Larimer County Emergency Flood Warning System
Cameron Peak Expansion – Phase I
Final Report

Prepared for:
Colorado Healthy Rivers Fund Grants
Attn: Chris Sturm

December 30, 2021

Larimer County
Grant Amount: $100,000
Prepared by: Eric Tracy

LARIMER COUNTY
COMMITTED TO EXCELLENCE

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Introduction

[1]The Cameron Peak Fire was reported on Thursday, August 13, 2020. The fire burned an area of 208,913 acres over several months in Larimer County, affecting both private and public lands until being fully contained on December 2, 2020. Weather and fuel conditions influenced fire growth, behavior, and effects of the Cameron Peak Fire. Extreme temperatures, low humidity, rough terrain and gusty winds reaching over 70 miles per hour were just some of the elements that were contributing factors influencing fire development.

Within its burn perimeter, the Cameron Peak Fire reduced or eliminated above ground vegetation cover and altered soil structure, resulting in varying degrees of post-fire hydrophobicity. These direct changes to vegetation, structure, composition, and density will lead to reduced precipitation interception, decreased soil infiltration capacity, and elevated runoff compared to pre-fire conditions. The Soil Burn Severity (SBS), soil erosion, hydrology and debris flow modelling results obtained and used in the risk analysis indicate that post-fire there will be an increase in watershed response. This means:

- Increased erosion and sedimentation
- Areas that flood or had debris flows pre-fire will have larger magnitude events
- Areas that occasionally flood or had debris flows pre-fire will see more frequent events
- Areas that previously did not have streamflow or debris flow may now flood or have debris flows
- Private and public infrastructure are at an increased risk of damage to post-fire flood events
- Additional impacts to aquatic and terrestrial habitats are likely to occur

Expansion of the Larimer County Emergency Flood Warning System (EFWS) to include rainfall and stream gaging sites located in the Cameron Peak Fire burn scar is expected to help inform emergency response personnel to the potential risks in real-time and aid in the effort to protect life, property, and the environment.

Background

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.

A Flood Warning System Master Plan was in progress when the Cameron Peak Fire started. When it was clear that gaging sites would be needed in the burn scar, the consultant expanded the Master Plan to include the burn area. Reference to the original USGS Burn Area Emergency Response (BAER) report was made while evaluating potential sites in the burn scar. Ultimately, the Larimer County Master Plan was updated to include these sites.

The Cameron Peak Fire Expansion (Phase I) provides 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 provide real, empirical data to be used in the future design of rehabilitation project, mitigation projects, future planning and research purposes.

Other projects currently in progress or planned include Phase II, a partnership with the City of Greeley for a Phase III (dependent on EWP Grant Funding or other funding sources), and a partnership with the Colorado Department of Transportation (CDOT) to install additional gaging sites along Highway 14 and emergency Flash Flood Warning signs located at Ted's Place at the bottom of the Poudre Canyon and one located in Walden, CO for travelers entering the Poudre Canyon from the top.

The Larimer County EFWS – Cameron Peak Fire Expansion Phase I project included the following sites:

- Sheep Mountain Repeater
- Green Ridge Road
- Crown Point Road
- Poudre River below Poudre Falls
- Bennett Creek at Pingree Park Road
- Comanche Reservoir
- Buckhorn Headwaters
- South Fork Poudre at Pingree Park Road

Methods

Task 1 - Project Management

The Larimer County Engineering Department managed the project from the beginning to completion. Contracts, purchase orders and workorders with the consultant were processed, invoices collected and paid in a timely manner. All contracts were done in compliance with the Larimer County Procurement standards and processes. Pre-installation site visits occurred for most sites. Meetings with the consultant occurred regularly.

Task 2 – Master Planning

The Larimer County Emergency Flood Warning System Master Plan was in progress before the Cameron Peak Fire started. After it was obvious that additional rain and stream gages were going to be needed in the fire burn scar, the consultant added analysis to the Master Plan to include the burn scar area. Stakeholder outreach was a big part of the Master Plan process. The consultant utilized the initial USDA Burn Area Emergency Response (BAER) Report in their analysis of additional sites within the burn scar area. The Master Planning task was completed before the contract for this grant and was not a part of the proposed budget.

Task 3 – Equipment Procurement

The contractor ordered, received, and checked for shipping damage all equipment associated with the post fire expansion. Any equipment ordered prior to the grant contract date was applied only to the local match (see Match Split below).

In the original Estimated Budget, it was anticipated that equipment purchases would occur before the contract date, so no CWCB match was proposed. As some of the equipment was actually ordered after the contract date, a revision of the match is shown in the Actual Budget and CWCB funds were used to pay for equipment on Invoices #4191, 4212, 4235, 4266, 4322, and 4356.

CWCB funds were used to purchase general hardware, installation materials, cables, antennas, solar equipment, Campbell Scientific Data Loggers, traffic poles and bases, NEMA Boxes, pressure transducers, batteries, concrete mix, rebar, groundrods, modulators, encoders, environmentally safe antifreeze (for all-weather station), wind screens, etc. Quantities and more detailed descriptions can be found on the contractor invoices.

Care was taken in the invoice processing to only include costs that occurred after the contract date in the CWCB match portion of the project.

Task 4 – Implementation

An initial United States Forest Service (USFS) Standard Form 299 application was submitted and the USFS CAN 727 permit was issued for the Sheep Mountain repeater site. USFS approval of the other site locations within this Phase I was obtained by amending the Sheep Mountain Repeater permit to include the new sites. Radio licenses were obtained from the Federal Communications Commission (FCC) for each station that transmits using VHF radio.

An upgrade of the Base Station to ALERT2 Protocol was necessary to add the additional sites to the existing Larimer County EFWS. Upgraded equipment was purchased, configured and installed to accommodate the new radio protocol.

The Sheep Mountain Repeater was required to relay data from the burn scar area to the base stations in Fort Collins. This repeater site was the first priority and permitting and equipment procurement started early.

The contractor constructed, configured, programed and bench tested all monitoring equipment prior to installation. This consisted of installing equipment onto backplanes of the monitoring enclosures, programming data loggers, programming radios and satellite modems, programming sensor inputs and testing sensor configurations. A plan was developed for the ALERT2 Time Division Multiple Access (TDMA) plan integration for data transmissions using the existing radio frequencies employed by the County, the City of Fort Collins and the City of Loveland. The plan identified the best available cooperative regional utilization of frequencies, developed the associated FCC licensing requirements, and identified any changes to existing frequency utilization that would be required.

Utility locates were conducted at each station prior to any earth work associated with installation. Each monitoring station was installed upon completion of utility locates and bench testing. Each station was installed and tested to ensure accurate and reliable data transmission and reception of data at the base stations located in Fort Collins. All sensors were calibrated in the field as part of installation. The construction installation schedule varied from the original plan due to equipment procurement issues and site access due to USFS area closures in the fire area. Special permissions were eventually granted to access closed portions of the USFS to install equipment. Some sites remained inaccessible by vehicle due to treefall across forest service roads. In those situations, the contractor went as far as they could by vehicle, then hauled the equipment and materials in by foot the remaining distance. For example, the contractor had to haul in by foot all equipment for the Buckhorn Headwaters site over two miles.

Each new station was defined in the base stations receiving data in Fort Collins. Data was received from the stations using ALERT2 VHF radio protocol. Alarm thresholds for rainfall rates and water level/flow conditions were configured on the base stations with input from

Larimer County, the National Weather Service and USFS. Real-time notifications were configured for these alarm conditions using email and texts to cell phones. Contact lists for emergency personnel was updated. A feed of real-time data for these stations was implemented to the NWS in Boulder to support their mission of forecasting and issuance of weather alerts for emergency managers and community at large.

Stream channel cross section surveying was performed at each of the stream monitoring stations. The cross-section survey data was used to develop theoretical stage-discharge relationships to convert readings of stream level to flow. Manual flow measurements were taken at the time of cross-section surveying to aid in the development of the stream rating. A final Stream Rating report was prepared by the consultant.

Task 5 – Maintenance & Operations

As the sites were all installed this year and site visits, calibration and testing were all part of the installation process, additional site visits were not needed for most sites. Any maintenance of the sites was included in the costs of implementation on the consultants' invoices and it wasn't possible to split off the direct costs associated with the Maintenance and Operations. It is requested that the funding be reallocated to Task 4 where the expenses occurred.

All the sites were added to the WETMap interface as they were installed. Some of the sites were in operation during some of the rainfall events that occurred throughout the summer and the data was used in the Emergency Operations Center during these events.

Results

All the proposed gages were procured, constructed, configured, installed and put into operation as expected. The inclusion of these sites into the existing Larimer County Emergency Flood Warning System was seamless. Data is being transmitted as expected and was used in decision-making processes for some of the rainfall events that occurred this summer.

Below are summaries of the data collected off the sites that were in operation during the rain season. Real time data can be viewed on either WETMap or the TriLynx Operator on the following weblink…

https://larimerco-ns5.trilynx-novastar.systems/novastar/operator/#/map

Figure 1: Green Ridge Road

Figure 2: Poudre River at Crown Point Road

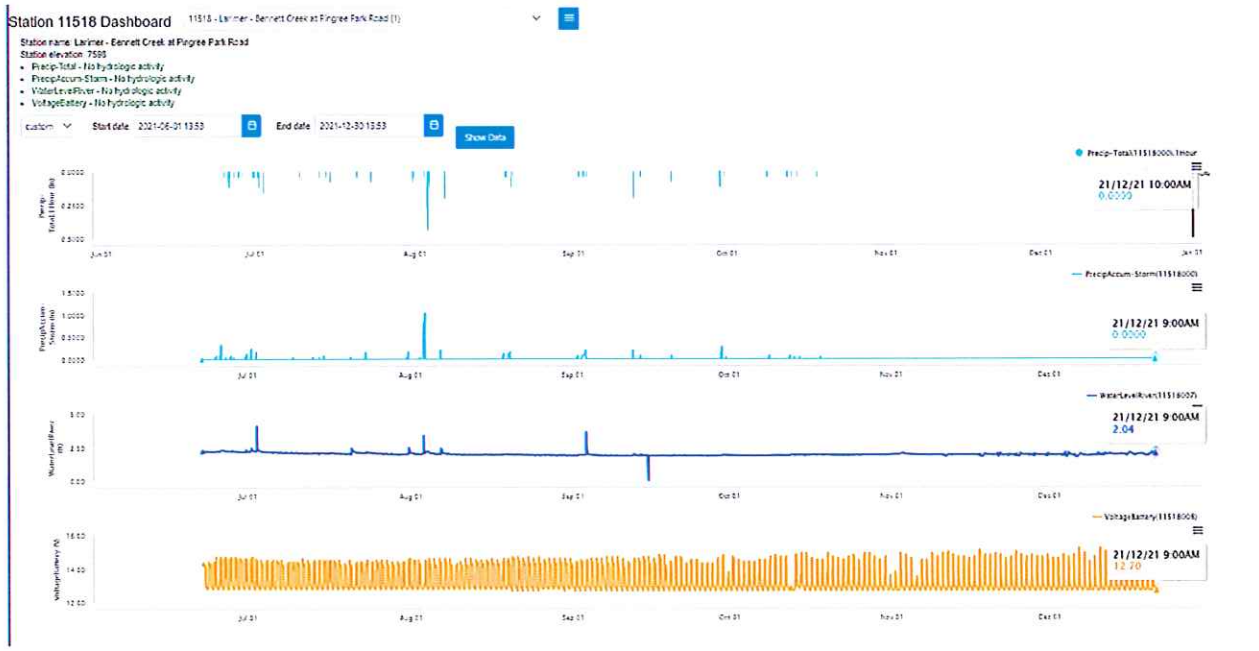


Figure 3: Bennett Creek at Pingree Park Road

Figure 4: Comanche Reservoir

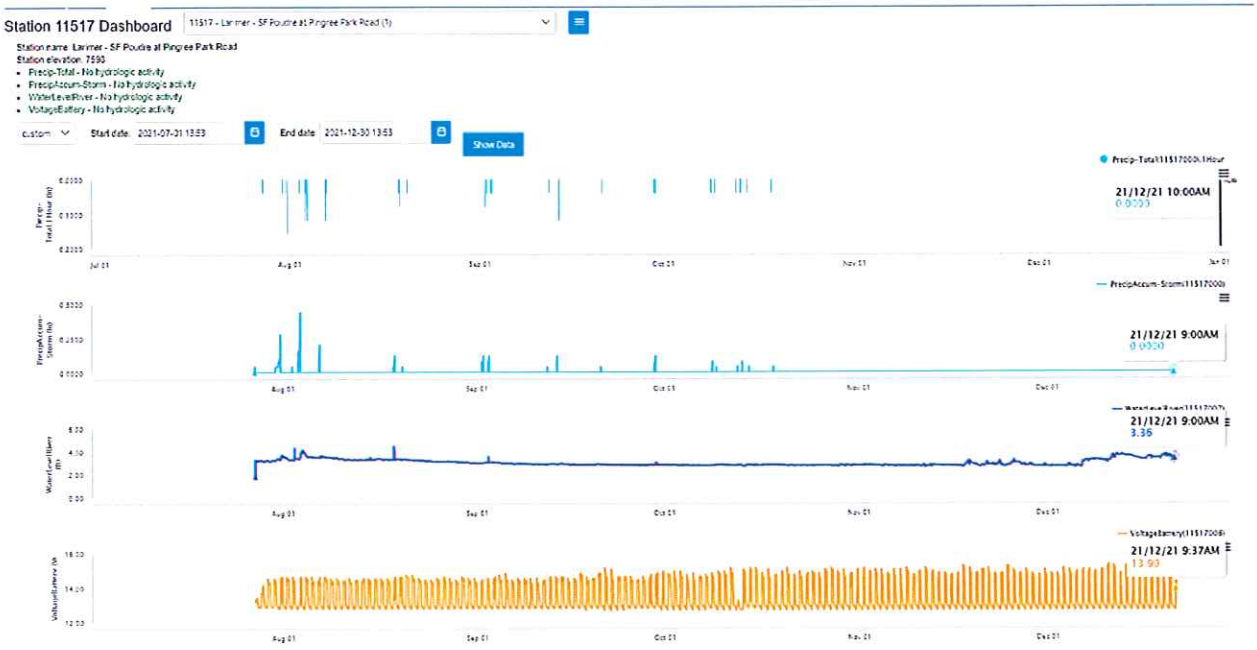


Figure 5: South Fork Poudre at Pingree Park Road

Conclusions and Discussion

All proposed stations have been installed and are operational as intended. These gages are producing real-time data that is being transmitted to Larimer County's consultant Water & Earth Technology, the City of Fort Collins, the City of Loveland and to the National Weather Service. Other partners such as the City of Greeley, Weld County, Town of Estes Park and the Town of Wellington also have access to this data with appropriate emergency personnel on the alert notification list. This data is available to the public for viewing via the TriLynx Operator website.

https://larimerco-ns5.trilynx-novastar.systems/novastar/operator/#/map

The addition of these gaging sites has already provided valuable information to emergency response personnel in the Larimer County Emergency Operations Center during rainfall events that occurred last summer.

These sites have been added to Larimer County's annual maintenance program and will continue to be maintained and operated as part of the Larimer County Emergency Flood Warning System for the expected lifespan of the equipment of approximately 10-years. The general operations will include spring installation (for equipment that is winterized), calibration and radio checks, general summer site visits with re-calibration, post-flood event site visits and fall take-down, again for sites that need to be winterized. Larimer County owns spare equipment that can be used in the event that something malfunctions.

The project went generally as planned, except that we ran into supply chain issues. This has been a common problem during COVID. Certain pieces of equipment such as the standpipes could not be procured and we had to have a custom fabricator fabricate the standpipes for us at higher cost and delayed schedule.

Overall the project came in under budget. The equipment costs were significantly higher as described in the financial reports, however labor was much cheaper than expected, so we were able to keep the project within budget.

Additional projects are currently in process or proposed to expand the Larimer County EFWS. Phase II will add additional sites within the Cameron Peak burn scar and is being implemented at the time of this report. It is expected that Phase II will be finished soon. Larimer County, in an effort to partner with other jurisdictions has also proposed a Phase III to include gages that have been requested by the City of Greeley. Current requests are submitted for the Emergency Watershed Protection Program grants to help fund the additional sites requested by the City of Greeley. Larimer County has also partnered with the Colorado Department of Transportation to install additional gages along Highway 14 and also two emergency Flash Flood Warning signs located on the bottom of the Poudre Canyon

at Ted's Place and also just outside of Walden, CO as you enter the Poudre Canyon. Lessons learned from this project will help with the timely implementation of those additional sites. Larimer County has also partnered with the City of Fort Collins, Town of Timnath, Town of Wellington and the North Poudre Irrigation Company to install rain and stage gaging as part of the emergency operations of the NRCS dams located in the northern part of Larimer County.

The installation of these additional gaging sites will continue to benefit the citizens of Larimer County and others throughout the recovery period of the Cameron Peak Fire burn area.

Actual Expense Budget

(Invoices Attached Separately)

Budget Estimate vs. Actual Budget

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Watershed Restoration Program Grant - Detailed Budget Estimate
Fair and Reasonable Estimate

Prepared Date: 5/10/2021
Name of Applicant: Larimer County
Name of Water Project: Larimer County (EFWS) – Cameron Peak Fire Expansion (Phase I)

EXAMPLE C: Construction

							Actual		
Task 1 - Project Management									
Sub-task	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds	Total Cost	CWCB Funds	Matching Funds
Project Manager (Senior Civil Engineer)	Hour	-	$ 75	$ -	$ -	$ -		$ -	$ -
Task 2 - Master Planning									
Sub-task	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds	Total Cost	CWCB Funds	Matching Funds
EFWS Master Planning (COMPLETE)	EA	-	$ 20,000	$ -	$ -	$ -		$ -	$ -
Task 3 - Equipment Procurement									
Sub-task	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds	Total Cost	CWCB Funds	Matching Funds
Base Station Upgrades to ALERT 2	EA	1	$ 6,417	$ 6,417	$ -	$ 6,417	$ 5,200	$ -	$ 5,200
Sheep Mountain Repeater	EA	1	$ 10,876	$ 10,876	$ -	$ 10,876	$ 8,218	$ -	$ 8,218
Rain Station	EA	4	$ 6,500	$ 26,000	$ -	$ 26,000	$ 87,568	$ 37,187	$ 50,381
Rain/Stream Station	EA	3	$ 9,000	$ 27,000	$ -	$ 27,000			
Task 4 - Implementation									
Sub-task	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds	Total Cost	CWCB Funds	Matching Funds
Base Station Upgrades to ALERT 2	EA	1	$ 1,440	$ 1,440	$ -	$ 1,440	$ 1,890	$ -	$ 1,890
Sheep Mountain Repeater	EA	1	$ 10,850	$ 10,850	$ 5,425	$ 5,425	$ 16,800	$ 2,468	$ 14,333
Rain Gage	EA	4	$ 10,000	$ 40,000	$ 32,475	$ 7,525	$ 82,486	$ 60,346	$ 22,141
Rain/Stream Gage	EA	3	$ 22,500	$ 67,500	$ 54,800	$ 12,700			
Task 5 - Maintenance & Operations									
Sub-task	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds	Total Cost	CWCB Funds	Matching Funds
Sheep Mountain Repeater	EA	1	$ 1,400	$ 1,400	$ 700	$ 700		$ -	$ -
Rain Station	EA	4	$ 1,425	$ 5,700	$ 2,850	$ 2,850		$ -	$ -
Rain/Stream Station	EA	3	$ 2,500	$ 7,500	$ 3,750	$ 3,750		$ -	$ -
TOTAL				$ 204,683.00	$ 100,000	$ 104,683	$ 202,163	$ 100,000	$ 102,163

Summary …

Total Project Cost: $202,163 ($2,520 under budget)

CWCB Match : $100,000 (49.47%)

Larimer County Match: $102,163 (50.53%)

Match Split

Base Station Upgrade

Date	Invoice	Invoice Total	Equipment	Labor	Match CWCB	Match Local
March	4147	$ 17,553.93				
			$ 5,200.00		$ -	$ 5,200.00
				$ 840.00	$ -	$ 840.00
April	4166	$ 14,979.14				
			$ -		$ -	$ -
				$ 1,050.00	$ -	$ 1,050.00
		Total	$ 5,200.00	$ 1,890.00		
		Budget	$ 6,417.00	$ 1,440.00		
		Difference	$ 1,217.00	$ (450.00)		
		Remaining Budget	$ 767.00			

Sheep Mountain Repeater

Date	Invoice	Invoice Total	Equipment	Labor	CWCB	Local
March	4147	$ 17,553.93				
			$ 7,613.14		$ -	$ 7,613.14
				$ 2,520.00	$ -	$ 2,520.00
April	4166	$ 14,979.14				
			$ -		$ -	$ -
				$ 1,365.00	$ -	$ 1,365.00
May	4188	$ 30,480.89				
			$ 604.98		$ -	$ 604.98
				$ 7,980.00	$ -	$ 7,980.00
June	4211	$ 23,325.66				
			$ -		$ -	$ -
				$ 4,935.00	$ 2,467.50	$ 2,467.50
			$ 8,218.12	$ 16,800.00		
		Budget	$ 10,876.00	$ 10,850.00		
		Difference	$ 2,657.88	$ (5,950.00)		
		Remaining Budget	$ (3,292.12)			

n/Stream Stations

Date	Invoice	Invoice Total	Equipment	Labor	CWCB	Local
	4167	$ 22,857.36				
			$ 17,029.86		$ -	$ 17,029.86
				$ 5,827.50	$ -	$ 5,827.50
May (1-14)	4190	$ 13,913.83				
			$ 7,823.83		$ -	$ 7,823.83
				$ 6,090.00	$ -	$ 6,090.00
May (15-31)	4191	$ 3,001.50				
			$ 366.50		$ 183.25	$ 183.25
				$ 2,635.00	$ 1,317.50	$ 1,317.50
	4212	$ 42,107.03				
			$ 24,295.78		$ 12,147.89	$ 12,147.89
				$ 17,811.25	$ 8,905.63	$ 8,905.63
	4235	$ 47,393.91				
			$ 31,996.41		$ 18,799.95	$ 13,196.47
				$ 15,397.50	$ 15,397.50	$ -

Match Split (cont.)

(4) Rain Stations, (3) Rain									
	4266	$ 18,058.14							
			$ 4,828.14				$ 4,828.14	$	-
				$ 13,230.00			$ 13,230.00	$	-
	4322	$ 11,622.65							
			$ 1,227.65				$ 1,227.65	$	-
				$ 10,395.00			$ 10,395.00	$	-
	4341	$ 7,020.00							
			$ -				$ -	$	-
				$ 7,020.00			$ 7,020.00	$	-
	4356	$ 4,080.00							
			$ -				$ -	$	-
				$ 4,080.00			$ 4,080.00	$	-
			$ 87,568.17	$ 82,486.25					
		Budget	$ 53,000.00	$ 107,500.00					
		Difference	$ (34,568.17)	$ 25,013.75					
		Remaining Budget	$ (9,554.42)						

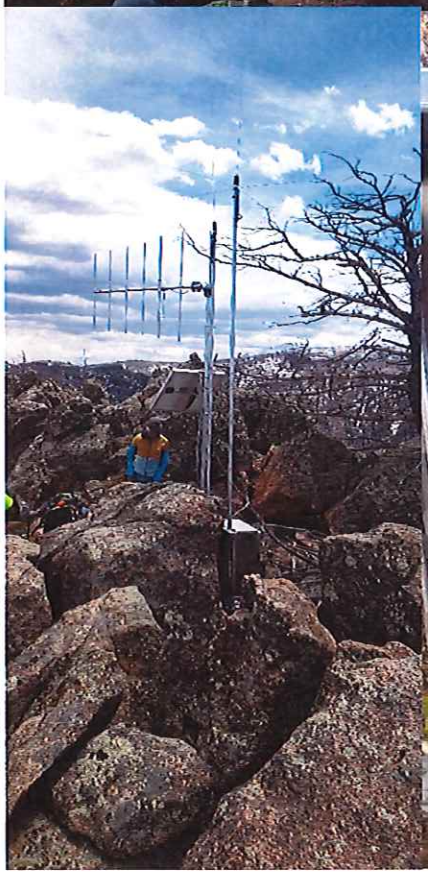
Maint & Operations	Date	Invoice	Invoice Total	Equipment	Labor	CWCB	Local
			$ -				
				$ -		$ -	$ -
					$ -	$ -	
				$ -	$ -		
			Budget	$ -	$ 14,600.00		
			Difference	$ -	$ 14,600.00		
			Remaining Budget	$ 14,600.00			

Project Total:	$ 100,986.29	$ 101,176.25	
Budget	$ 70,293.00	$ 134,390.00	
Difference	$ (30,693.29)	$ 33,213.75	
Grand Total	**$ 202,162.54**		$ 100,000.00 $ 102,162.54
Budget Total	$ 204,683.00		
	$ 2,520.46		

Appendix A – Photos

(Additional Photos included in Google Drive Link)

Sheep Mountain Repeater

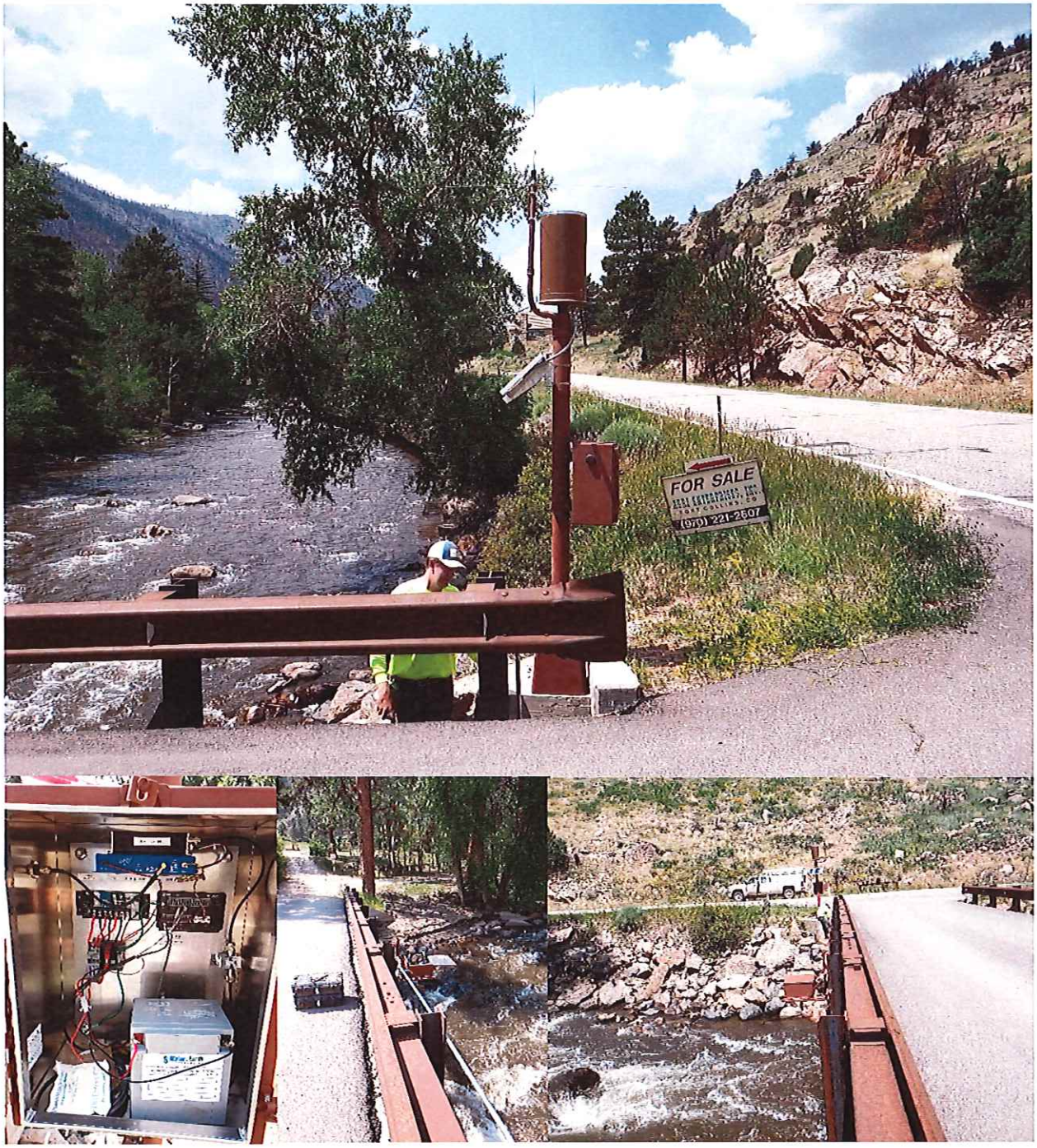


Green Ridge Road (Rain Only)

11510

Crown Point Road (Rain & Stream)

11514

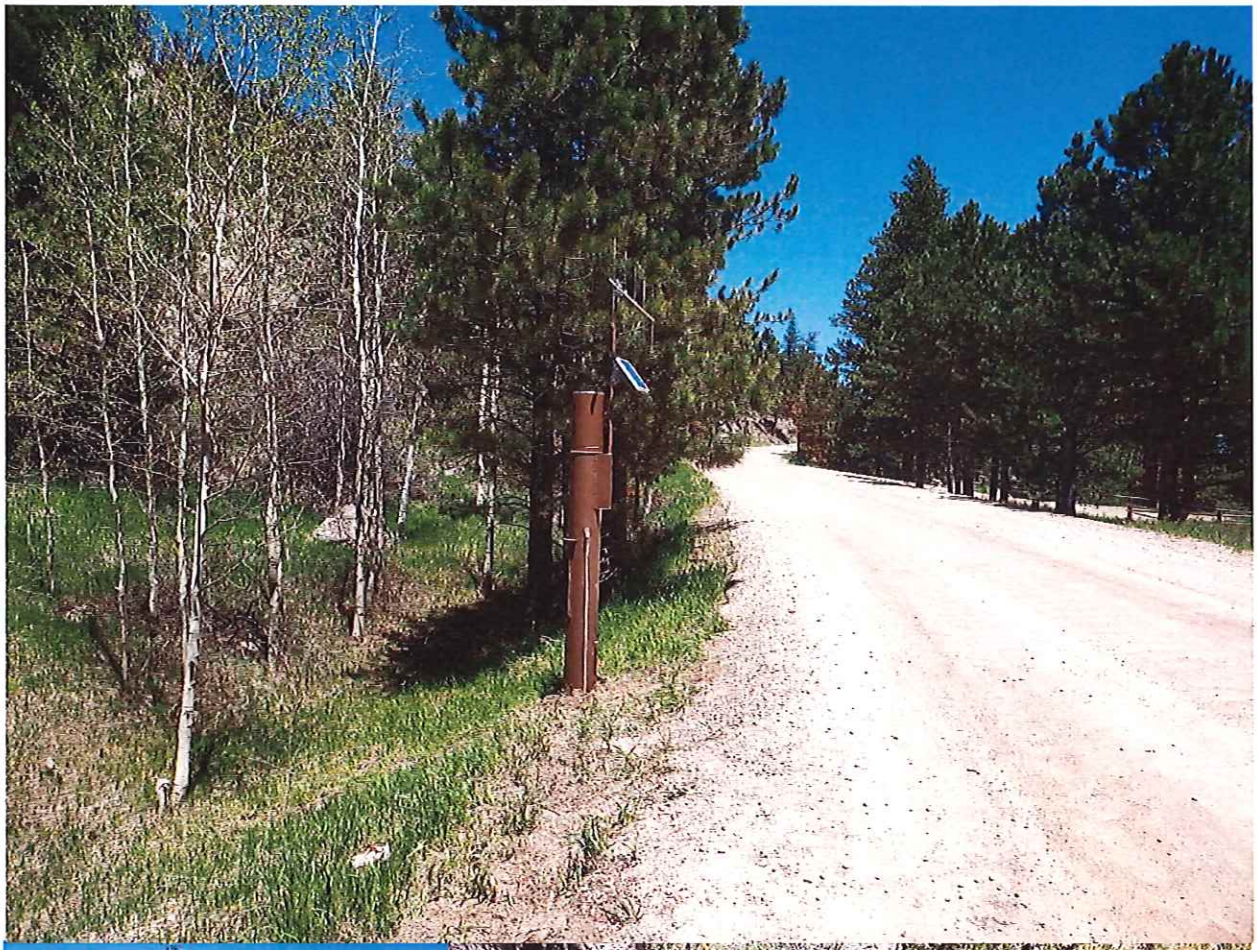


Poudre River below Poudre Falls (Rain & Stream)

11531

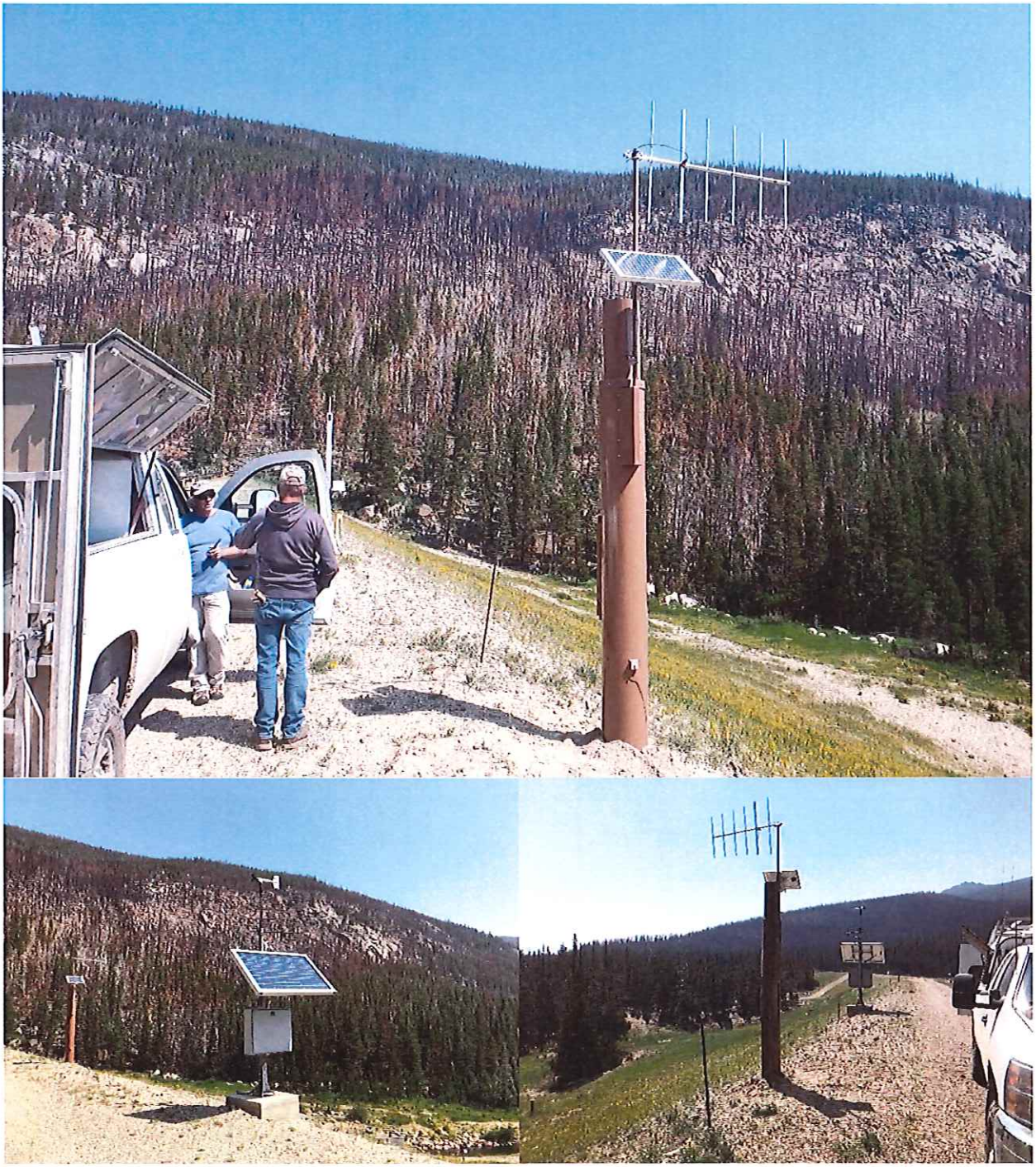
Bennett Creek at Pingree Park Road (Rain & Stream)

11518



Comanche Reservoir (Rain Only)

11522



Buckhorn Headwaters (Rain Only)

11524

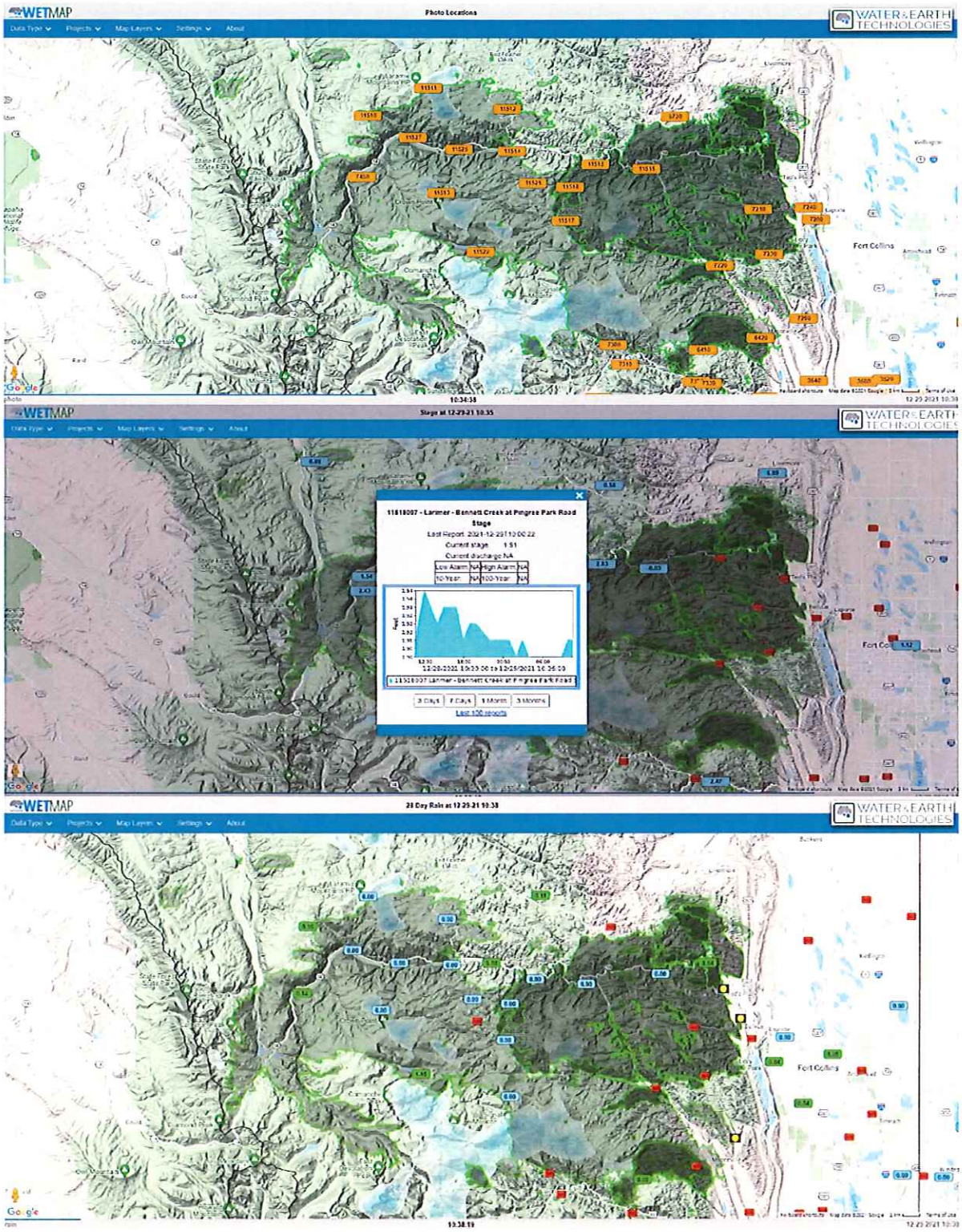
South Fork Poudre at Pingree Park Road (Rain & Stream)

11517

Appendix B – WETMap Screenshots

Additional Information and Real-Time data can be viewed at
https://wetmapgc.wetec.us/WETMapV3/LarimerCounty/#

WETMap Screenshots



Appendix C – Stream Rating Report

(Full Report Attached Separately)

WATER & EARTH TECHNOLOGIES

Date:	December 28, 2021
Prepared For:	Eric Tracy, P.E., Larimer County
By:	Kate Malers P.E., WET
Subject:	Rating development for the Cameron Peak Fire Burn Expansion ALERT stream gages

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I. Background

Due to the Cameron Peak Fire's impact on the Cache La Poudre River (CLP River) and its subwatersheds, Larimer County sought funding for an expansion of the planned Early Warning System (EWS) that had been designed to detect developing flood threats on the CLP River. The County contracted with Water & Earth Technologies, Inc. (WET) to complete the expansion project, including:

- 11531 CLP River blw Poudre Falls (precip and stream monitoring)
- 11510 Green Ridge Road (all-season precip monitoring)
- 11517 South Fork Poudre River @ 63E (precip and stream monitoring)
- 11518 Bennett Creek @ 63E (precip and stream monitoring)
- 11522 Comanche Reservoir (all-season precip monitoring), and
- 11524 Buckhorn Headwaters (precip monitoring)

WET was tasked with providing stage-discharge ratings for the three stream gage locations, to allow estimates of discharge to be provided for each measured record of stream stage. This memorandum briefly describes how the stage-discharge rating for each stream gage was developed and documents each rating in writing. Technical details including survey data in XCEL spreadsheet workbook files and HEC-RAS model input and output files are available upon request.

For each stream gage location, WET conducted a reach- and cross-section survey to obtain the data required for a local hydraulic model (using the U.S. Army Corps of Engineers' HEC-RAS hydraulic modeling software). In some cases it was difficult to complete surveys that provide ground surface data for a model that extends into the magnitude of peak flows that are possible from these burn-impacted watersheds. Areas that are inaccessible during WET's reach and cross-section surveying typically include overbank areas that are on private property, that extend beyond busy roadways or that simply extend so far beyond the top-of-bank that sightlines cannot be maintained for the full distance that would be required to characterize the cross-section. Where available, LIDAR data were used to extend the local hydraulic model cross-sections beyond what could reasonably be surveyed in the field, but LIDAR data were not available in the vicinity of all of the stream gages.

Ratings extending into high flood flows provide only initial estimates of discharge, since flows of high magnitude frequently *cause* channel geometry changes that render ratings obsolete, and/or may involve the formation of temporary hydraulic phenomena, including debris dams and road collapses, that are NOT reflected in the theoretical rating development.

II. CLP River Blw Poudre Falls (ID 11531)

County Station 11531 acts as only a stream gage using a bridge-mounted RADAR unit on the upstream face of the bridge. The bridge is significantly skewed to the stream channel at this site, which lies

Appendix D – Permits

(Full Permits Attached Separately)

FCC Permit Example

Federal Communications Commission

Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: LARIMER COUNTY STORMWATER ENGINEERING

ATTN: ERIC TRACY
LARIMER COUNTY STORMWATER ENGINEERING
200 WEST OAK STREET SUITE 3000
PO BOX 1190
FORT COLLINS, CO 80522

Call Sign	File Number
WRNP374	0009580879
Radio Service: IG - Industrial/Business Pool, Conventional	
Regulatory Status: PMRS	
Frequency Coordination Number	

FCC Registration Number (FRN): 0026034074

Grant Date	Effective Date	Expiration Date	Print Date
08-03-2021	08-03-2021	08-03-2031	08-04-2021

STATION TECHNICAL SPECIFICATIONS

Fixed Location Address or Mobile Area of Operation

Loc. 1 Address: Little Thompson at Stagecoach Rd
City: Lyons County: LARIMER State: CO
Lat (NAD83): 40-17-16.7 N Long (NAD83): 105-17-11.0 W ASR No.: Ground Elev: 1714.0

Loc. 2 Address: Big Elk Meadows
City: Lyons County: LARIMER State: CO
Lat (NAD83): 40-15-42.9 N Long (NAD83): 105-25-09.7 W ASR No.: Ground Elev: 2282.0

Loc. 3 Address: Pole Hill Rd at Penstock at CO Rd 18E
City: Loveland County: LARIMER State: CO
Lat (NAD83): 40-22-06.2 N Long (NAD83): 105-19-54.9 W ASR No.: Ground Elev: 2259.0

Loc. 4 Address: Sheep Mountain Repeater
City: Rustic County: LARIMER State: CO
Lat (NAD83): 40-40-55.4 N Long (NAD83): 105-25-29.9 W ASR No.: Ground Elev: 2298.0

Loc. 5 Address: Killpecker Tower
City: Rustic County: LARIMER State: CO
Lat (NAD83): 40-46-12.6 N Long (NAD83): 105-42-57.1 W ASR No.: Ground Elev: 3354.0

Loc. 6 Address: Manhattan Road
City: Rustic County: LARIMER State: CO
Lat (NAD83): 40-44-46.5 N Long (NAD83): 105-36-22.8 W ASR No.: Ground Elev: 2703.0

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

USFS Permit

Auth ID: CAN727
Contact ID: 599542010602
Use Code: 423

FS-2700-23 (v. 10/09)
OMB No. 0596-0082

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
AMENDMENT
FOR

SPECIAL-USE AUTHORIZATION CAN727

Amendment#: 1

This amendment is attached to and made a part of the CAN727 special use authorization for Weather Station/Flood warning system issued to **Larimer County Engineering Dept.** on 07/25/2017 which is hereby amended as follows:

Installation and operation of additional repeater, and stream and/or rain gauges for Larimer County Flood Warning Network. Locations are shown on SF-299, application figure 1, attached as Appendix A. Sites Include:

- Sheep Mountain Repeater Station (site No. 81)
- Pole Hill Road @Penstock rain gauge (site No. 1)
- Buckhorn Creek Headwaters rain gauge (Site No. 80)
- Green Ridge Road rain gauge (Site No. 30)
- Killpecker rain gauge (Site No. 31)
- Manhattan Road rain gauge (Site No. 32)
- Crown Point Road rain gauge (Site No. 33)
- Old Flower Road rain gauge (Site No. 59)
- Salt Creek Cabin rain gauge (Site No. 60)
- Comanche Reservoir rain gauge (Site No. 61)
- Cache la Poudre rain/stream gauge (Site No. 34) – installation to be located at bridge slightly downstream of falls.
- Cache la Poudre rain/stream gauge at Narrows (Site No. 39) – near the wing wall
- Bennet Creek @ Pingree Park Road (Site No. 41)
- Stove Prairie @ 14 (Site No. 42) – place on culvert structure if possible
- Washout Gulch rain/stream gauge (Site No. 82)
- Kelly Flats Bridge (Site No. 38)
- La Poudre Pass Creek below Long Draw Reservoir – add rain gauge to existing gauge (Site No. 27) – attach to outlet works or gauge already there.
- South Fork (Site No. 40) – located on downstream bridge near Monument Gulch Road

This Amendment is accepted subject to the conditions set forth herein, and to conditions Appendix B to attached hereto and made a part of this Amendment.

Holder:

Mark R Peterson

Mark Peterson — Date
Engineering Director
Larimer County

USDA Forest Service:

MONTE WILLIAMS
Digitally signed by MONTE WILLIAMS
Date: 2021.07.06 15:44:34 -06'00'

Monte Williams — Date
Forest Supervisor
Arapaho & Roosevelt National Forests, and
Pawnee National Grassland

Larimer County Right-of-Way Permits

LARIMER COUNTY | ENGINEERING DEPARTMENT

200 West Oak Street, Suite 3000, PO Box 1190, Fort Collins, Colorado 80522-1190 970.498.5700, larimer.org/Engineering

RIGHT-OF-WAY PERMIT 21-ROW0179

ISSUED DATE: 07/19/2021
FEE:

10 Working Days Required for Review of Permit

CONTACT INFORMATION

Applicant Information:
Name: Kate Malers
Phone: 97022560803
Mobile Phone: 9709886410
Email Address: kmalers@water-and-earth.com

Address: 1225 Red Cedar Cir Suite A
Fort Collins, CO 80524

Utility Information:
Name: Erik Carlson
Phone: (970) 225-6080
Email Address: ecarlson@wetec.us

Address:

Contractor Information:
Contractor:
Phone:
Mobile Phone:
Email Address:

Address:

WORK AREA

Location: Crown Point Dr & HWY 14
Nearest County Road Intersection: Crown Point Dr & HWY 14
Work Order #:
Total Footage for Project:
Schedule Begin: 07/19/2021
Work Being Performed: County R.O.W. permit for installation and operation/maintenance of Larimer County-owned Flood Warning Network (precip and precip/streamflow) gages per Eric Tracy @ Larimer County
Inspector Assigned: Wyatt Schiermeyer
Plans Attached: Y
Traffic Control Plan Submitted: Y
Applicant Shall Pay for Inspection Fees: N

Subdivision:

End: 09/17/2021

Existing Surface:
Road Closure: N

References

1. Larimer County Office of Emergency Management, Cameron Peak Fire Risk Assessment – Summary results of the Cameron Peak Fire Risk Assessment and Hydrology Analysis, May 2021
2. Cameron Peak Fire Forest Service Burned Area Emergency Response (BAER) Report - Arapaho Roosevelt National Forest