

# APPENDIX A

## *PROJECT CORRESPONDENCE*

## Fourmile Creek Master Plan Kick-Off Meeting

### Monday 7/21/14 10am—12pm

#### Attendees

Consultant Team: Kevin Doyle, Laura Sneeringer, Ryan Golten

BoCo: Clare DeLeo (POS – by phone), Varda Blum (Floodplain program), Wendy Blanchard (Public Health), Dan Delange (Transportation), Stacey Proctor, Julie McKay (by phone) and Diane Malone (by phone)

#### Agenda

##### Purpose:

- Refine the scope and objectives of the Fourmile Creek Watershed Plan
- Obtain feedback on the proposed approach
- Clarify coordination with Boulder County
- Refine interview plan

##### Topics:

- Welcome, Introductions and Agenda Review
- Refine Scope and Approach
- Project Team Coordination
- Interviews
- Review Action Items and Next Steps

#### Action Items

##### Baker Team:

- Email schedule, work plan, interview questions, interview contacts and meeting summary to BoCo
- Schedule interviews
- Contact Gary for his suggestions on interviewees and other outreach questions, including about talking with Grace at LTFRG
- Work w/ Stacey to schedule a biweekly standing meeting time
- Get mine tailings data/research from Scott Coulson at BoCo

##### BoCo Staff:

- All – Review meeting materials and provide feedback, as needed
- Claire - send a copy of the USGS post-fire report related to mine tailings
- Denise - Coordinate meeting with Boulder County Historic Preservation Advisory Board (HPAB) and Switzerland Trail contacts and/or work with CDR to schedule.
- Stacey
  - Email contact for Logan Mill Ranch Tree farm (DONE)
  - Coordinate with CDR on scheduling standing meetings
- Wendy
  - Send Pine Brook Hills contact (DONE)
  - Identify contact from CDPHE
  - Contact Aaron Dodge at Public Health to determine what data is available from 404 grant to work on nutrient levels in Fourmile. Send any relevant info.

#### Discussion

After introductions, Kevin from Baker gave a presentation on the tentative scope and approach, for discussion and refining with County staff. Below are the issues that were discussed and follow-up actions.

#### Issues Regarding the Scope of this Master Plan

- **Historic mining towns.** Need to look at ways to protect them; e.g., ensure road design supports community character
- **More individualized mapping.** This Plan will take a closer look (in terms of assessment and recommendations) at private crossings. BoCo hopes the MP will be a useful way to get to the mapping; i.e., which areas are

important to map in? Topographic maps are in flux. We can start with CWCB and USACE maps and supplement where we can.

- More focused on **individual property owner outreach** than other watersheds. We'll still talk about outreach at the Watershed and Reach/Neighborhood level, but there will be more focus on property owners. We discussed coordinating these one-on-one discussions while doing on-site creek assessments, but won't wait for those to start outreach. We'll make sure to reach out to community leaders and entities like the Fire Districts before the public meetings.
- **Road issues.** This MP will directly inform transportation design. Need to look at both what's best for the road and the Creek. Public process for road design is further ahead, but will quickly fall behind given the longer schedule. Kevin and Jeb at Baker are having regular meetings to coordinate on roadway and the Creek planning. The MP can come up with options; then will work around the roadway plan in those areas where the Canyon is tight. Will know where pinch points are, and where there's room to work with different options.
- **Mine tailings and water quality.** They are all through Fourmile, not just between Salina and Poor Man Rd. Pine Brook Hills should be involved, as they pump water from near Poor Man. BoCo hasn't heard this issue being raised extensively in this area by residents. Follow up on this issue:
  - Mark Williams in Jamestown knows about this.
  - USGS issued a post-fire report about the mine tailings. Obtain a copy from Claire.
  - Stacey will get Pine Brook contacts from Mark W.
  - Scott Coulson has been working with Public Health on this and should have research/data. There hasn't been any post-flood research of effects of metals on drinking water.
  - We will interview contacts from the Keep it Clean Partnership (Janice Lopitz). They have a grant to conduct post-flood analysis.
  - Wendy will find out about a 404 grant to work on nutrient levels in Fourmile and will find out from Aaron Dodge at Public Health what data is available from that.
  - We should touch base with CDPHE. Wendy will find who's a good contact for Fourmile.
- Other issues - community character, debris flow, stream alignment issues; stream restoration; how these issues and values line up with roadway issues.

### Project Team Structure

- **Boulder Creek Coalition** is forming. More information is on the BoCo website's main page for Creek Planning, BoCo planning 2013 (see June presentation to CWCB). Chris Tagert from Baker will be helping support the Coalition, including providing some analysis from Two Mile and Fourmile Canyon Creek. Chris can represent Fourmile on the Coalition; sometimes Kevin may attend as well. In addition to the Fourmile MP, this Coalition will oversee the MP from Boulder Creek to confluence of Boulder Creek with St. Vrain (BoCo is partnering with Urban Drainage). For lower Boulder Creek, Shea at Urban Drainage is just getting started on RFP, so Fourmile MP could be done by time getting started with rest of Boulder Creek.
  - The Boulder Creek Coalition consists of:
    - BoCo
    - City of Boulder – OSMP, Utilities
    - Longmont
    - Weld County
    - Frederick & other small towns in Weld County
    - UDFCD
- The County is open to other entities besides BoCo joining the Project Team. A recommendation will be made after discussing how people want to be involved during the interviews. It is important that any addition has a constituency and is not solely focused on their individual property issues. We can propose different structures – e.g., committee of neighborhood leaders; clusters of specific areas where people can share access w/ 1 creek crossing, etc.

### Interviews

- We reviewed proposed interviewees and added the following new potential interviewees:
  - Logan Mill Ranch Tree farm (just did their own MP) (Stacey)
  - LTFG – Grace (ask Sanfracon)
  - Historic Preservation Advisory Board (County-appointed group but local) (Denise)
  - Switzerland Train organization – might be helpful intermediaries (Denise)

- Keep It Clean Partnership – Janice Lopitz
- BoCo transportation – both Project Engineers/public transportation staff (Dan) AND Flood Plain program (Varda) - interview them separately. This should include Anita and, Devan – dealing w/ temporary crossings.
- CDPHE (Wendy)
- Pine Brook Hills (Wendy)

### **Outreach Issues and Contacts**

- Key resources for finding key community leaders
  - Garry Sanfacon – confirm with him that we should contact Grace with Long-Term Flood Recovery Group (LTRFG)
  - Denise Grimm – may have contacts from sign-in sheets
  - Fourmile transportation meetings
- We need to be particularly mindful in Salina area, where there've been tensions between residents, to canvass everyone rather than assume some people represent a broad swath. They have been hit by multiple disasters over the years; there is great need as a result.
- **More emphasis on individualizing the Plan and working more on the person-by-person level than through a Coalition.** This MP is focused more on getting individual Property Owners closer to accessing homes and rebuilding their properties, in addition to stream restoration work.
- **Public Meeting #1.**
  - We discussed the Project Team's proposal of having the first public meeting after Labor Day, a week after the Fourmile Transportation Meeting. There are concerns about causing confusion and additional meeting fatigue with having another meeting after the Transportation Public meeting, though that current process only pertains to Salina Junction down to the Canyon.
  - County staff asked the Team to think about doing it the week of August 21<sup>st</sup>, before the roadway meeting. The Baker Team will look at our schedules and see if we can get through the interviews by then – it may be a little tight depending on people's schedules/flexibility for interviews. We talked about the Senior Center at the base of the Canyon as a good venue.

### **Standing Project Team Meetings**

- We discussed having a regularly scheduled Project Team meeting every other week. The first Thursdays of the month are hard for Denise because of Historic Preservation meetings. Stacey will try to find a time for BoCo folks and work with the Project Team to schedule it.

## Fourmile Creek Master Plan Meeting – Boulder County & Project Team Wednesday 8/6/14, 1-3pm

### Attendees

Consultant Team: Kevin Doyle, Enessa James, Laura Sneeringer, Ryan Golten

Boulder County (BoCo): Varda Blum, Dan Delange, Claire DeLeo, Erin Dodge (by phone), George Gerstle, Denise Grimm, Diane Malone, Julie McKay, Stacey Proctor

### Agenda

#### Purpose:

- Provide an overview of existing data and studies analysis and interviews
- Discuss if/how the Plan approach needs to be refined
- Discuss the community engagement approach and potential dates for the Community Kickoff Meeting

#### Topics:

- Welcome, Introductions and Agenda Review
- Work Plan and Other Updates
- Existing Data and Studies
- Review Interview Themes and Refined Scope & Planning Process
- Discuss Community Engagement Plan
- Review Action Items and Next Steps

### Action Items

#### Baker Team

- Talk this week with Jeb Sloan at Baker regarding coordinating the Fourmile Watershed Master Plan Kickoff and Road Planning community meeting and propose date/format for joint meeting – if longer than 2-2.5 hours, consider weekend. Coordinate with Dan and Stacey on the proposed format and scheduling and make a recommendation to the rest of the BoCo team.
- Follow up with Marty McComb at EPA regarding status of mine tailings pile at Salina Junction, and include Scott Coulsen as necessary since he is the BOCO liaison with EPA on this issue
- Talk with Jim Webster and Ryan Ludlow in BoCo Land Use (working on fire protection grants) about a way to coordinate efforts
- Share proposed Community Engagement Plan with Stacey before next meeting
- Schedule standing meetings on Wednesdays from 2-4 pm, every 2 weeks

#### BoCo Staff – by end of day next Monday:

- Review website and give input
- Review list of data sources and identify any additional resources that need to be reviewed
- Review Themes document and identify any needed changes

### Discussion

After introductions, Kevin gave an overview of tasks since the project kickoff meeting two weeks ago as well as upcoming activities to help refine the Work Plan. Enessa J gave an overview of the existing data/studies and how those are being tracked and analyzed. The group discussed Fourmile road planning activities and how to ensure those are coordinated with the master plan process.

Below are the issues that were specifically discussed.

### Risk Assessment and Modeling

- **Model.** Baker was originally going to use Atkins/CWCB data for the flood risk assessment, but it's now clear that they will need a new model that aligns with bridge locations for Fourmile and Gold Run. Baker is planning to develop a new model with site-specific hydraulic modeling for all existing bridge locations. They will be able to piece in sections for Logan Mill and Gold Run roads where they have previously developed designs and models. This model will also be able to accept more modeling/data in future.

- **Private crossings.** Depending on what data is available, the model and analysis may incorporate current crossings, permitted or unpermitted. The Fourmile Fire District has pre-flood data and photos to support other Boulder County data on structures. BoCo's goal is to include as many private crossings as possible in the modeling, so that residents can later use it if they seek to come into compliance on their private crossings.

### Public Meeting - Coordinating with County's Fourmile Roadway Planning

The group discussed scheduling the master plan kickoff community meeting with the upcoming Fourmile roadway planning meeting, which has not yet been scheduled.

- **Reasons to combine:** it is important to integrate road issues as part of the master plan, as well as minimize meetings for residents.
- **Challenge:** the master plan meeting will need more targeted input by creek reach, whereas the transportation agenda is more of a project update and opportunity to respond to questions. There are also somewhat different audiences, as the roadway issues are from Salina down, so a smaller geographic area (though upstream residents drive on the lower Fourmile roads to/from town so are also interested).
- **Agreed approach:** Kevin and CDR will talk with Jeb Sloan at Baker about possible dates and format for combining the meetings, and then coordinate with Dan and Stacey at BoCo to discuss the initial proposal. A combined meeting will likely be the first week in September.
- **Note about usefulness of integrating road issues in master plan:** Because of what we learned in the master plan interview process, Scott Coulsen is now coordinating with EPA and County transportation to make sure the roadway design avoids the mine tailings pile at Salina Junction and to make sure this is well flagged.

### Interviews and Themes

- **Additional community contact names:** The Baker Team described the community members that they interviewed. A few other names were mentioned as key contacts: Becky Meadows, who is very active on private access issues; and Terry Rodrigue, who worked with Garry Sanfracon on Fourmmile Fire recovery.
- **Interview themes:** Most interviews have been completed. Laura from CDR reviewed the Themes Document, which was circulated to the County Team. County staff made a couple of points that were not reflected in the early interviews:
  - BoCo has heard of lots of private access issues in lower Fourmile.
  - In terms of people's concerns about ponds, it was noted that many may not have a permit to divert/store water.
  - Though habitat issues haven't come up much yet, the project team still needs to talk with Parks and Open Space. It's not clear whether the watershed supports significant fish habitat due to its mining history.
  - In Gold Run, the transportation/road issue heard so far is to pave or not, because of the historic character.
- **Scope issues:**
  - **Drainages.** Baker is open to looking at tributaries that are identified as risk areas, and will try to incorporate specific comments/questions about a particular tributary or drainage (e.g., Ingram Gulch and possibly Sweet Home Gulch). If many more come up, this will be hard to address. The group discussed the benefit of taking a more systematic approach to what issues/locations get evaluated. For instance, we can quantify private crossings. Public health should be able to quantify well issues. For drainages, Baker may look at monetary damage from flooding in certain drainages if we need to prioritize certain areas.
  - **Burn areas.** We discussed the uniqueness of this area due to the burn areas. The Plan will address/model increased flows and sediment based on burn areas, but won't recommend certain land practices outside of the stream corridor. Baker may want to address the connection between fire recovery and flood impacts, recognize special risks to this watershed because of fire, and highlight the fact that land management has significant watershed impacts. One recommendation could include an additional study to outline appropriate land management practices, though much of this was done after the fire.

### Outreach

**The proposed outreach approach (see draft Work Plan) includes:** interviews; public meeting; field assessments and individual meetings (strategically, working with Grace Miller); email and web updates; four smaller meetings by reach/neighborhood or a second community meeting, or both. We specifically discussed the following:

- **Outreach to residents during field assessments:** A primary outreach strategy will be to contact residents when Baker is doing the field assessment on that reach. The Baker Team will send an e-mail blast when the field

assessment starts, asking residents to respond if they want to meet. Grace Miller has agreed to help Baker do this outreach.

- **Local leaders:** We decided it can be problematic to use neighborhood leads as liaisons because of potential conflicts and differing perspectives. Rather, the Baker team will strategically use local community advisors with broad credibility.
- **Getting homeowner input:** We discussed the importance of getting early feedback, and making sure Baker gets and considers community input early enough in the process to inform proposed solutions. It will be important to get feedback between the first public meeting and the draft plan in November. This is when Baker team will be meeting with people during the field assessments. The team will send regular/biweekly email blasts and update the website to ensure a steady presence and allow residents to follow the progression.

### **Role of Boulder Creek Coalition and Longer-Term Watershed Organizing**

- **Coalition oversight:** This plan will fall under the Boulder Creek Coalition, though the Coalition won't be involved in these developing stages of the plan. Instead, there will be significant outreach to landowners, key community leaders (discussed above), and stakeholder agencies like the Forest Service and CWCB. We discussed wanting to make sure this plan is competitive for state funding, and that it will be important to let residents know it will be useful to stay involved to make sure projects are funded. The Baker Team will make sure to ask residents whether/how they want to stay involved with watershed issues.
- **CWCB long-term funding for 'watershed organizations':** The County is having this conversation with CWCB outside the context of this master plan. The County hopes the master plan process will help provide momentum for longer-term organizing, and that this initial oversight structure will morph into something else, with significant resident involvement. In the meantime, the plan will seek meaningful ways to engage people in this quick process. It will be important to both connect and distinguish 'flood recovery' and long-term watershed organizing.

## Fourmile Creek Watershed Master Plan Themes Report (As of 8/18/14)

The following themes are based on preliminary conversations with over 30 stakeholders about the Fourmile Creek Watershed Master Plan and what they hope to see from it. This summary is by no means exhaustive. It serves primarily to help frame some of the issues and questions for public outreach and input during the Master Planning process.

### Scope and Expected Outcomes

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#### **Purpose:**

The Fourmile Creek Watershed Plan is an opportunity to:

- Conduct coordinated, long-term planning for Fourmile Creek and Gold Run at a watershed scale.
- Study the post-flood Watershed and identify priority projects that will enhance the creek corridor, enable flood recovery, and reduce future flood risk to public and private infrastructure.
- Increase the Watershed's opportunities and competitiveness for federal and state funding. This planning process does not include funding for implementation.

#### **Expected Outcomes:**

- Flood, geomorphic, and ecosystem risk assessments of the stream corridor performed at the reach scale. The watershed will be grouped into four reaches for the study.
- Clarity on what flood map and data sources (e.g., FEMA maps) exist for particular stream sections and identification of needs for future studies.
- Development of a model to improve understanding of how current and future infrastructure may impact the watershed.
- A list of guiding principles or prioritization criteria to utilize for future planning (e.g., safety, cost effectiveness, private access, multiple benefits, enhancement of ecosystems and preservation of community character).
- Recommendations on creek alignment, which will provide guidance for public road alignment, private access construction and other infrastructure restoration.
- Recommendations on priority projects for long-term flood recovery, watershed restoration and future flood mitigation, and associated costs and funding needs. Examples of projects may include rebuilding stream banks, conducting Watershed restoration and enhancing water quality.
- Identification of available funding resources, including associated requirements and timelines.

#### **The Plan will Not:**

- Change local policies and procedures related to project implementation. The Plan may help identify and inform potential changes and implementation strategies.
- Override existing Management Plans.
- In many cases, may not be detailed enough to provide property level guidance, but will inform what further information/studies may be necessary.
- Be implemented unless and until project funding becomes available.
- Update FEMA maps and affect flood insurance.
- Be a forum for addressing immediate, individual property needs. these questions will continue to be directed to the Boulder County Flood Rebuilding & Permit Information Center (FRPIC) and other appropriate agencies.

### Considerations for Master Plan Approach/ Process

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**Community discussion about whether to establish a Fourmile Creek Coalition:** The Fourmile Creek Watershed Master Plan is being conducted under the Boulder Creek Coalition umbrella. The Urban Drainage Flood Control District (UDFCD) is conducting a separate study under the Coalition, which will extend from the confluence of Fourmile Creek and Boulder Creek to the Boulder Creek confluence with Saint Vrain in Weld County. Updates on Fourmile activities will be provided at the Boulder Creek Coalition meetings.

As the Colorado Water Conservation Board (CWCB) has expressed its intent for project implementation to occur through the Coalition structure, residents and engaged stakeholders may want to discuss whether to form a distinct coalition for Fourmile Creek, including confirming the membership and roles of coalition members, post-master plan. Currently, Boulder County is intending to apply for funding sources to implement projects that are identified through the master planning process. If residents and stakeholders wish to establish a Fourmile Creek Coalition to oversee the continued watershed planning and project implementation process, the county would be open to this approach, particularly if it allows the Fourmile Creek Watershed to better compete for funding and supports CWCB's vision of citizen-led groups that lead implementation and are prioritized for funding.

**Community engagement:** A community representative noted that if the intent is for an efficient Plan in which Boulder County will lead implementation, then the current community engagement approach is appropriate. However, if the desire is for the community to be deeply bought in to the process and have a significant role in long-term project implementation, then additional engagement is needed over a longer timeframe, until people can see the benefit of the Plan through implemented projects.

The Project Team's current approach is to hold initial interviews with community leaders, hold two public meeting (including a full watershed meeting in September and a series of smaller, neighborhood meetings in November), to be available for one-on-one discussions during field visits, and to have an ongoing e-mail and website presence to share updates. Additional ideas include:

- Convene a group of neighborhood leaders to provide more detailed input throughout the Plan. It would likely be difficult to identify representatives as there are many different perspectives within each stretch.
- Identify key community members to serve as strategic advisors, as needed throughout the process, in a less formal role.

**Community engagement considerations:**

- It may be difficult to engage many residents because they've had meeting fatigue, there is some distrust of Boulder County-led initiatives, and they are private people.
- It's important to describe how the Plan is important to individuals and that the purpose of the meetings is to obtain input (as opposed to only presenting information).
- Transparency is critical on the expected outcomes (e.g., realistic timeframe for projects be constructed) and how decisions are made.
- Education may be needed on how upper watershed activities impact the lower watershed.

## Master Plan Focus Areas

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The following Plan focus areas were discussed.

**Protect homes and other key infrastructure:** This is a concern that the Creek channel is not aligned to avoid houses and other infrastructure. This is primarily an issue in the Salina area, where a major drainage empties into the community.

**Inform roadway and private access design/construction activities:** The planning process will directly inform Boulder County's roadway design. Private property upgrades for crossings and access is a primary focus for the Upper Fourmile/Wall Street area and some lower Fourmile residents. An updated hydraulic model will be set up to efficiently accept additional information on private and public structures as the information becomes available. It was noted that many bridges are still functional, but their abutments may not have long term stability.

**Ensure access to water:** Some wells are not producing due to drop in the creek profile and sedimentation in wells, and some Creek diversions were lost during the flood, thereby affecting ponds. This is particularly an issue in the upper Fourmile/Wall Street area. Also, the flood destroyed many of the Fourmile Fire Department's water supply points.

**Incorporate impacts from the Fourmile Fire:** The Plan should consider land stabilization needs, resulting from the Fourmile Fire, and should consider opportunities to improve land management, such as encouraging an open forest with understory vegetation to better hold soil. Many people described fire as the highest risk for the watershed. The plan should also consider additional potential flood risks as a result of the Fourmile Fire.

**Consider abandoned mine impacts:** There are abandoned mine sites throughout the watershed, some of which were uncovered and/or eroded during the flood. Specific areas include Salina Junction, Gold Run, Ingram Gulch and near Emerson Gulch. These abandoned locations are potential sources of point pollution.

**Protect water quality:** There appears to be higher levels of arsenic during storms, which is likely connected to tailings piles. There have also been increased levels of manganese, nitrate, carbon and sediment in the Creek. Many wells have high uranium levels, though this was likely the case before the flood since it's a historic mining district. There has also been increased sediment in wells.

**Prevent and/or mitigate mud flows and sediment loading:** A significant amount of sediment comes down from Ingram Gulch into Salina. Sediment loading from the burn area has decreased over time.

**Prevent and/or mitigate channel erosion or migration:** The Plan may be able to identify locations where erosion will take place and make recommendations on how to prevent it. Erosion is particularly challenging in this watershed due to the steepness of the terrain in some areas and the fire impacts.

**Maintain historic aesthetic of communities:** Project recommendations should strive to preserve the historic aesthetic and community character. There may also be opportunities to protect structures with historical significance.

**Restore aquatic and riparian habitat:** There have been considerable impacts to fisheries from channelization and the removal of woody materials during emergency flood restoration. The planning process should focus on re-establishing ecosystem function. The watershed does provide habitat for the Prebles Meadows Jumping Mouse and there are some sensitive resources in the Betasso Preserve.

**Prevent weed transport:** There have been weed transport challenges.

**Provide input for policy, programmatic, and regulatory issues:** The Plan will help address some regulatory questions, including:

- Floodplain Management: The plan should determine which FEMA maps are still relevant for specific stream stretches for obtaining rebuilding floodplain development and other permits, insurance, etc. It should also identify which maps need to be updated, what are the priority areas for remapping, what data is required to meet FEMA's standards and criteria for remapping, and what the timeline/cost is to update the county's FEMA maps.
- Hazard Areas: The plan should identify hazard areas and provide suggestions for how the county might explore new approaches to planning for and regulating development in hazard areas.

## **Potential Recommendations for Implementation**

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Preliminary ideas and recommendations for implementation include:

### **General recommendations:**

- Outline options for mapping in Gold Run in order to protect the area better, even if it is not ultimately regulated by FEMA.
- Provide general guidance on how to rebuild in a way that minimizes flood risk.
- Support advisory mapping so that responders can anticipate likely damage based on rain fall.

### **Location-specific projects:**

- The mine tailings pile in Salina at the Gold Run intersection, which is being capped by EPA.
- Ingram Gulch, an area in which significant amounts of sediment comes down into Salina. It also has many mine tailings and exploratory holes.

### **Funding/partnerships:**

- Identify funding sources for private property recovery, especially for people with income levels above HUD Community Development Block Grant Disaster Recovery funding requirements.

- NRCS may be able to provide Emergency Watershed Protection Phase II funding.
- The state held a Colorado Recovery Funding Workshop last spring that provided information about different funding programs that may be relevant to projects identified in the Master Plan. Website is: <https://sites.google.com/a/state.co.us/coloradounited/get-help-1/financial-and-insurance-assistance>

# Fourmile Creek Master Plan Meeting – Boulder County & Project Team

## Wednesday 8/27/14, 2:30-4pm

### Attendees

Consultant Team: Kevin Doyle, Laura Sneeringer, Ryan Golten  
 Boulder County (BoCo): Denise Grimm, Varda Blum, Julie McKay, Stacey Proctor

### Agenda

#### Purpose:

- Updates on project work plan/scheduling and activities completed since the last meeting
- Review technical approach and obtain feedback on the hydraulic modeling approach
- Review and obtain feedback on 9/3 community meeting approach

### Action Items

#### Baker Team

- Kevin will share draft presentation for the community meeting with Julie.

#### BoCo Staff

- Provide suggested modifications to the comment card by end of day Thursday 8/28
- For 9/3 meeting: Stacey will identify 4 note takers (will include Diane and Denise). Varda will help with registration table. Stacey will ask someone to take photos.
- Stacey will check with Dan about possible need to change future meeting dates to every *off* Wednesday.
- Julie will review draft presentation for any terminology issues, etc.

### Discussion

Below are the issues that were specifically discussed. See the 8/27 presentation for more information.

### Work Plan, Schedules & Updates

- In October, Baker will roll out pieces of the Plan in a piecemeal fashion so BoCo can review over the course of the month. Clear directions will be provided so that BoCo know what to expect and what specific feedback is requested. BoCo will meet internally to coordinate feedback during this time.

### Technical Work Update

#### Hydraulic Modeling:

- Baker assessed the existing hydraulic study by CWCB and Atkins and determined that the modeling could not be used. The automated methods used to set up the hydraulic model did not work well for Fourmile Creek and Gold Run. A hydraulic model is essential for this watershed due to the number of structures and narrow topography. Baker will develop a new model, which is necessary in any case as there is not a current model for Gold Run.
- The differences between the FEMA effective study, Wright Water Engineers study, CDOT/CWCB study and 2013 discharges were described in the presentation. The FEMA effective study was developed in 1977 and was not calibrated. Urban Drainage is concerned about lowering discharges for the lower portion of Boulder Creek particularly in light of the flood in the late 1800s.
- Baker will likely incorporate the CDOT/CWCB Study after reviewing the final version, which will be completed soon. Urban Drainage's main concern with the study is with the precipitation assumptions. Baker can modify the model to address Urban Drainage's concerns, if necessary. However, initial tests with modifying the precipitation indicated that it did not significantly impact the discharges. Kevin will continue to coordinate with Kevin Stewart and Shea Thomas from Urban Drainage.
- Wright Water Engineers has a post-fire hydrology study will also be useful.
- The hydraulic model will be set up so to analyze both the FEMA effective discharges and the final recommended discharges (likely from the CDOT/CWCB Study). The FEMA effective discharges will enable BoCO to see the extent of the floodplain from a regulatory context.
- Baker has conducted the following activities to begin to develop the model and prepare for the field assessment:
  - Gathered bridge data from the Fourmile Fire Dept., BoCo GIS and FRPIC and verified structures through a field assessment.

- Created the following data, which helps to identify areas to investigate in the field.
  - A GIS shapefile of the location and status of all structures in the study reaches of Fourmile and Gold Run;
  - Pre- and Post-Flood contour mapping from the LiDAR data;
  - Pre-and post-flood stream line data from the LiDAR data along with pre- and post-flood aerial photos; and
  - Mapping of areas of deposition and erosion created by comparing the pre- and post-flood LiDAR data.
- By the next BoCo Project Team meeting, Baker will have better idea of what to recommend for hydrology and will have the first draft hydraulic model developed.

### **Questions Related to Approach for Identifying Specific Recommendations**

- Initial data show areas where there is significant deposition and erosion, and additional information will be gathered through public comments, in and outside of meetings. Baker will investigate identified areas during the field assessment and recommend areas that need restoration.
- The initial assessment shows that the stream didn't migrate significantly – especially compared to the other watersheds. The most significant migration seemed to occur in Gold Run
- Re-vegetation and bank stabilization projects may be more likely than channel realignment.

### **Review Community Meeting Approach**

The group reviewed the proposed format and agenda for the 9/3 meeting. The meeting will be combined with a Fourmile road improvement update.

- 3 purposes for the watershed-master-plan portion of the meeting:
  - Information for public about goals/purpose;
  - Obtain input (values/principles for pre-screening criteria to evaluate projects; and plan focus areas/project ideas for to refine field assessment); and
  - Spur thinking of future watershed coalition work
- Purpose for roadway update: update on roadway design and answer questions
- Each small group will have a facilitator from CDR/Baker and maps of each reach
- Discussed the brief intro from community member (Chief Gibson) to welcome everyone and encourage active participation and confirmed that Julie McKay will provide welcoming remarks too.
- Discussion about the presentation:
  - Baker will try to keep presentation brief; focus on small group discussions
  - How to describe process of creating an updated model: It Will be brief and not too technical – e.g., ‘We are going to be out there assessing risk’; hope it will be of use to landowners” – but will be prepared to answer any further questions if it comes up.

## **SUMMARY OF INPUT FROM FOURMILE COMMUNITY MEETING AND ONLINE SURVEY**

This summary provides an overview of the discussion and input related to the Fourmile Creek Watershed Master Plan and Roadway Improvements. Community members have provided input in a number of ways, including: small group conversations at the September 3, 2014 community meeting filling out Watershed Master Plan comment card or online survey, adding input to the Watershed Plan interactive website map, sending e-mails or making calls to the project website/phone, and talking with team members during the field assessment.

This summary includes an overview of: the purpose and format of the community meeting, general themes based on an analysis of the input, small group discussions at the community meeting, online survey results, and full group questions at the community meeting.

### **FOURMILE CREEK COMMUNITY MEETING - WATERSHED MASTER PLAN AND ROADWAY UPDATE**

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Fourmile Creek Watershed Master Plan Kick-off Meeting and Roadway Update  
September 3, 2014 5:30-7:30pm, with Open House from 7:30-8pm  
Alfalfa's Community Room, Boulder, CO

The purpose of the community meeting was to announce the beginning of the watershed master planning process, inform the public on what flood recovery issues will be addressed, let community members know how they can provide input throughout the process, and obtain initial input to help refine the focus of the Master Plan. It was also an opportunity to provide an update and respond to questions about the permanent roadway design. 57 community stakeholders attended the meeting, in addition to staff from Boulder County and the consultant project team.

#### **Format:**

- Presentation on the Watershed Master Plan and permanent roadway design and full group questions and answers;
- Small group break-out discussions by stream section, focusing on values/vision for the Creek and key focus areas for the Master Plan (see below);
- Participants were asked to fill out a survey with their individual input on the Watershed Master Plan; and
- Open house with roadway design information, maps and informal Q&A.

### **OVERVIEW OF INPUT FOR THE FOURMILE CREEK WATERSHED MASTER PLAN**

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Key themes on the two primary questions are described below. Many community members noted the importance of acknowledging that the area will flood again and that wildfire is a more significant risk in this watershed.

What do you most value about the Creek in terms of your long-term vision for the watershed?

- Mountain/private lifestyle, including privacy afforded by creek vegetation
- Wildlife habitat in and around the creek
- Quality of life provided by natural setting (views, sounds, aesthetics)
- Historical character

How do you value the following types of projects, in terms of identifying and prioritizing long-term recovery projects?

- Prevent woody debris dams
- Provide recommendations to help private property owners construct private crossings
- Stabilize stream channel in key locations through 'natural' means

- Focus on preventing water contamination due to mine sites
- Identify key areas for revegetation to prevent erosion
- Consider key tributaries other than Gold Run
- Develop long-term creek oversight and maintenance

### **REACH-SPECIFIC SMALL GROUP DISCUSSIONS**

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The small groups were organized by stream section, or ‘reach.’ The purpose of the small groups was to (1) learn what community members’ value most about the watershed to help inform criteria for prioritizing future recommendations; and (2) identify which issues are most important to residents in each reach to help the project team refine its assessment. Community members were also invited to share any thoughts about if and how they want to be involved in implementing the Master Plan. There were also several comments specific to the roadway improvements.

#### **1) What do you most value about the Creek, as you think of a long-term vision for the watershed?**

##### **Reach 1 (Confluence with Boulder Creek to Poorman Road)**

- Wildlife habitat – in stream and out
- Stream sounds and natural, peaceful setting
- Vegetation provides privacy and wildlife habitat
- Views of the creek and landscape
- A mountain lifestyle separate from town

##### **Reach 2 (Poorman Rd. to Mile Marker 4, Upstream from Logan Mill Rd.)**

- Wildlife – in stream and out
- Quiet/solitude/relaxation – the sounds of the creek
- Historical preservation (railroad/mining/mountain living)
- Presence of Switzerland trail
- Sense of community (church/community center)

##### **Reach 3 (Mile Marker 4 to 5 & Gold Run from Salina Junction to Summerville)**

- Appreciation of pre-flood creek speed and channel
- Natural characteristics, including vegetation and wildlife
- Preservation of the character of historical resources – e.g., school and church
- Trees overhanging creek create quiet and privacy

##### **Reach 4 (Mile Marker 5 to Sunset)**

- Beautiful area with vegetation and water
- Access to wildlife and outdoors
- Mountain lifestyle

#### **2) What issues are most important for us to focus on as we study the watershed and develop recommendations?**

##### **Reach 1 (Confluence with Boulder Creek to Poorman Road)**

- Prevent culverts from backing up and blocking roads, access, and causing flooding
- The culvert under Fourmile Canyon Road at Poorman is now diagonal to private property, which is impacting the driveway and pond (this culvert used to be directly across Poorman into Creek)
- Trees along the creek below Poorman are constricting the channel
- Concern about woody debris and channel changes above pond to Crisman

- Need channel stabilization for homeowners (not just road stabilization)
- Need to consider how upstream channel issues and changes affect downstream residents
- Need clarity on whether creek restoration is a private or public responsibility
- Identify whether funding sources are available to cover repair costs that FEMA didn't cover
- Note that there are different issues for Creekside resident vs. residents on the other side of the road

*Roadway-specific*

- Need to ensure Poorman Road is secure during future floods, as it was the only access to town during the flood
- Need clarity on when residents should try to get permits for construction of private bridges in order to coordinate with road reconstruction
- Road shoulders/bike lane: consider safety for bikes and visibility issues
- Safety issues: road speed

**Reach 2 (Poorman Rd. to Mile Marker 4, Upstream from Logan Mill Rd.)**

- Impacts on aquatic life from road construction due to salts/sediments
- Maintain wildlife crossings
- Tree preservation/planting and revegetation, especially on burn areas
- Stabilize tributaries to make them more resilient – two specific areas of concern were described on the map
- Address debris dams (e.g., culverts that backed up with debris) and dam failure
- Contamination from mine tailings (coordinate with EPA)
- Identify historical artifacts and landmarks and preserve them –a 12x12 pile of railroad artifacts was described on the map
- Include education for community members on the potential risks of living by the creek as it will flood again and explain why
- Idea - collect historic flooding information and photos to inform plan

*Roadway-specific*

- Bike shoulder design – need to ensure residents are helping to inform decisions
- Concerns/questions about impacts on existing emergency access route

**Reach 3 (Mile Marker 4 to 5 & Gold Run from Salina Junction to Summerville)**

- The whole area floods due to a winding creek in Salina
- Reducing debris flow in general is a major issue - debris coming down from above Summerville is especially an issue, trees are overhanging the creek
- Need improved design for culverts - 2009 culverts installed by the County caused problems due to orientation and debris
- Water quality is important in both wells and creek – need to test for contamination from mines and elsewhere
- Need to fix/replace lost wells
- Protect historic nature of the buildings and area - especially Salina church and school
- Need for re-vegetation - loss of vegetation resulted in loss of privacy
- Ongoing repairs on private property without approval/permitting are a concern. People are not waiting for the Master Plan to start rebuilding, which affects neighbors and other reconstruction efforts.
- Housing densities vary within this reach. In the denser areas, neighbors' recovery actions affect each other and there's more of a need to work collaboratively.
- Need for future stream maintenance and oversight so Master Plan can be accomplished/successful.

- Want natural, not 'engineered', solutions – want the stream to look natural
- Desire for creek to again be wider than the road
- Let residents know when consultants will be in field so they can show them hot spots

*Roadway-specific*

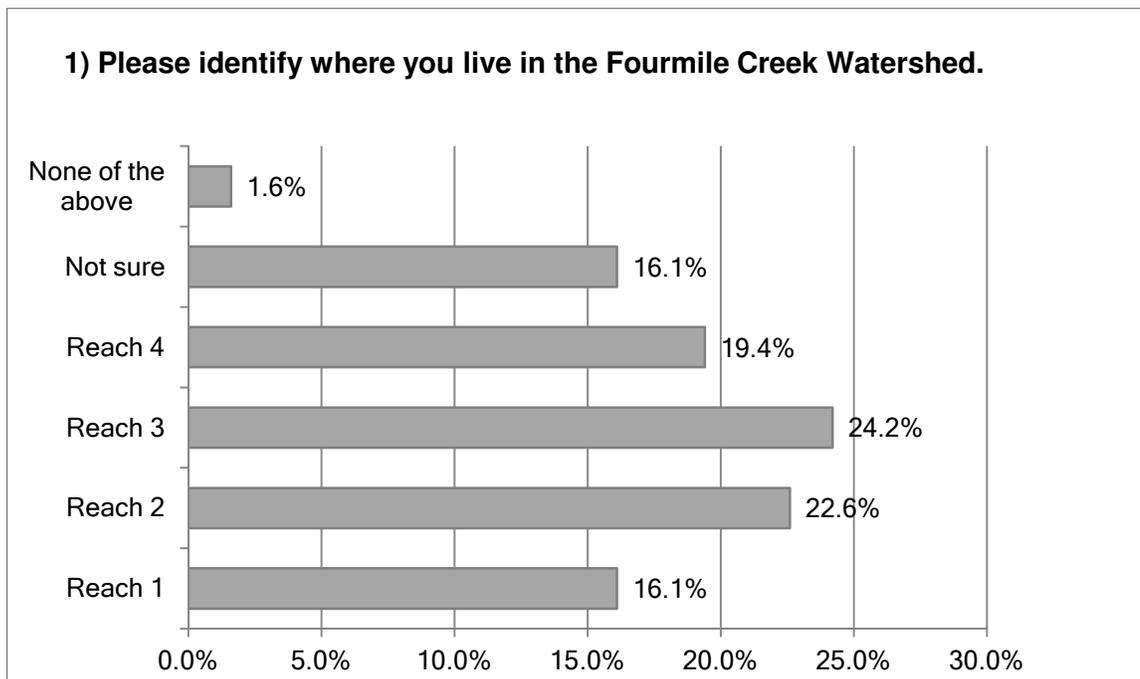
- Need to address road stabilization issues
- Don't allow road improvements to destroy natural characteristics of the area
- Road west of junction needs more of a meander, more vegetation
- Concern that the junction will be too much hardscape – want more vegetation and natural look
- There is a spring that comes up on the road
- Hope that road design will address how individual accesses meet the road

**Reach 4 (Mile Marker 5 to Sunset)**

- Private crossings are needed to rebuild and regain access to property
- Slow permitting/decision process for private crossings
- Concerns about County imposing high cost repairs due to expensive regulatory requirements
- Clarity needed on how restoration on private property will occur
- In Wall Street, creek moved substantially post-flood, and old channel is still wet. This has created mosquito breeding. There is not enough water for trees which creates falling hazards.
- Telephone pole in creek by road curve needs to be removed
- Re-vegetation
- Removal of rocks piled in road and stream
- Important to maintain natural look, want to avoid concrete or other engineered-looking solutions

**COMMENT CARD/SURVEY RESULTS**

61 community members filled out survey forms to answer the above questions. The results are described below.



**What do you most value about the Creek in terms of your long-term vision for the watershed? 1 is the highest value.**

Note that several people noted historical character, sense of community and privacy and solitude as important values within the survey narrative comments.

Answer Options	Rating Average
Natural setting/quality of life	1.9
Ecosystem health/habitat	2.0
Water quality	2.9
Recreation (e.g., fishing, hiking)	4.1

**How do you value the following types of projects, in terms of identifying and prioritizing long-term recovery projects? 1 is the highest value.**

Answer Options	Rating Average
Mitigating risks to private property damage from future flooding	4.7
Ensuring/enhancing water quality	4.9
Mitigating debris flows and sediment leading	5.0
Enhancing long-term oversight of the watershed	5.5
Protecting against erosion and/or creek migration	5.7
Ensuring access to water supply	6.2
Informing roadway and private access design	6.6
Restoring natural stream corridor	7.1
Mitigating risks to public infrastructure	7.3
Restoring aquatic/riparian habitat	7.9
Protecting historic structures and character	8.0
Preventing weed transport	10.0

**LARGE GROUP DISCUSSION QUESTIONS**

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**Watershed Questions**

- Please give examples of creek projects that will be prioritized.
- How will Master Plan fit into the 100 year floodplain requirements? Will it expedite floodplain re-mapping?
- Why does Reach 3 stop at Summerville? (Lots of water came from above the Reach.)
- Explain the plan for addressing the wide swaths as you come down the canyon where vegetation has been eliminated – are detention ponds being created?
- Is there a fish and wildlife expert consulting on the Master Plan?
- Residents considering flood repairs have encountered an expensive permitting process. Do you have advice for residents in making the go/no go decisions on those projects?
- How long will it take for creek ecosystems to recover?
- Will the Master Plan address any tributaries/gulches besides Gold Run?
- Are there examples where the County may require residents to take on repair costs?
- Many properties lost fresh water and septic systems. Is there any coordinated effort to help residents recover?

- How does the Master Plan interface with the Community Wildfire Protection Plan (CWPP)? Is the CWPP being considered?
- Is the Master Plan considering watershed post-wildfire conditions?

### **Roadway Questions**

- Is the County widening the entire roadway for bikes, or just in certain sections?
- Are there plans to increase culvert size where culverts were clogged during the flood?
- Is the County going to remove the concrete fill used to shore up the roads?
- What is the plan for widening the road, given current right of way?
- Is the roadway plan only for the two sections on the presentation map?
- What is the purpose of the new walls along the road, and how high will they be? What type of walls are being considered and for where? How far along is the planning?
- Does the roadway project have a website? Where/how can people get more information and/or provide more input?
- Will trees be cut down for roadway improvements?
- How are the roadway segments being prioritized?

## Fourmile Creek Master Plan Meeting – Boulder County & Project Team Wednesday 9/18/14, 2-4pm

### Attendees

Consultant Team: Kevin Doyle, Laura Sneeringer

Boulder County (BoCo): Varda Blum, Dan Delange, Claire Deleo (phone), Erin Dodge, Denise Grimm, Diane Malone, Julie McKay, Stacey Proctor

### Agenda

#### Purpose:

- Share updates on project work plan/scheduling and activities completed since the last meeting
- Share updates on the hydrology recommendation and hydraulics model
- Describe community input and how it will be used
- Obtain feedback on the Alternatives Analysis Pre-Screening Criteria

### Action Items

#### Baker Team

- Kevin will send Varda the draft model to review
- Kevin will follow up with Scott Coulson for information on the Salina Junction tailings pile
- CDR will reserve space for the November public meetings

#### BoCo Staff

- All BoCo staff will review the following documents and provide questions and comments by COB Weds, 9/24:
  - Alternatives Analysis - Prescreen categories – do any need to be added/deleted/refined?
  - Hydraulics Memo
  - Community Meeting Summary
  - Fourmile Data Roll Up
- Varda will share model components with other BoCo staff, as requested
- Erin will share Sediment Rule information with Kevin
- Stacey will confirm that Nov 5 and 6 works for public meetings
- Stacey will see if we can change the Oct 1 meeting to 1-3p to meet Claire's schedule (may not work for Denise)
- Stacey will reserve a larger room for future meetings

### Discussion

Below are the issues that were specifically discussed. See the 9/18 presentation for more information.

#### Hydrology Recommendation

Baker received and reviewed the final CDOT/CWCB Study the first week of September, and recommends this hydrology as the most accurate for the Fourmile Watershed. As discussed at previous meetings, this has a lower discharge than the FEMA effective study developed in 1977. The rationale for recommending the CDOT/CWCB Study includes:

- Precipitation inputs: As discussed at previous meetings, Urban Drainage had a concern about precipitation inputs. Baker tested these inputs and determined that they do not significantly impact the discharges.
- 1894 flood as an example of high discharges: Baker did research into this flood, in coordination with Dan Cenderelli from the Forest Service, and determined that the area was used for extensive logging from 1860-1890 to support the mining industry. In historical photographs, the area looks like a high plains desert, which would lead to high discharges, similar to a post fire situation.
- Gold Run discharges: The FEMA effective study does not include Gold Run. The CDOT/CWCB Study discharges seem low at 400 cfs, but there is not enough data available to suggest otherwise (only photos and videos). Baker ran models from 200-1200cfs. Because the topography in Gold Run is so steep the water surface does not change significantly. The bigger consideration is how debris impacts discharges.

Baker is setting up the hydraulic model to run the effective regulatory discharges and the CDOT/CWCB discharges. The difference in discharges is not significant enough to lead to different project recommendations. The group did suggest adding the floodplain to maps in the final Plan once BoCo makes a decision on which hydrology to incorporate.

The group discussed considerations related to FEMA requirements:

- If property owners want to develop in the floodplain, they must use the FEMA effective discharge because it is the most conservative discharge or go through the Conditional Process. Property owners should work with the FRPIC Office on these types of issues.
- Revising the effective FEMA Flood Insurance Study (FIS) to reflect updated discharges (and floodplain mapping) will take a significant amount of time (3+ years) because of FEMA's regulatory process to update studies. The discharge could also be submitted as a hydrology CLOMR, which means that FEMA will review the study to determine if it meets their Guidelines and Specifications, and will provide comment on if the discharges could be adopted in the future.

One consideration is using the same hydrology for all watersheds. Kevin noted that while the CDOT/CWCB Study is the most appropriate for Fourmile, this may not be the case in other watersheds. Each watershed has its unique attributes that need to be taken into account.

### **Hydraulic Model**

Kevin provided an overview of the hydraulic model. It provides both the FEMA effective discharge and CDOT/CWCB discharge for the 10, 50, 100 and 500 year flood. Added crossings are coded according to whether they were changed by the 2013 flood. Kevin will share the model with Varda to test out, and she will share outputs with other BoCo staff, as requested.

The group reviewed a few example sites, and discussed the following issues:

- Culverts: Some culverts stayed in place. However, they got plugged up and then the creek got redirected. An example is in Salina where the creek was redirected, and caused damage to the historical church. Some community members believe that culverts should not be rebuilt to withstand such a large flood event so that the creek will stay in the channel. The group discussed the idea of orienting culverts so that overflows would be directed toward the road and be easier to clean. However, the road needs to be clear to ensure people can leave the area safely.
- The Benjamin Property near Betasso Preserve is an example of a debris trap that prevented additional damage in lower Fourmile.

### **Pre-Screening Alternatives Analysis**

The purpose of the Pre-Screening Alternatives Analysis is to narrow down the types of alternatives that could be recommended per reach. It's meant to be an initial screening tool; each reach will have multiple alternatives and more detailed prioritization criteria will be developed for this stage.

The proposed criteria is based on an initial understanding of the watershed's needs, based on input from interviews and community input, research and initial field assessments. For example, "debris management" was added because this was a key theme from community input. "Status quo" and "nonstructural measures" criteria are typically included in Watershed Master Plans. The group discussed the following comments:

- A description of the categories is needed. For example, it is not clear that "structural improvements and additions" includes buildings.
- Recreation was added due to impacts to the Switzerland Trail. However, these impacts would be better incorporated in a historical preservation category, as the trail crosses private property in several areas.
- The group questioned whether post-flood wildfire impacts should be incorporated more clearly.
- Maintenance access is something that will come up in future phases, as recommendations are refined.

### **Overview of Community Input**

Community members have provided input in a number of ways, including: small group conversations at the Sept. 3 Community Meeting (57 non-Project team attendees), filling out the comment card or online survey (61 entries), adding input to the interactive website map, sending e-mails or making calls to the project website/phone that CDR manages (approx. 10 substantive comments), and talking to Baker staff in the field (4 individual visits). There was balanced input across all four reaches.

Key themes on the two primary questions are described below. These responses are aligned with the information from initial interviews and research, though wildlife habitat was highlighted more. Also, community members noted the importance of acknowledging that the area will flood again, which is a risk that residents must be ok with. Many people noted that wildfire is a larger risk.

What do you most value about the Creek in terms of your long-term vision for the watershed?

- Mountain/private lifestyle, including privacy afforded by creek vegetation
- Wildlife habitat in and around the creek
- Quality of life provided by natural setting (views, sounds, aesthetics)
- Historical character

How do you value the following types of projects, in terms of identifying and prioritizing long-term recovery projects?

- Prevent woody debris dams
- Provide recommendations to help people construct private crossings
- Stabilize stream channel in key locations through 'natural' means
- Focus on preventing water contamination due to mine sites
- Identify key areas for revegetation to prevent erosion
- Consider key tributaries other than Gold Run – *Note that Baker did visit additional tributaries that community members identified.*
- Develop long-term creek oversight and maintenance

There were several questions about whether property owners should hold off on their individual projects until the Plan is over. These individuals should contact FRPIC with these questions as each project has its individual considerations.

The group discussed having two public meetings on Nov 5 and 6<sup>th</sup> to obtain input on Plan alternatives. One will be for the upper watershed and one for the lower. The meetings will likely be held in Boulder, as the spaces are likely too small in Fourmile Canyon. Salina School could be possibility, but parking will likely be an issue due to construction activities.

#### **General Updates**

- A USGS gauge that measures instantaneous and daily flow was destroyed. This will not impact the Plan as it only had 3 years of data, which is not enough for data analysis.
- Roads Improvements: BoCo is in the scoping phase for Wall Street and Salina sections, and still working on the Final Design Task Order.
- Salina Junction tailings pile: Scott Coulson is keeping Dan updated on public health information, including communication with EPA. Kevin will also follow-up with Scott.
- Sediment Rule – Erin will update Kevin on the proposed Sediment Rule. It could have implications for cleaning out culverts, etc. One initial concern is that it uses data from the 1990's to determine what segments are impaired for sediments.

# Fourmile Creek Master Plan Meeting – Boulder County & Project Team

## Wednesday 10/15/14, 2-4pm

### Attendees

Consultant Team: Kevin Doyle, Laura Sneeringer

Boulder County (BoCo): Varda Blum, Dan Delange, Claire Deleo (phone), Denise Grimm, Diane Malone, Julie McKay, Stacey Proctor

### Agenda

#### Purpose:

- Share updates on project work plan/scheduling and activities completed since the last meeting
- Discuss the Ecological and Geomorphic Assessments
- Discuss the hydrology recommendation
- Discuss how BoCo input was incorporated into the Pre-Screening Alternatives Analysis
- Discuss the agenda and format for the Nov 5 and 6<sup>th</sup> community meetings

### Action Items

#### Baker Team

- Kevin will contact Chad Schroeder, FRPIC, to get information on the detention/sediment basins on Bob Vermillion's property
- Kevin will research tailings piles in Ingram Gulch that Claire described

#### BoCo Staff

- All BoCo staff will continue to review the draft Plan and provide feedback.
- Stacy will:
  - Contact Scott Coulson to determine how to coordinate with EPA on communications related to the Salina Junction tailings pile
  - Coordinate BoCo internal discussions to determine what the Plan narrative should say about the hydrology and whether the CDOT/CWCB discharge should be shared on an interactive, online map after the community meetings
  - Serve as POC for community meeting questions

### Discussion

Below are the issues that were specifically discussed.

### Updates

- **Salina Junction Tailings Pile:** A meeting was held with BoCo transportation staff and EPA staff on the tailings pile at Salina Junction, which Kevin and Dan attended. George Gerstel asked that BoCo be kept completely in the loop. Scott Coulson is serving as the BoCo POC with EPA. The following was discussed:
  - EPA staff are going to remove a portion of the tailings pile, and will cap the rest. It is expected that Phase I will be completed in Fall 2014, and Phase II in Fall 2015. This will help with roadway improvements, as this area is very narrow. The Fourmile Watershed Master Plan will describe "partial removal and capping by EPA." The draft Plan will be shared with EPA staff so they know what is being recommended upstream of the tailings pile.
  - EPA staff said that they will provide a draft of their plans, including how much they will be removing and the expected slope. EPA staff did not describe what materials will be used for capping. They are going to have to remove some trees in order to remove the tailings.
  - EPA staff are coordinating closely with the property owner and will conduct outreach with adjacent property owners. The group highlighted the importance of sharing information with the broader community related to what is happening, what it will look like, etc. Stacey will follow-up with Scott Coulson about how to coordinate with EPA on communication.
- **Draft Report:** The Ecological Assessment will be in the version 2 of the draft Plan and the Geomorphic Assessment will be in version 3. There will not likely be many alternatives. The Plan will note that "BoCo roadwork is ongoing" around Salina Junction, to take into account the culvert.

- **Website:** People do seem to be reviewing the website. There was a spike after the last e-mail blast and comments have been added to the interactive map.

### **Ecological and Geomorphic Assessments**

Kevin provided an overview of the Ecological Assessment, which considered riparian vegetation and canopy, water quality, barriers to fish and aquatic habitat, etc. The technical team was able to assess all sections of each reach, due to the smaller size of the watershed. The map shows actual ratings for representative areas within each reach section. The Geomorphic Assessment was recently completed, and more information will be provided at a future meeting. The group had no questions.

### **Hydrology Recommendation**

The group decided to show the Enhanced Effective Discharge on the maps in the Plan. Only one hydrology can be shown on printed maps because it would be too difficult to read with more than one. The rationale for showing the Enhanced Effective Discharge is that people need to plan based on the current regulatory floodplain. Even if BoCo ultimately recommends that the FEMA Flood Insurance Study (FIS) be revised, it will take several years. There may be opportunities to apply for a CLOMR based on a different hydrology, but it will also take a long time. Applying to use a different hydrology can be discussed on a case-by-case basis in the FRPIC office.

### **Pre-Meeting Planning for BoCo Conversation Related to Recommendations on Hydrology**

Additional BoCo meetings are needed to determine what the Plan's narrative should say about the CDOT/CWCB Study Plan, and whether electronic maps with multiple hydrology sources should be provided to the public. The following are considerations for these discussions, which Stacey will take the lead in coordinating.

- Who needs to attend? Who are the people with the authority to make a decision on recommendations? Who are the people that this decision impacts? Initial ideas include: George, Dale, Varda, Kim, Brian, Denise.
- What is the question for the group to discuss? Initial ideas include:
  - Should BoCo recommend that the FEMA Flood Insurance Study (FIS) be revised to reflect updated discharges?
    - If so, what hydrology should be recommended for each watershed? In order to come to this decision:
    - What are the principles for determining which hydrology to recommend (e.g., best available data or most conservative)?
    - How important is consistency across watersheds?
    - Who will be using this information (consider both public and private users)? What do they need? How does the decision impact them? What are pros/cons of different approaches for different users?
  - Are there any concerns about sharing all hydrology options with the public? Specifically, should we show the FEMA Effective Discharge, FEMA Effective Enhanced Discharge and CDOT/CWCB Study Discharge on an interactive online Fourmile Watershed Map?
- What information should be shared in advance to make it a productive conversation? For example:
  - Overview of work Chris Tagert is supporting
  - A summary of any recent, relevant decisions (e.g., to use the most conservative discharge in St. Vrain)
  - Perhaps an initial pro/con list for different options

### **Alternatives Analysis**

- The Plan will describe that others are doing work in Logan Mill, and will describe that BoCo roadway design is underway.
- Kevin noted that a detention/sediment basin is not likely in Ingram Gulch because it's a narrow gulch, and this could lead to larger hazards. A debris barrier is more appropriate. The group highlighted that the importance of looking at Bob Vermillion's property by contacting Chad Schroeder, FRPIC, because a detention/sediment basin may have been located there.
- Baker has not identified any mine tailing piles in Ingram Gulch that will be shown in the Plan. Kevin and the County have been in contact with Marti McComb from EPA, and expressed concern that there may be additional tailings piles in the Fourmile watershed that the EPA should look into. Claire noted that the tailings are past Bob

Vermillion's house, either on Jane Miller's property or on a combination of BoCo and BLM land. Additional review is necessary. Kevin will coordinate with Claire, and others, to research this further.

#### **Draft Plan**

The group approved the scale of the maps for the Plan and agreed that only the BoCo logo should be included on the cover (as opposed to other jurisdictions on the Boulder Creek Coalition). It is important, however, to ensure key partners (e.g., Urban Drainage, CWCB and the Forest Service) review the Plan closely.

#### **Community Meeting on Nov 5 and 6th**

The group reviewed the draft agenda for the community meetings. Dan Delange will provide a brief roadway improvements update at the beginning and a Baker roadway member will be available to answer additional questions. Julie McKay will provide a welcome as well. Stacey will review the draft agenda and provide comments.

## Summary from Fourmile Creek Watershed Master Plan November 2014 Community Meetings

This summary of the Fourmile Creek Watershed Master Plan community meetings held in November 2014 includes an overview of the purpose and format of the community meetings, participation, and questions from the full group discussion. Individual comments shared at the meeting and after the meeting (through November 14, 2014) will be included in an Appendix to the final Plan.

The Draft Plan has been available for download from the project website since November 3, 2014. The website is: <http://www.fourmilemasterplan.com>. The comment period was from November 3-14, 2014. Hard copies were also available at the Salina School on November 11 and 12 from 9 am to 5 pm and at the Boulder Public Library (Government Review Shelf) on Nov 13 and 14. The Final Plan will be added to the website, likely in early December.

### Purpose and Format

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The purpose of the community meetings was to share draft alternatives, or project recommendations, with the community and obtain input on whether they address community members concerns, whether the Project Team missed any key information and if the recommendations reflect the community's vision for the future of the Watershed. The following meetings were held. Attendance numbers are based on the number of people who signed in, and some people did not.

#### **Weds, Nov 5, 5:30-7:30 PM - Lower Fourmile Watershed**

**18 community members attended**, in addition to staff from Boulder County and the Project Team Reaches 1 and 2 – Fourmile Creek from confluence with Boulder Creek to Mile Marker 4 (Upstream of Logan Mill Road)

Commissioners Hearing Room, 3rd Floor of the County Courthouse, 1325 Pearl Street, Boulder, CO

#### **Thurs, Nov 6, 5:30-7:30 PM - Upper Fourmile Watershed**

**13 community members attended**, in addition to staff from Boulder County and the Project Team Reaches 3 and 4 – Fourmile Creek from Mile Marker 4 to Sunset and Gold Run from Salina Junction to Summerville

Alfalfa's Community Room, 1651 Broadway, Boulder, CO

The meeting began with a brief presentation to review the master planning process, which is available on the project website at <http://www.fourmilemasterplan.com/home/project-documents>. It included an overview of how community input was used, the assessment results, the process used to develop project alternatives, and next steps. Julie McKay from Boulder County also provided a brief overview of initial expectations for implementing the Plan. Community members were asked to sign up if they'd like to be involved with implementation (12 people signed up). Dan Delange from Boulder County also provided a brief update on roadway improvements.

After a full group discussion (see questions below), the group broke into reach-specific groups to review the alternatives for their area. This was an opportunity for individuals to talk directly with technical team members to ask questions and share input. Feedback was recorded on maps and comment cards, all of which will be reviewed closely by the Project Team and incorporated into the Plan as appropriate. These comments will be incorporated into an Appendix in the final Plan.

## Large Group Discussion Questions

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The following questions were asked. They are compiled from both meetings.

### Technical Approach/ Process to Develop Alternatives

- **How are private efforts to improve controlling the flow of water incorporated into the Master Plan?** The technical team reviewed private recovery efforts during its field assessment in September and October 2014, as best as possible. This information is included in the Master Plan. For example, there was an NRCS project that stabilized a bank, and the Master Plan recommends extending the stabilization.

### Clarification on Alternatives

- **What does re-vegetation include?** Native species – grasses, bushes, trees (e.g. willow, cottonwoods).
- **Has food sources for habitat been considered (e.g. road widening will wipe out apple trees that are food for bears)?** The Master Plan focused on the Creek habitat and native species, which does not include apple trees. The environmental review did address endangered species.
- **Why would you use large woody debris to increase in-stream habitat?** The concept plans in the Plan show how large logs and root wads can be buried into the bank. Fish prefer this approach to boulders. This is different than having woody debris floating in the water.
- **Is Creek bank stabilization on the non-road side of the Creek covered?** Areas identified for bank stabilization are described in the maps in the Plan. The Plan identifies site specific locations where the road is at risk and where a low-flow channel is recommended.
- **How does the Watershed Master Plan relate to the FEMA floodplain? How can you tell if you are eligible for HUD CDBG-Disaster Recovery funding?** The FEMA floodplain is the regulatory floodplain. Since Boulder County is enrolled in the National Flood Insurance Program, it must regulate to the effective FEMA study. Boulder County can request that the FEMA Flood Insurance Study (FIS) be revised, but it will take several years due to the FEMA process. It is possible for individual property owners to obtain a Letter of Map Amendment from FEMA if they believe their property is not in the floodplain. The Boulder County Long-Term Flood Recovery Group (LTFRG) can help with this process. It was also noted that the current HUD-CDBG-Disaster Recovery funding can be used for bridges, only if house rehabilitation is required. Boulder County is advocating changing this HUD grant criteria.

### Implementation of Watershed Master Plan

- **What are potential sources of funding to implement the Master Plan?** The Master Plan includes a table of potential funding sources.
- **What kind of role would residents have on a Citizen-led Coalition? Would they have to write grant applications? Will there be facilitation support to this Coalition?** After Thanksgiving, Boulder County will coordinate a meeting with those who signed up as interested in post-Master Plan implementation to determine specifically how the community wants to be engaged. There are some funds to help community organizations get initiated. Boulder County is committed to providing support to residents to pursue Master Plan project funding.

## Roadway Improvements

- ***Will there be separate community meetings on the roadway improvements?*** Community meetings occurred in the Spring and September 2014. Input from these meetings helped the Project Team refine alternatives. A meeting will likely be held in early 2015 to share the updated design and obtain input.
- ***Will there be Bike lanes on Fourmile Canyon Drive?*** A 4 foot shoulder is being added on some portions of Fourmile Canyon Drive to the uphill side of the road. The goal is to provide a safe roadway for all users.
- ***What funding sources will be used for roadway improvements?*** FEMA reimburses road projects. An evaluation with FEMA staff is in progress to determine specifically what restoration improvements FEMA will cover. The passage of the Boulder County sales tax could provide some gap funding for what FEMA will not cover. Other resources will be explored.
- ***What is the timeline for road re-building? Are there plans to continue stabilization of Gold Run?*** Gold Run is behind Lower Fourmile Canyon Drive. Construction on Fourmile Canyon Drive expected in late 2015, early 2016. The Watershed Master Plan will be used to integrate road and creek realignment, as needed. In the meantime, residents should contact Boulder County Road Maintenance to repair pot holes, washboards, etc.

# COMMUNITY MEETING

## FOURMILE CREEK WATERSHED MASTER PLAN KICKOFF AND UPDATE ON FOURMILE CANYON ROADWAY PLANNING



### Purpose of the Community Meeting

Learn more about:

- The Fourmile Creek Watershed Master Plan process and how your property fits into broader watershed planning;
- How roadway and watershed planning efforts are being integrated; and
- Updates on roadway planning on Fourmile Canyon Drive from: 1) Salina Junction to just north of Logan Mill Road and 2) Poorman Road to one mile north of Highway 119.

Provide input on focus areas for the Plan and what you value in the watershed to help us prioritize future project options.



**Weds, Sept 3, 2014 - 5:30 to 7:30 PM**  
**Alfalfa's Community Room**  
**1651 Broadway, Boulder, CO 80302**

Meeting format: brief presentation, question/answer session and small group facilitated discussions.

There will be a half-hour open house after the meeting.

The community room has a separate entrance to the right of the Alfalfa's parking lot entrance. Parking is also available in the Boulder County lot across the street and at the library.

### Purpose of the Watershed Plan

Boulder County has launched a process to develop a long-term Master Plan to enhance the resilience of the Fourmile Creek Watershed. This is an opportunity to:

- Conduct coordinated, long-term planning for Fourmile Creek and Gold Run at a watershed scale.
- Study the post-flood Watershed and identify priority projects that will enhance the creek corridor, enable flood recovery, and reduce future flood risk to public and private infrastructure.
- Increase the Watershed's opportunities and competitiveness for federal and state funding. This planning process does not include funding for implementation.

### Contact Information

For more information, please visit the Fourmile Creek Watershed Master Plan website at: [www.fourmilemasterplan.com](http://www.fourmilemasterplan.com)

Contact the Project Team at: **720-407-4789** or [fourmilemasterplan@mediate.org](mailto:fourmilemasterplan@mediate.org)

# COMMUNITY MEETING

## FOURMILE CREEK WATERSHED MASTER PLAN



### Purpose of the Community Meeting

- Learn about project alternatives for the Fourmile Creek Watershed Master Plan, including the process and methods used, and how community input was incorporated
- Discuss reach-specific project alternatives and share input before the Plan is finalized in late-November

Meeting format: brief presentation, question/answer session and open house

The draft Plan will be posted on the website the week of November 3rd. Comments may be submitted to the Project Team through November 14th.

#### **Wednesday, November 5, 5:30-7:30 PM - Lower Fourmile Watershed**

Reaches 1 and 2 – Fourmile Creek from confluence with Boulder Creek to Mile Marker 4 (Upstream of Logan Mill Road)

Commissioners Hearing Room, 3rd Floor of the County Courthouse, 1325 Pearl Street, Boulder, CO  
*Parking is available in the lot on the north side of the Courthouse.*

#### **Thursday, November 6, 5:30-7:30 PM - Upper Fourmile Watershed**

Reaches 3 and 4 – Fourmile Creek from Mile Marker 4 to Sunset and Gold Run from Salina Junction to Summerville

Alfalpa's Community Room, 1651 Broadway, Boulder, CO

*The community room has a separate entrance to the right of the Alfalfa's parking lot entrance. Please park in the city lot across the street or at the library.*

### Purpose of the Watershed Plan

Boulder County has launched a process to develop a long-term Master Plan to enhance the resilience of the Fourmile Creek Watershed. This is an opportunity to:

- Conduct coordinated, long-term planning for Fourmile Creek and Gold Run at a watershed scale.
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# Fourmile Creek Watershed



## Community Meeting

### Watershed Master Plan Kickoff & Update on Fourmile Canyon Roadway Plan

Boulder, Colorado  
September 3, 2014



# Community Meeting Purpose

## *Learn More About*

- The Fourmile Creek Watershed Master Plan process.
- How the roadway and watershed planning efforts are being integrated.
- Updates on the roadway planning on Fourmile Canyon Drive.

## *Provide input on the Watershed Master Plan*

- What do residents value in the watershed.
- What areas should the plan focus on.

# Flood Recovery

*Ongoing Recovery/Community Engagement/Site Specific Local Planning*



**Emergency  
Response**



**Imminent Threat  
Assessment and  
Mitigation**



**Long-Term Vision  
for Watershed**

**Fourmile  
Creek  
Watershed  
Master Plan**

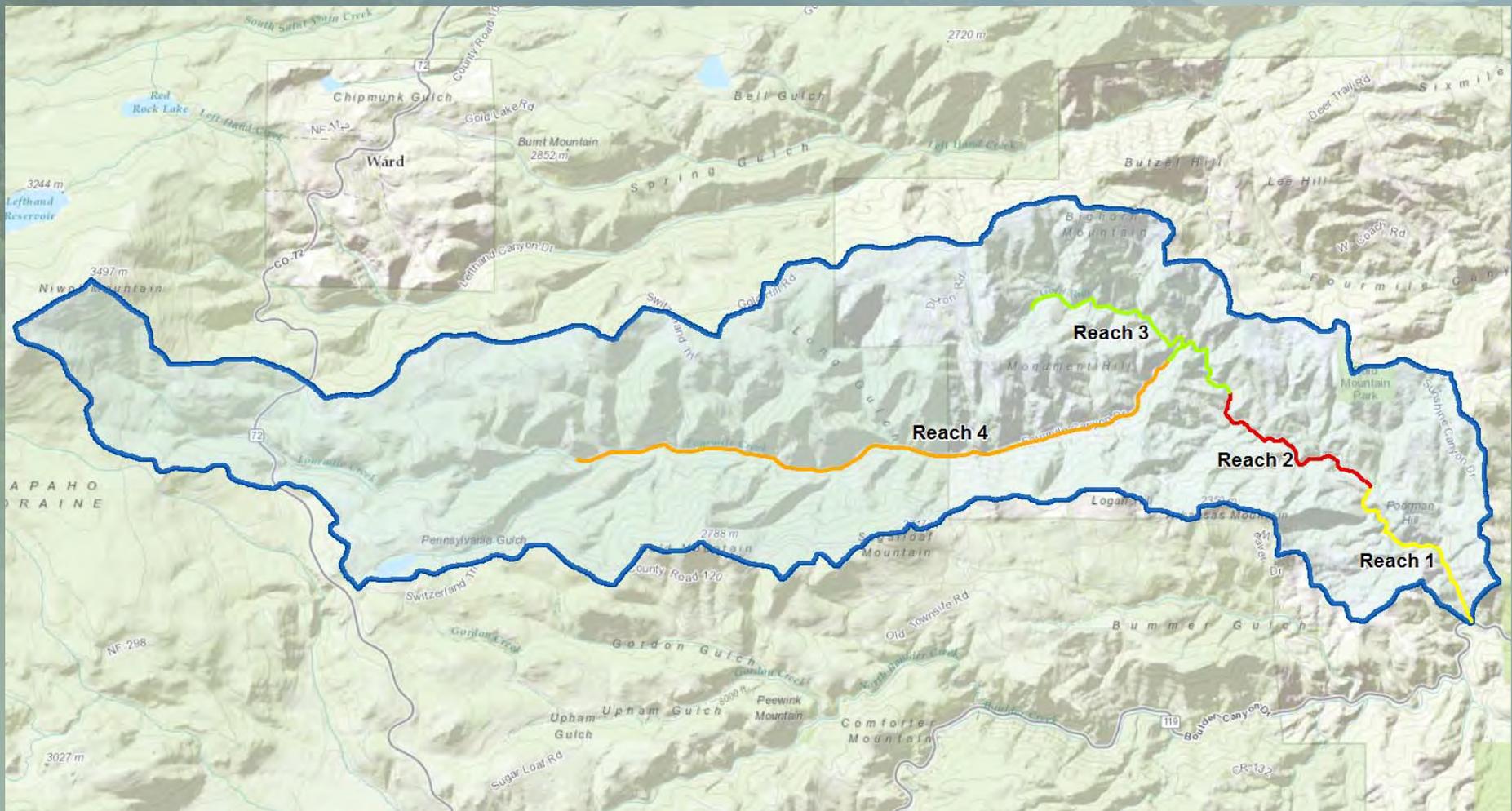


**Future Creek  
Projects**

**Funding  
and  
Implementation**

# Watershed Study Area

- 24 square miles, ~13 miles of creek



# Fourmile Master Plan

## *The Fourmile Master Plan will:*

- **Establish a Long-Term, Holistic Vision for a Sustainable Watershed**
- **Identify current data sources and where data gaps exist**
- **Develop a hydraulic model to understand current flood risk and assess proposed alternatives**
- **Include Field Assessment of Post-Flood Conditions**
- **Identify Projects throughout Watershed that meet Long-Term Recovery needs (i.e. stream bank stabilization, stream and road alignment, vegetation, etc.)**
- **Identify potential funding sources for implementation**

# Fourmile Master Plan

## *The Fourmile Master Plan will not:*

- **Change Local Policies and Procedures related to Project Implementation**
- **Override Existing Management Plans**
- **Be Implemented until Project Funding becomes available (no funding is guaranteed at this time)**
- **Update FEMA Maps and affect Flood Insurance**
- **Be a forum for addressing immediate, individual property needs**
  - **Contact the Boulder County Flood Rebuilding & Permit Information Center (FRPIC) for questions regarding immediate individual property needs.**

# Existing Plans and Data Collection

- **Plans - Over 25 plans collected and evaluated to date. Examples include:**
  - **Post-wildfire reports and studies**
  - **Local Plans (Transportation Plan, Comprehensive Plan, Biological Resources)**
  - **Previous hydrologic and hydraulic studies**
- **Data Sources – Numerous sources of existing data collected. Examples include:**
  - **Pre- and Post-Flood Topographic Data**
  - **Pre- and Post-Flood Aerial Photos**
  - **Flood damage reports**
  - **GIS Layers (ex. Historic structures, mine locations, culverts/bridges)**
- **Interviews with Stakeholders**

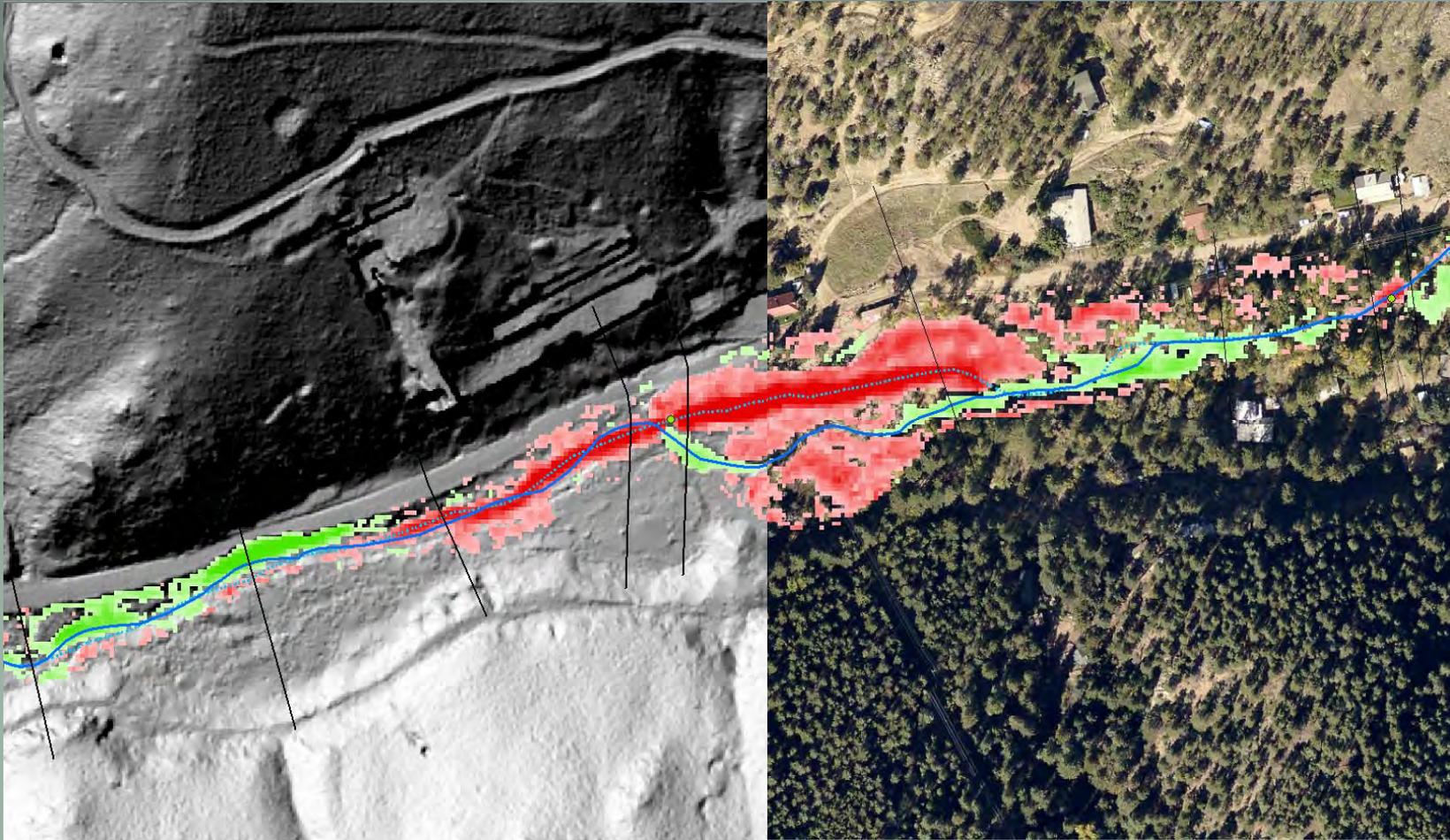
# Project Themes

## *Initial Focus Areas Identified:*

- **Protect homes and key infrastructure**
- **Inform roadway and private access design**
- **Ensure access to water supply**
- **Protect water quality**
- **Prevent/mitigate mud flows and sediment loading**
- **Prevent/mitigate channel erosion & migration**
- **Maintain historic character of the communities**
- **Restore riparian habitat**
- **Prevent weed transport**

# Technical Work

- Pre- and Post-Flood Creek locations identified
- Location and depths of erosion and deposition identified
- Hydraulic model under development



# Project Timeline

<b>Deliverable or Milestone</b>	<b>Date</b>	<b>Status</b>
Flood Risk And Field Assessments	Mid Aug. – Oct.	Ongoing
Community Kickoff Meeting	9/3/14	Today
Draft Alternatives Analysis	End of Oct.	Upcoming
Community Meeting(s)	Early Nov.	Upcoming
Final Master Plan	Early Dec.	Upcoming

# Project Website

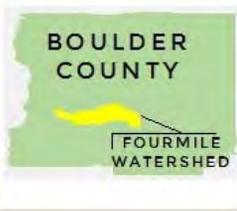
[www.fourmilemasterplan.com](http://www.fourmilemasterplan.com)



**WELCOME TO THE FOURMILE CREEK MASTER PLAN SITE**

**Home**

- [Interactive Project Map](#)
- [Project Timeline](#)
- [Project Updates / Events](#)
- [Project Documents](#)
- [Contact Us](#)
- [Links](#)
- [Sitemap](#)



**Home**

Join us for a [Community Meeting](#) on Wednesday, September 3<sup>rd</sup> at 5:30 PM ([click here](#) for additional information)

**Project Overview**

In September 2013, the Fourmile Creek Watershed experienced a catastrophic flood event which destroyed large sections of local roads, residential properties and private residential accesses along the Fourmile Creek and Gold Run. In the aftermath of the flood, land owners, land management and transportation agencies, and communities along Fourmile Creek and Gold Run responded by taking action, many short-term and temporary, to address the damage caused by the flood.



While local short-term solutions have and continue to be implemented, affected communities recognized the need to conduct long-term planning for Fourmile Creek and Gold Run at a watershed scale. The Fourmile Creek Watershed Master Plan is being developed to help identify priority projects that will restore the creek corridor and reduce future flood risk to public and private infrastructure. The master plan will also focus on preserving, enhancing, or restoring the creek's natural environment, and will identify priority projects that meet community needs to be implemented as funding becomes available.

**How to Get Involved**

# Next Steps

- **Complete Field Assessments**
  - **Contact us to meet with the technical team during the field assessments**
- **Draft Alternatives for Public Review/Input**
- **Continue Public Involvement**
- **Deliver a long-term solution that provides multiple benefits to the watershed and its inhabitants.**

**We need you to stay involved throughout this process.**

- **Subscribe to Project updates –**  
**[fourmilemasterplan@mediate.org](mailto:fourmilemasterplan@mediate.org)**
- **Check the website for updated information –**  
**[www.fourmilemasterplan.com](http://www.fourmilemasterplan.com)**

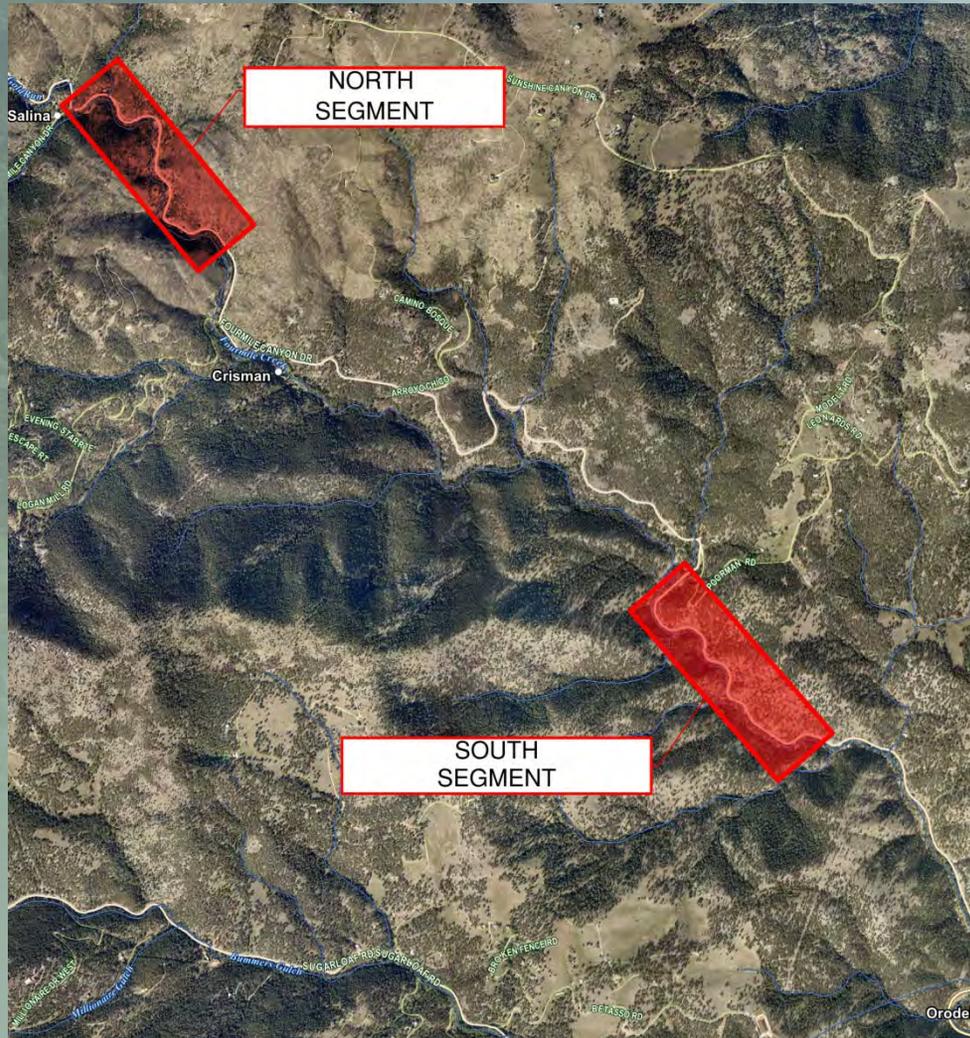
# Fourmile Canyon Drive Design

## *History/Progress Update*

- April public meeting
- Typical section analysis
- Design optimization
- Floodplain planning coordination



# Fourmile Canyon Drive Design

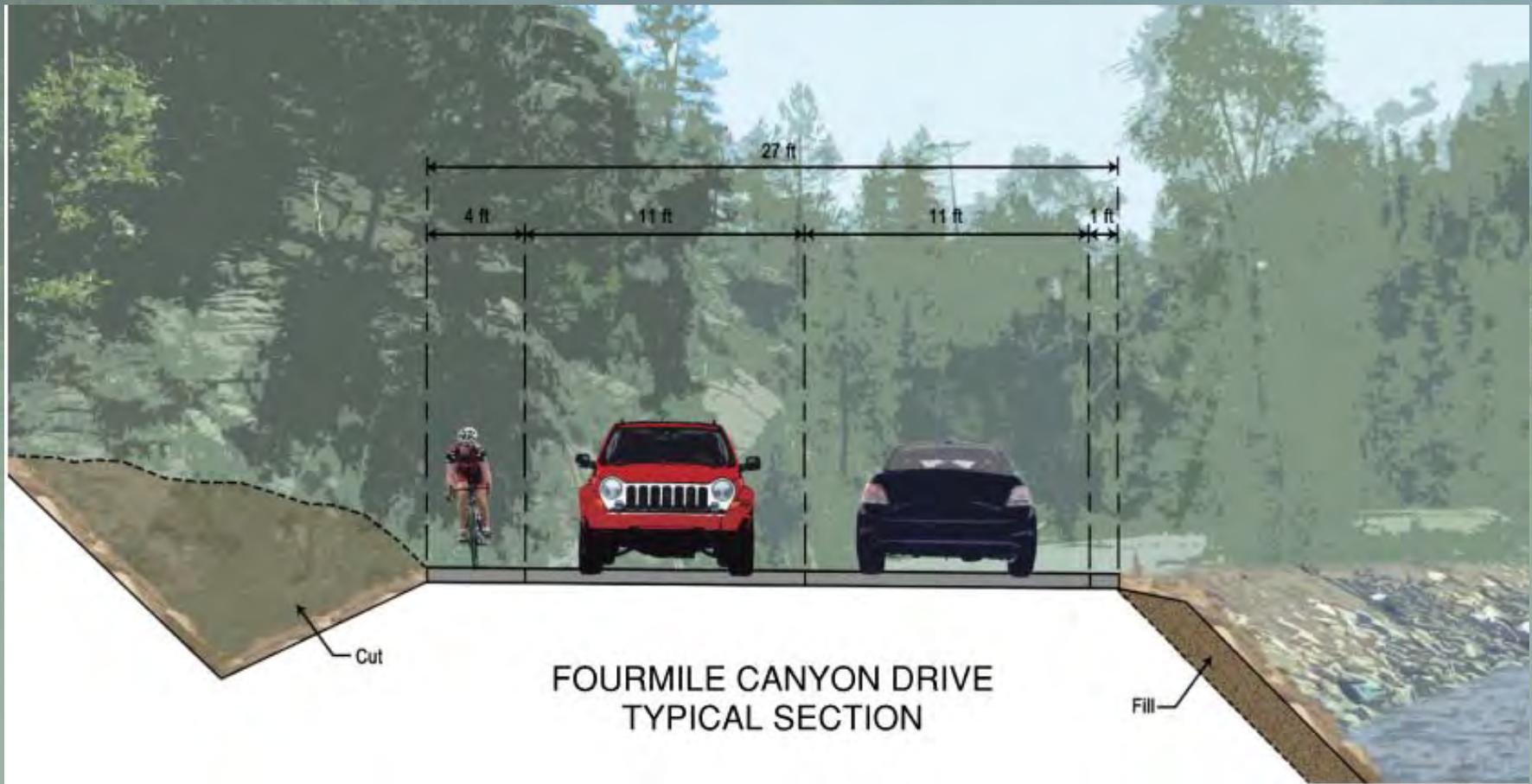


## *Limits of roadway construction*

- North Segment – Salina Junction to Logan Mill
- South Segment – Poorman to 1 mile north of Hwy 119

# Fourmile Canyon Drive Design

## *Typical Section*



# Fourmile Canyon Drive Design

## Challenges

- **Narrow canyon**
- **Widened section**
- **Minimizing environmental/property impacts**
- **Maximizing safety**
- **Minimizing flood potential**

## Mitigation Measures

- **Alignment optimization**
- **Use of walls to minimize stream and property impacts**
- **Use of barrier to minimize rock cuts and stream fills and increase road safety**
- **Rock fall mitigation**
- **Roadside ditch improvements to contain minor storm events**
- **Floodplain planning coordination**

# Community Discussion

**What additional questions do you have about the Master Plan or Roadway Plan?**

**Fourmile Creek Watershed Master Plan**

**Project Manager:**

**Kevin Doyle**

**Michael Baker International**

**Ph: (720) 514-1102**

**Email: [kdoyle@mbakerintl.com](mailto:kdoyle@mbakerintl.com)**

**Fourmile Creek Watershed Master Plan**

**Public Involvement:**

**Laura Sneeringer**

**CDR Associates**

**Ph: (720) 407-4715**

**Email: [lsneeringer@mediate.org](mailto:lsneeringer@mediate.org)**

**Fourmile Roadway Project**

**Andrew Barth**

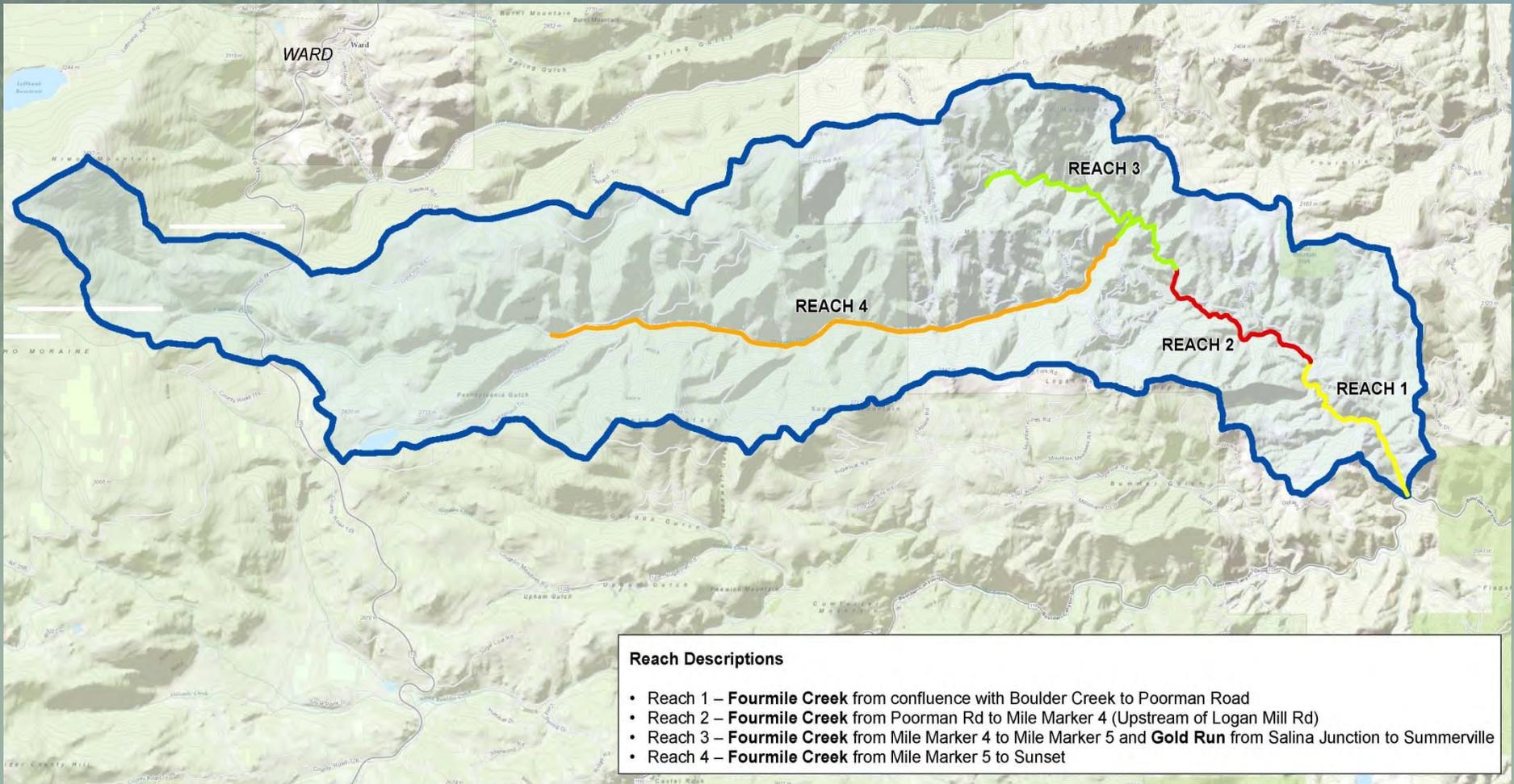
**Boulder County**

**Ph: (303) 441-1032**

**Email: [abarh@bouldercounty.org](mailto:abarh@bouldercounty.org)**

# Community Discussion

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# Fourmile Creek Watershed



## Community Meeting

**Watershed Master Plan  
Reaches 1 and 2 Update Meeting**

Boulder, Colorado  
November 5, 2014



# Community Meeting Purpose

## *Learn More About:*

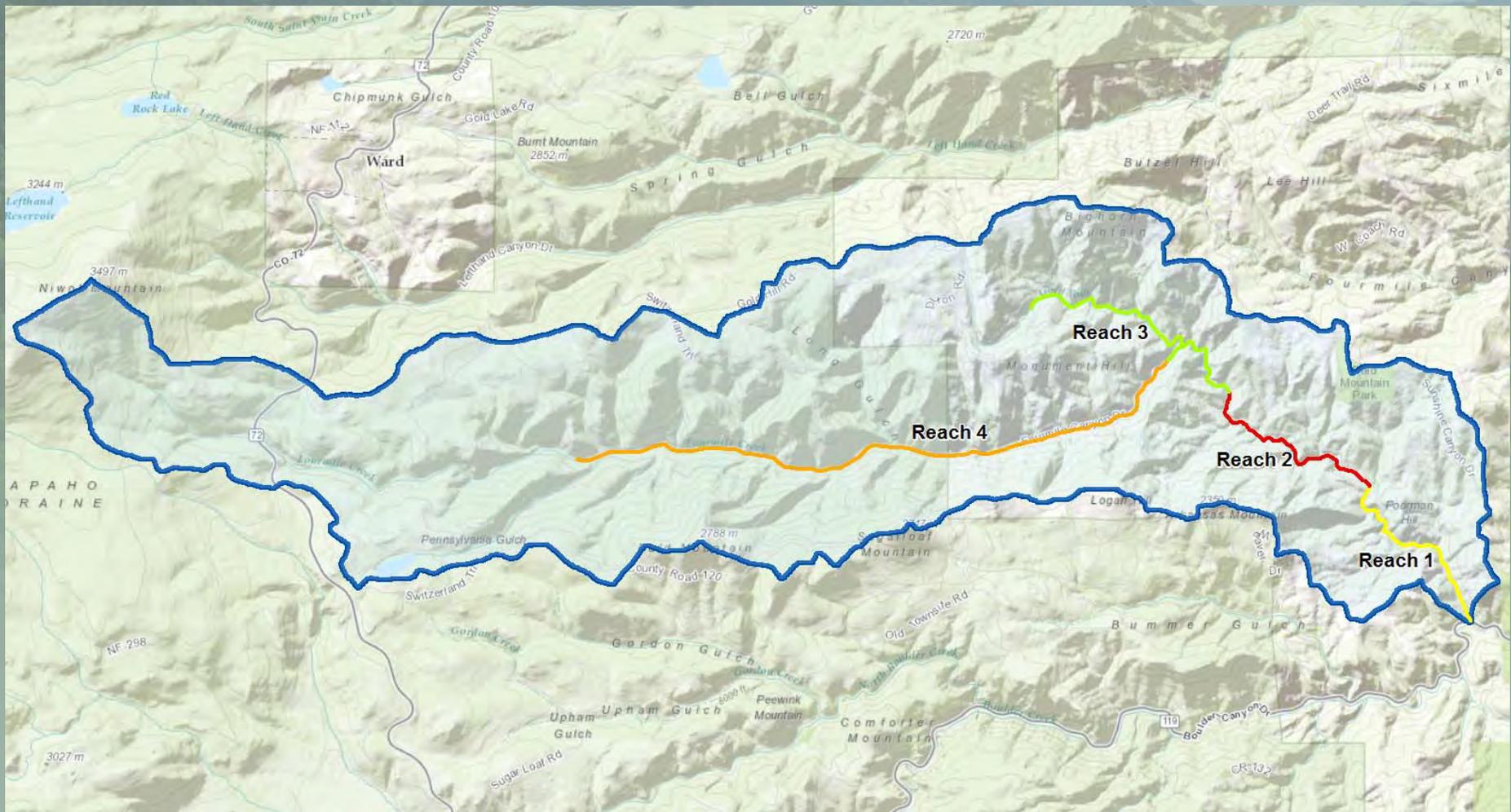
- The Fourmile Creek Watershed Master Plan process and methods used.
- How community input was incorporated.

## *Discuss:*

- Reach specific project recommendations.
- Obtain input to inform the Final Plan.

# Watershed Study Area

- 24 square miles, ~13 miles of creek



# Fourmile Master Plan

## *The Fourmile Master Plan will:*

- **Establish a Long-Term, Holistic Vision for a Sustainable Watershed**
- **Identify current data sources and where data gaps exist**
- **Develop a hydraulic model to understand current flood risk and assess proposed alternatives**
- **Include Field Assessment of Post-Flood Conditions**
- **Identify Projects throughout Watershed that meet Long-Term Recovery needs (i.e. stream bank stabilization, stream and road alignment, vegetation, etc.)**
- **Identify potential funding sources for implementation**

# What Data Informed the Plan

*The following data was used to inform the Plan:*

- **Historical plans and reports**
- **Post-flood efforts**
- **Ecological Assessment**
- **Geomorphic Analysis**
- **Flood Risk Analyses**
- **Public input from Community Meetings, online surveys, website, emails, phone calls, meetings in the field, etc.**

# Project Themes

## *From Community and Stakeholder Input:*

- **Protect homes and key infrastructure**
- **Inform private access and roadway design**
- **Stabilize stream channels through 'natural' means**
- **Re-vegetation**
- **Reduce debris flows**
- **Restore riparian habitat**
- **Address contamination from mine tailings**

# Alternatives Evaluation Criteria

## *Criteria used to evaluate alternatives (in no particular order)*

- Reach Objectives
- Natural Channel Restoration
- Fish Habitat
- Flood Conveyance
- Flood Mitigation
- Environmental Restoration
- Public Safety
- Transportation
- Aesthetics
- Permitting Requirements
- Property & Right of Way
- Operations and Maintenance
- Consistent with Local Policies & Plans

# Reach Recommendations

## *Reach 1 - Recommendations*

- Incorporate low flow channel
- Increase in-stream habitat complexity
- Re-vegetation
- Site specific bank protection
- Remove concrete bank protection and re-protect with natural materials
- Site specific removal of sediment aggradation to reduce flood risk
- Ongoing coordination with roadway improvements



# Reach Recommendations

## *Reach 2 - Recommendations*

### Lower part of Reach

- Minimal recommended projects

### Upper part of Reach

- Incorporate low flow channel
- Increase in-stream habitat complexity
- Re-vegetation
- Ongoing coordination with roadway improvements



# Draft Plan

## *Available for review:*

- Download from the project website ([www.fourmilemasterplan.com](http://www.fourmilemasterplan.com))

## *Plan Organization*

- Sections 1-6 – Introduction & process
- Section 7 – Conceptual design strategies
- Sections 8-11 – Reach summaries & recommendations
- Section 12 – Plan implementation & next steps
- Appendices – Ecological assessment, geomorphic assessment, flood risk assessment results

# Next Steps

***Collect feedback – Deadline for all comments is November 14th***

- Provide input tonight: On the maps or with comment cards
- Email the project team at [fourmilemasterplan@mediate.org](mailto:fourmilemasterplan@mediate.org)

***Assess all comments and revise draft plan as appropriate***

***Prepare Final Master Plan – Early December***

- Final plan will include cost estimates, project prioritization, and additional information

# Community Discussion

**What additional questions do you have about the Fourmile Creek Watershed Master?**

*We'll address Reach-specific questions and comments in the breakout groups*

**Fourmile Creek Watershed Master Plan**

**Project Manager:**

**Kevin Doyle**

**Michael Baker International**

**Ph: (720) 514-1102**

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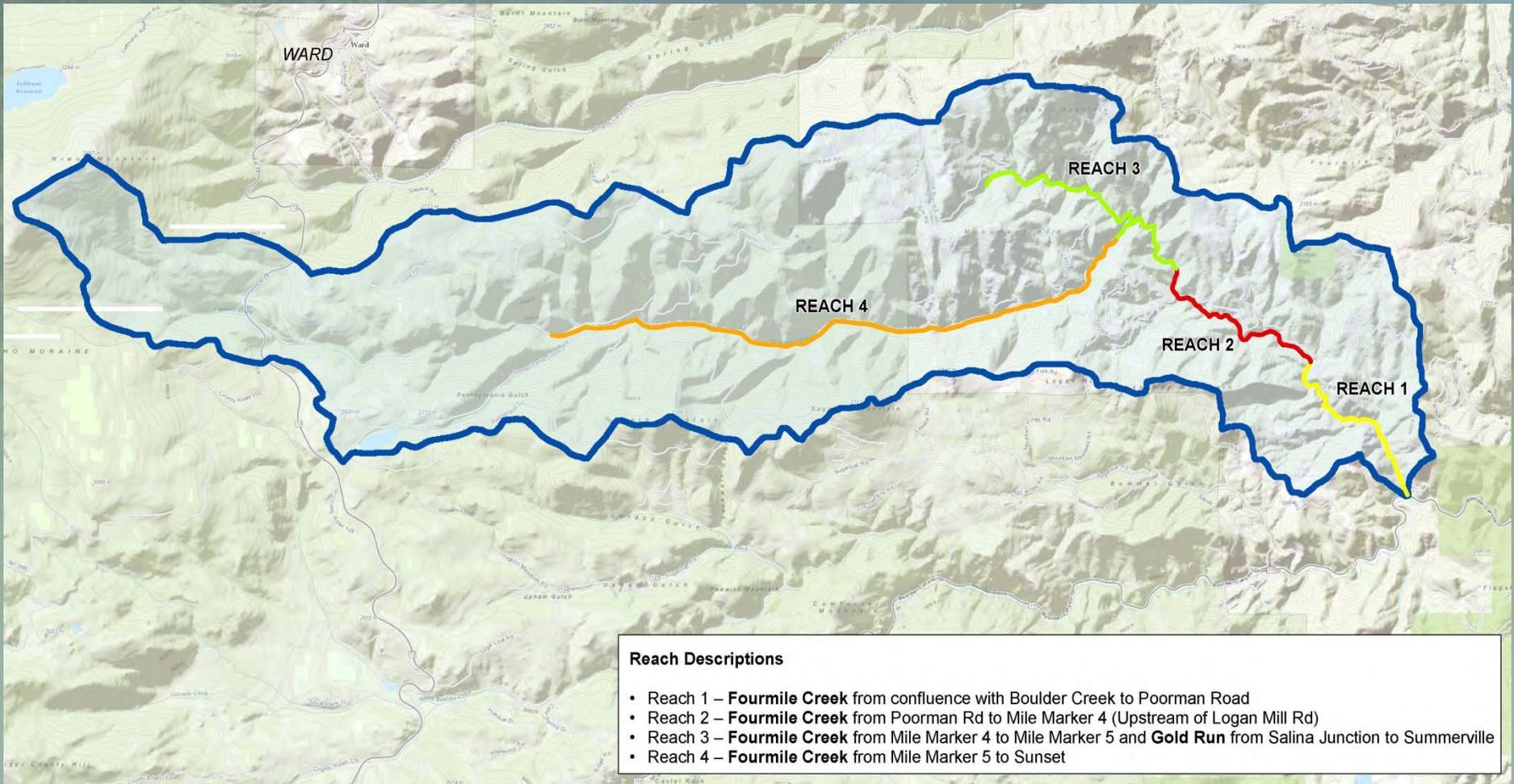
**CDR Associates**

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**Email: [lsneeringer@mediate.org](mailto:lsneeringer@mediate.org)**

# Reach-Specific Breakout Groups

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# Fourmile Creek Watershed



## Community Meeting

**Watershed Master Plan  
Reaches 3 and 4 Update Meeting**

Boulder, Colorado  
November 6, 2014



# Community Meeting Purpose

## *Learn More About:*

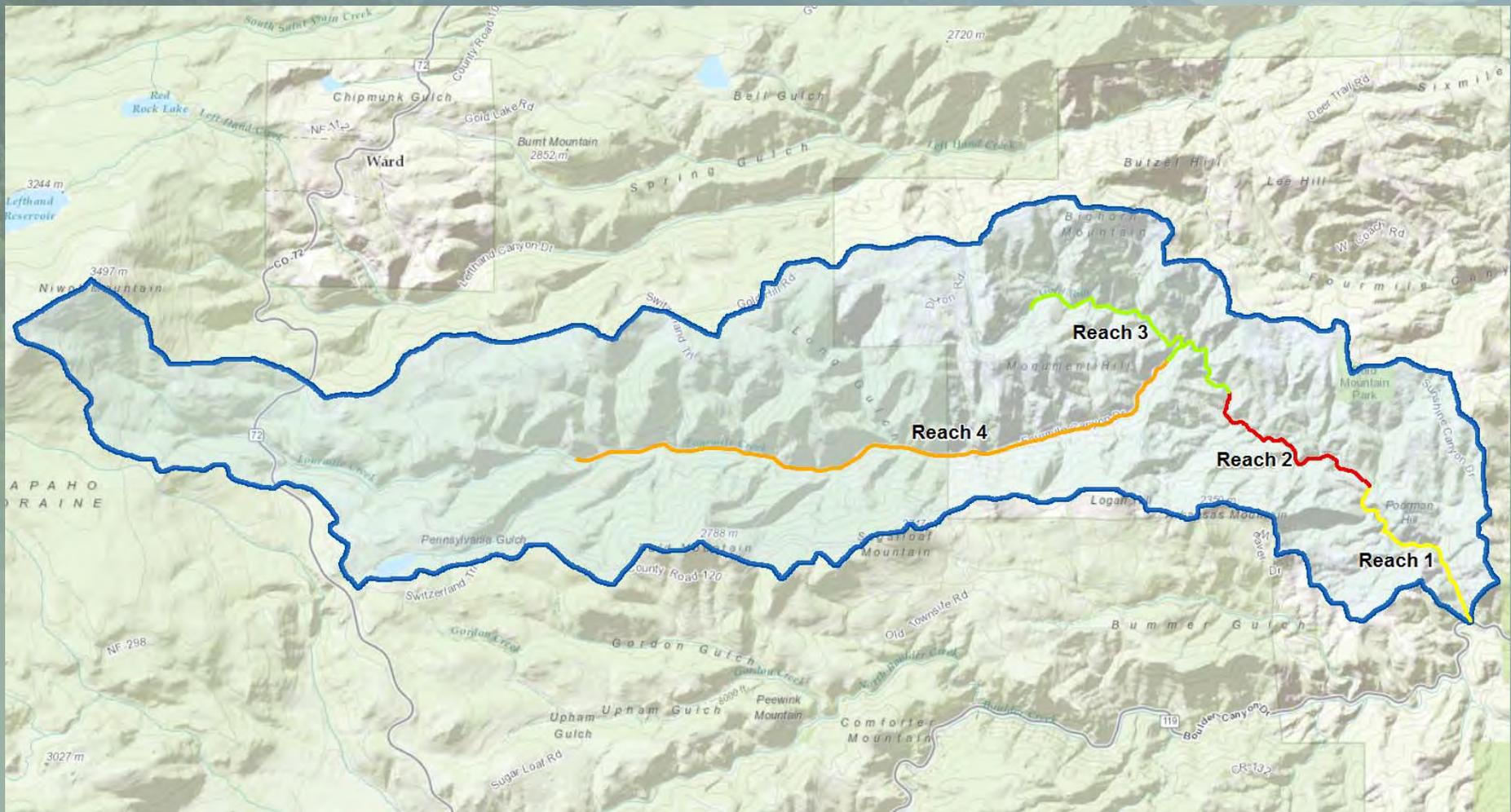
- The Fourmile Creek Watershed Master Plan process and methods uses.
- How community input was incorporated.

## *Discuss:*

- Reach specific project recommendations.
- Obtain input to inform the Final Plan.

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# Fourmile Master Plan

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- Identify current data sources and where data gaps exist
- Develop a hydraulic model to understand current flood risk and assess proposed alternatives
- Include Field Assessment of Post-Flood Conditions
- Identify Projects throughout Watershed that meet Long-Term Recovery needs (i.e. stream bank stabilization, stream and road alignment, vegetation, etc.)
- Identify potential funding sources for implementation

# Fourmile Master Plan

## *The Fourmile Master Plan will not:*

- **Change Local Policies and Procedures related to Project Implementation**
- **Override Existing Management Plans**
- **Be Implemented until:**
  - **Project Funding becomes available**
  - **Property owner coordination & final design occurs**
- **Affect Flood Insurance or the regulatory (FEMA) maps**
- **Address immediate, individual property needs**
  - **Contact the Boulder County Flood Rebuilding & Permit Information Center (FRPIC) for questions regarding immediate individual property needs.**

# What Data Informed the Plan

*The following data was used to inform the Plan:*

- **Historical plans and reports**
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# Project Themes

## *From Community and Stakeholder Input:*

- **Protect homes and key infrastructure**
- **Inform private access and roadway design**
- **Stabilize stream channels through 'natural' means**
- **Re-vegetation**
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# Alternatives Evaluation Criteria

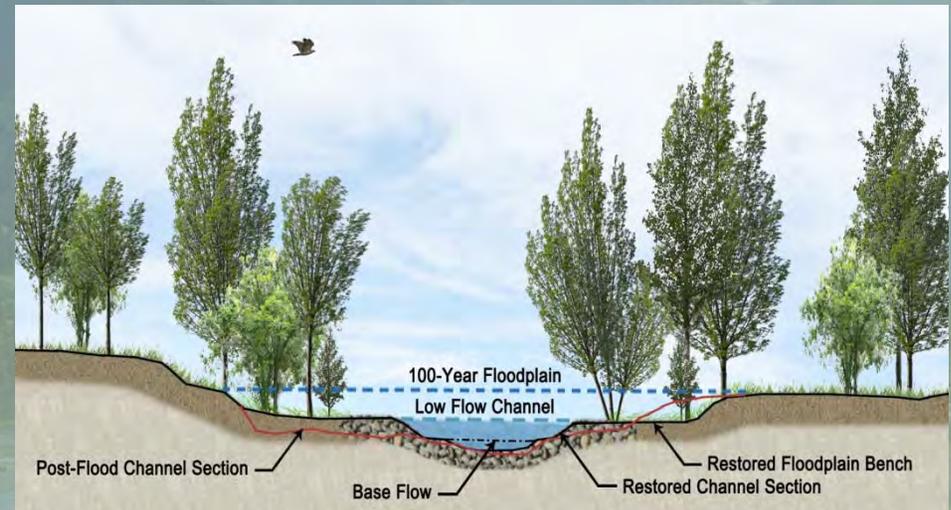
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- Flood Mitigation
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- Public Safety
- Transportation
- Aesthetics
- Permitting Requirements
- Property & Right of Way
- Operations and Maintenance
- Consistent with Local Policies & Plans

# Reach Recommendations

## *Reach 3 - Recommendations*

- Incorporate low flow channel
- Increase in-stream habitat complexity
- Re-vegetation
- 'Floodwalls'
- Stream realignment
- Site specific bank protection using natural materials
- Debris control (Ingram Gulch)
- Ongoing coordination with roadway improvements and EPA project



# Reach Recommendations

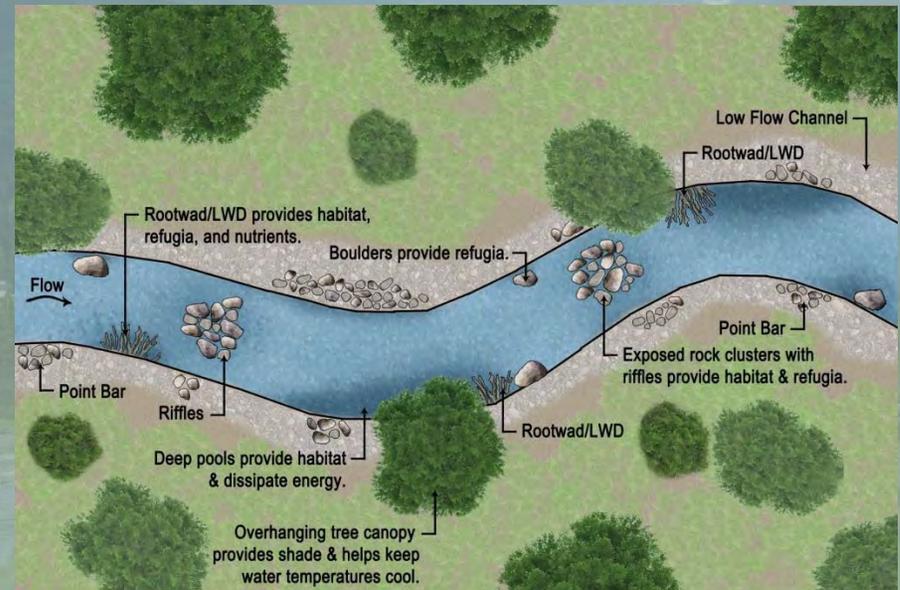
## *Reach 4 - Recommendations*

### Some Sub-Reaches

- Minimal recommended projects

### Other Sub-Reach

- Incorporate low flow channel
- Increase in-stream habitat complexity
- Re-vegetation
- Site specific removal of sediment aggradation to reduce flood risk
- Ongoing coordination with roadway improvements



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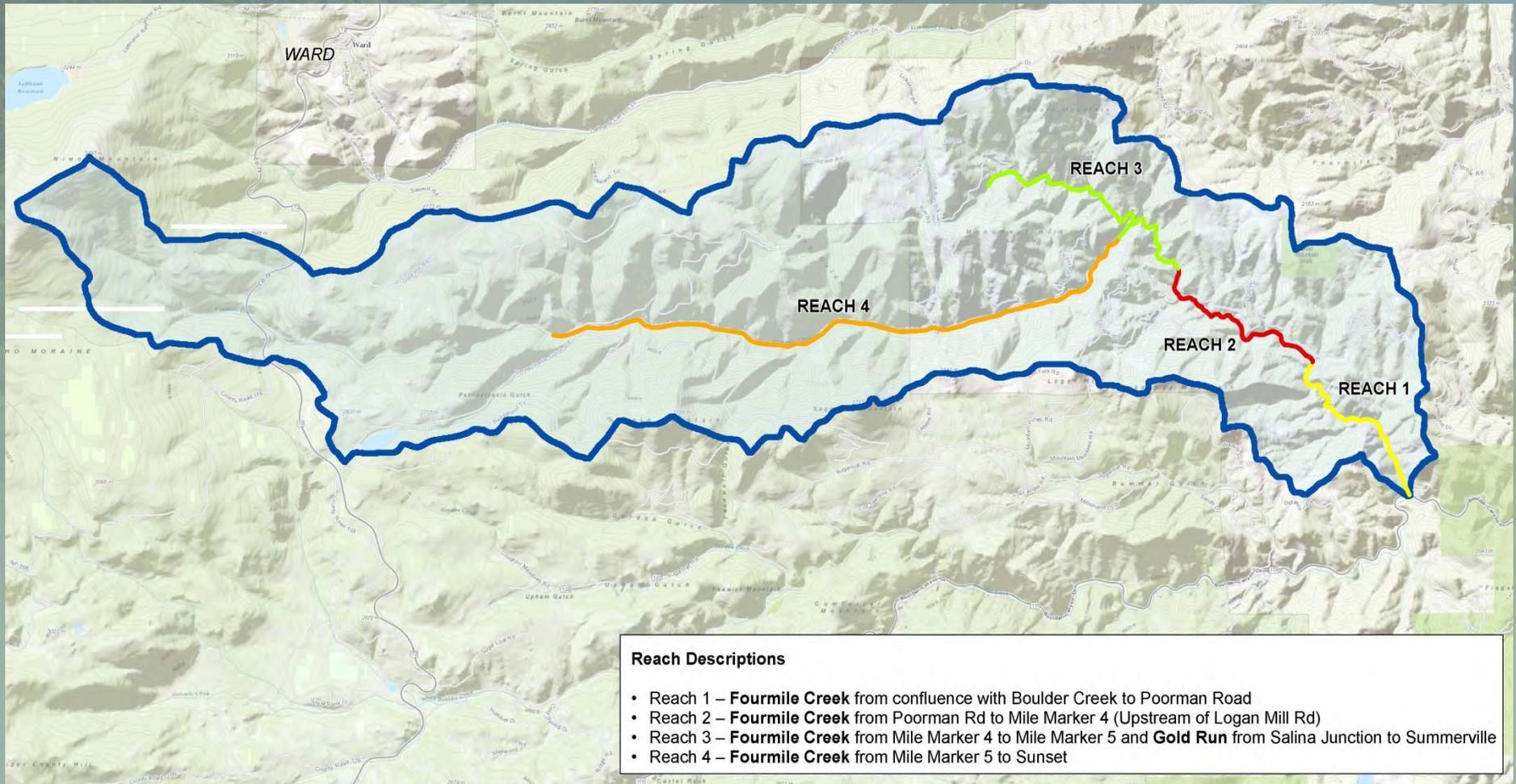
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# APPENDIX B

## *ECOLOGICAL ASSESSMENT*

# ECOLOGICAL ASSESSMENT

## 1. Introduction

As part of the Fourmile Creek Watershed Master Planning effort, the Baker Team completed an ecologic stream assessment of Fourmile Creek and Gold Run using the Stream Visual Assessment Protocol Version 2 (SVAP2), developed by the US Natural Resources Conservation Service (NRCS). SVAP2 is a qualitative field reconnaissance technique that assesses channel and floodplain conditions, riparian areas, water quality and aquatic habitat. The method allows for an assessment of streams so that they may be prioritized with regard to protection and restoration plans. For the purposes of this Master Plan the results were used to identify critical riparian ecosystem elements that were damaged or absent from the creek system, as well as to identify highly degraded areas. The evaluations are intended to supplement an overall understanding of the vulnerabilities in the Fourmile Creek Watershed and assist with focusing appropriate restoration strategies.

The application of the SVAP2 protocol includes the evaluation of features in the stream system that affects overall stream conditions and generally encompasses the following categories:

1. Channel stability (channel condition, bank condition)
2. Water quantity (hydrologic alteration)
3. Water quality (nutrient enrichment and manure/human waste)
4. Vegetation (riparian area quantity/quality and canopy cover)
5. Instream habitat (pools, habitat complexity)

A description of the specific elements evaluated as part of the SVAP2 protocol is presented in Table B.1 SVAP2 Ecologic Stream Assessment – Ecosystem Elements. At completion of the SVAP2 protocol stream reaches are classified into one of the following categories:

*Severely Degraded:* Channel and banks are highly unstable and/or covered with rip-rap or concrete; homogenous channel bed lacking in habitat complexity; natural flow regime is significantly altered; limited floodplain access; and there is little to no riparian vegetation.

*Poor:* Channel is unstable with fairly homogenous channel bed lacking in habitat complexity; inadequate riparian corridor with large gaps of vegetation along the reach; developments in floodplain, or inaccessible floodplain, with diverted flow altering the natural flow regime.

*Fair:* Channel may be displaying some instability, with marginal connections between the active channel and floodplain; narrow riparian corridor with large gaps of vegetation along the reach and limited canopy cover; limited habitat complexity.

*Good:* Channel may be displaying some instability, but the active channel and floodplain are connected in most areas; some development in floodplain, but does not significantly alter natural flow regime; adequate riparian corridor is present, but may have gaps along reach; moderate habitat complexity.

*Excellent:* Channel is stable with continuous floodplain access, complex fish habitat including numerous shallow and deep pools; extensive and diverse riparian corridor; natural flow regime prevails.

## 2. Method

The first task in the ecologic stream assessment was to divide the Fourmile Creek and Gold Run into reaches of similar geomorphic form. Aerial imagery and high-resolution topography (LiDAR) were evaluated to identify changes in geomorphic conditions (gradient, channel form, tributary confluences, etc.) which dictated locations of reach breaks. Fourmile Creek was divided into 23 ecosystem reaches and Gold Run was divided into 3 ecosystem reaches. Each reach (with the exception of 2a) was evaluated, from numerous locations within the reach, using the SVAP2 protocol. The results from reach 2b were extrapolated to reach 2a because

of access issues. Table B.1 describes the elements assessed as part of the SVAP2 protocol. Each element is scored with a value of zero to 10, where a higher score indicates a more healthy system. An overall score was assigned to each reach, based on the average of the scores for the elements assessed.

## 3. Results

Representative photographs from each reach are presented in the Photo Log section. The resulting SVAP2 scores are presented in Table B. 2 and the overall score is mapped by reach in Figure B.1 The overall ecological score for each reach were classified using the following categories:

- » Score of 0 to 2.9: Severely Degraded
- » Score of 3 to 4.9: Poor
- » Score of 5 to 6.9: Fair
- » Score of 7 to 8.9: Good
- » Score of 9 to 10: Excellent

All the sub-reaches in Reach 1 of Fourmile Creek (from the confluence with Boulder Creek to Poorman Road) received a “fair” overall ecosystem score. The riparian corridor within this reach has been reduced by adjacent development and/or damaged by the September 2013 flood. Additionally, there are periodic gaps of vegetation along the reach, limited diversity of native plant species, and areas of channel instability. The sub-reaches in

Reach 2 of Fourmile Creek (from Poorman Road to Mile Marker 4) received a range of overall ecosystem scores from “poor” to “good”. The lower part of this reach received a “good” ecosystem score because of the minimal floodplain development along with a high quantity and diversity of native plant species in the riparian corridor. Additionally, the lower part of this reach generally contains good in-stream habitat conditions. The upper part of the reach exhibited less vegetation and diversity of vegetation, and part of the reach exhibited some algal growth. The riparian corridor within this reach has been reduced by adjacent development and/or damaged by the September 2013 flood.

The sub-reaches in Reach 3 of Fourmile Creek and Gold Run (from Mile Marker 4 to Mile Marker 5 and Gold Run) also received a range of overall ecosystem scores from “poor” to “good”. The Fourmile Creek sub-reaches all received a score of “fair” because the riparian corridor has been reduced by adjacent development and/or damaged by the September 2103 flood. Additionally, there is limited diversity of native plant species and areas of channel instability within this part of the reach. The lower portions of Gold Run received scores of “poor” because the riparian corridor has mostly been eliminated due to adjacent development and there is a general lack of native vegetation. The riparian corridor in the upper reach of Gold Run has generally not been impacted by development and was not damaged by the flood. The quantity and quality of riparian vegetation in this reach is good and in-stream habitat conditions are favorable. It received an overall ecosystem score of “good.”

The sub-reaches in Reach 4 of Fourmile Creek received a “good” overall ecosystem rating, with the exception of the very downstream sub-reach which received a “fair” rating. The upper reaches of Fourmile Creek are generally less constrained and have good vegetative diversity. Additionally there are minimal barriers to movement and good pool formation for most of this reach.

## 4. Recommendations

A list of recommended habitat enhancements for each reach is presented in Table B.3.

Table B.1 SVAP2 Ecologic Stream Assessment – Brief Summary of Ecosystem Elements and Scoring Protocol

Element 1 - Channel Condition			
No discernible signs of incision or aggradation. Active channel and flood plain are connected throughout reach.	Some bank erosion or minimal migration. Active channel and floodplain are connected in most areas.	Incision evident or moderate migration and bank erosion. Frequent floodplain disconnections.	Massive incision or severe channel migration and bank erosion. Little or no floodplain connection.
10-9	8-6	5-3	2-0
Element 2 – Hydrologic Alterations			
Natural flow regime. No dams, dikes, or development in the floodplain	Some floodplain development (eg. Water withdrawals, water control structures), but does not alter the natural flow regime.	Floodplain development (eg. Water withdrawals, water control structures), that alters the natural flow regime.	Water withdrawals, flow augmentation, or urban runoff severely alters the natural flow regime
10-9	8-6	5-3	2-0
Element 3 – Bank Condition			
Banks are stable and naturally protected	Banks are moderately stable and naturally protected. A limited number of structures are present on the banks.	Banks are moderately unstable with little natural protection. Fabricated structures significant in the reach.	Banks are unstable with no natural protection. Riprap and/or other structures dominate.
10-9	8-6	5-3	2-0
Element 4 – Riparian area quantity			
Natural plant community extends the entire active floodplain and is contiguous throughout the reach.	Natural plant community extends more than 1/2 to 2/3 of the active floodplain. Vegetation gaps less than 10%.	Natural plant community extends more than 1/2 of the active floodplain. Vegetation gaps do not exceed 30%.	Natural plant community extends less than 1/4 of the active floodplain. Vegetation gaps exceed 30%.
10-9	8-7	6-5	4-0
Element 5 – Riparian area quality			
Natural and diverse riparian vegetation.	Natural and diverse riparian vegetation. Invasive species present in small numbers.	Natural vegetation compromised. Invasive species common.	Little or no natural vegetation. Invasive species widespread.
10-9	8-6	5-3	2-0
Element 6 – Canopy Cover			
> 75% of water surface shaded.	75%-50% of water surface shaded	49%-20% of water surface shaded	< 20% of water surface shaded.
10-9	8-6	5-3	2-0
Element 7 – Water Appearance			
Water is very clear	Water is slightly turbid. No evidence of oil sheen or metal precipitates.	Water is turbid most of the time and/or there is evidence of oil sheen or metal precipitates.	Water is very turbid most of the time and/or there is evidence of oil sheen.
10-8	7-5	4-2	1-0
Element 8 – Nutrient Enrichment			
Clear water with little algal growth	Fairly clear or slightly greenish water. Moderate algal growth	Greenish water. Abundant algal growth in warmer months.	Pea green color. Thick algal mats dominating the stream.
10-9	8-6	5-3	2-0
Element 9 – Manure or Human Waste			
Livestock do not have access to stream. No concentrated sewage flows directly to the stream.	Livestock access to stream is controlled or limited. No concentrated sewage flows directly to the stream.	Livestock have unlimited access to stream during part of the year. Manure is noticeable.	Livestock have unlimited access to stream during the entire year. Manure is noticeable.
10-9	8-6	5-3	2-0
Element 10 - Pools			
More than tree deep pools separated by boulders or wood.	Two to three deep pools.	Pools present but relatively shallow.	Pools absent.
10-9	8-6	5-3	2-0

Table B.1 SVAP2 Ecologic Stream Assessment – Brief Summary of Ecosystem Elements and Scoring Protocol

Element 11 – Barriers to aquatic species movement			
No artificial barriers.	Physical structures, water withdrawals and/or water quality seasonally restrict movement.	Physical structures, water withdrawals and/or water quality restrict movement throughout the year.	Physical structures, water withdrawals and/or water quality seasonally prohibit movement.
10	9-7	6-3	2-0
Element 12 – Fish Habitat Complexity			
Ten or more habitat features available.	Eight to nine habitat features available.	Six to seven habitat features available.	Zero to five habitat features available.
10-9	8-7	6-5	4-0
Element 13 – Aquatic Invertebrate Habitat			
At least 9 types of habitat present.	Six to eight types of habitat present.	Four to five types of habitat present.	Zero to three types of habitat present.
10-9	8-6	5-4	3-0
Element 15 – Riffle Embeddedness			
Gravel or cobble substrates are <10% embedded.	Gravel or cobble substrates are 10% - 20% embedded.	Gravel or cobble substrates are 21% - 30% embedded.	Gravel or cobble substrates are > 30% embedded.
10-9	8-7	6-5	4-0

Table B.2 SVAP2 Ecosystem Score Results for Fourmile Creek and Gold Run

Element	Sub-Reach																										
	1a	1b	1c	1d	1e	1f	2a	2b	2c	2d	2e	2f	3a	3b	3c	3d	3e	3f	3g	4a	4b	4c	4d	4e	4f	4g	
Channel Condition	4	4	4	4	4	4	6	6	9	2	2	4	5	5	5	5	4	4	3	4	7	4	4	4	4	6	7
Hydrologic Alteration	7	7	7	6	6	6	8	8	8	8	8	8	7	7	7	6	6	6	6	6	8	8	7	7	7	8	
Bank Condition	5	5	5	5	5	5	8	8	9	3	5	5	5	5	5	5	2	2	3	5	8	5	5	5	5	6	
Riparian Area Quantity	4	4	4	4	4	4	9	9	9	9	2	2	4	4	4	4	0	0	9	4	6	6	7	8	8	8	
Riparian Area Quality	3	3	3	3	3	3	8	8	8	8	3	3	3	3	3	3	0	0	9	3	6	6	8	8	8	8	
Canopy Cover	6	6	6	6	3	3	5	5	5	5	5	4	1	2	1	3	0	0	8	2	2	2	2	7	5	7	
Water Appearance	10	10	10	10	10	10	10	10	10	10	5	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
Nutrient Enrichment	9	9	9	9	9	9	10	10	10	10	7	7	9	10	10	9	10	10	10	10	10	10	10	10	10	10	
Manure or Human Waste	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	7	10	10	10	10	10	10	10	10	
Pools	3	3	8	6	4	3	10	10	10	3	2	2	9	9	3	8	2	2	6	8	8	10	10	5	9	9	
Barriers to Movement	10	9	6	9	3	9	9	9	9	9	7	10	9	9	9	9	2	2	9	9	9	10	9	9	6	9	
Fish Habitat Complexity	6	6	4	6	4	4	7	7	6	5	1	2	3	6	2	4	1	1	5	3	5	6	6	6	6	7	
Aquatic Invertebrate Habitat	5	5	5	7	5	5	7	7	6	5	1	2	3	5	2	5	1	1	5	5	5	5	5	6	7	7	
Riffle Embeddedness	8	8	N/A	8	9	9	9	9	N/A	N/A	N/A	N/A	10	9	9	8	N/A	N/A	9	9	8	N/A	9	9	9	9	
Overall Score	6.4	6.4	6.2	6.6	5.6	6.0	8.3	8.3	8.4	6.7	4.5	5.2	6.3	6.7	5.7	6.4	3.5	3.5	7.3	6.3	7.3	7.1	7.3	7.4	7.6	8.2	
Classification	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Good	Fair	Good	Good	Good	Good	Good	Good	

Table B.3 Fourmile Creek and Gold Run Ecosystem Restoration Recommendations

Reach	Recommendation
1a	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. Consider removing concrete/riprap bank protection and replacing with natural materials or native boulders.
1b	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. Consider removing concrete/riprap bank protection and replacing with natural materials or native boulders.
1c	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating boulders, rock clusters, and large woody debris.
1d	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris.
1e	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. Eliminate in-stream barrier and replace with step-pool feature.
1f	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris.
2a	No action recommended. Vegetation will re-establish over time.
2b	No action recommended. Vegetation will re-establish over time.
2c	No action recommended. Vegetation will re-establish over time.
2d	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. All improvements within this reach need to be coordinated with adjacent landowner.
2e	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. All improvements within this reach need to be coordinated with adjacent landowner.
2f	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. All improvements within this reach need to be coordinated with adjacent landowner.
3a	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating boulders, rock clusters, and large woody debris. Consider removing concrete/riprap bank protection and replacing with natural materials or native boulders.

Table B.3 Fourmile Creek and Gold Run Ecosystem Restoration Recommendations

Reach	Recommendation
3b	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating boulders, rock clusters, and large woody debris. Consider removing concrete/riprap bank protection and replacing with natural materials or native boulders.
3c	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. Consider removing concrete/riprap bank protection and replacing with natural materials or native boulders.
3d	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating boulders, rock clusters, and large woody debris. Consider removing concrete/riprap bank protection and replacing with natural materials or native boulders.
3e	Complete channel restoration would be required to restore ecosystem. Coordinate with ongoing Gold Run Road improvements to improve channel condition, in-stream habitat, riparian zone to the maximum extent possible. Consider reducing road width and/or modifying road alignment where practical to increase channel capacity and floodplain width.
3f	Complete channel restoration would be required to restore ecosystem. Coordinate with ongoing Gold Run Road improvements to improve channel condition, in-stream habitat, riparian zone to the maximum extent possible. Consider reducing road width and/or modifying road alignment where practical to increase channel capacity and floodplain width.
3g	Incorporate/stabilize a low flow channel section ; stabilize channel banks using native boulders or natural materials where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris.
4a	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris. Consider removing concrete/riprap bank protection and replacing with natural materials or native boulders. Consider reducing road width and/or modifying road alignment where practical to increase channel capacity and floodplain width.
4b	No action recommended. Reach is in good condition. Vegetation will re-establish over time and in-stream habitat will improve as channel continues to heal through natural processes.
4c	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; revegetate riparian corridor with native species where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris.
4d	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris.
4e	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris.
4f	Incorporate/stabilize a low flow channel section with lower width-to-depth ratio; stabilize channel banks using native boulders or natural materials where needed; increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and large woody debris.
4g	No action recommended. Reach is in good condition.

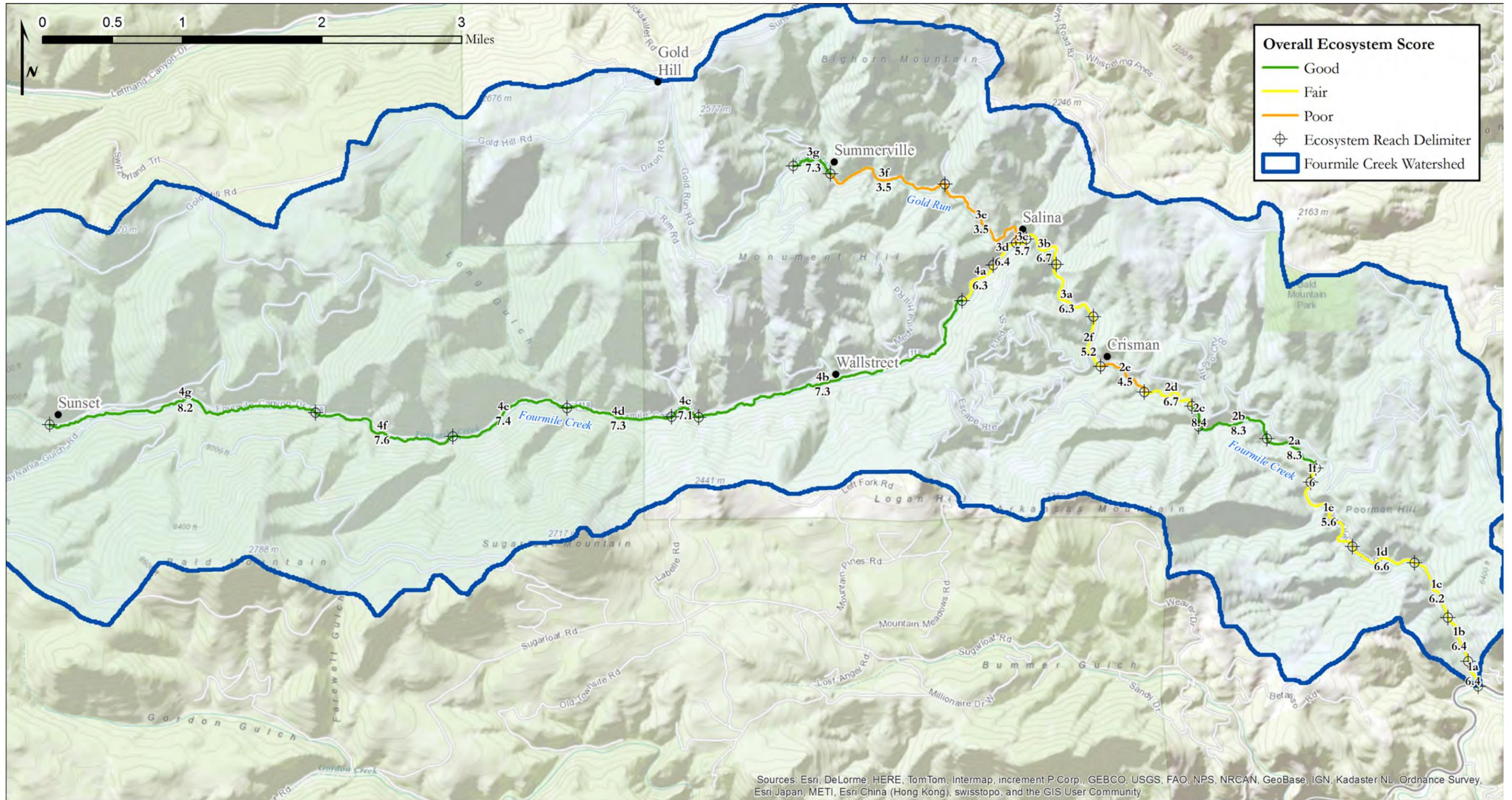


Figure B.1: Overall Ecosystem Score

FOURMILE WATERSHED  
MASTER PLAN  
Michael Baker  
INTERNATIONAL

4. Photo Log

*REACH 1A (FOURMILE CREEK FROM CONFLUENCE WITH BOULDER CREEK TO MILE MARKER 0.1– LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 1B (FOURMILE CREEK FROM MILE MARKER 0.1 TO MILE MARKER 0.4) – LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 1C (FOURMILE CREEK FROM MILE MARKER 0.4 TO MILE MARKER 0.8) – LOOKING DOWNSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 16, 2014*



*REACH 1D (FOURMILE CREEK FROM MILE MARKER 0.8 TO MILE MARKER 1.2) – LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 1E (FOURMILE CREEK FROM MILE MARKER 1.2 TO MILE MARKER 1.7) – LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 1F (FOURMILE CREEK FROM MILE MARKER 1.7 TO MILE MARKER 1.8) – LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 2B (FOURMILE CREEK FROM MILE LARKER 2.3 TO MILE MARKER 2.9) – LOOKING UPSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 2C (FOURMILE CREEK FROM MILE MARKER 2.9 TO MILE MARKER 3.1) – LOOKING UPSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 16, 2014*



*REACH 2D (FOURMILE CREEK FROM MILE MARKER 3.1 TO THE END OF CRISMAN) – LOOKING DOWNSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 16, 2014*



*REACH 2E (FOURMILE CREEK FROM THE END OF CRISMAN TO MILE MARKER 3.7) – LOOKING DOWNSTREAM(L), LOOKING UPSTREAM(R), SEPTEMBER 16, 2014*



*REACH 2F (FOURMILE CREEK FROM MILE MARKER 3.7 TO MILE MARKER 4.0)– LOOKING DOWNSTREAM(L), LOOKING UPSTREAM (R), SEPTEMBER 17, 2014*



*REACH 3A (FOURMILE CREEK FROM MILE MARKER 4.0 TO MILE MARKER 4.5) – LOOKING DOWNSTREAM(L), LOOKING UPSTREAM (R), SEPTEMBER 17, 2014*



*REACH 3B (FOURMILE CREEK FROM MILE MARKER 4.5 TO MILE MARKER 4.8) – LOOKING UPSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 17, 2014*



*REACH 3C (FOURMILE CREEK FROM MILE MARKER 4.8 TO MILE MARKER 4.9) – LOOKING DOWNSTREAM, SEPTEMBER 17, 2014*



*REACH 3D (FOURMILE CREEK FROM MILE MARKER 4.9 TO MILE MARKER 5.0) – LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 3E (GOLD RUN FROM THE CONFLUENCE WITH FOURMILE CREEK TO INGRAM GULCH) – LOOKING UPSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 17, 2014*



*REACH 3F (GOLD RUN FROM INGRAM GULCH TO MILE MARKER 1.4) – LOOKING UPSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 17, 2014*



*REACH 3G (GOLD RUN FROM MILE MARKER 1.4 TO SUMMERVILLE) – LOOKING UPSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 17, 2014*



*REACH 4A (FOURMILE CREEK FROM MILE MARKER 5.0 TO MILE MARKER 5.3) – LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 4B (FOURMILE CREEK FROM MILE MARKER 5.3 TO MILE MARKER 7.0) – LOOKING UPSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 16, 2014*



*REACH 4C (FOURMILE CREEK FROM MILE MARKER 7.0 TO MILE MARKER 7.2) – LOOKING UPSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 17, 2014*



*REACH 4D (FOURMILE CREEK FROM MILE MARKER 7.2 TO MILE MARKER 7.8) – LOOKING UPSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 17, 2014*



*REACH 4E (FOURMILE CREEK FROM MILE MARKER 7.8 TO MILE MARKER 8.5) – LOOKING UPSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 17, 2014*



*REACH 4F (FOURMILE CREEK FROM MILE MARKER 8.5 TO MILE MARKER 9.3) – LOOKING DOWNSTREAM (L), LOOKING DOWNSTREAM (R), SEPTEMBER 17, 2014*



*REACH 4G (FOURMILE CREEK FROM MILE MARKER 9.3 TO SUNSET) – LOOKING DOWNSTREAM (L), LOOKING UPSTREAM (R), SEPTEMBER 17, 2014*

