RECLAMATION

Managing Water in the West

Windy Gap Firming Project: Alternatives Report

Prepared for—

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and

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1.0 Introduction

This report was prepared to describe the process used to identify a reasonable range of practicable alternatives to meet the purpose and need for the proposed Windy Gap Firming Project (WGFP). This report was prepared under the direction of the Bureau of Reclamation (Reclamation), the lead agency responsible for National Environmental Policy Act (NEPA) compliance and preparation of the Environmental Impact Statement (EIS). The U.S. Army Corps of Engineers (Corps), as a cooperating agency, assisted in the review of the alternatives analysis for consistency with the requirements of Section 404(b)(1) Guidelines under the Clean Water Act. Grand County, also a cooperating agency, provided review and comment. Technical information on the proposed project was provided by the Municipal Subdistrict, Northern Colorado Water Conservancy District.

The original Windy Gap Project was developed, and is owned and operated, by the Municipal Subdistrict, Northern Colorado Water Conservancy District, which is a water conservancy district organized under the Colorado Water Conservancy Act. The WGFP is being developed, and will be owned and operated, by the Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the Windy Gap Firming Project Water Activity Enterprise, which is a water activity enterprise of the Municipal Subdistrict organized under C.R.S. §§ 37-45.1-101 et seq. A water activity enterprise is a government water activity business owned by a government district (in this case the Municipal Subdistrict), which receives less than 10 percent of its annual revenues in grants from all Colorado state and local governments combined and which is authorized to issue its own revenue bonds. For purposes of simplicity in this report, the Windy Gap Firming Project Water Activity Enterprise will be referred to as the "Subdistrict." On those rare occasions when the Municipal Subdistrict, Northern Colorado Water Conservancy District, itself (the owner of the Enterprise) is referenced, its full name will be used.

The Council on Environmental Quality regulations implementing the procedural provisions of the NEPA requires that an EIS include a description of the purpose and need for the proposed action and identification of alternatives available to meet that purpose. Two supplemental reports have been prepared prior to preparation of the EIS to assist with documenting the purpose and need and the selection of alternatives for the proposed project:

- The Windy Gap Firming Project Purpose and Need Report — Documents the purpose of the proposed project and the individual and cumulative needs of the Project Participants (ERO 2005)
- The Windy Gap Firming Project Alternatives Report — Documents the selection process for identification of alternatives for evaluation in the EIS (this report)

This report is divided into nine sections. Section 1 includes introductory material on the objective of the report and its relationship with the Windy Gap Firming Project Purpose and Need Report. Section 2 provides the purpose and need statement from the Windy Gap Firming Project Purpose and Need Report (ERO 2005). Section 3 describes the Alternative Selection Process including the regulatory requirements for alternative selection and an overview of the alternative screening process used in this evaluation. Section 4 briefly summarizes the results of the Alternative Plan Formulation Report that was conducted prior to the initiation of the NEPA process. Section 5 describes public and agency scoping input on preliminary alternatives. Section 6 provides an overview of the modeling methods used to identify yield and storage requirements for the proposed project. Section 7 includes an overview of the types of alternatives that were considered, including those identified in scoping and a no action alternative. Section 8 includes a discussion of the three levels of screening and evaluation used to narrow the range of reasonable alternatives. Section 9 describes the alternatives selected for evaluation in the EIS. The results of this alternatives analysis will be used in the preparation of the *Alternatives* chapter of the Draft EIS.

2.0 Project Purpose and Need

The purpose and need statement was developed by Reclamation. The basis for this statement is documented in the Windy Gap Firming Project Purpose and Need Report (ERO 2005). That document provides information on the existing and future water supply and demand for the WGFP Participants and the need to improve the firm yield of the existing Windy Gap Project. The following purpose and need statement was one of the principal evaluation criteria used for the selection of alternatives:

> *The purpose of the Windy Gap Firming Project is to deliver a firm annual yield of approximately 30,000 AF of water by 2010 from the existing Windy Gap Project to meet a portion of the water deliveries anticipated from the original Windy Gap Project and to provide up to 3,000 AF of storage to firm water deliveries for the Middle Park Water Conservancy District. Firm water deliveries from the Windy Gap Project are needed to meet a portion of the existing and future demands of the Project Participants.*

3.0 Alternative Selection Process

This section describes the regulatory requirements for alternative selection under NEPA and Section 404 of the Clean Water Act, and includes an overview of the alternative selection process used for the WGFP.

3.1 Regulatory Requirements for Alternative Selection

3.1.1 National Environmental Policy Act Requirements

NEPA regulations do not specify the number of alternatives that need to be considered in the EIS, but indicate that a reasonable range of alternatives should be evaluated. Reasonable alternatives typically include those that meet the project purpose

and need, as well as a no action alternative. The Council on Environmental Quality (CEQ) defines reasonable alternatives as "those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 1986, Question 2a. Forty Most Asked Questions Concerning CEQ's NEPA Regulations). Thus, the selection of alternatives under NEPA criteria includes consideration of a reasonable range of alternatives that meet the project purpose and need and that are economically and technically feasible.

3.1.2 Section 404(b)(1) Guidelines

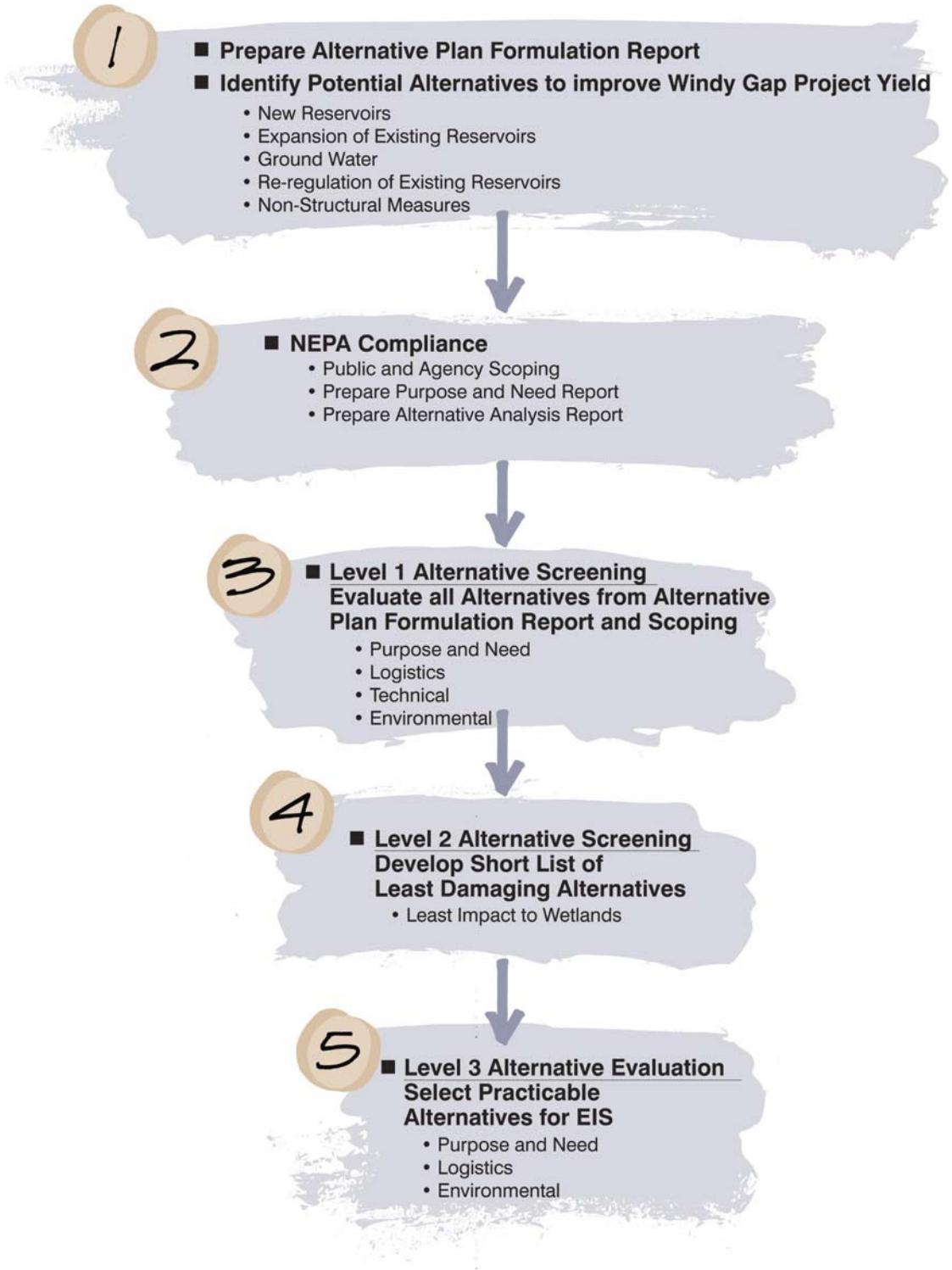
In addition to satisfying NEPA requirements, projects subject to permitting by the U.S. Army Corps of Engineers under the Clean Water Act also must comply with Section 404(b)(1) Guidelines (40 CFR, Part 230) for discharge of dredge and fill material into waters of the U.S. These Guidelines specify "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (Section 230.10(a)). An alternative is considered practicable if "it is capable of being done after taking into consideration cost, existing technology, and logistics in the light of overall project purposes" (Section 230.10(a)(2)). Practicable alternatives under the Guidelines assume that "alternatives that do not involve special aquatic sites are available, unless clearly demonstrated otherwise" (Section 230.3(q)). Guidelines also assume that "all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise" (Section 230.10 (a)(3)).

The alternatives analysis required for Section 404(b)(1) can be conducted either as a separate analysis for 404 permitting or incorporated into the NEPA process. Reclamation and the Corps have agreed that an integrated approach for the alternatives analysis is appropriate to satisfy the requirements of both the NEPA and 404(b)(1) Guidelines. Integration of both NEPA and 404(b)(1) Guidelines ensures that the alternatives selected for evaluation in the EIS are both reasonable and practical. An evaluation and comparison of the potential effects on all resources of concern will be conducted for each of the alternatives evaluated in detail in the EIS.

3.2 Alternative Screening Process

The identification and evaluation of alternatives for the Firming Project was conducted in several phases (Figure 1). The first phase of alternative evaluation was conducted by the Subdistrict prior to initiation of NEPA compliance. This began with identifying options to improve the delivery of water from the existing Windy Gap Project and included a comprehensive study of a broad range of potential alternatives, which are documented in the Alternative Plan Formulation Report (Boyle and EDAW 2003), as discussed in Section 4. The second phase began with the initiation of the NEPA compliance process, including preparation of a Notice of Intent to prepare an EIS (Federal Register: Vol. 68, No. 173, September 8, 2003), which outlined a draft

Figure 1. Windy Gap Firming Project Alternative Evaluation Process.



purpose and need and the preliminary alternatives identified in the Alternative Plan Formulation Report. Reclamation held public and agency scoping meetings to solicit comments and information on issues of concern regarding the proposed project and preliminary alternatives. Following scoping, Reclamation's third-party contractor prepared the Windy Gap Firming Project Purpose and Need Report to document the purpose and need for the proposed project (ERO Resources 2005).

This Alternatives Analysis Report was then prepared to evaluate a range of potential alternatives that would satisfy the project purpose and need. The alternative evaluation was conducted at three levels of screening and evaluation using NEPA and 404(b)(1) Guidelines to reduce the number of alternatives to a reasonable number to be carried forward in the Draft EIS. The alternatives analysis began with a re-evaluation of all of the alternatives identified in the Alternative Plan Formulation Report, as well as review of alternatives identified in scoping, and new alternatives that were identified over the course of the evaluation. Successive levels of screening were used to narrow the range of reasonable alternatives, as described in more detail in Section 8.

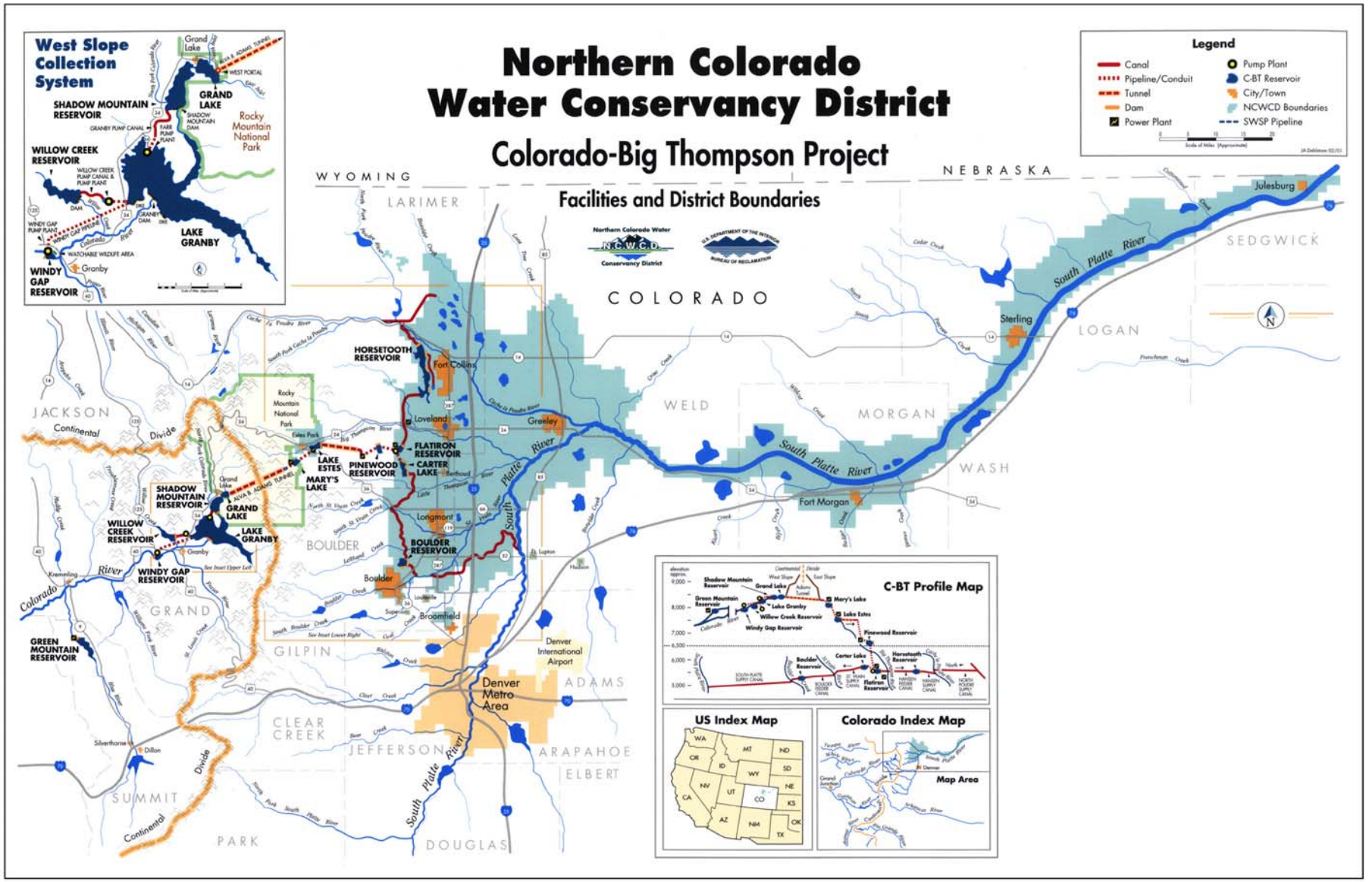
4.0 Alternative Plan Formulation Report

The initial investigation for options to improve the yield of the existing Windy Gap Project began with a two-year study funded by the Subdistrict. The purpose of that study was to identify and evaluate reasonable alternatives capable of firming the Windy Gap Project water supply based on engineering, technical, economic, environmental, and other relevant factors. The product of that investigation was documented in the Alternative Plan Formulation Report (Boyle and EDAW 2003).

The Alternative Plan Formulation Report (APFR) evaluated a variety of options for improving yield of the Windy Gap Project including new reservoir sites, enlargement or re-regulation of existing reservoirs, and development of ground water storage. In addition, non-structural measures were evaluated, such as borrowing storage space from Colorado-Big Thompson (C-BT) Project facilities, modifying the Windy Gap delivery schedule, buying C-BT storage, purchase and leaseback arrangements, and dry year options on C-BT shares. Hydrologic modeling results conducted for the APFR and subsequent analyses indicate that to provide Project Participants a consistent annual yield of about 30,000 AF would require approximately 100,000 AF of new storage. See Section 6 for information on the modeling methods used to identify yield and storage requirements.

The existing Windy Gap diversion and reservoir is located in Grand County. C-BT facilities deliver Windy Gap water to Project Participants on the East Slope (the cities of Broomfield, Greeley, Longmont, Lafayette, Louisville, and Loveland; the towns of Erie, Evans, Fort Lupton and Superior; the Central Weld County Water District; the Little Thompson Water District, the Platte River Power Authority) and provide releases of Windy Gap water to the Middle Park Water Conservancy District (MPWCD) on the West Slope (Figure 2). Project Participants are located in Weld, Larimer, Broomfield, and Boulder Counties on the East Slope and Summit and Grand Counties on the West Slope.

Figure 2. Existing Windy Gap and C-BT Project Facilities.



To ensure that a comprehensive range of alternatives was considered, a broad geographic study area was defined. The study area was bounded by Bear Creek Lake in Jefferson County to the south; the Wyoming/Colorado state line to the north; the Colorado-Nebraska border to the east; and Kremmling, Colorado to the west (Figure 3). The major drainage basins within the study area include the upper Colorado River basin on the West Slope, and the South Platte on the East slope including the Cache la Poudre River, St. Vrain Creek, Big Thompson River, and Clear Creek. Because the WGFP proposed to divert water using existing facilities without the acquisition of additional water rights, the most favorable water storage sites are located within reasonable proximity of existing Windy Gap and C-BT facilities. Potential storage sites farther from existing facilities are less desirable because of the inefficiency and technical difficulties of conveyance, cost for pipelines and pumping, and the practicality of storing and transporting water at great distances from the diversion source and the point of use. More distant storage facilities also have the potential for greater environmental impacts because of the need for construction of large conveyance pipelines and greater energy demands for pumping water to a storage site, and then from the storage site to Project Participants water treatment facilities. Reservoir sites located within the study area were considered to have potential for use in the WGFP; however, subsequent evaluation was used to determine feasibility.

The APFR began with a broad range of potential project elements or alternative components followed by three successive phases of screening and evaluation to identify potential alternatives. A total of 171 different project elements, which include individual discrete storage features, were evaluated during the initial screening process. A brief overview of the screening phases used in the APFR is described below in Sections 4.1, 4.2, and 4.3. The APFR (Boyle and EDAW 2003) provides a complete description of the alternatives evaluation process that was completed prior to initiation of the NEPA process.

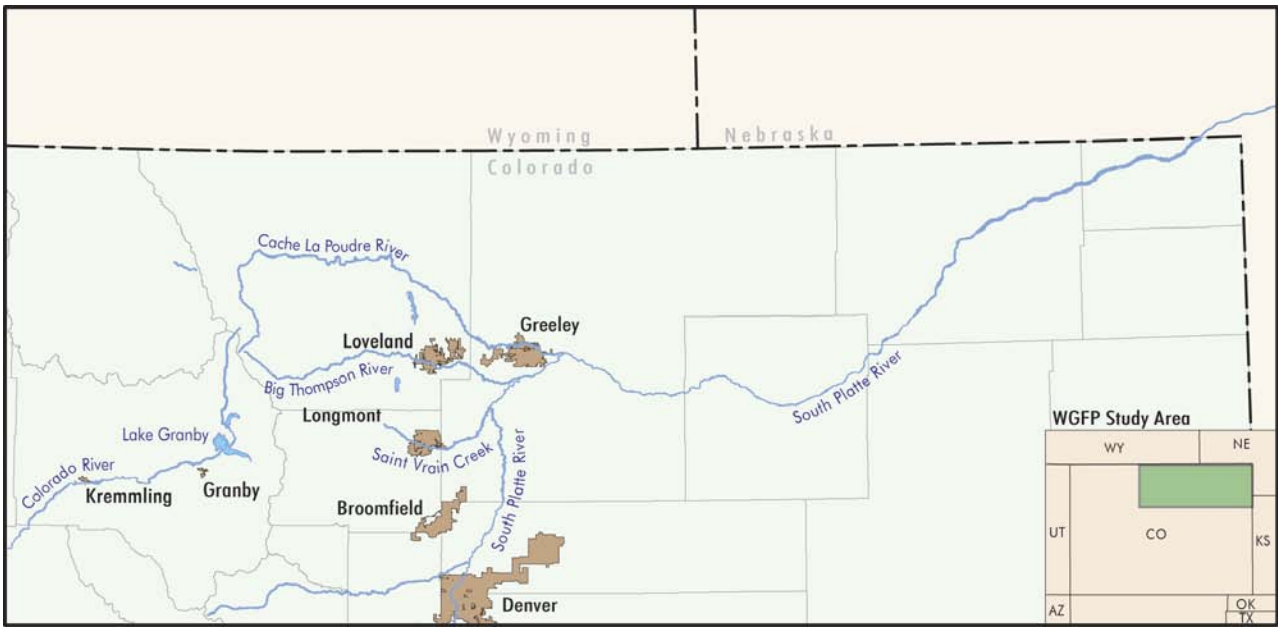
4.1 Phase I Element Identification and Screening

The first phase of screening in the APFR identified project elements that have major flaws or deficiencies that would make a project difficult to implement. Exclusion criteria were developed and applied to each element. A total of 67 project elements were eliminated based on physical and technical constraints and regulatory and land use conflicts.

4.2 Phase II Element Analysis

The second phase of analysis included qualitative and quantitative evaluations for each project element that remained following Phase I screening. Evaluation criteria included ecological, cultural, visual, land use, and regulatory considerations. The project element's potential impact on the resource was used to develop a numerical score. The combined score for all resources was then used to compare and rank each element. In addition, the economic feasibility for each project element was evaluated by developing a ranking based on the cost per acre-foot of storage. The rankings for each element developed in Phase II were then used to develop individual alternatives for further evaluation in Phase III. No project elements were eliminated during Phase II.

Figure 3. Windy Gap Firming Project Study Area.



4.3 Phase III Development of Conceptual Alternatives

In Phase III, several alternatives were formulated using either single elements or combination of elements that were evaluated during the Phase II analysis. The following criteria were used in the formulation of alternatives:

- Minimize environmental impacts
- Minimize cost
- Simplify permit requirements to the extent possible
- Maximize use of existing C-BT Project facilities without adversely impacting C-BT Project operations and in compliance with applicable provisions of Senate Document 80, Manner of Operations

No single element satisfied all criteria; therefore, the best combination of elements was used to satisfy multiple criteria. This evaluation resulted in 18 different alternatives using individual elements or a combination of elements. Based on the ranking criteria, as well as being representative of the different storage concepts, seven alternatives were selected for further evaluation and hydrologic modeling. The storage concepts and alternative plans are shown in Table 1. These seven plans, which include five potential reservoir sites, were the alternatives described during the public and agency scoping meetings held in the fall of 2003.

Table 1. Storage Concepts and Alternatives Identified in the Alternative Plan Formulation Report.

Storage Concepts	Alternative Plans
East Slope only storage	1. Chimney Hollow reservoir
	2. Little Thompson reservoir
	3. Cactus Hill reservoir
Primary East Slope storage with supplemental West Slope storage	4. Chimney Hollow and Jasper North A reservoirs
Primary West Slope storage with supplemental East Slope storage	5. Jasper North and Rawhide reservoirs
	6. Jasper North and Chimney Hollow reservoirs
East Slope storage with supplemental outlying storage	7. Chimney Hollow and Rawhide reservoirs

4.4 Alternative Refinement

Reclamation and the Corps reviewed the results of the APFR to determine the adequacy of the preliminary identification of potential alternatives and the analyses that were conducted to select alternatives. Both agencies concurred that the APFR provides an excellent compilation of data and alternatives analysis. However, further refinement of the alternative screening and selection process was needed to address the requirements of the 404(b)(1) Guidelines. To comply with 404(b)(1) Guidelines, Reclamation and the third-party contractor, in concert with the Corps, re-evaluated all of the alternatives identified in the APFR based on the purpose and need statement from the Windy Gap Firming Project Purpose and Need Report (ERO 2005).

In addition, several new potential reservoir sites on the West Slope were identified following completion of the APFR and were added to the list of alternatives under consideration. Section 8 describes the process used to re-evaluate alternatives identified in the APFR and review new reservoir sites.

5.0 Public and Agency Scoping

Scoping for the WGFP was conducted from September through November 2003. The scoping process, which included three public meetings and an agency meeting, was used to identify issues and concerns to be addressed by the EIS for the proposed Firming Project. Approximately 160 comments were received and summarized in a Public Scoping Report (ERO 2003).

Many of the comments received during scoping expressed opinions on the seven alternatives identified in the APFR. Several of the comments suggested new alternatives including variations or combinations of project elements identified in the APFR; other comments suggested different conceptual or operational measures. The new alternatives identified during scoping were added to the list of alternatives considered in Section 7.7.

6.0 Modeling Methods Used to Identify Yield and Storage Requirements

A comprehensive hydrologic model was used to evaluate the potential yield and storage requirements for the various Firming Project alternatives. Yield is dependent on the amount and timing of supplies and demands, reservoir storage contents, delivery constraints that vary with C-BT and Windy Gap operations, and the routes by which water can be moved from one part of the system to another. A computer model that simulates these elements over a long time period and under changing hydrologic conditions is necessary for this type of analysis.

Boyle Engineering used two models in the APFR to evaluate plans and integrate C-BT and Windy Gap project operations — the Boyle Engineering Stream Simulation Model (BESTSM) and the Colorado River Basin Water Resources Planning Model (CDSS Model). Two models were used because of the need to model hydrologic conditions on both the East and West Slope. A brief overview of the models is provided below and a more detailed description of the models is located in the APFR Chapter 6 and the Windy Gap Firming Project Modeling Report (Boyle 2003).

6.1 CDSS Model

The CDSS Model was developed jointly by the Colorado Water Conservation Board and the Division of Water Resources as part of the Colorado River Decision Support System. It is a water allocation and accounting model that was developed using StateMod, which is Colorado's Stream Simulation Model. The CDSS Model can be used to make comparative analyses of historical and future water management policies in the Upper Colorado River basin. The CDSS Model covers the entire Colorado River drainage, except the Gunnison River from the headwaters in Rocky Mountain National Park to the Colorado/Utah state line. The CDSS Model does not include the C-BT Project facilities and operations on the East Slope. The CDSS Model was used to evaluate the effects of water rights and operations throughout the Colorado River basin on the Windy Gap Project. The model estimates: the amount of water that Windy Gap must bypass to satisfy downstream senior water rights; instream flow requirements including the senior downstream demand for which Windy Gap must bypass water; and Fraser River inflow to the Colorado River above Windy Gap.

6.2 BESTSM

BESTSM is a water allocation and accounting model developed to simulate surface water operations of one or more river basins. The model can be used to compare various historical and proposed river basin water management policies. BESTSM simulates river basin operations and accounts for inflow, diversions, river gains and losses, reservoir operations, and water rights implementation using water allocation priorities. BESTSM simulates the operation of the C-BT and Windy Gap Project on both the East and West Slope. On the West Slope, it covers the Colorado River from the Continental Divide downstream to the Windy Gap Reservoir and diversion site including Lake Granby, Shadow Mountain, Grand Lake, and Willow Creek Reservoir. It does not include the Fraser River. On the East Slope, BESTSM covers the distribution of C-BT and Windy

Gap water throughout the Cache la Poudre, Big Thompson, St. Vrain, and Boulder Creek watersheds including all C-BT reservoirs and operations.

6.3 Model Integration

Information from the operation of the CDSS Model is used as input to the BESTSM Model. Where models overlap, nodes and baseflows match. Both models use a monthly time step for the study period from 1950 through 1996. Model results provide estimates of the yield from Windy Gap operations, under both current operating conditions and under various alternative scenarios including a variety of reservoir sizes and operating conditions. The models also provide hydrologic output for river nodes (inflow, outflow, and diversions) and reservoir nodes (elevation, surface area, volume, inflow, and outflow) so that changes in hydrologic conditions on the Colorado River, East Slope streams and reservoirs can be evaluated.

6.4 Model Verification

Boyle Engineering submitted a Windy Gap Firming Project Modeling Report (2003) to Reclamation, the Corps of Engineers, and Grand County for review following completion of the APFR. An addendum to the modeling report is being prepared to document changes and updates to the model since the original report was completed (Boyle Engineering 2005). Reclamation has reviewed the hydrologic models (CDSS/BESTSM) and determined that they provide a reasonable method for determining and assessing hydrologic effects for the purposes of the EIS.

7.0 Alternatives Considered

A complete list of the potential alternatives identified for the WGFP is included in Appendix A. Alternatives were divided into the same five categories used in the APFR — new reservoirs, expansion of existing reservoirs, aquifer storage, re-regulation of existing reservoirs, and non-structural or institutional opportunities. An additional category for alternatives that were suggested during the scoping period was added. Sections 7.2 through 7.7 briefly describe the types of action alternatives that were evaluated. Additional detail for most of these alternatives can be found in the APFR. The no action alternative described in Section 7.1 indicates what Project Participants would do if an action alternative is not implemented.

7.1 No Action Alternatives

NEPA requires analysis of a "No Action" alternative (CEQ Guidelines 1502.14). No action does not necessarily require continuation of current conditions or the status quo, but rather a reasonable projection of future conditions or actions that would occur if none of the action alternatives are implemented. No new action from Reclamation's perspective is what is reasonably likely to occur with continuation of the existing contractual arrangement between Reclamation and the Municipal Subdistrict, Northern Colorado Water Conservancy District for the delivery of Windy Gap water through the C-BT system without a new or amended permit for connection of new WGFP infrastructure to C-BT facilities. The No Action Alternative is described below and will be analyzed along with the action alternatives to provide a basis for comparison.

7.1.1 Current Windy Gap Project Operations

The current Windy Gap Project has been in operation since 1985. Windy Gap Project water is diverted from the Colorado River just downstream of the confluence of the Colorado and Fraser Rivers at Windy Gap Reservoir (Figure 2). Once collected, it is pumped to Lake Granby for storage and is conveyed to the East Slope via the Adams Tunnel to Carter Lake and Horsetooth Reservoir. Lake Granby is the only long-term storage facility for Windy Gap water. Carter Lake or Horsetooth Reservoir provide only short-term conveyance of Windy Gap water. On the East Slope, Windy Gap water is distributed using conveyance through C-BT facilities including the Hansen Feeder Canal and Horsetooth Reservoir for Project Participants to the north, and the St. Vrain Supply Canal, Boulder Feeder Canal, and Boulder Creek Supply Canal for Participants to the south. In addition, the Southern Water Supply Pipeline, which diverts water from the St. Vrain Supply Canal approximately one-mile downstream of Carter Lake provides delivery to six Project Participants to the south. No Windy Gap water is stored in East Slope C-BT storage reservoirs. Instead it is delivered on the East Slope through an exchange for Windy Gap water stored in Lake Granby. Storage capacity of Windy Gap water for most Project Participants once delivery is taken is limited; therefore, most Participants typically only order delivery of Windy Gap water from Lake Granby as needed.

The current Windy Gap Project, according to the terms outlined in the 1985 Supplement to the 1980 Agreement Concerning the Windy Gap Project and Azure Reservoir and Power Project, states, "the Municipal Subdistrict, Northern Colorado Water Conservancy District will dedicate and set aside annually, but non-cumulatively, at no cost to Middle Park, 3,000 acre-feet of water in Granby Reservoir that is produced each year from Subdistrict water supplies and any water so stored in Granby Reservoir shall be the last of any Subdistrict water to be spilled from Granby Reservoir." This water is for beneficial use without waste, either directly or by exchange or substitution, in the MPWCD. The direct beneficial uses do not include instream uses or industrial uses. MPWCD's Windy Gap water stored in Lake Granby shall be the last of any Subdistrict water to be spilled if the reservoir is full. MPWCD's Windy Gap water stored in Lake Granby cannot be carried over to the next year.

As discussed in more detail in the Windy Gap Firming Project Purpose and Need Report (ERO 2005), Windy Gap allottees and the MPWCD have not been able to rely on Windy Gap water for water deliveries in either dry or wet years. In some dry years, the Windy Gap Project water right has not come into priority so no water was diverted. Under the contract between the Municipal Subdistrict, the Northern Colorado Water Conservancy District, and Reclamation, storage and conveyance of C-BT project water has priority over any water conveyed and stored for any non-C-BT purpose including the Windy Gap Project. In wet years, when the C-BT system is full, there is no conveyance or storage capacity in the C-BT system for Windy Gap Project water.

7.1.2 No Action by Reclamation

If Reclamation does not approve a permit to connect new WGFP facilities to C-BT conveyance and reservoirs, all Project Participants in the near term would maximize delivery of Windy Gap water according to their demand, water rights, available storage in

Lake Granby, and existing Adams Tunnel conveyance constraints. The City of Longmont is the only Participant that currently has an option to develop storage independently if the WGFP is not implemented. However, most Participants indicate that, in the long term, they would seek other storage options, individually or jointly, to firm Windy Gap water because of their need for reliable Windy Gap deliveries and the substantial investment in existing infrastructure.

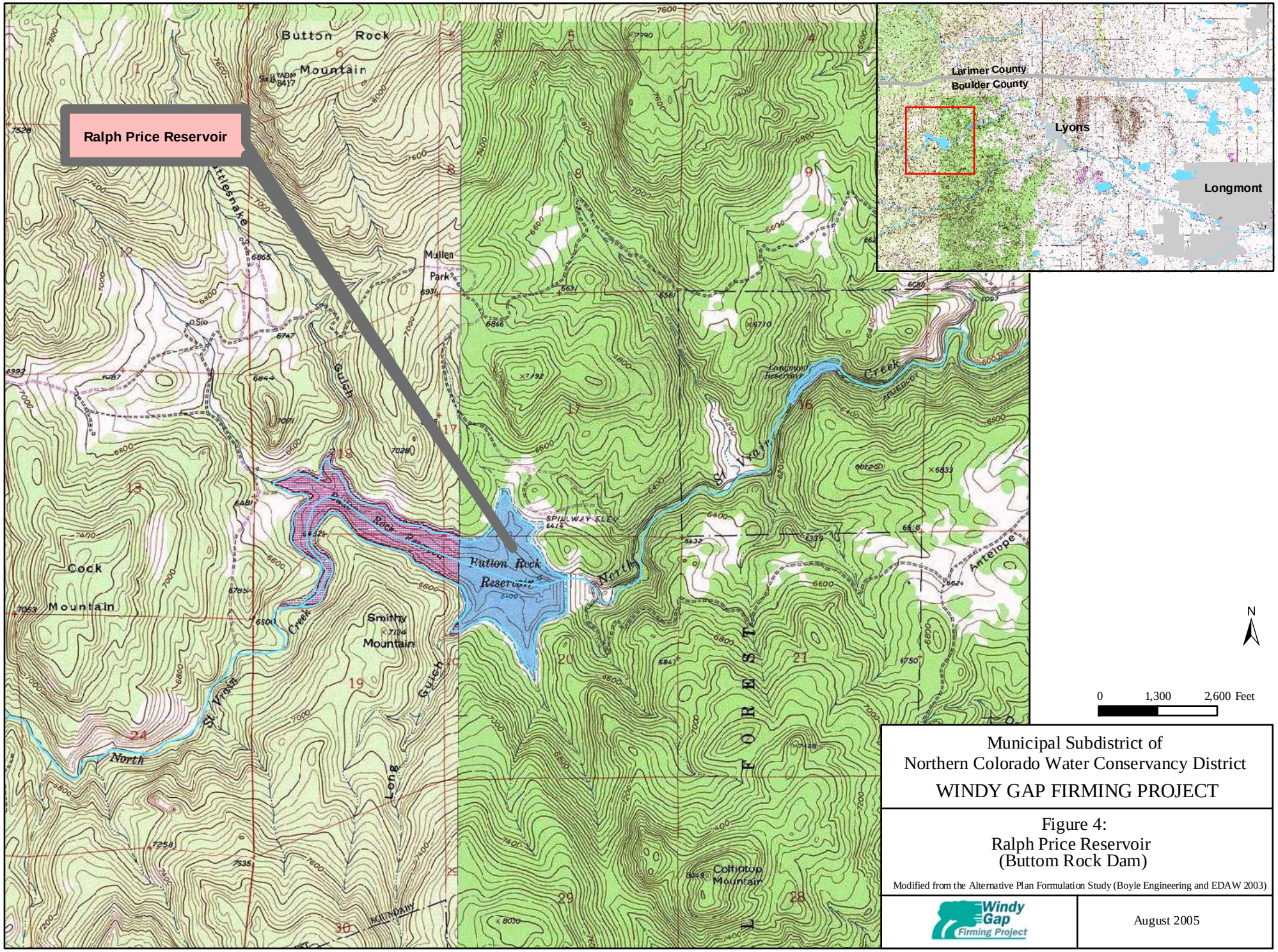
Those Participants that do not have a currently defined storage option would take delivery of Windy Gap water whenever it is available within the capacity of their existing water systems and delivery points under the terms of the existing Carriage Contract with Reclamation and the Municipal Subdistrict, Northern Colorado Water Conservancy District. Participants that would operate under this scenario include Broomfield, Central Weld County Water District, Erie, Evans, Fort Lupton, Greeley, Little Thompson Water District, Louisville, Loveland, Platte River Power Authority, and Superior. The City of Lafayette anticipates that it would withdraw from participating in the WGFP and not pursue acquisition of future units if the Firming Project is not implemented.

Longmont indicates that it would develop storage facilities for Windy Gap water independently if Reclamation denies approval of the Firming Project. The City would evaluate the enlargement of the existing Ralph Price Reservoir (also known as Button Rock Reservoir) located on North St. Vrain Creek or Union Reservoir located east of the City (Figure 4). The enlargement of Ralph Price by 13,000 AF would be the City's preferred option because Union Reservoir would not have sufficient capacity for Windy Gap water and other planned sources of water storage and conveyance and distribution would be more efficient from a higher elevation reservoir. Windy Gap water would be released to St. Vrain Creek via the St. Vrain Supply Canal and exchanged up to the enlarged Ralph Price Reservoir. Deliveries to the City would be conveyed using existing infrastructure.

Middle Park Water Conservancy District would continue to use Windy Gap water to provide augmentation flows for other water diversions in a manner similar to current operations. MPWCD can to store up to 3,000 AF of Windy Gap water in Lake Granby each year, if Windy Gap water can be diverted and storage space is available.

Hydrologic modeling of the No Action alternative in the EIS will be used to estimate the amount of Colorado River diversions, storage requirements, and yield for Project Participants based on the near-term maximization of Windy Gap deliveries with the addition of storage in an enlarged Ralph Price Reservoir by the City of Longmont. The following assumptions will also be used in the analysis:

- There would be no change in the existing Windy Gap or C-BT facilities for the conveyance or storage of Windy Gap water.
- East Slope Participants would continue to divert and take Windy Gap water from existing Participant delivery points, subject to existing conveyance limitations in delivering water from Lake Granby to the East Slope via the Adams Tunnel and existing East Slope C-BT conveyance facilities.
- The amount of water diverted from the Colorado River would be subject to existing Windy Gap water rights.



Municipal Subdistrict of
Northern Colorado Water Conservancy District

WINDY GAP FIRMING PROJECT

Figure 4:
Ralph Price Reservoir
(Buttom Rock Dam)

Modified from the Alternative Plan Formulation Study (Boyle Engineering and EDAW 2003)

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- Conditions set forth in the 1981 Record of Decision and associated agreements that limit or place conditions on the timing or amount of water that can be pumped by the Windy Gap Project would be adhered to.
- Project Participant demand for Windy Gap water would be the same as identified in the Windy Gap Firming Project Purpose and Need Report.

The enlargement of Ralph Price Reservoir could require action by federal agencies other than Reclamation and, if so, NEPA compliance would be necessary. Although the No Action Alternative would not require a federal action by Reclamation, it may still be subject to regulatory authority by the Corps of Engineers or other agencies.

Over the long term, most Participants would begin investigating other options to develop storage for their Windy Gap water. The types of storage that might be used for Windy Gap water include gravel pits, new reservoirs, enlargement of existing reservoirs, or options not yet identified. The construction of multiple new storage facilities also would require additional infrastructure to convey, pump, and distribute water outside of the C-BT system. The amount of water that could be delivered to new reservoirs would still be limited by the terms of the existing Carriage Contract. Because Participants have not identified specific facilities to store Windy Gap water independently, the physical disturbance and associated resource effects, as well as the hydrologic consequences, are difficult to quantify and thus will be qualitatively assessed in the EIS.

7.1.3 No Action by Corps of Engineers

The Corps considers a No Action alternative as one that results in no construction requiring a Corps permit, either by the applicant developing an alternative that avoids Corps jurisdiction, or by the denial of the permit by the Corps (33 CFR Part 325, Appendix B). Continued operation and delivery of Windy Gap Project water to Participants would not require a permit from the Corps, but the enlargement of Ralph Price Reservoir is likely to result in a discharge to a regulated water of the U.S., which is subject to Corps permitting requirements and other NEPA compliance. Because a No Action alternative that completely avoids Corps jurisdiction has not been identified, the Corps' No Action alternative is assumed to be the same as Reclamation's No Action alternative. Development of new independent storage by the Participants in the long term is also likely to require NEPA compliance and Corps permitting.

7.2 New Reservoirs

New reservoirs include reservoir sites identified during the APFR and new sites identified as part of the EIS process. A total of 136 new potential reservoir sites — 108 on the East Slope and 28 on the West Slope — were identified and preliminarily evaluated (Figure 5). Potential reservoirs sites ranged in size from a storage capacity of 400 AF to almost 2 million AF.

7.3 Expansion of Existing Reservoirs

Existing reservoirs within the study area were identified and reviewed for their potential for enlargement (Figure 5). Thirty-one existing reservoir sites were included in the evaluation. Existing reservoirs were considered regardless of ownership.

7.4 Aquifer Storage

Aquifer storage and recovery involves placing surface water into the subsurface for recovery at a later time when supplies are needed. The APFR investigated two aquifer storage options — bedrock aquifer storage and alluvial aquifer storage.

Bedrock aquifer storage is the storage of water in deep geologic formations. The suitability of bedrock aquifer for storage depends on a number of factors including permeability, saturated thickness, water quality, and other factors. Preliminary investigation on the use of the Laramie Foxhill aquifer for storage was considered in the APFR (pgs 27, 42-46).

Alluvial aquifer storage along major drainages in the project area also was evaluated in the APFR (Figure 5). Because alluvial aquifers are in direct hydrologic contact with surface water, any water introduced into an alluvial aquifer is more transient than bedrock aquifers and would not provide long-term storage.

7.5 Re-regulation of Existing Reservoirs

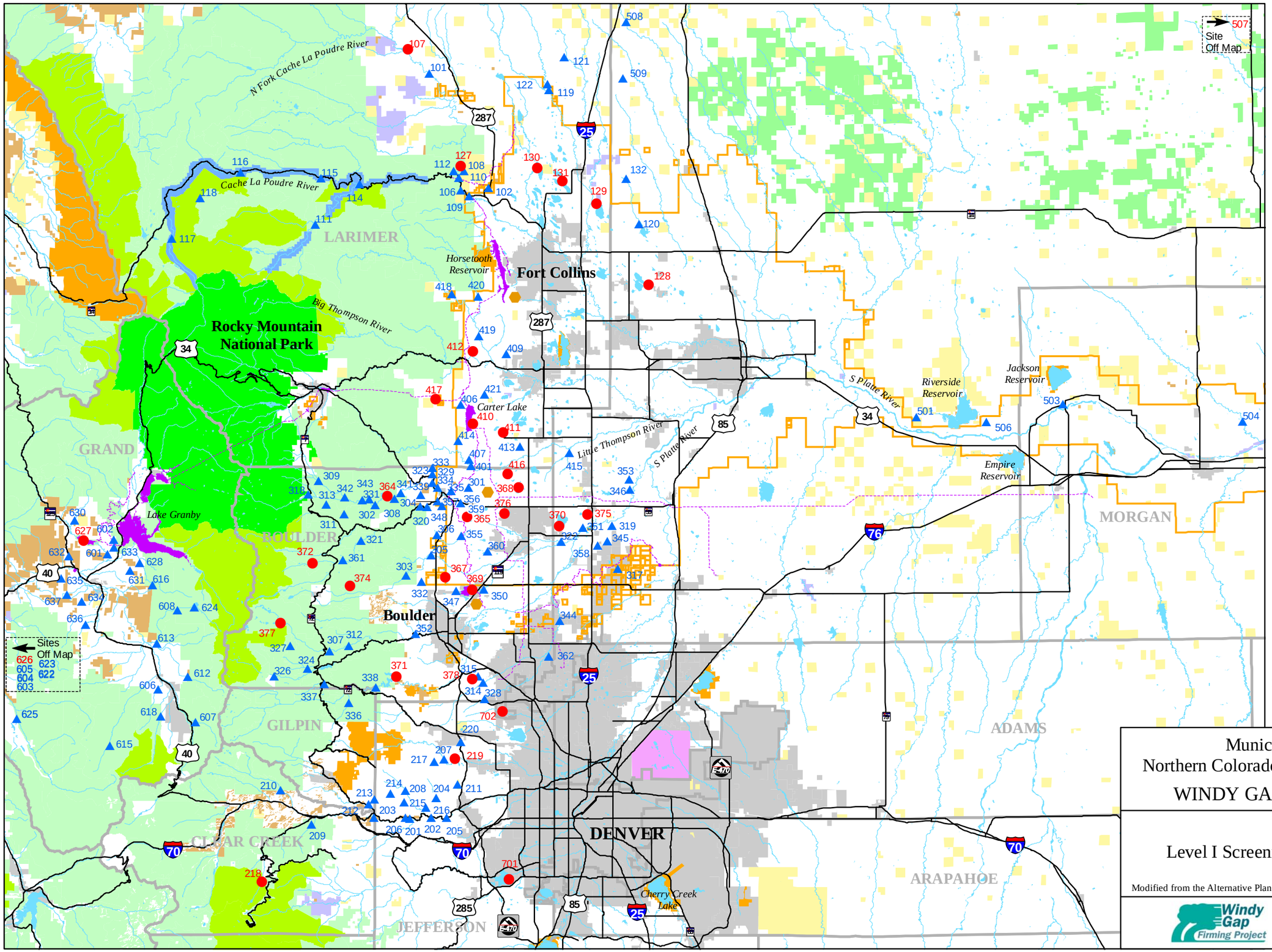
The APFR evaluated re-regulation of existing reservoirs as a separate category of alternatives. The potential for using existing reservoirs in the Cache La Poudre and St. Vrain drainages was examined to determine if additional storage space could be created by re-regulation of reservoir operation with that space then purchased and used to store Windy Gap water. Potential storage at any single reservoir would likely be limited, so dispersed storage at multiple facilities would be necessary.

7.6 Non-structural or Institutional Elements

Non-structural elements primarily involve modifications to existing operations or integration of existing facilities. They do not rely directly on significant new structural facilities such as dams or conveyance facilities, but may require modifications to existing facilities or coordination with other entities. The majority of the non-structural measures evaluated in the APFR relate to the manner in which the Windy Gap Project delivers water using C-BT facilities. The APFR (pgs. 15-26) provides a detailed description of the nine different non-structural alternatives that were evaluated. In addition, a concept (prepositioning) that integrates C-BT storage with new Windy Gap storage was evaluated. A brief discussion of the non-structural alternatives is provided in Sections 7.6.1 through 7.6.10 of this document.

7.6.1 Integration with the C-BT System—Unlimited Borrowing from C-BT

The existing Windy Gap Amendatory "Carriage" Contract between Reclamation, and the Municipal Subdistrict, Northern Colorado Water Conservancy District provides for the delivery of C-BT water to Windy Gap allottees in-lieu of Windy Gap water, also known as "borrowing." The borrowed water must be paid back with no injury to C-BT unit holders. The borrowed water is paid back with Windy Gap water when sufficient supplies exist. Currently, Windy Gap allottees may borrow an unlimited amount from C-BT; however, they must obtain an equal amount of water as collateral to replace any possible loss of water to C-BT within the same year. When sufficient Windy Gap supplies do not exist to replace the entire amount borrowed, the C-BT project may call on the collateral water to make up the difference.



Legend

- Existing C-BT Resources
- Water Supply Systems
- Highways
- NCWCD Service Area
- Municipal Boundaries (1997)
- County Boundaries

State and Federal Lands

- National Park
- Wilderness Area
- National Grasslands
- National Forest
- Wild and Scenic River
- Bureau of Land Management
- Rocky Mnt. Arsenal NWR
- State Park
- State Wildlife Area
- State Land Board

Level I Alternatives

- New Reservoir
- Reservoir Enlargement
- Aquifer Storage Locations

Municipal Subdistrict of
Northern Colorado Water Conservancy District

WINDY GAP FIRMING PROJECT

Figure 5:
Level I Screening: Alternative Locations

Modified from the Alternative Plan Formulation Study (Boyle Engineering and EDAW 2003)

Windy Gap Firming Project

August 2005

This alternative is different from the current borrowing program in that it would allow Windy Gap Participants to borrow an unlimited amount from C-BT without the collateral water requirement and accrue debt that is only paid back when Windy Gap water is available. The debt to C-BT could accrue over multiple years. This would require modification to the existing "Criteria for Integrated Operations of the Colorado-Big Thompson and Windy Gap Projects."

7.6.2 Integration with the C-BT System—Limited Borrowing from C-BT

This alternative is similar in concept to unlimited borrowing from C-BT; however, limits are placed on in-lieu deliveries to reduce potential injury to C-BT. Collateral water would not be required under this alternative.

7.6.3 Modified Borrowing of C-BT (Modifying Windy Gap Delivery)

This alternative is another variation in the C-BT borrowing program with an effort to reduce impacts to C-BT deliveries from Windy Gap borrowing and improve Windy Gap yield. This concept considers the potential of reducing or increasing Windy Gap deliveries in response to C-BT storage and forecasted inflows in conjunction with Windy Gap borrowing from C-BT supplies. This alternative might eliminate adverse impacts to C-BT resulting from borrowing and provide some level of firm Windy Gap yield at the expense of average year yield. For example, Windy Gap deliveries could be reduced if the total amount of C-BT water in storage plus forecasted C-BT inflows for the coming year fall below a certain threshold. Conversely, Windy Gap deliveries could then be increased during very wet periods in an attempt to deliver water that would otherwise be spilled to the extent that conveyance capacity in the C-BT system is available when needed. This concept might protect a greater quantity of C-BT storage for drought periods. In this scenario, Windy Gap deliveries would be increased if C-BT system contents and forecasted inflows for the coming year were above certain threshold levels. This alternative is based on the concept of delivering water to Windy Gap users that would otherwise be spilled from Lake Granby.

7.6.4 Buying Storage in the C-BT Project from the United States

Under this alternative, storage in existing C-BT facilities, such as Carter Lake, Horsetooth or Boulder Reservoirs, would be purchased by the Windy Gap Participants from the United States. Purchased storage would not be available for meeting C-BT quotas. This would reduce deliveries to C-BT allottees because less storage would be available for C-BT water.

7.6.5 Individually Operated Storage in C-BT Facilities

This alternative would establish separate storage accounts in C-BT facilities, such as Carter Lake, Horsetooth, and Boulder Reservoirs, for Participants who have both C-BT and Windy Gap water. Separate storage accounts could provide Participants with both C-BT and Windy Gap water some operational flexibility. For example, a Participant with a separate storage account in Carter Lake could make that storage available for Windy Gap in April to July, which is typically when Windy Gap can divert from the Colorado River. Any storage space in the account not used for Windy Gap could be filled with C-BT

water. As the Windy Gap water is released from the account, it would be replaced with C-BT water when available.

7.6.6 Interruptible Supply Contracts

This alternative would create a new class of C-BT units. Windy Gap Participants could purchase and retire a certain number of C-BT units from voluntary sellers. These units would then be reissued under a new interruptible class at a lower price and would receive a lower quota or delivery than regular C-BT units during a drought.

7.6.7 Purchase /Leaseback Arrangements and Dry Year Options on C-BT Units

Purchase/leaseback arrangements could be structured between Windy Gap Participants and C-BT allottees; these arrangements would function similar to an interruptible supply contract. Under purchase/leaseback arrangements and during drought conditions, C-BT water currently used for agricultural purposes would be used by Windy Gap Participants. Ownership of C-BT units could either be retained by the C-BT unit owner or purchased by the Windy Gap Participant and leased back to the agricultural user.

7.6.8 Integration with Denver Water's Raw Water and Treated Water System

This alternative considers the potential integration of the Denver's Moffat Collection System, which operates in the Fraser River basin upstream of the Windy Gap system, with the operation of the WGFP. A variety of complex operational and delivery options might be possible including delivery of Denver's raw water through the Windy Gap system or delivery of Windy Gap water through Denver's Moffat system. Multiple delivery options on the East Slope to Denver Water and Participants also could be considered.

7.6.9 West Slope Water Purchase

West Slope water rights could be acquired to increase water supplies for the Windy Gap Participants, but this would not firm the yield of existing Windy Gap water rights.

7.6.10 Prepositioning

Prepositioning involves storing C-BT water in a non C-BT reservoir to assure that space is available in Lake Granby to store Windy Gap water when it is available for pumping under Windy Gap water rights (APFR, pg. 132). The new reservoir would be kept nearly full at all times. By storing C-BT water in a new Firming Project reservoir, additional storage space for Windy Gap water could be made available in Lake Granby. As a result, there would be fewer instances when Windy Gap water could not be diverted because Lake Granby and the Adams Tunnel would be full at the same time. Total allowable C-BT storage would not change and the existing C-BT water rights and diversions would not be expanded. As Windy Gap water is stored in Lake Granby, an instantaneous transfer of water to C-BT from the Firming Project reservoir would occur and a commensurate amount of Windy Gap water would be transferred to the Firming Project Reservoir.

7.7 Alternatives Identified During Scoping

7.7.1 Around-the-Horn Delivery of Broomfield Water

This proposal involves leaving water that Denver Water normally diverts from the Fraser River basin through Denver's Moffat System for the City of Broomfield in the Fraser River. Water then could be diverted at the Windy Gap diversion and delivered to Broomfield through the C-BT/Windy Gap system. This alternative was suggested as a method for improving stream flow in the Fraser River.

7.7.2 Platte River Storage and Exchanges for C-BT Water

This alternative includes the development of additional storage on the Platte River below Denver that would allow a mechanism for the full reuse of existing Windy Gap diversions and other fully reusable effluent that could be exchanged for the right to reuse existing C-BT supplies higher in the system. This could be implemented in cooperation with other entities or as component of an alternative.

7.7.3 Storage in Horsetooth Reservoir

This alternative would include using any excess capacity in Horsetooth Reservoir for storage of Windy Gap water.

7.7.4 Interruptible Supply Contracts

This option would involve establishing contracts between the Subdistrict and downstream irrigators on the East Slope to lease or purchase water during dry years. This could include establishment of a South Platte River water bank.

7.7.5 Water Conservation

This alterative would involve improving water use efficiency and decreasing use to reduce demand and eliminate the need for firming the yield of the Windy Gap Project.

7.7.6 Joint West Slope Storage Project in Fraser Valley

The Upper Colorado River Basin (UPCO) Study was initiated in 1998 to summarize current water supplies and project future water demands in Grand and Summit Counties. Results of the UPCO Phase II study (Hydrosphere 2003) identified potential future water shortages in these counties and several potential projects that could satisfy some or all of the future needs. Some of these projects involve storage reservoirs in the Fraser Valley. Several potential reservoir sites were evaluated in reconnaissance-level feasibility studies by the UPCO study participants (GEI 2004).

A joint West Slope storage project alternative would involve combining a portion of the WGFP storage requirements with the storage needs in the Fraser Valley at a combined reservoir location. A component of this alternative could include storage of 3,000 AF of MPWCD's Windy Gap water in a new Fraser Valley reservoir. The analysis of a Fraser Valley reservoir is in the preliminary stages of evaluation; therefore, the implementation of such a project is uncertain.

8.0 Alternative Evaluation and Screening

To narrow the list of potential alternatives for consideration in the EIS, three successive levels of screening were used. Under 404(b)(1) Guidelines (40 CFR Section 230.10(a)(2)), the Corps has established five categories of screening criteria — Logistics, Technology, Environmental Consequences, Purpose and Need, and Cost. For Level 1 screening, four categories of screening criteria — Purpose and Need, Logistics, Technology, and Environmental Consequences — were used. Cost was not used to screen potential Firming Project alternatives because it did not adequately differentiate alternatives. Level 1 screening eliminated project elements that did not meet the criteria defined in Section 8.1. Alternatives such as aquifer storage, re-regulation of existing reservoirs, non-structural measures, and alternatives identified in scoping could not be readily evaluated using the Level 1 screening criteria and are discussed separately.

Alternatives remaining after Level 1 screening were further screened at a second level of evaluation based on the least impact to wetlands. A third level of screening and evaluation was then conducted on remaining alternatives based on the ability of the alternative to meet the project purpose and need and additional logistical and environmental considerations. The result was a short-list of alternatives that provided a reasonable range of potential actions for detailed analysis in the EIS.

8.1 Level 1 Alternative Screening

Sections 8.1.1 through 8.1.4 provide a description of the Level 1 screening criteria that were applied to the potential alternatives listed in Appendix A. Several of the screening criteria were the same or similar to those used and described in the APFR. Page references to the APFR are noted as applicable. Alternatives that did not meet these criteria were eliminated from further consideration, as discussed in Section 8.2 *Results of Level 1 Screening*.

8.1.1 Purpose and Need Screening Criteria

The purpose and need statement in Section 2.0 provided a basis for Level 1 alternative screening. Alternatives that clearly would not meet or reasonably contribute to meeting the Participants' water supply requirements were eliminated from further consideration. None of the potential reservoir storage alternatives were directly eliminated from consideration based on not meeting the project purpose and need. Each of the potential reservoir storage sites were considered to have the ability to contribute to meeting the purpose and need for the project. The purpose and need screen was used to screen other categories of alternatives including aquifer storage, non-structural measures, and alternatives identified in scoping, as appropriate. The ability to meet the project purpose and need, including yield and timing requirements, was used again to evaluate alternatives in Level 3 screening.

8.1.2 Logistical Screening Criteria

Land Use. Project elements were screened based on incompatibility with existing land uses (APFR, pgs. 54-57). Reservoir locations within designated Wild and Scenic or Recreational segments of the Cache la Poudre River were eliminated. In addition, reservoir sites located on North St. Vrain Creek, which is protected from dam

construction under existing legislation, were not considered. Reservoir sites within designated or proposed Wilderness Areas were eliminated. Modifications to existing C-BT reservoirs, such as Carter Lake, were eliminated from consideration because of the adverse effect to current operations and water deliveries to C-BT water users contrary to Reclamation obligations (Senate Document 80) and the need for Congressional action that would likely delay implementation of the project beyond the time needed for completion. Sites that could potentially affect or be affected by a Superfund area because of hazardous material were eliminated because of water quality concerns associated with water storage for a drinking water supply. Reservoir sites that would require the relocation of an Interstate Highway were eliminated from consideration because of the financial and functional impracticality.

Size and Number of Reservoirs. A minimum reservoir size and maximum number of reservoirs were used to screen small reservoirs and to limit the environmental effects associated with multiple reservoir sites. Hydrologic modeling conducted for the APFR indicate that the water storage necessary to firm the Windy Gap Project water supply is about 100,000 AF. Subsequent model runs and changes in Participant water storage requests indicate that about 90,000 AF of storage is needed. Because of the capacity limitation in conveying water from the West Slope to the East Slope via the Adams Tunnel, new storage is needed on the East Slope so that water is readily available for delivery to East Slope Participants. There are also potential advantages to having a portion of the required storage on the West Slope. Storage capacity on the West Slope allows Windy Gap diversions to be stored immediately without the potential for spilling from Lake Granby if the Adams Tunnel is delivering C-BT water at capacity or is otherwise unavailable due to maintenance or other reasons (APFR, pg. 86). However, too much storage on the West Slope may affect the reliability of the Firming Project because of the reliance on the operation of the Adams Tunnel and other facilities to convey water to East Slope Participants. West Slope storage also may provide some advantage to the MPWCD because the water would be immediately available for its use when needed. However, because MPWCD primarily uses its Windy Gap water by exchange, water could be exchanged from a new East Slope reservoir back to Lake Granby and released without a new West Slope reservoir.

Non-structural measures could also influence the size and location of reservoir storage. One concept being considered is referred to as prepositioning. Prepositioning would allow for the storage of C-BT water in a new WGFP facility. This would assure that space is available in Lake Granby to store Windy Gap water when it is available. With prepositioning, the storage available to the C-BT Project will be limited to approximately 840,000 AF, the same as without prepositioning or the WGFP in place. Prepositioning would improve the efficiency and yield of the Firming Project by increasing flexibility in water storage operations. Prepositioning is most advantageous with East Slope Windy Gap storage. If prepositioning is not used, then West Slope storage can improve project yield. The use of prepositioning to improve project yield will be considered in the EIS as an option in combination with an East Slope reservoir as discussed in Section 8.2.5.

A total of about 90,000 AF of storage is needed to meet WGFP yield requirements. Potential reservoir sites were screened using two different size criteria for East and West Slope reservoirs. Hydrologic modeling indicates that at least 20,000 AF of storage is needed on the West Slope to provide sufficient yield when combined with an East Slope reservoir. Thus, reservoir sites with less than 20,000 AF of storage on the West Slope were eliminated from further consideration.

A stand-alone East Slope reservoir site would need to have a storage capacity of about 90,000 AF to meet project needs. If 20,000 AF of storage is available on the West Slope, about 70,000 AF of East Slope storage is required. West Slope storage greater than 20,000 AF would reduce East Slope storage requirements. A minimum reservoir size of 30,000 AF on the East Slope was considered reasonable for the purpose of selecting reservoirs sites for consideration because at least twice this amount of storage (60,000 AF) is needed on the East Slope based on available West Slope storage.

Screening criteria for the number and size of reservoirs on the East Slope were established based on several considerations. The area of disturbance increases with the number of reservoirs. Thus, a single large reservoir would typically have less total disturbance than two smaller reservoirs with combined equivalent volume. The incremental environmental effects associated with multiple reservoir sites are likely greater than if the disturbance is concentrated at fewer locations. Multiple reservoirs also require the construction of additional pipelines, pumping stations, and other conveyance structures that increase environmental disturbance and reduce the operational efficiency. Multiple small reservoir sites typically have greater surface area and greater evaporation rates than larger deeper reservoirs depending on the topography. Thus, larger deep reservoirs conserve water resources by reducing evaporation losses compared to multiple smaller reservoirs. In some cases, hydrologic modeling indicates that the firm annual yield for the WGFP is decreased with shallow reservoirs on the plains because of increased evaporation. In consideration of the potential environmental impacts, operational inefficiencies, and evaporative water loss associated with multiple reservoir sites and conveyance requirements, alternative configurations were limited to no more than two reservoir sites on the East Slope.

8.1.3 Technical Screening Criteria

Constructability and Safety Factors. The ability to construct a dam and outlet facilities relates primarily to available geologic and geotechnical information. At the reconnaissance level of reservoir evaluation used in the APFR (pg. 52), only the presence of mines was used to eliminate alternatives. Other geologic hazards or safety risks would need to be assessed at later stages of evaluation to determine if there are any constraints to construction of a reservoir at a particular site. Other factors that would have to be considered in the future include the presence of active faults, suitable material for dam construction, and the potential for excessive leakage.

8.1.4 Environmental Screening Criteria

Wetlands. Potential impacts to wetlands were considered in the screening of reservoir sites. National Wetland Inventory (NWI) maps prepared by the U.S. Fish and Wildlife Service were used to estimate the potential wetland impacts for each of the

proposed reservoir sites. NWI maps were believed to provide a reasonable consistent standard for the screening alternatives; however, for several sites where access was available, additional data from field investigations or aerial photography were used to identify wetlands or the presence of fens. Reservoir sites were eliminated from consideration if they contain more than 25 acres of wetlands or if fens were known to be present.

Perennial Streams. Perennial streams provide year-round flows and often support aquatic ecosystems. Potential reservoir sites located on perennial streams were eliminated from consideration to avoid potential impacts to flowing streams and the associated aquatic life and habitat. Perennial streams were identified based on the presence of a solid blue line on U.S. Geological Survey Quadrangle Maps (scale = 1:24,000). Thus, potential reservoir sites were limited to off-channel ephemeral or intermittent drainages. Existing reservoirs located on a perennial stream were an exception to this criterion because these streams have already been impacted.

8.2 Results of Level 1 Screening

The following sections provide a brief discussion on the alternatives remaining following Level 1 screening and the rationale for the elimination of alternatives that were screened out. Appendix A indicates the criteria that eliminated each alternative.

8.2.1 New Reservoirs

A total of 124 of the potential new reservoir sites identified for analysis were eliminated in Level 1 screening. Thirteen reservoirs were carried forward for further screening and analysis in Level 2, including ten East Slope reservoir sites and three West Slope reservoir sites (Table 2).

8.2.2 Expansion of Existing Reservoirs

Application of the Level 1 screening criteria eliminated 26 of the potential enlargements of existing reservoirs. The enlargement of three East Slope reservoirs were carried forward for further screening in Level 2 (Table 2).

8.2.3 Aquifer Storage

Both bedrock and alluvial aquifer storage have limited value in meeting the needs of the proposed Firming Project based on investigations conducted as part of the APFR (pgs. 27, 41-46 and Technical Reports, Boyle 2002). A number of technical issues affect the success of aquifer storage and recovery including: 1) recharge/recovery performance; 2) water chemistry compatibility of native ground water and introduced water; and 3) aquifer conditions that affect the quantity and quality of recovered water.

Table 2. Alternatives Remaining Following Level 1 Screening

ID	Reservoir Site	Basin	Reservoir Size
New Reservoirs — East Slope			
102	Glade (1, 2, East, West)	Cache la Poudre	61,000 – 303,000
120	Cactus Hill	Cache la Poudre	104,071
121	Rawhide North	Cache la Poudre	43,100
301	Dowe Flats	St. Vrain	55,000 – 119,000
335	Stone Canyon	St. Vrain	31,800
406	Chimney Hollow	Big Thompson	60,000 – 110,000
407	Meadow Hollow	Big Thompson	60,000
409	Sprenger Ranch	Big Thompson	92,700
414	Dry Creek	Big Thompson	21,000 – 62,300
504	Wildcat	Lower South Platte	60,000
Enlarge Existing Reservoirs — East Slope			
107	Halligan	Cache la Poudre	35,300 – 62,900
127	Seaman	Cache la Poudre	3,200 – 38,000
411	Hertha	Big Thompson	74,300
New Reservoirs — West Slope			
633	Jasper East	Colorado	21,800
634	Rockwell/Mueller Creek	Colorado	20,000 – 30,000
637	Mt. Chauncey South	Colorado	23,500
Non-structural and Institutional Elements			
NA	Prepositioning	Multiple	NA

Bedrock Aquifer Storage. The Laramie-Fox Hill aquifer, which has the greatest potential for bedrock aquifer storage in the project area and underlies the communities of Erie, Louisville, Superior and Broomfield, was evaluated to determine potential feasibility. Water quality in this aquifer is generally considered fair to poor and total dissolved solids exceed secondary drinking water standards. Injection of Windy Gap water in this aquifer and the subsequent recovery may affect the suitability or treatment requirements prior to potable use. Based on yields from existing wells in the aquifer, wells averaging 25 gpm of yield are likely. Storage volumes are unlikely to be greater than several hundred AF per year and recovery efficiency could initially be less than 50 percent. While a small-scale bedrock aquifer storage system facility may be technically feasible, bedrock aquifer storage would not provide sufficient storage potential for meeting the project purpose and need; therefore, bedrock aquifer storage was eliminated from consideration.

Alluvial Aquifer Storage. Alluvial aquifers are present along the main drainages in the project area; the Cache la Poudre, St. Vrain, and Boulder Creek aquifers appear to

have the greatest potential for storage. These aquifers are in direct hydrologic contact with surface water and, thus, storage is more transient than bedrock aquifers, because water eventually drains to the surface. Storage and recovery cycles for alluvial aquifers would likely need to be seasonal to prevent significant losses. Aquifer storage capacity is relatively small. An aquifer within a useable area of 4 to 8 square miles with an unsaturated zone thickness of about 4 feet, and a specific yield of about 20 percent would provide about 2,000 to 4,000 AF of storage. Another consideration is that alluvial aquifer water quality is highly vulnerable to contamination from surface water sources. Alluvial aquifer storage could provide limited potential for seasonal storage and recovery, but would still be a very small component of the total water storage needs of the Firming Project. Alluvial aquifers were eliminated from consideration as a primary source of water storage for the Firming Project because of the limited storage volume and the inability to provide long-term storage; however, alluvial aquifers could be evaluated further in the EIS if additional small amounts of storage are needed or if aquifer storage would enhance performance of other alternatives.

8.2.4 Re-regulation of Existing Reservoirs

Re-regulation of existing reservoirs in the Cache la Poudre, Big Thompson, and St. Vrain Creek basins was evaluated to determine if additional storage space could be made available by operational changes in non-C-BT reservoirs. Major irrigation companies in these basins that own and operate several reservoirs include: Larimer and Weld; New Cache; Water Supply and Storage; North Poudre; Greeley-Loveland; Highland; and the Left Hand Ditch Irrigation Company. Water commissioners for these basins indicate that storage is in high demand and reservoirs owned by irrigation companies are typically fully utilized (Boyle 2004a). Larger reservoirs owned by irrigation companies in the Cache la Poudre Basin such as Douglass, Cobb, North Poudre Reservoir Nos. 5 and 6, and Big Windsor Reservoir are typically full in wet years and drawn down in dry years. Historical use of these reservoirs shows they are already being used to firm-up other water supplies. These reservoirs are typically filled during the winter or runoff season (November to July), and tend to be full when Windy Gap water is available for storage. There are only 13 reservoirs with capacities between 5,000 AF and 25,000 AF in the Poudre basin and, although re-operation could potentially free up some storage, the amount would be relatively small and dispersed throughout the basin. The only East Slope non-C-BT reservoir with a capacity greater than 30,000 AF in the Big Thompson and St. Vrain Creek basins is Boyd Lake. Owned and operated by the Greeley-Loveland Irrigation Company and the City of Greeley, this reservoir is already fully subscribed and no storage is available for Windy Gap water (Boyle 2004a).

Municipalities participating in the WGFP that own and operate reservoirs in the Cache la Poudre, Big Thompson, and St. Vrain basins do not have excess storage capacity in existing reservoirs for Windy Gap water. Participants are already operating their existing reservoirs in an effort to maximize yield of their other water supplies; therefore, storage space in most existing reservoirs is generally fully subscribed and not available for Windy Gap storage (Boyle 2004a).

Re-regulation of existing reservoirs was eliminated as a potential alternative because existing reservoirs are already being operated in an effort to maximize yield, so the re-

operation potential and amount of storage that might be available is minimal. Existing storage within the basins is typically fully utilized to firm other water supplies and is generally not available when Windy Gap water is diverted. Re-regulation of existing reservoirs was eliminated for the above reasons and because it would not substantially contribute to the storage needs identified in the purpose and need.

8.2.5 Non-structural or Institutional Elements

Non-structural measures primarily involve modification to existing operations without significant new structural features. Because non-structural measures do not result in physical disturbance, most of the criteria used in Level 1 screening are not applicable for evaluation of non-structural elements. Non-structural alternatives were evaluated primarily on their ability to firm Windy Gap Project water supplies as defined in the purpose and need for the Firming Project and logistical considerations. A summary of the results of the evaluation of non-structural measures is described below. The APFR (pgs. 79-91) provides additional detail.

Integration with the C-BT System—Unlimited and Limited Borrowing from C-BT. Each of these borrowing measures would result in adverse effects to C-BT unit holders by reducing the water available. Reclamation obligations to protect operation of the C-BT Project preclude any actions that would adversely impact deliveries to C-BT unit holders; therefore, this alternative was eliminated from further consideration.

Modified Borrowing of C-BT (Modifying Windy Gap Delivery). This alternative would involve modifying Windy Gap deliveries in conjunction with borrowing C-BT water. Windy Gap would borrow C-BT water in wet years to reduce spills and would not borrow in dry years. This alternative would still result in shortages to C-BT as a result of Windy Gap borrowing water during times of abundant supply and high storage levels in C-BT reservoirs. Modifying C-BT borrowing and Windy Gap deliveries would have adverse consequences to C-BT unit holders similar to limited and unlimited borrowing; therefore, this alternative was eliminated. In addition, this alternative is not consistent with meeting the WGFP purpose and need because there would be minimal to no Windy Gap deliveries during drought periods.

Buying C-BT Project Storage from the United States. Buying C-BT storage is contrary to the purpose for which the C-BT Project was created and would require Congressional action to change the designated use of facilities and authorize the sale. This alternative also results in a decreased yield of the C-BT project, which is contrary to Reclamation obligations. Because many of the WGFP Participants also rely on C-BT water, it would be counter productive to reduce the yield from one water source to increase the yield from another. This alternative was eliminated from consideration as an option for the Firming Project because of the institutional constraints associated with the purchase of C-BT storage and negative impacts on C-BT yield.

Individually Operated Storage in C-BT Facilities. This alternative would operate similar to purchase of C-BT storage and was likewise eliminated because of the conflict with the operation of the C-BT Project. Use of C-BT reservoirs other than Lake Granby for storage of Windy Gap water would likely require an act of Congress to change the designated use of these C-BT facilities.

Interruptible Supply Contracts. The use of interruptible supply contracts by creating a new class of C-BT units would possibly provide increased storage for Windy Gap water, but at the expense of C-BT storage. This alternative essentially trades C-BT storage for Windy Gap storage within existing C-BT reservoirs. Interruptible supply contracts would interfere with the operation, maintenance, and yield of the C-BT Project and adversely affect C-BT unit holders contrary to Reclamation obligations associated with the establishment of the C-BT Project as authorized by Congress. In addition, because many of the Project Participants also own C-BT units, any reductions in C-BT yield to improve Windy Gap yield would not increase their overall water supply. For these reasons this alternative was eliminated from consideration.

Purchase/Leaseback Arrangements and Dry Year Options on C-BT Units. These arrangements are similar to interruptible supply contracts and primarily involve the lease or purchase of C-BT water. Transferring C-BT water to Windy Gap shifts an existing shortage to another user without generating any new supplies, and it does not address the purpose and need of firming Windy Gap Project water supplies. For these reasons this alternative was eliminated from consideration.

Integration with Denver Water's Raw Water and Treated Water Systems. Integration of Windy Gap Firming with Denver Water's system would require a number of complex interactions. Denver Water's Moffat Collection System delivers water from a collection system in the Fraser River basin on the West Slope via a tunnel to South Boulder Creek on the East Slope. Water is then stored in Gross Reservoir and distributed to customers. Currently Denver Water is evaluating options to increase its yield from the Moffat Collection system, which will increase the amount of water transported through the Moffat tunnel.

The use of the Moffat Tunnel to convey Windy Gap water has several limitations including the lack of conveyance capacity in the Moffat System to convey both Denver Water water and Windy Gap water. Both Denver Water and Windy Gap divert water during periods of high flow in the spring and early summer, although Denver Water's rights are senior to Windy Gap water rights. Denver Water has indicated that there is insufficient capacity in the Moffat system during the runoff season to carry both Denver and Windy Gap water (Denver Water 2005). There also is a limitation in the channel capacity of South Boulder Creek, which sometimes restricts Denver's ability to convey water. Use of the Moffat Tunnel also would require a change in the diversion point for Windy Gap water from the Colorado River to the upper Fraser River, which would reduce flows in the Fraser River and the beneficial effects of maintaining stream flows until the current diversion on the Colorado River. Conveyance of Windy Gap water in the Moffat System would still require new storage to provide a firm supply of Windy Gap water and conveyance facilities to transport the water to Project Participants.

Construction of a West Slope Windy Gap reservoir could be used to exercise exchanges to the Moffat Tunnel when tunnel capacity is available. However, this option would be limited by the ability of Denver Water's senior water rights to divert any exchange water. The exchange of Windy Gap water would be junior to other Fraser basin water rights, including Colorado Water Conservation Board minimum stream flows, thus limiting the amount of water that could be exchanged (Denver Water 2005).

Denver Water does not believe that the integration of the two systems would be practical or beneficial for either Denver Water, Windy Gap Participants, or the West Slope (Denver Water 2005). Limitations in conveyance capacity, modifications in existing water rights, and difficulty in integrating the diverse delivery and storage operations of multiple water providers over a large geographic area would be extremely difficult and, if feasible, would be very unlikely to be completed in time to meet the purpose and need requirements of the WGFP. In addition, this is primarily a conveyance alternative and does not address storage requirements or provide the firm yield identified in the purpose and need statement. For these reasons this alternative was eliminated from consideration.

West Slope Water Purchases. The purchase of new West Slope water rights could potentially provide a new water supply to Windy Gap Participants, but would not improve the yield of the existing Windy Gap water rights. Senior West Slope water rights are primarily held by Denver Water and are not available for acquisition. Even if West Slope rights were available, new storage would still be needed to provide a reliable firm yield to Windy Gap Participants. The purchase of new water rights and the associated Water Court proceedings for the transfer of water rights to the East Slope would not meet the purpose and need of firming the existing Windy Gap Project water supply or provide water by 2010; therefore, this option was eliminated from consideration.

Prepositioning. The concept of prepositioning allows the storage of C-BT Project water in a new Firming Project reservoir thereby assuring that space is available in Lake Granby for the storage of Windy Gap water when it is available. This has the potential to improve yields from the WGFP without injury to C-BT unit holders or increasing storage available to the C-BT Project. Prepositioning was evaluated in combination with storage at Chimney Hollow Reservoir to determine the potential for improving yield.

8.2.6 Alternatives Identified during Scoping

Around-the-Horn Delivery of Broomfield Water. This proposal involves leaving water that would normally be delivered to Broomfield through Denver's Moffat System, in the Fraser River to be diverted at the Windy Gap Diversion and delivered to Broomfield through the C-BT/Windy Gap system. This conveyance alternative could potentially improve streamflow in the lower Fraser River basin and offset effects of Denver's additional diversions from the Fraser System, but does not contribute to meeting the firm yield in the purpose and need of the Firming Project or offset any effects of the WGFP. This routing option was not considered part of the Firming Project, but may be investigated by Denver Water as part of the Moffat Collection System EIS.

Platte River Storage and Exchanges for C-BT Water. The development of downstream storage on the South Platte River to allow reuse of Windy Gap water and upstream exchanges for C-BT water is not feasible for several reasons. First, there is no need for a downstream reservoir to store Windy Gap return flows. The majority of Windy Gap Participants already have dedicated commitments for the use of Windy Gap effluent or plans to reuse the return flows from their Windy Gap supplies. Several Participants have reuse systems (Superior and Broomfield) or are in the process of developing reuse systems (Louisville) and plan to fully reuse their Windy Gap effluent in

these systems to meet non-potable demands for irrigation or other obligations. Some Participant's currently exchange their Windy Gap effluent upstream for diversion and irrigation of golf courses and city parks (Erie), or use their Windy Gap effluent as replacement/augmentation water (Greeley) and will continue to do so as this source of supply is firmed. The Platte River Power Authority takes about 80 percent of its Windy Gap water supply as effluent and continues to recycle the water to extinction to meet cooling needs for the Rawhide Power Plant (ERO 2005).

Therefore, very limited Windy Gap return flows would be available for storage in a South Platte reservoir. In addition, the availability of reusable Windy Gap effluent is dependent on the reliable delivery of Windy Gap water for the first use; currently the firm yield of the Windy Gap Project for first use is zero. Without firming the delivery of the first use of Windy Gap water, there would be no reliable delivery of water for reuse. Under Article 19 of the 1938 Repayment Contract between the United States and the Northern Colorado Water Conservancy District (NCWCD) for the C-BT Project, return flows from the first use of C-BT Project water are reserved by the United States for the use of the NCWCD. In the same article of the repayment Contract, the NCWCD allocates such return flows first to downstream water users within the NCWCD based generally on water right priorities. Exchanging effluent for the right to reuse existing C-BT Project return flows is not possible under the terms of the 1938 Repayment Contract. The exchange of Windy Gap effluent for the first use of C-BT water does nothing to increase available water supplies or satisfy the need to firm Windy Gap water. This alternative does not meet the purpose and need of firming Windy Gap water rights, but rather provides a potential mechanism to capture and reuse Windy Gap water and perhaps other reusable water.

Interruptible Supply Contracts. Interruptible supply contracts typically are used to provide water in dry years and do not provide a long-term reliable supply of water. This alternative would not meet the purpose and need of the proposed project to firm the yield from existing Windy Gap water rights and provide a long-term reliable water supply.

Storage in Horsetooth Reservoir. Horsetooth Reservoir, which is a storage facility of the C-BT Project, does not have excess storage capacity that could be used to meet the purposes of the proposed WGFP. Historical end-of-month data indicates the reservoir has been fully utilized on a regular basis in the past to meet C-BT demands. Dedicating space in Horsetooth Reservoir for Windy Gap water would reduce Reclamation's ability to use that reservoir to meet C-BT demands. Reducing the amount of storage in Horsetooth available to C-BT would result in a higher risk of injury to C-BT owners that take delivery of water out of Horsetooth.

The C-BT Project is intended to meet the supplemental water needs within NCWCD on an annual basis. Because of the recent drought and resulting low storage levels with the C-BT Project, declared quotas have been based on available supply rather than the total supplemental need for additional water.

Permanently dedicating storage space in Horsetooth Reservoir for the use of the Windy Gap Project would harm C-BT Project water users because it would reduce the storage available for C-BT water and potentially reduce the yield of the C-BT Project.

Any reduction in C-BT Project storage space, whether it is in Horsetooth Reservoir, Lake Granby, or some other reservoir, would significantly reduce the overall storage capacity of the C-BT system and the long-term reliability of the C-BT Project. The C-BT Project relies upon its large carryover storage capacity to carry Project water users through drought periods, such as has occurred recently. In addition, dedicating space in Horsetooth Reservoir for Windy Gap use would impact diversion and storage under the C-BT Project's Big Thompson River direct flow water rights. These relatively junior Big Thompson direct flow water rights can be diverted when in priority for storage in Carter Lake and Horsetooth Reservoirs. If storage in Horsetooth is allocated for Windy Gap use, the ability of the C-BT Project to exercise its Big Thompson rights could be decreased because less space would be available for storage of Big Thompson water.

The permanent use of storage space in Horsetooth Reservoir for Windy Gap water would require a change in the purposes of the C-BT Project that would require Congressional action. This alternative was eliminated from consideration because it would adversely affect C-BT unit holders contrary to Reclamation obligations associated with the establishment of the C-BT Project authorized by Congress.

Water Conservation. Water conservation measures play an important role in meeting the water needs for each of the Project Participants as discussed in the Windy Gap Firming Project Purpose and Need Report (ERO 2005). Each Windy Gap Participant has developed and implemented a variety of conservation strategies to reduce water demand and extend existing water supplies. Water conservation measures vary by Participant according to the characteristics of each entity and the individual water supply systems. Measures include rebates for low water plumbing fixtures and appliances, metering, increasing water rates for higher amounts of use, education and technical assistance with reducing outdoor irrigation, as well as monitoring, pipe replacement, and leak detection to reduce delivery losses.

Incremental improvements in water conservation over time are expected to contribute to meeting Participant's future water needs; however, conservation alone does not meet all of their water supply requirements or eliminate the need for firming existing Windy Gap Project water supplies. Many of the Project Participants have near-term needs for additional water to firm their water supplies. While conservation measures will continue to reduce demand and conserve supplies in the future, they do not provide an immediate source of water to meet demand projections. Regardless of the implementation of the proposed Firming Project, Participants will continue to use water conservation measures to reduce water demand and improve the efficiency of available water supplies.

Joint West Slope Storage Project in Fraser Valley. This alternative was eliminated from further consideration for several reasons. A new Fraser Valley reservoir to meet estimated future water requirements and instream environmental flows in the Fraser Valley would need to be located in the Fraser River basin. The diversion of Windy Gap water to a reservoir located in the middle to upper Fraser River basin would require a change in the Windy Gap point of diversion from the Colorado River to a new location upstream on the Fraser River. It would also potentially further de-water the Fraser River in an area already short of water at times. Because of the potential for further de-watering of the Fraser River, uncertainty associated with the location and construction of

a Fraser Valley reservoir, the logistical constraints and legal requirements associated with delivery of Windy Gap water to a Fraser Valley reservoir, and the uncertainties associated with the timing of a Fraser Valley reservoir, this alternative was eliminated from consideration as part of the Firming Project. The purpose and need for the Firming Project includes completion of storage facilities by 2010 and it is unlikely that development of a joint project could be completed by this time (ERO 2005).

8.3 Level 2 Alternative Screening

Alternatives remaining following Level 1 screening included ten potential new reservoir sites and the enlargement of three existing reservoirs on the East Slope, and three potential new reservoir sites on the West Slope. Screening for Level 2 was based on storage options that would have the least potential effect on wetlands. For consistency with the Corps 404(b)(1) guidelines, reservoirs that affected the least acreage of wetlands were retained for further consideration. The top five East Slope reservoir sites, three West Slope sites, and three East slope reservoirs with potential for enlargement to meet Windy gap purposes were retained for further consideration (Table 3). Level 2 screening eliminated five new East Slope reservoir sites, and none of the potential East Slope reservoir sites that could be enlarged. All three potential West Slope reservoirs sites were retained for further consideration. The reservoir sites with the least wetland impact are indicated by shading in Table 3 and were carried forward for further evaluation in Level 3.

Table 3. Reservoir Alternatives Evaluated in Level 2 Screening.

ID	Reservoir Site	River Basin	Reservoir Size (AF)	Wetlands (acres)
New Reservoirs — East Slope				
102	Glade (1, 2, East, West)	Cache la Poudre	61,000 – 303,000	6-40
120	Cactus Hill	Cache la Poudre	104,071	14
121	Rawhide North	Cache la Poudre	43,100	1
301	Dowe Flats	St. Vrain	55,000 – 119,000	18
335	Stone Canyon	St. Vrain	31,800	0
406	Chimney Hollow	Big Thompson	60,000 – 110,000	2
407	Meadow Hollow	Big Thompson	60,000	6
409	Sprenger Ranch	Big Thompson	92,700	1
414	Dry Creek	Big Thompson	21,000 – 62,300	3 – 6
504	Wildcat	L. South Platte	60,000	13
Enlarge Existing Reservoirs — East Slope				
107	Halligan	Cache la Poudre	35,300 – 62,900	18
127	Seaman	Cache la Poudre	3,200 – 38,000	18
411	Hertha	Big Thompson	74,300	1
New Reservoirs — West Slope				
633	Jasper East	Colorado	21,800	19
634	Rockwell/Mueller Creek	Colorado	20,000 – 30,000	3 – 18
637	Mt. Chauncey South	Colorado	23,500	7

Note: Shaded reservoir sites had the least impact to wetlands and were carried forward for further evaluation in Level 3 screening.

8.4 Level 3 Selection of Alternatives for the EIS

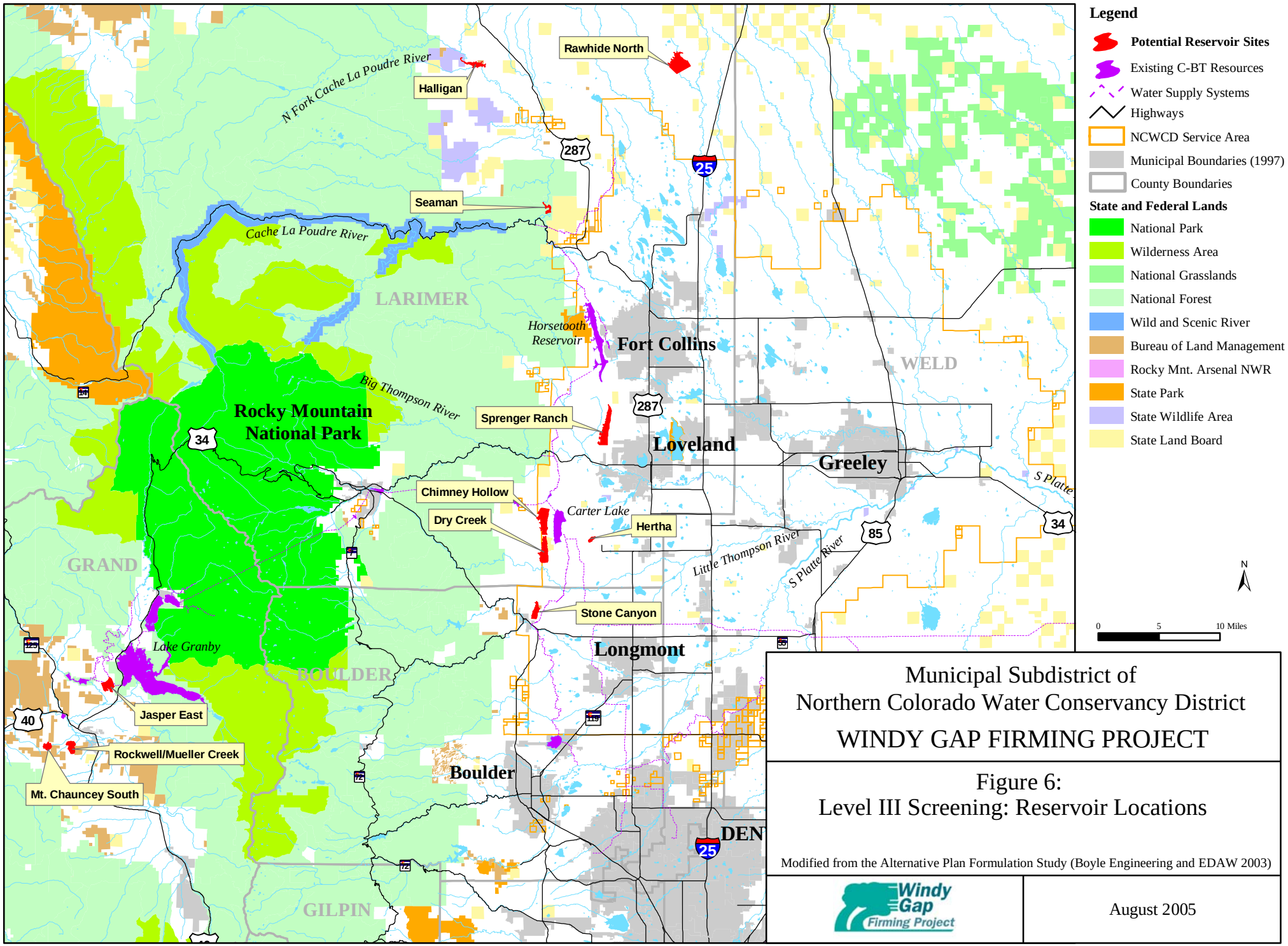
The third level of alternatives analysis evaluated the 11 remaining reservoir alternatives based on their ability to meet the purpose and need of the proposed project, along with consideration of additional logistical and environmental factors (Table 4). Reservoir sites evaluated in Level 3 are shown in Figure 6. Prepositioning was also evaluated to determine its potential for improving yield and meeting the project purpose and need. A discussion of each of the remaining alternatives and the rationale for inclusion or exclusion in the EIS follows.

Table 4. Reservoir Alternatives Evaluated in Level 3 Screening.

ID	Reservoir Site	Basin	Reservoir Size (AF)	Wetlands (acres)
New Reservoirs — East Slope				
121	Rawhide North	Cache la Poudre	43,100	1
335	Stone Canyon	St. Vrain	31,800	0
406	Chimney Hollow	Big Thompson	60,000 – 110,000	2
409	Sprenger Ranch	Big Thompson	92,700	1
414	Dry Creek	Big Thompson	21,000 – 62,300	3 – 6
Enlarge Existing Reservoirs —East Slope				
107	Halligan	Cache la Poudre	35,300 – 62,900	18
127	Seaman	Cache la Poudre	3,200 – 38,000	18
411	Hertha	Big Thompson	74,300	1
New Reservoirs — West Slope				
633	Jasper East	Colorado	21,800	19
634	Rockwell/Mueller Creek	Colorado	20,000 – 30,000	3 – 18
637	Mt. Chauncey South	Colorado	23,500	7

8.4.1 Rawhide North

The Rawhide North potential reservoir site is located about 20 miles north of Fort Collins in Larimer County (Figure 6). The Rawhide site is located in the rolling plains grasslands at an elevation of about 5,800 feet. With a maximum storage capacity of about 43,000 AF, Rawhide alone would not provide sufficient storage to meet the purpose and need for the proposed project and would need to be combined with a second reservoir. The APFR (Chapter 7) evaluated the Rawhide reservoir site in combination with Chimney Hollow reservoir or Jasper North reservoir. Hydrologic modeling of those reservoir combinations evaluated a 13,000 AF Rawhide reservoir combined with either a 110,000 AF Chimney Hollow reservoir or a 79,000 AF Jasper North reservoir on the West Slope. A 13,000 AF Rawhide was modeled because it could be used to meet the storage requirements of the nearby Platte River Power Authority Rawhide power plant.


Legend
Potential Reservoir Sites
Existing C-BT Resources
Water Supply Systems
Highways
NCWCD Service Area
Municipal Boundaries (1997)
County Boundaries
State and Federal Lands
National Park
Wilderness Area
National Grasslands
National Forest
Wild and Scenic River
Bureau of Land Management
Rocky Mnt. Arsenal NWR
State Park
State Wildlife Area
State Land Board
Rawhide North
Halligan
N Fork Cache La Poudre River
Seaman
Cache La Poudre River
LARIMER
Horsetooth Reservoir
Fort Collins
WELD
Big Thompson River
Rocky Mountain National Park
Sprenger Ranch
Loveland
Greeley
S Platte
Chimney Hollow
Carter Lake
Dry Creek
Hertha
Little Thompson River
S Platte River
GRAND
Stone Canyon
Lake Granby
Longmont
BOULDER
Jasper East
Rockwell/Mueller Creek
Mt. Chauncey South
Boulder
DEN
GILPIN
287
25
34
85
40
72
119
0 5 10 Miles
N
Municipal Subdistrict of
Northern Colorado Water Conservancy District
WINDY GAP FIRMING PROJECT
Figure 6:
Level III Screening: Reservoir Locations
Modified from the Alternative Plan Formulation Study (Boyle Engineering and EDAW 2003)
Windy Gap Firming Project
August 2005

The projected yield from combining Rawhide with Chimney Hollow reservoir resulted in a lower yield than the operation of Chimney Hollow alone. Similar low yield is projected when Rawhide is combined with Jasper North. The low firm yield from this alternative is primarily related to the evaporation rates associated with a relatively shallow plains reservoir. For example, the evaporation loss for Rawhide is two-thirds the loss for Chimney Hollow, which has over six times the storage capacity (Boyle Engineering 2004b). Compounded over multiple years of operation, the evaporative loss of an additional 1,000 AF/year with a Rawhide/Chimney Hollow combination versus Chimney Hollow alone substantially reduces the net yield and the ability to meet the purpose and need for the proposed project.

A larger Rawhide reservoir might improve firm yield, but total project storage would have to be increased to compensate for the evaporation losses and the amount of water diverted from the Colorado River would conceivably increase to compensate for the greater evaporation losses. However, diversion or conveyance constraints could limit the amount of water that could be conveyed through the Adams Tunnel. Because of the high evaporation losses, storage at Rawhide reservoir does not make the most efficient use of available water supplies.

Logistical constraints also limit the practicality of the Rawhide reservoir site because of its distance from most of the Participants. Rawhide reservoir could meet the needs for the Platte River Rawhide Power Plant located near the reservoir site, but practicable delivery to Participants located at least 35 miles to the south would be difficult. Extensive pipeline distribution would be needed to deliver water to southern Firming Project Participants if the reservoir was sized larger than the storage requirements of Platte River Power Authority. Water exchanges could potentially be used in the summer, but there would be no exchange potential in the winter months, when many of the Participants plan to take delivery of Windy Gap water to maximize return flows and reuse.

The environmental effects associated using Rawhide reservoir in combination with another reservoir site would be compounded because of the additional surface disturbance needed for two reservoir sites and the potential effect of additional water diversions to provide the same net yield as more efficient reservoir storage.

The Rawhide North reservoir site was eliminated from further consideration because of the inefficiency in water use due to high evaporation loss, its inability to effectively contribute to meeting the purpose and need firm yield requirements, the logistical inefficiencies associated with the distant location of the reservoir from Project Participants, and the potential environmental effects associated with the disturbance from construction of two reservoirs with no improvement in yield and the potential environmental effect from the additional water required to make up for evaporation losses.

8.4.2 Stone Canyon

The Stone Canyon potential reservoir site is located between two foothill ridges less than 1 mile northeast of the Town of Lyons (Figure 6). This potential reservoir has a

storage capacity of about 32,000 AF and would need to be combined with additional reservoir storage to meet the Firming Project's yield requirement.

This site is currently occupied by nine homes and about 80 acres of Boulder County open space. Boulder County open space property at the reservoir site includes the Indian Mountain, Dowe Flats, and a portion of a 40 acre parcel of BLM property that the County is currently leasing and managing. The County has an application pending for acquisition of the BLM property under the Recreation and Public Purposes Act. The Indian Mountain area is listed as a Natural Landmark in the Boulder County Comprehensive Plan (Koopman 2004). Natural Landmarks are defined by the County as important areas because of their value for plant and wildlife habitat, scenic vistas, ecological, and cultural resources. The Indian Mountain area is an archeological sensitive area considered to be of high value for preservation by Boulder County. The Rabbit Mountain-Dowe Flats-Indian Mountain complex of open space areas is believed to have the largest concentration of archaeological sites in the County (Koopman 2004). The West Dowe Flats open space parcel that would be partially inundated by the Stone Canyon reservoir "…is restricted in perpetuity for use only by American Indians for educational and ceremonial purposes" (Koopman 2004). Boulder County owns and manages the property with operational guidance from the United Tribes of Colorado. Boulder County has indicated that it is not willing to sell the open space property affected by the proposed reservoir or enter into an agreement that would allow construction of a dam and reservoir at this site (Koopman 2004).

To acquire this property it is likely that a condemnation procedure would be necessary. Boulder County would likely contest any condemnation procedure including appeals to the Colorado Court of Appeals and/or the Colorado Supreme Court (Trout 2005). This would likely delay acquisition of the Stone Canyon property for at least three to four years following completion of the NEPA process (Ibid). Delays in property acquisition would also postpone design and construction.

The Stone Canyon reservoir site was eliminated from further consideration because of the conflicting land uses including the presence of nine private residences, portions of two Boulder County open space properties, BLM land managed as open space, and the natural and cultural resource values associated with these lands. Subdistrict condemnation of property for reservoir construction including County Open Space and other private property, as well as consulting with the United Tribes of Colorado on the impacts to lands committed to ceremonial and educational uses in perpetuity by multiple tribes, is likely to take at least three years and would not allow completion of the project by 2010 as stated in the purpose and need for the Firming Project. In addition, a second East Slope reservoir would need to be combined with the Stone Canyon Reservoir to meet project storage requirements, and the environmental effects from two East Slope reservoirs are likely to be greater than other alternatives.

8.4.3 Chimney Hollow Reservoir

The Chimney Hollow potential reservoir site is located in a hogback valley just west of Carter Lake and about 5 miles west of the City of Loveland (Figure 6). The potential reservoir site is located on private property at an elevation of about 5,600 feet. There are no residences on the site. The reservoir could be constructed to a storage capacity of

40,000 to 110,000 AF. At the larger capacities, it could serve as a stand-alone facility. At smaller sizes, it would need to be combined with another East or West Slope reservoir. **The Chimney Hollow Reservoir site was carried forward for more detailed evaluation in the EIS**.

8.4.4 Sprenger Ranch

The Sprenger Ranch potential reservoir site is located about 5 miles west of the City of Loveland (Figure 6). This reservoir site is located at an elevation of about 5,200 feet in a hogback valley. This reservoir could be built to a capacity of up to about 93,000 AF and could potentially be used as a stand-alone reservoir or combined with other East or West Slope reservoirs to provide the needed storage and yield.

The reservoir site is currently occupied by about 15 residences, and overlaps portions of two Larimer County Open Space parcels — Rimrock and Devils Backbone. The Rimrock Open Space is located on the northern upstream end of the potential reservoir site. The Rimrock Open Space was established because it contains aesthetic and ecological values, portions of which include a highly significant Colorado Natural Heritage Conservation Site (Larimer County 2001). The Devils Backbone Open Space supports imperiled foothills plant communities, plants, and likely supports imperiled butterfly species that have been documented nearby within similar habitat (Larimer County 2004). Larimer County has indicated that it would not be willing to sell or enter into an agreement that would permit construction of a dam and reservoir that would impact Rimrock or Devil's Backbone Open Space (Buffington 2004).

Similar to the Stone Canyon site, it is likely that condemnation proceedings would be required to obtain Larimer County Open Space and possibly other private land for construction of a reservoir at this location (Trout 2005). Larimer County is opposed to use of open space lands for a reservoir site and extended legal proceedings are likely to take three to four years or more to acquire the property.

The Sprenger Ranch reservoir site was eliminated from further consideration because of the conflict with existing land uses including the presence of 15 residences in the reservoir site and two Larimer County Open Space parcels and their associated natural resource values. While the Subdistrict has the power of eminent domain in acquiring real estate for reservoir construction, the time required to potentially condemn Larimer County Open Space and other private property is likely to take at least three years and would not allow completion of the project by 2010 as stated in the purpose and need.

8.4.5 Dry Creek

The Dry Creek potential reservoir site is located southeast of Carter Lake and due south of the Chimney Hollow potential reservoir site (Figure 6). This site is located within a foothill hogback at an elevation of about 5,900 feet. A reservoir at this location could be constructed to a size ranging from 21,000 AF to about 62,000 AF. To meet the firm yield requirement for the Firming Project, this reservoir would need to be combined with an additional East or West Slope reservoir. The Dry Creek potential reservoir site is located on private property and State land and would affect at least two residences. **The**

Dry Creek Reservoir site was carried forward for more detailed evaluation in the EIS.

8.4.6 Halligan Reservoir

Halligan Reservoir is an existing 6,400 acre-foot reservoir located about 23 miles northwest of Fort Collins on the North Fork of the Cache La Poudre River (Figure 6). The City of Fort Collins, Greeley, and others are currently evaluating the potential to enlarge this reservoir to 40,000 AF. The City of Fort Collins has indicated that the full expansion capacity of an enlarged Halligan is fully subscribed by the City and others (Janonis 2004). As such, capacity is not sufficient for storage of Windy Gap water in this facility. The practicality of delivering and storing Windy Gap water at a reservoir site almost 40 miles from Carter Lake, where Windy Gap water is currently delivered, would also involve numerous logistical issues including the need for extensive pipeline construction and infrastructure, as well as high energy requirements for pumping, and the environmental effects associated with water conveyance facilities. Potential effects to wetlands and a perennial stream also would be high compared to other new reservoir sites. For these reasons, **enlargement of Halligan Reservoir was eliminated from further consideration**.

8.4.7 Seaman Reservoir

Seaman Reservoir is an existing reservoir located on the North Fork of the Cache La Poudre River downstream from Halligan Reservoir and about 10 miles northwest of Fort Collins (Figure 6). The City of Greeley, Fort Collins, and others are currently evaluating the potential for enlarging this reservoir to meet a portion of their future water storage needs. Floodplain areas along the North Fork of the Poudre River near the existing Seaman Reservoir are currently designated as critical habitat for the threatened Preble's meadow jumping mouse. The City of Greeley and others have fully subscribed all of the available capacity of an enlarged Seaman Reservoir (Koch 2004). Similar to the Halligan Reservoir enlargement, there are also substantial logistical difficulties and environmental concerns in conveying water to a distant reservoir site and then delivering water back south where most Participants are located. Potential effects to wetlands and the North Fork of the Poudre River also are higher compared to other new East Slope reservoir locations. For these reasons, **enlargement of Seaman Reservoir was eliminated from further consideration**.

8.4.8 Hertha Reservoir

The existing Hertha Reservoir site is located about 6 miles southwest of the City of Loveland and about 2 miles east of Carter Lake Reservoir (Figure 6). This small reservoir currently serves the Handy Ditch Company. Expansion of Hertha Reservoir to about 74,000 AF of storage capacity is possible with construction of approximately two miles of dam that would encircle and enlarge the existing reservoir. The Hertha Reservoir site also contains Rainbow Lake Estates, a residential subdivision containing at least 32 completed homes with an assessed individual value of $300,000 to $500,000, plus 39 additional lots for sale or homes under construction.

Hertha Reservoir is owned by the Handy Ditch Company. In order to acquire the right to enlarge Hertha Reservoir, the Subdistrict would have to acquire all of the real

estate interests in the land underlying and bordering the reservoir and most of the Rainbow Lake Estates. In order to acquire the right to use and enlarge the Hertha Reservoir, the Subdistrict would have to condemn the land at the reservoir site and most likely some interest in the water rights associated with the reservoir because reservoir enlargement would likely interfere with those water rights (Trout 2005). The Subdistrict likely would have to name all Handy Ditch Company shareholders in a condemnation action, which would include two governmental entities. While the Subdistrict has the power of eminent domain, it is unclear under present law whether the Subdistrict has the legal power to condemn property owned by other government entities. Legal proceedings through District and higher courts are likely to take at least three years (Trout 2005). Given the large number of residents at Hertha site, it is likely that acquisition of these properties through the condemnation process also would require at least three to four years (Trout 2005).

The Hertha Reservoir site was eliminated from further consideration because of conflicting land uses that would make it difficult to acquire both the property and the water rights and meet the timing requirements in the purpose and need for the Firming Project.

8.4.9 Jasper East

The Jasper East potential reservoir site is located between Willow Creek Reservoir and Lake Granby in Grand County (Figure 6). This potential reservoir site has a storage capacity of about 22,000 AF. The site is located in an area of irrigated pastureland. Reservoir construction at this site would require relocating County Road 40 and the Willow Creek Pump Station and a portion of the Willow Creek Canal, which are features of the C-BT Project. There are no homes present on this site. A potential reservoir at this site would need to be paired with additional East Slope storage. **The Jasper East Reservoir site in combination with Chimney Hollow Reservoir was carried forward for more detailed evaluation in the EIS**.

8.4.10 Rockwell/Mueller Creek

The Rockwell/Mueller Creek potential reservoir site is located about 2 miles southwest of the Town of Granby on the West Slope (Figure 6). This reservoir site has up to 35,000 AF of storage capacity. Current land use includes pastureland and an estimated four residences. A pipeline and pump station would be required to deliver water to Rockwell/Mueller Creek and back to Lake Granby. **The Rockwell/Mueller Reservoir site was carried forward for more detailed evaluation in the EIS in combination with either Chimney Hollow Reservoir or Dry Creek Reservoir**.

8.4.11 Mt. Chauncey South

The Mt. Chauncey South potential reservoir site is located at the headwater of Reed Creek about 4 miles southwest of the Town of Granby (Figure 6). This reservoir is located at an elevation of about 9,200 feet and is about 3 miles south of Windy Gap Reservoir. Because of the steep terrain, the dam would have to be relatively large in proportion to the storage volume. Construction of a reservoir at this elevation introduces several operating inefficiencies compared to lower elevation West Slope sites. The high elevation of this reservoir in relation to the diversion point on the Colorado River would

require substantial pumping and a bidirectional conveyance facility to lift the water about 1,400 feet from Windy Gap Reservoir. Energy requirements for operation would be higher than either the Rockwell/Mueller or Jasper East Reservoir sites, which are located at elevations similar to Lake Granby. To convey water to the Mt. Chauncey South reservoir site would require approximately 4.5 miles of pipeline, including about 1.5 miles at a grade of about 13 percent. New roads would also need to be constructed to access the reservoir site for construction and maintenance.

The Mt. Chauncey South Reservoir site is located within mixed forest and open land area at the headwaters of Reed Creek. The reservoir site and about 1.5 miles of the pipeline would be located in primarily undisturbed forest lands. Compared to the Rockwell/Mueller and Jasper East Reservoir sites, Mt. Chauncey South would require substantial disturbance to native vegetation communities from reservoir construction and the construction of access roads and installation of a pipeline in steep terrain. The impact to wetlands based on NWI mapping may be similar to Rockwell/Mueller depending on reservoir size, and while wetland effects may be less than the Jasper East reservoir site, the Jasper East wetlands appear to be supported primarily by irrigated pasturelands and ditch leakage. The Mt. Chauncey South reservoir site is also located in potential habitat for the federally listed threatened lynx (Colorado Division of Wildlife 2005).

The Mt. Chauncey Reservoir site was eliminated from further consideration because of the substantial operational inefficiency of locating a reservoir at this elevation, the high energy requirements needed for pumping, and the environmental disturbance associated with construction of facilities in primarily undisturbed and steep terrain, and potential lynx habitat. The Mt. Chauncey South reservoir site does not provide any logistical or environmental advantages over the other West Slope storage sites Jasper East and Rockwell/Mueller Creek, which will be considered in the EIS.

8.4.12 Prepositioning

Hydrologic modeling was used to determine whether prepositioning would improve yield when used with a stand alone 90,000 AF Chimney Hollow Reservoir. Results indicate that prepositioning improves project yield, but that without prepositioning, total project yield is reduced by about 15 percent. The reduction in firm yield for individual Participants would range from 0 to 30 percent depending on the number of Windy Gap units they own, demand, and their storage request for Chimney Hollow Reservoir. Without prepositioning all Windy Gap diversions must either be stored in Lake Granby or delivered directly through the Adams and Olympus Tunnels into Chimney Hollow if Lake Granby is full. The WGFP is particularly reliant on available capacity in the Adams and Olympus Tunnels in wet years when Lake Granby typically fills. The substantially reduced yield without prepositioning is primarily because of reduced Windy Gap diversions in wet years due to a lack of available space in the Tunnels. Chimney Hollow Reservoir without prepositioning was eliminated as an alternative because it would not provide adequate yield to meet the purpose and need of the proposed project for all of the Participants. **Chimney Hollow Reservoir with prepositioning will be considered in the EIS.**

9.0 Alternatives Selected for NEPA Analysis

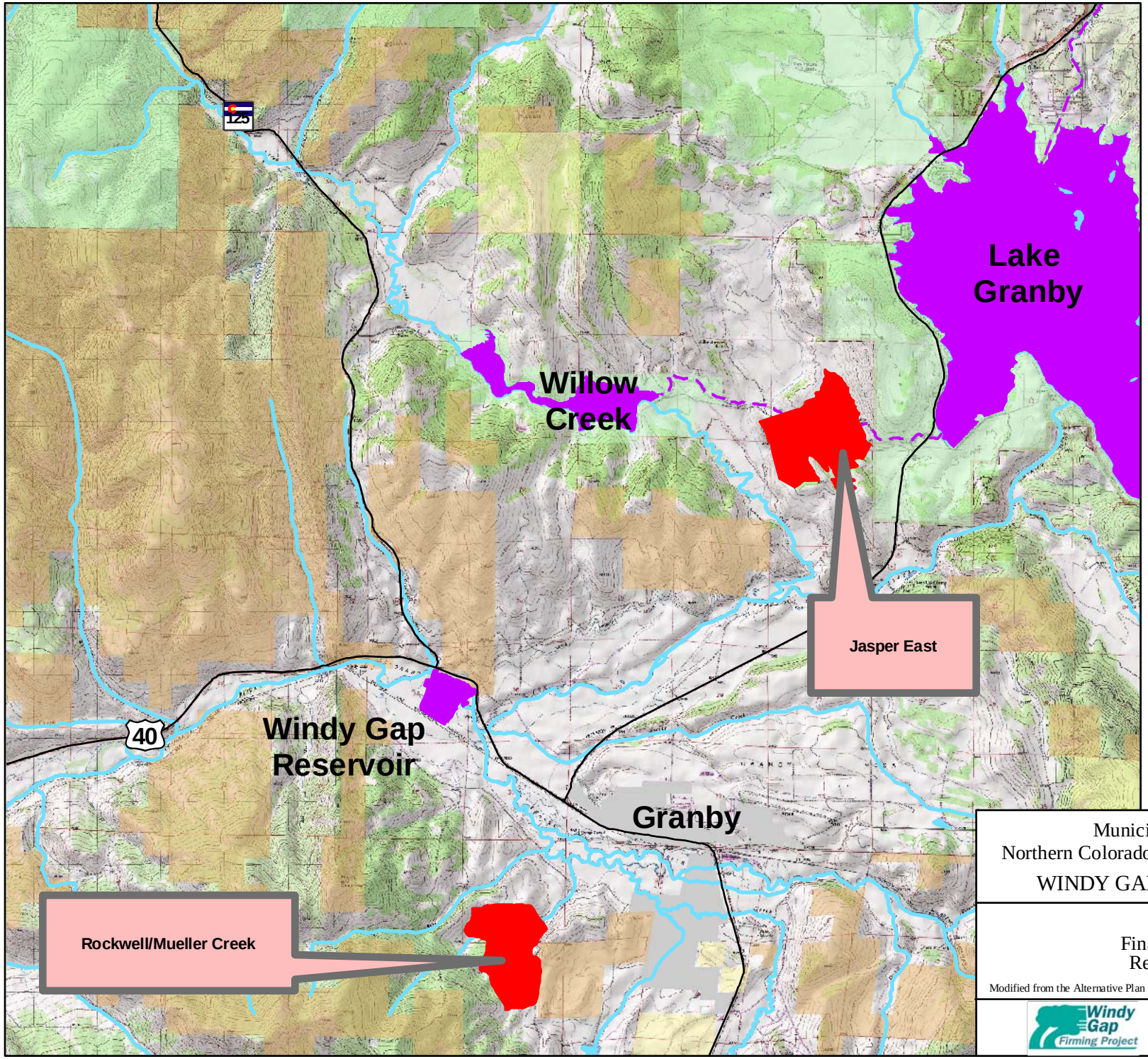
Based on the screening and evaluation of potential alternatives, four reservoir sites appear potentially feasible to meet the purpose and need for the proposed WGFP. Potential reservoir sites include Jasper East and Rockwell/Mueller Creek on the West Slope (Figure 7) and Chimney Hollow and Dry Creek on the East Slope (Figure 8).

The Chimney Hollow Reservoir site with prepositioning has the storage capacity to meet the purpose and need requirements as a stand-alone facility. The other reservoir sites would have to be used in various combinations. Chimney Hollow also could be combined with either of the two potential West Slope reservoirs. A Chimney Hollow and Dry Creek combination would provide adequate storage, but the construction of two East Slope reservoirs has several logistical and operational constraints, as well as environmental effects. The construction of two adjacent reservoirs on the East Slope provides no yield or operational advantages over a single large Chimney Hollow reservoir. The conveyance and distribution of water between Chimney Hollow, Dry Creek, Carter Lake, and connections to the Southern Water Supply Pipeline would require extensive pipelines and pumping facilities. In addition, the environmental effects for constructing both of these reservoirs would be substantially greater than a single Chimney Hollow reservoir. For these reasons, the Chimney Hollow/Dry Creek combination was not considered practical compared to other options. The Dry Creek reservoir site, which has a maximum storage capacity of about 60,000 AF could be combined with Rockwell/Mueller Creek reservoir on the West Slope to provide sufficient storage to meet the purpose and need. A Dry Creek and Jasper East combination is not feasible because Jasper East storage capacity is limited to about 20,000 AF.

The alternatives analysis has concluded that the following reservoirs, individually or in combination, provide a reasonable range of alternatives for meeting the project purpose and need, satisfying technical/logistic considerations, while minimizing environmental effects and should be considered in the EIS.

- Chimney Hollow (90,000 AF) with prepositioning
- Chimney Hollow (70,000 AF) and Jasper East (20,000 AF)
- Chimney Hollow (70,000 AF) and Rockwell/Mueller Creek (20,000 AF)
- Dry Creek (60,000 AF) and Rockwell/Mueller (30,000 AF)

Thus, a total of four action alternatives, plus a No Action alternative will be evaluated in the Draft EIS. The Subdistrict's proposed action is to construct a 90,000 AF Chimney Hollow reservoir using prepositioning to improve project yield. The Draft EIS will evaluate each of the alternatives in greater detail to compare potential yields, operational characteristics, and the environmental consequences.



Legend

- **Potential Reservoir Sites**
- Existing C-BT/WGP Resources
- Water Supply Systems
- Highways
- Municipal Boundaries (1997)

State and Federal Lands

- National Forest
- Bureau of Land Management
- State Wildlife Area
- State Land Board

N

0 3,500 7,000 Feet

Municipal Subdistrict of
Northern Colorado Water Conservancy District

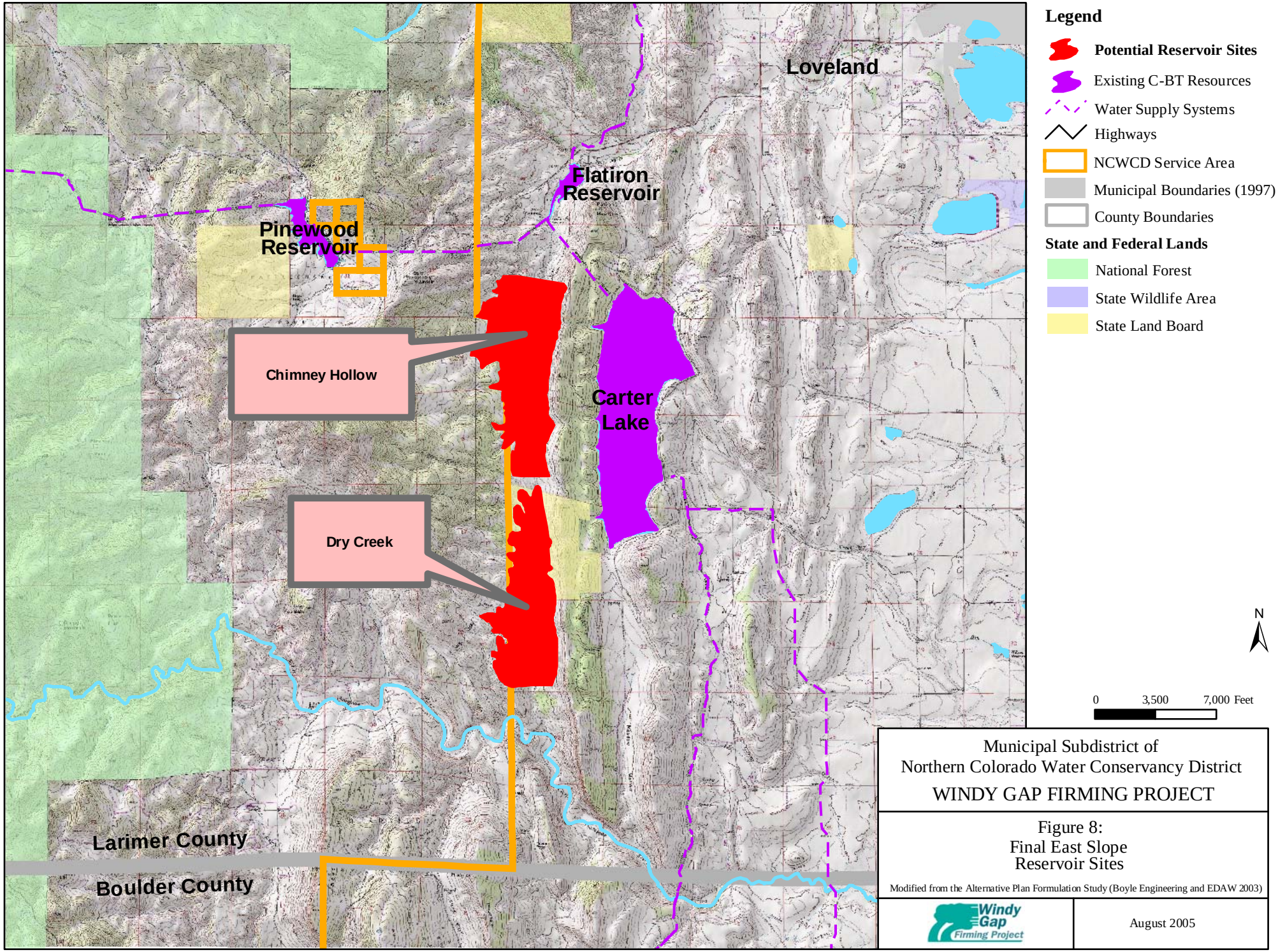
WINDY GAP FIRMING PROJECT

Figure 7:
Final West Slope
Reservoir Sites

Modified from the Alternative Plan Formulation Study (Boyle Engineering and EDAW 2003)

Windy Gap Firming Project

August 2005



Municipal Subdistrict of
Northern Colorado Water Conservancy District

WINDY GAP FIRMING PROJECT

Figure 8:
Final East Slope
Reservoir Sites

Modified from the Alternative Plan Formulation Study (Boyle Engineering and EDAW 2003)

Windy Gap Firming Project

August 2005

References

Boyle Engineering. 2002. Windy Gap Firming Project Ground Water Storage Alternatives. January 2002 Technical Report prepared for the Municipal Subdistrict, Northern Colorado Water Conservancy District.

Boyle Engineering. 2003. Windy Gap Firming Project Modeling Report.

Boyle Engineering. 2004a. Regulation of Existing Reservoirs. Correspondence from Heather Thompson, Boyle Engineering to Mark DeHaven, ERO Resources. November 22, 2004.

Boyle Engineering. 2004b. Evaporative Losses in Rawhide Reservoir. Correspondence from Heather Thompson, Boyle Engineering to Mark DeHaven, ERO Resources. November 22, 2004.

Boyle Engineering. 2005. Windy Gap Firming Project — Modeling Report Addendum. In progress.

Boyle Engineering and EDAW. 2003. Windy Gap Firming Project — Alternative Plan Formulation Report.

Buffington, Gary. 2004. Letter from Gary Buffington, Parks and Open Lands Director, Larimer County Parks and Open Lands Department to Brian Pearson, Eastern Colorado Area Director, Bureau of Reclamation, Loveland, CO. August 6, 2004.

Colorado Division of Wildlife. 2005. Natural Diversity Information Source website (http://ndis.nrel.colostate.edu)

Denver Water. 2005. Letter from Dave Little, Manager of Water Resources, to Brian Pearson, Eastern Colorado Area Director, Bureau of Reclamation.

ERO Resources Corp. 2003. Windy Gap Firming Project Public Scoping Report. Prepared for U.S. Bureau of Reclamation and Municipal Subdistrict, Northern Colorado water Conservancy District.

ERO Resources Corp. 2005. Windy Gap Firming Project Purpose and Need Report. Prepared for U.S. Bureau of Reclamation and Municipal Subdistrict, Northern Colorado water Conservancy District.

GEI Consultants, Inc. 2004. Fraser Valley Water Supply Alternatives Study. Memorandum to Ms. Taylor Hawes, Project Manager for NWCCOG and Fraser Valley Supply Participants from Joseph M. Green-Heffern, Project Manager for GEI. January 14, 2004.

Hydrosphere Resource Consultant, Inc. 2003. Upper Colorado River Basin Study Phase II Final Report. May 29, 2003. Prepared for Grand County, Summit County, Colorado River Water Conservation District, Denver Water, Colorado Springs Utilities, Middle Park Water Conservancy District, Northern Colorado Water Conservancy District, and NWCCOG's Water Quality/Quantity Committee.

Janonis, Brian. 2004. Water Resource and Treatment Manager, City of Fort Collins. October 11, 2004 letter to Brian Person, Area Manager, Bureau of Reclamation.

Koch, Nancy. 2004. Greeley Water Resource Manager. Letter to Will Tully, Bureau of Reclamation.

Koopman, Rich. 2004. Letter from Rich Koopman, Resource Planning Manager, Boulder County Parks and Open Space Department to Will Tully, Bureau of Reclamation, Loveland Colorado. August 18, 2004.

Larimer County Parks and Open Land. 2001. Resource Management and Implementation Plan for the Rimrock Open Space, Larimer County, CO.

Larimer County Parks and Open Land. 2004. Resource Management Plan for the Devil's Backbone Open Space, Larimer County, CO.

Trout, Robert. 2005. March 14, 2005 letter from Robert Trout (Trout, Witwer, and Freeman), counsel for the Municipal Subdistrict, Northern Colorado Water Conservancy District, to Brian Person, Area Manager, U.S. Bureau of Reclamation, Eastern Colorado Area Office, Loveland, Colorado.

Appendix A
Windy Gap Firming Project Alternatives — Level 1 Screening

ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
NEW RESERVOIR SITES									
101	Calloway Hill	Cache la Poudre	North Fork Cache la Poudre	Yes	Yes (36,000 – 63,000)	Yes	Yes 21	No	Perennial stream
102	Glade (1, 2, East, West)	Cache la Poudre	N/A	Yes	Yes (61,000 – 303,000)	Yes	Yes 6-40	Yes	Not eliminated in Level 1 Eliminated in Level 2 for wetland impacts
106	Grey Mountain	Cache la Poudre	Cache la Poudre	Yes	Yes (131,000 – 204,000)	Yes	N/A	No	Perennial stream
108	New Seaman	Cache la Poudre	North Fork Cache la Poudre	Yes	Yes (215,000)	Yes	No 33	No	Perennial stream
109	Portal	Cache la Poudre	Mainstem and North Fork of Cache la Poudre	Yes	Yes (217,000 – 310,000)	Yes	N/A	No	Perennial stream
110	Poudre	Cache la Poudre	Mainstem and North Fork of Cache la Poudre	Yes	Yes (55,100 – 143,000)	Yes	N/A	No	Perennial stream
111	Rockwell	Cache la Poudre	South Fork Cache la Poudre	Yes	Yes (50,000)	Yes	No 35	No	Wetlands, perennial stream
112	Trailhead	Cache la Poudre	Cache la Poudre	Yes	No (24,200)	Yes	N/A	No	Size, perennial stream
114	Elkhorn	Cache la Poudre	Cache la Poudre	No	Yes (186,000)	Yes	N/A	No	Land use (Wild and Scenic River), perennial stream
115	Indian Meadows	Cache la Poudre	Cache la Poudre	No	Yes (190,000)	Yes	N/A	No	Land use (Wild and Scenic River), perennial stream
116	Idylwilde	Cache la Poudre	Cache la Poudre	No	Yes (200,000)	Yes	N/A	No	Land use (Wild and Scenic River), perennial stream

*Shaded screening criteria indicate the reason why the alternative was eliminated. Shaded reservoir site/name indicate alternatives that were not eliminated.

ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
117	Upper Poudre	Cache la Poudre	Cache la Poudre	No	Yes (37,000)	Yes	N/A	No	Land use (Wild and Scenic River), perennial stream
118	Sheep Creek	Cache la Poudre	Sheep Creek	Yes	No (532)	Yes	N/A	No	Size, perennial stream
119	Box Elder	Cache la Poudre	Box Elder Creek	Yes	No (20,300)	Yes	Yes 21	Yes	Size
120	Cactus Hill	Cache la Poudre	Black Hollow Creek	Yes	Yes (104,071)	Yes	Yes 14	Yes	Not eliminated in Level 1 Eliminated in Level 2 for wetland impacts
121	Rawhide North	Cache la Poudre	Coal Creek	Yes	Yes (43,100)	Yes	Yes 1	Yes	Not eliminated in Level 1 or 2 Eliminated in Level 3 for not meeting purpose and need
122	Rawhide Creek (Rawhide, North and West)	Cache la Poudre	Rawhide Creek	Yes	Yes (11,200 – 30,300)	Yes	No 35	Yes	Wetlands
132	Upper Black Hollow Reservoir	Cache la Poudre	Unnamed tributary to Dry Creek	Yes	No (10,700)	Yes	Yes 0	No	Size, perennial stream
201	Centennial Site	Clear Creek	Clear Creek	Yes	Yes (110,000 – 230,000)	Yes	N/A	No	Perennial stream
202	Bridge	Clear Creek	Clear Creek	Yes	Yes (110,000)	Yes	N/A	No	Perennial stream
203	Confluence	Clear Creek	Clear Creek	Yes	Yes (35,000)	Yes	N/A	No	Perennial stream
204	Tucker Gulch	Clear Creek	Tucker Gulch	Yes	Yes (50,000)	Yes	N/A	No	Perennial stream
205	Tunnel No. 1	Clear Creek	Clear Creek	Yes	Yes (110,000)	Yes	N/A	No	Perennial stream
206	Tunnel No. 3	Clear Creek	Clear Creek	Yes	Yes (110,000)	Yes	N/A	No	Perennial stream
207	Upper Ralston	Clear Creek	Ralston Creek	Yes	Yes (58,000)	Yes	N/A	No	Perennial stream

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ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
208	Guy Gulch	Clear Creek	Guy Gulch	Yes	Yes (30,000)	Yes	N/A	No	Perennial stream
209	Soda Creek	Clear Creek	Soda Creek	Yes	Yes (30,000)	Yes	N/A	No	Perennial stream
210	Fall River	Clear Creek	Fall River	Yes	Yes (40,000)	Yes	N/A	No	Perennial stream
211	Pine Ridge	Clear Creek	Van Bibber Creek	Yes	No (20,000)	Yes	N/A	No	Size, perennial stream
212	North Clear Creek	Clear Creek	North Clear Creek	Yes	Yes (65,000)	Yes	N/A	No	Perennial stream
213	Horse Creek	Clear Creek	Horse Creek	Yes	No (6,200)	Yes	N/A	Yes	Size
214	Upper Elk Creek	Clear Creek	Elk Creek (middle fork)	Yes	No (12,000)	Yes	N/A	No	Size, perennial stream
215	Elk Creek	Clear Creek	Elk Creek	Yes	No (12,000)	Yes	N/A	No	Size, perennial stream
216	Guy Gulch Left Hand	Clear Creek	Guy Gulch (east tributary)	Yes	No (3,000)	Yes	N/A	NA	Size
217	Belcher Hill	Clear Creek	N/A	Yes	No (12,000)	Yes	N/A	NA	Size
220	Leyden Gulch	Clear Creek	Leyden Gulch	Yes	Yes (30,000 – 60,000)	Yes	Yes 3	No	Perennial stream
301	Dowe Flats	St. Vrain River	N/A	Yes	Yes (55,000 – 119,000)	Yes	Yes 18	Yes	Not eliminated in Level 1 Eliminated in Level 2 for wetland impacts
302	North Sheep Mountain	St. Vrain River	North St. Vrain Creek	No	Yes (30,000)	Yes	N/A	No	Land use (North St. Vrain Protection Area), perennial stream
303	Buckingham	St. Vrain River	Left Hand Creek	Yes	Yes 35,000)	Yes	N/A	No	Perennial stream

*Shaded screening criteria indicate the reason why the alternative was eliminated. Shaded reservoir site/name indicate alternatives that were not eliminated.

ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
304	Coffintop	St. Vrain River	South St. Vrain	Yes	Yes 43,000 – 116,000)	Yes	Yes 20	No	Perennial stream
305	Geer Canyon	St. Vrain River	Left Hand Creek	Yes	No (25,000)	Yes	Yes 8	No	Size, perennial stream
306	Lykins Gulch (and Lykins Alt. No. 1)	St. Vrain River	N/A	Yes	No (3,000 – 20,000)	Yes	Yes 0-4	Yes	Size
307	Sherwood	St. Vrain River	North Boulder Creek	Yes	Yes (35,000)	Yes	No 86	No	Wetlands, perennial stream
308	Smithy Mountain	St. Vrain River	North St. Vrain Creek	Yes	Yes (73,800)	Yes	Yes 3	No	Perennial stream
309	Tahosa	St. Vrain River	Cow Creek	Yes	No (15,000)	Yes	Yes 20	No	Size, perennial stream
311	Big John	St. Vrain River	Dry St. Vrain	Yes	Yes (30,000)	Yes	No 32	Yes	Wetlands
312	Bradley Ranch	St. Vrain River	North Boulder Creek	Yes	Yes (13,600 – 77,700)	Yes	N/A	No	Perennial stream
313	Buck Gulch	St. Vrain River	Rock Creek	Yes	Yes (9,000 – 67,000)	Yes	Yes 13	No	Perennial stream
314	Coal Creek	St. Vrain River	Coal Creek	No	No (11,000)	Yes	N/A	NA	Land use (Superfund site), size
315	Davidson	St. Vrain River	N/A	No	No (17,100)	No	N/A	NA	Land use (Superfund site), size, technical
317	Frederick	St. Vrain River	N/A	No	No (17,900)	Yes	N/A	NA	Land use (Interstate Highway), size
318	Hydraulic Lab	St. Vrain River	North St. Vrain	No	No (18,000)	Yes	N/A	No	Land use (North St. Vrain Protection Area), size, perennial stream
319	Last Chance	St. Vrain River	St. Vrain Creek	No	No (60,000)	Yes	N/A	No	Land use (Interstate Highway), size, perennial stream

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ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
320	Little Narrows	St. Vrain River	South St. Vrain Creek	Yes	No 4,000 – 23,000)	Yes	Yes 3	No	Size, perennial stream
321	Little South St. Vrain	St. Vrain River	South St. Vrain Creek	Yes	Yes (37,000)	Yes	Yes 0	No	Perennial stream
322	Longmont Sugar Plant	St. Vrain River	St. Vrain Creek		Yes (44,000)	Yes	N/A	No	Perennial stream
323	Lookout	St. Vrain River	North St. Vrain Creek		Yes (43,000)	Yes	N/A	No	Perennial stream
324	Nederland (and Nederland Alt. No. 1)	St. Vrain River	Middle Boulder Creek		Yes (37,000 – 80,000)	Yes	N/A	No	Perennial stream
326	Parks Alt. No. 1	St. Vrain River	Middle Boulder Creek	Yes	No (19,000)	Yes	Yes 1	No	Size, perennial stream
327	Parks Alt. No. 2	St. Vrain River	Caribou Creek	No	No (18,000)	Yes	N/A	NA	Land use (Wilderness area), size
328	Rock Creek	St. Vrain River	Rock Creek	Yes	No (16,400)	Yes	N/A	NA	Size
329	Rowell Hill (and Rowell Hill Alt. No. 1)	St. Vrain River	North St. Vrain Creek	Yes	Yes (28,000 – 47,000)	Yes	N/A	No	Size, mainstem
331	Sheep Mountain	St. Vrain River	North St. Vrain Creek	No	No (11,000)	Yes	N/A	No	Land use (Wilderness area), size, mainstem
332	Sixmile Canyon	St. Vrain River	N/A	Yes	No (18,000)	Yes	Yes 0	Yes	Size
333	Spring Gulch	St. Vrain River	Tributary of North St. Vrain	Yes	No (12,000)	Yes	Yes 1	Yes	Size
334	Steamboat Mountain	St. Vrain River	North St. Vrain Creek	Yes	Yes (55,000)	Yes	N/A	No	Perennial stream
335	Stone Canyon	St. Vrain River	Tributary of St. Vrain	Yes	Yes (31,800)	Yes	Yes 0	Yes	Not eliminated in Level 1 or 2 Eliminated in Level 3 for not meeting purpose and need

*Shaded screening criteria indicate the reason why the alternative was eliminated. Shaded reservoir site/name indicate alternatives that were not eliminated.

ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
336	Thorodin	St. Vrain River	South Beaver Creek	Yes	Yes (33,000)	Yes	N/A	No	Perennial stream
337	Tungsten	St. Vrain River	Beaver Creek	Yes	Yes (74,000)	No	N/A	NA	Technical (on abandoned mine)
338	Wondervu	St. Vrain River	South Boulder Creek	Yes	No (12,000)	Yes	Yes 4	No	Size, cost, perennial stream
339	Antelope Park	St. Vrain River	N/A	Yes	No (7,000)	Yes	Yes 0	NA	Size
341	Chimney Rock	St. Vrain River	North St. Vrain Creek	Yes	No (1,500)	No	Yes 4	No	Size, technical, perennial stream
342	Cook Mountain	St. Vrain River	North St. Vrain Creek	No	No (6,200)	Yes	N/A	No	Land use (North St. Vrain Protection Area), size, perennial stream
343	Coulson Gulch	St. Vrain River	North St. Vrain Creek	No	No (7,000)	Yes	N/A	No	Land use (North St. Vrain Protection Area), size, perennial stream
344	Erie	St. Vrain River	Coal Creek	Yes	No (9,000)	No	N/A	No	Size, technical (on abandoned mine), perennial stream
345	Harney	St. Vrain River	N/A	Yes	No (4,900)	Yes	No 27	Yes	Size, wetlands
346	Howlett	St. Vrain River	N/A	Yes	No (4,000)	Yes	No 31	No	Size, wetlands, perennial stream
347	Little Dry Creek	St. Vrain River	Little Dry Creek	Yes	No (3,700)	Yes	Yes 7	Yes	Size
348	Lower South St. Vrain	St. Vrain River	South St. Vrain Creek	Yes	No (2,000)	Yes	Yes 5	No	Size, perennial stream
350	Niwot	St. Vrain River	Dry Creek	Yes	No (3,400)	Yes	N/A	NA	Size
351	Oligarchy	St. Vrain River	N/A	Yes	No (3,000)	Yes	Yes 8	Yes	Size

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ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
352	Orodell	St. Vrain River	Boulder Creek	Yes	No (8,000)	Yes	N/A	No	Size, perennial stream
353	Pearl	St. Vrain River	N/A	Yes	No (2,000)	Yes	Yes 1	Yes	Size
355	Potato Hill	St. Vrain River	N/A	Yes	No (5,000)	Yes	Yes 15	Yes	Size
356	Red Gulch	St. Vrain River	St. Vrain Creek	Yes	No (5,000)	Yes	N/A	No	Size, perennial stream
357	Red Hill Gulch	St. Vrain River	Tributary of South St. Vrain	Yes	No (8,000)	Yes	Yes 0	Yes	Size
358	Rinn Valley	St. Vrain River	Unnamed Stream	Yes	No (5,600)	Yes	Yes 2	Yes	Size
359	Southwestern Portland Cement Company Pits	St. Vrain River	N/A	Yes	No (4,000)	Yes	Yes 2	Yes	Size
360	Table Mountain	St. Vrain River	Dry Creek	Yes	No (5,000)	Yes	No 51	Yes	Size, wetlands
361	Upper South St. Vrain	St. Vrain River	South St. Vrain Creek	Yes	No (4,000)	Yes	Yes 15	No	Size, perennial stream
362	Broomfield	St. Vrain River	Unnamed ephemeral stream	Yes	No (21,900)	Yes	Yes 5	Yes	Size
401	Little Thompson (5 alternative dam sites)	Big Thompson River	Little Thompson River	Yes	Yes (46,000 – 305,000)	Yes	No 36-41	No	Wetlands, perennial stream
406	Chimney Hollow	Big Thompson River	N/A	Yes	Yes (60,000 – 110,000)	Yes	Yes 2	Yes	NOT ELIMINATED – Included in DEIS
407	Meadow Hollow	Big Thompson River	Meadow Hollow	Yes	Yes (60,000)	Yes	6	Yes	Not eliminated in Level 1 Eliminated in Level 2 for wetland impacts
409	Sprenger Ranch	Big Thompson River	N/A	Yes	Yes (92,700)	Yes	Yes 1	Yes	Not eliminated in Level 1 or 2 Eliminated in Level 3 for not meeting purpose and need

*Shaded screening criteria indicate the reason why the alternative was eliminated. Shaded reservoir site/name indicate alternatives that were not eliminated.

ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
413	Berts Corner	Big Thompson River	Dry Creek	Yes	No (10,000)	Yes	N/A	Yes	Size
414	Dry Creek	Big Thompson River	Dry Creek	Yes	Yes (21,000 – 62,300)	Yes	Yes 3 - 6	Yes	NOT ELIMINATED– Included in DEIS
415	Big Hollow	Big Thompson River	Big Hollow Creek	Yes	No (7,100)	Yes	No 33	No	Size, wetlands, perennial stream
418	Upper Buckhorn Creek	Big Thompson River	Buckhorn Creek	Yes	Yes (18,000 – 71,000)	Yes	Yes 19-20	No	Perennial stream
419	Lower Buckhorn Creek	Big Thompson River	Buckhorn Creek	Yes	Yes (60,000)	Yes	N/A	No	Perennial stream
420	Redstone Creek	Big Thompson River	Redstone Creek	Yes	Yes (80,000 – 208,000)	Yes	Yes 13-18	No	Perennial stream
421	Pole Hill Road	Big Thompson River	Unnamed tributary to Dry Creek	Yes	No (25,300)	Yes	N/A	NA	Size
501	Hardin	Lower South Platte River	South Platte River	Yes	Yes (400,000)	Yes	No 1000	No	Wetlands, perennial stream
503	South Platte	Lower South Platte River	South Platte River	Yes	Yes (656,000)	Yes	No 1000	No	Wetlands, perennial stream
504	Wildcat	Lower South Platte River	Wildcat Creek (intermittent)	Yes	Yes (60,000)	Yes	Yes 13	Yes	Not eliminated in Level 1 Eliminated in Level 2 for wetland impacts
506	Weld	Lower South Platte River	South Platte River	Yes	Yes (1,962,000)	Yes	No 1,000	No	Wetlands, perennial stream
508	Lone Tree Creek	Lower South Platte River	Lone Tree Creek	Yes	No (14,000)	Yes	Yes 7	Yes	Size
509	Spring Creek	Lower South Platte River	N/A	Yes	No (27,500)	Yes	Yes 8	Yes	Size
601	Japer North Alt. 2	Colorado River	Church Creek	Yes	Yes (20,200)	Yes	No 57 (2.3)	No	Wetlands/fens, perennial stream

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ID	Reservoir Site/Name	Basin	Stream	Logistics		Technical	Environmental		Reason for Elimination
				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
601	Jasper North A	Colorado River	Church Creek	Yes	Yes (21,900)	Yes	No 67 (4.5)	No	Wetlands/fens, perennial stream
602	Jasper North	Colorado River	Church Creek	Yes	Yes (78,200)	Yes	No 84 (6.2)	No	Wetlands/fens, perennial stream
603	Azure	Colorado River	Colorado River	Yes	Yes (40,000 – 85,000)	Yes	N/A	No	Perennial stream
604	Red Mountain	Colorado River	Colorado River	Yes	Yes (84,000 – 140,000)	Yes	N/A	No	Perennial stream
605	Haypark	Colorado River	East Fork Troublesome Creek	Yes	Yes (20,000 – 31,000)	Yes	N/A	No	Perennial stream
606	Elk Creek	Colorado River	Elk Creek (southern tributary)	Yes	No (6,500)	Yes	N/A	No	Size, perennial stream
607	Jim Creek	Colorado River	Jim Creek	Yes	No (1,700)	Yes	N/A	No	Size, perennial stream
608	Meadow Creek	Colorado River	Meadow Creek	Yes	N/A	Yes	N/A	No	Perennial stream
612	Ranch Creek	Colorado River	Ranch Creek	Yes	No (8,000)	Yes	N/A	No	Size, perennial stream
613	Ranch Valley	Colorado River	Ranch Creek	Yes	Yes (20,000)	Yes	N/A	No	Perennial stream
615	St. Louis Creek	Colorado River	St. Louis Creek	Yes	No (2,000)	Yes	N/A	No	Size, perennial stream
616	Strawberry Creek	Colorado River	Strawberry Creek	Yes	No (3,400)	Yes	N/A	No	Size, perennial stream
618	Vasquez Creek (Siphon, North, South, and Tunnel)	Colorado River	Vasquez Creek	Yes	No (3,125)	Yes	N/A	No	Size, perennial stream
622	East Troublesome	Colorado River	Troublesome Creek	Yes	N/A	Yes	N/A	No	Perennial stream
623	Rabbit Ears	Colorado River	Troublesome Creek	Yes	N/A	Yes	N/A	No	Perennial stream
624	Sawmill Meadows	Colorado River	Meadow Creek	Yes	No (7,000)	Yes	N/A	No	Size, perennial stream

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				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
625	Ute Park	Colorado River	Williams Fork River	Yes	Yes (40,000)	Yes	N/A	No	Perennial stream
628	Walden Hollow	Colorado River	Walden Hollow	Yes	Yes (38,500)	Yes	No 350	No	Wetlands, perennial stream
629	Trail Mountain	Colorado River	N/A	Yes	Yes (19,500)	Yes	Yes 0	No	Perennial stream
630	Trail Creek	Colorado River	Trail Creek	Yes	Yes (24,700)	Yes	No 38	No	Wetlands, perennial stream
631	Granby South	Colorado River	N/A	Yes	No (17,600)	Yes	Yes 21	Yes	Size
632	Coyote Creek	Colorado River	Coyote Creek	Yes	Yes (25,200)	Yes	Yes 19	No	Perennial stream
633	Jasper East	Colorado River	N/A	Yes	Yes (21,800)	Yes	Yes 19	Yes	NOT ELIMINATED– Included in DEIS
634	Rockwell/Mueller Creek	Colorado River	Rockwell/Mueller Creek	Yes	Yes (20,000 – 30,000)	Yes	Yes 3 - 18	Yes	NOT ELIMINATED– Included in DEIS
635	Mt. Chauncey	Colorado River	N/A	Yes	Yes (19,500)	Yes	Yes 6	No	Perennial stream
636	Orr	Colorado River	Ninemile Creek	Yes	Yes (20,000)	Yes	No 32	No	Wetlands, perennial stream
637	Mt. Chauncey South	Colorado River	NA	Yes	Yes (23,500)	Yes	Yes 7	Yes	Not eliminated in Level 1 or 2 Eliminated in Level 3 for logistical reasons
EXISTING RESERVOIRS									
107	Halligan	Cache la Poudre	North Fork Cache la Poudre	Yes	Yes (35,300 – 62,900)	Yes	Yes 18	Yes	Not eliminated in Level 1 or 2 Eliminated in Level 3 for not meeting purpose and need and logistical constraints

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				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
127	Seaman	Cache la Poudre	North Fork Cache la Poudre	Yes	Yes 3,200 - 38,000	Yes	Yes 18	Yes	Not eliminated in Level 1 or 2 Eliminated in Level 3 for not meeting purpose and need and logistical constraints
128	Big Windsor	Cache la Poudre River	N/A	Yes	No (29,200)	Yes	No 94	Yes	Size, wetlands
129	Cobb	Cache la Poudre River	N/A	Yes	No (39,500)	Yes	No 90	Yes	Size, wetlands
130	Douglass	Cache la Poudre	Dry Creek	Yes	Yes (53,400)	Yes	No 104	Yes	Wetlands
131	North Poudre Nos. 5 and 6	Cache la Poudre	N/A	Yes	Yes (48,470)	Yes	No 128	Yes	Wetlands
218	Idaho Springs	Clear Creek	Chicago Creek	Yes	No (950)	Yes	N/A	Yes	Size
219	Ralston	Clear Creek	Ralston Creek	Yes	No (4,800)	Yes	Yes 1	No	Size, perennial stream
364	Ralph Price/Button Rock	St. Vrain River	North St. Vrain Creek	Yes	No (12,500)	Yes	Yes 1	No	Size, perennial stream
365	Foothills	St. Vrain River	N/A	Yes	No (4,260)	Yes	No 33	Yes	Size, wetlands
367	Left Hand Valley	St. Vrain River	N/A	Yes	No (3,000)	Yes	Yes 4	Yes	Size
368	Pleasant Valley (Terry Lake)	St. Vrain River	N/A	Yes	No (4,000)	Yes	No 33	Yes	Size, wetlands
369	Boulder	St. Vrain River	Little Dry Creek	Yes	No (11,000)	Yes	No 100	Yes	Size, wetlands
370	Calkins Lake (Union)	St. Vrain River	N/A	Yes	No (20,000 – 25,000)	Yes	No 148	Yes	Size, wetlands
371	Gross	St. Vrain River	South Boulder Creek	Yes	Yes (72,000)	Yes	N/A	No	Perennial stream

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				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
372	Beaver	St. Vrain River	Beaver Creek	Yes	No (7,000)	Yes	Yes 21	Yes	Size
374	Gold Lake	St. Vrain River	N/A	Yes	No (400)	Yes	N/A	Yes	Size
375	Highland No. 3 (Foster)	St. Vrain River	N/A	Yes	No (3,500)	Yes	No 48	Yes	Size, wetlands
376	McIntosh	St. Vrain River	N/A	Yes	No (1,500)	Yes	N/A	NA	Size
377	Silver Lake	St. Vrain River	North Boulder Creek	Yes	No (5,000)	Yes	Yes 1	No	Size, perennial stream
378	Marshall Lake	St. Vrain River	N/A	Yes	No (15,200)	No	Yes 0.2	Yes	Size, technical (on abandoned mine)
410	Carter Lake	Big Thompson River	N/A	No	Yes (23,000 – 108,400)	Yes	Yes 0	Yes	Land use and purpose and need (Conflict with C-BT operations and would likely delay implementation of the project beyond the needed time for completion)
411	Hertha	Big Thompson River	N/A	Yes	Yes (74,300)	Yes	Yes 1	Yes	Not eliminated in Level 1 or 2 Eliminated in Level 3 for not meeting purpose and need
412	Green Ridge Glade	Big Thompson River	N/A	Yes	No (5,400)	Yes	N/A	Yes	Size
416	Highland No. 2	Big Thompson River	N/A	Yes	No (3,300)	Yes	Yes 3	Yes	Size
417	Pinewood Lake	Big Thompson River	N/A	Yes	No (2,740)	Yes	Yes 10	Yes	Size
507	Julesburg	Lower South Platte River	South Platte River	Yes	No (21,900)	Yes	No 57	No	Size, wetlands, perennial stream
626	Wolford Mountain	Colorado River	Muddy Creek	Yes	Yes (120,000)	Yes	N/A	No	Perennial stream

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				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
627	Willow Creek Res.	Colorado River	Willow Creek	Yes	Yes (22,300 – 72,800)	Yes	No 138 (7.7)	No	Wetlands/fens, perennial stream
701	Bear Creek Lake	Upper South Platte River	Bear Creek	Yes	No (18,400)	Yes	N/A	No	Size, perennial stream
702	Great Western	Upper South Platte River	Walnut Creek	Yes	No (9,630)	Yes	Yes 8	No	Size, perennial stream
RE-REGULATION OF EXISTING RESERVOIRS									
N/A	Reservoirs owned by irrigation companies in the Cache la Poudre river and St. Vrain Creek basins		Cache la Poudre and St. Vrain	N/A	N/A	N/A	N/A	N/A	See Section 8.2.4
GROUND WATER									
N/A	Bedrock Aquifer	St. Vrain Creek	N/A	N/A	No 0- 2,000 af/ well field	N/A	N/A	N/A	Size
135	Alluvial Aquifer	Cache la Poudre	N/A	N/A	No 2,000 – 4,000 af/site	N/A	N/A	N/A	Size
380	Alluvial Aquifer	St. Vrain Creek	N/A	N/A	No 2,000 – 4,000 af/site	N/A	N/A	N/A	Size
381	Alluvial Aquifer	Boulder Creek	N/A	N/A	No 2,000 – 4,000 af/site	N/A	N/A	N/A	Size
NON-STRUCTURAL & INSTITUTIONAL OPPORTUNITIES									
N/A	Integration with the C-BT system: Unlimited borrowing from C-BT		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	Integration with the C-BT system: Limited borrowing from C-BT		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	Modified C-BT Borrowing and Windy Gap deliveries		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	Buying storage from C-BT shareholders		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5

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				Land Use (Avoids high value land or hazardous areas)	**Reservoir Size** (Provides 20,000 AF or more storage on West Slope or at least 30,000 AF of storage on East Slope)	**Construction and Safety Factors** (Dam and outlets are constructible)	**Wetlands** (Affects less than 25 acres of wetlands and avoids fens)/ (Wetland and (fen) acres)	**Perennial Streams** (Avoids perennial stream unless existing reservoir)	
N/A	Individually operated storage in C-BT facilities		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	Interruptible supply contracts		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	Purchase/leaseback arrangements and dry year options on C-BT shares		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	Integration with Denver Water's raw water systems		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	West Slope water purchases		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.5
N/A	Prepositioning		N/A	N/A	N/A	N/A	N/A	N/A	NOT ELIMINATED – Considered in EIS with Chimney Hollow Reservoir See Section 8.4.12
ALTERNATIVES IDENTIFIED IN SCOPING									
N/A	Round the horn delivery		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.6
N/A	Platte River storage and exchange for C-BT water		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.6
N/A	Interruptible supply contracts		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.6
N/A	Storage in Horsetooth Reservoir		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.6
N/A	Water conservation		N/A	N/A	N/A	N/A	N/A	N/A	See Section 8.2.6
N/A	Joint West Slope water project in Fraser Valley		Fraaser River Basin	0	N/A	N/A	N/A	N/A	See Section 8.2.6

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