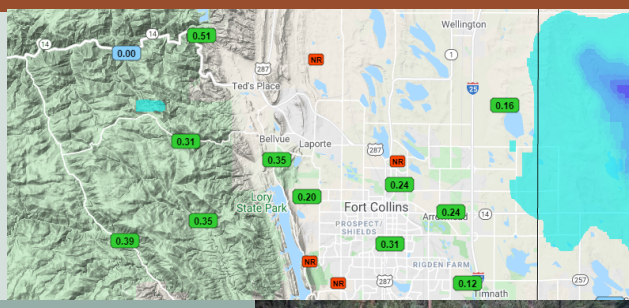
LARIMER COUNTY
ENGINEERING DEPARTMENT



EARLY FLOOD WARNING SYSTEM
CAMERON PEAK FIRE EXPANSION (PHASE II)

Grant Application
Colorado Watershed
Restoration Program

200 W. Oak St. ● Fort Collins, CO 80501 ● 970.498.5700 ● Larimer.org

LARIMER COUNTY

LARIMER COUNTY | ENGINEERING DEPARTMENT

P.O. Box 1190, Fort Collins, Colorado 80522-1190, 970.498.5700, Larimer.org

April 22, 2021

Colorado Water Conservation Board
Attn: Chris Sturm, Watershed Program Director
1313 Sherman Street, Room 718
Denver, CO 80203

Dear Director Sturm:

Larimer County appreciates the opportunity to be considered for grant funding under the special release of the Colorado Watershed Restoration Program. A successful award of this grant funding will allow Larimer County to leverage already secured funding to further implement the Emergency Flood Warning System (EFWS) in the Cameron Peak Fire burn scar. Addition of the Cameron Peak Fire burn scar, with consideration of the BAER report, H&H modeling and other pertinent information into our Larimer County EFWS Master Plan identified an additional 17 rain/stream gage sites within the burn scar. Phase II of the project will leverage available funds to implement the remaining portion (10 sites) of the project identified in the Master Plan.

The Cameron Peak Fire impacted over 200,000 acres, completely within Larimer County. Impacts from the burn scar will substantially increase threats to life-safety, transportation, drainage infrastructure, public and private property, and downstream water quality to the natural habitat, water providers, irrigation companies, etc. The Larimer County Emergency Flood Warning System provides real-time, mission-critical information for rainfall events measuring precipitation intensity, duration and corresponding stream channel discharge response.

Larimer County has continually committed to a collaborative approach with our EFWS. Partnerships and Inter-governmental Agreements are in place for various portions of our EFWS and we continue to work with other jurisdictions and the National Weather Service. Invitations for further collaboration has been a focus of our response to the Cameron Peak Fire.

If you have any questions regarding this application, please feel free to contact me directly.

Sincerely,

Eric Tracy, PE
Senior Civil Engineer
Emergency Flood Warning System Manager

LARIMER COUNTY

A. Project Proposal Summary Sheet

- Project Title

  Larimer County Early Flood Warning System
  Cameron Peak Fire Expansion (Phase II)

- Project Location (include map and/or latitude/longitude if applicable)

  Various locations within and surrounding the Cameron Peak Fire (see attached)

- Grant Request/Amount

  $100,000

- Cash Match Funding Secured

  $0

- Cash Match Funding Pending

  $100,000 –pending approval of the Phase I grant application.

  and/or

  $111,000 – pending verbally agreed upon participation of others in as separate project that would free up County funds. An IGA is in-progress for this funding, but not-yet approved.

- In-kind Match Funding

  $0

- Project Sponsor(s) (identify the fiscal agent if different from the project sponsor)

  Larimer County

- Contact person name, email address, and phone number

  Eric Tracy, PE
  etracy@larimer.org
  (office) 970-498-5729
  (cell) 970-443-3629

- Brief description of the project

  Expansion of the Larimer County Early Flood Warning System (EFWS) in areas directly impacted by the 2020 Cameron Peak Fire. Sites are identified in the most recent Larimer County EFWS Master Plan which considered available information including the final BAER report in the analysis as well as collaborative feedback from multiple stakeholders. The project includes installation, configuration and operation of the remaining (7) rain gages and (3) rain/stream gages, base station configuration and stream rating curve development, FCC licensing, permitting, calibration, etc. The additional sites will be operated and maintained for a minimum of 10-years.

B. Applicant Qualifications (30 points)

- **B1**: Identify the lead project sponsor and describe the other stakeholders' level of participation and involvement.

  - Larimer County is the lead project sponsor. The project and EFWS is managed by Eric Tracy in the Larimer County Engineering Department. Eric has managed the system since it's beginning in 2012. The system is operated and maintained through Water & Earth Technologies, under current contract with the Larimer County Engineering Department.

  - In February 2021, the City of Fort Collins and Larimer County developed a Cooperative TDMA Plan to share FCC Licensed radio frequencies utilizing the ALERT2 protocol. Agreements are in place for Larimer County to use the City's existing repeater station at Cobb Lake and the City will benefit with redundancy from the County's WET repeater on the same frequency. The new repeater station at Sheep Mountain will transmit data from County and City stations through a cooperative agreement. Data sharing agreements with the City are in place.

  - CDOT is partnering with Larimer County through a separate IGA to utilize existing radio backbone infrastructure to procure four rain/stream gages along Highway 14 in locations of interest to the State. These sites and funding through CDOT is **NOT** part of what is being presented and will be tracked separate, however this is an example of a cooperative effort to reduce costs and avoid duplication of efforts in the fire recovery area.

  - The Big Thompson Watershed Coalition is in discussions with Larimer County regarding additional monitoring on Miller Fork.

  - Community outreach for input to the Larimer County Emergency Flood Warning System Master Plan (applicable to this area) included the City of Fort Collins, Town of Laporte, Poudre Park, Rustic, Larimer County Sherriff's Office, Larimer County Emergency Operations, Glacier View Fire Protection district, Poudre Canyon Fire Protection District, Red Feather Lakes Fire Protection District, Poudre Valley Fire Authority, Rist Canyon Voluntary Fire Department, CDOT, NWS, US Bureau of Reclamation, United States Forest Service, Colorado State University, etc.

  - Larimer County participates in and presented at the Larimer Recovery Collaborative – Wildfire meeting on April 12, 2021 and offered partnerships and collaboration with anyone of interest. Watershed Coalitions, water providers, emergency personnel, etc are a part of this group.

- **B2**: What information is the project sponsor using to develop the proposed plan or project? Include any relevant information regarding existing fire recovery plans and models.

    - The Larimer County Emergency Flood Warning System Master Plan was in the process of being developed by Water & Earth Technologies when the Cameron Peak Fire occurred. Larimer County expanded the scope of the Master Plan to include the burn area and WET incorporated the final Burn Area Emergency Response (BAER) Report in the analysis. Preliminary H&H modeling from Enginuity has also been considered as well as comments from other stakeholders. Preliminary theoretical radio path studies were performed to help identify potential sites.

    - The "Example Scope of Work: Flood Warning Systems" developed by Enginuity Engineering Solutions for the CWCB has been reviewed. All aspects of this example scope of work are part of our vetted procedures for the design, implementation, operation, and maintenance of our existing EFWS.

- **B3:** Specify in-kind services and cash contributions (match) amount for proposed activities in the fire affected area. Discuss whether other funding sources are secured or pending.

    - $100,000 (pending) - The Larimer County Board of County Commissioners has approved $225,000 for the Cameron Peak Fire Expansion Project. If the Phase I grant application is not approved, the entire $225,000 will need to be reserved for Phase I implementation. If the Phase I Grant Application is approved, it would free up $100,000 of already-secured funding to leverage in this match.

    - $111,000 (pending) – CDOT has agreed to partner on three additional sites outside of the scope of this project that would free up other already-secured County funds that could be reallocated to this project. The original goal was to use those funds to further expand that particular project and is preferred, however this project, or portions of this project may take precedence. An IGA for those sites with CDOT is in-progress.

    - Larimer County will provide staff project management as in-kind services as an overmatch beyond the required 50%.

C. Organizational Capability (30 points)

- **C1**: What is the applicant organization's history of accomplishments in the watershed? Provide several past project examples. List partner organizations and agencies with which applicant worked to implement past projects.

    - Larimer County was awarded grant funding through the CWCB after the High Park Fire in 2012 to install four rain/stream gages within the burn scar and two NWS alert-triggered flashing beacon warning signs. Those sites are still in operation today.

    - FEMA Hazard Mitigation Grant Program funding was awarded to Larimer County following the 2013 Big Thompson Flood to expand and improve our EFWS in the Big Thompson Canyon. Multiple rain and rain/stream gages were installed as well as two additional flashing beacon signs. Partnerships with the Division of Water Resources allowed the County to co-locate gaging stations at Olympus Dam and at Storm Mountain Road on the North Fork of the Big Thompson. Estes Park entered an agreement with Larimer County to add two gage sites to our system on the Big Thompson at Mary's Lake Road and at the Fish Hatchery Road near the entrance to Rocky Mountain National Park. Shared maintenance agreements with the City of Loveland are in place to share maintenance costs for the gages located within the canyon. Stations are located along CO Highway 34 and required coordination with CDOT. Permitting was required through US Forest Service, FCC Radio Licensing, FEMA/LC Floodplain permitting, CDOT, etc.

    - In February 2021, the City of Fort Collins and Larimer County developed a Cooperative TDMA Plan to share FCC Licensed radio frequencies utilizing the ALERT2 protocol. Agreements are in place for Larimer County to use the City's existing repeater station at Cobb Lake and the City will benefit with redundancy from the County's WET repeater on the same frequency. The new repeater station at Sheep Mountain will transmit data from County and City stations and provide redundancy through a cooperative agreement.

    - All of the data is sent in real-time to the National Weather Service for their use in releasing effective and accurate flood related emergency notifications.

    - Event threshold-triggered emergency notifications are sent directly to local emergency service providers including law enforcement, fire departments, Emergency Operations Managers, Road and Bridge, CDOT, etc.

- **C2**: What level of staffing will be directed toward the implementation of the proposed project/planning effort? Discuss the number of staff and amount of time dedicated for the project. Will volunteers be utilized, and if so, how?

    - Project management by Larimer County will involve one full-time employee at about 10%-20% during the period of the project.

    - Design, procurement, installation, testing, configuration, calibration, stream ratings development, operations and maintenance of the system is done by Water & Earth Technologies, Inc.

    - Larimer County's consultant Water & Earth Technologies has indicated they have staffing ready and available to implement Phase II prior to June 2022.

    - No volunteers will be utilized.

D. Proposal Effectiveness (40 points)

- **D1**: Demonstrate that the project budget and schedule are realistic. All projects shall be completed by June 30, 2022. Please use the attached budget/timeline spreadsheet.

    - Water & Earth Technologies has indicated they have resources available and ready to implement Phase II prior to June 30, 2022.

    - Site planning including theoretical radio path studies have been completed in the EFWS Master Plan.

    - The Forest Service Permit is in the process of being modified to include the additional sites identified in the EFWS Master Plan. All comments from the USFS have been addressed and the final Forest Service Permit is expected any day.

    - All sites have been intentionally located within public land, public rights-of-way or on County-owned property and no private easements or property acquisition is expected.

    - All sites have been included in the Cooperative TDMA plan for the ALERT2 system with the City of Fort Collins and we do not anticipate having to acquire an additional radio frequency from the FAA.

- **D2**: Discuss the multi-objective aspects of the project and how they relate to each other. Provide a description of the project, its purpose, and a summary of goals and objectives, specifically note whether the project is intended to (1) restore and/or protect the water, lands and other natural resources within the watershed, (2) mitigate flood hazards, and/or (3) integrate a multi-objective approach that also addresses (1) or (2).

    - Larimer County's EFWS Cameron Peak Expansion Project Phase I will install seven gage sites within the burn area and one repeater site. The system integrates a multi-objective approach providing real-time information to emergency personnel to help protect life and property from flood hazards, while providing empirical data for future flood rehabilitation, mitigation efforts and research. This data, used in the context of research could help develop future procedures, protocols and best management practices in future fire areas.

    - Real-time, accurate information is key to making life-saving decisions in the event of a flood. The information will help inform emergency response personnel and road maintenance crews.

- The City of Fort Collins has indicated this information is "mission-critical" in their effort to assess watershed mitigation efforts and provide their community with timely and accurate measure of post-fire threats. See attached Letter of Support.

- **D3**: Describe other fire recovery activities in the fire affected and how this application complements those activities.

  - Additional gage sites located in the fire burn scar will help to inform design and implementation of future rehabilitation and mitigation projects.

  - Actual rainfall/runoff response will help determine level of risk when designing drainage infrastructure across roadways.

  - Real-time information will inform emergency personnel in the event of a major rainfall event.

  - Rainfall/runoff response data can be used by water and irrigation water providers.

  - Data collected by the system can be used in future research efforts.

E. Attachments

Please complete the enclosed scope of work and budget template. Other documents may be attached to the application in order to support the request for funding. These may include:

- Letters of support from other entities and letters of financial commitment.
  - National Weather Service (NWS)
  - City of Fort Collins

- Pertinent still photos.
  - Examples of rain gage, stream gage, and repeater.
  - Screenshot of WetMAP (online rain/stream gage portal)

- Maps and reports from other similar or related projects.
  - Scope of Work
  - Budget & Timeline Table
  - Larimer County EFWS Master Plan Map
  - Larimer County EFWS Master Plan Table
  - Other full reports can be provided upon request:
    - Larimer County Emergency Flood Warning System Master Plan
    - US Forest Service Permit (Sheep Mountain Repeater)
    - Operations & Maintenance Contract with WET
    - Annual End-Of-Season Report from WET
    - Access to WetMAP web interface
      - http://wetmap.wetec.us/WETMapV3/WET/WETMapV3.html
        - Username: WET
        - Password: water1225

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service Forecast Office
325 Broadway, WS1
Boulder, Colorado 80305-3328

April 21, 2021

Dear Kevin Houck and Colleagues at the Colorado Water Conservation Board,

I am the Meteorologist in Charge (MIC) of the National Weather Service Forecast Office in Boulder, Colorado. I am writing to show my office's full support of the grant proposal submitted by Eric Tracy from Larimer County to expand the ALERT gage network. Larimer County was especially hard hit by the Cameron Peak Fire, which ended up being the largest wild fire in Colorado history. The Burned Area Emergency Response Team (BAER) released a report that showed large parts of the burn area are at high risk of debris flows and flash flooding, and many populated areas and key infrastructure are likewise at high risk of being impacted. Eric's proposal is to expand the rain & stream gages within the Cameron Peak burn area.

When it comes to burn scar flash flooding, the two most critical tools at our disposal are weather radar, and rain/stream gages that provide data in real time. Adding these critical rainfall and streamflow observations would enhance our office's ability to issue timely and potentially life-saving warnings for the affected areas. The Cameron Peak burn scar is in between radar coverage, and in some cases, we may not be adequately able to detect the heavy rain that may generate debris flows and flash flooding based on radar data alone. Thus, rain and stream gages are vital to obtaining early detection of high impact rainfall (and debris flows/flash flooding) so that we can issue warnings with as much lead time as possible. With the Big Thompson and Cache La Poudre Rivers within the burn scar, there are a great many people at risk, so we urge you to fund the gage network. This grant would greatly support our mission of protecting lives and property for those living/working in and downstream of the Cameron Peak burn scar.

Warm Regards,

Jennifer Stark

Jennifer Stark
Meteorologist In Charge
National Weather Service Boulder, CO

Stormwater Utility
700 Wood St
Fort Collins, CO 80521
970.221.6700
fcgov.com

April 21, 2021

Chris Sturm
Colorado Water Conservation Board
1313 Sherman Street, Room 718
Denver, CO 80203

Dear Chris,

The City of Fort Collins operates Floodwarning System (FWS) network of rainfall, streamflow, and weather gages in the City of Fort Collins (City) and throughout Larimer County as an early warning detection system for flood threats to our community. The need for real-time rain and flow data became apparent during the 1997 Fort Collins flood event, when National Weather Service forecasts underestimated rainfall depths in our area by half. Following that flood event, the City used State and Federal grant funding to begin gage placement activities in 1999, Since that time, the City has continued to expand our FWS to its present size of 70 locations.

Key locations established on the Poudre River to augment the invaluable flow information sourced from CWCB's Canyon Mouth gage include a new site placed in 2012 at the Hewlett Gulch bridge in Poudre Park, placed in response to the Hewlett Gulch & High Park Fires that year. This gage proved to be tremendously helpful in monitoring Poudre Watershed flow conditions during the Colorado Flood event of September 2013. After successfully receiving award of FEMA Hazard Mitigation Grant funding in 2015, the City placed Poudre flow gages in Rustic, CO and at Lions Park, upstream of Fort Collins.

About this time, the City committed support to Larimer County as it sought to enhance and extend the FWS gage network by identifying new locations lacking needed monitoring of active flood risk. The County's effort included re-establishing and enhancing, subsequent to the 2013 Flood event, a streamflow and rain gage network in the Big Thompson watershed as well as several sites in the foothills west of Fort Collins and Loveland. In addition to sharing gage data, our cooperation has included developing a FWS architecture designed to prevent competition of radio reports and avoid duplication of sites. This density of gages the City had established provided our both City and County Emergency Response officials with critical information important to conduct our public safety mission.

Presently, the Cameron Peak and East Troublesome Fires burn scars are projected to vastly increase rapid runoff, erosion, debris and sediment generation from rainfall events. Direct threats to life-safety, transportation and drainage infrastructure, public and private property, and downstream water quality will then propagate from the upper Poudre watershed downstream. Further, rehabilitation efforts to re-establish forest floor surface cover, as they can be implemented, will need evaluation subsequent to rainfall events to assess effectiveness, so measure of precipitation intensity, duration, and corresponding stream channel discharges is vital.

Since most of the burn area of these two historic fires extend well beyond the current extent of the existing FWS gage network, it is the City's hope that the CWCB will support Larimer County as they seek to establish a much needed, and carefully prioritized, expansion of the existing FWS network there. In summary, the real-time rainfall, runoff, and related watershed post-fire storm-response behavior data gathered from this expansion will be mission-critical in our collective effort to assess watershed fire mitigation efforts as well as provide our Communities timely and accurate measure of these significant post-fire flood threats.

If you have any questions, please feel free to contact me at (970) 416-2240 or by email clochra@fcgov.com.

Sincerely,

THE CITY OF FORT COLLINS

Chris Lochra
Flood Warning Engineer

P.O. Box 1190, Fort Collins, Colorado 80522-1190, 970.498.5700, Larimer.org

Exhibit 1: Example Repeater - Storm Mountain Repeater (Big Thompson)

Exhibit 2: Example Rain/Stream Gage – Mill Canyon

Exhibit 3: Example Rain Gage – Devils Gulch (Big Thompson)

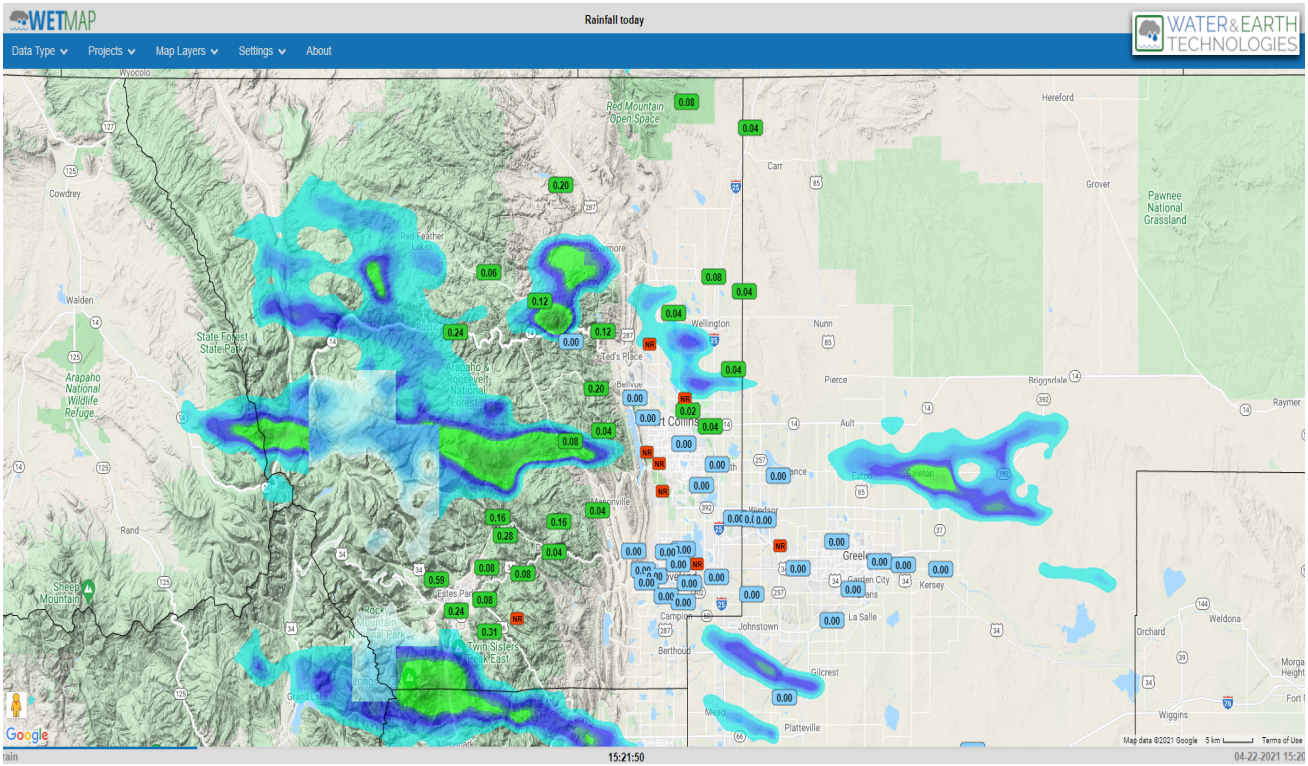


Exhibit 4: Screenshot of WetMAP (online portal)

Scope of Work

GRANTEE and FISCAL AGENT (if different)

Larimer County

PRIMARY CONTACT

Eric Tracy, PE (Project Manager)

ADDRESS

Larimer County Engineering Department
(Mailing) PO Box 1190
(Physical) 200 W Oak St, Suite 3000
Fort Collins, CO 80522

PHONE

(Office) 970-498-5729
(Cell) 970-443-3629

PROJECT NAME

Larimer County Emergency Flood Warning System (EFWS) – Cameron Peak Fire Expansion (Phase II)

GRANT AMOUNT

$100,000

INTRODUCTION AND BACKGROUND

Expansion of the Larimer County Early Flood Warning System (EFWS) in areas directly impacted by the 2020 Cameron Peak Fire. Sites are identified in the most recent Larimer County EFWS Master Plan which considered available information including the final BAER report in the analysis as well as collaborative feedback from multiple stakeholders. The project includes installation, configuration and operation of the remaining (7) rain gages and (3) rain/stream gages, base station configuration and stream rating curve development, FCC licensing, permitting, calibration, etc. The additional sites will be operated and maintained for a minimum of 10-years.

OBJECTIVES

List the objectives of the project. Please include objectives for all aspects of the project whether funded by the CWCB or not

The Larimer County EFWS provides real-time, mission-critical information for rainfall events measuring precipitation intensity, duration and corresponding stream channel discharge response. The Cameron Peak Fire Expansion (Phase II) will provide additional gaging sites located within the burn scar to monitor the watershed response to rainfall events. Data from these sites will be transmitted in real-time to emergency personnel and directly to the National Weather Service for use in their release of accurate flood related warnings. These sites will provide real, empirical data to be used in the future design of rehabilitation project, mitigation projects, future planning and research purposes. Larimer County has established a telemetry backbone and encourages partnerships with other jurisdictions and organizations to reduce costs and avoid duplication of efforts in the fire recovery process.

TASKS

Provide a detailed description of each task using the following format. Detailed descriptions are only required for CWCB funded tasks. Other tasks should be identified but do not require details beyond a brief description.

TASK 1 (Non-CWCB Funded)– Project Management, Coordination and Research

Description of Task

Larimer County will provide general project management, coordination, and communication with various agencies involved in the development and implementation of the project.

TASK 2 (Non-CWCB Funded) – Master Planning

Description of Task

Larimer County, with the professional assistance of Water & Earth Technologies has developed the Larimer County Emergency Flood Warning System (EFWS) Master Plan.

Method/Procedure

This plan was amended to include the Cameron Peak Fire burn scar and included the final BAER report, preliminary H&H modeling and stakeholder input. The plan includes the identification of critical locations, placement of gages including theoretical radio path studies, required equipment, base station upgrade requirements and repeater station location.

Deliverable

Larimer County Emergency Flood Warning System Master Plan (RECEIVED)

TASK 3 (CWCB Funded) – Implementation

Description of Task

Equipment procurement, all required permitting (USFS, CDOT, Army COE, FEMA Floodplain Permitting, etc), configuration of equipment, bench testing, station installation, field testing, base station configuration, stream rating curve development, alert trigger threshold setting and alert contact list updates.

Deliverable

La Poudre Pass Creek below Long Draw Reservoir ID 27 (rain)
Joe Wright Creek below Joe Wright Reservoir ID 28 (rain)
Joe Wright Creek below Chambers Reservoir ID 29 (rain)
Kilpecker ID 31 (rain)
Manhattan Road ID 32 (rain)
CLP River @ Crown Point Drive Bridge ID 35 (rain/stream)
Old Flowers Road ID 59 (rain)
Salt Creek Cabin ID 50 (rain)
South Fork CLP River @ Pingree Park ID 62 (rain/stream)
Sevenmile Creek @ Mouth ID 63 (rain/stream)
Stream Rating Curve Report
Copies of all required permits
All sites updated in WetMAP

*Reference attached Larimer County Emergency Flood Warning System Master Plan

TASK 4 (Non-CWCB Funded) – Maintenance, Operations and Winterization (10-Years)

Description of Task

Additional sites will be added to the Larimer County EFWS Annual Maintenance Program.

Method/Procedure

Annual proactive maintenance of each station including at least three site visits per year, early season station start-up and calibration, mid-season site inspection/calibration and end-of-season closure. All equipment pulled for the winter is stored in a heated warehouse. Site visits after significant rainfall events determine if updates to the rating curves is necessary.

Deliverable

An end-of-year annual report is prepared by Water & Earth Technologies and includes operational information, maintenance logs, and photos.

REPORTING AND FINAL DELIVERABLE

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the statement of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

Budget & Timeline Table

Task	Description	Target Start Date	Target Completion Date	Quantity	Unit Cost	CWCB Funds	Other Funding Cash*	Other Funding In-Kind*	Total
1	Project Management, Coordination	6/1/2021	6/30/2022						
2	Master Planning	COMPLETE							
3	Implementation	6/1/2021	6/30/2022						
	Equipment Procurement								
	Rain Gage			7	6500	$22,750.00	$22,750.00		$45,500.00
	Rain/Stream Gage			3	9000	$13,500.00	$13,500.00		$27,000.00
	Labor (permitting, configuration, bench testing, station installation, field testing, base station configuration, stream rating development)	6/1/2021	6/30/2022						
	Rain Gage			7	10000	$32,500.00	$37,500.00		$70,000.00
	Rain/Stream Gage			3	22500	$31,250.00	$36,250.00		$67,500.00
4	Maintenance, Operations, Winterization								
	TOTALS					**$100,000.00**	**$110,000.00**		

*10-years of maintenance funded under other appropriations

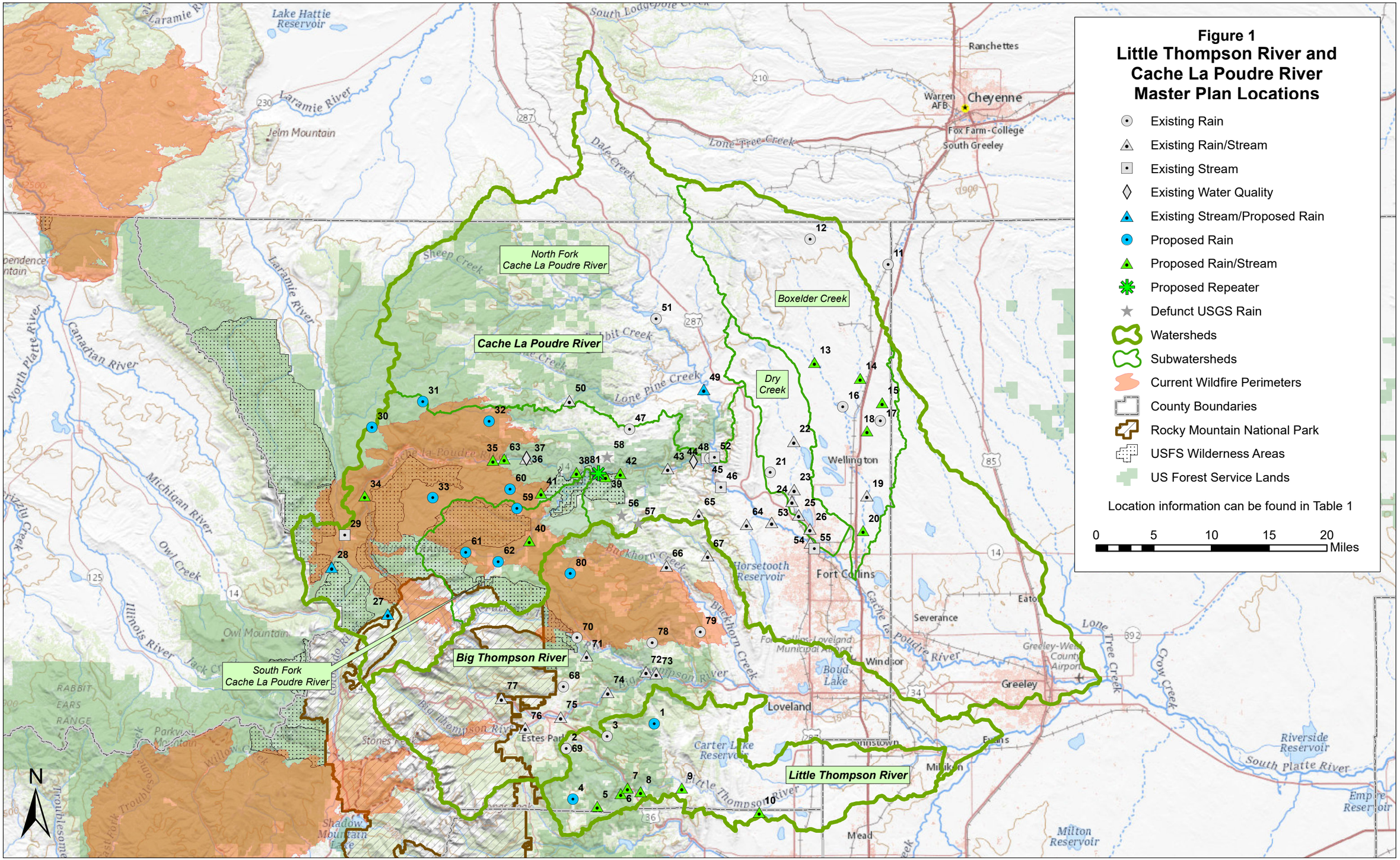


Figure 1
Little Thompson River and
Cache La Poudre River
Master Plan Locations
Existing Rain
Existing Rain/Stream
Existing Stream
Existing Water Quality
Existing Stream/Proposed Rain
Proposed Rain
Proposed Rain/Stream
Proposed Repeater
Defunct USGS Rain
Watersheds
Subwatersheds
Current Wildfire Perimeters
County Boundaries
Rocky Mountain National Park
USFS Wilderness Areas
US Forest Service Lands
Location information can be found in Table 1
0 5 10 15 20
Miles
North Fork
Cache La Poudre River
Cache La Poudre River
South Fork
Cache La Poudre River
Big Thompson River
Little Thompson River
Boxelder Creek
Dry
Creek
Lake Hattie
Reservoir
Laramie River
Jelm Mountain
Ranchettes
Warren
AFB
Cheyenne
Fox Farm-College
South Greeley
Lone Tree Creek
Dale Creek
Sheep Creek
Lone Pine Creek
Buckhorn Creek
Horsetooth
Reservoir
Fort Collins
Wellington
Loveland
Windsor
Greeley
Severance
Eaton
Boyd
Lake
Carter Lake
Reservoir
Milliken
Mead
Riverside
Reservoir
South Platte River
Empire
Reservoir
Milton
Reservoir
Estes Park
Owl Mountain
Shadow
Mountain
Lake
Michigan River
Owl Creek
Illinois River
Canadian River
North Platte River
Crow Creek
Lone Tree Creek
RABBIT
EARS
RANGE
N

No	Gage Type	Name	Owner/ID	Lat	Lon	Comments
1	Proposed Rain	Pole Hill Rd. @ Penstock @ Co Rd 18E	Larimer County	40.368381	-105.331922	Important to montitor rain in the N. Fork Little T Watershed Could monitor streamflow nearby @ 23% of watershed (NF Little T blw Pole Hill Outlet); then few/poor streamgage sites to the mouth
2	Existing Rain	Hermit Park	Larimer County	40.336623	-105.4762	Monitors rain in the Little T headwaters (mainstem) Watershed
3	Existing Rain	Panorama Pk Rain/Repeater	Larimer County	40.35222	-105.40923	Monitors rain applicable to the Little T/N. Fork Little T Watersheds
4	Proposed Rain	Big Elk Park @ Co Rd 59	Larimer County	40.273315	-105.464818	Important to montitor rain in the W. Fork Little T Watershed; maybe redundant with 5
5	Proposed Rain/Stream	Big Elk Meadows: Mirror Lake or Meadow Lake	Larimer County	40.264596	-105.425032	Highest Stream gage location on the mainstem of the Little Thompson; Meadow Lake site catches an additional tributary inflow from the north
6	Proposed Rain/Stream	WF Little Thompson @ Co Rd 47 #1	Larimer County	40.280943	-105.386283	Difficult to monitor the Little Thompson below the confluence of the West Fork and the upper mainstem until Seneca Rd; therefore, monitor each trib at mouth
7	Proposed Rain/Stream	Little Thompson @ Co Rd 47	Larimer County	40.288131	-105.375426	
8	Proposed Rain/Stream	Little Thompson @ Seneca Rd	Larimer County	40.283263	-105.35396	
9	Proposed Rain/Stream	Little Thompson @ Stagecoach Trail	Larimer County	40.287937	-105.286318	Interest from other parties in a gage at this site
10	Proposed Rain/Stream	Little Thompson @ 83rd St. or Co Rd 21	County Partner(s)?	40.257766	-105.159282	Maybe of greatest interest to Weld County; 83rd St. location is in Boulder Co.
11	Existing Rain	Meadow Springs Ranch Weather	City of FC 6550	40.944167	-104.947778	Boxelder Headwaters
12	Existing Rain	Soapstone	City of FC 6780	40.976058	-105.076797	City of FC looking at up to 3 new gages on Soapstone Natural Area
13	Proposed Rain/Stream	NRCS Dam B-2	Larimer County	40.821678	-105.069566	Reclassified "High Hazard" Dam Requiring Monitoring
14	Proposed Rain/Stream	NRCS Dam B-3	Larimer County	40.801933	-104.993696	Reclassified "High Hazard" Dam Requiring Monitoring
15	Proposed Rain/Stream	NRCS Dam B-4	Larimer County	40.771326	-104.957654	Reclassified "High Hazard" Dam Requiring Monitoring
16	Existing Rain	CR 9 @ N. Poudre Canal	City of FC 6640	40.766111	-105.0227778	City Rain Gage Close to Larimer County Water Level Gage Site(s)
17	Existing Rain	CR 3 @ Indian Ck Reservoir	City of FC 6630	40.748056	-104.9605556	City Rain Gage Close to Larimer County Water Level Gage Site(s)
18	Proposed Rain/Stream	Clark Reservoir	Larimer County	40.735944	-104.982709	
19	Existing Rain/Stream	CR 56 @ Boxelder Creek	City of FC 6100	40.6547	-104.983	
20	Proposed Rain/Stream	CR 50 Detention Basin	Larimer County	40.610876	-104.989136	No monitoring required
21	Existing Rain	CR 60 @ West Dry Creek	Cit of FC 6600	40.683611	-105.142222	
22	Existing Rain/Stream	CR 66 @ Dry Creek	City of FC 6463	40.7228	-105.1033	
23	Existing Rain/Stream	FCB # 1	City of FC 6680	40.6625	-105.1027	
24	Existing Rain/Stream	FCB # 2	City of FC 6670	40.6475	-105.1063	
25	Existing Rain/Stream	Shields @ Dry Creek	City of FC 6070	40.6306	-105.0952	
26	Existing Rain/Stream	College @ Larimer & Weld	City of FC 6690	40.613	-105.0766	

No	Gage Type	Name	Owner/ID	Lat	Lon	Comments
27	Existing Stream/Proposed Rain	La Poudre Pass Creek blw Long Draw Reservoir	DWR LAPLODCO	40.503744	-105.770969	La Poudre Pass Creek[1]
28	Existing Stream/Proposed Rain	Joe Wright Creek blw Joe Wright Reservoir	USGS JOEBELCO	40.561932	-105.863914	Joe Wright Creek[2]
29	Existing Stream	Joe Wright Creek blw Chambers Reservoir	DWR JWCCHACO	40.602222	-105.842803	Joe Wright Creek[2]
30	Proposed Rain	Green Ridge Road Rain Gage	Larimer County	40.737726	-105.799825	Roaring Creek[3]; storms tracking east towards Sevenmile[4] and Elkhorn Creeks
31	Proposed Rain	Kilpecker Rain Gage	Larimer County	40.770254	-105.715876	Sevenmile[4] and Elkhorn Creeks
32	Proposed Rain	Manhattan Road Rain Gage	Larimer County	40.746362	-105.606312	Sevenmile[4] and Elkhorn Creeks
33	Proposed Rain	Crown Point Road Rain Gage	Larimer County	40.649792	-105.698093	Sheep Creek[5], Black Hollow[6], Crown Point Gulch[a], Mineral Springs Gulch[b], Storms Tracking West to East will continue onto Bennett Creek[7], S. Fork CLP[8]
34	Proposed Rain/Stream	CLP River blw Poudre Falls (preferred) or CLP River @ Big South Trailhead (CLP headwaters only)	Larimer County	40.65173	-105.81069	At Big South Trailhead would monitor the CLP Headwaters above the confluence with Joe Wright Creek[2]; Blw Poudre Falls Gage site is below their confluence.
35	Proposed Rain/Stream	CLP River @ Crown Point Drive Bridge	Larimer County	40.697691	-105.599645	Tunnel Creek, Sheep Creek[5], Williams Gulch, Roaring Creek[3], Peterson Creek, Washout Gulch, Black Hollow[6], Dry Creek, Crown Point Gulch[a]
36	Existing Rain/Stream	CLP River blw Rustic	City of FC 11047	40.699993	-105.544942	Sevenmile Creek[4], Mineral Springs Gulch[b]
37	Existing Water Quality	CLP River Indian Meadows WQ	City of FC	40.700199	-105.544301	Approx. 200' ds of Rustic gage site (33); City would like to consolidate the two
38	Proposed Rain/Stream	CLP River @ Mountain Park Campground Bridge	Larimer County	40.682796	-105.461671	Bennett Creek[7]
39	Proposed Rain/Stream	CLP River @ Hwy 14 - At Narrows	Larimer County	40.677588	-105.413563	S Fork CLP River[8], Elkhorn Creek. S Fork tribs include: Little Beaver[9], Fish Creek, Beaver Creek[10], Fall Creek, Pennock Creek[11], Pendergrass Creek[12]
40	Proposed Rain/Stream	S. Fork CLP River @ Pingree Park Rd (Bridge #1)	Larimer County	40.59703	-105.538741	On S. Fork CLP
41	Proposed Rain/Stream	Bennett Creek @ Pingree Park Road	Larimer County	40.6568	-105.52	Bennett Creek[7]
42	Proposed Rain/Stream	Stove Prairie Landing @ Hwy 14	Larimer County	40.6823	-105.389514	On Stove Prairie Landing Tributary (Burned in the High Park Fire)
43	Existing Rain/Stream	CLP River @ Hewlett Gulch Bridge	City of FC	40.688333	-105.3113889	Stove Prairie Landing Tributary (Burned in the High Park Fire)
44	Existing Water Quality	CLP River @ Manners Bridge WQ	City of FC	40.696794	-105.268998	Gordon Creek (Hewlett Gulch) (Burned in the Hewlett Gulch Fire)
45	Existing Stream	CLP River @ City of FC Intake	City of FC	40.700964	-105.247528	Utilized for Water Resources
46	Existing Stream	CLP @ Canyon Mouth Near Fort Collins	DWR/City of FC CLAFTCCO	40.664722	-105.2233333	Gordon Creek, N. Fork CLP
47	Existing Rain	Hewlett Gulch Rain	City of FC 6730	40.737377	-105.374678	Hewlett Gulch (Burned in the Hewlett Gulch Fire)
48	Existing Rain	Gateway Park	City of FC 6720	40.701103	-105.241568	
49	Existing Stream/Proposed Rain	N. Fork CLP @ Livermore	USGS CLANLICO	40.787482	-105.252205	N. Fork CLP
50	Existing Rain/Stream	Red Feather Highlands/ S. Fork Lone Pine Creek	WET	40.773084	-105.474053	Headwaters only of S. Fork Lone Pine Creek are Impacted by Cameron Pk Fire
51	Existing Rain	Halligan Reservoir	City of FC 110060	40.875704	-105.331445	N. Fork CLP
52	Existing Stream	N. Fork CLP blw Seaman Reservoir	DWR CLANSECO	40.70266	-105.234118	N. Fork CLP
53	Existing Rain/Stream	CLP @ Lions Park	City of FC 11050	40.6213	-105.1396	Below Canyon
54	Existing Rain/Stream	CLP College @ Downtown Whitewater Park	City of FC 110090	40.5956	-105.0758	In Fort Collins
55	Existing Stream	CLP River @ Fort Collins, CO	USGS/City of FC CLAFORCO	40.588083	-105.069222	In Fort Collins
56	Defunct USGS Rain	High Park Precip at Sky Corral nr Stove Prairie CO	USGS 403746105231301	40.629361	-105.3868333	USGS seeking funding partners to reactivate these. Or, it may be possible to use ALERT protocol equipment at existing station infrastructure.
57	Defunct USGS Rain	High Park Precip Station @ Stove Prairie, CO	USGS 403710105213401	40.619361	-105.3593333	
58	Defunct USGS Rain	High Park Precip @ Glacier View nr Livermore, CO	USGS 404220105244001	40.702778	-105.4111111	
59	Proposed Rain	Old Flowers Road Rain	Larimer County	40.637203	-105.559615	N. Fork Little Beaver Creek, Little Beaver Creek[10]
60	Proposed Rain	Salt Creek Cabin Rain	Larimer County	40.661296	-105.5711	Bennett Creek[7]
61	Proposed Rain	Commanche Reservoir Rain	Larimer County	40.581907	-105.643281	S Fork CLP River[8], on Tributary Beaver Creek[10]
62	Proposed Rain	S. Fork CLP River @ Pingree Park	Larimer County	40.570291	-105.58972	S Fork CLP Headwaters
63	Proposed Rain/Stream	Sevenmile Creek @ Mouth	Larimer County	40.699558	-105.581121	Sevenmile Creek[4]

No	Gage Type	Name	Owner/ID	Lat	Lon	Comments
64	Existing Rain/Stream	Mill Canyon	Larimer County	40.619034	-105.181091	
65	Existing Rain/Stream	Rist Canyon	Larimer County	40.631104	-105.260132	
66	Existing Rain/Stream	Buckhorn Canyon	Larimer County	40.566647	-105.312866	
67	Existing Rain/Stream	Redstone Canyon	Larimer County	40.579443	-105.245126	
68	Existing Rain	Devils Gulch Road	Larimer County	40.414474	-105.481247	
69	Existing Rain	Hermit Park	Larimer County	40.336623	-105.4762	
70	Existing Rain	Dunraven Trailhead	Larimer County	40.47549	-105.459558	
71	Existing Rain/Stream	North Fork Big Thompson at Glen Haven	Larimer County	40.45327	-105.44372	
72	Existing Rain/Stream	North Fork Big Thompson at Storm Mountain Road	Larimer County	40.43362	-105.3458	
73	Existing Rain/Stream	Big Thompson at Moodie Bridge	Larimer County	40.431411	-105.329166	
74	Existing Rain/Stream	Big Thompson at Sleepy Hollow	Larimer County	40.40768	-105.40845	
75	Existing Rain/Stream	Big Thompson Below Olympus Dam	Larimer County	40.376327	-105.485736	
76	Existing Rain/Stream	Marys Lake Road at Big Thompson	Larimer County	40.362423	-105.54357	
77	Existing Rain/Stream	Fish Hatchery Road at Fall River	Larimer County	40.399589	-105.583053	
78	Existing Rain	Storm Mountain	City of Fort Collins 6410	40.469982	-105.335975	
79	Existing Rain	Green Ridge	City of Fort Collins 6420	40.483333	-105.256944	
80	Proposed Rain	Buckhorn Creek Headwaters	Larimer County	40.55604	-105.471274	Gage headwaters Buckhorn Creek; NWS area of concern
81	Proposed Rptr	Sheep Mountain Repeater	Larimer County	40.681821	-105.424904	Poundre Canyon Repeater