Hazard Identification & Risk Assessment, Housing and Land Use Analysis

Town of Jamestown

December 2015

Leese & Associates

Acknowledgements

The Project Team would like to thank and acknowledge the significant contributions of the members of this plan's Advisory Team, who provided valuable guidance and vision throughout the course of the planning process. We would also like to thank attendees who participated in the community meetings and survey.

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EXECUTIVE SUMMARY

Jamestown experienced a traumatic flood event on September 11, 2013 that lasted for three days. During this event, the town lost 13% of the homes, 35% homes damaged, 50% of the drinking water distribution system, the water treatment plant infrastructure, 50% of the roads, a bridge, culvert, and the Jamestown Volunteer Fire Department Fire Station. About 90% of the population was displaced since the floods heavily damaged the drinking water infrastructure and roads. Despite the tremendous loss, Jamestown is pushing forward with long-term recovery and has made progress on a multitude of fronts.

During the first year following the flood, the Town had to focus on the basics of restoring services and access. During the second year following the flood, the Town worked tirelessly to complete a Long-Term Recovery Plan (LTRP) that was adopted by the Town Board of Trustees (BOT) in April 2015. The LTRP specifically addressed the objectives of the recovery process, long-term sustainability and the efficient use and leveraging of available recovery resources.

Land Use and Housing, one of six Community Planning Groups participating in the development of the Jamestown Long Term Recovery Plan, established a goal to: "Explore options to allow Jamestown to manage growth consistent with the mountain character of Jamestown."

It is of utmost importance to the residents of Jamestown that the recovery and any future development be executed in an informed, conscientious and culturally appropriate way that contributes to the overall sustainability and small mountain-town character of Jamestown and the surrounding environment. Housing needs must be strategically planned and carried out to preserve the Town's character and economic sustainability.

There are two parts to the overall study:

- Part One: Hazard Identification and Risk Assessment (HIRA)
- Part Two: Housing and Land Use Analysis

Part One, the HIRA, or risk assessment, is basic to providing the Town with the knowledge base it needs to understand its risks to natural hazards. The information in the HIRA tells the Town and property owners where moderate and high hazard areas exist, and what cautions to exercise as it contemplates new development.

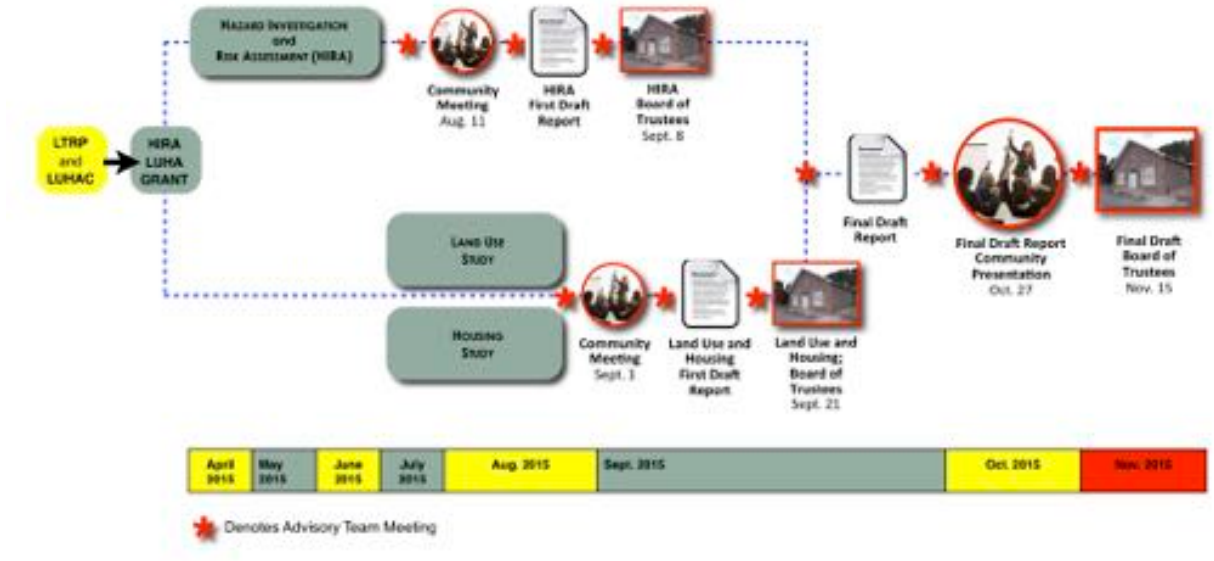
In 2015, Jamestown submitted a hazard assessment (See Appendix E) to Boulder County in order to be covered under the County Hazard Mitigation Plan, which makes the Town eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Hazard Mitigation Assistance (HMA) grant program, and Pre-Disaster Mitigation (PDM) program, among others. Without the Boulder County Hazard Mitigation Plan, Jamestown would not have been eligible to receive FEMA funding after the 2013 floods, and it is important to remain eligible for disaster funding in case the Town experiences another disaster. The preparation of this HIRA was coordinated with the Office of Emergency Management of Boulder County.

Part Two, the Housing and Land Use Assessment, builds on the information provided by the HIRA. Individual parcels were rated in terms of hazard risk (flooding, wildfire, and geological), water service (water treatment plant capacity, water distribution capacity, and second source water supply), development feasibility (slope, access, parcel size, potential for septic field, potential for water well), and professional experience in site planning.

Housing goals that were derived from a community survey, infrastructure availability, and other development feasibility criteria were combined with the HIRA information to create a number of categories of development opportunities called focus areas. This categorization enabled the consultant team to estimate the numbers of potential development sites that exist within each focus area. The focus areas were then characterized by ease of implementation, environmental impact, anticipated timeframe to develop or implement, infrastructure needs, revenue generation, etc.

The final sections of Part Two contain: a summary of the Town's ordinances, followed by a step-by-step description of the various permitting processes that a property owner encounters as he/she seeks to subdivide and/or develop a property in Jamestown. This is followed by a list of opportunities for improving the Town's resilience, safety, and sustainability.

Figure ES-1: Process Chart



Part One – Hazard Identification and Risk Analysis

Wildfire Hazard Mitigation Implementation Options

Jamestown is vulnerable to wildfires during periods of high fire or greater fire danger. Flammable woody debris and vegetation support rapid fire spread and high intensity flames that are difficult to control. Rapid evacuation will be needed to get citizens out of harm's way.

Wildfire hazard mitigation options developed as a result of this study include:

1. Develop a Community Wildfire Protection Plan (CWPP) that outlines specific mitigation techniques designed for the community's terrain and hazards.
2. Adopt "Fire Adapted Communities" strategies.
   A Fire Adapted Community takes actions before a wildfire to:
   - Ensure that the local fire department is signed up with the Ready, Set, Go! program, and is equipped to provide local protection.
   - Ensure that all neighborhoods are participating in the Firewise Communities/USA® Recognition Program.
   - Actively implement a Community Wildfire Protection Plan.
   - Provide residents with emergency planning kits and safety plans.
   - Establish a safety zone for residents if safe evacuation is not an option.
3. Ensure that homes are built or retrofitted with fire-resistant materials, and landscaped to reduce wildfire risk. (Adopt Boulder County Building Code Amendment)

4. Ensure that forests, trees, and brush in the surrounding landscapes are managed to reduce hazardous fuels.

Flooding Hazard Mitigation Implementation Options

The floodplain delineations presented in this report provide preliminary information to guide the planning and development process for the Town of Jamestown, as well as highlight possible future changes to the floodplain. Updated hydrologic data and stream projects completed by the EWP may affect future floodplain delineations for the Town of Jamestown.

This flood risk assessment developed a hydraulic model using 2014 hydrologic data to show the possible effect of the updated hydrologic data on the current delineation. The results demonstrated that the floodplain analysis completed with the 2014 hydrologic data is not significantly different from the current regulatory analysis, but further studies are needed for a detailed delineation. The EWP work that has been completed since the 2014 Provisional Delineation has affected the channel configuration and cross-sections geometry, which may result in changes in the 1% annual chance floodplain.

Flood hazard mitigation options developed as a result of this study include:

1. Continue to pursue updating of the floodplain data by the Colorado Water Conservation Board. That data will ultimately be used to develop a new floodplain delineation for the Town.

Geological Hazard Mitigation Implementation Options

Several geologic hazards and geologic constraints affect Jamestown. They include debris flows, slope-stability issues, mines and mill tailings, hazards and constraints on valley floors, seismic hazards, and radon.

Geological hazard mitigation options developed as a result of this study include:

1. All drainage basins that have potential to generate debris flows should be evaluated by a team of hydrologists, geologists, and geotechnical engineers to assess the probability of debris flows and their volumes and hydraulic properties. Until these studies are completed, new construction should be avoided in debris-flow areas. Mitigation should be undertaken to protect existing structures from future debris flows. Awareness through education, and warnings when precipitation conditions are favorable for debris-flow generation, also are important.
2. The erosional damage at the site on the west bank of Little James Creek should be evaluated by a geotechnical engineer to determine whether the damage should be repaired and, if needed, what should be done.
3. The old landslide detected on the hillside above the cemetery should be studied in detail to determine why it happened at that location and whether other parts of Town have similar conditions. In the meantime, excavation and construction are not recommended on the old landslide. Geotechnical investigations should be conducted at all sites in potentially unstable areas prior to undertaking any excavation or construction to avoid destabilizing the slopes.
4. Construction should not be allowed in the rockfall hazard area unless mitigative measures are utilized. When Andersen Hill Road is rebuilt, the loose fill in the area of sloughing may need to be replaced or mitigated by geotechnical engineers. The rock avalanche on the slopes of Porphyry Mountain above Town should be evaluated to determine if a similar or larger event could affect the town.
5. The mine and mill areas should be examined for hazardous shafts, adits, and subsidence features. Any discovered hazardous mine features should be safeguarded.
6. The extent, locations, and depths of underground workings should be determined as well as possible, and structures should not be built over shallow underground workings where subsidence of the ground surface might occur. Septic systems should not be permitted over shallow underground workings or over highly fractured rock to avoid seepage of leachate into aquifers.

7. Studies should be conducted to assess the potential for environmental and radiation hazards in the mine and mill areas. Ground-based radiation surveys are recommended in mine and mill areas known to contain uranium minerals prior to selecting sites for structures. Suitability of soils for foundations in mine, mill, and reclaimed areas should be assessed prior to construction of new buildings.
8. Radon testing should be done not only for existing and new structures in areas known to contain uranium minerals, but also for all homes in town because the types of rocks beneath the town tend to have naturally elevated concentrations of radioactive minerals, and past testing has detected radon levels well above recommended levels. Avoidance is a first option for new building sites. Radon mitigation is feasible for both existing and new structures.
9. Structures built on valley floors should be designed to resist erosion and sediment deposition during flood events because it is difficult to predict exactly where these fluvial processes will happen during flooding. Existence of and depths to shallow groundwater can be determined by test drilling. Presence of compressible, organic-rich soils may be best determined on a site-specific basis.
10. New construction should, at a minimum, be built using the seismic design criteria in the currently adopted building code.

Part Two – Housing and Land Use Analysis

Housing Analysis

Demographic data and building permit records revealed that although there have been fluctuations, the average growth has been approximately 1 unit per year since 1950 (this correlates with the most recent LUHA survey data). During the 1960s (when Jamestown saw its greatest recent growth) the annual average growth was 1.7 units/year.

In 2010, there were 131 households in Jamestown, and in 2014, according to the U.S. Census, there were 112 households.

There is a fairly even distribution of age ranges in Jamestown. There are relatively fewer younger people (<44 years) compared to Boulder County and a greater percentage of the population in the middle age category (45-74). About 5% of Jamestown's population is over the age of 75.

Jamestown's estimated median household income is $69,444 in 2015, slightly lower than Boulder County, which is $70,214.

Survey Results

Eighty-three residents responded to the Jamestown Hazard Investigation, Housing and Land Use Questionnaire (October 2015). Compared to the town demographics, 55-74 age respondents were overrepresented while younger residents (25-54) were underrepresented. Over half of the respondents have had to address repairs for flood damages. While the majority of respondents had less than $15,000 in damage, several reported much higher cost estimates.

To help address the Town's fiscal situation, the majority of residents supported a property tax increase (although most wanted more information), and wanted the Town to investigate alternative revenue sources.

A majority supported the addition of more housing at the historic growth rate of one unit per year.

There was little support for multifamily housing. While there was general support for ADUs, many would not consider one for their property.

There was general support for:

- Allowing subdivision lot sizes to be smaller than 2.3 acres
- Adding more housing in town on vacant properties

- Annexing private lands with existing houses on them
- Bringing municipal water to Rose M and West of Ward Street
- Services to help residents age in place
- Existing town services

The results of the survey indicated that the majority (58%) of residents responded that not adding more housing was a bad idea and expressed preferences about the locations of new home-sites. 70% responded that they agreed with adding more housing in Town on vacant properties. 51.9% responded that they would support allowing lot sizes to be smaller than the current minimum size, and 56.4% agreed with the idea of bringing Town water to the lots west of Ward Street.

Projections

Housing prices have generally continued to increase despite the flooding in 2013. In general, Jamestown will follow county level and regional trends.

Between 2009 and 2013, the median housing value in Jamestown was estimated at $289,800 (compared to $350,900 in Boulder County). In September 2015, homes available for sale in Jamestown ranged in price from $350,000 to $419,000.

In general, future housing trends are likely to mirror past housing trends. There are significant barriers to entry into the Town and a lack of support for any change in housing types and the growth rate.

Housing Criteria

The Survey results supported the following considerations, or criteria, that were then used to inform the land use analysis.

- Maintain Jamestown's unique mountain town character
- Bolster the Town's financial health and support ways of identifying new sources of revenue (property taxes, alternative revenue sources, increased housing, etc.).
- Provide for:
  - Aging in place
  - A mix of age
  - A mix of incomes
- Reflect the historical rate of growth
- Honor the Town's heritage and culture
- Reflect preferences for single family dwellings with allowances for ADUs
- Improve the safety and sustainability of the Town

Land Use Analysis

The Land Use Analysis builds on the information provided by the HIRA. Using the HIRA data, individual parcels were rated in terms of hazard risk (flooding, wildfire, and geological), water service (water treatment plant capacity, water distribution capacity, and second source water supply), development feasibility (slope, access, parcel size, potential for septic field, potential for water well), and professional experience in site planning.

Housing goals that were derived from the community survey, infrastructure availability, and other development feasibility criteria were combined with the HIRA information to create a number of categories of development opportunities called focus areas. This categorization enabled the consultant team to estimate the number of potential development sites that exist within each focus area. The focus areas are then characterized by ease of implementation, environmental impact, anticipated timeframe to develop or implement, infrastructure needs, revenue generation, etc.

Build-out and Revenue Generation Projections

In order for the Town of Jamestown to evaluate Land Use and Housing options vis-à-vis possible impacts on its annual budgets and/or desire for expansion of community services, the following projections have been provided. It should be noted that this summary only represents opportunities, as development within the Town has to be considered market driven. These projects are based on a growth rate of 1-2 homes per year, with a projection of the number of years to achieve full build-out for each focus area provided in Table ES-1.

Table ES-1: Buildout and Revenue Generation Projections

Focus Area	Defining Characteristic	Timeframe	Estimated Available Number of Lots or Sites	Years to Achieve Full Build-out at Rate of 1- 2 Dwelling Units/yr.	Estimated Cumulative Fiscal Impact by Year 2025, General + Capital Revenue
1	Vacant platted lots in Town	0 – 3 yrs.	13	13 yrs. to 7 yrs.	1 DU/yr.: $19,562 2 DU/yr.: $38,549
2	Larger parcels in Town, if subdivided	0 – 3 yrs.	7	7 yrs. to 4 yrs.	1 DU/yr.: $16,055 2 DU/yr.: $25,302
3	Parcels in Town, owned by Federal Agencies	0 – 5 yrs.	14	14 yrs. to 7 yrs.	1 DU/yr.: $23,393 2 DU/yr.: $40,260
4	Parcels in Town, owned by the Town	0 – 5 yrs.	6	6 yrs. to 3 yrs.	1 DU/yr.: $18,420 2 DU/yr.: $10,475
5	Parcels adjacent to Town, if subdivided	0 – 10 yrs.	10	10 yrs. to 5 yrs.	1 DU/yr.: $12,229 2 DU/yr.: $3,803

This summary builds on work completed on behalf of the Town by the State of Colorado's Department of Local Affairs in association with the Center for Priority Based Budgeting. It shows the potential property tax revenues from additional residences in the Town of Jamestown for several focus areas. The analysis assumes that a single family detached residence would be valued at $289,800 in 2015 dollars. Property values have been rising, and the analysis assumes that values would continue to rise at an average rate of 3% annually. Since, under Colorado Law, all real property is re-appraised in the odd number years, it was assumed that the impact to the property taxes would be seen in even number years (since property taxes are paid one year in arrears) rather than annually. Residences are built and added to the Town at either 1 or 2 dwelling units per year. Mill levies of 23.5mills for the Town were assumed (based on 8 mills for Fire, 12.5 Mills for the General Fund, and 3 Mills for Capital.) It also assumed the temporary mill levy increase of 1.7 for the first three years of the analysis.

Table ES-1 summarizes the defining characteristic of each of the focus areas, the general time frame, the estimated number of available lots, years to achieve full buildout, and the estimated cumulative revenue generated by the year 2025 by these additional residences for each focus area. Costs of expansion, such as the cost to extend water distribution lines, are not included. Such costs are not possible to produce without feasibility studies and potentially could be paid for by other sources, such as grants. The Board of Trustees will need to address the costs of future development through feasibility studies, grant applications, etc.

Opportunities for improving the Town's resilience, safety and sustainability

The Town of Jamestown has an opportunity for improving its resilience, safety, and sustainability to the benefit of all its residents. With these Land Use and Housing options, the Town is better equipped to determine its own course of action regarding future policy and regulatory decisions. From the work generated in the various sections of this report, the following items are presented for consideration by the Town's Board of Trustees:

1. Continue regular Hazard Identification and Risk Analysis (HIRA) and Hazard Mitigation Plan (HMP) updates

The Town should continue its coordinated efforts with Boulder County Office of Emergency Management and the State of Colorado towards regular HIRA and HMP updates.

2. Continue already initiated planning and mitigation efforts related to potential fire hazards

Prior to the September 2013 flooding, Jamestown was engaged in several efforts related to better protecting itself from potential fire hazards, including:

- Town of Jamestown Community Wildfire Protection Plan
- The Town of Jamestown should continue its current update of its Community Wildfire Plan.
- The National Fire Protection Association's (NFPA) Firewise Program
  Jamestown had initiated work towards joining this program. This program empowers neighbors to work together to reduce risk. It has an educational component, includes an annual event, and provides insurance discounts through the United Services Automobile Association (USAA). Ultimately, it improves the overall safety and sustainability of the community and the Town should consider participation.

3. Consider adoption of Boulder County's Amendment to the Building Code

The Town should consider adopting that portion of the Boulder County's Amendment to the Building Code that is related to fire hazard mitigation. The Town could limit this to new construction. Its adoption would improve the Town's sustainability and safety over the long term. As is the case today with the Town's current Building Code review, it would be administered by the County. Furthermore, it would establish requirements for improvements to parcels that are consistent to those in the unincorporated areas of the County that surround Jamestown.

- Amend the IGA to have a review of the HIRA data, and in particular the hazard maps, added to the County's development review process.
- Amend the 1997 IGA, Ordinance 3, Series 2011 and Ordinance 2, Series 2014 to activate the currently excluded Boulder County Building Code Amendments to the County development review of building permits in Jamestown.
- Amend the IGA to include site plan review in the County's development review.
- Amend the IGA to adopt the 2015 International Building Code (IBC) at the same time that Boulder County adopts the 2015 IBC in January 2016, including requirements for fire sprinkler systems in residences (currently excluded per Ordinance 2, Series 2014.Ask Boulder County to update its list of Intergovernmental Agreements page (http://www.bouldercounty.org/property/build/pages/igas.aspx) to include the 1997 IGA between Boulder County and the Town of Jamestown and Jamestown's Ordinance 2, Series 2008 (repealed) with Ordinance 3, Series 2011 and Ordinance 2, Series 2014.

4. Continue already initiated planning and mitigation efforts related to potential flood hazards

Jamestown has been engaged in a series of planning and mitigation efforts related to its exposure to flooding that should be continued, including:

- Flood Hazard Mitigation Plan
  Adopted in 1993, the Flood Mitigation Plan should be updated based upon lessons learned from the 2013 Flood and incorporating new floodplain mapping once completed. It should also be made available on the Town website.

- Jamestown Stream Corridor Master Plan
  The Town should update the provisional hydrology/hydraulics map that was included in the report by AMEC in February 2014. The Colorado Water Conservation Board (CWCB) has prioritized the floodplain mapping for the James Creek and the Little James Creek in the Jamestown area. This probably will occur in 2016. The Town of Jamestown should continue to work toward incorporation of this material into its regular HIRA and HMP updates as well as its Flood Hazard Mitigation Plan.

- Technical Capacity
  The Town currently has a Floodplain Administrator funded by a grant until July 2016. Given its history with flooding, the Town should endeavor to find the funding necessary to retain a Floodplain Administrator.

- Floodplain Ordinance
  Jamestown established an ordinance (Ordinance No. 8, Series of 2012), providing for the prevention of flood damage through adoption of principles promoted by FEMA. Updates to this ordinance, as appropriate and responsive to updated flood mapping, should be considered.

5. Continue participation and engagement in programs that enhance the Town's ability to reduce risk

Jamestown currently participates, or has participated, in several initiatives that reduce risks to both the Town and residents specifically, including:

- National Flood Insurance Program (NFIP)
  The Town of Jamestown joined the NFIP on July 18, 1983. The NFIP allows private property owners to purchase affordable flood insurance. Participation also enables the community to retain its eligibility to receive certain federally back monies and disaster relief funds.

- Community Rating System (CRS)
  The Community Rating System (CRS) is a voluntary program for National Flood Insurance Program (NFIP) participating communities. The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. The CRS has been developed to provide incentives in the form of premium discounts for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. The Town should continue its efforts working with FEMA towards joining the CRS.

6. Continue capacity building and partnerships

Jamestown's capacity to plan and respond to natural hazards continues to rely on the volunteer efforts of it residents. The Town has also built strong relationships and partnerships with many entities in the Boulder County region. To enhance the Town's ability to expand its capacity towards emergency planning and early warning, the following items should be considered:

- Public Information Programs
  As noted in Boulder County's 2015 HMP (anticipated to be approved by FEMA in 2016), Jamestown has regularly hosted educational programs including those provided by the EPA, U.S. Forest Service, Boulder County Health, Boulder County Office of Emergency Management, the James Creek Watershed Initiative and the Left Hand Watershed Oversight Group. Programs such as these should be continued and incorporated as recommendations into regular HIRA and HMP updates.

- Additional Agency Collaborations
  Additional collaborations that promote community evolvement should be considered, including a recommendation of the LTRP for the Town to "Work with local fire departments and other agencies to assist private landowners with creating defensible space and participate in programs such as FireWise Communities that encourage and support mitigation."

- Inter-Mountain Alliance (IMA)
  The Town continues to participate with the IMA. Responsive to a recommendation of the LTRP, the Town should "Work with the Inter-Mountain Alliance to establish a community-wide resident preparedness group."

- Mountain Emergency Radio Network (MERN)
  The Town continues to work closely with Boulder County in a variety of Emergency Preparedness and Early Warning programs. Supplementing these efforts and consistent with efforts of the IMA and a recommendation of the LTRP, the Town should "Promote participation in the Mountain Emergency Radio Network (MERN)."

- Town Auxiliary
  Consistent with a recommendation of the LTRP, the Town should consider establishing "an auxiliary to provide support services to Fire/EMS and assist in exploring fund-raising options for Town emergency services."

7. Review established process for special review

Jamestown's Ordinance No. 2, Series 1984 establishes that any building permit application for improvements within a high hazard area be subject to a special review. To this end, the Town should consider:

- Revisiting the definition of what is a High Hazard, consistent with this HIRA and the HMP
- Revisiting what the special review process, procedures and fees might be
- The establishment of a Special Review committee to provide a local perspective in addition to a technical development review by Boulder County
- Development standards/requirements for any new construction addressing mitigation of the hazard(s) as much as possible

8. Development Standards

To better maintain the Town's unique character and impacts that might be caused by new development, the Town may wish to consider the establishment of several development standards, including:

- Building setbacks.
  Currently the Town does not require setbacks for structures from property lines, including Accessory Dwelling Units (ADU). Noting that a "Good Neighbor" approach has worked well in the past for most projects, establishing minimum requirements will better ensure privacy and enhance the overall public safety of the community in the event of fire and other hazards.

- Lot line elimination and maximum lot size.
  Many communities along the Front Range have experienced the trend of "scrape offs", where an owner decides to demolish an existing structure to build a larger structure. This scenario can often include the elimination of lot lines with adjacent properties so that a much larger structure can be built. Given the possibility of an owner "aggregating" multiple lots, eliminating lot lines and building a large "McMansion" on the aggregate site, the Town may wish to explore the establishment of a maximum lot size and possibly revisions to its Lot Line Adjustment Ordinance (Ordinance No. 4; Series 2014).

9. Consider planning for expansion of the Town's water service capacity

At the time of this report, Jamestown had initiated exploration of a second water source. Complementary to this, the Town may also benefit from exploring expansion of its water service - possibly including a second water treatment plant in the Little James Creek sub-area - as a part of the Town's full build-out scenario.

10. Town of Jamestown and Boulder County Agreements and planning documents

As a part of the Town's overall Land Use planning, it should review the benefits of updates to the following:

- 1981 Comprehensive Plan
  The Town should consider updating the 1981 Comprehensive Plan. One potential benefit of the update might be agreements between the Town, County and the Forest Service that are responsive to the Long Term Recovery Plan's recommendation to "Explore options for mitigating Forest Service land with other public land."

- A 3-mile plan should be developed that encompasses any areas for potential future annexation to conform to state statutory requirements. This can be accomplished as a stand-alone plan or as part of the Comprehensive Plan update.

- Intergovernmental Agreement (IGA) Review
  The current Boulder County and Jamestown IGA (1997) addresses the administration of building permit including inspection services. Several sections of this agreement may merit re-examination, including:

  - Section A: Services to Be Provided
    This section should be coordinated with any efforts by the Town to possible revisions to the Special Review procedures and requirements.

  - Section B: Compensation
    This section of the agreement, which establishes the percentage of fees collected by the County and remitted to the Town, should be revisited especially if the Town adopts revisions to the Special Review procedures and requirements.

11. Development and Permit Fees

To assist the Town's ability to minimize any potential impacts from new development, the following should be considered:

- Permit Fees
  To improve the capacity of the Town to provide staff and/or personnel capable of reviewing future building permit applications and prepare reports to the Board of Trustees, an increase to the existing permit fees should be considered. Currently, Jamestown's building permit fees range from $5 - $30.

- Development Fees
  Ordinance 1, 2012 - Development Fees was established to Offset Impacts of Growth. This ordinance should be revisited particularly related to Fire and Safety Services (to continue the excellent service level provided by the Jamestown Volunteer Fire Department and EMT) and Streets and Bridges (particularly, to provide more capacity for road improvements and extensions) as well as Water Plant Capacity (to include possible expansion of services). New construction fees are currently established at $1.16/ft2 and an increase should be explored.

12. Mitigation, Maintenance and Operational Needs of Town Assets

The updated Boulder County HMP identifies the Fire Hall, Town Hall and Water Treatment Plant as Critical Facilities in Jamestown. To enhance the Town's capacity to better protect these assets and meet the challenges of major events, the following items are provided for consideration:

- Maintenance, Mitigation and Operational Reserves
  The Town should consider, through established mechanisms - such as increased Permit and/or Development Fees suggested above - the necessary funding that would establish and contribute to a "rainy day" fund that would result in a fiscally sustainable plan that incorporates mitigation into the maintenance of all Town property.

- Emergency Generators
  Consistent with a recommendation of the LTRP, the Town should consider obtaining "generators, one for central hub of Town Hall/Mercantile and one for the water plant."

- Slash Pile Facility
  To reduce exposure to wildfire, the LTRP recommends making "a slash pile available to residents."

13. Subdivision Approval Process

A review of the Subdivision Pamphlet has produced the following suggestions for improvement:

- The Town could amend the Subdivision Pamphlet to add a reference to the HIRA data and direct the applicant, the Town Board, and its consultants to the data for guidance.
- The Town could amend the ordinance to require that the applicant reimburse the Town for the cost to hire consultants to provide technical reviews of the proposed hazards and to propose mitigation measures that become conditions of approval.
- The ordinance requires that a topographical drawing be provided that shows areas of less than 5% slope, 5-15% slope, 15-30% slope, and greater than 30% slope. Other Town ordinances refer to a 20% slope as a trigger for special review requirements. It would be helpful if the Subdivision Pamphlet language were adjusted to require mapping of slopes that incorporated the 20% limit for consistency across ordinances. An example would be: less than 5%, 5-10% slope, 10-15% slope, 15-20% slope, and greater than 20% slope.
- The major hazard that is not addressed in the Subdivision pamphlet is wildfire. This would best be addressed by amending the Boulder County IGA to add enforcement of the Boulder County Building Code Amendments to the County's development review process.
- The Subdivision Pamphlet could be amended to specify that the preliminary plat is presented to the Town Board by the Town Planner, or a consultant hired by the Town to review the proposal with the cost to be reimbursed by the developer. The Town Planner or consultant would present the proposal with a view toward to whether the proposal is in compliance with Town ordinances, and the developer or his/her representative would present the features of the proposal and answer questions from the Board and public.
- The Town could amend the IGA with Boulder County to include a technical review of subdivision proposals by Boulder County development review staff and establish a Special Review committee such as LUHAC that would provide a local perspective.

14. Site Drainage Studies

Several areas of Town - including on 16th above the school and down towards Andersen Hill - continue to experience Storm Drainage issues that impact individual parcels as well as public roads. Funding for the civil engineering necessary to conduct a drainage plan should be explored.

15. Irrigation Ditch Repairs

That portion of the irrigation ditch that extends between 16th St. and 12th St. and above Spruce Street should be repaired to reduce impacts to developed and undeveloped parcels in this area.

Based on the survey results and the high level of participation in the community meetings, it is clear that the Town is ready to continue to improve the Town's future outlook by its willingness to mitigate hazard risks, to safeguard its unique character and lifestyle, and to plan for a fiscally sustainable growth that preserves the all-important character of this small mountain community tucked into the foothills of Boulder County.

PART 1 ~ HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

SECTION 1 | INTRODUCTION

The HIRA, or Hazard Identification and Risk Assessment, provides the Town with the knowledge base it needs to better understand its vulnerability to natural hazards and protect residents and property from hazard events. The HIRA demonstrates the community's commitment to reducing risks from hazards and is a tool to help decision-makers direct resources toward mitigation activities. The information in the HIRA tells the Town and property owners where moderate and high hazard areas exist, and what cautions it may want to exercise as it contemplates new development.

Jamestown submitted a hazard assessment (See Appendix F) to Boulder County in 2015 in order to be covered under the Boulder County Hazard Mitigation Plan, which made the Town eligible for federal Hazard Mitigation Assistance (HMA) grant programs, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) program, among others. Without the Boulder County Hazard Mitigation Plan, Jamestown would not have been eligible to receive FEMA funding after the 2013 floods, and it is important to remain eligible for disaster funding in case the Town experiences another disaster. The preparation of this HIRA was coordinated with the Office of Emergency Management of Boulder County.

While recovery from the flood and associated mudslides has been and continues to be the focus of Jamestown's day-to-day operations, there are other natural hazards such as wildfire and landslides that need to be better understood by the community and Town leadership. The landscape of Jamestown has changed as a result of the flooding and will continue to change through property acquisitions and land deed restrictions, revised floodplain mapping, and other potential regulatory changes.

By considering these elements, Jamestown can understand how to best manage and plan for its greatest risks across the full range of the threats and hazards it faces. It will allow Jamestown to make its own choices as to its health, safety and welfare. It also empowers residents to take voluntary steps on their own to better protect themselves and their properties against hazards.

This report has divided the list of potential hazards at two levels:

Tier One Hazards: This portion of the report places a focus upon wildfire, flooding, and geological hazards that have the highest magnitude in terms of scale and hazard threat.

Tier Two Hazards: This portion of the report addresses those hazards that have less bearing on land use planning decisions in Jamestown.

Tier One Hazards are dealt with in greater detail than the Tier Two Hazards. The hazard assessments for Tier One Hazards begin with a summary, followed by a more technical assessment. The technical hazard assessments are followed by vulnerability assessments and options for implementation of mitigation measures that will build upon the implementation strategies for objectives listed in the Long Term Recovery Plan, relating to hazards, land use, and housing.

1.1 Notes on the Wildfire Risk Assessment

The wildfire assessment was prepared using the Colorado Wildfire Risk Assessment Profile (CO-WRAP). CO-WRAP is the primary mechanism for the Colorado State Forest Service to deploy risk information and create awareness about wildfire issues across the state. It is comprised of a suite of applications tailored to support specific workflow and information requirements for the public, local community groups, private landowners, government officials, hazard-mitigation planners, and wildland fire managers. Collectively these applications provide baseline information needed to support mitigation and prevention efforts across the state, including mountain communities such as Jamestown.

While the scale of the state's CO-WRAP shows that wildfire risk is relatively evenly distributed throughout the Town (therefore minimizing variation in the development of land use concepts), it does provide this report with information about the need for emergency preparedness and other hazard mitigation plans and projects. There are, however smaller-scale considerations that improve the Town's ability to mitigate wildfire hazards, such as the expanding water distribution system, additional fire hydrants, and the ability to draw water for fire suppression from James Creek. These considerations will be more appropriately accounted for in the Land Use Study within the Land Use and Housing Assessment.

1.2 Notes on the Hydrology Risk Assessment

The most recent hydrology data that is available was obtained following the flooding, therefore it does not take into account the improvements that were made after the hydrology data was obtained. However, this is the data that the Town is currently using for its floodplain regulations. The hydrologists working on this study estimate that the post-flood hydrology data conducted after the floods, but before the improvements from AMEC, will probably end up being a more conservative estimate of the floodplain than a floodplain based on hydrology data that would be gathered today. Therefore, using the post-flood data as the currently best available data is reasonable. The CWCB is now in the process of beginning to obtain new data for several areas in Colorado, including Jamestown. That work was not complete in time to be incorporated into this study, despite efforts to make that happen.

This HIRA and Land Use and Housing Assessment is meant to give the town a planning and decision-making tool for helping Jamestown citizens decide how they want growth, if any, to occur. For planning purposes, the post-flood data that has been incorporated into this study is conservative and sufficiently useful in terms of its applicability to Land Use and Housing options.

SECTION 2 | JAMESTOWN WILDFIRE ASSESSMENT

Prepared by Jim Webb, Forest Stewardship Concepts, LLC

2.1 Summary

As seen in recent history, Jamestown is vulnerable to wildfires during periods of high fire or greater fire danger. The Town's setting and proximity to high amounts of flammable woody debris and vegetation can support rapid fire spread and high intensity flames. If a wildfire occurs, rapid evacuation will be needed to get citizens out of harm's way.

A detailed Community Wildfire Protection Plan (CWPP) is needed to chart the way to mitigate wildfire hazards in Jamestown and mobilize the community to take the necessary actions in response to a wildfire event. More detail on Community Wildfire Protection Planning and the need for a CWPP are included in the last part of this section.

2.2 Study Area Description

Jamestown is a small mountain town approximately 10 miles northwest of the City of Boulder. Historically a mining town, Jamestown is now a residential community and had a population of approximately 274 people in 2010 (AMEC, 2014). The town lies at approximately 6,920 feet above sea level and is surrounded by mountainous terrain with steep slopes. Existing development in Jamestown is located on both sides of James Creek. Land use is primarily residential with some business and commercial uses. The location of Jamestown is displayed in the following figures.

Figure 1-1: Project Area within Boulder County

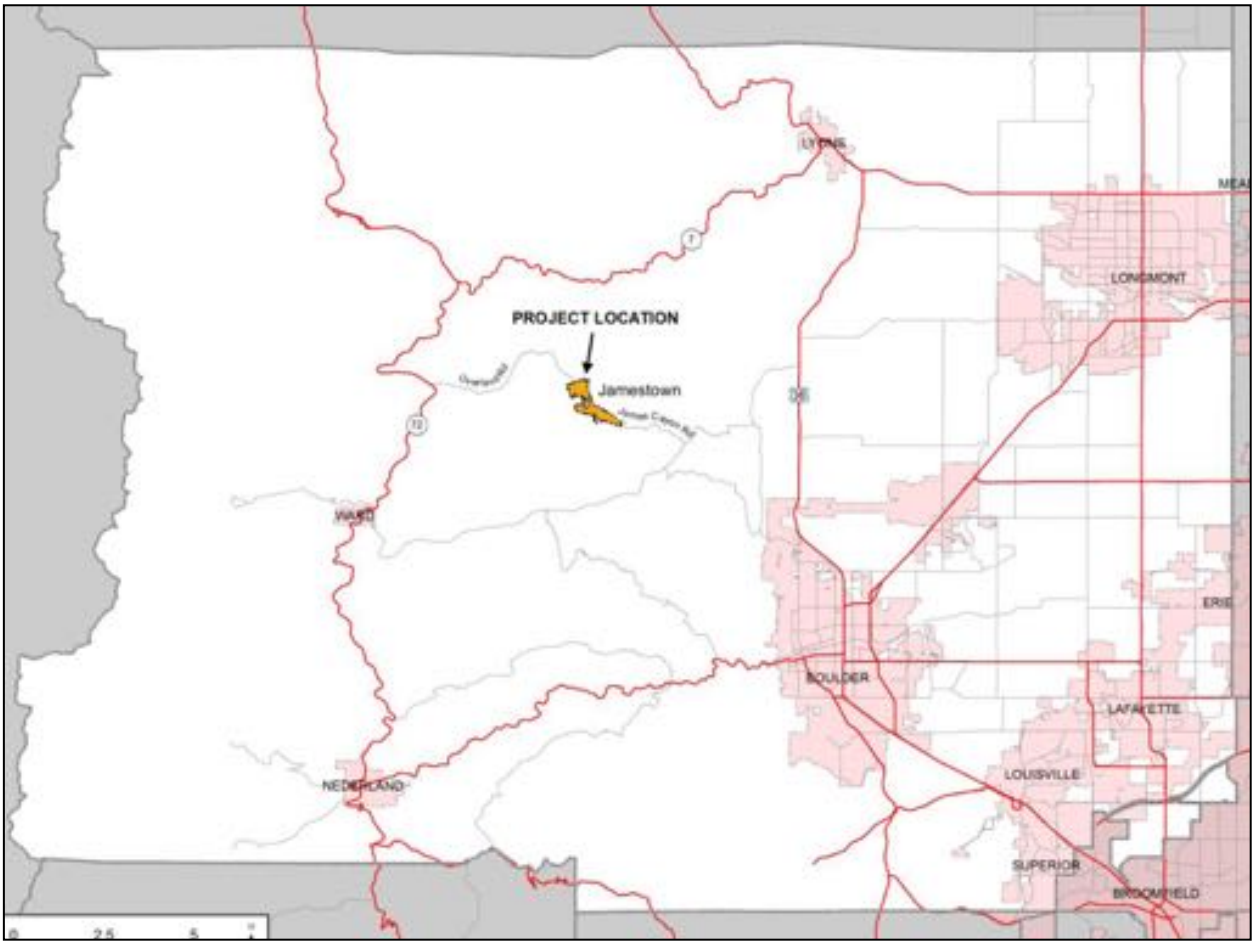
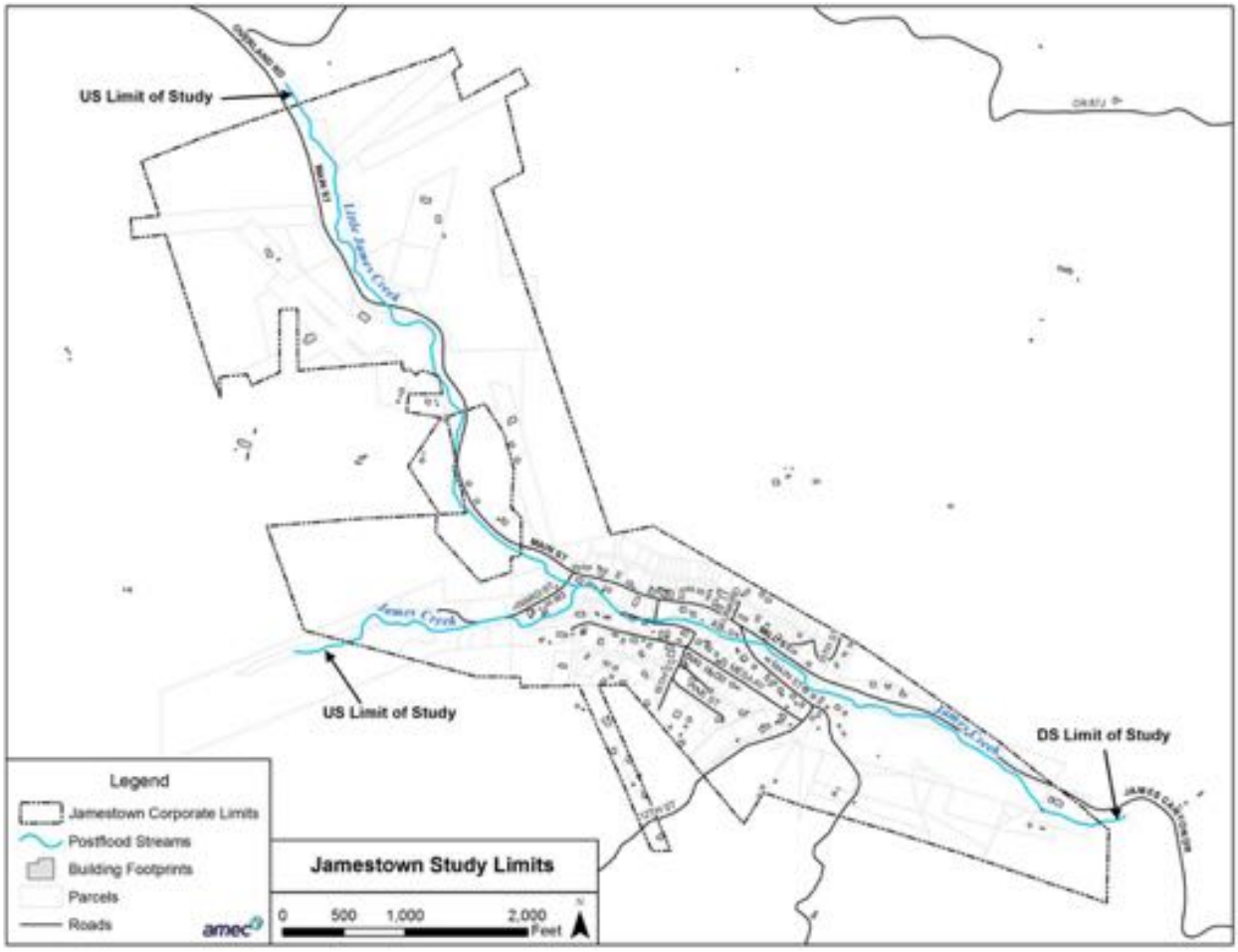


Figure 1-2: Town Limits of Jamestown



2.3 Technical Report

Methodology

A risk assessment report for the area that includes Jamestown was developed using the Colorado Wildfire Risk Assessment Program (CO-WRAP). The assessment area covers 9,286 acres within the area likely to impact the Jamestown community. The report was reviewed, and its veracity was checked with a site visit to Jamestown. Important facets of the report are summarized here. The complete contents of that report are contained in Appendix A for anyone wishing to conduct an in-depth review.

Colorado Wildfire Risk Assessment Portal

The Colorado Wildfire Risk Assessment (CO-WRA) and its Portal (CO-WRAP) is a web-mapping tool that provides access to statewide wildfire risk assessment information in Colorado. CO-WRAP is the primary tool for the Colorado State Forest Service to display risk information from the Colorado Wildfire Risk Assessment and create awareness about wildfire issues across the state. The goal of CO-WRAP is to provide a consistent and comparable set of scientific results to be used as a foundation for wildfire mitigation and prevention planning in Colorado.

Through CO-WRAP, fire mitigation professionals, prevention planners, natural resource professionals and interested citizens can generate maps and download data and reports that describe defined project areas, such as neighborhoods or watersheds. The information in the web portal is based on geographic information system (GIS) data layers that allow users to view such themes as likelihood of an acre burning, potential fire intensity, historic fire occurrence and values at risk from wildfire.

Wildfire Risk Indicators

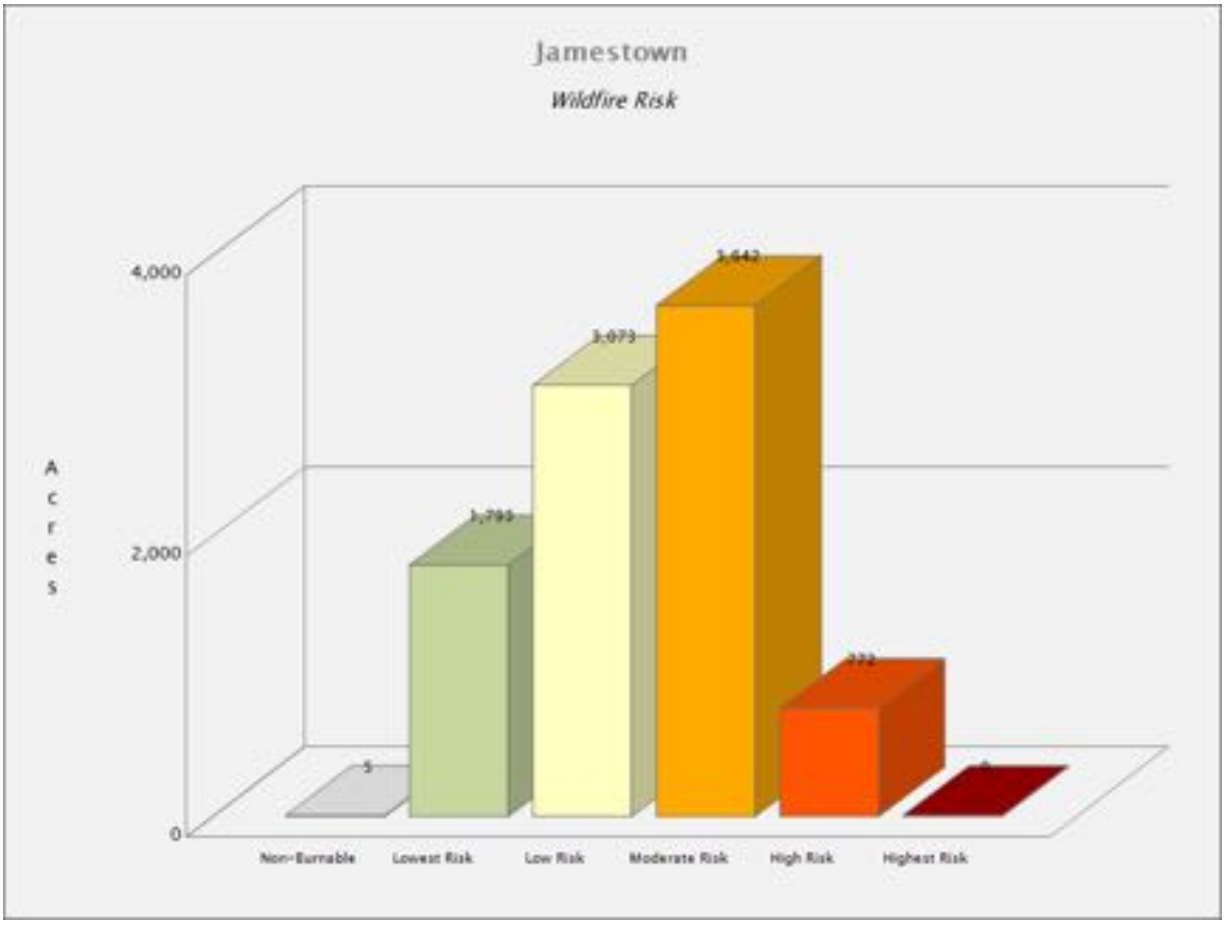
The Wildland-Urban Interface Risk Index

The Wildland-Urban Interface (WUI) Risk Index is a rating of the potential impact of a wildfire on people and their homes. The key input, the WUI, reflects housing density (houses per acre) consistent with Federal Register national standards. The location of people living in the wildland-urban interface and rural areas is essential for defining potential wildfire impacts to people and homes. Forty-eight percent of the Jamestown CO-WRAP assessment area has a moderate to high WUI risk index. Jamestown and the 772 acres surrounding Jamestown have the highest likelihood for negative impacts.

WUI is defined as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk from wildfire. The Jamestown Area WUI has a population of 320, which includes the entire population of Jamestown. Sixty-nine percent of the houses are located on parcels of five acres or less.

Wildfire risk combines the likelihood of a fire occurring (threat), with those areas of most concern that are adversely impacted by fire (fire effects), to derive a single overall measure of wildfire risk.

Figure 1-3: Jamestown Wildfire Risk (Vulnerability)



This chart shows that a significant (48%) portion of the Jamestown Wildland Urban Interface area (the area within a 3-mile radius of the Town limits) has a moderate to high risk (vulnerability) of a wildfire.

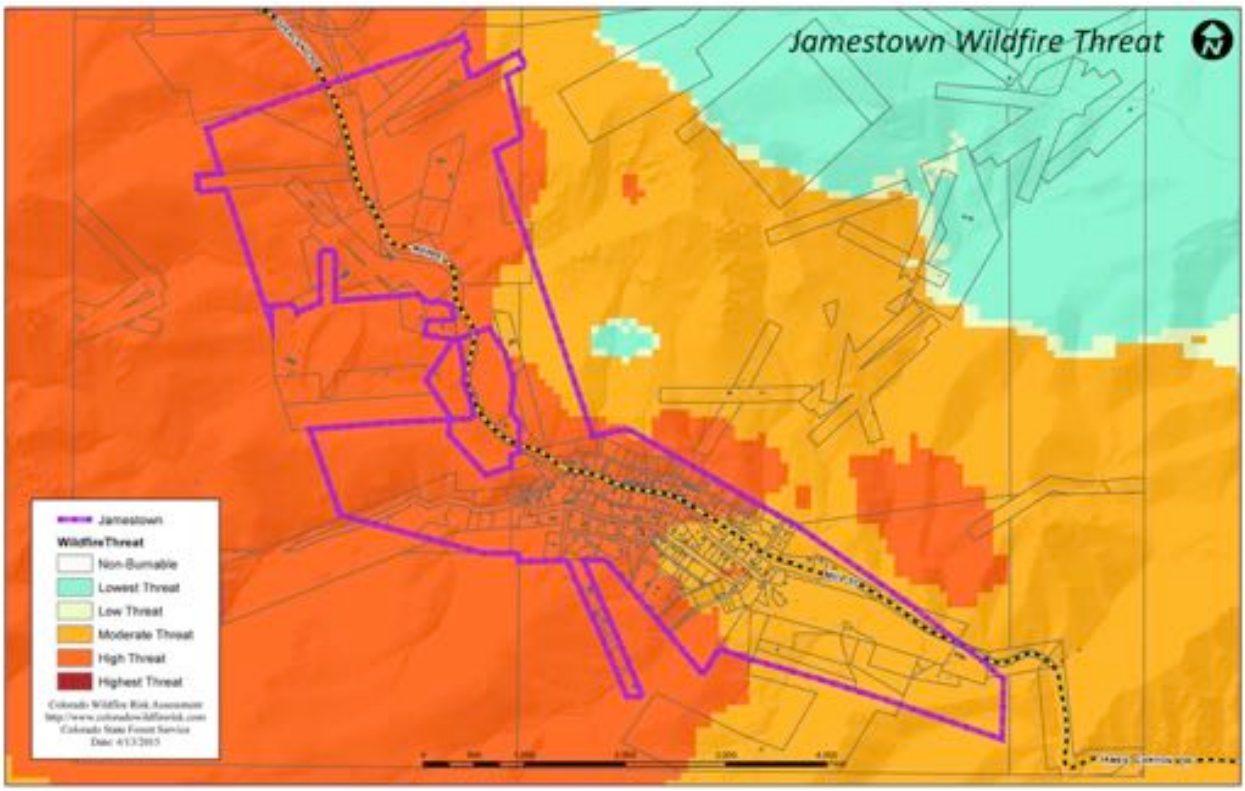
Fire Threat Index

The measure of wildfire threat used in the CO-WRAP is called Fire Threat Index (FTI). FTI combines the probability of an acre igniting (fire occurrence) and the expected final fire size based on rate of spread in four

weather percentile categories. Since all areas in Colorado have FTI calculated consistently, it allows for comparison and ordination of areas across the entire state. For example, a high threat area in East Colorado is equivalent to a high threat area in West Colorado.

Most of Jamestown is within the area designated as "High Threat". Figure 1-4 indicates that the north-facing slope on the south side of town has a higher threat than the south-facing slopes on the north side of Jamestown which seems counter intuitive because south-facing slopes tend to be drier than north-facing slopes due to greater sun exposure. Also, north and south slopes often burn differently. The categories of content extracted from the CO-WRAP are rather broad. In the context of the report the difference between north and south slopes is not significant enough to be differentiated. If/when the Town does a Community Wildfire Protection Plan (CWPP) these finer-grained differences would emerge.

Figure 1-4: Fire Threat Index in the Jamestown Area



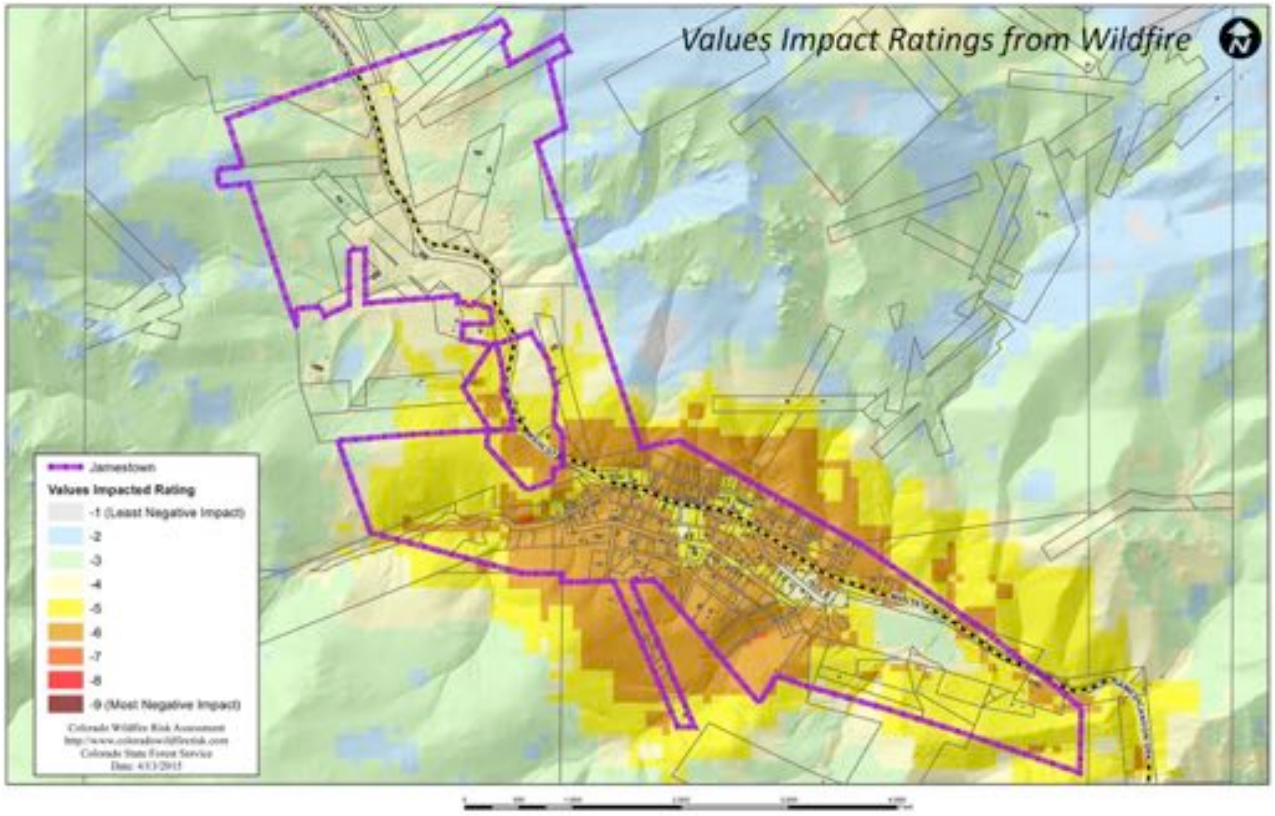
Jamestown proper has a wildfire threat of moderate to high.

The Values Impacted Rating

The Values Impacted Rating (VIR) is an overall fire effects rating that combines the risk ratings for Wildland Urban Interface, Forest Assets, Riparian Assets, and Drinking Water Importance Areas into a single measure of values-at-risk.

Values-at-risk are those items that are likely to be damaged or destroyed by a wildfire. They include life, property, infrastructure, watershed health, recreational quality, wildlife habitat, timber, visual quality, etc.

Figure 1-5: Jamestown Values Impacted Rating Map

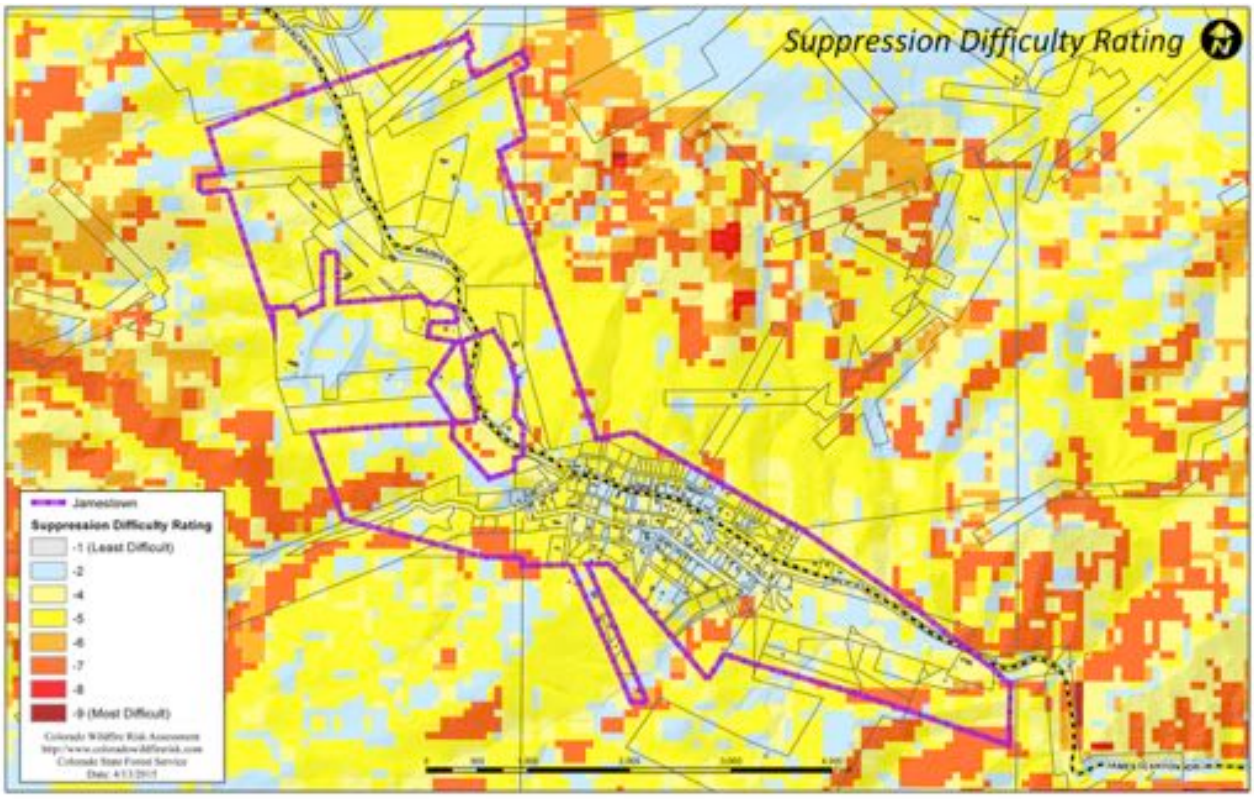


This map shows that there will likely be serious impacts to the values in Jamestown due to the concentration of those items measured (houses, infrastructure, and other improvements, etc.).

Suppression Difficulty Rating

The suppression difficulty rating reflects the relative difficulty and cost to suppress a fire given the terrain and vegetation conditions that may impact machine operability. This layer is an overall index that combines the slope steepness and the fuel type characterization to identify areas where it would be difficult or costly to suppress a fire due to underlying terrain and vegetation conditions that would impact machine operability (in particular, a Type II dozer). Most of the Jamestown area is designated as having a suppression difficulty rating of -5. Note that this rating does not take into account specific locations of fire hydrants in Jamestown. A detailed CWPP would take into account finer-grained distinctions such as locations of sources of water used for fire suppression.

Figure 1-6: Suppression Difficulty in Jamestown Area

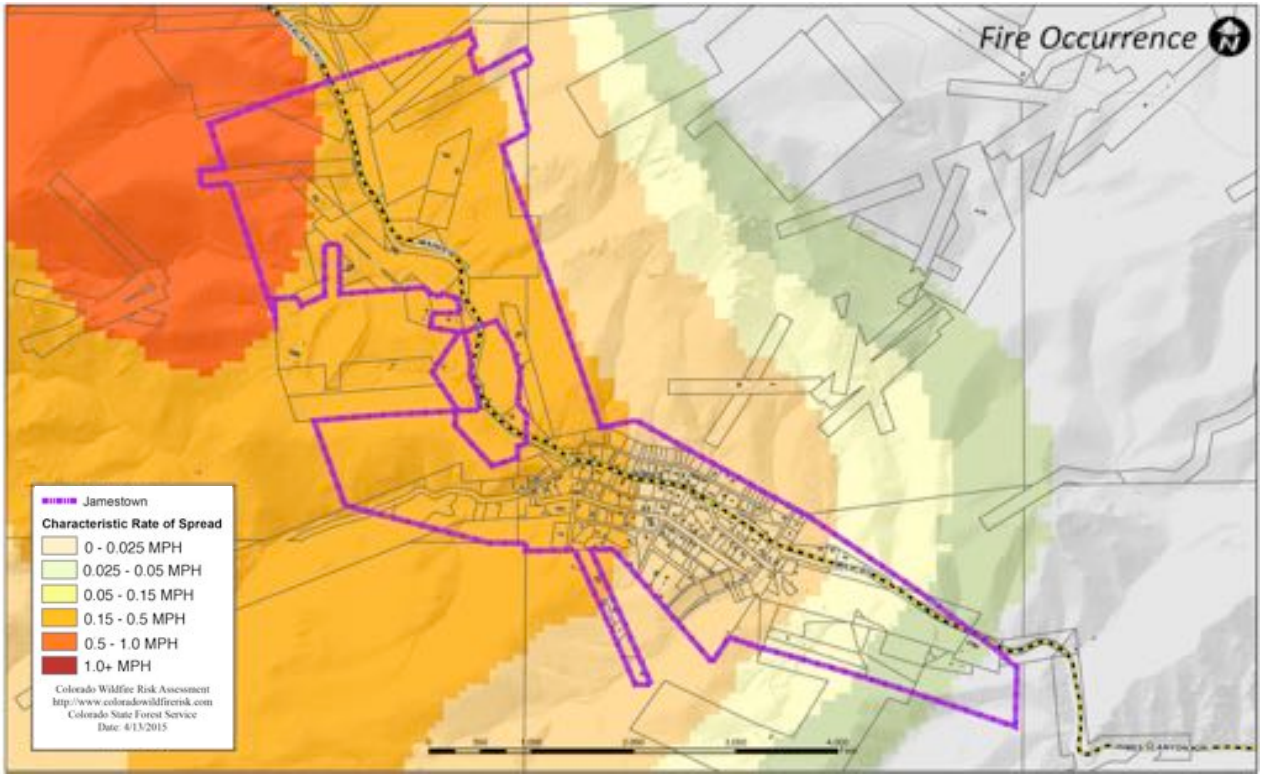


This map indicates that it will be difficult to suppress wildfires in the vicinity the Jamestown area. The inability to suppress nearby wildfires increases the probability that a wildfire will burn into Jamestown.

Fire Occurrence

Fire Occurrence is an ignition density that represents the likelihood of a wildfire starting based on historical ignition patterns. Fire Occurrence is based on numbers of fires. It is the best available depiction of where fires historically occur in the area. It is a useful indicator of where fires are most likely to originate in the future and also where wildfire prevention activities may be most helpful in reducing risk.

Figure 1-7: Fire Occurrence in Jamestown Area

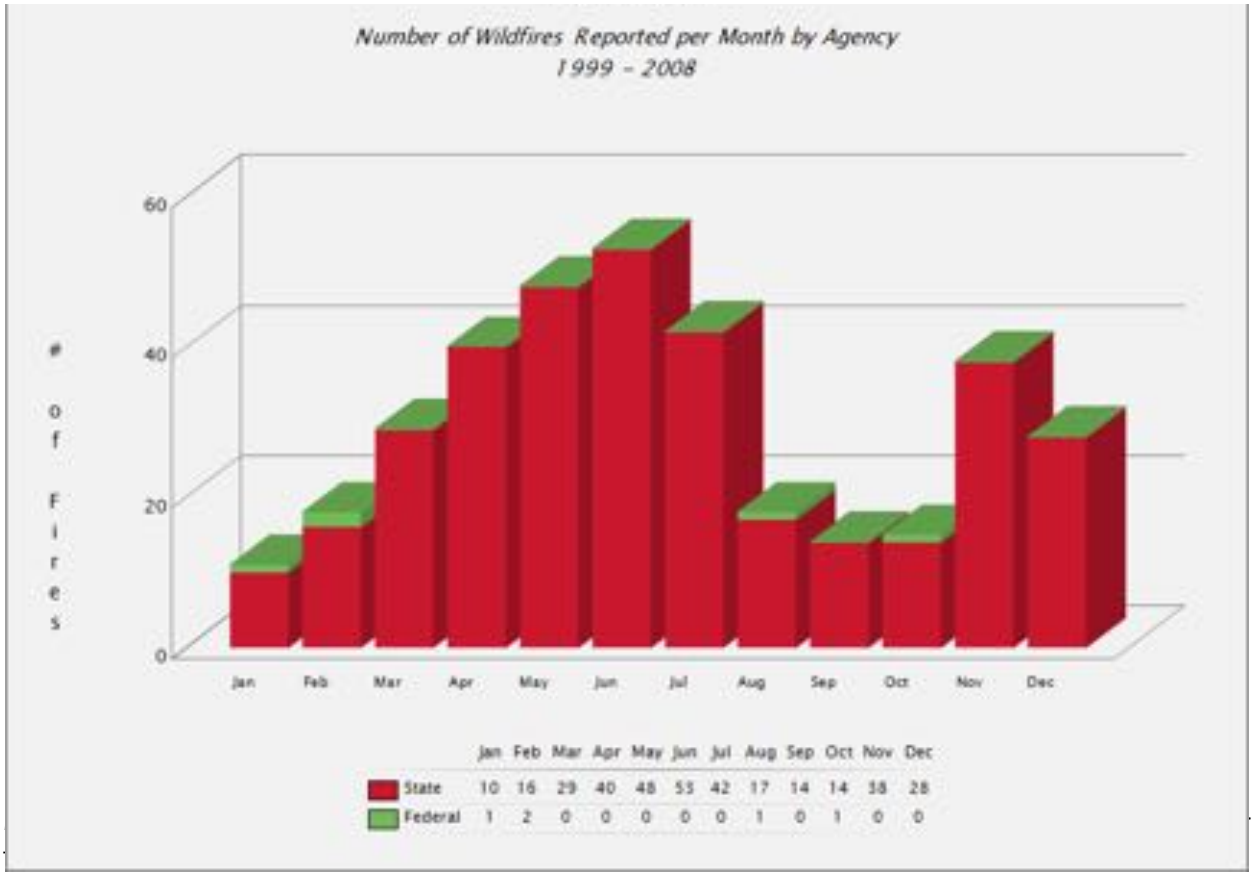


This map provides an insight into where wildfires have occurred in the past. One large destructive fire, such as the 2003 fire, is considered only one fire. This is why it may not appear to correlate with the evidence of the 2003 fire that is visible on the slopes north of Jamestown.

Fire History Statistics

Fire history statistics provide insight as to the number of fires, acres burned, and causes of fires in Colorado. These statistics are useful for prevention and mitigation planning. They can be used to quantify the level of fire activity, determine the time of year most fires typically occur, and develop a fire prevention campaign aimed at reducing a specific fire cause. Figure 1-8 shows the fire history statistical data for Colorado by month. Basically, it shows when fires have occurred in the past and therefore are likely to occur again on the future.

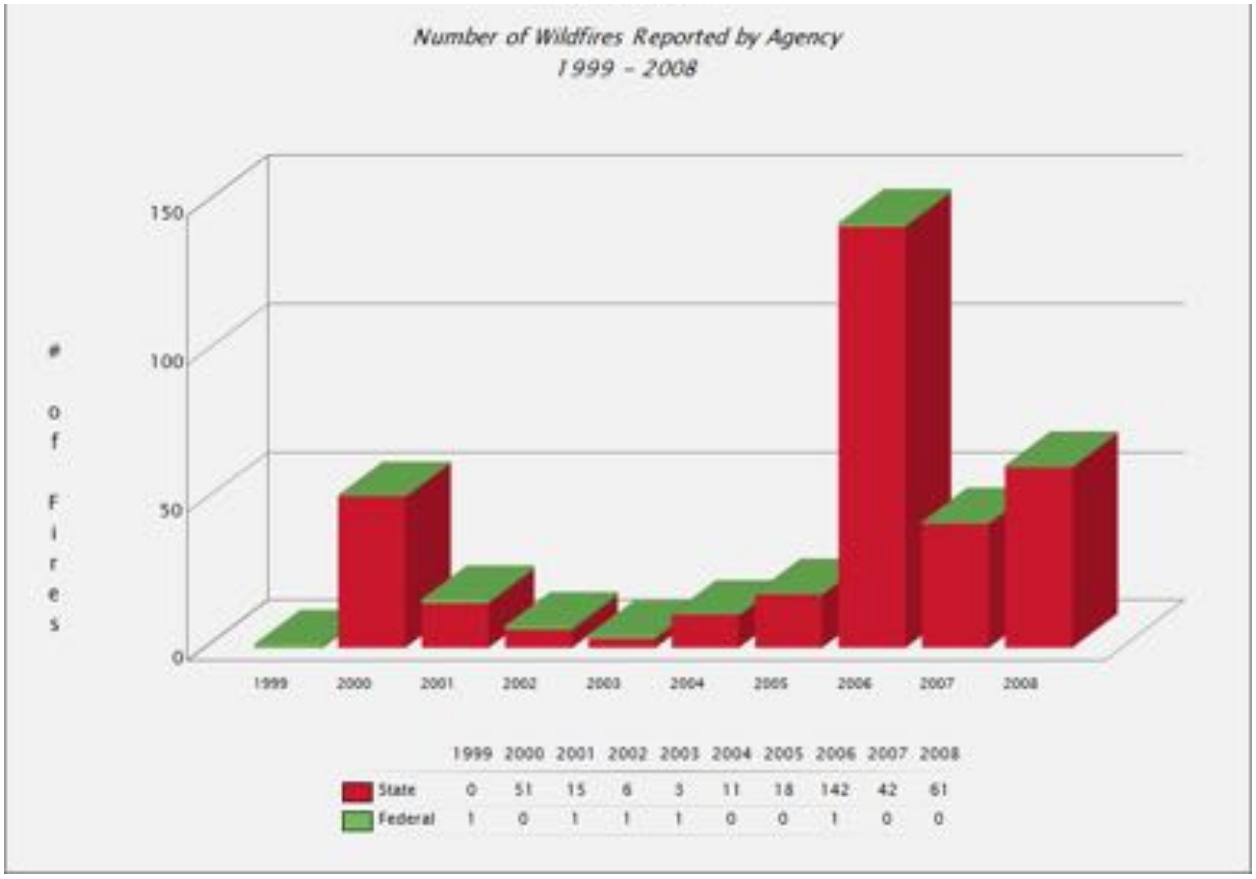
Figure 1-8: Number of Wildfires by Month in Colorado



Most of the monthly variability in fire occurrence shown in this chart can be explained by monthly fire danger fluctuations driven mostly by fuel moistures. The wetter a month is the less likely a wildfire will occur.

The number of fires each year fluctuates based primarily on the length of the fire season, which is a function of low fuel moisture over an extended period of time. As the number of fires that occur in any particular year increases, the probability that Jamestown will eventually have a wildfire in close proximity also increases.

Figure 1-9: Number of Wildfires Reported by Agency in Colorado



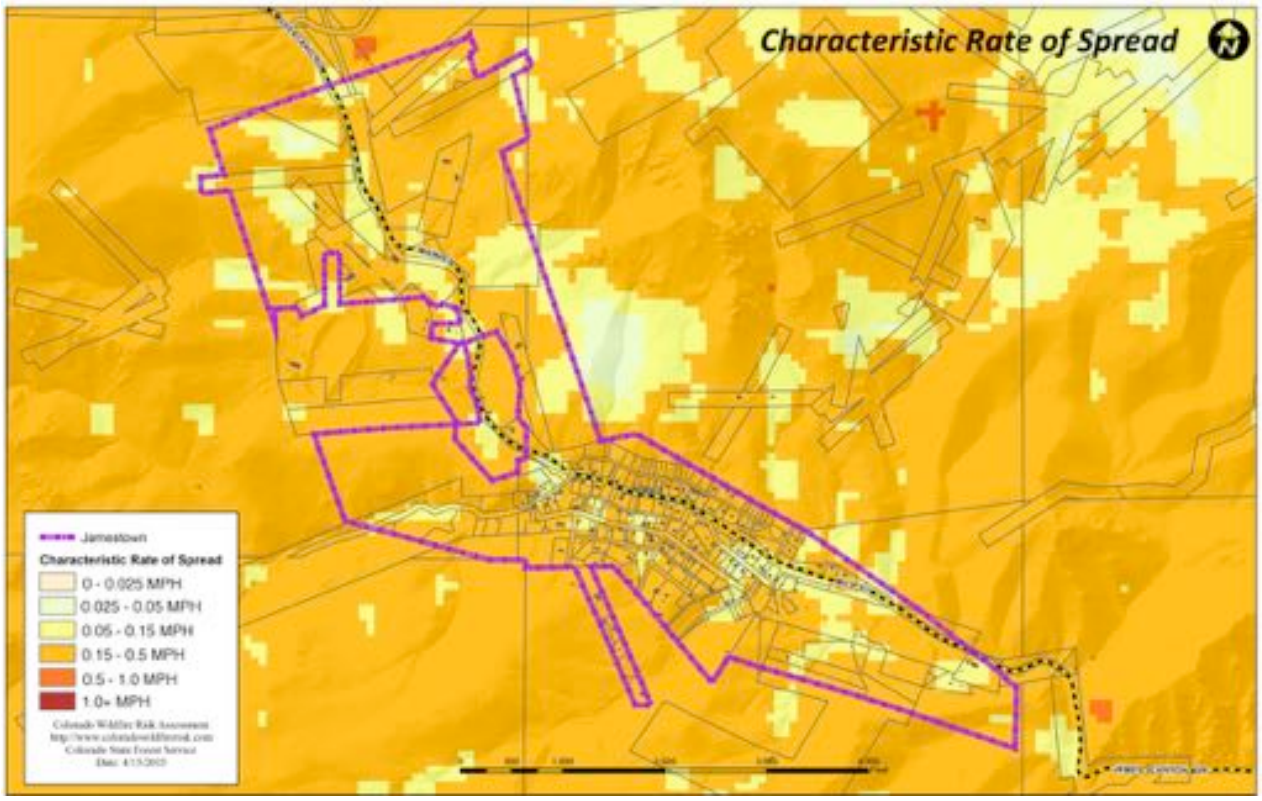
Fire Behavior Characteristics

Fire behavior characteristics are attributes of wildland fire that pertain to its spread, intensity, and growth. Fire behavior characteristics identified in the CO-WRAP include fire type, rate of spread, flame length and fireline intensity (fire intensity scale). These metrics are used to determine the potential fire behavior under different weather scenarios. Areas that exhibit moderate to high fire behavior potential can be identified for mitigation treatments, especially if these areas are in close proximity to homes, business, or other assets.

Rate of Spread

Rate of spread is the speed with which a fire moves in a horizontal direction across the landscape, usually expressed in chains per hour (ch/hr) or feet per minute (ft/min). (1 chain equals 66 feet.) For this report, the Characteristic Rate of Speed for the Jamestown Assessment Area is shown in terms of miles per hour.

Figure 1-10: Characteristic Rate of Spread, Jamestown Assessment Area



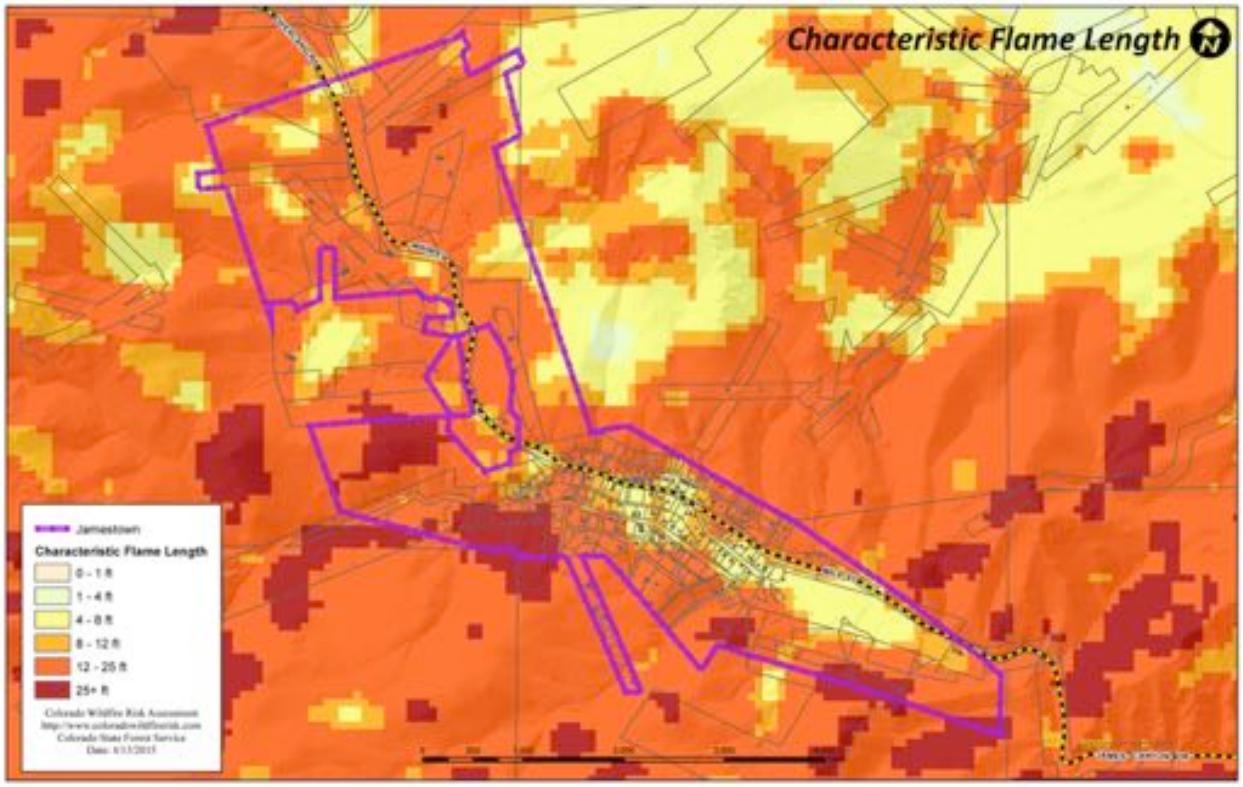
This maps shows that a wildfire is likely to be moving at up to a half mile per hour when it hits Jamestown. It is a good tool for planning evacuation timing. If it will take three hours to notify Jamestown residents to evacuate and another hour for them to safely leave the area then is behooves authorities to start the evacuation process when the fire is at least 2.5 miles (giving a half hour buffer) from populated areas. Note that many fires in this area are wind driven events that exceed spread rates of a half-mile per hour. Close coordination between firefighters and evacuation authorities is critical when making the evacuation decision.

Flame Length

Flame Length is defined as the distance between the flame tip and the midpoint of the flame depth at the base of the flame, which is generally the ground surface. It is an indicator of fire intensity and is often used to estimate how much heat the fire is generating. Flame length is typically measured in feet (ft), and the range identified in Figure 1-11 is between 0 feet and greater than 25 feet. Firefighters have a difficult time engaging a fire with flame lengths over four feet. When flames exceed four feet, indirect attack is required which means firefighters back away from the flames and either construct firelines in favorable areas and wait for the fire to come to them or they burn out pre-existing breaks in surface fuels.

Ninety six percent of the Jamestown analysis area (the area within a three-mile radius of the Town limits) is likely to produce wildfires with flame lengths of over 12 feet, which are problematic for firefighters.

Figure 1-11: Characteristic Flame Lengths in the Jamestown Area

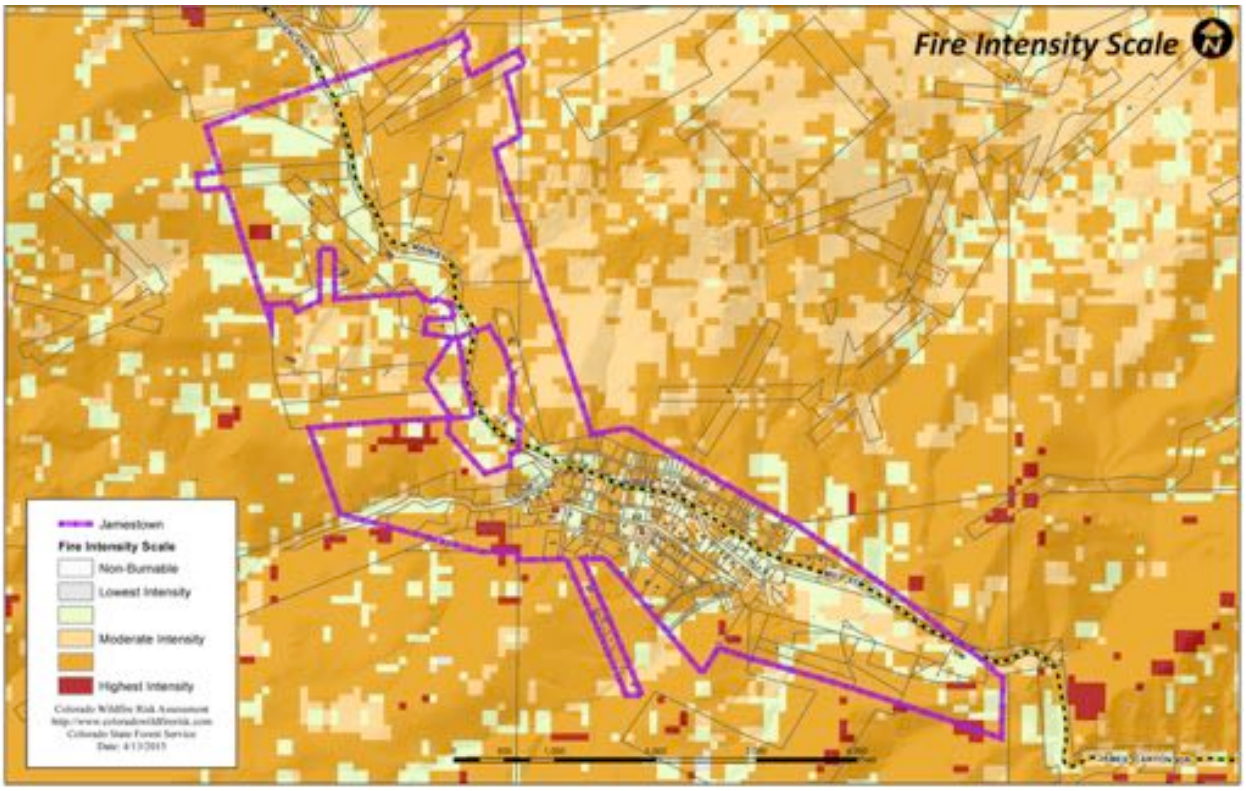


Fire Intensity Scale

Fire Intensity Scale (FIS) specifically identifies areas where significant fuel hazards and associated dangerous fire behavior potential exists. Similar to the Richter scale for earthquakes, FIS provides a standard scale to measure potential wildfire intensity. Sixty three percent of the Jamestown area (the area within a three-mile radius of the Town limits) is in fire intensity scale moderate to high. High FIS areas are likely to experience large flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. (Spotting is when a fire produces firebrands that are transported by ambient winds, fire whirls, and/or convection columns causing spot fires ahead of the main fire perimeter. Firebrands are flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or by gravity into unburned fuels.)

Direct attack by trained firefighters, engines, and dozers historically has been ineffective, although an indirect attack may be effective. (Indirect attack means firefighters back away from the flames and either construct firelines in favorable areas and wait for the fire to come to them or they burn out pre-existing breaks in surface fuels.)

Figure 1-12: Fire Intensity Scale



Surface Fuels

Surface fuels, or fire behavior fuel models as they are technically referred to, contain the parameters required by the Rothermel (1972) surface fire spread model to compute surface fire behavior characteristics, including rate of spread, flame length, fireline intensity and other fire behavior metrics. As the name might suggest, surface fuels account only for surface fire potential. Canopy fire potential is computed through a separate but linked process.

Surface fuels typically are categorized into one of four primary fuel types based on the primary carrier of the surface fire: 1) grass, 2) shrub/brush, 3) timber litter, and 4) slash. Two standard fire behavior fuel model sets have been published. The Fire Behavior Prediction System 1982 Fuel Model Set (Anderson, 1982) contains 13 fuel models, and the Fire Behavior Prediction System 2005 Fuel Model Set (Scott & Burgan, 2005) contains 40 fuel models. The CO-WRA uses fuel models from the 2005 Fuel Model Set.

Figure 1-13: Surface Fuels in Jamestown Area

Surface Fuels	Description	FBPS Fuel Model Set	Acres	Percent
GR 1	Short, Sparse Dry Climate Grass (Dynamic)	2005	29	0.3%
GR 2	Low Load, Dry Climate Grass (Dynamic)	2005	125	1.3%
GS 1	Low Load, Dry Climate Grass-Shrub (Dynamic)	2005	193	2.1%
GS 2	Moderate Load, Dry Climate Grass-Shrub (Dynamic)	2005	2,331	25.1%
SH 1	Moderate Load, Humid Climate Grass-Shrub (Dynamic)	2005	247	2.7%
SH 2	Moderate Load, Dry Climate Shrub	2005	251	2.7%
SH 7	Very High Load, Dry Climate Shrub	2005	6	0.1%
TU 1	Light Load, Dry Climate Timber-Grass-Shrub	2005	1,415	15.2%
TU 5	High Load, Conifer Litter	2005	3,618	39.0%
TL 1	Low Load, Compact Conifer Litter	2005	3	0.0%
TL 3	Moderate Load, Conifer Litter	2005	718	7.7%
TL 8	Long-needle Litter	2005	342	3.7%
	Total		**9,286**	**100.0%**

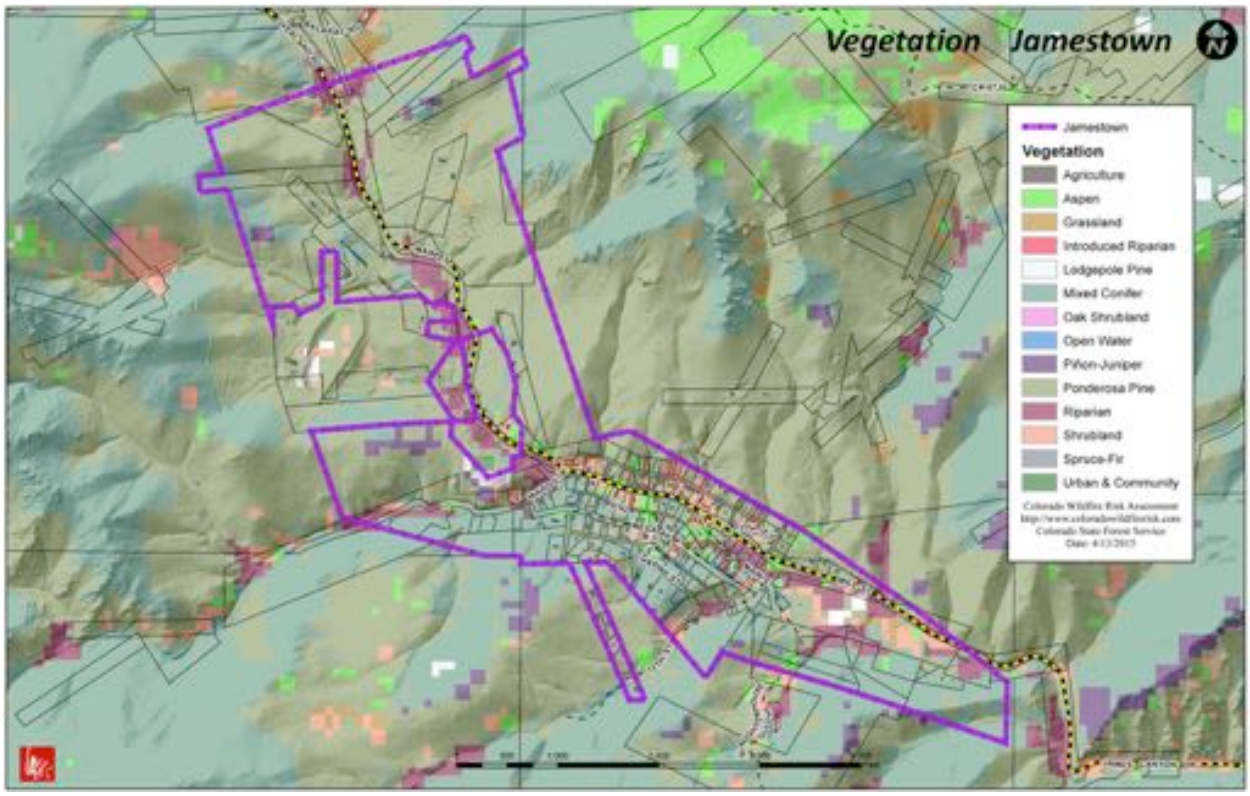
Vegetation

The Vegetation map describes the general vegetation and land cover types across the Jamestown assessment area. In the CO-WRAP, the Vegetation dataset is used to support the development of the Surface Fuels, Canopy Cover, Canopy Stand Height, Canopy Base Height, and Canopy Bulk Density datasets.

The LANDFIRE program Refresh version of data products (Existing Vegetation Type) was used to compile the Vegetation data for the West Wide Risk Assessment and the CO-WRAP. This reflects data current to 2008. Some modifications were completed to reflect recent disturbances such as large wildfires and pine beetle infestations prevalent in central Colorado over recent years. The LANDFIRE EVT data were classified to reflect general vegetation cover types for representation with CO-WRAP.

Jamestown proper is surrounded by Ponderosa Pine, Lodgepole Pine, and Blue Spruce. Lodgepole Pine and Blue Spruce are especially prone to aid the spread of wildfires.

Figure 1-14: Vegetation in Jamestown Area



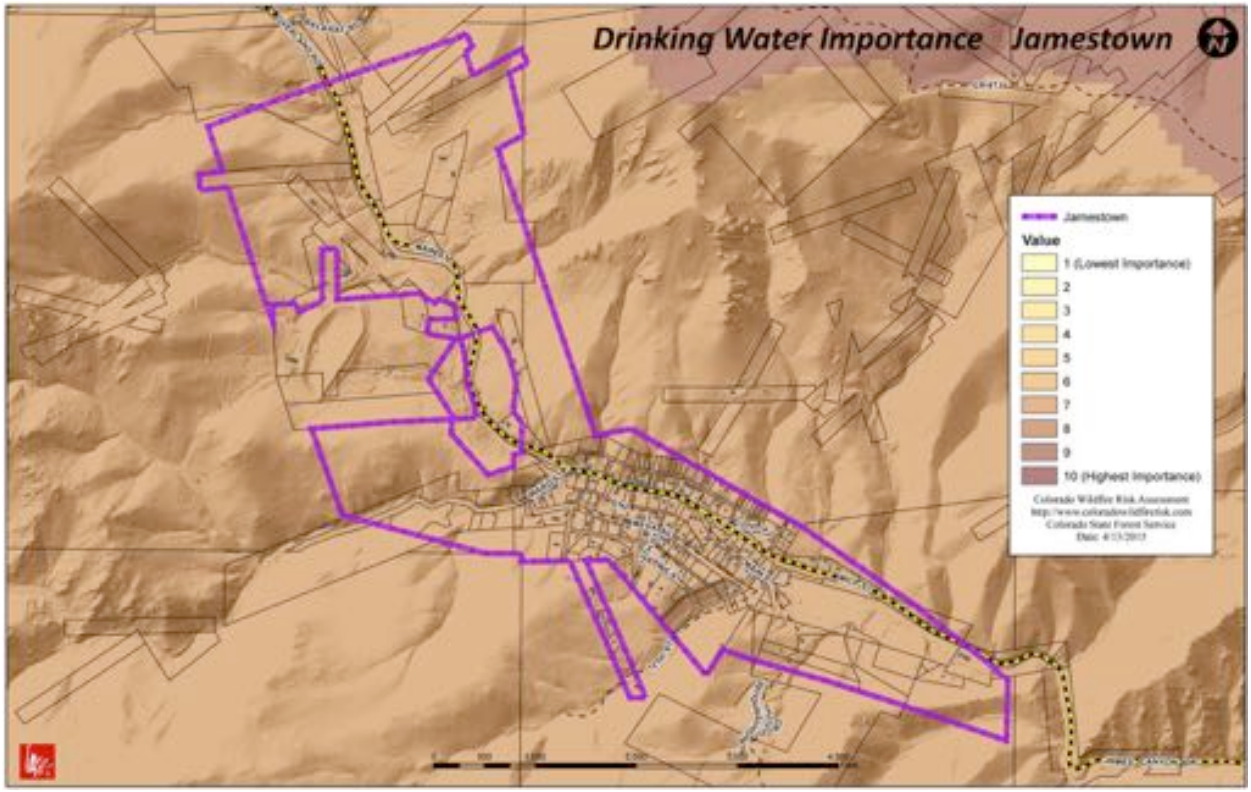
Drinking Water Importance Areas

Drinking Water Importance is the measure of quality and quantity of public surface drinking water categorized by watershed. Areas that are a source of drinking water are of critical importance and adverse effects from fire are a key concern. Watersheds are ranked from 1 to 10 reflecting relative level of importance, with 10 being the most important and 1 the least important.

Several criteria are considered to derive the drinking water importance rating including water supply, flow analysis, and downstream drinking water demand. The final model of surface drinking water importance combines the drinking water protection model, capturing the flow of water and water demand, with a model of mean annual water supply.

The drinking water importance areas ranking in the Jamestown assessment area is 7, meaning that for Jamestown, the quality and quantity of drinking water is important to consider.

Figure 1-15: Drinking Water Importance Areas



Drinking Water Risk Index

Drinking Water Risk Index is a measure of the risk to Drinking Water Importance Areas based on the potential negative impacts from wildfire, such as mudslides, silt, or other contamination in the water supply.

In areas that experience low-severity burns, fire events can serve to eliminate competition, rejuvenate growth and improve watershed conditions. But in landscapes subjected to high, or even moderate-burn severity, the post-fire threats to public safety and natural resources can be extreme.

High-severity wildfires remove virtually all forest vegetation – from trees, shrubs and grasses down to discarded needles, decomposed roots and other elements of ground cover or duff that protect forest soils. A severe wildfire also can cause certain types of soil to become hydrophobic by forming a waxy, water-repellent layer that keeps water from penetrating the soil, dramatically amplifying the rate of runoff.

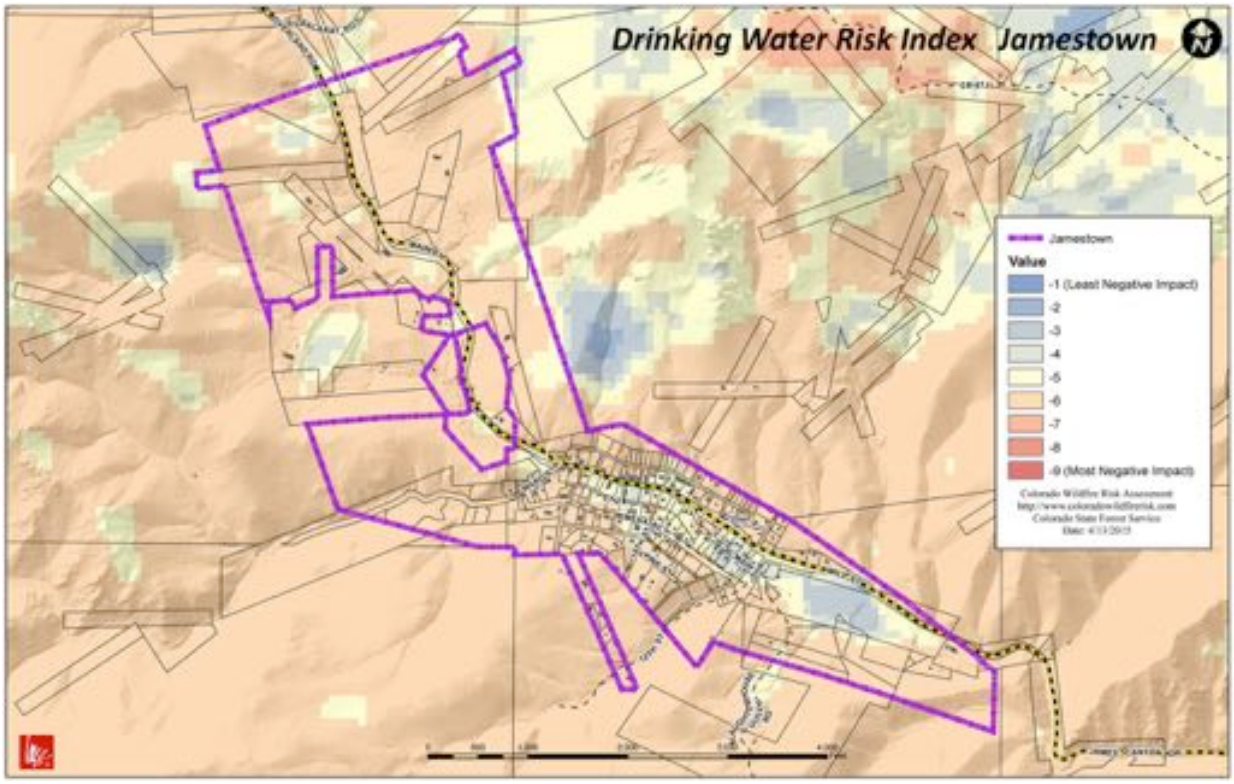
Plant roots stabilize the soil, and stems and leaves slow the water to give it time to percolate into the soil profile. The loss of critical surface vegetation leaves forested slopes extremely vulnerable to large-scale soil erosion and flooding during subsequent storm events. In turn, these threats can impact the health, safety, welfare, and integrity of communities and natural resources downstream.

The likelihood that such a post-fire event will occur in Colorado is increased by the prevalence of highly erodible soils in several parts of the state and weather patterns that frequently bring heavy rains on the heels of fire season.

In the aftermath of the 2002 fire season, the Colorado Department of Health estimated that 26 municipal water storage facilities were shut down due to fire and post-fire impacts. High, or even moderate-burn severity fires can destroy the ability of the soil to filter water that eventually finds its way into the Town's potable water collection and distribution system.

Most of the Jamestown area is in an area designated as having a drinking water risk index of -6 on a scale of -1 to -9, -9 being the designation for areas experiencing the most negative impact. This, of course would affect only the Town's water distribution system and the areas it serves. It would not affect residents that get their water from a well or cistern.

Figure 1-16: Drinking Water Risk Index



Risk Assessment Summary

Jamestown is vulnerable to wildfires during periods of high fire or greater fire danger. Flammable woody debris and vegetation support rapid fire spread and high intensity flames that are difficult to control. Rapid evacuation will be needed to get citizens out of harm's way.

Jamestown's survival following the Overland Fire of 2003 is a testimony to firefighter courage and tenacity. In its current configuration, Jamestown is difficult to protect. The present road system, terrain and land ownership patterns pose serious impediments to wildfire suppression and hazard mitigation. While a few homes in Jamestown are constructed of fire-resistant materials and landscaping to reduce risk, there is room for improvement.

Interpretation of all this information leads professional fire personnel to conclude that the likelihood of high intensity, fast moving, and destructive wildfire in and around Jamestown is high. It also points out that there may be opportunities to reduce wildfire behavior characteristics by reducing fuel loading on 3,618 acres of high load conifer fuels. This means thinning stands to around forty percent crown cover and removing woody debris from the forest floor.

Residents are advised to do as much wildfire hazard mitigation around their homes as they can, collaborate with adjacent landowners to expand their wildfire hazard mitigation zone, and follow the advice relative to evacuation preparedness found in the Jamestown Fire Department Information About Fire & Flood Safety Emergencies.

It will take a Community Wildfire Protection Planning (CWPP) effort, followed by dedicated implementation, to increase the community's wildfire resilience.

A detailed CWPP will chart the way to mitigate wildfire hazards in Jamestown and mobilize the community to take the necessary actions eventually outlined in the CWPP.

Implementation Options

Developing wildfire hazard mitigation strategies and improving community resilience to future fires is the role of Community Wildfire Protection Planning. A Community Wildfire Protection Plan (CWPP) is developed by a core team of wildfire personnel, emergency services personnel, landowners, etc. The CWPP describes the wildfire hazards in detail and then outlines specific mitigation techniques designed for the community's terrain and hazards. A CWPP is a collaborative effort and relies upon local knowledge of terrain, individual landowner data and potential funding to describe what needs to be done to make the community safer.

A summary of implementation options for each objective listed in the Long Term Recovery Plan (LTRP) relating to wildfire hazard identification and risk assessment follows.

LTRP Safe Community Goal 1, Emergency Services

Adopt "Fire Adapted Communities" strategies.

A Fire Adapted Community takes actions before a wildfire to:

- Ensure that the local fire department is signed up with the Ready, Set, Go! program, and is equipped to provide local protection.
- Ensure that all neighborhoods are participating in the Firewise Communities/USA® Recognition Program.
- Actively implement a Community Wildfire Protection Plan.
- Provide residents with emergency planning kits and safety plans.
- Establish a safety zone for residents if safe evacuation is not an option.

LTRP Safe Community Goal 2, Disaster Mitigation

- Ensure that homes are built or retrofitted with fire-resistant materials, and landscaped to reduce wildfire risk. (Adopt Boulder County Building Code Amendment)
- Ensure that forests, trees, and brush in the surrounding landscapes are managed to reduce hazardous fuels.

References Cited

Jamestown Volunteer Fire Department Information About Fire and Flood Safety and Emergencies

http://jamestownco.org/files/2013/12/JVFDEmergencyPreparednessHandbook.pdf

Boulder County Community Wildfire Protection Plan

http://www.bouldercounty.org/property/forest/pages/lucwppmain.aspx

Boulder County Planning & Zoning Regulations

http://www.bouldercounty.org/doc/landuse/landusecode.pdf

Boulder County Community Wildfire Protection Plan

http://www.bouldercounty.org/property/forest/pages/lucwppmain.aspx

Boulder County Building Code Amendments

http://www.bouldercounty.org/doc/landuse/2012buildingcode.pdf

SECTION 3 | JAMESTOWN FLOODING ASSESSMENT

Prepared by Scott Shipley, P.E. and Morgan Ross, S20 Design and Engineering

3.1 Summary

This report compiled the most current hydrology and hydraulic data for the Town of Jamestown and completed a flood risk assessment based on the current floodplain delineations. The Town of Jamestown is currently regulated by both the 2012 FIS and the 2014 Provisional Floodplain delineation. This report reviewed both delineations and created a combined floodplain map displaying the most conservative floodplain estimate based on a review of current regulatory materials. This provided the 1% annual chance (100 year) delineation that is currently being used for regulation. The combined delineation presented here was completed to inform future planning and development within the Town, and has no implications for flood insurance rates and regulations.

Concurrently, the Colorado Water Conservation Board is working to collect new floodplain data for several areas in Colorado, including Jamestown that will be used to update FEMA's Flood Insurance Rate Maps (FIRMs). The updated FIRMs must be approved by the U.S. Army Corps of Engineers and the approval process takes two to three years to complete. More information on this process is provided later in this section, in 3.2.2.1 National Floodplain Regulations.

S20 Design and Engineering (S20) also completed a review of available hydrologic and hydraulic data that has been collected since the 2014 delineation to determine potential future impacts to the current delineation, which has been incorporated into the combined floodplain map that is presented later in this section. A floodplain analysis using updated hydrologic data was completed to illustrate possible changes to the current delineation. S20 also reviewed changes to the channel resulting from the 2013 flood recovery and restoration efforts. These changes in channel geometry and configuration also have the potential to affect the current floodplain delineation.

3.2 Technical Report

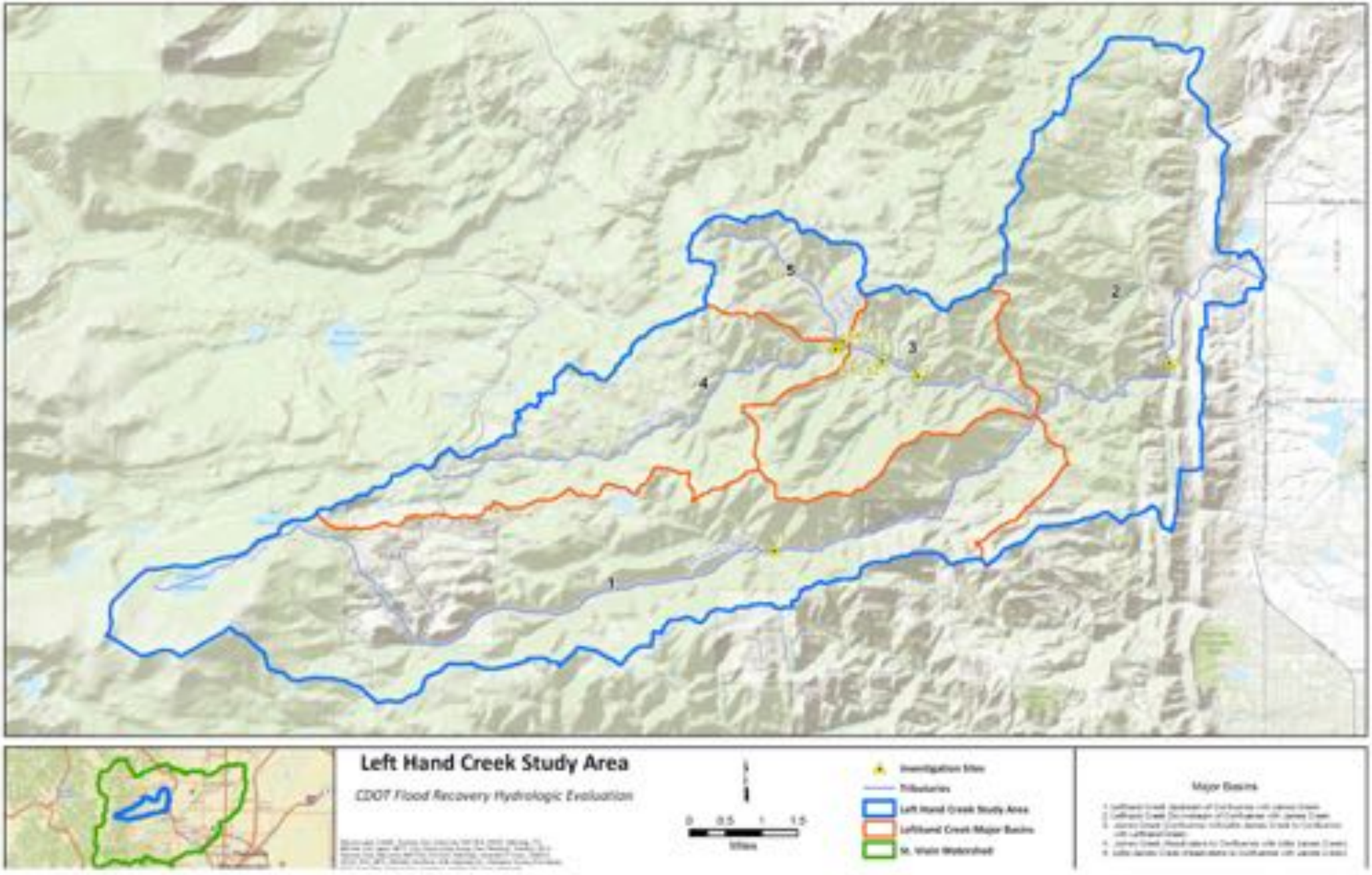
Hydrology and Flood Risk

James Creek drains an area of approximately 9 square miles upstream of Jamestown and flows into Jamestown from the west. Little James Creek drains an area of approximately 3 square miles, flowing into James Creek in Jamestown at Ward St. to 13th Street. Downstream of Jamestown, James Creek has a total drainage area of 19 square miles and is a tributary to Left Hand Creek. Left Hand Creek watershed is displayed below in Figure 1-17 (Jacobs, 2014). Rainfall in the basin averages 24 inches annually (AMEC, 2014).

Floods in Jamestown usually occur between May and September. Snowmelt in late spring contributes to high flows, however, serious flooding usually does not occur without significant rainfall (FEMA, 2012). Peak flooding will usually occur within a few hours after a single rainfall event.

The steep channel slopes of James Creek and Upper James Creek cause swift currents during a flood, increasing the potential for damages. Debris carried downstream in the current poses threats to bridges and culverts, as well as houses and other structures in the floodplain. Bridges and culverts are often the sites of constrictions in the channel, causing an increase in the water surface elevation. Erosion and undercutting of banks further contribute to the destruction of structures.

Figure 1-17: Left Hand Creek Watershed



Flood History

There have been numerous flood events documented in Jamestown over the past century. In June 1894, flooding washed away much of the low-lying area of the Town. This flood was a result of heavy rain combined with spring runoff. In August 1913, a short cloudburst lasting approximately 30 minutes damaged bridge and culvert crossings along James Creek. Another flood occurred in 1916, destroying almost all houses along James Creek and washing away all wagon and footbridges. The Town was also flooded in 1965, and again in May of 1969, where the floodwaters left the normal channel, destroying buildings and the town water supply.

The 2013 Flood Event

The 2013 flood event was one of the most costly and widespread flood events in Colorado history. James Creek and Little James Creek both left their channels and formed new channels, undercutting houses and roads. Homes, bridges, culverts and roads were washed away during the event. The severity of the flood was exacerbated by the 2003 Overland fire, which had burned on the mountains north of town. The lack of vegetation due to the fire left the hillside unprotected from the erosive forces of rain, leading to mudflows and debris flows. The debris flows carried trees, boulders and sediment downstream, causing extensive damage to infrastructure and depositing sediment and debris along the town's main corridor (AMEC, 2014). 90% of residents were relocated due to flooding.

National Floodplain Regulations

Flood frequency analysis is a major component of flood-risk assessment. The magnitude of floods is typically described by the peak discharge and the statistical probability that the event will occur. The 1% annual chance flood event is the standard national measurement for flood mitigation actions and the National Flood Insurance Program (NFIP). The 1% annual chance flood is also referred to as the 100-year flood, and has a 1 in 100 chance of occurring in any one year. The 0.2% annual chance flood, or the 500-year flood, has a 1 in 500 chance of occurring in any given year (Colorado Flood Mitigation plan, 2013).

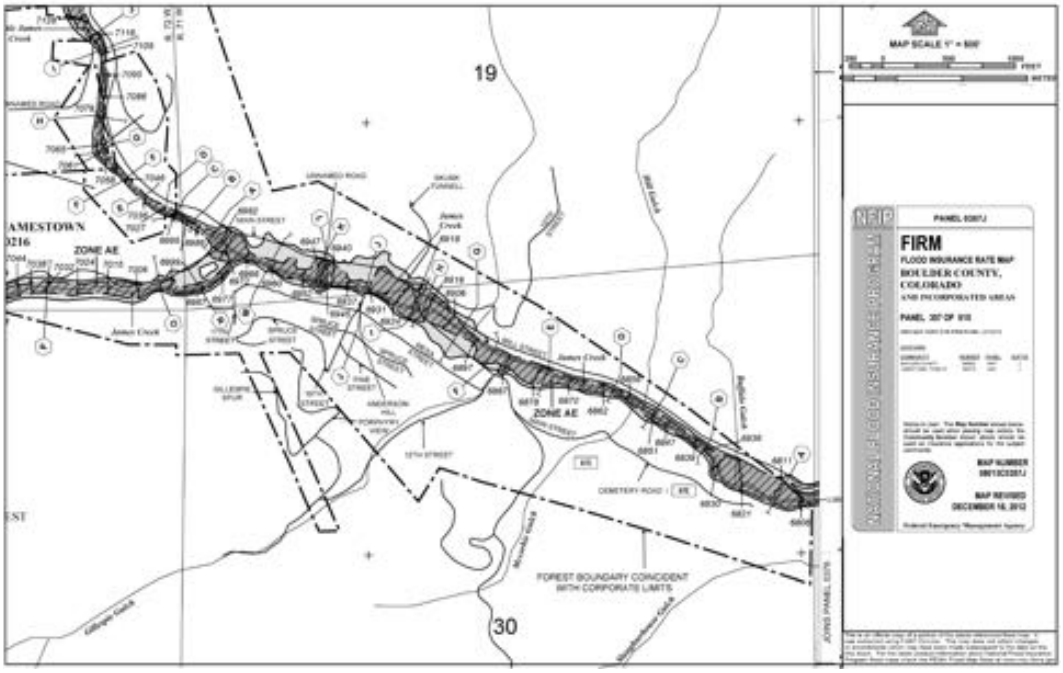
The current regulatory framework as authorized by the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 consists of Flood Insurance Rate Maps (FIRMs) depicting Special Flood Hazard Zones (SFHAs). FIRMs are developed through a Flood Insurance Study (FIS), a hydraulic and hydrologic study to create flood profiles, and establishes a Base Flood Elevation (BFE). BFEs correspond with the 1% annual chance (100-year) floodplain. FIRMs delineate special hazard areas and flood risk premium zones applicable to the community. Special Flood Hazard Areas (SFHAs) are areas that fall within the 1% annual chance (100-year) floodplain.

Applicable Hydraulic and Hydrologic Studies

Boulder County and the 2012 Flood Insurance Study

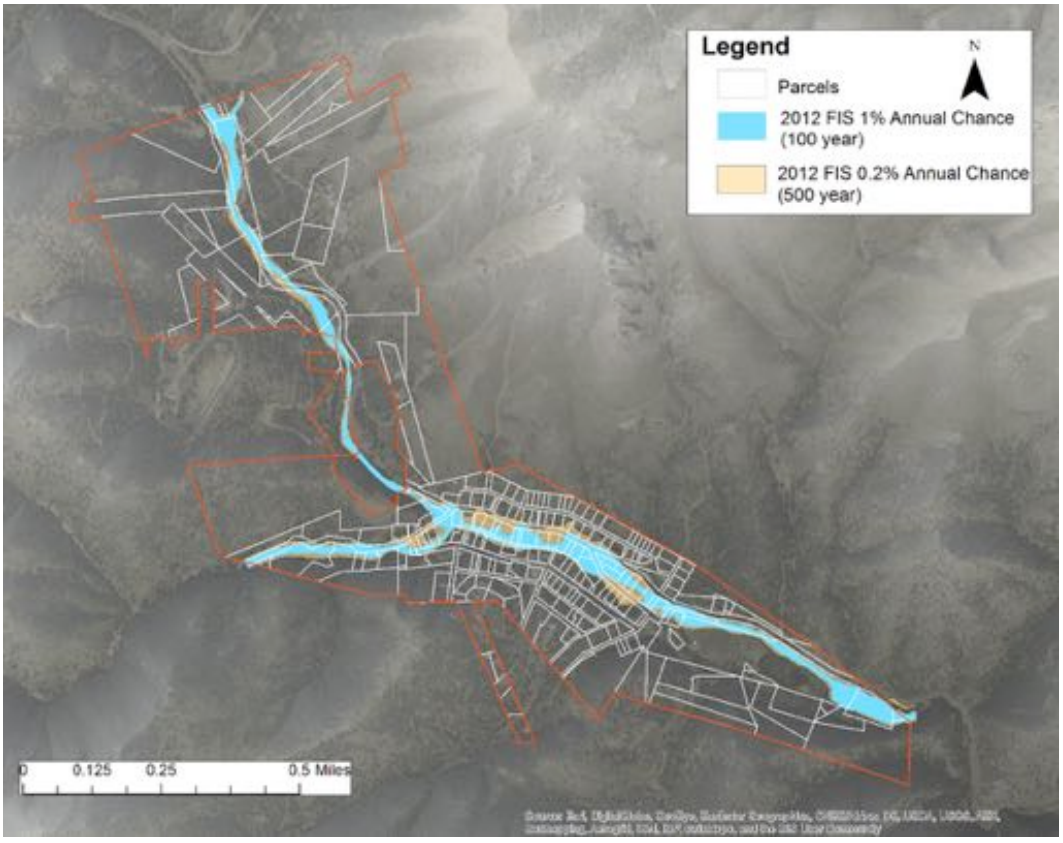
A Flood Insurance Study (FIS) was completed by FEMA in 2012 for Boulder County and Incorporated Areas to delineate the 100-year return period flood event. The effective regulatory flow rates used in the 2012 FIS were developed from hydrologic studies between 1978 and 1983 (AMEC, 2014). The 100-year and 500-year floodplains delineated in this study were then used for regulations prior to the 2013 flood. The 2012 FIS delineation for the Town of Jamestown is shown below in Figure 1-18. Water surface elevations were established at each cross-section displayed on the 2012 FIRM.

Figure 1-18: 2012 FIS (FEMA, 2012)



The 1% annual chance floodplain and the 0.2% annual chance floodplain that were used for the pre-flood regulations are displayed in Figure 1-19.

Figure 1-19: 2012 FIS Floodplain Delineation showing both the 1% annual chance and 0.2% Annual Chance Flood Event

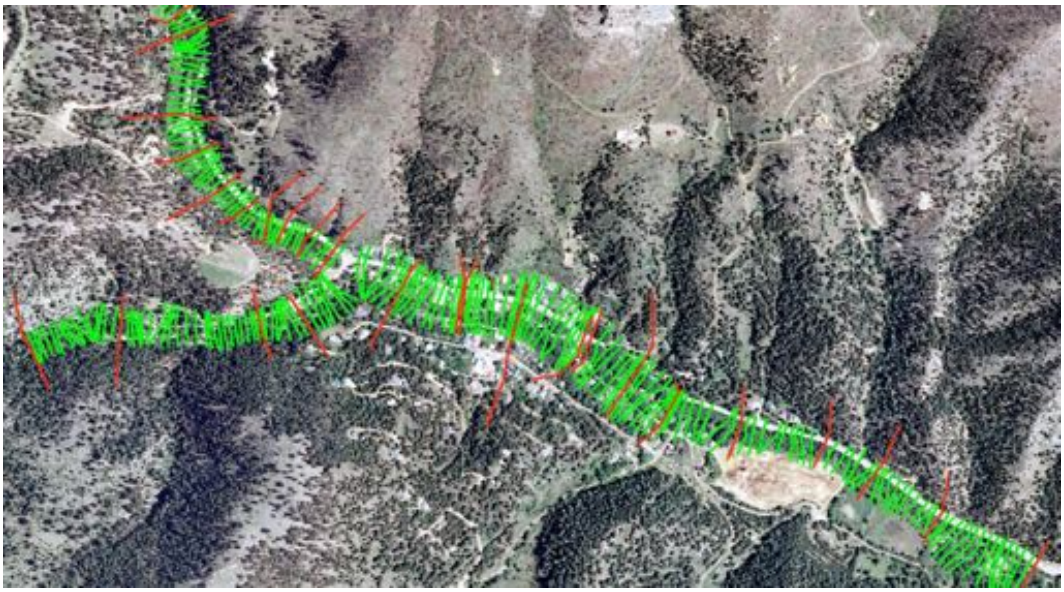


2014 Provisional Floodplain Delineation

Following the 2013 flood, the Town of Jamestown issued a temporary moratorium on floodplain development permits to allow for the evaluation of the physical impacts of the flood. AMEC developed a hydraulic model to analyze post-flood conditions in Jamestown and delineate a provisional 1% annual chance floodplain that reflected the post-flood channel morphology (referred to later in this report as the 2014 Provisional Delineation).

For the 2014 provisional flood delineation, AMEC used the same cross-sections as those used in the 2012 FIS, which were then densified using post-flood LiDAR data and surveyed cross-sections. The cross sections in the AMEC delineation are displayed below in Figure 6 (AMEC, 2014).

Figure 1-20: Cross-sections Used for the 2014 Provisional Hydraulic Model.



The 2012 FIS (orange) cross-sections were filled in with LiDAR terrain data to create additional cross-sections (green) for the 2014 study (AMEC, 2014, p. 6).

The channel geometry used by AMEC in the development of the provisional delineation was representative of conditions immediately following the flood, prior to any major channel improvements.

AMEC used the same hydrologic data as the 2012 FIS to run a steady flow analysis in HEC-RAS. HEC-RAS is a one-dimensional hydraulic model used to calculate water surface profiles and is the standard software used by FEMA to generate Digital Flood Insurance Rate Maps (DFIRM). Estimated discharge for the 1% annual chance event was 3930 cubic feet per second (cfs) at the downstream end of the study (AMEC, 2014). The 1% annual chance flow rates used in the 2012 FIS and the 2014 Provisional Delineation are displayed below in Table 1-1.

Table 1-1: Flow Rates Used in the 2012 FIS

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent Annual Chance	2-Percent Annual Chance	1-Percent Annual Chance	0.2 Percent Annual Chance
Balarat Creek					
At Upstream Limit of Detailed Study	0.5	30	150	270	760
Little James Creek					
At Upstream Limit of Detailed Study	1.8	109	544	970	2,690
At Confluence of Balarat Creek	2.25	130	650	1,160	3,220
At Confluence with James Creek	2.8	130	650	1,160	3,220
James Creek					
At Upstream Limit of Detailed Study	8.9	200	1,190	2,140	6,010
At Confluence of Little James Creek	12.1	300	1,760	3,160	8,725
At Main Street Bridge	12.2	300	1,785	3,205	8,850
At Cross Section A	14.5	355	2,180	3,930	10,880

AMEC used HEC-RAS to determine the flood extents and depths, and then HEC-GeoRAS was used to develop a flood inundation surface based on the surface elevations at each cross section. From these results, AMEC created a provisional floodplain map to guide post-flood recovery efforts.

Water Surface Elevation Comparison: Pre- and Post-Flood

The report completed by AMEC compared pre- and post-flood water surface elevations for the 1% annual chance event. Immediately upstream of the confluence of James Creek and Little James Creek, Little James Creek shows an increase of 19 feet from the 2012 FIS. At the furthest upstream cross-section, Little James Creek showed a decrease of 22.6 feet from the 2012 FIS water surface elevation. The change in water surface elevation for James Creek ranged from a 2.6 decrease to an increase of 19.2 feet. The changes in water surface elevations for James Creek and Little James Creek are displayed below in Table 1-2 and Table 1-3, respectively. The cross-sections referenced in the table correspond with the cross-sections identified in the 2012 FIS and shown in Figure 1-21.

Table 1-2: Changes in water surface elevation at James Creek from the 2012 FIS to the 2014 provisional delineation

FLOODING SOURCE					1 PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1,2]	PROVISIONAL FHD MODEL RIVER STATION[3]	PROVISIONAL FHD DISTANCE[3]	MEAN VELOCITY[3] (FEET PER SECOND)	REGULATORY[2] (FEET NAVD)	PROVISIONAL FHD[3] (FEET NAVD 88)	NET INCREASE[3] (FEET)
JAMES CREEK							
A	12,862	128+62	12,862	9.1	6,810.8	6,814.2	3.4
B	13,559	135+59	13,559	15.4	6,836.1	6,834.3	-1.8
C	14,079	140+31	14,034	13.8	6,851.1	6,848.5	-2.6
D	14,431	144+00	14,486	14.3	6,859.3	6,862.1	2.8
E	14,963	149+50	14,568	11.2	6,875.9	6,879.1	3.2
F	15,408	154+15	15,495	14.2	6,891.9	6,891.3	-0.6
G	15,693	157+48	15,748	10.5	6,901.5	6,903.8	2.3
H	16,017	160+91	16,091	12.1	6,915.8	6,916.3	0.5
I	16,066	161+26	16,128	14.1	6,918.0	6,916.7	-1.3
J	16,488	165+63	16,563	11.3	6,930.9	6,933.1	2.2
K	16,824	169+07	16,907	10.2	6,945.0	6,944.4	-0.6
L	16,852	169+32	16,932	9.9	6,947.3	6,945.2	-2.1
M	17,256	173+51	17,351	8.2	6,960.3	6,959.6	-0.6
N	17,669	101+20	18,129	11.8	6,980.6	6,980.1	-0.5
O	18,151	184+67	18,463	14.0	7,001.4	7,002.0	0.6
P	19,050	193+64	19,364	14.9	7,031.9	7,043.6	11.7
Q	19,609	200+58	20,008	12.6	7,061.8	7,081.0	19.2

[1] Feet above confluence with Lefthand Creek
[2] Based on FIS, December 18, 2012
[3] Based on results of AMEC Provisional Flood Hazard Delineation (FHD); corrected Effective Model February 4, 2014

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOULDER COUNTY, CO
AND INCORPORATED AREAS

COMPARISON OF PROVISIONAL FLOOD HAZARD DATA

JAMES CREEK

Table 1-3: Changes in water surface elevation at Little James Creek from the 2012 FIS to the 2014 provisional delineation

FLOODING SOURCE					1 PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1,2]	PROVISIONAL FHD MODEL RIVER STATION[3]	PROVISIONAL FHD DISTANCE[3]	MEAN VELOCITY[3] (FEET PER SECOND)	REGULATORY[2] (FEET NAVD)	PROVISIONAL FHD[3] (FEET NAVD 88)	NET INCREASE[3] (FEET)
LITTLE JAMES CREEK							
A	365	2+09	209	6.4	6,582.0	6,581.5	-0.5
B	460	4+08	408	10.9	6,586.4	6,586.1	-0.3
C	600	5+56	556	12.3	6,994.5	7,013.6	19.1
D	700	6+48	648	11.2	7,026.7	7,030.7	4.0
E	900	8+96	896	11.3	7,037.3	7,036.7	-0.6
F	1,100	10+70	1,070	10.9	7,046.0	7,045.0	-1.0
G	1,365	13+07	1,307	9.0	7,061.0	7,060.9	-0.1
H	1,540	15+49	1,549	11.8	7,078.7	7,073.8	-4.9
I	2,150	21+08	2,108	9.8	7,105.0	7,105.0	0.0
J	2,270	23+36	2,336	11.0	7,115.9	7,119.1	3.2
K	3,070	32+11	3,211	9.5	7,164.4	7,164.1	-0.3
L	3,220	33+59	3,359	10.6	7,171.3	7,171.2	-0.1
M	3,870	40+54	4,054	12.1	7,204.9	7,202.3	-2.6
N	4,610	47+89	4,789	9.2	7,242.0	7,239.7	-2.3
O	4,730	49+08	4,908	8.7	7,267.4	7,244.8	-22.6

[1] Feet above confluence with James Creek
[2] Based on FIS, December 18, 2012
[3] Based on results of AMEC Provisional Flood Hazard Delineation (FHD); corrected Effective Model February 4, 2014

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOULDER COUNTY, CO
AND INCORPORATED AREAS

COMPARISON OF PROVISIONAL FLOOD HAZARD DATA

LITTLE JAMES CREEK

A comparison of the pre-flood and post-flood water surface elevations completed by the AMEC shows there have been both increases and decreases in the base flood elevation along the channel, which has the potential to affect the current 1% annual chance floodplain delineation.

The floodplain analysis presented here is based on channel geometry determined from surveys completed by AMEC immediately following the flood and is not representative of additional improvements made along the channel.

Channel Improvements since the 2013 Flood Event

While this delineation is based on the terrain surveyed immediately after the flood, there have been significant improvements along the channel in this reach, including the construction of engineered drop structures that will dissipate energy of the stream during high flows. These improvements will be taken into account when the Colorado Water Conservation Board updates the flood data for the area, later this year.

Hydraulic Analysis

Hydraulic analysis is used to model the dynamic behavior of water in the delineation of flood hazards, and the identification of possible measures to mitigate potential impacts.

Objectives

Current floodplain regulations in the Town of Jamestown are based on the more conservative of either the 2012 FIS or the 2014 AMEC provisional mapping. The changes in water surface elevations between the 2012 FIS and the 2014 AMEC report indicate that the 2013 flood has affected the channel configuration and geometry, leading to changes in the floodplain extent. This study combined the 2012 FIS and the 2014 provisional map to present a single map delineating the most conservative floodplain for the Town.

Methods

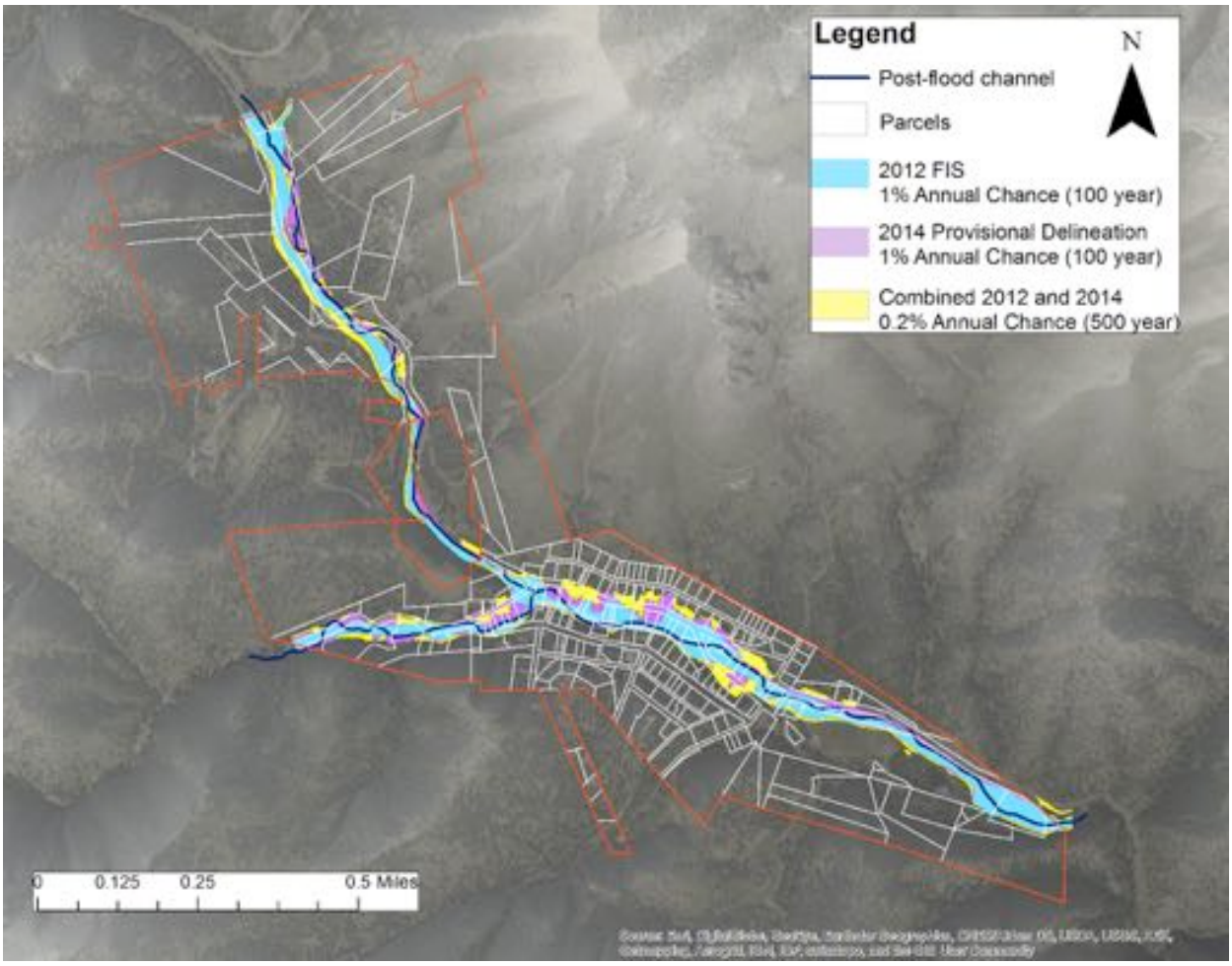
The 2012 FIS and 2014 provisional floodplain delineations were combined using ArcGIS 10.2 to illustrate the most conservative floodplain delineation. The 0.2% annual chance (500 year) floodplain was merged between the two delineations to create the most conservative estimate of a 0.2% annual chance floodplain. The 2014 1% annual (100-year) chance floodplain was added to the 2012 1% annual chance floodplain to highlight the changes in the delineations resulting from the 2013 flood event.

Regulatory Floodplain Delineation Results

The 2013 flood caused scouring and aggradation (deposition of settlement) along James Creek and Little James Creek, changing the channel configuration of James Creek and Little James Creek, leading to changes in the floodplain.

The maps displayed below in Figure 1-21 and Figure 1-22 show the combined 2012 FIS and 2014 provisional 1% chance floodplain. Figure 1-22 shows the 1% annual delineation from the 2012 FIS with the 2014 added onto it. Figure 1-22 combines the floodplain extent from the 2012 FIS and 2014 provisional delineation into a single floodplain delineation. Both maps display 0.2% chance floodplain from the combined 2012 and 2014 delineations.

Figure 1-21: Combined 2012 and 2014 floodplain delineations



The 2012 1% annual chance floodplain is displayed in blue, and the additional floodplain included from the 2014 delineation is delineated in purple. The 0.2% chance floodplain from each report has been merged to form a single unit, identified in yellow.

The maps displayed above illustrate the changes in the 1% annual chance floodplain that resulted from the 2013 flood event. The area right below the confluence of James Creek and Little James Creek experienced changes in the floodplain delineations due to changes in channel configuration. The delineation completed by AMEC (2014) extended the 1% annual chance delineations along Main Street just downstream of the confluence area. After the September 2013 flood event, the channel configuration shifted as a result of flood processes. Areas where there are large discrepancies between the AMEC and FIS floodplain is an indication of changes in channel morphology.

Figure 1-22: Combined 2012 and 2014 1% and 0.2% annual chance delineations with land parcels

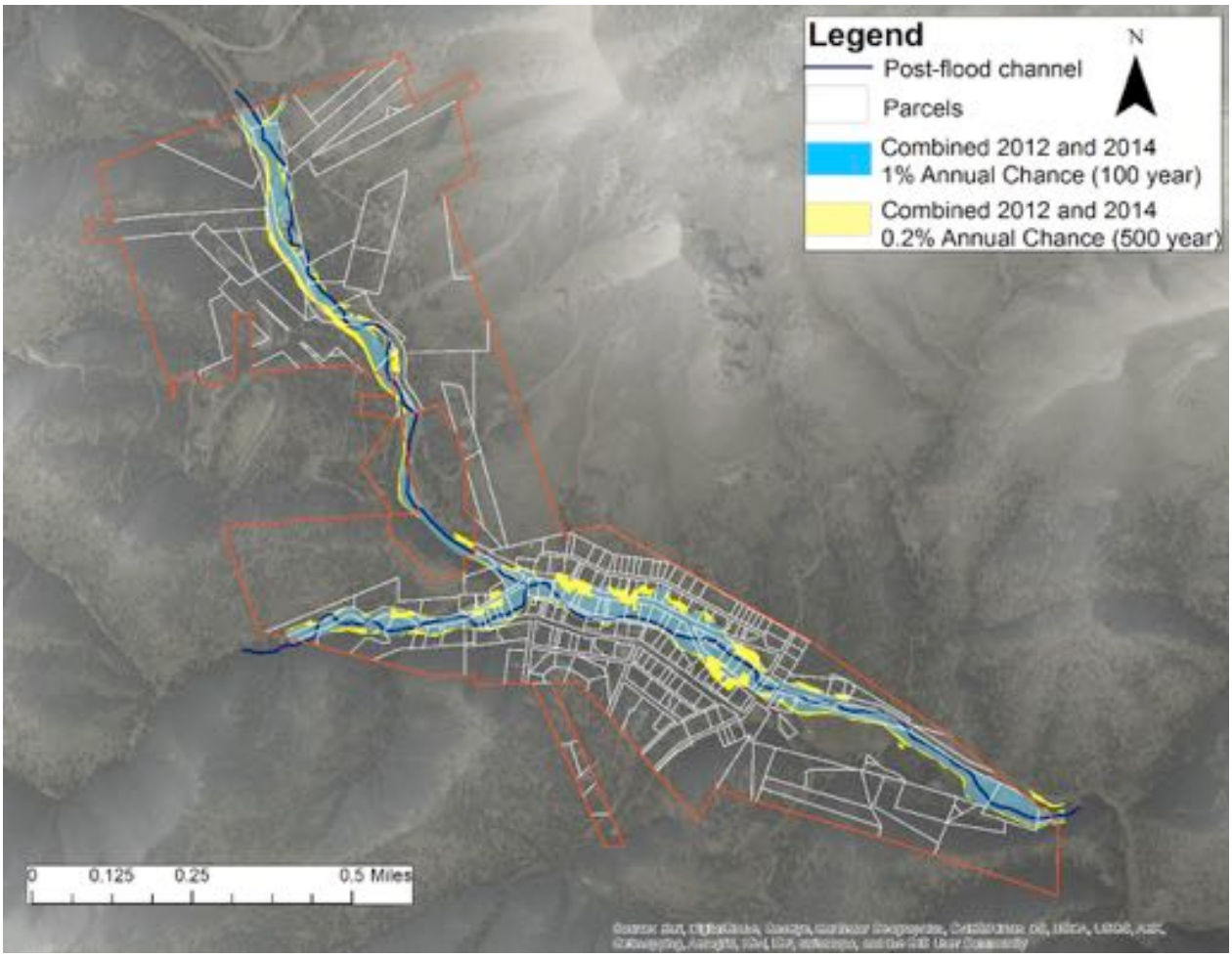


Figure 1-22 shows the post-flood creek channel and the combined 1% annual chance and .02% annual chance delineations from the 2012 and 2014 studies. The change in delineation is a reflection of changes in the creek channel that occurred during the flood. The flood caused aggradation and scouring along the channel, leading to shallower depths in some areas and deeper depths in others.

While the combined delineation is the most conservative based on the information available, an updated delineation based on the current channel morphology and newly-collected hydrologic data, will be conducted by the Colorado Water Conservation Board in the coming year. The future floodplain delineation may reveal areas where the floodplain has contracted from its previous levels.

Potential Changes to Current Delineations

Hydrology

In 2014, Jacobs completed a post-flood hydrologic evaluation of the Left Hand Creek Watershed for the Colorado Department of Transportation (CDOT). This analysis estimated the peak discharges of the 2013 flood event and modeled flow rates for the 1% annual chance event using a rainfall-runoff model. The objective of this study was to prepare a flood-frequency analysis to guide the reconstruction of the roads at Highway 36 based on updated rainfall data and calibrations with the 2013 flood event. The 2014 modeled discharge rates for the 1% annual chance flood were compared with the current regulatory flow rates used in both the 2012 FIS and the 2014 Provisional Delineation. The results from the study are shown below in Table 1-4.

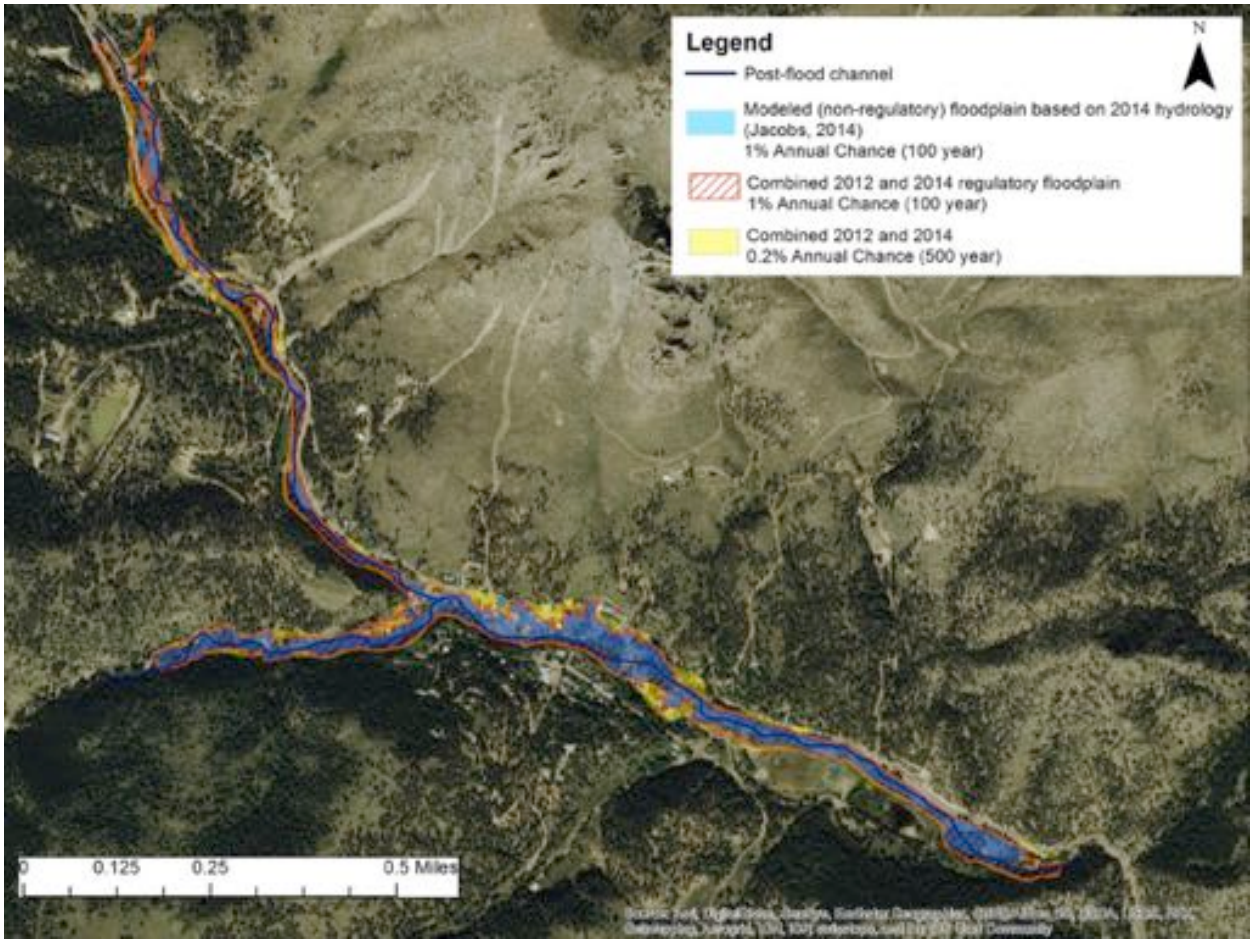
Table 1-4: 100 year modeled peak discharges compared to regulatory discharges

Location	Current Regulatory Discharge (cfs)	Modeled Discharge (cfs)	Percent Difference
Little James Creek at upstream limit of detailed study	970	590	- 40%
Little James Creek upstream of confluence with James Creek	1,160	1,390	+ 19%
James Creek upstream of confluence with Little James Creek	2,140	2,340	+ 9%
James Creek at confluence with Little James Creek	3,205	2,780	- 13%
James Creek below Jamestown	3,930	3,300	- 16%
James Creek above confluence with Lefthand Creek	4,810	3,510	- 27%

The 2014 modeled discharges for James Creek downstream of the confluence were slightly lower than the current regulatory discharge rate (16% decrease). Discharges along Little James Creek at the upstream end of the study area showed a 40% decrease from regulatory flows. The confluence of Little James Creek and James Creek showed an increase of 19% in the modeled discharge rate. The discharge rates determined by Jacobs were not used in the regulatory floodplain analysis completed by AMEC. The change in flow rates resulting from the updated rainfall data has the potential to affect the current regulatory floodplain.

S20 completed a floodplain delineation using the CDOT hydrologic data with the terrain data used in the AMEC report. This delineation is shown in Figure 1-23 and overlain on the combined 2012 FIS and 2014 Provisional Delineation. Despite the changes in the hydrology, the floodplain extent with the updated hydrologic data does not differ significantly from the combined delineation, however, there may be variations in water surface elevations.

Figure 1-23: Modeled Floodplain Delineation using CDOT hydrology and AMEC cross-section data, overlain on the 2012 and 2014 combined delineation



EWP As-Builts

The 2014 Provisional Delineation and the analysis presented above was based on the terrain and channel configuration surveyed immediately following the flood and did not include channel improvements that were completed through the Emergency Watershed Protection (EWP) program.

There has been extensive EWP work done along James Creek and Little James Creek, including rock drop structures and bank stabilization work. S20 evaluated the EWP as-built documents to assess potential changes in the floodplain resulting from the work. It appeared that all structures were built at or below the original grade of the river, which will likely not result in a significant change in water surface elevation; however, a complete hydraulic modeling analysis is necessary to determine to the effect of these structures.

Other Hazards

Fire and geologic hazards contribute to the risk of debris flows. Debris flows are a significant hazard in this area due to the terrain. Aerial imagery from the 2013 floods showed evidence that debris flows contributed to dam failures. A USGS report discussing the 2013 landslides states "debris flows exacerbated flooding by supplying sediment to stream valleys. This sediment was mobilized by floods and in some cases caused surging flood pulses that destroyed building and infrastructure" (Godt et al., 2013). During the 2013 flood, debris flows took out culverts and contributed to the extensive damage to infrastructure throughout town (AMEC, 2014).

The Overland Fire occurred in 2003, however, there are still long-lasting effects that contribute to the risk of flooding. Despite restoration efforts that included erosion control, re-vegetation, and mulching projects, rainstorms have caused significant erosion and debris flows since the fire. Residents estimate that Main Street

was closed three to four times between 2004 and 2008 due to debris flows from the Overland fire burn area (AMEC, 2014). Vegetation plays a key role in mitigating hillside erosion and runoff and without this vegetation, the area is much more susceptible to debris flows during heavy rain events, as seen during the 2013 flood.

Hazard Analysis and Recommendations

Flood Risk Summary

The risk of flooding in the Town of Jamestown was described by a combination of the 2012 FIS and 2014 Provisional study. The combination of the pre- and post-flood delineations shows the extent of the current regulatory floodplain. It also shows the possible area that will be included in the re-mapping of the 1% annual chance (100-year) floodplain for the Town of Jamestown. The floodplain delineations presented in this report provide preliminary information to guide the planning and development process for the Town of Jamestown, as well as highlight possible future changes to the floodplain. Updated hydrologic data and stream projects completed by the EWP may affect future floodplain delineations for the Town of Jamestown.

This flood risk assessment developed a hydraulic model using 2014 hydrologic data to show the possible effect of the updated hydrologic data on the current delineation. The results demonstrated that the floodplain analysis completed with the 2014 hydrologic data is not significantly different from the current regulatory analysis, but further studies are needed for a detailed delineation. The EWP work that has been completed since the 2014 Provisional Delineation has affected the channel configuration and cross-sections geometry, which may result in changes in the 1% annual chance floodplain.

The Town is not able to use data that has not gone through the LOMR (Letter of Map Revision) process (Williams, M., pers comm, 2015), therefore any information presented here is provided strictly to present a better understanding of the risk of flooding within the Town and is not intended to replace current regulations or insurance requirements, or project future regulations and requirements.

It is recommended that the Town pursue updating of the floodplain data by the Colorado Water Conservation Board.

Recommendation from the Jamestown Long Range Recovery Plan

- Identify a restoration plan coordinator and create a collaborative stream corridor restoration plan for public and private property throughout Jamestown, including assistance to private property owners.
- Develop education and outreach programs on restoration techniques to promote the planting of native species and the use of bioengineering techniques to stabilize stream bands and prevent erosion.

References Cited

AMEC. (2014). *Jamestown Stream Corridor Master Plan Technical Memorandum.*
ESRI. (2013). *ArcGIS for Desktop: Version 10.2.* Redlands, CA.
FEMA. (2012). *Flood Insurance Study: Boulder County, Colorado and Incorporated Areas. Flood Insurance Study.*
Jacobs. (2014). *Hydrologic Evaluation of the Lefthand Creek Watershed.*

SECTION 4 | JAMESTOWN GEOLOGICAL HAZARDS AND GEOLOGIC CONSTRAINTS

Prepared by Robert M. Kirkham, PG CPG, GeoLogical Solutions

4.1 Background and Summary

Several geologic hazards and geologic constraints affect Jamestown. They include debris flows, slope-stability issues, mines and mill tailings, hazards and constraints on valley floors, seismic hazards, and radon. The mapped extent of the debris -flow hazards is shown on Figure 1-24. Slope-stability hazards and constraints are -depicted on Figure 1-25. Hazards and constraints related to mines and mill tailings are on Figure 1-26. Areas with geologic hazards and constraints on valley floors are on Figure 1-27. Larger versions of these figures are included at the end of the report.

Each hazard area depicted has a high or moderate hazard rating. Areas outside the hazard areas shown on the figures have either low or no potential for that hazard. Radon hazards are very site dependent and require site-specific studies to assess the hazard.

Debris flows pose the most serious geologic hazard to the town in the near term, although the damage caused by a future earthquake could be more extensive. About 13 percent of the town is within debris-flow hazard areas, with about 30 basins being capable of producing debris flows that could affect the town in the future (See Figure 1-24). Six of these basins generated debris flows during the 2013 storm. All identified debris-flow basins should be studied to assess the probability for and size of future debris flows.

One small, old landslide was detected during this project and briefly examined in the field. It is on the hillslope above the cemetery. The underlying bedrock is metamorphic gneiss and schist. The old landslide should be studied to determine the conditions that led to a slope failure at that location.

Over 70 percent of Jamestown lies on steep hillslopes considered to be potentially unstable slopes (see Figure 1-25). They are in a state of quasi-equilibrium and may become unstable when disturbed by human activities or by extreme precipitation events. Shallow soil creep is a common process on potentially unstable slopes. Excavation activities in areas of potentially unstable slopes may trigger small landslides and rockfall or accelerate soil slip. Cut slopes in these areas may tend to ravel or slump. Extreme precipitation events may trigger small, thin landslides called soil slips that can transition into debris flows.

Two small areas in the north part of town below cliffs on Porphyry Mountain are subject to moderate rockfall hazards. Rocks that dislodge from the cliffs may roll or bounce into the rockfall hazard areas.

The section of Andersen Hill Road that remains on the south side of James Creek was undercut by erosion during the 2013 flood. A section of the eroded slope below the road continued to slough or ravel during 2015, threatening the integrity of the remaining road surface.

A landform on Porphyry Mountain above the town limits is interpreted to be a result of a very fast-moving, rock avalanche. A similar future event, particularly if larger, could be very hazardous to the town.

Areas with inactive mines and mills, as well as reclaimed areas, also pose geologic hazards and constraints. They occupy nearly 10 percent of the town (see Figure 1-26). There may be underground tunnels, stopes, and raises in mine areas that pose subsidence hazards to the overlying ground surface in the event of a roof collapse in underground workings.

The underground workings and highly fractured rock found at shallow depths may serve as preferential pathways for rapid movement of effluent from septic systems. This could degrade ground water or surface water. Mine and mill areas, as well as reclaimed areas, may contain material that is loose, unconsolidated, and unsuitable for foundations. These areas may also have radiation and environmental hazards.

Geologic hazards and constraints also exist on the valley floors of the creeks within town. About 12 percent of the town lies on a valley floor, which includes the creek channels, floodplains, and low terraces adjacent to the

floodplain (see Figure 1-27 for locations). Potential problems found on valley floors include erosion and sediment deposition during floods, shallow groundwater, and possible compressible, organic-rich soils.

Jamestown is moderately at risk to earthquakes. Colorado's largest historic earthquake occurred in 1882 near Estes Park; it had an estimated magnitude of 6.6. The causative fault for the 1882 earthquake has not yet been recognized, and the earthquake occurred in a geologic environment similar to Jamestown. It is possible that a similar earthquake could occur in closer proximity to Jamestown.

The nearest known geologically young faults that are capable of generating large earthquakes in the future are about 40 to 45 miles west-southwest of Jamestown. These include the Williams Fork Mountains Fault, several short faults on the floor of the Williams Fork Valley, and the Gore Range Frontal Fault. Future large earthquakes on these faults could cause moderate ground shaking in Jamestown. Little is known about the recent activity of faults in and near town.

Existing studies indicate radon in homes in Jamestown often exceeds recommended levels. New and existing homes should be tested for radon.

No other geologic hazards or constraints were identified in the Jamestown area. This includes swelling soils, heaving bedrock, collapsible or hydrocompactible soils, and sinkholes.

Figure 1-24: Map of Debris-flow Hazards

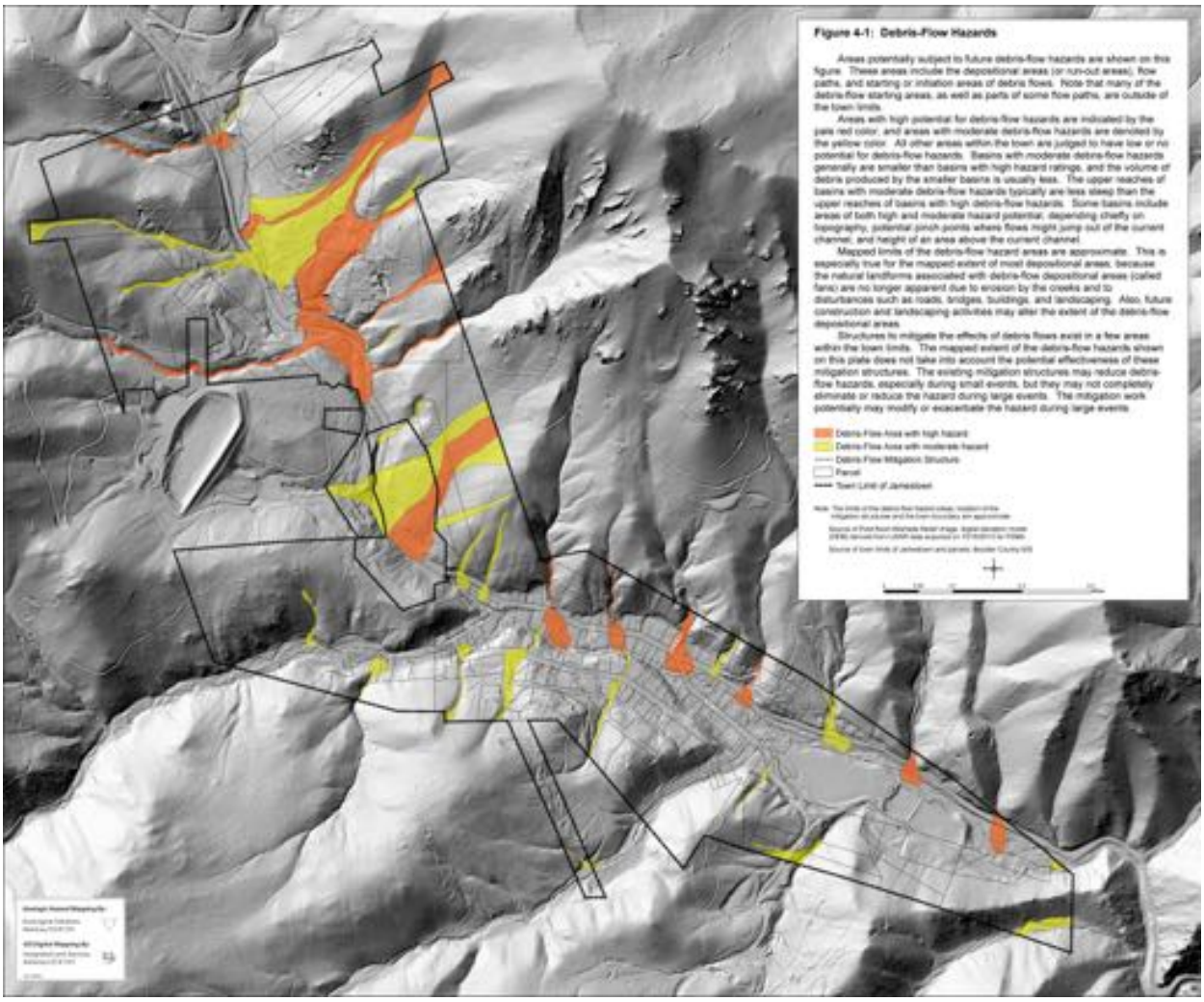


Figure 1-25: Map of Slope Stability Hazards and Constraints

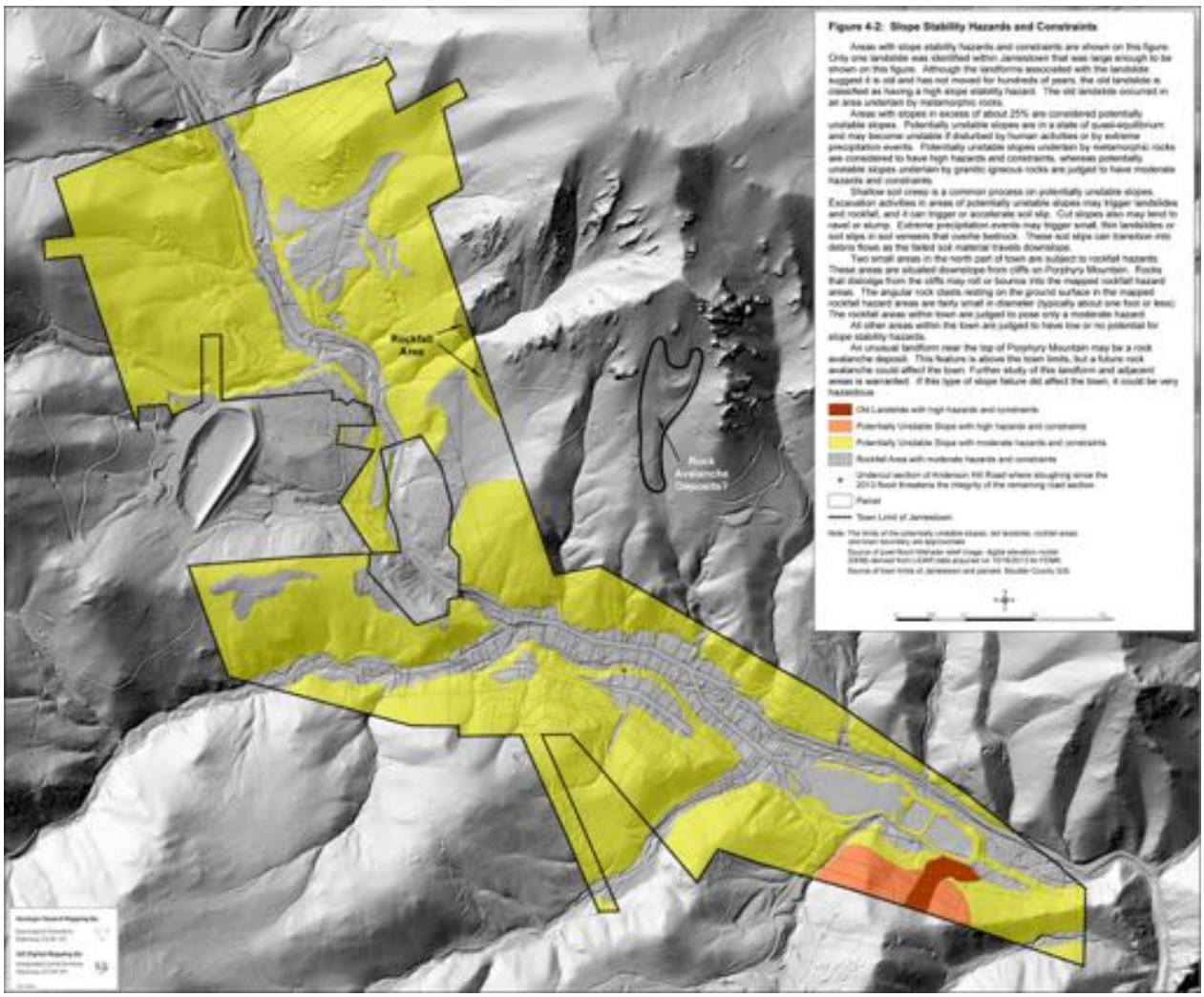


Figure 1-26: Map of Geologic Hazards and Constraints Related to Mines and Mill Tailings

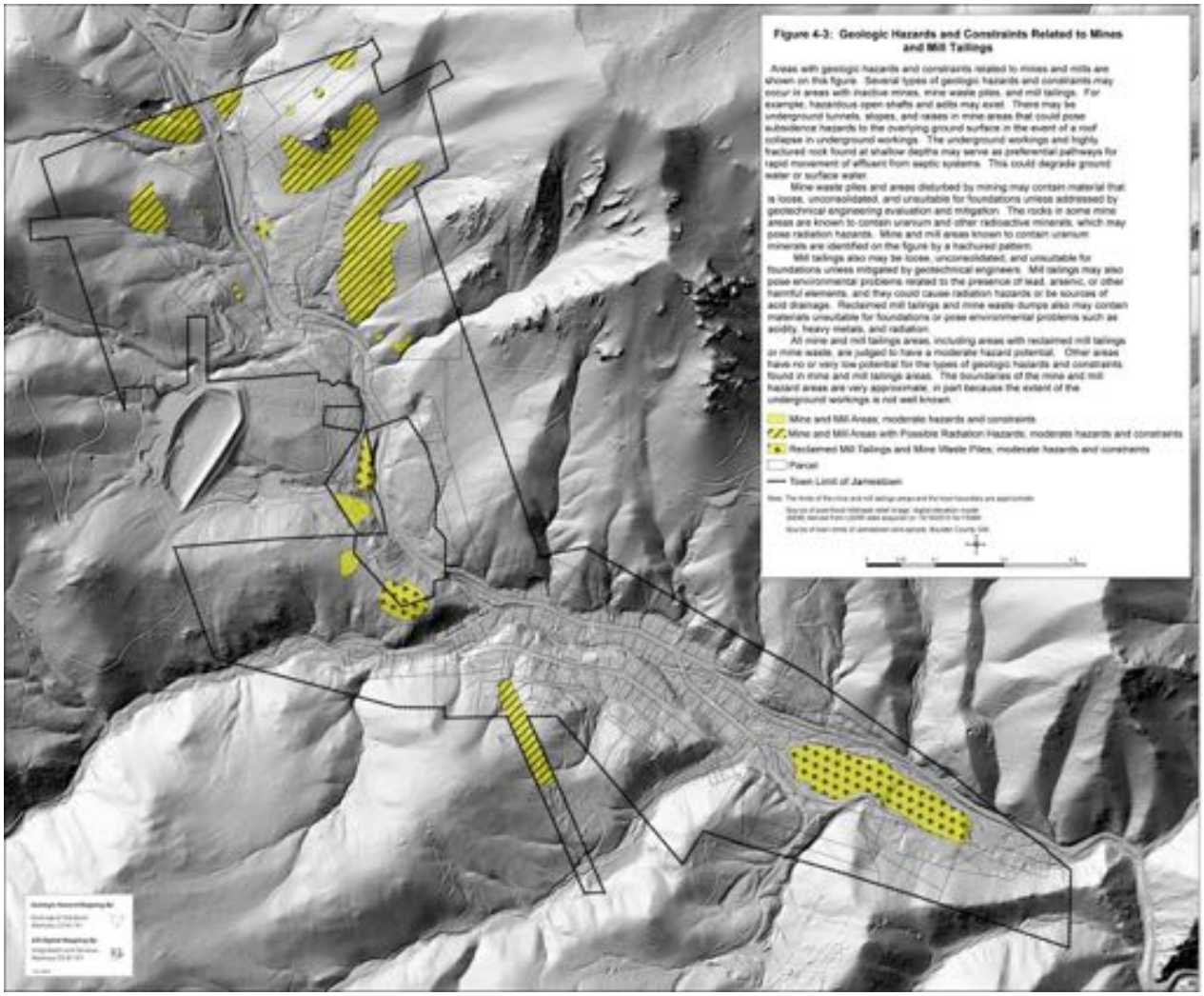
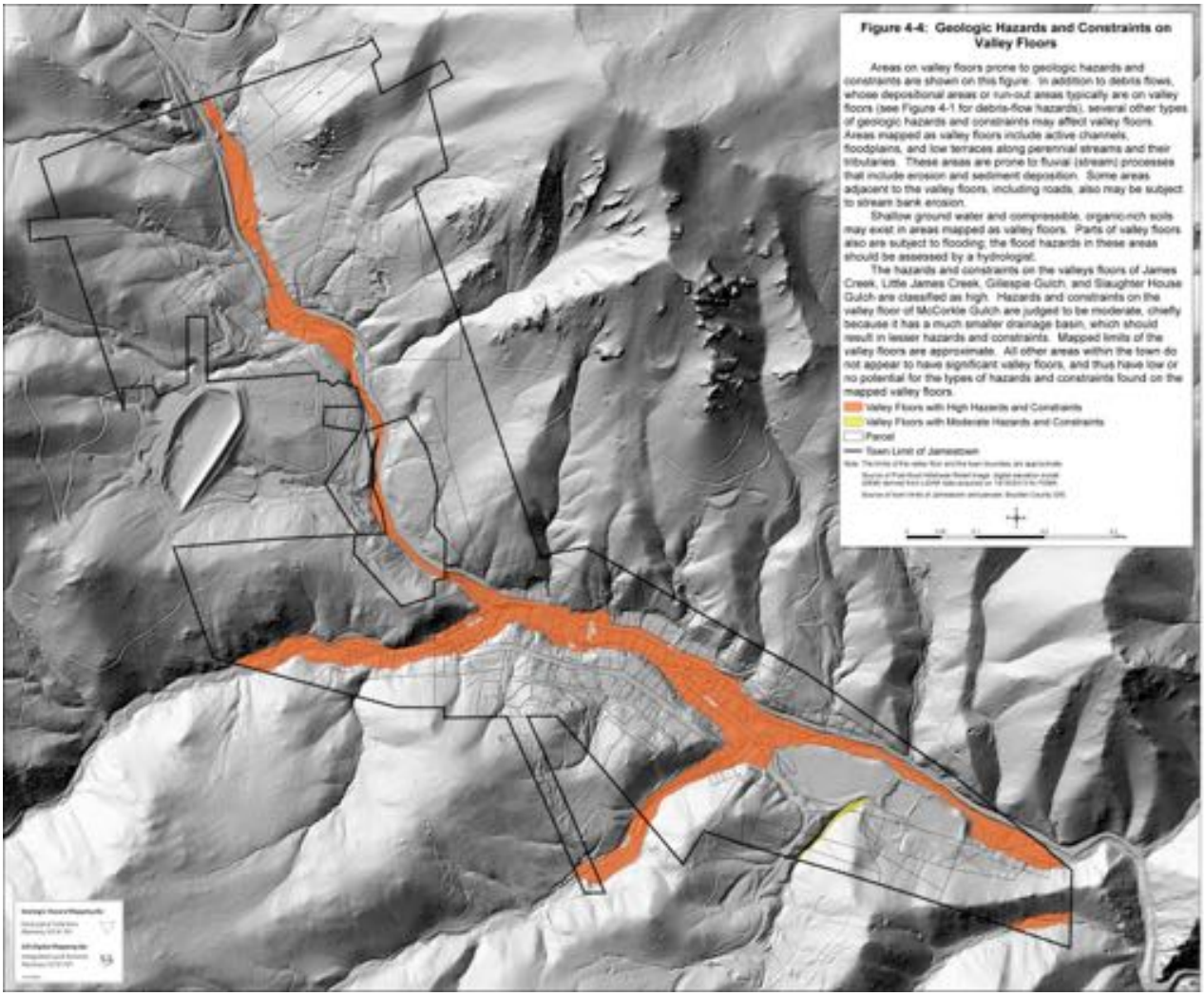


Figure 1-27: Map of Geologic Hazards and Constraints on Valley Floors



4.2 Technical Report

Introduction

This report describes the results of data collection and a reconnaissance analysis of the geologic hazards and geologic constraints in Jamestown, Colorado. The investigation is an integral part of the Jamestown Hazard Risk Assessment, Land Use and Housing Analysis.

Jamestown is located in the Front Range about seven miles northwest of the city of Boulder (Figure 1-28). The town extends across parts of sections 19 and 30, T. 2 N., R. 71 W., and sections 24 and 25, T. 2 N., R. 72 W., 6th P.M. It occupies about 367 acres on the valley floors and valley walls of James Creek, Little James Creek, and their tributaries. Elevations in town range from about 6,800 to 7,700 feet above mean sea level. Cole and Braddock (2009) include Jamestown in their Rolling Upland physiographic zone.

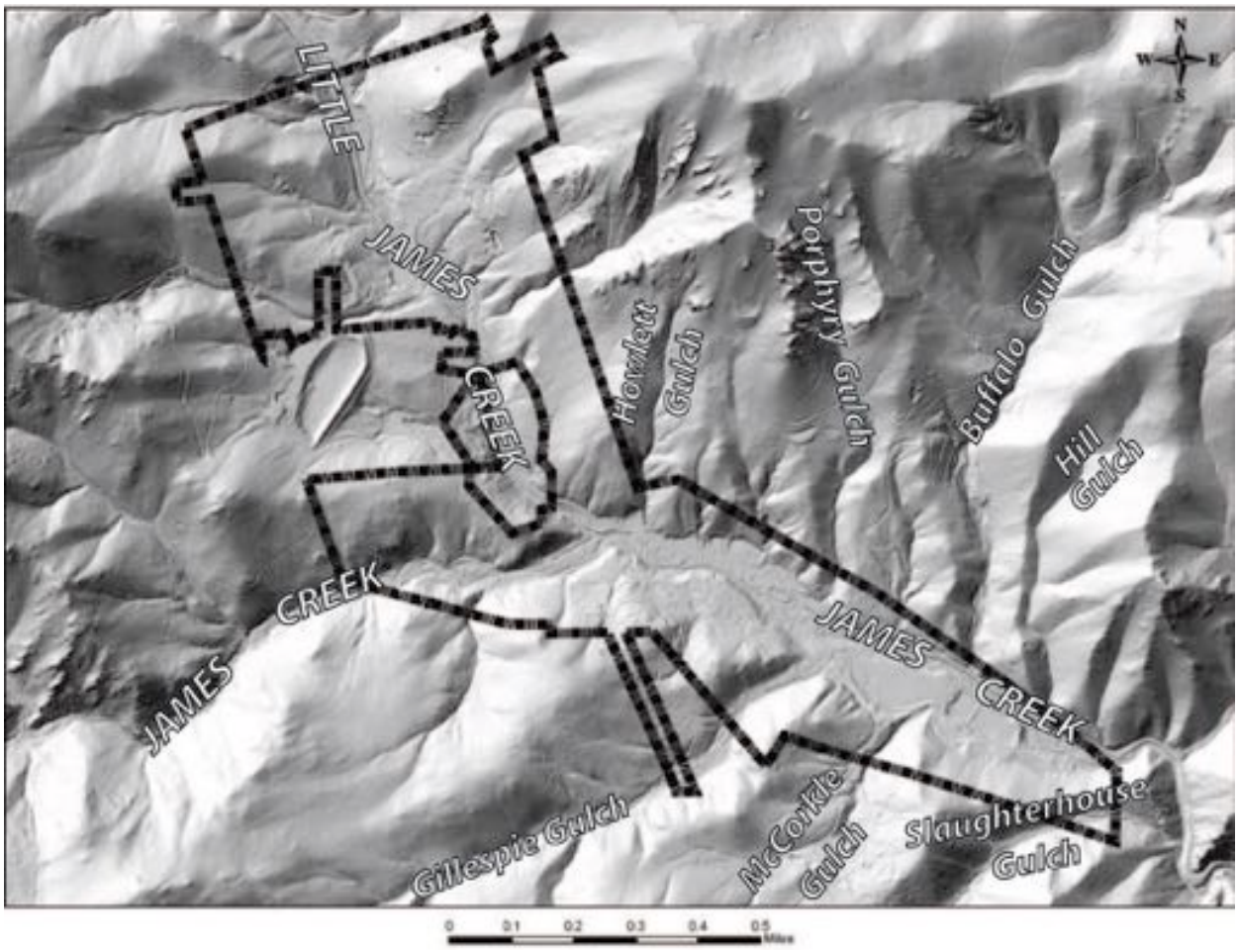
There are several named tributaries and many unnamed tributaries to James and Little James Creeks within town. Gillespie Gulch, McCorkle Gulch, and Slaughterhouse Gulch are on the southwest side of James Creek (Figure 1-29). Howlett Gulch, Porphyry Gulch, Buffalo Gulch, and Hill Gulch are on the northeast side of James Creek. Except for Howlett Gulch, all these drainages are named on the U.S. Geological Survey (USGS) Gold Hill 7.5-minute topographic quadrangle.

The valley floors of James and Little James Creeks are narrow within town, and the valley walls are moderately steep to very steep. Porphyry Mountain is on the northeast side of town (see Figure 1-28). It abruptly rises above the town to an elevation of 8,336 feet. To the northwest of town is Bueno Mountain (elevation 8,662 feet), and just west of it is the 8,716-feet-high Overland Mountain. The tributaries draining off these mountains, especially Porphyry Mountain, have steep gradients and are prone to debris flows.

Jamestown was originally settled by prospectors and miners who worked the numerous precious metal veins in and near the town. Gold was discovered in the district in 1865 (Lovering and Goddard, 1950). Several stamping or processing mills were in use by the 1880s, and a short-lived boom occurred in 1883, at which time Jamestown was incorporated. Typical of many mining towns, Jamestown (or Jimtown, as it sometimes is known) experienced several boom and bust cycles. Most of the mines within the town limits were primarily fluorspar mines. Fluorspar is the common name for the mineral fluorite, which consists of calcium fluoride. Commercial fluorspar was found in 1903. The first fluorspar boom peaked in 1918 and then rejuvenated during the Second World War (Lovering and Goddard, 1950). Many of the fluorspar veins in the Jamestown mining district contain radioactive minerals. The most productive uranium mine in Boulder County, the Fair Day Mine, is about two miles west of Jamestown (Sims and Sheridan, 1964). Although ore from many of the fluorspar mines within Jamestown contained radioactive mineral, none are known to have commercially produced uranium (Nelson-Moore et al., 1978).

Figure 1-28: Regional Location Map

Figure 1-29: Named creeks and gulches in Jamestown, shown on a LiDAR hillshade



The thick black line is the town limits of Jamestown.

Methodology

This geologic hazards investigation was conducted in a manner consistent with the degree of skill and care ordinarily exercised by the geologic profession currently practicing in the State of Colorado under similar conditions. The first phase of the project involved the collection and review of existing published and publicly available reports, maps, and data relevant to the project. Google Earth imagery also was utilized. The review and usage of these documents and data continued throughout the project.

The second phase of the project involved the creation of base maps for use in the field and in the reports. Fortunately, high resolution LiDAR for the Jamestown area was acquired by Boulder County before the September 2013 flood and by FEMA after the flood. LiDAR, which stands for Light Detection and Ranging, is a type of remote sensing method. It uses light in the form of a pulsed laser to generate precise, three-dimensional information about the shape of the Earth's ground surface. The three dimensional data can be used to create digital elevation models (DEMs), detailed topographic maps with contour lines, hillshade images (a type of shaded relief map), and slope maps.

In addition to providing detailed georeferenced base maps, the hillshade images, topographic contour maps, and slope maps created from the LiDAR are very useful for geologic hazard investigations. For example, the irregular, hummocky landforms associated with most landslides typically are very obvious in the hillshade images and contour maps. Topographic scarps resulting from movement of active faults also tend to be very prominent and easy to identify. The hillshade images simulate the shadows and bright highlights caused when

the sun is at a low angle to the earth's surfaces, which emphasizes the landforms of features such as landslides and fault scarps. The azimuth at which the sun is artificially shone across the DEM to create the hillshade can be at any compass direction and at any sun angle to the Earth.

The post-flood LiDAR data used for this investigation was flown for FEMA on October 16, 2013. It has a vertical resolution of 0.7 meters. Integrated Land Services Inc., located in Alamosa, Colorado, used the LiDAR and other digital data to create the hillshade images, slope maps, topographic contour maps, and aerial imagery used for the geologic hazard investigation. The hillshade image used as the base map in Figures 1-24 through 1-27 and 1-29 was derived from the LiDAR DEM. For geologic interpretive purposes, hillshade images were created with sun angle of 450 and sun azimuths of 450, 1350, 2250, and 3150. A sun azimuth of 3150 was used for the hillshade images on the figures.

A short reconnaissance site visit was conducted on March 27, 2015. During this visit town representatives Ken Lenarcic and Vic Harris, and also our team member Ray Kramer, provided valuable background on the 2013 flood event and the damage caused by it, as well as a tour of the town and its infrastructure. Geologic hazard mapping was performed on April 27, 28, and 29, 2015. Ken and/or Vic also accompanied GeoLogical Solutions staff while in the field, provided additional background information, and served as on-site liaisons with many of the town's residents.

During the fieldwork, visual observations were made from all public roads. Foot traverses were made on public lands and across several private parcels in Jamestown. Additional field traverses were made on hillslopes above the town limits to better understand the geologic hazards. This included visual examination of the starting zones and flow paths of the debris flows that formed on the slopes of Porphyry Mountain during the 2013 flood.

While in the field, geologic hazard mapping was recorded on 1:3,000-scale hillshade images. A total of twenty-six 1:3,000-scale hillshade images were needed to cover the entire town. The hazard mapping subsequently was reviewed and in some cases modified while in the office, based on observations and interpretations of the various hillshade images, slope maps, topographic contour maps, aerial images, and Google Earth. Topographic maps with contour lines at five feet intervals were available for the entire town and nearby areas. Maps with one-foot contour intervals were created for most hazard areas.

The twenty-six hillshade images were scanned and delivered to Integrated Land Services, who digitized the hazard mapping and created figures 1-24 through 1-27, which depict the mapped geologic hazards and constraints. Debris -flow hazards are shown on Figure 1-24. Slope-stability hazards and constraints are depicted on Figure 1-25. Geologic hazards and constraints related to mines and mill tailings are on Figure 1-26. And the geologic hazards and constraints on valley floors are on Figure 1-27. GeoLogical Solutions reviewed the figures and prepared this report.

The boundaries of the geologic hazard and constraint areas shown on the figures should be considered approximate. For example, debris flow paths and depositional areas can be influenced by blockages that form in channels or by obstructions such as buildings. Extent of the mine hazard areas was mapped on the basis of mining-related features on the ground surface as observed in the LiDAR images. It is possible that underground workings extend beyond the mapped areas. Underground mine maps are available for some mines, but they are poorly georeferenced, meaning additional work beyond the scope of this project is required to accurately determine the extent of the underground workings.

In this project geologic hazards are considered to be those types of geologic processes that should be avoided. In contrast, geologic constraints are geologic processes that usually can be addressed and mitigated by appropriate geotechnical investigations, assuming the designs and recommendations coming from those investigations are implemented.

No additional investigative methods, including drill holes, trenches, test pits, soil analyses, geophysics, chemical analyses, radiation monitoring, or computer modeling of debris flows or slope stability were conducted during this project. However, the data obtained from these types of additional investigative

techniques may be needed in the future to adequately characterize the geologic hazards and constraints, particularly for site-specific studies.

Geologic Setting of Jamestown

The geologic hazards in Jamestown are in large part controlled by its complex geologic setting. The town is located within the Front Range, which is an eroded remnant of an old geological uplift called the Ancestral Front Range that was bounded on both sides by faults and folds. Uplift of the Ancestral Front Range started about 65 to 70 million years ago and probably ended about 35 or 40 million years ago (Tweto, 1980; Sonnenberg and Bolyard, 1997). Geologists call this period of mountain building the Laramide Orogeny, which in addition to mountain building also was accompanied by igneous intrusions and volcanism. The Front Range and many adjacent areas also have undergone broad, regional uplift during approximately the past 15 to 20 million years (Steven et al., 1997). The carving of the deep canyons like those at Jamestown initiated around 5 million years ago and continues to the present.

Geologists classify rocks into three main classes: igneous, metamorphic, and sedimentary. Nearly all the bedrock beneath Jamestown is very ancient igneous intrusive rock. Igneous rocks are solidified from molten or liquid rock (called magma by geologists). Intrusive igneous rocks were molten rock that cooled off and hardened below the surface of the Earth. Igneous intrusive rocks typically are very hard and resistant to erosion, although subsequent fracturing and weathering or chemical alteration can weaken them.

In contrast, extrusive igneous rocks are molten rock erupted onto the Earth's surface from volcanoes and are commonly called volcanic rock. No volcanic rock is known to be present in Jamestown.

A very small area in the southeast part of town is underlain by ancient metamorphic rock (see Figures 1-31 and 1-32). Metamorphic rocks are formed when pre-existing rocks are subjected to high heat, pressure, and/or chemical processes. The metamorphism usually happens deep within the Earth. Some of the rock within and adjacent to the mineralized veins in Jamestown has been altered by chemical and thermal processes at the same time that the precious metals and fluorspar were deposited in the veins. The ancient metamorphic rocks usually are hard and resistant to erosion, but some are weak and easily eroded particularly where altered. Other metamorphic rocks, especially schist and gneiss, have layering and planar alignments of recrystallized minerals that can serve as slip planes for landslides.

Sedimentary rocks consist of loose sediment that has been consolidated or turned into rock. Sediment includes clastic material like sand, gravel, and clay, as well as chemically deposited material like rock salt and gypsum and also organic material like peat, which becomes coal or lignite when turned into rock. No sedimentary rock is known to exist in Jamestown, but unconsolidated sediment is found along the creeks and streams. The material in debris flows also is considered sediment.

Three published maps depict the geology of the Jamestown area and were used during this project. All three maps focused on bedrock, not on the unconsolidated surficial deposits that locally overlie bedrock. The oldest of the three maps is a preliminary regional map at a scale of 1:250,000 authored by Braddock and Cole (1978). Figure 4-7 shows the location of Jamestown on an excerpted part of the map by Braddock and Cole. All but the northern end of Jamestown also is covered by the detailed 1:24,000-scale map by Gable (1980), which is shown in Figure 1-31. The most recent geologic map of the Jamestown area is the 1:100,000-scale map by Cole and Braddock (2009); Figure 1-32 is from this published map.

The mapped unconsolidated sediment includes sand, gravel, and silt deposited by streams (unit Qa on Figures 1-31 and 1-32), and tailings and artificial fill placed by humans (unit "f" on Figure 1-32). Veneers of colluvium (unconsolidated sediment on hillslopes that was transported primarily by gravity), debris-flow deposits, rockfall debris, and residuum (unconsolidated materials formed by in-place weathering of bedrock) exist in many locations in Jamestown. But these deposits usually were not mapped by the three published geologic maps because they focused on bedrock. One possible old landslide was identified in the LiDAR hillshades during this investigation; it is located in the southwest part of the town above the cemetery and is discussed further in the geologic hazards section.

Although the names assigned to the bedrock formations beneath Jamestown vary from map to map, the general type of bedrock is consistent on each map. The bedrock beneath nearly all of Jamestown is igneous intrusive rock. A very small area in the southeast part of town is underlain by ancient metamorphic rocks.

The igneous intrusive bedrock beneath Jamestown can, in general terms, be called granitic rock. That common name, granitic, is used to describe the igneous intrusive rock beneath Jamestown in the geologic hazards sections of this report. The small area of metamorphic rocks in the southeast part of town consists of gneiss and schist. In contrast to the intrusive igneous rock, the minerals within gneiss and schist often are aligned into what geologists call foliation. And when gneiss and schist are formed by metamorphosing layered sedimentary and volcanic rocks, the gneiss schist may preserve the layering. The foliation and layering within gneiss and schist can create planes of weakness within the rock that can serve as slip planes for landslides when conditions are favorable.

As shown on the geologic maps in Figures 1-31 and 1-32, there are several faults within Jamestown. Faults are fractures in which the rock on opposite sides of the fracture have moved or slid in different directions. When a fault moves suddenly, the vibrational energy released by the movement causes the earth to shake, creating an earthquake. The frequency of and spacing between fractures often is greater in the bedrock near the faults, which can cause the rock to be more easily eroded.

In rocks that are hard and otherwise relatively impermeable to water, the faults and fractures become the preferred pathways for ground water to follow. Water-filled faults and fractures can be important sources of ground water for wells. When hot, mineralized water moves through the faults and fractures, the dissolved minerals will precipitate into solid minerals when the temperature, pressure, and chemical conditions favor precipitation. The precious metal and fluorspar veins in and near Jamestown formed in this manner. The hot mineralized water often alters or locally metamorphoses the bedrock adjacent to the faults. The altered rock may be more or less hard (indurated) and may be more or less resistant to erosion when exposed at the Earth's surface.

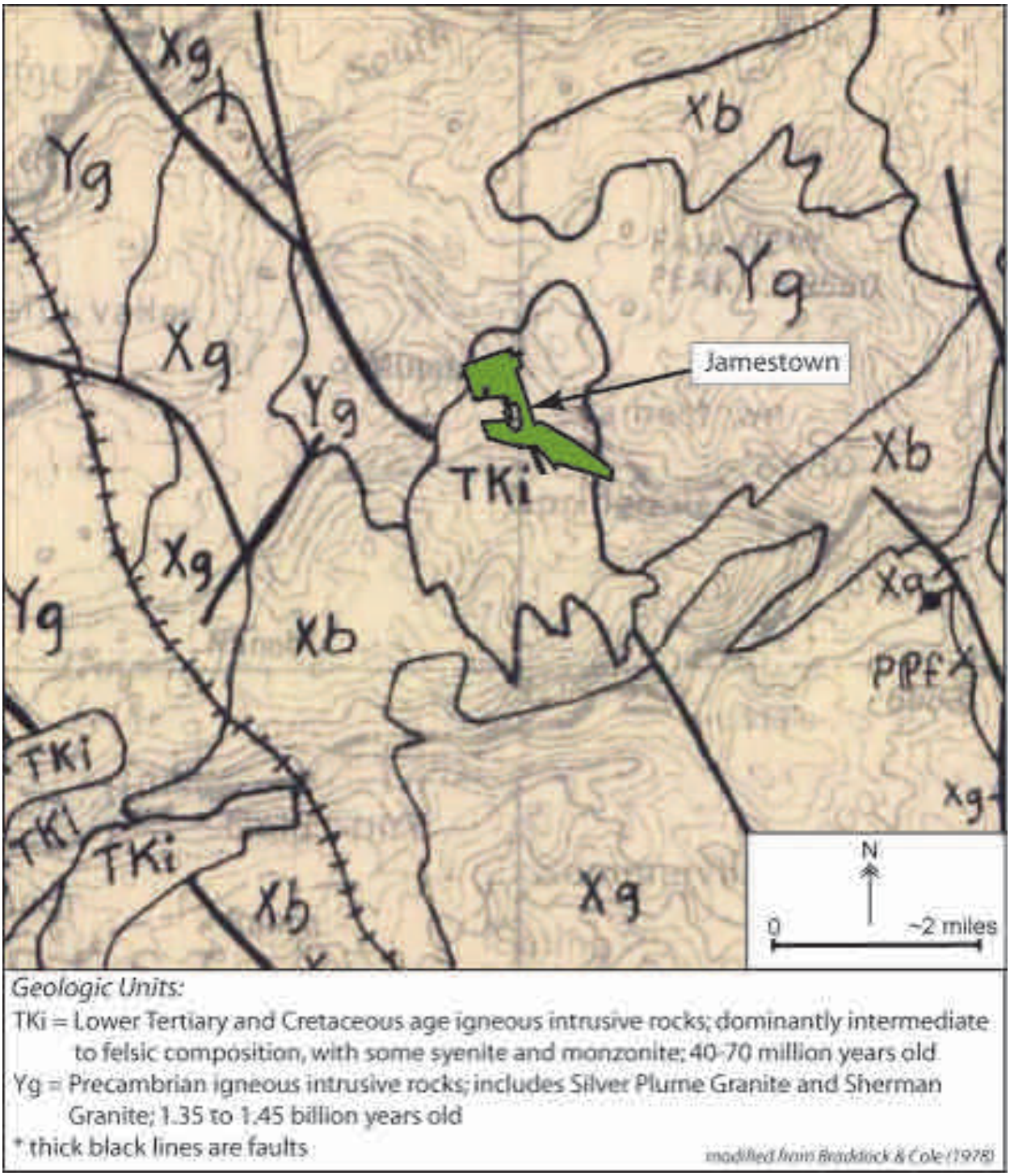
The following paragraphs describe the bedrock beneath Jamestown in more technical terms. The oldest rocks in Jamestown are metamorphic gneiss and schist found in the southeast part of town, uphill and southwest of the reclaimed tailings ponds (unit Xgns in Figure 1-31 and unit Xb in Figure 1-32). These rocks originally were sedimentary rocks, and they were metamorphosed about 1.7 billion years (Cole and Braddock, 2009). Since the original sedimentary rocks were in layers or beds, these metamorphic rocks also are layered.

The intrusive rocks beneath Jamestown are of three different ages, all of which are younger than and intruded into the metamorphic rocks. Cole and Braddock (2009) called the oldest intrusive rock beneath Jamestown the Granite of Longs Peak, which is about 1.4 billion years old and Precambrian in age (unit YgLP in Figure 1-32). Gable (1980) correlated these oldest intrusive rocks with the Silver Plume Quartz Monzonite (unit Ysp in Figure 1-31). On their preliminary geologic map, Braddock and Cole (1978) mapped these rocks as unit Yg, which included both Silver Plume Granite and Sherman Granite (Figure 1-30). These oldest igneous intrusive rocks underlie relatively small areas in the northern and eastern parts of Jamestown, but are much more widespread beyond the town limits.

The intermediate-age intrusive rocks underlie most of the town. Cole and Braddock (2009) classify these rocks as monzodiorite (unit Kmzd; Figure 1-32. This intrusion was emplaced 'only' around 72 to 78 million years ago. They are about 1.3 billion years younger than the older Precambrian intrusive rocks. Gable (Figure 1-31) maps these rocks as unit Kqm, or quartz monzonite and quartz monzonite porphyry, and assigned a slightly younger age to them. Braddock and Cole combined the intermediate-age intrusion and a younger intrusion into a single unit (TKi) on their map.

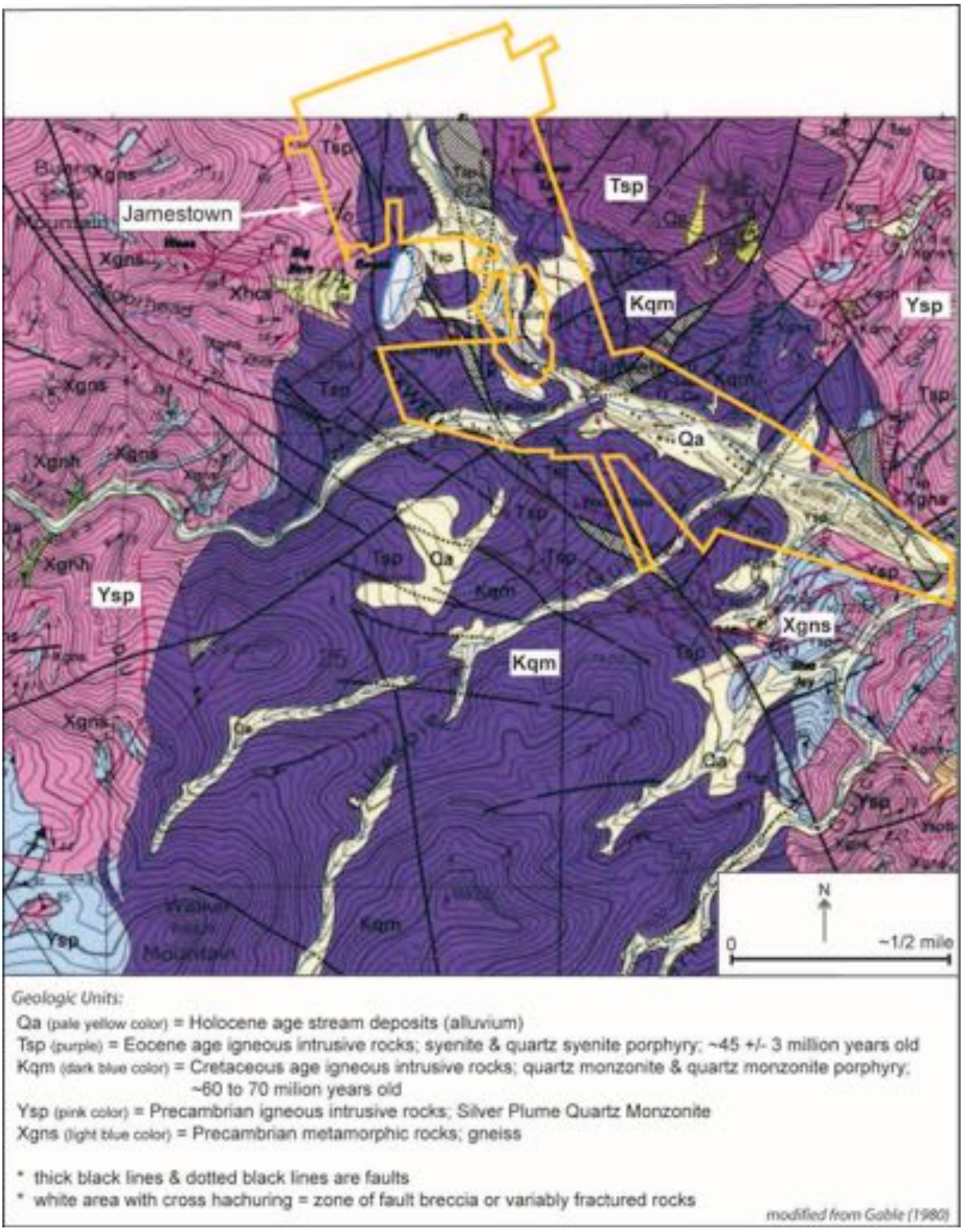
A small area in the northeast part of the town is underlain by the younger intrusion. It also crops out as narrow dikes in several places within town. These youngest intrusive rocks are widespread on Porphyry Mountain and were the source of much of the sediment contained within the 2013 debris flows. Gable (1980) classified the younger intrusive rocks as syenite and quartz syenite. Cole and Braddock (2009) used the same names for these rocks.

Figure 1-30: Regional geologic map of Jamestown area



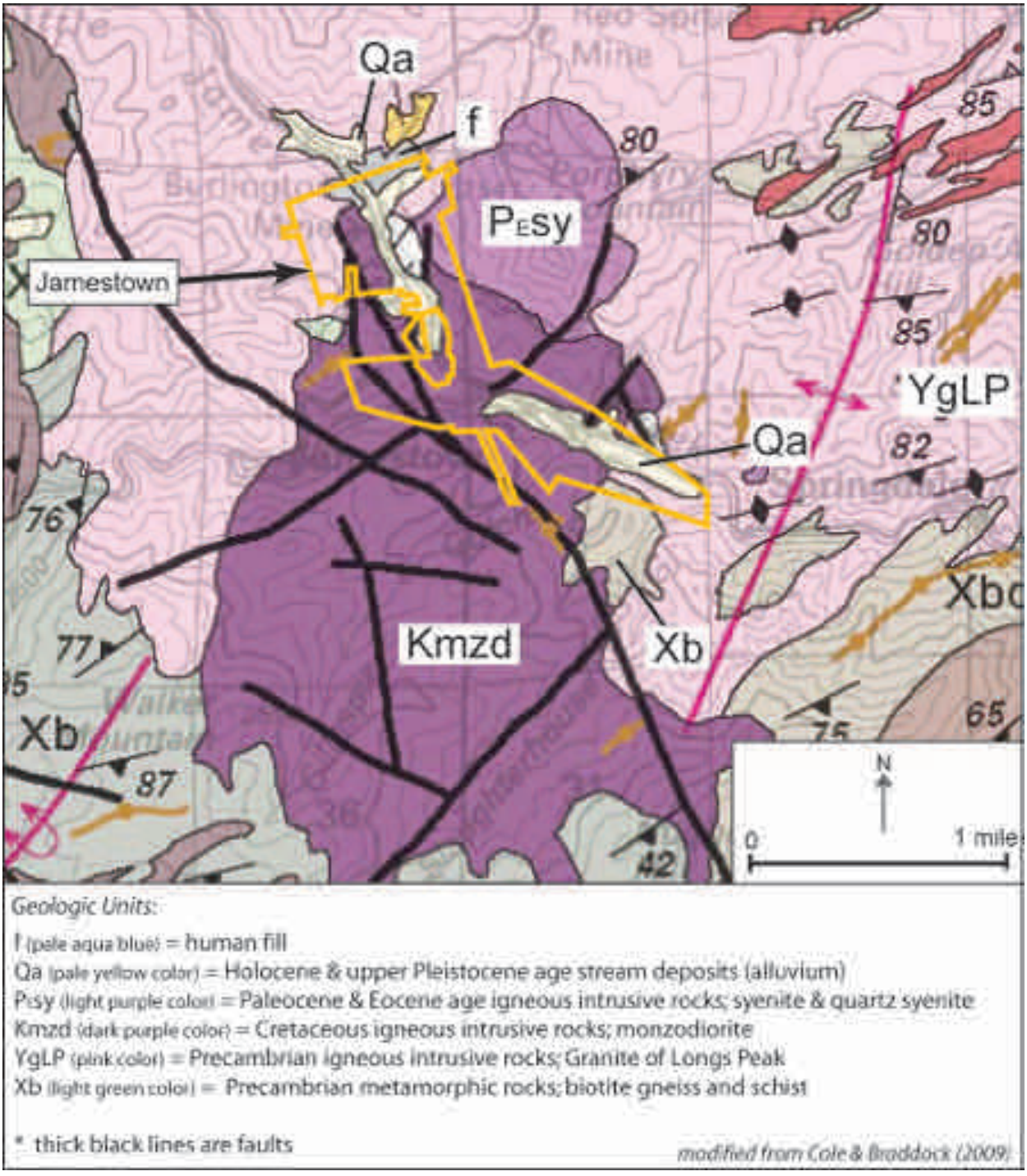
From Braddock and Cole, 1978; scale 1:250,000. Extent of the town is shown by the green area with black outline.

Figure 1-31: Detailed geologic map of the Jamestown



From Gable, 1980; scale 1:24,000. The thick gold line marks the town limits. The geology of the northern part of town has not been mapped at this detailed scale.

Figure 1-32: The most recent geologic map of the Jamestown area



The most recent geologic map of the Jamestown area is a 1:100,000-scale map by Cole and Braddock (2009). The thick gold line marks the town limits.

Description of Geologic Hazards and Constraints

Geologic Hazard Studies Prior To the 2013 Storm and Flood

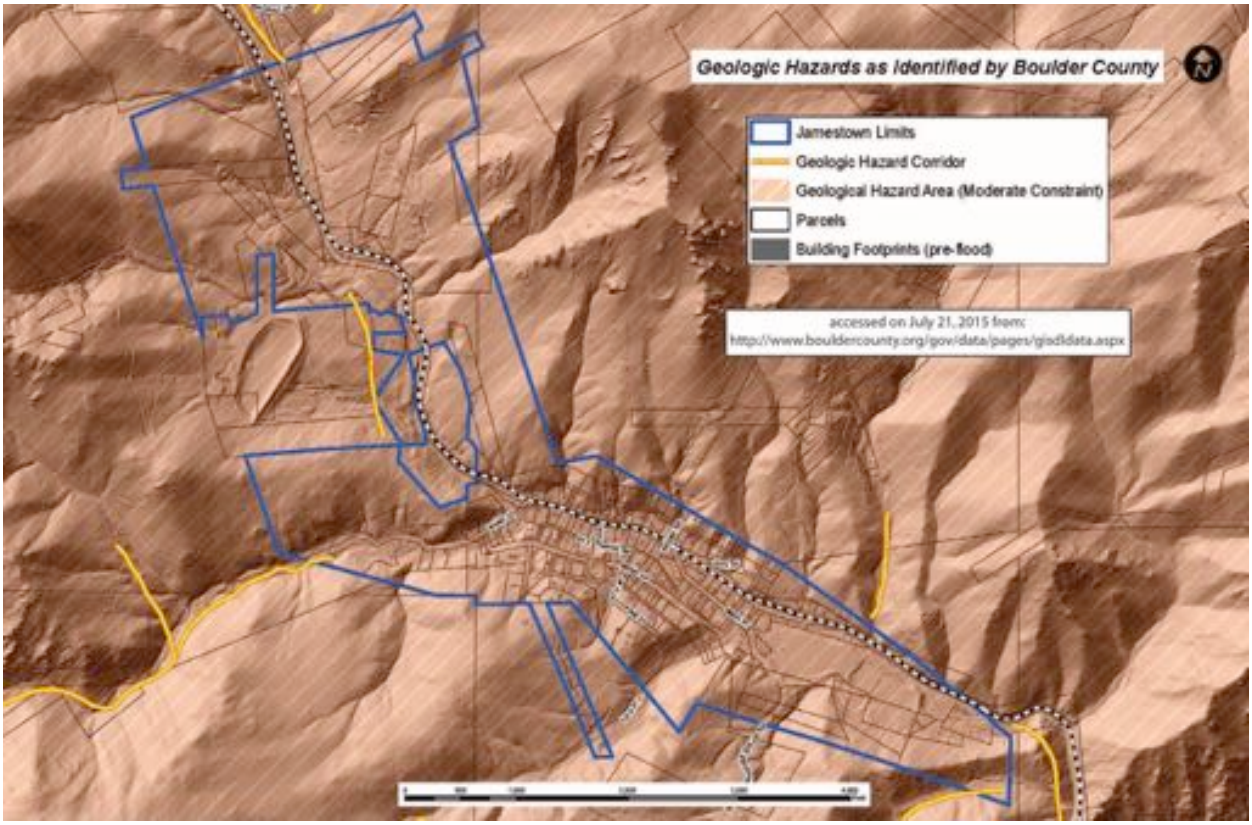
Prior to the 2013 floods, the only existing geologic hazard mapping for Jamestown and adjacent areas was Boulder County's geologic hazard mapping and a preliminary, regional, small-scale landslide map by the U.S. Geological Survey (Colton and others, 1975). Figure 1-33 shows Boulder County's generalized geologic hazard mapping for the Jamestown area. The figure was prepared by using the county's GIS hazard files and plotting that data on a Lidar hillshade.

All of Jamestown is identified as a moderate constraint geologic hazard area with "significant problems" and "provisional risk", but the specific types of problems are not described. Narrow major geologic hazard corridors described as having "extensive problems" and "high risk" appear to be aligned along several drainages, but most corridors are slightly shifted off of the drainages in the LiDAR image, perhaps due to scaling issues. The hazard corridors terminate at or near the town limits and do not extend across the town. Additionally, the specific geologic hazards in the constraint corridors included in their online digital data are not defined in the digital data, which is not very helpful for the town's planning purposes.

Boulder County also has a geologic hazard map in their Comprehensive Plan. The map in the Comprehensive Plan appears to be based upon the same digital data used to create Figure 1-33. Excerpts from the geologic map in the Boulder County Comprehensive Plan were used to construct Figure 1-34. On this map the symbol "3rcl" appears to be associated with one of the hazard corridors southwest of town. The symbol "3" indicates the major geologic hazard corridor is located in the montane (or mountain) subprovince. The symbol "rcl" denotes rockfall, rock avalanche, soil creep, landslides, mudslides, mudfalls, and debris fans. It is uncertain whether this same map symbol applies to other major geologic hazard corridors near Jamestown. Also, the mapped major hazard corridors end at the town limits.

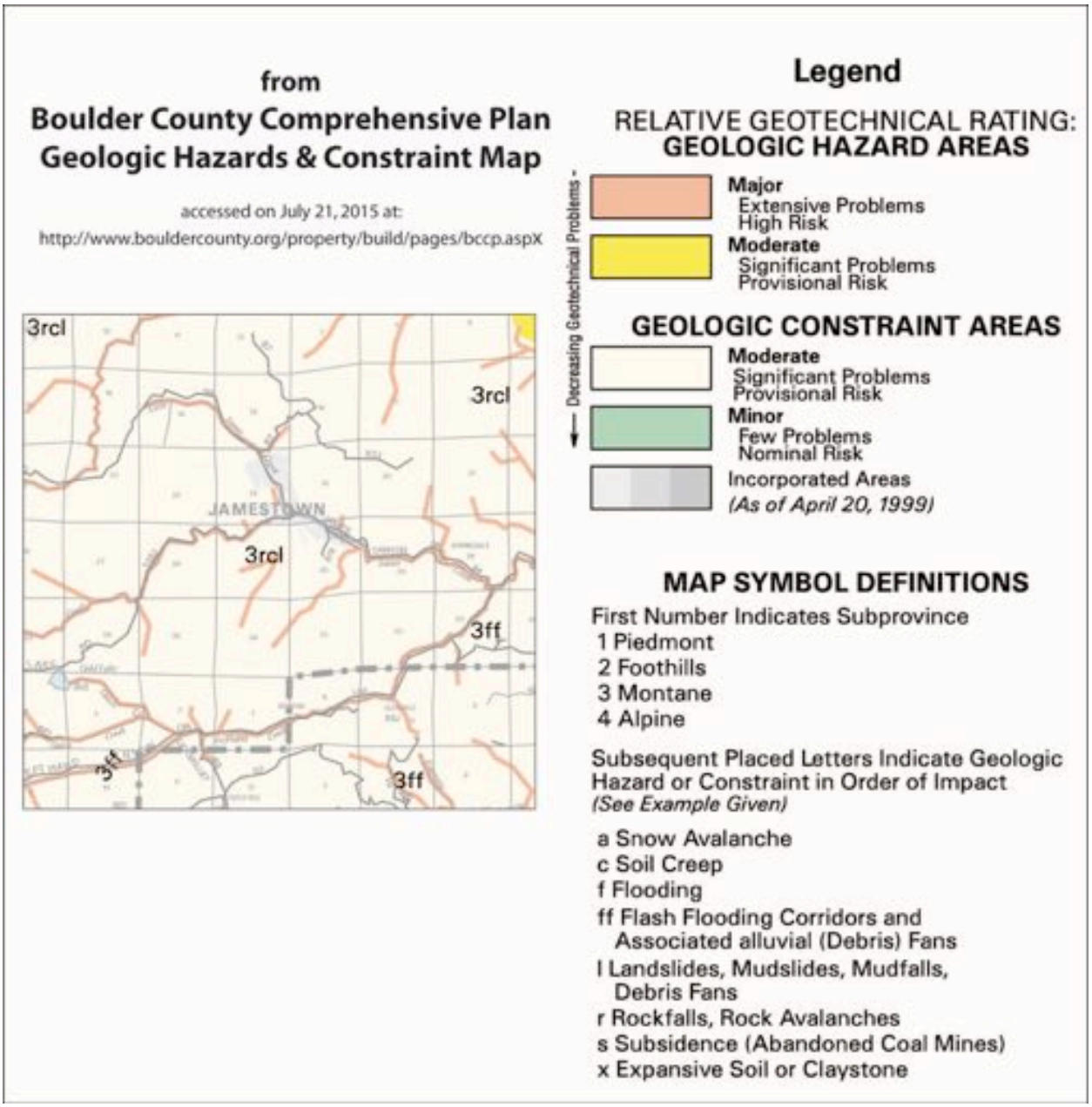
The part of the landslide map by Colton et al., (1975) that covers Jamestown and the surrounding area is reproduced in Figure 1-35. They did not identify any landslides in or near the town. The nearest landslides detected by Colton and others were along the eastern margin of the Front Range over 3 miles from Jamestown.

Figure 1-33: Map showing Boulder County's digital geologic hazard and constraint GIS data for the Jamestown area on a LiDAR hillshade



All of Jamestown is identified as a moderate constraint geologic hazard area with significant problems and provisional risk. Narrow major geologic hazard corridors (yellow lines) appear to align with several drainages, but most corridors are slightly shifted off of the drainages in the LiDAR image, perhaps due to scaling issues. The specific hazards associated with the hazard corridors are not defined in the online digital database. GIS data accessed online on July 21, 2015 at: http://www.bouldercounty.org/gov/data/pages/gisdldata.aspx

Figure 1-34: Excerpt from the geologic hazards map in Boulder County's Comprehensive Plan



Excerpt from the geologic hazards map in Boulder County's Comprehensive Plan, which was accessed online on July 21, 2015 at http://www.bouldercounty.org/property/build/pages/bccp.aspx. On this map the symbol "3rcl" appears to be associated with one of the hazard corridors southwest of town. The symbol indicates the major geologic hazard corridor is located in the montane subprovince and includes rockfall, rock avalanche, soil creep, landslides, mudslides, mudfalls, and debris fans.

Figure 1-35: Regional landslide map (modified from Colton et al., 1975). The nearest landslides identified on the 1:250,000-scale regional landslide map of the Greeley 10 x 20 quadrangle by Colton and others (1975) involved loose soil overlying sedimentary rocks on the hogback ridges along the east side of the Front Range about 3 miles from Jamestown. They did not recognize any landslides in the granitic terrain in the vicinity of Jamestown. Similarly, Gable (1980) did not depict any landslides in the vicinity of Jamestown on her 1:24,000-scale geologic map of the Gold Hill quadrangle, nor did Cole and Braddock (2009) identify any landslides near Jamestown on their 1:100,000 scale map of the Estes Park 30' x 60' quadrangle. (This map is the only landslide map available for Jamestown prior to this study. It is a regional map, but it was made by people who are experts at identifying landslides using aerial photography. The small size of some of the mapped landslides gives an indication of the "resolution" of their mapping.)

Figure 1-35: Regional Landslide Map

Geologic Hazards in Jamestown Triggered by the 2013 Storm

The 2013 storm generated debris flows, landslides, and rockfalls across large parts of Boulder and Larimer Counties. Debris flows were especially common, with over 1,000 documented by Coe et al., (2014) and Morgan et al., (2013). Debris flows are the only known geologic hazard that affected Jamestown during the 2013 flood. A debris flow is a fast-moving slurry of loose rock, mud, sand, organic matter, water, and air that travels down

a channel or hillslope under the influence of gravity. At least 50 to 60 percent of the volume of a flow needs to be sediment, and the entrained sediment must significantly control the flow behavior in order for a flow to be called a debris flow. In contrast, flood deposits consist mostly of water, with lesser amounts of sediment. The media often refer to debris flows as mud slides, but the term debris flow is a more accurate name for fast-moving, sediment-rich flows like those that occurred on the slopes of Porphyry Mountain during the 2013 storm.

GeoLogical Solutions did not conduct field inspections of the 2013 debris flows immediately following the storm. The following descriptions rely chiefly upon publicly available reports and maps by other geologists who did examine the debris flows soon after the storm, including the work of Morgan et al., (2013), Coe et al., (2014), and Godt et al., (2014). The following descriptions also rely upon GeoLogical Solutions' observations and interpretations of post-flood Google Earth images, LiDAR imagery, and aerial photography, and their field investigation conducted in April of 2015.

Soon after the 2013 storm, the Colorado Geological Survey released preliminary mapping that depicted the debris flows, landslides, and rockfall deposits in Boulder County that resulted from the 2013 flood (Morgan et al., 2013). This mapping is currently available at:

http://www.arcgis.com/home/item.html?id=39e6c721635f40c8add90112c9d1a646

The digital files associated with the mapping by Morgan et al., (2013) were used to create Figure 1-36. According to the mapping of Morgan et al., (2013), debris flows were the only geologic hazard that affected Jamestown during the 2013 flood; they did not identify any landslides or rockfalls in or adjacent to the town that were a result of the 2013 flood. Six of the drainage basins on Porphyry Mountain produced debris flows that entered the town.

In addition to the debris flows documented by Morgan et al., (2013), another 2013 debris flow in the upper part of Porphyry Gulch was discovered during our investigation. It travelled about two-thirds of the way down the drainage and did not reach the town limits. Many other debris flows occurred in other parts of Boulder County during the storm.

The 2013 debris flows initiated as small, water-saturated soil slips involving relatively thin veneers of granular soils overlying granitic bedrock on steep slopes on the west and southwest sides of Porphyry Mountain (Figures 1-32 and 1-33). The soil slips were only a few to several feet thick and only tens of feet in width. Godt et al., (2014) reported that most all of the debris flows triggered by the 2013 storm in Boulder and Larimer Counties also initiated as discrete, thin, sliding masses of soil that moved downslope as a fluidized mixture of sediment and water.

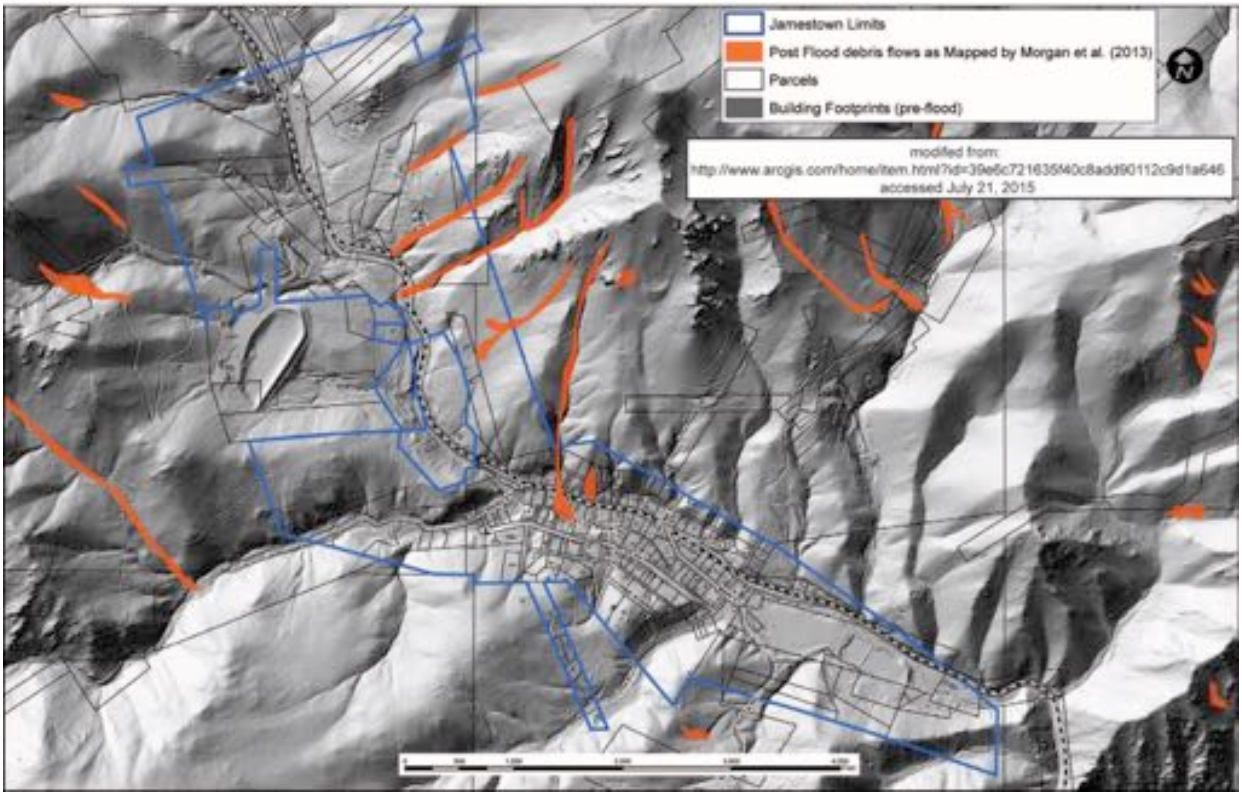
All of the debris flows that initiated on Porphyry Mountain and ran into Jamestown originated in areas burned by the 2003 Overland wildfire. However, that may only be a coincidence. Debris flows in burned areas are most likely to occur within about the first three years after the fire (Verdin et al., 2013), and they typically do not initiate from discrete landslides (Santi et al., 2008). Much of the sediment contained in debris flows that form in very recently burned areas typically comes from widespread erosion on hillslopes (e.g. Kirkham et al., 2000). As noted by Morgan et al., (2013), many of the debris flows generated in Boulder County during the 2013 storm were not associated with areas recently burned by wildfires.

After initiating as soil slips, the 2013 debris flows on Porphyry Mountain moved into and flowed down the main channel within each basin. The debris flows increased their size by eroding and incorporating additional material from the channel bottom and sides into the flow, a process called bulking (Figures 1-38 & 1-39). Levees were formed along some channels (Figure 1-40), a depositional characteristic typical of many debris flows. Additional storm water runoff drained into the flows as they traveled downslope, which also increased the flow volume. Some of the debris flows reached the valley floor along Little James Creek and James Creek, while others deposited their entrained sediment on hillslopes above town and did not flow into town. Debris flows that reached the valley floors exacerbated the flooding on Little James and James Creeks by supplying additional sediment to the flooding creeks.

Three debris flows deposited large volumes of sediment on the valley floors and into the creeks within town. Two of these were unnamed basins with runout areas (also called inundation areas) along Little James Creek immediately upstream of the confluence with James Creek. Debris from these basins blocked Overland Road (94 Rd) and prevented its use as an evacuation route. Figure 1-41 shows the debris in the runout area of an unnamed basin above the confluence of James and Little James Creeks that remained at the time of the field investigation. The debris flow in Howlett Gulch deposited boulder-rich sediment along James Creek in the main part of town immediately below the confluence with Little James Creek (Figure 1-42). The Howlett Gulch debris flow was responsible for the fatality in Jamestown that resulted from the 2013 storm.

Sediment deposited by debris flows typically form fan-like landforms in their runout or inundation areas. The runout areas for the debris flows in Jamestown are small and are disturbed by roads and residential construction. The fan-like landforms associated with the debris-flow basins in Jamestown are not well developed or preserved.

Figure 1-36: Map of debris flows generated by the 2013 storm



Map of debris flows generated by the 2013 storm (from Morgan et al., 2013); accessed on July 21, 2015 at: http://www.arcgis.com/home/item.html?id=39e6c721635f40c8add90112c9d1a646) Another 2013 debris was discovered in Porphyry Gulch during our field investigation. It initiated in the upper part of Porphyry Gulch, travelled about two-thirds of the way down the drainage, but did not reach the town limits.

Figure 1-37: Google Earth image showing initiation areas, flow paths, and runout areas of debris flows generated during the 2013 storm on the west and southwest sides of Porphyry Mountain.

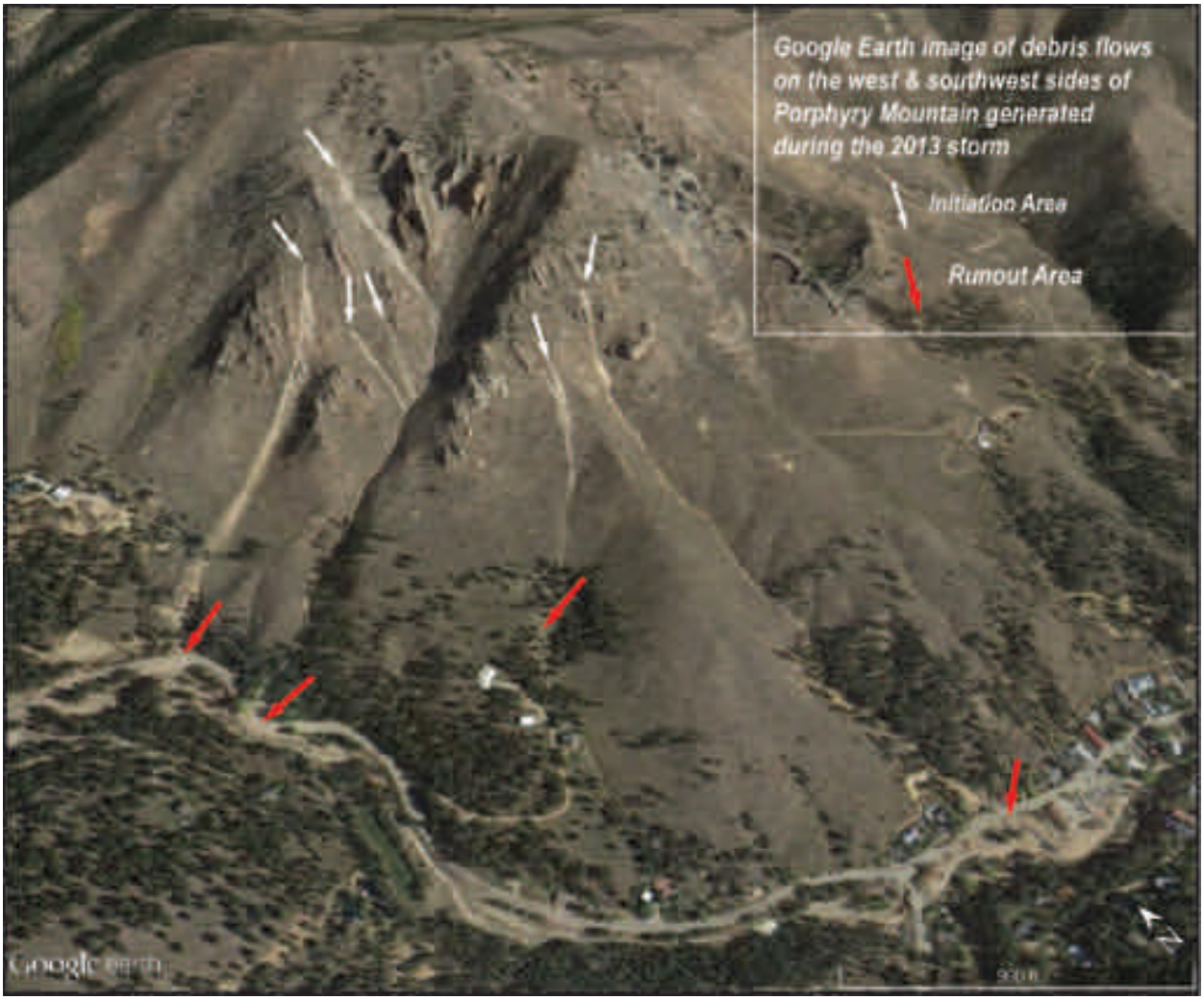


Figure 1-38: Photograph showing erosion on channel bottom and walls caused by a debris flow in one of the unnamed basins upstream of the confluence of James and Little James Creeks.

The eroded sediment increased the size of the debris flow. (from Morgan et al., 2013; accessed on July 21, 2015 at: http://www.arcgis.com/home/item.html?id=39e6c721635f40c8add90112c9d1a646)

Figure 1-39: Photograph taken on April 27, 2015 of the same basin shown in Figure 1-38, taken nearly 2 years after the 2013 flood

Overland Road, seen in the foreground, was blocked by the debris flow from this basin. Note that considerable loose sediment remains in the walls and bottom of the channel and is available for incorporation into future debris flows.

Figure 1-40: View of debris-flow levees formed on Porphyry Mountain during the 2013 flood

.From Morgan et al., 2013; accessed on July 21, 2015 at: http://www.arcgis.com/home/item.html?id=39e6c721635f40c8add90112c9d1a646)

Figure 1-41: Photograph of the debris that remained in the runout area of an unnamed basin above the confluence of James and Little James Creeks at the time of the field investigation

Debris from this basin blocked Overland Road during the 2013 flood.

Figure 1-42: Photograph of boulder-rich debris-flow deposits in the runout area of Howlett Gulch

This debris flow was responsible for the fatality in Jamestown. (from Morgan et al., 2013; accessed on July 21, 2015 at: http://www.arcgis.com/home/item.html?id=39e6c721635f40c8add90112c9d1a646)

Geologic Hazards Areas Identified by this Project

The previously described geologic hazard studies are helpful for regional studies, but they are not sufficiently detailed or comprehensive for the Town's land use project. Therefore, additional geologic hazard studies that included on-the-ground fieldwork were conducted as part of our project. Our investigation is the first attempt to evaluate and identify all geologic hazards and geologic constraints that potentially could affect the town at a scale adequate for local planning purposes. Our mapping, although a significant improvement over prior hazard studies, is not designed to replace the need for the site-specific evaluations of individual parcels for mitigation work.

The potential geologic hazards and constraints identified and described in this section include debris flows, slope failures or landslides, mines and mills, valley floors, seismic hazards, and radon. Figure 1-24 shows the approximate extent of areas with debris-flow hazards. Areas with slope-stability hazards and constraints are depicted on Figure 1-25. Areas with geologic hazards and constraints related to mines and mill tailings are on Figure 1-26. Valley floors with geologic hazards and constraints are shown on Figure 1-27. Seismic hazards are illustrated by Figures 1-46 – 1-49, which show historical earthquakes, geologically young faults that could cause damaging earthquakes in the future, and the probability of ground shaking in the next 50 years. Radon is a widespread problem in town that requires site-specific studies.

Debris Flow Hazards

Debris flows pose the greatest geologic hazard to Jamestown in the near term. Earthquake could cause significantly more damage, but the probability of a large earthquake in the near future is lower than the potential for debris flows. The debris flows that hit the town during the 2013 flood clearly demonstrate the types of hazards caused by debris flows. Most future debris flows will be associated with extreme precipitation events, as were the 2013 debris flows. An extreme precipitation event can be widespread and cause debris flows in several or many basins during a single storm. Or it could be concentrated in just one or two basins, with debris flows emanating only out of them.

Early in 2015 the Colorado Geological Survey released a preliminary regional map showing areas in Boulder County susceptible to debris flows during future extreme precipitation events (Morgan et al., 2015). According to this study, more than twenty basins have potential to generate debris flows that could affect Jamestown (Figure 1-43). Our interpretation of debris-flow potential varies somewhat from that of the Colorado Geological Survey, perhaps because our study focused only on Jamestown. Their study was a preliminary regional study that did not have the benefit of multiple days of fieldwork spent in Jamestown, nor did it have the benefit of the topographic mapping with 1-foot contour intervals. In some instances, the hazard boundaries by Morgan et al., (2015) do not reflect the influences of significant topographic features. Additionally, areas with high potential are differentiated from those with moderate potential on Figure 1-24, but this differentiation was not made by Morgan, et al (2015).

The debris-flow hazard mapping generated by our town-specific project is in Figure 1-24. About 30 basins are thought to be capable of producing debris flows that could flow into Jamestown (see Figure 1-24 for locations of the basins). Thirteen of these basins are classified as having high potential for future debris flows. The six basins that produced debris flows during the 2013 event all have high potential for future debris flows. The hazard rating for the seventeen other basins is judged to be moderate. Basins with moderate debris-flow hazards generally are smaller than basins with high hazard ratings. The upper reaches of basins with moderate debris-flow hazards typically are less steep than the slopes in the upper reaches of basins judged to have high debris-flow hazards. Some basins include areas of both high and moderate hazard potential, depending chiefly on topography, potential pinch points where flows might jump out of the current channel, and height of the area above the current channel.

About 7.0 percent (25.5 acres) of Jamestown has a high potential for future debris flows, and about 6.6 percent (24.4 acres) of the town has moderate potential. The balance of the town is interpreted to have low or no potential for debris flows.

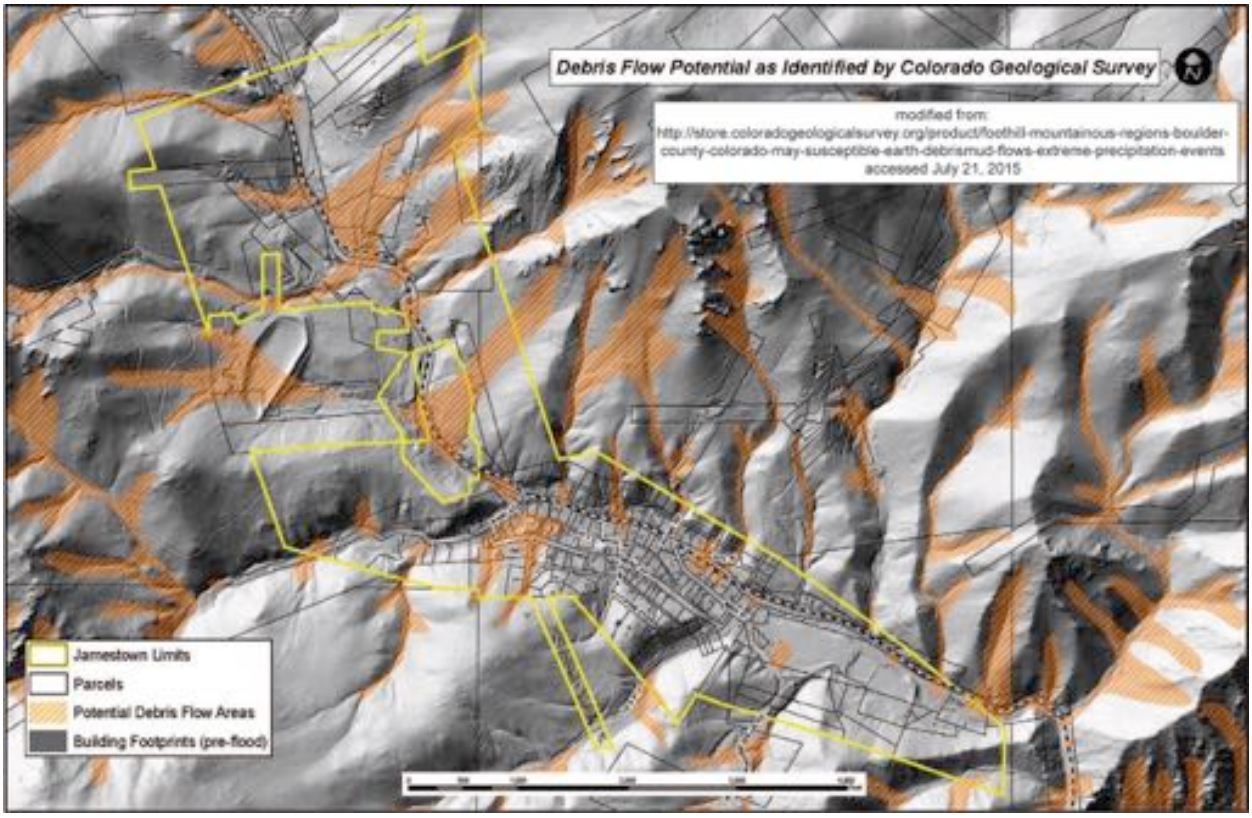
Granitic rocks in the Jamestown area tend to weather to granular material that contains relatively little clay. The granular surficial deposits in the debris-flow initiation zones can rapidly become water saturated during extreme precipitation events or during extended periods of rainfall. Water-saturated granular soils may fluidize and slide off of steep hillsides, creating the soil slips that generate debris flows like those during the 2013 storm.

The sediment entrained in debris flows generated from this type of granular material tends to consist dominantly of sand, gravel, and boulders with lesser amounts of mud (clay- and silt-sized grains). Locally, the granitic bedrock is hydrothermally altered by hot fluids associated with the deposition of fluorspar, precious metals, and other minerals found in veins. These altered granitic rocks may be more likely to weather to clay- and silt-sized particles. This fine-grained sediment could increase the amount of mud within a debris flow and modify the hydraulic properties of debris flows generated in or flowing through areas of hydrothermally altered rock.

Structures to mitigate the effects of debris flows were observed in a few areas within the town limits. They are located at Howlett Gulch, the fire station, and at a residence in the northeast part of town (see Figure 1-24 for locations). The mapped extent of the debris-flow hazards shown on this figure does not take into account the potential effectiveness of these mitigation structures. The existing mitigation structures may reduce debris-flow hazards, especially during small events, but they may not completely eliminate or reduce the hazard during large events. They potentially could cause a large flow to jump out of the channel and move into another basin.

The mapped limits of the debris-flow hazard areas, locations of the mitigation structures, and town boundary are approximately located. Additional site-specific studies are needed to more accurately define the hazard areas.

Figure 1-43: Preliminary map by the Colorado Geological Survey showing potential debris-flow areas in and near Jamestown during future extreme precipitation events



From Morgan et al., 2015; accessed on July 21, 2015 at: http://store.coloradogeologicalsurvey.org/product/foothill-mountainous-regions-boulder-county-colorado-may-susceptible-earth-debrismud-flows-extreme-precipitation-events/

Slope-Stability Hazards and Constraints

Areas with slope-stability hazards and constraints are shown on Figure 1-25. Four types of slope-stability hazards and constraints were identified within Jamestown: 1) an old landslide; 2) potentially unstable slopes; 3) areas prone to rockfall; and 4) an area where stream bank erosion undercut a road and the fill beneath the road is sloughing off the eroded bank.

None of the published geologic maps identified any landslides in or near Jamestown, and no landslides were identified in or near Jamestown in the regional landslide study of Colton, et al (1975). The distinctive topography of recent landslides would be easily recognizable in the LiDAR hillshades, if any were present. There is, however, an area on the steep hillslope above the cemetery in the southeastern part of the town that appears to be an old landslide. This bowl-like feature was first noticed when viewed from a distance while on Porphyry Mountain. As seen in a detailed topographic map generated from the LiDAR data, the ground surface at the old landslide is slightly lower than the adjacent hillslopes, and there are low-amplitude, rounded swales and hummocks present, which also are indicative of landslides. The old landslide is rated as a high hazard area.

Bedrock underlying the upper and central parts of the old landslide was mapped as metamorphic gneiss and schist by Gable (1980). These rocks are foliated, which means the re-crystallized minerals within the rocks are aligned in a planar fashion, and they are layered. The foliation planes potentially can serve as failure surfaces of slip planes for landslides, particularly where they are parallel or subparallel to hillslopes. Detailed geotechnical investigations will be needed to confirm whether or not this area is indeed an old landslide. If proven to be an

old landslide, it may be an example of the type of slope failure that can occur on the potentially unstable slopes underlain by metamorphic rocks.

Areas with slopes in excess of about 25 percent are considered potentially unstable slopes. Areas mapped as potentially unstable slopes are in a state of quasi-equilibrium and may become unstable if disturbed by human activities or by extreme precipitation events. Most of the mountainous land adjoining the valley floors have slopes in excess of 25 percent and are considered potentially unstable slopes. Short slopes in excess of 25 percent on the valley floors generally were not classified as potentially unstable slopes. Additional geologic studies may be warranted to better define the presence, extent, and character of metamorphic rocks in other parts of town.

Where underlain by metamorphic rocks, the potentially unstable slopes are assigned a high hazard rating. Potentially unstable slopes within town that are underlain by granitic igneous rocks or by loose, unconsolidated sediment or fill placed by humans are considered to have a moderate slope-stability hazard. Zones of weakness potentially may locally occur within the granitic rock where fractures and faults are parallel or subparallel to hillslopes. Only about 6.6 acres or 1.8 percent of the land occupied by Jamestown is classified as potentially unstable slopes with a high hazard ranking, whereas about 259 acres or 70 percent of the town is on potentially unstable slopes with a moderate hazard rating. Additional fieldwork is needed to better understand the fracture and fault orientations and the potential for these features to affect slope stability.

Shallow soil creep is a common process on potentially unstable slopes. "Pistol-butted" and tilted trees on hillslopes (Figure 1-40) often are caused by and are indicators of soil creep. Excavation activities in areas of potentially unstable slopes may trigger landslides or rockfall, and cut slopes may tend to ravel or slump. Figure 18 shows how raveling or sloughing of a cut slope can create a problem. Areas with thick veneers of loose surficial soil are especially prone to these types of issues. Extreme precipitation events may trigger small, thin landslides or soil slips in the soil veneers that overlie bedrock on potentially unstable slopes. These soil slips can transition into debris flows as the failed soil material travels downslope.

Two small areas in the north part of town are subject to rockfall hazards. These areas are situated downslope from cliffs of granitic rock that crop out near the top of Porphyry Mountain. Rocks that dislodge from the cliffs may roll or bounce into the mapped rockfall hazard areas. The angular rock clasts resting on the ground surface in the mapped rockfall hazard areas are fairly small in diameter (typically about one foot or less in diameter), and the mapped rockfall areas in town are some distance from the cliffs that are the source of the rockfall debris. Therefore, the identified rockfall areas within town are judged to have only a moderate hazard.

Part of the Andersen Hill Road was removed by erosion during the 2013 flood, and the remaining section of road that climbs up the hill on the south side of James Creek has been undercut by erosion. The eroded slope below the road continued to slough or ravel during 2015, threatening the integrity of the remaining road surface, and for that reason is shown as a hazard area on Figure 1-25. The material beneath the sloughing section of road appears to consist of loose, unconsolidated fill. In contrast, the adjacent stable sections of the road appear to be underlain by bedrock.

All other areas within the town are judged to have low or no potential for slope-stability hazards.

An unusual landform on Porphyry Mountain above the town limits may be a rock avalanche deposit (see Figure 1-25 for location). This feature was not investigated in the field during this project because it is outside the town limits, but a future rock avalanche potentially could affect the town. Further study of this landform and adjacent areas is warranted. If this type of slope failure occurred in the future, especially one that was larger, it could be very hazardous to the town.

Figure 1-44: Pistol-butted and tilted trees on potentially unstable slopes.

Figure 1-45: Material raveling and sloughing off of a cut slope

Material raveling and sloughing off of a cut slope in a potentially unstable area causes problems for this home at 81 Main Street and is typical of the types of issues that can develop on potentially unstable slopes.

Geologic Hazards and Constraints Related to Mines and Mill Tailings

Areas with hazards and constraints related to mines and mill tailings are shown on Figure 1-26. One hazard category includes mine and mill areas known to contain uranium minerals that may pose possible radiation hazards; it covers about 6.2 percent of the town. A second hazard area outlines areas with mines and mills not known to contain uranium minerals; about 0.5 percent of the town is within this hazard category. The third category of mine and mill hazard areas includes reclaimed mill tailings and mine waste. About 3.3 percent of the town falls within this category. The boundaries of hazard areas shown on Figure 1-26 are very approximately located, primarily because the extent of underground workings is not well understood at this time.

Several mines operated within the current town limits, including the Nations Treasure, Emmett, Brown Spar, Poorman, Buckhorn, Chancellor, Invincible, and Yellow Girl. These mines contained shafts as much as 480 feet deep, and they sometimes have extensive underground workings including tunnels and stopes. The Burlington and Orion mines were located near the town limits and may partially be within the town. Other nearby mines include the Alice, Argo, Blue Jay, Bueno, Energy, Fair Day, Lulu B, and Victory mines. Although gold and silver first brought the miners to Jamestown, fluorspar (a calcium fluoride mineral) eventually became the primary mineral of interest.

Boulder County was once one of the major uranium-producing counties in the United States, and several mines near Jamestown are known to have produced uranium (Sims and Sheridan, 1964; Nelson-Moore et al., 1978). They include the Blue Jay, Fair Day, Lulu B, and Victory mines, which are outside of the town limits. Veins associated with some of the mines within Jamestown, particularly those that produced fluorspar, are known to contain uranium minerals. They include the Brown Spar, Burlington, Emmett, Energy, Nations Treasure, Orion, and Poorman mines, but uranium apparently was not actually produced at any of the mines within Jamestown.

Goddard (1944) contains sketch maps showing underground workings for several of the mines within Jamestown, but very little is known about the exact location and extent of the Poorman Mine. The position of its shaft is depicted on a small-scale sketch map in Sims and Sheridan (1964). Nelson-Moore et al., (1978) described the location as being on "a low flat ridge 1,200 ft S350W of Jamestown at an elevation of 7,200 ft", but obvious evidence of mining is not visible at this location in the LiDAR imagery. Nonetheless, this location was used to estimate the limits of the hazard area for the Poorman mine on Figure 1-26.

Bueno mine is the only mine in close proximity to Jamestown that recently held a permit from the Colorado Division of Reclamation, Mining and Safety. It is located about 2,600 feet northwest of the confluence of James and Little James Creeks, just outside of the town limits. Evidence of the mine and mill is clearly visible in the west-central part of Figure 1-26. The prominent oval-shaped, basin-like feature was built to store tailings from the mill, but apparently was never used. The mine portal and mill building are on the west side of the tailings pond, near the base of the steep hillslope.

Reclaimed tailings from the Bueno mill (and perhaps other mills) are found at four locations within Jamestown. One is on the ridge overlooking the confluence of James and Little James Creeks. A second one is on the west bank of Little James Creek about 1,600 feet above the confluence with James Creek; and a third one is on the east bank of Little James Creek about 3,700 feet above the confluence. Both of the reclaimed tailings piles along Little James Creek are relatively small. The fourth reclaimed tailings area is the large three-celled tailings pond at and downstream of the town's park in the lower end of Jamestown.

The reclaimed tailings pile on the ridge overlooking the confluence appears to have withstood the 2013 storm with few or no problems. Damage done by the 2013 flood to the berm along the tailings piles at and downstream of the town's park has been repaired. The erosional damage at the site on the west bank of Little James Creek has not been repaired; it should be evaluated by a geotechnical engineer to determine whether the damage should be repaired and, if needed, what should be done.

Additional information to better understand the hazards and constraints associated with mines and mills may also be obtained from mineral survey patents held by the U.S. Bureau of Land Management and from the

published work of Goddard and Glass (1940), Goddard (1944; 1946), Vanderwilt (1947), King et al., (1953), Sims and Sheridan (1964), and Nelson-Moore et al (1978). The old reports and unpublished file information by the U.S. Bureau of Mines and Atomic Energy Commission also may have maps and other useful data. Documentation in the files of the U.S. Environmental Protection Agency may provide information on the reclaimed tailings piles in the town.

Several types of geologic hazards and constraints may exist in areas with inactive mines, mine waste piles, and mill tailings. For example, hazardous open shafts, adits, and subsidence features may exist within mine areas. Open shafts can be very hazardous if one falls into them. The roofs of adits may be unstable and prone to failure. Adits may also contain bad air. Winzes (shafts in the floor of an adit or tunnel) are dangerous to those unaware of them. Partially plugged shafts may appear safe, but the plugs may fail if weight is applied to them. Homes, roads, and other improvements should not be built over plugged shafts.

Open tunnels, stopes, and raises exist in the underground workings of many of the mines. If the roof of an underground opening collapses, the overlying ground surface may subside and damage structures on the ground surface. Open underground workings and highly fractured rock over the underground workings at shallow depths can serve as preferential pathways that allow for rapid movement of effluent from septic systems, which could degrade ground water or surface water. Mine waste piles and areas disturbed by mining may contain material that is loose, unconsolidated, and unsuitable for foundations. The rocks in some mine areas are known to contain uranium and other radioactive minerals, which may pose radiation hazards. The mine and mill areas known to contain radioactive minerals are noted on Figure 1-26.

Mill tailings also may be loose, unconsolidated, and unsuitable for foundations unless mitigated. Mill tailings may pose environmental problems related to the presence of lead, arsenic, or other harmful elements, and they potentially could cause radiation hazards or be sources of acid drainage. Reclaimed mill tailings and mine waste dumps also may contain materials unsuitable for foundations, and they also may pose environmental problems such as acidity, heavy metals, and radiation.

All mine and mill tailings areas, including reclaimed areas, are judged to have a moderate hazard potential. Other areas have no or very low hazards related to mines and mills.

Geologic Hazards and Constraints on Valley Floors

Areas mapped as valley floors include active channels, floodplains, and low terraces along perennial streams and their tributaries; they occupy about 12 percent of the town. Areas on valley floors prone to geologic hazards and constraints are shown on Figure 1-27. In addition to debris flows, whose inundation or runout areas often are on valley floors, several other types of geologic hazards and constraints affect valley floors. These include the fluvial (stream) processes of erosion and sediment deposition, shallow ground water, and compressible, organic-rich soils. Some areas adjacent to the valley floors, including roads, also may be subject to stream bank erosion.

The hazards and constraints on the valleys floors of James Creek, Little James Creek, Gillespie Gulch, and Slaughterhouse Gulch are classified as high. Hazards and constraints on the valley floor of McCorkle Gulch are judged to be moderate, chiefly because it has a much smaller drainage basin. Mapped limits of the valley floors are approximate. All other areas within the town do not appear to have significant valley floors, and thus have low or no potential for the hazards and constraints that may be present in the mapped valley floors.

Earthquake Hazards

Earthquake hazards include the rupture of the ground surface when a fault suddenly moves, and the shaking of the Earth caused by the fault rupture. Secondary effects triggered by earthquakes also can pose significant hazards. Secondary effects that might occur in Jamestown include landslides, rockfalls, and perhaps local soil liquefaction on valley floors. Soil liquefaction is a phenomenon that can occur when earthquake waves pass through a saturated or partially saturated granular soil, causing the soil to lose strength and stiffness and to

behave more like a liquid. Buildings, vehicles, and other objects may sink into the ground when underlying soil liquefies.

Figure 1-46 shows the locations and magnitudes of historical earthquakes recorded by seismographs, and also older, pre-seismograph earthquakes near Jamestown for which there is a written record. The use of seismographs to locate and determine magnitudes for Colorado earthquakes started in the early 1960s (Stover et al., 1984; Kirkham and Rogers, 2000). The older historical earthquakes that occurred prior to the establishment of seismographs in the region during the 1960s are poorly located. Until 2002 there was only one permanent seismograph in continuous operation in Colorado. The epicenters of earthquakes during that time period (~1960-2002) should be considered approximate, with accuracies varying from a few miles to as much as about 20 miles from the actual epicenter. Currently there are eight seismographs operating in Colorado, and earthquakes are being better located and their magnitudes are better determined.

The largest known historical earthquake in Colorado occurred on November 7, 1882, long before seismographs were in use. This earthquake had a maximum Modified Mercalli Intensity of VI to VII (Figure 1-47). It caused minor to moderate damage in Denver and Boulder and was felt across a wide area. The earthquake shook most of Colorado, southern Wyoming, and northeastern Utah, and it was felt as far east as Salina, Kansas.

Hadsell (1968) was the first geophysicist to collect data on the 1882 earthquake and to estimate its magnitude. Because of the earthquake size and the fact that it is Colorado's largest historical earthquake, numerous studies have since been conducted of this event (e.g. Dames and Moore, 1981; Kirkham and Rogers, 1986; Spence et al., 1996). The more recent studies concluded that the earthquake occurred in north-central Colorado, probably in the vicinity of Estes Park, and that the earthquake's magnitude was about 6.6. The felt effects of the 1882 earthquake in Jamestown are not known, but if its currently accepted location is correct, the shaking in Jamestown should have been fairly strong and some or perhaps considerable damage might have occurred in town.

The fault that ruptured in 1882 and caused Colorado's largest historical earthquake has not yet been identified. The earthquake happened in a geologic environment fairly similar to that at Jamestown. It is possible that a similar earthquake could occur elsewhere in the northern Front Range, including the Jamestown area. Due to the proximity of the 1882 earthquake and its uncertain epicentral location, Jamestown's seismic hazard is considered moderate, because a similar earthquake potentially could occur much closer to Jamestown.

Other known, pre-seismograph, historical earthquakes in the vicinity of Jamestown include the September 9, 1903 and the October 12, 1916 events. The 1903 earthquake was felt strongly in Estes Park, and also felt in Fort Collins, Longmont, and Loveland. Reports from Estes Park (see the September 16, 1903 issue of "The Weekly Courier", published in Fort Collins) call it a violent earthquake that awoke many people in Estes Park shortly before 1 A.M. Cattle on several ranches stampeded, but no damage was reported. These felt effects warrant an intensity rating of V.

Humphreys (1914-1924) first described the small earthquake on October 11, 1916. He reported that it was felt in Grand Lake, where a rumbling was reported, and at Frances, an old mining camp near Ward, where the earthquake awoke some people. Stover et al., (1984) rated the intensity of the earthquake at IV and placed the epicenter a short distance west-southwest of Jamestown.

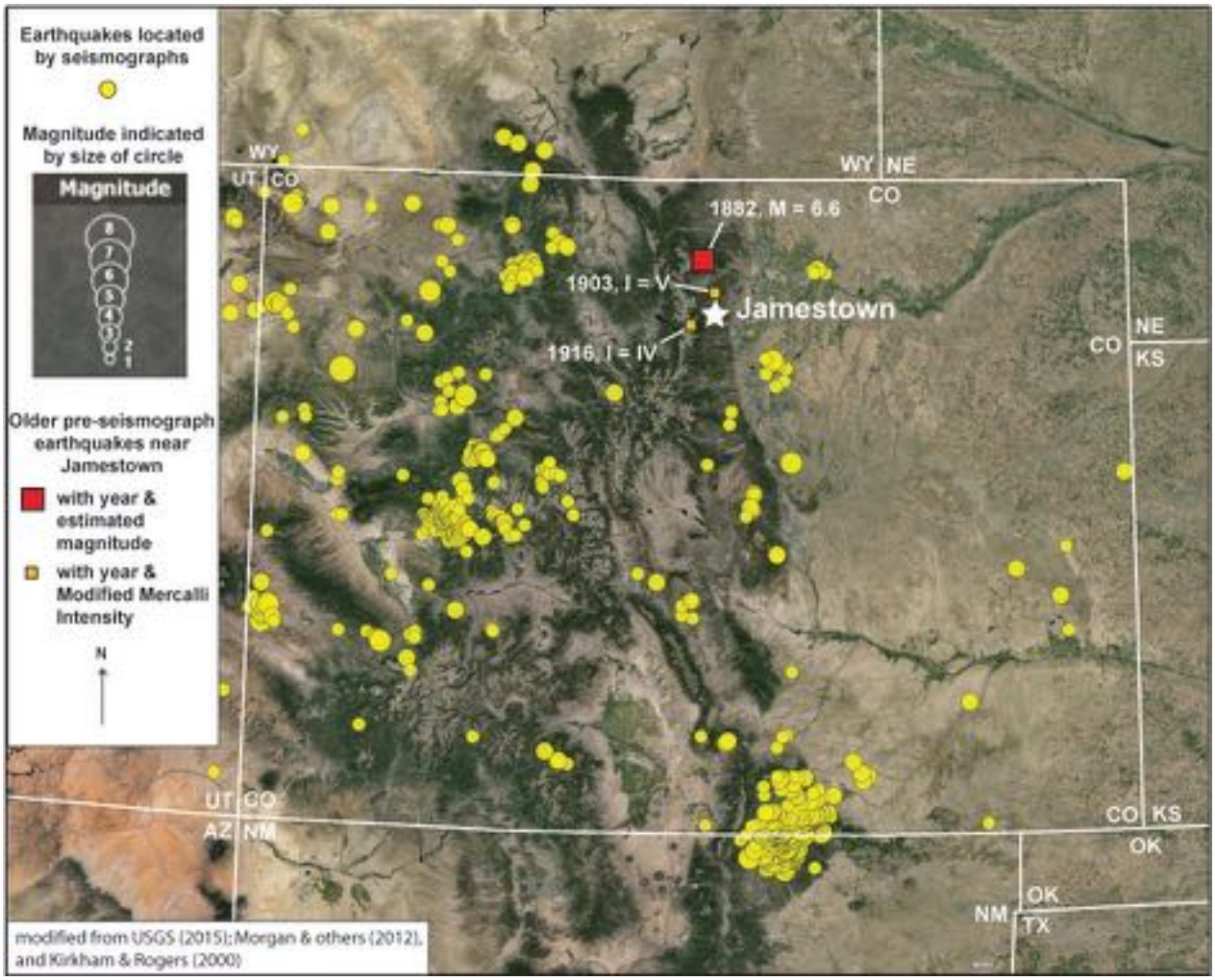
Since earthquakes are caused by sudden movement on faults, geologically young faults can be good indicators of future earthquake hazards. Figure 1-48 shows the locations of known geologically young faults in the region surrounding Jamestown that could cause earthquakes in the future. Although several faults exist within and near Jamestown (Figures 1-31 and 1-32), none are known to be geologically young and capable of causing future earthquakes. For these reasons they are not shown on Figure 1-48.

The nearest known geologically young faults are about 40 to 45 miles west-southwest of town. They include the Williams Fork Mountains Fault, located along the east side of the Williams Fork Mountains; several small faults on the floor of the Williams Fork Valley; and the Gore Range Frontal Fault on the east side of the Gore

Range (Kirkham, 2004; Derouin et al., 2010). These faults are thought capable of producing earthquakes as large as magnitude 7, which could result in damage in Jamestown.

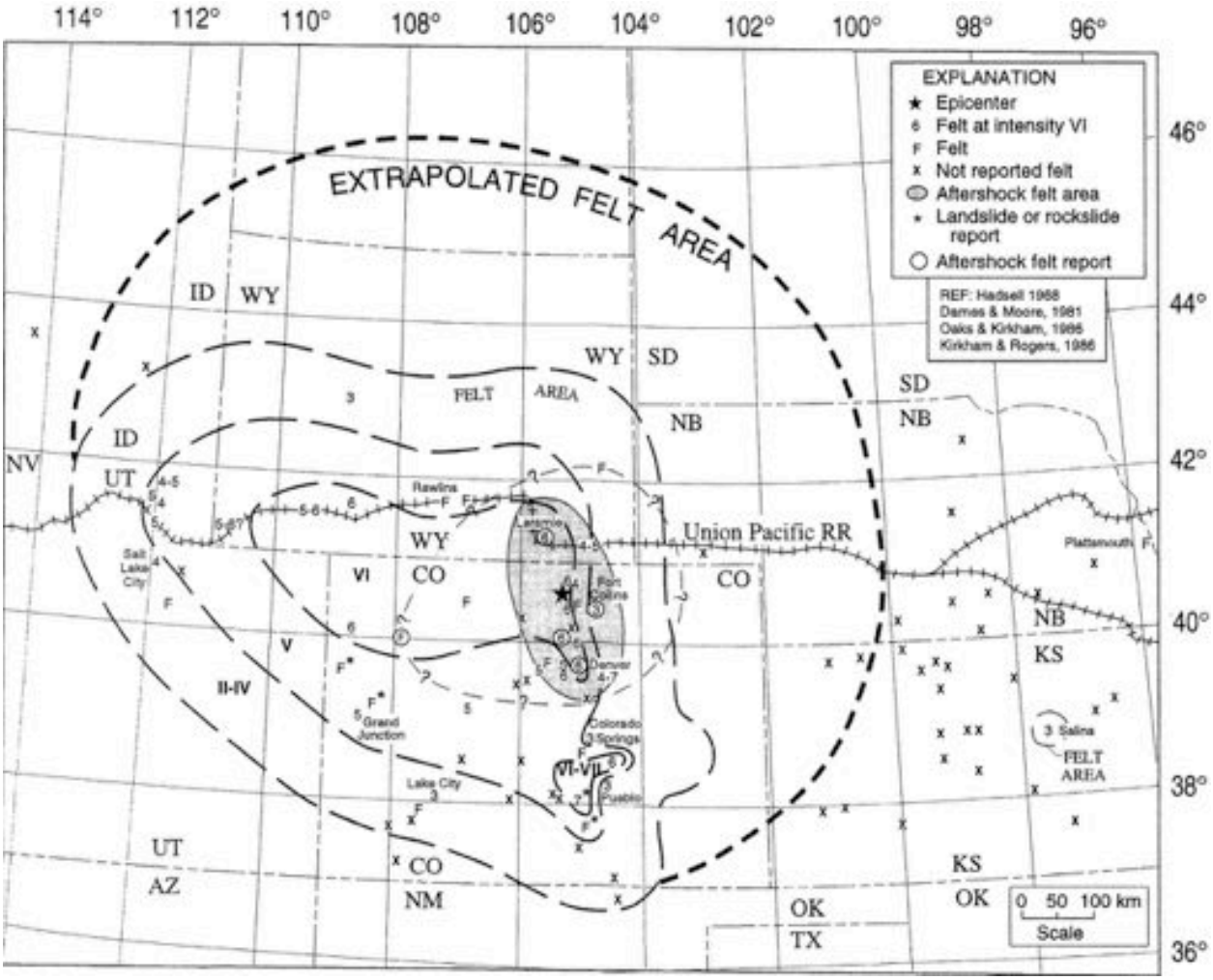
Figure 1-49 shows the USGS's simplified 2014 probabilistic seismic hazard map for the United States. It depicts the peak ground acceleration with a 2 percent probability of annual exceedance during the next 50 years. The acceleration is expressed as a fraction of the standard gravity (g). On this map the peak ground acceleration for Jamestown lies within the 8-16 percent of gravity peak ground acceleration, which is in the moderate to low hazard range. The USGS's 2008 probabilistic seismic hazard maps, which are slightly different than the 2014 maps, are used in the current International Building Code. Their 2014 seismic hazard maps probably will be used in the next update of the International Building Code.

Figure 1-46: Earthquake map showing the locations and magnitudes of events recorded by seismographs



Earthquake map showing the locations and magnitudes of events recorded by seismographs in and near Colorado, and also older pre-seismograph earthquakes near Jamestown that are known only from reports of shaking in newspapers and other records (modified from USGS, 2015; Morgan et al., 2012; and Kirkham and Rogers, 2000). Yellow circles represent earthquakes located by seismographs, with the magnitude indicated by the size of the circle. Red square marks the approximate location of Colorado's largest historical earthquake, which occurred in 1882 and has an estimated magnitude of 6.6. Small orange squares are the approximate locations of other pre-seismograph, historical earthquakes near Jamestown. The maximum Modified Mercalli Intensity of the pre-seismograph 1903 earthquake north of Jamestown was V, and the intensity of the 1916 event west of town was IV.

Figure 1-47: Map showing the location and intensities of the 1882 earthquake

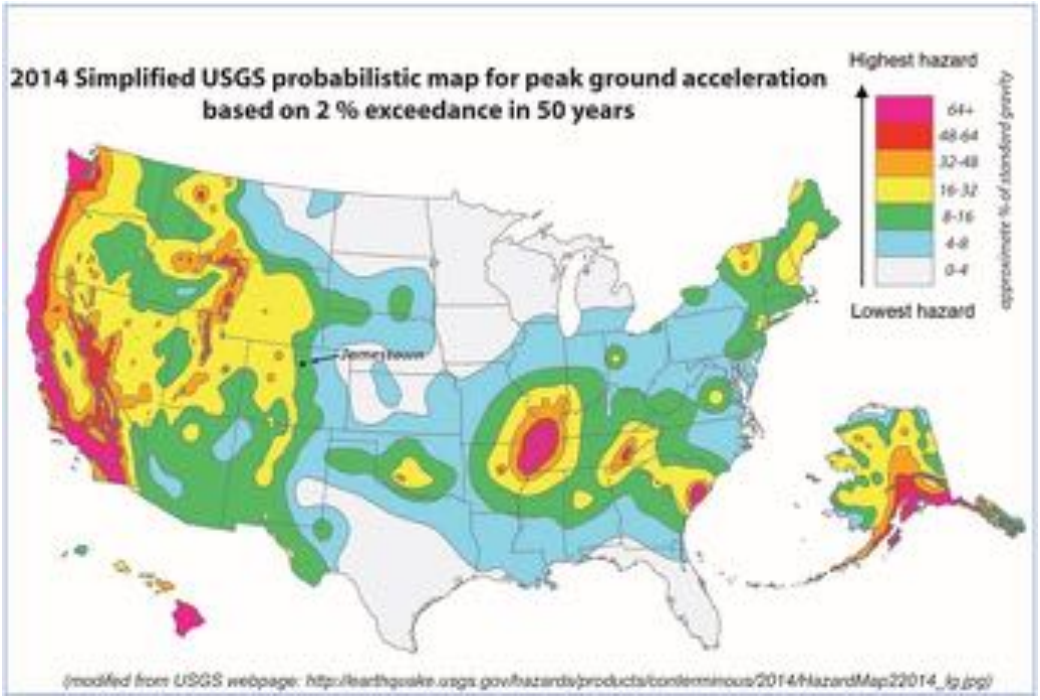


Map showing the location and intensities of the 1882 earthquake, Colorado's largest historical earthquake (from Spence et al., 1996). Evidence suggests it epicenter was near Estes Park, and its estimated magnitude was 6.6.

Figure 1-48: Map of geologically young faults (Quaternary age) in the region surrounding Jamestown

Map of geologically young faults (Quaternary age) in the region surrounding Jamestown. Image updated from USGS website: http://earthquake.usgs.gov/hazards/qfaults/map, which is based upon USGS and Colorado Geological Survey (2006) and Widmann et al., (1998). Age of Gore Range Frontal Fault from Derouin et al., (2010).

Figure 1-49: Simplified USGS probabilistic map for peak ground acceleration



Simplified USGS probabilistic map for peak ground acceleration based on 2 percent exceedance in 50 years. Jamestown lies within the 8 to 16 percent of gravity peak ground acceleration, which is in the moderate to low hazard category.

Other Types of Geologic Hazards

Radon is a potential problem in many parts of Colorado, including Jamestown. The types of granitic and metamorphic bedrock beneath Jamestown tend to cause a somewhat higher risk of radon than that in some other locations in the state. Presence of uranium minerals in some of the mineralized veins increases the likelihood of radon in those areas.

The Colorado Geological Survey (1991) reported on nine radon tests from the Jamestown zip code that were included in their state-wide study reconnaissance in-door radon study. All nine tests from Jamestown exceeded 4 picocuries per liter, which is the maximum level that US EPA recommends for indoor air. The nine test samples averaged 23.5 picocuries per liter, well in excess of the recommended level.

Other types of geologic hazards found elsewhere in Colorado include sinkholes due to dissolution of underlying rock, swelling soils, heaving bedrock, compactible soils, etc. These types of geologic hazards are not known to be present in Jamestown.

Preliminary Options to Mitigate the Potential Effects of Geologic Hazards and Constraints

Debris Flows

Santi et al., (2011) described some of the ways to reduce debris-flow hazard and risk. Education is important, including awareness of the hazard, being warned when conditions favor generation of debris flows, and knowing what to do when the hazard is imminent. Avoidance of high hazard areas is an ideal way to mitigate, but often is not feasible in urban locations. Channelization, both temporary and permanent types, can effectively divert debris flows away from homes when properly designed and constructed. Interception can reduce the volume of sediment and also the maximum size of boulders and cobbles in debris flows. Hillside treatments may be helpful if implemented soon after an area is burned.

Channelization was used to contain future debris flows from Howlett Gulch (Figure 1-50). The short section of re-constructed channel on Howlett Gulch within town has a berm on one side and a concrete wall on the other, and is designed to constrain the flow from the head of the inundation area to the culvert/bridge on Main Street.

The types and effectiveness of debris-flow mitigation efforts performed by Boulder County in the area of the 2011 Fourmile Canyon fire, as well as recommendations to improve the mitigation effort, are contained in six technical memorandums prepared for Boulder County by Wright Water Engineers (2011). Although this study addressed mitigation efforts in a recently burned area, it contains information applicable to Jamestown because the geologic and geographic environments are similar. The following paragraphs combine information from the memorandums with mitigation work described in several other publications and the professional experiences of GeoLogical Solutions.

Burned areas are most prone to generate debris flows during the first few years following a fire, and the potential for debris flows gradually decreases during ensuing years until the debris-flow hazard returns to the pre-fire level. Common mitigation approaches to reduce sediment loads available to debris flows generated in recently burned basins include 1) aerial or ground applications of seed and mulch to the upper and middle parts of basins where the vegetative cover is absent or thinned due to the fire; 2) correctly installed felled trees along the contour of hillslopes prone to erosion; 3) installation of small check dams (not over 2 or 3 feet high) in rills and small gullies using naturally available nearby materials such as rocks and logs, especially where access for construction and maintenance is feasible; and 4) removal of sediment from existing natural or artificial depositional areas to create opportunities for additional sediment storage. Examples 3 and 4 are also appropriate for areas that have not burned recently.

The 2013 debris flows initiated on very steep slopes high on Porphyry Mountain in the area burned by the 2003 Overland wildfire over ten years ago. Grasses and forbes have revegetated the burned area fairly well and have stabilized the loose soils on hillslopes to some degree. The 2013 debris flows on Porphyry Mountain

started as discrete soil slips, not as widespread hillslope erosion as is common for debris flows that form in very recently burned basins.

Debris-flow mitigation in Jamestown will be challenging. Future debris flows that threaten Jamestown likely will have similar origins to the 2013 debris flows, and they probably will not be limited to the area burned by the 2003 Overland fire. When a storm produces rainfall with the intensity and duration needed to exceed threshold initiation conditions, debris flows may be generated in any of the debris-flow basins surrounding the town. About thirty basins around Jamestown are thought to be capable of producing debris flows in the future, with thirteen of them rated as highly hazardous (see Figure 1-24 for locations). Prioritizing which areas to evaluate and mitigate is a difficult but needed first step.

Models to predict the probability and volume of debris flows from recently burned areas are available. For example, Cannon et al., (2010) developed a model that has been used in several recently burned areas around the country. Verdin et al., (2013) used it to model debris-flow potential for the 2013 West Fork Fire Complex in southwestern Colorado immediately following the fire.

Models predicting the probability and volumes of debris flows from unburned or long-ago-burned basins are not yet widely accepted. Many researchers use hydrologic models to predict the volume of clear-water runoff (Flow-2D is an example), then increase the volume by estimating a bulking factor for sediment eroded from the basin and added to the water. Estimates of the bulking factor can be refined by detailed studies of the sediment availability in a given basin. While this will help to understand the size of debris flows a basin may generate, it does not provide much guidance for probability or likelihood of occurrence. Other models predict the runout or inundation area of debris flows (e.g. Prochaska and others, 2008; Berti and Simoni, 2007; Griswold, 2004). These types of models work best for well-developed debris fans, which is not the case for Jamestown.

Sediment catchment basins (also called debris basins) are one of the more effective and reliable ways to intercept debris flows. They commonly are constructed at the head of a runout zone where sufficient room is available for their construction. Unfortunately, in Jamestown there are closely spaced homes or roads in most of these locations. Debris basins could also be constructed in the channels upslope of town, but much of these areas are steep, which reduces the volume of sediment that can be stored in a debris basin. Equipment access for construction and maintenance of debris basins on steep slopes above town also reduces the feasibility of debris basins in those areas.

Small check dams placed in series within the debris-flow channels may be an alternative way to capture and reduce sediment. But equipment access to them is required, and unless properly designed and constructed they potentially can exacerbate debris flows if they fail during an event. Debris-flow fences or debris strainers may retain larger-sized material and woody debris, help to reduce flow rates, and could be constructed where the channels are narrow, as in many of the areas immediately above the urbanized part of town. Geotextile silt fences generally have inadequate strength to resist the forces of a debris flow. A collection of baffles within wider channel areas will also slow the velocities of debris flows and allow sediment to drop out of suspension, but these also require adequate room. These also require careful design, construction, and maintenance.

There are some areas in and above town where the debris-flow channels are shallow. Future debris flows may jump out of these channels and flow into unpredictable locations, especially when the channel becomes blocked by trees or large boulders. Diversion structures, channelization, or other techniques used to control the flow might help to retain the flow within a preferred channel. Runout areas of many of the basins are occupied by closely spaced buildings and have limited ground in which mitigation can occur. This makes avoidance of the debris flows difficult. Given adequate space, features such as berms can be employed to direct flows away from individual buildings, but in confined spaces channelization may be the only option.

To protect investments and guard against impacts to properties in the near term, new structures should not be built in debris-flow hazard areas until studies are conducted to better understand the hazard risk level in the particular locations. For existing buildings where adequate space is available in the runout area, sediment catchment basins constructed at the head of the runout area potentially may be feasible and should be

explored. Channelization of debris-flow pathways through areas with existing structures, as was done at Howlett Gulch (Figure 1-50), may be the best and most realistic method to reduce the potential for damage to existing structures in the near term, but the channels should be designed and built to safely handle the types of flows that long-term modeling predicts.

Figure 1-50: Example of channelization used to control future debris flows in the Howlett Gulch runout area

The channelized section directs flows to the culvert/bridge on Main Street.

Slope-Stability Hazards and Constraints

The old landslide on the hillslope above the cemetery should be studied in detail to determine why it happened at that location and whether other parts of town have similar conditions. Additional geologic studies may be warranted to better define the presence, extent, and character of metamorphic rocks in other parts of town. The existence of thick layers of unconsolidated surficial deposits overlying bedrock in areas with potentially unstable slopes also would help to better define the landslide hazard. The presence of potential planes of weakness within both the metamorphic and granitic rocks also should be evaluated to better understand landslide hazards. These potential planes of weakness include foliation planes in the metamorphic rocks and faults and fractures within the granitic and metamorphic rocks.

In the meantime, excavations and construction should avoid the area of the old landslide. Excavation and construction in the adjacent, high hazard, potentially unstable areas underlain by metamorphic rocks probably should be avoided unless site-specific geotechnical studies are conducted and their recommendations adopted.

New construction should be avoided in the rockfall hazard area unless mitigative measures are utilized. Excavation and construction in the moderately hazardous potentially unstable area underlain by granitic rocks is feasible if geotechnical evaluations are conducted and implemented. When Andersen Hill Road is rebuilt, the loose fill in the area of sloughing should be replaced or mitigated with consultation by geotechnical engineers.

The unusual landform high on Porphyry Mountain that may be a rock avalanche deposit should be studied to better understand its origin. If the studies demonstrate the landform is a result of a rock avalanche or other significant geologic hazard, the slopes on Porphyry Mountain area should be evaluated to assess whether similar events in the future could affect the town.

Geologic Hazards and Constraints Related to Mines and Mill Tailings

Any hazardous open shafts, adits, and subsidence features should be safeguarded. The Colorado Division of Reclamation, Mining, and Safety can safeguard the openings at no cost to the landowner. Structures should not be built over shallow underground workings where subsidence of the ground surface might occur. Septic systems should not be permitted over shallow underground workings or over highly fractured rock to avoid seepage of septic leachate into the fractured aquifer. Drilling test holes and various geophysical techniques may help with locating underground workings if they are at relatively shallow depth.

Ground-based radiation surveys should be conducted in mine and mill areas known to contain uranium minerals prior to selecting sites for structures that humans will occupy. Avoidance is recommended as the first option for sites with high radiation levels, although radon mitigation can be included in the design of structures. Radon testing should be done for existing structures in areas known to contain uranium minerals. Radon testing probably should be done in all existing homes and businesses in Jamestown, because granitic rocks tend to have naturally elevated concentrations of radioactive minerals and because prior radon tests done in town found high results. Radon mitigation is recommended for structures with high radon levels.

Geotechnical studies should be conducted prior to construction of new buildings in mine and mill areas, including reclaimed areas, to assess the suitability of the underlying materials for foundations. In areas known or thought to contain harmful elements such as lead and arsenic, testing should be done, and if found to be problematic, avoidance or mitigation is recommended.

Geologic Hazards and Constraints on Valley Floors

Structures built on valley floors should be designed to resist erosional forces and sediment deposition that can occur during flooding. Flood hazards should be addressed by hydrologists. Structures should be designed to withstand the erosion and sediment deposition that can occur during floods. A recent publication by Gartner et al., (2015) may be helpful to determine where erosion and sediment deposition might occur. The possible existence of shallow ground water and compressible, organic-rich soils should be assessed.

Earthquake Hazards

At a minimum, new construction should be built using the seismic design criteria in the currently adopted building code. If an earthquake similar to the one in 1882 happened to occur near Jamestown, additional seismic resistance would be desirable.

Other Types of Geologic Hazards and Constraints

The only other geologic hazard and constraint identified in Jamestown is the potential for radon gas emanating from the granitic and metamorphic bedrock and from the veins within them, as well as the surficial deposits derived from them. As previously stated, radon testing is recommended for all existing and new structures to determine if it is present at high levels. Those buildings with indoor air radon levels that exceed the current federal guideline of 4 picocuries per liter should be mitigated. Ventilation is a common mitigative method. Vapor barriers placed over the ground exposed in crawl spaces can be helpful.

Summary of How Geologic Threats and Hazards Have Changed as a Result of Recent Flood Events

The 2013 flood caused major changes on valley floors that will affect future erosion and sediment deposition. Shallow ground water continues to exist locally on the valley floors, although the erosion and sediment

deposition during the flood probably has altered the depth to shallow ground water in those areas. The existence of organic-rich compressible soils also may have been changed by the 2013 flood.

Considerable sediment was eroded and removed from basins that produced large debris flows during the 2013 storm (Anderson et al., 2015). However, large volumes of sediment remain in these basins and are available for mobilization during future events (e.g. see Figure 1-39 and 1-40). Indeed, many basins that have produced debris flows historically have continued to produce subsequent debris flows (e.g. Kirkham et al., 2000; Coe et al., 2000), including the Fourmile Canyon area (Wright Water Engineers, 2011). The debris-flow basins that produced flows during the 2013 storm are just as susceptible to future debris flows as are those that did not flow during 2013.

The erosion control protection on the reclaimed tailings on the west bank of Little James Creek above the confluence with James Creek was damaged by the 2013 flood. The damage should be evaluated by engineers and, if needed, replaced or repaired.

The section of Andersen Hill Road that climbs up the hill on the south side of James Creek was undercut by erosion during the 2013 flood. The artificial fill exposed in the eroded slope beneath the road has continued to slough or ravel during 2015, threatening the integrity of the remaining road section. This should be considered during the design and construction when the road is rebuilt.

No other geologic hazards or constraints are known to have changed as a result of the 2013 flood.

Risk Assessment Summary

This section summarizes our risk assessment of the geologic hazards and constraints that affect Jamestown. The study utilized a variety of data sources, it included on-site field investigations, and it made use of aerial imagery and other remote sensing data. The post-flood LiDAR acquired by FEMA was especially helpful, and the hillshade relief maps created from the LiDAR data were used as the base maps for the figures that depict the geologic hazards.

Several geologic hazards and geologic constraints affect Jamestown. They include debris flows, slope-stability issues, mines and mill tailings, hazards and constraints on valley floors, seismic hazards, and radon. The debris-flow hazard areas are shown on Figure 1-24. Slope-stability hazards and constraints are depicted on Figure 1-25. Hazards and constraints related to mines and mill tailings are on Figure 1-26. And areas with geologic hazards and constraints on valley floors are on Figure 1-27. Each hazard area is assigned a high or moderate hazard rating. Areas outside the hazard areas shown on the figures have either low or no potential for the particular hazard shown on each figure. Seismic hazards are regional and apply to the entire town. Radon hazards are very site dependent, and site-specific studies are required to assess the hazard.

Debris flows pose the most serious immediate geologic hazard to the town. The damage caused by an earthquake could be more extensive, but debris flows are more likely to occur. The debris flows experienced during the 2013 storm clearly demonstrate this hazard. There are about 30 basins thought to be capable of producing debris flows that could affect the town in the future (see Figure 1-24 for locations). Only six of these basins generated debris flows during the 2013 storm (see Figures 1-36 and 1-37). Approximately 7 percent (25.5 acres) of Jamestown is classified as having a high debris-flow potential, and a nearly equal amount of the town (6.6 percent; 24.4 acres) has a moderate debris-flow potential.

Methods potentially applicable to mitigating debris-flow hazards include education and awareness, avoidance, and warnings, channelization, and interception. In the event of another wildfire, hillside treatments may be helpful if implemented soon after the fire.

No landslides are shown in or near Jamestown on any of the published geologic maps, including a regional map that focused only on landslides. However, an old landslide was detected on the hillslope above the cemetery during this project using the LiDAR imagery, and it was briefly examined in the field. The underlying bedrock in this area is metamorphic gneiss and schist, which may contain layering and foliations that can serve as slip planes for landslides. No excavation or construction should be allowed on the old landslide on the hillslope

above the cemetery unless geotechnical investigations are conducted and their recommendations are implemented.

Much of Jamestown lies on steep hillslopes. Areas with slopes in excess of about 25 percent are considered potentially unstable slopes. Potentially unstable slopes are in a state of quasi-equilibrium and may become unstable when disturbed by human activities or by extreme precipitation events. Potentially unstable slopes underlain by granitic rocks have moderate hazards and constraints (~70 percent of the town), whereas slopes underlain by metamorphic rocks are judged to have high hazards and constraints (~1.7 percent of the town).

Shallow soil creep is a common process on potentially unstable slopes. Excavation activities in areas of potentially unstable slopes may trigger landslides and rockfall, and it can trigger or accelerate soil slip. Cut slopes also may tend to ravel or slump. Extreme precipitation events may trigger small, thin landslides or soil slips in soil veneers that overlie bedrock. These soil slips can transition into debris flows as the failed soil material travels downslope.

Excavation and construction in the adjacent, high hazard, potentially unstable areas underlain by metamorphic rocks also should be avoided unless site-specific geotechnical studies are conducted and their recommendations enforced. Excavations and construction in the moderately hazardous potentially unstable area underlain by granitic rocks may be feasible if geotechnical evaluations are conducted and implemented.

Two small areas in the north part of town are subject to moderate rockfall hazards. They cover only about 1.2 acres of the town (~0.3 percent). These areas are situated downslope from cliffs on Porphyry Mountain. Rocks that dislodge from the cliffs may roll or bounce into the mapped rockfall hazard area within town. No construction should be allowed in the rockfall hazard area unless mitigative measures are utilized.

Part of the Andersen Hill Road was removed by erosion during the 2013 flood, and the section of road that climbs up the hill on the south side of James Creek was undercut by erosion. This undercut section of the road continued to slough or ravel during 2015, threatening the integrity of the remaining road surface. When Andersen Hill Road is rebuilt, the loose fill in the area of sloughing should be replaced or mitigated with consultation by geotechnical engineers. There potentially may be other small areas where sloughing may occur or very small landslides may exist, but these were not identified during the study.

An unusual landform high on Porphyry Mountain may be a rock avalanche deposit. This feature is above the town limits (see Figure 1-25), but a future rock avalanche potentially could affect the town. Further study of this landform and adjacent areas is warranted. This type of rapidly moving slope failure, particularly if it is larger, could be very hazardous to the town.

Areas with inactive mines and mills also have geologic hazards and constraints. These areas are assigned a moderate hazard rating. Hazardous open shafts, adits, and subsidence features may exist in these areas. If any exist, they should be safeguarded. There may be underground tunnels, stopes, and raises in mine areas that could pose subsidence hazards to the overlying ground surface in the event of a roof collapse in underground workings. Structures should not be built over shallow underground workings where subsidence of the ground surface might occur. The mapped boundaries of the mine and mill hazard areas are very approximate, in part because the extent of the underground workings is not well known.

The underground workings and highly fractured rock found at shallow depths may serve as preferential pathways for rapid movement of effluent from septic systems. This could degrade ground water or surface water. Septic systems should not be permitted over shallow underground workings or over highly fractured rock. Mine and mill areas, as well as reclaimed mill tailing and mine water, may contain material that is loose, unconsolidated, and unsuitable for foundations. Geotechnical studies should be conducted prior to construction of new buildings in mine and mill areas, including reclaimed areas, to assess the suitability of the underlying materials for foundations.

Uranium and other radioactive minerals may be present in mine and mill areas, especially those that were worked for fluorspar since the radioactive minerals reportedly were associated with the fluorspar. These

materials may pose radiation hazards, and they may also contain potentially harmful lead, arsenic, or other elements, or be sources of acid drainage. The mine and mill hazard areas affect about 10 percent of the town.

To avoid areas with concentrated radioactive minerals, ground-based radiation surveys should be conducted in mine and mill areas known to contain uranium minerals prior to selecting sites for structures that humans will occupy. Radon testing should be done not only for existing structures in areas known to contain uranium minerals, but also for all existing homes and businesses in Jamestown because the rocks beneath town tend to have naturally elevated concentrations of radioactive minerals and the past testing that has been conducted detected radon levels in excess of recommended concentrations. Testing should also be done to evaluate the presence of harmful elements such as lead and arsenic.

Geologic hazards and constraints and constraints on valley floors are classified as moderate. In addition to debris flows, which were previously discussed, fluvial processes will cause erosion and sediment deposition. Shallow ground water and compressible, organic-rich soils may exist in valley floor areas. The hazards and constraints on the valley floors of James Creek, Little James Creek, Gillespie Gulch, and Slaughterhouse Gulch are classified as high. They comprise about 12 percent of the town. Hazards and constraints on the valley floor of McCorkle Gulch are judged to be moderate, chiefly because it has a much smaller drainage basin.

Structures built on valley floors should be designed to resist the erosional forces and sediment deposition that can occur during flooding. Testing should be done to evaluate sites for shallow ground water and compressible, organic-rich soils. Flood hazards should be addressed by hydrologists.

Jamestown has a moderate earthquake hazard. Colorado's largest historic earthquake occurred in 1882 near Estes Park; it had an estimated magnitude of 6.6. The causative fault for the 1882 earthquake has not yet been recognized, and the earthquake occurred in a geologic environment fairly similar to Jamestown. It is possible that a similar earthquake could occur in closer proximity to Jamestown.

The nearest known geologically young faults that are capable of generating damaging future earthquakes are about 40 to 45 miles west-southwest of Jamestown. These include the Williams Fork Mountains Fault, several faults on the floor of the Williams Fork Valley, and the Gore Range Frontal Fault. Future large earthquakes on these faults could cause moderate ground shaking in Jamestown. Little is known about the recent activity of faults near Jamestown.

Probabilistic seismic hazard maps prepared by the U.S. Geological Survey are used in the International Building Code for the design and construction of permitted structures in Jamestown. In their simplified 2014 probabilistic seismic hazard map, the expected peak ground acceleration in Jamestown with a 2 percent probability of annual exceedance during the next 50 years is moderate to low compared to the rest of the country

At a minimum, new construction should be built using the seismic design criteria in the currently adopted building code. If an earthquake similar to the one in 1882 happened to occur near Jamestown, additional seismic resistance would be desirable.

The only other geologic hazard and constraint identified in Jamestown is the potential for radon gas emanating from the granitic and metamorphic bedrock and surficial deposits that underlie the town. Radon testing is recommended for all existing structures.

Implementation Options

All drainage basins that have potential to generate debris flows should be evaluated by a team of hydrologists, geologists, and geotechnical engineers to assess the probability of debris flows and their volumes and hydraulic properties. This information can be used to design mitigation efforts. Until these studies are completed, new construction should be avoided in debris-flow areas. Mitigation should be undertaken to protect existing structures from future debris flows. Channelization and interception, when appropriately designed and constructed, are options to reduce hazards for existing and new structures. Hillside treatments

may be helpful if implemented soon after an area is burned. Awareness through education, and warnings when precipitation conditions are favorable for debris-flow generation, also are important.

The erosional damage at the site on the west bank of Little James Creek has not been repaired; it should be evaluated by a geotechnical engineer to determine whether the damage should be repaired and, if needed, what should be done.

The old landslide, detected on the hillside above the cemetery, should be studied in detail to determine why it happened at that location and whether other parts of town have similar conditions. In the meantime, excavation and construction are not recommended on the old landslide. Geotechnical investigations should be conducted at all sites in potentially unstable areas prior to undertaking any excavation or construction to avoid de-stabilizing the slopes.

Construction should not be allowed in the rockfall hazard area unless mitigative measures are utilized. When Andersen Hill Road is rebuilt, the loose fill in the area of sloughing may need to be replaced or mitigated by geotechnical engineers. The rock avalanche on the slopes of Porphyry Mountain above town should be evaluated to determine if a similar or larger event could affect the town.

The mine and mill areas should be examined for hazardous shafts, adits, and subsidence features. Any discovered hazardous mine features should be safeguarded. The Colorado Division of Reclamation, Mining, and Safety can safeguard the openings at no cost to the landowner.

The extent, locations, and depths of underground workings should be determined as well as possible, and structures should not be built over shallow underground workings where subsidence of the ground surface might occur. Septic systems should not be permitted over shallow underground workings or over highly fractured rock to avoid seepage of leachate into aquifers.

Studies should be conducted to assess the potential for environmental and radiation hazards in the mine and mill areas. Ground-based radiation surveys are recommended in mine and mill areas known to contain uranium minerals prior to selecting sites for structures. Suitability of soils for foundations in mine, mill, and reclaimed areas should be assessed prior to construction of new buildings.

Radon testing should be done not only for existing and new structures in areas known to contain uranium minerals, but also for all homes in town because the types of rocks beneath the town tend to have naturally elevated concentrations of radioactive minerals, and past testing has detected radon levels well above recommended levels. Avoidance is a first option for new building sites. Radon mitigation is feasible for both existing and new structures.

Structures built on valley floors should be designed to resist erosion and sediment deposition during flood events because it is difficult to predict exactly where these fluvial processes will happen during flooding. Existence of and depths to shallow ground water can be determined by test drilling. Presence of compressible, organic-rich soils may be best determined on a site-specific basis. Flood hazards should be addressed by hydrologists.

New construction should, at a minimum, be built using the seismic design criteria in the currently adopted building code. Increased seismic design may be desirable in case an earthquake similar to the one in 1882 hits near the town. Existing homes can improve their performance during earthquakes by making sure the structure is attached to the foundation, by securing gas appliances like hot water heaters to walls, and other mitigative methods.

Recommendation from the Jamestown Long Range Recovery Plan:

- Identify and reduce tributaries from potential contaminant sources (metals, sediment, etc.).

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Observation to Changes in Hazards

According to Boulder County's Hazard Mitigation Plan (HMP), the most significant natural hazards for Jamestown are floods, debris flow, drought, wildfire and windstorm. To better understand Jamestown's potential risk to these hazards and allowing the Town to establish the framework for developing and prioritizing mitigation actions to reduce risk from future hazard events, it is important to evaluate changes in Hazards based upon previous events. Within the past ten years, the October 2003 Overland Fire and the flooding of September 2013 have resulted in changes to the Town's overall exposure to natural hazards.

Overland Fire, 2003

Long-lasting effects from this fire have contributed to the risk of flooding, debris flow, mudslides, reduced soil and slope stability. Despite restoration efforts that included erosion control, re-vegetation, and mulching projects, rainstorms have caused significant erosion and debris flows since the fire. According to AMEC's 2014 report, Main Street has been closed three to four times between 2004 and 2008 due to debris flows from the

Overland fire burn area. As vegetation plays a key role in mitigating hillside erosion and runoff, the lack of vegetation in this area makes the town more susceptible to debris flows during heavy rain events, as seen during the 2013 flood.

2013 Flood

The 2013 flood event was one of the most costly and widespread flood events in Colorado history. The severity of the flood was exacerbated by the 2003 Overland fire, which had burned on the hills north of town. The lack of vegetation due to the fire left the hillside unprotected from the erosive forces of rain, leading to mudflows and debris flows. The debris flows carried trees, boulders and sediment downstream, causing extensive damage to infrastructure and depositing sediment and debris along the town's main corridor.

Summary of Changes

The following Summary of Observations as to the changes in Hazards is based upon the consulting team's field investigations, previous recovery plans by others as well as available updated data, including review of most recent LiDAR data. This summary also includes input from the Town staff, residents and the Advisory Team.

Flooding

Both the Overland Fire and 2013 Flood have contributed to several major changes to the Town's exposure to flooding, including:

- **Floodplain:** During the 2013 Flood, James Creek and Little James Creek both left their channels and formed new channels, undercutting houses and roads. Homes, bridges, culverts and roads were washed away during the event. As the event altered previous channel configurations, new floodplain mapping reflecting the dynamics of this event - as detailed in the Applicable Hydraulic and Hydrologic Studies section - is necessary.
- **Scouring**: The 2013 flood also caused scouring and aggradation (deposition of settlement) along James Creek and Little James Creek. One area of concern identified by Town staff and the Advisory Team related to scouring is that portion of the James Creek near the Town's water treatment plant and below 180 Mesa. The rock outcropping in this area is granitic and exhibits signs of long term fissuring. Without the benefit of having pre 2013 flood documentation establishing the extent of long term fissuring, it is difficult to ascertain changes due to the flood. Given the stated concern in this location, the outcropping should continue to be monitored by engineers.
- **Debris Flow**: See summary of Debris Flow from both events in the following Geological Hazards section.

Geological Hazards

Both the Overland Fire and 2013 Flood have caused several major changes to Geological Hazards, including:

- **Valley Floor**: Approximately 12 percent of Jamestown is considered "Valley Floor". This includes active channels, floodplains, and low terraces along perennial streams and their tributaries. As a result of the 2013 Flood, these areas experienced significant debris flows, erosion and sediment deposition. Areas of such impacts include portions of James Creek, Little James Creek, Gillespie Gulch, and Slaughterhouse Gulch. Due to its smaller drainage basin, the McCorkle Gulch was less impacted.

  Shallow ground water continues to exist locally on the valley floors, although the erosion and sediment deposition during the flood probably has altered the depth to shallow ground water in those areas. The existence of organic-rich compressible soils also may have been changed. Considerable sediment was eroded and removed from basins that produced large debris flows during the 2013 storm. However, large volumes of sediment remain in these basins and are available for mobilization during future events (e.g. see Figure 1-39 and 1-40).

- **Debris Flow**: Debris flows pose the most serious geologic hazard to the town in the near term. All of the debris flows that initiated on Porphyry Mountain and ran into Jamestown originated in areas burned by the 2003 Overland wildfire. The areas of greatest potential for debris flow within the Town

Limits are identified in the Debris Flow Hazards and Figure 1-43. The erosion control protection on the reclaimed tailings on the west bank of Little James Creek above the confluence with James Creek was damaged by the 2013 flood. The damage should be evaluated by engineers and, if needed, replaced or repaired. Also, since the flooding, large amounts of debris remain along reaches of both the James Creek and Little James Creek in forestlands immediately outside of the Town limits.

- **Slope Stability**: As nearly 70 percent of Jamestown lies on steep hillslopes that are considered to be potentially unstable slopes with other portions located along riparian corridors, slope stability is a common issue in towns with a mountain geologic setting such as Jamestown's. These conditions predate the Overland Fire and 2013 Flood. However, each in their own way exacerbated the common process of soil creep on potentially unstable slopes, mudslides and erosion. A particular example of erosion caused by the 2013 Flood is that section of Andersen Hill Road that remains on the south side of James Creek, which was undercut by erosion during the flooding. A section of the eroded slope below the road continued to slough or ravel during 2015, threatening the integrity of the remaining road surface.

Roads

Roads into, within and through the Town are vital means of egress during any disaster. Since the Overland Fire, most Forest roads have been stabilized and repaired as a part of the fire's restoration efforts with Boulder County. Since the 2013 Flood, most roads that were damaged within the Town limits have been stabilized and/or repaired. The exception to this is Andersen Hill Road, which is in the process of being rebuilt. Outside of the Town limits, however, degradation of two Forest Service roads has occurred, including:

- **Ward Road**: Portions of this road, located immediately outside of Town limits and along James Creek, have been washed away. The degradation of this road limits it as a potential egress route for residents in certain events.
- **Gillespie Spur**: Beyond its intersection with 12th St. and outside of Town limits, Gillespie Spur extends into forested areas. Similar to Ward Road, portions of this forest road were washed away by the flooding of 2013 and its degradation limits it as a potential egress route for residents in certain events.

SECTION 5 | TIERED HAZARDS

This section of the report summarizes the level of risk related to natural hazards that the Town of Jamestown is exposed to. This summary is consistent with the Town of Jamestown's Community Hazard Profile as included in the Boulder County Hazard Mitigation Plan (BHMP). It is broken into two tiers:

5.1 Tier One Hazard Type(s)

Tier One is that level of natural hazards that should be considered especially in the context of the town's Land Use Planning as they represent the highest level of overall risk to individual property owners and the community on the whole. Tier One Hazards include:

1. Flood
2. Geological, including:
    - Debris Flow
    - Landslide
    - Avalanche
    - Earthquake
    - Subsidence
    - Expansive Soils
    - Rockfall
3. Wildfire

5.2 Tier Two Hazard Type(s)

Tier Two hazards are those natural hazards that - due to their limited exposure to individual properties and the community on the whole - are not as critical in terms of the Town's Land Use Planning. Tier Two Hazards include:

1. Communicable Disease
2. Dam and Levee Failure
3. Drought
4. Extreme Heat
5. Hailstorm
6. Lightning
7. Severe Winter Storm
8. Tornado
9. Windstorm

5.3 Descriptions

The Boulder County Hazard Mitigation Plan (2015) provides the following descriptions of each hazard:

Avalanche

The Boulder County Hazard Mitigation Plan (2015) provides the following description of an Avalanche:

Avalanche hazards occur predominantly in the mountainous regions of Colorado above 8,000 feet. The vast majority of avalanches occur during and shortly after winter storms. Avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common.

The combination of steep slopes, abundant snow, weather, snowpack, and an impetus to cause movement create an avalanching episode. According to the Colorado Avalanche Information Center (CAIC), about 90

percent of all avalanches start on slopes of 30-45 degrees; about 98 percent of all avalanches occur on slopes of 25-50 degrees. Avalanches release most often on slopes above timberline that face away from prevailing winds (leeward slopes collect snow blowing from the windward sides of ridges). Avalanches can run, however, on small slopes well below timberline, such as gullies, road cuts, and small openings in the trees. Very dense trees can anchor the snow to steep slopes and prevent avalanches from starting; however, avalanches can release and travel through a moderately dense forest. An average-sized avalanche travels around 80 mph; the typical range of impact pressure from an avalanche is from 0.5 to 5.0 tons per foot.

Historically in Colorado, avalanches have occurred during the winter and spring months between November and April. The avalanche danger increases with major snowstorms and periods of thaw. About 2,300 avalanches are reported to the CAIC in an average winter. More than 80 percent of these fall during or just after large snowstorms. The most avalanche-prone months are, in order, February, March, and January. Avalanches caused by thaw occur most often in April.

This hazard generally affects a small number of people, such as snowboarders, backcountry skiers, and climbers who venture into backcountry areas during or after winter storms. Motorists along highways are also at risk of injury and death due to avalanches. Road and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches. Recognizing areas prone to avalanches is critical in determining the nature and type of development allowed in a given area.

Communicable / Zoonotic Disease Outbreak

The impact to human health that communicable disease outbreaks can have on an area can be substantial. Diseases such as HIV/AIDS and the simple head cold are communicable, or easily passed person to person through direct contact or contamination of inanimate objects or food. Hand washing and adequate personal hygiene practices can help prevent the spread of many communicable diseases.

Zoonotic diseases, such as the Swine Flu or West Nile Virus are transmitted from animal to human. Safe food and animal handling practices are the best ways to prevent the onset of these zoonotic types of disease.

Dam and Levee Failure

Dams are man-made structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. Dams typically are constructed of earth, rock, concrete, or mine tailings. Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of development and infrastructure located downstream.

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which result in overtopping
- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping or rodent activity
- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

Overtopping is the primary cause of earthen dam failure. Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Associated water quality and health concerns could also be an issue.

Drought

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

Drought is a complex issue involving many factors - it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects:

- **Meteorological** drought is usually defined by a period of below average water supply.
- **Agricultural** drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.
- **Hydrological** drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as stream flow, snowpack, and as lake, reservoir, and groundwater levels.
- **Socioeconomic** drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

With its semi-arid conditions, drought is a natural but unpredictable occurrence in Colorado. Due to natural variations in climate and precipitation sources, it is rare for all of Colorado to be deficient in moisture at the same time. However, single season droughts over some portion of the state are quite common. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users that have a different water supply. Individual water suppliers may use criteria, such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler, to define their water supply conditions. The drought issue is further compounded by water rights specific to a state or region. Water is a commodity possessed under a variety of legal doctrines.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Colorado are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. An ongoing drought may also leave an area more prone to beetle kill and associated wildfires. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

Earthquake

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is usually expressed as a Richter magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface as felt by humans and defined in the Modified Mercalli scale. Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Other damage-causing effects of earthquakes include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, fires, and dam failure.

Colorado is considered a region of minor earthquake activity. Geologic studies indicate there are about 90 potentially active faults in Colorado with documented movement within the last 1.6 million years.

Active faults, which represent the highest earthquake hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 15,000 years).

Expansive Soils

Expansive (swelling) soils or soft bedrock are those that increase in volume as they get wet and shrink as they dry. Commonly, they are known as bentonite, expansive, or montmorillinitic soils. Swelling soils contain high percentages of certain kinds of clay particles that are capable of absorbing large quantities of water and expanding up to 10 percent or more as the clay becomes wet. The force of expansion is capable of exerting pressures of 20,000 pounds per square foot or greater on foundations, slabs, and other confining structures.

In Colorado, swelling soils tend to be at a constant moisture content in their natural state and are usually relatively dry prior to any construction disturbance. Exposure to water sources during or after development generally results in swelling. Colorado, with its arid or semiarid areas and seasonal changes in soil moisture, experiences a much higher frequency of swelling problems than eastern states that have higher rainfall and more constant soil moisture. Rocks that contain swelling clay are generally softer and less resistant to weathering and erosion than other rocks; therefore, expansive soil events occur more often along the sides of mountain valleys and on the plains than in the mountains.

Swelling soils are one of the nation's most prevalent causes of damage to buildings. Annual losses are estimated in the range of $2 billion. In Colorado, the cost is estimated at $16 million annually. Damage can include severe structural damage; cracked driveways, sidewalks, and basement floors; heaving of roads and highway structures; condemnation of buildings; and disruption of pipelines and other utilities. Destructive forces may be upward, horizontal, or both. Buildings designed with lightly loaded foundations and floor systems often incur the greatest damage and costly repairs from expansive soils. Building in and on swelling soils can be done successfully, although more expensively, as long as appropriate construction design and mitigation measures are followed.

Extreme Temperatures

Extreme Heat

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. According to the National Weather Service (NWS), among natural hazards, only the cold of winter—not lightning, hurricanes, tornadoes, floods, or earthquakes—takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails.

The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days.

Extreme Cold

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities.

In 2001, the NWS implemented an updated Wind Chill Temperature index. This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Flood

Floods can be among the most frequent and costly natural disaster in terms of human hardship and economic loss and can be caused by a number of different weather events. Floods can cause injuries and deaths and substantial damage to structures, landscapes, and utilities. Certain health hazards are also common to flood events. Standing water and wet materials in structures can become a breeding ground for microorganisms such as bacteria, mold, and viruses. This can cause disease, trigger allergic reactions, and damage materials long after the flood. Direct impacts such as drowning can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be critical to reduce life and safety impacts.

Risk of flooding in Boulder County is increased as a result of the burn scars such as that left by the Fourmile Canyon Fire in September of 2010. Heavy rainfall, especially in the form of cloudbursts, is alone capable of causing flooding, even more so if it occurs over the burn areas where vegetation has largely been lost. Floods caused by rainstorms can peak within a few minutes or hours of the rainfall, leaving little time for evacuation.

Communities in Boulder County are susceptible to various types of flood events as described below.

Riverine or Overbank Flooding

This type of flooding is defined as when a watercourse exceeds its "bank-full" capacity and is usually the most common type of flood event. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with soils or drainage systems that are already saturated or overloaded from previous rain events. The duration of riverine floods may vary from a few hours to several days.

Factors that directly affect the amount of flood runoff include precipitation amount, intensity, and spatial and temporal distribution; the amount of soil moisture; seasonal variation in vegetation; snow depth; and the water resistance of the surface due to urbanization. The largest watersheds extend as far west as the continental divide and snowmelt in these watersheds dominates stream flows in late spring and early summer. Heavy rainfall on top of the snowpack can increase the rate of snowmelt and the extra runoff can produce significant flooding downstream. Other factors, such as debris blocking a waterway or channel, can further aggravate a flood event. In portions of Boulder County, development has altered the natural environment, changing and interrupting some of the natural drainage-ways. As a result, drainage systems can become overloaded more frequently.

The most serious overbank flooding occurs during flash floods that result from intense rainstorms or following a dam failure. The term "flash flood" describes localized floods of great peak flow and magnitude and short duration. In contrast to riverine flooding, this type of flood usually results from a heavy rainfall on a relatively small drainage area. Flash floods by definition occur very quickly and may occur with little or no warning. Flash flood risk can be greatly increased when drainages are cleared of foliage that normally absorbs and slows the rate of runoff.

Irrigation Ditch/Canal Flooding

The eastern portion of Boulder County has more than 100 irrigation ditches and canals used to convey water collected in the mountain reservoirs to downstream users. Ditches convey irrigation water along hillsides, following contours and, as a result, cut across the natural drainage pattern of stormwater runoff flowing down hillsides. Although efforts are made to separate stormwater runoff and irrigation water, excessive runoff can flow into an irrigation ditch causing overbank flooding or a collapse of the ditch itself. Similar to flash floods, there is often little warning for these types of events.

Urban or Street Flood Events

These events occur due to the conversion of land from fields to roads and parking lots, which cause the land to lose its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. Except at underpasses, street flooding and yard ponding usually do not exceed more than a foot or two and are often viewed more as a nuisance than a major hazard. However, during periods of urban flooding, high velocity flows can occur in streets, even in areas with only shallow flooding.

Until recently, the Left Hand Creek floodplain was devoted entirely to agriculture. Now, because of expanding population and industrialization, urban development has begun at both ends and in the middle of the study reach.

Floodplains

The area adjacent to a channel is the floodplain. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a 1% chance in any given year of being equaled or exceeded. The 100-year flood is the federal minimum standard to which communities regulate their floodplains through the National Flood Insurance Program.

The potential for flooding can change and increase as a result of land use changes and changes to land surface that change the floodplain. A change in environment can create localized flooding problems in and out of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity. Development in narrow mountain canyons presents a unique flooding problem as the floodplain and floodway occupy essentially the entire canyon floor. Historically the mountain canyons were developed extensively with infrastructure, private residences, and small amounts of commercial and industrial property. Much of this development occurred along stream banks within the canyon floodways presenting a flooding hazard to those properties as well as debris hazards for downstream stream reaches.

Hailstorm

Hail is associated with thunderstorms that can also bring high winds and tornadoes. It forms when updrafts carry raindrops into extremely cold areas of the atmosphere where they freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth.

Hailstorms occur throughout the spring, summer, and fall in the County, but are more frequent in late spring and early summer. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 mph.

Severe hailstorms can be quite destructive. In the United States, hail causes more than $1 billion in damage to property and crops each year. In 2005, hail and wind damage made up 45 percent of home owners insurance losses. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury to humans, and occasionally has been fatal.

Hail is a major cause of property damage in the plains just east of the Rockies. The past 30 years have brought one catastrophic hailstorm after another to the Front Range. One of these large storms occurred on July 11, 1990, when Denver took a direct hit by hail during a severe thunderstorm. Damage totals close to $600 million

were reported—the greatest property losses from hail ever reported from one storm up to that time and one of the most expensive natural disasters to affect Colorado.

Geological - Landslide/Mud and Debris Flow/Rockfall/Subsidence

Landslide

A landslide is a general term for a variety of mass-movement processes that generate a downslope movement of soil, rock, and vegetation under gravitational influence. Some of the natural causes of ground instability are stream and lakeshore erosion, heavy rainfall, and poor quality natural materials. In addition, many human activities tend to make the earth materials less stable and, thus, increase the chance of ground failure. Human activities contribute to soil instability through grading of steep slopes or overloading them with artificial fill, by extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation. Landslides typically have a slower onset and can be predicted to some extent by monitoring soil moisture levels and ground cracking or slumping in areas of previous landslide activity.

Mud and Debris Flow

According to the Colorado Geological Survey, a mudslide is a mass of water and fine-grained earth materials that flows down a stream, ravine, canyon, arroyo or gulch. If more than half of the solids in the mass are larger than sand grains-rocks, stones, boulders, the event is called a debris flow. A debris fan is a conical landform produced by successive mud and debris flow deposits, and the likely spot for a future event.

The mud and debris flow problem can be exacerbated by wildfires that remove vegetation that serves to stabilize soil from erosion. Heavy rains on the denuded landscape can lead to rapid development of destructive mudflows.

Rockfall

A rockfall is the falling of a detached mass of rock from a cliff or down a very steep slope. Weathering and decomposition of geological materials produce conditions favorable to rockfalls. Rockfalls are caused by the loss of support from underneath through erosion or triggered by ice wedging, root growth, or ground shaking. Changes to an area or slope such as cutting and filling activities can also increase the risk of a rockfall. Rocks in a rockfall can be of any dimension, from the size of baseballs to houses. Rockfall occurs most frequently in mountains or other steep areas during the early spring when there is abundant moisture and repeated freezing and thawing. Rockfalls are a serious geological hazard that can threaten human life, impact transportation corridors and communication systems and result in other property damage. Due to the Fourmile Canyon Fire in 2010, there is an increased risk of debris flows in Fourmile Canyon.

Subsidence

The Colorado Geological Survey defines land subsidence as the sinking of the land over manmade or natural underground voids. In Boulder County, the type of subsidence of greatest concern is the settling of the ground over abandoned mine workings. Past coal and clay mining activities have created surface subsidence in some areas and created the potential for subsidence in other areas.

Subsidence can result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate the natural processes of subsidence. Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the empty space previously occupied by water or soluble minerals. The consequences of improper use of land subject to ground subsidence can be excessive economic losses, including the high costs of repair and maintenance for buildings, irrigation works, highways, utilities, and other structures. This results in direct economic losses to citizens as well as indirect economic losses through increased taxes and decreased property values.

Room and pillar mining is the mining technique used almost exclusively in early Colorado mining. In the room and pillar technique, a shaft or adit was driven or dug to the layer of coal. Passageways were excavated in the coal seam and openings or rooms of coal were dug out on either wide of the tunnel. Between the rooms, pillars of coal were left in place to support the roof of the mine. When the coal be "ran out", the miner's started to "pull pillars" at the back of the mine. Ideally, pillars were removed until the roof started to cave in and settle. In reality, pillars were not always removed in a systematic manner and many pillars were left to support the roof.

In some cases, coal was "poached" or more coal was removed from an area than would be noted on the mine map. Also, many mines were mislocated relative to surface features due to surveying errors. Consequently, the precise location and extent of underground mines can be difficult to determine. The possible inaccuracies in mining records and the ability to determine present mine conditions combine to make subsidence resulting from room and pillar mining unplanned and unpredictable.

Lightning

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes with an average of about four. The length and duration of each lightning stroke vary, but typically average about 30 microseconds.

Lightning is one of the more dangerous weather hazards in the United States and in Colorado. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of $6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

Intra-cloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel, similar to a cloud-to-ground flash, can be visible for many miles.

Although not as common, cloud-to-ground lightning is the most damaging and dangerous form of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat. Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

The ratio of cloud-to-ground and intra-cloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year.

Boulder County implemented the use of lightning software to monitor lightning occurrences in the county. All Fire Departments and Districts were trained in July 2012 on the use of the software and provided a username

and password to access it. This enables Fire Departments and Districts to monitor cloud-to-ground strike within their jurisdictions and respond as they see appropriate, given the fire conditions.

Severe Weather Storm

Winter storms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind- driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Winter storms in Boulder County, including strong winds and blizzard conditions, can result in localized power and phone outages and closures of streets, highways, schools, businesses, and non-essential government operations. People can also become isolated from essential services in their homes and vehicles. A winter storm can escalate, creating life-threatening situations when emergency response is limited by severe winter conditions. Other issues associated with severe winter weather include the threat of physical overexertion that may lead to heart attacks or strokes. Snow removal costs can also impact budgets significantly. Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly.

Tornadoes

Tornadoes form when cool, dry air sits on top of warm, moist air. In the plains areas of Colorado, this most often happens in the spring and early summer (i.e., May, June, and July) when cool, dry mountain air rolls east over the warm, moist air of the plains.

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist. They can have the same pressure differential that fuels 300-mile-wide hurricanes across a path less than 300 yards wide. Closely associated with tornadoes are funnel clouds, which are rotating columns of air and condensed water droplets that unlike tornadoes, do not make contact with the ground.

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, most injuries and deaths result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response.

Wildfire

Wildfire and urban wildfire are an ongoing concern for Boulder County and the state of Colorado. Generally, the fire season extends from spring to late fall. Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in air and fuel. These conditions, especially when combined with high winds and years of drought, increase the potential for wildfire to occur. The wildfire risk is predominantly associated with the wildland-urban interface, areas where development is interspersed or adjacent to landscapes that support wildland fire. A fire along this wildland-urban interface can result in major

losses of property and structures. Significant wildfires can also occur in heavily populated areas. Rangeland and grassland fires are a concern in the eastern portion of Boulder County, including urbanized areas, due to increased residential development in the urban- wildland interface.

Generally, there are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather.

Fuel—Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also to be considered as a fuel source are manmade structures, such as homes and associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. In addition, "ladder fuels" can spread a ground fire up through brush and into trees, leading to a devastating crown fire that burns in the upper canopy and cannot be controlled. The volume of available fuel is described in terms of fuel loading. Certain areas in and surrounding Boulder County are extremely vulnerable to fires as a result of dense vegetation combined with a growing number of structures being built near and within rural lands. The presence of fine fuels, 1,000 hour fuels, and needle cast combined with the cumulative effects of previous drought years, vegetation mortality, tree mortality, and blowdown across Boulder County has added to the fuel loading in the area. Fuel is the only factor that is under human control.

Topography—An area's terrain and land slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.

Weather—Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater the wind, the faster a fire will spread, and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Lightning also ignites wildfires, which are often in terrain that is difficult for firefighters to reach. Drought conditions contribute to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases.

Potential losses from wildfire include human life; structures and other improvements; natural and cultural resources; quality and quantity of the water supply; assets such as timber, range and crop land, and recreational opportunities; and economic losses. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can lead to secondary impacts or losses, such as future flooding and landslides during heavy rains.

Windstorm

High winds can result in property damage and injury and are a frequent occurrence throughout the region that includes Boulder County. Strong wind gusts can rip roofs from buildings, snap power lines, shatter windows, down trees, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, Streets blocked by debris, dust storms, and occasional structure fires. Windstorm types that are prevalent in Boulder County include the following:

Chinook Winds

Downslope winds in the region of Colorado that includes Boulder County are referred to as Chinook winds, after the Native American tribe of the Pacific Northwest. These downslope winds can occur with violent intensity in areas where mountains stand in the path of strong air currents. These warm and dry winds occur when the winds from the west blow across the Continental Divide from the west and descend from the foothills and out onto the plains. They are caused by high-pressure conditions west of Boulder County, low pressure over and/or east of the County, and strong westerly winds in the mountains.

Bora Winds

In general, Bora winds are downslope winds that replace relatively warm light wind conditions with cold temperatures and strong wind gusts. The specific Bora winds that affect Boulder County are relatively dry and cold and blow from the west. While their pattern onset is similar to Chinook winds, they are comprised of cold air, whereas a Chinook brings warmer and drier air. Generally but with certain notable exceptions, Bora winds are less extreme than winds generated during Chinook events.

Hazard Rating

Within the Hazard Summary Table that follows, each hazard is summarized using the following rating methodology:

Geographical Location
This rating identifies the extent of the areas of the Town that are most likely to be affected by a hazard event. For clarification:

Isolated: Less than 10 percent of the Jamestown planning area
Small: 10 - 25% percent of the Jamestown planning area
Medium: 25 - 50% of the Jamestown planning area
Large: 50-100% of the Jamestown planning area

Occurrences
This rating represents information on historic incidents, including impacts where known. The frequency of past events is considered to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrences is categorized into one of the following classifications:

Occasional: Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Likely: Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Highly Likely: Near 100 percent chance of occurrence in next year, or happens every year.

Magnitude
This rating summarizes the magnitude and severity of a hazard event based largely on previous occurrences and specific aspects of risk as it relates to the Jamestown planning area. Magnitude and severity is classified in the following manner:

Negligible: Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid
Limited: 10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Critical: More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths

Hazard Level

This rating summarizes the overall vulnerability and potential impact of each hazard in Jamestown as it summarizes probability of future occurrence, magnitude of previous occurrences, and assessments of public safety risk and threat to property, life and infrastructure.

Low: No probable loss of human life and low economic and/or environmental losses; losses are principally limited to the owner's property
Medium: No probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns
High: Probable loss of life

In the Table, three zones have been established:

Zone 1: Areas along James and Little James Creek (determined by Town's current flood map)

Zone 2: Areas along James and Little James Creek but outside of the current flood map elevations and referred to as the Valley Floor

Zone 3: Areas above the Valley Floor and referred to as Hillside

Table 1-5: Tier One Hazard Profile Summary

Hazard Type	Geographic Location	Occurrences	Magnitude/ Severity	Hazard Level
FLOOD	Large	Highly Likely	Critical	
ZONE 1				High
ZONE 2				Medium
ZONE 3				Low
DEBRIS FLOW	Medium	Highly Likely	Limited	
ZONE 1				High
ZONE 2				Medium
ZONE 3				Low
LANDSLIDE	Medium	Likely	Limited	
ZONE 1				High
ZONE 2				Medium
ZONE 3				Medium
AVALANCHE	Isolated	Occasional	Negligible	
ZONE 1				Low
ZONE 2				Low
ZONE 3				Low
EARTHQUAKE	Large	Occasional	Critical	
ZONE 1				High
ZONE 2				High
ZONE 3				High

Hazard Type	Geographic Location	Occurrences	Magnitude/ Severity	Hazard Level
SUBSISTENCE	Isolated	Occasional	Negligible	
ZONE 1				Low
ZONE 2				Low
ZONE 3				Low
EXPANSIVE SOILS	Isolated	Occasional	Negligible	
ZONE 1				Low
ZONE 2				Low
ZONE 3				Low
ROCKFALL	Medium	Likely	Limited	
ZONE 1				Low
ZONE 2				Low
ZONE 3				Low
WILDFIRE	Large	Highly Likely	Critical	
ZONE 1				High
ZONE 2				High
ZONE 3				High

Key
Geographic Location: isolated- small – medium- large
Occurrences: occasional – likely- highly likely
Magnitude: negligible- limited- critical
Hazard Level: low – medium – high

Table 1-6: Tier Two Hazard Profile Summary

Hazard Type	Geographic Location	Occurrences	Magnitude/ Severity	Hazard Level
DAM & LEVEE FAILURE	Isolated	Occasional	Negligible	
ZONE 1				High
ZONE 2				Low
ZONE 3				Low
DROUGHT	Small	Occasional	Limited	Low
EXTREME HEAT	Isolated	Occasional	Negligible	Low
HAILSTORM	Small	Likely	Limited	Medium
LIGHTNING	Medium	Highly Likely	Limited	Medium
SEVERE WINTER STORM	Small	Likely	Limited	Medium
WINDSTORM	Medium	Highly Likely	Limited	Medium
TORNADO	Isolated	Occasional	Negligible	Low

Key
Geographic Location: isolated- small – medium- large
Occurrences: occasional – likely- highly likely
Magnitude: negligible- limited- critical
Hazard Level: low – medium – high

5.4 Emergency Preparedness and Emergency Alerts

Jamestown has a demonstrated history related to Emergency Preparedness and Notification. Bolstered by the continued dedication of its residents, the town continues to build partnerships with other agencies and non-governmental organizations, including Boulder County (Land Use Department and Office of Emergency Management), Emergency Services - Boulder County Sheriff's Department, U.S. Forest Service, Colorado State Forest Service and the Inter-Mountain Alliance.

Community leaders and town residents continue to commit financial and personal resources into the Jamestown Volunteer Fire Department (JVFD) and EMS. An entirely volunteer department, the organization consists of both wildland and structure firefighters, first responders as well as EMTs. It is dedicated to providing the best possible response to our remote mountain community as well as our neighboring fire protection districts. This past year, the JVFD and EMS moved into the new Jamestown Fire Station, replacing the previous facility lost during the 2013 floods.

In 1997 the Emergency Preparedness Handbook was developed by Nancy Edelstein for the Jamestown Volunteer Fire Department (JVFD), with input and review by a variety of partners, including Chris Dye (1997 Chief, JVFD), Tim O'Dair (former Chief, JVFD), Craig Jones and Rich Grey (Colorado State Forest Service), Chris White (Jamestown Land Use Department), Larry Stern (Boulder City/County Office of Emergency Management), and Gary Fager and Dave Booton (Emergency Services, Jamestown Sheriff's Department).

Jamestown is also in the process of obtaining a grant for the Jamestown Rain Gauge/Local Flood Warning System. This early alert system will be linked to its flood hazard alert systems.

Emergency Alerts and Warning Systems (EAS)

The Town of Jamestown is closely linked at several levels to the Boulder County Office of Emergency Management's Emergency Alerts and Warning Systems. The following summarizes the EAS system (excerpts from the BOCO OEM).

Emergency Alert Program

This system allows all residents of Jamestown, including Jamestown and surrounding areas, to be notified of emergency situations in a variety of ways including:

- Cell phone
- Home phone
- Work phones
- Text messaging
- E-mail

Time-sensitive and situational messages can be selected for the location(s) that best covers the need of each resident, including home, work, school and family.

All Hazard Alerts

Currently, the City of Boulder and Boulder County staffs receive alerts from the Boulder County OEM. The alerts are established at levels similar to a traffic light:

- **Green**: "Everything is normal, but you should maintain your situational awareness and observe your surroundings."
- **Yellow**: "Analyze the situation, be cautious, gather more information about what is happening, and decide what actions to take."
- **Red**: "Stop" what you are doing and take action now. Fully implement emergency plans."

Emergency Alert System (EAS)

Formerly called the Emergency Broadcast System, EAS transmits national, state and local emergency warning information over television and radio stations. It is designed to automatically break into regular programming to provide guidance to your specific viewing area.

NOAA Weather Radio (NWR)

NWR is a nationwide network of radio stations that broadcast continuous weather information directly from the nearest National Weather Service (NWS) office. NWR broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week.

NWR also works with the Federal Communication Commission's EAS to be an "all-hazards" radio network, making it a single source for emergency information. In conjunction with Federal, State and local public safety officials and emergency managers, NWR can broadcast warning and post-event information about all types of hazards – natural (such as winter storms or flash flood), environmental (such as a chemical spill), or public safety (such as an AMBER alert).

NOAA Weather radios are available at many retail outlets, including electronics, department, and sporting goods stores, as well as many grocery stores. They can also be purchased via the Internet from online retailers or directly from manufacturers. They are available with many different features, and can cost anywhere from $20 to $200. A few of the more useful features include:

- **Tone alarm**: The alarm tone will activate for watch and warning messages even if the receiver is turned off.
- **SAME technology**: Specific Alert Message Encoding allows you to specify the area for which you would like to receive alerts. Without this feature, you may hear watches and warnings for several counties. With this feature, you will hear messages only about the areas you have selected.
- **Battery backup**: This feature is useful since power outages often accompany severe weather. It is recommended that you use the AC power under normal conditions, however, in order to preserve battery life.

Wireless Emergency Alerts (WEA)

WEA is a public safety system that allows customers who own certain wireless phone models and other enabled mobile devices to receive geographically-targeted, text-like messages alerting them of imminent threats to safety in their area. The technology ensures that emergency alerts will not get stuck in highly congested areas, which can happen with standard mobile voice and texting services. WEA enables government officials to target emergency alerts to specific geographic areas through cell towers for reception by WEA-enabled mobile devices.

Outdoor Warning Sirens

Sirens are an effective way to warn people who are outdoors and in an immediate threat to safety. When you hear a siren, you should:

- Visit www.boulderoem.com for the latest emergency information.
- Tune in Boulder Municipal Cable Channel 8 (for those with cable TV in Boulder).
- Tune in to radio stations KOA 850 AM, KBCO 1190 AM or 97.3 FM. • Turn on local television news channels (2, 4, 7, 9 or 31) Listen for a voice message if you are near a voice activated siren. • Refrain from calling 911 unless you are experiencing an emergency.

More than 30 outdoor warning sirens are in place across Boulder County. In addition to the siren in Jamestown (located at the Fire Station), sirens are located in Boulder, Longmont, Lafayette, Lyons, Eldorado Springs, Superior, Erie and the University of Colorado at Boulder. The sirens will broadcast a voice message immediately following the siren signal to inform the public of the situation and what actions should be taken.

When a flood, tornado or other disaster occurs, the sirens will sound. The sound and length of the signal may vary, depending on the situation. Listen for voice commands and tune to a local radio or TV station for further information.

The outdoor warning sirens are sounded only in the event of an emergency or during pre-announced tests. The sirens are activated through the Boulder County Sheriff's Communications, Boulder Police and Fire Communications and Longmont Police and Fire Communication centers.

Flood Warning and Detection System

A flood forecasting system was implemented after the Big Thompson Flood in 1976. Rain gauges were placed in the drainages emptying into the City of Boulder and throughout Jamestown, west of Highway 36 and below 9000 feet. These gauges are monitored on a 24/7 basis from April through mid-September, peak season for flooding.

Other Partnerships

Jamestown is also part of the Inter-Mountain Alliance (IMA). The following excerpt from the Jamestown Town Website provides a summary of this partnership.

In the wake of the 2010 devastating Fourmile Canyon Fire a "phoenix has risen from the ashes". Since March of 2011, a group of mountain mayors and community leaders from the small towns west of Boulder have been meeting monthly. It began when the unaffected mountain towns came forward to help their neighbors. People from Nederland and Ward put together and served a sit down dinner for 300 for the Town of Gold Hill after the evacuation order had been lifted.

The natural bond between the neighboring towns and desire to work together in an emergency was apparent. This bond has grown between the communities of Allenspark, Gold Hill, Jamestown, Lyons, Nederland and Ward, as they review their Emergency Disaster Preparedness Plans, especially in lieu of spring flooding and the impending wildfire season.

The group's focus has been to learn from the communities affected by the Fourmile Canyon Fire. They have been reviewing emergency plans that were in place before the fire; what procedures were created during the fire; what has been put in place as a result of the fire; and what is still needed.

Each participating community is creating an emergency preparedness plan that will complement their local emergency response teams. There has been an emphasis on safety by investigating what is needed behind the lines of an emergency and not putting any community members at risk. In communicating with their local Volunteer Fire Department Chiefs/Law Enforcement Officials the towns are finding ways to support efforts in an emergency. The Boulder Office of Emergency Management's participation has also provided insight into models of community disaster preparedness and available resources.

One of the first steps has been to begin educating the communities on individual family preparedness, as personal and family safety is primary before turning attention to other support efforts. Second is encouraging neighbors to find out if they require assistance evacuating in an emergency.

The areas being explored and developed are:

- Establishing communication with mountain residents (internal and external)
- Providing support for the local Mountain District Fire Departments
- Setting up Safe Site information Centers
- Setting up Red Cross Evacuation Centers
- Having trained Weather Spotters/HAM Radio Operators (Mountain Emergency Radio Network)
- Facilitating animal evacuations
- Listing resources (i.e. availability of local large equipment and licensed operators; available local facilities)

PART 2 ~ HOUSING AND LAND USE ANALYSIS

SECTION 1 | INTRODUCTION

The loss of housing and property due to the flooding in 2013, and changes to the floodplain have impacted the town. The Town's top priority in the immediate future is to replace the homes that were lost to the flooding. This study is focused more on understanding the options for growth beyond the replacement of lost homes and how they might be evaluated. Housing needs must be strategically planned and carried out to preserve the Town's economic sustainability. It is of utmost importance to the Town that this recovery and any future development be executed in an informed, conscientious and culturally appropriate way that contributes to the overall sustainability and small mountain-town character of Jamestown and the surrounding environment.

Land Use and Housing, one of six community planning groups participating in the Jamestown Long Term Recovery Plan, established a goal to: "Explore options to allow Jamestown to manage growth consistent with maintaining the mountain character of Jamestown."

The overall study has two parts:

- Part One: Hazard Identification and Risk Assessment (HIRA)
- Part Two: Housing and Land Use Analysis

The HIRA analysis in Part One is a catalogue of the natural hazards that represent the biggest threats to the town's safety and wellbeing. And as we consider revisions to the town's land use policies, taking into account the need for hazard threat mitigation, they become determinants of land use policy.

Part Two builds on the information provided by the HIRA. Using the HIRA data, individual parcels were rated in terms of hazard risk (flooding, wildfire, and geological), water service (water treatment plant capacity, water distribution capacity, and second source water supply), development feasibility (slope, access, parcel size, potential for septic field, potential for water well), and professional experience in site planning.

Housing goals that were derived from a community survey, infrastructure availability, and other development feasibility criteria were combined with the HIRA information to create a number of categories of development opportunities called scenarios. This categorization enabled the consultant team to estimate the numbers of potential development sites that exist within each category, or scenario. The scenarios are then characterized by ease of implementation, environmental impact, anticipated timeframe to develop or implement, infrastructure needs, and revenue generation.

The most critical housing issues for Jamestown are to rebuild from the flood in a way that potentially improves the Town's resilience and sustainability, and accommodates new growth in order for the town to maintain its fiscal health, safety, mountain character, and diversity, including the ability to continue to have a school in the years to come.

Beyond this study, the Town can use the risk assessment to identify projects that would mitigate or reduce the level of impact that the identified hazards could have on the Town.

The final sections of Part Two contain: a summary of the Town's ordinances, followed by a step-by-step description of the various permitting processes that a property owner encounters as he/she seeks to subdivide and/or develop a property in Jamestown. This is followed by a list of opportunities for improving the Town's resilience, safety, and sustainability.

1.1 Land Use Goals

Through the process of working through this study, the Advisory Team has affirmed that Jamestown's land use policies should strive to accomplish the following four goals:

- Maintain Jamestown's unique mountain town character
- Promote the Town's safety, health and welfare

- Reinforce the Town's fiscal sustainability
- Reflect the Town's heritage and culture

1.2 Methodology

This study has two parts: housing analysis and land use analysis.

The housing analysis considered the history of housing in Jamestown, housing criteria, housing options, and levels of housing activity (sales and the pace of growth) over the years. As part of the housing analysis, a survey was conducted to determine residents' collective appetite for: growth, town services and capital improvements, and/or taxation. The results of the survey indicated that the majority (58%) of residents responded that not adding more housing was a bad idea and expressed preferences about the locations of new home-sites. 70% responded that they agreed with adding more housing in Town on vacant properties. 51.9% responded that they would support allowing lot sizes to be smaller than the current minimum size, and 56.4% agreed with the idea of bringing Town water to the lots north of Ward Street.

The land use analysis applied a number of land use criteria to the properties within the town and immediately surrounding lands, and determined what areas are most suitable for future housing development. It took into account the geography of hazards from the Hazard Investigation and Risk Assessment (HIRA) that was produced as a prelude to this report, and then added other land use criteria, including slope profile (as a metric to describe a parcel's potential as a home-site), and service capacity (whether the parcel can be served by the town's water distribution system), and whether ownership of a parcel is private or public. The result is a geographical analysis that indicates the most acceptable locations for new home-sites.

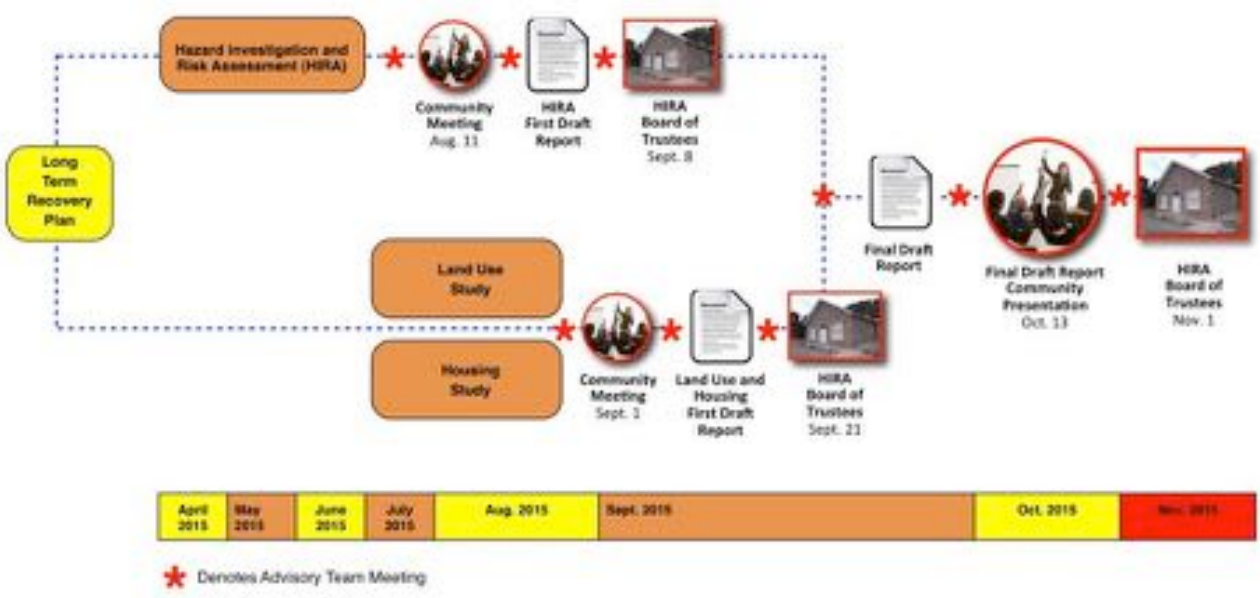
The last steps in the process were to offer housing and land use options for the town to consider and present an estimate of the amounts of revenue that could be generated by the additional housing (gross revenue).

The geographical analysis is followed by an analysis of the town's ordinances that guide growth and how they could be amended to better support the town's goals of financial sustainability and manage growth while maintaining the town's mountain-town character.

In short, the methodology consists of the following elements:

1. Examine the Town's physical characteristics and development history
2. Examine hazard threats and vulnerabilities
3. Assess the Town's infrastructure and service capacity
4. Identify areas for preferred growth on both existing un-built lots within Town limits and other buildable lands in proximity to the Town
5. Assess possible subdivision of private properties within Town limits
6. Assess possible annexation of private properties and public lands adjacent to the Town
7. Assess the potential impacts of development on the Town's generation of revenues from property taxes
8. Evaluate the Town's existing regulations that guide growth with a view toward improving safety, resilience, and sustainability
9. Propose housing and land use options for the Town to consider
10. Propose actions that the Town may want to consider to improve its safety, resilience, and sustainability

Figure 2-1: Project roadmap to guide the process



1.3 Background & Context of this Study

Jamestown experienced a traumatic flood event on September 11, 2013 that lasted for three days. During this event, the town lost 13% of its homes, 50% of its drinking water distribution system, the water treatment plant infrastructure, 50% of its roads, a bridge and major culvert, and the Jamestown volunteer fire department fire hall. About 90% of the population was displaced since the floods heavily damaged the drinking water infrastructure and roads. Despite the tremendous loss, Jamestown is moving forward with long-term recovery.

During the first year following the flood, the town had to focus on the basics of restoring access and services.

During the second year following the flood, the Town completed a long-term recovery (LTR) plan that was adopted by the town board of trustees (BOT) in April 2015. The LTR plan specifically addressed the objectives of the recovery process, long-term sustainability and the efficient use and leveraging of available recovery resources. Jamestown's Land Use and Housing Planning Group established the need to: "identify issues, opportunities and constraints relating to rebuilding lost housing and using public lands, taking into account current development regulations, and the impact that rebuilding has on the town's finances, services and safety" as a focus. This study is the Town's initial response to this need.

1.4 Study Area

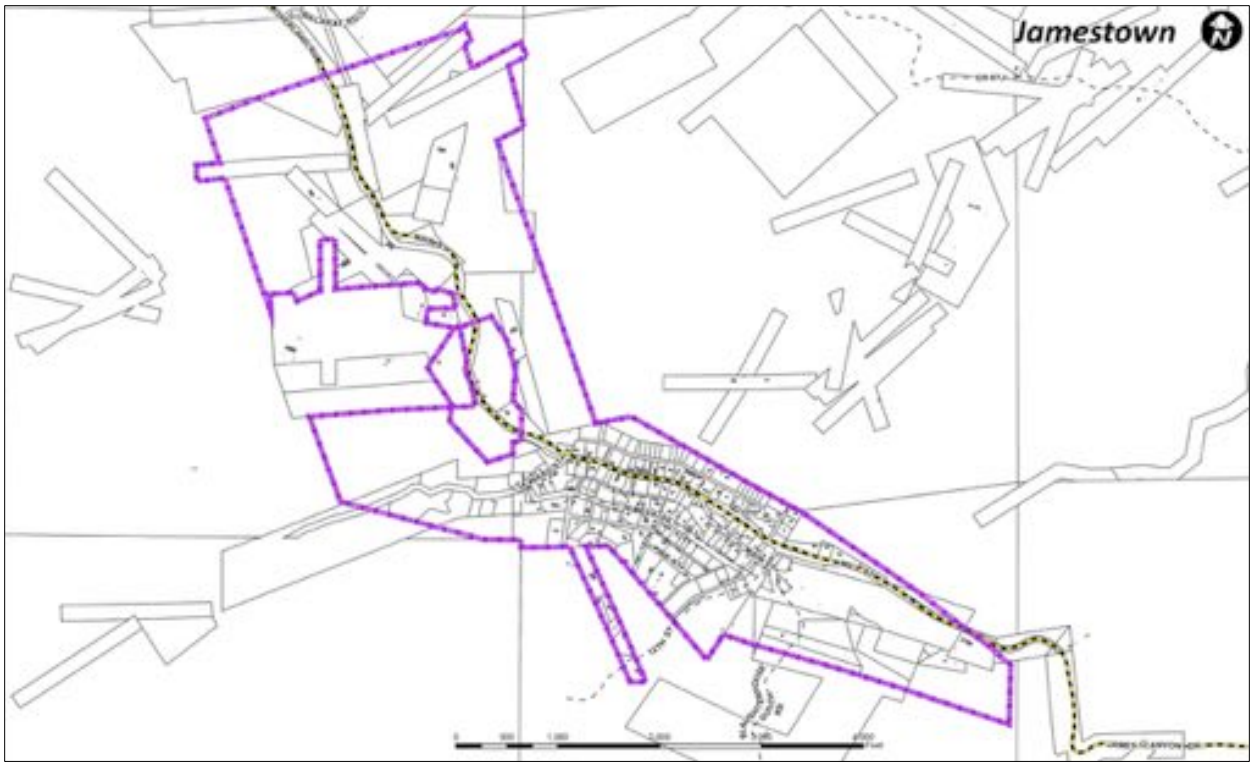
This study is concerned with the areas within the town's limits and the areas immediately surrounding, or contiguous to, the Town limits. The Town is almost entirely surrounded by United States Forest Service (USFS) - controlled lands (see Figure 2-2).

1.5 Desired Outcomes

This study has three desired outcomes:

- Planning options that promote Jamestown's safety, unique sense of place and distinctive community character
- Identification of possible implications to the Town's existing planning and regulatory tools
- Identification of possible issues related to the Town's fiscal sustainability, particularly as it relates to its housing and land use options

Figure 2-2: Study Area



1.6 Jamestown History

Jamestown was settled in 1864 or 1865, with much of the settlement located near and below the confluence of the James and Little James Creeks. Originally a mining camp called Buckhorn, and later Camp Jimtown, Jamestown was host to gold, silver, tellurium ore, and fluorspar mining activity. Originally comprised mostly of tents and a few permanent structures, through its evolution, tents gave way to more permanent structures built from local materials, using the skills of local workers. As the Town continued to evolve, and stamping mills were built, early sheds gave way to houses and businesses.

Water rights were established in 1880s, and the Boulder County Assessor's office began recording property sales in the early 1900s. (Source: http://www.rockymountainprofiles.com/jamestown_colorado.htm)

The mining boom lasted only a few years before the town was deserted for a decade. Remnants of the mining town's hotels, dance halls and parlor houses are still present. Very little of the housing built prior to World War II (without significant alterations) remains today. Housing built after World War II (and alterations to housing built prior to WWII) began to incorporate newer building materials and construction types, such as plywood and asphalt shingle roofing, etc.

The town's most visible elements are a series of restored cabins, now converted to year-round residences, the Town Hall, the church, and the Jamestown Mercantile Co. Cafe, the center of social life in the community. Pre-flood, the population was approximately 274 (2010 census). (Source: http://www.colorado.com/cities-and-towns/jamestown) At the time of this writing, it is close to 250.

1.7 Geographical Context

Jamestown is a statutory town, located 12 miles northwest of the City of Boulder, located in the Left Hand Canyon Watershed. Road Access is provided via Highway 36 and County Rd 94.

It is a quiet mountain community in the Arapahoe-Roosevelt National Forest. Steep mountain slopes and thick forests completely surround the town. Large portions of the Town are located within canyons carved out by the James and Little James Creeks. The Town climbs up the valley slopes from the banks of the two creeks.

1.8 Governance

The town's form of government is Mayor and Town Board (six board members known as "Trustees"). Jamestown maintains an inter-governmental cooperative agreement with Boulder County. The agreement references the Jamestown Comprehensive Plan (1981). Boulder County is required to exercise its planning, zoning, and subdivision administration in a manner consistent with the goals and objectives of the Jamestown Comprehensive Plan (Source: Jamestown/Boulder County Inter-Governmental Agreement, July 6, 1981). (Source: www.local-buildingpermit.com).

Colorado's planning enabling legislation includes: Zoning (31-23-301); Subdivision Regulations (optional for municipalities) (31-23-214); Local Government Land Use Control Enabling Act (29-20-101); and "1040 powers" (2465.1-101) (areas and activities of state interest) (Source: Local Government and Land Use Authority in Colorado – Community Development Office – Colorado Department of Local Affairs).

Jamestown is within Colorado Planning and Management Region #3 and is located within the geographical area of the Denver Regional Council of Governments (COG). Boulder County is a member of the Denver COG; Jamestown is not (Source: Denver Regional Councils of Governments Website, 2013).

1.9 Existing Town Services

Jamestown currently provides core municipal services, including:

- Street and bridge maintenance
- Fire and EMS safety services
- Water treatment and distribution
- Parks and recreation

Other services are provided via regulations and agreements with other governmental agencies and/or other non-governmental organization service providers:

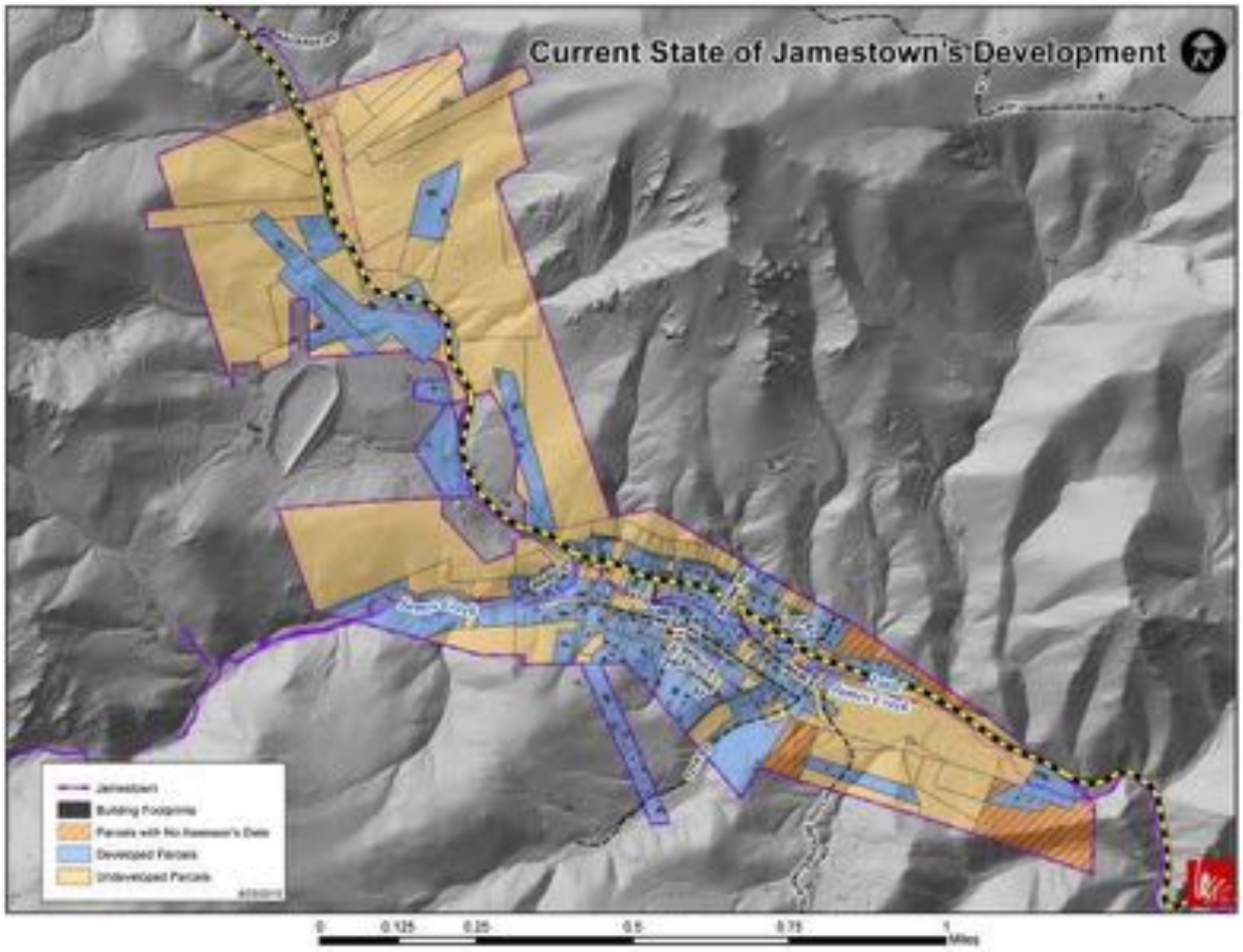
- Well permits are issued by the State of Colorado.
- Boulder County provides: septic system permits, emergency management/early warning services, building permitting services, law enforcement (Sheriff), and road maintenance of County Road 94, except that the Town is responsible for a portion of the maintenance of County Road 94 where it passes through the Town.
- The U. S. Forest Service issues Special Use permits for Forest Service access roads in a limited fashion.
- Surface water rights are adjudicated by the Left Hand Water District.
- Postal service is provided by the U.S. Postal Service.
- Elementary School is administered by the Boulder Valley School District.

Figure 2-3 shows the geographic distribution of improved (developed) and unimproved (undeveloped) parcels. In the center of town, the layout of parcels is compact, lining the streets. In other areas, parcels have no relationship to topography and considerations like ease of access, as they mostly are the result of mining claims.

The map shows a significant number of unimproved parcels on High Street, on the hillside north of Main Street. These lots remain unimproved because they are mostly inaccessible.

Note that there are areas of the town that extend outward and create pockets of U. S. Forest Service (USFS) lands that are surrounded on three sides by town lands. The result is that distribution of town water to these areas would be easier than to other areas should the town decide to investigate annexation of these lands. While annexation of these areas may be possible, it may take many years to accomplish due to the USFS processes.

Figure 2-3: Current State of Jamestown Development



SECTION 2 | HOUSING ANALYSIS

2.1 Introduction

The most critical housing issues for Jamestown include rebuilding from the flood in a way that potentially improves the Town's resilience and sustainability while accommodating new growth in order for the town to maintain its fiscal health and maintaining the Town's mountain character. There is a strong desire to maintain the past rate of growth and the existing housing typology in the community, which is single-family detached structures. There are also concerns relating to the aging of the population and the provision of services to help residents age in place. The housing analysis and questionnaire conducted as part of this study primarily support the land use planning and analysis.

Due to the flooding, 17 houses and 13 lots were lost. As of this writing, 5 homes have been rebuilt or are nearing completion. Four more are in various stages of planning and design. Four residential properties have been acquired by the Town through CDBG-DR and/or the Hazard Mitigation Grant Program (HMGP). Up to five more will likely be purchased soon through these programs.

Land Use and Housing, one of six community planning groups participating in the Jamestown Long Term Recovery Plan, established a goal to: "Explore options to allow Jamestown to manage growth consistent with maintaining the mountain character of Jamestown."

A paper and web-based household questionnaire was conducted from August 11 to August 14, 2015 to help inform the analysis and provide direction. The purpose of the questionnaire was to obtain post-flood information unavailable through other sources. Town of Jamestown staff and volunteers were responsible for its distribution and inputting of the received data into a database. The consultant team analyzed and summarized the data. The questionnaire targeted all households within Jamestown, including renters and owners. Approximately 83 households responded to the questionnaire representing over 60% of all Jamestown households, which is an excellent response rate for a questionnaire of this type.

At the third community presentation, the results of the questionnaire that appeared to support growth, even at the pace of one home per year, were challenged by a community resident. The basis of the challenge was that some of the questions were based on a premise that additional growth of housing was a possible solution to the Town's short-term fiscal problems. A show of hands during the presentation confirmed that the majority of attendees supported growth (and in some cases, higher rates of growth) independently of growth offering a potential a solution to the Town's fiscal issues.

The Housing Analysis is organized into three sections as follows:

- ***Demographic Background:*** The demographic information includes population and household estimates from the US Census to describe how Jamestown has grown over time. Information from Claritas, which is a private demographic data source, was also used to help supplement US Census information and to help describe Jamestown in 2015. For purposes of the demographic analysis, Boulder County information is also presented.
- ***Housing and Land Use Questionnaire:*** The questionnaire asked Jamestown residents about their demographic characteristics (in order to help ground the survey and compare it to US Census information about the town). It also asked questions about respondents' current housing situations, the financial impact to households as a result of the flood, attitude towards additional housing in town, town services, and options to address the town's fiscal situation.

2.2 Demographic Background

Table 2-1 below describes the change in population and households since 1980, according to the US Census. Both Jamestown and Boulder County have witnessed population growth in the last 25 years. Since 1980, Jamestown has grown by 39 persons in 34 years, just over 1 person per year. According to the latest US Census estimate, household sizes have actually increased since 2010 in both Jamestown and Boulder County. This reversed a previous trend in Jamestown of smaller household sizes. The latest official US Census estimates of Jamestown's population in 2014 was 262 persons, down from 274 persons in 2010. There are also an estimated 19 fewer households in 2014 compared to 2010.

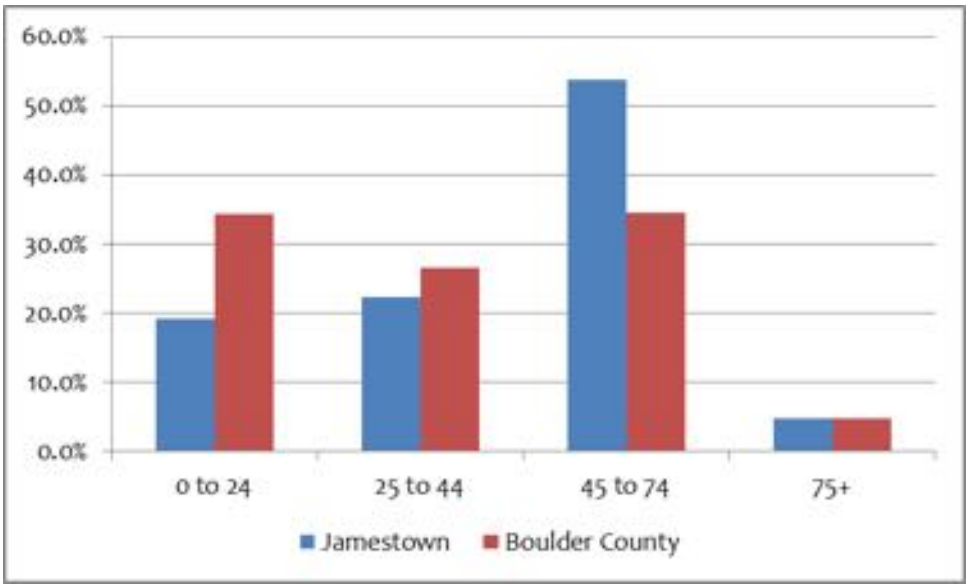
Table 2-1: Population and Household Trends, 1980-2014

		Jamestown	Boulder County
Population	1980	223	189,625
	1990	251	226,374
	2000	205	271,651
	2010	274	294,567
	2014 (est)	262	313,333
Households	2000	96	114,680
	2010	131	119,300
	2014 (est)	112	120,521
Person/HH	2000	2.14	2.37
	2010	2.09	2.47
	2014 (est)	2.34	2.60
Change in Population (1980-2014)		39	123,708
Change in Household Size (2000-2014)		0.20	0.23
Household CAGR (2000-2014)		1.1%	0.4%

Source: US Census, ArLand

Figure 2-4 shows the age distribution for Jamestown and Boulder County. The greatest percentage of population, for both areas, is in the 45-74 years range. Jamestown has a lower percentage of population under the age of 24 (19.1%) compared to Boulder County (34.3%). This is also true for the population aged 25-44, accounting for 22.3% in Jamestown and 26.6% in Boulder County. Both areas have a similar percentage of population over the age of 75, at nearly 5% of the population.

Figure 2-4: Age Distribution 2015



Source: Claritas, ArLand

Household income breakdowns for Jamestown and Boulder County are shown in Figure 3. Jamestown has the highest percentage of household incomes (18.3%) in the $150,000 to $199,999 range compared to Boulder County, which has the highest percentage (15.1%) in the $50,000 to $74,999 category. About 35.8% of the households in Jamestown have incomes over $100,000, which is essentially equal to that of Boulder County at 35.7%.

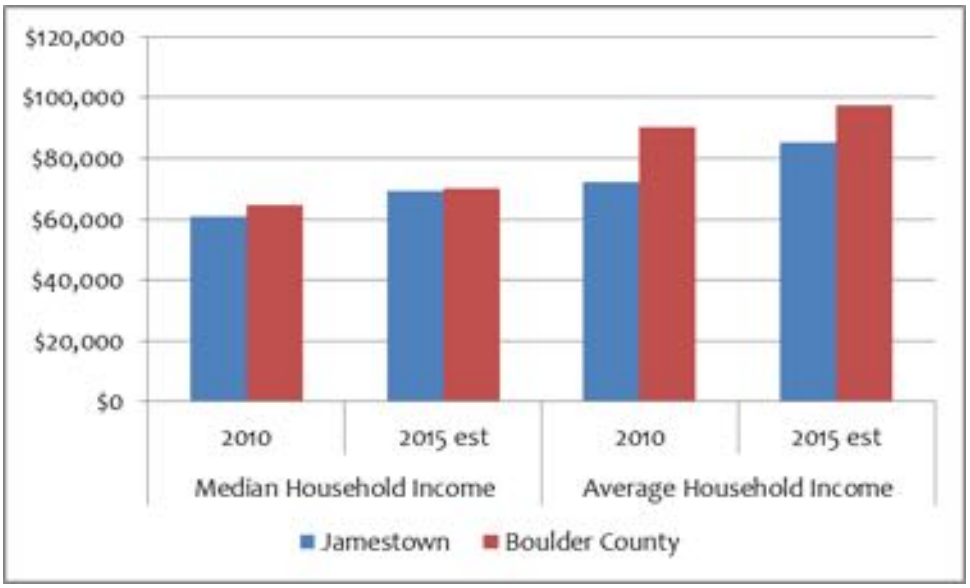
Table 2-2: Household Incomes, 2015

	Jamestown	Boulder County
Less than $15,000	11.9%	10.8%
$15,000 to $24,999	5.6%	7.9%
$25,000 to $34,999	8.7%	7.3%
$35,000 to $49,999	12.7%	11.8%
$50,000 to $74,999	14.3%	15.1%
$75,000 to $99,999	11.1%	11.4%
$100,000 to $124,999	5.6%	9.5%
$125,000 to $149,999	10.3%	7.4%
$150,000 to $199,999	18.3%	9.1%
$200,000 or more	1.6%	9.7%
Total	100.0%	100.0%

Source: Claritas, ArLand

In 2015, the median household income in Jamestown was estimated at $69,444 while the average household income was estimated at $85,317. The median household income in Boulder County is estimated at $70,214 while the average is $97,189.

Figure 2-5: Median and Average Household Incomes, 2015



Source: US Census, Claritas, ArLand

2.3 Housing Trends

The following section describes housing inventory and conditions in Jamestown and Boulder County.

Table 2-3 below outlines the year in which housing units were constructed according to the US Census American Community Survey and the Boulder County Assessor's Office, supplemented with information from the Town of Jamestown. When compared to Boulder County, Jamestown's housing units were built more sporadically, with 42% of units built before 1940. Between 1950 and 2015 (subtracting units that have been rebuilt or are rebuilding from the flood) the Town has seen an estimated 71 units built, or a little over 1 unit per year.

It is important to note that 9 of the 10 units built since 2010 represent units that are replacing those that were destroyed by the flood. Some have been built and are now occupied, or are under construction, or are currently being planned.

Table 2-3: Year Structure Built

	Jamestown	Boulder	Jamestown	Boulder
Year Structure Built				
Built 2010 or later [1]	10	697	6.8%	0.5%
Built 2000 to 2009	6	17,254	4.1%	13.5%
Built 1990 to 1999	14	25,798	9.5%	20.2%
Built 1980 to 1989	7	21,314	4.8%	16.7%
Built 1970 to 1979	15	27,926	10.2%	21.9%
Built 1960 to 1969	17	15,580	11.6%	12.2%
Built 1950 to 1959	11	7,215	7.5%	5.6%
Built 1940 to 1949	9	2,167	6.1%	1.7%
Built 1939 or earlier	58	9,753	39.5%	7.6%
Total housing Units	147	127,704	100.0%	100.0%

Source: US Census, Boulder County Assessor's Office, Town of Jamestown, ArLand
[1] Nine of the 10 are units rebuilt or are in the process of being rebuilt as a result of the flood

Unit breakdowns are displayed in Table 2-4. Single-family homes are the primary type of housing in Jamestown, accounting for 87% of all housing units. Duplexes are the second most prevalent type of housing units in Jamestown at nearly 7% of all units. There are a lesser number of homes in three or four unit configurations and no units in 5+ unit configurations.

Table 2-4: Units in Structure, 2009-2013

	Jamestown	Boulder County	Jamestown	Boulder County
1-unit, detached	114	77,748	87.0%	60.9%
1-unit, attached	4	9,376	3.1%	7.3%
2 units	9	2,426	6.9%	1.9%
3 or 4 units	4	5,431	3.1%	4.3%
5 to 9 units	0	7,860	0.0%	6.2%
10 to 19 units	0	7,979	0.0%	6.2%
20 or more units	0	13,253	0.0%	10.4%
Mobile home	0	3,559	0.0%	2.8%
Boat, RV, van, etc.	0	72	0.0%	0.1%
Total	131	127,704	100.0%	100.0%

Source: US Census, ArLand

The home ownership rate is high in both Jamestown and Boulder County at 76.2% and 62.8% respectively based on current estimates provided by Claritas in Table 2-5. In Jamestown, nearly a quarter of all units are rented. There are no current vacancies.

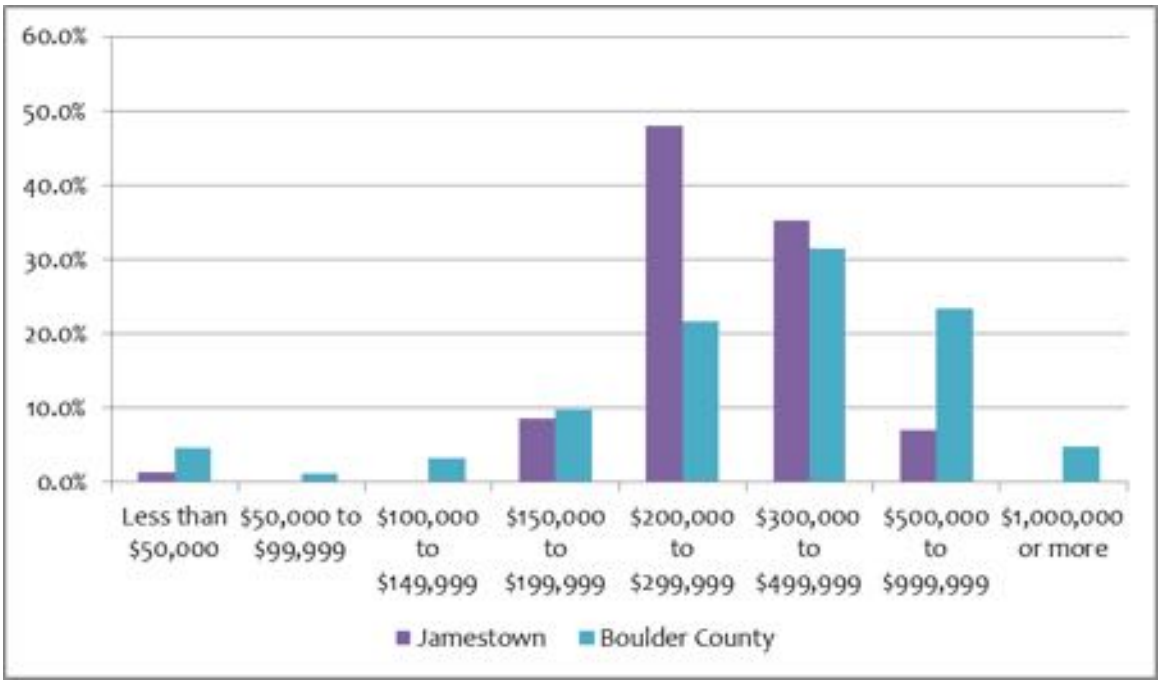
Table 2-5: Housing Tenure, 2015

	Jamestown	Boulder County
Owner Occupied Housing Units	76.2%	62.8%
Renter Occupied Housing Units	23.8%	37.2%
Vacant Housing Units	0.0%	0.0%
Total Housing Units	100.0%	100.0%

Source: Claritas, ArLand

Figure 2-6 shows the value of housing units in Jamestown and Boulder County from 2009-2013 estimates. In Jamestown, the highest percentage of units (47.9%) had a value between $200,000 and $299,999 compared to Boulder County with 31.4% of units in the $300,000 to $499,999 range.

Figure 2-6: Value of Units, 2009-2013

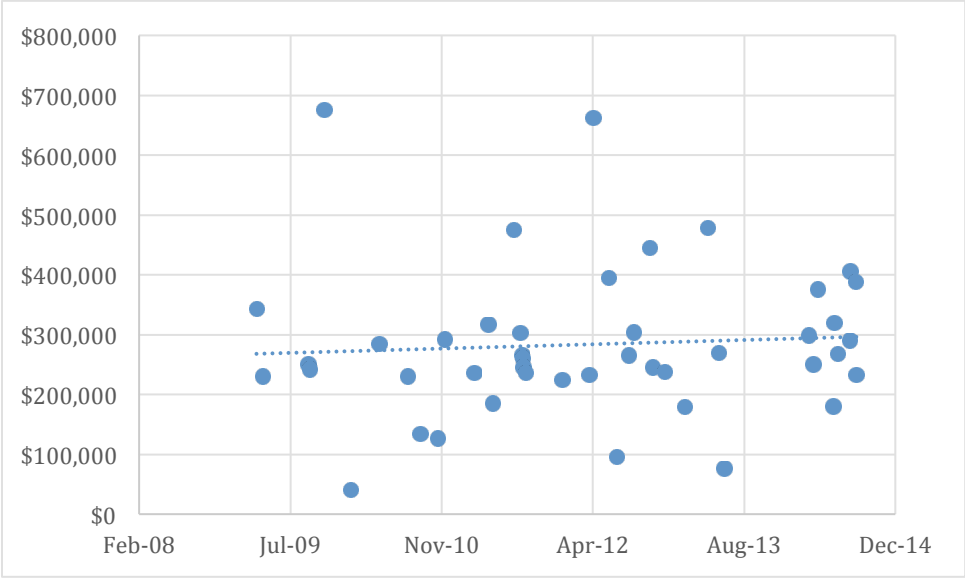


Source: US Census American Community Survey 2009-2013, ArLand

Between 2009 and 2013, the median housing value in Jamestown was estimated at $289,800 compared to $350,900 in Boulder County. However, it is clear that despite the flood, that housing values have continued to generally increase.

Figure 2-7 shows the overall prices of homes sold in Jamestown from 2009 to 2014 according to the Boulder County Assessor's Office. While overall prices widely vary based on the age, size and condition of the house, in general, values steadily increased during this time period.

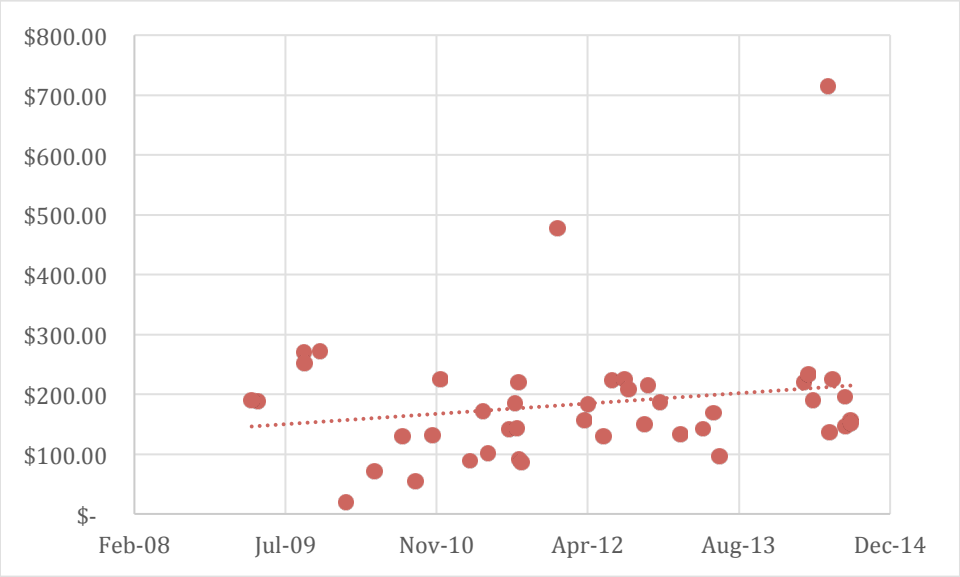
Figure 2-7: Jamestown Home Sales Prices, 2009-2014



Source: Boulder County Assessor's Office, ArLand

House size is a major determinant of house price. We also analyzed the sale price per square foot and found a wide range of prices, however, in general, prices per square foot have steadily increased since 2009 with average prices per square foot at the end of 2014 at over $200.

Figure 2-8: Jamestown Home Sales Prices per Square Foot, 2009-2014



Source: Boulder County Assessor's Office, ArLand

Homes available for sale in Jamestown as of September 2015 range in price from $350,000 to $419,000 (Figure 2-9) with prices per square foot ranging from $100 to over $250 per square foot.

Assuming a 20 percent down payment, a 30-year fixed rate mortgage with an interest rate of 4.5% and assuming that 28% of gross income should be used for principal and income payments, a household income of $60,000 to $75,000 would be needed to afford these homes. Jamestown's median household income in 2015 was estimated at $69,400.

Figure 2-9: Jamestown Listings – September 2015

Address	14094 Lefthand Canyon Dr
Year built	1990
Price	$350,000
Home size (sq ft)	3,484
Price/sq ft	$100.46
Lot size (acres)	4.51
# of bedrooms	2
# of bathrooms	3

Source: Internet Research, ArLand

Address	7706 Lefthand Canyon Dr
Year built	1971
Price	$419,000
Home size (sq ft)	1,886
Price/sq ft	$222.16
Lot size (acres)	6.25
# of bedrooms	3
# of bathrooms	2

Address	8801 Lefthand Canyon Dr
Year built	1969
Price	$375,000
Home size (sq ft)	1,400
Price/sq ft	$267.86
Lot size (acres)	5.8
# of bedrooms	3
# of bathrooms	2

2.4 Housing and Land Use Questionnaire

A questionnaire was distributed to Jamestown residents in August 2015 in order to supplement the US Census information and to get a more detailed picture of the flood's impacts on Jamestown residents. The following section describes the more pertinent findings from the questionnaire. A full copy of the questionnaire with respondents' answers is provided in the appendix at the end of this report.

Table 2-6 compares the age distribution of respondents' households to the current estimated age distribution of town residents. The questionnaire respondents in the 25 to 54 year age category were underrepresented relative to the number of residents in the town who fall in this age group. Respondents in the 55 to 74 year age group were slightly overrepresented among the respondents according to Figure 10. The number of respondents older than 75 years of age was represented in the same proportion as their overall percentage in town.

Table 2-6: Age Distribution of Respondents

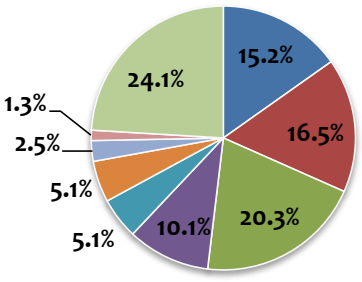
	Demographics	Questionnaire
	%	%
0 to 24	19%	19%
25 to 54	41%	27%
55 to 64	24%	30%
65 to 74	12%	18%
75+	5%	5%
Total	100%	100%
Number	262	132

Source: Claritas, Jamestown Questionnaire, ArLand

Household incomes for respondents are depicted in Table 2-7 below. Most of the respondents preferred not to answer this question. The next highest percentage of respondents were in the $50,000 to $74,999 category, which corresponds to the median household income in Jamestown at $69,444. The next largest group of respondents to answer (16.5%) have household incomes of $35,000 to $49,999.

Table 2-7: Household Incomes of Respondents

Income	# of Responses	%
Less than $35,000	12	15.2%
$35,000 - $49,999	13	16.5%
$50,000 - $74,999	16	20.3%
$75,000 - $99,999	8	10.1%
$100,000 - $124,999	4	5.1%
$125,000 - $149,999	4	5.1%
$150,000 - $199,999	2	2.5%
$200,000+	1	1.3%
Prefer not to answer	19	24.1%

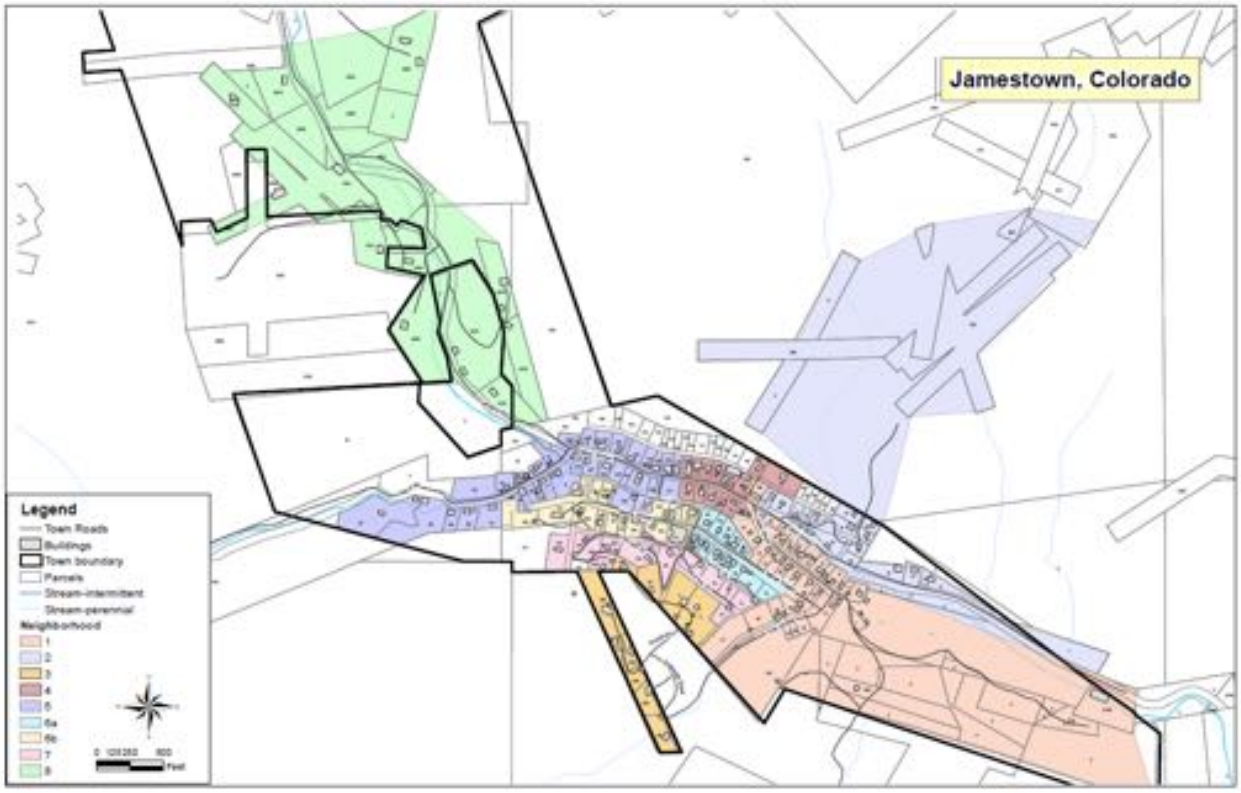


Source: Jamestown Questionnaire, ArLand

When asked how long the respondents have lived in Jamestown, a wide timeline was given ranging from 2 months to 52 years. Most respondents listed jobs (66%) as their primary income source.

Figure 2-10 shows the neighborhood map of Jamestown provided in the questionnaire to generally identify the respondents' locations. Most of the respondents live in Neighborhood 1 and 5.

Figure 2-10: Jamestown Neighborhood Map



Source: Town of Jamestown

Table 2-8: Neighborhoods of Respondents

Neighborhood	# of Responses	%
1	**17**	23.0%
2	**4**	5.4%
3	**8**	10.8%
4	**10**	13.5%
5	**16**	21.6%
6a	**5**	6.8%
6b	**6**	8.1%
7	**5**	6.8%
8	**3**	4.1%

Source: Jamestown Questionnaire, ArLand

Respondents were also asked to identify whether they currently own or rent. 82.9% of respondents currently own their homes and 11% rent from a landlord (Table 2-9). Three respondents currently live outside of Jamestown but indicated that they wish to return.

Table 2-9: Housing Tenure of Respondents

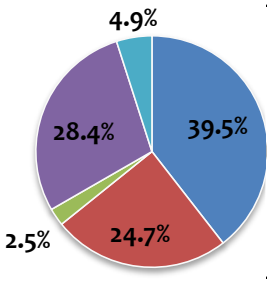
Tenure	# of Responses	%
Owned by you or a family member in Jamestown	68	82.9%
Rented from a landlord and located in Jamestown	9	11.0%
Outside of Jamestown but wish to return to Jamestown	3	3.7%
Other	2	2.4%

Source: Jamestown Questionnaire, ArLand

The majority of questionnaire responses came from couples without children and householders living alone as shown in Table 2-10.

Table 2-10: Household Composition of Respondents

Household Composition	# of Responses	%
Couple without children	32	39.5%
Couple with children	20	24.7%
Single parent with children	2	2.5%
Single/Living alone	23	28.4%
Includes at least one person who is unrelated to me	4	4.9%



Source: Jamestown Questionnaire, ArLand

2.5 Personal Economic Impacts of Flood

Respondents were asked to identify the current condition of their homes (Table 2-11). While almost half of respondents (48.8%) said their homes were unaffected by the flood, others had a wide array of responses regarding needed repairs. At least 10 respondents either had major repairs or needed to totally rebuild. Two respondents have applied for HMGP or a CDBG-DR buyout.

Table 2-11: Current Condition of Respondent's Homes

Condition of Home	# of Responses	%
Unaffected by the flood	39	48.8%
Affected by the flood and fully repaired	18	22.5%
Inhabitable but needs minor repairs (<$15,000)	11	13.8%
Inhabitable but needs major repairs (>$15,000)	4	5.0%
Uninhabitable - total rebuilding needed	6	7.5%
Applied for/moving forward with HMGP or CDBG-DR buyout	2	2.5%

Source: Jamestown Questionnaire, ArLand

The 2013 flood event had a large impact on many of the respondent's incomes (Table 2-12). The greatest economic impacts to individual households were household repairs over and above regular maintenance, using savings or borrowing, and time spent dealing with insurance and other household matters.

Table 2-12: Economic Impacts

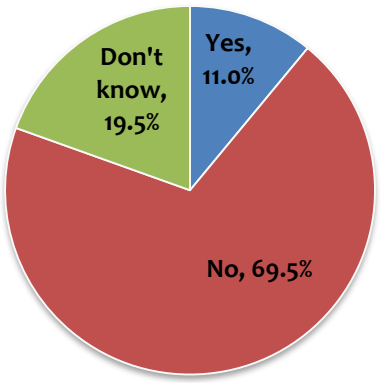
Impact	# of Responses	%
Paying mortgage on house currently being repaired while paying rent on temporary housing	9	5.2%
Household repairs over and above regular maintenance	31	18.0%
Leave of absence from regular job	14	8.1%
Time dealing with insurance and other household matters	26	15.1%
Using savings or borrowing from non-reimbursable temporary living expenses	27	15.7%
Purchasing, installing, maintaining cisterns while water services were out	24	14.0%
Has not impacted income	27	15.7%
Other	14	8.1%

Source: Jamestown Questionnaire, ArLand

The majority of respondents (55.9%) estimated that they spent less than $15,000 on household repairs. The next highest category was $15,000 to $50,000. Three respondents reported that they spent over $100,000.

When asked about future plans, more than half of respondents said they would not consider a move to another home outside of Jamestown in the next five years.

Figure 2-11: Considering a Move Outside of Jamestown



Source: Jamestown Questionnaire, ArLand

However, of the respondents who answered either "Yes" or "Don't Know", common reasons for consideration were to be closer to work/education, more housing options, less expensive housing options, and to be closer to services, including medical. No one answered the "Cost to Rebuild in Jamestown" (Figure 2-12).

Figure 2-12: Reason for Considering a Move Outside of Jamestown

Source: Jamestown Questionnaire, ArLand

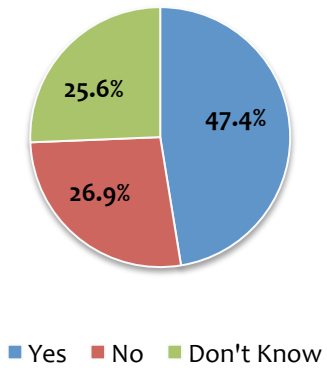
Respondents were asked about renewing their homeowners insurance. The majority of residents (59%) had either been refused insurance or had heard of someone who had. Of the 38 responses to the question, 24 or the majority of responses mentioned fire hazard, fire risk or fire mitigation. Four mentioned flooding.

2.6 The Town's Future

Respondents were asked a series of questions regarding the fiscal health and stability of Jamestown's future. Figure 22 demonstrates that a large number of respondents (47.4%) would be willing to raise property taxes to ensure that Jamestown remains fiscally stable.

Note that later in the year, in the November 2015 election, Jamestown voters did indeed approve two measures to increase the Town's mil levies to ensure the Town's fiscal stability. A measure (2E) to increase the mil levy by 5 mills ($15,250/yr.) was approved by 62.07% of the electorate, and another measure (2F) to increase the mil levy by 3 mills ($5,500/yr. for three years) was approved by 71.55% of the electorate.

Figure 2-13: Support for Raised Property Taxes

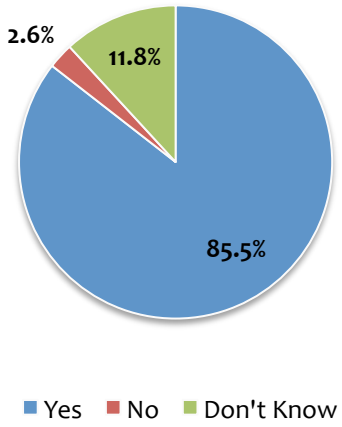


Source: Jamestown Questionnaire ArLand

Although there was general support for a property tax increase, the overwhelming majority of respondents indicated that they would need to know the amount, time period and proposed use of new tax before supporting it.

Similarly, a majority of respondents would like Jamestown to investigate alternative revenue sources to maintain town services. Figure 2-14 shows 85.5% of respondents are open to this idea.

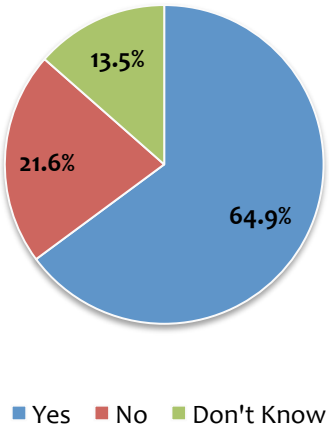
Figure 2-14: Support for Investigating Alternative Revenue Sources



Source: Jamestown Questionnaire, ArLand

With Jamestown growing at a rate of only one housing unit annually, the addition of more housing may help increase financial health. The majority of respondents (64.9%) are supportive of this idea as shown in Figure 2-15.

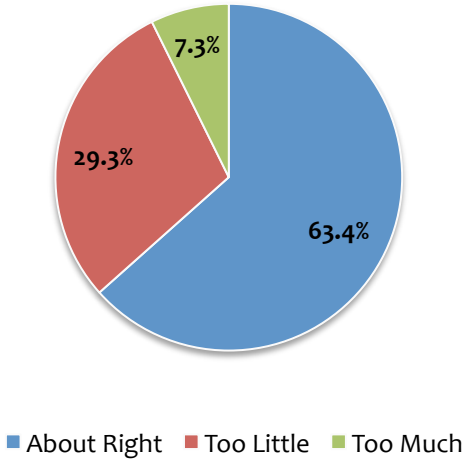
Figure 2-15: Support for Additional Housing



Source: Jamestown Questionnaire, ArLand

It is also important to note that respondents were generally in favor of Jamestown growing at its current rate of about 1 unit per year. Figure 2-16 below shows that 29.3% of respondents believe the growth rate is too low.

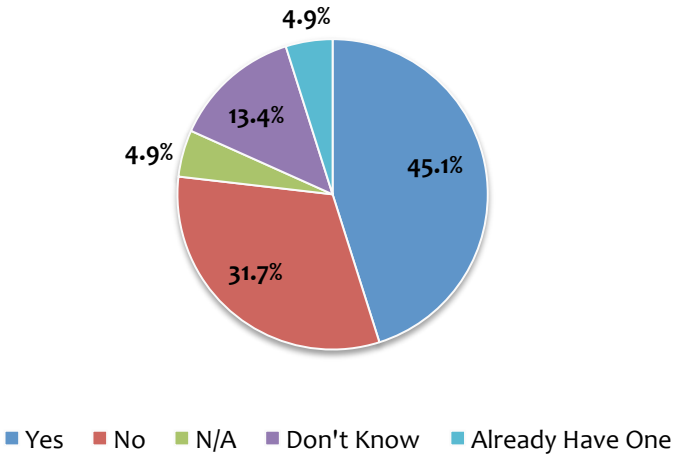
Figure 2-16: Current Growth Rate



Source: Jamestown Questionnaire, ArLand

An additional way of adding to the housing stock is through Accessory Dwelling Units (ADUs). ADUs are secondary dwelling units added to, created within, or detached from a primary dwelling unit on the same property. ADUs can be used for a wide variety of residential purposes and/or help provide supplemental rental income. Jamestown's ADU Ordinance, which describes requirements and process for building an ADU, was adopted by the Board of Trustees in January 2014. Respondents were asked if they would be willing to build an accessory dwelling unit (ADU) on their property, 45.1% of respondents said they would consider it while 31.7% indicated that they would not.

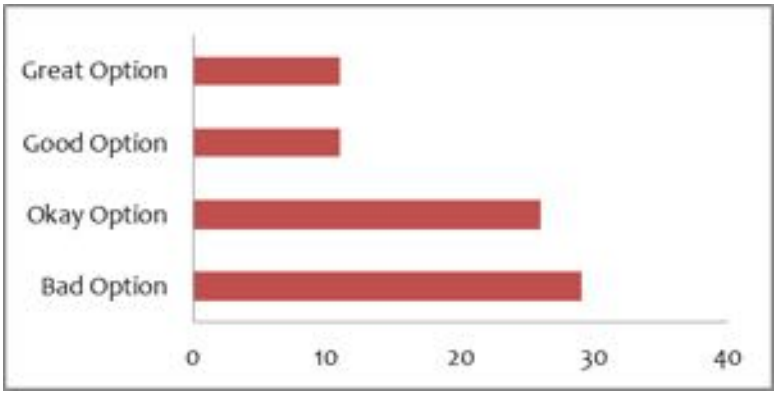
Figure 2-17: Would Consider Building Accessory Dwelling Units



Source: Jamestown Questionnaire, ArLand

Figure 2-18 describes the respondents' feelings towards permitting multi-family dwellings. Most respondents answered that multi-family dwelling units were bad for the area.

Figure 2-18: Attitudes towards Multi-Family Dwellings



Source: Jamestown Questionnaire, ArLand

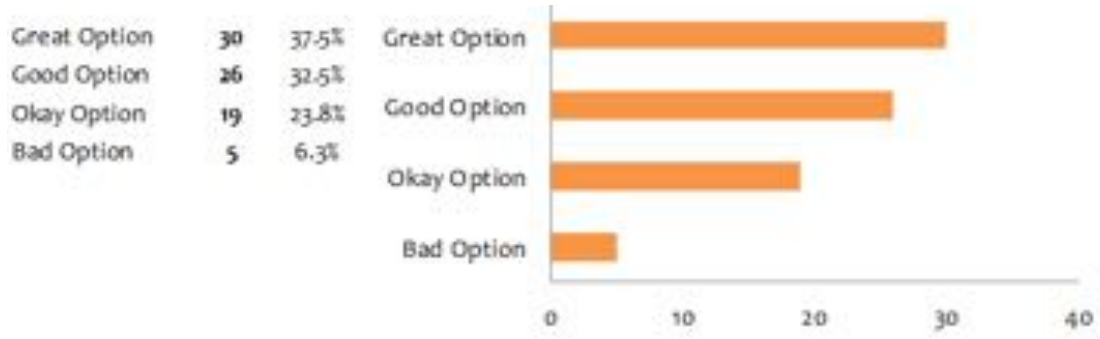
Although there was little support for multi-family dwelling units (20% thought it was a great or good option, while 29% thought it was a bad option), there was generally strong support for adding additional units to Jamestown through:

- Allowing subdivision lot sizes to be smaller than 2.3 acres (Figure 2-19)
- Adding more housing in town on vacant properties. (Figure 2-20)
- Adding ADU's (although the support appeared to be more tepid.) (Figure 2-21)
- Annexing private lands with existing houses on them. (Figure 2-22)
- Bringing municipal water to Rose M and West of Ward Street. (Figure 2-23)

Figure 2-19: Allow Subdivision Lot Sizes to be Smaller than 2.3 Acres

Source: Jamestown Questionnaire, ArLand

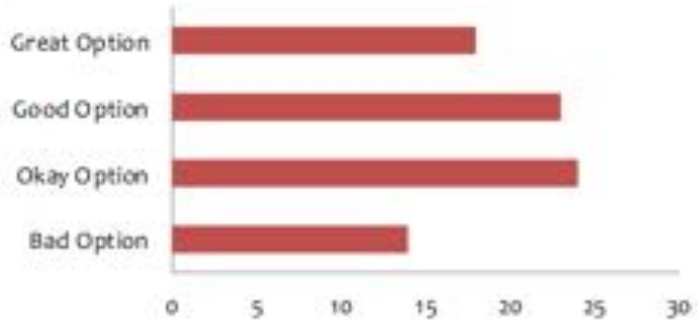
Figure 2-20: Add More Housing in Town on Vacant Properties



Source: Jamestown Questionnaire, ArLand

Figure 2-21: Add More Housing by Adding ADUs

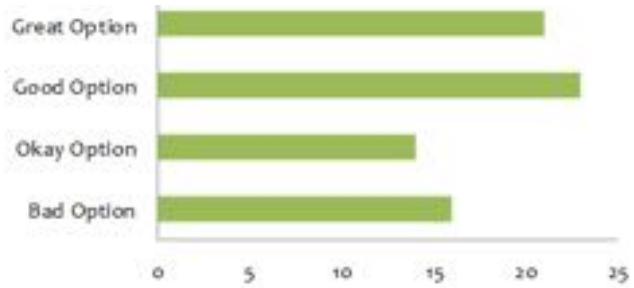
Great Option	18	22.8%
Good Option	23	29.1%
Okay Option	24	30.4%
Bad Option	14	17.7%



Source: Jamestown Questionnaire, ArLand

Figure 2-22: Annex Private Lands with Existing Homes

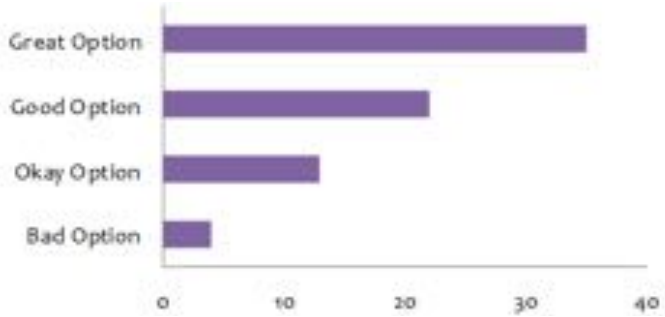
Great Option	21	28.4%
Good Option	23	31.1%
Okay Option	14	18.9%
Bad Option	16	21.6%



Source: Jamestown Questionnaire, ArLand

Figure 2-23: Bring Municipal Water to Existing Lots at Rose M

Great Option	35	47.3%
Good Option	22	29.7%
Okay Option	13	17.6%
Bad Option	4	5.4%



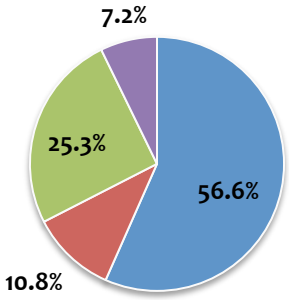
Source: Jamestown Questionnaire, ArLand

Figure 2-24: Bring Municipal Water to Existing Lots West of Ward Street

Great Option	18	23.1%
Good Option	26	33.3%
Okay Option	21	26.9%
Bad Option	13	16.7%

Source: Jamestown Questionnaire, ArLand

Figure 2-25: Support for Annexing Private Lands (with existing housing) to Pay for Services



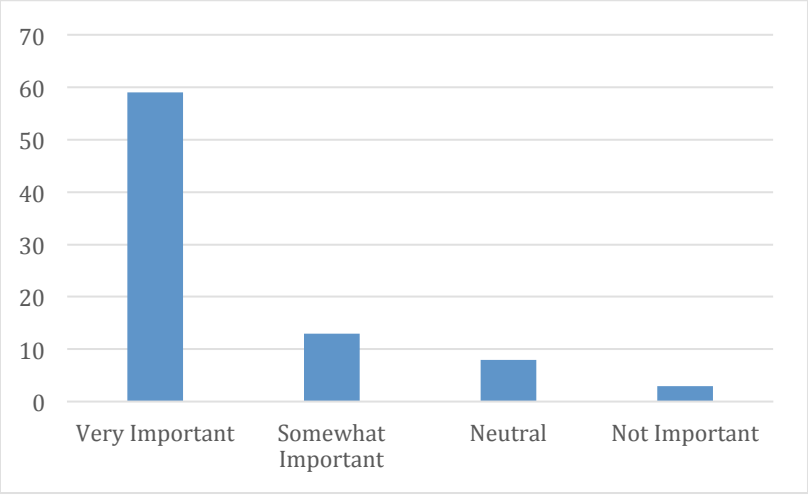
Source: Jamestown Questionnaire, ArLand

2.7 Jamestown Services

Respondents were also asked about their attitudes toward decreasing town services. An overwhelming majority of respondents (74.6%) do not want to see this happen. There were a series of questions inquiring about satisfaction with Town services such as Water, Fire, Emergency Services, Roads and Bridges, and Parks and Recreation. In general, there is a high level of satisfaction with these services. Additional questions about the satisfaction with the cost and availability of housing received mostly neutral responses.

Respondents were also asked about the necessity of keeping the elementary school open (Figure 2-26). More than 71% of respondents felt it was very important to keep the elementary school open to continue to attract young families.

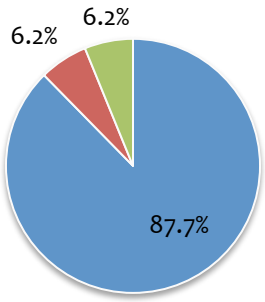
Figure 2-26: Keeping Jamestown Elementary School Open



Source: Jamestown Questionnaire, ArLand

More than 71% of respondents felt it was very important to keep the elementary school open.

Figure 2-27: Services to Help Jamestown Residents Age in Place



Source: Jamestown Questionnaire, ArLand

However, when more specific questions were asked about the need for services, the number of responses for this section of the questionnaire was very low. A few services stood out as needed or received. Currently, assistance with household tasks and meals delivered to the house are received by a number of respondents. Services most needed to assist with aging in place include personal care and transportation.

Recommendations from the Jamestown Long Range Recovery Plan

The Jamestown Long Range Recovery Plan included the following recommendations. Both recommendations have been acted upon and carried out.

- Craft a resolution to create a Land Use and Housing Advisory Committee (LUHAC) that reviews and advises the Board of Trustees on development issues such as subdivisions, annexations and ADUs, and present to the Board for approval.
- Research ADU Ordinances in other towns, assess the potential impacts of ADUs on Jamestown infrastructure and draft an updated ADU Ordinance to present to the Board of Trustees.

References Cited

American Community Survey 2009-2013, US Census Bureau
US Census Bureau
Town of Jamestown
Boulder County Assessor's Office
Jamestown Housing and Land Use Questionnaire

SECTION 3 | LAND USE ANALYSIS

The Land Use Analysis builds on the information provided by the HIRA and the Housing Analysis. Using the HIRA data, individual parcels were rated in terms of hazard risk (flooding, wildfire, and geological), water service (water treatment plant capacity, water distribution capacity, and second source water supply), development feasibility (slope, access, parcel size, potential for septic field, potential for water well), and professional experience in site planning.

Housing goals that were derived from the community survey, infrastructure availability, and other development feasibility criteria were combined with the HIRA information to create a number of categories of development opportunities called focus areas. The focus areas were then further characterized by ease of implementation, environmental impact, anticipated timeframe to develop or implement, infrastructure needs, and revenue generation. The consultant team then estimated the number of potential development sites that exist within each focus area.

As already stated in the Housing Analysis, the most critical housing issue for Jamestown is to rebuild from the flood in a way that potentially improves the Town's resilience against natural hazards, and accommodates new growth in a way that maintains the Town's fiscal health, safety, mountain character, and diversity, including the ability to continue to have an elementary school in the years to come.

Based on the survey results and the high level of participation in the community meetings, it is clear that the Town is ready to continue to improve the Town's future outlook by its willingness to mitigate hazard risks, to safeguard its unique character and lifestyle, and to plan for a fiscally sustainable growth that preserves the all important character of this small mountain community tucked into the foothills of Boulder County.

Beyond this study, the Town can use the risk assessment results to make choices that would mitigate or minimize the levels of impacts that the identified hazards could have on the Town.

The last section of this study provides options for the Town of Jamestown to consider as it plans for its future land planning and housing needs. This study identifies a number of opportunities that the Town has for improving its safety, resilience, and sustainability.

3.1 Goals for Land Use

The Jamestown Land Use Policies should reflect the overall goals for this work, including:

1. Maintain Jamestown's unique mountain town character
2. Promote the Town's safety, health and welfare
3. Reinforce the Town's fiscal sustainability
4. Reflect the Town's heritage and culture

3.2 Hazard Area / Parcel Analysis

Two series of maps were developed in order to assign hazard profiles on a parcel-by-parcel basis. The first series of maps show a simplified rating of hazard areas, classified in most cases as either: low, moderate, or high, based on the mapping done for the HIRA in Part One of this report. Hazard areas were mapped for: Wildfire Suppression, Flood, Debris/Mud Slide, and Mine and Mill hazards.

Figure 2-28: Flood Hazard Areas

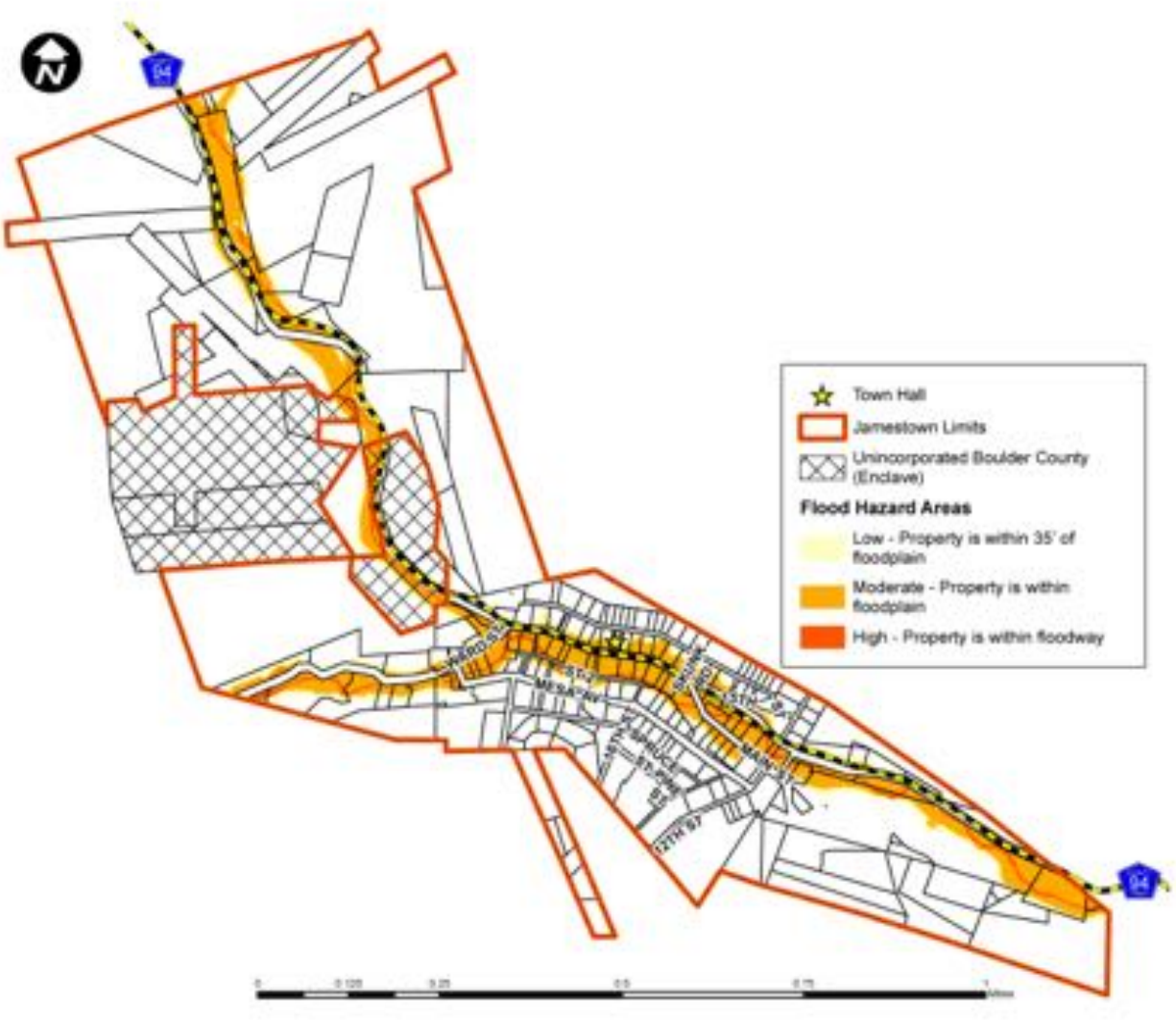


Figure 2-29: Debris/Mud Slides Hazard Areas

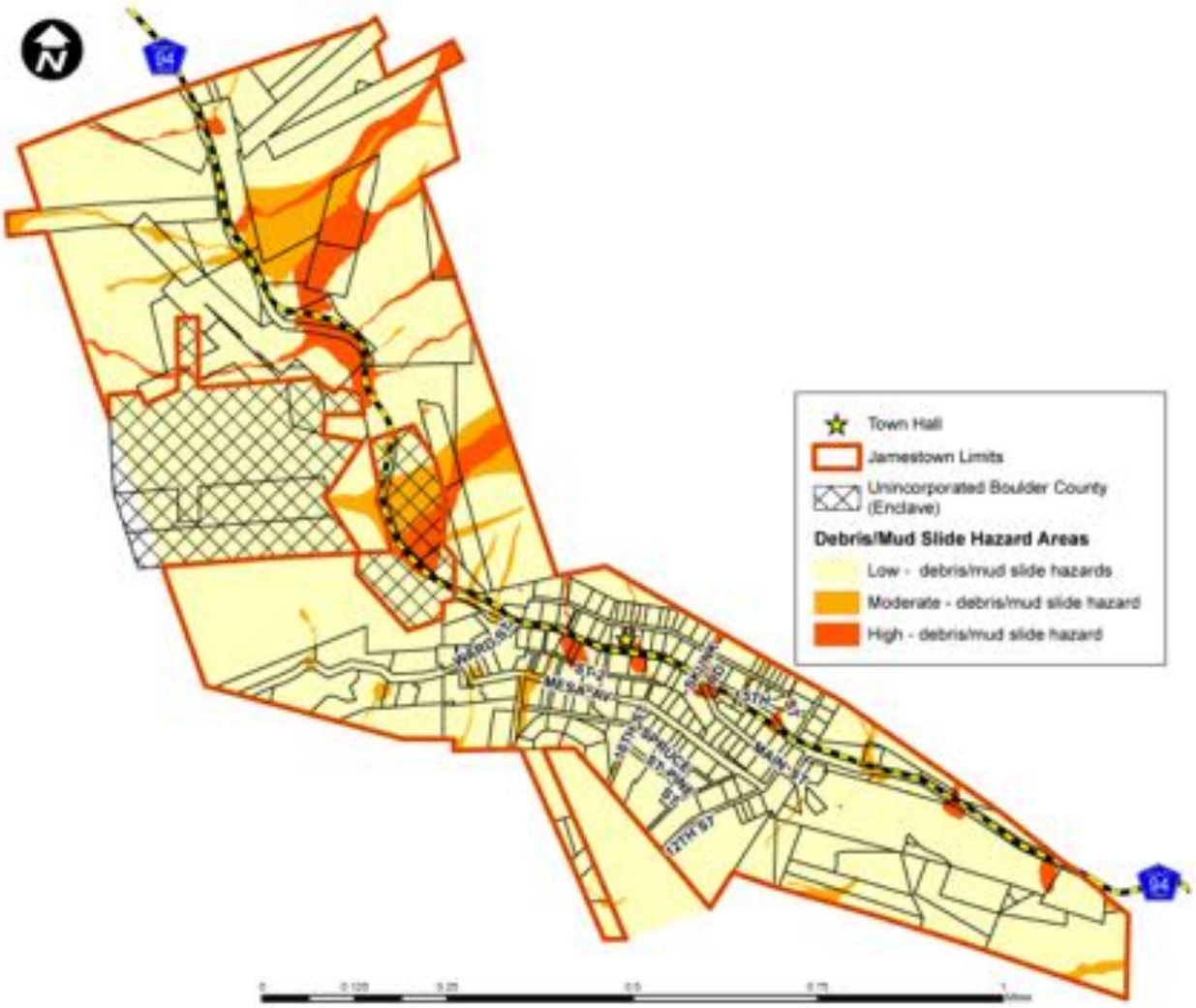


Figure 2-30: Mine Hazard Areas

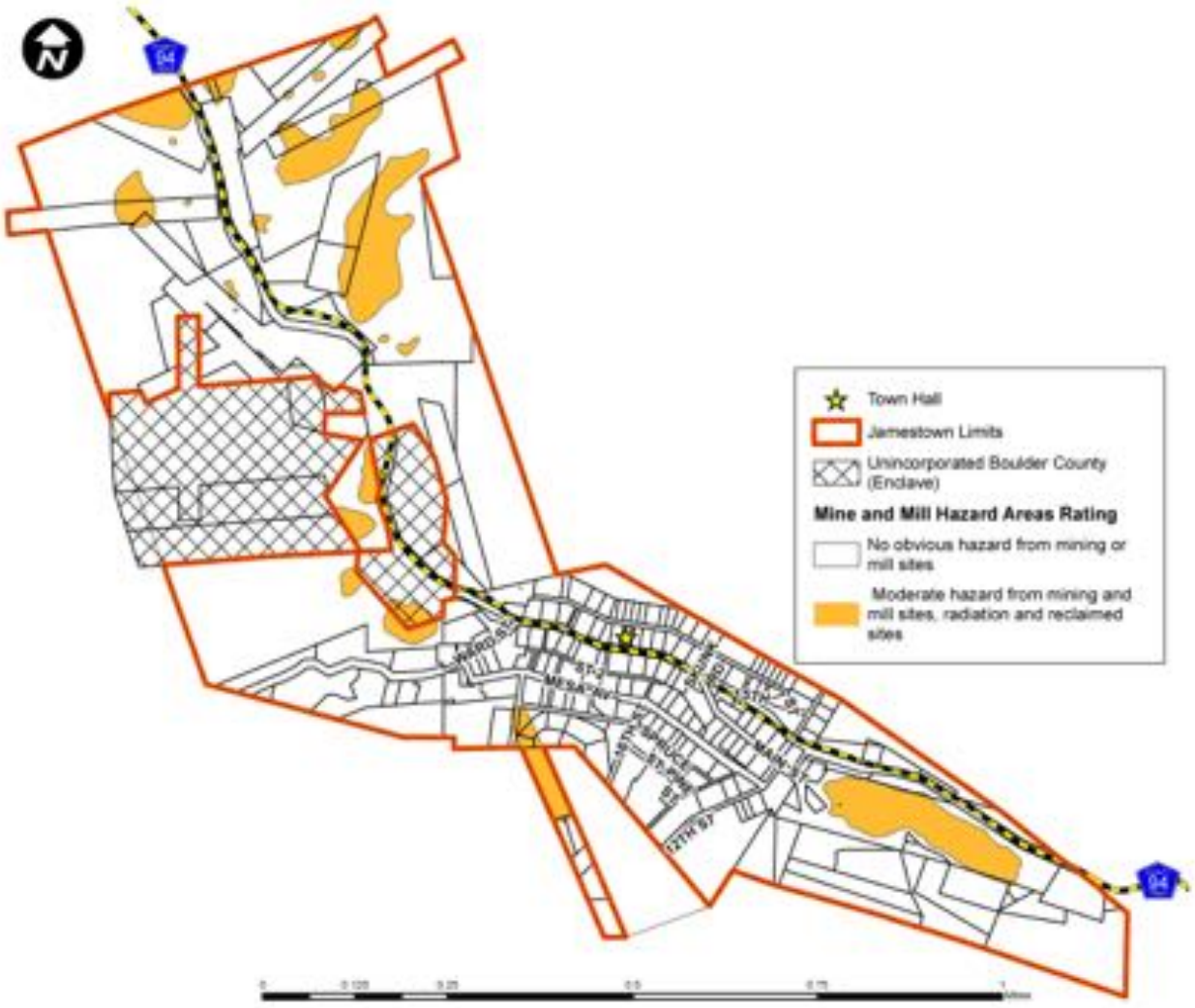
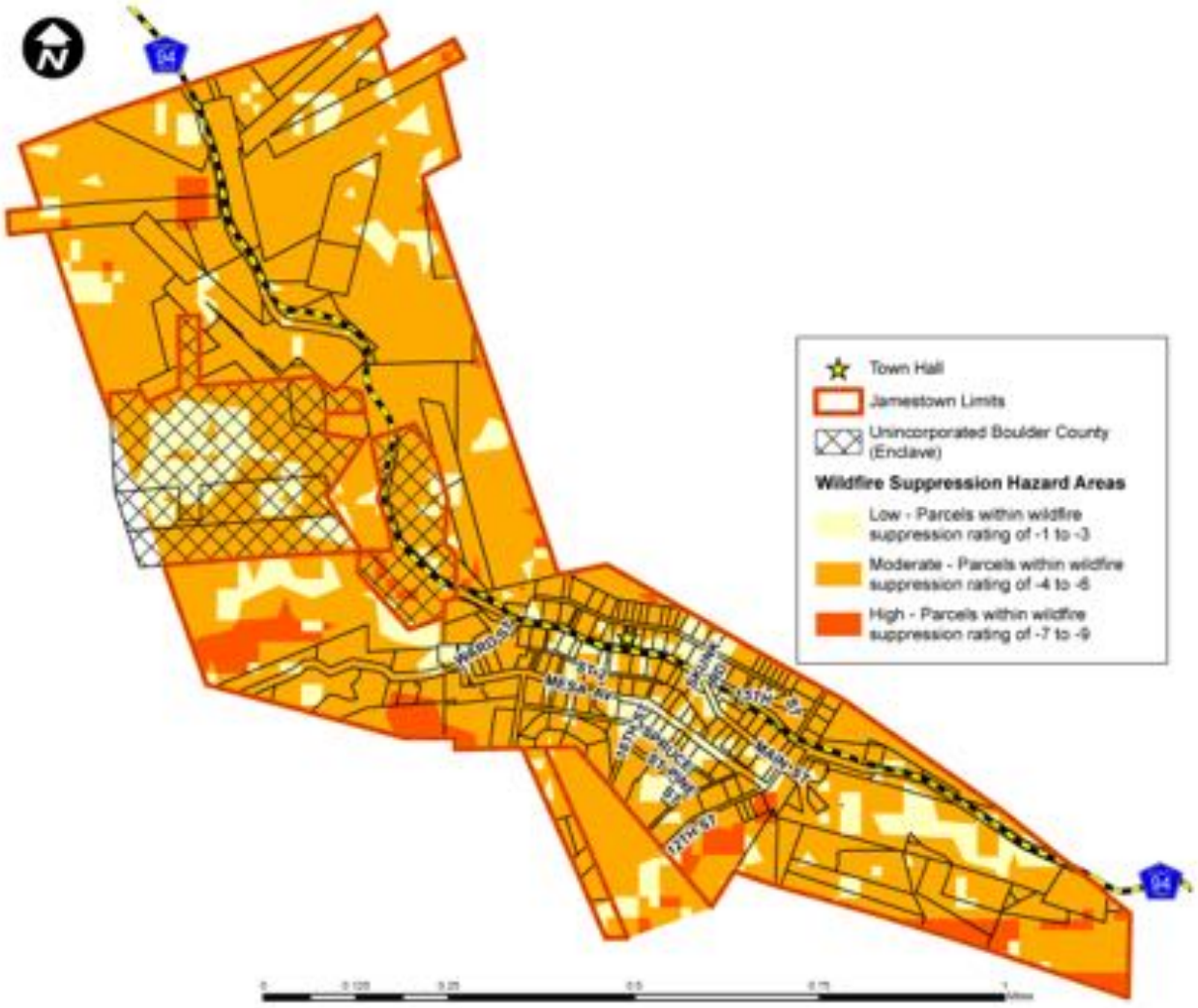


Figure 2-31: Wildfire Suppression Hazard Areas



The second series of maps assigns a hazard rating (low, moderate, or high) to each parcel based on the underlying hazard rating. There is a map for each hazard: Flood, Debris/Mud Slides, Mines, and Wildfire Suppression. Each parcel was evaluated for each of the four hazard assessments and assigned a value based on the predominance or extent and rating of the hazard profile within the area of the parcel. For some of the parcels, the decision about how to evaluate and rate the parcel was not clear-cut and had to involve professional judgment as architects and site planners. As stated before, the consultant team's approach was to be liberal in the identification of the opportunities for development and conservative in the assessment of hazard risks.

Figure 2-32: Flood Hazard Parcel Analysis

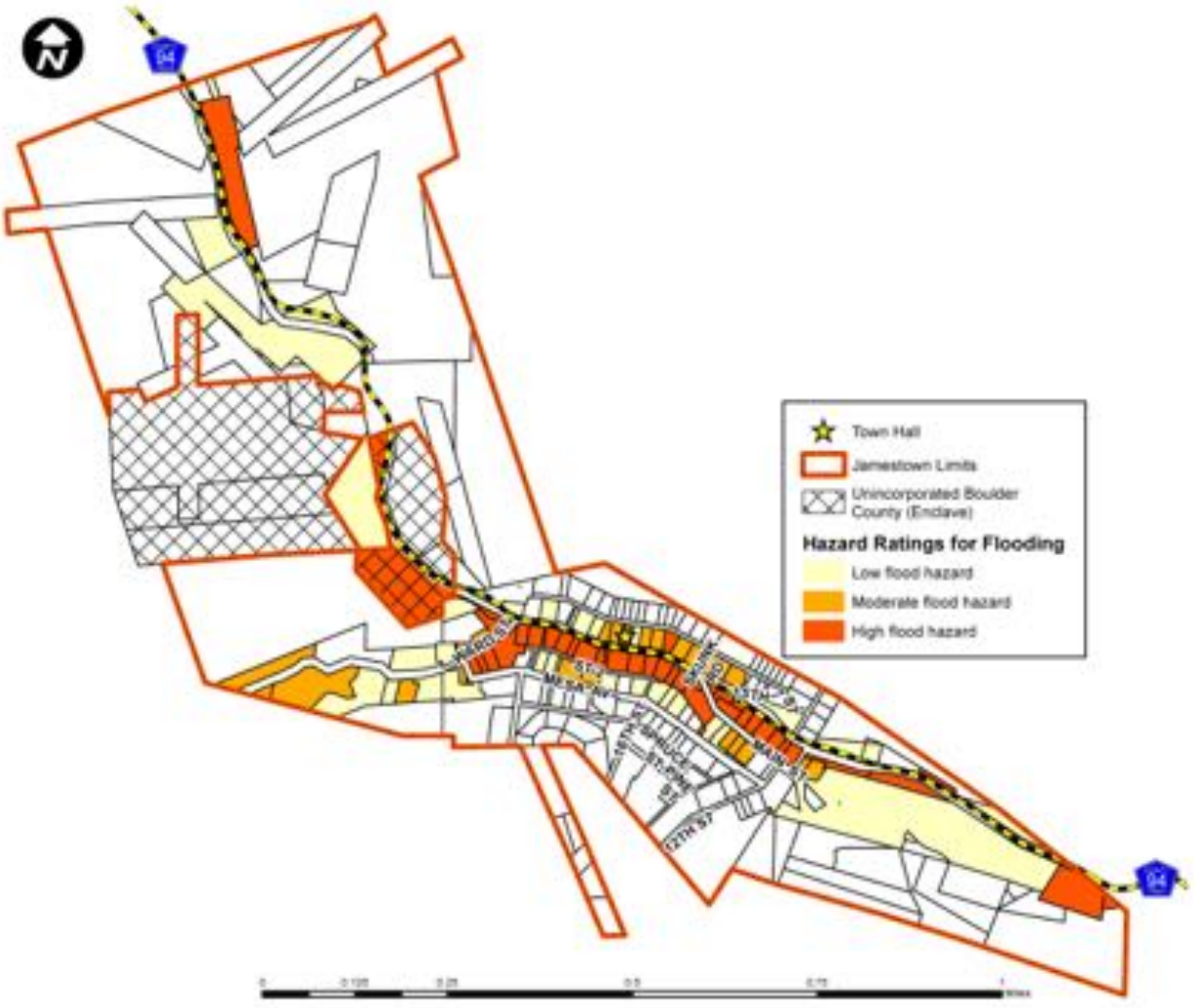


Figure 2-33: Debris/Mud Slides Hazard Parcel Analysis

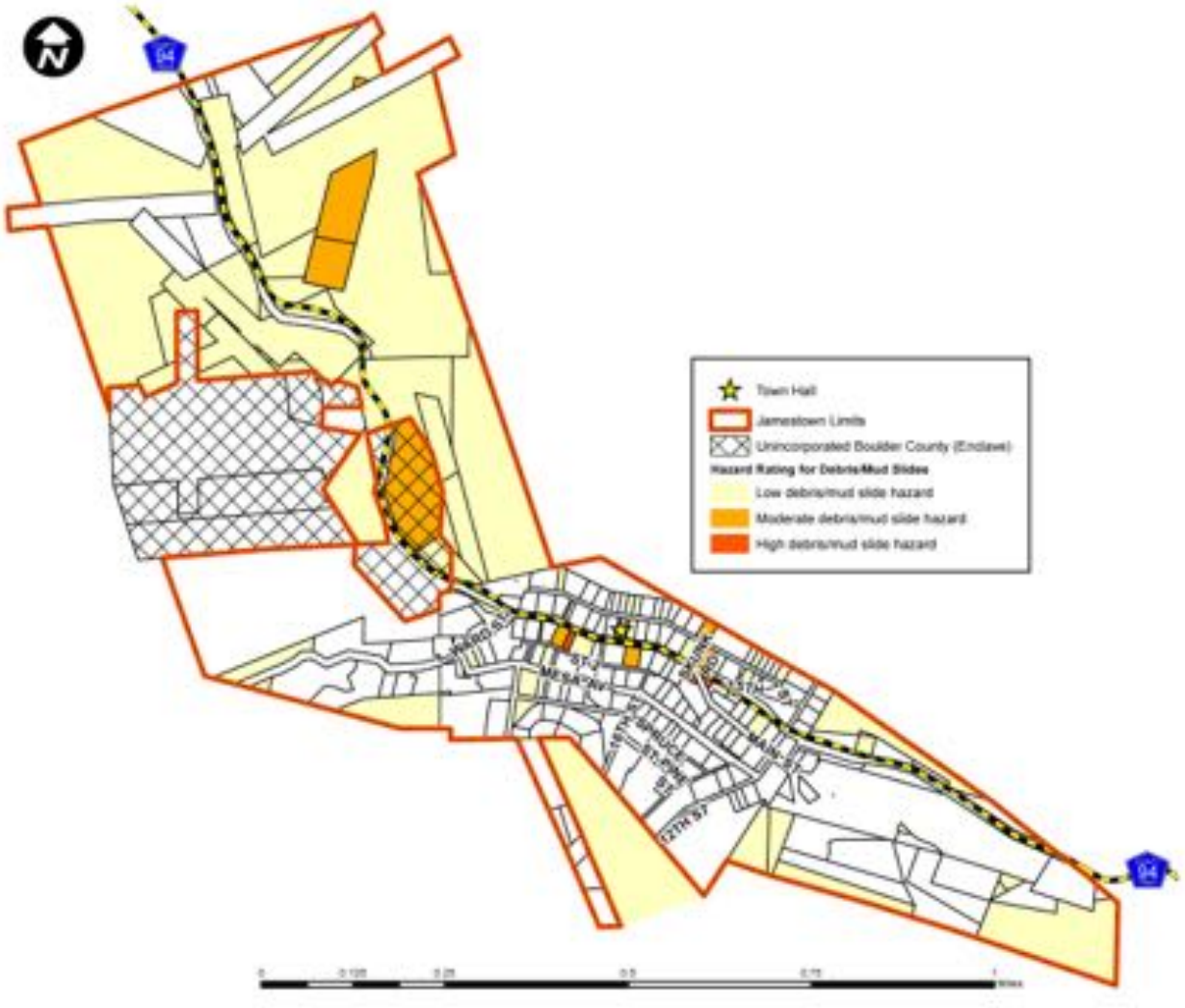


Figure 2-34: Mine Hazard Parcel Analysis

Figure 2-35: Wildfire Suppression Hazard Parcel Analysis

Two more maps were developed as part of the analysis.

Figure 2-36 shows which parcels are improved vs. unimproved, and publicly owned vs. privately owned. This information is key to understanding how to place parcels into a number of development opportunity categories, or scenarios. Note that in Figure 2-36, properties that have been acquired by the Town through CDBG-DR or FEMA grant programs are shown as improved in order to remove them from consideration.

Figure 2-36: Existing Land Ownership and Improved Parcels

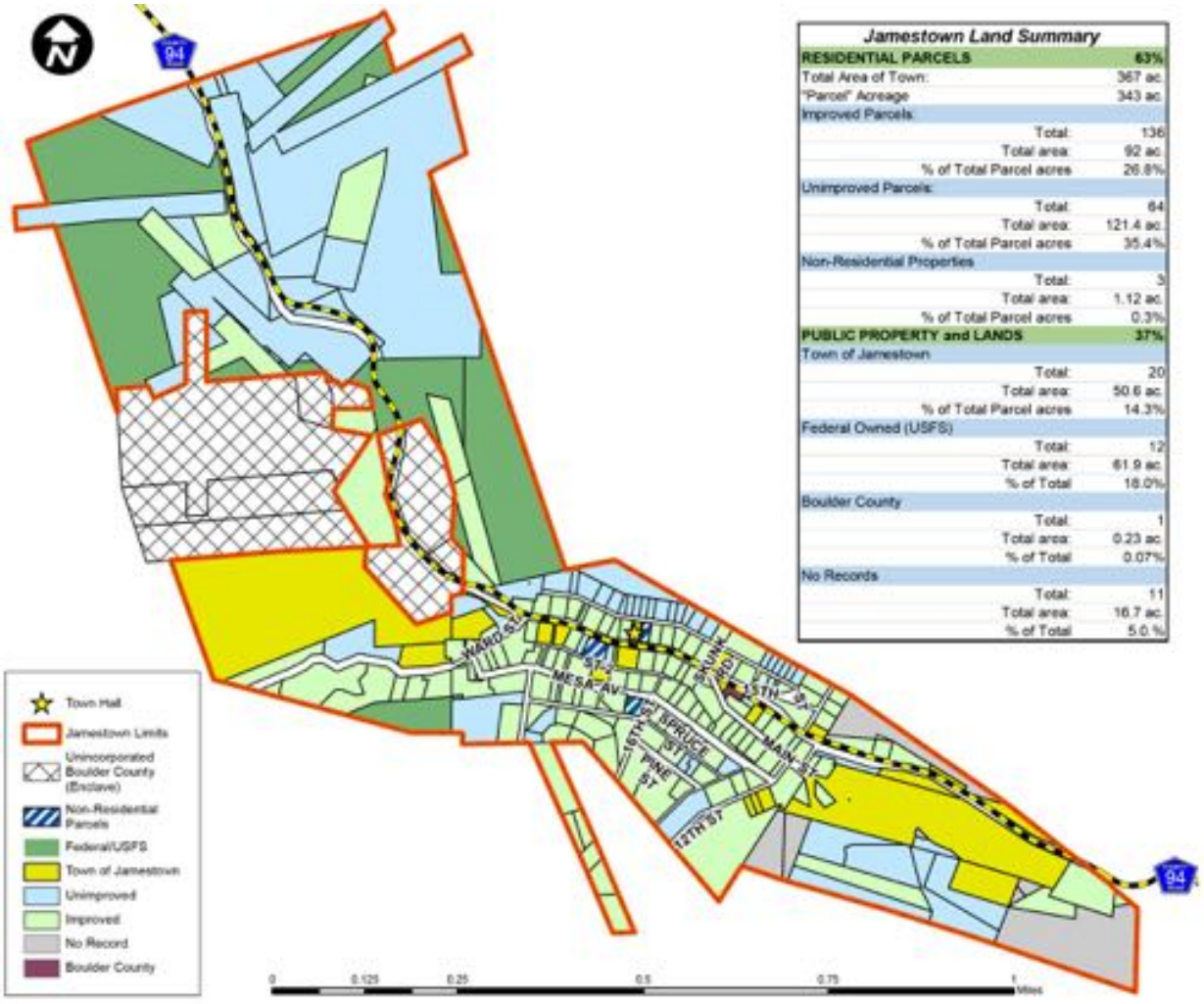
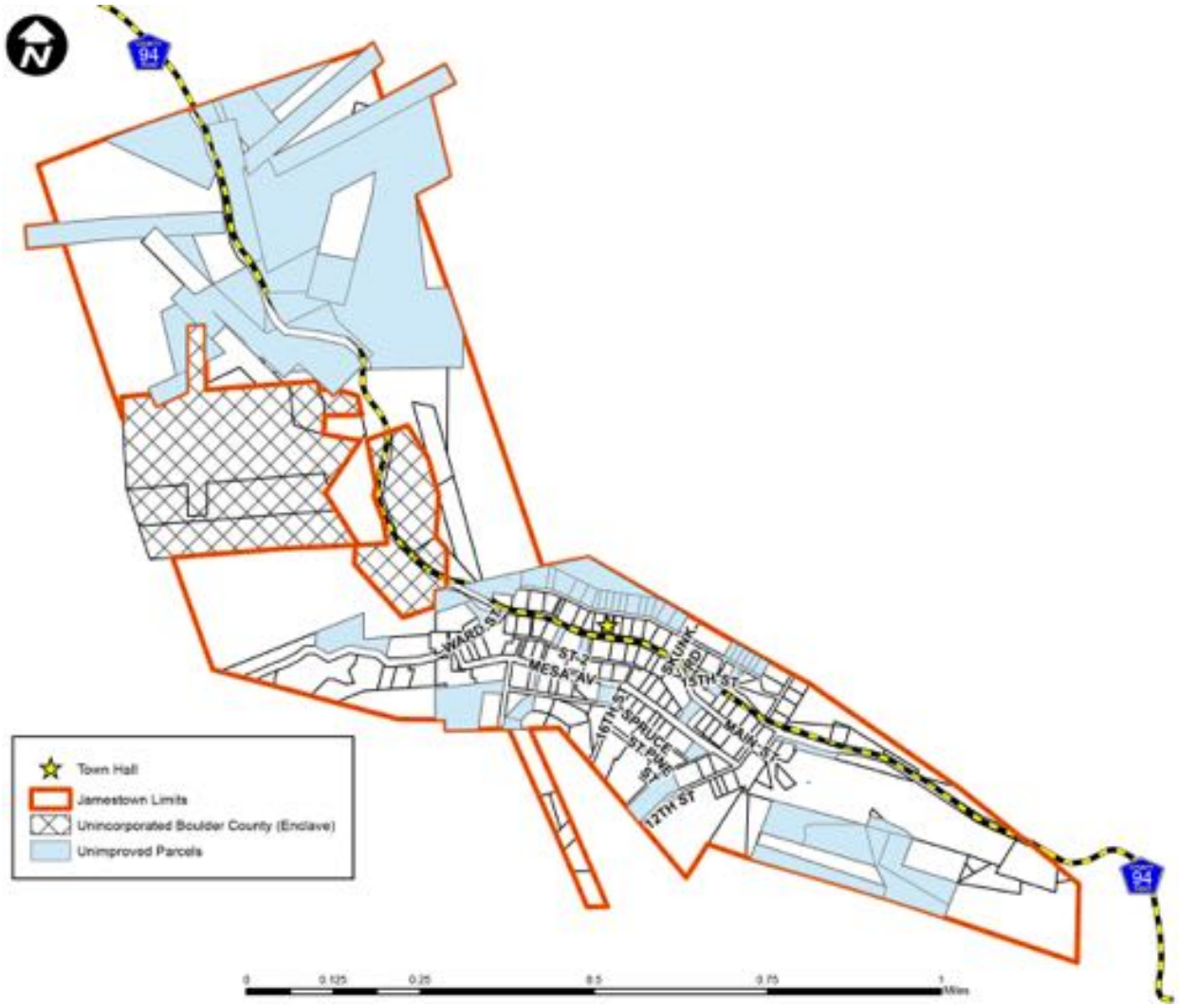


Figure 2-37 shows all unimproved parcels within Town limits. While there are a few remaining in the core of Town, most are concentrated in areas such as the Rose M Subdivision, along High Street and along the Little James Creek. As in Figure 2-36, properties that have been acquired by the Town through CDBG-DR or FEMA grant programs are considered as improved in order to remove them from future consideration. The feasibility of the development of the indicated unimproved parcels is further evaluated in the five Focus Areas that follow.

Figure 2-37: Existing Land Ownership and Improved Parcels



SECTION 4 | FOCUS AREAS FOR FUTURE DEVELOPMENT

Based on the mapping exercise described above, plus the housing goals that came out of the community survey, infrastructure availability, and other development feasibility criteria, a number of categories of development opportunities called "focus areas" were created. The focus areas are characterized by: location and type of parcel (e.g. privately owned platted lots, Town-owned, etc.), possible timeframe to implement (usually indicating the level of difficulty and/or cost), and issues that would have to be considered (such as environmental impacts, and availability of infrastructure). Within each focus area, the numbers of potential development sites were estimated.

In reviewing the following focus areas, it is important to note that:

1. Development is market driven so only opportunities are pointed out
2. Hazards, including slopes over 20%, will continue to be subject to special review per existing ordinances.
3. ADUs are not considered in the scenarios because the potential impact of ADUs on the Town's finances is not significant. ADUs are important to the Town, however, because they represent the single biggest opportunity for the Town to accomplish certain housing goals, in particular the goals of aging in place, and providing housing for a mix of ages and a mix of incomes.

4.1 Criteria for Analysis of Parcels

In developing the proposed scenarios, the following criteria were used in the selection of parcels as candidates for development sites.

Hazards:

- Flooding (Using the combination of the current regulatory floodplain based on the 2012 FIS and the 2014 Provisional Delineation)
- Geological (debris/mud slides hazard areas and mine hazard areas)

Note that Wildfire Suppression Difficulty Rating was not used as a criterion since wildfire hazard risk is fairly uniform (moderate and high) for the parcels being studied.

Water Service, including, but not limited to:

- Capacity of water treatment plant
- Water distribution capacity
- Second source water supply such as wells

Development feasibility of available sites:

- Slope (parcels with slopes in excess of 25% are considered potentially unstable slopes and generally not feasible to be developed according to the geological hazard assessment in Part 1, Section 4 of this report. Ordinance No. 2, series of 1984 defines slopes greater than 20% as being a natural hazard area and subject to special review. If the owner has the financial resources, he or she may, of course, be able to construct a home on slopes steeper than 20% or perhaps even 25% but, for the purposes of this study, 20% has been adopted as the upper limit for defining feasibility with regard to steepness of slope, which is the trigger for requiring a special review. For reference, 20% is the equivalent of 11.31 degrees; 20 degrees is the equivalent of 37.5% - see conversion chart to the right.)
- Access (Ordinance No. 2, series of 1984 specifies that for a lot to be eligible for development, it must front on or abut an existing public street or private road. Only those parcels compliant with this requirement have been indicated as meeting the criteria for "feasibly developable". It should

Percent	Degrees
5.0	2.86
10.0	5.71
11.1	6.34
12.5	7.12
14.3	8.13
16.67	9.46
20	11.31
25	14.04
33.3	18.43

be noted, however, that through a variety of methods, such as the assemblage of multiple lots - as could be the case on High Street - that a developer could justify the cost of needed infrastructure improvements, including road and water extensions.)

- Parcel size (Ordinance No. 2, series of 1984 specifies that "building lots must be 15,000 square feet or larger" or in existence since before the ordinance became effective.)
- Potential for septic field (The minimum spacing between a water well and a septic field or other contaminant is 100 feet, and the minimum distance between a water well and a septic tank is 50 feet (Source: http://www.freedrinkingwater.com/water_quality/quality2/j8-08-private-water-wells-sited-from-septic-tanks-fieldlines-page2.htm). A property owner would need to verify the locations of nearby septic fields and tanks in order to determine a suitable location for a water well. A property owner would also need to know the locations of nearby water wells in order to determine suitable locations for septic fields and tanks. It should be noted that through the years, septic systems meeting the needs of rugged mountain conditions have been developed. Examples include plastic container leach fields, or drip irrigation, which is well suited for steep slopes. Another alternative is the Clivis Multrum, or composting toilet, which is self-contained, and suitable for mountain conditions. With the recent growth of sustainable/green technologies, there are now many more options for micro septic systems that require significantly smaller footprints.)
- Potential for Town water or water well permit (spacing, jurisdiction, size of parcel, year of creation of parcel, etc. Water wells are not permitted within the Town limits except that exempt well permits may be issued within the Town's water service area if the Town provides a letter stating that it does not object to a particular well permit, and the Colorado Division of Water Resources receives evidence that the parcel was created prior to 1972. Parcels created after 1972 generally are not eligible for an exempt well permit. Developers of proposed new subdivisions, either within or outside the Town limits, are required to provide a water supply plan that does not rely on exempt well permits. (For more on this subject, see Section 5.3, Water Well Permit Approval Process.) The minimum spacing between two water wells is 600 feet. But may be reduced if approved by a hearing and consent by all well owners within 600 feet. (Source: Guideline 2003-5, Regarding the Use of Wells Within Water Service Areas, Colorado Division of Water Resources, 2003.))
- Professional judgment (Two members of the consultant team are architects with experience in a broad range of building types including the design of residences on steeply sloping sites. The consultant team used a two-part approach: being liberal in the identification of the opportunities for development; and being conservative in the assessment of hazard risks, using data from the HIRA.)
- Properties that have been or are being rebuilt or acquired, as a result of the flood. (Lots that have been acquired through FEMA Hazard Mitigation Grant Program (HMGP) or Community Development Block Grants for Disaster Recovery (CDBG-DR) funding and lots on which homes are being rebuilt are excluded from consideration. The parcels that have been acquired through these funds cannot be developed in the future and for all practical purposes have become open space. Note that in Figure 2-36, properties that have been acquired by the Town through FEMA and CDBG-DR grant funds are shown as developed in order to remove them from consideration.)

4.2 Focus Area 1

Purpose:

Efficient and orderly "infill development" of existing vacant lots/parcels within the Town's "core" is the purpose of this initial evaluation. Incorporating the criteria in section 4.1, existing unimproved parcels are evaluated to determine which are the most promising in terms of being "feasibly developable." (Note: those improved parcels that had structures destroyed by the 2013 flooding and/or are eligible for the FEMA Hazard Mitigation Grant Program and CDBG-DR program are not included.)

Observations:

Incorporating the established land use criteria of this report and the definition of "feasibly developable" (as defined in section 4.1), unimproved/vacant lots in this area have been broken into two Categories:

Category No. 1:

Development of these parcels (refer to Figure 2-38, Focus Area 1) meet the definition of feasible development given the following:

- Water Service: the indicated parcels have reasonable access to existing water service lines.
- Road Access: the indicated parcels have direct access to existing and/or improved public rights-of-way.

Given these conditions, these parcels have the most potential to be improved in a feasible manner.

Category No. 2:

Development of these parcels (see Figure 2-38: Focus Area 1) do not, at this time, meet the definition of feasible development given the following:

- Water Service: these parcels require significant extension of water service lines.
- Road Access: these parcels do not have direct access to existing and/or improved public rights-of-way.
- Topography: many of these parcels, especially those located along the High Street right-of-way have significant topographical challenges.
- Hazard: parcels - or portions of parcels - that are within the current Flood Hazard zone are also included in Category No. 2. It is noted, however, that per the Town's existing Floodplain Ordinance 8, Series 2012, these parcels remain eligible to make an application for a Floodplain Development Permit.

However, it may be possible that those issues could fairly easily be addressed.

Considerations:

In terms of development of any of the indicated parcels, the following additional considerations are noted:

- Slope: All parcels - or portions of all parcels - in Categories No. 1 and No. 2 have slopes that exceed the established 20% that triggers a special review.
- Exposure to Natural Hazards: Given that each of the parcels will require special review in order to comply with existing Town regulations regarding excessive slope, recommendations as to mitigation of other natural hazards, including geological hazards, floodplain areas, and areas of unstable soils, will also be required.
- Other: As a supplemental part of the special review related to improvement of any parcel, the following should also be evaluated:
    - Emergency access and egress considerations, beyond just providing access from a public right-of-way.
    - Possible impacts on neighboring property values.
    - Possible impacts such as additional traffic, noise, dust, night light, views, etc.

Potential Improved Parcel Yield:

Category 1: Approximately 13 parcels meet the criteria for feasibly developable.

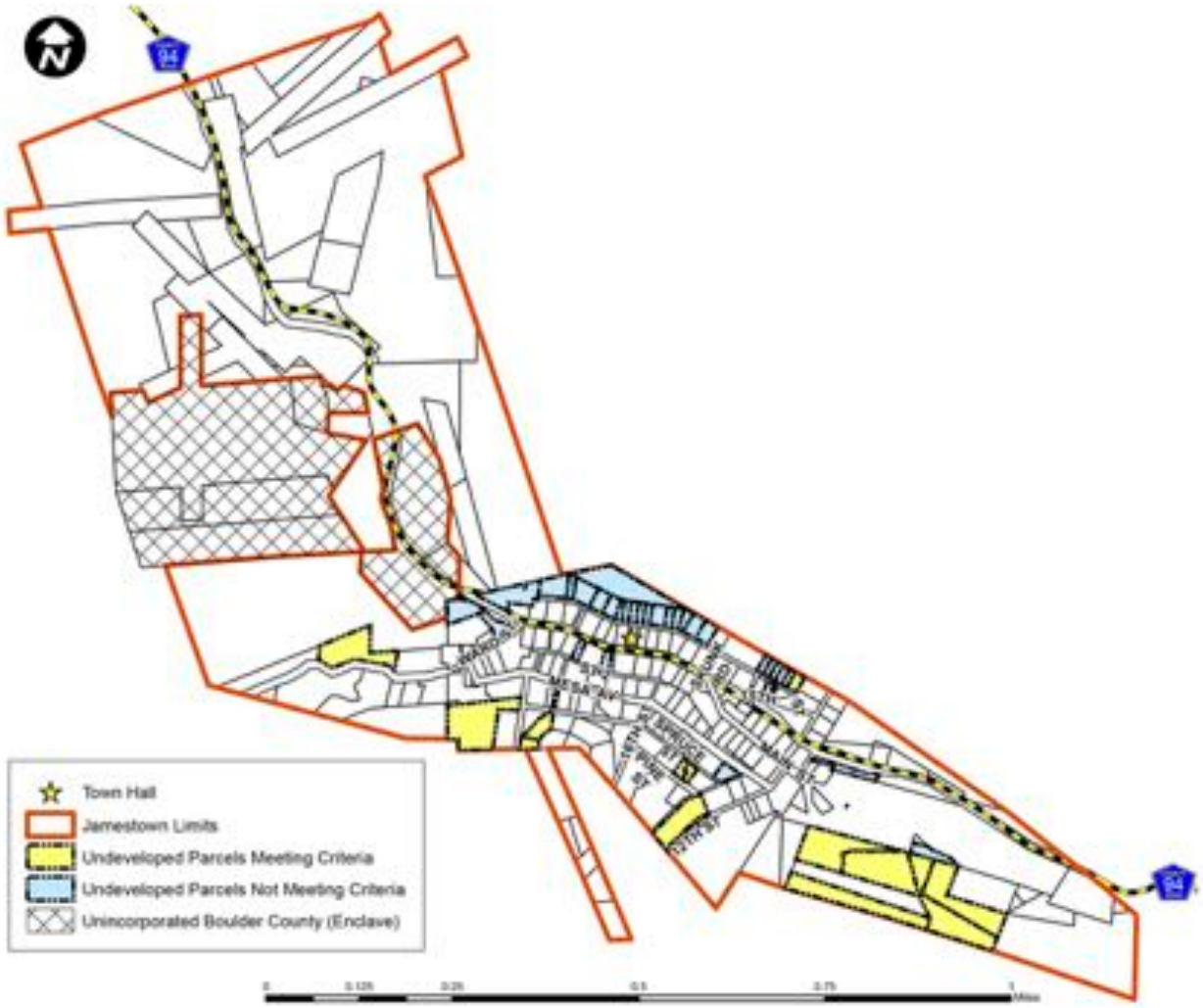
Category 2: Approximately 31 parcels.

Time Frame:

Category 1: The time frame for the possible improvement of these parcels is Immediate (0 years +)

Category 2: The time frame for the possible improvement of these parcels is Long Range (5 years +) given the needs for infrastructure improvements including extension of the existing water distribution and necessary road improvements.

Figure 2-38: Focus Area 1



Please note that the parcels colored blue are undeveloped parcels that currently do not meet the development feasibility criteria for access and water service. However, it may be possible that those issues could be addressed.

4.3 Focus Area 2

Purpose:

The purpose of this evaluation is the identification of larger parcels within the Town's core area that might yield new parcels if subdivided. Focus Area No. 2 overlaps with some parcels highlighted in Focus Area No. 1. Achieving additional parcels through subdivision would require revisions to the Town's existing Subdivision Ordinance to reduce the minimum allowable lot size. For this examination, the minimum lot size of 15,000 square feet, as established in Ordinance No. 2, Series of 1984, is the minimum lot size that has been used.

Through the "incentives" provided to the property owners of the larger underlying parcels by the proposed subdivision revisions, it is hoped that they would form partnerships with the Town for the creation of new parcels within the its core.

Observations:

Similar to the larger underlying parcels identified in Focus Area No. 1, these new parcels would meet the definition of feasible development given the following:

- Water Service: the new parcels would have reasonable access to existing water service lines.
- Road Access: the new parcels would have direct access to existing and/or improved public rights-of-way.

Considerations:

In terms of development of any of the new parcels, the following additional considerations are noted:

- Slope: All new parcels, or portions thereof, have slopes that exceed the established 20% that triggers a special review.
- Exposure to Natural Hazards: Given that each of the parcels will require special review in order to comply with existing Town regulations regarding excessive slope, recommendations as to mitigation of other natural hazards, including geological hazards, floodplain areas, and areas of unstable soils, will also be required.
- Other: As a supplemental part of the special review related to improvement of any parcel, the following should also be evaluated:
    - Emergency access and egress considerations, beyond just providing access from a public right-of-way.
    - Possible impacts on neighboring property values.
    - Possible impacts such as additional traffic, noise, dust, night light, views, etc.

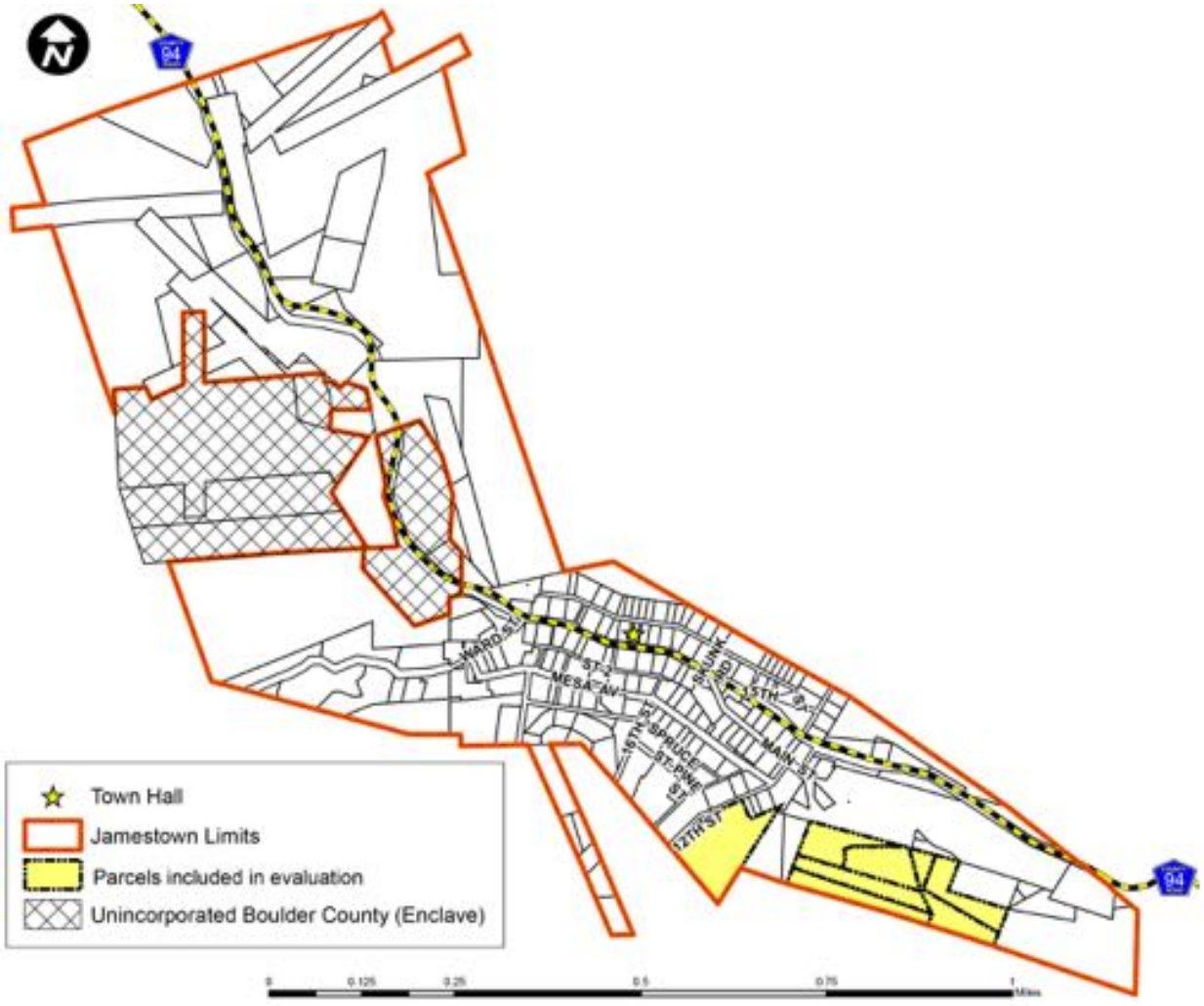
Potential Improved Parcel Yield:

Up to 7 new parcels meeting the criteria for feasible development could be generated.

Time Frame:

The time frame for the possible improvement of these parcels is immediate (0 years +) assuming revisions to the Town's Subdivision Ordinance.

Figure 2-39: Focus Area 2



4.4 Focus Area 3

Purpose:

The purpose of this evaluation is to consider the possible benefits related to the acquisition, annexation and development of public properties and lands (Federal, USDA, US Forest Service, etc.) within or immediately adjacent to the Town limits, as well as annexation of privately owned properties in immediately adjacent enclave areas.

Observations:

Annexation is governed by the Municipal Annexation Act of 1965 and the Colorado Constitution. Those portions of the Act's purpose and intent that are applicable to land use planning by the Town of Jamestown include:

- "To encourage natural and well-ordered development." For Jamestown, having large remnants of public lands that remain within the Town limits is inconsistent with this intent.
- "To distribute the cost of municipal services among those who benefit" and "To extend municipal government, services, and facilities to eligible areas which form a part of a whole community." As a component of Jamestown's long term planning efforts, the establishment of a full "build-out" scenario should be considered. Acquisition of federally-owned public property within the Town limits or annexation of those outside Town limits, could prove beneficial at several levels, including:
    - The creation of the necessary resources for needed expansion of services to those in the "whole community" including those in the Little James Creek/West Subarea of Town.
    - The creation of additional infill development parcels.
- "To simplify governmental structure" in these areas and "to reduce friction among contiguous or neighboring" entities. For Jamestown, coordination of the large remnants of federally-owned public lands within the Town limits results in a complicated "governmental structure" resulting in a lack of clarity as to who is responsible for on-going management and maintenance of these areas.

Two categories of properties for consideration by the Town related to annexation are indicated in Figure 2-40, Focus Area No. 3:

Category 1: Public Properties and Lands

These areas include those within the Town limits or immediately adjacent to and nearly circumscribed by Town limits such as the Forest Property above 12th St.

Category 2: Private Property

These are enclave areas where private property is either already developed or still undeveloped. The State of Colorado considers an enclave as property that is entirely surrounded by a municipality. Annexation of the property requires that it has been surrounded by the municipality for at least three years. This is the case with each of these parcels.

Considerations:

There are many considerations as to possible annexation(s), including:

- Extent: The Town may desire to only annex areas that have a direct and immediate benefit. An example is the portion of Forest Service property on 12th St. - outside of but immediately adjacent to Town limits.
- Cost of Acquisition: Public lands can be purchased and annexed through a variety of means, including purchase by the Town, partnerships for land acquisition of public properties within Town limits with entities such as Land Conservation/Land Trusts or Affordable Housing Agencies, etc.
- Water service: The feasibility if providing water service varies among the parcels in this Focus Area and would have to be addressed on a parcel-by-parcel basis.

- Access: The Provision of road access to the parcels in this Focus Area appears to be feasible in most cases, but varies quite a lot from parcel to parcel.
- Slope: All new parcels, or portions thereof, have slopes that exceed the established 20% that triggers a special review.
- Exposure to Natural Hazards: Given that each of the parcels will require special review in order to comply with existing Town regulations regarding excessive slope, recommendations as to mitigation of other natural hazards, including geological hazards, floodplain areas, and areas of unstable soils, will also be required.
- Other: As a supplemental part of the special review related to improvement of any parcel, the following should also be evaluated:
    - Emergency access and egress considerations, beyond just providing access from a public right-of-way.
    - Possible impacts on neighboring property values.
    - Possible impacts such as additional traffic, noise, dust, night light, views, etc.

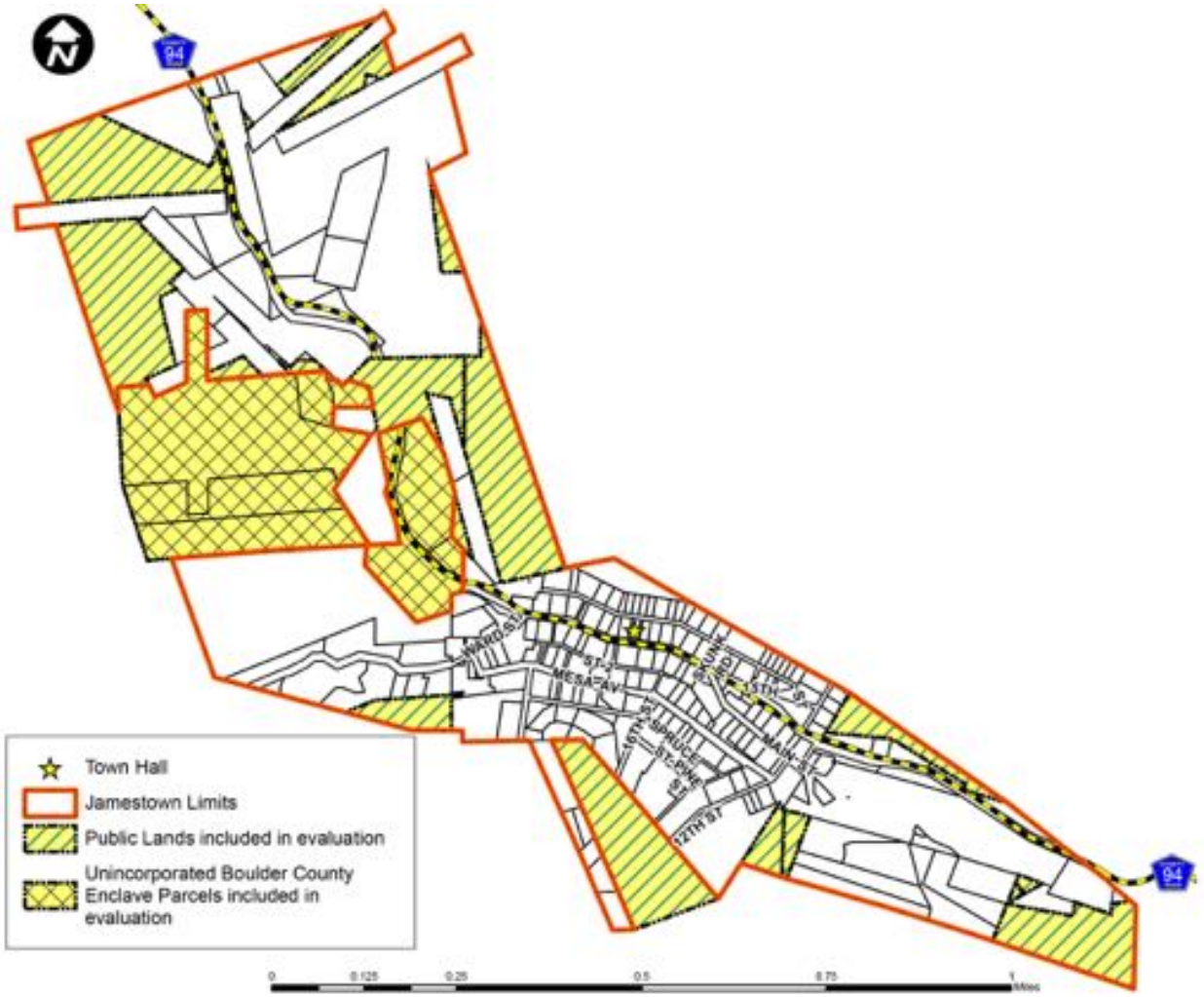
Potential Improved Parcel Yield:

Approximately 14 parcels could be created. This includes annexation of existing enclave properties and new infill parcels located within the US Forest property located above 12th. St.

Time Frame:

Given the obligations of the Municipal Annexation Act, acquisition costs, etc., the time frame for this approach is Long Range (5 years +).

Figure 2-40: Focus Area 3



4.5 Focus Area 4

Purpose:

The purpose of this Focus Area is the evaluation of several centrally located, unimproved, Town-owned properties whose development may result in the creation of several new parcels.

Observations:

At this time, there are no known municipal facility needs for the Town that might be met by these properties. These "core" properties - which appear better suited for residential uses - could provide opportunities for development and the creation of new parcels that could contribute to the Town's overall financial sustainability. This is especially true as these vacant properties currently require on-going maintenance while not eligible for the "impacted services" fees as provided for in the Town's development impact fee ordinance.

Development and improvement of these properties could be accomplished through a variety of approaches including the solicitation of partnerships with developers, non-profits, program related investment groups, etc., that provide housing options that are consistent with the goals of the community to maintain its unique mountain character.

Considerations:

In terms of development of any of the new parcels, the following additional considerations are noted:

- Water Service: most of the new parcels would have reasonable access to existing water service lines.
- Road Access: several of the new parcels would have direct access to existing and/or improved public rights-of-way while others might require access agreements with adjacent property owners.
- Slope: All new parcels, or portions thereof, have slopes that exceed the established 20% that triggers a special review.
- Exposure to Natural Hazards: Given that each of the parcels will require special review in order to comply with existing Town regulations regarding excessive slope, recommendations as to mitigation of other natural hazards, including geological hazards, floodplain areas, and areas of unstable soils, will also be required.
- Other: As a supplemental part of the special review related to improvement of any parcel, the following should also be evaluated:
    - Emergency access and egress considerations, beyond just providing access from a public right-of-way.
    - Possible impacts on neighboring property values.
    - Possible impacts such as additional traffic, noise, dust, night light, views, etc.

Partnerships:

Acknowledging that the Town has limited funding sources for development of these properties, the Town may want to consider the exploration of partnerships for the creation of these parcels and housing types with developers, non-profits, program related investment groups, etc., that provide housing types that are consistent with the goals of the community to maintain its unique mountain character.

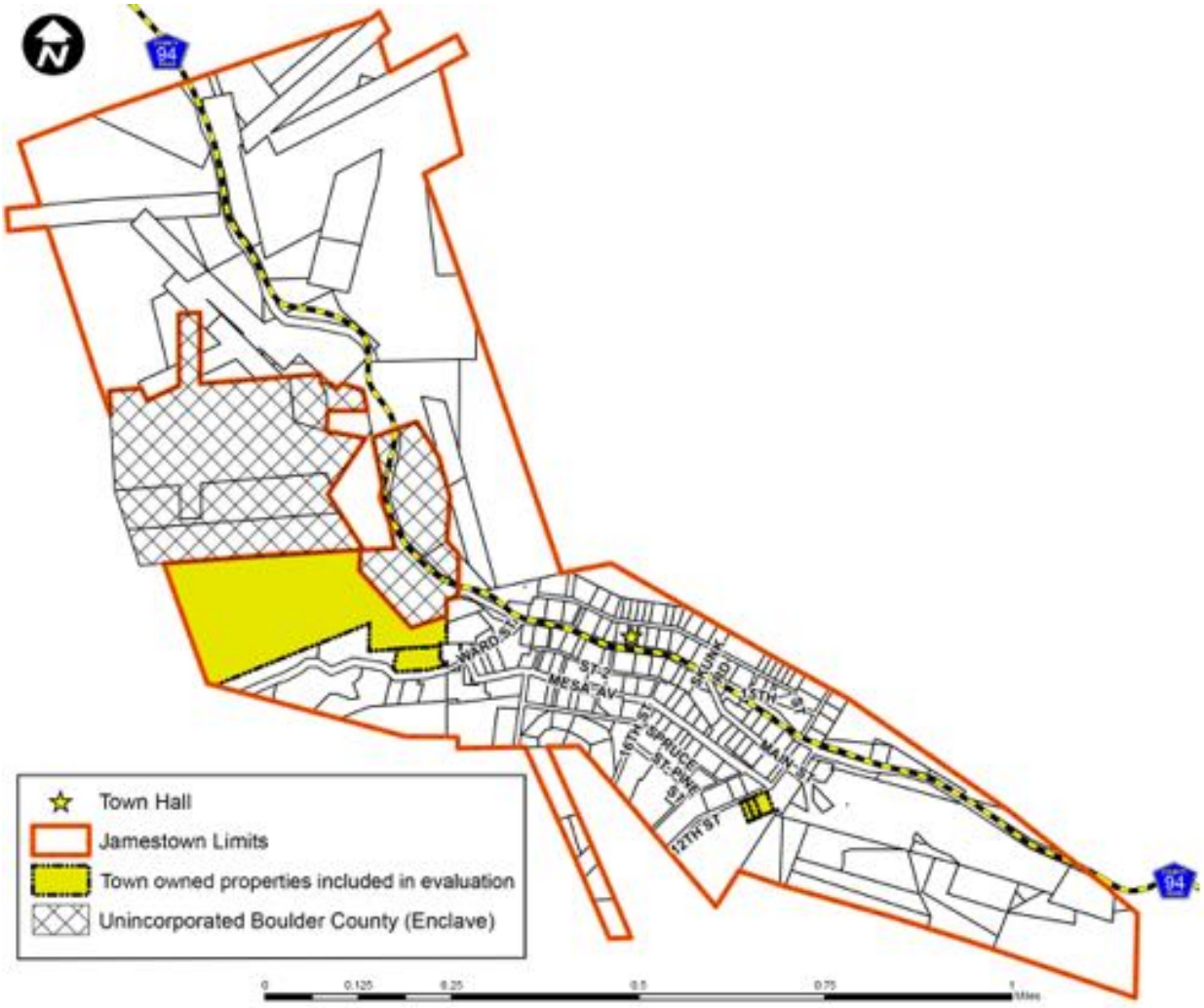
Potential Improved Parcel Yield:

Using the minimum 15,000 square foot lot size established in Ordinance No. 2, Series of 1984, 6 new parcels meeting the criteria for feasible development, or that could fairly easily meet the criteria for feasible development, could be generated.

Time Frame:

The time frame for the possible creation of these parcels is Long Range (5 years +) assuming revisions to the Town's Subdivision Ordinance and solicitation of development partners.

Figure 2-41: Focus Area 4



4.6 Focus Area 5

Purpose:

The purpose of the evaluation of parcels within this final focus area is the identification of opportunities and barriers related to the development of parcels located in the northwest end of the Town that share similar challenges. While outside of what is considered the Town's "core" area, i.e., located in the Little James Creek/West Subarea of Town and well outside of the existing water distribution system, these existing parcels should be considered as an important component of the Town's planning for its final "build out." They should also be recognized for their many valuable attributes.

Observations:

Barriers

- Development of unimproved parcels in this area currently face significant challenges, including:
- Water Service: development of these parcels will likely require significant expansion of the Town's water system, including the possible construction of new water storage tanks as well as new service distribution lines.
- Topography: many of these parcels have significant topographical and slope challenges.
- Hazards: several parcels have natural and environmental challenges including:
    - Flood: portions of several parcels are located within the High Hazard zone. It is noted, however, that per the Town's existing Floodplain Ordinance 8, Series 2012, that these parcels remain eligible to make an application for a Floodplain Development Permit.
    - Mining: Several parcels are part of old mining operations and may require some level of environmental clean up.

Opportunities:

These parcels should be recognized for their many valuable attributes that are consistent with and evocative of Jamestown's unique mountain character. These existing parcels should be considered as an important component of the Town's planning for its final "build out."

Considerations:

When development occurs, the following issues, similar to many within the other Focus Areas, should be addressed:

- Slope: All parcels - or portions of all parcels - have slopes that exceed the established 20% that triggers a special review.
- Exposure to Natural Hazards: Given that each of the parcels will require special review in order to comply with existing Town regulations regarding excessive slope, recommendations as to mitigation of other natural hazards, including geological hazards, floodplain areas, and areas of unstable soils, will also be required.
- Other: As a supplemental part of the special review related to improvement of any parcel, the following should also be evaluated:
    - Emergency access and egress
    - Possible impacts on neighboring property values
    - Possible impacts such as: additional traffic, noise, dust, night light, views, etc.

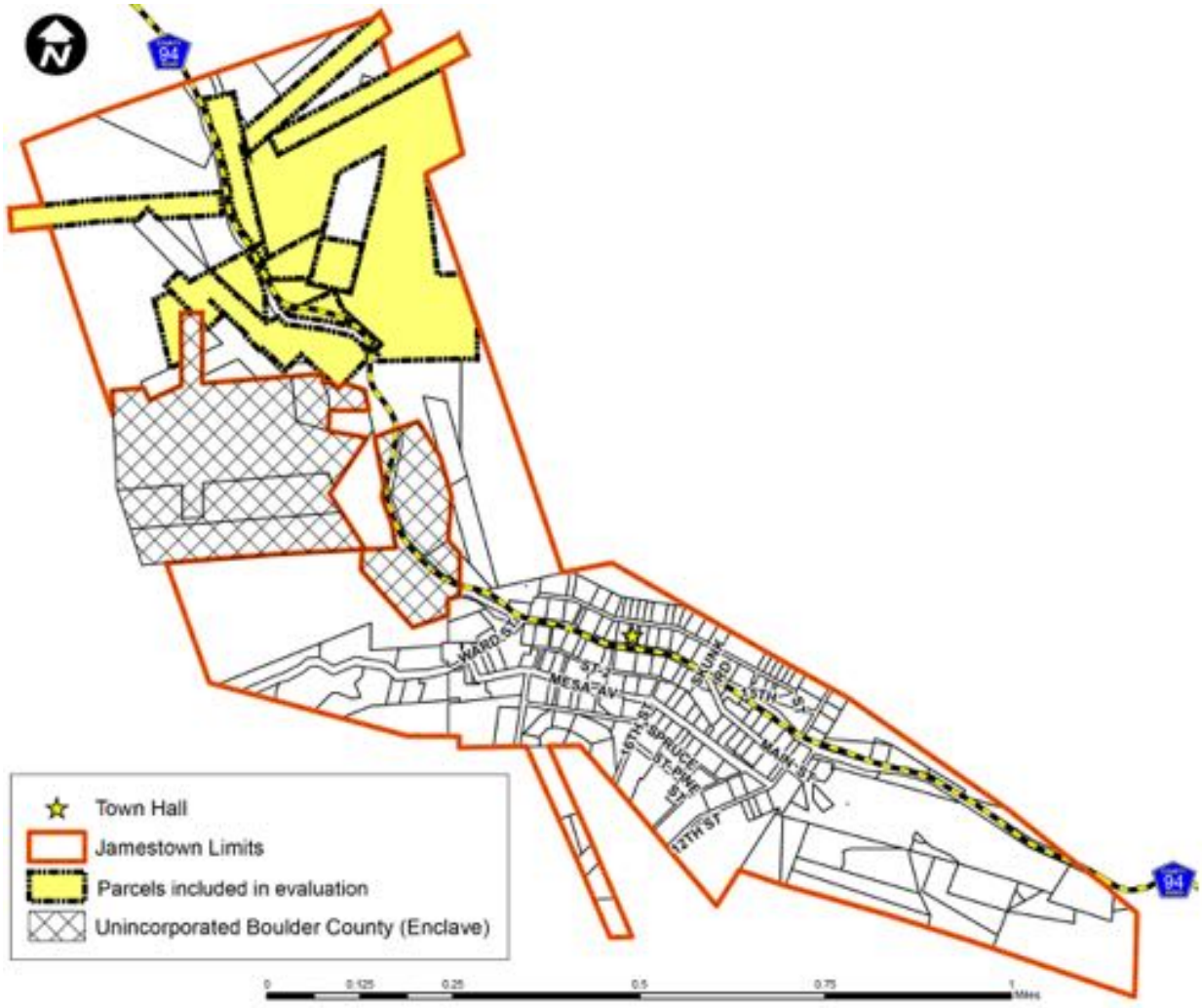
Potential Improved Parcel Yield:

Based upon the number of existing unimproved parcels in this focus area and the possible subdivision of several larger parcels, approximately 10 developable lots could be generated.

Time Frame:

The time frame for the possible improvement of these parcels is Long Range (5 years +) as their improvement would require significant extension of Town services.

Figure 2-42: Focus Area 5



4.7 Build-out and Revenue Generation Projections

In order for the Town of Jamestown to evaluate Land Use and Housing options vis-à-vis possible impacts on its annual budgets and /or desire for expansion of community services, the following projections have been provided. It should be noted that this summary only represents opportunities, as development within the Town is market driven. These projects are based on a growth rate of 1-2 homes per year, with a projection of the number of years to achieve full build-out for each focus area provided in Table 2-13.

This summary builds on work completed on behalf of the Town by the State of Colorado Department of Local Affairs in association with the Center for Priority Based Budgeting. It shows the potential property tax revenues from additional residences in the Town of Jamestown in the focus areas. The analysis assumes that a single family detached residence would be valued at $289,800 in 2015 dollars. Property values have been rising, and the analysis assumes that values would continue to rise at an average rate of 3% annually. Since, under Colorado Law, all real property is re-appraised in the odd number years, it was assumed that the impact to the property taxes would be seen in even number years (since property taxes are paid one year in arrears) rather than annually. Residences are built and added to the Town at either 1 or 2 dwelling units per year. Mill levies of 23.5 mills for the Town were assumed (based on 8 mills for Fire, 12.5 Mills for the General Fund, and 3 Mills for Capital.) It also assumed the temporary mill levy increase of 1.7 for the first three years of the analysis.

Table 2-13 summarizes the defining characteristic of each of the focus areas, the general time frame, the estimated number of available lots, years to achieve full buildout, and the estimated cumulative revenue generated by the year 2025 by these additional residences for each focus area.

Costs of expansion, such as the cost to extend water distribution lines, are not included. Such costs are not possible to produce without feasibility studies and potentially could be paid for by other sources, such as grants. The Board of Trustees will need to address the costs of future development through feasibility studies, grant applications, etc.

Table 2-13: Buildout and Revenue Generation Projections

Focus Area	Defining Characteristic	Timeframe	Estimated Available Number of Lots or Sites	Years to Achieve Full Build-out at Rate of 1- 2 Dwelling Units/yr.	Estimated Cumulative Fiscal Impact by Year 2025, General + Capital Revenue
1	Vacant platted lots in Town	0 – 3 yrs.	13	13 yrs. to 7 yrs.	1 DU/yr.: $19,562 2 DU/yr.: $38,549
2	Larger parcels in Town, if subdivided	0 – 3 yrs.	7	7 yrs. to 4 yrs.	1 DU/yr.: $16,055 2 DU/yr.: $25,302
3	Parcels in Town, owned by Federal Agencies	0 – 5 yrs.	14	14 yrs. to 7 yrs.	1 DU/yr.: $23,393 2 DU/yr.: $40,260
4	Parcels in Town, owned by the Town	0 – 5 yrs.	6	6 yrs. to 3 yrs.	1 DU/yr.: $18,420 2 DU/yr.: $10,475
5	Parcels adjacent to Town, if subdivided	0 – 10 yrs.	10	10 yrs. to 5 yrs.	1 DU/yr.: $12,229 2 DU/yr.: $3,803

SECTION 5 | ORDINANCE AND PROCESS REVIEW

5.1 Summary of Existing Ordinances and Regulations Relating to Land Use

Jamestown's land development regulations consist of a comprehensive plan and a number of ordinances that define land use policy for the town. Land use decisions concerning parcels within the Town of Jamestown are made by the Jamestown Board of Trustees, with input from residents. The Jamestown Comprehensive Plan was adopted in 1981 via an intergovernmental agreement (IGA) between the town and county for the purpose of planning and regulating the development of land in Jamestown.

Land use decisions for unincorporated, non-federally owned areas of Boulder County surrounding Jamestown are made by the Boulder County Board of Commissioners with recommendations from the Boulder County Planning Commission and department staff. Boulder County assists the town in the processing of building permits and inspection services provided through its IGA with Boulder County.

A summary of Jamestown's adopted ordinances related to Land Use follow:

Ordinance No. 2, Series of 1984: AN ORDINANCE FOR THE REGULATION AND RESTRICTION OF THE USE OF REAL PROPERTY TO LIMIT DEVELOPMENT IN THE TOWN OF JAMESTOWN TO THE ABILITY OF THE TOWN TO PROVIDE SERVICES AND TO PRESERVE THE SMALL TOWN CHARACTER OF THE TOWN.

This ordinance, adopted shortly after the adoption of the Jamestown Comprehensive Plan, established a definition of the Town of Jamestown per its water service area as well as lot and development standards for new construction of single family residences in such a way that would not compromise the small town character.

- Defines the Town of Jamestown as the area served by the municipal water system
- Is limited to new single family construction in the area served by the municipal water system
- Requires that property under consideration front upon or otherwise abut upon an existing private road or a street which has been dedicated to the public
- That such road or street be constructed and accepted for public maintenance or an access road built to Town standards and paid for by the applicant/developer
- Building lots must be 15,000 square feet or larger in size
- Exception to the minimum lot size are those legally existing single lots of records existing prior to adoption of the ordinance
- Lots must have been in separate ownership and not of continuous frontage with other lots under the same ownership
- No permit will be issued by the Town prior to receipt from the Boulder County Health Department an individual sewage disposal system permit

This ordinance states further that:

- Many areas in the Town have been designated Natural Hazard Areas
- Similar to the current Boulder County Hazard Mitigation Plan and the HIRA, the hazards identified include:
  - Areas of steep slopes (greater than 20%)
  - Rockfall Areas
  - Wildfire Areas
  - Floodplain
  - Alluvial Soils Areas
- New construction proposed in such Hazard Areas are subject to Special Review
- The developer of such property is required to submit studies and reports, at his/her expense, from qualified professional people concerning mitigation of the hazards. These studies might consist of:
  - Soils investigations

  - Geology reports
  - Engineering plans
  - Other evidence as may be required
- That the applicant shall pay a non-refundable Special Review Use Application Fee to the Town of $50.00 on submission of the application to cover the processing costs of the Town
- That in addition to the fee, the Town shall bill the applicant for costs incurred by the Town for necessary legal and consultant review of the application.

ORDINANCE NO. 8, Series of 2001: AN ORDINANCE ADOPTING REVISED SUBDIVISION REGULATIONS AND PROVIDING FOR THE ENFORCEMENT THEREOF

This ordinance is accompanied by Pamphlet SR2001 and first established the minimum subdivision standard of 2.3 acres. It was again revised by Ordinance No. 2, Series 2009.

Ordinance No. 2, Series of 2009: AN ORDINANCE ADOPTING REVISED SUBDIVISION REGULATIONS AND PROVIDING FOR THE ENFORCEMENT THEREOF

This ordinance, includes several revisions to the earlier Ordinance No. 8, Series 2001; Subdivision Regulations, including the addition of the Historic Property Variance and septic requirements. It is accompanied by Pamphlet SR2009; Town of Jamestown Subdivision Regulations.

Section 2, states the purpose, and the following intent:

- To encourage well planned subdivisions in order to preserve the public peace, health and safety and to provide for an orderly, efficient, integrated development in accordance with established Town policies.
- To establish minimum uniform standards for subdivision design, taking into account environmental factors and establishing minimum engineering criteria and performance guarantees.
- To establish adequate, efficient and safe rights of way and easements for streets, utilities, drainage and other site plan needs.
- To safeguard both interests of the public and the applicant, improve land records and boundary monumentation and ensure equitable processing of subdivision plats.
- To give reasonable assurance that an adequate water supply, sanitation facilities, applicable utilities, access, fire protection and school facilities are available for the development.
- To help:
  - Preserve the natural beauty of the land
  - Protect the vegetative cover of natural areas
  - Prevent the pollution of surface water, subsurface water and air;
  - Regulate development in areas of geological and topographical hazards (including, but not limited to; floodplains, areas of unstable soils, excessive slopes);
  - Protect against loss or injury from inappropriate use of land
  - And otherwise help preserve and enhance both the safety and quality of the environment

Section 4, General Regulations, establishes that the Regulations apply to:

- Whoever divides or participates in the division of a lot, tract or parcel into two or more lots, sites or other divisions of land for the purpose of sale, building development, or other use,
- The building of a structure upon any tract of land which has not been previously platted
- Any replat or division of land previously subdivided or platted

Section 4.1 excludes the following:

- Any division of a tract of land which creates parcels of land each of which comprises 35 or more acres of land, none of which is intended for use by multiple owners, when such subdivision does not involve the creation of any new streets or easements of access as may be determined by the Town Board.

- Any division of land to heirs through an estate proceeding, unless utilized for the purpose of evasions of these regulations.
- Unless for subdivision or construction purposes, any transfer of a part of another lot or parcel which does not create an additional lot.
- Any division of land by foreclosure or a deed of trust.
- Any division of land solely for the purpose of providing right-of-way to the Town for the widening or improvement of any Town Street.

Section 5 jurisdiction identify the following land that to which these provisions apply:

- All Land located within the legal boundaries of the Town.
- Land in process for annexation for which an annexation petition has been filed.
- All land located within three miles of the Town limits, and not located in any other municipality; for the purpose of control with reference to major street plan which may be contained in any Town Comprehensive Plan.

Section 7 preliminary Plat, establishes the Procedures for the Platting and Recording of all subdivisions with the Town of Jamestown and Boulder County. It also includes the requirements for information to be shown on the Plat, including the following components outlined in Section 7.2:

- Proof of ownership by the applicant of the subdivided properties or proof acceptable to the Town that the applicant is proceeding under the authority of the owner of record.
- Total acreage of the subdivision.
- Total number of lots and acreage for each lot.
- For each lot; accurate dimensions of all boundaries, streets, alleys, easements, and areas reserved for public use or other features.
- The total, gross acreage for each lot shall not be less than 2.3 acres, excepting any lots for which a variance to the minimum lot size requirement is requested pursuant to Section 12 (Variance to Protect Historic Structures)
- Legal description of properties to include township, range section, quarter-section, block and lot numbers.
- All dimensions both linear and angular shall be determined by an accurate control survey in the field which must balance and close within a limit of one in ten
- Seal of a Registered Land Surveyor

As a part of the review, the following information is further required for Town review:

- A sketch showing each lot in the subdivision and;
  - Proposed and existing streets, roads, building locations, septic systems, sewers, wells, waterlines and mains, electric utilities, poles lines (above and below ground), culverts
  - Geological features or hazards, bridges and other features
- And taking further into account:
  - Boulder County septic regulations
  - State well restrictions
  - Existing utilities
  - And applicable laws, regulations and ordinances affecting setback, driveway, slope, grading and roads.
- A statement of distance from the subdivision lots or units from the nearest Town water main including a proposal for providing potable water to each lot or unit.
- Evidence acceptable to the Town that provision has been made for facility sites, easements, and rights of access for electrical and natural gas utility service sufficient to ensure reliable and adequate electric or, if applicable, natural gas service for the subdivision.

- An erosion control, revegetation and drainage plan. Plan shall include a drawing showing roads, existing and proposed, driveways, culverts, topography areas of less than 5% slope, 5-15% slope, 15-30% slope and greater than 30% slope. Areas existing and proposed erosion and excavation shall be illustrated and recovery addressed. Irrigated areas such as lawns, sod, gardens shall be limited to 2000 square feet if Town water is proposed. Natural drainage shall be shown and proposed culverts and ditching shall be reasonably adequate to protect adjacent property, roads and all subdivision lots.
- If any part of the subdivision falls within a floodplain, the applicant shall prepare a sketch and statement regarding location of any proposed building or affected feature and the methodology and process for compliance with the Town Floodplain ordinance. If the subdivision is not located in any floodplain the applicant is required to present a certification for review by the Town Floodplain Administrator.

Section 11 establishes Design Standards and Site Considerations, for incorporation into the application, including:

- Provision of the subdivided lots providing desirable settings for buildings to be constructed that
  - Make use of natural land contour and setting
  - Protect view and afford privacy to both subdivided and neighboring lots.
- Steep land, areas of inadequate drainage, mining damage and other man made or natural hazard areas must provide provisions are - made by a registered engineer qualified in the pertinent field - for elimination or control of the problem.
- Drainage areas shall be left in a natural state wherever possible and no encroachments shall be made on any natural channel.
- Any land within the floodplain may be platted only in accordance with the Town floodplain ordinance.
- The arrangement of streets, lots, alleys, easements, and other elements of the proposed subdivision shall be consistent with these Regulations and otherwise be made to ensure protect the public health, safety and welfare; to preserve to the extent possible natural features; to ensure adequate and proper circulation of traffic; to ensure the safe and
- Adequate provision of utilities and essential services; to provide desirable settings for buildings and other structures; and to afford privacy and protection from adverse or unnecessary noise, traffic, light or hazards both for residents within the subdivision and adjoining owners.

Section 12 contains the language for a variance to Protect Historic Structures provides the Board of Trustees the ability to take into account archeological sites, structures listed on the Boulder County, State or National registers of historic places, and sites or structures deemed historically significant by the Town Board due to age (over 100 years), historic event or other historic or archeological significance.

Ordinance No. 1, Series of 2012 - AN ORDINANCE PROVIDING FOR THE IMPOSITION, COMPUTATION, AND PAYMENT OF LAND DEVELOPMENT FEES TO OFFSET THE IMPACT OF NEW GROWTH IN THE TOWN AND PROVIDING FOR THE ESTABLISHMENT OF SEPARATE IMPACT FEE FUNDS, AND PROVIDING FOR EXEMPTIONS, REFUNDS, AND APPEALS

Adopted in January 2012, this Ordinance provides provisions for Impacts to the Town of Jamestown's Capital Needs and Capital Improvement Plan (Plan), based upon Growth, for the period of 2012 through 2021. The Ordinance establishes Land development as:

- Any construction, reconstruction expansion or conversion of a building, structure or use
- Any change in the use of any building or structure that requires a building permit
- Creates additional demand for public services.

It establishes a Land development fee assessed to land development, in dollars per square foot for the following impacted services:

- Town's Parks and Recreation land development fee
- Fire and EMT Safety Services land development fee

- Streets and Bridges land development fee
- Water Plant Capacity Improvement land development fee

Section 2 establishes Non-Residential Land Development as any commercial or industrial building or any size greater than 120 square feet, whose purpose it to house a business or materials or equipment used in a business Residential Land Development Unit is established as any apartment, duplex or housing structure, whether or not free standing, otherwise separate from any other residence, designed for human occupancy.

The Impact Fees established are (per square foot):

- For Parks and Recreation: $ .21
- For Fire and EMT Safety Services: $.54
- For Streets and Bridges $.29
- For Water Plant Capacity $.12
- For a total of $1.16 per square foot.

Section 5 establishes limits for use of the funds for each of the impacted services.

Ordinance No. 4, series of 2014 - AN ORDINANCE SETTING FORTH PROCEDURES FOR LOT LINE ADJUSTMENTS BETWEEN PROPERTY OWNERS

Adopted shortly after the 2013 flooding, this ordinance allows for adjustments of lot lines between platted lots having a common border and consenting owners. The following prohibitions were established"

- The lot line adjustment cannot:
  - Create any new lot or other division of land.
  - Cause any lot or structure to become out of conformance with any Town ordinance.
- Drainage easements or rights-of-way reserved for drainage shall not be changed unless the application is accompanied by engineering data acceptable to the Town.
- Street locations and street rights-of-way shall not be changed.

Ordinance 3, Series of 2014 - AN ORDINANCE PERMITTING AND PROVIDING REQUIREMENTS FOR ACCESSORY DWELLING UNITS

A recommendation by the Town's Land Use and Housing Advisory Committee (LUHAC) - which was formed in response to the Town's recovery post the 2013 flooding, this ordinance permits the planning, development and use of Accessory Dwelling Units (ADU's). In doing so it:

- Provides for reasonable regulations emphasizing the safety of occupants and compliance with safety and fire regulations
- Provides for less restrictive uses of owned property

Section 2 defines the following:

- An Accessory Dwelling Unit (ADU) as a dwelling unit of permanent construction added to, created within, or detached from a single-family dwelling that provides basic requirements for living, sleeping, eating, cooking, and sanitation.
- An Apartment House means a single building having three or more dwelling units.
- A Dwelling Unit means a building or portion of a building intended as living quarters for a single family, having a single set of kitchen facilities (a bathroom, stove plus either or both a refrigerator and sink) not shared with any other unit.
- The definition of Family as a single individual or a group of persons related by blood, marriage or adoption, or by the relationship of guardian, ward or foster family who may not necessarily be related by blood or marriage, or a group of not more than three (3) unrelated persons living together in a dwelling unit as a single household unit or two unrelated people and any children related to either of them.
- Multiple Dwelling Units (MDU) as a collection of three or more dwelling units on a single lot.

- Owner Occupancy as the property owner, including title holders and contract purchasers, occupying either the principal unit or the ADU as their permanent residence as evidenced by:
  - Voter registration
  - Vehicle registration or similar means
  - And at no time receiving rent for the owner-occupied unit.
- Principal Unit as the owner occupied portion of the original dwelling unit from which the ADU was created or in the case of a detached unit, the original Single Family Dwelling.
- Single Family Dwelling (SFD) as a detached building designed for or occupied by one family. The addition of a conforming ADU to a SFD shall not change its status as a SFD.

Section 4 establishes that ADUs are permitted within the Town boundaries under the following conditions:

- That the ADU is created from any single family dwelling, or as a detached unit on any conforming lot that includes a Single Family Dwelling.
- That existing conforming and nonconforming ADUs are recognized (grandfathered) provided the property owner meets the requirements listed in Sections 6 (size and number).

Section 5 further clarifies that the ordinance is not intended address the construction of apartment houses, cluster homes, duplex homes or any other multi- family housing.

Section 6 establishes the allowed size and number of ADU's:

- Size and Number of ADUs shall not exceed 50% of the total square footage of a SFD, not including the square footage of any attached or detached garage or storage shed
- An individual ADU shall be at least 300 square feet. The maximum square footage of an individual ADU shall be 1200 square feet
- The number of ADUs on a property shall be limited to one
- ADUs are permitted solely as an accessory use subordinate to and located upon the same property as a principal unit
- Interests in ADUs shall never be conveyed separately from the property, lot or parcel upon which the ADUs are located.

Section 7 establishes that ADUs be constructed in accordance with applicable building codes and include safe emergency access and egress, fire/smoke alarms and carbon monoxide detectors.

Section 8 establishes that Single Family Dwellings with ADUs meet all State and County regulations for On-Site Wastewater Systems.

Section 9 establishes that:

- ADUs served by the Municipal Waterworks be subject to a charge for water service based upon each additional bathroom constructed for an ADU.
- All water service connections to service ADUs be subject to review and approval by the Town and constructed in accordance with Town requirements.

Section 10 addresses other considerations including property owners considering available parking and if practicable, or if required by the Town, provisions for off street parking for occupants of any SFD containing ADUs.

5.2 Summary of Existing Regulatory Mitigation Strategies

The chart below lists the regulatory measures that currently are in place to protect future homeowners from hazards. Ultimately, they also serve to enhance the safety of the entire community, in that as new development occurs, it avoids or mitigates risks from hazardous threats, and over time, the safety of the whole community is improved.

At this time, through the requirements of FEMA, new construction in the floodplain is either prohibited or forced to mitigate the hazardous risks from flooding. Geological hazard threats are mitigated through requirements to obtain the services of a geotechnical engineer to verify potentially hazardous conditions prior to obtaining a building permit. For wildfire threats, there is no safeguard. There is only the requirement in ordinances No. 2, Series of 1984 and No. 2, Series of 2009 for special review of development proposals in hazardous areas. There are no requirements for new construction to be non-combustible, provide defensible space, etc. Boulder County has amendments to its Building Code that address wildfire threat mitigation, but it does not apply to Jamestown because Jamestown opted out of those requirements by ordinance.

Hazard Type	Existing Mitigation Strategy to Protect Future Homeowners and the Town
Flooding	Floodplain Delineation (Encourage the CWCB to complete the update to the floodplain delineation)
	Floodplain Management by Floodplain Administrator
	FEMA 404 Hazard Mitigation Acquisition Program
	Design and construction requirements, e.g., flood proofing and elevating structures
Geological	Soils tests are required when submitting for building and septic permit in hazard areas Ordinances No. 2, Series of 1984 and No. 2, Series of 2009 require special review of development proposals in hazard areas. Special review requirements may include submittal of a soils report.
Wildfire	None, except that ordinances No. 2, Series of 1984 and No. 2, Series of 2009 require special review of development proposals in hazard areas and special review requirements may include submittal of a soils report.

5.3 Review and Commentary on Permitting Processes

Building Permit Application Process and Hazard Mitigation

Before any building project begins, a preliminary conversation to determine requirements should always be held with the Boulder County Land Use Department, which issues building permits for unincorporated areas of Boulder County, as well as for Jamestown through the Intergovernmental Agreement (IGA) of December 29, 1997. Please refer to the Jamestown Rebuilding and Restoration Guide for more guidance on assembling the building team needed in order to prepare certified plans. The property owner or contractor representing the property submits the building plans and an application for a building permit to the Boulder County Land Use Department. A permit for new a new home also requires a warranty deed, evidence of water, evidence of sanitation, and access. Please refer to the water well and septic system sections below for details. Boulder County collects the application fees for both Jamestown and Boulder County and forwards the drawings and the Jamestown portion of the permit fee to the Jamestown Town Clerk. Then both the Town of Jamestown and Boulder County staff review the plans. The Jamestown Town Clerk does the review for Jamestown.

For structural additions, Jamestown's Town Clerk looks for any indications that an existing septic system may need to be upgraded to handle an increase in the number of occupants, such as additional bedrooms, square footage, etc. Applications for maintenance items such as a roof replacement are generally approved without further investigation. There is no formal site plan review process, except for a review by the Board of Trustees, which takes place as necessary.

When both jurisdictions have completed their plan reviews, collected the impact fees, and find that they have no objections to the proposed construction, Jamestown staff tells Boulder County that there are no objections, and, assuming Boulder County also has no objections, Boulder County notifies the property owner or contractor that the plans have been approved. The property owner or contractor then pays any remaining permit fee amount and picks up the building permit. (Source: Kathy Costa, Boulder County Land Use Department)

While Boulder County enforces its amendments to the Boulder County Building Code that include special requirements for construction in wildfire hazard areas, BuildSmart Program, contractor licensing requirements and sprinkler requirements in other areas of the county, Jamestown has opted out of these codes and programs through Ordinance 2, Series of 2014. Therefore applications from Jamestown are currently not reviewed according to these criteria.

- The Boulder County Building Code amendments address a number of items, including special requirements for construction in high wildfire hazard areas of the County. (Source: http://www.bouldercounty.org/property/build/pages/buildingamends.aspx)
- Boulder County BuildSmart Program encourages high-performing, sustainable residential development, and redevelopment in the unincorporated areas of Boulder County by promoting development that will: create energy-efficient structures that reduce both the production of greenhouse gases from residential buildings and the amount of material sent to landfills, conserve water and other natural resources in the homebuilding process, and ensure proper indoor air quality. Source: http://www.bouldercounty.org/property/build/pages/buildsmarthome.aspx)
- Boulder County Contractor Licensing Program ensures that contractors are qualified and use good business practices. (Source: http://www.bouldercounty.org/property/build/pages/contractorlicensing.aspx)

Commentary:
The following improvements to the permit application review process are suggested and are included in Section 6:

- The Town and County amend the IGA to have a review of the HIRA data, and in particular the hazard maps, be added to the County's development review process.
- Amend the 1997 IGA, Ordinance 3, Series 2011 and Ordinance 2, Series 2014 to activate the currently excluded Boulder County Building Code Amendments to the County development review of building permits in Jamestown.
- Amend the IGA to include site plan review in the County's development review.
- Amend the IGA to adopt the 2015 International Building Code (IBC) at the same time that Boulder County adopts the 2015 IBC in January 2016, including requirements for fire sprinkler systems in residences (currently excluded per Ordinance 2, Series 2014.
- Ask Boulder County to update its list of Intergovernmental Agreements page (http://www.bouldercounty.org/property/build/pages/igas.aspx) to include the 1997 IGA between Boulder County and the Town of Jamestown and Jamestown's Ordinance 2, Series 2008 (repealed) with Ordinance 3, Series 2011 and Ordinance 2, Series 2014.
- Delegate review authority to the Jamestown Town Planner for all applications currently reviewed by the Jamestown Town Clerk.

Floodplain Development Permit Application Process

Before property owners apply for a building permit, they must obtain a floodplain development permit for projects located in the floodplain. Property owners are encouraged by the Town and County to meet with the Jamestown Floodplain Administrator long before applying for a building permit. The Floodplain Administrator reviews the proposed site plan and if the proposed construction is in the floodplain, the floodplain administrator reviews the project for compliance with the National Flood Insurance Program (NFIP) and the Jamestown floodplain ordinances, and issues a floodplain development permit with conditions that ensure compliance, or denies the development if it is determined that it can have an adverse impact on the community or neighboring properties. Boulder County Building Division staff checks to see if a floodplain development permit is required, and if so, whether it is been issued when they review plans for a building permit application for projects in the FEMA-designated Special Flood Hazard Area (SFHA) - also known as the 100-year floodplain.

(Source: Mark Williams, Jamestown Floodplain Administrator)

Subdivision Approval Process and Hazard Mitigation

The steps to a subdivision approval are:

Preliminary Plat submittal. The submittal is required to address proposed and existing streets, roads, building locations, septic systems, sewers, wells, waterlines and mains, electric utilities, poles lines (above and below ground), culverts, geological features or hazards, bridges and other features, and take into account Boulder County septic regulations, state well restrictions, existing utilities, and applicable laws, regulations and ordinances affecting setback, driveway, slope, grading and roads. It also requires a review by the Jamestown Floodplain Administrator.

Preliminary Plat processing. The proposed subdivision is presented to the Board of Trustees. The Subdivision Pamphlet does specify who presents the proposal to the Town Board. The Board ensures that the Water Plant Operator, Fire Department, Town Attorney and other appropriate Town entities have an opportunity to review and provide input.

This is followed by a public hearing with public notice posted 30 days prior to the hearing. Within 30 days after the public hearing, the Board approves, disapproves, or approves with modifications, the preliminary plat.

Final Plat. Within one year of approval of the preliminary plat, the applicant is to provide a final plat to the Town Clerk who refers it to the Mayor and Town Attorney. If they find that it is in conformance with the preliminary plat, a public hearing is held by the Town Board within 60 days. If, at the second public hearing (see Section 9, paragraph 2), the Town Board approves the final plat, it is signed by the Mayor and sent to the County Clerk and Recorder for recording.

Subdivision Agreement. The applicant and the Town execute a written guarantee that all public improvements will be made.

Commentary:
The Town of Jamestown Subdivision Regulations Pamphlet SR2009 provides the best assurances of all of Jamestown's ordinances for providing for the review and mitigation of hazardous conditions. It asks for geological features or hazards to be identified on the proposed plan and states that "steep land, areas of inadequate drainage, mining damage, and other man-made or natural hazard areas shall not be platted unless acceptable provisions are made by a registered engineer qualified in the pertinent field for elimination or control of the problem".

There are also safeguards against development in a floodplain in that the applicant is required to comply with the Town's floodplain ordinance and certify to the Town's Floodplain Administrator that the subdivision is not in a floodplain.

There is no provision for a technical review of the subdivision application with respect to hazard identification and mitigation. It only states that the subdivision must be approved by the Town Board.

The following improvements to the review process are suggested and are included in Section 6:

- The Town could amend the Subdivision Pamphlet to add a reference to the HIRA data and direct the applicant, the Town Board, and its consultants to the data for guidance.
- The Town could amend the ordinance to require that the applicant reimburse the Town for the cost to hire consultants to provide technical reviews of the proposed hazards and to propose mitigation measures that become conditions of approval.
- The ordinance requires that a topographical drawing be provided that shows areas of less than 5% slope, 5-15% slope, 15-30% slope, and greater than 30% slope. Other Town ordinances refer to a 20% slope as a trigger for special review requirements. It would be helpful if the Subdivision Pamphlet language were adjusted to require mapping of slopes that incorporated the 20% limit for consistency across ordinances. An example would be: less than 5%, 5-10% slope, 10-15% slope, 15-20% slope, and greater than 20% slope.
- The major hazard that is not addressed in the Subdivision pamphlet is wildfire. This would best be addressed by amending the Boulder County IGA to add enforcement of the Boulder County Building Code Amendments to the County's development review.
- The Subdivision Pamphlet should be amended to specify that the Town Planner take the lead in presenting the project to the Town Board with an emphasis on how the proposal does or does not comply with the Town's regulations, and the applicant is available to describe the project and to answer questions from the Board.

Septic System Permit Approval Process

Septic Systems must be approved by Boulder County Public Health (BCPH).

The permit application, a list of registered professional engineers, and a list of licensed installers from Boulder County Public Health are available at www.septicsmart.org or in-person. The applicant is directed schedule a detailed soil analysis/percolation test with a registered professional engineer or professional geologist, schedule a contractor to dig an eight-foot-deep profile test pit excavation, locate and clearly mark the property's water lines and soil test holes, and submit the following items, in-person, to BCPH:

- Completed permit application
- Directions to the site
- A plot plan of the property that includes the location of the house, well, water lines, and Onsite Wastewater Treatment System (OWTS) components
- Results of a detailed soil investigation/percolation test
- The OWTS design
- Permit fee
- BCPH staff will schedule a site inspection only after all of the submittal requirements have been met. Following the site inspection, a permit will be issued if all regulations have been met. The process takes about two weeks from the time BCPH receives a complete application.

(Source: http://www.bouldercounty.org/env/water/pages/septicsmartindex.aspx)

Water Well Permit Approval Process

A well permit is required to construct any new water well in Colorado. In the Jamestown area the Colorado Division of Water Resources (DWR) generally issues two types of well permits, "exempt" and "non-exempt".

Exempt permits are exempt from administration under the prior-appropriation system so they do not require a Plan for Augmentation (see below), however the eligibility for exempt permits and their allowed uses are limited.

In general, to qualify for a new "exempt" well permit, the parcel cannot have been subdivided since June 1, 1972, the well must be the only well on the parcel, and the parcel cannot have access to another water supply. Residential exempt well-permitted uses will typically be limited to household uses only inside one single family dwelling, with no outdoor uses allowed, for parcels less than 35 acres. DWR cannot guarantee the issuance of any well permit. Applicants should read the instructions on the well permit application form for details on application fees and required documents. To learn more about water well permitting in Colorado, see DWR's Guide to Colorado Well Permits, Water Rights, and Water Administration.

Non-exempt permits operate within Colorado's prior-appropriation water rights system and are typically issued pursuant to a Plan for Augmentation approved by the Water Court. An augmentation plan is a court-approved plan, which is designed to protect existing water rights by replacing water used by a new project. Please see The Beginner's Guide to Augmentation Plans for Wells for a brief introduction to Augmentation Plans for Wells.

Jamestown is located in an over-appropriated watershed. Therefore, the DWR cannot issue any new residential well permits for lots in post-1972 subdivisions unless the well is included in a Plan for Augmentation that has been approved by the Water Court.

New subdivision review processes typically include a review of the subdivision's proposed water supply:

When a subdivision is created by Boulder County (in an unincorporated part of the county), the County is required, pursuant to section 30-28-136(h), C.R.S., to send a copy of the preliminary subdivision plan to DWR for an opinion regarding the adequacy of the water supply. Typically, such subdivision water supply plans involve either a Plan for Augmentation that has been approved by the Water Court or connection to a municipal water supply system. If DWR finds that the proposed water supply is inadequate, the County may choose to still approve the subdivision. Subdivision approval by the County does not guarantee that DWR will issue well permits.

When a subdivision is created by Jamestown, the Town is not required to send a copy of the preliminary subdivision plat to DWR, nor is DWR required to provide an opinion regarding the adequacy of the water supply. That said, the applicant /developer is still required by Jamestown's Subdivision Ordinance to provide a water supply plan. Similar to subdivisions in unincorporated parts of the County, water supply plans typically involve either a Plan for Augmentation that has been approved by the Water Court or connection to a municipal water system. Once a property has been subdivided by Jamestown, DWR will not be able to issue exempt well permits on the property. Though the Town is not required to send proposed subdivisions to DWR for review, DWR welcomes such referrals should the Town deem it pertinent to their review process.

In summary, whether the subdivision is created by Jamestown or Boulder County, DWR will not be able to issue new well permits in post-June 1, 1972 subdivisions without a Plan for Augmentation approved by the Water Court. DWR is willing to provide referral letters regarding proposed subdivision water supply plans (and in some cases this process is required), but in all cases it is up to the entity approving the subdivision (Jamestown or Boulder County) to decide whether or not to approve the proposed subdivision.

The process of getting an augmentation plan approved by the Water Court, the water supply plan review process through the Town or County, and the well permitting process through DWR are all distinct processes that take place at different points in time. Typically the well permitting process takes place during subdivision construction, which is sometime after the Plan for Augmentation has been approved by the Water Court and the Town or County has approved the subdivision.

Below are links to additional resources regarding the prior-appropriation system, water well permitting, and the subdivision water supply plan review process:

http://issuu.com/cfwe/docs/wl4_r9_web

http://water.state.co.us/DWRIPub/Documents/wellpermitguide.pdf

http://water.state.co.us/DWRIPub/Documents/BeginnersGuideToAugmentationPlansForWells.pdf

http://water.state.co.us/DWRIPub/Documents/Policy_2011_1_SubdivisionsAndExemptions.pdf

http://water.state.co.us/DWRIPub/Documents/Policy_2011_1_MemoToCountyPlanners.pdf

Please note that the above information is intended as a general overview, is not necessarily absolute in its description, and may be subject to change at a later time. Please see the Colorado Division of Water Resources' website for more information or call the DWR Groundwater Information Desk at (303) 866-3587.

SECTION 6 | OPPORTUNITIES FOR IMPROVING THE TOWN'S RESILIENCE, SAFETY, AND SUSTAINABILITY

From the work generated in the various sections of this report, the following items are presented for consideration by the Town's Board of Trustees:

1. Continue regular Hazard Identification and Risk Assessment (HIRA) and Hazard Mitigation Plan (HMP) updates

The Town should continue its coordinated efforts with Boulder County Office of Emergency Management and the State of Colorado towards regular HIRA and HMP updates.

2. Continue already initiated planning and mitigation efforts related to potential fire hazards

Prior to the September 2013 flooding, Jamestown was engaged in several efforts related to better protecting itself from potential fire hazards, including:

- Town of Jamestown Community Wildfire Protection Plan

  The Town of Jamestown should continue its current update of its Community Wildfire Plan.

- The National Fire Protection Association's (NFPA) Firewise Program
  Jamestown had initiated work towards joining this program. This program empowers neighbors to work together to reduce risk. It has an educational component, includes an annual event, and provides insurance discounts through the United Services Automobile Association (USAA). Ultimately, it improves the overall safety and sustainability of the community and the Town should consider participation.

3. Consider adoption of Boulder County's Amendment to the Building Code

The Town should consider adopting that portion of the Boulder County's Amendment to the Building Code that is related to fire hazard mitigation. The Town could limit this to new construction. Its adoption would improve the Town's sustainability and safety over the long term. As is the case today with the Town's current Building Code review, it would be administered by the County. Furthermore, it would establish requirements for improvements to parcels that are consistent to those in the unincorporated areas of the County that surround Jamestown.

- Amend the IGA to have a review of the HIRA data, and in particular the hazard maps, added to the County's development review process.
- Amend the 1997 IGA, Ordinance 3, Series 2011 and Ordinance 2, Series 2014 to activate the currently excluded Boulder County Building Code Amendments to the County development review of building permits in Jamestown.
- Amend the IGA to include site plan review in the County's development review.
- Amend the IGA to adopt the 2015 International Building Code (IBC) at the same time that Boulder County adopts the 2015 IBC in January 2016, including requirements for fire sprinkler systems in residences (currently excluded per Ordinance 2, Series 2014.Ask Boulder County to update its list of Intergovernmental Agreements page (http://www.bouldercounty.org/property/build/pages/igas.aspx) to include the 1997 IGA between Boulder County and the Town of Jamestown and Jamestown's Ordinance 2, Series 2008 (repealed) with Ordinance 3, Series 2011 and Ordinance 2, Series 2014.

4. Continue already initiated planning and mitigation efforts related to potential flood hazards

Jamestown has been engaged in a series of planning and mitigation efforts related to its exposure to flooding that should be continued, including:

- Flood Hazard Mitigation Plan

Adopted in 1993, the Flood Mitigation Plan should be updated based upon lessons learned from the 2013 Flood and incorporating new floodplain mapping once completed. It should also be made available on the Town website.

- Jamestown Stream Corridor Master Plan
  The Town should update the provisional hydrology/hydraulics map that was included in the report by AMEC in February 2014. The Colorado Water Conservation Board (CWCB) has prioritized the floodplain mapping for the James Creek and the Little James Creek in the Jamestown area. This probably will occur in 2016. The Town of Jamestown should continue to work toward incorporation of this material into its regular HIRA and HMP updates as well as its Flood Hazard Mitigation Plan.

- Technical Capacity
  The Town currently has a Floodplain Administrator funded by a grant until July 2016. Given its history with flooding, the Town should endeavor to find the funding necessary to retain a Floodplain Administrator.

- Floodplain Ordinance
  Jamestown established an ordinance (Ordinance No. 8, Series of 2012), providing for the prevention of flood damage through adoption of principles promoted by FEMA. Updates to this ordinance, as appropriate and responsive to updated flood mapping, should be considered.

5. Continue participation and engagement in programs that enhance the Town's ability to reduce overall risk

Jamestown currently participates, or has participated, in several initiatives that reduce risks to both the Town and residents specifically, including:

- National Flood Insurance Program (NFIP)
  The Town of Jamestown joined the NFIP on July 18, 1983. The NFIP allows private property owners to purchase affordable flood insurance. Participation also enables the community to retain its eligibility to receive certain federally back monies and disaster relief funds.

- Community Rating System (CRS)
  The Community Rating System (CRS) is a voluntary program for National Flood Insurance Program (NFIP) participating communities. The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. The CRS has been developed to provide incentives in the form of premium discounts for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. The Town should continue its efforts working with FEMA towards joining the CRS.

6. Continue capacity building and partnerships

Jamestown's capacity to plan and respond to natural hazards continues to rely on the volunteer efforts of it residents. The Town has also built strong relationships and partnerships with many entities in the Boulder County region. To enhance the Town's ability to expand its capacity towards emergency planning and early warning, the following items should be considered:

- Public Information Programs
  As noted in Boulder County's 2015 HMP (anticipated to be approved by FEMA in 2016), Jamestown has regularly hosted educational programs including those provided by the EPA, U.S. Forest Service, Boulder County Health, Boulder County Office of Emergency Management, the James Creek Watershed Initiative and the Left Hand Oversight Group. Programs such as these should be continued and incorporated as recommendations into regular HIRA and HMP updates.

- Additional Agency Collaborations
  Additional collaborations that promote community evolvement should be considered, including a recommendation of the LTRP for the Town to "Work with local fire departments and other agencies to

assist private landowners with creating defensible space and participate in programs such as FireWise Communities that encourage and support mitigation."

- Inter-Mountain Alliance (IMA)
  The Town continues to participate with the IMA. Responsive to a recommendation of the LTRP, the Town should "Work with the Inter-Mountain Alliance to establish a community-wide resident preparedness group."

- Mountain Emergency Radio Network (MERN)
  The Town continues to work closely with Boulder County in a variety of Emergency Preparedness and Early Warning programs. Supplementing these efforts and consistent with efforts of the IMA and a recommendation of the LTRP, the Town should "Promote participation in the Mountain Emergency Radio Network (MERN)."

- Town Auxiliary
  Consistent with a recommendation of the LTRP, the Town should consider establishing "an auxiliary to provide support services to Fire/EMS and assist in exploring fund-raising options for Town emergency services."

7. Review established process for special review

Jamestown's Ordinance No. 2, Series 1984 establishes that any building permit application for improvements within a high hazard area be subject to a special review. To this end, the Town should consider:

- Revisiting the definition of what is a High Hazard, consistent with this HIRA and the HMP
- Revisiting what the special review process, procedures and fees might be
- The establishment of a Special Review committee to provide a local perspective in addition to a technical development review by Boulder County
- Development standards/requirements for any new construction addressing mitigation of the hazard(s) as much as possible

8. Development Standards

To better maintain the Town's unique character and impacts that might be caused by new development, the Town may wish to consider the establishment of several development standards, including:

- Building setbacks.
  Currently the Town does not require setbacks for structures from property lines, including Accessory Dwelling Units (ADU). Noting that a "Good Neighbor" approach has worked well in the past for most projects, establishing minimum requirements will better ensure privacy and enhance the overall public safety of the community in the event of fire and other hazards.

- Lot line elimination and maximum lot size.
  Many communities along the Front Range have experienced the trend of "scrape offs", where an owner decides to demolish an existing structure to build a larger structure. This scenario can often include the elimination of lot lines with adjacent properties so that a much larger structure can be built. Given the possibility of an owner "aggregating" multiple lots, eliminating lot lines and building a large "McMansion" on the aggregate site, the Town may wish to explore the establishment of a maximum lot size and possibly revisions to its Lot Line Adjustment Ordinance (Ordinance No. 4; Series 2014).

9. Consider planning for expansion of the Town's water service capacity

At the time of this report, Jamestown had initiated exploration of a second water source. Complementary to this, the Town may also benefit from exploring expansion of its water service - possibly including a second water treatment plant in the Little James Creek sub-area - as a part of the Town's full build-out scenario.

10. Town of Jamestown and Boulder County Agreements and Planning Documents

As a part of the Town's overall Land Use planning, it should review the benefits of updates to the following:

- 1981 Comprehensive Plan
  The Town should consider updating the 1981 Comprehensive Plan. One potential benefit of the update might be agreements between the Town, County and the Forest Service that are responsive to the Long Term Recovery Plan's recommendation to "Explore options for mitigating Forest Service land with other public land."

- A 3-mile plan should be developed that encompasses any areas for potential future annexation to conform to state statutory requirements. This can be accomplished as a stand-alone plan or as part of the Comprehensive Plan update.

- Intergovernmental Agreement (IGA) Review
  The current Boulder County and Jamestown IGA (1997) addresses the administration of building permit including inspection services. Several sections of this agreement may merit re-examination, including:

  - Section A: Services to Be Provided
    This section should be coordinated with any efforts by the Town to possible revisions to the Special Review procedures and requirements.

  - Section B: Compensation
    This section of the agreement, which establishes the percentage of fees collected by the County and remitted to the Town, should be revisited especially if the Town adopts revisions to the Special Review procedures and requirements.

11. Development and Permit Fees

To assist the Town's ability to minimize any potential impacts from new development, the following should be considered:

- Permit Fees
  To improve the capacity of the Town to provide staff and/or personnel capable of reviewing future building permit applications and prepare reports to the Board of Trustees, an increase to the existing permit fees should be considered. Currently, Jamestown's building permit fees range from $5 - $30.

- Development Fees
  Ordinance 1, 2012 - Development Fees was established to Offset Impacts of Growth. This ordinance should be revisited particularly related to Fire and Safety Services (to continue the excellent service level provided by the Jamestown Volunteer Fire Department and EMT) and Streets and Bridges (particularly, to provide more capacity for road improvements and extensions) as well as Water Plant Capacity (to include possible expansion of services). New construction fees are currently established at $1.16/ft2 and an increase should be explored.

12. Mitigation, Maintenance and Operational Needs of Town Assets

The updated Boulder County HMP identifies the Fire Hall, Town Hall and Water Treatment Plant as Critical Facilities in Jamestown. To enhance the Town's capacity to better protect these assets and meet the challenges of major events, the following items are provided for consideration:

- Maintenance, Mitigation and Operational Reserves
  The Town should consider, through established mechanisms - such as increased Permit and/or Development Fees suggested above - the necessary funding that would establish and contribute to a "rainy day" fund that would result in a fiscally sustainable plan that incorporates mitigation into the maintenance of all Town property.

- Emergency Generators
  Consistent with a recommendation of the LTRP, the Town should consider obtaining "generators, one for central hub of Town Hall/Mercantile and one for the water plant."
- Slash Pile Facility
  To reduce exposure to wildfire, the LTRP recommends making "a slash pile available to residents."

13. Subdivision Approval Process

A review of the Subdivision Pamphlet has produced the following suggestions for improvement:

- The Town could amend the Subdivision Pamphlet to add a reference to the HIRA data and direct the applicant, the Town Board, and its consultants to the data for guidance.
- The Town could amend the ordinance to require that the applicant reimburse the Town for the cost to hire consultants to provide technical reviews of the proposed hazards and to propose mitigation measures that become conditions of approval.
- The ordinance requires that a topographical drawing be provided that shows areas of less than 5% slope, 5-15% slope, 15-30% slope, and greater than 30% slope. Other Town ordinances refer to a 20% slope as a trigger for special review requirements. It would be helpful if the Subdivision Pamphlet language were adjusted to require mapping of slopes that incorporated the 20% limit for consistency across ordinances. An example would be: less than 5%, 5-10% slope, 10-15% slope, 15-20% slope, and greater than 20% slope.
- The major hazard that is not addressed in the Subdivision pamphlet is wildfire. This would best be addressed by amending the Boulder County IGA to add enforcement of the Boulder County Building Code Amendments to the County's development review process.
- The Subdivision Pamphlet could be amended to specify that the preliminary plat is presented to the Town Board by the Town Planner, or a consultant hired by the Town to review the proposal with the cost to be reimbursed by the developer. The Town Planner or consultant would present the proposal with a view toward to whether the proposal is in compliance with Town ordinances, and the developer or his/her representative would present the features of the proposal and answer questions from the Board and public.
- The Town could amend the IGA with Boulder County to include a technical review of subdivision proposals by Boulder County development review staff and establish a Special Review committee such as LUHAC that would provide a local perspective.

14. Site Drainage Studies

Several areas of Town - including on 16th above the school and down towards Andersen Hill - continue to experience Storm Drainage issues that impact individual parcels as well as public roads. Funding for the civil engineering necessary to conduct a drainage plan should be explored.

15. Irrigation Ditch Repairs

That portion of the irrigation ditch that extends between 16th St and 12th St. and above Spruce Street should be repaired to reduce impacts to developed and undeveloped parcels in this area.

Based on the survey results and the high level of participation in the community meetings, it is clear that the Town is ready to continue to improve the Town's future outlook by its willingness to mitigate hazard risks, to safeguard its unique character and lifestyle, and to plan for a fiscally sustainable growth that preserves the all-important character of this small mountain community tucked into the foothills of Boulder County.

SECTION 7 | COMMUNITY ENGAGEMENT

Involving community members in the planning process was an important part of gaining broad support for the study. During each phase of the study, the project team engaged the Board of Trustees, Boulder County staff, DOLA staff, FEMA staff, key stakeholders and residents to obtain their ideas and perspectives. The project team offered a range of community engagement activities, allowing opportunities for all interested community members to become informed and provide input and feedback into the study. These activities are described below.

Table 2-14 lists the primary community engagement activities, their dates and the items covered at that event.

Table 2-14: Primary Community Engagement Activities

Meeting/Activity	Date	Topic
Board of Trustees	March 17, 2015	Introduction to the Community at the Merc
Board of Trustees	April 13, 2015	Joint Planning Meeting
Board of Trustees	April 21, 2015	Project Initiation and Introductions
LUHAC	April 29, 2015	Project Overview
Board of Trustees	May 4, 2015	Review Scope of Work and Project Approach
Advisory Team	May 11, 2015	AT Initiated – Project Presentation
Community Meeting	May 12, 2015	Project introduction/Overview
Board of Trustees	May 18, 2015	Review Scope of Work, Public Involvement Plan and Project Approach/Coordination
Inter-Mountain Alliance	May 21, 2015	Project Presentation
Board of Trustees	June 1, 2015	LTRP Plan Update and Update to HIRA field work
Board of Trustees	June 15, 2015	LTRP Plan Update and Update to HIRA field work
Advisory Team	June 16, 2015	AT Meeting Schedule and Review of Survey Questions,
Advisory Team	June 22, 2015	Conference Call; Project Update
Board of Trustees	July 6, 2015	Scope of Work and Schedule revisions
Advisory Team	July 14, 2015	Project Update
Board of Trustees	July 20, 2015	Project Update
Advisory Team	July 22, 2015	Review HIRA Initial Findings
Advisory Team	August 3, 2015	Review HIRA August Presentation
Community Meeting	August 11, 2015	HIRA Update and Surveys Distributed
Board of Trustees	August 17, 2015	LTRP Update and Community Meeting Report
Advisory Team	August 25, 2015	Review HIRA Report
Advisory Team & Community Meeting	September 1, 2015	Land Use and Housing Surveys Presentation
Board of Trustees	September 8, 2015	Draft HIRA Report Presentation
Community Meeting	September 16, 2015	Boulder County OEM Presentation
Board of Trustees	September 18, 2015	LUHA Initial Findings
Advisory Team	Sept. 29, 2015	Review BOT Comments and Land Use Methodology
Board of Trustees	October 5, 2015	Project Update
Advisory Team	October 6, 2015	Review Draft Community Meeting Presentation
Advisory Team	October 13, 2015	Review Scenario Methodology
Advisory Team	October 20, 2015	Review Scenario Methodology
Community Meeting	October 27, 2015	Final Presentation of Findings
Advisory Team	November 24, 2015	Review Draft Report
Board of Trustees	December 14, 2015	Final Report presentation to the Board of Trustees for approval

7.1 Board of Trustees Updates

The project team provided periodic updates and briefings to the Board of Trustees throughout the duration of the planning process.

7.2 Advisory Team

The Advisory Team provided direction related to the scope of work, background information, local history, hazard mitigation efforts and issues, and local sensitivities to the full array of options that were discussed.

7.3 Community Meetings

The project team held three community meetings at key milestones throughout the study process. The purpose of these meetings was to maximize information sharing and effectively incorporate the concerns and ideas and needs of the public into the development of the study. Many of the comments and questions that were received during the community meetings were incorporated into the study during each successive phase.

7.4 Key Informant Interviews

Members of the project team met with and interviewed Town of Jamestown staff (Town Mayor, Town Clerk, Town Planner and Floodplain Administrator) and recovery consultants (ace-h20) as well as representatives of Boulder County agencies including the Boulder County Office of Emergency Management, Land Use Department, Land Use Systems Team (GIS), Transportation Department and Flood Recovery Office. Team members also consulted with AMEC on previous flood mapping.

7.5 Property Owner and Stakeholder Meetings

Members of the project team met with a number of property owners throughout the duration of the study to inform them about the goals and progress of the study, specific issues they were experiencing at their properties, and provide them with answers or to refer them to others, and to understand their respective perspectives and interests in the outcomes of the study.

7.6 Field Visits

Each member of the team visited the town and surrounding area to gain an understanding of the hazard, land use, and housing context and issues, and to field verify the information that was being collected from numerous sources around the state.

7.7 Questionnaires

Three questionnaires were distributed and collected, first in hard copy form at the conclusion of a community meeting, followed by an online version of the same questionnaires on the Town's website. Altogether, there were 83 respondents, which for a community of approximately 270 residents households, is a very high response rate, over 60%.

7.8 Downloadable Presentations on the Town's Website

Each presentation that was presented at a community meeting was posted on the town's website in downloadable form within 48 hours. Many residents took advantage of this so that they could print out their own copies of the documents.

APPENDIX A | QUESTIONNAIRE INSTRUCTIONS AND QUESTIONNAIRES

Hazard Investigation and Risk Assessment, Land Use, and Housing Study Questionnaires

The Jamestown Long Term Recovery Plan established the need to:
"….identify issues, opportunities and constraints relating to rebuilding lost housing and using public lands, taking into account current development regulations, and the impact that rebuilding has on the Town's finances, services and safety."

Funding for this Study is provided through a Community Development Block Grant for Disaster Recovery (CDBG-DR) grant administered by the Colorado Department of Local Affairs (DoLA)

Desired outcomes of this study:

- Identify Jamestown's risks to natural hazards
- Make planning and growth decisions that serve residents' needs while maintaining Jamestown's unique sense of place and distinctive mountain character
- Address issues related to the Town's fiscal sustainability

Instructions for filing out the Hazard Investigation, Land Use and Housing Questionnaires:

- Please complete **one** survey per Household.
- Please answer carefully. Your responses are very important to the success of the Hazard Investigation and Risk Assessment Study.
- Please inform your neighbors who could not attend the August 11 Community Meeting that the Survey is available electronically on the Town website. Hard copies are also available in the Town Hall, Merc and Post Office.
- Please return the survey by **Friday, August 14** to the Town Hall where a box will be provided.

Thank you for your participation!

A

JAMESTOWN HAZARD SURVEY

The purpose of this survey is to better inform the planning team as to personal experiences as possible action items are prepared for public input. For more about this study, please visit: http://jamestownco.org/hazard-risk-and-land-use-study/

–About You–

Your Name (Optional): _____ **Street Address** (Optional): _____

–Hazards in Your Neighborhood–

Which of the following Natural Disasters do you feel are a threat to your immediate neighborhood?

Wildfire	☐	Landslides*/Slope Failure	☐
Flood	☐	Wind Damage	☐
Drainage/Debris Flow*	☐	Other: _____	

In the chart below, please list any personal experiences you have had or observed in your neighborhood related to natural hazard that you feel should be addressed in this study.

Year	Location	Natural Hazard Event	Frequency of Event	Known Cause?

Debris Flow *- a moving mass of* ***loose*** *mud, soil, rock, water, woody debris and air that travels down a slope and creates a muddy deposit on a valley floor.*
Landslides/Slope Failure *- the sliding down of a mass of earth or rock from a mountain or cliff.*

Jamestown Hazard Investigation & Risk Assessment, Land Use and Housing Analysis Study

B

JAMESTOWN HOUSING & LAND USE QUESTIONNAIRE

The purpose of this questionnaire is to better inform the planning team as to community preferences around housing and land use as possible action items are prepared for public input. For more about this study, please visit: http://jamestownco.org/hazard-risk-and-land-use-study/

1. What neighborhood do you live in? The Land Use and Housing Advisory Committee (LUHAC) – made up of JT residents – has identified neighborhoods as part of their work. Please see the attached map to determine your neighborhood number.

1-☐ 2-☐ 3-☐ 4-☐ 5-☐ 6a-☐ 6b-☐ 7-☐ 8-☐

2. How long have you lived in Jamestown? _____years

3. Which of these best describes your household:
☐Couple without children
☐Couple with children
☐Single parent with children
☐Live alone
☐Includes at least one person who is unrelated to me
☐Other _____

4. Circle the number of people of the following ages living in your home (including yourself):
Under 5..... 0 1 2 3 4 5+
5-12..... 0 1 2 3 4 5+
13-18..... 0 1 2 3 4 5+
19-24..... 0 1 2 3 4 5+
25-54..... 0 1 2 3 4 5+
55-64..... 0 1 2 3 4 5+
65-74..... 0 1 2 3 4 5+
75+..... 0 1 2 3 4 5+

5. For your household, is the size of your residence:
☐Just right
☐Too small
☐Too large

6.Are you considering downsizing into a smaller home or adding on to your home in the near future (within 5 years)?
☐Downsizing
☐Adding on
☐None
☐Other _____

Jamestown Hazard Investigation & Risk Assessment, Land Use and Housing Analysis Study

7. When was your home built?

☐ 2010 or later
☐ 2000 to 2009
☐ 1990 to 1999
☐ 1980 to 1989
☐ 1970 to 1979
☐ 1960 to 1969
☐ 1950 to 1959
☐ 1940 to 1949
☐ 1939 or earlier

-Jamestown's Future-

There is a very strong desire to maintain Jamestown's mountain character. The town is currently doing well because of grants it received to help with flood recovery. However, these grants will not continue; they were provided on a ***one-time basis only*** to help with flood recovery. The town's ability to pay for services that it provides to residents (water, fire and emergency services, local government, infrastructure) has diminished since the flood due to the loss of homes and important property tax revenues. There is an understanding, based on financial projections, that the town will become financially unstable in the next 5 years.

8. Based on current knowledge of the town's financial health, and given the following choices, which would you support to help maintain town services and return the town to fiscal sustainability?

	Yes	No	Don't Know
Raise Property Taxes (see 8a)	☐	☐	☐
Investigate Alternate Revenue Sources	☐	☐	☐
Increase in Housing	☐	☐	☐
Decrease in Town Services (see 8b)	☐	☐	☐

8a. Before supporting a property tax increase to help with the Town's fiscal sustainability, would you need to know: (Check all that apply)

☐ Amount
☐ Time Period (whether temporary or permanent)
☐ Proposed Use of New Tax
☐ Other _____

8b. If you answered "Yes" to "Decrease in Town Services", which services would you support decreasing?

_____

9. Would you support annexing private lands (with existing housing) to help maintain town services? ☐Yes ☐No ☐Don't Know
☐Other _____

-Housing-

10.According to Town records, historical, average growth in Jamestown from 1950 to 2014 has been about 1 new house built per year. About six new houses were built between 1994 and 2014. Do you think this rate of growth (about 1 house per year) is:

☐About Right
☐Too Little
☐Too Much

11. Are there areas in town or adjacent to town where the consultant team should investigate the feasibility of constructing new homes? (Check all that apply)

☐Rose M
☐West of Ward St.
☐Public Lands (Acquire / Annex)
☐None
☐Other _____

12. Accessory Dwelling Units (ADUs) are secondary dwelling units added to, created within, or detached from a primary dwelling unit on the same property. ADUs can be used for a wide variety of residential purposes and/or help provide supplemental rental income. The ADU Ordinance was adopted by the Jamestown Board of Trustees in January 2014. Would you consider building or converting an existing secondary structure on your property to an accessory dwelling unit (ADU) in which a relative or unrelated household member could live?

☐ Yes ☐No ☐NA ☐Don't Know ☐Already have one

13. Please rank your preference on how the town should consider adding more housing? Please check "Great Option", "Good Option", "Okay Option" or "Bad Option for each.

	Great Option	Good Option	Okay Option	Bad Option
Should not add more housing	☐	☐	☐	☐
Add more housing:				
In town on vacant properties	☐	☐	☐	☐
Adding ADU's	☐	☐	☐	☐
Acquire / annex public lands	☐	☐	☐	☐
Annex private lands (with existing housing)	☐	☐	☐	☐
Bring municipal water to existing lots at Rose M	☐	☐	☐	☐
Bring municipal water to existing lots West of Ward Street	☐	☐	☐	☐
Allow lot sizes to be smaller than 2.3 acres	☐	☐	☐	☐
Permit multifamily dwellings	☐	☐	☐	☐
Other _____	☐	☐	☐	☐

-Services-

14. Jamestown's Long Term Recovery Plan and the Jamestown Land Use and Housing Advisory Committee (LUHAC) has highlighted aging in place as a goal. Would you support town activities to help residents age in place?

☐Yes ☐No ☐Other _____

15. We would like to identify aging in place needs. In the past year, did anyone you know in your household or neighborhood need or receive outside help (from non-relatives) with any of the following (check all that apply)

	Needed	Received
Household tasks (such as yardwork or heavy cleaning)	☐	☐
Personal care (bathing, dressing, etc.)	☐	☐
Home health assistance	☐	☐
Meals delivered to home	☐	☐
Transportation services	☐	☐
Other_____	☐	☐

16. Is keeping the Jamestown K-5 Elementary School operating with sufficient numbers of students important to you either for the purpose of drawing/keeping young families in Jamestown or for other personal / community benefits?

☐Very Important ☐Somewhat Important ☐ Neutral ☐ Not Important

17. How satisfied are you with the current:

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Unsatisfied	Very Unsatisfied
Town services					
Water	☐	☐	☐	☐	☐
Fire/EMS	☐	☐	☐	☐	☐
Roads & Bridges	☐	☐	☐	☐	☐
Parks & Recreation	☐	☐	☐	☐	☐
Other_____	☐	☐	☐	☐	☐
Availability of Services	☐	☐	☐	☐	☐
Cost of Services	☐	☐	☐	☐	☐
Pace of development	☐	☐	☐	☐	☐
Housing opportunities	☐	☐	☐	☐	☐
Cost of housing	☐	☐	☐	☐	☐
Ability to "age in place"	☐	☐	☐	☐	☐

18. Are there any services that you would like to see the town add?

19. Do you have any other questions, comments, or recommendations related to land use, housing and fiscal sustainability?

C

JAMESTOWN HOUSING & LAND USE QUESTIONNAIRE: BACKGROUND INFO

The purpose of this questionnaire is to provide the planning team with additional background information in order to better inform the needs, desires, and preferences of the Jamestown community regarding housing options. The information is also being requested in order to get a better understanding of the community's financial burden. While some of this information may be personal, none of this information can or will be used to identify you personally. Your privacy will be protected. Your answer will be combined with other answers to provide information about the community as a whole. For more about this study, please visit: http://jamestownco.org/hazard-risk-and-land-use-study/

1. What neighborhood do you live in? The Land Use and Housing Advisory Committee (LUHAC) – made up of JT residents – has identified neighborhoods as part of their work. Please see the attached map to determine your neighborhood number.

1-☐ 2-☐ 3-☐ 4-☐ 5-☐ 6a-☐ 6b-☐ 7-☐ 8-☐

2. Before the flood, was your Jamestown residence:
☐Owned by you or a family member
☐Rented from a landlord
☐Other _____

3. Is your residence currently:
☐Owned by you or a family member in Jamestown
☐Rented from a landlord and located in Jamestown
☐Outside of Jamestown but wish to return to Jamestown
☐Other _____

4. What is the *current* condition of your home in Jamestown?
☐Unaffected by the flood
☐Affected by the flood and fully repaired
☐Inhabitable but needs minor repairs (<$15,000)
☐Inhabitable but needs major repairs (>$15,000)
☐Uninhabitable – total rebuilding needed
☐Applied for/moving forward with HMGP or CDBG-DR buyout

5. Are you planning or considering a move to a different residence (outside of Jamestown) within the next 5 years?
☐ Yes ☐No ☐Don't Know

Jamestown Hazard Investigation & Risk Assessment, Land Use and Housing Analysis Study

5a. If yes/don't know, why would you consider / plan a move (outside of Jamestown) within the next 5 years? (Check all that apply)

- ☐More housing options
- ☐Closer to family / friends / support network
- ☐Closer to job / education
- ☐Closer to needed services including medical
- ☐Less expensive housing
- ☐Cost to rebuild in Jamestown
- ☐Other _____

6. What is your primary source of income?

- ☐Job
- ☐Unemployment benefits
- ☐Retirement pension
- ☐Social Security
- ☐Investment (real estate, stocks, bonds, IRA, not including retirement pension)
- ☐Family support
- ☐Other _____

7. How has the flood impacted your household income? (check all that apply)

- ☐Paying mortgage on house currently being repaired while paying rent on temporary housing
- ☐Household repairs over and above regular maintenance (see Question 7a)
- ☐Leave of absence from regular job
- ☐Time dealing with insurance and other household matters
- ☐Using savings or borrowing for unreimbursed or unreimbursable temporary living expenses
- ☐Purchasing, installing, maintaining cisterns while water services were out
- ☐Has not impacted income
- ☐Other _____

7a. If you checked "Household repairs over and above regular maintenance" in Question 7, how much would you estimate your household has spent?

- ☐$0-$14,999
- ☐$15,000-$49,999
- ☐$50,000-$99,999
- ☐$100,000+

8. Have you experienced or heard of anyone in our mountain community being refused renewal of their homeowners insurance policy?

☐ Yes ☐No

8a. Reason for Cancellation, if known? _____

_____

9. What is your current gross annual household income (total income for all household members before taxes)?

- ☐Less than $35,000
- ☐$35,000-$49,999
- ☐$50,000-$74,999
- ☐$75,000-$99,999
- ☐$100,000 to $124,999
- ☐$125,000-$149,999
- ☐$150,000 to $199,999
- ☐$200,000+
- ☐Prefer not to answer

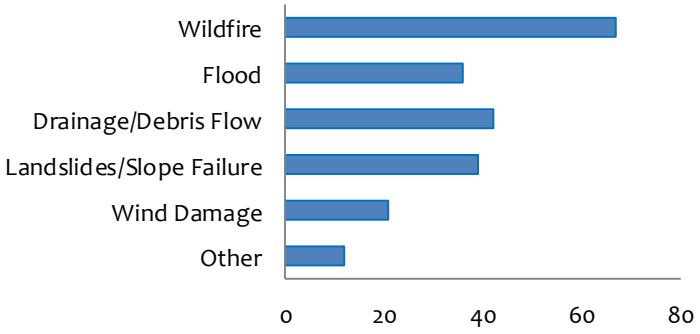
APPENDIX B | JAMESTOWN HAZARD INVESTIGATION, HOUSING AND LAND USE QUESTIONNAIRE RESULTS

Jamestown Hazard Investigation, Housing & Land Use Questionnaire

October 1, 2015

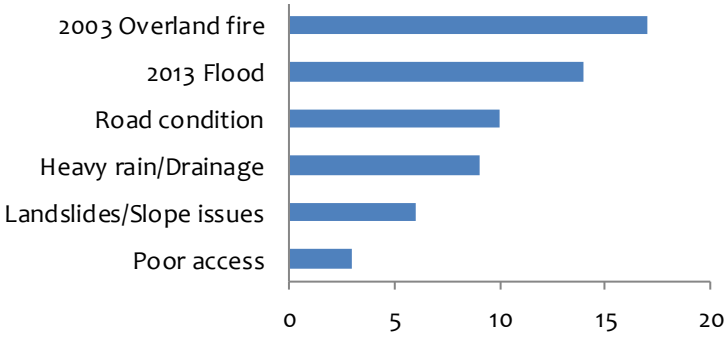
Which of the following Natural Disasters do you feel are a threat to your immediate neighborhood?

Wildfire	**67**	75.3%
Flood	**36**	40.4%
Drainage/Debris Flow	**42**	47.2%
Landslides/Slope Failure	**39**	43.8%
Wind Damage	**21**	23.6%
Other	**12**	13.5%



Personal Experiences you have had or observed in your neighborhood related to natural hazards

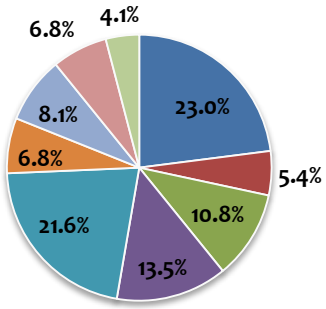
2003 Overland fire	17
2013 Flood	14
Road condition	10
Heavy rain/Drainage	9
Landslides/Slope issues	6
Poor access	3



Background Information

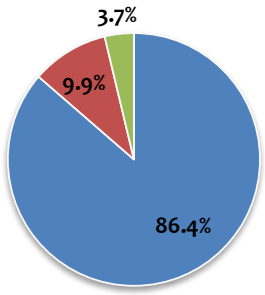
1). What neighborhood do you live in?

1	17	23.0%
2	4	5.4%
3	8	10.8%
4	10	13.5%
5	16	21.6%
6a	5	6.8%
6b	6	8.1%
7	5	6.8%
8	3	4.1%



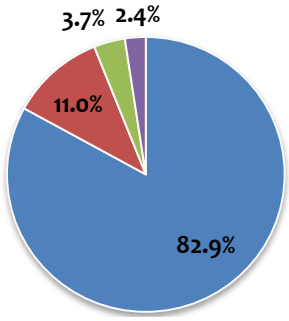
2). Before the flood, was your Jamestown residence:

Owned by you or a family member	70	86.4%
Rented from a landlord	8	9.9%
Other	3	3.7%



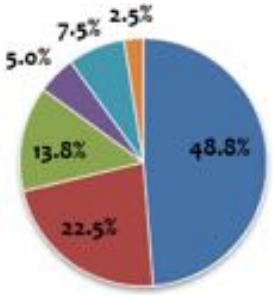
3). Is your residence currently:

Owned by you or a family member in Jamestown	68	82.9%
Rented from a landlord and located in Jamestown	9	11.0%
Outside of Jamestown but wish to return to Jamestown	3	3.7%
Other	2	2.4%



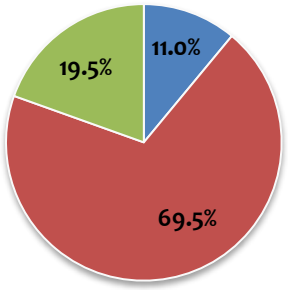
4). What is the current condition of your home in Jamestown?

Unaffected by the flood	39	48.8%
Affected by the flood and fully repaired	18	22.5%
Inhabitable but needs minor repairs (<$15,000)	11	13.8%
Inhabitable but needs major repairs (>$15,000)	4	5.0%
Uninhabitable - total rebuilding needed	6	7.5%
Applied for/moving forward with HMGP or CDBG-DR buyout	2	2.5%



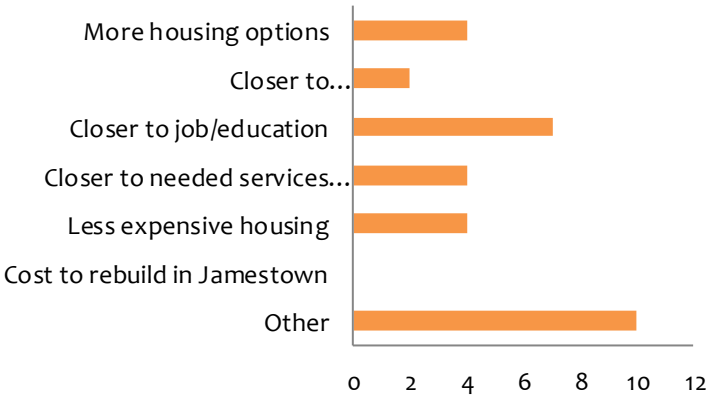
5). Are you planning or considering a move to a different residence (outside of Jamestown) within the next 5 years?

Yes	9	11.0%
No	57	69.5%
Don't know	16	19.5%



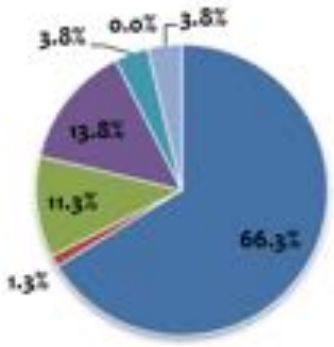
5a). If yes/don't know, why would you consider/plan a move (outside of Jamestown) within the next 5 years?

More housing options	4	12.9%
Closer to family/friends/support network	2	6.5%
Closer to job/education	7	22.6%
Closer to needed services including medical	4	12.9%
Less expensive housing	4	12.9%
Cost to rebuild in Jamestown	0	0.0%
Other	10	32.3%



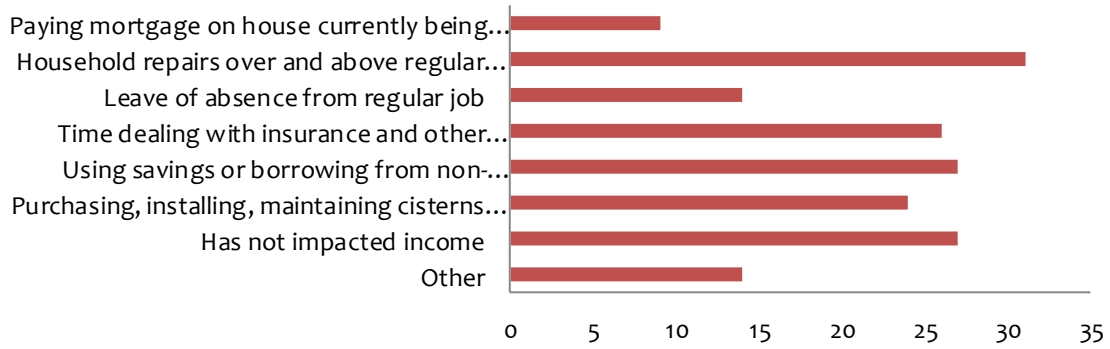
6). What is your primary source of income?

Job	53	66.3%
Unemployment benefits	1	1.3%
Retirement pension	9	11.3%
Social Security	11	13.8%
Investment (real estate, stocks, bonds, IRA, not including retirement pension)	3	3.8%
Family support	0	0.0%
Other	3	3.8%



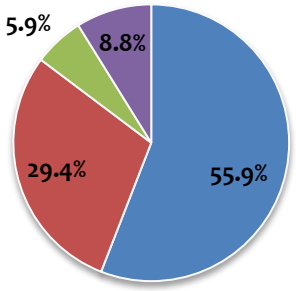
7). How has the flood impacted your household income?

Paying mortgage on house currently being repaired while paying rent on temporary housing	**9**	5.2%
Household repairs over and above regular maintenance (see Question 7a)	**31**	18.0%
Leave of absence from regular job	**14**	8.1%
Time dealing with insurance and other household matters	**26**	15.1%
Using savings or borrowing from non-reimbursable temporary living expenses	**27**	15.7%
Purchasing, installing, maintaining cisterns while water services were out	**24**	14.0%
Has not impacted income	**27**	15.7%
Other	**14**	8.1%



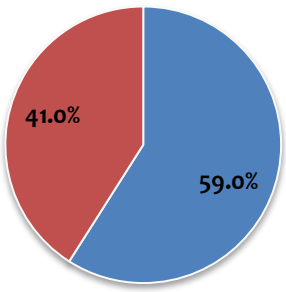
7a). If you checked "Household repairs over and above regular maintenace" in Question 7, how much would you estimate your household has spent?

$0 - $14,999	**19**	55.9%
$15,000 - $49,999	**10**	29.4%
$50,000 - $99,999	**2**	5.9%
$100,000+	**3**	8.8%



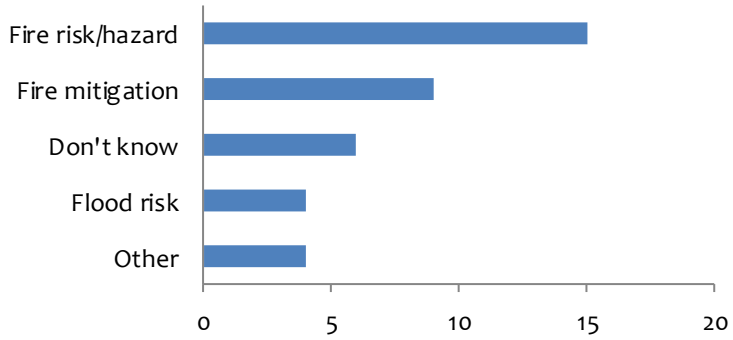
8). Have you experienced or heard of anyone in our mountain community being refused renewal of their homeowners insurance policy?

Yes	**46**	59.0%
No	**32**	41.0%



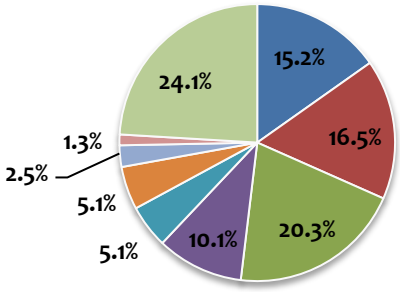
8a.) If you answered yes to Question 8 above, please explain the reason for the cancellation, if known.

Fire risk/hazard	15
Fire mitigation	9
Don't know	6
Flood risk	4
Other	4



9). What is your current gross annual household income (total income for all household members before taxes)?

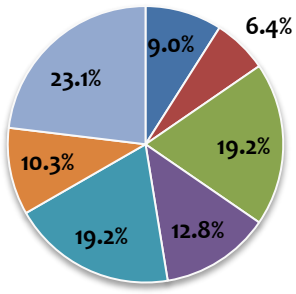
Less than $35,000	12	15.2%
$35,000 - $49,999	13	16.5%
$50,000 - $74,999	16	20.3%
$75,000 - $99,999	8	10.1%
$100,000 - $124,999	4	5.1%
$125,000 - $149,999	4	5.1%
$150,000 - $199,999	2	2.5%
$200,000+	1	1.3%
Prefer not to answer	19	24.1%



Jamestown Housing & Land Use Survey

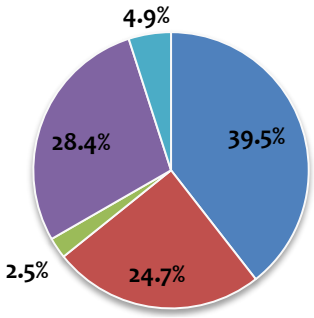
1) How long have you lived in Jamestown?

0 to 4 years	7	9.0%
5 to 9 years	5	6.4%
10 to 14 years	15	19.2%
15 to 19 years	10	12.8%
20 to 24 years	15	19.2%
25 to 29 years	8	10.3%
30+ years	18	23.1%



2). Which of these best describes your household?

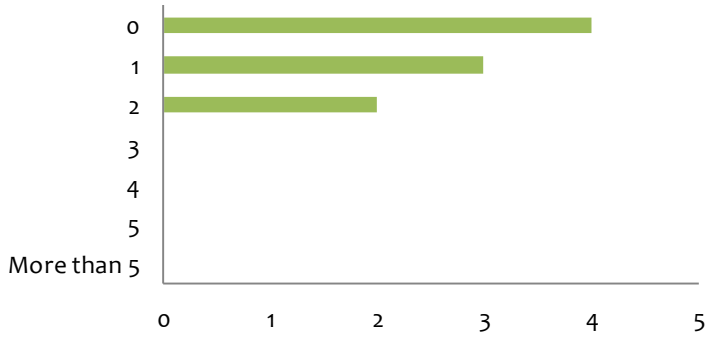
Couple without children	**32**	39.5%
Couple with children	**20**	24.7%
Single parent with children	**2**	2.5%
Single/Living alone	**23**	28.4%
Includes at least one person who is unrelated to me	**4**	4.9%
Other	**0**	0.0%



3) Please choose the number of people and their ages who are living in your household, including yourself?

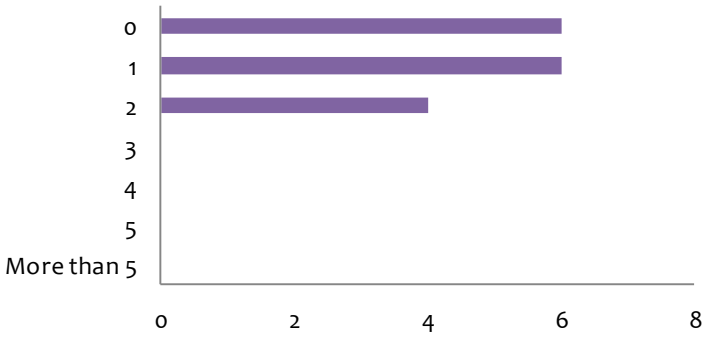
Under 5

0	**4**	44.4%
1	**3**	33.3%
2	**2**	22.2%
3	**0**	0.0%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



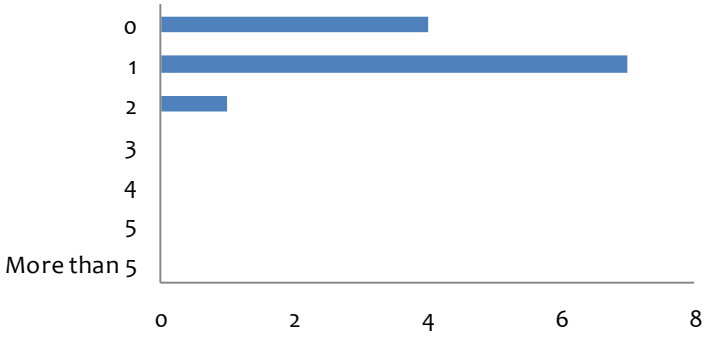
Age 5-12

0	**6**	37.5%
1	**6**	37.5%
2	**4**	25.0%
3	**0**	0.0%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



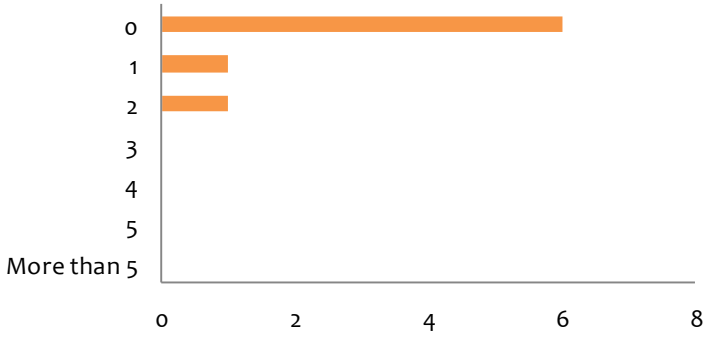
Age 13-18

0	**4**	33.3%
1	**7**	58.3%
2	**1**	8.3%
3	**0**	0.0%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



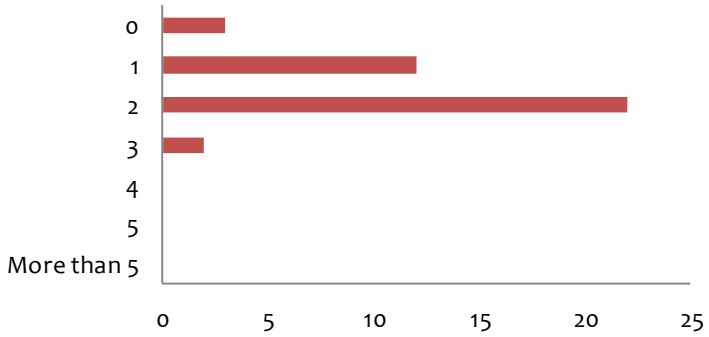
Age 19-24

0	**6**	75.0%
1	**1**	12.5%
2	**1**	12.5%
3	**0**	0.0%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



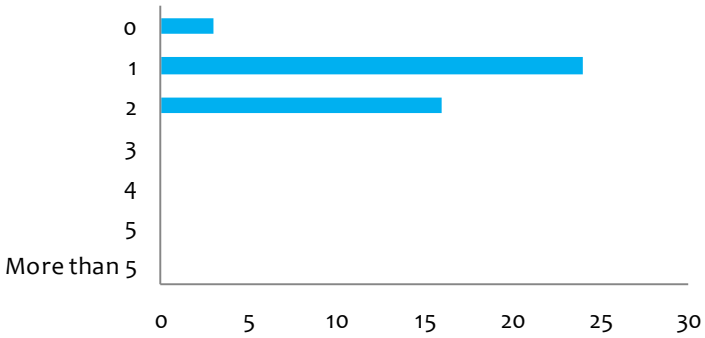
Age 25-54

0	**3**	7.7%
1	**12**	30.8%
2	**22**	56.4%
3	**2**	5.1%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



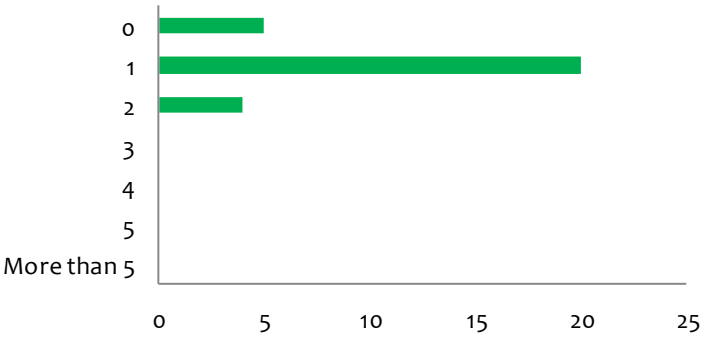
Age 55-64

0	**3**	7.0%
1	**24**	55.8%
2	**16**	37.2%
3	**0**	0.0%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



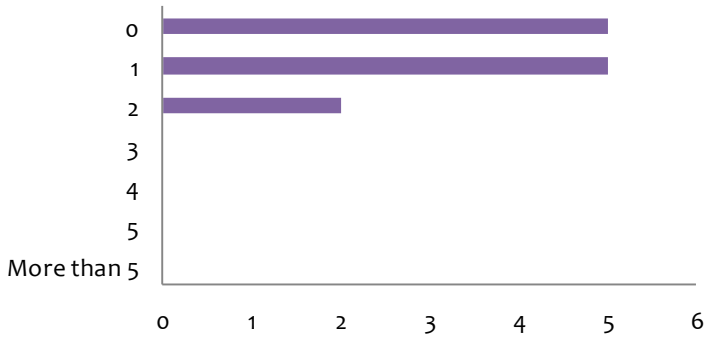
Age 65-74

0	**5**	17.2%
1	**20**	69.0%
2	**4**	13.8%
3	**0**	0.0%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



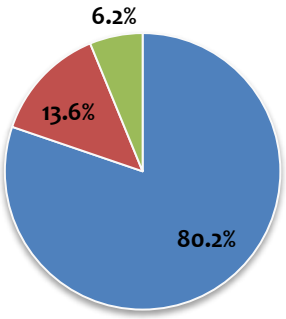
Over 75

0	**5**	41.7%
1	**5**	41.7%
2	**2**	16.7%
3	**0**	0.0%
4	**0**	0.0%
5	**0**	0.0%
More than 5	**0**	0.0%



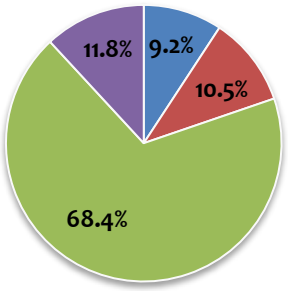
4). For your household, is the size of your residence?

Just right	65	80.2%
Too small	11	13.6%
Too large	5	6.2%



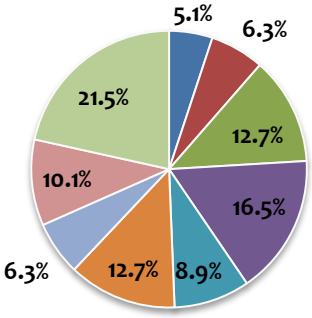
5). Are you considering downsizing into a smaller home or adding on to your home in the near future (within 5 years)?

Downsizing	7	9.2%
Adding on	8	10.5%
None	52	68.4%
Other	9	11.8%



6). When was your home built?

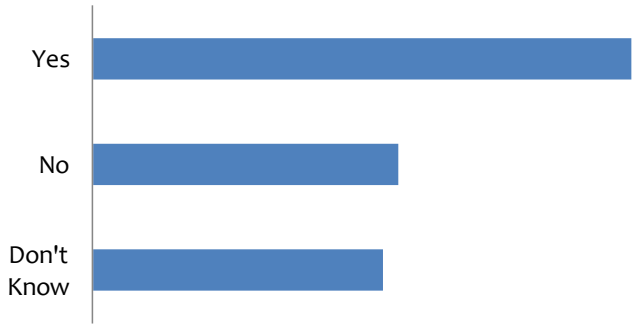
2010 or later	4	5.1%
2000 to 2009	5	6.3%
1990 to 1999	10	12.7%
1980 to 1989	13	16.5%
1970 to 1979	7	8.9%
1960 to 1969	10	12.7%
1950 to 1959	5	6.3%
1940 to 1949	8	10.1%
1939 or earlier	17	21.5%



7). Based on current knowledge of the town's financial health, and given the following choices, which would you support to help maintain town services and return the town to fiscal

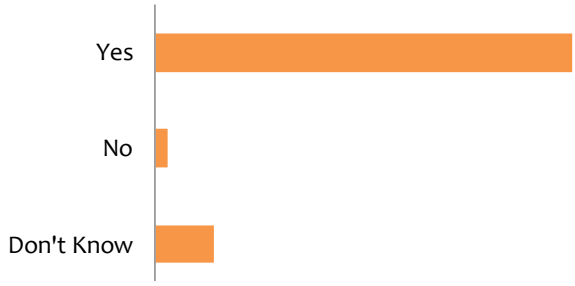
Raise Property Taxes

Yes	37	47.4%
No	21	26.9%
Don't Know	20	25.6%



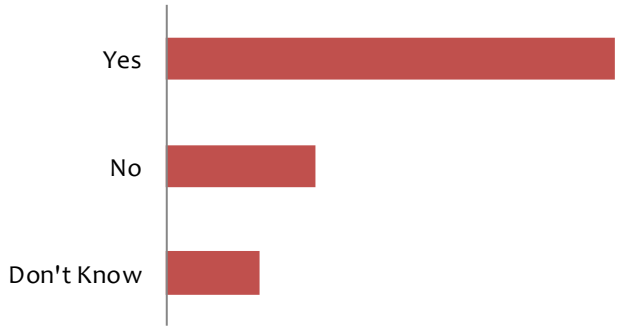
Investigate Alternate Revenue Sources

Yes	**65**	85.5%
No	**2**	2.6%
Don't Know	**9**	11.8%



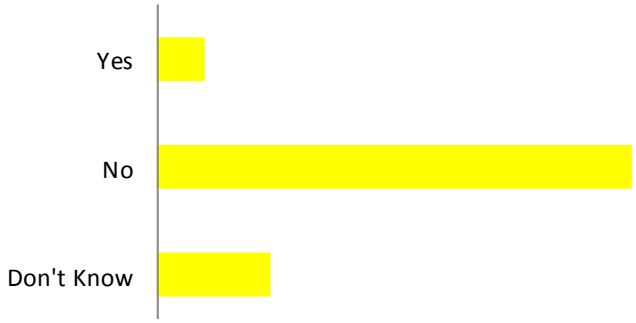
Increase in Housing

Yes	**48**	64.9%
No	**16**	21.6%
Don't Know	**10**	13.5%



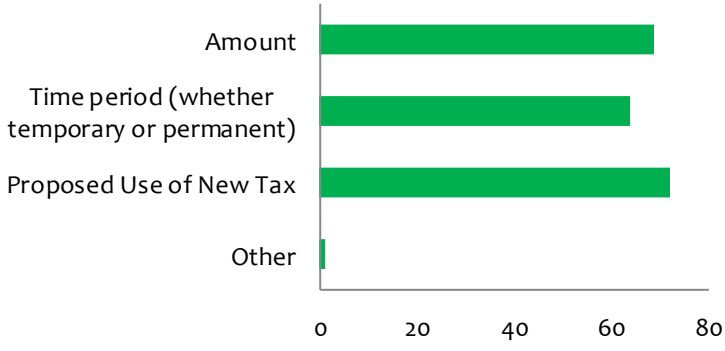
Decrease in Town Services

Yes	**5**	7.5%
No	**50**	74.6%
Don't Know	**12**	17.9%



7a). Before supporting a property tax increase to help with the Town's fiscal sustainability, would you need to know:

Amount	**69**	90.8%
Time period (whether temporary or permanent)	**64**	84.2%
Proposed Use of New Tax	**72**	94.7%
Other	**1**	1.3%

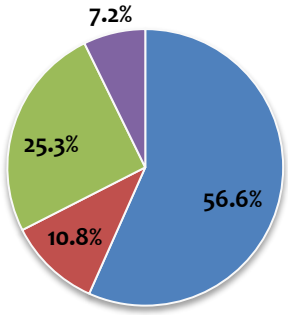


7b). If you answered "Yes" to "Decrease in Town Services, which services would you support decreasing?

None	1	14.3%
All except water	1	14.3%
Any	1	14.3%
Other	4	57.1%

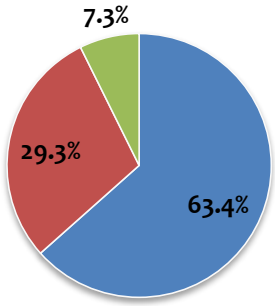
8). Would you support annexing private lands (with existing housing) to help maintain town services?

Yes	47	56.6%
No	9	10.8%
Don't Know	21	25.3%
Other	6	7.2%



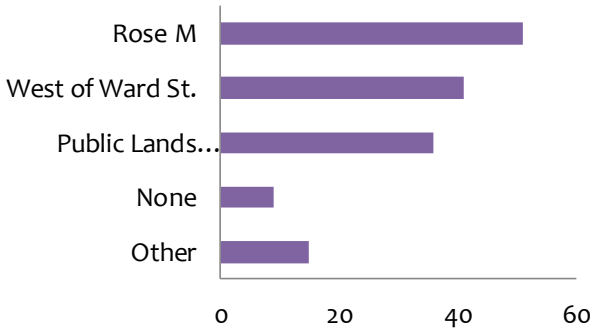
9). According to Town records, historical, average growth in Jamestown from 1950 to 2014 has been about 1 new house built per year. About six new houses were built between 1994 and 2014. Do you think this rate of growth (about 1 house per year) is:

About Right	52	63.4%
Too Little	24	29.3%
Too Much	6	7.3%



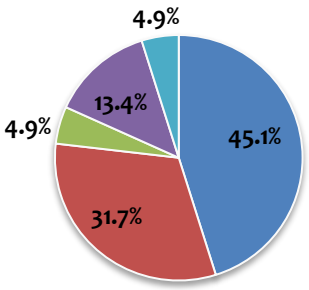
10). Are there areas in town or adjacent to town where the consultant team should investigate the feasibility of constructing new homes?

Rose M	**51**	65.4%
West of Ward St	**41**	52.6%
Public Lands (Ac	**36**	46.2%
None	**9**	11.5%
Other	**15**	19.2%



11). Accessory Dwelling Units (ADUs) are secondary dwelling units added to, created within, or detached from a primary dwelling unit on the same property. ADUs can be used for a wide variety of residential purposes and/or help provide supplemental rental income. The ADU Ordinance was adopted by the Jamestown Board of Trustees in January 2014. Would you consider building or converting an existing secondary structure on your property to an accessory dwelling unit (ADU) in which a relative or unrelated household member could live?

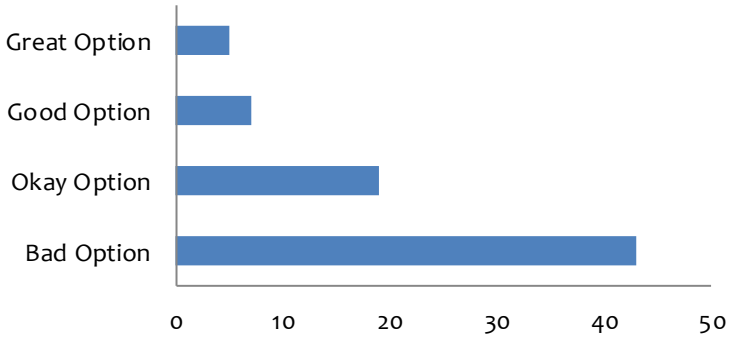
Yes	**37**	45.1%
No	**26**	31.7%
N/A	**4**	4.9%
Don't Know	**11**	13.4%
Already Have One	**4**	4.9%



12). Please rank your preference on how the town should consider adding more housing?

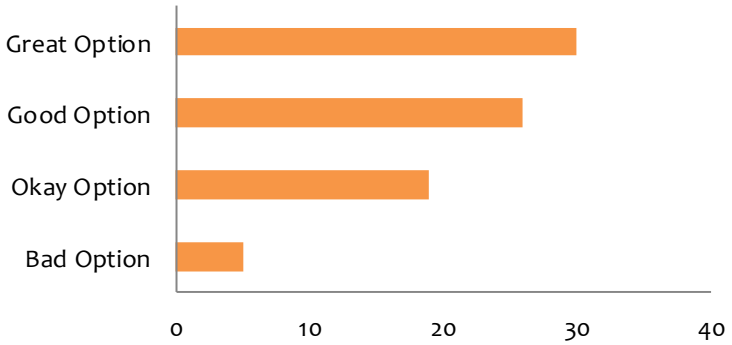
Should not add more housing

Great Option	**5**	6.8%
Good Option	**7**	9.5%
Okay Option	**19**	25.7%
Bad Option	**43**	58.1%



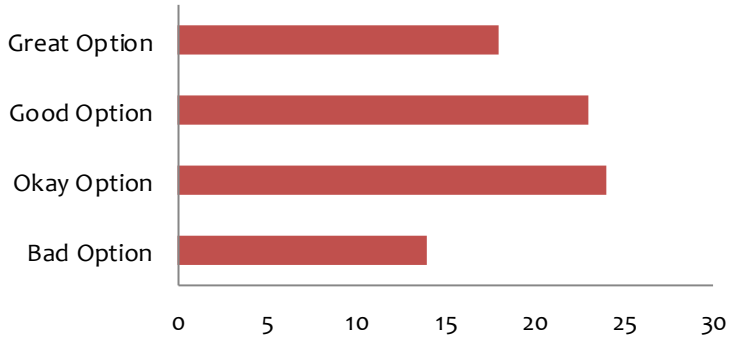
Add more housing in town on vacant properties

Great Option	**30**	37.5%
Good Option	**26**	32.5%
Okay Option	**19**	23.8%
Bad Option	**5**	6.3%



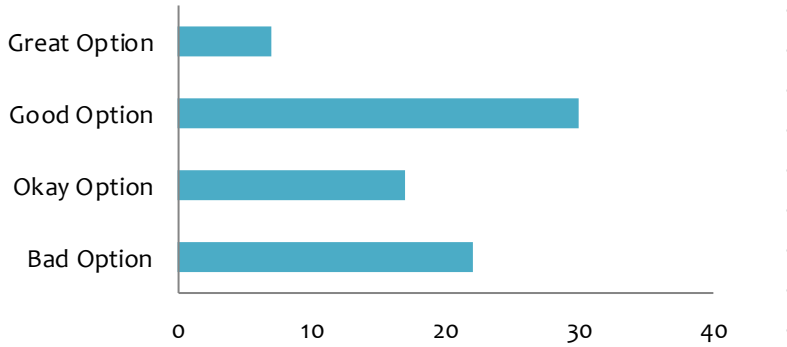
Add more housing by adding ADUs

Great Option	**18**	22.8%
Good Option	**23**	29.1%
Okay Option	**24**	30.4%
Bad Option	**14**	17.7%



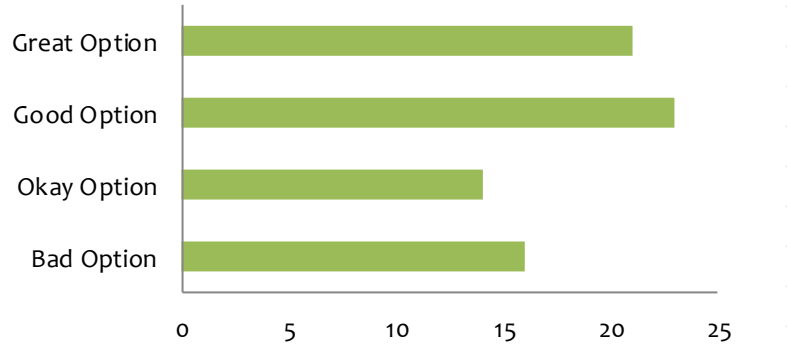
Add more housing by Acquiring/Annexing Public Lands

Great Option	**7**	9.2%
Good Option	**30**	39.5%
Okay Option	**17**	22.4%
Bad Option	**22**	28.9%



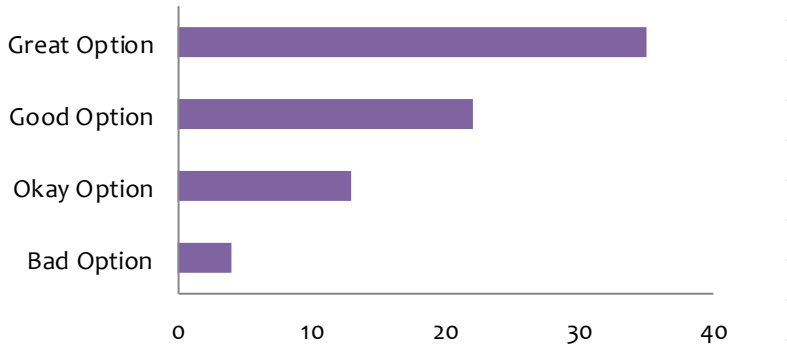
Annex Private lands with existing homes

Great Option	**21**	28.4%
Good Option	**23**	31.1%
Okay Option	**14**	18.9%
Bad Option	**16**	21.6%



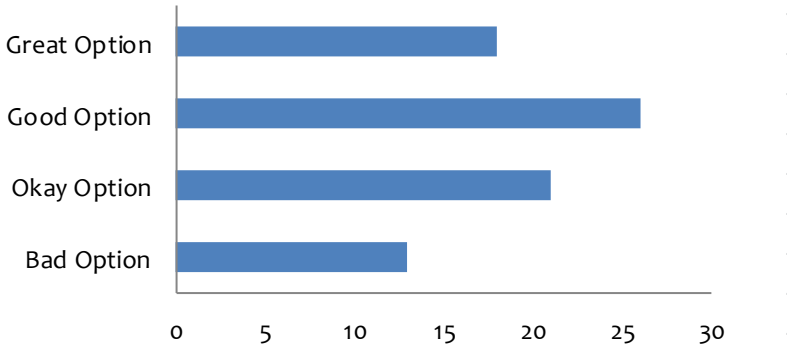
Bring municipal water to existing lots at Rose M

Great Option	**35**	47.3%
Good Option	**22**	29.7%
Okay Option	**13**	17.6%
Bad Option	**4**	5.4%



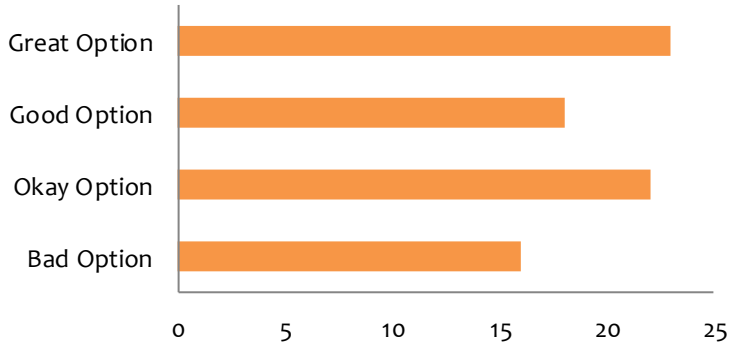
Bring municipal water to existing lots West of Ward Street

Great Option	**18**	23.1%
Good Option	**26**	33.3%
Okay Option	**21**	26.9%
Bad Option	**13**	16.7%



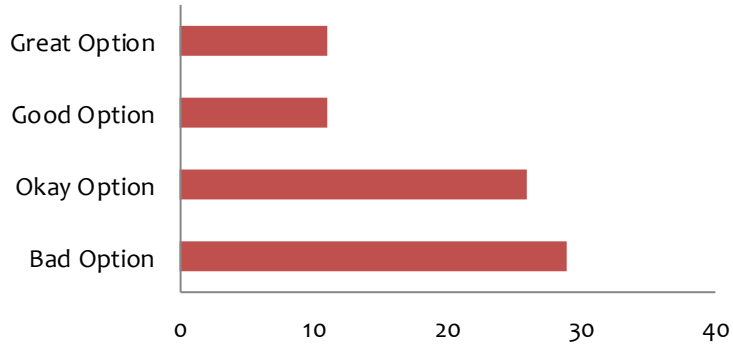
Allow Subdivision Lot Sizes to be Smaller than 2.3 Acres

Great Option	**23**	29.1%
Good Option	**18**	22.8%
Okay Option	**22**	27.8%
Bad Option	**16**	20.3%



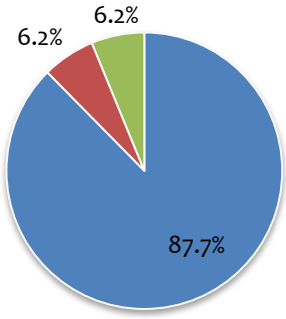
Permit multifamily dwellings (e.g. duplexes, apt., town homes)

Great Option	**11**	14.3%
Good Option	**11**	14.3%
Okay Option	**26**	33.8%
Bad Option	**29**	37.7%



13). Jamestown's Long Term Recovery Plan and the Jamestown Land Use and Housing Advisory Committee (LUHAC) has activities to help residents age in place?

Yes	**71**	87.7%
No	**5**	6.2%
Other	**5**	6.2%



14). We would like to identify aging in place needs. In the past year, did anyone you know in your household or neighborhood need or receive outside help (from non-relatives) with any of the following?

Household tasks (e.g. yard work, heavy cleaning, etc.)

Needed	14	41.2%
Received	20	58.8%

Personal care (e.g. bathing, dressing, etc.)

Needed	7	77.8%
Received	2	22.2%

Home health assistance

Needed	7	63.6%
Received	4	36.4%

Meals delivered to home

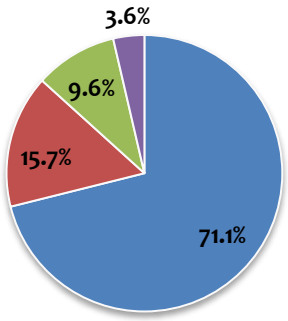
Needed	9	56.3%
Received	7	43.8%

Transportation Services

Needed	17	81.0%
Received	4	19.0%

15). Is keeping the Jamestown K-5 Elementary School operating with sufficient numbers of students important to you either for the purpose of drawing/keeping young families in Jamestown or for other personal/community benefits?

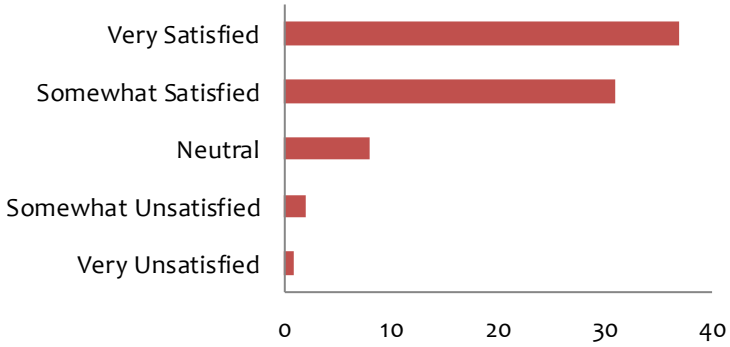
Very Important	59	71.1%
Somewhat Important	13	15.7%
Neutral	8	9.6%
Not Important	3	3.6%



16). How satisfied are you with the current:

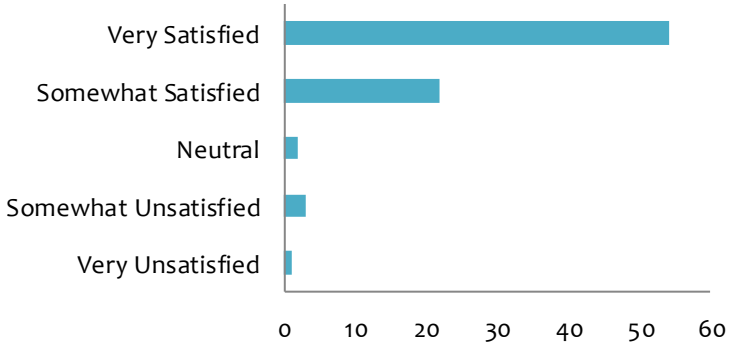
Water

Very Satisfied	37	46.8%
Somewhat Satisfied	31	39.2%
Neutral	8	10.1%
Somewhat Unsatisfied	2	2.5%
Very Unsatisfied	1	1.3%



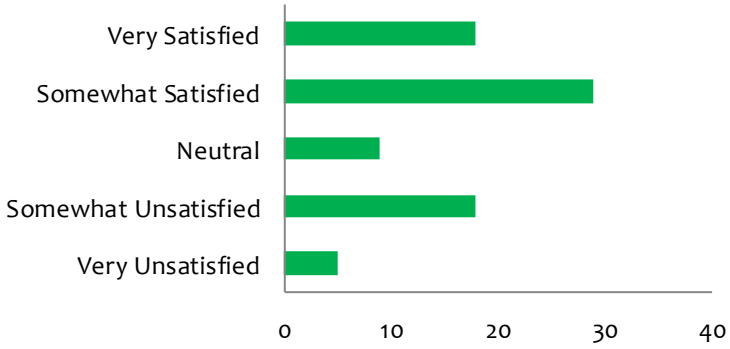
Fire/EMS

Very Satisfied	54	65.9%
Somewhat Satisfied	22	26.8%
Neutral	2	2.4%
Somewhat Unsatisfied	3	3.7%
Very Unsatisfied	1	1.2%



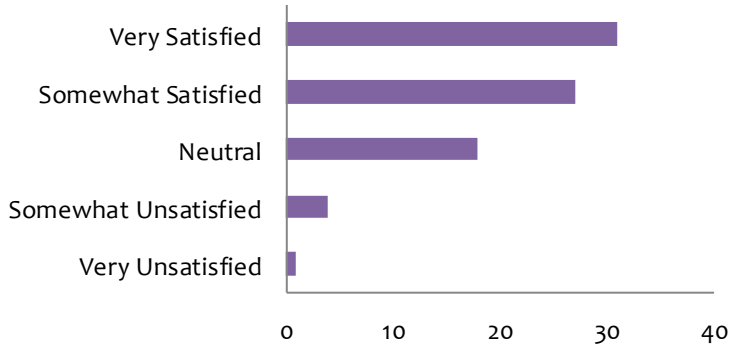
Roads & Bridges

Very Satisfied	18	22.8%
Somewhat Satisfied	29	36.7%
Neutral	9	11.4%
Somewhat Unsatisfied	18	22.8%
Very Unsatisfied	5	6.3%



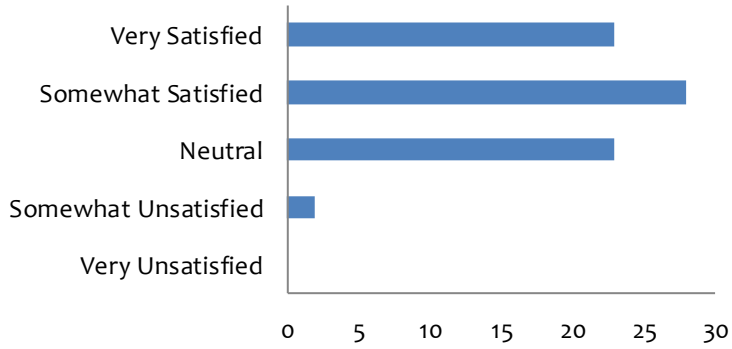
Parks & Recreation

Very Satisfied	31	38.3%
Somewhat Satisfied	27	33.3%
Neutral	18	22.2%
Somewhat Unsatisfied	4	4.9%
Very Unsatisfied	1	1.2%



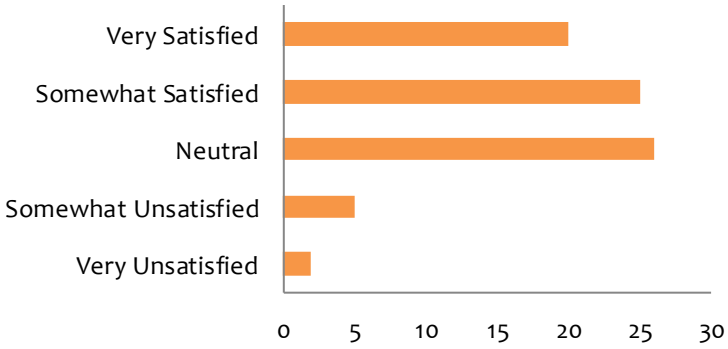
Availability of Services

Very Satisfied	23	30.3%
Somewhat Satisfied	28	36.8%
Neutral	23	30.3%
Somewhat Unsatisfied	2	2.6%
Very Unsatisfied	0	0.0%



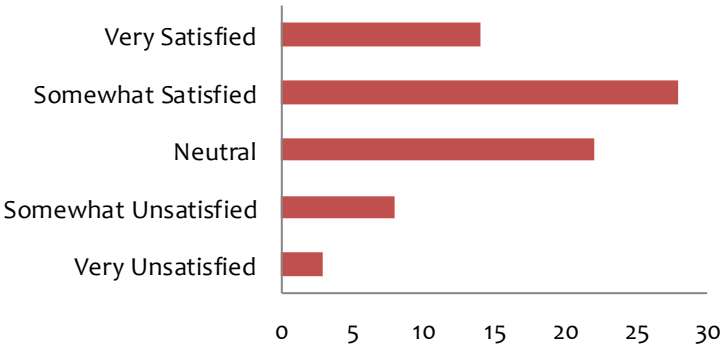
Cost of Services

Very Satisfied	20	25.6%
Somewhat Satisfied	25	32.1%
Neutral	26	33.3%
Somewhat Unsatisfied	5	6.4%
Very Unsatisfied	2	2.6%



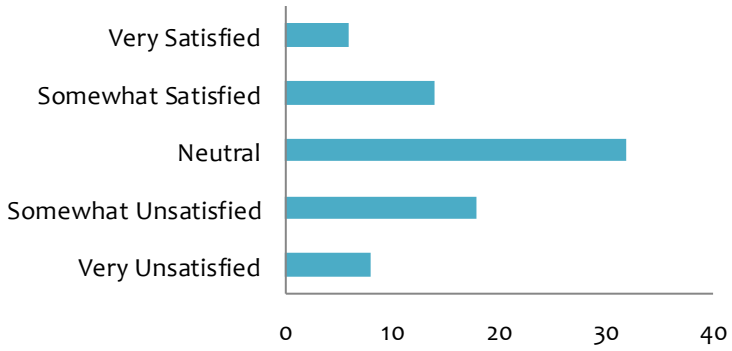
Pace of Development

Very Satisfied	14	18.7%
Somewhat Satisfied	28	37.3%
Neutral	22	29.3%
Somewhat Unsatisfied	8	10.7%
Very Unsatisfied	3	4.0%



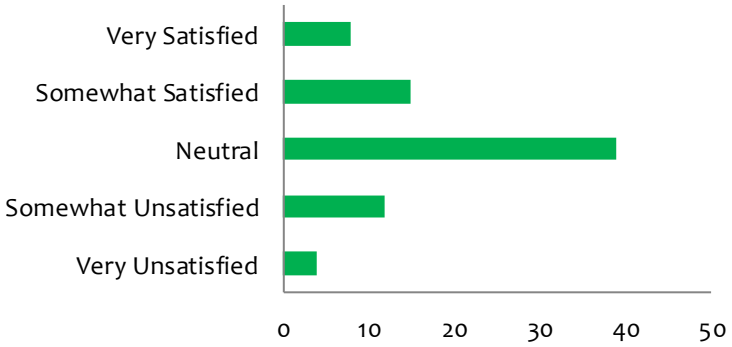
Housing Opportunities

Very Satisfied	6	7.7%
Somewhat Satisfied	14	17.9%
Neutral	32	41.0%
Somewhat Unsatisfied	18	23.1%
Very Unsatisfied	8	10.3%



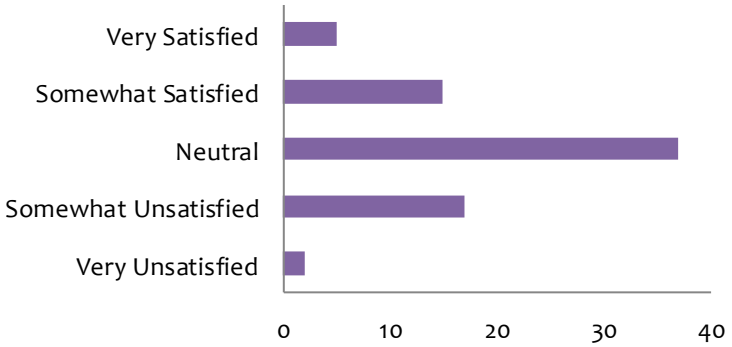
Cost of Housing

Very Satisfied	8	10.3%
Somewhat Satisfied	15	19.2%
Neutral	39	50.0%
Somewhat Unsatisfied	12	15.4%
Very Unsatisfied	4	5.1%



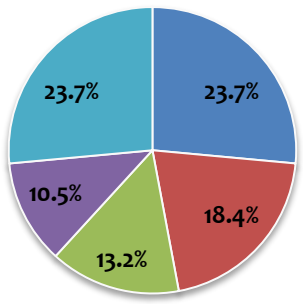
Ability to "age in place"

Very Satisfied	5	6.6%
Somewhat Satisfied	15	19.7%
Neutral	37	48.7%
Somewhat Unsatisfied	17	22.4%
Very Unsatisfied	2	2.6%



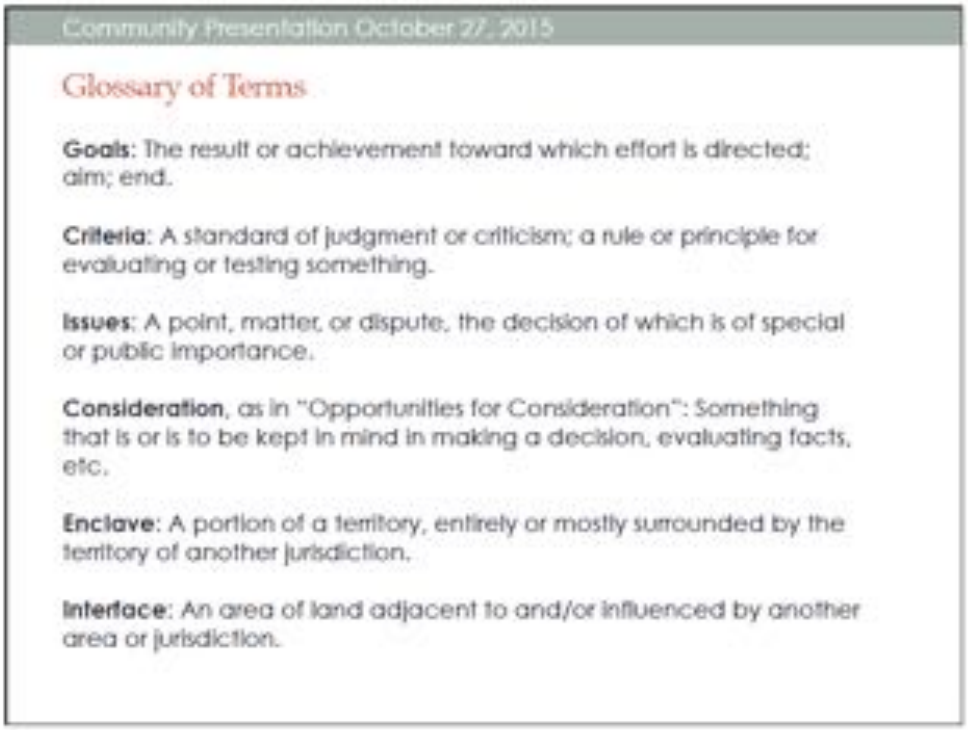
17. Are there any services that you would like to see the Town add?

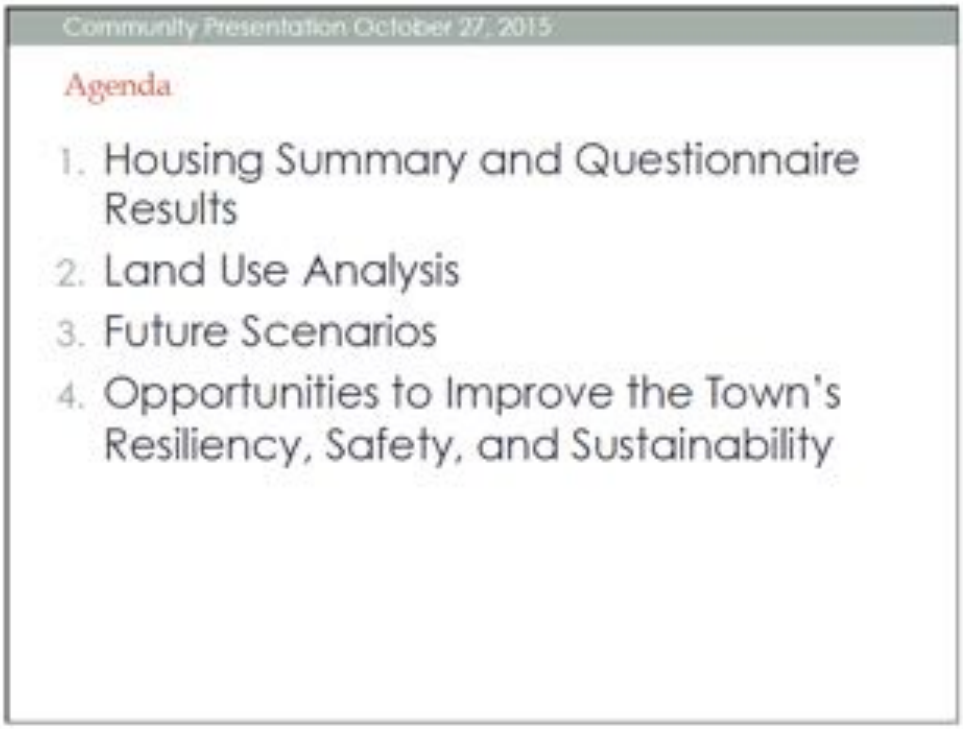
Recycling	9	23.7%
Recreational amenities	7	18.4%
Better government	5	13.2%
Aging in place services	4	10.5%
Other	9	23.7%

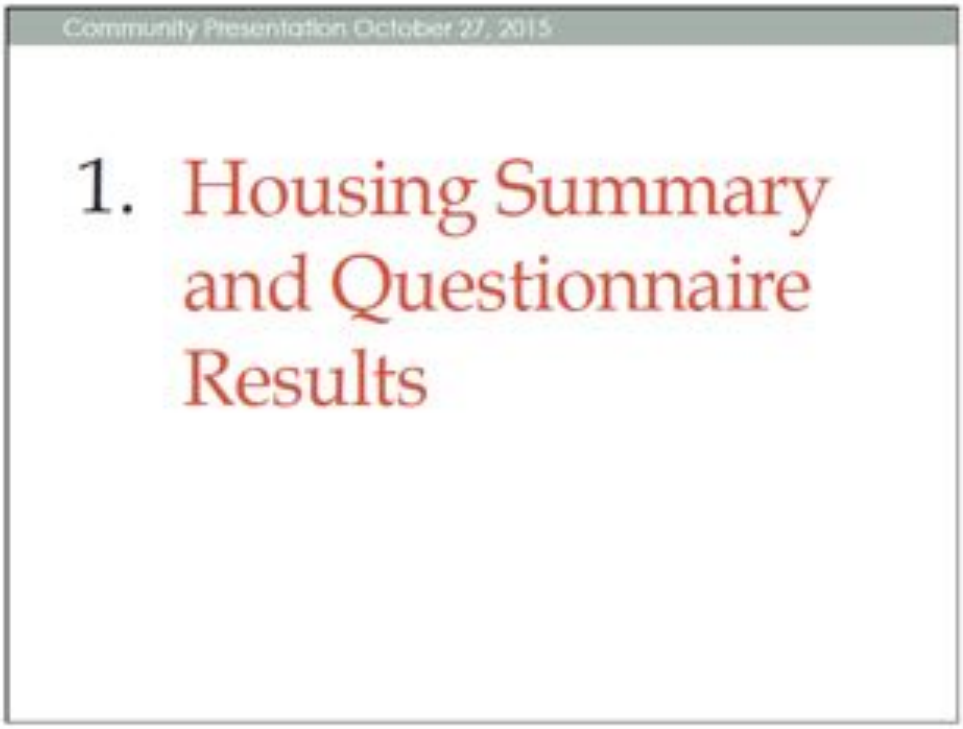


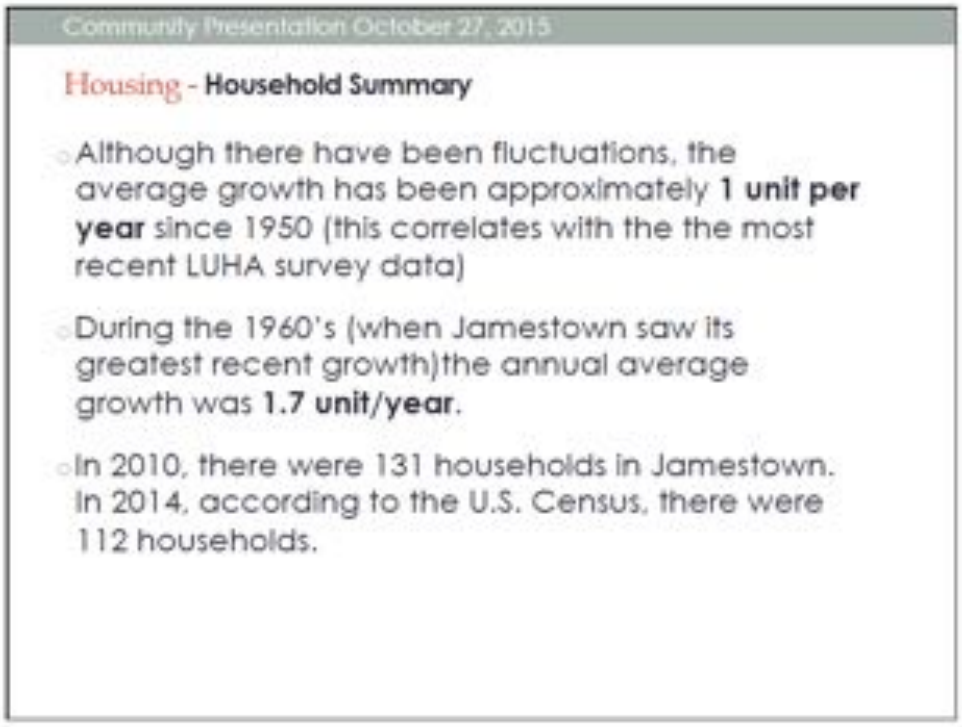
18. Do you have any other questions, comments or recommendations related to land use, housing and fiscal sustainability?

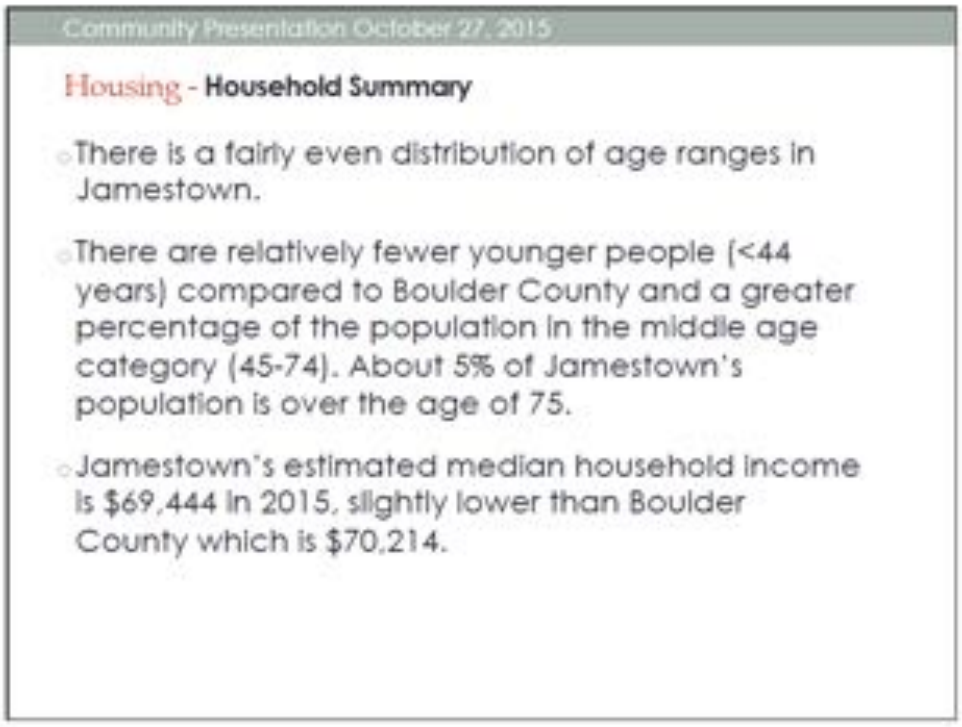
APPENDIX C | COMMUNITY MEETING #3 PRESENTATION

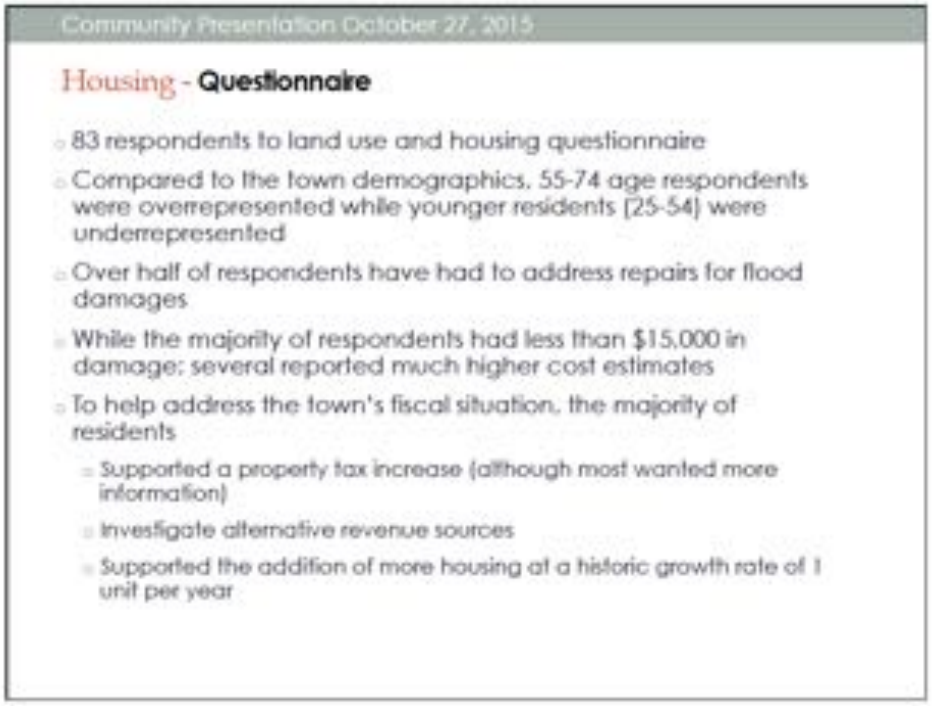


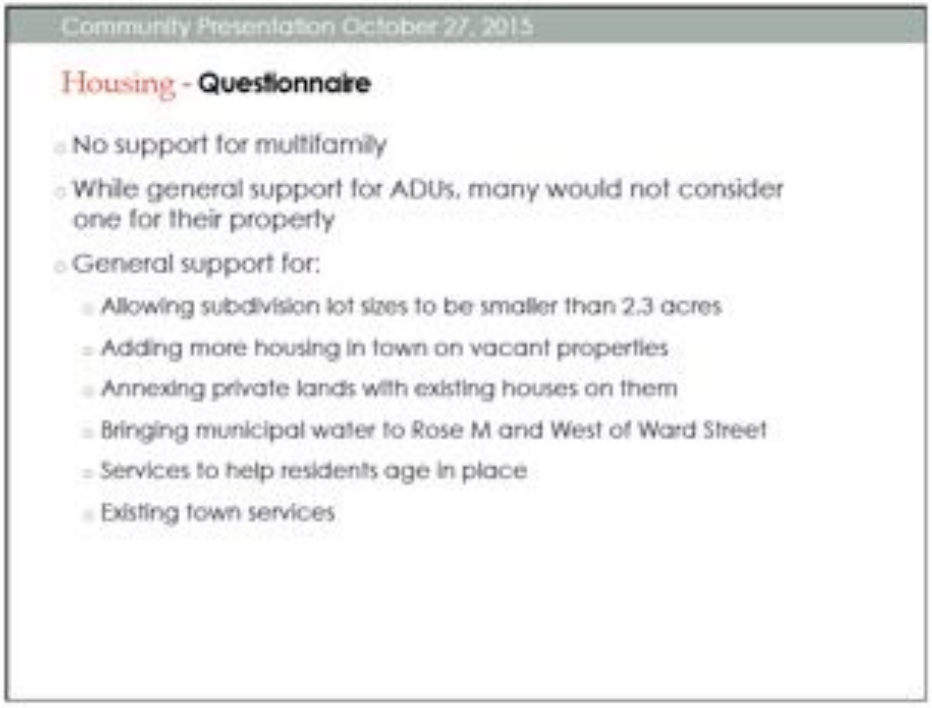

Community Presentation October 27, 2015
Agenda
1. Housing Summary and Questionnaire Results
2. Land Use Analysis
3. Future Scenarios
4. Opportunities to Improve the Town's Resiliency, Safety, and Sustainability

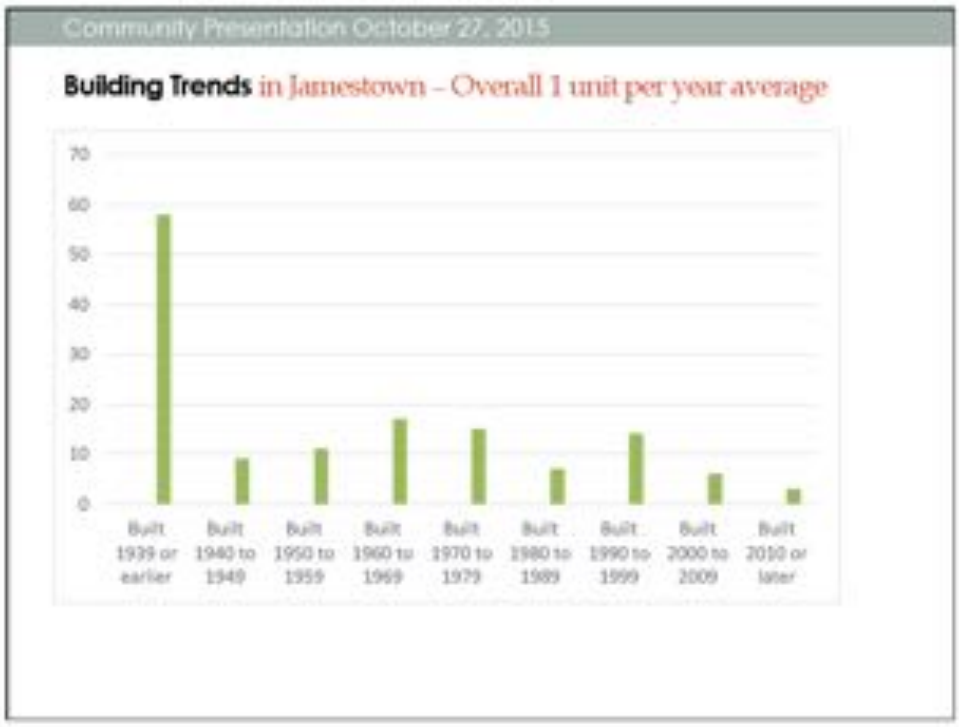

Community Presentation October 27, 2015
1. Housing Summary and Questionnaire Results


Community Presentation October 27, 2015
Housing - Household Summary
Although there have been fluctuations, the average growth has been approximately 1 unit per year since 1950 (this correlates with the the most recent LUHA survey data)
During the 1960's (when Jamestown saw its greatest recent growth)the annual average growth was 1.7 unit/year.
In 2010, there were 131 households in Jamestown. In 2014, according to the U.S. Census, there were 112 households.

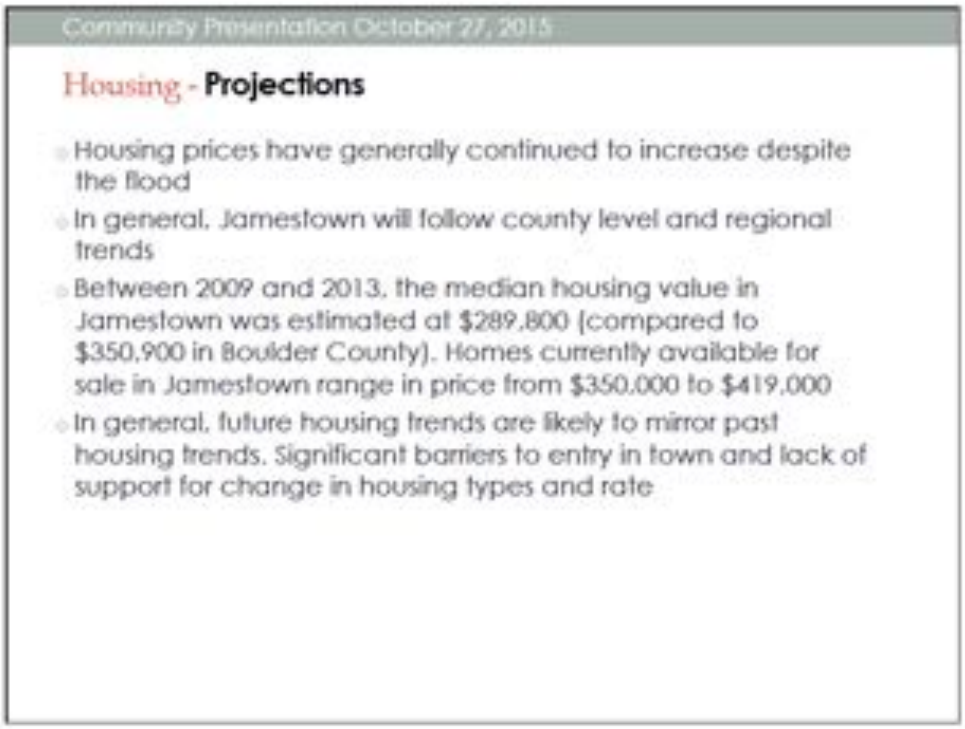

Community Presentation October 27, 2015
Housing - Household Summary
There is a fairly even distribution of age ranges in Jamestown.
There are relatively fewer younger people (<44 years) compared to Boulder County and a greater percentage of the population in the middle age category (45-74). About 5% of Jamestown's population is over the age of 75.
Jamestown's estimated median household income is $69,444 in 2015, slightly lower than Boulder County which is $70,214.


Community Presentation October 27, 2015
Housing - Questionnaire
83 respondents to land use and housing questionnaire
Compared to the town demographics, 55-74 age respondents were overrepresented while younger residents (25-54) were underrepresented
Over half of respondents have had to address repairs for flood damages
While the majority of respondents had less than $15,000 in damage; several reported much higher cost estimates
To help address the town's fiscal situation, the majority of residents
Supported a property tax increase (although most wanted more information)
Investigate alternative revenue sources
Supported the addition of more housing at a historic growth rate of 1 unit per year

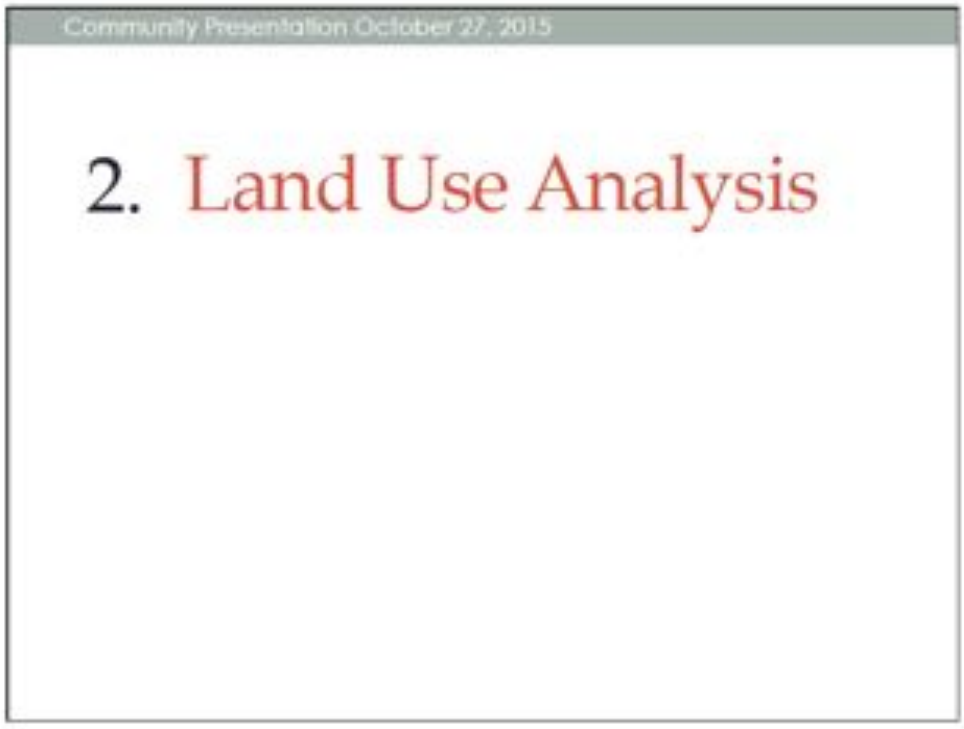

Community Presentation October 27, 2015
Housing - Questionnaire
No support for multifamily
While general support for ADUs, many would not consider one for their property
General support for:
Allowing subdivision lot sizes to be smaller than 2.3 acres
Adding more housing in town on vacant properties
Annexing private lands with existing houses on them
Bringing municipal water to Rose M and West of Ward Street
Services to help residents age in place
Existing town services


Community Presentation October 27, 2015
Building Trends in Jamestown – Overall 1 unit per year average
70
60
50
40
30
20
10
0
Built 1939 or earlier
Built 1940 to 1949
Built 1950 to 1959
Built 1960 to 1969
Built 1970 to 1979
Built 1980 to 1989
Built 1990 to 1999
Built 2000 to 2009
Built 2010 or later

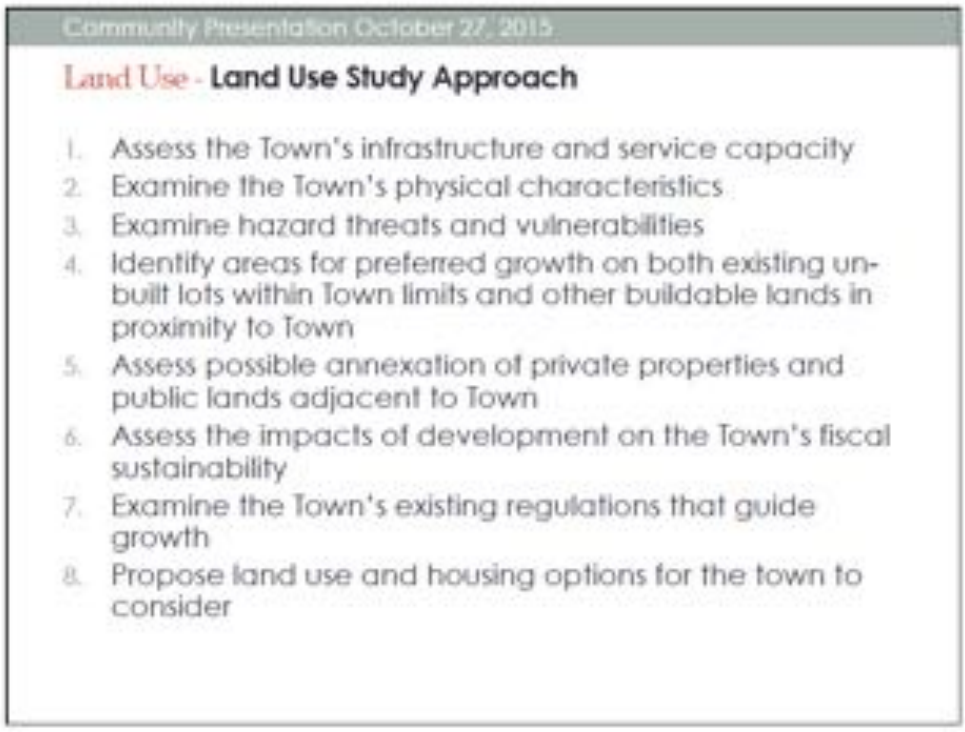

Community Presentation October 27, 2015
Jamestown Housing - Sales Prices
Overall Sales Prices
Price Per Finished Square Foot


Community Presentation October 27, 2015
Housing - Projections
Housing prices have generally continued to increase despite the flood
In general, Jamestown will follow county level and regional trends
Between 2009 and 2013, the median housing value in Jamestown was estimated at $289,800 (compared to $350,900 in Boulder County). Homes currently available for sale in Jamestown range in price from $350,000 to $419,000
In general, future housing trends are likely to mirror past housing trends. Significant barriers to entry in town and lack of support for change in housing types and rate


Community Presentation October 27, 2015
Housing - Housing Criteria
Considerations for Jamestown Housing Policies:
✓Maintain Jamestown's unique mountain town character
✓Bolster the Town's financial health and support ways of identifying new sources of revenue (property taxes, alternative revenue sources, increased housing, etc.).
✓Provide for:
aging in place
a mix of ages
a mix of incomes
✓Reflect the historical rate of growth
✓Honor the Town's heritage and culture
✓Reflect Preferences for Single Family dwellings with allowances for ADU's
✓Improve the safety and sustainability of the Town


Community Presentation October 27, 2015
2. Land Use Analysis


Community Presentation October 27, 2015
Land Use - Goals
The Jamestown Land Use Policies should:
✓Maintain Jamestown's unique mountain town character
✓Promote the Town's safety, health and welfare
✓Reinforce the Town's fiscal sustainability
✓Reflect the Town's heritage and culture

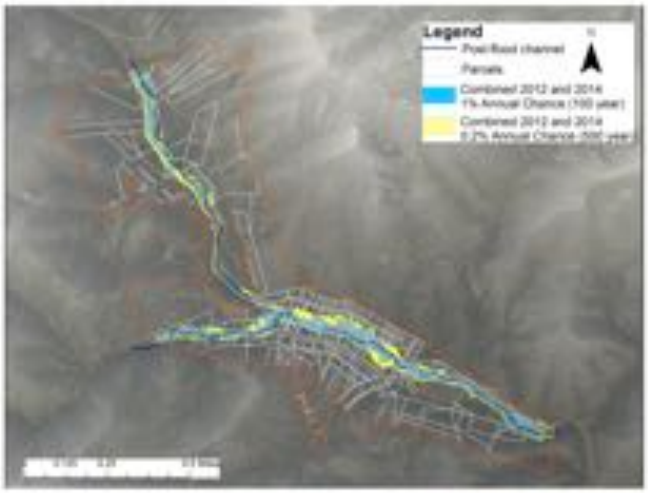

Community Presentation October 27, 2015
Land Use - Land Use Study Approach
1. Assess the Town's infrastructure and service capacity
2. Examine the Town's physical characteristics
3. Examine hazard threats and vulnerabilities
4. Identify areas for preferred growth on both existing un-built lots within Town limits and other buildable lands in proximity to Town
5. Assess possible annexation of private properties and public lands adjacent to Town
6. Assess the impacts of development on the Town's fiscal sustainability
7. Examine the Town's existing regulations that guide growth
8. Propose land use and housing options for the town to consider


Community Presentation October 27, 2015
Land Use - Criteria
Land Use options will take into account:
- Flood Recovery Efforts:
  - Road and Bridge Repairs (Andersen Hill as an example)
  - Culvert and Drainage Improvements
  - Properties that have been or are being rebuilt or acquired, as a result of the flood
- Hazards:
  - Flooding (including updated FEMA maps)
  - Fire (including Wildfire)
  - Geological
- Water Service, including, but not limited to:
  - Water Treatment Plant Capacity
  - Water Distribution Capacity
  - Second Source Water Supply
- Development feasibility of available sites:
  - Slope
  - Access
  - Size
  - Potential for septic field (distance from water wells, etc.)
  - Potential for water well (spacing, geological conditions, etc.)

Community Presentation October 27, 2015

Land Use - Flood Overview

Current Regulatory Floodplain based on 2012 FIS and 2014 Provisional Delineation

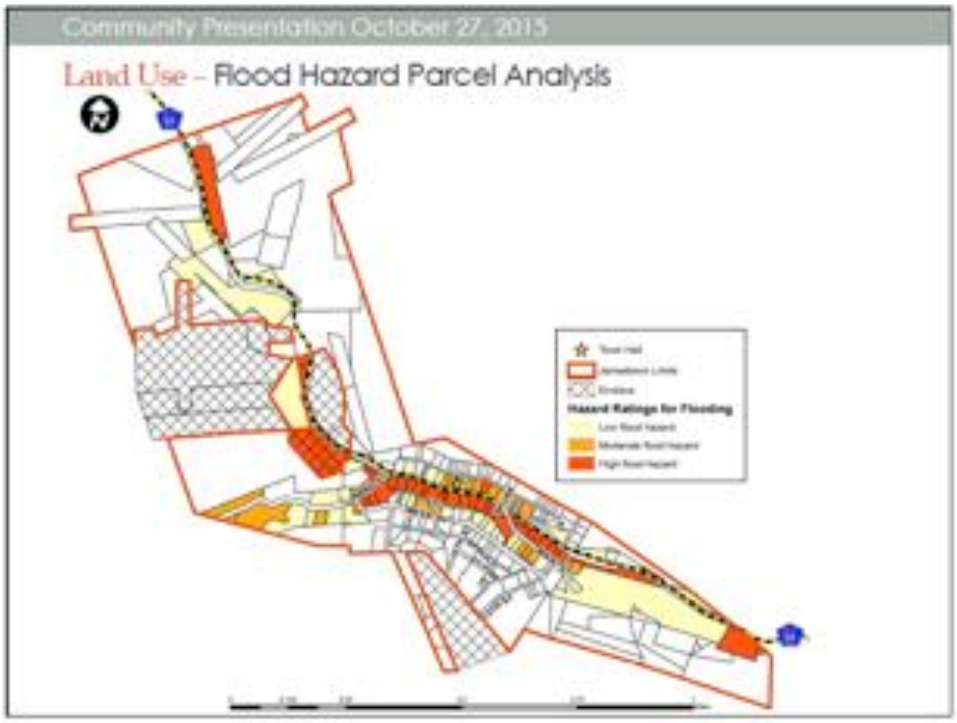


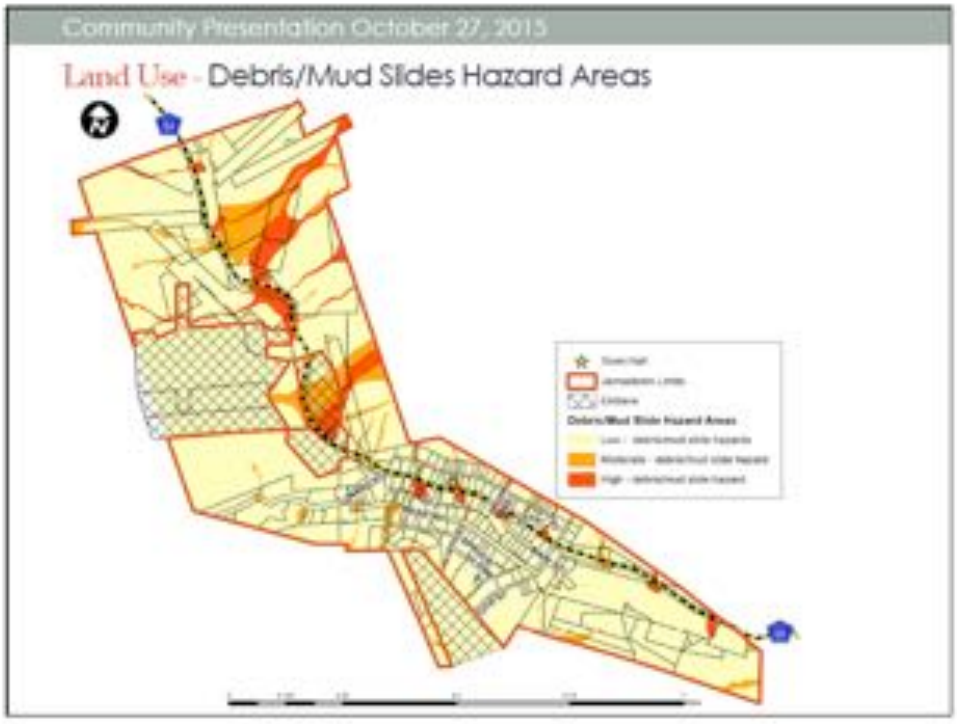
Flow rates for both studies were obtained from previous hydrologic data and have not been revised with updated hydrologic information.

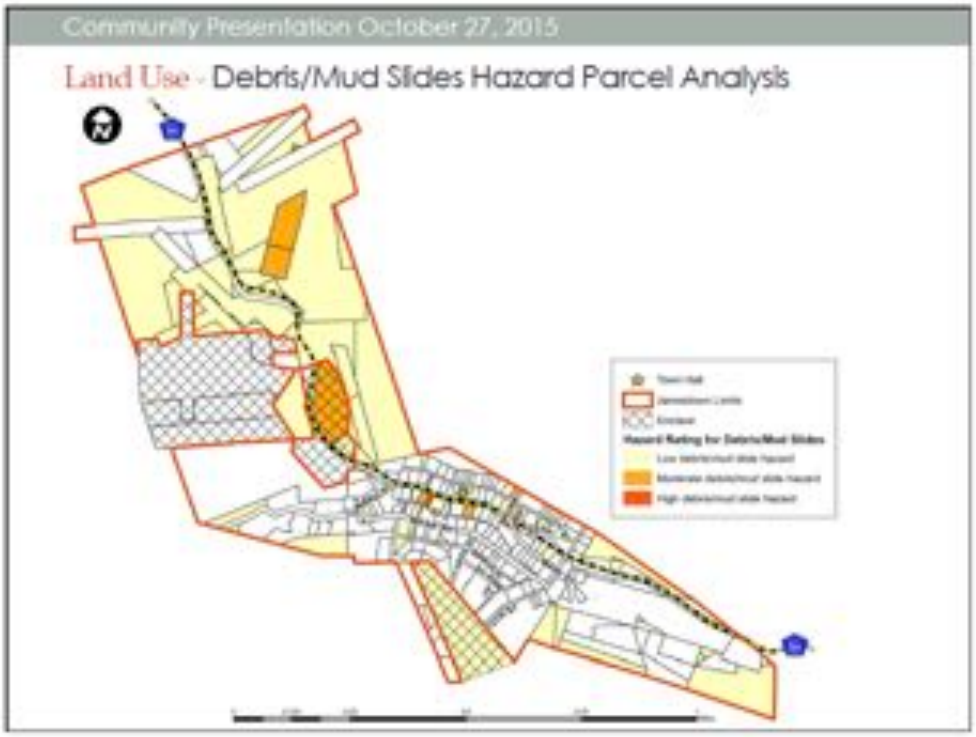
This delineation does not include changes in channel configuration resulting from the EWP work.

Community Presentation October 27, 2015

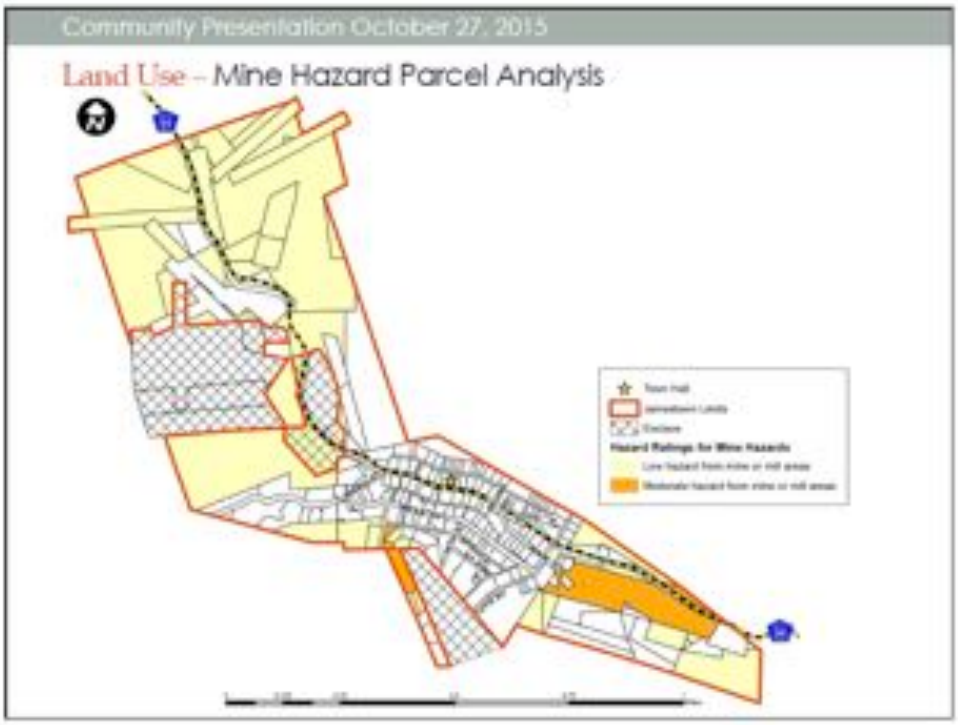
Land Use – Flood Hazard Areas


Community Presentation October 27, 2015
Land Use – Flood Hazard Parcel Analysis
Hazard Ratings for Flooding


Community Presentation October 27, 2015
Land Use - Debris/Mud Slides Hazard Areas


Community Presentation October 27, 2015
Land Use - Debris/Mud Slides Hazard Parcel Analysis


Community Presentation October 27, 2015
Land Use – Mine Hazard Areas


Community Presentation October 27, 2015
Land Use – Mine Hazard Parcel Analysis


Community Presentation October 27, 2015
Land Use – Wildfire Suppression Hazard Areas

Community Presentation October 27, 2015

Land Use – Wildfire Suppression Hazard Parcel Analysis

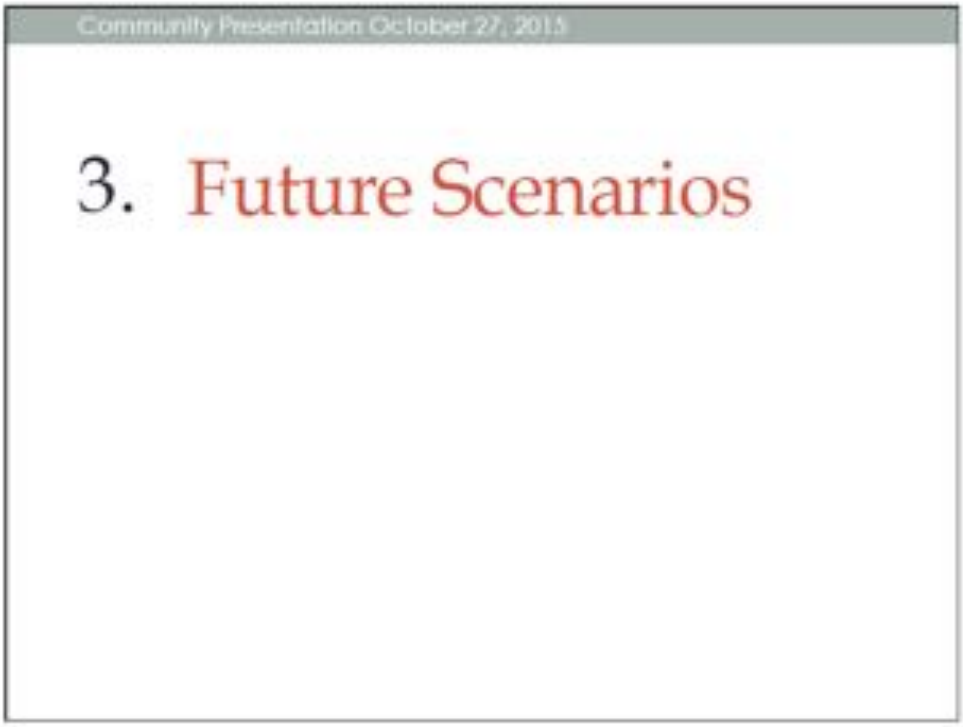
Community Presentation October 27, 2015

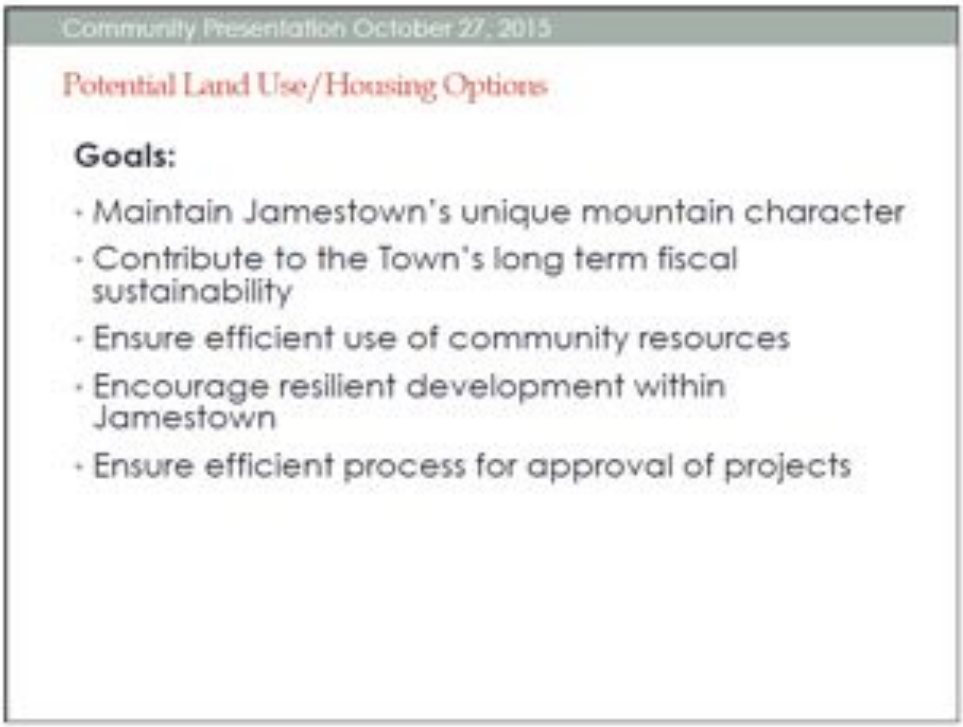
Ordinance Evaluation Hazard Mitigation Strategies

The chart below summarizes the current state of strategies in place to mitigate hazardous conditions on new development sites.

Hazard Type	Existing Mitigation Strategy to Protect Future Homeowners and the Town
Flooding	Floodplain Delineation
	Floodplain Management by Floodplain Administrator
	FEMA 404 Hazard Mitigation Buy-out Program
	Design and construction requirements, etc., e.g., Floodproofing
Geological	Soils tests required when submitting for building and septic permit in hazard areas
Wildfire	none

With regard to new development and wildfires, the Town has several opportunities to improve its resiliency, safety, and sustainability. More on this at the end of the presentation....


Community Presentation October 27, 2015
3. Future Scenarios


Community Presentation October 27, 2015
Potential Land Use/Housing Options
Goals:
• Maintain Jamestown's unique mountain character
• Contribute to the Town's long term fiscal sustainability
• Ensure efficient use of community resources
• Encourage resilient development within Jamestown
• Ensure efficient process for approval of projects

Community Presentation October 27, 2015

Potential Land Use/Housing Options

Notes:

- We are only pointing out opportunities; development is market driven.
- For all scenarios, building sites must be accessible, with slopes less than 25%.
- Feasibly developable means that the site's hazards can be mitigated, slopes are less than 25%, Town water could be made available (inside the Town limits), or a water well is possible, and a septic field is possible.
- Hazards will be continued to be subject to special review.
- ADU's are not considered because the impact of ADU's on the overall numbers and the Town's finances is not significant.

Community Presentation October 27, 2015

Potential Land Use/Housing Options

Scenario 1a: Immediate Achievable within a Timeframe of 0 – 3 Years:

- Unimproved/vacant parcels that are located within the Town's existing water service area
- Annexation of existing private properties adjacent to Town and subject to owner approval, environmental considerations (such as mine sites/tailings) and annexation costs

Scenario 1b: Immediate: Achievable within a Timeframe of 0 – 3 Years:

Subdivision of larger parcels within the Town limits, within the Town's water service area, with access and slopes below 20%. Such sites are contingent upon changes to the Town's current subdivision ordinance.

Community Presentation October 27, 2015

Potential Land Use/Housing Options

Scenario 2a : Near-term: Achievable within a Timeframe of 0 – 5 Years:

Acquisition, annexation and development of Public Properties and Lands (Federal, US Forest Service, etc.) within or immediately adjacent to Town limits and annexation of enclave areas.

Scenario 2b : Near-term: Achievable within a Timeframe of 0 – 5 Years:

Development of select Town of Jamestown properties

Scenario 3: Long-term: Achievable within a Timeframe of 0 – 10 Years:

Development of large parcels in the Little James Creek area west of Ward St.

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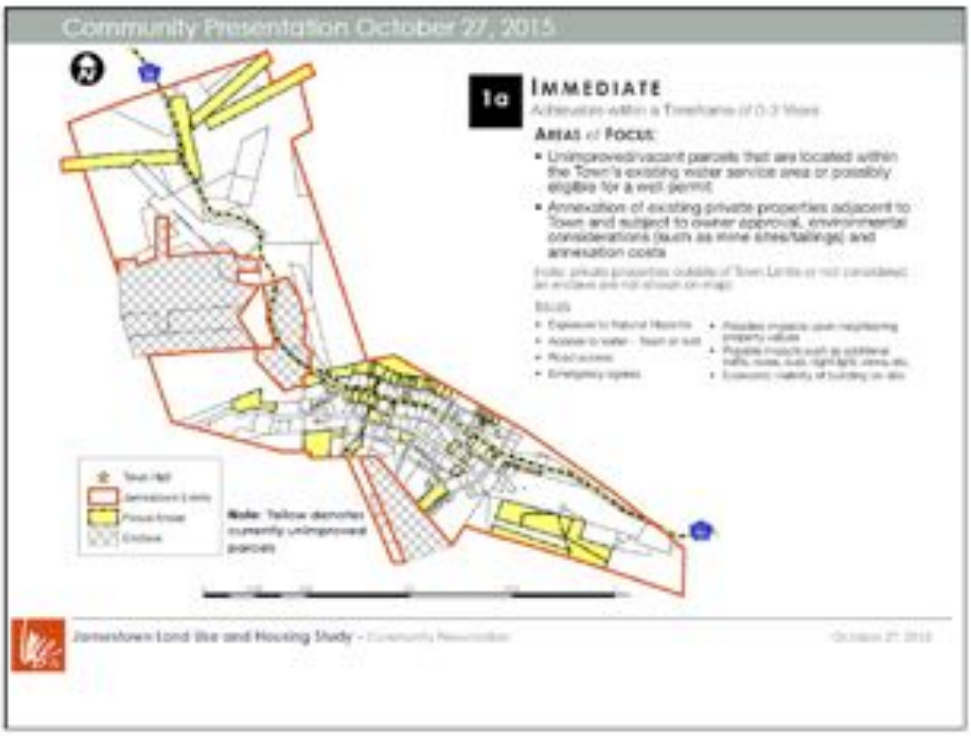
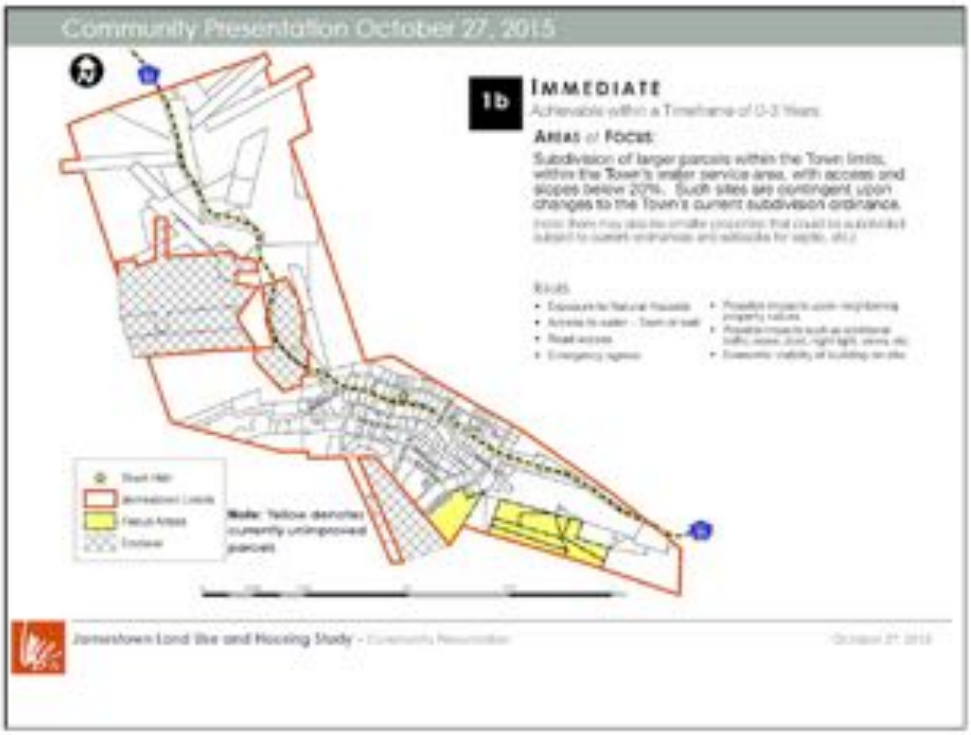
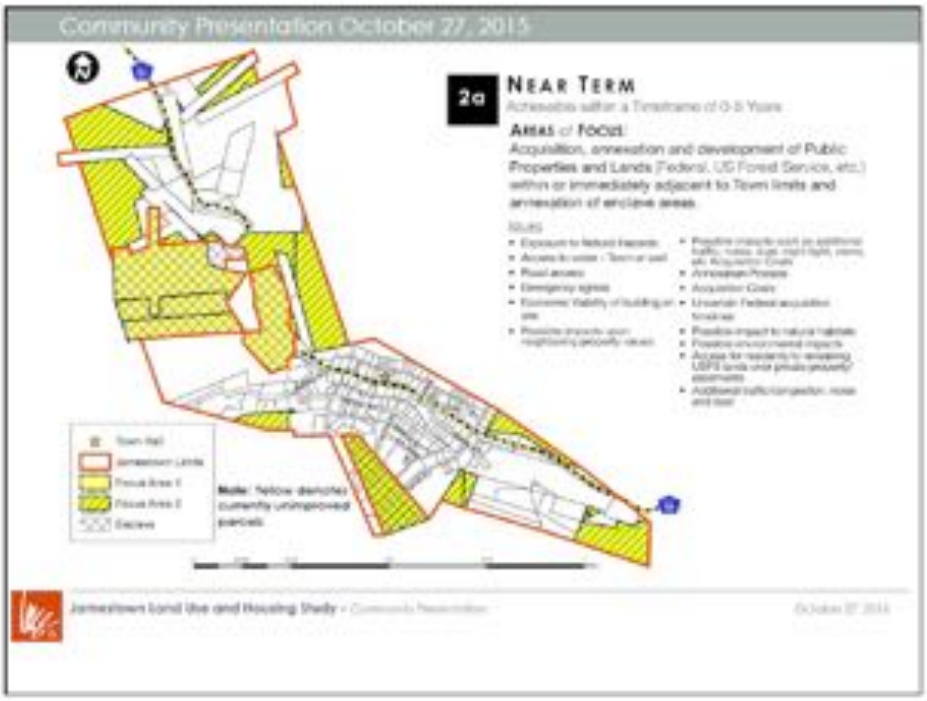
Land Use – Land Use and Housing Summary


Community Presentation October 27, 2015
1a
IMMEDIATE
AREAS of FOCUS:
Unimproved/vacant parcels that are located within the Town's existing water service area or possibly eligible for a well permit
Annexation of existing private properties adjacent to Town and subject to owner approval, environmental considerations (such as mine sites/tailings) and annexation costs
Note: Yellow denotes currently unimproved parcels
Jamestown Land Use and Housing Study


Community Presentation October 27, 2015
1b
IMMEDIATE
AREAS of FOCUS:
Subdivision of larger parcels within the Town limits, within the Town's water service area, with access and slopes below 20%. Such sites are contingent upon changes to the Town's current subdivision ordinance.
Note: yellow denotes currently unimproved parcels
Jamestown Land Use and Housing Study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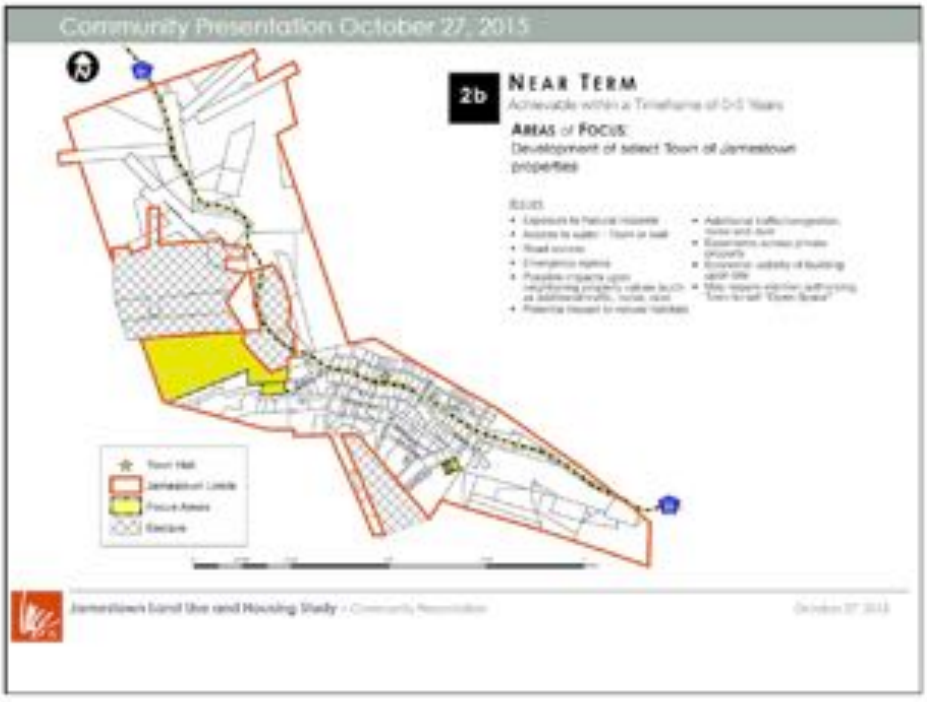
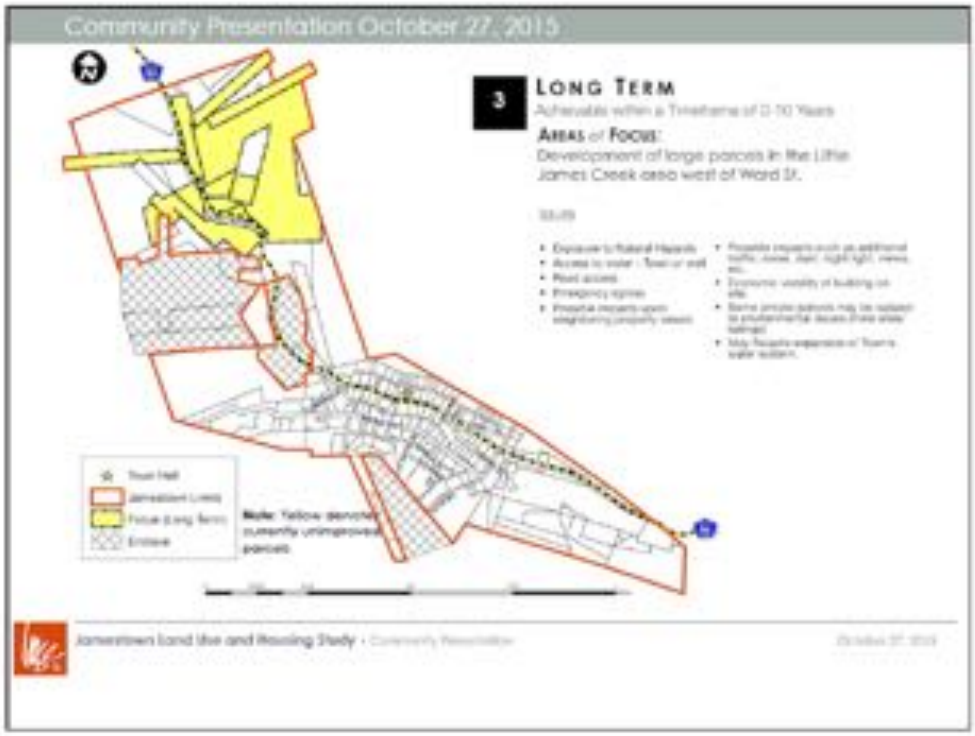
2a
NEAR TERM
AREAS of FOCUS:
Acquisition, annexation and development of Public Properties and Lands (Federal, US Forest Service, etc.) within or immediately adjacent to Town limits and annexation of enclave areas.
Note: Yellow denotes currently unimproved parcels


Community Presentation October 27, 2015
2b
NEAR TERM
AREAS of FOCUS:
Development of select Town of Jamestown properties



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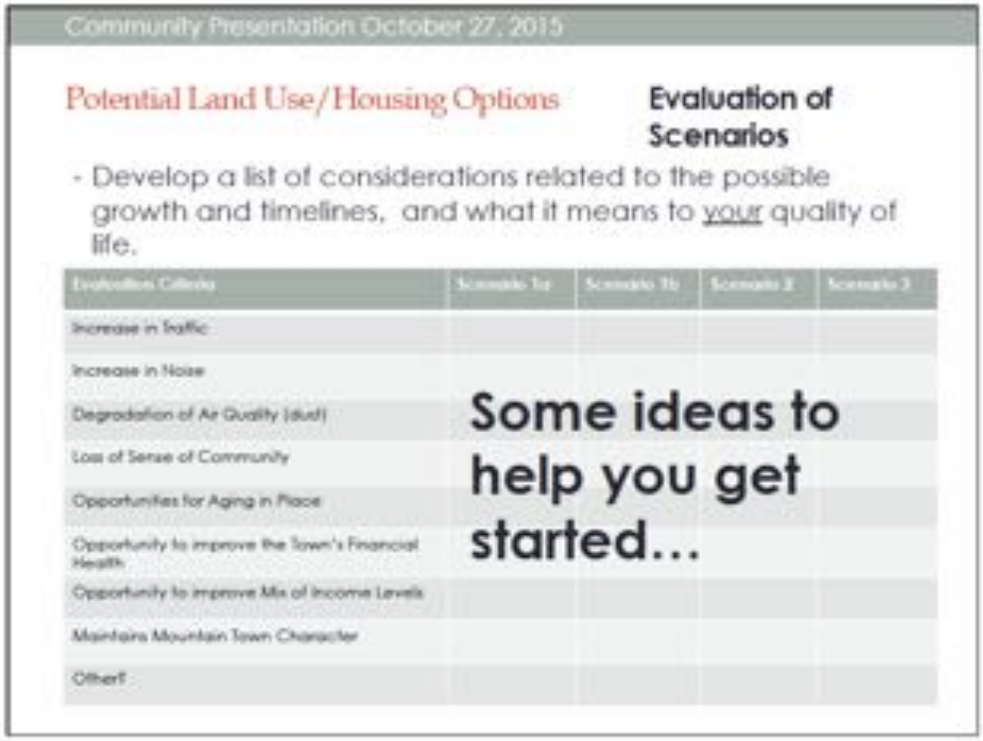
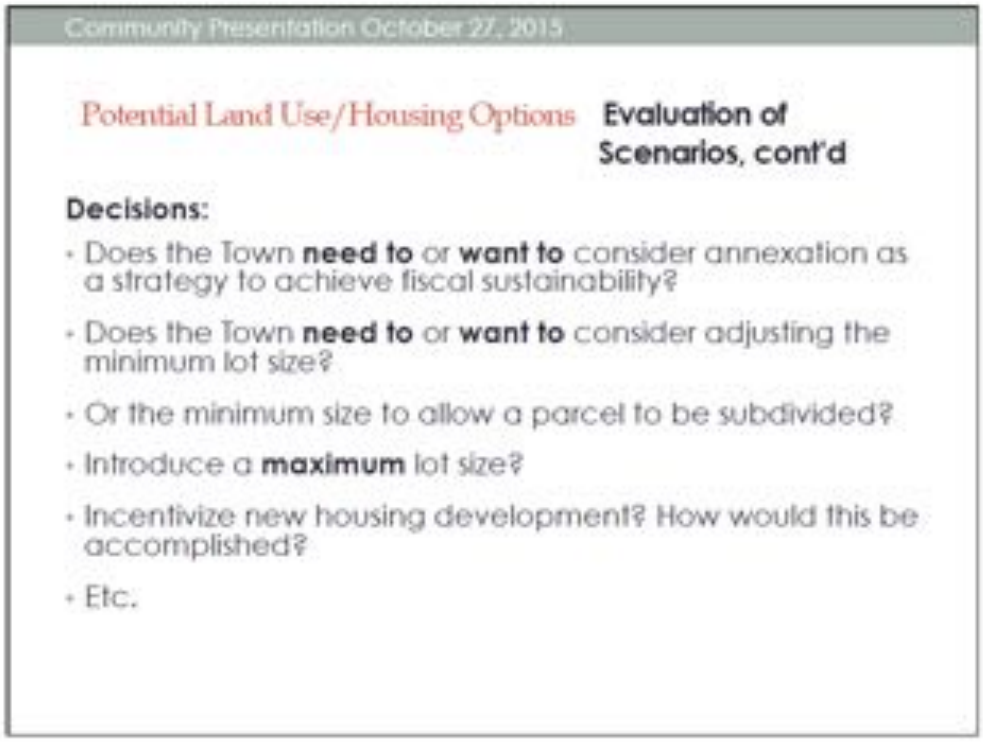
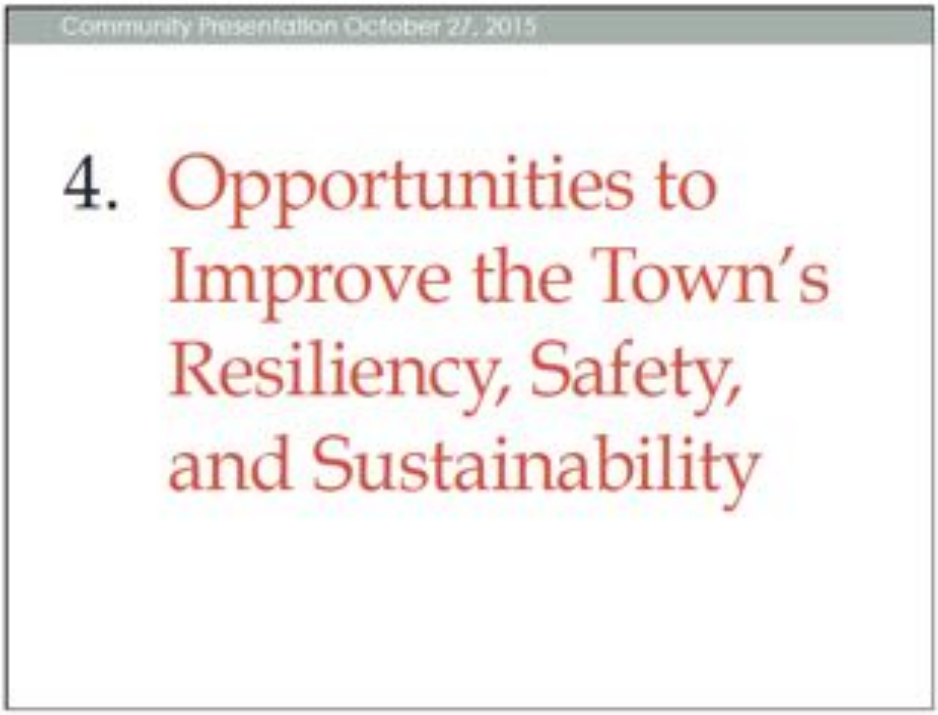
Potential Land Use/Housing Options Full Build-out of Scenarios

- In all cases, we are only pointing out opportunities; development is market driven.
- Based on a growth rate range of 1 to 2 homes per year, estimate the number of years to achieve full build-out for each scenario.
- Fiscal impact does not include cost of extending water service.

Scenario	Focus Area	Timeframe	Estimated Available Number of Possible Lots or Sites	Years to Achieve Full Build-out at Rate of 1- 2 DU's/ yr.	Estimated Cumulative Fiscal Impact by Year 2025: General + Capital Revenue
1a	Vacant platted lots in Town	0 – 3 yrs.	13	13 yrs. to 7 yrs.	1 DU/yr.: $17,914 2 DU/yr.: $29,388
1b	Larger parcels in Town, if subdivided	0 – 3 yrs.	7	7 yrs. to 4 yrs.	1 DU/yr.: $15,345 2 DU/yr.: $18,813
2a	Parcels in Town, owned by Federal Agencies	0 – 5 yrs.	14	14 yrs. to 7 yrs.	1DU/yr.: $17,916 2DU/yr.: $30,689
2b	Parcels in Town, owned by the Town	0 – 5 yrs.	6	6 yrs. to 3 yrs.	1DU/yr.: $14,044 2DU/yr.: $13,231
3	Parcels adjacent to Town, if subdivided	0 – 10 yrs.	10	10 yrs. to 5 yrs.	1DU/yr.: $12123 2DU/yr.: $5,341


Community Presentation October 27, 2015
Potential Land Use/Housing Options
Evaluation of Scenarios
- Develop a list of considerations related to the possible growth and timelines, and what it means to your quality of life.
Some ideas to help you get started…


Community Presentation October 27, 2015
Potential Land Use/Housing Options
Evaluation of Scenarios, cont'd
Decisions:
- Does the Town need to or want to consider annexation as a strategy to achieve fiscal sustainability?
- Does the Town need to or want to consider adjusting the minimum lot size?
- Or the minimum size to allow a parcel to be subdivided?
- Introduce a maximum lot size?
- Incentivize new housing development? How would this be accomplished?
- Etc.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4. Opportunities to Improve the Town's Resiliency, Safety, and Sustainability


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The Town has opportunities for improving its resiliency, safety and sustainability, to everyone's benefit:
Consider adopting Boulder County's Amendment to the Building Code that addresses fire hazard mitigation.
Would apply only to new construction
Would improve the Town's sustainability and safety over the long term
Would be administered by the County (as is the case today)
Would be treated the same as any property in unincorporated County
Consider using guidelines to address the design of homes to preserve the mountain-town character.
Would be voluntary
Would not cost the Town anything
Consider becoming a Firewise Community.
There is a cost ($2/capita)
Empowers neighbors to work together to reduce risk
Has an educational component, annual event, insurance discounts through USAA, and improves community safety and sustainability

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Opportunities for improving the Town's resiliency, safety and sustainability, cont'd:

- Consider ensuring that any property owner proposing to build in a high hazard area mitigate the hazard(s) as much as possible.
  - Would apply only to new construction
  - No cost to the Town
  - Would improve entire community's safety and sustainability
- Consider having a maximum lot size as one way to preserve the mountain-town character.
  - Would apply only to new construction
  - No cost to the Town
  - Would prevent combining of platted lots to create sites for "McMansions"
- Consider using setbacks to protect homeowners' privacy.
  - No cost to the Town
  - Would prevent future homes, ADU's, and out-buildings from being built too close to neighbors' homes -- to protect privacy

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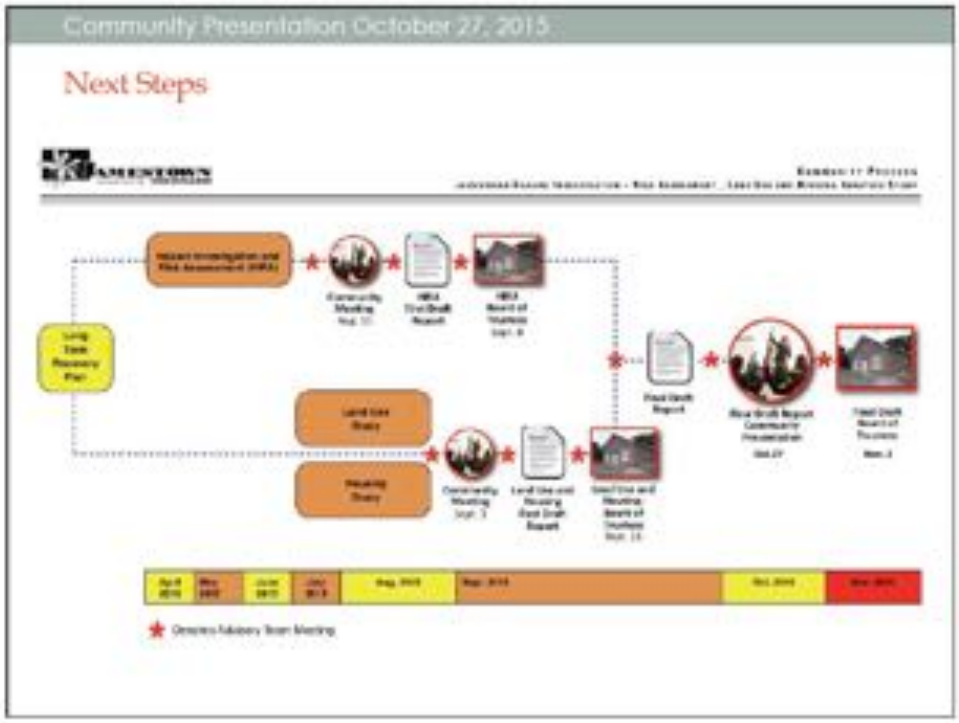
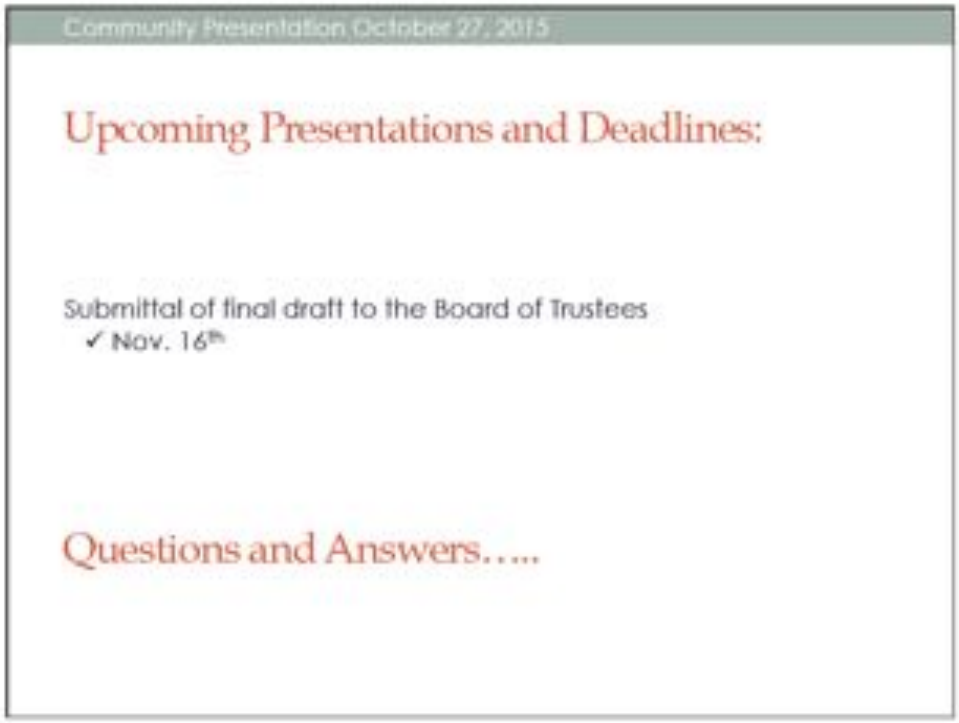
Opportunities for improving the Town's resiliency, safety and sustainability, cont'd:

- Consider increase in permit fees
  - Would apply only to new construction
  - Would contribute to the Town's fiscal health
- Consider updating the 1981 Comprehensive Plan.
  - Further explore ways to maintain the Town's mountain character, improve the Town's fiscal health, etc.
- Consider updating the Town's Community Wildfire Protection Plan.
  - Would improve entire community's safety and resiliency
  - No cost to the Town


Community Presentation October 27, 2015
Next Steps


Community Presentation October 27, 2015
Upcoming Presentations and Deadlines:
Submittal of final draft to the Board of Trustees
✓ Nov. 16th
Questions and Answers…..

APPENDIX D | COMMUNITY MEETING #3 PUBLIC COMMENTS

Scenario 1: Vacant platted lots in Town

This entirely up to the property owners – that obligation and risk is the very definition of private property ownership.

These should be considered as a primary way of increasing the revenue and growth.

Positive – easy politically.

Negative – Mostly depends on owners – out of control of Town and general population.

Needs to be permitted & inclusive of surrounding neighborhood concerns. Roads area being rebuilt on the Fike Property north of Town. Are these roads permitted? And have considerations been made for access, drainage, shared maintenance, etc.?

Many already platted lots fail the 20% slope and /or road access.

This is a good option. Should be more fiscally feasible for Town to develop and/or maintain services.

Some concern about presenting a crowded appearance, not in character with mountain living.

If buildable – best choice.

Some areas slope is too steep.

Decision is decided by Town – no 3rd party.

Map slopes >25% Oh it's 1b

Davis lot on Main Street is developed – map is outdated.

5 or 6 platted lots should suffice for building lot as per Mesa, Main Street, etc.

12th (next to Gosbee) = Yes (inquire-worthy)!

13 parcels – NOPE!

Map has unbuildable lots.

Included (i.e. Buy-out properties are included & flooded properties that have already been rebuilt are also included.)

If they are not in higher danger areas developing them would be great.

This seems like a sound option to me.

I like that not every space is built. Just because there's a spot that can be built, doesn't improve the character of the Town.

Cheaper than acquisitions & permitting – a good place to begin.

Easy access to H20.

Less cost to Town/homeowners than other scenarios.

Scenario 2. Larger parcels in Town, subdivided

Case by case basis, this is between the private property owner & the Jamestown board. Personally I hope it doesn't happen.

Access problems galore! Good ideas on a flat map.

Needs to be permitted & inclusive of surrounding neighborhood concerns. Roads area being rebuilt on the Fike Property north of Town. Are these roads permitted? And have considerations been made for access, drainage, shared maintenance, etc.?

This is the best option. – ½ acre is more the ideal.

Is this area really buildable?

Challenging to existing property owners.

Do we include cost to build road?

Good revenue to Town in short period.

Only if it mirrors the neighborhood or close neighbors approve.

Should not negatively impact value of neighbors' properties.

Are there such lots that would as this conform to the present Town ordinance of the 2.3 acres?

If this can be done without affecting the value and character of Jamestown and environs.

Positive – Some have access, buildable slope, and water access

Negative – Some lack access, buildable slopes or water access; Town & populace lack control over potential development ….

Incentives?

Good option. It would allow a moderate growth with low impact.

Current subdivision ordinance keeps new neighborhoods from developing in areas where water service could be better utilized

Old platted lots are closer together.

What changes to the subdivision ordinance would be required?

Would this affect the whole town or just these areas?

Noise, traffic, dust not a positive.

That 12th St. parcel isn't it too steep? (i.e.>20%?)

Scenario 3. Parcels in Town, owned by Federal Agencies

Town should begin to straighten irregular boundary this may require annexation of federal land. Historically used by Jamestown, See 2b below.

No.

Positive – Prime property for residences

Direct real impact – additional residences without waiting for owners to respond.

Negative – Small number of citizens against it – very vociferous bunch.

Yes. Same as above.

Not many years to acquire and other hoops to jump through – infrastructure costs?

Annex the Bueno Mine – smooth the edges – annex Overland Rd. enclaves also.

Current road is better maintained than Town roads.

Current property owners built there because they did not want close neighbors –which would be negated by additional small lot building.

Areas are currently inhabited or frequented by wildlife.

Good idea. If legalities can be worked out, it's a good option for JT.

Having the Town boundary be a clean line on a map is not relevant to our small town.

Leave the wildlife & forest lands alone. That's why we live here!

What is the cost to acquire these?

Where will the $ come from?

Good to create a "cleaner" town boundary.

Poor choice since both forest service and county must approve.

Road deterioration.

Loss of open space

Devalue current property

Best option for more lots in my opinion: Porphry view, mine tract west of Town.

Worth consideration. Lots of interweaving of private & public lands.

Scenario 4. Parcels in Town, owned by the Town

Adjust existing lot lines for current residents. After lot line adjustments, Town should keep Town property as parks and open space and as a reserve for the future.

Town property should be used as Town property.

Positive – Could be shovel ready.

Perhaps only a little political pushback.

Negative – Unclear how many buildable lots there are.

This is a very long-term option. Acquisition of Forest Service land requires act of Congress.

Do these lots conform to the Town ordinances?

Not many seem buildable.

Access problems up Ward Street

As approved by a majority of residents.

(Town property… Town decision.)

I see no reason why they should not be developed. Good for financial sustainability.

Yes.

If Town owned property can be accessed, is within reasonable range of H20 mains and does not exceed slope constraints this might be a good option.

Scenario 5. Parcels adjacent to Town, if subdivided

Consider on a case-by-case basis. See comment, same as 1b.

Neutral on this.

Difficult to evaluate – not enough info.

Extended traffic area is a concern. There's so much dissention about traffic with the small amount of road through Town proper as it is now.

It is fine as long as done in an environmentally friendly manner.

They're in the Town limits –great sites for subdividing – feasibility & cost of water are serious limitations.

Do these lots have to be annexed? Water & other infrastructure costs?

I hope we don't need that much growth.

Seems challenging to bring services to this area & ensure properties are environmentally safe.

More "thru" traffic is not a positive.

How does water cost & revenue add up in these scenarios?

If grants can be had to run water this is great.

Depends on parcels & need in future.

Again issue here is availability /cost of extending water.

Good possibility!

PS:

1. RE: Firewise Community – we already have Wildfire Partners (BoCo agency) to assist homeowners with mitigation.
2. I think ADU's are undervalued for Town impact RE: school viability, potential tax revenue to Town (rent tax).
3. Permit fees could be raised whereas a new house permit costs $4-6000 to Boulder County only another $50 went to Town.

APPENDIX E | JAMESTOWN COMMUNITY PROFILE

Boulder County

Town of Jamestown

C.1 Community Profile

Jamestown is a mountain community located in central Boulder County at an elevation of 7,000 feet at the confluence of James Creek and Little James Creek. The City of Boulder is 14 miles to the southeast. Gold was discovered in the 1870's and the Town became an important area for stamping (processing) of gold ore; as many as eight stamping mills were in use by the 1880s. Concurrently, the Town became a source of supplies and social activities for the miners and was incorporated as a statutory Town by the Colorado Legislature on April 4, 1883. As the gold played out, the mining of fluorspar became more important and several fluorspar mines existed around the Town into the 1960s. With transportation improvements and a paved road, residents found they could live in Jamestown and be employed in Boulder or Longmont; today most residents commute to work but there is also a mix of retirees and cottage industry.

C.1.1 Population

The estimated 2010 population of the Town of Jamestown was 274. Select Census 2010 demographic and social characteristics for Jamestown are shown in Table C.1.

Table C.1. Jamestown's Demographic and Social Characteristics

Characteristic	
Gender/Age	
Male (%)	51.5
Female (%)	48.5
Under 18 Years (%)	6.6
65 Years and Over (%)	12.0
Race/Ethnicity (one race)	
White (%)	99
Hispanic or Latino (Of Any Race) (%)	1.0
Other	
Average Household Size	2.1
High School Graduate or Higher (%)	100

Source: U.S. Census Bureau, 2010, www.census.gov

C.1.2 Economy

According to the 2000 Census, the industries that employed most of Jamestown's labor force were educational, health, and social services (47.7%); professional, scientific, management, administrative, and waste management services (14.6%); and manufacturing (13.9%). Select economic characteristics for Jamestown from 2013 estimates are shown in Table C.2.

Boulder County

Town of Jamestown

Table C.2. Jamestown's Economic Characteristics

Characteristic	
Families below Poverty Level, 2013	0
Individuals below Poverty Level, 2013	~20
Median Home Value	$289,800
Median Household Income, 2013 (est.)	$65,227
Per Capita Income, 2013 (est.)	$27,000
Population in Labor Force	174

Source: U.S. Census Bureau, 2009-2013 American Community Survey 5-year estimates, www.census.gov/

C.2 Hazard Summary

The most significant hazards for Jamestown are floods, debris flow, drought, wildfire and windstorm. Refer to Section 4.3 Vulnerability Assessment for detailed vulnerability to the flood and wildfire hazards. Other hazards that could impact Jamestown include hailstorm, lightning, and severe winter storm. Due to its location in the foothills Jamestown has had problems with nearby wildfires, floods and debris flows associated with heavy rains on the burned areas.

C.3 Asset Inventory

C.3.1 Property Inventory

Table C.3 represents an inventory of property in Jamestown based on the Boulder County Assessor's data as of March 12, 2008.

Table C.3. Jamestown's Property Inventory Before September 2013 Floods

Property Type	Parcel Count	Land Values ($)	Improved Parcel Count	Improved Values ($)	Total Values ($)
Residential	140	15,433,800	135	21,510,500	36,944,300
Exempt	22	2,268,300	1	273,100	2,541,400
Commercial	1	77,400	1	80,900	158,300
Vacant	51	1,115,200	0	0	1,115,200
Minerals	6	32,300	0	0	32,300
Unknown	2	0	0	0	0
Total	**222**	**18,927,000**	**137**	**21,864,500**	**40,791,500**

Source: Boulder County Assessor's Office

Boulder County

Town of Jamestown

Table C.4. represents an inventory of property in Jamestown based on the Boulder County Assessor's data as of December 31, 2014

Table C.4. Jamestown's Property Inventory After September 2013 Floods

Property Type	Parcel Count	Land Values ($)	Improved Parcel Count	Improved Values ($)	Total Values ($)
Residential	139	3,914,865	117	16,094,300	20,009,165
Exempt	23	2,338,535	2	409,900	2,748,435
Commercial	3	221,614	3	699,814	921,428
Vacant	44	677,400	0	0	677,400
Minerals	5	25,900	5	0	25,900
Unknown	0	0	0	0	0
Total	**214**	**7,178,314**	**127**	**17,204,014**	**24,382,328**

Note that two additional commercial properties appear in the inventory between 2008 and 2014

C.3.2 Other Assets

Table C.4 is a detailed inventory of assets identified by the Town's planning team. This inventory includes critical facilities. For more information about how "critical facility" is defined in this plan, see Section 4.3 Vulnerability Assessment.

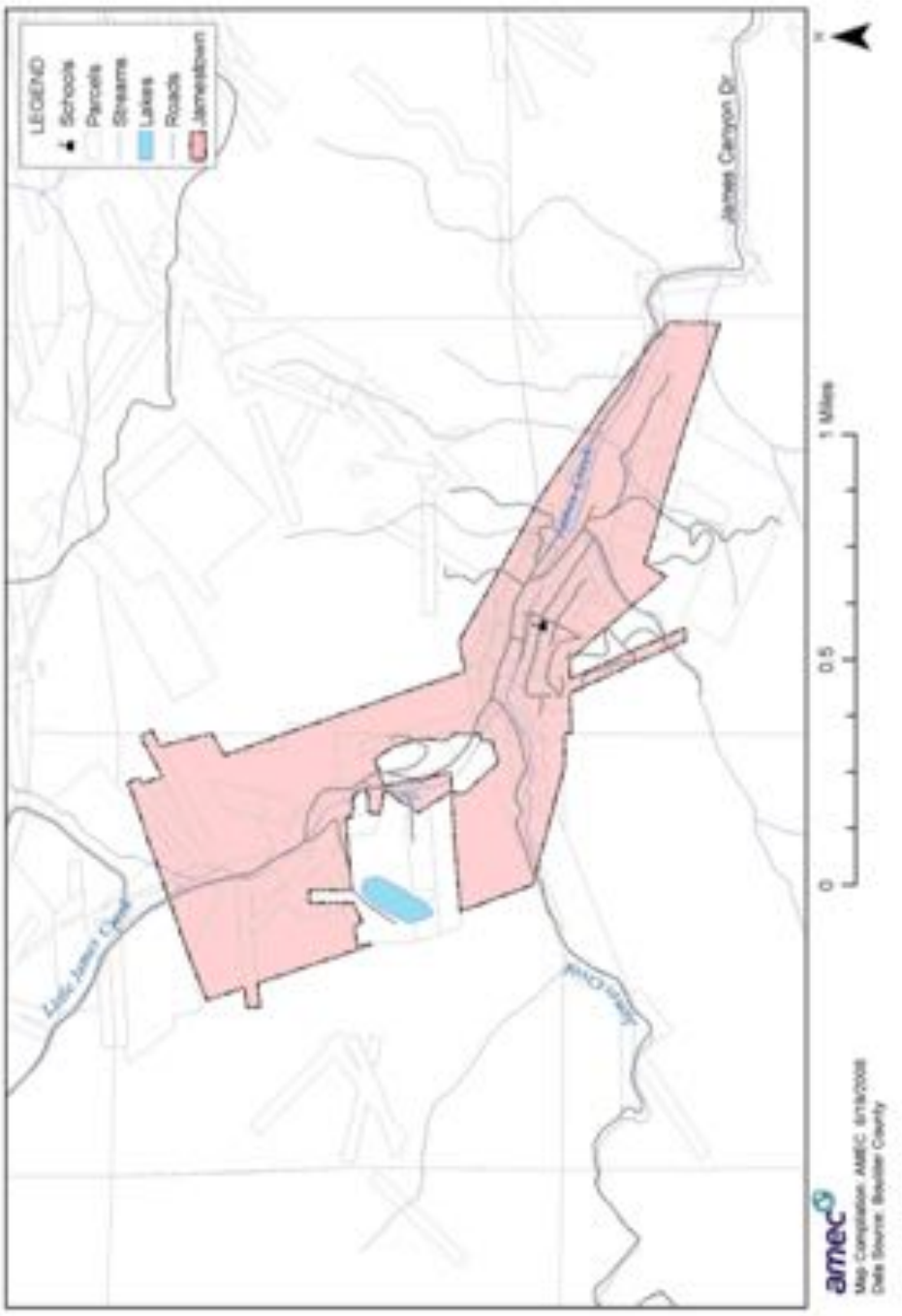
Table C.5. Jamestown's Assets

Name of Asset	Type	Address	Replacement Value ($)	Occupancy/ Capacity #	Hazard Specific Info
Fire Hall	Critical/Essential	66 Main St	$888,000		Fire collapse
Town Hall	Critical/High Potential Loss	118 Main St	$400,000		Fire collapse, historic structure
Upper Bridge	Critical/Transportation	Andersen Hill St	$2,200,000		Flood collapse
Lower Main Bridge	Critical/Transportation	Main St/Mill St	$1,100,000		Flood collapse
Water Treatment Plant	Critical	25 Ward St	$1,500,000		Fire, flood collapse

The GIS database provided by Boulder County includes one school in Jamestown (kindergarten through 5th grade). The location of this school is shown on the map in Figure C.1.

Town of Jamestown

Figure C.1. Jamestown's Base Map and Critical Facilities



Town of Jamestown

C.3.3 Economic Assets

According to the 2007 Jamestown Community Profile from the Denver Regional Council of Governments, the major employers in Jamestown are the U.S. Postal Service and the Boulder Valley School District. In addition, the Jamestown Mercantile restaurant is also an employer in Jamestown.

C.3.4 Natural, Cultural, and Historic Resources

Assessing the vulnerability of Jamestown to disaster also involves inventorying the natural, historical, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

For information about natural resources in Boulder County, which includes Jamestown, see Section 4.3 Vulnerability Assessment.

Historic and Cultural Resources

Table C.6 lists the properties in Jamestown that are on the National Register of Historic Places and/or the Colorado State Register of Historic Properties (for more information about these registers, see Section 4.3 Vulnerability Assessment).

Table C.6. Jamestown's Historic Properties/Districts in National and State Registers

Property	Address	Date Listed
Jamestown Mercantile Building	108 Main Street	8/3/1989
Jamestown Town Hall	118 Main Street	7/10/2003

Sources: Directory of Colorado State Register Properties, www.coloradohistory-oahp.org/programareas/register/1503/; National Register Information System, www.nr.nps.gov/

Town of Jamestown

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

C.4 Growth and Development Trends

Table C.7 illustrates Jamestown's growth in terms of population and number of housing units between 2000 and 2010.

Table C.7. Jamestown's Change in Population and Housing Units, 2000-2010

2000 Population	2010 Population	Estimated Percent Change 2000-2010	2000 # of Housing Units	2010 Estimated # of Housing Units	Estimated Percent Change 2000-2010
205	274	+25	102	135*	+25

Source: Colorado Division of Local Government State Demography Office, www.dola.colorado.gov/dlg/demog/
* down to 117 post- September 2013 flood

No significant development trends are expected; however, some limited to moderate growth at wildland interface area west of town is anticipated.

C.5 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capability assessment summarizes Jamestown's regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities and then discusses these capabilities in further detail along with other mitigation efforts as they pertain to the National Flood Insurance Program's Community Rating System (CRS). Although the CRS is flood-focused, this discussion also incorporates activities related to other hazards into the categories established by the CRS.

C.5.1 Mitigation Capabilities Summary

Table C.8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Jamestown.

Town of Jamestown

Table C.8. Jamestown's Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
Master plan	Yes	We have a Hazardous Mitigation Plan, a Stream Corridor Master Plan, and a Comprehensive Plan (1981)
Zoning ordinance	No	
Subdivision ordinance	Yes	Ord 2, Series 2009 – An ordinance adopting revised subdivision regulations and providing for the enforcement thereof
Growth management ordinance	Yes	Ord 2, Series 1984 – An ordinance for the regulation and restriction of the use of real property to limit development in the Town of Jamestown to provide services and to preserve the small town character of the Town
Site plan review requirements	No	
Floodplain ordinance	Yes	Ord 8, Series 2012 – An ordinance providing for the prevention of flood damage through adoption of principles promulgated by the Federal Emergency Management Agency
Other special purpose ordinance (stormwater, steep slope, wildfire)	No	
Building code	Yes	Version: Ordinance 4, 2005, updating to 2006 by 10/081997 IGA with Boulder County Land Use concerning the implementation of building and electrical permit and inspection services for the Town of Jamestown
Fire department ISO rating	Yes	Rating: 5
Erosion or sediment control program	No	
Stormwater management program	No	
Capital improvements plan	Yes	Reserve Property Taxes
Economic development plan	No	
Local emergency operations plan	No	
Other special plans	Yes	Flood Hazard Mitigation Plan, 1993
Flood insurance study or other engineering study for streams	Yes	Stream Corridor Master Plan with provisional hydrology/hydraulics and mapping dated February 2014,u Environmental Sustainability Study (for catastrophic wildfire event that would contaminate the creek)

Table C.9 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in Jamestown.

Table C.9. Jamestown's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Temporary Contractor	Would be contracted
Engineer/professional trained in	Yes	Temporary Contractor	Would be contracted

Boulder County

Town of Jamestown

Personnel Resources	Yes/No	Department/Position	Comments
construction practices related to buildings and/or infrastructure			
Planner/engineer/scientist with an understanding of natural hazards	Yes	Temporary Contractor	Would be contracted
Personnel skilled in GIS	Yes		Volunteer
Full-time building official	No	Boulder County	Intergovernmental agreement
Floodplain manager	Yes		Grant supported to July2016
Emergency manager	Yes	Fire Chief	Volunteer
Grant writer	Yes	Volunteers/Donations Coordinator	Volunteer
GIS Data – Hazard areas	Yes	Boulder County Data	
GIS Data – Critical facilities	Yes	Boulder County Data	
GIS Data – Building footprints	Yes	Boulder County Data	
GIS Data – Land use	Yes	Boulder County Data	
GIS Data – Links to assessor's data	Yes	Boulder County Data	
Warning systems/services (Reverse 9-11, cable override, outdoor warning signals)	Yes	Boulder County	

Table C.10 identifies financial tools or resources that Jamestown could potentially use to help fund mitigation activities.

Table C.10. Jamestown's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Disaster Recovery
Capital improvements project funding	Yes	Capital Improvements Fund portion of property tax revenue
Authority to levy taxes for specific purposes	Yes	Subject to TABOR
Fees for water, sewer, gas, or electric services	Yes	Water (municipal)
Impact fees for new development	Yes	Ord 1, Series 2012 – The imposition, computation, and payment of land development fees to offset the impact of new growth in the town and providing for the establishment of separate impact fee funds, and providing for exemptions, refunds and appeals
Incur debt through general obligation bonds	No	
Incur debt through special tax bonds	No	Subject to TABOR
Incur debt through private activities	No	
Withhold spending in hazard-prone areas	No	(per 2014 revision supplied by Erika – which will it be? I vote to withhold

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spending in high hazard areas)

C.5.2 Community Rating System Activities (All Hazards)

National Flood Insurance Program

The Town of Jamestown joined the National Flood Insurance Program (NFIP) on July 18, 1983. The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds.

NFIP insurance data indicates that as of October 31, 2014, there were 20 policies in force in Jamestown, resulting in $5,067,200 of insurance in force. Of these, 19 were for single family homes, of which 7 are in the AE zone (special flood hazard areas), and 13 are in the standard or preferred lower risk zones. There is $14,859 worth of premiums in force, which is the total amount of premiums paid annually by the 20 policy holders in Jamestown. (As of January 5, 2015)In Jamestown prior to the 2013 flood, there had been two historical claims for flood losses totaling $696. These losses were both for pre-FIRM single-family homes in a B, C, or X zone. There were no repetitive or severe repetitive losses.

Following the 2013 flood there is $1,779,171 in paid losses. (As of January 5, 2015)

Community Rating System Categories

The Community Rating System (CRS) categorizes hazard mitigation activities into six categories. These categories, and applicable Jamestown activities, are described below. Note: some of the activities are appropriate to multiple categories. For purposes of simplicity, they are only included in the category deemed most appropriate based on the definitions and examples provided in the CRS Coordinator's Manual.

Preventive

Preventive activities keep problems from getting worse. The use and development of hazard-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

- Comprehensive Plan 1981- Describes use of property within the Town limits and identifies areas of potential growth.
- Land acquisition in the SFHA through HMGP.
- Subdivision Ordinance- Limits new building lots to a minimum of 2.3 acres and provides for public input prior to completion of any division of land.
- Growth Ordinance – Provides for minimum lot size for growth on building parcels recognized prior to the Town Subdivision Ordinance.

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- Floodplain Management Ordinance- Contains element of FEMA model and is approved by Colorado Water Conservation Board.
- Flood Hazard Mitigation Plan – Describes emergency resources and mitigation options in case of flood.
- Source Water Protection Plan – Identifies issues of concerns for source water protection, and plans implementation strategies to address those concerns.

Emergency Response Plan for Jamestown Water Enterprise.

Other

- A drainage plan has been devised for the area behind the Town Hall, church, and parsonage in relation to the Town Hall addition.

Property Protection

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

There are currently no private property protection activities being undertaken. The Town has contracted for a flood study and topographical surveys for Skunk Tunnel Road.

Natural Resource Protection

Natural protection activities preserve or restore natural areas or their natural functions and are usually implemented by parks, recreation, or conservation agencies or organizations.

The Town has completed the restoration of the soil cap on 5 acres of Elysian Park (19.5 acres) and some additional natural resource protection is built into the project (monitoring plan, etc).

Emergency Services

Emergency services measures are taken during an emergency to minimize impacts. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

No current projects/activities.

Structural Projects

Structural projects keep hazards away from an area (e.g., levees, reservoirs, other flood control measures). They are usually designed by engineers and managed or maintained by public works staff.

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- The Town of Jamestown has replaced a culvert (post office location) with prefab concrete to control mudflow. Jamestown received a Flood Mitigation Assistance Grant from the Colorado Water Conservation Board in 2000 to implement a project that was later destroyed in the 2004 mudslides. A 2013 mudslide at the same location resulted in one death. Subsequent NRCS project funding created a retaining wall structure, but the culvert underneath CR 94 is still the original capacity.
- A 2013 NRCS grant for emergency watershed protection was used to improve the channel on James Creek throughout Town, and resulted in post-flood riparian and floodplain reconfiguration with bioengineered structures to reduce velocity and scouring from 25 year flood events.

Public Information

Public information activities advise property owners, potential property owners, and visitors about the hazards. They detail the ways to protect people and property from the hazards, and describe the natural and beneficial functions of natural resources (e.g., local floodplains). They are usually implemented by a public information office.

- The Town has hosted educational programs including those provided by the EPA, U.S. Forest Service, Boulder County Health, James Creek Watershed Initiative, and Left Hand Watershed Oversight Group.

APPENDIX F | FLOOD RECOVERY EFFORTS

Road and Bridge Repairs

As a part of the Town's overall recovery efforts, a series of projects related to Road and Bridge repairs have been studied and in many cases implemented or in the process of being implemented at the time of this report. The following list of projects summarizes these recovery efforts:

Road Repairs (within Town limits)

To accommodate repairs to flood damaged portions of roads as well as installation of improved storm drainage culverts, storm sewer lines and repairs to water distribution lines, portions of the following roads and/or streets within Town limits have had repairs completed:

- Lower Main Street
- Main Street
- Ward Street
- 12th Street
- 15th Street
- 16th Street
- High Street (Skunk tunnel to High Street)
- Mesa Street
- Spruce Street

Road and Bridge Replacement (within Town limits)

Andersen Hill

Andersen Hill Road is a vital route between the southern neighborhoods and the core of the Town. The lower portion of Road and its bridge - which crossed James Creek - were both washed away in the 2013 Flooding. As a part of the Town's flood recovery efforts, it is in the process of rebuilding the bridge and road. To accommodate its reconstruction and the road's realignment, the Town purchased property between the proposed Town Square and Post Office. The project (property acquisition, design and construction) is being funded by a series of grants. Once completed, access to the neighborhoods located above James Creek and to the Jamestown Elementary School will be greatly enhanced, as well as emergency egress routes from the neighborhoods.

Main Street Bridge

Planning for replacement of a deteriorating wooden bridge - ultimately condemned by the State Highway Department, began in 1981. The town secured funding for the construction of the 44 foot wide, two lane pre-cast concrete bridge in 1987. Replacement of the extant Main Street Bridge, which crosses James Creek, was studied as part of 2013 Flood Recovery efforts. The study evaluated the possible replacement of the single span bridge by a dual span bridge as part of potential floodplain improvements. The study concluded that the cost of the new dual span bridge exceeded funding capabilities of the Town.

Road Repairs (outside of Town limits)

Jamestown's primary route for access is Boulder County Road 94, which parallels James Creek and Little James Creek. The road intersects with US 36 to the east and Colorado 72 (Peak to Peak Highway) to the west. From its intersection with US 36, the road is referred to as Lefthand Canyon until its intersection with James Canyon Drive (located at the juncture of Lefthand Creek and James Creek). Entering the Town from the east, the road is referred to as Mill Street until its intersection with Lower Main St. Through the core of Town it is referred to as Main Street until its western exit from the Town (headed towards Peak to Peak Highway and paralleling Little James Creek) where it is then referred to as Overland Road. Through much of its route paralleling James Creek, the road is within a canyon and was heavily damaged by the flooding of 2013. Temporary repairs (bank retention, limited repairs, temporary

culvert replacements, etc.) were made shortly after the flood to make the road serviceable. The Boulder County Transportation Department has hosted several meetings with residents of Jamestown presenting designs for the permanent repairs to the highway. The James Canyon Drive portion of the project is anticipated to be initiated upon the completion of repairs to Lefthand Canyon Drive.

Culvert and Drainage Improvements

As a part of the Town's overall recovery efforts, a series of projects related to culvert and drainage improvements have been studied and in many cases implemented or in the process of being implemented at the time of this report. The following list of projects summarizes these efforts:

Ward Street Culvert: A major flood project, the Ward Street culvert, located at the juncture of the Little James Creek and James Creek, has been completed.

Ward Street culvert under construction.

12th Street Culvert:

Another major flood recovery project, the 12th Street culvert, located along 12th St. and its intersection with Lower Main, was being redesigned with construction anticipated by the end of 2015.

Gillespie Gulch Culvert:

Another major flood recovery project, Gillespie Gulch culvert was nearing initiation of construction at the time of this report.