CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This "Environmental Consequences" chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this EA. This chapter also includes definitions of impact thresholds (e.g., negligible, minor, moderate, and major), methods used to analyze impacts, and the analysis methods used for determining cumulative impacts. As required by CEQ regulations implementing the NEPA, a summary of the environmental consequences for each alternative is provided in table 1, which can be found in "Chapter 2: Alternatives." The topics presented in this chapter and the organization of the topics corresponds to the discussions contained in "Chapter 3: Affected Environment."

GENERAL METHODOLOGY FOR ESTABLISHING IMPACT THRESHOLDS AND MEASURING EFFECTS BY RESOURCE

The following elements were used in the general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category.

- general analysis methods as described in guiding regulations, including the context and duration of environmental effects
- basic assumptions used to formulate the specific methods used in this analysis
- thresholds used to define the level of impact resulting from each alternative
- methods used to evaluate the cumulative impacts of each alternative in combination with unrelated factors or actions affecting park resources
- methods and thresholds used to determine if impairment of specific resources would occur under any alternative

These elements are described in the following sections.

GENERAL ANALYSIS METHODS

The analysis of impacts follows CEQ guidelines and DO-12 procedures (NPS 2001) and is based on the underlying goal of providing for long-term protection and conservation of natural resources and cultural resources at C&O Canal NHP. This analysis incorporates the best available literature applicable to the setting and the actions being considered in the alternatives. For each resource topic addressed in this chapter, the applicable analysis methods are discussed, including assumptions and impact intensity thresholds.

ASSUMPTIONS

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below.

Geographic Area Evaluated for Impacts (Area of Analysis). The geographic study area (or area of analysis) for this assessment is the entire section of the C&O Canal NHP (between canal Miles 28.46 and 29.35) that would be affected from the implementation of the new water lines. The area of analysis may extend beyond the park's boundaries for some cumulative impact assessments. The specific area of analysis for each impact topic is defined at the beginning of each topic discussion.

IMPACT THRESHOLDS

Determining impact thresholds is a key component in applying NPS *Management Policies 2006* and DO-12. These thresholds provide the reader with an idea of the intensity of a given impact on a specific topic. The impact threshold is determined primarily by comparing the effect to a relevant standard based on applicable or relevant/appropriate regulations or guidance, scientific literature and research, or best

professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. Intensity definitions are provided throughout the analysis for negligible, minor, moderate, and major impacts. In all cases, the impact thresholds are defined for adverse impacts. Beneficial impacts are addressed qualitatively.

Potential impacts of all alternatives are described in terms of type (beneficial or adverse). Adverse impacts are also described in context; duration (short- or long-term); and intensity (negligible, minor, moderate, major). Definitions of these descriptors are included below.

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.

Context: Context is the affected environment within which an impact would occur, such as local, park-wide, regional, global, affected interests, society as whole, or any combination of these. Context is variable and depends on the circumstances involved with each impact topic. As such, the impact analysis determines the context, not vice versa.

Duration: The duration of the impact is described as short-term or long-term. Duration is variable with each impact topic; therefore, definitions related to each impact topic are provided in the specific impact analysis narrative.

Intensity: Because definitions of impact intensity (negligible, minor, moderate, and major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed.

CUMULATIVE IMPACTS ANALYSIS METHOD

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). As stated in the CEQ handbook, "*Considering Cumulative Effects*" (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. Cumulative impacts are considered for all alternatives, including the no action alternative.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. It was necessary, therefore, to identify other past, ongoing or reasonably foreseeable future projects and plans in the project and, if applicable, the surrounding area. Table 3 summarizes these actions that could affect the various resources at the park. Additional explanation for most of these actions is provided in the narrative following the table.

The analysis of cumulative impacts was accomplished using four steps:

Step 1 — Identify Resources Affected - Fully identify resources affected by any of the alternatives. These include the resources addressed as impact topics in chapters 3 and 4 of the document.

Step 2 — Set Boundaries - Identify an appropriate spatial and temporal boundary for each resource. The temporal boundaries are noted at the top of table 2 and the spatial boundary for each resource topic is listed under each topic.

Step 3 — Identify Cumulative Action Scenario - Determine which past, present, and reasonably foreseeable future actions to include with each resource. These are listed in table 4 and are described below.

Step 4 — Cumulative Impact Analysis - Summarize impacts of these other actions (x) plus impacts of the proposed action (y), to arrive at the total cumulative impact (z). This analysis is included for each resource in this chapter. The following past, present, and reasonably foreseeable future actions at C&O Canal NHP or in the surrounding area have been identified as having the potential to impact the resources evaluated in this EA.

- **Canal Farm Heritage Education Center** – This project, located at canal Mile 42 of the park, would consider a long-term educational use of the property.

- **Canal Quarters Pilot Program** – This project would occur park-wide, but locally at Lockhouse 25 (Edwards Ferry) and Lockhouse 28. This program would provide an interpretive experience for visitors to stay overnight in a historic canal building and learn about life on the canal. At canal Mile 48, a future EA would explore additional structures.

- **Catoctin Aqueduct** – This project has undergone an EA with a FONSI and is under construction to restore the aqueduct located at canal Mile 51 and is also an American Recovery and Reinvestment Act project.

- **New Design Raw Water Line upgrades** – This project has undergone an EA with a FONSI and construction is mostly completed (January 2011) except for grass seeding, which will be completed in Spring 2011. This project consisted of upgrades to raw water lines at Nolands Ferry, located at canal Mile 44, in Frederick County, Maryland.

- **Point of Rocks Boat Ramp** – This is an American Recovery and Reinvestment Act of 2009 project. The EA and FONSI have been completed and construction of new boat ramp facility at canal Mile 48 is in process.

- **Power Plant Right of Way at Point of Rocks (Sempra/Catoctin Power) -** The Sempra project involves the establishment of a water line across park property at Point of Rocks, MD. The water line would supply raw water from the Potomac River to the proposed power plant. This project underwent an EA in 2008, resulting in a Finding of No Significant Impact (FONSI). Project construction is currently pending.

- **Potomac Interceptor Odor Control Project** – The District of Columbia Water and Sewer Authority is constructing odor control buildings within the park at the Anglers Inn and Fletchers Boathouse, located at canal Miles 12 and 3, respectively. This project has undergone an EA with FONSI and the buildings are under construction. These two structures will have public restrooms for park visitors.

Table 4. Actions that Contribute to Cumulative Impacts

Impact Topic	Study Area	Past Actions	Present Actions	Future Actions
Soils	C&O Canal NHP	• New Design Raw Water Line upgrades	• Catoctin Aqueduct • Point of Rocks Boat Ramp • Potomac Interceptor Odor Control Project	• Power Plant Right-of-Way at Point of Rocks
Vegetation	C&O Canal NHP	• New Design Raw Water Line upgrades	• Catoctin Aqueduct • Potomac Interceptor Odor Control Project	• Power Plant Right-of-Way at Point of Rocks
Terrestrial Wildlife and Wildlife Habitat	C&O Canal NHP	• New Design Raw Water Line upgrades	• Catoctin Aqueduct • Potomac Interceptor Odor Control Project	• Power Plant Right-of-Way at Point of Rocks
Cultural Resources	C&O Canal NHP	• New Design Raw Water Line upgrades	• Catoctin Aqueduct • Point of Rocks Boat Ramp • Potomac Interceptor Odor Control Project • Canal Quarters Pilot Program	• Canal Farm Heritage Education Center • Power Plant Right-of-Way at Point of Rocks
Visitor Use and Experience	C&O Canal NHP	None	• Catoctin Aqueduct • Point of Rocks Boat Ramp • Potomac Interceptor Odor Control Project • Canal Quarters Pilot Program	• Canal Farm Heritage Education Center • Power Plant Right-of-Way at Point of Rocks
Park Operations and Management	C&O Canal NHP	None	• Catoctin Aqueduct • Point of Rocks Boat Ramp • Potomac Interceptor Odor Control Project • Canal Quarters Pilot Program	• Canal Farm Heritage Education Center •

SOILS

The geographic study area for soils is contained within the area of the C&O Canal NHP that parallels Summit Hall Farm between the Potomac River and the farm that would be affected by the proposed action.

IMPACT THRESHOLDS

Analyses of the potential intensity of impacts on soils were derived from available information on the C&O Canal NHP and the professional judgment of the park staff. The following thresholds were used to determine the magnitude of impacts on soils:

Negligible – Soils would be impacted below or at the lower levels of detection. Any impacts on soils would be slight.

Minor – Impacts to soils would be detectable. Impacts to undisturbed areas would be over a small area. Mitigation would be needed to offset adverse impacts and would be relatively simple to implement and would likely be successful.

Moderate – Impacts to soils would be readily apparent and result in a change to the soil over a relatively wide area. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.

Major – Impacts to soils would be readily apparent and substantially change the character of the soils over a large area in or out of the park. Mitigation measures necessary to offset adverse impacts would be needed, extensive, and their success would not be guaranteed.

Duration – Short-term impacts occur during the implementation of the alternative or within a year; long-term impacts extend beyond implementation of the alternative or more than a year.

Impacts of Alternative A: No Action

Impact Analysis

Alternative A represents the continuation of current management at the proposed site. There would be no excavation of soils or rock or removal of vegetation as a result of this alternative. Summit Hall would continue to withdraw water from the Potomac River for agricultural purposes under its existing permit from the MDE. Line #2 would continue to be impacted from frequent siltation, reducing its capability to draw water. Routine maintenance of the line, consisting of periodic silt removal, would not modify the soils in the project area. Implementation of alternative A would result in no adverse impacts on soils.

Cumulative Impacts

Alternative A would not result in adverse impacts on soils, and therefore, there would be no cumulative impacts.

Conclusion

Implementation of alternative A would result in no adverse impacts on soils. Cumulative impacts on soils from other projects in the area would be long-term minor adverse. Alternative A would not result in adverse impacts on soils, and therefore, there would be no cumulative impacts.

Impacts of Alternative B

Impact Analysis

Under alternative B, Summit Hall would be permitted to modify Line #2 on the existing water intake and irrigation system and install Line #3. Specifically, this alternative would relocate the existing Line #2 approximately 200 feet upstream (west) from the present location. Pump #2 would remain in its current location; the new Line #2 would be approximately 345 linear feet long. Line #3 would be installed approximately 1,700 feet downstream (east) of historic Culvert #41. Lines #2 and #3 would be installed using either directional drilling (option 1) or open trenching (option 2). Both options would also involve the removal of the existing Line #2 which now passes through Culvert #39.

Under both options, an approximately 5.5 square-foot concrete support foundation would be constructed to anchor each water line in place. Heavy machinery would be used to remove the top layers of soil. As a result of these activities, soils in the area of construction would become exposed, increasing the overall potential for erosion. Although soil productivity would temporarily decline in disturbed areas, these areas would be reseeded to stabilize the soil. As a result, construction activities related to the installation of the

concrete support foundations would cause short-term minor adverse impacts on soils. Construction of the pump pit for Pump #3 of the new Line #3 would not affect soils within the project area as it would be located off NPS property, in a pit on an area of mowed lawn within the Summit Hall property.

Under either option, the use of heavy equipment for staging directional drilling or for open trenching to install Lines #2 and #3 would disturb soils through compaction in areas of major construction activity. As a result, the two soil types existing at the project site, Huntington silt loam and Lindside silt loam, would be affected, resulting in a short-term loss in soil productivity; however, the degree of soil disturbance would differ between the two options.

During the construction period, Summit Hall and its contractor would follow all applicable federal and state regulations to minimize adverse impacts on soils if overall disturbance is expected to exceed 5,000 SF, as is expected in the case of Option 2. These measures include adhering to an erosion and sediment control plan completed in accordance with the *Maryland Erosion and Sediment Control Guidelines for State and Federal Projects* (MDE 2004). To help ensure the protection of natural and cultural resources and the quality of the visitor experience, the following protective measures would be implemented. The NPS would implement an appropriate level of monitoring throughout the construction process to help ensure that protective measures are being properly implemented and are achieving their intended results by:

- reducing or minimizing adverse impacts by employing best management practices to prevent and control soil erosion and sedimentation during installation and operation of Lines #2 and #3, including stabilization and revegetation after construction is completed
- implementing erosion containment controls such as silt fencing and sediment traps (e.g., straw/seed-free bales) to contain sediment onsite
- careful program design and management of construction would further minimize any impacts

Option 1 – Directional drilling is a trenchless method of installing underground pipes, cables, and/or conduits in a shallow arc along a prescribed bore path. This activity incorporates a surface-launched drill rig to ensure minimal impact on surrounding soils. As a result, the directional drilling method would result in highly localized disturbances to soils. The bore path resulting from the proposed drilling would be slightly larger than the 10-inch-diameter pipe and would be submerged underground. The bore path would be located well below the clay layer underneath the canal prism, keeping it intact. Under trenching, a water proof layer would be established in the canal prism per modern construction design. As a result, adverse impacts from directional drilling on soils on the project site under option 1 would be short-term and minor. Removal of the existing Line #2 at Culvert #39 would result in short-term negligible adverse effects.

If a bore pit for a new line is established, it would be located on Summit Hall property, off NPS property. The descending pit would most likely be converted to the pump pit after construction is complete and would likely be the same size as the existing pump pits for Lines #1 and #2. The receiving pit on the shoreline would not be very large but would be called out during design. Construction of the receiving pit would be monitored for soil impacts after the design is finalized.

Option 2 – Open trenching is a method of installing underground pipes, cables, and/or conduits using machinery to lay an open trench. This method, while less expensive than directional drilling, would result in a greater ground disturbance and associated impacts on soils on the project site. The engineering design standards for ensuring safety during trenching excavations differ for different soil types, with design standards for stable rock (OSHA 2010). Depending on the soil types identified onsite during construction staging, greater or lesser amounts of soils disturbance may be required to accommodate the required slope. It is estimated that open trenching activities required for trenching under the proposed

action would result in an approximate disturbance of 0.25 acre (10,890 square feet) of soils (Carter 2010). Soils disturbed during site preparation (digging the open trench) and installation (placement of the lines) would be compacted, resulting in short-term loss of potential productivity. Disturbed areas would be revegetated with NPS/C&O Canal NHP-approved native seed mix/vegetative plantings as soon as possible to prevent erosion. Though not expected, a waterproof layer in the canal prism, per the construction design, would be placed should a breach of the clay layer underneath the prism occur. Disturbed areas would be replanted as soon as possible with NPS/C&O Canal NHP-approved native seed to prevent erosion. As a result, adverse impacts on soils from open trenching under option 2 would be short-term and minor.

Cumulative Impacts

Cumulative actions within the Potomac River and Summit Hall that would impact soils and geology include past actions such as construction activities associated with raw water line upgrades at Nolands Ferry, located at canal Mile 44 and current actions such as the construction of the Catoctin Aqueduct to restore the aqueduct located at canal Mile 51; construction of the Point of Rocks boat ramp facility at canal Mile 48; and the Potomac Interceptor Odor Control Project, which is constructing odor control buildings within the park at the Anglers Inn and Fletchers Boathouse, located at canal Miles 12 and 3, respectively. Planned future projects include the establishment of a water line across park property at Point of Rocks. These projects all may require some soils disturbance, including localized erosion and compaction. Effects to soils from these cumulative actions would result in short-term and long-term minor adverse impacts. Under option 1, soil disturbances from directional drilling related to the modification of Line #2 and irrigation system and installation of Line #3 would be short-term and minor. When combined with the impacts from the cumulative actions, it would have a slight contribution resulting in an overall long-term minor adverse impact on soils.

Under option 2, soil disturbances from open trenching related to the modification of Line #2 and irrigation system and installation of Line #3 would be short-term and moderate. When combined with the impacts from the cumulative actions, it would have a slight contribution (though greater than option 1) resulting in an overall long-term minor adverse impact on soils.

Mitigation under both Options

Impacts to soils would be mitigated by limitations on the use of construction equipment within the park and by a careful program of construction management.

Mitigation under Option 2 only

Mitigation measures would be implemented during construction to minimize the potential adverse impacts on soil. Such mitigation measures may include but are not limited to:

- Revegetate disturbed areas as soon as possible with NPS/C&O Canal NHP-approved native seed mix/vegetative plantings to help prevent erosion.
- Placing a waterproof layer in the canal prism, per the construction design, to should a breach of the clay layer underneath the prism occur.

Conclusion

Under alternative B, loss of soil productivity would occur due to directional drilling or open trenching in preparation for installation of Lines #2 and #3. Option 1 would result in short-term negligible adverse impacts on soils in the project site. Option 2 would result in short-term minor adverse impacts on soils in the project areas. Cumulative impacts on soils would be long-term minor and adverse, with both options 1 and 2 having a slight contribution to the overall long-term minor impacts on soils.

VEGETATION

The geographic study area for vegetation is contained within the area of the C&O Canal NHP that parallels Summit Hall Farm between the Potomac River and the farm that would be affected by the proposed action.

IMPACT THRESHOLDS

The following thresholds were used to determine the magnitude of impacts on vegetation:

Negligible – Some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The impacts would be on a small scale.

Minor – The alternative would affect some individual native plants and would also affect a relatively minor portion of that species' population. Mitigation would be needed to offset adverse impacts, would be relatively simple to implement, and would likely be successful.

Moderate – The alternative would affect some individual native plants and would also affect a sizeable segment of the species' population and over a relatively large area. Mitigation to offset adverse impacts could be extensive and would likely be successful.

Major – The alternative would have a considerable effect on native plant populations and would affect a relatively large area in and out of the park. Mitigation measures to offset the adverse impacts would be required, would be extensive, and success of the mitigation measures would not be guaranteed.

Duration – Short-term impacts would last the duration of construction; long-term impacts would occur longer than the duration of construction.

Alternative A: No Action

Impact Analysis

Under alternative A, modification of Line #2 and installation of Line #3 would not occur. Line #2 would remain at its current location at Culvert #39. Operations at Summit Hall would continue to utilize the existing Line #1 and Line #2. The NPS would continue to write special use permits for Summit Hall Farm for the periodic removal of silt from the intake at Line #2 to keep the line operational. Silt removal activities could result in the removal of nearby vegetated groundcover from use of construction machinery adjacent to the area being maintained.

The NPS would continue current levels of maintenance and would respond to future needs and conditions associated with Line #2. Due to periodic silt removal and the potential for removal of adjacent vegetated groundcover resulting from maintenance activities, alternative A would result in long-term negligible adverse impacts on vegetation.

Cumulative Impacts

Impacts on vegetation within the park include effects from land-disturbing activities. The park has additional proposed actions within the vicinity of the Summit Hall project area, including restoration of the Catoctin Aqueduct, construction of odor control buildings at the Anglers Inn and Fletchers Boathouse, and establishment of a water line across park property at Point of Rocks. Past actions include the raw water line upgrades at Nolands Ferry. All of these projects require some clearing of vegetation. Effects to vegetation from these cumulative actions would be long-term minor adverse. Alternative A would have long-term negligible adverse impacts on vegetation. When combined with the impacts from the

cumulative actions, alternative A would have a very slight contribution resulting in an overall long-term minor adverse impact on vegetation.

Conclusion

Under alternative A, maintenance activities to include silt removal at Line #2 would continue. These activities would have long-term negligible adverse impacts on vegetation. Cumulative impacts on vegetation would be long-term minor adverse, with alternative A having a negligible contribution to adverse impacts.

Alternative B – Modify Line #2 and Install Line #3

Impact Analysis

Option 1 – Under option 1, modification of Line #2 and installation of Line #3 would occur utilizing the directional drill method. This activity incorporates a surface-launched drill rig to ensure minimal impact on surrounding areas. Drilling of the bore path would not result in impacts on vegetation as the bore path would be submerged underground, although there could be negligible impacts on the root zone of trees. A few trees could be removed as a result of construction of the receiving pit on the shoreline. The pit would not be very large and would be called out during design. Construction of the receiving pit would be monitored for vegetation impacts after the design is finalized.

Construction of the approximately 5.5 square-foot concrete support foundations, to which both new pipes would be anchored, would result in long-term negligible adverse impacts on vegetation. These areas would be cleared of all vegetation to prepare the sites for installation of the new concrete foundation. Construction of the pump pit for Pump #3 of the new Line #3 would not affect vegetation as it would be located off NPS property, on an area of mowed lawn within the Summit Hall property. The construction staging areas would also be located on Summit Hall land, resulting in no impacts on vegetation. Once Line #2 is modified and constructed, the existing Line #2 which now passes through Culvert #39 would be removed. Removal of the existing Line #2 at Culvert #39 would result in short-term negligible adverse effects.

Option 2 – Under option 2, modification of Line #2 and installation of Line #3 would occur utilizing the open trenching method. This method would result in greater ground disturbance and associated impacts on vegetation than the directional drill method. It is estimated that open trenching activities required for trenching under the proposed action would result in a disturbance of approximately 0.25 acre (10,890 square feet) of soils (Carter 2010). Digging the open trenches would result in the permanent loss of trees within the proposed path of the lines. Since design for the open trench method has not been made, species that are expected to be removed include red and sugar maples, American sycamore, and hickory. Several very large-sized (DBH greater than 25 inches) sugar maples, American sycamores, and hickories occur within the project area; however, design would avoid impacting large trees to the greatest extent possible. Should option 2 be selected to implement the proposed action, further tree surveys would be required and a tree removal plan created. Although mitigation measures would be implemented, removal, breakage, or root damage from construction staging could result in impacts on vegetation immediately outside the path of the open trenching activities. Impacts would be long-term minor adverse.

Similar to option 1, once Line #2 is modified and constructed, the existing Line #2 which now passes through Culvert #39 would be removed. Removal of the existing Line #2 at Culvert #39 would result in short-term negligible adverse effects.

Construction of the approximately 5.5 square-foot concrete support foundations, to which both new pipes at Line #2 and #3 would be anchored, would result in long-term negligible adverse impacts on vegetation. These areas would be cleared of all vegetation to prepare the sites for installation of the new concrete foundation. Construction of the pump pit for Pump #3 of the new Line #3 would not affect vegetation as it would be located off NPS property, on an area of mowed lawn within the Summit Hall property. The

construction staging areas would also be located on Summit Hall land, resulting in no impacts on vegetation.

Maryland state law and regulations require that a sediment control plan be developed and approved by MDE before undertaking any earth-disturbing activity in excess of 5,000 square feet (including tree removal) on federal lands. Required sediment control practices are listed in the *Soil Erosion and Sediment Control Plan for Forest Harvest Operations in Maryland* (MDNR 2000). In addition, removal of trees under option 2 would require the use of best management practices to provide sediment and erosion control during forestry operations (MDNR no date).

Under this alternative, there is also the potential for the introduction of invasive species to the area from construction equipment brought in from other areas. Construction activities that disturb the forest could induce the spread of existing invasive species by creating conditions that promote the spread of such species. Mitigation measures would be implemented during construction to minimize the potential for the introduction or spread of invasive species.

Mitigation under both Options

Impacts to vegetation would be mitigated by limitations on the use of construction equipment within the park and by a careful program of construction management.

Mitigation under Option 2

Mitigation measures would be implemented during construction to minimize the potential adverse impacts on vegetation. Such mitigation measures may include but are not limited to the following:

- Ensure that all protection measures are clearly stated in construction specifications and that workers would be instructed to avoid conducting activities beyond the construction zone, as defined by the construction zone fencing.
- Minimize trimming and removing vegetation to accommodate construction equipment ingress and egress.
- Avoid collision of equipment with trees and other vegetation. Place protective fencing around tree trunks in close proximity to construction activities to minimize potential adverse effects to bark or other tree attributes resulting from collision.
- Minimize cutting trees whenever possible, particularly of trees with large DBH.
- Conduct tree survey and develop tree removal plan to minimize removal of large trees.

In addition, mitigation measures related to minimizing the introduction or spread of invasive species may include but are not limited to the following:

- Require the construction contractor to powerwash all construction vehicles and equipment prior to initial arrival at the park to remove seed and plant material.
- Revegetate disturbed areas as soon as possible with NPS/C&O Canal NHP-approved native seed mix/vegetative plantings to help prevent the spread of exotic invasive plant species.
- Enact monitoring protocol to ensure no new or additional exotic invasive plant species are spread into the project area.

Implementation of option 2 would result in long-term negligible to minor adverse impacts on vegetation within and adjacent to the project area due to removal of vegetation associated with the use of open trenching to construct the new water lines and the potential for the introduction and spread of invasive species.

Cumulative Impacts

Effects to vegetation from cumulative actions would be the similar to those under alternative A, resulting in long-term minor adverse impacts. Under alternative B option 1, vegetation removal would occur only in the areas where the new concrete support foundations would be constructed, which would result in long-term negligible impacts. When combined with the impacts from the cumulative actions, alternative B option 1would have a slight contribution resulting in an overall long-term minor adverse impact on vegetation.

Under alternative B option 2, vegetation removal would occur in the areas where open trenching activities would occur and where the new concrete support foundations would be constructed. These activities would result in long-term negligible to minor impacts. When combined with the impacts from the cumulative actions, alternative B option 2 would still have a slight contribution, although greater than option 1, resulting in an overall long-term minor adverse impact on vegetation.

Conclusion

Modification of Line #2 and installation of Line #3 utilizing the directional drill method under option 1 would involve a loss of vegetation in the areas where the concrete support structures would be constructed. This would result in long-term negligible adverse impacts on vegetation from the clearing of vegetation and trees during construction.

Modification of Line #2 and installation of Line #3 utilizing the open trenching method under option 2 would also involve a loss of vegetation in the areas where the concrete support structures would be constructed and along the alignment of the open trenching. All actions would incorporate mitigation measures to minimize vegetation loss and limit the areas of clearing. This would result in long-term minor adverse impacts on vegetation from the increased potential for clearing and removal of vegetation and trees during construction activities.

Cumulative impacts on vegetation would be long-term minor adverse, with both options having a slight contribution to adverse impacts.

TERRESTRIAL WILDLIFE AND WILDLIFE HABITAT

The Organic Act of 1916, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise they are protected from harvest, harassment, or harm by human activities. According to the NPS *Management Policies 2006* (NPS 2006a) Section 4.1.5, "the NPS will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function." Efforts may include, for example, restoration of native plants and animals. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems along with the natural abundance, diversity, and the ecological integrity of plants and animals. Information on wildlife and wildlife habitat occurring within the project area was taken from park documents and records. Analysis of possible impacts on wildlife and wildlife habitat was based on on-site inspection of the resource within the project area, review of existing literature, information provided by the NPS and other agencies, and professional judgment.

The geographic study area for wildlife and wildlife habitat is contained within the area of the C&O Canal NHP that parallels Summit Hall Farm between the Potomac River and the farm that would be affected by the proposed action. Construction and operation activities would not occur outside this area.

IMPACT THRESHOLDS

The following thresholds were used to determine the magnitude of impacts on terrestrial wildlife and wildlife habitat:

Negligible – There would be no observable or measurable impacts on native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.

Minor – Impacts would be detectable, but they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them. Mitigation measures, if needed to offset adverse impacts, would be slight and successful.

Moderate – Readily detectable impacts outside the range of natural variability would occur on native animal populations, their habitats, or the natural processes sustaining them. The change would be measurable in terms of population abundance, distribution, quantity, or quality, and would occur over a relatively large area. Mitigation to offset adverse impacts could be extensive, but would likely be successful.

Major – Readily apparent impacts outside the range of natural variability would occur on native animal populations, their habitats, or the natural processes sustaining them. The change would be measurable in terms of population viability and could involve the displacement, loss, or restoration of a wildlife or aquatic life population or assemblage. Mitigation measures to offset the adverse impacts would be required, would be extensive, and success of the mitigation measures would not be guaranteed.

Duration – Short-term impacts would last the duration of construction; long-term impacts would occur longer than the duration of construction.

Impacts of Alternative A: No Action

Impact Analysis

Under alternative A, modification of Line #2 and installation of Line #3 would not occur. Line #2 would remain at its current location at Culvert #39. Operations at Summit Hall would continue to utilize the existing Line #1 and Line #2. The NPS would continue current levels of maintenance, including periodic removal of silt from the intake at Line #2 to keep the line operational. Silt removal activities would result in the removal of some vegetated groundcover adjacent to the area of disturbed by construction machinery. A temporary disturbance to wildlife could occur in these areas during the short duration of the silt removal activity, as noise and human presence would deter wildlife from using this area. These activities would be infrequent and short in nature, and it is expected that wildlife would return to using the site after completion of the silt removal activity.

Silt removal at Line #2 would have short-term negligible adverse impacts on wildlife and wildlife habitat during the actual removal activities as there would be a temporary disturbance to species immediate to the area, but no effect on overall population levels in the vicinity of the project area. Continuation of current levels of maintenance, to include periodic silt removal, would result in long-term negligible adverse impacts on wildlife and wildlife habitat.

Cumulative Impacts

Impacts on wildlife and wildlife habitat within the park include effects from land-disturbing activities. The park has additional proposed actions within the vicinity of the Summit Hall project area, including restoration of the Catoctin Aqueduct, construction of odor control buildings at the Anglers Inn and Fletchers Boathouse, and the establishment of a water line across park property at Point of Rocks. Past actions include the raw waterline upgrades at Nolands Ferry. All of these projects require some clearing

of habitat. Effects to wildlife and wildlife habitat from these cumulative actions would result in long-term minor adverse impacts. Alternative A would have short- and long-term negligible adverse impacts on wildlife and wildlife habitat. When combined with the impacts from the cumulative actions, alternative A would have a very slight contribution resulting in an overall long-term minor adverse impact on wildlife and wildlife habitat.

Conclusion

Under alternative A, maintenance activities to include silt removal at Line #2 would continue. These activities could temporarily displace wildlife and wildlife habitat and would have short-term negligible adverse impacts. Continuation of periodic silt removal would also result in long-term negligible adverse impacts. Cumulative impacts on wildlife and wildlife habitat would be long-term minor adverse, with alternative A having a negligible contribution to adverse impacts.

Alternative B – Modify Line #2 and Install Line #3

Impact Analysis

Option 1 – Under option 1, modification of Line #2 and installation of Line #3 would employ HDD technology to establish the water lines. Directional drilling would employ a trenchless method of installing the underground pipes in a shallow arc along a prescribed bore path. Directional drilling utilizes a surface-launched drill rig that would have a negligible adverse impact on the wildlife and wildlife habitat.

Similar to alternative A, alternative B option 1 would have short-term negligible adverse impacts on wildlife. During the construction activities, there would be a temporary disturbance to species from noise and human presence, deterring wildlife from using the immediate area; however, there would be no effect on overall population levels in the vicinity of the project area.

Impacts on wildlife habitat would also be short-term negligible adverse, as the surface-launched drill would be located and operated from the Summit Hall property. Construction of the pump pit for Pump #3 of the new Line #3 would not affect wildlife or wildlife habitat as it would be located off NPS property, on an area of mowed lawn within the Summit Hall property. Construction of the new concrete support for the modification of Line #2 and installation of a new Line #3 would require vegetation removal in the area of construction, resulting in short-term negligible adverse impacts on wildlife and wildlife habitat.

Once Line #2 is modified and constructed, the existing Line #2 which now passes through Culvert #39 would be removed. Removal of the existing Line #2 at Culvert #39 would result in short-term negligible adverse effects during construction activities.

Option 2 - Under option 2, modification of Line #2 and installation of Line #3 would occur utilizing the open trenching method. This method would result in greater ground disturbance and associated impacts on wildlife and wildlife habitat than the directional drill method to install the pipes. It is estimated that open trenching activities required for trenching under the proposed action would result in a disturbance of approximately 0.25 acre (10,890 square feet) of forested area.

Construction of the new water lines using open trenching would result in the long-term loss of forest habitat within the proposed path of the lines (approximately 0.25 acre of trees). However, construction design would avoid impacting large trees to the greatest extent possible. Should option 2 be selected to implement the proposed action, further tree surveys would be required and a tree removal plan created. Impacts on wildlife habitat from tree removal would be long-term minor adverse.

Construction of the approximately 5.5 square-foot concrete support foundations, to which both new pipes at Line #2 and #3 would be anchored, would result in short-term negligible adverse impacts on wildlife habitat. The areas for installation of the new concrete foundations would be cleared of all vegetation to

prepare the sites. Construction of the pump pit for Pump #3 of the new Line #3 would not affect wildlife habitat as it would be located off NPS property, on an area of mowed lawn within the Summit Hall property. The construction staging areas would also be located on Summit Hall land, resulting in no impacts on wildlife habitat.

Similar to option 1, once Line #2 is modified and constructed, the existing Line #2 which now passes through Culvert #39 would be removed. Removal of the existing Line #2 at Culvert #39 would result in short-term negligible adverse effects during construction.

Some wildlife individuals that utilize the construction areas would be forced to relocate outside the construction limits and could be susceptible to increased levels of predation or competitive stress. This displacement could result in a slight population depression within and adjacent to the areas of construction, however, following project completion and successful revegetation efforts, wildlife would again reoccupy areas in and adjacent to the open trenched areas. Further impacts from construction would include noise disturbance from heavy machinery and the presence of work crews. The increase in human and mechanical activity would temporarily deter some species from utilizing the adjacent habitat. Construction would result in short-term minor impacts on the wildlife within and adjacent to the area of construction as a result of displacement and disturbance caused by the use of heavy machinery and attendant human activities.

After construction of the new water lines and concrete support foundations have been completed, wildlife would again utilize the available habitats. Long-term minor adverse impacts on wildlife would likely occur from removal of forested habitat.

In order to minimize the project's impacts on FIDS, the NPS would follow MDNR guidelines for conservation of FIDS habitat. With the implementation of these guidelines, impacts on FIDS would be long-term minor adverse.

Mitigation under both Options

- Conduct vegetation clearing outside the breeding season for migratory birds (typically April through August) and/or remove no occupied bird nests, to ensure compliance with the Migratory Bird Treaty Act.
- Appropriate-sized screening over the intake lines would be used to avoid entrainment of fish or mussel larvae.

Cumulative Impacts

Effects to wildlife and wildlife habitat from cumulative actions would be similar to those under alternative A, resulting in long-term minor adverse impacts. Option 1 would have short-term negligible adverse impacts on wildlife from the displacement of wildlife during construction activities and the increased potential for clearing and removal of habitat. When combined with the impacts from the cumulative actions, option 1 would have a very slight contribution resulting in an overall long-term minor adverse impact on wildlife and wildlife habitat.

Effects to wildlife and wildlife habitat from cumulative actions would be the similar to those under alternative A, resulting in long-term minor adverse impacts. Option 2 would have short- and long-term minor adverse impacts on wildlife from the displacement of wildlife during construction activities and the removal of forested habitat. When combined with the impacts from the cumulative actions, option 2 would still have a slight contribution, though greater than option 1, resulting in an overall long-term minor adverse impact on wildlife and wildlife habitat.

Conclusion

Modification of Line #2 and installation of Line #3 utilizing the directional drill method under option 1 would involve a temporary displacement of wildlife within the project area. Wildlife would be temporarily displaced during times of loud construction and increased human activity. This would result in short-term negligible adverse impacts on wildlife from the displacement of wildlife during construction activities.

Modification of Line #2 and installation of Line #3 utilizing the open trenching method under option 2 would also involve a loss of forested wildlife habitat in the areas where the concrete support structures would be constructed and along the alignment of the open trenching. Construction would incorporate mitigation measures to minimize vegetation loss and limit the areas of clearing and would result in long-term minor adverse impacts on wildlife habitat. Wildlife would be temporarily displaced during times of loud construction and increased human activity, resulting in short-term minor adverse impacts on wildlife. Impacts to FIDS would be long-term minor adverse.

Both options 1 and 2 would have a slight contribution to an overall long-term minor adverse cumulative impact on wildlife and wildlife habitat, with option 2 having a slightly greater impact than option 1.

CULTURAL RESOURCES

Federal actions that have the potential to affect cultural resources are subject to a variety of laws and regulations. The NHPA, as amended, is the principal legislative authority for managing cultural resources associated with NPS projects. Generally, Section 106 of the NHPA requires all federal agencies to consider the effects of their actions on cultural resources listed and/or determined eligible for listing in the NRHP. Such resources are termed "historic properties." Agreement on mitigation of adverse effects to historic properties is reached through consultation with the SHPO; Tribal Historic Preservation Officer, if applicable; and, as required, the ACHP. In addition, the NHPA requires that federal agencies take actions to minimize harm to historic properties that would be adversely affected by a federal undertaking. Among other things, Section 110 of the NHPA also charges federal agencies with the responsibility for establishing preservation programs for the identification, evaluation, and nomination of historic properties to the NRHP.

Other important laws and regulations designed to protect cultural resources are the Native American Graves Protection and Repatriation Act, 1990; the American Indian Religious Freedom Act, 1978; NEPA, 1969; ARPA, 1979; and Executive Order 11593 Protection and Enhancement of the Cultural Environment, 1971.

In addition, the NPS is charged with the protection and management of cultural resources in its custody. This is furthered through the implementation of *DO-28: Cultural Resources Management Guideline* (NPS 1998), NPS *Management Policies 2006* (NPS 2006a), and the 2008 Servicewide Programmatic Agreement with the ACHP and the National Conference of State Historic Preservation Officers (NPS 2008b). These documents charge NPS managers with avoiding, or minimizing to the greatest degree practicable, adverse impacts on park resources and values. Although the NPS has the discretion to allow certain impacts in parks, that discretion is limited by the statutory requirement that park resources and values remain unimpaired, unless a specific law directly provides otherwise.

The NPS categorizes cultural resources by the following categories: archeological resources, cultural landscapes, historic districts and structures, museum objects, and ethnographic resources. As noted in "Issues and Impact Topics" of "Chapter 1: Purpose and Need," only impacts on historic districts and structures and archeological resources are of potential concern for this project. There would be no impacts on cultural landscapes, ethnographic resources, or museum objects, so these topics were

dismissed from consideration, and all potential impacts on historic views are addressed under the historic structures and districts topic.

The analyses of effects on cultural resources that are presented in this section respond to the requirements of both NEPA and Section 106 of the NHPA. In accordance with the ACHP's regulations implementing Section 106 (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were identified and evaluated by (1) determining the APE; (2) identifying cultural resources present in the APE that are either listed in or are eligible to be listed in the NRHP (i.e., historic properties); (3) applying the criteria of adverse effect to affected historic properties; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the implementing regulations for Section 106, a determination of either *adverse effect* or *no adverse effect* must also be made for affected historic properties. An adverse effect occurs whenever an impact alters any characteristic of a cultural resource that qualifies it for inclusion in the NRHP (for example, diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the proposal that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5). A determination of *no adverse effect* means there is either no effect or that the effect would not diminish, in any way, the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

CEQ regulations and the NPS DO-12 also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered; therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

DO-12, the NPS guidance for evaluating impacts (NPS 2001), requires that impact assessment be scientific, accurate, and quantified to the extent possible. For cultural resources, it is seldom possible to measure impacts in quantifiable terms; therefore, impact thresholds must rely heavily on the professional judgment of resource experts.

HISTORIC DISTRICT AND STRUCTURES

The study area for cultural resources is the APE as defined by the NPS under the Section106 regulations. (See the "Cultural Resources" section in "Chapter 3: Affected Environment.") In this case, the project has the potential to directly or indirectly impact four historic resources associated with the C&O Canal NHP: Culvert #39, Culvert #41, the canal prism, and the canal towpath. For purposes of this EA, the study area is limited to resources within park lands.

IMPACT THRESHOLDS

For a historic district or structure to be listed on the NRHP, it must possess significance (the meaning or value ascribed to the historic district or structure) and have integrity of those features necessary to convey its significance. For purposes of analyzing potential impacts on historic districts and structures, the thresholds of change for the intensity of an impact are defined as follows:

Negligible – The impact is at the lowest level of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor – Alteration of a pattern(s) or feature(s) of a historic district or structure listed on or eligible for the NRHP is easily detectable but would not diminish the integrity of a character-defining feature(s)

or the overall integrity of the historic property. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate – The impact would alter a character-defining feature(s) of a historic district or structure and diminish the integrity of that feature(s) of the historic property. For purposes of Section 106, the determination of effect would be *adverse effect*.

Major – The impact would alter a character-defining feature(s) of the historic district or structure and severely diminish the integrity of that feature(s) and the overall integrity of the historic property. For purposes of Section 106, the determination of effect would be *adverse effect*.

Beneficial – No levels of intensity for beneficial impacts are defined. Beneficial impacts can occur under the following scenarios: when character-defining features of the historic district or structure would be stabilized/preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995), to maintain its existing integrity; when the historic district or structure would be rehabilitated in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to make possible a compatible use of the property while preserving its character-defining features; or when the historic district or structure would be restored in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to accurately depict its form, features, and character as it appeared during its period of significance. For purposes of Section 106, a beneficial effect is equivalent to *no adverse effect*.

Duration – Short-term impacts would last for the duration of construction activities associated with the proposed alternative; long-term impacts would last beyond the construction activities.

Alternative A – No Action Alternative

Impact Analysis

Under alternative A, existing conditions would remain essentially constant, and there would no change in the integrity of historic resources, including the canal prism, the towpath, Culvert #39, and Culvert #41. The current level of preservation maintenance would remain in effect, so there would be no direct or indirect impacts on historic resources.

Cumulative Impacts

Because there would be no impacts from alternative A, there would be no cumulative impacts.

Conclusion

Implementation of alternative A would result in no impacts (*no adverse effect* under Section 106), either beneficial or adverse, to historic districts and structures. Because there would be no impacts from alternative A, there would be no cumulative impacts.

Alternative B – Modify Line #2 and Install Line #3

Impact Analysis

Alternative B would modify the alignment of Line #2 and install Line #3, with optional construction methods for installation of the Line #2 and Line #3.

Both options would involve the removal of the existing Line #2 which now passes through Culvert #39. Removal of the existing water intake pipe would pose a slight short-term risk to the integrity of Culvert #39, as some machinery would operate in around Culvert #39; this risk would be mitigated by a careful

construction inspection program on the part of NPS. Over the long term, the removal of Line #2 would result in an indirect beneficial impact (*no adverse effect* under Section 106) to Culvert #39, as the existing Line #2 is an intrusive, non-historic element that has a negative effect on the appearance of the structure. Culvert #41 is located at the upper limit of the study area. None of the optional construction methods would result in any direct impacts on this structure, nor would they result in the alteration of its setting; therefore, impacts on Culvert #41 would be negligible.

Option 1 - Installation of modified Line #2 and Line #3 by the directional boring construction method would result in negligible direct and indirect long-term impacts on historic structures in the vicinity. In the short term, there would be negligible to minor adverse impacts (*no adverse effect* under Section 106) to the existing towpath as a result of its brief use for construction vehicle traffic. Construction vehicles would be allowed on the towpath only during periods when they could travel without rutting or otherwise scarring the towpath surface. There would be no perceptible loss of integrity to the towpath or the canal prism, as the directional boring would not require any surface excavation or settling from tunneling. The new intake structures and water line would be barely visible from the towpath, so indirect impacts would be negligible (*no adverse effect* under Section 106).

Option 2 – This option would require excavation of an open trench for installation of Line #2 and Line #3, assuming that the trenches would require a bottom width of three feet and that they would be excavated with sloping sidewalls, following Occupational Safety and Health Association excavation safety standards. The maximum width at grade would be approximately 21 feet, depending on the varying terrain. By necessity, the trenches would cut through the towpath and the canal prism to install the new water lines. The open trenches would result in a direct adverse impact on the towpath and canal prism at both water line locations, by the alteration of each structure's integrity of form; because this would be a short-term loss, it would be considered minor in intensity and equivalent to *no adverse effect* under Section 106. Immediately after construction, the trenches would be backfilled with existing material so that the form of the canal prism and towpath would be restored in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (NPS 1996), which would mitigate the short-term loss of their integrity of form. The restoration of vegetation in the disturbed area would require many years, and this alteration of the canal's setting would represent a minor long-term indirect impact (*no adverse effect* under Section 106) to the canal and towpath in the immediate area of Line #2 and Line #3.

Mitigation under both Options

Mitigation of impacts on historic districts and structures would be mitigated by limitations on the use of construction equipment within the park and by a careful program of construction management. The risk of damage to Culvert #39 would be mitigated by the development of special use permit requirements designed to limit construction activities around this feature. NPS would also strictly enforce existing regulations regarding vehicle traffic on the towpath. Aside from protecting Culvert #39 from accidental damage, there would be little need for other mitigation measures for option 1. Adverse impacts on the canal that would result from the open trenching construction method required by option 2 would be mitigated by strictly limiting the width of the trench and consequent damage to the landscape. Consistent with excavation safety standards, NPS would require that the trench width be minimized by the use of shoring devices.

Cumulative Impacts

The various projects used for cumulative impact analysis for this project would be located at some distances away from the present project, and would generally have limited impacts on historic structures and districts. Some of these projects would have no direct impacts on historic structures and districts, including the Point of Rocks Boat Ramp (Mile 48), the establishment of a water line across park property

at Point of Rocks (Mile 48), the upgraded raw water lines at Nolands Ferry (Mile 44), and the Potomac interceptor odor control project at Anglers Inn (Mile 12) and Fletchers Boat House (Mile 3). In some cases, new structures would be built within the historic setting of the canal, but context-sensitive design would ensure that any alteration of the historic setting would result in only a negligible indirect impact on historic structures and districts.

Three projects, the Canal Farm Heritage Education Center, the Reconstruction of the Catoctin Aqueduct (Mile 51) and the Canal Quarters Pilot Program, focusing on Lockhouse 28 (Mile 48), would directly involve historic structures. For the Canal Farm Heritage Education Center, the NPS has performed preservation maintenance on the Corncrib and Dairy barn on site. The Catoctin Aqueduct Reconstruction will be carried out in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and it will return the aqueduct to its historically accurate form, which would be a long-term beneficial impact. The Canal Quarters Pilot Program focuses on Lockhouse 28 but may potentially involve other historic structures within the park. Potential impacts on historic structures would be formally evaluated in a future EA, but it is assumed that any impacts would be negligible to minor, as the actions necessary to rehabilitate the structures for visitor use would be performed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Considered as a whole, the cumulative projects would result in a beneficial impact on historic structures and districts. Both options being considered under alternative B would add to the beneficial impacts from the other past, present, and future projects, as a result of the removal of the pipe from the existing Line #2 running through Culvert #39. Option 1 would result in negligible adverse impacts on historic districts and structures, so its contribution to the cumulative impact scenario would be negligible, and overall cumulative impacts would be beneficial. Option 2 would result in minor short-term adverse effects to historic structures and districts. When combined with the impacts from the cumulative actions, option 2 would still have a slight contribution, resulting in an overall long-term beneficial impact on historic structures and districts.

Conclusion

Alternative B would pose a risk to the integrity of Culvert #39 as a result of accidental damage to the structure during removal of the existing Line #2; this risk would be mitigated by a careful program of construction management. Over the long term, the removal of Line #2 from Culvert #39 would be a beneficial impact, as the existing line is an intrusive, non-historical feature that detracts from the historic setting and appearance of Culvert #39; both construction methods would provide equivalent beneficial impacts from the removal of the existing water line.

Under option 1, long-term direct and indirect impacts on historic districts and structures resulting from installation of the new lines would be negligible (*no adverse effect* under Section 106), and short-term impacts would be negligible (*no adverse effect* under Section 106). Option 2 would result in a minor short-term direct adverse impact (*no adverse effect* under Section 106) to the towpath and canal prism, caused by the excavation of open trenches for Line #2 and Line #3. Because the form of the towpath and prism would be restored to their historically accurate form with the same material, however, the long-term loss of integrity would be negligible (*no adverse effect* under Section 106). A minor long-term adverse effect (*no adverse effect* under Section 106) to the historical setting would result from the removal of the vegetation that presently forms the setting along this area of the canal. When combined with the impacts from the cumulative actions, alternative B would still have a slight contribution, resulting in overall long-term beneficial impacts on historic structures and districts.

ARCHEOLOGICAL RESOURCES

As archeological resources exist essentially in subsurface contexts, potential impacts on archeological resources are assessed according to the extent to which the proposed alternatives would involve ground-disturbing activities such as excavation or grading. The analysis of possible impacts on archeological

resources was based on a review of previous archeological studies, consideration of the proposed design concepts, and other information provided by the NPS.

The study area for cultural resources is the APE as defined by the NPS under the Section106 regulations. (See the "Cultural Resources" section in "Chapter 3: Affected Environment.") In this case, the project has the potential to directly or indirectly impact archeological resources along the C&O Canal NHP between canal Miles 28.26 and 29.35. For purposes of this EA, the impact analysis is limited to resources within park lands.

IMPACT THRESHOLDS

Impacts on archeological resources occur when the proposed alternative results in complete or partial destruction of the resource, which is termed a loss of integrity in the context of Section 106. Impact thresholds for archeological resources consider both the extent to which the proposed alternative results in a loss of integrity and the degree to which these losses can be compensated by mitigating activities, such as preservation or archeological data recovery. The process begins with assessment of a resource according to its eligibility for the NRHP, as only sites considered significant enough for listing on the NRHP are protected by federal regulations.

Under federal guidelines, resources are eligible for the NRHP if they possess integrity and if they meet one or more of the criteria of eligibility for inclusion in the NRHP. Most archeological resources found eligible for the NRHP are significant under criterion D because they have the potential to provide important information about the history or prehistory. However, in some circumstances, archeological resources might be found significant because (1) they are associated with events that have made a significant contribution to the broad patterns of our history (NRHP criterion A); (2) they are associated with the lives of persons significant in our past (NRHP criterion B); or (3) they exhibit the distinctive characteristics of a type, period, or method of construction (NRHP criterion C).

For purposes of analyzing impacts on archeological resources, thresholds for the intensity of an impact are based on the foreseeable loss of integrity. All of these discussions consider only the direct impacts of construction, because operation of the facilities should have no ground-disturbing activities and no additional effect on archeological resources under any of the alternatives under consideration. All impacts are considered long term (e.g., lasting longer than the period of construction).

Negligible – Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be *no adverse effect.*

Minor – Disturbance of a site(s) results in little, if any, loss of integrity. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate – Disturbance of a site(s) results in loss of integrity to the extent that there is a partial loss of the character-defining features and information potential that form the basis of the site's NRHP eligibility. Mitigation is accomplished by a combination of archeological data recovery and in-place preservation. The determination of effect for Section 106 would be *adverse effect*.

Major – Disturbance of a site(s) results in loss of integrity to the extent that it is no longer eligible for the NRHP. Its character-defining features and information potential are lost to the extent that archeological data recovery is the primary form of mitigation. The determination of effect for Section 106 would be *adverse effect*.

Beneficial – A beneficial impact would occur when actions were taken to actively preserve or stabilize a site in its preexisting condition, or when it would be preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Weeks and Grimmer

1995) to accurately depict its form, features, and character as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Duration – All impacts on archeological resources are considered long term.

Alternative A – No Action

Impact Analysis

Under alternative A, existing conditions would remain essentially constant, and there would no change in the integrity of any archeological resources within the study area. Under the Archeological Site Management Information System, all known archeological resources sites would be periodically inspected to update their preservation status. There would be no impacts on archeological resources.

Cumulative Impacts

Because there would be no impacts from alternative A, there would be no cumulative impacts.

Conclusion

Implementation of alternative A would result in no impacts (*no adverse effect* under Section 106), either beneficial or adverse, to archeological resources. Because there would be no impacts from alternative A, there would be no cumulative impacts.

Alternative B – Modify Line #2 and Install Line #3

Impact Analysis

Alternative B would modify the alignment of Line #2 and install Line #3, with optional construction methods for installation of Line #2 and Line #3.

Both options would involve the removal of the existing Line #2 which now passes through Culvert #39. Removal of the existing water intake pipe may involve some minor excavations to free the pipe, but these excavations would be limited to areas of recent silt deposition or the active Potomac River floodplain. Neither area contains any known archeological resources, nor do they have any potential for undiscovered archeological resources because of the recent age of these landforms.

Option 1 - Installation of modified Line #2 and Line #3 by the directional boring construction method would not cause any short-term or long-term impacts on archeological resources in the study area. The directional boring would be initiated in a push pit located on private land outside the study area and it would advance the boring at a depth of at least three feet below the base of the canal prism, emerging or daylighting in the active floodplain of the Potomac River. It is conceivable that the directional bore could pass through an as-yet-unidentified, deeply buried archeological site, but the magnitude of this impact would be negligible, given the small diameter of the bore (one foot or less).

Option 2 - Under this option, open trenches would be excavated for installation of Line #2 and Line #3. The width of the trenches would vary according to the terrain, and it is assumed that they would require a bottom width and sloping sidewalls, so that a maximum area of 0.25 acre at present grade would be disturbed. This would result in a long-term direct adverse impact on any archeological sites within the study area, including deeply buried, as-yet-unidentified sites. Line #2 would pass near (approximately 75-100 feet) of Site 18MO93, a site with prehistoric and historic components that was originally recorded in 1974. This site has not been evaluated for NRHP eligibility but was characterized as having potential for deeply buried deposits. Line #3 would cut directly through Site 18MO4, a prehistoric site with Paleoindian, Archaic, and Woodland period components that was initially recorded in 1958 and subsequently investigated by the Archeological Society of Maryland and American University. The NRHP eligibility of the site has not been evaluated, nor has its boundary been well established. Neither

of the sites' sizes and boundaries are defined well enough to assess the potential impacts of the open trenching, but it must be assumed that either site would be found NRHP eligible if they retain any degree of integrity. Likewise, deeply buried, as-yet-unidentified sites would likely meet NRHP eligibility criteria. Assuming that either Line #2 or Line #3 would cut through Site 18MO4, 18MO93 or an as-yet-unidentified site, there would be a long-term direct adverse impact that could be substantial; however, there would be a requirement for mitigation (see below) that would include site investigation, geoarcheological testing, and other measures including a possible formal recovery program to minimize impacts on unknown resources. There would also be a more extensive Section 106 consultation process that could include development of a Memorandum of Agreement with the SHPO. With this mitigation, impacts would range from negligible (*no adverse effect* under Section 106) to moderate (*adverse effect* under Section 106), due to a loss of the site's physical integrity.

Mitigation under Option 2

If the directional boring construction method (option 1) is selected, there would be no need for mitigation measures for archeological resources, as any impacts would be negligible (*no adverse effect* under Section 106). If the open trenching construction method is implemented, NPS would develop a program of archeological investigation that would begin with a formal NRHP evaluation (Phase II study) of Site 18MO4 along with a combined Phase I and Phase II study of 18MO93 to formally determine its boundary and integrity. A program of geoarcheological testing would also be developed and implemented within the construction corridors for Line #2 and Line #3 to assess the potential for deeply buried sites. Then, depending on the results of the geoarcheological study, a combined Phase I and Phase II study would be implemented. Assuming that NRHP-eligible archeological resources were identified in either of the two trench corridors, additional mitigation measures would be evaluated, such as realignment of the water line, archeological documentation during construction through a program of monitoring, or a formal archeological data recovery program. Throughout this process of archeological identification, evaluation, and treatment, NPS would consult with the MHT, Maryland's SHPO.

Cumulative Impacts

The projects considered for cumulative impact analysis as a whole have limited potential for impacts on archeological resources, either because they would not require ground-disturbing activities, because they have been sited in areas where no archeological resources are present, or because they are still in a planning stage where impacts on archeological sites can be avoided by careful design and siting choices. Projects that would not involve ground-disturbing activities or for which NEPA analysis has resulted in a finding of no impacts on archeological resources include the rehabilitation of the Catoctin Aqueduct; the upgraded raw water lines at Nolands Ferry; the Point of Rocks Boat Ramp; and the Potomac interceptor odor control project. For purposes of cumulative impact analysis, it is assumed that careful design and siting choices for the Canal Farm Heritage Education Center , the Canal Quarters Pilot Program, and the establishment of a water line across park property at Point of Rocks would avoid more than moderated adverse impacts (*adverse effect* under Section 106) to archeological resources. When combined with the impacts from the cumulative actions, alternative B would have a slight contribution (with option 2 having a greater contribution than option 1), resulting in overall long-term minor impacts on archeology.

Conclusion

Depending on the method of construction for alternative B, impacts on archeological resources could range from negligible (*no adverse effect* under Section 106) to moderate (*adverse effect* under Section 106). The directional drilling method (option 1) would have negligible impacts, while the open trenching method (option 2) could have a long-term minor to moderate adverse impact on site 18MO4, 18MO93, or an as-yet-unidentified, deeply buried site. Adverse impacts associated with option 2 would be mitigated by a program of archeological investigation that would include an assessment of each resource's

boundaries, integrity, and NRHP eligibility, followed by measures to mitigate adverse effects as appropriate.

SECTION 106 ASSESSMENT OF EFFECT

National Historic Preservation Act Section 106 Summary

This *Summit Hall Turf Farm Water Access EA* analyzes the impacts of the no action alternative and one action alternative with two optional construction methods with regard to potential impacts on archeological resources and on historic structures and districts within the C&O Canal NHP.

Alternative A - No Action

Under alternative A, existing conditions would remain essentially constant. There would be no change to archeological resources, within the project areas. Under the Archeological Site Management Information System, all known archeological resources sites would be periodically inspected to update their preservation statuses. Additionally, there would no change in the integrity of historic resources, including the canal prism, the towpath, Culvert #39, and Culvert #41. The current level of preservation maintenance would remain in effect, so there would be no direct or indirect impacts on historic resources.

Alternative B – Modify Line #2 and Install Line #3

Under alternative B, the park would permit the (1) removal of an existing water supply line (Line #2) that passes through Culvert #39 and (2) construction of two new water lines (Line #2 and Line #3) between Mile 28.26 and Mile 29.35 of the C&O Canal NHP.

The removal of Line #2 would result in a long-term beneficial impact on historic structures and districts by the removal of an intrusive, non-historical element that presently detracts from the setting of Culvert #39. Removal of the existing water pipe would pose some risk to the integrity of Culvert #39, but this would be mitigated by a careful program of construction management and monitoring.

Installation of the new water lines by the directional drilling method (option 1) would not result in any noticeable loss of integrity (*no adverse effect* under Section 106) to any historic structures in the study area, including the towpath, the canal prism, Culvert #39, or Culvert #41. The new water supply lines would be almost unnoticeable from the towpath, so any alteration of the setting of the C&O Canal Historic District would be negligible. Likewise, impacts on archeological resources (18MO4, 18MO93, or deeply buried, as-yet-unidentified sites) would be negligible (*no adverse effect* under Section 106), as the directional bore would disturb a subsurface corridor that would be roughly one foot or less in diameter.

Installation of the new water lines by the open trench construction method (option 2) would result in a minor short-term loss of integrity to the towpath and canal prism, but because the towpath and canal prism would be restored to their original form with existing material immediately after installation of the water lines, the overall impact of the project would support a finding of *no adverse effect* to historic structures and districts under Section 106.

Open trenching could, however, have long-term adverse impacts on archeological resources in the study area, including Sites 18MO4 and 18MO93 or deeply buried, as-yet-unidentified sites. If the open trench construction method is chosen, NPS would develop and implement a phased program of archeological investigation prior to construction that would include (1) a formal assessment of the boundaries, integrity, and NRHP eligibility of Sites 18MO4 and 18MO93, and (2) a geoarcheological program to identify and assess deeply buried sites along the trench corridors for Line #2 and Line #3. Then, if NRHP-eligible resources were identified, NPS would seek ways to avoid or minimize adverse effects, which could include project design modifications, monitoring of construction, or full-scale archeological data

recovery. Any necessary archeological or geoarcheological studies would be completed by professional staff with appropriate training and experience. With mitigation, the intensity of impacts for option 2 could range from negligible (*no adverse effect* under Section 106) to moderate (*adverse effect* under Section 106).

Conclusion

In accordance with Section 106 of the NHPA, potential adverse effects (as defined in 36 CFR 800) on archeological resources and on historic structures and districts listed on or eligible for listing on the National Register would be coordinated between the NPS and the SHPO to determine the level of effect on the property and to determine any necessary mitigation measures. Continuing implementation of DO-28 (NPS 1998) and adherence to NPS *Management Policies 2006* (NPS 2006c) and the 2008 Servicewide Programmatic Agreement with the ACHP on Historic Preservation and National Conference of State Historic Preservation Officers (NPS 2008b) would all aid in reducing the potential to adversely impact historic properties.

Copies of this *Summit Hall Turf Farm Water Access EA* will be distributed to the MHT, Maryland's SHPO, for review and comment related to compliance with Section 106 of the NHPS. The NPS is seeking a "no adverse effect" concurrence from the SHPO as part of the ongoing consultation which included review and comment on this public document. A full description of agency consultation and coordination is available in "Chapter 5: Consultation and Coordination."

VISITOR USE AND EXPERIENCE

The purpose of this impact analysis is to assess the effects of the proposed actions on visitor use and experience in the study area. The analysis for this resource area is focused on visitor use and experience along the C&O Canal towpath. To determine impacts, the current uses of the project area were considered and the potential effects of the construction and implementation of the proposed actions on visitor use and experience were analyzed. Activities and the type of visitor experience and use/visitation that occur in the park and which might be affected by the proposed actions, as well as the visual character of the area and noises experienced by the visitors, were considered.

The geographic study area for visitor use and experience is contained within the area of the C&O Canal NHP that parallels Summit Hall Farm between the Potomac River and the farm that would be affected by the proposed actions.

IMPACT THRESHOLDS

Negligible – Visitors would likely be unaware of impacts associated with implementation of the alternative. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.

Minor – Changes in visitor use and experience would be slight and detectable, but would not appreciably limit or enhance critical characteristics of the visitor experience. Visitor satisfaction would remain stable and individuals could be affected in a localized area. If mitigation were needed, it would be relatively simple and would likely be successful.

Moderate – The number of participants engaging in a specified activity would be altered. Some visitors who desire their continued use and enjoyment of the activity might be required to pursue their choices in other available local regional areas. Visitor satisfaction would begin to decline. Mitigation measures would probably be necessary but would likely be successful.

Major – The number of participants engaging in an activity would be greatly reduced or increased. Visitors who desire their continued use and enjoyment would be required to pursue their choices in

other available local or regional areas. Visitor satisfaction would markedly decline. Extensive mitigation measures would be needed, and success would not be guaranteed.

Duration – Short-term impacts would be immediate, occurring during construction of the alternative. Long-term impacts would persist after construction of the alternative.

Impacts of Alternative A: No Action

Impact Analysis

Under the no action alternative, Line #2 would remain in its current location at Culvert #39 and Line #3 would not be installed. Summit Hall would continue to utilize the existing Line #1 and Line #2. All portions of the project area would remain open to the public. The pump stations associated with Line #1 and Line #2 would remain, but off of NPS property and unobtrusive to the view associated with the project area.

Alternative A would result in no adverse impacts on visitor use as there would be no construction to install or modify water lines. There would, however, be long-term negligible adverse impacts on visitor experience from noise intrusion as a result of the continued seasonal operation of pumps #1 and #2.

Cumulative Impacts

Past, present and future activities within the vicinity of the Summit Hall project area that could affect visitor use and experience include restoration of the Catoctin Aqueduct, raw waterline upgrades at Nolands Ferry, construction of odor control buildings at the Anglers Inn and Fletchers Boathouse, construction of a boat ramp at Point of Rocks, the Canal Farm Heritage Education Center , the Canal Quarters Pilot Program, and the establishment of a water line across park property at Point of Rocks. Most of these activities would likely result in long-term beneficial impacts on visitor use and experience since they would maintain and enhance the areas used by visitors and increase visitor use opportunities. However, some of these projects could potentially adversely impact visitor use and experience in the short term. Construction would have short-term minor adverse impacts on the visual and acoustic character of the park and would introduce the presence of construction vehicles to the park. There would also be short-term moderate adverse impacts on visitor use as a result of the closure of facilities or portions of the park due to construction. When combined with the impacts from the cumulative actions, alternative A would have a very slight contribution resulting in overall long-term beneficial impacts on visitor use and experience.

Conclusion

Under the no action alternative, there would be no impacts on visitor use as visitors to the C&O Canal NHP would continue their current use. However, the two pumps located on Summit Hall property would continue to operate seasonally, resulting in long-term negligible adverse impacts on visitor experience from noise intrusion. Cumulative impacts on visitor use and experience would be overall long-term beneficial with alternative A having a very slight contribution, resulting in an overall long-term beneficial impact on visitor use and experience.

Impacts of Alternative B

Impact Analysis

Option 1 – Under this option, Line #2 would be modified and Line #3 would be installed utilizing the directional drill method. Directional drilling involves a surface-launched drill rig that minimizes impacts on surrounding areas. Construction of the pump pit for Pump #3 of the new Line #3 would be located off NPS property, on an area of mowed lawn within the Summit Hall property. The construction staging areas would also be located on Summit Hall land. The park would remain open for use during

construction; however, there may be short-term minor adverse impacts on visitor use due to a temporary bypass that could be created for safe visitor travel on the towpath.

The project area is in a portion of the park classified as Zone D- Short-term Remote Zone, known for its low-density use and sense of remoteness. Construction activities and the presence of construction vehicles would visually and acoustically disturb this park setting, resulting in short-term minor adverse impacts on visitor experience.

Option 2 – Under this option, Line #2 would be modified and Line #3 would be installed utilizing the open trenching method. Impacts to visitor use and experience would be similar to those of option 1, resulting in short-term minor adverse impacts during construction. However, under option 2, there would be greater disturbance to soil and vegetation, as well as greater visual intrusion and long-term change in visual character of the area (removal of forest cover along the path of the water lines), resulting in long-term minor adverse impacts on visitor experience.

Operation of the water pumps, under either Option 1 or Option 2, would create some noise intrusion in the area, potentially affecting visitor experience. However, typically the pumps would not operate all at once; and when they are in operation, it is only for a short period of time. In addition, the pumps are located more than 2,000 feet apart on one another, far enough that visitors would not be able to hear the pumps even if they are being operated simultaneously. Therefore, any adverse impacts on visitor experience would be negligible from the operation of the pumps

Mitigation under both Options

- Public information would be issued through press releases and on signs posted on-site to inform visitors of construction activities within the project area.
- If the towpath is closed during construction, a bypass would be created to enable safe visitor passage.

Cumulative Impacts

Impacts to visitor use and experience from cumulative actions would be similar to those under the no action alternative, with long-term beneficial impacts due to improvements to areas used by visitors, and increased visitor use opportunities and short-term moderate adverse impacts on visitor use from potential area and facilities closures. In addition, construction from these projects could result in short-term minor adverse impacts due to the acoustic and visual intrusions caused by construction activities and vehicles. Options 1 and 2 would result in short-term minor adverse impacts from construction activities and long-term negligible to minor adverse impacts on visitor use and experience. When combined with the impacts from the cumulative actions, either option 1or 2 would have a very slight contribution, resulting in an overall long-term beneficial impact on visitor use and experience.

Conclusion

Under alternative B, Line #2 would be modified and Line #3 would be installed using either direct drilling (option 1) or open trenching (option 2), resulting in short-term minor impacts on visitor use as a result of a temporary bypass created for safe travel on the towpath. In addition, there would be short-term minor adverse impacts on visitor experience as a result of the visual and acoustic intrusion to the park setting from the presence of construction vehicles and construction activities. Option 2 would have a greater disturbance to soil and vegetation, as well as greater visual intrusion than option 1, resulting in long-term minor adverse impacts on visitor experience. Cumulative impacts on visitor use and experience would be overall long-term beneficial with both options of alternative B having a slight to very slight contribution to the adverse impacts.

PARK OPERATIONS AND MANAGEMENT

C&O Canal NHP is responsible for providing staff to perform all of the day-to-day operations and maintenance required to manage and maintain the towpath that serves park visitors. The study area for park operations and management is contained within the area of the C&O Canal NHP that parallels Summit Hall Farm between the Potomac River and the farm that would be affected by the proposed actions.

IMPACT THRESHOLDS

The impact intensities for park operations and management were defined as follows:

Negligible – Impacts would be barely detectable and would not have an appreciable effect on park operations.

Minor – The impact would be detectable and would be of a magnitude that would not have an appreciable effect on park operations. If mitigation were needed to offset adverse effects, it would be simple and likely successful.

Moderate – The impacts would be readily apparent and result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would be necessary to offset adverse effects but would likely be successful.

Major – The impacts would be readily apparent, result in a substantial change in park operation in a manner noticeable to staff and the public, and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed and extensive, and success could not be guaranteed.

Duration – Short-term impacts would be immediate, occurring during implementation of the alternatives. Long-term impacts would persist after implementation of the alternative.

Impacts of Alternative A: No Action

Analysis

Under the no action alternative, Line #2 would remain in its current location at Culvert #39, and Line #3 would not be installed. Summit Hall would continue to utilize the existing Line #1 and Line #2. All portions of the project area would remain open to the public. The NPS would continue to write special use permits for Summit Hall Farm for the periodic removal of silt from the intake at Line #2 to keep the line operational.

Alternative A would result in long-term negligible adverse impacts on park operations and management because, although the silt removal activities require special use permitting, special use permits are not out of the ordinary for this park and the amount of permits would not appreciably impact park operations.

Cumulative Impacts

Cumulative impacts projects would potentially affect park operations and management by creating new facilities or features that require a proportional increase or reduction in park staff or operating costs. Past, present and future projects within the C&O Canal NHP—including restoration of the Catoctin Aqueduct, construction of odor control buildings at the Anglers Inn and Fletchers Boathouse, construction of a boat ramp at Point of Rocks, the Canal Farm Heritage Education Center , the Canal Quarters Pilot Program, and the— could result in increases in staff and operating costs. However, these increases in staff time and operating costs would not be of a magnitude that would have an appreciable effect on park operations and would result in long-term minor adverse impacts on park operations and management. When combined

with the impacts from the cumulative actions, alternative A would have a negligible contribution resulting in an overall long-term minor adverse impact on park operations and management.

Conclusion

Under the no action alternative, the NPS would continue to write special use permits for Summit Hall Farm, resulting in long-term negligible adverse impacts on park operations and maintenance. Cumulative impacts on park operations and maintenance would be long-term minor adverse, with alternative A having a negligible contribution to the impacts.

Impacts of Alternative B

Impact Analysis

Under options 1 and 2, Line #2 would be modified and Line #3 would be installed, utilizing the directional drill method and open trenching method, respectively. There would be short-term minor adverse impacts on park management and operations during construction due to the demands for construction oversight and project management, especially if any cultural resource surveys are required. With both options, Summit Hall personnel would manually attach extensions to the intake lines as needed to reach deeper waters and would remove them when not in use. No special use permits would be required for attachment and removal of these extension lines, resulting in long-term beneficial impacts on park operations and management.

Cumulative Impacts

Impacts to park operations and management from cumulative actions would be similar to those under the no action alternative, resulting in potential increases in staff and operating costs. However, these increases in staff time and operating costs would not be of a magnitude that would have an appreciable effect on park operations and would result in long-term minor adverse impacts on park operations and management. When combined with the impacts from the cumulative actions, alternative B would have a negligible contribution, resulting in overall long-term minor adverse impacts on park operations and management.

Conclusion

Alternative B represents the modification of Line #2 and installation of Line #3, using one of two methods. Under alternative B, the NPS would not need to approve special use permits for Summit Hall Farm to attach or remove the extensions to the new pipes, resulting in long-term beneficial impacts on park operations and maintenance. Staff demands during construction would result in short-term negligible adverse impacts. Cumulative impacts on park operations and maintenance would be long-term negligible adverse, with alternative B having a negligible contribution to the impacts.