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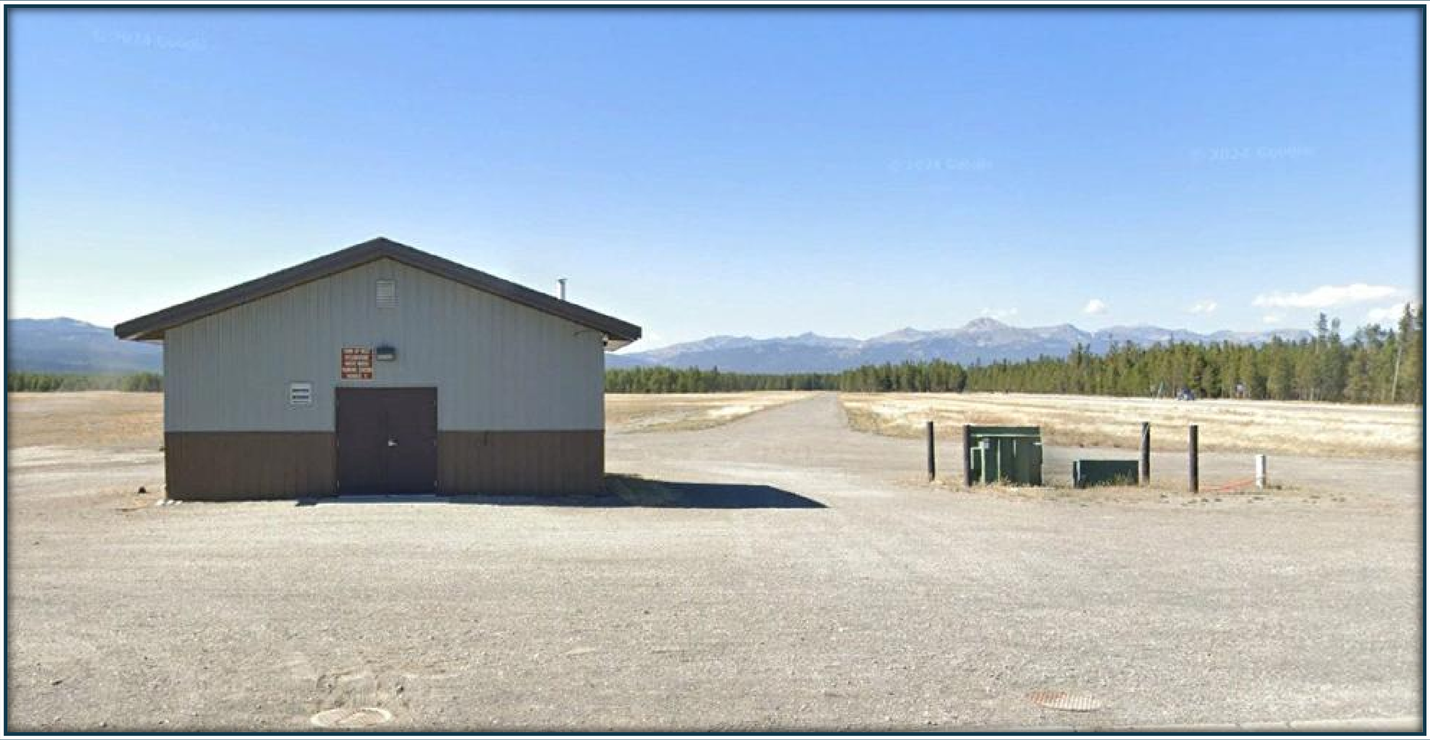

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IRIS LIFT STATION – PRELIMINARY EVALUATION
TOWN OF WEST YELLOWSTONE

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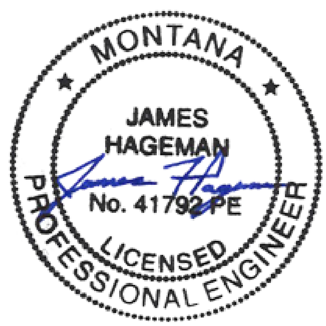

JOB NO. B25-091 **MARCH 2026**

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1 INTRODUCTION

The Town of West Yellowstone currently operates two wastewater lift stations. The Madison lift station, located near the intersection of De Lacy Avenue and North Hayden Street, serves a relatively small portion of the Town's collection system and primarily conveys residential wastewater. In contrast, the Iris Lift Sation, which is the focus of this study, serves the entirety of the southern portion of Town and receives the majority of wastewater generated within the Town's commercial and industrially zoned areas. The Iris station resides on the far west end of the Town near the intersection of Iris Street and C Parkway. The lift station is currently operational and continues to convey wastewater effectively; however, capacity limitations, operational constraints, and safety concerns have been identified that may affect long-term reliability and the ability to accommodate future growth.

A utility service area map illustrating lift station service boundaries, contributing collection areas, and projected areas of future growth is included as Exhibit A.

2 STUDY OBJECTIVES

Operational data indicates sustained high flows and frequent pump cycling during peak operating periods, particularly during the summer months. While the installed pumps are capable of scaling flow to some extent, the physical configuration of the existing wet well and force main imposes limitations on system flexibility. These constraints prompted the Town to initiate this pre-design study to evaluate improvement alternatives and establish a technically defensible path forward.

The purpose of this report is to document the findings of the pre-design evaluation, assess feasible improvement alternatives, and provide a recommendation based on hydraulic performance, operational reliability, safety, constructability, and long-term service considerations. The findings are intended to provide a planning-level foundation to guide future design decisions and capital investment.

2.1 DATA SOURCES AND PLANNING HORIZON

The primary data sources used to inform this evaluation include: Supervisory Control and Data Acquisition (SCADA) records (i.e., pump runtime data and hourly flow trends), site observations, existing lift station design documents, and projected wastewater demand associated with planned and potential development. Three years of recent operational data (2023 through 2025) were assessed to characterize typical operating conditions and peak seasonal demands. Particular emphasis was placed on summer operating periods, when wastewater flow is highest and system stresses are most pronounced.

Rather than relying on a conventional population-based planning horizon, this evaluation was framed around the ultimate wastewater treatment plant capacity; the Town's new wastewater treatment plant is slated to come online in 2026. The Iris Lift Station conveys approximately 94% of the Town's total wastewater flow, and its long-term performance must be compatible with the full processing capacity of the new wastewater treatment plant under both average and peak seasonal conditions. Accordingly, improvement alternatives were evaluated based on their ability to reliably convey wastewater flows up to the practical capacity of the treatment plant, recognizing the Town's unique seasonal loading characteristics and the limited applicability of standard growth projections.

3 EXISTING LIFT STATION ASSESSMENT

A multidisciplinary evaluation of the existing lift station was conducted as part of this pre-design study. The assessment included a site visit by a team of civil, mechanical, and electrical engineers to observe existing conditions, review operational configuration, and document structural, mechanical, and electrical components. Field observations were supplemented by system operational data to evaluate system performance, limitations, and improvement alternatives.

The following sections summarize the regulatory expectations, the existing lift station configuration and operating conditions observed during the site visit and include an evaluation of operational characteristics based on available SCADA data. Together, these assessments form the technical basis for identifying system limitations and evaluating various alternatives presented later in this report.

3.1 REGULATORY AND OPERATIONAL EXPECTATIONS

The Montana Department of Environmental Quality (MDEQ) has strict regulations guiding the design of wastewater lift stations. Design guidelines have changed over time with the most recent version being revised in December of 2018 (*DEQ-2 - Design Standards for Public Sewage Systems*, Revised 12/21/2018).

Modern wastewater lift stations are generally expected to provide adequate storage volume, operational flexibility to accommodate seasonal demand fluctuations, redundancy to allow maintenance and protect against equipment failure, and safe access consistent with occupational health considerations. Electrical and control systems are also expected to comply with current codes and industry standards.

The following sections evaluate the existing Iris lift station relative to these general expectations.

3.2 EXISTING LIFT STATION CONFIGURATION AND PHYSICAL LAYOUT

The existing lift station consists of a building housing mechanical, electrical, and control components with the wet well located directly beneath the structure. Wastewater is conveyed from the wet well through a 14-inch force main to Town’s wastewater treatment plant. The station operates with two installed pumps that function independently under normal operating conditions.

The physical arrangement of the wet well beneath the occupied building, combined with the routing of the force main and the constrained site footprint, imposes inherent limitations on the ability to expand, retrofit, or meaningfully reconfigure the facility.

3.2.1 PUMP CONFIGURATION AND REDUNDANCY

The lift station operates with two pumps and does not provide the physical space or hydraulic configuration necessary to add a third pump. Under peak conditions, both pumps are heavily taxed and would ideally operate in parallel to reduce individual loading and improve efficiency. The inability to add redundancy or staged pumping limits the station’s ability to respond to increased demand, maintenance activities, or equipment failure.

3.2.2 SAFETY AND OCCUPATIONAL HEALTH CONSIDERATIONS

A significant safety concern associated with the existing station is the location of the wet well directly beneath the building and its access from within the occupied structure. This configuration increases the risk of hydrogen sulfide (H_2S) gas accumulation in enclosed spaces and complicates confined space entry procedures.

In addition, a large natural gas generator is housed within the same building. While the generator includes exhaust provisions, the overall configuration introduces compounded risks related to confined space entry, exhaust gases, and air quality management. These conditions present inherent safety challenges that are difficult to fully mitigate through incremental improvements.

3.2.3 ELECTRICAL SYSTEM DEFICIENCIES

The existing 480 volt, 3-phase electrical service provided by Fall River Electric is sized at 200 amps. A main disconnect switch located within the building serves an automatic transfer switch. The entire building is backed up by a 130-kW natural gas-fueled generator. A 480-volt panel supplies the two 40-HP pumps, and a 25-kVA step-down transformer provides power to a 120/240-volt panel that serves the smaller building loads.

All electrical equipment within the building is exposed to the wet well, which is not properly sealed from the occupied space. Under the National Electrical Code (NEC), this area would be classified as a Class I, Division 2 hazardous location if properly ventilated and a Class I, Division 1 location if not ventilated. Because the existing exhaust system is not properly sized and does not operate continuously, the space likely falls under the more stringent Class I, Division 1 classification. None of the existing electrical components in the room (i.e., panels, heaters, generator, light fixtures) are rated for use in this type of hazardous environment. In addition, conduit installations would be required to comply with hazardous location requirements, including the use of explosion-proof fittings, seal-offs, and other compliant installation methods. A related concern is that the existing electrical equipment is not rated for corrosive environments and is beginning to show signs of corrosion due to exposure to wet well gases.

The existing emergency generator no longer functions reliably. The Town has since purchased a portable diesel generator and is in the process of installing an outdoor generator tap box that will allow the portable generator to be connected during a utility power outage rather than relying on the indoor natural gas generator. In the future, it would be recommended to install a new diesel generator in an outdoor rated enclosure. This would provide multiple benefits. On-site fuel storage would allow the generator to operate during a natural gas outage (such as might occur during a seismic event). Relocating the generator outside the building would also remove it from the corrosive and hazardous environment currently present within the structure. Additional benefits include freeing up interior space and reducing the combustion air requirements and control integration associated with operating dampers, exhaust fans, and generator interlocks.

The existing variable frequency drives (VFDs) serving the 40-HP pumps are currently functional but are recommended for replacement due to age. Similar to the other electrical equipment described above, the existing VFDs are not rated for corrosive or hazardous environments and should be relocated when replaced. The facility also contains harmonic filters that would likely no longer be required with modern VFD replacements, which would free additional floor space within the building.

The lighting, heating, and all of the raceways (i.e., conduits and junction boxes) need to be upgraded to comply with hazardous location requirements. In addition, the major electrical equipment (i.e., panels, transfer switch, VFD's, step-down transformer, and generator) would need to be removed, or fully isolated, from the hazardous environment. If additional pumping capacity or a new wet well were added to improve redundancy, the existing electrical service would likely require an upgrade to approximately 400 amps. Such an upgrade would also provide an opportunity to relocate the panels and transfer switch and install a new outdoor generator, substantially improving overall electrical safety and code compliance.

3.2.4 MECHANICAL SYSTEM DEFICIENCIES

The mechanical systems within the existing lift station were evaluated as part of the site inspection and were found to exhibit several deficiencies. The mechanical exhaust system is configured to operate in a manner to provide cooling to the building and does not operate continuously as required by Montana Department of Environmental Quality circular DEQ-2. The mechanical exhaust system and electric unit heaters are under capacity to provide the required 12 air changes per hour of continuous ventilation. There are no indoor air quality monitoring equipment or alarms to indicate the presence of toxic, corrosive and/or flammable gases present in the building.

3.3 EXISTING OPERATIONAL PERFORMANCE BASED ON SCADA DATA

The operational performance of the Iris Lift Station was evaluated using SCADA data to quantify flow characteristics, pump operation, and cycling behavior under both peak and off-peak seasonal conditions. For purposes of this evaluation, peak season is defined as June through September, corresponding to the period of highest sustained wastewater flows associated with tourism activity. Off-peak season includes the remainder of the year. Shoulder seasons were not evaluated separately for this preliminary analysis.

3.3.1 SEASONAL FLOW CHARACTERISTICS

Review of the most recent three years of SCADA data indicates a pronounced seasonal disparity in wastewater flows conveyed through the Iris Lift Station. Average daily flows during the peak season are approximately 694,000 gallons per day, compared to approximately 388,000 gallons per day during the off-peak season. These values represent nearly a two-to-one difference between seasonal operating conditions.

In addition to seasonal average flows, SCADA data from 2025 (the highest flow year within the evaluated period) was reviewed to characterize peak and minimum operating conditions. During that year, the observed peak day flow was approximately 800,000 gallons, while the peak hourly flow approached 67,000 gallons. The minimum daily flow in 2025 was approximately 300,000 gallons per day.

This magnitude of seasonal variability is atypical of many municipal wastewater systems and reflects West Yellowstone's tourism-driven demand profile. These values illustrate the breadth of operating conditions the Iris Lift Station must accommodate, ranging from relatively low off-season demand to sustained high-flow and short-duration peak conditions. The ability to reliably manage this range of flows is a critical consideration for both near-term operation and long-term system scalability.

3.3.2 WET WELL STORAGE, OPERATING SET POINTS, AND PUMP CYCLING BEHAVIOR

The existing wet well provides an effective operating volume of approximately 2,250 gallons based on current pump on/off elevations. The pump "on" elevation is set near the influent pipe invert, limiting available storage above the activation level, while the pump "off" elevation is set approximately 1.5 feet above the wet well bottom to prevent pump cavitation, overheating, and other operational issues. Based on field observations and operator input, these set points offer little, if any, opportunity for further adjustment without introducing additional operational risk. The limited wet well volume significantly constrains the system's ability to buffer variable inflows and results in rapid drawdown once pumps are activated

The lift station is configured to alternate pump operation under normal conditions. Each pump discharges at a fixed rate of approximately 1,550 gallons per minute (gpm). Given the limited wet well volume and fixed discharge rate, pump cycling behavior is highly sensitive to variations in influent flow.

The theoretical relationship between inflow rate and pump cycling frequency can be calculated directly from the wet well operating volume and pump discharge rate. For a constant inflow over a one-hour period, the number of pump cycles per hour is governed by the rate at which the wet well fills to the pump "on" elevation and is subsequently drawn down by the pump. This calculated relationship is presented as the black curve in Figure 1, below.

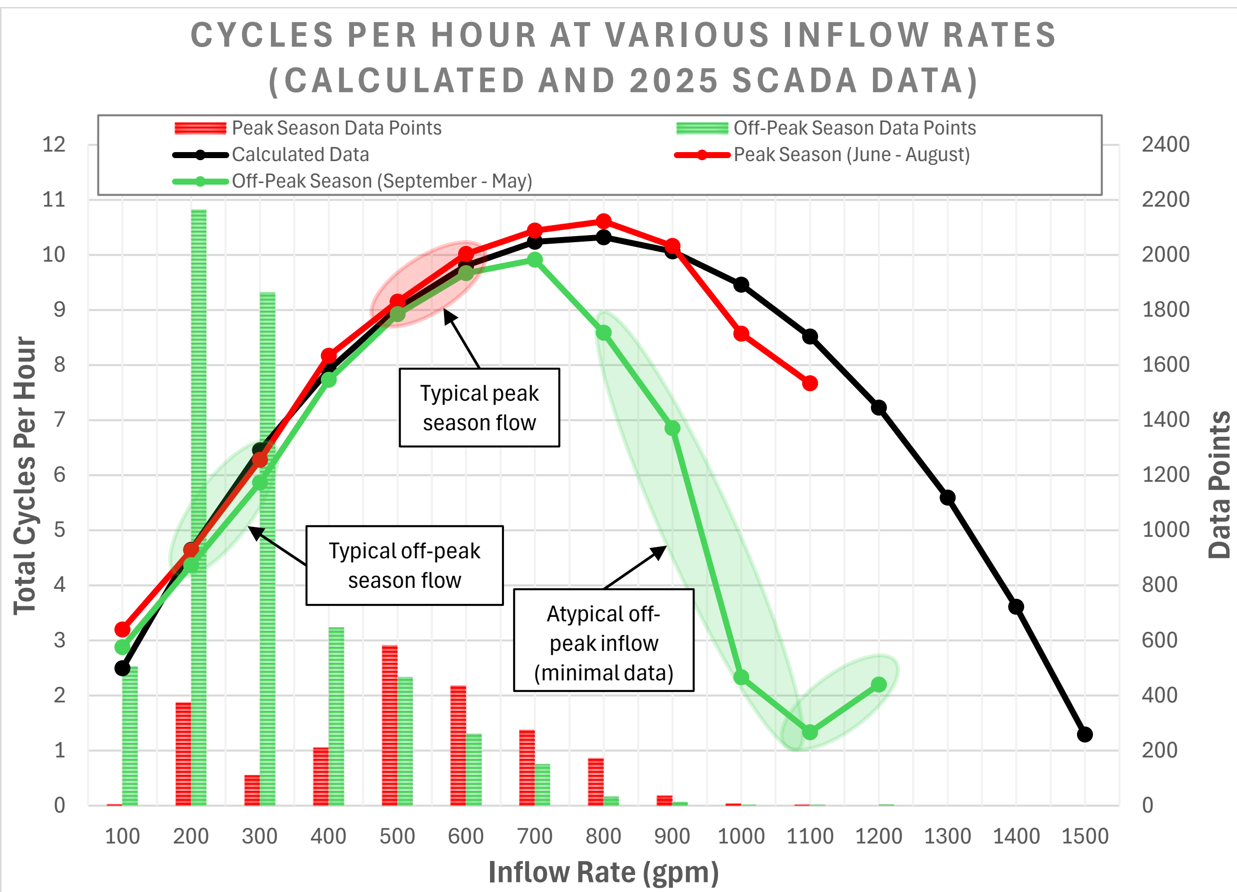


Figure 1. Iris Lift Station Pump Cycling Frequency as a Function of Inflow Rate (Theoretical and SCADA-Derived Data)

Also shown in Figure 1 are the observed operational data derived from SCADA records. For each recorded hour of operation, total flow discharged from the lift station was converted to an average hourly inflow rate (in gpm). Pump start counts per hour for each pump were combined to determine the total cycles per hour for the station. These results were grouped by inflow rate and plotted for peak season (June through September, shown in red) and off-peak season (October through May, shown in green).

As shown in Figure 1, the observed operational data closely follow the calculated cycling curve across the primary operating range of the lift station. This alignment confirms that pump cycling frequency is fundamentally governed by wet well volume and fixed discharge rate, rather than other operator-controlled variables. The system behaves largely as predicted under conditions of relatively consistent inflow over a given hour.

The secondary y-axis in Figure 1 presents the number of data points contributing to each plotted inflow rate, shown as clustered columns for peak (red) and off-peak (green) conditions. This distribution illustrates the typical operating range of the lift station. During off-peak season, the majority of operating hours have an inflow rate between approximately 200 and 300 gpm. During peak season, typical inflows shift upward to approximately 500 to 600 gpm. Even during peak season, it is relatively uncommon for hourly average inflow rates to exceed approximately 900 gpm.

At higher inflow rates during off-peak months (particularly above approximately 800 gallons per minute), the data points become sparse. These instances are likely associated with atypical system events such as flushing or maintenance activities, which can artificially elevate hourly average flow values. Because these short-duration events do not represent sustained inflow conditions, the calculated cycling relationship becomes less predictive in those ranges.

During off-peak conditions, the typical inflows (200 to 300 gpm) result in an average of approximately six pump cycles per hour, or roughly three cycles per pump per hour under alternating operation. During peak season conditions, typical influent flows (500 to 600 gpm) result in approximately nine to ten cycles per hour, typically distributed as five cycles on one pump and four or five on the other.

Manufacturer information indicates that the installed pumps are rated for up to ten starts per hour. While observed cycling generally remains within this operational limit under normal two-pump operation, the limited wet well volume and high relative discharge rate result in short cycle durations and frequent starts. These operating characteristics reduce operational margin and increase mechanical wear on the equipment.

A key operational concern associated with this configuration is the system’s sensitivity to reduced redundancy. If one pump were unavailable due to maintenance or failure, the remaining pump would be required to operate at or near the maximum recommended number of starts per hour for extended periods under peak seasonal conditions. This operating scenario would further increase mechanical stress and elevate the risk of accelerated equipment degradation.

3.3.3 FORCE MAIN VELOCITY CONSIDERATIONS AND OPERATIONAL CONSTRAINTS

The operational flexibility of the Iris Lift Station is further constrained by minimum velocity requirements within the downstream 14-inch force main. MDEQ guidance recommends that wastewater force mains be operated at velocities generally between 3 and 8 feet per second to prevent solids deposition, odor generation, and long-term maintenance issues.

Under current operating conditions, the fixed pump discharge rate of approximately 1,550 gallons per minute results in force main velocities that exceed the recommended minimum threshold of 3 feet per second. This operating rate therefore satisfies velocity-based performance expectations and supports reliable conveyance under both peak and off-peak conditions.

It is understood that the installed pumping equipment may be capable of variable-speed operation, at least from an equipment standpoint. However, the extent to which variable-speed control can be implemented without introducing adverse impacts has not been fully evaluated as part of this pre-design effort. While it may be conceptually advantageous to reduce pump discharge rates during specific inflow rates in order to mitigate cycling frequency and/or increase pump runtime, doing so introduces concerns related to force main velocity. Reducing discharge rates below current levels could result in velocities approaching or falling below recommended minimums, increasing the risk of solids accumulation and associated operational issues.

As a result, the ability to materially reduce pump discharge rates as a means of addressing cycling behavior is constrained by both force main velocity considerations and uncertainty regarding long-term impacts on pump operation and equipment life. These factors further limit the effectiveness of operational adjustments as a standalone solution to the lift station's observed performance challenges.

3.4 PROJECTED NEAR-TERM WASTEWATER DEMAND

The Town currently assigns wastewater demand using Single Family Equivalents (SFEs). As of 2025, the total number of assigned SFEs within West Yellowstone was approximately 4,279. Based on currently planned developments and anticipated changes to existing lots and buildings, the Town anticipates an increase of approximately 570 additional SFEs in the next 5 to 10 years.

While detailed growth projections are not in the scope of this report, these anticipated increases provide important context for near-term system loading. Additional SFEs will further increase average and peak flows conveyed through the Iris Lift Station, compounding the operational challenges associated with limited wet well storage, fixed discharge rates based on force main size, and constrained pump redundancy. Long-term improvements to the lift station must therefore account for both immediate growth pressures and the ultimate wastewater flows associated with the Town's new wastewater treatment plant.

3.5 SUMMARY OF EXISTING SYSTEM LIMITATIONS

Based on field observations, operational configuration, and review of SCADA data, the existing Iris Lift Station exhibits several fundamental limitations that affect its ability to provide reliable, flexible, and scalable wastewater conveyance. These limitations are inherent to the facility's physical layout and operating characteristics and cannot be fully resolved through incremental upgrades or operational adjustments.

A summary of key system limitations discussed above, include:

- **Pronounced seasonal variability in wastewater flow**

  The Iris Lift Station experiences sustained seasonal loading, with average daily flows during peak summer months nearly double those observed during off-peak periods. These elevated flows persist for extended durations rather than occurring as short-term peak events, placing prolonged stress on lift station components.

- **Limited wet well storage volume**

  The effective wet well operating volume is approximately 2,250 gallons, providing minimal buffering capacity to absorb variable inflows. Current pump on/off set points offer little opportunity for adjustment without introducing additional operational risks, limiting the system's ability to moderate inflow fluctuations.

- **Fixed pump discharge rates and constrained operational flexibility**

  Pumps operate at a fixed discharge rate of approximately 1,550 gallons per minute. When combined with limited wet well storage, this configuration results in rapid drawdown and frequent pump cycling, particularly under peak seasonal conditions.

- **Limited pump redundancy**

  While current operations generally remain within nominal limits under normal two-pump operation, the system operates with minimal margin for error (i.e., pump failure). The lift station lacks the physical space and hydraulic configuration necessary to add a third pump. If one pump were unavailable due to maintenance or failure, the remaining pump would be required to operate near the maximum recommended number of starts per hour for extended periods during peak season, increasing mechanical stress and reducing system reliability.

- **Hydraulic constraints imposed by the force main**

  The 14-inch force main creates minimum velocity concerns that limit the ability to reduce pumping rates dynamically in an effort to control pump cycling and operational runtime. These constraints further restrict operational flexibility and contribute to elevated cycling frequency.

- **Safety and occupational health concerns**

  The location of the wet well beneath the occupied building, combined with internal access and the co-location of a diesel generator, introduces compounded safety risks related to confined space entry, hydrogen sulfide accumulation, and air quality management.

- **Electrical and mechanical system deficiencies**

  Electrical and mechanical components and installations exhibit inconsistencies with current codes and industry best practices. While some deficiencies may be correctable, the cumulative condition of the electrical systems reflects the challenges associated with retrofitting an aging facility to meet modern reliability and safety expectations.

Collectively, these limitations constrain the long-term reliability, scalability, and resiliency of the existing Iris Lift Station. While the facility remains fully operational and capable of conveying moderately increased wastewater flows within its current operating configuration, its configuration lacks the redundancy and operational flexibility expected of modern lift stations to reliably respond to equipment outages or to adapt to the Town's pronounced and sustained seasonal loading characteristics.

4 IMPROVEMENT ALTERNATIVES EVALUATION

Improvement alternatives for the Iris Lift Station were developed to address the operational, safety, redundancy, and scalability limitations identified in Section 3. Each alternative was reviewed with respect to hydraulic performance, operational reliability, safety, constructability, long-term flexibility, and scalability with anticipated future wastewater flows. Three conceptual alternatives were evaluated and are described below.

4.1 ALTERNATIVE 1 – RETAIN AND IMPROVE EXISTING STATION

4.1.1 DESCRIPTION

Alternative 1 consists of retaining the existing Iris Lift Station in its current configuration and implementing a series of targeted operational, safety, and equipment-related upgrades intended to extend service life and address select deficiencies. Potential improvements under this alternative could include electrical upgrades, mechanical system upgrades, safety enhancements, and limited control system refinements where feasible.

No expansion of the existing wet well, force main, or pump configuration is assumed under this alternative. The fundamental design components of the facility, including wet well volume, number of pumps, and force main diameter, would remain unchanged.

4.1.2 EVALUATION

While Alternative 1 represents the lowest initial capital investment and minimizes near-term disruption, it does not address the fundamental constraints that govern lift station performance. Limited wet well storage and fixed pump discharge rates would continue to result in frequent pump cycling, particularly during peak seasonal loading. Operational adjustments, including potential variable-speed operation, are constrained by force main velocity requirements and uncertainty regarding long-term impacts on pump reliability and control system performance.

The existing station would continue to operate with only two pumps and no ability to add additional redundancy. Under this alternative, the station would remain highly sensitive to the reduced redundancy, with limited ability to reliably respond to pump outages or extended maintenance activities.

Safety and occupational health concerns associated with wet well access beneath the occupied structure and the co-location of a diesel generator would still remain. While certain safety measures could be improved (i.e., ventilation and proper air exchange), the underlying configuration contributing to these risks would not be eliminated.

Electrical and mechanical system upgrades could address select deficiencies; however, the cumulative challenges associated with retrofitting an aging facility would persist, and improvements would not fundamentally enhance system resiliency or scalability.

4.1.3 SUMMARY

Alternative 1 allows the Iris Lift Station to remain operational under current conditions and may support limited short-term increases in wastewater flow. However, it does not resolve the primary limitations identified in this study, including constrained redundancy, limited operational flexibility, sensitivity to seasonal loading, and safety concerns. As a result, this alternative represents a short-term extension of existing conditions rather than a long-term solution.

4.2 ALTERNATIVE 2 – PARTIAL REHABILITATION AND EXPANSION OF STATION

4.2.1 DESCRIPTION

Alternative 2 consists of retaining the existing Iris Lift Station while expanding and reconfiguring the facility to address identified deficiencies (where possible) and provide additional redundancy. Under this alternative, the existing building would be expanded and modified to relocate and upgrade electrical, mechanical, and control components, thereby addressing safety, hazardous space, and electrical/mechanical code compliance concerns associated with the current configuration.

A new wet well would be constructed adjacent to the existing building and integrated into the lift station system. The collection system would be modified to normally convey wastewater to the new wet well, with the existing wet well retained as a secondary or emergency wet well. New pumps, controls, and associated appurtenances would be provided to allow either wet well to operate independently, providing full pumping redundancy and allowing one wet well to be taken out of service for maintenance without interrupting system operation.

This alternative would also include new control systems housed within the expanded building to manage operation of both wet wells and associated pumps. Depending on the operational strategy selected, the system could be configured such that the new wet well serves as the primary operating basin while the existing wet well remains available as a standby or emergency facility.

4.2.2 EVALUATION

Alternative 2 offers several operational advantages relative to the existing condition. The new wet well would be designed to increase overall storage capacity and significantly improve pump cycling behavior under both peak and off-peak conditions. Providing two independent wet wells would allow maintenance activities to be performed without taking the entire lift station out of service, substantially improving redundancy and operational resiliency.

Relocating electrical and mechanical systems into an expanded building would allow many existing safety and code compliance concerns to be addressed. Modern controls could be implemented to improve monitoring, automation, and operational flexibility relative to the current configuration.

However, this alternative introduces several operational and maintenance considerations. If one wet well is used primarily for normal operation while the other remains in standby service, the associated pumps may experience extended periods without operation. Submersible wastewater pumps are designed to operate periodically, and prolonged inactivity can contribute to mechanical degradation over time. Mechanical seals rely on periodic shaft rotation to maintain lubrication and prevent adhesion between seal faces, and extended inactivity can increase the likelihood of seal leakage or startup failure when the pump is eventually placed back into service. For this reason, standby pumping equipment typically requires periodic exercise cycles to maintain reliability. Operating and maintaining two independent wet wells would therefore require additional operational oversight and control strategies to ensure that the pumps associated with both basins are periodically exercised and maintained.

In addition, retaining the existing wet well preserves several hydraulic limitations associated with its original design. The existing wet well provides limited operating storage relative to the fixed pump discharge rate required to maintain adequate velocity in the downstream 14-inch force main. Even if the new wet well were designed with improved storage characteristics, the existing wet well would continue to exhibit rapid drawdown and elevated pump cycling when placed into service. As a result, the system would continue to rely on infrastructure that does not fully align with the overall hydraulic and operational requirements.

This alternative also introduces substantial cost and constructability challenges. Expanding the existing facility to meet current code requirements would necessitate extensive system modifications as described in Section 3.2.3. Furthermore, constructing a deep wet well adjacent to the existing building would be particularly costly given local soil conditions and excavation requirements, and close proximity would be necessary to make hydraulic and structural connections feasible.

While this alternative provides redundancy and improves operational flexibility, it does not eliminate the inherent limitations of the existing wet well. Integrating new systems with legacy components increases complexity and introduces long-term maintenance and reliability concerns.

Additionally, construction would need to be carefully phased to maintain continuous lift station operation, further increasing complexity, risk, and cost.

4.2.3 SUMMARY

Alternative 2 provides meaningful improvements over the existing condition by addressing safety concerns, improving redundancy, and increasing operational flexibility. However, these benefits come at the cost of significant construction complexity and expense, and the alternative continues to rely on portions of the existing facility that impose inherent limitations.

While this approach may be technically feasible, the effort required to retrofit and integrate aging infrastructure for long-term service raises concerns regarding cost effectiveness, constructability, and long-term reliability. As a result, Alternative 2 represents an intermediate solution that improves system performance and redundancy but does not fully resolve the fundamental constraints identified in this study.

4.3 ALTERNATIVE 3 – BUILD NEW STATION AND ABANDON EXISTING STATION

4.3.1 DESCRIPTION

Alternative 3 consists of abandoning the existing Iris Lift Station and constructing a new lift station facility with all new structural, mechanical, electrical, and control components. The new station would be designed holistically to meet current design standards and long-term operational needs, including adequate wet well storage, multiple pumps with staged and parallel operation, modern electrical and control systems, appropriately sized mechanical ventilation system and improved safety features.

This alternative allows the lift station layout, pumping configuration, and operational philosophy to be optimized without the constraints imposed by the existing facility. The new station could be sited to improve access, constructability, and long-term maintainability.

4.3.2 EVALUATION

Alternative 3 fully addresses the limitations identified in Section 3. A new facility can be designed with sufficient wet well storage to moderate seasonal inflow variability and reduce pump cycling. Additional pumps can be provided to achieve true redundancy, allowing the system to reliably accommodate equipment outages and maintenance activities without operating near manufacturer limits.

Pump discharge rates, force main velocities, and control strategies can be coordinated as part of an integrated design, providing greater operational flexibility and improved efficiency across a wide range of flow conditions. Safety and occupational health concerns associated with wet well access, confined space entry, and generator placement can be addressed through modern design practices.

Although this alternative potentially represents the highest initial capital investment, it offers the greatest long-term benefit by eliminating reliance on aging infrastructure and providing a lift station capable of supporting wastewater flows reaching the ultimate design capacity of the Town's new wastewater treatment plant.

4.3.3 SUMMARY

Alternative 3 provides the most comprehensive and resilient solution by fully eliminating the constraints imposed by the existing lift station. It offers improved redundancy, enhanced operational flexibility, modern safety features, and long-term scalability consistent with the Town's future wastewater treatment capacity. While capital-intensive, this alternative provides the greatest long-term value and reliability.

4.4 COMPARATIVE SUMMARY TABLE

The three alternatives were evaluated against key performance criteria, including capital cost, reliability, redundancy, operational flexibility, safety, constructability, lifecycle risk, and long-term scalability.

Preliminary planning-level (Rough Order of Magnitude, or ROM) capital cost estimates were developed for each alternative. These estimates are based on conceptual-level assumptions regarding structural work, mechanical systems, electrical upgrades, site work, and integration requirements. Costs are presented in 2025 dollars and are intended solely for comparative planning purposes. At this stage of project development, a ±50% accuracy range is assumed.

Table 1. Comparative Summary of Lift Station Alternatives

Evaluation Criteria	Alternative 1: Retain & Improve Existing	Alternative 2: Partial Rehabilitation & Expansion of Station	Alternative 3: Build New Lift Station & Abandon Existing Station
ROM Capital Cost (2025 Dollars)	\$0.8M - \$1M	\$4.5M - \$6M	\$5M - \$7M
Wet Well Storage Capacity	No change (~2,250 gal)	Increased (new + existing)	Fully optimized
Pump Redundancy	Limited (2 pumps only)	Full redundancy (dual wet wells)	Full redundancy (multi-pump configuration)
Cycling Reduction Potential	Minimal	Moderate to Significant	Significant
Ability to Handle Seasonal Variability	Limited	Improved	Fully Addressed
Compatibility with WWTP Ultimate Capacity	Constrained	Moderate	Fully Scalable
Safety & Code Compliance	Partially Addressed	Substantially Improved	Fully Compliant (modern design)
Electrical & Mechanical Reliability	Incrementally Improved	Mixed (new + legacy systems)	Fully Modernized
Constructability Complexity	Moderate	High (deep excavation + integration)	Moderate (new facility construction)
Construction Risk	Moderate	High (phasing + integration)	Moderate
Lifecycle Risk (20–30 years)	High (aging infrastructure retained)	Moderate (legacy components retained)	Low
Long-Term Expandability	Very Limited	Constrained by site & legacy layout	Flexible

5 RECOMMENDED ALTERNATIVE

The evaluation of the Iris Lift Station identified several fundamental limitations that affect the facility's ability to provide reliable, flexible, and resilient wastewater conveyance over the long term. These limitations are driven by the physical configuration of the existing station, including limited wet well storage volume, constrained pump redundancy, sensitivity to seasonal loading, force main velocity constraints, personnel safety, and mechanical and electrical system concerns associated with the current building.

Review of SCADA data confirms that the lift station remains fully operational and capable of conveying increased wastewater flows from limited short-term growth. However, the system operates with minimal operational margin during peak seasonal periods and lacks proper system redundancy. Pump cycling frequency approaches manufacturer-recommended limits during sustained high-flow conditions, and the system has limited ability to adapt to equipment outages or extended maintenance activities without increasing mechanical stress and operational risk.

Three improvement alternatives were evaluated as part of this pre-design study. Retaining the existing lift station with targeted operational and equipment upgrades (Alternative 1) would allow continued operation but would not address the underlying constraints that govern system performance. This alternative does not materially improve redundancy, operational flexibility, or long-term scalability and therefore represents a short-term extension of existing conditions rather than a permanent solution.

Partial rehabilitation and expansion of the existing facility (Alternative 2) would provide meaningful improvements in redundancy and operational flexibility by adding storage and pumping capacity and addressing many safety and code compliance concerns. However, this approach introduces significant construction complexity and continues to rely on aging infrastructure that imposes inherent limitations. The effort required to retrofit and integrate new systems with existing structures, utilities, and equipment introduces considerable cost uncertainty and reduces the potential cost advantage typically associated with rehabilitation projects. Depending on final design requirements and construction constraints, the total project cost could approach or potentially exceed that of constructing a new lift station. These factors combined raise concerns regarding constructability, cost effectiveness, and long-term reliability.

Abandonment of the existing lift station and construction of a new facility (Alternative 3) provides the most comprehensive and robust solution. This alternative eliminates the constraints imposed by the existing configuration and allows the lift station to be designed holistically to meet modern standards for redundancy, safety, and operational flexibility. A new facility can be scaled to accommodate near-term growth and the ultimate wastewater flows associated with the Town's new wastewater treatment plant, while providing sufficient operational margin to manage sustained seasonal loading and equipment outages.

Based on the findings of this evaluation, Alternative 3 is recommended as the most prudent and defensible long-term solution. While this alternative potentially represents the highest initial capital investment, it offers the greatest long-term reliability, resiliency, and value.

6 RECOMMENDED ACTIONS (ALTERNATIVE 3)

This pre-design study establishes a planning-level basis for lift station improvements and supports advancement into detailed design. Implementation of a new Iris Lift Station would likely occur over a multi-year period due to the sequencing of planning, funding applications, legislative review, design, and construction. Based on typical Montana municipal infrastructure funding cycles, the overall timeline from initial planning grant application through project construction may span five to seven years. The following sequence outlines a typical pathway for advancing the recommended Alternative 3 project while leveraging state and federal funding programs commonly used for municipal wastewater infrastructure improvements.

1. **Apply for Planning-Level Funding**

   The first step in advancing the project is securing funding for planning and preliminary engineering activities. Planning grants are commonly available through programs such as the Montana Department of Commerce Montana Coal Endowment Program (MCEP) and the Montana Department of Natural Resources and Conservation (DNRC) Renewable Resource Grant and Loan (RRGL) planning program. These grants are typically intended to fund preparation of a Preliminary Engineering Report (PER), environmental documentation, and related feasibility work necessary to advance infrastructure projects to the construction funding stage. Application cycles for these programs typically occur biennially and may require several months for review and award following submission.

2. **Prepare a Preliminary Engineering Report (PER)**

   Following receipt of planning funds, the Town would proceed with preparation of a formal PER consistent with Montana requirements. The PER would refine many of the planning-level assumptions documented in this pre-design study, including confirmation of the preferred lift station site, evaluation of geotechnical conditions, hydraulic modeling, wet well sizing, pump configuration, and conceptual site layout. The PER would also include refined cost estimates, evaluation of alternatives as required by funding agencies, and supporting documentation necessary to pursue construction funding. Completion of a PER typically requires coordination with regulatory agencies and local stakeholders and may take approximately 9 to 12 months depending on the scope of investigation required.

3. **Apply for Construction Funding Programs**

   Upon completion of the PER, the Town would pursue construction funding through state and federal infrastructure funding programs. Common sources include the MCEP Infrastructure Grant program, the DNRC RRGL program, and the MDEQ State Revolving Fund (SRF) loan program. These programs operate on annual or biennial application cycles and generally require the completed PER as a prerequisite for application. It should be noted that these funding programs are competitively ranked, and not all projects that apply receive funding during a given cycle. Funding packages for municipal wastewater projects frequently combine multiple programs, pairing grant funding with low-interest loan financing to assemble a complete project funding structure.

4. **Grant Review and Legislative Authorization**

   Many state infrastructure funding programs in Montana, particularly MCEP and RRGL construction grants, require legislative approval before funds can be awarded. Applications submitted during the funding cycle are reviewed by state agencies and prioritized for legislative consideration. The Montana Legislature typically meets on a biennial cycle aligned with odd-numbered years, and final funding awards are often contingent upon legislative authorization. As a result, projects relying on these programs must account for potential delays associated with the legislative schedule when planning overall project timelines.

5. **Advance to Design-Level Engineering**

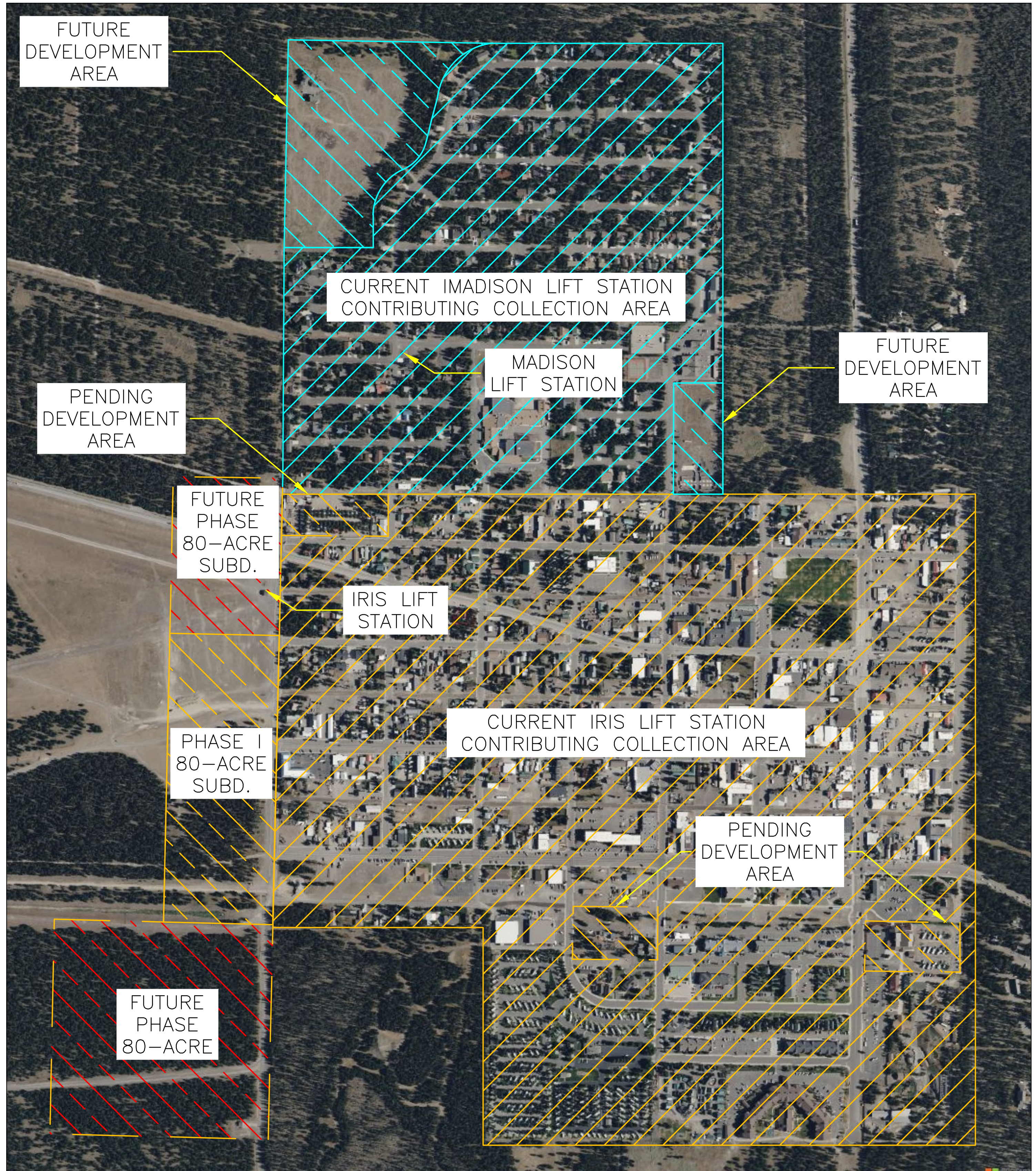
   Once construction funding is secured or reasonably assured, the Town can proceed with detailed design of the new lift station. Design-level engineering would refine the facility layout, finalize wet well dimensions, pump sizing and redundancy configuration, electrical and control systems (including backup power), site grading, and force main connections. During this phase, detailed construction documents would be prepared and submitted for regulatory review and approval. This stage would also include development of construction sequencing and bypass pumping strategies necessary to maintain continuous wastewater service during the transition from the existing station to the new facility.

6. **Construct the New Lift Station Facility**

   Following completion of design and regulatory approvals, the project would proceed to construction bidding and contract award. Upon completion and commissioning of the new lift station, the existing facility could be decommissioned and removed from service.

Through this staged approach, the Town can advance the recommended Alternative 3 while aligning project development with available funding opportunities and regulatory review processes. Although the full process would span several years, structuring the project around established planning and construction grant cycles provides a practical pathway for implementing the improvements identified in this study while minimizing the financial burden on the community.

EXHIBIT A



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REV	DATE	REVISION

NOT FOR CONSTRUCTION

DRAWN BY: JDH
DESIGNED BY: JDH
QUALITY CHECK:
DATE: 03.04.2026
JOB NO. B25-091
FIELDBOOK

TOWN OF WEST YELLOWSTONE
WEST YELLOWSTONE, MONTANA

EXHIBIT A
LIFT STATION COLLECTION AREAS

B25-044-LIFTSTATIONOPTIONS(12.2025)_JH.DWG

EXHIBIT A

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