DRAFT ENVIRONMENTAL IMPACT STATEMENT

HALLIGAN WATER SUPPLY PROJECT

Applicant:
City of Fort Collins Utilities

U.S. Army Corps of Engineers
Omaha District
12565 West Center Road
Omaha, Nebraska

November 2019

Kiel G. Downing, Acting Chief
REGULATORY BRANCH
U.S. ARMY CORPS OF ENGINEERS, OMAHA DISTRICT

Date: Nov 2019
This page left intentionally blank.
Cover Sheet
Draft Environmental Impact Statement
Halligan Water Supply Project

Lead Agency: Department of the Army, Corps of Engineers, Omaha District

Cooperating Agencies:
- Colorado Parks and Wildlife
- Colorado Department of Public Health and Environment
- Colorado Department of Natural Resources
- Larimer County
- U.S. Bureau of Land Management
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

Jurisdictions in Colorado That Could Be Directly Affected: Larimer County

Abstract: The Halligan Water Supply Project (Halligan Project) Draft Environmental Impact Statement (Draft EIS) evaluates the effects of enlarging the existing Halligan Reservoir located about 25 miles northwest of Fort Collins on the North Fork of the Cache la Poudre River (North Fork) in Larimer County in north central Colorado. The City of Fort Collins Utilities (Fort Collins) proposes to raise Halligan Dam by 25.4 feet to enlarge Halligan Reservoir from its current capacity of 6,400 acre-feet to approximately 14,525 acre-feet to provide about 7,900 acre-feet of additional annual firm yield to meet Fort Collins’ projected 2065 municipal and industrial water demands. The existing reservoir surface area is approximately 253 acres; the proposed enlargement would result in a surface area of approximately 386 acres. The Halligan Project would result in the placement of fill material into waters of the U.S., which requires a Department of the Army permit under Section 404 of the Clean Water Act.

Halligan Dam is a concrete arch dam built over 100 years ago and will require rehabilitation in the near future to address safety risks. These safety risks would be addressed by Fort Collins under their proposed action during enlargement of the dam. Under the Project Alternatives, ownership of and responsibility for the dam rehabilitation would revert back to the North Poudre Irrigation Company. Under Fort Collins’ proposed action, Halligan Reservoir would continue to be filled with direct flows from the North Fork. Releases would be made to the North Fork downstream of the dam and would flow through Seaman Reservoir to the confluence with the Cache la Poudre River. From there, water would be exchanged up to Fort Collins’ intake or to the Monroe Canal intake and delivered to Fort Collins’ water treatment facility through the Pleasant Valley Pipeline. Under the proposed action, Fort Collins would maintain a minimum flow of five cubic feet per second in the North Fork from May 1 to September 30, a minimum flow of three cubic feet per second the remainder of the year, and forego all diversions to the enlarged pool and Halligan Reservoir for the three days that coincide with the forecasted peak runoff flow event for the North Fork.

This Draft EIS also evaluates the effects of the following alternatives to the Halligan Project: the No-Action Alternative; the Expanded Glade Alternative; the Gravel Pits Alternative; the Agricultural Reservoirs Alternative and the No-Action Alternative.

Reviewers should provide the Corps with their comments during the Draft EIS review period. The Corps will respond to substantive comments on the Draft EIS in a Final EIS. The Draft EIS and supporting documents are available at: or https://go.usa.gov/xEfp5 or http://www.nwo.usace.army.mil/Missions/Regulatory-Program/Colorado/EIS-Halligan/

EIS Contact for Comments and Additional Information:
Cody Wheeler
Halligan EIS Project Manager
U.S. Army Corps of Engineers, Omaha District 9307 South Wadsworth Blvd.
Littleton, CO 80128-6901
Email: NWO.HalliganEIS@usace.army.mil
Comments are due January 21, 2020. Written comments should be received by close of business, 5 p.m.
Executive Summary

This Executive Summary provides a brief overview of the proposed action, alternatives, and conclusions from the effect analyses. The accompanying Environmental Impact Statement (EIS) and supporting technical reports, which can be found on the U.S. Army Corps of Engineer’s (Corps) website (https://www.nwo.usace.army.mil/Missions/Regulatory-Program/Colorado/EIS-Halligan/) and Fort Collins’ Halligan Water Supply Project website (https://www.fcgov.com/halligan/), provide additional project information and detailed analyses.

PROJECT OVERVIEW

The city of Fort Collins, Colorado (Fort Collins) proposes to enlarge the existing Halligan Reservoir. Halligan Reservoir is located about 25 miles northwest of Fort Collins on the North Fork of the Cache la Poudre River (North Fork) and has a current capacity of approximately 6,400 acre-feet. Fort Collins proposes to enlarge the capacity to 14,525 acre-feet by raising the existing dam by 25.4 feet. The existing reservoir surface area is approximately 253 acres; the proposed enlargement would result in a surface area of approximately 386 acres.

Halligan Reservoir currently supplies water to the shareholders of North Poudre Irrigation Company (NPIC), but Fort Collins acquired Halligan Reservoir in 2004 pursuant to a 1993 option agreement. Fort Collins does not own nor is able to use any water currently stored in Halligan Reservoir. Fort Collins entered the 1993 option agreement because it wanted to leave open the possibility of enlarging the reservoir if, at a later date, it was determined to be the most appropriate means of meeting Fort Collins’ water demands. The 1993 option agreement between Fort Collins and NPIC allows Fort Collins to enlarge Halligan Reservoir but requires Fort Collins to re-convey the reservoir facilities back to NPIC if Fort Collins abandons or is otherwise unable to enlarge the reservoir.

Although dam inspection reports suggest that the dam at Halligan Reservoir is currently sound, it will require rehabilitation in the near future to address safety risks. The dam is over 100 years old; and seepage through the dam and freeze-thaw cycles will continue to degrade the mass of the dam and present an increasing safety risk unless rehabilitated. These issues identified in the dam inspection reports would be addressed by Fort Collins if the dam is raised and rehabilitated under the proposed action. Dam rehabilitation plans have not yet been developed, but Fort Collins assumes that Halligan Dam would be raised by enlarging the existing dam base, adding concrete on the downstream face, and raising the existing dam crest and spillway crest. Preparation for the foundation would require rock excavation along the abutments and valley bottom outside of the existing footprint by approximately eight to 12 feet. Fort Collins assumes the enlargement would be completed using mass conventional concrete produced onsite. The spillway would be reconstructed in a size and manner similar to the pre-existing spillway. An energy-dissipating structure would be located immediately downstream of the spillway section.

Halligan Reservoir would continue to be filled with direct flows from the North Fork. Releases would be made to the North Fork downstream of the dam and would flow through Seaman Reservoir to the
confluence with the Cache La Poudre River (in this EIS, the portion of the Cache La Poudre River from
the confluence with the North Fork to the confluence with the South Platte River is referred to as the
Main Stem). From there, water would be exchanged to the upper Cache la Poudre River (in this EIS, the
portion of the Cache La Poudre River upstream of the confluence with the North Fork is referred to as the
Upper Poudre) where it can be diverted to the Fort Collins intake or to the Munroe Canal intake and
delivered to the Fort Collins water treatment facility through the Pleasant Valley Pipeline. Modeling
indicates that releases from Halligan Reservoir are fully exchangeable to Fort Collins’ existing intakes
94 percent of the time. NPIC would continue to operate its current storage volume in Halligan Dam for
agricultural purposes as it has in the past.

A Summer Low Flow Plan (Summer Plan), a Peak Flow Bypass Program, and a Winter Release Plan are
also part of Fort Collins’ Proposed Action. The Summer Plan involves adjusting operations to maintain a
minimum flow of five cubic feet per second in approximately 22 miles of the North Fork between
Halligan Dam and Seaman Reservoir from May 1 to September 30 each year. Under the plan, diversions
of Fort Collins’ water for storage in Halligan Reservoir would be curtailed when necessary to maintain a
minimum flow of five cubic feet per second in the North Fork. When diversions are not occurring, but
flows anywhere below Halligan Dam drop below five cubic feet per second, releases would be made from
Fort Collins’ portion of the enlarged Halligan Reservoir. Hydrologic modeling showed that the minimum
flow of five cubic feet per second could be maintained without increasing the size of the proposed
reservoir enlargement. All releases made under the Summer Plan would be delivered into Fort Collins’
municipal water supply system. The Summer Plan would be curtailed if Fort Collins would require any
water restrictions for the coming summer or in the case of a water supply emergency.

Fort Collins proposes a Peak Flow Bypass Program that would forgo all diversions to the enlarged pool at
Halligan Reservoir for the three days that coincide with the forecasted peak runoff flow event for the
North Fork. Peak flows drive many riverine physical and ecological processes, including sediment
transport, aquatic habitat formation and maintenance, and riparian area inundation. The intended purpose
of the Peak Flow Bypass Program is to prevent any additional attenuation of peak flows on the North
Fork below Halligan Dam. Hydrologic modeling showed that operating the Peak Flow Bypass Program
could be done without increasing the size of the proposed reservoir enlargement. The Peak Flow Bypass
Program would be curtailed when operating the plan would cause a water supply shortage or would
violate Fort Collins’ storage reserve factor. In general, Peak Flow Bypass Program curtailment would
occur if Fort Collins would require water restrictions for the coming summer or in the case of a water
supply emergency.

The Winter Release Plan is primarily a means for Fort Collins to meet wintertime return flow obligations.
The winter releases are also considered an operational means to decrease reliance on other water sources
from storage in the winter (i.e., Colorado-Big Thompson Project or Joe Wright Reservoir), thereby
preserving these sources for use later in the summer. For the proposed action, the Winter Release Plan
would involve releasing three cubic feet per second of water from storage to the North Fork for
subsequent diversion at the Fort Collins intakes between October 1 and April 30 of each year. The winter
releases would have a concurrent benefit of improving stream flows in the North Fork during periods

1 The term “diversions” means that portion of flows on the North Fork captured by the enlarged Halligan Dam to fill
the enlarged portion of Halligan Reservoir.
when river flows are typically low. Winter releases would result in an increase to stream flows in the North Fork between Halligan Reservoir and the Main Stem.

With the exception of meeting winter releases and the Summer Plan, releases from the enlarged Halligan Reservoir would be made only when other sources of water are unavailable to meet Fort Collins’ water demands. There was no pre-determined demand or release pattern for the enlarged Halligan Reservoir. In general, releases from the enlarged Halligan Reservoir would occur: (1) to meet Fort Collins’s reusable water demand when there is a lack of other reusable water sources, or (2) in dry years or emergency water supply disruptions to meet Fort Collins’ single-use and reusable water demands when other Fort Collins water sources are unavailable.

Fort Collins’ Proposed Action would require the discharge of dredged and fill material into jurisdictional waters of the U.S., thereby requiring a Clean Water Act Section 404 permit from the Corps. Fort Collins notified the Corps of their intent to seek a Section 404 permit for the proposed action in 2005.

**PURPOSE AND NEED FOR THE PROPOSED ACTION**

Under the National Environmental Policy Act guidelines and implementing regulations in 40 Code of Federal Regulations 1502.13, the lead federal agency must state the purpose and need for the proposed action when preparing an EIS. In this case, the Corps is the lead federal agency because they must decide whether to issue a Section 404 permit for the proposed action, or one of the alternatives described below. Furthermore, Clean Water Act guidelines (40 Code of Federal Regulations 230.10(a)(2)–(3)) distinguish between the basic (fundamental, essential, or irreducible) purpose and overall project purpose, and specify that the basic purpose determines whether the proposed action is water dependent. This distinction ensures that the scope of the EIS and the range of alternatives analyzed are sufficiently broad to fully inform the agency decision maker.

The Corps determined that the basic purpose of Fort Collins’ Proposed Action is to supply water. In this instance, the basic purpose of supplying water, whether for municipal, industrial or agricultural uses, does not require access or proximity to, or siting within, a special aquatic site for it to be fulfilled. Therefore, Fort Collins’ Proposed Action is not water dependent for the purposes of the 404(b)(1) Clean Water Act Guidelines and the following rebuttable presumptions apply: (1) practicable alternatives not involving special aquatic sites are available, and (2) such alternatives are less damaging to the aquatic ecosystem, unless clearly demonstrated otherwise.

The Corps uses the overall project purpose to evaluate whether less environmentally damaging practicable alternatives are available and to help make a decision whether to issue or deny a Section 404 permit. The 404(b)(1) Clean Water Act Guidelines state that an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose (40 Code of Federal Regulations 230.10(a)(2)). This evaluation applies to all waters of the U.S., not just special aquatic sites. The Corps determined the overall project purpose is:

> To provide additional system firm yield for Fort Collins in order to satisfy an additional need of approximately 7,900 acre-feet per year to meet its projected 2065 municipal and industrial demands with water of a quality comparable to the water now delivered to its customers.
This overall project purpose is synonymous with the purpose and need statement that the Corps developed under the National Environmental Policy Act, taking into consideration purpose and need statements identified by Fort Collins and projected water needs and demands to the year 2065. In evaluating the need for Fort Collins’ Proposed Action, the Corps considered Fort Collins’ existing and future firm yield estimates of population growth for Fort Collins, water use trends, and future water demands as well as other pertinent factors, such as current and future conservation measures taken by Fort Collins. The Corps, exercising its independent judgment and review, and considering Fort Collins’ and the public’s perspective, evaluated and accepted the purpose and need statement as the basis for defining and evaluating alternatives within the Corps’ decision-making process (33 Code of Federal Regulations 325, Appendix B, Section 9(b)(4)).

AGENCY AND PUBLIC SCOPING

The Corps initiated the scoping process by publishing a Notice of Intent to prepare an EIS in the Federal Register on February 1, 2006. At that time, Fort Collins and the city of Greeley (Greeley) jointly proposed the Halligan-Seaman Water Supply Project, under which Fort Collins and Greeley would enlarge and jointly operate both the Halligan and Seaman reservoirs, located on the North Fork. In 2006, other public scoping activities included publishing paid advertisements announcing public scoping meetings, distributing a scoping announcement to members on a mailing list provided by the participants and the Corps, publishing project information on the Halligan-Seaman Water Supply Project website and Corps website, and holding supplemental outreach meetings. The Corps held three public scoping meetings to solicit ideas, issues, and concerns regarding the Halligan-Seaman Water Supply Project. The meetings were held in the city of Livermore, Fort Collins, and Greeley on February 23, 27, and 28, 2006, respectively. The Corps held a separate meeting to gather input from local, state, and federal agencies having regulatory authority or an interest in the Halligan-Seaman Water Supply Project. The agency scoping meeting was conducted on February 23, 2006 in Fort Collins. The Corps also sent letters to Native American tribes to inform them of the Halligan-Seaman Water Supply Project and to solicit input. The scoping process helped establish the framework for this environmental analysis and facilitated the development of a reasonable range of feasible alternatives to be evaluated in the Draft EIS.

During the formal scoping period, the Corps received over 350 comments. Comments were received via U.S. Postal Service, electronic mail, facsimile, in person at scoping meetings, and online via a website established and maintained by the Corps. In early 2015, the Corps granted a request by Fort Collins and Greeley to separate the analysis of the two projects into two EISs.

ALTERNATIVES

The following three action alternatives meet the purpose and need described above and represent a reasonable range of alternatives to Fort Collins’ Proposed Action. The No-Action Alternative includes a combination of non-structural measures that Fort Collins could implement to improve its water supply position in lieu of enlarging Halligan Reservoir and without the need for an individual Section 404 permit or other federal permit. However, the No-Action Alternative does not meet the purpose and need.
Under all alternatives to Fort Collins’ Proposed Action, Halligan Dam would be rehabilitated with no change to the storage capacity of the reservoir. The 1993 option agreement between Fort Collins and NPIC requires Fort Collins to re-convey the reservoir facilities back to NPIC if Fort Collins abandons or is otherwise unable to enlarge the reservoir. Although dam inspection reports suggest the dam at Halligan Reservoir is currently sound, it will require rehabilitation in the near future to address safety risks and would therefore be rehabilitated regardless of which alternative, including the proposed action, is chosen.

The Winter Release Plan described above as part of Fort Collins’ Proposed Action would also apply to all action alternatives. For all action alternatives, three cubic feet per second would be released into the Main Stem from their corresponding storage element.

**Expanded Glade Alternative**

Under the Expanded Glade Alternative, Fort Collins would meet its purpose and need through enlargement of the proposed Glade Reservoir and construction of necessary infrastructure to deliver water to its water treatment plant. The proposed Glade Reservoir would be a 170,000 acre-feet storage reservoir part of the Northern Integrated Supply Project (NISP) proposed by the Northern Colorado Water Conservancy District (Northern Water) on behalf of 15 Northern Front Range water suppliers. The NISP Final EIS was released in July 2018, after the Expanded Glade Alternative considered in this EIS was developed. The feasibility of the Expanded Glade Alternative is contingent on NISP being permitted and constructed.

The Expanded Glade Alternative assumes that Fort Collins could reach an agreement with Northern Water to design and construct the proposed Glade Reservoir and associated infrastructure to meet the combined NISP participants’ and Fort Collins’ purpose and need. The Expanded Glade Alternative is feasible only if Fort Collins’ needs are incorporated prior to the design and construction of the proposed Glade Reservoir; the alternative is not feasible if enlarging and retrofitting the proposed Glade Reservoir is required after it is constructed. The Expanded Glade Alternative anticipates that if the proposed Glade Reservoir was constructed, it would include dedicated storage capacity of 6,075 acre-feet for Fort Collins in addition to the NISP participants’ storage of 170,000 acre-feet for a total capacity of 176,075 acre-feet.

Under this alternative, Fort Collins would expand the Poudre Valley Canal to convey its peak storable diversions (60 cubic feet per second) from the Main Stem to the proposed Glade Forebay. The Poudre Valley Canal had a planned capacity of 1,700 cubic feet per second, which would be expanded to 1,760 cubic feet per second for the Expanded Glade Alternative. Fort Collins would expand the canal turn-out to convey the additional 60 cubic feet per second to the proposed Glade Forebay and would enlarge the forebay by approximately 80 acre-feet. It is assumed that the additional forebay capacity could be obtained without substantially enlarging the footprint envisioned by NISP, but rather by slightly increasing the proposed depth by about 0.85 feet.

The Glade Pump Station would require the maximum power of approximately 2,850 horsepower for the Fort Collins storage operations. The additional power could be addressed by either adding an additional pump(s) with such capacities or including the additional requirements in the design of shared pumps with NISP participants.
Project components solely required for Fort Collins’ purpose and need would include additional pumping capacity at the proposed Glade Forebay, a new 48-inch diameter pipeline to connect the proposed Glade Reservoir outlet pipeline to Fort Collins’ existing pipeline and the Pleasant Valley Pipeline, an outflow control system, a pretreatment plant at the Glade Pump Station, and a turnout structure at the Main Stem. Releases from the proposed Glade Reservoir for Fort Collins would be conveyed to the Fort Collins water treatment facility.

Water stored in the proposed Glade Reservoir is expected to have lower water quality than Fort Collins’ current water sources. To provide water of quality similar to existing sources, a 16 million gallons per day pretreatment facility would be constructed.

Fort Collins must have independent control and operation of its reservoir storage account and associated facilities. Adding Fort Collins to the multi-user NISP project, including its different water rights portfolios and demands from storage, could present situations requiring filling and releasing operations simultaneously. These simultaneous operations would require exchanges and paper storage accounting transfers in the reservoir (book-over) between the various users.

**Gravel Pits Alternative**

Under the Gravel Pits Alternative, Fort Collins would develop 3,875 acre-feet of new water storage at the gravel pits complex located along the Main Stem northwest of Fort Collins. The gravel pits complex consists of over 15 existing and potential gravel pit sites; gravel pits considered for this alternative are located on the north side of the river on existing or proposed gravel pit sites within the complex. Many different potential configurations may be available to Fort Collins that incorporate pits that currently are being excavated or that have already been excavated and could be readily connected into a single storage complex. The selected gravel pits would have a below-grade storage potential of about 2,100 acre-feet. Above-grade storage at two of the pits would be used to augment the below-grade storage to satisfy the storage requirement. Above-grade storage would be achieved by adding 20-foot high berms around those two pits.

The proposed gravel pit storage reservoirs would be designed to operate as a single unit with the pits as full as possible to minimize evaporation losses. Gravel pit bottom grades and maximum water storage levels would be designed to maximize the ability to move water through the gravel pit complex by gravity, but some pumping may be necessary. Based on state regulations, the pits would be excavated to bedrock or an impermeable formation and, in accordance with standard practice and state regulations for gravel pit design in Colorado, be confined by an impermeable barrier (i.e., slurry wall).

Water for storage in this alternative would be diverted at the existing Larimer County Canal Number 2 diversion structure on the Main Stem and conveyed through the existing canal using excess capacity to a new lateral structure located approximately 1.1 miles from the diversion structure. From the lateral diversion, a 1.7-mile bi-directional pipeline would convey water to the gravel pits complex. Water would be released from the gravel pits complex via a 560 horsepower pump station and conveyed to a pretreatment facility. Pretreated water would be pumped to the existing Fort Collins 36-inch pipeline and to the Pleasant Valley Pipeline. This would provide operational flexibility, allowing Fort Collins to release water to the water treatment facility via the existing 36-inch pipeline when the Pleasant Valley Pipeline is flowing in the opposite direction during the winter, or via the Pleasant Valley Pipeline when
there is not available capacity in the 36-inch pipeline. Connection to both the Pleasant Valley Pipeline and 36-inch pipeline would allow water from the gravel pit complex to be delivered at all times, which is necessary to maintain Fort Collins’ storage reserve factor.

In addition to gravel pit storage, this alternative features reoperation of Joe Wright Reservoir, a facility owned and operated by Fort Collins. Storage in Joe Wright Reservoir would be maintained at a higher level for winter carryover by conducting fewer single-use water trades with NPIC.

**Agricultural Reservoirs Alternative**

Under the Agricultural Reservoirs Alternative, Fort Collins would obtain additional water storage capacity of approximately 6,475 acre-feet by purchasing dedicated storage in the existing NPIC Reservoirs Number 5 and 6 (referred to as the agricultural reservoirs), located approximately nine miles northeast of Fort Collins’ water treatment facility. This alternative assumes that Fort Collins would own and be able to operate its portion of the storage independently of NPIC and its operations.

Storage for Fort Collins in the agricultural reservoirs would be provided by acquiring dedicated space in the existing Reservoirs Number 5 and 6, a set of two interconnected reservoir units owned by NPIC that could be operated as a single unit. Information from NPIC indicates the combined reservoirs have an active capacity of 16,392 acre-feet, so Fort Collins would need to acquire approximately 40 percent (i.e., 6,475 acre-feet) of the assumed available storage in those reservoirs. Fort Collins’ storage in Reservoirs Number 5 and 6 would be acquired through a purchase and operating agreement. The storage would have to be independently owned, operated, and controlled by Fort Collins to count towards its storage reserve factor. NPIC has agreed to allow Fort Collins to study the use of Reservoirs Number 5 and 6 for this alternative, but has not indicated whether the required purchase and operating agreement could be completed. If acquisition is possible, it is assumed Fort Collins would need to compensate NPIC for loss of reservoir capacity, potential loss of any associated water rights, and any negative impacts to the NPIC system or shareholders.

Water to fill the agricultural reservoirs would be diverted from the Upper Poudre at the Munroe Canal diversion structure. It would then be conveyed using first the Munroe Canal, then 6.8 miles of the Pleasant Valley Pipeline, and then 9.9-miles of the 48-inch proposed bi-directional pipeline from the Pleasant Valley Pipeline to Reservoir Number 6. The section of the Pleasant Valley Pipeline would be shared with the Tri-Districts. Preliminary analyses indicate there would be sufficient capacity available in the Munroe Canal and the Pleasant Valley Pipeline for this alternative. A dedicated 42-inch 2.5-mile-long pipeline would convey water from Reservoir Number 6 to Reservoir Number 5. This 42-inch pipeline would be connected at a valve house proposed at the Reservoir Number 6 outlet. The valve house would be designed to permit NPIC releases from Reservoir Number 6 to the downstream outlet channel while simultaneously allowing Fort Collins’ filling operations through the pipeline to Reservoir Number 5.

Fort Collins would require access to stored water at all times to count towards the storage reserve factor and satisfy the project purpose and need. The 48-inch bi-directional pipeline would therefore be connected with both the existing Pleasant Valley Pipeline and Fort Collins’ existing 36-inch pipeline to deliver stored water to Fort Collins’ water treatment facility under all operating conditions. Similar to the Expanded Glade Alternative and the Gravel Pits Alternative, releases from the agricultural reservoirs would require pretreatment to improve expected poorer water quality relative to current supplies. The
pretreatment facility would be located along the bi-directional pipeline. While deliveries from Reservoirs Number 5 and 6 to the pretreatment plant would not require pumping; pumping would be required for conveyance of pretreated water to the water treatment facility.

A river turn-out to the Main Stem would be constructed off the new bi-directional pipeline to allow Fort Collins to exchange releases from Reservoirs Number 5 and 6 to its existing river intakes upstream on the river. It is assumed river releases would not require treatment, but future regulations may require such discharges to be treated.

Potentially feasible alignments have been selected for proposed conveyance facilities, and have been specified as 200-foot wide corridors. Specific pipeline locations within the corridors would have to be refined based on utility interferences, property ownership, and other factors.

**No-Action Alternative**

The No-Action Alternative describes what Fort Collins would do if Fort Collins’ Proposed Action or an acceptable alternative were not permitted. According to Corps regulations, the No-Action Alternative need not meet the project purpose and need and should not require a Corps permit of any type, including a Section 404 nationwide permit (33 Code of Federal Regulations Part 325, Appendix B). Fort Collins’ No-Action Alternative consists of three components: (1) reoperation of Joe Wright Reservoir; (2) acquisition of additional NPIC shares to obtain the Colorado-Big Thompson Project storage component associated with each share; and (3) institution of more frequent drought restrictions. As configured, the No-Action Alternative does not meet the purpose and need due to the mandatory drought restrictions necessary to provide water through the 1-in-50-year critical drought and because storage would be 600 acre-feet short of the storage reserve factor in the 1-in-50 year drought, even with water restrictions.

Releases from Joe Wright Reservoir would be reduced to target a winter carryover storage amount of 3,200 acre-feet. This storage level would not require any modifications to the existing outlet facilities at Joe Wright Reservoir. The reduction in releases would be accomplished by not executing a water trade with NPIC for Colorado-Big Thompson Project water under certain circumstances.

As part of Fort Collins’ Proposed Action and all other action alternatives, Fort Collins projected future acquisition of additional shares of several ditch companies including shares of NPIC. These acquisitions would be beyond the shares already owned or converted for municipal use. For the No-Action Alternative, Fort Collins would acquire even more shares of NPIC instead of the other ditch companies. Each share of NPIC includes four Colorado-Big Thompson Project units. Each unit provides an annually variable amount of water in the Colorado-Big Thompson Project system, equal to one acre-foot multiplied by an annual quota. The quota has varied historically between 50 percent and 100 percent, with an average of approximately 70 percent. Under the No-Action Alternative, Fort Collins contemplates acquisition of an additional 854 NPIC shares, of which 665 additional shares are unique to the No-Action Alternative. These 665 shares represent about seven percent of the outstanding NPIC shares. Acquisition of shares under the No-Action Alternative would increase Fort Collins’ ownership to approximately 44 percent from 37 percent and would likely reduce projected municipal ownership by other entities by the same percentages (seven percent). The additional 665 shares would provide 1,064 acre-feet of additional storage in Horsetooth Reservoir for Fort Collins.
The No-Action Alternative includes mandatory drought restrictions on Fort Collins’ water utility customers during periods of drought to reduce water demands on the system. Using a hydrologic model, years where restrictions would be necessary were identified based on the state of the model in each May and projected water availability for the rest of the summer using methods currently employed by Fort Collins (e.g., estimates of water rights yield based on remaining snowpack, reservoir levels, etc.). If a shortfall was projected for a given summer, Fort Collins assigned a drought restriction level to reduce demands through the following modeled October. In years with no projected shortfall, no drought restrictions would be implemented. Fort Collins used a tiered system of drought restrictions, with Level 1 being the least and Level 4 being the most restrictive.

The model was re-run with reduced demands in years that a drought restriction was required. The model results indicated that restrictions would be necessary in five of the 86 simulated years, including four years of Level 1 restrictions and one year of Level 3 restrictions. The storage reserve factor was not met through the critical drought even with the Level 3 restrictions. The storage reserve factor is designed to provide Fort Collins with water to counteract an emergency, such as failure of one its raw water lines or the Horsetooth Reservoir intake. Although under the No-Action Alternative Fort Collins would be able to meet its future demands, it would not meet the storage reserve factor – a critical aspect of the project need and purpose – and would be at risk of not having enough water to counteract these types of emergency situations during a drought.

Environmental Effects

Environmental effects of Fort Collins’ Proposed Action and the Project Alternatives were evaluated for 19 resources which included both flow-related and land-based resources. For the flow-related resources, the Corps developed a Common Technical Platform so that the environmental effects to multiple flow-related resources - surface water, groundwater, water quality, geomorphology, aquatic habitat, riparian community, wetlands - could be compared against consistently defined future hydrology conditions. The Common Technical Platform was required by the Corps for three proposed projects located primarily in the Cache la Poudre River basin and potentially affecting some of the same river reaches: the NISP project proposed by Northern Water, the Seaman Water Supply Project proposed by Greeley, and the Halligan Project proposed by Fort Collins. With three proposed projects, the Corps felt it was important that each project EIS evaluate the effects on the river basin using a common approach based on consistent hydrology data and assumptions regarding key operational aspects. To meet this objective, the Corps developed a series of integrated hydrologic models (i.e., the Common Technical Platform model sequence) to simulate future conditions hydrology, Project Alternatives scenarios including the proposed action for each of the three projects, and cumulative effects of the proposed actions. The Corps also used the Common Technical Platform model sequence to determine the yield from Fort Collins’ water rights portfolio.

With that background, the following discussions summarize the meaningful impacts of each Project Alternative and the rehabilitation of Halligan Dam, which would occur under all alternatives, based on the extensive evaluations presented in the accompanying EIS. A summary of cumulative effects is also included.
Halligan Dam Rehabilitation

Halligan Dam requires rehabilitation in the near future to address safety risks and would therefore be rehabilitated under all Project Alternatives. Under Fort Collins’ Proposed Action, it would also be raised to enlarge Halligan Reservoir. The Corps assumed that the activities to rehabilitate the existing dam would not exceed those described for Fort Collins’ Proposed Action, which was used for the analysis. The long-term footprint occupied by the dam would be slightly larger, as the foundation would require rock excavation along the abutments and valley bottom outside of the existing footprint by approximately eight to 12 feet. The spillway would be reconstructed in a size and manner similar to the pre-existing spillway; however, an energy-dissipating structure would be located immediately downstream of the spillway section. The larger footprint and energy-dissipating structure would affect designated critical habitat for the threatened Preble’s meadow jumping mouse long-term, as the northern-most extent of critical habitat along the North Fork terminates at the existing Halligan Dam. The Corps would consult with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act regarding effects to critical habitat once an alternative has been selected. An estimated 22.4 acres of borrow material would be extracted for dam rehabilitation. Potential borrow sources have been identified near the dam, but geologic testing is needed to determine the suitability and quantity of the material. Excavation of borrow areas in shallow soils would expose granite bedrock, a difficult substrate for revegetation. Observations of the floristic composition within the existing borrow area used for the Halligan Dam construction in 1910 supports this conclusion, as the area is dominated by sparse vegetation characteristic of disturbed sites. Long-term loss of mule deer severe winter range (approximately 27 acres) would result from the borrow material excavation and access roads but this loss is minor because it makes up only about 0.02 percent of mapped mule deer severe winter range in the Data Analysis Unit. No other long-term effects would occur as a result of dam rehabilitation.

Other environmental effects would be short-term and associated with construction activities. Examples of such effects include beneficial socioeconomic effects, such a generation of short-term employment and income, and increase in business activity due to purchases of material and supplies from local and regional vendors. However, Fort Collins water rates or NPIC one-time assessment would potentially increase to recoup the cost of the dam rehabilitation. Other short-term effects include construction noise, dust and other air pollutants, increased traffic, and limits on recreation activities, particularly to members of the Landowners Association for Phantom Canyon Ranches that use Halligan Reservoir for water-based recreation. Effects to wildlife would be negligible to minor. Short-term effects are not considered meaningful because they would cease once dam rehabilitation is complete.

Fort Collins’ Proposed Action

Environmental effects due to enlargement of Halligan Reservoir under Fort Collins’ Proposed Action are largely related to inundation and changes to stream flow on the North Fork and Main Stem downstream from the reservoir. Halligan Reservoir would increase in size from approximately 253 to approximately 386 acres. The expanded area of inundation would result in the long-term loss of 16.74 acres of wetland. The majority of the loss (almost 15 acres) would occur along or below the ordinary high water mark of the existing reservoir. However, nearly 11 acres of wetland are expected to reestablish along the new ordinary high water mark; therefore, the net impact to wetlands would be moderate. The loss of 8.5 acres of riparian shrubland and 2.6 acres of riparian woodland is also considered moderate because of their
ecological importance. The enlarged reservoir would inundate approximately 0.75 mile of the North Fork upstream of the existing reservoir. Free-flowing riffle and pool complexes in the river would be replaced with a flatwater reservoir, which would be a major adverse effect for the coldwater stream community of fish, benthic macroinvertebrates, and algae. While the effect to the coldwater stream community would be adverse, the enlarged reservoir would result in a minor to moderate beneficial effect for species of fish and other organisms already present in the reservoir by providing new habitat. Waterfowl, American white pelican, and osprey might also benefit from the creation of new habitat (surface water area). The enlarged reservoir would also result in approximately 133 acres of soil loss due to inundation and make the expansion area inaccessible for use as a construction material resource. Some of the upland vegetation communities that would be inundated meet the description of vegetation associations tracked by the Colorado Natural Heritage Program because they are critically imperiled and/or imperiled in the state, and their loss would affect the overall size and distribution of these plant communities in the area. The effect to these communities would be moderate. The threatened Preble’s meadow jumping mouse is known to occur around Halligan Reservoir based on surveys conducted in 2003. The expanded reservoir would inundate suitable habitat and potentially result in the drowning of some mice. The Corps would consult with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act regarding effects to threatened species if this alternative is selected. The only major socioeconomic effect would be a 23 percent increase in Fort Collins’ water supply requirement fee, affecting developers, housing costs, and regional development patterns.

Because Fort Collins’ Proposed Action includes the Summer Plan, Peak Flow Bypass Program, and Winter Release Plan, many environmental effects on the North Fork would be beneficial. For example, the benefits to fish in one segment of the North Fork are considered major because days with no flow that currently occur would be eliminated under the Summer Plan and Winter Release Plan, which would create new permanent stream habitat for aquatic organisms. This, in turn, would be a minor benefit to recreation (fishing) on the North Fork. Other minor benefits include an increase in alluvial groundwater recharge and enhancement of wetland and riparian communities along the North Fork due to the Winter Release Plan. Additionally, the Summer Plan would reduce the extent that groundwater fluctuates during the growing season, which may assist in the reestablishment of more desirable wetland plants less tolerant of large fluctuations in the water table. Potential indirect benefits extend to wildlife that use the wetland and riparian communities. Environmental effects from Fort Collins’ Proposed Action on the Main Stem are primarily negligible to minor, although the 0.5-mile exchange reach between the Fort Collins intake and the confluence with the North Fork would have a minor to moderate adverse effect to aquatic habitat due to prolonged low flow periods in dry years.

Other environmental effects from Fort Collins’ Proposed Action would be negligible to minor. These include water quality and temperature effects in both Halligan and Seaman Reservoirs, as well as the North Fork and Main Stem. No exceedances of water quality or temperature standards are projected. Negligible effects to stream morphology and sediment transport on the North Fork and the Main Stem are expected. Fort Collins' Proposed Action would inundate and result in the loss of surface accessibility to a maximum of nine acres of the Halligan 1-4 placer mining claims owned by Cubic Carbon LLC and situated on Bureau of Land Management land. Fort Collins and Cubic Carbon LLC have entered into an agreement permitting Fort Collins to inundate these claims. Fort Collins applied to the Bureau of Land Management on December 21, 2016 for a perpetual Federal Land Policy and Management Act right-of-
way to inundate up to nine acres of Bureau of Land Management land. A minor adverse recreational effect due to the loss of up to several boating days on the Main Stem above Fort Collins would result from Fort Collins’ Proposed Action. Resources including land use, visual and aesthetic resources, air quality, and noise would not be affected by Fort Collins’ Proposed Action. No known hazardous waste sites would be affected by or affect the Proposed Action.

**Expanded Glade Alternative**

Environmental effects due to the Expanded Glade Alternative are primarily related to inundation and associated infrastructure. Under this alternative, the proposed Glade Reservoir inundation area would increase from approximately 1,626 acres to 1,678 acres (an increase of approximately three percent).

This alternative would inundate 0.1 acre of emergent wetland, which is considered a minor effect. The proposed expanded Glade Reservoir would result in approximately 69.4 acres of soil loss due to inundation and access roads, and the expanded area would be inaccessible for use as a construction material resource. Approximately 62.2 acres of upland vegetation not otherwise disturbed or developed would be directly affected by inundation or other long-term disturbance; this is considered a moderate effect because of the magnitude of upland vegetation loss. Approximately 0.35 acre of two shrubland associations tracked by the Colorado Natural Heritage Program would also be affected, which would be considered a moderate effect. The threatened Preble’s meadow jumping mouse has been documented at and near the proposed expanded Glade Reservoir, based on a survey conducted in 2004. The expanded reservoir would inundate suitable habitat and potentially result in the drowning of some mice. The Corps would consult with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act regarding effects to a threatened species if this alternative is selected. The only major socioeconomic effect would be a 43 percent increase in Fort Collins’ water supply requirement fee, affecting developers, housing costs, and regional development patterns. Three hazardous sites exist within the Expanded Glade Alternative search area, requiring appropriate mitigation and management practices.

Because of the relatively small (three percent) increase in inundation area under the Expanded Glade Alternative, most environmental effects are negligible to minor. No water quality exceedances of standards are projected. Although temperature modeling for the Main Stem predicted greater temperature effects than for Fort Collins’ Proposed Action, projected temperature reductions would be more prevalent than projected temperature increases. This implies that relevant narrative standards associated with the maintenance of “normal” patterns of temperature diel and seasonal fluctuations would be achieved for this alternative. Negligible effects to stream morphology and sediment transport on the North Fork and the Main Stem are expected. Access road construction would result in the long-term loss of about 0.6 acre of ditches or canals (i.e., artificial water conveyance features excavated in uplands), which is considered a minor effect to “other waters” potentially regulated under the Clean Water Act. The long-term loss of 0.01 acre of riparian woodland to inundation is considered a minor effect as the loss would not substantially affect the overall distribution or abundance of riparian woodland in the area. Indirect effects to herbaceous and shrub-dominated wetlands and cottonwood woodlands along the Main Stem are unlikely or negligible. The Expanded Glade Alternative would provide a small increase in new open water habitat for aquatic organisms. The proposed Glade Reservoir would be suitable for a recreational fishery that could support populations of both stocked and self-sustaining fish species. The Expanded Glade Alternative would represent a minor beneficial effect on aquatic biological resources, and wildlife
species that might feed on these resources, such as American white pelican. Other wildlife effects would be negligible. A minor adverse recreational effect due to the loss of up to three boating days on the Main Stem above and through Fort Collins would result from the Expanded Glade Alternative. No additional recreational use above that estimated for the proposed Glade Reservoir itself is expected as a result of the Expanded Glade Alternative. The inundation area for the expanded reservoir includes a small portion of the U.S. Highway 287 realignment and affects lands owned by Northern Water. Other land use effects include small changes in agricultural operations in Larimer County. The Expanded Glade Alternative would not affect visual and aesthetic resources, air quality, and noise.

Gravel Pits Alternative

Environmental effects due to the Gravel Pits Alternative are primarily related to inundation and associated infrastructure. A total of 4.3 acres of wetland around the perimeter of the Gravel Pits would be lost long-term either from inundation or physical removal to facilitate lining and shoreline erosion protections. This loss of wetland is considered a moderate effect. In addition, the Gravel Pits Alternative would result in approximately 24 acres of soil loss due to access roads, berms, and other infrastructure and the disturbed areas would be inaccessible for use as a construction material resource. The only major socioeconomic effect would be a 123 percent increase in Fort Collins’ water supply requirement fee, affecting developers, housing costs, and regional development patterns.

Most environmental effects under the Gravel Pits Alternative are considered minor or negligible. This is due in part to existing disturbances, such as existing gravel pits and adjacent agricultural lands. No exceedances of water quality standards are projected, and day-to-day patterns of temperature variability would be altered only slightly on the Main Stem. This alternative would have a negligible effect on morphology and sediment transport on the both North Fork and Main Stem. No long-term adverse effects to groundwater are expected. A total of 0.3 acre of ponds and ditches would be permanently lost due to access road construction. These are artificial water storage and conveyance features excavated entirely in an upland setting and their loss would be considered a minor effect to “other waters” potentially regulated under the Clean Water Act. The long-term loss of 0.01 acre of riparian woodland to inundation is considered a minor effect, as the loss would not substantially affect the overall distribution or abundance of riparian woodland in the area. Indirect effects to herbaceous and shrub-dominated wetlands and cottonwood woodlands along the Main Stem are unlikely or negligible. The Gravel Pits Alternative would create open water that would likely support a limited community of aquatic organisms due to the constant changes in water level and storage volume. The overall effect on aquatic biological resources would be a minor beneficial effect. The majority of long-term vegetation effects would occur to agricultural lands and non-native grasslands. Effects on these communities are considered minor. About 0.2 acre of foothill grasslands would be affected from access road construction. An estimated 20 percent (0.04 acre) of this grassland meets the description for a grassland community considered vulnerable to imperiled in the state by the Colorado Natural Heritage Program. However, the native foothill grasslands that would be affected by the Gravel Pits Alternative have been degraded by non-native, invasive species, including cheatgrass and smooth brome. Long-term loss of this grassland association would be minor because of the small size of the loss and the degraded condition of the grassland. No or negligible impacts would occur to big game and other wildlife or habitat, including big game severe winter range. Minor effects would occur to 10 species of concern. The gravel pits would not be available for recreation, so recreation effects are
negligible. A minor change in the visual quality rating would occur. This alternative would have the highest emissions levels for all criteria air pollutants due to the required excavation. One pollutant, carbon monoxide, is projected to exceed the threshold during construction, but this effect would be temporary. Likewise, some noise levels are expected to exceed thresholds during construction, but again, the effect would be temporary. No known hazardous waste sites would be affected by or affect the Gravel Pits Alternative.

Agricultural Reservoirs Alternative

Environmental effects from the Agricultural Reservoirs Alternative are primarily associated with infrastructure. The size of the Agricultural Reservoirs (NPIC Reservoirs Number 5 and 6) would not change, therefore inundation effects would not occur. Long-term wetland loss would total 0.32 acre due to the placement of a pipeline in the ditch extending from the Agricultural Reservoirs to the Larimer County Canal. This loss is considered a minor effect. This alternative would result in approximately 11 acres of soil loss due to access road, pump station, pretreatment facility, valve house, and river turnout construction and the disturbed areas would be inaccessible for use as a construction material resource. About 8.1 acres of foothill shrublands would be temporarily affected by a staging area west of Claymore Lake. This foothill shrublands meets the description of an association considered to be vulnerable to imperiled in the state by the Colorado Natural Heritage Program. Additionally, the staging area would be located on the edge of the Horsetooth Reservoir Hogbacks Potential Conservation Area, which is considered an area of very high biodiversity significance by the Colorado Natural Heritage Program because of the presence of sensitive species and sensitive plant communities that support those species. The Corps considered short-term effects on these foothill shrublands to be major because of their status in the state and the unlikelihood of successful restoration. The only major socioeconomic effect would be a 166 percent increase in Fort Collins’ water supply requirement fee, affecting developers, housing costs, and regional development patterns.

Most environmental effects under the Agricultural Reservoirs Alternative are considered minor or negligible. This is due in part to existing disturbances and no new inundation. No exceedances of water quality standards are projected. Main Stem temperature modeling for the Agricultural Reservoirs Alternative predicted temperature effects that are slightly greater than for Fort Collins’ Proposed Action and include multiple short-term periods of both temperature reduction and increases. While a few of these short-term increases are predicted to climb slightly above the relevant water quality standard under future conditions, there are also instances where this alternative is predicted to lower temperatures below the standard – i.e. to eliminate an existing violation. The total number of standards violations is thus predicted to remain roughly the same. This alternative would have a negligible effect on morphology and sediment transport on the both North Fork and Main Stem. No long-term adverse effects to groundwater are expected. Negligible effects on herbaceous and shrub-dominated wetlands and cottonwood woodlands throughout the Main Stem are expected. The Agricultural Reservoirs Alternative would not change the size of NPIC Reservoirs Number 5 and 6 but would slightly increase the average annual volume of water stored in the reservoirs and therefore the average area available as habitat for aquatic organisms. This would represent a minor beneficial effect on aquatic biological resources. No or negligible impacts would occur to big game and other wildlife or habitat, including big game severe winter range. Minor effects would occur to 10 species of concern. Overall socioeconomic effects are generally minor, although this
alternative would be the most costly to build of all the alternatives, including Fort Collins’ Proposed Action. Recreation impacts would be negligible to minor as recreational use of the reservoirs would continue as under current conditions with no changes in access or activities. A minor change in the visual quality rating would occur. Regarding air quality, one pollutant, carbon monoxide, is projected to exceed the threshold during construction, largely due to a gasoline-fueled generator operating during construction. Most emissions would not occur in the carbon monoxide maintenance areas and this effect would be temporary. Likewise, some noise levels are expected to exceed thresholds during pipeline construction, but again, the effect would be temporary. No known hazardous waste sites would be affected by or affect the Agricultural Reservoirs Alternative.

No-Action Alternative

Under the No-Action Alternative, no new infrastructure would be developed and no construction would occur, therefore this alternative has the least environmental effects. This alternative does include operational changes at Joe Wright Reservoir, acquisition of shares in NPIC, specifically for the Colorado-Big Thompson storage shares component, and mandatory water restrictions during periods of drought and system failures, so some effects would occur. Under the No-Action Alternative, historic aquifer recharge rates would likely be reduced due to diversion of historic irrigation water rights for municipal use, potentially resulting in long-term adverse effects to groundwater quality due to declines in the local water table in rural areas where water was diverted to Fort Collins. The No-Action Alternative could indirectly affect some wildlife, including species of concern, through the transfer of agricultural water rights to municipal use, which could potentially dry up wetlands associated with agricultural return flows. Species whose habitat includes wetland and riparian communities, which include federally listed Preble’s meadow jumping mouse, Colorado butterfly plant, and Ute ladies’-tresses, would be most likely to experience indirect effects, although the effects would be difficult to discern due to overall drought stress. Furthermore, mandatory water restrictions in Fort Collins would likely result in water-stressed landscaped areas including residential lawns, city parks and, possibly, golf courses. Water restrictions would potentially affect urban wetlands and riparian areas supported by lawn irrigation return flows and elevated groundwater. These areas could be used by some wildlife species and have potential to support species of concern.

Fort Collins would invest about the same amount of money budgeted for Fort Collins’ Proposed Action into water acquisitions, specifically shares of NPIC. Therefore, the No-Action Alternative would cost an estimated $38.2 million dollars, all for water acquisitions. Water rates would increase by 25 percent for all customers during years that Fort Collins would implement Level 3 mandatory watering restrictions. The excess water surcharge also would increase by 15 percent for all customers in applicable situations. These increases in water rates would result in major effects to customers; however, Level 3 restrictions would occur only rarely, in one year of the 86-year modeling period. As with Fort Collins’ Proposed Action, the No-Action Alternative would require a 23 percent increase in Fort Collins’ Water Supply Requirement fee for all customer types; that increase would constitute a major effect to that fee. During times when Fort Collins would need to enforce mandatory water use restrictions, the potential exists for a moderate level of effects to residents, with the exception of major, temporary effects from water rate increases under Level 3 restrictions. Those effects would be focused specifically on activities related to water use. The No-Action Alternative would affect agriculture due to both the reoperation of Joe Wright
Reservoir and the acquisition of additional NPIC shares. An estimated 800 acres would be converted from irrigated to dryland agriculture, resulting in $1.0-million dollar loss of annual agricultural production and loss of eight agricultural jobs.

CUMULATIVE EFFECTS

Cumulative effects are those that would result incrementally from the Project Alternatives in combination with other past, present, and reasonably foreseeable future actions (RFFAs) over a period of time. Spatial and temporal boundaries were defined to analyze cumulative effects. The spatial boundary (physical area) evaluated was the geographic area where effects from the Project Alternatives are expected to occur, and the Fort Collins Utilities service boundary, unless otherwise specified for specific resources (e.g., wildlife, socioeconomics). The temporal boundary spans effects from past, present, and RFFAs through 2065. The past temporal parameter was set as 1909, the year Halligan Dam was built, which was the first major water project in the Cache la Poudre River Basin. The future temporal parameter was set based on the Fort Collins’ purpose and need statement to meet the 2065 water demand requirement.

For flow-related resources, 15 RFFAs were included in Common Technical Platform modeling, and effects were determined by comparing the Cumulative Effects model run against the Future Conditions baseline model run. An additional three flow-related projects were considered qualitatively because they were identified following completion of the Common Technical Platform model. Thirteen land-based RFFAs were identified for evaluation. Climate change and its effects on the Project Alternatives were considered an RFFA and included in the analysis. While climate change may be considered reasonably foreseeable, there is no generally accepted scientific method to correlate air temperature changes with incremental changes in stream flow or reservoir levels. In addition, while climate change projections generally agree that an increase in ambient air temperatures is probable, projections of climate change-related effects on precipitation in the Cache la Poudre River Basin are less consistent. Thus, hydrologic changes in response to global climate change are not quantitatively described.

Regarding surface water, on the Upper Poudre, the Cumulative Effects model run compared to the Future Conditions hydrology showed minor changes in stream flows above the Munroe Canal under all alternatives. Below the Munroe Canal and the Fort Collins Pipeline, reductions in annual stream flows were minor, averaging between 1.0 percent and 2.1 percent, depending on the alternative. The 1.0 percent reduction under Fort Collins’ Proposed Action was due to higher demands with Fort Collins Proposed Action as well as diversions taken from the Halligan Reservoir by exchange. Reductions occurred year-round but were typically highest in June and July.

Continuing downstream, annual stream flows at Canyon Gage were reduced between 20 percent and 21 percent, depending on the alternative, when Cumulative Effects were compared to the Future Baseline conditions. The large reduction under Cumulative Effects comes largely from the NISP project effects as the Canyon Gage is located just downstream of the Poudre Valley Canal headgate where NISP water supply sources would be diverted. This effect continues below Larimer Canal Number 2 and New Mercer Ditch, where flows were reduced between 29 percent and 30 percent, depending on the alternative. At this location, flows were decreased during the months of May to August but were actually higher during the winter months due to the proposed NISP low flow augmentation program along this stretch of the river. Resources affected by hydrology changes would be incrementally affected by the Project Alternatives.
The cumulative impacts to land-based resources showed an incremental increase but nothing crossed a threshold.
This page left intentionally blank.
Chapter 1 - Purpose and Need
Table of Contents

1 Purpose and Need ........................................................................................................................... 1-1
  1.1 Introduction ............................................................................................................................... 1-1
  1.2 Cooperating Agencies .............................................................................................................. 1-1
  1.3 Background ............................................................................................................................... 1-2
  1.4 Project Purpose and Need ......................................................................................................... 1-3
    1.4.1 Basic Project Purpose ......................................................................................................... 1-3
    1.4.2 Overall Project Purpose ..................................................................................................... 1-3
      1.4.2.1 Consideration of Purpose and Need Statements Identified by Fort Collins .................. 1-4
      1.4.2.2 Other Considerations .................................................................................................... 1-6
    1.4.3 Need for the Project ............................................................................................................ 1-7
      1.4.3.1 Existing Water Supply and Demand .............................................................................. 1-7
      1.4.3.1.1 Relationship of Firm Annual Yield to Drought Protection .................................... 1-8
      1.4.3.1.2 Safety Factor .............................................................................................................. 1-9
      1.4.3.1.3 Firm Yield Calculation .............................................................................................. 1-9
      1.4.3.2 Future Water Demand .................................................................................................. 1-10
      1.4.3.2.1 Projected Growth ........................................................................................................ 1-10
      1.4.3.2.2 Projected Future Water Demand ............................................................................... 1-11
      1.4.3.3 Determination of Need .................................................................................................. 1-13
    1.4.4 Purpose and Need Statement ............................................................................................... 1-14
  1.5 Agency and Public Scoping Issues ............................................................................................ 1-15
  1.6 Required Permits and Approvals ............................................................................................ 1-16
  1.7 References ............................................................................................................................... 1-19

List of Tables

Table 1-1. Permits and approvals likely required to construct and operate the Halligan Water Supply Project. ................................................................................................................................. 1-17

List of Figures

Figure 1-1. Population projections for Fort Collins, 2015 to 2065...................................................... 1-11
Figure 1-2. Historical and projected water requirements for the Fort Collins Utilities through 2065..... 1-13
Figure 1-3. Comparison of future water demands (yellow bars) with current firm annual yield (black line) for Fort Collins. ............................................................................................................. 1-14
List of Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-BT</td>
<td>Colorado-Big Thompson Project</td>
</tr>
<tr>
<td>CDPHE</td>
<td>Colorado Department of Public Health and Environment</td>
</tr>
<tr>
<td>Corps</td>
<td>United States Army Corps of Engineers, Omaha District, Regulatory Branch</td>
</tr>
<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
</tr>
<tr>
<td>EISPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>Fish and Wildlife Service</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Forest Service</td>
<td>U.S. Forest Service</td>
</tr>
<tr>
<td>Fort Collins</td>
<td>city of Fort Collins</td>
</tr>
<tr>
<td>Greeley</td>
<td>city of Greeley</td>
</tr>
<tr>
<td>Halligan Project</td>
<td>Halligan Water Supply Project</td>
</tr>
<tr>
<td>Main Stem</td>
<td>The portion of the Cache La Poudre River from the confluence with the North Fork to the confluence with the South Platte</td>
</tr>
<tr>
<td>NISP</td>
<td>Northern Integrated Supply Project</td>
</tr>
<tr>
<td>North Fork</td>
<td>North Fork of the Cache la Poudre River</td>
</tr>
<tr>
<td>Northern Water</td>
<td>Northern Colorado Water Conservancy District</td>
</tr>
<tr>
<td>NPIC</td>
<td>North Poudre Irrigation Company</td>
</tr>
<tr>
<td>Poudre River</td>
<td>The entire river system from the headwaters to the confluence with the South Platte</td>
</tr>
<tr>
<td>RFFA(s)</td>
<td>Reasonably Foreseeable Future Actions</td>
</tr>
<tr>
<td>Summer Plan</td>
<td>North Weld County Water District, East Larimer County Water District, and the Districts</td>
</tr>
<tr>
<td>Tri-Districts</td>
<td>Fort Collins-Loveland Water District</td>
</tr>
<tr>
<td>U.S.</td>
<td>United States</td>
</tr>
<tr>
<td>Upper Poudre</td>
<td>The portion of the Poudre River above the confluence with the North Fork</td>
</tr>
<tr>
<td>WEST</td>
<td>Western Ecosystems Technology, Inc.</td>
</tr>
</tbody>
</table>
1 Purpose and Need

1.1 INTRODUCTION

The United States (U.S.) Army Corps of Engineers, Omaha District, Regulatory Branch (Corps) has prepared this Draft Environmental Impact Statement (Draft EIS) to evaluate potential environmental consequences associated with the proposed Halligan Water Supply Project (Halligan Project), a municipal water supply project designed to serve the future water needs of the city of Fort Collins (Fort Collins), Colorado. The Halligan Project proponent is Fort Collins acting through Fort Collins Utilities. Construction of the Halligan Project would require the discharge of dredged and fill material into jurisdictional waters of the U.S., thereby requiring a Clean Water Act Section 404 permit from the Corps. Fort Collins notified the Corps of their intent to seek a Section 404 permit for the Halligan Project in 2005.

In review of the Halligan Project, the Corps determined that an analysis of potentially significant natural and human environmental effects of the Halligan Project and a reasonable range of alternatives was required in accordance with the National Environmental Policy Act of 1969, as amended, and the Corps regulations for implementing the National Environmental Policy Act, (33 Code of Federal Regulations 325 1988).

This Draft EIS has also been formulated to address the information requirements of the Clean Water Act Section 404(b)(1) Guidelines (40 Code of Federal Regulations 230). The Corps is the lead federal agency responsible for preparing the Draft EIS. The Corps was assisted by a team of third-party contractors led by Western Ecosystems Technology, Inc. (WEST), working under the direction of, and in cooperation with, the Corps in accordance with December 17, 1997 guidance from the Chief of Engineers regarding preparation of an EIS. The Corps has verified and takes responsibility for all determinations and conclusions in this Draft EIS.

1.2 COOPERATING AGENCIES

The Corps requested that federal and state agencies and local governments with statutory authority over the Halligan Project, or special expertise with an environmental issue, participate in the National Environmental Policy Act process as cooperating agencies (40 Code of Federal Regulations 1501.6 and 1508.5). Those agencies and governments include the U.S. Environmental Protection Agency (Environmental Protection Agency); U.S. Fish and Wildlife Service (Fish and Wildlife Service); U.S. Forest Service (Forest Service); Bureau of Land Management; Colorado Department of Natural Resources, which includes the Colorado Division of Parks and Wildlife (formerly Colorado Division of Wildlife) and the Colorado Water Conservation Board; Colorado Department of Public Health and Environment (CDPHE), and Larimer County. Weld County declined to be a cooperating agency.

The Environmental Protection Agency is a cooperating agency on issues for which the agency has special expertise. The Fish and Wildlife Service is responsible for consultation with the Corps and Fort Collins
under the Endangered Species Act (1973) and the Fish and Wildlife Coordination Act. The Forest Service is a cooperating agency because the Halligan Project could affect hydrology-related resources in the North Fork of the Cache la Poudre River (North Fork) flowing through the Roosevelt National Forest. The Bureau of Land Management agreed to be a cooperating agency because the Halligan Project could inundate some Bureau of Land Management land. Colorado Department of Natural Resources became a cooperating agency to facilitate federal and state coordination under the Fish and Wildlife Coordination Act and development of a state Fish and Wildlife Mitigation Plan pursuant to the requirements of Colorado Revised Statutes 37-60-122.2. CDPHE became a limited-scope cooperating agency due to their statutory authority under Section 401 of the Clean Water Act and their special expertise related to water quality issues, with their scope limited to addressing water quality assessment methodology and water quality impact analyses. Larimer County agreed to be a cooperating agency due to their statutory requirements to allow a decision to be rendered by the Larimer County Planning Commission for Location and Extent Review (Colorado Revised Statutes 30-28-110) for projects in Larimer County. A 1041 permit or intergovernmental agreement, building permits, and approval of site plans would also be required from Larimer County.

1.3 BACKGROUND

In 2005, Fort Collins and the city of Greeley (Greeley) jointly proposed the Halligan-Seaman Water Supply Project, under which the two cities would enlarge and jointly operate Halligan and Seaman reservoirs, located on the North Fork, northwest of Fort Collins. The project was proposed to provide a reliable water supply for the anticipated demands associated with projected growth of the two cities, the Tri-Districts (composed of the North Weld County Water District, East Larimer County Water District, and the Fort Collins-Loveland Water District), and the North Poudre Irrigation Company (NPIC). The enlarged Seaman Reservoir would meet the needs of Greeley, while the enlarged Halligan Reservoir would meet the needs of Fort Collins, the Tri-Districts, and NPIC. Up until January 2015, the Corps was working toward a combined EIS for the Halligan-Seaman Water Supply Project. In early 2015, the Corps granted a request by Fort Collins and Greeley to separate the analysis of the two projects into two EISs: the Halligan Water Supply Project and the Seaman Water Supply Project. The Corps performed a significant amount of work and analysis prior to the separation of the two projects that will be necessary for and appropriately included in the separate National Environmental Policy Act analyses. In preparing the Halligan Project Draft EIS, the Corps has reviewed all previous work for the Halligan-Seaman Water Supply Project and, unless otherwise specified, concludes it remains current and relevant. Some documents cited in this Draft EIS for the Halligan Project may refer to the Halligan-Seaman Water Supply Project.

Fort Collins acquired Halligan Reservoir in 2004 pursuant to a 1993 option agreement with NPIC. While the acquisition agreement allows Fort Collins to enlarge Halligan Reservoir, the existing storage of approximately 6,400 acre-feet remains in NPIC ownership and control. In 2005, as part of the originally proposed Halligan-Seaman Water Supply Project, Fort Collins proposed to build a new dam and increase the capacity of Halligan Reservoir by 33,462 acre-feet to meet Fort Collins’ future water needs and the needs of the Tri-Districts and NPIC. After the Tri-Districts and NPIC withdrew from the project in 2009 and 2013, respectively, Fort Collins reduced the proposed enlargement of Halligan Reservoir to
8,125 acre-feet. The proposed enlargement of 8,125 acre-feet, along with the existing capacity of 6,400 acre-feet, would result in a total enlarged capacity of 14,525 acre-feet.

For the purposes of this Draft EIS, the Corps defined the portion of the Cache La Poudre River from the confluence with the North Fork to the confluence with the South Platte River as the Main Stem. Poudre River is used when discussing the entire river system from the headwaters to the confluence with the South Platte River. The Upper Poudre refers to that portion of the Poudre River above the confluence with the North Fork.

1.4 PROJECT PURPOSE AND NEED

Under the National Environmental Policy Act guidelines and implementing regulations in 40 Code of Federal Regulations 1502.13, the lead federal agency must state the purpose and need for the proposed action when preparing an EIS. Clean Water Act guidelines (40 Code of Federal Regulations 230.10(a)(2)–(3)) distinguish between the basic (fundamental, essential, or irreducible) purpose and overall project purpose, and specify that the basic purpose determines whether the proposed action is water dependent. This distinction ensures that the scope of the EIS and the range of alternatives analyzed are sufficiently broad to fully inform the agency decision maker.

To describe the project purpose and need, the proposed project must first be defined. In Corps EISs for permits under Section 404 of the Clean Water Act, the project is proposed by the applicant and is not necessarily what the Corps can or will authorize. In this EIS, enlargement of the Halligan Reservoir – the Halligan Project – is Fort Collins’ Proposed Action.

1.4.1 Basic Project Purpose

In an effort to afford special protection to wetlands and other special aquatic sites as identified in subpart E of the 404(b)(1) Clean Water Act Guidelines, there are two rebuttable presumptions for activities that do not require access or proximity to or siting within special aquatic sites to fulfill their basic purpose. Such activities are considered to be non-water dependent, and the Corps presumes that (1) practicable alternatives not involving special aquatic sites are available, and (2) such alternatives are less damaging to the aquatic ecosystem, unless clearly demonstrated otherwise (40 Code of Federal Regulations 230.10(a)(3)). Whether or not an activity is water dependent or not is based on the definition of the basic project purpose. The Corps determined that the Halligan Project’s basic project purpose is to supply water. In this instance, the basic purpose of supplying water, whether for municipal, industrial or agricultural uses, does not require access or proximity to, or siting within, a wetland or riffle pool complex (the special aquatic site types that would be affected by Fort Collins’ Proposed Action) for it to be fulfilled. Therefore, Fort Collins’ Proposed Action is not water dependent for the purposes of the 404(b)(1) Clean Water Act Guidelines and the rebuttable presumptions apply.

1.4.2 Overall Project Purpose

The Corps uses the overall project purpose to evaluate whether less environmentally damaging practicable alternatives are available and to help make a decision whether to issue or deny a Section 404
permit. The 404(b)(1) Clean Water Act Guidelines state that an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose (40 Code of Federal Regulations 230.10(a)(2)). This evaluation applies to all waters of the U.S., not just special aquatic sites.

Independent evaluation of the overall project purpose is the Corps’ responsibility. The Corps, in all cases, exercises independent judgment in defining the purpose and need for a project to be permitted under its regulatory program from the applicant’s and public’s perspective (33 Code of Federal Regulations 325, Appendix B, Section 9(b)(4)) and in light of the public’s perspective. The Halligan Project’s overall purpose is synonymous with the purpose and need statement for the Halligan Project, which is:

To provide additional system firm yield for Fort Collins in order to satisfy an additional need of approximately 7,900 acre-feet per year to meet its projected 2065 municipal and industrial demands with water of a quality comparable to the water now delivered to its customers.

1.4.2.1 Consideration of Purpose and Need Statements Identified by Fort Collins

Although the Corps should consider the views and needs of the applicant regarding the project purpose and need and the existence (or lack) of practicable alternatives, the Corps must determine and evaluate these matters itself, with no control or direction from the applicant, and without undue deference to the applicant’s wishes (33 Code of Federal Regulations 325, Appendix B, Section 9(b)(4)). The overall project purpose must be specific enough to define the applicant’s needs and the geographic area of consideration for the proposed project, but the Corps must be careful to not so narrowly define a project purpose that it unduly restricts a reasonable search for alternatives and at the same time not prescribe an overly broad definition that requires such an exhaustive review of alternatives that an analysis cannot reasonably be completed. The Corps’ definition is to be formulated in light of the purpose(s) and need(s) identified by the applicant(s), in light of the public’s perspectives provided during the scoping process.

Fort Collins identified a number of purposes and objectives for the Halligan Project, including drought protection, system flexibility, optimization of current water portfolios, replacing an aging dam to address potential safety issues, and providing reliable water supplies of a certain quality to address anticipated growth and water needs. In addition, Fort Collins identified potential environmental restoration and enhancements in the North Fork as part of the Halligan Project. Fort Collins also investigated operations that would enhance the environment along the Main Stem. In the Project Description Report for the Halligan Reservoir Expansion (Fort Collins 2006) as well as other documents, Fort Collins identified its purpose as creating additional raw water storage to address all of the identified purposes and/or objectives listed above. The Fort Collins Water Supply Policy (Resolution 88-205, Fort Collins 2014a), established in 1988, required that Fort Collins maintain a water supply sufficient to meet the treated water demands of Fort Collins during a specific drought standard (i.e., the design drought), referred to in the policy as the “1-in-50 year critical drought.” This policy was revised in 2003 as the Water Supply and Demand Management Policy (Resolution 2003-104, 2014b) and was last updated in 2012 (Resolution 2012-099). All revisions to the policy have continued the 1-in-50 year design drought criterion. Thus, Fort Collins defined its water supply reliability criteria as no system shortages while maintaining a minimum of 15 percent annual demand in storage at the end of each month through the 1-in-50 year critical drought. The proposed storage in Halligan Reservoir would provide increased water supply by creating long-term
carryover storage and operational storage. Long-term carryover storage could be used to maximize yield from existing and future water rights and to provide adequate water supplies in the 1-in-50-year critical drought under predicted future development conditions in Fort Collins’ service areas. Operational storage would allow the re-timing of water seasonally to maximize the yield of existing and future water rights and would also be used to meet certain return flow obligations required when converting agricultural water to municipal water as decreed by Colorado's water courts. The Corps viewed the inclusion of “raw water storage” in the purpose statement as being too narrow specifically because it resulted in a restricted range of alternatives. The Corps determined that storage was only one of several ways to achieve the needs of Fort Collins. Modifications or additions to existing system infrastructure and operations, integration with other water providers' systems and sources, and acquisition of new sources are some ways that potentially could address some or all of Fort Collins’ identified needs. Most of these strategies require new storage to address the entire need; however, specifying new storage within the purpose statement would possibly eliminate many of these strategies because they do not necessarily rely solely on storage.

Conversely, the number and type of purposes identified by Fort Collins greatly increased the complexity of the Halligan Project purpose statement and would require an exhaustive review of alternatives that the Corps could not reasonably accomplish. Alternatives would need to be formulated for each purpose: optimization of current water portfolios, environmental enhancement or restoration, replacing the aging dam, system flexibility (which itself would prove challenging to formulate a manageable range of options), drought protection, and providing reliable supplies to address anticipated growth. The Corps does not have to accept an applicant’s definition of project purpose that merges multiple aspects into one definition. Rather, the Corps evaluated each purpose within the context of the overall purpose and sought alternatives that would address each component as well as integrated options.

Fort Collins’ desire to optimize its current water rights portfolio by obtaining additional yields or extending their availability over various timeframes was understandable. There are obvious benefits to using rights one owns to address project purposes and needs. Efforts to obtain the existing rights had been accomplished, and it was more efficient to better use those than to acquire additional rights. Ownership of a specific right, however, whether water or other property right, does not confine the alternatives analysis to that right and therefore does not warrant its inclusion in the purpose statement (Corps 2007). Inclusion of such rights in the purpose statement effectively narrows the alternatives search specifically to those rights and eliminates the reasonability and practicability of other options. The 404(b)(1) Clean Water Act Guidelines require the consideration of alternatives that are not presently owned by the applicant which can reasonably be obtained, utilized, expanded or managed. Additionally, the National Environmental Policy Act requires the consideration of alternatives that are not necessarily desirable from the applicant’s standpoint.

Fort Collins’ identification of potential environmental enhancements or restoration on the North Fork was also understandable. While Fort Collins’ Proposed Action would allow this benefit to occur, it was not identified as a specified purpose to address identified needs that Fort Collins wanted to undertake at the time of its permit application. Therefore, environmental improvement was not included as a project purpose and Fort Collins agreed with its exclusion. However, this exclusion does not prohibit the Corps’ consideration of these benefits in the National Environmental Policy Act or 404(b)(1) Clean Water Act Guidelines evaluations in the Draft EIS, where applicable.
Likewise, Fort Collins’ intention to replace the aging Halligan Dam is understandable. The existing Halligan Dam is over 100 years old and, although dam inspections indicate that the structure is currently stable, continuing assessments of the dam indicate it will require major rehabilitation or replacement in the future. Fort Collins’ Proposed Action would ameliorate the potential public safety risk and financial liability presented by the existing, aging Halligan Dam. However, including dam replacement in the purpose statement would significantly narrow the range of alternatives that could be considered. Therefore, the Corps determined and Fort Collins agreed to omit dam replacement as a project purpose.

Attempting to incorporate into the purpose statement such a broad and discretionary-based characteristic as system flexibility would make the analysis of alternatives unwieldy. The Corps found that its inclusion in the overall purpose statement was not warranted, although system flexibility was addressed in the evaluation of all reasonable and practicable alternatives. The applicant would typically have broad discretion in the degree of flexibility of system operations, and this degree can vary widely among the alternatives. The range of system operations that can be associated with any of the alternatives will be action-specific and will be utilized to avoid and minimize impacts to aquatic and other resource factors while ensuring that critical water supply criteria are met (e.g., system yield).

Fort Collins has established water quality goals and policies for treated water delivered to their customers. Fort Collins has identified maintaining water quality for treated water delivered to its customers as a desired purpose. Although there are established federal standards that allow for lower-quality water to be provided, Fort Collins has strived to provide higher-quality water for the benefit of the public. The Corps believes that maintaining these standards and meeting the public’s continued expectations is a reasonable component of the project purpose. That does not designate a particular source of water with specified quality to address the needs because the specified quality could be attained through additional treatment. Inclusion of this objective in the purpose statement will not adversely affect the range of reasonable alternatives or their practicability.

1.4.2.2 Other Considerations

Based on definitions by which the Corps operates, the Halligan Project is considered a supply project and not a management project. The major distinguishing point between a supply project and a management project is that a supply project addresses new demands, whereas a management project proposes to increase the efficiency of existing water supplies and/or address needs during droughts. Furthermore, management projects that address drought can restrict the availability of water for use only during a drought. Supply projects allow more flexibility in water use. In general, the Corps has used a 50-year planning period for regional water supply projects. The Halligan Project National Environmental Policy Act process was initiated in 2005 with a 45-year planning period, projecting needs and demands to 2050. Due to delays and reformulation of applicants associated with the project, the Corps re-evaluated the purpose and need in 2015 and extended the planning period to 2065 (Corps 2015). The re-evaluation considered changes in the demand, projected population growth, planned conservation measures, and incorporated available data related to water use. It was not necessary to re-evaluate changes in Fort Collins’ water supply portfolio, facilities, and operations from 2005 to 2015 because these changes are part of the future conditions baseline and are incorporated in the model runs used to determine the size of the Halligan Reservoir enlargement needed to meet Fort Collins future demands. The Corps analyzed the
potential effects of the demand change and extended planning period on the hydrology modeling and alternatives screening results. The Corps concluded the hydrology model and alternatives screening process were still valid with the changed demand and planning period extended to 2065. Fort Collins stated that the Halligan Project would address the projected demands out to approximately 2065 and provide desired greater system flexibility.

In ensuring that the Halligan Project is adequately captured, and while maintaining an alternatives analysis that is neither too restrictive nor too broad, the Corps held that providing additional system safe and reliable yield ("firm yield" or "firm annual yield") for water supply should be the focus of the purpose statement. By incorporating the term “firm yield,” items such as drought protection and reliable supply will be fully captured. These factors are critical to making reasonability and practicability determinations for alternatives.

1.4.3 Need for the Project

The need for the Halligan Project is to secure additional system firm yield for Fort Collins necessary to satisfy its projected 2065 municipal and industrial demands. The need for the Halligan Project is determined, in large part, by the magnitude and timing of the Fort Collins water demands in excess of water supplies available, including during drought years. In evaluating Fort Collins’ need for the Halligan Project, the Corps considered Fort Collins’ existing and future firm yield estimates of population growth for Fort Collins, water use trends, and future water demands as well as other pertinent factors, such as current and future conservation measures taken by Fort Collins. Additional details concerning Fort Collins’ projected need are presented below and in the Technical Memorandum HE-1. City Of Fort Collins Water Demands (Harvey Economics 2015) and Final Purpose and Need Report for the Halligan Water Supply Project Environmental Impact Statement (Purpose and Need Report; WEST 2016).

1.4.3.1 Existing Water Supply and Demand

The Corps and the third-party contractor developed a Common Technical Platform so that the environmental effects to multiple flow-related resources - surface water, groundwater, water quality, geomorphology, aquatic habitat, riparian habitat, wetlands - from the Northern Integrated Supply Project (NISP) proposed by Northern Water, the Seaman Water Supply Project proposed by Greeley, and the Halligan Project could be compared against consistently defined current and future hydrology conditions. With three proposed projects located primarily in a single river basin and potentially impacting some of the same river reaches, the Corps felt it was important that each EIS evaluate effects to the river basin using a common approach based on consistent hydrology data and assumptions regarding key operational aspects. To meet this objective, the Corps developed a series of integrated hydrologic models known as the Common Technical Platform model sequence to simulate current conditions hydrology, future conditions hydrology, Project Alternatives scenarios including the Proposed Action for each of the three projects, and cumulative effects of the Proposed Actions. The Corps provided a review of the hydrology and modeling activities of Fort Collins, Greeley, and the Northern Colorado Water Conservation District in a separate report titled Hydrologic Modeling Technical Report for the Halligan Water Supply Project Environmental Impact Statement (CDM Smith, Inc. and DiNatale Water Consultants 2016). The Corps also used the Common Technical Platform model sequence to determine the yield from Fort Collins’
water rights portfolio. More information concerning modeling is also contained in the *Purpose and Need Report* (WEST 2016).

Calculation of the firm annual yield considered current Fort Collins infrastructure, seasonally variable municipal demand, non-potable demands, and other reasonably foreseeable future conditions that could affect the yield of any part of the existing water rights portfolio (e.g., development of conditional water rights by others). The modeling process to compute the firm annual yield for Fort Collins required the use of two models: (1) the Poudre Basin Network model to quantify water rights yields of individual ditch and reservoir systems and municipal-owned water rights, and (2) the Fort Collins system model to simulate Fort Collins’ water supply system operations. The Common Technical Platform model sequence incorporated the Fort Collins-defined reliability criteria to be no system shortages while maintaining a minimum of 15 percent of annual demand in storage at the end of each month through a 1-in-50-year critical drought.

Some changes to Fort Collins’ water rights and water supply facilities have occurred since 2010, which was the year used to define the baseline conditions in the Common Technical Platform model sequence. For example, in 2015 Fort Collins constructed a gravel pit storage facility, the Rigden Reservoir, used to meet return flow obligations and manage reusable wastewater effluent. As a result, Fort Collins curtailed releases from the existing Halligan Reservoir of exchanged Southside Ditch agricultural water to meet winter return flow obligations, an operation based on an annual verbal agreement with NPIC. As other examples, Fort Collins converted additional Southside Ditch shares from agricultural to municipal use in 2014, and completed a change of use water court case that converted shares of the Water Supply and Storage Company from agricultural use to municipal use in 2015.

Changes occurring after 2010 are not incorporated in the baseline or firm yield modeling. However, these changes are part of the Future Conditions Baseline and are incorporated in the model runs used to determine the size of the Halligan Reservoir enlargement required to meet Fort Collins future demands. Therefore, changes to Fort Collins water rights portfolio and the construction of new water supply facilities since 2010 would not alter the size of the Halligan Reservoir enlargement.

1.4.3.1.1 Relationship of Firm Annual Yield to Drought Protection

Firm annual yield by definition is water available throughout the period of need, or in this case, the model hydrology study period, including all droughts contained within the study period. Fort Collins proposed, and the Corps determined appropriate, a 1-in-50-year critical drought hydrology for analysis of water supply reliability. To capture the 1-in-50-year critical drought period, Fort Collins based its system model hydrology on a study period with historic hydrology (1950-2005) verified by the Corps. The Corps accepted this historic hydrology because it included a wide range of flows and concluded that while data from 2005 to the present may be available, it would not significantly change the modeled hydrology; thus there was no need to update the hydrology study period.

Fort Collins adopted drought criteria based on a previous study conducted for Fort Collins (Resource Consultants, Inc. 1985). This study provided the basis for resolutions by the City Council that specified firm deliveries of water to its citizens in a 1-in-50-year critical drought, as defined in the Fort Collins drought studies (Resource Consultants, Inc. 1985). The Corps further documented the critical drought in the *Hydrologic Modeling Technical Report for the Halligan Water Supply Project Environmental Impact*
1.4.3.1.2 Safety Factor

Water providers typically include a safety factor in their water supply modeling that provides a buffer if an unanticipated stress occurs on water delivery systems. This stress can include storage or delivery system failure, forest fire, adverse unexpected water court rulings, a more severe drought than used for planning, ineffectiveness of conservation measures or drought restrictions, increased raw water losses, and the effects of climate change. Some providers use an “increased annual demand” safety factor, which increases the anticipated annual demand on the system by about eight to 10 percent. Others incorporate a “reserve pool” safety factor in the modeling that keeps a quantity of water equal to some percentage of the total annual demand in storage at all times. Although there is no established standard regarding the size of the reserve pool, Colorado’s Front Range water providers commonly use 15 percent. A few providers incorporate both an increased annual demand safety factor and a reserve pool, with the reserve pool intended to account for the need to keep a minimum volume in storage to maintain water quality and adequate delivery flow rates.

Fort Collins elected to use a “reserve pool” safety factor (also termed the “storage reserve factor”) of 15 percent. Therefore, the Fort Collins system modeling included a condition that a quantity of water equal to 15 percent of the average annual demand remains in its storage reservoirs (existing storage plus the proposed enlargement pool in Halligan Reservoir) at any time. This safety factor provides a reasonable level of assurance there would be a small supply buffer (approximately two to three months of winter or indoor supply, or one month of summer supply) in the event unexpected stressors occur during drought or other events.

In 2012, Fort Collins increased their safety factor to 20 percent in an update to the City’s Water Supply and Demand Management Policy. This change occurred after the Corps had conducted numerous EIS analyses using the 15 percent safety factor. To prevent delay to the National Environmental Policy Act and 404 permitting process, Fort Collins agreed that a 15 percent safety factor should be used in this EIS.


1.4.3.1.3 Firm Yield Calculation

Firm yield is defined as the "maximum amount of demand that can be met with available supply during a representative hydrologic period". For the purposes of the Halligan Project needs assessment, existing or current condition reflected the Fort Collins 2010 water rights portfolio. The firm yield was determined by increasing total water demand in the Fort Collins system model until the model could not meet Fort Collins’ reliability criteria of meeting the demand in a 1-in-50 year critical drought period while maintaining the safety factor of 15 percent of annual demand in storage. The maximum demand at which the reliability criteria were satisfied was considered the firm yield and represented the maximum amount
of water that Fort Collins could provide without the Halligan Project through the critical period while meeting the reliability criteria. The Corps estimated that Fort Collins’ firm yield without the Halligan Project was approximately 30,442 acre-feet per year. The firm yield, termed “Safe Annual Demand” in Fort Collins’ planning documents was met in addition to maintaining a safety factor of 15 percent of that yield (approximately 4,566 acre-feet) in storage at the end of each month during the modeled period.

### 1.4.3.2 Future Water Demand

#### 1.4.3.2.1 Projected Growth

The Corps projected population growth for Fort Collins based on a variety of factors, including historical growth rates, projections of growth from local, regional and state planning agencies, and analyses of the residential and industrial development likely to occur within Fort Collins’ service area.

The Corps made projections of Fort Collins Utilities’ service area population for 2015 through 2040 by applying projected average annual growth rates reflected in traffic analysis zone data to the Fort Collins’ historical population data. The Corps estimated that build-out for Fort Collins Utilities’ service area would occur by 2040, and after that time, additional population growth would be due to re-development. The Corps assumed a small amount of annual growth between 2040 and 2065 due to re-development based in large part on the Fort Collins Buildable Lands Inventory and Capacity Analysis and analysis of recently-approved developments.

The Corps estimated the total population served by Fort Collins Utilities would increase by about 41,300 people (excluding Colorado State University students), or about 32.4 percent, between 2015 and 2065 (Figure 1-1). This amounts to an average annual growth rate of about 0.6 percent. Annual growth rates were projected to decrease over time, from about 1.5 percent per year through 2020 to about 0.3 percent per year after 2040. In comparison to Fort Collins’ projected growth rate, the Colorado State Demographer projected an average annual growth rate of 1.4 percent for Larimer County between 2015 and 2050 (Colorado Department of Local Affairs 2016).

The Corps estimated the slower average growth rate for Fort Collins as compared to projections for Larimer County because:

- Growth within Fort Collins’ service area was projected to be mostly related to in-fill and redevelopment since the City is largely built out
- Fort Collins’ service area is surrounded by other water providers and is unlikely to expand
- Southern portions of Larimer County are developing rapidly and may account for more growth than other areas within the county

The Corps evaluated Fort Collins’ population projections in the context of specific economic and demographic characteristics of Fort Collins and the surrounding area. These projections were considered reasonable compared to future growth rates projected by the Colorado State Demographer and other agencies.
1.4.3.2 Projected Future Water Demand

Water demand forecasting techniques are not standardized and the methods for projecting future water demands can differ substantially among entities. For example, a gallons per capita per day-based approach requires an assumption of potable gallons per capita per day and the application of population projections to that assumption. This approach is more common as it is easily explained to and understood by the public. A land use-based approach uses an assumption of water use per acre for different land types and the application of the number of acres of each land type to that assumption. Other approaches to developing water demand projections also exist that take into account various other factors. Each approach has its own merits and may be applicable to individual water providers, depending on their unique circumstances.

Projections of future potable water demands and requirements for Fort Collins were estimated using a gallons per capita per day forecasting technique. This approach provides a reliable and supportable method for preparing water demand projections. Fort Collins also used the gallons per capita per day-based approach when making projections prior to the commencement of this Draft EIS, so the continued use of a similar method was appropriate.

Records show that Fort Collins’ customers have experienced a fundamental change in water use patterns and attitudes toward water use since the early 2000s drought. In addition, Fort Collins is committed to
maintaining the recently achieved low water use rates by expanding the water conservation program in the future. The individual conservation measures included in Fort Collins’ overall conservation program may change; some measures may be removed while new ones may be added. Taken together, Fort Collins anticipated that the suite of conservation programs will maintain recent lower per capita water use levels. Therefore, the 2004 to 2014 average of 132 total gallons per capita per day (excluding large water users) was applied to Fort Collins’ population projections to estimate a portion of future water demands between 2015 and 2065; these projected demands account for the effects of existing and future conservation measures and reflect associated water savings. Future water savings from conservation was estimated as the difference between the longer term historical average gallons per capita per day (151) and the average gallons per capita per day over the more recent period (132), which, as previously noted, reflects a strong conservation program and current customer attitudes towards water use. Given future population estimates, the calculated water savings from conservation amounted to as much as 3,500 acre-feet by 2065.

Future water demands for identified large water users was projected independently and separately from the population-based projections; these water demands were added into the final projections of total potable demand. Fort Collins’ non-potable demands were not included in the analysis of water requirements because non-potable supplies were also excluded.

Projected water requirements included applicable conveyance, treatment, and distribution losses. The annual loss percentages experienced by Fort Collins’ in recent years was used to estimate the projected water requirements through 2065.

Using the above steps, the Corps estimated potable water requirements at the point of diversion in 2015 for the Fort Collins Utilities to be approximately 26,700 acre-feet (Figure 1-2) and projected water requirements for 2065 to be about 38,400 acre-feet, an increase of about 11,700 acre-feet. Water requirements are projected to increase by approximately 44 percent for the Fort Collins Utilities during this period, or at an average rate of about 0.7 percent per year.
1.4.3.3 Determination of Need

Fort Collins’ need was estimated by comparing their current firm annual yield to projections of future water demands and requirements. The Corps also considered water conservation already achieved and anticipated as identified in Chapter 5 of the Purpose and Need Report (WEST 2016) to be water need reducers. Because Fort Collins’ need already takes into account the water savings expected from future planned conservation measures, conservation need not be considered as a potential alternative, as the demand still exceeds the amount that could be conserved. A comparison of Fort Collins’ projected water demands between 2015 and 2065 and Fort Collins’ firm annual yield based on current water rights and facilities is illustrated in Figure 1-3.

Source: Harvey Economics 2015.
Note: Water requirements are calculated at the point of diversion.

Figure 1-2. Historical and projected water requirements for the Fort Collins Utilities through 2065.
Without the Halligan Project, Fort Collins firm annual yield, excluding non-potable supplies, was calculated at 30,442 acre-feet, based on the current (2010) water rights portfolio, storage capabilities, and operations. This number reflects firm annual yield at the point of river diversion and included a safety factor of 15 percent (refer to Section 1.4.3.1.2.). Given the firm yield of 30,442 acre-feet, Fort Collins could meet projected water demands (estimated requirements at the point of diversion) with existing supplies through about 2020. After 2020, water demand is predicted to exceed available firm water supplies without adding additional firm annual yield. A water supply shortfall of about 4,700 acre-feet is anticipated by 2040 and a shortfall of about 7,900 acre-feet by approximately 2065 without additional water supplies (Figure 1-3).

1.4.4 Purpose and Need Statement

Based on information and analysis described within the Purpose and Need Report (WEST 2016), the Corps developed the purpose and need statement as follows:

*To provide additional system firm yield for Fort Collins in order to satisfy an additional need of approximately 7,900 acre-feet per year to meet its projected 2065*
municipal and industrial demands with water of a quality comparable to the water now delivered to its customers.

The Corps, exercising its independent judgment and review, and considering Fort Collins’ and the public’s perspective, evaluated and accepted the purpose and need statement as the basis for defining and evaluating alternatives within the Corps’ decision-making process (33 Code of Federal Regulations 325, Appendix B, Section 9(b)(4)).

1.5 AGENCY AND PUBLIC SCOPING ISSUES

Scoping, as defined by National Environmental Policy Act (§1501.7), is an early and open process to gather information from the public and interested agencies on the issues and alternatives to be evaluated in the Draft EIS. The goal of scoping was to provide opportunities for the public and agencies to provide input on the Project. The Corps used scoping comments to identify the nature and extent of potential issues and impacts.

The Corps initiated the scoping process for the Halligan-Seaman Water Supply Project by publishing in the Federal Register on February 1, 2006 a Notice of Intent to prepare an EIS for the project. Other public scoping activities included publishing paid advertisements announcing public scoping meetings, distributing a scoping announcement to members on a mailing list provided by the participants and the Corps, publishing project information on the Halligan-Seaman Water Supply Project website and Corps website, and holding supplemental outreach meetings. The Corps held three public scoping meetings to solicit ideas, issues, and concerns regarding the Halligan-Seaman Water Supply Project. The meetings were held in the city of Livermore, Fort Collins, and Greeley on February 23, 27, and 28, 2006, respectively. The Corps held a separate meeting to gather input from local, state, and federal agencies having regulatory authority or an interest in the Halligan-Seaman Water Supply Project. Agency scoping meetings were conducted on February 23, 2006 in Fort Collins. Additionally, the Corps sent letters to Native American tribes to inform them of the Halligan-Seaman Water Supply Project and to solicit input. The scoping process helped established the framework for this environmental analysis and facilitated the development of a reasonable range of feasible alternatives to be evaluated in the Draft EIS.

During the formal scoping period, the Corps received over 350 comments. Comments were received via U.S. Postal Service, electronic mail, facsimile, in person at scoping meetings, and online via a website established and maintained by the Corps. In general, the majority of comments received related to one or more of the following major issue categories:

- Surface water
- Purpose and Need
- Recreation
- Project Alternatives
- Wildlife resources (including protected species)
- Aquatic resources
• Land use concerns
• Vegetation/Wetland/Ecosystems

To a lesser extent, the Corps also received comments on the following categories:

• Socioeconomics
• Transportation
• Cumulative effect
• Groundwater
• Water rights/use
• Air quality
• Soils
• Cultural resources
• Dam safety
• The National Environmental Policy Act process
• Other general concerns

More detailed information on the National Environmental Policy Act scoping process, original scoping letters, and specific comments gathered by the Corps during the process can be found in the Final Scoping Report for Halligan Seaman Water Management Project Environmental Impact Statement (Corps 2006).

1.6 REQUIRED PERMITS AND APPROVALS

The construction and operation of any of the alternatives, with the exception of the No-Action Alternative (see Chapter 2), under consideration for the Halligan Project would require a Section 404 permit from the Corps. As part of the permit process, and because the Corps is neither an opponent nor a proponent of the Halligan Project, a systematic and unbiased evaluation of the practicable alternatives is required under the Section 404(b)(1) Clean Water Act Guidelines (40 Code of Federal Regulations 230) and the Corps’ Public Interest Review (33 Code of Federal Regulations 320).

After issuance of the Final EIS, the Corps must wait at least 30 days before issuing a Record of Decision as specified in 40 Code of Federal Regulations 1506.10 and 33 Code of Federal Regulations 325, Appendix B, Section 18. The Corps’ Record of Decision will include information prescribed in 40 Code of Federal Regulations 1505.2 as well as a determination relative to its Public Interest Review (33 Code of Federal Regulations 320) and Section 404(b)(1) Clean Water Act Guidelines compliance determination (40 Code of Federal Regulations 230). The Corps may decide to:

• Issue the permit for the Applicant’s preferred alternative
• Issue the permit for the Applicant’s preferred alternative with modifications or conditions
• Issue the permit for one of the identified alternatives (excluding the No-Action Alternative as this alternative would not require a Section 404 Permit)
• Deny the permit (33 Code of Federal Regulations 325, Appendix B, Section 9(b)(5) and 40 Code of Federal Regulations 230)

The Corps may add special conditions to the permit to satisfy public interest requirements provided those conditions are directly related to the impacts, are appropriate to the scope and degree of those impacts, and are reasonably enforceable (33 Code of Federal Regulations 325.4(a)). Conditions may also be added to address the requirements of the Section 404(b)(1) Clean Water Act Guidelines (40 Code of Federal Regulations 230.12(a)(2)).

In addition, other federal, state, and local permits and approvals might be required to implement the Halligan Project. This Draft EIS provides information for the other regulatory agencies having jurisdictional responsibility for lands and resources affected by the Halligan Project. Table 1-1 lists the permits and approvals considered necessary for initiation and completion of Fort Collins’ Proposed Action (see Chapter 2).

**Table 1-1. Permits and approvals likely required to construct and operate the Halligan Water Supply Project.**

<table>
<thead>
<tr>
<th>Permit/Approval</th>
<th>Purpose</th>
<th>Applicable Project Component</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Army Corps of Engineers (Corps): Permit to Discharge Dredged or Fill Material (Section 404 Permit)</td>
<td>Authorizes placement of fill or dredged material in waters of the United States (U.S.) including adjacent wetlands.</td>
<td>All surface-disturbing activities affecting waters of the U.S., including wetlands, such as construction of a dam, reservoir, diversion structure, roads and pipeline crossings.</td>
</tr>
<tr>
<td>U.S. Fish and Wildlife Service: Endangered Species Act (Section 7) Compliance</td>
<td>Protects threatened and endangered species.</td>
<td>Any activity potentially affecting listed threatened or endangered species, such as the Preble’s meadow jumping mouse.</td>
</tr>
<tr>
<td>Migratory Bird Treaty Act Compliance</td>
<td>Protects migratory birds.</td>
<td>All surface-disturbing activities affecting migratory birds, such as burrowing owls and raptors.</td>
</tr>
<tr>
<td>Fish and Wildlife Coordination Act Compliance</td>
<td>Compliance with the Corps’ obligations under the Fish and Wildlife Coordination Act and State Law 37-60-122.2.</td>
<td>All surface-disturbing activities affecting fish and wildlife in the Project area.</td>
</tr>
<tr>
<td>U.S. Department of the Interior: Bureau of Land Management Special Use Permit</td>
<td>Authorizes the rights and privileges for a specific use of Bureau of Land Management land for a specific period of time.</td>
<td>Expanded Halligan Reservoir</td>
</tr>
<tr>
<td>Permit/Approval</td>
<td>Purpose</td>
<td>Applicable Project Component</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Advisory Council on Historic Preservation: Cultural Resource Compliance (Section 106 of the National Historic Preservation Act of 1966, as Amended, 2014)</td>
<td>Protects cultural and historic resources; coordinated with the Colorado State Historic Preservation Officer</td>
<td>All ground disturbing activities or inundation of land.</td>
</tr>
<tr>
<td>State of Colorado</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorado Department of Public Health and Environment, Air Pollution Control Division: Land Development Permit (Fugitive Dust Control Plan)</td>
<td>Protects air quality from dust and airborne particulates resulting from construction activities over 25 acres in size or 6 months in duration.</td>
<td>All ground-disturbing construction activities.</td>
</tr>
<tr>
<td>Air Pollutant Emissions Notice</td>
<td>The Air Pollutant Emissions Notice reporting threshold for the criteria pollutant particulate matter less than 10 microns in diameter (PM$<em>{10}$) is two tons per year (uncontrolled rate) for emissions sources in attainment areas (the Halligan Project is in an attainment area). If the Halligan Project were to emit five (or more) tons per year of PM$</em>{10}$ (uncontrolled rate), then an air quality permit would be needed.</td>
<td>Concrete batch plant for construction of the Project.</td>
</tr>
<tr>
<td>Colorado Department of Public Health and Environment, Water Quality Control Division: General Permit for Stormwater Discharges Associated with Construction Activity</td>
<td>Controls the discharge of stormwater pollutants associated with construction activities.</td>
<td>All ground-disturbing construction activities disturbing more than one acre.</td>
</tr>
<tr>
<td>Section 401 Water Quality Certification</td>
<td>Ensures that activities authorized under Section 404 meet state water quality standards and do not degrade water quality.</td>
<td>All activities subject to the Section 404 Permit from the Corps.</td>
</tr>
<tr>
<td>Construction Dewatering Permit</td>
<td>Ensures that dewatering of groundwater from a construction site does not impair the receiving waters.</td>
<td>Dewatering during excavation and placement of fill for the dam.</td>
</tr>
<tr>
<td>Office of Archaeology and Historic Preservation, Colorado State Historic Preservation Officer Concurrence with Section 106 Determination</td>
<td>Determines significance of cultural resources potentially affected by ground disturbing activities.</td>
<td>All ground-disturbing activities or inundation of land.</td>
</tr>
</tbody>
</table>
### Permit/Approval Purpose Applicable Project Component

<table>
<thead>
<tr>
<th>Permit/Approval</th>
<th>Purpose</th>
<th>Applicable Project Component</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colorado Water Court System Water Rights</strong></td>
<td>Legal appropriation of water in the state of Colorado.</td>
<td>Surface water and/or groundwater used by the Project.</td>
</tr>
<tr>
<td><strong>Colorado Department of Natural Resources:</strong> Colorado Parks and Wildlife and Colorado Wildlife Commission and Colorado Water Conservation Board CRS 37-60-122.2</td>
<td>Develops the official state position on mitigation of impacts to fish and wildlife resources.</td>
<td>All activities potentially affecting fish and wildlife resources.</td>
</tr>
<tr>
<td><strong>Colorado Department of Natural Resources: State Engineer’s Office</strong> Permit to Construct Facility (Dam) Reservoir Storage Permit Dam Safety Permit</td>
<td>Authorizes dam and reservoir construction and reviews dam safety.</td>
<td>Dam and reservoir construction and operation.</td>
</tr>
<tr>
<td><strong>Larimer County</strong> Engineering Department Grading Permit</td>
<td>Authorizes construction activities.</td>
<td>All ground-disturbing activities.</td>
</tr>
<tr>
<td>Floodplain Development Permit</td>
<td>Authorizes construction within a floodplain.</td>
<td>Diversion structure.</td>
</tr>
<tr>
<td>Right-of-Way Use Permit</td>
<td>Authorizes construction within rights of way.</td>
<td>Pipelines within rights of way.</td>
</tr>
<tr>
<td>Planning Department Use by Special Review</td>
<td>Addresses probable effects on county services and resources.</td>
<td>All project facilities proposed to be modified.</td>
</tr>
<tr>
<td>Building Department Building Cut Permit</td>
<td>Authorizes construction of all Project facilities.</td>
<td>All project facilities.</td>
</tr>
</tbody>
</table>

### 1.7 References


40 Code of Federal Regulations (CFR) 1500-1508. Title 40 - Protection of Environment; Chapter V - Council on Environmental Quality; Parts 1500-1508. 40 CFR 1500-1508.


aesthetic, 13, 14

**Agricultural Reservoirs Alternative**, 7, 15, 16

air quality, 13, 14, 16, 1-19

Aquatic resources, 1-17

boating, 13, 14

Bureau of Land Management, 13, 1-1, 1-2, 1-19

C-BT, ii

CDPHE, ii, 1-1, 1-2

Clean Water Act, 3, 4, 14, 15, 1-1, 1-2, 1-3, 1-4, 1-6, 1-17, 1-18

climate, 18, 1-10

Colorado-Big Thompson Project, 3, 9, ii

Common Technical Platform, 10, 18, 1-8, 1-9

conservation, 4, 1-7, 1-8, 1-10, 1-13, 1-14


cultural resources, 1-20

cumulative effects, 10, 18, 1-8

delivery, 1-10

Department of Public Health and Environment, ii, 1-1, 1-19

diversion, 3, 7, 8, 17, 1-13, 1-14, 1-15, 1-18

diversions, 2, 6, 18

drought, 9, 10, 17, 1-5, 1-7, 1-8, 1-9, 1-10, 1-13

element, 5

dependangered species, 1-18

eynergy, 1, 11

Environmental Protection Agency, ii, 1-1, 1-2, 1-21

exchange, 8, 12, 18

Expanded Glade Alternative, 5, 6, 8, 13, 14

firm yield, 4, 1-4, 1-7, 1-9, 1-10, 1-15

fish, 12, 14, 1-19, 1-20

Fish and Wildlife Service, 11, 12, 13, ii, 1-1, 1-2, 1-18

fishery, 14

fishing, 12

Fort Collins, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, ii, 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 1-8, 1-9, 1-10, 1-11, 1-12, 1-13, 1-14, 1-15, 1-16, 1-18, 1-21, 1-22

Fort Collins' Proposed Action, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 16, 17, 18, 1-3, 1-4, 1-6, 1-18

Fort Collins-Loveland Water District, ii, 1-2

fugitive dust, 1-19

geomorphology, 10, 1-8

Glade Reservoir, 5, 6, 13, 14

gavel pits, 7, 15

**Gravel Pits Alternative**, 7, 8, 14, 15

Greeley, 4, 5, 10, ii, 1-2, 1-8, 1-16

groundwater, 10, 12, 15, 16, 17, 1-8, 1-20

habitat, 2, 10, 11, 12, 13, 14, 15, 16, 17, 1-8

Halligan Reservoir, 1, 2, 3, 5, 11, 18, 1-2, 1-3, 1-5, 1-7, 1-9, 1-10, 1-19, 1-21

hydrology, 10, 18, 19, 1-2, 1-7, 1-8, 1-9

inundation, 2, 12, 13, 14, 15, 16, 1-19, 1-20

land use, 13, 14, 1-12

Main Stem, 2, 3, 5, 6, 7, 8, 12, 13, 14, 15, 16, ii, 1-3, 1-5

Migratory Bird Treaty Act, 1-18

mitigation, 14, 1-20
mule deer, 11
municipal and industrial, 4, 1-4, 1-7, 1-16
Munroe Canal, 2, 8, 18
National Historic Preservation Act, 1-19
Native American tribes, 4, 1-16
No-Action Alternative, 5, 9, 10, 17, 1-17, 1-18
noise, 11, 13, 14, 15, 17
North Fork, 1, 2, 3, 4, 11, 12, 13, 14, 15, 16, ii, 1-2, 1-3, 1-5, 1-6
permits, 1-2, 1-3, 1-18
permits and approvals, 1-18
Pleasant Valley Pipeline, 2, 6, 7, 8
population, 1-8, 1-11, 1-12, 1-13, 1-21
population growth, 4, 1-7, 1-8, 1-11
Poudre River, 1, 2, 10, 18, ii, 1-2, 1-3
Poudre Valley Canal, 6, 18
purpose and need, 3, 4, 5, 6, 8, 9, 18, 1-3, 1-4, 1-7, 1-15, 1-16
raptors, 1-18
rates, 11, 17, 1-10, 1-11, 1-12, 1-13
recreation, 11, 12, 15
reservoir levels, 10, 18
riparian areas, 17
safety factor, 1-10, 1-15
scoping, 4, 5, 1-5, 1-16, 1-17
Seaman Reservoir, 2, 1-2
Section 404 permit, 3, 4, 5, 1-1, 1-4, 1-17
sediment transport, 2, 13, 14, 15, 16
service areas, 1-5
socioeconomic, 11, 12, 13, 14, 16
soil, 12, 13, 14, 16
South Platte River, 2, ii, 1-3
species of concern, 15, 16, 17
stream flow, 12, 18
stream morphology, 13, 14
surface water, 10, 12, 18, 1-8
temperature, 13, 14, 15, 16, 18
threatened and endangered species, 1-18
traffic, 11, 1-11
vegetation, 11, 12, 13, 15
visual quality, 15, 16
water demand, 3, 18, 1-10, 1-12, 1-15
water quality, 6, 8, 10, 13, 14, 15, 16, 1-2, 1-6, 1-8, 1-10, 1-20
water rights, 6, 8, 10, 17, 1-5, 1-6, 1-8, 1-9, 1-10, 1-14, 1-15
water use, 4, 17, 1-7, 1-8, 1-12, 1-13
wetlands, 10, 12, 14, 15, 16, 17, 1-3, 1-8, 1-18
wildlife, 11, 12, 14, 15, 16, 17, 18, 1-19, 1-20

1-23