 Frederick Rd	00019431	1.50	Retail - Other	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	1,805
	Conley Thomas W Et Al Tr	23407 Frederick Rd	00018642	1.65	Retail - Other	CRT 0.5, C 0.5, R 0.5, H 45	N/A	1020	1,986
	Montgomery County Maryland	23365 Frederick Rd	00018675	0.93	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	1,119
	Ashley Wallace T & A J	23346 Frederick Rd	00022371	0.53	Single Family Home	CRT 0.5, C 0.5, R 0.5, H 45	N/A	70	635
	Montgomery County	23311 Frederick Rd	00030930	1.16	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	1,396
	Montgomery County Maryland	21411 Spire Sd	00017807	0.95	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	1,143
	Rudden Jerry N Et Al	00000 Stringtown Rd	03410212	0.35	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	421
	Natelli Clarksburg LLC	00000 Frederick Rd	00020350	0.39	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	471
	Mullen Laura L Et Al	00000 Frederick Rd	00026697	0.74	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	890
	Natelli Clarksburg LLC	00000 Frederick Rd	00020372	0.89	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	1,076
	Pleasants W D Sr & W D Jr	00000 Frederick Rd	00027681	1.15	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	1,384
	Aries Investment Group LLC	00000 Frederick Rd	00027327	0.01	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	10
	Darby Rodney H & A T	00000 Frederick Rd	00019008	0.59	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	711
	Montgomery County Maryland	00000 Frederick Rd	00027670	0.20	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	239
	Hardisty John T	00000 Frederick Rd	00027908	0.15	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	182
	Montgomery County Maryland	00000 Frederick Rd	00027668	0.63	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	762
	Woojung Inc	00000 Frederick Rd	00021365	0.80	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	963
	Montgomery County Md	00000 Frederick Rd	03612240	0.53	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	639
	Buffington Enterprises II LLC	23315 Frederick Rd	03678967	0.91	Retail	CRT 0.5, C 0.5, R 0.5, H 45	N/A	1810	-
	Darby Rodney H & A T	00000 Frederick Rd	03436901	0.41	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	492
Ferguson/Anderson LLC	00000 Frederick Rd	00023535	1.15	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	1,384	
Clarksburg Meth Ch Tr	00000 Clarksburg Rd	00018482	0.55	Vacant	CRT 0.5, C 0.5, R 0.5, H 45	N/A	-	662	
One-acre Wright property east of MD121 near the intersection with Gateway Center Drive	Ralph E Wright & JA	00000 Clarksburg Rd	00019156	1.17	Vacant	CRT 2.0, C 2.0, R 2.0, H 120	N/A	-	2,529
West of I-270									
Pulte King Properties	Shiloh farm Investments LLC	Null	00016871	67.47	Vacant	RNC (Rural Neighborhood Cluster)	N/A	-	94,237
	Pulte Home Corp	Null	00019203	1.57	Single Family (1414 Sqft)	RNC (Rural Neighborhood Cluster)	N/A	-	
	King John R Jr Et Al	Null	00023012	69.59	Vacant	RNC (Rural Neighborhood Cluster)	N/A	-	
	King John R Jr Et Al	Null	00023023	51.75	Vacant	RNC (Rural Neighborhood Cluster)	N/A	-	
	King John R Jr Et Al	Null	00023034	0.90	Vacant	RNC (Rural Neighborhood Cluster)	N/A	-	
	King John R Jr Et Al	Null	00023045	16.38	Vacant	RNC (Rural Neighborhood Cluster)	N/A	-	
	Shiloh farm Investments LLC	Null	00028845	230.11	Mostly Vacant (Single Family - 1,664 sqft)	RNC (Rural Neighborhood Cluster)	N/A	-	
	Shiloh farm Investments LLC	Null	00029565	43.50	Vacant	RNC (Rural Neighborhood Cluster)	N/A	-	
Shiloh farm Investments LLC	Null	01592550	59.60	Vacant	RNC (Rural Neighborhood Cluster)	N/A	-		

*Three properties all zoned R-200. Amendment eliminated the potential to use a planned development zone. Parcels currently have single family houses and barns. No proposed development.

**Of the three parcels (zoned R-90) near MD355, the two smaller parcels currently have a single family home while the largest parcel is vacant.

***Even though these parcels are zoned R-90, they may not be suitable for future development. One parcel (owned by Michael Redgrave) has no access and is located in an environmental buffer, while the other (owned by Potomac Edison Co) currently houses an electric substation.

****9 Parcels (5-Vacant, 2-Residential and 2-commercial) are all rezoned CRN 0.25, C 0.25, R0.25, H35.

*****5 Parcels (3-Vacant, 2-Residential) are all rezoned CRT 0.75, C 0.75, R0.25, H65.

Appendix D

Business Case Evaluation

Section 1. Background

The *Clarksburg – Ten Mile Creek Area Sewer Facility Study* is examining alternatives for extending wastewater collection and treatment services to Future Service Area C in the Ten Mile Creek Area of Clarksburg, Maryland. A working draft of the study was issued on October 30, 2015 by CDM Smith in conjunction with the Planning Group of the Washington Suburban Sanitary Commission (“WSSC”) and Environ-Civil Engineering, Ltd. The Future Service Area C includes approximately 980 acres of land, of which approximately 220 acres are located north of Clarksburg Road and east of I-270 and the remainder is located north of Clarksburg Road and west of I-270. The Asset Management Program (“AMP”) Unit of WSSC, which is a part of the Planning Group, was requested to perform an abbreviated business case evaluation of six alternatives identified through the sewer facility study process.

The AMP at WSSC has developed over the past several years and different facets of the program are being implemented in a phased approach. One such facet of the AMP is the project needs validation process, which is embedded throughout WSSC, and serves as the means through which WSSC identifies needs and the AMP validates and evaluates solutions to address those needs. A business case evaluation is one part of the AMP’s project needs validation process. The business case evaluation stage typically includes an assessment of various factors, including engineering considerations, financial outcomes, risk outcomes, and level of service impacts. Due to the timing of the implementation of the business case process and the timing of the completion of the *Clarksburg – Ten Mile Creek Area Sewer Facility Study*, an abbreviated business case evaluation was performed on only six of the highest ranking alternatives. The criteria utilized in this abbreviated business case evaluation include lifecycle cost and risk.

The six alternatives that were requested for inclusion in the abbreviated business case evaluation undertaken by the AMP Unit are as follows:

- Alternative 9
 - This alternative makes use of low pressure sewer, grinder pump units, and gravity sewer for the Pulte property, gravity sewer and two wastewater pumping stations (“WWPS”) for the Egan/Mattlyn property and other properties north of Egan/Mattlyn, and gravity sewer and a WWPS for the Miles/Coppola and historic district properties. The WWPS on the Miles property also receives wastewater flows from the Egan WWPS. This alternative consists of approximately 8,470 feet of gravity sewer, three WWPS, 5,490 feet of force mains, 3,500 feet of low pressure sewer, and 284 individual grinder pump units.
- Alternative 10
 - Alternative 10 is similar to Alternative 9 with the exception that the central portion of the Miles/Coppola property that is served by gravity sewer will discharge along a yet to be defined access road to this new development area. The sewer service configuration results in a reduction in the length of gravity sewer and an increase in the length of force mains compared to Alternative 9. This alternative consists of approximately 8,100 feet of gravity sewer, three WWPS, 6,450 feet of force mains, 3,500 feet of low pressure sewer, and 284 individual grinder pump units.
- Alternative 11
 - This alternative makes use of gravity sewer, low pressure sewer, and grinder pump

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units for the Pulte property, gravity sewer, low pressure sewer, grinder pump units, and a WWPS for the Egan/Mattlyn property and other properties north of Egan/Mattlyn, and gravity sewer and a WWPS for the Miles/Coppola and historic district properties. The WWPS on the Miles property also receives wastewater flows from the Egan WWPS. This alternative consists of approximately 8,470 feet of gravity sewer, two WWPS, 3,440 feet of force mains, 6,060 feet of low pressure sewer, and 304 individual grinder pump units.

- Alternative 12
 - Alternative 12 is similar to Alternative 11 with the exception that the central portion of the Miles/Coppola property that is served by gravity sewer will discharge along a yet to be defined access road to this new development area. The sewer service configuration results in a reduction in the length of gravity sewer and an increase in the length of force mains compared to Alternative 11. This alternative consists of approximately 8,100 feet of gravity sewer, two WWPS, 4,400 feet of force mains, 6,060 feet of low pressure sewer, and 304 individual grinder pump units.
- Alternative 11 with Pulte WWPS
 - This alternative makes use of gravity sewer and a WWPS for the Pulte property, gravity sewer, low pressure sewer, grinder pump units, and a WWPS for the Egan/Mattlyn property and other properties north of Egan/Mattlyn, and gravity sewer and a WWPS for the Miles/Coppola and historic district properties. The WWPS on the Miles property also receives wastewater flows from the Egan WWPS. This alternative consists of approximately 8,470 feet of gravity sewer, three WWPS, 5,090 feet of force mains, 2,560 feet of low pressure sewer, and 20 individual grinder pump units.
- Alternative 12 with Pulte WWPS
 - Alternative 12 with Pulte WWPS is similar to Alternative 11 with Pulte WWPS with the exception that the central portion of the Miles/Coppola property that is served by gravity sewer will discharge along a yet to be defined access road to this new development area. The sewer service configuration results in a reduction in the length of gravity sewer and an increase in the length of force mains compared to Alternative 11 with Pulte WWPS. This alternative consists of approximately 8,100 feet of gravity sewer, three WWPS, 6,050 feet of force mains, 2,560 feet of low pressure sewer, and 20 individual grinder pump units.

As part of the abbreviated business case evaluation, the AMP Unit undertook two analyses with regard to each of the six selected alternatives. The first analysis undertaken was a lifecycle cost analysis. This analysis determines the capital and operation and maintenance (“O&M”) costs and benefits to WSSC of the assets over their expected life. The second analysis undertaken by the AMP Unit was a risk absorption analysis. The risk absorption analysis examines the additional risk that WSSC would absorb associated with the implementation of each of the six selected alternatives.

Section 2. Lifecycle Cost Analysis Results

The results of the lifecycle cost analysis are shown in Table 1 on the next page. As shown in Table 1, all of the alternatives have positive present value totals. This means that all of the alternatives are expected to produce revenues over their expected useful life in excess of their upfront capital costs and on-going O&M costs. However, it is important to note that costs associated with wastewater

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facilities downstream of the facility study area such as the additional O&M costs to pump the new wastewater through other WWPS and the additional O&M costs of treating the wastewater have not been included in this analysis due to the abbreviated nature of the business case evaluation.¹ Therefore, it is uncertain if the revenues from the project will fully cover the costs associated with the services provided.²

As shown in Table 1, the alternative with the highest total net present value is Alternative 12, which has a net present value of \$20,613,988 over the 54-year analysis period. The next best alternative based on the total net present value is Alternative 11, which has a net present value of \$20,461,885. The variation in total net present values between the six alternatives is relatively large, with a difference of \$4,387,010 between the alternatives with the lowest and highest total net present values. Alternative 11 with Pulte WWPS, which has the lowest total net present value, has a total net present value that is approximately 21.3% lower than Alternative 12.

Table 1: Lifecycle Cost Analysis Results

Alternative	Analysis Period	Asset Useful Life	Total Future Value	Total Net Present Value	Annuitized Value
Alternative 9	54	50	\$115,144,854	\$16,975,172	\$771,846
Alternative 10	54	50	\$115,233,192	\$17,127,275	\$778,762
Alternative 11	54	50	\$124,273,652	\$20,461,885	\$930,384
Alternative 12	54	50	\$124,361,990	\$20,613,988	\$937,300
Alternative 11 with Pulte WWPS	54	50	\$114,276,879	\$16,226,978	\$737,826
Alternative 12 with Pulte WWPS	54	50	\$114,365,217	\$16,379,080	\$744,742

Section 3. Risk Absorption Analysis Results

WSSC quantifies the level of risk exposure to the Commission associated with its assets based upon its business risk exposure (“BRE”) measure. There are three components to the BRE measure: the probability of failure (“POF”), the consequence of failure (“COF”), and the mitigation factor (“MF”). The formula for the BRE measure is as follows:

$$\text{BRE} = \text{POF} \times \text{COF} \times \text{MF}$$

The POF for the alternatives are calculated based upon the likelihood of failure of the assets associated with the alternatives. Each alternative is assigned a COF based on a triple bottom line

¹ While the downstream costs of pumping and treating the wastewater have not been included in the lifecycle cost analysis, the amount of flow is expected to be the same for each of the alternatives. Therefore, the inclusion of these costs would not impact the relative ranking of the alternatives.

² Additionally, the account maintenance fee was not included in the analysis. The account maintenance fee was not included in the analysis as the fee is meant to recover the fixed costs of servicing a customer’s account, regardless of the amount of water used or sewage generated, such as the costs of purchasing and reading water meters, billing, and customer service. Therefore, the account maintenance fee and the fixed costs of servicing a customer’s account are assumed to have a net zero effect on lifecycle cost and were not included in the analysis due to the abbreviated nature of the business case evaluation.

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approach, in which a monetary value is assigned to each alternative to account for its potential social, economic, and environmental consequences of failure. The MF for each alternative is based upon whether or not there is a method in place for lessening the effects of a failure if one were to occur.

The results of the risk absorption analysis are shown in Table 2 below. The risk absorption analysis undertaken examined the amount of risk absorption to WSSC associated with each alternative. As the Clarksburg Ten Mile Creek Area represents a new service territory for wastewater collection and treatment, there is no risk reduction to WSSC from the implementation of this project. In fact, the inverse is true in this particular case. If wastewater collection and treatment services are extended to this area, then WSSC will be absorbing more risk as it currently has no risk associated with this area. Therefore, the analysis that was undertaken looked at risk absorption and not risk reduction.

The risk analysis shows that Alternative 11 with Pulte WWPS and Alternative 12 with Pulte WWPS are tied for the lowest risk absorption by WSSC among the six alternatives. Alternative 11 and Alternative 12 are tied for the highest risk absorption to WSSC if they were to be implemented. The difference in risk absorption among the various alternatives is relatively small. In nominal terms, the difference is \$27,245 of additional risk if the highest risk alternative were to be implemented in place of the lowest risk alternative. This represents an increase in risk of 8.9% between the lowest and highest alternatives in terms of risk absorption.

Table 2: Risk Analysis Results

Alternative	Years to Expected Failure	POF	COF	MF	Risk
Alternative 9	21 – 50 Years	3.0%	\$11,037,701	1.00	\$331,131
Alternative 10	21 – 50 Years	3.0%	\$11,037,701	1.00	\$331,131
Alternative 11	21 – 50 Years	3.0%	\$11,096,544	1.00	\$332,896
Alternative 12	21 – 50 Years	3.0%	\$11,096,544	1.00	\$332,896
Alternative 11 with Pulte WWPS	21 – 50 Years	3.0%	\$10,188,373	1.00	\$305,651
Alternative 12 with Pulte WWPS	21 – 50 Years	3.0%	\$10,188,373	1.00	\$305,651

Section 4. Summary Results

Table 3 on the next page summarizes the results from the lifecycle cost and the risk absorption analyses that were performed as part of the abbreviated Clarksburg Ten Mile Creek Area business case evaluation. The results show that Alternative 12 has the highest annuitized net present value to WSSC and that Alternative 11 with Pulte WWPS and Alternative 12 with Pulte WWPS are tied for

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the lowest risk absorption for WSSC. Given the relatively large differences in annuitized value and the relatively small differences in risk absorption between the alternatives, the analyses undertaken as part of the abbreviated business case evaluation suggest that Alternative 12 should be the recommended alternative for execution by WSSC.

The ranking of the alternatives was tested for sensitivity to varying discount rates. The range of discount rates for which the results were checked for sensitivity was between a discount rate of 1% and 7%, in increments of 1%. The discount rate sensitivity analysis revealed that the relative ranking of the alternatives is not sensitive to changes in the discount rate. Therefore, the ranking of Alternative 12 as the preferred alternative is considered stable with regard to changing discount rates.

Table 3: Summary Results

Alternative	Annuitized Value	Risk
Alternative 9	\$771,846	\$331,131
Alternative 10	\$778,762	\$331,131
Alternative 11	\$930,384	\$332,896
Alternative 12	\$937,300	\$332,896
Alternative 11 with Pulte WWPS	\$737,826	\$305,651
Alternative 12 with Pulte WWPS	\$744,742	\$305,651

