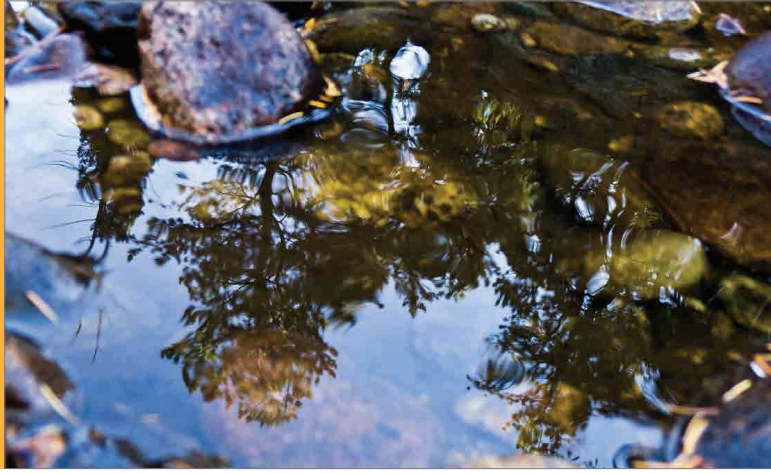




ST. VRAIN CREEK RESTORATION ASSESSMENT

SPRING 2020 MURP CAPSTONE

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St. Vrain Creek Restoration Assessment

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Master of Urban and Regional Planning

COLLEGE OF ARCHITECTURE AND PLANNING

UNIVERSITY OF COLORADO **DENVER**



EXECUTIVE SUMMARY

INTRODUCTION + BACKGROUND RESEARCH

Lyons is a small town, in northwest Colorado, and is known for its thriving arts, music, & outdoor scene. In September 2013, a large flood devastated the Town; forcing hundreds of people to evacuate and permanently altering the flow of the St. Vrain Creek. One of the many places that was affected by the flood was the site of the City of Longmont's former water treatment plant, located at 4652 Ute Highway, near the intersection of SH 66 and US 36. The site is located within the Eastern Corridor, which recommends future mixed-use and commercial development. Generator Real Estate Development Company recently bought the site from the Town of Lyons. This report will address how the site can be adequately restored to support a healthy ecosystem and future development and will provide river restoration best practices for the Town to use in the event of another flood.

The manipulation of rivers and the subsequent restoration of rivers has evolved over the years. For example, restoration has focused on physical form, ecosystem processes, water quality and a mix of all three. However, restoration is a complex process and faces numerous challenges including climate change, increasing urbanization, a lack of long-term monitoring, and conflicting ideas of what restoration should entail. Best practice research states that a successful restoration project is holistic and considers the social, physical, and ecological processes. This will ensure a functioning river system for people, infrastructure, and the ecosystem. Additionally, regardless of the chosen restoration strategy, all projects must have a plan with established goals and objectives, the involvement of all stakeholders, implementation steps, and a long-term monitoring strategy, such as an adaptive management process.

The September 2013 flood devastated Colorado front range communities, including Lyons. Recovery efforts started immediately following the flood and are still ongoing. Restoring the St. Vrain Creek is a key part of Lyons recovery efforts and are included in numerous Town documents and plans. In addition to reconfiguring the river in a way that is safe for people and infrastructure, Lyons wants to create a healthy, functioning, and resilient river for wildlife and the ecosystem.

Additionally, Lyons is expanding its borders due to increased population growth and sustainable development that is compatible with restoration efforts is essential. Furthermore, Lyons was only one of many towns to initiate river recovery efforts. Various municipalities and organizations created river restoration master plans following the flood all using a similar process of conducting an existing conditions assessment to determine the best restoration techniques for each designated reach.



Exhibit 1: A view of the site and its surrounding context

METHODOLOGY

The methodology for this report was broken into three sections: The site, the river, and the town. An existing conditions assessment was conducted for the site and its adjacent river reach to determine adequate restoration strategies that are compatible with future development. A variety of sources were used for the site's existing conditions assessment and the Left Hand Watershed Center's Regional Stream Stewardship and Recovery Handbook was the primary source used to conduct an assessment of the site's reach. Additionally, since the client was interested in having general restoration guidelines for when another flood affects the Town of Lyons, the author conducted a content analysis to identify the most important river restoration information. Final development and river restoration recommendations and conclusions were derived directly from the data collection and analysis process informed by the methodology for each section.

EXISTING CONDITIONS

Lyons is a small, well-educated, older, and majority white town. The educational services and health care field is the Town's largest industry. The Town's populations is growing as well as its boundaries. The site is located just east of US Highway 36 in Lyons and south of State Highway 66, and is adjacent to the St. Vrain Creek. It is home to Longmont's former water treatment plant and the federally threatened Preble's mouse and has recently been annexed into the Town's municipal boundaries. The 2013 flood washed away over a third of the site's developable land, creating difficult development conditions. The flood also changed the course of the St. Vrain Creek throughout the town and required a re-mapping of the 100-year floodplain through the Colorado Hazard Mapping Program. Preliminary Flood Rate Insurance Maps (FIRM) were adopted in January 2020, allowing Boulder County to regulate floodplain development. Permanent FIRM changes will be effective in 2021. Generator Real Estate, a Denver based developer, bought the site in February 2020 and has plans to develop the site into a hospitality use. This development will revitalize the site to be compatible with the Lyons Primary Planning Area Master Plan, the proposed extension of the St. Vrain Greenway Trail, and any restoration projects.

LYONS POPULATION PRE- & POST 2013 FLOOD

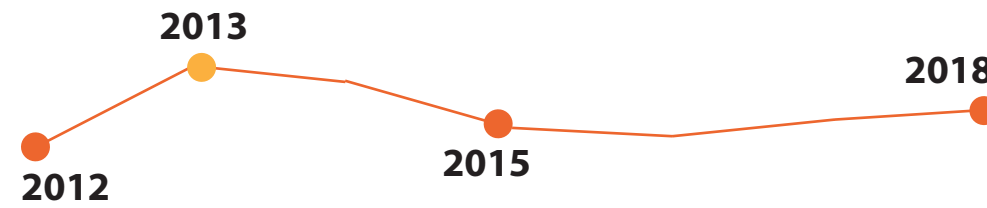


Exhibit 2



Exhibit 3: A view of the site and its adjacent river reach, looking southwest

SITE SPECIFIC RECOMMENDATIONS

The 12 restoration strategies, as seen in Exhibit 4 below, recommended by the seven assessments, provide a starting point for restoring the site's river reach. Based on the assessment results, the stated priorities of the developer, and the recommendations provided by the St. Vrain Watershed Master Plan, the author recommends that the following three restoration strategies be prioritized: Bank Armoring, Increase Floodplain, and Sediment Removal.

Bank armoring and increasing, or moving, the floodplain are two of the most expensive strategies comparatively, but they are important for protecting the banks and future structures as well as providing the developer with more usable land. Adequately armoring the bank will also help to protect the property from future floods and provide a safe place for future visitors to gather by the stream. Since the site has not been used since the 2013 flood, a large amount of sediment has settled on the banks and in the basement of the structures. The sediment must be removed to allow for adaptive reuse of the structures and before any other type of restoration or development can begin. The Sediment Removal and Increase Floodplain strategies can be used in conjunction to generate more developable land.

The remaining nine strategies can be implemented over time. Strategies that achieve more than one objective, such as riparian plantings that provide habitat, shade, and bank stabilization, are useful since restoration costs, including new plants and materials, are expensive. The cost funding options in Chapter 5 and the cost and implementation matrix, seen in Exhibit 4 below, can be used to assess and reduce restoration costs. Similarly, restoration strategies could be implemented over a series of years to limit the burden of high upfront costs. Implementing a mix of hard (e.g. riprap, boulders, retaining walls) and soft restoration strategies (e.g. riparian plantings, root wads) is recommended to adequately protect the site and its structures from future floods, while implementing the Town's goals of sustainably restoring river ecosystems and preserving wildlife habitat.

Additionally, since the proposed St. Vrain Greenway would travel along the northern area of the site, it would likely not impact any chosen restoration strategy.

However, when constructed, the Greenway will attract visitors and residents to the site and creating an attractive space along the stream with plantings and gathering spaces will only benefit the site's prosperity.

Although the future development of the site is in its preliminary stages, the presented restoration strategies are compatible and adaptable with any type of future hospitality development. Using an adaptive management strategy, as presented in Chapter 2, allow for learning by doing and adjusting techniques as needed. Additionally, although there is no current Preble's mouse habitat on the site, it would be best to preserve existing and enhance low quality riparian habitat along the streambanks.

RIVER RESTORATION RESOURCES

River restoration is multi-disciplinary and complex, much like a river ecosystem itself. Understanding the type of stream that needs restoring ensures each restoration strategy is effective. A successful restoration project requires the skill and knowledge of a variety of experts and stakeholders, including engineers, consultants, scientists, and contractors. Not only can these professionals identify and implement the best restoration strategies, they can guarantee the correct permits are being pulled and identify grant and other funding opportunities. Furthermore, restoring one river reach can affect the entire community, including all upstream and downstream landowners. Therefore, involving the local community in restoration projects, when appropriate, is essential. It is likely that another flood will affect Lyons and Chapter 6 provides important information and resources to help the Town to be more prepared.

CONCLUSION

Based on the restoration assessments, 12 restoration strategies are recommended including: People Places, Stream Access, Bank Revegetation, Bank Reshaping, Wildlife Habitat, Fish Habitat, Undesirable Wildlife Management, Invasive Plant Management, Increase Floodplain, Channel Complexity, Bank Armoring, and Sediment Removal. All strategies can be implemented together and are adaptable to various types of development, including any future hospitality use.

The three strategies that should be prioritized first are Increase Floodplain, Bank Armoring, and Sediment Removal. The 2013 flood washed away one-third of the site's developable land and moving the floodplain further south, if possible, will provide more space. Bank armoring is a recommended strategy by Nathan Werner from S2O Design and Engineering, the St. Vrain Creek Watershed Master Plan, and the restoration assessments. It is crucial to protecting any structures from future floods. Lastly, sediment has collected along the banks and in the existing structures and needs to be removed before any development can begin. These three strategies are more expensive than others, but they will be necessary in the long run. Afterwards, the remaining nine restoration strategies can be implemented over time, and as funding allows, to provide additional protection for the site's structures and enhance the stream's riparian areas for the Preble's mouse and other native flora and fauna.

Generator Real Estate should work with restoration experts and professionals to plan and implement chosen restoration strategies as to not negatively affect the property itself or its upstream and downstream neighbors. A community meeting will likely not need to be held since the restoration involves one private property owner, however, the community could provide valuable insight and/or assistance. Restoration projects are expensive and the cost funding options presented in Chapter 5 can help offset the costs. Partnering with the Town of Lyons will be necessary to secure certain grants. The FEMA Hazard Mitigation Grant Program, specifically, could be a good option.

NEXT STEPS

- Contact restoration experts to start the restoration process, including a plan, timeline, estimated costs, and implementation of restoration strategies. S2O Design and Engineering is a local organization that provides restoration services.
- Gather all information necessary for any required permits.
- Conduct a hydraulic analysis to determine whether the floodway and floodplain will be impacted by the project.
- Work with the Town of Lyons and other local organizations to secure funding.
- Adopt adaptive management strategies, and monitor and adapt the site's restoration strategies, as needed, over the next few years.

- Become familiarized with the provided restoration resources in Chapter 6 and update it regularly. New Town staff members should have access to the resources should turnover occur.
- Identify ways to involve the community in future restoration projects.
- Partner with local organizations and coalitions to create strong connections in the face of a future flood.
- Adopt adaptive management strategies and monitor every restoration project in the Town to ensure continued resiliency.

Restoration Strategies Cost and Implementation Matrix






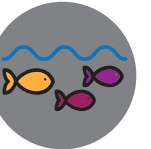


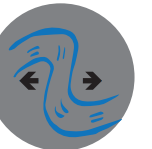



12 Restoration Strategies	 People Places	 Stream Access	 Bank Revegetation	 Bank Reshaping	 Wildlife Habitat	 Fish Habitat	 Undesirable Wildlife Management	 Invasive Plant Management	 Increase Floodplain	 Channel Complexity	 Bank Armoring	 Sediment Removal
Cost Range \$ \$\$ \$\$\$	\$\$	\$\$	\$\$	\$\$	\$	\$\$	\$\$	\$\$	\$\$\$\$	\$\$	\$\$\$\$	\$
Difficulty to Install	● ○ ○	● ● ○	● ● ○	● ● ○	● ○ ○	● ● ○	● ● ○	● ● ○	● ● ●	● ● ○	● ● ●	● ○ ○
Permit(s) Required? Yes/No/Maybe	Maybe	Maybe	Maybe	Yes	No	Yes	Maybe	No	Yes	Yes	Yes	Yes

Exhibit 4: A cost and implementation matrix for the 12 restoration strategies for the site as recommended by the restoration assessments