Proposed Water Treatment Residuals Management Process

Project Introduction and Description of Proposed Action and Alternatives

Prepared for

Washington Aqueduct
Baltimore District, U.S. Army Corps of Engineers

Washington, D.C.

May 2004

CH2MHILL
Herndon, Virginia

Contents

Acronyms & Abbreviations

C&O	Chesapeake & Ohio
CSO	Combined Sewer Overflow
DC WASA	District of Columbia Water and Sewer Authority
DEIS	Draft Environmental Impact Statement
DOPAA	Description of Proposed Actions and Alternatives
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FCWA	Fairfax County Water Authority
FFCA	Federal Facilities Compliance Agreement
mgd	million gallons per day
MHW	mean high water
MLW	mean low water
NEPA	National Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
TSS	total suspended solids
WSSC	Washington Suburban Sanitary Commission
WTP	Water Treatment Plant

SECTION 1

Introduction

1.1 Background and Project History

The U.S. Army Corps of Engineers, Baltimore District, Washington Aqueduct operates the Dalecarlia and McMillan Water Treatment Plants (WTPs) in Washington, D.C., serving over 1 million persons in the D.C. and Northern Virginia area with potable water. The treatment process removes solid particles (e.g., river silt) from the Potomac River supply water, treats and disinfects the water, and distributes the finished water to the metropolitan service area. The solids removed during the treatment process have historically been returned to the Potomac River, but a recently reissued version of the Washington Aqueduct National Pollution Discharge Elimination System (NPDES) permit (Permit No. DC 0000019) effectively precludes the discharge of water treatment solids, or residuals, to the river.

Consequently, Washington Aqueduct is in the process of evaluating water treatment residuals management options that minimize or eliminate the discharge of residuals to the river. The residuals management option that is ultimately selected has a potential to affect the human environment, and thus development of the residuals management plan must comply with the National Environmental Policy Act (NEPA). This Description of Proposed Actions and Alternatives (DOPAA) portion of the Draft Environmental Impact Statement (DEIS) partially fulfills the NEPA requirements to document the environmental implications of residuals management alternatives before a decision is made on the proposed action. NEPA requires federal agencies to integrate environmental considerations into their decision-making processes by evaluating the environmental impacts of their proposed actions and reasonable alternatives to those actions.

The current water treatment system consists of a series of reservoirs and treatment facilities (Figure 1-1). Raw water diverted from the Potomac River is collected in the Dalecarlia Reservoir. Natural sedimentation of river silt typically occurs in the Forebay of the Dalecarlia Reservoir (Figure 1-2). This silt (Forebay residuals) is periodically dredged, temporarily land applied on Washington Aqueduct property for drying, and then trucked offsite or utilized onsite. The part of this process that involves trucking of dried Forebay solids occurs approximately every seven years.

Washington Aqueduct water treatment operations then achieve an additional level of sediment removal by adding aluminum sulfate (alum) as a coagulant. Alum is added after the water has passed through the Dalecarlia Reservoir, but prior to reaching the four sedimentation basins at the Dalecarlia WTP (Figure 1-2) and the Georgetown Reservoir (Figure 1-3) where the coagulated sediment (i.e., water treatment residuals) is removed. The settled residuals are periodically flushed from the basins to the Potomac River. This process had been previously permitted through the U.S. Environmental Protection Agency's (EPA's) NPDES permitting process.

The reissued NPDES permit, which became effective on April 15, 2003, significantly reduced the allowable concentration of residuals that may be discharged by the Washington

Aqueduct to the Potomac River. Washington Aqueduct and EPA Region III entered into a Federal Facilities Compliance Agreement (FFCA), on June 12, 2003, to allow the continued production of drinking water during the development of a new residuals management process to meet the requirements of the new permit. The FFCA includes a strict schedule for delivering documentation and achieving compliance with the NPDES permit, including completion of an alternatives evaluation and a disposal study, a DEIS, and final compliance with the numerical discharge limitations.

1.2 Purpose and Need for Action

The purpose and need for the project were defined in the Notice of Intent, published in the *Federal Register* on January 12, 2004, as restated below:

> The objectives of the proposed residuals management process are as follows, not necessarily in order of precedence (measurement indicators in parentheses):
>
> - To allow Washington Aqueduct to achieve complete compliance with NPDES Permit DC0000019 and all other federal and local regulations.
> - To design a process that will not impact current or future production of safe drinking water reliably for the Washington Aqueduct customers. (Peak design flow of drinking water)
> - To reduce, if possible, the quantities of solids generated by the water treatment process through optimized coagulation or other means. (Mass or volume of solids generated)
> - To minimize, if possible impacts on various local and regional stakeholders and minimize impacts on the environment. (Traffic, noise, pollutants, etc.)
> - To design a process that is cost-effective in design, implementation, and operation. (Capital, operations, and maintenance costs)

Washington Aqueduct developed these objectives with the intention of ensuring compliance with all permit and other legal mandates, and preserving or improving upon the safety, reliability, and efficiency of the current water treatment process. In addition, Washington Aqueduct incorporated into the objectives a concern for minimizing impacts to the human and natural environment.

The comments generated from the scoping process have been incorporated into the list of alternatives presented in this document or will be included in the evaluations of the affected environment or environmental consequences of the DEIS. None of the submitted comments resulted in a modification of the original objectives as published in the Notice of Intent.

Alternatives screening criteria, linked to the purpose and need statement as listed above, were developed subsequent to the issuance of the Notice of Intent. These screening criteria have been used to identify a reasonable range of alternatives for detailed analysis in the DEIS.

Washington Aqueduct will select an alternative among those presented in Chapter 2 for implementation. The final alternative selected may be contingent on authorization, approvals, or issuance of permits or easements by various public agencies or private entities

including, but not limited to, the relevant State Historic Preservation Office, the National Capital Planning Commission, the Environmental Protection Agency, the National Park Service, and the Washington Aqueduct Wholesale Customers.

FIGURE 1-1
Washington Aqueduct Supply and Treatment System

Legend

- Approximate Location of New/Modified Facilities
- County Boundary
- Existing Buildings
- Roads

The geographic information shown on this map is based on data from the District of Columbia Geographic Information System (DC GIS). The District Government makes no warranty, express or implied, and disclaims all implied warranties of suitability of the DC GIS product for a particular purpose.

N W E S

0 375 750 1,500 Feet

Figure 1-2
Dalecarlia Reservoir and Forebay

CH2MHILL

Legend

- County Boundary
- Existing Buildings
- Roads

The geographic information shown on this map is based on data from the District of Columbia Geographic Information System (DC GIS). The District Government makes no warranty, express or implied, and disclaims all implied warranties of suitability of the DC GIS product for a particular purpose.

N
W E
S

0 375 750 1,500
Feet

Figure 1-3
Georgetown Reservoir

CH2MHILL

SECTION 2

Description of Proposed Action and Alternatives

2.1 Proposed Action

The proposed action is to develop, design, and construct a permanent new residuals management process that will cost-effectively collect, treat, and dispose of the residuals in conformance with the purpose and need stated above. The selected action must meet the FFCA compliance deadlines. It must also address the management of projected residuals quantities for a period of at least 20 years. Table 2-1 lists the volume of water treatment and Forebay residuals generated daily as developed for the Engineering Feasibility Study. The table also lists the number of truck trips associated with the residuals quantities based on a 5-day week. Not all alternatives evaluated use trucking for the disposal of dewatered residuals. The larger residuals values listed in the design year column reflect the larger quantity of water anticipated to require treatment approximately 20 years in the future.

TABLE 2-1
Washington Aqueduct Basis for Residuals Quantities

	Daily Generated Volume (Cubic Yards)[a]		Truck Trips/Day[b]			
			22 Cubic Yards/ Truck		11 Cubic Yards/ Truck	
Residuals	Current Average	Design Year Average	Current Average	Design Year Average	Current Average	Design Year Average
Water Treatment	94	120	7	8	13	16
Forebay	22	28	2	2	3	4

[a] Based on 7 days per week production.
[b] Based on hauling 5 days per week.

2.2 Development of Alternatives

Washington Aqueduct has been evaluating residuals management approaches for a number of years. During that time many options have been identified. However, there have also been shifts in emphasis for the residuals management goals and objectives. Thus, not all approaches considered within the history of the project achieve the current objectives equally well.

The first step in the NEPA alternative identification process was to review the project history and compile a full range of possible alternatives that have the potential to meet the

stated purpose and need. The following documents were reviewed to develop the historical list:

- Department of the Army, Baltimore District, Corps of Engineers, Washington Aqueduct. "Dalecarlia Water Treatment Plant and Georgetown Reservoir Residuals Collection and Treatment Engineering Estimate (35% Design)." Whitman, Requardt, and Associates. November 1996
- Department of the Army, Baltimore District, Corps of Engineers, Washington Aqueduct. "Dalecarlia Water Treatment Plant and Georgetown Reservoir Residuals Disposal Facilities Residuals Disposal Study." Whitman, Requardt, and Associates in association with Malcolm Pirnie, Inc. September 1995
- Department of the Army, Baltimore District, Corps of Engineers, Washington Aqueduct. "Draft NPDES Permit Review Memorandum on Residual Solids Evaluations." AH Environmental Consultants, Inc., and Greeley and Hansen LLC. May 30, 2003

To this list were added new alternatives and approaches with the potential to improve the historical alternatives. Suggestions made by the public during the scoping process, such as plasma heat treatment of residuals were also considered.

2.3 Alternatives Description

The following 26 alternatives were initially evaluated for this project. Since many of the alternatives are similar, they have been grouped in categories based on similarity of critical components, such as the method of dewatering residuals, transport, or the location of processing facilities.

Alternative 1 is a "No-Action" alternative that provides no changes to the current practice of discharging residuals to the Potomac River as allowed by the previous NPDES permit. Although this alternative clearly does not meet the purpose and need for the project because it does not comply with the current NPDES permit, it must be examined under NEPA for comparison to other alternatives.

Alternatives 2 through 8 do not require continuous trucking of residuals from the Dalecarlia WTP. They consist of the following alternatives:

- Alternative 2: Process water treatment residuals at Dalecarlia WTP and dispose of them in the Dalecarlia monofill. Process Forebay residuals by current methods and periodically haul offsite.
- Alternative 3: Coprocess water treatment and Forebay residuals at Dalecarlia WTP and codispose in Dalecarlia monofill.
- Alternative 4: Pump unthickened water treatment residuals via Potomac Interceptor to the District of Columbia Water and Sewer Authority (DC WASA) Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul.
- Alternative 5: Thicken water treatment residuals at Dalecarlia WTP, then pump via a new pipeline to the District of Columbia Water and Sewer Authority (DC WASA) Blue

Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul.

- Alternative 6: Thicken water treatment residuals at Dalecarlia WTP, then transport by barge to the Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul.
- Alternative 7: Thicken water treatment residuals at Dalecarlia WTP, then pump via pipeline to neighboring water utility. Process Forebay residuals by current methods and periodically haul.
- Alternative 8: Thicken water treatment residuals at Dalecarlia WTP, then pump via pipeline to a new dewatering location. Process Forebay residuals by current methods and periodically haul.

Alternatives 9 through 11 anticipate discharging some portion of the residuals, or related process stream, back to the Potomac River. They consist of the following alternatives:

- Alternative 9: Process most water treatment residuals at the Dalecarlia WTP and haul offsite, but dilute some residuals for discharge back to the Potomac River. Process Forebay residuals by current methods and periodically haul.
- Alternative 10: Renegotiate NPDES permit to allow discharge of all residuals to the Potomac River.
- Alternative 11: Process water treatment residuals at Dalecarlia WTP and haul offsite. Process Forebay residuals by current methods and periodically haul. Dilute side streams and discharge to the Potomac River.

Alternatives 12 through 15 involve constructing residuals facilities in the Dalecarlia Reservoir. They consist of the following alternatives:

- Alternative 12: Store all residuals in the Dalecarlia Reservoir prior to processing at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals. Dispose of in Dalecarlia and McMillan monofills.
- Alternative 13: Store all residuals in the Dalecarlia Reservoir prior to processing at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal.
- Alternative 14: Construct new sedimentation basins at the Dalecarlia Reservoir and process all residuals at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal.
- Alternate 15: Coagulate all flow in the Dalecarlia Reservoir and process all residuals at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal.

Alternatives 16 through 23 anticipate constructing residuals facilities at the McMillan WTP. They consist of the following alternatives:

- Alternative 16: Thicken water treatment residuals at the McMillan WTP and dewater at an existing wholesale customer's treatment facility. Contract haul dewatered residuals. Process Forebay residuals by current methods and periodically haul.
- Alternative 17: Coprocess Forebay and water treatment residuals at the McMillan WTP. Dispose of residuals via contract hauling from the McMillan WTP.
- Alternative 18: Process water treatment residuals at the McMillan WTP and haul offsite. Process Forebay residuals by current methods and periodically haul.
- Alternative 19: Thicken water treatment residuals at the McMillan WTP and dewater at an existing wholesale customer's dewatering facility. Dispose of residuals via contract hauling from the existing facility. Discharge Forebay residuals to the Potomac River.
- Alternative 20: Thicken water treatment residuals at the Dalecarlia WTP and Georgetown Reservoir and dewater at the McMillan WTP. Dispose of water treatment residuals via contract hauling from the McMillan WTP. Process Forebay residuals via current methods and periodically haul.
- Alternative 21: Store residuals at lagoons at Forebay, Dalecarlia WTP, and McMillan WTP. Thicken and dewater residuals with portable equipment and dispose via contract hauling from all locations.
- Alternative 22: Store water treatment residuals in Dalecarlia and Georgetown Reservoirs prior to thickening and dewatering at Dalecarlia and McMillan WTPs. Dispose of water treatment residuals via contract hauling from the Dalecarlia and McMillan WTPs. Process Forebay residuals via current methods and periodically haul.
- Alternative 23: Store water treatment residuals in the McMillan Reservoir prior to dewatering at the McMillan WTP. Dispose of water treatment residuals via contract hauling from McMillan WTP. Process Forebay residuals via current methods and periodically haul.

Alternatives 24 through 26 anticipate constructing residuals facilities at the Dalecarlia WTP. They consist of the following alternatives:

- Alternative 24: Coprocess Forebay and water treatment residuals at the Dalecarlia WTP. Dispose of residuals via contract hauling from the Dalecarlia WTP.
- Alternative 25: Process water treatment residuals at the Dalecarlia WTP and dispose via contract hauling. Process Forebay residuals via current methods and periodically haul.
- Alternative 26: Use plasma oven technology to process Forebay and water treatment residuals at the Dalecarlia WTP. Dispose of residuals via contract hauling from the Dalecarlia WTP.

Appendix A briefly describes each alternative evaluated in this project; the locations where residuals are produced and processed; and how each type of residual will be collected, conveyed, processed, and disposed of.

An Engineering Feasibility Study is being prepared for residuals management concurrent with the DEIS and provides detailed technical information on the identified alternatives.

The Engineering Feasibility Study also describes and evaluates the alternatives in much greater detail and can be consulted for more information. The Engineering Feasibility Study documents the evaluation of the alternative methods for the collection and disposal of Forebay residuals and water treatment residuals (produced at the Dalecarlia Water Treatment Plant and Georgetown Reservoir). The results of the study include a determination of feasible alternatives with consideration given to the most environmentally sound, economical, and practical methods. This document will be finalized on May 28, 2004, and will be available for review in the Document Repository as part of the EIS Administrative Record.

2.4 Alternatives Screening Process and Criteria

Screening of alternatives is an approach commonly used as part of the NEPA process to identify the feasible alternatives and insure a reasonable range of alternatives for detailed evaluation in the DEIS. In this DOPAA, each previously or newly identified alternative (or individual component of a residuals management approach) was screened against predetermined criteria. The draft predetermined screening criteria were circulated for public review and comment during the Scoping Process before they were applied to the alternatives.

The screening criteria used to judge attainment of purpose and need are:

- Is able to comply with the requirements of the FFCA, including schedule
- Preserves the quality, reliability, and redundancy of the existing water treatment and distribution system
- Uses proven methods (i.e., proven design water treatment processes, construction equipment and techniques, and operating principles)
- Complies with NPDES permit to reduce or eliminate discharge to the Potomac River
- Does not produce an undue economic hardship on Washington Aqueduct customers by adding new facilities that are not needed for other feasible alternatives that cost more than 30 percent of the baseline budget of $50 million
- Complies with zoning and land use regulations, institutional constraints, and other Federal and local regulations including, but not limited to, the Endangered Species Act, wetland protection requirements, and cultural resource protection requirements
- Reduces residual quantities, if possible

2.5 Alternatives Screening Results

Table 2-2 concisely describes each of the 26 alternatives considered in this analysis and summarizes the results of the screening process. Three of the alternatives were found to be feasible based upon the screening analysis. In addition, the no-action alternative will be carried forward into the EIS, as required by the NEPA process. The three feasible alternatives are described in more detail in Section 2.7 of this DOPAA.

The remaining 22 alternatives did not meet one or more of the screening criteria. Table 2-2 provides a brief list of the screening criteria that were not satisfied for each of these 22 alternatives. The reasons for considering these alternatives infeasible are also described in more detail following Table 2-2.

More extensive details on each alternative and the associated screening process are also provided in the Engineering Feasibility Study. A "Scope of Statement" that identifies the detailed studies, investigations, and evaluations, which will be carried out for each of the final alternatives, will be issued for public review before preparation of the DEIS.

TABLE 2-2
Screening Results Summary

No.	Description	Screening Result (Consistent/ Inconsistent with Screening Criteria)	Unsatisfied Screening Criteria
1	No Action	Analyzed in detail in the EIS per NEPA requirements	• N/A
Alternatives 2 to 8: Alternatives That Do Not Include Continuous Trucking from the Dalecarlia WTP			
2	Process water treatment residuals at Dalecarlia WTP and dispose in Dalecarlia monofill. Process Forebay residuals by current methods and periodically haul.	Consistent	• None
3	Coprocess water treatment and Forebay residuals at Dalecarlia WTP and codispose in Dalecarlia monofill.	Inconsistent	• Reliability and redundancy
4	Pump unthickened water treatment residuals via Potomac Interceptor to DC WASA Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• Reliability and redundancy • Economic • Zoning, land use, and Federal and local regulations
5	Thicken water treatment residuals at Dalecarlia WTP, and then pump via a new pipeline to DC WASA Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul.	Consistent	• None
6	Thicken water treatment residuals at Dalecarlia WTP, and then transport by barge to DC WASA Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• Reliability and redundancy • Zoning, land use, and local regulations • Proven methods

TABLE 2-2
Screening Results Summary

No.	Description	Screening Result (Consistent/ Inconsistent with Screening Criteria)	Unsatisfied Screening Criteria
7	Thicken water treatment residuals at Dalecarlia WTP, and then pump via pipeline to neighboring water utility. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• Economic (FCWA) • Institutional constraints (FCWA, WSSC)
8	Thicken water treatment residuals at Dalecarlia WTP and pump via pipeline to new dewatering location. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• FFCA • Economic
Alternatives 9 to 11: Alternatives with a Discharge to the Potomac River			
9	Process most water treatment residuals at Dalecarlia WTP and haul offsite, but dilute some residuals for discharge back to Potomac River. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• Reliability and redundancy • NPDES
10	Renegotiate NPDES Permit to allow discharge of all residuals to Potomac River.	Inconsistent	• NPDES
11	Process water treatment residuals at Dalecarlia WTP and haul offsite. Process Forebay residuals by current methods and periodically haul. Dilute treatment side streams and discharge to the Potomac River.	Inconsistent	• Reliability and redundancy • NPDES
Alternatives 12 to 15: Alternatives Involving the Dalecarlia Reservoir			
12	Store all residuals in the Dalecarlia Reservoir prior to processing at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals. Dispose in Dalecarlia & McMillan monofills.	Inconsistent	• Reliability and redundancy
13	Store all residuals in the Dalecarlia Reservoir prior to processing at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal.	Inconsistent	• Reliability and redundancy
14	Construct new sedimentation basins at the Dalecarlia Reservoir and process all residuals at Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal.	Inconsistent	• Reliability and redundancy
15	Coagulate all flow in the Dalecarlia Reservoir and process all residuals at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal.	Inconsistent	• Reliability and redundancy

TABLE 2-2
Screening Results Summary

No.	Description	Screening Result (Consistent/ Inconsistent with Screening Criteria)	Unsatisfied Screening Criteria
Alternatives 16 to 23: Alternatives with Facilities at the McMillan WTP			
16	Thicken water treatment residuals at the McMillan WTP and dewater at an existing wholesale customer's treatment facility. Contract haul dewatered residuals. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• FFCA • Reliability and redundancy • Economic • Proven methods
17	Coprocess Forebay and water treatment residuals at the McMillan WTP. Disposal of residuals via contract hauling from McMillan WTP. *(Same as Alternative 18 w/ coprocessing)*	Inconsistent	• Reliability and redundancy • FFCA • Economic and proven methods
18	Process water treatment residuals at the McMillan WTP and haul offsite. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• FFCA • Reliability and redundancy • Economic • Proven methods
19	Thicken water treatment residuals at the McMillan WTP and dewater at an existing wholesale customer's treatment facility. Dispose of residuals via contract hauling from the existing facility. Discharge Forebay residuals to the Potomac River.	Inconsistent	• FFCA • Reliability and redundancy • Economic • Proven methods • NPDES
20	Thicken water treatment residuals at the Dalecarlia WTP and the Georgetown Reservoir and dewater at the McMillan WTP. Dispose of water treatment residuals via contract hauling from McMillan WTP. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• FFCA • Reliability and redundancy • Economic • Proven methods
21	Store residuals in lagoons at Forebay, Dalecarlia WTP, and McMillan WTP. Thicken and dewater residuals with portable equipment and dispose via contract hauling from all locations.	Inconsistent	• FFCA • Reliability and redundancy • Economic • Proven methods

TABLE 2-2
Screening Results Summary

No.	Description	Screening Result (Consistent/ Inconsistent with Screening Criteria)	Unsatisfied Screening Criteria
22	Store water treatment residuals in Dalecarlia and Georgetown Reservoirs, prior to thickening and dewatering at the Dalecarlia and McMillan WTPs. Dispose of water treatment residuals via contract hauling from the Dalecarlia and McMillan WTPs. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• FFCA • Reliability and redundancy • Economic • Proven methods
23	Store water treatment residuals in McMillan Reservoir prior to dewatering at the McMillan WTP. Dispose of water treatment residuals via contract hauling from the McMillan WTP. Process Forebay residuals by current methods and periodically haul.	Inconsistent	• FFCA • Reliability and redundancy • Economic • Proven methods
Alternatives 24 through 26: Alternatives with Facilities at the Dalecarlia WTP			
24	Coprocess Forebay and water treatment residuals at Dalecarlia WTP. Dispose of residuals via contract hauling from the Dalecarlia WTP. *(Same as Alternative 25 w/ coprocessing)*	Inconsistent	• Reliability and redundancy
25	Process water treatment residuals at the Dalecarlia WTP; and dispose via contract hauling. Process Forebay residuals by current methods and periodically haul.	Consistent	• None
26	Use plasma oven technology to process Forebay and water treatment residuals at the Dalecarlia WTP. Dispose of residuals via contract hauling from the Dalecarlia WTP. *(Same as Alternative 25 w/ coprocessing and plasma oven step)*	Inconsistent	• Reliability and redundancy • Economic • Proven methods

2.6 Description of Alternatives Inconsistent with Screening Criteria

Alternative 3: Coprocess Water Treatment and Forebay Residuals at Dalecarlia WTP and Codispose in Dalecarlia Monofill

This alternative is the same as Alternative 2 except that it provides for coprocessing of Forebay and water treatment residuals, rather than processing the Forebay residuals separately as is currently practiced. Alternative 2 was selected as a feasible alternative, and is therefore described further in Section 2.7.

Reliability and Redundancy. Except for Alternative 26, all options involving the coprocessing of Forebay residuals with water treatment residuals were eliminated in the Engineering Feasibility Study due to reliability and redundancy concerns. The Forebay residuals contain a much higher percentage of grit and sand than do the water treatment residuals. Coprocessing the two materials would require all processes to be sized for a much greater volume of flow. Additionally, coprocessing would result in a greater volume of dewatered residuals (in all cases except for Alternative 26), which is not consistent with the purpose and need. Coprocessing would also result in an unacceptable level of wear on process equipment. This rationale does not apply to Alternative 26 because there is no disadvantage in volume reduction from coprocessing both residual streams with this technology. Therefore, coprocessing of residuals for Alternative 26 was not eliminated under this rationale.

Alternative 4: Pump Unthickened Water Treatment Residuals via Potomac Interceptor to Blue Plains. Process Forebay Residuals by Current Methods and Periodically Haul

This alternative calls for residuals to be discharged directly to the Potomac Interceptor for conveyance to Blue Plains Wastewater Treatment Plant. The residuals would be commingled with the wastewater in the interceptor and processed as part of the influent at Blue Plains. Note that Alternative 5, which calls for transporting residuals to Blue Plains using a separate pipeline in the Potomac Interceptor right-of-way, was selected as feasible and is described in Section 2.7.

Reliability and Redundancy. Preliminary discussions with the DC WASA, which operates the Blue Plains plant, identified several issues that would affect DC WASA's operational capabilities to handle the residuals with incoming flow.

Peak quantities of residuals would constitute up to 80 percent of the typical amount of residuals currently processed at Blue Plains. This amount of additional solids loading cannot be accommodated at the Blue Plains plant without providing equalization to significantly decrease the peak quantities sent to the plant. An extremely large volume of storage (an infeasible amount) would be required to equalize the solids loading.

It is anticipated that a significant percentage of the residuals associated with this alternative would settle in the Blue Plains primary clarifiers. However, the primary clarifiers are one of the limiting treatment processes at the plant, making it difficult to accommodate this amount of additional loading.

Residuals passed on to secondary treatment would not, as inert material, be beneficial to the biological treatment operations. The additional material would also compromise the operations because secondary clarifiers would be overloaded by this degree of additional loading, effectively reducing the treatment capacity of the existing plant.

The digesters, which would ultimately process the residuals, are also a biological process that would not benefit from inert material. DC WASA does not have capacity in the digesters currently; new digesters will be online in 2008.

This alternative would have a significantly negative impact on the operations at Blue Plains. Because DC WASA does not have the capacity to accept all of the residuals as influent from

the Potomac Interceptor, this alternative fails to provide a reliable method that protects the ability of Washington Aqueduct to produce drinking water.

Economic Consideration. The economic impact of discharging Washington Aqueduct's water treatment residuals into the Potomac Interceptor was not calculated. However, the cost would likely be considerable. Additional flow into the Potomac Interceptor would exacerbate the existing DC WASA Combined Sewer Overflow (CSO) problem. Thus, during wet weather events the water treatment residuals, along with raw sanitary sewage, could overflow and be discharged to the Potomac River. The Combined Sewer System Long Term Control Plan has identified $250 million in improvements to solve the existing problems in Potomac River portion of the conveyance system. These proposed improvements include the rehabilitation of the Potomac Pumping Station, the consolidation of CSOs in the Georgetown waterfront area, and the construction of a 58-million-gallon Potomac Storage Tunnel. Although DC WASA is actively working on this program, the Long-Term Control Plan is so extensive that it has an implementation period of 15 to 40 years.

At the Blue Plains facility, impacts were identified for most of the major treatment processes:

- Primary clarification
- Biological treatment and secondary clarification
- Anaerobic digestion
- Dewatering

Because of the number of processes impacted, and the complexities of the programs that are currently underway to address treatment and capacity issues at the plant, a detailed cost estimate for the impact of the discharge of water treatment residuals to Blue Plains through the Potomac Interceptor was not developed for this evaluation. Using a conservative estimate of $5 to $10 to construct a gallon of treatment capacity (assuming that biological treatment can be excluded), and assuming that treatment capacity for at least an additional 4 mgd would be required (the approximate difference between Washington Aqueduct average and peak flows), then it could be assumed that an impact to the existing facilities of $20 million to $40 million could be established. This impact would not include the cost of residuals collection and thickening facilities at the Washington Aqueduct. In addition, Washington Aqueduct would need to provide extensive storage and flow equalization facilities to help minimize the impact of water treatment residual flows on the existing CSO situation and on treatment processes at Blue Plains. Since these costs are at least equal to the costs of providing processing facilities at the Washington Aqueduct, this option can be eliminated on the basis of economic considerations.

Zoning, Land Use, Institutional Constraints, and Federal and Local Regulations. The discharge of water treatment residuals to Blue Plains via sewer would have major impacts on the treatment processes at this facility. In many communities, the discharge of water treatment residuals to the sewer system is a common practice. However, the representative of DC WASA who was contacted for this evaluation indicated that operations staff already find it challenging to adjust the treatment processes to accommodate the current highly variable flow and load conditions. Therefore, discharge to the sewer system is not feasible in this case.

Previous work conducted by Whitman Requardt & Associates evaluated this option in detail. As part of the previous effort, the District of Columbia Department of Public Works (the entity that operated Blue Plains before the creation of DC WASA) stated that this alternative was not acceptable to their agency. In response to a more recent request by another jurisdiction for the discharge of biosolids into the Potomac Interceptor, DC WASA cited Section 4, Paragraph 3 of District of Columbia Order No 64-1680 (Regulations for use of the Potomac Interceptor), which prohibits "sludges or other materials from sewage or industrial waste treatment plants or from water treatment plants."

Therefore, Alternative 4 can be eliminated from further consideration due to institutional constraints, based on discussions with DC WASA and on past responses to requests of this nature.

Additional Consideration. Until the combined sewer problem is addressed for the DC WASA conveyance system, there is no way to guarantee that residuals discharged to the interceptor will not be discharged to the Potomac River as part of a CSO event. Management techniques (i.e., equalization storage, instrumentation and controls, etc.) required to completely control overflows would be cost prohibitive and operationally difficult. Since the elimination of discharges of water treatment residuals to the Potomac River is a fundamental goal of the purpose and need of this project, Alternative 4 is in violation of this requirement.

Alternative 6: Thicken Water Treatment Residuals at Dalecarlia WTP, Then Transport by Barge to Blue Plains. Process Forebay Residuals by Current Methods and Periodically Haul

This alternative attempts to eliminate local truck traffic associated with residuals by transporting all residuals via barge to the Blue Plains Wastewater Treatment Plant for further processing and disposal.

Reliability and Redundancy. Barge size must be limited because of water depths and bridge clearances along the route:

- Arlington Memorial Bridge: clear width of 80 ft with vertical clearance of 30 ft
- 14th St. Bridge Complex: clear width of 104 ft with vertical clearance of 18 ft above mean high water (MHW), resulting in maximum air draft of 14 to 16 ft for barge/pushboat operation
- Obstructions (old stone bridge piers) at 10 ft below mean low water (MLW) just north of Key Bridge
- Minimum water depth of 10 ft below MLW resulting in maximum water draft of 7 ft for barge/pushboat operation

Thus as many as six barges per day (each way) must be used. These barges must negotiate difficult navigational conditions, including limited water depths, horizontal and vertical bridge clearances, and bottom conditions along the route. Figure 2-1 illustrates the route along the Potomac River. With six barges per day in each direction negotiating these conditions, the risk of accidents would be unacceptably high. An accident would halt residuals processing and could jeopardize the water treatment process. In addition, the channel freezes and at times navigation is curtailed for security reasons. Thus the

combinations of potential accidents and non-navigational periods put the production of potable water significantly at risk and the alternative does not meet the criterion.

Zoning, Land Use, Institutional Constraints, and Local and Federal Regulations. The industrial-scale barging operation would not be compatible with current land uses or the purpose and objectives of the Chesapeake & Ohio (C&O) National Historic Park, which is zoned for "parks, recreation, and open space." If the route of the barging operation were to extend beyond the Key Bridge, the barging operation (including potential dredging to widen the channel) would have major impacts on the park and its operation.

Proven Methods. There is no existing barging operation in the Georgetown Channel or in Washington Harbor. To initiate such an operation would involve a major commitment of planning, permitting, engineering, and financial resources. In addition, the risks associated with the reliability and redundancy of such an operation are clear, making the whole concept "unproven."

Alternative 7: Thicken Water Treatment Residuals at Dalecarlia WTP, Then Pump via Pipeline to Neighboring Water Utility. Process Forebay Residuals by Current Methods and Periodically Haul

This alternative eliminates local truck traffic associated with residuals by transporting all residuals by pipeline to either the Washington Suburban Sanitary Commission's (WSSC's) Potomac Water Treatment Plant or the Fairfax County Water Authority's (FCWA's) Corbalis Water Treatment Plant for further processing and disposal.

Economic Considerations. Preliminary cost estimates indicate that the FCWA alternative, which requires a new pipeline approximately 18 miles in length, would exceed the cost criterion.

Zoning, Land Use, Institutional Constraints, and Local and Federal Regulations. The Washington Aqueduct does not have any existing formalized relationship with WSSC or FCWA. Each of these entities serve different jurisdictions and customer bases, and they have had no previous need to enter into cooperative agreements with Washington Aqueduct. Upon discussions with both WSSC and FCWA, neither entity indicated interest in serving as a regional residuals processing operation. In addition, because there exist alternatives that work within present institutional frameworks and better meet the mission of the stakeholders, this alternative is eliminated from consideration.

Alternative 8: Thicken Water Treatment Residuals at Dalecarlia WTP and Pump via Pipeline to a New Dewatering Location. Process Forebay Residuals by Current Methods and Periodically Haul

This alternative attempts to eliminate local truck traffic associated with residuals by transporting all residuals by pipeline to a new dewatering facility for further processing and disposal.

FFCA. This alternative would require additional time to identify, evaluate, and obtain a parcel of land suitable for a new dewatering facility. This effort would also require time to obtain easements for a new pipeline route. The Engineering Feasibility Study includes the development of a time line (Figure 2-2) to incorporate these siting and routing evaluations,

which must be completed before the comparison of alternatives can be conducted as part of the DEIS. The additional effort would prevent Washington Aqueduct from meeting the FFCA schedule, which requires the completion of the DEIS by December 20, 2004.

Economic Considerations. Preliminary cost estimates indicate that this alternative, which requires acquisition of approximately 10 acres of suitable industrial or commercial land and a new pipeline, would exceed the cost criterion.

Alternatives 9–11: Alternatives with a Discharge to the Potomac River

These alternatives incorporate a discharge of the residuals or the liquid waste stream from the dewatering process to the Potomac River. Alternative 10 calls for a renegotiation of the permit, whereas Alternatives 9 and 11 attempt to meet the current permit by diluting the waste stream to meet the allowable total suspended solids (TSS) concentration. Because the river water is too high in TSS concentration to serve as dilution water, Dalecarlia Reservoir water must be used. Preliminary calculations indicate that at least 17 percent of the Dalecarlia WTP production capacity would be needed for this dilution. Following wet weather events, the Dalecarlia Reservoir water is also too high in TSS to serve as dilution water, and therefore additional storage of low-turbidity water would have be provided for the waste stream.

Reliability and Redundancy. Alternatives 9 and 11 fail to provide a reliable and redundant system for handling the residuals and would significantly reduce the reliability and redundancy of the Dalecarlia WTP production process by diverting production capacity to dilution of the waste stream.

NPDES. Alternative 10 fails to meet the current NPDES permit, which has been finalized after several years of negotiation.

Additional Considerations. Alternatives 9 through 11 fail to meet the purpose and need of the project because they do not minimize or eliminate the residuals discharge to the Potomac River. Alternatives 9 and 11 additionally fail to meet the purpose and need due to the significant interference with process operations associated with diverting reservoir water to the waste stream.

Alternatives 12–15: Alternatives Involving the Dalecarlia Reservoir

These alternatives relied on storage of residuals with periodic dredging in various combinations of reservoirs and new sedimentation basins.

Reliability and Redundancy. These alternatives fail to meet the reliability and redundancy criterion due to the reduction or elimination of the Dalecarlia Reservoir's storage capacity.

In addition, the Dalecarlia Reservoir acts as a sedimentation basin and dampens the large swings in turbidity that occur in the Potomac River, stabilizing the amount of treatment that is required in the downstream plant. Without the reservoir serving that purpose, there would be an impact to plant operations. Additional dredging would also degrade water quality in the reservoir with similar impact on plant operations.

Alternatives 16–23: Alternatives with Facilities at the McMillan WTP

Eight alternatives were identified with residuals processing at the McMillan WTP. The specifics of each alternative differ, but each attempts to eliminate local (Dalecarlia) truck traffic associated with residuals by constructing conveyance pipelines, including one or more within the City Tunnel to the McMillan WTP. Since the residuals pipeline in the City Tunnel is the most critical element in of these alternatives, the feasibility evaluation was based primarily on the feasibility of this pipeline.

FFCA. Construction in the City Tunnel adds complexity and interdependency to the residuals construction project. It would require that the Georgetown Reservoir and the McMillan WTP be out of service for the duration of construction in the tunnel. During this time, all production would need to occur at the Dalecarlia WTP, and therefore work on the sedimentation basins could not occur concurrently with the tunnel work. The FFCA schedule allows approximately 1.5 years of construction time for compliance in at least one sedimentation basin, and 3 years for full compliance. With an estimated duration of 12 to 24 months dedicated to the construction of the pipeline in the City Tunnel, there would not be adequate time for design, permitting approvals, and construction of the other elements of the alternative to meet the FFCA deadlines.

Reliability and Redundancy. These alternatives would have both short-term and long-term impacts on reliability and redundancy. Short-term impacts will occur during construction of the pipeline in the City Tunnel. As discussed above, the Dalecarlia WTP would need to meet the demand for 12 to 24 months during this construction. The Dalecarlia WTP has a maximum finished water capacity of 220 mgd and the peak historical demand during summer months is 260 mgd. Thus, Washington Aqueduct will be unable to meet the demand and provide a reliable supply of water during the peak demand periods if construction in the City Tunnel is allowed to occur 12 months per year. Discontinuing construction in the City Tunnel during the high demand periods of the year, to allow the McMillan WTP to be placed back into service, could allow the Washington Aqueduct to meet peak demands, but it would likely lengthen the timeframe required to complete the City Tunnel piping work. This could further restrict the amount of time available to construct the continuous residuals removal facilities at each of the existing Dalecarlia sedimentation basins and reduce the overall reliability and redundancy of the treatment process during the construction period.

Long-term impacts include maintenance and repair of the pipeline in the City Tunnel. The tunnel is the only means of providing the McMillan WTP with coagulated water. A failure of the residuals pipeline could result in contamination of a major portion of the water supply and possibly an inability to process residuals. Since the tunnel is rarely taken out of service, maintenance of the pipeline to prevent failures, and repair if a failure were to occur, will be extremely difficult. Even redundant and double-walled installation of the pipeline would not eliminate this risk.

Economic Considerations. Preliminary cost estimates indicate that all of the McMillan alternatives would fail to meet the cost criterion due to the construction of the pipeline in the City Tunnel.

Proven Methods. Although the construction of the residuals pipeline within the tunnel is feasible in concept, the tunnel has not been dewatered for inspection in many years. Therefore, the current condition of the tunnel is unknown. The risks associated with undertaking such an operation without a thorough evaluation of the tunnel's condition are clear, making the whole concept "unproven."

Alternative 24: Coprocess Forebay and Water Treatment Residuals at Dalecarlia WTP. Dispose of Residuals via Contract Hauling from the Dalecarlia WTP

This alternative is the same as Alternative 25 except that it provides for coprocessing of Forebay and water treatment residuals rather than the processing of Forebay residuals separately, as is currently practiced. Alternative 25 was selected as a feasible alternative, and is therefore described further in Section 2.7.

Reliability and Redundancy. Coprocessing would create a much larger quantity and volume of residuals, which would both increase the operations and maintenance requirements for thickening and dewatering and require additional trucks to haul the residuals to the offsite disposal location. Thus, no advantages were identified for coprocessing, and Alternative 25 was selected as the feasible alternative.

Alternative 26: Use Plasma Oven Technology to Process Forebay and Water Treatment Residuals at Dalecarlia WTP. Dispose of Residuals via Contract Hauling from the Dalecarlia WTP

This alternative involves the utilization of plasma oven technology for the processing of both Forebay and water treatment residuals. The process would convert the residuals to an inorganic slag material and a combustible gas. The technology could be used for either water treatment residuals alone, or for coprocessed water treatment and Forebay residuals. Coprocessing of Forebay and water treatment residuals, while not recommended due to reliability and redundancy considerations, was included in this alternative because, unlike the other coprocessing alternatives, there is no disadvantage in terms of volume reduction resulting from the plasma treatment of the residuals.

Reliability and Redundancy. This technology has been typically used in the treatment of hazardous waste and contaminated materials, such as soil. To our knowledge, this technology has not been applied to the processing of water treatment residuals. The degree of residual volume reduction and gas generation is anticipated to be lower than what is found in typical applications due to the lower levels of organic constituents in the Forebay and water treatment residuals. The uncertainty with the operation and effectiveness of a plasma oven system and uncertainty in terms of the options for disposal or use of the final product creates concern over the continual management of residuals with such a system, proving that this alternative fails the reliability and redundancy criterion.

Economic Considerations. This technology requires a significant capital investment and has presumably high long-term maintenance and operating costs, primarily due to the large amounts of heat required to maintain the process. According to plasma oven technology system vendors, a 20 percent to 30 percent solid cake material is preferred for inputting into the system, which means that equipment is required for both thickening and dewatering in addition to the plasma oven equipment. The savings that this technology may provide in terms of reduced residual handling and disposal costs is not expected to offset the expected

high capital, operations and maintenance costs. The additional electricity requirement for this technology alone is expected to be on the order of 10 percent of the current annual Washington Aqueduct operating budget.

It is estimated that it would cost a minimum of $20 million to install a plasma system at the Washington Aqueduct (in addition to all other costs associated with residuals, collection, conveyance, and processing). Therefore, this alternative can be eliminated as inconsistent with the screening criterion for economic considerations because these additional costs are greater than 30 percent of the $50 million baseline budget for the project.

Proven Methods. To our knowledge, this technology has not been applied to the processing of water treatment residuals. Therefore, it is unproven and inconsistent with the screening criterion.

2.7 Alternatives for Detailed Evaluation

This section includes a short description of the alternatives that will be evaluated in more detail during the Engineering Feasibility Study. Additional details of these alternatives will be available in the draft EIS.

Alternative 1: No Action Alternative

This alternative is retained as a NEPA requirement.

Alternative 2: Process Water Treatment Residuals at Dalecarlia WTP and Dispose in Dalecarlia Monofill. Process Forebay Residuals by Current Methods and Periodically Haul

Residuals from the Dalecarlia Sedimentation Basins and the Georgetown Reservoir would be collected and thickened/dewatered at the Dalecarlia WTP before being disposed of in the Dalecarlia monofill. Residuals from the Forebay would be processed separately as is currently practiced and periodically hauled offsite.

Facilities. Figure 2-3 shows a graphic description of facilities for this alternative. The figure indicates the sedimentation basins to be upgraded, the preliminary location of thickening and dewatering facilities, and the approximate footprint of the monofill. As currently conceived, the monofill would be approximately 50 ft tall on the Dalecarlia Parkway side and 80 ft tall on the Dalecarlia Reservoir side. The footprint of the monofill is anticipated to occupy approximately 30 acres.

Conveyance and Transport. Pipelines would convey coagulated residuals from both the Dalecarlia sedimentation basins and the Georgetown Reservoir to the Dalecarlia thickening facility. After thickening and dewatering, onsite trucks would be used to haul the residuals to the monofill. On average, six onsite truck trips per day (6 days per week) would be required.

Alternative 5: Thicken Water Treatment Residuals at Dalecarlia WTP, Then Pump via a New Pipeline to Blue Plains. Process Forebay Residuals by Current Methods and Periodically Haul

This alternative would eliminate truck traffic associated with residuals on the roads surrounding the Washington Aqueduct Reservation by conveying coagulated residuals to the Blue Plains Wastewater Treatment Plant for further processing and disposal. Residuals

from the Forebay would be processed separately for onsite disposal as is currently practiced. Figure 2-4 illustrates an overview of this alternative.

Facilities. This alternative would involve similar sedimentation basin modifications and new thickening facilities as shown in Figures 2-5 and 2-6. Dewatering facilities would be located at Blue Plains.

Conveyance and Transport. Pipelines would convey coagulated residuals from both the onsite sedimentation basins and the Georgetown Reservoir to the Dalecarlia thickening facility. Another dedicated pipeline within the right-of-way of the Potomac Interceptor would convey the thickened residuals to Blue Plains for final processing. This pipe would be approximately 10 miles in length and 12 inches in diameter.

Alternative 25: Process Water Treatment Residuals at the Dalecarlia WTP and Dispose via Contract Hauling. Process Forebay Residuals by Current Methods and Periodically Haul

This alternative consists of thickening and dewatering water treatment residuals at the Dalecarlia WTP. Residuals from the Dalecarlia sedimentation basins and the Georgetown Reservoir would be collected and thickened/dewatered at the Dalecarlia WTP. The disposal method would be contract hauling from Dalecarlia WTP to a permitted disposal facility.

Facilities. Figures 2-5 and 2-7 show a graphic description of facilities for this alternative. The figures indicate the sedimentation basins to be upgraded and the preliminary location of thickening and dewatering facilities.

Conveyance and Transport. Pipelines would convey water treatment residuals from both the onsite sedimentation basins and the Georgetown Reservoir to the Dalecarlia thickening facility. After thickening and dewatering, the residuals would be hauled by truck to a permitted offsite disposal facility. The estimated number of trucks is approximately eight per day (5 days per week) on average with a peak number of approximately 33 trucks per day (6 days per week) under maximum loading conditions.

2.8 Treatment Options to be Explored During the Detailed Alternatives Evaluation Phase

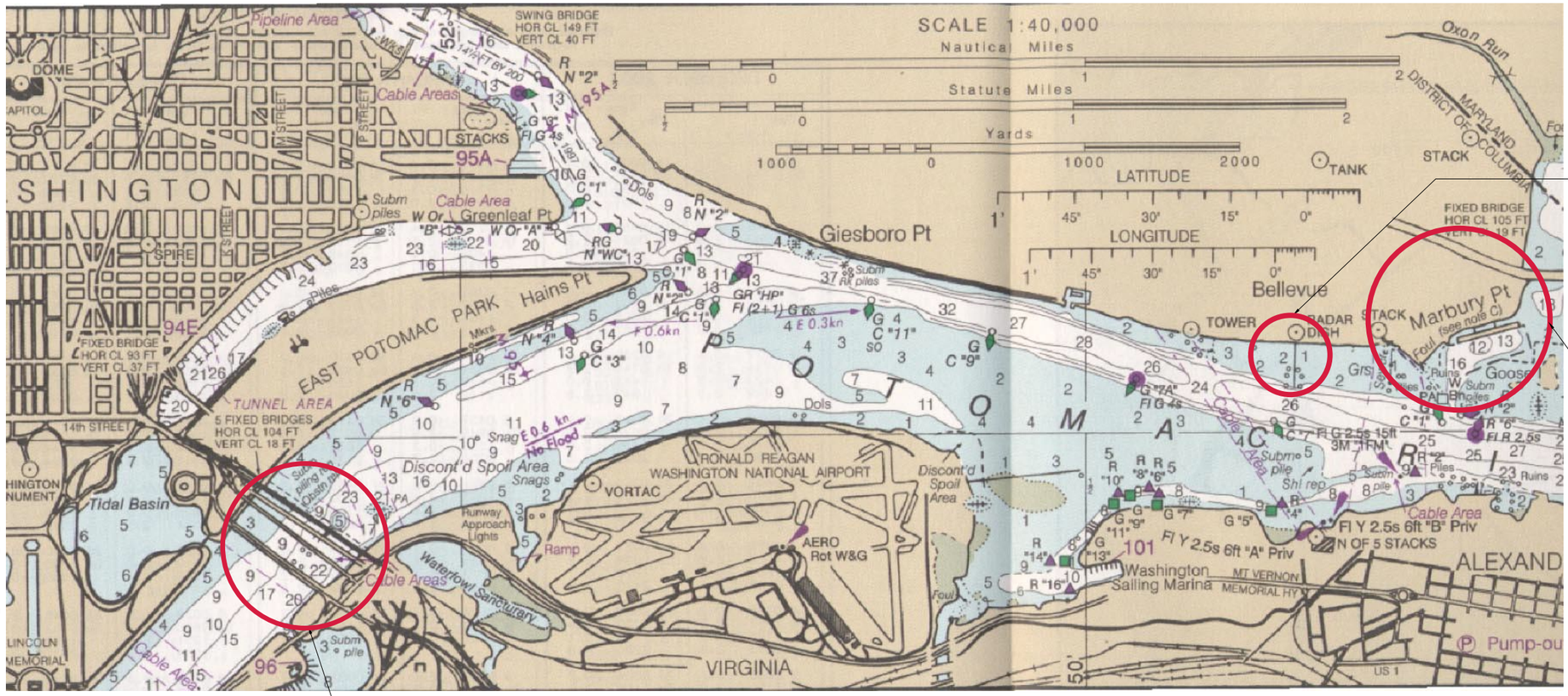
In order to enhance performance, reduce cost, and mitigate environmental impacts, options to selected components described above will be explored for Alternatives 2, 5, and 25. Options under consideration include the following:

- Forebay residuals removal and treatment technologies, including the installation of a new mechanical silt removal system in the Forebay and the addition of Forebay residuals treatment equipment in the residuals dewatering building, planned for construction on the Dalecarlia WTP site. In addition, Forebay residuals may be integrated into the monofill instead of disposed of through offsite trucking
- Sedimentation and residuals collection technologies for the Georgetown Reservoir site, including installing dredges in the existing the first two cells of the reservoir and construction of a new plate settler-type sedimentation basin in a portion of the

Georgetown Reservoir to serve the same sedimentation basin function as the existing reservoir. The new sedimentation basin would be equipped with continuous residuals removal equipment, similar to that planned for the Dalecarlia sedimentation basins. Dredging of the remainder of the Georgetown Reservoir would not be required if a new sedimentation basin were installed in the reservoir

- Dalecarlia sedimentation basin configurations, including installation of continuous residuals removal equipment in all four existing basins, installation of plate settlers and chain and flight residuals removal equipment in Basin 1 and conversion of existing sedimentation Basin 2 to a flocculation basin to allow the entire design plant flow to be treated through Basins 1 and 2, and construction of a new sedimentation basin on the Dalecarlia plant site sized to replace the sedimentation basin function currently being performed by the Georgetown Reservoir
- Alternate residuals dewatering technologies such as centrifuges and belt filter presses

These options will be explored in more detail in the Engineering Feasibility Study. The potential environmental impacts associated with these options will also be investigated as part of the detailed EIS.



NRL PIER (GOVERNMENT USE)

BLUE PLAINS PLANT
AND PRIVATE PIER
WITH ACCESS CHANNEL

14TH ST. BRIDGE COMPLEX

PLAN: MARBURY PT. TO HAINS PT.

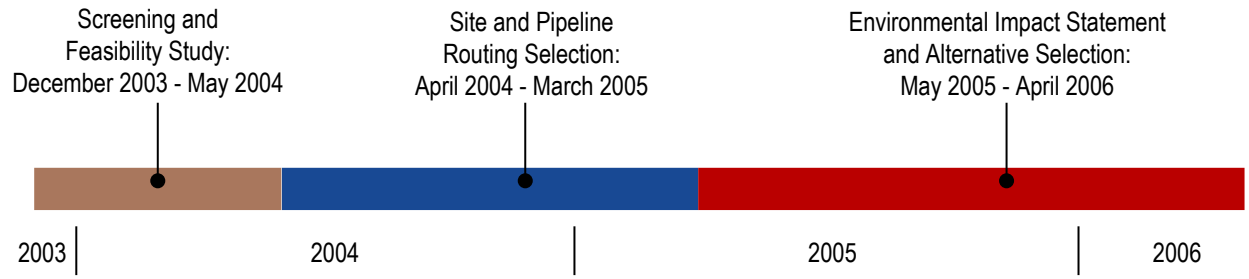
1250' 0 1250' 2500' 3750'
1" = 1250'-0"

NOTES:
1. SEE SHEET 1 FOR NOTES APPLICABLE TO THE PORTION OF THE POTOMAC RIVER FROM MARBURY PT. TO HAINS PT.

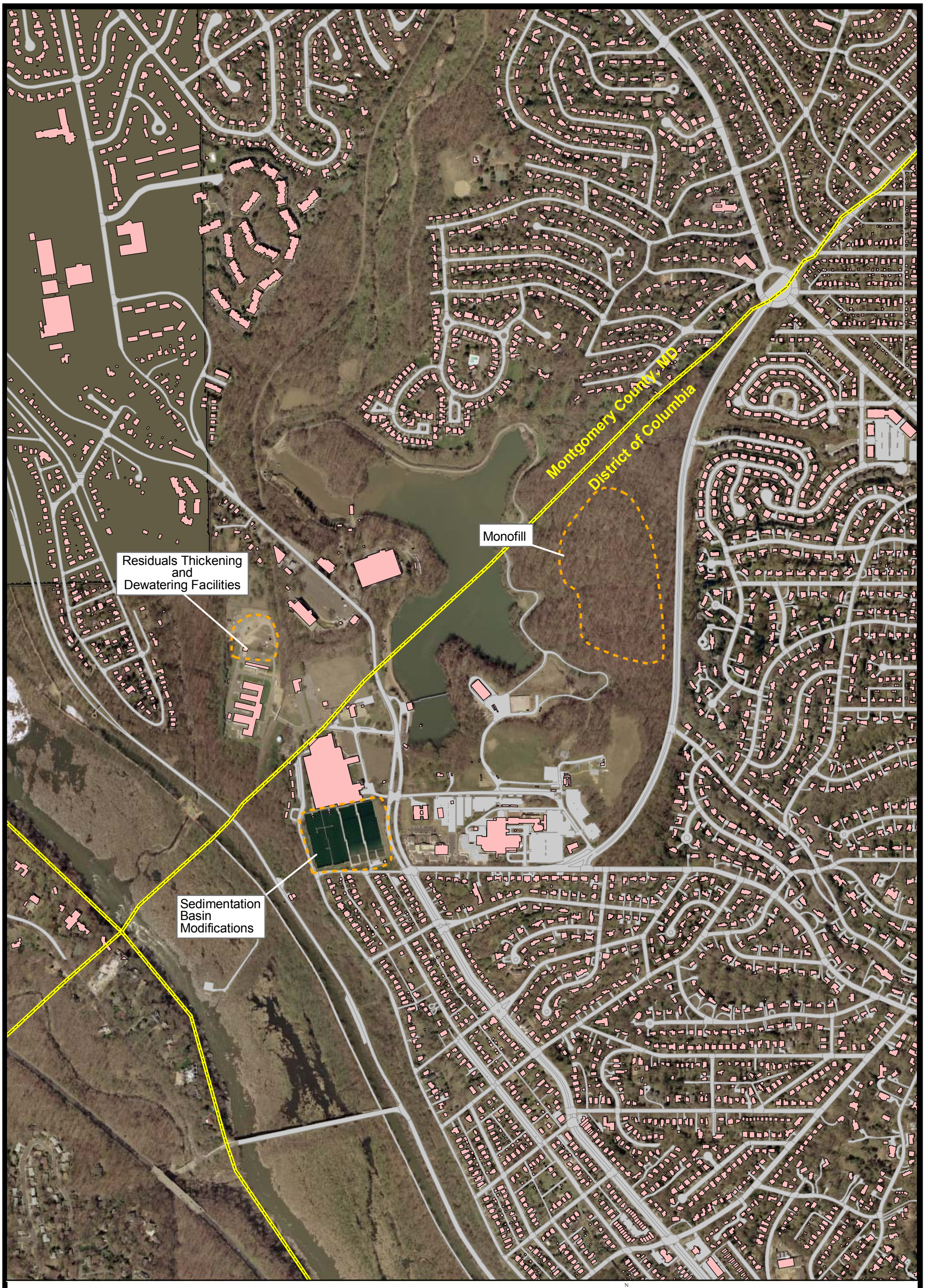
FIGURE 2-1
Navigational Constraints for Alternative 6

W042004001WDC_WAResiduals_Alt6_v5

FIGURE 2-2
Alternative 8 Time Line



W042004001WDC_WAResiduals_Timeline_v1



Legend

- Approximate Location of New/Modified Facilities
- County Boundary
- Existing Buildings
- Roads

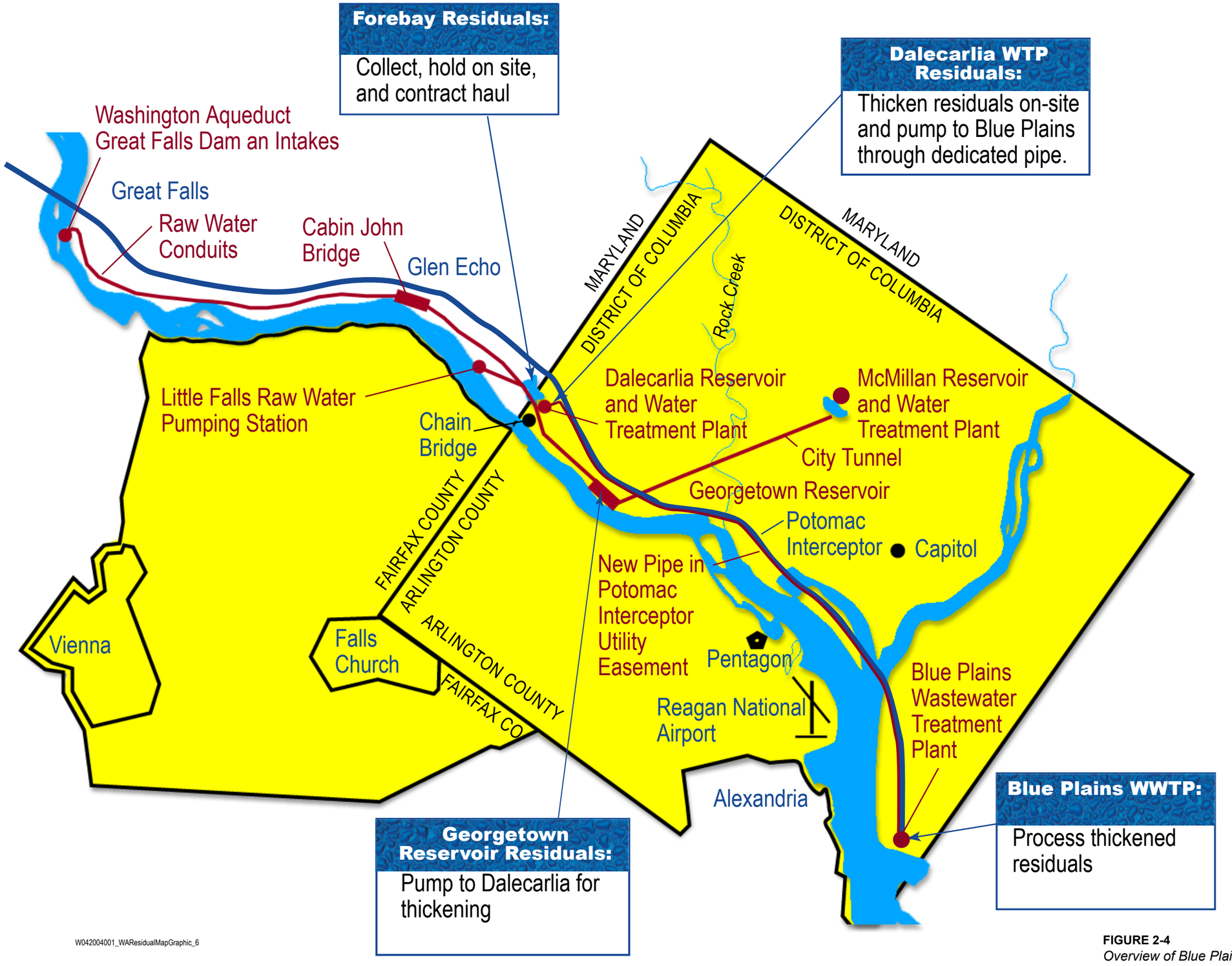
The geographic information shown on this map is based on data from the District of Columbia Geographic Information System (DC GIS). The District Government makes no warranty, express or implied, and disclaims all implied warranties of suitability of the DC GIS product for a particular purpose.

N W E S

0 375 750 1,500 Feet

Figure 2-3
Monofill at Reservoir

CH2MHILL



W042004001_WAResidualMapGraphic_6

FIGURE 2-4
Overview of Blue Plains Alternatives

Legend

- Area of Potential Modifications
- County Boundary
- Existing Buildings
- Roads

The geographic information shown on this map is based on data from the District of Columbia Geographic Information System (DC GIS). The District Government makes no warranty, express or implied, and disclaims all implied warranties of suitability of the DC GIS product for a particular purpose.

N
W E
S

0 375 750 1,500
Feet

Figure 2-5
Georgetown Reservoir

CH2MHILL

Legend

- Approximate Location of New/Modified Facilities
- County Boundary
- Existing Buildings
- Roads

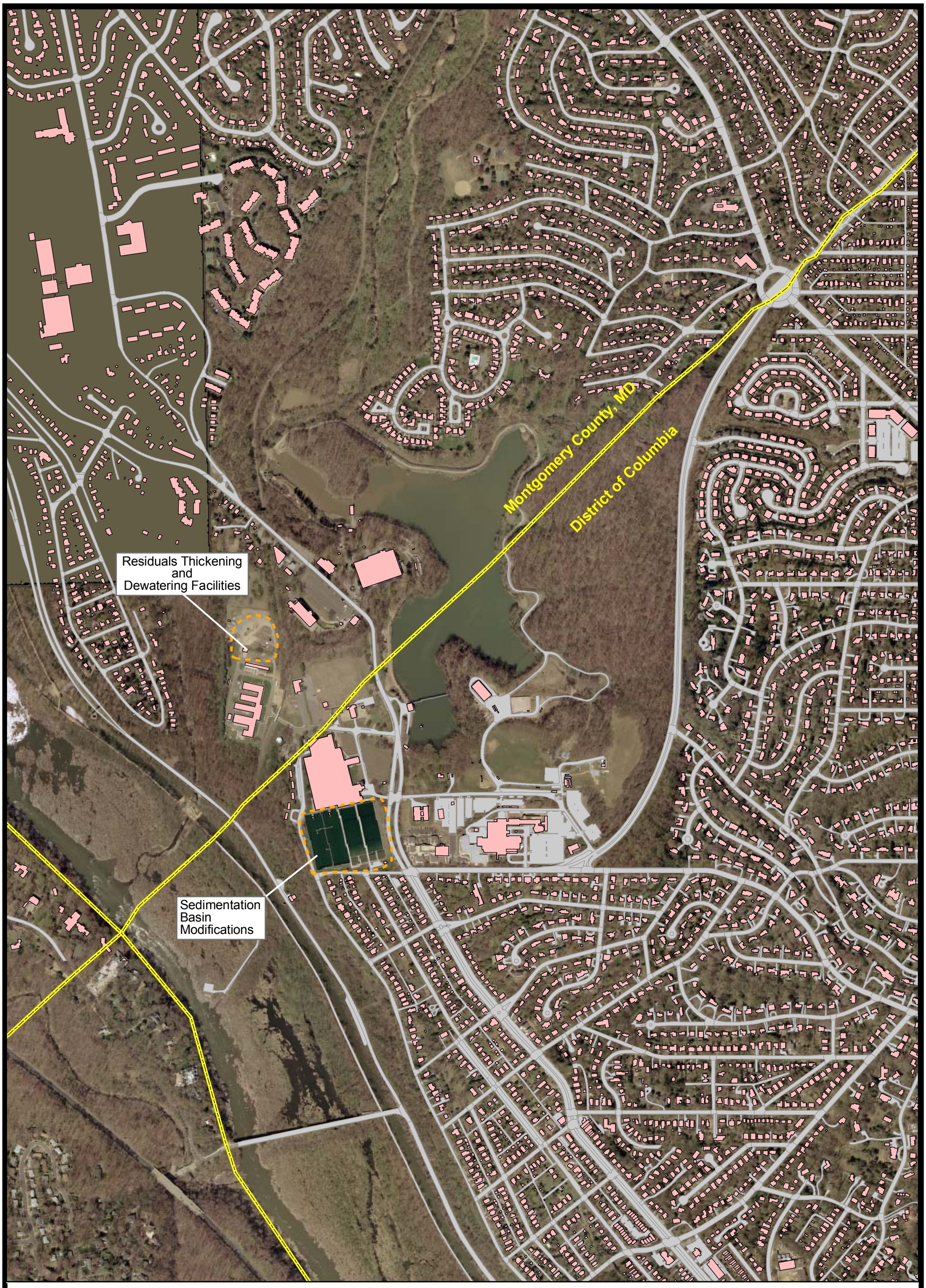
The geographic information shown on this map is based on data from the District of Columbia Geographic Information System (DC GIS). The District Government makes no warranty, express or implied, and disclaims all implied warranties of suitability of the DC GIS product for a particular purpose.

N W E S

0 375 750 1,500 Feet

Figure 2-6
Residuals Management at Dalecarlia for the Blue Plains Alternative

CH2MHILL



Legend

- Approximate Location of New/Modified Facilities
- County Boundary
- Existing Buildings
- Roads

The geographic information shown on this map is based on data from the District of Columbia Geographic Information System (DC GIS). The District Government makes no warranty, express or implied, and disclaims all implied warranties of suitability of the DC GIS product for a particular purpose.

N W E S

0 375 750 1,500 Feet

Figure 2-7
Residuals Management at Dalecarlia

CH2MHILL

SECTION 3

Conclusion

Based on the alternatives screening process described in this document, alternatives 1, 2, 5, and 25 will be carried forward and investigated in more detail in the DEIS. These alternatives will also be the subject of upcoming workshops and public meetings.

It is currently anticipated that the draft EIS will be made available for public review in November 2004.

Appendix A

Tables A-1 through A-5 identify each of the residuals-handling steps (i.e., collection, conveyance, processing, and disposal) required for each alternative, list collection and treatment locations, and describe the anticipated residuals disposal location for each alternative.

TABLE A-1
Description of Alternatives that Do Not Require Continuous Offsite Trucking from the Dalecarlia Water Treatment Plant

Location	Collection	Conveyance	Processing	Disposal
Alternative 2: Process water treatment residuals at Dalecarlia WTP and dispose in Dalecarlia monofill. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to Dalecarlia monofill
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to Dalecarlia monofill
Forebay	Collect Forebay residuals using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years
Alternative 3: Coprocess water treatment and Forebay residuals at Dalecarlia WTP and codispose in Dalecarlia monofill				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to Dalecarlia monofill
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals Dalecarlia monofill
Forebay	Collect Forebay residuals using current methods	Pump residuals to Dalecarlia thickening facility along with water treatment residuals	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to Dalecarlia monofill

TABLE A-1
Description of Alternatives that Do Not Require Continuous Offsite Trucking from the Dalecarlia Water Treatment Plant

Location	Collection	Conveyance	Processing	Disposal
Alternative 4: Pump unthickened water treatment residuals via Potomac Interceptor to the District of Columbia Water and Sewer Authority (DC WASA) Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals into the Potomac Interceptor	Process residuals at Blue Plains with raw sewage	Transport dewatered residuals for disposal per current Blue Plains methods
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals from Dalecarlia to Potomac Interceptor	Process residuals at Blue Plains with raw sewage	Transport dewatered residuals for disposal per current Blue Plains methods
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years
Alternative 5: Thicken water treatment residuals at Dalecarlia WTP, then pump via a new pipeline to DC WASA Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility Pump thickened residuals to Blue Plains via a new dual pipeline	Thicken collected residuals at Dalecarlia Process thickened residuals at Blue Plains	Transport dewatered residuals for disposal per current Blue Plains methods
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility Pump thickened residuals to Blue Plains via a new dual pipeline	Thicken collected residuals at Dalecarlia Process thickened residuals at Blue Plains	Transport dewatered residuals for disposal per current Blue Plains methods
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-1
Description of Alternatives that Do Not Require Continuous Offsite Trucking from the Dalecarlia Water Treatment Plant

Location	Collection	Conveyance	Processing	Disposal
Alternative 6: Thicken water treatment residuals at Dalecarlia WTP, then transport by barge to DC WASA Blue Plains Wastewater Treatment Plant. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility Transport thickened residuals to Blue Plains by barge	Thicken collected residuals at Dalecarlia Process thickened residuals at Blue Plains	Transport dewatered residuals for disposal per current Blue Plains methods
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility Transport thickened residuals from Dalecarlia to Blue Plains by barge	Thicken collected residuals at the Dalecarlia Process thickened residuals at Blue Plains	Transport dewatered residuals for disposal per current Blue Plains methods
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years
Alternative 7: Thicken water treatment residuals at Dalecarlia WTP, then pump via pipeline to neighboring water utility. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility Pump thickened residuals to WSSC or FCWA facility	Thicken collected residuals at Dalecarlia Dewater thickened residuals at WSSC or FCWA	Dispose of dewatered residuals with residuals from host facility
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility Pump thickened residuals from Dalecarlia to WSSC or FCWA facility	Thicken collected residuals at Dalecarlia Dewater thickened residuals at WSSC or FCWA	Dispose of dewatered residuals with residuals from host facility
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-1
Description of Alternatives that Do Not Require Continuous Offsite Trucking from the Dalecarlia Water Treatment Plant

Location	Collection	Conveyance	Processing	Disposal
Alternative 8: Thicken water treatment residuals at Dalecarlia WTP and pump via pipeline to new dewatering location. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from the existing sedimentation basins	Pump residuals to Dalecarlia thickening facility Pump thickened residuals to new offsite dewatering facility	Thicken the collected residuals at Dalecarlia Dewater the thickened residuals at offsite facility	Contract haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility Pump thickened residuals from Dalecarlia to a new dewatering facility	Thicken collected residuals at Dalecarlia facility Dewater the thickened residuals at offsite facility	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-2
Description of Alternatives With Discharge to the Potomac River

Location	Collection	Conveyance	Processing	Transport
Alternative 9: Process most WTP residuals at Dalecarlia WTP and haul offsite, but dilute some residuals for discharge back to Potomac River. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump portion of residuals to Dalecarlia thickening facility Pump portion of residuals to Dalecarlia storage and dilution facility (10% assumed)	Thicken and dewater portion of collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location Discharge diluted residuals to Potomac River
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals from Dalecarlia to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir	Pump residuals to Dalecarlia WTP thickening facility	Thicken and dewater collected residuals at Dalecarlia thickening facility	Haul dewatered residuals to offsite disposal facility every 7 years
Alternative 10: Renegotiate NPDES Permit to allow discharge of all residuals to Potomac River				
Dalecarlia WTP	Renegotiate NPDES Permit to discharge all water treatment residuals to the Potomac River			
Georgetown Reservoir	Renegotiate NPDES Permit to discharge all water treatment residuals to the Potomac River			
Forebay	Collect Forebay residuals from reservoir	Pump residuals to Dalecarlia WTP thickening facility	Thicken and dewater collected residuals at Dalecarlia thickening facility	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-2
Description of Alternatives With Discharge to the Potomac River

Location	Collection	Conveyance	Processing	Transport
Alternative 11: Process water treatment residuals at Dalecarlia WTP and haul offsite. Process Forebay residuals by current methods and periodically haul. Dilute treatment side streams and discharge to the Potomac River				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump portion of residuals to Dalecarlia thickening facility Pump thickener overflow and centrate to onsite storage and dilution facility	Thicken and dewater portion of collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location Discharge diluted thickener overflow and centrate to Potomac River
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals from Dalecarlia to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-3
Description of Alternatives Involving the Dalecarlia Reservoir

Location	Collection	Conveyance	Processing	Transport
Alternative 12: Store all residuals in the Dalecarlia Reservoir prior to processing at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals. Dispose in Dalecarlia and McMillan monofills				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia Reservoir	Thicken and dewater collected residuals at Dalecarlia facility	Haul dewatered residuals to monofills on Dalecarlia and McMillan sites
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia Reservoir	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to monofills on Dalecarlia and McMillan sites
McMillan WTP Facilities				Haul dewatered residuals to monofill on the McMillan site
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia facility	Haul dewatered residuals to Dalecarlia and McMillan monofills
Alternative 13: Store all residuals in the Dalecarlia Reservoir prior to processing at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia Reservoir	Thicken and dewater collected residuals at Dalecarlia facility	Haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia Reservoir	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to a permitted offsite location

TABLE A-3
Description of Alternatives Involving the Dalecarlia Reservoir

Location	Collection	Conveyance	Processing	Transport
Alternative 14: Construct new sedimentation basins at the Dalecarlia Reservoir and process all residuals at Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal				
Dalecarlia WTP	Collect water treatment residuals from new sedimentation basins	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Abandon Georgetown Reservoir; all coagulation to occur at Dalecarlia			
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Haul dewatered residuals to a permitted offsite location
Alternative 15: Coagulate all flow in the Dalecarlia Reservoir and process all residuals at the Dalecarlia WTP. Coprocess Forebay and water treatment residuals and haul to offsite disposal				
Dalecarlia WTP	Add Coagulant at Dalecarlia Lift Station; Coagulate in the Dalecarlia Reservoir Dredge the Dalecarlia Reservoir	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Abandon Georgetown Reservoir; all coagulation to occur at Dalecarlia			
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to permitted offsite location

TABLE A-4
Description of Alternatives with Facilities at the McMillan Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 16: Thicken water treatment residuals at the McMillan WTP and dewater at an existing wholesale customer's treatment facility. Contract haul dewatered residuals. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to McMillan thickening facility Pump thickened residuals to Blue Plains, Arlington, or Falls Church dewatering facility	Thicken collected residuals at McMillan facility Dewater thickened residuals at Blue Plains, Arlington, or Falls Church facility	Contract haul dewatered residuals from host facility to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to McMillan thickening facility Pump thickened residuals to Blue Plains, Arlington, or Falls Church dewatering facility	Thicken collected residuals at McMillan facility Dewater thickened residuals at Blue Plains, Arlington, or Falls Church facility	Contract haul dewatered residuals from host facility to a permitted offsite location
McMillan WTP	Collect combined Dalecarlia and Georgetown Reservoir water treatment residuals	Pump residuals to McMillan thickening facility Pump thickened residuals to Blue Plains, Arlington, or Falls Church dewatering facility	Thicken collected residuals at McMillan Dewater thickened residuals at Blue Plains, Arlington, or Falls Church facility	Contract haul the dewatered residuals from host facility to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-4
Description of Alternatives with Facilities at the McMillan Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 17: Coprocess Forebay and water treatment residuals at the McMillan WTP. Dispose of residuals via contract hauling from McMillan WTP				
(Same as Alternative 18 w/ coprocessing)				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to McMillan thickening facility	Thicken and dewater collected residuals at McMillan	Contract haul dewatered residuals from McMillan to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to McMillan	Thicken and dewater collected residuals at McMillan	Contract haul dewatered residuals from McMillan to a permitted offsite location
McMillan WTP Facilities	N/A	Pump water treatment residuals from Dalecarlia WTP and Georgetown Reservoir to McMillan thickening facility	Thicken and dewater collected residuals at McMillan	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect water treatment residuals from reservoir using current methods	Pump Forebay residuals to McMillan thickening facility	Thicken and dewater collected residuals at McMillan	Contract haul dewatered residuals to a permitted offsite location
Alternative 18: Process water treatment residuals at the McMillan WTP and haul offsite. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to McMillan thickening facility	Thicken and dewater collected residuals at McMillan	Contract haul dewatered residuals from McMillan to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to McMillan	Thicken and dewater collected residuals at McMillan	Contract haul dewatered residuals from McMillan to a permitted offsite location
McMillan WTP Facilities	Collect Dalecarlia and Georgetown Reservoir water treatment residuals	Pump residuals to McMillan	Thicken and dewater collected residuals at McMillan	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-4
Description of Alternatives with Facilities at the McMillan Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 19: Thicken water treatment residuals at the McMillan WTP and dewater at an existing wholesale customer's treatment facility. Dispose of residuals via contract hauling from the existing facility. Discharge Forebay residuals to the Potomac River				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to McMillan Pump thickened residuals to Blue Plains, Arlington, or Falls Church dewatering facility	Thicken collected residuals at McMillan Dewater thickened residuals at Blue Plains, Arlington, or Falls Church facility	Contract haul dewatered residuals from host facility to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to McMillan Pump thickened residuals to Blue Plains, Arlington, or Falls Church dewatering facility	Thicken collected residuals at McMillan Dewater thickened residuals at Blue Plains, Arlington, or Falls Church facility	Contract haul dewatered residuals from host facility to a permitted offsite location
McMillan WTP Facilities	Collect Dalecarlia and Georgetown Reservoir water treatment residuals	Pump residuals to McMillan Pump thickened residuals to Blue Plains, Arlington, or Falls Church dewatering facility	Thicken collected residuals at McMillan Dewater thickened residuals at Blue Plains, Arlington, or Falls Church facility	Contract haul dewatered residuals from host facility to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to Potomac River	None	None

TABLE A-4
Description of Alternatives with Facilities at the McMillan Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 20: Thicken water treatment residuals at the Dalecarlia WTP and the Georgetown Reservoir and dewater at the McMillan WTP. Dispose of water treatment residuals via contract hauling from McMillan WTP. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility Pump thickened residuals to McMillan dewatering facility	Thicken collected residuals at Dalecarlia facility Dewater thickened residuals at McMillan	Contract haul dewatered residuals from McMillan to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Georgetown thickening facility Pump thickened residuals to McMillan	Thicken collected residuals at Georgetown Dewater thickened residuals at McMillan	Contract haul dewatered residuals from McMillan to a permitted offsite location
McMillan WTP Facilities	Collect thickened Dalecarlia and Georgetown Reservoir water treatment residuals	Pump residuals to McMillan	Dewater residuals at McMillan	Contract haul dewatered residuals to offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years
Alternative 21: Store residuals in lagoons at Forebay, Dalecarlia WTP, and McMillan WTP. Thicken and dewater residuals with portable equipment and dispose via contract hauling from all locations				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia storage lagoon	Thicken and dewater collected residuals at Dalecarlia with portable equipment	Contract haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to McMillan storage lagoon	Thicken and dewater collected residuals at McMillan with portable equipment	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to Dalecarlia storage lagoon	Thicken and dewater collected residuals at Dalecarlia with portable equipment	Contract haul dewatered residuals to a permitted offsite location

TABLE A-4
Description of Alternatives with Facilities at the McMillan Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 22: Store water treatment residuals in Dalecarlia and Georgetown Reservoirs, prior to thickening and dewatering at the Dalecarlia and McMillan WTPs. Dispose of water treatment residuals via contract hauling from the Dalecarlia and McMillan WTPs. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Add coagulant at Dalecarlia Lift Station Collect water treatment residuals from existing sedimentation basins Dredge Dalecarlia Reservoir	Pump collected residuals to the Dalecarlia Reservoir Pump dredged residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to McMillan Reservoir	Thicken and dewater dredged residuals at McMillan facility	Contract haul dewatered residuals to a permitted offsite location
McMillan WTP Facilities	Dredge the McMillan Reservoir	Pump dredged residuals to the McMillan thickening facility	Thicken and dewater dredged residuals at McMillan	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-4
Description of Alternatives with Facilities at the McMillan Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 23: Store water treatment residuals in McMillan Reservoir prior to dewatering at the McMillan WTP. Dispose of water treatment residuals via contract hauling from the McMillan WTP. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to McMillan Reservoir	Thicken and dewater dredged residuals at McMillan facility	Contract haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to McMillan Reservoir	Thicken and dewater dredged residuals at McMillan	Contract haul dewatered residuals to a permitted offsite location
McMillan WTP Facilities	Dredge the McMillan Reservoir	Pump dredged residuals to the McMillan thickening facility	Thicken and dewater dredged residuals at McMillan	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-5
Description of Alternatives with Facilities at the Dalecarlia Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 24: Coprocess Forebay and water treatment residuals at Dalecarlia WTP. Dispose of residuals via contract hauling from the Dalecarlia WTP				
Same as Alternative 25 w/ coprocessing				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir	Pump residuals to Dalecarlia	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location
Alternative 25: Process water treatment residuals at the Dalecarlia WTP; and dispose via contract hauling. Process Forebay residuals by current methods and periodically haul				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening facility	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia	Thicken and dewater collected residuals at Dalecarlia	Contract haul dewatered residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir using current methods	Pump residuals to existing holding pond	Transfer residuals from holding pond to onsite drying bed	Haul dewatered residuals to offsite disposal facility every 7 years

TABLE A-5
Description of Alternatives with Facilities at the Dalecarlia Water Treatment Plant

Location	Collection	Conveyance	Processing	Transport
Alternative 26: Use plasma oven technology to process Forebay and water treatment residuals at the Dalecarlia WTP. Dispose of residuals via contract hauling from the Dalecarlia WTP				
Same as Alternative 25 w/ coprocessing and plasma oven step				
Dalecarlia WTP	Collect water treatment residuals from existing sedimentation basins	Pump residuals to Dalecarlia thickening/ dewatering/plasma oven facility	Use plasma oven process following thickening and dewatering on collected residuals at Dalecarlia	Contract haul processed residuals to a permitted offsite location
Georgetown Reservoir	Collect water treatment residuals from reservoir	Pump residuals to Dalecarlia thickening/ dewatering/plasma oven facility	Use plasma oven process following thickening and dewatering on collected residuals at Dalecarlia	Contract haul processed residuals to a permitted offsite location
Forebay	Collect Forebay residuals from reservoir	Pump residuals to Dalecarlia thickening/ dewatering/plasma oven facility	Use plasma oven process following thickening and dewatering on collected residuals at Dalecarlia	Contract haul processed residuals to a permitted offsite location