



Water Service Area Report and Impact Fee Study

Prepared for:
Bozeman, Montana

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Table of Contents

Executive Summary	3
Montana Impact Fee Enabling Legislation.....	3
Public Facilities	3
Service Area Report	4
Legal Framework.....	4
Methodology	6
Conceptual Impact Fee Calculation	7
Evaluation of Credits	7
Maximum Supportable Water Impact Fees.....	8
Water Service Area Report	11
Service Area	11
Cost Allocation	11
Service Demand Units	11
Existing and Projected Growth in Service Area.....	14
Water Capital Improvement Plan	15
Cost Analysis of Water Projects	16
Water Supply Cost Analysis.....	16
Water Storage Cost Analysis	17
Water Treatment Cost Analysis	17
Water Distribution Cost Analysis	18
Credit for Other Revenues Sources.....	20
Water Department Personnel and Operations.....	20
Maximum Supportable Water Impact Fees.....	21
Projected Water Impact Fee Revenue.....	25
Appendix A: Land Use Assumptions	26
Population and Housing Characteristics.....	26
Building Permit History	26
Base Year Housing Units and Population	27
Housing Unit and Population Projections.....	30
Current Employment and Nonresidential Floor Area.....	31
Employment and Nonresidential Floor Area Projections	31
Vehicle Trip Generation	33
Residential Vehicle Trips by Housing Type.....	33
Residential Vehicle Trips Adjustment Factors.....	34
Nonresidential Vehicle Trips	34
Vehicle Trip Projections.....	36
Demand Indicators by Dwelling Size	37
Bozeman Control Totals.....	37
Demand Indicators by Dwelling Size	37
Persons by Dwelling Size	38
Person by Dwelling Size and Housing Type.....	39
Trip Generation by Dwelling Size	42
Vehicle Trip Ends by Dwelling Size	43

Vehicle Trip Ends by Dwelling Size and Housing Type 44

Appendix B: Land Use Definitions 46

Residential Development..... 46

Nonresidential Development..... 46

EXECUTIVE SUMMARY

The City of Bozeman, Montana, contracted with TischlerBise to document land use assumptions, prepare the Service Area Report, and update impact fees within the applicable service areas pursuant to Montana Code 7-6-16 (hereafter referred to as the “Enabling Legislation”). Governmental entities in Montana may assess impact fees to offset infrastructure costs to the governmental entity for public facilities needed to serve future development. For each public facility for which an impact fee is imposed, the governmental entity shall prepare and approve a service area report. The impact fees must (1) be reasonably related to and reasonably attributable to the development's share of the cost of infrastructure improvements made necessary by the new development and (2) may not exceed a proportionate share of the costs incurred or to be incurred by the governmental entity in accommodating the development.

Impact fees are one-time payments used to construct system improvements needed to accommodate future development, and the fee represents future development's proportionate share of infrastructure costs. Impact fees may be used for infrastructure improvements or debt service for growth-related infrastructure. In contrast to general taxes, impact fees may not be used for operations, maintenance, replacement, or correcting existing deficiencies.

This Service Area Report and associated update to its impact fees are for Bozeman water infrastructure. In a tandem effort, TischlerBise is also updating the Service Area Reports for fire/EMS, transportation, and wastewater public facilities.

Montana Impact Fee Enabling Legislation

The Enabling Legislation governs how impact fees are calculated for governmental entities in Montana.

Public Facilities

Under the requirements of the Enabling Legislation, impact fees may only be used for construction, acquisition, or expansion of public facilities made necessary by new development. “Public Facilities” means any of the following categories of capital improvements with a useful life of 10 years or more that increase or improve the service capacity of a public facility (§7-6-1601(7)):

1. a water supply production, treatment, storage, or distribution facility;
2. a wastewater collection, treatment, or disposal facility;
3. a transportation facility, including roads, streets, bridges, rights-of-way, traffic signals, and landscaping;
4. a storm water collection, retention, detention, treatment, or disposal facility or a flood control facility;
5. a police, emergency medical rescue, or fire protection facility; and
6. other facilities for which documentation is prepared as provided in 7-6-1602 that have been approved as part of an impact fee ordinance or resolution by:
 - a two-thirds majority of the governing body of an incorporated city, town, or consolidated local government; or
 - a unanimous vote of the board of county commissioners of a county government.

Also, §7-6-1601(5a) states that "impact fee" means 'any charge imposed upon development by a governmental entity as part of the development approval process to fund the additional service capacity required by the development from which it is collected. An impact fee may include a fee for the administration of the impact fee not to exceed 5 percent of the total impact fee collected.'

Service Area Report

For each public facility for which an impact fee is imposed, the governmental entity shall prepare and approve a service area report. The service area report is a written analysis that must:

1. describe existing conditions of the facility;
2. establish level-of-service standards;
3. forecast future additional needs for service for a defined period of time;
4. identify capital improvements necessary to meet future needs for service;
5. identify those capital improvements needed for continued operation and maintenance of the facility;
6. make a determination as to whether one service area or more than one service area is necessary to establish a correlation between impact fees and benefits;
7. make a determination as to whether one service area or more than one service area for facilities is needed to establish a correlation between impact fees and benefits;
8. establish the methodology and time period over which the governmental entity will assign the proportionate share of capital costs for expansion of the facility to provide service to new development within each service area;
9. establish the methodology that the governmental entity will use to exclude operations and maintenance costs and correction of existing deficiencies from the impact fee;
10. establish the amount of the impact fee that will be imposed for each unit of increased service demand; and
11. have a component of the budget of the governmental entity that:
 - a. schedules construction of public facility capital improvements to serve projected growth;
 - b. projects costs of the capital improvements;
 - c. allocates collected impact fees for construction of the capital improvements; and
 - d. covers at least a 5-year period and is reviewed and updated at least every 5 years.

Legal Framework

Both state and federal courts have recognized the imposition of impact fees as a legitimate form of land use regulation, provided the fees meet standards intended to protect against regulatory takings. Land use regulations, development exactions, and impact fees are subject to the Fifth Amendment prohibition on taking of private property for public use without just compensation. To comply with the Fifth Amendment, development regulations must be shown to substantially advance a legitimate governmental interest. In the case of impact fees, that interest is in the protection of public health, safety, and welfare by ensuring development is not detrimental to the quality of essential public services. The means to this end are also important, requiring both procedural and substantive due process. The process followed to receive

community input (i.e., stakeholder meetings, work sessions, and public hearings) provides opportunities for comments and refinements to the impact fees.

There are three reasonable relationship requirements for impact fees that are closely related to “rational nexus”, or “reasonable relationship” requirements enunciated by a number of state courts. Although the term “dual rational nexus” is often used to characterize the standard by which courts evaluate the validity of impact fees under the U.S. Constitution, we prefer a more rigorous formulation that recognizes three elements: “need,” “benefit,” and “proportionality.” The dual rational nexus test explicitly addresses only the first two, although proportionality is reasonably implied, and was specifically mentioned by the U.S. Supreme Court in the Dolan case (*Dolan v. City of Tigard*, OR, 1994). Furthermore, the plaintiff in the 2024 *Sheetz v. El Dorado County* U.S. Supreme Court case argued that the El Dorado County, CA impact fee program failed to meet the Nollan/Dolan test. The U.S. Supreme Court remanded the case back to the California Supreme Court for further proceedings on a stricter interpretation of the rational nexus, specifically the extent impact fees can be “roughly proportionate.” Thus, it has been determined that State courts will make similar judgements on future similar cases. Individual elements of the nexus standard are discussed further in the following paragraphs.

All new development in a community creates additional demands on some, or all, public facilities provided by local government. If the capacity of facilities is not increased to satisfy that additional demand, the quality or availability of public services for the entire community will deteriorate. Impact fees may be used to recover the cost of development-related facilities, but only to the extent that the need for facilities is a consequence of development that is subject to the fees. The Nollan decision reinforced the principle that development exactions may be used only to mitigate conditions created by the developments upon which they are imposed. That principle clearly applies to impact fees. In this study, the impact of development on infrastructure needs is analyzed in terms of quantifiable relationships between various types of development and the demand for specific capital facilities, based on applicable level-of-service standards.

The requirement that exactions be proportional to the impacts of development was clearly stated by the U.S. Supreme Court in the Dolan case and is logically necessary to establish a proper nexus. Proportionality is established through the procedures used to identify development-related facility costs, and in the methods used to calculate impact fees for various types of facilities and categories of development. The demand for capital facilities is measured in terms of relevant and measurable attributes of development (e.g., a typical housing unit’s average weekday vehicle trips).

A sufficient benefit relationship requires that impact fee revenues be segregated from other funds and expended only on the facilities for which the fees were charged. Impact fees must be expended in a timely manner and the facilities funded by the fees must serve the development paying the fees. However, nothing in the U.S. Constitution or the state enabling legislation requires that facilities funded with fee revenues be available exclusively to the development paying the fees. In other words, benefit may extend to a general area including multiple real estate developments. Procedures for the earmarking and expenditure of fee revenues are discussed near the end of this study. All of these procedural as well as substantive issues are intended to ensure that new development benefits from the impact fees they are

required to pay. The authority and procedures to implement impact fees are separate from and complementary to the authority to require improvements as part of subdivision or zoning review.

As documented in this report, the City of Bozeman has complied with applicable legal precedents. Impact fees are proportionate and reasonably related to the capital improvement demands of new development. Specific costs have been identified using local data and current dollars. With input from City staff, TischlerBise identified service demand indicators for each type of infrastructure and calculated proportionate share factors to allocate costs by type of development. This report documents the formulas and input variables used to calculate the impact fees for each type of public facility. Impact fee methodologies also identify the extent to which new development is entitled to various types of credits to avoid potential double payment of growth-related capital costs.

Methodology

Impact fees for public facilities made necessary by new development must be based on the same level of service provided to existing development in the service area. There are three basic methodologies used to calculate impact fees. They examine the past, present, and future status of infrastructure. The objective of evaluating these different methodologies is to determine the best measure of the demand created by new development for additional infrastructure capacity. Each method has advantages and disadvantages in a particular situation and can be used simultaneously for different cost components. Additionally, impact fees for public facilities can also include a fee for the administration of the impact fee not to exceed five percent of the total impact fee collected.

Reduced to its simplest terms, the process of calculating impact fees involves two main steps: (1) determining the cost of growth-related capital improvements and (2) allocating those costs equitably to various types of development. In practice, though, the calculation of impact fees can become quite complicated because of the many variables involved in defining the relationship between development and the need for facilities within the designated service area. The following paragraphs discuss basic methods for calculating impact fees and how those methods can be applied.

- **Cost Recovery** (past improvements) - The rationale for recoupment, often called cost recovery, is that future development is paying for its share of the useful life and remaining capacity of facilities already built, or land already purchased, from which future development will benefit. This methodology is often used for utility systems that must provide adequate capacity before new development can take place.
- **Incremental Expansion** (concurrent improvements) - The incremental expansion methodology documents current level-of-service standards for each type of public facility, using both quantitative and qualitative measures. This approach assumes there are no existing infrastructure deficiencies or surplus infrastructure capacity. Future development is only paying its proportionate share for growth-related infrastructure. Revenue will be used to expand or provide additional facilities, as needed, to accommodate future development. An incremental expansion methodology is best suited for public facilities that will be expanded in regular increments to keep pace with development.

- **Plan-Based** (future improvements) - The plan-based methodology allocates costs for a specified set of improvements to a specified amount of development. Improvements are typically identified in a long-range facility plan and development potential is identified by a land use plan. There are two basic options for determining the cost per service demand unit: (1) total cost of a public facility can be divided by total service demand units (average cost), or (2) the growth-share of the public facility cost can be divided by the net increase in service demand units over the planning timeframe (marginal cost).

Conceptual Impact Fee Calculation

In contrast to project-level improvements, impact fees fund growth-related infrastructure that will benefit multiple development projects, or the entire service area (usually referred to as system improvements). The first step is to determine an appropriate service demand unit for the particular type of infrastructure. The service demand indicator measures the number of service units for each unit of development. For example, an appropriate indicator of the demand for roadways is vehicle trips or vehicle miles of travel that can be determined by development type. The second step in the impact fee formula is to determine infrastructure improvement units per service demand unit, typically called level of service (LOS) standards. In keeping with the roadway example, a common LOS standard is volume to capacity ratio. The third step in the impact fee formula is the cost of various infrastructure units. To complete the roadway example, this part of the formula would establish a construction cost per lane mile of road expansion.

The body of the report will detail these steps specific to the Bozeman Water Impact Fee analysis. For reference, the service units and LOS standards can be found starting on page 11 ; and infrastructure costs starting on page 16.

Evaluation of Credits

The consideration of credits is integral to the development of a legally defensible impact fee. There are two types of credits that should be addressed in impact fee studies and ordinances. The first is a revenue credit due to possible double payment situations, which could occur when other revenues expected to be paid by future development may contribute to the capital costs of infrastructure covered by the impact fee. This type of credit is integrated into the fee calculation, thus reducing the fee amount.

The second type of credit is a site-specific credit for system improvements that have been included in the impact fee calculations. Policies and procedures related to site-specific credits for system improvements are addressed in the ordinance that establishes the impact fees. However, the general concept is that developers may be eligible for site-specific credits only if they provide system improvements that have been included in the impact fee calculations. Project improvements normally required as part of the development approval process are not eligible for credits against impact fees. Site-specific credits are addressed in the administration and implementation of the development fee program.

Below, Figure 1 summarizes service areas, methodologies, and infrastructure cost components. Described in the body of the report, the analysis takes a hybrid approach to calculating the capital cost of providing water service to future development.

Figure 1. Impact Fee Service Areas, Methodologies, and Cost Allocation

Fee Category	Service Area	Cost Recovery	Incremental Expansion	Plan-Based	Cost Allocation
Water	Citywide	Water Storage, Treatment	-	Water Supply, Storage, Distribution	Gallons

Maximum Supportable Water Impact Fees

The following figures list the schedule of the maximum supportable impact fees by type of land use. The fees represent the highest amount allowable for each type of applicable land use. The City may adopt fees that are less than the amounts shown. However, a reduction in impact fee revenue will necessitate an increase in other revenues, a decrease in planned capital expenditures, and/or a decrease in levels of service.

Notably, the results of the study are a decrease from the current residential water impact fees. Several factors influenced this decrease. First, the recently adopted water conservation policy suggests that future development will consume less water than current users. Specifically, irrigation water use (which accounts for two-thirds of water use during peak season) will be reduced by 44 percent under the conservation policy. Resulting in a reduction in the estimated demand from new development and proportionate impact fee. Second, the existing water impact fee fund accounts for 25 percent of the impact fee eligible costs in the Capital Improvement Plan and existing debt. In this case, a reduction of 25 percent is included in the fee analysis. The increase in the nonresidential impact fees is a result of the relative increase in commercial water user compared to residential water.

The maximum supportable impact fees for residential development will be assessed per housing unit, based on the square footage of the unit. This study presents additional size bands compared to the current fee schedule. Expanding the schedule allows for further proportionately for smaller and larger housing units. Nonresidential impact fees will be assessed based on water meter size.

Figure 2. Maximum Supportable Water Impact Fee Schedule – Single-Unit Dwelling Including Townhomes

Residential - Single-Unit Dwelling including Townhomes			
Dwelling Size (square feet)	Maximum Supportable Fee	Current Fee	Increase/ (Decrease)
Residential (per housing unit)			
Under 600	\$1,115	\$2,217	(\$1,102)
600 to 800	\$1,294	\$2,217	(\$923)
801 to 1,000	\$1,568	\$2,217	(\$649)
1,001 to 1,200	\$1,788	\$2,217	(\$429)
1,201 to 1,400	\$1,978	\$2,217	(\$239)
1,401 to 1,600	\$2,136	\$2,819	(\$683)
1,601 to 1,800	\$2,272	\$2,978	(\$706)
1,801 to 2,000	\$2,399	\$3,167	(\$768)
2,001 to 2,200	\$2,504	\$3,389	(\$885)
2,201 to 2,400 (avg.)	\$2,609	\$3,579	(\$970)
2,401 to 2,600	\$2,693	\$3,769	(\$1,076)
2,601 to 2,800	\$2,777	\$3,832	(\$1,055)
2,801 to 3,000	\$2,861	\$4,023	(\$1,162)
3,001 to 3,200	\$2,935	\$4,276	(\$1,341)
3,201 to 3,400	\$2,998	\$4,276	(\$1,278)
3,401 to 3,600	\$3,072	\$4,276	(\$1,204)
3,601 to 3,800	\$3,124	\$4,276	(\$1,152)
3,801 to 4,000	\$3,188	\$4,276	(\$1,088)
4,001 or More	\$3,240	\$4,276	(\$1,036)

Figure 3. Maximum Supportable Water Impact Fee Schedule – Other Residential

Residential - Other Residential			
Dwelling Size (square feet)	Maximum Supportable Fee	Current Fee	Increase/ (Decrease)
Residential (per housing unit)			
Under 600	\$1,044	\$2,217	(\$1,173)
600 to 800	\$1,226	\$2,217	(\$991)
801 to 1,000	\$1,487	\$2,217	(\$730)
1,001 to 1,200	\$1,696	\$2,217	(\$521)
1,201 to 1,400	\$1,878	\$2,217	(\$339)
1,401 to 1,600 (avg.)	\$2,009	\$2,819	(\$810)
1,601 to 1,800	\$2,139	\$2,978	(\$839)
1,801 to 2,000	\$2,270	\$3,167	(\$897)
2,001 to 2,200	\$2,374	\$3,389	(\$1,015)
2,201 to 2,400	\$2,479	\$3,579	(\$1,100)
2,401 to 2,600	\$2,557	\$3,769	(\$1,212)
2,601 to 2,800	\$2,635	\$3,832	(\$1,197)
2,801 to 3,000	\$2,713	\$4,023	(\$1,310)
3,001 to 3,200	\$2,766	\$4,276	(\$1,510)
3,201 to 3,400	\$2,844	\$4,276	(\$1,432)
3,401 to 3,600	\$2,896	\$4,276	(\$1,380)
3,601 to 3,800	\$2,948	\$4,276	(\$1,328)
3,801 to 4,000	\$3,026	\$4,276	(\$1,250)
4,001 or More	\$3,053	\$4,276	(\$1,223)
Group Quarters (per person)			
Group Quarters	\$1,200	\$1,424	(\$224)

Figure 4. Water Maximum Supportable Water Impact Fee – Nonresidential

Nonresidential			
Meter Size (inches)	Maximum Supportable Fee	Current Fee	Increase/ (Decrease)
3/4	\$6,785	\$4,752	\$2,033
1	\$11,297	\$7,919	\$3,378
1 1/2	\$22,620	\$15,840	\$6,780
2	\$36,187	\$25,344	\$10,843
3	\$67,860	\$47,521	\$20,339

WATER SERVICE AREA REPORT

The Bozeman Water Impact Fee Study includes improvements towards water supply, storage, treatment, and distribution. Water demand flows through these infrastructure components at separate times to deliver the water to the user, thus, the components are examined separately. The analysis uses a hybrid approach to calculate the average capital cost per gallon to provide those four infrastructure components to future development. The methodology includes a cost recovery approach associated with previously constructed growth-related infrastructure that was debt-financed and includes future growth-related projects identified in the FY26-31 Capital Improvement Plan (plan-based). The requirement and purpose of the service area report is explained on page 3.

Importantly, the fee calculation uses previously constructed and future infrastructure projects and capacity added by the projects (in gallons) to determine the average construction cost per gallon to the City of Bozeman to expand that type of infrastructure. The average cost per gallon is then multiplied by the water demand (in gallons) by development type to find the maximum supportable impact fee. The methodology is not taking a more aggressive pure plan-based approach by directly attributing specific projects to a specific amount of growth (i.e., a 10-year capital plan compared to a 10-year projected growth). Rather, the updated impact fees represent the cost to expand the Bozeman water network at a per gallon basis and the specific water demand by the development type.

Service Area

The Bozeman water system is one, interconnected network and the water impact fee program funds infrastructure which benefits all future water users. As such, there is one, citywide service area in the analysis.

Cost Allocation

Water infrastructure is sized to service peak time demand. Thus, costs for water improvements are allocated to residential and nonresidential development based on daily water use during peak month. If an annual average metric was used there would be a mismatch between infrastructure capital planning, costs, and demand from development.

Service Demand Units

A service unit is a standardized measure of demand. The service unit for the water development fees is an Equivalent Dwelling Unit (EDU). The standard EDU represents the demand from an average sized single-unit dwelling with a $\frac{3}{4}$ -inch water meter. The following section details the calculations to estimate EDU daily water use during peak month. For water service, the level of service is the amount of capacity (gallons) allocable to an EDU. The level of service generally represents the amount of capacity attributable to an EDU.

Based on water utility account data, the September billing cycle has been the peak month in Bozeman for water use. This water demand includes residential irrigation, so to account for weather variation, three years of account data is used to find a daily average. The average daily water use during the peak month from an EDU (single-unit dwelling with a $\frac{3}{4}$ -inch meter) is found to be 407 gallons.

However, the recently adopted irrigation reduction policy in the Water Efficient Landscape Ordinance which reduces the allowable amount of turf grass on new construction lots needs to be accounted for when determining water demand from future development. Shown in Figure 5, the *Water Conservation and Efficiency Plan* estimated that 67 percent of residential water use is for irrigation, or 273 gallons per EDU (407 gallons x 67 percent = 273 gallons). Bozeman Water Conservation staff examined a variety of irrigation scenarios with the turf grass change and determined that a 44 percent reduction in irrigation is an appropriate average for an EDU. Thus, an average future EDU will generate 153 gallons of irrigation water demand (273 gallons x [1.00-0.44] = 153 gallons).

Also, indoor water use represents 33 percent of total use in the *Water Conservation and Efficiency Plan*, thus an estimated 134 gallons of daily indoor water use from an EDU. As a result, during peak month a future EDU is estimated to generate 287 gallons of daily water demand.

Figure 5. EDU Peak Month Average Daily Water Use

Single-Unit Dwelling 3/4-Inch Meter	Gallons
3-Year Avg. Peak Month Daily Water Use [1]	407
Current Irrigation Water Use (67%) [2]	273
Irrigation Reduction Policy [3]	44%
New Irrigation Water Use	153
Indoor Peak Water Use (33%) [2]	134
Future EDU Peak Month Daily Water Use	287

[1] Water utility account data

[2] Bozeman *Water Conservation and Efficiency Plan* (2023)

[3] Bozeman Water Efficient Landscape Ordinance (2024) reduced the allowable amount of turf grass on the new construction lots. Bozeman Water Conservation staff examined a variety of irrigation scenarios and determined that a 44 percent reduction is an appropriate average for an EDU.

Residential Bozeman water impact fees are based on the size and type of the dwelling unit. In Figure 6, the analysis incorporates persons per household (PPHH) factors to calculate EDUs by size groupings. Additionally, the current average size Single-Unit dwelling in Bozeman is between 2,201 and 2,400 square feet which generates 2.48 PPHH. These characteristics are assumed for an EDU. As a result, EDUs per household are found by comparing the PPHHs. For example, the average size Other Residential housing type has 1.92 PPHH or 0.77 EDUs (1.92 PPHH / 2.48 PPHH per EDU = 0.77 EDUs). Note: definitions for the Single-Unit Dwelling and Other Residential housing types can be found in Appendix B: Land Use Definitions.

Figure 6. Water Ratio of Service Unit to Development Unit

Single-Unit Dwelling including Townhomes			Other Residential		
Dwelling Size (square feet)	Single-Unit PPHH	EDU	Dwelling Size (square feet)	Other Res. PPHH	EDU
Under 600	1.06	0.43	Under 600	1.00	0.40
600 to 800	1.23	0.50	600 to 800	1.16	0.47
801 to 1,000	1.49	0.60	801 to 1,000	1.41	0.57
1,001 to 1,200	1.70	0.69	1,001 to 1,200	1.61	0.65
1,201 to 1,400	1.88	0.76	1,201 to 1,400	1.78	0.72
1,401 to 1,600	2.03	0.82	1,401 to 1,600 (avg. other)	1.92	0.77
1,601 to 1,800	2.16	0.87	1,601 to 1,800	2.04	0.82
1,801 to 2,000	2.28	0.92	1,801 to 2,000	2.16	0.87
2,001 to 2,200	2.38	0.96	2,001 to 2,200	2.25	0.91
2,201 to 2,400 (EDU)	2.48	1.00	2,201 to 2,400	2.35	0.95
2,401 to 2,600	2.56	1.03	2,401 to 2,600	2.42	0.98
2,601 to 2,800	2.64	1.06	2,601 to 2,800	2.50	1.01
2,801 to 3,000	2.72	1.10	2,801 to 3,000	2.57	1.04
3,001 to 3,200	2.79	1.13	3,001 to 3,200	2.64	1.06
3,201 to 3,400	2.85	1.15	3,201 to 3,400	2.70	1.09
3,401 to 3,600	2.92	1.18	3,401 to 3,600	2.76	1.11
3,601 to 3,800	2.97	1.20	3,601 to 3,800	2.81	1.13
3,801 to 4,000	3.03	1.22	3,801 to 4,000	2.87	1.16
4,001 or More	3.08	1.24	4,001 or More	2.91	1.17
			Group Quarters (per person)		
			Group Quarters	1.00	0.40

Nonresidential water impact fees are calculated based on demand relative to an EDU. Using account data, a Single-Unit dwelling with a ¾-inch water meter averaged 65,934 gallons in 2022 while commercial and industrial users with the same sized water meter averaged 171,478 gallons in 2022. Thus, a nonresidential water user with a ¾-inch meter consumes 260 percent of a residential water use with the same meter size. In other words, a nonresidential water user with a ¾-inch meter represents 2.60 EDUs. In the previous (2018) impact fee study, nonresidential users accounted for 1.50 EDUs.

This difference in relationship of demand between residential and nonresidential uses may be influenced by a variety of factors including conservation efforts by residential users, higher occupancy in office spaces, busier restaurants, or similar increases in intensity of use.

Figure 7. Comparison of Residential and Nonresidential Water Demand

3/4 Inch Meter	2022 Total Water Use (MGD)	2022 Account	2022 Avg Use (gal) per Account
Single-Unit Dwelling	662	10,038	65,934
Commercial, Industrial	127	741	171,478

Nonresidential Use vs Residential Use **260%**

Following the data presented in Figure 8, a nonresidential development using a ¾-inch water meter is assessed 2.60 EDUs. Furthermore, the AWWA standards for max water flow by water meter size are used

to calculate EDUs for developments with larger water meters. For example, the max water flow for a 1.5-inch meter is 100 gallons per minute, resulting in 8.67 EDUs (100 gpm / 30 gpm x 2.60 EDUs = 8.67 EDUs).

Larger meters can show highly variable use patterns. Thus, nonresidential developments with a water meter greater than three inches are assessed an impact fee on a case-by-case basis based on its specific estimated water need. Estimated need is determined from plumbing fixture counts and other data during the building permit process to establish an expected average gallons per day. The City does not have an adequate installed inventory of meters greater than three inches diameter to provide a reliable average demand value. Irrigation supply meters also have use profiles different from standard service meters. Impact fee for an irrigation supply meter is prepared by determining average daily designed use in gallons and then multiplying that number of gallons by the cost per gallon established in this service area report.

Figure 8. Nonresidential EDU Factor by Water Meter Size

Meter Size (inches)	AWWA Max Flow (gal) [1]	EDU Factor [2]
3/4	30	2.60
1	50	4.33
1 1/2	100	8.67
2	160	13.87
3	300	26.01

[1] American Water Works Association max water flow (gallons per minute) standards.

[2] Nonresidential demand from 3/4 inch accounts is 260 percent of demand from residential EDU demand.

Existing and Projected Growth in Service Area

In 2023, the daily water use in Bozeman was 6.30 million gallons (MGD). The recent *Water Conservation and Efficiency Plan* (2023) detailed several scenarios which included changes to Bozeman plumbing code and conservation programs. At the moment, the most likely scenario is Plumbing Code and Conservation Program A. Under this scenario, citywide water demand will increase to 8.50 MGD by 2033. This represents a 2.20 MGD increase, 35 percent from 2023. Importantly, the City has water supply to accommodate the increase in demand and has committed to further expanding the water supply.

Figure 9. Projected Daily Water Use

City of Bozeman	Base Year 2023	5-Year Increment						10-Year Increase
		2024	2025	2026	2027	2028	2033	
Total Daily Water Use (MGD)	6.30	6.56	6.81	7.01	7.21	7.41	8.50	2.20

Source: Bozeman *Water Conservation and Efficiency Plan* (2023); Water projection based on Plumbing Code and Conservation Program A Savings

Water Capital Improvement Plan

The impact fee portion of the FY26-30 Water Capital Improvement Plan (CIP) is listed in Figure 10 and Figure 11. The City of Bozeman publishes an annual CIP with a larger project list that includes projects that are not impact fee eligible. The five-year plan totals \$38.2 million that addresses water supply, storage, and distribution infrastructure needs to accommodate future development. The majority (\$37.5 million) is impact fee eligible, while \$700,000 is scheduled based on other sources of funding.

Figure 10. Bozeman Impact Fee Funding Water Capital Improvement Plan

Project Code	Project Name	ALL FUNDING					5-Year Total
		FY26	FY27	FY28	FY29	FY30	
WIF33	Municipal Test Well & Mitigation System Exploration Program	\$1,622,400	-	-	-	-	\$1,622,400
WIF32	Municipal Groundwater Public Water Supply & Mitigation System	-	\$1,000,000	\$9,000,000	-	-	\$10,000,000
WIF60	W Sourdough Reservoir #1	-	-	-	\$4,015,000	-	\$4,015,000
WIF99	Water Development Oversizing	\$355,000	\$720,000	\$305,000	-	\$655,000	\$2,035,000
WIF68	Stucky/S 27th Water Improvements	-	\$354,300	\$2,456,700	-	-	\$2,811,000
WIF59	Western Transmission Main / New South Pressure Zone	-	-	-	\$1,350,000	\$16,400,000	\$17,750,000
		\$1,977,400	\$2,074,300	\$11,761,700	\$5,365,000	\$17,055,000	\$38,233,400

Figure 11. Bozeman Impact Fee Funding Water Capital Improvement Plan cont.

Project Code	Project Name	Project Type	5-Year Total	Impact Fee Funding	Other Funding
WIF33	Municipal Test Well & Mitigation System Exploration Program	Supply	\$1,622,400	\$1,622,400	\$0
WIF32	Municipal Groundwater Public Water Supply & Mitigation System	Supply	\$10,000,000	\$10,000,000	\$0
WIF60	W Sourdough Reservoir #1	Storage	\$4,015,000	\$4,015,000	\$0
WIF99	Water Development Oversizing	Distribution	\$2,035,000	\$2,035,000	\$0
WIF68	Stucky/S 27th Water Improvements	Distribution	\$2,811,000	\$2,108,200	\$702,800
WIF59	Western Transmission Main / New South Pressure Zone	Distribution	\$17,750,000	\$17,750,000	\$0
Total			\$38,233,400	\$37,530,600	\$702,800

Cost Analysis of Water Projects

This Service Area Report defines the service demand units and the service area to be used in the impact fee calculations. This section details the method of calculating the capital cost to service new demand for water supply, storage, treatment, and distribution. The cost per gallon is applied to the service demand units at the end of the report to calculate the maximum supportable impact fees by land use type.

As mentioned, the fee calculation uses the previously constructed and future infrastructure projects and capacity added by the projects (in gallons) to determine the average construction cost per gallon to the City of Bozeman to expand that type of infrastructure. The average cost per gallon is then multiplied by the water demand (in gallons) by development type to find the maximum supportable impact fee. The methodology is not taking a more aggressive pure plan-based approach by directly attributing specific projects to a specific amount of growth (i.e. a 10-year capital plan compared to a 10-year projected growth). Rather, the updated impact fees represent the cost to expand the Bozeman water network at a per gallon basis and the specific water demand by the development type. Water demand flows through these infrastructure components at separate times to deliver the water to the user, thus, the components are examined separately.

Water Supply Cost Analysis

To address future water supply needs Bozeman has two future projects in the CIP. The projects combine for \$11.6 million and will add 1.44 MGD to the water supply infrastructure. The growth-related capital cost to add capacity to the water supply network is found by comparing the impact fee funding portion to the added capacity. As a result, the water supply component of the impact fee program is \$8.07 per gallon (\$11,622,400 / 1.44 MGD = \$8.07 per gallon).

Figure 12. Water Supply Capital Cost per Gallon

Project Code	Project Name	Project Type	Year Scheduled	Total Cost	Impact Fee Funding	Capacity Increase MGD
WIF33	Municipal Test Well & Mitigation System Exploration Program	Supply	FY26	\$1,622,400	\$1,622,400	1.44
WIF32	Municipal Groundwater Public Water Supply & Mitigation System	Supply	FY27	\$10,000,000	\$10,000,000	
Total				\$11,622,400	\$11,622,400	1.44

Impact Fee Related Costs	\$11,622,400
Capacity Increase (MGD)	1.44
Capital Cost per Gallon	\$8.07

Water Storage Cost Analysis

The cost to provide water storage to future development in Bozeman is found by examining a future project in the City's CIP and a previously constructed project. First, the future W Sourdough Reservoir #1 project is planned to add 5 million gallons (MG) and is considered to be 100 percent growth-related. Additionally, the City anticipates debt financing the project. Impact fees can service principal and interest costs associated with growth-related debt payments. Based on the City's standard financing assumptions (5 percent interest rate, 2 percent financing costs, over 20 years) the total cost represents estimated principal and interest payments.

The second project listed in Figure 13 is a previously constructed water tank (2017) that was debt-financed and considered to be 100 percent growth-related. The remaining principal and interest payments on the State Revolving Fund Revenue Bond Series 2017 total \$6.3 million and the tank added 4 MG to the Bozeman water storage network. Since the project is considered to be 100 percent growth-related the entire remaining debt payments are impact fee eligible.

In total, the City has added or plans to add 9 MG that is related to future growth totaling \$12.9 million. The average cost per gallon to add to the water storage system is found by dividing the cost by the added gallons, resulting in \$1.43 per gallon (\$12,858,949 / 9 MG = \$1.43 per gallon). In this case, future impact fee collections can fund the future reservoir project and help service the remaining debt service. However, future development is only paying its fair share based on the average cost per gallon found with these two projects. No other revenues (such as utility rates) will be used to service the debt payments as well. Thus, there is no double charging in this case.

Figure 13. Water Storage Capital Cost per Gallon

Project Code	Project Name	Project Type	Year Scheduled	Total Cost	Impact Fee Funding	Capacity Increase MG
WIF60	W Sourdough Reservoir #1*	Storage	FY29	\$6,572,349	\$6,572,349	5.00
-	Remaining Water Tank/Storage Debt Payment [1]	Storage	FY17	\$6,286,600	\$6,286,600	4.00
Total				\$12,858,949	\$12,858,949	9.00

*City plans to debt finance project. Based on the City's standard financing assumptions (5% interest rate, 2% financing costs, over 20 years) the total cost represents estimated principal and interest payments.

[1] Water tank project added 4 MG to the City's storage network and is considered to be 100% growth-related. State Revolving Fund Revenue Bond Series 2017.

Impact Fee Eligible Costs	\$12,858,949
Capacity Increase (MG)	9.00
Capital Cost per Gallon	\$1.43

Water Treatment Cost Analysis

The impact fee study focuses on the previous plant expansion project and the remaining growth-related debt payments for the water treatment component. Listed in Figure 14, the 2011 plant expansion project replaced a 15 MGD plant with a 22 MGD plant, adding 7 MGD to accommodate future growth. This represents a 31.8 percent growth share. Additionally, there is \$10.5 million remaining in debt payments, \$3.3 million that is

considered growth's share. The average cost per gallon to add treatment plant capacity is found by dividing growth's cost by the gallons added, resulting in \$0.48 per gallon ($\$3,332,567 / 7 \text{ MGD} = \$0.48 \text{ per gallon}$).

The non-growth-related portion of this debt is to be funded through utility rates. The non-growth-related portion represents a previous deficiency in the water system, which is not impact fee eligible, thus other funding is needed. In other words, existing and future water users pay their fair share of addressing infrastructure deficiencies through utility rates and future users pay their fair share of capacity expansion through the impact fees. The City of Bozeman accounts for these separate sources and growth share of expansion projects ensuring utility rates are not funding growth portions of debt. Thus, no revenue credit is needed to prevent double charging.

Figure 14. Water Treatment Capital Cost per Gallon

Bozeman Water Debt		Principal+Interest Total Remaining
Remaining Water Treatment Plant Debt Payment [1]		\$10,479,770
Total Remaining Payments		\$10,479,770
Growth's Share (31.8%)*		\$3,332,567
Growth's Cost		\$3,332,567
Added Capacity (MGD)		7.0
Capital Cost per Gallon		\$0.48

[1] State Revolving Fund Revenue Bond Series 2011A/2011B

*Capacity at Sourdough Water Treatment Plant was previously 15 MGD and expanded to 22 MGD. Adding 7MGD, the project is 31.8% growth-related ($7 \text{ MGD} / 22 \text{ MGD} = 31.8\%$)

Water Distribution Cost Analysis

Lastly, there are a few growth-related water distribution projects in the water impact fee FY26-30 CIP, \$33.2 million which is impact fee eligible. One project, the future Western Transmission Main, is considered to be 100 percent growth-related and the City anticipates debt financing the project. Impact fees can service principal and interest costs associated with growth-related debt payments. Based on the City's standard financing assumptions (5 percent interest rate, 2 percent financing costs, over 20 years) the total cost in Figure 15 represents estimated principal and interest payments and is entirely impact fee eligible.

In the case of water distribution infrastructure, the capital cost per gallon is found by dividing the impact fee eligible cost by the current capacity of the water network. The capacity of the water network is based on the current capacity of the water treatment plant (22 MGD). As a result, the

water distribution capital cost per gallon is \$1.51 (\$33,199,041 / 22 MGD = \$1.51 per gallon). This represents the capital cost to the Bozeman water network for future development to buy-in to the current distribution network.

Figure 15. Water Distribution Capital Cost per Gallon

Project Code	Project Name	Project Type	Year Scheduled	Total Cost	Impact Fee Funding
WIF99	Water Development Oversizing	Distribution	FY26	\$2,035,000	\$2,035,000
WIF68	Stucky/S 27th Water Improvements	Distribution	FY27	\$2,811,000	\$2,108,200
WIF59	Western Transmission Main / New South Pressure Zone*	Distribution	FY29	\$29,055,841	\$29,055,841
Total				\$33,901,841	\$33,199,041

*City plans to debt finance project. Based on the City's standard financing assumptions (5% interest rate, 2% financing costs, over 20 years) the total cost represents estimated principal and interest payments.

Impact Fee Eligible Costs	\$33,199,041
Capacity of Water System (MGD)	22.00
Capital Cost per Gallon	\$1.51

Credit for Other Revenues Sources

Evaluation of other revenues funding capital expansion is necessary to ensure the impact fee is proportionate and there are no double charging scenarios.

The City has an existing water impact fee fund balance (\$15 million) which is not scheduled for current projects and will fund a portion of the CIP. Currently, the growth-related CIP and remaining debt payments total \$61 million. Thus, 24.6 percent of the growth-related water infrastructure cost has already been collected. A credit for this amount is included in the final impact fee calculation.

Figure 16. Existing Water Impact Fee Fund Balance Credit

City of Bozeman	Water Impact Fee Fund
Existing Fund Balance*	\$14,983,916
Impact Fee CIP + Debt	\$61,012,957
Balance Share of Growth-Related Costs	24.6%

*Excludes balance that is earmarked for current projects

Furthermore, City staff examines the non-growth-related share of each water project. The portion that is considered to be non-growth-related is funded through other sources such water utility rates. In this case, impact fees are funding the growth-related portion, thus there is no double charging concern and no need for another revenue credit. Similarly, previously issued debt for the water tank project is planned to be 100 percent funded through impact fees, requiring no credit.

Water Department Personnel and Operations

As described in the legal framework section of this report, impact fees are limited to capacity adding capital expansion. No Water Department personnel, operations, or maintenance expenses are allowed to be included in an impact fee and all such expenses are excluded from the impact fee. All these expenses are paid for with monthly services charges or other non-impact fee revenue.

Maximum Supportable Water Impact Fees

The following figures list the maximum supportable Bozeman Water Impact Fees for residential and nonresidential development and include an administration fee of five percent (§ 7-6-1601(5a)). After reducing the fee for the existing fund balance credit, the net total cost per gallon is \$9.09. Based on the water account data, an EDU generates a demand of 287 gallons per day in the peak month. This results in a capital cost per EDU of \$2,609 ($\$9.09 \text{ per gallon} \times 287 \text{ gallons per EDU} = \$2,609 \text{ per EDU}$). Fees are calculated based on EDUs. For example, the fee for a 1,300 square foot Single-Unit dwelling is \$1,978 ($\$2,609 \text{ per EDU} \times 0.76 \text{ EDUs} = \$1,978 \text{ per unit}$).

Notably, the results of the study are a decrease from the current residential water impact fees. Several factors influenced this decrease. First, the recently adopted water conservation policy suggests that future development will consume less water than current users. Specifically, irrigation water use (which accounts for two-thirds of water use during peak season) will be reduced by 44 percent under the conservation policy. Resulting in a reduction in the estimated demand from new development and proportionate impact fee. Second, the existing water impact fee fund accounts for 26 percent of the impact fee eligible costs in the Capital Improvement Plan and existing debt. In this case, a reduction of 26 percent is included in the fee analysis. The increase in the nonresidential impact fees is a result of the relative increase in commercial water user compared to residential water.

The fees represent the highest amount allowable for each type of applicable land use, which represents new growth's fair share of the cost for capital facilities. The City may adopt fees that are less than the amounts shown. However, a reduction in impact fee revenue will necessitate an increase in other revenues, a decrease in planned capital expenditures, and/or a decrease in levels of service.

Figure 17. Maximum Supportable Water Impact Fee Schedule – Single-Unit Dwelling

Components	Cost per Gallon
Water Supply	\$8.07
Water Storage	\$1.43
Water Treatment	\$0.48
Water Distribution	\$1.51
Gross Total	\$11.49
Credit for Existing Fund Balance (24.6%)	(\$2.83)
Administrative Fee (5%)	\$0.43
Net Total	\$9.09
 Peak Month Daily Avg Gallons per EDU	 287
Capital Cost per EDU	\$2,609

Residential - Single-Unit Dwelling including Townhomes

Dwelling Size (square feet)	EDU Factor	Maximum Supportable Fee	Current Fee	Increase/ (Decrease)
Residential (per housing unit)				
Under 600	0.43	\$1,115	\$2,217	(\$1,102)
600 to 800	0.50	\$1,294	\$2,217	(\$923)
801 to 1,000	0.60	\$1,568	\$2,217	(\$649)
1,001 to 1,200	0.69	\$1,788	\$2,217	(\$429)
1,201 to 1,400	0.76	\$1,978	\$2,217	(\$239)
1,401 to 1,600	0.82	\$2,136	\$2,819	(\$683)
1,601 to 1,800	0.87	\$2,272	\$2,978	(\$706)
1,801 to 2,000	0.92	\$2,399	\$3,167	(\$768)
2,001 to 2,200	0.96	\$2,504	\$3,389	(\$885)
2,201 to 2,400 (avg.)	1.00	\$2,609	\$3,579	(\$970)
2,401 to 2,600	1.03	\$2,693	\$3,769	(\$1,076)
2,601 to 2,800	1.06	\$2,777	\$3,832	(\$1,055)
2,801 to 3,000	1.10	\$2,861	\$4,023	(\$1,162)
3,001 to 3,200	1.13	\$2,935	\$4,276	(\$1,341)
3,201 to 3,400	1.15	\$2,998	\$4,276	(\$1,278)
3,401 to 3,600	1.18	\$3,072	\$4,276	(\$1,204)
3,601 to 3,800	1.20	\$3,124	\$4,276	(\$1,152)
3,801 to 4,000	1.22	\$3,188	\$4,276	(\$1,088)
4,001 or More	1.24	\$3,240	\$4,276	(\$1,036)

Figure 18. Maximum Supportable Water Impact Fee Schedule – Other Residential

Components	Cost per Gallon
Water Supply	\$8.07
Water Storage	\$1.43
Water Treatment	\$0.48
Water Distribution	\$1.51
Gross Total	\$11.49
Credit for Existing Fund Balance (24.6%)	(\$2.83)
Administrative Fee (5%)	\$0.43
Net Total	\$9.09
 Peak Month Daily Avg Gallons per EDU	 287
Capital Cost per EDU	\$2,609

Residential - Other Residential

Dwelling Size (square feet)	EDU Factor	Maximum Supportable Fee	Current Fee	Increase/ (Decrease)
Residential (per housing unit)				
Under 600	0.40	\$1,044	\$2,217	(\$1,173)
600 to 800	0.47	\$1,226	\$2,217	(\$991)
801 to 1,000	0.57	\$1,487	\$2,217	(\$730)
1,001 to 1,200	0.65	\$1,696	\$2,217	(\$521)
1,201 to 1,400	0.72	\$1,878	\$2,217	(\$339)
1,401 to 1,600 (avg.)	0.77	\$2,009	\$2,819	(\$810)
1,601 to 1,800	0.82	\$2,139	\$2,978	(\$839)
1,801 to 2,000	0.87	\$2,270	\$3,167	(\$897)
2,001 to 2,200	0.91	\$2,374	\$3,389	(\$1,015)
2,201 to 2,400	0.95	\$2,479	\$3,579	(\$1,100)
2,401 to 2,600	0.98	\$2,557	\$3,769	(\$1,212)
2,601 to 2,800	1.01	\$2,635	\$3,832	(\$1,197)
2,801 to 3,000	1.04	\$2,713	\$4,023	(\$1,310)
3,001 to 3,200	1.06	\$2,766	\$4,276	(\$1,510)
3,201 to 3,400	1.09	\$2,844	\$4,276	(\$1,432)
3,401 to 3,600	1.11	\$2,896	\$4,276	(\$1,380)
3,601 to 3,800	1.13	\$2,948	\$4,276	(\$1,328)
3,801 to 4,000	1.16	\$3,026	\$4,276	(\$1,250)
4,001 or More	1.17	\$3,053	\$4,276	(\$1,223)
Group Quarters (per person)				
Group Quarters	0.46	\$1,200	\$1,424	(\$224)

Figure 19. Maximum Supportable Water Impact Fee Schedule – Nonresidential

Components	Cost per Gallon
Water Supply	\$8.07
Water Storage	\$1.43
Water Treatment	\$0.48
Water Distribution	\$1.51
Gross Total	\$11.49
Credit for Existing Fund Balance (24.6%)	(\$2.83)
Administrative Fee (5%)	\$0.43
Net Total	\$9.09
 Peak Month Daily Avg Gallons per EDU	 287
Capital Cost per EDU	\$2,609

Nonresidential

Meter Size (inches)	EDU Factor [1]	Maximum Supportable Fee	Current Fee	Increase/ (Decrease)
3/4	2.60	\$6,785	\$4,752	\$2,033
1	4.33	\$11,297	\$7,919	\$3,378
1 1/2	8.67	\$22,620	\$15,840	\$6,780
2	13.87	\$36,187	\$25,344	\$10,843
3	26.01	\$67,860	\$47,521	\$20,339

[1] Nonresidential demand from 3/4 inch accounts is 260 percent of demand from residential EDU demand

Projected Water Impact Fee Revenue

Revenue projections assume implementation of the maximum supportable water impact fees and that future development is consistent with the land use assumptions described in Appendix A: Land Use Assumptions. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the impact fee revenue. As shown in Figure 20, water impact fee revenue is expected to total approximately \$20 million over the next 10 years, compared to projected total water expansion cost of \$61 million. The funding gap is the result of the credit for existing impact fee fund balance. Additionally, some of the CIP projects are expanding network capacity for growth beyond ten years. For example, the Sourdough Reservoir has a capacity of 5 MG while there is a projected increase in water demand of 2.2 MG (Figure 9). In this case, development over the next ten years will only be funding its proportionate share of the project.

Figure 20. Projected Water Impact Fee Revenue

	Total Cost	Impact Fee Funding
Water Supply	\$11,622,400	\$11,622,400
Water Storage	\$12,858,949	\$12,858,949
Water Treatment	\$10,479,770	\$3,332,567
Water Distribution	\$33,901,841	\$33,199,041
Total Expenditures	\$68,862,960	\$61,012,957

Year	EDU \$2,609
Base 2023	21,951
1 2024	22,843
2 2025	23,734
3 2026	24,424
4 2027	25,115
5 2028	25,806
6 2029	26,496
7 2030	27,187
8 2031	28,002
9 2032	28,817
10 2033	29,632

Ten-Year Increase 7,680

Projected Revenue	<u>\$20,038,072</u>
CIP Expenditures	<u>\$61,012,957</u>
Funding Gap	<u><u>\$40,974,885</u></u>

APPENDIX A: LAND USE ASSUMPTIONS

The following sections detail base year and projected demographic assumptions. These assumptions are used in the Water impact fee calculations along with the tandem efforts in updating the Service Area Reports for Fire/EMS, Transportation, and Wastewater public facilities. In this case, there is data in the following section that relates to the other efforts and not the Water calculations (i.e., trip generation rates and the Transportation Service Area Report).

Note: definitions for the Single-Unit Dwelling and Other Residential housing types can be found Appendix B: Land Use Definitions

Population and Housing Characteristics

Impact fees often use per capita standards and persons per housing unit or persons per household to derive proportionate share fee amounts. Housing types have varying household sizes and, consequently, a varying demand on City infrastructure and services. Thus, it is important to differentiate between housing types and size.

When persons per housing unit (PPHU) is used in the development impact fee calculations, infrastructure standards are derived using year-round population. In contrast, when persons per household (PPHH) is used in the development impact fee calculations, the fee methodology assumes all housing units will be occupied, thus requiring seasonal or peak population to be used when deriving infrastructure standards. The City of Bozeman and the surrounding area is home to a significant number of second/vacation homes and hosts many visitors throughout the year. Thus, TischlerBise recommends that fees for residential development in Bozeman be imposed according to the persons per household.

Figure 21 shows the US Census American Community Survey 2021 5-Year Estimates data for the City of Bozeman. Single-unit dwellings have an average household size of 2.48 persons and other residential dwellings have an average household size of 1.92 persons. Additionally, there is a housing mix of 59 percent single-unit dwelling and 41 percent other residential.

The estimates in Figure 21 are for household size calculations. Base year population and housing units are estimated with another, more recent data source.

Figure 21. Persons per Household

Housing Type	Persons	Housing Units	Persons per Housing Unit	Households	Persons per Household	Housing Unit Mix
Single-Unit Dwelling [1]	31,140	13,355	2.33	12,534	2.48	59%
Other Residential [2]	16,235	9,110	1.78	8,451	1.92	41%
Subtotal	47,375	22,465	2.11	20,985	2.26	

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2021 American Community Survey 5-Year Estimates

Building Permit History

In Figure 22, the past six years of building permit history is listed by housing type to understand the recent growth trend in Bozeman. There has been a steady amount of single-unit dwelling development over the

past years in Bozeman, while other residential development has been the driving factor in the elevated construction trend. Housing development peaked in 2021 which included the largest apartment complex ever built in the city. Housing activity leveled slowed in 2022 (consistent with the national trend with increasing interest rates) while construction had a noticeable increase in 2023.

Overall, there has been an average of 228 single-unit dwellings and 766 other residential units constructed annually.

Figure 22. Building Permit History by Housing Type

Housing Type	2018	2019	2020	2021	2022	2023	Total	Average
Single-Unit Dwelling [1]	266	245	211	255	197	193	1,367	228
Other Residential [2]	593	546	734	1,128	522	1,075	4,598	766
Total	859	791	945	1,383	719	1,268	5,965	994

Source: City of Bozeman

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Base Year Housing Units and Population

Furthermore, the nature of the influx of seasonal population in Bozeman necessitates four types of populations to be included in the impact fee study:

- 1) Permanent Residents
- 2) Seasonal Residents
- 3) On-Campus Students
- 4) Overnight-Visitors

Bozeman is a destination for vacationers, students, and seasonal residents and City facilities and services have been sized to accommodate the additional demand. The peak population includes residents who have second homes in the city, students living on-campus at Montana State University, and the seasonal labor influx during peak tourism months. The MSU students living off-campus are captured in the permanent housing population.

Bozeman permanent population is found by using the housing growth since the 2020 US Census. The 2020 decennial census estimated that there were 23,535 housing units and 49,298 household population in Bozeman. Additionally, there were 663 single-unit dwellings and 2,384 other residential units constructed since the survey. Based on PPHU factor, there has been an increase of 5,788 residents since the census.

By combining the 2020 US Census household population and estimated new residents since the Census, a 2023 permanent population of 55,086 residents is estimated.

Figure 23. Permanent Population

Bozeman, MT	Housing Units [1]	HH Population [2]
2020 Census	23,535	49,298

Housing Units	2020 Census	Post Census	2023
Single-Unit Dwelling	13,991	663	14,654
Other Residential	9,544	2,384	11,928
Total	23,535	3,047	26,582

Bozeman, MT	Units Built Post Census	PPHU	New Residents Post Census
Single-Unit Dwelling	663	2.33	1,545
Other Residential	2,384	1.78	4,244
Total	3,047		5,788

Bozeman, MT	2020 Census	New Residents Post Census	2023 Estimate
Household Population	49,298	5,788	55,086

[1] Source: US Census DP1 Table

[2] Source: US Census DP1 Table. Household population excludes those in group quarters. Group quarters is estimated with On-Campus Students in another figure.

Seasonal housing population estimates are found by applying the PPH factors for each housing type to base year housing estimates to the percent of housing occupied for seasonal use. As a result, the seasonal population estimate is 4,185 (Figure 24).

Figure 24. Seasonal Population

Housing Units	2023 Housing Units	% Seasonal Units	Seasonal Units	PPH	Seasonal Residents
Single-Unit Dwelling	14,654	7%	967	2.48	2,399
Other Residential	11,928	8%	930	1.92	1,786
Total	26,582		1,898		4,185

Shown in Figure 25, in a survey of hotel and motels in Bozeman, TischlerBise found 2,241 lodging rooms in the city. Based on general peak seasonal lodging factors there are 4,258 overnight-visitors assumed.

Figure 25. Bozeman Visitors

Total Lodging Rooms	2,241
Assumed Ave Occupancy	2
Assumed Occupancy Rate	95%
Total Overnight-Visitors	4,258

Source: TischlerBise survey of lodging property and general peak season lodging factors

Lastly, based on a news briefing from Montana State University in September 2023 there were 5,200 students living on-campus. The information above is summarized in Figure 26. Based on the four population types, there is an estimated peak population of 68,729 residents along with 26,582 housing units in Bozeman.

Figure 26. Base Year Housing and Population

Bozeman, MT	Base Year 2023
Permanent Hsg Population [1]	55,086
Seasonal Hsg Population [2]	4,185
On-Campus Students [3]	5,200
Overnight-Visitors [4]	4,258
Total Peak Population	68,729
Housing Units [1]	
Single-Unit Dwelling	14,654
Other Residential	11,928
Total Housing Units	26,582

[1] Calculated based on 2020 US Census estimate plus housing development since

[2] Assuming seasonal housing is fully occupied during peak season

[3] MSU News Service (September, 2023)

[4] TischlerBise survey of lodging property and general peak season lodging factors

Housing Unit and Population Projections

The ten-year residential projections are listed in Figure 27. Housing development in Bozeman is assumed to continue at its current pace over the next ten years. Overall, over the next ten years, 2,280 new single-unit dwellings and 7,660 other residential units are assumed to be constructed. As a result of the market supporting more non-single-unit dwelling development, by 2033 there will be more non-single-unit dwelling units than single-unit dwellings in Bozeman.

Population growth is based on housing development and PPHH factors. Over the next ten years, housing development will support 18,841 new permanent residents and 1,520 seasonal residents. It is assumed that visitors to Bozeman will grow at the same rate as the resident population. Lastly, MSU has built a new dormitory every five years and is currently exploring another expansion. Conservatively, a 1 percent annual growth is assumed for on-campus students. Overall, the peak population is estimated to grow from 68,729 to 91,099, a 32.5 percent increase.

Figure 27. Residential Development Projections

City of Bozeman, MT	Base Year 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total Increase
Permanent Hsg Population [1]	55,086	56,970	58,855	60,739	62,623	64,507	66,391	68,275	70,159	72,043	73,928	18,841
Seasonal Hsg Population [1]	4,185	4,337	4,489	4,641	4,793	4,945	5,097	5,249	5,401	5,553	5,705	1,520
On-Campus Students [2]	5,200	5,252	5,305	5,358	5,412	5,466	5,521	5,576	5,632	5,688	5,745	545
Overnight-Visitors [3]	4,258	4,404	4,551	4,697	4,843	4,989	5,136	5,282	5,428	5,574	5,721	1,463
Total Peak Population	68,729	70,964	73,199	75,435	77,671	79,907	82,145	84,382	86,621	88,859	91,099	22,369
Percent Increase		3.3%	3.2%	3.1%	3.0%	2.9%	2.8%	2.7%	2.7%	2.6%	2.5%	32.5%
Housing Units [4]												
Single-Unit Dwelling	14,654	14,882	15,110	15,338	15,566	15,794	16,022	16,250	16,478	16,706	16,934	2,280
Other Residential	11,928	12,694	13,460	14,226	14,992	15,758	16,524	17,290	18,056	18,822	19,588	7,660
Total Housing Units	26,582	27,576	28,570	29,564	30,558	31,552	32,546	33,540	34,534	35,528	36,522	9,940

[1] Permanent and seasonal population growth is based on housing development and PPHH factors

[2] On-campus residences are conservatively assumed to grow by 1 percent annually

[3] Visitor population is estimate to grow at the same rate as permanent and seasonal population

[4] Housing development is based on the recent building permit trends without the 2021 peak development year

Importantly, the impact fee methodology does not rely on the growth projections to determine the fee amount. Rather, the current level of service is used in the fee calculation. In this case, if the growth projections included in the report overestimate or underestimate the real development in Bozeman, the fee collection is still accurate. For example, if growth is slower than the 10-year projection, less revenue will be collected, however, the City will provide less capital expansion to keep up with the level of service.

Current Employment and Nonresidential Floor Area

The impact fee study will include nonresidential development as well. The base year employment estimates are calculated from two sources. First, from the Montana Department of Labor & Industry there is an estimated 34,569 total jobs in Bozeman. Second, from the U.S. Census Bureau OnTheMap web application employment splits are found between retail, office, industrial, and institutional industries. As a result, the institutional industries (which include education and healthcare) account for the highest share while retail industries employee over 10,000 jobs as well.

Furthermore, the floor area for the four industry types is summarized in Figure 28. Retail, office, and industrial square footage is available from the Montana Department of Revenue (DOR). However, since public education and healthcare facilities are tax exempt the DOR does not gather floor space for such development. Instead, TischlerBise applied the average employee density factors (square feet per employee) for schools and hospitals to the estimated institutional job total to estimate floor area. As a result, there are 22.4 million square feet of nonresidential development in Bozeman. The majority being institutional and retail industries.

Figure 28. Base Year Nonresidential Floor Area

Employment Industries	Base Year Jobs [1]	Percent of Total	Floor Area (sq. ft.) [2]	Percent of Total
Retail	10,116	29%	7,855,849	35%
Office	7,798	23%	3,025,341	14%
Industrial	5,042	15%	3,204,452	14%
Institutional [3]	11,612	34%	8,278,652	37%
Total	34,569	100%	22,364,294	100%

[1] Source: MT Employment Statistics - LAUS

[2] Source: Montana Department of Revenue Database

[3] Source: Trip Generation, Institute of Transportation Engineers, 11th Edition (2021)

Employment and Nonresidential Floor Area Projections

The Bozeman *Community Plan 2020* provides an in-depth analysis of the local market and buildout capacity of the city. Through 2045, the *Community Plan* projected a growth of 6.3 million square feet of nonresidential development broken down by retail, office, industrial, and institutional industries. The ten-year growth projections from the impact fee studies relies on these projections along with employee density factors from the Institution of Transportation Engineers' (ITE). For the retail industry the Shopping Center land use factors are used; for office the General Office factors are used; for industrial the Light Industrial factors are used; for Institutional the Hospital factors are used.

Figure 29. Institute of Transportation Engineers (ITE) Employment Density Factors

Employment Industry	ITE Code	Land Use	Demand Unit	Emp Per Dmd Unit	Sq Ft Per Emp
Retail	820	Shopping Center	1,000 Sq Ft	2.12	471
Office	710	General Office	1,000 Sq Ft	3.26	307
Industrial	110	Light Industrial	1,000 Sq Ft	1.57	637
Institutional	610	Hospital	1,000 Sq Ft	2.86	350

Source: *Trip Generation*, Institute of Transportation Engineers, 11th Edition (2021)

Shown in Figure 30, Bozeman is anticipated to grow by 6,075 jobs (17.6 percent) over the next ten years. Institutional, office, and retail industries all have significant growth while industrial development is anticipated to taper off. Based on the employee density factors, the employment growth will generate 2,250,000 million square feet of nonresidential floor area (10 percent growth from the base year).

Figure 30. Employment and Nonresidential Floor Area Projections

Industry	Base Year 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total Increase
Jobs [1]												
Retail	10,116	10,222	10,329	10,435	10,541	10,647	10,753	10,859	10,966	11,072	11,178	1,062
Office	7,798	7,996	8,194	8,391	8,589	8,787	8,985	9,182	9,380	9,578	9,776	1,978
Industrial	5,042	5,070	5,098	5,126	5,154	5,182	5,210	5,238	5,266	5,295	5,323	280
Institutional	11,612	11,888	12,164	12,439	12,715	12,990	13,266	13,541	13,817	14,092	14,368	2,755
Total	34,569	35,176	35,784	36,391	36,999	37,606	38,214	38,821	39,429	40,036	40,644	6,075
Percent Increase		1.8%	1.7%	1.7%	1.7%	1.6%	1.6%	1.6%	1.6%	1.5%	1.5%	17.6%
Nonresidential Floor Area (1,000 sq. ft.) [2]												
Retail	7,856	7,906	7,956	8,006	8,056	8,106	8,156	8,206	8,256	8,306	8,356	500
Office	3,025	3,086	3,147	3,207	3,268	3,329	3,390	3,450	3,511	3,572	3,632	607
Industrial	3,204	3,222	3,240	3,258	3,276	3,294	3,312	3,329	3,347	3,365	3,383	179
Institutional	8,279	8,375	8,472	8,568	8,664	8,761	8,857	8,954	9,050	9,147	9,243	964
Total	22,364	22,589	22,814	23,039	23,264	23,489	23,714	23,939	24,164	24,389	24,614	2,250

[1] Source: Bozeman Community Plan (2020)

[2] Source: Institute of Transportation Engineers, Trip Generation, 2021

Vehicle Trip Generation

Residential Vehicle Trips by Housing Type

A customized trip rate is calculated for the single-unit dwellings and other residential units in Bozeman. In Figure 31, the most recent data from the US Census American Community Survey is input into equations provided by the Institute of Transportation Engineers to calculate the trip ends per housing unit factor. A single-unit dwelling is estimated to generate 9.27 trip ends and other residential units are estimated to generate 5.36 trip ends on an average weekday.

Figure 31. Customized Residential Trip End Rates by Housing Type

Tenure by Units in Structure	Vehicles Available ¹	Households by Structure Type ²			Vehicles per HH by Tenure
		Single Family	Multifamily	Total	
Owner-Occupied	19,262	8,463	889	9,352	2.06
Renter-Occupied	20,735	4,071	7,562	11,633	1.78
Total	39,997	12,534	8,451	20,985	1.91
Housing Units ³		13,355	9,110	22,465	

Housing Type	Persons in Households ⁴	Trip Ends ⁵	Vehicles by Type of Unit	Trip Ends ⁶	Average Trip Ends	Local Trip Ends per Unit	National Trip Ends per Unit ⁷
Single-Unit Dwelling	31,140	86,764	24,680	160,855	123,810	9.27	9.43
Other Residential	16,235	37,097	15,292	60,543	48,820	5.36	4.54
Total	47,375	123,861	39,972	221,398	172,630	7.68	

1. Vehicles available by tenure from Table B25046, 2020 American Community Survey 5-Year Estimates.
2. Households by tenure and units in structure from Table B25032, 2020 American Community Survey 5-Year Estimates.
3. Housing units from Table B25024, 2020 American Community Survey 5-Year Estimates.
4. Total population in households from Table B25033, 2020 American Community Survey 5-Year Estimates.
5. Vehicle trips ends based on persons using formulas from Trip Generation (ITE 2021). For single-family housing (ITE 210), the fitted curve equation is $\text{EXP}(0.89 \cdot \text{LN}(\text{persons}) + 1.72)$. To approximate the average population of the ITE studies, persons were divided by 3 and the equation result multiplied by 3. For multi-family housing (ITE 221), the fitted curve equation is $(2.29 \cdot \text{persons}) - 64.48$ (ITE 2017).
6. Vehicle trip ends based on vehicles available using formulas from Trip Generation (ITE 2021). For single-family housing (ITE 210), the fitted curve equation is $\text{EXP}(0.92 \cdot \text{LN}(\text{vehicles}) + 2.68)$. To approximate the average number of vehicles in the ITE studies, vehicles available were divided by 5 and the equation result multiplied by 5. For multi-family housing (ITE 221), the fitted curve equation is $(4.77 \cdot \text{vehicles}) - 46.46$ (ITE 2021).
7. Trip Generation, Institute of Transportation Engineers, 11th Edition (2021).

Residential Vehicle Trips Adjustment Factors

A vehicle trip end is the out-bound or in-bound leg of a vehicle trip. As a result, so as to not double count trips, a standard 50 percent adjustment is applied to trip ends to calculate a vehicle trip. For example, the out-bound trip from a person's home to work is attributed to the housing unit and the trip from work back home is attributed to the employer.

However, an additional adjustment is necessary to capture city residents' work bound trips that are outside of the city. The trip adjustment factor includes two components. According to the National Household Travel Survey, home-based work trips are typically 31 percent of out-bound trips (which are 50 percent of all trip ends). Also, utilizing the most recent data from the Census Bureau's web application "OnTheMap", 40 percent of Bozeman workers travel outside the city for work. In combination, these factors account for 6 percent of additional production trips ($0.31 \times 0.50 \times 0.40 = 0.06$). Shown in Figure 32, the total adjustment factor for residential housing units includes attraction trips (50 percent of trip ends) plus the journey-to-work commuting adjustment (6 percent of production trips) for a total of 56 percent.

Figure 32. Residential Trip Adjustment Factor for Commuters

<i>Trip Adjustment Factor for Commuters</i>	
Employed Bozeman Residents (2020)	25,702
Residents Working in Bozeman (2020)	15,447
Residents Commuting Outside of Bozeman for Work	10,255
Percent Commuting Out of Bozeman	40%
Additional Production Trips	6%
Standard Trip Adjustment Factor	50%
Residential Trip Adjustment Factor	56%

Source: U.S. Census, OnTheMap Application, 2020

Nonresidential Vehicle Trips

Vehicle trip generation for nonresidential land uses are calculated by using ITE's average daily trip end rates and adjustment factors found in their recently published 11th edition of *Trip Generation*. To estimate the trip generation in Bozeman, the weekday trip end per 1,000 square feet factors listed in Figure 33 are used. The prior service area report used the 10th Edition of the *Trip Generation*. The latest edition includes travel surveys since the previous edition ensuring changes in travel behavior is being captured in the update.

Figure 33. Institute of Transportation Engineers Nonresidential Factors

Employment Industry	ITE Code	Land Use	Demand Unit	Wkdy Trip Ends Per Dmd Unit	Wkdy Trip Ends Per Employee
Retail	820	Shopping Center	1,000 Sq Ft	37.01	17.42
Office	710	General Office	1,000 Sq Ft	10.84	3.33
Industrial	110	Light Industrial	1,000 Sq Ft	4.87	3.10
Institutional	610	Hospital	1,000 Sq Ft	10.77	3.77

Source: *Trip Generation*, Institute of Transportation Engineers, 11th Edition (2021)

For nonresidential land uses, the standard 50 percent adjustment is applied to office, industrial, and institutional development. A lower vehicle trip adjustment factor is used for retail development because

this type of growth attracts vehicles as they pass-by on arterial and collector roads. For example, when someone stops at a convenience store on their way home from work, the convenience store is not their primary destination.

In Figure 34, the Institute for Transportation Engineers' land use code, daily vehicle trip end rate, and trip adjustment factor is listed for each land use.

Figure 34. Daily Vehicle Trip Factors

Land Use	ITE Codes	Daily Vehicle Trip Ends	Trip Adj. Factor	Daily Vehicle Trips
Residential (per housing unit)				
Single-Unit Dwelling	210	9.27	56%	5.19
Other Residential	220	5.36	56%	3.00
Nonresidential (per 1,000 square feet)				
Retail	820	37.01	38%	14.06
Office	710	10.84	50%	5.42
Industrial	110	4.87	50%	2.44
Institutional	610	10.77	50%	5.39

Source: *Trip Generation*, Institute of Transportation Engineers, 11th Edition (2021); National Household Travel Survey, 2009

Vehicle Trip Projections

The base year vehicle trip totals and vehicle trip projections are calculated by combining the vehicle trip end factors, the trip adjustment factors, and the residential and nonresidential assumptions for housing stock and floor area. Citywide, residential land uses account for 111,875 vehicle trips and nonresidential land uses account for 179,264 vehicle trips in the base year (Figure 35).

Through 2033, it is projected that daily vehicle trips will increase by 50,788 trips with the majority of the growth being generated by residential development (69 percent).

Figure 35. Vehicle Trip Projections

Development Type	Base Year 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total Increase
Residential Trips												
Single-Unit Dwelling	76,072	77,255	78,439	79,623	80,806	81,990	83,173	84,357	85,541	86,724	87,908	11,836
Other Residential	35,803	38,102	40,402	42,701	45,000	47,299	49,598	51,898	54,197	56,496	58,795	22,992
Subtotal	111,875	115,358	118,841	122,323	125,806	129,289	132,772	136,255	139,737	143,220	146,703	34,828
Nonresidential Trips												
Retail	110,483	111,186	111,889	112,593	113,296	113,999	114,702	115,405	116,109	116,812	117,515	7,032
Office	16,397	16,726	17,055	17,385	17,714	18,043	18,372	18,701	19,030	19,359	19,688	3,291
Industrial	7,803	7,846	7,890	7,933	7,977	8,020	8,064	8,107	8,151	8,194	8,238	435
Institutional	44,581	45,100	45,619	46,138	46,658	47,177	47,696	48,215	48,735	49,254	49,773	5,193
Subtotal	179,264	180,859	182,454	184,049	185,644	187,239	188,834	190,429	192,024	193,619	195,214	15,950
Vehicle Trips												
Grand Total	291,139	296,217	301,294	306,372	311,450	316,528	321,606	326,684	331,761	336,839	341,917	50,778

Source: Institute of Transportation Engineers, *Trip Generation*, 11th Edition (2021)

Demand Indicators by Dwelling Size

Impact fees must be proportionate to the demand for infrastructure. Because averages per household, for both persons and vehicle trip ends, have a strong, positive correlation to the square footage of the dwelling unit, TischlerBise recommends residential fee schedules by the size of the unit (consistent with the City of Bozeman's current fee schedule).

Bozeman Control Totals

According to the U.S. Census Bureau, Bozeman single-unit dwellings have an average household size of 2.48 persons and other residential units have an average household size of 1.92 persons.

Figure 36. Persons per Household

Housing Type	Persons	Housing Units	Persons per Housing Unit	Households	Persons per Household	Housing Unit Mix
Single-Unit Dwelling [1]	31,140	13,355	2.33	12,534	2.48	59%
Other Residential [2]	16,235	9,110	1.78	8,451	1.92	41%
Subtotal	47,375	22,465	2.11	20,985	2.26	

[1] Includes attached and detached single family homes and mobile homes

[2] Includes all other types

Source: U.S. Census Bureau, 2021 American Community Survey 5-Year Estimates

Trip generation rates are also dependent upon the average number of vehicles available per dwelling. Key independent variables needed for the analysis (i.e., vehicles available, households, and persons) are available from the U.S. Census Bureau American Community Survey (ACS), indicating an average of 1.90 vehicles per household in Bozeman.

Figure 37. Vehicles per Household

Tenure	Vehicles Available	Households			Vehicles per HH by Tenure
		Single Family	Multifamily	Total	
Owner-occupied	19,262	8,463	889	9,352	2.06
Renter-occupied	20,735	4,071	7,562	11,633	1.78
Total	39,997	12,534	8,451	20,985	1.91

Housing Type	Vehicles Available	Housing Units	Vehicles per Housing Unit
Single-Unit Dwelling [1]	24,680	12,534	1.97
Other Residential [2]	15,292	8,451	1.81
Total	39,972	20,985	1.90

Source: U.S. Census Bureau, 2021 American Community Survey 5-Year Estimates

Demand Indicators by Dwelling Size

Custom tabulations of demographic data by bedroom range can be created from individual survey responses provided by the U.S. Census Bureau in files known as Public Use Microdata Samples (PUMS). PUMS files are only available for areas of at least 100,000 persons with Bozeman included in Public Use Microdata Areas (PUMA) 400.

Cells shaded yellow below are survey results for PUMA 400. Unadjusted persons per household (2.31), derived from PUMS data for the PUMA listed above, are adjusted downward to match the control totals for Bozeman (2.26), as shown above in Figure 36. Adjusted persons per household totals are shaded in gray.

Figure 38. Persons by Bedroom Range

Bedroom Range	Persons ¹	Vehicles Available ¹	Households ¹	Housing Mix	Unadjusted PPHH	Adjusted PPHH ²	Unadjusted VPHH	Adjusted VPHH ²
0-2	2,180	2,204	1,273	33%	1.71	1.68	1.73	1.46
3	3,508	3,443	1,471	38%	2.38	2.33	2.34	1.97
4	2,173	2,139	798	21%	2.72	2.67	2.68	2.25
5+	1,070	958	327	8%	3.27	3.20	2.93	2.46
Total	8,931	8,744	3,869	100%	2.31	2.26	2.26	1.90

[1] American Community Survey, Public Use Microdata Sample for Montana PUMA 400 (2021 5-Year unweighted data).

[2] Adjusted multipliers are scaled to make the average PUMS values match control totals for Bozeman based on 2021 American Community Survey 5-Year Estimates.

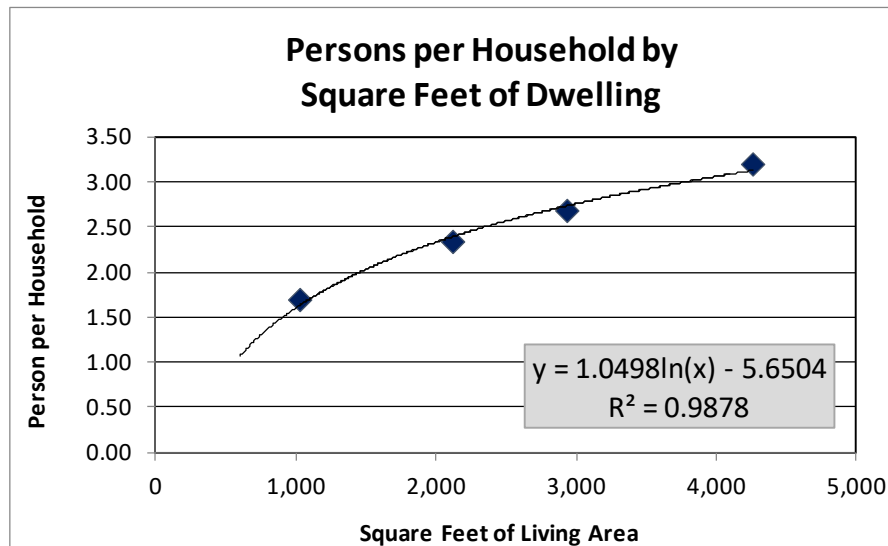
Persons by Dwelling Size

Average floor area and number of persons by bedroom range are plotted in Figure 39 with a logarithmic trend line derived from 2021 square footage estimates provided by the U.S. Census Bureau (West Region). Dwellings with two bedrooms or less average 1,032 square feet of floor area—based on multifamily dwellings constructed in the West Census Region. Three-bedroom dwellings average 2,118 square feet, four-bedroom dwellings average 2,932 square feet, and dwellings with five or more bedrooms average 4,269 square feet—based on single-unit dwellings constructed in the West Census Region. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 19 size thresholds, expanding the low and high range of the fee schedule.

As shown in the upper-right corner of the table below, the smallest floor area range (under 600 square feet) has an estimated average of 1.06 persons per dwelling. The largest floor area range (4,001 square feet or more) has an estimated average of 3.08 persons per dwelling.

Figure 39. Persons by Dwelling Size

Actual Averages per Hsg Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Persons	Sq Ft Range	Persons
0-2	1,032	1.68	Under 600	1.06
3	2,118	2.33	600 to 800	1.23
4	2,932	2.67	801 to 1,000	1.49
5+	4,269	3.20	1,001 to 1,200	1.70
Average persons per household derived from 2021 ACS PUMS data for the area that includes Bozeman. Unit size for 0-2 bedroom is from the 2021 U.S. Census Bureau average for all multifamily units constructed in the Census West region. Unit size for all other bedrooms is from the 2021 U.S. Census Bureau average for single-unit dwellings constructed in the Census Mountain division.			1,201 to 1,400	1.88
			1,401 to 1,600	2.03
			1,601 to 1,800	2.16
			1,801 to 2,000	2.28
			2,001 to 2,200	2.38
			2,201 to 2,400	2.48
			2,401 to 2,600	2.56
			2,601 to 2,800	2.64
			2,801 to 3,000	2.72
			3,001 to 3,200	2.79
			3,201 to 3,400	2.85
			3,401 to 3,600	2.92
			3,601 to 3,800	2.97
			3,801 to 4,000	3.03
			4,001 or More	3.08



Person by Dwelling Size and Housing Type

The PPHH factors in Figure 39 represents an average over all housing types in Bozeman. An equivalent dwelling unit (EDU) analysis is completed to calculate the PPHH by size for single-unit dwellings and other residential units.

Shown in Figure 40, one single-unit EDU is set to the average sized single-unit dwelling in Bozeman (2,201 to 2,400 square feet). The EDU factor for the other size thresholds is found by comparing the PPHH factors, for example, a single-unit dwelling from 1,801 to 2,000 square feet is 0.92 EDUs (2.28 PPHH / 2.48 PPHH = 0.92 EDUs).

The EDU factors for the size threshold is then combined with the average PPHH for single-unit dwelling. For example, found with US Census ACS 2021 data (Figure 21) the average single-unit dwelling home in Bozeman is 2.48 persons, thus a single-unit home from 1,801 to 2,000 square feet is 2.28 persons (0.92 EDUs x 2.48 persons = 2.28 persons per household).

Figure 40. Single-Unit Dwelling PPHH by Size

Single-Unit Dwelling including Townhomes			
Dwelling Size (square feet)	Overall PPHH	EDU Factor	Single-Unit PPHH
Under 600	1.06	0.43	1.06
600 to 800	1.23	0.50	1.23
801 to 1,000	1.49	0.60	1.49
1,001 to 1,200	1.70	0.69	1.70
1,201 to 1,400	1.88	0.76	1.88
1,401 to 1,600	2.03	0.82	2.03
1,601 to 1,800	2.16	0.87	2.16
1,801 to 2,000	2.28	0.92	2.28
2,001 to 2,200	2.38	0.96	2.38
2,201 to 2,400 (avg. single)	2.48	1.00	2.48
2,401 to 2,600	2.56	1.03	2.56
2,601 to 2,800	2.64	1.06	2.64
2,801 to 3,000	2.72	1.10	2.72
3,001 to 3,200	2.79	1.13	2.79
3,201 to 3,400	2.85	1.15	2.85
3,401 to 3,600	2.92	1.18	2.92
3,601 to 3,800	2.97	1.20	2.97
3,801 to 4,000	3.03	1.22	3.03
4,001 or More	3.08	1.24	3.08
Average			2.48

Shown in Figure 41, one Other Residential EDU is set to the average sized Other Residential dwelling in Bozeman (1,401 to 1,600 square feet). The EDU factor for the other size thresholds is found by comparing the PPHH factors, for example, a unit from 1,001 to 1,200 square feet is 0.84 EDUs (1.70 PPHH / 2.03 PPHH = 0.84 EDUs).

The EDU factors for the size threshold is then combined with the average PPHH for other residential dwellings. For example, found with US Census ACS 2021 data (Figure 21) the average other residential dwelling home in Bozeman is 1.92 persons, thus a single-unit home from 1,001 to 1,200 square feet is 1.61 persons (0.84 EDUs x 1.92 persons = 1.61 persons per household).

Figure 41. Other Residential PPHH by Size

Other Residential			
Dwelling Size (square feet)	Overall PPHH	EDU Factor	Other Res. PPHH
Under 600	1.06	0.52	1.00
600 to 800	1.23	0.61	1.16
801 to 1,000	1.49	0.73	1.41
1,001 to 1,200	1.70	0.84	1.61
1,201 to 1,400	1.88	0.93	1.78
1,401 to 1,600 (avg. other)	2.03	1.00	1.92
1,601 to 1,800	2.16	1.06	2.04
1,801 to 2,000	2.28	1.12	2.16
2,001 to 2,200	2.38	1.17	2.25
2,201 to 2,400	2.48	1.22	2.35
2,401 to 2,600	2.56	1.26	2.42
2,601 to 2,800	2.64	1.30	2.50
2,801 to 3,000	2.72	1.34	2.57
3,001 to 3,200	2.79	1.37	2.64
3,201 to 3,400	2.85	1.40	2.70
3,401 to 3,600	2.92	1.44	2.76
3,601 to 3,800	2.97	1.46	2.81
3,801 to 4,000	3.03	1.49	2.87
4,001 or More	3.08	1.52	2.91
Average			1.92

Trip Generation by Dwelling Size

Rather than rely on one methodology, the recommended trip generation rates shown at the bottom of Figure 42, shaded gray, are an average of trip rates based on persons and vehicles available for all types of housing units. In Bozeman, the average household is expected to yield 8.86 average weekday vehicle trip ends (AWVTE), compared to the national weighted average of 7.45 trip ends per household.

Figure 42. Average Weekday Vehicle Trip Ends by Bedroom Range

Bedroom Range	Persons ¹	Vehicles Available ¹	Households ¹	Housing Mix	Unadjusted PPHH	Adjusted PPHH ²	Unadjusted VPHH	Adjusted VPHH ²
0-2	2,180	2,204	1,273	33%	1.71	1.68	1.73	1.46
3	3,508	3,443	1,471	38%	2.38	2.33	2.34	1.97
4	2,173	2,139	798	21%	2.72	2.67	2.68	2.25
5+	1,070	958	327	8%	3.27	3.20	2.93	2.46
Total	8,931	8,744	3,869	100%	2.31	2.26	2.26	1.90

National Averages According to ITE

ITE Code	AWVTE per Person	AWVTE per Vehicle	AWVTE per HH	Housing Mix	Persons per Household	Vehicles per Household
210 SFD	2.65	6.36	9.43	59%	3.56	1.48
221 Apt	3.31	5.10	4.54	41%	1.37	0.89
Weighted Avg	2.92	5.85	7.45	100%	2.67	1.24

Recommended AWVTE per Household

Bedroom Range	AWVTE per HH Based on Persons ³	AWVTE per HH Based on Vehicles ⁴	AWVTE per Household ⁵
0-2	4.91	8.54	6.73
3	6.80	11.52	9.16
4	7.80	13.16	10.48
5+	9.34	14.39	11.87
Average	6.60	11.12	8.86

1. American Community Survey, Public Use Microdata Sample for Montana PUMA 400 (2021 5-Year unweighted data).
2. Adjusted multipliers are scaled to make the average PUMS values match control totals for Bozeman based on 2021 American Community Survey 5-Year Estimates.
3. Adjusted persons per household multiplied by national weighted average trip rate per person.
4. Adjusted vehicles available per household multiplied by national weighted average trip rate per vehicle.
5. Average trip rates based on persons and vehicles per household.

ITE Code	AWVTE per Person	AWVTE per Vehicle	AWVTE per HH	Unadjusted PPHH	Unadjusted VPHH
210 SFD	6.80	11.52	9.16	2.33	1.97
220 Apt	5.20	10.59	7.90	1.78	1.81
All Types	6.16	11.12	8.64	2.11	1.90

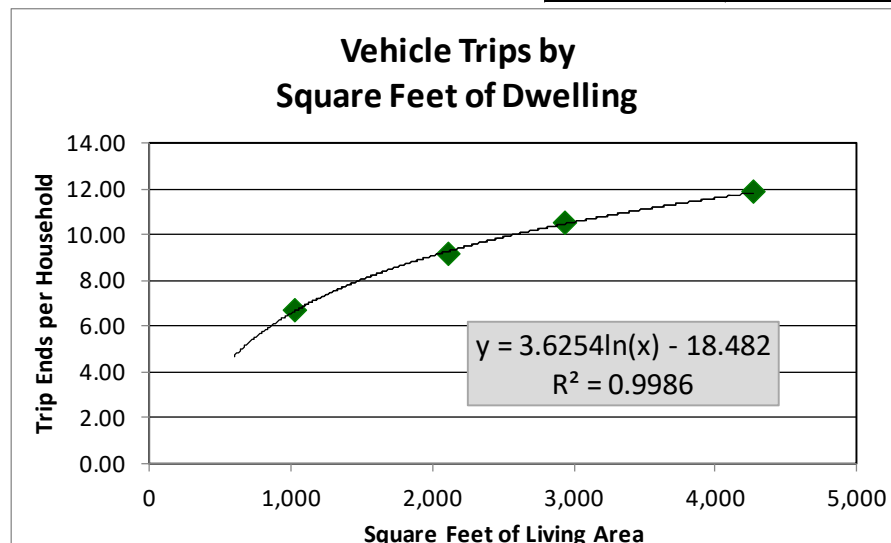
Vehicle Trip Ends by Dwelling Size

To derive AWWTE by dwelling size, TischlerBise matched trip generation rates and average floor area, by bedroom range, as shown in Figure 43, with a logarithmic trend line derived from 2021 square footage estimates provided by the U.S. Census Bureau (West Region). Using the trend line formula shown in the chart, TischlerBise derived the estimated average weekday vehicle trip ends, by dwelling size, using 19 size thresholds, expanding the low and high range of the fee schedule.

As shown in the upper-right corner of the table below, the smallest floor area range (under 600 square feet) generates an estimated average of 4.70 trip ends per dwelling. The largest floor area range (4,001 square feet or more) generates an estimated average of 11.68 trip ends per dwelling.

Figure 43. Vehicle Trip Ends by Dwelling Size

Actual Averages per Hsg Unit			Fitted-Curve Values	
Bedrooms	Square Feet	Trip Ends	Sq Ft Range	Trip Ends
0-2	1,032	6.73	Under 600	4.70
3	2,118	9.16	600 to 800	5.27
4	2,932	10.48	801 to 1,000	6.18
5+	4,269	11.87	1,001 to 1,200	6.91
Vehicle trips by dwelling size are derived from 2021 ACS PUMS data for the area that includes Bozeman. Unit size for 0-2 bedroom is from the 2021 U.S. Census Bureau average for all multifamily units constructed in the Census West region. Unit size for all other bedrooms is from the 2021 U.S. Census Bureau average for single-unit dwellings constructed in the Census Mountain division.			1,201 to 1,400	7.51
			1,401 to 1,600	8.03
			1,601 to 1,800	8.49
			1,801 to 2,000	8.89
			2,001 to 2,200	9.25
			2,201 to 2,400	9.58
			2,401 to 2,600	9.88
			2,601 to 2,800	10.16
			2,801 to 3,000	10.42
			3,001 to 3,200	10.66
			3,201 to 3,400	10.89
			3,401 to 3,600	11.10
			3,601 to 3,800	11.30
			3,801 to 4,000	11.50
			4,001 or More	11.68



Vehicle Trip Ends by Dwelling Size and Housing Type

The vehicle trip end factors in Figure 43 represents an average over all housing types in Bozeman. An equivalent dwelling unit (EDU) analysis is completed to calculate the trip ends by size for single-unit dwellings and other residential units. Shown in Figure 44, one single-unit EDU is set to the average sized single-unit dwelling in Bozeman (2,201-2,400 square feet). The EDU factor for the other size thresholds is found by comparing the trip factors, for example, homes from 1,801 to 2,000 square feet are 0.93 EDUs (8.89 trip ends / 9.58 trip ends = 0.93 EDUs).

The EDU factors for the size threshold is then combined with the average trip end factor for single-unit dwellings to find the trip ends by size. For example, found with US Census ACS 2021 data (Figure 31) the average single-unit dwelling in Bozeman generates 9.27 trip ends, thus a single-unit dwelling from 1,801 to 2,000 square feet has a trip end factor of 8.60 (0.93 EDUs x 9.27 trip ends = 8.60 trip ends per household).

Figure 44. Single-Unit Dwelling Trip Ends by Size

Single-Unit Dwelling including Townhomes			
Dwelling Size (square feet)	Overall Trip Ends	EDU Factor	Single-Unit Trip Ends
Under 600	4.70	0.49	4.55
600 to 800	5.27	0.55	5.10
801 to 1,000	6.18	0.65	5.98
1,001 to 1,200	6.91	0.72	6.69
1,201 to 1,400	7.51	0.78	7.27
1,401 to 1,600	8.03	0.84	7.77
1,601 to 1,800	8.49	0.89	8.22
1,801 to 2,000	8.89	0.93	8.60
2,001 to 2,200	9.25	0.97	8.95
2,201 to 2,400 (avg. single)	9.58	1.00	9.27
2,401 to 2,600	9.88	1.03	9.56
2,601 to 2,800	10.16	1.06	9.83
2,801 to 3,000	10.42	1.09	10.08
3,001 to 3,200	10.66	1.11	10.32
3,201 to 3,400	10.89	1.14	10.54
3,401 to 3,600	11.10	1.16	10.74
3,601 to 3,800	11.30	1.18	10.93
3,801 to 4,000	11.50	1.20	11.13
4,001 or More	11.68	1.22	11.30
Average			9.27

Shown in Figure 45, one Other Residential EDU is set to the average sized Other Residential dwelling in Bozeman (1,401 to 1,600 square feet). The EDU factor for the other size thresholds is found by comparing the trip factors, for example, homes from 1,001 to 1,200 square feet are 0.86 EDUs (6.91 trip ends / 8.03 trip ends = 0.86 EDUs).

The EDU factors for the size threshold is then combined with the average trip end factor for other residential dwellings to find the trip ends by size. For example, found with US Census ACS 2021 data (Figure 31) the average other residential dwelling in Bozeman generates 5.36 trip ends, thus an Other

Residential dwelling from 1,001 to 1,200 square feet has a trip end factor of 4.61 (0.86 EDUs x 5.36 trip ends = 4.61 trip ends per household).

Figure 45. Other Residential Trip Ends by Size

Other Residential			
Dwelling Size (square feet)	Overall Trip Ends	EDU Factor	Other Res. Trip Ends
Under 600	4.70	0.59	3.14
600 to 800	5.27	0.66	3.52
801 to 1,000	6.18	0.77	4.13
1,001 to 1,200	6.91	0.86	4.61
1,201 to 1,400	7.51	0.94	5.01
1,401 to 1,600 (avg. other)	8.03	1.00	5.36
1,601 to 1,800	8.49	1.06	5.67
1,801 to 2,000	8.89	1.11	5.93
2,001 to 2,200	9.25	1.15	6.17
2,201 to 2,400	9.58	1.19	6.39
2,401 to 2,600	9.88	1.23	6.59
2,601 to 2,800	10.16	1.27	6.78
2,801 to 3,000	10.42	1.30	6.96
3,001 to 3,200	10.66	1.33	7.12
3,201 to 3,400	10.89	1.36	7.27
3,401 to 3,600	11.10	1.38	7.41
3,601 to 3,800	11.30	1.41	7.54
3,801 to 4,000	11.50	1.43	7.68
4,001 or More	11.68	1.45	7.80
Average			5.36

APPENDIX B: LAND USE DEFINITIONS

Residential Development

Single-Unit Dwelling:

1. Single-family detached is a one-unit structure detached from any other house, that is, with open space on all four sides. Such structures are considered detached even if they have an adjoining shed or garage. A one-family house that contains a business is considered detached as long as the building has open space on all four sides.
2. Single-family attached (townhouse) is a one-unit structure that has one or more walls extending from ground to roof separating it from adjoining structures. In row houses (sometimes called townhouses), double houses, or houses attached to nonresidential structures, each house is a separate, attached structure if the dividing or common wall goes from ground to roof.
3. Mobile home includes both occupied and vacant mobile homes, to which no permanent rooms have been added, are counted in this category. Mobile homes used only for business purposes or for extra sleeping space and mobile homes for sale on a dealer's lot, at the factory, or in storage are not counted in the housing inventory.

Other Residential:

1. 2+ units (duplexes and apartments) are units in structures containing two or more housing units, further categorized as units in structures with "2, 3 or 4, 5 to 9, 10 to 19, 20 to 49, and 50 or more apartments."
2. Boat, RV, Van, etc. includes any living quarters occupied as a housing unit that does not fit the other categories (e.g., houseboats, railroad cars, campers, and vans). Recreational vehicles, boats, vans, railroad cars, and the like are included only if they are occupied as a current place of residence. Such living quarters are only allowed under Bozeman zoning under unusual temporary conditions.

Nonresidential Development

Nonresidential development categories represent general groups of land uses that share similar average weekday vehicle trip generation rates and employment densities (i.e., jobs per 1,000 square feet).

Retail: Establishments primarily selling merchandise, eating/drinking places, and entertainment uses. By way of example, *Retail* includes shopping centers, supermarkets, pharmacies, restaurants, bars, nightclubs, automobile dealerships, and movie theaters.

Industrial: Establishments primarily engaged in the production, transportation, or storage of goods. By way of example, *Industrial* includes manufacturing plants, distribution warehouses, trucking companies, utility substations, power generation facilities, and telecommunications buildings.

Office: Establishments providing management, administrative, professional, or business services. By way of example, *Office* can include business offices, office parks, and corporate headquarters.

Institutional: Establishments providing education and healthcare services. By way of example, *Institutional* includes universities, nursing homes, daycare facilities, and hospitals.