



PREPARED BY:



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FAIRFIELD TOWN

APRIL 2025

SEWER MASTER PLAN

DRAFT

FAIRFIELD TOWN SEWER MASTER PLAN

April 2025

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Prepared for:

**FAIRFIELD
TOWN**

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CHAPTER 1 INTRODUCTION

INTRODUCTION & BACKGROUND

Fairfield Town (the Town) has contracted with Bowen Collins & Associates (BC&A) to prepare a sewer master plan. The purpose of this master plan report is to forecast future wastewater production as a result of growth, evaluate alternative methods of treating future wastewater flows, recommend parameters for a future sewer collections system, and identify improvements that will be required to create a wastewater collections and treatment system.

Currently, all wastewater flows within Fairfield Town are sent to septic systems owned by individual residents. Discussion with developers have prompted Town personnel to consider the future need of a centralized collection and treatment system.

SCOPE OF SERVICES

As part of this master plan, BC&A completed the following tasks:

Task 1: Collect, review, and organize data to identify expected sewer flows and needed capital improvements.

Task 2: Project population growth and estimate future wastewater flows.

Task 3: Evaluate alternatives and recommend sewer collection and treatment options.

Task 4: Develop a comprehensive capital facilities plan incorporating all recommended projects identified for the collection and treatment system as applicable.

Task 5: Document results of the previous tasks in a report.

It should be noted that the primary focus of this report was to identify the big-picture aspects and needs of constructing a new wastewater system. Therefore, we have outlined a general plan for a sewer system but have not developed any detailed design for these systems.

REPORT ASSUMPTIONS

The following assumptions were key to developing this master plan and the final results presented. If any of these assumptions prove to be incorrect as more details about system growth and development are available, the results of this master plan should be revised to reflect those changes.

- Eagle Mountain City has expressed willingness to treat Fairfield's sewer flows, pending an agreement between the two parties.
- Development in the Town will begin in the northeast corner. Additional development will occur over time at the north end, through the town center, and at the southwest corner near Allen's Ranch Road. The timing of these developments is unknown, but initial sewer system infrastructure is expected to be needed within the next 5 years.
- The indoor water demand estimates in the 2025 Water Master Plan are representative of existing and expected water use patterns and therefore sewer flows.
- As later described in this report, BC&A has assumed that the Town will limit development to 1 ERU/acre for industrial customers and 2 ERUs/acre for commercial customers.¹

¹ In connection with limitations on development density, BC&A has also assumed that the Town will require customers to limit sewer release rates to the maximum planned discharged for buildout level of service, as shown in Table 2-3 of Chapter 2. Release rates higher than the peak month average day or peak hour flow listed in this report may impact pipe sizing and treatment capacity needs outlined in this report.

- All cost estimates have been included in 2025 dollars. Future project costs will need to be inflated to the year of construction for a true cost projection.

CHAPTER 2

WASTEWATER SYSTEM GROWTH PROJECTIONS

INTRODUCTION

A key aspect of the master planning process is developing projections for future system utilization. Growth projections have a direct impact on important components of this master plan and other Town planning studies (including the 2025 Water Master Plan). The purpose of this chapter is to estimate future growth and project future wastewater production within the Town's service area.

ESTIMATING BASE WASTEWATER FLOWS

Wastewater flows consist of flows from base sanitary sources (residential, commercial, and industrial), inflow, and infiltration. Each of these components are described in greater detail below.²

Base Sanitary Sewer Flow

Base sanitary wastewater is categorized as flow that intentionally enters the collection system from a home, business, or other sewer connection. Ideally, base sanitary waste should make up the majority of flow in the sewer collection system. Often sewer flows are estimated using water meter data by evaluating demands in winter months, when little to no irrigation occurs and therefore most water use is for indoor applications. Due to the lack of reliable historic metered data from sales and water production, indoor water use was estimated based on typical per capita water use in the state of Utah in combination with a conservatively high household size of 3.3 people per household (Fairfield 2020 census data reports 2.09 people/household). Based on this method the estimated indoor water use per residential connection is 198 gpd. BC&A checked water production data for 2022 and 2023 and verified that this estimate is reasonable.

The average household indoor water use does not necessarily equate to the water that is discharged into the sewer system. While the majority of culinary water use in the winter directly enters the sewer collection system after use (such as water used for toilets, showers, washing machines, dishwashers, etc., hereafter referred to as "non-consumptive" water use), a small portion does not. Water used for drinking or cooking, watering plants, or water that is lost through internal leaks within the unit's plumbing system on the customer's side of the meter will not enter the sewer. However, this is only a small portion of the total flow. For a residential unit, it is estimated that 90 – 95% of metered winter water use will be discharged into the sewer collection system.

For the purpose of this master plan, it was conservatively assumed that 95% of overall indoor water use would ultimately enter the sewer collection system. Under this assumption, Table 2-1 summarizes base sanitary wastewater flow estimates for residential and non-residential connections under an average daily demand scenario. Non-residential applications are assumed to use a larger share of water indoors, resulting in higher sewer flows and more sewer ERUs per connection. See the 2025 Fairfield Water Master Plan for details concerning estimated water use for these facilities.

Note that actual sewer flows vary throughout the day due to typical patterns of indoor water use. The values shown in Table 2-1 represent peak month, average day flows.

² Utah Administrative Code R317-3 titled, "Design Requirements for Wastewater Collection, Treatment and Disposal Systems" provides guidelines for estimating per capita wastewater production for the purpose of sizing sewer collection and treatment systems. The code states that, "New sewer systems shall be designed on the basis of an annual average daily rate of flow of 100 gallons per capita per day unless there are data to indicate otherwise. The per capita rate of flow includes an allowance for infiltration/inflow". The design guidelines presented in UAC R317-3 are typically conservative when compared to actual sewer flows in a collection system. Since historic water production data is available from the Town, sewer flow estimates specific to the Fairfield sewer system were developed and used for this master plan as described in this chapter.

Table 2-1
Estimated Standard Base Sanitary Wastewater Flow

Customer Type	Estimated Typical Indoor Water Use per Connection (gal)	Estimated % of Non-Consumptive Indoor Water Use	Estimated Peak Month, Average Day Wastewater Production per Connection (gal)	Sewer ERU per Connection
Residential	198	95%	188	1.0
Light Industrial	388	95%	368	2.0
Commercial	775	95%	737	3.9

Inflow and Infiltration

Inflow refers to flows that enter the sewer system via unofficial connections (such as manhole covers, leaky service laterals, root damage, etc.) during a precipitation event. These are temporary increases in flow that enter the system after a storm. Conversely, infiltration is related to groundwater seeping into the wastewater collection system through cracks, breaks, or un-sealed pipe joints. Groundwater levels—and therefore infiltration flows—can vary with seasonal and long-term precipitation trends but are generally constant over a 24-hour period.

Inflow and infiltration flows can be separated from base sanitary wastewater flows with detailed monitoring. However, most sewer systems don't have sufficient data to separate these sources. In the absence of detailed monitoring, we have assumed infiltration to be 18% of base sanitary sewer flows. Inflow will be accommodated in the pipe capacity safety factor discussed in Chapter 4.

Peak Hour Flows

Sewer flows typically vary throughout the day based on daily water use patterns. For example, morning and evenings typically see a spike in domestic water use (and therefore sewer flows) as more people are at home using showers, toilets, washing machines, etc. as opposed to the middle of the day, when people often leave the house for work or other activities. Understanding and planning for these hourly peaks is crucial to adequately sizing a sewer collection system.

Hourly peaking factors may change over time for multiple reasons, including, but not limited to:

- **System Growth:** Peaking factors generally decrease as a system grows. As additional connections are added to the system, the base flows conveyed through the collection system increases, which reduces the peaking effect of a single or small group of customers.
- **Change in Customer Class Distribution:** The daily indoor water use patterns of residential and non-residential customers are usually very different, which creates different peaking factors. Therefore, peaking factors often change when the balance between residential and non-residential customers changes within a sewer system.

Peaking factors were estimated based on the 10-state Standard for small area peaking factors. This method uses historic data collected over many systems, estimated connections, and estimated flows to project peaking factors for hourly sewer flows. For Fairfield, these peaking factors range from 4.05 in the first year of system operation to 2.66 at buildout.

Hourly peaking factors are applied only to the base sanitary sewer flows, not I&I.

Proposed Level of Service for New Users

BC&A proposes the level of service per ERU for new development in Fairfield as shown in Table 2-2. These values are based on the assumption that future development will follow similar indoor use patterns as existing Fairfield Town water customers, and that infiltration will continue at 18% of total base sanitary flows per ERU.

Table 2-2
Recommended Near-Term Level of Service per ERU (10-yr)

Flow Component	Peak Month, Average Day Flow per Sewer ERU (gpd)	Peak Hour Flow per Sewer ERU (gpd)
Base Sanitary Flow	188	761
Infiltration ¹	34	34
Total Level of Service	222	795

¹Assumed to constitute 18% of total base sanitary sewer flow.

Table 2-3 shows the projected level of service for the system at buildout.

Table 2-3
Estimated Buildout Level of Service per ERU

Flow Component	Peak Month, Average Day Flow per Sewer ERU (gpd)	Peak Hour Flow per Sewer ERU (gpd)
Base Sanitary Flow	188	501
Infiltration ¹	34	34
Total Level of Service	222	535

¹Assumed to constitute 18% of total base sanitary sewer flow.

Note that it is likely that water use patterns will change as development occurs, impacting the sewer flows per ERU estimated in this study. The Town should review incoming development proposals and monitor real water use and/or sewer flows to understand if and when these estimates need to be updated.

Additionally, some customers (notably non-residential) may create peak instantaneous sewer discharges larger than those published in Tables 2-2 and 2-3. In order to reduce the risk of overwhelming the collections and treatment systems with these large peak wastewater flows, BC&A recommends that the Town requires all developments to restrict sewer releases to the buildout peak hour flows for base sanitary flows published in Table 2-3.

Summary of Flow Projections

Below is a summary of flow projections described in this section. These values represent the base sanitary sewer flow and expected I&I.

- Existing and future peak month, average day flow = 222 gpd/ERU
- Existing peak hour flow = 795 gpd/ERU (0.552 gpm/ERU)
- Future peak hour flow = 535 gpd/ERU (0.372 gpm/ERU)

GROWTH PROJECTIONS AND FUTURE FLOWS

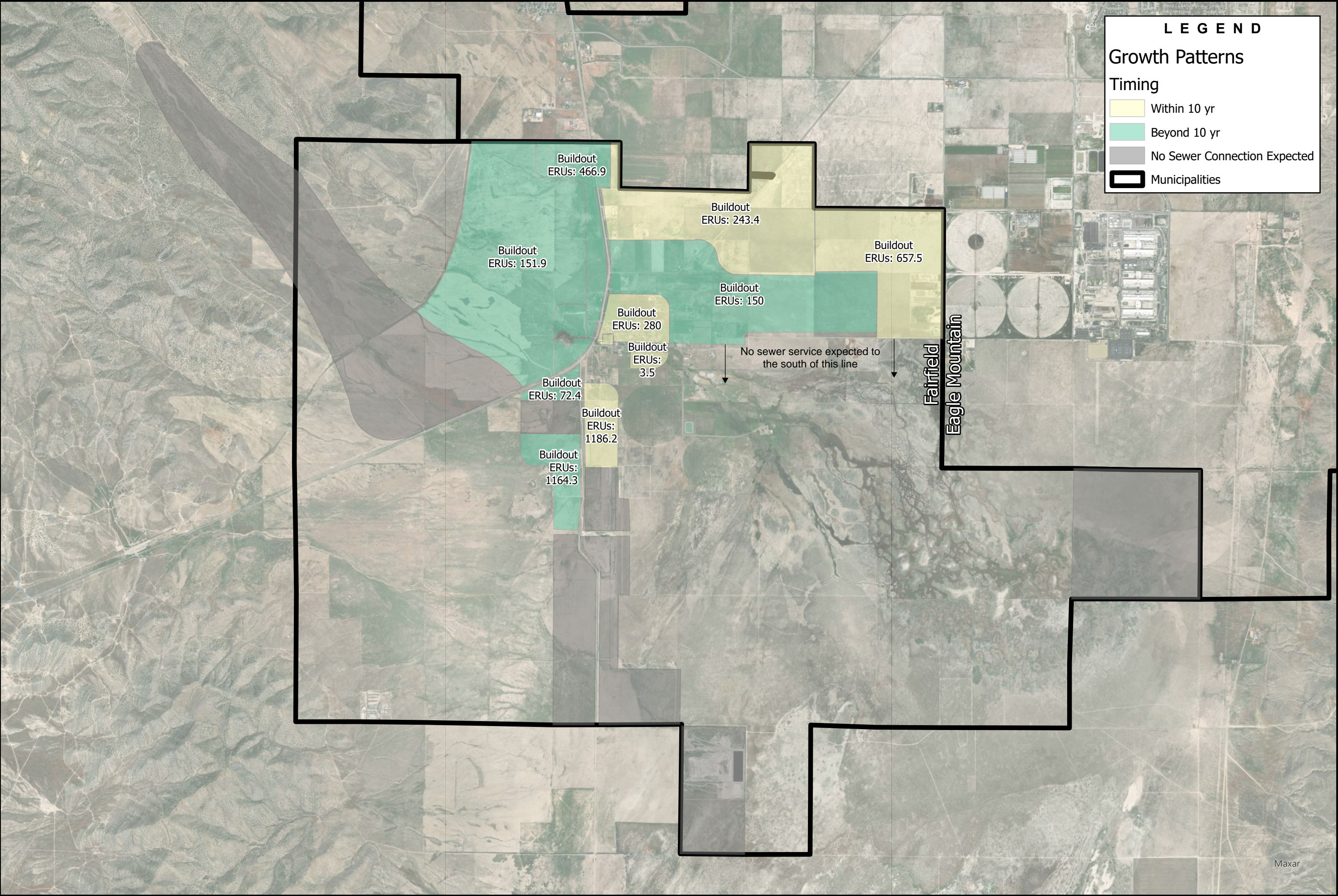
Future growth projections for all of Fairfield Town were estimated in the concurrently developed 2025 Water Master Plan, completed by BC&A. After coordinating with Town staff, BC&A decided to utilize these growth projections to ensure consistency between the different utility master plans. One important difference in how the growth projections were used in this plan pertains to existing users. Since there is no existing centralized sewer system in Fairfield currently, BC&A adjusted the number of “new ERUs” in the system to be zero for the sewer system and to grow with development. BC&A conservatively assumed current residents of Fairfield will connect to the centralized sewer system within the next 10 years. Growth projections shown in Table 2-4 reflect this assumption.

Table 2-4
Growth Projections for Fairfield Town

Year	Estimated Growth Rate	Population	Sewer ERUs	Base Sanitary Sewer Flow (gpd)	Infiltration (gpd)	Total Average Flow (gpd)
2025	--	265	0	0	0	0
2026	54.0%	355	85	17,879	3,218	21,098
2027	35.2%	445	128	27,040	4,867	31,907
2028	26.2%	535	172	36,278	6,530	42,808
2029	18.8%	625	209	44,138	7,945	52,083
2030	16.4%	718	248	52,306	9,415	61,722
2031	20.1%	839	306	64,546	11,618	76,164
2032	19.2%	974	373	78,742	14,174	92,916
2033	18.2%	1,123	451	95,027	17,105	112,132
2034	17.2%	1,282	538	113,499	20,430	133,929
2035	16.1%	1,449	635	133,953	24,112	158,064
2040	11.1%	2,249	1,286	271,076	48,794	319,869
2045	7.8%	2,744	2,191	462,048	83,169	545,217
2050	4.9%	2,952	3,143	662,755	119,296	782,051
2055	2.4%	3,025	3,832	807,952	145,431	953,384
2060	0.9%	3,049	4,175	880,417	158,475	1,038,892
2065	0.3%	3,056	4,308	908,280	163,490	1,071,770
2070	0.1%	3,059	4,354	918,106	165,259	1,083,365
2075	0.0%	3,059	4,369	921,171	165,811	1,086,981
2080	0.0%	3,060	4,373	922,148	165,987	1,088,135

ESTIMATED DISTRIBUTION OF FUTURE GROWTH

While it is impossible to predict exactly when and where new development will occur within the system, Town staff have a general idea of where new projects are occurring and how new development will unfold in the future. Through coordination with the Town staff, Figure 2-1 displays the estimated distribution of new growth within the 10-year planning window and 20-year planning window. This exercise helps to prioritize which sewer collection system projects will need to be built to accommodate the needs of future growth. It should be noted that the areas identified in the 10-year window are not expected to be fully developed within ten years, but that at least some portion of growth will begin within this planning window. If the Town observes significant deviations from these assumptions with respect to the location or timing of new development, updates should be made in subsequent master planning efforts.



LEGEND

Growth Patterns

Timing

Within 10 yr

Beyond 10 yr

No Sewer Connection Expected

Municipalities

SCALE: 0 1,750 3,500 Feet

NORTH:

PROJECTED AREAS
OF GROWTH

FAIRFIELD TOWN
2025 FAIRFIELD
SEWER MASTER PLAN

**BOWEN COLLINS
& ASSOCIATES**

FIGURE NO.
2-1

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CHAPTER 3

FUTURE TREATMENT ALTERNATIVES EVALUATION

BC&A began its analysis by considering sewer treatment alternatives because the location of treatment facilities will inform much of how the collections system is conceptualized. The purpose of this chapter is to consider which alternatives exist for treating Fairfield's sewer flows, understand the relative advantages and disadvantages of each alternative, and provide a recommended treatment alternative.

TREATMENT ALTERNATIVES

While there are many nuances to sewer treatment options, BC&A considered two main alternatives for this master plan:

- Building a new wastewater treatment facility in Fairfield or
- Entering into an agreement with another entity to treat sewer flows.

These alternatives are described and analyzed in the following sections. BC&A summarized advantages and disadvantages by considering short-term and long-term costs to the Town, ease of complying with state regulations regarding sewer treatment, and time to have an operational system.

Alternative 1: Build a New Wastewater Treatment Facility in Fairfield

Fairfield may plan for, design, build, and operate its own wastewater treatment plant (WWTP). The estimated cost, advantages, and disadvantages of this alternative are as follows:

Estimated Cost:

- Capital Construction Cost: ~\$22 million
- Annual Operation & Maintenance: Between \$270,000 and \$2.0 million per MGD of treatment capacity
- Annual Treatment System Capital Investment³: ~\$392,000/year

Advantages:

- Gives the Town control over treatment processes
- Holds the cost at actual cost of treatment (i.e. cost not dependent on an agreement with another entity)

Disadvantages:

- Expensive to construct, operate, and maintain
- Requires full time licensed and/or certified personnel to be added to Town staff
- Requires approval by the Utah Division of Environmental Quality to build and operate. Approval is unlikely due to the proximity to the existing treatment plant in Eagle Mountain.
- Relatively long time frame to have an operational sewer system because of time for design, state approval, and construction
- Functionality of WWTP becomes difficult without a surface water body in the Town for effluent discharge

³ Long-term budget required to sustainably maintain the capital facilities associated with treatment after it is initially paid for. Based on expected 50-year service life for most treatment facilities.

Alternative 2: Enter into an Agreement with Eagle Mountain for Sewer Treatment

The other alternative Fairfield has in dealing with centralized sewer treatment is to enter into an agreement with Eagle Mountain for sewage to be treated at the Eagle Mountain WWTP. At the time of writing this master plan, Fairfield has already approached Eagle Mountain public works staff and City Council to propose this alternative. The Eagle Mountain City Council approved the proposal submitted by the Town, but the actual terms of the agreement have not been set. As with Alternative 1, the estimated cost, advantages, and disadvantages of this alternative are as follows:

Estimated Cost:

- Both initial capital and ongoing annual costs will be dependent on the cost of treatment and conveyance for Eagle Mountain and will be decided in the official agreement between Eagle Mountain and Fairfield. Eagle Mountain's current sewer capacity impact fee is \$4,665/ERU. While this is expected to increase in the future, it is significantly less than the approximately \$15,000/ERU cost associated with building treatment for Alternative 1. An additional cost advantage of Alternative 2 is that it would be easier to add cost (and treatment capacity) incrementally compared to Alternative 1.

Advantages:

- A much simpler process for the Town because it eliminates the need to hire additional staff members, acquire licenses and permits for building and operating a WWTP, working through state approval, etc.
- More in line with state desires to consolidate treatment locations where possible
- It is expected that Eagle Mountain will allow the Town to buy into the treatment plant incrementally. This would result in a much smaller up-front capital investment than Alternative 1.

Disadvantages:

- Agreement cost will be controlled by Eagle Mountain, may not be strictly cost of service, and will likely be increased on a regular basis
- May require a more extensive collections system to reach the Eagle Mountain WWTP

TREATMENT CONCLUSIONS AND RECOMMENDATIONS

Based on the cost estimates, advantages, and disadvantages stated above, we anticipate Alternative 2 will be the best option for Fairfield economically and administratively. We recommend the following action be taken to facilitate treating sewer flows at the Eagle Mountain WWTP:

- Continue discussions with Eagle Mountain public works to form an agreement for sewer treatment. While this agreement will be unique to Eagle Mountain and Fairfield, the following items are commonly seen in these types of agreement or are general things to consider:
 - The agreement will likely include a buy-in portion (i.e. Fairfield has to purchase their fair share of treatment capacity from Eagle Mountain) and a volume portion (i.e. the cost of actually treating each gallon of sewage). In addition to treatment capacity, this may also include a buy-in to existing collection facilities that Fairfield ties into.
 - While there are multiple different approaches to determining buy-in costs, it is recommended that the Town negotiate a buy-in cost for existing development that is closely tied to the calculation of Eagle Mountain's impact fees. This will ensure that the fees are calculated fairly and according to a set process dictated by State code.

- Future volume capacity can be purchased in blocks at a time to cover expected development for the next several years or can be purchased for individual connections as they are developed. If possible, it is recommended that the Town pursue an agreement in which its new connections simply pay an impact fee to Eagle Mountain as they connect to the system. Again, this will ensure that the fee is fairly calculated and will remove any kind of burden for financing future development off the Town.

CHAPTER 4 FUTURE COLLECTIONS SYSTEM

This chapter was written under the assumption that Fairfield sewage flows will be treated at the Eagle Mountain WWTP, as discussed in Chapter 3. Therefore, all collections system improvements discussed in this chapter are laid out to send flows to that location.

COLLECTIONS SYSTEM ALTERNATIVES

Multiple alternatives or alternative combinations were developed for the future sewer collection system in Fairfield, as shown in Figure 4-1 and summarized in Table 4-1. Three basic alternatives were considered:

- **Alternative 1:** Sends majority of flows north to tie into Eagle Mountain's existing sewer mains in Pole Canyon Rd. This alternative would leave a small area to the east that would need to be served by a lift station.
- **Alternative 2:** Sends all flows to the northeast corner of Fairfield to connect into Eagle Mountain's collection system along Magnolia Rd.
- **Alternative 3:** Sends flows to Fairfield's Main Street, where they will be sent east and north to connect to Eagle Mountain's collection system along Magnolia Rd.

The following items were considered when developing and evaluating these alternatives:

- The amount of the system that can gravity flow to the WWTP, rather than requiring lift stations and force mains (which are typically more expensive to build, operate, and maintain);
- The number of outfalls from Fairfield into the Eagle Mountain sewer collections system and WWTP;
- Total pipe required and expected pipe sizes (assuming minimum pipe slope per Utah code R317-3-2.3(D)(4)); and
- Rough estimated cost.

In addition to the considerations above, the following assumptions were made when sizing gravity pipes in this analysis:

- Manning's roughness coefficient of 0.013 was assumed.
- Pipes were sized such that maximum pipe capacity for base flows did not exceed 75% pipe capacity (q/Q). The remaining 25% of pipe capacity is reserved for precipitation related inflow or atypical fluctuations in base sanitary water use.

**Table 4-1
Comparison of Collections Alternatives**

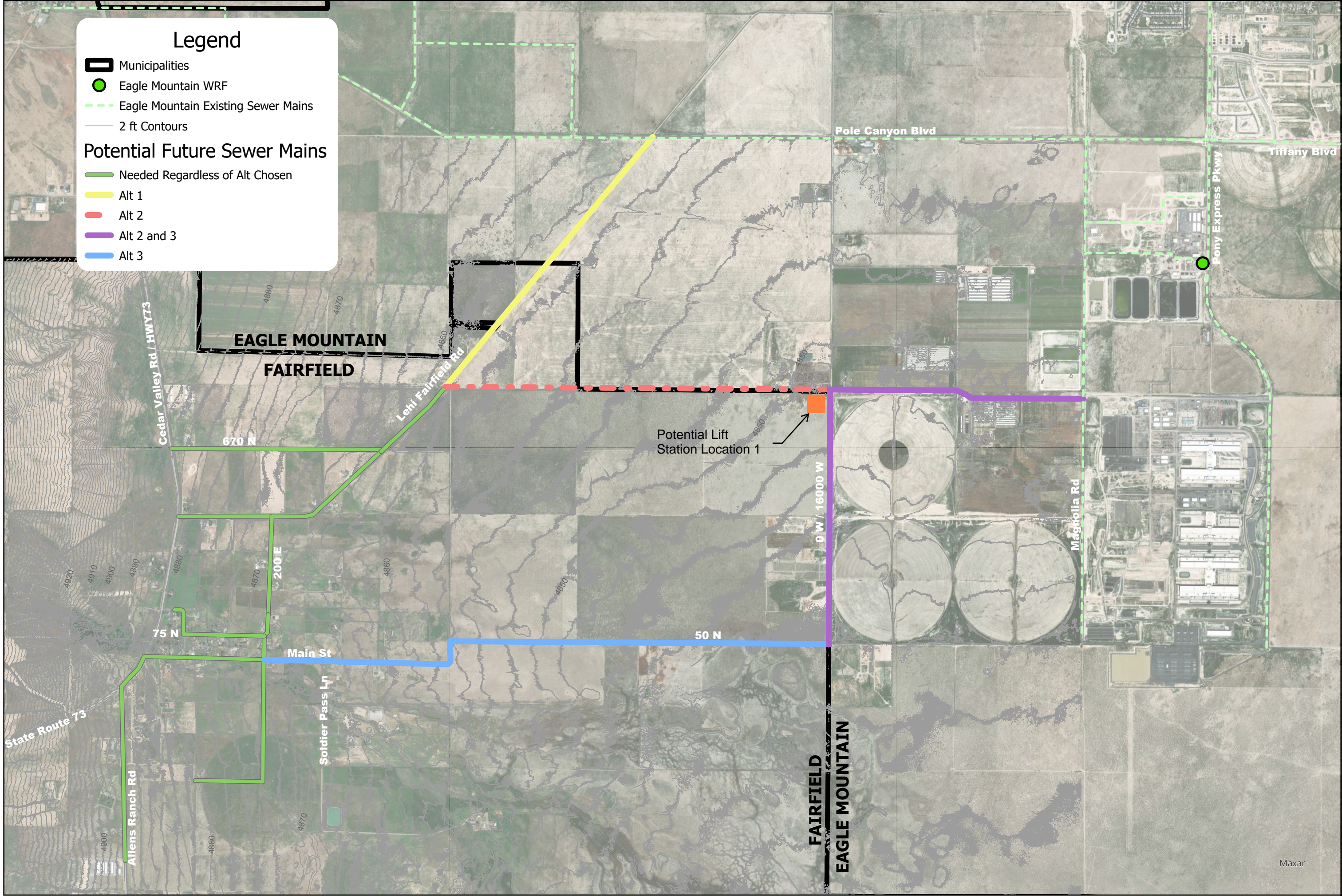
	Alternative 1 Only	Alternative 2 Only	Alternative 3 Only	Alternatives 1 and 3	Alternatives 2 and 3
Number of Major Lift Stations Required	1	0	0	0	0
Number of Outfalls to Eagle Mountain System	1	1	1	2	1
Total Gravity Pipe (inch-diameter miles)¹	100	134	159	157	163
Total Force Main Pipe Length (inch-diameter-miles)²	12	0	0	0	0
Pipe Cost Estimate (design, material, & pipe installation)³	\$20,067,900	\$21,641,500	\$24,859,100	\$25,153,900	\$25,958,100
Lift Station Cost Estimate	\$1,003,000	\$0	\$0	\$0	\$0
Approximate Cost of Buy-In to Eagle Mountain Conveyance Facilities⁴	\$3,984,300	\$1,538,700	\$1,538,700	\$1,538,700	\$1,538,700
Total Collections Cost Estimate	\$25,055,200	\$23,180,200	\$26,397,800	\$26,692,600	\$27,496,800
Additional Notes	This alternative cannot function without lift station location 1 (see Figure 4-1).	—	---	Splits the Fairfield system into two separate systems and outfalls. May be beneficial to avoid overwhelming the Eagle Mountain collections system but also creates challenges for cost sharing.	This alternative creates virtually two separate systems on the north and south ends of Fairfield, while isolating connections to Eagle Mountain to only one location.

¹Inch-diameter-mile is a measure of total pipe length weighted by pipe diameter and is commonly used to objectively compare a mix of pipe lengths and diameters.

²Force main dimensions based on C900 PVC DR14 pipe.

³Excludes appurtenant construction costs such as survey, traffic control, pipe fittings, etc. Should be used for comparison of alternatives only with a more detailed estimate to be assembled after an recommended alternative is selected.

⁴Actual cost of Eagle Mountain conveyance cost is unknown. It was assumed for the purposes of this analysis that Fairfield can share capacity in these pipes. We have assumed this would be approximately 60% of the cost of installing independent infrastructure.



Municipalities

Eagle Mountain WRF

Eagle Mountain Existing Sewer Mains

2 ft Contours

Potential Future Sewer Mains

Needed Regardless of Alt Chosen

Alt 1

Alt 2

Alt 2 and 3

Alt 3

SCALE:

0

900

1,800

Feet

NORTH:

NORTH

BUILDOUT COLLECTIONS
SYSTEM ALTERNATIVES

FAIRFIELD TOWN

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& ASSOCIATES

FIGURE NO.

4-1

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Based on the information contained in Table 4-1 the following discussions and conclusions can be made:

- From an initial capital cost perspective, Alternative 1 is the second cheapest, however this does not consider the ongoing costs of operating and maintaining the lift station(s).
- Alternative 2 keeps collections infrastructure required to a minimum, while also likely eliminating the need for a lift station.
- A high-level investigation performed for this analysis indicated that a pipe laid at a minimum slope north from 50 N could eliminate the need for a lift station in Alternatives 2 and 3. However, additional survey and topographical investigation should be performed to confirm these slopes and constructability of a gravity line for these alternatives.
- The combination of alternatives may make sense as development occurs, depending on development patterns. For example, if the north end of the system develops many years before the south end, building enough infrastructure only for the immediate demand would reduce the Town's cost burden of paying for infrastructure that will not be used or reimbursed for many years. However, it's also important to remember that the more separate the systems, the more infrastructure is required and the more difficult it is to share costs for infrastructure among future customers.
- An additional consideration is related to the amount of pipe capacity available in the existing Eagle Mountain main lines that Fairfield would connect into. BC&A does not have information on these existing pipe sizes and would encourage additional investigation and coordination with Eagle Mountain to determine pipe capacity availability. If existing pipe capacity is insufficient for total Fairfield sewer flows, it may be better to connect to the Eagle Mountain system at two locations in order to avoid needing to upsize existing pipes.

Without further information about the Eagle Mountain system, BC&A recommends moving forward with the collection system shown in Alternative 2. This alternative is economical, likely does not involve constructing and maintaining a sewer lift station, allows for infrastructure cost sharing among future sewer customers, and isolates the connection to Eagle Mountain to one location.

COLLECTIONS CONCLUSIONS AND RECOMMENDATIONS

BC&A recommends having conversations with Eagle Mountain to understand:

1. If there is a preferred location to tie-in to their existing sewer system based on the alternatives presented in this master plan; and
2. If the existing Eagle Mountain sewer pipes we are proposing to connect to (shown in Figure 4-1) are sized to handle the additional flows from Fairfield.

Unless information from Eagle Mountain reveals high additional cost associated with upsizing the existing sewer line along Magnolia Rd, BC&A recommends Fairfield make Alternative 2 the preferred alignment for its collection system.

CHAPTER 5

CAPITAL IMPROVEMENT PLAN

The purpose of this chapter is to summarize the projects recommended to create a centralized sewer system in Fairfield and assemble a 10-year capital improvement plan to implement the recommended projects. This will include recommendations regarding funding mechanisms for capital projects. The timing and need for the capital projects included in this chapter rely heavily on when and where development will occur within the Town. If actual development patterns differ significantly from what is assumed in this master plan, the timing of capital projects should be revised to match actual growth.

SUMMARY OF RECOMMENDATIONS AND SYSTEM PROJECTS

The following projects represent a summary of all recommendations made throughout this master plan. Note that some items in this list are projects related to the physical infrastructure of the sewer system, while others involve additional analysis or discussions required to appropriately plan for and construct the physical infrastructure. These projects are summarized in Table 5-1 and illustrated in Figure 5-1.

Treatment Projects

- **T-1 - Implement a Sewer Flow Release Limitation for Non-Residential Customers:** The Town should implement an ordinance or similar regulation for all future non-residential customers which restricts development of industrial customers to 1 ERU/acre and commercial customers to 2 ERUs/acre. Sewer flow releases for these customers should be limited to those flows shown in Table 2-3 of this report. This will reduce the risk of a high volume of water being released into the sewer system and creating surcharging or overwhelming the treatment system infrastructure.
- **T-2 - Finalize Agreement for Eagle Mountain Wastewater Treatment:** Fairfield should continue discussions with Eagle Mountain to finalize the treatment agreement. Important considerations for this agreement include but are not limited to:
 - Cost of initial buy-in and volume charges;
 - Process and cost for addition of future capacity;
 - Definition of process for future rate increases and of allowable profit margin (if applicable);
 - Required notification time of cost increases (i.e. Eagle Mountain must provide at least x days' notice of agreement cost increase so that Fairfield can adjust its own budget accordingly).

Collections Projects

- **C-1 - Finalize Collection System Layout:** Fairfield should discuss the proposed Alternative 2 collection system connection with Eagle Mountain, specifically to ensure the location of connection is amenable to Eagle Mountain and there is sufficient capacity available in receiving pipes. Unless otherwise required based on these discussions, Fairfield should use the Alternative 2 collection system layout to plan for future sewer service.
- **C-2 - Install 24-inch Sewer Main from Fairfield Boundary to Eagle Mountain System:** The first sewer main required will be the connection between the Fairfield boundary and the existing Eagle Mountain sewer system. We have proposed placing this line along ~2500 N

and tying into the existing sewer line on Magnolia Rd. Expected ERUs through this pipe at buildout are ~4,380.

- **C-3 – Install 8-inch Sewer Main Along 0 W/ 1600 W:** A sewer line along the boundary line between Fairfield and Eagle Mountain will collect flows from the far east side of the Town and convey them north to the sewer trunkline constructed in project C-3. Expected ERUs through this pipe at buildout are ~558. This pipeline will be required only as dictated by development and may not be needed for many years.
- **C-4 – Install 21-inch Sewer Main Along 2500 N:** Based on the vision plan in the Town's updated General Plan, a road is expected to be built along ~2500 N. BC&A recommends installing a sewer trunkline along this roadway that will collect the majority of the Town's flows and connect into project C-2. Expected ERUs through this pipe at buildout are ~3,820.
- **C-5 – Install 21-inch Sewer Main Along Lehi-Fairfield Rd:** A sewer main along Lehi-Fairfield Road will connect future sewer pipes within the town center with projects C-2 through C-4. Expected ERUs through this pipe at buildout are ~3,635.
- **C-6 – Install 18-inch Sewer Main Along 200 E:** BC&A expects that the expansion of the sewer system into the town center will be largely driven by development to the southwest but may also come as a result of demand for centralized sewer service from existing residents. Expected ERUs through this pipe at buildout are ~2,700.
- **C-7 – Install 12-inch Sewer Main Between 200 E and Tal Adair Property:** To avoid installing a lift station on the east side of the Tal Adair property, BC&A recommends installing a gravity line from this area that connects to project C-6 which convey flows north along 200 E. Expected ERUs through this pipe at buildout are ~1,185.
- **C-8 – Install 8-inch Sewer Main Along 75 N:** This project has been included in the 10-year window but may fall outside this planning window depending on completion of other project and the demand from existing residents to connect to the centralized sewer system. This line will service existing residents who are now on septic systems in addition to potential development on the west side of Highway 73. Expected ERUs through this pipe at buildout are ~140.
- **C-9 – Install 12-inch Sewer Main Along Allen's Ranch Rd and 15-inch Main Along Main St:** As required by development on the west side of Allen's Ranch Rd and along Main St, a sewer main should be constructed along these roads to connect into project C-6. This will likely be outside the 10-year planning window. Expected ERUs through this pipe at buildout are ~1,380.
- **C-10 – Install 8-inch Sewer Main Along Lehi-Fairfield Rd to Highway 73:** This pipeline may be needed to service existing or new customers on the west side of the Town who desire to connect into the centralized sewer system, but it not expected to be built until after 2035. It will also likely service some commercial development planned to occur on the west side of the highway in the future. Expected ERUs through this pipe at buildout are ~420.
- **C-11 – Install 8-inch Sewer Main Along 670 N:** Similar to C-10, this pipeline will service some commercial development expected in the northwest corner of the Town, in addition to residential customers within this area. Expected ERUs through this pipe at buildout are ~350.

CAPITAL IMPROVEMENTS PLAN

Each project described above has been summarized in the capital improvement plan (CIP) shown in Table 5-1. Detailed cost estimates for these projects are included in Appendix A. The following are items to be aware of when using and interpreting this CIP:

- This CIP is meant to aid the Town in understanding the timing and approximate cost of each project so that they can budget and plan accordingly. Note that, except for the discussions with Eagle Mountain, all projects will be driven by development. In other words, if development pressures change from what was expected at the time of this writing, project timing will also change. Therefore, the Town should closely monitor land development over the next 10 years and adjust this plan accordingly.
- Pipe sizes listed in this plan are approximate. Actual pipe sizes will need to be defined during detailed design using projected flows and designed pipe slopes calculated from survey data.
- For ease of interpretation and due to the unknown nature of future development, projects descriptions have been broken into large sections of pipe. Actual construction of these sewer mains will likely be completed in smaller sections as development occurs and as funds become available.
- BC&A has assumed that the northeast corner of Fairfield will be developed first before expanding to the southwest corner, and the order of projects reflects this assumption. It is possible that development occurs in the southwest corner before expected, which would expedite the need to construct sewer mains between Main Street and Lehi-Fairfield Rd (projects C-5 and C-6).

**Table 5-1
Sewer Capital Improvements Plan**

Project ID	Description	Time Frame	Estimated Year of Completion	Estimated Cost (2025 \$'s)
Treatment				
T-1	Implement a Sewer Flow Release Limitation for Non-Residential Customers	Within 10-years	2025	\$0
T-2	Finalize Agreement for Eagle Mountain Wastewater Treatment	Within 10-years	2025	\$10,000
<i>Treatment Subtotal</i>				<i>\$10,000</i>
Collections				
C-1	Finalize Collection System Layout and Alignment	Within 10-years	2025	\$5,000
C-2	Install 24-inch Sewer Main from Fairfield to Eagle Mountain System	Within 10-years	2026	\$3,412,800
C-3	Install 8-inch Sewer Main Along 0 W/ 1600 W	Within 10-years	2027	\$1,852,100
C-4	Install 21-inch Sewer Main Along 2500 N	Within 10-years	2028	\$4,637,300
C-5	Install 21-inch Sewer Main Along Lehi-Fairfield Rd	Within 10-years	2030	\$2,748,100
C-6	Install 18-inch Sewer Main Along 200 E	Within 10-years	2032	\$1,590,400
C-7	Install 12-inch Sewer Main Between 200 E and Tal Adair Property	Within 10-years	2034	\$1,516,800
C-8	Install 8-inch Sewer Main Along 75 N	Within 10-years	2035	\$838,700
C-9	Install 12-inch Sewer Main Along Allen's Ranch Rd and 15-inch Main along Main St	Beyond 10-years	--	\$2,446,200
C-10	Install 8-inch Sewer Main Along Lehi-Fairfield Rd to Highway 73	Beyond 10-years	--	\$699,000
C-11	Install 8-inch Sewer Main Along 670 N	Beyond 10-years	--	\$1,572,600
<i>Collections Subtotal</i>				<i>\$21,319,000</i>
TOTAL				\$21,329,000
TOTAL WITHIN 10-YR WINDOW				\$16,611,200

CAPITAL IMPROVEMENTS FUNDING

This section discusses items relevant to capital improvements funding to answer questions such as which improvements are to be funded under Town funding mechanisms, what are the available sources of funding, and how to coordinate funding with land developers.

Project Level Improvements

Land developers are required to provide all infrastructure necessary to connect to the Town's existing sewer system infrastructure including all collection piping and lift stations necessary to convey sewer flows from the development. These project level improvements typically include collection pipe networks, lift stations not otherwise needed for regional use, as well as other improvements as needed. Project level improvements are funded by land developers outside of Town funding mechanisms, approved by the Town Engineer and built to Town Standards, and dedicated to the Town for long term ownership and maintenance.

System Level Improvements

System Level Improvements are those which provide system-wide and/or regional benefits to multiple land developments. These projects include regional collection pipes, and regional lift stations. They are generally funded under or within Fairfield funding mechanisms.

It should be noted that system level improvements—while generally funded under Fairfield mechanisms—do not always need to be funded initially or directly using Town resources. It is often necessary to partner with land developers to overcome cash flow challenges associated with building infrastructure ahead of the receipt of revenues (i.e. impact fees and rate revenues are realized only after infrastructure is built and customers are connected to the system). See the following descriptions of various funding options for system level improvements.

Cash Funding

Cash funding involves the Town using cash on hand to fund projects. The principal source of cash for the Town is rate revenues. Cash funding is a critical piece of funding any capital facilities plan. It is recommended, however, that this be used in conjunction with other funding mechanisms.

Impact Fees

Impact fees are an excellent way to distribute the cost of system level infrastructure between new and existing users. Impact fees are charged to new connections to collect their proportional share of the infrastructure that has or will be constructed on their behalf.

Impact Fee Credits

In the Town—and in many other sewer systems experiencing high growth—impact fee receipts are insufficient to construct all of the system level improvements at the time requested by development. This is because of the inherent characteristic of impact fee receipts that they recover the full cost of projects only after all of the planned properties have developed (and thus paid their impact fees). Fortunately, impact fees can still facilitate the construction of system level infrastructure in a timely manner by offering impact fee credit to land developers in exchange for their constructing system level infrastructure (i.e. “If you construct system level infrastructure, you have in essence already paid your impact fees or a portion thereof and thus won’t need to pay that portion at the time of connection.”)

Grants

Sewer treatment grants are an excellent way to fund system infrastructure when available. Grants are typically provided by state or federal agencies. Each of these grants target different types of projects and come with their own requirements and attached strings. It is recommended that the

Town apply to be part of the new State of Utah Unified Water Infrastructure Plan (UWIP), monitor potential grant opportunities, and utilize grants when and where applicable and advantageous. Grants do not typically need to be repaid as long as grant requirements are met.

Debt

Another potential source of funding for the Town is debt. Debt can be in the form of revenue bonds, special assessment bonds, and loans. The advantage of debt is the ability to spread costs over time to manage cash flow and related issues (such as rate increases). Of course, debt is not a standalone funding mechanism since debt must be repaid via another funding source.

Public Improvement Districts (PIDs)

PIDs can sometimes be used by property owners (typically land developers) to fund public infrastructure. The typical mechanism is to create a special property tax for the area covered by the PID and to sell bonds backed by the future property tax receipts. The bonds thus generate immediate funds for public infrastructure.

APPENDIX A DETAILED COST ESTIMATES

**Table A-1
Detailed Cost Estimates**

Project ID	Description	Quantity	Unit	Unit Cost	Initial Cost Estimate	Contingency	Engineering	Item Total
Treatment								
T-1	Implement a Sewer Flow Release Limitation for Non-Residential Customers	1	LS	\$0	\$0	--	--	\$0
T-2	Finalize Agreement for Eagle Mountain Wastewater Treatment	1	LS	\$10,000	\$10,000	--	--	\$10,000
<i>Treatment Subtotal</i>								\$10,000
Collections								
C-1	Finalize Collection System Layout and Alignment	1	LS	\$5,000	\$5,000	--	--	\$5,000
C-2	Install 24-inch Sewer Main from Fairfield to Eagle Mountain System	5,400	LF	\$458	\$2,472,988	\$494,598	\$445,138	\$3,412,800
C-3	Install 8-inch Sewer Main Along 0 W/ 1600 W	5,300	LF	\$253	\$1,342,094	\$268,419	\$241,577	\$1,852,100
C-4	Install 21-inch Sewer Main Along 2500 N	8,100	LF	\$415	\$3,360,354	\$672,071	\$604,864	\$4,637,300
C-5	Install 21-inch Sewer Main Along Lehi-Fairfield Rd	4,800	LF	\$415	\$1,991,321	\$398,264	\$358,438	\$2,748,100
C-6	Install 18-inch Sewer Main Along 200 E	3,100	LF	\$372	\$1,152,445	\$230,489	\$207,440	\$1,590,400
C-7	Install 12-inch Sewer Main Between 200 E and Tal Adair Property	4,000	LF	\$275	\$1,099,106	\$219,821	\$197,839	\$1,516,800
C-8	Install 8-inch Sewer Main Along 75 N	2,400	LF	\$253	\$607,741	\$121,548	\$109,393	\$838,700
C-9	Install 8-inch Sewer Main Along Allen's Ranch Rd and Main St	7,000	LF	\$253	\$1,772,577	\$354,515	\$319,064	\$2,446,200
C-10	Install 8-inch Sewer Main Along Lehi-Fairfield Rd to Highway 73	2,000	LF	\$253	\$506,451	\$101,290	\$91,161	\$699,000
C-11	Install 8-inch Sewer Main Along 670 N	4,500	LF	\$253	\$1,139,514	\$227,903	\$205,113	\$1,572,600
<i>Collections Subtotal</i>								\$21,319,000
TOTAL								\$21,329,000

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